

**22ND INTERNATIONAL
CONFERENCE
LASER OPTICS
ICLO 2026**



ADVANCE PROGRAM

Saint Petersburg

2026

22ND INTERNATIONAL CONFERENCE LASER OPTICS ICLO 2026

PLENARY SESSION

Location: Moskovsky Congress Hall

- 11:00–11:15 **Opening and welcome remarks**
G. S. Sokolovskii,
Ioffe Institute, Russia
- 11:15–12:00 **Towards remote photonic brain computer interface**
Zeev Zalevsky,
Faculty of Engineering and the Nanotechnology Center, Bar-Ilan University,
Israel
- 12:00–12:45 **Illuminating Brain Connectivity with AI and Advanced Optical Imaging**
Francesco Saverio Pavone,
Laboratory for advanced biological sensing, University of Florence, Italy
- 12:45–13:30 **Ultrafast science with optical and X-ray lasers**
Majed Chergui,
Elettra Sincrotrone Trieste S.C.p.A., Italy and Lausanne Centre for Ultrafast
Science (LACUS), École Polytechnique Fédérale de Lausanne (EPFL),
Switzerland



Towards remote photonic brain computer interface



ZEEV ZALEVSKY

Faculty of Engineering and the Nanotechnology Center, Bar-Ilan University, Israel

Shot bio

Zeev Zalevsky received his B.Sc. and direct Ph.D. degrees in electrical engineering from Tel-Aviv University in 1993 and 1996 respectively. Zeev is currently a full Professor at Bar-Ilan University and its Vice President for academia industry relations. He is the former Dean of the faculty of engineering at Bar-Ilan University, Israel. His major fields of research are optical super resolution, biomedical optics, nano-photonics and fiber-based processing and sensing architectures. Zeev has published more than 620 peer review papers, 360 proceeding papers, 9 books (6 authored and 3 as an editor), 36 book chapters and about 100 patents. Zeev gave about 700 conference presentations with more than 260 invited/keynote or plenary talks.

Zeev is a fellow of many large scientific societies such as SPIE, OSA, IEEE, EOS, IOP, IET, IS&T, ASLMS, AIMBE and more. He is also a fellow of the American National Academy of Inventors (NAI). For his work he received many national and international prizes such as the Krill prize, ICO prize and Abbe medal, SAOT prize, Juludan prize, Taubenblatt prize,

young investigator prize in nanotechnology, the International Wearable Technologies (WT) Innovation World Cup 2012 Prize, Image Engineering Innovation Award, NANOSMAT prize, SPIE startup challenge prize, SPIE prism award, IAAM Scientist Medal Award, International Photonic Award, Dr. Horace Furumoto Innovations Professional award, The Asian Advanced Materials Award, Edison Award, IEEE distinguished lecturer award, VEBLEO Scientist Award, Joseph Fraunhofer Award/Robert M. Burley Prize, Lotfi Zadeh Memorial Award, E&T Innovation Award, CES (Consumer Electronics Show) 2022 Innovation Award, German Innovation Award 2022, the Humboldt research prize, SPIE 2023 Chandra S. Vikram Award for Metrology, IVS research excellence prize, German Berthold Leibinger innovation prize, IEEE Photonics Society (IPS) 2023 Laser Instrumentation Award, 2024 SPIE Dennis Gabor Award in Diffractive Optics, the Vidyasagar Award and more.

Besides his academic research activity, Zeev is also very active in commercializing his inventions into start-up companies. Zeev was and is involved in technologically leading of more than 10 startup companies.

Abstract

I will present a photonic sensor that can be used for remote sensing of nano-vibrations such as those associated with hemodynamic processes in our brain. This technology is based upon illuminating a surface with a laser and then using a camera with its special optics to perform temporal and spatial tracking of secondary speckle patterns in order to have nano metric accurate estimation of the movement of the back reflecting surface. The capability of sensing those movements in nano-metric precision allows connecting the movement with remote bio-sensing and with medical diagnosis capabilities.

The proposed technology was already applied for remote and continuous estimation of vital bio-signs (such as heart beats, respiration, blood pulse pressure and intra ocular pressure), for molecular sensing of chemicals in the blood stream (such as for estimation of alcohol, glucose and lactate concentrations in blood stream, blood coagulation and oximetry) as well as for sensing of hemodynamic characteristics such as blood flow to various regions of the brain. It was used in medical trials for remote medical diagnosis of various diseases such as cardio-pulmonary diseases.

The capability of sensing the hemodynamic activity when applied on the brain and when combined with advanced machine learning and AI based algorithmic allows us to detect various insights that are important for brain computer interfacing (BCI) application. For example, I will show how we detect which one out of the five senses cortices of the human brain is stimulated in a given moment, how we remotely classify the objects that a subject is looking at and thus stimulate his visual cortex (visual cortex shape recognition) only by sensing the activity at the visual cortex, how we perform remote decoding of inner speech by directing the sensor to brain's Broca area and finally how directing the sensor to Motor cortex allows connecting our remote sensor with electrical motor and operating it with various types of movements only by thinking about them.

We believe that such an ability could initiate a breaking through era of BCI in which communication with external machinery and sensors could be done by the power of thinking and in a non-invasive manner.

Illuminating Brain Connectivity with AI and Advanced Optical Imaging



FRANCESCO SAVERIO PAVONE
Laboratory for advanced biological sensing,
University of Florence, Italy

Short bio

Francesco Saverio Pavone was born in Bari the 23th March 1962. In 1989 he obtained his Laurea degree in Physics at the University of Florence. In 1990 he became Research Officer at the European Laboratory for Non-Linear Spectroscopy (University of Florence). In 1993 he obtained a Master in Optics at the National Institute for Optics (Florence, Italy). In 1997 he spent one year and half as “Maitre de Conférences Associe au College de France”, Paris, with experimental work at the “Ecole Normale Superieure” (ENS) of Paris with Prof. Claude Cohen-Tannoudji (1997 Nobel prize in Physics). In 1998 he became associate Professor of physics at the department of physics of the University of Perugia, Italy and Scientific director of the section of Atomic and Molecular Physics at the European Laboratory for Non-Linear Spectroscopy (LENS), Florence, Italy. In 2001 he moved as associate professor to the

University of Florence (Dept. of Physics) and became scientific responsible of the Biophotonics Area at LENS (Florence, Italy). In 2005 he became Full Professor of Physics of the Matter at the Department of Physics and Astronomy, University of Florence. He was Director of LENS from Dec 2013 until Dec 2019. He is currently area manager at LENS and president of the Museum Science Galileo in Florence.

As scientific experience, from 1990 to 1995 he worked in the field of Atomic and molecular spectroscopy. From 1995 to 1999 he worked in the field of Atomic physics, and since 1999 in Biophysics. Currently he is directing a research group of more than 50 people working in the field of biophotonics, in particular on microscopy, biomedical imaging, image analysis, data management and machine learning.

Pavone is author of more than 250 international papers and editor of international books. He has more than

150 invited talk and he is editor of several international journals. He's unit coordinator of International, European and national projects and obtained an Advanced Grant of European Research Council (ERC BrainBIT, 2016–2021) , an associated ERC Proof-Of-Concept (POC) and a NIH grant in the framework of the Brain Initiative (NIH BICCN U01MH117023, 2018–2023). He is the Italian node leader of the infrastructure EBRAIN and the italian delegate in the Board of Directors of the infrastructure EurobioImaging. He has organized several international congresses. He is in the evaluation panel of the European Research Council (PE3) and the DFG (Germany), fellow of SPIE, AIMBE and OSA. He has an h-index equal to 54 (Google scholar). Finally, Pavone is founder of companies Light4tech (www.l4t.it) in 2005 and Emoled (www.emoled.com) in 2016, and author of some patents.

Abstract

Artificial intelligence (AI) is transforming biophotonics by enhancing the analysis of complex biological structures and functions. Here, we present two experiments combining advanced imaging with machine learning for data analysis and brain connectivity reconstruction.

The first uses light-sheet microscopy to obtain high-resolution 3D maps of human brain structure. Machine learning algorithms support automated segmentation, identification of neural networks, and reconstruction of connections between cortical areas, improving accuracy and efficiency in neuroimaging and neuroplasticity studies.

The second focuses on zebrafish brain connectivity. Two-photon and light-sheet microscopy are used to monitor real-time brain activity, while AI processes large imaging datasets to reconstruct neural networks and analyze dynamic connectivity. Deep learning and predictive models provide insights into brain circuits and functional responses, with relevance for neuroplasticity and neurodegenerative disease models.

Together, these studies show how AI-driven biophotonics can advance brain mapping, early disease detection, and personalized therapeutic approaches.

Ultrafast science with optical and X-ray lasers



MAJED CHERGUI

Elettra Sincrotrone Trieste S.C.p.A., Italy and
Lausanne Centre for Ultrafast Science (LACUS),
École Polytechnique Fédérale de Lausanne (EPFL),
Switzerland

Short bio

Emeritus Professor of the Ecole Polytechnique Fédérale de Lausanne in Switzerland and Group leader at Elettra-Sincrotrone Trieste in Italy, Majed Chergui is known for pioneering novel ultrafast spectroscopic methods for the study molecular systems, proteins and solids. In particular, he developed ultrafast X-ray spectroscopy, which has witnessed a huge growth with the advent of Free Electron Lasers. He was the founding director of the Lausanne Centre for Ultrafast Science (LACUS) and was the founding editor of the journal Structural Dynamics (AIP Publishing) between 2014 and 2020. In recognition of his achievements, he has received several Awards and Prizes, the most recent ones in 2026 being the Great Arab Minds award (UAE) and the Meggers award (Optica, USA).

Abstract

Ultrafast science has witnessed dramatic developments since its birth in the early 1990s. One of these developments was the advent of X-ray Free Electron lasers (XFELs) around 2010. With ultrashort pulses, high photon flux/pulse, degree of coherence and photon energy range, these sources enable probing dynamics of matter at the atomic-scales of time (femtoseconds) and length (Ångströms). This is a game changer for describing photoinduced processes in (bio)chemical and material systems. A full description requires however input from optical domain (ultraviolet to infrared) experiments carried out with table-top lasers.

I will present examples of combining ultrafast optical domain and X-ray spectroscopic studies, showing some representative examples on (bio)chemical and material systems.

I will present recent developments that that aim at exploiting the high photon fluxes at XFELs in the emerging field of non-linear X-ray science.

9TH INTERNATIONAL A. M. PROKHOROV SYMPOSIUM ON BIOPHOTONICS

PLENARY SESSION

Location: Moskovsky Congress Hall, floor 1

- 14:15–14:30 **Opening and welcome remarks**
Ivan A. Shcherbakov,
Prokhorov General Physics Institute of RAS, Russia
- 14:30–15:15 **Quantum sensorics for biology and medicine**
Alexander Sergeev,
National Center for Physics and Mathematics, Russia
- 15:15–16:00 **Phototheranostics in the treatment of high-energy exposure wounds**
Igor Reshetov,
Institute of Cluster Oncology named after Professor L.L. Levshin Sechenov
University, Russia
- 16:00–16:45 **Optical imaging in regenerative medicine**
Elena V. Zagainova
Lopukhin Federal Research and Clinical Center of Physical-Chemical Medicine,
Russia



Quantum sensorics for biology and medicine



ALEXANDER SERGEEV

National Center for Physics and Mathematics,
Russia

Short bio

Scientist in the field of laser physics, femtosecond optics, theory of nonlinear wave phenomena, plasma physics and biophotonics.

Born on August 2, 1955 in the village of Buturlino, Nizhny Novgorod Region.

In 1977, he graduated from the Department of Radio Physics at Gorky State University named after N. I. Lobachevsky (now the National Research Lobachevsky State University of Nizhny Novgorod, NNSU) with a degree in radio physics. He started his carrier as a research intern at the Institute of Applied Physics of the USSR Academy of Sciences.

In 2003 he was elected a corresponding member, and in 2016, he was elected an academician of the Russian Academy of Sciences. From 2017 to 2022, he was the President of the Russian Academy of Sciences.

Since October 2022 he has been appointed Scientific Director of the National Center for Physics and Mathematics.

Awards and Recognition:

State Prize of the Russian Federation in Science and Technology (1999)

Order of Honour (2006)

Government Prize of the Russian Federation in Science and Technology (2012)

Gruber Prize in Cosmology (as part of the LIGO collaboration) (2016)

Officer of the Order of the Academic Palms, France (2018)

Laureate of the International Medal “For Contribution to the Development of Nanoscience and Nanotechnology” awarded by UNESCO (2018)

Order of Merit for the Fatherland, 4th Class (September 10, 2020) – for significant contribution to the development of science and many years of fruitful work
Medal “In Commemoration of the 800th Anniversary of Nizhny Novgorod” (2021)

Honorary Citizen of the Nizhny Novgorod Region (2021)

The A. M. Prokhorov Gold Medal (September 19, 2023)

Order of Alexander Nevsky (February 5, 2024)

Abstract

Quantum sensing (Q-Sens) utilizes quantum phenomena—such as quantized energy levels in microscopic objects, the quantum states of light and fields, superposition, and entanglement—to create ultra-sensitive and precise sensors. This field can be broadly divided into two complementary approaches: (1) The use of single quantum objects (photons, atoms, molecules, nanoparticles, quantum dots, color centers, Josephson junctions) as sensitive, often optical, probes; and (2) The development of macroscopic devices for detecting quantum processes (e.g., single-photon detectors, spectrometers, microscopes). These methods and devices measure physical quantities like temperature, magnetic fields, time, or gravity with unmatched sensitivity and accuracy, surpassing classical limits. They are enabling breakthroughs in quantum computing, telecommunications, metrology, navigation, medical imaging.

Here, we examine the state of the art in the fields of single-photon detection, optics, lasers, chemistry, and nanofabrication, focusing on their applications in quantum sensing. Subsequently, we will concentrate on the adoption of Q-Sens in the life sciences. Specifically, we will discuss:

- Label-based fluorescence nanoscopy, including applications in living cells, three-dimensional imaging (with adaptive optics), fluorescence lifetime imaging, and quantum ghost imaging with correlated photons;
- Theranostics with nanoparticles and targeted drug delivery;
- Surface-enhanced Raman scattering and photoluminescence for ultra-sensitive medical analytics (e.g., in flow cytometry);
- Diamonds with color centers for intracellular thermometry and magnetometry, applicable to encephalography and cardiography;
- Physical chemistry and innovative fabrication techniques for new types of labels and structures, such as biomimetic molecules, nanolithography, genetic encoding, and DNA origami.

Special attention will be given to optical tomography of scattering biological tissues and multispectral fluorescence in vivo bioimaging for preclinical studies, which utilize modern single-photon detectors.

Phototheranostics in the treatment of high-energy exposure wounds



IGOR RESHETOV

Institute of Cluster Oncology named after Professor L. L. Levshin Sechenov University, Russia

Abstract

Purulent wounds treatment of soft tissues is associated with certain difficulties, which are caused by multiple factors, including occurrence, formation and wound nature specificities. Purulent complications significantly increase a treatment time and a process cost. We propose the problem solution of antibiotic-resistant microflora decontamination using technology based on fluorescent diagnostics and photodynamic inactivation (PDI). As nanocarriers, the photosensitizer ethosomes were used. Due to its neutral charge and spherical shape, the nanoparticles were able to penetrate through skin barrier and destroy pathogenic microorganisms.

150 patients were received PDI technology treatment of purulent wounds. Before and after irradiation, microflora composition and quantity were analyzed. The obtained data evidenced that local application of Photoran E6 and PDI technology inactivate both Gram-positive and Gram-negative bacteria. The use of photosensitizer nanocarriers led to obtain a quantitative decrease of bacterial growth in the wound of all patients and reduce the healing time of wounds. PDI technology using application of photosensitizer nanocarriers showed high antimicrobial activity against antibiotic-resistant microflora of infected wounds in most clinical instances. The decontamination of microflora enabled to perform delayed reconstructive plastic surgery to close soft tissue defects and reduce hospitalization time of patients.

Short bio

Dr. Igor V. Reshetov graduated from the N.I.Pirogov Moscow Medical University University in 1987 and obtained PhD in 1992. Then he continued work in P.A.Herzen Cancer Research Institute. He defended doctoral dissertation about oncology microsurgical reconstruction organs and tissues in 1998. Afterwards he relocated in Sechenov University in 2014. Nowadays he has the position of Director Institute cluster oncology from 2019. As a recognized leader of oncology treatment and rehabilitation, he joined the Russian Academy of Science in 2004 and became the RAS fellow in 2016. He has published more than 100 investigation articles in SCI(E) journals. Index Hi 26.

Optical imaging in regenerative medicine



ELENA V. ZAGAINOVA

Lopukhin Federal Research and Clinical Center of Physical-Chemical Medicine, Russia

Abstract

Regenerative medicine includes the creation of tissue-engineered constructs, stimulation of organ regeneration, the development of cellular products from iPSCs, and CRISPR technologies. In our studies, optical imaging enabled intravital sorting of properly differentiated cells into adipogenic, chondrogenic, and osteogenic lines from mesenchymal stem cells—laying the foundation for future label-free cell sorting. We were able to track skin formation in recipients from transplanted equivalents—controlling the structure and quality of transplanted tissue-engineered constructs. We analyzed the metabolic and oxygen status of 3D neurospheres from iPSCs, energy metabolism, and intracellular pH changes in neural spheroids carrying Down syndrome—a 3D organ model for drug testing. We determined metabolic changes in living Langerhans islets, which allowed us to select the highest-quality ones for patient transplantation. We also formulated new FLIM and OCT criteria for intraoperative verification of the effectiveness of resected liver regeneration—prognosis and determination of the critical volume of organ resection.

Short bio

Elena Zagaynova is a Vice director of Lopuchin Federal Research and Clinical Center of physical-chemical medicine (FMBA).

Prof. Elena Zagaynova's research focus is on the methods of the latest optical bioimaging from the subcellular level to the patient for the problems of regenerative medicine and oncology and the clinical applications in endoscopy for optical coherence tomography.

She received her Ph.D. in 2000 and the Dr. Sciences in Medicine in 2007 from the Nizhny Novgorod Medical Academy, Russia. She is a corresponding member of the Russian Academy of Science.

Prof. Zagaynova is a Senior Member of SPIE society. The results obtained by Elena Zagaynova have been published in more than 280 scientific papers in peer-reviewed journals.



**22ND INTERNATIONAL CONFERENCE
LASER OPTICS ICLO 2026**

PL. PLENARY

Location: Congress Hall, Floor 1; Monday, June 22, 2026

PL. PLENARY

MoPL-01

11:15-12:00

Towards remote photonic brain computer interface (Plenary)

Z. Zalevsky; Faculty of Engineering and the Nanotechnology Center, Bar-Ilan University, Israel

I will present a photonic sensor that can be used for remote sensing of nano-vibrations such as those associated with hemodynamic processes in our brain. This technology is based upon illuminating a surface with a laser and then using a camera with its special optics to perform temporal and spatial tracking of secondary speckle patterns in order to have nano metric accurate estimation of the movement of the back reflecting surface.

MoPL-02

12:00-12:45

Illuminating brain connectivity with AI and advanced optical imaging (Plenary)

F.S. Pavone; Laboratory for advanced biological sensing, University of Florence, Italy
Artificial intelligence (AI) is transforming biophotonics by enhancing the analysis of complex biological structures and functions. Here, we present two experiments combining advanced imaging with machine learning for data analysis and brain connectivity reconstruction.

MoPL-03

12:45-13:30

Ultrafast science with optical and X-ray lasers (Plenary)

M. Chergui; Elettra Sincrotrone Trieste S.C.p.A., Italy and Lausanne Centre for Ultrafast Science (LACUS), École Polytechnique Fédérale de Lausanne (EPFL), Switzerland

Ultrafast science has witnessed dramatic developments since its birth in the early 1990s. One of these developments was the advent of X-ray Free Electron lasers (XFELs) around 2010. With ultrashort pulses, high photon flux/pulse, degree of coherence and photon energy range, these sources enable probing dynamics of matter at the atomic-scales of time (femtoseconds) and length (Ångströms). This is a game changer for describing photoinduced processes in (bio)chemical and material systems.

R01. SOLID STATE LASERS

Location: Deyneka 1+2 Room, Floor 2; Tuesday, June 23, 2026

R01. SOLID STATE LASERS 1

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| <p>TuR01-02
15:30-15:45</p> <p>Dynamic processes in low-lying states of the Er³⁺ ion in the BaY(1.8)Lu(0.2)F₈ crystal
A.V. Astrakhantseva, T.M. Minnebaev, A.S. Nizamutdinov; Institute of Physics, Kazan Federal University, Russia</p> <p>Here we present the energy transfer parameters W11 and W22 determined within the Förster-Dexter theory, which tend to depopulate 4I13/2 state of Er³⁺ ion at high doping. Gain at 2.7 μm of Er³⁺ ion at different pump powers estimated with a system of rate equations is seen to increase for the highly concentrated sample.</p> | <p>TuR01-05
16:15-16:30</p> <p>Compositional dependence of the Verdet constant in As-S-Se and As-Se-Te glasses
Ilya Snetkov¹, Roman Blagin², Ella Karaksina², Vladimir Shiryayev²; ¹Federal Research Center A.V. Gaponov-Grekhov Institute of Applied Physics of RAS, ²G.G. Devyatykh Institute of Chemistry of High-Purity Substances of RAS, Russia</p> <p>A systematic investigation of the influence of the composition of chalcogenide As(40)S(60-x)Se(x) (x=0, 15, 30, 45, 60) and As(40)Se(60-x)Te(x) (x=0, 10, 20, 30, 40, 50) glasses on the Verdet constant value in the wavelength range 1310 nm – 1940 nm is carried out.</p> |
| <p>TuR01-03
15:45-16:00</p> <p>The key features of stimulated emission in NV₂C: HPHT diamond
V.F. Lebedev¹, T.S. Misnikova¹, E.A. Vasiliev², Ya.A. Ryvkina¹, I.V. Klepikov³, A.V. Koliadin³; ¹St.Petersburg State University of Aerospace Instrumentation; ²Mining University; ³LLC "New Diamond Technology", Russia</p> <p>The characteristic features of stimulated emission underlying pulsed laser generation on synthetic HPHT diamond with NV₂C color centers have been experimentally determined. Obtaining a smooth spectrum and a short radiation pulse is determined by the presence of a sufficient concentration of single nitrogen centers in the crystal, the absolute concentration of NV₂C centers, the volume of the active medium with population inversion, and the energy of the pumping pulse.</p> | <p>TuR01-06
16:30-16:45</p> <p>Cr⁴⁺-doped YAG ceramic Q-switch modulators with varying dopant concentrations
A.V. Kiselev¹, V.V. Ionin¹, A.A. Burtsev¹, A. Y. Kanaev², V.A. Mikhalevsky¹, A.A. Lotin^{1,3}; ¹NRC "Kurchatov Institute", ²Lebedev Physical Institute of RAS, ³Mendeleev University of Chemical Technology, Russia</p> <p>Investigations of the optical and lasing characteristics of a solid-state laser based on a YAG:Nd³⁺ (1 at.%) ceramic active medium operating in the passively Q-switched regime have been conducted. Laser pulse trains with individual pulse durations of 50 ns and 450 ns were obtained using ceramic passive Q-switches with chromium ion concentrations of 0.1 at.% and 1 at.%.</p> |
| <p>TuR01-04
16:00-16:15</p> <p>Mitigation of amplified spontaneous emission via optimization of the reflectivity at the gain medium-heat sink interface.
D.A. Kuzin, I.I. Kuznetsov, A.N. Mitrofanov, E.A. Perevezentsev, A.V. Starobor, and O.V. Palashov; ¹Federal Research Center A.V. Gaponov-Grekhov Institute of Applied Physics of RAS, Russia</p> <p>Amplified spontaneous emission (ASE) limits performance of laser with simultaneously high average and peak power. A novel mitigation method using optimized dielectric mirrors to guide ASE into the heatsink is proposed. Numerical and experimental studies demonstrate that this approach, combined with direct bonding, significantly enhances gain and stored energy density compared to traditional mounting methods with non-optimized optics.</p> | <p>TuR01-07
16:45-17:00</p> <p>Generation efficiency in the passive Q-switch mode of a 2-micron KYW:Tm, Ho laser using PbS QD doped glass as a Q-switcher
V.N. Ivanov^{1,2}, M. Salhab², T.V. Zotova¹, A.A. Onushchenko¹, A.N. Titov¹, A.V. Shashkin¹, A.V. Vasilieva², K.V. Dukelskiy¹; ¹JSC RPC S.I. Vavilov State Optical Institute, ²St. Petersburg Electrotechnical University "LETI", Russia</p> <p>Estimation of the generation efficiency in the passive Q-switch mode of a 2-micron KYW:Tm, Ho laser using PbS QD doped glass as a Q-switcher (a generation energy of 6 mJ, 22 ns) by comparing with the generation parameters in the active Q-switch mode (8 mJ, 25 ns) carried out.</p> |

- Coffee Break -

Location: Deyneka 1+2 Room, Floor 2; Tuesday, June 23, 2026

R01. SOLID STATE LASERS 2

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| <p>TuR01-08
17:30-18:00</p> <p>Rare earth doped chalcogenide fiber lasers emitting at λ > 5 μm (Invited paper)
V.V. Koltashev¹, V.V. Likhov¹, A.G. Okhrimchuk¹, V.G. Plotnichenko¹, M.V. Sukhanov², A.P. Velmuzhov², E.N. Lashmanov², B.I. Denker³, B.I. Galagan³, S.E. Sverchkov³, M.P. Frolov⁴; ¹Prokhorov General Physics Institute of RAS, Dianov Fiber Optics Research Center, ²Devyatykh Institute of Chemistry of High-Purity Substances of RAS, ³Prokhorov General Physics Institute of RAS, ⁴P.N. Lebedev Physical Institute of RAS, Russia</p> <p>We demonstrate chalcogenide glass fiber lasers emitting at 5.0-5.8 μm. The fibers had Ø4-20 μm selenide core with of Tb³⁺, Ce³⁺ or Nd³⁺ doping and undoped Ø240-250 μm sulfide cladding. Temperature tunable narrowband laser oscillations at 5 μm wavelength region were obtained in Tb-doped chalcogenide glass fiber due to feedback from the Bragg grating inscribed in it.</p> | <p>TuR01-09
18:00-18:15</p> <p>Linear cavity Raman dissipative solitons generator
V.M. Volos^{1,2}, V.D. Efremov^{1,2}, D.S. Kharenko^{1,2}; ¹Institute of Automation and Electrometry SB RAS; ²Novosibirsk State University, Russia</p> <p>We experimentally and numerically investigated the generation of Raman dissipative solitons in a linear cavity configuration with synchronous pumping by highly chirped dissipative solitons. In the experiment, pulses with an energy of 6 nJ and a repetition rate of 15.4 MHz were obtained at 1.14 μm. The possibility of increasing the energy to 12 nJ was demonstrated numerically.</p> |
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- TuR01-10 18:15-18:30
Raman dissipative solitons generation in a synchronously-pumped all-fiber ring cavity
 V.M. Volosi^{1,2}, A. M. Patrashkov^{1,2}, N.A. Koliada^{1,3}, D.S. Kharenko^{1,2}; ¹Institute of Automation and Electrometry SB RAS, ²Novosibirsk State University, ³Institute of Laser Physics SB RAS, Russia
 In this work, we experimentally showed the generation of a picosecond Raman dissipative solitons with an output energy of 7 nJ at the central wavelength of 1.66 μm in an all-fiber scheme. Particular attention is given to the use of a fiber laser with picosecond-duration pulses and a narrow optical spectrum as synchronous pump for a ring fiber cavity.
- TuR01-11 18:30-18:45
Gas-discharge fiber lasers: plasma laser parameter measurement using microwave discharge Instability
 I.A. Bufetov, A.V. Gladyshev, D.G. Komissarov, A.P. Mineev, S.M. Nefedov, A.F. Kosolapov, V.V. Velmiskin; Prokhorov General Physics Institute of RAS, Russia
 The instability of microwave discharge in a hollow core fiber located in the region of interference of microwave fields was observed. In the scheme of a gas-discharge fiber laser this instability manifests itself as variation of the active medium length with characteristic time of ~ 1 ns. Using this phenomenon, the laser parameters of plasma in a hollow fiber were measured.
- TuR01-12 18:45-19:00
Continuous-wave tunable holmium laser with an intracavity optical filter based on a tapered PM fiber
 A.V. Shirmankin, A.I. Lobanov, V.A. Kamynin, V.B. Tsvetkov; Prokhorov General Physics Institute of RAS, Russia
 This study investigates of a PM tapered fiber (20 μm diameter of the waist, 4 mm length) as an optical filter in a holmium laser. The implementation of mechanical bending in the tapered fiber enabled a wavelength tuning range of up to 34 nm. The laser operation was demonstrated in both single-wavelength generation and three-wavelength generation.
- TuR01-13 19:00-19:15
Frequency doubling of a Raman-pumped Yb-doped fiber laser to 489 nm
 E.A. Evmenova¹, E.K. Kashirina¹, K.V. Kolosova¹, A.V. Dostovalov^{1,2}, S.I. Kablukov^{1,2}; ¹Institute of Automation and Electrometry SB RAS, Russia; ²Novosibirsk State University, Russia
 We report a simple, cost-effective, linearly polarized Yb-doped fiber laser at 978 nm delivering 2 W. It uses a standard active fiber pumped in a nearly single-mode regime by a diode-pumped Raman laser at 954 nm. Single-pass frequency doubling of this source in a PPLN crystal generated about 70 mW at 489 nm, enabling applications in spectroscopy and biomedicine.

R03. SEMICONDUCTOR LASERS, MATERIALS AND APPLICATIONS

Location: Stenberg 1 Room, Floor 3; Tuesday, June 23, 2026

R03. SEMICONDUCTOR LASERS, MATERIALS AND APPLICATIONS 1

- TuR03-01 09:00-09:30
Optical gain, two-state lasing and dynamic characteristics of InAs/AlGaAs quantum well-dot lasers (Invited paper)
 M.V. Maximov¹, G.O. Kornyshev², A.A. Beckman², A.A. Kharchenko¹, V.V. Dyudelev², V.V. Podoprigora², A.A. Nikitin², A.S. Payusov², S.A. Mintairov², N.A. Kalyuzhnyy², N.Yu. Gordeev², Yu.M. Shernyakov², G.S. Sokolovskii²; ¹Nanophotonics Laboratory, Alferov University, ²Ioffe Institute, Russia
 Ground state modal gain as high as 100 cm^{-1} is demonstrated in edge-emitting lasers with active region based on a single layer of quantum well-dots. Material gain is estimated as $2.2 \times 10^4 \text{ cm}^{-1}$, which exceeds the values reported for quantum well lasers. In 200 μm long lasers, pure ground state lasing occurs up currents greater than the threshold by 17.5 times.
- TuR03-02 09:30-10:00
Internal optical loss and light-current characteristic in quantum dot lasers (Invited paper)
 L. Asryan; Virginia Tech, USA
 The operating characteristics of semiconductor quantum dot lasers are reviewed considering the internal optical loss that varies with the density of injected carriers. The second mode of generation (that emerges due to carrier-density-dependent internal loss) is discussed in addition to the first (conventional) mode (that oscillates both in absence and presence of such loss).
- TuR03-03 10:00-10:15
Optically pumped III-nitrides microdisk lasers with high temperature stability of spectral characteristics
 N.V. Kryzhanovskaya¹, E.I. Moiseev¹, S.D. Komarov¹, K.A. Ivanov¹, A.F. Tsatsul'nikov², E.V. Lutsenko³, A.G. Vainilovich³, A.V. Sakharov^{2,4}, D.S. Artemyev^{2,4}, A.E. Nikolaev⁴, E.E. Zavarin^{2,4}, D.A. Masyutin¹, A.A. Pivovarova⁴, N.D. Ilyinskaya⁴, I.P. Smirnova⁴, L.K. Markov⁴, A.E. Zhukov¹; ¹HSE University, ²Submicron Heterostructures for Microelectronics, Research and Engineering Center, Russia; ³B.I. Stepanov Institute of Physics of the National Academy of Sciences of Belarus, Belarus; ⁴Ioffe Institute, Russia
 Whispering gallery mode microlasers have been developed using an InGaN/GaN/AlGaIn epitaxial semiconductor structure grown on a silicon or a sapphire substrate. Lasing has been demonstrated in 5-8 μm -diameter microlasers, operating under pulsed optical pumping from room temperature to 100 degrees Celsius. High temperature stability of the emission wavelength near 420 nm, described by the coefficient $d\lambda/dT = 0.0115 \text{ nm/K}$ is achieved.
- TuR03-04 10:15-10:30
Compact sources of high peak power sub-ns laser pulses based on vertical laser diode-heterostructure switch assemblies
 S. Slipchenko, A. Podoskin, I. Shushkanov, A. Rizaev, M. Kondratov, V. Shamakhov, V. Kapitonov, K. Bakhvalov, A. Grishin, T. Bagaev, M. Ladugin, A. Marmalyuk, V. Simakov, N. Pikhtin; Ioffe Institute, Russia
 A compact laser source has been developed based on a vertical laser diode-heterostructure switch assembly. To increase peak power, a laser heterostructure with a volume active region and high-speed, high-current heterostructure switch were designed. Laser pulses with a peak power of 30 W and a duration of 64 ps at a wavelength of 880 nm have been demonstrated.

- TuR03-05 10:30-10:45
Energy-efficiency performance of the 1550 nm MBE-grown wafer-fused VCSELs
 Ya.N. Kovach¹, S.A. Blokhin¹, M.A. Bobrov¹, A.A. Blokhin¹, N.A. Maleev¹, A.V. Babichev², D.S. Papylev², P.E. Kopytov², V.V. Andryushkin², A.G. Gladyshev², I.I. Novikov², L.Ya. Karachinsky², E.S. Kolodeznyi², K.O. Voropaev¹, A.Yu. Egorov², G.A. Sapunov³, Si-Cong Tian³, Dieter Bimberg³; ¹Ioffe Institute, ²ITMO University, Russia; ³Bimberg Chinese-German Center for Green Photonics, CIOMP, CAS, China
 Dynamic performance and energy-efficiency of MBE-grown wafer-fused long-wavelength C-band VCSELs were studied. For dispersion-limited data transmission line of 10 km fiber energy-efficiency of ~100 fJ/(bit-km) was demonstrated for 10 Gbps.
- TuR03-06 10:45-11:00
Abrupt switching of two-state lasing modes in coupled-cavity InAs/InGaAs/GaAs quantum dot lasers
 F.I. Zubov¹, Yu.M. Shernyakov², M.V. Maximov¹; ¹Alferov Univ., ²Ioffe Inst., Russia
 We report on abrupt lasing switching from ground to excited state and vice versa in coupled-cavity InAs/InGaAs/GaAs quantum dot lasers of equal lengths, which occurs with much smaller current change than in individual devices. We attribute this effect to the relative shift of the longitudinal mode combs under pumping, which are nominally identical in the cold resonators of both chips.

- TuR03-07 11:00-11:15
Impact of pump current on the stability of a micro-ring-stabilized semiconductor laser
 D.E. Artemov¹, A.A. Kondakov¹, G.Y. Ivanov¹, A.Y. Danilov^{1,2}, V.N. Treshchikov¹; ¹T8 Company Group, ²MEPhI National Nuclear Research Univ., Russia
 The frequency noise spectrum of a semiconductor laser, stabilized to an external micro-ring resonator via self-injection locking, has been characterized over a broad frequency range.

- Coffee Break -

Location: Stenberg 1 Room, Floor 3; Tuesday, June 23, 2026

R03. SEMICONDUCTOR LASERS, MATERIALS AND APPLICATIONS 2

- TuR03-08 14:45-15:15
Single-photon sources: Хороший, плохой, злой (Invited paper)
 F. Laussy; Instituto de Ciencia de Materiales de Madrid, Spain
 Photon creation, processing and detection are deeply intermingled. I show that the standard purity criterion $g^{(2)}(0)=0$ is inadequate to describe single-photon sources. A natural definition leads instead to $g^{(2)}(\tau)\tau^N$, unifies CW and pulsed regimes, and inspires novel implementations such as one-way quantum cascades, also paving the road towards multiphoton sources. I also discuss photon interferences in single and multiphoton physics.
- TuR03-09 15:15-15:45
Single-photon C-band sources for quantum cryptography (Invited paper)
 A. Toporov; Ioffe Institute, Russia
 I will present research conducted in recent years at the Ioffe Institute on the development of a single-photon source for the telecom C-band, around 1.55 μm . By forming a metamorphic heterostructure with InAs/InGaAs quantum dots and a hybrid microcavity with semiconductor and dielectric Bragg reflectors, we implemented resonant coherent pumping and achieved a record-high efficiency of pure single-photon emission for this wavelength: 22% at the source output.
- TuR03-10 15:45-16:00
Zero-field cross-relaxation resonances in ensembles of NV centers in diamond for fully optical magnetometry
 D.S. Filimonenko, A.P. Nizovtsev, S.Ya. Kilin; B.I. Stepanov Institute of Physics, Belarus
 We studied the zero-field level-anticrossing resonance in NV-center ensembles, analyzing its response to magnetic modulation frequency and laser pump power. For the [111] crystal orientation, cross-relaxation spectra enable fully optical vector magnetometry, reconstructing the magnetic field vector. The simplest design of a microwave-free magnetic sensor is demonstrated.
- TuR03-11 16:00-16:15
Polariton lasing in a high-Q microcavity
 V.A. Stolyarov¹, A.S. Kurdyubov¹, A.V. Trifonov¹, M.Yu. Petrov¹, M.S. Lozhkin², S.A. Eliseev², Yu.P. Efimov², V.A. Lovtcius², A.V. Kavokin^{1,3,4}; ¹Spin Optics Lab., St. Petersburg State Univ., ²Nanophotonics Research Center, St. Petersburg State Univ., ³Abrikosov Center for Theoretical Physics, Moscow Center for Advanced Studies, ⁴Russian Quantum Center, Skolkovo, Russia.
 We report the realization of a polariton laser in a high-Q GaAs/AlGaAs planar microcavity grown by molecular beam epitaxy using a digital-alloy-based Bragg mirror design. The structure exhibits an ultrahigh quality factor of up to 54 000 and a low polariton lasing threshold. We demonstrate strong light-matter coupling and polariton condensation under non-resonant optical pumping.
- TuR03-12 16:15-16:30
Post-processing in optoelectronic reservoir computing
 A.V. Kovalev, V.V. Vitkin, E.A. Viktorov; ITMO Univ., Russia
 We investigate the parameter space of nonlinear functions used in a post-processing stage of a reservoir computing system based on a laser with optoelectronic feedback. We demonstrate how changing the scaling and offset coefficient of sine squared, hyperbolic tangent, and logistic functions can improve solving the Santa Fe time-series prediction task.
- TuR03-13 16:30-16:45
Watt-range InGaAs/GaAs superluminescent diodes based on grazing stripe waveguide
 N.Yu. Gordeev¹, A.S. Payusov¹, G.O. Kornyshev¹, Yu.M. Shernyakov¹, A.A. Beckman¹, Yu.A. Salii¹, S.A. Mintairov¹, N.A. Kalyuzhnyy¹, M.V. Maximov²; ¹Ioffe Inst., Russia; ²Alferov Univ., Russia
 We designed and investigated superluminescent diodes with the active region based on InGaAs quantum well-dots emitting at a wavelength of ~1 μm . The devices have shown spectra as broad as 20 nm and output CW optical power as high as 1 W limited by catastrophic optical mirror damage. The work was supported by the Russian Science Foundation (project No 23-72-00038).

TuR03-14

16:45-17:00

Fabrication of optical microcavities coated with perovskite materials for laser sources

L.N. Dvoretckaia¹, V.V. Volosatova², S.P. Ilin¹, E.A. Vyacheslavova², A.M. Mozharov², D.V. Miniiv², A.K. Kavveev^{2,3}, V.V. Fedorov², S.V. Makarov¹, I.S. Mukhin²; ¹ITMO University, ²Laboratory of Renewable energy sources, Alferov University, ³Ioffe Institute, Russia

This work is aimed at experimental study of the integration of perovskite materials with A3B5-based microresonators for the development of laser radiation sources.

- Coffee Break -

Location: Stenberg 1 Room, Floor 3; Tuesday, June 23, 2026

R03. SEMICONDUCTOR LASERS, MATERIALS AND APPLICATIONS 3

TuR03-15

17:30-18:00

QCL-pumped DFB-laser based on a quasirelativistic-momentum-law HgCdTe quantum well structure with a third-order Bragg grating (*Invited paper*)

S.V. Morozov, O.M. Litovchenko; Institute for Physics of Microstructures, Russia

Single-frequency lasing at a wavelength of 13.5 μm was demonstrated from a waveguide structure with HgCdTe QWs pumped by an infrared quantum cascade laser due to the formation of a periodic system of ridges on the structure's surface, realizing DFB.

TuR03-16

18:00-18:15

Quantum cascade detectors for 8 μm spectral range

V.V. Dudelev¹, A.D. Andreev¹, D.V. Chistyakov¹, V.V. Podoprigora¹, A.A. Nikitin¹, D.A. Mikhailov¹, E.D. Cherotchenko¹, I.I. Vruble¹, V.Yu. Mylnikov¹, S.N. Losev¹, N.N. Deryagin¹, S.H. Abdulrazak¹, A.V. Babichev¹, A.V. Lyutetskiy¹, S.O. Slipchenko¹, N.A. Pikhin¹, A.G. Gladyshev², K.A. Podgaetskiy³, A.Yu. Andreev³, I.V. Yarotskaya³, M.A. Ladugin³, A.A. Marmalyuk³, D.S. Papylev², I.I. Novikov^{2,4}, E.A. Kognovitskaya^{1,6}, V.I. Kuchinskii¹, L.Ya. Karachinsky^{2,4}, A.Yu. Egorov², G.S. Sokolovskii¹; ¹Ioffe Institute, ²Connector Optics LLC, ³M.F. Stelmakh POLYUS Research and Development Institute, ⁴ITMO University, ⁵D.I. Mendeleev Institute for Metrology VNIIM, Russia

Quantum cascade detectors (QCDs) for 8 μm spectral region fabricated from a high-power quantum cascade laser (QCL) structure comprising 50 cascades demonstrate RF signal bandwidth exceeding 1GHz and maximum responsivity above 100mA/W. Integration of QCD and QCL on a single heat sink represents compact and cost-effective concept for power-stabilized laser design.

TuR03-17

18:15-18:30

Control of THz quantum cascade laser intermode spacing by microwave modulation of bias

R.A. Khabibullin^{1,2}, S.S. Pushkarev^{1,2}, D.A. Belov³, A.V. Ikonnikov³, I.A. Glinskiy², A.V. Zuev¹, D.L. Gnatyuk¹; ¹National Research Centre "Kurchatov Institute", ²Moscow Institute of Physics and Technology, ³Lomonosov Moscow State University, Russia

The emission spectra of 3.3 THz quantum cascade laser with a 2.0 mm Fabry-Perot cavity were measured. The supplied DC bias was modulated by a microwave signal with a few μW power. It was demonstrated that the spacing between adjacent peaks in the spectrum is pulled (or even locked) to the synthesizer frequency within significant frequency range from 19.0 to 23.2 GHz, and outside this range returns to the value typical for a free-running laser.

TuR03-18

18:30-18:45

Spectral characteristics of terahertz quantum cascade lasers with first and third order distributed feedback

D.A. Belov¹, A.V. Ikonnikov¹, D.R. Khokhlov¹, D.V. Ushakov², A.A. Afonenko², B.A. Zhmud³, I.E. Rykov³, M.V. Vinokurov³, F.I. Zubov⁴, A.Yu. Pavlov^{3,5}, R.R. Galiev^{3,5}, R.A. Khabibullin^{3,5}; ¹Lomonosov Moscow State Univ., Russia; ²Belarusian State Univ., Belarus; ³Moscow Inst. of Physics and Technology, ⁴Alferov St. Petersburg National Research Academic Univ. RAS, ⁵National Research Centre "Kurchatov Institute", Russia

Practical application of THz QCLs often requires robust single-mode operation, hence, a certain method for frequency selection. In this work, we present the emission spectra of 1- and 3-order DFB THz QCLs, where DFB is formed by $\lambda/4$ -shifted lateral ridge corrugations and split antennas, respectively. The lasers demonstrate single-mode emission close to the design frequency up to high biases.

TuR03-19

18:45-19:00

An open-path Eddy-covariance laser spectrometer for simultaneous monitoring of CO₂, CH₄, and H₂O

B.R. Pravuk^{1,2}, V.V. Meshcherinov^{1,2}, V.A. Kazakov^{1,2}, I.S. Gazizov³, S.F. Gazizov¹, M.V. Spiridonov², A.V. Rodin¹; ¹Moscow Institute of Physics and Technology, ²Space Research Institute of RAS, Russia; ³Institute of Chemical Technologies and Analytics, Austria

We present a compact laser-based open-path mid-IR spectrometer for simultaneous measurements of CO₂, CH₄, and H₂O, designed for eddy-covariance flux studies. The instrument demonstrates high linearity, good precision at 10 Hz, and agreement with commercial analyzers in field tests. Its multi-gas capability provides a practical advantage for outdoor greenhouse gas monitoring.

TuR03-20

19:00-19:15

Temporal ghost imaging with VCSEL-based controllable thermal source

A. Smaliakou, V. N. Chizhevsky, D. Mogilevtsev, S. Kilin; B.I. Stepanov Institute of Physics, NAS of Belarus, Belarus

Temporal ghost imaging reconstructs fast temporal objects using detectors that cannot resolve them directly. We demonstrate standard and computational schemes based on a VCSEL-based generator of bunched and super-bunched light. Imaging is achieved with a slow detector, and reconstruction quality is optimized by tuning the laser's noise bandwidth, illustrating the potential of controllable pseudo-thermal sources for temporal ghost imaging.

TuR03-21

19:15-19:30

Image edge detection by optoelectronic spiking neural network based on VCSEL and SPAD

V. N. Chizhevsky, M. V. Lakhmitski, S.Ya. Kilin; B.I. Stepanov Institute of Physics, NAS of Belarus, Belarus

The paper presents the results of an experimental study on the feasibility of image edge detection using a hardware-software implementation of a convolutional network. This network employs a 2x2 kernel based on optoelectronic artificial spiking neurons with probabilistic neuron responses consisting of VCSEL and SPAD.

R04. LASER BEAM CONTROL

Location: Stenberg 2 Room, Floor 3; Tuesday, June 23, 2026
R04. LASER BEAM CONTROL 1

- TuR04-01 14:30-15:00
- Structural stability of tightly focused optical vortices with different polarization state** (*Invited paper*)
S.S. Stafeev^{1,2}, V.V. Kotlyar^{1,2}; ¹Image Processing Systems Institute, NRC "Kurchatov Institute", ²Samara National Research University, Russia
In this paper, we investigate the stability of an optical vortex with respect to the relative directions of polarization and phase rotation. It is shown theoretically and numerically that a focused beam with opposite handedness of polarization and phase rotation (i.e., circular polarization opposite to the vortex topological charge) exhibits greater stability against such distortions.
- TuR04-02 15:00-15:30
- Generation of scalar and vector optical vortices in polarization Mach-Zehnder interferometer with corner-cube reflectors** (*Invited paper*)
M.E. Pavelina¹, D.D. Reshetnikov¹, A.A. Ryzhaya², E.V. Malyutina¹, A.A. Sevryugin², E.A. Vashukevich¹, V.M. Petrov¹, V.Yu. Venediktov^{1,2}; ¹St.Petersburg State Univ., ²St. Petersburg Electrotechnical Univ. "LETI", Russia
We present an experimentally implemented scheme for the controllable generation of scalar and vector optical vortices using a polarization Mach-Zehnder interferometer with corner-cube retroreflectors. The method enables stable generation and fast switching of vortex states without spatial light modulators and provides low angular divergence of the generated beams.
- TuR04-03 15:30-15:45
- Forming of vortex Bessel beams using gyrotron radiation at 263 GHz**
N.A. Bazdyrev^{1,2}, V.V. Gerasimov^{1,3}, V.P. Nazmov^{1,4}, V.S. Pavelyev⁵, A.N. Agafonov⁵, V.I. Platonov⁵, A.V. Kirsanov⁶, M.V. Morozkin⁶, A.P. Fokin⁶, A.V. Chirkov⁶; ¹Budker Institute of Nuclear Physics of the SB RAS, ²Institute of Automation and Electrometry of the SB RAS, ³Novosibirsk State University, ⁴Institute of Solid State Chemistry and Mechanochemistry of the SB RAS, ⁵Samara University, ⁶Institute of Applied Physics of the RAS, Russia
This paper presents an investigation of vortex Bessel beams at 263 GHz formed with a reflective phase plate. The obtained experimental data are compared with simulations.
- TuR04-04 15:45-16:00
- All-fiber polarization-dependent optical vortex generation via nonlinear acousto-optic interaction**
D. Vikulin, B. Sokolenko, D. Yavorsky, C. Alexeyev, M. Yavorsky; ¹V.I. Vernadsky Crimean Federal University, Russia
We report on a novel type of vector optical mode conversion in circular fibers with a nonlinear acousto-optic interaction. The possibility of generation of optical vortices with topological charge -2 or +2 is theoretically predicted. Such a process is found to be polarization dependent: both the vortex topological charge and polarization are governed by the circular polarization of the input mode.
- TuR04-05 16:00-16:15
- Focused optical vortices with extended DOF via flat multilevel diffractive lens**
Anita Kumari¹, Tina M. Hayward², Rajesh Menon^{2,3}, Vishwa Pal¹; ¹Department of Physics, Indian Institute of Technology Ropar, India; ²Department of Electrical and Computer Engineering, University of Utah, USA; ³Oblate Optics, Inc., USA
We present a novel method for generating focused optical vortices with extended depth of focus using an inverse-designed, compact flat multilevel diffractive lens. The MDL focuses incident optical vortices at a prescribed working distance while enhancing the depth of focus by several times. Moreover, increasing the vortex size further enhances the DOF, while introducing rings that depend on topological charge.
- TuR04-06 16:15-16:30
- Measurements of stable field configurations in tightly focused laser beams using subwavelength probes**
M.A. Zolotavin¹, K.F. Burdonov¹, A.A. Sidnev¹, I.B. Mukhin¹, A.E. Pestov², A.A. Soloviev¹; ¹A.V. Gaponov-Grekhov Institute of Applied Physics of RAS (IAP RAS), ²The Institute for Physics of Microstructures of RAS (IPM RAS), Russia
The research is devoted to measurements of the optical field structure arising from counterpropagating focusing of laser channels using subwavelength probes. Particular attention is given to probe diagnostic methods. The research is conducted within the framework of the XCELS project.
- TuR04-07 16:30-17:00
- High-power Terahertz radiation beam control of the NovoFEL using diffractive optical elements** (*Invited paper*)
N.D. Osintseva¹, Yu.Yu. Choporova¹, V.V. Gerasimov^{1,2}, V.S. Pavelyev³, A.N. Agafonov³, K.N. Tukmakov³, S.A. Degtyarev³, A.S. Reshetnikov³, M.S. Komlenok⁴, T.V. Kononenko⁴, G.A. Komandin⁴, V.I. Konov⁴, B.A. Knyazev¹; ¹Budker Inst. of Nuclear Physics of SB RAS, ²Novosibirsk State Univ., ³Samara National Research Univ., ⁴Prokhorov General Physics Inst. of the RAS Russia
NovoFEL is a unique high-power frequency tunable terahertz radiation source. It enables advanced techniques like real-time imaging, pump-probe, and holography to be applied to many areas, including heritage studies and semiconductor inspections. The report reviews specific optical elements for controlling high-power THz beams, including focusing optics and advanced beamforming components (Laguerre-Gaussian, Hermite-Gaussian, and Bessel modes) and their applications.

- Coffee Break -

Location: Stenberg 2 Room, Floor 3; Tuesday, June 23, 2026

R04. LASER BEAM CONTROL 2

- TuR04-08 17:30-18:00
Quantum optical vortices for atmospheric communication channels: methods and features of generation and detection
(Invited paper)
 D.D. Reshetnikov¹, E.V. Malyutina¹, T.K. Korol¹, V.M. Petrov¹; ¹St. Petersburg State University, Russia
 The work explores the potential applications of vector quantum optical vortices in free-space communication channels. Particular emphasis is placed on the techniques for rapid generation, detection, and analysis of quantum polarization states with spatial structures. We investigate the statistical characteristics of various sources of vector optical vortices, as well as the feasibility of employing higher-order vortices in turbulent atmospheric communication links.
- TuR04-09 18:00-18:30
Linear Bragg diffraction as a method for research and parameter checkout of regular domain structures in ferroelectric crystals *(Invited paper)*
 S.M. Shandarov¹, E.N. Savchenkov¹, D.E. Belskaya¹, A.V. Dubikov¹, K.P. Melnik¹, N.I. Burimov¹, M.A. Chuvakova², A.R. Akhmatkhanov², V.Ya. Shur²; ¹Tomsk State University of Control Systems and Radioelectronics, ²Ural Federal University, Russia
 We report the results of the experimental studies and theoretical analysis for different aspects of nondestructive method of linear Bragg diffraction on RDS created in ferroelectric crystals 5%MgO:LiNbO₃ and 1%MgO:LiTaO₃, which have been intended for second harmonic generation.
- TuR04-10 18:30-18:45
Multi-layer holographic optical elements for wavefront correction, laser writing and imaging: individual specialization of technologies
 R.I. Kuts, V.P. Korolkov, D.A. Belousov, V.E. Zaytseva; Institute of Automation and Electrometry of SB RAS, Russia
 Holographic optical elements (HOE) play an important role in the modification and control of laser radiation. A special task in creating diffraction structures is to increase spatial resolution, minimize errors in the topology of structures, simplify and reduce the cost of technological stages of production. This paper presents the practical results of studies of HOE creation, using laser writing on multilayer thin films, obtained in IA&E SB RAS.
- TuR04-11 18:45-19:00
The control of transverse modes of laser beam by a tunable diffractive optical element based on lithium niobate
 A.R. Akhmatkhanov¹, A.A. Esin¹, V.S. Pavelyev^{2,3}, V.Ya. Shur¹; ¹Ural Federal University, ²Samara University, ³Image Processing Systems Institute, NRC "Kurchatov Institute", Russia
 We have used ferroelectric lithium niobate (LiNbO₃) crystals with static domain structure corresponding to the required phase function for creation of diffractive optical elements (DOEs), which can be switched on and off by the action of external electric field. DOEs for generation of TEM₀₁ mode and for generation of the beam with orbital angular momentum (OAM) are fabricated and studied.
- TuR04-12 19:00-19:15
Features of holographic optical elements for high-power lasers
 M.V. Gavrish^{1,2}, P.K. Rozanov^{1,2}, D.A. Gatsko¹, S.S. Makarin¹, U.V. Prokhorova¹, V.V. Sementin¹, A.P. Pogoda¹, N.V. Nikonov²; ¹Baltic State Technical University "VOENMEH" named after D.F. Ustinov, ²ITMO University, Russia.
 This paper examines holographic Bragg gratings and diffusers recorded in photothermorefractive (PTR) glass - key elements for high-power lasers. Their uniqueness lies in the combination of high diffraction efficiency and high laser-induced damage threshold, unattainable in other media. The principles of recording, advantages for managing high-energy beams, and promising applications in laser systems are presented.
- TuR04-13 19:15-19:30
Laser beam wavefront control: self-consistent Fourier analysis and adaptive digital holography
 V.V. Kabanov, A.O. Nehryienko; Institute of Physics NAS of Belarus, Belarus
 We show that using digital hologram in combination with the high resolution of their Fourier transforms allows us to identify individual structural components corresponding to the initially generated laser beam and the accompanying speckle structure, eliminate interference caused by the speckle structure and imperfections of optical-electronic components, improve the quality of the digital hologram, and accurately determine the amplitude and phase profile of the signal beam.

R06. LASERS AND SYSTEMS FOR IMAGING, GREEN PHOTONICS AND SUSTAINABILITY

Location: Rihter 1+2 Room, Floor 3; Tuesday, June 23, 2026

R06. LASERS AND SYSTEMS FOR IMAGING, GREEN PHOTONICS AND SUSTAINABILITY 1

- TuR06-01 15:00-15:15
Encryption and decryption of images using digital hologram synthesis
 V.V. Sementin, A.P. Pogoda, M.V. Gavrish, P.K. Rozanov, U.V. Prokhorova, A.S. Boreysho; Baltic State Technical University "VOENMEH" named after D.F. Ustinov, Russia
 This article presents a method for image encryption and decryption based on computer synthesis of digital holograms. The proposed approach models the diffraction field of the image and forms a hologram through the interference of object and reference waves. Successful decryption requires precise matching of the parameters. The method demonstrates high noise immunity and potential for use in laser communication systems.
- TuR06-02 15:15-15:30
Ghost image formation in the THz and sub-THz frequency ranges
 D.A. Chernousov, A.S. Sinko, I.A. Ozheredov; Faculty of Physics, Lomonosov Moscow State Univ., Russia
 The experimental realization of ghost imaging in the THz and sub-THz frequency ranges using methods of compressive sensing and cross-correlation function calculation is considered. The accuracy of reconstruction with various methods for different objects is compared, taking into account the spatial profile of the scanning beam.

TuR06-03 15:30-15:45

Enhanced-resolution interrogation with random Raman fiber laser

D.V. Nadein, O.A. Gorbunov, I.D. Vatrik, D.V. Churkin; Novosibirsk State University, Russia

We demonstrate super-resolution spectroscopy using a random Raman fiber laser with distributed feedback. By engineering operation with only a few narrow spectral modes and combining a low-resolution grating analyzer with a full-power photodetector, we reconstruct a transmission spectrum substantially narrower than the analyzer resolution, while using a simplified, single-channel measurement scheme suitable for practical implementations.

TuR06-04 15:45-16:00

High-resolution pulsed terahertz microscopy based on solid immersion effectD.D. Rybnikov^{1,2}, V.A. Zhelnov¹, S.O. Yurchenko², K.I. Zaytsev¹, N.V. Chernomyrdin¹; ¹Prokhorov General Physics Institute of RAS, ²Federal State Autonomous Educational Institution of Higher Education "Bauman Moscow State Technical University", Russia

We developed pulsed terahertz solid immersion microscope combining subwavelength spatial resolution of a solid immersion lens and advanced information content of a THz pulsed imaging. Spatial resolution of this microscope was estimated in time and frequency domains. The highest resolution down to 0.047λ was obtained for spectral phase image representation. The method offers potential for biophotonics and materials science applications.

TuR06-05 16:00-16:15

Transformable nadir+oblique/back-to-back multispectral and LiDAR system for green photonics

D.A. Stolyarenko, K.I. Tokar; L-Scan Lab Ltd., Russia

Modern forest management is transitioning from static imaging to dynamic mobile mapping. There is a high demand for cost-effective, lightweight, and automated data processing solutions. Our system addresses these challenges through a transformable design optimized for versatile deployment of multispectral cameras either back-to-back for land use or aerial dual Nadir and 15° Oblique views for aerial use.

TuR06-06 16:15-16:30

Multichannel photonic integrated sensing system: design concept and experimental validationA.G. Zakoyan¹, V.S. Lyubopytov¹, I.V. Stepanov¹, O. Klimenko², G.S. Voronkov¹; ¹Ufa University of Science and Technology, ²Laboratory of Advanced Electronic Devices, Center for Engineering Physics, Skolkovo Institute of Science and Technology, Russia

This work demonstrates an experimental implementation of a multichannel sensing scheme on a photonic integrated circuit (PIC). A chip fabricated on a silicon nitride (Si_3N_4) platform employed an asymmetric Mach-Zehnder interferometer and two microring resonators with thermo-optic phase shifters. Experiments confirmed simultaneous on-chip interrogation feasibility, highlighting the potential of compact, scalable, and cost-effective PIC-based sensing systems.

TuR06-07 16:30-16:45

Microresonator clusters for spectral analysis with machine-learning interpreter

I. Saetchnikov, E. Tcherniavskaya, A. Saetchnikov; Belarusian State University, Belarus

We present a compact, scalable, chip-based spectroscopic instrument integrating thousands of optical microresonators within the clusters. By combining a whispering gallery mode resonance phenomenon with a machine-learning interpreter using ensemble methods and variational autoencoder-based data augmentation, the system achieves accurate wavelength identification with 100 fm precision over up to 100 nm visible spectral range.

- Lunch Break -

R08. NONLINEAR PHOTONICS: FUNDAMENTALS AND APPLICATIONS

Location: Stenberg 2 Room, Floor 3; Tuesday, June 23, 2026

R08. NONLINEAR PHOTONICS: FUNDAMENTALS AND APPLICATIONS 1

TuR08-01 09:00-09:30

Enhanced frequency comb generation and degenerate optical parametric oscillations in normal-dispersion photonic-crystal microresonators (Invited paper)V.E. Lobanov¹, O.V. Borovkova¹, A.E. Shitikov¹, N.S. Tatarinova^{1,2}, D.A. Chermoshentsev^{1,2}, I.A. Bilenko^{1,3}; ¹Russian Quantum center, ²Moscow Inst. Physics and Technology, ³Faculty of Physics, Lomonosov Moscow State Univ., Russia

The use of photonic-crystal structures enables the implementation of various nonlinear signal generation regimes in Kerr microresonators with normal group velocity dispersion, including excitation of platicons and triangular pulses, and their effective control. The possibility of platicon propagation direction switching was demonstrated in such microresonators. It was also revealed that it is possible to significantly decrease the threshold for squeezed light generation via bichromatic pump in photonic-crystal microresonators.

TuR08-02 09:30-09:45

Bound solitons in a SNAP microresonator

A.Yu. Kolesnikova, I.D. Vatrik; Novosibirsk State University, Russia

We theoretically study soliton interaction in a nonlinear cylindrical microresonator with a nanoscale radius variation (SNAP). Using numerical simulations of coupled Lugiato-Lefever equations, we show the formation of azimuthal solitons in three coupled axial modes with different axial field profiles. Despite distinct mode dispersions, nonlinear coupling synchronizes the soliton repetition rates.

- TuR08-03 09:45-10:00
Generation of stokes microcombs in silicon nitride microresonators
 A.E. Shitikov¹, A.N. Golodukhina^{1,2}, N.Yu. Dmitriev¹, D.M. Sokol^{1,3}, V.E. Lobanov¹, I.A. Bilenko^{1,2}, D.A. Chermoshentsev^{1,3}; ¹Russian Quantum Center, Skolkovo, ²Faculty of Physics, Lomonosov Moscow State University, ³Moscow Institute of Physics and Technology, Russia
 We report the first observation of Stokes microcombs, including coherent platicon-like states, in silicon nitride microresonators with normal group-velocity dispersion. Using tunable and self-injection-locked diode laser pumping, we demonstrate efficient broadband Stokes comb generation coexisting with Kerr combs. The results reveals the crucial role of Raman processes in comb initiation and enables deterministic switching between Kerr and Stokes regimes.
- TuR08-04 10:00-10:30
Controlled soliton clusters in coupled Kerr microcavities (Invited paper)
 A.G. Vladimirov; National Research University Higher School of Economics, Russia
 It has been demonstrated that coupled Kerr resonators support multiple soliton cluster types whose stability and separation are controllable via pump phase difference and cavity mismatch. The asymptotic analysis predicts three cluster types, confirmed numerically. These findings provide insights into soliton interactions and enable new approaches for controlling dissipative solitons in photonic integrated circuits.
- TuR08-05 10:30-10:45
Solitons in coupled anomalous-normal dispersion microresonators
 A. Yu. Kolesnikova, A. A. Gelash; Center of Engineering Physics, Skolkovo Institute of Science and Technology, Russia
 We theoretically investigate a system of coupled optical microresonators with normal and anomalous dispersion. Using the Lugiato-Lefever equations in the supermode basis, we analytically study modulation instability of the nonlinear hybridized dispersion system. Our numerical simulations reveal the formation of Kerr soliton frequency combs with a flat spectral profile near the pumped mode, promising broad telecommunication applications.
- TuR08-06 10:45-11:00
Formation and control of ordered and disordered dynamic microcavity arrays via colliding single-cycle attosecond pulses in resonant medium
 R.M. Arkhipov, M.V. Arkhipov, N.N. Rosanov; Ioffe Institute, Russia
 We present creation of spatially ordered and disordered arrays of dynamic microcavities in a resonant medium created via collision of two counter-propagating attosecond single-cycle light pulses in two- and three-level resonant medium.

- Coffee Break -

Location: Stenberg 2 Room, Floor 3; Tuesday, June 23, 2026

R08. NONLINEAR PHOTONICS: FUNDAMENTALS AND APPLICATIONS 2

- TuR08-07 11:30-12:00
Terahertz time-resolved nonlinear optics of discrete media: from gas to liquid (Invited paper)
 A.M. Balakin, N.A. Kuzechkin, P.M. Solyankin, A.P. Shkurinov; Department of Physics, Lomonosov Moscow State University, Russia
 We present the results of experimental studies and the theoretical modelling of nonlinear optical experiments on the generation and interaction of THz radiation with "discrete" nanocomposite media. We show that the polarization dependences of THz radiation from nano dispersive medium demonstrates the sensitivity to the subwavelength typical scale of the medium.
- TuR08-08 12:00-12:30
Terahertz and second harmonic generation in the air-based femtosecond plasma under loose focusing (Invited paper)
 O.G. Kosareva^{1,2}, I.A. Nikolaeva^{1,2}, D.E. Shipilo^{1,2}, N.A. Panov^{1,2}, G.E. Rizaev^{1,2}, A.V. Koribut^{1,2}, D.V. Pushkarev¹, Ya.V. Grudtsyn^{1,2}, A.B. Savel'ev^{1,2}, L.V. Seleznev^{1,2}, A.A. Ionin², A.P. Shkurinov¹; ¹Faculty of Physics, Lomonosov Moscow State University, ²Lebedev Physical Institute RAS, Russia
 We used filamentation of 940 nm, 90 fs, 3.5 mJ pulse to measure the second harmonic and terahertz in comparatively long focusing geometry (40-cm and 100-cm focal lengths, ≥ 1 -cm filament). The unified description of the even harmonic emission based on the vectorial second order current shows that the two lobes of the terahertz beam broken along the laser polarization are oriented perpendicularly to the two lobes of the second harmonic beam in agreement with the experiment.
- TuR08-09 12:30-12:45
Characteristics of terahertz emission from single-color ultraviolet laser filaments
 G.E. Rizaev^{1,2}, T.A. Dick¹, M.V. Levus^{1,2}, L.V. Seleznev^{1,2}; ¹P.N. Lebedev Physical Institute of RAS; ²M.V. Lomonosov Moscow State University, Russia
 We experimentally investigate terahertz emission from single-color ultraviolet laser filaments in air and compare it with infrared filaments. The angular distributions, spectral, and energy characteristics of terahertz radiation are measured for a wide range of experimental parameters. Unlike infrared filaments, which exhibit an optimal focusing that maximizes terahertz output, ultraviolet filaments demonstrate a monotonic increase of terahertz energy with numerical aperture followed by saturation.
- TuR08-10 12:45-13:15
IR shifting light bullet in femtosecond air filament (Invited paper)
 D. Pushkarev¹, D. Uryupina¹, E. Mitina¹, M. Ustyuzhanin¹, N. Zdidovtsev¹, A. Bulygin³, O. Kosareva^{1,2}, Yu. Geints³, A. Savel'ev^{1,2}; ¹Faculty of Physics, Lomonosov Moscow State University, ²Lebedev Physical Institute RAS, ³Zuev Institute of Atmospheric Optics RAS, Russia
 During filamentation of a high-power femtosecond laser pulse in molecular gases, Raman spectral components form light bullet. We present series of experimental studies, including the measurement of single-pulse frequency-angular spectra, of the filamentation of a femtosecond laser pulse with terawatt peak power in air under various focusing conditions, chirping, and other parameters.

TuR08-11

13:15-13:30

Surface-plasmon-enhanced terahertz wave generation by mid-infrared laser pulses

M.V. Rozhko¹, Ya.O. Romanovskii^{1,2,3}, N.V. Yakushkin^{1,2,4}, A.V. Mitrofanov^{1,2,3}, A.A. Voronin^{1,2}, D.A. Sidorov-Biryukov^{1,2,3}, A.B. Fedotov^{1,2}; ¹Russian Quantum Center, ²Lomonosov Moscow State University, ³NRC "Kurchatov Institute", ⁴Scoltech, Russia

The generation of terahertz radiation from the diffraction grating surface irradiated by mid-infrared laser pulses upon plasmon excitation is demonstrated. The dependence of terahertz radiation energy on laser intensity, while separately varying pulse energy, duration, and target-to-focus position is analyzed. In simulations, the influence of the plasma density gradient on the energy of electrons and terahertz radiation is revealed.

TuR08-12

13:30-13:45

Optical fiber bundle -based superresolution imaging systems for THz range

G.M. Katyba^{1,2}, A.V. Radivon^{2,3}, D.V. Lavrukhin⁴, D.S. Ponomarev⁴, I.N. Dolganova^{1,2}, A.-E.P. Protopopova¹, V.N. Kurlov¹, K.I. Zaytsev²; ¹Osipyan Institute of Solid State Physics of RAS; ²Prokhorov General Physics Institute of RAS; ³Moscow Center for Advanced Studies; ⁴National Research Center "Kurchatov Institute", Russia

Optical fiber bundles allow for diffraction-free transmission of 2D optical fields, with resolution limited by the individual fiber's diameter. While standard fibers are limited by wavelength ($\Delta\lambda$), high-refractive-index fibers, like sapphire bundles in the terahertz (THz) range, can achieve subwavelength resolution ($\Delta\lambda$ 0.3–0.5 λ). This paper introduces a semi-analytical model to analyze image quality using the modulation transfer function (MTF).

- Lunch Break -

R09. OPTICAL NANOMATERIALS

Location: Pudovkin 1+2 Room, Floor 3; Tuesday, June 23, 2026

R09. OPTICAL NANOMATERIALS 1

TuR09-01

11:30-12:00

Understanding resonator coupling: coupled mode theory vs. quasinormal mode theory (Invited paper)

P. Lalanne; LP2N, CNRS, Institut d'Optique Graduate School, Univ. Bordeaux, France

Coupled Mode Theory (CMT) has long been a reliable tool for modeling the interaction of light with electromagnetic resonators. However, its dependence on fitted coefficients limits its ability to offer predictive design capabilities. In this work, we review our ongoing efforts to overcome this limitation, with a particular focus on elucidating dissipative coupling.

TuR09-02

12:00-12:30

Visible-light photochemistry with quantum dot-sensitized photon upconversion (Invited paper)

Pramod P. Pillai; Indian Institute of Science Education and Research (IISER) Pune, India

Quantum dot (QD)-sensitized triplet-triplet annihilation upconversion (TTA-UC) systems have been effectively utilized to perform a high-energy UV-driven chemical synthesis with low-energy visible-light.

TuR09-03

12:30-13:00

Photosensitization of molecular catalysts by semiconductor nanocrystals (Invited paper)

Anindya Datta; Department of Chemistry, Indian Institute of Technology Bombay, and Institute of Nano Technology and Science, Mohali, India

Quantum dots are found to effectively photosensitize molecular catalysts, through ultrafast photoinduced electron transfer (PET). Two kinds of QDs have been used: Cu⁺-doped CdS and CuInS₂, with and without a ZnS shell. Cu⁺-doping facilitates PET and makes the NCs more potent photosensitizers. The ZnS shell on CuInS₂ hinders PET, but aids photosensitization due to surface capping and hindrance of back electron transfer.

TuR09-04

13:00-13:30

What the long-time tails of the photoluminescence decay of semiconductor nanocrystals can tell us (Invited paper)

A.L. Simões Gamboa¹, E.N. Bodunov²; ¹ITMO Univ., ²Emperor Alexander I St. Petersburg State Transport Univ., Russia

We present and compare models for the analysis of the nonexponential photoluminescence decay kinetics of nanocrystals that consider (i) a Poisson distribution of the number of charge carrier traps per nanocrystal, (ii) detrapping of charge carriers, (iii) the traps are not or can be recombination centers, and (iv) a single trap depth or a trap energy distribution (decreasing exponential function).

TuR09-05

13:30-13:45

Wide band gap nanostructured β -Ga₂O₃-GaN for UV applications

L.A. Mochalov, E.A. Slapovskaya, A.S. Belousov; Lobachevsky State University of Nizhny Novgorod, Russia

PECVD synthesis method was employed for the preparation of nanostructured β -Ga₂O₃-GaN films with different GaN contents for UV-C photodetectors. Nanostructures were characterized by a higher surface-to-volume ratio and therefore improved photosensitivity compared to thin continuous films. The prepared materials were investigated using various physicochemical methods.

- Lunch Break -

Location: Pudovkin 1+2 Room, Floor 3; Tuesday, June 23, 2026

R09. OPTICAL NANOMATERIALS 2

- TuR09-06 15:00-15:15
Simulation of optical multiple-focus formation by nanosphere and nanocrater planar arrays
 Y.E. Geints¹, I.V. Minin², O.V. Minin²; ¹V.E. Zuev Institute of Atmospheric Optics SB RAS, ²Tomsk Polytechnic University, Russia
 The formation of patterned optical near-field focusing by microassemblies of nanospheres and nanocraters embedded in a dielectric film is studied. Using theoretical simulation, we demonstrate that spatial modulation of the incident field creates periodic subwavelength field localization regions in the near field. These regions emerge due to phase inhomogeneities formed by ordered microassemblies of scatterers (nanospheres and nanocraters).
- TuR09-07 15:15-15:30
Spectral shaping in WSe₂ monolayer: the role of bending geometry in controlling plasmon-enhanced photoluminescence.
 A.V. Nikolaeva¹, M.A. Anikina¹, F.M. Maksimov¹, A. Kuznetsov¹, V.M. Kondratev¹, V.A. Sharov^{2,3}, A.A. Kuchmizhak⁴, A.D. Bolshakov¹; ¹Moscow Institute of Physics and Technology, ²Alferov University, ³Ioffe Institute, ⁴Far Eastern Federal University, Russia
 This work presents a WSe₂ monolayer integrated with plasmonic gold nanobumps. The combined effect of nanoscale deformation and exciton-plasmon interaction enables control over photoluminescence intensity and spectral shape. A direct correlation between the PL spectral profile and the local curvature at the bump is revealed, demonstrating a precise link between nanoscale geometry and optical response.
- TuR09-08 15:30-15:45
Screening technique for measuring the confinement of THz surface plasmon polariton field on conducting nanolayers
 V.D. Kukotenko¹, V.V. Gerasimov^{1,2}, V.S. Vanda^{1,2}, A.G. Lemzyakov^{1,3}, A.I. Ivanov⁴, I.A. Azarov^{2,4}, A.K. Nikitin⁵; ¹Budker Institute of Nuclear Physics of SB RAS, ²Novosibirsk State University, ³Synchrotron Radiation Facility "Siberian Circular Photon Source", ⁴A.V. Rzhanov Institute of Semiconductor Physics, SB RAS, ⁵Scientific and Technological Centre of Unique Instrumentation of RAS, Russia
 This paper presents a shielding method that enables the experimental determination of the penetration depth of surface plasmon polaritons (SPP) in air. Combined with the measured SPP attenuation coefficient along the propagation direction, this parameter enables the reconstruction of the effective optical constants of thin films. The method was tested on gold and graphene nanoparticle composite films in the 0.8–2.1 THz range using radiation from the Novosibirsk free electron laser (NovoFEL).
- TuR09-09 15:45-16:00
Ultrafast laser-induced processes in hybrid nanostructures
 A.V. Povolotskiy, E.S. Chebanova, Z. Tang, A.S. Konev; Institute of Chemistry, St.Petersburg State University, Russia
 This work is aimed at investigating ultrafast processes in core-shell type hybrid nanostructures based on metallic cores to elucidate the mechanisms of physical and chemical processes under laser pumping. The ultrafast processes are studied using data from up-conversion luminescence spectroscopy and transient absorption measured by pump-probe techniques with a resolution of approximately 50 fs.
- TuR09-10 16:00-16:15
Dielectric properties of SrTiO₃ nanofilms in the Terahertz range
 N.A. Nikolaev^{1,2}, D.S. Gribanov^{1,2}, A.V. Pavlenko³; ¹Novosibirsk State Univ., ²Inst. of Automation and Electrometry SB RAS, ³Federal Research Centre "Southern Scientific Centre", RAS, Russia
 Quantum ferroelectric SrTiO₃ is promising due to its high dielectric permittivity that strongly depends on the external electric field. The effect can be associated with a soft mode near ~2.62 THz. We study the dependence of the dielectric constant in the range of 0.2–8 THz on the thickness of STO films and reveal the nonlinear behavior.
- TuR09-11 16:15-16:30
Centrifugal microfluidic size separation of Mie-resonant silicon nanoparticles: color trend analysis
 S.U. Bikmetova, E.A. Petrova, D.A. Zuev; ITMO University, Russia
 This work presents two microfluidic strategies for the size-selective separation of polydisperse colloidal silicon nanoparticles synthesized via laser ablation. A passive inertial spiral chip and an active centrifugal microfluidic chip were designed to isolate Mie-resonant fractions (target diameter range from 117 nm to 240 nm). The devices successfully extracted target nanoparticle fractions from broader initial dispersions.
- TuR09-12 16:30-16:45
Light-driven transformation of photonic properties of liquid-crystalline blue phases
 P.V. Dolganov¹, E.A. Maksimov¹, N.V. Balenko², V.K. Dolganov¹; ¹Osipyan Institute of Solid State Physics RAS, ²Department of Chemistry, Lomonosov Moscow State University, Russia
 Tunable three-dimensional photonic crystals (liquid-crystalline Blue Phases) were obtained employing a chiral photosensitive material. Optical and spectral studies of the photonic structures are reported. Temperature – illumination time phase diagrams were determined. Reversible light-driven tuning of structural colors across the whole visible range is achieved.
- TuR09-13 16:45-17:00
Development of whispering-gallery-mode microresonators based on microcapillaries for detection and spectroscopy.
 N.A. Aprelov, A.D. Novikov, I.D. Vatnik; Novosibirsk State University, Russia
 We propose a method to create a silica microcapillary whispering gallery mode microresonator. We calculated optimal geometric parameters for internal medium analysis, developed a wall thinning fabrication technique using commercially available capillaries, and analyzed transmission spectra for various internal media. Results confirm feasibility for sensing applications and open new research prospects on this platform.

- Coffee Break -

Location: Rihter 1+2 Room, Floor 3; Tuesday, June 23, 2026
R09. OPTICAL NANOMATERIALS 3

TuR09-14

17:30-17:45

Formation of laser-induced periodic surface structures on chalcogenide phase-change materials

V. Fedyaj^{1,2}, A. Revjakin^{1,2}, K. Bronnikov³, V. Simonov¹, A. Kokhanovskiy³, E. Menshikov³, P. Lazarenko⁴, A. Yakubov⁴, K. Okotrub¹, S. Babin^{1,2}, A. Kuchmizhak^{4,5}, A. Dostovalov^{1,2}; ¹Institute of Automation and Electrometry of the SB RAS, ²Novosibirsk State University, ³School of Physics and Engineering, ITMO University, ⁴National Research University of Electronic Technology, ⁵Institute of Automation and Control Processes of the FEB RAS, ⁶Far Eastern Federal University, Russia

We present a comprehensive experimental study on the formation of laser-induced periodic surface structures on various chalcogenide phase-change material thin films (GeTe, Sb₂Se₃, GST compounds) using femtosecond laser pulses. We also demonstrate the fabrication of complex 2D-LIPSS patterns using a spatial light modulator to generate multiple beams with individual polarization state and intensity distribution, significantly enhancing throughput and pattern diversity.

TuR09-15

17:45-18:00

Vapor-Solid-Solid growth of GaN nanowires in metastable phase

N.V. Sibirev^{1,2}, O.V. Gridchin^{1,2,3}, I.P. Soshnikov^{2,3}, A.M. Dautov^{1,2,3}, T. Shugabaev^{1,3}, I.V. Shtrom^{1,2,3}; ¹St. Petersburg State University, ²Institute for Analytical Instrumentation of RAS, ³St. Petersburg Academic University, RAS, Russia

This report discusses the features of the growth of gallium nitride nanowires with gold and nickel catalysts. The opportunity of the growth of GaN nanowires with cubic, zinc-blende structure is discussed.

TuR09-16

18:00-18:15

Design of wide field of view metalens based on spliced phase profile

Zehao Gao^{1,2}, Jie Lin^{1,2}; ¹Key Laboratory of Micro-systems and Micro-structures Manufacturing, Ministry of Education, Harbin Institute of Technology, ²School of Physics, Harbin Institute of Technology, China

We propose a 100° field-of-view metalens at 632.8 nm. By splicing central hyperbolic and peripheral quadratic phase profiles, we mitigate off-axis aberrations while maintaining focal sharpness. Simulations confirm high-quality focusing up to ±50° incidence, offering a novel solution for wide-angle imaging.

R10. NONLINEAR QUANTUM PHOTONICS

Location: Deyneka 1+2 Room, Floor 2; Tuesday, June 23, 2026
R10. NONLINEAR QUANTUM PHOTONICS 1

TuR10-01

09:00-09:30

Multilayer polaritonic neuromorphic networks with binary convolutional neurons (*Invited paper*)

E. Sedov; Moscow Institute of Physics and Technology, Russia

We propose multilayer polaritonic neuromorphic networks based on binary convolutional neurons, where local comparison with a convolutional kernel and nonlinear activation are implemented through threshold switching of optically driven exciton-polariton condensates. The architecture processes local features of spatially structured data and transfers optical signals directly between successive condensate-based network layers, enabling compact neural computation within a single polaritonic platform.

TuR10-02

09:30-09:45

Progress in key devices and technologies for on-chip cold atom systems

Jun Wang; Shanghai Institute of Optics and Fine Mechanics, CAS, China

Cold-atom systems offer high precision but their widespread adoption is hindered by bulky setups. Our work advances miniaturization by integrating core components—lasers, magneto-optical traps, and field controllers—using silicon photonics and metasurface technologies. This creates a foundational platform for preparing on-chip cold-atom ensembles and conducting coherent experiments, paving the way for fully integrated systems in sensing and measurement.

TuR10-03

09:45-10:15

Symmetry-driven wave packet dynamics in photonic graphene (*Invited paper*)

S. Koniakhin; Center for Theoretical Physics of Complex Systems, South Korea

Photonic graphene enables all-optical emulation of quantum transport. Three studies show how symmetry and synthetic fields control dynamics: unidirectional valley-dependent snake states at magnetic domain boundaries, ratchet currents from asymmetric scattering at oriented triangular defects, and symmetry-determined vortex-antivortex arrays from a single Gaussian beam. These findings unify symmetry as the core principle for engineering photonic devices.

TuR10-04

10:15-10:30

Nuclear optical clocks

S.M. Ignatovich¹, O.N. Prudnikov^{1,2}, A.V. Taichenachev^{1,2}, V.I. Yudin^{1,2,3}; ¹Institute of Laser Physics SB RAS, ²Novosibirsk State University, ³Novosibirsk State Technical University, Russia

In this talk we give a brief overview of recent advances in the field of optical clocks based on the transition between ground and isomeric states in the Th-229 nuclear. We outline the main problems that should be solved on the way to creation of nuclear optical clock with relative uncertainty of the order of 10⁻¹⁹–10⁻²⁰. Especial attention will be focused on our proposal on the two-photon optical nuclear clock.

TuR10-05

10:30-10:45

Bichromatic pure-optical trap for capturing and cooling ytterbium-171 atomsR.Ya. Ilenkov¹, O.N. Prudnikov¹, A.V. Tainchenachev^{1,2}, V.I. Yudin^{1,2}; ¹Institute of Laser Physics SB RAS, ²Novosibirsk State University (NSU), Russia

The problem of laser cooling and trapping of ytterbium-171 atoms in a bichromatic laser field is considered. The possibility of creating a purely optical deep macroscopic trap of centimeter scale is demonstrated, which allows for simultaneous trapping and cooling of atoms to sub-Doppler temperatures. This cold-atom cell concept is proposed as an alternative to the magneto-optical trap.

TuR10-06

10:45-11:00

Non-Markovian protection of states of a quasi-PT-symmetric system from lossesT.T. Sergeev^{1,2}, E.S. Andrianov^{1,2}, A.A. Zyablovsky^{1,2}; ¹Dukhov Research Institute of Automatics (VNIIA), ²Moscow Institute of Physics and Technology (MIPT), Russia

We demonstrate that non-Markovian effects in the quasi-PT-symmetric system can make the states of the system infinitely living, loss-protected states, even in the absence of gain. We show that the boundaries of regions with different numbers of loss-protected states are determined by conditions similar to those for the PT transition in a quasi-PT-symmetric system with Markovian reservoirs.

- Coffee Break -

Location: Deyneka 1+2 Room, Floor 2; Tuesday, June 23, 2026

R10. NONLINEAR QUANTUM PHOTONICS 2

TuR10-07

11:30-12:00

Theory of coherent light-matter interaction in 2D superconductors (Invited paper)

I. Savenko; Guangdong Technion-Israel Institute of Technology (GTIIT) in Shantou, China

We theoretically investigate anomalous transport in 2D chiral s-, p-, and d-wave superconductors driven by surface acoustic waves (SAWs), demonstrating that SAWs offer a powerful probe for distinguishing unconventional pairing. Using the Boltzmann kinetic equation, we examine the second-order response to an acoustoelectric field from a longitudinal Bleustein-Gulyaev SAW on a piezoelectric substrate. Conventional superconductors produce acoustoelectric current solely along the SAW direction, whereas chiral p-type superconductors generate an additional Hall component.

TuR10-08

12:00-12:15

Challenges in precision quantum metrologyO.N. Prudnikov¹, D.N. Kapusta¹, A.N. Goncharov¹, A.V. Tainchenachev^{1,2}, V.I. Yudin^{1,2,3}; ¹Institute of Laser Physics SB RAS, ²Novosibirsk State University, ³Novosibirsk State Technical University, Russia

We present the results obtained at the Institute of Laser Physics SB RAS, which open up new possibilities in the field of precision quantum metrology for a wide range of applied and fundamental tasks.

TuR10-09

12:15-12:45

Multimode squeezed light (Invited paper)

P. Sharapova; Theoretical Quantum Optics, Universität Paderborn, Germany

This talk will highlight our recent advances in multimode squeezed light generation and characterization, including new regimes of bright squeezed vacuum generation in waveguides and multimode homodyne detection technique with a broadened local oscillator using microstructured fibers. We will discuss the impact of losses during the state generation and applications of multimode squeezed states in nonlinear interferometry.

TuR10-10

12:45-13:00

Periodically poled silica fibers for generation of polarization-entangled photon pairsA.V. Gladyshev¹, A.F. Kosolapov¹, V.V. Velmiskin¹, D.G. Komissarov¹, D.S. Dubrovskii¹, Yu.P. Yatsenko¹; I.A. Bufetov¹, M.A. Smirnov^{1,2}, O.A. Ermishev^{1,2}, I.V. Fedotov³, A.A. Voronin³, A.B. Fedotov³; ¹Prokhorov General Physics Institute of RAS, ²Kazan Quantum Center, Kazan National Research Technical University named after A.N. Tupolev, ³Faculty of Physics, Lomonosov Moscow State University, Russia

A special optical fiber is developed and periodically poled to induce second-order nonlinearity. Second harmonic generation and spontaneous parametric down-conversion in the fiber samples are investigated. The results obtained provide a basis for realization of efficient fiber sources of the quantum states of light that are of high interest for quantum information technology.

TuR10-11

13:00-13:15

Two-photon microwave cavity: bistability and decoherence timeV.Yu. Mylnikov¹, S.O. Potashin¹, M.S. Ukhtary², G.S. Sokolovskii¹; ¹Ioffe Institute, Russia; ²Research Center for Quantum Physics, National Research and Innovation Agency (BRIN), Indonesia

The decoherence time of the qubit based on the two-photon Kerr microwave cavity with two-photon drive and nonlinear dissipation is studied.

TuR10-12

13:15-13:30

Numerical simulation of noise reduction in Raman spectroscopy using squeezed lightA.A. Sorokin¹, A.N. Romanov^{1,2}, A.V. Andrianov¹; ¹A.V. Gaponov-Grekhov Institute of Applied Physics of RAS, ²Lobachevsky State University of Nizhny Novgorod, Russia

We develop a model of quantum-enhanced Raman spectroscopy setup using polarization-squeezed light generated in a nonlinear fiber. In the simulated setup, we observed an improvement in the signal-to-noise ratio of up to 5 times. This model can be used to evaluate the impact of various system parameters on resolution and noise reduction, and to further optimize the setup.

- Lunch Break -

Location: Rihter 1+2 Room, Floor 3; Tuesday, June 23, 2026
R10. NONLINEAR QUANTUM PHOTONICS 3

TuR10-13

17:30-18:00

Ring half-solitons in rotating quantum fluid (*Invited paper*)

N. Voronova; National Research Nuclear University MEPhI, Russia

Rotation of an exciton-polariton condensate gives rise to a synthetic magnetic field coming from TE-TM splitting of photons and optically-induced Zeeman splitting of excitons, allowing for appearance of well-defined ring-shaped domains, followed by formation of ring half-solitons. This regime where spin-orbit coupling, interactions, and orbital flow are comparably strong, offers new means to engineer spin textures in non-equilibrium quantum fluids.

TuR10-14

18:00-18:15

Theoretical model of atomic interferometer in counter-propagating light waves

M.D. Radchenko^{1,2,3}, V.I. Yudin^{1,2,3}, M.Yu. Basalaev^{1,2,3}, O.N. Prudnikov^{1,2}, A.V. Taichenachev^{1,2}, V.I. Krotov^{1,2}, D.N. Kapusta¹; ¹Inst. of Laser Physics SB RAS, ²Novosibirsk State Univ., ³Novosibirsk State Technical Univ., Russia

In this work fully quantum treatment of the atomic Mach-Zehnder interferometer was used to confirm the presence of recently discovered lineshape-asymmetry-caused shift. The theoretical model for compact interferometers-gravimeters with short baseline and relatively small pulse durations was developed from the first principles of quantum mechanics. Bragg transitions were considered due to counter-propagating light waves geometry of the atomic interferometer.

TuR10-15

18:15-18:30

Programming of integrated optical interferometers with a high level of thermal cross-talk interference

A.S. Argenchiev¹, I.V. Kondratyev¹, N.N. Skryabin^{1,2}, I.V. Dyakonov^{1,2}, S.S. Straupe^{1,2}, S.P. Kulik¹; ¹Lomonosov Moscow State Univ., Quantum Technology Centre, ²Russian Quantum Center, Russia

We developed a numerical model of a 16-mode interferometer using PyTorch optimization. By reconstructing 1231 internal parameters (including crosstalk), the model achieves high accuracy with a coefficient of determination of 0.9966, fully describing the physical device.

TuR10-16

18:30-18:45

The calculation of the entangling of the solitonpulses in the optical fibers

Yu.A. Mazhirina¹, L.A. Melnikov¹, A.A. Sysolyatin², A.D. Zverev², K.V. Zotov³; ¹Yuri Gagarin Stets Technical University of Saratov, ²A.M.Prokhorov General Physics Institute of RAS, ³NPO "Soliton", Russia

We propose to use discrete representation of the pulses, constructed from these counts autocorrelation matrix, its singular decomposition for calculation and measurement of pulse entanglement parameter - Schmidt information. The entanglement in different propagation regimes were calculated, experiment results for the pulses from ring fiber cavity excited by 6 W 1550 nm cw fiber laser are presented.

TuR10-17

18:45-19:00

Brillouin scattering as a tool for linear operations in optical neural networks.

I.V. Vovchenko^{1,2}, A.A. Zyablovsky^{1,2,3}, A.A. Pukhov^{1,3}, E.S. Andrianov^{1,2,3}; ¹Moscow Institute of Physics and Technology, ²Dukhov Research Institute of Automatics (VNIIA), ³Institute for Theoretical and Applied Electrodynamics, Russia

Neural networks use analog and digital coprocessors for acceleration. While digital is more precise, analog offers speed and energy efficiency. We demonstrate a novel analog coprocessor using ring resonators with Brillouin photon-phonon interaction coupled to a waveguide. The stationary waveguide mode intensity is proportional to a vector-matrix product, enabling linear computation. This scalable architecture supports parallel processing in the frequency domain with computation time determined mainly by the system's stabilization period.

TuR10-18

19:00-19:15

Controlling strong coupling with high intensity pump field

I.V. Doronin, A.A. Zyablovsky, E.S. Andrianov; FSUE VNIIA, Russia

We consider an optical nano system comprised of dye molecule and plasmon particle interacting in the strong coupling regime. We show that high amplitude coherent pumping of such structure results in restructuring of energy levels in this system, which in turns results in particular, in non-monotone dependence of luminescence intensity and linewidth on pumping intensity.

TuR10-19

19:15-19:30

Dynamics of a two-level system under incoherent modulated microwave excitation

I.A. Gulyaev^{1,2,3}, V.V. Soshenko^{4,5}, A.V. Akimov^{1,5}; ¹Russian Quantum Center, ²Kotelnikov Institute of Radioengineering and Electronics RAS, ³Lomonosov Moscow State University, ⁴Lebedev Physical Institute RAS, ⁵LLC Diamond Sensors, Russia

To improve the tracking speed of a resonance frequency, it is necessary to take into account the constraints of both the modulation characteristics and the dynamic range inherent in the lock-in detection system. In this work, we present a semi-analytical model that describes the dynamics of a two-level system subjected to modulated microwave excitation field under incoherent pumping conditions.

R11. LASERS FOR SPACE COMMUNICATION AND NAVIGATION

Location: Rihter 1+2 Room, Floor 3; Tuesday, June 23, 2026

R11. LASERS FOR SPACE COMMUNICATION AND NAVIGATION 1

- | | | | |
|---|-------------|---|-------------|
| <p>TuR11-01
 Nd:YAG lasers for new-generation satellite and lunar laser ranging (<i>Invited paper</i>)
 V.V. Koval, A.F. Kornev, Y.V. Katsev, R.V. Balmashnov, A.M. Makarov; Lasers and Optical Systems, Russia
 We present a suite of Nd:YAG lasers specifically engineered for high-precision space laser ranging. To address satellite and lunar ranging requirements, two picosecond systems were developed: a ruggedized unit for wide-ranging field temperatures (35 ps, 3 mJ at 532 nm, up to 1 kHz, -40 °C to +40 °C) and a high-energy lunar system (~65 ps, 730 mJ at 532 nm, 200 Hz featuring a 79% SHG efficiency).</p> | 09:00-09:30 | <p>TuR11-03
 Space -based gravimetric complex with laser interferometric sensors and a ground -based data processing system
 S.S. Donchenko, R.A. Davlatov; Federal State Unitary Enterprise "Russian Metrological Institute of Technical Physics and Radio Engineering", Russia
 A space-based gravimetric complex is proposed to improve gravitational mapping accuracy in high-latitude regions. The system integrates a central spacecraft, nanosatellites, laser interferometric sensors, and ground-based data processing to construct high-precision gravitational maps for navigation, geodetic, and hydrographic applications in the Arctic.</p> | 10:00-10:15 |
| <p>TuR11-02
 Compact highly coherent laser sources for sensing, navigation, and frequency standards (<i>Invited paper</i>)
 V.N. Treshchikov^{1,2}, E.A. Fomiryakov¹, D.R. Kharasov¹, S.P. Nikitin¹, D.E. Artemov¹, G.Y. Ivanov¹, A.V. Reznikov¹, O.E. Nani^{1,3}; ¹T8 Company group, ²Fryazino branch of the V.A. Kotelnikov Institute of Radio Engineering and Electronics, RAS, ³Department of Physics, Lomonosov Moscow State University, Russia
 A review of fiber coupled lasers developed by T8, LLC is given, including external cavity diode lasers (ECDL), distributed feedback Erbium-doped fiber lasers (DFB-FL) and InP-Si3N4 microring self-injection locked lasers. Relative intensity, phase noises and sensitivity to vibrations were measured. The application of these lasers for sensing, navigation, and frequency standards is discussed.</p> | 09:30-10:00 | <p>TuR11-04
 Ground terminal for high-speed space laser communication
 R.K. Lozov, S.V. Petushkov, V.V. Murashkin, V.E. Nesterova, V.V. Netkachev, T.K. Govorov, E.K. Ugrevitskiy, M.V. Maslovets, R.A.Leksina; JSC RPC "PSI", Russia
 This paper presents a multi-beam laser uplink terminal review, including operating principles and optical scheme.</p> | 10:15-10:30 |
| | | <p>TuR11-06
 Polarization analysis of quantum-optical systems for space laser communications using a modified BB84 protocol
 A.S. Akentev, A.L. Sokolov; JC "Research and Production Corporation "Precision Systems and Instruments", Russia
 This paper examines the polarization characteristics of a pointing system for quantum-optical systems for space laser communications. The polarization state of the beam at the guidance system's output was experimentally determined, and polarization losses were studied. A polarization analysis of the quantum-optical laser beam guidance system, which can be used for a ground-based space laser communications system, revealed a significant change in the orientation of the polarization plane depending on the beam direction.</p> | 10:30-10:45 |

- Coffee Break -

Location: Rihter 1+2 Room, Floor 3; Tuesday, June 23, 2026

R11. LASERS FOR SPACE COMMUNICATION AND NAVIGATION 2

- | | | | |
|---|-------------|--|-------------|
| <p>TuR11-07
 Applications of satellite laser ranging in GNSS (<i>Invited paper</i>)
 S.N. Karutin, V.D. Glotov, A.A. Pafnutev; Central Research Institute for Machine Building, Russia
 Based on the international experiments results and the experience of JSC TsNIIMash specialists, the following directions for using of Satellite Laser Ranging in Global Navigation Satellite Systems (GNSS) are considered: Determination of spacecraft orbits and monitoring their accuracy; Calibration of radio equipment; Synchronization of ground-based and onboard frequency standards; Refinement of coordinate systems.</p> | 11:30-12:00 | <p>TuR11-09
 Study of characteristics of erbium-doped NALM fiber lasers with different net cavity dispersion
 A.A. Filonov¹, V.S. Pivtsov^{1,2}, N.A. Koliada^{1,3}; ¹Institute of Laser Physics SB RAS, ²Novosibirsk State Technical University, ³Institute of Laser Physics SB RAS, Russia
 In this paper, we investigated characteristics of erbium fiber lasers with a nonlinear amplifying loop mirror (NALM) at different values of the net cavity dispersion (NCD) of the laser. During the work, an average output power, pulse duration, optical spectrum width, signal-to-noise ratio (SNR) of the first harmonic of laser intermode beats (LIB) and mode locking self-starting conditions were investigated.</p> | 12:15-12:30 |
|---|-------------|--|-------------|

TuR11-10

12:30-12:45

Adaptive control of laser beam parameters in radiation-hard ToF systems for space debris detection, autonomous docking and one-way optical synchronization

V.V. Davydov^{1,2}, A.V. Shavshin³, R.A. Dmitriev³, D.A. Boldarev³; ¹Peter the Great St.Petersburg Polytechnical University, ²St.Petersburg Electrotechnical University "LETI", ³St.Petersburg State University of Telecommunications, Russia

An adaptive laser beam pointing control method for spaceborne laser ranging and optical synchronization systems is presented. The system employs a photodiode array to measure the beam position and a closed-loop correction scheme based on a fast steering mirror. Simulation results demonstrate more than a fivefold reduction in angular drift, providing improved ranging accuracy and enhanced stability of the optical synchronization channel.

TuR11-11

12:45-13:00

Multidither adaptive optical system for real-time correction of turbulent laser beam distortions

P.M. Kuzmitsky¹, A.V. Kudryashov¹, V.A. Tikhonov², A.N. Nikitin¹; ¹Sadovsky Institute of Geosphere Dynamics RAS, ²JSC "PLANETA-SID", Russia

Multidither adaptive optical system has been developed for real-time correction of turbulent laser beam distortions. The correction is performed through five control channels with frequency separation, each reproducing a specific Zernike mode.

TuR11-12

13:15-13:30

Radiation hardness of InP DBR laser on photonic integrated circuit

K.M. Malakhov¹, A.A. Gorelov¹, I.Yu. Popova¹, T.A. Meleshko¹, R.K. Mozhaev², E.E. Kovalev¹, I.A. Kazakov¹, A.V. Shipulin¹; ¹Skoltech, ²National Research Nuclear University "MEPhI", Russia

A study of gamma-induced effects on InP-based DBR laser on photonic chip is presented. The laser was exposed to the total ionizing dose of 25 krad. The observed central wavelength red shift up to 0.38 nm might be explained as a result of competing processes: band filling and thermal effects. The radiation-hardening measures for long-term space missions are required.

TuR11-13

13:30-13:45

Interference and diffraction techniques for investigating the propagation of vector vortex beams

D.D. Reshetnikov¹, E.V. Malyutina¹, T.K. Korol¹, A.A. Ryzhaya², M.E. Pavelina¹, V.Yu. Venediktov^{1,2}, A.L. Sokolov³, V.M. Petrov¹; ¹St.Petersburg State University, ²St. Petersburg Electrotechnical University "LETI", ³National Research University "Moscow Power Engineering Institute", Russia

Various experimental techniques for the rapid control of vectorial polarization field modes in Mach-Zehnder and Michelson interferometers will be explored. The propagation of vector vortex polarization fields in media with optical turbulence will also be considered. To simulate optical turbulence, employing both a model with normally distributed refractive index fluctuations and a Kolmogorov spectrum. The potential for holographic detection of vortex beams in ring interferometers and interferometric circuits based on collinear beams has been investigated.

TuR11-14

13:45-14:00

Application of parallel-coupled resonators in optical resonant gyroscope with a broadband light source

Yu.V. Filatov, E.V. Shalymov, V.Yu. Venediktov; St.Petersburg Electrotechnical University "LETI", Russia

The subtypes of resonant optical gyroscopes with a broadband light source are briefly discussed and classified. Expressions are obtained that describe the operation of gyroscope subtypes with a broadband light source using multi-ring parallel-connected resonators. It has been demonstrated that the use of parallel-connected resonators allows for a significant increase in energy efficiency and sensitivity.

- Lunch Break -

R12. LASER ADDITIVE MANUFACTURING: PROCESSES, MATERIALS AND APPLICATION

Location: Stenberg 1 Room, Floor 3; Tuesday, June 23, 2026

R12. LASER ADDITIVE MANUFACTURING: PROCESSES, MATERIALS AND APPLICATION 1

TuR12-01

11:30-11:45

Advanced additive manufacturing of lead-free piezoceramics: enabling textured, multi-material, and topologically engineered devices.

I.V. Shiskovsky; Lebedev Physical Institute of RAS, Russia.

We demonstrate photopolymerization--based additive manufacturing of lead-free BaTiO₃, KNN, and NBT piezoceramics, achieving polymerization depths up to >100 μm (vs. <20 μm in Refs.) and d₃₃ = 148 pC/N for BaTiO₃. A custom multi-laser 3D printer, optimized pastes (≤50 vol.%), scalable digital workflow, and topological composites (0–3, 1–3, 3–3) were realized, enabling textured, high-efficiency piezodevices.

TuR12-02

11:45-12:00

The features of laser shock processing of AMG6 alloy

S.I. Kuznetsov, S.I. Yaresko, A.S. Panin, E.Yu. Tarasova, I.A. Bakulin; Samara Branch of P.N. Lebedev Physical Institute of RAS, Russia

The effect of laser shock processing without coating (LSPwC) using low-energy pulses (0.3 - 0.4 J) on the structure and stress state of deformable aluminum alloy AMg6, with a different crystallographic texture and a thickness of 4 - 14 mm before and after heat treatment, is considered. The effectiveness of LSPwC to create residual compressive stresses in an alloy to a depth greater than 2 mm, with a maximum surface stress of -300 MPa, is shown.

TuR12-03

12:00-12:15

Application of selective picosecond laser etching with circular polarization for precision 3D processing of quartz glassS.S. Lyubin^{1,2}, M.A. Murzakov¹, I.I. Ryashko¹; ¹LLC "VPG Laserone", ²National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), Russia

This study demonstrates the application of Selective Laser Etching (SLE) for high-precision machining of fused silica using a picosecond laser (15 ps pulse duration, 400 kHz). The use of circularly polarized radiation is emphasized to mitigate anisotropic scattering effects during internal modification. Optimal processing parameters were established, enabling the fabrication of complex 2D contours, such as micro-gears, with a cut taper angle less than 1°. The results confirm SLE as a potent tool for manufacturing micro-optical and microfluidic components.

TuR12-04

12:15-12:30

Neural network fusion of Rayleigh and Raman reflectometry for enhanced distributed temperature sensingN.V. Nikitin^{1,2}, Z. D. Evsiukhin^{1,2}, D.R. Kharasov¹, D.M. Bengalskii¹, V.N. Treshchikov¹; ¹T8 Company Group, ²MEPhI National Nuclear Research Univ., Russia

Enhanced accuracy and saving of spatial resolution for distributed temperature sensing are demonstrated by employing a recurrent neural network to combine the readings from Raman and Rayleigh phase-sensitive reflectometers. The proposed data fusion method effectively compensates for the inherent limitations of each individual sensing technique, as validated by experimental results.

TuR12-05

12:30-12:45

Laser drilling of micro holes in transparent media under three different conditionsV.N. Ivanov^{1,2}, M. Salhab², S.A. Chemchem², A.V. Vasilieva²; ¹JSC RPC S.I. Vavilov State Optical Institute, ²St.Petersburg Electrotechnical University "LETI", Russia

This study compares nanosecond laser drilling of glass, focusing on the effect of an absorbing coolant on drilling quality under dry, top-surface, and bottom-surface cooling conditions. The results indicate that localized top-surface cooling provides superior thermal management, reducing heat-affected zones, cracking and debris while improving hole geometry. These findings demonstrate the effectiveness of controlled cooling strategies for enhancing precision and surface integrity in laser drilling of transparent materials.

TuR12-06

12:45-13:00

Modern high-power laser sources and scanning systems for additive technologies

M. Lukyantsev; JSC "LLS", Russia

This work presents recent advancements in high-power blue (450 nm) and green (535 nm) fiber-coupled laser sources (BWT and analogs; Gongda Laser, VPG "Lazeruan") and Scanner Optics scanners for additive manufacturing. Advantages in processing metals and polymers, industrial 3D printing applications, and prospects for hybrid technologies integration are highlighted.

TuR12-07

13:00-13:15

High power lasers in additive manufacturing

K.D. Babkin; Institute of Laser and Welding Technologies, State Marine Technical University, SMTU, Russia

This study describes improvement in laser metal deposition additive technology through usage of high power fiber lasers. It is shown, that productivity of manufacturing process can be raised up in 5-10 times in comparison to traditional 2-3 kW laser machines. Higher power brings bigger melt pool size, higher powder utilization rate and through this significant reduction of manufacturing cost.

TuR12-08

13:15-13:30

Advanced materials for laser based - direct energy deposition technology

O.G. Klimova-Korsmik; Institute of Laser and Welding Technologies, State Marine Technical University, SMTU, Russia

This The study explores Laser-based Direct Energy Deposition (LB-DED) for producing advanced materials like basic alloys, metal-matrix composites (MMC), functionally-graded materials (FGM), and high-entropy alloys (HEA). LB-DED allows precise control over composition and properties. MMCs gain strength and heat resistance from carbide phases. FGMs combine multiple properties (e.g., corrosion resistance, strength) via layer-by-layer composition changes.

TuR12-09

13:30-13:45

Powder jet optimization in direct laser deposition: effect of carrier gas flow rate, lateral wire feed and nozzle position on a thin wall

M. Khomenko, D. Ronzhin, P. Rodin, M. Bannikov, I. Buzhin, A. Dubrov; NRC "Kurchatov Institute", Russia

A coupled model of aerodynamics and particle tracking is applied for feeding process optimization in direct laser deposition. Single-track thin wall fabrication on high carrier gas feed rate was shown to be optimal for catchment efficiency maximization.

- Lunch Break -

R08. NONLINEAR PHOTONICS: FUNDAMENTALS AND APPLICATIONS - POSTERS

Location: Congress Hall, Floor 1; Tuesday, June 23, 2026

- TuR08-p01** 15:00-18:30
Ultralinear accumulation of nonlinear noise in multi-span communication lines
 V.S. Anpilov^{1,3}, R.I. Shaidullin^{1,2}, Y.A. Tezadov³, M.A. Golubev²; ¹Moscow Institute of Physics and Technology, ²Fryazino branch of Kotelnikov Institute of Radio-Engineering and Electronics, ³LLC "VPG Laserone", Russia
 A model for determining the influence of nonlinear effects on optical noise generation for multi-span communication lines is proposed. This model allows for the complex nature of nonlinear noise accumulation in long-distance optical communication lines (over 1000 km).
- TuR08-p02** 15:00-18:30
The influence of nonlinear effects on the maximum transmission range of an optical signal over a fiber
 R.I. Shaidullin^{1,2}, V.S. Anpilov^{1,3}, Y.A. Tezadov³, M.A. Golubev²; ¹Moscow Institute of Physics and Technology, ²Fryazino branch of Kotelnikov Institute of Radio-Engineering and Electronics, ³LLC "VPG Laserone", Russia
 A theoretical dependence is proposed to determine the optimal parameters of an optical signal for transmitting information over a maximum distance.
- TuR08-p03** 15:00-18:30
From stationary to non-stationary generation of a superradiant laser with a change in its length
 E.R. Kocharovskaya, V.I.V. Kocharovsky; Institute of Applied Physics RAS, Russia
 Based on the numerical solution to the Maxwell-Bloch equations, typical dependences of the superradiant lasing modes on a length of a low-Q cavity are established. Particular attention is paid to the transition from steady-state to non-stationary lasing, which is determined by the structure and dynamic properties of the nonlinear polariton mode affected by the self-consistent half-wavelength population-inversion grating.
- TuR08-p04** 15:00-18:30
Superradiant vs self-modulation lasing of a nonlinear polariton mode in a low-Q Fabry-Perot cavity
 V.V. Kocharovskiy¹, E.R. Kocharovskaya¹; IAP RAS, Russia
 It is shown that, over a wide range of superradiant laser parameters, a nonlinear polariton mode exists that alters the transition from steady-state to nonstationary lasing. Instead of the typically assumed transition to a regime of quasi-periodic superradiance of short pulses, a weak quasi-sinusoidal modulation of the polariton mode emerges. The characteristics of both self-modulation and pulse superradiance are analyzed.
- TuR08-p05** 15:00-18:30
Low-phase-noise microwave generator based on a normal-dispersion Si₃N₄ microresonator
 C. Li^{1,2}, T.S. Tebeneva¹, V.E. Lobanov¹, D.A. Chermoshentsev^{1,3}, I.A. Bilenko^{1,2}, A.E. Shitikov¹; ¹Russian Quantum Center, ²Faculty of Physics, Moscow State University, ³Moscow Institute of Physics and Technology, Russia
 We obtained a low single-sideband (SSB) phase noise microwave generator at 10.67 GHz from a high-Q (10⁷) normal-dispersion integrated Si₃N₄ microresonator. The SSB phase noise is as low as -85 dBc/Hz at 10 kHz frequency offset.
- TuR08-p06** 15:00-18:30
Multi-frequency microcomb in normal-dispersion Si₃N₄ microresonators via multi-frequency self-injection locking
 C. Li^{1,2}, T.S. Tebeneva¹, V.E. Lobanov¹, D.A. Chermoshentsev^{1,3}, I.A. Bilenko^{1,2}, A.E. Shitikov¹; ¹Russian Quantum Center, ²Faculty of Physics, Moscow State University, ³Moscow Institute of Physics and Technology, Russia
 We report and study a regime of multi-frequency self-injection locking (MF-SIL) in a single-frequency DFB laser. This approach, implemented in a normal group-velocity dispersion (GVD) microresonator, allows the generation of various platycon-like multi-comb patterns, extending the capability of the established self-injection locking technique for laser stabilization and Kerr comb generation.
- TuR08-p07** 15:00-18:30
Systematics of harmonic mode-locking states in a soliton fiber laser
 V.A. Ribenek^{1,2}, P.A. Itrin¹, G.A. Tertyshnikova¹, D.A. Korobko¹, A.A. Fotiadi¹; ¹Ulyanovsk State University, ²SMC "Technological Centre", Russia
 While harmonic mode-locking (HML) in soliton fiber lasers effectively generates multi-gigahertz pulse trains, the simultaneous control of pulse repetition rate (PRR) and optical spectrum width (OSW) remains technically demanding. In this work, we experimentally achieve broad and continuous tunability of both PRR and OSW within an HML soliton fiber laser governed by nonlinear polarization evolution (NPE).
- TuR08-p08** 15:00-18:30
Control of single-pulse generation and optimization of harmonic mode-locking regime in a PM fiber-based soliton laser
 V.A. Ribenek^{1,2}, E.P. Kitsyuk², D.A. Korobko¹, A.A. Fotiadi¹; ¹Ulyanovsk State University, ²SMC "Technological Centre", Russia
 This work presents a study of the saturable absorber's role in a polarization-maintaining (PM) fiber laser based on a Semiconductor Saturable Absorber Mirror (SESAM). Numerical simulations revealed a narrow region within the cavity where precise placement of the SESAM ensures stable single-pulse operation at significantly higher gain levels, which was also confirmed experimentally.
- TuR08-p09** 15:00-18:30
Investigation of optical centers induced by two-photon absorption in KTP crystal
 D.S. Chunaev, S.B. Kravtsov, P.G. Zverev; Prokhorov General Physics Institute of RAS, Russia
 Optical centers in KTP crystal induced by irradiation with picosecond laser pulses at a wavelength of 523 nm by two-photon absorption have been studied. Numerical modeling allowed us to obtain the values of the TPA coefficient equal to 0.37 cm/GW and the absorption cross section of the induced optical centers equal to 2.1•10¹⁸ cm² for E//a polarization.
- TuR08-p10** 15:00-18:30
Behavior of cavity solitons in long Kerr resonators at high finesse limit
 G. Semaan, Y. Sun, N. Englebort, C. Simon, S.-P. Gorza, F. Leo; Belgium
 We investigate cavity solitons in a fiber Kerr resonator operated at tunable high finesse using distributed Raman gain. By compensating losses we access a long photon lifetime regime where soliton threshold, scaling laws, Raman self frequency shift, and noise properties are directly controlled. Experiments and theory reveal predictive design rules for high finesse soliton resonators.

- TuR08-p11 15:00-18:30
From terahertz to near-IR: multiband generation in a nonlinear barium-based crystal platform
 E.A. Migal¹, D.Z. Suleimanova¹, D.V. Badikov², F.V. Potemkin¹; ¹Moscow State University, ²Kuban State University, Russia
 We report recent advances in the development of near-, mid-, and far-infrared laser sources based on optical parametric amplification and difference-frequency generation in ternary and quaternary barium-containing nonlinear crystals. Their high damage threshold, strong nonlinearity, and broad transparency range make these materials highly attractive for developing efficient laser systems.
- TuR08-p12 15:00-18:30
Interferometer based on cold rubidium atoms for inertial sensing
 G.V. Osipenko, M.S. Aleynikov; FSUE Russian National Research and Development Institute of Physicotechnical and Radiotechnical Measurements (VNIIFTRI), Russia
 Accurate measurement of the absolute value of the free fall acceleration constant finds its application in various fields, such as geophysics, metrology, navigation, and fundamental science. We present the results of the development of an interferometer based on cold rubidium atoms.
- TuR08-p13 15:00-18:30
Angular and temperature phase matching curves for type 1 second harmonic generation of 1030 nm pulsed laser radiation in LiNa₅Mo₉O₃₀ (LNM) crystal
 D.A. Denisov¹, D.Yu. Demushkin¹, A.V. Konyashkin²; ¹Moscow Inst. of Physics and Technology (State Univ.), ²Fryazino branch of Inst. of Radio Engineering and Electronics RAS, Russia
 Type 1 second harmonic generation of pulsed laser radiation at 1030 nm was performed in lithium-sodium molybdate (LiNa₅Mo₉O₃₀, LNM) crystal. Angular and temperature phase matching tuning curves were studied.
- TuR08-p14 15:00-18:30
Tunable optical phase shifter cells based on thin films of phase-change materials
 A.A. Burtsev¹, A.V. Kiselev¹, V.A. Mikhalevsky¹, A.A. Nevzorov^{1,2}, V.V. Ionin¹, A.A. Lotin^{1,3}; ¹National Research Centre "Kurchatov Institute", ²University of Science and Technology MISIS, ³Mendeleev University of Chemical Technology, Russia
 Experimental results are presented on the optical phase shift of a free-space beam induced by the crystallization of controlled cells based on thin films of phase-change materials: Ge₂Sb₂Te₅, Ge₂Sb₂Se₄Te₁, Sb₂Se₃, and Bi₂Se₃. Crystallization was initiated by pulsed laser irradiation. A phase shift of the optical beam passing through the controlled phase-change material cell relative to the reference beam in a Jamin interferometer is demonstrated. Estimates of the phase shift based on analytical expressions and mathematical modeling are provided.
- TuR08-p15 15:00-18:30
Numerical dynamics of dual self-injection locking
 D.M. Sokol^{1,2}, A.E. Shitikov¹, I.A. Bilenko^{1,3}, D.A. Chermoshentsev^{1,2}; ¹Russian Quantum Center, Skolkovo, ²Moscow Institute of Physics and Technology, ³Faculty of Physics, Lomonosov Moscow State University, Russia
 We study soliton microcomb generation using a dual self-injection locking scheme, where two diode lasers are simultaneously locked to different modes of a high-Q microresonator. Numerical results reveal the nonlinear dynamics of dual-pump operation with a frequency separation of 2-FSR, enabling enhanced control of multi-pump microcomb systems.
- TuR08-p16 15:00-18:30
Simulation of relaxation of the plasma channel of a filament in air
 S.P. Skorik¹, D.E. Shipilo^{1,2}, O.G. Kosareva^{1,2}; ¹Faculty of Physics, Lomonosov Moscow State University, ²Lebedev Physical Institute RAS, Russia
 We numerically simulate relaxation of femtosecond plasma channel in air in order to determine the effect of the medium response evolution on the sequence of pulses. For the exponentially decaying filament plasma channel we obtained reduction by several times of the maximum electron density after the last pulse in a sequence of six ones sent into air with equidistant 10-ns delay.
- TuR08-p17 15:00-18:30
Widely tunable high-pulse energy mid-IR frequency-comb parametric source
 O.L. Antipov, I.D. Eranov, Yu.A. Getmanovskiy, V.V. Sharkov; Institute of Applied Physics of RAS (IAP RAS), Russia
 Mid-IR parametric oscillators with intracavity GaAs and Si plates of 30-100 μm thickness operating in nanosecond frequency comb regime were studied. A wide-band tuning of signal and idler frequency combs within 3.4-5.5 μm was implemented using the temperature control of the intracavity etalon. Additional ZGP parametric amplifier provided the pulse energy gain up to 40 mJ in a repetitively-pulsed mode.
- TuR08-p18 15:00-18:30
A linear time-invariant based model and experimental validation for optical time-domain reflectometry traces in dense wavelength division multiplexing systems
 V.S. Vazyulya^{1,2}, A.S. Remizova¹, A.N. Dorozhkin¹, K.A. Beklemysheva², V.N. Treschikov¹; ¹T8 NTC, ²MIPT, Russia
 Optical Time Domain Reflectometry (OTDR) is essential for diagnosing fiber-optic networks. This work presents a numerical simulation framework for OTDR traces, using a Linear Time-Invariant systems approach for arbitrary pulses. The framework was implemented in MATLAB and validated experimentally. It facilitates analysis and enables synthetic dataset generation, which is important for training event-identification algorithms for DWDM system testing.
- TuR08-p19 15:00-18:30
Self-starting picosecond pulse formation in laser systems with semiconductor optical amplifier and optoelectronic power feedback
 D.A. Khudozhitkova¹, A.E. Bednyakova¹, S. Boscolo², S.K. Turitsyn²; ¹Novosibirsk State Univ., Russia; ²Aston Inst. of Photonic Technologies, Aston Univ., UK
 We propose a new fiber laser system based on a semiconductor optical amplifier (SOA) with optoelectronic feedback, which uses a portion of the output radiation to modulate the current in the SOA. Numerical simulations demonstrate picosecond pulse generation from noise in this system without saturable absorbers or modulators.
- TuR08-p20 15:00-18:30
Analytical treatment of optical nonlinear susceptibility of atomic gases
 K.V. Lvov^{1,2}, S.Y. Stremoukhov^{1,2}; ¹Lomonosov Moscow State University, ²National Research Center "Kurchatov Institute", Russia
 The quantum-mechanical non-perturbative approach is used to calculate gaseous medium polarization. Through the natural expansion in the laser field of the matrix elements contained in the medium polarization, the analytical expression is obtained for the nonlinear susceptibility of an arbitrary order of a gaseous medium.

TuR08-p21

15:00-18:30

Nonlinear control of high-harmonic generation in a cadmium sulfide crystal via intense terahertz fields

M.A. Andreeva, E.A. Migal, D.Z. Suleimanova, F.V. Potemkin; Faculty of Physics, M.V. Lomonosov Moscow State Univ., Russia

We demonstrate that an intense terahertz (THz) field enables the generation of even-order harmonics and modulates the yield of high-order odd harmonics in CdS crystal. Semiclassical calculations show that the THz field effectively manipulates the intraband current underlying the nonperturbative light-matter interaction and leads to nonlinear response of the process as the THz field strength increases.

TuR08-p22

15:00-18:30

Non-diffracting propagation of conically refracted low-coherent light

S.H. Abdulrazak, V.Yu. Mylnikov, N.G. Deryagin, V.V. Dudelev, G.S. Sokolovskii; Ioffe Institute, Russia

We demonstrate that low-coherent illumination enables formation of non-diffracting Raman structures in conically refracted light and find that reduction of spatial coherence extends the distance of non-diffracting Raman structure propagation and decreases separation of Raman spots.

TuR08-p23

15:00-18:30

Random lasing and stimulated Raman scattering in highly porous nanostructured aluminum oxyhydroxide infiltrated with Rhodamine 6GM.A. Shevchenko¹, S.A. Savinov¹, N.V. Tcherniega¹, V.V. Voronova¹, S.F. Umanskaya¹, A.N. Maresev¹, A.N. Khodan², I.A. Stafeev²; ¹Lebedev Physical Institute of RAS, ²The Institute of Physical Chemistry and Electrochemistry RAS (IPCE RAS), Russia

Stokes lines of stimulated Raman scattering (SRS) in the emission spectra of random laser based on the porous structure of aluminum oxyhydroxides infiltrated with rhodamine 6G were detected. The spectral and temporal characteristics of random laser radiation coupled with SRS were investigated.

TuR08-p24

15:00-18:30

Calibrating the composition of low-alloy steels by Laser Induced Breakdown Spectroscopy and linear and nonlinear Machine Learning modelsM.V. Belkov¹, K.Y. Catsalap¹, M.A. Khodasevich¹, P.S. Kolodochka¹, A.V. Aseev²; ¹B.I. Stepanov Institute of Physics of NASB, Belarus; ²ITMO University, Russia

Linear (partial least squares) and nonlinear (support vector regression) machine learning models are created for calibration the composition of low-alloy steels using low-resolution laser induced breakdown spectra. Nonlinear calibration models are quantitative for 9 of the 12 chemical elements considered. Nonlinear models are characterized by higher prediction accuracy for concentration for 11 of the 12 elements compared to linear ones.

TuR08-p25

15:00-18:30

Modified Fresnel formulas for the case of oblique incidence on an isotropic gyrotropic medium

V.A. Diukov, K.S. Grigoriev, V.A. Makarov; Lomonosov Moscow State Univ., Russia

Modified Fresnel formulas for the oblique incidence of plane elliptically polarized electromagnetic waves on a flat boundary of a non-absorbing isotropic gyrotropic medium are obtained. We take into account the influence of near-surface inhomogeneity of the matter. Considering the optical activity of the medium and its near-surface layer leads to significant differences between the modified and classical Fresnel formulas.

TuR08-p26

15:00-18:30

Relationship between different approaches to describing three-dimensional laser fields

O.A. Shoutova, A.V. Andreev, V.R. Sadyrova; Lomonosov Moscow State University, Russia

Vortex optical fields attract attention for their subwavelength light-matter interaction properties. Recent 3D field descriptions include approach using Gell-Mann matrices and nine generalized Stokes parameters, which expands beyond the Poincaré sphere, lacks experimental measurability, and complicates observations. An alternative approach accounts for the longitudinal component with fewer parameters (\leq classical Stokes), offers full field restoration via experiment, but falls short for azimuthally polarized fields—requiring one additional parameter—and considers both symmetric/antisymmetric coherence matrix terms.

TuR08-p27

15:00-18:30

Third-harmonic generation of two-color femtosecond laser pulses focused into the ambient air

E. Gospodchikov, D. Fadeev, A. Korytin, A. Silaev, A. Stepanov; Institute of Applied Physics of RAS, Russia

We report both experimental and theoretical study of third harmonic generation (THG) of two-color femtosecond Ti:Sapphire laser radiation in ambient air. An adding a small part of second harmonic to the laser pulses significantly improves efficiency of the THG. Ionization currents dominate the THG at laser intensity above 100 TW/cm/cm, and the resulting laser plasma becomes the limiting factor.

TuR08-p28

15:00-18:30

Numerical simulation of the superradiance pulse train generation in a four-level medium

I.V. Kuzmin, E.R. Kocharovskaya; Federal Research Center Institute of Applied Physics of RAS, Russia

A model problem (2D+t) of the superradiance pulse train generation in a four-level medium is considered in the work. The generation is achieved under the condition of an inhomogeneous lasing line broadening, a low quality factor of a plane-parallel cavity and a high value of the cooperative frequency.

TuR08-p29

15:00-18:30

Unipolar emitter based on laser-induced surface breakdownM.V. Arkhipov¹, O.O. Dyachkova², A.A. Shimko², R.M. Arkhipov¹, N.N. Rozanov¹; ¹Ioffe Institute, RAS, ²St.Petersburg State University, Russia

We present a radio-photonics unipolar emitter based on a femtosecond laser spark on a metal wire. The spark induces a unidirectional current pulse, making the wire a unipolar antenna. We directly observe the emitted pulse transition from unipolar (non-zero electric area) in the near zone to bipolar in the far zone. This mechanism enables a compact source of ultrabroadband radiation with significant DC spectral content.

TuR08-p30

15:00-18:30

Optical breakdown of ZGP crystals under the influence of pulsed laser radiation in the IR rangeN.N. Yudin¹, O.L. Antipov², E.S. Slyunko¹, M.M. Zinoviev¹, V.S. Kuznetsov¹, D.V. Vlasov¹, M.M. Kulesh¹, S.N. Podzyvalov¹, A.B. Lysenko¹, A.Yu. Kalsin¹, I.D. Eranov²; ¹Tomsk State University, ²Institute of Applied Physics of RAS, Russia

This paper summarizes the mechanisms of the laser-induced damage (LID) of high-purity ZGP crystals under periodically pulsed nanosecond irradiation by a Ho³⁺:YAG laser at 2.1 μ m. The impact of processing techniques and the post-growing methods for polishing and anti-reflective coatings on the LID threshold are discussed. The importance of the defect structure of the crystal lattice and the parameters of transparent coatings for increasing the LID threshold are also discussed.

TuR08-p31

15:00-18:30

Stimulated cascade scattering on polaritons in Mg:LiNbO₃ crystal in the high parametric gain mode

M.A. Seleznev, K.A. Kuznetsov, G.Kh. Kitaeva; Faculty of Physics; M.V. Lomonosov Moscow State University, Russia

We report light scattering by THz polaritons in Mg:LiNbO₃ under intense 1064 nm pumping. Frequency-angular spectra near 532 nm reveal periodic emission structures attributed to sum- and difference-frequency generation involving the lowest polariton branch. The results are relevant for compact tunable sources in the visible, near-infrared, and high-power terahertz emitters based on nonlinear photonic materials.

TuR08-p32

15:00-18:30

Optical and nonlinear properties of bismuth-lead-germanate glasses

V.A. Aseev¹, Yu.K. Fedorov¹, A.N. Tsyarkin¹, B.S. Demin¹, A.O. Ismagilov¹, E.N. Oparin¹, N.V. Nikonov¹, M. Ghotbi²; ¹ITMO University, Russia; ²University of Kurdistan, Iran

Glasses based on heavy metal oxides possess high nonlinear refractive index values, which makes them promising materials for Raman amplifiers and optical fibers. The aim of this work was to study the nonlinear properties of glass system Bi₂O₃-GeO₂-SiO₂-PbO. The properties of the synthesized glasses were also investigated by differential scanning calorimetry, IR and Raman spectroscopy and Z-scan.

TuR08-p33

15:00-18:30

Revealing quiet regimes for integrated self-injection locked microcombs

A.K. Vorobyev^{1,2}, D.V. Morozov^{1,2}, A.E. Shitikov¹, N.Yu. Dmitriev¹, V.E. Lobanov¹, D.A. Chermoshentsev^{1,2}, I.A. Bilenko^{1,3}; ¹Russian Quantum Center, ²Moscow Institute of Physics and Technology, ³Faculty of Physics, Moscow State University, Russia

We experimentally and numerically examine coherent properties of optical frequency combs based on integrated Si₃N₄ microresonators. Using a self-injection locking technique, we generate frequency combs exhibiting microwave beat note at 21.3 GHz with the phase noise as low as -90 dBc/Hz at 10 kHz. We show that the dominant noise mechanisms arise from the pump frequency fluctuations.

TuR08-p34

15:00-18:30

Active element architecture of solid-state laser with spatially separated Er³⁺ and Yb³⁺ doped zone for implementing optical cooling

A.S. Ryzhov, A.V. Ivanov; ITMO University, Russia

We propose a novel active element architecture based on a laser crystal with spatially separated Er³⁺ and Yb³⁺ doped zones. This design aims to independently optimize 1.5 μm lasing in the Er³⁺ core and optical cooling via anti-Stokes fluorescence in the Yb³⁺ cladding, mitigating thermal limitations from energy transfer in co-doped systems for improved high-power laser performance.

TuR08-p35

15:00-18:30

High-Q semiconductor crystalline microresonators for mid-IR

T.S. Tebeneva¹, A.E. Shitikov¹, D.A. Chermoshentsev¹, K.N. Min'kov¹, V.E. Lobanov¹, I.A. Bilenko^{1,2}; ¹Russian Quantum Center, ²Faculty of Physics, Lomonosov Moscow State University, Russia

We demonstrate high-Q whispering gallery mode microresonators from crystalline germanium and gallium arsenide in the mid-IR range. The values of Q-factor are the highest ever recorded at 2.6, 4.6 and 8.6 μm for both materials. The obtained results open new possibilities for developing highly efficient devices for applications in areas like laser stabilization, nonlinear optics, and spectroscopy in the mid-IR.

TuR08-p36

15:00-18:30

On optical mode excitation in metal capillariesE.E. Popov^{1,2}, A.P. Kouzov¹, V.V. Vitkin², I.K. Chubchenko^{1,3}; ¹St.Petersburg State University, ²ITMO University, ³Mendeleev Institute for Metrology, Russia

The excitation of the E- and H- modes by focusing of a monochromatic beam onto a hollow metal capillary (MC) entrance is theoretically detailed. As found, a numerical aperture sets a bound on the number of excited optical modes. Transmission characteristics calculated provide grounding to use MCs as a means to enhance the Raman signals.

TuR08-p37

15:00-18:30

Laser-induced element redistribution in N-BK7 glass using nanosecond back-irradiation

H. Saleh¹, M.A. Baranov², Y.A. Konin³, A.A. Petrov¹; ¹Institute of Laser Technologies, ITMO University, ²International Research and Education Centre for Physics of Nanostructures, ITMO University, ³Perm State National Research University, Russia

We investigated the modified region produced in N-BK7 glass by nanosecond laser back-irradiation. The process forms a recondensed track surrounded by a stress-affected zone. Energy-dispersive X-ray spectroscopy (EDX) indicates redistribution of elements: Na and K are enriched in the track core, while Si and O show a relative decrease in the same region.

TuR08-p38

15:00-18:30

Continuous wave up-conversion mirrorless laser on aluminofluoride glass doped by Tm³⁺ and Yb³⁺ ions

A.S. Grabtchikov¹, G.D. Artykova¹, V.A. Orlovich¹, I.A. Khodasevich¹, L.Yu. Mironov², E.V. Kolobkova^{2,3}; ¹B.I. Stepanov Institute of Physics, NASB, Belarus; ²ITMO University, ³St.Petersburg State Institute of Technology (Technical University), Russia

In this report we describe the preliminary data on room temperature operation of the first continuous-wave up-conversion laser based on aluminofluoride glass with low phosphate content doped by thulium and ytterbium ions with emission generated in the blue, red, and deep red spectral ranges.

TuR08-p39

15:00-18:30

Formation of two- and three-particle quasiparticles in a controlled optomechanical system

E.A. Tereshchenkov^{1,2,3}, A.A. Zyablovsky^{1,2,3}, E.S. Andrianov^{1,2,3}; ¹Dukhov Research Institute of Automatics (VNIIA), ²Moscow Institute of Physics and Technology, ³Institute for Theoretical and Applied Electromagnetics, Russia

The existence of a third-order exceptional point in hybrid optomechanical systems is predicted and conditions for the implementation of it are found. The developed model offers a mechanism for controlling the composition and properties of quasiparticles. By changing only the frequency and the intensity of pumping, it is possible to "switch" the system between regimes where photonic, excitonic or phononic properties dominate.

TuR08-p40

15:00-18:30

Mode-locking in multicore fibers via controlling spatio-temporal nonlinear dynamics of light

E.A. Anashkina, A.V. Andrianov; A.V. Gaponov-Grekhov Institute of Applied Physics RAS, Russia

We propose and theoretically investigate ultrafast lasers utilizing active dual-core and multicore fibers (MCFs), functioning simultaneously as amplifying elements and saturable absorbers. We demonstrate that in MCFs with normal dispersion, stable generation of chirped pulses with output energies >10 nJ is achievable. This approach allows for near-infrared operation with silica MCFs and mid-infrared operation with soft glass MCFs.

TuR08-p41 15:00-18:30

Development of AgCl_{0.25}Br_{0.75} -TII fibers for infrared lasers and systems

P.V. Pestereva, A.A. Yuzhakova, E.A. Ermakov, I.V. Yuzhakov, D.D. Salimgarev, L.V. Zhukova; Ural Federal University, Russia

IR fibers based on the AgCl_{0.25}Br_{0.75} – TII single-crystal system were developed and manufactured. The fibers exhibit transmission in the 3.5–25.0 μm range and optical losses 0.40±0.05 dB/m in the 12–18 μm wavelengths.

TuR08-p42 15:00-18:30

New water in the skin layer: low-threshold stimulated Raman scattering and optical breakdownS.M. Pershin¹, V.A. Orlovich², A.I. Vodchits², I.A. Khodasevich², M.Ya. Grishin¹, G.A. Boldin¹, E.A. Cheshev³; ¹Prokhorov General Physics Institute of RAS, Russia; ²B.I. Stepanov Institute of Physics of NASB, Belarus; ³Lebedev Physical Institute of RAS, Russia

A near-surface water layer ("skin layer") of ~3 mm thickness was revealed using picosecond probing, showing an exceptionally low optical breakdown threshold (~2 μJ) and reduced thresholds for forward and backward stimulated Raman scattering (SRS). The physical mechanisms responsible for this near-surface restructuring are discussed.

TuR08-p43 15:00-18:30

Frequency and wavelength tunable picosecond laser source in 2.15 -2.35 spectral rangeA.I. Lobanov¹, E.M. Gafurov¹, S.A. Filatova¹, V.A. Kamynin¹, A.E. Bednyakova², A.A. Sysoliatin¹, I.A. Lobach³, Y.G. Gladush⁴, D.M. Krasnikov⁴, A.G. Nasibulin⁴, V.B. Tsvetkov¹; ¹Prokhorov General Physics Institute of RAS, ²Novosibirsk National Research State University, ³Institute of Automation and Electrometry of SB RAS, ⁴Skolkovo Institute of Science and Technology, Russia

A laser source generating picosecond pulses in the wavelength range from 2.15 to 2.35 μm with repetition rates from 22 to 108 MHz was demonstrated. The source is based on a master oscillator, which is a mode-locked holmium fiber laser, a holmium fiber amplifier and a nonlinear fiber doped with germanium oxide (GeO₂). The maximum achieved pulse energy was 348 pJ.

TuR08-p44 15:00-18:30

2D spatial hole burning in a multicore fiber laserA.Yu. Kolesnikova¹, A.G. Kuznetsov², E.V. Podivilov², S.A. Babin²; ¹Novosibirsk State University, ²Institute of Automation and Electrometry SB RAS, Russia

Strong optical coupling in multicore fibers enables spectrum collapse into a single narrow line, offering a path to extreme linewidth narrowing in high-power lasers. Modeling and experiments confirm that linewidth is controlled by core count, coupling strength, and FBG properties. The modified physics of broadening (spatial-hole-burning, Kerr effects) distinguishes multicore systems from single-core lasers. With many strongly coupled cores, high-power multicore lasers are predicted to achieve unprecedented spectral narrowing.

TuR08-p45 15:00-18:30

Dual-wavelength-tunable nanosecond pulse all-fiber Raman laserA.V. Ivanenko^{1,2}, V. Volosy^{1,2}; ¹Novosibirsk State University, ²Institute of Automation and Electrometry of SB RAS, Russia

This work demonstrates for the first time the efficient generation of synchronized pulses at spaced and synchronously tunable wavelengths in the 1.04-1.07 μm and 1.2-1.25 μm range in an all-fiber laser with a nested cavity.

TuR08-p46 15:00-18:30

Subwavelength model of a multilayer medium: from classical electrodynamics and justified experimentM.R. Konnikova^{1,2}, A.K. Tretyakov³, Yu.A. Akimov⁴, Yu.V. Kistenev³, A.P. Shkurinov¹; ¹Faculty of Physics, Lomonosov Moscow State University, ²National Research Center "Kurchatov Institute", ³Laboratory of Laser Molecular Imaging and Machine Learning, Tomsk State University, ⁴Troitsk Branch, Lebedev Physical Institute, RAS, Russia

The problem of determining the complex dielectric permittivity of subwavelength layers in the terahertz (THz) frequency range is considered. We propose a theoretical approach based on the analysis of THz radiation reflected from and transmitted through the sample under study. The complex dielectric constants of heterostructure elements were recovered over a wide range of dielectric constant values for TE and TM polarizations of THz radiation. The obtained data were used to design and fabricate tunable THz photonic devices.

TuR08-p47 15:00-18:30

Generation threshold reduction in Brillouin laser in hard excitation regime

A.R. Mukhamedyanov, E.S. Andrianov, A.A. Zyablovsky; VNIIA, Russia

We propose using a low-intensity seed wave to reduce the threshold of hard excitation in a Brillouin laser. The seed wave destabilizes the low-intensity state in the bistable regime, what leads to abrupt switching at lower pump powers. This opens the way for low-power optical transistors and logic elements.

TuR08-p48 15:00-18:30

Investigation of μ-SHG in electron-irradiated glassA.N. Terpitskiy^{1,2}, S.A. Scherbak^{1,2}, V.P. Kaasik^{1,2}, I.V. Reshetov¹, A.A. Lipovskii^{1,2}; ¹Alferov University, ²Peter the Great St. Petersburg Polytechnic University, Russia

We studied a micron-scale distribution of second optical harmonic signal generated by e-beam drawn patterns in a glass. Experiments with strips of charge provide insight into the electric field distribution within the near-surface region of the glass

TuR08-p49 15:00-18:30

Measurement of optical nonlinearity coefficients of integrated microresonatorsD.V. Morozov^{1,2}, A.K. Vorobyev^{1,2}, V.I. Pavlov¹, N.Yu. Dmitriev¹, A.E. Shitikov¹, D.A. Chermoshentsev^{1,2}, I.A. Bilenko^{1,3}; ¹Russian Quantum Center, ²Moscow Institute of Physics and Technology, ³Faculty of Physics, Moscow State University, Russia

This paper experimentally measures the optical nonlinearity coefficients in integrated silicon nitride microresonators. By applying slow and fast laser modulation, Kerr and thermal coefficients are separated, revealing that for most microresonators thermal nonlinearity significantly exceeds the Kerr effect. Results emphasize the critical role of thermal effects in microresonator nonlinear dynamics.

TuR08-p50 15:00-18:30

Strong- vs weak-coupling lasing in polymer-film microcavitiesD.A. Sannikov¹, N.M. Urazova¹, M.D. Kolker¹, A.V. Averchenko¹, G.D. Ivanov¹, A.D. Putintsev¹, L.T. Sahharova², N.S. Shlapakov², V.P. Ananikov², P.G. Lagoudakis¹; ¹Hybrid Photonics Laboratory, Skolkovo Institute of Science and Technology, ²Zelinsky Institute of Organic Chemistry, RAS, Russia

MeLPPP's rigid backbone, narrow exciton linewidth, and high photostability enable polariton lasing in microcavities. Cavity-length tuning reveals a crossover to photon lasing with a sharp threshold increase, emission energy pulling toward the gain maximum, and vibron-assisted relaxation reducing thresholds at resonances—establishing MeLPPP as a versatile platform for low-threshold coherent light sources.

- TuR08-p51 15:00-18:30
Investigating the Mott transition in VO₂ thin films using terahertz time-domain spectroscopy
 G.A. Kazakov, K.A. Kuznetsov; Lomonosov Moscow State University, Russia
 Terahertz transmission is investigated in a vanadium dioxide thin film via its thermal-induced metal-insulator phase transition. The experimental results obtained using terahertz time-domain spectroscopy demonstrate a significant change in the transmission function and validate the material's potential for developing terahertz modulators and detectors.
- TuR08-p52 15:00-18:30
Evolution of SHG tuning curves during optical poling of Ge-doped silica fibers
 A.Yu. Ostapiv¹, K.V. Zotov², N.V. Tereshchenko², A.V. Konyashkin³; ¹Moscow Institute of Physics and Technology, ²VPG "Laserone" LLC, ³Kotelnikov Institute of Radio-Engineering and Electronics of RAS, Russia
 We studied the evolution of second harmonic generation (SHG) tuning curves in optically poled fibers. Observed curve asymmetry, narrowing, and peak shifting. The phase-matching shift decreased from 30 m⁻¹ to 15 m⁻¹ over 33 hours, indicating dynamic χ^2 grating changes even with stable SH power. Simulations qualitatively reproduced the asymmetric shapes.
- TuR08-p53 15:00-18:30
Tunable narrowband terahertz generation in virtual PPLN
 A.I. Shugurov¹, S.B. Bodrov^{1,2}, M.V. Sarafanova¹, M.I. Bakunov¹; ¹University of Nizhny Novgorod, ²Institute of Applied Physics of RAS, Russia
 Generating tens-of-cycles long terahertz pulses by nonlinear mixing of o- and e-components of a femtosecond laser pulse in a bulk LiNbO₃ crystal is experimentally demonstrated. The achieved bandwidth is as narrow as 8 GHz at 0.47 THz. The central frequency was varied from 0.37 to 0.76 THz by slightly changing the incidence angle of the pump beam onto the crystal.
- TuR08-p54 15:00-18:30
Experimental comparison of microresonator -based radio-frequency generators
 N.S. Tatarinova^{1,2}, A.E. Shitikov¹, V.E. Lobanov¹, I.A. Bilenko^{1,3}, D.A. Chermoshentsev^{1,2}; ¹Russian Quantum Center, ²Moscow Inst. of Physics and Technology, ³Faculty of Physics, Lomonosov Moscow State Univ., Russia
 We demonstrate RF generation on a silicon nitride microresonator for compact, low-noise on-chip microwave sources. On the same platform we compare dual self-injection locking of two DFB lasers to adjacent modes, dual SIL to orthogonally polarized modes, microring-feedback-induced four-wave mixing in the laser gain medium, and single pump soliton microcomb generation, highlighting trade-offs in spectral purity, tunability, and experimental complexity.
- TuR08-p55 15:00-18:30
Non-principal cascading processes influence on the frequency tripling in quadratic medium
 D.M. Kharitonov¹, V.A. Trofimov¹, A.M. Sapronchev²; ¹Lomonosov Moscow State University, ²Skolkovo Institute of Science and Technology, Russia
 We show that the non-principal cascading processes (such as weak fourth harmonic generation followed by difference frequency generation) may influence third harmonic generation occurring at phase matching due to principal cascading process.
- TuR08-p56 15:00-18:30
Fabrication of high-Q BaMgF₄ microresonators for frequencycombs generation
 K. Min'kov^{1,2}, A. Vorobyev^{1,3}, T. Gorshkov^{1,4}, M. Mishevky⁴, A. Mkrtchyan⁴, A. Nasibulin⁴, Y. Gladush⁴, V. Lobanov^{1,4}, I. Bilenko^{1,5}; ¹Russian Quantum Center, ²Russian Metrological Institute of Technical Physics and Radio Engineering, ³Moscow Institute of Physics and Technology, ⁴Skoltech Center for Photonic Science and Engineering, Skolkovo Institute of Science and Technology, ⁵Faculty of Physics, Moscow State University, Russia
 Ultra-high-Q whispering gallery mode microresonators based on BaMgF₄ crystals are fabricated using diamond turning, annealing, and chemo-mechanical polishing. Quality factors up to 10⁹ at 1550 nm enable efficient optical frequency comb generation. The results demonstrate strong potential of BaMgF₄ microresonators for UV-visible nonlinear photonics.
- TuR08-p57 15:00-18:30
Solution of nonlinear Schrodinger equation by quadrature for optical communications
 P.Ya. Ilyushin¹, D.E. Shipilo^{1,2}, I.A. Nikolaeva^{1,2}, N.A. Panov^{1,2}, O.G. Kosareva^{1,2}; ¹Lomonosov Moscow State Univ., ²Lebedev Physical Inst., Russia
 An optical signal propagation model was built based on the Nonlinear Schrodinger Equation. We analyze it in the first approximation of perturbation theory and derive an expression for the solution part, which represents the Intersymbol Interference of the signal. On a set of initial signal shapes we demonstrate its applicability for modeling the nonlinear distortions in the Fiber-Optic Communication Lines.
- TuR08-p58 15:00-18:30
Dual-pulse generation in an Er/Yb-doped fiber laser
 I.A. Volkov^{1,2}, A.V. Sudin¹, S.N. Ushakov^{1,3}, K.N. Nishchev¹; ¹National Research Ogarev Mordovia State University, ²Ulyanovsk State University, ³Prokhorov General Physics Institute of RAS, Russia
 Dual-pulse were generated in a double-clad Er/Yb fiber laser with passive mode locking based on nonlinear polarization rotation (NPR). Their spectral and temporal characteristics are also investigated.
- TuR08-p59 15:00-18:30
Bandpass sampling in terahertz time-domain spectroscopy imaging
 A.A. Rybak^{1,2}, S.A. Kuznetsov^{1,2,3}, N.A. Nikolaev^{1,2}; ¹NSU, Russia, ²Institute of Automation and Electrometry, ³Rzhanov Institute of Semiconductor Physics, Russia
 We demonstrate the implementation of terahertz time-domain spectroscopy imaging with undersampled data using a custom-designed bandpass filter. The undersampling technique was experimentally tested, showing a reduction in data acquisition time without a noticeable loss in accuracy. The approach can be promising for narrow-band spectral imaging applications, particularly in non-destructive testing, detection of hidden terahertz tags or substances with characteristic fingerprints.
- TuR08-p60 15:00-18:30
Optimization of terahertz radiation output from Mg:LiNbO₃ crystal via silicon adapters in the Cherenkov generation scheme
 S.A. Kalmanov^{1,2}, P.A. Chizhov², D.A. Safronenkov¹, K.I. Zaytsev², G.Kh. Kitaeva¹; ¹Faculty of Physics, Lomonosov Moscow State Univ., ²Prokhorov General Physics Inst. of RAS, Russia
 We study the ways to optimize silicon adapters for efficient extraction of terahertz radiation from Mg:LiNbO₃ crystals. Unlike previous studies, our approach explicitly accounts for the extended spatial nature of the nonlinear-optical source. Results demonstrate that conical adapters provide superior sideways output and collimation for such distributed sources compared to prism-lens or traditional prism systems.

TuR08-p61

15:00-18:30

Wavelength tuning of a random fiber laser via an embedded SNAP active core microresonator controlled by external pumping

D.V. Kudashkin, O.A. Gorbunov, I.D. Vatik; Novosibirsk State University, Russia

We demonstrate tunable single-mode operation in a random fiber laser with an integrated SNAP microcavity made of active-core fiber. Laser generation occurs at the microcavity resonance with a linewidth of ~10 MHz. The system is tuned via pump-induced thermal shifts of the microcavity and is capable of tuning by ~15 pm.

TuR08-p62

15:00-18:30

Tilted-pulse-front terahertz generation in a plane-parallel LiNbO₃ plate

S.B. Bodrov^{1,2}, M.A. Kurnikov¹, M.V. Sarafanova¹, M.I. Bakunov¹; ¹University of Nizhny Novgorod, ²Institute of Applied Physics RAS, Russia

A new scheme of optical-to-terahertz conversion of tilted-pulse-front laser pulses in a plane-parallel, rather than commonly used prism-shaped, LiNbO₃ crystal is experimentally demonstrated. The scheme has a potential of scaling up the terahertz yield by using large-size LiNbO₃ wafers and wide-aperture terawatt-level pump laser beams.

TuR08-p63

15:00-18:30

"Resonant" 3D-trajectories of oblique rays in significantly multimode optical fibers

A.A. Makovetskii, D.V. Ryakhovskii, S.M. Popov, A.A. Zamyatin; Kotelnikov Institute of Radio Engineering and Electronics of RAS, Russia

A numerical calculation of 3D-ray trajectories with the same "resonant" caustic coefficient χ , but with different angles of radiation entry into the optical fiber θ_i , was performed. These angles correspond to the propagation angles of a family of hybrid modes with a caustic coefficient close to χ . The ray exit points optical fiber's end form a "resonant" structure on it.

TuR08-p64

15:00-18:30

TIR-based terahertz output coupler

M.A. Kurnikov, M.I. Bakunov; Department of Radiophysics, Lobachevsky State University of Nizhny Novgorod, Russia

We present a new element of terahertz photonics for extracting terahertz radiation from semiconductor substrates of photoconductive antennas. The element is a truncated silicon paraboloid. Unlike the commonly used substrate lenses, the radiation is totally internally reflected by the paraboloid's convex surface and propagates through its cross-section into free space with the 70% efficiency as a parallel beam.

TuR08-p65

15:00-18:30

Photonic microwave generator via laser in gain switch regime stabilised by microresonator

A.E. Shitikov¹, C. Li^{1,2}, T.S. Tebeneva¹, V.E. Lobanov¹, I.A. Bilenko^{1,2}, D.A. Chermoshentsev¹; ¹Russian Quantum Center, ²Faculty of Physics Lomonosov MSU, Russia

We have developed a frequency-comb-based tunable microwave generator utilizing a gain-switched self-injection-locked distributed feedback laser diode. A microwave signal is used to modulate the current of the DFB laser. The result beatnote between Kerr comb lines and sidebands of the modulated pump enables the generation of tunable, low phase noise sidebands at modulation frequencies around the platicon repetition rate.

TuR08-p66

15:00-18:30

Half-cycle light pulses in laser induced plasma mirrors: microscopic mechanism of generation

R.M. Arkhipov, M.V. Arkhipov, N.N. Rosanov; Ioffe Institute, Russia

We report a mechanism for generating tailored half-cycle optical transients via reflection of a single-cycle pulse from a plasma with a tailored inhomogeneity. The approach allows deterministic control over the temporal pulse profile by designing the initial spatial density gradient of the target.

TuR08-p67

15:00-18:30

Picosecond stimulated Raman scattering in aqueous solution of sodium nitrate

A.I. Vodchits¹, V.A. Orlovich¹, I.A. Khodasevich¹, L.E. Batay¹, S.M. Pershin², E.A. Cheshev³; ¹Institute of Physics, NASB, Belarus; ²General Physics Institute, RAS, ³Physical Institute, RAS, Russia

Stimulated Raman scattering (SRS) is investigated in saturated aqueous solution of sodium nitrate using picosecond (50 ps) laser pulses at 532 nm. The SRS generation of four Stokes components (near 564, 599, 639, and 685 nm), and two anti-Stokes components (near 504 and 479 nm) has been obtained. The maximum SRS efficiency for the second Stokes component reached about 30 %.

R01. SOLID STATE LASERS

Location: Stenberg 1 Room, Floor 3; Wednesday, June 24, 2026

R01. SOLID STATE LASERS 3

- | | |
|---|---|
| <p>WeR01-14
09:30-10:00</p> <p>High power kilohertz thin disk amplifier with 616mJ pulse energy and 586 fs pulse duration (<i>Invited paper</i>)
Huang Zhou¹, Renchong Lv^{1,2}, Lei Feng¹, Sen Tian¹, Jiangfan Pan¹, Yong Zhen^{1,3}, Peng He¹, Wenlong Tian³, Jiangfeng Zhu³, Xinkui He^{1,2}, Zhiyi Wei^{1,2}; ¹Songshan Lake Materials Laboratory, ²Institute of Physics, CAS, ³School of Optoelectronic Engineering, Xidian University, China</p> <p>Addressing OPCPA's demand for high-energy pump sources, we are developing a kHz thin-disk Yb:YAG amplifier system. The broadband seed laser integrating a solid-state oscillator and a spectrum-shaped Yb:CALGO pre-amplifier (>5 nm BW) feeds sequential amplification stages: a regenerative amplifier and three multi-pass amplifiers, achieving pulse energy of 616 mJ. Grating compression (1740 l/mm, 93% throughput) yields 586-fs pulse length with PW-scale applicability.</p> | <p>WeR01-16
10:15-10:30</p> <p>Energy scaling of Yb:YAG thin-disk amplifier utilizing a novel multi-pass telescopic scheme
A.I. Gorokhov, E.A. Perevezentsev, M.R. Volkov, I.B. Mukhin; Federal Research Center A.V. Gaponov-Grekhov Institute of RAS (IAP RAS), Russia</p> <p>A new unique multi-element amplifier employing a multi-pass telescopic scheme including two Yb:YAG thin-disk AEs, each pumped by 2.5kW diode is constructed. SSG 1.7 per pass with good beam quality was obtained after 8 passes. 245mJ output signal was obtained within 7mJ input signal. 10% optical-to-optical efficiency for output signal ~500mJ is expected after increasing input signal to 15mJ.</p> |
| <p>WeR01-15
10:00-10:15</p> <p>High aperture Yb:YAG single crystal disk laser head for noncryogenic high energy lasers: design and study
E.A. Perevezentsev, M.R. Volkov, A.I. Gorokhov, G.A. Kurnikov, I.B. Mukhin; Federal research center A.V. Gaponov-Grekhov Institute of Applied Physics of RAS (IAP RAS), Russia</p> <p>This work presents a novel room-temperature laser head using a Yb:YAG single crystal as a high-aperture active mirror, designed to replace costly, cryogenically-cooled ceramic amplifiers. Pumped by a 70kW diode module at 940nm, 11J of stored energy at 10Hz was achieved. The two laser head system is intended for a 10J, 10Hz laser under development at IAP RAS.</p> | <p>WeR01-17
10:30-10:45</p> <p>Subnanosecond NV-diamond laser for shadow registration of fast processes
E.D. Zaloznaya, A.D. Savvin, A.E. Dormidonov; Dukhov Automatics Research Institute (VNIIA), Russia</p> <p>The report demonstrates for the first time the use of a subnanosecond megawatt laser based on NV color centers in diamond as an illumination source for shadow recording of fast processes. A significant increase in the resolution of the shadow method is shown due to the low temporal coherence of the light illuminated the object under study.</p> |
| | <p>WeR01-18
10:45-11:00</p> <p>Dual-wavelength generation via angular filtering in mode-locked Nd:YVO₄ lasers
S. Alipour, M. Jandaghi, E. Barati, Z. Mohammadzahery, M. Abrishami; Iranian Institute of Laser Science and Technology, Iran</p> <p>We demonstrate wavelength switching in a mode-locked Nd:YVO₄ laser by selectively amplifying spontaneous-emission photons using angular filtering with a dual-pinhole aperture. Without altering the cavity design, the laser switches between 1064 nm and 1086 nm. At 3.5 W pump power, the two configurations generate a 9 nJ and 4 nJ pulses, respectively, at ~79 MHz repetition rate.</p> |

- Coffee Break -

Location: Stenberg 1 Room, Floor 3; Wednesday, June 24, 2026

R01. SOLID STATE LASERS 4

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|---|--|
| <p>WeR01-19
11:30-12:00</p> <p>Femtosecond Cr:ZnS(e) mid-infrared lasers (<i>Invited paper</i>)
Ka Fai Mak; School of Optical and Electronic Information, Huazhong University of Science and Technology, China</p> <p>To be provided later.</p> | <p>WeR01-21
12:15-12:30</p> <p>1.6-Watt femtosecond Cr²⁺:ZnSe laser for Raman soliton generation
E.A. Kozlova, D.T. Batov, V.S. Voropaev, M.K. Tarabrin; Science and Education Center for Photonics and IR-Technology, Bauman Moscow State Technical University, Russia</p> <p>This study presents the development of a 1.6-W femtosecond Cr²⁺:ZnSe laser with a pulse duration of 83 fs at 2.44 μm. This source enabled the generation of a Raman soliton at 2.7 μm via the self-frequency shift in a ZBLAN fiber, with an output power of 240 mW.</p> |
| <p>WeR01-20
12:00-12:15</p> <p>Tapered planar waveguide Yb:YAG laser amplifier
I.I. Kuznetsov, S.A. Chizhov, O.V. Palashov, I.B. Mukhin; Nonlinear Dynamics and Optics Department, A.V. Gaponov-Grekhov Institute of Applied Physics of RAS, Russia</p> <p>Simple design of Yb:YAG amplifier based on a tapered planar waveguide geometry is implemented. High beam quality preservation after amplification is demonstrated despite the multimode structure of the waveguide. 87 W output power is achieved, and great potential for the further average and peak power scalability is visible.</p> | |

WeR01-22

12:30-12:45

Luminescence and laser generation dynamics in Fe²⁺:ZnSe crystal under a two-photon ionization

A.A. Ushakov¹, A.A. Sirotkin¹, P.A. Chizhov^{1,2}, V.V. Bulgakova¹, T.V. Dolmatov¹, E.M. Gavrishchuk³, Yu.L. Kalachev¹, I.G. Kononov¹, S.V. Podlesnykh^{1,4}, K.N. Firsov¹; ¹Prokhorov General Physics Institute of RAS; ²Moscow Institute of Physics and Technology; ³G.G. Devyatikh Institute of Chemistry of High-Purity Substances of RAS; ⁴Vernadsky Institute of Geochemistry and Analytical Chemistry, Russia

The effect of two-photon ionization by femtosecond laser pulses with a central wavelength of $\lambda = 800$ nm on the luminescence and generation parameters in the spectral range $\lambda = 3.5 - 5$ μm of a Fe²⁺:ZnSe crystal optically pumped by Cr³⁺:Yb³⁺:Ho³⁺:YSGG has been studied. Fe²⁺:ZnSe crystal ionization significantly affected the shape and amplitude of the luminescence and generation pulses.

WeR01-23

12:45-13:00

1.94 μm Tm³⁺:YAP laser beam profiling through upconversion in LiYF₄:Ho³⁺ ceramic

K.E. Sumachev, A.P. Savikin, V.V. Sharkov; Lobachevsky State University of Nizhny Novgorod, Russia

The spatial-energy parameters measurement of 1.94- μm Tm³⁺:YAP laser through upconversion in LiYF₄:Ho³⁺ ceramics was presented. The energy transfer processes responsible for upconversion luminescence of Ho³⁺ in LiYF₄:Ho³⁺ ceramics were analyzed. The beam intensity profile of 1.94- μm Tm³⁺:YAP was obtained using CCD. The dependence of the luminescence intensity profile of LiYF₄:Ho³⁺ ceramics on the excitation radiation power was investigated.

- Lunch Break -

Location: Stenberg 1 Room, Floor 3; Wednesday, June 24, 2026

R01. SOLID STATE LASERS 5

WeR01-24

15:15-15:45

Acousto-optic control for ultrashort laser pulses (Invited paper)

K.B. Yushkov; Univ. MISIS, Russia

Various acousto-optic devices have become essential components of high-power ultrashort-pulse lasers. We overview different advanced acousto-optic techniques for controlling femtosecond lasers. They include adaptive dispersion management, regenerative gain narrowing control, high-resolution pulse shaping, carrier-envelope-phase stabilization, multi-GHz chirped pulse modulation, and spatial beam shaping.

WeR01-25

15:45-16:00

Experimental evidence for low-frequency phase noise caused by spontaneous emission in amplified fiber lasers.

S.P. Nikitin¹, G.Y. Ivanov¹, A.Y. Danilov^{1,2}, O.E. Nani^{1,3}, and V.N. Treshchikov^{1,4}; ¹T8 Company Group, ²MEPhI National Nuclear Research Univ, ³M.V. Lomonosov Moscow State Univ., Phys. Dept., ⁴V.A. Kotelnikov Institute of Radio Engineering and Electronics, Russia

Measurements of Erbium doped fiber laser phase noise has been performed in a broad frequency range from 1 Hz to 100 MHz by using modified delayed self-heterodyning interferometric technique. An observed excessive flicker phase noise at sub-kHz frequencies is shown to be consistent with thermal perturbations caused by spontaneous emission earlier suggested theoretically in addition to thermorefractive and thermomechanical noises.

WeR01-26

16:00-16:15

Portable system for laser frequency stabilization in metrology and quantum computing applications

M.I. Shakirov¹, K.S. Kudayarov¹, D.S. Kryuchkov¹, K.Yu. Khabarova¹, and N.N. Kolachevsky^{1,2}; ¹P.N. Lebedev Physical Institute of RAS, ²Russian Quantum Center, Skolkovo, Russia

A transportable frequency stabilization system based on a high-finesse optical cavity was implemented. A laser with a wavelength of 1550 nm, stabilized by the system, achieved a fractional frequency instability of less than 2×10^{-15} for averaging times from 0.2 to 4 seconds and can be utilized for quantum metrology, sensing, and communications.

WeR01-27

16:15-16:30

Compact single-polarization single-frequency DBR laser at 978 nm

A.N. Abramov¹, A.A. Rybalovskiy², D.A. Davydov², M.E. Likhachev², A.S. Lobanov¹, D.S. Lipatov¹; ¹Institute of Chemistry of High-Purity Substances of RAS; ²Prokhorov General Physics Institute of RAS, Dianov Fiber Optics Research Center, Russia

A single-polarization single-frequency fiber laser operating at 978 nm has been obtained using a photosensitive ytterbium-doped polarization-maintaining fiber embedded with a distributed Bragg reflector (DBR) resonator as short as 14 mm long. Record-breaking continuous-wave lasing for the developed fiber laser has been demonstrated (30% overall pump-to-single-frequency conversion efficiency, 17% in one direction).

WeR01-28

16:30-16:45

Application of machine learning methods for stabilization of single-frequency fiber laser

A.S. Gemuzov¹, P.A. Itrin², A.E. Bednyakova¹, I.S. Panyaev², A.A. Redyuk¹, D.A. Korobko², A.A. Fotiadi², M.P. Fedoruk¹; ¹Novosibirsk State University, ²Ulyanovsk State University, Russia

Stabilization of a single-frequency fiber laser using a ring fiber cavity for self-injection locking of a standard DFB laser has been demonstrated. The classical PID controller was replaced by neural network controllers, including an LSTM-based behavioral cloning model and a TD3 reinforcement learning agent for PID gain optimization, with their performance compared on experimental data.

WeR01-29

16:45-17:00

Laser wavelength stabilization based on an optoelectronic oscillator

G.S. Voronkov, V.V. Ivanov, V.S. Lyubopytov, I.V. Stepanov, E.P. Topolskaya; ¹Ufa University of Science and Technology, Russia

An optoelectronic-oscillator-based control loop is proposed for laser wavelength stabilization, converting laser-filter frequency offset into a microwave error signal processed to drive the laser. Noise from the oscillator, photodetector, and amplitude detector is calculated, and the Allan variance analysis shows instability comparable to that of Pound-Drever-Hall systems with a simpler implementation and no precision resonator temperature control.

- Coffee Break -

Location: Stenberg 1 Room, Floor 3; Wednesday, June 24, 2026

R01. SOLID STATE LASERS 6

- WeR01-30 17:30-18:00
- Multi-center heterogeneous-core Bismuth-doped fibers for multi-band lasers and amplifiers** (*Invited paper*)
S.V. Alyshev¹, S.A. Ostrikov¹, A.V. Elopov¹, D.I. Oleinik², A.A. Umnikov², A.V. Kharakhordin¹, A.M. Khagai¹, E.G. Firstova¹, M.A. Melkumov¹, S.V. Firstov¹; ¹Prokhorov General Physics Institute of RAS, Dianov Fiber Optics Research Center; ²G.G. Devyatikh Institute of Chemistry of High Purity Substances of RAS, Russia
A concept for a multi-center bismuth-doped fiber with a heterogeneous glass core is proposed as a promising active medium for multi-band lasers and amplifiers. We demonstrate Bi-doped fibers with the cores made of P2O5-SiO2, GeO2-SiO2, and Al2O3-SiO2 glass layers. This provides favorable conditions for the formation of each type of BAC, enabling the achievement of good performance.
- WeR01-31 18:00-18:15
- Thermal activation of "hidden" capabilities as a new approach to increasing optical gain in bismuth-doped fibers**
A.V. Kharakhordin¹, K.E. Riumkin¹, S.V. Alyshev¹, A.M. Khagai¹, E.G. Firstova¹, A.A. Umnikov², M.A. Melkumov¹, S.V. Firstov¹; ¹Prokhorov General Physics Institute of RAS; ²G.G. Devyatikh Institute of Chemistry of High-Purity Substances of RAS, Russia
We propose a new approach to improving the gain properties of bismuth-doped fibers by increasing the content of bismuth active centers (BACs) through intelligent thermal processing. As a result, 90% of Bi ions containing in a fiber can be transformed into BACs, where ~60% of the BACs is thermally converted from "dark" forms, while 30% BACs are formed during fabrication.
- WeR01-32 18:15-18:30
- Bi-doped fibers with a GeO₂-Al₂O₃-P₂O₅-SiO₂ core for lasers and amplifiers in the T+O-telecom bands**
D.S. Lipatov¹, D.F. Burmistrov¹, F.V. Afanasiev¹, A.N. Abramov¹, A.S. Lobanov¹, S.A. Ostrikov², A.V. Kharakhordin², K.E. Riumkin², E.G. Firstova², S.V. Alyshev², A.M. Khagai², S.V. Firstov², M.A. Melkumov²; ¹G.G. Devyatikh Institute of Chemistry of High-Purity Substances of RAS; ²Prokhorov General Physics Institute of RAS, Dianov Fiber Optics Research Center, Russia
Bi-doped fibers with a germanoaluminophosphosilicate glass core were fabricated using the MCVD process. In such fibers, a new type of bismuth active center (BAC) with a gain band peaked at 1240 nm was revealed. The fibers with discovered BACs was used as the active media for a 30-dB amplifier and a watt-level laser operating in the T+O-telecom band.
- WeR01-33 18:30-18:45
- Triggering and control of different pulsed regimes in all-fiber lasers by using negative optical feedback**
B.N. Nyushkov^{1,2}, M.D. Radchenko^{1,2}, I.I. Korel^{1,2}; ¹Novosibirsk State Technical University, ²Institute of Laser Physics SB RAS, Russia
We explored pulsed regimes accessible in rare-earth-doped all-fiber lasers with negative optical feedback (NOF). We demonstrate that the dynamics of NOF-induced cross-gain modulation and the resulting pulsed generation can be controlled by varying the optical lengths of the NOF and laser cavity. This enables the selection of different lasing regimes to generate either pulse bursts, single pulses, or multi-pulse trains.
- WeR01-34 18:45-19:00
- Bidirectional pulse generation in fiber laser using Yin-Yang double-feedback resonator**
B.N. Nyushkov^{1,2}, M.D. Radchenko^{1,2}, I.I. Korel^{1,2}; ¹Novosibirsk State Technical Univ., ²Inst. of Laser Physics SB RAS, Russia
We demonstrate synchronous bidirectional pulse generation in a minimalistic, continuously pumped Yin-Yang fiber laser without the use of modulators or saturable absorbers. Its Yin-Yang resonator provides both positive and negative feedback to the gain medium. This enables self-sustained cross-gain modulation and pulsed lasing, which were explored numerically for various rare-earth-doped fiber lasers and experimentally investigated in an Er-doped fiber laser.
- WeR01-35 19:00-19:15
- Amplitude, phase and polarization analysis of ultrashort pulses from non-PM fiber laser**
D.T. Batov¹, V.S. Voropaev¹, S.I. Mizgirev¹, R. Trebino², V.A. Lazarev¹, M.K. Tarabrin¹; ¹Science and Education Center for Photonics and IR-Technology, Bauman Moscow State Technical University, Russia; ²School of Physics, Georgia Institute of Technology, USA
The importance of the full vectorial characterization of ultrashort pulses generated by non-PM fiber lasers was shown. The pulse characteristics are measured using TURTLE principle and SHG FROG setup directly at the mode-locked thulium-doped fiber laser output and after an isolator with polarization mode dispersion. The complex polarization, intensity, and phase evolution across the ultrashort pulse were demonstrated and analyzed.

R02. HIGH POWER LASERS: FIBER, SOLID STATE, GAS AND HYBRID

Location: Deyneka 1+2 Room, Floor 2; Wednesday, June 24, 2026

R02. HIGH POWER LASERS: FIBER, SOLID STATE, GAS AND HYBRID 1

- WeR02-01 11:30-12:00
- High-power narrow-band lasers based on multimode and multicore fibers and components for high-power lasers** (*Invited paper*)
S.A. Babin; Institute of Automation and Electrometry SB RAS, Russia
We review recent developments on multicore/multimode fiber lasers with direct LD pumping and fiber components allowing for their high-power operation, all-fiber performance and comprehensive spatio-spectral control, which reveal new physical effects such as combined Raman and Kerr beam cleaning, spatio-spectral filtering by regular and random refractive-index structures in multimode graded-index fibers, beam localization and spectrum collapse in multicore fibers.
- WeR02-02 12:00-12:30
- Passively mode-locked ultrashort pulse fiber lasers** (*Invited paper*)
Li Li¹, Bin Zhang², Song Yang³, Lei Jin²; ¹Harbin Institute of Technology, ²Harbin Engineering University, ³Institute of Semiconductors, Chinese Academy of Sciences, China;
Ultrashort infrared pulse sources were widely applied in the fields of industrial processing and optical communication. My presentation introduces the recent development of passively mode-locked Er- and Tm-doped fiber lasers for generation of pico- and femto-second pulses at 1.5 μm and 2.0 μm band, particularly with two-dimensional materials and mixed-dimensional heterostructure as saturable absorber.

WeR02-03

12:30-12:45

Tapered Er -Yb-doped fiber amplifier

E.K. Mikhailov¹, A.E. Levchenko¹, V.V. Velmiskin¹, T.S. Zaushitsyna¹, M.M. Bubnov¹, D.S. Lipatov², M.E. Likhachev¹; ¹Prokhorov General Physics Institute of RAS, Dianov Fiber Optics Research Center of RAS, ²G.G. Devyatikh Institute of Chemistry of High Purity Substances of RAS, Russia

We demonstrate the first tapered Er-Yb-doped fiber amplifier. The fiber had single-mode input with a core/cladding diameter of 8.5/85 μm and an enlarged output of 25/250 μm (to provide a high threshold of non-linear effects). To achieve pump-to-signal conversion efficiency, comparable to Er-Yb-doped fiber analogs high co-doping of Yb₂O₃ and P₂O₅ was performed alongside M-shaped core refractive index profile optimization.

WeR02-04

12:45-13:00

Determination of the mode composition of the output radiation of a multimode fiber laser

F.R. Iakupov¹, R.I. Shaidullin²; ¹VPG Laserone", ²Fryazino Branch of Institute of Radio Engineering and Electronics RAS, Russia

A method of determining the mode composition of the output radiation of a multimode fiber laser based on the analysis of its spectral characteristics has been developed. An experimental study of a multimode fiber laser showed that it maintains from 2 to 4 transverse modes depending on the pump power, while the waveguide itself supports the propagation of 17 modes.

WeR02-05

13:00-13:15

Pulse duration evolution in ytterbium ultrafast fiber laser with nonlinear optical loop mirror

D.V. Khudiyakov, A.A. Semirenchenkov; Prokhorov General Physics Institute of RAS, Russia

In our work we present the ytterbium ultrafast fiber laser on wavelength 1030 nm with a nonlinear optical loop mirror which built entirely on polarization maintaining fibers for pulse stabilization against changes in ambient conditions. The method of changing the output pulse duration by changing of the length of fiber segment in input channel of the beam splitter was proposed.

WeR02-06

13:15-13:30

Modeling of amplification processes in optical fibers with an ultra-high concentration of ytterbium ions in the core

K.O. Ionkina^{1,2}, E.K. Mikhailov¹, S.S. Aleshkina¹, M.E. Likhachev¹; ¹Prokhorov General Physics Inst. of RAS, Dianov Fiber Optics Research Center of RAS, ²National Research Univ. Higher School of Economics, Russia

An improved model explaining efficiency degradation in optical fibers with ultra-high ytterbium concentrations is proposed. We show that standard rate equations fail for aluminophosphosilicate fibers with high Yb doping. The model introduces "good" Yb³⁺ ions contributing to amplification and two types of "bad" ions with fast non-radiative decay, enabling accurate gain modeling without artificial parameter adjustment.

- Lunch Break -

Location: Deyneka 1+2 Room, Floor 2; Wednesday, June 24, 2026

R02. HIGH POWER LASERS: FIBER, SOLID STATE, GAS AND HYBRID 2

WeR02-07

15:00-15:30

Research progress of high performance large aperture laser optics at SIOM (Invited paper)

Jianda Shao, Zhu Meiping, Yunxia Jin, Yanzhi Wang, Chaoyang Wei, Shijie Liu; ¹Shanghai Institute of Optics and Fine Mechanics, CAS, ²China-Russia Joint Laboratory on Laser Science, China

In this talk, we will present the research progress of high performance large aperture laser optics for high-power laser systems at Shanghai Institute of Optics and Fine Mechanics(SIOM), Chinese Academy of Sciences.

WeR02-08

15:30-16:00

Fabrication and research of yttrium oxide -based laser ceramics (Invited paper)

V.V. Lisenkov, V.V. Osipov, V.A. Shitov; Institute of Electrophysics UrB RAS, Russia
Ceramic samples (Nd:Y₂O₃, Yb:Y₂O₃, Nd:YAG, Yb:YAG, Yb:(Lu,Y)₂O₃) were studied. Our experiments yielded stable laser output with a power of up to 80 W (in short-term mode) and a slope efficiency of up to 78.8%. The decay kinetics of the (Yb³⁺) ion emission was studied. It was found that defects in the ceramics can be an additional pump source, prolonging the emission.

WeR02-09

16:00-16:30

Bimorph multy-piezo element deformable mirrors for wide aperture laser beam correction (Invited paper)

A.V. Kudryashov; Sadovsky Institute of Geosphere Dynamics of RAS, Russia

The design and application of several wide-aperture bimorph mirrors would be considered in the presentation.

WeR02-10

16:30-17:00

Laser microwelding of metals and glass with high-intensity laser sources in VPG Laserone (Invited paper)

M. Murzakov; Laser Complex department, VPG Laserone, Russia

This paper presents a review of the results of a study conducted at VPG Laserone on laser microwelding of borosilicate glass to glass and to metals. The laser intensities required to form welded joints between both homogeneous and dissimilar materials were experimentally determined. The microstructure of the glass-to-metal welded joint was studied.

- Coffee Break -

Location: Deyneka 1+2 Room, Floor 2; Wednesday, June 24, 2026

R02. HIGH POWER LASERS: FIBER, SOLID STATE, GAS AND HYBRID 3

WeR02-11

17:30-18:00

Optically pumped rare gas laser (Invited paper)

A.P. Torbin, P.A. Mikheyev; P.N. Lebedev Physical Institute, Samara branch, Russia

This report will review the features of optically pumped all-rare-gas lasers and discuss possible approaches to its further development and scaling.

WeR02-12

18:00-18:30

Features of coupled fluid dynamics and physical optics in high power COIL active medium (Invited paper)

A.V. Savin, A.S. Boreysho; Laser Systems, Russia

Equation for simulation of fluid dynamics and physical optics of supersonic HP COIL active medium are completely different in their computational nature. The former are hyperbolic in flow direction, whereas the latter are elliptic ones. Therefore coupled simulation meet considerable complexities. An computationally effective coupled model is derived in the paper, and example simulations are presented.

<p>WeR02-13 Laser-driven shock tube as a novel laboratory device for studies of hypersonic flows, hydrodynamic instabilities and turbulence (<i>Invited paper</i>) V.D. Zvorykin, N.N. Ustinovskii, A.V. Shutov; Lebedev Physical Inst. RAS, Russia The laser-driven shock tube (LDST) is based on the acceleration of a thin CH film by ablative plasma pressure, which is created when exposed to UV pulses of the GARPUN KrF laser (100 J & 100-ns). A prism raster and a lens produced irradiation homogeneity ~ 3% with intensity 1 GW/cm². Continuous 1D or frame-by-frame 2D shadow and Schlieren images of hydrodynamic processes were analyzed.</p>	<p>18:30-19:00</p>	<p>WeR02-15 Liquid crystal modulator for CO laser A.V. Belyanskaya¹, A.A. Ionin², Yu.M. Klimachev², A.Yu. Kozlov², A.V. Kuznetsov², O.A. Rulev², E.P. Pozhidaev²; ¹Bauman Moscow State Technical University, ²P.N. Lebedev Physical Institute of RAS, Russia A double pass of radiation through the liquid crystal cell was arranged to simulate its operation inside a laser cavity of CO laser (5.0 - 5.6 μm). By increasing the modulation frequency up to 10 kHz, modulation of CO laser pulse was carried out with switching time of ~20 μs. The best contrast ratio was 3.2:1 at 5 kHz.</p>	<p>19:15-19:30</p>
<p>WeR02-14 Krypton laser with wavelengths of 810 and 744 nm pumped by a pulsed inductive discharge D.S. Churkin, R.A. Tkachenko, E.S. Kargapol'tsev; Inst. of Laser Physics SB RAS, Russia The spectral and temporal characteristics of krypton laser radiation were studied on transitions of neutral (Kr I) and ionized (Kr II) krypton atoms pumped by a pulsed inductive cylindrical discharge. Laser generation was achieved on the 5p-5s (810 nm) and 4d-5p (744 nm) transitions of Kr I and Kr II. The duration of optical generation pulses reached 21±1 ns (FWHM).</p>	<p>19:00-19:15</p>	<p>WeR02-16 Active mode-locking in a rubidium vapor laser A.A. Babin¹, A.V. Zakhryapa¹, V.O. Pautov¹, A.A. Sirotkin², A.V. Strakhov¹; ¹Institute of Laser Physics Research, Russian Federal Nuclear Center – VNIIEF, ²Prokhorov General Physics Institute of RAS, Russia We demonstrate stable mode-locking in a rubidium vapor laser operating in the Gaussian transverse mode regime without an intracavity diaphragm. The maximum energy in a single synchronized pulse is 100 nJ, the minimum pulse duration is less than 0.4 ns, the lasing pulse period is equal to 10 ns.</p>	<p>19:30-19:45</p>

R05. SUPER-INTENSE LIGHT FIELDS AND ULTRA-FAST PROCESSES

Location: Rihter 1+2 Room, Floor 3; Wednesday, June 24, 2026

R05. SUPER-INTENSE LIGHT FIELDS AND ULTRA-FAST PROCESSES 1

<p>WeR05-01 Recent developments of a laser-driven ion acceleration beamline at SIOM (<i>Invited paper</i>) J. H. Bin; Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, Shanghai, China Laser driven ion acceleration provides a route to achieve high quality ion beams, which could be superior for specific applications. In this talk I will present recent development of a laser driven ion acceleration beam line based on a homemade table-top 200 TW laser system at Shanghai Institute of Optics and Fine Mechanics (SIOM). Our major motivation is the potential application of such pulsed ion sources.</p>	<p>09:00-09:30</p>	<p>WeR05-03 Direct observation of the ion Weibel instability in femtosecond -laser-driven plasma expansion A.V. Korzhimanov, R.S. Zemskov, S.E. Perevalov, A.V. Kotov, A.A. Murzanev, A.I. Korytin, K.F. Burdonov, V.N. Ginzburg, A.A. Kochetkov, S.E. Stukachev, I.V. Yakovlev, I.A. Shaikin, A.A. Kuzmin, E.V. Derishev, A.A. Soloviev, A.A. Shaykin, A.N. Stepanov, M.V. Starodubtsev, E.A. Khazanov; Gaponov-Grekhov Inst. of Applied Physics RAS, Russia We report the direct observation of the long-lived filaments attributed to ion Weibel instability in a femtosecond-laser-driven plasma. Filaments (~80 μm) persisted for 20 ns, generating megagauss fields. Supported by modeling, this demonstrates an ion-scale kinetic instability, relevant to astrophysical collisionless shocks.</p>	<p>09:45-10:00</p>
<p>WeR05-02 Acceleration of ions with laser pulse self-trapping propagation S.G. Bochkarev^{1,2}, A.J. Castillo^{1,3}, M.G. Lobok^{1,2}, V.Yu. Bychenkov^{1,2}; ¹P. N. Lebedev Physics Institute RAS, ²Center for Fundamental and Applied Research, All-Russian Research Institute of Automatics, ³Peoples' Friendship University of Russia (RUDN University), Russia Numerical modeling of relativistic acceleration of electrons and protons (2.2 J, 6–20 fs) in relativistic self-trapping (RST) from near-critical density targets has been performed. Self-trapping propagation forms an exploding cavern, during whose explosion a combined accelerating field (double layer field and electron bunch) is generated, providing proton injection and Coulomb explosion. The achieved proton acceleration efficiency is 10–20 MeV/J — higher than that of foils.</p>	<p>09:30-09:45</p>	<p>WeR05-04 Enhanced laser-ion acceleration using nano structure (<i>Invited paper</i>) Zhang Hui; Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, China Here, we present the recent progress on laser-driven ion acceleration carried out on the Shanghai Superintense Ultrafast Laser Facility (SULF), where two types of nano structures are used to enhance the proton acceleration. In experiment, using 3D-printed nano-wire array structure, the conversion efficiency from laser to protons reaches up to 9%, 3.5 times higher than that of the planar target. Meanwhile, by employing carbon-nano-tube foam, the proton energy is increased by 130%.</p>	<p>10:00-10:30</p>
<p>WeR05-05 Laser triggered ion acceleration from layered targets A.V. Brantov^{1,2}, S.I. Glazyrin^{2,1}, M.A. Rakitina¹, V.Yu. Bychenkov^{1,2}; ¹P.N. Lebedev Physical Institute of RAS, ²Dukhov Research Institute of Automatics (VNIIA), Russia Based on 3D PIC modeling, this paper compares the ion acceleration efficiency of short laser pulses from various targets (thin foil, layered targets with a low-density layer). The contributions of different acceleration mechanisms (TNSA, radiation pressure acceleration, synchronized acceleration by slow light) are discussed. The influence of preplasma on ion acceleration is considered.</p>	<p>10:30-10:45</p>		

WeR05-06

10:45-11:00

Low-divergence proton beams from interaction of high-intensity laser pulses with thin solid targets

K.V. Safronov, A.A. Bushukhin, S.A. Gorokhov, V.A. Flegentov, N.N. Shamaeva, I.N. Shishkov, D.O. Zamuraev, A.L. Shamraev, S.F. Kovaleva, N.A. Fedorov, S.N. Pakhomov, A.V. Savelyev, A.V. Potapov; Russian Federal Nuclear Center — All-Russian Research Institute of Technical Physics named after Academician E.I. Zababakhin, Russia

We present experimental results on the generation of low-divergence proton beams using a 100 TW Ti:Sa femtosecond laser. Two methods for divergence reduction were investigated: ultra-thin 100 nm DLC targets to suppress hot electron flux filamentation and employment of long-focus ($f/10$) optics to increase the laser interaction spot size on 6 μm aluminum foils.

- Coffee Break -

Location: Rihter 1+2 Room, Floor 3; Wednesday, June 24, 2026

R05. SUPER-INTENSE LIGHT FIELDS AND ULTRA-FAST PROCESSES 2

WeR05-07

11:30-12:00

High-field laser solitons and generation of extreme electron beams (Invited paper)

V.Yu. Bychenkov; Center for Fundamental and Applied Research, Dukhov Research Institute of Automatics (VNIIA) and P.N. Lebedev Physics Institute, RAS, Russia

Relativistic self-trapping (RST) of an electromagnetic beam in plasma is a promising soliton-like regime of stable channeled propagation of laser lights. The RST theory presented overcomes the unsubstantiated or incomplete previous theories and formulates the conditions for implementing RST at a quantitative level. The developed theoretical approach is applicable to a wide, practically relevant range of laser powers. Electron acceleration in the RST regime up to sub-GeV energies with multi-nanocoulomb charge carried by the accelerated electron bunch is discussed.

WeR05-08

12:00-12:15

Focusing ultrashort laser-accelerated electron beams for medical applications

M.G. Lobok^{1,2}, V.Yu. Bychenkov^{1,2}; ¹VNIIA, ²LPI RAS, Russia

Ultrashort laser-accelerated VHEE electron bunches are investigated for medical irradiation with improved lateral dose gradients. A Ti:sapphire driver (0.8 μm , 20 fs) with circular polarization enhances acceleration efficiency, enabling therapeutically relevant bunch charge before electrons reach the decelerating phase of the plasma cavity. PIC phase space is imported into GEANT4 to assess in-phantom focusing, depth-dose, and penumbra reduction.

WeR05-09

12:15-12:45

Generation of collimated quasi-monoenergetic electron beams on a terawatt laser system (Invited paper)

I.N. Tsymbalov^{1,2}, E.M. Starodubtseva¹, K.A. Ivanov^{1,3}, A.B. Savel'ev^{1,3}; ¹Faculty of Physics, Lomonosov Moscow State University, ²Institute for Nuclear Research of RAS, ³Lebedev Physical Institute of RAS, Russia

We demonstrated experimentally and numerically how the blast-wave modification of the gas target can be used to form a quasimonoenergetic electron bunch with controlled energy and improved divergence as well as tracking changes in the bunch parameters during laser wakefield acceleration.

WeR05-10

12:45-13:00

Multi-stage direct laser acceleration of electron beams in plasma channels

E.M. Starodubtseva¹, S.D. Solntsev², I.N. Tsymbalov^{1,3}, K.A. Ivanov^{1,4}, A.B. Savel'ev^{1,2,4}; ¹Lomonosov Moscow State University, ²Lomonosov Moscow State University, Sarov Branch, ³Institute for Nuclear Research of RAS, ⁴Lebedev Physical Institute of RAS, Russia

A multi-stage scheme for direct laser acceleration (DLA) of electrons in plasma channels is proposed to overcome dephasing and pump depletion limits. An analytical model defines optimal stage parameters. The scheme is successfully validated via quasi-3D Particle-in-Cell simulations, demonstrating GeV-energy, high-charge electron beam generation, with practical feasibility for modern high-power laser systems like XCELS.

WeR05-11

13:00-13:15

Breit-Wheeler pair production in a strong laser field assisted by a copropagating ultrashort pulse

I.A. Aleksandrov^{1,2}, A.A. Andreev; ¹St. Petersburg Univ., Russia; ²Ioffe Institute, Russia

We explore the nonlinear Breit-Wheeler mechanism for electron-positron pair production induced by a high-energy photon in a strong laser field. Our analysis specifically emphasizes the dynamical enhancement of this process through the application of a relatively weak subattosecond pulse. We identify the parameter regime in which the presence of this ultrashort pulse significantly amplifies pair production.

WeR05-12

13:15-13:30

The influence of preplasma and focusing point position on ion acceleration during laser irradiation of a flat target

M.A. Rakitina¹, A.V. Brantov^{1,2}, S.I. Glazyrin^{1,2}; ¹Lebedev Physical Institute, RAS, ²Dukhov Research Institute of Automatics (VNIIA), Russia

It is shown that the efficiency of laser acceleration of protons can be increased by controlling the parameters of the pre-plasma by shifting the focusing point of the laser pulse onto the target pre-plasma at a fixed pre-pulse energy.

WeR05-32

13:30-13:45

Advances in pulse compression gratings

Yunxia Jin, Jianda Shao, Hongchao Cao, Fanyu Kong, Yuxing Han, Shijie Liu; ¹Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, ²China-Russia Joint Laboratory on Laser Science, China

Progress in pulse compression grating has advanced the peak power of petawatt lasers into the 10 PW regime. Nevertheless, further peak-power scaling of single-channel lasers beyond 10 PW remains challenging, particularly in improving grating damage resistance, developing large-aperture fabrication techniques, and more wavelength compatible gratings. Over the past two decades, SIOM has achieved substantial progress in grating technologies, which will be comprehensively reviewed in this presentation.

- Lunch Break -

R07. FREE ELECTRON LASERS*Location: Rihter 1+2 Room, Floor 3; Wednesday, June 24, 2026***R07. FREE ELECTRON LASERS 1**

WeR07-01

15:00-15:30

Generation of powerful coherent radiation in the (0.3) - 1.2 THz range in FEL based on a kiloampere beam formed by the linac LIU: design parameters and computer modeling (*Invited paper*)

N.Yu. Peskov^{1,2}, A.V. Arzhannikov¹, P.A. Bak¹, N.S. Ginzburg², D.A. Nikiforov¹, V.A. Pavlyuchenko¹, E.S. Sandalov¹, A.V. Savilov², A.S. Sergeev², S.L. Sinitsky¹, D.I. Skovorodin¹, V.Yu. Zaslavsky^{1,2}; ¹Budker Institute of Nuclear Physics, RAS, ²Gaponov-Grekhov Institute of Applied Physics, RAS, Russia

Long-pulse sub-GW power FEL based on the linac LIU 5 MeV / 2 kA / 200 ns is currently being developed. The aim of this project is to achieve a record pulse energy content up to 10 - 100 J at THz frequencies. The report presents design parameters, simulations and "cold" tests of the key components of this FEL.

WeR07-02

15:30-16:00

Compton free electron lasers based on multiple backscattering (*Invited paper*)

L.A. Yurovskiy; Federal Research Center A.V. Gaponov-Grekhov Institute of Applied Physics of RAS (IAP RAS), Russia

To achieve coherent X-Ray stimulated emission in Compton FEL, we propose using multiple backscattering of optical pump pulse on relativistic electron beam by introducing a resonator for the optical radiation. Simultaneously, energy of scattered X-ray radiation is accumulated in additional resonator consisting of two multilayer X-ray mirrors. The pulses round-trip times in the both resonators are detuned to attain coherence of the generated radiation.

WeR07-03

16:00-16:30

Generation of a terahertz radiation flux in a beam-plasma system using kiloampere REB (*Invited paper*)

A.V. Arzhannikov^{1,2}; ¹Budker Inst. of Nuclear Physics SB RAS, BINP SB RAS, ²Novosibirsk State University, Russia

This talk devotes to detail analysis of processes in generating terahertz radiation fluxes due to relaxation of a high-current relativistic electron beam in a magnetized plasma column. At a plasma density of $1 \times 10^{15} \text{ cm}^{-3}$, the frequency of this escaping flux is 0.2 THz at a pulse power 4 MW. Increasing the plasma density in 3 times shifts the flux frequency up to 0.4 THz.

WeR07-04

16:30-16:45

Development of the beam electron-optical system for a terahertz FEL based on the linear induction accelerator

E.S. Sandalov¹, S.L. Sinitsky¹, A.V. Arzhannikov¹, P.A. Bak¹, N.S. Ginzburg², V.Yu. Zaslavsky², K.I. Zhivankov¹, A.A. Krylov¹, P.V. Logachev¹, N.Yu. Peskov², D.I. Skovorodin¹, V.A. Pavluchenko¹; ¹Budker Institute of Nuclear Physics of SB RAS (BINP SB RAS), ²Gaponov-Grekhov Institute of Applied Physics of RAS (IAP RAS), Russia

In this paper we consider the project of a sub-gigawatt free electron laser (FEL) in the subTHz/THz- range based on a high-current electron beam (up to 2 kA, 5 MeV) generated in the new linear induction accelerator (LIA)[1]. The main objective of our research is the development and creation of the FEL capable of generating pulses of coherent subTHz/THz (0.3-1.2 THz) radiation with a subGW power level and a record energy content in a pulse of about 10-100 J.

WeR07-05

16:45-17:00

Project of multi-GW power sub-THz band planar FEL with 3D distributed feedback based on the U-2 accelerator complex

N.Yu. Peskov^{1,2}, A.V. Arzhannikov¹, E.D. Egorova^{1,2}, N.S. Ginzburg², E.S. Sandalov¹, D.A. Samtsov¹, S.L. Sinitsky¹, V.Yu. Zaslavsky^{1,2}; ¹Budker Institute of Nuclear Physics, RAS, ²Gaponov-Grekhov Institute of Applied Physics, RAS, Russia

The project of an ultra-high power sub-THz band planar FEL-oscillator with 3D distributed feedback is being developed based on the U-2 accelerator 1 MeV / 100 kA / 7 μs forming sheet electron beams with a cross-section of up to 1 cm \times 100 cm. The report is devoted to the design and modeling the key components of this FEL.

- Coffee Break -

*Location: Rihter 1+2 Room, Floor 3; Wednesday, June 24, 2026***R07. FREE ELECTRON LASERS 2**

WeR07-06

17:30-17:45

Novosibirsk free electron laser user facility

Ya.V. Getmanov^{1,2,3}, O.A. Shevchenko¹, N.A. Vinokurov^{1,2}, V.S. Arbuzov¹, K.N. Chernov¹, O.I. Deychuli¹, E.N. Dementiev¹, B.A. Dovzhenko¹, Ya.I. Gorbachev¹, A.A. Kondakov¹, E.V. Kozyrev^{1,2}, S.A. Krutikhin¹, V.V. Kubarev¹, G.N. Kulipanov^{1,3}, I.V. Kuptsov¹, G.Ya. Kurkin¹, L.E. Medvedev¹, S.V. Motygin¹, V.K. Ovchar¹, V.N. Osipov¹, V.M. Petrov¹, A.M. Pilan¹, V.M. Popik¹, I.V. Popik¹, V.V. Repkov¹, T.V. Salikova¹, I.K. Sedlyarov¹, S.S. Serednyakov¹, A.N. Skrinsky¹, S.V. Tararyshkin¹, A.G. Tribendis¹, V.G. Tcheskidov¹, M.G. Vlasenko¹, V.N. Volkov¹; ¹Budker Institute of Nuclear Physics, SB RAS, ²Novosibirsk State University, ³Novosibirsk State Technical University, Russia

Novosibirsk free electron laser still has the highest in the world average power of narrow-band tunable coherent radiation in its wavelength range (8–400 micron). Status and plans of the facility are described.

WeR07-07

17:45-18:15

Study of metal, carbon and dielectric materials using terahertz radiation of Novosibirsk free electron laser (*Invited paper*)

V. V. Gerasimov^{1,2}, V. S. Vanda^{1,2}, A. G. Lemzyakov^{1,2,3}, A. G. Kocheneva^{1,3}, V. P. Nazmov^{1,4}, A. I. Ivanov⁵, I. A. Azarov^{2,5}, L. S. Kuznetsova^{2,5}, S. G. Bortnikov⁵, D. I. Krasnikov⁶, N. I. Raginov⁶, D. V. Fromichev⁷, V. A. Stepanov⁷, A. K. Nikitin⁸, I. Sh. Khasanov⁸; ¹Budker Institute of Nuclear Physics SB RAS, ²Novosibirsk State University, ³Synchrotron Radiation Facility SKIF, ⁴Institute of Solid State Chemistry and Mechanochemistry, SB RAS, ⁵Rzhanov Institute of Semiconductor Physics SB RAS, ⁶Skolkovo Institute of Science and Technology, ⁷Joint Stock Company "Novosibirsk Factory of Semiconductor Device EAST, Novosibirsk, ⁸Scientific and Technological Centre of Unique Instrum. of RAS, Russia

This report will present an overview of studies of metallic, semiconductor, carbon-containing, and dielectric films using terahertz radiation from the Novosibirsk free-electron laser. Both classical optical methods and unique surface plasmon refractometry techniques are used to study the optical properties of thin films (with sizes much smaller than the radiation wavelength). The problems being solved are of both fundamental and applied importance for THz photonics.

WeR07-08

18:15-18:45

New methods and results of terahertz molecular spectroscopy in strong magnetic field at the NovoFEL (*Invited paper*)

V.V. Kubarev¹, A.V. Bragin¹, E.N. Chesnokov², P.V. Koshlyakov²; ¹Budker Institute of Nuclear Physics SB RAS, ²Voevodsky Institute of Chemical Kinetics and Combustion SB RAS, Russia

Terahertz and far-infrared free-electron lasers (NovoFEL) and a superconducting solenoid with a magnetic field of up to 7.3 T were used to develop new methods of magnetic molecular spectroscopy. New data on the magnetic moment of highly excited rotational states of molecules have been discovered.

WeR07-09

18:45-19:00

Polarization of the ground Kramers doublet in single-molecule magnets based on Co(II) by pumping the spin system with resonant pulsed THz radiation

A.R. Melnikov¹, A.S. Ishchenko^{1,3}, Y.V. Getmanov², A.S. Samulionis⁴, D.S. Yambulatov⁴, S.A. Nikolaevskii⁴, M.V. Fedin¹, S.L. Veber¹; ¹International Tomography Center SB RAS, ²Budker Institute of Nuclear Physics SB RAS, ³Novosibirsk State University, ⁴Kurnakov Institute of General and Inorganic Chemistry RAS, Russia

At the EPR endstation of the NovoFEL facility processes induced by terahertz radiation resonant with the spin system were investigated in Co(II) single-molecule magnets. By changing the wavelength of THz radiation, we demonstrated direct excitation of spin transitions, which led to a non-equilibrium population of the ground state. This work was supported by the Russian Science Foundation 23-73-00042.

WeR07-10

19:00-19:15

A modification of pump probe in experiments with periodic pulses

V.M. Popik; Budker INP, Russia

Pump-probe is a powerful method in modern optical research. The maximum measurable decay time is determined by the optical setup. If the method uses periodic pulses, then by varying the delay of the pump pulse relative to the first probe pulse and using the classic pump-probe setup with a second probe pulse, it is possible to study the decay pattern both before and after the arrival of the pump pulse, which is important for multicomponent decay.

R08. NONLINEAR PHOTONICS: FUNDAMENTALS AND APPLICATIONS

Location: Stenberg 2 Room, Floor 3; Wednesday, June 24, 2026

R08. NONLINEAR PHOTONICS: FUNDAMENTALS AND APPLICATIONS 3

WeR08-13

09:00-09:30

Nonlinear multimode fiber photonics for biomedical applications (*Invited paper*)

V. Ceccconi¹, K. Stefanska¹, A. Momenzadeh¹, M. Di Salvo¹, F. Mangini², M. Jonard³, P. Roy³, F. Gerome³, E. Okafor³, M. Fabert³, C. Lefort³, U. Arles³, M. Colas⁴, T. Larque⁴, C. Strutynski⁵, A. Tonello³, V. Couderc³, M. Papi⁶, I. Boskoski⁷, S. Hermanns⁸, S. Dammeier⁹, S. Wabnitz¹; ¹Sapienza University of Rome, ²Niccolo Cusano University, Italy; ³Université de Limoges, XLIM, UMR CNRS⁷²⁵², France; ⁴Université de Limoges, IRCER, UMR CNRS⁷³¹⁵, France; ⁵ICB Université Bourgogne Europe, UMR CNRS⁶³⁰³, France; ⁶Università Cattolica del Sacro Cuore, Italy; ⁷Fondazione Policlinico Gemelli, Italy; ⁸Erbe Elektromedizin, Germany

Nonlinear propagation effects in multimode optical fiber-based endoscopic probes permit for a novel teragnostic approach combining real-time biopsy with cold-plasma treatment of cancer cells.

WeR08-14

09:30-10:00

Optomechanical effects in harmonically mode-locked fiber lasers (*Invited paper*)

V.A. Ribenek¹, P.A. Itrin¹, G.A. Tertyshnikova¹, D.A. Korobko¹, A.A. Fotiadi^{1,2}; ¹Ulyanovsk State University, Russia; ²University of Mons, Belgium

We report optomechanical effects in harmonically mode-locked soliton fiber lasers observed when a cavity pulse repetition rate matches an intrinsic optoacoustic resonance of the cavity fiber.

WeR08-15

10:00-10:30

Wavelength-switchable laser and Raman generation in fiber-microresonator systems (*Invited paper*)

E.A. Anashkina, A.V. Andrianov, A.V. Gaponov-Grekhov Institute of Applied Physics RAS, Russia

We theoretically and experimentally demonstrate wavelength-switchable Er-doped fiber laser systems with feedback provided by a high-Q silica or tellurite microsphere. Two regimes are achieved: 1) single-mode generation in the C-L-bands; 2) single-mode laser generation in the C-band, initiating simultaneous Raman generation in the U-band in the silica microsphere and two-cascade Raman generation up to 2.1 μm in the tellurite microsphere.

WeR08-16

10:30-10:45

A sensitive dark matter detector based on high nonlinear optical fiber

S.V. Erin¹, A.A. Sysoliatin², A.I. Kolbatova³, G.N. Goltsman³; ¹National Research Center Kurchatov Institute– IHEP, ²Dianov Fiber Optic Research Center, Prokhorov General Physics Institute of RAS, ³Federal State Budgetary Educational Institution of Higher Education MPGU, Russia

Dark matter is a cornerstone of modern physics, confirmed by astrophysical and cosmological explorations. Among DM candidates dark photons stand out as particularly compelling. Photon conversion into hidden photons in dielectric medium could be carried out via nonlinear effects, e.g. modulation instability in optical fiber. A hidden photon detection via nonlinear phenomena in silica fiber is possible.

WeR08-17

10:45-11:00

Nonlinear Kerr beam reshaping in step-index few-mode fibres

Z. Mohammadzahery, M. Jandaghi, S. Alipour; National Center for Laser Science and Technology, Iran

We demonstrate Kerr-induced beam self-cleaning in a step-index few-mode fiber at 532 nm. A bell-shaped LP₀₁-like beam emerges above a 6 kW threshold and remains stable up to 25 kW. At higher powers, intermodal four-wave mixing generates spectral sidebands in higher-order modes, limiting spatial purity. Experiments and multimode nonlinear Schrödinger simulations show excellent agreement.

- Coffee Break -

Location: Stenberg 2 Room, Floor 3; Wednesday, June 24, 2026

R08. NONLINEAR PHOTONICS: FUNDAMENTALS AND APPLICATIONS 4

WeR08-19

12:00-12:30

Supersolidity in optically trapped exciton-polariton condensates (Invited paper)P. Kozhevnikov^{1,2}, A. Liubomirov¹, R. Cherbunin^{1,2}, M.A. Chukeev¹, I. Chestnov³, A. Kavokin^{1,2,4}, A. Nalitov^{4,2}; ¹Department of Physics, St. Petersburg State University, ²Russian Quantum Center, ³Department of Physics, ITMO University, ⁴Abrikosov Center for Theoretical Physics, Russia

In this work we show that nonequilibrium exciton-polariton condensates, formed in annular optically induced traps, demonstrate emergent supersolidity due to effective attractive interaction, mediated by the normal excitonic component of the system. The competition of the effective potential autolocalization with the kinetic energy provided by the dissipative mode selection mechanism result in the transition to the supersolid phase.

WeR08-20

12:30-12:45

Mandelstam-Brillouin oscillations in specially made three-dimensional film metamaterials

N.A. Inogamov; Landau Institute for Theoretical Physics, RAS, Dukhov Institute for Automatics, Russia

Mandelstam-Brillouin (MBO) oscillations associated with the reflection of light from a traveling acoustic wave in glass are analyzed.

WeR08-21

12:45-13:15

Generation of squeezed light and its quantum mode structure in waveguides with large Kerr nonlinearity (Invited paper)A.V. Andrianov¹, A.N. Romanov^{1,2}, E.A. Anashkina¹, A.A. Sorokin¹; ¹A.V. Gaponov-Grekhov Institute of Applied Physics RAS, ²Lobachevsky State University of Nizhny Novgorod, Russia

We experimentally studied the generation of polarization-squeezed light in a short highly nonlinear chalcogenide fiber with large normal dispersion and in a microstructured tellurite fiber with near-zero dispersion pumped by a femtosecond laser. Detailed numerical simulation of the quantum signal dynamics and quantum modes structure showed that the large normal dispersion regime provides better squeezing than the near-zero dispersion regime.

WeR08-22

13:15-13:30

Manipulation of quadratic optical nonlinearity in ion-exchanged glasses via Maxwell-Wagner phenomenonG. Kan^{1,2}, S.A. Scherbak^{1,2}, V.P. Kaasik^{1,2}, A.A. Lipovskii^{1,2}; ¹Alferov Univ., ²Peter the Great St.Petersburg Polytechnic Univ., Russia

We investigate the induction of second-order nonlinearity in soda-lime glass via ion-exchange followed by the application of a DC voltage. The resulting second harmonic was characterized, identifying an optimal thickness for the potassium-enriched layer. Temporal signal evolution allowed us to estimate the ultra-low sodium and potassium ion mobilities in glass at room temperature, providing an alternative approach to glass characterization.

WeR08-23

13:30-13:45

Hysteresis of second harmonic generation in metal-semiconductor Si/Au structures as a manifestation of the memory effectA.O. Larin¹, A.A. Ermina², Yu.A. Zharova², D.A. Zuev¹; ¹ITMO University, ²Ioffe Institute, Russia

Metal-semiconductor Si/Au structures capable of generating the second harmonic are presented. A hysteresis of the nonlinear optical response was observed during pump power scanning due to deep-level charge traps on the semiconductor surface. This behavior is similar to a memristor, which allows to consider the structure as an element for neuromorphic photonics. The effect has been experimentally demonstrated and operating regimes have been identified.

WeR08-24

13:45-14:00

Nonlinear photonic crystals and thin films with periodical ferroelectric domain structure

V.Ya. Shur, A.R. Akhmatkhanov, M.A. Chuvakova, B.I. Lisjikh, M.S. Kosobokov; Ural Fedral Univ., Russia

The recent progress in fabrication of nonlinear light frequency converters in ferroelectric crystals and thin films by creation of the periodic domain structure will be presented. The second harmonic generation, optical parametric oscillation and spontaneous parametric down conversion for generating of entangled photon pairs have been realized. The domain switching in the bulk by femtosecond laser irradiation will be demonstrated.

- Lunch Break -

Location: Stenberg 2 Room, Floor 3; Wednesday, June 24, 2026
R08. NONLINEAR PHOTONICS: FUNDAMENTALS AND APPLICATIONS 5

WeR08-18 15:00-15:30

Quantum enhanced stimulated Raman scattering (*Invited paper*)

N. Kalinin¹, K. Scheffter^{1,2}, H. Gallop³, M. Alizadeh³, A.F. Pegoraro⁴, M. Morrison³,

P. Rose³, L. Ramunno³, H. Fattahi^{1,2}, A. Stelow³, L.L. Sánchez-Soto^{1,5,6}, G. Leuchs^{1,2,3}; ¹Max Planck Institute for the Science of Light, ²Physik Department, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany; ³Department of Physics, University of Ottawa, ⁴Metrology Research Centre, National Research Council Canada, Canada; ⁵Departamento de Óptica, Facultad de Física, Universidad Complutense, Spain; ⁶Institute for Quantum Studies, Chapman University, USA

The sensitivity of stimulated Raman scattering (SRS) is - like all sensors - ultimately limited by quantum uncertainty. We demonstrate signal-to-noise-ratio (SNR) enhancement 3 dB beyond the standard quantum noise limit, which is the shot noise limit.

WeR08-25 15:30-16:00

Manipulation of nonlinear optical pulses and soliton tomography (*Invited paper*)

A.A. Gelash; Center of Engineering Physics, Skolkovo Institute of Science and Technology, Russia

We develop novel approaches to manipulating multi-soliton optical pulses using analytical-numerical Inverse Scattering Transform theory. We introduce the framework of soliton eigenvalue response functions (RFs), validated experimentally using a recirculating optical fiber loop system with a Raman amplifier, electro-optic modulators, and homodyne interferometric tools. Our theoretical treatment shows that the RFs approach can be applied to arbitrary-shaped pulses and, most importantly, used in soliton tomography, where solitons probe either external potentials or nonlinear media properties.

WeR08-26 16:00-16:15

Linear and nonlinear light trapping on topological dislocation

S.K. Ivanov¹, A.V. Kireev^{2,3}, K. Sabour³, N.S. Kostyuchenko^{2,4}, S.A. Zhuravitskii^{2,4}, N.N. Skryabin⁴, I.V. Dyakonov⁴, A.A. Kalinkin⁴, V.O. Kompanets², S.P. Kulik^{2,4}, S.V. Chekalin², A. Ferrando¹, V.N. Zadkov^{2,5}, Y.V. Kartashov²; ¹Instituto de Ciencia de los Materiales, Universidad de Valencia, Spain; ²Institute of Spectroscopy, ³Moscow Institute of Physics and Technology, ⁴Quantum Technology Centre, Faculty of Physics, M.V. Lomonosov Moscow State University, ⁵Faculty of Physics, Higher School of Economics, Russia

Topological dislocations are global lattice defects found in various systems from crystalline solids to photonic lattices. We report the first observation at optical frequencies of localized linear modes—bound to edge dislocations, along with their nonlinear counterparts—dislocation solitons. These results reveal an interplay between real-space topology and nonlinearity, enabling new approaches to controlling light localization.

WeR08-27 16:15-16:45

Creation of solitons in nonlinear optical fibers with fractional dispersion (*Invited paper*)

B.A. Malomed; Department of Physical Electronics, School of Electrical and Computer Engineering, Faculty of Engineering, Tel Aviv University, Israel

This talk provides a summary of models for the wave propagation in fractional optical media. The models are based on fractional Schrödinger equations (FSEs) with the diffraction or group-velocity dispersion (GVD) operator represented by the fractional Riesz derivative with Levy index α , usual GVD corresponding to $\alpha = 2$.

WeR08-28 16:45-17:15

Superradiant state stability under exciton-phonon interactions in hybrid perovskites and fundamental soliton (*Invited paper*)

A.A. Gladkij¹, N.A. Veretenov¹, N.N. Rosanov¹, B.A. Malomed^{2,3}, V.A. Osipov⁴, B.D. Fainberg⁵; ¹Ioffe Physical-Technical Institute, Russia; ²School of Electrical Engineering, Tel Aviv University, Israel; ³Instituto de Alta Investigación, Universidad de Tarapaca, Chile; ⁴Institute for Advanced Study in Mathematics, Harbin Institute of Technology, China; ⁵Faculty of Sciences, Holon Institute of Technology, Israel

We investigate the stability of the superradiant state concerning exciton-phonon interactions. We derive nonlinear equations in the coordinate space. We perform a linear stability analysis of the superradiant state. Our findings indicate that the superradiant state is modulationally stable. We solve the 2D nonlocal nonlinear Schrödinger equation in the polar coordinates and obtain its fundamental soliton solution, which is stable.

WeR08-29 17:15-17:30

Stable vortex solitons sustained by localized gain in a cubic medium

Chunyan Li¹, Ya.V. Kartashov²; ¹School of Physics, Xidian University, China; ²Institute of Spectroscopy, RAS, Russia

we propose a new simple mechanism of formation of the ringlike dissipative vortex solitons with high topological charges that does not require competing nonlinearities, nonlinear absorption or optical potentials. Instead, it employs a ringlike gain landscape created in a medium with uniform background linear losses and defocusing cubic nonlinearity that in this case prevents an uncontrollable growth of light intensity.

R03. SEMICONDUCTOR LASERS, MATERIALS AND APPLICATIONS - POSTERS

Location: Congress Hall, Floor 1; Wednesday, June 24, 2026

- WeR03-p01 10:00-13:30
- Room temperature pillar cavity lasers**
A.V. Babichev¹, I.S. Makhov², N.V. Kryzhanovskaya², Y.M. Zadiranov¹, Yu. A. Salii¹, M. M. Kulagina¹, A.A. Blokhin¹, M.A. Bobrov¹, A.P. Vasiliev¹, S.A. Blokhin¹, N.A. Maleev¹, L.Ya. Karachinsky³, I.I. Novikov³, A.Yu. Egorov²; ¹Ioffe Inst., ²HSE Univ., ³ITMO Univ., Russia
A planar microcavity structure with low-absorbed mirrors was grown using molecular-beam epitaxy. Micropillar cavities were fabricated using dry etching process. For 15- μm -diameter pillars, lasing was demonstrated at room temperature with a threshold of 37 mW and an emission wavelength of 961 nm.
- WeR03-p02 10:00-13:30
- Modeling of micropillar lasers with antireflective coating**
A.V. Babichev¹, S.A. Blokhin¹, N.A. Maleev¹, L.Ya. Karachinsky², I.I. Novikov², A.Yu. Egorov²; ¹Ioffe Inst., ²ITMO Univ., Russia
960 nm-range micropillar cavity laser with low-absorbed mirrors and an antireflective coating was examined. Close to zero reflectivity was realized in the range of 780–810 nm. The use of an antireflective coating allowed to increase the power conversion efficiency by approximately 7% compared to a semiconductor vertical microcavity.
- WeR03-p03 10:00-13:30
- High-voltage thyristor current switch based on GaAs/AlGaAs for pulsed pumping of high-power IR lasers: quasi-1D drift-diffusion model analysis**
I.V. Oreshko, S.O. Slipchenko, A.A. Podoskin, I.V. Shushkanov, N.A. Pikhtin; Ioffe Inst., Russia
Simulation of high-voltage heterostructure current switch based on GaAs/AlGaAs shows that the current amplitude and the turn-on front weakly depend on the design of the n-p-n equivalent transistor and are ~ 70 A and 1.5-1.6 ns, respectively, at a maximum voltage of 180 V. Minimum turn-on delay and residual voltage of 5.5 ns and 1.86 V are observed for the n-collector structure thinned to 0.2 μm .
- WeR03-p04 10:00-13:30
- Surface-emitting semiconductor IR laser with resonator based on 2D photonic crystal**
I.V. Oreshko, V.V. Zolotarev, S.O. Slipchenko, A.S. Nekrasov, N.A. Pikhtin; Ioffe Inst., Russia
Calculations of output losses of laser resonator based on 2D photonic crystal with square symmetry show that holes with C2 rotational symmetry are characterized by the presence of high-Q modes with low radiative efficiency. On the other hand, trapezoidal holes, which do not possess C2 symmetry, demonstrate the greatest mode discrimination between low-threshold modes.
- WeR03-p05 10:00-13:30
- Characterization of metal halides as optical materials for the THz range**
I.V. Yuzhakov¹, A.A. Yuzhakova¹, N.A. Nikolaev², A.A. Rybak², A.E. Lvov¹, L.V. Zhukova¹; ¹Ural federal university, UrFU, ²Institute of Automation and Electrometry, Siberian Branch of RAS, IAE SB RAS, Russia
A transmission window has been identified in the 0.2–1.2 THz range for metal halide-based single crystals. Their absorption coefficient and refractive index were measured, showing an increase from 3.7 to 4.0. The results indicate the potential application of these materials as THz optics.
- WeR03-p06 10:00-13:30
- Internal quantum efficiency in optically pumped InGaN/GaN quantum-well microdisk lasers**
S.D. Komarov¹, N.V. Kryzhanovskaya¹, E.I. Moiseev¹, K.A. Ivanov¹, D.A. Masyutin¹, I.S. Makhov¹, A.F. Tsatsul'nikov², A.V. Sakharov^{2,4}, D.S. Arteev^{2,4}, E.V. Lutsenko³, A.G. Vainilovich³, A.E. Nikolaev⁴, E.E. Zavarin^{2,4}, A.A. Pivovarov⁴, N.D. Ilyinskaya⁴, I.P. Smirnova⁴, L.K. Markov⁴, N. Cherkashin⁵, A.E. Zhukov¹; ¹International Laboratory of Quantum Optoelectronics, HSE University, ²Submicron Heterostructures for Microelectronics, Research and Engineering Center, RAS, Russia; ³B.I. Stepanov Institute of Physics, National Academy of Sciences of Belarus, Belarus; ⁴Ioffe Institute, Russia, ⁵CEMES-CNRS, Université de Toulouse, France
Optically pumped InGaN/GaN quantum-well microdisk lasers on Al₂O₃ were investigated, focusing on internal quantum efficiency (IQE) versus disk size and pump energy. Room-temperature lasing was observed for radii of 2.5–6 μm with Q factors above 2300. Power-dependent photoluminescence enabled extraction of relative IQE curves and separation of the contributions of competing recombination mechanisms from QCSE-related effects.
- WeR03-p07 10:00-13:30
- Analysis of beam divergence angles of Terahertz quantum cascade lasers based on the method of second order moments**
I.E. Rykov, M.V. Maytama, D.A. Belov, A.V. Ikonnikov, R.A. Khabibullin; Moscow Institute of Physics and Technology, Russia
We present the results of calculating the beam divergence angles of terahertz (THz) quantum cascade lasers (QCL) with operating frequencies of 2, 3.75 and 4 THz by utilizing the method of second order moments. The obtained values are compared with the more traditional method of evaluation by the ratio of full width at half maximum (FWHM) to the distance to the laser.
- WeR03-p08 10:00-13:30
- Calculation of facet reflection coefficients for AlGaInAs/InP superluminescent diodes with tilted waveguide and anti-reflective coatings**
D.A. Frolov, O.L. Astarkina, K.A. Podgaetskii, A.V. Lobintsov, A.A. Marmalyuk; Stelmakh Research Institute "Polyus", Russia
A study of combined implementation of tilted waveguide and anti-reflection coatings for manufacturing SLD samples was made. It is shown that there are combinations of waveguide tilt angles and compositions of anti-reflection coatings that enable the achievement of the lowest values of the reflection coefficient. Theoretical calculations were used in the experimental work on the manufacturing of SLD samples.
- WeR03-p09 10:00-13:30
- Heat source localization and the thermal impedance spectrum of laser diode**
A.E. Chernyakov¹, A.L. Zakgeim¹, A.A. Beckman²; ¹Submicron Heterostructures for Microelectronics, Research and Engineering Center, RAS, ²Ioffe Institute, Russia
The thermal properties, including thermal resistance R_{th}, capacitance C_{th}, and time constant τ_{th} of high-power laser diodes, have been investigated and analyzed over a wide current range. The transient thermal behavior was modeled using a multi-exponential function, where each time constant corresponds to a specific thermal resistance R_{th,i} and capacitance C_{th,i} component of the laser structure.

WeR03-p10

10:00-13:30

Application of free-standing wire-grid polarizers for Terahertz spectroscopy

Yu.I. Borisov, K.B. Dolganov, Yu.G. Goncharov, I.E. Spector, S.V. Garnov, G.A. Komandin; Prokhorov General Physics Institute of RAS, Russia

This paper presents the core design solutions for a Terahertz Time-Domain Spectroscopy (TDS-THz) system based on photoconductive antennas (PCA). Transmission characteristics are modeled for free-standing wire-grid polarizers with various geometric parameters, designed to produce linearly polarized radiation in the 0.1–3.0 THz range. The obtained is crucial for investigating the optical properties of anisotropic materials within the THz range.

WeR03-p11

10:00-13:30

Optimization of heterostructure and laser diode chip parameters based on InGaAsP/InP for different operating current ranges

A.E. Rizaev, A.A. Podoskin, I.V. Shushkanov, A.E. Grishin, M.I. Kondratov, S.O. Slipchenko, N.A. Pikhtin; Ioffe Institute, Russia

A numerical model accounting for transverse carrier transport and longitudinal photon distribution was used to optimize heterostructure design and laser cavity parameters for different pulsed current ranges. It is shown that optimizing chip parameters enables comparable output power levels from lasers with distinct heterostructures, each originally optimized for a different current range.

WeR03-p12

10:00-13:30

Synthesis of high-purity gallium arsenide with high carrier mobility

L.A. Mochalov, E.A. Slapovskaya, A.S. Belousov; Lobachevsky State University of Nizhny Novgorod, Russia

A technology has been developed for the synthesis of polycrystalline GaAs for growing high purity GaAs ingots with a diameter of 100 mm, a carrier mobility of $5.55 \times 10^{13} \text{ cm}^2/(\text{V}\cdot\text{sec})$ and a dislocation density of $2.8 \times 10^{13} \text{ cm}^{-2}$ by the VGF method. As and Ga of the 4N grade of purity were used as raw materials.

WeR03-p13

10:00-13:30

Investigation of the AgBr - TlCl(0.74)Br(0.26), AgCl(0.25)Br(0.75)-TlBr(0.46)I(0.54) and AgCl(0.25)Br(0.75)-TlI systems radiation resistance

S.E. Barykina, E.Y. Kabykina, V.O. Kosmachev, P.V. Pestereva, S.K. Shvartz, D.D. Salimgareev, L.V. Zhukova; Ural Federal University, UrFU, Russia

The dependence of the transmittance of the AgBr – TlCl_{0.74}Br_{0.26}, AgCl_{0.25}Br_{0.75} – TlBr_{0.46}I_{0.54}, and AgCl_{0.25}Br_{0.75} – TlI systems samples under the influence of β -irradiation up to 1000 kGy was studied. High radiation resistance and clearing observed at irradiation doses of 100–300 kGy.

WeR03-p14

10:00-13:30

Enhanced fiber-optic sensor with artificial reflectors inscribed by femtosecond laser pulsesI.S. Pochtarev^{1,2}, D.M. Bengalskii¹, D.R. Kharasov¹, K.A. Akmarov¹, K.A. Emelyanov¹, V.N. Treschikov¹; ¹T8 LLC, ²National Research Nuclear University MEPhI, Russia

A novel method based of enhancing performance of fiber-optic sensors interrogated by phase-sensitive optical time-domain reflectometer is investigated. The method based on artificial reflectors, which are inscribed in standard single mode fiber wounded around sensor using femtosecond laser. Signal processing allows us to adjust both sensitivity and dynamic range using multi gauge lengths algorithm. Sub-pulse gauge length is successfully utilized.

WeR03-p15

10:00-13:30

Metrological support of the technology of creating photonic integrated circuitsN.L. Istomina¹, K.S. Nepeina²; ¹NRU MAI, department. Innovation Management, Russia; ²Kyrgyz State Technical University (Polytechnic Institute), Kyrgyzstan

Metrological support for monitoring layer parameters during the creation of semiconductor lasers is relevant for their mass production. The sources of instrumental errors, including the error of calibration of measuring equipment when using optical methods of non-destructive testing, are considered.

WeR03-p16

10:00-13:30

Minimal excitable laser-neuron network for handwritten digit classification

I.S. Mamaev, A.V. Kovalev; ITMO Univ., Russia

A minimal neuromorphic-photonic classifier based on an excitable semiconductor-laser neuron modeled by normalized Yamada rate equations is evaluated. Using standard gradient training on amplitude-encoded MNIST and EMNIST (digits), accuracies of 89.6% and 91.0% are obtained in deterministic simulations, while 88% accuracy is achieved on noisy EMNIST by averaging 10 stochastic runs.

WeR03-p17

10:00-13:30

All-optical modulation of SHG intensity in metal-organic frameworks single crystalsN.A. Zhestkij¹, A.V. Lubimova¹, A.O. Larin¹, S.A. Shipilovskikh¹, D.A. Zuev¹, V.A. Milichko²; ¹ITMO Univ., Russia; ²New Uzbekistan Univ., Uzbekistan

We demonstrate direct all-optical modulation of second harmonic generation (SHG) in single crystals of a non-centrosymmetric erbium-based metal-organic framework (Er-BTC). Modulation is achieved by simultaneous irradiation with a continuous-wave 532 nm laser inducing thermal lattice dynamics and a femtosecond 1050 nm laser generating the SHG signal. The approach enables reversible, in-situ control of nonlinear optical response in crystalline hybrid materials.

WeR03-p18

10:00-13:30

Study of the amplification of an external optical signal in a CsPbBr₃ quantum dots thin film

F. Kuzikov, E. Menshikov, D. Gets, S. Povarov, A. Kokhanovskiy; ITMO Univ., Russia

In this work an amplification of an external optical signal in CsPbBr₃ quantum-dot thin films under UV femtosecond excitation is studied. We analyze pump-probe measurement using rate equation model to evaluate recombination parameters to create a numerical model describing the gain as a function of material and sample parameters and input intensity.

WeR03-p19

10:00-13:30

Characterization of heat dissipation in quantum cascade lasers using an effective thermal diffusivityE.D. Cherotchenko¹, I.I. VrubeI¹, V.V. Dudelev¹, A.D. Andreev¹, D.V. Chistyakov¹, V.V. Podoprigora¹, A.A. Nikitin¹, D.A. Mikhailov¹, V.Yu. Mylnikov¹, S.N. Losev¹, N.N. Deryagin¹, S.H. Abdulrazak¹, A.V. Babichev¹, A.V. Lyutetskiy¹, S.O. Slipchenko¹, N.A. Pikhtin¹, A.G. Gladyshev², K.A. Podgaetskiy³, A.Yu. Andreev³, I.V. Yarotskaya³, M.A. Ladugin³, A.A. Marmalyuk³, D.S. Papylev², I.I. Novikov^{2,4}, E.A. Kognovitskaya^{1,5}, V.I. Kuchinskii¹, L.Ya. Karachinsky^{2,4}, A.Yu. Egorov², G.S. Sokolovskii¹; ¹Ioffe Institute, ²Connector Optics LLC, ³M.F. Stelmakh POLYUS Research and Development Institute, ⁴ITMO University, ⁵D.I. Mendeleev Institute for Metrology VNIIM, Russia

This work presents an experimental and analytical method for characterizing transient heat dissipation in QCLs using an effective thermal diffusivity constant. The approach combines time-resolved analysis of Fabry–Perot mode chirp with a Green's-function-based analytical model, providing a compact and physically transparent metric for benchmarking thermal performance of QCL designs and post-growth processing techniques.

- WeR03-p20 10:00-13:30
Study of pulsed cathodoluminescence of silver and monovalent thallium halides
 A.E. Ivov, P.V. Pestereva, I.V. Yuzhakov, N.A. Karavanskiy, D.D. Salimgareev, L.V. Zhukova; Ural Federal University, UrFU, Russia
 This work is devoted to the study of the cathodoluminescent properties of single crystals and optical ceramics based on solid solutions of the AgCl_{0.25}Br_{0.75} – Tl system. The samples have emission in the range of 500–700 nm.
- WeR03-p21 10:00-13:30
Frequency stabilization of external cavity diode laser E-LAS by Pound-Drever-Hall technique.
 A.V. Reznikov¹, N.O. Zhadnov², D.R. Kharasov¹, S.P. Nikitin¹, S.A. Voronchenko¹, E.A. Fomiryakov¹, G.Y.Ivanov¹, A.Yu. Danilov¹, Yu.M. Sokolov¹, O.E. Nani^{1,4}, V.N. Treshchikov^{1,3}; ¹T8 Company group, ²Lebedev Physical Inst., RAS, ³Fryazino branch of the V.A. Kotelnikov Inst. of Radio Engineering and Electronics, RAS, ⁴Department of Physics, Lomonosov Moscow State Univ., Russia
 It is shown that the frequency of external cavity diode laser (ECDL) manufactured by T8 LLC can be locked to a high-finesse optical cavity by Pound-Drever-Hall (PDH) technique making possible ultrastable laser operation.
- WeR03-p22 10:00-13:30
Analysis of radiative and thermal properties of Al -containing and Al-free heterostructures for high-power laser bars in the spectral range of 780-810 nm
 N.V. Gultickov, T.A. Bagaev, A.Yu. Andreev, I.V. Yarotskaya, K.Yu. Telegin, A.A. Marmalyuk, M.A. Ladugin; Polyus Research and Development Institute named after M.F. Stelmakh, Russia
 This work is devoted to the comparison of the radiative characteristics of Al-containing and Al-free heterostructures in the spectral range of 780–810 nm, as well as the numerical simulation of thermal resistance for laser bars based on the studied heterostructures.
- WeR03-p23 10:00-13:30
Green InGaN LED-based entropy source for cryptographic applications
 I.A. Kotov¹, H. Lin¹, W. Niu¹, T.K. Ng¹, B.S. Ooi^{1,2}; ¹Electrical and Computer Engineering Program, Computer, Electrical and Mathematical Sciences and Engineering Division, King Abdullah University of Science and Technology (KAUST), Saudi Arabia; ²Department of Electrical, Computer, and Systems Engineering, Rensselaer Polytechnic Institute, USA
 Quantum random number generation is an important task in cryptography due to its fundamental randomness. A green InGaN LED, in combination with silicon avalanche photodiodes, was used to generate information entropy. The estimated generation rate is already comparable to that of the physical entropy source used in integrated digital random number generators, but provides an unpredictability of quantum nature.
- WeR03-p24 10:00-13:30
Single-frequency mid-infrared quantum cascade laser for detection of methane
 D.A. Mikhailov¹, V.V. Dudelev¹, D.V. Chistyakov¹, E.D. Cherotchenko¹, I.I. Vruble¹, V.Yu. Mylnikov¹, S.N. Losev¹, N.G. Deryagin¹, S.Kh. Abdulrazak¹, A.V. Babichev¹, A.V. Lyutetskiy¹, S.O. Slipchenko¹, N.A. Pikhtin¹, A.G. Gladyshev², K.A. Podgaetskiy³, A.Yu. Andreev³, I.V. Yarotskaya³, M.A. Ladugin³, A.A. Marmalyuk³, D.S. Papylev⁴, I.I. Novikov^{2,4}, E.A. Kognovitskaya^{1,5}, V.I. Kuchinskii¹, L.Ya. Karachinsky^{2,4}, A.Yu. Egorov², G.S. Sokolovskii¹; ¹Ioffe Institute, ²Connector Optics LLC, ³"Polyus" Research Institute of M.F. Stelmakh Joint Stock Company, ⁴ITMO University, ⁵D.I. Mendeleev Institute for Metrology, Russia
 We report on the detection of methane using a quantum cascade laser (QCL) with an external resonator in the Littrow configuration operating in 7550-7750 nm range, demonstrating sensitivity at 165 ppm, which is more than 250-fold below the lower limit of the explosive methane concentration in the atmosphere.
- WeR03-p25 10:00-13:30
Nozaki-Bekki holes in long cavity 1550 nm laser
 E.E. Popov, Y.N. Kovach, G.O. Danilenko, V.V. Vitkin, E.A. Viktorov, A.V. Kovalev; ITMO University, Russia
 We study the dynamics of a fiber ring laser, which has a semiconductor optical amplifier as the active medium and a distributed fiber grating with a reflection peak near 1548 nm, which is optically injected by a semiconductor distributed feedback laser. We report the observation of Nozaki-Bekki holes in this configuration.
- WeR03-p26 10:00-13:30
Fluorescence-based direct detection of nitrogen dioxide for environmental, industrial, and security applications
 A.V. Shelaev, A.V. Baryshev; Dukhov Automatics Research Institute, Russia
 Accurate, selective, and sensitive detection of NO₂ is essential for ambient air quality monitoring, industrial safety and security applications. We report on a compact, fluorescence-based system for the real-time direct NO₂ detection with a high selectivity and the ppt level sensitivity.
- WeR03-p27 10:00-13:30
Improvement of the thermal mode of a high-power laser diode using non-injection window
 V.S. Vyazankin, N. V. Gultikov, A.A. Marmalyuk, A.V. Podkopaev; Stelmakh Research Institute «Polyus», Russia
 This study demonstrates effective suppression of catastrophic optical mirror damage (COMD) using a non-injection window (NIW) structure near the laser diode facet. Simulations and experiments show that NIW reduces current density and carrier concentration at the facet, decreasing influence of key heat sources. Laser emitters with NIW demonstrate higher output optical power in comparison with ones without NIW.

R04. LASER BEAM CONTROL - POSTERS

Location: Congress Hall, Floor 1; Wednesday, June 24, 2026

- WeR04-p01 10:00-13:30
- Shack-Hartmann sensor with an arbitrary oriented lenslet array for optical communication applications**
I. Galaktionov^{1,2}, D. Chizhin¹, V. Toporovsky¹, O. Kolesnikov¹; ¹Moscow Technical University of Communications and Informatics, ²Moscow Polytechnic University, Russia
Shack-Hartmann wavefront sensor is widely used device in a large number of applications. Though it's calibration and assembly are well-described, there are a few issues left. One of the issues is the necessity to orient the lenslet array precisely to the sensor of the camera. We developed the algorithm that allows to overcome this issue.
- WeR04-p02 10:00-13:30
- A multi-stage laser beam focusing optimization algorithm for free-space optics communications**
I. Galaktionov^{1,2}, V. Toporovsky¹, O. Kolesnikov¹; ¹Moscow Technical University of Communications and Informatics, ²Moscow Polytechnic University, Russia
Thermal flows and imperfections in optical components can induce wavefront aberrations that severely degrade wireless optical communication links. This study investigates a novel combined stochastic gradient descent optimization algorithm designed to compensate for such optical distortions. The results indicate a substantial improvement in performance: the algorithm increased the total collected power of a beam focused onto a 10 μm fiber core from 0.3 mW to 2 mW, corresponding to a potential rise in coupling efficiency from 0.1 to 0.6.
- WeR04-p03 10:00-13:30
- Fiber-end surface analysis using non-phase-shifting interferometry**
I. Galaktionov^{1,2}, V. Toporovsky¹, O. Kolesnikov¹; ¹Moscow Technical University of Communications and Informatics, ²Moscow Polytechnic University, Russia
We introduced an alternative algorithm that integrates Moving Average and Fast Fourier Transform (MAFFT) techniques with Polynomial Fitting. The proposed method achieves results comparable to a Zygo interferometer under standard conditions, with an error margin under 2%.
- WeR04-p04 10:00-13:30
- Error budget atmospheric horizontal path laser radiation transferring estimation using adaptive optics**
V.V. Toporovsky¹, I.V. Galaktionov^{1,2}, D.D. Chizhin¹, O.V. Kolesnikov¹; ¹Moscow Technical University of Communication and Informatics, Russia; ²Moscow Polytechnic University, Russia
Theoretical estimation of error budget for laser radiation propagated over the atmospheric turbulence with horizontal transmission is presented. The model is based on the fit and temporal error caused phase fluctuations. The output recommendations for the adaptive optics parameters (bandwidth, control elements number) are estimated with Strehl ratio value.
- WeR04-p05 10:00-13:30
- Stroke optimization for piezoelectric modal wavefront corrector**
V.V. Toporovsky¹, I.V. Galaktionov^{1,2}, V.V. Tatyani³, M.V. Koryachko^{2,3}; ¹Moscow Technical University of Communication and Informatics, ²Moscow Polytechnic University, ³MIREA - Russian Technological University, Russia
Predictive analysis of corrector parameters is vital for adaptive optics. This paper presents theoretical estimation of spatial stroke for a modal bimorph deformable mirror. The model accounts for substrate and piezo materials, dimensions, and control electrode area to predict the amplitude of reflective surface deformation.
- WeR04-p06 10:00-13:30
- Effect of atmospheric turbulence on the wandering of a vortex beam: an experiment on a 500-meter path**
V.V. Kuskov¹, R.M. Makhmanazarov^{1,2}, V.E. Zuev Institute of Atmospheric Optics SB RAS, ²National Research Tomsk State University, Russia
The results of an experimental study on the effect of atmospheric turbulence on the propagation of superpositions of vortex beam modes are presented. It was shown that increasing the maximum topological charge in the superposition leads to larger transverse beam sizes at the end of the propagation path, reducing the amplitude of beam wander.
- WeR04-p07 10:00-13:30
- Demodulation of superpositions of vortex beam modes after propagation through a turbulent medium**
V.V. Kuskov¹, R.M. Makhmanazarov^{1,2}, L.O. Gerasimova¹; ¹V.E. Zuev Institute of Atmospheric Optics SB RAS, ²National Research Tomsk State University, Russia
The results of atmospheric experiments on the demodulation of laser radiation representing a superposition of vortex beam modes are presented. The atmospheric propagation path length was 150 meters. The experimental results demonstrate the feasibility of demultiplexing vortex laser beams after their propagation through a randomly inhomogeneous medium.
- WeR04-p08 10:00-13:30
- Zonal piezoelectric wavefront corrector characteristics framework**
V.V. Toporovsky¹, I.V. Galaktionov^{1,2}, O.V. Kolesnikov¹; ¹Moscow Technical University of Communication and Informatics, ²Moscow Polytechnic University, Russia
Estimation of the key parameters of the wavefront corrector is important task for the adaptive optical system performance. The paper presents the theoretical estimation of the of zonal piezoelectric wavefront corrector parameters – stacked-actuator deformable mirror with cylindrical piezostacks. The model takes into consideration the substrate and piezostack materials, linear dimensions, blocking force, actuator stiffness.
- WeR04-p09 10:00-13:30
- Block -type Shack-Hartmann wavefront sensor with configurable focal length of microlens array**
V.V. Toporovsky¹, I.V. Galaktionov^{1,2}, O.V. Kolesnikov¹; ¹Moscow Technical University of Communication and Informatics, ²Moscow Polytechnic University, Russia
Quality of the measurement of the phase fluctuations defines the wavefront correction efficiency. The accuracy of the Shack-Hartmann wavefront sensor depends from the lenslet array choice and camera selection. However, there are numerous applications requiring various dynamic range and accuracy. We propose the block-type Shack-Hartmann wavefront sensor with configurable focal length of microlens array.
- WeR04-p10 10:00-13:30
- The diffraction-driven evolution of singular beams upon reflection from the rough surfaces**
B.V. Sokolenko, Yu.A. Egorov, N.V. Shostka; Institute of Physics and Techniques, V.I. Vernadsky Crimean Federal University, Russia
We present a numerical study of singular beam diffraction by surfaces with inhomogeneities. These defects induce vortex displacement and generate detectable phase singularities moving on closed loops trajectories. This phenomenon enabling sensitive surface defect diagnostics with singular beams. Self-reconstruction of diffracted beams, particularly Laguerre-Gaussian and Bessel-Gaussian types, allows accurate surface profile retrieval from interferograms using straightforward software processing.

- WeR04-p11 10:00-13:30
Modeling of lensed optical fiber polishing defects
 R.S. Ponomarev, L.O. Zhukov, F.E. Khasnullin; Perm State University, Russia
 This study models the impact of polishing defects in lensed optical fibers, specifically apex-axis misalignment. Using COMSOL simulations, it shows that for lenses with an apex angle exceeding 110° , a misalignment of up to $10\ \mu\text{m}$ is non-critical, preserving a Gaussian output profile. However, for angles below 110° , even minor defects significantly distort the beam profile and alter its direction. The findings highlight stringent precision requirements for manufacturing narrow-angle lensed fibers used in integrated photonics coupling.
- WeR04-p12 10:00-13:30
High-OAM deep ultraviolet twisted light for relativistic vortex electrons source
 A.S. Dyatlov^{1,2}, D.M. Dolgintsev¹, V.V. Gerasimov^{3,4}, V.V. Kobets², V.P. Nazmov^{3,5}, M.A. Nozdrin², A.N. Sergeev¹, D.S. Shokin², K.E. Yunenkov², D.V. Karlovets^{1,6}; ¹School of Physics and Engineering, ITMO University, ²Joint Institute for Nuclear Research, ³Budker Institute of Nuclear Physics SB RAS, ⁴Department of Physics, Novosibirsk State University, ⁵Institute of Solid State Chemistry and Mechanochemistry SB RAS, ⁶St.Petersburg Nuclear Physics Institute of NRC "Kurchatov Institute", Russia
 We demonstrate deep-ultraviolet (266 nm) high-orbital-angular-momentum (OAM) vortex beams generated using fabricated diffractive optical elements: fork gratings, a spiral phase plate, and binary axicons. The SPP produces a Laguerre–Gaussian mode with $l = 64$ and $\sim 80\%$ efficiency, while axicons generate quasi-Bessel beams up to $m = 10$. These beams enable structured photocathode illumination for electron accelerator applications.
- WeR04-p13 10:00-13:30
Temporal modal piezoelectric wavefront corrector characteristics theoretical analysis
 V.V. Toporovsky¹, I.V. Galaktionov^{1,2}, A.R. Kalimullina³, M.V. Koryachko^{2,3}; ¹Moscow Technical University of Communication and Informatics, ²Moscow Polytechnic University, ³MIREA – Russian Technological University, Russia
 Predictive analysis of the wavefront corrector parameters is crucial task for estimation of the adaptive optical system performance. The paper presents the theoretical estimation of the temporal of modal piezoelectric wavefront corrector – mainly bimorph deformable mirror. The model takes into consideration the substrate and piezoelectric plate materials, diameters, thicknesses and boundary conditions.
- WeR04-p14 10:00-13:30
A setup for measuring delays in bidirectional optical amplifiers
 O.V. Kolmogorov, S.S. Donchenko, D.V. Prokhorov, P.M. Gunin; FSUE Russian National Research and Development Institute of Physicotechnical and Radiotechnical Measurements (VNIIFTRI), Russia
 A measurement setup for high-precision determination of signal delays in bidirectional optical amplifiers is presented. The setup reproduces nominal bidirectional operating conditions and uses a two-stage calibration procedure. Experimental results show that delay measurements with an uncertainty of several tens of picoseconds are achievable.
- WeR04-p15 10:00-13:30
Conversion of two-micron radiation into the visible spectral range using ZBLAN:Er³⁺/Ho³⁺ fluoride glass
 V.A. Egorov, A.P. Savikin, S.V. Kurashkin, A.V. Marugin; Lobachevsky Nizhny Novgorod State Univ., Russia
 Up-conversion luminescence of ZBLAN:Er³⁺/Ho³⁺ fluoride glass under excitation by $2\ \mu\text{m}$ region radiation was investigated, interionic energy transfer was studied. In the visible part of the spectrum, luminescence bands were observed in the regions of 545 and 655 nm. The visualization threshold power density of Tm³⁺:YAP laser radiation ($\lambda = 1.94\ \mu\text{m}$) was $30\ \text{W}/\text{cm}^2$ in the ZBLAN:1%Er³⁺+1%Ho³⁺ sample.
- WeR04-p16 10:00-13:30
Bessel beam eigenmodes in a gyrotropic medium
 Yu.A. Egorov, V.B. Mostovskoy, B.V. Sokolenko; Institute of Physics and Techniques, V.I. Vernadsky Crimean Federal University, Russia
 The propagation of non-diffracting electromagnetic beams in crystals whose properties are described by diagonal permittivity and optical activity tensors is considered. It is shown that a Bessel beam with initial linear polarization exhibits a cross-shaped conoscopic pattern in the orthogonal component, formed by an array of optical vortices. Along with the initial polarization, the conoscopic pattern also changes during beam propagation, and it tends to recover at lengths equal to a quarter of the beat length.
- WeR04-p17 10:00-13:30
Control of laser beam parameters for measuring the refractive index of liquid media with an accuracy of 0.00005 using an Anderson differential cuvette
 V.V. Davydov^{1,2}, D.S. Provodin¹, M.A. Yakusheva³, A.D. Kurkova; ¹Peter the Great St.Petersburg Polytechnical University, ²St.Petersburg Electrotechnical University "LETI", ³St.Petersburg State University of Telecommunications, Russia
 It has been established that in differential refractometers the refractive index measurement error depends on the position of the laser radiation optical axis on the photodiode array. Accurate localization of the optical axis within a single pixel requires control of the laser beam parameters. This paper presents results of studying the dependence of the beam width on the photodiode array on the laser power after transmission through an Anderson differential cuvette.
- WeR04-p18 10:00-13:30
Metrological assurance of frequency-stabilized lasers. National standards
 Z.V. Fomkina, K.V. Chekirda, N.A. Kononova, Yu.G. Zackharenko; D.I. Mendeleev Institute for Metrology (VNIIM), Russia
 The report is about the metrological assurance of frequency-stabilized lasers.
- WeR04-p19 10:00-13:30
The calculation of the actuators influence functions of a rectangular deformable mirror with free edges
 D.A. Yagnyatinskiy, V.N. Fedoseyev; Luch JSC, Russia
 Analytically calculated actuators influence functions for a rectangular deformable mirror with free edges are obtained. The deflection is expanded into a series of natural vibration modes of a rectangular plate, which can be grouped into three classes: ordinary modes and two additional families of extraordinary modes. Analytical results have been compared with finite-element simulations for different parameters of DMs.
- WeR04-p20 10:00-13:30
Pattern formation and control in broad-area VCSELs with nonlinear gain
 E.A. Yaronova^{1,2}, A.A. Krents^{1,2}, N.E. Molevich^{1,2}; ¹Samara National Research University, Russia; ²Lebedev Physical Institute, Russia
 Broad-area VCSELs tend to produce irregular emission as modulation instabilities arise from the interaction of many transverse modes. Optical injection of a weak external beam is a known method for suppressing these instabilities and obtaining spatially uniform output. This study provides generalized calculations using the Maxwell-Bloch model with radiative recombination. Our results show that adding nonlinear gain does not disrupt the stabilization mechanism.

WeR04-p21

10:00-13:30

Laser beam control in differential measurements for determining interfaces between media in hydrocarbon mixtures

V.V. Davydov^{1,2}, R.P. Klimenko³, V.I. Danilova³, A.D. Kurkova³; ¹Peter the Great St.Petersburg Polytechnical University, ²St.Petersburg Electrotechnical University "LETI", ³St.Petersburg State University of Telecommunications, Russia

The necessity of studying the dynamics of phase separation boundary formation in hydrocarbon mixtures is substantiated. A new differential method has been developed using a triangular cuvette with a sealed lid to enable long-term measurements of the refractive index n when working with volatile hydrocarbons. The proposed method implements control of laser radiation parameters, including wavelength and power variation. The results of investigating changes in the phase separation boundary are presented.

WeR04-p22

10:00-13:30

Beam-specific phase masks for beam shaping of diode lasers

D.A. Radnatarov, I.V. Gromov, Zh.E. Munkueva, Y.S. Fedotov, S.M. Kobtsev; Novosibirsk State University, Russia

A beam-specific phase-mask-based method is presented for shaping diode laser emission into predefined intensity profiles or for effective collimation prior to focusing. The phase masks are individually designed based on beam characterization, enabling compensation of astigmatism, intensity asymmetry, and complex spatial structure with minimal optical loss. specially made phase mask that creates a beam with a specified intensity profile or effectively collimates it for subsequent focusing.

WeR04-p23

10:00-13:30

Binary-phase filtering of tightly focused vector petal laser beams for overcoming the diffraction limit

A.G. Sedukhin, R.I. Kuts; Institute of Automation and Electrometry of SB RAS, Russia

It is shown numerically that using optimization and a binary-phase spatial filtering of the initial field of tightly focused vector petal laser beams, one can reduce the size of these beams in their waist, with overcoming the diffraction limit. The focused intensity patterns of super-resolved beams with 6 petals, taken as examples, were generated and analyzed for radial and azimuthal polarization of the initial field.

WeR04-p24

10:00-13:30

Neutral atom entanglement with non-Gaussian beams

A. Gordeev^{1,2}, D. Kuzmenok^{1,2}, I. Iukhnovets^{1,2,3}, O. Bychkova^{1,2}, I. Bobrov¹, G. Struchalin¹, S. Straupe^{1,4}; ¹Faculty of Physics, Lomonosov Moscow State University, ²Lebedev Physical Institute RAS, ³Moscow Institute of Physics and Technology, ⁴Russian Quantum Center, Russia

We study quantum computing technology based on neutral atoms of rubidium where atomic entanglement is achieved with effect of Rydberg blockade. Rubidium atoms are placed in optical lattice and cooled. Residual thermal motion of atoms increases error of entangling operations, which can be suppressed using non-Gaussian beams. Theoretical analysis and experimental results will be presented.

WeR04-p25

10:00-13:30

Formation of Bessel beams and Laguerre-Gaussian modes selection in an Nd:YAG laser using immersed axicons

E.A. Cheshev¹, A.L. Koromyslov¹, V.A. Petukhov¹, K.V. Prokhorchuk^{1,2}, Yu.V. Senatsky¹; ¹P.N. Lebedev Physical Institute of RAS, ²National Research Nuclear University (MEPhI), Russian

Data on the formation of Bessel beams and Laguerre-Gaussian modes selection in an LD-pumped Nd:YAG laser using immersed axicons are presented. Experiments and calculations have shown that immersing complements the functionality of axicons (including acute-angled ones) with lasers.

WeR04-p26

10:00-13:30

Megajoule-class laser facility aberrations correction by means of a modal algorithm

R.A. Shnyagin, F.A. Starikov; Russian Federal Nuclear Center – VNIIEF, Russia

The numerical-theoretical investigation on the performance of a modal algorithm for static phase aberrations correction of the megajoule-class laser facility radiation employing a wide-aperture 61-channel adaptive mirror within an adaptive optics system without a wavefront sensor has been carried out. Modal correction can significantly reduce the root-mean-square wavefront error in several algorithm iterations. A hybrid correction method has been proposed.

WeR04-p27

10:00-13:30

Coherent beam combining of multichannel fiber laser radiation by the combined aperture method using a two-stage stochastic parallel gradient algorithm.

N.M. Rakcheev, S.V. Tyutin, O.L. Techko, A.A. Lastovkin, N.A. Zaretsky, M.I. Konovaltsov; Russian Federal Nuclear Center All-Russian Research Institute of Experimental Physics, Russia

The paper demonstrates two methods of coherent combining of continuous fiber laser beams on beam-splitting mirrors. In the first method, three beams are connected to the reference one in series, and in the second, the radiation from four channels is combined into two groups of two channels each, and then the combined radiation is added to the combining element.

WeR04-p28

10:00-13:30

Evaluation of the metrological characteristics of the two-wave laser interferometer

E.A. Lavrov; Russian National Research and Development Institute of Physicotechnical and Radiotechnical Measurements (VNIIFTRI), Russia

The paper presents the results of studies the metrological characteristics of the developed two-wave laser interferometer based on the State primary special standard of the unit of length GET 199–2024. The optical scheme of the device is shown in the work. A device for increasing the resolution of the laser interferometer is also described.

WeR04-p29

10:00-13:30

Gauge-invariant analysis of angular momentum in vector vortex beams

E.V. Malyutina, D.D. Reshetnikov, E.V. Vashukevich, T.U. Golubeva; St.Petersburg State University, Russia

A method for constructing a gauge-invariant transverse potential for vector vortex beams is proposed. Explicit expressions are obtained for the values of the spin and orbital angular momenta. It is shown that the ratio J_z/W generalizes the classical result for scalar vortices. The possibility of experimental investigation of orbital angular momentum in such beams is described.

WeR04-p30

10:00-13:30

Multistage pure silica core optical fiber tapering

S. Vlasov¹, T. Gorshkov^{1,2}, A. Timur³, S. Arkhipov⁴, A. Lazareva⁵, D. Myasnikov⁵, A. Ivanov¹, M. Popov¹, D. Chermoshentsev¹, K. Min'kov^{1,6}; ¹Russian Quantum Center, ²Skoltech Center for Photonic Science and Engineering, Skolkovo Institute of Science and Technology, ³Project Center for Applied Photonics and Quantum Technologies, Skolkovo Institute of Science and Technology, ⁴Research Facilities Center, Skolkovo Institute of Science and Technology, ⁵VPG Laserone, ⁶Russian Metrological Institute of Technical Physics and Radio Engineering, Russia

A multistage tapering technique for pure silica core optical fibers is demonstrated for efficient whispering gallery mode excitation at 405 nm. The method suppresses mode leakage into the secondary cladding, improves optical transmission, and preserves a short, mechanically stable sub-micron waist region, achieving up to 40% transmission in tapered S405-XP fibers.

R05. SUPER-INTENSE LIGHT FIELDS AND ULTRA-FAST PROCESSES - POSTERS

Location: Congress Hall, Floor 1; Wednesday, June 24, 2026

- WeR05-p01 15:00-18:30
- Transition radiation of a single attosecond pulse from multi-layer target irradiated by relativistic laser pulse**
K.Yu. Platonov^{1,3}, A.A. Andreev^{2,3}; ¹Peter the Great St.Petersburg Polytechnic University, ²St.Petersburg State University, ³Ioffe Institute, Russia
An (sub)attosecond-duration electromagnetic pulse of transition radiation generated when a thin (a few nanometers) dense first target electron bunch accelerated by a laser pulse hits a second metallic target is being considered. The pulse duration and the conversion coefficient of laser energy into coherent transition radiation energy are determined. Conditions are found for distinguishing the transition radiation pulse from other secondary radiation channels generated when the electron bunch and laser pulse hit the second target.
- WeR05-p02 15:00-18:30
- Simulation of laser acceleration with a decomposition in azimuthal modes**
N.N. Nikiforov^{1,3}, I.N. Tsybalov^{1,2}, A.B. Savel'ev^{1,3}; ¹Faculty of Physics, Lomonosov Moscow State Univ., ²Inst. for Nuclear Research of RAS, ³Branch of Lomonosov Moscow State Univ. in Sarov, Russia
We numerically investigated electron acceleration by the interaction of a femtosecond laser pulse with a plasma with density 0.1-1% of critical value. PIC simulation was performed in cylindrical geometry with a decomposition in azimuthal modes. The simulation results obtained with different numbers of modes used were compared with three-dimensional modeling.
- WeR05-p03 15:00-18:30
- Enhancement of quasi-stationary magnetic fields by orders of magnitude via optimization of the plasma transverse density profile in the regime of relativistic self-channeling**
V.A. Kuleshova¹, A.V. Korzhimanov²; ¹Faculty of Physics and Sarov Branch, Lomonosov Moscow State University, ²Gaponov-Grekhov Institute of Applied Physics of RAS, Russia
This research enhances quasi-stationary magnetic fields generated via the inverse Faraday effect during relativistic laser self-channeling. Introducing a tailored plasma density peak overcomes field saturation by concentrating electrons, boosting currents, and amplifying the axial magnetic field over tenfold.
- WeR05-p04 15:00-18:30
- The 3D numerical optimization of gas-jet targets for acceleration of electrons and protons by picosecond laser pulse with intensity of $5 \cdot 10^{19}$ W/cm²**
V.A. Lykov, G.N. Rykovanov, D.V. Torshin; Russian Federal Nuclear Center – Zababakhin All-Russian Scientific Research Institute of Technical Physics, Russia
The 3D simulation results of charge particles acceleration at the irradiation of gas jet targets with subcritical density by the picosecond laser pulse with intensity of $5 \cdot 10^{19}$ W/cm² are discussed. It is predicted that the use of gas jet target with optimal parameters instead of solid-state foils can raise considerably a brightness of laser based source of MeV gamma-rays in experiments at the SOKOL-P facility.
- WeR05-p05 15:00-18:30
- Femtosecond laser point-by-point inscription of apodized chirped fiber Bragg gratings**
P.A. Elizarova^{1,2}, Z.E. Munkueva^{1,2}, V.M. Volosi^{1,2}, D.S. Kharenko^{1,2}, N.A. Koliada^{1,3}, A.V. Dostovalov^{1,2}, S.A. Babin^{1,2}; ¹Inst. of Automation and Electrometry of the SB RAS, ²Novosibirsk State Univ., ³Inst. of Laser Physics of the SB RAS, Russia
We demonstrate an experimental realization of a dome-spectrum apodized chirped FBGs (ACFBGs) fabricated by femtosecond point-by-point inscription technique in a polarization-maintaining fiber. Our approach combines the inscription techniques for chirped FBGs and apodized FBGs to fabricate ACFBGs. Moreover, we present the implementation of dome-spectrum ACFBGs applied for mode-locked fiber laser as a dispersion component and a spectral filter.
- WeR05-p06 15:00-18:30
- The dynamics of motion of a relativistic electron emitted from a thin foil during an intense laser pulse, with foil interaction.**
A.S. Kuratov^{1,2}, A.V. Brantov^{1,2}, V.Yu. Bychenkov^{1,2}; ¹VNIIA, ²LPI RAS, Russia
The present study investigates the process of high-energy electron formation resulting from the interaction between a high-intensity femtosecond laser pulse and a thin metal foil. The formation and motion characteristics of these electrons play a pivotal role in the generation of terahertz radiation. The characteristic electron spectra, the characteristics of their formation, energy gain and loss, and motion outside the foil are examined based on numerical simulations using the particle-in-cell method and theoretical estimates.
- WeR05-p07 15:00-18:30
- Optimizing the Compton radiation source in linear and weakly nonlinear regimes using GPU-accelerated code**
A.S. Samsonov¹, A.A. Zakharova², I.Yu. Kostyukov¹; ¹Federal Research Center A.V. Gaponov-Grekhov Institute of Applied Physics of RAS, ²Lomonosov Moscow State University, Sarov Branch, Russia
We report on development of GPU-accelerated code aimed at optimizing Compton source parameters in realistic conditions, accounting for electron beam and laser pulse focusing, energy spreads, weakly nonlinear effects, etc. The optimization process yields optimal laser parameters for maximum photon yield and spectral monochromaticity. The code is also used to validate effectiveness of a flying-focus technique to enhance source performance.
- WeR05-p08 15:00-18:30
- Experimental study of the interaction of femtosecond laser pulses with targets of near-critical density**
A. Kotov¹, S. Perevalov¹, R. Zemskov¹, E. Blinov¹, K. Burdonov¹, V. Ginzburg¹, A. Kuzmin¹, S. Stukachev¹, I. Yakovlev¹, N. Bukharsky², N. Borisenko², A. Shaikin¹, E. Khazanov¹, M. Starodubtsev¹, O. Rozmey³, N. Andreev⁴, A. Soloviev¹; ¹Institute of Applied Physics, RAS, ²Lebedev Physical Institute, RAS, Russia; ³GSI Helmholtz Centre for Heavy Ion Research, Germany; ⁴Joint Institute for High Temperatures, RAS, Russia
This paper presents an experimental study of secondary radiation generation from the interaction of femtosecond laser pulses (60 fs, 12 J, 910 nm) with thin aluminum foil and a cellulose triacetate foam target with an average density of 2-4 mg/cm³, including preionization by a nanosecond pulse.

WeR05-p09

15:00-18:30

Spectral features of high-power femtosecond radiation scattering on plasma dust structuresA.A. Andreev^{1,2}, V.Yu. Karasev¹, K.Yu. Platonov³, A.A. Schimko¹; ¹St. Petersburg Univ., ²Ioffe Institute, ³St. Petersburg Tech. Univ., Russia

The paper presents the results of theoretical and experimental studies on the interaction of high-power femtosecond laser pulses with dust plasma particles. Optimization of the conditions for the generation of harmonics of laser radiation from submicron high-density plasma clusters irradiated by 50 fs and energy up to 5 mJ laser pulses is considered.

WeR05-p10

15:00-18:30

High frequency all-diode-pumped Ti:Sapphire laser system for fabrication of photonic devices in transparent materials by femtosecond laser writingK.A. Emelyanov¹, K.A. Akmarov¹, A.Yu. Danilov¹, D.M. Bengalskii¹, I.R. Ovsyankin¹, A.V. Reznikov¹, S.P. Nikitin^{1,2}, O.E. Nanii¹ and V.N. Treshchikov¹; ¹T8 LLC, ²FemtoVision LLC, Russia

An all-diode-pumped Ti:Sapphire laser system designed for photonic device fabrication by femtosecond laser writing has been built and tested. The use of sub-100 fs pulses allows to reduce laser energy fluence required for fiber core modification below 1,5 J/cm².

WeR05-p11

15:00-18:30

Methods of increasing the maximum recording base using a laser rangefinder

S.A. Finyushin, A.V. Fedorov, E.A. Chudakov, D.A. Kalashnikov, I.S. Gnutov, E.A. Razumkov;

Russian Federal Nuclear Center – All-Russian Research Institute of Experimental Physics, Russia

An experimental method for quasi-continuous laser recording of reflective surface movements has been developed at RFNC-VNIIEF since 2015. The laser rangefinder system developed on this basis enables the study of fast processes by precisely recording the coordinates of the objects being studied. As part of the research, methods for increasing the maximum detection base using the laser rangefinder method have been proposed and experimentally tested.

WeR05-p12

15:00-18:30

Self-consistent account of spectrum formation during filamentation in compressed gases in the mean-field approximationYu.E. Geints¹, A.D. Bulygin¹, V.O. Kompanet², S.V. Chekalin²; ¹V.E. Zuev Institute of Atmospheric Optics SB RAS, ²Institute of Spectroscopy RAS, Russia

In this work, the formation of a supercontinuum spectrum is experimentally and theoretically studied during filamentation in compressed nitrogen of chirped femtosecond optical pulses in the mode of sharp focusing.

WeR05-p13

15:00-18:30

Ultrashort-pulse laser interaction with microclusters as a source of hard X-ray radiation

D.A. Gozhev, S.G. Bochkarev, O.E. Vais, M.G. Lobok, V.Yu. Bychenkov; , Russia

Using 3D PIC simulations, volumetric stochastic heating of submicron-sized cluster plasma composed of heavy atoms was investigated under irradiation by an ultrashort laser pulse of moderately relativistic intensity. The characteristics of the generated hard X-ray radiation were determined for a laser pulse with a given energy (~1 J). The analysis reveals that bremsstrahlung radiation makes the dominant contribution to hard X-ray emission, compared to synchrotron-like emission caused by stochastic electron motion.

WeR05-p14

15:00-18:30

A comparative study of laser-driven electron acceleration in "laser bullet" and "bubble" regimesA.J. Castillo^{1,3,4}, S.G. Bochkarev^{1,2}, V.Yu. Bychenkov^{1,2}, M.G. Lobok^{1,2}; ¹P.N. Lebedev Physics Institute, RAS, ²Center for Fundamental and Applied Research, All-Russian Research Institute of Automatics, ³Pirogov Russian National Research Medical University, ⁴Peoples' Friendship University of Russia (RUDN University), Russia

Extreme charge and conversion efficiency in laser-driven electron acceleration are achieved through relativistic self-trapping in "laser bullet" and "bubble" regimes. 3D PIC simulations show that the laser bullet regime enables enhanced production of 15–30 MeV electrons, applicable to radiation-nuclear technologies.

WeR05-p15

15:00-18:30

Formation and diagnostics of a gas target for a prospective laser-plasma extreme ultraviolet source

E.S. Blinov, S.E. Perevalov, A.V. Kotov, A.A. Soloviev; IAP RAS, Russia

This work presents a combined interferometric and ionization diagnostic method for accurate density profile calibration of a supersonic xenon gas jet. The intensity of laser-induced breakdown glow is used to determine the local gas concentration profile. The results provide essential data for optimizing the jet as a target for a prospective 11.2 nm laser-plasma EUV source for lithography.

WeR05-p16

15:00-18:30

Femtosecond filamentation and supercontinuum generation in KYW crystal

K.B. Yushkov, A.I. Chizhikov, V.S. Shcherbakova, V.Ya. Molchanov; Univ. MISIS, Russia

Femtosecond filamentation and supercontinuum generation is observed experimentally in KY(WO₄)₂ single crystal at pump pulse wavelength of 1030 nm. The regimes of a single filament, periodic refocusing of the filament, and multiple filaments were obtained by increase in pulse energy from 0.35 to 2.9 mJ. Associated conical emission patterns corresponding to X-pulse generation were observed in the far field.

WeR05-p17

15:00-18:30

Effect of pressure on time-dependent optical Kerr nonlinearity in Ar, N₂ and CO₂ gasesY.E. Geints¹, V.O. Kompanets^{1,2}, S.V. Chekalin^{1,2}; ¹V. E. Zuev Institute of Atmospheric Optics SB RAS, ²Institute of spectroscopy RAS, Russia

We present experimental data on the coefficient n₂ for atomic Ar, molecular N₂ and CO₂ with a pressure change from 1 to 11 bar and optical pulse duration from 50 to 500 fs of propagating femtosecond laser radiation (800 nm). Importantly, all three gases under study possess close n₂-values in the short pulse limit over the entire pressure range. Meanwhile, with increasing gas pressure, effective n₂ also increases.

WeR05-p18

15:00-18:30

Investigation of THz radiation generated from interaction of relativistic laser pulse with pre-ablated thin-layer liquid jet targetA.V. Samsonov^{1,2,3}, I.N. Tsymbalov^{1,4}, K.A. Ivanov¹, S.A. Shulyapov¹, A.B. Savel'ev¹; ¹Faculty of Physics, M.V. Lomonosov Moscow State University, ²Sarov branch, M.V. Lomonosov Moscow State University, ³Russian Federal Nuclear Center - VNIIEF, ⁴Institute for Nuclear Research of RAS, Russia

This paper presents computational-theoretical and experimental studies on the development of methods for generation and detection of THz radiation obtained from the interaction of a relativistic intensity femtosecond pulse with a target pre-ablated by a nanosecond laser pulse. A continuous ethanol jet with a thickness of several micrometers was used as the target, providing the required density, spatial stability, and continuous operation at high pulse repetition rates.

WeR05-p19

15:00-18:30

Broadband and ultra- fast optical switch based on 2D metal-organic framework

Yu. Kenzhebayeva¹, S. Povarov¹, A.S. Potapov², V.A. Milichko³; ¹School of Physics and Engineering, ITMO University, ²Nikolaev Institute of Inorganic Chemistry, Russia; ³New Uzbekistan University, Uzbekistan

The development of ultrafast and broadband optical switches is a priority area of modern optics and optoelectronics. In our research, we present an optical switch based on a 2D metal-organic framework with a resonant response speed of 1 to 25 GHz in the operating wavelength range of 590-695 nm and a nonresonant response speed of 0.1 THz in the range of 580-685 nm.

WeR05-p20

15:00-18:30

Spherical collapse of an extremely short dipole pulse.

I.I. Metelskii^{1,2}, V.Yu. Bychenkov^{1,2}, V.F. Kovalev^{1,3}; ¹Dukhov Automatics Research Institute (VNIIA), ²Lebedev Physical Institute of RAS, ³Keldysh Institute of Applied Mathematics of RAS, Russia

An analytical investigation of the spherical collapse of an extremely short single-cycle laser pulse has been performed. Exact nonstationary solutions of Maxwell's equations in a vacuum, which describe converging electromagnetic dipole pulses, are analyzed in detail.

These solutions allow for the modeling of highly efficient electromagnetic field focusing, matter compression, charged particle acceleration in extreme fields.

R06. LASERS AND SYSTEMS FOR IMAGING, GREEN PHOTONICS AND SUSTAINABILITY - POSTERS

Location: Congress Hall, Floor 1; Wednesday, June 24, 2026

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|--|-------------|--|-------------|
| <p>WeR06-p01
 Development of a microscope model with three-dimensional visualization and measurement based on dual-wavelength digital holography
 V.V. Sementin, A.P. Pogoda, D.V. Gapon, D.A. Gatsko, S.S. Makarin, A.S. Boreysho; Baltic State Technical University "VOENMEH" named after D.F. Ustinov, Russia
 This paper focuses on the design of a three-dimensional microscope prototype based on dual-wavelength digital holography. The design of a modular optoelectronic system, control of reference beam parameters, and alignment of optical elements are discussed. The influence of temperature and laser diode operating mode on wavelength stability is investigated, and the feasibility of three-dimensional surface reconstruction in quasi-real time is discussed.</p> | 15:00-18:30 | <p>WeR06-p06
 Computer simulation of the fluorescent lidar for monitoring the concentration of NO₂ molecules in gas emissions from ship power plants
 A.N. Popov, V.A. Turkin, V.G. Shemanin; Admiral F.F. Ushakov State Maritime University, Russia
 Most of the ship power plants have a large concentration of NO₂ molecules in their gas emissions. The computer simulation of a fluorescent lidar for monitoring the NO₂ molecules concentration at the ranging distance up to 105 m with these molecules concentration is about of the low permissible concentration and higher has fulfilled.</p> | 15:00-18:30 |
| <p>WeR06-p02
 The impact of helically-wound cable on signal fidelity using DAS for seismic exploration
 I.S. Ponomarev^{1,2}, E.A. Fomiryakov¹, D.R. Kharasov¹, O.E. Nani^{1,2}, V.N. Treschikov¹; ¹T8 LLC, ²Lomonosov Moscow State University, Russia
 In this Letter, we developed a prototype of a fiber optic sensor cable with a helically-wound fiber for geophysical applications. Data from a field experiment and a comparison with a straight fiber cable are also provided.</p> | 15:00-18:30 | <p>WeR06-p07
 Laser-assisted formation of hierarchical Ti-based SERS substrates
 E.Y. Ponkratova¹, A.S. Loshkarev¹, K.A. Maleeva², M.P. Sandomirskii¹, A.S. Shtumpfi, E.I. Ageev¹, D.A. Zuev¹; ¹Faculty of Physics, ITMO University, ²International Research and Education Center for Physics of Nanostructures, ITMO University, Russia
 Developing simple and inexpensive methods for creating SERS substrates is an important task for their practical application. In this study, we use nanosecond laser irradiation of a titanium plate to create microstructures with various morphologies. Thermal deposition of silver islands on the fabricated structures enhances the SERS signal by up to an order of magnitude compared to the untreated surface.</p> | 15:00-18:30 |
| <p>WeR06-p03
 Use of neural networks for processing the output signal of a ring gas laser
 A.O. Sinelnikov¹, I.A. Smetanin¹, E.A. Smetanin¹, U.F. Bykanova²; ¹RUDN University, ²Lomonosov Moscow State University, Branch in the City of Sarov, Russia
 This study compares hybrid neural networks to classical IMU data processing. It evaluates CNN and LSTM architectures. A hybrid CNN-LSTM model achieved 96.2% accuracy in activity classification, a 27% gain over SVM. An LSTM filter also outperformed a Kalman filter in reducing noise. The research confirms these models are viable for efficient, real-time embedded systems in robotics and wearable devices.</p> | 15:00-18:30 | <p>WeR06-p08
 Lightweight TCN for robust vibration reconstruction in self-mixing interferometry under deep speckle fading
 A.V. Rybaltovskii, A.V. Kovalev; ITMO Univ., Russia
 Industrial SMI usage is limited by signal degradation from speckle modulation and noise. We propose a pooling-free temporal convolutional network (TCN) for vibration reconstruction under deep amplitude fading (up to 80%). Unlike pooling-based convolutional neural networks (CNNs), our architecture retains full temporal resolution. The method achieves sub-wavelength accuracy (mean absolute error 72.5 nm) with low computational cost (21.89 MMACs), enabling nearly real-time embedded implementation.</p> | 15:00-18:30 |
| <p>WeR06-p04
 Development of a self-compensated dual-wavelength distributed temperature sensor for well monitoring applications
 E.S. Vissarionova, A.B. Mukhtubaev; ITMO University, Russia
 A self-compensated dual-wavelength distributed temperature sensor for oil and gas well monitoring is presented. The method uses two optical wavelengths that generate closely spaced Raman components, allowing compensation of hydrogen-induced spectral losses in optical fibers. The approach improves temperature measurement accuracy without modifying already installed downhole fiber-optic cables.</p> | 15:00-18:30 | <p>WeR06-p09
 Laser-optical systems for registration of ultrafast processes
 A.E. Dormidonov, A.S. Bychkov, V.G. Kamenev, P.V. Kubasov, A.D. Savvin, V.A. Simonova, A.A. Tikhov, V.N. Turkin; Dukhov Automatics Research Institute (VNIIA), Russia
 The report presents the latest developments of the VNIIA in the field of laser-optical systems and instruments for investigation of ultrafast processes in gas-dynamic experiments.</p> | 15:00-18:30 |
| <p>WeR06-p05
 Determination method for optimal radiation frequency for measuring N₂O absorption
 Ya.V. Antonenko^{1,2}, I.V. Sherstov^{1,2}; ¹Institute of Laser Physics SB RAS, ²Novosibirsk State Technical University, Russia
 A theoretical assessment of the influence of interfering atmospheric gases absorption on the detection of nitrous oxide absorption near 4.5 μm was performed. An experiment was conducted to select the laser radiation operating frequency. A method for determining optimal radiation frequencies for measuring the absorption of target gases substances using a laser photoacoustic gas analyzer is proposed for nitrous oxide.</p> | 15:00-18:30 | | |

R11. LASERS FOR SPACE COMMUNICATION AND NAVIGATION - POSTERS

Location: Congress Hall, Floor 1; Wednesday, June 24, 2026

- WeR11-p01 15:00-18:30
Four-frequency Zeeman laser gyroscope with a static frequency bias
 Yu.Yu. Broslavets, A.A. Fomichev, E.A. Polukeev, V.G. Semenov, A.B. Mordvinova, E.S. Ivanina, A.I. Varenik; Moscow Institute of Physics and Technology (National Research University), Russia
 This paper presents a four-frequency Zeeman laser gyroscope with an equifacial tetrahedral cavity and static frequency bias. Cavity stabilization and rotation sensing utilize combined signals without separating orthogonal polarization beats. Numerical modeling, accounting for dispersion and gain, determined optimal stabilization and beat parameters. As a result, complex bias subtraction is avoided and stable operation of the gyroscope is achieved.
- WeR11-p02 15:00-18:30
Comparison of laser and radio communication channels for the small spacecraft constellation
 S.Yu. Strakhov, D.M. Kadochnikov, N.V. Sotnikova; Baltic State Technical University "VOENMEH" named after D.F. Ustinov, Russia
 The paper provides a comparative analysis of laser (optical) and radio-technical inter-satellite communication channels for grouping small spacecraft operating in low-Earth orbits. The requirements for bandwidth, energy potential of the line, resistance to interference and the possibility of scaling the grouping to hundreds of small spacecraft are considered.
- WeR11-p03 15:00-18:30
Aerosol concentration assessment model using the Beer-Lambert-Bouguer law
 I. Galaktionov^{1,2}, V. Tatyani³, V. Toporovsky¹, M. Koryachko^{2,3}; ¹Moscow Technical University of Communications and Informatics, ²Moscow Polytechnic University, ³MIREA - Russian Technological University, Russia
 This paper presents a software model for estimating aerosol concentration using the Beer-Lambert-Bouguer (BLB) law. The model numerically solves the radiative transfer equation to account for light-particle interactions and derives concentration from measured attenuation. Laboratory verification showed less than 2% error for wavelengths of 600–1200 nm and particle sizes of 0.5–5 μm.
- WeR11-p04 15:00-18:30
Optically inhomogeneous medium impact on BER and coupling efficiency for FSO communications
 I. Galaktionov^{1,2}, A. Kalimullina³, V. Toporovsky¹, M. Koryachko^{2,3}; ¹Moscow Technical University of Communications and Informatics, ²Moscow Polytechnic University, ³MIREA - Russian Technological University, Russia
 This work analyzes the impact of wavefront distortions on Free Space Optical (FSO) links. We evaluate how the root mean square (RMS) wavefront error affects fiber coupling efficiency and the Bit Error Rate (BER). Results quantify the degradation of received power and system performance.
- WeR11-p05 15:00-18:30
Amplitude noise of 89Xnm single-mode VCSELs
 M.A. Bobrov¹, S.A. Blokhin¹, Ya.N. Kovach¹, A.A. Blokhin¹, N.A. Maleev¹, A.G. Kuzmenkov¹, M. N. Marchii¹, A.P. Vasil'ev²; ¹Ioffe Institute, ²Submicron Heterostructures for Microelectronics, Research and Engineering Center, Russia
 The study of the amplitude noise of the 89X nm single-mode polarization-stable VCSELs is presented. The increase in photon lifetime led to the relative intensity noise decrease of ~10 dB (at the same output power). The polarization-resolved relative intensity noise depends on polarization state and SMSR and was 10-20 dB higher than relative intensity noise depending on current and frequency.
- WeR11-p06 15:00-18:30
Correlations and frequency of variations of of laser beam parameters in a turbulent medium
 P.M. Kuzmitsky¹, F.Yu. Kanev², O. Del²; ¹Sadovsky Institute of Geosphere Dynamics RAS, ²V.E. Zuev Institute of Atmospheric Optics SB RAS, Russia
 In numerical experiments, the frequencies of variations, correlation and autocorrelation coefficients of laser radiation characteristics in a turbulent medium are obtained. A description of the computer applications used to conduct the studies is provided.
- WeR11-p07 15:00-18:30
Features of optical system design for daytime free-space quantum key distribution
 V.M. Vakhrusheva^{1,2}, A.N.Klimov², S.P.Kulik²; ¹SFB Laboratory, ²Faculty of Physics, MSU, Russia
 The work addresses the design of free-space quantum key distribution (QKD) systems operating over horizontal atmospheric links under daytime conditions. The paper describes the main sources of noise and provides an estimation of losses arising during the propagation of optical beams in the atmosphere, as well as during their transmission and reception by optical systems.
- WeR11-p08 15:00-18:30
Free-space optical communication based on quantum cascade lasers
 S.A. Chakhlov^{1,2,3}, A.A. Lastovkin¹, F.A. Starikov¹, N.G. Zakharov¹; ¹Inst. of Laser Physics Research, RFNC-VNIIEF, ²Moscow State Univ., ³Branch of Moscow State Univ. in Sarov, Russia
 The development of infrared communication systems is a pressing issue. Infrared radiation with wavelengths falling within transparency windows is subject to less scattering and absorption, allowing operation in almost any weather. Quantum cascade lasers are promising sources for this type of application due to their compactness and the ability to design a laser for virtually any wavelength.
- WeR11-p09 15:00-18:30
Countermeasure against detector blinding attack on the subcarrier wave quantum key distribution system
 M.E. Gellert, B.A. Nasedkin, V.V. Chistiakov; ITMO University, Russia
 In this study, we proposed a countermeasure against a blinding attack. This countermeasure exploits the features of the subcarrier wave quantum key distribution system. Specifically, we suggest periodically increasing the modulating signal amplitude on the receiver side, allowing to detect the eavesdropper's actions. Simulation and experimental results confirm the effectiveness of the proposed approach without significant changes in the system.
- WeR11-p10 15:00-18:30
Comparison of methods for implementing optical communication channels based on single- and multi-element (matrix) emitters and receivers
 S.Yu. Strakhov, D.M. Kadochnikov, N.V. Sotnikova; Baltic State Technical University "VOENMEH" named after D.F. Ustinov, Russia
 The paper considers the architectures of free-space optical communication channels implemented on the basis of single-element and multi-element (matrix) emitters and receivers. The analysis is carried out from the point of view of line energy, angular coverage, requirements for guidance and tracking systems, as well as noise immunity and fault tolerance of the channel. Special attention is paid to the use of such solutions in compact platforms with strict restrictions on weight, dimensions and energy consumption.

WeR11-p11

15:00-18:30

Background glare assessment for a ground station in space-to-earth laser link acquisition

S.D. Levashov^{1,4}, R.M. Bakhshaliev^{1,4}, A.V. Khmelev^{1,2,3}, A.V. Duplinsky^{1,4}; ¹QSpace Technologies, ²National University of Science and Technology MISIS, ³Moscow Institute of Physics and Technology, ⁴HSE University, Russia

For laser Space-to-Earth communication, precise guidance via a ground-based beacon is critical. Its beam must have high divergence to guarantee acquisition considering satellite coordinate accuracy, yet high brightness for detection against a variable solar background. Software has been developed to estimate the actual background glare using images from precision guidance cameras on the "Impulse-1" and "Vladivostok-2" satellites. The tool processes the images to evaluate background intensity, enabling the calculation of the minimum laser power required to reliably overcome it.

WeR11-p12

15:00-18:30

Optical system for satellite laser navigation in free-space optical communications

R.M. Bakhshaliev^{1,2}, A.V. Khmelev¹, K.A. Barbyshev^{1,2}, V.E. Merzlinkin^{1,2}, S.D. Levashov^{1,2}; ¹QSpace Technologies, ²HSE University, Russia

Classical optical communication facilitates high-speed data links between spacecraft and ground stations, or inter-satellite links, offering superior interference resistance, energy efficiency, low detectability, and higher data rates versus radio-frequency systems. However, these benefits necessitate precise laser pointing and tracking to minimize bit error rate (BER) and maintain link stability. This paper examines the subsystem design and assesses its impact, with preliminary results confirming reliable link performance.

R02. HIGH POWER LASERS: FIBER, SOLID STATE, GAS AND HYBRID

Location: Deyneka 1+2 Room, Floor 2; Thursday, June 25, 2026

R02. HIGH POWER LASERS: FIBER, SOLID STATE, GAS AND HYBRID 4

ThR02-17

09:00-09:30

High-power pulsed broadband solid-state lasers with Bragg gratings (*Invited paper*)A.P. Pogoda¹, M.V. Gavrish¹, P.K. Rozanov¹, U.V. Prokhorova¹, A.S. Boreysho^{1,2}; ¹Baltic State Technical University "VOENMEH" named after D.F. Ustinov, ²Laser Systems JSC, Russia

An analysis of the current state of laser technology based on broadband solid-state active media with radiation in the range of 780-900 nm is presented. Methods of using Bragg gratings for radiation control and optical coupling of cavities of laser systems are presented.

ThR02-18

09:30-10:00

Mitigating thermally induced depolarization in Faraday isolators using composite structures (*Invited paper*)

A.V. Starobor; Federal Research Center A.V. Gaponov-Grekhov Institute of Applied Physics of RAS (IAP RAS), Russia

We demonstrate composite magneto-optical elements as an effective method to mitigating thermally induced depolarization in high-power Faraday isolators. By combining a high-Verdet constant medium (TAG/Tb₂O₃ ceramic) with a sapphire heatsink using optical adhesive, significant heat dissipation is achieved. Experimental results confirm a reduction in depolarization by factors of 2.6 and 3.7 respectively, offering a robust solution for high-power laser applications.

ThR02-19

10:00-10:15

Design and development of a diode-pumped Nd³⁺:YAG solid-state laser for laser shock peeningA.S. Shchekin^{1,2}, E.D. Ishkinyaev^{1,2}, O.V. Pagaev¹, A.I. Demidchik¹; ¹LLC LASSARD, ²National Research Nuclear University MEPhI, Russia

We present the development of a diode-pumped solid-state laser based on a master oscillator power amplifier (MOPA) architecture designed for laser shock peening applications. The system combines a single-frequency master oscillator (wavelength 1.064 μm, M² < 1.5) with a five-stage power amplifier, delivering stable pulses with energies up to 10 J at a 10 Hz repetition rate and 20 ns pulse duration.

ThR02-20

10:15-10:30

T+O+E ultra-wideband Bi-doped fiber amplifierA.M. Khagai¹, K.E. Riumkin¹, S.V. Firstov¹, D.S. Serenkov¹, A.V. Elopov¹, A.V. Kharakhordin¹, A.S. Lobanov², M.A. Melkumov¹; ¹Prokhorov General Physics Institute of RAS, ²G.G. Devyatkh Institute of Chemistry of High-Purity Substances of RAS, Russia

We have developed an ultra-wideband amplifier based on bismuth-doped fibers that operates in the T, O, and E telecommunication bands. The amplifier utilizes three types of bismuth-doped fiber, namely germanosilicate, phosphosilicate, and aluminophosphosilicate fibers doped with Bi. The amplifier was backward pumped at 1230 nm and bi-directionally pumped at 1137 nm. The results obtained may be of interest to telecommunications applications, particularly those related to multiband transmission techniques.

ThR02-21

10:30-10:45

Temperature-dependent absorption at the gain wavelength in Yb:YAG crystalA.O. Kuptsova^{1,2}, G.V. Kuptsov^{1,3}, V.A. Petrov^{1,3}, V.V. Petrov^{1,2,3}; ¹Institute of Laser Physics SB RAS, ²Novosibirsk State University, ³Novosibirsk State Technical University, Russia.

Yb:YAG exhibits temperature-dependent reabsorption of amplified radiation that affects efficiency of laser amplifiers. The dependence of absorption in Yb:YAG crystal on wavelength around 1030 nm in temperature range from 40 to 420 K is studied. The results shows that there is a discrepancy between the measured absorption cross section and the one calculated from published data on luminescence cross section.

- Coffee Break -

Location: Deyneka 1+2 Room, Floor 2; Thursday, June 25, 2026

R02. HIGH POWER LASERS: FIBER, SOLID STATE, GAS AND HYBRID 5

ThR02-22

11:30-12:00

Formation of carrier-envelope phase stable gigawatt single-cycle pulses for ultrafast spectroscopy (*Invited paper*)A.B. Fedotov^{1,2}, I.V. Savitsky¹, A.A. Voronin^{1,2}, E.A. Stepanov^{1,2}, A.A. Lanin^{1,2}; ¹Lomonosov Moscow State University, ²Russian Quantum Center, Russia

We report an overview of the methods for the formation and characterization of single-cycle pulses, as well as approaches to stabilizing the field phase relative to the envelope of laser pulses (carrier-envelope phase (CEP)), with an emphasis on methods for passive stabilization of powerful pulses using nonlinear processes. The features and advantages of using phase-stable single-period pulses for current problems of ultrafast nonlinear spectroscopy are discussed.

ThR02-23

12:00-12:30

Resonant high harmonic generation and attosecond pulses production in intense laser field (*Invited paper*)V.V. Strelkov^{1,2}; ¹P.N. Lebedev Physical Institute of RAS, ²A.V. Gaponov-Grekhov Institute of Applied Physics of RAS, Russia

We present the four-step model of the resonant high-harmonic generation, where the steps of the process are (i) photoionization, (ii) the photoelectron's motion in the laser field, (iii) trapping of the electron by the parent ion so that the system lands in the AIS, and (iv) transition from the AIS to the ground state leading to XUV emission.

<p>ThR02-24 Generation of strong magnetic fields and terahertz radiation by irradiation of profiled targets with relativistic laser pulses <i>(Invited paper)</i> N.D. Bukharskii, Ph.A. Korneev; National Research Nuclear University MEPhI, P.N. Lebedev Physical Institute of RAS, Russia The work presents theoretical and experimental studies investigating the possibility of using intense laser-driven discharge currents for generation of strong quasi-stationary magnetic fields and powerful terahertz radiation pulses with controllable characteristics. For this purpose, we propose the use of profiled micro-targets of different geometries, where the currents are excited by ultra-short relativistically-intense laser pulses.</p>	<p>12:30-13:00</p>	<p>ThR02-25 Metrological support for high power laser radiation S.B. Buchkov, S.V. Tikhomirov, S.A. Moskaluk; The All Russian Research Institute of Optical and Physical Measurements, Russia The report describes the results of R&D work on creating a metrological support system for measuring high levels of optical power. This includes reference installations, an upgraded State Primary Standard GET28 2022, and developed powermeters operating in the spectral range of 1,07–10,6 μm and the dynamic range of 1–500 kW, which meet the requirements of manufacturers of technological and special laser equipment.</p>	<p>13:00-13:15</p>
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- Lunch Break -

R04. LASER BEAM CONTROL

Location: Rihter 1+2 Room, Floor 3; Thursday, June 25, 2026

R04. LASER BEAM CONTROL 3

<p>ThR04-14 Methods for in-situ monitoring and quantitative stability metrics in volume hologram recording <i>(Invited paper)</i> P.K. Rozanov^{1,2}, M.V. Gavrish^{1,2}, D.A. Gatsko¹, U.V. Prokhorova¹, V.V. Sementin¹, S.S. Makarin¹, N.V. Nikonov², A.P. Pogoda¹; ¹BSTU "VOENMEH" named after D.F. Ustinov, ²ITMO University, Russia This work presents a set of methods for in-situ monitoring of phase drift, vibrations, and intensity fluctuations during the recording of volume holographic elements. We introduce quantitative metrics to assess setup stability and demonstrate their direct correlation with the final hologram's diffraction efficiency and uniformity. The implemented monitoring and stabilization system enables highly reproducible fabrication of high-quality optical elements.</p>	<p>11:30-12:00</p>	<p>ThR04-17 Karhunen-Loève-Lukosz functions in model-based control algorithms for adaptive optics D.A. Yagnyatinskiy; V.E. Zuev Institute of Atmospheric Optics, SB RAS, Russia In existing model-based control algorithms (for adaptive optics) operating via minimizing the root-mean-squared focal spot radius, Karhunen-Loève-Lukosz functions can be used as control modes. In case of 10th-order modal correction of Kolmogorov wavefronts, their use instead of Lukosz polynomials, provides an increase of the Strehl ratio by 2.4 times (at turbulence levels 40-45) and a decrease of the effective spot size (laser beam quality β-factor) by 1.4 times (at a turbulence level of 5).</p>	<p>13:00-13:15</p>
<p>ThR04-15 Optimization of a predictive adaptive correction algorithm on inhomogeneous atmospheric paths <i>(Invited paper)</i> I.P. Lukin, V.P. Lukin; V.E. Zuev Institute of Atmospheric Optics, SB RAS, Russia In this paper we develop phase control methods for adaptive optics systems, in particular, the efficiency of such systems is improved by developing algorithms that use the prediction of fluctuations in correctable wavefront distortions. The possibilities of optimization in the construction of adaptive phase correction algorithms that take into account the evolution of the wave front caused by the wind movement of turbulence across the propagation path of optical waves on inhomogeneous atmospheric paths are analyzed.</p>	<p>12:00-12:30</p>	<p>ThR04-18 Correlations of the phase gradients of the wave propagating in a turbulent inhomogeneous atmosphere in the weak scintillations regime A.V. Nemtseva^{1,2}, F.A. Starikov^{1,3}; ¹KATC-VNIIEF, ²Lomonosov Moscow State University, ³MEPhI, SarPhTI, Russia We investigate the non-diagonal component of matrix of correlations between gradients of the phase of the light wave propagating through the turbulent atmosphere. The turbulent path is inhomogeneous. For such conditions, we conduct numerical experiment and extract the information about the Rytov variance up to values of 1, i.e. in the weak scintillations regime.</p>	<p>13:15-13:30</p>
<p>ThR04-16 Structured fields based on coherent beam combining <i>(Invited paper)</i> V.V. Dudorov, E.V. Adamov, V.P. Aksenov, G.A. Filimonov, V.V. Kolosov, M.E. Levitskiy; V.E. Zuev Institute of Atmospheric Optics of SB RAS (IAO SB RAS), Russia This paper proposes a new approach using coherent beam combining technology to control the shape (intensity distribution), polarization structure, orbital angular momentum, and spatial coherence of the optical field. In this approach, the synthesized field is the result of interference of a matrix of subbeams. Control of the amplitude, phase, and polarization of the matrix subbeams is based on a modification of the well-known SPGD method using phase and polarization elements in the feedback loop.</p>	<p>12:30-13:00</p>	<p>ThR04-19 Self-powered smart contact lenses with microfabricated loop antennas for adaptive optical control P. Salzenstein¹, B. Guichardaz¹, A.M. Bessou¹, L. Salzenstein², M.V. Pogumirsky³; ¹CNRS, FEMTO-ST, Besancon, France; ²Universite Marie et Louis Pasteur, Besancon, France; ³FAREXPORT Ltd., Russia We present self-powered smart contact lenses integrating microfabricated 900 MHz–1.1 GHz loop antennas and miniaturized energy sources for adaptive optical control. These lenses enable real-time beam shaping, aberration correction, and optical modulation directly on the ocular surface. Simulations and experiments demonstrate compact, efficient antennas supporting wireless power and communication, providing a platform for wearable, autonomous adaptive optics in laser beam applications.</p>	<p>13:30-13:45</p>

- Lunch Break -

Location: Rihter 1+2 Room, Floor 3; Thursday, June 25, 2026
R04. LASER BEAM CONTROL 4

ThR04-20

15:00-15:30

Ghost imaging microscopy: theory, implementation and perspectives (*Invited paper*)

A.M. Vyunishchev^{1,2}, N.N. Davletshin^{1,2}, A.S. Chirkin³; ¹Kirensky Institute of Physics, Federal Research Center KSC SB RAS, ²Siberian Federal University, ³M.V. Lomonosov Moscow State University, Russia

Ghost imaging microscopy is an innovative microscopic technique based on spatially correlated light fields. Here we report that the ghost imaging microscopy is less susceptible to spreading and blurring images than using standard optical microscopy. The results have the potential to be used for a wide-field, label- and scan-free imaging of complex biological tissues.

ThR04-21

15:30-15:45

Advances in TAG and YIG magneto-optic ceramics for high-power optical isolators

Jie Chen; Shanghai Institute of Optics and Fine Mechanics, CAS, China

This report highlights advances in TAG and YIG ceramics, two key magneto-optic materials for Faraday isolators at 1- μm and 2-5 μm mid-infrared bands, respectively. Pioneered by SIOM in 2011, TAG ceramics offer a Verdet constant ~ 1.5 times that of TGG crystals. Recent progress in Mg^{2+} - Si^{4+} co-doping has further enhanced its optical quality. Meanwhile, emerging YIG ceramics demonstrate exceptional performance in the mid-infrared, promising to address the lack of high-performance materials in this spectral region for high-power isolators.

ThR04-22

15:45-16:00

Reconfigurable vector-field generation of polychromatic light from photopatterned twisted nematics

E. Grigoryan, H.H. Harutyunyan, H. Hakobyan, S.A. Shvetsov, T. Orlova, M. Rafayelyan, V. L. Grigoryan; Yerevan State Univ., Armenia

Adiabatic light propagation in twisted nematic liquid crystals enables wavelength-independent polarization structuring of polychromatic beams. Rewritable photoalignment provides spatial control of the director without dynamic phase modulation. Broadband probe light follows the twisted director, forming vector fields with polarization singularities and high linear polarization across the visible spectrum.

Location: Rihter 1+2 Room, Floor 3; Thursday, June 25, 2026
R04. LASER BEAM CONTROL 5

ThR04-25

17:30-18:00

Dynamics of a nanosecond pulse optical limiting by amorphous carbon nanoparticles in water (*Invited paper*)

I.M. Kislyakov¹, A.Yu. Vlasov², A.Yu. Venediktova³, Bin Zhang¹, Jun Wang¹; ¹Shanghai Institute of Optics and Fine Mechanics, CAS, China; ²St. Petersburg State University, Russia

Carbon nanoparticle suspensions are widely considered as effective nanosecond optical limiters. However, kinetics of the effect spanning the laser pulse is still a debatable issue. By combining thermodynamic modeling with data from the high-speed detectors, we analyze this complex process, revealing the inter-relation of a sharp drop in transmission with multiple explosive boiling of water around a carbon particle.

ThR04-23

16:00-16:15

Multifunctional Ferroelectric PMN-PT Crystals for Electro-Optic Modulation and Domain-Engineered Optical Phased Array Beam Steering

A.D. Ushakov¹, J. Li², W. Huang², X. Liu², A.P. Turygin¹, Y. Zhang², Y. Zhang², Q. Hu², Y. Zhuang², V. Shur¹, X. Wei²; ¹Ural Federal University, Russia; ²Xi'an Jiaotong University, China

PMN-PT ferroelectric crystals enable fast electro-optic modulation and solid-state beam steering through domain and phase engineering. Reversible R-O phase switching in PIN-PMN-PT provides optical intensity modulation at moderate fields without high-temperature poling. Cascaded domain optical phased arrays in tetragonal PMN-PT achieve beam steering with 0.32 deg/V/ μm efficiency, highlighting PMN-PT as a multifunctional platform for photonics

ThR04-24

16:15-16:30

Quasi-distributed strain sensor based on weakly reflecting fiber Bragg gratings with a large number of sensing elements in a single fiber

K.I. Koshelev, A.B. Pnev, E.M. Rubtsov, A.D. Potapova, A.V. Sibircev, S.A. Nizel'nik, V.V. Kuklin, A.R. Vavilov, S.D. Utkin, T.M. Volkov; Scientific Education Center Photonics and IR Techniques, Bauman Moscow State Technical University, Russia

A method for interrogating sensing elements based on weakly reflecting fiber Bragg gratings (FBGs) using a phase-sensitive reflectometer is proposed. The approach enables recording signals from several hundred sensing elements in a single fiber with high sensitivity.

ThR04-26

18:00-18:15

ThR04-26

18:00-18:15

Dyakonov surface waveguide modes in interfacial waveguide with asymmetric metal-air boundaries

O.V. Borovkova¹, I.I. Stepanov^{1,2}, S.A. Dyakov³, D.A. Chermoshentsev^{1,2}; ¹Russian Quantum Center, Skolkovo, ²Moscow Institute of Physics and Technology, ³Skolkovo Institute of Science and Technology, Russia

We report Dyakonov surface waveguide modes (DSWMs) that propagate along a flat strip interfacial waveguide formed by two anisotropic materials, bounded by metal on one side and air on the other. Due to asymmetric metal/air boundary conditions, surface waves can exist in such a system regardless of the type of optical anisotropy.

ThR04-27

18:15-18:30

Calculation of the effect of the lensed fiber tip displacement on the shape of the focal spot

L.O. Zhukov, R.S. Ponomarev; Perm State University, Russia

A numerical study was conducted to investigate the effect of the vertical displacement of the fiber lens tip on the focal spot of a conical lens. The results show that an increase in the height displacement shifts the focus away from the optical axis, while the lens self-corrects the focus position.

<p>ThR04-28 18:30-18:45</p> <p>Effects of whispering gallery modes cleaning in microsphere by using surface defects H.A. Rizk, V.A. Simonov, V.S. Terentyev, V.E. Fedyaj, A.E. Simanchuk, A.V. Dostovalov; Institute of Automation and Electrometry, Russia</p> <p>Spectral cleaning with a maximum Q-factor $1.2 \cdot 10^5$ of a microsphere was experimentally achieved by suppressing the excitation of higher-order modes through the ablation of grooves on its surface using a femtosecond laser.</p>	<p>ThR04-29 18:45-19:00</p> <p>Fabrication-tolerant data-driven on-demand programming of interlaced multimode interferometer photonic circuits V.S. Beliaeva^{1,2}, I.V. Kondratyev^{2,3}, A.E. Shitikov¹, D.A. Chermoshentsev^{1,4}, I.A. Bilenko^{1,2}; ¹Russian Quantum Center, ²Faculty of Physics, M.V. Lomonosov Moscow State University, ³Quantum Technology Centre, M.V. Lomonosov Moscow State University, ⁴Moscow Institute of Physics and Technology, Russia</p> <p>We report an optimization routine that constructs a digital model of a universal unitary converter. By training a regression model on experimental transmission data, we reconstruct the device's transformation landscape. This approach enables on-demand reconfiguration while automatically accounting for thermal crosstalk and fabrication imperfections. The resulting model demonstrates high fidelity, enabling precise on-demand reconfiguration.</p>
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R05. SUPER-INTENSE LIGHT FIELDS AND ULTRA-FAST PROCESSES

Location: Stenberg 1 Room, Floor 3; Thursday, June 25, 2026

R05. SUPER-INTENSE LIGHT FIELDS AND ULTRA-FAST PROCESSES 3

<p>ThR05-13 09:00-09:30</p> <p>Advanced compressor designs for ultra high power laser <i>(Invited paper)</i> E.A. Khazanov, A.G. Vyatkin; Gaponov-Grekhov Institute of Applied Physics of RAS, Russia</p> <p>We propose a new compressor geometry – a full-aperture two-grating slanted-groove compressor, consisting of two parallel Littrow-mounted gratings with slanted grooves. The angle of slanting is chosen so as to ensure decoupling of the input and output beams. The gratings and the beam on the first grating have the same size.</p>	<p>ThR05-16 10:15-10:45</p> <p>Magnetic stagnation of two counterstreaming plasma jets induced by intense laser <i>(Invited paper)</i> R.S. Zemskov, S.E. Perevalov, A.V. Kotov, A.A. Murzanev, A.I. Korytin, K.F. Burdonov, V.N. Ginzburg, A.A. Kochetkov, S.E. Stukachev, I.V. Yakovlev, I.A. Shaikin, A.A. Kuzmin, E.V. Derishev, A.V. Korzhimanov, A.A. Soloviev, A.A. Shaykin, A.N. Stepanov, E.A. Khazanov, M.V. Starodubtsev; A.V. Gaponov-Grekhov Institute of Applied Physics of RAS, Russia</p> <p>Experimental observations of the stagnation and redirection of colliding counterpropagating laser plasma flows generated by intense laser pulses with an intensity of 1×10^{18} W/cm² are presented. Hybrid PIC-fluid simulations demonstrate the compression of colliding toroidal self-generated magnetic fields embedded in the counterpropagating plasma flows that leads to stagnation and the redirection of plasma flows.</p>
<p>ThR05-14 09:30-09:45</p> <p>Coherent beam combining in high average and peak power Yb:YAG laser I.I. Kuznetsov, I.V. Ponomarev, S.A. Chizhov, O.V. Palashov, N.I. Karpov; Nonlinear Dynamics and Optics Department, A.V. Gaponov-Grekhov Institute of Applied Physics of RAS, Russia</p> <p>The multichannel Yb:YAG laser with high average and peak power is under development. Coherent beam combination is demonstrated using tiled aperture scheme. Intensity fluctuations of the combined beam were successfully suppressed using the digital phase controller down to <1% standard deviation. Pulse energy of 17 mJ and average power of 20 W were achieved at the laser output.</p>	<p>ThR05-17 10:45-11:00</p> <p>Numerical estimation of the number of femtosecond laser accelerated ions from solid targets and clusters I.M. Mordvintsev^{1,2}, K.A. Ivanov^{1,2}, T.A. Semenov⁴, A.V. Lazarev³, R.V. Volkov¹, V.M. Gordienko¹, A.B. Savel'ev^{1,2}; ¹Physics faculty, M.V. Lomonosov Moscow State University, ²P.N. Lebedev Physical Institute of RAS, ³Faculty of chemistry, M.V. Lomonosov Moscow State University, ⁴National Research Centre "Kurchatov Institute", Russia</p> <p>It was demonstrated that it is possible to estimate the absolute number of ions detected in a specific region of the MCP array if the ion count is small and the MCP is used in single-pulse mode at maximum gain. It was demonstrated a significant increase temperatures and maximum energies of C1+, C2+ and C3+ ions (from 150 keV/charge to 2 MeV) when using cluster targets.</p>
<p>ThR05-15 09:45-10:15</p> <p>High-power lasers for the prospective Compton radiation sources <i>(Invited paper)</i> I.B. Mukhin^{1,2}, S.Yu. Mironov¹, M.V. Starodubtsev¹, I.Yu. Kostyukov¹, S. G. Rykovanov^{2,3}, V.V. Kaminsky^{2,4,5}, Ya.V. Getmanov^{4,5}; ¹Federal Research Center A.V. Gaponov-Grekhov Institute of Applied Physics RAS (IAP RAS), ²National Center for Physics and Mathematics, ³Skolkovo Institute of Science and Technology (Skoltech), ⁴Budker Institute of Nuclear Physics SB RAS, ⁵Novosibirsk State University, Russia</p> <p>The inverse Compton scattering is one of promising approaches to produce a monoenergetic and high brightness fluence of gamma quanta. The detailed investigation of specificities of suitable laser systems is presented for linear and nonlinear Compton scattering processes.</p>	

- Coffee Break -

Location: Stenberg 1 Room, Floor 3; Thursday, June 25, 2026

R05. SUPER-INTENSE LIGHT FIELDS AND ULTRA-FAST PROCESSES 4

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| <p>ThR05-18
11:30-12:00</p> <p>Few- and half-cycle electromagnetic pulses: formation, characterization, and interaction with quantum objects (<i>Invited paper</i>)
N.N. Rosanov¹, I.A. Aleksandrov^{1,2}, M.V. Arkhipov¹, R.M. Arkhipov¹, S.V. Fedorov¹, N.A. Veretenov¹; ¹Ioffe Inst., ²St.Petersburg State Univ., Russia</p> <p>An analysis of the interaction of extremely short pulses with quantum objects confirms that their main characteristic is their electric area. The vector structure of the pulse field is described by the hodograph of the electric field and the temporal polarization surface. Experiments demonstrate the formation of quasi-unipolar pulses when irradiating metal wires with femtosecond laser pulses.</p> | <p>ThR05-21
12:30-12:45</p> <p>Inverse Compton scattering at a plasma film in the field of counter-propagating relativistic laser pulses
V.V. Kulagin¹, V.N. Kornienko², V.A. Cherepenin²; ¹Stenberg Astronomical Institute of Lomonosov Moscow State University, ²Kotel'nikov Institute of Radio-Engineering and Electronics of RAS, Russia</p> <p>The formation of X-ray and gamma-ray pulses through inverse Compton scattering using a laser system with a power of up to tens of petawatts and a plasma film is investigated analytically and using 2D numerical simulations. The energy of the photons produced can reach hundreds of MeV, while a needle beam with an angular width of less than one degree is formed.</p> |
| <p>ThR05-19
12:00-12:15</p> <p>Generation of sub-attosecond pulses by structured relativistic laser plasma targets
A.A. Andreev^{1,2}, K.Yu. Platonov³; ¹St.Petersburg State Univ., ²Ioffe Phys. Tech. Institute, ³St.Petersburg Tech. Univ., Russia</p> <p>The possibility of effective generation of thin dense relativistic electron sheets and its (sub)attosecond radiation is shown by analytical modeling and multidimensional simulations of intense laser pulse interaction with structured over-dense plasma targets (in particularly ultra-thin layers). It was shown that the maximum electron energy and minimal duration of the radiated pulses can be gained by optimal tuning between the target and laser parameters.</p> | <p>ThR05-22
12:45-13:00</p> <p>Improved approximation of dipole focusing in a multi-beam configuration using a system of parabolic and ellipsoidal mirrors
D.N. Bulanov, A.A. Soloviev, A.V. Korzhimanov; Federal Research Center A.V. Gaponov-Grekhov Institute of Applied Physics of RAS, Russia</p> <p>A combination of parabolic and ellipsoidal mirrors was tested for a dipole focusing system via numerical simulation. The intensity above 3.8×10^{26} W/cm² was found obtainable using 12 beams of 50 PW each — a 23% improvement from parabolic only configuration. 90% of the value is realistically achievable; both systems show similar aberration stability. The calculated fields' structure is analyzed through multipole expansion.</p> |
| <p>ThR05-20
12:15-12:30</p> <p>Generation of synchrotron radiation in various sub-regimes of the relativistic self-trapping of a laser pulse
O.E. Vais^{1,2}; M. G. Lobok^{1,2}; V. Yu. Bychenkov^{1,2}; ¹VNIIA, ²LPI RAS, Russia</p> <p>Synchrotron-like radiation source based on the laser-plasma acceleration of electrons has unique features: small size, short duration and low divergence. Here, we consider the generation of this radiation during the relativistic self-trapping regime of laser propagation through plasmas of different densities.</p> | <p>ThR05-23
13:00-13:30</p> <p>Multispecies laser-driven plasma source with versatile liquid sheet target (<i>Invited paper</i>)
K.A. Ivanov¹, S.A. Shulyapov¹, I.N. Tsybalov^{1,2}, I.P. Tsygvintsev³, E.M. Starodubtseva¹, A.S. Samsonov^{1,4,5}, S.N. Klopov^{1,4}, D.A. Gorlova², R.V. Volkov¹, A.B. Savel'ev¹; ¹Physics Faculty, M.V. Lomonosov Moscow State University, ²Institute for Nuclear Research of RAS, ³Keldysh Institute of Applied Mathematics of RAS, ⁴Russian Federal Nuclear Center - VNIIEF, ⁵Branch in Sarov, M.V. Lomonosov Moscow State University, Russia</p> <p>The use of special converging nozzle forms a quasi-flat liquid stream with easily adjustable thickness from tens down to a sub-micrometer level to fulfil specific requirements of highly efficient energy transfer from relativistically intense femtosecond laser to particles beams. It is demonstrated, that introducing a prepulse one may form an undercritical plasma slab in the interaction area, dynamically evolving on the nanosecond time scale.</p> |

- Lunch Break -

Location: Stenberg 1 Room, Floor 3; Thursday, June 25, 2026

R05. SUPER-INTENSE LIGHT FIELDS AND ULTRA-FAST PROCESSES 5

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| <p>ThR05-24
15:00-15:30</p> <p>Instabilities and magnetic structuring of plasma flows generated by high-power nanosecond and femtosecond laser pulses at PEARL facility (<i>Invited paper</i>)
K.F. Burdonov, R.S. Zemskov, S.E. Perevalov, A.V. Kotov, A.A. Murzanev, A.I. Korytin, V.N. Ginzburg, S.E. Stukachev, I.V. Yakovlev, A.A. Kuzmin, A.V. Korzhimanov, A.A. Soloviev, A.A. Shaykin, A.N. Stepanov; E.A. Khazanov, M.V. Starodubtsev; Institute of Applied Physics of RAS, Russia</p> <p>Experiments with laser-produced high-velocity plasma flows propagating in an externally applied strong magnetic field can help to improve our understanding of the mechanisms behind some astrophysical phenomena. We present here the overview of our laboratory astrophysics investigations devoted to the formation of instabilities and magnetic structuring of plasma flows generated by high-power nanosecond and femtosecond laser pulses at PEARL facility.</p> | <p>ThR05-25
15:30-15:45</p> <p>Plasma inhomogeneities impact on the development of parametric instabilities in ICF targets corona
S.I. Glazyrin^{1,2}, A.V. Brantov^{1,2}, V.Yu. Bychenkov^{1,2}; ¹FSUE VNIIA, ²LPI RAS, Russia</p> <p>The paper considers the parametric instabilities development in the presence of plasma inhomogeneities in the near-critical region of corona. Due to refraction and filamentation of laser beams, local regions of increased intensity may arise, exceeding the thresholds for the development of parametric instabilities, while the average laser intensity remains below the threshold. The paper refines the criteria for the development of parametric instabilities in such conditions.</p> |
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ThR05-26

15:45-16:15

Long-wavelength reshaping of high harmonic spectrum generated by intense multi-cycle near-IR laser field in gas: the route to time-resolved x-ray absorption spectroscopy (Invited paper)

F.V. Potemkin; Faculty of Physics M.V. Lomonosov Moscow State University, Russia

This study demonstrates coherent control of high-order harmonic generation by combining mid-IR and terahertz fields with a near-IR driver. The THz field breaks symmetry, producing even harmonics via altered recombination. The mid-IR field broadens the spectrum to 200 eV in helium by enabling efficient electron acceleration on extended trajectories. This two-color method enables tailored attosecond light sources and novel spectroscopic applications.

ThR05-27

16:15-16:30

Features of high-order harmonic generation in gases under normal and strongly overdriven regimes

V.I. Trunov^{1,2,3}, S.V. Avtaeva^{1,2}, V.V. Petrov^{1,2,3}, S.A. Frolov¹, A.V. Kirpichnikov¹, V.A. Vasiliev¹, K.V. Gubin¹; ¹Institute of Laser Physics SB RAS, ²Novosibirsk State Technical University, ³Novosibirsk State University, Russia

We present the results of experimental and theoretical studies of the features of high-order harmonic generation in argon jet in a wide range of exciting femtosecond radiation intensities, including the "strongly overdriven regime" mode.

- Coffee Break -

Location: Stenberg 1 Room, Floor 3; Thursday, June 25, 2026

R05. SUPER-INTENSE LIGHT FIELDS AND ULTRA-FAST PROCESSES 6

ThR05-29

17:30-17:45

Optimization of laser-plasma EUV source parameters for the next generation lithograph at 11.2 nm

S.E. Perevalov, E.S. Blinov, R.S. Zemskov, A.V. Kotov, K.F. Burdonov, M.A. Zolotavin, S.E. Stukachev, I.B. Mukhin, A.A. Soloviev; Federal Research Center A.V. Gaponov-Grekhov Institute of Applied Physics of RAS (IAP RAS), Russia

The work describes experimental setup for optimizing the parameters of the laser-plasma EUV source, which includes wide diagnostics set for gas target, laser source and laser breakdown. We used a 1-7 ns up to 1 J laser. Experiments with argon and xenon showed that laser pulse temporal shape, EUV spectra and conversion efficiency varies with pulse length and energy.

ThR05-30

17:45-18:00

Possible mechanisms of deeply subwavelength silicon structuring by intense terahertz pulses

I.V. Oladyshkin, D.I. Kulshin, K.S. Kotova; A.V. Gaponov-Grekhov Institute of Applied Physics of RAS, Russia

We propose a mechanism of deeply subwavelength structuring of silicon by intense THz pulses via stimulated Raman scattering. Ionization creates a conductive layer, which support surface plasmon polaritons at anti-Stokes combination frequency. SPP standing wave heats the surface periodically and create LIPSS with periods of 2-4.5 μm parallel to the pump polarization. We derive the threshold condition for SRS regime and discuss alternative mechanisms.

ThR05-28

16:30-17:00

Laser-plasma EUV source for the new generation lithography (Invited paper)

A.A. Soloviev¹, A.N. Nechay², A.A. Perekalov², V.E. Guseva², S.E. Perevalov¹, E.S. Blinov¹, I.S. Abramov¹, I.I. Kuznetsov¹, O.V. Palashov¹, I.B. Mukhin¹, S.V. Golubev¹, M.V. Starodubtsev¹, and N.I. Ckhalo²; ¹IAP RAS, ²IPM RAS, Russia

This paper presents an experimental and theoretical study of the efficiency of a laser-plasma source operating at a wavelength of 11.2 nm for a next-generation lithography machine. Key fundamental and technological aspects of achieving the required efficiency are discussed: the architecture and parameters of the laser system, the formation of a vacuum xenon jet and diagnostics of its flow, and ionization dynamics under laser pulses.

ThR05-31

18:00-18:15

Features of nuclear isomer generation during the interaction of an intense femtosecond laser pulse with a gas cluster jet

M.V. Sedov^{1,2}, I.Yu. Skobelev^{1,2}; ¹Joint Institute for High Temperatures of RAS (JIHT RAS), ²National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), Russia

We numerically investigated the optimal conditions for generating nuclear isomers using three-dimensional particle-in-cell simulations. This approach could provide an alternative method for producing nuclear isomers without accelerators or nuclear reactors. We studied the interaction of femtosecond (30 fs) laser radiation with a krypton cluster of 50-100 nm diameter. The optimal laser intensity and cluster size for generating the 83mKr isomer have been determined, and the calculation results have been verified by comparison with recent experiments.

ThR05-33

18:15-18:30

Electron and X-ray generation from relativistic laser-cluster plasma for radiobiological and diffraction experiments

A.A. Tausenev, T.A. Semenov, P.A. Shcheglov, M.V. Chashchin, V.G. Shuvatova, A.S. Zhirnik, M.M. Nazarov; National Research Centre "Kurchatov Institute", Russia

We demonstrate the results obtained from the use of MeV electron source and characteristic X-ray radiation generated by femtosecond relativistic laser plasma in radiobiological and diffraction experiments. Mouse melanoma B16 cells were irradiated with a beam of accelerated electrons at ultra-high peak dose rate of ≈ 1010 Gy/s. Diffraction measurements of Kr K α radiation (12.6 keV) were performed using a Si(111) crystal.

R08. NONLINEAR PHOTONICS: FUNDAMENTALS AND APPLICATIONS

Location: Stenberg 2 Room, Floor 3; Thursday, June 25, 2026

R08. NONLINEAR PHOTONICS: FUNDAMENTALS AND APPLICATIONS 6

ThR08-30

09:00-09:15

Transfer learning for predicting nonlinear pulse evolution in fiber amplifiers with limited experimental dataA.E. Bednyakova¹, A.S. Gemuzov¹, M.S. Mishevsky², K.P. Saraeva¹, A.A. Redyuk¹, A.A. Mkrtychyan², A.G. Nasibulin², Yu.G. Gladush²; ¹Novosibirsk State University, ²Skolkovo Institute of Science and Technology, Russia

We present a novel approach combining Transformer neural network architecture with transfer learning to predict nonlinear pulse evolution in fiber amplifiers under conditions of limited experimental data. The model is pretrained on synthetic NLSE simulations and then fine tuned on a small set of experimental spectra, accurately reproducing various evolution regimes, including the development of modulational instability and the propagation of higher-order solitons.

ThR08-31

09:15-09:30

Tunable single frequency fiber random laser operating in the telecommunication bandS.M. Popov¹, A.A. Rybaltovskii², A.M. Smirnov³, A.P. Bazakutsa³, A.S. Shikin³, D.V. Ryakhovskii¹, A.O. Kolosovskii¹, V.V. Voloshin¹, I.L.Vorob'ev¹, D.S. Lipatov⁴, O.V. Butov³, Yu.K. Chamorovskii¹; ¹Kotelnikov Institute of Radio Engineering and Electronics of RAS (Fryazino Branch), ²Prokhorov General Physics Institute of RAS, ³Kotelnikov Institute of Radio Engineering and Electronics of RAS (Moscow Branch), ⁴Devyatkh Institute of Chemistry of High-Purity Substances of the RAS, Russia

A tunable "random" fiber laser with a cavity based on an erbium-doped optical fiber with an array of chirped fiber Bragg gratings inscribed during the OF drawing process is described. Such laser is tunable in a range of 1546-1548 nm with pumping at the wavelength of 976 nm with a slope efficiency of 10% and a linewidth ~470 Hz.

ThR08-32

09:30-09:45

Transition from narrowband generation to turbulent multimode spectrum in a random fiber laser

O.A. Gorbunov, D.V. Kudashkin; Novosibirsk State University, Russia

We study the statistical manifestation of the transition process from narrowband regime to turbulent-like wide spectrum generation in a random fiber laser. We demonstrate the analogy between exponential growth of energy in the spectral mode of a single-mode laser and growth of number of modes in the random fiber laser, and emphasize the role of nonlinear interactions in this process.

ThR08-33

09:45-10:00

Mode-locked laser using a silica multicore fiber as a saturable absorberA.V. Andrianov¹, A.N. Romanov^{1,2}, E.A. Anashkina¹; ¹A.V. Gaponov-Grekhov Institute of Applied Physics RAS, ²Lobachevsky State University of Nizhny Novgorod, Russia
Mode-locking in a ring fiber laser is experimentally demonstrated for the first time using a passive silica multicore fiber as a saturable absorber operating in the nonlinear regime of radiation trapping in one of the cores. Generation of 190 fs, 12 nJ pulses with peak power of 50 kW is achieved at 1030 nm and repetition rate of 6.6 MHz.

ThR08-34

10:00-10:15

Nonlinear power equalization of pulse propagating in a weakly-coupled 7-core fiberN. Bochkarev^{1,2}, M. D. Gervaziev^{1,2}, D. S. Kharenko^{1,2}, A.Y. Kolesnikova^{1,2}, E.V. Podivilov^{1,2}, S. A. Babin^{1,2}; ¹Novosibirsk State Univ., ²Inst. of Automation and Electrometry SB RAS, Russia

We experimentally demonstrate nonlinear power equalization at the output of a weakly-coupled seven-core fiber during subnanosecond pulse propagation. Increasing input peak power reduces output power deviation below 5%, and the nonlinear regime shows enhanced stability against mechanical perturbations. A theoretical model supports the observations.

ThR08-35

10:15-10:30

Mode analysis of spectral components during supercontinuum generation in multimode GRIN fiberM.D. Gervaziev^{1,2}, N. Bochkarev^{1,2}, D.S. Kharenko^{1,2}, S.A. Babin^{1,2}, S. Wabnitz^{1,3}; ¹Novosibirsk State University, ²Institute of Automation and Electrometry SB RAS, Russia; ³DIET, Sapienza University of Rome, Italy

We experimentally investigate supercontinuum generation in multimode GRIN fiber using sub-nanosecond pulses. Mode decomposition of spectrally filtered output reveals the modal structure of residual pump and Stokes components. Results show that the fundamental mode initiates Stokes generation and depletes via nonlinear processes, providing insight into the spatial dynamics of spectral broadening in multimode fibers.

ThR08-36

10:30-10:45

Methods of advanced holographic modal decomposition for revealing fast nonlinear beam dynamics in optical fibersD.S. Kharenko^{1,2}, M.D. Gervaziev^{1,2}, A.A. Revyakin^{1,2}, K.V. Serebrennikov^{1,2}, S.A. Babin^{1,2}; ¹Institute of Automation and Electrometry SB RAS, ²Department of Physics, Novosibirsk State University, Russia

To date, a number of mode decomposition methods have been presented, each with its own application areas, advantages, and disadvantages. However, truly new possibilities can arise from combining them. For example, combining holographic and matrix-oriented approaches allows for reduced noise sensitivity and an increased number of simultaneously analyzed modes. This paper explores the details of this approach in the context of studying the fast nonlinear dynamics of laser beams in optical fibers.

ThR08-37

10:45-11:00

Ultrafast heterodyning spectral measurement technique for characterization of narrowband regime of a random fiber laser

I.D. Vatik, O.A. Gorbunov, D.V. Churkin; Novosibirsk State University, Russia

We introduce a fast spectral measurement technique, based on heterodyning method, utilizing a widely tunable narrowband laser. With its scanning range from 1528 nm to 1568 nm, swept within 5 ms, we can accurately register all narrow modes, emerging simultaneously in radiation of a random fiber laser, what is impossible with conventional spectral measurements.

- Coffee Break -

Location: Stenberg 2 Room, Floor 3; Thursday, June 25, 2026

R08. NONLINEAR PHOTONICS: FUNDAMENTALS AND APPLICATIONS 7

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| <p>ThR08-38
Surface solitons and nonlinear stability restoration in non-Hermitian Wadati potentials (<i>Invited paper</i>)
D.A. Zezyulin; School of Physics and Engineering, ITMO University, Russia
Despite their non-Hermitian nature, Wadati potentials support the propagation of stationary nonlinear states that exhibit a remarkable blend of properties from both conservative and dissipative solitons. Our first result is the existence of surface solitons in such potentials. Our second result concerns nonlinearity-induced stability restoration in a waveguide with a parity-symmetric Wadati potential.</p> | 11:30-12:00 | <p>ThR08-41
Dissipative coherent, incoherent, and hybrid solitons
M.V. Arkhipov¹, R.M. Arkhipov¹, A.A. Shimko², N.N. Rozanov¹; ¹Ioffe Institute, RAS, ²St. Petersburg State University, Russia
We demonstrate simultaneous generation of two distinct dissipative solitons in one laser in hybride mode: Kerr solitons from fast electronic nonlinearity and Self-Induced Transparency (SIT) solitons from slow coherent resonance in cesium vapor. Their coexistence, achieved via spectral-spatial filtering, was previously deemed unfeasible due to contradictory physical requirements. This result breaks the paradigm of single-soliton dominance and pioneers hybrid laser sources combining resonant and non-resonant nonlinearities.</p> | 12:30-12:45 |
| <p>ThR08-39
Observation of topological vortex solitons on disclinations
A.V. Kireev^{1,2}, K. Sabour², V.O. Kompanets¹, S.Y. Alyatkin³, N.S. Kostyuhenko^{1,4}, S.A. Zhuravitskii^{1,4}, N.N. Skryabin⁴, I.V. Dyakonov⁴, A.A. Kalinkin⁴, K.A. Sitnik², S.K. Ivanov⁵, S.P. Kulik^{1,4}, S.V. Chekalin¹, P.G. Lagoudakis³, V.N. Zadkov^{1,6}, Y.V. Kartashov¹; ¹Institute of Spectroscopy, RAS, ²Moscow Institute of Physics and Technology, ³Hybrid Photonics Laboratory, Skolkovo Institute of Science and Technology, ⁴Quantum Technology Centre, Faculty of Physics, M.V. Lomonosov Moscow State University, Russia; ⁵Instituto de Ciencia de los Materiales, Universidad de Valencia, Spain; ⁶Faculty of Physics, Higher School of Economics, Russia
We experimentally demonstrate stable topological vortex solitons localized at disclination defects in photonic higher order topological insulators. Using laser written aperiodic waveguide arrays and picosecond pulse excitation, we realize thresholdless vortex localization protected by topology. These nonlinear states reveal a strong interplay between orbital angular momentum, lattice geometry, and material topology.</p> | 12:00-12:15 | <p>ThR08-42
Nonlinear vectorial spatio-temporal optical vortices generation in the slab of cholesteric liquid crystal in isotropic state near the temperature of phase transition
G.M. Shishkov, V.A. Makarov; Lomonosov Moscow State University, Russia
We have numerically modeled the nonlinear propagation of an elliptically polarized light pulse in a slab of cholesteric liquid crystal (CLC) in the isotropic state. We investigate how light-induced reorientation of CLC molecules affects the spatiotemporal profile of the pulse and, in particular, the subsequent generation of spatiotemporal optical vortices in the circularly polarized components of the pulse.</p> | 12:45-13:00 |
| <p>ThR08-40
Spatiotemporal solitons of self-induced transparency in a medium with amplification and absorption
N.A. Veretenov, S.V. Fedorov, A.A. Gladkij, N.N. Rosanov; Ioffe Inst., Russia
We predict the existence of stable 3D self-induced transparency solitons in an extended medium with absorption-compensating gain. The possibility of creating such solitons in a multimode waveguide with gain is also explored.</p> | 12:15-12:30 | <p>ThR08-43
Subcycle optical solitons in a multi-level resonant medium
A.V. Pakhomov; St.Petersburg State University, Russia
When dealing with a subcycle pulse propagation in a resonant medium, common approximations, such as the two-level model, become invalid due to ultrabroad pulse spectrum. Therefore multiple energy levels in the medium have to be properly considered. We develop the higher-order sudden-perturbation approach to derive the general nonlinear equations for the propagation of subcycle pulses in an arbitrary multi-level medium. Using these equations, we demonstrate the existence of stable subcycle dissipative solitons in non-equilibrium media with multiple resonant transitions.</p> | 13:00-13:15 |

- Lunch Break -

Location: Stenberg 2 Room, Floor 3; Thursday, June 25, 2026

R08. NONLINEAR PHOTONICS: FUNDAMENTALS AND APPLICATIONS 8

- | | | | |
|---|-------------|---|-------------|
| <p>ThR08-44
Nonlinear exciton-polaritons in 2D semiconductors as a platform for on-chip optical information processing (<i>Invited paper</i>)
V. Kravtsov; ITMO University, Russia
Our results suggest that nanophotonic waveguides integrated with 2D van der Waals semiconductors provide a promising platform for room-temperature on-chip nonlinear optical and opto-electronic components for next-generation integrated photonic circuits.</p> | 15:00-15:30 | <p>ThR08-45
Phase locking of exciton-polariton condensates in optically imprinted Penrose quasicrystals
S.Yu. Alyatkin¹, H. Sigurðsson², Y.V. Kartashov^{1,3}, K.A. Sitnik¹, J.D. Töpfer¹, P.G. Lagoudakis¹; ¹Skolkovo Institute of Science and Technology, Russia; ²Univ. of Warsaw, Poland; ³Institute of Spectroscopy of RAS, Russia
We demonstrate condensation of microcavity polaritons in optically imprinted 2D Penrose quasicrystal. Using a spatially structured nonresonant laser excitation, we imprint ballistically propagating polariton condensates co-localized with the vertices of the Penrose mosaic. Realized interferometric techniques confirm formation of macroscopic coherent state across aperiodic Penrose tiling and reveal nontrivial phase locking between the condensates.</p> | 15:30-15:45 |
|---|-------------|---|-------------|

ThR08-46

15:45-16:00

Coherence revivals and lifetime extension of polariton condensates by mirror-mediated optical feedback

I. Smirnov, S. Alyatkin, P.G. Lagoudakis; Skolkovo Institute of Science and Technology, Russia

We report on coherence control of trapped polariton condensate using reinjection of a fraction of its photoluminescence. We find that such optical feedback enables to diminish phase diffusion and therefore, improves coherence of the condensate. For a long time delay we observe coherence revivals, whereas for a short - increase of coherence time. Developed analytical model supports all experimental observations.

ThR08-47

16:00-16:30

Synchronous rotation of the polarization planes in the interacting polariton lasers (*Invited paper*)A. Yulin¹, I. Gnusov², S. Baryshev², S. Alyatkin², P. G. Lagoudakis²; ¹Department of Physics, ITMO University, ²Skolkovo Institute of Science and Technology, Russia

Two interacting exciton-polariton condensates are considered, with one of the condensates subjected to a rotating potential. This rotating effective potential arises from the action of an exciton reservoir created by two Laguerre–Gauss laser beams that are slightly detuned in frequency and have angular indices differing by two. The frequency detuning between the beams determines the angular velocity of the rotating potential.

R09. OPTICAL NANOMATERIALS*Location: Pudovkin 1+2 Room, Floor 3; Thursday, June 25, 2026***R09. OPTICAL NANOMATERIALS 4**

ThR09-17

09:00-09:30

Interface-induced symmetry breaking for chirality origination in metal halide perovskite nanoclusters and quantum dots (*Invited paper*)

J.Z. Zhang; University of California Santa Cruz, USA

We have found that ligand-assisted metal halide molecular clusters, metal halide perovskite magic sized clusters as well as quantum dots exhibit chirality based on circular dichroism measurements. The origin of the chirality has been traced to the liquid-solid or liquid-liquid interface that breaks the symmetry in formation of the two enantiomers, resulting in unequal population of the two.

ThR09-18

09:30-10:00

Theory and simulation of nanostructured materials (*Invited paper*)

N. Seriani; The Abdus Salam ICTP, Italy

Shape and composition of nanostructured materials are affected by environmental conditions, thus influencing their functional properties. Atomistic simulations give insight into these effects. They contribute to understand phenomena like the shape evolution of nanoparticles, photoabsorption, and chemical and photochemical properties. I will discuss successes, limitations, and perspectives of these techniques, as well as new perspectives offered by artificial intelligence.

ThR09-19

10:00-10:15

Spontaneous core-shell and length-dependent elemental distributions in ternary III-V nanowires

V.G. Dubrovskii; Faculty of Physics, St. Petersburg State University, Russia

Recent experiments reveal spontaneous formation of inhomogeneous elemental distributions during growth of III-V and III-nitride nanowires. We develop a general theoretical approach for understanding and modelling of core-shell and length-dependent compositions in such nanowires and review the available data from this viewpoint.

ThR09-20

10:15-10:30

Tuning the length distributions of III-V semiconductor nanowires

V.G. Dubrovskii; Faculty of Physics, St. Petersburg State University, Russia

The key tuning knobs for controlling the length distributions of III-V nanowires are studied theoretically and checked against the available experimental data. It is demonstrated that the shape of the length distributions can be varied within a wide range from sub-Poissonian to a much wider Polya-type or beta-type distributions. In the latter case, the length distributions feature the Family-Vicsek scaling.

ThR09-21

10:30-10:45

Vapor-liquid-solid growth of metal arsenides nanowires with arsenic-rich catalystsI.V. Shtrom^{1,2,3}, N.V. Sibirev^{1,2}, I.V. Ilkiv^{1,2,3}, I.P. Soshnikov^{2,3,4}, E.V. Ubyivovk¹; ¹St. Petersburg State University, ²Institute for Analytical Instrumentation of RAS, ³St. Petersburg Academic University, RAS, ⁴Ioffe Institute, Russia

We discuss in this report the opportunity of the growth of arsenide NWs, with lead and tin catalysts. Photoluminescence spectra of lead and tin catalyzed NWs were measured. Photoluminescence bands have a lot of peaks, which can correspond to Pb, Sn, Si donor or acceptor impurities.

ThR09-22

10:45-11:00

Graphene quantum dots as a pH-sensitive lifetime sensors for luminescence bioimaging

V.A. Baigildin, A.P. Pavlov, E.V. Durova, N.A. Zharskaia, S.P. Tunik; St.Petersburg State University, Russia

Graphene quantum dots (gQDs) are the youngest member of carbon-based materials with great potential in biosensing and bioimaging owing to their luminescent properties. GQDs with the edge amino groups were prepared by a one-step hydrothermal method. Prepared gQDs were applied as the fluorescence lifetime pH sensors for intracellular bioimaging with pH sensitivity up to 1 ns per pH unit.

- Coffee Break -

R10. NONLINEAR QUANTUM PHOTONICS

Location: Deyneka 1+2 Room, Floor 2; Thursday, June 25, 2026

R10. NONLINEAR QUANTUM PHOTONICS 4

ThR10-20

15:00-15:30

Polariton waveguides (*Invited paper*)

D. Sanvitto; Istituto di Nanotecnologia - CNR Nanotec, Lecce & Roma, Italy

In this talk I will discuss how guided polaritons can combine on-chip propagation with strong light-matter interactions, offering a route beyond conventional linear optics and present nonlinear photonics, where functionality typically relies on small refractive-index changes.

ThR10-21

15:30-16:00

Dynamics of a quantum polariton vortex in the low-excitation nonlinear regime (*Invited paper*)

H. Vinck; Departamento de Física, Universidad Nacional de Colombia, Colombia

We discuss the dynamics of a quantum polariton vortex in the low-excitation nonlinear regime. A fully quantized description reveals vortex-core trajectories that go beyond the usual semiclassical circular motion and are directly linked to light-matter correlations. These results provide a possible benchmark for entanglement in polaritonic systems and suggest extensions toward driven-dissipative few-polariton dynamics.

ThR10-22

16:00-16:30

Exciton-polariton quantum circuits (*Invited paper*)

D. Gerace; Dipartimento di Fisica "A. Volta", Università di Pavia, Italy

Prospective applications of quantized polaritons in integrated circuits are shown to enable quantum nonlinear interferometers with functionalities unattainable in linear photonic circuits, including two-qubit entangling gates with arbitrarily high fidelity. It will be shown that these results remain valid even when considering the finite temporal extent of single-polariton wavepackets, beyond the commonly used single-mode approximation.

ThR10-23

16:30-16:45

Dispersive readout technique for NV-center in diamondS.V. Bolshedvorskii^{1,2}, N.E. Salangin^{1,3}, A.M. Kozodaev^{1,3,4}, P.G. Vilyuzhanina^{1,2,3,4}, S.M. Drofa^{1,2,3,4}, A. Chernyavskiy^{1,2,3}, B.E. Pak^{1,3}, I.S. Cojocar^{1,4}, A.N. Smolyaninov², V.V. Soshenko^{1,2}, A.V. Akimov^{4,1}; ¹Lebedev Physical Institute of RAS, ²LLC Diamond Sensors, ³Moscow Institute of Physics and Technology (National Research University), ⁴Russian Quantum Center, Russia

Dispersive readout technique propose a strong coupling regime of a high-quality resonator with a quantum system in order to enhance readout fidelity. In this work we provide a qualitative and quantitative comparison of dispersive readout and standard optical readout for NV center.

ThR10-24

16:45-17:00

Dispersive readout with two orthogonal modes of a dielectric cavityA.M. Kozodaev^{1,2,3}, I.S. Cojocar^{1,3,4}, S.M. Drofa^{1,2,3}, P.G. Vilyuzhanina^{1,2,3}, A. Chernyavskiy^{1,2,3}, N.I. Salangin², B.E. Pak², V.G. Vins⁵, S.Ya. Kilin^{6,7}, A.N. Smolyaninov⁴, S.V. Bolshedvorskii^{3,4}, V.V. Soshenko^{3,4}, A.V. Akimov^{1,3,4}; ¹Russian Quantum Center, ²Moscow Institute of Physics and Technology, ³P.N. Lebedev Institute RAS, ⁴LLC Diamond Sensors, ⁵LLC Velman, ⁶National Research Nuclear University "MEPhI", Russia; ⁷B.I. Stepanov Institute of Physics NASB, Belarus

Nitrogen-vacancy color center in diamond recommended themselves as a good sensitive element for measurement of magnetic field. While mainstream of magnetometers based on NV centers is using so-called optically detected magnetic resonance, recently there was a suggestion to use dispersive readout of a dielectric cavity to enhance sensitivity of a magnetometers. Here we demonstrating that dispersive readout approach can be significantly improved if two-channel scheme is considered.

- Coffee Break -

Location: Deyneka 1+2 Room, Floor 2; Thursday, June 25, 2026

R10. NONLINEAR QUANTUM PHOTONICS 5

ThR10-25

17:30-18:00

Plasma modes of finite thickness superconducting film (*Invited paper*)

V.M. Kovalev, A.V. Chaplik; Rzhanov Institute of Semiconductor Physics, SB RAS, Russia

Anderson proved superconducting transitions do not alter plasma dispersion. However, recently, a new acoustic plasma mode was experimentally discovered in finite-thickness superconducting films, contrasting with the classic neutral Carlson-Goldman mode. Our theory attributes this discovery to incomplete superconducting and normal densities compensation across the film thickness, which excites bulk charges and long-range Coulomb forces. This theoretical model accurately describes the new mode's linear dispersion and temperature behavior.

ThR10-26

18:00-18:15

Metrological uncertainty and international comparisons in Brillouin light scattering and microwave photonic systemsP. Salzenstein¹, T.Y. Wu²; ¹FEMTO-ST, CNRS, France; ²Agency for Science, Technology and Research (A*STAR), Singapore

Brillouin Light Scattering enables key functionalities in nonlinear quantum photonics, from precision sensing to low-noise microwave generation. This contribution highlights the importance of rigorous uncertainty evaluation and international comparability. Recent analyses of Brillouin frequency shift measurements using tandem Fabry-Pérot interferometry and phase noise characterization of optoelectronic oscillators are reviewed within a global metrology framework.

ThR10-27

18:15-18:30

Entangling two-qudit operations in a Faraday light-atomic interaction

E.A. Vashukevich, R. Surmay, V.A. Leonov; St.Petersburg State University, Russia

The work proposes a protocol for generating entangling two-qudit gates in the QRQ (QND-rotation-QND) protocol. The entanglement power for a unitary two-qudit transformation was derived for an arbitrary dimension of the logical space for a unitary two-qudit transformation in the QRQ protocol for an arbitrary dimension of the logical space. We demonstrate the invariance of these conditions with respect to the system dimension. Furthermore, the work presents an analysis of the probabilities of implementing entangling operations.

ThR10-28

18:30-18:45

Quantum noise of axial modes in cylindrical microresonator

A.Yu. Kolesnikova, I.D. Vatik; Novosibirsk State University, Russia

We derive a theory of the spectrum of quantum fluctuations of nonlinearly interacting whispering gallery modes of a cylindrical microresonator. We reveal that the utilizing the nonuniform distribution of the modes along the cylinder axis helps optimize the position of the coupling element, simultaneously ensuring highly efficient pumping of the central mode and high output rate of the correlated photon pairs in the sidebands.

ThR10-29

18:45-19:00

All-optical NV-diamond thermometry: high sensitivity with charge-state-assisted background subtractionM. Solotnikov^{1,2,3,4}, I.V.Fedotov^{1,2,3,4}, A.A.Lanin^{1,2,4}, D.A. Sidorov-Biryukov^{1,2}, A.B. Fedotov^{1,2,3,4}; ¹Russian Quantum Center, ²Lomonosov Moscow State University, ³National Research Nuclear University (MEPhI), ⁴LIFT Center LLC, Russia

We demonstrate dual-mode, all-optical NV-diamond thermometry in a fiber-compatible format: a high-sensitivity ZPL-based readout reaching 16 mK·Hz^{-0.5} (shot-noise limit < 2 mK·Hz^{-0.5}), comparable to all-optical split-vacancy thermometers. We further introduce a charge-state-assisted background-subtraction mode that uses a single-wavelength pulsed pump and early-late time-gated differencing to cancel static or slowly varying optical background, keeping the background-induced temperature shift below 0.1 K even when the background dominates the NV ZPL region.

ThR10-30

19:00-19:15

PbTe thin films for Mid-IR high-sensitive photodetectors

L.A. Mochalov, E.A. Slapovskaya, A.S. Belousov; Lobachevsky State University of Nizhny Novgorod, Russia

A novel PCVD synthesis approach was developed to obtain the highly sensitive lead telluride layers. One vacuum cycle was employed for the production and sensitization of the resulting films. The effect of annealing conditions on the surface morphology and photoelectric properties of the prepared films was elucidated.

ThR10-31

19:15-19:30

A possible manifestation of dark matter luminescence in our GalaxyA.T. D'yachenko^{1,2}; ¹Kurchatov Inst., ²St.Petersburg State Transp. Univ., Russia

We show that the contribution of new X17 particles in glow in our Galaxy is approximately twice as large as the temperature spectrum.

R01. SOLID STATE LASERS - POSTERS

Location: Congress Hall, Floor 1; Thursday, June 25, 2026

- ThR01-p01 10:00-13:30
Nd:YAG end-diode-pumped amplifier efficiency related to the terminal laser level relaxation rate
 V.B. Morozov, A.N. Olenin, D.V. Yakovlev; Physics Faculty of M.V.Lomonosov Moscow State University, Russia
 Two-pass amplifiers are important structural components of energy-effective amplifiers based on Nd-doped materials. When the terminal level lifetime is longer than pulse duration, gain efficiency meets limitation due to "bottleneck" effect. This is why its lifetime value is important parameter for picosecond and short nanosecond amplifiers. Partial recovery of amplifying ability due to fast relaxation should be taken into account.
- ThR01-p02 10:00-13:30
Suppression of thermally induced depolarization in Faraday isolators using a specially designed magnetic field profile
 D.A. Kochkin, E.A. Mironov; A.V. Gaponov-Grekhov Institute of Applied Physics of RAS, Russia
 Solid-state lasers delivering both high peak and high average power have become indispensable tools for fundamental and applied research. A significant constraint on advancing these laser technologies and their application is the lack of high-performance Faraday isolators (FIs) capable of operating under such challenging conditions. The key limitation arises from the heating of the magneto-optical element (MOE) by laser radiation.
- ThR01-p03 10:00-13:30
Pulsed joule-level Cr²⁺:CdSe laser tunable from 2.22 to 3.65 μm
 Ya.K. Skasyrsky, M.P. Frolov, Yu.V. Korostelin, V.I. Kozlovsky, S.O. Leonov; P.N. Lebedev Physical Institute of RAS, Russia
 Tunable and femtosecond IR lasers based on transition-metals-doped crystals of II-VI compounds are demand in medicine, environmental monitoring, spectroscopy and metrology. The most developed lasers in this class use Cr²⁺:ZnSe and Fe²⁺:ZnSe crystals. The tuning curves of these lasers (1.88-3.349 μm and 3.76-5.29 μm, respectively) do not overlap. The laser based on Cr²⁺:CdSe crystal allows you to partially master the problematic range.
- ThR01-p04 10:00-13:30
Pulse-splitting suppression in a diode-pumped Ti:Sa.
 K.E. Reznikov^{1,2}, M.N. Esaulkov¹, A.V. Naumov²; ¹Avesta Ltd., ²P.N. Lebedev Physical Institute of RAS, Russia
 We demonstrate a diode-pumped Ti:Sa oscillator where modulation instability (MI), limiting high-power KLM, is controlled by pump focusing (lens focal length - F). Experimentally, when stable pulses (9.9 fs) reached 300 mW at 8 W of pump power, shorter focal lengths improved stability and output power with 7.5 fs pulse duration, eliminating MI. This offers a simple route to stable and efficient diode-pumped KLM Ti:Sa oscillators.
- ThR01-p05 10:00-13:30
Single-frequency laser system with ultra-low amplitude and frequency noise.
 K.A. Zagorulko, A.V. Kozlov, M.K. Brazhnikov; Russian Metrological Institute of Technical Physics and Radio Engineering, Russia
 We report the complete suppression of the relaxation oscillation peak and RIN reduction of a single-frequency fiber laser to the level of a DFB laser diode using optical injection. A laser system with the frequency noise of a fiber laser and the RIN of a DFB laser diode is presented.
- ThR01-p06 10:00-13:30
Cladding-pumped Bismuth-doped multi-core phosphosilicate fiber laser at 1.31 μm
 A.V. Kharakhordin¹, V.V. Velmiskin¹, A.A. Umnikov², F.V. Afanasiev², D.I. Oleinik², A.N. Denisov¹, A.M. Khagai¹, A.N. Abramov², S.V. Alyshev¹, E.G. Firstova¹, V.A. Agakhanova¹, D.S. Lipatov², S.L. Semjonov¹, M.A. Melkumov¹ and S.V. Firstov¹;
¹Prokhorov General Physics Institute of RAS, Dianov Fiber Optics Research Center, ²G.G. Devyatikh Institute of Chemistry of High-Purity Substances of RAS, Russia
 The first laser at 1.31 μm based on Bi-doped multicore fiber (MCF) with strongly coupled-core structure in a hexagonal pattern was developed in cladding-pumped configuration using multimode laser diodes at 793 nm. Supermode lasing using a 190-m-long bismuth-doped MCF in a Fabry-Perot cavity with ≈100%- and 4%-reflective mirrors was obtained.
- ThR01-p07 10:00-13:30
Compact DPSS green laser for interferometry with frequency stability better than 10⁻¹²
 V.V. Naumova, O.A. Orlov, E.P. Krivtsov; D.I. Mendeleev Institute for Metrology, (VNIIM), Russia
 this paper is devote to development and investigation a compact high efficiency DPSS SLM laser at 532 nm. It was shown that the optical pumping by powerful multimode laser diodes stimulate additional amplitude noise of output power. Single longitudinal mode diode pump laser allows increase laser frequency stability about one order of magnitude comparing with multimode pumping
- ThR01-p08 10:00-13:30
1-W -level soliton molecule generation in an Erbium-doped chirped pulse amplification fiber system
 A. Ismaeel^{1,2}, I.O. Orekhov¹, N.A. Sorokin¹, A.O. Prudnikov¹, V.M. Bogomolov¹, G.V. Pshenichnikov¹, P.V. Aleksandrov¹, S.G. Sazonkin¹, D.A. Dvoretzkiy¹, A.A. Krylov², V.E. Karasik¹; ¹Bauman Moscow State Technical University, ²Moscow Institute of Physics and Technology, ³Prokhorov General Physics Institute of RAS, Dianov Fiber Optics Research Center, Russia
 We report the amplification of soliton molecules (SM) in an erbium-doped fiber chirped pulse amplification (CPA) system. We achieved 1.73 W average power for an 11-pulse SM with 1.48 ps pulse duration and 3.1 ps pulses separation.
- ThR01-p09 10:00-13:30
Growing bulk β-BBO crystals in the BaB₂O₄ -NaBaBO₃ -Bi₂O₃ system
 E.A. Simonova¹, D.M. Ezhov², A.A. Goreyavcheva¹, D.M. Khramtcova¹, A.E. Kokh¹; ¹V.S. Sobolev Institute of Geology and Mineralogy SB RAS, ²Tomsk State University, Russia
 The primary crystallization region of β-BBO was determined in the BaB₂O₄-NaBaBO₃-Bi₂O₃ system. The study demonstrated that the system is promising for growing β-BBO single crystals (the grown crystal weighed 165 g, while the melt solution weighed 750 g) due to its wide range of crystallization concentrations and temperatures. The Na⁺ and Bi³⁺ impurity content in the grown crystals was below detection limits, as determined by microprobe analysis.
- ThR01-p10 10:00-13:30
Balancing heat and dispersion: how pump power shapes femtosecond pulse generation in SESAM-assisted Kerr-lens mode-locked Ti:Sapphire oscillators
 Z. Mohammadzahery, M. Jandaghi, M. Abrishami, S. Alipour; Iranian Institute of Laser Science and Technology, Iran
 We analyze how pump-induced thermal lensing reshapes intracavity mode size and perturbs the nonlinear–dispersion balance in a SESAM-assisted Kerr-lens mode-locked Ti:sapphire oscillator. By quantifying thermal lens strength via knife-edge profiling, we identify the pump-power window where thermal focusing, effective nonlinearity, and dispersion compensation jointly enable stable sub-40-fs pulse generation.

- ThR01-p11 10:00-13:30
Laser micromachining for the fabrication of micron-scale target components
 M.A. Rogozhina, I.A. Chugrov; RFNC-VNIIEF, Russia
 This paper presents the results of creating a stand for laser micro-processing of materials and manufacturing micron-sized target components on it.
- ThR01-p12 10:00-13:30
High-repetition-rate Q-switched lasing with a composite ceramic YAG:Nd³⁺/YAG:Cr⁴⁺ element
 M.N. Ershkov¹, S.A. Solokhin¹, T.A. Nazarova¹, A.E. Shepelev¹, S.N. Smetanin²; ¹KSTA named after V.A. Degtyarev; ²Prokhorov General Physics Institute of RAS, Russia
 The results of experimental studies of a high-repetition-rate Q-switched oscillation of a compact laser based on a composite all-ceramic YAG:Nd³⁺/YAG:Cr⁴⁺ element at a wavelength of 1.064 μm are presented. 290 kHz repetition-rate laser oscillation with 4.52 W output power and 5.6 ns pulse duration was achieved.
- ThR01-p13 10:00-13:30
Efficiency of cw-end-pumped Q-switched single mode Nd:YLF - laser
 A.J. Abazadze; Polyus Research and Development Institute named after M.F. Stelmakh, Russia
 A theoretical and experimental study of a single - mode Nd:YLF laser with a Q-switched resonator and longitudinal pumping by continuous radiation from laser diodes was carried out, during which the parameters of the pump beam and the resonator configuration were varied.
- ThR01-p14 10:00-13:30
Optical properties of diffusion-doped Cr: CdTe crystals
 S.V. Kurashkin^{1,2}, D.V. Savin², V.B. Ikonnikov², O.V. Martynova¹; ¹Lobachevsky State Univ. of Nizhny Novgorod, Russia; ²Devyatykh Inst. of Chemistry of High-Purity Substances of RAS, Russia
 Infrared optical properties of diffusion-doped Cr: CdTe crystals were studied. Cr doping of CdTe single crystals was achieved by thermal diffusion from metallic thin films. All samples demonstrated strong intracenter absorption bands characteristic of Cr²⁺ ions and had a wide emission spectrum from 1.8 to 3.1 μm. The room-temperature luminescence lifetime in the Cr: CdTe samples ranged from 2.4 to 3.2 μs.
- ThR01-p15 10:00-13:30
A study of the influence of background radiation of the sky on the registration of a useful signal in a laser ranging system
 D.V. Kovalev; Lomonosov Moscow State University, branch in Sarov, Russia
 This study evaluates how background sky radiation affects signal detection in laser ranging systems. By analyzing sky background power variations, the research determines the system's maximum operating range under both laboratory and field conditions. Finally, the authors validate their performance model by successfully comparing the calculated theoretical limits with experimental range data.
- ThR01-p16 10:00-13:30
5 J 10 Hz Nd:YAG laser with near-bandwidth-limited nanosecond pulses
 A.F. Kornev, R.V. Balmashnov, Yu.V. Katsev, V.V. Koval, A.M. Makarov; "Lasers and Optical Systems" Co. Ltd., Russia
 We developed a 1064 nm Nd:YAG MOPA-laser with passively Q-switched diode-end-pumped master oscillator and two-pass flashlamp-pumped power amplifier with SBS mirror. The laser produces 7 ns near-bandwidth-limited pulses with 5 J pulse energy at 10 Hz pulse repetition rate. The output beam is flat-top with near-diffraction-limited beam divergence (<1.3xDL). The laser is designed as a compact monoblock unit with an integrated power supply and cooling system.
- ThR01-p17 10:00-13:30
Low-energy transmission coefficient investigation of the NPE-based saturable absorber in an all-fiber laser
 S.V. Chirkov^{1,2}, N.N. Smolyaninov¹, V.D. Efremov^{1,2}, D.S. Kharenko^{1,2}; ¹Inst. of Automation and Electrometry, ²Novosibirsk State Univ., Russia
 We report a study of the saturable absorber's low-energy transmission coefficient (LETC) through numerical simulation of a mode-locked ytterbium fiber laser using the vector nonlinear Schrodinger equation. A range of achievable laser output parameters of the fundamental mode-locking regime and the influence of the LETC on them was investigated and compared with experimental results.
- ThR01-p18 10:00-13:30
Highly efficient 915 nm single-mode Nd-doped all-fiber laser with ASE suppression near 1060 nm
 D.A. Davydov¹, S.S. Aleshkina¹, V.V. Velmiskin¹, A.S. Lobanov², M.V. Yashkov², D.F. Burmistrov², D.S. Lipatov², D.V. Przhiialkovskii³, O.V. Butov³, and M. E. Likhachev¹; ¹Prokhorov General Physics Institute of RAS, Dianov Fiber Optics Research Center, ²G.G. Devyatykh Institute of Chemistry of High-Purity Substances of RAS, ³Kotelnikov Institute of Radioengineering and Electronics of RAS, Russia
 We report an all-fiber 915 nm laser with a slope efficiency of ~37%, the highest reported to date among near-diffraction-limited all-fiber lasers. For this purpose, a novel Nd-doped fiber with cladding-embedded absorbing high-index rods, designed to enhance 915 nm lasing by spectrally filtering amplified spontaneous emission (ASE) near 1064 nm, was fabricated. Strong ASE suppression was observed, with a signal-to-ASE ratio >50 dB.
- ThR01-p19 10:00-13:30
A spectroscopic study of a CaF₂:Tm³⁺, Dy³⁺ crystal
 L.V. Gafurova, A.A. Sirotkin, V.A. Konyushkin, P.A. Chizov, V.Kh. Bagdasarov, Yu.L. Kalachev, B.D. Ovcharenko; Prokhorov General Physics Institute of RAS, Russia
 The spectroscopy of a CaF₂ crystal co-doped with Tm³⁺ and Dy³⁺ ions with varying concentrations was performed. The experimental data analysis provided the lifetimes, energy transfer coefficients, and absorption and luminescence cross-sections. Our researcher demonstrated that the CaF₂:Tm³⁺, Dy³⁺ crystal promising for MID-IR lasing.
- ThR01-p20 10:00-13:30
AIBVI crystals doped with transition metals
 A.S. Azhgalieva, D.S. Denisenko, E.B. Borisenko, A.V. Timonina, N.N. Kolesnikov; Osipyan Institute of Solid State Physics RAS (ISSP RAS), Russia
 ZnSe, CdSe, and Cd_{0.88}Zn_{0.12}Te crystals doped with transition metals at the level of 10¹⁸×10²⁰ cm⁻³ were grown by vertical zone melting under argon pressure. As a result of the study, experimental data were obtained on the distribution of ions of the alloying additive in the grown crystals.
- ThR01-p21 10:00-13:30
Nanosecond 2.94 μm KTA OPO system for biological tissue ablation
 D.A. Nazarov, A.A. Teslenko, M.K. Tarabrin; BMSTU, Russia
 Laser sources in the 2.7 to 3 μm spectral range have found numerous applications in laser surgery due to the strong absorption peaks of water, collagen, and hydroxyapatite. However, the ablation process performed by commercial systems is often followed by collateral damage. To reduce it, a 2940 nm nanosecond OPO with pulse energy of more than 15 mJ was developed.
- ThR01-p22 10:00-13:30
Diagnostics of C, NV: HPHT diamond as a new laser material
 T.S. Misnikova, V.F. Lebedev; St.Petersburg State University of Aerospace Instrumentation, Russia
 Two optical schemes for recording the spectral-temporal characteristics of the stimulated emission (SE) of HPHT-diamond with NV-- centers are proposed. The analysis of radiation propagating inside and outside the crystal is carried out, including an analysis of the directivity of the radiation beam exiting the sample and the intensity distribution in its cross-section.

ThR01-p23

10:00-13:30

Spectral-kinetic study of Tb³⁺ ions in two-component CaF₂-SrF₂ systems doped with Yb³⁺ ions

P.G. Zverev, A.V. Nekhoroshikh, V.A. Konyushkin; Prokhorov General Physics Institute, RAS, Russia

Alkaline earth metal fluorides CaF₂-SrF₂ doped with terbium Tb³⁺ ions are important materials for laser technology, bioimaging, and dosimetry. The study of terbium Tb³⁺ ions in CaF₂-SrF₂ crystals doped with Yb³⁺ ions is aimed at understanding the energy transfer between ions and the spectroscopic characteristics of laser materials. Yb³⁺ acts as a sensitizer, increasing the efficiency of terbium luminescence due to the long excited state lifetime.

ThR01-p24

10:00-13:30

Single-frequency generation in a short-cavity Nd doped phosphosilicate fiber laserA.V. Shirmankin¹, A.I. Trikshev¹, V.A. Kamynin¹, A.A. Rybaltovsky¹, S.E. Sverchkov¹, B.I. Denker¹, V.B. Tsvetkov¹, V.V. Velmiskin²; ¹Prokhorov General Physics Institute RAS, ²E.M. Dianov Fiber Research Center of IOF RAN, Russia

This paper presents a fiber laser based on a short phosphosilicate fiber with a high neodymium concentration. The laser demonstrated stable single-frequency operation at a wavelength of 1066 nm.

ThR01-p25

10:00-13:30

Photoluminescence of KTP crystal excited by nitrogen laser

D.S. Chunaev, S.B. Kravtsov, P.G. Zverev; Prokhorov General Physics Institute of RAS, Russia

Luminescence of KTP crystal irradiated by pulsed nitrogen laser at wavelength of 337 nm has been studied. Two wide bands were recorded at 470-650 and 750-850 nm. The decay curve exhibits dual-exponential behavior with characteristic lifetimes of 1.7 and 4.3 μs.

ThR01-p26

10:00-13:30

Modelling of thermal lenses in inhomogeneously doped Cr:ZnSe laser rodsD.A. Nuzhdin¹, O.V. Martynova¹, A.P. Savikin¹, S.V. Kurashkin^{1,2}; ¹Lobachevsky State University of Nizhny Novgorod, ²Devyatkh Institute of Chemistry of High-Purity Substances of RAS, Russia

The study investigates thermal distortions in a Cr:ZnSe laser rod with a radially symmetrical doping profile under continuous-wave (CW) pumping. Modelling of the induced temperature fields was performed using the COMSOL for uniformly and non-uniformly doped rods, considering the effect of pump absorption saturation.

ThR01-p27

10:00-13:30

Thermal broadening of Yb³⁺ luminescence spectra in ceramic and single-crystal gain mediaV.Yu. Zhmykhov¹, D.A. Guryev¹, E.A. Dobretsova¹, S.V. Kuznetsov¹, V.A. Tarala², V.B. Tsvetkov¹; ¹Prokhorov General Physics Institute of the RAS, Moscow, ²Scientific and Laboratory Complex Clean Room, North Caucasus Federal University, NCFU, Russia

The temperature-dependent luminescence properties of Yb³⁺-doped scandium-containing YAG-based laser ceramics were investigated in the temperature range from 77 K to 400 K. A broadening of the luminescence lines with increasing temperature was observed, which is attributed to enhanced electron-phonon interaction, while the spectral peak positions remained nearly unchanged, demonstrating the structural stability of the ceramic materials.

ThR01-p28

10:00-13:30

Thermal distortions in multi-pass and multi-channel scheme of pumping for a disk laserA.L. Koromyslov¹, I.M. Tupitsyn¹, K.V. Prochorchuk^{1,2}, E.A. Cheshev¹; ¹P.N. Lebedev Physical Institute of RAS, ²National Research Nuclear University MEPhI, Russia

This paper presents the results of a numerical study of thermo-optical effects in a composite disk laser with multi-pass and multi-channel pumping scheme. A form of distribution and the proportion of a contribution of components to the formation of a thermal lens are demonstrated.

ThR01-p29

10:00-13:30

Stretched pulse generation in an all-fiber Erbium-doped oscillator with hybrid mode-lockingA. Ismaeel^{1,2,3}, A.A. Krylov¹, E.D. Obraztsova^{1,4}; ¹Prokhorov General Physics Institute of RAS, Dianov Fiber Optics Research Center, ²Moscow Institute of Physics and Technology, ³Bauman Moscow State Technical University, ⁴Prokhorov General Physics Institute of RAS, Russia

We report the generation of stretched pulses in an erbium-doped fiber laser. A Gaussian spectrum with 28 nm width, corresponding to 111 fs pulse duration, is achieved via hybrid mode-locking combining single-walled carbon nanotubes (SWCNTs) and nonlinear polarization evolution (NPE). We also demonstrate the transformation of this regime into a similariton-like state upon increasing the pump power.

ThR01-p30

10:00-13:30

Solid state YAG:Cr⁴⁺ laser gyroscope with mode locking and features of frequency biasing via KTP electro-optic modulator

Yu.Yu. Broslavets, A.A. Fomichev, E.A. Polukeev, V.G. Semenov, A.B. Mordvinova, E.S. Ivanina; Moscow Institute of Physics and Technology (National Research University), Russia

This work presents the development of a YAG:Cr⁴⁺ solid-state laser gyroscope with a frequency bias generation via KTP electro-optic phase modulator. The modulator was optimized considering its electro-optic characteristics, dispersion properties, and geometry. Numerical modeling of bidirectional lasing in a ring laser under mode-locking and applied frequency bias was performed. The region of stable bidirectional generation and mode-locking was determined.

ThR01-p31

10:00-13:30

Transient dynamics of short-cavity Erbium fiber lasersA.M. Smirnov^{1,2}, M.P. Bazakutsa¹, A.S. Shikin¹, A.V. Dorofeenko^{1,3,4,5}, O.V. Butov¹; ¹Kotelnikov Institute of Radioengineering and Electronics of RAS, ²Faculty of Physics of Lomonosov Moscow State University, ³Moscow Institute of Physics and Technology, ⁴Institute for Theoretical and Applied Electromagnetics RAS, ⁵Dukhov Research Institute of Automatics, Russia

The operation dynamics of erbium fiber lasers with short cavities are experimentally investigated as a function of erbium concentration and pump power. The study is extended to the L-band spectral region. The transition from pulsed to continuous-wave (CW) regimes is analyzed by varying the active fiber composition, fabrication technology as well as when shifting the lasing wavelength toward 1625 nm.

ThR01-p32

10:00-13:30

Heat generation in Yb:YAG crystalline sample under laser irradiation at 1030 nm wavelengthD.Yu. Demushkin¹, D.A. Denisov¹, A.V. Konyashkin²; ¹Moscow Institute of Physics and Technology (State University), ²Fryazino Branch of Kotelnikov Institute of Radioengineering and Electronics of RAS, Russia

We present the measurement results of the heat dissipation in an Yb:YAG active element during interaction with the pulsed nanosecond laser radiation at 1030 nm wavelength. The absorbed power and its proportion relative to the pump radiation were calculated by solving the heat conduction equation.

ThR01-p33

10:00-13:30

Efficient UV active medium and distribution coefficient of Ce³⁺ ions in LiSr(x)Ca(1-x)AlF₆A.A. Shavelev¹, T.M. Minnebaev¹, A.M. Zubareva¹, A.A. Shakirov¹, A.G. Kiamov¹, I.D. Sidorov¹, S.L. Korableva¹, V.V. Semashko^{1,2}, K.R. Minnebaev¹, B.I. Gareev¹, A.S. Nizamutdinov¹; ¹Kazan Federal University, ²Kazan Research Center of RAS, Russia

In this paper we study the distribution of Ce³⁺ ions in LiSr_xCa_{1-x}AlF₆:Ce³⁺ depending on the ratio of Ca²⁺/Sr²⁺ cations. In a series of single crystal samples with Ce³⁺ and different x values, an optimal crystal composition of LiSr_{0.5}Ca_{0.5}AlF₆:Ce³⁺ was established with the distribution coefficient of Ce³⁺ ions 6 times higher than in the known UV active medium – LiCaAlF₆:Ce³⁺ crystal.

ThR01-p34

10:00-13:30

Influence of different laser cladding modes on invasion of carbide powders in stainless steel studied by LIBS

E.L. Surmenko, T.N. Sokolova, P.N. Ustinov, D.A. Bessonov, I.V. Rodionov; Yuri Gagarin State Technical University of Saratov, Russia

Pulsed laser cladding of titanium carbide powder on different modes was used in the restoration of steel parts. The process of cladding with changing laser parameters was implemented on laser commercial setup Bulat LRS 50A. The efficiency of titanium powder invasion was studied by LIBS-method.

ThR01-p35

10:00-13:30

Combined laser exposure initiating stimulated emission in synthetic C, NV⁻: HPHT diamond

T.S. Misnikova, V.F. Lebedev, Ya.A. Ryvkina; St.Petersburg State University of Aerospace Instrumentation, Russia

The effect of combined pumping on narrow-band stimulated emission (SE) in HPHT diamond with high concentrations of NV⁻ and C-centers. The sample was pre-irradiated continuously ($\lambda=365, 405, \text{ or } 532 \text{ nm}$) and then pulsed ($\lambda=532 \text{ nm}$). The maximum SE was observed at $\lambda=405 \text{ nm}$, while $\lambda=365 \text{ nm}$ yielded lower intensity. These findings require further investigation of absorption at $\lambda < 450 \text{ nm}$.

ThR01-p36

10:00-13:30

Microchip quasi-CW single-frequency tunable Nd:YVO₄ laser generating at 1064.5 nm

A.F. Kornev, S.S. Terekhov; "Lasers and Optical Systems" Co. Ltd., Russia

We developed a single-frequency 30 mW microchip 1064 nm Nd:YVO₄ laser with long-term wavelength stability of 0.2 pm and wavelength tunability of $\pm 0.1 \text{ nm}$. The laser was end-pumped at 808 nm by a 1 W laser diode with 50 μm emitter size.

ThR01-p37

10:00-13:30

Application of 1064 and 532 nm fiber lasers for coupling with laminar water jet

G.N. Dubrovin, P.E. Samarin; VPG Laserone, Russia

This paper investigates the propagation characteristics of a laser beam inside a laminar water jet. The influence of laser wavelength on the efficiency of laser radiation input into the jet is assessed. Different types of pulsed fiber lasers are considered.

R02. HIGH POWER LASERS: FIBER, SOLID STATE, GAS AND HYBRID - POSTERS

Location: Congress Hall, Floor 1; Thursday, June 25, 2026

- ThR02-p01 15:00-18:30
Adaptive system for simultaneous aberration correction of multiple high-energy laser beams using a single wavefront sensor
 D.A. Fedorino¹, A.L. Rukosuev¹, J.V. Sheldakova¹, A.V. Kudryashov^{1,2}; ¹Sadovsky Institute of Geosphere Dynamics RAS, ²Moscow Polytechnic University, Russia
 An adaptive system for simultaneous aberration correction of four high-energy laser beams using a single wavefront sensor is presented. Each beam forms a spot pattern in a dedicated subregion of the detector, enabling independent correction. The approach eliminates redundant hardware, significantly simplifying the multi-beam system while preserving independent channel functionality.
- ThR02-p02 15:00-18:30
Dynamic chaos in a CO₂ laser with mechanical feedback modulation
 A.P. Mineev, S.M. Nefedov, P.A. Goncharov; Prokhorov General Physics Institute of RAS, Russia
 The transition to dynamic chaos in the output radiation pulsations of a single-frequency planar CO₂ laser with continuous RF excitation and additional feedback achieved through mechanical modulation (changing the optical path length) and subsequent injection of a small fraction (~1%) of the output radiation into the peripheral region of the unstable laser cavity was studied.
- ThR02-p03 15:00-18:30
Multi-frequency broadband tunable dye lasers
 A.P. Mineev, S.M. Nefedov, P.A. Goncharov; Prokhorov General Physics Institute of RAS, Russia
 The spectral and energy characteristics of lasers with active media on several dyes located in separate coaxial cuvettes and excited by pulsed laser radiation at 532 nm were studied. This configuration allowed for flexible modification of the active medium composition, working with various dyes, solvents, and their concentrations, while avoiding potential interactions between the mixture components. The R6G and DCM dye laser, in separate cuvettes, features wavelength tuning within the 551-693 nm range.
- ThR02-p04 15:00-18:30
Numerical analysis of time-frequency distribution energy in chirped laser beams
 C.A. Yampolskaya, A.G. Yastremskii, Yu.N. Panchenko, V.F. Losev; Institute of High Current Electronics SB RAS, IHCI, Tomsk, Russia
 Based on the Cohen and Wigner distribution functions the algorithm for numerical analysis of the time-frequency distribution of photon flux density of a chirped laser beam has been developed. This made it possible to use well-known photon transport equations to study the evolution of the time-frequency distribution of laser energy in high-power laser systems.
- ThR02-p05 15:00-18:30
Numerical analysis of the stability of a non-uniform KrF laser pump discharge under high power pulsed excitation
 S.A. Yampolskaya, A.G. Yastremskii, Yu.N. Panchenko; Institute of High Current Electronics SB RAS, Russia
 This paper presents a numerical analysis of the behavior of non-uniform KrF laser pump discharges excited by high-power current pulses (~10 MW/cm³). It was shown that, for some electrodes roughness, the density of plasma spots on the cathode surface increases with increasing excitation pulse power. In some modes, a localized increase in pump power density in a non-uniform active medium allows for higher output energy compared to a uniform discharge.
- ThR02-p06 15:00-18:30
Scaling procedure for centrifugal bubbling singlet oxygen generators of high-power chemical oxygen-iodine lasers
 A.S. Boreisho, D.F. Izosimov, I.A. Kiselev, A.V. Savin; JSC "Laser Systems", Russia
 A scaling methodology for centrifugal bubbling singlet oxygen generators has been developed to enable the design of high-power chemical oxygen-iodine lasers. The approach preserves five key physical parameters during upscaling from a 1-kW prototype. The 20-kW module is identified as optimal, offering only a 5.5% reduction in singlet oxygen yield despite a twenty fold power increase, while keeping the integrated residence parameter within acceptable limits.
- ThR02-p07 15:00-18:30
Characterization of the indirect-drive cryogenic target parameters at megajoule laser facility
 E.Yu. Zarubina^{1,2}, M.A. Rogozhina¹, E.Yu. Solomatina¹, I.A. Chugrov¹; ¹The Russian Federal Nuclear Center-All-Russian Scientific Research Institute of Experimental Physics (RFNC-VNIIEF), ²MSU named after M.V. Lomonosov, MSU Branch in Sarov, Russia
 This paper presents the results of development of complex of complementary methods for characterization of the parameters of the indirect-drive cryogenic target elements for inertial confinement fusion.
- ThR02-p08 15:00-18:30
Power enhancement of an optically pumped metastable argon laser via auxiliary pumping
 A.P. Torbin, R.A. Kuramshin, M.I. Svistun, A.K. Chernyshov, P.A. Mikheyev; P.N. Lebedev Physical Institute of RAS, Samara Branch, Russia
 This study demonstrates enhanced power scaling in an optically pumped metastable argon laser. Using auxiliary optical pumping at 810.4 nm alongside the primary pump at 811.5 nm mitigates losses from the lower laser level. The output power at 912.3 nm increased from 0.48 W to 0.58 W, confirming the recovery of atoms from the 1s₄ state into the lasing cycle.
- ThR02-p09 15:00-18:30
Comparison of the numerical model of the generation dynamics of a laser on vibronic crystals with a real system
 S.S. Makarin, D.A. Gatsko, V.V. Sementin, P.K. Rozanov, M.V. Gavriush, U.V. Prokhorova, A.S. Boreysho, A.P. Pogoda; Baltic State Technical University "VOENMEH" named after D.F. Ustinov, Russia
 This paper presents the results of modeling the dynamics of laser generation on vibronic crystals by solving a system of velocity equations and comparing them with a real system. The analysis of the reasons for the discrepancy between the mathematical model and the real system is also carried out.
- ThR02-p10 15:00-18:30
Vulnerability of 1310-nm quantum key distribution systems to 1550-nm cw light-injection attacks.
 E.V. Borisova¹, A.A. Ponosova¹, D.O. Trefilov², M.A. Petrov², V. Makarov^{1,2,3}; ¹Russian Quantum Center, Russia; ²Vigo Quantum Communication Center, University of Vigo, Spain; ³NTI Center for Quantum Communications, National University of Science and Technology MISiS, Russia
 This paper examines the possibility of attacks using a high-power CW laser operating at 1550 nm on fiber-optic isolators that are part of QKD systems operating at 1310-nm.

- ThR02-p11 15:00-18:30
Study of the possibility of increasing the SBS threshold of a fiber laser using the phase modulation method
 V.I. Bolshakova; Lomonosov Moscow State University, branch in Sarov, Russia
 A method for suppressing stimulated Brillouin scattering (SBS) in fiber lasers using phase modulation was investigated. By controlling the modulation parameters, the spectral width and coherence of the radiation can be controlled for use in high-power laser systems with spectral combining.
- ThR02-p12 15:00-18:30
High-power laser at 1.25 μm based on bismuth -doped fiber with hybrid active centers
 S.A. Ostrikov¹, A.V. Kharakhordin¹, A.V. Elopov¹, A.S. Lobanov², L.D. Lipatov², A.M. Khagai¹, S.V. Alyshev¹, K.E. Riumkin¹, M.A. Melkumov¹, and S.V. Firstov¹;
¹Prokhorov General Physics Institute of RAS, Dianov Fiber Optics Research Center, ²G.G. Devyatkh Institute of Chemistry of High-Purity Substances of RAS, Russia
 A high-power continuous-wave laser operating in the short-wavelength O-band was developed using a bismuth-doped fiber (BDF) with hybrid active centers associated with AlPO_4 structural units. The laser provided an output power of $\approx 11\text{W}$ and a slope efficiency of 30% at room temperature. It was found that the laser efficiency increases to almost 45% when the BDF temperature decreases to -100°C .
- ThR02-p13 15:00-18:30
Control of the radiation spectrum of a single-frequency laser for stimulated Brillouin scattering thresholds in fiber lasers
 K.G. Aksenov, Y.A. Krykov, S.V. Tytin, V.S. Tsikin, N.A. Zaretsky; RFNC - VNIIEF, Russia
 The presented work is devoted to the study of the possibility of controlling the width of the radiation spectrum of a single-frequency fiber laser source using single- and two-stage phase modulation in order to increase the threshold of SBS.
- ThR02-p14 15:00-18:30
Phenomena in the "afterglow" of a pumping volume discharges and energy parameters of pulse-periodical TEA-CO₂ Lasers
 B.A. Kozlov¹, E.A. Kozlov¹, A.A. Makarenko¹, D.S. Makhanko²; ¹Ryazan State Radio Engineering Univ., ²JCS Plasma, Russia
 Local discharges in the "afterglow" of a volume pumping discharge limit the pulse repetition rate and average radiation power of TEA-CO₂ lasers. In a TEA-CO₂ laser with an active media of 12 cm³ using a CO₂:N₂:He = 1:1:8 mixture, the average radiation power was increased from 30 to 45 Watts by the effective elimination of mismatch voltages.
- ThR02-p15 15:00-18:30
Active all-glass microstructured optical fibers with a reduced core refractive index
 A.N. Denisov, S.L. Semjonov; Dianov Fiber Optics Research Center, Prokhorov General Physics Institute of RAS, Russia
 This paper presents the results of a theoretical study of active all-glass leakage channel microstructured optical fibers (MOFs) containing two layers of fluorine-doped silica glass elements in the cladding and a doped core with a diameter of 20 μm and a reduced refractive index. The proposed active MOFs can be used in high-power fiber lasers and amplifiers.
- ThR02-p16 15:00-18:30
Temperature and concentration profiles in the discharge channel of a low-pressure nitrogen laser
 B.A. Kozlov, Z.V. Shvets, A.A. Makarenko; Ryazan State Radio Engineering University, Russia
 Analytical profiles of the temperature and concentration of molecular nitrogen in a low-pressure N₂-laser were obtained under various discharge channel parameters. Quantitative information about the maximum temperature in the channel (3000 °C), as well as the change in the concentration of nitrogen molecules near the walls of the discharge gap and on its axis, was established.
- ThR02-p17 15:00-18:30
High power laser marking of hot metal slabs
 A. Perestoronin^{1,2}, D. Arbutov¹, N. Grezev¹, I. Ryashko¹, S. Shmelev¹; ¹Laser Complex department, VPG Laserone, Russia; ²Bauman Moscow State Technical University, Russia
 This paper presents the results of an experimental study on laser marking of hot metal slabs. Marking was performed using a high-power pulsed laser source with an output power of 5 kW. The experiments were conducted on hot metal preheated to a temperature of 900-1000°C. The process parameters for laser marking of QR and Data Matrix codes were experimentally determined.
- ThR02-p18 15:00-18:30
Second harmonic generation of optical pumped laser on metastable argon atom at 456 nm
 A.A. Kalacheva, Yu.A. Adamenkov, M.A. Gorbunov, V.A. Shaidulina, A.V. Yuriev; FSUE "Russian Federal Nuclear Center - VNIIEF", Russia
 The paper presents laser generation of the second harmonic at a wavelength of 456 nm of a laser with optical pumping on rare gases (OPRGL) with power 2 mW. The conversion of continuous radiation of the main frequency of OPRGL (912nm) into the second harmonic using a nonlinear element (LBO crystal) was experimentally shown.
- ThR02-p19 15:00-18:30
Experimental investigation of injection seeded in a passively Q-switched and gain-switched Yb-doped all-fiber laser
 E.D. Maslova^{1,2}, I.V. Obronov², S.V. Larin², A.A. Gagarin²; ¹National Research Nuclear University MEPhI, ²VPG Laserone, Russia
 We demonstrate injection-seeding of a passively Q-switched and gain-switched (QSGS) Yb-fiber laser. The slave laser's pulse repetition rate is synchronized to a tunable master oscillator. Synchronization yields a 2–2.5-fold peak power increase and enables two operational regimes: phase-locked synchronization and a regime where the master pulse is coherently amplified within the slave cavity.
- ThR02-p20 15:00-18:30
Study of the interaction between two crossing laser beams in plasma using a new generation laser facility
 D.V. Bakaykin, D.D. Barinova, S.V. Bondarenko, V.N. Derkach, L.A. Dushina, S.Yu. Golovkin, E.A. Kartaeva, V.V. Murylev, S.F. Popov, L.F. Potapkina, V.N. Pugacheva, V.Yu. Romanova, A.I. Sharafutdinova, I.R. Smagin, K.V. Starodubtsev, L.P. Vylomov; FSUE RFNC-VNIIEF, Russia
 Experiments were conducted at the MIK laser complex to investigate the Cross-Beam Energy Transfer (CBET) effect. Two laser beams with nanosecond duration (pump and probe) were crossed in a hydrocarbon-based plasma layer. The experiments demonstrated a several-fold increase in probe beam peak power due to CBET. We also present modeling results obtained in the quasi-stationary approximation.

ThR02-p21

15:00-18:30

MW-class diode pump source at 0.87 μm for multichannel Nd:glass zig-zag slab amplifier

M.I. Gavrilenko^{1,2}, D.V. Sizmin¹, M.G. Kuzin¹, A.A. Marinin¹; ¹Russian Federal Nuclear Center - All-Russian Research Institute of Experimental Physics, ²Physics Department, Lomonosov Moscow State University, Russia

A MW-class diode pump source at 0.87 μm for a multichannel Nd:glass zig-zag slab amplifier is presented. The source's spatio-temporal and spectral-energy characteristics were measured under various currents (50-200 A) and pulse durations (200-400 μs). The wavelength shifts with coolant temperature (~ 0.3 nm/ $^{\circ}\text{C}$) and current (~ 0.015 nm/A). The 4-5 nm spectral width falls entirely within the Nd:glass absorption band.

ThR02-p22

15:00-18:30

Precision absolute distance measurement method based on laser with mode locking

A.Y. Fedorenko, S.G. Sazonkin, I.O. Orekhov, V.E. Karasik; Bauman Moscow State Technical University, Russia

The paper presents a methodology for indirect absolute distance measurement based on the frequency of laser pulses with mode locking. The principle of distance measurement in this method is described. A schematic representation of a laser rangefinder, capable of achieving accuracy within 1 μm , is provided.

ThR02-p23

15:00-18:30

The influence of the active medium composition on the radiation characteristics of pulsed ultraviolet inductive nitrogen laser

D.S. Churkin, I.A. Trunov, R.A. Tkachenko, E.S. Kargapol'tsev; Inst. of Laser Physics SB RAS, Russia

Experimental study results of the inert gases (He, Ne) and hydrocarbons (propylene, benzol) additives influence on the energy, spectral and temporal characteristics of the inductive UV nitrogen laser radiation are presented. The use of propylene additives increased the pulse duration and extended the service life by 1.3 times. The decrease of the Lewis-Rayleigh afterglow duration was observed.

ThR02-p24

15:00-18:30

976 nm lasing efficiency improvement in Yb-doped fiber with cladding-embedded absorbing rods

D.A. Davydov, S.S. Aleshkina, M.E. Likhachev; Prokhorov General Physics Institute of RAS, Dianov Fiber Optics Research Center, Russia

An improved Yb-doped fiber design featuring cladding-embedded Tm-doped absorbing rods is proposed to enhance 976 nm signal amplification by suppressing ASE near 1030 nm. Numerical modeling in COMSOL and MATLAB shows a ~ 2 times increase in power conversion efficiency compared to standard fiber, achieved through optimized rod sizes and positioning.

ThR02-p25

15:00-18:30

Numerical modeling of Yb-doped fiber amplifier pumped at 1005-1040 nm

M.M. Iakovlenko^{1,2}, I.V. Obronov¹, N.N. Evtikhiev^{1,2}; ¹LLC VPG LASERONE, ²National Research Nuclear University MEPhI, Russia

A numerical model has been developed for simulation of beam amplification in a Yb-doped fiber amplifier. It takes into account amplified spontaneous emission generation, a signal beam propagation in pulsed mode and the cross sections dependence on wavelength. The dependence of the output parameters such as central amplified wavelength and small signal gain on the pumping wavelength was investigated.

ThR02-p26

15:00-18:30

Method of characterization of laser cleaning performance

S.V. Larin, N.A. Broytman, I.V. Obronov; VPG Laserone, Russia

Various laser-cleaning systems currently can be found on the market. Despite of huge combination of laser parameters, output optics parameters and surface contamination composition can be realized, there is a demand for simple and stable test method to compare a laser cleaning process performance for given solution. In this paper a simple approach using mass-defect measurement is described, some results provided and analyzed.

ThR02-p27

15:00-18:30

Modeling of thermal lens compensation in Yb:YAG crystal using Yb:CaF₂ crystal

E.D. Tulnikov^{1,2}, A.S. Burkov^{1,2}, N.V. Tereshchenko¹, I.V. Obronov¹; ¹VPG Laserone, ²MIPT, Russia

This paper explores thermal lens compensation in a Yb:YAG crystal using a Yb:CaF₂ crystal. The propagation and amplification of radiation were modeled, taking into account thermal lensing. The simulation showed that the sequential arrangement of crystals allows for complete compensation of the thermal lens at a selected pump power, and significantly reduces its optical power at lower pump powers.

ThR02-p28

15:00-18:30

UV laser generation in Ar-N₂-He mixture in the afterglow

G.N. Lelyavsky^{1,2}, V.D. Zvorykin¹, I.G. Rudoy, A.M. Soroka, N.N. Ustinovskiy¹, L.I. Karmazin¹, A.V. Shutov¹; ¹Lebedev Physical Institute, RAS, ²National Research Nuclear University "MEPhI", Russia

Ultraviolet laser generation on the nitrogen second positive system at $\lambda \approx 358$ nm is experimentally demonstrated in the afterglow of electron-beam pumping in high-pressure Ar-N₂-He mixtures. Laser pulses with energies up to ~ 50 mJ and durations up to ~ 110 ns were obtained. The emission maximum occurs in the afterglow region, with an energy conversion efficiency of approximately 2-3%.

R09. OPTICAL NANOMATERIALS - POSTERS

Location: Congress Hall, Floor 1; Thursday, June 25, 2026

- ThR09-p01 15:00-18:30
Approximation methods for weak polarization-optical responses
 Y.A. Fofanov, V.V. Manoilov; Institute for Analytical Instrumentation RAS, Russia
 The results for a comparison of algorithms and methods for processing data of precision laser polarization-optical analysis of matter are discussed. Using the example of weak polarization responses of magnetic nanofluids, the advantages and disadvantages of various algorithms and methods for approximating experimental data from laser polarization-optical diagnostics of structural effects and fluctuations in ordered substances and materials are shown.
- ThR09-p02 15:00-18:30
New decene-1 based precursors in the chemistry of chalcogenide colloidal nanocrystals
 I.A. Shuklov, V.V. Lim, A.Yu. Shalagin; Moscow Institute of Physics and Technology, Russia
 Dissolution of elemental chalcogens in 1-decene was studied at elevated temperatures and pressures as a route to the novel chalcogen precursors in colloidal nanoparticles synthesis. By the application of these new reagents, we demonstrated the preparation of binary selenide (PbSe, HgSe) and eco-friendly ternary sulfide ABS2 (A = Cu, Ag; B = Ga, In) nanocrystals. The chemical nature of precursors was established.
- ThR09-p03 15:00-18:30
Investigation of the photostability and radiation resistance of the AgBr(0.7)I(0.3)-TlBr(0.46)I(0.54) solid solution system
 D.D. Salimgareev, V.S. Kostrov, E.Y. Kabykina, N.T. Shardakov, D.A. Vorobyova, L.V. Zhukova; ¹Ural Federal University, Russia
 The photostability and radiation resistance of single crystals and optical ceramics of various compositions in the AgBr_{0.7}I_{0.3} – TlBr_{0.46}I_{0.54} system were studied. The samples proved to be photo- and radiation-resistant.
- ThR09-p04 15:00-18:30
Metal halides thermophysical characteristics and their relationship with structure
 D.D. Salimgareev, I.V. Yuzhakov, F.M. Kucherenko, A.E. Lvov, V.O. Kosmachev, A.A. Yuzhakova, L.V. Zhukova; Ural Federal University, Russia
 Temperature dependencies of heat capacity, thermal conductivity, and coefficient of thermal expansion of silver and thallium halides have been investigated. A correlation between the thermophysical properties and the structural-chemical parameters of the materials has been established.
- ThR09-p05 15:00-18:30
Saturable absorber based on Fe²⁺-doped transparent lithium aluminosilicate glass-ceramics for passive Q-switching of near IR solid-state lasers
 A.M. Malyarevich¹, V.E. Kisel¹, A.S. Yasukevich¹, K.V. Yumashev¹, O.S. Dymshits², S.S. Zapalova², Yu.R. Zhokhova², I.P. Alekseeva², D.P. Danilovich³, A.A. Zhilin⁴; ¹Department of Laser Technique and Technology, Belarusian National Technical University, Belarus; ²Glass Department, S.I. Vavilov State Optical Institute, Russia; ³Department of Refractory Nonmetallic and Silicate Materials, St. Petersburg State Technological Institute, Russia; ⁴D.V. Efremov Institute of Electrophysical Apparatus, Russia
 Transparent glass-ceramics (GCs) of lithium aluminosilicate, aluminogalliumsilicate, and galliumsilicate systems based on Fe²⁺-doped nanocrystals with spinel structure were developed by secondary heat-treatments of iron-doped glasses melted in reducing conditions. Their structure and spectral properties are studied. The first results of application of GCs based on Fe²⁺:γ-Ga₂O₃ nanocrystals for passive Q-switching of erbium glass laser at 1.53 μm are presented.
- ThR09-p06 15:00-18:30
Spectroscopic properties and structure of lithium aluminosilicate glass-ceramics with near zero thermal expansion nucleated by Tm³⁺-doped and Tm³⁺/Yb³⁺ co-doped YNbO₄ nanocrystals
 O.S. Dymshits^{1,2}, A.A. Volokitina¹, I.P. Alekseeva², M.Ya. Tsenter², S.S. Zapalova², S. Maltsev¹, K.V. Bogdanov³, D.P. Danilovich⁴, E.V. Vilejshikova⁴, K.V. Yumashev⁴, A.A. Zhilin⁵; ¹Center of Nanoheterostructure Physics, Ioffe Institute, ²Glass Department, S.I. Vavilov State Optical Institute, ³International Research and Education Center for Physics of Nanostructures, ITMO University, ⁴Department of Refractory Nonmetallic and Silicate Materials, St. Petersburg State Technological Institute, Russia; ⁵Department of Laser Technique and Technology, Belarusian National Technical University, Belarus; ⁶D.V. Efremov Institute of Electrophysical Apparatus, Russia
 Transparent and opaque lithium aluminosilicate glass-ceramics containing nanocrystals of orthorhombic, tetragonal and monoclinic phases of Tm³⁺:YNbO₄, or Tm³⁺/Yb³⁺:YNbO₄ (8-15 nm) and β-quartz (β-spodumene) solid solutions (ca. 48 nm) are developed. Variation of their spectroscopic properties follows the phase transformations of the orthoniobate phase. Glass-ceramics can be used for efficient near-infrared down-conversion.
- ThR09-p07 15:00-18:30
Numerical simulation of laser imprinted metasurfaces based on chalcogenide phase change materials
 E. Menshikov¹, F. Kuzikov¹, V. Fedyaj^{2,3}, D. Terekhov⁴, A. Dostovalov^{2,3}, E. Kokhanovskiy¹; ¹ITMO Univ, ²Inst. of Automation and Electrometry of the SB RAS, ³Novosibirsk State Univ., ⁴National Research Univ. of Electronic Technology, Russia
 : In this work we study the optical response of metasurfaces composed of periodic arrays of crystalline inclusions formed in chalcogenide phase-change material films (PCMs). We analyze the influence of the structure geometry, crystallization depth, and additional cladding layers on the reflection and transmission spectra. We show that local PCM crystallization enables prototyping of tunable optical devices with complex optical responses.
- ThR09-p08 15:00-18:30
Aerogel-based synthesis of Nd:YAG nanopowders
 A.A. Efimov^{1,2}, M.P. Sazhnev¹, A.E. Lebedev³, M.P. Zykova¹, A.A. Pytchenko¹, I.Kh. Avetissov¹, I.V. Taydakov⁴; ¹D. Mendeleev Univ. of Chemical Technology, ²Kotelnikov Inst. of Radio Engineering and Electronics (Fyzazino Branch) RAS, ³FSUE RPC "Pharmzashchita" of the Federal Medical and Biological Agency, ⁴P.N. Lebedev Physical Inst. RAS, Russia
 Yttrium aluminum garnet (YAG) nanopowders were synthesized via novel sol-gel route assisted by supercritical carbon dioxide (CO₂) drying. For samples calcined at 850 °C Scherrer crystallite size was 35 nm and the average particle size was 53 nm.
- ThR09-p09 15:00-18:30
Study of the modification of Yb³⁺ centers in CeO₂ nanoparticles via Bi³⁺ co-doping using EPR and optical spectroscopy
 A.K. Ginkel¹, R.M. Rakhmatullin¹, O.A. Morozov^{1,2}, S.L. Korableva¹, V.V. Semashko^{1,2}, A.A. Rodionov¹, M.S. Pudovkin¹; ¹Kazan Federal University, Institute of physics, ²Zavoisky Physical-Technical Institute, FRC Kazan Scientific Center of RAS, Russia
 The impact of Bi³⁺ co-doping on CeO₂ nanoparticles structure was studied with EPR and optical spectroscopy of Yb³⁺ probe ions. EPR analysis of Yb³⁺ in CeO₂ shows that annealing with 0.1% Bi³⁺ yields cubic sites, whereas 0.5% Bi³⁺ co doping significantly increases trigonal sites. Annealing at 1000°C leads to oxygen vacancy migration and trigonal site formation. Luminescence correlates with EPR results.

ThR09-p10

15:00-18:30

Rare-earth-doped Bi₂O₃-GeO₂ glasses NIR luminescence

K.S. Serkina¹, O.V. Knyazkova¹, A.A. Eliseeva¹, E.S. Sektarov², I.V. Stepanova¹; ¹The Department of Chemistry and Technology of Crystals, D. Mendeleev University of Chemical Technology, ²Institute of Spectroscopy RAS, ISAN, Russia

Rare earth (RE)-doped bismuth-germanate oxide glasses were synthesized and their luminescent characteristics have been investigated. It was revealed that erbium, thulium and holmium doping changes luminescent band due to the appearance of RE ions luminescence. Luminescence mechanisms in synthesized glasses was proposed depending on the rare earth oxide types.

ThR09-p11

15:00-18:30

Laser-modified titanium surfaces for reducing the intensity of reflected signals across a wide temperature range

M.S. Kuritskij¹, A.A. Kostrina¹, A.V. Tsibulnikova¹, D.A. Artamonov¹, V.A.Slezhkin^{1,2}, E.S. Zemlyakova^{1,2}, I.I. Lyatun¹, I.G. Samusev¹, V.V. Bryukhanov¹; ¹Immanuel Kant Baltic Federal University, ²Kaliningrad State Technical University, Russia

The paper presents the results of measuring the reflected signal from low-reflection unique laser-modified titanium surfaces in the visible and IR ranges over a wide temperature range.

ThR09-p12

15:00-18:30

Luminescence and emission properties of halide double perovskites tuned by pressure and doping

Haizhong Guo^{1,2}, Lingrui Wang¹, Jiaxiang Wang¹, Xueqian Wu¹; ¹Key Laboratory of Materials Physics, Ministry of Education, School of Physics, Zhengzhou University, ²Institute of Quantum Materials and Physics, Henan Academy of Sciences, China

To optimize the optical properties of optically inactivity and weak emission of halide double perovskites (HDPs), the strategy by applying high pressure and doping can effectively tune the structural and optical properties of HDPs, offering new avenues for property optimization. We endeavor to comprehensively summarize the luminescence and emission properties engineering of HDPs under high pressure and doping.

ThR09-p13

15:00-18:30

Moiré-based intensity modulator for CO₂ lasers using phase transition vanadium dioxide

J.F. Calderon, C.A. Galíndez; Universidad del Valle, Colombia

Systems based on the uneven overlap of photonic crystal slabs have introduced the possibility of controlling its guided resonances. Through RCWA simulations of two parallel superimposed vanadium dioxide gratings, we develop an intensity modulator for CO₂ lasers, based on splitting of a guided resonance. At 10.6 μm these system exhibits smooth tunability, reaching 75.3% reduction of the maximum transmitted intensity.

ThR09-p14

15:00-18:30

Precise trimming of photonic integrated circuits with phase-change material nanofilms

A.V. Tronev¹, P.M. Agruzov¹, M.V. Parfenov¹, D.Y. Terkhov², Y.S. Lebedeva², P.I. Lazarenko², A. Olihovich³, A.A. Bogdanov¹, A.V. Shamray¹; ¹Ioffe Institute, ²MIET, ³St.Petersburg Electrotechnical University "LETI", Russia

An application of GeSbTe phase-change material for trimming of lithium niobate photonic integrated circuits is discussed. Attenuation, phase delay and polarization dependent losses in optical waveguides loaded GeSbTe overlay nanofilm were efficiently controlled by laser irradiation. Optically controllable TM-pass polarizer with extinction ratio over 20 dB and under 1 dB insertion losses was demonstrated on titanium diffused lithium niobate waveguides.

ThR09-p15

15:00-18:30

Energy transfer processes between Nd³⁺ and Yb³⁺ ions in yttrium fluoride matrix affecting the luminescent characteristics

E.I. Oleynikova¹, M.S. Pudovkin¹, V.V. Semashko²; ¹Institute of Physics, Kazan Federal University, ²Zavoisky Physical-Technical Institute, FRC Kazan Scientific Center of RAS, Russia

Energy transfer processes between Nd³⁺ and Yb³⁺ ions determine the temperature dependences of spectral and kinetic characteristics. An increase in the decay time of Nd³⁺ luminescence with an increase in temperature is associated with the process of radiation trapping between Nd³⁺ ions. The energy transfer between Nd³⁺ and Yb³⁺ in the temperature range of 80-320 K is phonon-assisted. To create temperature sensors, the dependence of luminescence intensity ratio or luminescence decay time on temperature can be used.

ThR09-p16

15:00-18:30

Colloidal quantum dots at the air-water interface

A.L. Simões Gamboa¹, E.N. Bodunov²; ¹ITMO Univ., ²Emperor Alexander I St. Petersburg State Transport Univ., Russia

We examine the behavior of Langmuir films of colloidal semiconductor nanocrystals (colloidal quantum dots) at the air-water interface and the factors influencing the transition occurring when the films are compressed beyond the collapse pressure, consistent with a change from the monolayer to the trilayer state. We compare this behavior with that of other Langmuir film-forming substances displaying similar transitions.

ThR09-p17

15:00-18:30

MoRe superconducting nanowire single-photon detector atop of lithium niobate on insulator

A. Nevzorov¹, I. Venediktov^{2,3}, V. Korovin^{1,3}, S. Svyatodukh², N. Titova², E. Baeva^{1,2}, I. Florya¹, D. Kobtsev^{1,3}, A. Kolbatova^{1,2}, V.Kovalyuk^{1,3}, G. Goltsman^{3,4}; ¹Laboratory of Photonic Gas Sensors, University of Science and Technology MISIS, ²Department of Physics, Moscow Pedagogical State University, ³HSE University, ⁴Group of Quantum Photonic Integrated Circuits, Russian Quantum Center, Skolkovo, Russia

An amorphous molybdenum-rhenium (MoRe) film on a thin-film lithium niobate is presented as an efficient superconducting single-photon detector (SNSPD) operating at 2.5K and exhibiting high internal efficiency in a wide spectral wavelength range.

ThR09-p18

15:00-18:30

Extending silicon infrared photoresponse by laser hyperdoping with transition metals

V.I. Pryakhina¹, D.E. Tkachuk¹, P.A. Paletskikh¹, A.R. Akhmatkhanov¹, S.I. Kudryashov^{1,2}; ¹Institute of Natural Sciences and Mathematics, Ural Federal University, ²Lebedev Physical Institute, Russia

Transition metal laser hyperdoping provided a practical, tunable method to extend silicon photoresponse into the infrared range. Optimized laser processing created sub-bandgap absorption and enabled room-temperature infrared photodetection at 1550 nm.

ThR09-p19

15:00-18:30

Angle-independent structural coloring on laser-induced periodic surface structures (LIPSS) encoded subpixels assisted with laser-induced backward transfer (LIBT)

V.A. Domakova¹, K.M. Arbuzova¹, A. Ramos-Velazquez^{1,2}, K.A. Karelin¹, D.A. Sinev¹; ¹ITMO University, ²Laser Center LLC, Russia

This work presents a method for creating an iridescent image viewable from wide observation angles. A pixelated image is recorded combining techniques laser-induced backward transfer (LIBT) and laser-induced periodic surface structures (LIPSS). Each pixel is composed of four subpixels, encoded with different LIPSS orientations by varying the laser polarization. This allows to avoid the usual fixed-angle viewing requirement of LIPSS-based structural colors.

ThR09-p20

15:00-18:30

Femtosecond laser fabrication of antireflection microstructures on LiInS_2 and LiInSe_2 nonlinear crystals

V. Fedyaj^{1,2}, A. Kurus^{2,3}, L. Lobanov^{2,3}, A. Eliseev^{2,3}, A. Dostovalov^{1,2}, A. Kuchmizhak^{4,5}, L. Isaenko^{2,3}; ¹Institute of Automation and Electrometry of the SB RAS, ²Novosibirsk State University, ³Sobolev Institute of Geology and Mineralogy of the SB RAS, ⁴Institute of Automation and Control Processes of the FEB RAS, ⁵Far Eastern Federal University, Russia

We present a comprehensive study on the direct femtosecond laser fabrication of antireflection microstructures on the surfaces of nonlinear optical crystals LiInS_2 and LiInSe_2 . We explore the effects of laser wavelength, pulse energy, number of pulses per point, and lattice symmetry (square, hexagonal) on the resulting morphology and on the optical transmittance in the infrared spectral range.

ThR09-p21

15:00-18:30

Spectral and kinetic characteristics of crystalline $\text{SrF}_2:\text{Ce}^{3+}$, Tb^{3+} microparticles

M.S. Pudovkin¹, S.I. Kalinichenko¹, Yu.A. Ermakova², A.A. Alexandrov², S.V. Kuznetsov²; ¹Kazan Federal University, ²Prokhorov General Physics Institute of RAS, Russia

We carried out laser spectroscopy of $\text{SrF}_2:\text{Ce}^{3+}$, Tb^{3+} microparticles in order to determine the mechanisms of energy exchange between Ce^{3+} and Tb^{3+} ions. It was revealed that the shape of the $\text{SrF}_2:\text{Ce}^{3+}$, Tb^{3+} spectra was dependent on temperature. The energy exchange is phonon-assisted via excited 5d state of Ce^{3+} and 5D3 state of Tb^{3+} . It was shown, that the studied $\text{SrF}_2:\text{Ce}^{3+}$, Tb^{3+} microparticles are highly effective in luminescence temperature sensing.

ThR09-p22

15:00-18:30

Creation of colloidal solutions of optically resonant silicon nanoparticles by pulsed laser ablation in a liquid in nanosecond and femtosecond regime

D.V. Sennikova, V.A. Gulinyan, M.A. Viskov, S.U. Bikmetova, D.A. Zuev; ITMO Univ, Russia

his work presents a comparative study of nanosecond and femtosecond laser ablation of a silicon in a flow system. Parameters of colloidal solutions, such as concentration, optical density, size dispersion, stability, and viscosity, are compared for each pulse duration. The optimal ablation mode and liquid flow rate for achieving a higher content of optically resonant silicon nanoparticles in the colloid are demonstrated.

ThR09-p23

15:00-18:30

Moth-eye-inspired vertical unidirectional grating coupler with experimental anisotropy proof

I.A. Kazakov, I.Y. Popova, A.V. Shipulin; Photonic Integration Research Lab, Skoltech, Russia

We demonstrate a fabrication-friendly, moth-eye-inspired single-etch vertical subwavelength grating coupler (ME-vGC) that enables preferential in-plane routing under normal incidence through transverse symmetry breaking, supporting compact vertical source integration. Experiments show a forward/backward contrast up to 11dB near 1530nm and a peak single-coupler insertion loss of ~9dB.

ThR09-p24

15:00-18:30

Highly ordered formation of perovskite by nanoimprinting method

F.M. Kochetkov¹, A.A. Yakubova², D. Gets¹, A.S. Toikka¹, D.V. Lebedev³, N.A. Solomonov², I.S. Mukhin², S.V. Makarov¹; ¹ITMO University, ²Alferov University, ³Institute for Analytical Instrumentation, Russia

A new universal method for synthesizing ordered nanostructures from the halide perovskite CsPbBr_3 using nanoimprinting techniques has been proposed and experimentally realized. The method enables the formation of homogeneous areas containing two types of perovskite structures: ordered arrays of isolated nanoparticles and microflakes. Investigation of the optical properties of the synthesized samples revealed narrow resonant emission peaks at 523 nm for the particle array and 525 nm for the flakes.

ThR09-p25

15:00-18:30

Low-dimensional metamaterials in THz photonics

P.M. Kovaleva¹, K.A. Kuznetsov^{1,2}, P.I. Kuznetsov², D.V. Lavrukhin³, R.R. Galiev³, R.A. Khabibulin³, D.S. Ponomarev^{3,4}, G.Kh. Kitaeva¹; ¹Faculty of Physics, Lomonosov Moscow State University, ²Kotelnikov FIRE RAS (Fryazino Branch), ³National Research Centre "Kurchatov Institute", ⁴Prokhorov General Physics Institute of RAS, Russia

This work investigates enhancing terahertz (THz) emission in photoconductive antennas using topological insulators (BSTS) and InGaAs/InAlAs heterostructures integrated with plasmonic gratings. BSTS-based antennas achieved an expanded 2.5 THz bandwidth due to high carrier mobility, while InGaAs/InAlAs structures improved low-frequency output via internal piezoelectric fields. These results demonstrate that tailoring electronic structures and local field redistribution is essential for developing high-efficiency, compact THz emitters.

ThR09-p26

15:00-18:30

The influence of crystallization on the luminescent properties of rare-earth ions in PbCl_2 - TeO_2 glasses

A. Bakaeva¹, D. Butenkov², N. Simonenko², P. Loiko³, O. Petrova¹; ¹The Department of Chemistry and Technology of Crystals, D. Mendeleev University of Chemical Technology, ²N.S. Kurnakov Institute of General and Inorganic Chemistry of RAS, Russia; ³Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), Université de Caen Normandie, France

The spectral-luminescent characteristics of oxochloride lead-tellurite glasses doped with Dy^{3+} , Ho^{3+} , and Er^{3+} and glass-ceramics based on them are investigated. The incorporation of rare earth elements into the crystalline phase of PbCl_2 during crystallization of the initial glass was studied.

R10. NONLINEAR QUANTUM PHOTONICS - POSTERS

Location: Congress Hall, Floor 1; Thursday, June 25, 2026

- ThR10-p01 10:00-13:30
Optically detected magnetic resonance spectroscopy of the single NV-center in diamond coupled to the ^{13}C nuclear spin
 P.G. Vilyuzhanina^{1,2,3,4}, S.V. Bolshedvorskii^{1,4}, V.V. Soshenko^{1,4}, I.S. Cojocaru^{1,2}, A.M. Kozodaev^{1,2,3}, S.M. Drofa^{1,2,3,4}, A. Chernyavskiy^{1,2,3}, B.E. Pak^{1,3}, N.I. Salangin^{1,3}, A.N. Smolyaninov⁴, A.V. Akimov^{2,4}; ¹Lebedev Physical Institute of RAS, ²Russian Quantum Center, Skolkovo, ³Moscow Institute of Physics and Technology (MIPT), ⁴LLC Diamond Sensors, Russia
 Nitrogen-vacancy centers in diamond, coupled to the ^{13}C nuclear spins are promising candidates for solid-state quantum qubits. In this work, we present the results of optically detected magnetic resonance spectroscopy of the single nitrogen-vacancy center coupled to the ^{13}C nuclear spin, resulting in hyperfine splitting.
- ThR10-p02 10:00-13:30
Treatment of resonant Raman scattering by 2LO phonons in a ZnS crystal
 L.E. Semenova; Prokhorov General Physics Inst. RAS, Russia
 Resonant Raman scattering by 2LO phonons in a wurtzite ZnS crystal under excitation below excitonic levels was theoretically studied, taking into account the anisotropy of the hole effective masses.
- ThR10-p03 10:00-13:30
Multi-parameter optimization of non-classical states in a polariton trimer
 T.A. Khudaiberganov;
 We investigate total blockade conditions for polaritonic light in a three-resonator trimer. We developed an algebraic approach using tensor states with fixed particle numbers to satisfy n -particle blockade conditions. By optimizing mixing coefficients in a passive linear optical system, our method enables deterministic engineering of n -particle Fock states in the emitted polariton radiation.
- ThR10-p04 10:00-13:30
Optimization of AgGaS_2 crystal orientation for quantum standardless calibration of the spectral radiance
 A.V. Veselovskiy^{1,2}, A.V. Paterova², G.Kh. Kitaeva^{1,2}; ¹Lomonosov Moscow State Univ., ²South Ural State Univ., Russia
 We develop the collinear optical scheme for absolute calibration of the spectral radiance using quantum properties of spontaneous parametric down-conversion (SPDC) in AgGaS_2 . Results of calculations of the angle between the crystal optical axis and the pump wave vector, required to achieve collinear phase matching, are presented and verified experimentally by recording the frequency-angular distribution of SPDC signal in AgGaS_2 .
- ThR10-p05 10:00-13:30
Spontaneous parametric down conversion of vectoroptical vortices
 V.A. Leonov, E.A. Vashukevich; St.Petersburg State University, Russia
 This work presents a theoretical model of spontaneous parametric down-conversion for quantum vector optical vortices with inhomogeneous polarization. We show a relationship between orbital angular momentum and the helical topological charge of polarization, with conservation of topological charge during the process. Control of the pump's polarization and spatial structure enables selective generation of entangled states, advancing quantum algorithms using vector vortices.
- ThR10-p06 10:00-13:30
Ramsey and hyper-Ramsey spectroscopy of the octupole transition of ytterbium-171 ion in small magnetic fields
 D.S. Krysenko^{1,2}, O.N. Prudnikov¹, V.I. Yudin^{1,2,3}, A.V. Taichenachev^{1,3}, S.V. Chepurov¹; ¹Inst. of Laser Physics, SB RAS, ²Novosibirsk State Technical Univ., ³Novosibirsk State Univ., Russia
 The comparative analysis of the shifts of the central resonance in Ramsey and Hyper-Ramsey spectroscopy of octupole transition was carried out in small magnetic fields. In particular, Rabi frequencies and magnetic field values have been determined for achievement the influence of non-linear light shift and second-order Zeeman shift on central resonance shift no more than 10^{-19} .
- ThR10-p07 10:00-13:30
Non-Gaussian dynamics and quantum correlations in lambda type light-matter interfaces
 J.C.B. Luna-Veronico^{1,2}, K.S. Tikhonov^{1,3,4}, P.R. Sharapova⁵, O.V. Tikhonova⁶; ¹St. Petersburg State Univ., ²HSE Univ., ³Russian Quantum Center, ⁴P.N. Lebedev Phys. Inst., Russia; ⁵Univ. of Paderborn, Germany; ⁶Moscow State Univ., Russia
 We present a cumulant expansion framework for characterizing non-Gaussian light in high-photon Lambda-type systems. This method solves the light-matter hierarchy problem without basis truncation, reducing computational complexity by orders of magnitude. By using higher-order cumulants as direct metrics for non-Gaussianity, we bypass full state reconstruction, enabling efficient analysis of macroscopic quantum statistical dynamics in multilevel atomic systems.
- ThR10-p09 10:00-13:30
On two approaches of noise equivalent power determination for THz superconductor HEB under continuous and pulsed illumination
 T.I. Novikova¹, K.V. Shein², S.V. Seliverstov^{3,4,5}, G.Kh. Kitaeva¹; ¹Faculty of Physics, Lomonosov Moscow State University, ²National Research University Higher School of Economics, ³Telecommunications Research and Development Institute, HSE University, ⁴Physics Department, Moscow State Pedagogical University, ⁵Laboratory of Photonic Gas Sensors, University of Science and Technology MISIS, Russia
 Two different approaches to the sensitivity estimation are considered that can be applied at different operation modes of hot electron bolometers (HEB) with a given noise equivalent power (NEP). The equivalence of two methods of measurement of spectral noise density of superconducting bolometers operating under continuous and pulsed illumination is demonstrated.
- ThR10-p10 10:00-13:30
Coexistence of decoy-state phase-time coding DV-QKD with classical channels over 80 km optical fiber
 A.V. Borisova¹, A.N. Klimov²; ¹JSC InfoTeCS, ²Quantum Technology Centre, Lomonosov Moscow State University, Russia
 This work presents an experimental investigation of the integration of O-band quantum key distribution based on decoy-state phase-time coding with classical C-band signals. Quantum-classical coexistence is demonstrated over an 80-km fiber-optic link, exceeding the previous result for a similar system by 20 km.
- ThR10-p11 10:00-13:30
On Grover's algorithm in continuous variables
 S.G. Grigorev, E.A. Vashukevich; St.Petersburg State University, Russia
 The work focuses on constructing Grover's algorithm for continuous variables, which reduces error accumulation and implementation complexity compared with the discrete version. However, the existing formulation involves a projection operator onto phase space, making its implementation highly non-trivial. The algorithm requires nonlinear operations, which are proposed to be realised using so-called non-Gaussian nodes.

ThR10-p12

10:00-13:30

Computational prediction of promising deep-UV nonlinear optical borate fluorides SrBO₂F and BaBO₂F

D.D. Barma¹, A.S. Obrubov¹, A. Tudi^{2,3}, Z. Yang^{2,3}, A.A. Mikhailova¹, D.V. Rybkovskiy¹, A.R. Oganov¹; ¹Skolkovo Institute of Science and Technology, Russia; ²Xinjiang Technical Institute of Physics and Chemistry, China, ³Center of Materials Science and Optoelectronics Engineering, University of CAS, China

This study introduces novel borate fluorides SrBO₂F and BaBO₂F predicted using the USPEX evolutionary algorithm as potential deep-ultraviolet nonlinear optical materials. DFPT calculations predict a large birefringence and a second-harmonic generation coefficient comparable to that of the benchmark KDP crystal. The origin of these enhanced optical properties is attributed to the presence of [BO₂]_n chains within the crystal structure.

ThR10-p13

10:00-13:30

Analog circuit-QED simulator of quantum spin dynamics through the extended Bose-Hubbard model

I.V. Dudinets^{1,2}, J. Kim³, T. Ramos⁴, A.K. Fedorov^{1,5,6}, V.I. Man'ko^{6,2}, J. Huh⁷; ¹Russian Quantum Center, ²Moscow Inst. of Physics and Technology, Russia; ³SKKU Advanced Inst. of Nanotechnology, Sungkyunkwan University, Republic of Korea; ⁴Inst. of Fundamental Physics IFF-CSIC, Spain; ⁵National Univ. of Science and Technology "MISIS", ⁶Lebedev Physical Inst., Russia; ⁷Yonsei Univ., Republic of Korea

We report an analog quantum simulator for the Heisenberg spin model using nonlinear microwave photonics in circuit-QED. By employing a regularized Dyson-Maleev transformation, we map spin dynamics onto the extended Bose-Hubbard Hamiltonian with engineered photon-photon nonlinearities. Numerical simulations confirm high-fidelity reproduction of complex spin dynamics, establishing a scalable photonic platform for exploring many-body phenomena through controlled quantum optical nonlinearities.

ThR10-p14

10:00-13:30

Incorporating measurement imperfections into Continuous-Variable QKD

A.S. Naumchik, R.K. Goncharov, A.D. Kiselev; ITMO Univ., Russia

We analyze measurement asymmetry effects – unbalanced beam splitters and mismatched detector efficiencies – in the Gaussian-modulated coherent-state continuous-variable quantum key distribution protocol under untrusted-noise scenario. These imperfections introduce excess noise accessible to Eve, negatively impacting secure key rate.

ThR10-p15

10:00-13:30

Statistical features of “elementary” response of superconducting hot-electron bolometer

A.V. Osipenkov, T.I. Novikova, P.A. Prudkovskii, G.Kh. Kitaeva; Faculty of Physics, Lomonosov Moscow State University, Russia

We present an experimental study of the photoresponse of a superconducting hot-electron bolometer under low-power 1.5 THz radiation. Asymmetric response histograms are modeled by Poisson-weighted convolutions of Gaussian distribution functions, revealing power-dependent pulse amplitudes and saturation behavior. Results indicate fluctuating hot-spot configurations and can be used to study detection mechanisms in superconducting photodetectors.

ThR10-p16

10:00-13:30

Wavelength-tunable optical injection attacks on the QKD transmitter

K.D. Bondar^{1,2}, I.S. Sushchev^{1,2}, D.S. Bulavkin¹, D.M. Melkonian¹, K.E. Bugai^{1,3}, A.S. Sidelnikova¹, V.M. Vakhrusheva^{1,2}, and D.A. Dvoretzkiy^{1,3}; ¹SFB Laboratory, LLC, ²Quantum Technology Centre and Faculty of Physics, Lomonosov Moscow State University, ³Bauman Moscow State Technical University, Russia

We experimentally investigate the effects of optical injection attacks on the transmitter side of QKD systems. Previous studies have primarily considered such attacks in the context of optical injection locking with slight frequency detuning between the master (Eve) and slave (Alice) lasers. Here, we demonstrate the impact of these attacks over a broad spectral range $\lambda = 1260 - 1650$ nm, showing a reduction in the relative key length under the decoy-state BB84 protocol.

ThR10-p17

10:00-13:30

Trigger-energy hysteresis in single-photon detectors under blinding attacks

D.M. Melkonian¹, D.S. Bulavkin¹, I.S. Sushchev^{1,2}, K.E. Bugai¹, R.Y. Lokmatov¹, D.A. Dvoretzkiy¹; ¹SFB Laboratory, LLC, ²Quantum Technology Centre and Faculty of Physics, M.V. Lomonosov Moscow State University, Russia

We observe hysteresis in the trigger-pulse energy of InGaAs/InP single-photon avalanche diodes under pulsed and continuous-wave detector blinding attacks at repetition rates of 2-10 MHz. The always-click, never-click thresholds, and the gap between them - key parameters in current statistics-based countermeasures - can be dynamically tuned over a much wider range than previously recognized, beyond detector heating, impacting the defenses' security.

ThR10-p18

10:00-13:30

Laser damage attacks on fusion-spliced attenuators: modeling attack scenarios in quantum key distribution systems

K. E. Bugai^{1,2}, D. A. Gavrilovets², A. P. Zyzkin¹, D. S. Bulavkin¹, I. S. Sushchev¹, D. M. Melkonian¹, K. D. Bondar¹, A. S. Sidelnikova¹, V. M. Vakhrusheva¹, D. A. Dvoretzkiy^{1,2};

¹SFB Laboratory, Ltd, ²Bauman Moscow State Technical University, Russia

This work investigates laser damage attack targeting fusion-spliced attenuators within Quantum Key Distribution (QKD) systems, demonstrating that these passive components are vulnerable to thermal modification induced by high-power optical injection. Through modelling and experimental verification, we show that controlled heating produces permanent attenuation changes that remain undetected by standard QKD monitoring procedures. The results reveal a realistic hardware-based security loophole that threatens the practical implementation of quantum-secure communication networks.

R08. NONLINEAR PHOTONICS: FUNDAMENTALS AND APPLICATIONS

Location: Stenberg 2 Room, Floor 3; Friday, June 26, 2026

R08. NONLINEAR PHOTONICS: FUNDAMENTALS AND APPLICATIONS 9

- FrR08-48 09:00-09:30
- Polariton lasers for applications in quantum computing**
(Invited paper)
A.V. Kavokin^{1,2,3}, R.V. Cherbunin^{1,3}, A. Lyubomirov^{1,3}, M. Chuukeev^{1,3}, S.V. Kavokina^{1,2,3};
¹Russian Quantum Center, ²Abrikosov Center for Theoretical Physics, Moscow Institute of Physics and Technology, ³Spin Optics Laboratory, Russia
Are driven-dissipative bosonic condensates of exciton-polaritons suitable for implementation of qubits, quantum gates and quantum networks? We show experimentally that the coherence time of a trapped polariton condensate in a superposition state may exceed the single polariton lifetime by at least two orders of magnitude. This allows for the realization of robust qubits and quantum networks based on arrays of trapped bosonic condensates of exciton-polaritons.
- FrR08-49 09:30-09:45
- Polariton topological insulator with disclination**
K. Sabour¹, Y.V. Kartashov²; ¹Moscow Institute of Physics and Technology, ²Institute of Spectroscopy, RAS, Russia
We study polariton topological insulators formed in aperiodic microcavity pillar arrays containing disclination. Resonant optical pumping allows selective excitation of topological states at the disclination core, including vortex states. Strong polariton-polariton interactions result in tilted resonance curves and bistability. Stability analysis confirms robustness of polariton vortex disclination modes.
- FrR08-50 09:45-10:00
- Competitive influence of weak second harmonics on cascading frequency tripling**
D.M. Kharitonov, V.A. Trofimov; Lomonosov Moscow State University, Russia
We study cascading third harmonic generation (THG) in a quadratic medium accounting for both ordinary wave and extraordinary one with doubled frequency. High efficiency THG is achievable.
- FrR08-51 10:00-10:15
- Lyapunov charts of ring fiber cavity**
V.A. Razukov, L.A. Melnikov, P.V. Kuptsov; Yuri Gagarin State Technical University of Saratov, Russia
The Lyapunov exponents method determines the dynamical state of ring fiber cavities. We demonstrate calculating their spectrum and constructing dynamic regime maps for nonlinear optics problems, enabling identification and prediction of special regions in parameter space. The universal approach for counter-propagating waves allows easy inclusion or exclusion of various nonlinear effects.
- FrR08-52 10:15-10:30
- PPLN proton exchange waveguides for C-band second harmonics generation**
A.R. Akhmatkhanov¹, M.A. Chuvakova¹, E.D. Savelyev¹, A.V. Sosunov², R.S. Ponomarev², K.V. Maltsev², V.Ya. Shur¹; ¹Ural Federal University, ²Perm State University, Russia
We report the fabrication of periodically poled waveguides in lithium niobate single crystal. We have fabricated multi-grating periodical domain structure with periods near 18 μm corresponding to room temperature second harmonics generation (SHG) of the C-band pump. Optical testing of obtained SHG device by precision fiber alignment revealed the SHG efficiency up to 85 %/W.
- FrR08-53 10:30-10:45
- Two-dimensional ultrafast cross-range Fourier spectroscopy of electron-vibrational transitions in dye and fluorescent protein markers**
A.S. Shvedov¹, E.A. Stepanov^{1,2}, G.D. Ivanov¹, A.A. Lanin^{1,3}, A.A. Voronin^{1,2}, A.B. Fedotov^{1,2}; ¹Lomonosov Moscow State University, Physics Department, ²Russian Quantum Center, Skolkovo, ³LIFT Center LLC, Skolkovo Innovation Center, Russia
This study demonstrates realization of cross-range 2D Fourier spectroscopy technique. Combining the visible pump and tunable mid-IR probe femtosecond pulses for the DCM dye, we directly revealed the activation of Franck-Condon vibrational modes (1547 and 1576 cm^{-1}) during electronic excitation. The technique reconstructs nonlinear absorption phase and separates emission from absorption processes, establishing a powerful approach for studying electron-vibrational correlations during photooxidizing in complex fluorescent proteins.



**9TH INTERNATIONAL A. M. PROKHOROV
SYMPOSIUM ON BIOPHOTONICS**

SYP. SYMPOSIUM ON BIOPHOTONICS - PLENARY

Location: Congress Hall, Floor 1; Monday, June 22, 2026
SYP. SYMPOSIUM ON BIOPHOTONICS - PLENARY

MoSYP-01

14:30-15:15

Quantum sensorics for biology and medicine (Plenary)

A. Sergeev¹, A. Naumov²; ¹National Center for Physics and Mathematics (NCPM), ²Lebedev Physical Institute RAS, Russia

The talk provides an overview of the basic principles, advantages, and future prospects of quantum sensing in biomedicine. It covers key techniques for single-photon detection and spectroscopy (absorption, photoluminescence, Raman) of single quantum emitters, as well as associated microscopy and nanoscopy methods. Furthermore, it discusses the instruments and methodologies derived from these techniques for the detection, imaging, and characterization of biological objects and tissues.

MoSYP-02

15:15-16:00

Phototheranostics in the treatment of high-energy exposure wounds (Plenary)

I.V. Reshetov¹, T.N. Pisareva¹, M.P. Ivankov², N.A. Kalyagina^{3,4}, K.T. Efendiev^{3,4}, A.M. Udineev⁴, D.V. Yakovlev^{3,5}, A.V. Meshkov², V.B. Loshenov^{3,4}, A.A. Shiryaev¹; ¹Sechenov First Moscow State Medical University, Department of Oncology, Radiotherapy and Reconstructive Surgery, University Clinical Hospital No.1, ²Federal State Budgetary Institution 'A.A. Vishnevsky National Medical Research Centre for Military Medicine', Ministry of Defence of Russia, ³Prokhorov General Physics Institute of RAS, ⁴National Research Nuclear University "MEPhI", ⁵Shemyakin-Ovchinnikov Institute of Bioorganic Chemistry, RAS, Russia

We propose a method to address the problem of inactivating antibiotic-resistant microflora using a technology based on fluorescence diagnostics and photodynamic therapy (PDT). This study investigated the influence of irradiation parameters and the method of photosensitizer application on the photodynamic inactivation (PDI) of the microflora on the wound surface.

MoSYP-03

16:00-16:45

Optical imaging in regenerative medicine (Plenary)

E.V. Zagaynova^{1,2}, A.V. Meleshina², D.S. Kuznetsova², S.A. Rodimova², A.S. Kashirina², P.S. Ermakova², V.I. Shcheslavskiy^{2,4}, G. Gelikonov³; ¹Lopukhin Federal Research and Clinical Center of Physical-Chemical Medicine, ²Institute of Biomedical Technologies, Privolzhskiy Medical Research University, ³Nizhny Novgorod Regional Clinical Oncological Dispanceyr, Russia; ⁴Becker and Hickl GmbH, Germany; ⁵A.V. Gaponov-Grekhov Institute of Applied Physics of RAS, Russia

Regenerative medicine includes the creation of tissue-engineered constructs, stimulation of organ regeneration, the production of cellular products from iPSCs, and CRISPR technologies. Using optical imaging, we sorted differentiated cells from MSCs, verified the structure of the transplanted tissue equivalent, identified Langerhans islets suitable for transplantation, and formulated optical criteria for effective liver regeneration for intraoperative assessment.

SYA. SECTION A. ADVANCED LASER MEDICAL SYSTEMS AND TECHNOLOGIES

Location: Petrov-Vodkin 3 Room, Floor 2; Tuesday, June 23, 2026

SYA. SECTION A. ADVANCED LASER MEDICAL SYSTEMS AND TECHNOLOGIES 1

Session Chair: Vladimir A. Duvanskiy, Peoples' Friendship University of Russia, Russia

<p>TuSYA-01 09:00-09:30</p> <p>Optimization of methods for processing venous bed images obtained using visible and infrared radiation sources (<i>Invited paper</i>) K.V. Prosvirin, P.A. Ryabochkina, M.V. Gerasimov; Department of Photonics, National Research Ogarev Mordovia State University, Russia</p> <p>We propose a dual-spectral pipeline for venous bed visualization combining visible (VIS) and near-infrared (NIR) images captured by two cameras with a shared lens and dichroic beam splitter, providing pixel-level alignment. Processing has two stages: dual-spectral combination with local contrast enhancement, then vessel segmentation using multi-scale Frangi filtering. Experiments on manually annotated images show improved segmentation quality over a single-channel NIR baseline.</p>	<p>TuSYA-03 10:00-10:30</p> <p>The effect of LED liver therapy on the clinical and biochemical characteristics of drug induced toxic hepatitis in tuberculosis patients (<i>Invited paper</i>) S. D. Nikonov^{1,2,4}, A. P. Mayorov³, L. G. Daudova¹, N. F. Davidovich², D. A. Bredikhin¹, T. S. Geleskul², N. V. Miller²; ¹Novosibirsk State University, ²Novosibirsk Regional Clinical Tuberculosis Hospital, ³Institute of Laser Physics, SB RAS, ⁴Novosibirsk TB Research Institute of the Ministry of Health of the Russian Federation, Russia</p> <p>With a reported efficacy of only 54% in TB chemotherapy (WHO, 2018), treatment outcomes are significantly limited by toxicity of anti-tuberculosis drugs. The development of toxic hepatitis (TH) as a consequence of medication necessitates chemotherapy (CT) cessation and transition to hepatotropic therapy, consequently increasing hospital length of stay and reducing overall treatment success. LED therapies for TH currently lack pathogenetic validation.</p>
<p>TuSYA-02 09:30-10:00</p> <p>Laser-activated irrigation of infected acute and chronic wounds (<i>Invited paper</i>) I.A. Abushkin¹, V.M. Chudnovsky², M.A. Guzev³, A.E. Anchugova⁴, A.M. Plantus⁵; ¹Center for Medical Laser Technologies, ²Pacific Oceanological Institute in V.I. Ilyichev, ³Institute of Applied Mathematics, ⁴Chelyabinsk State University, ⁵North-West District Scientific Clinical Center in L.G. Sokolov, Russia</p> <p>It is shown that during laser cavitation at the end of the optical fiber located in the tube, when the end of the fiber and the tube are near the bottom of the cuvette with water, a suction effect occurs. The use of the identified effect in medicine helps to effectively treat acute and chronic infected wounds.</p>	<p>TuSYA-04 10:30-10:45</p> <p>Temperature control during laser lithotripsy: thermochromic fiber for thulium fiber laser D.E. Lesnykh¹, O.I. Baytsaeva¹, V.V. Zefirov², M.G. Mukhin¹, E.A. Shirshin², V.A. Andreeva¹; ¹VPG LaserONE, ²Lomonosov Moscow State University, Russia</p> <p>High-power laser lithotripsy carries a risk of overheating the irrigation fluid and surrounding tissue. A thermochromic fiber has been developed for the thulium fiber laser (TFL) to provide real-time visual temperature feedback. This in vitro study characterized its response, demonstrating a distinct color transition at a specific irrigation fluid temperature.</p>
	<p>TuSYA-05 10:45-11:00</p> <p>Comprehensive evaluation of a 3050-nm fiber laser for ablative fractional resurfacing in dermatology V. Arkhipova¹, A. Mimov², V. Smolyannikova³, I. Konstantinova⁴, I. Larionov¹, V. Andreeva¹; ¹VPG LaserONE, ²TORI Clinic, ³Sechenov University, ⁴RUDN University, Russia</p> <p>In presented study, we evaluated a novel laser emitting at a wavelength of 3050 nm. We analysed its effect on skin ablation and regeneration. Our data show that this system has a strong tissue regenerative effect and a great potential for use in dermatology.</p>

- Coffee Break -

Location: Petrov-Vodkin 3 Room, Floor 2; Tuesday, June 23, 2026

SYA. SECTION A. ADVANCED LASER MEDICAL SYSTEMS AND TECHNOLOGIES 2

Session Chair: Vladimir P. Minaev, IRE-Polus Ltd., Russia

<p>TuSYA-06 11:30-12:00</p> <p>The automatic optical tissue recognition function in a super-pulsed thulium fiber laser: clinical application (<i>Invited paper</i>) O.I. Baytsaeva¹, P.A. Ibragimova¹, D.E. Lesnykh¹, A.G. Martov^{2,3}, V.A. Andreeva¹; ¹Department of Laser Technologies in Medicine, VPG LaserONE, ²Urological Center, the Central Clinical Hospital of Civil Aviation, ³Department of Urology and Andrology, IPPE of A.I. Burnazyan SSC FMBC, FMBA of Russia, Russia</p> <p>This study evaluated the Tissue Sensor (TS), an automatic optical tissue recognition system in a super-pulsed thulium fiber laser (SP TFL), during lithotripsy in 60 patients. The TS actively prevented off-target radiation, significantly reducing thermal mucosal injuries without high-grade complications. Most procedures reported no significant impact on operative duration, demonstrating improved safety without compromising efficiency.</p>	<p>TuSYA-07 12:00-12:30</p> <p>Laser beam characteristics for optimization of stereotactic interstitial hyperthermia of cerebral gliomas (<i>Invited paper</i>) O.V. Ostreiko; Pavlov University, Russia</p> <p>The characteristics of laser radiation optimal for minimally invasive laser hyperthermia of cerebral gliomas (LITT) are presented. The results are based on scientific research conducted at Pavlov University. An original LITT technique based on zonal coagulation of intracerebral tumors has been developed. The technique has been clinically tested by the Ministry of Health. It is used at Pavlov University. The experience of more than 70 operations demonstrates the good effectiveness and safety of the developed LITT method.</p>
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TuSYA-08

12:30-12:45

A fluorescent dye -based temperature sensor for intraoperative liquid temperature monitoring

H. Afraa¹, N.V. Korneva¹, I.R. Andrievskiy¹, S.O. Shiriaev², D.A. Davydov¹, G.S. Budylin², E.A. Shirshin²; ¹Department of Quantum Electronics, Faculty of Physics, Lomonosov Moscow State University, ²Biomedical Science and Technology Park, Laboratory of Clinical Biophotonics, First Moscow State Medical University, Russia

Real-time temperature monitoring is crucial during endoscopic laser lithotripsy to prevent urothelial damage. We present an all-optical Methylene Blue-based thermal sensor enabling fiber-optic measurements in saline solution. Temperature-dependent dye optical properties allow simple, biocompatible, and real-time monitoring, providing a practical solution for intraoperative control in minimally invasive urinary tract procedures.

TuSYA-09

12:45-13:00

ML -based prediction model of laser ablation morphology in biological tissues

G.A. Filokhin^{1,2}, N.V. Kovalenko^{1,2}; ¹MIPT, ²Fryazino branch of the Kotelnikov IRE of RAS, Russia

A predictive model for the morphology of laser ablation columns in biological tissues has been built using machine learning methods. A laboratory setup was developed to collect data in phantoms (40 g/l gelatin gel) using a thulium laser (wavelength 1942 nm) for various pulse powers (2.5--5.0 W) and durations (0.1--0.3 ms). The model demonstrated prediction errors of 14% for depth and 8% for diameter.

- Lunch Break -

Location: Petrov-Vodkin 3 Room, Floor 2; Tuesday, June 23, 2026

SYA. SECTION A. ADVANCED LASER MEDICAL SYSTEMS AND TECHNOLOGIES 3

Session Chair: David G. Kochiev, Prokhorov General Physics Institute RAS, Russia

TuSYA-12

15:00-15:30

Laser photodestruction for the treatment of pyogenic granuloma in children (Invited paper)

E.N. Gasanova, A.V. Bryantsev, A. G. Dorofeev, O.O. Sarukhanyan; Clinical and Research Institute of Emergency Pediatric Surgery and Trauma - Dr. Roshal's Clinic (CRIEPT), Russia

Novel method of combined laser photodestruction using 0.97 μm wavelength radiation for the radical treatment of pyogenic granuloma in pediatric patients.

TuSYA-13

15:30-16:00

All-optical detection of temperature and distance to fiber in laser surgery (Invited paper)

G. Budylin¹, S. Shiriaev¹, D. Fain², V. Andreeva², V. Panov², E. Shirshin²; ¹Laboratory of Clinical Biophotonics, Sechenov First Moscow State Medical University, ²Faculty of Physics, M.V. Lomonosov Moscow State University, Russia

We report first experiments on a compact single-fiber near-infrared diffuse reflectance approach for intraoperative feedback in laser lithotripsy. Water absorption features in the irrigated field are leveraged to provide qualitative estimates of fiber-to-target proximity and local temperature trends using the same fiber for delivery and collection. Preliminary tests support feasibility for real-time guidance and safety monitoring.

TuSYA-10

13:00-13:15

Development of a spectral optical coherence tomography system enhanced with AI algorithms

A.M. Tarasov, E.A. Chudakov, L.V. Chernov, I.I. Gogin, M.P. Kalinin, L.U. Sheremeto, D.A. Tinyakov, A.S. Matveenko, M.A. Klychnikov, D.S. Ponomarenko; ¹Russian Federal Nuclear Center All-Russian Research Institute of Experimental Physics, Russia

A model of a spectral OCT device for ophthalmology is presented. The model includes an optical layout and a digital processing unit with AI algorithms for real-time retinal analysis. The development aims at creating a compact device with improved diagnostic accuracy and automated data interpretation.

TuSYA-11

13:15-13:30

New approaches to optical temperature measurement in endovenous laser coagulation

O.V. Pykhtina¹, V.A. Arkhipova¹, N.R. Rovnyagina², G.S. Budylin², V.V. Zefirov³, E.A. Shirshin², V.A. Andreeva²; ¹VPG LaserOne, ²Sechenov First Moscow State Medical University, ³Lomonosov Moscow State University, Russia

This study presents a fiber-optic instrument with a temperature-sensitive coating designed to monitor the temperature in the area of laser exposure during endovenous laser coagulation. We demonstrated localized heating measurement in the fiber area and temperature extrapolation to the vein wall, a capability which will enable adjustment of radiation parameters for controlled thermal exposure during clinical application.

TuSYA-14

16:00-16:30

Real-time stone composition detection with an AI-based laser-integrated lithotripsy vision system (Invited paper)

P. Ibragimova¹, O. Baytsaeva¹, I. Golubev¹, D. Lesnykh¹, T. Khramov¹, A. Martov^{2,3,4}, V. Andreeva¹; ¹VPG LaserONE, ²Urological Center of the Central Clinical Hospital of Civil Aviation, ³Department of Urology and Andrology, IPPE of A.I. Burnazyan SSC FMBC, FMBA of Russia, ⁴Medical Research and Education Institute, M.V. Lomonosov Moscow State University, Russia

In this study we developed a deep-learning computer-vision model embedded in the Urolase Vision System to detect and classify urinary stones from intraoperative endoscopic video in real time, supporting thulium fiber laser (TFL) parameter selection. Trained and tested on clinically sourced videos with lab-confirmed fragments, the model achieved mAP50 \approx 87.5% across urate, COM, COD, and phosphate stones.

TuSYA-15

16:30-16:45

Are visible femtosecond laser pulses safe for trophectoderm biopsy of mammalian embryo?

D.S. Sitnikov¹, M.A. Filatov², V.S. Agentova¹, M.V. Kubekina², Y.Y. Silaeva³; ¹Joint Institute for High Temperatures of RAS, ²Center for Precision Genome Editing and Genetic Technologies for Biomedicine, IGB RAS, ³Core Facility Centre, IGB RAS, Russia

Femtosecond laser pulses (514 nm, 280 fs, 16 TW/cm²) are used for trophectoderm biopsy of mouse embryos at a blastocyst stage for the first time. Expression of heat shock proteins (HSPs) and reactive oxygen species (ROS) are used as markers for induced biological effects. Biopsy procedure did not increase ROS level. However, some increase in HSP caused by laser exposure is observed.

TuSYA-16

16:45-17:00

Differentiation of biliary tract tissue and stones based on DRS spectroscopy in laser lithotripsy

E.S. Ermilova^{1,2}, O.I. Baytsaeva², M.V. Murashkina³, N.R. Rovnyagina⁴, E.A. Shirshin⁵, V.A. Andreeva²; ¹National Research Nuclear University MEPhI, ²Department of Laser Technologies in Medicine, VPG LaserONE, ³City Clinical Hospital No.31 named after Academician G.M. Savelyeva, ⁴Sechenov First Moscow State Medical University, ⁵M.V. Lomonosov Moscow State University, Russia

Study adapted Tissue Sensor algorithm from urology TFL lithotripsy for safe bile duct procedures to prevent wall perforation. DRS spectra from 25 clinical cases analyzed: tissue shows hemoglobin absorption peaks, stones exhibit smooth monotonic decay. Achieved 100% differentiation accuracy via spectral ratio analysis. System automatically terminates laser emission upon soft tissue detection ahead of fiber.

TuSYA-17

17:00-17:15

Exploring ring gas laser for biomedical research

I.A. Smetanin, A.O. Sinelnikov, E.A. Smetanin, A.A. Kuznetsova; RUDN University, Russia

Ring laser gyroscopes (RLG) with vibration suspension show promise for cardioseismic diagnostics. This study assessed their feasibility for detecting cardiac mechanical activity. An experimental setup evaluated RLG sensitivity to external disturbances with cardiographic spectra. Results confirm the RLG effectively registers cardiac signals, supporting its practicality for non-invasive cardiovascular monitoring.

SYB. SECTION B. LASER INTERACTION WITH CELLS AND TISSUES: CLINICAL IMAGING AND SPECTROSCOPY

Location: Petrov-Vodkin 1 Room, Floor 2; Tuesday, June 23, 2026

SYB. SECTION B. FLUORESCENCE AND FLIM 1

Session Chair: Alexander V. Priezzhev, Lomonosov Moscow State University, Russia

TuSYB-01

09:00-09:30

Autofluorescence of intrinsic chromophores in various environments: towards monitoring of redox reactions in living cells (Invited paper)

O.S. Vasyutinskii¹, A.V. Belashov¹, A.A. Zhikhoreva¹, F. Lin², Z. Huang², I.V. Semenova¹, J. Qu², E.A. Glazkova¹; ¹Ioffe Institute, Russia; ²Shenzhen University, China

The talk presents the analysis of FLIM images of intrinsic chromophores in living cells. As is known, in general, short and long decay times relate to unbound and bound chromophores, respectively. However, as shown in the talk the determination of relative concentrations of free and bound chromophores in cell compartments is not straightforward and needs additional experiments and significant theoretical analysis.

TuSYB-02

09:30-10:00

Optical express-biopsy using macro-FLIM: a feasibility study in glioma and breast cancer surgery (Invited paper)

M.V. Shirmanova¹, D.A. Sachkova¹, A.A. Plekhanov¹, E.B. Kiseleva¹, D.V. Yuzhakova¹, I.D. Shchekhin¹, K.S. Yashin¹, A.Yu. Vorontsov², E.A. Shirshin³, V.I. Shcheklavskiy¹; ¹PRMU, ²Nizhny Novgorod Region Oncology Hospital, Russia, ³Moscow State University, Russia

Macro-FLIM (Macroscopic Fluorescence Lifetime Imaging) offers a unique opportunity to quickly obtain large field-of-view images of tissue samples based on autofluorescence. Macro-FLIM is sensitive to the biochemical differences between tumors and normal tissues, which makes it a potential tool for differentiating normal and pathological states. We demonstrate the feasibility of using macro-FLIM for the intraoperative assessment of glioma surgical margins and the identification of breast cancer metastases in sentinel lymph nodes (RSF, 25-14-00313).

TuSYB-03

10:00-10:30

Fluorescent probes based on proton phototransfer for protein surface analysis (Invited paper)

E.A. Slyusareva, E. Nemtseva, D. Surzhikova; Siberian Federal University, Russia

Properties of the proteins surface differ from those of the solvent. Fluorescent probes based on intra- and intermolecular proton phototransfer exist as an equilibrium of ionic/tautomeric forms, disturbed in the near-surface regions. Difference in the spectral characteristics of these forms allows extracting useful ratiometric signals and associating them with the characteristics of the protein surface.

TuSYB-04

10:30-10:45

Fluorescence-based tumor tracking and photosensitizer depth mapping for real-time dual-wavelength photodynamic therapy monitoring

A.S. Savelyev, M.Y. Kirillin, E.A. Sergeeva, A.B. Kostyuk, P.D. Agrba, I.V. Turchin; A.V. Gaponov-Grekhov Inst. of Applied Physics RAS, Russia

Noninvasive photosensitizer (PS) distribution assessment and tumor tracking improve photodynamic therapy (PDT). This study presents a software solution for real-time dual-wavelength fluorescence imaging that enables both tasks. Software validation, which included clinical post-processing and real-time phantom tests for the CSRT-based tracker and agar phantom tests for the depth estimation algorithm, demonstrated its capability for automated PS distribution and photobleaching assessment.

TuSYB-05

10:45-11:00

Quantifying the sensitivity limit of ICG imaging in the presence of tissue autofluorescence

Y. Belozero, I. Turchin; Inst. of Applied Physics RAS, Russia

This work investigates the fundamental sensitivity limit of indocyanine green fluorescence imaging in the NIR-I range. We demonstrate that tissue autofluorescence is the dominant factor constraining detection sensitivity, establishing a performance threshold for imaging systems. The study defines critical equipment requirements to optimizing contrast agent dosage and enabling autofluorescence registration in clinical applications.

- Coffee Break -

Location: Petrov-Vodkin 1 Room, Floor 2; Tuesday, June 23, 2026

SYB. SECTION B. BLOOD + LDF + PHOTOPLETISMOGRAPHY OPTICS

Session Chair: Mikhail Kirillin, A.V. Gaponov-Grekhov Institute of Applied Physics of RAS, Russia

TuSYB-06

11:30-12:00

Multimodal optical diagnostics of microcirculatory-tissue systems: from stationary to wearable devices (Invited paper)

A.V. Dunaev¹, E.V. Zharkikh¹, Y.I. Loktionova¹, V.V. Sidorov², V.V. Dremmin¹, E.V. Potapova¹; ¹Research and Development Center of Biomedical Photonics, Orel State University, ²SPE "LAZMA" Ltd, Russia

The work shows that a multimodal optical approach to the diagnosis of microcirculatory-tissue systems of the body makes it possible to identify pathological changes in the early stages of their development, classify neoplasms and predict the outcome of treatment. It is noted that such diagnostic technologies can be implemented in both stationary and wearable formats and are applicable in clinical and rehabilitation practice, as well as in space missions.

TuSYB-07

12:00-12:30

Wearable laser Doppler flowmetry analyzers in monitoring microvascular responses to diverse physiological stimuli (Invited paper)

E.V. Zharkikh, Y.I. Loktionova, V.S. Yanushin, A.V. Dunaev; Research and Development Center of Biomedical Photonics, Orel State University, Russia

The paper presents the results of the study of the effect of individual physiological and environmental factors on the parameters recorded using wearable multimodal laser analyzers.

TuSYB-08

12:30-13:00

Light interaction with blood vessels in biological tissue in vivo (Invited paper)

A.A. Kamshilin; Institute of Automation and Control Processes FEB RAS, Russia

This work examines the reasons why the intensity of light, after its interaction with a tissue, becomes modulated at heart rate. The question of how the observed modulation of light is related to the perfusion of biological tissue will be discussed.

TuSYB-09

13:00-13:15

Imaging photoplethysmography reveals specific manifestations of systemic lupus erythematosus

N.P. Podolyan¹, M.A. Volynsky², O.V. Mamontov^{3,4}, R.V. Romashko¹, A.A. Kamshilin¹; ¹Institute of Automation and Control Processes, FEB RAS, ²ITMO University, ³Almazov National Medical Research Centre, ⁴Pavlov First St. Petersburg State Medical University, Russia

Imaging photoplethysmography synchronized with electrocardiography was used to diagnose systemic lupus erythematosus. It was found that patients had significant changes in the microcirculatory blood flow of the facial skin in the cheek area compared with the control. Therefore, the proposed technique can claim to be an objective instrumental criterion of the disease.

TuSYB-10

13:15-13:30

Systemic lupus erythematosus diagnostics based on surface-enhanced Raman scattering

L.A. Bratchenko^{1,2}, Y.A. Khristoforova², A.V. Ulyanova³, P.A. Lebedev³, I.A. Bratchenko^{1,2}; ¹Immanuel Kant Baltic Federal Univ., ²Samara Univ., ³Samara State Medical Univ., Russia

An approach based on the integration of surface-enhanced Raman scattering of blood serum and multivariate analysis is presented for monitoring patients with systemic lupus erythematosus (SLE). Surface-enhanced spectra are implemented using a substrate of spherical silver particle agglomerates. The proposed approach enables spectral profiling of SLE and the identification of SLE patients with an accuracy exceeding 95%.

- Lunch Break -

Location: Petrov-Vodkin 1 Room, Floor 2; Tuesday, June 23, 2026

SYB. SECTION B. TISSUE MODIFICATION AND TUMOR TREATMENT

Session Chair: Andrey Belikov, ITMO University, Russia

TuSYB-11

15:00-15:30

Optical diagnostics in skin photoaging assessment and development of novel PDT protocols (Invited paper)

M. Kirillin¹, M. Shakhova^{1,2}, V. Fokeev^{1,2}, A. Saveliev^{1,3}, D. Kurakina¹, V. Prokopenko¹, D. Solovieva³, K. Bylinskaya¹, V. Perekatova¹, A. Serebryakova^{1,3}, A. Mironycheva^{1,2}, I. Turchin¹, E. Sergeeva¹; ¹A.V. Gaponov-Grekhov Institute of Applied Physics RAS, ²Privolzhsky Research Medical University, ³Lobachevsky State University of Nizhny Novgorod, Russia

Optical coherence tomography (OCT) and diffuse optical spectroscopy are used to detect structural features and chromophore content of skin with different photodamage level. OCT is used to evaluate clinical outcome of novel photodynamic therapy protocol for ENT diseases.

TuSYB-12

15:30-16:00

Optical and thermal modeling of benign retinal tumors laser treatment (Invited paper)

A.V. Belikov¹, A.A. Shamovaa¹, S.N. Smirnov¹, D.S. Polyakov¹, Yu.V. Fyodorova¹, G.D. Shandybina¹, T.G. Zakaraiya², E.V. Boiko²; ¹ITMO University, ²S. Fyodorov Eye Microsurgery Federal State Institution, Russia

An optical-thermophysical model of the human eye with a benign retinal vascular tumor is proposed. The results of model verification and numerical optimization of laser transpupillary thermotherapy for human retinal capillary hemangioblastoma are presented and discussed.

TuSYB-13

16:00-16:30

Sapphire fiber tips for laser interstitial therapy of soft tissues and natural canals (Invited paper)

I.N. Dolganova^{1,2}, I.A. Shikunova¹, P.V. Aleksandrova², A.A. Platonova², A.K. Zotov², V.N. Kurlov¹; ¹Osipyan Institute of Solid State Physics of RAS, ²Prokhorov General Physics Institute of RAS, Russia

In this talk, we describe and discuss various designs of sapphire fiber tips for laser medicine. Special attention is paid to thin capillary sapphire tips, manufactured by Stepanov (EFG) crystal growth concept, for interstitial laser coagulation of soft tissues and natural canals.

TuSYB-14

16:30-16:45

Wearable devices in monitoring microcirculatory-tissue systems under the influence of G-loads and postural test

Y.I. Loktionova¹, E.V. Zharkikh¹, V.S. Yanushin¹, D.N. Lutsevich², N.V. Vlasova², V.V. Sidorov³, K.S. Kireev², A.V. Dunaev¹; ¹Research and Development Center of Biomedical Photonics, Orel State University, ²State Organization "Gagarin Research and Test Cosmonaut Training Center", ³SPE "LAZMA" Ltd, Russia

This study focuses on monitoring blood microcirculation and oxidative metabolism parameters of skin under the influence of simulated spaceflight factors on professional cosmonauts using a distributed system of portable multimodal analyzers.

TuSYB-15

16:45-17:00

Breath-holding effect on cerebral blood supply and systemic arterial pressure in rats

P.M. Dolotovskaya¹, A.Y. Sokolov², I.A. Mizeva³, A.A. Kamshilin⁴; ¹N.P. Bechtereva Institute of the Human Brain of the RAS, ²Pavlov Institute of Physiology of RAS, ³Institute of Continuous Media Mechanics, UB RAS, ⁴Institute of Automation and Control Processes, FEB RAS, Russia

In the present study, we measured the dynamics of cerebral perfusion and systemic arterial pressure in rats during a breath-holding test using a contactless imaging photoplethysmography synchronized with an electrocardiogram. It was found that this technique allows us to qualitatively assess processes of cerebral blood supply regulation caused by temporary cessation of respiration.

SYC. SECTION C. PHOTONICS AND NANOBIO TECHNOLOGY

Location: Petrov-Vodkin 2 Room, Floor 2; Tuesday, June 23, 2026

SYC. SECTION C. PHOTONICS AND NANOBIO TECHNOLOGY 1

TuSYC-01

09:00-09:45

Functional nanoprobe for in vivo Imaging (Keynote presentation)

Mingyuan Gao; School of Life Sciences, Soochow University, China

The in vivo applications of functional nanoparticles for the diagnosis of major diseases will be reported. Moreover, the clinical translation of functional nanoparticles will also be discussed.

TuSYC-02

09:45-10:15

Multifunctional and multimodal contrast agents: preparation, properties control, biomedical applications (Invited paper)

D.A. Gorin; Skolkovo Institute of Science and Technology, Russia

One of the trends in modern biophotonics is the use of multimodal diagnostic systems. This requires the development of multimodal contrast agents. A technology for synthesizing multimodal contrast agents has been developed. It has been established that the concentration of inorganic nanoparticles and/or organic dyes in composite particles allows for altering the contrast of OA, ultrasound, and MRI images.

TuSYC-03

10:15-10:45

Functionalized gold nanobipyramids and luminescent Au⁰ atomic nanoclusters for biomedical applications (Invited paper)

N.G. Khlebtsov^{1,2}, A.M. Burov¹, D.S. Chumakov¹, S.S. Evstigneeva^{1,2}; ¹Institute of Biochemistry and Physiology of Plants and Microorganisms, Saratov Scientific Centre of RAS, ²Saratov State University, Saratov, Russia

Pentagonal gold bipyramids and nanorods with LPR from 640 to 940 nm were synthesized, functionalized with nitrobenzenethiol, and characterized by UV-vis spectroscopy, transmission electron microscopy (TEM), surface enhanced Raman scattering (SERS), and photothermal (PT) studies. We also show that fluorescent glutathione-stabilized gold nanoclusters are capable of selectively binding to bacterial biofilms, but do not stain planktonic bacteria.

TuSYC-04

10:45-11:00

Optimising 825 nm photobiomodulation in adipose-derived stem cells: a comparative analysis of two- and three-dimensional culture systems

A. Crous, P. Mulaudzi, H. Abrahamse; Laser Research Centre, Faculty of Health Science, University of Johannesburg, South Africa

This study compared the effects of 825 nm photobiomodulation on adipose-derived stem cells cultured in 2D monolayers and 3D spheroids. PBM at 5 J/cm² optimally enhanced viability and proliferation in 2D, while 10 J/cm² produced the most stable, physiologically relevant responses in 3D spheroids, underscoring the importance of 3D models for translational PBM optimisation.

- Coffee Break -

Location: Petrov-Vodkin 2 Room, Floor 2; Tuesday, June 23, 2026

SYC. SECTION C. PHOTONICS AND NANOBIO TECHNOLOGY 2

TuSYC-05

11:30-12:00

Magnetic particle imaging: from physics to biomedical applications (Invited paper)

Jing Zhong; Beihang University, China

Magnetic Particle Imaging (MPI) is new imaging modality that enables the direct and quantitative detection and imaging of magnetic nanoparticles (MNPs). MPI directly detects the dynamic magnetization of MNPs for radiation-free and tissue-background-free imaging. This study introduces the fundamental physics of MPI for in vitro biomolecule detection and in vivo imaging for cancer diagnostics.

TuSYC-06

12:00-12:30

Optical characterization of advanced biosensing architectures for express sensitive detection of clinical biomarkers and food contaminants (Invited paper)

A.V. Orlov; Prokhorov General Physics Institute of RAS, Russia

Label-free optical biosensing platforms based on interferometry enable real-time characterization of biomolecular interactions with sub-nanometer axial resolution. This work presents advanced sensing architectures combining stimulus-responsive materials, reconfigurable molecular interfaces, and novel surface functionalization strategies. Systematic evaluation of interferometric and magnetometric detection reveals synergistic advantages for achieving sub-picogram sensitivity across extended dynamic ranges in clinical and food safety applications.

- TuSYC-07 12:30-12:45 TuSYC-09 13:00-13:15
- Next generation optical biosensing with hybrid AI-Photonics architecture**
I. Saetchnikov, E. Tcherniavskaia, A. Saetchnikov; Belarusian State University, Belarus
We present a scalable optical biosensing platform combining thousands of high-Q whispering-gallery-mode microresonators with a hybrid deep-learning engine. By integrating CNNs, biLSTMs, transformer encoders, and cross-channel attention, the system enables real-time analysis of complex biochemical mixtures. In multiplexed immunosensing, it achieves >98% classification accuracy and parts-per-billion (ppb) concentration resolution, addressing scalability and data-heterogeneity challenges in photonic biosensing.
- Light-responsive multilayer carriers for controlled STING agonist release**
L.V. Mikhailova¹, O.A. Gusliakova², N.A. Shushunova³, M.V. Zyuzin^{1,4}, G.B. Sukhorukov^{2,5}; ¹Bridge Center, Faculty of Physics, ITMO University, ²Center for Bio- and Medical Technologies, Skoltech, ³Core Facility Center, Saratov State Medical Univ., ⁴Moscow Center for Advanced Studies, ⁵Life Improvement by Future Technologies (LIFT) Center, Russia
Light-responsive polymer carriers encapsulating a STING agonist were engineered to reprogram tumor-associated macrophages from an M2- to an M1-like phenotype. Macroscopic and submicron carriers loaded with gold nanorods enabled NIR-triggered heating, controlled agonist release, and efficient uptake by macrophages. In vitro and in vivo experiments demonstrated enhanced CD86 expression and M1 polarization in melanoma, highlighting a spatiotemporally controlled immunotherapeutic strategy.
- TuSYC-08 12:45-13:00 TuSYC-10 13:15-13:30
- Novel highly sensitive readout for an enzyme-linked immunosorbent assay based on surface-enhanced Raman scattering**
E.G. Evtushenko^{1,2}, A.D. Vasilyeva¹, L.V. Yurina¹, E.S. Gavrilina¹, V.B. Krylov³, N.E. Nifantiev³, D.V. Basmanov⁴, I.N. Kurochkin^{1,2}; ¹N.M. Emanuel Inst. of Biochemical Physics RAS, ²Lomonosov Moscow State Univ., Faculty of Chemistry, ³N.D. Zelinsky Inst. of Organic Chemistry RAS, ⁴Lopukhin Federal Research and Clinical Center of Physical-Chemical Medicine, Russia
An enzyme-linked immunosorbent assay (ELISA) is a widely used and universal method in laboratory diagnostics. We report on the development of a protocol for the measurement of horseradish peroxidase label in ELISA based on surface-enhanced Raman scattering (SERS) of 2,3-diaminophenazine using a silver nanoparticles colloid. We will demonstrate its application for the analysis of galactomannan, a marker of invasive aspergillosis.
- Laser-induced release of neuroactive proteins from polymer capsules using one- and multiphoton excitation for directed neural cell differentiation in 2D and 3D models**
I.V. Smirnov¹, V.S. Usatova², O.G. Astakhova^{2,3}, A.A. Lanin^{3,4}, G.B. Sukhorukov^{1,4}; ¹Skolkovo Inst., ²FCBN FMBA, ³MSU, ⁴LIFT, Russia
Combining the processes of photoconversion and laser-induced release of neuroactive proteins from polyelectrolyte capsules allows for long-term tracking of the behavior of individual activated cells within a cellular population.

- Lunch Break -

Location: Petrov-Vodkin 2 Room, Floor 2; Tuesday, June 23, 2026
SYC. SECTION C. PHOTONICS AND NANOBIO TECHNOLOGY 3

- TuSYC-11 15:00-15:30 TuSYC-14 16:15-16:30
- Nanostructured particles for remote neuron stimulation (Invited paper)**
T. Pallaeva^{1,2}, A. Romaschenko², S. Lisitsyn², I. Smirnov¹, A. Abdurashitov^{1,2}, G. Sukhorukov^{1,2}; ¹Skolkovo Institute of Science and Technology, ²LIFT Center, Russia
The paper describes recent advances in fabrication of micro- and nanostructured systems enable to label, activate and track individual biological cells via alternated magnetic field and/or light.
- Single-exosome analysis in microfluidic flow by fluorescence correlation spectroscopy and burst detection**
D.D. Kozhevnikova¹, A.V. Barulin², A.V. Petukhov², S.M. Novikov², A.M. Yashchenok¹; ¹Skolkovo Institute of Science and Technology, ²Moscow Institute of Physics and Technology, Russia
Accurate characterization of small extracellular vesicles is challenging due to their nanoscale size and heterogeneity. We present a microfluidics-assisted fluorescence spectroscopy approach combining fluorescence correlation and burst analysis for single-vesicle detection. This dual-modality method enables sensitive measurement of particle concentration and provides size-related information for exosome-enriched fractions.
- TuSYC-12 15:30-16:00 TuSYC-15 16:30-16:45
- Plasmonic porous silicon-gold nanoparticles for optical diagnostics and multimodal therapy (Invited paper)**
L.A. Osminkina^{1,2}; ¹Faculty of Physics, Lomonosov Moscow State University, ²Institute for Biological Instrumentation of RAS, Russia
Plasmonic hybrid porous silicon-gold nanoparticles are presented as a multifunctional platform for optical diagnostics and multimodal cancer therapy. The combination of biodegradable porous silicon and plasmonic gold enables photothermal effects, radiosensitization, and surface-enhanced Raman diagnostics. These results highlight the potential of the proposed nanoplatform for future development of integrated theranostic approaches in oncology.
- Multilayer sensing system with controllable density of antibody binding sites for hormone analysis**
N.A. Belyakov^{1,2}, A.S. Rakitina^{1,2}, S.G. Trofimenko^{1,3}; ¹Prokhorov General Physics Institute of RAS, ²Moscow Center for Advanced Studies, ³National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), Russia
We developed a new universal approach in biosensorics which is based on an adaptive programmable biolayers that can form a multilayer architecture on a surface of a glass sensor chip. Under a specific microenvironment the upper layers can be desorbed what allows to change the steric structure of the biosensor and change the calibration curve directly during the measurement.
- TuSYC-13 16:00-16:15
- Microfluidic synthesis of AgInS₂/ZnS quantum dots with different stoichiometry for biomedicine**
I.A. Reznik¹, A.A. Cherednikova¹, S. Bikmetova¹, D.V. Danilov², M.V. Zyuzin¹; ¹Faculty of Physics, Bridge Center, ITMO University, ²Interdisciplinary Research Center for Nanotechnology, St. Petersburg State University, Russia
We developed a microfluidic protocol to synthesize AgInS₂/ZnS quantum dots with tunable core stoichiometry (Ag:In = 0.05–0.30) and variable ZnS shell thickness. Optical properties and ROS generation were systematically linked to composition. Ag-rich QDs showed enhanced photodynamic activity against glioblastoma cells, indicating promise for biomedical imaging and photodynamic therapy applications.

SYB. SECTION B. LASER INTERACTION WITH CELLS AND TISSUES: CLINICAL IMAGING AND SPECTROSCOPY - POSTERS

Location: Congress Hall, Floor 1; Tuesday, June 23, 2026

- TuSYB-p01 15:00-18:30
The effect of laser-generated ionizing secondary radiation on the pigment-protein complex C-phycoyanin
 V.V. Teplyakov¹, T.A. Semenov¹, Y.E. Sergeeva¹, P.M. Gotovtsev², M.M. Nazarov¹; ¹National Research Centre "Kurchatov Institute", ²Institute for Information Transmission Problems of RAS, Russia
 We present results of experiments on the effect of two types of femtosecond pulsed radiation - an electron beam with an intensity of $3 \cdot 10^{18} \text{ W/cm}^2$ and THz radiation with a pulse energy of $20 \mu\text{J}$ - on a solution of the pigment-protein complex C-phycoyanin in deionized water as part of a study of the non-thermal effects of ionizing radiation on biological objects.
- TuSYB-p02 15:00-18:30
Optical imaging for characterization of tumor-associated fibroblasts
 A.I. Gavrina, V.D. Kapustina, N.I. Ignatova, V.V. Elagin, V.V. Dudenkova, I.N. Druzhkova; Privolzhskiy Research Medical Univ., Russia
 Tumor-associated fibroblasts (CAFs) are a specific population of stromal cells in tumor tissue that differ from normal fibroblasts in their altered phenotype and functionality. They play a key role in the development and progression of cancer, making them potential targets for anticancer therapy. Targeting senescent CAFs may be a new approach to tumor treatment.
- TuSYB-p03 15:00-18:30
Fluorescence lifetime and optical spectrum dependence during photooxidation of lipofuscin granules
 P. Morozov^{1,2}, V. Andreev^{2,3}, M. Tokarev¹, M. Yakovleva^{4,5}, A. Kostyukov^{4,5}, T. Feldman^{4,5}, V. Kuzmin⁴, M. Ostrovsky^{4,5}, G. Goltsman^{1,3}; ¹Moscow State Pedagogical Univ., ²LLC "Supercon Nanotech", ³National Research University Higher School of Economics, ⁴N.M. Emanuel Institute of Biochemical Physics RAS, ⁵Lomonosov Moscow State University, Russia
 In this paper we study the process of photooxidation in lipofuscin granules (LG) using fluorescence lifetime microscopy in combination with a superconducting single-photon detector (SSPD). The aim was to develop early diagnosis criteria for age-related macular degeneration (AMD). LG's, which accumulate in the retinal pigment epithelium (RPE), are the main source of fundus autofluorescence (FAF). Changes in their fluorescence properties during photooxidation serve as a model for studying AMD pathology.
- TuSYB-p04 15:00-18:30
Principal component analysis for virus classification
 E.E. Popov¹, A.T. Tabarov^{1,2}, V.V. Vitkin¹; ¹Institute of Advanced Data Transfer Systems, ITMO University, ²St. Petersburg State Pediatric Medical University, Russia
 In this work we study the influence of changes in Raman spectrum of Solution of virus-containing particles on accuracy of classification using principal component analysis (PCA) as a machine learning tool for classification. Both experimental and modeling studies are presented.
- TuSYB-p05 15:00-18:30
The possibility of using histological data in assessing the skin thickness by OCT
 A.P. Tarasov^{1,2}, D.A. Rogatkin¹; ¹Moscow Regional Research and Clinical Institute (MONIKI) named after M.F. Vladimirovsky, ²National Research Centre "Kurchatov Institute", Russia
 The work presents the results of a preliminary study on the possibility of using histological data for calibrating the scale of OCT images of human skin. The study utilized thick cadaver skin, and the thickness of the stratum corneum was determined. It was established that, in general, the use of histology characterized by significant variability, which complicates the calibration of the optical tomograph's scale.
- TuSYB-p06 15:00-18:30
Method and device for detecting intracranial tumor tissue in situ using fiber-optic multimodal laser spectroscopy
 I.D. Romanishkin¹, A. Ospanov², T.A. Savelieva^{1,2}, K.G. Linkov¹, D.V. Yakovlev¹, A.V. Kosyrkova³, G.V. Pavlova^{3,4}, I.N. Pronin³, V.B. Loschenov^{1,2}; ¹Prokhorov General Physics Institute of RAS, ²National Research Nuclear University MEPhI, ³N.N. Burdenko National Medical Research Center of Neurosurgery, ⁴Institute of Higher Nervous Activity and Neurophysiology of RAS, Russia
 This article discusses the approach to intraoperative multimodal laser spectroscopic analysis of intracranial tumors based on the simultaneous measurements of FAD and PpIX fluorescence, diffuse reflectance and Raman scattering. The data obtained this way automatically undergoes classification using a training set compiled from spectral signatures previously obtained by measuring samples of such tumors in the biobank conditions.
- TuSYB-p08 15:00-18:30
Simulation of infrared radiation backscattering by curved multilayer biological tissue
 R.R. Chegadaev¹, S.V. Ul'yanov², Yu.A. Zhavoronkov^{1,2}; ¹Peter the Great St. Petersburg Polytechnic University, ²St. Petersburg State University, Russia
 We present results of Monte Carlo backscattering simulations for tissue models with different numbers of flat or curved layers, with particular emphasis on a human head model. We also studied possible causes of the loss of spatial coherence, leading to the broadening of the coherent backscattering peak. Backscattered intensity exhibited high sensitivity to blood penetration into the cerebrospinal fluid layer.
- TuSYB-p09 15:00-18:30
Ce³⁺ -lasers emission interaction with skin cells investigation in the presence of antioxidants
 A.S. Nizamutdinov, A.A. Varlamov, I.D. Sidorov, D.A. Makarova, N.I. Shamsutdinov, A.A. Shavelev, Y.M. Hamdan, T.A. Nevzorova, P.V. Zelenikhin, V.V. Semashko; Kazan Federal University, Russia
 We report the cytotoxic effect of UVB laser radiation from LiCaAlF₆:Ce³⁺ and LiLu_{0.7}Y_{0.3}F₄:Ce³⁺-Yb³⁺ lasers on human skin fibroblasts. We show that only $6.2 \pm 2.2\%$ of cells reach the stage of late apoptosis, due to which they have the potential to restore the cytoplasmic membrane and subsequently divide. The effect of vitamins C and E on viability under UV irradiation is discussed.
- TuSYB-p10 15:00-18:30
Development of a software package for photoacoustic tomography data analysis based on open-source Python libraries
 S.A. Shevtsova¹, E.S. Prikhodzhenko², D.N. Bratashov^{1,2}; ¹Saratov State Univ., ²Moscow Institute of Physics and Technology, Russia
 A software package for comprehensive photoacoustic tomography data processing has been introduced. It includes loading raw experimental data in HDF5 format and visualizing three-dimensional images. Based on reconstruction algorithms that convert ultrasonic sensor signals into spatial absorption maps, this tool enables both qualitative visual assessment and quantitative analysis of biological chromophore concentrations.

TuSYB-p11

15:00-18:30

Synthesis bis-diimine rhenium(I) complexes and micelles based on it for photoacoustic research

V.A. Suslova, K.S. Kisel; St.Petersburg State University, Russia

Re(I) complexes are promising candidates for synthesis contrast agents potentially applicable in photoacoustic imaging experiments. Usage of ligands with hydrophilic and hydrophobic functions allow us to obtain micelles based on this complexes. Photophysical properties of such micelles are consistent with their application as contrast agents.

TuSYB-p12

15:00-18:30

Real-time thermal mapping of biological tissue phantoms using two-dimensional FBG arrayV.A. Simonov^{1,2}, Z.E. Munkueva^{1,2}, A. Kokhanovskiy^{1,4}, A.V. Dostovalov^{1,2}, A.A. Evtushenko^{1,3}, L.V. Boldyreva^{1,3}; ¹Novosibirsk State University, ²Institute of Automation and Electrometry SB RAS, ³Scientific Research Institute of Neurosciences and Medicine, ⁴ITMO University, Russia

The real-time thermal mapping of the biological tissue phantom under the laser treatment is demonstrated using the two-dimensional fiber Bragg grating (FBG) array with 1 mm resolution. The method can be used to develop treatment protocols of tumors under the impact of laser radiation or cold atmospheric plasma.

SYA. SECTION A. ADVANCED LASER MEDICAL SYSTEMS AND TECHNOLOGIES

Location: Deyneka 1+2 Room, Floor 2; Wednesday, June 24, 2026

SYA. SECTION A. ADVANCED LASER MEDICAL SYSTEMS AND TECHNOLOGIES 4

<p>WeSYA-18</p> <p>Improvement of advanced laser systems for monitoring diabetes mellitus complications using tissue optical clearing (Invited paper)</p> <p>V.V. Tuchin^{1,2,3}, D. Li^{4,5}, Dan Zhu⁴, E.A. Genina¹, P.A. Timoshina¹, D.K. Tuchina¹, I.Yu. Yanina¹, S. Liu⁴, J. Huang⁴, Yu.I. Surkov¹, I.A. Serebryakova¹, K.V. Berezin¹; ¹Saratov State Univ., ²Tomsk State Univ., ³FRC "Saratov Scientific Centre of the RAS", Russia, ⁴Huazhong Univ. of Science and Technology, China</p> <p>The potential of using tissue optical clearing (TOC) technology for effective disease diagnostics by increasing the sensitivity and resolution of advanced laser medical systems is discussed for monitoring diabetes mellitus complications. A wide range of laser methods and devices successfully operating under TOC conditions, including optical coherence tomography (OCT), laser speckle-contrast imaging, multiphoton microscopy, Raman and fluorescence microscopies, are presented.</p>	<p>09:00-09:30</p>	<p>WeSYA-20</p> <p>Solid-state nanosecond laser source for surgery with minimal collateral thermal damage (Invited paper)</p> <p>M.K. Tarabrin, D.A. Nazarov, E.A. Kozlova, D.T. Batov; Bauman Moscow State Technical University, Russia</p> <p>A laser scalpel enables the bloodless and non-contact ability to create the incisions or to perform a debulking process. Unfortunately, many commercial systems create a large overheated zone around the ablation crater, which leads to the prolonged rehabilitation time. In this work the ablation of the biological tissue with minimal collateral damage by the nanosecond laser source was performed.</p>	<p>10:00-10:30</p>
<p>WeSYA-19</p> <p>Laser photodestruction for the treatment of ganglion cyst in children (Invited paper)</p> <p>M.A. Dvornikova, A.V. Bryansev, E.N. Gasanova, R.T. Nalbandyan; Scientific and Research Institute of Emergency Pediatric Surgery and Trauma - Dr. Roshal's Clinic, Russia</p> <p>A ganglion cyst is the most common benign soft tissue tumor of the hand in children, most frequently located on the dorsal aspect. These lesions can cause pain, paresthesia, and limited joint function, significantly reducing the quality of life. Current conservative and surgical treatments are associated with high recurrence rates (up to 80% and 50%, respectively). Therefore, the search for new, more effective surgical approaches remains a relevant clinical task in pediatric surgery.</p>	<p>09:30-10:00</p>	<p>WeSYA-21</p> <p>Method and device for hyperspectral imaging in the diagnosis of vascular hyperplasia and mesenteric blood flow disorders</p> <p>V.V. Shupletsov¹, I.A. Goryunov¹, N.A. Adamenkov^{1,2}, A.V. Mamoshin^{1,3}, E.V. Potapova¹, A.V. Dunaev¹, V.V. Dremine^{1,4}; ¹Orel State University, Research and Development Center of Biomedical Photonics, ²Orel Regional Clinical Hospital, ³The National Medical Research Center of Surgery Named After A. Vishnevsky, Russia; ⁴Aston University, College of Engineering and Physical Sciences, United Kingdom</p> <p>A hyperspectral imaging system for assessment of vascular hyperplasia and mesenteric blood flow disorders is developed. Diffuse reflectance-derived oxygenation maps combined with unsupervised and gradient boosting classifiers enable staging of infantile hemangiomas and identification of irreversible intestinal ischemia, demonstrating high diagnostic accuracy and intraoperative applicability.</p>	<p>10:30-10:45</p>
<p>WeSYA-22</p> <p>Results of treatment of congenital melanocytic nevi in children with a wavelength of 0.45 microns and a CO₂ laser with a wavelength of 10.6 microns</p> <p>S.A. Podurar¹, A.V. Bryantsev¹, G.P. Kuzmin², A.A. Sirotkin², Yu.L. Kalachev², G.A. Varev³, M.A. Remennikova⁴; ¹Research Institute of Emergency Pediatric Surgery and Traumatology, ²Prokhorov General Physics Institute of RAS, ³Russian Engineering Club LLC, ⁴Perm Scientific and Production Instrument Company (PNPPK PJSC), Russia</p> <p>The optimal laser radiation parameters of 0.45 microns and 10.6 microns of pulsed periodic CO₂ laser for removal of congenital melanocytic nevi have been experimentally and clinically determined.</p>	<p>10:45-11:00</p>		

- Coffee Break -

SYB. SECTION B. LASER INTERACTION WITH CELLS AND TISSUES: CLINICAL IMAGING AND SPECTROSCOPY

Location: Petrov-Vodkin 1 Room, Floor 2; Wednesday, June 24, 2026

SYB. SECTION B. FLUORESCENCE AND FLIM 2

Session Chair: Boris Yakimov, Sechenov First Moscow State Medical Univ., Russia

<p>WeSYB-16</p> <p>Homogeneous luminescent bionanosensors based on fractions of carbon dots (Invited paper)</p> <p>K.A. Laptinskiy^{1,2}, A.A. Korepanova¹, A.M. Vervalde^{1,2}, T.A. Dolenko^{1,2}; ¹Physics Department, Moscow State University, ²Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University, Russia</p> <p>Carbon nanodots (CNDs) hold promise for biomedical diagnostics and therapeutics. However their application is hampered by the poorly understood photoluminescence mechanism. This leads to empirical particle selection, which is also heterogeneous after synthesis. In this study, CND fractions isolated by horizontal gel electrophoresis were used to visualize and analyze the intracellular environment.</p>	<p>09:00-09:30</p>	<p>WeSYB-17</p> <p>Oxidation-induced autofluorescence of proteins for drug storage monitoring (Invited paper)</p> <p>A.A. Rubekina¹, B.P. Yakimov^{1,2}, E.A. Shirshin¹; ¹M.V. Lomonosov Moscow State Univ., ²Sechenov University, Russia</p> <p>Deep blue autofluorescence (dbAF) emerges in proteins as a result of oxidative modifications and reflects their structural degradation. Here, we demonstrate that dbAF intensity increases under thermal and irradiation stress and correlates with non-optical indicators of protein instability. These results suggest that dbAF can serve as a rapid, non-invasive optical marker for monitoring the stability and quality of monoclonal antibodies during storage.</p>	<p>09:30-10:00</p>
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WeSYB-18

10:00-10:30

NIR autofluorescence for prostate cancer diagnostics (Invited paper)

B.P. Yakimov^{1,2}, N.V. Danilova³, V.S. Andreev⁴, P.V. Morozov⁴, V.I. Scheslavsky⁵, P.G. Malkov³, I.V. Turchin⁶, L.S. Urusova⁷, E.A. Shirshin^{1,2,3}; ¹Physics Department, Lomonosov Moscow State University, ²Laboratory of Clinical Biophotonics, Biomedical Science and Technology Park, Sechenov University, ³Medical Research and Educational Institute, Lomonosov Moscow State University, ⁴Physics Department, Moscow Pedagogical State University, ⁵Privolzhsky Research Medical University, ⁶Department for Radiophysical Methods in Medicine, Institute of Applied Physics of RAS, ⁷Endocrinology Research Center, Russia

Near-infrared autofluorescence (NIRAF), often considered background in Raman spectroscopy, encodes diagnostic information for prostate cancer. We show NIRAF intensity and lifetime distinguish benign from malignant tissue and correlate with glandular morphology, revealing its potential as an intrinsic optical contrast mechanism.

WeSYB-19

10:30-10:45

Advanced monitoring of intracellular compartments by label-free fluorescence lifetime imaging

I.A. Gorbunova¹, E.E. Nikonova¹, A. M. Mozerov¹, D. S. Kuznetsova¹, V.I. Shcheslavskiy², M.V. Shirmanova¹, E.A. Shirshin^{1,2}, P.S. Timashev¹; ¹Institute for Regenerative Medicine, Sechenov First Moscow State Medical University, ²Faculty of Physics, M.V. Lomonosov Moscow State University, ³Institute of Experimental Oncology and Biomedical Technologies, Privolzhsky Research Medical University, Russia

In this work, we present advanced approaches for monitoring cellular metabolism in distinct intracellular compartments. We demonstrate that ultrafast FLIM detection significantly enhances molecular specificity by resolving multiple free NADH lifetimes and the short picosecond lifetime of FAD, enabling more accurate redox ratio determination. Analysis of endogenous nuclear fluorescence reveals distinct metabolic subpopulations in chemotherapy-treated cells, highlighting metabolic heterogeneity.

- Coffee Break -

Location: Petrov-Vodkin 1 Room, Floor 2; Wednesday, June 24, 2026

SYB. SECTION B. FLUORESCENCE AND FLIM 3, OCT AND TERAHERTZ 1

Session Chair: Marina Shirmanova, Privolzhskiy Research Medical Univ., Russia

WeSYB-21

11:30-12:00

Fluorescence guidance in endocrine surgery: beyond parathyroid detection - a multimodal biophotonics approach (Invited paper)

E.A. Shirshin; M.V. Lomonosov Moscow State University, Russia

We assess the origin of unique optical properties of endocrine organs and suggest multimodal techniques for optical guidance in endocrine surgery.

WeSYB-22

12:00-12:30

The role of conformational dynamics of protein globules in the photophysical properties of colored fluorescent proteins (Invited paper)

M. Khrenova, A. Gavshina, N. Marynich, I. Soloviev, S. Kasatkina, G. Demina, M. Shleeva, A. Savitsky; FRC Biotechnology of RAS, Russia

Fluorescence as a phenomenon is characterized by a spectrum of temporal events ranging from femtoseconds to milliseconds. Similarly, thermal motions are possible in proteins in this same range. Colored fluorescent proteins are a striking example of visualizing this entire time range as changes in the physical parameters of fluorescence, as they are complex and highly informative chromophore-protein structures.

WeSYB-20

10:45-11:00

Pituitary near-infrared autofluorescence as the basis of optical intraoperative navigation in neurosurgery

V.M. Alibaeva¹, G.S. Budylin², N.V. Korneva^{1,3}, A. Y. Grigoriev⁴, G. Y. Starkov⁴, A.M. Lapshina³, L.S. Urusova³, E.A. Shirshin^{1,3}; ¹Faculty of physics, Lomonosov Moscow State University, ²Laboratory of Clinical Biophotonics, Sechenov First Moscow State Medical University, ³Laboratory of Endocrine Biophotonics, Endocrinology Research Center, ⁴Neurosurgical department, Endocrinology Research Center, Russia

We evaluate label-free near-infrared autofluorescence for intraoperative differentiation in endoscopic endonasal pituitary surgery. In 27 operations, a fiber probe quantified autofluorescence near 805 nm. Pituitary tissue generally showed higher signal than PitNET and surrounding tissues, with step-like transitions during continuous probe movement. Ex vivo confocal spectral imaging links the contrast to secretory granule rich microdomains with extended long-wavelength emission.

WeSYB-23

12:30-12:45

UV-induced skin autofluorescence spectroscopy for in vivo diagnosis of metabolic and neurodegenerative diseases

S.V. Belenkaya^{1,2}, V.V. Salmin^{2,3}, N.P. Bainaev-Mangilev⁴, E.O. Ivanova¹, M.V. Ershova¹, A.B. Salmina¹, S.N. Illarioshkin¹; ¹Russian Center of Neurology and Neurosciences, ²National Research Nuclear University MEPhI, ³Bauman Moscow State Technical University, ⁴National Research University MIPT, Russia

Characteristic patterns of skin autofluorescence were identified in persons with Parkinson's disease, diabetes mellitus, in the control and comorbid groups. The observed spectral profiles reflect alterations in endogenous fluorophores associated with affected metabolic pathways rather than isolated biochemical markers. Statistical analysis confirmed that these spectral features enable detection of pathology and provide a basis for noninvasive assessment of disease severity.

WeSYB-24

12:45-13:00

Characterization of skin morphological layers by mapping the optical scattering coefficient and speckle-contrast parameter for optical coherence tomography scans (Invited paper)

A.A. Sovetsky¹, K.S. Petrova², M.A. Brueva^{1,2}, M.G. Ryabkov³, A.L. Matveyev¹, L.A. Matveev¹, V.Y. Zaitsev¹; ¹A.V. Gaponov-Grekhov Institute of Applied Physics of RAS, ²N.I. Lobachevsky State University of Nizhny Novgorod, ³N.A. Semashko Clinic of Nizhny Novgorod Region, Russia

In vivo segmentation of upper skin-tissue layers is of high biomedical importance. In this regard, OCT offers exceptionally promising prospects. We demonstrate that by analyzing optical scattering and speckle-contrast parameters for OCT data, the junctions of stratum corneum, living-cell epidermis and dermis beneath can clearly be found, even when experts may hardly discern these layers in initial structural OCT scans.

WeSYB-25

13:00-13:15

Terahertz-wave scattering in absorption medium: spherical and cylindrical scatterersA.S. Kucheryavenko¹, I.N. Dolganova¹, N.V. Chernomyrdin², K.I. Zaytsev²; ¹Institute of Solid State Physics of RAS, ²Prokhorov General Physics Institute of RAS, Russia

Terahertz (THz) technology finds many applications in medical diagnostics, where the effective medium theory (EMT) is commonly used to describe wave-tissue interaction. To study the limits of EMT applicability, we developed two phantom types: spherical scatterers or ordered cylindrical structure, surrounded by absorption medium. Using THz time-domain spectroscopy and Lorenz-Mie theory analysis, we demonstrate that EMT remains applicable for a broad range of scatterers' dimensions and volume fractions.

- Lunch Break -

Location: Petrov-Vodkin 1 Room, Floor 2; Wednesday, June 24, 2026

SYB. SECTION B. OCT AND TERAHERTZ 2

Session Chair: Evgeny Shirshin, Lomonosov Moscow State University, Russia

WeSYB-26

15:00-15:30

High-resolution terahertz microscopy and endoscopy of biological tissues (Invited paper)V.A. Zhelnov¹, D.R. Il'enkova^{1,2}, D.D. Rybnikov^{1,2}, G.M. Katyba^{1,3}, V.N. Kurlov³, K.I. Zaytsev¹, N.V. Chernomyrdin¹; ¹ – Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia; ² – Bauman Moscow State Technical University, Moscow, Russia; ³ – Osipyan Institute of Solid State Physics of the Russian Academy of Sciences, Chernogolovka, Russia

We present super-resolution terahertz (THz) solid immersion (SI) microscopy approaches including continuous-wave, pulsed and polarization-sensitive modalities. We also propose sapphire-based THz SI endoscopic system with a focal spot of 0.2λ , as well as a sapphire waveguide-assisted THz refractometry approach. Developed approaches pushing the wide application of THz technologies in biophotonics and medical diagnosis.

WeSYB-27

15:30-16:00

Terahertz sensors for biomarker detection (Invited paper)O.P. Cherkasova^{1,2,3}, N.A. Nikolaev^{1,3}; ¹Laboratory of Terahertz Photonics, Institute of Automation and Electrometry SB RAS, ²National Research Centre "Kurchatov Institute", ³Laboratory of Laser Biophysics, Institute of Laser Physics SB RAS, Russia

Terahertz sensors based on metamaterials exhibit unique sensitivity for detecting small amounts of molecular biomarkers. This work presents the basic principles of biosensing with terahertz metamaterials and provides examples of the sensors' designs for stress hormone and glioma biomarker detection.

WeSYB-28

16:00-16:15

Intrinsic protein luminescence as a tool for studying the structure, conformational dynamics and functioning of enzymes: case study of bacterial luciferaseEV Nemtseva^{1,2}; ¹Siberian Federal University, ²Institute of Biophysics of SB RAS, Russia

The application of various photonics techniques based on intrinsic fluorescence and phosphorescence of the protein to the analysis of conformational stability and dynamics, as well as ligand binding rates, of two bacterial luciferases is presented. The excellence and limitations of tryptophan as a universal intrinsic luminescent protein probe are discussed.

WeSYB-29

16:15-16:45

Prospects of multimodal optical coherence tomography in clinical application (Invited paper)A.A. Plekhanov¹, E.B. Kiseleva¹, E.V. Gubarkova¹, A.A. Sovetsky², P.A. Shilyagin², D.A. Vorontsov³, S.V. Panfilov³, V.E. Zagainov^{1,3}, S.I. Gazhva¹, G.O. Grechkanov¹, E.V. Grigoriev⁴, M.A. Sirotkina¹, S.V. Gamayunov³, E.V. Zagaynova^{1,5}, G.V. Gelikonov², V.Y. Zaitsev², N.D. Gladkova¹; ¹Privolzhsky Research Medical University, ²A.V. Gaponov-Grekhov Institute of Applied Physics RAS, ³Nizhny Novgorod Regional Oncological Hospital, ⁴Research Institute for Complex Issues of Cardiovascular Diseases, ⁵Lopukhin Federal Research and Clinical Center of Physical-Chemical Medicine, Russia

We demonstrate the successful application of multimodal OCT to address new clinical challenges. The analysis of tissue microstructural features revealed the high diagnostic potential of cross-polarization-OCT and OCT-elasticity for detecting precancerous/cancerous lesions in oral mucosa, breast, colon and endometrium. Pioneering studies of sublingual microcirculation demonstrated the efficacy of OCT-angiography in monitoring patients during surgery and in postoperative intensive care phase.

Location: Petrov-Vodkin 1 Room, Floor 2; Wednesday, June 24, 2026

SYB. SECTION B. EMERGING TECHNIQUES

Session Chair: Andrei Lugovtsov, Lomonosov Moscow State University, Russia

WeSYB-30

17:30-18:00

Cardiovascular risk stratification based on Raman spectroscopy of blood serum: an alternative to MSCT of coronary arteries (*Invited paper*)

I.A. Bratchenko^{1,2}, I.A. Pimenova², P.A. Lebedev³, M.A. Skuratova⁴, L.A. Bratchenko^{1,2}; ¹Scientific and Educational Center "Fundamental and Applied Photonics. Nanophotonics", Immanuel Kant Baltic Federal University, ²Laser and Biotech Dept. Samara National Research University, ³Therapy Dept. Samara State Medical University, ⁴Samara Regional Clinical Hospital named after V.D. Seredavin, Russia

The study compared SERS data from blood serum analysis with MSCT data from human vascular studies. Using MSCT data as a standard, predictive models for the development of cardiovascular diseases were constructed based on optical biopsy data. These models demonstrated high accuracy (90% and higher) in identifying non-communicable diseases based solely on serum analysis. The proposed method demonstrates significant potential as an alternative to expensive MSCT imaging.

WeSYB-31

18:00-18:30

Discovery of a water skin layer using spontaneous Raman and stimulated Brillouin spectroscopies (*Invited paper*)

S.M. Pershin¹, D.G. Artemova¹, M.Ya. Grishin¹, P.S. Smerchansky², G.A. Boldin¹, I.A. Khodasevich³; ¹Prokhorov General Physics Institute of RAS, ²National Research University Higher School of Economics, Russia; ³B.I. Stepanov Institute of Physics of the NASB, Belarus

A near-surface water layer with distinct optical and interfacial properties is detected at room temperature using Raman spectroscopy, Rayleigh scattering, stimulated Brillouin scattering (SBS), and capillary meniscus measurements. Over 3–4 hours a 1–4 mm skin layer develops, accompanied by a characteristic deformation of the OH-stretch Raman band toward the ice-related component (~3200 cm⁻¹) and by a noticeable decrease in elastic-scattering fluctuations.

WeSYB-32

18:30-19:00

Pre-breakdown Raman spectroscopy of protein solutions (*Invited paper*)

I.R. Eremin, A.Yu. Chikishev, N.N. Brandt; Lomonosov Moscow State University, Russia

We compare Raman spectra of aqueous solutions of protein excited at a wavelength of 532 nm with different energy parameters. Continuous radiation with varying powers and pulsed radiation with varying repetition rates, durations, and energies are used.

WeSYB-33

19:00-19:15

Heterogeneity and birefringence of soft tissues probed by the polarization-sensitive terahertz solid immersion microscopy

D.R. Il'enkova^{1,2}, D.D. Rybnikov^{1,2}, A.I. Alekseeva³, A.S. Kucheryavenko^{1,4}, S.O. Yurchenko², K.I. Zaytsev¹, N.V. Chernomyrdin¹; ¹Prokhorov General Physics Institute of RAS, ²Bauman Moscow State Technical University, ³Research Institute of Human Morphology, ⁴Osipyan Institute of Solid State Physics of RAS, Russia

A polarization-sensitive terahertz (THz) solid immersion (SI) microscope applied to analyze freshly-excised rat tissues (muscles, tendons, aorta, brain). Refractive index was measured for orthogonal polarizations of the incident beam. Obtained THz birefringence attributed to fibrous morphology and confirmed by histology, was most pronounced in muscle tissue and Corpus callosum of the brain. These findings are crucial for developing THz biophotonics methods.

SYC. SECTION C. PHOTONICS AND NANOBIO TECHNOLOGY

Location: Petrov-Vodkin 2 Room, Floor 2; Wednesday, June 24, 2026

SYC. SECTION C. PHOTONICS AND NANOBIO TECHNOLOGY 4

WeSYC-16

09:00-09:30

Analysis of small extracellular vesicles with magnetic particles and flow cytometry (*Invited paper*)

A.M. Yashchenok; Skoltech, Russia

Immunomagnetic isolation in combination with flow cytometry is of great interest for the development of sEV-based liquid biopsy methods. This combination makes it possible to enrich sEVs free of contaminating proteins and non-vesicular particles and to detect sEV membrane proteins in situ using fluorescently labeled antigens. This, in turn, opens up great opportunities for the detection of a wide range of tumor biomarkers.

WeSYC-17

09:30-10:00

SERS probing of individual exosomes and their identification (*Invited paper*)

A.K. Sarychev¹, A. Ivanov¹, D. Korzhov^{2,4}, M. Shestopalova^{2,4}, K. Afanasev¹, I. Bykov¹, A. Smyk⁵, A. Shurygin⁵, K. Mochalov^{2,3}; ¹Inst. for Theoretical and Applied Electromagnetics of RAS, ²Shemyakin-Ovchinnikov Inst. of Bioorganic Chemistry, RAS, ³RUDN Univ., ⁴National Research Nuclear Univ., MEPhI, ⁵James River Branch LLC, Russia

Individual exosomes are detected using surface-enhanced Raman scattering (SERS) by accumulating an electromagnetic field on a specially designed metasurface, which is a silver nanofilm deposited on a modulated plastic substrate. In the recesses of the metasurface, where the exosomes reside, the field reaches extremely high values under plasmon resonance conditions. Individual exosomes differ in their SERS spectra.

WeSYC-18

10:00-10:30

Development of approaches to the determination of biologically active substances by the method of SERS spectroscopy (*Invited paper*)

I.A. Veselova, M.V. Samodelova, N.R. Yarenkov, E.Yu. Afonyushkina, Yu.S. Verzhinina, O.O. Kapitanova; Analytical Chemistry Division, Chemistry Division, Lomonosov Moscow State Univ., Russia

The report will focus on the plasmonic nanostructured polymeric materials and the creation of photocatalytic materials for SERS sensors for the detection of biological active substances. Approaches to controlling the hydrophilicity/hydrophobicity of the sensor surface will also be discussed. This will not only expand the range of analytes but also control the orientation of analyte molecules (using specific functional groups) on the plasmonic surface.

WeSYC-19

10:30-10:45

Using Raman scattering and fluorescence for non-invasive express -diagnosis of ENT-diseases (head and neck diseases)A.B. Timurzieva^{1,2}, V.A. Duvansky², V.I. Popadyuk², V.I. Kukushkin³, Yu.E. Abramov²; ¹N.A. Semashko National Research Institute of Public Health, ²Peoples' Friendship University of Russia named after Patrice Lumumba, ³Yu.A. Osipyan Institute of Solid State Physics, Russia

The aim of the study is to demonstrate the diagnostic possibility of Raman scattering and fluorescence for the early express-diagnosis of ENT-diseases. Raman scattering and fluorescence for ENT-diseases identification were useful for early, non-invasive, express-diagnostics of such pathology in clinical medicine in the future.

WeSYC-20

10:45-11:00

A novel dual reporter gene system for lung metastasis multimodal imagingI.E. Rozhkova¹, A.N. Gabashvili¹, A.O. Sosnovtseva², A.A. Dresviannikova¹, A.S. Petrova¹, D.V. Goliusova³, P.I. Nikitin¹; ¹Prokhorov General Physics Institute of RAS, ²Engelhardt Institute of Molecular Biology RAS, ³Lopukhin Federal Research and Clinical Center of Physical-Chemical Medicine of FMBA, Russia

Molecular imaging aids in studying malignant diseases in vivo. This study presents two novel genetic constructs combining genes for luminescent enzymes and bacterial nanocompartments. Stable cell lines of Lewis lung carcinoma (LLC1) were generated. These cells were successfully used for modeling and multimodal visualization of lung metastases in mice.

- Coffee Break -

Location: Petrov-Vodkin 2 Room, Floor 2; Wednesday, June 24, 2026
SYC. SECTION C. PHOTONICS AND NANOBIO TECHNOLOGY 5

WeSYC-21

11:30-12:00

Application of fluorescent polarization analysis (FPA) for determination of proteins, enzyme activity and immunodiagnosis of infectious and fungal diseases (*Invited paper*)L.I. Mukhametova¹, S.A. Eremin¹, S.V. Tillib², V.B. Krylov³, N.E. Nifantiev³; ¹Chemical Department, Lomonosov Moscow State University, ²Institute of Gene Biology, RAS, ³N.D. Zelinsky Institute of Organic Chemistry, RAS, Russia

The use of fluorescent single-domain-nanobodies enables detection of the number of human proteins and their conformation by FPIA. FPIA used to measure of lysozyme activity by synthetic flu-substrates. Flu-glycoconjugates are used for Brucella-specific antibodies detection in cattle serum. Methods for invasive mycoses detection using high-specific MAb developed. This work was supported by the Ministry of Science and Higher Education of the Russian Federation № 075-00422-24-02 (agreements № 075-03-2024-401/3 from 30.05.2024).

WeSYC-22

12:00-12:30

Highly sensitive optical and magnetic biosensor methods for quantification of folic acid (*Invited paper*)V.A. Bragina¹, D.O. Novichikhin¹, N.A. Belyakov^{1,2}, B.G. Gorshkov¹; ¹Prokhorov General Physics Institute of RAS, ²Moscow Center for Advanced Studies, Russia

Highly sensitive optical and magnetic biosensor methods based on protein-ligand interactions for folic acid (FA) quantification have been developed. The optical method, monitoring FA conjugate-antibody interactions on functionalized sensor chips, provides high analytical sensitivity with a wide dynamic range of six orders of magnitude. The point-of-care magnetic method enables rapid, simple and user-friendly FA detection in artificial saliva.

WeSYC-23

12:30-12:45

Reproducibility of albumin nanoparticle synthesis by the desolvation method

Z.R. Galaeva, P.V. Khramtsov; Institute of Ecology and Genetics of Microorganisms (IEGM), RAS, Russia

The desolvation method is a simple approach for protein nanoparticle preparation based on reduced protein solubility upon addition of an organic solvent, leading to protein aggregation. However, synthesis reproducibility strongly depends on protein purity and physicochemical properties. In this study, reproducibility of albumin nanoparticles synthesized from bovine serum albumin of different manufacturers and purification grades was evaluated.

WeSYC-24

12:45-13:00

Factors affecting the choice of IR radiation dose in nanoparticle-based photothermal therapy

A.A. Anikin, D.A. Petrukhin, V.D. Salnikov, V.K. Belyaev, V.V. Rodionova; Immanuel Kant Baltic Federal University, Russia

Anti-cancer photothermal therapy uses infrared laser heating of nanoparticles to induce cancer cell death. Compared to magnetic hyperthermia, it provides higher SAR at lower nanoparticle concentrations but involves strong temperature gradients and nanoparticle photothermal instability. These factors critically affect temperature control and optimal irradiation intensity in photothermal therapy and will be discussed in this report.

WeSYC-26

13:00-13:15

Mimicking optoelectronic synapse in a hybrid fluorescent protein/carbon nanotube transistorI. Bobrinetskiy¹, A. Kudriavtseva^{1,2}; ¹Moscow Center for Advanced Studies, ²Prokhorov General Physics Institute of RAS, Russia

This work demonstrates an electro photoactive synaptic transistor based on individual single-walled carbon nanotube modified with green fluorescent protein (FP/SWCNT) as a light tunable charge trapping layer. The device can be electrically switched between volatile and non volatile operating modes, enabling concurrent short term and long term neuroplasticity under specific light illumination. This work was supported by the Russian Science Foundation, grant no. 26-19-00062.

- Lunch Break -

Location: Petrov-Vodkin 2 Room, Floor 2; Wednesday, June 24, 2026
SYC. SECTION C. PHOTONICS AND NANOBIO TECHNOLOGY 6

WeSYC-27

15:00-15:30

Characterization of different optical labels and their surroundings for more sensitive biosensing (*Invited paper*)

A.V. Zherdev, B. B. Dzantiev; A.N. Bach Institute of Biochemistry, Research Centre of Biotechnology of RAS, Russia

The report presents the use of different labels in immuno- and aptasensors with colorimetric and fluorimetric detection. It discusses the factors determining detection limits of homogeneous and membrane biosensors for antibiotics and other analytes, the solutions for increasing sensitivity through new labels, techniques of their functionalization and integration into intermolecular complexes. The study was supported by the RSF grant 24-16-00273.

WeSYC-28

15:30-16:00

The detection of pesticides and plasticizers by Fluorescence Polarization ImmunoAssay in different objects (*Invited paper*)S.A. Eremin^{1,2}, M.A. Pashkova^{1,2}, Diao Zicheng², Xue Shixia², S. Filimonova³; ¹A.N. Bach Institute of Biochemistry, Research Centre of Biotechnology of RAS, ²Faculty of Chemistry, Lomonosov Moscow State University, ³Institute of Pharmacy, I.M. Sechenov First Medical University, Russia

Fluorescence Polarization Immunoassay (FPIA) is powerful tool for low-molecular-weight contaminants monitoring in a variety of matrices. This work highlights current developments of pesticides (acetochlor, butachlor) detection and plasticizers (phthalates and bisphenol A) by FPIA. Strategies for developing immunoreagents (antibodies and tracers), approaches to sample preparation for the analysis of complex matrices (water, soil, plant and animal products), and analytical characteristics are discussed. Acknowledgements: The study was supported by the Russian Science Foundation (RSF) grant # 24-43-00196 (<https://rscf.ru/project/24-43-00196/>).

WeSYC-29

16:00-16:15

Substrate solution optimization as a method for signal enhancement in colorimetric analysis based on Prussian blue nanoparticles.A.D. Novokshonova¹, P.V. Khramtsov^{1,2}; ¹Perm Federal Research Center UB RAS, Russia, ²Perm State Univ., Russia

Prussian blue nanoparticles are actively studied as a label in colorimetric analysis, such as in ELISA. However, the experimental conditions during the assay optimization phase are often not systematically studied. Our work is dedicated to optimizing the conditions of nanoparticle-based colorimetric assays. We demonstrate that the colorimetric signal can be significantly enhanced by optimizing the composition of the substrate solution.

WeSYC-30

16:15-16:30

Visible light induced encapsulation of living cells into iron alginate hydrogelA.S. Sokolov¹, S.G. Poroshin^{1,2}, G.B. Sukhorukov^{1,2}; ¹Skolkovo Institute of Science and Technology, ²Life Improvement by Future Technologies (LIFT) Center, Russia

The trump card of iron ions as alginate crosslinkers lies in the different behavior of iron ions with different charges. Fe³⁺ ions are strong and form a stiff, highly crosslinked hydrogel, whereas Fe²⁺ ions are weaker and crosslink alginate chains poorly. Using two visible-light-activated redox reactions, reversible hydrogel formation and dissolution were achieved. We present results on the cytocompatibility of this system.

WeSYC-31

16:30-16:45

Anisotropic magnetic nanolabels for competitive lateral flow immunoassayA.M. Skirda^{1,2}, A.V. Orlov¹, J.A. Malkerov^{1,3}, V.V. Volkov^{1,3}, U.D. Rezepova^{1,3}, P.I. Nikitin^{1,3}; ¹Prokhorov General Physics Institute of RAS, ²Moscow Center for Advanced Studies, ³National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), Russia

Due to unique properties of magnetic nanochains (MNCs), they are highly promising for diverse applications, including chemical synthesis, biosensing, and nanomedicine. Here, we present the MNCs application for the development of immunoassay for detection of chloramphenicol in milk. The proposed approach offers the detection limit of 5 pg/mL at the assay time of only 25 minutes.

WeSYC-32

16:45-17:00

Modeling and numerical investigation of SPR biosensor for the detection of lung cancer cells

Jay Kumar Yadav, S.K. Tripathy; Department of Electronics and Communication Engineering, National Institute of Technology Silchar, India

We have demonstrated for the first time, a new class of light-based nanogeneration of plasmon using silver/Perovskite (CsGeI₃)/ZnSe for the detection of lung cancer using the refractive index of the sample. The maximum possible nanogeneration of plasmons due to light-matter interaction occurs after optimizing various layers of the proposed surface plasmon resonance (SPR) biosensors, results in better sensor performance parameters.

SYD. SECTION D. PHOTODYNAMIC PROCESSES IN BIOLOGY AND MEDICINE

Location: Petrov-Vodkin 3 Room, Floor 2; Wednesday, June 24, 2026

SYD. SECTION D. PHOTODYNAMIC PROCESSES IN BIOLOGY AND MEDICINE 1

- WeSYD-01 09:00-09:30
- Photoluminescence of molecular oxygen in systems of biological importance. Fifty years after the discovery. History, measurement technologies, application fields (Keynote presentation)**
- A.A. Krasnovsky Jr; Federal Research Center of Biotechnology RAS, Russia
- Singlet oxygen molecules (SO) are known to promote photodynamic stress. In 1976, 50 years ago this author discovered that SO deactivation in natural systems is accompanied by IR phosphorescence at 1270 nm. Currently, this phosphorescence has been using worldwide as the best tool for SO investigation. This paper provides a survey of the progress for the half of century of phosphorescence research.
- WeSYD-02 09:30-10:00
- Multimodal QPI and FLIM-based platform for analysis of localized photodynamic treatment of cells in vitro (Invited paper)**
- I.V. Semenova, A.V. Belashov, A.A. Zhikhoreva; Ioffe Institute, Russia
- This report presents a multimodal approach combining the fluorescence lifetime imaging microscopy (FLIM) and spatial light interference microscopy (SLIM) into a single complex allowing for a concurrent analysis of fluorescence and morphological parameters of cells in vitro. The developed approach was validated on investigation of cell response to photodynamic treatment applied both onto the entire sample and on individual cells.
- WeSYD-03 10:00-10:30
- Singlet oxygen generation in protein-containing solutions: towards understanding the mechanisms of photodynamic therapy (Keynote presentation)**
- O.S. Vasyutinskii¹, D.M. Beltukova¹, V.P. Belik¹, K.A. Chudakov², O.V. Smirnov¹, I.V. Semenova¹; ¹Ioffe Institute, ²Peter the Great St. Petersburg Polytechnic University, Russia
- As demonstrated, the photosensitizer Ce6 bound with human serum albumin practically does not produce singlet oxygen. The result obtained challenges the established mechanisms of photodynamic therapy through singlet oxygen production. Moreover, the we suggest a novel method for characterization of photosensibilizer triplet states at room temperature that was not possible before.
- WeSYD-04 10:30-10:45
- Sensitive singlet oxygen detection system based on a superconducting single photon detector**
- V.S. Andreev^{1,2,3}, P.V. Morozov^{2,3}, G.N. Goltsman^{1,2,3}; ¹HSE University, ²Moscow Pedagogical State University, ³LLC "Scontel", Russia
- In this paper we present sensitive system for detecting photons of singlet oxygen phosphorescence combined with the superconducting nanowire single photon detector. Detector coupled with multimode fiber and efficiency above 80 % with working area 50x50 um² and DCR at working point of 1000, optimized for measurements around 1270 nm.
- WeSYD-05 10:45-11:00
- Study of RPE lipofuscin photooxidation degree using VIS-NIR spectroscopy and fluorescence lifetime imaging microscopy**
- P. Morozov^{1,2}, V. Andreev^{1,2,3}, M. Yakovleva^{4,5}, A. Kostyukov^{4,5}, M. Tokarev¹, T. Feldman^{4,5}, V. Kuzmin⁴, G. Goltsman^{1,3}, M. Ostrovsky^{4,5}, M. Shirmanova¹; ¹Physics dept., Moscow Pedagogical State University, ²LLC "Superconductor Nanotech", ³Physics dept., National Research University Higher School of Economics, ⁴N.M. Emanuel Institute of Biochemical Physics RAS, ⁵Biology dept., Lomonosov Moscow State University, Russia
- To study fluorescence lifetimes of lipofuscin from retinal pigment epithelium cells we used fluorescence excitation method with time correlated photon counting and fluorescence lifetimes imaging microscopy in combination with superconducting single-photon detector. An analysis of fluorescence lifetimes and VIS-NIR spectra before and after photooxidation of lipofuscin granules showed significant differences in the characteristic lifetimes, as well as a shift of the maximum of fluorescence spectrum to short-wavelength region. These methods become promising for development of early preclinical method.

- Coffee Break -

Location: Petrov-Vodkin 3 Room, Floor 2; Wednesday, June 24, 2026

SYD. SECTION D. PHOTODYNAMIC PROCESSES IN BIOLOGY AND MEDICINE 2

<p>WeSYD-06 11:30-12:00</p> <p>Photo- and sonocatalytic activity of Fotoditazin decorated microbubbles (Invited paper) A. Orlova^{1,2}, A. Boltenko^{1,2}, T. Estifeeva^{2,3}, M. Rider¹, M. Yaroslavova¹, K. Parutina², A. Surkova¹, R. Barmin^{2,3}, P. Rudakovskaya^{2,3}; ¹International Research and Education Centre for Physics of Nanostructures, ITMO University, ²Center for Photonic Science and Engineering, Skolkovo Institute of Science and Technology, ³Dmitry Mendeleev University of Chemical Technology of Russia, Russia</p> <p>Mixtures of protein-shelled microbubbles with the photosensitizer Fotoditazin were studied for photo- and sonodynamic applications. Circular dichroism and optical spectroscopy revealed that Fotoditazin interacts with the microbubble shell, inducing shell-dependent changes in BSA structure and sensitizer aggregation. Stabilized shells and monomeric chlorin e6 result in enhanced photo- and sonocatalytic activity of Fotoditazin.</p>	<p>WeSYD-08 12:30-12:45</p> <p>Evaluation of phototoxic potential of gold nanoparticles - liposome - pheophorbide-a against breast cancer cells B.P. George, M. Zahra, H. Abrahamse; Univ. of Johannesburg, South Africa</p> <p>Breast cancer treatment is limited by poor specificity and therapy resistance. This study evaluated green-synthesised Dicoma anomala-derived gold nanoparticles encapsulated in liposomes and loaded with pheophorbide-a for photodynamic therapy against MDA MB-231 triple-negative breast cancer cells. The nanoformulation showed dose-dependent cytotoxicity and induced intrinsic apoptosis, highlighting its potential as a promising breast cancer therapeutic platform.</p>
<p>WeSYD-07 12:00-12:30</p> <p>Nano-phytoformulations of berberine and pheophorbide-a mediated photodynamic therapy on lung cancer spheroids model (Invited paper) H. Abrahamse, M. Moloudi, B. George; Laser Research Centre, Faculty of Health Sciences University of Johannesburg, South Africa</p> <p>Lung cancer is the second most common cancer, causing ~2 million cases and 1.76 million deaths annually due to late diagnosis. Smoking and environmental factors dominate risk. Conventional therapies face toxicity and resistance. Photodynamic therapy is a targeted, noninvasive alternative. Natural photosensitizers berberine and pheophorbide-a show promise, enhanced by nanocarriers and validated using 3D spheroid models.</p>	<p>WeSYD-09 12:45-13:00</p> <p>Synthesis of core-shell ternary quantum dots -porphyrin conjugates and its photodynamic therapy application S.O. Oluwafemi; Univ. of Johannesburg, South Africa</p> <p>In this presentation, a large-scale aqueous synthesis of ternary quantum dots (QDs) and their conjugation to porphyrin will be discussed as an efficient way to overcome photosensitizer shortcomings. The singlet oxygen generation of this highly aqueous-soluble novel conjugate and its cell viability against different cancer cell lines will be discussed, highlighting its potential for PDT applications.</p>
	<p>WeSYD-10 13:00-13:15</p> <p>Plasmon-oxygen luminescence method for registration of quercetin and its derivatives in extract solutions A.V. Tsibulnikova¹, E.S. Zemlyakova^{1,2}, V.A. Slezhkin^{1,2}, A.A. Kostrina¹, D.A. Artamonov¹, I.G. Samusev¹; ¹Immanuel Kant Baltic Federal University, Russia</p> <p>This paper presents a luminescent method for the qualitative determination of flavonoids – quercetin and its main derivatives in the extract of viburnum berries (<i>Viburnum Opulus L.</i>) using oxygen saturation process and plasmon mechanism.</p>

- Lunch Break -

Location: Petrov-Vodkin 3 Room, Floor 2; Wednesday, June 24, 2026

SYD. SECTION D. PHOTODYNAMIC PROCESSES IN BIOLOGY AND MEDICINE 3

<p>WeSYD-11 15:00-15:30</p> <p>A fiber photometry approach for the in vivo assessment of BBB integrity and brain tissue clearance (Invited paper) A.K. Berdnikov¹, A.V. Stavrovskaya¹, I.V. Potapenko^{1,2}, V.I. Zhdankina¹, A.N. Lukyanchuk¹, Yu.K. Komleva¹, V.V. Salmin², A.B. Salmina^{1,2}; ¹Russian Center of Neurology and Neuroscience, ²Bauman Moscow State Technical University, Russia</p> <p>Fiber photometry could be a potent method for assessing blood-brain barrier integrity in vivo. By monitoring sodium fluorescein decay in 5xFAD Alzheimer's mice versus wild-type controls, we observed significantly altered clearance dynamics. This approach enables longitudinal monitoring of BBB function, overcoming the limitations of standard post-mortem assessments.</p>	<p>WeSYD-12 15:30-16:00</p> <p>Non-invasive optical assessment of skin perfusion under lower limb ischemia (Invited paper) V.I. Bukova¹, A.M. Kovalchuk², I.V. Makarova¹, A.V. Guryleva¹, A.S. Machikhin¹, V.P. Baklaushev²; ¹Scientific and Technological Centre of Unique Instrumentation of RAS, ²Federal Center of Brain Research and Neurotechnologies of FMBA of Russia, Russia</p> <p>Critical lower limb ischemia impacts microcirculation and requires early, non-invasive diagnosis. This study proposes the use of photoplethysmography and videocapillaroscopy for assessing skin microcirculation to address this issue. In a rat ischemia model, reduced perfusion and vessel density were observed after embolization. The method is rapid, safe, cost-effective, and suitable for continuous studies.</p>
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WeSYD-13

16:00-16:15

Controlling radiation parameters to expand the functional capabilities of the optical method of recording human physiological signals

V.V. Davydov^{1,2}, M.A. Yakusheva³, D.S. Provodin¹, E.V. Porfir'eva¹, D.V. Davydova¹, E.A. Zhestkaya², Y.A. Guseva¹; ¹Peter the Great St.Petersburg Polytechnic University, ²St.Petersburg Electrotechnical University "LETI", ³St.Petersburg State University of Telecommunications, Russia

A new method for recording human biological signals based on an optical sensor with a CCD array and radiation parameter adjustment has been proposed. The use of the new method has made it possible to increase the signal-to-noise ratio by more than an order of magnitude and to record minor changes in the cardiovascular system that were not previously reflected in the recorded signals.

WeSYD-14

16:15-16:30

Intraoperative fluorescent verification of intracerebral bone fragments in penetrating cranial injuries

G.G. Bulyshchenko¹, N.K. Vasileva¹, B.V. Martynov¹, G.V. Papayan², K.A. Chemodakova¹, K.N. Babichev¹, S.D. Mirzametov¹, B.G. Adleyba¹, S.A. Goryainov³, A.I. Gaivoronsky¹, I.A. Menkov¹, I.V. Boykov¹, D.V. Svistov¹; ¹Department of Neurosurgery, Military Medical Academy named after S.M. Kirov, ²Center for Laser Medicine, Almazov National Medical Research Centre, ³Department of Bone and Soft Tissue Tumors, A. Tsyb Medical Radiological Research Center, Russia

A novel intraoperative method using ultraviolet light (390 nm) visualizes bone fragments in penetrating brain injuries via green-blue autofluorescence. In a clinical case, it enabled complete removal of fragments <5 mm, undetectable under white light. The technique is simple, portable, and cost-effective, significantly improving surgical precision and infection prevention in field and emergency neurosurgery.

WeSYD-15

16:30-16:45

LED compact illuminator -based photodynamic therapy efficacy assessment

A.Yu. Sain¹, A.S. Abdurashitov^{1,2}, P.I. Proshin², D.A. Terentyeva^{1,3}, G.B. Sukhorukov^{1,2}, O.A. Sindeeva¹; ¹Center for Bio- and Medical Technologies, Skolkovo Institute of Science and Technology, ²Life Improvement by Future Technologies (LIFT) Center, ³Center for Photonic Science and Engineering, Skolkovo Institute of Science and Technology, Russia

The increasing demand for specialized equipment in photodynamic therapy necessitates innovative design approaches. This study presents the tunable LED illuminator operated at 660 nm engineered to scan-less provide uniform irradiation. The practical efficacy of the compact LED illuminator for photodynamic therapy parameters optimization was evaluated through experiments involving commonly used in vitro models for studying cancer treatments across various organs.

WeSYD-16

16:45-17:00

Hardware design for reliable photosensitizers assessment

A.S. Abdurashitov^{1,2}, P.I. Proshin^{1,2}, A.U. Sain¹, D.A. Terentyeva^{1,3}, A.D. Kosov⁴, G.B. Sukhorukov^{1,2}, O.A. Sindeeva¹; ¹Center for Bio- and Medical Technologies Skoltech, ²Life Improvement by Future Technologies (LIFT) Center, ³Center for Photonic Science and Engineering, Skoltech, ⁴Department of Chemistry, Lomonosov Moscow State University, Russia

This work details a compact, scanless 660 nm LED illuminator engineered for PDT. The design ensures precise, uniform, and stable light delivery (1-20 mW/cm²) across standard 96-well plates. We validate performance through rigorous photodynamic efficacy studies on six cancer cell lines, establishing a robust platform for in vitro photosensitizer testing.

SYA. SECTION A. ADVANCED LASER MEDICAL SYSTEMS AND TECHNOLOGIES - POSTERS

Location: Congress Hall, Floor 1; Wednesday, June 24, 2026

- WeSYA-p01 15:00-18:30
- Speckle correlation analysis approach with acoustic probing for the diagnostic of the morphology of the multi-phase foam-like systems**
E.A. Isaeva, A.A. Isaeva, D.A. Zimnyakov; Yury Gagarin State Technical University of Saratov, Russia
The methods for the analyzing the structural and functional properties of foam-like media play an important role in the development of the methods for synthesizing tissue engineered structures or monitoring the degradation processes of 3D scaffolds. This paper presents the results of a study of a laser field scattered by the model gas-liquid foam under the lowfrequency acoustically probing using speckle correlometry technique.
- WeSYA-p02 15:00-18:30
- The light transport modeling during the foam-like media aging**
E.A. Isaeva, A.A. Isaeva, D.A. Zimnyakov; Yuri Gagarin State Technical University of Saratov, Russia
This paper presents the results of radiation transfer modeling based on the Percus–Yevick hard-sphere model, which reproduces the morphology of gas-liquid foam during the initial stages of a foam-like medium aging and statistical modeling of radiation transfer in foam-like media simulated using a system of Kelvin cells at various stages of aging. Additionally, modeling of radiation transfer processes in a foam-like medium with a polydisperse structure was performed.
- WeSYA-p03 15:00-18:30
- Improving human sperm motility using infrared low-level laser irradiation**
D.S. Sitnikov¹, I.M. Shorina¹, N.P. Makarova²; ¹Joint Institute for High Temperatures of RAS, ²National Medical Research Center for Obstetrics, Gynecology and Perinatology MoH, Russia
Infrared (780 nm) low-level laser radiation was used for photobiostimulation as a means of therapy for male infertility. We studied the motility of human sperm after exposure to radiation with at an intensity of 140 MW/cm² for two minutes. An increase in sperm kinetics was detected compared to control group.
- WeSYA-p04 15:00-18:30
- Influence of UV laser treatment on the wettability of metallic materials for biomedical applications**
M.Yu. Kandaurova, T.Yu. Sablina, I.A. Zyatikov, Yu.N. Panchenko; Institute of High Current Electronics, SB RAS, Russia
The effect of UV laser treatment ($\lambda = 266$ nm) on the wettability, phase and chemical composition of TiNi alloy and AISI 316L stainless steel was studied.
- WeSYA-p05 15:00-18:30
- Notched fibers as a sensing element of infrared fiber probes**
I.V. Yuzhakov, P.V. Pestereva, A.A. Yuzhakova, E.N. Malyskina, A.E. Lvov, L.V. Zhukova; Ural Federal University, Russia
The notched fiber is made of ceramic with a composition of 42 mol. % AgBr_{0.710.3} in AgCl. It transmits radiation in the range of 3.5–15.0 μ m with a loss of up to 1.8 dB/m. This fiber is a promising sensor element for fiber-optic probes.
- WeSYA-p06 15:00-18:30
- Histophysiological study of the striated muscle tissue after exposure to 2 μ m continuous-wave laser radiation**
V.V. Astashov¹, M.S. Kopyeva^{1,2}, S.A. Filatova², V.A. Kamynin², V.I. Kozlov¹, V.A. Duvanskiy¹; ¹Peoples' Friendship University of Russia, RUDN University, ²Prokhorov General Physics Institute of RAS, Russia
A histophysiological study of the striated muscle tissue of experimental animals was carried out on the 3rd day after exposure to continuous-wave laser radiation of a Holmium fiber laser with different exposure times. Using histological and functional research methods, morphological changes characteristic of aseptic inflammation were identified, depending on the radiation dose.
- WeSYA-p07 15:00-18:30
- Surface modification of Ti-6Al-4V alloy by nanosecond ultraviolet laser irradiation**
T.Yu. Sablina, M.Yu. Kandaurova, I.A. Zyatikov, I.K. Lopatkin, Yu.N. Panchenko; Institute of High Current Electronics, SB RAS, Russia
The microstructure and surface functional characteristics of Ti-6Al-4V titanium alloy were investigated following treatment with nanosecond ultraviolet (UV) laser irradiation. UV laser treatment led to the formation of titanium oxide phases (TiO₂, TiO). This resulted in enhanced nanohardness (by 25–30%), increased roughness, and a significant increase in hydrophilicity – the water contact angle decreased from 80° to 9–13°.
- WeSYA-p08 15:00-18:30
- Laser formation of surface functional layers for use as neurointerfaces**
D.T. Murashko¹, M.S. Savelyev¹, A.Yu. Gerasimenko^{1,2}; ¹Institute of Biomedical Systems, National Research University of Electronic Technology, ²Institute for Bionic Technologies and Engineering, I.M. Sechenov First Moscow State Medical University, Russia
The formation of functional layers based on carbon nanomaterials contributes to an increase in the effective surface area of neurointerfaces. This study presents the results of the formation of functional layers by laser exposure to the surface of an AISI 316L steel substrate and the introduction of a layer of single-walled carbon nanotubes.
- WeSYA-p09 15:00-18:30
- Comparative modeling of intramaterial inscription in hydrophilic and hydrophobic acrylics for intraocular lenses**
U.S. Averkieva¹, S.G. Sazonkin¹, I.O. Orekhov¹, K.B. Pershin², S.I. Kudryashov², N.A. Smirnov², P.P. Pakholchuk², A.V. Gorevoy², Yu.S. Gulina², E.N. Rimskaya², P.A. Danilov², A.Yu. Tsygankov²; ¹Bauman Moscow State Technical Univ., ²P.N. Lebedev Physical Inst. of RAS, Russia
We investigated intramaterial inscription in hydrophilic and hydrophobic acrylics for intraocular lenses at 1.56 μ m. Line and ring geometries were compared for femtosecond and picosecond pulses using fluence maps, normalized ratio, depth, and thermal buildup. Femtosecond pulses yielded narrower regions above threshold and thinner walls, whereas picosecond pulses increased depth per pass but raised thermal load, especially in hydrophilic acrylic.

WeSYA-p10

15:00-18:30

The effect of fiber output end shape on the 1.54 μm laser ablation efficiency of biotissues phantoms

R. Nasser, S.N. Smirnov, A.Yu. Perepelyakov, A.V. Belikov; Institute of Laser Technologies, ITMO University, Russia

This study investigates how shaping the output end of an optical fiber (flat, V, pyramid, ball) affects laser-induced cavitation bubbles and tissue ablation. Using a 1.54 μm Yb,Er:Glass laser, we show that specially shaped fibers significantly increase bubble size and ablation efficiency in gel phantoms, with the pyramid shape yielding a 5.3-fold improvement over a standard flat end.

SYC. SECTION C. PHOTONICS AND NANOBIO TECHNOLOGY - POSTERS

Location: Congress Hall, Floor 1; Wednesday, June 24, 2026

WeSYC-p01

15:00-18:30

New asymmetric porphyrin-based dyad as a fluorescent probe for cellular imaging

A.A. Smirnov, D.A. Lukyanov, A.V. Povolotskiy, V.A. Pomogaev, E.V. Solovyeva; Institute of Chemistry, St. Petersburg State University, Russia

Porphyrin dyads are considered promising multimodal fluorescent probes due to their ratiometric spectral response and excellent biocompatibility. However, very few water-soluble compounds of this type are known. In this study, a new asymmetric dyad, ZnTPPS-TPP, was synthesized, containing both metallated and non-metallated fragments. Photophysical properties of the dyad were studied in biological environments and supported by DFT modeling.

WeSYC-p02

15:00-18:30

Wavelet analysis of cerebral versus systemic hemodynamics responses to breath-holding in rats

I.A. Mizeva¹, A.Y. Sokolov², A.A. Kamshilin³; ¹Institute of Continuous Media Mechanics, UrB RAS, ²I.P. Pavlov Institute of Physiology of RAS, ³Institute of Automation and Control Processes FEB RAS, Russia

The study analyzes the response of low-frequency components of simultaneously measured cerebral blood supply and systemic arterial blood pressure to breath-holding in rats. The dynamics of cerebral blood supply was assessed by imaging photoplethysmography. The dynamics of the frequency components was quantified by the wavelet analysis. Results reveal distinct, frequency-specific regulatory mechanisms of cerebral blood supply.

WeSYC-p03

15:00-18:30

Separation of linear dichroism and birefringence in Polarization-Modulation Pump-Probe method as a tool for studying ultrafast dynamics in biomolecules.

O.S. Vasyutinskiy¹, D.A. Volkov¹, M.V. Belashov^{1,2}, A.V. Dmitrieva^{1,3}, M.A. Plotitsyna^{1,3}, M.E. Sasin¹; ¹Ioffe Institute, ²ITMO University, ³Peter the Great St. Petersburg Polytechnic University, Russia

We experimentally separated linear dichroism (LD) and birefringence (BF) effects in NADH solution using polarization-modulation pump-probe spectroscopy. The BR detection gives significant increase in signal and can be used for studying long relaxation processes. The LD signal is more convenient for studying of fast relaxation processes. The approach enables the detailed study of ultrafast energy transfer processes in biomolecules in solutions and cells.

WeSYC-p04

15:00-18:30

Photoluminescence quenching of carbon dots by multi-metal ion systems in aqueous solutions

A.A.Cherednikova¹, H.Barhum², L.V.Mikhailova¹, M.V.Timofeeva¹, E.N. Gerasimova¹, A.E. Zhilina², I.I. Vazhenin¹, I.A.Reznik¹, P. Ginzburg², M.V.Zyuzin¹; ¹School of Physics and Engineering, ITMO University, Russia; ²Department of Physical Electronics, Tel Aviv University, Israel; ³Faculty of Biotechnologies, ITMO University, Russia

Fe³⁺ and Co²⁺ are essential for oxygen transport and vitamin B12 synthesis. Monitoring metal ion concentration changes enables early-stage diagnostics. Biological environment is a multicomponent system, containing various metals. This study explores CD's photoluminescence quenching behavior and sensitivity to Fe³⁺, Co²⁺, Fe³⁺/Co²⁺ combined system, where it's detected separately and as multi-metal ion system.

WeSYC-p05

15:00-18:30

Fluorescent copper nanoclusters stabilized with small L-proline and large vancomycin: ligand effect

A.I. Demenshin, E.A. Kolobova, T.S. Sych, U.P. Zimarina, E.V. Solovyeva; St.Petersburg State University, Russia

Copper nanoclusters are promising for bioanalytics. Their intrinsic fluorescence can be combined with recognition properties of stabilizing organic ligands for improved biomolecule sensing. In this work, we present the developed procedures of the synthesis of L-proline and vancomycin-stabilized copper nanoclusters, their characterization and application in fluorescence sensing and electrophoretic separation of drugs from the family of selective serotonin reuptake inhibitors.

WeSYC-p06

15:00-18:30

Kinetic characterization of G-protein-coupled receptors using spectral-phase interferometry

A.M. Skirda^{1,2}, A.V. Orlov¹, S.G. Trofimenko^{1,3}, E.S. Vyhodtseva^{1,3}, P.I. Nikitin^{1,3}; ¹Prokhorov General Physics Institute of RAS, ²Moscow Institute of Physics and Technology, ³National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), Russia

Despite their therapeutic importance, a substantial number of G-protein-coupled receptors (GPCRs) remain classified as "orphan receptors", meaning their ligands and cellular functions are unknown. Using a low-coherence interferometry-based biosensing platform, we characterize the binding kinetics between GPCR fragments and stabilizing antibodies. Developed approach provides a scalable method for the functional profiling of orphan GPCRs and the screening of potential ligands.

WeSYC-p07

15:00-18:30

Quantitative analysis of amino acid mixtures using drop-coating deposition Raman spectroscopyE.Y. Ponkratova¹, A.S. Shtumpf¹, M.P. Sandomirskii¹, K.A. Maleeva², D.A. Zuev¹; ¹Faculty of Physics, ITMO University, ²International Research and Education Center for Physics of Nanostructures, ITMO University, Russia

Proteinogenic amino acids are vital for peptides and proteins in the human body. Current analysis methods face challenges, prompting exploration of Raman spectroscopy with drop-coating deposition (DCDR) for unique molecular vibrations. This study evaluated the DCDR method using amino acid mixtures, determining optimal parameters. Results indicated varying accuracy based on hydrophobicity, highlighting DCDR's limitations and potential for analyzing complex mixtures.

WeSYC-p08

15:00-18:30

Integration of optical genome mapping with super-enhancer annotations: a conceptual framework for structural variant analysis in regulatory regions

N.N. Orlova, G.A. Ashniev, Yu.V. Makus, A.V. Orlov; Prokhorov General Physics Institute of RAS, Russia

We propose a conceptual framework for integrating optical genome mapping (OGM) data with super-enhancer annotations to systematically identify structural variants affecting cancer-associated regulatory regions. OGM utilizes laser-induced fluorescence imaging of labeled DNA molecules, providing resolution suitable for analyzing extended regulatory elements. This approach may enable detection of enhancer hijacking events and facilitate discovery of novel mechanisms of oncogene dysregulation.

WeSYC-p09

15:00-18:30

Modeling of skin diffuse reflectance spectraYa.A. Razumov¹, I.A. Serebryakova¹, Y.I. Surkov¹, E.A. Genina^{1,2}, V.V. Tuchin^{1,2,3}; ¹Optics and Biophotonics Department, Saratov State University, ²Laboratory of Biophotonics, Tomsk State University, ³Laboratory of Laser Diagnostics of Technical and Living Systems, IPMC RAS, FRC "Saratov Scientific Centre of the RAS", Russia

This study presents a comprehensive investigation of the optical properties of human skin with varying melanin content (1–50%) and hematocrit levels (10–50%) using the CloudMonteCarloforLightTransport platform. Simulated diffuse reflectance spectra in the 400–1000 nm range were compared with experimental *in vivo* data acquired using a spectrometer and a dermatoscope. The work aims to establish a foundation for developing color-correction algorithms and quantitative methods for assessing skin biochemical parameters based on accessible optical measurements

WeSYC-p10

15:00-18:30

Optical biosensors for studying the kinetics of antibody binding and regeneration of sensor chips based on gelatin - folate conjugatesD.O. Novichikhin¹, V.A. Bragina¹, G.M. Sorokin², A.I. Nikitin³, N.A. Belyakov^{1,4}; ¹Prokhorov General Physics Institute of RAS, ²Chuvash State University, ³Volga branch of MADI, ⁴Moscow Center for Advanced Studies, Russia

A label-free optical biosensor based on low-coherence interferometry was developed for studying molecular binding kinetics by measuring surface biolayer thickness. Antibody binding to immobilized folic acid-gelatin conjugate (FA-gelatin) was investigated as a model system. Kinetic constants, competitive displacement, and surface regeneration were characterized for various chip modifications. Results demonstrate that FA-gelatin serves as a convenient model conjugate for assays with limited binding-site accessibility.

WeSYC-p11

15:00-18:30

Partial enzymatic hydrolysis as a promising sample preparation method for the analysis of protein amino acid side chains oxidation using surface-enhanced Raman spectroscopyA.D. Vasilyeva¹, I.A. Boginskaya², R.O. Aliev¹, L.V. Yurina¹, E.G. Evtushenko^{1,3}, M.I. Indeykina¹, K.N. Afanas'ev², M.V. Sedova², I.A. Ryzhikov^{2,4}, M.A. Rosenfeld¹, I.N. Kurochkin^{1,3}; ¹N.M. Emanuel Institute of Biochemical Physics, RAS, ²Institute for Theoretical and Applied Electromagnetics, RAS, ³Lomonosov Moscow State University, Faculty of Chemistry, ⁴N.E. Bauman Moscow State Technical University, Russia

Surface-enhanced Raman spectroscopy (SERS) is a well-established basis for the development of cheap and rapid analytical protocols. For the case of hypochlorite-induced fibrinogen oxidative modification, SERS spectra of oxidized and native fibrinogen were shown to be very similar. Partial enzymatic hydrolysis of the protein significantly enhances the differences, enabling the SERS-based analysis of amino acid side chains oxidative modification.

SYB. SECTION B. LASER INTERACTION WITH CELLS AND TISSUES: CLINICAL IMAGING AND SPECTROSCOPY

Location: Petrov-Vodkin 1 Room, Floor 2; Thursday, June 25, 2026

SYB. SECTION B. OPTICAL IMAGING MODALITIES + OPTICAL CLEARING 1

Session Chair: Sergey Nikitin, Lomonosov Moscow State University, Russia

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| <p>ThSYB-34 09:00-09:30</p> <p>Erythrocyte-endothelium interplay investigated via optical tweezers (<i>Invited paper</i>)</p> <p>M.K. Maksimov¹, P.B. Ermolinskiy¹, O.N. Scheglovitova², M.R. Kapkaeva², A.E. Lugovtsov¹, A.V. Priezzhev¹; ¹Faculty of Physics, Lomonosov Moscow State University, ²The Gamaleya National Center of Epidemiology and Microbiology, Russia</p> <p>The interactions between pairs of erythrocytes, between single erythrocytes and endothelium monolayer are studied in vitro via optical tweezers. RBC-endothelium system is altered by the addition of nitric oxide precursor, L-Arginine. The results acquired demonstrate the dose-dependent decrease in erythrocyte aggregation and disaggregation forces, while the erythrocyte-endothelium adhesion forces seem to be not affected by nitric oxide.</p> | <p>ThSYB-38 10:15-10:30</p> <p>Hybrid nanomaterials for optical heating and temperature monitoring in biological objects</p> <p>E.N. Gerasimova, L.V. Mikhailova, M.V. Zyuzin; ITMO University, Russia</p> <p>Nanoscale temperature monitoring is vital in biomedicine, as thermal changes affect cellular functions. This study introduces hybrid nanomaterials for real-time thermal sensing during laser heating. We demonstrate temperature monitoring via ODMR in nanodiamonds with nitrogen-vacancy center during photoinduced delivery of bioactive compounds and photothermal therapy. Additionally, we show plasmonic or all-dielectric nanostructures enable optical heating and monitoring through Raman scattering.</p> |
| <p>ThSYB-35 09:30-10:00</p> <p>Optical monitoring of intrafollicular drug delivery (<i>Invited paper</i>)</p> <p>Yu.I. Svenskaya¹, Yu.I. Surkov^{1,2}, M.S. Saveleva¹, P.A. Demina¹, I.A. Serebryakova², M.E. Lobanov¹, R.A. Anisimov¹, G.S. Terentyuk¹, E.A. Genina², V.V. Tuchin^{1,2}; ¹Science Medical Center, Saratov State University, ²Institute of Physics, Saratov State University, Russia</p> <p>We report on a novel approach towards the glucocorticosteroid encapsulation and delivery to hair follicles. Efficient intrafollicular accumulation of the GC-loaded carriers after their US-assisted topical application in vivo in rats provided the delivery of the drug molecules to targeted receptors. Gradual degradation of the vaterite matrices inside the HF granted in situ liberation of the payload. The resulting enhancement of a local drug concentration in skin provided the lowering of the dose and frequency of its application.</p> | <p>ThSYB-39 10:30-10:45</p> <p>Intraoperative diagnostics of brain tumors using optical spectroscopy and machine learning algorithms</p> <p>A. Ospanov¹, T.A. Savelieva^{1,2}, I.D. Romanishkin², S.V. Shugai³, S.A. Goryajnov³, G.V. Pavlova^{3,4}, I.N. Pronin³, V.B. Loschenov^{1,2}; ¹National Research Nuclear University MEPhI, ²Prokhorov General Physics Institute of RAS, ³N.N. Burdenko National Medical Research Center of Neurosurgery, ⁴Institute of Higher Nervous Activity and Neurophysiology of RAS, Russia</p> <p>The paper discusses classification algorithms for the analysis of fluorescence, diffuse reflectance, and Raman spectra obtained from biopsies of intracranial tumors.</p> |
| <p>ThSYB-36 10:00-10:15</p> <p>Comparative analysis of optical properties of subcutaneous and visceral adipose tissue in the context of diabetes mellitus modeling</p> <p>I.Yu. Yanina; Saratov State University, Russia</p> <p>The aim of this part of the study was to identify the optical characteristics of subcutaneous and abdominal adipose tissue in normal conditions and in a diabetic model using multiwavelength refractometry and spectroscopy in an experimental study of the absorption and reflectance spectra of biological tissues, as well as to determine their absorption and scattering.</p> | |
| <p>ThSYB-37 10:00-10:15</p> <p>Convolutional neural networks for differential diagnosis of maxillary sinus pathologies</p> <p>E.O. Bryanskaya¹, D.V. Gerasin¹, A.V. Bakotina², A.Yu. Ovchinnikov², Yu.O. Nikolaeva², V.V. Dremine¹, A.V. Dunaev¹; ¹Research and Development Center of Biomedical Photonics, Orel State University, ²Russian University of Medicine of the Ministry of Health of the Russian Federation, Russia</p> <p>The work shows that application of convolutional neural networks in digital diaphanoscopy makes it possible to identify pathological changes in maxillary sinuses, classify the type of pathology (sinusitis, cystic change), indicating the side of the pathology. The proposed approach can be used for developing a clinical decision support system for early detection of maxillary sinus pathologies.</p> | |

Location: Petrov-Vodkin 1 Room, Floor 2; Thursday, June 25, 2026

SYB. SECTION B. OPTICAL IMAGING MODALITIES + OPTICAL CLEARING 2
 Session Chair: Ilya Turchin, A.V. Gaponov-Grekhov Institute of Applied Physics of RAS, Russia

ThSYB-40

11:30-12:00

Application of optical methods for noninvasive mapping of skin endogenous chromophores (Invited paper)

S.A. Perkov¹, V.A. Vorobev^{1,2}, T.N. Torokhov^{1,3}, B.V. Sheludko^{4,15}, D.U. Musaeva¹, M.M. Kuziuk⁶, M.A. Kurochkin¹, S.Yu. Gorodkov⁷, D.A. Gorin¹; ¹Skolkovo Institute of Science and Technology, Russia; ²Ecole Polytechnique Federale de Lausanne, Switzerland; ³Prokhorov General Physics Institute of the Russian Academy of Sciences, Russia; ⁴Institute for Information Transmission Problems of the Russian Academy of Sciences, Russia; ⁵Moscow Institute of Physics and Technology, Russia; ⁶Central University, Russia; ⁷Saratov State Medical University, Russia

An overview of optical methods for assessing skin chromophore concentrations in newborns is presented, emphasizing their diagnostic potential. As specific examples, the application of hyperspectral imaging for noninvasive diagnosis of infantile hemangioma and the use of fluorescence spectroscopy to assess bilirubin photodegradation during neonatal jaundice treatment are investigated.

ThSYB-41

12:00-12:30

Laser beam scattering on a blood smear and the diffractometric parameter of erythrocytes (Invited paper)

S.Yu. Nikitin, E.G. Tsybrov, M.S. Lebedeva; M.V. Lomonosov Moscow State University, Russia

This paper examines the problem of measuring the geometric parameters of red blood cells in a blood smear using laser diffractometry. An algorithm is proposed for measuring the parameter characterizing the variation in red blood cell size and shape.

ThSYB-42

12:30-13:00

Optoacoustic characterization of vascular network in health and disease (Invited paper)

A.G. Orlova¹, A.M. Glyavina^{1,2}, A.A. Kurnikov¹, D.A. Khochenkov³, Yu.A. Khochenkova³, K.S. Kim^{1,2}, A.V. Maslennikova^{1,2,4}, S.V. Nemirova^{1,4}, I.V. Turchin¹, P.V. Subochev¹; A.V. Gaponov-Grekhov Institute of Applied Physics of RAS, Russia

The structural and functional state of human and animal tissues was investigated using optoacoustic imaging. Normal tissues and experimental tumors with different transplantation sites were compared. Therapy-induced changes in tumor vascularity were demonstrated. In patients with post-thrombotic syndrome, increased blood volume, vessel diameter, and vascular tortuosity were revealed.

- Lunch Break -

Location: Petrov-Vodkin 1 Room, Floor 2; Thursday, June 25, 2026

SYB. SECTION B. RAMAN SPECTROSCOPY
 Session Chair: Ivan Bratchenko, Immanuel Kant Baltic Federal University, Russia

ThSYB-45

15:00-15:30

Multidistance self-calibrating diffuse optical spectroscopy of biotissue (Invited paper)

I.V. Turchin¹, V.V. Perekatova¹, K.A. Bylinskaya¹, A.S. Savelyev¹, E.A. Sergeeva¹, M.Yu. Kirillin¹, S.P. Dmitriev², S.V. Gamayunov²; ¹Federal Research Center A.V. Gaponov-Grekhov Institute of Applied Physics of RAS, ²Research Institute of Clinical Oncology "Nizhny Novgorod Regional Clinical Oncological Dispensary", Russia

This study evaluates analytical models for diffuse optical spectroscopy (DOS), comparing them to Monte Carlo simulations. A refined model shows superior accuracy for source-detector distances over 2 mm, while a semi-analytical fit performs best at small source-detector separations. A self-calibrating probe design improves measurement precision, and the developed broadband DOS system has been applied in tumor and skin graft monitoring.

ThSYB-43

13:00-13:15

Metrology and data processing for photoacoustic imaging and cytometry

D.N. Bratashov^{1,2}, E.S. Prikhozhenko¹; ¹MIPT, ²Saratov State University, Russia

This work examines capabilities of photoacoustic (PA) imaging and in vivo flow cytometry techniques for quantitative biomedical analysis. As the PA signal is nearly proportional to chromophore concentration, these methods enable precise in vivo spectroscopy and metrology. We focus on calibration approaches that allow real-time measurement of chromophores, nanoparticles, and metabolites, with applications in pharmacokinetics, pharmacodynamics, and targeted drug delivery.

ThSYB-44

13:15-13:30

Assessment of major skin chromophores in different body sites using diffuse reflectance spectroscopy

K.A. Bylinskaya, M.Y. Kirillin, E.A. Sergeeva, I.V. Turchin, A.B. Kostyuk, V.M. Perekatova; Biophotonics Laboratory, A.V. Gaponov-Grekhov Institute of Applied Physics of RAS, Russia

Diffuse reflectance spectroscopy (DRS) is a non-invasive technique for assessing chromophore concentrations in biological tissues. This study aims to quantify variations in the content of main chromophores (melanin, hemoglobin, water etc.) in skin across different anatomical sites and age groups, using a VIS-NIR self-calibrating DRS system. Measurements were performed on healthy volunteers at the wrist, palm, web space, and temple.

ThSYB-46

15:30-16:00

Tissue optical clearing in the diagnosis of a number of pathologies (Invited paper)

E.A. Genina¹, Yu.I. Surkov¹, I.A. Serebryakova¹, P.A. Timoshina¹, E.N. Lazareva¹, D.K. Tuchina¹, V.V. Tuchin^{1,2,3}; ¹Saratov State Univ., ²Tomsk State Univ., ³IPMC RAS, Russia

Tissue optical clearing was used as an assistant technology in multimodal diagnostics of skin neoplasm and modeled alloxan diabetes.

ThSYB-47

16:00-16:30

Built-in multi-spectral imaging system for in vivo biomedical applications (*Invited paper*)

A.S. Machikhin, V.I. Batshev, A.V. Guryleva, V.I. Bukova; Scientific and Technological Centre of Unique Instrumentation of RAS, Russia

We present a compact single-sensor multispectral imaging system based on a split-aperture design operating in the 0.4–1.7 μm range. Spatospectral calibration and image processing enable accurate mapping of viable parameters. Experiments on phantoms, rats, and volunteers demonstrate the efficiency of the proposed device for non-invasive assessment of blood microcirculation and hemodynamic parameters.

ThSYB-48

16:30-16:45

Direct and inverse problem of the dependence between optical properties and diffuse reflected and transmitted signal for multilayer biological tissuesA.A. Krivetskaya^{1,2}, T.A. Savelieva^{1,2}, D.M. Kustov¹, V.V. Levkin³, S.S. Kharnas³, I.D. Romanishkin¹, V.B. Loschenov^{1,2}; ¹Prokhorov General Physics Institute of RAS, ²Institute of Engineering Physics for Biomedicine, National Research Nuclear University MEPhI, ³Department of Faculty Surgery No.1, I.M. Sechenov First Moscow State Medical University, Russia

The knowledge of the biological tissues' optical properties is important for the personalization of the laser-induced therapy. The investigation of the direct and inverse problems is crucial for the understanding of the laser-tissue interaction.

ThSYB-49

16:45-17:00

Impact of laser spatial and temporal coherence in laser speckle contrast imaging

V.V. Perekatova, E.A. Sergeeva, M.Yu. Kirillin, D.A. Kurakina, Y.A. Belozerov, A.S. Savelyev, I.V. Turchin; A.V. Gaponov-Grekhov Institute of Applied Physics of RAS, Russia

Laser Speckle Contrast Imaging quantifies blood flow, but source coherence critically affects accuracy. However, the critical influence of the illumination source's coherence properties on measurement accuracy is often overlooked. This study systematically investigates how temporal and spatial coherence affect speckle contrast.

SYC. SECTION C. PHOTONICS AND NANOBIO TECHNOLOGY*Location: Petrov-Vodkin 2 Room, Floor 2; Thursday, June 25, 2026***SYC. SECTION C. PHOTONICS AND NANOBIO TECHNOLOGY 7**

ThSYC-33

09:00-09:30

Gold -based hybrid nanostructures with porphyrin derivatives for theranostics (*Invited paper*)

E.V. Solovyeva, A.A. Smirnov, V.O. Svinko, S.F. Aslanov, D.A. Lukyanov, A.V. Povolotskiy; St. Petersburg State University, Russia

The use of porphyrins in photomedicine is already in clinical practice. However, the search of more effective agents continues, including the development of organic-inorganic structures in which porphyrins combine with plasmonic nanoparticles. Here, we present hybrid structures based on gold nanoparticles and porphyrins, their photophysical properties, preliminary cellular tests and potential for bioimaging and photodynamic therapy.

ThSYC-34

09:30-10:00

Induction of non-apoptotic cell death in hepatocarcinoma cells via photothermal therapy using Au@Fe₃O₄ nanostars (*Invited paper*)K. Levada¹, S. Pshenichnikov¹, A. Anikin¹, A. Motorzhina¹, M. Albino^{2,3}, V. Malashchenko⁴, L. Litvinova⁴, V. Rodionova¹, C. Sangregorio^{2,3}, L. Panina^{1,5}; ¹REC Smart Materials and Biomedical Applications, Immanuel Kant Baltic Federal University, Russia; ²Institute of Chemistry of Organometallic Compounds - C.N.R., Italy; ³Department of Chemistry 'Ugo Schiff' and INSTM, University of Florence, Sesto Fiorentino (FI), Italy; ⁴Center for Immunology and Cell Biotechnology, Immanuel Kant Baltic Federal University; ⁵National University of Science and Technology MISiS, Russia

Hybrid Au@Fe₃O₄ nanostars, with a gold core and magnetite shell, are promising for photothermal cancer therapy. They efficiently convert near-infrared light to heat. In tests on liver cancer cells (Huh7), combining low-dose nanostars with NIR light reduced cell viability by 79% and triggered non-apoptotic cell death, confirming their potential for targeted, minimally invasive treatment.

ThSYC-35

10:00-10:30

Plasma membrane-bound heat shock proteins: mHsp70 as a target for theranostics in oncology (*Invited paper*)M. Shevtsov^{1,2}; ¹Department of Radiation Oncology, Klinikum rechts der Isar, Technical University of Munich, Germany; ²Laboratory of Biomedical Nanotechnologies, Institute of Cytology (RAS), Russia

Heat shock protein 70 (Hsp70) is uniquely expressed on the plasma membrane of malignant cells (mHsp70) but not normal tissues, making it an attractive therapeutic target. Experimental, preclinical, and pilot clinical studies demonstrate that mHsp70 promotes tumor invasion and migration and can be selectively targeted by chaperone inhibitors, tumor-homing peptides, and antibody-functionalized nanoplateforms for theranostic applications in neuro-oncology.

ThSYC-36

10:30-10:45

Detection of Alzheimer's disease using potential SPR biosensorJay Kumar Yadav¹, Kedar Nath Das²; ¹Dept. of Electronics and Communication Engineering, National Institute of Technology Silchar, ²Dept. of Mathematics, National Institute of Technology Silchar, India

In this paper, we have developed a perovskite (CsGeI₃)-Ta₂O₅-based Kretschmann's configuration surface plasmon resonance (SPR) biosensor for assessing Alzheimer's disease, utilizing the refractive index (RI) of the sample to differentiate between healthy brain tissue and Alzheimer's disease. Furthermore, to enhance light-matter interaction, we have optimized the thickness of the silver and Ta₂O₅ material layers, along with the analyte sample.

ThSYC-37

10:45-11:00

Plasmonic Au-decorated magnetic Fe₃O₄ elongated clusters for dual-mode biosensing

V.V. Volkov^{1,2}, A.M. Skirda^{1,3}, A.V. Orlov¹, P.I. Nikitin^{1,2}; ¹Prokhorov General Physics Inst. of RAS, ²National Research Nuclear Univ. MEPhI (Moscow Engineering Physics Inst.), ³Moscow Inst. of Physics and Technology, Russia

Plasmonic magnetic elongated clusters were developed for dual-mode biosensing. Magnetite nanoparticles, synthesized by co-precipitation, self-assembled into anisotropic clusters under magnetic field and coated with SiO₂ via Stöber process. Au satellites were deposited via borohydride reduction. The platform enables simultaneous magnetic manipulation/detection and optical readout with possibility of simple biomolecule functionalization on Au surface through thiol groups.

- Coffee Break -

Location: Petrov-Vodkin 2 Room, Floor 2; Thursday, June 25, 2026

SYC. SECTION C. PHOTONICS AND NANOBIO TECHNOLOGY 8

ThSYC-38

11:30-12:00

Programmable DNA nanostructures for on-chip photonic architectures (Invited paper)

I.V. Martynenko; Skoltech, Russia

Structural DNA nanotechnology, particularly the DNA origami technique, provides a powerful bottom-up approach for fabricating photonic architectures with nanometer precision. By using programmable DNA self-assembly, complex plasmonic and photonic elements can be precisely positioned and integrated on-chip with unprecedented spatial control. This talk presents recent advances in DNA-origami-templated nanophotonics, emphasizing scalable assembly strategies and their potential for next-generation biophotonic and quantum optical devices.

ThSYC-39

12:00-12:30

Limitations and solutions for nanozyme application in immunoassays (Invited paper)

P.V. Khramtsov; Perm Federal Research Center, Russia

Nanozymes—artificial enzyme mimetics—are increasingly regarded in the current literature as promising alternatives to natural enzymes in colorimetric immunoassays. In this presentation, we aim to address several challenges associated with the practical implementation of nanozymes, as well as to discuss potential solutions and future research directions in this field.

ThSYC-40

12:30-12:45

Biosensor based on reduced graphene oxide for noninvasive detection of carcinoembryonic antigen

A.S. Kudriavtseva^{1,2}, B.G. Gorshkov¹, I.I. Bobrinetskiy², P.I. Nikitin¹; ¹Prokhorov General Physics Institute of RAS, ²Moscow Center for Advanced Studies, Russia

A biosensor based on reduced graphene oxide functionalized with a DNA aptamer was developed for non-invasive detection of carcinoembryonic antigen in saliva. The dual-mode platform, combining field-effect transistor and electrochemical principles, achieves a zeptomolar detection limit and a dynamic range spanning eight orders of magnitude. This approach enables rapid, reliable, and highly sensitive point-of-care cancer monitoring.

ThSYC-41

12:45-13:00

Machine learning in data analysis and data augmentation for Raman spectroscopy

E.S. Prikhozhenko; MIPT, Russia

This study uses Principal Component Analysis (PCA) to generate synthetic Raman spectra and augment training data for classifying adipose tissue before and after lipase exposure. Optimized Random Forest and Gradient Boosting models achieved high accuracy (up to 96.4%), validating the data augmentation method and aligning with expected biochemical changes from hydrolysis.

ThSYC-42

13:00-13:15

Machine learning and evolutionary optimization in modeling the optical response of organic pigments

V.A. Kurkov¹, D.D. Chesalin², N.N. Reutskii³, A.N. Samarin¹, R.Y. Pishchalnikov¹; ¹Prokhorov General Physics Institute of RAS, ²Faculty of Biology, Lomonosov Moscow State University, ³Faculty of Physics, Lomonosov Moscow State University, Russia

Considering the optically allowed electronic transition of carotenoids at 400-550 nm, we classified absorption spectra of these pigments by the set of Huang-Rhys factors. The modeling of the spectra in terms of semiclassical theory was optimized by differential evolution. As the result, the data base containing pigments, their spectra, and corresponding quantum parameters was made for the optical response identification.

ThSYC-43

13:15-13:30

Ultrafast force-clamp spectroscopy reveals force-dependent friction regulation of the microtubule-binding Ndc80 complex

V.M. Demidov, I.V. Gonchar, F.I. Ataullakhanov; Center for Theoretical Problems of Physicochemical Pharmacology, RAS, Russia

This work demonstrates the use of ultrafast force-clamp spectroscopy to investigate the properties and mechanism of force-induced motion of the kinetochore protein complex Ndc80 at the single-molecule level in vitro. We show that the Ndc80 complex can glide along microtubule wall under external force, and that this motion is highly asymmetric in a direction-dependent manner. This asymmetry arises from force-dependent modulation of the Nuf2 domain's interaction with the microtubule.

- Lunch Break -

Location: Petrov-Vodkin 2 Room, Floor 2; Thursday, June 25, 2026
 SYC. SECTION C. PHOTONICS AND NANOBIO TECHNOLOGY 9

<p>ThSYC-44 Multi-functionalization diamond particles for biological applications (<i>Invited paper</i>) K.V. Bogdanov¹, T.E. Didukh¹, S.A. Grudinkin², A.V. Baranov; ¹ITMO University, ²Ioffe Institute, Russia This study presents CVD diamond nano/sub-microparticles with core/shell structure for biomedical applications. The boron core heats via laser absorption, exciting SiV/GeV color centers in the shell for temperature-sensitive and visualization luminescence at 738/602 nm.</p>	<p>15:00-15:30</p>	<p>ThSYC-47 Stabilization of the mesoporphyrin IX dihydrochloride with flavonoids (Tagetes patula L.) luminescent complex by ytterbium ions E.S. Zemlyakova, A.V. Tcibulnikova, V.A. Slezhkin, A.A. Kostrina, D.A. Artamonov, I.G. Samusev; Immanuel Kant Baltic Federal University, Russia The study focuses on the photosensitizers found in plant extracts, their activation by molecular oxygen, and the formation of luminescent complexes with electromagnetic energy transfer.</p>	<p>16:15-16:30</p>
<p>ThSYC-45 Optical properties of diatom algae: from nature to photonic structures (<i>Invited paper</i>) J. Cvjetinovic, S. Dyakov, M. Reshetova, A. Ivleva, D. Tsiurko, D. Gorin; Skolkovo Inst. of Science and Technology, Russia Diatom frustules are hierarchically structured silica shells enabling efficient light manipulation. Numerical modeling reveals Talbot interference and enhanced energy localization. Scaled-up biomimetic frustules fabricated by DLP 3D printing experimentally confirm Talbot focusing in the terahertz range. Modification via iron oxide nanoparticles is explored, linking optical and biological effects. The results demonstrate potential applications in bioinspired photonics, sensing, and light-harvesting technologies.</p>	<p>15:30-16:00</p>	<p>ThSYC-48 Smart microchamber biomaterial scaffolds for bioactive compounds release and microenvironment modulation A.V. Ermakov¹, E.V. Lengert², A.N. Ivanov³, G.B. Sukhorukov^{1,4}; ¹Life Improvement by Future Technologies (LIFT) Center, ²Institute of Molecular Theranostics, I.M. Sechenov Future Moscow State Medical University, ³Central Research Laboratory, Saratov State Medical University of V.I. Razumovsky, Ministry of Health of the Russian Federation, ⁴Vladimir Zelman Center for Neurobiology and Brain Rehabilitation, Skolkovo Institute of Science and Technology, Russia Addressing the rising costs of wound care, we present a novel microstructured wound dressing with integrated sensing and controlled release capabilities. Utilizing solid-powder encapsulation, this platform dynamically modulates the wound microenvironment via sustained delivery of antioxidants and hydrogen peroxide. This approach promotes angiogenesis, reduces inflammation, and facilitates scar-free healing by subtly shifting the chemical profile for optimized tissue regeneration.</p>	<p>16:30-16:45</p>
<p>ThSYC-46 Application of lasers for amyloid fibril aggregation, disaggregation and detection Y.A. Trutnev, T.A. Matveeva, E.A. Molkova, R.M. Sarimov; Prokhorov General Physics Institute of RAS, Russia Amyloid fibrils, central to neurodegenerative diseases, resist conventional disaggregation and often yield toxic oligomers. We generated lysozyme-derived fibrils under varied conditions—temperature (22–65°C), denaturant concentration, and agitation—to produce structurally diverse aggregates. These were irradiated with ns/ps Nd:YAG laser pulses (1064/532 nm). This approach aims to achieve precise, non-invasive fibril disaggregation, advancing targeted therapy for protein-misfolding disorders.</p>	<p>16:00-16:15</p>	<p>ThSYC-49 Intravital cardiac dynamics imaging of zebrafish larva with a tunable two-photon light-sheet microscope K.A. Kungurov^{1,2}, A.D. Sergeeva^{3,4}, L.L. Naumov³, M.A. Solotenko^{1,2}, A.B. Fedotov^{1,2}, V.V. Belousov^{2,3,4}, D.S. Bilan^{3,4}, A.A. Lanin^{1,2}; ¹Physics Department, M.V. Lomonosov Moscow State University, ²Life Improvement by Future Technologies (LIFT) Center, Skolkovo, ³M.M. Shemyakin and Yu.A. Ovchinnikov Institute of Bioorganic Chemistry, RAS, ⁴Federal Center of Brain Research and Neurotechnologies, Federal Medical Biological Agency, Russia We have developed a femtosecond, three-stage, ytterbium-doped fiber chirped pulse amplifier for a solid-state laser. This source was used in a two-photon light-sheet microscopy scheme. As study subjects we used zebrafish larva with labeled cardiomyocytes. The developed system enabled non-invasive, high-speed, high-resolution visualization of cardiac temporal dynamics and morphology.</p>	<p>16:45-17:00</p>

SYD. SECTION D. PHOTODYNAMIC PROCESSES IN BIOLOGY AND MEDICINE

Location: Petrov-Vodkin 3 Room, Floor 2; Thursday, June 25, 2026
 SYD. SECTION D. PHOTODYNAMIC PROCESSES IN BIOLOGY AND MEDICINE 4

<p>ThSYD-17 Aqueous dispersions of carbon nanoparticles: variability of basic structural elements and their role in the generation and accumulation of ROS (<i>Invited paper</i>) N.N. Rozhkova¹, A.S. Stepanova^{1,2}, N.D. Sharpar^{1,2}, S.P. Rozhkov³; ¹Institute of Geology, Karelian Research Centre RAS, ²Petrozavodsk State University, ³Institute of Biology, Karelian Research Centre RAS, Russia We analyzed the factors of structural heterogeneity of aqueous dispersions of shungite carbon nanoparticles (ShC). Water regulates intermolecular interactions and predetermines the existence of two types of ShC phases in water at physiological temperatures. ShC acts as a heterogeneous catalyst, enhancing the generation of ROS in the presence of iron ions, determining their antibacterial effect on the pathogenic microorganisms.</p>	<p>09:00-09:30</p>
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ThSYD-18

09:30-10:00

Colloidal CaF₂:Eu²⁺ nanoparticles as nanoscintillators for X-ray-induced photodynamic therapy (Invited paper)

Yu.V. Orlovskii¹, A.T. Shaidulin^{1,2}, E.O. Orlovskaya¹, O.V. Uvarov¹, S.Kh. Batygov¹, I.G. Samusev³, Yu.S. Romanko⁴, V.B. Loschenov¹, V.N. Makhov⁵; ¹Prokhorov General Physics Institute of RASciences, ²National Research University Higher School of Economics, ³Immanuel Kant Baltic Federal University, ⁴I.M. Sechenov First Moscow State Medical University, ⁵P.N. Lebedev Physical Institute of RAS, Russia

X-ray-induced photodynamic therapy is a cancer treatment method that combines the advantages of clinically used photodynamic therapy and radiation therapy. This method's high penetration depth is achieved by X-ray radiation, while enhanced cytotoxicity is achieved by a suitable combination of a nanoscintillator emitting in the optical region and a photosensitizer that effectively absorbs this radiation. To achieve this, we synthesize non-toxic, stable aqueous colloids of CaF₂ nanoparticles doped with europium ions in their inactivated state.

ThSYD-19

10:00-10:15

Macrophage-guided transport of photosensitizers for enhanced photodynamic tumor treatment

D.A. Terentyeva, Z.V. Kozyreva, D.A. Gorin, O.A. Sindeeva; Skolkovo Inst. of Science and Technology, Russia

Macrophages can function as "Trojan horses" delivering photosensitizer-loaded microcapsules into tumors to enhance photodynamic therapy. Layer-by-layer microcapsules were efficiently internalized and retained by peritoneal macrophages for up to 6 days without degradation, enabling transport into tumor spheroids and light-induced tumor regression in a CT-26 colon cancer model, addressing limited photosensitizer penetration in solid tumors.

Location: Petrov-Vodkin 3 Room, Floor 2; Thursday, June 25, 2026

SYD. SECTION D. PHOTODYNAMIC PROCESSES IN BIOLOGY AND MEDICINE 5

ThSYD-22

11:30-12:00

Method of planning and monitoring the absorbed dose of laser light during photodynamic therapy of multilayered tissues of hollow organs (Invited paper)

T.A. Savelieva^{1,2}, A.A. Krivetskaya^{1,2}, D.M. Kustov¹, V.V. Levkin³, S.S. Kharnas³, V.B. Loschenov^{1,2}; ¹Prokhorov General Physics Institute of RAS, ²Institute of Engineering Physics for Biomedicine, National Research Nuclear University MEPhI, ³Department of Faculty Surgery No.1, I.M. Sechenov First Moscow State Medical University, Russia

A PDT planning algorithm has been developed based on numerical modeling and utilizing optical-spectral measurement data of diffuse transmittance and diffuse reflectance of laser radiation by the walls of hollow gastrointestinal organs and the fluorescence of the photosensitizer contained within them, which allows to calculate the absorbed laser dose and to assess the biochemical effectiveness of PDT.

ThSYD-23

12:00-12:30

Raman spectroscopy: from solving fundamental problems to practical applications (Invited paper)

V.S. Novikov¹, L.Yu. Kozlova¹, S.O. Liubimovskii¹, S.M. Kuznetsov¹, D.D. Vasimov^{1,2}, A.M. Semin^{1,3}, V.I. Andreev^{1,3}, A.N. Bortcova^{1,3}, M.N. Moskovsky⁴, S.V. Gudkov¹, V.V. Kuzmin¹, E.A. Sagitova¹, G.Yu. Nikolaeva¹; ¹Prokhorov General Physics Institute of RAS, ²Moscow Institute of Physics and Technology, ³D.I. Mendeleev Russian University of Chemical Technology, ⁴Federal Scientific Agronomic and Engineering Center VIM, Russia

Raman spectroscopy remains a powerful tool for molecular analysis, with expanding applications enabled by portable instruments and advanced data processing. We develop Raman methods (including Resonance Raman and SERS) to assess polymer crystallinity and composition, analyze oils and dietary supplements, identify carotenoids, and detect plant diseases at early stages, supporting medical, food, and agricultural applications.

ThSYD-20

10:15-10:30

Tissue-mimicking phantoms with tunable optical properties for laser thermotherapy

S.A. Mirzaeva¹, P.V. Aleksandrova¹, I.N. Dolganova^{1,2}, Yu.A. Suchkov¹, V.B. Tsvetkov¹, K.I. Zaytsev¹, D.G. Kochiev¹, A.K. Zotov¹; ¹Prokhorov General Physics Institute of RAS, ²Osipyan Institute of Solid State Physics of RAS, Russia

Laser ablation demands precise thermal control. Existing phantoms cannot simultaneously replicate tissue's mechanical and optical properties and thermal response. We developed liver-mimicking alginate phantoms matching 1064 nm optical and thermal dynamics, bone-mimicking tunable opal structures replicating optical properties and thermal response, hybrid phantoms modeling thermal response on bone-soft tissue interfaces. Our results enable protocol optimization, device calibration, and surgical training for cancer therapy.

ThSYD-21

10:30-10:45

Low level laser therapy in dentistry

Y.S. Kozlova; Sechenov First Moscow State Medical Univ., Russia

Low Level Laser Therapy in Dentistry (LLLT) is very wide used in different parts of dentistry for example for treatment of dentin hypersensitivity, temporomandibular joint, for quicker healing process after any surgical procedure in the oral cavity, in orthodontic treatment for accelerating tooth movement, periodontal treatment.

ThSYD-24

12:30-12:45

Photodynamic therapy effect on the mouse mammary tumors with high levels of mechanical stress

A.V. Ryabova^{1,2,3}, I.D. Romanishkin¹, I.V. Markova^{1,2}, T.A. Savelieva^{1,2}, A.S. Moskaliev^{1,2}, D.A. Vasilieva², D.V. Pominova^{1,2}; ¹Prokhorov General Physics Institute of RAS, ²Institute of Engineering Physics for Biomedicine, National Research Nuclear University MEPhI, ³Peoples' Friendship University of Russia named after Patrice Lumumba, Russia

The effects of photodynamic therapy (PDT) on the tumor's extracellular matrix (ECM) were studied. The used tumors were differed in stiffness, scattering, blood permeability, water and collagen content. Ce6 accumulation was slower for stiffer tumors, which correlates with hypoperfusion and hypoxia. PDT reduced tumor stiffness due to cell death and ECM damage.

ThSYD-25

12:45-13:00

Methylene blue and chlorin e6 metabolic effects on macrophages: FLIM monitoring

D.V. Pominova^{1,2}, I.V. Markova^{1,2}, I.D. Romanishkin¹, A.S. Skobeltsin^{1,2}, V.I. Makarov^{1,2}, A.V. Ryabova^{1,2}; ¹Prokhorov General Physics Institute of RAS, ²Institute of Engineering Physics for Biomedicine, National Research Nuclear University MEPhI, Russia

We studied methylene blue (MB) and chlorin e6 (Ce6) metabolic effects on tumor-associated macrophages (TAMs). At first M1 and M2 macrophages polarized from THP-1 were treated with MB or Ce6, and then, photodynamic therapy was performed. Fluorescence-lifetime imaging microscopy (FLIM) of NAD(P)H/FAD revealed MB-induced OXPPOS restoration versus Ce6 OXPPOS blockade. Changes in NADH and FAD metabolic trajectories corresponding to the M2 to M1 shift in macrophage polarization were observed.

ThSYD-26

13:00-13:15

Optical properties of tumors with varying stroma stiffness in the visible and short-wave infrared ranges

I.V. Markova^{1,2}, D.V. Pominova^{1,2}, T.A. Savelieva^{1,2}, I.D. Romanishkin¹, A.S. Skobeltsin^{1,2}, A.V. Ryabova^{1,2}; ¹Prokhorov General Physics Inst. of RAS, ²National Research Nuclear Univ. MEPhI, Russia

In this work, the tumors with varying stiffness optical properties in transplanted mouse models during photodynamic therapy (PDT) in the visible and short-wave infrared ranges were studied. Using diffuse reflectance spectroscopy, a correlation between the tumor stiffness, absorption and scattering characteristics was established, as well as scattering decrease after PDT was observed.

- Lunch Break -

Location: Petrov-Vodkin 3 Room, Floor 2; Thursday, June 25, 2026

SYD. SECTION D. PHOTODYNAMIC PROCESSES IN BIOLOGY AND MEDICINE 6

ThSYD-27

15:00-15:30

Photodynamic therapy for cancer of external and visceral localizations in Russia (*Invited paper*)

E.Ph. Stranadko¹, T.I. Malova², M.V. Riabov¹; ¹Skobelkin Centre for Laser Medicine - a branch of the Federal Clinical Center for High Medical Technologies, FMBA of Russia, ²"VETA-GRAND" LLC, Russia

Photodynamic Therapy (PDT) for cancer at various stages and locations has been practiced in Russia for 32 years. PDT fundamentally changes the status of a significant group of inoperable patients with various cancer localizations.

ThSYD-28

15:30-15:45

Endoscopic photodynamic recanalization for inoperable obstructive esophageal cancer

E.Ph. Stranadko¹, T.I. Malova², M.V. Riabov¹; ¹Skobelkin Centre for Laser Medicine - a branch of the Federal Clinical Center for High Medical Technologies, FMBA of Russia, ²"VETA-GRAND" LLC, Russia

Esophageal cancer is one of the most aggressive and rapidly progressing malignant tumors. Photodynamic Therapy (PDT) expands the treatment options for inoperable esophageal cancer. PDT is effective in advanced obstructive esophageal cancer, improving the outcomes for this challenging group of patients and enhancing their quality and duration of life.

ThSYD-29

15:45-16:00

Ultraviolet irradiation of bacterial cellulose as an additional purification method (*Invited paper*)

P.M. Larionov¹, N.A. Maslov², I.A. Rozhin², T.M. Terekhova¹, I.A. Kirilova¹, A.A. Korytkin¹; ¹Research department, Novosibirsk Research Institute of Traumatology and Orthopedics named after Ya.L. Tsvyanyan of the Ministry of Health of the Russian Federation, ²Laser Technologies Laboratory, S.A. Khristianovich Institute of Theoretical and Applied Mechanics, SB RAS, Russia

The effectiveness of ultraviolet (UV) irradiation for the purification of bacterial cellulose was studied using laser-induced spectroscopy (LIFS) and laser scanning microscopy (LSM). A total UV dose of 12 J/cm² resulted in the disappearance of the tryptophan peak and a marked reduction in the tyrosine peak, consistent with LSM results showing a significant reduction in the size and density of microbial inclusions.

ThSYD-30

16:00-16:15

Effective polycationic photosensitizer, their mechanisms of accumulation and effects on cancer cells in vitro

E.V. Akhlyustina^{1,8}, I.D. Romanishkin^{2,8}, I.G. Meerovich³, S.Sh. Karshieva^{4,5}, A.S. Skobeltsin^{1,2,8}, D.A. Bunin^{6,8}, E.A. Makarova^{7,8}, V.B. Loschenov^{1,2}, E.A. Kogan⁸, Zh.-L. Chen⁹, G.A. Meerovich^{2,8}, Yu. G. Gorbunova^{4,10}, I.V. Reshetov⁸; ¹National Research Nuclear University MEPhI, ²Prokhorov General Physics Institute of RAS, ³A.N. Bach Institute of Biochemistry, Research Center of Biotechnology RAS, ⁴National University of Science and Technology MISIS, Russia, ⁵N.N. Blokhin National Medical Research Center of Oncology, ⁶Frumkin Institute of Physical Chemistry and Electrochemistry, ⁷Organic Intermediates and Dyes Institute, ⁸I.M. Sechenov First Moscow State Medical University, Russia; ⁹Huadong Hospital, Fudan University, China; ¹⁰Kurnakov Institute of General and Inorganic Chemistry, Russia

The binding of photosensitizer molecules to cancer cells depends on the sign and charge value. A comparative in vitro study demonstrated that polycationic one exhibit higher phototoxicity. Photodynamic therapy with polycationic photosensitizer has a damaging effect on cancer cells through direct necrosis, increased apoptosis, a reduction in the number of all cancer stem cell subpopulations, and suppression of their proliferation.

ThSYD-31

16:15-16:30

Diagnosis of microbial contamination in bacterial cellulose using laser-induced fluorescence (LIF) spectroscopy

N.A. Maslov¹, P.M. Larionov², I.A. Rozhin¹, T.M. Terekhova², A.A. Korytkin²; ¹Khristianovich Inst. of Theoretical and Applied Mechanics SB RAS, ²Novosibirsk Research Inst. of Traumatology and Orthopedics MH RF, Russia

This study explores the potential of laser-induced fluorescence (LIF) for real-time monitoring of bacterial cellulose (BC) purity. Our analysis reveals that current purification methods fail to completely remove residual proteins and microbial contaminants, limiting BC's applicability in medical settings. LIF spectroscopy proved highly effective in rapidly and accurately detecting amino acid residues, making it a promising tool for optimizing purification processes.

ThSYD-32

16:30-16:45

Investigation of the antibacterial effect of quartz nanoparticles of shungite rocks

N.D. Sharpar^{1,2}, A.S. Stepanova^{1,2}, N.N. Rozhkova¹; ¹Institute of Geology of the Karelian Research Centre of RAS, ²Petrozavodsk State University, Russia

The antibacterial activity of aqueous dispersions of quartz nanoparticles stabilized with carbon has been studied. Dispersions have been shown to have a bacteriostatic effect on pathogenic bacteria, inhibiting their growth. With respect to non-pathogenic bacteria, the effect was manifested only with prolonged exposure and the addition of ascorbic acid ions. The results confirm the potential of nanoparticles for biomedical applications.

SYD. SECTION D. PHOTODYNAMIC PROCESSES IN BIOLOGY AND MEDICINE - POSTERS

Location: Congress Hall, Floor 1; Thursday, June 25, 2026

- ThSYD-p01 10:00-13:30
- Hydrothermal microwave-assisted synthesis of colloidal solutions of $\text{CaF}_2\text{:Eu}^{2+}$ nanoscintillators**
 A.T. Shaidulin^{1,2}, E.O. Orlovskaya¹, O.V. Uvarov¹, S.Kh. Batygov¹, V.B. Loschenov¹, V.N. Makhov³, Yu.V. Orlovskii¹; ¹Prokhorov General Physics Institute of RAS, ²National Research University Higher School of Economics, ³P.N. Lebedev Physical Institute of RAS, Russia
 This work examines the influence of the microwave-assisted hydrothermal synthesis conditions of colloidal $\text{CaF}_2\text{:Eu}^{2+}$ nanoparticles (NPs) on the brightness of the Eu^{2+} X-ray excited optical luminescence (XEOL) at the interconfigurational transition $4f65d1 \rightarrow 4f7$ ($8S7/2$) (luminescence in the range of 400–480 nm with a maximum at 425 nm, close to the Curcumin photosensitizer absorption maximum at 420–430 nm).
- ThSYD-p02 10:00-13:30
- Optical methods and devices for monitoring microcirculation during photodynamic therapy**
 A.V. Guryleva¹, A.S. Machikhin¹, T.G. Grishacheva², S.G. Chefu², N.N. Petrishchev²; ¹Biomedical Instrumentation Lab. STC UI RAS, ²Laser Medicine Center, Pavlov University, Russia
 Direct assessment of skin microcirculation during photoactivation is crucial for understanding and optimizing photodynamic therapy. We propose a non-invasive imaging photoplethysmography method for continuous, spatially resolved monitoring of microcirculation in tumor and healthy tissue. Validated in an animal model, it reveals distinct tumor-tissue microvascular responses during and after photoactivation.
- ThSYD-p03 10:00-13:30
- Direct singlet oxygen generation by a bi-chromatic Raman fiber laser and its effect on glioblastoma cells**
 M. Naumenko^{1,2}, V. Volosi², A. Leonteva^{1,3}, A. Nushtaeva^{1,3}, A. Ivanenko², S. Kulemzin⁴, K. Baranov⁴, A. Moskalensky^{1,2}; ¹Sirius University of Science and Technology, ²Novosibirsk State University, ³Institute of Chemical Biology and Fundamental Medicine, ⁴Institute of Molecular and Cellular Biology, Russia
 Singlet oxygen ($^1\text{O}_2$) underpins photodynamic therapy but is limited in brain tumors by photosensitizer delivery across the blood–brain barrier. We investigate photosensitizer-free $^1\text{O}_2$ generation in glioblastoma cells using a dual-wavelength NIR pulsed fiber laser (1066 and 1241 nm), revealing wavelength-dependent differences between chemical $^1\text{O}_2$ yield and biological metabolic suppression.
- ThSYD-p04 10:00-13:30
- Photophysical properties of chlorin E6 at aPDT on experimental models**
 A.F. Malikov¹, A.M. Udeneev¹, D.V. Yakovlev², N.A. Kalyagina^{1,2}; ¹National Research Nuclear University MEPhI, ²A.M. Prokhorov General Physics Institute of RAS, Russia
 The aim of this study is to investigate various photophysical properties of chlorin e6 during antimicrobial photodynamic therapy (PDT) using wound surface models. The analysis of the accumulation and photobleaching of the photosensitizer in molecular and ethosomal forms on the wound surface of post mortem models was performed.
- ThSYD-p05 10:00-13:30
- FLIM-assisted monitoring of intracellular transportation and accumulation of Radachlorin photosensitizer**
 E.A. Glazkova¹, A.A. Zhikhoreva², A.V. Belashov², T.N. Belyaeva³, A.V. Salova³, I.K. Litvinov³, E.S. Kornilova³, I.V. Semenova², O.S.Vasyutinskii²; ¹Herzen State Pedagogical University, ²Ioffe Institute, ³Institute of Cytology of RAS, Russia
 Mechanisms and kinetics of Radachlorin uptake and accumulation in HeLa cells were studied by analysis of distributions of fluorescence intensity and lifetime at different incubation times. The observed decrease of Radachlorin fluorescence lifetime during its intracellular transportation was suggested to be due to its uptake via endocytosis and gradual acidification of endosomes on the way to lysosomes.

**CONFERENCE ON OPTICS OF DIELECTRIC, METAL,
AND SEMICONDUCTOR NANOSTRUCTURES
(ODMSN)**

C01. CONFERENCE ON OPTICS OF DIELECTRIC, METAL, AND SEMICONDUCTOR NANOSTRUCTURES

Location: Pudovkin 1+2 Room, Floor 3; Wednesday, June 24, 2026

C01. CONFERENCE ON OPTICS OF DIELECTRIC, METAL, AND SEMICONDUCTOR NANOSTRUCTURES 1

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| <p>WeC01-01
 Glasses with semiconductor nanocrystals for photonic applications (<i>Invited paper</i>)
 A.A. Onushchenko; S.I. Vavilov State Optical Institute, Russia
 Nanocrystals (NCs) of narrow-bandgap semiconductor compounds such, for example, as lead chalcogenides exhibit fundamental emission that can be easily tuned over the whole shortwave infrared range by varying the NC size. Emission efficiency is crucial for the practical application of such phosphors. My talk will provide a brief overview of research in this area.</p> | <p>09:00-09:30</p> | <p>WeC01-03
 Photoluminescence and excited-state dynamics of nanomaterials for optoelectronic devices (<i>Invited paper</i>)
 Amitava Patra; School of Materials Sciences, Indian Association for the Cultivation of Science, Jadavpur, India
 Here, we investigate the carrier dynamics, energy transfer, and charge carrier dynamics of 2D CdSe nanoplatelets and perovskite nanocrystals</p> | <p>10:00-10:30</p> |
| <p>WeC01-02
 Upconversion nanoparticles: size-dependent concentration quenching (<i>Invited paper</i>)
 Guanying Chen; Harbin Institute of Technology, China
 Lanthanide concentration quenching remains a major barrier to achieving high luminescence efficiency under high dopant levels. Here, we propose a general strategy to suppress lanthanide luminescence quenching by confining the thickness of the active layer in a rationally designed core-multishell architecture with minimized surface quenching.</p> | <p>09:30-10:00</p> | <p>WeC01-04
 Interfacial and hydration strategies in perovskite nanocrystals (<i>Invited paper</i>)
 H. Huang; School of Optoelectronic Science and Engineering, Soochow University, China
 We facilitated interfacial ion transport using oleylamine molecules as shuttles at the polar-nonpolar interface. We successfully synthesized CsPbX₃ nanorods using CsX nanocrystals as precursors and leveraging the directional diffusion of lead ions at the interface. We synthesized the Cs₄ZnBi₂Cl₁₂ as a promising p-type transparent conductor (TC), which features a wide direct bandgap of 3.56 eV and intrinsic p-type conductivity.</p> | <p>10:30-11:00</p> |

- Coffee Break -

Location: Pudovkin 1+2 Room, Floor 3; Wednesday, June 24, 2026

C01. CONFERENCE ON OPTICS OF DIELECTRIC, METAL, AND SEMICONDUCTOR NANOSTRUCTURES 2

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| <p>WeC01-05
 Monodisperse APbI₃ perovskite nanoplatelets for light-emitting diodes and nonlinear optical applications (<i>Invited paper</i>)
 A.P. Litvin^{1,2}, X. Zhang¹, W. Zheng¹, A.L. Rogach³; ¹Jilin Univ., China; ²ITMO Univ., Russia; ³CityU Univ., China
 Metal halide perovskite nanoplatelets offer tunable and narrow emission for high-definition displays and nonlinear optics. We demonstrate synthesis of monodisperse CsPbI₃ nanoplatelets through either halide-ratio control or Ostwald ripening, followed by anion exchange. Post-treatment enables efficient A-site cation exchange or surface passivation. Synthesized nanoplatelets were used to create orange and pure-red efficient LEDs with ultra-narrow emission, meeting Rec. 2020 standards.</p> | <p>11:30-12:00</p> | <p>WeC01-07
 Peculiarities of the behavior of the exciton-polariton dispersion law taking into account multiphoton transitions (<i>Invited paper</i>)
 O. Korovai; Shevchenko Pridnestrovian State University, Moldova
 The features of the behavior of the exciton-polariton dispersion law are studied, taking into account the permitted single-photon and multiphoton transitions of excitations of excitons, biexcitons and triexcitons in semiconductors. The behavior of the exciton-polaritons dispersion law depends on quantum parameters, i.e., phase differences between the Rabi frequencies of the transitions under consideration.</p> | <p>12:30-13:00</p> |
| <p>WeC01-06
 Efficient and stable electroluminescence from thick perovskite emissive layers (<i>Invited paper</i>)
 Yingtong Zhou, Wenxu Yin, Xiaoyu Zhang; Jilin University, China
 Thick perovskite LEDs offer bright emission as well as peak external quantum efficiency of over 25%.</p> | <p>12:00-12:30</p> | <p>WeC01-08
 Kinetics of nonequilibrium quasiparticles in CdSe nanoplatelets under optical Stark effect conditions
 A.V. Ivanov¹, S.A. Khokhorin¹, D.P. Scherbinin¹, A.E. Romashova¹, A.A. Shimko²; ¹ITMO University, ²St. Petersburg State University, Russia
 In this research, we consider the kinetics of nonequilibrium quasiparticles excited by an intense laser pulse in colloidal CdSe nanoplatelets. The modeling of kinetic processes is performed within the framework of the density matrix formalism and implements the conditions of the pump-probe experiment. The influence of trap states on the shift of exciton energy levels is investigated.</p> | <p>13:00-13:15</p> |

- Lunch Break -

Location: Pudovkin 1+2 Room, Floor 3; Wednesday, June 24, 2026

C01. CONFERENCE ON OPTICS OF DIELECTRIC, METAL, AND SEMICONDUCTOR NANOSTRUCTURES 3

- WeC01-09 15:00-15:30
- Photomodulating properties of structures based on diarylethenes and CdSe/ZnS quantum dots** (*Invited paper*)
 S.A. Maskevich¹, P.V. Karpach², G.T. Vasilyuk², O.V. Venidiktova³, A.O. Ayt³, V.A. Barachevsky³; ¹Belarussian State University, ²Yanka Kupala State University of Grodno, Belarus; ³Photochemistry Center, NRC Kurchatov Institute, Russia
 The paper examines the spectral-kinetic, photochromic and photomodulating characteristics of nanostructures based on 4 diarylethenes and CdSe/ZnS quantum dots of various sizes in the spectral range of absorption and luminescence of 350-700 nm in solutions, polymer nanospheres and polymer films.
- WeC01-10 15:30-16:00
- Chemiluminescent probes based on complexes of chemiluminophores with nanoparticles and nanostructures** (*Invited paper*)
 G.R. Simonenko, N.S. Petrov, A.V. Palekhova, I.Yu. Nikitin, D.R. Dadadzhanov, N.B. Leonov, T.A. Vartanyan; International Scientific and Educational Center for Physics of Nanostructures, ITMO University, Russia
 Covalently bonded complexes of luminol molecules with metal nanoparticles and with quantum dots were created. In the first case, an increase in chemiluminescence intensity was achieved due to the acceleration of the radiative transition. In the second case, the shift of the emission spectrum to the long-wavelength region reduces radiation scattering in an inhomogeneous medium, allowing for emission from greater depths in biological tissue.
- WeC01-11 16:00-16:15
- Metal chloride - luminol electrochemiluminescent system for metal ion detection**
 I.Yu. Nikitin, G.R. Simonenko, I.D. Buev, T.A. Vartanyan; ITMO University, Russia
 In this work electrochemiluminescence of luminol was obtained via electrolysis of luminol – metal chloride solutions. It was found that some metal ions boost the process of electrochemiluminescence, while others tend to give background chemiluminescence and give lower signal intensities. The results of this work may be used in sensors for heavy metals
- WeC01-12 16:15-16:45
- In situ observation of compressive forces experienced by DNA loci in the nucleus of living HeLa cell** (*Invited paper*)
 Maria Mukhina¹, Vincent Tsai¹, Yulia Gromova¹, Nancy Kleckner²; ¹University of Maryland, ²Harvard University, USA
 In this talk, I will discuss two in situ force nanoprobe that my group is developing to elucidate mechanical information processing in the genome of living HeLa cells.
- WeC01-13 16:45-17:15
- Application of CdSe/ZnS and AgInS/ZnS quantum dots in clinical morphology for differentiation of cancer cells** (*Invited paper*)
 N.D. Strelak¹, I.G. Motevich¹, A.V. Shulga², S.A. Maskevich¹; ¹Yanka Kupala State University of Grodno, ²Grodno State Medical University, Belarus
 The photoluminescence spectra of CdSe/ZnS and AgInS/ZnS quantum dots exhibit high sensitivity to the polar environment in aqueous solutions and in biopsy of ovarian, colon, and cervical tissues of different pathology degree.

C01. CONFERENCE ON OPTICS OF DIELECTRIC, METAL, AND SEMICONDUCTOR NANOSTRUCTURES

Location: Pudovkin 1+2 Room, Floor 3; Thursday, June 25, 2026

C01. CONFERENCE ON OPTICS OF DIELECTRIC, METAL, AND SEMICONDUCTOR NANOSTRUCTURES 4

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| <p>ThC01-14 09:00-09:15
 Photodynamic therapy of melanoma cells mediated by AIS QDs
 X.L. Jiang^{1,2}, A.V. Boltenko¹, Z.B. Wang², A.O. Orlova¹; ¹ITMO University, Russia, ²Changchun University of Science and Technology, China
 Photodynamic therapy using AgInS₂/ZnS@TGA quantum dots (AIS QDs) demonstrated potent efficacy against A375 melanoma cells. At 4 μM concentration under 540 nm irradiation (10 J/cm²), AIS QDs induced 50 % viability reduction with negligible dark toxicity (>80% viability). ROS generation and atomic force microscopy confirmed concentration-dependent apoptosis. AIS QDs represent promising heavy-metal-free photosensitizers for targeted melanoma PDT.</p> | <p>ThC01-17 10:00-10:15
 Comparing aggregation and layer-by-layer assembly for SERS-active polymer microspheres
 K.A. Maleeva, A.P. Tkach, E. Smirnov, K.V. Bogdanov; ITMO University, Russia
 A comparison of two methods for synthesizing SERS tags created by gold coated polymer microspheres revealed that adsorption of quasi-stable ascorbate-reduced nanoparticles yields a surface coverage of 32% vs. 14% for the LbL method, higher AEF due to aggregates, and better plasmonic coupling.</p> |
| <p>ThC01-15 09:15-09:30
 Hybrid Nanostructure Engineering using Machine Learning: A Pathway to Highly Selective Volatile Organic Compounds Detection
 A. Surkova¹, S. Domarev¹, A. Boltenko¹, M. Saveliev², E. Boichenko², D. Kirsanov², A.O. Orlova¹; ¹International Laboratory "Hybrid Nanostructures for Biomedicine", PhysNano Department ITMO University, ²Chemical Engineering Center, ITMO University, Russia
 The development of gas sensors for non-invasive diagnostics via breath analysis requires efficient material design. We applied QSPR (Quantitative Structure-Property Relationship) modeling to a set of 20 nanocrystals. Using material descriptors and Partial Least Squares regression, we predicted their electrical conductivity response to VOCs. The results demonstrate that data-driven QSPR can accelerate the selection of optimal sensing materials, reducing reliance on extensive experimental screening.</p> | <p>ThC01-18 10:15-10:45
 Luminescent CDs: synthesis and applications (Invited paper)
 Songnan Qu; University of Macau, China
 Carbon nanodots (CDs) are the new type of carbon-based luminescent materials. Our group proposed a method of controlling the bandgap emissions of CDs through sp²C domains controlling and surface engineering to achieve full color and NIR emissive CDs.</p> |
| <p>ThC01-16 09:30-10:00
 Chiral symmetry breaking in colloidal nanostructures (Invited paper)
 M. Ghalawat, D. Feferman, D. Dadadzhyanov, A. Idrees, G. Markovich; School of Chemistry, Tel Aviv University, Israel
 We employ two approaches to symmetry breaking in inorganic nanocrystals. First, chiral molecular ligands induce intrinsically chiral nanocrystals with complete enantioselectivity. Second, circularly polarized light breaks the shape symmetry of plasmonic nanostructures, rendering them optically active, both for substrate-bound nanocrystals and freely rotating particles in solution.</p> | <p>ThC01-19 10:45-11:15
 Chiral carbon dots and their bioconjugates (Invited paper)
 E.V. Ushakova¹, M.S. Kim^{1,2}, A.A. Efimova¹, A.M. Mitroshin¹, A.A. Vedernikova, S.A. Cherevkov¹; ¹PhysNano Department, ITMO University, ²Branch of Petersburg Nuclear Physics Institute named by B.P. Konstantinov of National Research Centre "Kurchatov Institute", Institute of Macromolecular Compounds, Russia
 We report red/green-emissive carbon dots functionalized via chiral isocyanate post-treatment and their integration into CaCO₃-magnetite composites. These multimodal microspheres with carbon dots exhibit tunable luminescence, magnetic responsiveness, low cytotoxicity, and enantioselective bio-interactions—enabling multiplexed bioimaging, flow cytometry, and targeted theranostics.</p> |

- Coffee Break -

Location: Pudovkin 1+2 Room, Floor 3; Thursday, June 25, 2026

C01. CONFERENCE ON OPTICS OF DIELECTRIC, METAL, AND SEMICONDUCTOR NANOSTRUCTURES 5

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| <p>ThC01-20 11:30-12:00
 Laser synthesis of carbyne-like structures for nanophotonics (Invited paper)
 A. Kucherik¹, A. Osipov¹, V. Samyshkin¹, A. Abramov¹, A. Lelekova¹, A. Povolotskiy²; ¹Department of Physics and Applied Mathematics, Stoletov Vladimir State University, ²Institute of Chemistry, St. Petersburg State University, Russia
 The successful synthesis of carbyne, a linear acetylenic carbon chain characterized by alternating single and triple bonds, has been realized. This 1D material exhibits anisotropic optical properties and strong photoluminescence due to its direct band gap. We synthesized carbyne chains terminated by gold clusters and studied their optical behaviour, revealing strong polarization-dependent luminescence and a blue-shifted emission, which enables estimation of chain length and suggests applications in nanoscale optoelectronics.</p> | <p>ThC01-21 12:00-12:15
 Optoelectric characteristics of TiO₂ microscrolls doped with stabilized carbyne chains
 V. Samyshkin, D. Bukharov, A. Kucherik, A. Lelekova; Department of Physics and Applied Mathematics, Stoletov Vladimir State University, Russia
 We study optoelectric properties of TiO₂ microscroll films doped with linear carbon chains and metal nanoparticles (Au, Cu, Fe). Under 532 nm light, they generate electric current. A Schottky photodiode model calculates the photocurrent. The integral quantum efficiency reaches 82 %, showing potential for solar cells.</p> |
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- ThC01-22 12:15-12:45 ThC01-24 13:00-13:15
- Chirality imprinting via plasmon-assisted radical polymerization** (*Invited paper*)
D.R. Dadadzhyanov^{1,2}, N.S. Petrov², I. A. Gladskikh², T.A. Vartanyan², G. Markovich¹; ¹Raymond and Beverly Sackler Faculty of Exact Sciences, School of Chemistry, Tel Aviv University, Israel; ²International Research and Education Center for Physics of Nanostructures, ITMO University, Russia
We demonstrate the induction of circular dichroism in plasmonic metasurfaces via asymmetric near-field-localized deposition of divinylbenzene polymer. Particularly, symmetry breaking in initially achiral nanoparticles on basis sparse and dense ensemble is achieved through near field "imprinting" of a polymer layer with a refractive index contrast relative to the surrounding medium, which produces an asymmetric dielectric environment and, consequently, a chiroptical response.
- ThC01-23 12:45-13:00 ThC01-25 13:15-13:30
- Study of absorption nanostructure of pyroelectric detector based on tetraaminodifenil film from visible to terahertz range**
V.V. Gerasimov^{1,2}, V.S. Vanda^{1,2}, A.G. Lemzyakov^{1,2,3}, V.P. Nuzmov^{1,4}, S.A. Kuznetsov^{2,5}, A.A. Ryback^{2,6}, V.A. Stepanov⁷, D.V. Fromichev⁷, A.K. Nikitin⁸; ¹Budker institute of nuclear physics SB RAS, ²Novosibirsk state university, ³Synchrotron Radiation Facility SKIF, ⁴Institute of Solid State Chemistry and Mechanochemistry, SB RAS, ⁵Rzhanov Institute of Semiconductor Physics SB RAS, ⁶Institute of Automation and Electrometry, ⁷Joint Stock Company " Novosibirsk factory of semiconductor device EAST, ⁸Scientific and Technological Centre of Unique Instrum. of RAS, Russia
The talk will present the results of a study of the optimal parameters of an absorbing nanostructure for pyroelectric detectors based on organic tetraaminodiphenyl films manufactured by the Novosibirsk Semiconductor Devices Plant. The results demonstrate broadband absorption from the visible to THz frequency range, and the receiver's sensitivity, noise characteristics, and response time compare favorably with foreign commercial analogs.
- ThC01-26 13:30-13:45
- Features of nanostructures of oxide multilayer interference reflecting coatings of laser mirrors**
V.V. Azarova, A.S. Danilov, M.M. Rasev, M.S. Shvedov, I.V. Chertovich; POLYUS Research Institute of M.F. Stelmakh, Russia
Ion-beam sputtering (IBS) enables the production of laser mirrors with extremely high reflectivity, low scattering, and absorption, surpassing other PVD methods in density, purity, and film thickness control. Mirrors are critical for resonators and precision laser systems, where current performance is limited by coating technology. SEM/FIB studies show that even nanoscale substrate defects propagate through multilayer structures, requiring substrates to be virtually defect-free with sub-nanometer roughness. This research focuses on methods for producing high-quality mirrors using ion-beam sputtering.
- ThC01-24 13:00-13:15
- Femtosecond laser patterning of chalcogenide phase-change materials for development of tunable metasurfaces**
V. Fedayaj^{1,2}, A. Kokhanovskiy³, E. Menshikov³, A. Revjakin^{1,2}, K. Bronnikov³, V. Simonov¹, V. Terentiev¹, P. Lazarenko⁴, A. Yakubov⁴, S. Babin^{1,2}, A. Kuchmizhak^{5,6}, A. Dostovalov^{1,2}; ¹Institute of Automation and Electrometry of the SB RAS, ²Novosibirsk State University, ³School of Physics and Engineering, ITMO University, ⁴National Research University of Electronic Technology, ⁵Institute of Automation and Control Processes of the FEB RAS, ⁶Far Eastern Federal University, Russia
We demonstrate the femtosecond laser writing of reconfigurable metasurfaces on chalcogenide phase-change materials thin films (GST-225, GeTe, Sb₂Se₃). Various approaches including direct beam writing, spatial beam shaping via spatial light modulator, LIPSS formation were demonstrated. These single-step, lithography-free methods can find applications in rapid prototyping of tunable optical devices with tailored reflection and transmission spectra.
- ThC01-25 13:15-13:30
- Fluorescence recovery and fluorescence correlation microscopy studies of colloidal perovskite diffusivity**
L. Borodina¹, D. Tatarinov¹, K. Annas¹, I. Kuznetsov², A. Barulin², V. Borisov¹, A. Veniaminov¹; ¹PhysNano department, ITMO University, ²Moscow Center for Advanced Studies, Russia
The diffusivity of colloid perovskite nanocrystals crucial for holographic recording using photoinduced diffusion was studied using two luminescence microscopy approaches based on photobleaching-recovery and fluctuation statistics. The results indicate the apparent hydrodynamic diameters of diffusing nanocrystals within the 10 to 25 nm range. The diversity of nanocrystals' size manifests itself via peculiar shapes of luminescence profiles and their broadening dynamics.
- ThC01-26 13:30-13:45
- Features of nanostructures of oxide multilayer interference reflecting coatings of laser mirrors**
V.V. Azarova, A.S. Danilov, M.M. Rasev, M.S. Shvedov, I.V. Chertovich; POLYUS Research Institute of M.F. Stelmakh, Russia
Ion-beam sputtering (IBS) enables the production of laser mirrors with extremely high reflectivity, low scattering, and absorption, surpassing other PVD methods in density, purity, and film thickness control. Mirrors are critical for resonators and precision laser systems, where current performance is limited by coating technology. SEM/FIB studies show that even nanoscale substrate defects propagate through multilayer structures, requiring substrates to be virtually defect-free with sub-nanometer roughness. This research focuses on methods for producing high-quality mirrors using ion-beam sputtering.

- Lunch Break -

Location: Pudovkin 1+2 Room, Floor 3; Thursday, June 25, 2026

C01. CONFERENCE ON OPTICS OF DIELECTRIC, METAL, AND SEMICONDUCTOR NANOSTRUCTURES 6

- ThC01-27 15:00-15:30 ThC01-28 15:30-16:00
- Developments of metalens platforms for miniaturized biophotonic tools** (*Invited paper*)
A.V. Barulin; Moscow Center for Advanced Studies, Russia
This work discusses metalens miniaturization for portable biophotonic devices. We present a transmissive and on-fiber metalenses for single-molecule fluorescence spectroscopy and nanoparticle sizing. A second application features a long-focus metalens enabling high-resolution photoacoustic microscopy, including 3D imaging in brain organoids for neurodegenerative disease research. These platforms enable compact tools for medical and environmental sensing.
- ThC01-28 15:30-16:00
- Principles of contactless movement of semimetal/ semiconductor nanosheets by a laser beam** (*Invited paper*)
I.M. Kislyakov, Yan Wang, Jun Wang; Shanghai Institute of Optics and Fine Mechanics Chinese Academy of Sciences, China
Laser drive is a promising method for the controllable movement of 2D materials and, therefore, a key factor for their integration into nano-electromechanical systems and nanorobotics. However, strong van-der-Waals interactions between nanosheets and substrates hinder this application. Here we describe the various forces generated in semimetal/ semiconductor nanosheets under femtosecond irradiation and analyze conditions for achieving controlled motion.

ThC01-29

16:00-16:15

Dynamical phase transitions in quadrupole-trap-based nonlinear levitodynamic systems

V.V. Rybin, S.S. Rudyi, I.A. Huaman, A.A. Kropotov, D.P. Shcherbinin, ITMO University, Russia

This work considers the nonlinear effects arising in the charged microsphere dynamics in a quadrupole trap at atmospheric pressure. The particle motion possesses a phase transition manifesting as the formation of an extended orbit trajectory. We show that the phase transition is preceded by a transient dynamic state that is highly sensitive to the levitadiodynamic system parameters and external influences.

ThC01-30

16:15-16:30

Ising machine platform based on charged microparticle in a hybrid electrodynamic optical trap

E.V. Soboleva, S.S. Rudyi, A.V. Ivanov; International Research and Educational Center for Physics of Nanostructures, ITMO University, Russia

We present theoretical research of an Ising machine platform using a charged microparticle in a hybrid electrodynamic-optical trap. A controllable spatial bifurcation of the particle's stable equilibrium positions enables direct spin encoding via laser power and RF parameters. Our levitated optomechanical system offers a highly visualizable, room-temperature analog optimizer inspired by Ising machine for solving combinatorial optimization problems.

ThC01-31

16:30-16:45

Collective motion of Coulomb crystals in hybrid traps

A.V. Romanova, Yu.V. Rozhdestvensky; ITMO Univ., Russia

This work focuses on studying collective motion in Coulomb crystals trapped in a hybrid trap. We numerically solve equations of motion for a system of $N=10$ particles. We show that the additional optical potential changes phase transition conditions. Then we study the oscillation spectrum of the collective motion in the presence of the optical trap and without it.

ThC01-32

16:45-17:00

Optical dynamics of microparticles as a platform for gravity gradiometer

A.S. Leshchev, Yu.V. Rozhdesvenskii; International Research and Educational Center for Nanostructure Physics, ITMO University, Russia

In this work we present a new idea of a gradiometer based on an optical pendulum. We study the dynamics of a spherical dielectric microparticle in a Gaussian optical beam under vacuum. The local gravity acceleration can be derived from the amplitude and frequency of this motion. Theoretical analysis indicates a potential accuracy competitive with quantum gravimeters.

C01. CONFERENCE ON OPTICS OF DIELECTRIC, METAL, AND SEMICONDUCTOR NANOSTRUCTURES - POSTERS

Location: Congress Hall, Floor 1; Thursday, June 25, 2026
Session Chair:

- | | | | |
|---|-------------|---|-------------|
| <p>ThC01-p01
Study of magnetic properties of thin films using the magneto-optical Kerr effect
D. Unurbileg¹, G. Batzul¹, R. Galbadrakh¹, L. Mend-Amar¹, V.V. Koledov², S.V. von Gratosky², J. Davaasambuu¹; ¹Institute of Physics and Technology, Mongolian Academy of Science, Mongolia; ²Institute of Radio Engineering and Electronics named after V.A.Kotelnikov, RAS, Russia
In this study, a MOKE measurement system operating in the polar configuration where the incident light and the applied magnetic field are oriented normal to the sample surface was developed. Using this setup, the magnetic hysteresis loop along the (100) crystallographic direction was measured for a 133 nm thick bismuth-substituted yttrium iron garnet (Bi₂Y₁Fe₅O₁₂) thin film epitaxially grown on a Gd₃Ga₅O₁₂ substrate.</p> | 15:00-18:30 | <p>ThC01-p05
Electrodynamic mechanisms of plasmon enhanced lumino-chemiluminescence and systematic study of spectral characteristics
G.R. Simonenko, T.A. Vartanyan, N.S. Petrov; ITMO University, Russia
This work presents a systematic spectral analysis of lumino-chemiluminescence enhanced by silver nanoparticles. We demonstrate that the spectral enhancement factor correlates precisely with the Localized Surface Plasmon Resonance (LSPR) profile. These findings provide direct experimental evidence of the Purcell effect, confirming the electrodynamic nature of the enhancement and distinguishing it from purely catalytic enhancement.</p> | 15:00-18:30 |
| <p>ThC01-p02
Fabrication of hybrid nanostructures based on carbon nanotubes and CdSe nanoplatelets for sensing applications
M.A. Rider, A.V. Boltenko, S.N. Domarev, A.O. Orlova, V.V. Zakharov; ITMO Univ., Russia
Hybrid nanostructures based on carbon nanotubes and CdSe nanoplatelets were fabricated and investigated. Their optical, morphological, and electrical properties were studied, along with their response to volatile organic compounds. The results demonstrate analyte-dependent and reversible optical and electrical responses, confirming the potential of these hybrid nanostructures for selective sensing applications.</p> | 15:00-18:30 | <p>ThC01-p07
Upconversion luminescence in rare-earth -doped polystyrene microspheres: doping conditions, optical properties, and potential for whispering-gallery-mode sensing applications
A.V. Kochakov¹, E.O. Soloveva¹, D.R. Dadadzhyanov^{1,2}; ¹International Research and Education Center for Physics of Nanostructures, ITMO University, Russia; ²Raymond and Beverly Sackler Faculty of Exact Sciences, School of Chemistry, Tel Aviv University, Israel
We synthesized NaYF₄:Er³⁺,Yb³⁺ upconversion nanocrystals (UCNC) by solvothermal synthesis. To make polystyrene microspheres (PMS) as potential active microresonators their surface was functionalized with synthesized UCNC by soaking for 24 hrs. Optical characterization was performed by luminescent microscopy and spectroscopy.</p> | 15:00-18:30 |
| <p>ThC01-p03
Formation of an optical rejection filter at the optical fiber end facet during the deposition of quasi-ordered C -Ag films
A.O. Kucherik¹, A.V. Osipov¹, V.D. Samyshkin¹, A.S. Abramov¹, R. Ponomarev², A. Gordeeva²; ¹Vladimir State University, ²Perm State University, Russia
A study presents a fast, semi-automated method for fabricating optical notch filters directly on fiber end facets using multilayer linear carbon and silver nanoparticle coatings. Droplet deposition of water-based colloids was used for 10, 20, and 30-layer structures, with results showing that additional layers narrow the transmission spectrum and shift the central wavelength toward 1100 nm.</p> | 15:00-18:30 | <p>ThC01-p08
Ultra-fast recombination processes in thin films of CsPbBr₃ nanocrystals with varying defect densities
I.M. Sevastianova, D.S. Gets; ITMO University, Russia
This study used ultrafast spectroscopy to examine recombination processes in CsPbBr₃ nanocrystals of various sizes and defect densities. Higher defect-density samples showed lasing and amplified spontaneous emission, alongside shorter PL decay times and lower quantum yields. Decay curves of PL and ASE on the picosecond scale by TAS measurement revealed that in defect-rich samples, charge carriers redistributed between higher energy levels.</p> | 15:00-18:30 |
| <p>ThC01-p04
Lumino-chemiluminescence enhancement in the cavities of a thin aluminum film via acceleration of radiative transitions
N.S. Petrov¹, G.R. Simonenko¹, D.R. Dadadzhyanov^{1,2}, T.A. Vartanyan¹; ¹ITMO Univ., Russia; ²Tel Aviv Univ., Israel
A thin perforated aluminum film is proposed as an enhancer of lumino-chemiluminescence. Numerical simulations show that the enhancement factor that is proportional to the radiative transition acceleration is distributed over the interior of the cylindrical cavities more homogeneously as compared to the empty spaces between cylindrical aluminum posts studied previously. For the optimized geometry, the overall enhancement of chemiluminescence is found to be about 13, proving the potential of the proposed structure for application in biosensing.</p> | 15:00-18:30 | <p>ThC01-p09
Temperature-dependent fluorescence properties of defective states in ternary quantum dots AgInS₂/ZnS
E.A. Lijina¹, E.O. Solovyova¹, A.A. Starovoytov¹, D.R. Dadadzhyanov¹, N.A. Toropov²; ¹ITMO Univ., Russia, ²Southampton Univ., United Kingdom
We investigated the effect of cryogenic temperatures on spectroscopically detectable defects in ternary semiconductor quantum dots, which can be attributed to vacancies or excess metals. In the absence of other external factors (e.g., changes in pH), the spectral component responsible for these defects exhibits properties different from those typically observed—it retains its position and exhibits no contour change.</p> | 15:00-18:30 |

ThC01-p10

15:00-18:30

Plasmon-enhanced emission from carbon dot -doped spherical polymer microresonators

E.O. Soloveva¹, A.A. Starovoytov¹, K.V. Bogdanov¹, A.P. Tkach¹, N.N. Shevchenko², D.R. Dadadzhyanov^{1,3}; ¹International Research and Educational Center for Physics of Nanostructures, ITMO University, 2- Branch of Petersburg Nuclear Physics Institute named by B.P. Konstantinov of National Research centre "Kurchatov Institute", Russia; ³Raymond and Beverly Sackler Faculty of Exact Sciences, School of Chemistry, Tel Aviv University, Israel

Plasmonic nanoparticle functionalization enhances whispering-gallery mode emission in carbon dot-doped polystyrene microresonators. Gold nanoparticles provide strong (~2x) microresonator emission enhancement through local field amplification, while silver nanoparticles offer less enhancement and cause resonance broadening due to scattering losses.

ThC01-p11

15:00-18:30

Study of the terahertz surface plasmon polaritons on metals with different optical properties

V.S. Vanda, V.V. Gerasimov, A.G. Lemzyakov, A.G. Kocheneva, V.P. Nazmov, A.I. Ivanov, I.A. Azarov, L.S. Kuznetsova, A.K. Nikitin; Russia

This paper examines the characteristics of SPPs on gold films deposited on a flat substrate under different magnetron sputtering conditions. Based on experiments performed on a Michelson plasmon interferometer in the wavelength range of 50–233 μm using radiation from the NovoFEL, an analysis of the radiation and ohmic losses of SPPs was performed depending on the gold film parameters.

ThC01-p12

15:00-18:30

Anisotropic plasmonic nanostructures created by near-field photopolymerization

I.A. Gladskikh¹, D.R. Dadadzhyanov^{1,2}, N.S. Petrov¹, G. Markovich²; ¹ITMO University, International Research and Educational Center for Physics of Nanostructures, Russia; ²Raymond and Beverly Sackler Faculty of Exact Sciences, School of Chemistry, Tel Aviv University, Israel

The optical response of silver and gold nanostructures under local refractive-index modification was studied using near-field photoinduced radical polymerization under continuous-wave laser irradiation. Silver nanostructures exhibited a strong linear dichroism response (up to 30% of optical density), associated with hotspot-driven symmetry breaking, whereas gold showed a weaker response due to plasmon–laser spectral mismatch.

ThC01-p13

15:00-18:30

Sensor based on plasmonic chiral nanostructures

N.S. Petrov¹, I.A. Gladskikh¹, A.V. Kochakov¹, D.R. Dadadzhyanov^{1,2}; ¹ITMO Univ., Russia; ²Tel Aviv Univ., Israel

This work reports a scalable method for fabricating chiral plasmonic structures via plasmon-enhanced polymerization. The structures exhibit strong circular dichroism (CD) (40 mDeg) with a refractive-index-dependent response, demonstrating their potential for biological and refractive index sensing applications.

ThC01-p14

15:00-18:30

Studies on the dielectric and thermal properties of ITO films with radiation ranging from visible to terahertz

D.S. Gribanov^{1,2,3}, N.A. Nikolaev^{1,3}, N.D. Osintseva²; ¹Inst. of Automation and Electrometry, ²Budker Inst. of Nuclear Physics, ³Novosibirsk State Univ., Russia

We have studied the interaction of terahertz radiation of varying intensities with ITO films of the thicknesses of 41, 133, and 290 nm. Free-carrier plasma frequency, scattering frequency, and DC conductivity were determined. The complex refractive index of the films in the terahertz range was determined and lower limit of the optical damage threshold for terahertz waves has been estimated.

**CHINESE-RUSSIAN
INTERNATIONAL SYMPOSIUM ON PHOTONICS
CRISP 2026**

C02. CHINESE-RUSSIAN INTERNATIONAL SYMPOSIUM ON PHOTONICS (CRISP 2026)

Location: Piedmonte Room, Floor 3; Wednesday, June 24, 2026

C02. CHINESE-RUSSIAN INTERNATIONAL SYMPOSIUM ON PHOTONICS (CRISP 2026) 1

WeC02-01

09:20-09:40

Terahertz microscopy based on an air plasma dynamic aperture and its applications (*Invited paper*)

X.K. Wang, Y. Zhang; Key Laboratory of Terahertz Optoelectronics Ministry of Education, Beijing Key Laboratory of Metamaterials and Devices, Department of Physics; Department of Physics, Capital Normal University, China

In this work, a near-field technique was proposed based on an air-plasma dynamic aperture, where two mutually perpendicular air-plasmas overlapped to form a cross-filament above a sample surface that modulated an incident THz beam. Sub-wavelength THz imaging was realized without approaching a sample with any devices.

WeC02-02

09:40-10:00

Optically addressed programmable metasurface for terahertz wavefront modulation (*Invited paper*)

Yan Zhang; Capital Normal University, China

We present optically addressed programmable metasurfaces for dynamic terahertz wavefront modulation. By employing structured optical pumping, multiple metasurface architectures are reconfigured to realize image storage, tunable focusing, and multi-bit phase modulation. Experimental results demonstrate flexible and efficient control of terahertz waves, offering versatile platforms for terahertz communication and imaging applications.

WeC02-03

10:00-10:20

An overview of Terahertz phase imaging (*Invited paper*)

N. Petrov; ITMO University, Russia

An overview of the terahertz phase imaging landscape is presented, covering various sources, detection modes, and holographic configurations. Despite intensive development, the comprehensive application and evaluation of iterative phase retrieval algorithms in the THz range remain underexplored. This gap is addressed through analysis of hardware components and comparison of algorithms, supported by practical examples in biomedicine, industry, and security.

- Coffee Break -

Location: Piedmonte Room, Floor 3; Wednesday, June 24, 2026

C02. CHINESE-RUSSIAN INTERNATIONAL SYMPOSIUM ON PHOTONICS (CRISP 2026) 2

WeC02-06

15:00-15:20

Metalens for control of complex light fields (*Invited paper*)

Li Li¹, Ruoxing Wang², Qianyun Zhang³; ¹Harbin Institute of Technology, ²North China Electric Power University, ³Tianjin University, China

The presentation introduces diverse metalenses to control complex light field. We proposed a reflective metalens with four focal points for polarization detection. A metalens for generating a customized vectorial focal curve was achieved. A compact metalens spectrometer was demonstrated with the wavelength and phase multiplexing. A metasurface approach to generate multispectral grafted perfect vector vortex beams was realized in experiment.

WeC02-04

10:20-10:40

Modulation of ferroelectric polarization and electro-optic properties based on the synergistic effect of optical field and electric field (*Invited paper*)

P. Tan, X. Jin, B. Xing, H. Tian; Harbin Institute of Technology, China

Precise laser control relies on electro-optic crystals, whose performance stems from ferroelectric polarization. This study modulated polarization and electro-optic properties via the synergistic effect of optical field and electric field in potassium tantalate-niobate crystals, drastically enhancing polarization stability and electro-optic effects, providing effective ferroelectric regulation strategies.

WeC02-05

10:40-11:00

Terahertz multifunctional modulation device based on electrically controlled liquid crystal with structured electrodes and metasurfaces (*Invited paper*)

Y. Wang, C.X. Liu, Y.Y. Jia; School of Physics, Harbin Institute of Technology, China

To address the challenge of difficult dynamic switching of terahertz structured light beams, high-efficiency THz phase modulation is realized via electrically controlled liquid crystals, and the tunable THz wavefront control and multifunctional integration are achieved by combining structured THz-transparent electrodes with metasurfaces.

WeC02-06

15:00-15:20

Metalens for control of complex light fields (*Invited paper*)

Li Li¹, Ruoxing Wang², Qianyun Zhang³; ¹Harbin Institute of Technology, ²North China Electric Power University, ³Tianjin University, China

The presentation introduces diverse metalenses to control complex light field. We proposed a reflective metalens with four focal points for polarization detection. A metalens for generating a customized vectorial focal curve was achieved. A compact metalens spectrometer was demonstrated with the wavelength and phase multiplexing. A metasurface approach to generate multispectral grafted perfect vector vortex beams was realized in experiment.

WeC02-07

15:20-15:40

Fabrication of computer-generated holograms for high-precision optical testing (*Invited paper*)

Xiangji Bian¹, Roman Kuts², Kai Xu¹, Hongda Wei¹, Haixiang Hu¹, Zhiyu Zhang¹, V.P. Korolkov²; ¹Changchun Institute of Optics, Fine Mechanics and Physics, CAS, China; ²Institute of Automation and Electrometry of SB RAS, Russia

A Computer-Generated Hologram (CGH) is a diffractive null lens used together with the laser interferometer for measuring surface figures of aspheres and freeform optics. It offers the advantages of interferometry, such as full resolution, snapshot measurement, and high accuracy. In this presentation, recent advancements in fabrication of CGHs is discussed. These developments enable the high-precision testing of large-aperture aspheric mirrors.

WeC02-08 15:40-16:00 WeC02-10 16:20-16:40

Thin films of carbon nanotubes for advanced sensorics and optics (*Invited paper*)
 N.I. Raginov¹, A.V. Radivon², A.S. Ezersky³, A.V. Chernykh³, A.V. Terentyev², K.V. Zhivetyev², I.I. Rakov¹, I.V. Novikov¹, E.G. Tsiplakova³, M.I. Paukov², V.V. Starchenko², A.V. Arsenin², K.I. Zaitsev⁴, N.V. Petrov³, M.G. Burdanova^{2,4}, D.S. Kopylova¹, B.P. Gorshunov², V. Volkov², A.G. Nasibulin¹, D.V. Krasnikov¹; ¹Skolkovo Institute of Science and Technology, ²Moscow Institute of Physics and Technology, ³ITMO University, ⁴Prokhorov Institute of General Physics of RAS, Russia
 Here we report our recent advances on tuning carbon nanotubes to create an element base in the THz range. By identifying five levels of material organization ("individual nanotubes", "nanotube agglomerates", "network of agglomerates", "structured assembly", "system of assemblies"), we transform the polyphony of properties of carbon nanotubes to THz field and sensorics create modulators, sensors, etc.

Unveiling ultra-high helical dichroism by twisted light with twisted nanostructure (*Invited paper*)
 Xingguang Liu, Shuyuan Hu, Shengjie Gao, Junqing Li; School of Physics, Harbin Institute of Technology, China
 The advent of twisted beam has introduced new forms of chirality through the helical wavefronts, which gives strong interaction with twisted structure. Here we present how to greatly enhanced this kind of dichroism by chiral nanostructures.

WeC02-09 16:00-16:20 WeC02-11 16:40-17:00

Pd-coated Au core-shell nanorod metamaterial for optical hydrogen sensing (*Invited paper*)
 Yajie Wang, Haibin Ni; Nanjing University of Information Science and Technology, China
 We report a compact optical hydrogen sensor based on Au@Pd nanorod arrays embedded in anodic aluminum oxide (AAO). Near-field coupling between localized surface plasmon resonance and a vertical Fabry-Pérot cavity yields a hybrid mode with enhanced refractive-index sensitivity. The device shows 11.33 nm/% sensitivity from 0–2 vol% H₂, with <20 s response, <50 s recovery, and stable cycling over time.

Two-dimensional single-crystal gold for extreme nanophotonics (*Invited paper*)
 Pan Wang; Zhejiang Univ., China
 In this work, by downscaling the thickness of plasmonic nanostructures to the nanometer limit, we show that atomic scale light-matter interactions can be significantly enhanced, enabling the realization of ultrathin photonic devices with high performance.

- Coffee Break -

Location: Piedmonte Room, Floor 3; Wednesday, June 24, 2026

C02. CHINESE-RUSSIAN INTERNATIONAL SYMPOSIUM ON PHOTONICS (CRISP 2026) 3

WeC02-12 17:30-17:50 WeC02-15 18:30-18:50

Computational imaging lidar (*Invited paper*)
 Chenfei Jin; School of Physics, Harbin Institute of Technology, China
 We reviewed the significant role that "computation" has played in driving the innovation of imaging lidar systems. We also introduced the research work conducted by our group in different stages of the development of computational imaging lidar, and finally looked forward to the future development trends of imaging lidar.

SVETIANNa: an open-source framework for diffractive optical neural networks and its applications (*Invited paper*)
 A. Kokhanovskiy¹, S. Chugunov¹, V. Igoshin¹, A. Sherbakov¹; ¹School of Physics and Engineering, ITMO University, Russia
 We present SVETIANNa, an open-source Python framework for the simulation, training and design of diffractive optical neural networks (D²NN). Built on top of PyTorch, the library represents every optical element as a differentiable module, so that complete free-space optical pipelines — phase masks, amplitude masks, lenses, apertures, polarizers, detectors and propagators - can be assembled and trained end-to-end with standard gradient-based optimizers.

WeC02-13 17:50-18:10

Light field manipulation and computing based on diffractive optical neural networks (*Invited paper*)
 Weiqiang Ding, Qi Jia; Harbin Institute of Technology, China
 We utilize diffractive optical neural networks to light field compensation and multispectral high-resolution polarization imaging. We also propose a novel optical computing architecture that integrates diffractive metasurfaces and deep neural networks, enabling snapshot real-time measurement of the polarization states of vector beam modes and hybrid-order Poincaré beams, and discussed the effect of spatial coherence on the performance of DONN.

WeC02-14 18:10-18:30

High-throughput spatiotemporal microscopic imaging (*Invited paper*)
 Yutong Li, Zhengjun Liu; School of Physics, Harbin Institute of Technology, China
 Our work provides the guidelines and insights for high-throughput microscopic applications in pathology and real-time dynamic observation.

C02. CHINESE-RUSSIAN INTERNATIONAL SYMPOSIUM ON PHOTONICS (CRISP 2026) - POSTERS

Location: Congress Hall, Floor 1; Wednesday, June 24, 2026

- WeC02-p01** 10:00-13:30 **Bias-voltage control of terahertz waves by thin-film bismuth strips**
P.S. Demchenko¹, N.S. Kablukova^{1,2}, V.V. Nikolaev³, Yu.V. Kistenev³, M.K. Khodzitsky; ¹Terahertz Photonics LLC, ²Herzen State Pedagogical University, ³National Research Tomsk State University, Russia
We study bias-voltage dependent of the structure of bismuth thin-film strips on a mica substrate on effective optical properties and transmittance. It was shown that the modulation depth has a value up to 47.7% at 1.2 THz at 0-28.6V bias-voltage. There were different amplitude modulation modes in different spectral ranges. The strips structure had decreased sample's plasma frequency.
- WeC02-p02** 10:00-13:30 **Beam profiling of a terahertz quantum cascade laser using phase retrieval**
I.G. Stepanov¹, E.G. Tsipakova^{1,2}, A.V. Chernykh¹, I.E. Rykov³, M.V. Maytama³, I.A. Glinskiy³, D.A. Belov^{3,4}, A.V. Ikonnikov^{3,4}, R.A. Khabibullin³, N.V. Petrov^{1,5}; ¹Digital and Display Holography Laboratory, ITMO University, Russia; ²Qingdao Innovation and Development Center, Harbin Engineering University, China; ³Moscow Institute of Physics and Technology, Russia; ⁴Physics Department M.V. Lomonosov Moscow State University, Russia; ⁵School of Physics, Harbin Institute of Technology, China
Beam emitted by quantum cascade laser operating at 3.75 THz is characterized. Raster-scanning with a Golay cell provided intensity measurements at different propagation planes. Phase fronts are obtained by means of single beam multiple intensity reconstruction method. The performed analysis allows for comprehensive understanding of the beam profile, enabling precise alignment of the optical scheme.
- WeC02-p03** 10:00-13:30 **Crystal growth and Terahertz time-domain spectroscopy in Sm-xR_xFeO₃ orthoferrite**
Anhua Wu¹, Zhen Zhang¹, Liangbi Su¹, A.M. Kalashnikova², R.V. Pisarev²; ¹Shanghai Institute of Ceramics, CAS, China; ²Ioffe Institute of RAS, Russia
The dynamics of spin reorientation phase transition is studied in SmxR1-xFeO3 single crystal. Our results demonstrate that Terahertz time-domain spectroscopy is an effective method to study iron ions spin reorientation phase transition.
- WeC02-p04** 10:00-13:30 **Parametric study and spectral control of plasma photonic crystal slabs**
Nie Chen¹, Ying Wang^{1,2,3}, Chengxun Yuan^{1,2,3}, Zhongxiang Zhou^{1,2,3}; ¹School of Physics, Harbin Institute of Technology, ²Heilongjiang Provincial Key Laboratory of Plasma Physics and Application Technology, ³Heilongjiang Provincial Innovation Research Center for Plasma Physics and Application Technology, China
This paper presents a unified modeling framework for plasma photonic crystal slabs (PCS) in the GHz band. We investigate the tunable spectral response controlled by geometric parameters and plasma parameters. Numerical results reveal the influence of plasma dispersion on guided mode resonance, proposing a strategy for realizing reconfigurable electromagnetic device with tunable bandwidth and lineshape.
- WeC02-p05** 10:00-13:30 **Scanning off-axis beam wavefront detection method based on metasurface**
Xingdong Liu, Li Li; Harbin Institute of Technology, China
By using metasurfaces and through the principle of PB phase control and the derivation of the generalized Snell's law, researchers have successfully achieved the detection of the isophase surfaces of unknown beams under off-axis conditions.
- WeC02-p06** 10:00-13:30 **High-speed structured fields generation via spinning disk and multichannel diffraction optics**
V.S. Shumigai^{1,2}, P.A. Khorin¹; ¹Samara National Research University, ²ITMO University, Russia
This work presents the design of a high-speed spatiotemporal light modulator based on a spinning disk with diffractive masks. The modulator's core topology employs multi-order diffractive optical elements (DOEs) featuring 25 diffraction orders and a resolution of 256 × 256 pixels. This architecture enables the integration of over 300 distinct DOEs on a 135-mm diameter disk.
- WeC02-p07** 10:00-13:30 **Normalized cutoff frequency as a universal robustness metric for optical diffractive neural networks**
Ning Wang¹, Siyuan Wang¹, Zonglin Guo¹, Yu Zhao², Qi Jia¹, Jingbo Zhang¹, Jian Wang¹; ¹Harbin Institute of Technology, ²Beijing Institute of Spacecraft System Engineering, China
We address the underexplored robustness of optical diffractive neural networks (ODNNs) for real-world deployment. We introduce a normalized cutoff frequency (NCF) criterion and show robustness is governed by the light field's spatial-frequency bandwidth. Across architectures, equal NCF yields comparable robustness in classification and regression, for both linear and nonlinear ODNNs, enabling efficient robustness prediction for large-scale models.
- WeC02-p08** 10:00-13:30 **Performance limits of pattern dithering for compressive sensing imaging**
V.S. Shumigai, V.S. Tuchin, A.O. Ismagilov, A.N. Tcyppkin; ITMO Univ., Russia
This work analyzes image reconstruction accuracy in compressive sensing with grayscale patterns. Such patterns require dithering for projection on binary modulators, introducing signal distortion. We quantify how this distortion grows with scaling factor of dithered pattern.
- WeC02-p09** 10:00-13:30 **Experimental investigation of frequency-modulated single-pixel imaging Lidar**
A.K. Lappo-Danilevskaia¹, A.O. Sazhin^{2,3}, A.O. Ismagilov¹, A.S. Sinko^{2,3}, V.S. Shumigai¹; ¹ITMO University, ²Lomonosov Moscow State University, ³NRC Kurchatov Institute, Russia
The use of single-pixel imaging (SPI) as an alternative to conventional detector-array based imaging systems in Lidar technologies represents a promising approach and is especially relevant for frequency-modulated continuous-wave (FMCW) Lidar. In this work, we experimentally demonstrate that a FMCW LiDAR system based on the SPI concept is capable of simultaneously measuring distances and visualizing multiple objects.
- WeC02-p10** 10:00-13:30 **Improving noise robustness in single-pixel imaging via adaptive frequency-hopping modulation**
E.N. Oparin, A.N. Tcyppkin; ITMO Univ., Russia
We present an adaptive frequency-hopping spread-spectrum (FHSS) method for improving the noise robustness of single-pixel imaging (SPI). By distributing the modulation across multiple frequencies and dynamically excluding corrupted ones, the system maintains high reconstruction quality under low-frequency drifts and narrowband interference. Numerical simulations and experiments confirm substantial improvements over conventional SPI.

- WeC02-p11 10:00-13:30
Improving the accuracy of an optical-electronic triangulation system with active laser markers through the use of redundant measurement information
 A.A. Luzanov, I.A. Konyakhin; ITMO Univ., Russia
 The paper presents a multichannel optical-electronic triangulation system with active emitting markers for monitoring large-scale structures. It is shown that the use of redundant measurement information and appropriate processing methods increases the accuracy of spatial coordinate determination without additional hardware complexity.
- WeC02-p12 10:00-13:30
High-brightness multimode fiber laser based on wavefront shaping
 Zhen Huang^{1,2}, Chenxin Gao^{1,2}, Xiaofei Ma^{1,2}, Xiangfei Zhu^{1,2}, Xin Tian^{1,2}, Chenzi Lun^{1,2}, Pengfei Ma^{1,2}, Zefeng Wang^{1,2}; ¹College of Advanced Interdisciplinary Studies, National University of Defense Technology, ²Nanhu Laser Laboratory, National University of Defense Technology, China
 In this work, we first theoretically demonstrate that a diffraction-limited Gaussian beam ($M^2 \approx 1$) can be achieved through coherent superpositions of fiber modes. We experimentally implement intensity-guided wavefront shaping in a high-power multimode fiber amplifier. Using a genetic algorithm with the optimized TR size, we achieve a focused output beam at 168 W average power, representing an eightfold brightness enhancement compared to the uncontrolled multimode output.
- WeC02-p13 10:00-13:30
High-power all-fiber laser exceeding 3 kW based on a pair of YDF-FBGs fabricated by femtosecond laser direct writing
 Xinda Lu^{1,2}, Rong Zhao^{1,2}, Shancheng Liao^{1,2}, Hao Li^{1,2}, Xin Tian^{1,2}, Zilun Chen^{1,2}, Pengfei Ma^{1,2}, Zefeng Wang^{1,2,4}; ¹College of Advanced Interdisciplinary Studies, National University of Defense Technology, ²Nanhu Laser Laboratory, National University of Defense Technology, China
 This work demonstrates that femtosecond laser direct writing through the coating is a viable and promising technique for fabricating high-power-rated fiber Bragg gratings in active fibers, paving the way for further power scaling of monolithic all-fiber lasers.
- WeC02-p14 10:00-13:30
Fabrication of kilowatt-level chirped tilted fiber Bragg gratings using femtosecond laser direct writing method
 Cong Chen^{1,2}, Hao Li^{1,2}, Shancheng Liao^{1,2}, Meng Wang^{1,2}, Rong Zhao^{1,2}, Xin Tian^{1,2}, Zilun Chen^{1,2}, Pengfei Ma^{1,2}, Zefeng Wang^{1,2}; ¹College of Advanced Interdisciplinary Studies, National University of Defense Technology, ²Nanhu Laser Laboratory, National University of Defense Technology, China
 Our works verifies the feasibility of fabricating high-power chirped tilted fiber Bragg gratings using the femtosecond laser direct writing system, which provides new insights into the development of CTFBG for high-power fiber lasers.
- WeC02-p15 10:00-13:30
Study of optical transmission in GaP nanowire-based directional 2x2 couplers
 M.A. Anikina¹, A. Kuznetsov¹, D.V. Grudin¹, A.N. Abramov³, V.A. Sharov², V.M. Kondratev¹, A.D. Bolshakov¹; ¹Moscow Center for Advanced Studies, ²Alferov Univ., ³School of Physics and Engineering, ITMO Univ.
 We investigate the optical properties of a GaP nanowire-based 2x2 coupler with the aim of developing a fully functional nanophotonic device and optimizing its performance. Optical transmittance is shown to depend on the coupling length, nanowire (NW) diameters, and gap between NWs. Mechanical assembly and the intrinsic elasticity of GaP NWs enable in-situ tuning, demonstrating reconfigurable nanophotonic couplers.
- WeC02-p16 10:00-13:30
Modeling of a distributed feedback laser based on a fiber Bragg grating in erbium-doped fiber
 Ia.D. Moor, A.V. Kulikov, G.P. Miroshnichenko, I.A. Pakhomov; ITMO University, Russia
 This work investigates the stability of DFB fiber lasers via modeling and experiment. A sufficient active medium gain is proven essential for stable single-frequency operation, confirmed using FiberCore Er-doped fibers. A 70 mm FBG caused observed spectral splitting, explained by a noise-inclusive coupled-mode model. Simulations show a small distributed chirp ($\xi = 4.3 \times 10^{-3}$ nm/cm) stabilizes the ASE peak, analogous to a π -phase shift. The results are vital for designing stable lasers for sensing and communications.
- WeC02-p17 10:00-13:30
High brightness radiation sources and isotopes production generated by high power laser beams
 Mingzhe Yang¹, Ziyao Wang¹, Jieru Ren¹, Wenqing Wei¹, Benzhen Chen¹, Bubo Ma¹, Shizheng Zhang¹, Lirong Liu¹, Fangfang Li¹, Jie Xiong¹, Hongwei Yue¹, Zeyu Lai¹, Wenxuan Li¹, Dieter Hoffmann¹, Olga Rosmej², Parysatis Tawana², N.E. Andreev³, I.R. Umarov³, Zhigang Deng⁴, Wei Qi⁴, Shaoyi Wang⁴, Quanping Fan⁴, Zongqiang Yuan⁴, Weiwu Wang⁴, Bo Cui⁴, Xiaohui Zhang⁴, Yuchi Wu⁴, Weimin Zhou⁴, Jingqin Su⁴, Rui Cheng⁵, Yongtao Zhao⁵; ¹School of Physics, Xi'an Jiaotong University, China; ²Heavy Ion Research Center, Germany; ³Joint Institute for High Temperatures, RAS, Russia; ⁴Laser Fusion Research Center of China Academy of Engineering Physics, China; ⁵Institute of Modern Physics, CAS, China
 We explored the generation of high intensity electron beams to generate high brightness radiation sources using the interaction of high-power laser-radiation with near-critical density plasma. The laser generated electron beam was directed onto a tantalum converter, and resulted in a photon production of 1010 photons/(MeV·sr). We investigated the spatial angular distribution and energy spectral information of these radiation sources. Our findings also demonstrate the efficient feasibility of producing isotopes based on direct laser acceleration.
- WeC02-p18 10:00-13:30
Spectral-control-assisted Kerr-lens mode-locking in a Tm:Y₂O₃ ceramic laser
 Zeyu Gong¹, Jing Wang¹, Panqiang Kang¹, Weichao Yao¹, Yujie Peng¹, Jun Wang², Dingyuan Tang³, Yuxin Leng¹; ¹State Key Laboratory of Ultra-intense Laser Science and Technology, Shanghai Institute of Optics and Fine Mechanics, CAS, ²Jiangsu Key Laboratory of Advanced Laser Materials and Devices, Jiangsu Normal University, ³Future Technology School, Shenzhen Technology University, China
 We report a Kerr-lens mode-locked Tm:Y₂O₃ ceramic laser stabilized by spectral control, that delivers an average output power of 0.5 W with a pulse duration of 113 fs at a repetition rate of 91 MHz. Further optimization for shorter pulses achieved a duration of 107 fs, at the reduced output power of 0.22 W.
- WeC02-p19 10:00-13:30
Tri-additive PEGDA-based quasi-solid electrolyte for enhanced ion transport and interface stability in Li-O₂ batteries
 Jiaqi Wang¹, Xiqiang Huang¹, Xingbao Zhu², Yuanguo Wu¹, Zining Man¹, Xiangyu Wen¹, Weiting Qi², Xing Tang², Zhe Liu¹; ¹Center for Condensed Matter Science and Technology, Harbin Institute of Technology, ²School of Physics, Beijing Institute of Technology, China
 Solid polymer electrolytes for Li-O₂ batteries often suffer from low ionic conductivity and high interfacial resistance. We report a PEGDA-based quasi-solid electrolyte formed in situ polymerization with cellulose acetate, N-methyl-2-pyrrolidone and fluoroethylene carbonate. Synergistic Li⁺ coordination and interphase stabilization deliver 8.54×10^{-4} S cm⁻¹ conductivity, $t_{Li^+} = 0.78$, and markedly improved Li-O₂ cycling performance.

WeC02-p20

10:00-13:30

Trace triazole enables kinetic-controlled Zn deposition via adsorptive interface regulation for highly reversible zinc metal anodes

Jingwen Shao¹, Ping Lei², Lan Jin¹, Jiehui Liu¹, Shuyuan Zhuge¹, Zhe Lü¹; ¹Harbin Institute of Technology, ²Harbin University of Science and Technology, China

Trace 1H-1,2,3-Triazole (Trl) additive reconfigures the Zn interface to enhance aqueous zinc-ion battery stability. Trl preferentially adsorbs on Zn anodes, forming a water-depleted layer that suppresses side reactions. By accelerating interfacial de-solvation while preserving bulk solvation, Trl enables kinetic-controlled uniform deposition. This achieves ultra-stable cycling (5000 h) and 99.75% Coulombic efficiency, and significantly enhances practical applications.

WeC02-p21

10:00-13:30

Enhancing SHG around exceptional point by coupling a quasi-BIC and toroidal dipole modes

Jiashuo Huo¹, Qiaohua Wu¹, Wei Wang¹, Jie Lin¹, Peng Jin^{2,3}, Shutian Liu¹, Keya Zhou¹; ¹School of Physics, Harbin Institute of Technology, ²Key Laboratory of Micro-systems and Micro-Structures Manufacturing, Harbin Institute of Technology, ³School of Instrumentation Science and Engineering, Harbin Institute of Technology, China

We demonstrate an exceptional point (EP) formed by coupling a bound state in the continuum with a toroidal dipole mode in a bilayer metasurface. The EP exhibits enhanced field localization and boosts second harmonic generation efficiency by 5.6 times, further improved to 0.35 through structural perturbation, enabling high-efficiency nonlinear photonics.

C02. CHINESE-RUSSIAN INTERNATIONAL SYMPOSIUM ON PHOTONICS (CRISP 2026)

Location: Piedmonte Room, Floor 3; Thursday, June 25, 2026

C02. CHINESE-RUSSIAN INTERNATIONAL SYMPOSIUM ON PHOTONICS (CRISP 2026) 4

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| <p>ThC02-16
Digital holographic microscopy in laser processing and quantitative analysis of polarization-phase anisotropy of liquid crystals and sol-gel films (<i>Invited paper</i>)
A.V. Chernykh¹, T.V. Reztsov¹, A.S. Ezerskii^{1,2}, T. Han², V.R. Gresko¹, E.G. Tsiplakova^{1,2}, J. Li³, M.M. Sergeev¹, B. Wang², T. Orlova⁴, L. Li³, S. Makarov^{2,1}, H. Tian³, N.V. Petrov^{1,3}; ¹ITMO University, Russia; ²Harbin Engineering University, China; ³Harbin Institute of Technology, China; ⁴Yerevan State University, Armenia</p> <p>We discuss the application of digital holographic monitoring for quantitative phase analysis of polarization-sensitive materials treated with femtosecond pulses. A custom-built polarization holographic microscope reconstructs the full Jones matrix with high sensitivity, operating at three wavelengths (450, 532, 660 nm) to analyze spectral anisotropy. This enables direct visualization of laser-induced phase and polarization changes, advancing controlled laser microstructuring.</p> | <p>ThC02-19
Carrier dynamics in perovskite micro-nano structures revealed by ultrafast laser spectroscopy (<i>Invited paper</i>)
Z. Lu, C.Y. Zhao; Anhui Key Laboratory for Control and Applications of Optoelectronic Information Materials, School of Physics and Electronic Information, Anhui Normal University, China</p> <p>We applied the time-resolved photoluminescence-scanned imaging microscopy with both the sub-micron spacial resolution and ultrafast time-resolution to study the detailed carrier dynamics and transportation mechanism in both the three-dimensional and two-dimensional micro-nano structures of metal halide perovskites for future optoelectronic applications.</p> |
| <p>ThC02-17
Laser writing and microfabrication for diffractive optics and microoptics (<i>Invited paper</i>)
V.P. Korolkov, R.I. Kuts, D.A. Belousov, D.E. Kapustina; Inst. of Automation and Electrometry SB RAS, Russia</p> <p>The results of the development of technologies for fabrication of diffractive optics and microoptics are presented. The technologies include laser writing on inorganic films and photoresists, and also reactive ion etching. Typical applications of the technologies are considered.</p> | <p>ThC02-20
Low-power optical generation and polymer stabilization of topological structures in liquid-crystalline materials (<i>Invited paper</i>)
D.D. Darmoroz, S.A. Shvetsov, M.S. Rafayelyan, T. Orlova; Yerevan State University, Armenia</p> <p>Liquid crystals (LC) are versatile photonic materials with emerging applications beyond classic optoelectronics. Chiral LCs can host localized topological structures applicable in modern optics and photonics, but their implementation requires mechanical stability. A photopolymerizable, azo-dye-doped chiral LC enables the optoelectronic approach for generation and transformation of topological structures. Their configuration can be stabilized at any moment during the structural evolution.</p> |
| <p>ThC02-18
Laser-induced amplified spontaneous emission and microresonator fabrication in perovskite nanocrystal films by femtosecond processing (<i>Invited paper</i>)
L.E. Zelenkov¹, S.V. Makarov^{2,3}, D.S. Gets²; ¹School of Physics, Harbin Institute of Technology, China; ²School of Physics and Engineering, ITMO University, Russia; ³Qingdao Innovation and Development Center, Harbin Engineering University, China</p> <p>A femtosecond laser approach for inducing amplified spontaneous emission and fabricating resonant photonic structures in perovskite nanocrystal films is presented. Local laser modification enables spatially selective light amplification and direct writing of microresonators and photonic elements with controllable geometry.</p> | <p>ThC02-21
Sleep improves the effectiveness of photobiomodulation of aging brain (<i>Invited paper</i>)
O. Semyachkina-Glushkovskaya¹, V. Adushkina¹, A. Terskov¹, A. Shirokov¹, N. Navolokin^{1,2}, I. Blokhina¹, D. Zlatogorskaya¹, A. Evsyukova¹, O. Semiachkina-Glushkovskaia¹, K. Sonina¹, E. Ilyukov³, S. Popov³, D. Myagkov³, D. Tuktarov³, I. Fedosov³; ¹Department of Biology, Saratov State University, ²Department of Pathological Anatomy, Saratov State Medical University, ³Institute of Physics, Saratov State University, ⁴Department of computer science and information technology, Saratov State University, Russia</p> <p>Age is a limiting factor in photobiomodulation (PBM) of the aging brain and treatment of age-related brain diseases. In this study, we tested and confirmed the hypothesis that sleep improves therapeutic efficacy of PBM in aged mice in terms of beta-amyloid clearance and cognitive function.</p> |

- Coffee Break -

Location: Piedmonte Room, Floor 3; Thursday, June 25, 2026

C02. CHINESE-RUSSIAN INTERNATIONAL SYMPOSIUM ON PHOTONICS (CRISP 2026) 5

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| <p>ThC02-22
Methods and technologies for creating high-quality fiber-optic filters for high-coherence lasers and QKD systems (<i>Invited paper</i>)
A.V. Kulikov, Ia.D. Moor, S.V. Varzhel, A.A. Dmitriev, V.A. Klishina, U.R. Korobkova, D.M. Kaliagina; ITMO University, Russia</p> <p>This paper presents methods for fabricating high-quality fiber Bragg grating (FBG) filters. Narrowband, highly reflective FBGs were inscribed using phase mask and four-mirror interferometer techniques with KrF excimer lasers. An apodization method was optimized to achieve >23 dB side lobe suppression. The developed filters, including a cascaded configuration with a 47 pm bandwidth and >50 dB attenuation, demonstrate superior spectral selectivity compared to commercial counterparts, making them suitable for QKD systems and coherent lasers.</p> | <p>ThC02-23
Biochemical sensing based on surface structural modification of optical fibers (<i>Invited paper</i>)
X.H. Yang; Harbin Engineering University, China</p> <p>Fiber-optic biochemical sensors enable highly sensitive trace detection through surface functionalization that enhances light-matter interactions. This work presents integrated microfluidic, SERS, and photoelectrochemical sensing architectures based on functionalized hollow and coreless fibers, demonstrating strong potential for trace analysis, multiphysics sensing, and in situ detection in confined environments.</p> |
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- ThC02-24 12:10-12:30 ThC02-26 12:50-13:30
Dynamics of multitype mode-locking and pulse control in the ultrafast fiber lasers (*Invited paper*)
 Lei Jin; Harbin Engineering University, China
 This report focuses on the core bottlenecks and innovative breakthroughs in mode-locking technology for ultrafast fiber lasers, systematically sharing insights through a three-dimensional framework of "mechanism construction – dynamic analysis – intelligent control." It combines theoretical depth with engineering value, providing important references for research and applications in related fields.
- ThC02-25 12:30-12:50 ThC02-27 13:10-13:30
Integrated optics and optical devices in special functional fibres: focus on multi-core fibres and their sensing applications (*Invited paper*)
 Xinghua Yang¹, Fengjun Tian¹, Li Li², Yuanyuan Xiang¹; ¹Harbin Engineering University, ²Harbin Institute of Technology, China
 Multi-core fibres (MCFs), pivotal special functional fibres, enable multi-light-beam manipulation for high-performance sensing. This report highlights tailored MCF design/fabrication via advanced technologies, novel sensing platforms (SPR/LSPR sensors), and robust applications in structural health, biomedicine, and marine industries. It also addresses challenges and future AI-integrated, miniaturized development directions.
- ThC02-26 12:50-13:30
High power 2 μm lasers from bulk to thin -disk geometry (*Invited paper*)
 Weichao Yao; Shanghai Institute of Optics and Fine Mechanics, CAS, China
 The 2 μm lasers hold significant potential for material processing and EUV generation. We have developed in-band pumped Ho lasers with <100 fs pulses in bulk and >200 W in thin-disk geometries, and are developing high-power amplifiers.
- ThC02-27 13:10-13:30
Diamond Brillouin laser- featuring single-frequency output with high power and narrow linewidth (*Invited paper*)
 Duo Jin¹, Zhenxu Bai², Yulei Wang², Zhiwei Lv², Richard Paul Mildren³; ¹Northeast Forestry Univ., ²Hebei Univ. of Technology, China; ³Macquarie Univ., Australia
 High-power narrow-linewidth lasers are vital for advanced scientific applications. Traditional lasers face limitations like ASE and mode instability. In contrast, Brillouin lasers using SBS gain achieve quantum-noise-limited, ultra-narrow linewidths. This research demonstrates a spatial-structure Brillouin laser producing 22.5 W single-frequency output at 37.5% efficiency. To suppress cascaded Stokes waves, a method linking cascade order to cavity FSR and medium parameters is derived. Using diamond, with its high sound velocity, enables high-power single-frequency operation without cascading interference.

- Lunch Break -

Location: Piedmonte Room, Floor 3; Thursday, June 25, 2026

C02. CHINESE-RUSSIAN INTERNATIONAL SYMPOSIUM ON PHOTONICS (CRISP 2026) 6

- ThC02-28 15:00-15:20 ThC02-31 15:55-16:10
Controlling femtosecond laser generation through tunable carbon nanotube saturable absorber (*Invited paper*)
 Yu. Gladush; Skoltech, Russia
 In our work, we investigate the saturable absorption of electrochemically gated carbon nanotubes and demonstrate that the gating effect exhibits nontrivial wavelength dependence. We then integrate a carbon nanotube electrochemical cell with a side-polished fiber and insert it into a fiber laser to achieve femtosecond pulse generation. By tuning the absorption saturation, we switch between various pulse generation regimes: Q-switching, mode locking, harmonic mode-locking of various orders. These findings open avenues toward efficient, high-repetition-rate lasers operating in harmonic mode-locking regimes.
- ThC02-31 15:55-16:10
New progress of high-power narrow-linewidth pulsed fiber lasers
 Pengfei Ma^{1,2,3}, Heting Du^{1,2}, Xin Tian^{1,2}, Zilun Chen^{1,2}, Zefeng Wang^{1,2}; ¹College of Advanced Interdisciplinary Studies, National University of Defense Technology, ²Nanhu Laser Laboratory, National University of Defense Technology, China
 In this report, two types of large-mode-area active fibers are designed and fabricated to balance these competing constraints, achieving record-level performance in both high-peak-power and high-average-power regimes. Based on the master oscillator power amplifier (MOPA) architectures, a record peak power of 200 kW at 270 W average power was achieved with a spectral linewidth of 2.53 GHz, pulse duration of 450 ps, and near-diffraction-limited beam quality.
- ThC02-29 15:20-15:40 ThC02-32 16:25-16:40
Kerr microcomb states in nontrivial dispersion profiles (*Invited paper*)
 A.A. Gelash, A.Yu. Kolesnikova; Center of Engineering Physics, Skolkovo Institute of Science and Technology, Russia
 We investigate the formation of coherent and partially coherent nonlinear optical states within the Lugiato–Lefever equation model of optical cavities with nontrivial dispersion profiles. Considering the current state of the art in dispersion engineering, we study new Kerr soliton states that may address the long-standing challenges of microcomb technology—self-referencing and high conversion efficiency.
- ThC02-32 16:25-16:40
Non-destructive quality grading of milled rice via synergistic fusion of deep learning and explicit optical metrics using SS-OCT
 Yuantong Liu^{1,2,3}, Xinxu Duan^{1,2,3}, Lei Jin^{1,2,3}; ¹College of Physics and Optoelectronic Engineering, Harbin Engineering University, ²Key Laboratory of Photonic Materials and Device Physics for Oceanic Applications, ³Qingdao Innovation and Development Center of Harbin Engineering University, China
 This paper presents a non-destructive framework for classifying milled rice quality grades using 1310 nm swept-source optical coherence tomography (SS-OCT). We propose a fusion strategy that combines deep learning-based texture features with explicit optical metrics. By integrating morphological patterns with physical density quantification, the proposed method effectively detects subsurface defects to ensure precise quality grading.
- ThC02-30 15:40-15:55 ThC02-33 16:40-17:00
2.2 kW narrow-linewidth laser delivery over 1 km anti-resonant hollow-core fiber
 J. Shi^{1,2,3}, Z. Chen^{1,2,3}, J. Jia^{1,2,3}, G. Sun^{1,2,3}, Z. Wang^{1,2,3}; ¹College of Advanced Interdisciplinary Studies, National University of Defense Technology, ²Nanhu Laser Laboratory, National University of Defense Technology, ³Hunan Provincial Key Laboratory of High Energy Laser Technology, National University of Defense Technology, China
 This work represents the first demonstration of all-fiber, kilometer-level delivery of narrow-linewidth lasers, marking a significant step toward practical applications such as coherent detection, LiDAR, and gravitational wave detection.
- ThC02-33 16:40-17:00
Study on hot-electron photoelectric conversion (*Invited paper*)
 W. Shao; Guangxi Normal University, China
 We have designed several hot-electron extraction junctions to explore the path to reliable and feasible photoelectric conversion.

- Coffee Break -

Location: Piedmonte Room, Floor 3; Thursday, June 25, 2026

C02. CHINESE-RUSSIAN INTERNATIONAL SYMPOSIUM ON PHOTONICS (CRISP 2026) 7

- ThC02-34 17:30-17:50
- New types of ferroelectric crystals and photoelectric functional devices** (*Invited paper*)
Hao Tian; School of Physics, Harbin Institute of Technology, China
Taking ferroelectric crystals as the research subject, this work achieved efficient modulation of their optical and piezoelectric properties via methods including chemical doping and external field modulation, which demonstrates the high tunability of the material properties of ferroelectric crystals as well as their application potential in photoelectric functional devices.
- ThC02-35 17:50-18:10
- Engineering of charged domain walls in lead-free KNN single crystals** (*Invited paper*)
C. Hu; School of Physics, Harbin Institute of Technology, China
We report a current-controlled poling protocol to induce and modulate stable CDWs density in bulk lead-free (K, Na)NbO₃ (KNN) single crystals by engineering leakage current and oxygen vacancy. The as-formed CDWs exhibit a high current-carrying capacity (exceeding 0.1 mA at 30 V) and ultra-long-term stability (over 2 years), overcoming the key limitations of previously reported counterparts.
- ThC02-36 18:10-18:30
- Domain evolution induced by multi-field and its properties in KN-based single crystals** (*Invited paper*)
Xiangda Meng, Yifeng Suo, Yining Dong; School of Physics, Harbin Institute of Technology, China
With the purpose of studying the potential of KN-based materials in piezoelectric field, we grew a few of KN-based single crystals with large size and high quality via top-seed solution growth (TSSG) method and carried out investigations of their performance. The as-grown crystal displayed outstanding properties, which is caused by the engineered domain structure induced by multi-field. In addition, the domain evolution is also investigated.
- ThC02-37 18:30-18:50
- Plasmonic nanocavities for memristive light emitting devices and ultrahigh efficiency electro-optic modulators** (*Invited paper*)
Shunping Zhang^{1,2}; School of Physics and Technology, Wuhan University, ²Wuhan Institute of Quantum Technology, China
We developed a memristive plasmonic tunneling junction for memristive light emitting device and a hybrid plasmonic cavity for record low V_{πL} electro-optic modulators operating at > 60 GHz.
- ThC02-38 18:50-19:10
- Radiation dosimetric properties via radiophotoluminescence in metal oxide-doped lithium fluoride.** (*Invited paper*)
Guanghui Ge¹, V.I. Korepanov², E.F. Policadova²; ¹Department of Physics, College of Science, Northeast Forestry University, China; ²Department of Materials Science, National Research Tomsk Polytechnic University, Russia
This work develops metal oxide -doped lithium fluoride nanocomposites for radiation dosimetry. The materials show dramatically enhanced radiophotoluminescence (RPL) sensitivity, a wide linear dose response, and allow for non-destructive, repeated readout. This makes them promising for next-generation personal dosimeters and high-resolution dose mapping in medical radiotherapy.

C02. CHINESE-RUSSIAN INTERNATIONAL SYMPOSIUM ON PHOTONICS (CRISP 2026)

Location: Pudovkin 1+2 Room, Floor 3; Friday, June 26, 2026

C02. CHINESE-RUSSIAN INTERNATIONAL SYMPOSIUM ON PHOTONICS (CRISP 2026) 8

<p>FrC02-40</p> <p>Development challenges of augmented reality waveguides: focus on critical trade-offs (<i>Invited paper</i>)</p> <p>A.B. Solomashenko, M.V. Shishova, O.L. Afanaseva; Holography and waveguide optics laboratory, BMSTU, Russia</p> <p>The report analyzes the key challenges of waveguide technologies for AR devices: diffraction – optimizing grating profiles for high efficiency and suppressing chromatic aberration; refractive – parallelism tolerances for reflective surfaces to reduce ghosting; holographic – efficiency/selectivity tradeoffs and new recording methods.</p>	<p>09:00-09:20</p>	<p>FrC02-43</p> <p>Photo-thermo-refractive glass - advanced polyfunctional material for photonics: properties, technologies and applications (<i>Invited paper</i>)</p> <p>N.V. Nikonorov, V.A. Aseev; ITMO University, Russia</p> <p>Photo-thermo-refractive glasses are a medium for recording ultra-deep volume holographic optical elements. Examples of creating the photonic elements and devices based on such glasses are presented: ultra-narrow-band spectral filters, chirped Bragg gratings for light pulse compression, spectral multiplexers with high spectral resolution, laser light beam combiners, holographic prisms for testing of rocking platforms, holographic waveguides for AR glasses.</p>	<p>10:00-10:20</p>
<p>FrC02-41</p> <p>AR displays based on slanted waveguide diffractive periscopes (<i>Invited paper</i>)</p> <p>A.N. Putilin^{1,2}, S.S. Kopenkin^{1,2}, N.A. Putilin^{1,2}, S.E. Dubynin¹, Yu.P. Borodin^{1,2}; ¹Lebedev Physical Institute RAS, ²Moscow State University of Geodesy and Cartography, Russia</p> <p>Waveguide diffractive periscopes (WDP) in AR display design provide both optical axis shift and exit pupil multiplication. In addition to the classic configurations, the variations of the diffractive element parameters makes it possible the slanted variant of design. We investigated the dependence of the maximum angular field of view for various WDP design modifications, including several original designs.</p>	<p>09:20-09:40</p>	<p>FrC02-44</p> <p>Bound states in the continuum for applied photonics (<i>Invited paper</i>)</p> <p>M.V. Rybin^{1,2}; ¹School of Physics and Engineering, ITMO University, ²Ioffe Institute, Russia</p> <p>Here I trace the advancement of bound states in the continuum (BICs) from fundamental principles to functional metasurface applications. It highlights key demonstrations in silicon-based platforms for chiral dichroism and polarization-independent electromagnetically induced transparency, progresses to active switching with phase-change materials, and examines critical studies on Q-factor scaling and structural robustness.</p>	<p>10:20-10:40</p>
<p>FrC02-42</p> <p>Development of an immersive virtual reality simulator for training and retraining of water transport specialists (<i>Invited paper</i>)</p> <p>A.N. Popov¹, D.V. Zakharkin², A.S. Nekrasov¹; ¹AUMSU, ²VR Concept, Russia</p> <p>Training of maritime specialists is currently implemented in a digital environment. The STCW Convention will soon mandate such training on virtual reality simulators. VR Concept, utilizing a Russian 3D engine, makes it possible this idea to be realized today. 3D modelling and initial texturing of key units and the engine room scene have been performed based on authentic layout drawings.</p>	<p>09:40-10:00</p>	<p>FrC02-46</p> <p>Neural network analysis of bound states in the continuum in disordered dielectric metasurfaces</p> <p>K.V. Semushev, N.A. Vlasov, A.I. Solomonov, Z.F. Kondratenko, E.E. Maslova; ITMO University, Russia</p> <p>This study explores how imperfections affect the Q factor of symmetry-protected bound states in the continuum in dielectric structures. Using neural networks, we analyze position disorder and shape defects. The approach enables rapid assessment of imperfection impacts, drastically reducing required computational resources.</p>	<p>10:40-10:55</p>

- Coffee Break -

Location: Pudovkin 1+2 Room, Floor 3; Friday, June 26, 2026

C02. CHINESE-RUSSIAN INTERNATIONAL SYMPOSIUM ON PHOTONICS (CRISP 2026) 9

<p>FrC02-47</p> <p>Pushing plasmonic nanogaps to sub-5 nm limit in ultrathin single-crystal gold</p> <p>Chenming Wu; Zhejiang University, China</p> <p>Here we report the realization of sub-5-nm gaps in single-crystal gold films with thicknesses down to 4 nm, achieved by using focused helium ion beam milling. This capability establishes ultrastrong optical confinement in both in-plane and out-of-plane directions and opens new opportunities for extreme nanophotonics.</p>	<p>11:30-11:45</p>	<p>FrC02-49</p> <p>High-Q resonance Terahertz metasensors</p> <p>Fei Yan, Li Li, Hao Tian; Harbin Institute of Technology, China</p> <p>High-quality-factor (high-Q) resonances in the terahertz (THz) regime are pivotal for advancing ultrasensitive biochemical sensing. However, achieving high-Q factors has been a long-standing challenge due to the inherent ohmic and radiation losses in metamaterials, particularly for magnetic dipole resonances. In this presentation, I will introduce the recent experimental and theoretical works of high-Q THz metasensors, beginning with fundamental designs aimed at pushing the limits of Q-factor and figure-of-merit (FOM).</p>	<p>12:00-12:15</p>
<p>FrC02-48</p> <p>Measurement of dielectric function of single crystal gold</p> <p>Yi Luo; Zhejiang University, China</p> <p>Here we determine the complex dielectric function of chemically synthesized single-crystal gold flakes (bulk-like thickness, >150 nm) using imaging micro-area spectroscopic ellipsometry over 360–1000 nm. Relative to widely used datasets for single-crystal and polycrystalline gold, our measurements show a markedly smaller value of the imaginary part of the permittivity (lower ϵ_2) in the spectral range from ~600-1000 nm, consistent with reduced dissipation.</p>	<p>11:45-12:00</p>		

A1. EXHIBITION WORKSHOP

Зал Пьемонт, 3 этаж
24 Июня 2026, 11:30–13:30
Язык мероприятия: русский и английский

Piedmonte Room, 3rd floor
June 24, 2026, 11:30–13:30
The event will be held in English and Russian

11:30–11:45

Стратегический партнер полного цикла в области оптики и фотоники: 10 лет экспертизы АО «ЛЛС»
Сердюк Е. Б., АО «ЛЛС», Россия

Full-cycle strategic partner in optics and photonics: 10 years of expertise from SC LLS
Serduk Egor, SC LLS, Russia

11:45–12:00

Компактные импульсные диодные драйверы для накачки Nd:YAG лазеров и блоки управления затворами от ООО «ОЕМ Тех». Разработка и производство
Старовыборнов А. Б., ООО «ОЕМ Тех», Беларусь

Compact pulsed pump-diode drivers for Nd:YAG lasers and Pockels cell drivers from OEM Tech — design and manufacturing
Starovybornov Andrey, OEM TECH, Belarus

12:00–12:15

Новые разработки компании «АВЕСТА»
Диденко Н. В., ООО «АВЕСТА», Россия

Avesta's recent product development
Didenko Nikita, LLC Avesta, Russia

12:15–12:30

Фемтосекундная компенсация дисперсии лазерного излучения, широкополосное управление поляризацией и ультрафиолетовая нелинейная фотоника: от chirpiрующих зеркал и свержахроматических волновых пластин до кристаллов CLBO
Лукьянов В., C-Component (Presenting on behalf of Shalom EO, China)

Femtosecond Laser Dispersion Compensation, Broadband Polarization Control, and Ultraviolet Nonlinear Photonics: from Chirped Mirrors, Super Achromatic Waveplates, to CLBO crystals
Lukyanov Vladimir, C-Component (Presenting on behalf of Shalom EO, China)

12:30–12:45

Инфраструктурные решения для лазерной лаборатории: Безопасность, Эргономика
Ляпин А. А., ООО «ФотонТехСистем», Россия

Infrastructure solutions for laser laboratories: Safety, Ergonomics
Lyapin Andrey, PhotonTechSystem LLC, Russia

12:45–13:00

Достижения в области мощных Nd:YAG лазеров с накачкой VCSEL-диодами
Li Yang, LASERCONN, Китай

Advances in High-Energy VCSEL-Pumped Nd:YAG Lasers
Li Yang, LASERCONN, China

13:00–13:15

ЗАО «СЛС Прайм Технолоджи» — лазеры и лазерные системы для научных исследований и промышленных задач
Бобчик А., ЗАО «СЛС Прайм Технолоджи», Беларусь

CJSC “SLS Prime Technology” — Lasers and Laser systems for Science and Industry
Bobchik Arina, CJSC “SLS Prime Technology”, Belarus

13:15–13:30

Пьезоактуаторы российского производства в управляемых зеркалах
Карев П. В., ООО «Пьезопривод», Россия

Piezoactuators manufactured in Russia for Fast Scanning Mirrors
Karev Pavel, LLC PIEZOPRIVOD, Russia

EXHIBITION “LASERS AND PHOTONICS”



AVESTA
LASERS AND OPTICAL SYSTEMS



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AVESTA Ltd. produces femtosecond lasers and relevant measurement equipment and accessories. We offer Ti:S, Yb and Cr:F solid-state fs and CW lasers, Ti:S, Yb and Cr:F fs mJ-level amplifiers up to multi-TW level, fiber lasers (Er-, Yb-doped and frequency-doubled, frequency combs and supercontinuum systems), as well as optical parametric oscillators and amplifiers.

The diagnostics include autocorrelators, VIS and IR spectrometers, cross-correlators, SPIDER. Additional components like pulse pickers, pulse compressors, Faraday isolators and rotators, THz generators, attenuators and harmonic generators are also available.

We also develop customized systems based on requirements. Our optomechanics division produces a broad range of optomechanical products like adjustable mirror mounts, translation stages, rotation stages, motorized components.

Laser Components LLC is a big Russian supplier of optics, laser, measuring and equipment for the manufacture of optical components, as well as a wide range of highly reliable electronic components and vacuum and semiconductor equipment from leading manufacturers in China.

The company is constantly increasing the range and volume of supplies, providing organizations and enterprises in critical sectors of the economy with modern and reliable instruments and components, analogues that successfully replace Western products. All products are characterized by high reliability, impeccable quality, safety and ease of operation and are provided with warranty and service. Laser Components LLC has a quality management system certificate according to GOST ISO 9001-2001 (ISO 9001:2008), as well as GOST RV 0015-002-2012.

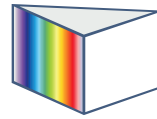
Among our clients are more than 50 organizations that are part of the Rosatom and Rostec state corporations, more than 10 organizations of the rocket and space industry, as well as about 30 research institutes.



**SSPA «OPTICS, OPTOELECTRONICS,
AND LASER TECHNOLOGY», BELARUS**

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State Scientific and Production Association of Optics, Optoelectronics and Laser Technology has been created by National Academy of Sciences of Belarus in 2011. SSPA “Optics, Optoelectronics and Laser Technology” includes such well-known organizations as B.I. Stepanov Institute of Physics of National Academy of Sciences of Belarus, Center of LED and Optoelectronic Technologies of National Academy of Sciences of Belarus, Centre of Geophysical Monitoring of National Academy of Sciences of Belarus etc. Main research and development activity of the SSPA “Optics, Optoelectronics and Laser Technology” belongs to the fields of laser physics, nonlinear optics and laser spectroscopy, microwave photonics, photoelectronics, robotic systems and sensors. Own mechanical and optical departments enable manufacturing of lasers and optics with required characteristics in the shortest time periods. One of the main directions is development and manufacturing of compact eye-safe pulsed erbium glass lasers, powerful diode-pumped Nd:YAG lasers, and optical parametric oscillators for wide temperature range.



Shalom EO

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Shalom EO is an industry-leading manufacturer and supplier specializing in high-precision optics, laser crystals, wafers and scintillators. With decades of technical expertise, our engineering and sales teams provide expert solutions tailored to diverse applications, including laser systems, thermal imaging, nuclear detection and semiconductor research. As your steadfast partner, we collaborate closely on technical advancements to propel your projects to new heights. We operate a state-of-the-art, ISO9001-certified production line, ensuring a seamless balance between sophisticated custom manufacturing and quick-turnaround bulk orders. Committed to excellence, we utilize advanced metrology, such as Zygo interferometers, to guarantee stringent quality standards. Every product includes a detailed measurement report and a 12-month warranty. Our inventory features thousands of standard components available for convenient online ordering and fast global dispatch. Since 2025, Shalom EO have an official distributor C-Component in Russia to deal with the business in Russia.



AZIMUTH PHOTONICS, RUSSIA

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AZIMUTH PHOTONICS's core business is supplying optoelectronic components from leading global manufacturers in Russia, developing new projects, and providing technical and informational support to customers. We supply optoelectronic components such as X-ray modules, photodiodes, photomultiplier tubes, detectors, CCD/CMOS, IR arrays, IR emitters, scintillation materials, laser diodes and laser modules, and DPSS lasers. Our goal is to facilitate the development and support of projects by Russian manufacturing companies, introducing modern technologies and innovative optoelectronic solutions into mass production.

Our customers include large Russian manufacturing companies and research institutes working in various sectors of electronics development and production, including industrial electronics, medical and household appliances, diagnostic equipment, scientific and experimental research, and others.

In 2019, we launched a new business line – supplying integrated systems and components for microscopy applications. Today, this division specializes in equipment selection for a wide range of applications: ontogenetics, electrophysiology, neurobiology, live cell imaging, microfluidics, phenotyping, and more. We help our clients find everything they need for their experiments, from laboratory glassware to microscopes with climate chambers.

In 2022, we launched a new project, <https://phantomlab.ru/>, featuring simulation equipment for medical personnel training. We offer phantoms and mannequins for practicing medical examinations, surgical procedures, ultrasound and X-ray examinations, punctures and injections, and more.



SemiTEq JSC, RUSSIA

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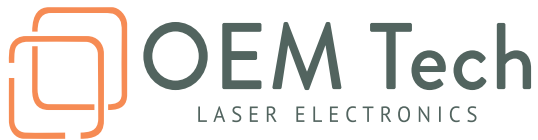
www.semiteq.ru

SemiTEq JSC is leading Russian manufacturer of semiconductor equipment for microwave electronics and photonics.

Since 2001 SemiTEq JSC designs and manufactures epitaxial systems for A3N, A3B5 and A2B6 compound semiconductors growth, as well as wide range of wafer processing equipment.

Own design and production center, as well as Application Lab with wide library of basic technologies provide high research, production and service standards. Every completed project is a guarantee of quality for our customers.

Key Systems components have patented design and include SemiTEq's technology know-how. Increasing localization of production ensures independence from imported components and provide wide range of service solutions.



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OEM Tech designs and manufactures advanced power supplies with a strong focus on laser systems. We develop high-quality power electronics, AC/DC converters, and pulsers — including capacitor chargers, simmer supplies, flashlamp drivers to build a power supply for flashlamp-pumped lasers, and laser diode drivers for DPSS lasers such as Nd:YAG. Our solutions power a wide range of pulsed systems, including Alexandrite, Er:YAG, Ho:YAG, CTH:YAG, Nd:YAG, Er:Glass, fiber lasers (TFL, EFL), direct diodes, and IPL systems. We also provide fast Pockels cell drivers for Q-switches, pulse-pickers, and other applications (up to 10 kV and 4 MHz), as well as RF generator modules.

With an in-house R&D department, we deliver customer-tailored solutions for demanding laser applications.

LASERS AND OPTICAL SYSTEMS, RUSSIA

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“Lasers & Optical Systems” Co. Ltd. is a research and industrial company producing solid-state lasers and systems. We combine science and industrial experience to meet consumer demand and to innovate cutting-edge technologies into our products. We produce high-power diode pumped solid state lasers and laser systems for various applications. We have been in the market for over 30 years and our brand is well-recognized both in Russia and abroad. LOS participates in the ITER Project in the European Fusion Programme.

ЛАССАРД



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LASSARD LLC is a Russian vertically integrated company that independently conducts all production cycles. Since 2015, it has been developing, manufacturing, and selling optomechanical products, lasers, laser systems, and laser machinery.

LASSARD is part of the Varton Group, which has been active in the industrial production market since 2008.

The company designs and manufactures equipment, systems, and components for various industries and activities: microelectronics, medicine, the energy industry, automotive and aircraft manufacturing, the oil and gas industry, communications systems, and telecommunications.

PHOTONIC TECHNOLOGY SYSTEMS LLC, RUSSIA

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The research and production company PhotonTechSystem LLC was founded by a group of scientists in 2017.

We manufacture educational photonics kits, laser beam visualizers, optical table, laminar flow box, laser safety solutions, lasers, visualizers, laboratory furniture, optical and fiber components. Our goal is to integrate the results of scientific and educational activities in the field of photonics and business. PhotonTechSystem are based on the spirit of partnership, continuous development and high quality.



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SLS Prime Technology is a manufacturer of lasers & laser systems for solving scientific and industrial tasks of any complexity. The company's main specialization is development and production of pulsed solid-state lasers that generate laser radiation with specified characteristics in various spectral ranges from UV to IR. We offer solutions in the following product lines:

- DPSS Lasers
- Flash Lamp Lasers
- OPOs & Tunable Laser Systems
- Custom Laser Systems

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Piezoprivod Ltd. produces piezoactuators, scanning mirrors and drivers for them. Piezo Actuators (PA) provides precise and dynamic motion in compact size. Standard PA provides stroke 35...430 μm , blocking force 12...164 N and resonance frequency 312...1670 Hz. Fast Steering Mirrors (FSM) are produced on PA basis and provides angular stroke 0.5...18 mRad and resonance frequency 60...400 Hz. Mirrors based on composite diamond-silicon carbide material AKK Skeleton. The density of material is 3.4 g/sm³. The weight of mirror with 60 mm optical surface is 130 grams. Mirrors passed the tests for reflection and power resistance. Piezo Actuators and FSM are driven by own Drivers, Strain Gauge Boards and Strain Gauges (SG) for sensor feedback. Piezo Actuators are capable of providing precision and high-speed operation not achievable for standard electromagnetic motors.



SC LLS, RUSSIA

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SC LLS is a full-cycle technology partner in photonics, optoelectronics, and laser technologies. Resident of ITMO University Technopark, member of the Laser Association.

Key focus areas:

- Comprehensive laboratory equipment: optomechanics, test and measurement equipment, hyperspectral cameras;
- Fiber-optic systems: components and fiber handling equipment;
- Laser systems: continuous-wave, pulsed, broadband, and supercontinuum sources;
- Optical communications: RF photonics, time and frequency standards, quantum technologies.

Core services:

- Laboratory and production line setup
- Technology transfer and engineering
- Service and support (warranty / post-warranty, repairs)
- Testing and certification
- Installation, commissioning, personnel training

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Laserconn is a Beijing-based manufacturer specializing in high-power vertical-cavity surface-emitting lasers (VCSELs) and high-energy diode-pumped solid-state (DPSS) lasers. With over a decade of dedicated effort, Laserconn now delivers the highest efficiency and power density in 808nm, 940nm, and 975nm VCSELs for solid-state laser pumping. Compared to conventional edge-emitting laser bars, Laserconn's 808nm high-power VCSEL chips offer multiple advantages for Nd:YAG laser pumping, including exceptional reliability with no catastrophic optical damage (C.O.D.), stable wavelength with a low temperature coefficient of 0.068nm/°C, a wide operating temperature range from -60°C to 85°C, an extended lifetime of up to 50 billion shots, and significantly lower cost per watt. Leveraging the unique characteristics of VCSEL chips and patented pumping geometry, Laserconn has also developed high-energy VCSEL-pumped laser gain modules that deliver high optical efficiency and uniform optical distribution. These modules are widely used in Q-switched and MOPA-based DPSS lasers, supporting pulse energies from 10mJ to 100J and repetition rates from 10Hz to 1kHz. Thanks to the long lifetime, high reliability, and low cost of VCSEL technology, these VCSEL-pumped lasers are poised to replace conventional laser bars and lamp-pumped Nd:YAG lasers in medical, scientific, and industrial applications—including aesthetic lasers, LIBS, PIV, PLD, LIF, OPO, laser shock peening, wafer annealing, and more.

Founded in 2015, Laserconn is now an ISO9001, ISO13485, and GMP-certified manufacturer, with 1,200 square meters of R&D office space, 3,700 square meters of manufacturing facilities, and a team of approximately 100 employees.



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ETM Photonics, LLC supplies equipment for scientific research in the fields of photonics, laser physics and quantum optics. Founded in 2021 in St. Petersburg, with a branch in Moscow. All company employees have higher technical education or specialized education related to direct job responsibilities.

Since 2021, the company has been a member of the Lomonosov Moscow State University Quantum Technology Center.

We directly work with manufacturers and independently carry out customs clearance of imported products, which ensures fulfillment of warranty obligations and high-speed delivery at reasonable prices. At the same time, the company is constantly working to find new manufacturers of high-quality products, create new logistics chains and additional hubs in the most important regions for supplies, and establish financial and business relationships that allow us to maintain stability and uninterrupted supply of complex scientific equipment.



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Akmetron JSC is a software developer, manufacturer, and a leading system integrator.

Since 2012, Akmetron has been advancing its expertise in testing, metrology, photonics, and microelectronics, building the infrastructure essential for the country's technological leadership.

Core Business Areas:

- Supply of measurement and testing equipment
- Comprehensive laboratory and production facility equipment solutions
- Software development and process automation
- Career development in technology through training and internships
- Production of ESD-protected furniture
- Equipment calibration and diagnostics
- Maintenance and repair services.

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