CONFERENCE PROGRAM

ICONO/LAT 2013

International Conference on Coherent and Nonlinear Optics (ICONO)
Conference on Lasers, Applications, and Technologies (LAT)

Presidium Bldg of the Russian Academy of Sciences, Leninski Ave. 32a
Moscow, Russia
June 18–22, 2013

Organized by

Russian Academy of Sciences
M. V. Lomonosov Moscow State University

Co-Organized by

A. M. Prokhorov General Physics Institute,
Russian Academy of Sciences
International Laser Center, M. V. Lomonosov
Moscow State University
Center of Laser Technology and Material
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PROGRAM HIGHLIGHTS

WELCOME TO ICONO/LAT 2013!

The International Conference on Coherent and Nonlinear Optics (ICONO 2013) and the Conference on Lasers, Applications, and Technologies (LAT 2013) will be held concurrently, June 18–22, 2013 at the Presidium Bldg (new) of the Russian Academy of Sciences in Moscow, Russia.

The ICONO conference has a rich four-decade tradition as the principal conference in Russia and the Former Soviet Union in quantum electronics, basic research in lasers, nonlinear and quantum optics, quantum information and quantum computing, fundamental laser metrology, physics of high-power laser interactions with matter, and physics of nanostructures. The LAT conference, started just in 2002, complements the ICONO conference in a wide range of laser technologies and applications including laser device development, processing of advanced materials, optical information technologies, biomedicine and ecology applications.

TECHNICAL PROGRAM OVERVIEW

Abstracts of the papers to be presented at ICONO/LAT 2013 appear in this *Conference Program*. The presentation of the majority of the papers requires 6 parallel sessions during the five-days conference. All plenary, oral, and poster sessions will take place at the Presidium Bldg. of the Russian Academy of Sciences in Moscow, Russia. Together, ICONO and LAT have a total of about 900 papers. Special symposia will be organized in the frame of the ICONO/LAT 2013 targeting at emerging fields by putting emphasis on fast developing, well defined topics (see below).

LANGUAGE

English will be the official language of the conference, which will be used for all printed materials, presentations, and discussions.

JOINT PLENARY SESSIONS

Two joint plenary sessions will take place at 14:00–16:00 in the Conference Hall on June 18 and June 20. This year's plenary sessions will feature four distinguished talks listed below.

June 18 • 14:00–15:00 • PLENARY

Photonic crystal fibers: Enabling new science, Philip Russell*, Max Planck Institute for the Science of Light, Germany*

The past 15 years have seen the emergence of glass fibers with intricate transverse microstructures, often with nanoscale features. Their ability to guide and manipulate light in new ways has led to many novel applications. Examples include generation of octave-spanning supercontinua in silica-air photonic crystal fibre (PCF), giant optomechanical nonlinearities in two parallel nanoscale membranes supported within a capillary fibre, all-optical modulation of light by GHz acoustic resonances tightly confined in micron-sized glass cores, excitation of orbital angular momentum states in twisted solid-core photonic crystal fibre (PCF) and opto-thermal trapping of particles in hollow core PCF.

Hollow core PCF also offers unique opportunities for studying ultrafast pulse dynamics in gases: pressure-tunable dispersion, metre-long diffraction-free path-lengths, very high optical damage thresholds, a small core offering near single-mode operation and a Kerr nonlinearity that (at high pressure) can rival that of silica glass. When a noble gas is used, very low group velocity dispersion and the absence of Raman scattering allow almost perfect self-compression of high order solitons to few-cycle pulses, resulting in the efficient generation of ultraviolet (UV) dispersive waves (or Čerenkov radiation) whose wavelength is pressure- and energy-tunable from the vacuum UV out to the visible. At the temporal focus the intensity can be as high as 10^{14} W/cm^2, exceeding the ionisation threshold of the gas, and permitting for the first time the observation of a soliton self-frequency blue-shift. When Raman-active gases are used, frequency combs spanning many octaves can be generated, and studies of dynamic self-similarity are made possible by using a HC-PCF in which only pump and first Stokes signals are guided. It seems probable that over the next years photonic crystal fibres will continue to yield many exciting new results of fundamental scientific interest, some with considerable commercial potential.

Philip Russell Philip Russell is a Director at the Max-Planck Institute for the Science of Light in Erlangen, Germany and holds the Krupp Chair in Experimental Physics at the University of Erlangen-Nuremberg. His research interests currently focus on scientific applications of photonic crystal fibers and related structures. He is a Fellow of the Royal Society, the Optical Society of America (OSA) and the UK Institute of Physics and has won several international awards for his research including the 2013 EPS Prize for Research into the Science of Light, the 2005 Körber Prize for European Science, the 2005 Thomas Young Prize of the Institute for Physics (UK) and the 2000 OSA Joseph Fraunhofer Award/Robert M. Burley Prize. In 2012 he was elected vice-president of OSA for 2013.

June 18 • 15:00–16:00 • PLENARY

Quantum dot lasers and their optimization for various applications, Alexey Zhukov, *St. Petersburg Academic Univ., Russia*

Basic principles of quantum dot formation by self-organization phenomena in epitaxial growth will be discussed. The talk will be focused on long-wavelength quantum dots capable of emitting around 1.3 μm as it is suitable for various laser applications including optical fiber communication. The following aspects of optimization of quantum dot lasers and quantum dots themselves will be highlighted: formation of broad lasing (gain) spectra, achievement of high power levels, suppression of excited state lasing, suppression of higher spatial-order lasing, maximization of modulation frequency, minimization of heat dissipation under direct modulation, improvement of temperature stability.

Alexey E. Zhukov (graduated from Leningrad Electrical Engineering Institute, 1992; Cand. of Sci. Ioffe Phys.-Tech. Institute of RAS, 1996; Doc. of. Sci. Ioffe Phys.-Tech. Institute of RAS, 2002) is currently a prorector and head of the Nanophotonics Laboratory at St. Petersburg Academic University of the Russian Academy of

Sciences. In 2008 he was elected as a corresponding member to the RAS, division of Nanotechnologies and Information Technologies. He is known as a specialist in epitaxial growth of semiconductor nanostructures, such as self-organized quantum dots, development and study of semiconductor nano- and optoelectronic devices, including quantum dot lasers.

June 20 • 14:00–15:00 • PLENARY

Novosibirsk free electron laser as a tunable source of high-power radiation: Facility development and application highlights, Gennadiy Kulipanov, *Budker Inst. of Nuclear Physics, Russia*

Novosibirsk free electron laser (FEL) facility has three FELs to generate radiation spanning a wavelength range between 5 and 240 μm. The accelerator part consists of a four-track energy recovery linac with maximum electron energy of 40 MeV. By the end of 2012 we have commissioned completely the accelerator system. Two FELs are already operating in mid- and far-infrared (terahertz) spectral ranges emerging monochromatic radiation in the range from 50 to 240 μm. Maximum average power of radiation reached at the facility at the wavelength of 140 μm was 500 W at a 100-ps pulse repetition rate of 11.2 MHz. The peak power reached 1 MW. Impressive experiments in physics, chemistry, biology, material science and other fields have been performed or are in progress at six user stations, which are well-equipped with commercially available and home-made instrumentation. Users from more than 15 research institutes, universities and companies work at the facility. Description of most interesting experiments, including ultrasoft THz ablation of biological molecules, study of impact of THz radiation on genetics materials, biological cell systems and microorganisms, surface plasmon spectroscopy, time-resolved superfast THz time domain spectroscopy, flame diagnostics using THz radiation, is presented.

Gennady Kulipanov is an academician of the Russian Academy of Sciences, vice-director of the Budker Inst. of Nuclear Physics and director of the Siberian Center of Synchrotron Radiation of the Siberian Branch of the Russian Academy of Sciences in Novosibirsk, Russia. In 1963, he graduated from the Novosibirsk Electrotechnical Institute and started his scientific career with the Budker Institute of Nuclear Physics at the one of the first in the world colliders VEPP-1 and made a number of fundamental works on studying the dynamics of particles in nonlinear magnetic fields. Later on, in 1971, he was one of the initiators of the launch of the storage ring VEPP-3, which gave the start of the research on synchrotron radiation in Russia. In the end of 1970th Gennady Kulipanov organized first in the FSU workshop on the synchrotron radiation problems, which becomes regular and since 1986 transformed into an international conference.

Gennady Kulipanov initiated the works that led to the development of a number of synchrotron wigglers, the first realization of the superconducting wigglers, inclusive. He was a project principal investigator for the sources of synchrotron radiation Siberia-1 and Siberia-2 constructed at the Kurchatov Institute of Nuclear Physics in Moscow, Russia. Kulipanov suggested a concept of the synchrotron radiation source of the 4th generation based on the accelerator-rucuperattor, and is one of the authors of the MARS project. He initiated the construction of the FEL facility in Novosibirsk and leads numerous application projects that run on this facility.

June 20 • 15:00–16:00 • PLENARY

High power, high pulse repetition rate disk lasers and applications, Friedrich Dausinger*, Dausinger & Giesen GmbH, Germany*

Since its invention in 1991 by Adolf Giesen the thin disk technology found numerous applications in industrial production processes and scientific applications. A wide spanning substitution of rod type solid-state lasers as well as of gas lasers was stimulated by stronger focussability at high power. While this feature is offered by the competing fiber laser approach, as well, the disk laser is advantageous whenever highest pulse energy at high repetition rate is required. The contribution will review what has been achieved in this respect for industrial and scientific applications and discuss the future potential.

Friedrich Dausinger, Dr. rer.nat.habil., is managing partner of Dausinger+Giesen GmbH, a company whose business model is to expand the application of thin disk technology in science and industry. He disposes of now more than 30 years of experience with the application and development of high power lasers acquired in industrial (Bosch, D+G) and academic (Stuttgart Univ.) surrounding. He was chairman of national project initiatives in the field of ultrafast laser science, is Fellow of LIA (Laser Institute of America) and corresponding member of Russian Academy of Engineering.

KEYNOTE TALKS

A number of keynote talks are scheduled throughout the ICONO/LAT 2013 Program. These presentations by experts in their respective fields are intended as introductions to important areas in laser physics and its applications.

ICONO SYMPOSIA

Symposium on Femtosecond Laser Pulse Filamentation

Organizers:
See Leang Chin, *Laval Univ., Canada*
Olga Kosareva, *Lomonosov Moscow State Univ., Russia*

Topics include, but are not limited to, filamentation in solids and gases; nonlinear optics of filaments; pulse self-compression in filaments; modulation instability in filaments; long-range filamentation in atmosphere; filament-induced spectroscopy; white-light-fs-LIDAR; filament diagnostics of pollution; filament discharge control.

Symposium on Organic Photovoltaics

Organizers:
Maxim Pshenichnikov, *Univ. of Groningen, the Netherlands*
Dmitry Paraschuk, *Lomonosov Moscow State Univ., Russia*

The Symposium will present and discuss the most recent developments, perspectives, and advanced concepts in organic and hybrid photovoltaics. The Symposium strongly encourages presentation of oral as well as poster contributions from scientists from all over the world.

Joint ICONO/LAT Symposium on THz Optics and Technologies

Organizers:
Alexander Shkurinov, *Lomonosov Moscow State Univ., Russia*
Xi-Cheng Zhang, *Huazhong Univ. of Science and Technology, China/Univ. of Rochester, USA*

Topics include, but are not limited to, sources, detector, components, and systems working in the far-infrared region of the spec-

trum (in the range of 300 GHz to 10 THz), including ultrafast time-domain systems, direct generation using pulsed lasers, and cw generation based on nonlinear optical mixing; applications using THz radiation for spectroscopy, sensing, and imaging, including the physical and life sciences application; advances in THz communications concepts and systems; new THz measurement techniques and instrumentation, including advances in imaging configurations, detector technologies, and THz optical components and waveguides; nonlinear THz phenomena, and THz optical measurements using surface plasmons, near-field effects, photonic crystals and metamaterials, and nonlinear optics.

POSTER SESSIONS

Two poster sessions will be held on Wednesday (June 19) and Friday (June 21) at 18:30–20:00 in the designated areas. For poster presentation each author is provided an A0 size vertical bulletin board. The author is requested to remain in the vicinity of the bulletin board for the duration of the poster session to answer questions.

Authors may set up their posters one hour prior to the assigned session and must remove their posters 1 hour following the session. Posters remaining on boards will be discarded. Push-pins/scotch will be available for set-up. Poster papers are not supplied with any audio-visual or computer equipment. All boards will feature a sign corresponding to the paper number.

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2. Nonlinear Space-Time Dynamics, Instabilities, and Patterns

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9. Symposium on Femtosecond Laser Pulse Filamentation

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10. Symposium on Organic Photovoltaics

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The ICONO/LAT 2013 Registration Desk will be located at the Presidium Bldg of the Russian Academy of Sciences in the lobby of the Conference Hall during the following hours:

ICONO/LAT Registration Hours	
Monday, June 17	16:00–18:30
Tuesday, June 18	08:30–18:00
Wednesday, June 19	08:30–18:00
Thursday, June 20	08:30–18:00
Friday, June 21	08:30–18:00
Saturday, June 22	08:30–16:00

What Does the Full Registration Fee Include?

The full registration for the ICONO/LAT 2013 conferences includes:

- Admission to all ICONO/LAT 2013 technical sessions;
- One copy of the Conference Program and Technical Digest in electronic form;
- Coffee breaks scheduled in the Conference Program;
- Admission to the Conference Welcome Reception;
- Guided tour around Moscow (information will be posted in the registration area).

Registration Fees

	Before May 15, 2013	After May 15, 2013
Full registration	500 EUR	600 EUR
Full-time Student	150 EUR	180 EUR
Conference Dinner Ticket	90 EUR (3500 RBL)	90 EUR (3500 RBL)

Students must provide student identification at the time of registration to be granted student full registration prices.

CONFERENCE PUBLICATIONS

Conference Program

This *Conference Program* will be handled to all the conference attendees at the registration.

Technical Digests

The Technical Digests for ICONO/LAT 2013 will consists of camera-ready summaries submitted by all authors. Attendees will receive the combined ICONO/LAT 2013 Digests when they register. Additional copies are available for purchase at the meeting at the special conference price of 30 EUR. The digests will be available after the conference from the Conference Organizers at a higher price.

CONFERENCE SERVICES

Message and Conference Information Center

A Message Desk and Conference Information Center will be located at the Registration area. Messages will be posted for attendees on a message board. Working hours correspond to those of registration hours.

Speaker/Presider Check

To ensure that the program runs smoothly, all speakers are requested to report to the ICONO/LAT Organizing Committee room located in the registration area. Presiders are requested to identify themselves at least 30 minutes before the session begins to the audiovisual personnel for a quick review of equipment and procedures.

Audiovisual Equipment

The meeting room will contain the following equipment:

- Podium microphone (when necessary).
- Data Projector for computer presentations and a PC under MS Windows with installed MS PowerPoint and Adobe Acrobat Reader. MAC users must bring a respective DVI (or mini-DVI)-VGA connector to connect their own notebooks.
- Laser pointer.
- Screen.
- 60 minute timer.

WELCOME TO MOSCOW, RUSSIA

The ICONO/LAT:2013 will be held in Moscow, capital of the Russian Federation, the biggest city in Europe and one of the biggest in the world. Moscow's origin as a symbol of Russia goes back 850 years. From the Kremlin, Moscow spreads out in four distinctive rings of development. Most of the city's sites are within the first circle, an area that can easily be covered on foot. Most visitors are surprised to see so many churches, but the Kremlin was once the center of Russian Orthodox Church as well as the State. A visiting 19th-century French aristocrat, the Marquis de Custine, described the exterior of St. Basil's as a sort of irregular fruit bristling with excrescence, a cantaloupe melon with embroidered edges. The Novodevichy Convent, a cluster of 16 sparkling domes behind turreted walls is perhaps the most beautiful of the city's convents.

If you like more conventional museums, there are scores to choose from. The Pushkin State Fine Arts Museum boasts a broad selection of European works from the Renaissance onward. The Tretyakov Gallery has the world's best collection of

Russian icons and a fine collection of pre-Revolutionary Russian art. There are also numerous literary museums such as the Tolstoy, Pushkin, Dostoevsky, Gogol, and Lermontov museums.

There is enough going on in Moscow's theaters and halls to keep anyone entertained for months. While a night of ballet or opera at the Bolshoi, or a concert at the Conservatory, would be top priorities for most, there are at least 60 other theaters to choose from.

Moscow etiquette and customs. Greeting someone in Moscow. A simple handshake is sufficient for most occasions. Address the person with his/her title and last name until requested to use their first name. If visiting someone in a more social setting, it is customary to bring a small gift such as wine, flowers or chocolates.

Tipping advice. Tipping is left to your discretion if the service warrants it. An amount of 10 to 15 percent is sufficient.

Moscow dress code. For business, attire is the same as in any major capital city, i.e. smart suits. When visiting tourist attractions such as churches, remember that Russia is a Christian Orthodox country and women are requested to cover their heads.

Moscow weather. Moscow's weather in June-July is regularly quite mild. The average temperature is some 20–25 C in June. Rain is always possible. The best advice is to keep checking the weather information in Moscow region and be prepared!

Sightseeing Program

An extended sightseeing program is offered to the conference participants and accompanying persons. Please contact the travel agency table at the registration area for details.

Conference Venue

The ICONO/LAT:2013 will be organized at the Presidium Building of the Russian Academy of Sciences in Moscow, Russia. This 22-store building is the host for the Russian Academy of Sciences, Russian Foundation for Basic Research, as well as for a number of Research Institutes. It is located at the high bank of the Moscow river at the Vorob'evy (Sparrow) Hills, providing a fantastic look to the whole Moscow downtown from the top of this building.

Address
Presidium Bldg of the Russian Academy of Sciences
Leninski Ave., 32a,
Moscow 119991
Russia

AGENDA OF SESSIONS

ICONO 2013 TOPICS

ICONO-01: Fundamentals of Nonlinear Optics and Novel Phenomena

ICONO-02: Nonlinear Space-Time Dynamics, Instabilities, and Patterns

ICONO-03: Quantum and Atom Optics

ICONO-04: Quantum Physics, Information, and Technologies

ICONO-05: High-Field Physics and Attoscience

ICONO-06: Nano-Optics and Plasmonics

ICONO-07: Physics of Metamaterials and Complex Media

ICONO-08: Ultrafast Phenomena and High-Precision Measurements

ICONO-09: ICONO Symposium: Femtosecond Laser Pulse Filamentation

ICONO-10: ICONO Symposium: Organic Photovoltaics

ICONO-11: Joint ICONO/LAT Symposium on THz Optics and Technologies

LAT 2013 TOPICS

LAT-01: Solid-State Lasers, Materials and Applications

LAT-02: High-Power Lasers and Applications

LAT-03: Laser Remote Sensing and Tunable Diode Laser Spectroscopy

LAT-04. Diffractive Optics and Nanophotonics

LAT-05: Ultra-Fast Diagnostics in Laser Research

LAT-06: Advances in Electro/Magneto-Optics

LAT-07: Biophotonics and Laser Biomedicine

LAT-08: Fiber Optics

AGENDA OF SESSIONS

TUESDAY, JUNE 18, 2013

Hall 1	Hall 2	Hall 3
9:00–11:00 **ITuA • Fundamentals of Nonlinear Optics and Novel Phenomena I (ICONO-01/1)**	**9:00–11:00** **LTuA • Solid-State Lasers, Materials, and Applications I (LAT-01/1)**	**9:00–11:00** **ITuB • Nano-Optics and Plasmonics I (ICONO-06/1)**
11:00–11:30 COFFEE BREAK		
11:30–13:00 **ITuE • Fundamentals of Nonlinear Optics and Novel Phenomena II (ICONO-01/2)**	**11:30–13:00** **LTuC • Solid-State Lasers, Materials, and Applications II (LAT-01/2)**	**11:30–13:00** **ITuF • Nano-Optics and Plasmonics II (ICONO-06/2)**
13:00–14:00 LUNCH (on your own)		
	14:00–16:00 **PTuA • Plenary Lectures I (Hall 1)**	
16:00–16:30 COFFEE BREAK		
16:30–18:30 **ITuI • Fundamentals of Nonlinear Optics and Novel Phenomena III (ICONO-01/3)**	**16:30–18:30** **LTuE • Solid-State Lasers, Materials, and Applications III (LAT-01/3)**	**16:30–18:15** **ITuJ • Nano-Optics and Plasmonics III (ICONO-06/3)**
18:30–20:00 WELCOME RECEPTION		

AGENDA OF SESSIONS

TUESDAY, JUNE 18, 2013

Hall 4	Hall 5	Hall 6
9:00–10:45 **ITuC • Ultrafast Phenomena and High-Precision Measurements I (ICONO-08/1)**	**9:00–11:00** **ITuD • Quantum and Atom Optics I (ICONO-03/1)**	**9:00–11:00** **LTuB • Laser Remote Sensing and Tunable Diode Laser Spectroscopy I (LAT-03/1)**
11:00–11:30 COFFEE BREAK		
11:30–13:00 **ITuG • Ultrafast Phenomena and High-Precision Measurements II (ICONO-08/2)**	**11:30–13:00** **ITuH • Quantum and Atom Optics II (ICONO-03/2)**	**11:30–13:00** **LTuD • Laser Remote Sensing and Tunable Diode Laser Spectroscopy II (LAT-03/2)**
13:00–14:00 LUNCH (on your own)		
14:00–16:00 **PTuA • Plenary Lectures I (Hall 1)**		
16:00–16:30 COFFEE BREAK		
16:30–18:30 **ITuK • Ultrafast Phenomena and High-Precision Measurements III (ICONO-08/3)**	**16:30–18:30** **ITuL • Quantum and Atom Optics III (ICONO-03/3)**	**16:30–18:30** **LTuF • Laser Remote Sensing and Tunable Diode Laser Spectroscopy III (LAT-03/3)**
18:30–20:00 WELCOME RECEPTION		

AGENDA OF SESSIONS

WEDNESDAY, JUNE 19, 2013

Hall 1	Hall 2	Hall 3
9:00–11:00 IWA • Fundamentals of Nonlinear Optics and Novel Phenomena IV (ICONO-01/4)	9:00–11:00 LWA • Solid-State Lasers, Materials, and Applications IV (LAT-01/4)	9:00–11:00 IWB • Nano-Optics and Plasmonics IV (ICONO-06/4)
11:00–11:30 COFFEE BREAK		
11:30–13:00 IWE • Fundamentals of Nonlinear Optics and Novel Phenomena V (ICONO-01/5)	11:30–13:00 LWC • Solid-State Lasers, Materials, and Applications V (LAT-01/5)	11:30–13:00 IWF • Nano-Optics and Plasmonics V (ICONO-06/5)
13:00–14:00 LUNCH (on your own)		
14:00–16:00 IWI • Fundamentals of Nonlinear Optics and Novel Phenomena VI (ICONO-01/6)	14:00–16:00 LWE • Solid-State Lasers, Materials, and Applications VI (LAT-01/6)	14:00–16:00 IWJ • Nano-Optics and Plasmonics VI (ICONO-06/6)
16:00–16:30 COFFEE BREAK		
16:30–18:30 IWM • Fundamentals of Nonlinear Optics and Novel Phenomena VII (ICONO-01/7)	16:30–18:30 LWG • Solid-State Lasers, Materials, and Applications VII (LAT-01/7)	16:30–18:30 LWH • Biophotonics and Laser Biomedicine I (LAT-07/1)
18:30–20:00 ICONO/LAT POSTER SESSION I IWP, IWR, IWS, IWV, IWT, IWU, LWJ, LWK, LWL (ICONO-01, ICONO-03, ICONO-06, ICONO-07, ICONO-08, ICONO-10, LAT-01, LAT-03, LAT-08)		

AGENDA OF SESSIONS

WEDNESDAY, JUNE 19, 2013

Hall 4	Hall 5	Hall 6
9:00–11:00 **IWC • Ultrafast Phenomena and High-Precision Measurements IV (ICONO-08/4)**	**9:00–11:00** **IWD • Quantum and Atom Optics IV (ICONO-03/4)**	**9:00–11:00** **LWB • Laser Remote Sensing and Tunable Diode Laser Spectroscopy IV (LAT-03/4)**
11:00–11:30 COFFEE BREAK		
11:30–13:00 **LWD • Fiber Optics I (LAT-08/1)**	**11:30–13:00** **IWG • Quantum and Atom Optics V (ICONO-03/5)**	**11:30–13:00** **IWH • Symposium on Organic Photovoltaics I (ICONO-10/1)**
13:00–14:00 LUNCH (on your own)		
14:00–16:00 **LWF • Fiber Optics II (LAT-08/2)**	**14:00–16:00** **IWK • Physics of Metamaterials and Complex Media I (ICONO-07/1)**	**14:00–16:00** **IWL • Symposium on Organic Photovoltaics II (ICONO-10/2)**
16:00–16:30 COFFEE BREAK		
16:30–18:30 **LWI • Fiber Optics III (LAT-08/3)**	**16:30–18:30** **IWN • Physics of Metamaterials and Complex Media II (ICONO-07/2)**	**16:30–18:30** **IWO • Symposium on Organic Photovoltaics III (ICONO-10/3)**
18:30–20:00 ICONO/LAT POSTER SESSION I **IWP, IWR, IWS, IWV, IWT, IWU, LWJ, LWK, LWL** **(ICONO-01, ICONO-03, ICONO-06, ICONO-07, ICONO-08, ICONO-10, LAT-01, LAT-03, LAT-08)**		

AGENDA OF SESSIONS

THURSDAY, JUNE 20, 2013

Hall 1	Hall 2	Hall 3
9:00–11:00 **IThA • High-Field Physics and Attoscience I (ICONO-05/1)**	**9:00–11:00** **LThA • Diffractive Optics and Nanophotonics I (LAT-04/1)**	**9:00–11:00** **LThB • Biophotonics and Laser Biomedicine II (LAT-07/2)**
11:00–11:30 COFFEE BREAK		
11:30–13:00 **IThD • High-Field Physics and Attoscience II (ICONO-05/2)**	**11:30–13:00** **LThD • Diffractive Optics and Nanophotonics II (LAT-04/2)**	**11:30–13:00** **LThE • Biophotonics and Laser Biomedicine III (LAT-07/3)**
13:00–14:00 LUNCH (on your own)		
14:00–16:00 **PThA • Plenary Lectures I (Hall 1)**		
16:00–16:30 COFFEE BREAK		
16:30–18:30 **IThG • High-Field Physics and Attoscience III (ICONO-05/3)**	**16:30–18:30** **LThG • Diffractive Optics and Nanophotonics III (LAT-04/3)**	**16:30–18:30** **LThH • Biophotonics and Laser Biomedicine IV (LAT-07/4)**
18:30–20:00 CONFERENCE DINNER		

AGENDA OF SESSIONS

THURSDAY, JUNE 20, 2013

Hall 4	Hall 5	Hall 6
9:00–10:45 **LThC • Fiber Optics IV (LAT-08/4)**	**9:00–11:00** **IThB • Physics of Metamaterials and Complex Media III (ICONO-07/3)**	**9:00–11:00** **IThC • Symposium on Organic Photovoltaics IV (ICONO-10/4)**
11:00–11:30 COFFEE BREAK		
11:30–13:00 **LThF • Fiber Optics V (LAT-08/5)**	**11:30–13:00** **IThE • Physics of Metamaterials and Complex Media IV (ICONO-07/4)**	**11:30–13:00** **IThF • Symposium on Organic Photovoltaics V (ICONO-10/5)**
13:00–14:00 LUNCH (on your own)		
14:00–16:00 **PThA • Plenary Lectures II (Hall 1)**		
16:00–16:30 COFFEE BREAK		
16:30–18:30 **LThI • Advances in Electro/Magneto Optics I (LAT-06/1)**	**16:30–18:30** **IThH • Physics of Metamaterials and Complex Media V (ICONO-07/5)**	**16:30–18:30** **IThI • Symposium on Organic Photovoltaics VI (ICONO-10/6)**
18:30–20:00 CONFERENCE DINNER		

AGENDA OF SESSIONS

FRIDAY, JUNE 21, 2013

Hall 1	Hall 2	Hall 3
9:00–11:00 IFA • High-Field Physics and Attoscience IV (ICONO-05/4)	9:00–11:00 LFA • Diffractive Optics and Nanophotonics IV (LAT-04/4)	9:00–11:00 LFB • High-Power Lasers and Applications I (LAT-02/1)
11:00–11:30 COFFEE BREAK		
11:30–13:00 IFD • High-Field Physics and Attoscience V (ICONO-05/5)	11:30–13:00 JFA • Symposium on THz Optics and Technologies I (Joint Symposium/1)	11:30–13:00 LFD • High-Power Lasers and Applications II (LAT-02/2)
13:00–14:00 LUNCH (on your own)		
14:00–16:00 IFH • High-Field Physics and Attoscience VI (ICONO-05/6)	14:00–16:00 JFB • Symposium on THz Optics and Technologies II (Joint Symposium/2)	14:00–16:00 LFE • High-Power Lasers and Applications III (LAT-02/3)
16:00–16:30 COFFEE BREAK		
16:30–18:30 LFF • Ultrafast Diagnostics in Laser Research I (LAT-05/1)	16:30–18:30 JFC • Symposium on THz Optics and Technologies III (Joint Symposium/3)	16:30–18:30 LFG • High-Power Lasers and Applications IV (LAT-02/4)
18:30–20:00 ICONO/LAT POSTER SESSION II **IFO, IFP, IFR, IFS, JFD, LFH, LFI, LFJ, LFK, LFL** **(ICONO-02, ICONO-04, ICONO-05, ICONO-09, ICONO-11, LAT-02, LAT-04, LAT-05, LAT-06, LAT-07)**		

AGENDA OF SESSIONS

FRIDAY, JUNE 21, 2013

Hall 4	Hall 5	Hall 6
9:00–11:00 **LFC • Advances in Electro/Magneto Optics II (LAT-06/2)**	**9:00–11:00** **IFB • Symposium on Femtosecond Laser Pulse Filamentation I (ICONO-09/1)**	**9:00–11:00** **IFC • Quantum Physics, Information, and Technologies I (ICONO-04/1)**
11:00–11:30 COFFEE BREAK		
11:30–13:00 **IFE • Nonlinear Space-Time Dynamics, Instabilities, and Patterns I (ICONO-02/1)**	**11:30–13:00** **IFF • Symposium on Femtosecond Laser Pulse Filamentation II (ICONO-09/2)**	**11:30–13:00** **IFG • Quantum Physics, Information, and Technologies II (ICONO-04/2)**
13:00–14:00 LUNCH (on your own)		
14:00–16:00 **IFI • Nonlinear Space-Time Dynamics, Instabilities, and Patterns II (ICONO-02/2)**	**14:00–16:00** **IFJ • Symposium on Femtosecond Laser Pulse Filamentation III (ICONO-09/3)**	**14:00–16:00** **IFK • Quantum Physics, Information, and Technologies III (ICONO-04/3)**
16:00–16:30 COFFEE BREAK		
16:30–18:30 **IFL • Nonlinear Space-Time Dynamics, Instabilities, and Patterns III (ICONO-02/3)**	**16:30–19:00** **IFM • Symposium on Femtosecond Laser Pulse Filamentation IV (ICONO-09/4)**	**16:30–18:30** **IFN • Quantum Physics, Information, and Technologies IV (ICONO-04/4)**
18:30–20:00 ICONO/LAT POSTER SESSION II **IFO, IFP, IFR, IFS, JFD, LFH, LFI, LFJ, LFK, LFL** **(ICONO-02, ICONO-04, ICONO-05, ICONO-09, ICONO-11, LAT-02, LAT-04, LAT-05, LAT-06, LAT-07)**		

AGENDA OF SESSIONS

SATURDAY, JUNE 22, 2013

Hall 1	Hall 2	Hall 3
	9:00–11:00 JSA • Symposium on THz Optics and Technologies IV (Joint Symposium/4)	9:00–11:00 LSB • Biophotonics and Laser Biomedicine V (LAT-07/5)
	11:00–11:30 COFFEE BREAK	
	11:30–13:00 JSB • Symposium on THz Optics and Technologies V (Joint Symposium/5)	11:30–13:00 LSD • Biophotonics and Laser Biomedicine VI (LAT-07/6)
	13:00–13:30 COFFEE BREAK	
	13:30–15:30 JSC • Symposium on THz Optics and Technologies VI (Joint Symposium/6)	

AGENDA OF SESSIONS

SATURDAY, JUNE 22, 2013

Hall 4	Hall 5	Hall 6
9:00–11:00 **LSA • Ultrafast Diagnostics in Laser Research II (LAT-05/2)**	**9:00–11:00** **ISA • Joint Session of Symposium on Femtosecond Laser Pulse Filamentation and Joint Symposium on THz Optics and Technologies I (ICONO-09/11-1)**	**9:00–11:00** **ISB • Quantum Physics, Information, and Technologies V (ICONO-04/5)**
11:00–11:30 COFFEE BREAK		
	11:30–13:00 **ISC • Joint Session of Symposium on Femtosecond Laser Pulse Filamentation and Joint Symposium on THz Optics and Technologies II (ICONO-09/11-2)**	
13:00–13:30 COFFEE BREAK		

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ICONO/LAT2013

TECHNICAL PROGRAM ABSTRACTS

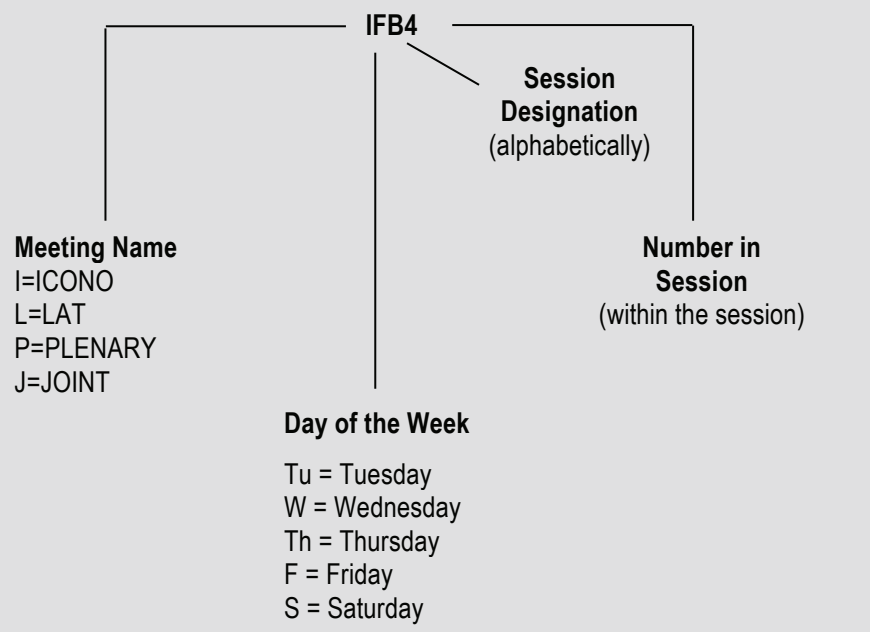
KEY TO SHADING

ICONO and JOINT Sessions

LAT Sessions

Explanation of Session Codes

The first letter of the code indicates the name of the meeting: ICONO (I), LAT (L), PLENARY (P), and JOINT sessions (J). The second character designates the day of the week (Tuesday = Tu, Wednesday = W, Thursday = Th, Friday = F, Saturday = S). The next character indicates the session within that particular day of the paper is given. Each day begins with a letter A and continues alphabetically. The number of the end of the code signals the position of the paper within the session (first, second, third, etc.). For example, a session number IFB4 would indicate that this paper is an ICONO paper, being presented on Friday during session B, and the fourth paper (4) presented in that session.



Hall 1
ICONO-01/1

9:00–11:00
ITuA • Fundamentals of Nonlinear Optics and Novel Phenomena I (ICONO-01/1)
Alexei Zheltikov, *Lomonosov Moscow State Univ., Russia, Presider*

Hall 2
LAT-01/1

9:00–11:00
LTuA • Solid-State Lasers, Materials, and Applications I (LAT-01/1)
Boris Denker, *Prokhorov General Physics Inst., Russia, Presider*

LTuA1 • 09:00-09:30 • KEYNOTE
Fluoride laser ceramics, V.V.Osiko, P.P.Fedorov, M.E.Doroshenko, *A.M.Prokhorov General Physics Inst., Russia,* E.A.Garibin, *ZAO "INKROM" Co, Russia.* In this presentation we discuss our resent results in developing fluoride laser ceramics. Some features and problems of preparation of the fluoride ceramics, their mechanical, thermal, optical, spectroscopic, and laser properties will be described.

Hall 3
ICONO-06/1

9:00–11:00
ITuB • Nano-Optics and Plasmonics I (ICONO-06/1)
Anatoly Zayats, *King's College London, UK, Presider*

ITuB1 • 09:00-09:30 • INVITED
Complex DNA plasmonics, N.Liu, *Max Planck Inst. for Intelligent Systems, Germany,* B.Ding, *Natl Center for Nanoscience and Technology, China.* We demonstrate the realization of three-dimensional plasmonic chiral nanostructures through programmable transformation of gold nanoparticle-dressed DNA origami. The concept of combining the know-how in plasmonics and biology opens a new pathway to the design of smart artificial plasmonic nanostructures for answering intriguing biological questions.

ITuB2 • 09:30-09:45
Plasmonic nanolaser in photonic crystal film, A.S.Kuchyanov, E.O.Maltseva, A.I.Plekhanov, *Inst. of Automation and Electrometry, Russia,* I.K.Igumenov, B.M.Kuchumov, *Nikolaev Inst. of Inorganic Chemistry, Russia,* C.-W.Lee, Y.Park, S.Cheonin, K.Kim, *Samsung Advanced Inst. of Technology, Korea,* M.I.Stockman, *Georgia State Univ., USA.* We present the result of an original research on lasing spasers in a three-dimensional photonic crystal. The results of this research will be useful for a wide range of applications and should be interesting to a diverse audience.

Hall 4
ICONO-08/1

9:00–11:00
ITuC • Ultrafast Phenomena and High-Precision Measurements I (ICONO-08/1)
Barry Bruner, *Weizmann Inst. of Science, Israel, Presider*

ITuC1 • 09:00-09:45 • KEYNOTE
The future is now: single atom clocks, surpassing the SI second and exploring the limits of time, A.A.Madej, P.Dubé, M.Tibbo, J.E.Bernard, *Natl Res. Council of Canada, Canada.* We report studies and applications employing a single, trapped, and laser cooled $^{88}Sr^{+}$ ion which has an evaluated systematic uncertainty (2.3×10^{-17}) over an order of magnitude smaller than the best realizations of the SI second.

Hall 5
ICONO-03/1

9:00–11:00
ITuD • Quantum and Atom Optics I (ICONO-03/1)
Victor Balykin, *Inst. of Spectroscopy, Russia, Presider*

ITuD1 • 09:00-09:30 • INVITED
Long coherence time and precision measurement of atomic interactions in a Bose-Einstein condensate, M.Egorov, V.Ivannikov, R.Anderson, I.Mordovin, B.Opanchuk, B.V.Hall, P.Drummond, P.Hannaford, A.I.Sidorov, *Swinburne Univ., Australia.* We report a high precision method of measuring s-wave scattering lengths in a Bose-Einstein condensate (BEC) and a coherence time of 2.8 s in a Ramsey interferometer employing an interacting BEC.

ITuD2 • 09:30-10:15 • KEYNOTE
Quantum state engineering with large atomic objects, Eu.Polzik, *Niels Bohr Inst., Copenhagen Univ., Denmark.* Recent progress with generation and applications of quantum entangled states in macroscopic systems will be reviewed. Spin polarized atomic gas in a magnetic field behaves as a quantum harmonic oscillator in the ground state even at room temperature. Entanglement generated by dissipation and a steady entangled state with an arbitrary long life time has been demonstrated for such oscillators. Entanglement between two atomic spin ensembles allowed for demonstration of a magnetic field measurement in which suppression of the quantum measurement back action and quantum projection noise has led to a record sensitivity at the sub-femtoTesla level. Recently quantum teleportation of atomic spin states between two spin ensembles has been demonstrated. These methods and ideas are now being transferred to mechanical and electrical oscillators paving the road to quantum state transfer between disparate macroscopic quantum systems.

Hall 6
LAT-03/1

9:00–11:00
LTuB • Laser Remote Sensing and Tunable Diode Laser spectroscopy I (LAT-03/1)
Vladislav Mikhalevich, *Prokhorov General Physics Inst., Russia, Presider*

LTuB1 • 09:00-09:45 • KEYNOTE
Remote sensing of seawater and drifting ice by GPI compact Raman lidar, A.F.Bunkin, *A.M.Prokhorov General Phys. Inst., Russia.* A compact Raman LIDAR system for remote sensing of sea and drifting ice was developed. It's applications for express monitoring of seawater with high concentration of floating ice in the Arctic Ocean is discussed.

Hall 1
ICONO-01/1

9:00–11:00
ITuA • Fundamentals of Nonlinear Optics and Novel Phenomena I (ICONO-01/1)—Continued

ITuA2 • 09:45-10:00
Multi-color carrier-envelope phase locked pulse with continuous color tunability, A.Yabushita, C.-H.Kao, D.-Y.Juang, *Natl Chiao-Tung Univ., Taiwan,* A.Baltuska, *Techn. Univ. Wien, Austria,* T.Kobayashi, *CREST, Japan Sci. and Technology Agency, Japan, Univ. of Electro-Communs, Japan, Osaka Univ., Japan.* We have developed a multi-color carrier-envelope phase locked pulse laser with continuous color tunability. The phase was passively stabilized by using idler pulse of non-collinear optical parametric amplifier.

ITuA3 • 10:00-10:15
Modeling of generation of Lyman-Alpha radiation and discharge in laser wave mixing in Kr-Ar gas, O.A.Louchev, N.Saito, S.Wada, K.Miyazaki, Y.Oishi, M.Iwasaki, *RIKEN, Japan.* We present computational results for nonlinear optics and multi-step plasma generation mechanisms involved in sum-difference process in initially phase-matched Kr-Ar gas under optical discharge for the study and optimization of VUV Lyman-α generation (121.6 nm) by resonant mixing of fundamental ns pulses of 212.6 nm and 843 nm radiation.

ITuA4 • 10:15-10:30
Energy transfer dynamics induced by intense femtosecond laser in a bulk of crystalline dielectrics: from electron subsystem excitation to micromodification formation, F.V.Potemkin, V.M.Gordienko, P.M.Mikheev, E.I.Mareev, A.A.Podshivalov, *Lomonosov Moscow State Univ., Russia.* We successively probed energy transfer stages after femtosecond laser excitation of a bulk of crystalline dielectrics from femtosecond to nanoseconds timescale. We observed a change in the frequency of THz phonons from 1.4 to 4.6 THz, quasi-resonantly excited by laser plasma oscillations under tight focusing (NA~0.4) of intense femtosecond laser radiation in a bulk of quartz. In BaF_2 a 15 ps time delay of the significant increase in the phonon wave amplitude was shown. In LiF the energy transfer between many phonon modes is clearly visible.

Hall 2
LAT-01/1

9:00–11:00
LTuA • Solid-State Lasers, Materials, and Applications I (LAT-01/1)—Continued

LTuA2 • 09:45-10:15 • INVITED
Preparation of oxide laser ceramics based on non-agglomerated nanopowders, Yu.L.Kopylov, V.B.Kravchenko, *Fryazino branch of the Kotel'nikov Inst. of Radioengineering and Electronics, Russia,* S.N.Bagaev, *Inst. of Laser Phys., Russia,* A.A.Kaminskii, *Inst. of Crystallography, Moscow, Russia.* The importance to use the non-agglomerated powder in production of laser ceramics is shown. Different ways for preparation of such powders are discussed. The mechanical disintegration of partially agglomerated powders as very effective method is presented. Another method based on chemical preparation of ideal spherical particles is also described and discussed.

LTuA3 • 10:15-10:30
Thermally induced beam distortions in laser ceramics with large and small grain size, A.G.Vyatkin, E.A.Khazanov, *Inst. of Appl. Phys., Russia.* Thermally induced beam distortions in laser ceramics were evaluated and compared using the geometric optics approximation for the large grain size case and the theory of Rayleigh-Debye scattering for the unrestricted grain size case.

Hall 3
ICONO-06/1

9:00–11:00
ITuB • Nano-Optics and Plasmonics I (ICONO-06/1)—Continued

ITuB3 • 09:45-10:00
Spaser for ultrasensitive nanolocal and surface specroscopy, Yu.E.Lozovik, *Inst. of Spectroscopy, Russia,* I.A.Nechepurenko, A.V.Dorofeenko, E.S.Andrianov, A.A.Pukhov, *Inst. for Theoretical and App. Electromagnetics, Russia.* A new surface and/or nanolocal ultrasensitive spectroscopy method, based on spaser (plasmonic nanolaser) is proposed. Two principal schemes are considered: spaser based on (i) surface plasmon-polariton for surface spaser spectroscopy; or (ii) on the needle plasmon for spaser spectroscopy with subwavelenght spatial resolution.

ITuB4 • 10:00-10:15
Quantum optics of atoms near plasmonic nanostructures, Yu.V.Vladimirova, V.M.Pastukhov, V.N.Zadkov, *Lomonosov Moscow State Univ., Russia.* We analyze how the quantum-optical properties of an atom are modified in the vicinity of a plasmonic nanoparticle (PN). Specifically, we study the resonance fluorescence of an atom near the PN of both spherical and spheroidal shapes, generation of squeezed states in such systems, and analyze the statistics of photons in the resonance-fluorescence of a two-level-atom.

ITuB5 • 10:15-10:30
THz surface plasmon-assisted characterization of highly doped Si, M.M.Nazarov, *Inst. on Laser and Information Technologies, Russia,* A.P.Shkurinov, *Lomonosov Moscow State Univ., Russia,* F.Garet, J.-L.Coutaz, *Univ. of Savoie, France.* We employ highly-doped silicon as a medium for THz surface plasmons (SP) and characterize this material from the SP measurements. SP propagation over several cm permits the detection of small changes of the dielectric function.

Hall 4
ICONO-08/1

9:00–11:00
ITuC • Ultrafast Phenomena and High-Precision Measurements I (ICONO-08/1)—Continued

ITuC2 • 09:45-10:15 • INVITED
High-precision optical clocks based on ultracold atoms and ions: new methods and approaches, A.V.Taichenachev, V.I.Yudin, S.N.Bagayev, *Inst. of Laser Phys., Russia, Novosibirsk State Univ., Russia, Novosibirsk State Technical Univ., Russia*. We review new spectroscopic methods proposed and developed by us and other groups in order to improve metrological characteristics of modern optical frequency standards based on ultracold atoms and ions.

ITuC3 • 10:15-10:30
Two-photon spectroscopy of 1S-3S transition in atomic hydrogen using frequency comb, A.Matveev, E.Peters, D.C.Yost, T.Udem, T.W.Hänsch, *Max Planck Inst. of Quantum Optics, Germany*. We report about successful implementation of a frequency comb for Doppler-free excitation of two-photon transition 1S-3S in atomic hydrogen. Precise measurement of energy of this transition can be used for determination of the proton charge radius and Rydberg constant.

Hall 5
ICONO-03/1

9:00–11:00
ITuD • Quantum and Atom Optics I (ICONO-03/1)—Continued

ITuD3 • 10:15-10:45 • INVITED
Quasi-two-dimensional atomic Fermi gas with tunable interactions, A.Turlapov, *Inst. of App. Phys., Russia*. A planar Fermi gas of atoms with tunable *s*-wave interactions is studied in various smoothly-connected many-body regimes including the regime of Fermi liquid, strong interaction, and molecular Bose gas.

Hall 6
LAT-03/1

9:00–11:00
LTuB • Laser Remote Sensing and Tunable Diode Laser spectroscopy I (LAT-03/1)—Continued

LTuB2 • 09:45-10:15 • INVITED
Recording and analyzing of high resolution molecular gas phase spectra at temperatures between 50 and 296 K, A.W.Mantz, *Connecticut College, USA*. Absorption spectra collected using Copper cells with 0.20 or 21.68 meter paths, cooled by He refrigerators, using a Tunable laser source or Michelson Interferometer showed non-Voigt lines, line mixing, and non-power law dependence of the broadening parameter below 130 K.

LTuB3 • 10:15-10:45 • INVITED
Quantum cascade laser spectroscopy in biomedical and forensic science, M.W. Sigrist, J.Kottmann, J.M.Rey, K.M.-C.Hans, *ETH Zürich, Switzerland*. This paper discusses recent examples of quantum cascade laser spectroscopy applied to glucose sensing in epidermal skin with a limit of detection (LOD) of 100 mg/dl and to cocaine detection in saliva with a LOD of 1μg/ml.

Hall 1
ICONO-01/1

9:00–11:00
ITuA • Fundamentals of Nonlinear Optics and Novel Phenomena I (ICONO-01/1)—Continued

ITuA5 • 10:30-10:45
Quantum electrodynamics resonances in a strong pulsed laser field, S.P.Roshchupkin, *Inst. of App. Phys., NASU, Ukraine.* The review on the resonant processes of quantum electrodynamics (QED) proceeding in the strong pulsed light fields, realized in modern powerful pulsed lasers is presented. The appearance of resonances in a laser field is one of the fundamental problems of QED in electromagnetic fields. Following QED processes of the second order in the fine structure constant in the pulsed laser field are considered: resonant spontaneous bremsstrahlung by an electron scattered by a nucleus, resonant photocreation of electron–positron pairs on a nucleus, and resonant scattering of a lepton by a lepton and others. The resonant peak's altitude and width are defined by the external pulsed wave properties. It is demonstrated that the resonant cross sections may be several orders of magnitude greater than the corresponding cross sections in the absence of an external field. Results obtained may be experimentally verified, for example, by the scientific facilities at the SLAC Natl Accelerator Lab. and FAIR in Germany.

ITuA6 • 10:45-11:00
All-optical transistor action in a photonic crystal with a defect containing Raman-gain medium, V.G. Arkhipkin, S.A. Myslivets, *L.V.Kirensky Inst. of Phys., Russia.* We theoretically demonstrate all-optical transistor action in photonic crystal with a defect doped with Raman-gain atoms and analyze conditions for its observation. It is shown that the intensity of switching field could be 1-10 μW/cm^2.

Hall 2
LAT-01/1

9:00–11:00
LTuA • Solid-State Lasers, Materials, and Applications I (LAT-01/1)—Continued

LTuA4 • 10:30-10:45
Two micron lasing in thulium doped fluoride ceramics, A.A.Lyapin, P.A.Ryabochkina, A.V.Malov, K.N.Nischev, A.A.Pynenkov, *N.P.Ogarev Mordovian State Univ., Russia,* P.P.Fedorov, V.V.Osiko, S.N.Ushakov, *A.M.Prokhorov General Phys. Inst., Russia,* E.A.Garibin, *INCROM Ltd., Russia.* The laser radiation of CaF_2:Tm laser ceramics was obtained at 1900 nm. The structural, spectroscopic and thermo-mechanical properties of fluoride ceramics showed promising features for use as active media of solid-state lasers.

LTuA5 • 10:45-11:00
Novel efficient 2.1-μm lasers based on 800-nm pumped Tm^{3+}:Lu_2O_3 ceramics in CW, Q-switch and mode-locking regimes, O.L.Antipov, A.A.Novikov, A.P.Zinoviev, *Inst. of App. Phys., Russia,* R.I.Kositsyn, *Nizhny Novgorod State Univ., Russia,* H.Yagi, *Konoshima Chemical Co., Japan,* A.A.Lagatskii, *Univ. of St Andrews, UK.* High efficiency and high power oscillations at ~2.1 μm in CW, active Q-switched and passive mode-locking regimes in the novel Tm^{3+}:Lu_2O_3 ceramics lasers with diode or laser pumping at ~800 nm were achieved.

Hall 3
ICONO-06/1

9:00–11:00
ITuB • Nano-Optics and Plasmonics I (ICONO-06/1)—Continued

ITuB6 • 10:30-11:00 • INVITED
«Split-Hole Resonator»: a new highly efficient nonlinear optical element in nanoplasmonics, P.N.Melentiev, A.E.Afanasiev, V.I.Balykin, *Inst. for Spectroscopy, Russia.* We propose and experimentally realize a new element for nanoplasmonics - a split hole resonator (SHR). Here, we demonstrate the use of the SHR as a highly efficient nonlinear optical element for: (1) the generation of the third harmonic from a single SHR; (2) the excitation of intense multiphoton luminescence from a single SHR; (3) the construction of a polarization-ultrasensitive nanoelement; and finally, as a practical application, (4) the building up of an all-optical display.

Hall 4
ICONO-08/1

9:00–11:00
ITuC • Ultrafast Phenomena and High-Precision Measurements I (ICONO-08/1)—Continued

ITuC4 • 10:30-11:00 • INVITED
Frequency combs and soliton mode-locking in optical microresonators, M.L.Gorodetsky, T.Kippenberg, *Lomonosov Moscow State Univ., Russia,* T.Herr, *École Polytechnique Fédérale de Lausanne (EPFL), Switzerland.* Recent breakthrough in soliton mode-locked Kerr optical frequency combs generated in optical microresonators with whispering gallery modes opens the way for compact sources of femtosecond pulses as well as stable photonic microwave oscillators.

Hall 5
ICONO-03/1

9:00–11:00
ITuD • Quantum and Atom Optics I (ICONO-03/1)—Continued

ITuD4 • 10:45-11:00
Influence of magnetic field on relaxation processes in ultracold laser plasma, B.B.Zelener, S.A.Sahakian, V.A.Sautenkov, B.V.Zelener, *Joint Inst. for High Temperatures, Russia,* E.A.Manykin, *Natl Res. Nuclear Univ., Russia, Kurchatov Inst., Natl Res. Centre, Russia.* We analyze influence of external magnetic field on relaxation processes in ultracold plasma. Simulations show that magnetic field can strongly reduce of the recombination plasma rate. We assembled setup for preparation and study of ultracold lithium plasma by using tunable lasers. Behavior of laser cooled plasma in external magnetic fields will be investigated.

ITuD5 • 11:00-11:15
Ultracold Rydberg matter: new phases and effects, Yu.E.Lozovik, *Inst. of Spectroscopy, Russia, Moscow Inst. of Phys. and Technology (State Univ.), Russia.* Last achievements in the field of ultracold Rydberg matter are reviewed. Crystallization of Rydberg gas and mesoscopic clusters of Rydberg atoms due to van der Waals repelling is discussed. Supersolid formation in the system of Rydberg crystal embedded in BEC of nonexcited atoms is discussed. Induced dipoles and polaron effects on the crystallization are discussed.

Hall 6
LAT-03/1

9:00–11:00
LTuB • Laser Remote Sensing and Tunable Diode Laser spectroscopy I (LAT-03/1)—Continued

LTuB4 • 10:45-11:00
Development of field-deployable QCL sensor for simultaneous detection of atmospheric N_2O and CO, J.S.Li, U.Parchatka, H.Fischer, *Max Planck Inst. for Chemistry, Germany.* We report on the development of field-deployable QCL sensor for simultaneous detection of atmospheric trace gases N_2O and CO. A short-term precision of 0.85 ppb/Hz and 0.64 ppb/Hz was obtained for N_2O and CO, respectively.

Hall 1 ICONO-01/2

11:30–13:00
ITuE • Fundamentals of Nonlinear Optics and Novel Phenomena II (ICONO-01/2)
Atsushi Yabushita, *Natl. Chiao-Tung Univ., Taiwan, Presider*

ITuE1 • 11:30-12:00 • INVITED
Nonlinear (micro-) spectroscopy with tailored pulses, T.Buckup, J.Rehbinder, A.Wipfler, M.Motzkus, *Phys.-Chem. Inst., Ruprecht-Karls-Universität Heidelberg, Germany.* Ultrabroadband laser pulses of sub 10 fs are designed by phase and amplitude shaping for different nonlinear excitation processes in multimodal nonlinear microscopy. Switching between narrowband and broadband Multiplex CARS, elimination of unwanted two-photon fluorescence or direct determination of the linear Raman spectrum can be easily achieved.

ITuE2 • 12:00-12:15
Nonlinear optical activity for the ultrashort elliptically polarized pulse: numerical solution of Maxwell equations by finite-difference time-domain method, V.A.Makarov, I.A.Perezhogin, N.N.Potravkin, *Lomonosov Moscow State Univ., Russia.* The modification of finite-difference time-domain method is used for the analysis of the propagation of elliptically polarized ultrashort pulse in a medium with frequency and spatial dispersion of cubic nonlinearity. The results of our research significantly differ from those obtained within the slowly varying envelope approach.

Hall 2 LAT-01/2

11:30–13:00
LTuC • Solid-State Lasers, Materials, and Applications II (LAT-01/2)
Yuri Kopylov, *FIRE RAS, Russia, Presider*

LTuC1 • 11:30-12:00 • INVITED
Novel high-efficiency thulium lasers based on monoclinic $KLu(WO_4)_2$ crystalline host, S.N.Bagaev, S.M.Vatnik, I.A.Vedin, P.F.Kurbatov, *Inst. of Laser Phys., Russia,* A.A.Pavlyuk, *A.V.Nikolaev Inst. of Inorganic Chemistry, Russia,* X.Mateos, M.C.Pujol, F.Díaz, *Univ. Rovira i Virgili, Spain,* V.Petrov, U.Griebner, *Max-Born-Inst. for Nonlinear Optics and Ultrafast Spectroscopy, Germany,* Yu.V.Korostelin, Ya.K.Scasyrsky, *P.N.Lebedev Physical Inst., Russia.* We report our recent results on spectroscopy, thermo-optics and multi-watt CW, quasi-CW (QCW), and passively Q-switched (PQS) laser operation of monoclinic $KLu(WO_4)_2$ crystalline host activated with thulium, employing both thin disk and mini-slab concepts.

LTuC2 • 12:00-12:15
Co-doping effect and local structure of Nd,Y:CaF_2 laser crystals, L.Su, Y.Zhan, Q.Wang, X.Qian, C.Wang, D.Jiang, L.Zheng, J.Xu, *Shanghai Inst. of Ceramics, CAS, China.* A series of Nd,Y:CaF_2 single crystals grown by TGT method are studied systematically by absorption, excitation and luminescence spectra, and extended x-ray absorption fine structure (EXAFS). The incorporation of Y^{3+} substantially manipulates the local structure of Nd ions in CaF_2 crystal lattice, including coordination number and bond length. Furthermore, photoluminescence spectra parameters of Nd ions can be modulated in a large range, including emission peak wavelength (from 1047 to 1054 nm), peak emission cross section ($1.3–3.0\times10^{-20}$ cm^2), and fluorescence lifetime (12–372 μs). At last, we show some laser experiments for 2%Nd-2%Y:CaF_2 crystal, which achieved true CW laser operation with a Ti:Sapphire laser pump.

Hall 3 ICONO-6/2

11:30–13:00
ITuF • Nano-Optics and Plasmonics II (ICONO-06/2)
Yurii Lozovik, *Inst. of Spectroscopy, Russia, Presider*

ITuF1 • 11:30-12:15 • KEYNOTE
Nanoplasmonics: polarisation effects, A.V.Zayats, *King's College London, UK.* Applications of plasmonic nanostructures for polarisation manipulation will be overviewed, including new approaches to controlling polatisation based on plasmonic metamaterials with hyperbolic dispersion and non-Hermitian metamaterials with loss-coupled plasmonic resonances. All-optical ultrafast control of light polarisation using intrinsic metal nonlinearities will also be discussed.

Hall 4 ICONO-08/2

11:30–13:00
ITuG • Ultrafast Phenomena and High-Precision Measurements II (ICONO-08/2)
Evgeny Ryabov, *Inst. of Spectroscopy, Russia, Presider*

ITuG1 • 11:30-12:00 • INVITED
Coherent magnetization dynamics, M.Vomir, M.Barthelemy, M.Sanches Piaia, J.-Y.Bigot, *Univ. de Strasbourg, France.* The coherent coupling between femtosecond laser pulses and the magnetization of a ferromagnetic material is exemplified in a magneto-optical four-wave-mixing experiment performed on a garnet thin film. It allows separating the coherent and population spins dynamics.

ITuG2 • 12:00-12:15
Ultrafast Faraday rotation in magnetophotonic microcavities, A.I.Musorin, M.I.Sharipova, A.V.Chetvertukhin, T.V.Dolgova, A.A.Fedyanin, *Lomonosov Moscow State Univ., Russia,* M.Inoue, *Toyohashi Univ. of Technology, Japan.* Femtosecond dynamics of Faraday effect in magnetophotonic microcavities is experimentally demonstrated by using polarization-sensitive correlation scheme. Complex spectral-dependent behavior of Faraday rotation dynamics is shown.

Hall 5 ICONO-03/2

11:30–13:00
ITuH • Quantum and Atom Optics II (ICONO-03/2)
Eugene Polzik, *Niels Bohr Inst., Copenhagen Univ., Denmark, Presider*

ITuH1 • 11:30-12:00 • INVITED
Observing a large optical phase shift from a single trapped atomic ion, A.Jechow, *Univ. of Potsdam, Germany,* E.W.Streed, B.G.Norton, S.Haendel, V.Blums, D.Kielpinski, *Griffith Univ., Australia.* We have used a single trapped atomic ion to induce and measure a large optical phase shift of 1.3 radians in light scattered by the atom by utilizing spatial interferometry based on absorption imaging.

ITuH2 • 12:00-12:30 • INVITED
Quantum computation in an array of trapped Rydberg atoms, M.Saffman, *Univ. of Wisconsin, USA.* We report on progress towards multi-qubit quantum logic using an array of optically trapped neutral atom qubits. Rydberg state mediated long range interactions enable gate operations beyond nearest neighbors for scalable computing.

Hall 6 LAT-03/2

11:30–13:00
LTuD • Laser Remote Sensing and Tunable Diode Laser spectroscopy II (LAT-03/2)
Markus Sigrist, *ETH Zurich, Switzerland, Presider*

LTuD1 • 11:30-12:00 • INVITED
High-resolution IR laser spectroscopy of ozone isotopomers using a diode laser stabilised by a new interferometric phase frequency emission control, C.Janssen, H.Elandaloussi, C.Rouillé, *CNRS, UMR 7092, Univ. Paris 6, France,* H.Willner, *Bergische Univ., Germany.* Highly accurate absolute IR spectroscopic parameters are of an ever-increasing importance. Laser diodes can provide such highly resolved spectral data. Here we describe the improvement of a diode laser control based on an opto-electrical feedback scheme using a HeNe laser stabilized Michelson interferometer with a path difference of 80 cm. The new interferometer allows a path difference control of ~ 10 nm (λ(HeNe)/64) instead of λ(HeNe)/8 = 79 nm, corresponding to a relative interferometer stability of the order of 10^{-8}. Here we report on first performance test of the new system, using spectra of pure asymmetric ozone $^{16}O^{16}O^{18}O$ in the 10 µm range.

LTuD2 • 12:00-12:30 • INVITED
Mid-Infrared semiconductor laser based trace gas sensor technologies: recent advances and applications, F.K.Tittel, R.Lewicki, M.Jahjah, W.Jiang, J.Zhang, L.Gong, R.Griffin, *Rice Univ., Houston, USA,* P.Stefanski, J.Tarka, *Wroclaw Univ. of Technology, Poland.* Recent advances in the development of ultra-sensitive sensor technology based on mid–infrared semiconductor lasers for the detection of trace gas species and their application in industrial process control and environmental monitoring will be reported.

Hall 1 ICONO-01/2

11:30–13:00 ITuE • Fundamentals of Nonlinear Optics and Novel Phenomena II (ICONO-01/2)—Continued

ITuE3 • 12:15-12:30
High-order harmonic generation in plasmas using 1 kHz lasers, R.A.Ganeev, *Saitama Medical Univ., Japan,* C.Hutchison, J.W.G. Tisch, J.P.Marangos, *Imperial College London, UK.* Recent results on high-order harmonic generation in laser-produced plasmas using high repetition rate, few cycle pulses are presented. We discuss stable plasma harmonic generation, single harmonic generation using 3.5fs pulses, and fullerene- and nanoparticles-induced harmonics.

ITuE4 • 12:30-12:45
Multi-bistable effect in resonantor-augmented metal-insulator-metal plasmonic waveguides, R.-Ch.Shiu, Y.-Ch.Lan, *Natl Cheng Kung Univ., Taiwan,* G.-Y.Guo, *Natl Chengchi Univ., Taiwan, Natl Taiwan Univ., Taiwan.* In this contribution, multi-bistable effect in two third non-linear optical material resonators side-coupled to a metal-insulator-metal plasmonic waveguide is demonstrated theoretically.

ITuE5 • 12:45-13:00
Low-energy photon-avalanche-like ultrafast excitation and optical switching in transparent solids, E.Yu.Perlin, A.V.Ivanov, A.A.Popov, *St.Petersburg Natl Res. Univ. of Inform. Technologies, Mechanics and Optics, Russia.* A new mechanism of photoexcitation of transparent solids is studied. The mechanism exhibits an exceptionally high degree of optical nonlinearity and shows itself even at moderate laser radiation intensities $j \sim 10^5$ W/cm^2.

Hall 2 LAT-01/2

11:30–13:00 LTuC • Solid-State Lasers, Materials, and Applications II (LAT-01/2)—Continued

LTuC3 • 12:15-12:30
Diode pumped CW 4.3 μm laser operation of self terminated $^6H_{11/2}$–$^6H_{13/2}$ transition of $PbGa_2S_4$:Dy^{3+} crystal, M.E.Doroshenko, V.V.Osiko, *A.M.Prokhorov General Phys. Inst., Russia,* V.V.Badikov, D.V.Badikov, *Kuban State Univ., Russia,* H.Jelinkova, J.Sulc, *Czech Technical Univ., Czech Republic.* CW 4.3 μm mid-IR oscillations of $PbGa_2S_4$:Dy^{3+} crystal were obtained under 1.31 μm and 1.76 μm diode pumping with slope efficiency up to 8%. The self terminated $^6H_{13/2}$–$^6H_{11/2}$ transition lower laser level depopulation mechanism is suggested.

LTuC4 • 12:30-12:45
LiF:F^{2-} color center laser pumped by 946 nm Nd:YAG ceramic laser, Z.J.Liu, S.J.Men, C.Wang, Z.H.Cong, X.Y.Zhang, *Shandong Univ., China,* P.G.Zverev, V.A.Konyshikin, *A.M.Prokhorov General Phys. Inst., Russia.* Broad-band LiF:F^{2-} color center laser pumped by a *Q*-switched 946 nm Nd:YAG ceramic laser is realized. The highest pulse energy of 34.8 μJ is obtained with the conversion efficiency of 17.5%.

LTuC5 • 12:45-13:00
$LiY_{0.3}Lu_{0.7}F_4$: Ce^{3+}, Pr^{3+} mixed crystal as a perspective upconversionally pumped UV active medium, V.G.Gorieva, V.V.Semashko, S.L.Korableva, M.A.Marisov, *Kazan Federal Univ., Russia.* Investigation results of energy transfer from Pr^{3+} ions to Ce^{3+} ions are presented. Absolute concentrations of Pr^{3+} and Ce^{3+} ions are determined and coefficient of energy transfer from Pr^{3+} ions to Ce^{3+} ions is estimated.

Hall 3 ICONO-06/2

11:30–13:00 ITuF • Nano-Optics and Plasmonics II (ICONO-06/2)—Continued

ITuF2 • 12:15-12:30
Polarization-sensitive plasmonic nanomaterials: polarization state control on femtosecond and nanometer scales, M.R.Shcherbakov, P.P.Vabishchevich, V.V.Komarova, B.B.Tsema, T.V.Dolgova, A.A.Fedyanin, *Lomonosov Moscow State Univ., Russia.* Polarization properties of anisotropic metallic nanostructures are studied by means of far-field optical spectroscopy, near-field optical microscopy, and femtosecond Stokes parameters chronometry revealing possibilities of efficient control over state of polarization of light with surface plasmon resonances.

ITuF3 • 12:30-12:45
Circular dichroism in second harmonic generated from planar G-shaped nanostructures, E.A.Mamonov, I.A.Kolmychek, A.I.Maydykovsky, T.V.Murzina, *Lomonosov Moscow State Univ., Russia,* S.Vandendriessche, T.Verbiest, *Katholieke Univ. Leuven, Belgium,* M.Hojeij, *Paul Scherrer Inst., Switzerland,* Y.Ekinci, *ETH Zurich, Switzerland,* V.K.Valev, *Univ. of Cambridge, UK.* Circular dichroism in second harmonic generation (SHG-CD) from planar G-shaped nanostructures is studied. It is found that the effect of SHG-CD is maximal for normal incidence and diminishes as the angle of incidence increases.

ITuF4 • 12:45-13:00
Femtosecond pump-probe spectroscopy of Au/TiO_2 nanocomposites: the evolution of localized plasmon resonance and its connection to charge transfer effects, A.Aiboushev, A.Kostrov, F.Gostev, O.M.Sarkisov, V.Nadtochenko, *N.N.Semenov Inst. of Chemical Phys., Russia.* The temporal non-thermic shift of localized plasmon resonance for Au/TiO_2 nanocomposites was studied in femto-second and picosecond time scale. FDTD and TD-DFT analysis was made to explain the shift in frame of charge transfer model.

Hall 4
ICONO-08/2

11:30–13:00
ITuG • Ultrafast Phenomena and High-Precision Measurements II (ICONO-08/2)—Continued

ITuG3 • 12:15-12:30
Femtosecond Faraday rotation dynamics spectroscopy, P.V.Perepelkin, A.I.Musorin, M.I.Sharipova, A.V.Chetvertukhin, T.V.Dolgova, A.A.Fedyanin, *Lomonosov Moscow State Univ., Russia.* A new polarization-sensitive correlation spectroscopy technique for femtosecond Faraday rotation dynamics measurements is presented.

ITuG4 • 12:30-12:45
Precision laser detection of magnetization processes of magnetically ordered substances, Ya.A.Fofanov, *Inst. for Anlytical Instrumentation, Russia,* E.E.Bibik, *St.-Petersburg State Inst. of Technology (Technical Univ.), Russia,* I.V.Pleshakov, P.M.Agruzov, *Ioffe Physical-Technical Inst., Russia*. The perspectives for development of highly sensitive laser methods for the study of magnetic phenomena are discussed. It is shown that the observed polarization responses reflect rather subtle features of magnetization processes in different samples.

ITuG5 • 12:45-13:00
Atomic magnetometer based on Rb^{87} atoms pumped by linearly polarized laser field, A.A.Zibrov, *Advanced Energy Technologies LTD, Russia,* V.I.Yudin, A.V.Taichenachev, *Inst. of Laser Phys., Russia, Novosibirsk State Univ., Russia,* A.N.Kozlov, *N.V.Pushkov Inst. of Terrestrial Magnetism, Ionosphere and Radiowave Propagation, Russia,* A.K.Vershovski, A.S.Pazgalev, *Ioffe Physical-Technical Inst., Russia,* V.L.Velichansky, V.V.Vassiliev, A.S.Zibrov, S.A.Zibrov, *P.N.Lebedev Physical Inst., Russia.* We propose to use the $F_g=1 \rightarrow F_e=1$ transition of the Rb^{87} D1 line excited by a linearly polarized laser radiation for magnetometer realization. The magnetic field is determined through the detection of the doubled Larmor frequency.

Hall 5
ICONO-03/2

11:30–13:00
ITuH • Quantum and Atom Optics II (ICONO-03/2)—Continued

ITuH3 • 12:30-13:00 • INVITED
Ultra cold magnesium atoms for an optical frequency standard: state of the art and future trends, A.N.Goncharov, A.E.Bonert, D.V.Brazhnikov, A.M.Shilov, A.V.Taichenachev, V.I.Yudin, S.N.Bagayev, *Inst. of Laser Phys., Russia, Novosibirsk State Univ., Russia, Novosibirsk State Technical Univ., Russia.* The paper presents the last results on ultra-high resolution spectroscopy of laser cooled and trapped magnesium atoms. Application of cold Mg atoms for an optical frequency standard with relative uncertainty $\Delta \nu/\nu < 10^{-16}$.

Hall 6
LAT-03/2

11:30–13:00
LTuD • Laser Remote Sensing and Tunable Diode Laser spectroscopy II (LAT-03/2)—Continued

LTuD3 • 12:30-12:45
Near-IR laser-based system for $^{13}CO_2/^{12}CO_2$ ratio analysis in breath, A.V.Koval'[1,2], E.V.Stepanov[1], [1]*A.M.Prokhorov General Phys. Inst., Russia,* [2]*Moscow Inst. of Phys. and Technology (State Univ.), Russia.* A 2.05 μm laser based analyzer of the relative content of CO_2 isotope modifications in exhaled air is presented. Special algorithm of spectral data processing is proposed.

LTuD4 • 12:45-13:00
Diode pulsed lidar-rangefinder: eye-safe measurements with ~1 cm accuracy by a 15 ns laser pulse, S.Pershin, V.Lednev, A.Turin, *A.M.Prokhorov General Phys. Inst., Russia,* V.Makarov, *Space Research Inst., Russia.* Portable eye-safe rangefinder based on 15 ns (~4.5 m) pulsed diode-laser and single-photon counter was capable to measure distance with accuracy better than 1 cm with the suggested signal processing.

Hall 1 PLENARY SESSION I		

14:00–16:00
PTuA • Opening. Plenary Lectures I
Sergey Bagayev*, Inst. of Laser Physics, Russia, and*
John Dudley, *Univ. de Franche-Comté, France, Presiders*

PTuA1 • 14:00-15:00 • PLENARY

Photonic crystal fibers: Enabling new science, Philip Russell, *Max Planck Institute for the Science of Light, Germany*. The past 15 years have seen the emergence of glass fibers with intricate transverse microstructures, often with nanoscale features. Their ability to guide and manipulate light in new ways has led to many novel applications. Examples include generation of octave-spanning supercontinua in silica-air photonic crystal fibre (PCF), giant optomechanical nonlinearities two parallel nanoscale membranes supported within a capillary fibre, all-optical modulation of light by GHz acoustic resonances tightly confined in micron-sized glass cores, excitation of orbital angular momentum states in twisted solid-core photonic crystal fibre (PCF) and optothermal trapping of particles in hollow core PCF.

Hollow core PCF also offers unique opportunities for studying ultrafast pulse dynamics in gases: pressure-tunable dispersion, metre-long diffraction-free path-lengths, very high optical damage thresholds, a small core offering near single-mode operation and a Kerr nonlinearity that (at high pressure) can rival that of silica glass. When a noble gas is used, very low group velocity dispersion and the absence of Raman scattering allow almost perfect self-compression of high order solitons to few-cycle pulses, resulting in the efficient generation of ultraviolet (UV) dispersive waves (or Čerenkov radiation) whose wavelength is pressure- and energy-tunable from the vacuum UV out to the visible. At the temporal focus the intensity can be as high as 10^{14} W/cm^2, exceeding the ionisation threshold of the gas, and permitting for the first time the observation of a soliton self-frequency blue-shift. When Raman-active gases are used, frequency combs spanning many octaves can be generated, and studies of dynamic self-similarity are made possible by using a HC-PCF in which only pump and first Stokes signals are guided. It seems probable that over the next years photonic crystal fibres will continue to yield many exciting new results of fundamental scientific interest, some with considerable commercial potential.

PTuA2 • 15:00-16:00 • PLENARY

Quantum dot lasers and their optimization for various applications, Alexey Zhukov, *St.Petersburg Academic Univ., Russia*. Basic principles of quantum dot formation by self-organization phenomena in epitaxial growth will be discussed. The talk will be focused on long-wavelength quantum dots capable of emitting around 1.3 μm as it is suitable for various laser applications including optical fiber communication. The following aspects of optimization of quantum dot lasers and quantum dots themselves will be highlighted: formation of broad lasing (gain) spectra, achievement of high power levels, suppression of excited state lasing, suppression of higher spatial-order lasing, maximization of modulation frequency, minimization of heat dissipation under direct modulation, improvement of temperature stability.

Hall 1
ICONO-01/3

16:30–18:30
ITuI • Fundamentals of Nonlinear Optics and Novel Phenomena III (ICONO-01/3)
Kazuaki Sakoda, *Natl. Inst. for Material Science, Japan, Presider*

ITuI1 • 16:30-17:00 • INVITED
Bright fibers: special concepts and technologies for light generation in optical fibers, H.Bartelt, *Inst. of Photonic Technology, Germany.* Different concepts for light generation in optical fibers will be addressed such as fiber lasing as well as laser-pumped light generation in fibers such as second harmonic generation and super-continuum generation.

ITuI2 • 17:00-17:15
Stimulated Raman Scattering in liquids, embedded into pores of globular photonic crystals or glasses, V.S.Gorelik, A.D.Kudryavtseva, P.P.Sverbil, N.V.Tcherniega, Yu.P.Voinov, *P.N.Lebedev Physical Inst., Russia*, V.A.Orlovich, A.I.Vodchits, *B.I.Stepanov Inst. of Phys., Belarus*. Stimulated Raman Scattering in some liquids embedded into pores of photonic crystals and glasses has been observed. Lowering of Stimulated Raman Scattering threshold has been observed in photonic structures with comparing to homogeneous liquids.

Hall 2
LAT-01/3

16:30–18:30
LTuE • Solid-State Lasers, Materials, and Applications III (LAT-01/3)
Igor Razdobreev, *Univ. Lille, France, Presider*

LTuE1 • 16:30-17:00 • INVITED
Thermo-optical properties and thermal lensing in RE-doped double tungstate and vanadate laser crystals, P.A.Loiko, K.V.Yumashev, N.V.Kuleshov, *Belarusian Natl Technical Univ., Belarus,* A.A.Pavlyuk, *A.V.Nikolaev Inst. for Inorganic Chemistry, Russia*. This paper presents recent achievements in experimental characterization of dispersion and anisotropy of thermo-optic coefficients, athermal propagation directions and thermal lens properties for rare-earth-doped monoclinic double tungstate $KRE(WO_4)_2$ and tetragonal vanadate $REVO_4$ laser crystals.

LTuE2 • 17:00-17:15
Growth and spectroscopic investigations of Raman-active strontium molybdate crystals doped with rare-earth elements, I.S.Voronina, E.E.Dunaeva, A.V.Nekhoroshikh, L.I.Ivleva, P.G.Zverev, *A.M.Prokhorov General Phys. Inst., Russia*. The results of growth experiments and investigation of concentration series of the scheelite type $SrMoO_4$ doped with Nd^{3+}, Yb^{3+}, Pr^{3+} are presented. The luminescence and laser properties of the Raman materials are discussed.

Hall 3
ICONO-06/3

16:30–18:15
ITuJ • Nano-Optics and Plasmonics III (ICONO-06/3)
Na Liu, *Max-Planck Inst. for Intelligent Systems, Germany, Presider*

ITuJ1 • 16:30-17:00 • INVITED
Anisotropic plasmonic metasurfaces for ultra-thin wave plates, S.I.Bozhevolnyi, *Univ. of Southern Denmark, Denmark.* Our latest results on efficient control of the phase of light reflected by plasmonic metasurfaces consisting of arrays of gap-plasmon resonators are overviewed, discussing both fundamental issues raised and practical applications envisioned.

ITuJ2 • 17:00-17:30 • INVITED
Nanoscale optics with single emitters in hybrid plasmonic-photonic systems, A.F.Koenderink, M.Frimmer, *Center for Nanophotonics, FOM Institute for Atomic and Molecular Phys., The Netherlands.* We investigate the LDOS on a subwavelength scale with a near-field fluorescing scanning probe microscope. Furthermore, we explore novel opportunities of LDOS engineering in hybrid photonic systems combining nano-antennas with larger dielectric structures like cavities and mirrors.

Hall 4
ICONO-08/3

16:30–18:30
ITuK • Ultrafast Phenomena and High-Precision Measurements III (ICONO-08/3)
Eric Cormier, *Univ. of Bordeaux 1, France, Presider*

ITuK1 • 16:30-17:00 • INVITED
Resolving attosecond scale tunneling dynamics in molecules, B.D.Bruner, D.Shafir, H.Soifer, M.Dagan, N.Dudovich, *Weizmann Inst. of Sci., Israel,* Y.Mairesse, *Univ. Bordeaux I, France,* S.Patchkovskii, *Natl Res. Council of Canada, Canada,* M.Yu.Ivanov, O.Smirnova, *Max-Born Inst. for Nonlinear Optics and Short Pulse Spectroscopy, Germany.* The dynamics of tunnel ionization are probed via high harmonic generation. We demonstrate how this approach can resolve subtle differences in ionization dynamics between electronic orbitals in molecules.

ITuK2 • 17:00-17:30 • INVITED
Morphology of bulk heterojunction revealed by ultrafast excitons, M.S.Pshenichnikov, A.Serbenta, V.G.Pavelyev, J.C.Hummelen, P.H.M.van Loosdrecht, *Zernike Inst. for Advanced Materials, Univ. of Groningen, The Netherlands.* Ultrafast visible pump – IR probe spectroscopy on fullerene excitons is applied to learn the nanoscale texture of polymer-fullerene heterojunctions used in plastic solar cells. The proposed technique allows obtaining valuable information on morphology "on-the-fly" in working photovoltaic devices.

Hall 5
ICONO-03/3

16:30–18:30
ITuL • Quantum and Atom Optics III (ICONO-03/3)
Mark Saffmann, *Univ. of Wisconsin, USA, Presider*

ITuL1 • 16:30-17:00 • INVITED
Quantum electrodynamics of atoms and molecules in nanoenvironment, V.V.Klimov, *P.N.Lebedev Physical Inst., Russia.* In this talk I will discuss influence of nanoparticles and nanostructures (including metamaterials) on optical properties of atoms and molecules. In the first part of lecture I will present history and general principles of QED in nanoenvironment. Here I will touch both weak and strong regimes of light-matter interaction. Special attention will be paid to quantization of electromagnetic field near nanoparticles and nanostructures and relation between classical and quantum descriptions. Notion of local density of photon states will be also discussed here. In second part of lecture I will present our results on radiation of atoms and molecules for different specific geometries and materials. In final part of talk I will outline main challenges in this area.

ITuL2 • 17:00-17:30 • INVITED
Few-photon spectroscopy of a trapped ion through sensitive recoil detection, Y.Wan, F.Gebert, B.Hemmerling, K.Hammerer, P.O.Schmidt, *PTB Braunschweig and Leibniz Univ. Hannover, Germany.* We present a novel spectroscopy technique for trapped ions which combines the high detection efficiency of the electron shelving technique with background-free spectroscopy of short-lived excited states.

Hall 6
LAT-03/3

16:30–18:30
LTuF • Laser Remote Sensing and Tunable Diode Laser Spectroscopy III (LAT-03/3)
Arlan Mantz, *Connecticut College, USA, Presider*

LTuF1 • 16:30-17:00 • INVITED
Frequency comb spectroscopies in the mid IR, F.Zhu, A.Kolomenski, J.Strohaber, H.Schuessler, *Texas A&M Univ., USA.* There is an ongoing revolution in the field of spectroscopy based on frequency comb lasers (FCL).This talk will present our efforts to use FCL to detect greenhouse gases and in particular atmospheric methane.

LTuF2 • 17:00-17:15
Double pulse laser induced breakdown spectroscopy: 30 years of success, S.M.Pershin, V.N.Lednev, *A.M.Prokhorov General Phys. Inst., Russia.* The double pulse LIBS is an effective technique to improve signal-to-noise ratio of spectral lines by factor up to 200 times and increase the plasma lifetime that results in improved of analysis data.

Hall 1 ICONO-01/3

16:30–18:30
ITuI • Fundamentals of Nonlinear Optics and Novel Phenomena III (ICONO-01/3)—Continued

ITuI3 • 17:15-17:30
Nonlocal nonlinear magneto-optical response of a co-based plasmonic crystal, I.Razdolski, D.G.Gheorghe, A.V.Kimel, A.Kirilyuk, Th.Rasing, *Radboud Univ. Nijmegen, The Netherlands,* E.Th.Papaioannou, *Uppsala Univ., Sweden.* Surface plasma resonance excitation in a Co-based magnetoplasmonic crystal was found to strongly enhance second harmonic generation efficiency and induce huge changes in the phase shift between the non-magnetic and magnetic second harmonic contributions.

ITuI4 • 17:30-17:45
Nonlinear optics with backward waves: extraordinary features, materials and applications, A.K.Popov, *Univ. of Wisconsin-Stevens Point, USA.* Extraordinary properties of nonlinear-optical propagation processes are investigated that involve electromagnetic or elastic waves with negative group velocity. Nanostructured materials that support such waves and prospective unique photonic devices are described.

ITuI5 • 17:45-18:00
New mechanism of the terahertz generation in two-color laser fields, A.V.Andreev, S.Yu.Stremoukhov, *Lomonosov Moscow State Univ., Russia.* New interpretation of the terahertz radiation generation in atomic gases interacting with laser fields is presented. The mechanism is in intra-atomic nonlinearity, the emission energy is determined by electron motion in the non-harmonic intra-atomic field.

Hall 2 LAT-01/3

16:30–18:30
LTuE • Solid-State Lasers, Materials, and Applications III (LAT-01/3)—Continued

LTuE3 • 17:15-17:30
Thermal diffusivity and upper-state lifetime of ceramic and single crystalline $Tm:Lu_2O_3$, I.Kisialiou, E.Ivakin, *B.I.Stepanov Inst. of Phys., Belarus,* K.Petermann, *Inst. of Laser-Physics, Germany,* O.Antipov, *Inst. of Appl. Phys., Russia.* We present a comparison between the properties of single crystalline $Tm:Lu_2O_3$ and polycrystalline ceramics with two concentrations of Tm^{3+}. Thermal diffusivity and metastable-level lifetime have been measured by the transient gratings method.

LTuE • 17:30-17:45
Thermal effects in Yb:YAG thin disk and Yb:YAG/YAG composite active elements, I.I.Kuznetsov, I.B.Mukhin, O.V.Palashov, *Inst. of Appl. Phys., Russia.* Full analysis of thermal effects in Yb:YAG thin disk and Yb:YAG/YAG composite active elements is carried out. Heat transfer coefficients, heat generation, small signal gain, thermal lens and thermal depolarization are investigated theoretically and experimentally.

LTuE5 • 17:45-18:00
Spectral parameters control in vanadate lasers, A.A.Sirotkin, V.I.Vlasov, A.I.Zagumennyi, Yu.D.Zavartsev, S.A.Kutovoi, S.V.Garnov, I.A.Shcherbakov, *A.M.Prokhorov General Phys. Inst., Russia.* We have investigated angular dependences of the luminescence intensity of Stark transitions in vanadate crystals. Novel methods of creation active media were suggested. High power passively Q-switched laser generation, tunable radiation, two-color lasing were realized.

Hall 3 ICONO-06/3

16:30–18:15
ITuJ • Nano-Optics and Plasmonics III (ICONO-06/3)—Continued

ITuJ3 • 17:30-17:45
Single-photon sources based on nanocrystal fluorescence in 1-D photonic bandgap microcavities, S.G.Lukishova, J.M.Winkler, *Univ. of Rochester, USA,* L.J.Bissell, *U.S. Air Force Research Lab., Wright-Patterson Air Force Base, USA,* D.Goldberg, V.M.Menon, *Queens College-CUNY, USA.* Single-photon sources based on nanocrystal fluorescence in 1-D-photonic-bandgap microcavities (chiral cholesteric-liquid-crystal and Bragg-reflector with a defect layer) are prepared. Nanocrystal quantum dots, NV-color-center nanodiamonds and nanocrystals doped with trivalent rare-earth ions were used as emitters.

ITuJ4 • 17:45-18:00
Scattering of evanescent wave by periodic system of nanowires, L.L.Frumin, A.V.Nemykin, D.A.Shapiro, *Inst. of Automation and Electrometry, Russia,* S.V.Perminov, *A.V.Rzhanov Inst. of Semiconductor Phys., Russia.* The scattering of electromagnetic wave by periodic array of nanowires is studied by the extended boundary element method. The plasmonic resonance is found to be widely tunable by small variations of the angle of incidence.

Hall 4
ICONO-08/3

16:30–18:30
ITuK • Ultrafast Phenomena and High-Precision Measurements III (ICONO-08/3)—Continued

ITuK3 • 17:30-17:45
Theory of strong-field injection and carrier-envelope phase control of photocurrents in dielectrics, S.Yu.Kruchinin, V.S.Yakovlev, *Max Planck Inst. of Quantum Optics, Germany.* We present a theory of optically excited currents in dielectric exposed to a non-resonant ultrashort laser pulse, and show that injection of CEP-controlled currents can be interpreted as a quantum-mechanical interference of multiphoton excitation pathways.

ITuK4 • 17:45-18:00
Optical-field-induced current in dielectrics: insights from semiclassical and quantum models, V.S.Yakovlev, S.Yu.Kruchinin, *Max Planck Inst. of Quantum Optics, Germany,* M.G.Benedict, P.Földi, *Univ. of Szeged, Hungary.* Using quantum and semiclassical models, we theoretically investigate attosecond-scale electron dynamics in a dielectric interacting with a few-cycle near-infrared laser pulse that has a peak intensity just below the damage threshold.

Hall 5
ICONO-03/3

16:30–18:30
ITuL • Quantum and Atom Optics III (ICONO-03/3)—Continued

ITuL3 • 17:30-17:45
Optical control of coherent and squeezed phonons: major differences and similarities, O.V.Misochko, *Inst. of Solid State Phys., Russia.* Coherent and squeezed phonon oscillations can be excited in solids impulsively by a single femtosecond pulse whose duration is shorter that a phonon period. By applying the second ultrafast pump pulse these oscillations can be significantly, but differently modified.

ITuL4 • 17:45-18:00
Electromagnetic coupling of atoms with nanostructures: modification of atomic states and excitation of optical modes, V.G.Minogin, *Inst. of Spectroscopy RAS, Russia.* We describe radiative decay rates of the excited atoms into dielectric nanostructures, shifts of the atomic energy states and the shape of the laser-excited fluorescence line for the atoms located near nanostructures.

Hall 6
LAT-03/3

16:30–18:30
LTuF • Laser Remote Sensing and Tunable Diode Laser Spectroscopy III (LAT-03/3) —Continued

LTuF3 • 17:15-17:30
Application of linear estimation technique for retrieval the particle properties from multiwavelength LIDAR and Sun photometer measurements, A.Suvorina, I.Veselovskii, M.Korenskiy, A.Kolgotin, *Phys. Instrumentation Center of General Phys. Inst., Russia,* D.N.Whiteman, *NASA GSFC, USA,* O.Dubovik, *CNRS Univ. de Lille 1, France,* D.Perez-Ramirez, *Univ. of Granada, Spain.* Application of the linear estimation technique to multiwavelength Raman lidar measurements demonstrate that lidars are capable not only to provide the height profiles of particle properties but also to reveal the height-temporal evolution of aerosol features. The same technique was used to obtain the particle radius and volume from the direct Sun measurements of radiometers. The retrievals are in agreement with the results provided by AERONET operational algorithm.

LTuF4 • 17:30-17:45
Contribution of pumping from metastable levels into population of excited state of resonance transitions of Ca I and Ca II in femtosecond laser-induced breakdown spectroscopy of liquids, A.A.Ilyin, *Inst. of Automation and Control Processes, Russia, Far Eastern Federal Univ., Russia.* Cross-section and excitation rates for transitions from metastable levels were calculated. It is shown that pumping from metastable level can be equal to pumping from ground state.

LTuF5 • 17:45-18:00
Assessment of potential possibilities of cloud sensing with a terahertz free-electron laser, G.G.Matvienko, A.A.Lisenko, *V.V.Zuev Inst. of Atmospheric Optics, Russia,* A.B.Kargin, *Inst. of Computational Mathematics and Mathematical Geophysics, Russia,* V.V.Kubarev, *Inst. of Chemical Kinetics and Combustion, Russia,* V.M.Vladimirov, *Krasnoyarsk Scientific Center, Russia,* A.G.Anshits, *Inst. of Chemistry and Chemical Technology, Russia.* Feasibilities of remote sensing of the microphysical composition of low-level clouds with terahertz free-electron laser (FEL) are assessed. The Monte Carlo technique is used to simulate the lidar echo signal from a liquid-droplet cloud in the terahertz frequency range on the assumption of statistical variations of the extinction coefficient and the cloud base height.

Hall 1
ICONO-01/3

16:30–18:30
ITuI • Fundamentals of Nonlinear Optics and Novel Phenomena III (ICONO-01/3)—Continued

ITuI6 • 18:00-18:15
Green up-conversion in KGW crystal, I.A.Khodasevich, A.S.Grabtchikov, *B.I.Stepanov Inst. of Phys., Belarus,* A.A.Kornienko, E.B.Dunina, *Vitebsk State Technological Univ., Belarus.* We report observation of green emission in KGW crystal pumped by cw diode laser radiation. Data of measurements show that emission is result of up-conversion on low concentration Er ions and accompanied by transmission modification.

ITuI7 • 18:15-18:30
Čerenkov nonlinear diffraction of femtosecond pulses, A.M.Vyunishev, A.S.Aleksandrovsky, A.I.Zaitsev, *L.V.Kirensky Inst. of Phys., Russia,* V.V.Slabko, *Siberian Federal Univ., Russia.* Čerenkov nonlinear diffraction of femtosecond pulses in one-dimensional nonlinear photonic crystal of strontium tetraborate was studied theoretically and experimentally in both frequency and time domains.

Hall 2
LAT-01/3

16:30–18:30
LTuE • Solid-State Lasers, Materials, and Applications III (LAT-01/3)—Continued

LTuE6 • 18:00-18:15
Thermal diffusion bonding of oxide crystals for different laser applications, I.B.Mukhin, E.A.Perevezentsev, O.V.Palashov, *Inst. of Appl. Phys., Russia.* The new simple technique of thermal diffusion bonding is developed and Yb:YAG/YAG, TGG/YAG and Yb:GGG/Yb:YAG composite active elements are fabricated by using this method. Bonded samples have a high optical and mechanical properties and used in different laser systems.

LTuE7 • 18:15-18:30
Picosecond all-solid-state Nd:YVO_4 laser with CW diode pumping, T.V.Bezyazychnaya, M.V.Bogdanovich, A.V.Grigor'ev, V.V.Kabanov, Y.V.Lebiadok, K.V.Lepchenkov, A.G.Ryabtsev, G.I.Ryabtsev, M.A.Shchemelev, L.L.Teplyashin, *B.I.Stepanov Inst. of Phys., Belarus.* Optimization of cavity geometry and optical elements characteristics for passively mode locked picosecond laser with SESAM is discussed. The influence of SESAM parameters on laser pulse characteristics is the main aspect of this report.

Hall 3
ICONO-06/3

16:30–18:15
ITuJ • Nano-Optics and Plasmonics III (ICONO-06/3)—Continued

ITuJ5 • 18:00-18:15
Propagation of surface plasmon polaritons in curved 2D chains of nano-spheroids, I.L.Rasskazov, *Siberian Federal Univ., Russia,* S.V.Karpov, *L.V.Kirensky Inst. of Phys., Russia,* V.A.Markel, *Univ. of Pennsylvania, USA.* We investigate propagation of surface plasmon polaritons in 2*D* chains of Ag nano-spheroids using the dipole approximation and the Drude model for dielectric permeability. We showed that SPP can propagate along these chains with strong localization and minimal losses of energy compared to the chains of Ag nanospheres.

Hall 4
ICONO-08/3

16:30–18:30
ITuK • Ultrafast Phenomena and High-Precision Measurements III (ICONO-08/3)—Continued

ITuK5 • 18:00-18:15
Dynamics of intra-cluster processes induced in molecular clusters by resonant UV and IR femtosecond radiation, D.G.Poydashev, *Moscow Inst. of Phys. and Technology, Russia,* S.V.Chekalin, V.O.Kompanets, V.N.Lokhman, E.A.Ryabov, *Inst. for Spectroscopy, Russia.* The dynamics of intra-cluster reactions and cluster decay induced by resonant excitation of electronic and vibrational states of clusterized molecules by femtosecond UV and IR radiation pulses, respectively, is studied.

ITuK6 • 18:15-18:30
Femtosecond dynamics of surface plasmons in one-dimentional plasmonic crystals: frequency-resolved optical gating, V.V.Komarova, P.P.Vabishchevich, T.V.Dolgova, A.A.Fedyanin, *Lomonosov Moscow State Univ., Russia.* Femtosecond dynamics of resonantly excited surface plasmons in one-dimentional plasmonic crystals is observed by using frequency-resolved optical gating (FROG). The FROG spectrograms differ significantly for both edges of plasmonic band gap due to strong spectral variation of surface plasmon lifetime within Fano resonances.

Hall 5
ICONO-03/3

16:30–18:30
ITuL • Quantum and Atom Optics III (ICONO-03/3)—Continued

ITuL5 • 18:00-18:15
Generalized Ramsey method in precision spectroscopy of ultracold atoms and ions, K.S.Tabatchikova, A.V.Taichenachev, V.I.Yudin, *Inst. of Laser Phys., Russia, Novosibirsk State Technical Univ., Russia, Novosibirsk State Univ., Russia.* We analyze the Hyper-Ramsey excitation scheme with account for the spontaneous relaxation of atomic levels and finite width of laser line. It is shown that for efficient cancelation of the light shift both effects should be considered.

ITuL6 • 18:15-18:30
Atomic slower via dispersive optical interactions, M.Hamamda, F.Correia, J.Baudon, T.Taillandier-Loize, G.Dutier, F.Perales, M.Ducloy, *Laser Lab, University Paris 13, France,* M.Boustimi, *Umm Al-Qura Univ., Saudi Arabia.* The dispersive interaction of atoms with optical potential pulses generated by a time-modulated standing wave lowers the velocity from several hundreds m/s down to almost zero, over a path shorter than 20 cm.

Hall 6
LAT-03/3

16:30–18:30
LTuF • Laser Remote Sensing and Tunable Diode Laser Spectroscopy III (LAT-03/3) —Continued

LTuF6 • 18:00-18:15
Light stimulated desorption and diffusion of molecular gases in a polymer organic film, S.N.Atutov, A.I.Plekhanov, *Inst. of Automation and Electrometry, Russia,* R.Calabrese, B.Mai, L.Tomassetti, *Univ. di Ferrara, Italy, Istituto Nazionale di Fisica Nucleare, Italy.* We report the first detailed study of photo-desorption of various molecular gases from polymer organic film. The results of the experiment are important for expanding of the list of particles, which can be involved in this process: gas photo-desorption supported by particles bulk diffusion. We believe that this efficient method of long term collection and fast realization molecules by photo-desorption could be used for enhancement of sensitivity of existed sensors for the trace detection of various molecules (including toxic or radioactive ones) which is important to environmental applications, medicine or in geology.

LTuF7 • 18:15-18:30
Intracavity absorption spectroscopy of high sensitivity in water free NIR spectral regions, P.Fjodorow, B.Löhden, S.Kuznetsova, O.Hellmig, K.Sengstock, V.Baev, *Univ. Hamburg, Inst. für Laserphysik, Germany.* Three lasers, based on Tm/Ho- and Er-doped fibers and on a Cr:forsterite crystal, are applied for sensitive multicomponent intracavity absorption spectroscopy in water free spectral regions between 1.2 and 2.1 μm.

Hall 1 ICONO-01/4

9:00–11:00
IWA • Fundamentals of Nonlinear Optics and Novel Phenomena IV (ICONO-01/4)
Marcus Motzkus, *Ruprechts-Karls Univ. Heidelberg, Germany, Presider*

IWA1 • 09:00-09:30 • INVITED
Nonlinear processes in air, R.B.Miles, A.Dogariu, *Princeton Univ., USA.* Nonlinear optical interactions in air have led to the writing of lines and patterns for turbulence measurements and the generation of backward propagating laser light and coherent Radar REMPI for remote detection of trace species.

IWA1 • 09:30-09:45
Nonlinear broadband frequency conversion of CO laser radiation into mid- and far-IR, A.A.Ionin, I.O.Kinyaevsky, Yu.M.Klimachev, A.Yu.Kozlov, A.A.Kotkov, *P.N.Lebedev Physical Inst., Russia,* Yu.M.Andreev, G.V.Lanskii, A.V.Shaiduko, *Inst. of Monitoring of Climatic and Ecological Systems, Russia.* Two-stage sum and difference frequency converter of CO laser radiation in a nonlinear crystal resulted in 670 new spectral lines (2.5-8.3 micron) had been designed. Opportunity of broadband frequency conversion into 1.25-3000 micron range is discussed.

Hall 2 LAT-01/4

9:00–11:00
LWA • Solid-State Lasers, Materials, and Applications IV (LAT-01/4)
Vyacheslav Osiko**,** *Prokhorov General Physics Inst., Russia, Presider*

LWA1 • 09:00-09:45 • KEYNOTE
Bismuth-doped optical fibers: a challenging active medium for near IR lasers and optical amplifiers, Evgeny Dianov, *Fiber Optics Research Center, Russia.* It has recently been demonstrated that Bi-doped glass opical fibers are a promising active laser medium. Various types of Bi-doped optical fibers have been developed and used to construct Bi-doped fiber lasers and optical amplifiers. This presentation reviews the recent results regarding the luminescence properties of various Bi-doped optical fibers and the development of Bi-doped fiber lasers and optical amplifiers for the 1150 to 1550 nm spectral region.

Hall 3 ICONO-06/4

9:00–11:00
IWB • Nano-Optics and Plasmonics IV (ICONO-06/4)
Javier Garcia de Abajo, *Univ. of the Basque Country, Spain, Presider*

IWB1 • 09:00-09:30 • INVITED
High-sensitive subwavelength microscopy and near field laser nanotechnology, Yu.E.Lozovik, A.A.Kolesnikov, *Moscow Inst. of Phys. and Technology, Russia,* S.P.Merkulova, A.L.Merkulov, *Inst. of Spectroscopy, Russia.* New method of laser spectroscopy which have both high, subwavelength spatial resolution and high sensitivity is discussed. The method is based on usage sharpened fiber laser near generation threshold instead of ordinary sharpened fiber in near field optical microscope. Absorption in near field on nanoobjects leads to quenching of lasing and ultrasensitive burning out in laser generation spectra. The last our experimental results in the apertureless near field nanolithography are discussed.

IWB2 • 09:30-09:45
Nonlinear optical effects in 2D arrays of magnetic nanostructures, V.L.Kryutyanskiy, I.A.Kolmychek, E.A.Gan'shina, T.V.Murzina, *Lomonosov Moscow State Univ., Russia.* Optical and nonlinear optical properties of 2D arrays of magnetic nanoparticles are studied. We show that magneto-optical effects are sensitive to the plasmon excitation and vortex type of magnetization of nanostructures of different shape.

Hall 4
ICONO-08/4

9:00–11:00
IWC • Ultrafast Phenomena and High-Precision Measurements IV (ICONO-08/4)
Nikolay Kolachevsky, *Lebedev Physics Inst., Russia, Presider*

IWC1 • 09:00-09:30 • INVITED
Ultrafast time-resolved spectroscopy of photovoltaic polymer P3HT film and its benzene solution, A.Yabushita, C.-H.Kao, *Natl Chiao-Tung Univ., Taiwan,* Y.-H.Lee, H.-S.Wu, *Industrial Technology Research Inst., Taiwan,* T. Kobayashi, *CREST, Japan, Univ. of Electro-Communications, Japan, Osaka Univ., Japan.* We have performed ultrafast spectroscopy of a a poly(3-hexylthiophene) (P3HT) film and its benzene solution using sub-10fs visible laser pulse. The result elucidated electronic dynamics and vibration dynamics of P3HT simultaneously.

IWC2 • 09:30-09:45
Ultra high quality factor optoelectronic oscillator stabilized with acousto optic cells, P.Salzenstein, *CNRS, FEMTO-ST, France,* A.S.Trushin, V.B.Voloshinov, *Lomonosov Moscow State Univ., Russia.* TeO_2-crystal-based acousto-optic cells allows the stabilization of an optoelectronic oscillator (OEO). The system is operating for any resonator to be inserted into the OEO with a Q-factor from $2x10^7$ to 10^{11}.

Hall 5
ICONO-03/4

9:00–11:00
IWD • Quantum and Atom Optics IV (ICONO-03/4)
Alexander Sergienko, *Boston Univ., USA, Presider*

IWD1 • 09:00-09:45 • KEYNOTE
From nonlinear optics with single photons to nanoscale quantum sensors: new frontiers of optical science, M.Lukin, *Harvard Univ., USA.* We will discuss recent developments involving a new scientific interface between quantum optics, many body physics, nanoscience and quantum information science. Specific examples include the use of quantum optical techniques for manipulation of individual spins using atom-like impurities in diamond and for controlling individual optical photons using strongly interacting atoms. Novel applications of these techniques ranging from quantum networks to strongly interacting photonic systems andnanoscale sensing in biology will be discussed.

Hall 6
LAT-03/4

9:00–11:00
LWB • Laser Remote Sensing and Tunable Diode Laser spectroscopy IV (LAT-03/4)
Cristof Jannsen, *LPMAA, France*, *Presider*

LWB1 • 09:00-09:15
Influence of focusing conditions of the femtosecond laser beam on the emission spectra of optical breakdown on the surface of the liquid, A.V.Kolesnikov, S.S.Golik, A.A.Ilyin, M.Yu.Babiy, *Far Eastern Federal Univ., Russia,* O.A.Bukin, *Inst. of Automation and Control Processes, Russia.* The significant increasing of the intensity of the line spectrum of optical breakdown generated by Ti:Sapphire femtosecond laser on the liquid surface in consequence of beam diameter increasing from 7 to 14 mm was registered.

LWB2 • 09:15-09:30
Remote determination of saline composition of waters with the help of Raman spectroscopy using neural networks, T.A.Dolenko, S.A.Burikov, S.A.Dolenko, A.O.Efitorov, I.G.Persiantsev, *Lomonosov Moscow State Univ., Russia.* Results of successful solution of the inverse problem of identification and determination of salts partial concentrations in multi-component water solutions by Raman spectra using artificial neural networks are presented in this paper.

LWB3 • 09:30-09:45
CARS diagnostics of combustion of decane with admixed nanoparticles of Al, V.D.Kobtsev, S.A.Kostritsa, A.M.Starik, A.A.Tumanov, *P.I.Baranov Central Inst. of Aviation Motors, Russia,* V.V.Smirnov, O.M.Stelmakh, *A.M.Prokhorov General Phys. Inst., Russia.* The process of combustion of liquid hydrocarbon fuels with admixed aluminum nanoparticles is investigated. Two-dimensional distributions of local gas temperatures inside the flame have been obtained employing coherent anti-Stokes Raman spectroscopy.

Hall 1 ICONO-01/4

9:00–11:00 IWA • Fundamentals of Nonlinear Optics and Novel Phenomena IV (ICONO-01/4)—Continued

IWA3 • 09:45-10:00
Nonlinear processes responsible for mid-infrared and blue light generation in alkali vapours, A.M.Akulshin, R.J.McLean, *Swinburne Univ. of Technology, Australia,* D.Budker, B.Patton, *Univ. of California, USA.* The nonlinear processes responsible frequency up- and down-conversion of resonant low-intensity laser radiation in Rb vapour have been evaluated from the spatial and temporal properties of blue and mid-IR light resulting from wave mixing.

IWA4 • 10:00-10:15
High spatial resolution nonlinear spectroscopy of near-critical fluid in pores of nanoporous glass and glass-metal composite, V.G.Arakcheev, V.B.Morozov, *Lomonosov Moscow State Univ., Russia,* V.N.Bagratashvili, *Inst. of Perspective Laser and Information Technologies, Russia.* Coherent anti-Stokes Raman scattering spectroscopy is applied to study the vibrational spectra of near-critical carbon dioxide confined in glass nanopores doped by silver nanoparticles.

IWA5 • 10:15-10:30
Nonlinear optical phenomena in traps for dipolar excitons in quantum-well heterostructures: interplay between Bose-Einstein condensation and polariton mode lasing, P.A.Kalinin, E.R.Kocharovskaya, V.V.Kocharovsky, Vl.V.Kocharovsky, *Inst. of Appl. Phys., Russia.* We find that exciton recombination lasing is possible in nowadays experiments aimed on Bose-Einstein condensation of dipolar excitons in quantum-well heterostructure traps and examine the relationship between the condensation and lasing phenomena under CW pumping.

Hall 2 LAT-01/4

9:00–11:00 LWA • Solid-State Lasers, Materials, and Applications IV (LAT-01/4)—Continued

LWA2 • 09:45-10:15 • INVITED
Rare-earth doped fluoride crystals for short-pulse and waveguide lasers, W.Bolanos, F.Starecki, G.Brasse, A.Benayad, J.L.Doualan, A.Braud, R.Moncorgé, P.Camy, *Centre de recherche sur les Ions, les Materiaux et la Photonique (CIMAP) UMR 6252 CNRS-CEA-ENSICAEN, Univ. de Caen, France.* Advances about rare-earth doped fluorides for laser purpose are reported. Results concerning Yb-doped CaF_2 are presented. Waveguide laser operation based on liquid phase epitaxy of high quality rare earth-doped $LiYF_4$ crystals is also reported.

LWA3 • 10:15-10:30
Investigation of infrared bismuth fluorescence in $ZnWO_4$ and BaF_2 crystals, O.K.Alimov, A.G.Papashvili, M.E.Doroshenko, I.S.Voronina, L.I.Ivleva, V.A.Konyushkin, A.N.Nakladov, V.V.Osiko, *A.M.Prokhorov General Phys. Inst., Russia.* IR fluorescence of bismuth doped as grown $ZnWO_4$ crystal was investigated under different excitation wavelengths. IR fluorescence with spectral shape and position close to BaF_2:Bi crystal was observed and characterized.

Hall 3 ICONO-06/4

9:00–11:00 IWB • Nano-Optics and Plasmonics IV (ICONO-06/4)—Continued

IWB3 • 09:45-10:00
Atomic force microscopy and femtosecond laser radiation for studying nonlinear optical properties of gold nanoparticles, N.V.Ilin, A.I.Smirnov, A.N.Stepanov, D.A.Yashunin, *Inst. of App. Phys., Russia.* We investigated nonlinear interaction of a gold nanoparticle with an atomic force microscope probe in femtosecond laser field. It was demonstrated that the probe presence significantly affects the nonlinear optical response of gold nanoparticles.

IWB4 • 10:00-10:15
Non-linear plasmonics on femtosecond-laser excited surfaces: transient optics of virtual plasmonic materials, S.I.Kudryashov, A.A.Ionin, S.V.Makarov, L.V.Seleznev, D.V.Sinitsyn, *P.N.Lebedev Physical Inst., Russia.* Intense femtosecond laser excitation of semiconducting materials was demonstrated to enable propagation on their surfaces of surface plasmon-polaritons (SPPs) visualized in the mean-field by time-resolved optical microscopy and giving rise to important sub-diffractive nanofabrication applications.

IWB5 • 10:15-10:30
Magnetic field-controlled femtosecond pulse shaping by magnetoplasmonic crystals, P.P.Vabishchevich, A.Yu.Frolov, M.R.Shcherbakov, A.A.Grunin, T.V.Dolgova, A.A.Fedyanin, *Lomonosov Moscow State Univ., Russia.* Femtosecond-scale magnetic field-controlled shaping of femtosecond laser pulses reflected from a one-dimensional magnetoplasmonic crystal is experimentally demonstrated.

Hall 4 ICONO-08/4

9:00–11:00
IWC • Ultrafast Phenomena and High-Precision Measurements IV (ICONO-08/4)—Continued

IWC3 • 09:45-10:00
Sub-Doppler atomic spectroscopy in multilayer gas cells, A.Ch.Izmailov, *Inst. of Phys., ANAS, Azerbaijan*. We analyze possibilities of ultra-high resolution spectroscopy of atoms (or molecules) in the suggested multilayer gas cell, which is the compact analog of many plane-parallel atomic (molecular) beams and may be used as the basis for new compact optical frequency standards.

IWC4 • 10:00-10:15
Feedback spectroscopy of atomic resonances, V.I.Yudin, A.V.Taichenachev, *Inst. of Laser Phys., Russia, Novosibirsk State Univ., Russia,* D.I.Sevostianov, V.L.Velichansky, *Natl Res. Nuclear Univ. (MEPhI), Russia,* V.V.Vassiliev, A.S.Zibrov, S.A.Zibrov, *P.N.Lebedev Physical Inst., Russia,* A.A.Zibrov, *Advanced Energy Technologies LTD, Russia.* We propose and demonstrate a spectroscopic technique that uses feedback control of the input probe field parameters to significantly improve atomic resonances. We have applied this method to the study of ^{87}Rb dark resonances and achieved a two-orders of magnitude increase of the resonance quality factor and the resonance contrast of 260%.

IWC5 • 10:15-10:30
Nonlinear and multipole effects on atoms in a lattice with a red magic wavelength, V.D.Ovsiannikov, *Voronezh State Univ., Russia,* V.G.Pal'chikov, *Inst. of Metrology for Time and Space at Natl Res. Inst. for Physical-Technical and Radiotechnical Measurements, Russia,* A.V.Taichenachev, V.I.Yudin, *Inst. of Laser Phys., Russia, Novosibirsk State Univ., Russia.* Uncertainties of the clock frequency caused by magnetic dipole, electric quadrupole and hyperpolarizability effects are determined numerically for Sr atoms in a lattice with red-detuned magic wavelength λ_{mag}=813.4274 nm.

Hall 5 ICONO-03/4

9:00–11:00
IWD • Quantum and Atom Optics IV (ICONO-03/4)—Continued

IWD3 • 10:15-10:45 • INVITED
Long-distance quantum networks built from spin registers in diamond, R.Hanson, *Delft Univ. of Technology, The Netherlands.* We present our most recent results towards realization of scalable quantum networks with spins in diamond, including universal control of a local nuclear spin register and heralded entanglement of electron spins separated by 3 meters.

Hall 6 LAT-03/4

9:00–11:00
LWB • Laser Remote Sensing and Tunable Diode Laser spectroscopy IV (LAT-03/4)—Continued

LWB4 • 09:45-10:00
Diagnostics of molecular gases in heated H_2-O_2 mixtures using laser-induced gratings, D.N.Kozlov, V.D.Kobtsev, O.M.Stel'makh, V.V.Smirnov, *A.M.Prokhorov General Physics Inst., Russia.* Laser-induced gratings were employed to measure collisional deactivation rate of O_2 molecules excited into the $b^1\Sigma_g^+$ state by a pulsed laser, local gas temperature and concentration of H_2O molecules in a heated H_2-O_2 mixture.

LWB5 • 10:00-10:15
Investigation of the possibilities of laser remote sensing of uranium (VI) complexes in aqueous media, G.S.Budylin, E.A.Shirshin, V.V.Fadeev, V.G.Petrov, S.N.Kalmykov, *Lomonosov Moscow State Univ., Russia.* Method for determination of aqueous uranium (VI) complexes concentration combining time resolved laser-induced fluorescence spectroscopy and nonlinear laser fluorimetry is proposed. The dependence of luminescence decay rate on the intensity of excitation is demonstrated.

LWB6 • 10:15-10:30
Laser sensing of aerosol by white-light lidar with femtosecond source, G.G.Matvienko, V.K.Oshlakov, A.Ya.Sukhanov, A.N.Stepanov, *Inst. of Atmospheric Optics, Russia.* A technique for reconstruction of unimodal distribution functions of artificial aerosols from model and experimental data based on the genetic algorithm is considered The closed numerical simulation is carried out, and the inverse problem is solved for the experimental backscattered spectrum of signals of the supercontinuum component in a wavelength range 0.6–1 μm obtained at the lidar sensing with the use of filamented radiation of high-power femtosecond pulses.

Hall 1 ICONO-01/4

9:00–11:00 IWA • Fundamentals of Nonlinear Optics and Novel Phenomena IV (ICONO-01/4)—Continued

IWA6 • 10:30-10:45
Peculiarities of high-order harmonic generation of picosecond Nd:YAG laser radiation in lead plasma, G.S.Boltaev, R.A.Ganeev, I.A.Kulagin, T.Usmanov, *Inst. of Ion-Plasma and Laser Technologies, Uzbekistan.* The resonance-induced enhancement of the 11th harmonic (96.7 nm) of picosecond Nd:YAG laser radiation from Pb-containing plasmas, compare the high-order harmonic spectra from the plasmas produced on the surfaces of Sn and Sn:Pb containing alloy, and influence of the gases inserted inside the vacuum chamber are studied.

IWA7 • 10:45-11:00
Dissipative soliton resonance in passive mode-locked lasers, [1,2)]A.Komarov, [3)]F.Amrani, [2)]A.Dmitriev, [1)]K.Komarov, [3)]F.Sanchez, *[1)]Inst. of Automation and Electrometry, Russia, [2)]Novosibirsk State Technical Univ., Russia, [3)]Université d'Angers, France.* By numerical simulation it is found that the dissipative soliton resonance prevents to an appearance in generation of new pulses with increasing pump power. It can be used for generation of high-energy pulses.

Hall 2 LAT-01/4

9:00–11:00 LWA • Solid-State Lasers, Materials, and Applications IV (LAT-01/4)—Continued

LWA4 • 10:30-10:45
Synthesis and emission properties of bismuth-doped Mg-Al-silicate glass, B.I.Galagan, B.I.Denker, S.E.Sverchkov, I.L.Shulman, *A.M.Prokhorov General Phys. Inst., Russia,* E.M.Dianov, *Fiber Optics Research Center, Russia.* A model Bi-activated Mg-Al-silicate glass and its laboratory synthesis procedures are described. The changes of the synthesis temperature, redox conditions and doping level greatly affect the formation of different emission centers in the glass.

LWA5 • 10:45-11:00
Near-infrared luminescence in TlCl:Bi crystal, D.V.Philippovskiy, V.G.Plotnichenko, V.O.Sokolov, E.M.Dianov, *Fiber Optics Research Center, Russia,* I.S.Lisitsky, M.S.Kouznetsov, K.S.Zaramenskikh, *State Scientific-Research and Design Inst. of Rare-Metal Industry "Giredmet" JSC, Russia.* Experimental and theoretical studies of spectral properties of crystalline TlCl:Bi are performed. Two luminescence bands are observed: one near 1.2 μm and another at 1.5 μm. Computer modeling suggests that $Bi^{+}V_{Cl}$ center is most likely responsible for the IR luminescence.

LWA6 • 11:00-11:15
Broadband near-IR luminescence from subvalent bismuth center in the reduced bismuth-zinc borophosphate glasses, A.N.Romanov, V.B.Sulimov, *Lomonosov Moscow State Univ., Russia, Dimonta Ltd, Russia,* Z.T.Fattakhova, E.V.Haula, D.N.Vtyurina, V.N.Korchak, *N.N.Semenov Inst. of Chemical Phys., Russia,* A.A.Veber, V.B.Tsvetkov, *A.M.Prokhorov General Phys. Inst., Russia.* Bismuth-zinc borophosphate glasses, prepared in reductive environment display characteristic absorption in visible and intense broadband near-IR luminescence, peaked at 1130 nm. This luminescence can be eliminated by prolonged oxidative treatment of the glass melt.

Hall 3 ICONO-06/4

9:00–11:00 IWB • Nano-Optics and Plasmonics IV (ICONO-06/4)—Continued

IWB6 • 10:30-10:45
Focusing of high-intensity femtosecond-laser excited surface plasmon-polaritons, M.S.Gubko, A.A.Ionin, S.I.Kudryashov, S.V.Makarov, A.A.Rudenko, L.V.Seleznev, D.V.Sinitsyn, R.A.Khmelnitsky, *P.N.Lebedev Physical Inst., Russia.* Focusing of surface femtosecond surface plasmon-polaritons with intensities close to ablation threshold of metal was studied experimentally and theoretically. Focusing led not only to field enhancement, but also to formation of unique nanostructures.

IWB7 • 10:45-11:00
Study of second order nonlinear optical properties of chromophore-containing polyimides in thin films, A.I.Gorkovenko, A.I.Plekhanov, A.E.Simanchuk, *Inst. of Automation and Electrometry, Russia,* A.V.Yakimansky, G.I.Nosova, N.A.Solovskaya, N.N.Smirnov, *Inst. of Macromolecular Compounds, Russia.* New synthesized chromophore-containing polyimides with covalently attached dye DR13 are described. For these polyimides, refractive index dispersions and frequency dependences of the second harmonic generation coefficient d_{33} are measured in the range of 400-800 nm.

Hall 4
ICONO-08/4

9:00–10:45
IWC • Ultrafast Phenomena and High-Precision Measurements IV (ICONO-08/4)—Continued

IWC6 • 10:30-10:45
The mode locking in a ring bidirectional YAG:Cr^{4+} laser, Yu.Yu.Broslavets, M.A.Georgieva, A.A.Fomitchev, *Moscow Inst. of Phys. and Technology (State Univ.), Russia.* This paper concerns features of mode locking in a bidirectional ring YAG:Cr^{4+} laser based on the Kerr lens and SESAM. We investigated the bidirectional generation and explored the possibility of gyroscopic effect in the laser.

Hall 5
ICONO-03/4

9:00–11:00
IWD • Quantum and Atom Optics IV (ICONO-03/4)—Continued

IWD4 • 10:45-11:00
Complete quantum theory of nondegenerate optical parametric amplification at low frequency pumping, A.S.Chirkin, A.M.Chebotarev, T.V.Tlyachev, *Lomonosov Moscow State Univ., Russia.* We develop quantum theory of three coupled parametric processes including one parametric down-conversion followed by two up-conversion. To find the density operator for this interaction the approach, elaborated by us earlier, is applied.

Hall 6
LAT-03/4

9:00–11:00
LWB • Laser Remote Sensing and Tunable Diode Laser spectroscopy I (LAT-03/4)—Continued

LWB7 • 10:30-10:45
Lidar method of definition of refraction index structural characteristic of atmosphere, D.N.Krymskaya, *Kyrgyz-Russian Slavic Univ., Kyrgyzstan.* The theory of method and experimental data of calculation of refraction index structural characteristic versus height accounting by multiwave lidar sensing of atmosphere using method worked out on Lidar Station Teplokluchenka is presented.

Hall 1
ICONO-01/5

11:30–13:00
IWE • Fundamentals of Nonlinear Optics and Novel Phenomena V (ICONO-01/5)
Richard Miles, *Princeton Univ., USA, Presider*

IWE1 • 11:30-12:00 • INVITED
Ultra-broadband optical parametric amplifiers: towards single-cycle carrier-envelope-phase stable pulses, C.Manzoni, D.Brida, G.Cerullo, *Politecnico di Milano, Italy.* We review different schemes of ultrabroadband optical parametric amplification to generate widely tunable few-optical-cycle light pulses. We discuss passive, all-optical carrier-envelope-phase stabilization of such pulses and introduce schemes for coherent synthesis of multi-octave-spanning spectra.

IWE2 • 12:00-12:15
Nonlinear propagation and interaction of polarization singularities in Isotropic gyrotropic medium with spatial dispersion of cubic nonlinearity, K.S.Grigoriev, V.A.Makarov, I.A.Perezhogin, N.N.Potravkin, *Lomonosov Moscow State Univ., Russia.* The interaction of light beams containing polarization singularities in nonlinear isotropic gyrotropic medium was analyzed numerically. The impact of local and nonlocal optical response on the C-points topological features, shift, nucleation and annihilation dynanics was studied.

Hall 2
LAT-01/5

11:30–13:00
LWC • Solid-State Lasers, Materials, and Applications V (LAT-01/5)
Evgenii Sorokin, *Vienna Univ. of Technology, Austria, Presider*

LWC1 • 11:30-12:00 • INVITED
Ultrarelativistic regimes of multi-petawatt laser interaction with matter, A.V.Bashinov, A.A.Gonoskov, A.V.Kim, A.M.Sergeev, *Inst. of Appl. Phys., Russia.* Combining multipetawatt beams to intensity 10^{26} W/cm^2 opens unprecedented possibilities to excite new exotic ultrarelativistic processes. Creation of extra-brilliant directed gamma rays and attosecond light probes for studying structure of vacuum are of especial interest.

LWC2 • 12:00-12:15
Kerr-lens mode-locked Yb:CaF_2 laser oscillator delivering sub-70 fs pulses with 2.3 W average power, P.Sévillano, G.Machinet, F.Guichard, D.Descamps, E.Cormier, *Univ. Bordeaux-CNRS-CEA-UMR 5107, France,* R.Dubrasquet, *Azur light System, Cité de la Photonique-Meropa, France,* P.Camy, J.-L.Doualan, R.Moncorgé, *Univ. de Caen, France,* P.Georges, F.Druon, *CNRS, Univ. Paris Sud, France.* By means of a high-brightness optical pumping scheme with a fiber laser, we demonstrate Kerr-lens mode locking with an Yb:CaF_2 laser crystal. Stable 68 fs pulses are produced at an average power of 2.3 W.

Hall 3
ICONO-6/5

11:30–13:00
IWF • Nano-Optics and Plasmonics V (ICONO-06/5)
Yurii Lozovik, *Inst. of Spectroscopy, Russia, Presider*

IWF1 • 11:30-12:00 • INVITED
Plasmons in low-dimensional structures, F. J. Garcia de Abajo, *Univ. of the Basque Country, Spain.* We will review recent results on the study of collective electron excitations (plasmons) in systems of low dimensionality, including small metallic nanoparticles, graphene, and simple molecules. In particular, we will show that plasmons in graphene can be used to achieve electrical modulation of light in a robust, solid state environment. Plasmons in polycyclic aromatic hydrocarbons, which can be regarded as small versions of graphene, will be also shown to exhibit remarkable tunability and strong plasmonic response, thus revealing their interest in the new field of molecular plasmonics. Quantum effects in these systems, ranging from nonlocality to the discreteness of the electronic transitions involved, will be shown to lead to exciting new physics and a wealth of potential applications.

IWF2 • 12:00-12:15
Coulomb blocking and collective plasmon-exciton excitations in nanojunctions, B.D.Fainberg, B.Apter, *Holon Inst. of Technology, Israel,* A.White, M.Galperin, *Univ. of California at San Diego, USA.* Energy-transfer interaction between sites in molecular wire can compensate Coulomb blocking for particular relationships between their values. Tuning this relationship is achieved by using the exciton-plasmon interaction calculated with the formalism developed in this work.

Hall 4
LAT-08/1

11:30–13:00
LWD • Fiber Optics I (LAT-08/1)
Evgeny Dianov, *Fiber Optics Research Ctr., Russia, Presider*

LWD1 • 11:30-12:15 • KEYNOTE
Advances and emerging applications in fiber lasers, A.B.Grudinin, *Fianium Ltd, UK.* In this talk we review latest developments and applications of picosecond and femtosecond fiber lasers. Considered for a long time as emerging technology with high scientific interest and tremendous potential, ultrafast fiber lasers are now widely used in a growing number of applications.

Hall 5
ICONO-03/5

11:30–13:00
IWG • Quantum and Atom Optics V (ICONO-03/5)
Mikhail Lukin, *Harvard Univ., USA, Presider*

IWG1 • 11:30-12:00 • INVITED
Deep laser cooling of Thulium atoms, N.Kolachevsky, D.Sukachev, E.Kalganova, G.Vishnyakova, A.Savchenkov, A.Sokolov, A.Akimov, V.Sorokin, *P.N.Lebedev Physical Inst., Russia.* We report on deep two-stage laser cooling and trapping of Thulium atoms. Atoms were loaded in magnetic and optical dipole traps for spectroscopy of the inner-shell transition at 1.14 μm.

IWG2 • 12:00-12:15
Second stage laser cooling and optical trapping of ^{169}Tm atoms, G.Vishnyakova, D.Sukachev, E.Kalganova, A.Savchenkov, A.Sokolov, A.Akimov, N.Kolachevsky, V.Sorokin, *P.N.Lebedev Physical Inst., Russia.* We have demonstrated second-stage laser cooling of ^{169}Tm atoms on the weak transition (wavelength λ=530.7,nm, natural line width γ=36 kHz). Laser cooled atoms have been trapped in an optical dipole trap operating near 532 nm.

Hall 6
ICONO-10/1

11:30–13:00
IWH • Symposium on Organic Photovoltaics I (ICONO-10/1)
Maxim Pshenichnikov, Univ. of Groningen, the Netherlands, *Presider*

IWH1 • 11:30-11:45
Introductory words, Maxim Pshenichnikov, *Univ. of Groningen, the Netherlands.*

IWH2 • 11:45-12:15 • INVITED
New approaches to the material design for organic bulk heterojunction solar cells, P.A.Troshin, D. K.Susarova, O.A.Mukhacheva, A.E.Goryachev, *Inst. for Problems of Chemical Phys., Russia,* S.A.Ponomarenko, *Enikolopov Inst. of Synthetic Polymer Materials, Russia,* D.A.M.Egbe, N.S.Sariciftci, *Johannes Kepler Univ. Linz, Austria.* This talk will highlight important correlations revealed between the molecular structures of the polymer and fullerene counterparts, their physical properties (solubility), the morphology of their photoactive blends and their photovoltaic performance.

Hall 1 ICONO-01/5

11:30–13:00 IWE • Fundamentals of Nonlinear Optics and Novel Phenomena V (ICONO-01/5)—Continued

IWE3 • 12:15-12:30
Laser cooling of doped solids by stimulated Raman scattering, A.V.Ivanov, Yu.V.Rozhdestvensky, *St-Petersburg Natl Res. Univ. of Inform. Technologies, Mechanics and Optics, Russia.* A new laser cooling mechanism for crystals doped by the rare earth ions is proposed. The mechanism includes two photons Raman transitions through 5d dipole-allowed ion level and electron-phonon transitions in the Stark shifted manifold.

IWE4 • 12:30-12:45
Decay of organic molecules on the dielectric surface and growth of carbon structures under the action of IR femtosecond laser radiation, V.B.Laptev, S.V.Chekalin, V.O.Kompanets, S.V.Pigul'sky, E.A.Ryabov, *Inst. of Spectroscopy, Russia.* The formation of carbon structures as a result of decomposition of some organic molecules on the surface of metal fluorides (without molecular decay in a gas) exposed to mid-IR femtosecond laser radiation is revealed.

IWE5 • 12:45-13:00
Optical parametric amplification by incoherent pump, V.Pyragaite, A.Stabinis, V.Smilgevičius, A.Piskarskas, *Vilnius Univ., Lithuania.* We demonstrate that the spectral radiance of seeded signal at the output of the OPA pumped by incoherent radiation can significantly exceed the spectral radiance of the pump wave.

Hall 2 LAT-01/5

11:30–13:00 LWC • Solid-State Lasers, Materials, and Applications V (LAT-01/5)—Continued

LWC3 • 12:15-12:30
Ultrafast laser-induced crystallization of hydrogenated amorphous silicon for photovoltaics, M.V.Khenkin, A.V.Emelyanov, A.G.Kazanskii, *Lomonosov Moscow State Univ., Russia,* P.A.Forsh, *Natl. Res. Centre "Kurchatov Inst.", Russia,* M.Beresna, M.Gecevicius, P.Kazansky, *Univ. of Southampton, UK.* We studied films of amorphous hydrogenated silicon treated by femtosecond laser radiation. Electrical, photoelectric and optical properties of modified films are discussed in terms of films crystallization and hydrogen out-diffusion processes.

LWC4 • 12:30-12:45
Optical diagnostic in technology of gas-jet assisted laser cutting by high-power fiber laser, A.V.Dubrov, V.D.Dubrov, Yu.N.Zavalov, A.N.Antonov, N.G.Dubrovin, E.S.Makarova, *Inst. on Laser and Inform. Technology, Russia.* The cutting of mild-steel plate by high-power fiber laser is under investigation. Measurements of the temperature in zone of action of laser radiation on the molten metal have been performed using optical pyrometer.

LWC5 • 12:45-13:00
The Q-switched Nd:YAG laser application for solar cells technologies, D.A.Zuev, A.A.Lotin, A.V.Shorokhova, O.A.Novodvorsky, O.D.Khramova, *Inst. on Laser and Information Technologies, Russia,* G.G.Untila, A.Y.Poroykov, I.A.Petuhov, M.N.Rumyanzeva, *Lomonosov Moscow State Univ., Russia.* The present work reports the experimental results on the development of the laser texturization of multicrystalline silicon and PLD of transparent conductive oxides for solar cells application.

Hall 3 ICONO-6/5

11:30–13:00 IWF • Nano-Optics and Plasmonics V (ICONO-06/5) — Continued

IWF3 • 12:15-12:30
Optimization of optical and thermal properties of plasmonic nanostructures for nonlinear effects, A.E.Afanasiev, P.N.Melentiev, V.I.Balykin, *Inst. for Spectroscopy, Russia.* The optical and thermal properties of nanostructures are calculated for nonlinear processes. We show that a single nanoopening with its optimal geometrical and material properties in a metal nanofilm allows to realize a highly efficient nanolocalized light sourse based on nonlinear properties of the nanostructure.

IWF4 • 12:30-12:45
Highly efficient visualization of arbitrary oriented single molecules, S.V.Boichenko, *Irkutsk Branch of Inst. of Laser Phys., Russia.* We show using computations that the utilization of an elliptically polarized cylindrical vector beam as an exciting beam in laser-scanning confocal fluorescence single-molecule microscopy eliminates a dependence of intensity maximum of a single-molecule image on the molecule orientation.

IWF5 • 12:45-13:00
Interaction of surface plasmon-polaritons and sub-terahertz acoustic waves in hybrid metal-semiconductor structures, N.E.Khokhlov, V.I.Belotelov, *Lomonosov Moscow State Univ., Russia,* B.A.Glavin, *Inst. of Semiconductor Phys., NASU, Ukraine.* A new type of acousto-plasmonic structure for achieving control of SPP excitation is proposed. It is shown that relative change of the reflectivity can reach several percents for realistic acoustic wave ampIIWDes.

Hall 4 LAT-08/1

11:30–13:00
LWD • Fiber Optics I (LAT-08/1)—Continued

LWD2 • 12:15-12:30
Ultralong unrepeatered fiber-optic links for 100 Gb/s DP-QPSK signal transmission, V.V.Gainov, N.V.Gurkin, V.N.Treshchikov, *T8 Comp., Russia,* S.N.Lukinih, O.E.Nanii, *Lomonosov Moscow State Univ., Russia.* In this work we experimentally demonstrate 500-km errorless unrepeatered transmission of a single-channel 100 Gb/s DP-QPSK signal and perform an advanced analysis for necessary parameters of the line with optical remotely pumped amplifiers (ROPA).

LWD3 • 12:30-12:45
Optimization of single SMF link for DP-QPSK 120Gb/s transmission, S.O.Plaksin, O.E.Naniy, *T8 Comp., Russia,* N.V.Gurkin, A.G.Novikov, V.N.Treshikov, *Lomonosov Moscow State Univ., Russia.* We demonstrate optimization of DP-QPSK 120 Gb/s signal transmission over single link of SMF fiber with electronic chromatic dispersion compensation. It was shown that BER based optimal power are different from power which maximizes OSNR margin.

LWD4 • 12:45-13:00
Experimental investigation of nonlinear distortion in 100 Gb/s DP-QPSK coherent lightwave communication systems, O.E.Nanii, S.O.Plaksin, *Lomonosov Moscow State Univ., Russia,* N.V.Gurkin, A.G.Novikov, V.N.Treshchikov, R.R.Ubaydullaev, *T8 Comp., Russia.* Nonlinear distortion of 100 Gb/s DP-QPSK coherent signal has been investigated using straight-line transmission testbed. The optimal signal launch power and OSNR margin has been measured for the set of transmission distances up to 4000 km. The results have a good agreement with previously reported analytical model.

Hall 5 ICONO-03/5

11:30–13:00
IWG • Quantum and Atom Optics V (ICONO-03/5)—Continued

IWG3 • 12:15-12:45 • INVITED
High-efficiency object identification using multi-dimensional correlated orbital angular momentum (OAM) states, A.V.Sergienko, N.Uribe-Patarroyo, A.Fraine, D.S.Simon, O.Minaeva, *Boston Univ., USA.* We present a novel approach that allows object identification using fewer resources than in conventional pixel-by-pixel imaging by exploiting the enhanced sensitivity of correlated orbital angular momentum states to multiple azimuthal Fourier coefficients.

IWG4 • 12:45-13:00
Structure and optical control of the spectrum of resonance fluorescence at x-ray energies, S.M.Cavaletto, Z.Harman, C.Buth, C.H.Keitel, *Max-Planck-Inst. fuer Kernphysik, Germany.* The spectrum of x-ray resonance fluorescence is studied with the aim of (i) observing Rabi flopping induced by intense XFEL pulses and (ii) generating an x-ray frequency comb from coherent pulse shaping.

Hall 6 ICONO-10/1

11:30–13:00
IWH • Symposium on Organic Photovoltaics I (ICONO-10/1)—Continued

IWH3 • 12:15-12:30
Accelerated stability testing of organic photovoltaics, E.A.Katz, A.Mescheloff, C.Bounioux, M.Gabai, A.Braun, I.Visoly-Fisher, *Ben-Gurion Univ. of the Negev, Israel,* Y.Galagan, *Holst Centre, The Netherlands.* Degradation of organic photovoltaics (OPV) is instigated by light, heat, water or/and oxygen. We suggest a methodology allowing an independent control of intensity of concentrated sunlight, the sample temperature and environment during the degradation experiments.

IWH4 • 12:30-12:45
Spectral technique for efficiency measurement of organic and hybrid solar cells, A.Gavrik, V.Bruevich, V.A.Trukhanov, Yu.Chernikov, D.Yu.Paraschuk, *Lomonosov Moscow State Univ., Russia.* We present a spectral laboratory technique for accurate efficiency measurement of organic and hybrid solar cells. We show that the solar cells efficiency can be measured with accuracy of 2%.

IWH5 • 12:45-13:00
AFM combined with localized optical excitation: application in photovoltaics, P. Dorozhkin, A.Shelaev, S.Shashkov, A.Ankudinov, M.Ledinsky , *NT-MDT Co., Russia.* We will present new opportunities in photovoltaics research given by AFM integrated with localized optical excitation. Sample can be optically excited by a tightly focused laser spot or through a SNOM probe; electrical response is measured by electrical AFM modes. AFM-Raman studies of solar cells will be also presented.

Hall 1
ICONO-01/6

14:00–16:00
IWI • Fundamentals of Nonlinear Optics and Novel Phenomena VI (ICONO-01/6)
Giulio Cerullo, *Politecnico di Milano, Italy, Presider*

IWI1 • 14:00-14:30 • INVITED
Light in structured nonlinear photonic materials, C.Denz, M.Ayoub, M.Boguslawski, F.Diebel, J.Imbrock, P.Rose, *Univ. of Muenster, Germany.* We present selected wave propagation phenomena in structured nonlinear photonic media ranging from oscillating solitons and Anderson localization in refractive index lattices to high harmonic generation in disordered quadratic media.

IWI2 • 14:30-14:45
Second order nonlinear optical scattering from multilayer graphene, A.Y.Bykov, A.I.Maydykovskiy, T.V.Murzina, *Lomonosov Moscow State Univ., Russia,* M.G.Rybin, E.D.Obraztsova, *A.M.Prokhorov General Phys. Inst., Russia.* We report experimental investigation of nonlinear optical hyper-Rayleigh scattering from multilayer CVD graphene under ambient conditions and subjected to an uniaxial mechanical strain. The mechanism of the nonlinear optical response is discussed.

Hall 2
LAT-01/6

14:00–16:00
LWE • Solid-State Lasers, Materials, and Applications VI (LAT-01/6)
Patrice Camy**,** *Univ. de Caen, France, Presider*

LWE1 • 14:00-14:30 • INVITED
Few-cycle mid-IR oscillators, E.Sorokin, *Institut fur Photonik, TU Wien, Austria,* N.Tolstik, I.T.Sorokina, *Norwegian Univ. of Science and Technology, Trondheim, Norway.* Recent breakthrough in femtosecond oscillators operating directly in the mid-infrared wavelength region resulted in ~10-nJ pulses with 8 optical cycles duration at Watt-level of average power, demonstrating interesting nonlinear-optical phenomena and opening new application possibilities.

LWE2 • 14:30-14:45
The controlled dual wavelength oscillation in passive Q-switch CW pumped lasers, A.V.Fedorov, A.A.Fomichev, *Moscow Inst. of Phys. and Technology (State Univ.), Russia.* The mechanism for controlled dual wavelength oscillation in passive Q-switch CW pumped lasers is suggested and modeled using Er:YAG laser with Co:ZnSe passive Q-switcher with oscillation switching between 1645 and 1617 nm as an example.

Hall 3
ICONO-06/6

14:00–16:00
IWJ • Nano-Optics and Plasmonics VI (ICONO-06/6)
Sergey Bozhevolnyi, *Univ. of Southern Denmark, Denmark, Presider*

IWJ1 • 14:00-14:30 • INVITED
Operation of SPASER in low plasmon number regime, A.P.Vinogradov E.S. Andrianov, D.G.Baranov, A.A.Pukhov, A.V.Dorofeenko, *Moscow Inst. of Physics and Technologies, Russia, Inst. of Theoretical and Applied Electromagnetics*, *Russia*, A.A.Lisyansky, *City Univ. of New York, USA*. We consider spaser operation near the threshold pumping. In this case, the spontaneous excitation of plasmons prevails over the stimulated excitation and the number of coherent plasmons is less than unit. Nevertheless, such spasers can be used for loss compensation in plasmonic composites (metamaterials).

IWJ2 • 14:30-14:45
Radiative decay rates of excited atoms into multimode nanosized waveguides, A.V.Masalov, *P.N.Lebedev Physical Inst., Russia,* V.G.Minogin, *Inst. of Spectroscopy, Russia.* We analyze decay rates of excited atoms into higher-order optical fiber modes and show that mode excitation efficiency for lowest fiber modes TE_{01}, TM_{01}, and HE_{21} can considerably exceed that for fundamental mode HE_{11}.

Hall 4
LAT-08/2

14:00–16:00
LWF • Fiber Optics II (LAT-08/2)
Peter Kazansky, *Univ. of Southampton, UK, Presider*

LWF1 • 14:00-14:30 • INVITED
Coherent Raman interactions in gas-filled hollow-core photonic crystal fibres, A.Abdolvand, B.M.Trabold, F.Belli, A.M.Walser, J.C.Travers, P.St.J.Russell, *Max Planck Inst. for the Sci. of Light, Germany*. The application of gas-filled hollow-core PCF to studies of different interaction regimes in stimulated Raman scattering is reviewed. It is shown that these fibres offer a versatile and unique playground for studying gas-based nonlinear optics.

LWF2 • 14:30-14:45
Mode-locked Er fibre laser with variable wave plate based on liquid crystal, D.A.Radnatarov, S.A.Khripunov, A.V.Ivanenko, S.M.Kobtsev, *Novosibirsk State Univ., Russia.* Use of half-wave liquid crystal variable retarder in Er fibre lasers mode-locked by non-linear polarisation evolution enables control over mode locking and stabilisation of its parameters by controlling the amplitude of satellites of the peak of radio-frequency beating between laser modes.

Hall 5
ICONO-07/1

14:00–16:00
IWK • Physics of Metamaterials and Complex Media I (ICONO-07/1)
Yuri Kivshar, *The Australian Natl. Univ., Australia, Presider*

IWK1 • 14:00-14:30 • INVITED
Manipulation of quantum-dot emission in magnetic metamaterials, D.N.Neshev, *Australian Natl Univ., Australia.* We review our recent advances on coupling of quantum dots to magnetic metamaterials, revealing the effects of spontaneous emission enhancement due to the interplay between coupling to the magnetic and the electric metamaterial resonances.

IWK2 • 14:30-15:00 • INVITED
Second-order nonlinear-optical effects in planar metamaterials, E.A.Mamonov, I.A.Kolmychek, V.K.Valev, T.Verbiest, T.V.Murzina, *Lomonosov Moscow State Univ., Russia*. Recent experimental results on optical second harmonic generation in arrays of planar chiral and magnetic nanoparticles are reviewed. We demonstrate that plasmon excitation, shape anisotropy and magnetic state of nanostructures determine the nonlinear optical response of metamaterials.

Hall 6
ICONO-10/2

14:00–16:00
IWL • Symposium on Organic Photovoltaics II (ICONO-10/2)
Oleg Poluektov, *Argonne Natl. Lab, USA*, *Presider*

IWL1 • 14:00-14:30 • INVITED
Recombination pathways in high-efficiency OPV materials and devices, V.Dyakonov, A.Sperlich, C.Deibel, *Julius-Maximilian Univ. of Wuerzburg, Germany.* We investigate the dramatic variation of the power conversion efficiency of solar cells based on PTB7:$PC_{71}BM$ bulk-heterojunctions from about 3.5 to 7.5% upon adding co-solvent DIO using a combination of various transient conductivity and spin-sensitive techniques and discuss it in view of non-geminate recombination and electron back transfer.

IWL2 • 14:30-14:45
Optical fiber microlens for surface laser modification, A.A.Kuchmizhak, O.B.Vitrik, A.G.Savchuk, *Inst. of Automation and Control Processes, Russia,* S.V.Makarov, *P.N.Lebedev Physical Inst., Russia.* An fiber dielectric microlens was proposed for surface laser nanomodification. This fiber microlens enables surface λ/2-localization of laser beam, as shown both numerically and experimentally. Single and periodical nanoholes with the minimum size down to 35 nm were fabricated in the 50-nm Au/Pd film, using this microlens and a 532-nm pump nanosecond laser.

Hall 1 ICONO-01/6

14:00–16:00
IWI • Fundamentals of Nonlinear Optics and Novel Phenomena VI (ICONO-01/6)—Continued

IWI3 • 14:45-15:00
Non-linear response of chalcogenide glasses in the spectral range between one- and two-photon bandgaps, E.Romanova, *Saratov State Univ., Russia,* S.Guizard, A.Mouskeftaras, *Lab. des Solides Irradiés, CNRS-Ecole Polytechnique, France,* N.A.Moneim, D.Furniss, A.B.Seddon, *Univ. of Nottingham, UK.* Sub-picosecond temporal dynamics of the non-linear response of chalcogenide glass samples of the system As-S-Se has been studied near the bandgap frequencies of the samples by using the interferometric pump-probe method.

IWI4 • 15:00-15:15
Measurement of nonlinear refractive index and two photon absorption coefficient of biosilicate nanocomposite materials by Z-scan method, D.Yu.Proschenko, S.S.Golik, A.A.Chekhlenok, O.A.Bukin, Yu.N.Kulchin, *Inst. of Automation and Control Processes, Russia, G.I. Nevelskoi Maritime State Univ., Russia,* I.V.Postnova, *Far Eastern Federal Univ., Russia,* Yu.A.Shchipunov, *Inst. of Chemistry, Russia.* We report on direct measurements of nonlinear refractive index n_2 and two photon absorption coefficient β of novel organic-inorganic hybrid materials by means of Z-scan technique with using ultrashort laser pulses.

IWI5 • 15:15-15:30
Non-dipole effects in photoelectron angular distributions in two-photon atomic ionization, E.V.Gryzlova, A.N.Grum-Grzhimailo, S.I.Strakhova, *Lomonosov Moscow State Univ., Russia.* Possibility to observe non-linear non-dipole effects at atomic ionization using free-electron laser facilities is discussed. Angular distribution of photoelectrons in sequential two-photon double ionization and two-color two-photon single ionization are considered as the most promising.

Hall 2 LAT-01/6

14:00–16:00
LWE • Solid-State Lasers, Materials, and Applications VI (LAT-01/6)—Continued

LWE3 • 14:45-15:00
Synchronization enhancement of pulse-diode-pumped mode-locked lasers, V.B.Morozov, A.N.Olenin, D.V.Yakovlev, *Lomonosov Moscow State Univ., Russia.* We report results on precise synchronization of pulsed pumped mode-locked lasers output with external triggering signal. Jitter level about pulse width has been achieved. Limiting factors will be discussed.

LWE4 • 15:00-15:15
Multicascade supercontinuum generation over 2 μm, V.A.Kamynin, A.S.Kurkov, V.B.Tsvetkov, *A.M.Prokhorov General Phys. Inst., Russia,* Ya.E.Sadovnikova, *Moscow State Univ. of Instrument Engineering and Computer Sci., Russia.* Multi-cascade supercontinuum generation was demonstrated. The first cascade included a part of high-nonlinear Ge-doped fiber and the second one-fiber amplifier. As result, we obtained wide spectrum from 2000 to 2650 nm.

LEW5 • 15:15-15:30
Active stabilization of quasi-continuously pumped passively mode-locked Nd:YAG laser in bounce geometry, M.Jelinek, M.Čech, V.Kubeček, *Czech Technical Univ., Prague, Czech Republic.* Active stabilization of passively mode-locked highly-doped Nd:YAG laser under quasi-continuous diode-pumping is presented. Single 19 ps, 9 μJ, TEM00 laser pulses at 1.06 μm were generated at repetition rate of 100 Hz with the timing jitter 315 ns.

Hall 3 ICONO-06/6

14:00–16:00
IWJ • Nano-Optics and Plasmonics VI (ICONO-06/6)—Continued

IWJ3 • 14:45-15:00
Spectral features of light scattering and photoluminescence in silicon particle ensembles produced by means of laser ablation in liquids, S.V.Zabotnov, O.I.Eroshova, M.B.Gongalsky, L.A.Golovan, P.K.Kashkarov, *Lomonosov Moscow State Univ., Russia,* P.A.Perminov, *Natl Res. Center "Kurchatov Inst.", Russia,* M.Yu.Kirillin, E.A.Sergeeva, *Inst. of App. Phys., Russia.* Silicon nanoparticles produced via laser ablation in the water and liquid nitrogen were studied by the light scattering, Raman spectroscopy and photoluminescence methods. The produced nanoparticle ensembles demonstrate effective light scattering, crystallinity and visible photoluminescence.

IWJ4 • 15:00-15:15
Photoinduced laser deposition of bimetal nanostructures from liquid phase, A.Povolotckaia, A.Povolotskiy, A.Manshina, S.Tunik, *St.-Petersburg State Univ., Russia.* Laser-induced phenomena of nanostructures formation on substrate-solution interface are considered. As a result of experiments deposition of gold-silver nanoparticles, nanoflakes and nanostars was observed. The deposits were investigated by SEM, EDX, TEM, XPS etc. techniques.

IWJ5 • 15:15-15:30
Enhancement of ZnO films photoluminescence under the influence of surface plasmon resonance. Role of excitation level, S.I.Rumyantsev, V.M.Markushev, M.V.Ryzhkov, A.P.Tarasov, Ch.M Briskina, *Kotel'nikov Inst. of Radio-engineering and Electronics, Russia,* A.A.Lotin, O.A.Novodvorsky, *Inst. on Laser and Information Technologies, Russia.* It was discovered that luminescence enhancement in Ag-coated ZnO films occurs under low pumping, while quenching exists under high pumping. For explanation of this phenomenon an assumption about the losses occurrence in system was made.

Hall 4
LAT-08/2

14:00–16:00
LWF • Fiber Optics II (LAT-08/2)—Continued

LWF3 • 14:45-15:00
CW all-fiber optical parametric oscillator operating near 930 nm, E.A.Zlobina, S.I.Kablukov, S.A.Babin, *Inst. of Automation and Electrometry, Russia.* CW all-fiber optical parametric oscillator based on photonic crystal fiber pumped by Ytterbium-doped fiber laser is realized. The FOPO has 31.8% slope efficiency and 350 mW output power at 930 nm.

LWF4 • 15:00-15:15
Optimization of double-clad Er-doped fibers for high power highly efficient lasers and amplifiers, L.Kotov, *Moscow Inst. of Phys. and Technology (State Univ.), Russia,* M.Likhachev, M.Bubnov, O.Medvedkov, *Fiber Optics Research Center, Russia,* M.Yashkov, A.Guryanov, *Inst. of High Purity Substances, Russia,* S.Fevrier, *Univ. of Limoges, France,* J.Lhermite, E.Cormier, *Univ. Bordeaux 1, France.* Optimization of Yb-free Er-doped double-clad fiber design is presented in this paper. Accurate choice of the fiber core compound and diameter allowed us to fabricate multiple 10 W lasers and amplifiers with record efficiency (>40%).

LWF5 • 15:15-15:30
10-fs fiber based pulse delivery, J.Skibina, *Saratov State Univ., Russia,* M.Bock, D.Fischer, R.Grunwald, G.Steinmeyer, *Max-Born-Inst. for Nonlinear Optics and Short-Pulse Spectroscopy, Germany,* R.Wedell, *Inst. für angewandte Photonik e.V., Germany,* M.Bretschneider, *Inst. for Scientific Instruments GmbH, Germany,* S.Burger, *Konrad-Zuse-Zentrum für Informationstechnik, Germany,* V.Beloglazov, *Nanostructured Glass Technology Comp., Russia.* Delivery of few-cycle pulses at 800 nm through a specially designed hollow-core fiber with less than 50% loss is reported. The fiber supports a >200 nm bandwidth and features negative easy-to-compensate waveguide dispersion.

Hall 5
ICONO-07/1

14:00–16:00
IWK • Physics of Metamaterials and Complex Media I (ICONO-07/1)—Continued

IWK3 • 15:00-15:15
Universality of mode symmetries for creating photonic Dirac cones in the Brillouin-zone center, K.Sakoda, *Natl Inst. for Materials Sci., Japan.* Mode-symmetry requirement for creating photonic Dirac cones in the Brillouin-zone center by accidental degeneracy is clarified by a degenerate perturbation theory developed for the vector electromagnetic field of periodic structures.

IWK4 • 15:15-15:30
Third harmonic generation in fishnet metamaterials, M.R.Shcherbakov, A.S.Shorokhov, A.A.Fedyanin, *Lomonosov Moscow State Univ., Russia,* J.Reinhold, A.Chipouline, C.Helgert, T.Pertch, *Friedrich-Schiller-Univ. Jena, Germany.* Optical third harmonic generation in gold-based fishnet metamaterials is studied. Pumping the magnetic resonance of the metamaterial showed an additional contribution to third-order optical nonlinearities rising from antisymmetric structure of the currents in metamaterial layers.

Hall 6
ICONO-10/2

14:00–16:00
IWL • Symposium on Organic Photovoltaics II (ICONO-10/2)—Continued

IWL3 • 14:45-15:00
Numerical modeling of organic solar cells with plasmonic nanoparticles and interface porosity, A.R.Tameev, A.V.Vannikov, *A.N.Frumkin Inst. of Physical Chemistry and Electrochemistry, Russia,* R.Sh.Ikhsanov, *Research Inst. of Scientific Instruments ("Rosatom" Corp.), Russia,* A.-C. Su, *Natl Tsing Hua Univ., Taiwan.* Optical and electrical properties of organic solar cells based on bulk-heterojunction active layer of P3HT and PCBM are modeled. Optical properties of a solar cell with aluminum nanoparticles embedded into PEDOT:PSS buffer layer are described by Maxwell-Garnet formalism. The observed experimentally high interface porosity and the concentration-dependent volume fractions of P3HT and PCBM along the active layer are taken into consideration as parameters influencing the charge carrier mobility and generation.

IWL4 • 15:00-15:15
Monte-Carlo study of geminate recombination kinetics in polymers with traps, V.R.Nikitenko, N.A.Korolev, *Natl Res. Nuclear Univ. "MEPhI", Russia,* A.P.Tyutnev, *Moscow State Inst. of Electronics and Mathematics of Natl Res. Univ. «Higher School of Economics», Russia.* Monte-Carlo modeling of non-stationary geminate recombination kinetics is carried out and limits of applicability of drift-diffusion approximation has been established. Peculiarities of geminate recombination are discussed, if initial separation is comparable with hopping distance.

IWL5 • 15:15-15:30
Kinetic approach to calculate real efficiencies of organic photovoltaic cells, A.Sosorev, *Lomonosov Moscow State Univ., Russia,* D.Godovsky, *Inst. of Elementoorganic Compounds, Russia, LG TCM, LG Electronics, Russia.* The kinetic approach to model the real efficiencies of organic solar cells will be discussed, which is based on Marcus type treatment of charge transfer and modified Onsager-Braun (Tachiya) model for the field driven charge separation. The model predicts the real efficiencies of organic solar cells and provides the insight into the nature of CT exciton states.

Hall 1
ICONO-01/6

14:00–16:00
IWI • Fundamentals of Nonlinear Optics and Novel Phenomena VI (ICONO-01/6)—Continued

IWI6 • 15:30-15:45
Polarization-resolved DFWM spectroscopy in studies of transient gas anisotropy, P.Maksyutenko, P.P.Radi, *Paul Scherrer Inst., Switzerland,* D.N.Kozlov, *A.M.Prokhorov General Phys. Inst., Russia,* A.P.Kouzov, *St.-Petersburg State Univ., Russia.* Photo-dissociation of H_2O_2 by linearly polarized ns-pulse radiation at 266 nm results in transient anisotropies of nascent OH fragments velocity and angular momentum distributions. These anisotropies are probed at variable delays using pulsed polarization-resolved DFWM.

IWI7 • 15:45-16:00
Influence of photon bunching on two-photon excited fluorescence: thermal vs. coherent light, H.Kurzke, A.Jechow, M.Seefeldt, H.Kurzke, A.Heuer, R.Menzel, *Univ. of Potsdam, Inst. of Phys. and Astronomy, Photonics, Germany.* The photon bunching effect of thermal light is exploited to enhance the efficiency of two-photon excited fluorescence in a common fluorophore and water soluble quantum dots. This has potential applications in microscopy.

Hall 2
LAT-01/6

14:00–16:00
LWE • Solid-State Lasers, Materials, and Applications VI (LAT-01/6)—Continued

LWE6 • 15:30-15:45
Spectral selectivity of gain gratings in the solid-state holographic laser with a multiloop self-pumped phase-conjugate cavity at powerful pumping by 2D diode stacks, A.P.Pogoda, V.F.Lebedev, A.S.Boreysho, *Laser Systems, Ltd., Russia, Baltic State Technical Univ., Russia,* S.N.Smetanin, *Kovrov State Technological Academy, Russia.* Spectral selectivity of holographic gain gratings in the powerful diode-pumped solid-state laser with a multiloop self-pumped phase-conjugate cavity is explained and quantitatively measured in this work.

LWE7 • 15:45-16:00
Ultrashort pulses direct UV laser oscilator on the basis of Ce^{3+}:LiCaAlF$_6$, O.R.Akhtyamov, A.S.Nizamutdinov, V.V.Semashko, *Kazan Federal Univ., Russia.* Transient and photodynamic processes implementation for ultrashort laser pulses generation on interconfigurational $4f^{n-1}5d$– $4f^n$ transitions of Ce^{3+} ions in the $LiCaAlF_6$ crystals was shown with conventional pulsed 10-nanosecond pumping.

Hall 3
ICONO-06/6

14:00–15:45
IWJ • Nano-Optics and Plasmonics VI (ICONO-06/6)—Continued

IWJ6 • 15:30-15:45
Surface plasmon polariton pulse interaction in Kerr nonlinear media, D.O.Ignatyeva, A.P.Sukhorukov, *Lomonosov Moscow State Univ., Russia.* We present a theoretical study of the interaction of two surface plasmon polariton pulses propagating along the interface between a metal and dielectric with Kerr nonlinearity. We demonstrate that varying the amplitude of the powerful pump pulse the delay of the signal pulse can be controlled.

Hall 4
LAT-08/2

14:00–16:00
LWF • Fiber Optics II (LAT-08/2)—Continued

LWF6 • 15:30-15:45
Progress in passively stabilized single-frequency Brillouin fiber lasers with doubly-resonant cavities, A.A.Fotiadi, *Ioffe Physical-Technical Inst., Russia,* I.O.Zolotovskiy, *Ulyanovsk State Univ., Russia,* V.V.Spirin, C.A.López-Mercado, *Scientific Research and Advanced Studies Center of Ensenada (CICESE), México,* E.A.Zlobina, S.I.Kablukov, *Inst. of Automation and Electrometry, Russia,* D.Kinet, E.Preda, P.Mégret, *Univ. of Mons, Belgium.* Brillouin fiber lasers with doubly-resonant cavities are successfully stabilized through self-injection locking and dynamical population grating mechanisms. The pump-to-Stokes conversion efficiency of ~40% and Stokes linewidths <500 Hz are achieved for both laser configurations.

LWF7 • 15:45-16:00
Development of hybrid Er/Tm fiber laser system for high power femtosecond pulse generation in the 2 micron range, M.Yu.Koptev, E.A.Anashkina, A.V.Andrianov, S.V.Muravyev, A.V.Kim, *Inst. of App. Phys., Russia.* We propose a design of an all-fiber laser system that combines Er:fiber laser and Tm-doped amplifier for generation of high-power ultrashort pulses. The system is based on nonlinear wavelength conversion of 1.56 μm ultrashort Er:fiber laser pulses to the 2 μm range.

Hall 5
ICONO-07/1

14:00–16:00
IWK • Physics of Metamaterials and Complex Media I (ICONO-07/1)—Continued

IWK5 • 15:30-15:45
Multipole moments of meta-atoms and optical properties of planar metamaterials, A.Pavlov, V.Klimov, *P.N.Lebedev Physical Inst., Russia.* New approach to analysis of optical properties of planar metamaterials based on calculation of multipole moments of meta-atoms is proposed and then used for investigation of planar metamaterials with chiral meta-atoms.

IWK6 • 15:45-16:00
Measurement of radiation forces generated by guided mode of one-dimensional photonic crystals, E.V.Lyubin, I.V.Soboleva, A.A.Fedyanin, *Lomonosov Moscow State Univ., Russia.* Radiation forces acting on a micrometer dielectric sphere near surface of one-dimensional photonic crystals are measured using photonic-force microscopy technique. The force magnitude is shown to be strongly enhanced at photonic-crystal guided mode resonance.

Hall 6
ICONO-10/2

14:00–16:00
IWL • Symposium on Organic Photovoltaics II (ICONO-10/2)—Continued

IWL6 • 15:30-15:45
Fill factor of organic solar cells can exceed the Shockley-Queisser limit, V.A.Trukahnov, V.V.Bruevich, D.Yu.Paraschuk, *Lomonosov Moscow State Univ., Russia.* By numerical modeling we show that fill factor of bilayer organic solar cells can exceed Shockley-Queisser limit for inorganic solar cells. We suggest that this is due to field-dependent charge recombination at the donor-acceptor interface.

IWL7 • 15:45-16:00
Improved performance of photosensitive organic field-effect transistors by innovations of device structures, B.Yao, Y.Peng, W.Lv, *Lanzhou Univ., China.* The structural design is an important way to improve device characteristics. Reasearch found photOFETs by utilizing buffer layer under source / drain electrodes or hybrid planar-bulk heterojunction could significantly improve photosensitivity of devices.

Hall 1 ICONO-01/7

16:30–18:30
IWM • Fundamentals of Nonlinear Optics and Novel Phenomena VII (ICONO-01/7)
Hartmut Bartelt, *Onst. Of Photonic Technologies, Germany, Presider*

IWM1 • 16:30-17:00 • INVITED
Accelerated rogue solitons, A.Demircan, Sh.Amiranashvili, C.Brée, *Weierstrass Inst. for Appl. Analysis and Stochastics (WIAS), Germany,* Ch.Mahnke, F.Mitschke, *Univ. of Rostock, Germany,* G.Steinmeyer, *Max-Born-Inst., Germany.* We discuss enhanced cross-phase modulation of dispersive waves captured in the group-velocity event horizon of a soliton. This is a relevant yet overlooked mechanism for rogue wave generation in nonlinear fiber optics.

IWM2 • 17:00-17:15
The Distortions in absorption spectra of Cs atoms in coated sells, D.I.Sevostianov, V.P.Yakovlev, V.L.Velichansky, *Natl Res. Nuclear Univ. "MEPhI", Russia,* A.N.Kozlov, *Pushkov Inst. of Terrestrial Magnetism, Ionosphere and Radio Waves Propagation, Russia,* V.V.Vassiliev, S.A.Zibrov, *P.N.Lebedev Physical Inst., Russia.* The distortion of absorption lineshapes of $D_{1,2}$ Cs transitions in glass cells with antirelaxation coating are investigated. An asymmetry in the shape of the absorption contour, depending on the direction of frequency scanning is observed.

Hall 2 LAT-01/7

16:30–18:30
LWG • Solid-State Lasers, Materials, and Applications VII (LAT-01/7)
Alexander Sergeev, *Inst. of Applied Physics, Presider*

LWG1 • 16:30-16:45
Sol-gel derived microstructured fibers doped with active optical ions and metallic nanoparticles, M.Bouazaoui, H.El Hamzaoui, L.Bigot, A.Le Rouge, G.Bouwmans, Y.Quiquempois, A.Baz, I.Razdobreev, I.Fsaifes, G.Le Cocq, R.Bernard, O.Robbe, B.Capoen, M.Douay, *Lille 1 Univ., France.* In this presentation, we will show that the Sol-Gel route combined to fiber fabrication by the Stack and Draw method can be used to realize efficient optical amplifiers and fiber lasers.

LWG2 • 16:45-17:00
Technological problems of production of large-size rod active elements from neodymium phosphate glasses, V.I.Arbuzov, M.I.Bakaev, G.V.Evteev, *Research and Technological Inst. of Optical Material Sci., All-Russian Scientific Center "S.I.Vavilov State Optical Inst.", Russia.* Requirements to neodymium phosphate glasses for large-size rod active elements (RAE) and the ways to solve technological problems of melting glasses of required quality and making RAEs of diverse types are discussed.

IWM3 • 17:00-17:15
Novel photo-thermo-refractive and oxyfluoride glasses and glassceramics doped with rare earth ions for laser applications, N.V.Nikonorov, V.A.Aseev, A.I.Ignatiev, E.V.Kolobkova, *St.-Petersburg Natl. Res. Univ. of Inform. Technologies Mechanics and Optics, Russia.* Two laser materials have been developed – photo-thermo-refractive glass and oxyfluoride glassceramics doped with rare earth ions. The first combines itself lasers and waveguides fabrication and Bragg gratings recording. The second is focused on 3-μm lasers.

Hall 3 LAT-07/1

16:30–18:30
LWH • Biophotonics and Laser Biomedicine I (LAT-07/1)
Valery Tuchin, *Saratov State Univ., Russia, Presider*

LWH1 • 16:30-17:15 • KEYNOTE
Application of non-invasive spectroscopic methods for the determination of the antioxidative status of human skin: New prospects of biofeedback measurements, J.Lademann, M.C.Meinke, R.Yu, S.Jung, M.E.Darvin, *Charité – Universitätsmedizin Berlin, Germany.* Non-invasive optical and spectroscopic in vivo methods like resonance Raman and reflectance spectroscopy were used for the analysis of the interaction of free radicals and antioxidants in human skin under diverse conditions.

Hall 4
LAT-08/3

16:30–18:30
LWI • Fiber Optics III (LAT-08/3)
Amir-Abdolvand, *Max-Planck Inst. for the Science of Light, Germany, Presider*

LWI1 • 16:30-17:00 • INVITED
Hidden symmetries in nonlinear fiber optics: nonautonomous solitons and squeezions, V.N.Serkin, *Benemerita Univ. Autonoma de Puebla, Mexico.* The fundamental concept of colored nonautonomous solitons and squeezions in nonlinear and dispersive nonautonomous physical systems is analyzed. Novel soliton solutions for the nonautonomous nonlinear Schrodinger equation models with linear and harmonic oscillator potentials substantially extend the concept of classical solitons and generalize it to the plethora of nonautonomous solitons that interact elastically and generally move with varying amplitudes, speeds and spectra adapted both to the external potentials and to the dispersion and nonlinearity variations.

LWI2 • 17:00-17:15
Mechanisms of photoinduced absorption in phosphosilicate ytterbium-doped optical fibers, A.A.Rybaltovsky, K.K.Bobkov, M.E.Likhachev, M.M.Bubnov, E.M.Dianov, *Fiber Optics Research Center, Russia,* A.A.Umnikov, D.S.Lipatov, A.N.Guryanov, *Inst. of Chemistry of High-Purity Substances, Russia,* I.A.Kamenskikh, V.V.Mikhailin, *Lomonosov Moscow State Univ., Russia.* Photoinduced color centers in ytterbium-doped phosphosilicate fibers have been investigated by the use of the absorption and luminescence spectra analysis methods. The crucial rule of ytterbium "charge-transfer" absorption band in the color centers photoinduction has been proved.

Hall 5
ICONO-07/2

16:30–18:30
IWN • Physics of Metamaterials and Complex Media I (ICONO-07/2)
Dragomir Neshev, *Australian Natl. Univ., Australia, Presider*

IWN1 • 16:30-17:00 • INVITED
Multi-color computer generated holograms from highly dispersive metamaterials, T.Pertsch, *Friedrich Schiller Univ. Jena, Germany.* A computer generated hologram based on an ultrathin metamaterial is presented which is capable of manipulating light waves spatially and spectrally. By applying a special coding scheme, the device projects images at two distinct wavelengths.

IWN2 • 17:00-17:30 • INVITED
Graphene and topological insulators for plasmonics and nanophotonics, Y.E.Lozovik, *Inst. of Spectroscopy, Russia, Moscow, Inst. of Phys. and Technology, Russia.* Graphene and topological insulators as a constituent elements for plasmonics and nanophotonics are discussed. Plasmon polaritons in a monolayer and bilayer doped graphene embedded in optical microcavity are analyzed. The plasmon polaritons in the system can be used for high-speed information transfer and sensors in THz region. The collective excitations, spin-plasmons, in a helical Dirac electron liquid on a surface of 3D topological insulator are studied. Graphene based photonic crystals are considered.

Hall 6
ICONO-10/3

16:30–18:30
IWO • Symposium on Organic Photovoltaics III (ICONO-10/3)
Vladimir Dyakonov, *Julius-Maximilian Univ. of Wuerzburg, Germany, Presider*

IWO1 • 16:30-17:00 • INVITED
Ultrafast dynamics in organic donor-acceptor interfaces, G.Lanzani, *Istituto Italiano di Tecnologia, Politecnico di Milano, Italy.* By using ultrafast pump probe spectroscopy early events following photoexcitation are characterized in prototype organic donor acceptor interfaces, revealing hot injection and unexpected energy transfer phenomena.

IWO2 • 17:00-17:30 • INVITED
Charge generation and separation in novel push-pull polymers, M.S. Pshenichnikov, V.G.Pavelyev, A.Serbenta, S.D.Dimitrov, P.H.M. van Loosdrecht, J.R.Durrant, *Univ. of Groningen, Netherlands.* We report on ultrafast charge transfer followed photon absorption in novel push-pull polymers for organic photovoltaics, with the focus on the interplay between intra- (i.e. within the polymer) and inter- (between the polymer and electron-accepting fullerene).

Hall 1 ICONO-01/7

16:30–18:30 IWM • Fundamentals of Nonlinear Optics and Novel Phenomena VII (ICONO-01/7)—Continued

IMI3 • 17:15-17:30
Oscillations of optical beams in the cell with a thermal optical nonlinearity with the feedback system, G.A.Knyazev, D.A.Davtyan, A.P.Sukhorukov, *Lomonosov Moscow State Univ., Russia.* A new type of optoelectronic oscillators was considered. Autooscillations implemented in a system built on the basis of interaction of optical beams in a medium with thermal nonlinearity of the refractive index. An optoelectronic feedback was used for the implementation of the oscillation regime. The results of the experiment and the numerical and analytical analysis of the self-oscillating system are presented.

IMI4 • 17:30-17:45
Inelastic collisions of excited rubidium atoms with the surface of sapphire, V.V.Khromov, S.G.Przhibel'skii, T.A.Vartanyan, *St.-Petersburg Natl Res. Univ. of Inform. Technologies, Mechanics and Optics, Russia,* A.S.Pazgalev, *Ioffe Phys.-Tech. Inst., Russia,* D.Sarkisyan, *Inst. for Physical Res., Armenia.* An incomplete quenching of excited atoms after a collision with solid surfaces is shown to lead to efficient population of lower lying excited states. The role of the resonance van der Waals repulsion is highlighted.

IMI5 • 17:45-18:00
Waveform shaping of stretched-pulse fiber laser output with a hollow photonic-crystal fiber, A.V.Mitrofanov, *Inst. of Laser and Inform. Technologies, Russia,* A.A.Lanin, D.A.Sidorov-Biryukov, A.M.Zheltikov, *Lomonosov Moscow State Univ., Russia.* A hollow-core photonic-crystal fiber is integrated with a stretched-pulse ytterbium fiber oscillator to enable pulse compression of single-pulse fiber-laser output and tunable ultrashort-pulse pair generation in the regime where the laser delivers a double-pulse output.

Hall 2 LAT-01/7

16:30–18:30 LWG • Solid-State Lasers, Materials, and Applications VII (LAT-01/7)—Continued

LWG4 • 17:15-17:30
Spectroscopic characteristics of the Cr:LiGaSiO$_4$ nano-glass-ceramics, K.A.Subbotin, A.A.Veber, D.A.Nikolaev, V.A.Smirnov, I.A.Shcherbakov, *A.M.Prokhorov General Phys. Inst., Russia,* Yu.N.Osipova, E.V.Zharikov, *D.I.Mendeleyev Univ. of Chemical Technology of Russia, Russia.* The spectroscopic properties of transparent Cr:LiGaSiO$_4$ nano-glass-ceramic were studied. It was shown that chromium changes its oxidation state for +4 during the samples synthesis from the vitreous precursors, and forms two separate kinds of fluorescent centres.

LWG5 • 17:30-17:45
Ceramic planar waveguide structures for amplifiers and lasers, V.A.Konyushkin, A.N.Nakladov, D.V.Konyushkin, M.E.Doroshenko, V.V.Osiko, A.Ya.Karasik, *A.M.Prokhorov General Phys. Inst., Russia.* Based on fluoride crystals and ceramic planar weakly guiding waveguides are fabricated by hot pressing technique. The structure of waveguides is demonstrated. Prospects of investigations are discussed.

LWG6 • 17:45-18:00
Cooperative photoluminescence of Yb^{3+} ions in silica based channel waveguides, E.A.Savelyev, A.S.Shikin, K.M.Golant, *Kotel'nikov Radio-Engineering Inst., Russia.* Experimental results characterizing ytterbium clusters formation in amorphous silicon dioxide synthesized by the surface-plasma CVD method are presented. Intensities of co-operative luminescence excited in different channel waveguides with Yb:SiO$_2$ as the core material are compared.

Hall 3 LAT-07/1

16:30–18:30 LWH • Biophotonics and Laser Biomedicine I (LAT-07/1)—Continued

LWH2 • 17:15-17:45 • INVITED
Laser-excited skin photo-bleaching effects, J.Spigulis, A.Lihachev, J.Lesinsh, I.Ferulova, D.Jakovels, *Univ. of Latvia, Latvia.* Photo-bleaching of visible low-power laser excited skin autofluorescence has been studied by several techniques - single-spot, spectral imaging and parametric imaging of photo-bleaching rates. Role of skin pigments (melanin, hemoglobin) in the photo-bleaching process will be discussed.

LWH3 • 17:45-18:00
Fiber Spectroscopy for Biomedical Diagnostics - from Fluorescence to Mid-IR-Absorption, V.Artjushenko,G.Danielyan, V.Lobachov, T.Sakharova, *A.M. Prokhorov General Phys. Inst., Moscow, Russia,* A.Bocharnikov, J.Mannhardt, *Art photonics GmbH, Berlin, Germany.* Short review of the latest fiber spectroscopy methods used for biomedical diagnostics in broad spectral range – from UV-fluorescence to UV-Vis-NIR and Mid IR absorption and Raman scattering. Recent applications of fibre spectroscopy will be presented - from live cells monitoring of multi-organ biochips, up to use of endoscopic spectroscopy for clinical diagnostics.

Hall 4 LAT-08/3	Hall 5 ICONO-07/2	Hall 6 ICONO-10/3

16:30–18:30
LWI • Fiber Optics III (LAT-08/3)—Continued

LWI3 • 17:15-17:30
Adjustment method for doubly-resonant Brillouin cavities, A.A.Fotiadi, *Ulyanovsk State Univ., Russia, Ioffe Physical-Technical Inst., Russia,* C.A.López-Mercado, V.V.Spirin, *Scientific Research and Advanced Studies Center of Ensenada (CICESE), México,* E.A.Zlobina, S.I.Kablukov, *Inst. of Automation and Electrometry, Russia,* P.Mégret, *Univ. of Mons, Belgium.* We demonstrate a simple universal algorithm for adjustment of double pump-, Stokes-resonance in a ring fiber Brillouin cavity. In the experiment 8 m ring cavity has been adjusted by the proposed method.

LWI4 • 17:30-18:00 • INVITED
Unique properties of the negative curvature hollow core fibers, A.D.Pryamikov, A.F.Kosolapov, A.S.Biriukov, A.N.Kolyadin, V.G.Plotnichenko, E.M.Dianov, *Fiber Optics Research Center, Russia.* In this paper we discuss waveguide properties of the negative curvature hollow core fibers (NCHCFs) with cladding consisting of one row of capillaries. The physical mechanism which allows to guide light in such NCHCFs is considered.

14:00–16:00
IWN • Physics of Metamaterials and Complex Media I (ICONO-07/2)—Continued

IWN4 • 17:45-18:00
Towards broadband ultra-low permeability in non-resonant metamaterials, A.K.Krylova, P.A.Belov, *St.-Petersburg Natl Res. Univ. of Inform. Technologies, Mechanics and Optics, Russia,* M.Lapine, R.C.McPhedran, *Univ. of Sydney, Australia,* C.G.Poulton, *Univ. of Technology Sydney, Australia,* Y.S.Kivshar, *Australian Natl Univ., Australia.* We demonstrate how to achieve extremely low effective permeability in a wide frequency range, employing anisotropic stacks of densely packed conductive rings. We discuss the optimal design and its scaling towards optical spectral range.

16:30–18:30
IWO • Symposium on Organic Photovoltaics III (ICONO-10/3)—Continued

IWO4 • 17:30-17:45
Charge recombination in photovoltaic blends based on star-shaped conjugated molecules, O.V.Kozlov, V.G.Pavelyev, A.Serbenta, M.S.Pshenichnikov, *Univ. of Groningen, The Netherlands,* D.Yu.Paraschuk, *Lomonosov Moscow State Univ., Russia,* Yu.N.Luponosov, S.A.Ponomarenko, *Inst. of Syntetic Polymeric Materials, Russia,* Yo.Olivier, J.Cornil, *Univ. de Mons, Belgium,* A.Elschner, *Heraeus Precious Metals GmbH & Co., Germany.* Charge dynamics in donor-acceptor blends based on novel star-shaped small molecules are studied by ultrafast photoinduced absorption spectroscopy. Two different recombination channels are identified and discussed.

IWO5 • 17:45-18:15 • INVITED
Dynamics of trapped charge carriers in organic and hybrid photovoltaic devices, A.A.Bakulin, A.Rao, Ya.Vaynzof, S.C.Neutzner, R.H.Friend, *Univ. of Cambridge, UK,* V.G.Pavelyev, P.H.M. van Loosdrecht, M.S.Pshenichnikov, *Univ. of Groningen, The Netherlands,* S.Dmitrov, J.R.Durrant, *Imperial College, UK,* H.J.Bakker, *AMOLF, The Netherlands.* Ultrafast charge-manipulation experiments on organic photovoltaic devices show that excessive excitation energy in such systems is used to reach delocalised states that act as the gateway for long-range charge separation.

Hall 1 ICONO-01/7	Hall 2 LAT-01/7	Hall 3 LAT-07/1
16:30–18:30 **IWM • Fundamentals of Nonlinear Optics and Novel Phenomena VII (ICONO-01/7)—Continued**	**16:30–18:30** **LWG • Solid-State Lasers, Materials, and Applications VII (LAT-01/7)—Continued**	**16:30–18:30** **LWH • Biophotonics and Laser Biomedicine I (LAT-07/1)—Continued**
IWM6 • 18:00-18:15 ***Anomalous enhancement of supercontinuum generation efficiency in KDP crystals incorporated with anatase nanoparticles,*** L.A.Golovan, I.A.Ozheredov, A.P.Shkurinov, I.E.Usenov, *Lomonosov Moscow State Univ., Russia,* V.Ya.Gayvoronsky, M.A.Kopylovsky, *Inst. of Phys. NASU, Ukraine,* I.M.Pritula, *Inst. for Single Crystals NASU, Ukraine.* Supercontinuum generation in crystalline potassium dihydrogen phosphate matrix with incorporated TiO_2 nanocrystals in the field of femtosecond laser pulses is discussed. The efficiency enhancement is observed to be five times more comparing with the nominally pure KDP crystal.	**LWG7 • 18:00-18:15** ***Continuous optical discharge sustained by radiation of ytterbium fiber lasers,*** V.P.Zimakov, V.A.Kuznetsov, N.G.Solovyov, A.N.Shemyakin, A.O.Shilov, M.Yu.Yakimov, *A.Ishlinsky Inst. for Problems in Mechanics, Russia.* The details of experimental studies of continuous optical discharge (COD) sustained in high pressure Xe by Yb fiber lasers radiation are reported. Threshold laser power, laser power absorption, thermal radiation emission and other COD plasma characteristics were investigated. COD features inherent to sustaining by 1 μm radiation are discussed.	**LWH4 • 18:00-18:15** ***Two-photon/CARS tomograph for in vivo imaging of lipid distribution in healthy and neurodermitis-affected skin,*** M.E.Darvin, J.Lademann, *Charité – Universitätsmedizin Berlin, Germany,* M.Weinigel, R.Bückle, M.Kellner-Höfer, H.G.Breunig, K.König, *JenLab GmbH, Germany.* The microscopic distribution of lipids inside the human skin was investigated in vivo by using combined two-photon and CARS tomography. The lipid distribution in healthy and neurodermitis-affected human skin is presented.
IWM7 • 18:15-18:30 ***Finely phase-tuned coherent Raman scattering with tailored optical driver fields,*** A.A.Lanin, A.B.Fedotov, A.M.Zheltikov, *Lomonosov Moscow State Univ., Russia.* We show that the phase of coherent Raman scattering can be accurately controlled by using waveform-tailored optical driver fields, which is visualized through the interference of the coherent Raman signal with the nonresonant background.	**LWG8 • 18:15-18:30** ***Dynamic processes in CaF_2:Ce^{3+}+Yb^{3+}+Lu^{3+} crystals,*** S.A.Shnaidman, A.S.Nizamutdinov, V.V.Semashko, S.L.Korableva, M.A.Marisov, *Kazan Federal Univ., Russia.* The work has carried out comprehensive research into new materials – fluorite-type crystal structure CaF_2-LuF_3 solid solutions doped with Ce^{3+} and Yb^{3+} ions. Optical gain in UV spectral region and switching properties are shown and discussed.	**LWH5 • 18:15-18:30** ***Tissue optical clearing towards in vivo imaging,*** D.Zhu, *Huazhong Univ. of Science and Technology, China*. In this paper, the progress in optical clearing of tissue for in vivo imaging in my group is presented.

Hall 4 LAT-08/3	Hall 5 ICONO-07/2	Hall 6 ICONO-10/3
16:30–18:30 **LWI • Fiber Optics III (LAT-08/3)—Continued**	**14:00–16:00** **IWN • Physics of Metamaterials and Complex Media I (ICONO-07/2)—Continued**	**16:30–18:30** **IWO • Symposium on Organic Photovoltaics III (ICONO-10/3)—Continued**
LWI5 • 18:00-18:15 ***Non-linear optical properties of chalcogenide glasses of the system As-Se-Te,*** Yu.S.Kuzyutkina, A.V.Melnikov, E.A.Romanova, *Saratov State Univ., Russia,* N.A.Moneim, D.Furniss, A.B.Seddon, *Univ. of Nottingham, UK.* By using a semi-empirical method of evaluation of the non-linear refractive indices, chalcogenide glasses of the system As-Se-Te have been characterised as prospective material for non-linear photonics in the mid-infrared spectral range.	**IWN5 • 18:00-18:15** ***Thermorefractive noise in phoxonic crystal defect cavity,*** N.M.Kondratiev, M.L.Gorodetskiy, *Lomonosov Moscow State Univ., Russia.* The Fluctuation-Dissipation Theorem is used to calculate the thermal noise of phoxonic crystal defect cavity resonance frequency. The cavity is formed by tapering of holes spacing in nanobeam. The noise spectral densities for high and low frequencies are obtained.	
LWI6 • 18:15-18:30 ***Bend, refractive index, and temperature sensing using structure based on a depressed inner cladding fiber,*** O.V.Ivanov, *Ulyanovsk Branch of Inst. of Radio Engineering and Electronics, Russia,* I.V.Zlodeev, *Ulyanovsk State Univ., Russia.* A fiber-optic structure based on a depressed inner cladding fiber section that is spliced between two standard SMF-28 fibers is investigated for bend, temperature, and refractive index sensing.	**IWN6 • 18:15-18:30** ***Microstructured optical fiber with magnetic fluid cladding: modulation and polarization properties,*** P.M.Agruzov, I.V.Pleshakov, A.V.Shamrai, *Ioffe Physical-Technical Institute, Russia,* E.E.Bibik, *St.-Petersburg State Inst. of Technology (Technical Univ.), Russia,* Ya.A.Fofanov, *Inst. for Analytical Instrumentation, Russia.* The results of the investigation of microstructured optical fiber, filled by magnetic fluid, are presented. The dependencies of the radiation intensity on magnetic field strength, frequency and field orientation are obtained.	**IWO6 • 18:15-18:30** ***Photovoltaics with Renishaw Raman spectrometers: Benefits and examples of applications***, K.Ponkratov, *OOO Renishaw, Russia*. Raman spectroscopy is a universal, non-destructive tool for characterization of photovolatic materials (Si based, CdTe, CIGS, organic, etc.). Renishaw (UK) is a world leading manufacturer of Raman spectrometers, ideally suitable for such a type of analysis.

IWP • 18:30-20:00

Fundamentals of Nonlinear Optics and Novel Phenomena (ICONO-01): Posters

IWP1

Blue (420 nm) and Infrared (1324 nm) coherent beams generated by multiple wave mixing in Rb vapor, J.F.Sell, M.A.Gearba, R.J.Knize, *United States Air Force Academy, USA.* Utilizing nonlinear optical processes such as multiple wave mixing in hot rubidium vapor we discuss the generation of coherent optical fields at 420 nm and 1324 nm.

IWP2

Orientational optical nonlinearity and photoisomerisation in doped nematic liquid crystals, I.A.Budagovsky, M.P.Smayev, A.S.Zolot'ko, *P.N.Lebedev Physical Inst., Russia,* S.A.Shvetsov, *Moscow Inst. of Phys. and Technology, Russia,* N.I.Boiko, *Lomonosov Moscow State Univ., Russia,* M.I.Barnik, *Shubnikov Inst. of Crystallography, Russia.* Optical nonlinearities and the isomer composition of dopants in the light field were studied for the nematic liquid crystals with the admixture of low- and high-molar-mass azocompounds.

IWP3

Stimulated Raman two-pulse optical nutation in the condition of atom-molecular conversion in Bose-Einstein condensate, P.I.Khadzhi, A.P.Zingan, *Dniester State Univ., Moldova, Inst. of Appl. Phys., ASM, Moldova.* The effect of self-trapping system and modification of the amplitudes and periods of the oscillations of the particle densities in the process of nutation in the condition of atom-molecular conversion in Bose-Einstein condensate is investigated.

IWP4

Dynamics of electronic excitations under two-photon interband absorption in tungstate and molibdate crystals, V.I.Lukanin, A.Ya.Karasik, *A.M.Prokhorov General Phys. Inst., Russia.* Under two-photon interband picosecond excitation in tungstate and molibdate crystals we studied kinetics of generation, relaxation and accumulations of electronic excitations over a wide temperature and time (from picoseconds to hundreds of seconds) range.

IWP5

Semiclassical theory of intracavity transient stimulated Raman scattering in compact lasers, S.V.Voitikov, V.A.Orlovich, *B.I.Stepanov Inst. of Phys., Belarus,* A.A.Demidovich, M.B.Danailov, *Laser Lab Sincrotrone-Trieste, Italy.* Semiclassical theory of multi-frequency stimulated Raman scattering in compact lasers is developed. Equations for the amplitudes of Stokes/anti-Stokes waves, amplitudes of collective vibrations, and population of excited atoms are formulated and satisfactory applied to experiment.

IWP6

Picosecond broadband optical parametric generator (OPG) seeded by broadband signal wave, A.K.Vereshchagin, K.A.Vereshchagin, *A.M.Prokhorov General Phys. Inst., Russia,* V.B.Morozov, V.G.Tunkin, D.V.Yakovlev, *Lomonosov Moscow State Univ., Russia.* We demonstrate the ability to generate broadband high-intensity laser picosecond pulses using an optical parametric generator, working on non-collinear scheme, pumped by the second-harmonic output of a 60-ps Nd:YAG laser and seeded by output of a broadband cavityless dye laser.

IWP7

Multiphoton absorption controlled by the resonance optical Stark effect in solids, E.Yu.Perlin, A.V.Ivanov, M.A.Bondarev, *St.-Petersburg Natl Res. Univ. of Inform. Technologies, Mechanics and Optics, Russia.* A theory of nonlinear absorption of high-intensity laser radiation in the conditions of double multiphoton-one-photon resonance at adjacent interband transitions is developed. The theory takes into account the effects of reconstruction of the electron band spectrum.

IWP8

Kinetics of photo-induced transitions on the surface of transparent wide-gap crystals, A.V.Ivanov, M.A.Bondarev, E.Yu.Perlin, *St.-Petersburg Natl Res. Univ. of Inform. Technologies, Mechanics and Optics, Russia.* In the framework of a multiband model of a semi-infinite wide-gap crystal the kinetics of surface electron-hole pair's generation is considered under laser pulses with the light intensity 10^9-10^{11} W/cm^2.

IWP9

Adiabatic approximation in the theory of light pulses propagation, V.I.Yudin, A.V.Taichenachev, *Inst. of Laser Phys., Russia, Novosibirsk State Univ., Russia,* M.Yu.Basalaev, *Novosibirsk State Technical Univ., Russia*. We suggest the method allowing in adiabatic approximation to construct the consistent theory of light pulses propagation through atomic medium in arbitrary nonlinear regime on the field, taking into account the light polarization, temporal and spatial dispersions.

IWP10

Nonlinear wave theory of formation of nanoparticle ensembles with multimodal size distributions upon laser irradiation of solids, V.I.Emel'yanov, A.S.Kuratov, *Lomonosov Moscow State Univ., Russia.* Nonlinear wave theory of formation of nanoparticle ensembles with multimodal size distribution function is developed. The theory is used for interpretation of experimental results on formation of nanoparticle ensembles with bimodal size distribution function under laser-controlled atom deposition.

IWP11

Generation of a pilot phase pulse during the propagation of slow elliptically polarized pulses, D.V.Brazhnikov, A.V.Taichenachev, V.I.Yudin, *Inst. of Laser Phys., Russia, Novosibirsk State Univ., Russia,* M.Yu.Basalaev, *Novosibirsk State Technical Univ., Russia.* Effect of stimulated phase modulation under the variation of the spatial orientation of the polarization ellipse has been discovered. This phase modulation includes both a pilot pulse passing through the medium at the vacuum speed of light and a slow pulse.

IWP12

Efficient second harmonic generation of ultra-intense femtosecond pulses by Ti:Sa laser radiation, V.Tcheremiskine, R.Clady, O.Uteza, M.Sentis, *Aix-Marseille Univ. - LP3 Laboratory, CNRS, France,* S.Mironov, A.Shaykin, *Inst. of App. Phys., Russia,* L.Mikheev, *P.N.Lebedev Physical Inst., Russia.* Energy conversion efficiency of the second harmonic generation in KDP under 40-fs fundamental pulses with peak intensities of 1÷5 TW/cm^2 at 800 nm is studied. Efficiency of 50% is demonstrated.

IWP13

Occurrence of nonstationary parametric resonance optical properties of semiconductors in the exciton range of spectrum, L.Yu.Nadkin, P.I.Khadzhi, *Inst. of Appl. Phys., Moldova, T.G.Shevchenko Pridnestrovian State Univ., Moldova.* Pump-probe method theoretically investigated the optical properties of the semiconductor in the exciton region of the spectrum, taking into account the exciton-exciton interaction..It was obtained, that excitons concentrations and susceptibilities depend on the detuning and intensity of pump pulse.

IWP14

Terahertz radiation generation by a drag current induced by a femtosecond pulse in the metal, S.G.Bezhanov, S.A.Uryupin, *P.N.Lebedev Physical Inst., Russia.* Terahertz radiation generation by a drag current induced by a femtosecond pulse irradiating surface of metal has been studied. Dependences of terahertz radiation generation efficiency on metal and incident radiation parameters were analyzed.

IWP15

The non-resonant macroscopic second-harmonic generation behavior of some pyrazol-5-one azo- dyes, A.Emandi, M.Marinescu, I.Ionita, *Univ. of Bucharest, Romania,* I.C.Vasiliu, *Natl Inst. of Res. and Development for Optoelectronics - INOE 2000, Romania,* A.Purice, *Natl Inst. for Laser, Plasma and Radiation Phys., Romania.* The paper deals with the macroscopic origin of the Second-Harmonic Generation (SHG) resonance of some powder azo-dyes. We assigned the observed SHG resonance, on the basis of theoretical optimization of geometry (DFT), powder-XRD and solvatochromic behavior.

IWP16

High harmonics spectrum in superlattices: coherent control, K.A.Pronin, *Inst. of Biochemical Phys., Russia,* A.D.Bandrauk, *Univ. de Sherbrooke, Canada.* We demonstrate that in a superlattice the spectrum contains high harmonics in response to moderate periodic fields, the spectrum shape can be controlled by induced localization and in meander-type fields it exhibits a transition from multi-harmonic to single-harmonic response.

IWP17

Optical wave equation for scattered field in linear and nonlinear macroscopically inhomogeneous media, V.I.Kovalev, *P.N.Lebedev Physical Inst., Russia.* A novel equation is presented for describing linear and nonlinear optical wave interactions in materials with imprinted or induced macroscopic spatial inhomegeneity on the sub-wavelength of optical radiation scale, currently referred to as nanophotonic materials.

IWP18

Third harmonic generation by few-cycle pulses reflected from a mirror with a nonlinear dielectric layer, E.M.Buyanovskaya, S.A.Kozlov, *St.-Petersburg Natl Research Univ. of Inform. Technologies, Mechanics and Optics, Russia,* A.A.Sukhorukov, *Australian Natl Univ., Australia.* We model the reflection of ultra-short optical pulses from a layer of nonlinear dielectric on the metal mirror, taking into account the counter-directional interactions, and identify regimes of increased third harmonic generation by few-cycle pulses.

IWP19

Nonlinear-optical effects in composite materials based on the glasses doped with "semiconductor-metal" nanostructures, N.Nikonorov, A.Kim, P.Shirshnev, A.Sidorov, V.Tsekhomsky, *St.-Petersburg State Natl Res. Univ. of Inform. Technologies, Mechanics and Optics, Russia.* Nonlinear glasses doped with synthesized nanostructures of "semiconductor-metal" have been developed with use of thermo-induced crystallizations. The glasses exhibit high nonlinear effects and can be used for photonic applications.

IWP20

Double three-photon atomic ionization involving formation of polarized intermediate ion, A.S.Chetverkina, A.N.Grum-Grzhimailo, E.V.Gryzlova, S.I.Strakhova, *Lomonosov Moscow State Univ., Russia.* Sequential three-photon double non-resonant ionization is described theoretically within the second-order perturbation theory. Photoelectron angular distributions are calculated for the case of double ionization from the 2p shell of atomic neon.

IWP21

Generation of quasistationary currents in plasma interacting with a short laser pulse, V.E.Grishkov, S.A.Uryupin, *P.N.Lebedev Physical Inst., Russia.* The quasistationary currents arising in the rarefied plasma interacting with a short laser pulse have been studied. The quasistationary currents caused by the potential and vortex parts of a ponderomotive for⊂e have been found.

IWP22

The treatment of the resonant scattering by phonons for two-photon excitation, L.E.Semenova, *A.M.Prokhorov General Phys. Inst., Russia.* The scattering of light by TO-phonons in semiconductors is considered under two-photon excitation near the absorption edge, taking into account the Wannier excitons as intermediate virtual states.

IW23

Surface photorefractivity in NLCs with dye-doped orienting polyimide layer, I.A.Budagovsky, M.P.Smayev, A.S.Zolot'ko, *P.N.Lebedev Physical Inst., Russia,* S.A.Shvetsov, *Moscow Inst. of Phys. and Technology, Russia,* M.I.Barnik, *Shubnikov Inst. of Crystallography, Russia.* Aberrational light self-action in transparent nematic liquid crystal with doped and undoped orienting layer under dc voltage has been studied. Photorefractive response of diazodye-doped cell is much higher than that of undoped one.

IWP24

Raman spectrum of laser-modified multi-walled carbon nanotubes suspension, K.G.Mikheev, G.M.Mikheev, T.N.Mogileva, *Inst. of Mechanics, UB RAS, Russia,* V.L.Kuznetsov, M.A.Shuvaeva, *Inst. of Catalysis, SB RAS, Russia.* It is experimentally shown that multi-walled carbon nanotubes (MWNTs) suspension in dimethylformamide (DMF) irreversibly bleaches in a wide spectrum range under a pulsed laser radiation effect of nanosecond duration at a wavelength of 532 nm. Using the Raman spectroscopy the bleaching is shown to be caused by MWNTs degradation with forming of new hydrocarbon chemical bonds which are resulted from laser-induced chemical reactions between MWNTs and DMF molecules.

IWP25
Parametric diffraction at small angles of the pump beams, V.Pyragaite, R.Butkus, G.Archipovait, D.Kezys, A.Stabinis, V.Smilgevičius, A.Piskarskas, *Vilnius Univ., Lithuania.* We demonstrate that the parametric diffraction can be suppressed in the case of small angles between two pump beams.

IWP26
Stimulated Raman scattering and stimulated emission coupling in dyed random media, V.P.Yashchuk, A.P.Smaliuk, A.O.Komyshan, O.A.Prigodiuk, L.A.Olkhovik, *Kyiv Taras Shevchenko Natl Univ., Ukraine,* E.A.Tikhonov, *Inst. of Phys. NASU, Ukraine,* A.A.Ishchenko, *Inst. of Organic Chem., Ukraine.* Coupled phenomenon of random lasing (RL) and stimulated Raman scattering (SRS) in multiple scattering media was investigated. The phenomenon reveals all Raman lines which coincide with RL spectrum. SRS behaviour is determined significantly by RL.

IWP27
Auger-recombination emission lines of the acceptor-bound trions and Landau quantization of two-dimensional heavy holes, I.V.Podlesny, S.A.Moskalenko, L.Gherciu, I.A.Lelyakov, *Inst. of Appl. Phys., Moldova,* A.A.Kiselyov, *State Univ. of Civil Aviation, Russia.* Landau quantization of the 2D heavy holes, its influence on the energy spectrum of 2D magnetoexcitons, and their optical orientation are studied. The transformation of the shake–up into the shake–down recombination lines is explained.

IWP28
Two-dimensional magnetoexciton-polariton in microcavity, S.A.Moskalenko, I.V.Podlesny, *Inst. of App. Phys., Moldova,* M.A.Liberman, *Uppsala Univ., Sweden,* B.V.Novikov, *St.-Petersburg State Univ., Russia,* E.S.Kiselyova, *Moldova State Univ., Moldova.* The Hamiltonian describing the interaction of the two-dimensional magnetoexcitons with photons propagating with arbitrary oriented wave vectors in the three-dimensional space was deduced.

IWP29
Four-wave mixing oscillation of frequency components at transient stimulated Raman scattering in crystals, S.N.Smetanin, *A.M.Prokhorov General Phys. Inst., Russia.* The effects of four-wave mixing oscillation of Raman radiation components in Raman-active crystals under femtosecond and picosecond pumping is theoretically studied in comparison with known experimental results. Decrease of the oscillation thresholds of different Stokes and anti-Stokes components owing to its parametric coupling is shown.

IWP30
Noncollinear second harmonics generation using beams from separate laser amplifiers, V.Pyragaite, G.Archipovait, A.Narmontas, R.Butkus, V.Smilgevicius, *Vilnius Univ., Lithuania,* A.Michailovas, K.Michailovas, *UAB „Ekspla", Lithuania, State Sci. Res. Inst. Center for Phys.l Sci. and Technology, Lithuania.* We demonstrate efficient noncollinear second harmonics generation of lasers pulses from two separate amplifiers and its application for beam profile enhancement.

IWP31
Investigation of backscattered spectra of intense femtosecond laser radiation from water aerosol droplets, A.A.Murzanev, Yu.A. Malkov, A.N.Stepanov, *Inst. of Appl.Phys., Russia.* We investigated backscattered spectra from water aerosol jet irradiated by intense femtosecond laser pulses. Spectra transformation due to ionization of the water microdroplets was observed and backward reflection of laser radiation was measured.

IWP32
Cnoidal waves and polarization "chaos" in a medium with nonlinear gyrotropy, V.A.Makarov, V.M.Petnikova, N.N.Potravkin, V.V.Shuvalov, *Lomonosov Moscow State Univ., Russia.* We present approximate solutions for a pair of bound circularly-polarized chirped field components in isotropic Kerr-type media with nonlinear gyrotropy and show that as waves with periodic change of polarization as polarization "chaos" can be excited.

IWP33
Non-linear absorption, scattering and luminescence of solutions of Zn -thetra-thyophenoporphirazine with gold nanoparticules in thetrahydrofurane, M.A.Kazaryan, A.V.Karpo, S.I.Rasmagin, V.I.Krasovskii, V.I. Pushkarev, L.G.Tomilova, *P.N.Lebedev Physical Inst., Russia.* In the yielded work results of reception and research of luminescent properties of complexes tireno-porfirazinovogo phthalocyanine of zinc with gold nanoparticles in tetrahydrofuran are presented.

IWP34
Nonlinear absorption of new homoleptical diphtalocianine complexes of rare-earth metals, A.V.Zasedatelev, M.A.Kazaryan, A.V. Karpo, V.I.Krasovskii, V.I.Pushkarev, L.G.Tomilova, *P.N.Lebedev Physical Inst., Russia.* In the work the results of research of optical and nonlinear-optical properties of new homoleptical diphtalocyanine complexes of europium (III), dysprosium (III), erbium (III) and lutecium (III) in a tetrahydrofuran solution are presented.

IWP35
Superradiant scattering of light from a BEC of dilute atomic gas, Yu.A.Avetisyan, *Inst. of Precision Mechanics and Control, Russia, Saratov State Univ., Russia,* E.D.Trifonov, *Herzen State Pedagogical Univ. of Russia, Russia.* The theory of superradiant light scattering from a Bose-Einstein condensate of dilute atomic gas is presented. We show that the intensity of superradiant scattering critically depends on the atomic recoil frequency shifts.

IWP36
Short light pulse tunneling in the forbidden gap of a 1D photonic crystal, S.V.Marchenko, P.Yu.Shestakov, I.G.Zakharova, K.V.Zharikov, *Lomonosov Moscow State Univ., Russia.* We present results of numerical study of light pulses tunneling through a photonic crystal. We found out that an effect of the time delay saturation observed for wide pulses vanishes when the pulse spectrum extends.

IWP37
Temperature dependence of optical harmonic generation in nematic liquid crystals, S.I.Trashkeev, V.S.Pivtsov, V.M.Klementyev, *Inst. of Laser Phys., Russia,* B.N.Nyushkov, S.M.Kobtsev, *Novosibirsk State Univ., Russia.* Temperature dependence of optical harmonic generation in nematic liquid crystals is investigated. Efficiency of the third harmonic generation spikes at the temperature of nematic-isotropic transition. Maintaining this temperature allows exploitation of the enhanced cubic nonlinearity.

IWP38
Broadband near-infrared femtosecond optical parametric amplifier, A.A.Podshivalov, F.V.Potyemkin, D.A.Sidorov-Biryukov, *Lomonosov Moscow State Univ., Russia.* Parametric amplification with bandwidth of 4-cycle optical pulse was demonstrated in collinear geometry scheme. LBO and DKDP crystal OPA was pumped by second harmonic of Cr:Forsterite laser. Energy of output signal pulses was 6-12 mkJ with bandwidth of 150 nm and 220 nm in the range 1000 – 1230 nm.

IWP39
Dispersion of the dielectric constant for $Mg:LiNbO_3$ crystals in the THz region, G.Kh. Kitaeva, S.P.Kovalev, K.A.Kuznetsov, I.I.Naumova, A.N.Penin, *Lomonosov Moscow State Univ., Russia.* Dispersion of the dielectric constant in the terahertz frequency range is measured by a three-frequency interference methods under spontaneous parametric down-conversion for $Mg:LiNBO_3$. Influence of point structural defects on optical properties of crystals is discussed.

IWP40
Time oscillations of populations and polarization of two-level atoms driving by polyharmonic field, S.V.Uvarova, S.A.Pulkin, A.Sumarokov, *St.-Petersburg State Univ., Russia,* M.Yu.Savel'eva, *Univ. of Technology and Design, Russia.* The numerical solution for population difference and polarization for two-level atom driving by polyharmonic field was made. The analytical solution for partial symmetrical case confirmed numerical one. The results can be used for nonlinear comb – spectroscopy.

IWP41
Coding information of exciting laser pulses in optical echo-processor, I.A.Rusanova, *Kazan Federal Univ./Phys. Inst., Russia.* Efficiency of realization of the elementary logic gate XOR on the basis of two-pulse excitation of the resonant environment with phase memory is considered. The coded information is pawned in the time form of laser pulses in the form of peak modulation of "echelon" of present «1» and absent «0» pulses-codes, for reception of more effective logic elements reducing noise in a quantum communication channel.

IWP42
Second harmonic generation of CW laser radiation in 2D QPM nonlinear photonic crystals, [1)]D.B.Yusupov, [2)]U.K.Sapaev, [1)]A.A. Sherniyozov, [1)]*Tashkent State Technical Univ., Uzbekistan;* [2)]*Ion-Plasma and Laser Technology Inst., Uzbekistan*. We study second harmonic generation in 2D nonlinear photonic crystals. We developed an analytical method for analyzing second harmonic generation (SHG) in 2D QPM crystals with rectangular shape and motifs. Developed method allows analyzing the conversion efficiency of SHG in any arbitrary designed 2D quasi-phase matched crystals based on rectangular asymmetry with arbitrary rectangular motif sizes.

IWP43
Efficient approach in modeling self-shifted solitons in microstructured fibers, Yu.Bashkatov, O.Kutsenko, B.Tsyganok, *Natl Technical Univ. of Ukraine "KPI", Ukraine,* V.Khomenko, V.Voitsekhovich, N.Kachalova, *Inst. of Phys. NASU, Ukraine,* S.Pentegov, *LTD Lasertrack, Russia.* This article is focused on description of red shifted solitons appearing during supercontinuum generation in photonic crystal fibers by femtosecond pump. Numerical approach for modeling soliton appearing in supercontinuum spectrum is presented. This approach is based on split-step Fourier method. Fast multipole method and modified Raman response model were used for dispersion properties calculation and Raman gain calculation respectively. It is shown that experimental results have agreement with theory.

IWP44
Unsteady reflection of an electromagnetic pulse from a layered structure with losses, A.V.Kozar, A.V.Trofimov, *Lomonosov Moscow State Univ., Russia.* The experimental, analytical and numerical studies of unsteady phenomena of an electromagnetic pulse reflection from the antireflective structure with losses are discussed. It was shown analytically that the envelope of the reflected amplitude-modulated signal significantly change in the presence of even small losses. The comparison of experimental, analytical and numerical results is presented.

IWR • 18:30-20:00
Quantum and Atom Optics (ICONO-03): Posters

IWR1
Single-emitter nanolaser – Heisenberg-Langevin and density operator approach, N.V.Larionov, *St-Petersburg State Polytechnic Univ., Russia,* M.I.Kolobov, *Univ. Lille 1, France*. Using Heisenberg-Langevin and density operator approaches we investigate properties of incoherently pumped single-emitter nanolaser. We provide analytical results in good- and bad-cavity regimes and also specify conditions needed for thresholdless behaviour.

IWR2
Capture and cooling of atoms in an optical trap formed by sequences of counterpropagating light pulses, L.P.Yatsenko, V.I.Romanenko, Ye.G.Udovitskaya, *Inst. of Phys., NASU, Ukraine,* A.V.Romanenko, *Taras Shevchenko Natl Univ. of Kyiv, Ukraine,* G.A.Kazakov, A.N.Litvinov, *St.-Petersburg State Polytechnical Univ., Russia.* The motion of atoms in a trap formed by sequences of counter-propagating light pulses has been analyzed. We use Monte-Carlo wave function approach for description of the atomic state, whereas the atomic motion is described by classical mechanics. The motion of trapped atom was shown to be slowed down for properly chosen parameters of the field.

IWR3
Quantum fluctuations of 1D-dark dissipative solitons in a driven nonlinear interferometer, L.A.Nesterov, N.A.Veretenov, N.N.Rosanov, *St.-Petersburg Natl Res. Univ. of Inform. Technologies, Mechanics and Optics, Russia, Vavilov State Optical Inst., Russia.* The theory of quantum fluctuations of spatial dark dissipative solitons in a driven nonlinear interferometer is developed. The formation of soliton states squeezed in pulse is predicted and possible experiments with large squeezing are discussed.

IWR4
Asymptotic analytical formulas for the static polarizabilities of Rydberg atom or ion, A.A.Kamenski, V.D.Ovsiannikov, *Voronezh State Univ., Russia.* The approximation model for describing single-electron Rydberg states of atom or ion are proposed on the basis of method of the Fues' model potential. Scalar and tensor static polarizabilities are presented as asymptotic series with coefficients derived analytically.

IWR5
Dynamic back action in imbalanced Michelson interferometer, S.P.Vyatchanin, N.A.Vostrosablin, *Lomonosov Moscow State Univ., Russia.* We consider Michelson interferometer with movable north and east mirrors, which may demonstrate optical rigidity. For balanced interferometer optical rigidity is unstable. We show that in imbalanced case this model allows to get stable optical spring.

IWR6
Semiclassical study of sub-Doppler laser cooling of magnesium atoms using $3^3P_2 \rightarrow 3^3D_3$ dipole transition, D.V.Brazhnikov, A.E.Bonert, A.N.Goncharov, A.V.Taichenachev, A.M.Tumaikin, V.I.Yudin, A.M.Shilov, K.S.Tabatchikova, *Inst. of Laser Phys., Russia, Novosibirsk State Technical Univ., Russia, Novosibirsk State Univ., Russia.* Theoretical analysis of laser cooling of ^{24}Mg atoms using 3^3P_2 -> 3^3D_3 transition out of limits of slow atoms approximation and for arbitrary field intensity is presented. The temperature as low as several microkelvins can be achieved.

IWR7
Advanced LIGO imbalanced scheme, N.A.Vostrosablin, S.P.Vyatchanin, *Lomonosov Moscow State Univ., Russia.* Laser interferometer gravitational-wave observatory (LIGO) is designed to detect gravitational waves and to become a tool in the study of their sources. We consider a DC readout scheme which will be applied in Advanced LIGO. We analyze such scheme in terms of quantum noise and we calculate its spectral density.

IWR8
Adaptive quantum measurement in gravitational-wave detectors, M.Korobko, O.Kiriukhin, *Lomonosov Moscow State Univ., Russia.* Second-generation gravitational-wave detectors will be quantum noise limited. We introduce an original method of overcoming of this limit, called Standard Quantum Limit (SQL). Our method – adaptive quantum measurements – allows to overcome SQL without significant modification of experimental scheme.

IWR9
Collimation of thulium atomic beam by two-dimensional optical molasses, E.Kalganova, D.Sukachev, G.Vishnyakova, A.Sokolov, N.Kolachevsky, V. Sorokin, *P.N.Lebedev Physical Inst., Russia.* We have increased the number of laser cooled and trapped thulium atoms in a magneto-optical trap (MOT) by a factor of 3 using a two-dimensional optical molasses which collimates an atomic beam before a Zeeman slower. Also we have devised a semiconductor laser amplifier operating at 410.6 nm to form laser beams for optical molasses.

IWR10
Methods of approximation of whispering gallery modes eigenfrequencies in rotational bodies, Y.A.Demchenko, *Lomonosov Moscow State Univ., Russia.* This work is devoted to approximate calculation of eigenfrequencys of WGM in bodies of revolution. Calculations were performed for toroidal cavity and strongly oblate spheroidal cavity. Also approximation have been refined for dielectric cavity.

IWR11
Thermal shifts and broadening of energy levels in the group II ions, V.V.Chernushkin, I.L.Glukhov, S.N.Mokhnenko, E.A.Nikitina, V.D. Ovsiannikov, *Voronezh State Univ., Russia.* Asymptotic polynomial extrapolation formulas, derived on the basis of calculations in the Fues model potential approach, are presented for natural widths and blackbody-radiation-induced shifts and broadening of energy levels in Be^+, Mg^+ and Ca^+ ions.

IWR12
Back action exclusion and mechanical squeezing detection in resolved sideband regime, A.A.Demchenko, S.P.Vyatchanin, *Lomonosov Moscow State Univ., Russia.* We explore the physics of continuous measurement in an optomechanical system based on a Fabri-Perot resonator with one movable mirror and feed-back. It is shown that in resolved sideband limit a) the back action fluctuations may be excluded, b) mechanical squeezing produced by parametric excitation may be detected.

IWR13
Theory of superfluidity and drag force in the one-dimensional Bose gas, A.Yu.Cherny, *Joint Inst. for Nuclear Research, Russia,* J.-S.Caux, *Univ. of Amsterdam, The Netherlands,* J.Brand, *Massey Univ., New Zealand.* The one-dimensional Bose gas is an unusual superfluid. In contrast to higher spatial dimensions, the existence of non-classical rotational inertia is not directly linked to the dissipationless motion of infinitesimal impurities. Recently, experimental tests with ultracold atoms have begun and quantitative predictions for the drag force experienced by moving obstacles have become available. This topical review discusses the drag force obtained from linear response theory in relation to Landau's criterion of superfluidity. Based upon improved analytical and numerical understanding of the dynamical structure factor, results for different obstacle potentials are obtained, including single impurities, optical lattices and random potentials generated from speckle patterns. The dynamical breakdown of superfluidity in random potentials is discussed in relation to Anderson localization and the predicted superfluid–insulator transition in these systems.

IWR14
Squeezing of optomechanical modes in detuned Fabry-Perot interferometer, A.A.Rakhubovsky, S.P.Vyatchanin, *Lomonosov Moscow State Univ., Russia.* Analysis of optomechanical system formed by moveable mirror of Fabry-Perot cavity pumped by detuned laser is carried out. Possibility of squeezing of optomechanical modes created by optical spring via modulation of pumping power is shown.

IWR15
Steady state of atoms in a standing wave: quantum description and localization effects, R.Y.Ilenkov, D.V.Brazhnikov, A.V.Taichenachev, V.I.Yudin, *Inst. of Laser Phys., Russia.* Scientific task is investigation of two-level atoms laser cooling. For this purpose we developed an exact quantum calculation method with taking into full account recoil effects. A new effect of anomalous localization of atoms in a strong laser field was discovered.

IWR16
Elimination of nonlinear effects on clock frequency in a lattice with a blue magic wavelength, V.D.Ovsiannikov, *Voronezh State Univ., Russia,* V.G.Pal'chikov, *Inst. of Metrology for Time and Space at Natl Res. Inst. for Physical, Technical and Radiotechnical Measurements, Russia,* A.V.Taichenachev, V.I.Yudin, *Inst. of Laser Phys., Russia, Novosibirsk State Univ., Russia.* Nonlinear shift of clock levels disappears in a repulsive lattice. Uncertainties caused by multipole and hyperpolarizability contributions into linear shift of clock frequency are determined numerically for Sr lattice with a blue magic wavelength 389.889 nm.

IWR17
Static polarizability measurements of the 5D level in Rubidium-87, A.A.Golovizin, S.A.Snigirev, A.V.Akimov, N.N.Kolachevsky, V.N.Sorokin, *P.N.Lebedev Physical Inst, Russia.* We performed a sensitive measurements of static polarizability of the $5D_{5/2}$ and $5D_{3/2}$ fine structure levels in laser-cooled Rb-87 atoms placed in static electric field of a few kV/cm. 5D level was excited either by cascade excitation from the ground state or by Stimulated Raman Adiabatic Passage. Preliminary results are discussed.

IWR18
Atomic ratchet driven by the weak perturbation with broadband spectrum, D.V.Makarov, L.E.Kon'kov, *V.I.Il'ichev Pacific Oceanological Inst., Russia.* We present a scheme of atomic ratchet in a deep optical lattice perturbed by two additional low-amplitude lattices whose amplitudes are subjected to almost-periodic modulation with impact of randomness. This scheme provides activation of the net current even if the initial atomic ensemble is localized near the minima of the optical potential.

IWR19
Bernstein's paradox in multiqubit states, A.V.Belinsky, A.S.Chirkin, *Lomonosov Moscow State Univ., Russia.* An implementation of an analog of classical Bernstein's paradox on discrete quantum variables is discussed. In the case of three variables, this paradox consists in that the pair independence of events does not imply their mutual independence.

IWR20
Four-mode entangled quantum states in coupled intracavity optical parametric processes, M.S.Gevorgyan, A.S.Chirkin, *Lomonosov Moscow State Univ., Russia.* Quantum theory of laser generation, nondegenerate parametric down-conversion and up-conversion occurring simultaneously in active nonlinear crystals with aperiodic domain structure is presented. Entanglement of the quadrature Fourier components of generated frequencies is studied.

IWR21
Nonthreshold single-qubit laser, T.B.Karlovich, S.Ya.Kilin, *B.I.Stepanov Inst. of Phys. NASB, Belarus.* Two definitions of microlaser threshold on the basis of P- and Q-distribution functions are presented. The conditions of nonthreshold generation of a one-cubit laser are obtained. The influence of the dephasing on P-distribution is considered.

IWS • 18:30-20:00
Nano-Optics and Plasmonics (ICONO-06): Posters

IWS1
The investigation of specters of Kalium-Alumina-Borate glass with nanocrystalls of CuCl, P.S.Shirshnev, A.N.Babkina, N.V.Nikonorov, A.I.Sidorov, V.A.Tsekhomski, T.A.Shakverdov, *St.-Petersburg Natl Res. Univ. of Inform. Technologies, Mechanics and Optics, Russia.* It is shown that the luminescence in initial potassium-aluminum borate glasses is due to the presence of molecular clusters Cu_n (n < 10) in them. Chemical reactions during heat treatment lead to the formation of Cu_nCl_x and Cu_nO_x clusters with luminescence bands lying in the spectral range of 450–600 nm.

IWS2
Lifetime of two-dimensional excitons in ZnO quantum wells, A.A.Lotin, D.A.Zuev, O.A.Novodvorsky, O.D.Khramova, *Inst. on Laser and Information Technologies, Russia.* Two series of $Mg_xZn_{1-x}O$/ZnO multiple quantum wells with 18 at.% and 27 at.% of magnesium content in barrier layers and well width L_w from 1 nm to 20 nm have been grown by pulsed laser deposition method. The stimulated emission is observed in photoluminescence spectra excited by pulsed laser (λ_{exc}=248 nm). The pump density threshold of stimulated emission nonmonotonously depends on the well width that is associated with an increase of the internal quantum efficiency of two-dimensional structures caused by a reduction of radiative lifetime of excitons at decreasing of the well width as it has been shown by the time-resolved photoluminescence spectra analysis. The minimum value of a radiative lifetime τ_r=355 ps was obtained for the $Mg_{0.27}Zn_{0.73}O$/ZnO MQW with the well width L_w=2.6 nm.

IWS3
Dynamics of an exciton-polariton parametric oscillator, P.I.Khadzhi, *Inst. of App. Phys., Moldova,* O.F.Vasilieva, *Dniestr State Univ., Moldova.* The dynamics of parametric oscillations of polaritons in a microcavity due to periodic conversion of pair of pump polaritons into polaritons of signal and idler modes and vice versa is studied. The period and amplitude of oscillations depend on the initial polariton densities and on the initial phase difference.

IWS4
The dependence of optical properties of GaN epitaxial layers on doping level of Si, E.V.Borisov, V.F.Agekian , A.Yu.Serov, *St.-Petersburg State Univ., Russia.* The dependence of optical properties of GaN epitaxial layers on doping level of Si was investigated by Raman scattering and low-temperature photoluminescence. The overlap-ping of the impurity band with the conduction band was clearly manifested.

IWS5
Surface-plasmon-polariton modes in sub-wavelength microdisk cavities, A.V.Naumenko, N.A.Loiko, V.V.Kabanov, *B.I.Stepanov Inst. of Phys., Belarus.* Characteristics of surface-plasmon-polariton whispering-gallery eigenmodes in metal-caped microdisk cavities are analyzed by numerical and analytical approaches. Response of the cavity with linear or nonlinear mediums on an optical-frequency modulation/injection signal is investigated.

IWS6
Luminescence properties of nanocrystalline YAG:Eu^{3+}, I.Kolesnikov, D.Tolstikova, *St.-Petersburg State Univ., Russia,* M.Mikhailov, *St.-Petersburg State Polytechnical Univ., Russia.* Structural characterizations of nanopowders YAG:Eu^{3+} annealed at different temperatures were measured by XRD, SEM, Raman spectroscopy. The photoluminescence excitation and emission spectra, the fluorescence decay curves, the dependence of luminescence intensity on doping level were investigated.

IWS7
Laser-induced modification of refractive index in bulk $(Li_2O)_x$-$(P_2O_5)_{1-x}$ glasses, A.Kireev, I.Sokolov, A.Manshina, A.Povolotskiy, *St.-Petersburg State Univ., Russia.* Femtosecond laser-induced modification of refractive index in the bulk $(Li_2O)_x$-$(P_2O_5)_{1-x}$ glasses was investigated. Elemental composition and structure of the glasses have been studied with Raman spectroscopy and EDX analysis to explain the observed refractive index variation.

IWS8
Influence of band-to-band transition on light-controlled self-assembly of semiconductor nanoparticles, V.V.Slabko, E.A.Slyusareva, A.S.Aleksandrovsky, A.S.Tsipotan, A.A.Glushkov, *Siberian Federal Univ., Russia.* The possibility of light-controllable formation of nanostructures by the frequency and polarization of the light containing resonant semiconductor nanoparticles is considered. Influence of the band-to-band transition in dipole-dipole approximation was taken into account.

IWS9
Modification of the photon-number statistics in the resonance fluorescence from a two-level-atom in the vicinity of a silver nanosphere, V.M.Pastukhov, Yu.V.Vladimirova, V.N. Zadkov, *Lomonosov Moscow State Univ., Russia.* Modification of the photon number statistics in the resonance fluorescence from a two-level atom in the vicinity of a silver nanosphere that are driven by a near-resonant laser beam with a finite bandwidth is studied in detail. It is shown that the photon-number-statistics depends on several key parameters: the radius of the nanosphere, the atom's location around the nanoantenna, intensity of the laser field, its bandwidth and detuning.

IW10
Compression of XUV and x-ray beams reflected by nanograting at the edge of plasmon resonances, A.V.Andreev, V.A.Drynkin, A.A.Konovko, *Lomonosov Moscow State Univ., Russia.* The compression of x-ray beam under condition of reflection from nanograting at the edge of plasmon resonance is studied with respect to its dependence on the values of structural parameters of the grating.

IWS11
Tuning focusing spot of plasmonic nanolenses by linear polarization, S.Cao, W.Yu, C.Wang, X.Wei, Z.Lu, *Changchun Inst. of Optics, Fine Mechanics and Phys., China,* Y.Fu, *Univ. of Electronic Sci. and Technology of China, China,* J.Du, *Sichuan Univ., China.* Focusing effect of periodic elliptical ring nanolenses is studied. It is found the spot shape can be tuned by varying short axis to long axis ratio and there exists a good linear relationship.

IWS12
Luminescent properties of molecular clusters S_n and $(CdS)_n$ (n < 5) in fluorophosphate glasses, V.I.Egorov, E.V.Kolobkova, D.S.Kukushkin, N.V.Nikonorov, T.A.Shakhverdov, A.I.Sidorov, *St.-Petersburg Natl Res. Univ. of Inform. Technologies, Mechanics and Optics, Russia.* The investigation of luminescence and excitation spectra of glasses containing S and Cd is presented. Before the formation of CdS QD by heat treatment, S and Cd exist in the form of luminescent molecular clusters.

IWS13
Semiclassical model for the analysis of the nanolaser linewidth, M.Yu.Saygin, A.S.Chirkin, *Lomonosov Moscow State Univ., Russia,* A.V.Chipouline, *Friedrich-Schiller-Univ. Jena, Germany.* We study the dynamics of the plasmonic nanolaser by a semiclassical model, based upon accurate estimation of the effective parameters, that takes into account the interaction geometry of the nanolaser.

IWS14
Optodynamical and photochromic effects in composite media with aggregates of plasmon nanoparticles in pulsed laser fields, A.E.Ershov, S.V.Karpov, P.N.Semina, *L.V.Kirensky Inst. of Phys., Russia,* A.P.Gavrilyuk, *Inst. of Computational Modeling, Russia.* We propose the optodynamical model of interaction of pulsed laser radiation with aggregates of polydisperse spherical metallic nanoparticles in different matrices that explains experimental results on photomodification of such plasmon nanostructures. The model demonstrates change of spectral properties of aggregates due to light induced interparticle shifts and melting of particles in resonant domains.

IWS15
Photoluminescence and absorption enhancement of organic thin films in the near fields of plasmonic metal nanoparticles, T.A.Vartanyan, N.A.Toropov, A.A.Starovoytov, N.B.Leonov, V.V.Zakharov, *St.-Petersburg Natl Res. Univ. of Inform. Technologies, Mechanics, and Optics, Russia.* The influence of Ag nanoparticles on the optical properties of organic films was studied. It was found that nanoparticles contribute to the formation of J-aggregates. An increase of absorption and fluorescence of films was obtained.

IWS16
Optical properties of Au and Ag nanoparticles produced by PLD, E.A.Cherebilo, A.A.Lotin, D.A.Zuev, A.V.Shorokhova, O.A. Novodvorsky, O.D.Khramova, *Inst. on Laser and Information Technologies, Russia.* The present work reports the experimental results on the fabrication and investigation of optical properties of the Au and Ag nanoparticles produced by pulsed laser deposition on *p*-Si (100) and sapphire (00.1) substrates.

IWS17
Coupling effects in plasmonic nanorod dimers, A.T.Le, M.R.Shcherbakov, A.A.Fedyanin, *Lomonosov Moscow State Univ., Russia,* N.Dubrovina, A.T.Lupu, *Univ. Paris-Sud, France.* A systematic study of coupling effects in gold nanorod dimers is performed by determining localized surface plasmon resonance position as a function of both nanorod length and distance between them.

IWS18
Shape characterization of silver nanoparticles synthesized inside pores of nanoporous glass via plasmonic absorption band, V.G.Arakcheev, A.N.Bekin, V.B.Morozov, N.V.Minaev, A.O.Rybaltovskii, Yu.V.Vladimirova, *Lomonosov Moscow State Univ., Russia.* A metal-dielectric composite was produced via the synthesis of silver nanoparticles inside the pores of nanoporous glass. The shape characterization of the nanoparticles was performed by modeling of the measured absorption spectrum.

IWS19
Spectral diffusion as a reason of fluorescence blinking of single quantum emitters, S.V.Orlov, A.V.Naumov, Yu.G.Vainer, *Inst. for Spectroscopy, Russia,* L.Kador, *Univ. of Bayreuth, Germany.* We present the technique for studying of fluorescence intermittency of quantum objects which allows to keep the spectral information and recognize various intermittency mechanisms. One of the most important reasons of blinking is spectral diffusion.

IWS20
Optical properties of core-shell gold-material nanoparticles, L.Astafyeva, *B.I.Stepanov Inst. of Phys., Belarus,* V.K.Pustovalov, *Belarusian Natl Technical Univ., Belarus.* Modelling of nonlinear dependences of optical properties of sphericaL two-layered gold core and some material shell nanoparticles placed in water on parameters of core and shell was carried out.

IWS21
Modification of two-level atom resonance fluorescence near a metal nanospheroid, Eu.D.Chubchev, Yu.V.Vladimirova, V.N.Zadkov, *Lomonosov Moscow State Univ., Russia.* We analyze theoretically modification of the resonance fluorescence spectrum of a two-level atom driven by a monochromatic field near the plasmonic nanostructure, which we consider to be for simplicity a metallic nanospheroid, as a function of the parameters of the nanospheroid (its size and permittivity), polarization of the incident radiation, and the atom's location around the nanospheroid.

IWS22
A hybrid plasmonic waveguide for nonreciprocal Bloch oscillations, M.S.Mayorova, V.I.Belotelov, *Lomonosov Moscow State Univ., Russia,* S.N.Andreev, *A.M.Prokhorov General Phys. Inst., Russia,* V.P.Tarakanov, *United Inst. of High Temperatures, Russia,* M.Levy, *Michigan Technological Univ., USA.* Effect of magnetooptical nonreciprocity in a hybrid metal-dielectric waveguide is shown to be larger than the one for the all-dielectric waveguides. This makes plasmonic waveguides very appealing for the implementation of magnetic-field-controlled optical Bloch oscillations.

IWS23
Single molecule spectroscopy of nanoassemblies based on CdSe/ZnS semiconductor quantum dots and dyes, E.Zenkevich, D.Kowerko, *Natl Technical Univ. of Belarus, Belarus,* C.von Borczyskowski, *Chemnitz Univ. of Technology, Germany.* Based on laser spectroscopy of single nanoobjects, formation principles as well as mechanisms of exciton relaxation processes have been analyzed for amine-capped semiconductor CdSe/ZnS quantum dots with surface attached functionalized dye molecules (perylene-diimides).

IWS24
Control over the light propagation by means of the Pendellösung effect in 1D porous quartz photonic crystal, V.B.Novikov, S.E.Svyakhovskiy, A.A.Skorynin, V.A.Bushuev, B.I.Mantsyzov, A.I.Maydykovskiy, T.V.Murzina, *Lomonosov Moscow State Univ., Russia.* A periodic energy exchange between the transmitted and diffracted waves in 1D linear photonic crystal (PC) at the Laue diffraction scheme is observed as the probe wavelength or the PC thickness are varied.

IWS25
Relaxation dynamics of electronic excitations of nanocomposites based on high siliceous glass doped with reduced metal nanoparticles, S.A.Tikhomirov, O.V.Buganov, A.N.Ponyavina, *B.I.Stepanov Inst. of Phys., Belarus,* A.A.Alexeenko, *P.O.Sukhoi State Technical Univ. of Gomel, Belarus.* Electron extinction dynamics at siliceous glasses doped with Cu nanoparticles were studied by methods of the femtosecond time-resolved spectroscopy. Intensity depended effects of the reverse splitting of the surface plasmon absorption resonance and an oscillation character of induced density kinetics were revealed and analyzed.

IWS26
Competing and coexisting nonlinear optical processes responsible for two types self-diffraction of laser beams in the colloidal CdSe/ZnS quantum dots, V.Dneprovskii, M.Kozlova, A.Smirnov, *Lomonosov Moscow State Univ., Russia.* Self-diffraction of two types has been discovered in the case of resonant excitation of excitons in CdSe/ZnS quantum dots (highly absorbing colloidal solution) by picosecond laser beams: at the induced circular aperture; at the induced transient diffraction grating. The physical processes responsible for the observed self-action effects are discussed.

IWS27
Physical mechanism of the photoconductivity of silver nanoparticle ensembles on transparent dielectric substrates, E.V.Vashchenko, T.A.Vartanyan, *St.-Petersburg Natl Res. Univ. of Inform. Technology, Mechanics and Optics, Russia,* F.Hubenthal, *Univ. Kassel, Germany.* Dark conductivity and photoconductivity of silver nanoparticle ensembles (SNEs) on transparent dielectric substrates have been investigated. The substrates play a major role for the dark conductivity as well as in the photoconductivity of the SNEs.

IWS28
High sensitivity gas detection using a reflection of light at the glass-photonic crystal interface, A.S.Kuchyanov, A.I.Plekhanov, P.A.Chubakov, *Inst. of Automation and Electrometry, Russia,* H.Spisser, *Inst. D'Optique, France.* The asymmetric deformation of the silica photonic crystal as a change in the slope of the crystal planes at its filling analyte was we discovered and studied. This effect enabled to create a high-speed and high-sensitivity gas sensors.

IWS29
Electron structure and optical properties of gold nanoparticles, V.G.Yarzhemsky, *N.S. Kurnakov Inst. of General and Inorganic Chemistry, Russia,* M.A.Kazaryan, *P.N.Lebedev Physical Inst., Russia.* The partial density of states of gold nanoparticles were calculated be DFT method. Optical transtions are considered in dipole and quadruple approximations. The connection of theoretical structure with generation of spaser based on gold nanoparticles is discussed.

IWS30
Optical near-field mapping of metallic subwavelength rectangular apertures, M.I.Sharipova, M.I.Dobynde, A.A.Fedyanin, *Lomonosov Moscow State Univ., Russia,* N.Janunts, A.Chipouline, T.Pertsch, *Friedrich-Schiller-Univ. Jena, Germany.* Near-field phase and amplitude distribution of surface plasmon polaritons generated by rectangular subwavelength metallic aperture is mapped. A pseudo-heterodyne detection based scattering type scanning near- field optical microscope is applied for these measurements.

IWV • 18:30-20:00

Physics of Metamaterial and Complex Media (ICONO-07): Posters

IWV1

A new negative refraction index metamaterial proposed, H.C.Chan, S.Sun, G.Y.Guo, *Natl Taiwan Univ., Taiwan.* We propose a new metamaterial system that possesses both negative effective permittivity ε_{eff} and negative effective permeability μ_{eff} in the near-infrared (NIR) region, and demonstrate that such system exhibits negative index of refraction with a broad working band.

IWV2

Optical transmittance of bismuth ferrite thin films, V.B.Shirokov, Yu.I.Golovko, V.M.Mukhortov, *Southern Scientific Center RAS, Russia.* Transmission of $BiFeO_3$ single-crystal films deposited onto single-crystal MgO substrate in the wavelength range 200-1100 nm is investigated. The spectra were processed using the dispersion formula for the dielectric constant as the sum of the oscillator with the relaxation that has allowed allocating direct and indirect transitions. The absorption edge of the films with thickness of 14 and 60 nm was estimated as 2.81 and 2.78 eV respectively for direct transitions.

IWV3

Nonlinear quasisurface waves in symmetric three-layer structure with left-handed film, O.V.Korovai, P.I.Khadzhi, A.V.Corovai, *T.G. Shevchenko Pridnestrovian State Univ., Moldova, Inst. of App. Phys., Moldova*. We study the theory of the nonlinear s-polarized quasisurface waves, propagating along the plane interface of symmetric three-layer structure with linear left-handed film, embedded in infinite nonlinear semiconductor. The dispersion laws are obtained and investigated.

IWV4

Electromagnetic wave propagation through a monolayer of discrete scatterers: first principles analysis, S.Moiseev, *Ulyanovsk State Univ., Russia, Kotel'nikov Inst. of Radio Engineering and Electronics, Russia.* Dependence of the transparency and reflection of a monolayer formed by electric dipoles on the structure parameters is analyzed in detail. It follows from the low of energy conservation that absorption coefficient of monolayer is limited to 1/2.

IWV5

Hybrid states of surface and Tamm plasmon-polaritons in photonic crystals, B.I.Afinogenov, V.O.Bessonov, I.V.Soboleva, A.A.Fedyanin, *Lomonosov Moscow State Univ., Russia.* Experimental observation of Tamm plasmon-polariton (TPP) and surface plasmon-polariton (SPP) hybrid mode in metal/photonic crystal system is reported. Interaction between TPP and SPP leads to repulsion of their dispersion curves.

IWV6

Pulse Fourier spectroscopy of metafilms in THz range, Yu.E.Terekhov, G.V.Belokopytov, *Lomonosov Moscow State Univ., Russia,* M.K.Khodzitsky, *St.-Petersburg Natl Res. Univ. of Inform. Technologies, Mechanics and Optics, Russia.* Dimensional dependences of resonance modes parameters of planar arrays of copper split-ring resonators on dielectric substrate has been studied experimentally using time-domain spectroscopy and numerically via finite-element simulations. Shift of resonances in transmittance spectra is obtained.

IWV7

Space-selective laser-induced modification of phosphate glass containing gold nanoparticles, S.V.Lotarev, A.S.Lipatiev, V.I.Savinkov, G.Yu.Shakhgildyan, V.N.Sigaev, *D.I.Mendeleyev Univ. of Chemical Technology of Russia, Russia,* A.Paleari, *Univ. of Milano-Bicocca, Italy.* An impact of femtosecond Yb amplifier on Au-doped phosphate glass is studied for different irradiation conditions. Formation of color centers, peripheric Au nanoparticles growth and their dissolution directly under the beam exposure are discussed.

IWV8

Laser deposition of metallic particles from colloid systems, A.A.Antipov, S.M.Arakelian, S.V.Kutrovskaya, A.O.Kucherik, A.A.Makarov, *Vladimir State Univ., Russia.* Research of the process of shaping and depositing nanoparticles from colloid systems on the substrate surface under the local pulse laser action has been carried out.

IWV9

Modeling of absorption of electromagnetic wave by periodically distributed spherical conductive microparticles, A.P.Anzulevich, L.N.But'ko, I.V.Bychkov, V.D.Buchelnikov, *Chelyabinsk State Univ., Russia,* S.G.Moiseev, *Kotel'nikov Inst. of Radio Engineering and Electronics, Ulyanovsk Branch, Russia.* Dependences of absorption and power loss density of microwaves in the periodically distributed sphereical conductive microparticles on the frequency of the incident radiation and size of the particles are obtained and investigated. Absorption is increasing at decreasing of the size of particles.

IWV10

Effective dynamic permittivity and permeability of composite media and metamaterials, L.N.But'ko, A.P.Anzulevich, I.V.Bychkov, V.D. Buchelnikov, *Chelyabinsk State Univ., Russia,* S.G.Moiseev, *Kotel'nikov Inst. of Radio Engineering and Electronics, Ulyanovsk Branch, Russia.* Direct numerical finite element method (FEM) for solving differential equations of Maxwell determined the effective permittivity and permeability of the composite medium as orderly arranged conductive spherical particles and long cylinders. Shows the dependence of the effective permeability of the frequency of the alternating electromagnetic field, dielectric and magnetic parameters, conductivity, geometry and concentrations of the individual components.

IWV11

The propagation of electromagnetic waves in slab waveguide of indefinite-index metamaterials, N.M.Moiseeva, *Volgograd State Univ., Russia.* The propagation terms in slab waveguide made of indefinite- index materials are considered. The longitudinal permittivity is negative while the transverse permittivity is positive. The dispersion equation for the waveguide of indefinite- index materials solved graphically.

IWV12

Antireflection structure with monolayer of metal nanoparticles, S.G.Moiseev, *Ulyanovsk State Univ., Russia, Kotel'nikov Inst. of Radio Engineering and Electronics, Ulyanovsk Branch, Russia,* A.P.Anzulevich, L.N.But'ko, *Chelyabinsk State Univ., Russia.* A model of a low-reflective coating based on a monolayer of metal nanoparticles embedded in a host dielectric medium is proposed. Optical properties of the composite structure are calculated for two forms of nanoparticles.

IWV13

Mechanisms of the photoelastic effect in 2-D photonic crystals, Z.A.Pyatakova, *Gubkin Russian State Univ. of Oil and Gas, Russia*. The paper gives a simple model of mechanisms for tuning photonic crystal parameters by incident acoustic wave: photoelastic effect in the components, strain, deformation of the inclusions. The relative contribution of each mechanism is estimated.

IWT • 18:30-20:00

Ultrafast Phenomena and High-Precision Measurements (ICONO-08): Posters

IWT1

Coherent population trapping resonances on lower levels of atomic Λ-systems, E.Şahin, R.Hamid, M.Çelik, *Natl Metrology Inst. of Turkey, Turkey,* G.Özen, *Istanbul Technical Univ., Turkey,* A.Ch.Izmailov, *Inst. of Phys., ANAS, Azerbaijan.* We detected and analyzed coherent population trapping resonances induced in absorption of the probe light beam by the counter-propagating two-frequency pumping radiation in the rarefied cesium vapor. Such narrow high-contrast resonances may be used in ultrahigh resolution atomic spectroscopy, frequency standards and magnetometers.

IWT2

Laser system for second stage cooling of Sr atoms, K.Yu.Khabarova, S.N.Slyusarev, S.A.Strelkin, G.S.Belotelov, A.S.Kostin, V.G.Pal'chikov, *FSUE VNIIFTRI, Russia, N.N.Kolachevsky, P.N.Lebedev Physical Inst., Russia.* We report on a narrow line width laser system at 689 nm for the second stage laser cooling of ^{87}Sr atoms. Ultracold ^{87}Sr atoms loaded into an optical lattice will be used in an optical frequency clock which is under development at VNIIFTRI as a part of GLONASS program.

IWT3

Pulsed nanolocal photodesorption of molecular ions, S.A.Aseyev, B.N.Mironov, A.P.Cherkun, S.V.Chekalin, *Inst. for Spectroscopy, Russia.* Study of the molecular complexes at a surface with a high spatial resolution and high elemental (chemical) sensitivity is a rather impressive problem. Here we describe our approaches which potentially allow resolve this goal.

IWT4

Coherent phonon generation in a bulk of fluorine-containing crystals by tightly focused femtosecond laser radiation under plasma formation, E.I.Mareev, F.V.Potemkin, A.A.Podshivalov, *Lomonosov Moscow State Univ., Russia.* We observed a 15 ps time delay of the significant increase in the phonon wave amplitude in BaF_2, the energy transfer between many phonon modes in LiF and phonons dynamics in CaF_2.

IWT5

Interaction of femtosecond laser radiation with Van der Waals molecular clusters, D.G.Poydashev, *Moscow Inst. of Phys. and Technology, Russia,* V.N.Lokhman, N.-D.D.Ogurok, V.M.Apatin, E.A.Ryabov, *Inst. for Spectroscopy, Russia.* The results of the studies on interaction of molecular clusters with femtosecond laser radiation are presented. Multiphoton ionization of molecular and cluster beams as well as the dynamics of laser induced intracluster photochemical reactions are studied.

IWT6

Light modulation properties of thin layer of dense resonant medium, V.I.Borisov, E.V.Timoshchenko, V.A.Yurevich, Yu.V.Yurevich, *Mogilev State Univ. of Food Technologies, Belarus.* Results of the computing modelling of thin film resonant reflection and pulse superradiation transformation for conditions of excitation by an external femtosecond light pulse are discussed.

IWT7

Low uncertainty determined by modern approach for high precision optoelectronic phase noise measurements, E.Pavlyuchenko, P.Salzenstein, *CNRS, FEMTO-ST, France.* Uncertainty on phase noise is calculated by modern approach for an optoelectronic measurement system. The final global uncertainty on the spectral density of phase noise determined by this method is lower than 2 dB.

IWT8

Nonlinear absorption of radiation pulses under the two-photon resonance in solids in the conditions of femtosecond pump-probe spectroscopy, E.Yu.Perlin, E.G.Idrisov, *St.-Petersburg Natl Res. Univ. of Inform. Technologies, Mechanics, and Optics, Russia.* The interaction of two successive short pulses (femtosecond pump-probe spectroscopy) with bulk crystals and low-dimensional structures under the conditions of two-photon resonance at interband transitions and transitions between size-quantized subbands is studied.

IWT9

Femtosecond photoinduced absorption dynamics in biocompatible composite photoluminescence silicon quantum dots, V.O.Kompanets, S.V.Chekalin, *Inst. for Spectroscopy, Russia,* S.G.Dorofeev, G.V.Fetisov, *Lomonosov Moscow State Univ., Russia,* N.N.Kononov, *A.M.Prokhorov General Phys. Inst., Russia,* A.A.Ischenko, *Lomonosov Moscow State Univ. of Fine Chemical Technologies, Russia.* Ultrafast excitation relaxation dynamic in a series of hydrophobic and hydrophilic Silicon quantum dots were studied. The mean sizes of particles and their size distribution density function were derived from SAXS and XRD experiments and compared with HRTEM images and values calculated by the quantum limit model in accordance with the experimental optical absorption gap values. It is observed that the significant difference of relaxation processes in the samples with different geometry is determined also by surface states peculiarities.

IWT10

Multiple-pulse femtosecond selective laser spectroscopy molecular motions in liquids, A.G.Shmelev, V.G.Nikiforov, A.V.Leontiev, G.M.Safiullin, V.S.Lobkov, *Zavoisky Physical-Technical Inst., Russia.* A train of two 35fs pulses was used for selective suppression or enhancement of the vibrational modes in net liquid carbon tetrachloride CCl_4 and orthodichlorobenzene $C_6H_4Cl_2$. The control parameters were time delay between pulses, relative intensity and polarization state of the pulses.

IWT11

Optical frequency standard based on the coherent population trapping resonance, E.V.Baklanov, S.N.Bagayev, A.K.Dmitriev, A.V.Taichenachev, V.I.Yudin, *Inst. of Laser*

Phys., Russia, Novosibirsk State Univ., Russia, Novosibirsk State Technical Univ., Russia. We propose an optical frequency standard, which uses as a reference the coherent population trapping resonance. This frequency standard is based on a self-mode-locked laser with the frequency of pulse repetition directly locked to the hyperfine splitting of ^{133}Cs. An important feature of the proposed standard consists in the absence of source of microwave radiation.

IWT12
Time-domain coherent anti-Stokes Raman scattering and statistical mechanics of gaseous medium, S.Yu.Nikitin, *Lomonosov Moscow State Univ., Russia.* While developing theory of time-domain coherent anti-Stokes Raman scattering in gases, we have obtained a number of new equations, related to general statistical mechanics of gaseous medium. One of these equations states a relation between the correlation time of molecular thermal velocity and the mean free run time of a gas molecule.

IWT13
Center of mass movement and width evolution peculiarities for few cycle optical pulses in dispersive media, Yu.A.Kapoyko, S.A.Kozlov, *St.-Petersburg Natl Res. Univ. of Inform. Technologies, Mechanics, and Optics, Russia.* Analytical expressions for center of mass movement and dispersive broadening velocities for single-cycle optical pulses in dispersive medium are derived. For initial Gaussian pulses these expressions are reduced to arithmetical ones. Differences from well-known relations for quasi-monochromatic waves are discovered.

IWT14
Ultrafast below-band-gap laser pulse induced relaxations in CdS crystal, A.V.Leontyev, K.V.Ivanin, V.S.Lobkov, *Zavoisky Physical-Technical Inst., Russia.* We report an experimental study of the intra- and interband transitions in bulk CdS crystal induced by a strong below-band-edge femtosecond laser pulse. An additional peak was observed in spectrally resolved four-wave mixing signal shifted to lower energy and positive time delay.

IWT15
Accuracy control of the inverse problem of a heterodyne microscope by changing the wavelength of the probe beam, I.M.Akhmedzhanov, D.V.Baranov, E.M.Zolotov, *A.M. Prokhorov General Phys. Inst., Russia.* The accuracy of the solution of the inverse problem of differential heterodyne scanning microscope for the characterization of V-shaped plasmon polariton waveguides is analyzed. The algorithm for solving the inverse problem is based on the library search approach for which a database of phase and amplitude responses of a microscope was calculated at TE-polarization.

IWT16
Features of excitation of quantum system by ultra-short nonresonance laser pulses, V.A.Bagan, V.A.Astapenko, *Moscow Inst. of Phys. and Technology, Russia.* The theoretical investigation of characteristic features arising during two-level system (TLS) excitation by short nonresonance laser pulses is held. The treatment is made within the applicability of perturbation approach. Main attention is given to the dependence of total excitation probability of TLS on the pulse duration for different detuning of carrier laser frequency from eigen frequency of TLS.

IWT17
Ultra-narrow and high-contrast electromagnetically induced absorption resonance in presence of buffer gas, D.V.Brazhnikov, A.V.Taichenachev, A.M.Tumaikin, V.I.Yudin, M.Yu.Basalaev, S.M.Ignatovich, *Inst. of Laser Phys., Russia, Novosibirsk State Univ., Russia, Novosibirsk State Technical Univ., Russia.* New method for observing electromagnetically induced absorption in the Hanle configuration is proposed. Theoretical calculations have demonstrated the possibility for observing ultra-narrow and high-contrast resonance by using buffer gas or a cell with anti-relaxation coating.

IWT18
Fiber point diffraction interferometer for measurements of optical fields from external sources, D.E.Silin, I.E.Kozhevatov, *Inst. of App. Phys., Russia.* A modified point diffraction interferometer with a single-mode fiber in the reference arm is presented. The calibration procedure is proposed to obtain phase distortions of the interferometer and subtract them from the measured phase distributions.

IWT19
Femtosecond time-resolved transverse Kerr effect measurements in magnetoplasmonic crystals, A.Yu.Frolov, P.P.Vabishchevich, M.R. Shcherbakov, T.V.Dolgova, A.A.Fedyanin, *Lomonosov Moscow State Univ., Russia.* Experimental technique for observation of femtosecond dynamics of the transverse magneto-optical Kerr effect by measurements of second-order cross-correlation functions is presented.

IWU • 18:30-20:00

Symposium on Organic Photovoltaics (ICONO-10): Posters

IWU1
The investigation of spectroscopy and nonlinear photophysical properties of the organic luminophore and UV-dye-lasers by using the full spectrum of electronic singlet and triplet excited states, A.E.Obukhov, *Natl Res. Univ. "Moscow Power Engineering Inst.", Russia.* In this paper an investigation of the spectral and nonlinear photophysical properties of the multiatomic compounds was carried out with help of the quantum-chemical mechanisms of superfine electron-nuclear interactions in different aggregative states.

IWU2
Luminescent concentrator for solar semiconductor photoconverters, T.N.Nurakhmetov, K.A.Kuterbekov, T.A.Schmedake, A. Zhanbotin, A. Kainarbay, J.M.Salihodja, A.M.Zhunusbekov, S.Pazylbek, K.Bekmyrza, D.Daurenbekov, A.Baitemirova, *L.N.Gumilyov Eurasian Natl Univ., Kazakhstan.* Research of fluorescence spectroscopy and spectrophotometry intrinsic and extrinsic nature of the luminescence, energy transfer of electronic excitation in the emitter of mesoporous silica oxide particles, activated by rare-earth ions Eu^{3+}, Tb^{3+}. In addition, the possibility of using such systems as luminescent converters of solar radiation in the red light was also studied.

IWU3
Optical quenching of photoresponse in copper phthalocyanine based Schottky photodiode, S.V.Yablonskii, S.G.Yudin, V.V.Bodnarchuk, *Inst. of Crystallography, Russia,* E.V.Levin, *P.N.Lebedev Physical Inst., Russia.* Copper phthalocyanine (CuPc)/Aluminum (Al) Schottky diodes were studied in the photodiode mode. The intermediate thin film of 13 Langmuir-Blodgett layers of random copolymer of 70% vinylidene fluoride and 30% trifluoroethylene P(VDF-TrFE) 70:30 was used to prevent migration of Al atoms through CuPc film. It was found that IR photosensitivity of Schottky diode was essentially suppressed by visible light.

IWU4
Photoeffect in nonaqueous lyotropic phases of dipalmitoyl lecithin, S.V.Yablonskii, V.V. Bodnarchuk, *Inst. of Crystallography, Russia.* Photoelectric effect was detected in nonaqueous lamellar lyotropic phases of dipalmitoyl lecithin (DPPC, right enantiomer). A correlation was drawn between the temperature dependence of the photoresponse and phase state of the samples. Biological consequence for membrane functionality was mentioned.

IWU5
Nitrogen rich carbon nitride (CN_x) materials for photovoltaic device applications, J.C. Byers, O.A.Semenikhin, *The Univ. of Western Ontario, Canada,* F.Billon, A.C.Deslouis, A.Pailleret, *CNRS, UPR 15, France, UPMC Univ. Paris VI, France.* The semiconductor properties of nitrogen rich carbon nitride (CNx) thin films prepared using a reactive magnetron sputtering technique were investigated both individually and as composites with organic conjugated polymers for potential photovoltaic applications.

IWU6
Regioselective functionalization of [6,6]-open $C_{60}(CF_2)$ for organic solar cells, V.A.Brotsman, V.A.Ioutsi, V.A.Trukhanov, A.V.Rybalchenko, N.M.Belov, O.M.Nikitin, N.S.Ovchinnikova, T.V. Magdesieva, D.Yu.Paraschuk, A.A.Goryunkov, *Lomonosov Moscow State Univ., Russia.* Novel class of mono-, di- and heterodialkylated [60]fullerene derivatives containing CF_2 bridge were synthesized and characterized by spectral techniques and cyclic voltammetry. Benzyl and pentafluorobenzyl derivatives of [6,6]-open $C_{60}(CF_2)$ were studied in polymer:fullerene solar cells.

IWU7
Comparative study of photovoltaic properties of fulleroproline alkyl ester and related double-caged fullerene derivative, V.A.Brotsman, V.A.Ioutsi, V.A.Trukhanov, M.E.Maksimova, O.M.Nikitin, N.M.Belov, T.V.Magdesieva, D.Yu.Paraschuk, A.A.Goryunkov, *Lomonosov Moscow State Univ., Russia.* Decyl ester of fulleroproline and novel double-caged fullerene n-decyl ester with good solubility have been synthesized, characterized by MALDI MS, UV/VIS, ^1H and ^{13}C NMR spectroscopy, cyclic voltammetry and tested in polymer-fullerene photovoltaic devices.

IWU8
New double donor perylene imides (PMIs) for dye-sensitized solar cells (DSCs) application, A.Skabeev, D.Jänsch, L.Chen, K.Müllen, *Max-Planck-Institut für Polymerforschung, Germany,* Y.Zagranyarski, *Univ. of Sofia, Bulgaria.* Perylene imides (PMIs) and diimides (PDIs) have been applied in many electronic and photonic devices, especially in organic solar cells. The first synthetic route towards solely peri-doubly functionalized PMIs and application in DSCs are presented.

IWU9
Organic polymer p-n heterostructures for photovoltaics, B.M.Rumyantsev, *N.M.Emanuel Inst. of Biochemical Phys., Russia,* V.I.Berendyaev, D.V.Pebalk, *Karpov Inst. of Physical Chemistry, Russia.* For creation of organic optoelectronic devices (photovoltaic, electroluminescent cells etc) the approach turns to be successful using twolayer heterostructures in which there is the contact of two layers with different charge transport and donor-acceptor properties. Their advance is the essential decrease of volume charge carrier recombination rate because the photogeneration occurs on phase interface (p-n interface) while their transport takes place in space-separated p and n-regions.

IWU10
Novel conjugated 4,4'-difluorocyclopentadithiophene-based polymers for organic photovoltaics, F.V.Drozdov, E.N.Myshkovskaya, A.V.Shcherbina, Bakirov, M.Yu.Balakina, S.N.Chvalun, S.A.Ponomarenko, *Inst. of Synthetic Polymeric Materials, Russia,* P.A.Susarova, M.A.Troshin, *Inst. of Problems of Chemical Phys., Russia,* A.Yassar, *École Polytechnique, France.* New four narrow band gap 4,4'-cyclopentadithiophene-based copolymers were synthesized via Suzuki reaction. Copolymers were fully characterized by UV-vis spectroscopy, thermal analysis, X-ray, CVA. Photovoltaic investigations have shown that the copolymers obtained can be used as donor materials in bulk-heterojunction solar cells.

IWU11
Effect of the fullerene component in bulk heterojunction organic solar cells based on the PPV-PPE copolymers, O.A.Mukhacheva, A.E.Goryachev, P.A.Troshin, *Inst. for Problems of Chemical Phys., Russia,* D.A.M. Egbe, N.Serdar Sariciftci, *Johannes Kepler Univ. Linz, Austria.* We report a systematic study of organic bulk heterojunction solar cells based on conjugated PPV-PPE copolymers and various fullerene derivatives. It was demonstrated that molecular structure of the fullerene derivative has a great impact on the morphology of the composites and their photovoltaic performance.

IWU12
Luminescent UV-vis down-converters for organic solar cells, V.A.Trukhanov, M.S.Meleshko, D.Yu.Paraschuk, *Lomonosov Moscow State Univ., Russia,* O.V.Borshchev, F.V.Drozdov, N.S.Surin, S.A.Ponomarenko, *Inst. of Synthetic Polymer Materials, Russia.* Polymer substrates based on highly efficient organosilicon luminophore were developed and used as down-converters for increasing the efficiency of ITO-free low-bandgap polymer solar cells.

IWU13
Properties of new layered MoS_2 intercalated films, O.P.Ivanova, E.P.Krinichnaya, T.S.Zhuravleva, *N.M.Emanuel Inst. of Biochemical Phys., Russia, IBChPh, Russia,* A.S.Golub, N.D.Lenenko, *A.N.Nesmeyanov Inst. of Organoelement Compounds, Russia.* Optical, structural and photoelectrical properties of new layered MoS_2 intercalated films have been researched. The different types of intercalantes were used. It was observed the increase of conductivity (dark and photo) more than one order in films with Ni and Co guests. Also the significant modifications of optical spectra in 500-850 nm range were registered for all intercalated films.

IWU14
Efficiency of organic solar cells as a function of their area, A.I.Nadezhdin, V.V.Bruevich,

D.Yu.Paraschuk, *Lomonosov Moscow State Univ., Russia.* The effect of surface resistance of the transparent electrode on the efficiency of solar cells is studied both numerically and experimentally. As a transparent anode highly conductive PEDOT:PSS was used.

IWU15
Design of indigo-based semiconductor materials for organic electronics, I.V.Klimovich, L.I.Leshanskaya, D.V.Novikov, D.V.Anokhin, P.A.Troshin, *Inst. of Problems of Chemical Phys., Russia.* Here we report the synthesis of a family of functional derivatives of indigo, their characterization and application as organic semiconductor materials for field effect transistors and photovoltaic cells.

IWU16
Novel oligothiophene-based donor-acceptor oligomers for organic photovoltaics, Y.N.Luponosov, S.A.Ponomarenko, *Inst. of Synthetic Polymeric Materials, Russia,* J.Min, T.Ameri, C.J.Brabec, *Friedrich-Alexander-Univ. Erlangen-Nuremberg, Germany.* The synthesis of new oligothiophene-based oligomeric molecules with electron-withdrawing substituents and their properties as well as application as electron donor materials in bulk heterojunction solar cells has been described.

IWU17
A precise method for estimation of the open circuit voltage of bulk heterojunction solar cells, D.V.Novikov, *Inst. of Energy Problems for Chemical Phys., Russia,* A.V.Akkuratov, A.V.Mumyatov, D.K.Susarova, O.A.Muhacheva, E.D.Levchenkova, P.A.Troshin, *Inst. for Problems of Chemical Phys., Russia.* We report a precise method for estimation of the open circuit voltage of bulk heterojunction solar cells based on the cyclic voltammetry measurements performed for the fullerene/polymer composites.

IWU18
Rational design of conjugated polymers for bulk heterojunction organic solar cells, A.A.Akkuratov, D.K.Susarova, D.V.Novikov, E.A.Khakina, O.A.Mukhacheva, P.A.Troshin, *Inst. of Problems of Chemical Phys., Russia.* We report a new strategy for designing of conjugated polymers with advanced electronic properties for application in organic bulk heterojunction solar cells.

IWU19
Synthesis and properties of novel star-shaped triphenylamine-based molecule for organic photovoltaics, A.N.Solodukhin, Y.N.Luponosov, S.A.Ponomarenko, *Inst. of Synthetic Polymeric Materials, Russia,* J.Min, T.Ameri, C.J.Brabec, *Friedrich-Alexander-Univ. Erlangen-Nuremberg, Germany.* The synthesis of new star-shaped triphenylamine-oligothiophene molecule with electron-withdrawing dicyanovinyl substituents and its properties as well as application as electron donor materials in bulk heterojunction solar cells is described.

IWU20
Novel low band gap electron donor material for small-molecule organic solar cells, D.K.Susarova, E.A.Kvashnina, M.V.Maksimova, A.V.Akkuratov, D.V.Novikov, P.A.Troshin, *Inst. of Problems of Chemical Phys., Russia.* A novel alternating oligomer molecule TBTBT ("T" - thiophene, "B" - benzothiadiazole) was designed and applied as photoactive material for vacuum-processed small-molecule planar and bulk heterojunction solar cells.

IWU21
New low band gap conjugated polymers based on fluorinated fused thiophene derivatives for organic solar cells, V.S.Kochurov, D.Yu.Paraschuk, *Lomonosov Moscow State Univ., Russia*, M.L.Keshtov, S.A.Kuklin, A.R.Khokhlov, *A.N.Nesmeyanov Inst. of Organoelement Compounds, Russia,* Y.Geng, *Changchun Inst. of App. Chem., CAS, China.* Two new fluorinated donor/acceptor conjugated copolymers based on fused thiophene derivatives were synthesized by Stille cross-coupling reaction. The polymers synthesis, polymers properties, device structure, and characteristics of photovoltaic devices will be presented.

IWU22
A systematic study of the operational stability of conjugated polymers and organic solar cells made thereof, E.D.Levchenkova, D.K.Susarova, N.P.Piven, S.D.Babenko, P.A.Troshin, *Inst. for Problems of Chemical Phys., Russia.* Operational stability of twelve different conjugated polymers have been investigated using newly developed techniques based on the optical absorption, photoluminescence and electron spin resonance spectroscopy.

IWU23
Light-Induced EPR study of spin-assisted charge transfer in PANI-ES/P3DDT/PCBM composite, V.I.Krinichnyi, E.I.Yudanova, *Inst. of Problems of Chemical Phys., Russia,* B.Wessling, *CEO, BWSI GmbH & Co KG, Germany.* LEPR study of charge carriers photoinitiated in P3DDT/PCBM and PANI/P3DDT/PCBM bulk heterojunctions are described. The main parameters of these charge carriers were shown to be governed by conformation of polymer matrices and exchange interaction of polarons.

LWJ • 18:30-20:00
Solid-State Lasers, Materials, ans Applications (LAT-01): Posters

LWJ1
Thermal effects in side-pumped Nd:YAG slab laser with direct water cooling, A.D.Lyashedko, V.F.Seregin, I.A.Shcherbakov, V.B.Tsvetkov, *A.M.Prokhorov General Phys. Inst., Russia.* Experimental study and computer modeling of temperature distributions and test beam wavefront distortions in side-pumped slab with direct water cooling were made to define maximum output power in this scheme.

LWJ2
Subround-trip scale nonlinear dynamics in a picosecond laser controlled with a combination of positive and negative optoelectronic feedbacks, M.V.Gorbunkov, Yu.Ya.Maslova, V.A.Petukhov, M.A.Semenov, Yu.V.Shabalin, A.V.Vinogradov, *P.N.Lebedev Physical Inst., Russia.* We propose a simple laser system controlled by a combination of inertial positive and negative optoelectronic feedbacks which demonstrates extremely high speed nonlinear dynamics at time scale less than a laser cavity round trip time.

LWJ3
Properties of compound cavity modes of a feedback semiconductor laser with an arbitrary feedback level, Q.Zou, *Inst. Mines-Telecom, Telecom SudParis, UMR 5157 CNRS, France.* We provide additional information about the physical insight into a feedback laser with arbitrary feedback levels, and discuss the similarities and the differences between an iterative travelling-wave model and the Lang and Kobayashi model.

LWJ4
Optical athermal directions in laser host $KGd(WO_4)_2$ and $KLu(WO_4)_2$ crystals under uniform heating, V.V.Filippov, *B.I.Stepanov Inst. of Phys., Belarus.* All athermal propagation directions in laser host $KGd(WO_4)_2$ and $KLu(WO_4)_2$ crystals are found for two configurations (monolithic and laser cavity) at two wavelengths of 633 and 1064 nm. Four branches of solutions exist in $KGd(WO_4)_2$ and one, two or four branches in the $KLu(WO_4)_2$ crystal.

LWJ5
UV laser action in Ce^{3+}:$SrAlF_5$ crystal, A.N.Yunusova, V.V.Semashko, M.A.Marisov, *Kazan Federal Univ., Russia,* G.M.Safiullin, *Zavoisky Physical-Technical Inst., Russia.* UV laser action in Ce^{3+}:$SrAlF_5$ crystal was excited for the first time. The role of multisite activation of $SrAlF_5$ crystals by Ce^{3+} ions and color center formation in these crystals under pumping condition are discussed.

LWJ6
160 W single-frequency laser based on active tapered double-clad fiber amplifier, A.I.Trikshev, A.S.Kurkov, V.B.Tsvetkov, *A.M.Prokhorov General Phys. Inst., Russia,* S.A.Filatova, *Moscow State Univ. of Instrument Engineering and Computer Sci., Russia,* J.Kertulla, V.Filippov, O.G.Okhotnikov, *Tampere Univ. of Technology, Finland,* Yu.K.Chamorovskiy, *Inst. of Radio Engineering and Electronics, Russia.* 160 W single-frequency laser based on two stage fiber amplifiers is presented. A GTWave fiber is used for the first stage and tapered double-clad fiber is used for the second stage of amplifier.

LWJ7
Bistable laser with resonant thin-film reflector, V.I.Borisov, V.A.Yurevich, Yu.V.Yurevich, *Mogilev Univ. of Food Technologies, Belarus.* The possibility of the arising of optical hysteresis in output radiation intensity of solid-state (or injection) laser with the cavity containing a film resonant reflector as the passive Q-modulator is estimated.

LWJ8
Influence of heterovalent impurities on optical properties of SBN crystals, P.A.Lykov, N.V.Bogodaev, L.I.Ivleva, P.G.Zverev, *A.M.Prokhorov General Phys. Inst., Russia.* The dependence of linear dychroism in SBN crystals on the type and concentration of doping ions is measured. The influence of dopant ions (Ce, Co, Cr, Ni) on cubic nonlinearity specifically two-photon absorption and stimulated Raman scattering of SBN crystals is studied.

LWJ9
1.5-Joule Fe:ZnSe laser at 4-µm wavelength, M.P.Frolov, Yu.V.Korostelin, V.I.Kozlovsky, V.V.Mislavskii, Yu.P.Podmar'kov, Ya.K.Skasyrsky, *P.N.Lebedev Physical Inst., Russia,* S.A.Savinova, *Moscow Inst. of Phys. and Technology (State Univ.), Russia.* We report the results of study of pulsed Fe:ZnSe laser operating at 77 K. Pumping with 2.94-µm free-running Er:YAG laser achieved output of 1.47 J at 4.1 µm with 52% absorbed energy slope efficiency.

LWJ10
All-fiber Tm-Ho Q-switched laser, Ya.E.Sadovnikova, *Moscow State Univ. of Instrument Engineering and Computer Sci., Russia,* V.A.Kamynin, A.S.Kurkov, *A.M.Prokhorov General Phys. Inst., Russia,* A.V.Maraculin, L.A.Minashina, *Russian Federal Nuclear Center VNIITF, Russia.* We have suggested and realized passive Q-switched Tm-doped fiber laser with a saturable absorber based on Ho heavily-doped fiber pumped by a Raman laser. The pulse energy was 3 µJ, pulse duration was 600 ns.

LWJ11
Laser generation of sound in semiconductors in the presence of electron drift velocity modulation, V.G.Mikhalevich, V.N.Streltsov, *A.M.Prokhorov General Phys. Inst., Russia.* General expressions for the space-time distribution of the conduction electron density in semiconductors under inhomogeneous laser illumination of the sample and for the time profiling of the electron drift velocity are obtained from the generalized kinetic equation. Generation of sound in an acoustic resonator under these conditions at harmonic modulation of the drift velocity is described.

LWJ12
Improved pulsed ring OPO based on $KTiPO_4$ crystals, U.I.Dashkevich, V.A.Orlovich, G.I.Timofeeva, *B.I.Stepanov Inst. of Phys., Belarus,* A.P.Shkadarevich, *LEMT Scientific and Technical Centre of BelOMO, Belarus.* Reasons limiting energy of a ring three-mirror OPO based on KTP crystals are revealed. It is shown that the performance can be improved by using crystals lengths of which increase along the path of pumping.

LWJ13
Numerical simulation of single-mode lasing of an end-pumped Ho:YAG laser, V.A.Garyutkin, G.M.Mishchenko, V.A.Volkov, *RFNC - VNIIEF, Russia.* Results of numerical modeling of an end-pumped cw Ho:YAG laser on the basis of the solution of the 2D paraxial wave equation are reported. Influence of pump power and pumping beam radius on the laser output parameters is considered. It is shown that the actual cavity modes can considerably differ from the modes of the empty cavity.

LWJ14
Pore collapse dynamics in metal coatings under the action of laser radiation pulses, I.N.Zavestovskaya, M.S.Zolotykh, A.P.Kanavin, *P.N.Lebedev Physical Inst., Russia.* A self-consistent model of the pore collapse under the action of a laser pulse onto the surface in the metal coatings has been developed. The dependence of the pore collapse time on the thermophysical properties of the coating and the intensity and duration of the laser pulse has been determined analytically and numerically.

LWJ15
Demonstration of room-temperature laser action at 5.7 µm from Fe:CdTe Crystal, M.P.Frolov, V.V.Mislavskii, Yu.P.Podmar'kov, *Moscow Inst. of Phys. and Technology (State Univ.), Russia,* Yu.V.Korostelin, V.I.Kozlovsky, Ya.K.Skasyrsky, *P.N.Lebedev Physical Inst., Russia.* Laser action from Fe^{2+}-doped CdTe was demonstrated for the first time. Room-temperature pulsed-laser operation was obtained with a free-running spectrum centered at 5.7 µm. The material seems to be promising for lasing at wavelength exceeding 7 µm.

LWJ16
Nd:GGG thin disk laser operation with separate pumping zones, M.N.Pivkina, G.A.Bufetova, V.F.Seregin, V.B.Tsvetkov, *A.M. Prokhorov General Phys. Inst., Russia.* The output performances of Nd-based thin disk laser are investigated under pulse operation at two separated spots of diode pumping. The shape and behavior of the lasing spots in the near and far zones are investigated.

LWJ17
Lasing and spectroscopy characteristics of various oriented $Tm:Sc_2SiO_5$ crystal, Yu.D.Zavartsev, A.I.Zagumennyi, Yu.L.Kalachev, S.A.Kutovoi, V.A.Mikhaylov, I.A.Shcherbakov, *A.M.Prokhorov General Phys. Inst., Russia.* The $Tm^{3+}:Sc_2SiO_5$ laser crystal was grown and experimentally investigated. Spectroscopy properties of crystal, oriented along *x*- and *y*-crystallographic axis were investigated. Lasing of this crystal at 1.98 μm under the pumping into the absorption line $^3H_6$–$^3F_4$ of Tm^{3+} ions was studied.

LWJ18
Nonlinear refraction and absorption in vanadates crystals at 1064 and 532 nm, A.I.Vodchits, V.A.Orlovich, P.A.Apanasevich, *B.I.Stepanov Inst. of Phys., Belarus,* V.S.Gorelik, N.V.Tcherniega, A.D.Kudryavtzeva, *P.N.Lebedev Physical Inst., Russia.* Nonlinear refraction and absorption in such vanadates crystals as $GdVO_4$, $Nd:GdVO_4$, YVO_4, $Nd:YVO_4$, $Gd_{0.64}Y_{0.36}VO_4$, $Yb:Gd_{0.64}Y_{0.36}VO_4$, and $Er,Yb:Gd_{0.64}Y_{0.36}VO_4$ are measured at 1064 and 532 nm using a single-beam Z-scan method with picosecond laser pulses.

LWJ19
$Nd:GdVO_4$ laser in bounce geometry passively mode-locked by semiconductor saturable absorber, M.Frank, M.Jelinek, V.Kubeček, *Czech Technical Univ., Prague, Czech Republic.* $Nd:GdVO_4$ laser in grazing incidence geometry passively mode-locked using a semiconductor saturable absorber is reported. In continuous mode-locked regime an average power of 7 W for 22 W diode pumping with pulse duration of 30 ps was obtained.

LWJ20
Two-frequency σ-polarized $Nd:YVO_4$ -YVO_4 laser, S.P.Sadovskiy, A.A.Sirotkin, S.V.Garnov, *A.M.Prokhorov General Phys. Inst., Russia.* Experimental researches of two-frequency $Nd:YVO_4$-YVO_4 laser, cut along the *a* axis, for σ-polarization at the transition $^4F_{3/2}$–$^4I_{11/2}$, with the possibility of tuning the wavelength of the radiation by using Fabry-Perot different thicknesses.

LWJ21
Diode-pumped laser with multiple Stokes Raman conversion in CVD diamond at high repetition rate, P.V.Shpak, V.A.Orlovich, *B.I. Stepanov Inst. of Phys., Belarus,* A.A.Demidovich, M.B.Danailov, *LaserLab ELETTRA-Sincrotrone, Italy.* Raman conversion was investigated for diode-pumped microchip laser and small-scale diamond Raman laser, placed in a common long coupled cavity. Radiation of two Stokes components contained fast (8 GHz) oscillations with 66 ps spike duration.

LWJ22
Investigation of two-wavelength laser operation mode, Yu.D.Arapov, A.F.Ivanov, I.V.Kasyanov, L.E.Magda, *VNIITF, Russia.* Implemented pulse-periodic two-wavelength laser generator and amplifier. Research of the laser amplifier based on a crystal of the active medium $YAG:Nd^{3+}$ in the mode of simultaneous amplification of two wavelengths in a pulsed mode.

LWJ23
Numerical simulation of passively mode-locked semiconductor lasers under dual mode optical injection regime, R.M.Arkhipov, *St.-Petersburg State Univ., Russia,* M.Radziunas, A.G.Vladimirov, *Weierstrass Inst. Mohrenstr. 39 10117, Berlin, Germany.* Passively mode-locked edge-emitting semiconductor laser under dual mode external optical injected regime is studied numerically using a set of 3 delay differential equations. Estimation of the locking range is performed.

LWJ24
Study of the stress-strain state in glass-carbon plates after ultrafast laser processing, E.L.Surmenko, I.A.Popov, T.N.Sokolova, Yu.V.Chebotarevsky, A.V.Konyushin, D.A.Bessonov, *Gagarin Saratov State Technical Univ., Russia.* Paper presents the simulation of the mechanical stresses that occur in a glass-carbon plate under the influence of a series of ultrafast laser pulses with high energy density.

LWJ25
The PLD of $Si_{1-x}Mn_x$ thin films for spintronics application, A.V.Shorokhova, O.A.Novodvorsky, O.D.Khramova, D.A.Zuev, E.V.Khaydukov, V.Ya.Panchenko, *Inst. on Laser and Information Technologies, Russia,* V.V.Rylkov, S.N.Nikolaev, K.Yu.Chernoglazov, B.A.Aronzon, V.V.Tugushev, I.A.Likhachev, E.M.Pashaev, *Natl. Res. Center "Kurchatov Institute", Russia,* A.S.Semisalova, N.S.Perov, A.B.Granovsky, *Lomonosov Moscow State Univ., Russia.* The investigations of the pulsed laser deposition conditions influence (energy fluence, substrate temperature, deposition velocity) on the $Si_{1-x}Mn_x$ thin films properties were conducted. The $Si_{1-x}Mn_x$ films electrical, structural, magnetic and transport properties were studied.

LWJ26
High power passively Q-switched vanadate lasers, A.A.Sirotkin, *A.M.Prokhorov General Phys. Inst., Russia, Advanced Energy Technologies LTD, Russia.* We present passively Q-switched lasers based on a novel methods control of spectral parameters in vanadate lasers. The high peak power passively Q-switched variable-cut vanadate lasers with Cr^{4+}:YAG saturable absorber are investigated.

LWJ27
Optimization of conditions for steady-state intracavity frequency doubling in weakly anisotropic solid-state lasers, P.A.Khandokhin, Yu.A.Mamaev, *Inst. of Appl. Phys., Russia.* Optimization of conditions of steady-state intracavity frequency doubling on the basis of anisotropic model of active medium and nonlinear element is considered using Jones matrix method. Optimal angle of the nonlinear element orientation is found.

LWJ28
Simultaneous lasing at wavelengths 1061.5 nm and 1064.15 nm in Nd:YAG laser with saturable absorber, P.A.Khandokhin, I.V.Koryukin, *Inst. of Appl. Phys., Russia.* The two-wavelength Q-switching at the wavelengths 1061.5 nm and 1064.15 nm in Nd:YAG lasers is investigated theoretically. A multimode model of this laser is proposed. Conditions of simultaneous Q-switching at these wavelengths are found.

LWJ29
Powerful broadband source based on Yb-doped GTWave fiber, S.A.Filatova, *Moscow State Univ. of Instrument Engineering and Computer Sci., Russia,* A.I.Trikshev, A.S.Kurkov, V.B.Tsvetkov, *A.M.Prokhorov General Phys. Inst., Russia.* We realized broadband light source in the spectral range 1025–1125 nm, based on Yb-doped fiber, pumped into the cladding. Maximum output power of 117 mW and spectral width of 44 nm at the level of –10 dB were measured.

LWJ30
New all-solid-state tunable UV Ce^{3+},Yb^{3+}: $LiY_{0.4}Lu_{0.6}F_4$ laser, L.A.Nurtdinova, V.V.Semashko, S.L.Korableva, *Kazan Federal Univ., Russia.* Laser test results of the new UV solid-state active medium based on a Ce+Yb: $LiY_{0.4}Lu_{0.6}F_4$ mixed crystal pumped by Ce:LiCAF laser are reported. Slope efficiency of 13% and 304–332 nm tunability was achieved.

LWJ31
Holmium-doped fiber laser emitting at 2.21 micron, S.O.Antipov, V.A.Kamynin, A.S.Kurkov, *A.M.Prokhorov General Phys. Inst., Russia,* O.I.Medvedkov, *Inst. of Automation and Electrometry, Russia, Novosibirsk State Univ., Russia,* A.V.Marakulin, L.A.Minashina, *E.I.Zababakhin All-Russian Scientific-Research Inst. of Technical Phys., Russian Federal Nuclear Centre, Russia.* We have realized the holmium-doped fiber laser emitting at 2.21 micron. To the best of our knowledge it is the highest value for lasers based on silica fibers. The output power was measured as 130 mW.

LWJ32
Approach to the decay law analysis of NIR luminescence in Bi-doped media, A.A.Veber, V.B.Tsvetkov, *A.M.Prokhorov General Phys. Inst., Russia,* O.V.Usovich, L.A.Trusov, P.E.Kazin, *Lomonosov Moscow State Univ., Russia.* Investigation of the luminescence decay in NIR range was performed for silicate and germanate Bi-doped glasses. Strongly non-exponential decay is observed in most cases. Used approach could be used for deconvolution of different luminescent bands.

LWJ33
Optical properties of the $Gd_3(Al_xGa_{1-x})_5O_{12}:Ce^{3+}$ epitaxial films, N.V.Vasil'eva, I.V.Randoshkin, *A.M.Prokhorov General Phys. Inst., Russia,* D.A.Spassky, E.M.Aleksanyan, S.Vielhauer, *Inst. of Phys., Univ. of Tartu, Estonia,* V.O.Sokolov, V.G.Plotnichenko, *Fiber Optics Research Center, Russia,* V.N.Kolobanov, A.V.Khakhalin, *Lomonosov Moscow State Univ., Russia,* E.M.Eganova, A.A.Dudin, *Inst. of Nanotechnology of Microelectronics, Russia.* The epitaxial films of the Ce-doped $Gd_3(Al_xGa_{1-x})_5O_{12}$ with x=0.00, 0.22, 0.31, 0.38 formula units have been grown using liquid-phase epitaxy method and their optical properties were studied. The emission of Ce^{3+} ions was observed.

LWJ34
Temperature stability of Er-doped superfluorescence fiber sources, A.V.Kichanov, O.L.Kel, M.A.Solodovniko, A.S.Kurkov, *JSP Perm Scientific-Industrial Instrument Making Company, Russia.* We have tested 48 Er-doped superfluorescence fiber sources in the temperature range from –60 to +75°C. Variations of the emission spectrum and output power were measured.

LWJ35
Features of SBS in single-mode glass fiber, V.F.Efimkov, I.G.Zubarev, S.I.Mikhailov, *P.N.Lebedev Physical Inst., Russia.* Theoretically investigated characteristics of stimulated Brillouin scattering in long (L > 100 m) single-mode fibers. The analysis of the applicability of the interaction of plane waves to describe the dynamics of interaction was made. There are conclusion about the good applicability of the plane waves and the absence of inhomogeneous broadening of the contour scattering.

LWJ36
1.34 μm Nd:YAG laser with loop cavity and V:YAG passive Q-switching, M.N.Ershkov, A.V.Fedin, A.V.Gavrilov, S.N.Smetanin, S.A.Solokhin, D.S.Tegin, *V.A.Degtyarev Kovrov State Technological Academy, Russia.* The flash-lamp pumped Nd:YAG laser with loop cavity and passive Q-switching operating at 1.34 μm wavelength is experimentally investigated. Using a passive 47-% V:YAG Q-switch the laser generates the 380-mJ trains of 260-ns laser pulses with an individual pulse energy of 27 mJ.

LWJ37
The lasing characteristics of new effective fluorophores on the base of boron fluoride complexes with dipyrromethene for the broad spectral region, R.T.Kuznetsova, Yu.V.Aksenova, T.A.Solodova, T.N.Kopylova, E.N.Telminov, G.V.Mayer, *Tomsk State Univ., Russia,* M.B.Berezin, S.L.Yutanova, *Inst. of Solution Chemistry, Russia,* A.S.Semeikin, *Ivanovo State Univ. of Chemical Technology, Russia,* S.M.Arabei, *Belorussian State Agricultural Technical Univ., Belarus,* T.A.Pavich, K.N.Soloviov, *B.I.Stepanov Inst. of Phys., Belarus.* The spectral-luminescent, lasing, photochemical and resource characteristics of eight new coordination complexes of boron fluoride with dipyrromethenes of different structures. Experimental results were arrived in polar and nonpolar organic solvents and solid polymer films with participation of silica structures. The correlations of the structure of researched compounds and the formed solvates with optical properties are discussed.

LWJ38
Development of laser with optical parametric chirped conformal pulse amplification, G.S. Boltaev, V.V.Gorbushin, I.A.Kulagin, J.T.Pardaev, V.I.Redkorechev, B.R.Sobirov, T.Usmanov, *Inst. of Ion-Plasma and Laser Technologies, Uzbekistan.* The primary factors determining efficiency of optical parametric chirped pulse amplification with conformal intensity profiles are considered. The starting complex of the laser system with parametric chirped conformal pulse amplification is developed.

LWK • 18:30-20:00
Laser Remote Sensing and Tunable Diode Laser Spectroscopy (LAT-03): Posters

LWK1
Tunable diode laser spectroscopy (TDLS) based complex for the airplan laboratory, A.S.Kuzmichev, *Central Aerological Observatory, Russia,* A.I.Nadezhdinskii,Ya.Ya.Ponurovskiy, D.B.Stavrovskii, I.P.Popov, Y.P.Shapovalov, V.Ya.Zaslavskii, V.U.Khattatov, V.V.Galaktionov, *A.M.Prokhorov General Phys. Inst., Russia,* V.M.Semenov, *Natl Res. Univ. "Moscow Power Engineering Inst.", Russia.* Federal Agency for Hydrometeorology of the Russian Federation creates the flying laboratory on the basis of the

passenger airplane Yak-42D for geophysical monitoring.

LWK2
Laser induced breakdown spectroscopy of single wall carbon nanotubes, V.N.Lednev, S.M.Pershin, A.Yu.Ivochkin, R.N.Yulmetov, A.F.Bunkin, *A.M.Prokhorov General Phys. Inst., Russia,* P.A.Danilov, S.I.Kudryashov, A.A.Ionin, S.V.Makarov, V.I.Yurovskih, D.A.Zayarniy, *P.N.Lebedev Physical Inst., Russia.* Laser ablation of carbon nanotubes and pyrolitic graphite samples have been compared. Ablation thresholds, plasma imaging, spectra and plasma properties have been used as key characteristics for comparison.

LWK3
Multiparametric diagnostics of natural water using optical spectroscopy techniques, S.A.Burikov, T.A.Dolenko, I.V.Plastinin, A.V.Kharcheva, D.A.Khundzhua, P.A.Borodin, S.V.Patsaeva, *Lomonosov Moscow State Univ., Russia,* A.R.Sabirov, *A.N.Nesmeyanov Inst. of Organoelement Compounds, Russia.* Multiparametric characterization was performed for a large set of natural marine and freshwater samples using fluorescence, absorption and Raman scattering spectroscopy, and has demonstrated good correlation of spectroscopic features with the sample origin.

LWK4
Spectroscopic prism coupler for measuring refractive index, extinction coefficient and thickness of films, V.I.Sokolov, N.V.Marusin, S.I.Molchanova, V.Ya.Panchenko, A.G.Savelyev, E.V.Khaydukov, Inst. on Laser and Information Technologies, Russia. The design of spectroscopic prism coupler based on the resonant excitation of guided modes is proposed. The device can simultaneously measure thickness, refractive index, dispersion and extinction coefficient of thin films in the spectral range 400–1100 nm.

LWK5
Forming of higher transverse mods in nonplanar Zeeman laser gyro cavity, Yu.Yu.Broslavets, E.A.Polukeev, A.A.Fomichev, *Moscow Inst. of Phys. and Technology, Russia.* In this paper is investigated influence of optical circuit deviations from ideal (calculated) one on evolving structure of transverse mods in the nonplanar Zeeman laser gyro cavity. For each mode it was determined resonance curve width and resonant frequency. Studies have shown, that the symmetry of the transverse mods structure may serve as an additional criterion of laser gyros adjustment quality and reproducibility of drift characteristics in future. In the process of scanning frequency of input beam it was observed dynamic mod structure restructuring.

LWK6
Small absorption measurements by CRDS using the cavity with the light input/output through a mirror hole, P.V.Korolenko, I.V.Nikolaev, V.N.Ochkin, S.N.Tskhai, F.Yu.Khadzhiisky, A.N.Khizhenok, *P.N.Lebedev Physical Inst., Russia.* A measurements of small absorption by CRDS technique is presented. Compare to conventional version we provide to use the mirrors with a central hole thus ~100% radiation can be inserted in the high quality cavity.

LWL • 18:30-20:00
Fiber Optics (LAT-08): Posters

LWL1
Generation of 1178 nm through amplification of the second stokes, L.J.Henry, J.R.Grosek, *Air Force Research Lab., USA.* High power levels of 1178 nm are expected to be generated by simultaneously seeding with 1178 nm while pumping a Raman resonator cavity defined by high reflector fiber Bragg gratings at 1121 with 1069 nm.

LWL2
Two-photon interband absorption in SiO_2 and SiO_2-GeO_2 fibers at 349 nm, D.S.Chunaev, A.Ya.Karasik, *A.M.Prokhorov General Physics Inst., Russia.* Two-photon absorption coefficients were measured in SiO_2 and SiO_2-GeO_2 fibers at 349 nm picosecond laser excitation.

LWL3
Electrically tunable Brillouin fiber laser, S.M.Popov, I.L.Vorobyov, Y.K.Chamorovski, *Inst. of Radio Engineering and Electronics, Russia,* P.Mégret, *Univ. of Mons, Belgium,* A.A.Fotiadi, *Ioffe Physical-Technical Inst., Russia, Ulyanovsk State Univ., Russia.* We report temperature characteristics of the Brillouin lasing achieved in optical fibers coated by metals. The Brillouin laser tunability within the range of 25 MHz is demonstrated by applying of direct voltage to the metal coating.

LWL4
Influence of random and regular aberrations on radiation quality of coherently-combined multichannel optical system, F.Yu.Kanev, E.I.Tsyro, *V.E.Zuev Inst. of Atmospheric Optics, Russia,* O.L.Antipov, *Inst. of App. Phys., Russia.* Results of numeric simulation are presented in the report of coherently-combined multichannel radiation propagation under conditions of free diffraction and in a turbulent atmosphere. Specifically, the distance is defined on which application of the optical system to transfer energy is feasible. Also influence of aberrations induced by turbulence and developed in the system is assessed on the quality of radiation on the object as well as possibility to compensate for these aberrations with adaptive optics methods.

LWL5
Acoustic sensitivity of the negative curvature hollow core fiber, S.N.Turtaev, M.I.Belovolov, A.E.Levchenko, A.F.Kosolapov, A.D.Pryamikov, *Fiber Optics Research Center, Russia.* Acoustic sensitivity of the novel negative curvature hollow core fiber (NCHCF) is investigated. It was shown experimentally that the normalized acoustic response of NCHCF is of ~7 dB (re $1 \mu Pa^{-1}$) higher than in case of the conventional fiber.

LWL6
Wave-particle duality of the Schrödinger solitons and solitonic analog of the Ramsauer-Townsend effect, V.N.Serkin, T.L.Belyaeva, *Benemerita Univ. Autonoma de Puebla, Mexico.* We show that the scaling symmetry breaking in soliton scattering reveals the hidden role of the soliton self-interaction ("binding") energy and its dramatic impact on the wave-particle duality of solitons. Solitonic analog of the de Broglie wavelength and phenomenon similar to the Ramsauer-Taunsend effect can be discovered for Schrödinger solitons.

LWL7
Geiger-Nuttall law for Schrödinger solitons, V.N.Serkin, A.Hasegawa, T.L.Belyaeva, *Benemerita Univ. Autonoma de Puebla, Mexico, Osaka Univ., Japan, Univ. Autonoma del Estado de Mexico, México.* Based on the formal analogy between soliton tunneling through a classically forbidden potential barrier and α-particle tunneling and decay we introduce a "toy solitonic model of a nucleus" and show that the analog of the Geiger-Nuttall law can be discovered for Schrödinger solitons. We reveal and explain the analogy with virtual particle-antiparticle pair production and annihilation mechanisms and show how the nonlinear particle-like wave packet is being "dressed in a coat of virtual pairs" and transformed into the soliton. In computational experiments with different soliton parameters and for different profiles of the barriers, including the charged sphere Coulomb potential, we demonstrate how the Geiger-Nuttall law can be discovered for Schrödinger solitons in nonlinear optics.

LWL8
Luminescent properties of the bismuth-related emitting centers using UV excitation, E.G.Firstova, I.A.Bufetov, S.V.Firstov, V.V.Vel'miskin, E.M.Dianov, *Fiber Optics Research Center, Russia,* V.F.Khopin, A.N.Guryanov, *Inst. of Chemistry of High-Purity Substances, Russia,* B.I.Galagan, B.I.Denker, *A.M.Prokhorov General Phys. Inst., Russia.* In near UV and visible regions the excitation-emission contour plots for Bismuth-doped silica-based fibers without any additional dopants and codoped with Ge or P were obtained. New emission peaks of bismuth in glasses were revealed.

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Hall 1
ICONO-05/1

9:00–11:00
IThA • High-Field Physics and Attoseconds I (ICONO-05/1)
Gerhard Paulus, *Friedrich-Schiller-Univ. Jena, Germany, Presider*

IThA1 • 09:00-09:45 • KEYNOTE
Atto-science: what we learn by converting many photons into one, P.Corkum, *Univ. of Ottawa, Natl Res Council Canada, Canada.* Attosecond pulse generation can be understood via quantum trajectories of an ionizing electron. A trajectory begins from a bound state and returns to the same state after an excursion in the continuum. Quantum trajectories, such as these, map onto an interferometer – an electron interferometer created by light [1]. This mapping makes it obvious that weak fields perturb attosecond pulse generation and thereby construct perturbative nonlinear optics on top of the non-perturbative process [2]. I will show how this allows us develop an all optical method to fully characterize the space-time structure of attosecond pulses [3]. A (sheared) interferometer can measure most properties of light so we should be able to measure most properties of the electron [4]. I will show how high harmonic or attosecond spectroscopy can image molecular orbitals [5] or follow chemical dynamics of small molecules [4, 5]. [1] P. B. Corkum, "Recollision Physics", Physics Today, 64, 36, (2011). [2] J. B. Bertrand et al, Phys. Rev. Lett, 106, 023001 (2011). [3] K. T. Kim et al, to be published in Nature Physics [4] J. Itatani et al. Nature 432, 867 (2004). [5] H. J. Wörner et al. Nature, 466, 604, (2010). [6] H. J. Wörner et al. Science, 334, 208 (2011).

Hall 2
LAT-04/1

9:00–11:00
LThA • Diffractive Optics and Nanophotonics I (LAT-04/1)
Victor Soifer*, Image Processing Systems Inst., Russia, Presider*

LThA1 • 09:00-09:45 • KEYNOTE
Diffractive principle, devices and applications, C.Zhou, *Shanghai Inst. of Optics and Fine Mechanics, China.* I will report our work on diffractive principle, devices and applications. We discovered simple principles of the Talbot effect, such as the symmetry, regularly-rearranged neighboring-phase difference rule, prime-number decomposition rule. We invented distorted Dammann grating for simultaneous imaging of multiple objective planes in one single plane. We developed simplified modal method to design deep-etched fused silica gratings, such as the average mode indices of the triangular or sinusoidal gratings to describe the overall performance of its gradually-changing profile of grating grooves. We fabricated distorted Dammann grating and fused silica gratings by using the advanced microelectronic lithographic technique, holographic interference technique, and inductive-coupled-plasma dry-etching facility. Experimental results demonstrated that these novel diffractive devices should be highly interesting for a variety of applications.

Hall 3
LAT-07/2

9:00–11:00
LThB • Biophotonics and Laser Biomedicine II (LAT-07/2)
Boris Chichkov, *Lazer Centrum Hannover, Germany, Presider*

LThB1 • 09:00-09:30 • INVITED
High resolution functional assessment of human skin and non-melanoma skin cancer with Bessel beam OCT, R.A.Leitgeb, *Medical Univ. Vienna, Austria.* We present results for imaging both the structure and the vascular pattern of non-melanoma skin cancer with OCT. The OCT system employs a Bessel beam at 1300 nm for high penetration and high-resolution skin imaging.

LThB2 • 09:30-09:45
Coherent phase microscopy: parameters of organelles in interference images of the cell, V.P.Tychinsky, A.V.Kretushev, T.V.Vyshenskaya, I.V.Klemyashov, V.Zwerzgkhovsky, A.A.Shtil, *Moscow Inst. of Radioenginnering, Electronics and Automation, Russia.* A novel concept of meaningful parameters of the phase images allows for quantitative characterization of the functional state of the cell based on numerical values of organelles' phase thickness, phase volume, area and size.

Hall 4
LAT-08/4

9:00–10:30
LThC • Fiber Optics IV (LAT-08/4)
Valery Kozlov, *Corning Inc., USA, Presider*

LThC1 • 09:00-09:30 • INVITED
Semiconductor disk lasers in fiber technology, O.G.Okhotnikov, *Tampere Univ. of Technology, Finland.* The low-noise fiber Raman amplifiers have been developed pumped by semiconductor disk lasers. Hybrid Raman-bismuth doped fiber amplifier was proposed for further increase of pump conversion efficiency.

LThC2 • 09:30-09:45
Excited state absorption beyond 1.1 micron in bismuth-doped aluminosilicate fibers, K.E.Riumkin, M.A.Melkumov, I.A.Varfolomeev, A.V.Shubin, I.A.Bufetov, S.V.Firstov, E.M.Dianov, *Fiber Optic Research Center, Russia,* V.F.Khopin, A.N.Guryanov, *Inst. of Chemistry of High-Purity Substances, Russia.* The excited state absorption spectra of the alumosilicate bismuth-doped fibers with different bismuth concentration were measured at different temperature, pump power and wavelength.

Hall 5
ICONO-7/3

9:00–11:00
IThB • Physics of Metamaterials and Complex Media III (ICONO-07/3)
Vasily Klimov, *Lebedev Physical Inst., Russia, Presider*

IThB1 • 09:00-09:30 • INVITED
Metamaterials and metasurfaces in THz applications, A.V.Lavrinenko, R.Malureanu, M.Zalkovskij, P.U.Jepsen, A.Novitsky, S.Zhukovsky, A.Andriueyski, *Technical Univ. of Denmark, Denmark,* D.N.Chigrin, C.Kremers, *Bergische Univ. Wuppertal, Germany,* Z.Y.Song, Q.He, L.Zhou, *Fudan Univ., China.* We present a set of terahertz optical components, such as linear and circular polarizers, absorbers, devices with enhanced transmittance, and single layer chiral systems based on metamaterials. Discussion covers design rules, fabrication and characterization.

IThB2 • 09:30-10:00 • INVITED
Eigenmode analysis of surface plasmon polaritons in silver double nanowire systems, S.Sun, H.-T.Chen, W.-J.Zheng, G.-Y.Guo, *Natl Taiwan Univ., Taiwan.* We employ the eigenmode analysis approach based on finite element method to study the dispersion relation, propagation length and mode conversion of plasmon polaritions in Ag double nanowire systems.

Hall 6
ICONO-10/4

9:00–11:00
IThC • Symposium on Organic Photovoltaics IV (ICONO-10/4)
Guglielmo Lanzani, *Inst. Italiano di Technologia, Italy, Presider*

IThC1 • 09:00-09:30 • INVITED
Optoelectronic processes at hybrid interfaces, A.Petrozza, *Istituto Italiano di Tecnologia, Italy.* The working mechanisms of excitonic solar cells are strongly dominated by interface processes which influence the final device efficiency. We report on the effects of inter-molecular processes at a mesoscopic level.

IThC2 • 09:30-09:45
The effect of acceptor electron affinity on the ground-state and excited-state charge transfer in polymer-acceptor blends, O.D.Parashchuk, D.Yu.Paraschuk, *Lomonosov Moscow State Univ., Russia,* V.G.Pavelyev, P.H. M. van Loosdrecht, M.S.Pshenichnikov, *Univ. of Groningen, The Netherlands,* M.Krompiec, I.F.Perepichka, *Bangor Univ., UK,* T.V.Orekhova, *L.M.Litvinenko Inst. of Physical Organic and Coal Chemistry, Ukraine*. Ground-state charge transfer and ultrafast dynamics of photoinduced charges are studied in blends of a conjugated polymer and fluorene-type electron acceptors. We show how the acceptor electron affinity drives the ground-state complexation, charge generation and recombination.

Hall 1 ICONO-05/1	Hall 2 LAT-04/1	Hall 3 LAT-07/2

9:00–11:00
IThA • High-Field Physics and Attoseconds I (ICONO-05/1)—Continued

IThA2 • 09:45-10:00
High harmonic generation by atoms in elliptically polarized laser field, M.A.Khokhlova, *Lomonosov Moscow State Univ., Russia,* A.A.Gonoskov, I.A.Gonoskov, M.Yu.Ryabikin, *Inst. of App. Phys., Russia,* V.V.Strelkov, *A.M.Prokhorov General Phys. Inst., Russia.* We study numerically and analytically high harmonic generation in elliptically polarized laser field and derive equations describing HHG efficiency, harmonic ellipticity and rotation angle for the ground state with zero and nonzero orbital angular momentum.

IThA3 • 10:00-10:30 • INVITED
Attosecond Larmor clock, J.Kaushal, L.Torlina, M.Ivanov, O.Smirnova, *Max-Born Inst., Germany.* How much time does it take to absorb a photon and remove an electron from an atom or a molecule, and how does this time depend on the number of photons required for ionization?

9:00–11:00
LThA • Diffractive Optics and Nanophotonics I (LAT-04/1)—Continued

LThA2 • 09:45-10:00
Sub-nano precision optical surfaces, thin films, heterostructures and laser mirrors, V.Azarova, T.Tsvetkova, V.Fokin, *M.F.Stelmakh R&DI "Polyus", Russia.* There are analyzed the light measurement methods used in the technological processes of the precision laser mirrors and the laser heterostructures creation. These methods are light scattering (LS), white light interferometry (WLI), spectroscopic ellipsometry (SE) and variable angle spectroscopic ellipsometry (VASE). All these methods are nondestructive powerful technique to investigate the optical response of materials and to measure precision substrates surfaces parameters, such as roughness and shape, and to measure simultaneously the layers thickness, composition and dielectric parameters of multilayer systems.

LThA3 • 10:00-10:15
"Ideal" optical vortex generation using a liquid crystal spatial light modulator, C.Rickenstorff, A.S.Ostrovsky, *Autonomous Univ. of Puebla, Mexico.* A new kind of optical vortices is generated by means of liquid crystal spatial light modulators. Unlike other techniques, optical vortices with controllable dark core radius and any topological charge are obtained.

LThA4 • 10:15-10:30
Localized modes and magneto-optical resonances in integrated plasmonics, D.A.Bykov, L.L.Doskolovich, *Image Processing Systems Inst., Russia, Samara State Aerospace Univ., Russia.* Localized modes of magneto-optical cavity located on metal surface are investigated. Using rigorous analysis of the associated resonant magneto-optical effects we demonstrate the possibility to control the SPP amplitude by magnetizing the cavity.

9:00–11:00
LThB • Biophotonics and Laser Biomedicine II (LAT-07/2)—Continued

LThB3 • 09:45-10:00
Analysis of speckle patterns in multi-layered skin tissue, V.V.Barun, A.P.Ivanov, *B.I.Stepanov Inst. of Phys., Belarus,* S.K.Dick, N.D.Abramovich, *Belarus State Univ. of Informatics and Radioelectronics, Belarus.* Calculations of speckle patterns formed by multiply scattered light in multi-layered biological tissue are given. The given examples illustrate the opportunities of the procedure. A special part of the paper is devoted to the inverse problems of biomedical optics that can be posed and solved by the designed procedure.

LThB4 • 10:00-10:15
Design of optical methods to diagnose and therapeutically treat dentine caries, S.K.Dick, A.S.Terekh, A.V.Smirnov, M.M.Salimi Zadekh, *Belarus State Univ. of Informatics and Radioelectronics, Belarus,* G.G.Chistyakova, N.I.Rosenik, *Belarus State Medical Univ., Belarus.* Experimental data on hemodynamics of dental pulp at different stages of caries treatment are given. The speckle observation of backward scattered light is used as a measurement method. Various statistical characteristics of the random light field are studied as indicators of blood flow changes. The second part of the paper id devoted to the selection of a light source for photodynamic therapy while treating caries.

LThB5 • 10:15-10:30
Laser diffractometry as a means for assessing statistical characteristics of inhomogeneous ensembles of erythrocytes, S.Yu.Nikitin, M.A.Kormacheva, A.V.Priezzhev, A.E.Lugovtsov, V.D.Ustinov, *Lomonosov Moscow State Univ., Russia.* We propose an algorithm which allows to determine statistical characteristics for the erythrocytes, deformed and elongated in a shear flow. These are such characteristics as the average ratio of erythrocyte semiaxes, dispersion of the erythrocyte shape parameter, and asymmetry of the erythrocyte distribution in shapes.

Hall 4
LAT-08/4

9:00–10:30
LThC • Fiber Optics IV (LAT-08/4)—Continued

LThC3 • 09:45-10:00
Optical properties of the bismuth-doped aluminosilicate fiber within the temperature range 300-1500K, D.A.Dvoretsky, I.A.Bufetov, E.M.Dianov, *Fiber Optics Research Center, Russia,* V.F.Khopin, A.N.Guryanov, *Inst. of Chemistry of High Purity Substances, Russia,* L.K.Denisov, *Bauman Moscow State Technical Univ., Russia.* The optical properties of the bismuth-doped alumosilicate fiber have been measured for the first time in the temperature range 300-1500 K. The present results suggest that NIR-emitting active center comprises a low valence bismuth ion and an oxygen-deficient glass network defect.

LThC4 • 10:00-10:15
Investigation of modal content of radiation in cylindrical W-fibers, A.E.Ulanov, S.A.Nikitov, V.E.Ustimchik, *Moscow Inst. of Phys. and Technology (State Univ.), Russia,* Yu.K.Chamorovskii, *Inst. of Radio Engineering and Electronics, Russia.* Simulation of properties propagating and leaky modes in cylindrical W-fibers were presented in this paper. It was shown that leaky modes might significantly influence on properties of radiation propagation into cylindrical W-fibers depending on structure.

LThC5 • 10:15-10:30
Lasers operating in two-micron range based on Holmium-doped silica fiber, E.Sholokhov, *A.M.Prokhorov General Phys. Inst., Russia.* At present the actual problem is to develop compact fiber laser operating at wavelength of 2 microns with a relatively high output power. It is great interest today to create compact lasers in all-fiber design.

Hall 5
ICONO-07/3

9:00–11:00
IThB • Physics of Metamaterials and Complex Media III (ICONO-07/3)—Continued

IThB3 • 10:00-10:15
Comsol simulation of light interaction with chiral structures, I.V.Zabkov, V.V.Klimov, *Moscow Inst. of Phys. and Technology, Russia, P.N.Lebedev Physical Inst., Russia.* The Comsol RF Module was modified in order to work with chiral media. Calculation of different systems (cylinder, sphere) was performed and numerical results are in good agreement with analytical ones.

IThB4 • 10:15-10:30
Raman scattering and third-harmonic generation in silicon nanowire ensembles, L.A.Golovan, *NRC "Kurchatov Institute", Russia,* K.V.Bunkov, K.A.Gonchar, V.Yu.Timoshenko, L.A.Osminkina, D.V.Petrov, A.V.Neskoromnaya, *Lomonosov Moscow State Univ., Russia,* M.N.Kulmas, V.A.Sivakov, *Inst. für Photonische Technologien, Germany.* Experiments on Raman scattering and third-harmonic generation in silicon nanowire ensembles demonstrate one-order-of-magnitude rise of the signals in comparison with crystalline silicon, correspondingly. The Raman scattering efficiency strongly depends on the excitation wavelength.

Hall 6
ICONO-10/4

9:00–11:00
IThC • Symposium on Organic Photovoltaics IV (ICONO-10/4)—Continued

IThC3 • 09:45-10:15 • INVITED
Making most of the absorbed photon: new insights into carrier multiplication in semiconductor nanostructures, V.I.Klimov, *Los Alamos Natl Lab., USA.* This paper reviews recent progress in understanding carrier multiplication in semiconductor nanocrystals including the effect of particle size and shape as well as the role of competing energy-loss channels.

IThC4 • 10:15-11:00 • KEYNOTE
Theoretical pathways towards high efficiency organic photovoltaics, L.J.A.Koster[1], S.E.Shaheen[2], J.C. (Kees) Hummelen[1,3], *[1)]Zernike Inst. for Advanced materials, the Netherlands; [2)]Univ. of Denver, USA; Univ. of Groningen, [3)]The Netherlands*. We present three different theoretical approaches to identify pathways to organic solar cells with power conversion efficiencies in excess of 20%. First, a radiation limit for organic solar cells is introduced that elucidates the role of charge-transfer (CT) state absorption. Provided this CT action is either sufficiently weak or present in its maximized form throughout the active layer material, organic solar cells can be as efficient as their inorganic counterparts. Next, a model based on Marcus theory of electronic transfer -that considers exciton generation by both the electron donor and the electron acceptor- is used to show how reduction of the reorganization energies can lead to substantial power conversion efficiency gains. Third, and most important, we introduce the dielectric constant as a central parameter for efficient solar cells. We analyze how the dielectric constant influences every

Hall 1 ICONO-05/1	Hall 2 LAT-04/1	Hall 3 LAT-07/2
9:00–11:00 **IThA • High-Field Physics and Attoseconds I (ICONO-05/1)—Continued**	**9:00–11:00** **LThA • Diffractive Optics and Nanophotonics I (LAT-04/1)—Continued**	**9:00–11:00** **LThB • Biophotonics and Laser Biomedicine II (LAT-07/2)—Continued**
IThA4 • 10:30-10:45 ***High-harmonic-generation spectroscopy with an elliptically polarized laser field,*** M.V.Frolov, N.L.Manakov, T.S.Sarantseva, *Voronezh State Univ., Russia,* A.F.Starace, *Univ. of Nebraska, USA.* Based on the analytically derived results for high harmonic generation (HHG) by atoms in an intense laser field with small ellipticity, we discuss the elliptic HHG spectroscopy, i.e. retrieving from HHG spectra both the energy and angular dependence of the photorecombination cross section of an atomic target.	**LThA5 • 10:30-10:45** ***Generating high-frequency 2D surface plasmon interference patterns using metal slit arrays,*** E.A.Bezus, A.A.Morozov, L.L.Doskolovich, *Image Processing Systems Inst., Russia,* B.O.Volodkin, K.N.Tukmakov, S.V.Alferov, *S.P.Korolyov Samara State Aerospace Univ., Russia.* Generation of 2D surface plasmon polariton interference patterns using a diffractive structure consisting of four metal slit arrays is numerically and experimentally studied. Two ways to increase the pattern frequency at fixed wavelength are proposed: illumination of the structure with circularly polarized light and introduction of a corresponding "phase shift" into the structure geometry.	**LThB6 • 10:30-10:45** ***Laser-optic study of the effect of nanodiamonds on the functional properties of red blood cells,*** A.V.Priezzhev, A.E.Lugovtsov, V.B.Koshelev, O.E.Fadyukova, *Lomonosov Moscow State Univ., Russia,* C.-L.Cheng, E.B.Perevedentseva, L.-W.Tsai, Y.-C.Lin, *Natl Dong Hwa Univ., Taiwan.* State of the art laser-optic techniques were used to study the interaction of diamond nanoparticles with molecular (protein) and cellular (red blood cells) components of human and rat blood under *in vitro* incubation of freshly drawn blood samples with nanoparticles and intravenous administration of the latter into live rats. Measurements conducted *in vitro* showed various effects of nanodiamonds on the functional properties of red blood cells.
IThA5 • 10:45-11:00 ***Resonance enhanced multi-photon ionization of atmospheric air by high-power KrF laser radiation,*** I.V.Smetanin, A.O.Levchenko, A.V.Shutov, N.N.Ustinovskii, V.D.Zvorykin, *P.N.Lebedev Physical Inst., Russia.* (2+1) REMPI of molecular oxygen in atmospheric air by the nanosecond GARPUN KrF laser radiation is investigated. We have measured the ionization yield scales as squared intensity at 4×10^{8} to 10^{11} W/cm^2. Theory of coherent and incoherent (2+1) REMPI is developed in the wide domain of pulse duration, from the ultrashort pulses shorter than polarization relaxation time up to durations of hundred nanoseconds, which is in agreement with our experimental results.	**LThA6 • 10:45-11:00** ***Numerical modeling of integrated optical smoothly irregular waveguides,*** A.A.Egorov, *A.M.Prokhorov General Phys. Inst., Russia,* K.P.Lovetskii, A.L.Sevastyanov, *Peoples' Friendship Univ. of Russia, Russia,* L.A.Sevastyanov, *Joint Inst. for Nuclear Research, Russia.* The paper is devoted to the theoretical study of integrated optical smoothly irregular waveguides such as thin-film generalizes waveguide Luneburg lens. The numerical modeling is accomplished with help of innovative method of adiabatic modes.	**LThB7 • 10:45-11:00** ***Study of adsorption properties of functionalized nanodiamonds in aqueous solutions of metal salts using optical spectroscopy,*** K.A.Laptinskiy, S.A.Burikov, T.V.Laptinskaya, S.V.Patsaeva, A.M.Vervald, T.A.Dolenko, *Lomonosov Moscow State Univ., Russia,* J.Rosenholm, *Abo Akademi Univ., Finland,* A.R.Sabirov, *A.N.Nesmeyanov Inst. of Organoelement Compounds, Russia,* I.I.Vlasov, *A.M.Prokhorov General Phys. Inst., Russia.* This work presents results of a study of adsorption properties of the original (I6, RDDM) and modified (I6COOH, RDDM-SiO_2) nanodiamonds dispersed in water, with respect to some dissolved ions with help of photon correlation, absorption, Raman and IR spectroscopies.

Hall 4 LAT-08/4	Hall 5 ICONO-07/3	Hall 6 ICONO-10/4

9:00–11:00
IThB • Physics of Metamaterials and Complex Media III (ICONO-07/3)—Continued

IThB5 • 10:30-11:45
Simulating NIMs with Raman crystals, A.K.Popov, *Univ. of Wisconsin-Stevens Point, USA*, M.I.Shalaev, V.V.Slabko, *Siberian Federal Univ., Russia,* S.A.Myslivets, *L.V.Kirensky Inst. of Phys., Russia.* A possibility to mimic NIMs and to greatly enhance efficiency of stimulated Raman scattering in short-pulse regime is shown by making use of extraordinary properties of three-wave mixing of two ordinary electromagnetic and one backward elastic waves.

IThB6 • 10:45-11:00
Magnetic response of planar dielectric rings of arbitrary width, M.I.Bakunov, A.V.Maslov, S.M.Kuznetsova, *Univ. of Nizhny Novgorod, Russia.* Magnetic response of a planar dielectric ring to a time-harmonic magnetic field is analyzed. We find the self-consistent distribution of the polarization current in the ring and its magnetic moment. The results are compared with that from an equivalent *LCR* circuit model.

9:00–11:00
IThC • Symposium on Organic Photovoltaics IV (ICONO-10/4)—Continued

fundamental step in OPV. We analyze and model the case of the 2009 world record PTB7:[70]PCBM cell of 7.4%, using a drift-diffusion model. Based on the model and based on the fact that the exciton binding energy diminishes with increasing dielectric constant of the medium, we find that efficiencies of more than 20% are within reach upon increasing the dielectric constant ε_r of the material to 10.

Hall 1
ICONO-05/2

11:30–13:00
IThD • High-Field Physics and Attoseconds II (ICONO-05/2)
Misha Ivanov, *Max-Born Inst., Germany, Presider*

IThD1 • 11:30-12:00 • INVITED
Relativistic generation of intense attosecond pulses, J.Meyer-ter-Vehn, *Max-Planck-Inst. for Quantum Optics, Germany,* H.C.Wu, *Zhejiang Univ., China.* New ways of relativistic generation of intense attosecond pulses from nanometer thick foils irradiated by few-cycle laser pulses are described in terms of analytic theory and particle-in-cell simulations.

IThD2 • 12:00-12:15
Laser systems for the ELI-ALPS facility, S.Banerjee, M.Baudisch, J.Biegert, A.Borot, A.Borzsonyi, D.Charalambidis, T.Ditmire, Zs.Diveki, P.Dombi, K.Ertel, M.Galimberti, J.A.Fülöp, E.Gaul, C.Haeffner, M.Hemmer, C.Hernandez-Gomez, M.Kalashnikov, D.Kandula, A.P.Kovacs, R.Lopez-Martens, P.Mason, I.Márton, I.Musgrave, K.Osvay, M.Prandolini, E.Racz, P.Racz, R.Riedel, I.N.Ross, J.-P.Rosseau, M.Schulz, F.Tavella, A.Thai, I.Will, *Max-Born-Inst., Germany.* The high repetition rate laser systems providing the ELI-ALPS facility with TW-to-PW peak intensity pulses are designed to generate secondary light sources with a duration of tens of attosecond for basic and applied researches.

Hall 2
LAT-04/2

11:30–13:00
LThD • Diffractive Optics and Nanophotonics I (LAT-04/2)
Guofan Gin*, Tsinghua Univ., China, Presider*

LThD1 • 11:30-12:00 • INVITED
Plasmonic nanophotonic devices for optical interconnection, Q.Li, W.Zhang, M.Qiu, *Zhejiang Univ., China,* J.Wang, Y.Song, J.Tian, M.Yan, *Royal Inst. of Technology, Sweden.* Plasmonic nanowire waveguides and couplers are of potential importance for optical interconnection. Guiding modes, propagation losses, coupling efficiencies, and photothermal heating due to light absorption, are presented for applications in photonic integrated circuits.

LThD2 • 12:00-12:30 • INVITED
Spectral and temporal characteristics of radiation from a periodic resonant medium excited at the superluminal velocity, R.M.Arkhipov, I.Babushkin, *Weierstrass Inst., Germany*, M.V.Arkhipov, Yu.A.Tolmachev, *St.-Petersburg State Univ., Russia.* We consider periodically modulated string of oscillators excited by a pulse of light crossing the string in an oblique direction. It is shown that if the velocity of the propagating excitation is greater (lower) then the velocity of light in vacuum *c*, a new frequency appears in the spectrum of the medium response. Dependence of this frequency on string geometry is investigated. Possible applications of the effect are discussed.

Hall 3
LAT-07/3

11:30–13:00
LThE • Biophotonics and Laser Biomedicine III (LAT-07/3)
Rainer Leitgeb*, Medical Univ. Vienna, Austria, Presider*

LThE1 • 11:30-12:15 • INVITED
Imaging neuronal networks with femtosecond laser pulses, S.Zeng, Q.Luo, *Huazhong Univ. of Sience & Technology, China.* We show how the femtosecond laser pulse travel after passing an acousto-optic deflector, and how it is steered efficiently to stimulate and record neuronal activity and how the neuronal filing is recorded and explained.

LThE2 • 12:00-12:15
Parallel multisite long-term optical brain interrogation in freely moving mice with an implantable fiber-optic interface, L.V.Doronina-Amitonova, I.V.Fedotov, A.B.Fedotov, *Lomonosov Moscow State Univ., Russia,* O.I.Ivashkina, M.A.Zots, K.V.Anokhin, *P.K.Anokhin Inst. of Normal Physiology, Russia,* A.M.Zheltikov, *Texas A&M Univ., USA, Kurchatov Inst. Natl Res. Center, Russia.* Specifically designed implantable fiber-optic interface provides a powerful tool for parallel long-term optical interrogation of distinctly separate groups of neurons lying deeply in the brain of freely moving transgenic mice providing a high-fidelity optical detection of the genome activity.

Hall 4
LAT-08/5

11:30–13:00
LThF • Fiber Optics V (LAT-08/5)
Oleg Okhotnikov, *Tampere Univ. of Technology, Finland, Presider*

LThF1 • 11:30-12:00 • INVITED
Acrylate coated optical fibers for application temperatures up to +200°C, V.Kozlov, *Corning Inc., USA.* Optical fibers with specialty acrylate coatings (single and dual coat designs) were tested at temperatures up to 200°C in normal atmosphere to define fiber properties stability and maximum operating temperatures.

LThF2 • 12:00-12:15
On the threshold for stimulated Brillouin scattering in long optical fibers pumped by single and repetitive pulse laser radiation, V.I.Kovalev, *P.N.Lebedev Physical Inst., Russia, Heriot-Watt Univ., UK.* The effect of substantial difference between the threshold power and threshold energy in the single and repetitive pulse regimes of the SBS interaction in long optical fibers is demonstrated and its scale described theoretically.

Hall 5
ICONO-07/4

11:30–13:00
IThE • Physics of Metamaterials and Complex Media IV (ICONO-07/4)
Alan Boardman, *Univ. of Salford, UK, Presider*

IThE1 • 11:30-12:00 • INVITED
Nano spatially and femto temporally localized laser source, P.N.Melentiev, A.E.Afanasiev, V.I.Balykin, *Inst. for Spectroscopy, Russia,* A.A.Kuzin, A.V.Zablotskiy, A.S.Baturin, *Moscow Inst. of Phys. and Technology, Russia.* We study photoluminescence and nonlinear optical processes from single nanohole and nanoslit. The combination of these two physical effects and using a microcavity opens up the possibility of constructing of a nano spatially and femto temporally broadband and wavelength tunable light source.

IThE2 • 12:00-12:30 • INVITED
Fano resonances: quantum and classical mechanics vs. optics, M.I.Tribelsky, *Lomonosov Moscow State Univ., Russia, Moscow State Inst. of Radioengineering, Electronics and Automation (Technical Univ.), Russia.* The Fano resonances in mechanical systems (both quantum and classical) and light scattering by nanoparticles are compared. It is shown that there are some important differences in these two cases. It results in new effects, do not existing in mechanics.

Hall 6
ICONO-10/5

11:30–12:45
IThF • Symposium on Organic Photovoltaics V (ICONO-10/5)
Kees Hummelen, *Univ. of Groningen, The Netherlands, Presider*

IThF1 • 11:30-12:00 • INVITED
Photoinduced charge separation processes: from natural photosynthesis to organic photovoltaic cells, O.Poluektov, *Argonne Natl Lab., USA.* Light-induced, advanced EPR spectroscopy combined with DFT calculations have been used to study the charge separation dynamics in active OPV materials based on the composites of polymers (P3HT, PCDTBT, PTB7) and fullerene derivatives.

IThF2 • 12:00-12:15
Novel indolin-2-one methanofullerenes for bulk-heterojunction solar cells, A.V.Bogdanov, I.P.Romanova, G.R.Shaikhutdinova, I.A.Izdelieva, D.G.Yakhvarov, Sh.K.Latypov, V.F.Mironov, O.G.Sinyashin, *A.E.Arbuzov Inst. of Organic and Physical chemistry, Kazan Research Center, Russia,* V.A.Dyakov, D.Yu.Paraschuk, *Lomonosov Moscow State Univ., Russia.* A series of novel indolinono-substituted methanofullerenes (IMFs) were prepared by the reaction of fullerene C60 with N-alkylisatins and tris(diethylamino)phosphine. Bulk het-erojunction P3HT:IMF polymer:fullerene solar cells were studied.

Hall 1 ICONO-05/2	Hall 2 LAT-04/2	Hall 3 LAT-07/3
11:30–13:00 **IThD • High-Field Physics and Attoseconds II (ICONO-05/2)—Continued**	**11:30–13:00** **LThD • Diffractive Optics and Nanophotonics I (LAT-04/2)—Continued**	**11:30–13:00** **LThE • Biophotonics and Laser Biomedicine III (LAT-07/3)—Continued**
IThD3 • 12:15-12:45 • INVITED ***Attosecond time delays in photoionization,*** A.Maquet, J.Caillat, R.Taïeb, *Univ. Pierre et Marie Curie, France,* M.Dahlström, *Stockholm Univ., Sweden,* A.L'Huillier, *Lund Univ., Sweden.* We present a theoretical analysis of recent experiments that have evidenced the existence of attosecond time delays between the emission times of photoelectrons ejected from different states in noble gas atoms and in N_2.		**LThE3 • 12:15-12:45 • INVITED** ***Novel laser optoacoustic systems for noninvasive detection and characterization of intracranial hematomas and patient monitoring,*** R.O.Esenaliev, *Univ. of Texas Medical Branch, USA.* We proposed, built, and tested in pre-clinical and clinical studies laser optoacoustic systems utilizing OPOs or laser diodes. We will report our results obtained with these systems on noninvasive detection of hematomas and blood monitoring.
	LThD3 • 12:30-12:45 ***Curved photonic nanojet from a dielectric corner step,*** S.S.Stafeev, V.V.Kotlyar, A.A.Kovalev, *Image Processing Systems Inst., Russia.* We numerically and experimentally investigated a curved photonic nanojet formed by diffraction of plane wave (λ = 633 nm) on a dielectric corner step (height 2λ). Photonic nanojet has length 9.5λ and diameter 1.94λ (at a distance 5.5λ).	
IThD4 • 12:45-13:00 ***Polarization response of the atomic system in a strong field of the mid-IR frequency band,*** A.M.Popov, O.V.Tikhonova, E.A.Volkova, *Lomonosov Moscow State Univ., Russia.* The polarization response of the atomic system in the strong laser field of a mid-IR frequency band has been investigated by direct numerical integration of the Schrödinger equation. The contributions of neutral atoms in ground and excited states and electrons in the continuum to the polarization response at the fundamental frequency and its harmonics are analyzed in the nonperturbative regime of laser – atom interaction.	**LThD4 • 12:45-13:00** ***The control of optical trap spatial structure by LC modulators,*** S.P.Kotova, K.N.Afanasiev, A.V.Korobtsov, N.N.Losevsky, V.V.Patlan, S.A.Samagin, V.G.Volostnikov, *P.N.Lebedev Physical Inst., Samara Branch, Russia.* The report contains the results obtained for the arrays and single traps formation with the aid of a HOLOEYE HEO-1080P multielement spatial modulator and a liquid crystal focusing device developed by the authors.	**LThE4 • 12:45-13:00** ***Optical properties measurements in tissue-like phantoms: the validity range of the diffusion models,*** S.A.Dolgushin, S.A.Titenok, S.A.Tereshchenko, *Natl Res. Univ. of Electronic Technology, Russia.* Three different versions of the diffusion model are investigated using experimental measurements of tissue-like phantoms and Monte Carlo simulations. The origins of the limited validity of the models are discussed and their accuracy is compared.

Hall 4
LAT-08/5

11:30–13:00
LThF • Fiber Optics V (LAT-08/5)—Continued

LThF3 • 12:15-12:30
Loss reduction in periodically poled silica fibres by intense near-UV irradiation, A.V.Gladyshev, A.F.Kosolapov, E.M.Dianov, *Fiber Optics Research Center, Russia,* C.Corbari, P.G.Kazansky, *Univ. of Southampton, UK,* A.V.Dostovalov, S.A.Babin, *Inst. of Automation and Electrometry, Russia,* M.V.Yashkov, *Inst. of Chemistry of High-Purity Substances, Russia.* UV-induced losses in GeO_2-doped periodically poled silica fibres were significantly reduced by using 355 nm instead of 244 nm irradiation for device fabrication. Frequency doubler based on Al_2O_3-doped fibre was demonstrated.

LThF4 • 12:30-12:45
Hybrid fiber with zero dispersion wavelength shifted to 1 μm, S.S.Aleshkina, M.E.Likhachev, A.K.Senatorov, M.M.Bubnov, *Fiber Optics Research Center, Russia,* M.Yu.Salganskii, A.N.Guryanov, *Inst. of High Purity Substances, Russia.* We demonstrate a novel all-solid hybrid fiber with zero dispersion wavelength shifted to 1 μm. Propagation of chirped pulses through the fabricated hybrid fiber allowed us to compress them from 8 ps to 330 fs.

LThF5 • 12:45-13:00
Contrast improvement of the optical interferometer with magneto-sensitive microstructured spun fiber for current measurement, Y.V.Przhiyalkovsky, S.K.Morshnev, N.I.Starostin, V.P.Gubin, *Inst. of Radio Engineering and Electronics, Russia, Profotech, Russia.* The modified fiber-optical interferometer with sensing element on microstructured Hi-Bi spun fiber is proposed. A new configuration allows to avoid an irreversible depolarization of the radiation and to enhance an interference pattern contrast.

Hall 5
ICONO-07/4

11:30–13:00
IThE • Physics of Metamaterials and Complex Media IV (ICONO-07/4)—Continued

IThE3 • 12:30-12:45
Laser formation of semiconductor nanoparticles and structures, A.Antipov, S.Arakelian, S.Kutrovskaya, A.Kucherik, A.Makarov, A.Osipov, *Vladimir State Univ., Russia,* V.Emelianov, *Lomonosov Moscow State Univ., Russia,* S.Zimin, *Yaroslavl State Univ., Russia.* The results on laser production of semiconductor nanoparticles under continuous laser action of near-by infrared range (up to $10^6 W/cm^2$) on a massive PbX sample in a liquid and an air are presented.

IThE4 • 12:45-13:00
Polariton solitons in arrays of coupled cavities containing interacting qubits, A.P.Alodjants, E.S.Sedov, S.M.Arakelian, *Vladimir State Univ., Russia,* I-H.Chen, Y.Y.Lin, Y.-C.Lai, R.-K.Lee, *Natl Tsing-Hua Univ., Taiwan.* We reveal the existence of polariton solitons in the array of coupled optical cavities, each containing an ensemble of qubits. We show that an enhancement of the nonlinearity can be achieved with negative interaction strength. Bright solitons are supported under perturbations only in the upper branch of polaritons.

Hall 6
ICONO-10/5

11:30–12:45
IThF • Symposium on Organic Photovoltaics V (ICONO-10/5)—Continued

IThF3 • 12:15-12:30
Doped conjugated polymers as (transparent) electrodes for photovoltaic devices, V.M.Kobryanskii, *P.N.Lebedev Physical Inst., Russia.* Doping of conjugated polymers by electronic donors or acceptors lead to disappearance of absorption band in visual region and appearance of absorption band in near infrared region. Doped conjugated polymers can be used as electrodes for photovoltaic devices.

IThF4 • 12:30-12:45
Additive-enhanced structural and electronic order in conjugated polymer films, V.Bruevich, A.Sizov, O.Parashchuk, D.Yu.Paraschuk, *Lomonosov Moscow State Univ., Russia,* S.Grigorian, *Univ. of Siegen, Germany.* We show that an archetypical conjugated polymer, MEH-PPV, enhances its structural and electronic order upon addition of electronic acceptor. This approach demonstrates a facile way to increase the order in conjugated polymers.

Hall 1 PLENARY SESSION II		

14:00–16:00
PThA • Opening. Plenary Lectures II
Martial Ducloy, *Univ. Paris-Nord, France, and*
Ivan Shcherbakov, *Prokhorov General Physics Inst., Russia,*
Presiders

PThA1 • 14:00-15:00 • PLENARY

Novosibirsk free electron laser as a tunable source of high-power radiation: Facility development and application highlights, Gennadiy Kulipanov, *Budker Inst. of Nuclear Physics, Russia*. Novosibirsk free electron laser (FEL) facility has three FELs to generate radiation spanning a wavelength range between 5 and 240 micrometer. The accelerator part consists of a four-track energy recovery linac with maximum electron energy of 40 MeV. By the end of 2012 we have commissioned completely the accelerator system. Two FELs are already operating in mid- and far-infrared (terahertz) spectral ranges emerging monochromatic radiation in the range from 50 to 240 μm. Maximum average power of radiation reached at the facility at the wavelength of 140 μm was 500 W at a 100-ps pulse repetition rate of 11.2 MHz. The peak power reached 1 MW. Impressive experiments in physics, chemistry, biology, material science and other fields have been performed or are in progress at six user stations, which are well-equipped with commercially available and home-made instrumentation. Users from more than 15 research institutes, universities and companies work at the facility. Description of most interesting experiments, including ultrasoft THz ablation of biological molecules, study of impact of THz radiation on genetics materials, biological cell systems and microorganisms, surface plasmon spectroscopy, time-resolved superfast THz time domain spectroscopy, flame diagnostics using THz radiation, is presented.

PThA2 • 15:00-16:00 • PLENARY

High power, high pulse repetition rate disk lasers and applications, Friedrich Dausinger, *Dausinger & Giesen GmbH, Germany*. Since its invention in 1991 by Adolf Giesen the thin disk technology found numerous applications in industrial production processes and scientific applications. A wide spanning substitution of rod type solid state lasers as well as of gas lasers was stimulated by stronger focussability at high power. While this feature is offered by the competing fiber laser approach, as well, the disk laser is advantageous whenever highest pulse energy at high repetition rate is required. The contribution will review what has been achieved in this respect for industrial and scientific applications and discuss the future potential.

Hall 1 ICONO-05/3

16:30–18:30
IThG • High-Field Physics and Attoseconds III (ICONO-05/3)
Alfred Maquet, *Univ. Pierre et Marie Curie, France, Presider*

IThG1 • 16:30-17:00 • INVITED
Probing the attosecond dynamics of strong-field ionization, G.G.Paulus, *Friedrich Schiller Univ. Jena, Germany, Helmholtz Inst. Jena, Germany.* The plateau electrons in above-threshold ionization (ATI) spectra exhibit a characteristic dependence on the absolute (carrier-envelope) phase when generated by few-cycle laser pulses. We compare the dependence of the ATI plateau on the absolute phase for different rare gas atoms and atomic hydrogen and draw conclusions on the attosecond timing of strong-field ionization.

IThG2 • 17:00-17:15
Field-cycle-controlled modulation of excited-state dynamics in ultrafast photoionization, E.E.Serebryannikov, A.M.Zheltikov, *Lomonosov Moscow State Univ., Russia.* Time-dependent Schrödinger-equation analysis of ionization induced by ultrashort laser pulses reveals an oscillatory quantum dynamics involving the entire manifold of free- and bound-electron states. These oscillations follow the cycles of the driving field and become especially well-resolved for large Keldysh parameters.

Hall 2 LAT-04/3

16:30–18:30
LThG • Diffractive Optics and Nanophotonics III (LAT-04/3)
Haifeng Wang, *Data Storage Inst., Singapore, Presider*

LThG1 • 16:30-17:00 • INVITED
Predictive modeling in diffractive nanophotonics, N.L.Kazanskiy, *Image Processing Systems Inst., Russia.* Possibilities of selecting geometric parameters of diffractive nanostructures that enable unique optical characteristics through mathematical modeling are discussed. The software-hardware tools necessary to conduct the said modeling are analyzed. Examples of the nanoplasmonic and magneto-optical structures designed that feature unique properties are given.

LThG2 • 17:00-17:15
Application of specular spectroscopic scatterometry in diffractive optics technology for etch depth characterization, V.P.Korolkov, *Novosibirsk State Univ., Russia,* A.S.Konchenko, V.V.Cherkashin, *Inst. of Automation and Electrometry, Russia.* Application of spectroscopic scatterometry to etch depth measurement at fabrication of binary phase holograms is offered. It allows one to measure depth of phase structures covered with metal mask at final step of dry etching.

Hall 3 LAT-07/4

16:30–18:30
LThH • Biophotonics and Laser Biomedicine IV (LAT-07/4)
Shaoqun Zeng, *Huazhong Univ. of Science&Technology, China, Presider*

LThH1 • 16:30-17:00 • INVITED
Fluorescence imaging in biomedical science, A.P.Savitsky, V.V.Jerdeva, I.G.Meerovich, A.S.Goryashenko, G.D.Lapshin, *A.N.Bach Inst. of Biochemistry, Russia.* Molecular in vivo imaging plays a key role in understanding of certain pathological processes including cancer. In vivo detection of enzyme activity is a valuable parameter for development of novel drugs directed to molecular targets.

LThH2 • 17:00-17:15
Photo-dynamics of the Photo-activated Adenylate Cyclase NgPAC2 from the Amoeboflagellate Naegleria gruberi NEG-M strain, A.Penzkofer, *Univ. Regensburg, Germany,* M.Tanwar, S.K.Veetil, S.Kateriya, *Univ. of Delhi, India,* M.Stierl, P.Hegemann, *Humboldt Univ. zu Berlin, Germany.* The photo-dynamics of NgPAC2 was studied in the dark, during and after blue-light exposure. The BLUF domain flavin cofactor photocycle dynamics was observed (photo-induced Tyr-flavin electron transfer with subsequent hydrogen bond restructuring and thermal recovery).

Hall 4
LAT-06/1

16:30–18:30
LThI • Advances in Electro/Magneto Optics I (LAT-06/1)
Eric Cormier, *Univ. of Bordeaux 1, France, Presider*

LThI1 • 16:30-17:45 • KEYNOTE
Controlling magnetism by light, Th.Rasing, *Radboud Univ., The Netherlands.* From the discovery of sub-picosecond demagnetization over a decade ago(1) ,the optical generation of magnetic field pulses (2) to the recent demonstration of magnetization reversal by a single 40 femtosecond laser pulse (3), the manipulation of spins by ultra short laser pulses has become a fundamentally challenging topic with a potentially high impact for future spintronics, data storage and manipulation and quantum computation (4,5). In addition, when the time-scale of the perturbation approaches the characteristic time of the exchange interaction (~10–100 fs), the magnetization dynamics enters a novel, highly non-equilibrium, regime, which was recently demonstrated by both fs optical and X-ray experiments (6,7). Theoretically, this field is still in its infancy, using phenomenological descriptions of the none-equilibrium dynamics between electrons, spins and phonons via 2- or 3-temperature models and atomistic spin simulations (1,8–10). A proper description should include the time dependence of the exchange interaction and nucleation phenomena on the nanometer length scale. Such developments need to be supported by experimental investigations of magnetism at its fundamental time and length scales, i.e. with fs time and nanometer spatial resolution. Using ultrashort optical excitations, we may be able to manipulate the exchange interaction itself. Such studies require the excitation and probing of the spin and angular momentum contributions to the magnetic order at timescales of 10fs and below, a challenge that could be met by the future fs X-ray FEL's(11). As many of the magnetic systems of interest consist of more than one sublattice, element specific probing of their dynamics is of utmost relevance. While XMCD is ofcourse developed for this (but requires synchrotrons or FEL's), spectroscopic all-optical techniques appear to be very suitable as well (12). In this lecture recent results and future challenges of ultrafast magnetization dynamics and the opto-magnetic techniques to control magnetic order will be discussed.

Hall 5
ICONO-07/5

16:30–18:30
IThH • Physics of Metamaterials and Complex Media V (ICONO-07/5)
Andrei Lavrinenko, *Technical Univ. of Denmark, Denmark, Presider*

IThH1 • 16:30-17:00 • INVITED
Advanced integrated designs of solitonic metamaterial-driven waveguide structures and Peregrine creation, A.D.Boardman, P.Egan, *Univ. of Salford, UK,* Yu.G.Rapoport, *Kyiv Taras Shevchenko Natl Univ., Ukraine.* Advanced, active, nonlinear metamaterial-driven waveguides are investigated with an emphasis upon spatial solitons. This family of excitations will include Peregrines that are both time- and space-localized, and optical vortices that are magnetooptically controlled.

IThH2 • 17:00-17:15
Polarization and nonlinear effects in diffraction-induced laser pulse splitting in photonic crystals, S.E.Svyakhovskiy, A.A.Skorynin, V.A.Bushuev, A.I.Maydykovskiy, T.V.Murzina, V.B.Novikov, B.I.Mantsyzov, *Lomonosov Moscow State Univ., Russia,* S.V.Chekalin, V.O.Kompanets, *Inst. of Spectroscopy, Russia.* Polarization and nonlinear effects in Bragg diffraction-induced laser pulse splitting in PC are studied theoretically and experimentally. Splitting time, as well number of outgoing pulses, are influenced significantly by the polarization of incident pulse.

Hall 6
ICONO-10/6

16:30–18:30
IThI • Symposium on Organic Photovoltaics VI (ICONO-10/6)
Dmitry Paraschuk, *Lomonosov Moscow State Univ., Rrussia, Presider*

IThI1 • 16:30-17:00 • INVITED
IThI1 • 16:30-17:00 • INVITED *OPVs: Spin, coherence and delocalization*, S.Gélinas[1], A.Rao[1], A.Kumar[1], S.L.Smith[1], A.W.Chin[1], J.Clark[1], P.C.Y.Chow[1], C.W.Schlenker[3], C.-Z.Li[4], H.-L.Yip[4],A.K-Y.Jen[3,4], D.S.Ginger[3], T.S. van der Poll[2], G.C.Bazan[2], R.H.Friend[1], [1]*Univ. of Cambridge, UK,* [2]*Univ. of California, USA,* [3]*Univ. of Washington, USA,* [4]*Univ. of Washington, Seattle, USA.* We present real-time observations of electron hole separation in organic photovoltaics and show it is driven by ballistic quantum-coherent transport. We then show how the electron wavefunction delocalization prevents triplet exciton formation from electron-hole recombination.

IThI2 • 17:00-17:30 • INVITED
Star-shaped oligothiophene-based small molecules for organic photovoltaic applications, S.A.Ponomarenko, Y. N.Luponosov, *Inst. of Synthetic Polymeric Materials, Russia,* T.Meyer-Friedrichsen, *Heraeus Precious Metals GmbH & Co. KG, Germany.* In this presentation design, synthesis, optical, thermal and electrical properties of solution processible oligothiophene-based small molecules and their application as electron donor materials in bulk heterojunction organic solar cells will be considered.

Hall 1 — ICONO-05/3

16:30–18:30
IThG • High-Field Physics and Attoseconds III (ICONO-05/3)—Continued

IThG3 • 17:15-17:45 • INVITED
XUV-pump-XUV-probe experiments in atoms and molecules at the 1fs temporal scale, P.Tzallas, E.Skantzakis, P.A.Carpeggiani, L.A.A.Nikolopoulos, D.Charalambidis, *FORTH-IESL and Univ. of Crete, Greece.* We report on XUV-induced-XUV-probed ultrafast evolving atomic and molecular coherences as well as ionization dynamics. These 1fs scale temporal studies are accomplished using energetic coherent XUV continua produced through combined high-harmonic-generation and interferometric-polarization-gating.

IThG4 • 17:45-18:00
Vibrational-rotational dynamics of the shocked diatomic heteronuclear molecule, V.Yu.Kharin, A.M.Popov, O.V.Tikhonova, *Lomonosov Moscow State Univ., Russia.* The vibratonal-rotational response of the diatomic heteronuclear molecule on the extremely short laser pulse is studied. Obtained analytical expressions describe general properties of the processes. Possibility of efficient molecular alignment by ultrashort laser pulses is analyzed.

Hall 2 — LAT-04/3

16:30–18:30
LThG • Diffractive Optics and Nanophotonics III (LAT-04/3)—Continued

LThG3 • 17:15-17:30
Fabrication and application of diffractive optical elements for non-typical surfaces testing, R.K.Nasyrov, A.G.Poleshchuk, *Inst. of Automation and Electrometry, Russia.* Methods for interferometrical testing of non-typical optical surfaces such as freeform, aspherical, conical and cylindrical are presented. Diffractive correctors for wavefront were developed. Simulation and experimental results are presented.

LThG4 • 17:30-17:45
Interferometric characterization of the angular structures manufacturing process of the CLWS-300IAE system, V.N.Khomutov, A.G.Poleshchuk, R.K.Nasyrov, *Inst. of Automation and Electrometry, Russia.* Interferometric method for characterization of angular scales, optical limbs, reticles, code disks etc. fabricated by technique of circular raster scanning with the precision circular laser writer system CLWS-300IAE is reported. Results of computer simulation and experiments are presented.

LThG5 • 17:45-18:00
Femtosecond laser fabrication of sub- and near-wavelength surface gratings: applied nanoplasmonics, S.I.Kudryashov, A.A.Ionin, S.V.Makarov, L.V.Seleznev, D.V.Sinitsyn, *P.N.Lebedev Physical Institute, Russia,* V.N.Lednev, A.E.Ligachev, S.M.Pershin, A.F.Bunkin, *A.M.Prokhorov General Phys. Inst., Russia,* V.I.Emel'yanov, *Lomonosov Moscow State Univ., Russia.* Femtosecond laser fabrication of sub- and near-wavelength surface gratings through the laser-surface plasmon-polariton interference mechanism and their multi-shot evolution are discussed in terms of transient optics of unstructured flat and intermediate nanostructured surfaces.

Hall 3 — LAT-07/4

16:30–18:30
LThH • Biophotonics and Laser Biomedicine IV (LAT-07/4)—Continued

LThH3 • 17:15-17:30
Laser biophotonics of cyanobacteria, F.I.Kuzminov, M.Y.Gorbunov, *Rutgers Univ., The State Univ. of New Jersey, USA,* E.A.Shirshin, I.V.Elanskaya, V.V.Fadeev, *Lomonosov Moscow State Univ., Russia.* To study primary stages of photosynthesis in cyanobacteria we use non-linear laser fluorimetry. Based on the proposed model of exciton transfer in cyanobacteria, we developed algorithms for determination of molecular photophysical parameters of fluorescent pigments.

LThH4 • 17:30-17:45
Tyrosine to tryptophan energy transfer in human serum albumin as an indicator of conformational changes, N.G.Zhdanova, E.A.Shirshin, I.M.Panchishin, V.V.Fadeev, *Lomonosov Moscow State Univ., Russia.* The manifestation of surfactant-induced conformational changes of human serum albumin in its fluorescence spectra connected with the tyrosine-tryptophan energy transfer was studied by means of classic and laser spectroscopy.

LThH5 • 17:45-18:00
Dynamics and spectroscopy of singlet excited-state double proton transfer in biflavonoid, S.L.Bondarev, *Minsk State Higher Radiotechnical College, Belarus,* V.N.Knyukshto, S.A.Tikhomirov, O.V.Buganov, *B.I.Stepanov Inst. of Phys., Belarus,* A.N.Pyrko, *International Sakharov Environmental Univ., Belarus.* The stepwise intramolecular double proton transfer (PT) with time constants 600 fs (first PT) and 3.1 ps (second PT) in polar and nonpolar biflavonoid solutions is reported using steady-state luminescence and femtosecond transient absorption spectroscopies.

Hall 4
LAT-06/1

16:30–18:30
LThI • Advances in Electro/Magneto Optics I (LAT-06/1)—Continued

LThI2 • 17:30-17:45 • INVITED
Active semiconductor fibers and devices, J.V.Badding, R.He, J.Sparks, V.Gopalan, N.Healy, P.Mehta, A.C.Peacock, *Pennsylvania State Univ., USA.* Unary and compound semiconductors have been deposited into microstructured optical fibers to make junction-based fiber devices, very high power infrared fibers, mid-infrared fiber lasers, and nonlinear hydrogenated amorphous silicon fibers.

LThI3 • 17:45-18:15 • INVITED
Nonlinear electro-optics: Methods and devices, E.D.Mishina, A.S.Sigov, *Moscow State Technical Univ. of Radioengineering, Electronics and Automation, Russia.* The paper presents overview of the current state of nonlinear electrooptics based on ferroelectrics. Two areas of its application are discussed: electric-filed induced second harmonic generation (SHG) for probing ferroelectric switching and SHG-based electrooptical devices.

Hall 5
ICONO-07/5

16:30–18:30
IThH • Physics of Metamaterials and Complex Media V (ICONO-07/5)—Continued

IThH3 • 17:15-17:30
Optical characteristics of the metal-wire hyperbolic medium, L.A.Melnikov, *Saratov State Technical Univ., Russia,* O.N.Kozina, *Saratov Branch of the Kotel'nikov Inst. of Radio-Engineering and Electronics, Russia,* I.S.Nefedov, *Aalto Univ., Finland.* Optical properties of metal-dielectric periodic structures which can be treat as anisotropic hyperbolic metamaterials in the limit of large wavelength are investigated. Super Plank thermal radiation and atom-field interaction peculiarities in this medium are discussed.

IThH4 • 17:30-17:45
Influence of the coupling between nanoresonator and quantum emitters on spontaneous emission dynamic, M.I.Dobynde, A.A.Fedyanin, *Lomonosov Moscow State Univ., Russia,* A.Chipouline, *Friedrich Schiller Univ. Jena, Germany.* We show theoretically that spontaneous emission dynamics in the system of quantum emitters coupled with plasmonic nanoresonator depends significantly on the coupling strength and is characterized with energy oscillation between the system components.

IThH5 • 17:45-18:00
Optical Tamm states and extraordinary light transmission through nanohole in metallic film, I.V. Treshin ,V.V.Klimov, P.N.Melentiev, V.I.Balykin, *P.N. Lebedev Physical Inst., Russia, Inst. of Spectroscopy, Russia.* Numerical FEM simulation of light transmission through a periodic array of nano-holes in a gold film placed on the surface of the Bragg mirror is carried out. The extraordinary transmission of light and the effect of "light diode" are predicted. The results are in good agreement with the experimental data.

Hall 6
ICONO-10/6

16:30–18:30
IThI • Symposium on Organic Photovoltaics VI (ICONO-10/6)—Continued

IThI3 • 17:30-17:45
In situ Raman probe of molecular order in organic photovoltaic cell, A.A.Mannanov, V.V.Bruevich, V.A.Trukhanov, D.Yu. Paraschuk, *Lomonosov Moscow State Univ., Russia.* We have developed the in situ raman probe of molecular order in organic photovoltaic cell during annealing and applied it to study and optimize the annealing process of various promising materials.

IThI4 • 17:45-18:00
Neighbor effect in charge-transfer complex formation between semiconducting polymers and organic acceptors, A.Yu.Sosorev, O.D.Parashchuk, S.A.Zapunidi, G.S.Kashtanov, D. Yu. Paraschuk, *Lomonosov Moscow State Univ., Russia,* I.F.Perepichka, *Bangor Univ., UK.* Threshold-like dependence of conjugated polymer:acceptor charge-transfer complexes (CTC) concentration on the acceptor content is explained by a neighbor effect. We investigate CTCs in various polymer:acceptor blends and discuss the CTC properties using the neighbor effect model.

Hall 1 ICONO-05/3	Hall 2 LAT-4/3	Hall 3 LAT-07/4
16:30–18:30 **IThG • High-Field Physics and Attoseconds III (ICONO-05/3)—Continued**	**16:30–18:30** **LThG • Diffractive Optics and Nanophotonics III (LAT-04/3)—Continued**	**16:30–18:30** **LThH • Biophotonics and Laser Biomedicine IV (LAT-07/4)—Continued**
IThG5 • 18:00-18:15 ***Self-focusing of a high-intensity laser in a collisional plasma in weakly-relativistic regime,*** D.N.Gupta, *Univ. of Delhi, India.* During the interaction of a laser with a collisional plasma in weakly relativistic regime, the plasma equilibrium density modifies and causes to generate the nonlinearty. For some appropriate simulation parameters, our results show a significant effect of this nonlinearity on laser self-focusing in this case.	**LThG6 • 18:00-18:15** ***Femtosecond laser-induced surface gratings as antireflective coatings,*** A.A.Ionin, Y.M.Klimachev, A.Y.Kozlov, S.I.Kudryashov, A.E.Ligachev, S.V.Makarov, L.V.Seleznev, D.V.Sinitsyn, A.A.Rudenko, R.A.Khmelnitsky, *P.N.Lebedev Physical Inst., Russia.* Near-IR antireflective layers were produced on PMMA and GaAs surfaces by femtosecond laser as self-organized gratings, significantly reducing total reflection, in agreement with the effective medium theory.	**LThH6 • 18:00-18:15** ***Oxidative stress in tumor-bearing organism under Raman laser irradiation,*** T.Gening, O.Voronova, T.Abakumova, D.Dolgova, *Ulyanovsk State Univ., Russia,* A.Kurkov, *A.M.Prokhorov General Phys. Inst., Russia.* The lipid peroxidation is evaluated in blood plasma and red blood cells of mice with experimental cervical cancer by the level of malondialdehyde (MDA, μmol/ l) and activity of antioxidant enzymes: catalase(μmol/s/l), superoxide dismutase (SOD, a.u.), glutathione-reductase(GR, μmol/ min/l), and glutathione-S-transferase(GST, μmol/min/l) after exposure to Raman laser irradiation. It has been registered that laser irradiation at the energy dose of 1062 J/cm^2 initiates an oxidative stress in tumor-bearing organism.
IThG6 • 18:15-18:30 ***Measurements of photoionization cross sections in the X-ray regime***, H.Kuehn, M. Braune, M. Krumrey, M. Richter, A. Sorokin, K. Tiedtke, *Deutsches Elektronen-Synchrotron DESY, Germany.* We report on the measurements of absolute partial photoionization cross sections in the X-ray regime using ion time-of-flight spectroscopy. The cross sections are important parameters for the Gas-Monitor- Detectors (GMD), measuring the pulse energy at Free-Electron-Lasers.	**LThG7 • 18:15-18:30** ***The study of nanoclusters and micron-sized periodic structures created at the surface of the crystal and amorphous silica by resonant CO_2 laser irradiation,*** A.F.Mukhamedgalieva, A.M.Bondar, I.M.Shvedov, *Moscow State Mining Univ., Russia,* M.A.Kononov, *A.M.Prokhorov General Phys. Inst., Russia,* V.B.Laptev, N.N.Novikova, *Inst. of Spectroscopy, Russia.* The pulsed CO_2 laser irradiation (1 J, 70 ns, laser spot approximately of 1 mm) of crystal and amorphous silica lead to creation both of the periodic microstructures and the nanoclusters at the irradiated surface.	**LThH7 • 18:15-18:30** ***Quantum origin of a jump in erythrocyte permeation through a microcapillary at 36.6°C. Physics of water and biosolution,*** S.M.Pershin, *A.M.Prokhorov General Phys. Inst., Russia.* Ortho-Para H_2O conversion is used as a quantum factor to interpret of a Jump in Erythrocyte Permeation through a Microcapillary at 36.6°C due to structural phase transition in hemoglobin hydration layer.

Hall 4
LAT-06/1

16:30–18:30
LThI • Advances in Electro/Magneto Optics I (LAT-06/1)—Continued

LThI4 • 18:15-18:30
Multilayer ferroelectric - multiferroic heterostructures based on (Ba,Sr)TiO_3 and (Bi,Nd)FeO_3, A.S.Anokhin, Yu.I.Golovko, V.M.Mukhortov, *Southern Scientific Center, Russia,* Yu.I.Yuzyuk, *Southern Federal Univ., Russia.* We present experimental results on the multilayer ferroelectric - multiferroic structures ($Bi_{0.98}Nd_{0.02}FeO_3$ (BNFO) - ($Ba_{0.8}Sr_{0.2}TiO_3$) deposed on a substrate (100) MgO by rf sputtering. Each layer thickness varied from 3 to 100 nm. The heterostructures consisted from 3 to 34 alternating layers. X-ray diffraction patterns of heterostructure contain independent Bragg reflections of each constituting layer if their thickness exceeds 40 nm. When the thickness of each deposed layer was about 3–6 nm satellite peaks on X-ray diffraction patterns were observed, implying formation of perfect superlattice structure.

Hall 5
ICONO-07/5

16:30–18:30
IThH • Physics of Metamaterials and Complex Media V (ICONO-07/5)—Continued

IThH6 • 18:00-18:15
Spontaneous decay, Anderson localization, and random laser action in cold atomic clouds, S.E.Skipetrov, *Univ. Grenoble 1/CNRS, France,* I.M.Sokolov, *St.-Petersburg State Polytechnic Univ., Russia,* A.Goetschy, *Yale Univ., USA.* We present a theoretical approach to light scattering in clouds of cold atoms based on the use of random Green matrices and apply it to study a number of collective phenomena in these systems.

IThH7 • 18:15-18:30
Fundamental macroscopic quantum phenomena in laser-induced nanostructured clusters, S.M.Arakelian, A.O.Kucherik, V.G.Prokoshev, *Vladimir State Univ., Russia.* The results on laser production of metal, semiconductor and carbonclusters under laser action on a massive sample are presented. The methods of control deposition clusters on a different substrates has been considered.

Hall 6
ICONO-10/6

16:30–18:30
IThI • Symposium on Organic Photovoltaics VI (ICONO-10/6)—Continued

IThI5 • 18:00-18:15
Perpendicular domain orientation in dense planar brushes of diblock copolymers, A.A.Rudov, I.I.Potemkin, *Lomonosov Moscow State Univ., Russia.* Dense planar brushes of physically attached diblock copolymers can reveal spatially ordered nanodomain structures perpendicularly oriented towards the substrate. Depending on composition of the copolymers, the domains can have various morphologies and sizes. Polymer films having such structures with very high interfacial area and based on donor and acceptor blocks can be useful for making efficient organic solar cells.

IThI6 • 18:15-18:30
Dye sensitized solar cells with increased open circuit voltage, Yu.A.Chernikov, O.D.Parashuk, V.S.Kochurov, A.Yu.Smirnov, M.S.Nechaev, D.Yu.Paraschuk, *Lomonosov Moscow State Univ., Russia,* A.F.Asachenko, *A.V.Topchiev Inst. of Petrochemical Synthesis, Russia.* The most efficient dye-sensitized solar cells (DSSC) are now based on Co metal complexes as a redox mediator. To increase the DSSC voltage, we synthesize and study in DSSCs new Co-based redox mediator with cyano-functionalized bipyridine ligands.

Hall 1
ICONO-05/4

9:00–11:00
IFA • High-Field Physics and Attoscience IV (ICONO-05/4)
Alexander Popov, *Lomonosov Moscow State Univ., Russia, Presider*

IFA1 • 09:00-09:30 • INVITED
Extreme laser power from external enhancement in high finesse Fabry-Perot cavities: application to high-flux X- or γ-Ray production through Compton scattering, E.Cormier, *Univ. of Bordeaux 1, France,* D.Jehanno, R.Chiche, V.Soskov, N.Delerue, A.Variola, F.Zomer, *Univ. Paris-Sud, France.* External enhancement of short pulses in high-finesse Fabry-Perot cavities allows reaching tens to hundreds of kW intracavity average power. Such a power is used to produce high-flux X- or γ-rays through Compton back-scattering on relativistic e- beams.

IFA2 • 09:30-09:45
Concept of the generation of extremely compressed high-energy electron bunches in several interfering intense laser pulses with tilted amplitude fronts, V.V.Korobkin, M.Yu.Romanovskiy, O.B.Shiryaev, V.A.Trofimov, *A.M.Prokhorov General Phys. Inst., Russia.* A novel concept of generating bunches of electrons is based on their acceleration in field traps arising within the pattern of interference of several relativistically intense laser pulses. The traps move with the speed of light, collect and compress electrons, forming tight bunches, and accelerate bunches to energies of several hundred GeV per electron.

Hall 2
LAT-04/4

9:00–11:00
LFA • Diffractive Optics and Nanophotonics IV (LAT-04/4)
N.L.Kazansky, *S.P.Korolyov Samara State Aerospace Univ., Russia, Presider*

LFA1 • 09:00-09:30 • INVITED
Fighting against diffraction using diffractive structures, H.Wang, *Data Storage Institute, Singapore,* S.Zhuang, *Univ. of Shanghai for Sci. and Technology, China.* Diffraction as the fundamentals of all imaging systems also limits their resolution. It makes light beams diverge during propagation. These disadvantages caused by diffraction can be resolved by introducing extra diffractive structures.

LFA2 • 09:30-10:00 • INVITED
Silicon nanophotonics for optical communications, Z.Zhou, *Peking Univ., China.* Recent progress on Si based photonic components, which include polarization beam splitter, optical 90°hybrid, photodetectors, and modulators, will reported. A low power penalty modulator and a temperature independent modulator will also be discussed.

Hall 3
LAT-02/1

9:00–10:45
LFB • High-Power Lasers and Applications I (LAT-02/1)
Sergei Garanin, *Russian Federal Nuclear Ctr., Russia, Presider*

LFB1 • 09:00-09:45 • KEYNOTE
National ignition facility - status and future plans, A.M.Dunne, *Lawrence Livermore Natl Lab, USA.* The National Ignition Facility (NIF), the world's largest and most energetic laser system, is now fully operational at Lawrence Livermore National Laboratory. The NIF's 192 beams have exceeded their design specification to deliver 1.8-megajoule, 500-terawatt, ultraviolet laser light in highly reproducible and precisely controlled conditions. This capability represents over 60 times more energy than any previous laser system. The NIF can now generate temperatures of more than 100 million degrees and pressures more than 100 billion times Earth's atmospheric pressure. These conditions, exceeding those at the center of the sun, have never before been created in the laboratory. This facility is designed to compress fusion targets to the conditions required for "ignition", liberating more energy than is required to initiate the fusion reaction. The system flexibility allows multiple target designs to be fielded, offering substantial scope for optimization of a robust target design. Recent activity has centered on two major goals: establishing the infrastructure and capability for NIF to operate as a highly instrumented scientific user facility; and beginning integrated ignition experiments with cryogenic, layered DT fuel targets. The scope for this work included the ignition physics program as well as the development of the diagnostics, targets, target cryogenic system, phase plates and other optics, and personnel and environmental protection activities required to execute ignition experiments. This talk will discuss the current status of the program to achieve ignition, presenting the most recent experimental results, and a look ahead to our plans for the coming months.

Hall 4
LAT-06/2

9:00–11:00
LFC • Advances in Electro/Magneto-Optics Materials II (LAT-06/2)
James Scott**,** *Cambridge Univ., UK, Presider*

LFC1 • 09:00-09:30 • INVITED
Magneto-Stark effect on excitons as origin of second harmonic generation in ZnO, V.V.Pavlov, A.V.Rodina, R.V.Pisarev, D.R.Yakovlev, *Ioffe Physical-Technical Inst., Russia,* M.Lafrentz, D.Brunne, B.Kaminski, M.Bayer, *Technische Univ. Dortmund, Germany,* A.Bakin, *Technische Univ. Braunschweig, Germany.* Magneto-Stark effect at 2s/2p(A/B) excitons in bulk ZnO brings an admixture of exciton wave functions with different parity and enables the second harmonic generation. This finding offers a powerful tool for the exciton spectroscopy in semiconductors.

LFC2 • 09:30-10:00 • INVITED
Advances in liquid crystal devices for non-display applications, I.Abdulhalim, *Ben Gurion Univ./Electrooptic Engineering, Israel.* Liquid crystal devices have seen a rising interest in the last decade in photonic applications such as in optical telecommunications, in light modulation, as tunable lasers, in biosensing, and in imaging systems such as microscopes.

Hall 5
ICONO-09/1

9:00–11:00
IFB • Symposium on Femtosecond Laser Pulse Filamentation I (ICONO-09/1)
Stelios Tzortzakis, *IESL-FORTH, Greece, Presider*

IFB1 • 09:00-09:45 • KEYNOTE
Lasing in air filaments: looking ahead, S.L.Chin, *Univ. Laval, Canada.* Femtosecond laser filamentation is a new branch of nonlinear optics that has attracted a lot of attention in recent years since its beginning in the mid-1990's. The temporally self-compressing pulse propagates inside the filament core as a plane wave with a constant high field because of intensity clamping. Using the femtosecond Ti-sapphire laser pulse, the extended filament zone in air could be as long as meters with a diameter of about 100 microns. The filament represents a unique interaction zone with a constant high peak intensity not found in any other optical focusing geometry. Many nonlinear optical processes could be excited in this ultrafast high intensity environment. This includes the excitation of high lying electronic states of a molecule including super-excited states. The fluorescence from either the parent molecule or the fragments exhibits gain along the filament in the form of amplified spontaneous emission (ASE). So far, this ASE type of lasing has been observed in nitrogen, carbon dioxide, water vapor and some hydrocarbons. The universality of this phenomenon is proposed.

Hall 6
ICONO-04/1

9:00–11:00
IFC • Quantum Physics, Information, and Technologies I (ICONO-04/1)
Leong-Chuan Kwek*, Natl. Uniuv. Of Singapore, Singapore*, *Presider*

IFC1 • 09:00-09:30 • INVITED
Coupling cold atoms to nanophotonics: a novel platform for quantum nonlinear optics, D.E.Chang, *Inst. de Ciencies Fotoniques, Mediterranean Technology Park, Spain.* We show that cold atoms coupled to nanophotonic devices represent a novel interface to realize new mechanisms for strong, controllable interactions between individual photons.

IFC2 • 09:30-10:00 • INVITED
Quantum simulation via 3-dimensional quantum photonics, A.Crespi, R.Osellame, R.Ramponi, V.Giovannetti, R.Fazio, E.Galvao, D.Brod, F.De Nicola, E.Maiorino, L.Sansoni, N.Spagnolo, C.Vitelli, F.Sciarrino, P.Mataloni, *Sapienza Univ. di Roma, Italy.* Recent quantum simulation experiments based on complex discrete quantum walk optical lattices, both ordered and disordered, and other experimental results obtained by using the 3-dimensional capability of these structures will be presented.

Hall 1 — ICONO-05/4

9:00–11:00
IFA • High-Field Physics and Attoscience IV (ICONO-05/4)—Continued

IFA3 • 09:45-10:15 • INVITED
Towards radiation pressure proton acceleration using ultrashort and ultraintense laser pulses, P.V.Nickles, *Gwangju Inst. of Sci. and Technology, South Korea.* Radiation pressure proton acceleration with linearly polarized 30 fs PW laser pulses is reported . Hybrid RPA mechanism delivers linear scaling of proton energy with laser intensity up to highest value ever of 45 MeV.

IFA4 • 10:15-10:30
Optical injector for laser plasma acceleration of electrons, Yu.A.Malkov, A.N.Stepanov, D.A.Yashunin, *Inst. of App. Phys., Russia,* L.P.Pugachev, P.R.Levashov, N.E.Andreev, *Joint Inst. for High Temperatures, Russia,* A.A.Andreev, *Vavilov State Optical Inst., Russia.* Generation of quasimonoenergetic 0.2-0.8 MeV electron bunches was investigated both experimentally and theoretically when 10^{17} W/cm^2 femtosecond laser radiation hit an aluminum foil edge. Laser pulse self-modulation instability in preplasma considered as the acceleration mechanism.

Hall 2 — LAT-04/4

9:00–11:00
LFA • Diffractive Optics and Nanophotonics IV (LAT-04/4)—Continued

LFA3 • 10:00-10:15
Large-area x-ray diffraction optical elements based on SiC membrane window, H.Li, Y.Liu, C.Xie, *Inst. of Microelectronics, CAS, China.* SiC membrane window with diameter as large as 75 mm was fabricated by high temperature plasma-enhanced chemical vapor deposition method. Based on this large-area membrane, x-ray gold transmission gratings with thickness of 2.5 μm were fabricated.

LFA4 • 10:15-10:30
Efficiency of one and two relief phase diffractive optical elements, S.A.Stepanov, G.I.Greysukh, E.G.Ezhov, Z.A.Sidyakina, *Penza State Univ. of Architecture and Construction, Russia.* The equations of linear-sawtooth and correlated relief of microstructures of single- and double-layer two-relief diffractive optical elements disposed on curvilinear interfaces of two mediums are given. These reliefs provide the desired shape of the generated wave front and 100% or close to it the diffraction efficiency at single wavelength, or in a given spectral range, independently of the number of Fresnel zones within the element aperture.

Hall 3 — LAT-02/1

9:00–10:45
LFB • High-Power Lasers and Applications I (LAT-02/1)—Continued

LFB2 • 09:45-10:15 • INVITED
UFL-2M facility - initial steps for construction, S.A.Belkov, S.G.Garanin, Yu.V.Shagalkin, *RFNC-VNIIEF, Russia.* High power megajoule neodymium glass laser facility UFL-2M is beginning to construct in last year in RFNC-VNIIEF. Some first results will be reported.

LFB3 • 10:15-10:30
Indirect Drive Targets for UFL-2M Laser Facility, S.A.Belkov, S.V.Bondarenko, E.I.Mitrofanov, O.O.Sharov, *VNIIEF, Russia*. Design of Indirect Drive Targets for UFL-2M Laser Facility were discussed.

Hall 4
LAT-06/2

9:00–11:00
LFC • Advances in Electro/Magneto-Optics Materials II (LAT-06/2)—Continued

LFC3 • 10:00-10:15
One-dimensional and three-dimensional liquid-crystalline photonic crystals, P.V.Dolganov, G.S.Ksyonz, *Inst. of Solid State Phys., Russia.* We present results of experimental and theoretical studies of liquid-crystalline photonic crystals. Optical properties of liquid-crystalline structures with one-dimensional and three-dimensional ordering are investigated. Transformation of the structure in external field is studied.

LFC4 • 10:15-10:30
Linear and nonlinear properties of unitary polaritons in homogeneous media and in photonic crystals, V.S.Gorelik, *P.N.Lebedev Physical Inst., Russia,* V.V.Filatov, *N.E.Bauman Moscow State Technical Univ., Russia.* The properties of unitary polaritons – quasiparticles, corresponding to electromagnetic waves, propagating in homogeneous media or photonic crystals with refractive index, satisfying to relation: $|n|=1$, are described. Two unitary polariton - scalar boson conversion processes have been predicted.

Hall 5
ICONO-09/1

9:00–11:00
IFB • Symposium on Femtosecond Laser Pulse Filamentation I (ICONO-09/1)—Continued

IFB2 • 09:45-10:15 • INVITED
Controlling plasma channels through ultrashort laser pulse filamentation, A.A.Ionin, *P.N.Lebedev Institute, Russia.* Review of studies fulfilled at Lebedev Institute in collaboration with Moscow State and Institute of Atmospheric Optics on influence of various characteristics of ultrashort laser pulse on plasma channels formed under its filamentation is presented.

IFB3 • 10:15-10:45 • INVITED
Laser filamentation in solids: from nanosecond to femtosecond propagation regimes, L.Berg'e, J.Rolle, S.Mauger, G.Colin de Verdi`ere, *Commissariat a l'Energie Atomique, France,* S.Skupin, *Max-Planck Inst., Germany, Friedrich Schiller Univ., Germany.* We present recent results on pulse filamentation in the nanosecond regime. Emphasis is put on the coupling between Kerr self-focusing and stimulated Brillouin backscattering, coupled wave instabilities and electron plasmas excited over femtosecond time scales.

Hall 6
ICONO-04/1

9:00–11:00
IFC • Quantum Physics, Information, and Technologies I (ICONO-04/1)—Continued

IFC3 • 10:00-10:15
Bose-Einstein condensation for trapped atomic polaritons in a biconical waveguide cavity, A.P.Alodjants, I.Yu.Chestnov, S.M.Arakelian, *Vladimir State Univ., Russia.* The problem of high temperature Bose-Einstein condensation of atom-light polaritons in a waveguide cavity was studied. Polaritons occur due to interaction of two-level atoms with non-resonant quantized optical radiation, in the strong coupling regime, in the presence of optical collisions with buffer gas of a very high pressure (500 bar). We propose a special biconical waveguide cavity, permitting localization and trapping of low branch polaritons. We have shown that critical temperature of BEC occurring in the system can be high enough – few hundred Kelvins.

IFC4 • 10:15-10:30
Revealing interference by continuous variable discordant states, G.Brida, I.P.Degiovanni, M.Genovese, A.Meda, *INRIM, Italy,* S.Olivares, M.G.A.Paris, *Univ. degli Studi di Milano, Italy, CNISM UdR Milano Statale, Italy.* We analyze properties of Gaussian states with peculiar quantum optical correlation properties to apply them even under scenarios that exceed the standard classification of quantum states into entangled and separable, like the one based on the use of the parameter discord.

Hall 1
ICONO-05/4

9:00–11:00
IFA • High-Field Physics and Attoscience IV (ICONO-05/4)—Continued

IFA5 • 10:30-10:45
Ultra high temporal contrast dual-beam Ti:sapphire laser system, M.P.Kalashnikov, L.Ehrentraut, G. Priebe, M.Schnuerer, H.Schoennagel, S.Steinke, W.Sandner, *Max-Born-Inst., Germany.* A double CPA Ti:sapphire laser system with two beams of the power level of 70 TW and 100 TW runs at 10Hz and generates optical pulses with temporal contrast in excess of 10^{11}.

IFA6 • 10:45-11:00
Prepulse effect on relativistic hot electron generation, K.A.Ivanov, S.A.Shulyapov, A.S.Larkin, D.S.Uryupina, A.B.Savel'ev, R.V.Volkov, *Lomonosov Moscow State Univ., Russia,* A.V.Brantov, V.Yu.Bychenkov, *P.N.Lebedev Physical Inst., Russia,* V.T.Tikhonchuk, *Univ. of Bordeaux-1, France*. The growth of hot electron energy is achieved at large preplasma at relativistic laser plasma interaction with a low contrast pulse. The micromodification of a target surface by prepulse is observed, leading to more efficient electron heating.

Hall 2
LAT-04/4

9:00–11:00
LFA • Diffractive Optics and Nanophotonics IV (LAT-04/4)—Continued

LFA5 • 10:30-10:45
Fabrication of diamond film-based photonics with focused ion beam, K.N.Tukmakov, B.O.Volodkin, *S.P.Korolev Samara State Aerospace Univ, Russia,* V.S.Pavelyev, *Image Processing Systems Inst., Russia,* M.S.Komlenok, A.A.Khomich, *A.M.Prokhorov General Physics Inst., Russia,* V.G.Ralchenko, *CVD Spark Ltd, Russia.* Diamond with color centers is of interest as a medium for quantum-based processing and storing devices at room temperature because of its suitability for realizing quantum bits and auxiliary waveguides in single diamond film. We report on use of focused ion beam to fabricate a photonic crystal resonator in microcrystalline diamond film and on investigation of its optical properties.

LFA6 • 10:45-11:00
Silicon diffractive optical elements for transformation of terahertz Novosibirsk Free Electron Laser radiation, V.S.Pavelyev, *Image Processing Systems Inst., Russia,* B.O.Volodkin, K.N.Tukmakov, A.N.Agafonov, *Samara State Aerospace Univ., Russia,* B.A.Knyazev, Yu.Yu.Choporova, *Budker Inst. of Nuclear Phys., Russia, Novosibirsk State Univ., Russia,* A.K.Kaveev, G.I.Kropotov, *TYDEX, J. S. Co., Russia.* Binary silicon diffractive optical elements (diffractive lenses, beam-splitters and gauss-to-rectangle focuser) for the terahertz spectral range have been designed and characterized using terahertz radiation of the Novosibirsk Free Electron Laser. Effect of an antireflection coating on the silicon elements was studied.

Hall 3
LAT-02/1

9:00–10:45
LFB • High-Power Lasers and Applications I (LAT-02/1)—Continued

LFB4 • 10:30-10:45
Shock compression of the materials in the range up to 100 Mbar, S.A.Bel'kov, S.G.Garanin, V.N.Derkach, V.M.Izgorodin, G.G.Kochemasov, I.N.Voronich, N.V.Zhidkov, *RFNC-VNIIEF, Russia.* Shock compression of the materials in the range up to 100 Mbar is discussed.

Hall 4
LAT-06/2

9:00–11:00
LFC • Advances in Electro/Magneto-Optics Materials II (LAT-06/2)—Continued

LFC5 • 10:30-10:45
Fabrication of microdomains and microdomain arrays by the AFM-method in strontium-barium niobate crystals, Ya.V.Bodnarchuck, R.V.Gainutdinov, T.R.Volk, *Inst. of Crystallography, Russia.* We present the data on recording microdomains and specified 1D and 2D microdomain structures in the field of an atomic force microscope (AFM) on the polar and nonpolar surfaces of the ferroelectric solid-solution strontium-barium niobate (SBN) crystals. The structures are fabricated by applying dc-voltages UDC to an AFM–tip contacting to the crystal surfaces. The AFM-recording was performed both on the polar and non-polar crystals surfaces.

LFC6 • 10:45-11:00
Strontium barium niobate (SBN) thin films for electro-optic and nonlinear photonic applications, M.Cuniot-Ponsard, *Lab. Charles Fabry, IOGS, CNRS, Univ. Paris Sud, France.* Epitaxial ferroelectric SBN thin films have been grown on conductive substrates. The electro-optic coefficient is measured larger than that of a LN crystal. Then the use of AFM to write and read domains is investigated in view of nonlinear applications.

Hall 5
ICONO-09/1

9:00–11:00
IFB • Symposium on Femtosecond Laser Pulse Filamentation I (ICONO-09/1)—Continued

IFB4 • 10:45-11:00
Remotely pumped stimulated emission at 337 nm in atmospheric nitrogen, D.Kartashov, S.Alisauskas, A.Pugzlys, A.Baltuska, *Vienna Univ. of Technology, Austria,* A.Schmitt-Sody, W.Roach, *Air Force Research Labs, Kirtland Air Force Base, USA,* P.Polynkin, *Univ. of Arizona, USA.* Stimulated emission at 337nm in atmospheric nitrogen pumped by an energetic picosecond laser pulse at 1,053nm is reported. The gain at 337nm is seeded by the spectral tail of the third harmonic of the pump.

Hall 6
ICONO-04/1

99:00–11:00
IFC • Quantum Physics, Information, and Technologies I (ICONO-04/1)—Continued

IFC5 • 10:30-10:45
Stimulated Raman processes under conditions of radiation trapping, L.V.Gerasimov, M.D.Havey, I.M.Sokolov, D.V.Kupriyanov, *St.-Petersburg State Polytechnic Univ., Russia, Old Dominion Univ., USA.* We consider the stimulated Raman process when the scattered mode is trapped on a dipole-closed atomic transition and can only diffusely escape the atomic sample. This enhances the coupling strength for the light – atom quantum interface and can attain the random lasing regime.

IFC6 • 10:45-11:00
Fluctuations estimations of the laser beams intensity in a turbulent atmosphere, B.A.Kuzyakov, V.A.Shmelev, R.V.Tihonov, V.S.Toptygin, *Moscow State Inst. of Radio-engineering, Electronics and Automation (Technical Univ.) Russia.* Methods of a laser beams phase correction in a turbulent atmosphere are examined. It is shown, that a method using of the orbital angular momentum states of photons, has the substantial advantages.

Hall 1
ICONO-05/4

11:30–13:00
IFD • High-Field Physics and Attoscience V (ICONO-05/4)
Peter Nickles, *Gwangiu Inst. of Science and Technology, Korea, Presider*

IFD1 • 11:30-12:00 • INVITED
Surprising strong-field physics in laser filamentation: lasing without inversion and bound states of a free electron, M.Ivanov, *Max Born Inst., Germany.* I will describe signatures of strong-field stabilized Rydberg states in the Kerr response of a gas, and the possibility of using molecular rotations to achieve lasing without inversion in the air.

IFD2 • 12:00-12:15
Extremely short pulses formation from resonant radiation in atomic gases, V.A.Antonov, Y.V.Radeonychev, M.Yu.Ryabikin, *Inst. of App. Phys., Russia,* O.A.Kocharovskaya, *Texas A&M Univ., USA.* We show the possibility to produce extremely short pulses from resonant radiation in atomic gases, dressed by an IR laser field, and discuss the underlying physical mechanisms on the basis of the derived analytical solutions.

Hall 2
JOINT/1

11:30–13:00
JFA • Joint Symposium on THz Optics and Technologies I (JOINT/1)
Christos Flytzanis, *Ecole Normale Superieure, France, Presider*

JFA1 • 11:30-12:15 • KEYNOTE
New directions in THz spectroscopy of condensed matter, P.Uhd Jepsen, *Technical Univ. of Denmark, Denmark.* The THz spectral range plays a key role in exploring physical phenomena in condensed matter. With state-of-the-art femtosecond laser technology it is possible to generate and detect extremely stable, ultrabroadband THz signals which can be used for the investigation of linear as well as extremely nonlinear phenomena in the THz range on the femtosecond time scale. In this presentation I will discuss linear, ultrafast photoconductive dynamics in disordered conductive systems and phenomena in metals where nonlinear optics is taken to the extreme electrostatic limit.

Hall 3
LAT-02/2

11:30–13:00
LFD • High-Power Lasers and Applications II (LAT-02/2)
Anthony Dunne, *Lawrence Livermore Natl. Lab., USA, Presider*

LFD1 • 11:30-12:00 • INVITED
A review of alkali lasers research and development, B.V.Zhdanov, R.J.Knize, *US Air Force Academy, USA.* In this talk, we present a short historical review of the alkali lasers research and development and discuss the most important achievements and future perspectives in this field of research.

LFD2 • 12:00-12:15
Kinetic and fluid dynamic processes in diode pumped alkali lasers: model calculations, B.D.Barmashenko, S.Rosenwaks, *Ben-Gurion Univ. of the Negev, Israel.* A semi-analytical model is developed for analysis of the kinetic and fluid dynamic processes in diode pumped alkali lasers (DPALs). Good agreement is obtained with measurements in static and flowing-gas DPALs.

Hall 4
ICONO-02/1

11:30–13:00
IFE • Nonlinear Space-Time Dynamics, Instabilities, and Patterns I (ICONO-02/1)
Stefan Skupin, *Friedrich Schiller Univ., Germany, Presider*

IFE1 • 11:30-12:15 • KEYNOTE
Nonlinear effects in subwavelength structures: from metamaterials to nanoplasmonics, Yu.Kivshar, *Australian Natl Univ., Australia, Russia.* This talk will discuss recent advances in nonlinear physics of novel metamaterial systems where structuring at the subwavelength scale may bring novel effects, including nonlinear tunability of metamaterials, oscillons and kinks in lattices of nonlinear nanoparticles, plasmonic cloaking and superscattering, and plasmon solitons.

Hall 5
ICONO-09/2

11:30–13:30
IFF • Symposium on Femtosecond Laser Pulse Filamentation II (ICONO-09/2)
See Leang Chin, *Univ. Laval, Canada, Presider*

IFF1 • 11:30-12:00 • INVITED
Femtosecond ultraviolet filamentation in water, A.Couairon, *Ecole Polytechnique, CNRS, France,* G.Tamosauskas, D.Majus, A.Dubietis, *Vilnius Univ., Lithuania,* A.Jarnac, A.Houard, A.Mysyrowicz, *ENSTA ParisTech, Ecole Polytechnique, CNRS, France.* Measurements fully characterizing the dynamics of 400 nm femtosecond pulses undergoing filamentation in water will be presented. Correlations between pulse-splitting, supercontinuum generation, conical emission, and nonlinear absorption peaks will be presented and compared to the results of numerical simulations.

IFF2 • 12:00-12:30 • INVITED
Filamentation dynamics probed by strong field processes, Milutin Kovačev, *Univ. Hannover, Germany*. Strong field processes can be used to track complex dynamics in filamentary propagation of ultra-short femtosecond laser pulses. We review latest results on the generation of high-order harmonic radiation from femtosecond filaments and elucidate propagation effects through observation of the resulting pulse duration.

Hall 6
ICONO-04/2

11:30–13:00
IFG • Quantum Physics, Information, and Technologies II (ICONO-04/2)
Paolo Mataloni, *La Sapienza Univ. do Roma, Italy, Presider*

IFG1 • 11:30-12:00 • INVITED
Nonlinear processes responsible for mid-infrared and blue light generation in alkali vapours, A.Akulshin, R.McLean, *Swinburne Univ. of Technology, Australia,* D.Budker, B.Patton, *Univ. of California, USA.* The nonlinear processes responsible for frequency up- and down-conversion of resonant low-intensity laser radiation in Rb vapour have been evaluated from the spatial and temporal properties of blue and mid-IR light resulting from wave mixing.

IFG2 • 12:00-12:30 • INVITED
Quantum simulator using atoms and photons in a hollow core fiber, L.C.Kwek, *Natl Univ. of Singapore, Singapore.* To circumvent the limitations of conventional computers in tackling complex physical processes, Richard Feynman proposed nearly thirty years ago a means of using well-understood quantum systems called quantum simulators (or quantum emulators) to emulate similar, but otherwise poorly understood, quantum systems. Among the various physical systems that could be used to build a quantum simulator, one possibility is the use of regular ar- rays of atoms or ions that are held in place by laser fields. In this talk, we describe how a quantum simulator is also possible through photons propagating through a nonlinear optical waveguide and interacting with cold atomic ensemble placed inside the fiber.

Hall 1
ICONO-05/5

11:30–13:00
IFD • High-Field Physics and Attoscience V (ICONO-05/5)—Continued

IFD3 • 12:15-12:45 • INVITED
Ultra-intense laser systems based on coherent beam combining, S.N.Bagayev, V.I.Trunov, E.V.Pestryakov, S.A.Frolov, V.E.Leschenko, A.E.Kokh, V.A.Vasiliev, *Inst. of Laser Phys., Russia.* A comparative analysis of the methods of coherent combining of few-cycle femtosecond pulses and the main factors determining its efficiency for multichannel systems based on laser and parametric amplification cascades is done. Coherent summation of parametrically amplified femtosecond pulses are investigated both experimentally and theoretically.

IFD4 • 12:45-13:00
Nuclear reactions initiation from picosecond laser-produced plasmas, V.V.Bolshakov, V.S.Belyaev, A.P.Matafonov, *TsNIImash, Russia.* The experimental results on the initiation of various (γ, n) and (p, n) nuclear reactions in the picosecond laser plasma are presented. It is demonstrated that the following nuclear reactions can be initiated at a laser intensity of 2×10^{18} W/cm^2.

Hall 2
JOINT/1

11:30–13:00
JFA • Joint Symposium on THz Optics and Technologies I (JOINT/1)—Continued

JFA2 • 12:15-12:45 • INVITED
Planar Terahertz Graphene Plasmonic Metamaterials, V.V.Popov, *Kotelnikov Inst. of Radio Engineering and Electronics, Russia, Saratov State Univ., Russia.* Recent advances in studying planar plasmonic metamaterials employing two-dimensional electron systems including graphene are reviewed. It is demonstrated that such metamaterials strongly couple to terahertz radiation and can be used as modulators, near-field concentrators, amplifiers and generators of terahertz radiation.

JFA3 • 12:45-13:00
THz properties of carbon nanoparticles, I.Khromova, *Public Univ. of Navarra, Spain,* L.Melnikov, *Saratov State Technical Univ., Russia,* A.Ponomarev, *JSC Astrin-Holding, Russia.* We present an experimental study of THz properties of different carbon nanomaterials: fullerenes C_{60}/C_{70}, multiwall carbon nanotubes (MWCNTs), microtubes and astralen nanoparticles. We show that different allotropes of carbon, depending on their molecular structure and geometry, exhibit different THz responses – from uniform to resonant. This allows us to suggest that carbon nanoparticles can be considered a promising material for THz applications.

Hall 3
LAT-02/2

11:30–13:00
LFD • High-Power Lasers and Applications II (LAT-02/2)—Continued

LFD3 • 12:15-12:30
High efficient cryogenic disk laser with sub-J output energy and sub-kHz repetition rate, E.Perevezentsev, I.Mukhin, O.Vadimova, O.Palashov, E.Khazanov, I.Kuznetsov, *Inst. of Appl. Phys., Russia.* Cryogenic disk laser with high output energy and average power is under developing. Currently, 233 mJ at 143 Hz and 125 mJ at 500 Hz are achieved from the main amplifier of laser system and ways to increase of output parameters are discussed.

LFD4 • 12:30-12:45
Correction of wave front distortions in the large-aperture YAG:Nd^{3+} laser generator, Yu.D.Arapov, A.F.Ivanov, A.V.Lukin, L.E.Magda, *VNIITF, Russia.* Growing of a rod YAG:Nd active elements diameter of 20 mm with high optical wave-front quality is very difficult technical process. For similar crystals distortions of wave front up to several micrometers are typical. In paper shows the experimental results of correcting aberration in a Nd:YAG large-aperture rod in high power pulse periodical DPSS laser. Initially, the transmitted wave front error for this laser rod was 2.3 μm (PV), 0.4 μm (RMS) at 632 nm in the 19-mm clear aperture. Using conformal optical elements (COE) this error was reduced to 0.04 μm. At laser work in a mode of free generation with the active medium inserted simultaneously with the COE in the resonator brightness substantial growth was observed.

LFD5 • 12:45-13:00
Generation of multipass modes in stable open resonators, V.G.Niziev, *Inst. on Laser and Inform. Technologies, Russia.* Newly developed numerical simulation of axially symmetrical resonators was employed in study of transverse mode formation. Single pass wave and multipass ray modes were obtained. Possibilities to obtain quality radiation from power lasers are discussed.

Hall 4
ICONO-02/1

11:30–13:00
IFE • Nonlinear Space-Time Dynamics, Instabilities, and Patterns I (ICONO-02/1)—Continued

IFE2 • 12:15-12:30 • INVITED
Optical billiard with pulsed laser beams, A.P.Sukhorukov, V.E.Lobanov, D.M.Zverev, *Lomonosov Moscow State Univ., Russia.* We discuss effects of pulsed laser beams collision. Mutual repulsion and switching speed and direction of signal and reference occur in defocusing media. Optical trajectories are similar to bone balls motion on a pool table.

IFE3 • 12:45-13:00
Parametric Doppler effect in nonlinear optical media, N.N.Rosanov, *St.-Petersburg Natl Res. Univ. of Inform. Technologies, Mechanics and Optics, Russia,* N.V.Vyssotina, *Vavilov State Optical Institute, Russia.* Presented is a review of the theory of parametric Doppler effect in nonlinear media where strong pump and weak probe waves propagate, and the consideration of corresponding frequency transformation between transparency bands in silica glass.

Hall 5
ICONO-09/2

11:30–13:30
IFF • Symposium on Femtosecond Laser Pulse Filamentation II (ICONO-09/2)—Continued

IFF3 • 12:30-13:00 • INVITED
Rogue waves in the beam profiles of femtosecond multifilaments, G.Steinmeyer, S.Birkholz, C.Bree, E.T.J.Nibbering, *Max-Born-Inst. für Nichtlineare Optik und Kurzzeitspektroskopie, Germany,* G.Genty, *Weierstraß-Inst. für Angewandte Analysis und Stochastik, Germany,* S. Skupin, *Max-Planck-Inst. für Physik komplexer Systeme, Germany, Univ. Jena, Germany.* The appearance of extreme-value statistics is experimentally observed in the beam profiles of multifilaments. A completely new type of optical rogue wave behavior is observed that does not rely on nonlinear noise amplification.

IFF4 • 13:00-13:30 • INVITED
Logarithmic scaling in the self-focusing of a laser beam in Kerr media, P.M.Lushnikov, S.A.Dyachenko, N.Vladimirova, *Univ. of New Mexico, USA*. Self-focusing of laser beam has well-known loglog collapse scaling. Validity of that scaling requires unrealistic amplitudes. We derive new collapse scaling which agrees with simulations beginning with amplitudes three times above of the initial pulse.

Hall 6
ICONO-04/2

11:30–13:00
IFG • Quantum Physics, Information, and Technologies II (ICONO-04/2)—Continued

IFG3 • 12:30-12:45
Coherent effects in resonance gas of cesium or rubidium diatomic molecules, S.A.Sahakian, *Joint Inst. for High Temperatures, Russia,* V.A.Sautenkov, *P.N.Lebedev Physical Inst., Russia,* A.M.Akulshin, *Swinburne Univ. of Technology, Australia,* B.B.Zelener, *Natl Res. Nuclear Univ., Russia.* We study coherent effects such as electromagnetically induced transparency and four-wave mixing in cesium and rubidium diatomic molecules. Our observations demonstrate a possibility of the light storage and intensity squeezing in a gas of alkali molecules.

IFG4 • 12:45-13:00
Measurement of the temperature of atomic ensembles via which-way information, R. de J.Leon-Montiel, J.P.Torres, *ICFO-Inst. de Ciencies Fotoniques, Univ. Politecnica de Catalunya, Spain.* We unveil a relationship between the temperature of a three-level atomic ensemble and the direction of emission of Stokes photons under pulse excitation. This relationship allows us to devise a new scheme to measure the temperature of atomic ensembles.

Hall 1 ICONO-05/6

14:00–16:00
IFH • High-Field Physics and Attoscience VI (ICONO-05/6)
Dimitros Charalambidis, *FORT-IESL, Greece, Presider*

IFH1 • 14:00-14:30 • INVITED
Charge transfer processes in dissociating molecules upon core-shell photoionization, B.Erk, D.Rolles, R.Boll, L.Foucar, D.Anielski, B.Rudek, S.W.Epp, I.Schliching, J.Ullrich, *Max Planck Advanced Study Group at CFEL, Germany,* M.Cryle, *Max-Planck-Inst. für Medizinische Forschung, Germany,* Ch.Bostedt, R.Coffee, K.R.Fergusson, S.Schorb, M.Swiggers, J.Bozek, *SLAC Natl Accelerator Lab., USA,* T.Marchenko, M.Simon, *UPMC and CNRS, France,* S.Trippel, J.Küpper, *Center for Free-Electron Laser Sci. CFEL, Germany,* S.-I.Wada, *Hiroshima Univ., Japan,* K.Ueda, *Tohoku Univ., Japan,* R.Moshammer, *Max-Planck-Inst. für Kernphysik, Germany,* A.Rudenko, *Kansas State University, USA*. Ultrafast charge rearrangement and nuclear dynamics in multiphoton inner-shell ionization of molecules by free-electron laser radiation are studied employing coincident momentum spectroscopy. Signatures of efficient charge exchange during molecular fragmentation are observed in time-resolved experiments.

IFH2 • 14:30-14:45
Interference stabilization and entanglement of a model Rydberg atom in a quantum electromagnetic field, P.R.Sharapova, O.V.Tikhonova, *Lomonosov Moscow State Univ., Russia*. The stabilization and entanglement arising in the case of interaction of a model Rydberg atom with quantum electromagnetic field is studied. Stable atomic wave packet highly entangled with a quantum field mode is found even in the limit of large time.

Hall 2 JOINT/2

14:00–16:00
JFB • Joint Symposium on THz Optics and Technologies II (JOINT/2)
Peter Jepsen, *Technical Univ. of Denmark, Denmark, Presider*

JFB1 • 14:00-14:30 • INVITED
Ultrafast high THz-field driven charge transport in semiconductors: transition from ballistic to diffusive transport regime, Th.Elsaesser, P.Bowlan, K.Reimann, M.Woerner, *Max-Born-Inst. für Nichtlineare Optik und Kurzzeitspektroskopie, Germany,* C.Flytzanis, *Ecole Normale Superieure, France,* R.Hey, *Paul-Drude-Inst. für Festkörperelektronik, Germany*. We present an experimental and theoretical study of ultrafast high THz-field-driven charge transport in bulk GaAs, in electron and hole plasma and in photo-generated electron-hole plasma. We evidence the transition from ballistic to diffusive regime in the latter case and the role played by the quantum coherences and quantum-kinetic scattering processes in conjunction with induced carrier-carrier interactions.

JDB2 • 14:30-15:00 • INVITED
THz Response of HgTe/CdTe Quantum Wells and Narrow-Gap HgCdTe Films: from Fundamentals to Applications, V.I.Gavrilenko, S.V.Morozov, V.V.Rumyantsev, M.S.Zholudev, A.V.Antonov, A.A.Dubinov, K.V.Maremyanin, K.E.Kudryavtsev, L.V.Krasilnikova, V.Ya.Aleshkin, N.N.Mihailov, S.A.Dvoretckiy, *Moscow Physico-Technical Inst., Russia*. Investigation into detection and emission of THz radiation in narrow gap HgCdTe layers and QWs is presented. A possibility of THz lasing in CdHgTe waveguide QW structures is discussed.

Hall 3 LAT-02/3

14:00–16:00
LFE • High-Power Lasers and Applications III (LAT-02/3)
Sergey Garnov, *Prokhorov General Physics Inst., Russia, Presider*

LFE1 • 14:00-14:30 • INVITED
Radiation properties of dense matter pumped by X-ray emission of plasma irradiated by laser intensities over 10^{20} W/cm^2, A.Ya.Faenov, S.A.Pikuz, I.Yu.Skobelev, *Joint Inst. for High Temperature, Russia,* J.Colgan, J.Abdallah Jr., *Los Alamos Natl Lab., USA,* E.Wagenaars, O.Culfa, R.J.Dance, A.L.Rossall, *Univ. of York, UK,* N.Booth, K.L.Lancaster, *STFC Rutherford Appleton Lab., UK,* C.R.D.Brown, D.J.Hoarty, *AWE, UK,* R.G.Evans, *Imperial College, UK,* R.J.Gray, P.McKenna, *Univ. of Strathclyde, UK,* T.Kaempfer, K.S.Schulze, I.Uschmann, A.G.Zhidkov, *Friedrich-Schiller-Univ. at Jena, Germany,* N.C.Woolsey, *PPC Osaka Univ. and JST, CREST, Japan*. When matter is heated by X-rays, electrons in the inner shells are ionized before the valence electrons and create atoms or ions with empty internal electron shells, which are known as hollow atoms. We demonstrate that such exotic states of matter, which are very far from equilibrium, can be formed by conventional optical laser technology when the laser intensity reached 10^{20} W/cm^2 and approaches to the radiation dominant regime.

LFE2 • 14:30-15:00 • INVITED
High quality electron and X-ray beams delivered by laser plasma accelerators, V.Malka, S.Corde, C.Thaury, K.Ta Phuoc, G.Lambert, A.Lifschitz, A.Rousse, *ENSTA ParisTech - CNRS UMR7639- École Polytechnique, France*. Laser plasma accelerators provide in an elegant and compact way high quality beams of electron and X-rays. Their remarkable properties are of interest for a very broad range of applications.

Hall 4
ICONO-02/2

14:00–16:00
IFI • Nonlinear Space-Time Dynamics, Instabilities, and Patterns II (ICONO-02/2)
Nikolay Rosanov, *St. Petersburg Natl. Univ. of Inf. Technologies, Mechanics, and Optics, Russia, Presider*

IFI1 • 14:00-14:30 • INVITED
Ultrashort light sources from laser matter interaction, S.Skupin, *Max Planck Inst. for the Phys. of Complex Systems, Germany, Friedrich Schiller Univ., Germany,* I.Babushkin, *Weierstrass-Inst. fuer Angewandte Analysis und Stochastik, Germany,* C.Koehler, L.Berge, *CEA-DAM, DIF, France,* E.Cabrera-Granado, *Univ. Complutense, Spain,* A.Husakou, J.Herrmann, *Max-Born-Inst. fuer Nichtlineare Optik und Kurzzeitspektroskopie, Germany.* High-intensity laser matter interaction can be exploited for the generation of radiation at new frequencies. Here, we will focus on the understanding of the relevant processes for THz generation and their efficient numerical modeling.

IFI2 • 14:30-15:00 • INVITED
Quantum walks of photon pairs in coupled nonlinear waveguides, A.A.Sukhorukov, A.S.Solntsev, D.A.Antonosyan, C.W.Wu, D.N.Neshev, Yu.S.Kivshar, *Australian Natl Univ., Australia.* We develop novel schemes for generation of entangled photon-pairs through spontaneous wave mixing accompanied by quantum walks in nonlinear coupled waveguides. We demonstrate control of non-classical output photon correlations through phase-matching and waveguide coupling engineering.

Hall 5
ICONO-09/3

14:00–16:30
IFJ • Symposium on Femtosecond Laser Pulse Filamentation III (ICONO-09/3)
Ruxion Li, *SIOM, CAS, Presider*

IFJ1 • 14:00-14:30 • INVITED
Non-linear optics merely using filament from a collimated femtosecond beam, A.Savel'ev, O.Kosareva, D.Uryupina, N.Panov, R.Volkov, S.L.Chin, *Lomonosov Moscow State Univ., Russia.* The collimated beam geometry that can be used to launch the femtosecond filament enhances its non-linearity and supports more stable filaments. We discuss a few example of implementations of the collimated beam scheme for highly efficient non-liner optical transformation of femtosecond laser pulses.

IFJ2 • 14:30-15:00 • INVITED
Filamentation and THz emission in air of a few cycle intense laser pulse at 1.8 microns, R.Li, P.Liu, Y.Bai, L.Song, R.Xu, Zh.Xu, *Shanghai Inst. of Optics and Fine Mechanics, CAS, China.* We developed a scheme to generate waveform-controlled THz radiation from air plasma produced when carrier-envelope-phase (CEP) stabilized few-cycle laser pulses undergo filamentation in ambient air, which can be used in the phase-sensitive THz remote sensing.

Hall 6
ICONO-04/3

14:00–16:00
IFK • Quantum Physics, Information, and Technologies III (ICONO-04/3)
Alexander Akulshin, *Swinburne Univ. of Technology, Australia*, *Presider*

IFK1 • 14:00-14:30 • INVITED
Entangling distant microwave resonators with local optical certification, P.Tombesi, *Univ. di Camerino, Italy.* A new protocol for distant parties entanglement certification is introduced to avoid non-local measurement.

IFK2 • 14:30-15:00 • INVITED
Majorana fermions in atomic wire networks and topologically protected quantum computing, M.A.Baranov, *RRC "Kurchatov Inst.", Russia,* C.V.Craus, P.Zoller, *Inst. for Quantum Optics and Quantum Information, Austria, Innsbruck Univ., Austria.* I discuss topologically protected Majorana edge states in systems of fermionic atoms in optical lattices: How one can create them, detect, braid, and use for a topologically protected implementation of the Deutsch-Josza algorithm.

Hall 1 ICONO-05/6	Hall 2 JOINT/2	Hall 3 LAT-02/3

14:00–16:00
IFH • High-Field Physics and Attoscience VI (ICONO-05/6)—Continued

IFH3 • 14:45-15:00
Control of atomic dynamics in laser-assisted electron-atom scattering through the driving laser ellipticity, N.L.Manakov, A.V.Flegel, M.V.Frolov, A.N.Zheltukhin, *Voronezh State Univ., Russia,* A.F.Starace, *Univ. of Nebraska, USA.* We predict orders of magnitude increases of the cross sections for laser-assisted low-energy electron-atom scattering as the laser ellipticity is increased. These ellipticity-controlled enhancements are manifestations of the field-free electron-atom scattering dynamics, such as the Ramsauer-Townsend effect in elastic electron-atom scattering.

IFH4 • 15:00-15:15
Propagation of femtosecond laser pulses through molecular gas medium with orientational nonlinearity, A.V.Gulyaev, S.S.Krassil'nikov, O.V.Tikhonova, *Lomonosov Moscow State Univ., Russia.* The propagation of a femtosecond laser pulse through molecular gas medium with orientation nonlinearity is studied. The field-induced molecular alignment is found to influence dramatically on the pulse evolution . The efficient broadening of the pulse spectrum is observed.

IFH5 • 15:15-15:30
Perspectives of attosecond pulse generation using resonance-enhanced high order harmonics, V.V. Strelkov, M.A. Khokhlova, *A.M.Prokhorov General Physics Inst., Russia.* We suggest the theory describing generation of a harmonic resonant with the transition from ground to autoionizing state of the generating particle. Calculating both harmonic amplitudes and phases, we study attopulse generation using these harmonics.

14:00–16:00
JFB • Joint Symposium on THz Optics and Technologies II (JOINT/2)—Continued

JFB3 • 15:00-15:15 • INVITED
Detection and quantification of atmospheric pollutants by means of THz instruments, R. Bocquet, G. Mouret, F. Hindle, A. Cuisset, *Univ. de Lille, France*. It will be presented at the conference why and how using THz waves to monitor air pollutants as well as the advantages and disadvantages of different techniques. We will discuss different techniques for the field measurements.

14:00–16:00
LFE • High-Power Lasers and Applications III (LAT-02/3)—Continued

LFE3 • 15:00-15:15
Multi-terawatt laser system of visible spectral range, V.Losev, N.Ratakhin, *Tomsk Polytechnic Univ., Russia,* S.Alekseev, N.Ivanov, B.Kovalchuk, Yu.Panchenko, A.Yastremsky, *Inst. of High Current Electronics, Russia,* L.Mikheev, G.Mesyats, *P.N.Lebedev Physical Inst., Russia.* The research results of a THL-100 multi-terawatt hybrid laser system based on a Start-480M titanium-sapphire starting complex and photochemical XeF(C-A) amplifier with a 25-cm aperture are presented. A laser beam peak power of 14 TW at 475 nm wavelength has been attained.

LFE4 • 15:15-15:30
220 nJ mode-locked fs fiber laser tunable from 976 nm to 1070 nm, R.Royon, J.Lhermite, L.Sarger, E.Cormier, *Univ. de Bordeaux- CNRS-CEA, France.* We report on tunable femtosecond pulse generation from an all-normal dispersion Yb-doped-fiber-oscillator emitting from 976 nm to 1070 nm. The laser delivers chirped pulses of 10 ps with an energy of 220 nJ. Pulses are externally recompressed below 350 fs.

Hall 4
ICONO-02/2

14:00–16:00
IFI • Nonlinear Space-Time Dynamics, Instabilities, and Patterns II (ICONO-02/2)—Continued

IFI3 • 15:00-15:15
Instability of a soliton crystal in a high power fiber laser, A.Niang, F.Amrani, M.Salhi, H.Leblond, F.Sanchez, *Univ. of Angers, France,* A.Komarov, K.Komarov, *Inst. of Automation and Electrometry, Russia.* We investigate experimentally the soliton pattern formation in passively mode-locked fiber lasers. Under specific conditions a stable soliton crystal is formed. We demonstrate that the crystal becomes unstable when the pumping power increases resulting in a splitting into crystals of smaller extent.

IFI4 • 15:15-15:30
Prospects for low-Q distributed-feedback sub-monolayer quantum-dot lasers: from superradiant pulsed operation to spontaneous self-mode locking, A.A.Belyanin, *Texas A&M Univ., USA,* E.R.Kocharovskaya, V.V.Kocharovsky, Vl.V.Kocharovsky, *Inst. of App. Phys., Russia.* We suggest novel class of semiconductor lasers, where photon lifetime is less than polarization lifetime and superradiance coexists with self-mode locking. We present their design and numerical analysis, based on the patterns of dynamical spectra.

Hall 5
ICONO-09/3

14:00–16:30
IFJ • Symposium on Femtosecond Laser Pulse Filamentation III (ICONO-09/3)—Continued

IFJ3 • 15:00-15:30 • INVITED
Quantum mechanical interpretation of higher-order optical Kerr effect in the strong field regime, P.Béjot, J.Houzet, F.Billard, E.Hertz, B.Lavorel, O.Faucher, *UMR 6303 CNRS-Université de Bourgogne, France,* J.Kasparian, J.-P.Wolf, *Univ. de Genève, Switzerland*, E.Cormier, *Univ. of Bordeaux 1, France.* Higher-Order Kerr effect commonly observed in gases under intense laser field is investigated in a quantum mechanical approach. The calculations reveal a supplementary contribution attributed to the interaction of continuum electrons with their parent ion.

Hall 6
ICONO-04/3

14:00–16:00
IFK • Quantum Physics, Information, and Technologies III (ICONO-04/3)—Continued

IFK3 • 15:00-15:15
Storage and non-collinear retrieval of orbital angular momentum of light in cold atoms, R.A. de Oliveira, P.S.Barbosa, D.Felinto, J.W.R.Tabosa, *Univ. Federal de Pernambuco, Brazil,* L.Pruvost, *CNRS, Univ. Paris-Sud, France,* D.Bloch, *CNRS, Univ. Paris 13, France.* We report on the storage and non-collinear retrieval of orbital angular momentum of light in an ensemble of cold cesium atoms. The stored and retrieved beams are shown to carry the same orbital angular momentum.

IFK4 • 15:15-15:30
Quantum state reconstruction with an unknown apparatus, D.Mogilevtsev, *Univ. Federal do ABC, Brazil,* A.Ignatenko, A.Maloshtan, *B.I.Stepanov Inst. of Phys., Belarus,* B.Stoklasa, J.Rehacek, Z.Hradil, *Palacky Univ., Czech Republic.* We propose a scheme for the reconstruction of the quantum state without a priori knowledge about the measurement setup. An iterative procedure for obtaining information about the measurement which is sufficient for an estimation of a particular signal state is developed.

Hall 1
ICONO-05/6

14:00–16:00
IFH • High-Field Physics and Attoscience VI (ICONO-05/6)—Continued

IFH6 • 15:30-15:45
Coherent attosecond X-rays from laser-nanofilm interaction, V.V.Kulagin, *Lomonosov Moscow State Univ., Russia,* V.A.Cherepenin, V.N.Kornienko, *Inst. of Radioengineering and Electronics., Russia.* Attosecond coherent X-ray pulses with controlled shape can be generated using a probe laser pulse counter reflection off a relativistic electron mirror, produced from a nanofilm by accelerating laser pulse. Using two-dimensional simulations, it is shown that, with modern laser installations, it is possible to generate coherent subterawatt level X-ray pulses with tens of attoseconds duration and less than 10 nm wavelength.

IFH7 • 15:45-16:00
Generation of hard x-rays in inverse Compton scattering from electrons driven by interfering laser pulses with tilted amplitude fronts, V.V.Korobkin, M.Yu.Romanovskiy, V.A.Trofimov, O.B.Shiryaev, *A.M.Prokhorov General Phys. Inst., Russia.* The radiation emitted by an ensemble of electrons which is driven by several interfering relativistically intense laser pulses with tilted amplitude fronts and interacts with a counterpropagating laser pulse is analyzed. Electrons are shown to emit short electromagnetic pulses into a narrow solid angle, with the radiation spectra reaching the hard x-ray range.

Hall 2
JOINT/2

14:00–16:00
JFB • Joint Symposium on THz Optics and Technologies II (JOINT/2)—Continued

JFB4• 15:30-15:45
Cellular and molecular effects of pulsed THz radiation in human skin in vivo, L.V.Titova[1], A.Ayesheshim[1], D.Fogen[2], A.Golubov[2], R.Rodriguez-Juarez[2], A.Kovalchuk[2], R.Woycicki[2], F.A.Hegmann[1], O.Kovalchuk[2], [1]*Univ. of Alberta, Canada,* [2]*Univ. of Lethbridge, Canada.*

Hall 3
LAT-02/3

14:00–16:00
LFE • High-Power Lasers and Applications III (LAT-02/3)—Continued

LWE5 • 15:30-15:45
Development of OPCPA channel of high power femtosecond diode-pumped Yb-laser system, V.V.Petrov, E.V.Pestryakov, A.V.Laptev, S.A.Frolov, V.I.Trunov, A.V.Kirpichnikov, *Inst. of Laser Phys., Russia.* Design of OPCPA-channel of amplification of femtosecond Yb:Y_2O_3 ceramic laser seed in LBO crystals and CPA-channel on cooled to cryogenic temperatures diode-pumped Yb-laser media, forming the picosecond pulses to pump parametric amplifiers of OPCPA-channel is discussed.

LWE6 • 15:45-16:00
Transversal interferometry of femtosecond filament plasma channel, V.V.Bukin, P.A.Chizhov, S.V.Garnov, *A.M.Prokhorov General Phys. Inst., Russia.* The results of experimental studying of plasma channel formation and recombination in gases (air, nitrogen and argon) are presented. Temporal dynamics of electron density for delay times up to 1 ns is obtained.

Hall 4
ICONO-02/2

14:00–16:00
IFI • Nonlinear Space-Time Dynamics, Instabilities, and Patterns II (ICONO-02/2)—Continued

IFI5 • 15:30-15:45
Mode instability in Yb^{3+}-doped high power fiber amplifiers: population and thermal gratings analysis, M.S.Kuznetsov, O.L.Antipov, *Inst. of App. Phys., Russia.* Spatio-temporal instability of fundamental mode in Yb^{3+}-doped large-mode-area fiber amplifiers under strong pumping was analyzed analytically and numerically. The traveling thermal and electronic (population) refractive index gratings were found to provide the inter-mode energy transfer.

IFI6 • 15:45-16:00
Optical switchings in a bistable VCSEL controlled by vibrational resonance, V.N.Chizevsky, *B.I.Stepanov Inst. of Phys., Belarus.* We experimentally demonstrate that optical switchings of polarization states in a bistable vertical-cavity surface-emitting laser at a selected polarization caused by a modulated orthogonal optical injection can be effectively controlled with an additional periodic current modulation through the phenomenon of vibrational resonance.

Hall 5
ICONO-09/3

14:00–16:30
IFJ • Symposium on Femtosecond Laser Pulse Filamentation III (ICONO-09/3)—Continued

IFJ4 • 15:30-15:45
Femtosecond filamentation of arbitrary polarized laser pulses in case of high order Kerr effect, N.A.Panov, V.A.Makarov, O.G.Kosareva, *Lomonosov Moscow State Univ., Russia,* V.Yu.Fedorov, *P.N.Lebedev Physical Inst., Russia.* We developed the model of filamentation, which includes high-order Kerr effect and an arbitrary pulse polarization. We show that for arbitrary pulse polarization the filament intensity tends to the one of linearly or circularly polarized pulse.

IFJ5 • 15:45-16:15 • INVITED
Mid-infrared femtosecond filaments in transparent media, D.Kartashov, S.Ališauskas, A.Pugžlys, A.Baltuška, *Vienna Univ. of Technology, Austria,* A.Zheltikov, *Lomonosov Moscow State Univ., Russia, Texas A&M Univ., USA,* J.Kasparian, M.Petrarca, J.-P.Wolf, *Univ. de Genève, Switzerland,* P.Béjot, *UMR 6303 CNRS-Univ. de Bourgogne, France,* D.Faccio, *Heriot-Watt Univ., UK.* We present an overview of results in experimental and numerical investigations of mid-IR femtosecond filamentation. Multi-octave supercontinuum generation and crucial role of Raman scattering in gases, a new filamentation regime in solids are discussed.

IFJ6 • 16:15-16:30
Multiple filamentation of picosecond sub-terawatt UV radiation pulses generated by Ti:Sapphire/KrF laser system GARPUN-MTW, V.D.Zvorykin, A.A.Ionin, L.V.Seleznev, A.O.Levchenko, D.V.Sinitsyn, I.V.Smetanin, E.A.Sunchugasheva, N.N.Ustinovskii, A.V.Shutov, *P.N.Lebedev Physical Inst., Russia.* Multiple filamentation of UV picosecond pulses being amplified at hybrid Ti:Sapphire/KrF laser facility GARPUN-MTW was investigated under propagation along an extended air distance of ~100 m. Peak pulse power attained 0.3 TW, which is in 3000 times higher than the critical value (~10^8 W) for filamentation of 248 nm wavelength radiation. In contrast to IR radiation filamentary UV laser beam does not reveal extended nonlinear focusing.

Hall 6
ICONO-04/3

14:00–16:00
IFK • Quantum Physics, Information, and Technologies III (ICONO-04/3)—Continued

IFK5 • 15:30-15:45
Cooperative light scattering on a $F_0 = 1 \rightarrow F' = 0$ transition, A.S.Sheremet, D.V.Kupriyanov, *St.-Petersburg State Polytechnic Univ., Russia,* A.D.Manukhova, *St.-Petersburg State Univ., Russia,* E.Giacobino, *Lab. Kastler Brossel, UPMC, CNRS, France.* We present here a microscopic analysis of the cooperative light scattering on an atomic system consisting of Lambda-type configured atoms with the spin-degenerate ground state. The results are compared with a similar system consisting of standard "two-level" atoms of the Dicke model.

IFR6 • 15:45-16:00
High resolution optical time-domain reflectometry using superconducting single-photon detectors, O.Minaeva, A.Fraine, A.Sergienko, *Boston Univ., USA,* A.Korneev, A.Divochiy, G.Goltsman, *Moscow State Pedagogical Univ., Russia.* We discuss the advantages and limitations of single-photon optical time-domain reflectometry with superconducting single-photon detectors. The higher two-point resolution can be achieved due to superior timing performance of SSPDs in comparison with InGaAs APDs.

Hall 1
LAT-05/1

16:30–18:30
LFF • Ultrafast Diagnostics in Laser Research I (LAT-05/1)
Mikhail Schelev**,** *Prokhorov General Physics Inst., Russia, Presider*

LFF1 • 16:30-17:15 • KEYNOTE
From microseconds to attoseconds recent achievements in high-speed imaging and photonics, M.Hugenschmidt, *Inst. for Photonics and Quantum Electronics, KIT, Karlsruhe Univ., Germany*. Based on studies at ISL (German-French Research Institute, Saint-Louis) and other institutes the keynote describes temporal resolution capabilities improved by 12 orders of magnitude since half a decade. Milestones are discussed, even including relativistic effects.

Hall 2
JOINT/3

16:30–18:30
JFC • Joint Symposium on THz Optics and Technologies III (JOINT/3)
Grigory Goltsman*, Moscow Pedagogicl State Univ., Russia, Presider*

JFC1 • 16:30-17:00 • INVITED
Tunable continuous-wave terahertz generation using photonic technologies, K.H.Park, N.Kim, J.-W.Park, S.-P.Han, K.Moon, H.Ko, D.Y.Kim, D.Lee, *ETRI, South Korea,* M.Y.Jeon, *Chungnam Natl Univ., South Korea,* D.W.Park, S.K.Noh, *Nano Materials Evaluation Center, KRISS, South Korea.* Newly developed several different types of semiconductor beating sources and broadband antenna integrated low-temperature-grown InGaAs photomixers show that the possibility of the realization of the cost-effective modules for the terahertz (THz) system.

JFC2 • 17:00-17:30 • INVITED
Sensitive detectors of terahertz radiation, D.R.Khokhlov, *Lomonosov Moscow State Univ., Russia.* The paper reviews technologies for sensitive detection of the terahertz radiation.

Hall 3
LAT-02/4

16:30–18:30
LFG • High-Power Lasers and Applications IV (LAT-02/4)
Anatoly Faenov**,** *Joint Inst. for High Temperatures, Russia, Presider*

LFG1 • 16:30-16:45
Excimer laser MOPA systems for high resolution lithography, Y.Wang, Y.Zhou, *Academy of Optoelectronics, China,* J.Zhou, *Shanghai Inst. of Optics and Fine Mechanics, China,* C.Jin, *Changchun Inst. of Optics, Fine Mechanics and Phys., China,* S.Vartapetov, V.Atezhev, I.Porofeev, I.Shcherbakov, *A.M.Prokhorov General Phys. Inst., Russia.* The high repetition rate ArF excimer laser (λ ~ 193 nm) with narrow line-width is designed. Excimer laser has MOPA (Master Oscillator – Power Amplifier) configuration. Laser generates pulse energy up to 10 mJ at 4 kHz with linewidth.

LFG2 • 16:45-17:00
The puzzle of ultrafast laser machining with longitudinal electric field, J.Zhang, M.Gecevičius, M.Beresna, P.G.Kazansky, *Lomonosov Moscow State Univ., Russia,* A.G.Kazanskii, *Univ. of Southampton, UK.* Cylindrically polarized beams produced by femtosecond laser written S-waveplate are used to modify amorphous silicon films. Paradoxically, no crystallization is observed in the maximum of longitudinal electric field despite the strongest light intensity.

LFG3 • 17:00-17:15
Singlet delta oxygen production in He-O_2 gas mixtures excited in gas flow cryogenic slab RF discharge, A.A.Ionin, D.V.Sinitsyn, *P.N.Lebedev Physical Inst., Russia,* I.V.Kochetov, A.P.Napartovich, *Troitsk Inst. for Innovation and Fusion Research, Russia.* Gas flow cryogenic slab RF discharge in He-O_2 mixtures was modeled for real experimental conditions. Calculations showed that singlet delta oxygen yield ~10% and gas temperature ~230 K could be obtained at the discharge zone outlet.

Hall 4
ICONO-02/3

16:30–18:00
IFL• Nonlinear Space-Time Dynamics, Instabilities, and Patterns III (ICONO-02/3)
Anatoly Sukhorukov, *Lomonosov Moscow state Univ., Russia, Presider*

IFL2 • 17:00-17:30 • INVITED
Subcycle field waveforms from fissioning soliton breathers, A.A.Voronin, A.B.Fedotov, D.A.Sidorov-Biryukov, *Lomonosov Moscow State Univ., Russia,* A.Baltuška, *Vienna Univ. of Technology, Austria,* A.M.Zheltikov, *Texas A&M Univ., USA.* Solitonic breather fissioning scenarios are shown to enable subcycle field waveform generation within a broad range of peak powers, offering a strategy whereby sub-quarter-cycle multigigawatt field waveforms can be generated in the mid-infrared range.

Hall 5
ICONO-09/4

16:30–19:00
IFM • Symposium on Femtosecond Laser Pulse Filamentation IV (ICONO-09/4)
Andrei Savelev, *Lomonosov Moscow State Univ., Russia, Presider*

IFM1 • 16:30-17:00 • INVITED
Filamentation of high-angle nondiffracting beams and applications to ultrafast laser processing, F.Courvoisier, A.Mathis, J.Zhang, L.Froehly, L.Furfaro, M.Jacquot, R.Giust, C.Xie, P.A.Lacourt, J.M.Dudley, *Inst. FEMTO-ST, UMR 6174 CNRS Univ. de Franch-Comté, France,* V.Jukna, A.Couairon, *CNRS, Ecole Polytechnique, France.* We report on filamentation of nondiffracting beams and show that the intense light-matter interaction regime achieved on long distances allows for an enhanced control on ultrashort laser deep ablation.

IFM2 • 17:00-17:30 • INVITED
Light bullets and supercontinuum spectra from femtosecond filament, S.V.Chekalin, V.O.Kompanets, *Inst. of Spectroscopy, Russia,* A.E.Dormidonov, E.O.Smetanina, V.P.Kandidov, *Lomonosov Moscow State Univ., Russia.* The formation of double-cycle 1800-nm light bullets under femtosecond laser pulse filamentation in a presence of anomalous GVD has been studied. Minimum duration of the light bullet corresponds to the monotonic broadening of supercontinuum spectrum.

Hall 6
ICONO-04/4

16:30–18:30
IFN • Quantum Physics, Information, and Technologies IV (ICONO-04/4)
Paolo Tombesi**,** *Univ. di Camerino, Italy, Presider*

IFN1 • 16:30-17:00 • INVITED
Information transmission capacities of hybrid communication channels, A.S.Holevo, *Steklov Mathematical Inst., Russia.* We compute and compare the classical entanglement-assisted capacity C_{ea} and the unassisted capacity C for two classes of entanglement-breaking communication channels: *measurement channels* give the most spectacular examples of the gain of entanglement assistance: C_{ea}/Cgg 1, while for *state preparation channels* $C_{ea}/C=1$, unless there is an (energy) constraint on the input of the channel.

IFN2 • 17:00-17:30 • INVITED
Making a large entangled state from a small one, A.I.Lvovsky, A.S.Prasad, R.Ghobadi, A.Chandra, C.Simon, Y.Kurochkin, *Univ. of Calgary, Canada.* We present two experiments on manipulating optical entanglement. In the first one, we generate a micro-macro entangled state from a microscopic one. In the second, we enhance the entanglement of the Einstein-Podolsky-Rosen state.

Hall 1
LAT-05/1

16:30–18:30
LFF • Ultrafast Diagnostics in Laser Research I (LAT-05/1)—Continued

LFF2 • 17:15-17:45 • INVITED
Irradiation of intense hard quasi-X-ray lasers utilizing amplification by spontaneous emission, E.Sato, S.Sato, A.Ogawa, *Iwate Medical Univ., Japan,* H.Kodama, O.Hagiwara, H.Matsukiyo, A.Osawa, T.Enomoto, M.Watanabe, S.Kusachi, *Toho Univ. School of Medicine, Japan.* Target evaporation leads to the formation of weakly ionized linear plasma, consisting of copper ions and electrons, around the fine target. Intense copper K-photons containing second harmonic photons are then produced from plasma axial direction.

LFF3 • 17:45-18:15 • INVITED
Structural dynamics of free molecules and condensed matter, A.A.Ischenko, *Lomonosov Moscow State Univ. of Fine Chemical Technologies, Russia.* Since 80-ies, the scientific world made intensive efforts in order to register movie about the coherent nuclei dynamics in the molecules, the fast dynamic processes in biological tissues and cells, and the structure dynamics of the solid in nano-volumes in time. The observed coherent changes in the nuclear subsystem by time-resolved electron diffraction method determine the fundamental transition from the standard kinetics to the dynamics of the phase trajectory of the molecule and the tomography of molecular quantum state.

Hall 2
JOINT/3

16:30–18:30
JFC • Joint Symposium on THz Optics and Technologies III (JOINT/3)—Continued

JFC3 • 17:30-18:00 • INVITED
Uncooled mm-wave/THz detector challenges: rectification and bolometer type detectors and arrays, F. Sizov, *Kiev' Univ., Ukraine*. Detectors are ones of the critical components of mm-wave/THz imaging systems. The questions related with the ultimate performance of THz uncooled detectors and the state of their development is discussed.

Hall 3
LAT-02/4

16:30–18:30
LFG • High-Power Lasers and Applications IV (LAT-02/4)—Continued

LFG4 • 17:15-17:30
Frequency-doubled Yb-doped fiber laser to produce picosecond pulses with 20 W average-power at 489 nm, J.Lhermite, R.Royon, E.Cormier, *Univ. de Bordeaux-CNRS-CEA, France.* We report on the generation of 20 W average power at 489 nm from a frequency doubled system delivering picosecond pulse at 10 MHz with an energy of 4 μJ. The frequency conversion efficiency is around 50%.

LFG5 • 17:30-17:45
Generation and control of ultrafast photocurrents in unbiased graphene, P.A.Obraztsov, S.V.Garnov, *A.M.Prokhorov General Phys. Inst., Russia,* T.Kaplas, Yu.P.Svirko, *Univ. of Eastern Finland, Finland.* We make use of strong photon-drag effect to generate and manipulate ultrafast photocurrents in unbiased graphene at room temperature. We also demonstrate the possibility to manipulate the photocurrents in time domain using two laser beams.

LFG5 • 17:45-18:00
Influence of plasma expansion on laser radiation absorption during optical breakdown in air, A.A.Ilyin, *Far Eastern Federal Univ., Russia, Inst. of Automation and Control Processes, Russia.* Maximum of transmitted laser energy is observed for 0.3–0.4 J incident energy for optical breakdown by 355 nm Nd:YAG laser radiation. Fast ionization wave may increase absorption of laser radiation.

Hall 4
ICONO-02/3

16:30–18:00
IFL• Nonlinear Space-Time Dynamics, Instabilities, and Patterns III (ICONO-02/3)—Continued

IFL3 • 17:30-17:45
Generation of few-cycle pulses in a passively mode-locked laser with inhomogeneously broadened active medium, V.V.Kozlov, *St.-Petersburg State Univ., Russia,* N.N.Rosanov, *St.-Petersburg Natl Res. Univ. of Inform. Technologies, Mechanics and Optics, Russia, Vavilov State Optical Inst., Russia.* Generation of few-cycle pulses from a laser by the technique of passive coherent mode-locking is theoretically and numerically demonstrated for the case when spectral lines of amplifying and absorbing media are strongly inhomogeneously broadened.

IFL4 • 17:45-18:00
Dynamical model of standing wave Raman fiber lasers, L.A.Melnikov, Yu.A.Mazhirina, *Saratov State Technical Univ., Russia.* Numerical model of standing-wave fiber laser is proposed based on the field representation in terms of longitudinal harmonics rather than monochromatic waves. Numerical results are presented for the case of Raman fiber laser.

Hall 5
ICONO-09/4

16:30–19:00
IFM • Symposium on Femtosecond Laser Pulse Filamentation IV (ICONO-09/4)—Continued

IFM3 • 17:30-17:45
Peculiarities of focusing of wire laser radiation, E.E.Orlova, *Inst. for Phys. of Microstructures, Russia.* Radiation of wire lasers (long lasers with sub-wavelength transverse dimensions) is highly divergent and exhibits rapid phase shifts decreasing the efficiency of conventional methods of focusing. We analyze the transformation of wire laser radiation by spherical lens and specially designed zone plate, and determine the conditions of effective focusing.

IFM4 • 17:45-18:15 • INVITED
Spatio-temporal evolution of the refractive index variations induced by femtosecond filament in fused silica, V.M.Kadan, I.V.Blonskyi, *Inst. of Phys. NASU, Ukraine,* E.O.Smetanina, V.P.Kandidov, *Lomonosov Moscow State Univ., Russia.* Refractive index variations induced by femtosecond filamentation are studied numerically and experimentally. Physical model of the intensity saturation in femtosecond filament based on the optical force dynamics of Kerr- and plasma lenses is proposed.

Hall 6
ICONO-04/4

16:30–18:30
IFN • Quantum Physics, Information, and Technologies IV (ICONO-04/4)—Continued

IFN3 • 17:30-17:45
Quantum gates with mesoscopic atomic ensembles, I.I.Beterov, E.A.Yakshina, M.P.Fedoruk, I.I.Ryabtsev, *Novosibirsk State Univ., Russia,* D.B.Tretyakov, V.M.Entin, *A.V.Rzhanov Inst. of Semiconductor Phys., Russia,* M.Saffman, *Univ. of Wisconsin, USA,* V.P.Zhukov, *Inst. of Computational Technologies, Russia,* C.W.Mansell, C.MacCormick, S.Bergamini, *The Open Univ., UK.* We present schemes for universal single-qubit and two-qubit operations in atomic ensembles containing an unknown number of atoms. Our approach is based on adiabatic passage in the Rydberg blockade regime.

IFN4 • 17:45-18:00
Development of deep UV contact lithography for fabrication of polymer waveguide arrays with high integration level on printed circuit board, K.V.Khaydukov, *Volgograd State Univ., Russia,* A.S.Akhmanov, V.Ya.Panchenko, A.G.Savelyev, V.I.Sokolov, E.V.Khaydukov, *Inst. on Laser and Information Technologies, Russia.* Polymer waveguide arrays are fabricated on the printed circuit board using transparent in telecom wavelength regions fluorinated acrylic monomers. Utilizing deep UV lithography we achieved high aspect ratio 1.75 with integration level 125 pcs/cm.

Hall 1
LAT-05/1

16:30–18:30
LFF • Ultrafast Diagnostics in Laser Research I (LAT-05/1)—Continued

LFF4 • 18:15-18:30
Theoretical studies of the electron transport in photosynthesis by means of femtosecond experiments modeling, R.Yu.Pishchalnikov, S.M.Pershin, A.F.Bunkin, *A.M.Prokhorov General Phys. Inst., Russia.* Considering the rotational-vibrational Hamiltonian of water molecules in the reaction centers of purple bacteria and based on the experience of the PSII reaction center pump-probe kinetics modeling, modulations of the radical pair states have been calculated.

Hall 2
JOINT/3

16:30–18:15
JFC • Joint Symposium on THz Optics and Technologies III (JOINT/3)—Continued

JFC4 • 18:00-18:15
High-power ultrashort terahertz source pumped by femtosecond photonic crystal fiber amplifier, Y.Li, J.Li, X.Hu, L.Chai, C.Wang, *Tianjin Univ., China,* A.Fedotov, A.Zheltikov, *Lomonosov Moscow State Univ., Russia.* We report on the generation of high-power ultrashort terahertz pulses by optical rectification in GaP crystals with a femtosecond photonic crystal fiber amplifier. Using chirp-optimized instead of transform-limited femtosecond pulses of 21 W, we generated 0.3 mW terahertz radiation from a 3 mm GaP crystal. The output could be further enhanced by sub-wavelength antireflective micropyramid structures fabricated on the crystal output surface.

Hall 3
LAT-02/4

16:30–18:30
LFG • High-Power Lasers and Applications IV (LAT-02/4)—Continued

LFG7 • 18:00-18:15
Strong restriction for larger Ti:sapphire amplifier apertures by transverse amplified spontaneous emission (TASE), V.Chvykov, J.Nees, K.Krushelnick, *Univ. of Michigan, USA.* We demonstrate existence of the severe losses due TASE and ability EDP technique to suppress it and parasitic lasing. The optimal conditions that can deliver up to kJ level energy with existing technology are presented.

LFG8 • 18:15-18:30
Heavy ion energy loss in plasmas, D.Martsovenko[1], N.Suslov[1], R.Garanin[1], N.Zhidkov[1], V.Vatulin[1], O.Rosmej[2], A.Blazevic[2], A.Schönlein[3], R.Maeder[3], Xe Gu[3], An.Tauschwitz[3], S.Faik[3], J.Jacoby[3], Y.Zhao[4], .R.Cheng[4], H.Zhao[4], L.Cao[5], Y.Gao[5], L.Borisenko[6], G.Vergunova[7], N.Borisenko[8], N.Orlov[8], N.Andreev[8], M.Basko[9], D. Klir[10], K. Rezac[10], J. Limpouch[10], *[1)]RFNC-VNIIEF, Russia; [2)]GSI Helmholtzzentrum für Schwerionenforschung GmbH, Germany; [3)]Univ. Frankfurt am Main, Germany; [4)]Inst. of Modern Physics, China; [5)]Laser Fusion Res. Ctr., China; [6)]Moscow State Univ., Russia; [7)]Lebedev Physical Inst., Russia; [8)]Joint Inst. for High Temperatures, Russia; [9)]Keldysh Inst. for Applied Mathematics, Russia; [10)]Czech Technical Univ., Czech Republic.* Indirectly heated CHO-foams were used to create a plasma target for applications in combined heavy ion beam-laser experiments that are aimed at investigation of the heavy ion energy loss in ionized matter.

Hall 4	Hall 5 ICONO-07/2	Hall 6 ICONO-10/3

16:30–19:00
IFM • Symposium on Femtosecond Laser Pulse Filamentation IV (ICONO-09/4)—Continued

IFM5 • 18:15-18:30
Self-focusing of spatially shaped femtosecond laser pulse, A.A.Ionin, S.I.Kudryashov, L.V.Seleznev, D.V.Sinitsyn, E.S.Sunchugasheva, *P.N.Lebedev Physical Inst., Russia,* Yu.E.Geints, A.A.Zemlyanov, *V.E.Zuev Inst. of Atmospheric Optics, Russia.* Self-focusing of spatially shaped femtosecond laser pulse was numerically and experimentally studied. By using such a pulse relocating of filament area and radiation refocusing behind the linear focal point was demonstrated.

IFM6 • 18:30-18:45
Asymmetrical profile of permanent refractive index change in β-BaB_2O_4 crystal under exposure of femtosecond pulses, A.G.Okhrimchuk, *Fiber Optics Research Ctr., Russia,* S.G.Grechin, *Bauman Moscow State Technical Univ., Russia,* A.E.Kokh, *Sobolev Inst. of Geology and Minerology, Russia,* V.Mezentsev, *Aston Univ., UK.* We have observed unusual asymmetrical refractive index change as a result of femtosecond laser inscription in a crystal without center of inversion. Profile of the refractive index change exhibits sign turn within the domain of femtosecond pulse exposure.

IFM7 • 18:45-19:00
Pressure effect on plasma filament decay in air, N_2 and Argon, S.Bodrov, A.Murzanev, Yu.Sergeev, Yu.Malkov, A.Stepanov, *Inst. of App. Phys., Russia,* M.Tsarev, *Univ. of Nizhny Novgorod, Russia,* N.Aleksandrov, *Moscow Inst. of Phys. and Technology, Russia,* I.Kochetov, *Troitsk Inst. of Innovation and Fusion Research, Russia.*

16:30–18:30
IFN • Quantum Physics, Information, and Technologies IV (ICONO-04/4)—Continued

IFN5 • 18:00-18:15
Generation of high-frequency entangled CV states by coupled parametric optical interactions, M.Yu.Saygin, *Lomonosov Moscow State Univ., Russia.* We theoretically study the formation of high-frequency entangled continuous variable states, generated in a multifrequency parametric optical process, comprised of three three-wave processes with shared frequencies.

IFN6 • 18:15-18:30
Intrinsic defects in silicon carbide for spin-based quantum applications, V.Dyakonov, *Bavarian Center for App. Energy Research, Germany,* D.Riedel, F.Fuchs, H.Kraus, S.Väth, A.Sperlich, G.V.Astakhov, *Julius-Maximilian Univ. of Wuerzburg, Germany,* V.A.Soltamov, P.G.Baranov, *Ioffe Physical-Technical Inst., Russia.* We show that defect spin qubits in SiC can be spectroscopically addressed, manipulated and selectively read out by means of double radio-optical resonance.

IFO • 18:30-20:00

Nonlinear Space-Time Dynamics, Instabilities, and Patterns (ICONO-02): Posters

IFO1
Broadband lasing in Yb:YAG and Yb:Glass under LiF:F_2^+ color center laser pumping, N.E.Bykovsky, Yu.V.Senatsky, *P.N.Lebedev Physical Inst., Russia.* Nanosecond pulses of broadband (100-500Å) lasing across the luminescence line in Yb-doped YAG and glass samples under LiF:F^{+2} laser pumping were observed. Distributed feedback laser action in samples at SBS of pump radiation is discussed.

IFO2
Single-mode semiconductor laser with incoherent optical feedback, I.V.Koryukin, *Inst. of App. Phys., Russia.* A novel model of a semiconductor laser with optical feedback is presented. It is shown that the transition from coherent to incoherent feedback leads to replacement of dynamical chaos by almost stationary lasing with slightly fluctuating intensity.

IFO3
Dynamics of two semiconductor lasers coupled via nonlinear difference frequency conversion, L.A.Kochkurov, L.A.Melnikov, M.I. Balakin, V.V.Astakhov, *Saratov State Technical Univ., Russia.* In this paper we present the dynamic model of two-color VECSEL with nonlinear crystal inside the cavity fir terahertz generation. It is shown that nonlinear coupling induces a variety of complex oscillation regimes.

IFO4
Generalized bipolariton model. Propagation of a ultrashort laser pulse through a thin semiconductor film in the conditions of two-photon generation of biexcitons, I.V.Beloussov, *Inst. of App. Phys., Moldova.* A generalized bipolariton model is proposed. Bpolaritons is formed from virtual excitons of four kinds. There exists both attractive and repulsive interaction between these excitons, though only excitons of a specific type can interact with light. A substantial difference between conventional [1] and our models is shown for the case of nonlinear transmission/reflection of ultrashort laser pulses by a thin semiconductor film under two-photon generation of biexcitons.

IFO5
Local field effects in quantum dot laser, O.Kh.Khasanov, G.A.Rusetsky, *SSPA "Scientific-Practical Material Research Centre of NASB", Belarus,* V.V.Samartsev, *Zavoisky Physical-Technical Inst., Russia.* The combined influence of the dynamic frequency shift of the absorption line and nonlinear phase relaxation on the quantum dot lasing is considered. Optimal value of detuning for minimal first threshold is estimated.

IFO6
Nonlinear reflection of an optical pulse from induced traveling grating, T.A.Voytova, A.P.Sukhorukov, *Lomonosov Moscow State Univ., Russia.* The interaction of optical pulses with nonlinearly induced moving grating is considered. The dynamics of signal reflection from such periodic structure depends on the GVM, pulse duration and a reference wave intensity.

IFO7
Polarization-phase dynamics in lasers, L.P.Svirina, *Belarussian Natl Technical Univ., Belarus.* The model has been developed of a single-mode four-frequency ring class A laser possessing both of polarization and phase instabilities. In the case of elliptical polarization of emitted waves regular and complicated oscillations have been revealed.

IFO8
The optical control of vortex solitons in dense media of optical fibers filled with a cold atomic gas, A.V.Prokhorov, M.Yu.Gubin, A.Yu.Leksin, S.M.Arakelian, *Vladimir State Univ. named after A. and N.Stoletovs, Russia,* M.G.Gladush, *Inst. for Spectroscopy, Russia.* We consider the problem of formation and all-optically control of optical vortex solitons for Lambda-scheme of Raman-type interaction, taking into account the local field effects and atom-field perturbations.

IFO9
Nonlinear phenomena in lasers of classes B and D: the comparative analysis of dynamical spectra, E.R.Kocharovskaya, N.S.Ginzburg, A.S.Sergeev, *Inst. of App. Phys., Russia.* The comparative analysis of multimode generation regimes is carried out for two opposite relations between photon lifetime and polarization lifetime in the lasers (of classes B and D) with distributed feedback and strong inhomogeneous broadening.

IFO10
Stabilization of a phase conjugated wave at SBS with feedback on standing phase gratings, M.G.Galushkin, *Inst. on Laser and Inform. Technologies, Russia,* K.V.Mitin, *Public Corporation «Natl Center on Laser Systems and Complexes «Astrophysica», Russia.* Theoretically is shown that the SBS geometry, used in a number of experimental works according to which direct pump wave and backward wave reflected from a focusing mirror form in nonlinear medium a standing phase grating, represents a realization of the separate case of a phase conjugation with feedback on standing phase gratings.

IFP • 18:30-20:00

Quantum Physics, Information, and Technologies (ICONO-04): Posters

IFP1
Statistical entropy of radiation and its increase due to finite beam aperture, A.V.Shepelev, *I.M.Gubkin Russian State Univ., Russia.* The basic concepts of radiation entropy are analyzed, the most commonly used in quantum optics and quantum information processing. Their peculiarities and disadvantages are discussed. If excluding the interaction of radiation with an optical system, the von Neumann's entropy is not an invariant of the system and is close to the Planck's entropy of for the thermal radiation. For this situation, the entropy increase due to the finite aperture and beam splitting is calculated.

IFP2
Resonance fluorescence of one and two atoms in feedback loop, L.V.Il'ichov, V.A.Tomilin, *Inst. of Automation and Electrometry, Russia, Novosibirsk State Univ., Russia, Ecole Politechnique, France*. We study the resonance fluorescence spectrum and photoemission statistics of two-level atom in classical light field with sign switching upon every detection of spontaneous photon. The statistics in the case of two atoms is also considered.

IFP3
Generation of arbitrary symmetric entangled states with conditional linear optical coupling, A.V.Sharypov, *Kirensky Inst. of Phys., Russia, Siberian Federal Univ., Russia,* B.He, *Univ. of Calgary, Canada.* An approach for generating the entangled photonic states $|\Psi_1\rangle|\Psi_2\rangle \pm |\Psi_2\rangle|\Psi_1\rangle$ from two arbitrary states $|\Psi_1\rangle$ and $|\Psi_2\rangle$ is proposed. The protocol is implemented by the conditionally induced beamsplitter coupling which leads to the selective swapping between two photonic modes.

IFP4
Emergence of time from static entangled states, M.Genovese, M.Gramegna, *L'Istituto Nazionale di Ricerca Metrologica, Italy,* L.Maccone, *Univ. di Pavia, Italy,* E.V.Moreva, *Moscow Natl Res. Nuclear Univ. "MEPHI", Russia.* We experimentally demonstrate the proposal by Page and Wootters that time may emerge from a static (with respect to an abstract external time) entangled state. Even though the total state of a system is static, "time" is recovered as correlations between a subsystem that acts as a clock and the rest of the system that evolves according to such clock. We use a system composed of two entangled photons: the rotation of the polarization of the first acts as a clock for proving an evolution of the polarization of the second. Nonetheless, we prove that the joint polarization state of both photons does not evolve.

IFP5
Self-induced polariton resonant nanocavities, V.S.Egorov, I.A.Chekhonin, M.A.Chekhonin, *St.-Petersburg Univ., Russia,* V.G.Nikolaev, *St.-Petersburg Natl Res. Univ. of Inform. Technologies, Mechanics and Optics, Russia,* S.N.Bagaev, *Inst. of Laser Phys., Russia.* The properties of coupled long-lived states of "field + matter" system produced by collision of two counter-propagating coherent pulses in the dense resonant media are discussed. It was shown that system reveals properties of polariton nanocavity with high *Q*-factor.

IFP6
Localization of atoms in bichromatic lattices, O.N.Prudnikov, A.M.Tumaikin, V.I.Yudin, *Novosibirsk State Univ., Russia, Inst. of Laser Phys., Russia.* We consider localization of atoms in bichromatic optical lattices. For two-level atom model we get analytical expressions for the force on atom, friction and diffusion coefficients. We find strong atom localization due to interference contribution from both light fields.

IFP7
Theory of open quantum systems based on stochastic differential equations, A.M.Basharov, *Natl Res. Centre "Kurchatov Inst.", Russia.* The evolution operator and the kinetic equation for the density matrix of an open system are obtained to analyze the dynamics of localized open systems in the Markov approximation.

IFP8
Entanglement dynamics of coupled oscillators under continuous quantum measurements, O.M.Kiriukhin, *Lomonosov Moscow State Univ. Russia.* We explore dynamics of quantum entanglement and study the possibility of observing it with future advanced gravitational-wave detectors or prototypes and other optomechanical systems.

IFP9
Manipulation of resonance fluorescence of the atoms or ions, which are subjected to mechanical oscillations in a standing wave, N.Enaki, S.Bazgan, *Inst. of App. Phys., Moldova.* This report is devoted to the problem of the resonance fluorescence of an atomic (or ion) system in the resonance with driving the standing wave of the optical cavity. It is shown that in this case resonance fluorescence depends on the location of atoms (or ions) relative to the positions of the nodes and antinodes of standing waves. It is demonstrated that if the atoms perform mechanical oscillations relative to the equilibrium position like in Paul traps, the distance between the Mollow type resonance fluorescence triplet is changed as a function of the frequency of these oscillations. This effect is possible for two and three level system placed in two transversal standing waves of the resonator. The dependence of the photon statistics on the applied mechanical oscillation is studied.

IFP10
High-fidelity atom-photon entangling operation using a Λ system, Y.Tokunaga, *NTT Corp., Japan, Japan Sci. and Technology Agency, CREST, Japan.* We present a high-fidelity maximally entangling gate between an atom and a photon using a three level Λ system with reflection geometry, where the dominant physical imperfections are mapped into heralded losses instead of infidelities.

IFR • 18:30-20:00

High-Field Physics and Atrtoscience (ICONO-05): Posters

IFR1
Laser damage of transparent dielectrics as a nonlinear optics effect: spatial similarity, S.T.Parinov, *FGUP "VNIIFTRI", Russia.* Base experimental features of laser damage may be interpreted by the methods of nonlinear optics. Accounting of the phase relations enables to establish the spatial similarity criterion for dimensions of laser damage centers. Experimental data for 50 years were collated by criterion was established.

IFR2
Variational description of solid state ablation bysuper short laser pulse, V.N.Strekalov, *Moscow State Univ. of Technology "STANKIN", Russia.* For an estimation of parameters of a crater created by laser pulse, the new variational method is designed. Method can be used, if the pulse duration is less than characteristic times of mass and energy transport. The estimations do not depend on a radiated frequency, but depend on a linear absorption coefficient of a sample.

IFR3
Nonlinear absorption of femtosecond laser pulses under conditions of multiphoton resonances in solids, E.Yu.Perlin, K.A.Eliseev, E.G.Idrisova, *St.-Petersburg Natl Res. Univ. of Inform. Technologies, Mechanics, and Optics, Russia,* Ya.T.Khalilov, *St.-Petersburg State Polytechnic Univ., Russia.* A theory of nonlinear absorption of femtosecond light pulses by bulk crystals and nanostructures of differing dimensionality is developed. The pulse duration is assumed to be small compared to the relaxation times of electron and hole momenta.

IFR4
New origin of the process of the high-order optical harmonic generation, A.V.Andreev,

S.Yu.Stremoukhov, *Lomonosov Moscow State Univ., Russia.* New interpretation of the high order harmonic generation in atomic gases interacting with laser fields is presented. The mechanism is in the temporal evolution of atomic electron density spatial distribution in the external laser field.

IFR5
Resonant processes in strong-field-dressed atoms: three-level model versus ab initio calculations, V.A.Antonov, M.Yu.Emelin, M.Yu. Ryabikin, Y.V.Radeonychev, *Inst. of App. Phys., Russia,* O.A.Kocharovskaya, *Texas A&M Univ., USA.* We show the fruitfulness and analyze the limitations of the three-level model with time-dependent parameters for description of the resonant processes in strong-field-dressed atomic hydrogen via comparison with solutions of the time-dependent Schrödinger equation.

IFR6
Direct measurement of the characteristic three-body electron attachment rates in atmospheric air in DC electric field, A.V.Shutov, I.V.Smetanin, A.O.Levchenko, N.N.Ustinovskii, V.D.Zvorykin, *P.N.Lebedev Physical Inst., Russia.* We report the results of theoretical and experimental study of the characteristic time for three-body attachment of laser-plasma electrons in the atmospheric air of different humilities in the external DC electric field with the strength ranged from 0.1 to 10 kV/cm.

IFR7
Effective absorption of wave function in numerical solution of time-dependent Schroedinger equation using imaginary potential method, A.A.Silaev, N.V.Vvedenskii, *Inst. of App. Phys., Russia.* We propose the absorbing imaginary potential containing several peaks of different width and height, which can be efficiently used to realize absorbing boundary conditions for the time-dependent Schroedinger equation.

IFR8
Ultrahigh-order harmonics in gases in the subnanometer wavelength range from mid-infrared laser sources, M.Yu.Emelin, A.S.Bolshukhina, M.Yu.Ryabikin, *Inst. of App. Phys., Russia.* The combined effect of the magnetic field of the laser pulse and the atomic ground-state depletion in high harmonic generation of intense mid-IR laser radiation in gases is studied both analytically and numerically in order to estimate the maximum attainable width of high-harmonic spectrum.

IFR9
Analytical model of gamma-ray generation in laser-solid interactions, E.N.Nerush, I.Yu.Kostyukov, *Inst. of App. Phys., Russia.* The analytical model that describes electron motion and incoherent synchrotron emission in a dense plasma irradiated by a petawatt laser pulse is presented and discussed along with the results of PIC+MC simulations.

IFR10
Generation of line X-rays from femtosecond cluster plasma using mixture of polyatomic molecules and noble gases, I.A.Zhvaniya, V.M.Gordienko, M.S.Dzhidzhoev, D.O.Fedorov, D.N. Trubnikov, *Lomonosov Moscow State Univ., Russia.* We have demonstrated that under femtosecond laser ($I\sim10^{15}$ W/cm^2, E~5mJ) excitation of large molecular clusters (SF_6, CF_3I, CF_2Cl_2) formed in the carrier gas Ar, the energy conversion efficiency to hard X-ray lines achieve ~10^{-5} (with yield ~10^{10} photons/J). Laser excitation of gas mixture (CF_2Cl_2-Ar) results in generation of X-ray K-lines of both Cl and Ar that confirms the presence of mixed CF_2Cl_2/Ar clusters.

IFR11
QED cascading in linearly polarized standing wave, V.F.Bashmakov, E.N.Nerush, I.Yu.Kostyukov, *Inst. of App. Phys., Russia.* QED cascading in the field of two counter propagating laser pulses is studied for a case of linear polarization. Numerical simulation with 3D PIC-MC code was carried out. Some peculiarities of a cascade development such as stair-step-like growth of particle number and breathing energy spectra were revealed and explained by analytical model.

IFR12
Electron energy spectra at the ionization of atoms by intense attosecond few-cycle pulses, A.V.Gets, V.P.Krainov, *Moscow Inst. of Phys. and Technology, Russia.* Electron energy spectra at the ionization of atoms by ultrashort few-cycle pulses of electromagnetic radiation are considered.

IFS • 18:30-20:00
Symposium on Femtosecond Laser Pulse Filamentation (ICONO-09): Posters

IFS1
Control of filament azimuthal position in vortex beam, V.M.Kadan, I.V.Blonskyi, O.I.Yarusevych, *Inst. of Phys. NASU, Ukraine,* A.A.Dergachev, S.A.Shlenov, *Lomonosov Moscow State Univ., Russia,* V.M.Puzikov, L.A.Grin', *Inst. for Single Crystals NASU, Ukraine.* Filamentation of femtosecond doubly charged vortex beam is investigated. Control of the filament azimuthal position is demonstrated. Dislocations of the interference pattern of supercontinuum emission and spiral propagation of filaments are observed.

IFS2
Femtosecond laser pulse filamentation in air controlled by the pulse aberration, E.S. Sunchugasheva, A.A.Ionin, S.I.Kudryashov, L.V. Seleznev, D.V.Sinitsyn, *P.N.Lebedev Physical Inst., Russia,* N.G.Iroshnikov, O.G.Kosareva, A.V.Larichev, N.V.Panov, *Lomonosov Moscow State Univ., Russia.* Intense laser pulse filamentation with wavefront controlled by a deformable mirror was studied. Initial beam wavefront was improved and subsequently modified with spherical aberrations. The filament length was found to increase with aberration amplitude growth.

IFS3
Dispersion influence on high-intensity femtosecond vortexes in fused silica, O.Khasanov, O.Fedotova, T.Smirnova, *Scientific-Practical Material Research Centre, Belarus.* Stability of high-intensive femtosecond vortex in Kerr medium under impact of photoinduced plasma inertia is analyzed in dependence on parameters of radiation and medium. Quasi-soliton regimes of vortex propagation are revealed in dependence of sign and value of group velocity dispersion.

IFS4
Frequency-angular spectrum of supercontinuum from filament of femtosecond Bessel beam, A.E.Dokukina, E.O.Smetanina, A.E.Dormidonov, V.P.Kandidov, *Lomonosov Moscow State Univ., Russia,* V.O.Kompanets, S.V.Chekalin, *Inst. of Spectroscopy, Russia.* The filamentation of femtosecond Gaussian pulse with Bessel-Gaussian spatial profile in fused silica is investigated numerically and experimentally. Frequency-angular spectra of such a pulse and of a supercontinuum after filamentation are presented.

IFS5
Formation of surface structures at the processing of materials by femtosecond laser radiation in liquid nitrogen, D.V.Abramov, S.M.Arakelian, D.A.Kochuev, S.A.Makov, V.G.Prokoshev, K.S.Khorkov, *Vladimir State Univ., Russia.* The experimental researches of creation of surface structures at processing of materials by femtosecond laser radiation in the presence of liquid nitrogen were carried out. The ordered systems of microcraters are obtained.

IFS6
Extended plasma channels when focusing UV and IR femtosecond pulses in air, A.A. Dergachev, V.P.Kandidov, S.A.Shlenov, *Lomonosov Moscow State Univ., Russia,* A.A.Ionin, D.V.Mokrousova, L.V.Seleznev, D.V.Sinitsyn, E.S.Sunchugasheva, *P.N.Lebedev Physical Inst., Russia.* We investigated experimentally and numerically the plasma channels formation when focused laser beam undergoes multiple filamentation in air. We registered the channels stretching from the filament onset over several meters behind the mirror focal plane.

JFD• 18:30-20:00
Joint Symposium on THz Optics and Technologies (JOINT): Posters

JFD1
Biohazard of terahertz radiation, V.I.Fedorov, *Inst. of Laser Physics, Russia.* Nonthermal low intensive terahertz radiation can be hazardous to biological systems under certain conditions as it initiates impairment of cell membrane permeability and resistance, organelle destruction, genomic instability, disturbance of cellular functional state, impairment of intercellular relationship, fall of cell viability, polymorphism, sterility, and stress.

JFD2
Diffraction of monochromatic terahertz radiation by ultrasound in germanium crystal, V.B.Voloshinov, P.A.Nikitin, *Lomonosov Moscow State Univ., Russia,* V.V.Gerasimov, B.A.Knyazev, Yu.Yu.Choporova, *Budker Inst. of Nuclear Phys., Russia, Novosibirsk State Univ., Russia.* Diffraction of terahertz free-electron laser radiation by ultrasound in a germanium crystal was studied experimentally. The diffraction was observed for 140 mm radiation and the acoustic frequency from 25 to 38 MHz.

JFD3
Excitation of terahertz surface waves in the metal under the action of a femtosecond laser pulse, S.A.Uryupin, A.A.Frolov, *P.N.Lebedev Physical Inst., Russia, Joint Inst. for High Temperatures, Russia.* The generation of terahertz surface waves under the action of a focused femtosecond laser pulse on the metal is considered. The source of the surface waves is the vortex electric current which is created in the skin layer of metal by the ponderomotive impact of a laser pulse. The spectral composition and generation efficiency of surface waves are investigated.

JFD4
Microwave pulse compression in the long-distance sliding mode plasma waveguide, A.V.Bogatskaya, *Lomonosov Moscow State University, Russia,* I.V.Smetanin, A.O.Levchenko, A.V.Shutov, N.N.Ustinovskii, V.D.Zvorykin, *P.N.Lebedev Physical Inst., Russia.* The dispersion characteristics of the tubular sliding-mode plasma waveguide in a wide range of operation parameters are investigated. Evolution of the peak amplitude of the phase-modulated microwave pulse in the waveguide is studied, the optimum initial chirp parameters to attain effective pulse compression are determined.

JFD5
Reconstruction of refractive index of planar layered structures using reflected signal of incident broadband pulse, E.V.Suvorov, V.A. Mironov, D.A.Fadeev, *Inst. of App. Phys., Russia.* The reconstruction of inhomogeneous media structure using reflected and transmitted radiation distribution is hard inverse problem. The novel methods of THz sensing provide the reflected signal (instead of integral characteristics) which could be used for reconstruction of planar media structure with iterative method (i.e. layer by layer). This method explore the causality principle and turn to be much more faster than other general-purpose methods for inverse problems. In this paper the limitations and different modifications of such iterative methods will be discussed.

JFD6
Terahertz imaging via collecting reflected radiation, P.A.Chizhov, V.V.Bukin, S.V.Garnov, A.I.Ritus, I.A.Sherbakov, *GPI RAS, Russia.* We perform a teraherz imaging scheme. A moving object was placed in focal plane of a PTFE lens. Images were obtained via recording of PED-signal from reflected THz radiation from different points of the object.

LFH• 18:30-20:00
High-Power Lasers and Applications (LAT-02): Posters

LFH1
Influence of parameters of radiation beam with different wavelength on gas laser cutting efficiency, V.V.Vasiltsov, M.G.Galushkin, V.D.Dubrov, V.Ya.Panchenko, *Inst. on Laser and Inform. Technologies, Russia.* The requirements to quality parameters of radiation having different wavelength (CO_2 lasers, fiber lasers) have been defined to perform efficient oxygen-free gas laser cutting of large-thickness samples. The main channels of consumption of radiation power in the process of cutting have been considered. It is noted that focused beam divergence not only decreases the cutting speed, but also causes cutting quality deterioration.

LFH2
The use of adaptive photothermal Zernike filter for the measurement of weak optical absorption, E.L.Bubis, I.E.Kozhevatov, V.V. Lozhkarev, Yu.A.Mamaev, V.O.Martynov, D.E.Silin, I.V.Yakovlev, *Inst. of Appl. Phys., Russia.* The use of photothermal Zernike filter for the measuring of the absorption proposed. It is shown that the efficiency is comparable to the scheme that uses linear filters with a significant simplification of the adjustment process.

LFH3
Detection of inhomogeneity in the medium by using phase contrast method with photothermal Zernike cell, E.L.Bubis, S.A.Gusev, I.E.Kozhevatov, V.V.Lozhkarev, Yu.A.Mamaev, V.O.Martynov, A.N.Stepanov, *Inst. of Appl.*

Phys., Russia. Some problems of detecting inhomogeneity of medium by phase contrast technique with optically thin and thick photothermal Zernike cell analysed. It is shown that the system with longitudinal heat sink have less distortion.

LFH4

Comparison between thyratrons of TPI1-10k/20 and TPI1-10k/50 series as high voltage switches in excitation systems of UV nitrogen lasers, A.M.Razhev, D.S.Churkin, *Novosibirsk State Univ., Russia,* E.S.Kargapol'tsev, I.A.Kozlov, *Inst. of Laser Phys., Russia,* V.D.Bochkov, *Pulsed Technologies Ltd., Russia.* A performance of single-gap and two-gap TPI thyratrons in excitation systems of UV induction ni-trogen laser is investigated. It is shown that two-gap thyratrons under other conditions unchanged improve laser efficiency by 20–30%.

LFH5

Radio frequency excited planar Xe-laser, A.P.Mineev, S.M.Nefedov, P.P.Pashinin, P.A. Goncharov, V.V.Kiselev, A.P.Drozdov, *A.M.Prokhorov General Phys. Inst., Russia.* The characteristics of the radiation of a planar Xe-laser excited by transverse RF discharge with diffusive cooling of the active medium have been investigated. A cw lasing power of 4 W and a maximum efficiency of ~0.7% are obtained.

LFH6

Pseudospark switches TPI-and TDItype in pumping systems of nitrogen and pulse-periodic nonchain HF (DF) lasers, Aksinin V.I., Bochkov V.D., Kazantsev S.Yu., Kononov I.G., Podlesnikh S.V., *Ryazan Radioengineering Inst., Russia.* The possibility of applying thyratrons TDI-type in charging voltage source of HF(DF) laser with output energy of 2 J and a pulse repetition rate of 50 Hz, has been investigated. The perspective of application of these thyratrons in charging generators for power pulsed and pulse periodic electric-discharge lasers, has been shown.

LFH7

Experimental investigation of the opacity in Al and Ge at the Iskra-5 laser facility, S.V.Bondarenko, R.V. Garanin, N.V.Zhidkov, A.V.Pinegin, N.A.Suslov, *RFNC-VNIIEF, Russia.* An experimental investigation of the opacity in Al and Ge bulk heated by soft X-ray radiation are presented. An experimental techniques for investigation of the opacity and density of heated samples are presented. The results of investigation of X-ray spectral absorption coefficients on the 1s–2p transitions in Al and the 2p–3d transitions in Ge and the results of measuring the density of heated Al sample are presented too.

LFH8

Acousto-resonance spectroscopy of nonlinear-optical crystals in course of laser frequency conversion, O.A.Ryabushkin, A.V.Konyashkin, D.V.Myasnikov, A.I.Baranov, *Moscow Inst. of Phys. and Technology, Russia,* V.A.Tyrtyshnyy, *NTO "IRE-Polus", Russia.* Novel method of acousto-resonance spectroscopy is introduced for crystal's true temperature measurement in course of laser frequency conversion process. Temperature tuning curves of PPLN crystal were precisely measured in second harmonic generation experiment.

LFH9

High average power, high repetition rate picosecond pulses amplifier output beam quality optimization using adaptive mirror, K.Michailovas, A.Michailovas, *EKSPLA, Lithuania, Center for Physical Sciences and Technology, Lithuania,* V. Smilgevicius, *Vilnius Univ., Lithuania.* We present results of experiments of optimizing the output beam quality (M^2 parameter) of an amplifier system providing ~80 W average output power at 1 kHz repetition rate with output pulse width of ~50 ps using adaptive mirror.

LFH10

Piezoelectric resonant laser calorimetry of nonlinear-optical crystals, O.A.Ryabushkin, A.V.Konyashkin, D.V.Myasnikov, O.I.Vershinin, *Moscow Inst. of Phys. and Technology, Russia,* V.A.Tyrtyshnyy, *NTO "IRE-Polus", Russia.* Novel method is proposed for accurate determination of nonlinear-optical crystal's heat transfer and optical absorption coefficients by measuring equivalent temperature kinetics of laser-heated crystal exploiting piezoelectric resonance frequencies dependence on temperature.

LFH11

Simulation of emission characteristics of XeCl excilamps excited by capacitance discharge, S.S.Anufri□k, A.P.Volodenkov, K.F.Znosko, *Yanka Kupala State Univ. of Grodno, Belarus.* Average power of radiation can achieve 620 W at efficiency 5.3% on pulse frequency 130 kHz for mix Cl_2:Xe:He=3:10:20, the storage capacity 0.2 nF and charging voltage 30 kV being used in excilamp of capacitance discharge.

LFH12

Reference radiation shaping system for UFL-2M laser facility, S.A.Bel'kov, S.G.Garanin, B.G.Zimalin, S.V.Mochkaev, A.V.Savkin, O.A. Sharov, *Russian Federal Nuclear Center - All-Russian Research Inst. of Experimental Phys., Russia.* A multichannel master oscillator of a powerful laser facility UFL-2M is described. The master oscillator makes it possible to form a spectral and temporal 3D profile of laser radiation on the target.

LFH13

Extremely-short spatial filters for laser pump of petawatt-class laser systems, K.F.Burdonov, A.S.Egorov, A.K.Potemkin, A.A.Shaykin, A.A.Soloviev, *Inst. of Appl. Phys., Russia.* This paper presents a spherical lenses based extremely-short spatial filter for 300 J multistage nanosecond pump laser of petawatt-class PEARL laser facility. The degradation of pump radiation parameters associated with the filter induced spherical aberrations was investigated. The experiments showed that the cost-effective spherical lenses based spatial filter does not lead to the pump beam quality degradation.

LFH14

Power neodymium-glass amplifier of a repetitively pulsed laser, V.E.Gaganov, A.V.Vinogradov, S.G.Garanin, N.V.Zhidkov, V.A.Krotov, S.P.Martynenko, E.V.Pozdnyakov, I.I.Solomatin, *Russian Federal Nuclear Center - All-Russian Scientific Research Inst. of Experimental Phys. (VNIIEF), Russia.* A neodymium-glass laser-diode-pumped amplifier with a zigzag laser beam propagation through the active medium was elaborated; the amplifier is intended for operation in a repetitively pulsed laser.

LFH15

Radio frequency excited planar CO-laser, A.P.Mineev, S.M.Nefedov, P.P.Pashinin, P.A. Goncharov, V.V.Kiselev, A.P.Drozdov, *A.M.Prokhorov General Phys. Inst., Russia.* Radiation characteristics of planar CO-laser and discharge parameters of the active medium – low-temperature plasma excited by a wide (3×40×400 mm) RF discharge at a frequency of 40 MHz have been studied. A cw output power of 30 W with an efficiency of ~10% in the spectral range 5.3–6.0 μm at electrodes temperature –70°C has been achieved.

LFH16

Complete determination of the temporal intensity profile of ultrashort pulses via the intensity autocorrelation and the third-order cross-correlation, P.Oliveira, F.Augé-Rochereau, *ENSTA - Ecole Polytechnique, France,* H.Crespo, *Univ. do Porto, Portugal.* We demonstrate that the intensity autocorrelation in conjunction with the third-order cross correlation completely define the temporal intensity profile of a pulse. This property could find application to high contrast temporal diagnostics of complex pulses.

LFH17

Compact slab RF-discharge overtone CO laser, A.A.Ionin, A.Yu.Kozlov, L.V.Seleznev, D.V.Sinitsyn, *P.N.Lebedev Physical Inst., Russia.* Slab RF-discharge overtone CO laser of compact design is developed and parametrically studied. Average output power of the laser with cryogenically cooled electrode system was up to 2 W at the efficiency of 1.6%.

LFH18

Dynamic phase locking of multi-channel continuous wave laser beam by stochastic parallel gradient algorithm, V.A.Volkov, M.V. Volkov, C.G.Garanin, U.V.Dolgopolov, A.V.Kopalkin, S.M.Kulikov, F.A.Starikov, S.A.Sukharev, S.V.Tyutin, S.V.Khohlov, *RFNC – VNIIEF, Russia.* Theoretical and experimental investigations of coherent beam combining by stochastic parallel gradient algorithm have been carried out. The dynamic phasing of 16-channel laser beam has been demonstrated. The simulation results show good agreement with the experimental data.

LFH19

High-power CO laser system emitting nanosecond pulses, A.A.Ionin, I.O.Kinyaevskiy, Y.M.Klimachev, A.A.Kotkov, A.Yu.Kozlov, *P.N. Lebedev Physical Inst., Russia.* High-power master oscillator - power amplifier CO laser system emitting nanosecond pulses was studied. Gain and saturation intensity in laser medium of power amplifier were measured.

LFH20

Modeling of high-power hybrid-cavity Yb:YAG laser with a thin plate, M.G.Galushkin, V.P.Yakunin, *Inst. on Laser and Inform. Technologies, Russia,* A.G.Grigoryants, R.G.Diachkov, R.S.Tretyakov, *Moscow N.E.Bauman State Technical Univ., Russia.* The spatial and energy parameters of a diode-pumped hybrid-cavity Yb:YAG thin plate laser including the case with waveguide propagation with kilowatt power level have been theoretically investigated. To compensate for thermal optical non-uniformities of the active element, a sectioned system of cooling has been suggested that offers a periodic change of the heat flow direction.

LFH21

Determination of optimum conditions of injection of ultrashort laser pulses in the regenerative amplifier, I.A.Diasamidze, N.V. Marusin, A.V.Moiseev, V.A.Muzychenko, V.N. Khramov, *Volgograd State Univ., Russia.* Results of numerical and experimental examinations of time, energy and resonant conditions of injection of nano- and subnanosecond ultrashort pulses of neodymium lasers in the regenerative amplifier are submitted. Conditions of capture of pulses by the amplifier and of the optimum frequency and amplitude-time matching of parameters of the master laser and the amplifier are found.

LFH22

Unlimited ion acceleration by the radiation pressure, E.Yu.Echkina, I.N.Inovenkov, *Lomonosov Moscow State Univ., Russia,* T.Zh. Esirkepov, M.Kando, *Kansai Photon Sci. Inst., Japan,* F.Pegoraro, *Univ. of Pisa, Italy,* G.Korn, *Inst. of Phys., Czech Republic,* S.V.Bulanov, *A.M.Prokhorov Inst. of General Phys., Russia, Moscow Inst. of Phys. and Technology, Russia.* The energy of the ions accelerated by an intense electromagnetic wave in the radiation pressure dominated regime can be greatly enhanced by a transverse expansion of a thin target. In the relativistic limit, the ions become phase-locked with respect to the electromagnetic wave resulting in an unlimited ion energy gain.

LFH23

Technological problems of production of large-size rod active elements from neodymium phosphate glasses, V.I.Arbuzov, M.I. Bakaev, G.V.Evteev, *Research and Technological Inst. of Optical Material Sci., All-Russian Scientific Center "S.I.Vavilov State Optical Inst.", Russia.* Requirements to neodymium phosphate glasses for large-size rod active elements (RAE) and the ways to solve technological problems of melting glasses of required quality and making RAEs of diverse types are discussed.

LFH24

The possibility of master oscillator creation of iodine photo-dissociation laser on the base of Nd-doped YLF crystal, E.V.Pozdnykov, N.V.Zhidkov, V.A.Krotov, *Russian Federal Nuclear Center 'All-Russian Scientific Research Institute of Experimental Physics' (VNIIEF), Research Inst. of Laser Phys., Russia.* The experimental results of possibility of YLF crystal application as an active medium of iodine laser master oscillator are presented. The possibility of spectrum control within the spectrum of iodine laser medium luminescence was researched.

LFH25

Large aperture conformal wavefront correctors for high-power solid-state lasers with YAG:Nd active elements, V.P.Korolkov, R.K.Nasyrov, A.G.Poleshchuk, A.I.Malyshev, A.R.Sametov, *Inst. of Automation and Electrometry, Russia,* Yu.D.Arapov, A.F.Ivanov, *VNIITF, Russia.* Conformal corrector for 45 mm YAG:Nd active element of high-power laser was designed on the base of phase map. It was manufactured by halftone proximity photolithography on fused silica window. Testing of the corrector demonstrated decreasing the distortions of unloaded active element by 4.5 times.

LFH26

Mathematical model of attenuation and refraction of the laser probe beam in an erosion plume, I.V.Shilov, A.V.Gavrilov, O.G. Barbossa, *V.A.Degtyarev State Technological Academy, Russia,* A.I.Shilova, *Moscow Inst. of Phys. and Technology, Russia.* Numerical experiments have shown the possibility of a hardware registration of a probe beam deflection

and attenuation, which characterize the point of transfer of low-temperature state of the erosion plume in high-heated condition.

LFH27
Optical pulse compressor with imperfect gratings for PW-class laser system, A.P. Fokin, A.A.Soloviev, *Inst. of Appl. Phys., Russia.* We present numerical simulation for grating based optical compressor for a PW-class laser system. The groove density mismatch in different gratings is taken into account. The main results are the recommendations for compressor alignment and estimates for the best optical parameters achievable with imperfect gratings.

LFH28
Microwave excited planar Xe-laser, A.P.Mineev, S.M.Nefedov, P.P.Pashinin, P.A. Goncharov, V.V.Kiselev, A.P.Drozdov, *A.M.Prokhorov General Phys. Inst., Russia.* The characteristics of the radiation of a planar Xe-laser excited by MW discharge with diffusive cooling of the active medium have been investigated. An average lasing power of 50 mW (pulse power 2.5 W) is obtained.

LFH29
The research of the efficiency of laser conversion to the second harmonic by the nonlinear crystals during the single experiment with the use of energetic measurements and registration of 1ω and 2ω temporal pulse shapes, A.V.Zubkov, V.E.Gaganov, E.V.Pozdnjakov, *Russian Federal Nuclear Center 'All-Russian Scientific Research Inst. of Experimental Phys.' (VNIIEF), Research Inst. of Laser Phys., Russia.* The temporal radiation pulse shape and energy for 1w and 2w are measured during the single laser shot. It allows to obtain the plot of efficiency for the range of interest from the continuous set of pulse intensities.

LFH30
Microscopic and mesoscopic femtosecond laser ablation of single-wall carbon nanotubes, P.A.Danilov, V.I.Yurovskikh, A.A.Ionin, R.A.Khmelnitskiy, S.I.Kudryashov, S.V.Makarov, N.N.Mel'nik, A.A.Rudenko, P.N.Saltuganov, D.A.Zayarniy, *P.N.Lebedev Physical Inst., Russia,* V.N.Lednev, A.E.Ligachev, E.D.Obraztsova, S.M.Pershin, A.F.Bunkin, *A.M. Prokhorov General Phys. Inst., Russia.* Femtosecond laser ablative surface modification of a single-wall carbon nanotube material proceeds as low-fluence mesoscopic disintegration of their packing, preserving their individual integrity, or high-fluence deep removal triggered by strong microscopic ablation of the individual nanotubes.

LFH31
The influence of gas temperature on the characteristics of self-sustained volume discharge in working mixtures of pulse periodic oxygen-iodine laser, V.I.Aksinin, K.N.Firsov, S.Yu.Kazantsev, I.G.Kononov, S.V.Podlesnikh, *A.M.Prokhorov General Phys. Inst., Russia,* S.A.Antsiferov, V.V.Kalinowski, V.N.Mikhalkin, I.V.Sevryugin, S.D.Velikanov, *Russian Federal Nuclear Center "All-Russian Research Institute of Experimental Physics", Russia.* The influence of gas temperature on the characteristics of self-sustained volume discharge in working mixtures of oxygen-iodine laser has been investigated. It was shown that voltage on the plasma of self-sustained volume discharge increases with the increasing of temperature of the gas mixture.

LFH32
Interaction of self-pulsing oscillations in fast-flow lasers with unstable cavity, A.I.Fedoseev, A.V.Moushenkov, A.I.Odintsov, A.P.Smirnov, *Lomonosov Moscow State Univ., Russia.* Interaction of different types of perturbations in unstable cavity of a laser with cross-flow medium is considered. Resonance of perturbation mode frequencies leads to significant increase in increments of self-pulsing oscillations development. Adjustment of resonance frequencies by varying of governing parameter of the system allows to control of the laser dynamics.

LFH33
Employment of stochastic parallel gradient algorithm in the problem of automatic alignment of amplifying section of UFL-2M facility, R.A.Shnyagin, S.G.Garanin, F.A.Starikov, *RFNC–VNIIEF ILFI, Russia.* The numerical simulation of the automatic alignment procedure of 4-pass amplifier section of the UFL-2M laser facility is carried out at aberrations presence in optical tract. The stochastic parallel gradient algorithm is implemented for management of control elements.

LFH34
Simulation of neutron emission due thermonuclear reactions during thin-film palladium deuteride irradiation by super-intense femtosecond laser pulses, S.N.Andreev, Yu.I.Eremeicheva, *A.M.Prokhorov General Phys. Inst., Russia,* V.P.Tarakanov, *Joint Inst. for High Temperatures, Russia,* S.G.Garanin, B.P.Yakutov, *Russian Federal Nuclear Center "All-Russian Research Inst. of Experimental Physics", Russia.* New configuration of laser-plasma neutron source is proposed as a result of numerical calculation. Maximum values of neutron flux density are several order of magnitude higher than corresponding values of the modern neutron sources.

LFH35
Glow of a channel of propagation of power laser radiation in ice, Yu.V.Sorokin, *SSC "NC LSK "Astrophysica", Russia.* The effect of a laser radiation with a wavelength of 1.07 microns of density about 10^6 W/cm^2 on ice by depth up to 100 cm see was studied. The outcomes of the analysis of a spectrum of glow demonstrate on hydrogenous spectrum lines of a series Pashen. High axial density of a laser radiation allows to use at a channelling in ice mediums padding energy release at the expense of combustion to be derivated as a result of a thermolysis of hydrogen.

LFH36
Spectroscopic diagnostics of laser-produced plasma in liquid, V.S.Burakov, A.V.Butsen, V.V.Kiris, N.V.Tarasenko, *B.I.Stepanov Inst. of Phys., Belarus.* Parameters (density, temperature of electrons and atoms) of plasma produced by double pulsed laser ablation of zinc alloy in water were determined by optical emission spectroscopy. A correlation between the plasma and target material composition was analyzed.

LFH37
Improving of contrast of femtosecond pulses at 1240 nm by nonlinear reflection from silicon surface, A.A.Podshivalov, F.V.Potemkin, E.I.Mareev, V.M.Gordienko, *Lomonosov Moscow State Univ., Russia.* We obtained significant reducing in amplitude of pre-pulses before main femtosecond pulse in Cr:forsterite amplifier beam, self-reflected at high intensity from silicon plate at Brewster angle without any beam distortion. Reflection efficiency was 40% at optimal intensity of 3 TW/cm^2, and could be explained by free-carrier generation from two-photon absorption at 1240 nm.

LFH38
Atomistic-continuum modeling of ultrashort laser pulse interaction with dielectric materials, D.S.Ivanov, B.Rethfeld, *Technical Univ. of Kaiserslautern, Germany,* M.Garcia, *Univ. of Kassel, Germany.* This work presents the atomistic-continuum model for simulation of ultrashort laser pulse interaction with dielectrics on the example of SiO_2. The model allows for investigation of the kinetics of laser-induced melting, spallation, and ablation processes.

LFH39
Mechanisms of the enhancement of the spectral line intensities in double-pulse laser-induced breakdown spectroscopy of stainless steel, T.A.Labutin, S.M.Zaytsev, A.M.Popov, N.B.Zorov, *Lomonosov Moscow State Univ., Russia.* Simultaneous study by emission and acoustic techniques to estimate the effect of the change in mass removal or extra heating on intensity increase at different evaporation conditions by double pulse LIBS.

LFH40
Scalability and miniaturization of multichannel semi-passive piezoelectric bimorph flexible mirror for phase distortion correction of intensive CW laser radiation, S.A.Chetkin, A.G.Safronov, *A.M.Prokhorov General Phys. Inst., Russia.* Multi-channel semi-passive bimorph flexible mirror (SPBFM) for CW laser phase distortion correction is investigated. SPBFM is able to have aperture of 10 mm, ~30 control channels, so stroke of mirrors will be a few microns under the voltage one hundred volts.

LFH41
Electro-optic high-power microwave pulse detection system, T.V.Dolmatov, V.V.Bukin, O.T.Loza, D.K.Ul'yanov, *A.M.Prokhorov General Phys. Inst., Russia.* A system utilizing linear electro-optic effect for electric field measurement in high-power microwave (HPM) pulses was created. The system was used for measurement of magnetron and plasma relativistic HPM oscillator pulses.

LFH42
Analytical modulation of thermal processes in deep-penetration laser welding, M.G.Galushkin, *Inst. on Laser and Inform. Technologies, Russia.* An approximate analytical model of deep-penetration laser welding has been developed. The key parameters of the welding process have been quantitatively assessed, and their interconnection has been analyzed. The comparison of the calculated data with the published experimental data has been made, from which it is apparent that the model describes the experimental data not only qualitatively, but also quantitatively with feasible accuracy.

LFH43
Directional source of short electromagnetic pulses, [1)]V.M.Brendel, [1)]V.V.Bukin, [1)]S.V.Garnov, [1)]S.P.Sadovskiy, [1)]V.H.Bagdasarov, [1)]N.N. Denisov, [1)]T.F.Yagafarov, [2)]V.A.Terehin, [2)]Yu.A. Trutnev, *[1)]A.M.Prokhorov General Physics Inst., Russia, [2)]FSUE RFNC-VNIIEF, Russia.* The prototype generator of short pulses of electromagnetic radiation was developed and manufactured. Generator is a parabolic vacuum photodiode in which phase-locked electron wave forms Cherenkov source of broadband EMP.

LFI • 18:30-20:00
Diffractive Optics and Nanophotonics (LAT-04): Posters

LFI1
Study of sharply focusing higher-order inhomogeneously polarized laser beams by means of near-field microscopy, S.V.Alferov, *S.P.Korolyov Samara State Aerospace Univ., Russia,* S.V.Karpeev, S.N.Khonina, *Image Processing Systems Inst., Russia.* We study the sharp focusing of radially and azimuthally polarized beams with use of a previously proposed optical setup based on the superposition of two circularly polarized beams.

LFI2
Sharp focus using a planar gradient-index lens with a slit, A.G.Nalimov, V.V.Kotlyar, *Image Processing Systems Inst., Russia.* Simulation by FDTD method shown, that a gradient-index secant hyperbolic micro lens made of Si, size of 2×5 μm with a slit width of 50 nm focuses TM-polarized plane wave in a focal spot width of FWHM = λ/23.

LFI3
Laser-aided formation of nanoporous structures in metal materials with the application of DOE-based optical systems, S.P.Murzin, N.L.Kazanskiy, *S.P.Korolyov Samara State Aerospace Univ., Russia.* Conditions of laser-aided formation of nanoporous structures with the application of DOE-based optical systems are defined. The intensity of pores formation and their sizes and shape depend from the temperature and speed conditions of processing.

LFI4
Generation and registration of optical vortices. Methods and devices, F.Yu.Kanev, V.P.Aksenov, *V.E.Zuev Inst. of Atmospheric Optics, Russia,* I.V.Izmailov, D.S.Kuksenok, *Natl Res. Tomsk State Univ., Russia.* In the report the methods of optical vortex generation are discussed from the point of view of their energy efficiency. Also the results of numeric simulation are included which characterize precision of singular point registration with the use of Hartmann sensor, ring interferometer, and on the base of mathematical processing of a vortex beam amplitude distribution.

LFI5
Hypergeometric beams in a parabolic-index media, A.A.Kovalev, V.V.Kotlyar, A.G.Nalimov, *Image Processing Systems Inst., Russia.* Expressions for modes and for focal spot size in a parabolic medium are deduced. Simulation has shown that binary parabolic microlens allows focusing Gaussian beam into elliptical spot with a smaller diameter of 0.45 wavelengths.

LFI6
Diffraction of the linearly polarized light with the phase singularity on a binary diffractive axicon, D.A.Savelyev, S.N.Khonina, *Image Processing Systems Inst., Russia.* FDTD-simulation of a diffraction of the linearly polarized light with the vortex or the linear phase singularity on a binary diffractive axicon with a high numerical aperture has demonstrated creation of the longitudinal component of the electric field on the optical axis.

LFI7
Combination of approaches of Mur and Berenger at realization FDTD method,

D.L.Golovashkin, *Image Processing Systems Inst., Russia,* L.V.Yablokova, *S.P.Korolyov Samara State Aerospace Univ., Russia.* Offers approach to modeling of absorption of radiation on borders of computing area at during calculations a FDTD method, connected from a combination ideal Berenger's coordinated layers and Mur's boundary conditions.

LFI8
Performance of LED secondary optics with two aspherical surfaces, M.A.Moiseev, S.V. Kravchenko, L.L.Doskolovich, *Image Processing Systems Inst., Russia, S.P.Korolyov Samara State Aerospace Univ., Russia.* The optical performance of LED optical elements with two aspherical surfaces is investigated. Differential equations for computation of optical surfaces are presented. It is shown that such kind of optics provides high lighting efficiency (85–92%) in case of generation required irradiance distribution with angular size from 20° to 160°.

LFI9
Achromatic apodizing filters with binary-amplitude structure, A.G.Sedukhin, A.G.Poleshchuk, *Inst. of Automation and Electrometry, Russia.* Achromatic apodizing filters with binary-amplitude diffractive structure are proposed and investigated. They are destined for the use in imaging and beam shaping optical systems. The structure of the filters has the form of 2D regular diffraction gratings with slowly varying fill factors of their cells.

LFI10
Graded index photonic quasicrystal lens, P.N.Dyachenko, *Technische Univ. Hamburg-Harburg, Germany,* V.S.Pavelyev, V.A.Soifer, *Image Processing Systems Inst., Russia.* We introduce graded photonic quasicrystals (GPQs) and investigate properties of such structures on the example of Luneburg lens based on a dodecagonal photonic quasicrystal. It is shown that the graded photonic quasicrystal lens has better focusing properties as compared with the graded photonic crystal lens in a frequency range suitable for experimental realization. The proposed graded photonic quasicrystals can be used in optical systems where compact and powerful focusing elements are required.

LFI11
Modeling of sharp focused beams propagation through the microscope probes, S.A.Degtyarev, S.N.Khonina, *Image Processing System Inst., Russia.* Using FDTD-method we have modeled the detection of sharp focused beams with high energy of longitudinal electrical-field component by means of conical probes. Energy transmission coefficient enhancement has been demonstrated when metal coating is filled by dielectric.

LFI12
Shaping of non-diffracting light beams with a predetermined distribution of transverse intensity, A.P.Porfirev, R.V.Skidanov, *Image Processing Systems Inst., Russia.* Method for shaping of non-diffracting light fields with a predetermined distribution of transverse intensity is presented. In this method is used a superpositions of 0-th order Bessel beams. The ability to shaping light fields, which have a user-defined cross-section, is demonstrated.

LFI13
Variable-bandwidth tunable optical filters, V.E.Pozhar, V.I.Pustovoit, K.I.Tabachkova, *STC Unique Instrumentation, Russia.* The method is discussed for bandwidth variation of acousto-optical tunable filters (AOTF) by means of linear-frequency modulation (LFM) of ultrasonic waves. Two basic geometries, collinear and non-collinear, are compared. Experimental results are presented for LFM-AOTF testing.

LFI14
The rotation of micro-objects by complex vortex beams, A.A.Morozov, R.V.Skidanov, *Image Processing Systems Inst., Russia.* A method for obtaining complex vortex beams is described. The DOE for the formation of such beams was designed and manufactured. Experimental images were getting by fabricated DOE. The experiment of rotational agglomeration of microparticles was conducted by using complex vortex beams.

LFI15
Binary microaxicon fabrication by two-photon polymerization technique, V.Osipov, *B.I.Stepanov Inst. of Phys., Belarus,* V.Pavelyev, *Image Processing Systems Inst., Russia,* D.Kachalov, *Samara State Aerospace Univ., Russia,* B.Chichkov, *Laser Zentrum Hannover, Germany.* The present work is devoted to the realization of binary diffractive relief of radial DOE's in the form of microaxicons with radial step 600 and 900 nm, using the Two-Photon Polymerization (2PP) technique.

LFI16
Development of acousto-optical devices made of KGW laser crystal, D.Yu.Velikovskiy, V.E.Pozhar, *Scientific and Technological Centre of Unique Instrumentation, Russia,* M.M.Mazur, *Natl Res. Inst. for Physicotechnical and Radio Engineering Measurements "VNIIFTRI", Russia.* Two acousto-optical devices based on laser crystal $KGd(WO_4)_2$ are presented. Both, the polarization-insensitive modulator and collinear narrow-band AOTF are resistant for high power laser radiation.

LFI17
Analytical design of freeform optical elements generating an arbitrary-shape curve, L.L.Doskolovich, A.Y.Dmitriev, E.A.Bezus, *Image Processing Systems Inst., Russia.* A general relationship for the freeform surface that produces a line focus is derived as an envelope of a parametric family of hyperboloids of revolution. The calculation of the hyperboloid parameters providing required irradiance distribution along the curve is reduced to the solution of an explicit first order differential equation.

LFI18
Simulation of focusing of ultra short pulse by microlenses, E.S.Kozlova, V.V.Kotlyar, *Image Processing Systems Inst., Russia.* In the Letter process of sharp focusing of short pulse (1.29 and 2.98 fs) by microlenses was simulated. Simulation were performed using FDTD-method with the dependence of the permittivity on frequency using Sellmeyer's model.

LFJ• 18:30-20:00
Ultra-Fast Diagnostic in Laser Research (LAT-05): Posters

LFJ1
How to look inside a focal volume of an intense tightly-focused laser beam: the possible ways and perspective, S.A.Aseyev, B.N.Mironov, V.G.Minogin, S.V.Chekalin, *Inst. for Spectroscopy, Russia.* Sub-focal spatially resolved photoionization of gases by ultrashort laser beam based on the ion projection microscopy is experimentally demonstrated. The technique can be used for profiling of laser radiation in a wide spectral range.

LFJ2
All optical display on a femtosecond time-scale, P.N.Melentiev, A.E.Afanasiev, V.I.Balykin, *Inst. for Spectroscopy, Russia.* We propose and experimentally realize a element for nanoplasmonics - a split hole resonator (SHR). The SHR is the marriage of two basic elements of nanoplasmonics, a nanohole and a nanorod. The SHR is an efficient nanolocalized radiation source under action of femtosecond laser light [1,2]. A peak field intensity in the SHR occurs at the single tip of the nanorod inside the nanohole. The peak field is much stronger than those of the nanorod and nanohole, because the SHR field involves contributions from the following two field-enhancement mechanisms: (1) the excitation of surface plasmon resonances and (2) the lightning-rod effect. Here, we demonstrate the use of the SHR as a highly efficient nonlinear optical element for: (i) the generation of the third harmonic from a single SHR; (ii) the excitation of intense multiphoton luminescence from a single SHR; (iii) the construction of a polarization-ultrasensitive nanoelement. We show that the SHR nanostructures may play the role of an optical pixel and we performed the proof-of-principle experiment on the building up of an all-optical display.

LFJ3
On the possibility of Ag/Pd-films employing to determine the light polarization, A.S.Saushin, G.M.Mikheev, *Inst. of Mechanics, Russia.* A photovoltaic effect was found out in the Ag/Pd-films obtained with the thick-film technology, which sensitive to the polarization of the incident light. The possibility of using these films as materials to make nonoptical analyzers of the polarization in a wide spectral band is shown.

LFJ4
Registration nanosecond and sub-nanosecond pulses of microchip laser with active mirror, V.K.Chevokin, V.V.Kiyko, V.A.Kondratyev, V.A.Podvyaznikov, *A.M.Prokhorov General Phys. Inst., Russia,* S.V.Gagarsky, A.N.Sergeev, *Natl Res. Univ. of Inform. Technologies, Mechanics and Optics, Russia.* Experimentally investigated operation of the Q-switched microchip laser with active mirror with controlled spatially-distributed reflection coefficient. Regularities of change of the pulses shape and duration have been identified, and also investigated lasing pulse train with controlled time interval between them.

LFJ5
Registration of picosecond SRS-compressed microchip laser pulses, V.K.Chevokin, V.V.Kiyko, V.A.Kondratyev, V.A.Podvyaznikov, *A.M.Prokhorov General Phys. Inst., Russia,* S.V.Gagarsky, A.N.Sergeev, *Natl Res. Univ. of Inform. Technologies, Mechanics and Optics, Russia.* Backward SRS-conversion from second harmonic of end-pumped microchip Nd^{3+}:YAG-Cr^{4+}:YAG laser with passive Q-switch in barium nitrate crystals was experimentally investigated. Maximum achieved conversion efficiency was more than 50%, and maximum value of temporal compression coefficient was more than 6.

LFJ6
Image converter cameras for fast phenomena studies, V.K.Chevokin, V.A.Podvyaznikov, *A.M.Prokhorov General Phys. Inst., Russia.* The Image Converter Cameras are electron-optical devices which are used to detect, intensify and shutter images from hard X-rays to near infrared (IR) regions of the electromagnetic spectrum. This report outlines the development of image converter streak and framing cameras based on image tubes with capability of good performance.

LFK • 18:30-20:00
Advances in Electro/Magneto-Optical Materials (LAT-06): Posters

LFK1
Growth and characterization of $(Ba,Sr)TiO_3$/$(Bi,Nd)FeO_3$ multilayer heterostructures, G.Khabiri, *Fayoum Univ., Egypt,* A.S.Anokhin, Yu.I.Golovko, V.M.Mukhortov, V.B.Shirokov, *Southern Scientific Center, Russia,* O.A.Bunina, Yu.I.Yuzyuk, *Southern Federal Univ., Russia.* Lattice distortions in epitaxial heterostructures containing one, two and three 80 nm-thick alternating $(Bi_{0.98}Nd_{0.02})FeO_3$ and $(Ba_{0.8}Sr_{0.2}TiO_3)$ layers deposited on MgO substrates studied by means of x-ray diffraction and Raman scattering are discussed.

LFK2
Investigation of the ionic mobility in the $Li_{0.03}Na_{0.97}Ta_{0.4}Nb_{0.6}O_3$ solid solution by Raman spectra, N.V.Sidorov, N.A.Teplyakova, M.N.Palatnikov, E.Yu.Obryadina, *I.V.Tananaev Inst. of Chemistry and Technology of Rare Elements and Mineral Raw Materials of the Kola Sci. Center, Russia.* Ionic mobility in the $Li_{0.03}Na_{0.97}Ta_{0.4}Nb_{0.6}O_3$ solid solution was investigated by Raman spectra. It was discovered that the lines width, corresponding to the Li^+ vibrations depends on temperature exponentially and the lines width, corresponding to the Na^+ vibrations – linearly. Average lifetime of Li^+ ions in the equilibrium position and the height the barrier were estimated: $\sim 8 \cdot 10^{-12}$ s and ~20 kJ/mol, respectively.

LFK3
Photoconductivity of granular silver films on sapphire surface, I.A.Gladskikh, T.A.Vartanyan, E.V.Vashchenko, *St.Petersburg Natl Res. Univ. of Inform. Technologies, Mechanics and Optics, Russia.* The electrical and photoelectrical properties of the granular silver films on sapphire substrates were investigated. Conductivity is found to be thermally activated. The influence of illumination on the conductivity of the film was studied.

LFK4
Structural transformations in ferroelectric PZT films: an effect on electrical and optical properties, D.S.Seregin, A.S.Sigov, K.A.Vorotilov, O.M.Zhigalina, *Moscow State Technical Univ. of Radioengineering, Electronics and Automation, Russia.* In this paper an effect of crystallization temperature on the fine microstructure, optical and electrical properties of PZT films prepared by chemical solution deposition on platinized silicon substrates is studied.

LFK5
Electrically controlled domain walls visual broadening/narrowing in iron garnet film, A.M.Vlasov, A.V.Nikolaev, E.P.Nikolaeva, A.P. Pyatakov, *Lomonosov Moscow State Univ., Russia.* Recent experiments with iron garnet film using planar electrodes parallel to magnetic domain structure show change of domain wall

visual width under electric field. This effect can be used for creation of ultrafast integrated optical devices.

LFL • 18:30-20:00
Biophotonics and Laser Biomedicine (LAT-07): Posters

LFL1
Raman spectroscopy for skin tumors, D.N.Artemev, I.A.Bratchenko, V.P.Zakharov, O.O.Myakinin, Yu.A.Khristoforova, *Samara State Aerospace Univ., Russia,* S.V.Kozlov, A.A.Moryatov, *Samara Regional Clinical Oncological Dispensary, Russia.* The main task of our study was research of fast noninvasive method for tumors diagnosis. In this study we analyzed malignant and benign skin tumors using Raman spectroscopy. According to the results of experimental studies, a method of determining malignancy by analyzing peak intensities of Raman scattering in the region 1200-1700 cm^{-1} was developed.

LFL2
Laser nanoformation of biocompatible volume nanocomposites, V.M.Podgaetsky, S.V.Selishchev, L.P.Ichkitidze, A.Yu.Gerasimenko, *Natl Res. Univ. of Electronic Technology (MIET), Russia.* Biological properties, ordering structure, hardness (~300 MPa), density (~1200 kg/m^3) of volume nanocomposites, produced by laser method from water-albumin dispersion with CNT's, were installed. There were compared characteristics of nanocomposites received of the alternative methods.

LFL3
A study of wavelength variability in laser cochlear nerve stimulation, S.Jiang, S.Zhang, S.An, L.Tian, *Shandong Univ., China.* Cochlear tissue absorptions and auditory brainstem responses to lasers are studied. Laser with wavelength from 500 to 700 nm, frequency from 0.4 to 70 Hz and pulse energy from 5 to 500 mJ is preferable for optical cochlear studies.

LFL4
Singlet oxygen generation by bioconjugates based on CdSe/ZnS quantum dots and porphyrin photosensitizers, E.I.Zenkevich, *Natl Technical Univ. of Belarus, Belarus,* E.I.Sagun, V.N.Knyukshto, A.S.Stasheuski, V.A.Galievsky, A.P.Stupak, *B.I.Stepanov Inst. of Phys., Belarus,* T.Blaudeck, *Linköping Univ., Sweden,* C.von Borczyskowski, *Chemnitz Univ. of Technology, Germany.* Upon variation of laser pulse energy followed by quantitative analysis of photoluminescence quenching in "CdSe/ZnS quantum-porphyrin" bioconjugates it was shown for the first time that energy transfer process QD porphyrin enhances singlet oxygen generation by these complexes.

LFL5
Laser design and testing of porous titanium and nitinol scaffolds for multipotent mesenchymal stem cells, S.Volchkov, O.Tumina, I.Bairikov, *Samara State Medical Univ., Russia,* I.Shishkovskii, *P.N.Lebedev Physical Inst., Samara branch, Russia.* The paper is devoted to experimental biocompatibility studies of 3D porous tissue-cellular scaffolds made of titanium and nitinol, including with the hydroxyapatite additive, synthesized via Selective Laser Sintering for implantology and cellular engineering.

LFL6
Femtosecond Raman and luminescence spectroscopy of water and biological objects, Yu.S.Biryukova, S.S.Golik, A.A.Ilyin, *Far Eastern Federal Univ., Russia,* A.Yu.Mayor, O.A.Bukin, *Inst. of Automation and Control Processes, Russia.* The Raman spectra of femtosecond laser pulses in distilled and tap water, and luminescence spectra of aqueous solutions containing dissolved organic matter, chlorophyll A and biological objects excited by ultra-short laser pulses were investigated.

LFL7
Parameters and morfological changes in kidney tissue under the interstitial Nd:YAG laser coagulation in animal testing, O.V.Teodorovich, G.G.Borisenko, S.A.Naryshkin, M.N.Shatokhin, *Central Clinical Hospital JSC RZhd "Russian Railways", Russia,* E.V.Rasshchupkina, *Russian Medical Academy of Postgraduate Education, Russia,* D.G.Kochiev, *A.M.Prokhorov General Phys. Inst., Russia,* Y.Y.Andreeva, *P.A.Hertzen Cancer Research Inst., Russia.* An experimentally obtained parameters for interstitial laser coagulation of the kidney tissue by using a 600 μm bare fiber catheter to be as follows: duration 2–10 seconds, output power 20–40 W, total exposure energy 200–400 J.

LFL8
New heterogeneous compositions of cadmium selenium nanoparticles and dye molecules with cyclodextrin inclusion complexes, M.M.Asimov, S.S.Anufrik, G.G.Sazonko, *B.I.Stepanov Inst. of Phys., Belarus.* Spectroscopic properties of new heterogeneous multicolor compositions based on cadmium selenium (CdSe/ZnS) nanocrystal and inclusion complexes of dye molecule with β-cyclodextrin are presented. Spectral florescence of proposed compositions investigated in aqueous solution and thin films.

LFL9
The temperature response of the tissue on the pulse laser radiation, S.Yu.Makarov, R.Sh.Zatrudina, *Volgograd State Univ., Russia.* The model of the temperature influence of the pulse laser radiation on the skin and subcutis, taking into account the presence of biological sources of heat, heat exchange with the air and the perfusion was presented. The results of numerical simulation of temperature distribution in the skin and the subcutis for different values of the air temperature and the density of the power of internal heat sources are analyzed.

LFL10
Simulation of laser-induced temperature field kinetics in tissue with the embedded nanoparticles: two-scale algorithm development, Yu.A.Avetisyan, A.N.Yakunin, V.V.Tuchin, *Inst. of Precision Mechanics and Control, Russia, Saratov State Univ., Russia.* A medium modeling biological tissue with the ensemble of embedded absorbing nanoparticles under pulsed laser irradiation is considered. A novel two-scale algorithm for calculation of the kinetics of laser-induced temperature field spatial distribution is proposed.

LFL11
Some peculiarities of the scattering of light in optically anisotropic media, E.L.Bubis, V.M. Gelikonov, G.V.Gelikonov, V.V.Lozhkarev, M.A. Novikov, V.I.Rubaha, *Inst. of App. Phys., Russia.* The experiments on the observation of light scattering in optically anisotropic transparent media are presented. In a side observation periodic track line are visible. To explain the experimental results carried out theoretical calculations.

LFL12
Laser and morphometric characterization of mononuclears for some diseases, G.I.Ruban, V.A.Loiko, *B.I.Stepanov Inst. of Phys., Belarus,* N.V.Goncharova, D.V.Marinitch, *Center of Transfusiology and Biomedicine Technologies, Belarus.* The flow cytometry and DIC microscopy were used to investigate mononuclear cells of peripheral blood. The discovered optical and morphometric features of the cell population enable one to reveal hepatitis B/C, leukemia and myelodysplastic syndromes.

LFL13
He-Ne laser irradiation of human lymphocytes induces structural changes in mitochondria related to increased ATP synthesis, V.M.Maneifel, T.I.Karu, *Inst. of Laser and Inform. Technologies, Russia.* Structural rearrangements of mitochondria in human lymphocytes induced by He-Ne laser (632.8 nm) irradiation are related to long-term increased ATP synthesis. Transformations of nuclear chromatin and nucleolus after the irradiation are due to activation of synthesis of mRNA and rRNA precursors, respectively.

LFL14
Gene expression under laser and LED radiation for modulation of cell adhesion: possible applications for biotechnology, L.Pyatibrat, T.Karu, *Inst. of Laser and Inform. Technologies, Russia.* A method to increase the proliferation of eukaryotic cells by laser and LED irradiation in red-to-near IR region is described and possible biotechnology applications are outlined.

LFL15
Laser and LED radiation in red-to-near IR region increases or decreases the motility of spermatozoa, A.Drozdov, *Inst. of Marine Biology, Russia,* T.Karu, V.Yusupov, *Inst. of Laser and Inform. Technologies, Russia,* V.Chudnovskii, *Pacific Oceanological Inst., Russia.* Irradiation with He-Ne laser (632.8 nm) and a LED (780 nm) increased the speed motility of sea-urchin spermatozoa but a LED emitting at 650 nm caused the decrease of motility and death of the cells.

LFL16
Interstitial Nd:YAG laser focal therapy of localized renal cell carcinoma, S.Naryshkin, A.Ryazancew, *Central Clinical Hospital No1 JSC RZhD "Russian Railways", Russia,* O.Teodorovich, G.Borisenko, E.Rasshchupkina, *Endoscopic Urology Department, Russian Medical Academy of Postgraduate Education, Russia,* D.Kochiev, A.Sharikov, *A.M.Prokhorov General Phys. Inst., Russia.* Nd:YAG laser in free running at 100Hz repetition rate was used for interstitial laser coagulation (ILC) of localized kidney tumor. Sixteen patients with tumor size 5–35 mm underwent ILC.

LFL17
Optical waveguides with silver nanoparticles shell for bio- and chemical sensing, V.I.Egorov, N.V.Nikonorov, A.I.Sidorov, *St.Petersburg Natl Res. Univ. of Inform. Technologies, Mechanics and Optics, Russia,* A.V.Nashchekin, A.V.Panfilova, *Ioffe Physical Technical Inst., Russia.* Two methods of silver nanoparticle synthesis on a glass waveguide surface are described. Spectral investigation shows that such waveguides are perspective for bio- and chemical sensing because of local field enhancement near plasmon resonance of nanoparticles.

LFL18
Photochemical processes and photoisomerization reactions induced in bilirubin upon direct laser excitation of dissolved molecular oxygen, V.Yu.Plavskii, A.I.Tretyakova, A.V.Mikulich, L.G.Plavskaya, A.S.Grabtchikov, I.A.Khodasevich, V.A.Orlovich, *B.I.Stepanov Inst. of Phys., Belarus.* The specificities of photochemical processes as well as photoisomerization reactions induced in bilirubin upon direct laser excitation of molecular oxygen in IR-band were investigated for the first time.

LFL19
Acceptors of laser radiation in IR spectral region responsible for realization of its biological action, V.Yu.Plavskii, A.S.Grabtchikov, I.A.Khodasevich, L.G.Plavskaya, A.I.Tretyakova, A.V.Mikulich, V.A.Orlovich, *B.I.Stepanov Inst. of Phys., Belarus,* N.V.Barulin, *Belarusian State Agricultural Academy, Belarus.* It is demonstrated for the first time that dissolved molecular oxygen and molecules of water can be acceptors of laser radiation determining its biological action in near IR spectral region.

LFL20
Evaluation of photosensitizing antiseptics for application in antimicrobial photodynamic therapy, A.V.Mikulich, A.I.Tretyakova, L.G.Plavskaya, V.Yu.Plavskii, *B.I.Stepanov Inst. of Phys., Belarus.* It is proposed a new approach for increasing the efficiency of action of antimicrobial drugs (antiseptics) based on the use of their photosensitizing properties and realization of antimicrobial photodynamic therapy method (APDT).

LFL21
THz time-domain spectroscopy of natural amino acids, A.V.Kapralova, A.S.Pogodin, *Inst. of Laser Phys., Russia,* M.V.Tsurkan, N.S.Balbekin, O.A.Smolyanskaya, *St.Petersburg Natl Res. Univ. of Inform. Technologies, Mechanics and Optics, Russia.* In the present work terahertz spectra of amino acids (tryptophan, tyrosine, cysteine, alanine, glycine, phenylalanine, methionine, histidine) have been researched in the range of 0.1 to 1.0 THz. System of generation and detection of THz radiation in the range of 0.1 to 2.0 THz has been used for spectroscopy (time-domain spectroscopy).

LFL22
Improved system for determining the concentration of the spatial distribution of tetrapyrrole compounds-based photosensitizers in the human fundus, S.S.Model, T.A.Savelieva, K.G.Linkov, *A.M.Prokhorov General Phys. Inst., Russia.* We improved system for the analysis of the spatial distribution of photosensitizers (PS) which was developed earlier in our laboratory. System provides real-time determining concentration of PS in different points of the field of view quickly and accurately.

LFL23
Dentistry application using a high-energy ultrashort pulse of Nd:YAP laser, T.S.Dem'yanova, I.V.Linchenko, V.N.Khramov, V.N. Khramova, *Volgograd State Univ., Russia.* The short and ultrashort pulses of Nd:YAP laser very little explored within applications of dentistry. We present general aspects of the ablation rate and discuss the applications of short and ultrashort laser pulses of a Nd:YAP laser for dentistry. We observe temperature variation during exposure, as well as presentation of original tissue after ablation.

LFL24
UV phototherapy of psoriasis: different mechanisms efficacy comparison with mathematical modeling, M.M.Stolnitz, *Saratov State Univ., Russia.* Basic known mechanisms of "UV-radiation – psoriatic skin" interaction are systematized. Simple but adequate mathematical models of psoriatic epidermis dynamics are selected. Dynamic behavior corresponding to psoriatic lesion resolution at UV phototherapy is analyzed.

LFL25
Determining the type of isomer of glutamic acid by the spectral characteristics of the optical rotation, S.A.Kutsenko, V.S.Nosachenko, *Volgograd State Univ., Russia.* Optically active isomer of the glutamic acid and its solutions was investigated numerically. Dependences characteristics of optical rotation on concentration and wave length were obtained. The wave length range in which the optical rotation of L and D isomers has a different sign it was found. These results allow us to determine the type of isomer quickly. The results of numerical research are confirmed by experiment.

LFL26
Investigation of diffusion processes in hydrogels by means of laser interferometry technique, V.V.Azarova, A.Yu.Golyaeva, P.Yu. Lobanov, I.S.Manuylovich, O.E.Sidoryuk, *M.F. Stelmakh "Polyus" Research Inst., Russia,* E.V.Dorofeeva, *M.M.Shemyakin and Yu.A.Ovchinnikov Inst. of Bioorganic Chemistry, Russia.* The present paper is devoted to the investigation of diffusion processes in polyacrylamide hydrogels. High optical clarity of polyacrylamide samples allows to use optical methods for analyzing the properties of the material, in particular on the basis of the known relationship between refractive index of the composite material and concentration of its components. In the present paper the effectiveness of laser interferometry technique and phase shifting interferometry was shown for the analysis of diffusion of some organic (glucose, lactose, sucrose, etc) and inorganic molecules (including hydrogen peroxide, heavy water, etc) in polyacrylamide hydrogels.

LFL27
Effect of low-intensity visible and near-infrared laser radiation on a growth of lactobacilli, L.E.Batay, A.I.Vodchits, V.A.Orlovich, *B.I.Stepanov Inst. of Phys., Belarus,* I.G.Chukhrai, E.I.Marchenko, I.L.Bobkova, *Belarusian Medical Academy of Postgraduate Education, Belarus*, N.V.Dudko, *Private Unitary Enterprise "Dialek", Belarus.* It was observed that continuous-wave low-intensity laser radiation at 1.3 and 2 μm wavelengths with the irradiation dose of about 0.6 J/cm^2 intensify statistically reliably a growth of lactobacilli.

LFL28
IR-spectroscopy of adenosine phosphates, R.Sh.Zatrudina, A.V.Surina, *Volgograd State Univ., Russia.* Quantum-mechanical calculations of normal vibration spectra of adenosine, adenosinmonophosphate, adenosindiphosphate and adenosintriphosphate by semiempirical and density functional theory quantum-mechanical methods was carry out. The interpretation of the vibrational spectrum was done. Changes of the characteristics frequency at increase of number of the acidum phosphoricum residua connected with a molecule adenosine are analysed.

LFL29
Cytotoxicity and apoptotic effects of polymer coated copper oxide nanoparticles synthesized via laser sintering in mesenchymal stem cells, I.Shishkovsky, *P.N.Lebedev Physical Inst., Samara Branch, Russia.* The aim of this study was to observe the cytotoxicity of copper oxide nanoparticles on culture of multipotent mesenchymal stem cells (MMSC). Copper oxide inclusions were incorporated in polycarbonate matrix via selective laser sintering process.

LFL30
The interaction of heavy metals with the model solutions of serum by static light scattering (SLS), A.Komarova, V.Gibizova, I.Sergeeva, *Lomonosov Moscow State Univ., Russia.* By static light scattering experiments were performed, the behavior of cesium ions in model solutions of serum. In a model solution healthy person, the slope of the concentration dependence is preserved, and for a sick person - is reversed. These results can be used to diagnose cancer at early stages.

LFL31
Optical clearing of skin in vivo for improvement of blood flow and fluorescence imaging, W.Jing, Y.Zhang, R.Shi, D.Zhu, *Huazhong Univ. of Sci. and Technology, China.* An optical clearing method was developed to make skin clearing rapidly and safely, which can improve the subcutaneous blood flow and fluorescence imaging.

LFL32
Ultrashort pulse distributed feedback dye laser for biomedical applications, T.Sh.Efendiev, V.M.Katarkevich, Yu.V.Kruchenok, V.Yu. Plavskii, A.N.Rubinov, A.N.Sobchuk, *B.I.Stepanov Inst. of Phys., Belarus.* A novel modification of the ultrashort pulse distributed feedback dye laser, excited by a diode-pumped solid-state Nd:LSB micro laser, is presented. Such laser source is especially suitable for time-resolved spectroscopic measurements in biology and medicine.

LFL33
Optical clearing agents and nanoparticles as enhancers for tissue optical imaging, E.A.Kolesnikova, E.K.Volkova, E.A.Genina, A.N. Bashkatov, V.I.Kochubey, *Saratov State Univ., Russia,* O.Minet, M.E.Darvin, J.Lademann, *Charité – Universitätsmedizin Berlin, Germany,* V.V.Tuchin, *Precision Mechanics and Control Inst., Russia, Univ. of Oulu, Finland.* The studies of human skin optical clearing and the two-photon detection depth increase by luminescent nanoparticles were carried out. The respective results obtained by using of transillumination and two-photon luminescent tomography are presented.

LFL34
Laser analysis of pH spatial distributions in biological media, V.B.Oshurko, A.N.Fedorov, *A.M.Prokhorov General Phys. Inst., Russia.* Possibility of laser Raman estimation of pH value in biosamples by the use of set of specially designed narrow-band resonant optical filters (bandwidth ~5 nm) and cameras have been tested. Images of different "OH-"-distributions in biological tissue were obtained.

LFL35
Research of optical radiation interaction with biological tissues using Raman spectroscopy, Yu.A.Khristoforova, I.A.Bratchenko, V.P.Zakharov, O.O.Myakinin, D.N.Artemev, *Samara State Aerospace Univ., Russia,* S.V.Kozlov, A.A.Moryatov, *Samara Regional Clinical Oncological Dispensary, Russia.* In this study the possibility of pathological skin formations diagnosis by Raman spectroscopy was performed. Numerical and experimental studies were carrying out. The method for melanoma detection in healthy skin was proposed.

LFL36
Fibre-optic laser systems for optogenetic investigation of deep brain structures and long term fluorescent analysis of bio cells, [1)]V.G.Artjushenko, [1)]G.L.Danielyan, [2)]S.Kasparov, [2)]A.Teschemacher, [3)]A.Gourine, [4)]A.Bocharnikov, *[1)]A.M. Prokhorov General Phys. Inst., Russia, [2)]Univ. of Bristol, UK, [3)]Univ. College London, UK, [4)]Art photonics GmbH, Berlin, Germany.* Development of innovative fibre optrodes used with laser light delivery systems for chronic opto-genetic experimentation on deep brain structures. New, small size optrodes can be optically connected by fiber optic cable with modulated laser system, which control brain cell activation of animals during the long time experiments. Design of fluorescent analysis system is based on fiber optic multichannel bundle used for laser light delivery for fluorescence excitation and for signal collection.

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Hall 1	Hall 2 JOINT/4	Hall 3 LAT-07/5

9:00–11:00
JSA • Symposium on THz Optics and Technologies IV (Joint/4)
Vladimir Gavrilenko, *Moscow Physical-Technical Inst., Russia, Presider*

JSA1 • 09:00-09:30 • INVITED
Terahertz wave generation via optical rectification of femtosecond transform-Limited and nanosecond non-transform-limited laser pulses, G.Kh.Kitaeva, *Lomonosov Moscow State Univ., Russia*. Specially designed terahertz spectra are obtained using optical rectification of broadband laser pulses in periodic and aperiodic quasi-phase-matched crystals regardless of whether the pulses are transform-limited or not. Generation efficiency under nanosecond-laser pumping is discussed.

JSA2 • 09:30-10:00 • INVITED
"Monochromatic" terahertz surface plasmon polaritons: prospects for surface study and optical communications, B.A.Knyazev, V.S.Cherkassky, V.V.Gerasimov, I.A.Kotelnikov, *Budker Inst. of Nuclear Physics, Russia,* A.K.Nikitin, *Novosibirsk State Univ., Russia,* G.N.Zhizhin, *Scientific and Technological Center for Unique Instrumentation, Russia.* Propagation of surface plasmon polaritons launched along a metal-dielectric-air plane and bended interfaces using monochromatic terahertz radiation of Novosibirsk free electron laser, as well as their diffraction at the surface edge, was studied both experimentally and theoretically.

9:00–11:00
LSB • Biophotonics and Laser Biomedicine V (LAT-07/5)
Rinat Esenaliev, *Univ. of Texas Medical Branch, USA, Presider*

LSB1 • 09:00-09:30 • INVITED
Multiple roles of mitochondrial respiratory chain in mammalian cells under action of red and IR-A radiation: cellular mechanisms of low power laser therapy, T.I.Karu, *Inst. of Laser and Inform. Technologies, Russia.* Data about action mechanisms of laser and LED radiation in red-to-near IR range on cellular metabolism are summarized. Photosignal transduction pathways from cytochrome c oxidase to nucleus are discussed in connection of laser therapy mechanisms.

LSB2 • 09:30-09:45
Biomedical application of the phenomenon of laser-induced blood oxyhemoglobin photodissociation, M.M.Asimov, *B.I.Stepanov Inst. of Phys., Belarus.* The results of investigations of the effect of low intensity laser radiation on photodissociation of blood oxyhemoglobin and its role in biomedical processes are presented. Novel optical method of local tissue oxygenation is proposed and developed.

Hall 4
LAT-05/2

9:00–11:00
LSA • Ultrafast Diagnostics in Laser Research II (LAT-05/2)
Martion Richardson, *CREOL, USA*, *Presider*

LSA1 • 09:00-09:30 • INVITED
New ultrafast beam sources and diagnostics at the Advanced Laser Light Source (ALLS) facility, J.C.Kieffer, E.Hallin, R.Fedosejevs, P.Antici, *Inst. Natl de la Recherche Scientifique, Canada.* I will present the most recent work we are doing at the ALLS facility with the 200TW system (5 J, 25 fs, 10 Hz) on new concepts for electron acceleration and on the development of a new coherent x-ray beam line based on LWA.

LSA2 • 09:30-10:00 • INVITED
On "temporal resolution" of fs light-pulse waveform meters, A.V.Masalov, *P.N.Lebedev Physical Inst., Russia.* Accuracy of waveform measurements of short laser pulses (< 10^{-11} s) by nonlinear optical methods (FROG, SPIDER, etc.) is analyzed. Examples of systematic and stochastic errors affecting fidelity of waveform reconstruction are presented.

Hall 5
ICONO-09-JOINT/1

9:00–11:00
ISA • Joint Session of Symposium on Femtosecond Laser Pulse Filamentation and Joint Symposium on THz Optica and Technologies I (ICONO-09-JOINT/1)
Alexander Shkurinov, *Lomonosov Moscow State Univ.*, *Russia, Presider*

ISA1 • 09:00-09:30 • INVITED
Remote THz generation via filamentation in air, A.Mysyrowicz, *Ecole Polytechnique, France.*

ISA2 • 09:30-10:00 • INVITED
Strong THz fields from filaments: new physics and applications, A.D.Koulouklidis, S.Tzortzakis, *Univ. of Crete, Greece,* A.Gorodetsky, M.Massaouti, *Inst. of Electronic Structure and Laser (IESL), Foundation for Research and Technology - Hellas (FORTH), Greece.* We present new experimental findings coupled with a comprehensive model explaining both on-axis and off-axis components of the far-field spatial distribution of intense broadband THz beams generated by femtosecond laser filaments in gases.

Hall 6
ICONO-04/5

9:00–11:00
ISB • Quantum Physics, Information, and Technologies V (ICONO-04/5)
Alexei Taichenachev, *Inst. of Laser Physics, Russia, Presider*

ISB1 • 09:00-09:30 • INVITED
Response of photoreceptor cells to single- and multi-photon stimulation, M.Phan, M.F.Cheng, L.Krivitsky, *Data Storage Inst., Singapore,* D.Bessarab, *Inst. of Medical Biology, Singapore.* We study responses of retinal photoreceptors (retinal rods) to stimulation by precisely controlled light pulses at a single photon level. The single photon pulses are generated via a process of spontaneous parametric down conversion.

ISB2 • 09:30-10:00 • INVITED
Single-qubit laser – a source of non-classical light for quantum information applications, S.Ya.Kilin, A.B.Mikhalychev, *B.I.Stepanov Inst. of Phys., Belarus.* We provide general unique and uniformly applicable solution for single-qubit laser stationary state in terms of nonlinear coherent states, prove non-classicality of the state and introduce nonlinear transition probabilities, revealing quantum nature of single-qubit laser.

Hall 1	Hall 2 JOINT/4	Hall 3 LAT-07/5

9:00–11:00
JSA • Symposium on THz Optics and Technologies IV (Joint/4)—Continued

JSA3 • 10:00-10:30 • INVITED
THz bolometer mixers, fast detectors and single-photon counters based on superconducting NbN films, G.Goltsman, *Moscow Pedagogical State Univ., Russia.* We present an overview of our research and development of the new generation of hot- electron superconducting sensors: single-photon counters, terahertz direct detectors and mixers. These sensors have already demonstrated a performance that makes them devices-of-choice for many optical and terahertz applications.

9:00–11:00
LSB • Biophotonics and Laser Biomedicine V (LAT-07/5)—Continued

LSB3 • 09:45-10:00
Optimization of laser therapy methods by proper selection of tissue irradiation wavelength, V.V.Barun, *Belarus State Univ. of Informatics and Radioelectronics, Belarus,* A.P.Ivanov, *B.I.Stepanov Inst. of Phys., Belarus.* A review of authors-designed techniques for increasing light power, absorbed by various tissue chromophores, via the optimal selection of the wavelength irradiating skin surface is given. The techniques are based on the simulation of light transfer through biotissues. Light-oxygen and photodynamic effects as well as photodissociation of blood oxyhemoglobin are considered.

LSB4 • 10:00-10:15
Methylpheophorbide a nanoparticles for the fluorescence diagnosis and photodynamic therapy application, A.V.Ryabova, D.V.Pominova, S.Yu.Vasilchenko, V.B.Loschenov, *A.M.Prokhorov General Phys. Inst., Russia,* E.G.Maximov, *Lomonosov Moscow State Univ., Russia,* G.V.Ponomarev, *V.N.Orekhovich Inst. of Biomedical Chemistry, Russia.* The study of methylpheophorbide a nanoparticles spectral properties, including the absorption and luminescence spectra transformation, luminescence lifetime at the interaction with biological objects have high scientific value for the new drug-diagnostic tools and technologies development.

LSB5 • 10:15-10:30
Application terahertz spectroscopy for early diagnosis pathological processes in biological tissues, A.Ezerskaya, E.Strepitov, I.Progeev, O.Smolyanskaya, *St.Petersburg Natl Res. Univ. of Inform. Technologies, Mechanics and Optics, Russia.* The following techniques of THz diagnostic of human's tissues pathologies was developed: all stages of recovery of the skin structure with dermatitis at various stages, plaque in blood vessels, early caries in human teeth enamel, and a number of diseases associated with the change of water content in the tissues of the tooth.

Hall 4
LAT-05/2

9:00–11:00
LSA • Ultrafast Diagnostics in Laser Research II (LAT-05/2)—Continued

LSA3 • 10:00-10:30 • INVITED
Remote plasmas produced by laser filaments, M.Richardson, R.Bernath, M.Weidmann, N.Barbieri, Kh.Lim, M.Durand, M.Baudelet, *Univ. of Central Florida, USA.* Ultra-fast optical diagnostics are use to characterize the unique plasmas that are created on remote surfaces of transparent and opaque surfaces irradiated with single ultrafast laser generated high intensity air filaments.

Hall 5
ICONO-09-JOINT/1

9:00–11:00
ISA • Joint Session of Symposium on Femtosecond Laser Pulse Filamentation and Joint Symposium on THz Optica and Technologies I (ICONO-09-JOINT/1)—Continued

ISA3 • 10:00-10:30 • INVITED
Filamentation and THz emission in air of a few cycle intense laser pulse at 1.8 microns, Ruxin Li, Peng Liu, Ya Bai, Liwei Song, Rongjie Xu, and Zhizhan Xu, *SIOM,CAS, China*. We developed a scheme to generate waveform-controlled THz radiation from air plasma produced when carrier-envelope-phase (CEP) stabilized few-cycle laser pulses undergo filamentation in ambient air, which can be used in the phase-sensitive THz remote sensing.

Hall 6
ICONO-04/5

9:00–11:00
ISB • Quantum Physics, Information, and Technologies V (ICONO-04/5)—Continued

ISB3 • 10:00-10:15
Experimental demonstration of a dimension witness of classical and quantum systems, M.Hendrych, R.Gallego, *ICFO-Inst. de Ciencies Fotoniques, Mediterranean Technology Park, Spain,* M.Micuda, *Palacky Univ., Czech Republic,* N.Brunner, *Univ. of Bristol, UK, A.Acin, ICREA-Inst. Catalana de Recerca i Estudis Avancats, Spain,* J.P.Torres, *Univ. Politecnica de Catalunya, Spain.* We report on the experimental demonstration of dimension witnesses in a prepare and measure scenario. For this, we make use of hyper-entangled photon pairs to generate ensembles of classical and quantum states.

ISB4 • 10:15-10:30
Guided-wave-coupled nitrogen vacancies in nanodiamond-doped photonic-crystal fibers, I.V.Fedotov, N.A.Safronov, Yu.A.Shandarov, A.A.Lanin, A.B.Fedotov, A.M.Zheltikov, *Lomonosov Moscow State Univ., Russia,* S.Ya.Kilin, A.P.Nizovtsev, V.N.Chizevski, D.I.Pustakhod, *B.I. Stepanov Inst. of Phys., Belarus.* Zero-phonon-line (ZPL) emission of nitrogen vacancies (NVs) is coupled to the guided modes of solid- and hollow-core nanodiamond-doped photonic-crystal fibers (PCFs). Both types of PCFs are tailored toward enhancing ZPL emission coupling to the fiber modes.

Hall 1	Hall 2 JOINT/4	Hall 3 LAT-07/5

9:00–11:00
JSA • Symposium on THz Optics and Technologies IV (Joint/4)—Continued

JSA4 • 10:30-10:45
Polymer metallized waveguides structures for THz radiation delivery, M.M.Nazarov, V.N.Glebov, E.V.Khaydukov, M.S.Kitai, V.Ya.Panchenko, V.I.Sokolov, *Inst. on Laser and Information Technologies, Russia,* A.A.Angeluts, A.P.Shkurinov, *Lomonosov Moscow State Univ., Russia.* To deliver short pulses of THz radiation we develop waveguide printed circuit board on the base of photopolymerization technology. Materials and devises are characterized by THz time-domain method. Polymer fibers and metallized tubes are compared.

JSA5 • 10:45-11:00
Generation and amplification of THz radiation in the system of excitons and biexcitons, D.A.Markov, A.V.Corovai, O.V.Korovai, P.I.Khadzhi, *T.G.Shevchenko Pridnestrovian State Univ., Moldova, Inst. of App. Phys., Moldova.* The new mechanism of terahertz radiation generation (amplification) which is based on using the quantum transitions between two-exciton and biexciton states is investigated. It is shown, that the enhancement coefficient of the terahertz radiation depends on the pump intensity.

9:00–11:00
LSB • Biophotonics and Laser Biomedicine V (LAT-07/5)—Continued

LSB6 • 10:30-10:45
Hard tooth tissue surface modification by laser formed carbon nano-coatings, A.V.Belikov, A.V.Skrypnik, N.A.Zulina, *St.-Petersburg Natl Res. Univ. of Inform. Technology, Mechanics and Optics, Russia.* Hard biological tissue surface was modified with carbon nanocoatings formed at the result of carbon emission from the graphite surface after Glass: Yb, Er laser irradiation. Microhardness and acid resistance of hard tooth tissue surface were estimated.

LSB7 • 10:45-11:00
Laser waveguide scalpel for mid IR, A.L.Butvina, L.N.Butvina, E.M.Dianov, *Fiber Optic Research Center, Russia,* N.V.Lichkova, V.N.Zagorodnev, *Inst. of Microelectronics Technology and High Purity Materials, Russia.* Three-layered polycrystalline fibers made of solid solutions of potassium halides with outer cladding made of silver halide were produced for the first time by extrusion method. This structure enables to create stable waveguides for mid infrared. Measured losses at 10,6 micron wavelength are 0,7 dB/m.

Hall 4
LAT-05/2

9:00–11:00
LSA • Ultrafast Diagnostics in Laser Research II (LAT-05/2)—Continued

LSA4 • 10:30-11:45
Use of Advanced Laser and Digital Technologies in Flow Visualization and Image Processing, I.A.Znamenskaya, N.N.Sysoev, *Lomonosov Moscow State Univ., Russia.* The results of experimental study of high speed flow in the shock tube with nanosecond discharge are presented. Laser and digital technologies are used in BOS and PIV methods of the supersonic flow analysis.

LSA5 • 10:45-11:00
Modern streak cameras designed for analysis of spatial-temporal parameters of pulsed radiation in nano and picosecond ranges, A.B.Berlizov, A.A.Demchenko, V.B.Lebedev, G.G.Feldman, *All-Russian Research Inst. of Optico-Physical Measurements, Russia.* The paper contains parameters of small-size streak cameras, manufactured by All-Russian research institute of optico-physical measurements jointly with BIFO company ltd.

Hall 5
ICONO-09-JOINT/1

9:00–11:00
ISA • Joint Session of Symposium on Femtosecond Laser Pulse Filamentation and Joint Symposium on THz Optica and Technologies I (ICONO-09-JOINT/1)—Continued

ISA4 • 10:30-10:45
Spectra of THz radiation emitted from dual-frequency nonlinear femtosecond pulse interaction in gases, O.Kosareva, A.Borodin, N.Panov, V.Andreeva, M.Esaulkov, V.Makarov, A.Shkurinov, *Lomonosov Moscow State Univ., Russia,* S.L.Chin, *Univ. Laval, Canada,* X.-C.Zhang, *Wuhan Natl Lab. for Optoelectronics, China, Univ. of Rochester, USA.* We demonstrate in the experiment and simulations that the two basic physical mechanisms of terahertz generation in a femtosecond filament, namely, the free electron photocurrent and the nonlinear polarization of neutrals, can be identified through the spectral analysis of terahertz radiation.

ISA5 • 10:45-11:00
Spectrum control of terahertz radiation from plasma string produced by few-cycle laser pulse in a gas, V.A.Kostin, N.V.Vvedenskii, *Inst. of App. Phys., Russia.* We study the terahertz radiation generated in a plasma string created by an ionizing few-cycle laser pulse in a gas and find the terahertz spectrum dependences on the carrier-envelope-phase of the ionizing laser pulse.

Hall 6
ICONO-04/5

9:00–11:00
ISB • Quantum Physics, Information, and Technologies V (ICONO-04/5)—Continued

ISB5 • 10:30-10:45
Simulation of hyperfine interactions in a large carbon cluster hosting NV center, A.P.Nizovtsev, S.Ya.Kilin, *B.I.Stepanov Inst. of Phys., Belarus,* A.L.Pushkarchuk, *Inst. of Physical Organic Chemistry, Belarus,* V.A.Pushkarchuk, *Belarusian State Univ. of Informatics and Radioelectronics, Belarus,* F.Jelezko, *Ulm Univ., Germany*. We have simulated hyperfine interactions in the $C_{291}NVH_{172}$ cluster for all possible positions of the ^{13}C atom and demonstrated good correspondence of calculated ODMR spectra with experimental data by Dreau et al. [*Phys. Rev. B* **85**, 134107 (2012)].

ISB6 • 10:45-11:00
Long and intermediate-distance qudit-type optical entanglement by means of weak local cross-Kerr nonlinearity, A.B.Mikhalychev, S.Ya.Kilin, *B.I.Stepanov Inst. of Phys., Belarus.* We provide a protocol for qudit-type entanglement generation between two optical field modes, separated by lossy medium and distance up to 100 km, using weak local cross-Kerr interactions and linear optical scheme for probabilistic entanglement enhancement.

Hall 1	Hall 2 JOINT/5	Hall 3 LAT-07/6

11:30–13:00
JSB • Symposium on THz Optics and Technologies V (Joint/5)
Fedir Sizov, *Kiev Univ., Ukraine, Presider*

JSB1 • 11:30-11:45
Terahertz time-domain and FTIR spectroscopy of the complexes of protein and model systems with crown ether, A.V.Borodin, N.N.Brandt, A.Yu.Chikishev, A.V.Kargovsky, A.A.Mankova, I.K.Sakodynskaya, A.P.Shkurinov, *Lomonosov Moscow State Univ., Russia,* Q.Luo, K.Wang, H.Zhao, *Huazhong Univ. of Sci. and Technology, China,* X.-C.Zhang, *Univ. of Rochester, USA.* Methods of THz and IR spectroscopy are used in the study of protein and tris(hydroximethyl)aminomethane and their complexes with 18-crown-6. The spectral changes and variations in the absolute values of the absorption coefficient are discussed.

JSB1 • 11:45-12:00
Influence of terahertz radiation on drosophila life span, V.I.Fedorov, Eu.F.Nemova, *Inst. of Laser Phys., Russia,* N.Ya.Weisman, *Inst. of Cytology and Genetics, Russia,* N.A.Nikolaev, A.A.Mamrashev, *Inst. of Automation and Electrometry, Russia.* It is known that THz radiation influences Drosophila gene status. Therefore it was studied THz influence on Drosophila life span. In irradiated females but not males it was significantly higher than in control. Mortality of female offspring F1 from mature and from immature oocytes at exposure of mothers is different from control at some stages of life.

JSB3 • 12:00-12:15
Effect of intermolecular interactions on the temperature dynamics of the THz and Raman spectra in progesterone and 17α-hydroxyprogesterone crystals, O.P.Cherkasova, *Inst. of Laser Phys., Russia,* B.F.Minaev, G.V.Baryshnikov, L.I.Tkachenko, V.A.Minaeva, *Bogdan Khmelnitskij Natl Univ., Ukraine,* I.N.Smirnova, *Inst. on Laser and Information Technologies Russia,* D.A.Sapozhnikov, A.V.Kargovsky, A.P.Shkurinov, *Lomonosov Moscow State Univ., Russia.* The total energy of intermolecular bonds in 17α-hydroxyprogesterone crystal (17HP) estimated on the basis of the DFT/B3LYP calculations is significantly higher than that in progesterone crystal. We argue that this fact causes experimentally observed absence of THz and Raman band position shifts in 17HP crystal upon cooling down to 18 K.

11:30–13:00
LSD • Biophotonics and Laser Biomedicine VI (LAT-07/6)
Tina Karu, *Inst. of Laser and Information Tachnologies, Russia, Presider*

LSD1 • 11:30-12:00 • INVITED
Cellular viscoelasticity probed by active rheology in optical tweezers, M.D.Khokhlova, E.V.Lyubin, M.N.Skryabina, A.A.Fedyanin, *Lomonosov Moscow State Univ., Russia.* Double optical tweezers combined with active rheology are suggested for dynamic monitoring of erythrocyte elastic properties. Frequency dependence of phase difference in forced movement of erythrocyte opposite edges depends on rigidity of the cellular membrane.

LSD2 • 12:00-12:15
Optical tweezers for studying interactions between magnetic microparticles, M.N.Skryabina, E.V.Lyubin, M.D.Khokhlova, A.A.Fedyanin, *Lomonosov Moscow State Univ., Russia.* Magnetic interaction between paramagnetic microparticles in external homogeneous magnetic field was studied by optical tweezers technique. We propose a novel method to detect and probe the forces of microparticles interaction using active microrheology approach. Two different orientations of external magnetic field were used: the one resulting in the existence of attractive forces between particles and the other resulting in the repulsive forces between them. The dependences of interaction forces on the magnetic field value were measured for both cases. The respond function of two magnetic microparticles on the external force acting on them was measured.

Hall 4	Hall 5 ICONO-09-JOINT/2	Hall 6

11:30–13:30
ISC • Joint Session of Symposium on Femtosecond Laser Pulse Filamentation and Joint Symposium on THz Optica and Technologies II (ICONO-09-JOINT/2)
Andre Mysyrowicz, *Ecole Polytechnique, France, Presider*

ISC1 • 11:30-12:00 • INVITED
Efficient THz generation by optical rectification of femtosecond laser pulses and application of THz radiation for plasma investigation, A.Stepanov, *Inst. of App. Physics, Russia.* Efficient optical rectification of femtosecond laser pulses in $LiNbO_3$ crystal in sandwich structure and the tilted front scheme will be demonstrated. THz generation by two-color femtosecond laser pulses in plasma filament in ambient air will be considered. The results of investigation of plasma density decay in a plasma filament using THz scattering will be presented as well.

ISC2 • 12:00-12:15
Coherent synthesis of THz radiation from femtosecond laser filaments in air, S.I.Mitryukovskiy, Y.Liu, A.Houard, B.Prade, A.Mysyrowicz, *Lab. d'Optique Appliquée, ENSTA ParisTech/CNRS/Ecole Polytechnique, France.* Coherent synthesis of the THz radiation from an array of femtosecond laser filaments is presented. THz energy scales up quadratically with the number of filaments. The directionality of THz emission can be easily controlled.

Hall 1	Hall 2 JOINT/5	Hall 3 LAT-07/6

11:30–13:00
JSB • Symposium on THz Optics and Technologies V (Joint/5)—Continued

JSB4 • 12:15-12:30
Terahertz ellipsometric and polarimetric measurement system at Novosibirsk free electron laser, Yu.Yu.Choporova, I.A.Azarov, B.A.Knyazev, D.G.Rodionov, *Budker Institute of Nuclear Phys., Russia,* S.R.Rykhlitskii, V.A.Shvets, *Rzhanov Inst. of Semiconductor Phys., Russia, Novosibirsk State Univ., Russia.* Terahertz ellipsometric and polarimetric measurement systems have been implemented using monochromatic radiation of Novosibirsk free electron laser. Semiconductors, blood films, polysaccharide enantiomers in aqueous solution have been used as test objects.

JSB5 • 12:30-12:45
Properties of KTP crystals in terahertz region, D.Antsygin, N.A.Nikolaev, A.A.Mamrashev, O.I.Potaturkin, *Novosibirsk State Univ., Russia, Inst. of Automation and Electrometry, Russia.* We measure properties of potassium titanyl phosphate crystals in the range from 0.2 to 2.0 THz by terahertz time-domain spectroscopy at different temperatures. We explain the measured properties by the influence of phonon mode absorption and K^+ ions hopping conductivity.

JSB6 • 12:45-13:00
Registration of energy and temporal parameters of terahertz radiation in scheme of optical rectification of femtosecond laser pulses, G.S.Rogozhnikov, V.V.Bukin, N.N.Rukavishnikov, R.Yu.Kostyunin, I.V.Mishina, *FSUE "RFNC-VNIIEF", Russia.* Paper deals with the results of research concerning energy and temporal parameters of terahertz radiation on the output of THz-generator running in scheme of optical rectification of femtosecond laser pulses in lithium niobate crystal.

11:30–13:00
LSD • Biophotonics and Laser Biomedicine VI (LAT-07/6)—Continued

LFD3 • 12:15-12:30
Optically bright upconversion nanoparticles for bioimaging applications, E.V.Khaydukov, V.A.Semchishen, V.V.Rocheva, V.N.Seminogov, A.V.Zviagin, A.S.Akhmanov, V.Ya.Panchenko, V.I.Sokolov, *Inst. on Laser and Inform. Technologies, Russia,* A.N.Generalova, E.A.Grebenik, *Shemyakin-Ovchinnikov Inst. of Bioorganic Chemistry, Russia,* A.Nadort, *Macquarie Univ., Australia,* A.V.Nechaev, *Moscow State Univ. of Fine Chemical Technologies, Russia,* A.E.Guller, A.B.Shekhter, *I.M.Sechenov First Moscow State Medical Univ., Russia.* We design and produce hybrid biocomplexes based on optically bright upconversion nanoparticles (UCNP). The UCNP surface represents a universal docking station for biomolecules of various specialized applications in bioimaging.

LFD4 • 12:30-12:45
Time resolution imaging system for upconversion fluorescence visualisation, D.V.Pominova, A.V.Ryabova, K.G.Linkov, *A.M.Prokhorov General Phys. Inst., Russia.* The upconversion fluorescence characteristics of different inorganic nanoparticles doped with pairs of rare-earth elements Yb^{3+}-Er^{3+} and Yb^{3+}-Tm^{3+} were studied. A posteriori the solution for imaging system for upconversion fluorecsence detection with time resolution was proposed.

LFD5 • 12:45-13:00
Electroconductivity laser stimulation of biocompatible composite layers based on multiwalled carbon nanotubes, A.Yu.Gerasimenko, L.P.Ichkitidze, V.M.Podgaetsky, B.M.Putrya, S.V.Selishchev, *Natl Res. Univ. of Electronic Technology (MIET), Russia,* E.V.Blagov, A.A.Pavlov, *Inst. of Microelectronics Nanotechnology (IMEN), Russia,* V.A.Galperin, E.P.Kitsyuk, Yu.P.Shaman, *SPC «Technology Center» MIET, Russia.* Electroconductivity laser stimulation of composite materials based on carboxymethyl cellulose and multiwalled carbon nanotubes has been researched. Specific conductivity of layers with thickness 0.5-10 μm was improved on 15-20% after laser irradiation (wavelength 970 nm, emission power 0.2 W/cm^2).

Hall 4	Hall 5 ICONO-09-JOINT/2	Hall 6

11:30–13:30
ISC • Joint Session of Symposium on Femtosecond Laser Pulse Filamentation and Joint Symposium on THz Optica and Technologies II (ICONO-09-JOINT/2)—Continued

ISC3 • 12:15-12:30
Femtosecond coherent control of THz spectra driven by free- and coupled electrons in gas plasma, M.N.Esaulkov, N.A.Panov, A.V.Borodin, O.G.Kosareva, A.P.Shkurinov, *Lomonosov Moscow State Univ., Russia*. Gas is one of the promising and convenient media for generation of broadband pulsed THz radiation. The highest THz generation efficiency is reached in the case of high intensity dual-frequency fs laser pulses. The most important contribution to generation of low-frequency field is due to the photocurrent of free charges, induced by photoionization, and the four-wave mixing process, describing nonlinear response of bound electrons in the gas. Here, we show both theoretically and experimentally that the THz-range radiation produced by co-propagating in nitrogen and air 800 nm and 400 nm high-intensity fs laser pulses consists of the contribution from both the free electron current and the nonlinear polarization of neutral molecules.

ISC4 • 12:30-12:45
Terahertz emission from a two-color tunable femtosecond laser-induced filament in air, A.I.Korytin, A.A.Murzanev, A.N.Stepanov, *Inst. of App. Phys., Russia.* Terahertz pulse generation in the laser-induced air plasma was investigated. Femtosecond laser pulses consisting of both a weak fundamental and its intense second-harmonic frequency were used for the terahertz generation. The dependences of terahertz emission on the laser pulses energy, polarization and frequency shift were studied. Experimental results reveal that free electrons clearly contribute to terahertz emission.

ISC5 • 12:45-13:00
Generation of low frequency few-cycle pulses under the four-wave mixing in femtosecond filament, V.A.Andreeva, N.A.Panov, O.G.Kosareva, A.P.Shkurinov, *Lomonosov Moscow State Univ., Russia,* P.Liu, R.Li, *Shanghai Inst. of Optics and Fine Mechanics, China,* S.L.Chin, *Laval Univ., Canada*. The possibility of single-cycle infrared pulses generation by for-wave mixing of visible seed radiation with high power femtosecond filament field with central wavelength of 800 nm is shown. It is determined that phase synchronism does not play a significant role in this ultrafast nonlinear optical process.

Saturday June 22, 2013

Hall 1	Hall 2 JOINT/5	Hall 3 LAT-07/6

Hall 4	Hall 5 ICONO-09-JOINT/2	Hall 6

11:30–13:30
ISC • Joint Session of Symposium on Femtosecond Laser Pulse Filamentation and Joint Symposium on THz Optica and Technologies II (ICONO-09-JOINT/2)—Continued

ISC6 • 13:00-13:15
Fluorescent methods of study of interaction of intensive laser irradiation with transparent materials, A.V.Kuznetsov, E.F.Martynovich, *Irkutsk Branch of Inst. of Laser Phys., Russia.* New fluorescent methods of study of interaction of intensive laser irradiation with transparent materials are developed. The methods are based on laser-induced creation of color centers in the materials. Experimental study of multiple filamentation was carried out. It was concluded, that the methods allow deriving the most precise experimental data about break-up of a laser beam into multiple filaments for adjustment of mathematical simulations.

ISC7 • 13:15-13:30
Numerical simulation of gas optical breakdown on GPU, D.A.Fadeev, *Inst. of App. Phys., Russia.* In this paper we refer to the model accounting for dispersion in wide range of frequencies with out additional terms correcting dispersion in NLS type models. Nonlinearity in our model includes ionization nonlinearity plus Kerr and Raman responses. The stable numerical scheme based on split-step Fourier approach is discussed and and efficient implementation of key algorithms for GPU platforms is proposed.

Hall 1	Hall 2 JOINT/6	Hall 3

13:30–15:30
JSC • Symposium on THz Optics and Technologies VI (Joint/6)
Boris Knyazev, *Budker Inst. of Nuclear Physics, Russia, Presider*

JSC1 • 13:30-13:45
Coulomb effects in directional photocurrent generation from gases ionized by intense laser pulses, L.N.Alexandrov, M.Yu.Emelin, M.Yu.Ryabikin, *Inst. of App. Phys., Russia.* On the basis of both simple classical model and full quantum-mechanical numerical simulations it is shown that in many cases Coulomb effects may be the major factor in directional photocurrent generation process.

JSC2 • 13:45-14:00
Terahertz generation from metal surface induced by femtosecond laser pulse, E.V.Suvorov, R.A.Akmedzhanov, V.A.Mironov, I.V.Oladyskin, I.E.Ilyakov, B.V.Shishkin, D.A.Fadeev, *Inst. of App. Phys., Russia.* Results of experimental and theoretical investigations on generation of terahertz radiation at the interaction of femtosecond laser pulses with a metal surface are presented. Experimentally observed the dependence of THz pulse energy on laser pulse energy, incidence angle and sort of metal. In theory the hydrodynamic model for electrons in metal plasma (accounting the pressure due to Fermi velocity distribution) is proposed. Both analytical and numerical results for the problem of low frequency currents generation and THz radiation due to this currents based on proposed model are presented.

JSC3 • 14:00-14:15
Terahertz emission produced by optical ionization of DC-biased gaseous and solid-state media, V.A.Kostin, N.V.Vvedenskii, *Inst. of App. Phys., Russia.* We study the terahertz emission from plasma created by a femtosecond laser pulse in a gaseous or solid-state medium in the presence of the external static electric field.

Hall 4	Hall 5	Hall 6

Hall 1	Hall 2 JOINT/6	Hall 3

13:30–15:30
JSC • Symposium on THz Optics and Technologies VI (Joint/6)—Continued

JSC4 • 14:15-14:30
Ionization-induced excitation of residual terahertz currents in plasmas produced by two-color laser pulses, A.A.Silaev, N.V.Vvedenskii, *Inst. of App. Phys., Russia.* This work is devoted to the analytical and numerical investigation of residual-current excitation in plasmas produced by gas ionization with two-color laser pulses for different ratios between frequencies of fundamental and additional fields.

JSC5 • 14:30-14:45
The reflected radiation amplification by plasma produced at the ionization of atoms in the field of ultrashort laser pulse, K.Yu.Vagin, S.A.Uryupin, *P.N.Lebedev Physical Inst., Russia.* The reflection of radiation by plasma produced at atoms ionization in the field of intense ultrashort laser pulse is studied. It is shown that there is a significant amplification of the reflected terahertz pulse due to Weibel instability development.

JSC6 • 14:45-15:00
Terahertz simultons in molecular vapors, O.Khasanov, O.Fedotova, G.Rusetsky, *Scientific-Practical Material Research Centre, Belarus,* J.Degert, E.Freysz, *Univ. Bordeaux, France.* We study simulton solutions for two terahertz pulses copropagating in ammonia vapors which are resonant with lowest adjacent rotational transitions. It is shown that powerful multi-humped and weak one-humped pulses may be trapped into simulton.

Hall 1	Hall 2 JOINT/6	Hall 3

13:30–15:30
JSC • Symposium on THz Optics and Technologies VI (Joint/6)—Continued

JSC7 • 15:00-15:15
On peculiarities of a Terahertz generation by bichromatic few-cycle light beam in dielectric media with induced plasma nonlinearity, S.A. Stumpf, A.A. Korolev, S.A. Kozlov, *Natl Research Univ. of Information Technologies, Mechanics and Optics, Russia*. The paper reports results of computer simulation of strong bi-chromatic few-cycle light beam propagation in dielectric media in case of plasma generation. We propose a method to control efficiency of spectral broadening to terahertz spectral range on pulse properties.

JSC8 • 15:15-15:30
Spectral limitations of the Air Based Coherent Detection (ABCD) technique of the THz pulse detection, M.N. Esaulkov, N.A. Panov, A.V. Borodin, A.A. Frolov, O.G. Kosareva, A.P. Shkurinov, *Lomonosov Moscow State Univ., Russia.* The coherent plasma detection technique to detect pulsed terahertz (THz) signal based on the transient photocurrent mechanism is suggested.

KEY TO AUTHORS/PRESIDERS

Millennia® eV™

HIGHEST POWER CW 532 nm DPSS LASER

The Millennia *eV* Advantage

- Industry leading power scalability from 5 W to 25 W
- Exceptional value and low cost of ownership
- Integrated laser head and power supply
- Best in-class power stability and beam quality
- Low optical noise
- High reliability for turn-key operation

APPLICATIONS

Scientific Applications

- Pumping CW and mode-locked Ti:Sapphire lasers
- Pumping solid state and dye lasers
- Spectroscopy

Industrial Applications

- Laser doping of solar cells
- Materials processing

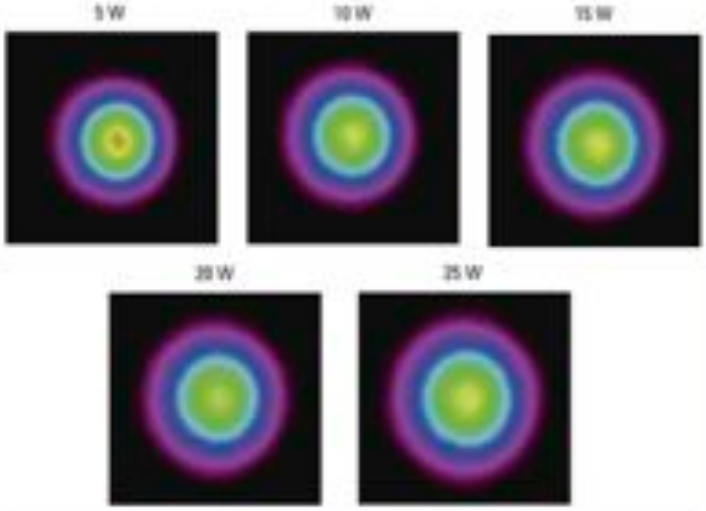
The new Millennia® eV™ from Spectra-Physics is the next generation Millennia, extending the highly successful product family of CW DPSS green lasers to unprecedented power levels and versatility. Millennia eV models are now available with 5 W, 10 W, 15 W, 20 W, and 25 W of CW power at 532 nm. All Millennia eV feature ultra-low optical noise, TEM_{00} beam quality and best-in-class power stability.

The new platform is based on Spectra-Physics' *It's in the Box*™ design, where the laser optical cavity, diode and control electronics are all integrated in a single, compact package, eliminating the need for an external power supply.

Millennia eV benefits from Spectra-Physics' extensive experience in the design of rugged industrial lasers. Millennia eV lasers utilize long life, highly reliable laser diodes. The result is a highly reliable laser, ensuring dependable, easy turnkey operation with exceptional value.

With its industry leading scalability from 5 W to 25 W average power and high reliability, Millennia eV is the next generation laser of choice for demanding scientific applications such as the pumping of high power ultrafast and CW Ti:Sapphire lasers and high power, high throughput industrial applications.

Power Scalability and Exceptional Beam Quality



Spectra-Physics
A Newport Corporation Brand

It's in the Box™

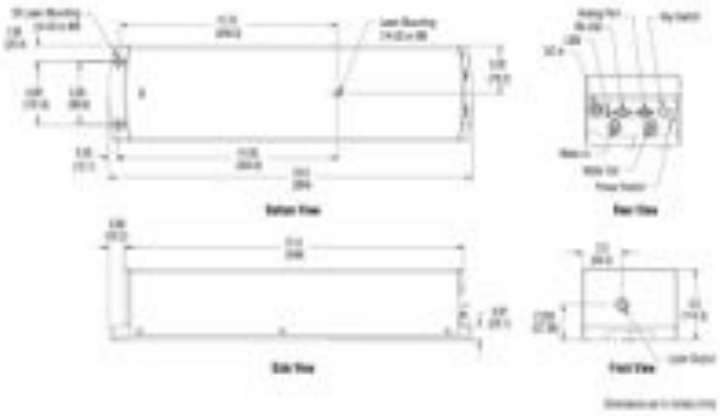
Millennia® eV™

Specifications*

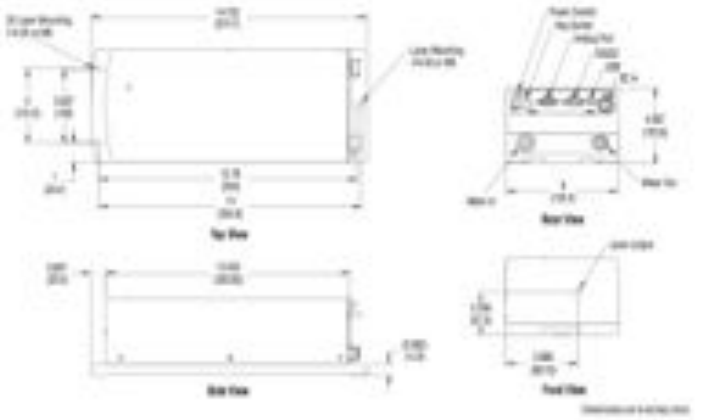
Output Characteristics[1,2]		
Output Power	5 W, 10 W, 15 W	20 W, 25 W
Wavelength	532 nm	
Spatial Mode[3]	TEM_{00}	
Beam Quality (M^2)	<1.1	
Beam Diameter (1/e²)	2.3 mm ±10%	
Beam Divergence	<0.5 mrad	
Polarization[4]	>100:1 vertical	
Power Stability[5]	±1%	
Beam Pointing Stability[6]	2 µrad/°C	
Noise[7]	<0.04% rms	
Power Requirements		
Operating Voltage	100–240 VAC, 50/60 Hz	
Power Consumption	<250 W (max)	<350 W (max)
Environmental Specifications		
Operating Temperature	64–95°F (18–35°C)	
Relative Humidity	0–85%, non-condensing	
Cooling Requirements	Closed-loop chiller	
Physical Characteristics		
Dimensions	14.75 x 6.56 x 4.08 in (374.7 x 152.4 x 103.6 mm)	23.0 x 6.0 x 4.5 in (584.2 x 152.4 x 114.3 mm)
Weight	<15 lbs (<7 kg)	<26 lbs (<12 kg)

1. All performance characteristics guaranteed at specified output power
2. Due to our continuous product improvement program, specifications are subject to change without notice
3. Beam ellipticity <10%
4. Vertical polarization standard, horizontal polarization option available
5. Measured over 2-hour period, after a 30-minute warm-up
6. Measured at farfield x and y position, after a 30-minute warm-up
7. Measured over a 10 Hz to 0.1 GHz bandwidth at the specified output power
8. **The Millennia eV is a Class IV – High-Power Laser, whose beam is, by definition, a safety and fire hazard. Take precautions to prevent exposure to direct and reflected beams. Diffuse as well as specular reflections can cause severe skin or eye damage.**

Millennia eV (20–25 W) Dimensions



Millennia eV (5–15 W) Dimensions



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03-841284 (05/13)

НОВЫЙ ФЕМТОСЕКУНДНЫЙ УСИЛИТЕЛЬ LEGEND™ ELITE HE+

Legend™ Elite HE+ стал последним прибавлением в семье фемтосекундных лазерных усилителей Legend™. В нем аккумулированы все прорывные технологии Coherent, появившиеся за последние годы. Использование для накачки лазера Evolution позволило Legend Elite HE+ стать самым мощным (средняя мощность 15 Вт) фемтосекундным усилителем со стабилизацией начальной фазы огибающей (CEP).

Выходная энергия нового Legend Elite обеспечивает выходную энергию до 12 мДж при частоте следования импульсов 1 кГц. Выходной пучок излучения прекрасного качества (M^2<1.5) имеет пространственную нестабильность менее 10 мкрад при среднеквадратичной девиации энергии менее 0.5%. Длительность выходного импульса может быть короче 25 фс (Legend Elite USX) или 35 фс (Legend Elite USP).

В настоящее время Coherent является единственным производителем, способным предложить наилучший вариант усилителя ультракоротких импульсов для таких быстро развивающихся областей исследования, как аттосекундная физика, генерация когерентного рентгеновского излучения, сильнонелинейные оптические процессы.

Представитель компании Coherent в России и СНГ – ООО «ЛазерТрэк»

e-mail: lasertrack@lasertrack.ru **web-site: www.lasertrack.ru**

ТЕЛ.: +7 (495) 775 38 63

Solid-state Pulsed Lasers

LOTIS TII

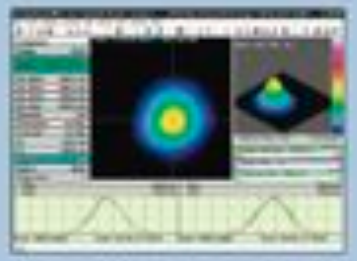
LS-2149 DPSS Q-switched Nd:YAG Laser

500 Hz, 12-15 ns
20 / 10 / 5 / 2 / 0,5 mJ

1064 nm | 532 nm | 355 nm | 266 nm | 213 nm

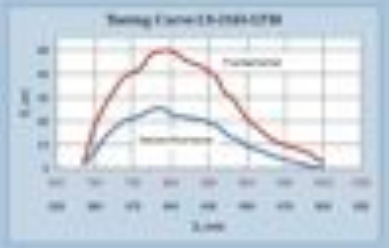
LS-2149 opens a series of LOTIS TII DPSS Lasers. LS-2149 has a built-in second harmonic (532 nm) and can be supplied with third (355 nm), fourth (266 nm) and fifth harmonic assembly (213 nm).

Main features:
- More than 10,000 hours of pump chamber operation
- Compactness and high reliability
- Built in monitor of laser fundamental frequency (1064 nm)
- Excellent beam quality and pointing stability
- TTL external triggering of pump diode and Q-switch
-Full PC control



LS-2145-LT50 Integrated Nd:YAG - Ti:Sapphire Laser System

LS-2145-LT50 combines Q-switched pump laser and Ti:Sapphire converter of Nd:YAG second harmonic radiation (532 nm) into tunable near IR, UV and visible spectral band. It is designed for scientific research in photochemistry, biology, medicine, for PAT and LIBS applications.



350 / 230 mJ
690-1000 nm
350-500 nm

1064 nm | 532 nm

Main features:
- Possibility of independent operation of pump laser at 1064 and 532 nm as well as tunable lasing
- Hands free operation and automatically switching output wavelengths
- PC control of pump laser and fundamental harmonic of Ti:Sa laser
- Built in monitors of Nd:YAG FF and SH output energy
- Built in high efficiency $Al_2O_3:Ti^{3+}$ second harmonic unit

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