



**Saratov State
University**

**Research-Educational
Institute of Optics &
BioPhotonics**

Saratov Fall Meeting SFM'10

XIV International School for Junior Scientists and Students on Optics, Laser Physics & Biophotonics

**October 5 - 8, 2010
Saratov, Russia**

Conference Chair

Valery V. Tuchin,

Saratov State University, Institute of
Precision Mechanics and Control RAS

Conference Secretary

Elina A. Genina,

Saratov State University

Workshops:

- Optical Technologies in Biophysics & Medicine XII
- Coherent Optics of Ordered and Random Media XI
- Laser Physics and Photonics XII
- Spectroscopy and Molecular Modeling XI
- Modern Optics IX
- Electromagnetics of Microwaves, Submillimeter & Optical Waves X
- English as a Communicative Tool in the Scientific Community IX
- Workshop on Management of High Technologies Commercialization and Regional Innovation Systems VII
- Luminescence VI
- Nanobiophotonics VI
- Nonlinear Dynamics I
- Internet Biophotonics III
- Microscopic and Low-Coherence Methods in Biomedical and Non-Biomedical Applications III
- History, Methodology and Philosophy of the Optical Education III

Seminar:

- Telemedicine V

Special events:

SPIE, OSA SHORT COURSE SESSION

Tissue Optics

Steven L. Jacques,

Oregon Health & Science University, USA

OCT, Polarization and Dynamic Light

Scattering Techniques in Biophotonics

Johannes F. de Boer,

Vrije Universiteit, Amsterdam, the
Netherlands, and MGH, USA

**Presentation of P4L Saratov Medical
Cluster** of Photonics4Life Consortium of
EC FP7: Network of Excellence for
Biophotonics

Special awards of Russian Foundation on Innovations

U.M.N.I.K in Optics, Laser Physics, and
Biophotonics

Organized by

Saratov State University named after
N.G. Chernyshevsky

Institute of Precision Mechanics and
Control, Russian Academy of Sciences

Research-Educational Institute of Optics
and Biophotonics at Saratov State
University

Research-Educational Center of
Nonlinear Dynamics & Biophysics (REC-
006) of CRDF and Ministry of Education
and Science of RF

International Research-Educational
Center of Optical Technologies for
Industry and Medicine "Photonics" at
Saratov State University

Volga Region Center of New Information
Technologies

Saratov State Medical University

Saratov Railway Clinic Hospital

SPIE Student Chapter

In cooperation with

Academy of Natural Sciences, Saratov
Regional Division

Russian Society for Photobiology

Saratov Science Center of the Russian
Academy of Sciences

Photonics4Life Consortium of EC FP7:
Network of Excellence for Biophotonics

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SPIE – The International Society for
Optical Engineering

SPIE Student Chapter

SPE "Nanostructured Glass Technology"

Ltd., Saratov

SPE "Erudit" Ltd., Saratov

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Saratov State University, Institute of
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Dmitry A. Zimnyakov,
Saratov State University, Institute of
Precision Mechanics and Control RAS

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Saratov State University

The main goal of the School and the Workshops is to involve junior researches and students in the field of recent developments and applications of laser and optical technologies in medicine and biology, coherent optics of random and ordered media, material and environmental sciences, nonlinear dynamics of laser systems, laser spectroscopy and molecular modeling. The main attention will be paid to discussion of fundamentals and general approaches of description of coherent, low-coherent, polarized, spatially and temporally modulated light interactions with inhomogeneous

scattering media, photonic crystals, tissue phantoms, and various types of tissues *in vitro* and *in vivo*. Such effects as static and dynamic light scattering, Doppler effect, optoacoustic and optothermal interactions, mechanical stress, photodynamic effect, etc will be considered. On this basis the variety of laser and optical technologies for medical diagnostics, therapy, surgery, and light dosimetry, as well as for spectroscopy of random and ordered media will be presented.

SFM-10 will be organized as the morning plenary sessions, afternoon lecture and oral sessions and evening poster presentations. The original oral reports and posters will be presented by the junior scientists and students. Plenary lectures will be presented by well-recognized experts in the field.

Last year

Maciej Wojtkowski, Institute of Physics, Nicolaus Copernicus University, Torun, Poland, with *Ultra-high speed and functional OCT*;

Gunter Steinmeyer, Max-Born Institute, Berlin, Germany, with *Chirped photonic crystal fibers: A novel architecture for guiding extremely short light pulses*;

Kirill Larin, University of Houston, Houston, USA, with *Noninvasive optical imaging and diagnostics of tissues and*

cells with optical coherence tomography: An overview of research projects at University of Houston;

Andreas Fery, University of Bayreuth, Bayreuth, Germany, with *Deformation properties of complex microparticles: Novel experimental approaches based on AFM-optics combination;* and

Alexander V. Priezzhev, Moscow State University, Russia, with *Impact of red blood cells and diamond nanoparticles: In vitro optical investigation* were plenary speakers.

SPIE short course *"Biophotonics in Microcirculation Imaging"* was presented by **Martin J. Leahy**, University of Limerick and National Biophotonics and Imaging Platform, Ireland.

The specificity of Saratov Fall Meetings is one-day Internet session. In 2009 such presentations have included plenary lectures made by

Michael Mishchenko, NASA Goddard Institute for Space Studies, New York, USA: *Single scattering, multiple scattering, and radiative transfer: An introduction;*

Alex Vitkin, Division of Biophysics and Bioimaging, Ontario Cancer Institute and Department of Medical Biophysics, University of Toronto, Toronto, Canada: *New developments in tissue polarimetry;*

Alexandre Douplik, Erlangen Graduate

School in Advanced Optical Technologies, Friedrich-Alexander University, Erlangen, Germany: *Cancer margin delineation by autofluorescence imaging under conditions of laser surgery;*

Qingming Luo, Britton Chance Center for Biomedical Photonics, Huazhong University of Science and Technology, Wuhan, P.R. China: *Optoelectronic neuroimaging approaches;*

Steven L. Jacques, Oregon Health & Science University, Portland, Oregon, USA: *Simplified light transport model for rapid spectral analysis.*

Participants from more 35 countries have located their papers on the meeting website: <http://optics.sgu.ru/SFM/>. Among invited Internet lecturers were well recognized experts in the fields of biomedical optics and light scattering.

Official languages of the School and the Workshops are English and Russian, translation will be provided.

The Conference fee

For foreign participants the conference fee is US \$ 200 (includes Program, two short-course, Welcome Party, Barbecue, Volga-river voyage, and light refreshments), may be paid during the Meeting or transferred to

the account number for request.

For Russian and FSU participants the Conference fee will depend on financial support from the Russian Foundation of Basic Research and other sponsors.

Lodging

Hotel "Slovakia" ashore the Volga river (US \$ 70-100 per night for single or double room)

<http://slovakia.all-hotels.ru/>

Hotel "Volga" in downtown (US \$ 70-100 per night for single or double room).

Western style mini-hotel Bogemia (from US \$ 85 per night for single room)

<http://www.bohemiahotel.ru>

mail@bohemiahotel.ru

Student hostel "Volna" (around US \$ 20-30 per night)

Culture program

Visits to Conservatoire, Theaters, and Museums, 4-hour Volga-tour.

Registration

Electronic registration before **August 15, 2010**, at <http://optics.sgu.ru/SFM/> is required.

Submission of Abstracts

Each author is requested to submit a one-page abstract. Abstract must be uploaded to the Conference website <http://optics.sgu.ru/SFM/> before **August 15, 2010**.

Proceedings

Conference papers will be published as SPIE Proceedings (CD, SPIE Digital Library), Conference Proceedings (in Russian and English) under the title "Optical Physics and Biophotonics" and in Russian and International peer-reviewed journals: J. of Biophotonics, Journal of Innovative Optical Health Sciences, Quantum Electronics (Russian/English), Applied Nonlinear Dynamics (Russian/English), Laser Physics (English), and Optics and Spectroscopy (Russian/English).

All papers will be subjected to the normal refereeing process for the journals. Manuscripts of papers should be submitted not later than **October 8, 2010**, the last day of the Conference.

Visa application support

To apply for visa to Russian Consulate you need an official invitation letter. Procedure for letter preparation takes two months; the following information about you and accompany persons are needed:

1. Passport number: _____
dates of issue: ____ and of expiry: ____
(copy of passport page with photo)
2. Date of birth: ____, place of birth: __
3. Living address: _____
4. Working position: _____
5. Working address: _____

Please, send this information to secretary of the SFM-10

Elina A. Genina: eagenina@yandex.ru
eagenina@optics.sgu.ru

Important deadlines

**Visa application support –
information for official invitation
letter, before
May 15, 2010**

**Submission of Abstracts – before
August 15, 2010**

**Registration – before
August 15, 2010**

**Hotel reservation – before
August 15, 2010**

**Conference fee –
October 5, 2010**

**Manuscripts submission – before
October 8, 2010**

SFM-10 webpage:
<http://optics.sgu.ru/SFM/>

We are expecting that collaborating groups from FSU and Western Countries Institutions supported by International Programs such as CRDF, INTAS, FP7, ISTC, Royal Society and others will present their papers.

We are expecting that collaborating groups from FSU and Western Countries Institutions supported by International Programs such as CRDF, INTAS, FP7, ISTC, Royal Society and others will present their papers.

On behalf of the Organizing Committee of SFM'10 I have a pleasure in inviting you to attend this Meeting

Valery V. Tuchin

Workshop: **Optical Technologies in Biophysics & Medicine XII**

Chair

Valery V. Tuchin,
Saratov State University, Institute of
Precision Mechanics and Control RAS

Secretary

Elina A. Genina,
Saratov State University

International Program Committee

Victor N. Bagratashvili,
Institute of Laser and Information
Technologies RAN (Russia)

Britton Chance,
University of Pennsylvania (USA)

Wei Chen,
University of Central Oklahoma (USA)

Kishan Dholakia,
University of St. Andrews (UK)

Paul M.W. French,
Imperial College of Science, Technology
and Medicine (UK)

James G. Fujimoto, MIT (USA)

Steven L. Jacques,
Oregon Health Sciences Univ. (USA)

Sean J. Kirkpatrick,
Michigan Technological Univ. (USA)

Juergen Lademann,
Humboldt University (Germany)

Martin Leahy,
University of Limerick (Ireland)

Qingming Luo,
Huazhong University of Science and
Technology (China)

Igor V. Meglinsky,
University of Otago (New Zealand),
Saratov State University (Russia)

Risto Myllyla,
University of Oulu (Finland)

Theodore G. Papazoglou,
FORTH-IESL (Greece)

Juergen Popp,
Institute of Photonic Technology, Jena
(Germany)

Alexander V. Priezzhev,
Moscow State University (Russia)

Lihong Wang,
Washington University in St. Louis
(USA)

Ruikang K. Wang,
Oregon Health Sciences University
(USA)

Dmitry A. Zimnyakov,
Saratov State University (Russia)

The main goal of the Workshop is to
involve junior researches and

students in the field of recent developments and applications of laser and optical technologies in medicine and biology. The main attention will be paid to discussion of fundamentals and general approaches of description of coherent, low-coherent, polarized, spatially and temporally modulated light interaction with inhomogeneous absorbing media, tissue phantoms, and various types of tissues *in vitro* and *in vivo*. Such effects as static and dynamic light scattering, Doppler effect, opto-acoustic and opto-thermal interactions, mechanical stress, photodynamic effect, etc will be considered. On this basis the variety of laser and optical technologies for medical diagnostics, therapy, surgery, and light dosimetry will be analyzed. Lasers and optical techniques for cardiology, dermatology, ophthalmology, gynecology, dentistry and other fields of medicine will be presented. Light scattering and photochemical methods in cell biology and microbiology will be discussed.

We are expecting about 60 lectures highlighting current research and recent progress in the field, which will be done by well-known experts, 70-75 original oral reports and posters from junior researchers, post-docs and PhD students.

Topics

The education and scientific program will include but is not restricted to the following topic areas:

- Photon migration in tissues
- Diffusion wave and correlation spectroscopy of tissues
- Spectrophotometry, fluorescence and Raman spectroscopy of tissues
- Static and dynamic light scattering in tissues
- Coherent optical methods for medical diagnostics
- Cell and tissue coherent microscopy
- Optical diffusion and coherent medical topography and tomography
- Laser Doppler measuring systems for medicine and biology
- Full field speckle-correlation biomedical techniques
- Optical techniques of biovibrations measurements
- Optical polarimetric methods for study of tissues and cell structures
- Optothermal and optoacoustic methods for tissue diagnostics
- Optical biopsy
- Optical microelastography of tissues
- Osmotic effects and optical monitoring of matter diffusion in tissues
- Tissue and blood optical clearing
- Optical glucose sensing
- Laser and optical technologies in microbiology
- Tissue phantoms designing
- Photochemical, photothermal and photobiological effects, mechanisms of phototherapy
- High energy laser interactions with cells and tissues, laser surgery techniques
- Lasers and optical technologies in dermatology, ophthalmology, gynecology, cardiology, dentistry, etc
- Microchannel and photonic crystal technologies in biology and medicine
- Biosensors

Workshop: Internet Biophotonics III

Chair

Valery V. Tuchin,
Saratov State University, Institute of
Precision Mechanics and Control RAS

Secretary

Ivan V. Fedosov,
Saratov State University

International Program Committee

Gert von Bally, University of Münster
(Germany); **Alexey N. Bashkatov**, SSU
(Russia); **Wei Chen**, Univ. of Central
Oklahoma (USA); **Cornelia Denz**,
University of Münster (Germany);
Kishan Dholakia, Univ. of St. Andrews
(UK); **Paul M.W. French**, Imperial
College of Science, Technology and
Medicine (UK); **Martin Leahy**, Univ. of
Limerick (Ireland); **Qingming Luo**,
Huazhong Univ. of Science and
Technology (China); **Igor V.
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Zealand), SSU (Russia); **Roberto Pini**,
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Fiorentino (Italy); **Juergen Popp**,
Institute of Photonic Technology, Jena
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Moscow State Univ. (Russia); **Katarina**

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Centre (Sweden); **Hugo Thienpont**,
Vrije Univ. Brussel (Belgium);
Lihong Wang, Washington Univ. in
St. Louis (USA); **Ruikang K. Wang**,
Oregon Health Sciences Univ. (USA);
Dmitry A. Zimnyakov, SSU (Russia).

The main goal of the Workshop is to
involve international community of
junior researches and students in the
field of recent developments of
biophotonics via distant learning
provided by the Internet facilities.
SFM has a prolonged experience in
organizing of Internet sessions during
last 12 years. In 2009 such
presentations have included plenary
lectures made by **Michael
Mishchenko**, NASA Goddard Inst. for
Space Studies, New York, USA: *Single
scattering, multiple scattering, and
radiative transfer: An introduction*;
Alex Vitkin, Univ. of Toronto,
Toronto, Canada: *New developments
in tissue polarimetry*; **Alexandre
Douplik**, Friedrich-Alexander Univ.,
Erlangen, Germany: *Cancer margin
delineation by autofluorescence
imaging under conditions of laser
surgery*; **Qingming Luo**, Huazhong
Univ. of Science and Technology,
Wuhan, P.R. China: *Optoelectronic
neuroimaging approaches*; **Steven L.
Jacques**, Oregon Health & Science
Univ., Portland, Oregon, USA:

*Simplified light transport model for rapid
spectral analysis.*

Participants from more 35 countries
have located their papers on the
meeting website:

<http://optics.sgu.ru/SFM/>.

In 2010 we are expecting 3-4 Internet
Plenary lectures, 20-30 Internet invited
lectures highlighting current research
and recent progress in Biophotonics,
which will be done by well-known
experts, 30-40 Internet reports from
junior researchers, post-docs and PhD
students all over the world.

Topics

The education and scientific program will
include but is not restricted to the
following topic areas:

- New photonic technologies for the
analysis of cell and tissue
processes
- Photonics for non- and minimally-
invasive diagnosis and therapy
- Nanobiophotonics
- Optical micromanipulation of cells
and particles
- Biosensors
- Modeling and data analysis in
Biophotonics
- Clinical applications

Workshop: Nanobiophotonics VI

Chair

Nikolai G. Khlebtsov,
Institute of Biochemistry and Physiology
of Plants and Microorganisms of RAS,
Saratov State University

Secretaries

Lev A. Dykman,
Institute of Biochemistry and Physiology
of Plants and Microorganisms of RAS,
Saratov State University

Boris N. Khlebtsov,
Institute of Biochemistry and Physiology
of Plants and Microorganisms of RAS,
Saratov State University

The term “nanotechnology” designates a new field of science and technology that operates with structures possessing characteristic sizes about of one billion part of meter. During last years, a new branch of the nanotechnology has been created. It is the so-called “nanobiotechnology” that uses biomolecular structures and processes to produce new functional materials for applications in biosensorics, bioelectronics, and biomedicine.

The Workshop is aimed at discussion of

basic and applied problems related to the fabrication and application of various nanostructures and nanoparticles (NPs). It is expected that the Workshop will be a multitopical forum involving experts of different scientific fields. The workshop program will include the following **topics**:

- Fabrication of plasmon-resonant NPs and nanostructures
- Composite nanostructured materials
- Optical properties of plasmon resonant NPs and nanostructures
- Physicochemical characterization of NPs and nanostructures
- Functionalization of NPs with biospecific macromolecules
- Nanoscale biosensors
- Quantum dots and its application
- Chemical technologies based on nanoparticles
- Cell imaging based on NPs bioconjugates
- Photothermal therapy using plasmon-resonant NPs
- Application of nanoparticles to the targeted drug delivery

Workshop: Management of High Technologies Commercialization and Regional Innovation Systems VII

Chair

Valery V. Tuchin,

Saratov State University, Institute of
Precision Mechanics and Control RAS

Secretary

Yulia S. Skibina,

Saratov State University, SPE
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Palomar Medical Technologies Inc. (USA)

Robert Breault,

Breault Research Organization, Arizona
Optics Industry Association (USA)

Viktor I. Fedotov,

Chamber of Commerce of Saratov
Region (Russia)

Boris Reznik, BioRASI, Inc. (USA)

Natalya V. Romanova,

Saratov State University (Russia)

Sergey N. Sokolov,

INJECT Enterprise (Russia)

Stoyan Tanev,

University of Southern Denmark,
Denmark

Dmitry A. Zimnyakov,

Saratov State University (Russia)

The workshop program will include
the following **topics**:

- High technology's commercialization, innovation management, high technologies and business, technologies of opening of the innovative companies, innovative business, transfer of technologies, financing of innovative activity, management of innovation risks, venture financing, education in the field of management in biophotonics and biotechnologies
- Development and monitoring of branch "road maps" as the base of planning of regional branch clusters and innovation zones.
- Actual priorities of the regional innovation policy
- Experience of IP commercialization and actual problems of Academy of Sciences, high schools,

chambers of commerce and
regional industrial companies
interaction.

For young Russian attendees (up to 28 years) special awards of Russian Foundation on Innovations in Optics, Laser Physics, and Biophotonics will be available. A few best Proposals (papers) will be selected by the Award Committee in accordance with guidelines of the Program **U.M.N.I.K** (<http://www.fasie.ru/index.php?rid=120>). All young scientists who are willing to apply for award:

- 1) should be acquainted with the U.M.N.I.K Program guidelines,
- 2) should send to SFM-10 Organizing Committee the title of his/her Project 40 days prior SFM-10 starting date and
- 3) an abstract - 20 days prior SFM-10 starting date.

All questions and requests on U.M.N.I.K Program awards you may send to **Yulia S. Skibina**, julia@mail.saratov.ru

Workshop: Microscopic and Low- Coherence Methods in Biomedical and Non- Biomedical Applications II

Chair

Kirill V. Larin,
University of Houston (USA)

Secretary

Georgy G. Akchurin,
Saratov State University

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National Research Council (Canada)

Mary Dickinson,
Baylor College of Medicine (USA)

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Joseph A. Izatt,
Duke University (USA)

Igor V. Meglinsky,
University of Otago (New Zealand),
Saratov State University (Russia)

Valery V. Tuchin,
Saratov State University (Russia)

Ruikang K. Wang,
Oregon Health Sciences University
(USA)

Development of non- or minimally-invasive methods for imaging, monitoring, and quantification of different materials and processes are extremely important for many biomedical (including therapy, diagnostics, management, and advanced imaging of various devastating diseases) and non-biomedical applications (dimensional metrology, material research and non-destructive testing, art diagnostics, botany, microfluidics, data storage, and security applications). This workshop will put emphasis on two aspects of optical imaging: microscopy and low coherence interferometry.

Topics

The education and scientific program will include but is not restricted to the following topic areas:

- Optical microscopy
- Methods of Low Coherence Interferometry
- Optical Coherence Tomography
- Combinations of LCI/OCT with microscopy

- Biomedical applications of optical microscopy and LCI
- Non-biomedical applications of optical microscopy and LCI

Workshop: **Nonlinear Dynamics I**

Chair

Vadim S. Anishchenko, Saratov State University

Secretaries

Galina I. Strelkova, Saratov State University

Svetlana Yu. Malova, Saratov State University

International Program Committee

Lutz Schimansky-Geier, Jürgen Kurths, Humboldt University, Berlin (Germany); Alexander Neiman, Ohio University (USA); Igor Khovanov, Warwick University (UK); Alexander Balanov, Natalia Janson, Loughborough University (UK); Olga Sosnovtseva, University of Copenhagen (Denmark); Alexander P. Chetverikov, Alexey N. Pavlov, Tatjana E. Vadivasova, Alexey V. Shabunin, Saratov State University (Russia)

The main goal of the Workshop is to attract young scientists and students to the discussion of topical problems and results in the field of nonlinear

dynamics. The special attention will be given to the review of contemporary achievements in the field of research of dynamics of complex nonlinear systems, both deterministic and stochastic. It is planned to invite some leading experts on nonlinear dynamics for delivering plenary lectures and to present oral and poster contributions of young researchers, PhD students and graduate students.

Topics

The scientific program will include but is not restricted to the following topic areas:

- Nonlinear Dynamics of Deterministic Finite-Dimensional and Distributed Systems
- Stability and Bifurcations
- Synchronization of Complex Processes
- Role of Fluctuations in Nonlinear Dynamics
- Applications of Nonlinear Dynamics Methods in Biology, Physiology, and Medicine

Workshop: **History, Methodology and Philosophy of the Optical Education III**

Chairs

Vladimir P. Ryabukho,
Saratov State University (Russia)

Boris A. Medvedev,
Saratov State University (Russia)

Secretary

Alexander A. Skaptsov,
Saratov State University (Russia)

International Program Committee

Vladimir L. Derbov,
Saratov State University (Russia)

Alexander V. Priezhev,
M.V. Lomonosov Moscow State
University (Russia)

Alexander V. Gorokhov,
Samara State University (Russia)

Valery V. Tuchin,
Saratov State University

Alex Vitkin,
University of Toronto (Canada)

The goals of the Workshop are the development of the optical education, the actualization of the interdisciplinary investigation using optical conceptions and tools, the expansion of European educational field of optical physics and biophysics and the increase of creative resources and potential of bachelor, master's degree, post-graduate training in Optics and Biophotonics.

Topics

There are five main discussing topics. History of discoveries in optics:

- Founders of optical physics.
- History of optical scientific schools.
- Optical discoveries on chronicles of the world culture.
- Historical aspects of optical investigations for life science.

Methodology problems of the optical education:

- Lecture demonstrations of optics.
- University optical training.
- Methodology of teaching optics in the general course of physics at a natural-science department.
- Principles of optical

mathematical simulation.

Teaching optics in the light of the interdisciplinary education and scientific knowledge integration:

- Problems of teaching optics at medical colleges and universities.
- Optical physics in the course "The modern natural scientific conception" at humanitarian departments.
- Minimum program of biology, biophysics, biochemistry, and biomedicine for student specialized in optics.

Master class: Optics of the twenty-first century. Elite lectures.

Round table: We and light. Philosophy problems of wave and quantum treatment of light nature.