Saratov State University (National Research University of Russia)

Research-Educational Institute of Optics & Biophotonics

Saratov Fall Meeting SFM'18

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

September 24 - 28, 2018
Saratov, Russia

Chair

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

Secretaries

Elena K. Volkova, Saratov State University

Irina Yu. Yanina, Saratov State University

Workshops:

- Modern Optics XVII (*Georgy V. Simonenko*)
- English as a Communicative Tool in the Scientific Community XVII (*Alexander B. Pravdin, Svetlana V. Eremina*)
- Workshop on Management of High Technologies Commercialization and Regional Innovation Systems XV (*Julia S. Skibina, Andrey Shuvalov, Valery V. Tuchin*)
- History, Methodology and Philosophy of the Optical Education XI (*Boris A. Medvedev, Vladimir P. Ryabukho*)
- Telemedicine XIII (*Valery V. Bakutkin, Sergey R. Utz*)

Co-located with:

International Symposium on Optics and Biophotonics -VI (Saratov Fall Meeting SFM'18 – Symposium, September 25 - 29, 2018)

3rd School on ADFLIM (Advanced Fluorescence Imaging Methods)

3rd School on ADFLIM (Advanced Fluorescence Imaging Methods)

Chairs: **Wolfgang Becker**, Becker & Hickl GmbH, Berlin, Germany

Alexander Savitsky, Bach Institute of Biochemistry, Research Center of Biotechnology of RAS, Russia

Valery V. Tuchin, Saratov State University, Russia

Russian-Germany Round-table on Societal Importance of Biophotonics: Innovation, Education and Networking

Chairs:

Jürgen Lademann, Charité-Universitätsmedizin Berlin, Germany

Jürgen Popp, Leibniz Institute of Photonic Technology, Jena.

Alexander Savitsky, Bach Institute of Biochemistry, Research Center of Biotechnology of RAS, Russia

Valery V. Tuchin, Saratov State University, Russia

Special event:

Special session on student reports awarded by the Russian Foundation on Innovations U.M.N.I.K. in Optics, Laser Physics, and Biophotonics

Short Course Program

SPIE To be announced

OSA To be announced

Public lectures: To be announced

Plenary and invited speakers

Vincent P. Wallace
University of Western Australia

Graphene-based heterostructures and concepts of their terahertz and infrared applications
Victor I. Ryzhii
Russian Academy of Sciences, Bauman Moscow State Technical University

Superconducting Thin Film Nanostructures as Terahertz and Infrared Heterodyne and Direct Detectors
Grigory N. Goltsman
Moscow State Pedagogical University

Igor V. Reshetov
Sechenov First Moscow State Medical University

Vladimor S. Gorelik
Lebedev Physical Institute of RAS

Internet Plenary speakers

Ubiquitous THz photonics from ultra-high bit-rate communications to super-resolution non-destructive imaging
Maksim Skorobogatiy
Polytechnique Montreal

Photonic and Magnetic Nanoparticles for Health, Energy, and Biosensing

T. Randall Lee

University of Houston, USA

Ablation of retbindin alters flavin levels and leads to rod and cone photoreceptor degeneration

Muayyad Al-Ubaidi

University of Houston, USA

Nanoparticle-based gene therapy for ocular diseases

Muna Naash

University of Houston, USA

Organized by

Saratov State University (National Research University of Russia) (SSU)

Research-Educational Institute of Optics and Biophotonics, SSU

International Research-Educational Center of Optical Technologies for Industry and Medicine “Photonics”, SSU

Institute of Biochemistry and Physiology of Plants and Microorganisms, RAS

Institute of Precision Mechanics and Control, RAS (IPMC RAS)

Saratov State Medical University n.a. V.I. Razumovsky

Volga Region Center of New Information Technologies, SSU

Tomsk State University (National Research University of Russia) (TSU), Russia

ITMO University (National Research University of Russia), Saint Petersburg, Russia

Bauman Moscow State Technical University, Russia

Institute of Solid State Physics of RAS, Russia

Biomedical Photonics Committee of Chinese Optical Society, China

SPIE Student Chapter, SSU

SPIE Student Chapter of Bauman Moscow State Technical University

SPIE Student Chapter of Institute of Solid State Physics of RAS, Chernogolovka

OSA Student Chapter, SSU

In cooperation with

Academy of Natural Sciences, Saratov Regional Division

Russian Society for Photobiology

Saratov Science Center, RAS

Photonics4Life Consortium (**P4L**) of EC FP7: Network of Excellence for Biophotonics

Biophotonics4Life Worldwide Consortium (**BP4L**) and BiophotonicsWorld.org

EPIC – European Photonics Industry Consortium

Co-sponsored by

RFBR – Russian Foundation for Basic Research

RAS – Russian Academy of Sciences

SPIE – The International Society of Photo-Optical Instrumentation Engineers

OSA –Optical Society of America

IEEE - Institute of Electrical and Electronics Engineers

LLC SPE Nanostructed Glass Technology, Saratov

Russian Technology Platform "The Medicine of the Future"

Russian Technology Platform "Photonics"

European Technology Platform "Photonics21"

Government of the Russian Federation

RME INJECT LLC, Saratov, Russia

Program Committee

Chair

Kirill V. Larin, University of Houston, USA; SSU, TSU

Members

Valery V. Bakutkin, Saratov Research Institute of Hygiene

Alexey N. Bashkatov, SSU, TSU

Dmitry A. Gorin, SSU, Skoltech

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Svetlana V. Eremina, SSU

Ivan V. Fedosov, SSU

Elina A. Genina, SSU

Nikolai G. Khlebtsov, Institute of Biochemistry and Physiology of Plants and Microorganisms, RAS, SSU

Yury V. Kistenev, TSU

Vyacheslav I. Kochubey, SSU

Marine Amouroux, Université de Lorraine – CRAN, France

Martin Leahy, National University of Ireland, Galway, Ireland

Boris A. Medvedev, SSU

Juergen Popp, Institute of Photonic Technology, Jena, Germany

Alexander B. Pravdin, SSU

Dmitry E. Postnov, SSU

Vladimir P. Ryabukho, SSU, IPMC RAS

Alexander Priezzhev, International Laser Center, Moscow State University

Julia S. Skibina, SPE "Nanostructed Glass Technology" Ltd., SSU

Olga A. Smolyanskaya, ITMO University

Valery V. Tuchin, SSU, IPMC RAS, TSU

Martin Wolf, University Hospital Zurich,

Switzerland

Sergey R. Utz, Clinics of Skin and Veneral Diseases, SSMU

Elena V. Zagaynova, Privolzhsky Research Medical University, Nizhny Novgorod

Kirill I. Zaytsev, Prokhorov General Physics Institute of RAS

Organizing Committee

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Georgy V. Simonenko, SSU

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Anton A. Namykin
Kirill I. Zaytsev
Olga Zyuryukina

Internet group

Co-chairs

Michael M. Slepchenkov
Ivan V. Fedosov

Members

Maxim Malovetsky
Andrey V. Slepnev
Maxim A. Kurochkin

The main goal of the School 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, nanophotonics and nanobiophotonics. 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, nanoparticles, tissue phantoms, and various types of tissues *in vitro* and *in vivo*. Such effects as static and dynamic light scattering, Doppler effect, Raman scattering, SERS, CARS, SHG, multiphoton fluorescence, 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 tissue will be presented.

SFM-18 will be organized as the Short Courses, 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 short courses

OSA SC1:

Speckle and Related Phenomena: Techniques and Applications in Biomedicine

Sean Kirkpatrick
Michigan Technological University, Michigan, USA

OSA SC2:

Optical coherence tomography and endoscopy

Xingde Li

Johns Hopkins University, Baltimore, USA

SPIE SC1:

Fluorescence Microscopy for Biomedical Applications

Herbert Schneckenburger

Institute of Applied Research, Aalen University, Germany

SPIE SC2:

Multimodal Imaging for the Biomedical Applications

Anna N. Yaroslavsky

Department of Physics, University of Massachusetts, Lowell, USA

Last year plenary speakers

Sapphire shaped crystals for biomedical applications

Vladimir N. Kurlov

Institute of Solid State Physics of RAS (Chernogolovka, Russia)

Laser speckle modelling and simulation for biophysical dynamics

Kosar Khaksari and Sean J. Kirkpatrick

Department of Biomedical Engineering, Tufts University, Medford, MA 02155 USA; Department of Biomedical Engineering, Michigan Technological University, Houghton, USA

Advances in label-free optical endomicroscopy technologies towards histological imaging of biological tissues in vivo

Xingde Li

Department of Biomedical Engineering, Department of Electrical and Computer Engineering, and Department of Oncology, Johns Hopkins University

Advanced methods of 3D live cell microscopy

Herbert Schneckenburger

Institute of Applied Research, Aalen University, Germany

Laser trapping and manipulation of red blood cells: an efficient tool for hemorheologic research

Alexander Priezzhev

Moscow State University, Moscow, Russia

Multiparametric analysis of tumor development and response for chemotherapy using time-resolved imaging

Elena Zagaynova

Nizhny Novgorod State Medical Academy, Russia

New generation of compact laser sources for imaging, diagnostics and treatment in biomedicine

Edik Rafailov

Aston University, United Kingdom

Raman spectroscopy of meteorite-catalyzed synthesized prebiotic compounds from formamide after proton irradiation

Ekaterina Borisova

Institute of Electronics, Bulgarian Academy of Sciences, Bulgaria

Last year internet plenary speakers

Speckle fluctuations to probe dynamics on the macroscopic to microscopic scales

David Boas

Boston University, USA

Optical tools in radiation therapy

Brian Pogue

Dartmouth College, United States

Acousto-optics - review of recent developments in biomedicine

Stefan Andersson-Engels, Michael Raju and Jacqueline Gunter

Tyndall National Institute and Department of Physics, University College Cork, Cork, Ireland

In vivo skin optical clearing window for cutaneous vascular and cell imaging

Dan Zhu

Britton Chance Center for Biomedical Photonics, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology, Wuhan, China

Evaluation of photodynamic treatment efficiency on glioblastoma cells ex vivo

Ekaterina Borisova

Institute of Electronics, Bulgarian Academy of Sciences, Bulgaria

Participants from Russia, USA, UK, Germany, France, Belgium, Switzerland, Sweden, Taiwan, Italy, Denmark, the Netherlands, Slovenia, Finland, Ukraine, Belarus, Poland, Bulgaria, Ireland, Israel, Turkey, China and others have located their papers at the meeting website:

http://sfm.eventry.org/2018/

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 $ 200 (lunches, barbecue, Volga-river voyage, and light refreshments), may be paid during the Meeting or transferred to the account number for request.

For Russian participants the Conference fee will depend on financial support from sponsoring organizations.

Lodging

Hotel "Slovakia" ashore the Volga river

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

Hotel "Saratov" in the downtown

http://astoria-saratov.ru/en/hotels/saratov/

Hotel "Volga" in the downtown

http://astoria-saratov.ru/en/hotels/volga/

Western style mini-hotel Bohemia in the downtown

http://www.bohemiahotel.ru

Hotel "Volna" ashore the Volga river

http://volna64.ru/

Hostel "Central"
http://www.travel.ru/hotel/russia/saratov/centralnyi/

Student hostel of SSU

Culture program

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

Pre-Registration

Please, fill up the registration form before **April 15, 2018** and e-mail it to Irina Yanina (School) irina-yanina@yandex.ru or

Polina Timoshina (Symposium)
timoshina2906@mail.ru

Submission of Abstracts

Each author is requested to submit a one-page abstract. Abstract must be uploaded to the Conference website http://sfm.eventry.org/symposium2018/ before **April 15, 2018**.

Proceedings

Conference papers will be published as Conference Proceedings (in Russian and English) under the title "Optical Physics and Biophotonics", SPIE Proceedings,

and in Russian and International peer-reviewed journals: *Journal of Biomedical Photonics & Engineering, Quantum Electronics (Russian/English), Optics and Spectroscopy (Russian/English), Nonlinear Applied Physics (Russian/English).*

SFM'18 attendees also encouraged to submit papers to SPIE Journals

J. of Biomedical Optics
https://www.spiedigitallibrary.org/journals/journal-of-biomedical-optics?SSO=1

J. of Medical Imaging
https://www.spiedigitallibrary.org/journals/journal-of-medical-imaging

J. of Neurophotonics

https://www.spiedigitallibrary.org/journals/neurophotonics

J. of Nanophotonics
https://www.spiedigitallibrary.org/journals/journal-of-nanophotonics

Last year Conference Proceedings:

https://spie.org/Publications/Proceedings/Volume/10336

http://spie.org/Publications/Proceedings/Volume/10337

http://optics.sgu.ru/_media/library/sfm2017.pdf

All papers will be subjected to the normal refereeing process for the journals. Manuscripts of papers should be submitted not later than **November 1, 2018**.

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 is needed:

1. Passport (valid up to six months after September 29, 2017) 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:_____

6. Name of town, where you are going to apply for visa (Russian consulate)

Please, send this information to general secretary of the SFM-18

Elina A. Genina: eagenina@yandex.ru

Important deadlines

Visa application support – information for official invitation letter, before April 15, 2018

Submission of Abstracts – before August 1, 2018

Registration – before August 1, 2018

Hotel reservation – before August 1, 2018

Conference fee – before September 25, 2018

Manuscripts submission – before November 1, 2018

SFM-18 webpage:
http://sfm.eventry.org/symposium2018/

On behalf of the Organizing Committee of SFM'18- School I have a pleasure in inviting you to attend this Meeting

Valery V. Tuchin

Workshop:
Modern Optics XVII

Lectures on Optics for University Students, Postgraduate Students and High School Students

Chair

Georgy V. Simonenko, Saratov State University

Secretaries

Irina Yu. Yanina Saratov State University

Program Committee:

Vladimir L. Derbov, *Saratov State University*

Boris B. Gorbatenko, *Saratov State Technical University*

Ivan V. Fedosov, *Saratov State University*

Boris A. Medvedev, *Saratov State University*

Leonid A. Melnikov, *Saratov State Technical University*

Alexander B. Pravdin, *Saratov State University*

Lyudmila V. Pravdina, *Saratov Physics and Technical Lyceum*

Alexander V. Priezzhev, *Moscow State University*

Vladimir P. Ryabukho, *Saratov State University*

Mikhail A. Starshov, *Saratov State University*

Valery V. Tuchin, *Saratov State University*

The main goal of the Workshop is promotion of school and high school youth achievements in optics - a thriving direction in physics.

One of the leading scientific schools of optics in Russia, which is a recognized authority in other countries formed in Saratov to date. Conferences, seminars and scientific schools are one of the effective ways to attract talented young people to scientific work, particularly in the area of optical research. Widening the circle of young people, the inclusion of students in high schools and colleges, including the physical, technical and other natural sciences field are one of the main tasks of scientific-methodical workshop on "Modern Optics".

Organized by

- N.G. Chernyshevsky Saratov National Research State University
- Research-Educational Institute of Optics and Biophotonics at Saratov State University
- Institute of Precision Mechanics and Control, Russian Academy of Sciences
- Saratov Physics and Technical Lyceum

Workshop program

The program of the seminar "Modern Optics" consists of lectures and demonstration parts and seminars on selected topics. One lecture day with thematic sections supposed to hold the afternoon. Section sessions supposed to hold for 3-4 favorites, the most interesting topics for teachers, which posts students and pupils on the results of independent work is supposed to hear and discuss also.

Workshop

English as a Communicative Tool in the Scientific Community XVII

Chairs:

Alexander B. Pravdin, **Svetlana V. Eremina,** Saratov State University

Secretary:

Natalia I. Kazadaeva, Saratov State University

Program Committee

Vladimir L. Derbov, Saratov State University

Alexander V. Priezzhev, Moscow State University

Valery V. Tuchin, Saratov Research University

Dmitry A. Zimnyakov, Saratov State Technical University

The main goal of the Workshop is to introduce young researches and students to the international community of scientists dealing with development and application of laser and optical technologies in medicine and biology. Joining this fast-developing field of research is impossible without active English, the language that has become an international communicative tool of modern science. The communicative problem that most of the beginner scientists face is well expressed in the maxim "If you want your voice to be heard in the present-day world, it should sound in English"

Most of the modern publications necessary for the work of a graduate student, postgraduate or young scientists is in English. Therefore, the skill of scanning large amounts of English text with selecting informationally valuable fragments will be one of the leading topics of the sessions and round-table discussions. The level of discussions will be intended for graduate students.

The main attention will be paid to training the active English as an international communicative tool without which it is impossible to present one's own research results to the scientific community. Traditionally in Russia the language education of specialists in natural sciences was oriented at passive English. We believe that introducing the students and young researchers to the technology of scientific presentations and Internet sites, to the style and grammar peculiarities of a scientific article, etc., will stimulate the progress in their language education and help to overcome the psychological barrier impeding the active use of English.

The Workshop will include lecture sessions with oral presentations. The subjects touched upon during these sessions will be extended and developed in round-table discussions.

We expect active participation of the leading English instructors of Saratov State University, including those working within the framework of REC006 Project, the School professors that have considerable experience in English scientific presentations, the members of Editorial Boards and referees of international journals. At least 3-4 foreign scientists including those from English-speaking countries are supposed to take part in the Workshop.

In the framework of the Workshop an Internet session will be organized in which the participants will be introduced to the facilities of remote language acquisition and consult with instructors.

Topics

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

- The style of a modern scientific publication

- Cursory reading as a means to extract maximal information basing on minimal vocabulary
- Submitting a paper to an International Journal: language requirements
- Russian-English terminology system in biomedical optics

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

Chairs

Julia S. Skibina,
Saratov State University, LLC SPE "Nanostructed Glass Technology"

Valery V. Tuchin,
Saratov State University

Andrey Shuvalov,
Saratov State University, LLC SPE "Nanostructed Glass Technology"

Secretary

Anastasiya A. Zanishevskaya,
Saratov State University, LLC SPE "Nanostructed Glass Technology"

Program Committee

Gregory B. Altshuler,
IPG Inc., USA

Robert Breault,
Breault Research Organization, Arizona Optics Industry Association, USA

Leonid E. Dolotov, Saratov State University

Yury V. Kistenev, National Research Tomsk State University, Russian Technology Platform "The Medicine of the Future"

Boris Reznik, BioRASI, Inc., USA

Natalya V. Romanova,
Saratov State University

Sergey N. Sokolov,
OJSC "RME "INJECT", Saratov, Russia

Stoyan Tanev,
University of Southern Denmark, Denmark

Andreas Thoss, Laser Focus World, Germany

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

- High technology 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 basis for 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 company interaction
- Special sessions on student presentations of new projects to be awarded and reports awarded by the Russian Foundation on Innovations U.M.N.I.K. in Optics, Laser Physics, and Biophotonics

Workshop:
History, methodology and philosophy of the optical education XI

Co-chairs:

Boris A. Medvedev, **Vladimir P. Ryabukho,** Saratov State University

Secretary:

Alexander A. Skaptsov Saratov State University

Program Committee

Vladimir L. Derbov, Saratov State University

Boris A. Medvedev, Saratov State University

Vladimir P. Ryabukho, Saratov State University

Alexander V. Priezzhev, M.V. Lomonosov Moscow State University

Alexander V. Gorokhov, Samara State University

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 three 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

Workshop:

Telemedicine: Opportunities, Applications, Prospects XII

Chairs:

Valery V. Bakutkin, Saratov Research Institute of Hygiene

Sergey R. Utz, Clinics of Skin and Veneral Diseases, SSMU, Russia

Program Committee

Marine Amouroux, Université de Lorraine – CRAN, France

Frank Lievens, ISfTeH, Belgium

Malina Jordanova, MD, PhD. Solar-Terrestrial Influences Laboratory. Bulgarian Academy of Sciences, Bulgaria

Anton V. Vladzimirsky, President of AfUTeHD, Ukraine

Valery V. Tuchin Saratov State University

Development of Telemedicine and e-Health for high-quality of medicine, medical education, medical researches. This Seminar will put emphasis on all aspects of Telemedicine and e-Health.

Topics

The workshop program will include but is not restricted to the following topics:

- consulting services
- diagnostic/monitoring systems and devices
- electronic health cards
- electronic medical records
- home monitoring services and equipment
- hospital information systems
- imaging/PACS
- internet/intranet services
- satellite communication
- secure data transmission
- surgical systems
- systems integration
- telecommunication services
- telemedicine equipment
- videoconferencing
- vital signs monitoring
- wireless data communication

In a professional and business-minded environment, Telemedicine III brings manufacturers and suppliers together with a qualified and international audience of healthcare service providers and other key contacts such as:

- consultants
- distributors and agents
- educators and researchers
- government representatives
- homecare service
- hospital buyers, administrators and department heads
- insurers
- international organizations and association executives
- physicians and nurses
- for the purpose of establishing new trade contacts and developing existing relationships

The event also features many educational opportunities through its extensive program of presentations, panel discussions and satellite conferences on topics such as:

- bio-informatics
- broadband and wireless networks
- business models
- cost-benefit studies
- current ehealth realizations and projects
- developing countries and ehealth
- distance education
- ehealth integration into routine medical practice
- electronic medical records
- home monitoring and homecare applications
- legal and ethical aspects
- reimbursement issues
- satellites and ehealth
- standardization and interconnectivity
- telemedicine applications and projects