

# **Saratov Fall Meeting SFM'21**

**9<sup>th</sup> International Symposium “Optics and Biophotonics”**

**25<sup>th</sup> International School for Junior Scientists and Students on Optics,  
Laser Physics & Biophotonics**

**BRICS Workshop on Biophotonics-2021**

# Schedule of SFM-21/BRICS-21

September 27, Monday(Saratov time UTC+4)

|                                                                    |                                                                                                                                                                                                                                                                              |                               |
|--------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| 14.00-14.10                                                        | <b>Introduction to SFM/BRICS Program</b><br><b>Valery V. Tuchin</b> , Saratov State University, Russia;<br><a href="https://us05web.zoom.us/j/9161835305?pwd=Sk5YcVFNNHZBS1RXZ05pU1NDVXFBZz09">https://us05web.zoom.us/j/9161835305?pwd=Sk5YcVFNNHZBS1RXZ05pU1NDVXFBZz09</a> | Zoom                          |
| 14.10-19.50                                                        | <b>ON-LINE BRICS INVITED LECTURE SESSIONS</b><br>Chairs: <b>Valery V. Tuchin</b> , Saratov State University, Russia; <b>Qingming Luo</b> , Hainan University, China<br><a href="https://us05web.zoom.us/j/9161835305">https://us05web.zoom.us/j/9161835305</a>               | Building 3,<br>Room 8<br>Zoom |
| Coffee breaks take place at sessions of each conference separately |                                                                                                                                                                                                                                                                              |                               |

September 28, Tuesday (SaratovtimeUTC+4)

<https://osachapter.zoom.us/j/97105128804> (PLENARY SESSION,SPONSOR SESSION)

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|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| 10.20-12.20 | <b>SFM/BRICS PLENARY SESSION I</b><br>Chair: <b>Valery V. Tuchin</b> , Saratov State University, Russia                                                                                                                                                                                                           | Building 8,<br>Conference<br>Hall 420<br>Zoom |
| 10.20-11.00 | <b>Live biophotonic analysis of early mammalian embryonic processes</b><br><b>Irina V. Larina</b> , Baylor College of Medicine, Houston, USA                                                                                                                                                                      |                                               |
| 11.00-11.40 | <b>From ocular biometry to cellular resolution- and multifunctional OCT -35 years of coherence ranging and 30 years of coherence imaging in the human eye(Zoom lecture)</b><br><b>Christoph Hitzenberger</b> , Center for Medical Physics and Biomedical Engineering at the Medical University of Vienna, Austria |                                               |
| 11.40-12.20 | <b>Fluorescent methods in the studies of retention and penetration of nanoparticles and polymers into the biological tissues(Zoom lecture)</b><br><b>Vitaliy Khutoryanskiy</b> , University of Reading, United Kingdom                                                                                            |                                               |
| 12.20-13.00 | <b>SFM SPECIAL EVENT: SPONSOR SESSION I</b><br>Chair: <b>Valery V. Tuchin</b> , Saratov State University, Russia                                                                                                                                                                                                  |                                               |
| 12.20-12.40 | <b>TRITOM - A Multimodality Imaging Platform for Volumetric Molecular Assessment of Murine Models</b><br><b>Sergey Ermilov</b> , PhotoSound Technologies, Inc., USA                                                                                                                                               |                                               |

|                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                              |                                 |                                                                                                                                                |                                          |                                                                                                          |                                                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|----------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| 12.40-13.00                                                                                                                                                                              | <b>Specialized fluorescence microscopy for high-resolution imaging of large biological samples</b><br><b>Alexander Sychevskij</b> , Biocommerce Ltd                                                                                                                                                                                                                          |                                 |                                                                                                                                                |                                          |                                                                                                          |                                                         |
| 14.10- 19.10                                                                                                                                                                             | <b>ON-LINE SFM/BRICS INVITED LECTURE SESSIONS</b><br>Chairs: <b>Vanderlei Salvador Bagnato</b> , University of São Paulo, Brazil; <b>Santhosh Chidangil</b> , Manipal Academy of Higher Education, India<br><a href="https://us05web.zoom.us/j/9161835305">https://us05web.zoom.us/j/9161835305</a>                                                                          |                                 |                                                                                                                                                |                                          |                                                                                                          | <i>Building 3,<br/>Room 8<br/>Zoom</i>                  |
| 19.15-22.00                                                                                                                                                                              | <b>Welcome Party</b>                                                                                                                                                                                                                                                                                                                                                         |                                 |                                                                                                                                                |                                          |                                                                                                          |                                                         |
| <b>September 29, Wednesday (Saratov time UTC+4)</b><br><a href="https://osachapter.zoom.us/j/97105128804">https://osachapter.zoom.us/j/97105128804</a> (PLENARY SESSION,SPONSOR SESSION) |                                                                                                                                                                                                                                                                                                                                                                              |                                 |                                                                                                                                                |                                          |                                                                                                          |                                                         |
| 10.00-11.20                                                                                                                                                                              | <b>SFM/BRICS PLENARY SESSION II</b><br>Chairs: <b>Valery V. Tuchin</b> , Saratov State University, Russia                                                                                                                                                                                                                                                                    |                                 |                                                                                                                                                |                                          |                                                                                                          | <i>Building 8,<br/>Conference<br/>Hall 420<br/>Zoom</i> |
| 10.00-10.40                                                                                                                                                                              | <b>The revolution of personalized medicine – are we going to cure all diseases and at what price??</b><br><b>Aaron Ciechanover</b> , Nobel Prize in 2004 for his work in ubiquitination<br>The Rappaport Family Technion Integrated Cancer Center (R-TICC), The Rappaport Faculty of Medicine and Research Institute, Technion-Israel Institute of Technology, Haifa, Israel |                                 |                                                                                                                                                |                                          |                                                                                                          |                                                         |
| 10.40-11.20                                                                                                                                                                              | <b>Laser spectroscopy applied to the environmental, ecological, agricultural, and medical areas</b><br><b>Sune Svanberg</b> , A member of the Academy of Sciences’ Nobel Committee for Physics (1998-2006) (Chairman 2005)<br>Lund University, Sweden, and South China Normal University, China                                                                              |                                 |                                                                                                                                                |                                          |                                                                                                          |                                                         |
| 11.20-11.40                                                                                                                                                                              | <b>SFM SPECIAL EVENT: SPONSOR SESSION I</b><br><b>Fiber photonics for biomed applications in 0.3-16μM range</b><br><b>Viacheslav Artyushenko</b> , art photonics GmbH, Berlin, Germany                                                                                                                                                                                       |                                 |                                                                                                                                                |                                          |                                                                                                          |                                                         |
| 12.00-18.00                                                                                                                                                                              | <b>INVITED LECTURE/ORAL SESSION MICROSCOPY AND LOW-COHERENCE METHODS XIX</b><br>Chair: <b>Kirill V. Larin</b> , University of Houston, USA                                                                                                                                                                                                                                   |                                 |                                                                                                                                                |                                          |                                                                                                          | <i>Zoom</i>                                             |
|                                                                                                                                                                                          | <b>ORAL SESSION LOW-DIMENSIONAL STRUCTURES</b><br>Chair: <b>Olga Glukhova</b> , Saratov State Univ., Russia                                                                                                                                                                                                                                                                  | <i>Building 8,<br/>Room 318</i> | <b>ORAL SESSION<br/>NONLINEAR DYNAMICS I</b><br>Chairs: <b>Galina I. Strelkova</b> ,<br><b>Andrei V. Slepnev</b> , Saratov State Univ., Russia | <i>Building 3,<br/>Room 38;<br/>Zoom</i> | <b>ORAL SESSION<br/>BIOCOMPUTING I</b><br>Chairs: <b>Dmitry E. Postnov</b> , Saratov State Univ., Russia | <i>Building 3,<br/>Hall 64</i>                          |

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|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
|                                                    | <b>INVITED LECTURE/ ORAL SESSION BIOPHYSICS I</b><br>Chair: <b>Yury Kistenev</b> , Tomsk State Univ., Russia                                                                                                                                                                                 | <i>Building 8, Hall 420 Zoom</i> | <b>ON-LINE INVITED LECTURE/ORAL SESSION NANOBIOPHOTONICS I</b><br>Chair: <b>Nikolai G. Khlebtsov</b> , IBPPM RAS, Saratov State Univ., Russia | <i>Building 9, Conference Hall Zoom</i>                                                                 | <b>ORAL SESSION SPECTROSCOPY I</b><br>Chair: <b>Lev M. Babkov</b> , Saratov State Univ., Russia                           | <i>Building 3, Room 34</i>                                        |
|                                                    | <b>ON-LINE INVITED LECTURE/ORAL SESSION BIOPHYSICS II</b><br>Chairs: <b>Mikhail Kirillin</b> , Institute of Applied Physics RAS, Russia<br><b>Ivan A. Bratchenko</b><br>Samara National Research University, Samara, Russia                                                                  | <i>Building 8, Hall 420 Zoom</i> | <b>ON-LINE ORAL SESSION LASER PHYSICS&amp;PHOTONICS</b><br>Chair: <b>Vladimir L. Derbov</b> , Saratov State Univ., Russia                     | <i>Zoom</i>                                                                                             | <b>LECTURE/ORAL SESSION EDUCATION I</b><br>Chairs: <b>Boris A. Medvedev</b> , Saratov State Univ., Russia                 | <i>Building 3, Hall 51</i>                                        |
| 13.50-18.50                                        | <b>ON-LINE SFM/BRICS INVITED LECTURE SESSIONS</b><br>Chairs: <b>Heidi Abrahamse</b> , University of Johannesburg, RSA, <b>Vanderlei Salvador Bagnato</b> , University of São Paulo, Brazil<br><b><a href="https://us05web.zoom.us/j/9161835305">https://us05web.zoom.us/j/9161835305</a></b> |                                  |                                                                                                                                               | <i>Building 3, Room 8 Zoom</i>                                                                          | <b>ON-LINE INVITED LECTURE/ORAL SESSION MACHINE LEARNING I</b><br>Chair: <b>Yury Kistenev</b> , Tomsk State Univ., Russia | <i>Zoom</i>                                                       |
| 19.00-21.00                                        | <b>Walk through the night Saratov</b>                                                                                                                                                                                                                                                        |                                  |                                                                                                                                               |                                                                                                         |                                                                                                                           |                                                                   |
| <b>September 30, Thursday (Saratov time UTC+4)</b> |                                                                                                                                                                                                                                                                                              |                                  |                                                                                                                                               |                                                                                                         |                                                                                                                           |                                                                   |
| 10.00-12.45                                        | <b>ON-LINE INVITED LECTURE SESSION BIOPHYSICS III</b><br>Chair: <b>Vladimir Y. Zaitsev</b> , Inst. of Applied Physics of the RAS, Russia, <b>Andrei Lugovtsov</b> , Faculty of Physics, Lomonosov Moscow State University, Moscow, Russia                                                    |                                  | <i>Building 8, Hall 420 Zoom</i>                                                                                                              | <b>INVITED LECTURE/ORAL SESSION TERAHERTZ</b>                                                           |                                                                                                                           | <i>Zoom</i>                                                       |
|                                                    |                                                                                                                                                                                                                                                                                              |                                  |                                                                                                                                               | <b>ORAL SESSION QUANTUM SCIENCE I</b><br>Chair: <b>Aleksey Fedorov</b> , Russian Quantum Center, Russia |                                                                                                                           | <i>Campus of the Skolkovo Institute of Science and Technology</i> |
|                                                    | <b>ON-LINE INVITED LECTURE/ORAL SESSION MACHINE LEARNING II</b>                                                                                                                                                                                                                              |                                  | <i>Building 9, Conference Hall</i>                                                                                                            | <b>ROUND TABLE DICUSSION ENGLISH</b><br>Chair: <b>Svetlana V. Eremina</b> , <b>Alexander B.</b>         |                                                                                                                           | <i>Building 18</i>                                                |

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|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
|                                        | Chair: <b>Yury Kistenev</b> , Tomsk State Univ., Russia                                                                                                                                                                                                                                                                                                                           | Zoom                                                              | <b>Pravdin</b> , Saratov State University (Russia)                                                                                              |                                                 |
| 12.45-13.00                            | <b>SFM SPECIAL EVENT</b><br><b>Why publishing in Journal of Biomedical Photonics &amp; Engineering is a huge career jump for a young scientist?</b><br><b>Oleg O. Myakinin</b> <sup>1</sup> , Valery V. Tuchin <sup>2</sup> , <sup>1</sup> Samara National Research University, Samara, Russia <sup>2</sup> Saratov State University, Saratov, Russia                             |                                                                   |                                                                                                                                                 | <i>Building 8,<br/>Hall 420<br/>Zoom</i>        |
| 15.30-16.10                            | <b>PUBLIC LECTURE SESSION MODERN OPTICS</b><br>Chairs: <b>Georgy V. Simonenko</b> , Saratov State University, <b>Anton Dyachenko</b> , Saratov State University, Boarding school 64<br><b>Biophotonics: how life begins</b> , <b>Irina V. Larina</b> , Valery Baylor College of Medicine, Houston, USA<br><a href="https://youtu.be/o1VWZHxb9Xc">https://youtu.be/o1VWZHxb9Xc</a> |                                                                   |                                                                                                                                                 | <i>Building 3,<br/>Room 8<br/>Yotube</i>        |
| 15.00-18.00                            | <b>ON-LINE INVITED LECTURE/ORAL SESSION<br/>BIOPHYSICS IV &amp;INTERNET BIOPHOTONICS</b><br>Chair: <b>Maxim E. Darvin</b> , Charité – Universitätsmedizin, Germany                                                                                                                                                                                                                | <i>Building 8,<br/>Hall 420<br/>Zoom</i>                          | <b>ON-LINE ORAL/INVITED SESSION<br/>NANOBIOPHOTONICS II</b><br>Chair: <b>Nikolai G. Khlebtsov</b> , IBPPM RAS, Saratov State University, Russia | <i>Building 9,<br/>Conference Hall<br/>Zoom</i> |
|                                        | <b>ORAL SESSION SPECTROSCOPY II</b><br>Chair: <b>Lev M. Babkov</b> , Saratov State Univ., Russia                                                                                                                                                                                                                                                                                  | <i>Building 3,<br/>Room 34</i>                                    | <b>ORAL SESSION NONLINEAR DYNAMICS II</b><br>Chairs: <b>Galina I. Strelkova</b> , <b>Andrei V. Slepnev</b> , Saratov State Univ., Russia        | <i>Building 3,<br/>Room 38;<br/>Zoom</i>        |
|                                        | <b>ORAL SESSION QUANTUM SCIENCE II</b><br>Chair: <b>Aleksey Fedorov</b> ,Russian Quantum Center, Russia                                                                                                                                                                                                                                                                           | <i>Campus of the Skolkovo Institute of Science and Technology</i> | <b>ROUND-TABLE DISCUSSION<br/>EDUCATION</b><br><br>Moderator: <b>Boris A. Medvedev</b> , Saratov State University, Russia                       | <i>Building 3,<br/>Hall 51</i>                  |
| 18.00-20.00                            | <b>JOINT POSTER/INTERNET SESSION</b><br><br>Chairs: <b>Ivan V. Fedosov</b> , <b>Oleg Grishin</b> , Saratov State Univ., Russia<br>Moderators: <b>Ivan V. Fedosov</b> , <b>Michael M. Slepchenkov</b> , <b>Vasily B. Ageev</b> , <b>Alexander I. Dubrovsky</b> , Saratov State Univ., Russia                                                                                       |                                                                   |                                                                                                                                                 | <i>Building 3</i>                               |
| October 1, Friday (Saratov time UTC+4) |                                                                                                                                                                                                                                                                                                                                                                                   |                                                                   |                                                                                                                                                 |                                                 |
| 10.00-13.00                            | <b>ON-LINE ORAL SESSION POLARIZATION</b><br>Chair: <b>Dmitry A. Zimnyakov</b> , Yuri Gagarin Saratov State Technical University, Russia                                                                                                                                                                                                                                           | Zoom                                                              | <b>INVITED LECTURE/ORAL SESSION<br/>ADVANCED MATERIALS</b>                                                                                      | <i>Zoom</i>                                     |
|                                        | <b>ORAL SESSIONELECTROMAGNETICS</b><br>Chair: <b>Michael V. Davidovich</b> , Saratov State University, Russia                                                                                                                                                                                                                                                                     |                                                                   |                                                                                                                                                 | <i>Building 8,<br/>Room 318</i>                 |



# 9<sup>th</sup> International Symposium on Optics and Biophotonics

## Conference on Optical Technologies in Biophysics & Medicine XXIII

*Co-chairs:* **Elina A. Genina**, Saratov State University; National Research Tomsk State University, **Valery V. Tuchin**, Saratov State University, Institute of Precision Mechanics and Control RAS, National Research Tomsk State University

*Secretary:* **Polina A. Dyachenko (Timoshina)**, Saratov State University, National Research Tomsk State University

**International Program Committee:** **Alexey N. Bashkatov**, Saratov State Univ., **Walter Blondel**, Univ. of Lorraine (France), **Wei Chen**, Univ. of Central Oklahoma (USA); **Kishan Dholakia**, Univ. of St. Andrews (UK); **Maria Farsari**, FORTH-IESL (Greece), **Paul M.W. French**, Imperial College of Sci., Technol. & Med. (UK); **James G. Fujimoto**, MIT (USA); **Steven L. Jacques**, Univ. of Washington (USA); **Vyacheslav Kalchenko**, Weizmann Institute of Science (Israel), **Sean J. Kirkpatrick**, Michigan Technological Univ. (USA); **Kirill V. Larin**, Univ. of Houston (USA), Saratov State Univ.; **Jürgen M. Lademann**, CharitéUniversitätsmedizin Berlin (Germany); **Martin Leahy**, National Univ. of Ireland, Galway and RCSI (Ireland); **Qingming Luo**, Hainan University (China); **Francesco S. Pavone**, University of Florence (Italy); **Juergen Popp**, Leibniz Inst. of Photonic Technol., Jena (Germany); **Alexey P. Popov**, VTT, Oulu (Finland), **Alexander V. Priezzhev**, M.V. Lomonosov Moscow State Univ. (Russia); **Lihong Wang**, Caltech(USA); **Ruikang K. Wang**, Univ. of Washington (USA); **Dan Zhu**, Huazhong Univ. of Sci. and Technol. (China)

**September 29, Wednesday**

### INVITED LECTURE/ORAL SESSION BIOPHYSICS I

*Zoom link:*

<https://osachapter.zoom.us/j/97105128804>

**ID 971 0512 8804**

**(Building 8, Hall 420)**

Chair: **Vladimir Y. Zaitsev**, Institute of Applied Physics  
RAS, Nizhniy Novgorod, Russia

**12.00-12.20**

**Invited**

**«Smart ardor»: selective low-power IR-laser activation of conformational DNA transformations in bacteria for disinfection and sterilization**

Sergey I. Kudryashov,<sup>1,4</sup> Victor Kompanets,<sup>2</sup> Svetlana N. Shelygina,<sup>1</sup> Eteri R. Tolordava,<sup>1,3,4</sup> Andrey A. Ionin,<sup>2</sup> Yulia K. Yushina,<sup>4</sup> Sergey V. Chekalin,<sup>1</sup> Michael S. Kovalev,<sup>5,1</sup> Lebedev Physical Institute, Russian Academy of Sciences, Moscow, Russia <sup>2</sup>Institute of Spectroscopy, Russian Academy of Sciences, Troitsk, Russia <sup>3</sup>Gamaleya National Research Center for Epidemiology and Microbiology, Moscow, Russia <sup>4</sup>V.M. Gorbатов Federal Scientific Center for Food Systems, Russian Academy of Sciences, Moscow, Russia <sup>5</sup>Bauman Moscow State Technical University, Moscow, Russia

**12.20-12.40**

**Invited**

**Studying alternating-sign strain fields during optical clearing of biological tissues by optical coherence elastography**

Yu. A. Alexandrovskaya<sup>1</sup>, O.I. Baum<sup>1</sup>, A.A. Sovetsky<sup>2</sup>, L.A. Matveev, A.L. Matveyev, V.Yu. Zaitsev<sup>2,1</sup> Institute of Photon Technologies, Federal Scientific Research Center "Crystallography and Photonics", Russian Academy of Sciences, Troitsk, Moscow, Russia <sup>2</sup>Institute of Applied Physics of the Russian Academy of Sciences, Nizhny Novgorod, Russia

**12.40-13.00**

**Invited**

**Application of Optical Coherence Elastography to Characterize Elastic Properties of Human Pericardium Samples Used for Fabrication of Cardiac-Valve Prostheses**

Vladimir Y. Zaitsev, Institute of Applied Physics  
RAS, Nizhniy Novgorod, Russia

**13.00-13.15**

**Oral**

**Mesoscopic early-photon fluorescence molecular lifetime tomography: first experimental results**

Alexander B. Konovalov,<sup>1,2</sup> Vitaly V. Vlasov,<sup>1,2</sup> Sergei I. Samarin,<sup>1</sup> Ilya D. Soloviev,<sup>2</sup> Alexander P. Savitsky<sup>2</sup>, Valery V. Tuchin,<sup>2,3,4,5</sup> <sup>1</sup>Federal State Unitary Enterprise "Russian Federal Nuclear

Center – Zababakhin All-Russia Research Institute of Technical Physics,” Snezhinsk, Russia <sup>2</sup> Bach Institute of Biochemistry, Research Center of Biotechnology of the Russian Academy of Science, Moscow, Russia <sup>3</sup> Saratov State University, Saratov, Russia <sup>4</sup> Tomsk State University, Tomsk, Russia <sup>5</sup> Institute of Precision Mechanics and Control of the Russian Academy of Sciences, Saratov, Russia

**13.15-13.30**

**Quantum dot versatile label for optical detection in analytical chemistry and bioanalysis**

Olga Goryacheva Saratov State University, Chemistry Institute, Department of General and Inorganic Chemistry, Saratov, Russia

**13.30-13.45**

**Oral**

**ON-LINE INVITED LECTURE/ORAL SESSION**

**BIOPHYSICS II**

*Zoom link:*

<https://osachapter.zoom.us/j/97105128804>

**ID 971 0512 8804**

**(Building 8, Hall 420)**

Chair: **Mikhail Kirillin**, Institute of Applied Physics RAS, Russia

Moderator: **Isabella Serebryakova**, Saratov State University, Russia

**14.00-14.20**

**Internet Invited**

**Optical coherence tomography for otitis media diagnostics**

Pavel A. Shilyagin,<sup>1</sup> Alexey A. Novozhilov<sup>1,2</sup> Tatiana V. Vasilenkova,<sup>1</sup> Anait L. Dilenyanyan,<sup>1,2</sup> Darya D. Smirnova,<sup>1,2</sup> Grigory V. Gelikonov,<sup>1</sup> Valentin M. Gelikonov,<sup>1</sup> <sup>1</sup>Institute of applied physics of RAS, Nizhny Novgorod, <sup>2</sup>Privolzhsky region medical center of Russian FMBA, Nizhny Novgorod, Russia

**14.20-14.40**

**Internet Invited**

**Raman spectroscopy for live early mammalian embryos: optimization of experimental conditions and selection of the estimation criteria**

E. Perevedentseva<sup>1,2</sup>, A. Karmenyan<sup>1</sup>, A. Krivokharchenko<sup>3</sup>, M. Sarmiento<sup>1</sup>, E. Baru<sup>1</sup>, S. Manuel<sup>1</sup>, V. Nadtochenko<sup>3,4</sup>, C.-L. Cheng<sup>11</sup> National Dong Hwa University, Hualien, Taiwan <sup>2</sup> P.N. Lebedev Physical Institute RAS, Moscow, Russia <sup>3</sup>N. Semenov Federal Research Center for Chemical Physics RAS, Moscow, Russia <sup>4</sup> Department of Chemistry, Lomonosov Moscow State University, Moscow, Russia

**14.40-15.00**

**Towards understanding the behavior of RBC in the optical beam of laser tweezers**

P.B. Ermolinskiy, A.E. Lugovtsov and A.V. Priezzhev, Faculty of Physics, Lomonosov Moscow State University, Moscow, Russia

**13.45-14.00**

**Oral**

**Investigation of fiber-optic Raman spectroscopy system for the presence of spectral noise signals and their intensity**

Dmitry N. Artemyev, Anastasia A. Shatskaya, Samara National Research University, Samara, Russia

**Internet Invited**

**Functional near-infrared spectroscopy brain research in clinical settings**

Teemu Myllylä Research Unit of Medical Imaging, Physics and Technology, Faculty of Medicine & Optoelectronics and Measurement Techniques Research Unit, Faculty of Information Technology and Electrical Engineering, University of Oulu, Oulu, Finland

**15.00-15.20**

**Internet Invited**

**Biophotonics study of cells interaction in blood under normal and pathological conditions**

Alexander Priezzhev,<sup>1</sup> Andrei Lugovtsov,<sup>1</sup> Petr Ermolinskiy,<sup>1</sup> Irina Kadanova,<sup>1</sup> Anton Neznanov,<sup>1</sup> Yuri Gurfinkel,<sup>3</sup> and Alexey Semenov,<sup>2,1</sup> Faculty of Physics, <sup>2</sup> Faculty of Biology, <sup>3</sup> Medical Research and Education Center of Lomonosov Moscow State University, Moscow, Russia

**15.20-15.40**

**Internet Invited**

**In vivo measurement of DNA in the skin using confocal Raman microspectroscopy: determination of the stratum corneum thickness and superficial microbiome**



Maxim E. Darwin,<sup>1</sup> Jin Song Ri,<sup>2</sup> Se Hyok Choe,<sup>2</sup> Johannes Schleusener,<sup>1</sup> Jürgen Lademann,<sup>1</sup> Chun Sik Choe,<sup>2</sup> <sup>1</sup>Charité – Universitätsmedizin Berlin, Corporate Member of Freie Universität Berlin and Humboldt-Universität zu Berlin, Germany <sup>2</sup>Kim Il Sung University, Pyongyang, Democratic People's Republic of Korea

**15.40-15.55**

**Internet Report**

**Studies of the fluorescence kinetics of indocyanine green in nanoscale structures depending on the bioenvironment in vivo**

Farrakhova D.S.<sup>1</sup>, Maklygina Yu.S.<sup>1</sup>, Romanishkin I.D.<sup>1</sup>, Ryabova A.V.<sup>1,2</sup>, Yakovlev D.V.<sup>1,3</sup>, Bezdetnaya L.<sup>4,5</sup>, Loschenov V.B.<sup>1,3</sup> <sup>1</sup>Prokhorov General Physics Institute of the Russian Academy of Science, <sup>2</sup>National Research Nuclear University "MEPhI, <sup>3</sup>Shemyakin-Ovchinnikov Institute of Bioorganic Chemistry of the Russian Academy of Science, Moscow, Russia; <sup>4</sup>Centre de Recherche en Automatique de Nancy, CNRS, Université de Lorraine, Vandoeuvre-lès-Nancy, France; <sup>5</sup>Institut de Cancérologie de Lorraine, Vandoeuvre-lès-Nancy, France;

**15.55 -16.10**

**Coffee break**

**16.10-16.25**

**Internet Report**

**Porphyrine metal complexes as photosensitizers and local viscosity sensors for personalized photodynamic therapy**

Natalia Shilyagina,<sup>1</sup> Lidia Shestakova,<sup>1</sup> Svetlana Lermontova,<sup>2</sup> Larisa Klapshina,<sup>2</sup> <sup>1</sup>Lobachevsky University, <sup>2</sup>GA Razuvaev Institute of Organometallic Chemistry RAS, Nizhny Novgorod, Russia

**16.25-16.40**

**Internet Report**

**Light scattering by a multilayer biological particle**

Vera G. Kontsevaya<sup>1</sup>, Kirill G. Kulikov<sup>2</sup>, <sup>1</sup>Pskov State University, Pskov, Russia, <sup>2</sup>Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia.

**16.40-16.55**

**Internet Report**

**UVA LED antiviral action on Coronavirus**

I. N. Zavestovskaya<sup>1</sup>, V. A. Guschin<sup>2</sup>, L. I. Russu<sup>2</sup>, E. A. Cheshev<sup>1</sup>, A. L. Koromyslov<sup>1</sup>, I. M. Tupitsyn<sup>1</sup>, A. A. Fronya<sup>1,3</sup>, and M. S. Grigoryeva<sup>1,3,1</sup> Lebedev Physical Institute, Russian Academy of Sciences, Moscow, Russia <sup>1</sup>National Research Center for Epidemiology and Microbiology named after Honorary Academician N.F. Gamaleya, Moscow, Russia <sup>3</sup>National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), Moscow, Russia

**16.55-17.10**

**Internet Report**

**Speckle noise assessment as a method of OCT analysis of brain glioma**

Polina V. Aleksandrova<sup>1,2,3</sup> Irina N. Dolganova<sup>2,3,4</sup> Kirill I. Zaytsev<sup>1,3,4</sup> Pavel V. Nikitin<sup>4</sup> Anna I. Alekseeva<sup>5</sup> Igor V. Reshetov<sup>6</sup> <sup>1</sup>Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia, <sup>2</sup>Institute of Solid State Physics of the Russian Academy of Sciences, Chernogolovka, Russia, <sup>3</sup>Bauman Moscow State Technical University, Moscow, Russia, <sup>4</sup>Institute for Regenerative Medicine, Sechenov University, Moscow, Russia, <sup>5</sup>Research Institute of Human Morphology, Moscow, Russia, <sup>6</sup>Institute for Cluster Oncology, Sechenov University, Moscow, Russia

**17.10-17.30**

**Internet Invited**

**Invited**

**Biomedical Optoacoustics: From Idea to Imaging and Therapy**

Rinat O. Esenaliev, PhD University of Texas Medical Branch, Galveston, Texas, USA

**17.30-17.50**

**Internet Invited**

**Rapid in vivo raman spectroscopy for non-invasive skin cancer detection**

Haishan Zeng, University of British Columbia, Vancouver, BC, Canada

**17.50-18.10**

**Internet Invited**

**Cerebral microcirculation heterogeneity at intracranial hypertension**

Denis E. Bragin, Lovelace Biomedical Research Institute, University of New Mexico School of Medicine, Albuquerque, USA

**September 30, Thursday**

**ON-LINE INVITED LECTURE SESSION  
BIOPHYSICS III**

**Zoom link:**

**<https://osachapter.zoom.us/j/97105128804>**

**ID 971 0512 8804**

**(Building 8, Hall 420)**

Chair: **Vladimir Y. Zaitsev**, Institute of Applied Physics of the RAS, Nizhny Novgorod, Russia

**Andrei Lugovtsov**, Faculty of Physics, Lomonosov Moscow State University, Moscow, Russia

**10.00-10.20**

**Internet Invited**

**Microrheologic and microcirculation parameters of blood characteristic of patients suffering from cardiovascular diseases**

Andrei Lugovtsov,<sup>1</sup> Petr Ermolinskiy,<sup>1</sup> Irina Kadanova,<sup>1</sup> Anton Neznanov,<sup>1</sup> Yuri Gurfinkel,<sup>2</sup> and Alexander Priezzhev,<sup>11</sup> Faculty of Physics, Lomonosov Moscow State University, Moscow, Russia <sup>2</sup>Medical Research and Education Center, Lomonosov Moscow State University, Moscow, Russia

**10.20-10.40**

**Internet Invited**

**Methodology of Microcirculatory-Tissue Systems Multimodal Optical Diagnostics**

Andrey Dunaev, Orel State University, Russia

**10.40-11.00**

**Internet Invited**

**Rigorous full-wave description of OCT-scan formation based on ballistic scattering of arbitrary-profile beams for simulation of multimodal OCT**

Alexander L. Matveyev, Lev A. Matveev, Aleksandr A. Moiseev, Alexander A. Sovetsky,<sup>1</sup> Grigory V. Gelikonov, Vladimir Y. Zaitsev, Federal research center Institute of Applied Physics of the Russian Academy of Sciences, Russia

**11.20-11.40**

**Internet Invited**

**The photonic microsphere based sensor of specific antibodies**

Paweł Wityk,<sup>1</sup> Paulina Listewnik,<sup>2</sup> And Małgorzata Szczerska<sup>2,1</sup> Department of Biopharmaceutics and Pharmacodynamics, Medical University of Gdańsk, Gdańsk, Poland <sup>2</sup> Department of Metrology and Optoelectronics, Faculty of Electronics, Telecommunications and Informatics, Gdańsk University of Technology, Gdańsk, Poland

**11.40-11.55**

**Internet Report**

**Side light scattering for observation of cell culture growth**

Daria N. Litunencko, Alexander E. Moskalensky, Novosibirsk State University, Novosibirsk, Russia

**11.55-12.10**

**Internet Report**

**Digital diaphanoscopy in the diagnosis of maxillary sinus diseases for patients with different anatomical and gender features**

E.O. Bryanskaya,<sup>1</sup> R.Yu. Gneushev,<sup>1</sup> I.N. Novikova,<sup>1</sup> V.V. Dremin,<sup>1,2</sup> A.V. Dunaev,<sup>1,1</sup> Orel State University named after I.S. Turgenev, Orel, Russia <sup>2</sup>College of Engineering and Physical Sciences, Aston University, Birmingham, UK

**12.10-12.30**

**Internet Invited**

**Aspect Imaging Compact: Advantages Of The Compact Permanent Preclinical Mri**

Kobi Katsobashvili, Aspect Imaging LTD., Shoham, Israel

**12.30-12.45**

**Internet Report**

**Photodynamic inactivation of Escherichia coli bacteria by cationic photosensitizers**

Gennady A. Meerovich,<sup>1,2</sup> Ekaterina V. Akhlyustina,<sup>2</sup> Dmitry S. Denisov,<sup>3</sup> Ekaterina G. Kholina,<sup>3</sup> Elena A. Makarova,<sup>4</sup> Evgeny A. Lukyanets,<sup>4</sup> Victor B. Loschenov,<sup>1,2</sup> Marina G. Strakhovskaya,<sup>3,5</sup> <sup>1</sup> Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia <sup>2</sup> National Research Nuclear University "MEPHI", Moscow, Russia <sup>3</sup> Lomonosov Moscow State University, Moscow, Russia <sup>4</sup> Organic Intermediates and Dyes Institut, Moscow, Russia <sup>5</sup> Federal Scientific Clinical Center for Specialized Types of Medical Assistance and Medical Technologies for the Federal Medical and Biological Agency, Moscow, Russia

**ON-LINE INVITED LECTURE/ORAL  
SESSION**

**BIOPHYSICS IV & INTERNET  
BIOPHOTONICS**

**Zoom link:**

**<https://osachapter.zoom.us/j/97105128804>**

**ID 971 0512 8804**

**(Building 8, Hall 420)**

Chair: **Maxim E. Darvin**, Charité –  
**Universitätsmedizin, Germany**

Moderator: Isabella Serebryakova, Saratov State University, Russia

**15.00-15.20**

**Internet Invited**

**Estimation of the spectral optical properties of rabbit pancreas and brain cortex from the UV to NIR**

Tânia Golçalves<sup>1</sup>, Hugo Silva<sup>1,2</sup>, Inês Martins<sup>2</sup>, Valery V. Tuchin<sup>3,4,5</sup>, Luís Oliveira<sup>1,1</sup> Physics Department, Polytechnic of Porto – School of Engineering, Portugal; <sup>2</sup> Center of Innovation in Engineering and Industrial Technology, Portugal; <sup>3</sup> Saratov State University, Saratov, Russia; <sup>4</sup> Tomsk State University, Tomsk, Russia; <sup>5</sup> Institute

of Precision Mechanics and Control RAS, Saratov, Russia

#### 15.20-15.40

##### Internet Invited

#### Non-invasive Hyperspectral Multi-distance Measurements of Cerebral Response to Breath Holding in Adult Humans

Vladislav Toronov<sup>1,2</sup>, Zahida Guerouah<sup>1</sup>, <sup>1</sup>Ryerson University, Canada; <sup>2</sup>Institute of Biomedical Engineering, Science and Technology (iBEST), Canada

#### 15.40-15.55

##### Internet Report

#### Application of dynamic light scattering method in studies of porphyrazine and phthalocyanine photosensitizers

A.R. Krot, I.A. Sergeeva, K.V. Fedorova  
Department of molecular processes and extreme states of matter, Faculty of Physics, Lomonosov Moscow State University, Moscow, Russia

#### 15.55-16.10

##### Internet Report

#### Raman-LIBS for the diagnosis of cancer: From tissue imaging to tumor cells

Pengkun Yin<sup>1</sup>, Zhengying Peng<sup>1</sup>, Youyuan Chen<sup>1</sup>, Qingyu Lin<sup>2</sup>, Yixiang Duan<sup>2,1</sup> College of Life Sciences, Sichuan University, Chengdu, Sichuan, People's Republic of China <sup>2</sup>Research Center of Analytical Instrumentation, School of Mechanical Engineering, Sichuan University, Chengdu, People's Republic of China

#### 16.10-16.25

##### Internet Report

#### Surface-enhanced Raman scattering substrates for DNA detection based on nanogold-capped poly(DEGDMA) microparticles

Malik H. Mahmood<sup>1,2,3</sup>, Ali Jaafar<sup>1,2,4</sup>, László Himics<sup>1</sup>, László Péter<sup>1</sup>, Ágnes Nagyné Szokol<sup>1</sup>, István Rigó<sup>1</sup>, Shereen Zangana<sup>5</sup>, Attila Bonyár<sup>5</sup>, Miklós Veres<sup>1</sup>; <sup>1</sup>Institute for Solid State Physics and Optics, Wigner Research Center for Physics, Hungary; <sup>2</sup>Institute of Physics, University of Szeged, Hungary; <sup>3</sup>Physiology Department, College of Medicine, University of Misan, Iraq; <sup>4</sup>Ministry of Higher Education and Scientific Research, Iraq; <sup>5</sup>Department of Electronics Technology, Faculty of Electrical Engineering and Informatics, Budapest University of Technology and Economics, Hungary

#### 16.25-16.40

##### Internet Report

#### Quantum chemical modeling of longitudinal hydrogen bonds in DNA

Alexander Samchenko<sup>1</sup>, Ivan Savelev<sup>1</sup>, Anton Klimov<sup>1</sup>, Lev Shishkin<sup>1</sup>, Oksana Polesskaya<sup>2</sup>, Alexander Vetcher<sup>1,3,4</sup>, Eugenia Kananykhina<sup>1</sup>, Elena Zhigmitova<sup>1</sup>, Richard Alan Miller<sup>5</sup>, Max Myakishev-Rempel<sup>1</sup>; <sup>1</sup>DNA Resonance Research Foundation, USA; <sup>2</sup>University of California, USA; <sup>3</sup>Nanotechnology Scientific and Educational Center, Institute of Biochemical Technology and

Nanotechnology, Peoples Friendship University of Russia, Russian Federation; <sup>4</sup>Shishonin Complementary and Integrative Health Clinic, Russian Federation; <sup>5</sup>OAK, Inc., Grants Pass, USA

#### 16.40-16.55

##### Internet Report

#### Stimulation of heart pacemakers cells using pulsed infrared radiation

Mohammad Ali Ansari, Hassan Tajarenejad, Soheila Akbari, Seyedeh Mehri Hamidi, Laser and plasma research institute, Shahid Beheshti University, Tehran, Iran

#### 16.55-17.10

##### Internet Report

#### Theoretical definition of the size distribution function for particles simulating blood cells

Vera G. Kontsevaya<sup>1</sup>, Kirill G. Kulikov<sup>2</sup>, <sup>1</sup>Pskov State University, Pskov, Russia, <sup>2</sup>Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia.

#### 17.10-17.25

##### Internet Report

#### Investigation of the hypercapnial effect on cerebral blood flow using imaging photoplethysmography

Maxim A. Volynsky<sup>1,2</sup>, Oleg V. Mamontov<sup>1,3</sup>, Anastasiia V. Osipchuk<sup>4</sup>, Valery V. Zaytsev<sup>1,3</sup>, Alexey Y. Sokolov<sup>4,5</sup>, Alexei A. Kamshilin<sup>1,3</sup>; <sup>1</sup>Institute of Automation and Control Processes of the Far Eastern Branch of the Russian Academy of Sciences, Vladivostok, Russia; <sup>2</sup>ITMO University, Saint Petersburg, Russia; <sup>3</sup>Almazov National Medical Research Centre, Saint Petersburg, Russia; <sup>4</sup>Valdman Institute of Pharmacology, Pavlov First Saint Petersburg State Medical University, Saint Petersburg, Russia; <sup>5</sup>Pavlov Institute of Physiology of the Russian Academy of Sciences, Saint Petersburg, Russia

#### 17.25-17.40

##### Internet Report

#### Dual-stage active delivery of chlorin-containing drugs by laser radiation with wavelength 450 nm

Andrey V. Belikov, Anastasia D. Kozlova, Sergey N. Smirnov; ITMO University, Russian Federation

##### Internet Report

#### Tracking spermatozoa movement toward the egg with functional Optical Coherence Tomography

Tian Xia<sup>1</sup>, Kohei Umezu<sup>1</sup>, Shang Wang<sup>2</sup>, Irina Larina<sup>1,\*</sup>; <sup>1</sup>Department of Molecular Physiology and Biophysics, Baylor College of Medicine, Houston, USA <sup>2</sup>Biomedical Engineering, Stevens Institute of Technology, Hoboken, USA

<https://bcm.box.com/s/gjcwjnnr3l1tmmcnt6rwc6c8advhix1j>

**JOINT INTERNET/POSTER SESSION  
BIOPHYSICS (B)  
(Building 3, 3rd floor Hall)**

Chairs (B): **Ivan V. Fedosov, Oleg Grishin,**  
Saratov State Univ., Russia

**18.00-20.00**

- 1B. E-cigarette smoking vape impact on optical properties of porcine gingival mucosa measured ex vivo in the range from 200 to 800 nm** A.A. Selifonov<sup>1</sup>, E.I. Selifonova<sup>2</sup>, V.V. Tuchin<sup>2,3,4</sup> <sup>1</sup> Children's Infectious Disease Clinical Hospital No. 5 "Children's Polyclinic No. 3", Saratov 410031, Russia <sup>2</sup>Saratov State University, Saratov 410012, Russia <sup>3</sup>National Research Tomsk State University, Tomsk 634050, Russia <sup>4</sup>Institute of Precision Mechanics and Control of the Russian Academy of Sciences, Saratov 410028, Russia
- 2B. Spectrophotometric study of the sorption of chlorhexidine bigluconate by glauconite** Selifonova E.I., Rusanova T.Yu., Serzhantov V.G., Venig S.B. Saratov State University, Saratov, Russia
- 3B. Laser Doppler flowmetry in assessing the effect of liraglutide on microcirculation in rats with absolute insulin deficiency** Era B. Popyhova, Tatiana V. Stepanova, Angelina A. Savkina, Daria D. Lagutina, Aleksei N. Ivanov Saratov State Medical University n.a. V.I. Razumovsky, Central Scientific Research Laboratory, Saratov, , Russia
- 4B. Photobiomodulation (PBM) and low-level laser therapy (LLLT) for brain disease and the extent to which it is affected by the energy density of laser and wavelengths: Review** Alaa S. Shanshool,<sup>1,2</sup> and Valery V. Tuchin,<sup>1,3,4</sup> Science Medical Center, Saratov State University, Saratov, Russia <sup>1</sup>Institute of Laser for Postgraduate Studies, University of Baghdad, Baghdad, Iraq <sup>2</sup>Interdisciplinary Laboratory of Biophotonics, National Research Tomsk State University, Tomsk, Russia <sup>3</sup>Laboratory of Laser Diagnostics of Technical and Living Systems, <sup>4</sup>Institute of Precision Mechanics and Control RAS, Saratov, Russia
- 5B. Detection of special points on a photoplethysmogram using MLPNN model** V.Yu. Gribkov, I.B.Isupov, R.Sh. Zatrudina, Volgograd State University, Russia
- 6B. Thermal heating patterns of ovalbumin during plasmon PTT** Yuliya D. Gudova, Sergey O. Ustalkov, Alexander A. Skaptsov, Saratov State University, Saratov, Russia
- 7B. Study of optical absorption and scattering of laser radiation by a biological tissue phantom using moveable integrating spheres** Tatiana K. Karpova,<sup>1</sup> Nikita V. Kovalenko,<sup>1,2</sup> Oleg A. Ryabushkin,<sup>1,2</sup> <sup>1</sup>Moscow Institute of Physics and Technology (National Research University), Dolgoprudny, Russia <sup>2</sup>Fryazino Branch of the Kotelnikov Institute of Radioengineering and Electronics of Russian Academy of Sciences, Fryazino, Russia
- 8B. Study of statistical properties the method of analysis of directional couplings based on modeling of phase dynamics** Dubinkina E.S.<sup>1</sup>, Borovkova E.I.<sup>1,2</sup>, Karavaev A.S.<sup>1,2,3</sup> <sup>1</sup>Saratov State University, Saratov, Russia <sup>2</sup>Department of Innovative Cardiological Information Technology, Institute of Cardiological Research, Saratov State Medical University, Saratov, Russia <sup>4</sup>National Medical Research Center for Therapy and Preventive Medicine, Moscow, Russia <sup>3</sup>Saratov Branch of the Institute of Radio Engineering and Electronics of Russian Academy of Sciences, Saratov, Russia
- 9B. In vivo OCT investigation of chemical enhance of the rat skin optical clearing by fructose solutions** Daria K. Tuchina,<sup>1,2</sup> Alexey N. Bashkatov,<sup>1,2</sup> Nikita A. Navolokin,<sup>1,3</sup> Valery V. Tuchin<sup>1,2,4</sup> <sup>1</sup>Saratov State University, Saratov, Russia; <sup>2</sup>National Research Tomsk State University, Tomsk, Russia; <sup>3</sup>Saratov State Medical University, Saratov, Russia; <sup>4</sup>Institute of Precision Mechanics and Control RAS, Saratov, Russia
- 10B. Statistical and spectral properties of spatio-temporal skin temperature oscillations derived by sweat glands activity: thermal imaging exploration** Andrey V. Fomin, Ivan U. Volkov, Dmitriy I. Mayskov, Ivan S. Zaletov, Anatoly V. Skripal and Andrey A. Sagaidachnyi. Saratov State University, Russia
- 11B. Creation of a prototype sensor for analyzing human exhalation based on a chirped waveguide** Pavel A. Lepilin,<sup>1,2</sup> Anastasia A. Zanishhevskaya,<sup>1,2</sup> Andrei A. Shuvalov,<sup>1,2</sup> Igor Yu. Silokhin,<sup>1,2</sup> Mikhail V. Chainikov<sup>1,2</sup> Yulia S. Skibina<sup>1,2</sup> Dmitry E. Glukhov<sup>2</sup> <sup>1</sup>Saratov State University, Saratov, Russia <sup>2</sup>SPE LLC "Nanostructured Glass Technology", Saratov, Russia
- 12B. Study of changes of the optical properties of rat blood during inhalation of e-**

- cigarette liquid aerosol by Raman spectroscopy and microscopic** Ekaterina N. Lazareva<sup>1,2</sup>, Polina A. Dyachenko<sup>1,2</sup>, Alexander E. Polozhenkov<sup>3</sup>, Lyudmila I. Kozakova<sup>3</sup>, Artyom M. Mylnikov<sup>3</sup>, Alla B. Bucharskaya<sup>1,2,3</sup>, Valery V. Tuchin<sup>1,2,4,1</sup> Saratov State University, Saratov, Russia, <sup>2</sup>Tomsk State University, Tomsk, Russia, <sup>3</sup>Saratov State Medical University, Saratov, Russia, <sup>4</sup>Institute of Precision Mechanics and Control RAS, Saratov, Russia
- 13B. Photoplethysmographic imaging of the low-frequency hemodynamics in peripheral vessels** Ivan U. Volkov, Andrey V. Fomin, Dmitry I. Mayskov, Ivan S. Zaletov, Anatoly V. Skripal and Andrey A. Sagaidachnyi A.A., Saratov State University, Russia
- 14B. Optical properties of partially dehydrated collagen fibers** Olga A. Zyuryukina, Marina E. Shvachkina, Dmitry A. Yakovlev, Yuri P. Sinichkin, Saratov State University, Saratov, Russia
- 15B. Changes of the optical properties of whole blood by the action of optical clearing agents in vitro** Ekaterina N. Lazareva<sup>1,2</sup>, Polina A. Dyachenko (Timoshina)<sup>1,2</sup>, Leonid E. Dolotov<sup>1</sup>, Alexey N. Bashkatov<sup>1,2</sup>, Elina A. Genina, Valery V. Tuchin<sup>1,2,3</sup> <sup>1</sup>Saratov State University, Saratov, Russia <sup>2</sup>Tomsk State University, Tomsk, Russia <sup>3</sup>Institute of Precision Mechanics and Control RAS, Saratov, Russia
- 16B. Effect of blood plasma gamma globulin on erythrocytes aggregation in vitro: study by optical techniques** K.N. Korneev, A.E. Lugovtsov, P.B. Ermolinskiy, A.I. Neznanov, I.M. Kadanova, A.V. Priezzhev Faculty of Physics, Lomonosov Moscow State University, Moscow, Russia
- 17B. Chemometrics-assisted spectrophotometric determination of synthetic food colorants in "strepsils" lozenges** Dmitrii V. Silaev<sup>1,2</sup>, Tatyana Yu. Rusanova<sup>1</sup>, Yulia A. Fomina<sup>2</sup>, Natalya B. Shestopalova<sup>2</sup> Saratov State University, Saratov, Russia <sup>2</sup>Saratov State Medical University, Saratov, Russia
- 18B. Assessing the platelets degree of aggregation by light scattering under arterial hypertension and type 2 diabetes mellitus** D.A. Umerenkov, P.B. Ermolinskiy, A.E. Lugovtsov and A.V. Priezzhev Faculty of Physics, Lomonosov Moscow State University, Moscow, Russia
- 19B. Towards to the correction of erythrocyte aggregation by using dextran proagregant macromolecules** A.A. Romanova, P.B. Ermolinskiy, A.N. Semenov, A.E. Lugovtsov and A.V. Priezzhev Faculty of Physics, Lomonosov Moscow State University, Moscow, Russia
- 20B. Detailed spectral assessment of the structural features of the dentin of the teeth after the office whitening procedure** Tatyana V. Kozlova,<sup>1</sup> Elena V. Timchenko,<sup>1</sup> Pavel E. Timchenko,<sup>1</sup> Oleg O. Frolov,<sup>1</sup> Oksana A. Magsumova,<sup>2</sup> Larisa T. Volova,<sup>2</sup> Mihail A. Postnikov,<sup>2</sup> <sup>1</sup>Samara National Research University, Samara, Russia <sup>2</sup>Samara State Medical University, Samara, Russia
- 21B. Optical analysis of juvenile dentin biomaterials during their manufacture** Pavel E. Timchenko,<sup>1</sup> Elena V. Timchenko,<sup>1</sup> Larisa T. Volova,<sup>2</sup> Oleg O. Frolov,<sup>1</sup> Mikhail Y. Vlasov,<sup>3</sup> Svetlana S. Shipko,<sup>1</sup> Samara National Research University, Samara, Russia <sup>2</sup>Samara State Medical University, Institute of Experimental Medicine and Biotechnology, Samara, Russia <sup>3</sup>Tissue Bank Research Center, Samara, Russia
- 22B. Chemometric analysis of the composition of hydroxyapatite after delipidation** Pavel E. Timchenko,<sup>1</sup> Elena V. Timchenko,<sup>1</sup> Elena V. Pisareva,<sup>1</sup> Mikhail Y. Vlasov,<sup>2,3</sup> Oleg O. Frolov,<sup>1</sup> Larisa T. Volova,<sup>2,3</sup> Ravil T. Samigullin,<sup>1</sup> <sup>1</sup>Samara National Research University, Samara, Russia <sup>2</sup>Samara Medical University, Samara, Russia <sup>3</sup>"Samara Tissue Bank" Research Center, Samara, Russia
- 23B. Optical properties of cholangiocarcinoma tissues in the spectral range of 350-2000 nm under photothermal therapy with gold nanorods** Vadim D. Genin,<sup>1,2</sup> Alla B. Bucharskaya,<sup>3</sup> Elina A. Genina,<sup>1,2</sup> Georgy S. Terentyuk,<sup>3</sup> Nikolai G. Khlebtsov,<sup>4</sup> Valery V. Tuchin,<sup>1,2,5</sup> Alexey N. Bashkatov,<sup>1,2</sup> <sup>1</sup>Saratov State University, Russia, <sup>2</sup>Tomsk State University, Russia, <sup>3</sup>Saratov State Medical University, Russia, <sup>4</sup>Institute of Biochemistry and Physiology of Plants and Microorganisms of RAS, Russia, <sup>5</sup>Institute for Problems of Precision Mechanics and Control of RAS, Russia
- 24B. Raman spectroscopy to assess the condition of tooth enamel after treatment of a pathological periodontal pocket** P.E. Timchenko, E.V. Timchenko, I.V. Bazhutova, O.O. Frolov, L.T. Volova, A.Y. Ionov
- 25B. Acousto-optical human blood typing method. Experimental data processing** Valeri A. Doubrovski,<sup>1</sup> Sergey V. Markov<sup>1,2</sup> <sup>1</sup>Saratov State Medical University, <sup>2</sup>Saratov State University
- 26B. Application of a multimodal method for the study of human skin neoplasms with optical clearing in vivo to increase the effectiveness of PDT** I.A. Serebryakova<sup>1,2</sup>, Yu.I. Surkov<sup>1,2</sup>, E.A. Genina<sup>1,2</sup>, E.N. Lazareva<sup>1,2</sup>, Y.K. Kuzinova<sup>3</sup>, O. M. Konopatskova<sup>3</sup>, A.N. Bashkatov<sup>1,2</sup>, V.V. Tuchin<sup>1,2,4</sup> <sup>1</sup>Saratov National Research State University named after N.G. Chernyshevsky <sup>2</sup>National Research Tomsk State University <sup>3</sup>Saratov State Medical

University named after V.I. Razumovsky  
Ministry of Health of Russia <sup>4</sup>Institute for  
Problems of Precision Mechanics and  
Control, RAS

- 27B. OCT monitoring of skin refractive index by optical clearing ex vivo** Yu.I. Surkov<sup>1,2</sup>, I.A. Serebryakova<sup>1,2</sup>, A.N. Bashkatov<sup>1,2</sup>, E.A. Genina<sup>1,2,1</sup> Saratov National Research State University N.G. Chernyshevsky <sup>2</sup> National Research Tomsk State University
- 28B. The determination of native blood erythrocytes characteristics by digital spectral microscopy** Valeri A. Doubrovski, <sup>1</sup> Stanislav O. Torbin, <sup>1</sup> Igor V. Zabenkov, <sup>2, 1</sup> Saratov State Medical University, <sup>2</sup> Moscow Automobile and Highway State Technical University
- 29B. Research of the transport of polarised irradiation in rat skin ex vivo during dehydration** Maria A. Grishaeva, <sup>1</sup> Sergey M. Zaytsev, <sup>1</sup> Elina A. Genina, <sup>1,2 1</sup> Saratov State University, Saratov, Russia <sup>2</sup> Tomsk State University, Tomsk, Russia
- 30B. Study of optical properties of the plasma in the presence of solutions of glycerol and propylene glycol by Raman spectroscopy** Arina A. Sokova<sup>1</sup>, Ekaterina N. Lazareva<sup>1,2</sup>, Valery V. Tuchin<sup>1,2,3</sup> <sup>1</sup>Saratov State University, Saratov, Russia <sup>2</sup>Tomsk State University, Tomsk, Russia <sup>3</sup>Institute of Precision Mechanics and Control RAS, Saratov, Russia
- 31B. OCT monitoring of ex vivo and in vivo mice skin enhanced optical clearing by the biocompatible OCA mixtures** Sergey M. Zaytsev<sup>1,2</sup>, Maria A. Grishaeva<sup>1</sup>, Elina A. Genina<sup>1,3</sup> <sup>1</sup>Saratov State University, Russia; <sup>2</sup>Université de Lorraine, France <sup>3</sup>Tomsk State University, Russia
- 32B. Blood toxicity and vascular distribution of magnetic mineral submicron vehicles in vivo** N.A. Shushunova<sup>1</sup>, P.A. Dyachenko<sup>1,2</sup>, Y.I. Svenskaya, R.A. Anisimov<sup>1</sup>, P.A. Demina<sup>1</sup>, M.V. Lomova<sup>1 1</sup> Saratov State University <sup>2</sup>Tomsk State University, Russia
- 33B. Investigation of the optical and kinetic properties of collagen materials during the diffusion of molecules OCA** Atsigeida S. <sup>1</sup>, Valery V. Tuchin <sup>1,2,3. 1</sup>. Saratov State University, Saratov, Russia, <sup>2</sup>. Tomsk State University, Tomsk, Russia <sup>3</sup>. Institute of Precision Mechanics and Control RAS, Saratov, Russia.
- 34B. Optical clearing of skin by CT and MRI agents in a wide wavelength range** Nikita S. Chikalkin<sup>1</sup>, Daria K. Tuchina, <sup>1,2,3</sup> Natalia A. Shushunova, <sup>1</sup> Alexander P. Savitsky, <sup>3</sup> Alexei A. Bogdanov, Jr. <sup>3,4</sup> Valery V. Tuchin<sup>1,2,3,5</sup> <sup>1</sup>Saratov State University, Saratov, Russia; <sup>2</sup>National Research Tomsk State University, Tomsk, Russia; <sup>3</sup>Federal Research Center of Biotechnology of the Russian Academy of Sciences, Moscow, Russia; <sup>4</sup>University of

Massachusetts Medical School, Worcester, MA, USA; <sup>5</sup>Institute of Precision Mechanics and Control Institute of the Russian Academy of Sciences, Saratov, Russia

#### INTERNET POSTER

- In vitro study of the effect of the parameters of 980nm diode laser radiation on the tensile strength of biological tissue bonding** Yulia V. Fedorova, Andrey V. Belikov, ITMO University, Russian Federation
- Investigation of changes in the absorption spectrum of modern chlorine-containing drugs for photodynamic therapy as a result of exposure to laser radiation with a wavelength of 450 nm** Yulia.V. Fedorova, Andrey.V. Belikov ITMO University, Russian Federation
- LED light sources for PDT and in vitro photodynamic studies** G.A. Meerovich,<sup>1,2</sup> K.G. Linkov,<sup>1</sup> A. Nekhoroshev,<sup>2</sup> D. Glechik,<sup>2</sup> A. Borodkin,<sup>1</sup> E.V. Akhlyustina,<sup>2</sup> I.P. Angelov,<sup>3</sup> V.B. Loschenov,<sup>1,2 1</sup> Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia <sup>2</sup> National Research Nuclear University "MEPhI", Moscow, Russia <sup>3</sup> Institute of Organic Chemistry with Centre of Phytochemistry, Institute of Electronics, Bulgarian Academy of Sciences, Bulgaria
- Fiber optic soil vibration sensor and data acquisition system** Artem T. Turov,<sup>1,2</sup> Yuri A. Konstantinov,<sup>2</sup> Maksim E. Belokrylov,<sup>2</sup> and Aleksander Yu. Maksimov,<sup>2 1</sup> Perm National Research Polytechnic University, Komsomolsky prospekt 29, Perm, Russia <sup>2</sup> Perm Federal Research Centre UB RAS, Lenina 13a, Perm, Russia
- Sensitivity and specificity of OCR in OME diagnostics** Anait L. Dilenyan, <sup>1,2</sup> Pavel A. Shilyagin,<sup>2</sup> Daria D. Smirnova,<sup>1</sup> Polina V. Bazan,<sup>1</sup> Alexander A. Moiseev,<sup>2</sup> Dmitrii A. Terpelov,<sup>2</sup> Sergey.Yu. Ksenofontov,<sup>2</sup> Alexey A. Novozhilov, <sup>1,2 1</sup> Privolzhsky region medical centre, Nizhny Novgorod, Russia <sup>2</sup> Institute of applied physics of RAS, Nizhny Novgorod, Russia
- Diffraction grating spectral resolution influence on signal value in OCT** Evgeny Sherstnev, Pavel A. Shilyagin, Grigory V. Gelikonov Institute of applied physics of RAS, Nizhny Novgorod, Russia
- Microhardness and wear resistance of titanium after laser processing in a graphite environment** Koshuro Vladimir Aleksandrovich - Yuri Gagarin State Technical University of Saratov Osipova Elena Olegovna - Yuri Gagarin State Technical University of Saratov, Russia Fomina Marina Alekseevna - Yuri Gagarin State Technical University of Saratov, Russia Fomin Aleksandr Aleksandrovich - Yuri

- Gagarin State Technical University of Saratov, Russia
8. **Optical sensors based on cellulose triacetate films for heavy metals detection and processing spectrometric data by chemometric algorithms** Ekaterina V. Yurova, Tatyana Yu. Rusanova Saratov State University, Saratov, Russia
  9. **5-Aminolevulinic acid and hexyl aminolevulinate mediated photodynamic diagnostics and therapy of cervical dysplasia and vulvar leukoplakia** K.T. Efendiev<sup>1</sup>, P.M. Alekseeva<sup>1,2</sup>, K.F. Orudzhova<sup>3</sup>, U.D. Agabekova<sup>3</sup>, E. K. Slovokhodov<sup>4</sup>, V.B. Loschenov<sup>1,2</sup> <sup>1</sup> Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia <sup>2</sup> National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), Moscow, Russia <sup>3</sup> City Clinical Hospital No. 40, Moscow, Russia <sup>4</sup> Central Clinical Hospital with Polyclinic, Administrative Department of the President of Russian Federation, Moscow, Russia
  10. **Microhardness and wear resistance of titanium after laser processing in a graphite environment** Koshuro Vladimir Aleksandrovich - Yuri Gagarin State Technical University of Saratov, Russia Osipova Elena Olegovna - Yuri Gagarin State Technical University of Saratov, Russia Fomina Marina Alekseevna - Yuri Gagarin State Technical University of Saratov, Russia Fomin Aleksandr Aleksandrovich - Yuri Gagarin State Technical University of Saratov, Russia
  11. **Deformation response of biological phantoms and cartilage tissue under laser exposure** Ekaterina M. Kasianenko, Aleksandr I. Omelchenko, Olga I. Baum Institute of Photon Technologies, Federal Scientific Research Center "Crystallography and Photonics", Russian Academy of Sciences, Troitsk, Moscow, Russia
  12. **Development of laser-optical methods for monitoring the biomechanical properties of the anterior part of the eye** Ekaterina M. Kasianenko, Alexey V. Yuzhakov, Olga I. Baum. Institute of Photon Technologies, Federal Scientific Research Center "Crystallography and Photonics", Russian Academy of Sciences, Troitsk, Moscow, Russia
  13. **Effect of duration of circadian rhythm disturbance by light exposure on liver morphology of laboratory rats** Svetlana S. Pakhomy, Olga, V. Zlobina, Galina N. Maslyakova, Alexey N. Ivanov, Irina O. Bugaeva, Alexandra O. Moskvina, Saratov State Medical University named after V.I. Razumovsky, Saratov, Russia
  14. **Reactivity of stress-releasing and stress-limiting systems under conditions of changing light regime in experiment** Olga, V. Zlobina,<sup>1</sup> Svetlana S. Pakhomy,<sup>1</sup> Alexey N. Ivanov,<sup>1</sup> Irina O. Bugaeva,<sup>1</sup> Alexandra O. Moskvina,<sup>1</sup> 1 Saratov State Medical University named after V.I. Razumovsky, Saratov, Russia
  15. **Interference methods in OAM imaging for biophysical applications** Solyanik V.A., Fedosov I.V., Tuchin V.V.
  16. **Immunofluorescence microscopy reveals expression and intracellular localization of transcription factor E2F1 in the peripheral neurons of rats and crayfish** Astacus Leptodactylus after axotomy Valentina A. Dzreyan, Stanislav V. Rodkin, Maria A. Pitinova, Moez Eid Laboratory of Molecular Neurobiology, Academy of Biology and Biotechnology, Southern Federal University, prospect Stachki 194/1, Rostov-on-Don, Russia
  17. **In vivo study on NIR light propagation in the human head** Priya Karthikeyana<sup>\*1</sup>, Ulrika Honkaa<sup>1</sup>, Martti Ilvesmäki<sup>2</sup>, Hany Ferdinando<sup>2</sup>, Vesa Korhonen<sup>1</sup>, and Teemu Myllylä<sup>1,2</sup> <sup>1</sup>University of Oulu, Research Unit of Medical Imaging, Physics and Technology, Oulu, Finland <sup>2</sup>University of Oulu, Optoelectronics and Measurement Techniques Unit, Oulu, Finland
  18. **NIR spectroscopic effects of irradiation on skin tissue: Comparison Study of In vivo and Ex vivo** Priya Karthikeyana<sup>\*1</sup>, Ulrika Honkaa<sup>1</sup>, Jesse Lohelaa<sup>1,4</sup>, Kalle Ingeta<sup>4</sup>, Hany Ferdinando<sup>1</sup>, Sakari S. Karhulaa<sup>4,5</sup>, Vesa Korhonen<sup>3,5</sup>, Juha Nikkinen<sup>4,5</sup>, Teemu Myllylä<sup>21</sup> <sup>1</sup>University of Oulu, Research Unit of Medical Imaging, Physics and Technology, Oulu, Finland, <sup>2</sup>University of Oulu, Optoelectronics and Measurement Techniques Unit, Oulu, Finland, <sup>3</sup>Oulu University Hospital, Department of Diagnostic Radiology, Oulu, Finland, <sup>4</sup>Oulu University Hospital, Department of Oncology and Radiotherapy, Oulu, Finland, <sup>5</sup>Medical Research Center (MRC), Oulu, Finland
  19. **Comparison of the capabilities of spectroscopic and video analysis of fluorescence for the diagnosis of cholangiocellular cancer** Dmitry V. Yakovlev,<sup>1,2</sup> Dina S. Farrakhova,<sup>1</sup> Artem A. Shiryaev,<sup>3</sup> Tatiana A. Savelieva,<sup>1</sup> Igor V. Reshetov,<sup>3</sup> Victor B. Loschenov,<sup>1,4</sup> <sup>1</sup> Prokhorov General Physics Institute of the Russian Academy of Science, Moscow, Russia <sup>2</sup> Shemyakin-Ovchinnikov Institute of Bioorganic Chemistry of the Russian Academy of Science, Moscow, Russia <sup>3</sup> University Clinical Hospital no. 1, Oncology Center, I.M. Sechenov First Moscow State Medical University (Sechenov University), Ministry of Health of the Russian Federation, Moscow, Russia <sup>4</sup> National Research Nuclear University "MEPhI, Moscow, Russia;
  20. **PD and PDT of precancerous diseases of the oral cavity and larynx after sublingual administration of 5-ALAP.** M. Alekseeva<sup>1,2</sup>,

- K.T. Efendiev<sup>1,2</sup>, A.A. Shiryaev<sup>3</sup>, M.A. Rusakov<sup>3</sup>, S.I. Samoilova<sup>3</sup>, I.V. Reshetov<sup>3</sup>, V.B. Loschenov<sup>1,2</sup> <sup>1</sup>Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia <sup>2</sup>National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), Moscow, Russia <sup>3</sup>Sechenov First Moscow State Medical University, Ministry of Health of the Russian Federation, University Clinical Hospital No.1, Levshin Institute of Cluster Oncology, Moscow, Russia
21. **Comparison of wearable and bedside laser Doppler flowmetry and fluorescence spectroscopy monitors** Elena Zharkikh,<sup>1</sup> Yulia Loktionova,<sup>1</sup> Denis Drozdov,<sup>1</sup> Viktor Dremine,<sup>1,2</sup> Victor Sidorov,<sup>3</sup> Edik Rafailov,<sup>2</sup> Andrey Dunaev,<sup>1</sup>. <sup>1</sup>Research & Development Center of Biomedical Photonics, Orel State University, Orel, Russia; <sup>2</sup>College of Engineering and Physical Sciences, Aston University, Birmingham, UK; <sup>3</sup>SPE "LAZMA" Ltd., Moscow, Russia.
  22. **Fluorescent indices of ornamental plants treated with growth regulators** Olesya A. Kalmackaya,<sup>1</sup> Vladimir A. Karavaev,<sup>1</sup> Ekaterina I. Gunar,<sup>2</sup> <sup>1</sup>Lomonosov Moscow State University, Moscow, Russia <sup>2</sup>Russian State Agrarian University – Moscow Timiryazev Agricultural Academy, Moscow, Russia
  23. **Optical sensors based on cellulose triacetate films for heavy metals detection and processing spectrometric data by chemometric algorithms** Ekaterina V. Yurova, Tatyana Yu. Rusanova Saratov State University, Saratov, Russia
  24. **Pathological cells determination based on blue autofluorescence** Ekaterina O. Bryanskaya,<sup>1</sup> Angelina I. Dolgikh,<sup>1</sup> Andrey V. Dunaev,<sup>1</sup> Andrey Y. Abramov,<sup>1,2</sup> <sup>1</sup>Cell Physiology and Pathology Laboratory, Orel State University, Orel, 302026, Russia; <sup>2</sup>Department of Clinical and Movement Neurosciences, UCL Queen Square Institute of Neurology, Queen Square, London, WC1N 3BG, UK
  25. **Application of the fiber-optic system for intraoperative study of pelvic organs in laparoscopic surgery** Nadezhda V. Golubova,<sup>1</sup> Nikolai I. Polenov,<sup>2</sup> Karina A. Zakuraeva,<sup>2</sup> Elena V. Potapova,<sup>1</sup> Viktor V. Dremine,<sup>1,3</sup> Maria I. Yarmolinskaya,<sup>2</sup> Andrey V. Dunaev,<sup>1</sup> Igor Yu. Kogan,<sup>2</sup> <sup>1</sup>Research and Development Center of Biomedical Photonics, Orel State University, Russia <sup>2</sup>FSBSI «The Research Institute of Obstetrics, Gynecology and Reproductology named after D.O. Ott», Russia <sup>3</sup>College of Engineering and Physical Sciences, Aston University, United Kingdom
  26. **In silico studies of the interaction of wavelengths of direct optical excitation of molecular oxygen with biological tissues** Irina N. Novikova,<sup>1</sup> Viktor V. Dremine,<sup>1,2</sup> <sup>1</sup>Orel State University, Orel, Russia <sup>2</sup>College of Engineering and Physical Sciences, Aston University, Birmingham, UK
  27. **The study of metabolic properties of mouse hepatocellular carcinoma cell culture using fluorescence lifetime microscopy** Ksenia Y. Kandurova,<sup>1</sup> Alexander A. Palalov,<sup>1</sup> Elena V. Potapova,<sup>1</sup> Andrey V. Dunaev,<sup>1</sup> Gerhard Holst,<sup>2</sup> Andrey Y. Abramov,<sup>1,3</sup> Evgeny A. Zherebtsov,<sup>1,4</sup> <sup>1</sup>Orel State University, Orel, Russia <sup>2</sup>PCO AG, Science and Research, Kelheim, Germany <sup>3</sup>UCL Queen Square Institute of Neurology, London, UK <sup>4</sup>University of Oulu, Oulu, Finland
  28. **Laser Doppler flowmetry in wearable implementation for the detection of arterial hypertension** Yulia I. Loktionova,<sup>1</sup> Maria A. Mikhailova,<sup>1,2</sup> Andrey I. Korolev,<sup>2</sup> Alexander Yu. Gorshkov,<sup>1</sup> Elena V. Zharkikh,<sup>1</sup> Andrey A. Fedorovich,<sup>2,3</sup> Evgeny A. Zherebtsov,<sup>1,4</sup>. <sup>1</sup>Research and Development Center of Biomedical Photonics, Orel State University named after I.S. Turgenev, Orel, Russia; <sup>2</sup>National Medical Research Center for Therapy and Preventive Medicine of the Ministry of Healthcare of the Russian Federation, Moscow, Russia; <sup>3</sup>Russian Federation State Research Center, Institute of Biomedical Problems of the Russian Academy of Sciences, Moscow, Russia; <sup>4</sup>Optoelectronics and Measurement Techniques, University of Oulu, Oulu, Finland.
  29. **Polyacrylamide-based phantoms of human skin for fluorescence optical measurements** Valery Shupletsov,<sup>1</sup> Margarita Mikenkina,<sup>1</sup> Evgeny Zherebtsov,<sup>1</sup>, <sup>2</sup> Viktor Dremine,<sup>1,3</sup> Alexander Bykov,<sup>2</sup> Elena Potapova,<sup>1</sup> Andrey Dunaev,<sup>1</sup> Igor Meglinski,<sup>2,3</sup> <sup>1</sup>Research & Development Center of Biomedical Photonics, Orel State University, Orel, Russia; <sup>2</sup>Optoelectronics and Measurement Techniques Unit, University of Oulu, Oulu, Finland <sup>3</sup>College of Engineering and Physical Sciences, Aston University, Birmingham, UK
  30. **Impact of short term ischemia on dynamics of fluorescence lifetime parameters in skin** Valery Shupletsov,<sup>1</sup> Olga Stelmashuk,<sup>1</sup> Julia Loktionova,<sup>1</sup> Igor Kozlov,<sup>1</sup> Evgeny Zherebtsov,<sup>1,2</sup>. <sup>1</sup>Research & Development Center of Biomedical Photonics, Orel State University, Orel, Russia; <sup>2</sup>Optoelectronics and Measurement Techniques Unit, University of Oulu, Oulu, Finland
  31. **A study of illumination spectra to improve contrast imaging of biological tissues** Vitaliy P. Nemov,<sup>1</sup> Vadim N. Prizemin,<sup>1</sup> Ilya A. Goriunov,<sup>1</sup> Igor O. Kozlov,<sup>1</sup> Evgeniya S. Seryogina,<sup>1</sup> Andrian V. Mamoshin,<sup>1,2</sup> Andrey V. Aladov,<sup>3</sup> Anton E. Chernyakov,<sup>3,1</sup> <sup>1</sup>Orel State university named after I. S. Turgenev, Orel, Russia <sup>2</sup>Orel



Regional Clinical Hospital, Orel, Russia

<sup>3</sup>SHM R&E Center, RAS, Saint-Petersburg, Russia

**32. Oscillation processes in synuclein-KO mouse skin microcirculation: a pilot study**

Kozlov I.O.<sup>1</sup>, Serov D.A.<sup>2</sup>, Seryogina E.S.<sup>3</sup>

Astashev M.E.<sup>2</sup> Tankanag A.V.<sup>2</sup> Chaprov

K.D.<sup>4</sup> Lysikova E.A.<sup>4</sup> Zhrebtsov E.A.<sup>3,5</sup>

Abramov A.Y.<sup>3,6</sup> Dunaev A.V.<sup>1,3</sup>, <sup>1</sup>R&D Center of Biomedical Photonics, Orel State University, Orel, Russia

<sup>2</sup>Institute of Cell Biophysics, Russian Academy of Science,

Pushchino, Moscow region, Russia <sup>3</sup>Cell

Physiology and Pathology Laboratory, Orel State University, Orel, Russia

<sup>4</sup>Institute of Physiologically Active Compounds Russian Academy of Sciences, Chernogolovka,

142432, Russia. <sup>5</sup>Optoelectronics and

Measurement Techniques Laboratory,

University of Oulu, Oulu, Finland

<sup>6</sup>Department of Clinical and Movement Neurosciences, UCL Queen Square Institute

of Neurology, London, UK

# Workshop on Laser Physics and Photonics XXIII

*Workshop Chair:* **Vladimir L. Derbov**, Saratov State University (Russia)

*Secretary:* **Svetlana V. Churochkina**, Saratov State University (Russia)

*International Program Committee* **Vladimir L. Derbov** (Chair), Saratov State University (Russia), **Alexander V. Gorokhov**, Samara University (Russia), **Bogos B. Joulakian**, University of Metz (France), **Alexander P. Kuznetsov**, Institute of Radio-Engineering of RAS (Russia), **Marian Marciniak**, National Institute of Telecommunications (Poland), **Leonid A. Melnikov**, Yuri Gagarin State Technical University of Saratov (Russia), **Yuri V. Popov**, Lomonosov Moscow State University (Russia), **Vladimir P. Ryabukho**, Saratov State University, IPM&C RAS (Russia), **Alexander P. Nizovtsev**, Institute of Physics of NASB (Belarus), **Sergue I. Vinitsky**, Joint Institute for Nuclear Research (Russia), **Aleksey M. Zheltikov**, Lomonosov Moscow State University (Russia)

## September 29, Wednesday

### ORAL SESSION PHOTONICS

(Zoom link:

<https://us02web.zoom.us/j/81839445204>

Conference ID: 818 3944 5204

Chair: **Vladimir L. Derbov**, Saratov State University, Russia

**The time is UTC+04:00, or Moscow time+01:00**

**16.00-16.20**

**Numerical calculation of the probabilities of quantum electron transitions between bound and free states in a multiphoton process by the method of functional integration**

Alexander A. Biryukov; Samara State Transport University, Samara, Russia

**16.20-16.40**

**Coffee Break**

**15.00-15.20**

**Frequency-modulated normal modes of electromagnetically induced transparency**

Oleg M. Parshkov, Alexander A. Makoveichuk; Yuri Gagarin State Technical University of Saratov, Saratov, Russia

**15.20-15.40**

**Excitation of the broadband surface plasmonpolaritons in planar metal-dielectric structures**

Roman A. Pavelkin; Samara University, Samara, Russia

**15.40-16.00**

**Laser interferometry method for measuring and analyzing micromovements of the eyeball**

Karina A. Sadchikova, Aleksey V. Dzhafarov, Maxim G. Inkin, Sergey Yu. Dobdin, Anatoly V. Skripal; Saratov State University, Saratov, Russia

**16.40-17.00**

**Five mathematical models of sampling process performed by digital image sensor: A comparison**

Konstantin A. Grebenyuk; Saratov State University, Saratov, Russia

**17.00-17.20**

**High power semiconductor lasers and their technological applications for material processing**

DmitriA. Avtaikin, Alexey I. Kunitskiy, GevorkT.Mikaelyan, AndreyN. Miryakha,VadimA.Panarin, Sergey N. Sokolov, Larisa I.Shestak; INJECT RME LLC, Saratov, Russia

**September 30, Thursday**

**JOINT POSTER/INTERNET SESSION**

Chair (P): **Alexander S. Plastun**, Saratov State University, Russia

**18.00-20.00**

**INTERNET REPORTS**

1. **Coherent States, Kahler Manifolds and Quantum Dynamics** Alexander V. Gorokhov; Samara University, Samara, Russia
2. **Cavity with graphene hyperbolic medium: optimization of parameters and conditions for efficient THz lasing** Olga N. Kozina<sup>1</sup>, Leonid A. Melnikov<sup>2</sup>; <sup>1</sup>Kotel'nikov Institute of Radio-Engineering and Electronics of Russian Academy of Science, Saratov Branch, Saratov, Russia; <sup>2</sup>Yuri Gagarin State Technical University of Saratov, Saratov, Russia

**INTERNET POSTERS**

- 1P. **The influence of the Henry factor on the dynamics of broad-area semiconductor lasers** Elizaveta A. Yarusova<sup>1,2</sup>, Anton A. Krents<sup>1,2</sup>, Nonna E. Molevich<sup>1,2</sup>; <sup>1</sup>Lebedev Physical Institute, Samara, Russia; <sup>2</sup>Samara University, Samara, Russia
- 2P. **Prolonged microlattices for generation of green light** Vitaly A. Smirnov<sup>1</sup>, Liubov I. Vostrikova<sup>1,2</sup>; <sup>1</sup>Rzhanov Institute of Semiconductor Physics SB RAS, Novosibirsk, Russia; <sup>2</sup>Departments of Mathematics and Natural Sciences and Informational Technologies of NSUEM, Novosibirsk, Russia
- 3P. **Decay of photoinduced susceptibility under red light** Liubov I. Vostrikova<sup>1,2</sup>, Vitaly A. Smirnov<sup>1</sup>; <sup>1</sup>Rzhanov Institute of Semiconductor Physics SB RAS, Novosibirsk, Russia; <sup>2</sup>Departments of Mathematics and Natural Sciences and Informational Technologies of NSUEM, Novosibirsk, Russia
- 4P. **Dynamics of two N-level atoms in external fields with dipole-dipole interaction** George I. Eremenko, Alexander V. Gorokhov; Samara University, Samara, Russia
- 5P. **Detection enhancement of the optical medium spatial anisotropy using the lens supplemented with a diffractive axicon** Pavel A. Khorin; Samara University, Samara, Russia
- 6P. **Application of the ninth harmonic generation cell for soft molecule photoionization for time-of-flight mass spectrometry** Georgy I. Tolstov<sup>1,2</sup>, Iakov A. Medvedkov<sup>1,2</sup>, Oleg V. Kuznetsov<sup>3</sup>, Alexander M. Mebel<sup>1,4</sup>, Valeriy N. Azyazov<sup>1,2</sup>; <sup>1</sup>Samara University, Samara, Russia; <sup>2</sup>Samara Branch of P.N. Lebedev Physical Institute of the Russian Academy of Sciences, Samara, Russia; <sup>3</sup>P.N. Lebedev Physical Institute of the Russian

Academy of Sciences, Moscow, Russia;  
<sup>4</sup>Florida International University, Miami, Florida, USA

- 7P. **Thermal entanglement in two atoms with dipole-dipole and Ising interactions** Rodion K Zakharov, Eugene K. Bashkurov; Samara University, Samara, Russia
- 8P. **Non-perturbative evolution of a two-level system in a non-Markovian bath and an external stochastic field** Victor A. Mikhailov, Nikolay V. Troshkin; Samara University, Samara, Russia
- 9P. **Matrix method for calculating vector beams in reflection and transmission by planar anisotropic inhomogeneous structures** Natalya M. Moiseeva; Volgograd State University, Volgograd, Russia

**POSTER SESSION**

**(Building 3, 3rd floor Hall)**

- 1P. **Sensing elements for the mid-IR spectroscopy based on irregular multimode chalcogenide fibers** Svetlana V. Korsakova<sup>1</sup>, Elena A. Romanova<sup>1</sup>, Vladimir S. Shiryayev<sup>2</sup>; <sup>1</sup>Saratov State University, Saratov, Russia; <sup>2</sup>Institute of Chemistry of High Purity Substances of RAS, Nizhny Novgorod, Russia
- 2P. **Optical and electronic properties of chalcogenide glasses of the Ge-Sb-Ga-Se system doped with Tb<sup>3+</sup> and Dy<sup>3+</sup>** Nina D. Parshina<sup>1</sup>, Vyacheslav I. Kochubey<sup>1</sup>, Elena A. Romanova<sup>1</sup>, Maksim V. Sukhanov<sup>2</sup>, Vladimir S. Shiryayev<sup>2</sup>; <sup>1</sup>Saratov State University, Saratov, Russia; <sup>2</sup>Institute of Chemistry of High Purity Substances, Nizhny Novgorod, Russia
- 3P. **Experimental study of a focusator with a high microrelief** Veronika A. Blank<sup>1,2</sup>, Sofiya V. Ganchevskaya<sup>1,2</sup>, Roman V. Skidanov<sup>1,2</sup>; <sup>1</sup>IPSI RAS - branch of the FSRC «Crystallography and Photonics» RAS, Samara, Russia; <sup>2</sup>Samara University, Samara, Russia
- 4P. **Amplitude noise limiting amplifier for polarization encoded signals using injection locking in semiconductor lasers** Leonid A. Kochkurov, Ekaterina V. Ushakova, Sergey S. Volchokov; Yuri Gagarin State Technical University of Saratov, Saratov, Russia
- 5P. **Thermal entanglement in Tavis-Cummings models with Kerr media** Eugene K. Bashkurov; Samara University, Samara, Russia
- 6P. **Dynamics of Rydberg atoms successively passing a thermal cavity taking into account detuning and Kerr nonlinearity** Eugene K. Bashkurov,

Rodion K. Zakharov; Samara University, Samara, Russia

- 7P. **Diffraction mathematical model of laser speckle interferometer of lateral displacements of scattering object with Gaussian illuminating beams** Ludmila A. Maksimova<sup>1</sup>, Bogdan A. Patrushev<sup>2</sup>, Natalia Yu. Mysina<sup>1</sup>, Vladimir P. Ryabukho<sup>1,2</sup>; <sup>1</sup>Institute of Precision Mechanics and Control RAS, Saratov, Russia; <sup>2</sup>Saratov State University, Saratov, Russia
- 8P. **Laser speckle interferometer of tangential displacements of a scattering object using a pair of illuminating Gaussian beams** Ludmila A. Maksimova<sup>1</sup>, Bogdan A. Patrushev<sup>2</sup>, Vladimir P. Ryabukho<sup>1,2</sup>; <sup>1</sup>Institute of Precision Mechanics and Control RAS, Saratov, Russia; <sup>2</sup>Saratov State University, Saratov, Russia
- 9P. **Laser micromachining of the thin films made from the molybdenum-copper alloys** Dmitrii A. Nozhkin<sup>1</sup>, Alexey A. Serdobintsev<sup>1</sup>, Ilya O. Kozhevnikov<sup>1</sup>, Victor V. Galushka<sup>1,2</sup>, Andrey M. Zakharevich<sup>1</sup>, Andrey V. Starodubov<sup>1,2</sup>; <sup>1</sup>Saratov State University, Saratov, Russia; <sup>2</sup>Kotel'nikov Institute of Radio-Engineering and Electronics of Russian Academy of Science, Saratov Branch, Saratov, Russia

- 10P. **Features of laser microtreatment with nanosecond pulses of thin copper films of different thicknesses on solid dielectric substrates** Ilya I. Rasulov<sup>1</sup>, Ilya O. Kozhevnikov<sup>1</sup>, Alexey A. Serdobintsev<sup>1</sup>, Victor V. Galushka<sup>1</sup>, Andrey V. Starodubov<sup>1,2</sup>; <sup>1</sup>Saratov State University, Saratov, Russia; <sup>2</sup>Kotel'nikov Institute of Radio-Engineering and Electronics of Russian Academy of Science, Saratov Branch, Saratov, Russia
- 11P. **Single-mode propagation of an adiabatic waveguide mode in a smooth transition between planar dielectric waveguides** Dmitriy V. Divakov<sup>1,2</sup>, Konstantin P. Lovetskiy<sup>1</sup>, Anton L. Sevastianov<sup>3</sup>; <sup>1</sup>Peoples' Friendship University of Russia (RUDN University), Moscow, Russia; <sup>2</sup>Joint Institute for Nuclear Research, Dubna, Russia; <sup>3</sup>High School of Economics, Moscow, Russia
- 12P. **Investigation of surface electromagnetic waves at the boundary with an anisotropic medium in CAS Sage** Oleg K. Kroytor; Peoples' Friendship University of Russia (RUDN University), Moscow, Russia

# Conference on Spectroscopy and Molecular Modeling XXII

*Workshop Chairs:* **Lev M. Babkov**, **Kirill V. Berezin**, Saratov State University (Russia)

*Secretary:* **Inna I. Plastun**, Saratov State Technical University (Russia)

*International Program Committee:* **Lev M. Babkov**, Saratov State University (Russia), **Lev A. Gribov**, Institute named by V. I. Vernadskyi RAS (Moscow, Russia), **Dmitry S. Umreiko**, Belarus State University (Minsk, Belorussia), **Nadezda A. Davydova**, Institute of Physics, NAS of Ukraine, **Tatiana G. Bourova**, Saratov State Pedagogical Institute (Russia), **Alexander V. Burenin**, Institute of Applied Physics RAS (Moscow, Russia), **Victor L. Furer**, Kazan Civil Engineer Academy (Russia), **Alexander V. Gorohov**, Samara State University (Russia)

**September 29, Wednesday**

## **ORAL SESSION SPECTROSCOPY (Building 3, Room 34)**

**Chair: Lev M. Babkov,**  
Saratov State University, Russia

**15.30-15.45**

**STRUCTURAL-DYNAMIC MODELS OF A  
NUMBER OF TRIGLYCERIDES OF  
CARBOXYLIC ACIDS TO DESCRIBE THE  
VIBRATIONAL SPECTRA OF COTTON OIL**

K.V. Berezin<sup>1</sup>, V.V. Nechaev<sup>2</sup>, K.N. Dvoretzkiy<sup>3</sup>,  
E.M. Antonova<sup>4</sup>, E.T. Shagautdinova<sup>4</sup>, E.V.  
Grabarchuk<sup>4</sup>, A.M. Likhter<sup>4</sup>

<sup>1</sup>Saratov State University, Saratov, Russia;

<sup>2</sup>Saratov State Technical University, Saratov,  
Russia

<sup>3</sup> Saratov State Medical University, Saratov,  
Russia;

<sup>4</sup>Astrakhan State University, Astrakhan, Russia

**15.45 - 16.00**

**MOLECULAR MODELING OF THE POST-  
DIFFUSION STAGE OF THE OPTICAL  
CLEARING PROCESS OF BIOLOGICAL  
TISSUES UNDER THE ACTION OF AN  
AQUEOUS SOLUTION OF OMNIPAQUE**

K.N. Dvoretzkiy<sup>1</sup>, K.V. Berezin<sup>2</sup>, V.V.  
Nechaev<sup>3</sup>, E.M. Antonova<sup>4</sup>, E.T. Shagautdinova<sup>4</sup>,  
E.V. Grabarchuk<sup>4</sup>, A.M. Likhter<sup>4</sup>, V.V. Tuchin<sup>2,5,6</sup>

<sup>1</sup>Saratov State Medical University,

<sup>2</sup>Saratov State University, Saratov, Russia;

<sup>3</sup>Saratov State Technical University, Saratov,  
Russia;

<sup>4</sup>Astrakhan State University, Astrakhan, Russia;

<sup>5</sup>Institute for Problems of Precision Mechanics and  
Control RAS, Saratov, Russia;

<sup>6</sup>National Research Tomsk State University,  
Tomsk, Russia

**16.00–16.15**

**RESEARCH OF SUCCINIC ACID  
CONFORMATIONAL POLYMORPHISM BY  
MOLECULAR MODELING AND ANALYSIS  
OF CONFORMERS STRUCTURE**

A.A. Zakharov, I. L. Plastun

Yuri Gagarin State Technical University of  
Saratov, Russia

**16.15–16.30**

**COMPUTER SIMULATION OF  
MACROMOLECULAR FLAGELLIN IN  
SOLVENT WITH METAL SULFIDES**

P.D. Filin, P.A. Zhulidin, I.L. Plastun

Yuri Gagarin State Technical University of  
Saratov, Russia

**16.30– 16.45**

**STRUCTURE AND VIBRATIONAL SPECTRA  
OF GLYCINE DIMER TAUTOMERS DURING  
INTRA-MOLECULAR PROTON TRANSFER  
IN AN ISOLATED STATE AND AQUEOUS  
SOLUTION**

G. N. Ten<sup>1</sup>, N.E. Scherbakova<sup>2</sup>

<sup>1</sup>Saratov State University, Saratov, Russia;

<sup>2</sup>Russian Research Anti-Plague Institute  
"Microbe", Saratov, Russia

**16.45– 17.00**

**PROLINE TAUTOMERISM IN THE SOLID  
PHASE STATE**

G. N. Ten<sup>1</sup>, N.E. Scherbakova<sup>2</sup>

<sup>1</sup>Saratov State University, Saratov, Russia;

<sup>2</sup>Russian Research Anti-Plague Institute  
"Microbe", Saratov, Russia

**17.00- 17.15**

**IR SPECTRA AND STRUCTURE OF  
CHROMENOPYRIDINE CARBONITRILE  
SYSTEMS**

I. V. Peretokina (Ivlieva), L. M. Babkov,

A. A. Mecheryakova, V.V. Sorokin,

Saratov State University

**17.15- 17.30**

**QUANTUM-CHEMICAL STUDIES OF THE  
BORAZINE MOLECULE**

V.F. Pulin<sup>1</sup>, E.V. Ryzhova<sup>2</sup>, T.Yu. Surinskaya<sup>2</sup>,  
P.M. Elkin<sup>1</sup>

<sup>1</sup>Yuri Gagarin State Technical University of  
Saratov, Russia

<sup>2</sup>Nikolai Vavilov State Agrarian University of  
Saratov, Russia

**September 30, Thursday**

**ORAL SESSION  
SPECTROSCOPY  
(Building 3, Room 34)**

**(Zoom link:**

**<https://us05web.zoom.us/j/8909408266?pwd=cHhZRvQyNW1Ea0hTbE01Z1hjbHkwUT09>**

**Conference ID: 890 940 8266, Code YVzXZ5)**

Chair: Lev M. Babkov,  
Saratov State University, Russia

**15.30-15.45**

**MODELING OF MITOXANTHONE WITH  
TARGETED DELIVERY POLYELECTROLYTE  
CAPSULES INTERMOLECULAR INTERACTION**

I.L. Plastun, A.A. Naumov, A.A. Zakharov  
Yuri Gagarin State Technical University of Saratov,  
Russia

**15.45 - 16.00**

**INTERMOLECULAR INTERACTION OF  
CYANINE 7 WITH AMINO ACIDS FROM  
IMMUNOGLOBULIN AND TNF COMPOSITION:  
MOLECULAR MODELING BY DENSITY  
FUNCTIONAL THEORY METHODS**

A.A. Naumov, I.L. Plastun, A.A. Zakharov  
Yuri Gagarin State Technical University of Saratov,  
Russia

**16.00–16.15**

**INTERACTION OF SOLUBLE HUMAN 55 KD  
TUMOR NECROSIS FACTOR (TNF) RECEPTOR  
WITH HUMAN TNF $\beta$ : MOLECULAR  
DYNAMICS AND COMPLEXATION**

P.A. Zhulidin, I.L. Plastun, P.D. Filin  
Yuri Gagarin State Technical University of Saratov,  
Russia

**16.15–16.30**

**CARBON DOTS GENOTOXICITY EVIDENCED  
BY COHERENT ANTI-STOKES RAMAN  
SPECTROSCOPY**

K.A. Laptinsky<sup>1</sup>, S.A. Burikov<sup>1,2</sup>, T.A. Dolenko<sup>1,2</sup>  
<sup>1</sup>Skobeltsyn Institute of Nuclear Physics,  
Lomonosov Moscow State University, Russia  
<sup>2</sup>Faculty of Physics, Lomonosov Moscow State  
University, Russia

**16.30–16.45**

**THE INFLUENCE OF SURFACE  
FUNCTIONALIZATION OF CARBON DOTS ON  
THEIR OPTICAL PROPERTIES**

M.Yu. Khmeleva<sup>1,2</sup>, K.A. Laptinsky<sup>1</sup>, S.A.  
Burikov<sup>1,2</sup>, A.E. Tomskaya<sup>3</sup>, T.A. Dolenko<sup>1,2</sup>

<sup>1</sup>Skobeltsyn Institute of Nuclear Physics,  
Lomonosov Moscow State University, Russia

<sup>2</sup>Faculty of Physics, Lomonosov Moscow State  
University, Russia

<sup>3</sup>Prokhorov General Physics Institute of the  
Russian Academy of Sciences, Russia

**16.45–17.00**

**THE MECHANISMS OF QUENCHING THE  
FLUORESCENCE OF CARBON DOTS UPON  
INTERACTION WITH HEAVY METAL  
CATIONS**

G.N. Chugreeva<sup>1</sup>, K.A. Laptinsky<sup>2</sup>, S.A.  
Burikov<sup>1,2</sup>, T.A. Dolenko<sup>1,2</sup>

<sup>1</sup>Faculty of Physics, Lomonosov Moscow State  
University, Russia

<sup>2</sup>Skobeltsyn Institute of Nuclear Physics,  
Lomonosov Moscow State University, Russia

**17.00- 17.15**

**USING METHOD INTEGRATION TRANSFER  
LEARNING FOR NEURAL NETWORK  
SOLUTION OF AN INVERSE PROBLEM IN  
OPTICAL SPECTROSCOPY (Internet Report)**

I.V. Isaev<sup>1,2</sup>, I.M. Gadzhiev<sup>1,3</sup>, O.E.  
Sarmanova<sup>1,3</sup>, S.A. Burikov<sup>1,3</sup>, T.A. Dolenko<sup>1,3</sup>,  
K.A. Laptinsky<sup>1</sup>, S.A. Dolenko<sup>1</sup>

<sup>1</sup>D.V. Skobeltsyn Institute of Nuclear Physics,  
<sup>2</sup>Kotelnikov Institute of Radioengineering and  
Electronics, Russian Academy of Sciences,  
Moscow, Russia

<sup>3</sup>Faculty of Physics, M.V. Lomonosov Moscow  
State University, Moscow, Russia

**17.15- 17.30**

**INFLUENCE OF INTENSITY OF EXCITING  
RADIATION ON THE LUMINESCENT  
PROPERTIES OF COMPLEXES  
NaYF<sub>4</sub>:Yb/Tm (Internet Report)**

E.A. Filippova<sup>1</sup>, A.A. Fedyanina<sup>1</sup>, S.A.  
Burikov<sup>1</sup>, S.V. Kuznetsov<sup>2</sup>, V.Y. Prodaikova<sup>2</sup>,  
V.V. Voronov<sup>2</sup>, T.A. Dolenko<sup>1</sup>

<sup>1</sup>M.V. Lomonosov Moscow State University,  
Moscow, Russia,

<sup>2</sup>Prokhorov General Physics Institute of the  
Russian Academy of Sciences, Russia,  
Moscow

**17.30 - 17.45**

**RAMAN CHARACTERIZATION OF  
AQUEOUS SOLUTIONS OF DIOLS (Internet  
Report)**

S.O. Liubimovskii, V.S. Novikov  
Prokhorov General Physics Institute of the  
Russian Academy of Sciences, Moscow,  
Russia

**17.45- 18.00**

**EVOLUTIONARY ELONGATION OF THE  
NUCLEOTIDE SEQUENCES WITH  
DELOCALIZED ELECTRON CLOUDS IN  
THE GENOME (Internet Report)**

M. Myakishev-Rempel<sup>1</sup>, I. Savelev<sup>1</sup>, A.  
Klimov<sup>1</sup>, A. Samchenko<sup>1</sup>, L. Shishkin<sup>1</sup>, L.

Yulmetova<sup>1</sup>, O. Polesskaya<sup>2</sup>, A. Voronka<sup>1</sup>, A. Vetcher<sup>1,3,4</sup>, R.A. Miller<sup>5</sup>, A. Naumova<sup>6</sup>

<sup>1</sup>DNA Resonance Research Foundation, San Diego, CA, USA

<sup>2</sup>University of California, San Diego, USA

<sup>3</sup>Nanotechnology Scientific and Educational Center, Institute of Biochemical Technology and Nanotechnology, Peoples Friendship University of Russia, Moscow, Russia

<sup>4</sup>Shishonin Complementary and Integrative Health Clinic, Moscow, Russian Federation

<sup>5</sup>OAK, Inc., Grants Pass, OR, USA

<sup>6</sup>Rzhanov Institute of Semiconductor Physics, Siberian Branch of RAS, Novosibirsk, Russian Federation

## September 30, Thursday

### JOINT POSTER/INTERNET SESSION SPECTROSCOPY (S) (Building 3, 3rd floor Hall)

Co-chairs: Lev M. Babkov, Kirill V. Berezin  
Saratov State University, Russia

18.00-20.00

#### 1S. SPECTRAL CHARACTERISTICS OF SUBSTITUTED CHROMENOPYRIMIDINO- NES AND CHROMENOPYRIDINES WITH DIFFERENT FUSED-RING ARRANGE-MENT

A.A. Meshcheryakova, A.V. Nikulin, N.O. Vasil'kova, A.V. Skliar, K.S. Neumoina, V.V. Sorokin, A.P. Kriven'ko

Saratov State University, Saratov, Russia

#### 2S. ELECTROSPECTRAL SERS DETECTION OF CYSTEINE USING COPPER ELECTRODE

N.E. Markina, A.V. Markin

Saratov State University, Saratov, Russia

#### 3S. THE APPLICATION OF NMR SPECTROSCOPY IN ANALYSIS OF REACTION PRODUCTS FOR 1,3-DIPOLAR CYCLOADDITION OF AZOMETHINE YLIDES AND BENZYLIDENEMALONONITRILES

S.V. Borisova, S.C. Abdulaeva, V.V. Sorokin

Saratov State University, Saratov, Russia

#### 4S. DEEP LEARNING ANALYSIS OF AMINO ACIDS RAMAN SPECTRA FOR THE DETERMINATION OF THEIR STRUCTURAL FEATURES

L.A. Bratchenko<sup>1</sup>, E.N. Tupikova<sup>2</sup>, V.A. Belova<sup>2</sup>, S.Zead<sup>1</sup>, V.P. Zakharov<sup>1</sup>, I. A. Bratchenko<sup>1</sup>

<sup>1</sup>Department of Laser and Biotechnical Systems, Samara University, Samara, Russia

<sup>2</sup>Department of Chemistry, Samara University, Samara, Russia

#### 5S. STUDY OF THE COMPLEXATION REACTION BETWEEN SUBSTITUTED 6,6'- BIS (DIPHENYLPHOSPHINOYL)-2,2'- BIPYRIDYLS AND IONS LANTHANUM

Ts.B. Sumyanova, N.E. Borisova, A.A. Petukhova, A.A. Kirsanova

Lomonosov Moscow State University, Faculty of Chemistry, Moscow, Russia

#### 6S. IR SPECTRA AND STRUCTURAL DYNAMIC MODELS OF 2- BENZYLPHENOL

L.M. Babkov<sup>1</sup>, N.A. Davydova<sup>2</sup>, M.D. Moskvitin<sup>1</sup>

<sup>1</sup>Saratov State University, Saratov, Russia,

<sup>2</sup>Institute of Physics NAS Ukraine, Kiev

#### 7S. STRUCTURE AND VIBRATIONAL SPECTRA OF DIHYDROXYBENZOIC ACID ISOMERS. THEORY, EXPERIMENT

D.S. Finashkin, L.M. Babkov

Saratov State University, Saratov, Russia

#### 8S. APPLICATION OF FTIR SPECTROSCOPY TO DETERMINE THE CONTENT OF SULFADIMESINE IN TABLETS

Yu.A. Fomina, N.B. Shestopalova,

Saratov State Medical University, Saratov, Russia

### INTERNET SESSION

#### 1SI. CONSENSUS DOCKING AND MOLECULAR DYNAMICS FOR DISCOVERY OF POTENTIAL INHIBITORS OF SARS-COV-2 MAIN PROTEASE

R.S. Tumskiy<sup>1</sup>, A.V. Tumskaya<sup>2</sup>

<sup>1</sup>Institute of Biochemistry and Physiology of Plants and Microorganisms Russian Academy of Sciences (IBPPM RAS), Saratov, Russia

<sup>2</sup>Saratov State University, Saratov, Russia

#### 2SI. ELECTROSPUN NANOFIBER SENSOR PLATFORM FOR DETERMINATION OF SOME BIOLOGICALLY ACTIVE COMPOUNDS

A.I. Danchuk, T.M. Makhova, S.Yu. Doronin

Saratov State University, Saratov, Russia

#### 3SI. 3D-SPECTRA AND LUMINESCENCE LIFETIME OF URANYL SALTS

A.V. Kharcheva, A.N. Kupaeva, N.E. Borisova, S.V. Patsaeva, Lomonosov Moscow State University, Moscow, Russia

# Conference on Nanobiophotonics XVII

*Workshop Chair:* **Nikolai G. Khlebtsov**, Institute of Biochemistry and Physiology of Plants and Microorganisms of the RAS, Saratov State University

*Secretary:* **Timofey E. Pylaev**, Institute of Biochemistry and Physiology of Plants and Microorganisms of the RAS, Saratov State Medical University, Agricultural Research Institute of South-East Region

*International Program Committee:* **Roberto Pini**, Institute of Applied Physics (IFAC-CNR) National Research Council of Italy; **Jian Ye**, School of Biomedical Engineering & Med-X Research Institute Shanghai Jiao Tong University, China; **Dmitry Gorin**, Scoltech, Saratov State University (Russia); **Irina Goryacheva**, Saratov State University (Russia); **Lev Dykman**, Institute of Biochemistry and Physiology of Plants and Microorganisms, RAS, Saratov (Russia); **Alexey Yashchenok**, Scoltech, Russia; **Vitaly Khanadeev**, Institute of Biochemistry and Physiology of Plants and Microorganisms, RAS, Saratov State University (Russia); **Boris Khlebtsov**, Institute of Biochemistry and Physiology of Plants and Microorganisms, RAS, Saratov (Russia)

**September 28, Tuesday**

## INVITED/PLENARY SESSION NANOBIOPHOTONICS

**11.40 – 12.20**

**Internet plenary**

**Fluorescent methods in the studies of retention and penetration of nanoparticles and polymers into the biological tissues**

Vitaliy Khutoryanskiy University of Reading, United Kingdom

**September 29, Wednesday**

## ORAL/INVITED SESSION NANOBIOPHOTONICS I

**Zoom link:** <https://osachapter.zoom.us/j/97105128804>  
**ID 971 0512 8804**  
**(Building 9, Conference Hall)**

Chair: **Nikolai G. Khlebtsov**, IBPPM RAS, Saratov State University, Russia

**14.00 – 14.20**

**SFM Special event: Sponsor Session**

**Recent advances in high content screening of cells and tissues**

Alexander Sychevskij, Biocommerce Ltd

**14.20 – 14.40**

**Invited**

**Laser ablation and fragmentation of nano- and microstructured silicon towards designing nanoparticles for biophotonics**

Stanislav V. Zobotnov,<sup>1</sup> Vyacheslav Yu. Nesterov,<sup>1</sup> Olga I. Sokolovskaya,<sup>1</sup> Alfia M. Sharafutdinova,<sup>1</sup> Daria A. Kurakina,<sup>2</sup> Aleksandr V. Khilov,<sup>2,1</sup> Ekaterina A. Sergeeva,<sup>2,1</sup> Pavel K. Kashkarov,<sup>1</sup> Leonid A. Golovan,<sup>1</sup> Mikhail Yu. Kirillin,<sup>2,1</sup> Lomonosov Moscow State University,

Faculty of Physics, Moscow, 119991, Russia  
<sup>2</sup>Institute of Applied Physics RAS, Nizhny Novgorod, 603950, Russia

**14.40 – 14.55**

**Internet Oral**

**Macromolecular HPMA-based nanoparticles with cholesterol for solid tumor targeting: synthesis, internal structure, and interaction with blood plasma proteins**

Sergey Filippov Reading School of Pharmacy University of Reading, UK

**14.55 – 15.10**

**Oral**

**Magnetic drug delivery submicron systems for breast cancer treatment: from drug encapsulation to BioBrillouin investigation**

M.V. Lomova,<sup>1</sup> P.A. Demina,<sup>1</sup> D.V. Voronin,<sup>1,2</sup> A.A. Abalymov,<sup>1</sup> Y.I. Svenskaya,<sup>1</sup> N.A. Shuhunova,<sup>1</sup> R.A. Anisimov,<sup>1</sup> A.V. Sadovnikov,<sup>1</sup> <sup>1</sup>Science Medical Center, Saratov State University, Astrakhanskaya St. 83, 410012 Saratov, Russia <sup>2</sup>Department of Physical and Colloid Chemistry, National University of Oil and Gas "Gubkin University", Leninsky Prospekt 65, 119991 Moscow, Russia

**15.10 – 15.25**

**Oral**

**Biophotonics as a Key to Understanding the Problems and Opportunities of Nanomedicine**

Olga A. Sindeeva,<sup>1,2</sup> Oksana A. Mayorova,<sup>2</sup> Ekaterina S. Prikhozhenko,<sup>2</sup> Olga I. Gusliakova,<sup>2</sup> Arkady S. Abdurashitov,<sup>1</sup> Daniil N. Bratashov,<sup>2</sup> Voronin V. Denis,<sup>2,3</sup> Maxim A. Kurochkin,<sup>1</sup> Roman A. Verkhovskii,<sup>2</sup> Nikolay A. Pyataev,<sup>4</sup> Valery V. Tulin,<sup>2</sup> Dmitry A. Gorin,<sup>1</sup> Gleb B. Sukhorukov,<sup>1,1</sup> Skolkovo Institute of Science and Technology, Moscow, Russia <sup>2</sup>Saratov State University, Saratov, Russia <sup>3</sup>National University of Oil and Gas "Gubkin University", Moscow, Russia <sup>4</sup>Ogarev Mordovia State University, Saransk, Russia



15.25 – 15.40

Oral

**Dependence of the luminescence intensity of NaYF<sub>4</sub>:Yb/Tm complexes on the pumping power when excited by pulsed laser radiation**

Anna A. Fedyanina,<sup>1</sup> E.A. Filippova,<sup>1</sup> S.A. Burikov,<sup>1</sup> S.V. Kuznetsov,<sup>2</sup> V.Yu. Prokhorova,<sup>2</sup> V.V. Voronov,<sup>2</sup> T.A. Dolenko<sup>11</sup> Lomonosov Moscow State University, Moscow, 119991 GSP-1, Leninskie Gory, 1 p. 2, Russia <sup>2</sup>Prokhorov General Physics Institute of the Russian Academy of Sciences, Vavilov str, 38, Moscow, 119991 Russia.

15.40 – 15.55

Oral

**In Vivo Study of Submicron Vaterite-Templated Polyelectrolyte Microcarriers Loaded with Zinc Phthalocyanine for Image-Guided Photodynamic Therapy**

Alexey V. Ermakov,<sup>1</sup> Arthur B. Volovetsky,<sup>1</sup> Artyom O. Zvyagintsev,<sup>1</sup> Daria B. Trushina,<sup>1,2,11</sup> I. M. Sechenov First Moscow State Medical University, Moscow, Russia <sup>2</sup>A.V. Shubnikov Institute of Crystallography of Federal Scientific Research Centre "Crystallography and Photonics" of Russian Academy of Sciences, Moscow, Russia

15.55 – 16.10

Oral

**Optoacoustic and fluorescent monitoring of bilirubin photodegradation: in vitro and in silico studies**

Sergei Perkov,<sup>1</sup> Stanislav Perevoschikov,<sup>1</sup> Oleg Grishin,<sup>2</sup> Rinat Esenaliev,<sup>3</sup> Dmitry Gorin<sup>11</sup> Skolkovo Institute of Science and Technology, Moscow, Russia <sup>2</sup>Saratov State University, Saratov, Russia <sup>3</sup>University of Texas Medical Branch, Galveston, TX, USA

16.10 – 16.25

Oral

**Photonic tools for studying freshwater and marine diatoms during long-term cultivation**

Julijana Cvjetinovic,<sup>1</sup> Yekaterina D. Bedoshvili,<sup>2</sup> Nikolai A. Davidovich,<sup>3</sup> Alexey I. Salimon,<sup>1</sup> Alexander M. Korsunsky,<sup>1,2</sup> Dmitry A. Gorin,<sup>11</sup> Skolkovo Institute of Science and Technology, Moscow, Russia <sup>2</sup>Limnological Institute SB, Russian Academy of Sciences, Irkutsk, Russia <sup>3</sup>T.I. Vyazemsky Karadag Scientific Station – Nature Reserve of the RUS – Branch of IBSS, Feodosia, Russia <sup>4</sup>Department of Engineering Science, University of Oxford, Oxford, United Kingdom

16.25-16.40  
Coffee Break

16.40 – 16.55

Oral

**Thiol-coated alloyed quantum dots: comparison of approaches to modification**

Strokin Pavel, Alexander Moshkov, Daniil Drozd, Irina Goryacheva Saratov State University, Saratov, Russia

16.55 – 17.10

Oral

**The impact of 755 and 1064 nm laser radiation on murine melanoma and macrophage cell line**

Anatolii Abalymov, Roman Verkhovskii, Oleg Grishin, Olga Inozemtseva Laboratory of Biomedical Photoacoustics, Science Medical Center, Saratov State University

17.10 – 17.25

Oral

**Synthesis and characteristics of fluorescent red-emitting DNA-templated silver nanoclusters based on aptamer to lung cancer**

Daniil S. Chumakov,<sup>1</sup> Anna S. Kichkailo,<sup>3,4</sup> Galina S. Zamay,<sup>3,4</sup> Andrey M. Burov,<sup>1</sup> Nikolai G. Khlebtsov,<sup>1,2</sup> <sup>1</sup>Institute of Biochemistry and Physiology of Plants and Microorganisms, Russian Academy of Sciences (IBPPM RAS), Saratov, Russia <sup>2</sup>Saratov State University, Saratov, Russia <sup>3</sup>Federal Research Center "Krasnoyarsk Science Center of the Siberian Branch of the Russian Academy of Science", Krasnoyarsk, Russia <sup>4</sup>Laboratory for Biomolecular and Medical Technologies, Krasnoyarsk State Medical University named after prof. V.F. Voino-Yasenecki, Krasnoyarsk, Russia

17.25 – 17.40

Oral

**Finding needle in the haystack: why we need *in vivo* cytometry, what is wrong with it and how to fix it.**

Daniil N. Bratashov,<sup>1</sup> Ekaterina S. Prikhozhenko,<sup>1</sup> Olga A. Sindeeva,<sup>2</sup> Oksana A. Mayorova,<sup>1</sup> Roman A. Verkhovskii,<sup>1</sup> Ilya O. Kozhevnikov,<sup>1</sup> Alexey V. Ermakov,<sup>1</sup> Oleg V. Grishin,<sup>1</sup> Mikhail A. Makarkin,<sup>1</sup> Danila A. Nenashev,<sup>11</sup> Saratov State University, Saratov, Russia <sup>2</sup>Skolkovo Institute of Science and Technology, Moscow, Russia

17.40 – 17.55

Oral

**Single-cell optoporation using nanosecond laser irradiation on grid-marked Au nanostars layers**

Timofey Pylaev,<sup>1,2</sup> Elena Avdeeva,<sup>1</sup> Boris Khlebtsov,<sup>2</sup> and Nikolai Khlebtsov,<sup>1,3</sup> <sup>1</sup>Institute of Biochemistry and Physiology of Plants and Microorganisms, Russian Academy of Sciences, Saratov 410049, Russia <sup>2</sup>Razumovsky Saratov State Medical University, Saratov 410012, Russia <sup>3</sup>Saratov National Research State University, Saratov 410012, Russia

17.55 – 18.10

Oral

**Calcium carbonate-based protein-tannin carriers with cytostatic activity**

Anatolii A. Abalymov,<sup>1</sup> Polina A. Demina,<sup>1</sup> Denis V. Voronin,<sup>1,2</sup> Alexandr V. Sadovnikov<sup>1</sup> and Maria V. Lomova,<sup>1</sup> Saratov State University, Astrakhanskaya St. 83, Saratov 410012, Russia, <sup>2</sup>National University of Oil and Gas "Gubkin University", Leninsky Prospekt 65, Moscow 119991, Russia

**18.10 – 18.25**

**Oral**

**Calcium alginate matrices with embedded biomolecules, nanoparticles and living cells as flexible platforms for in vitro and in vivo model studies**

Timofey E. Pylaev,<sup>1,2</sup> Boris N. Khlebtsov,<sup>1</sup> Maria A. Kupryashina,<sup>1,3</sup> Angelina A. Savkina,<sup>2</sup> Daniil N. Bratashov,<sup>3</sup> Nikolai G. Khlebtsov,<sup>1,3</sup> <sup>1</sup>Institute of Biochemistry and Physiology of Plants and

Microorganisms, RAS, Saratov, Russia <sup>2</sup>Saratov State Medical University, Saratov, Russia <sup>3</sup>Saratov State University, Saratov, Russia

**18.25 – 18.40**

**Oral**

**Photomodification of gold nanoparticles moving in a capillary under the action of a pulsed laser**

Vitaly A. Khanadeev,<sup>1,2</sup> Andrey V. Simonenko,<sup>3</sup> Oleg V. Grishin,<sup>3</sup> Nikolai G. Khlebtsov,<sup>1,3,1</sup> Institute of Biochemistry and Physiology of Plants and Microorganisms Russian Academy of Sciences (IBPPM RAS), Saratov, Russia; <sup>2</sup>Saratov State Vavilov Agrarian University, Saratov, Russia; <sup>3</sup>Saratov State University, Saratov, Russia

**September 30, Thursday**

### **ORAL/INVITED SESSION NANOBIOPHOTONICS II**

**Zoom link:** <https://osachapter.zoom.us/j/97105128804>

**ID 971 0512 8804**

**(Building 9, Conference Hall)**

Chair: **Nikolai G. Khlebtsov**, IBPPM RAS, Saratov State University, Russia

**15.00 – 15.20**

**Internet Invited**

**Yin and Yang of nanoparticles on the example of quantum dots application in biomedical research**

Elena S. Kornilova,<sup>1,2</sup> Ilya K. Litvinov,<sup>1</sup> Anna V. Salova,<sup>1</sup> Tatiana N. Belyaeva,<sup>1,1</sup> Institute of Cytology RAS, St.Petersburg, Russia, <sup>2</sup>Peter the Great St.Petersburg State Polytechnical University, St.Petersburg, Russia

**15.20 – 15.35**

**Internet Oral**

**Cytotoxicity of antimycotic-loaded submicron vaterite carriers under therapeutic ultrasound treatment**

Roman Verkhovskii, Ekaterina Lengert, Anastasiia Kozlova, Yulia Svenskaya Science Medical Center, Saratov State University, Saratov, Russia

**15.35 – 15.50**

**Internet Oral**

**Topical antifungal formulation for the treatment of dermatophyte infections**

Yulia Svenskaya, Ekaterina Lengert, Mariia Saveleva, Roman Verkhovskii, Georgy Terentyuk, Elina Genina, Valery Tuchin, Saratov State University, Russia.

**16.05 – 16.20**

**Internet Oral**

**Visualization of ICG based bimodal contrast agent on integrated photoacoustic/fluorescence tomography setup**

Maksim D. Mokrousov,<sup>1</sup> Weylan Thompson,<sup>2</sup> Sergey A. Ermilov,<sup>2</sup> Tatiana Abakumova,<sup>1</sup> Marina V. Novoselova,<sup>1</sup> Olga A. Inozemtseva,<sup>3</sup> Timofei S. Zatsepin,<sup>1,4</sup> Vladimir P. Zharov,<sup>5</sup> Ekaterina I. Galanzha,<sup>5</sup> Dmitry A. Gorin,<sup>1,1</sup> Skolkovo Institute of Science and Technology, Moscow, Russia <sup>2</sup>PhotoSound Technologies, Houston, TX, USA <sup>3</sup>Saratov State University, Saratov, Russia <sup>4</sup>Department of Chemistry, Lomonosov Moscow State University, Moscow, Russia <sup>5</sup>University of Arkansas for Medical Sciences, Little Rock, AR, USA

### **JOINT POSTER/INTERNET SESSION AND INTERNET DISCUSSION (Building 3, 3<sup>rd</sup> floor Hall)**

Chair (N): **Timofey E. Pylaev**, IBPPM RAS, Saratov, Russia

**18.00-20.00**

**1. Laser-fragmented silicon nanoparticles for biophotonics** Vyacheslav Yu. Nesterov,<sup>1</sup> Aleksandr V. Kolchin,<sup>1</sup> Dmitriy V.

Shuleiko,<sup>1</sup> Stanislav V. Zabotnov,<sup>1</sup> Denis E. Presnov,<sup>1</sup> Leonid A. Golovan,<sup>1</sup> Pavel K. Kashkarov,<sup>1</sup> Ekaterina A. Sergeeva,<sup>2,1</sup> Daria A. Kurakina,<sup>2</sup> Mikhail Yu. Kirillin,<sup>2</sup> 1 Lomonosov Moscow State University, Moscow, Russia; 2 Institute of Applied Physics RAS, Nizhny Novgorod, Russia

**2. Absorption spectra of polydisperse gold nanorods** Vitaliy A. Danilin, Alexander A. Skaptsov, Saratov State University, Saratov, Russia

3. **Computational visual analysis of objects in the bloodstream using the methods of classical computer vision.** Mihail A. Makarkin, 1. 1 Saratov State University.
4. **Detection of toxic substances using nanostructures based on L-aspartic acid** Vera V. Olomskaya, Ekaterina A. Mordovina, Larisa A. Nazaryan, Irina Yu. Goryacheva, Saratov State University, Saratov, Russia
5. **Surface-enhanced Raman spectroscopy of human serum** Sahar Z. Al-Sammarraie, 1 Lyuda A. Bratchenko, 1, Elena N. Typikova, 1 Peter A. Lebedev, 2 Valery P. Zakharov, 1 Ivan A. Bratchenko, 1 1 Samara University, Samara, Russia, 2 Samara state medical University, Samara, Russia
6. **3d printed system for rare objects magnetic separation from the bloodstream** Ilya O. Kozhevnikov, Oleg V. Grishin, Roman A. Verkhovskii, Daniil N. Bratashov Saratov State University, Saratov, Russia
7. **Spectral and time-resolved photoluminescence of human platelets doped with platinum nanoparticles** Karina I. Matveeva, 1 Andrey Yu. Zyubin, 1 Elizaveta A. Demishkevich, 1,2 Vladimir V. Rafalskiy, 1 Ekaterina M. Moiseeva, 1 Igor I. Kon, 1 Anna A. Kundalevich, 1,2 Viktoria V. Butova, 1 Ilia G. Samusev, 1 1 Immanuel Kant Baltic Federal University, Kaliningrad, Russia 2 Saratov State University, Saratov, Russia
8. **Application of surface-enhanced Raman spectroscopy for low concentrations of biologically active compounds study** Anna A. Kundalevich, 1, 2,, Andrey Yu. Zyubin, 1, Karina I. Matveeva, 1, Ilya G. Samusev, 1 1 Immanuel Kant Baltic Federal University, Kaliningrad, Russia 2 Saratov State University, Saratov, Russia
9. **FDTD simulations of local plasmonic fields for core-shell rod-shaped gold-based nanoparticles** Andrey Y. Zyubin, 1 Igor Kon, 1 Ilia Samusev, 1 1 Immanuel Kant Baltic Federal University
10. **Hydrophilization and stability of CdZnSeS / ZnS alloyed quantum dots** Alexander Moshkov, Saratov State University, Strokin Pavel, Saratov State University, Daniil Drozd, Saratov State University, Irina Goryacheva, Saratov State University
11. **Gold nanoparticles bifunctionalized with antibodies and peroxidase for the detection of bacterial cells** Alina Kerimova, 1, Gennady Burygin 2 1Saratov State University, Saratov, Russia; 2Institute of Biochemistry and Physiology of Plants and Microorganisms, Russian Academy of Sciences, Saratov, Russia
12. **Novel prolonged release particulate system for transdermal delivery of water-insoluble antifungal drug** Mariia Saveleva, 1, Ekaterina Lengert, 1, Roman Verkhovskii, 1, Anatolii Abalymov, 1, Anton Pavlov, 1, Sergei Shtykov, 1, and Yulia Svenskaya, 1 1 Saratov State University, Saratov, Russia
13. **Bactericidal impact of nickel-oxide nanoparticles on foodborne pathogens** Alena A. Nastulyavichus, 1,2 Pavel V. Shahov, 1,3 Liliana F. Khaertdinova, 1 Eteri R. Tolordava, 1,2,4 Irina N. Saraeva, 1,2 Svetlana N. Shelygina, 2 Yulia K. Yushina, 1 Andrey A. Rudenko, 2 Andrey A. Ionin, 2 Roman Khmelnitskiy, 2 Dmitry N. Khmelenin, 5 Tatiana N. Borodina, 5,6 Alexander Yu. Kharin, 3 Sergey I. Kudryashov, 1,2 1 -Federal State Budgetary Scientific Institution "Federal Scientific Center for Food Systems named after V.M. Gorbato" "Russian Academy of Sciences, Moscow, Russia 2 P. N. Lebedev Physics Institute of Russian Academy of Sciences, Moscow, Russia 3 National Research Nuclear University MEPhI, Moscow, Russia 4 N.F. Gamaleya Federal Research Centre of Epidemiology and Microbiology, Moscow, Russia 5 Institute of crystallography - Branch of the Federal Scientific Research Centre "Crystallography and Photonics" of Russian Academy of Sciences, Moscow, Russia 6 Institute of Molecular Medicine Sechenov First Moscow State Medical University, Moscow, Russia
14. **Comparative analysis of the influence of different kinds of electromagnetic radiation on self-organization of the main types of histone proteins** Anna V. Egorova, 1, Grigory E. Brill, 2, Olga V. Ushakova, 3 1 Russian National Research Medical University n.a. N.I. Pirogova, Moscow, Russia 2 Saratov State Medical University n.a. V.I. Razumovsky, Saratov, Russia 3 Yuri Gagarin State Technical University of Saratov, Saratov, Russia
15. **Effect of hydrochloric acid on synthesis of gold nanoantennas and their morphological and optical properties** Andrey V. Simonenko, 1 Vitaly A. Khanadeev, 2,3 Boris N. Khlebtsov, 2 Nikolai G. Khlebtsov, 1,2 1 Saratov State University, Saratov, Russia; 2 Institute of Biochemistry and Physiology of Plants and Microorganisms RAS, Saratov, Russia; 3 Saratov State Vavilov Agrarian University, Saratov, Russia;

**16. *In vivo* bioimaging of macrophages using fluorescent microcapsules as a model carrier for the delivery of high-molecular cargo** Anastasiya Yu. Sapach 1, Olga A. Sindeeva 1, Mikhail V. Nesterchuk 1,2 Alexandra A. Tsitrina 2, Ekaterina S. Prikhodzhenko 3, Roman A. Verkhovskii 3, Yuri V. Kotelevtsev 1,2, Gleb B. Sukhorukov 1,4 1 Skolkovo Institute of Science and Technology, Skolkovo Innovation Center, 143025, Moscow, Russia 2 Koltzov Institute of Developmental Biology of Russian Academy of Sciences, Moscow, 119334, Russia 3 Saratov State University, Saratov 410012, Russia 4 Queen Mary University of London, London E1 4NS, U.K.

**17. Investigation of magnetic polyelectrolyte microcapsules' behavior in mouse blood** Roman Verkhovskii1, Alexey Ermakov1,2, Olga Sindeeva3, Daniil Bratashov1 Affiliations: 1 - Science Medical Center, Saratov State University, 83 Astrakhanskaya str., Saratov, 410012 Russia 2 - I. M. Sechenov First Moscow State Medical University, Moscow, Russia 3 - Skolkovo Institute of Science and Technology, 3 Nobelya st., Moscow 121205, Russia

**18. Structured biomaterials for prolonged and controlled release of antibiotics and anti-inflammatory drugs from the surface of implants** Ekaterina S. Prikhodzhenko,1 Ekaterina A. Mordovina,1 Valentina O. Plastun,1 Irina Yu. Goryacheva,1 Gleb B. Sukhorukov,2 Oksana A. Mayorova,1 Olga A. Sindeeva,2 1 Saratov State University, Saratov, Russia 2 Skolkovo Institute of Science and Technology, Moscow, Russia

**19. Study of the effectiveness of aqueous dispersion of gold nanoparticles as a potential photosensitizer for photodynamic antimicrobial therapy** Olga V. Nechaeva 1, Tatiana A. Shulgina 2, Elena V. Glinskaya 3, Ksenia V. Zubova 3, Dmitry A. Shnaider 4, Natalya V. Bepalova 1 1 Saratov State Technical University, Saratov, Russia, 2 Institute of Traumatology and Orthopedics, Saratov Medical State University, Saratov, Russia, 3 Saratov State University, Saratov, Russia, 4 Saratov State Medical University, Saratov, Russia

**20. Scaffolds of WPI hydrogels with prolonged release of drugs for antimicrobial therapy** Valentina O. Plastun,1 Ekaterina S. Prikhodzhenko,1 Oksana A. Mayorova,1 1 Saratov State University, Russian Federation

**21. Optical assessment of early cell responses to nanotoxicological effects**

Vladimir A. Bogatyrev, 1 Daniil S. Chumakov, 1 Aram Akopyan, 3 Timofey E. Pylaev, 1,2 Lev A. Dykman 1 1 Institute of Biochemistry and Physiology of Plants and Microorganisms, RAS, Saratov, Russia 2 Saratov State Medical University, Saratov, Russia 3 Saratov State University, Russia

#### Internet Poster reports

**1NI. Evaluation of the application of thioglycolic acid-modified multinary quantum dots AgInS/ZnS in analysis** Anastasiya S. Novikova, Saratov State University, Saratov Tatiana S. Ponomaryova, Saratov State University, Saratov Alexey A. Sokolov, Saratov State University, Saratov Irina Yu. Goryacheva, Saratov State University, Saratov

**2NI. Synthesis and properties of luminescent composite nanoparticles** Yulia A. Podkolodnaya, Alina A. Kokorina, and Irina Y. Goryacheva Saratov State University, Saratov, Russia

**3NI. Nanodisk as a simple quasi 2D model: calculation and experiment** Andrey M. Burov,1 Boris N. Khlebtsov,1, Nikolay G. Khlebtsov,1,2 1 Institute of Biochemistry and Physiology of Plants and Microorganisms, Russian Academy of Sciences, Saratov, Russia 2 Saratov State University, Saratov, Russia

**4NI. Development of biological systems for targeted drug delivery in the field of personalized therapy** Oksana A. Mayorova, Saratov State University, Russia Roman A. Verkhovskii, Saratov State University, Russia Ekaterina S. Prikhodzhenko, Saratov State University, Russia Daniil N. Bratashov, Saratov State University, Russia

**5NI. Physicochemical properties of magnetic submicron carriers to achieve the maximum effect of hyperthermia** Veronika A. Kildisheva, 1 Roman A. Anisimov, 1 Alexandra E. Kalinova, 1 Polina A. Demina, 1 Maria V. Lomova 1 1 Saratov State University, Saratov, Russia

**6NI. Study of energy transfer processes between the rare earth ions in tri-doped upconversion nanoparticles NaGdF<sub>4</sub>:Yb-Er-Tm and NaGdF<sub>4</sub>:Yb-Er-Ho** D.V. Pominova1,2, V.Yu. Proydakova1, I. D. Romanishkin1, P.V. Grachev1,2, A.V. Ryabova 1,2 1 - Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia 2 - National research nuclear university MEPhI, Moscow, Russia

# Workshop on Microscopy and Low-Coherence Methods XIX

*Co-chairs:* **Kirill V. Larin**, Department of Biomedical Engineering, University of Houston, Houston, USA.

*Secretary:* **Georgy G. Akchurin**, Saratov State University (Russia), Institute of Precision Mechanics and Control of the RAS, Saratov, Russia.

*International Program Committee:* **Shoude Chang**, National Research Council (Canada); **Mary Dickinson**, Baylor College of Medicine (USA); **Christoph K. Hitzengerger**, University of Vienna (Austria); **Igor V. Meglinski**, University of Oulu (Finland), Saratov State University (Russia); **Valery V. Tuchin**, Saratov State University (Russia).

## September 28, Tuesday SFM/BRICS PLENARY SESSION I

10.00-10.40

Live biophotonic analysis of early mammalian embryonic processes

Irina V. Larina, Baylor College of Medicine, Houston, USA.

## September 29, Wednesday

### ORAL SESSION MICROSCOPY AND LOW-COHERENCE METHODS XIX

Chair: **Kirill V. Larin**, University of Houston,  
USA

ZOOM: <https://us05web.zoom.us/j/9161835305>

## September 29, Wednesday

12.00-12.20 invited

From millimeters to nanometers - reducing  
the scale in microscopy

Herbert Schneckenburger and Verena  
Richter, Institute of Applied Research, Aalen  
University, Beethov.

12.20-12.35

Recent Advances in Quantifying Ocular  
Biomechanics using Optical Coherence  
Elastography

Kirill V. Larin, University of Houston, USA.

12.50-13.05

Insights into the interior of rice starch  
granules using microscopy and  
spectroscopy techniques

Indira G., Ishita Chakraborty, Guan-Yu Zhuo, Sib  
Sankar Mal, Krishna Kishore Mahato,  
Nirmal Mazumder, Department of Biophysics  
Manipal School of Life Sciences, Manipal  
Academy of Higher Education, Manipal,  
Karnataka, India, Institute of New Drug  
Development, China Medical University,  
Taichung, Taiwan, Department of Chemistry,  
National Institute of Technology, Karnataka,  
India.

13.20-13.35 (zoom)

Study of objects of easel tempera painting  
using full-field time-domain optical  
coherence tomography system

Maxim A. Volynsky, Elizaveta S. Gladkova, Igor  
P. Gurov, Ekaterina V. Zhukova, Nikita B.  
Margaryants, Sergey V. Sirro, and Pavel S.  
Skakov, ITMO University, State Russian  
Museum, Saint Petersburg, Russia.

13.35-13.50 (zoom)

Implementation of data processing and  
visualization in low-coherence interferometry  
system

Pavel S. Skakov, Viktoriya E. Yakovleva, ITMO  
University, Saint Petersburg, Russia.

September 30, Thursday

## JOINT POSTER/INTERNET SESSION

Chair (M): **Georgy G. Akchurin**; Saratov State University (Russia), Institute of Precision Mechanics and Control of the RAS

18.30-20.00

### 1M. Structure and hardness of carbide coatings formed on complex-shaped steel products

Vladimir Koshuro, Alexander Aman, Stefan Palis, Aleksandr Fomin, Yuri Gagarin State Technical University of Saratov, Russia, Otto-von-Guericke-Universität, Magdeburg, Germany.

### 2M. Numerical simulations of improved compensation of masking strain-induced motions of scatterers in contact-mode optical coherence angiography

Alexey A. Zykov, Lev A. Matveev, Alexander L. Matveyev, Vladimir Y. Zaitsev, Federal research center Institute of Applied Physics of the Russian Academy of Sciences, Nizhny Novgorod, Russia.

### 3M. Detection of spheroids formed in microfluidic wells using acoustic resolution photoacoustic microscopy

Neda Aminoroaya, Amir Asadollahi, Mehrnoosh Nemati, Shahriar Zeynali, Zeinab Bagheri, Hamid Latifi, Laser and Plasma Research Institute, Shahid Beheshti University, Tehran, Iran.

### 4M. Ultrastructural changes in the crayfish abdominal ganglia after axotomy

A. Logvinov, M. Pitinova, Y. Kalyuzhnaya, E. Kirichenko, Southern Federal University.

### 5M. Investigation of the influence of induction-heat treatment on the morphology of titanium plasma-sprayed coatings

Elena O. Osipova, Olga A. Markelova, Vladimir A. Koshuro, Aleksandr A. Fomin, Yuri Gagarin State Technical University of Saratov, Russia.

### 6M. Structural And Morphological Characteristics Of Barium-Containing Tricalcium Phosphate Powder And Plasma Coatings Based On It

Markelova O.A., Taran V.M., Pichkhidze S.Y., Yuri Gagarin State Technical University of Saratov, Russia.

### 7M. Influence of the numerical aperture of illumination on the interference pattern contrast dependence

Daria M. Klychkova, Vladimir P. Ryabukho, Saratov State University, Institute of Precision Mechanics and Control of the RAS, Saratov, Russia.

### 8M. Combined optical coherence tomography and fluorescent two-photon selective-plane illumination microscopy for embryonic imaging

Md Mobarak Karim, Ruijiao Sun<sup>2</sup>, Behzad Khajavi, Manmohan Singh, Harshdeep S. Chawla, Alexander W. Schill, David Mayerich, Mary E. Dickinson, and Kirill V. Larin, University of Houston, USA.

### 9M. Assessing the effect of capsular bag on the biomechanics of the lens using Optical Coherence Elastography

Taye Mekonnen, Christian Zevallos-Delgado, Manmohan Singh, Salavat R. Aglyamov, Kirill V. Larin, University of Houston, USA.

### 10M. Evaluation of the Elasticity of Porcine Iris Using Optical Coherence Elastography

Christian Zevallos-Delgado, Taye Tolu Mekonnen, Fernando Zvietcovich, Manmohan Singh, Salavat R. Aglyamov, Kirill V. Larin, University of Houston, USA.

## INTERNET REPORTS

### 1. Increasing the spatiotemporal resolution by phase modulation in Lissajous scanning confocal microscopy

Hamed Qazvini, Amir Asadollahi, M. Sadegh Feiz, Ali Fakhrolmobasheri, Hamid Latifi, Laser and Plasma Research Institute, Shahid Beheshti University, Tehran, Iran.

### 2. Investigation of Accuracy of Peak-power Compensation in Fiber-Guided Acoustic-Resolution Photoacoustic Microscopy

Amir Asadollahi, Shahriar Zeynali, Hamed Ghazvini, Hamid Latifi, Laser and Plasma Research Institute, Shahid Beheshti University, Tehran, Iran.

**3. Axotomy induce an increase in the expression of Pink1, Parkin and Cofilin in dorsal root ganglia**

Mariya Pitinova, Y. Kalyuzhnaya, S. Demyanenko Southern Federal University.

**4. Dynamic volumetric imaging of ovulated egg transport to the fallopian tube with optical coherence tomography**

Kohei Umezu, Shang Wang and Irina V. Larina, Baylor College of Medicine, Houston, Texas, Stevens Institute of Technology, Hoboken, New Jersey, USA.

**5. Common motion estimator accuracy in shear wave-based optical coherence elastography**

Justin R. Rippey, Manmohan Singh, Salavat Aglyamov, and Kirill V. Larin, University of Houston, USA.

**6. Heartbeat Optical Coherence Elastography: Using Heartbeat to study Corneal Biomechanics**

Achuth Nair, Manmohan Singh, Salavat Aglyamov, and Kirill V. Larin, University of Houston, USA.

**7. Optical coherence tomography to assess the persistent and long-term effects of prenatal alcohol exposure on fetal brain vasculature**

Jessica Gutierrez, Manmohan Singh, Rajesh C. Miranda, Kirill V. Larin, University of Houston, USA.

**8. Evaluating the effects of imatinib on skin stiffness in vivo with optical coherence elastography**

Harshdeep Singh Chawla, Yanping Chen, Jessica, Chandra Mohan, Fernando, Manmohan Singh, Salavat R. Aglyamov and Kirill V. Larin, University of Houston, USA.

**9. Age-Related Changes in Rabbit Lens Viscoelasticity measured using Optical Coherence Elastography**

Hongqiu Zhang, Manmohan Singh, Fernando Zvietcovich, Kirill V. Larin, and Salavat R. Aglyamov, University of Houston, USA.

**10. Single-shot dynamic line-field optical coherence elastography**

Manmohan Singh, Alexander W. Schill, Achuth Nair, Salavat R. Aglyamov, Irina V. Larina, and Kirill V. Larin, University of Houston, USA.

**11. Compression-based optical coherence elastography of the cornea**

Manmohan Singh, Achuth Nair, Salavat R. Aglyamov and Kirill V. Larin, University of Houston, USA.

**12. Optimization of Airy beam parameters to improve light-sheet microscopy illumination**

Maryam Mokari, Alireza Arandian, Hamid Latifi Physics department, Shahid Beheshti University, Tehran, Iran, Laser and plasma research institute, Shahid Beheshti University, Tehran, Iran

# Conference on Internet Biophotonics XIV

**Chairs:** **Alexey N. Bashkatov**, Saratov State University, Saratov, Russia; National Research Tomsk State University, Tomsk, Russia; **Daria K. Tuchina**, Saratov State University, Saratov, Russia; National Research Tomsk State University, Tomsk, Russia; **Ivan V. Fedosov**, Saratov State University, Saratov, Russia; and **Valery V. Tuchin**, Saratov State University, Saratov, Russia; National Research Tomsk State University, Tomsk, Russia; Institute of Precision Mechanics and Control of the RAS, Russia

**Secretary:** **Isabella A. Serebryakova**, Saratov State University, Saratov, Russia; National Research Tomsk State University, Tomsk, Russia

**International Program Committee:** **Wei Chen**, University of Central Oklahoma (USA); **Cornelia Denz**, University of Münster (Germany); **Kishan Dholakia**, University of St. Andrews (UK); **Paul M.W. French**, Imperial College of Science, Technology and Medicine (UK); **Elina A. Genina**, Saratov State University (Russia); **Kirill V. Larin**, University of Houston (USA), Saratov State University (Russia); **Martin Leahy**, National University of Ireland, Galway; **Qingming Luo**, Hainan University (China); **Roberto Pini**, Inst. di Fisica Applicata, Sesto Fiorentino (Italy); **Juergen Popp**, Inst. of Photonic Technology, Jena (Germany); **Alexander V. Priezzhev**, Moscow State University (Russia); **Lihong Wang**, Caltech, Pasadena (USA); **Ruikang K. Wang**, University of Washington (USA); **Mikhail Yu. Kirillin**, Institute of Applied Physics RAS, Nizhny Novgorod (Russia); **Valery P. Zakharov**, Samara State University (Russia); **Edik Rafailov**, Aston University (UK).

**September 30, Thursday**

## ON-LINE JOINT INVITED LECTURE

### SESSION

#### BIOPHYSICS V & INTERNET BIOPHOTONICS

Zoom link:

<https://osachapter.zoom.us/j/97105128804>

ID 971 0512 8804

(Building 8, Hall 420)

Chair: Maxim E. Darwin, Charité –

Universitätsmedizin, Germany

Moderator: Isabella Serebryakova, Saratov  
State University, Russia

**15.00-15.20 (Saratov time UTC+4)**

**Invited**

**Estimation of the spectral optical properties of rabbit pancreas and brain cortex from the UV to NIR**

Tânia Golçalves<sup>1</sup>, Hugo Silva<sup>1,2</sup>, Inês Martins<sup>2</sup>, Valery V. Tuchin<sup>3,4,5</sup>, Luís Oliveira<sup>1</sup>, <sup>1</sup>Physics Department, Polytechnic of Porto – School of Engineering, Portugal; <sup>2</sup>Center of Innovation in Engineering and Industrial Technology, Portugal; <sup>3</sup>Saratov State University, Saratov, Russia; <sup>4</sup>Tomsk State University, Tomsk, Russia; <sup>5</sup>Institute of Precision Mechanics and Control RAS, Saratov, Russia

**15.20-15.40 (Saratov time UTC+4)**

**Invited**

**Non-invasive Hyperspectral Multi-distance Measurements of Cerebral Response to Breath Holding in Adult Humans**

Vladislav Toronov<sup>1,2</sup>, Zahida Guerouah<sup>1</sup>, <sup>1</sup>Ryerson University, Canada; <sup>2</sup>Institute of Biomedical Engineering, Science and Technology (iBEST), Canada

**16.10-16.25 (Saratov time UTC+4)**

**Surface-enhanced Raman scattering substrates for DNA detection based on nanogold-capped poly(DEGDMA) microparticles**

Malik H. Mahmood<sup>1,2,3</sup>, Ali Jaafar<sup>1,2,4</sup>, László Himics<sup>1</sup>, László Péter<sup>1</sup>, Ágnes Nagyné Szokol<sup>1</sup>, István Rigó<sup>1</sup>, Shereen Zangana<sup>5</sup>, Attila Bonyár<sup>5</sup>, Miklós Veres<sup>1</sup>, <sup>1</sup>Institute for Solid State Physics and Optics, Wigner Research Center for Physics, Hungary; <sup>2</sup>Institute of Physics, University of Szeged, Hungary; <sup>3</sup>Physiology Department, College of Medicine, University of Misan, Iraq; <sup>4</sup>Ministry of Higher Education and Scientific Research, Iraq; <sup>5</sup>Department of Electronics Technology, Faculty of Electrical Engineering and Informatics, Budapest University of Technology and Economics, Hungary

**16.25-16.40 (Saratov time UTC+4)**

**Quantum chemical modeling of longitudinal hydrogen bonds in DNA**

Alexander Samchenko<sup>1</sup>, Ivan Savelev<sup>1</sup>, Anton Klimov<sup>1</sup>, Lev Shishkin<sup>1</sup>, Oksana Poleskaya<sup>2</sup>, Alexander Vetcher<sup>1,3,4</sup>, Eugenia Kananykhina<sup>1</sup>, Elena Zhigmitova<sup>1</sup>, Richard Alan Miller<sup>5</sup>, Max Myakishev-Rempel<sup>1</sup>, <sup>1</sup>DNA Resonance Research Foundation, USA; <sup>2</sup>University of California, USA; <sup>3</sup>Nanotechnology Scientific and Educational Center, Institute of Biochemical Technology and Nanotechnology, Peoples Friendship University of Russia, Russian Federation; <sup>4</sup>Shishonin Complementary and Integrative Health Clinic, Russian Federation; <sup>5</sup>OAK, Inc., Grants Pass, USA



**ON-LINE INTERNET BIOPHOTONICS  
INTERNET INVITED REPORTS  
(Available during the conference)**

<https://sfmconference.org/sfm/sfm21/worksops/internet-biophotonics-xiv/preliminary/>

**1. Optical coherence tomography angiography and its applications (Invited)**

Ruikang K Wang, Department of Bioengineering, University of Washington, Seattle, USA

<https://www.dropbox.com/s/mpflm5ifxd8yd25/Ricky%20Wang%20Internet%20Talk.mp4?dl=0>

**2. The propagation of optical radiation and thermal field in cell culture media (Invited)**

Viktor Dremine<sup>1,2</sup>, Irina Novikova<sup>1,1</sup>, R&D Center of Biomedical Photonics, Orel State University, Orel, Russia; <sup>2</sup>College of Engineering and Physical Sciences, Aston University, Birmingham, UK

**3. A multimodal approach to non-invasive diagnosis of basal cell carcinoma: a pilot study (Invited)**

Elina A. Genina, Saratov State University, Saratov; National Research Tomsk State University, Tomsk

**4. Cytotoxicity of UCNPs with different coatings. Overview (Invited)**

Daria K. Tuchina<sup>1,2</sup>, Ekaterina N. Lazareva<sup>1,2</sup>, Roman A. Anisimov<sup>1</sup>, Roman A. Verkhovskii<sup>1</sup>, Maria V. Lomova<sup>1</sup>, Anna A. Doronkina<sup>1</sup>, Artyom M. Mylnikov<sup>3</sup>, Nikita A. Navolokin<sup>3</sup>, Vyacheslav I. Kochubey<sup>1</sup>, Irina Yu. Yanina<sup>1,2,1</sup>, Saratov State University, Saratov, Russia; <sup>2</sup>Tomsk State University, Tomsk, Russia; <sup>3</sup>Saratov State Medical University, Saratov, Russia

**5. Dual-wavelength fluorescence monitoring of photodynamic therapy: from analytical models to in vivo studies**

M. Kirillin<sup>1</sup>, D. Kurakina<sup>1</sup>, A. Khilov<sup>1</sup>, A. Orlova<sup>1</sup>, M. Shakhova<sup>1,2</sup>, V. Perekatova<sup>1</sup>, N. Shishkova<sup>1,3</sup>, A. Mironycheva<sup>1,2</sup>, A. Malygina<sup>2</sup>, I. Shlivko<sup>2</sup>, N. Orlinskaya<sup>2</sup>, S. Gamayunov<sup>1,4</sup>, I. Turchin<sup>1</sup>, and E. Sergeeva<sup>1,1</sup>, Institute of Applied Physics RAS, <sup>2</sup>Privolzhsky Research Medical University, <sup>3</sup>N.I. Lobachevsky State University of Nizhny Novgorod, <sup>4</sup>Nizhny Novgorod Regional Clinical Oncology Center, Nizhny Novgorod, Russia

<https://cloud.mail.ru/public/rfKS/dp47fLi1E>

**6. Computational optical clearing: a new tool for measuring hidden chromophores in skin estimate hidden chromophore content**

Mohammad Ali Ansari<sup>1</sup>, Valery V. Tuchin<sup>2,3,4,5,1</sup>, Laser and Plasma Research Institute, Shahid Beheshti University, Tehran, Iran;

<sup>2</sup>Saratov State University, Saratov, Russia

<sup>3</sup>Tomsk State University, Tomsk, Russia;

<sup>4</sup>Saratov State Medical University, Saratov, Russia; <sup>5</sup>Institute of Precision Mechanics and Control RAS, Saratov, Russia

**INTERNET REPORTS AND POSTERS**

(Available during the conference)

<https://sfmconference.org/sfm/sfm21/workshops/internet-biophotonics-xiv/preliminary/>

**1. The Muscle Tissue Optical Clearing monitoring by NIR-Excited upconversion luminescence of particles. Dependence on the direction of the sample cutting**

Marina Kozintseva<sup>1,3</sup>, Vyacheslav Kochubey<sup>1,2</sup>, Julia Konyukhova<sup>1</sup>, Valery Tuchin<sup>1,2,1</sup>, Saratov State University, Russia; <sup>2</sup>Tomsk State University, Russia; <sup>3</sup>Tsinghua - Berkeley Shenzhen Institute Building C2&C3, China

**2. Evaluation of the spatial position of a flow diverter in a blood vessel phantom using intravascular optical coherence tomography**

A.Yu. Potlov, S.V. Frolov, S.G. Proskurin; Department of Biomedical Engineering, Tambov State Technical University, Russia

**3. Evaluation of shear deformation in the wall of blood vessel phantom using intravascular optical coherence tomography**

S.V. Frolov, A.Yu. Potlov, S.G. Proskurin; Department of Biomedical Engineering, Tambov State Technical University, Russia

**4. Monte-Carlo simulation of the propagation of low-coherence irradiation in intravascular space in soft biological tissue**

A.Yu. Potlov, S.G. Proskurin, S.V. Frolov; Department of Biomedical Engineering, Tambov State Technical University, Russia

**5. The novel photosensitizer galactose – Lutetium (Lu)-phthalocyanine for photodynamic therapy in tumor-bearing mice**

Alla B. Bucharskaya<sup>1,2,3</sup>, Galina N. Maslyakova<sup>1,2</sup>, Nikita A. Navolokin<sup>1,2</sup>, Georgy S. Terentyuk<sup>2</sup>, Ekaterina Borisova<sup>4</sup>, Vanya Mantareva<sup>5</sup>, Ivan Angelov<sup>5</sup>, Vadim Genin<sup>2</sup>, Alexey N. Bashkatov<sup>2,3</sup>, Elina A. Genina<sup>2,3</sup>, Valery V. Tuchin<sup>2,3,6,1</sup>, Saratov State Medical University, Saratov, Russia; <sup>2</sup>Saratov State University, Saratov, Russia; <sup>3</sup>Tomsk State University, Tomsk, Russia; <sup>4</sup>Institute of Electronics, Bulgarian Academy of Sciences, Bulgaria; <sup>5</sup>Institute of Organic Chemistry with Center on Phytochemistry, Bulgarian Academy of Sciences, Bulgaria; <sup>6</sup>Institute of Precision Mechanics and Control RAS, Saratov, Russia

**6. Ex vivo confocal Raman microspectroscopy of porcine dura mater using 532 nm excitation and optical clearing**

Ali Jaafar<sup>1,2,3</sup>, Ágnes N. Szokol<sup>1</sup>, Malik H. Mahmood<sup>1,2,4</sup>, István Rigó<sup>1</sup>, Anton Y. Sdobnov<sup>5,6</sup>, Valery V. Tuchin<sup>5,7,8</sup> and Miklos Veres<sup>1</sup>; <sup>1</sup>Institute for Solid State Physics and Optics, Wigner Research Center for Physics, Hungary; <sup>2</sup>Institute of Physics, University of Szeged, Hungary; <sup>3</sup>Ministry of Higher Education and Scientific Research, Iraq; <sup>4</sup>Physiology Department, College of Medicine University of Misan, Iraq; <sup>5</sup>Science Medical Center, Saratov State University, Russia; <sup>6</sup>Optoelectronics and Measurement Techniques Laboratory, University of Oulu, Finland; <sup>7</sup>Laboratory of Laser Diagnostics of Technical and Living Systems, Institute of Precision Mechanics and Control of the Russian Academy of Sciences, Russia; <sup>8</sup>Interdisciplinary Laboratory of Biophotonics, National Research Tomsk State University, Russia

## **7. Morphological changes in rat lung tissue during inhalation of e-cigarette liquid aerosol**

Alla B. Bucharskaya<sup>1,2,3</sup>, Dmitry A. Mudrak<sup>1</sup>, Irina Yu. Yanina<sup>2,3</sup>, Nikita A. Navolokin<sup>1,2</sup>, Alexey N. Bashkatov<sup>2,3</sup>, Elina A. Genina<sup>2,3</sup>, Yury V. Kistenev<sup>3</sup>, Valery V. Tuchin<sup>2,3</sup>; <sup>1</sup>Saratov State Medical University n.a. V.I. Razumovsky; <sup>2</sup>Saratov National Research State University n.a. N.G. Chernyshevsky; <sup>3</sup>Tomsk National Research State University

## **8. Raman spectroscopy and autofluorescence analysis with patient's demographics for skin cancer detection**

Yulia A. Khristoforova<sup>1</sup>, Ivan A. Bratchenko<sup>1</sup>, Lyudmila A. Bratchenko<sup>1</sup>, Alexander A. Moryatov<sup>2</sup>, Sergey V. Kozlov<sup>2</sup>, Valery P. Zakharov<sup>1</sup>; <sup>1</sup>Samara University, Samara, Russia; <sup>2</sup>Samara State Medical University, Samara, Russia

## **9. Raman spectroscopic study on the TiO<sub>2</sub> nanoparticles effects on the hemoglobin state in single red blood cell**

E.V. Perevedentseva<sup>1, 2</sup>, Y. C. Lin<sup>1</sup>, A.V. Karmenyan<sup>1</sup>, K.T. Wu<sup>1</sup>, A. E. Lugovtsov<sup>3</sup>, A.V. Priezhev<sup>3</sup>, C.L. Cheng<sup>1,1</sup>; <sup>1</sup>Department of Physics, National Dong Hwa University, Hualien Taiwan; <sup>2</sup>P. N. Lebedev Physics Institute of Russian Academy of Sciences, Moscow, Russia; <sup>3</sup>Department of Physics, Moscow State University, Moscow, Russia

## **10. Differentiation of Lumpy Skin Disease Virus and Sheeppox Virus strains using of GB-speckles, generated for the nucleotide sequences of the gene GPCR**

Yury Saltykov<sup>1</sup>, Anna Kolosova<sup>1</sup>, Sergey Ulyanov<sup>1,2</sup>, Onega Ulianova<sup>2</sup>, Valentina Feodorova<sup>1</sup>; <sup>1</sup>Federal Research Center for Virology and Microbiology, Branch in Saratov, Russia; <sup>2</sup>Department of Medical Physics, Saratov State University, Saratov, Russia

## **11. Are the GB-speckles could be used to study the evolution of *Listeria monocytogenes*?**

Valentina A. Feodorova,<sup>1</sup> Maria A. Khizhnyakova<sup>1</sup>, Sergey S. Zaitsev,<sup>1</sup> Onega V. Ulianova,<sup>2</sup> Alexander S. Ulyanov,<sup>3</sup> Sergey S. Ulyanov; <sup>1,21</sup>Federal Research Center for Virology and Microbiology, Branch in Saratov, Russia; <sup>2</sup>Department of Medical Physics, Saratov State University, Saratov, Russia; <sup>3</sup>Rocolabs, New York, NY

## **12. Study of statistical properties of GB-speckles generated for the SARS-CoV-2 gene «S» for characterization of differences between Delta and other variants**

Valentina A. Feodorova,<sup>1</sup> Sergey S. Zaitsev,<sup>1</sup> Onega V. Ulianova,<sup>2</sup> Alexander S. Ulyanov,<sup>3</sup> Sergey S. Ulyanov; <sup>1,21</sup>Federal Research Center for Virology and Microbiology, Branch in Saratov, Russia <sup>2</sup>Department of Medical Physics, Saratov State University, Saratov, Russia; <sup>3</sup>Rocolabs, New York, NY

## **13. Hyperspectral imaging realized by unmodified smartphone**

Qinghua He<sup>1</sup>, Zhiyuan Sun<sup>1</sup>, Yuandong Li<sup>1</sup>, Wendy Wang<sup>1</sup>, and Ruikang K. Wang<sup>1,2</sup>; <sup>1</sup>Department of Bioengineering, University of Washington, Seattle, WA, USA; <sup>2</sup>Department of Ophthalmology, University of Washington, Seattle, WA, USA

## **14. Magnetic nanodiamond for bio-imaging and cells manipulation**

Rajakar Selvama<sup>1</sup>, Elena Perevedentseva<sup>1,2</sup>, Artashes Karmenyan<sup>1</sup>, Chia-Liang Cheng<sup>1</sup>; <sup>1</sup>Department of Physics, National Dong Hwa University, Taiwan; <sup>2</sup>P.N. Lebedev Physics Institute of Rus. Acad. Sci., Russia

## **15. Nanodiamond facilitated drug delivery for drug-resistant MCF-7 breast cancers cells in cellular models**

Yi-Jhen Su<sup>1</sup>, Chien-Ying Huang<sup>1</sup>, Chia-Liang Cheng<sup>1</sup>; <sup>1</sup>Department of Physics, National Dong Hwa University, Hualien Taiwan

## **16. Influence of the composition of silicon-polysaccharide-containing hydrogels on the surface morphology of their solid phase**

Olga N. Malinkina, Anna B. Shipovskaya  
Saratov State University

## **17. Study of the interaction between collagen and collagenase molecules by optical methods in the presence of chromium ions**

Anna V. Petrova, Irina A. Sergeeva, Anna V. Mitrofanova, Galina P. Petrova, Lomonosov Moscow State University, Faculty of Physics, Department of Molecular Processes and Extreme States of Matter. Russia

**18. Optical activity of micellar aqueous solutions Pluronic F-127**

Natalia O. Gegel, Vitaliy M. Kharlamov and Anna B. Shipovskaya, Saratov State University

**19. Multispectral imaging realized by unmodified smartphone**

Qinghua He<sup>1</sup>, Zhiyuan Sun<sup>1</sup>, Yuandong Li<sup>1</sup>, Wendy Wang<sup>1</sup>, Ruikang K. Wang<sup>1,2</sup>,  
<sup>1</sup>Department of Bioengineering, University of Washington, Seattle, WA 98105, USA;  
<sup>2</sup>Department of Ophthalmology, University of Washington, Seattle, WA98105, USA

**20. Pilot studies of complexes based on semiconductor quantum dots AIS/ZnS and aluminum phthalocyanine to increase the efficiency of phototheranostics**

Dmitry V. Yakovlev,<sup>1,3</sup> Ekaterina P. Kolesova,<sup>2</sup> Anna O. Orlova,<sup>2</sup> Kirill I. Annas,<sup>2</sup> Vladimir A. Oleinikov,<sup>1,21</sup> Shemyakin-Ovchinnikov Institute of Bioorganic Chemistry of the Russian Academy of Science, Moscow, Russia; <sup>2</sup>ITMO University, St. Petersburg, Russia; <sup>3</sup>Prokhorov General Physics Institute of the Russian Academy of Science, Moscow, Russia

# Conference on Low-Dimensional Structures XI

*Workshop Chair:* **Olga E. Glukhova**, Saratov State University (Russia)

*Secretaries:* **Pavel V. Barkov**, Saratov State University (Russia), **Dmitry A. Kolosov**, Saratov State University (Russia)

*International Program Committee:* **Ming-Fa Lin**, National Cheng Kung University, Tainan, Taiwan, **Albert G. Nasibulin**, Skolkovo Institute of Science and Technology, Russia, **Zhang Gang**, Institute of High Performance Computing, Agency for Science, Technology and Research, Singapore, **Tatiana R. Prytkova**, Cloud Pharmaceuticals, USA, **Irina V. Zaporotskova**, Volgograd State University, Volgograd, Russia, **Galina N. Maslyakova**, Saratov State Medical University named after V.I. Razumovsky, Saratov, Russia, **Igor S. Nefedov**, Aalto University, Espoo, Finland

## September 29, Wednesday

### ORAL SESSION

*(Building 8, Room 318)*

Chair: **Olga E. Glukhova**,  
Saratov State University  
Russia

#### 12.30-12.45

**Discrete breathers and their effect on properties of crystals**

S.V. Dmitriev, Institute for Molecule and Crystal Physics UFRC of RAS, Ufa, Russia

#### 12.45-13.00

**Semiclassical approach for the theoretically calculation coefficient absorption of carbons nanotubes verticals array in far infrared range**

M.D. Matasov, S.K. Sigalaev, A.A. Barmin, T.N. Smetukhova, The State Scientific Centre "Keldysh Research Center"

#### 13.00-13.15

**Influence of a non heating magnetic field different frequencies on the permeability of magnetic polyelectrolyte microcapsules**

I. Burmistrov<sup>1</sup>, A. Mikheev<sup>2</sup>, M. Veselov<sup>2</sup>, T. Borodina<sup>1</sup>, T. Bukreeva<sup>1,4</sup>, N. Klyachko<sup>2</sup>, V. Zaytsev<sup>2</sup>, D. Trushina<sup>1,3</sup>,<sup>1</sup>Shubnikov Institute of Crystallography of Federal Scientific Research Centre "Crystallography and Photonics" of Russian Academy of Sciences, Russia,<sup>2</sup>Lomonosov Moscow State University, Russia,<sup>3</sup>Institute of Molecular Medicine Sechenov, First Moscow State Medical University, Russia,<sup>4</sup>National Research Centre "Kurchatov Institute", Russia

#### 13.15-13.30

**Nanoscale trinary logic elements on the base of complex carbon nanocomposite**

S.G. Levitskiy, V.V. Shunaev, Saratov State University, Saratov, Russia

#### 13.30-13.45

**Investigation of porous graphene/CNT decorated with boron clusters**

D.A. Kolosov, O.E. Glukhova, Saratov State University, Saratov, Russia

#### 13.45-14.00

**Excitation and propagation of compression solitons in phosphorene**

I.D. Kolesnikov<sup>1</sup>, S.V. Dmitriev<sup>2</sup>, E.A. Korznikova<sup>2</sup>,<sup>1</sup>Saratov State University, Saratov, Russia,<sup>2</sup>Institute for Metals Superplasticity Problems of RAS, Ufa, Russia

#### 14.00-14.15

**Effect of the crumpled graphene density on its sorption capacity: atomistic simulation**

N.G. Apkadirova<sup>1</sup>, K.A. Krylova<sup>1,2</sup>,<sup>1</sup>Ufa State Petroleum Technical University, Ufa,<sup>2</sup>Institute for Metals Superplasticity Problems Russian RAS, Ufa

## September 30, Thursday

### INTERNET REPORTS

*(Google Meet link:*

<https://meet.google.com/ehh-dsoh-mzh>)

1L. **Mechanical responsiveness of composite materials based on glass carbon and carbon nanotubes**

A.A. Petrunin, O.E. Glukhova, Saratov State University, Saratov, Russia

2L. **A new method for step-by-step functionalization of graphene nanomesh with carboxyl groups COOH**

P.V. Barkov, O.E. Glukhova Saratov State University, Saratov, Russia

3L. **Manifestation of instability in clusters of high-amplitude excitations of the crystal lattice of composition A3B**

P.V. Zakharov<sup>1,2</sup>, I.S. Lutsenko<sup>3</sup>, S.V. Dmitriev<sup>2,4</sup>, E.A. Korznikova<sup>2,5</sup>,<sup>1</sup>Peter the Great St. Petersburg Polytechnic University, Saint Petersburg, Russia,<sup>2</sup>Institute for Metals Superplasticity Problems, RAS, Ufa, Russia,<sup>3</sup>Polzunov

Altai State Technical University, Barnaul, Russia,<sup>4</sup>Institute of Physics of Molecules and Crystals, Ufa Federal Research Center, RAS, Ufa, Russia,<sup>5</sup>Ufa State Aviation Technical University, Ufa, Russia

- 4L. **Synthesis of porous aluminum oxide structures modified with silver nanoparticles and study of their gas-sensitive properties in an atmosphere of ammonia vapors**  
I.N. Mikhailov<sup>1,2</sup>, M.Yu. Vasilkov<sup>1,2</sup>, I.D. Kosobudskiy<sup>1,2</sup>, N.M. Ushakov<sup>2,1</sup>, Saratov State Technical University named after Gagarin Yu.A., Saratov, Russia,<sup>2</sup>Kotel'nikov institute of radio engineering and electronics of RAS in Saratov, Saratov, Russia

**JOINT POSTER/INTERNET SESSION  
AND INTERNET DISCUSSION  
(Building 3, 3d floor Hall)**

Chair (L): **Olga E. Glukhova**, Saratov State University, Russia

**18.30-19.30**

- 5L. **Silver nanoparticles modified with cyclodextrins for SERS analysis**  
N.E. Markina, A.V. Markin Saratov State University, Saratov, Russia
- 6L. **Creation of needle-like microstructures with a high aspect ratio of geometric parameters by special laser milling**  
E.L. Surmenko, T.N. Sokolova, D.A. Bessonov, Yu.V. Chebotarevskiy, A.K. Klushev, Saratov State Technical University, Saratov, Russia
- 7L. **Formation and physical-chemistry properties of Langmuir monolayer of lipids with incorporated glucose oxidase**  
I.A. Gorbachev, A.V. Smirnov, I.E. Kuznetsova, V.V. Kolesov, Kotel'nikov institute of radio engineering and electronics of RAS in Saratov, Saratov, Russia
- 8L. **Energetic and Electronic Parameters of Graphene Decorated with Transition Metal Oxide**  
V.V. Shunaev, O.E. Glukhova, Saratov State University, Saratov, Russia
- 9L. **Atomic and electronic structure of hybrid films formed by single-walled carbon nanotubes and bilayer graphene**  
M.M. Slepchenkov, P.V. Barkov, O.E. Glukhova, Saratov State University, Saratov, Russia
- 10L. **Electrophysical and Optoelectronic Properties of Layered Van der Waals**

**Heterostructures Based on Blue Phosphorus and Zinc Oxide**

M.M. Slepchenkov, O.E. Glukhova, D.A. Kolosov, Saratov State University, Russia

- 11L. **Tunnel junction between graphene nanoribbons of different topologies**  
P.A. Kolesnichenko, O.E. Glukhova, V.V. Shunaev, Saratov State University, Saratov, Russia
- 12L. **Cellulose microfibers as versatile support for shape-stable composites with thermoregulating properties**  
D.V. Voronin<sup>1,2</sup>, M.I. Rubtsova<sup>1</sup>, R.I. Mendgaziev<sup>1</sup>, K.A. Cherednichenko<sup>1</sup>, P.A. Demina<sup>2</sup>, A.M. Abramova<sup>2</sup>, D.G. Shchukin<sup>3</sup>, V. Vinokurov<sup>1,1</sup>, National University of Oil and Gas «Gubkin University», Moscow, Russia,<sup>2</sup>Saratov State University, Saratov, Russia,<sup>3</sup>University of Liverpool, Liverpool, United Kingdom
- 13L. **Development of a method for diagnostic Crohn's disease using hybrid nanoparticles Fe<sub>3</sub>O<sub>4</sub>-Au**  
Z. Grigoreva<sup>1</sup>, Ch. Gritsenko<sup>1</sup>, M. Efremova<sup>2</sup>, M. Abakumov<sup>2</sup>, Y. Nevzorova<sup>3</sup>, O. Estevez<sup>3</sup>, E. Levada, V. Rodionova<sup>2,1</sup>, Immanuel Kant Baltic Federal University, Kaliningrad, Russia,<sup>2</sup>Chemistry Department, Lomonosov Moscow State University, Moscow, Russia,<sup>3</sup>Department of Genetics, Physiology and Microbiology, Faculty of Biology, Complutense University, Madrid, Spain
- 14L. **Magnetic field mapping with magnetoplasmonic crystal**  
V.K. Belyaev<sup>1</sup>, D.V. Murzin<sup>1</sup>, A.A. Grunin<sup>2</sup>, A.A. Fedyanin<sup>2</sup>, V.V. Rodionova<sup>2</sup>,<sup>1</sup>Immanuel Kant Baltic Federal University, Kaliningrad, Russia, <sup>2</sup>Lomonosov Moscow State University, Moscow, Russia
- 15L. **Molecular dynamic modeling of the nonlinear dynamics of the lattice of the CuPt7 crystal**  
P.V. Zakharov<sup>1,2</sup>, A.I. Cherednichenko<sup>2</sup>, S.V. Dmitriev<sup>3,4</sup>, E.A. Korznikova<sup>3,5</sup>,<sup>1</sup>Peter the Great St. Petersburg Polytechnic University, Saint Petersburg, Russia,<sup>2</sup>Shukshin Altai State University for Humanities and Pedagogy, Biysk, Russia,<sup>3</sup>Institute for Metals Superplasticity Problems, RAS, Ufa, Russia,<sup>4</sup>Institute of Physics of Molecules and Crystals, Ufa Federal Research Center, RAS, Ufa, Russia,<sup>5</sup>Ufa State Aviation Technical University, Ufa, Russia
- 16L. **Effect of temperature on the motion of defects in the graphene lattice**  
L.Kh. Galiakhmetova<sup>1</sup>, K.A. Krylova<sup>1,2</sup>,<sup>1</sup>Institute for Metals Superplasticity Problems of the Russian Academy of Sciences, Ufa, Russia,<sup>2</sup>Ufa State Petroleum Technological University, Ufa, Russia

- 17L. **Analysis of the mechanical properties of a graphene-nickel composite obtained under hydrostatic compression at elevated temperatures**  
L.R. Safina<sup>1</sup>, R.T. Murzaev<sup>2</sup>, K.A. Krylova<sup>1,2</sup>, J.A. Baimova<sup>2,1</sup> Ufa State

Petroleum Technological University, Ufa, Russia,<sup>2</sup>Institute for Metals Superplasticity Problems of the Russian Academy of Sciences, Ufa, Russia

# Conference on Biomedical Spectroscopy VIII

Conference Chairs: **Vyacheslav I. Kochubey**, **Alexander B. Pravdin**, Saratov State University (Russia)

Secretaries: **Natalia I. Kazadaeva**, Saratov State University (Russia)

International Program Committee: **Dmitry A. Gorin**, Saratov State University (Russia), **Gennady V. Melnikov**, Yuri Gagarin State Technical University of Saratov (Russia), **Alexander M. Saletsky**, Lomonosov Moscow State University (Russia), **Dzmitry Shcharbin**, Institute of Biophysics and Cell Engineering of NASB (Belarus), **Andre Skirtach**, Ghent University (Belgium)

**September 30, Thursday**

Oleg O. Myakinin<sup>1</sup>, Valery P. Zakharov<sup>1</sup>, 1 Samara National Research University, Samara, Russia

## **JOINT INTERNET/POSTERSESSION (Building 3, 3<sup>rd</sup> floor Hall)**

Chair (BS): **Natalia Kazadaeva**, Saratov State University, Russia

**18.00 – 20.00**

**1BS The attenuation of upconversion luminescence passing through biological tissue** Ekaterina A. Kozlova<sup>1</sup>, Natalia I. Kazadaeva<sup>1</sup>, Vyacheslav I. Kochubey<sup>1</sup>, 1 Saratov State University, Saratov, Russia

**2BS Optical clearing of skin by CT and MRI agents in a wide wavelength range** Nikita S. Chikalkin<sup>1</sup>, Daria K. Tuchina<sup>1,2,3</sup>, Natalia A. Shushunova<sup>1</sup>, Alexander P. Savitsky<sup>3</sup>, Alexei A. Bogdanov, Jr.<sup>3,4</sup>, Valery V. Tuchin<sup>1,2,3,5</sup>, 1 Saratov State University, Saratov, Russia; 2 National Research Tomsk State University, Tomsk, Russia; 3 Federal Research Center of Biotechnology of the Russian Academy of Sciences, Moscow, Russia; 4 University of Massachusetts Medical School, Worcester, MA, USA; 5 Institute of Precision Mechanics and Control Institute of the Russian Academy of Sciences, Saratov, Russia

**3BS Analysis of Raman spectra using the Multivariate Curve Resolution–Alternating Least Squares (MCR-ALS) method** Irina A. Matveeva<sup>1</sup>, Lyudmila A. Bratchenko<sup>1</sup>, Yulia A. Khristoforova<sup>1</sup>,

**4BS Polarized fluorescence parameters of FAD in solutions under excitation within the first and the second absorption bands** Marina K. Krasnopevtceva<sup>1</sup>, Maxim E. Sasin<sup>1</sup>, Ioanna A. Gorbunova<sup>1</sup>, Dmitrii P. Golyshev<sup>1</sup>, Andrey G. Smolin<sup>1</sup>, Victor P. Belik<sup>1</sup>, Oleg S. Vasyutinskii<sup>1</sup>, 1 Ioffe Institute, Saint Petersburg, Russia

**5BS Features of the processes of deactivation of the electronic excitation energy of luminescent probes in glycated proteins** Andrey Melnikov<sup>2</sup>, Vyacheslav I. Kochubey<sup>1</sup>, Alexander B. Pravdin<sup>1</sup>, Denis A. Bykov<sup>2</sup>, Gennady V. Melnikov<sup>2</sup>, 1 Saratov State University, Saratov, Russia; 2 Saratov State Technical University, Saratov, Russia

**6BS Upconversion nanoparticles toxicity analysis**, Anna A. Doronkina<sup>1</sup>, Natalia I. Kazadaeva<sup>1</sup>, Ekaterina A. Kozlova, Irina Yu. Yanina<sup>1,2</sup>, Alexander A. Skaptsov<sup>1</sup>, Yulia G. Konyukhova<sup>1</sup>, Alexander B. Pravdin<sup>1</sup>, Artyom M. Mylnikov<sup>3</sup>, Vyacheslav I. Kochubey<sup>1</sup>, 1 Saratov State University, Saratov, Russia; 2 Saratov State Medical University, Saratov, Russian

**7BS Temperature determination of biological tissues various types from the luminescence spectrum of upconversion nanoparticles through a biological tissue layer with intravenous administration of nanoparticles**, Natalia I.

Kazadaeva<sup>1</sup>, Anna A. Doronkina<sup>1</sup>, Ekaterina A. Kozlova, Irina Yu. Yanina<sup>1,2</sup>, Alexander A. Skaptsov<sup>1</sup>, Yulia G. Konyukhova<sup>1</sup>, Alexander B. Pravdin<sup>1</sup>, Artyom M. Mylnikov<sup>3</sup>, Vyacheslav I. Kochubey<sup>1</sup>, 1Saratov State University, Saratov, Russia; 2 Saratov State Medical University, Saratov, Russian

#### INTERNET REPORTS

- Method of fast intraoperative analysis of the intestinal wall optical properties in vivo** T.A. Savelyeva<sup>1,2</sup>, D.M. Kustov<sup>1</sup>, G.Sh. Egemberdy<sup>2</sup>, A.A. Krivetskaya<sup>2</sup>, S.S. Kharnas<sup>3</sup>, V.V. Levkin<sup>3</sup>, A.S. Gorbunov<sup>3</sup>, A.A. Shiryaev<sup>3</sup>, V.B. Loschenov<sup>1,2</sup>, 1 Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia; 2 National Research Nuclear University MEPhI, Moscow, Russia; 3 I.M. Sechenov First Moscow State Medical University, Moscow, Russia
- Indocyanine green in nanoform - IR-photosensitizer for microglia studies** Yu.S. Maklygina<sup>1</sup>, I.D. Romanishkin<sup>1</sup>, D.S. Farrakhova<sup>1</sup>, A.V. Ryabova<sup>1</sup>, L. Bolotin<sup>2</sup>, V.B. Loschenov<sup>1,3</sup>, 1 Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow; 2 Research Centre for Automatic Control of Nancy, University of Lotaringia, Nancy, France; 3 National Research Nuclear University MEPhI, Moscow
- Prolonged-release of ceftriaxone from microchamber arrays of polylactic acid** Ekaterina A. Mordovina<sup>1</sup>, Valentina O. Plastun<sup>1</sup>, Svetlana V. Raikova<sup>2</sup>, Olga A. Sindeeva<sup>3</sup>, Irina Yu. Goryacheva<sup>1</sup>, 1 Saratov State University, Saratov, Russia; 2 Saratov State Medical University, Saratov, Russia 3 Skolkovo Institute of Science and Technology, Moscow, Russia

#### INTERNET POSTERS

- Quantification of bacteriochlorophylls d and e in water with green sulfur bacteria: spectroscopic approaches**, A.A. Zhiltsova<sup>1</sup>, E.D. Krasnova<sup>2</sup>, D.A. Voronov<sup>2,3</sup>, S.V. Patsaeva<sup>1</sup>, 1 Lomonosov Moscow State University, Moscow, Russia; 2 Kharkevich Institute for Information Transmission Problems; 3 Russian Academy of Sciences, Moscow, Russia
- Raman scattering spectra postprocessing and decomposition to assess the glial tumor border**, A.V. Orlov<sup>1</sup>, T.A. Savelieva<sup>1,2</sup>, I.D. Romanishkin<sup>2</sup>, B.A. Tsarukaev<sup>3</sup>, A.V. Kosyrkova<sup>3</sup>, S.V. Shugaj<sup>3</sup>, S.A. Goryajnov<sup>3</sup>, V.B. Loschenov<sup>1,2</sup>, 1 National Research Nuclear University MEPhI, Moscow, Russia; 2 Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia; 3 N.N. Burdenko National Medical Research Center of Neurosurgery, Moscow, Russia
- Express diagnostics periodontitis by changing the spectral characteristics of teeth enamel**, Oleg O. Frolov<sup>1</sup>, Pavel E. Timchenko<sup>1</sup>, Elena V. Timchenko<sup>1</sup>, Larisa T. Volova<sup>2</sup>, Irina V. Bazhutova<sup>1</sup>, 1 Samara National Research University, Samara, Russia; 2 Samara State Medical University, Institute of Experimental Medicine and Biotechnology, Samara, Russia

**Collective Phenomena In Visually Induced MEG Signals Of The Human Cerebral Cortex**, Oleg Y. Panishev<sup>1</sup>, Sergey A. Demin<sup>1</sup>, Ruslan R. Latypov<sup>1</sup>, 1 Kazan Federal University, Kazan, Russia



# Conference on Computation Biophysics and Analysis of Biomedical Data VIII

*Workshop Chair:* **Dmitry E. Postnov**, Saratov State University (Russia)

*Secretary:* **Elena S. Litvinenko**, Saratov State University (Russia)

*International Program Committee:* **Alexander B. Neiman**, Ohio University, USA, **Olga V. Sosnovtseva**, University of Copenhagen, Denmark, **Oxana V. Semyachkina-Glushkovskaya**, Saratov State University, Russia, **Anatoly V. Skripal**, Saratov State University, Russia, **Boris P. Bezruchko**, Saratov State University, Russia

## September 29, Wednesday

### ORAL SESSION

(Building 3, Hall 64)

Chair: **Dmitry E. Postnov**, Saratov State University, Russia

**13:30-13:45**

**Computational implementation of the Cascade Hilbert-Zero Decomposition and perspectives of its applications for biophysical signal processing**

Eugene B. Postnikov<sup>1</sup>, E.A. Lebedeva<sup>2</sup>, A.Yu. Zyubin<sup>3</sup>, A.I. Lavrova<sup>3,4</sup>, <sup>1</sup>Kursk State University; <sup>2</sup>Saint-Petersburg State University; <sup>3</sup>Immanuel Kant Baltic Federal University; <sup>4</sup>Saint-Petersburg State Research Institute of Phthisiopulmonology, Russia

**13:45-14:00**

**Multiresolution wavelet analysis of noisy datasets with different measures for decomposition coefficients**

German A. Guyo, O.N. Pavlova, A.N. Pavlov, Saratov State University, Russia

**14:00-14:15**

**Changes in the properties of time-delay coupled identical Hodgkin-Huxley oscillators depending on the delay time and the number of elements in the ring**

Maksim V. Kornilov<sup>1,2</sup>, I.V. Sysoev<sup>1,2</sup>, <sup>1</sup>Saratov Branch of Kotelnikov Institute of Radioengineering and Electronics of RAS; <sup>2</sup>Saratov State University, Russia

**14:15-14:30**

**Epileptiform activity generation by an ensemble of complete electronic FitzHugh-Nagumo oscillators connected by a sigmoid couplings**

Nikita M. Egorov<sup>1</sup>, S.N. Melnikova<sup>1</sup>, V.I. Ponomarenko<sup>2,3</sup>, I.V. Sysoev<sup>3</sup>, M.V. Sysoeva<sup>1</sup>, <sup>1</sup>Yuri Gagarin State Technical University of Saratov; <sup>2</sup>Saratov Branch of Kotelnikov Institute of Radioengineering and Electronics

of RAS; <sup>3</sup>Saratov State University, Saratov, Russia

**14:30-14:45**

**Recurrence quantification analysis detects P300 on single-trial EEG**

Elena N. Pitsik, Innopolis University, Russia

**14:45-15:00**

**Internet**

**Application of artificial neural networks to recognize the average flow rate of physiological fluids in a capillary**

Ivan Stebakov<sup>1</sup>, E. Kornaeva<sup>1</sup>, E. Potapova<sup>1</sup>, V. Dremine<sup>1,2</sup>, <sup>1</sup>Orel State University named after I.S. Turgenev, Russia; <sup>2</sup>College of Engineering and Physical Sciences, Aston University, Birmingham, United Kingdom

**15:00-15:15**

**Internet**

**Application of machine learning methods to red blood cells motion detection**

Alexey Kornaev<sup>1</sup>, E. Kornaeva<sup>1</sup>, V. Dremine<sup>1</sup>, M. Volkov<sup>2</sup>, <sup>1</sup>Orel State University named after I.S. Turgenev; <sup>2</sup>ITMO University, Russia

**15:15-15:30**

**Internet**

**Mobile application for an independent express assessment of pigmented skin lesions**

Elena N. Rimskaya<sup>1,2</sup>, K.G. Kudrin<sup>3</sup>, S.S. Otstavnov<sup>1,4</sup>, I.V. Reshetov<sup>3,5</sup>, <sup>1</sup>Moscow Institute of Physics and Technology; <sup>2</sup>Bauman Moscow State Technical University; <sup>3</sup>Academy for Postgraduate Education, Federal Research and Clinical Center, Federal Medical Biological Agency of Russia; <sup>4</sup>Health Technology Assessment Association; <sup>5</sup>Sechenov First Moscow State Medical University, Russia

**15:30-15:45**

**Internet**

**Mathematical model of calcium-dependent glycemic control components in hepatocytes**

Oksana M. Tilinova<sup>1</sup>, A.V. Martyshina<sup>1</sup>, I.V. Dokukina<sup>1</sup>, S.I. Kisil<sup>2</sup>, M.V. Yamashev<sup>2</sup>, E.A.

Grachev<sup>2,1</sup>Sarov Physical and Technical Institute, National Research Nuclear University MEPhI; <sup>2</sup>Lomonosov Moscow State University, Russia

**15:45-16:00**

**Gliotransmitter and astrocytic calcium dynamics regulatory pathways mediate synaptic activity**

Andrey Yu. Verisokin<sup>1</sup>, A.R. Brazhe<sup>2,3</sup>, D.V. Verveiko<sup>1</sup>, D.E. Postnov<sup>4</sup>, <sup>1</sup>Kursk State University; <sup>2</sup>Lomonosov Moscow State University; <sup>3</sup>Institute of Bioorganic Chemistry RAS; <sup>4</sup>Saratov State University, Russia

**September 30, Thursday**

**JOINT POSTER/INTERNET SESSION  
AND INTERNET DISCUSSION**

Chair (BC): **Dmitry E. Postnov**, Saratov State University, Russia

**1BC. Assessing the stability of pulse waves component in the laser balistocardiography**Maria O. Tsoy, A.Burya, D.E. Postnov, Saratov State University, Russia

**2BC. The relationship between fluctuations of external influences and SID** Ksenia O. Merkulova, D.E. Postnov, Saratov State University, Russia

**3BC. Reveling kinetics of chemical transitions in colorimetric indicators of bacterial growth based on photometric data from a portative microbiological analyzer**Alexander V. Sychev<sup>1</sup>, R.N. Belenkov<sup>1</sup>, D.N. Ukolov<sup>1</sup>, A.V. Budaev<sup>1</sup>, A.I. Lavrova<sup>2,3</sup>, E.B. Postnikov<sup>1</sup>, <sup>1</sup>Kursk State University; <sup>2</sup>Saint-Petersburg State Research Institute of Phthisiopulmonology; <sup>3</sup>Saint-Petersburg State University, Russia

**4BC. Effect of orthodontic correction characteristics in brain electrical activity** Rodion V. Ukolov<sup>1</sup>, M.O. Zhuravlev<sup>1,2</sup>, R.K. Nasrullaev<sup>1,2</sup>, D.E. Suyenkov,<sup>2</sup> <sup>1</sup>Saratov State University, Saratov, Russia <sup>2</sup> Saratov State Medical University, Saratov, Russia

**5BC. Synchronization in interacting networks of Hodgkin-Huxley neurons**Andrey V. Andreev<sup>1,2</sup>, V.A. Maksimenko<sup>1,2,1</sup>, <sup>1</sup>Innopolis University; <sup>2</sup>Immanuel Kant Baltic Federal University, Russia

**6BC. Stable characteristics of the oscillatory structure in brain electrical activity during sleep**Mikhail Yu. Novikov<sup>1</sup>, M.A. Popova<sup>1,2</sup>, M.O. Zhuravlev<sup>1,2</sup>, <sup>1</sup>Saratov State Medical

University; <sup>2</sup>Saratov State University, Russia

**7BC. Properties of the spatial structure in the brain activity under load monotonic**Kamila S. Samatova<sup>1</sup>, A.E. Runnova<sup>1,2</sup>, M.S. Simonyan<sup>1</sup>, M.Yu. Novikov<sup>1</sup>, E. Egorov<sup>2</sup>, <sup>1</sup>Saratov State Medical University; <sup>2</sup>Saratov State University, Russia

**8BC. Features of synchronization in multichannel EEG data in patients with cognitive impairment** Margarita A. Popova<sup>1,2</sup>, A.E. Runnova<sup>1,2</sup>, A.O. Selskii<sup>1,2</sup>, <sup>1</sup>Saratov State Medical University; <sup>2</sup>Saratov State University, Russia

**9BC. Fatigue-related reconfiguration of the functional network of the brain during cognitive load**Semen A. Kurkin<sup>1,2</sup>, N. Smirnov<sup>1</sup>, A.A. Badarin<sup>1,2</sup>, V.V. Makarov<sup>1</sup>, <sup>1</sup>Innopolis University; <sup>2</sup>Immanuel Kant Baltic Federal University, Russia

**10BC. Source-level analysis of age-related differences in the motor initiation phase** Semen A. Kurkin<sup>1,2</sup>, A.E. Hramov<sup>1,2</sup>, <sup>1</sup>Innopolis University; <sup>2</sup>Immanuel Kant Baltic Federal University, Russia

**11BC. Specificities of ERD lateralization during motion execution** Nikita Smirnov<sup>1</sup>, S.A. Kurkin<sup>1,2</sup>, A.E. Hramov<sup>1,2</sup>, <sup>1</sup>Innopolis University; <sup>2</sup>Immanuel Kant Baltic Federal University, Russia

**12BC. The impact of cell connectivity in an astrocytic network on repeatable activation patterns** Darya V. Verveiko<sup>1</sup>, A.Yu. Verisokin<sup>1</sup>, D.E. Postnov<sup>2</sup>, A.R. Brazhe<sup>3,4</sup>, <sup>1</sup>Kursk State University; <sup>2</sup>Saratov State University; <sup>3</sup>Lomonosov Moscow State University; <sup>4</sup>Institute of Bioorganic Chemistry RAS, Russia

**13BC. About the time series analysis based on the forbidden permutation patterns searching methods** Maksim L. Korneevets<sup>1</sup>, A.V. Starodubov<sup>1,2</sup>, <sup>1</sup>Saratov State University; <sup>2</sup>Saratov Branch Institute of Radio Engineering and Electronics, RAS, Russia

**14BC. Frequency-space features of EEG activity during decision-making task with uncertainty** Alexander Kuc<sup>1,2</sup>, V. Grubov<sup>1,2,3</sup>, V. Maksimenko<sup>1,2</sup>, <sup>1</sup>Innopolis University; <sup>2</sup>Immanuel Kant Baltic Federal University; <sup>3</sup>Saratov State Medical University, Russia

**15BC. Studying behavioral performance and neural activity during a prolonged visual task** Alexander K. Kuc<sup>1,2</sup>, V.A. Maksimenko<sup>1,2</sup>, <sup>1</sup>Innopolis University; <sup>2</sup>Immanuel Kant Baltic Federal University, Russia

- 16BC. Effect of the previous stimulus on the processing of the current stimuli during their repetitive presentation** Alexander K. Kuc<sup>1,2</sup>, V.A. Maksimenko<sup>1,2</sup>, Innopolis University; <sup>2</sup>Immanuel Kant Baltic Federal University, Russia
- 17BC. Wireless personal training tracker for sports shooting** Vladimir M. Antipov, A.A. Badarin, Innopolis University, Russia
- 18BC. Hemodynamic response and functional connectivity during solving cognitive tasks: fNIRS study** Artem A. Badarin, S.A. Kurkin, V.V. Grubov, Innopolis University, Russia
- 19BC. Analysis of the coupling of autonomic regulatory loops of blood circulation in patients with Covid and cardiovascular pathologies** Viktoriia V. Skazkina<sup>1</sup>, K.A. Popov<sup>2</sup>, N.S. Krasikova<sup>2</sup>, E.I. Borovkova<sup>1,2</sup>, A.Yu. Gorshkov<sup>3</sup>, A.I. Korolev<sup>3</sup>, V.A. Dadaeva<sup>3</sup>, A.A. Fedorovich<sup>3</sup>, A.V. Kuligin<sup>2</sup>, A.S. Karavaev<sup>1,2,4</sup>, Yu.G. Shvarts<sup>2</sup>, A.R. Kiselev<sup>1-3</sup>, <sup>1</sup>Saratov State University; <sup>2</sup>Saratov State Medical University; <sup>3</sup>National Medical Research Center for Therapy and Preventive Medicine; <sup>4</sup>Saratov Branch of the Institute of RadioEngineering and Electronics of Russian Academy of Sciences, Russia

## INTERNET POSTERS

- 1. Modelling of multifractal dynamics of COVID-19 pandemic** Vladimir L. Derbov<sup>1</sup>, A.A. Gusev<sup>2</sup>, S.A. Mikheev<sup>3</sup>, I.V. Tsvetkov<sup>3</sup>, V.P. Tsvetkov<sup>3</sup>, S.I. Vinitsky<sup>2</sup>, <sup>1</sup>Saratov State University; <sup>2</sup>Joint Institute for Nuclear Research; <sup>3</sup>Tver State University, Russia
- 2. Flicker-Noise Spectroscopy Analysis of Magnetoencephalogram Signals in Diagnosis and Treatment of Photosensitive Epilepsy** Sergey A. Demin<sup>1</sup>, V.A. Yunusov<sup>1</sup>, O.Y. Panischev<sup>1</sup>, S.F. Timashev<sup>2,3</sup>, <sup>1</sup>Kazan Federal University; <sup>2</sup>Karpov Institute of Physical Chemistry; <sup>3</sup>National Research Nuclear University MEPhI, Russia
- 3. Effect of the fatigue in the equilibrium training** Vladimir S. Khorev, Innopolis University, Russia
- 4. Multilayer perceptron neural network for detecting singular points of photoprethysmograms** Vladislav Yu. Gribkov, I.B. Isupov, R.Sh. Zatrudina, Volgograd State University, Russia
- 5. The use of the Cross-Correlation Analysis in search for diagnostic criteria for Nocturnal Frontal Lobe Epilepsy** Valentin A. Yunusov, S.A. Demin, F.M. Gafarov, Kazan Federal University, Russia

# Workshop on Nonlinear Dynamics XII

Workshop Co-Chairs: **Galina I. Strelkova**, Saratov State University (Russia), **Andrei V. Slepnev**, Saratov State University (Russia)

Secretary: **Andrei V. Slepnev**, Saratov State University (Russia)

International Program Committee:

**Jürgen Kurths**, Humboldt University, Berlin, Germany; **Alexander Neiman**, Ohio University, USA; **Igor Khovanov**, Warwick University, UK; **Olga Sosnovtseva**, University of Copenhagen, Denmark; **Alexander P. Chetverikov**, Saratov State University, Russia; **Alexey N. Pavlov**, Saratov State University, Russia; **Tatiana E. Vadivasova**, Saratov State University, Russia; **Alexey V. Shabunin**, Saratov State University, Russia; **Dmitry E. Postnov**, Saratov State University, Russia

## September 29, Wednesday

### ORAL SESSION NONLINEAR DYNAMICS I (Building 3, Room 38; Zoom)

link: <https://zoom.us/j/92748456866?pwd=TUE2SGRmVldOSHVVScjdUVVhUbGhhZz09>

Co-Chairs: **Galina I. Strelkova**, Saratov State University (Russia), **Andrei V. Slepnev**, Saratov State University (Russia)

#### 14.00-14.15

##### Filtering of spatial modes in chaotic ensembles with non-local coupling

A.V. Shabunin<sup>1</sup>

<sup>1</sup>Saratov State University, Saratov, Russia

#### 14.15-14.30

##### Simulating the cardiorespiratory coupling in mathematical model with time delay

Yu.M. Ishbulatov<sup>1,2,3</sup>, A.S. Karavaev<sup>1,2,3</sup>, E.I. Borovkova<sup>1,2,3</sup>, A.R. Kiselev<sup>1,2,3</sup>, M.D. Prokhorov<sup>1,2</sup>

<sup>1</sup>Saratov Branch of the Institute of RadioEngineering and Electronics of Russian Academy of Sciences, Saratov, Russia

<sup>2</sup>Saratov State University, Saratov, Russia

<sup>3</sup>Saratov State Medical University, Saratov, Russia

#### 14.30-14.45

##### Synchronization of traveling waves in memristively coupled rings of FitzHugh-Nagumo neurons

I.A. Korneev<sup>1</sup>, A.V. Slepnev<sup>1</sup>, T.E. Vadivasova<sup>1</sup>

<sup>1</sup>Saratov State University

#### 14.45-15.00

##### Synchronization in a small starlike network of spin-torque oscillators coupled via magnetic fields

P. Kuptsov<sup>1</sup>

<sup>1</sup>Kotel'nikov's Institute of Radio-Engineering and Electronics of RAS, Saratov Branch, Zelenaya 38, Saratov 410019, Russia

#### 15.00-15.15

##### Coupling Strength Impact on the Synchronisation Degree in a Two-layer Network with Sparse Intercoupling

T.R. Bogatenko<sup>1</sup>, A.V. Bukh<sup>1</sup>, G.I. Strelkova<sup>1</sup>

<sup>1</sup>Saratov State University, Saratov, Russia

#### 15.15-15.30

##### Influence of reactive power on the dynamics of an ensemble of generators modeled by phase equations with inertia

P.A. Arinushkin<sup>1</sup>, T.E. Vadivasova<sup>1</sup>

<sup>1</sup>Saratov State University, Saratov, Russia

#### 15.30-15.45

##### Interplay between solitary states and chimeras in neural networks at different inter-layer coupling types

E.V. Rybalova<sup>1</sup>, A. Zakharova<sup>2</sup>, G.I. Strelkova<sup>1</sup>

<sup>1</sup>Institute of Physics, Saratov State University, Saratov, Russia

<sup>2</sup>Institut für Theoretische Physik, Technische Universität Berlin, Berlin, Germany

#### 15.45-16.00

##### Impact of noise on analog neural networks

Nadezhda Semenova<sup>1,2</sup>, Laurent Larger<sup>2</sup>, Daniel Brunner<sup>2</sup>

<sup>1</sup>Saratov State University, Russia

<sup>2</sup>Département d'Optique P. M. Duffieux, Institut FEMTO-ST, Université Bourgogne-Franche-Comté CNRS UMR 6174, Besançon, France

## September 30, Thursday

### ORAL SESSION NONLINEAR DYNAMICS II (Building 3, Room 38; Zoom)

link: <https://zoom.us/j/92748456866?pwd=TUE2SGRmVldOSHVVScjdUVVhUbGhhZz09>

Co-Chairs: **Galina I. Strelkova**, Saratov State University (Russia), **Andrei V. Slepnev**, Saratov State University (Russia)

#### 16.00-16.15

##### Excitation of electronic neuron-like generator with pulse stimulation

M.A. Mishchenko<sup>1</sup>, D.I. Bolshakov<sup>1</sup>, V.V. Matrosov<sup>1</sup>, I.V. Sysoev<sup>1,2,3</sup>

<sup>1</sup>National Research Lobachevsky State University, Nizhniy Novgorod, Russia

<sup>2</sup>Saratov State University, Saratov, Russia

<sup>3</sup>Saratov Branch of Institute of Radioengineering and Electronics of RAS, Saratov, Russia

### 16.15-16.30

#### **Change in heat capacity of the Fermi-Pasta-Ulam chain caused by energy localization**

Alina Y. Morkina<sup>1,2</sup>

<sup>1</sup>Ufa State Aviation Technical University, Ufa, Russia

<sup>2</sup>Institute For Metals Superplasticity Problems Of The Russian Academy Of Sciences, Ufa, Russia

### 16.30-16.45

#### **Agent-based modelling of the first and the second waves of COVID-19 spreading in Russian Federation regions**

Mikhail Kirillin<sup>1</sup>, Ekaterina Sergeeva<sup>1</sup>, Aleksandr Khilov<sup>1</sup>, Valeriya Perekatova<sup>1</sup>, Daria Kurakina<sup>1</sup>, Ilya Fiks<sup>1</sup>, Nikolay Saperkin<sup>2</sup>, Ming Tang<sup>3</sup>, and Elbert Macau<sup>4</sup>

<sup>1</sup>Institute of Applied Physics RAS, Nizhny Novgorod, Russia

<sup>2</sup>Privolzhsky Research Medical University, Nizhny Novgorod, Russia

<sup>3</sup>School of Physics and Electronic Science, East China Normal University, Shanghai, China

<sup>4</sup>Instituto de Ciências e Tecnologia, Universidade Federal de São Paulo, São Paulo, Brasil

### 16.45-17.00

#### **New real-time method for diagnostics of phase synchronization between autonomic control loops of blood circulation**

Aleksander V. Kurbako<sup>1,2</sup>, Danil D. Kulminsky<sup>1,2</sup>, Ekaterina I. Borovkova<sup>1,2,3</sup>, Anton R. Kiselev<sup>2,3</sup>, Victoria V. Skazkina<sup>1,2</sup>, Vladimir I. Ponomarenko<sup>1,2</sup>, Boris P. Bezruchko<sup>1,2</sup>, Anatoly S. Karavaev<sup>1,3</sup>

<sup>1</sup>Saratov Branch of the Institute of RadioEngineering and Electronics of Russian Academy of Science, Saratov, Russia

<sup>2</sup>Saratov State University, Saratov, Russia

<sup>3</sup>Department of Innovative Cardiological Information Technology, Institute of Cardiological Research Saratov State Medical University, Saratov, Russia

### 17.00-17.15

#### **Mechanisms of mass transfer in crystals in non equilibrium conditions**

Elena A. Korznikova<sup>1</sup>

<sup>1</sup>Ufa State Aviation Technical University

### 17.15-17.30

#### **Rotobreathers in the chain of coupled rotators**

Alexander V. Savin<sup>1</sup>, Sergey V. Dmitriev<sup>2</sup>

<sup>1</sup>N. N. Semenov Federal Research Center for Chemical Physics of RAS (FRCCP RAS), Moscow 119991, Russia

<sup>2</sup>Institute of Molecule and Crystal Physics, Ufa Federal Research Centre of RAS, Oktyabrya Ave. 71, Ufa 450054, Russia

### 17.30-17.45

#### **Inter-layer synchronization of 2D lattices of van der Pol oscillators with repulsive and attractive intra-layer coupling**

Igor A. Shepelev<sup>1</sup>, Tatiana E. Vadivasova<sup>1</sup>, Galina I. Strelkova<sup>1</sup>

<sup>1</sup>Saratov State University, Saratov, Russia

### 17.45-18.00

#### **Synchronization in multiplex networks of chaotic oscillators with frequency mismatch**

Igor A. Shepelev<sup>1</sup>, Tatiana E. Vadivasova<sup>1</sup>

<sup>1</sup>Saratov State University, Saratov, Russia

### **JOINT POSTER/INTERNET SESSION**

Chair (ND): **Andrei V. Slepnev**, Saratov State University, Russia

#### **1ND. Analysis of Cognitive evoked potentials to classify patients with chronic pain**

A.O. Selskii<sup>1,2</sup>, E.P. Emelyanova<sup>1</sup>, M.O. Zhuravlev<sup>1,2</sup>, A.E. Runnova<sup>1,2</sup>

<sup>1</sup>Saratov State University, Saratov, Russia

<sup>2</sup>Saratov State Medical University, Saratov, Russia

#### **2ND. Automatical system for estimation of individual EEG characteristics based on recurrent analysis**

E.P. Emelyanova<sup>1</sup>, A.O. Selskii<sup>1,2</sup>, M. Popova<sup>1,2</sup>, A.E. Runnova<sup>1,2</sup>

<sup>1</sup>Saratov State University, Saratov, Russia

<sup>2</sup>Saratov State Medical University, Saratov, Russia

#### **3ND. Dynamics of cluster structures in an ensemble of chaotic maps with noise-modulated nonlocal coupling**

N.N. Nikishina<sup>1</sup>, E.V. Rybalova<sup>1</sup>, G.I. Strelkova<sup>1</sup>, T.E. Vadivasova<sup>1</sup>

<sup>1</sup>Saratov State University, Saratov, Russia

#### **4ND. Impact of inhomogeneity of parameters on the existence of chimera states in a network of nonlocally coupled maps**

V.A. Nechaev<sup>1</sup>, E.V. Rybalova<sup>1</sup>, G.I. Strelkova<sup>1</sup>

<sup>1</sup>Saratov State University, Saratov, Russia

#### **5ND. Dynamics of the structure of directional couplings of the infraslow fluctuations in the potential of electroencephalograms and signals of the cardiovascular and respiratory systems in the different stages of sleep and in the awake state**

E.I. Borovkova<sup>1,2</sup>, A.N. Hramkov<sup>1</sup>, V.V. Skazkina<sup>1</sup>, A.S. Karavaev<sup>1,2,3</sup>

<sup>1</sup>Saratov State University N. G. Chernyshevsky

<sup>2</sup>Saratov State Medical University them. V. I. Razumovsky

<sup>3</sup>Saratov Branch of Kotelnikov Institute of Radio Engineering and Electronics of Russian Academy of Sciences

**6ND. Analysis of blood-brain barrier permeability based on machine learning approach**

Nadezhda Semenova<sup>1</sup>, Konstantin Sergeev<sup>1</sup>,  
Andrei Slepnev<sup>1</sup>, Oxana Semyachkina-  
Glushkovskaya<sup>1,2</sup>, Jürgen Kurths<sup>1,2,3</sup>

<sup>1</sup>Saratov State University, Russia

<sup>2</sup>Physics Department, Humboldt University, Berlin,  
Germany

<sup>3</sup>Potsdam Institute for Climate Impact Research,  
Potsdam, Germany

**7ND. Detection of Unmanned Aerial Vehicles by Acoustic Trace**

Daniil A. Kurylev<sup>1</sup>, Anton A. Dvorak<sup>1</sup>, Maxim I.  
Balakin<sup>1</sup>, Dmitry N. Zolotykh<sup>2</sup>, Viktor A.  
Senchurov<sup>2</sup>, Pavel E. Novikov<sup>2</sup>

<sup>1</sup>Yuri Gagarin State Technical University of  
Saratov, Saratov, Russia

<sup>2</sup>Joint-stock company Scientific Production  
Enterprise Almaz, Saratov, Russia

**8ND. Self-similar character of short pulse generation during the Cherenkov-type electron-wave interaction in a backward wave oscillator**

Alena A. Rostuntsova<sup>1,2</sup>, Nikita M. Ryskin<sup>2,3</sup>

<sup>1</sup>Institute of Applied Physics RAS, Nizhny  
Novgorod, Russia

<sup>2</sup>Saratov State University, Saratov, Russia

<sup>3</sup>Saratov Branch, Institute of Radio Engineering  
and Electronics RAS, Saratov, Russia

**9ND. The study of the statistical properties of the coherence indices between the interbeat intervals and blood pressure**

Aleksey N. Hramkov<sup>1,3</sup>, Ekaterina I. Borovkova<sup>1,2</sup>,  
Anatoly S. Karavaev<sup>1,2,3</sup>

<sup>1</sup>Saratov State University, Saratov, Russia

<sup>2</sup>Saratov State Medical University them V. I.  
Razumovsky, Saratov, Russia

<sup>3</sup>Saratov Branch of Kotelnikov Institute of Radio  
Engineering and Electronics of Russian Academy  
of Sciences, Saratov, Russia

**10ND. Propagation of mobile breathers in a transverse chain of non-isochronous oscillators when bubble excited**

Evgeniy I. Geraskin<sup>1</sup>, Alexander P. Chetverikov<sup>1</sup>

<sup>1</sup>Saratov State University, Saratov, Russia

**11ND. Development of a model of a quasi-molecular state for low-temperature synthesis of nuclei and interpretation of the formation of chemical elements in the process of vacuum melting of a metal by an electron beam**

Mikhail P. Kashchenko<sup>1,2</sup>, Nadezhda M.  
Kashchenko<sup>1</sup>

<sup>1</sup>Ural Federal University n.a.the first President of  
Russia B. N.Yeltsin, Yekaterinburg, Russia

<sup>2</sup>Ural State Forest Engineering University,  
Yekaterinburg, Russia

**12ND. Formation of Massive Electron Pairs as a Necessary Condition for Low-Temperature Nuclear Fusion and the Existence of a New State of Matter**

Mikhail P. Kashchenko<sup>1,2</sup>, Nadezhda M.  
Kashchenko<sup>1</sup>

<sup>1</sup>Ural Federal University n.a.the first President of  
Russia B. N.Yeltsin, Yekaterinburg, Russia

<sup>2</sup>Ural State Forest Engineering University,  
Yekaterinburg, Russia

# Workshop on Advanced Polarization and Correlation Technologies in Biomedicine and Material ScienceVIII

**Workshop Co-chairs:** Dmitry A. Zimnyakov, Yuri Gagarin Saratov State Technical University, Russia, Institute of Precise Mechanics and Control RAS, Russia

**Secretaries:** Elena A. Isaeva, Anna A. Isaeva, Yuri Gagarin Saratov State Technical University, Russia

*International Program Committee:*

**Robert R. Alfano**, CCNY, USA; **Stefan Andersson-Engels**, Tyndall National Institute, Cork, Ireland; **Oleg V. Angelsky**, Chernivtsi National University, Ukraine; **Victor N. Bagratashvili**, Inst. of Laser and Information Technologies RAS, Russia; **Claude Boccara**, ESPCI, France; **Alexander V. Bykov**, Univ. of Oulu, Finland; **Alexander V. Doronin**, Yale University, New Haven, CT, USA; **Steven L. Jacques**, Oregon Health Sciences Univ., USA; **Alexey P. Popov**, Univ. of Oulu, Finland; **Alexander P. Sviridov**, Inst. of Laser and Information Technologies RAS, Russia; **Valery V. Tuchin**, Saratov National Research State University, Institute of Precision Mechanics and Control RAS, National Research Tomsk State University, Russia; **Olga V. Ushakova**, Yuri Gagarin Saratov State Technical University of Saratov, Russia; **Alexander G. Ushenko**, Chernivtsi National University, Ukraine; **Lihong Wang**, California Institute of Technology, CA, USA

**October 1, Friday**

**ON-LINE JOINT ORAL SESSION**  
**Advanced Polarization and Correlation**  
**Technologies in Biomedicine and Material**  
**Science**

**Zoom link:**

<https://us05web.zoom.us/j/7097091571?pwd=VN0T2JZMlntSU0vdWFWUFIIZVFZdz09>

**Conference ID: 709 709 1571**

**Passcode: 11111**

**Chairs (P): Dmitry A. Zimnyakov**, Yuri Gagarin Saratov State Technical, Russia

**11.30-11.45 Stokes vector based polarization resolved second harmonic microscopy**  
Nirmal Mazumder, Manipal School of Life Sciences, Manipal Academy of Higher Education, India, Fu-Jen Kao, National Yang Ming Chiao Tung University, Taiwan

**11.45-12.00 Diagnostics of optical diffusion in the structural characterization of foamed polymers**  
Olga V. Ushakova, Yuri Gagarin State Technical University of Saratov, Russia, Dmitry A. Zimnyakov, Yuri Gagarin State Technical University of Saratov, Russia,

**12.00-12.15 Simulation and coherent-optical approach for the morphofunctional diagnostic of the foam-like multi-phase systems**  
Elena Isaeva, Yuri Gagarin State Technical University of Saratov, Russia, Anna Isaeva, Yuri Gagarin State Technical University of Saratov,

Russia, Dmitry Zimnyakov, Yuri Gagarin State Technical University of Saratov, Russia

**12.15-12.30 A stacked-speckle history method in diagnostics of structure features of foamed polymers** E.V. Ushakova, Yuri Gagarin State Technical University of Saratov, Russia, Marina V. Alonova, Yuri Gagarin State Technical University of Saratov, Russia, Dmitry A. Zimnyakov, Yuri Gagarin State Technical University of Saratov, Russia

**12.30-12.45 Stacked speckle history technique for characterization of the microscopic dynamics in foamed polylactide scaffolds**  
Dmitry A. Zimnyakov, Yuri Gagarin State Technical University of Saratov, Russia, M.V. Alonova, Yuri Gagarin State Technical University of Saratov, Russia, E.V. Ushakova, Yuri Gagarin State Technical University of Saratov, Russia, S.S. Volchkov, Yuri Gagarin State Technical University of Saratov, Russia, D. Klimov, Yuri Gagarin State Technical University of Saratov, Russia

**JOINT POSTER/INTERNET SESSION AND INTERNET DISCUSSION**

**Chairs (P): Dmitry A. Zimnyakov**, Yuri Gagarin Saratov State Technical, Russia

**September 30, Thursday**

**18.00-19.30**

**1P. Simulation of the interaction of the light and dry foam like system**  
Pantuyukov A.V., Yuri Gagarin State Technical University of Saratov, Russia, Anna Isaeva, Yuri Gagarin State Technical University of Saratov, Russia, Elena Isaeva, Yuri Gagarin State Technical University of Saratov, Russia, Dmitry

Zimnyakov, Yuri Gagarin State Technical University of Saratov, Russia

**2P. Spectral-polarization studies of electron transfer processes in the system eosin Y - titanium dioxid**

Denis A. Bykov, Sararov State Technical University, Russia, Andrey G. Melnikov, Sararov State Technical University, Russia, Gennady V. Melnikov, Sararov State Technical University, Russia, Dmitry A. Zimnyakov, Sararov State Technical University, Russia,

**3P. Statistical modeling of local polarization states of laser light multiple scattered: fundamentals of the speckle-polarization correlometry**

Dmitry. V. Tsypin, Yuri Gagarin State Technical University of Saratov, Russia, Marina. V. Alonova, Yuri Gagarin State Technical University of Saratov, Russia, Dmitry A. Zimnyakov, Yuri Gagarin State Technical University of Saratov, Russia.

**4P. Analysis of the Urbach energy of quasi-two-dimensional semiconductor oxide micro and nanocoatings**

Sergey S. Volchkov, Yuri Gagarin State Technical University of Saratov, Russia, A.Sh. Gubanov, Yuri Gagarin State Technical University of Saratov, Russia, L.A. Kochkurov, Yuri Gagarin State Technical University of Saratov, Russia, D.A. Zimnyakov, Yuri Gagarin State Technical University of Saratov, Russia

**5P Thermal aspects of interaction of polarized laser radiation with plasmon nanoparticles in vacuum photosensors**

Yakunin A.N., Institute of Precision Mechanics and Control, RAS, Saratov, Russia, Avetisyan Yu.A., Institute of Precision Mechanics and Control, RAS, Saratov, Russia, Akchurin G.G., Institute of Precision Mechanics and Control, RAS, Saratov, Russia, Zarkov S.V., Institute of Precision Mechanics and Control, RAS, Saratov, Russia, Tuchin V.V., Institute of Precision Mechanics and Control, RAS, and Saratov State University, Saratov, Russia

**6P Influence of laser radiation polarization when exposed to complexes of plasmon nanoparticles with proteins**

Zarkov S.V., Institute of Precision Mechanics and Control, RAS, Saratov, Russia, Avetisyan Yu.A., Institute of Precision Mechanics and Control, RAS, Saratov, Russia, Yakunin A.N., Institute of Precision Mechanics and Control, RAS, Saratov, Russia,

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



# Workshop on Electromagnetics of Microwaves, Submillimeter and Optical Waves XXI

**Workshop Chair:** Michael V. Davidovich, Saratov State University, Russia, Institute of Radio Engineering & Electronics RAS, Saratov Branch

**Secretaries:** Alexander N. Savin, Istok, Fryazino. (Russia), Dmitry A. Kolosov, Saratov State University (Russia), Kirill A. Sayapin, Saratov State University (Russia)

*International Program Committee:*

Alexander I. Nosich, Kharkov Institute of Radio-Engineering and Electronics, NAS Ukraine (Ukraine); Nikita M. Ryskin, Saratov State University (Russia); Igor S. Nefedov, Aalto University, Espoo (Finland); Georgi N. Georgiev, "Sts. Cyril and Methodius" University, VelikoTirnov, (Bulgaria); Andrei D. Grigoriev, St. Petersburg Electrotechnical University LETI (Russia); Josef Modelsky, Warsaw University of Technology (Poland); Alexander M. Lerer, South Federal University, Rostov-Don (Russia).

**Thursday September 30**

## JOINT POSTER/INTERNET SESSION

Chair (EM): Michael V. Davidovich, Saratov State University, Russia

## INTERNET REPORTS

**18.00-20.00**

- 1. Broadband Generation of Terahertz Waves via Infrared Frequency Nondegenerate Parametric Down-Conversion by Nonlinear Graphene Arrays,** Lerer A.M., Southern Federal University, Makeeva G.S., Penza State University, Cherepanov V.V., Southern Federal University
- 2. Tunable Parametric Up-Conversion of Mid-to Near-Infrared Using Multimode Resonance Regime in Nonlinear Graphene Metasurfaces,** Lerer A.M., Southern Federal University, Makeeva G.S., Penza State University, Cherepanov V.V., Southern Federal University
- 3. Diffraction of electromagnetic waves on a cylindrical lens made of a photonic crystal formed by hollow metal cylinders** Igor V. Donets, Alexander M. Lerer, Southern Federal University, Svetlana M. Tsvetkovskaya, Don State Technical University, Rostov-on-Don, Russia

## INTERNET POSTERS

**18.00-20.00**

- 1. Investigation of the composition, structure and hardness of tool steel after induction nitriding** Pavel A. Palkanov,<sup>1</sup> Aleksandr A. Fomin, Yuri Gagarin State Technical University, Saratov, Russia.

- 2. Investigation of the composition, structure and hardness of tool steel after induction nitriding** Pavel A. Palkanov, Aleksandr A. Fomin, Yuri Gagarin State Technical University of Saratov, Saratov, Russia.

## POSTER SESSION

*(Building 3, 3rd floor Hall)*

Chair (EM): Michael V. Davidovich, Saratov State University, Russia

**18.00-20.00**

- 1. APPROACHES TO MINIATURIZATION AND EXPERIMENTAL IMPLEMENTATION OF A FLEXIBLE ANTENNA WITH A COPLANAR INPUT / OUTPUT OF A SIGNAL FOR OPERATION IN THE ISM-BAND** Ivan A. Chistyakov<sup>1,2</sup> Ivan S. Ozhogin<sup>1</sup> Ilya O. Kozhevnikov<sup>1</sup> Alexey A. Serdobintsev<sup>1</sup> Anton M. Pavlov<sup>1</sup> Andrey V. Starodubov<sup>1,3</sup>, <sup>1</sup> Saratov State University, <sup>2</sup>SC «RPE «Almaz», <sup>3</sup>Saratov Branch, Institute of Radio Engineering and Electronics, RAS, Saratov, Russia.
- 2. Coplanar transmission line on a flexible dielectric substrate: numerical simulations, peculiarities of fabrication and experimental studies** Ivan S. Ozhogin<sup>1</sup> Ivan A. Chistyakov<sup>1</sup>, Viktor V. Galushka<sup>1</sup>, Alexey A. Serdobintsev<sup>1</sup>, Ilya O. Kozhevnikov<sup>1</sup>, Andrey V. Starodubov<sup>1,2</sup>, <sup>1</sup>Saratov State University, Saratov, Russia, <sup>2</sup>Saratov Branch, Institute of Radio Engineering and Electronics, RAS, Saratov, Russia.
- 3. Co-deposited Si-Al thin films as a base material to decrease the reflectance in the millimeter-band frequencies** Anastasia M. Kartashova<sup>1</sup>, Larisa D. Volkovoyanova<sup>1</sup>, Alexey

A. Serdobintsev<sup>1</sup>, Andrey V. Starodubov<sup>1,2</sup>,  
Anton A. Kozyrev<sup>3,1</sup>, Ilya O. Kozhevnikov<sup>1</sup>,  
Anton M. Tolstoi<sup>4</sup>, Anton M. Pavlov<sup>1</sup>, Daniil N.  
Bratashov<sup>1</sup>, <sup>1</sup>Saratov State University, Saratov,  
Russia, <sup>2</sup>Saratov Branch, V.A. Kotel'nikov  
Institute of Radio Engineering and Electronics  
RAS, Saratov, Russia, <sup>3</sup>National Research  
Nuclear University MEPhI, Moscow, Russia,  
<sup>4</sup>JSC "Saratovstroysteklo", Saratov, Russia.

**4. RESEARCH AND MANUFACTURE OF A  
DIELECTRIC SUBSTRATE WITH THE  
INCLUSION OF A METAMATERIAL FOR**

**PLANAR MODERATING SYSTEMS IN THE  
MILLIMETER RANGE** Ivan A. Chistyakov<sup>1,2</sup>,  
Ilya I. Rasulov<sup>1</sup>, Andrey G. Rozhnev<sup>1,3</sup>, Roman  
A. Torgashev<sup>1,3</sup>, Andrey V.  
Starodubov<sup>1,3,1</sup> Saratov State University,  
Saratov, <sup>2</sup>SC «RPE «Almaz», <sup>3</sup>Saratov Branch,  
Institute of Radio Engineering and Electronics,  
RAS, Saratov, 410019 Russia

**5. On the maximum achievable current  
densities of vacuum field emission** Michael  
Davidovich, Saratov State University.

**Friday Octoberer1**

**ORAL SESSION  
ELECTROMAGNETICS  
(Building 8, Room 318)**

Chair: **Michael V. Davidovich**, Saratov State University, Russia

**11.00-11.15**

**Frequency-dependent FDTD study of SAR  
distribution in the skin for the enhanced  
Microwave treatment of cancer**, Mohammad Ali  
Ansari, Shayan Dodge, MahshadHajian,  
AlirezaNiknam, Laser and Plasma Research  
Institute, ShahidBeheshti University, Tehran, Iran.

**11.15-11.30**

**Study of synchronization of a gyrotron by  
using the modified quasilinear theory**  
Grigoryeva N.V., Ryskin N.M., Kotelnikov Institute  
of Radio-Engineering of RAS, Saratov Branch,  
Saratov State University.

**11.30-11.45**

**Dispersion forces in one-dimensional and two-  
dimensional structures** Michael Davidovich,  
Saratov State University, Saratov, Russia.

# Conference on Terahertz Optics & Biophotonics IV

*Conference Chair:* Nikita V. Chernomyrdin, Prokhorov GPI RAS (Russia); Irina N. Dolganova, ISSP RAS (Russia); Dmitry S. Ponomarev, IUHFSE RAS (Russia); Kirill I. Zaytsev, Prokhorov GPI RAS (Russia)

*Secretary:* Arsenii A. Gavdush, Prokhorov GPI RAS (Russia)

*International Program Committee:* Olga P. Cherkasova, Institute of Laser Physics of SB RAS (Russia); Alexei Ivlev, Max-Planck-Institut für Extraterrestrische Physik (Germany); Pavel A. Karalkin, Institute for Cluster Oncology, Sechenov University (Russia); Gleb M. Katyba, Institute of Solid State Physics of RAS (Russia); Rustam A. Khabibullin, Institute of Ultra High Frequency Semiconductor Electronics of RAS (Russia); Gennady A. Komandin, Prokhorov General Physics Institute of RAS (Russia); Vladimir N. Kurlov, Institute of Solid State Physics of RAS; Institute for Regenerative Medicine, Sechenov University (Russia); Igor V. Reshetov, Institute for Cluster Oncology, Sechenov University; Academy of Postgraduate Education FSCC FMBA (Russia); Maksim Skorobogatiy, Polytechnique Montréal (Canada); Igor E. Spector, Prokhorov General Physics Institute of RAS (Russia); Petr S. Timashev, Institute for Regenerative Medicine, Sechenov University (Russia); Stanislav O. Yurchenko, Bauman Moscow State Technical University (Russia)

## September 30, Thursday

### Zoom:

<https://us02web.zoom.us/j/86988958684?pwd=OUVudXRqTXFseVhxRlI3dnBid00rUT09>

Идентификатор конференции: 869 8895 8684

Код доступа: 198284

### 10.00-10.20 (9.00-9.20 Moscow local)

#### Invited

#### **Terahertz and optical properties of carbon nanotubes and their heterostructures**

Maria G. Burdanova (Center for Photonics and 2D Materials, Moscow Institute of Physics and Technology, Dolgoprudny, Russia; Department of Physics, University of Warwick)

### 10.20-10.40 (9.20-9.40 Moscow local)

#### Invited

#### **Solving inverse problem of terahertz solid immersion microscopy for biomedical applications**

Nikita V. Chernomyrdin (Prokhorov General Physics Institute of the Russian Academy of Sciences, Russia; Bauman Moscow State Technical University, Russia; Institute for Regenerative Medicine, Sechenov University, Russia), Maksim Skorobogatiy, Kirill I. Zaytsev

### 10.40-11.00 (9.40-10.00 Moscow local)

#### Invited

#### **Novel designs and InGaAs-based materials for efficient THz detection**

Dmitry S. Ponomarev (Institute of Ultra-High Frequency Semiconductor Electronics of the Russian Academy of Sciences, Moscow, Russia; Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia), Denis V. Lavrukhin, Alexander E. Yachmenev, Rustam A. Khabibullin, Yurii G. Goncharov, Igor E. Spector, Kirill I. Zaytsev

### 11.00-11.15 (10.00-10.15 Moscow local)

#### **Studying brain glioma model heterogeneity using terahertz pulsed spectroscopy and solid immersion microscopy**

Anna S. Kucheryavenko, (Prokhorov General Physics Institute of the Russian Academy of Sciences, Russia; Institute of Solid State Physics of the Russian Academy of Sciences, Russia); N. V. Chernomyrdin, A. A. Gavdush, A. I. Alekseeva, P. V. Nikitin, and K. I. Zaytsev

### 11.15-11.30 (10.15-10.30 Moscow local)

#### **Influence of object dielectric properties on spatial resolution of a terahertz solid immersion microscope**

Vladislav Zhelnov, (Prokhorov General Physics Institute of the Russian Academy of Sciences, Russia; Bauman Moscow State Technical University, Russia), Nikita Chernomyrdin, Anna Kucheryavenko, Gleb Katyba, Kirill Zaytsev

### 11.30-11.45 (10.30-10.45 Moscow local)

#### **Spectroscopic observation of the forward and backward IR emission of bacteriorhodopsin under broadband optical pumping**

Valeriy V. Savransky (Prokhorov General Physics Institute of the Russian Academy of Sciences, Russia), E.L. Terpugov, O.V. Degtyareva

### 11.45-12.00 (10.45-11.00 Moscow local) – coffee break

### 12.00-12.20 (11.00-11.20 Moscow local)

#### Invited

## **APPLICATIONS OF THE SHAPED SAPPHIRE IN THZ-WAVE DELIVERY AND SUPER-RESOLUTION IMAGING**

Gleb M. Katyba (Institute of Solid State Physics of RAS, Russia; Prokhorov General Physics Institute of RAS, Russia; Bauman Moscow State Technical University, Russia)

**12.20-12.40 (11.20-11.40 Moscow local)**

**Invited**

### **Generation of powerful terahertz pulses in a terahertz system for medical applications**

Valeriy V. Teplyakov (Lomonosov Moscow State University, Russia), M. M. Nazarov, P. A. Shcheglov, M. V. Chashchin, A. V. Mitrofanov, D. A. Sidorov-Biryukov, A. M. Zheltikov, V. Ya. Panchenko

**12.40-13.00 (11.40-12.00 Moscow local)**

**Invited**

### **Design of achromatic THz broadband vortex and vector beam converters**

Nikolay V. Petrov (ITMO University, Saint-Petersburg, Russia), Bogdan V. Sokolenko, Maksim S. Kulya, Andrei Gorodetsky, Aleksey V. Cherhykh

**13.00-13.15 (12.00-12.15 Moscow local)**

### **THz and IR spectroscopy of astrophysical ice analogs**

Arsenii A. Gavdush (Prokhorov General Physics Institute of the Russian Academy of Sciences, Russia; Bauman Moscow State Technical University, Russia), Barbara M. Giuliano, B. Müller, Gennady A. Komandin, Kirill I. Zaytsev, Alexei V. Ivlev, and P. Caselli

**13.15-13.30 (12.15-12.30 Moscow local)**

### **Plasmonics-enhanced THz emitters: new designs and approaches**

Igor A. Glinskiy (Institute of Ultra High Frequency Semiconductor Electronics of RAS, Moscow, Russia; Prokhorov General Physics Institute of the Russian Academy of Sciences, Russia; Bauman Moscow State Technical University, Russia), Denis V. Lavrukhin,

Alexander E. Yachmenev, Rustam A. Khabibullin, Nikolay V. Zenchenko, Dmitry S. Ponomarev

## **13.30-13.45 (12.30-12.45 Moscow local) Terahertz pulsed spectroscopy and terahertz generation in nickel sulfate hexahydrate**

Konstantin E. Reznikov (Institute on Laser and Information Technologies of the Russian Academy of Sciences—Branch of the Federal Scientific Research Center “Crystallography and Photonics” of the Russian Academy of Sciences, Russia; Lomonosov Moscow State University, Russia), Petr M. Solyankin, Anton S. Sinko, Vera L. Manomenova, Alexander P. Shkurinov, Alexey E. Voloshin

**13.45-14.05 (12.45-13.05 Moscow local)**

**Invited**

### **The biological effects of THz radiation**

Olga P. Cherkasova (Institute of Laser Physics, Siberian Branch, Russian Academy of Sciences, Novosibirsk, Russia; Institute on Laser and Information Technologies - Branch of the Federal Scientific Research Centre “Crystallography and Photonics” of RAS, Shatura, Moscow Region, Russia)

## **JOINT PRESENTATIONS**

### **On-line at BRICS**

**Invited**

### **Prospects of terahertz technology in diagnosis of human brain tumors**

Kirill I. Zaytsev (Prokhorov General Physics Institute of the Russian Academy of Sciences, Russia; Bauman Moscow State Technical University, Russia; Institute for Regenerative Medicine, Sechenov University, Russia), N. V. Chernomyrdin, A. A. Gavdush, I. N. Dolganova, G. M. Katyba, P. V. Nikitin, V. N. Kurlov, and V. V. Tuchin

# Conference on Advanced Materials for Optics & Biophotonics IV

*Conference Chair:* Vladimir N. Kurlov, ISSP RAS (Russia); Mikhail S. Kovalev, Lebedev Physical Institute RAS, (Russia); Irina N. Dolganova, ISSP RAS (Russia); Kirill I. Zaytsev, Prokhorov GPI RAS

*Secretary:* Gleb M. Katyba, ISSP RAS (Russia)

*International Program Committee:* Nikita V. Chernomyrdin, Prokhorov General Physics Institute of the RAS (Russia); Alexei K. Fedorov, Russian Quantum Center (Russia); Arseniy A. Gavdush, Prokhorov General Physics Institute of RAS; Bauman Moscow State Technical University (Russia); Pavel A. Karalkin, Institute for Cluster Oncology, Sechenov University (Russia); Rustam A. Khabibullin, Institute of Ultra High Frequency Semiconductor Electronics of RAS (Russia); Sergey I. Kudryashov, Lebedev Physical Institute of RAS (Russia); Sergey V. Kuznetsov, Prokhorov General Physics Institute of RAS (Russia); Gennady A. Komandin, Prokhorov General Physics Institute of RAS (Russia); Vladimir A. Lazarev, Bauman Moscow State technical University (Russia); Vladimir M. Masalov, Institute of Solid State Physics of RAS (Russia); Dmitry S. Ponomarev, Institute of Ultra High Frequency Semiconductor Electronics of RAS (Russia); Igor V. Reshetov, Institute for Cluster Oncology, Sechenov University; Academy of Postgraduate Education FSCC FMBA (Russia); Maksim Skorobogatiy, Polytechnique Montréal (Canada); Igor E. Spector, Prokhorov General Physics Institute of RAS (Russia); Stanislav O. Yurchenko, Bauman Moscow State Technical University (Russia)

## October 1, Friday

### Zoom:

<https://us02web.zoom.us/j/87609395762?pwd=TWhGZE5hYlNSYktLZzZlUDB6RmpvQT09>

Идентификатор конференции: 876 0939 5762

Код доступа: 370715

### 10.00-10.20 (9.00-9.20 Moscow local)

#### Invited

#### Standard of up-conversion luminescence based on barium fluoride doped ytterbium and erbium

Sergey Kuznetsov, (Prokhorov General Physics Institute of the Russian Academy of Sciences (GPI RAS), Russia), E.I. Madirov, V.A. Konyushkin, A.N. Nakladov, Thomas Bergfeldt, D. Busko, H.B. Nasrabadi, D. Hudry, I.A. Howard, B.S. Richards, A. Turshatov

### 10.20-10.40 (9.20-9.40 Moscow local)

#### Invited

#### Mid-IR solid-state laser sources for medical applications

Mikhail Tarabrin, (Bauman Moscow State Technical University (BMSTU), Russia)

### 10.40-10.55 (9.40-9.55 Moscow local)

#### Fabrication and study of terahertz lenses made of artificial opals

Vladislav Ulitko, (Institute of Solid State Physics Russian Academy of Sciences (ISSP RAS), Russia), G.M. Katyba, G.A. Komandin, I.E. Spector, G.A. Emelchenko, V.N. Kurlov, V.M. Masalov, K.I. Zaytsev

### 10.55-11.10 (9.55-10.10 Moscow local)

### Submicron mineral particle with modified surface for hemodialysis model

Roman Anisimov, (Saratov State University (SSU), Science Medical Center, Russia), P. A. Demina, R. A. Verhovskiy, N. A. Shushunova, E. S. Shamsutdinova, M. V. Lomova

### 11.10-11.25 (10.10-10.25 Moscow local)

#### Sapphire-fiber lens: simulation vs. experiment

Nikolay Zenchenko, (Institute of Ultra High Frequency Semiconductor Electronics of the Russian Academy of Sciences (IUHFSE RAS), Russia), I.A. Glinskiy, D.V. Lavrukhin, G.M. Katyba, E.V. Yakovlev, K.I. Zaytsev, and D.S. Ponomarev

### 11.25-11.40 (10.25-10.40 Moscow local)

#### Control of the ice ball formation during tissue cryosurgery using sapphire shaped crystals

Andrey Yu. Shchelkunov, (Yuri Gagarin State Technical University of Saratov, Russia), A. V. Voyko, A. A. Fomin

### 11.40-12.00 (10.40-11.00 Moscow local) – coffee break =

### 12.00-12.20 (11.00-11.20 Moscow local)

#### Invited

#### Dynamics and heating of the high-power pulse-pumped quantum-cascade lasers

Grigori Sokolovskii, (Ioffe Institute, Russia)

### 12.20-12.35 (11.20-11.35 Moscow local)

#### Control of the ice ball formation during tissue cryosurgery using sapphire shaped crystals

ArsenZotov, (ISSP RAS, Russia), I. N. Dolganova, I. A. Shkunova, L. P. Safonova, and V. N Kurlov

**12.35-12.50 (11.35-11.50 Moscow local)**  
**Terahertz pulsed spectroscopy of tissue scaffolds moisture adsorption**

Guzel R. Musina, (GPI RAS, Russia), N. V. Chernomyrdin, E. R. Gafarova, A. A. Gavdush, G. A. Komandin, I. N. Dolganova, K. I. Zaytsev, P. S. Timashev

**12.50-13.05 (11.50-12.05 Moscow local)**  
**3D bioprinted fibrin-gelatin-based structures preserve the functionality of MSC spheroids**

Polina Bikmulina, (Sechenov University, Russia), N. V. Kosheleva, A. I. Shpichka, Yu. M. Efremov, A. S. Kuryanova, G. K. Vladimirov, K. N. Bardakova, P. S. Timashev

**13.05-13.20 (12.05-12.20 Moscow local)**  
**A reinforced collagen network of the Giant squid mantle - is it a candidate for a scaffold material in tissue engineering?**

Anastasia Frolova, (Sechenov University, Russia), I. A. Novikov, Yu. M. Efremov

**13.20-13.35 (12.20-12.35 Moscow local)**  
**Detection of acute myeloid leukemia marker c-Kit using fluorescent stem cell factor**

Varvara Maiorova (Dmitry Rogachev National Research Center of Pediatric Hematology, Oncology and Immunology, Russia), A. V. Posvyatenko, M. I. Lukashina, E. Y. Lyssuk, A. M. Popov, M. A. Maschan, A. V. Kibardin, S. S. Larin

**13.35-13.50 (12.35-12.50 Moscow local)**  
**Development of New Anti-Cancer WPI Hydrogels with a Long-Term pH-Dependent Drug Release Profile**

Oksana A. Mayorova(SSU, Russia), V. O. Plastun, O. A. Sindeeva

**13.50-14.05 (12.50-13.05 Moscow local)**  
**Application of the endovascular method of addressing polyelectrolyte capsules in the kidney cancer treatment**

Valentina O. Plastun (SSU, Russia), E. S. Prikhozhenko, O. I. Gusliakova, N. A. Shushunova, O. A. Mayorova, O. A. Sindeeva

**14.05-14.20 (13.05-13.20 Moscow local)**  
**Investigation of the operational properties of a layered "steel-titanium-oxide" structure after exposure to high-temperature induction heating**

Ivan S. Egorov, (Yuri Gagarin State Technical University of Saratov, Russia)

**14.20-14.35 (13.20-13.35 Moscow local)**  
**Electrically reduced optical switching threshold of VO<sub>2</sub>-based THz metasurface**

Vladimir Kaydashev(Moscow Institute of Physics and Technology (MIPT), Russia), A. S. Slavich, I. K. Domaratskiy, S. S. Zhukov, R. Kirtaev, D. Mylnikov, M. E. Kutepov, E. M. Kaidashev

**14.35-14.50 (13.35-13.50 Moscow local)**  
**Application of X-Ray micro-CT imaging for high-resolution visualization of the scaffolds**

Sergey Tkachev (Institute for Regenerative Medicine, Sechenov University, Russia), G. Vladimirov

**JOINT PRESENTATIONS**

**On site at OPTICAL TECHNOLOGIES IN BIOPHYSICS & MEDICINE XXIII**

**Invited**

**«Smart ARDOR»: selective low-power IR-laser activation of conformational DNA transformations in bacteria for disinfection and sterilization**

Sergey I. Kudryashov (Lebedev Physical Institute of RAS; V.M. Gorbato Federal Scientific Center for Food Systems of RAS, Russia)

**On-line at BRICS**

**Invited**

**Biodegradation: a novel challenge for biophotonics**

Peter Timashev (Sechenov University, Russia)

## JOINT INTERNET POSTER SESSION

### Advanced Materials for Optics and Biophotonics IV

#### Terahertz Optics and Biophotonics IV

##### **Enhancement of THz emission in WSe<sub>2</sub>/FeCo structure**

Dinar Khusyainov (MIREA – Russian Technological University, Russia), Sergei Ovcharenko, Andrey Guskov, Nicolas Tiercelin, Vladimir Preobrazhensky, Arseniy Buryakov, Alexander Sigov and Elena Mishina

##### **Laser induced crystallization of a-Si(Al) films using Ni absorption layer**

L.D. Volkovoyanova (SSU, Russia), A.A. Serdobintsev, A.V. Starodubov, I.O. Kozhevnikov, A. M. Pavlov

##### **Mid-IR laser disinfection of pathogenic bacteria**

S. Shelygina (Lebedev Physical Institute RAS, Russia), V. O. Kompanets, E. R. Tolordava, S. I. Kudryashov

##### **Particle-resolved study in colloids with tunable interactions: from fundamental research to practica**

S.A. Korsakova (BMSTU, Russia), E.V. Yakovlev, N.P. Kryuchkov, S.O. Yurchenko

##### **Study of the combined process of oxidation and carburization of titanium**

A. Voyko (Yuri Gagarin State Technical University of Saratov, Russia), A.M. Gerasimov, A.Yu. Shchelkunov, A.A. Fomin

##### **Mid-IR laser disinfection of pathogenic bacteria**

N. Zakharenko (SSU, Russia), A. Serdobintsev, A. Starodubov, A. Pavlov, I. Kozhevnikov, P. Demina, I. Ozhogin, E. V. Lengert,

##### **Fabrication of PVDF-based composites for $\alpha$ -, $\beta$ - and $\gamma$ -phases analysis**

M. Aronov (Immanuel Kant Baltic Federal University, Russia), A.A. Amirov, V.K. Belyaev, D.V. Murzin, V.V. Rodionova

# Workshop on Quantum Science and Technologies II

*Co-Chairs:* **Aleksey K. Fedorov**, and **Evgeniy O. Kiktenko**, Russian Quantum Center (Russia); Moscow Institute of Physics and Technology (Russia); Schaffhausen Institute of Technology (Switzerland)

*Secretary:* **Alena S. Mastiukova**, Russian Quantum Center (Russia); Moscow Institute of Physics and Technology (Russia)

*International Program Committee:*

Yury V. Kurochkin, NTI Center for Quantum Communications at MISiS University (Russia); Vadim Makarov, NTI Center for Quantum Communications at MISiS University (Russia); Georgy Shlyapnikov, LPTMS, University of Paris-Sud (France), University of Amsterdam (The Netherlands), Russian Quantum Center (Russia)

**October 1, Friday**

## ORAL SESSION

Campus of the Skolkovo Institute of Science and Technology / ZOOM

Chair: Aleksey Fedorov, Russian Quantum Center (Russia)

**11:30 - 11:35**

Aleksey Fedorov, Opening Ceremony

**11:40 - 12:05**

Stanislav Straupe, Decoherence and errors in quantum computers based on single trapped atoms

**12:10 - 12:35**

Ilya Semerikov, Ground state cooling and two-qubit operations in ion quantum computer (LRC Project)

**12:40 - 13:05**

Evgeniy Kiktenko, Estimating precision of quantum process tomography with confidence polytopes

**13:10 - 13:35**

Boris Bantysh, Improving quantum gates using tomography data (LRC Project)

**15:10 - 15:35**

Alexander Ulanov, Integrated quantum light source based on dual-frequency self-injection locking

**15:40 - 16:05**

Ilya Besedin, Two-mode tunable couplers for superconducting quantum processors

**16:10 - 16:35**

Ilia Luchnikov, Towards experiment compatible quantum many-body control

**16:40 - 17:05**

Denis Vrazhnov, Method for informative feature selection on a model IR spectra

**17:10 - 18:30**

Poster Session, Free Discussions

## POSTERS

**13:40 - 15:00**

Lunch

Alena Mastiukova (RQC, MIPT),  
Maxim Gavreev (RQC, MIPT).



# Workshop on Medical Applications of Laser Molecular Imaging and Machine Learning

Co-chairs: **Igor K. Lednev**, University at Albany, USA; Tomsk State University, Russian Federation, **Yury V. Kistenev**, Tomsk State University, Russian Federation, **Walter Blondel**, Université de Lorraine, France

Secretary: **Sergey M. Zaytsev**, Université de Lorraine, France; Saratov State University, Russian Federation

International Program Committee: **Arnaud Coussiet**, Université du Littoral Côte d'Opale, France, **Vladimir L. Vaks**, Institute of Applied Physics of RAS, Nizhny Novgorod, Russian Federation, **Olga P. Cherkasova**, Institute of Laser Physics of SB of RAS, Russian Federation, **Denis A. Vrazhnov**, Tomsk State University, Russian Federation, **Alexey V. Borisov**, Tomsk State University, Russian Federation

## September 29, Wednesday ON-LINE JOINT INVITED LECTURE/ORAL SESSION MACHINE LEARNING I (On-line)

Microsoft Teams link:

<https://teams.microsoft.com/l/meetup-join/19%3AGuDbade7SuWBI42V9R0XdTRwVwV3SXluUJXENfgwJbE1%40thread.tacv2/1632836714223?context=%7B%22Id%22%3A%22158716cf-46b9-48ca-8c49-c7bb67e575f3%22%2C%22Oid%22%3A%226d160075-9e77-4a77-bd00-9a335195c879%22%7D>

Chair: Yury Kistenev  
Moderator: Sergey Zaytsev

### 15.00-15.20 (local time 20.00-20.20) Machine learning assisted Raman microspectroscopy for objective discrimination of breast cancer cells from normal mammary epithelial cells

Hemanth Noothalapati<sup>1,2</sup>, Keita Iwasaki<sup>3</sup>, Ajinkya Anjekar<sup>3</sup>, Asuka Araki<sup>4</sup>, Riruke Maruyama<sup>4</sup>, Tatsuyuki Yamamoto<sup>1,2</sup>; <sup>1</sup>Faculty of Life and Environmental Sciences, Shimane University, Japan, <sup>2</sup>Raman Project Center for Medical and Biological Applications, Shimane University, Japan, <sup>3</sup>The United Graduate School of Agricultural Sciences, Tottori University, Japan, <sup>4</sup>Department of Organ Pathology, Faculty of Medicine, Shimane University, Japan

### 15.20-15.40 (local time 13.20-13.40)

Invited

### Intramolecular H-bond dynamics investigated by THz high-resolution spectroscopy

Jonas Bruckhuisen<sup>1</sup>, Guillaume Dhont<sup>1</sup>, Anthony Roucou<sup>1</sup>, Atef Jabri<sup>1</sup>, Hamdi Bayoudh<sup>1</sup>, Thi Thanh Tran<sup>1</sup>, Manuel Goubet<sup>2</sup>, Marie-Aline Martin-Drumel<sup>3</sup>, Arnaud Cuisset<sup>1</sup>; <sup>1</sup>LPCA, Laboratoire de Physico-Chimie de l'Atmosphère, Université du Littoral Côte d'Opale, F-59140 Dunkerque, France;

<sup>2</sup>PhLAM, Physique des Lasers Atomes et Molécules, Université de Lille, CNRS, F-59000 Lille, France; <sup>3</sup>Institut des Sciences Moléculaires d'Orsay, Université Paris-Saclay, CNRS, F-91405 Orsay, France

### 15.40-16.00 (local time 13.40-14.00)

Invited

### Fluorescence Guided Procedures and Photodynamic Therapy in Neurosurgery

R. Sroka<sup>1,2</sup>, H. Stepp<sup>1,2</sup>, N. Markwardt<sup>1</sup>, C. Heckl<sup>1</sup>, M. Aumiller<sup>1</sup>, A. Rühm<sup>1,2</sup>; <sup>1</sup>Laser-Forschungslabor in LIFE Center, University Hospital, LMU-Munich, Germany; <sup>2</sup>Department of Urology, University Hospital, LMU-Munich, Germany

### 16.00-16.20 (local time 15.30-15.50)

### Vascular networks dataset generation used in deep learning methods for enhancement of photoacoustic images

Shahriar Zeynali<sup>1</sup>, Amir Asadollahi<sup>1</sup>, Hamid Latifi<sup>1,2</sup>; <sup>1</sup>Laser and Plasma Research Institute, Shahid Beheshti University, Tehran, Iran, <sup>2</sup>Department of Physics, Shahid Beheshti University, Tehran, Iran

### 16.20-16.40 (local time 19.20-19.40)

### Possibilities of two-photon microscopy for analysis of fluorescent properties of elastin fibers of rats *in vivo*

Anastasia I. Knyazkova<sup>1,2</sup>, Alice A. Samarinova<sup>2</sup>, Viktor V. Nikolaev<sup>2</sup>, Alexey V. Borisov<sup>2</sup>, Yury V. Kistenev<sup>2,3</sup>; <sup>1</sup>V.E. Zuev Institute of Atmospheric Optics SB RAS, Tomsk 634055, Russia, <sup>2</sup>Tomsk State University, Tomsk 634050, Russia, <sup>3</sup>Siberian State Medical University, Tomsk 634050, Russia

### 16.40-17.00 (local time 18.10-18.30)

Invited

**Four Channel based Stokes-Mueller Polarimetry for Tissue Characterization Integrated with Machine Learning**

Spandana K. U.<sup>1</sup>, Sindhoora Kaniyala Melanthota<sup>1</sup>, Raghavendra U.<sup>2</sup>, Sharada Rai<sup>3</sup>, K. K. Mahato<sup>1</sup>, Nirmal Mazumder<sup>1</sup>,  
<sup>1</sup>Department of Biophysics, Manipal School of Life Sciences, Manipal Academy of Higher Education, Manipal, India, <sup>2</sup>Department of Instrumentation and Control Engineering, Manipal Institute of Technology, Manipal Academy of Higher Education, Manipal, Karnataka, India, <sup>3</sup>Department of Pathology, Kasturba Medical College, Mangalore, Karnataka, India.

**17.00–17.20 (local time 20.00–20.20)**

**Method for informative feature selection on a model IR spectra**

Denis A. Vrazhnov<sup>1,2</sup>, Tatyana V. Kabanova<sup>3</sup>, Tatyana E. Malakhova<sup>3</sup>, Alexey V. Borisov<sup>2</sup>, Yuri V. Kistenev<sup>2</sup>, <sup>1</sup>V.E. Zuev Institute of Atmospheric optics SBRAS, Tomsk, Russia, <sup>2</sup>Tomsk State University, Laboratory of biophotonics, Tomsk, Russia, <sup>3</sup>Tomsk State University, Institute of Applied Mathematics and Computer Science, Tomsk, Russia

**17.20–17.40 (local time 10.20–10.40)**

**Invited**

**Disease diagnosis by FTIR spectroscopy**

Denise M. Zzell<sup>1\*</sup>, Pedro A.A. Castro<sup>1</sup>, Matheus del Valle<sup>1</sup>, Kleber Stancari<sup>1</sup>, Moises O. Santos<sup>1,2</sup>, <sup>1</sup>Center for Lasers and Applications, Nuclear and Energy Research Institute IPEN/CNEN, Sao Paulo-SP, Brazil, <sup>2</sup>Amazonas State University UEA, Manaus-AM, Brazil

**September 30, Thursday  
JOINT INVITED LECTURE/ORAL  
SESSION  
MACHINE LEARNING II  
(Building 9, Conference Hall)  
Chair: Yury Kistenev**

**10.00–10.20**

**Invited**

**Breathomics using laser photo-acoustic spectroscopy and machine learning**

Yury Kistenev, Tomsk State University, Tomsk, 634050, Russia

**10.20–10.40**

**Invited**

**Machine learning in analysis of blood Raman spectra**

O. Cherkasova<sup>1,2</sup>, A. Mankova<sup>3</sup>, D. Vrazhnov<sup>4,5</sup>, Y. Kistenev<sup>5,6</sup>, <sup>1</sup>Institute of Laser Physics, Siberian Branch of the RAS, Novosibirsk, Russia, <sup>2</sup>Institute on Laser and Information Technologies - Branch of the Federal Scientific Research Centre "Crystallography and Photonics" of RAS, Shatura, Moscow Region, Russia, <sup>3</sup>Faculty of Physics, Lomonosov Moscow State University, Moscow, Russia, <sup>4</sup>V.E. Zuev Institute of Atmospheric optics, Siberian Branch of the RAS, Tomsk, Russia, <sup>5</sup>Tomsk State University, Tomsk, Russia, <sup>6</sup>Siberian State Medical University, Tomsk, Russia

**10.40–11.00**

**Analysis of spectral characteristics of collagen solutions in THz spectrum region**

Anastasia I. Knyazkova<sup>1,2</sup>, Olga P. Cherkasova<sup>1,3</sup>, Yuri V. Kistenev<sup>1</sup>, Alexey V. Borisov<sup>1</sup>, <sup>1</sup>Tomsk State University, Tomsk, Russia, <sup>2</sup>Institute of Atmospheric Optics SB RAS, Tomsk, Russia, <sup>3</sup>Institute of Laser Physics SB RAS, Novosibirsk, Russia

**11.00–11.20**

**Fluorescent multimodal nanosensor of heavy metal ions based on carbon dots**

Olga E. Sarmanova, Kirill A. Laptinskiy, Galina N. Chugreeva, Sergey A. Burikov, Tatiana A. Dolenko; Lomonosov Moscow State University, Department of Physics, Moscow, Russia

**11.20–11.40**

**Application of band-pass filters in terahertz time-domain spectroscopy to study the morphological picture of biological tissue**

Zakhar S. Kochnev, Alexey V. Borisov; National Research Tomsk State University, Lenin Ave. 36, 634050, Tomsk, Russia

**11.40–12.00**

**Application of optical spectroscopy and artificial neural networks for monitoring the elimination of anticancer nanoagents from the body**

A.D. Kudryashov, O.E. Sarmanov, K.A. Laptinsky, S.A. Burikov, M. Yu. Khmeleva, A.A. Fedyanina, P.V. Golubtsov, T.A. Dolenko; Moscow State University, Department of Physics, Moscow, Russia

**POSTER SESSION**

## MACHINE LEARNING III

Chair (ML): Denis Vrazhnov

18.00-20.00

ML1. **Increasing resolution of a noised gas-mixture absorption spectra by neural networks and data preprocessing methods** V.E. Skiba<sup>1</sup>, V.V. Prischepa<sup>1</sup>, D.A. Vrazhnov<sup>1,2</sup>, <sup>1</sup>Tomsk State University, Tomsk, Russian Federation, <sup>2</sup>Institute of Strength Physics and Materials Science of SB RAS, Tomsk, Russian Federation

## INTERNET POSTERS

1. **Increasing resolution of a noised gas-mixture absorption spectra by neural networks and data preprocessing methods** V.E. Skiba<sup>1</sup>, V.V. Prischepa<sup>1</sup>, D.A. Vrazhnov<sup>1,2</sup>, <sup>1</sup>Tomsk State University, Tomsk, Russian Federation, <sup>2</sup>V.E. Zuev Institute of Atmospheric Optics, Siberian Branch of the RAS, Tomsk, Russia
2. **Research of exosome fluorescence isolated from blood plasma in patients with colorectal polyps and colorectal cancer** Olga A. Zakharova<sup>1</sup>, Irina V. Kondakova<sup>2</sup>, Natalya V. Yunusova<sup>2</sup>, Alexey V. Borisov<sup>1</sup>, <sup>1</sup>Tomsk State University, Tomsk, Russia, <sup>2</sup>Cancer research institute, Tomsk National Research Medical Center of the Russian Academy of sciences, Tomsk, Russia
3. **Comparison of topical low-intensity photodynamic therapy using 5-aminolevulinic acid and methylene blue in wound healing by multiphoton microscopy *in-vivo*** Zuhayri H.<sup>1</sup>, Nikolaev V.V.<sup>1,2</sup>, Lepekhina T.B.<sup>1</sup>, Zakharova O.A.<sup>1</sup>, Knyazkova A.I.<sup>1,2</sup>, Borisov A.V.<sup>1</sup>, Kistenev Yu.V.<sup>1</sup>, N.A. Krivova<sup>1</sup>, <sup>1</sup>Tomsk State University, Tomsk, Russia, <sup>2</sup>Institute of Atmospheric Optics SB RAS, Tomsk, Russia
4. **Identification and Localization of Bacteria at Single - Cell Level in Cancer Cell using Raman Spectroscopy Combined with Multivariate Data Analysis** Pooja Manik Badgujar<sup>1</sup>, Kuan-Ting Wu<sup>1</sup>, Yu-Chung Lin<sup>1,2</sup>, Chia-Liang Cheng<sup>1</sup>, <sup>1</sup>Department of Physics, National Dong Hwa University, Hualien,

Taiwan, <sup>2</sup>Institute of Physics, Academia Sinica, Taipei, Taiwan

5. **Monitoring EEG of sleep** V.B. Ageev, Blohina I.A., I.V. Fedosov, O.V. Semyachkina-Glushkovskaya, Saratov State University, Russian Federation
6. **Application of deep learning and genetic algorithms to the solution of absorbance spectroscopy component analysis of gas mixtures problem** Vladimir V. Prischepa<sup>1</sup>, Victor E. Skiba<sup>1</sup>, Denis A. Vrazhnov<sup>1,2</sup>, <sup>1</sup>Tomsk State University, Tomsk, Russia, <sup>2</sup>V.E. Zuev Institute of Atmospheric Optics, Siberian Branch of the RAS, Tomsk, Russia
7. **Combining FTIR spectroscopy with multivariate chemoinformatic analysis for rapid detection of adulteration in coconut oil** Keita Iwasaki<sup>1,#</sup>, Soumyabrata Banik<sup>2,#</sup>, Hemanth Noothalapati<sup>3,4,\*</sup>, Tatsuyuki Yamamoto<sup>3,4</sup>, Sneha Sunil Chavan<sup>5,\*</sup>, Deepak Gupta<sup>5,\*</sup>, Nirmal Mazumder<sup>2,\*</sup>, <sup>1</sup>The United Graduate School of Agricultural Sciences, Tottori University, Tottori, Japan, <sup>2</sup>Department of Biophysics, Manipal School of Life Sciences, Manipal Academy of Higher Education, Manipal, India, <sup>3</sup>Faculty of Life and Environmental Sciences, Shimane University, Shimane, Japan, <sup>4</sup>Raman Project Center for Medical and Biological Applications, Shimane University, Shimane, Japan, <sup>5</sup>Marico India Limited, Mumbai, India, #equal contribution, \*corresponding authors
8. **Classification and Grading of Squamous Cell Carcinoma Tissue Images Using Machine Learning** Sindhoora K. M.<sup>1</sup>, Spandana K. U.<sup>1</sup>, Ragahvendra U.<sup>2</sup>, Sharada Rai<sup>3</sup>, Raghu Radhakrishnan<sup>4</sup>, K. K. Mahato<sup>1</sup>, Nirmal Mazumder<sup>1,\*</sup>, <sup>1</sup>Department of Biophysics, Manipal School of Life Sciences, Manipal Academy of Higher Education, Manipal, India, <sup>2</sup>Department of Instrumentation and Control Engineering, Manipal Institute of Technology, Manipal Academy of Higher Education, Manipal, Karnataka, India, <sup>3</sup>Department of Pathology, Kasturba Medical College, Mangalore, Karnataka, India, <sup>4</sup>Department of Oral Pathology, Manipal College of Dental Sciences, Manipal, Manipal Academy of Higher Education, Manipal, India

# 25<sup>d</sup> International School for Junior Scientists and Students on Optics, Laser Physics & Biophotonics

## Workshop on Modern Optics XX

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

*Chair:* **Georgy V. Simonenko**, Saratov State University

*Secretary:* **Ekaterina N. Lazareva**, Saratov State University, Tomsk State University

*Moderator:* **Isabella Serebryakova**, Saratov State University

*International Program Committee:* **Valery V. Tuchin**, **Vladimir P. Ryabukho**, **Vladimir L. Derbov**, **Alexander B. Pravdin**, **Boris A. Medvedev**, **Mikhail A. Starshov**, Saratov State University, **Alexander V. Priezhev**, Moscow State University

**September 30, Thursday**

**PUBLIC LECTURE SESSION MODERN OPTICS**  
(Building 3, Room 8, Youtube <https://youtu.be/o1VWZHzb9Xc>)

Chairs: **Georgy V. Simonenko**, Saratov State University, **Anton Dyachenko**, Saratov State University, Boarding school 64

**15.30-16.10**

**Biophotonics: how life begins**

**Irina V. Larina**, Baylor College of Medicine,, Houston, USA

<https://youtu.be/o1VWZHzb9Xc>

# Workshop English as a Communicative Tool in the Scientific Community XX

*Co-chairs:* **Svetlana V. Eremina**, Saratov State University (Russia)  
**Alexander B. Pravdin**, Saratov State University (Russia)

*Advising Chair:* **Vladimir L. Derbov**, Saratov State University (Russia)

*Secretary:* **Natalia I. Kazadaeva**, Saratov State University (Russia)

*Program Committee:* **Vladimir L. Derbov**, Saratov State University (Russia), **Igor V. Meglinski**, University of Oulu, (Finland); Saratov State University (Russia), **Valery V. Tuchin**, Saratov State University (Russia), **Dmitry A. Zimnyakov**, Saratov State Technical University (Russia)

**September 30, Thursday**

## **ROUND TABLE DISCUSSION** *(The venue will be announced)*

**11.00-12.45**

*Moderators:* **Svetlana V. Eremina**, **Alexander B. Pravdin**, Saratov State University (Russia)

1. **English To Be Taught** *Keynote speaker:* Svetlana V. Eremina, Saratov State University, Saratov, Russia
2. **English Summary: Mistkes We Make and Ways to Correct Them** *Keynote speaker:* Darya N. Tselovalnikova, Saratov State University, Saratov, Russia
3. **On Preparation of Annotation for Scientific Paper to Be Submitted to Web of Science/Scopus Indexed Journal** Galina I. Strelkova, Saratov State University, Saratov, Russia
4. **Internet Resources of University Library You May Use in Teaching and Learning ESP**, Mikhail.M. Stolnits, Saratov State University, Saratov, Russia

# Workshop on History, Methodology and Philosophy of the Optical Education XIV

Workshop Chairs: **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. Priezzhev**, M.V. Lomonosov Moscow State University, Russia; **Alexander V. Gorokhov**, Samara State University, Russia; **Valery V. Tuchin**, Saratov State University, Russia; **Alex Vitkin**, University of Toronto, Canada

## September 29, Wednesday

### LECTURE/ORAL SESSION I (Building 3, Hall 51)

Co-chairs: **Boris A. Medvedev**,  
**Vladimir P. Ryabukho**,  
Saratov State University, Russia

#### 15.00-15.45

##### **Educational distance: strategic and tactical disadvantages**

Valery M. Anikin<sup>1</sup>, B.N. Poizner<sup>2</sup>, E.A. Sosnin<sup>2</sup>,  
<sup>1</sup>Saratov State University, Saratov, Russia  
<sup>2</sup>Tomsk State University, Tomsk, Russia

#### 15.45-16.00

##### **Myths, discoveries, misconceptions in optics**

M.A. Starshov, Saratov State University, Saratov, Russia

#### 16.00-16.15

##### **Tasks for the online physics laboratory**

M.A. Starshov<sup>1</sup>, L.A. Kudryavtseva<sup>2</sup>,  
<sup>1</sup>Saratov State University, Saratov, Russia  
<sup>2</sup>Sergo Ordzhonikidze Russian State University for Geological Prospecting, Moscow, Russia

#### 16.15-16.30

##### **Application of critical thinking development technology in an optical workshop**

D.M. Klychkova, Saratov State University, Saratov, Russia

#### 16.30-16.45

##### **Study of the composition of molecules in gall-formers of two insect orders and their fodder plants using raman spectroscopy**

M. I. Nikelshparg<sup>1</sup>, E. I. Nikelshparg<sup>2</sup>, V.V. Anikin<sup>3</sup>,  
D.N. Bratashov<sup>3</sup>,  
<sup>1</sup>Gimnasium №3 of Saratov, Saratov, Russia  
<sup>2</sup>Lomonosov Moscow State University, Moscow, Russia  
<sup>3</sup>Saratov State University, Saratov, Russia

#### 16.45-17.00

##### **Fluorescent methods for the visualization of apoptosis and autophagy in human tumor cells**

N.A. Navolokin<sup>1,2</sup>, N.V. Polukonova<sup>1</sup>,  
D.A. Mudrak<sup>1</sup>, A.M. Myl'nikov<sup>1</sup>,  
M.A. Baryshnikova<sup>3</sup>, D.A. Khochenkov<sup>3</sup>,

A.B. Bucharskaya<sup>1,2</sup>, A.V. Polukonova<sup>1</sup>,  
G.N. Maslyakova<sup>1,2</sup>,

<sup>1</sup>Saratov State Medical University  
n.a.V.I.Razumovsky, Saratov,

<sup>2</sup>Saratov State University, Saratov, Russia,

<sup>3</sup>Blokhin Center for Medical Oncology  
Research, Moscow, Russia

#### 17.00-17.15

##### **Mathematical pattern recognition models in a problem of gut dysbiosis diagnosis**

L.D. Priory, J.A. Brodskaya, Saratov State University, Saratov, Russia

#### 17.15-17.30

##### **Computer arithmetic for ternary systems**

A.S. Dronkin, Saratov State University, Saratov, Russia

#### 17.30-17.45

##### **Dynamics of magnetic nanoparticles in an alternating magnetic field**

A.A. Harchenko, B.A. Medvedev, Saratov State University, Saratov, Russia

#### 17.45-18.00

##### **Fiber optic gyroscope noise types**

D.M. Spiridonov<sup>1,2</sup>, A.A. Ignatiev<sup>1</sup>,  
D.V. Obukhovich<sup>2</sup>,  
<sup>1</sup>Saratov State University, Saratov, Russia,  
<sup>2</sup>LLC RPC "Optolink", Zelenograd, Russia

#### 18.00-18.15

##### **Preparation and properties of microstructured glass with a hollow core coated with a photofluorescence coating based on quantum dots**

T.P. Kochergin, T.S. Ponomaryova,  
I.Yu. Goryacheva, Saratov State University, Saratov, Russia

#### 18.15-18.30

##### **Determination of photocatalytic properties of nanoscale carbon structures**

A.A. Bakal, A.V. Dushankova,  
M.S. Stepukhovich, E.A. Mordovina, D.V. Tsyupka, A.M. Abramova, I.Yu. Goryacheva, Saratov State University, Saratov, Russia

**September 30, Thursday**

**ROUND TABLE**

**Man and light in natural and art treatment of the Universe**

**(Building 3, Hall 51)**

Moderator: **Boris A. Medvedev**, Saratov State University, Russia

**Panel members:**

Valery V. Tuchin<sup>a</sup>, Vladimir P. Ryabukho<sup>a</sup>, Vladimir L. Derbov<sup>a</sup>, Victor V. Rozen<sup>a</sup>, Oleg V. Shimelfenig<sup>a</sup>, A. G. Rokakh<sup>a</sup>, Lev M. Babkov<sup>a</sup>, Vyacheslav I. Kochubey<sup>a</sup>, A. V. Gorokhov<sup>b</sup>, Dmitry A. Zimnyakov<sup>c</sup>, Leonid A. Melnikov<sup>c</sup>, Dmitry V. Mikhel<sup>c</sup>, Julia M. Duplinskaya<sup>c</sup>, Evgeniya V. Listvina<sup>a</sup>, Oleg M. Parshkov<sup>c</sup>, A. V. Priezzhev<sup>d</sup>,

<sup>a</sup>Saratov State University, Saratov, Russia

<sup>b</sup>Samara University, Samara, Russia

<sup>c</sup>Yuri Gagarin State Technical University of Saratov, Russia

<sup>d</sup>M.V. Lomonosov Moscow State University, Moscow, Russia

**14.00-14.45**

**To the 130th anniversary of the birth of S.I. Vavilov. I. The Microstructure of Light ... and Darkness.**

**II. From the physical light to the spiritual light. The inner world of S. I. Vavilov.**

B.A. Medvedev, M.M. Stolnits, Saratov State University, Saratov, Russia

**14.45-15.00**

**Antique knowledge: approaches of the ancient greeks and ancient romans**

V.V. Rozen, Saratov State University, Saratov, Russia

**15.00-15.15**

**The «pyramid» of aromaticity**

V. V. Sorokin, Saratov State University, Saratov, Russia

**15.15-15.30**

**Mathematical methods of pattern recognition in the attribution of painting by Leonardo da Vinci**

J.A. Brodskaya, Saratov State University, Saratov, Russia

**15.30-15.45**

**Pallas ' light of knowledge in the Science of the Russian state**

V.V. Anikin, Saratov State University, Saratov, Russia

**15.45-16.00**

**Wave-particle duality**

A.V. Gorokhov, Samara University, Samara, Russia

**16.00-16.15**

**Poetic image of the electron**

A.G. Rokakh, Saratov State University, Saratov, Russia

**16.15-16.30**

**Axioms in Science and Mysticism**

A.G. Rokakh, Saratov State University, Saratov, Russia

**16.30-16.45**

**Subject-game optics**

O.V. Shimelfenig, Saratov State University, Saratov, Russia

**16.45-17.00**

**"Thermodynamics of the mind": to the question of the fundamental asymmetry of the cognitive process**

Yu.M. Duplinskaya, Yuri Gagarin State Technical University of Saratov, Saratov, Russia

**17.00-17.15**

**"Constructivism in non-classical philosophy and modern engineering"**

N. V. Dovgalenko, Yuri Gagarin State Technical University of Saratov, Saratov, Russia

**17.15-17.30**

**XXI century: From the mission of the Enlightenment to the national idea of Russia**

B.A. Medvedev<sup>1</sup>, I.V. Babayan<sup>2</sup>,

<sup>1</sup>Saratov State University,

<sup>2</sup>Saratov State Conservatory named after L.V. Sobinov

**JOINT POSTER/INTERNET SESSION  
AND INTERNET DISCUSSION**

**(On-line)**

Chair (H): **A. Skaptsov**, Saratov State University, Saratov, Russia

1. **Microscopic analysis of the structure of apples under storage conditions at different temperatures**

E.V. Timchenko<sup>1</sup>, L.P. Timchenko<sup>2</sup>,  
I.V. Kurbatova<sup>2</sup>,

<sup>1</sup>Samara University, Samara, Russia

<sup>2</sup>Technical Lyceum named after S.P. Korolev, Samara, Russia

2. **On the possibilities of implementing patriotic education in technical universities when teaching physics**

L.A. Kudryavtseva, Sergo Ordzhonikidze Russian State University for Geological Prospecting, Moscow, Russia

3. **Studies of the optical properties of plants in the process of their**

**adaptation to changes in environmental conditions**

E.V. Timchenko<sup>1</sup>, A.P. Timchenko<sup>2</sup>,  
T.V. Melnikova<sup>2</sup>,

<sup>1</sup>Samara University, Samara, Russia

<sup>2</sup>Technical Lyceum named after S.P. Korolev,  
Samara, Russia

4. **Determination of some beta-lactam antibiotics by diffuse reflection spectroscopy**

A.V. Tumskaia, I.V. Kosyreva, Saratov State  
University, Saratov, Russia

**INTERNET REPORTS**  
**(Building 3, 3d floor Hall)**

**Alternative numerical systems**

Yuriy Zayko, Russian Presidential Academy of  
National Economy and Public Administration,  
Stolypin Volga Region Institute Saratov,  
Saratov, Russia