

Conference on Computation Biophysics and Analysis of Biomedical Data IX

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 28, Wednesday

ORAL SESSION I

(Building 3, Hall 64)

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

Google Meet:

<https://meet.google.com/nqx-mxxq-ooi>

11:30-11:40

Opening remarks

Dmitry E. Postnov, Saratov State University, Russia

11:40-11:55

Extended detrended cross-correlation analysis of physiological data

Alexander A. Koronovskii Jr., A.N. Pavlov, Saratov State University, Saratov, Russia

11:55-12:10

Multiresolution wavelet analysis of noisy signals

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

12:10-12:25

Influence of the light profile on the state of "sleep-wakefulness"

Ksenia O. Merkulova, D.E. Postnov, Saratov State University, Saratov, Russia

12:25-12:40

Development a method of marking and analysis spike-wave discharges in pentylenetetrazole rat model

Anastasia S. Ershova¹, E.M. Suleymanova², A.A. Grishchenko¹, L.V. Vinogradova², I.V. Sysoev³, ¹Saratov State University, Saratov; ²Institute of Higher Nervous Activity and Neurophysiology of the RAS, Moscow; ³Institute of Higher Nervous Activity and Neurophysiology, Saratov, Russia

12:40-12:55

Mathematical modeling of cell signaling regulators dynamics

Arina V. Martyshina¹, I.V. Dokukina¹, E.A. Grachev², ¹Sarov Physics and Technology Institute, National Research Nuclear University

MEPhI, Sarov; ²Lomonosov Moscow State University, Moscow, Russia

12:55-13:10

Internet

A model of norepinephrine influence on nervous system activity

Pavel O. Lukin¹, A.R. Brazhe², A.Yu. Verisokin¹, D.E. Postnov³, D.V. Verveyko¹, ¹Kursk State University, Kursk; ²Institute of Bioorganic Chemistry RAS; ³Saratov State University, Saratov, Russia

13:10-13:25

Internet

Spatially realistic model of neuron-glia communication

Artem V. Kirsanov¹, D.V. Verveyko², A.R. Brazhe³, A.Yu. Verisokin², ¹Lomonosov Moscow State University, Moscow; ²Kursk State University, Kursk; ³Institute of Bioorganic Chemistry RAS, Russia

13:25-13:40

Internet

Comparative analysis of photoplethysmograms of the finger and toe of a human

R.Sh. Zatrudina¹, **Igor B. Isupov**², V.Yu. Gribkov¹, ¹Volgograd State University, Volgograd, Russia ²Volgograd State Medical University, Volgograd, Russia

14:00 – 14:30

Coffee break

ORAL SESSION II

(Building 3, Hall 64)

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

Google Meet:

<https://meet.google.com/tow-bkhv-rmf>

14:40-14:55

Experimental Setup based on Infrared quantum-cascade laser spectroscopy for analysis of microcomponents in human exhaled breath

Olga A. Nebritova, I.L. Fufurin, A.A. Esakov, A.N. Morozov, Bauman Moscow State Technical University, Moscow, Russia

14:55-15:10

Analysis of biomarkers concentrations in human exhaled breath for the primary diagnosis of type 1 diabetes mellitus

Anastasiya V. Scherbakova¹, P.V. Berezhanskiy², I.S. Golyak¹, D.R. Anfimov¹, P.P. Demkin¹, O.A. Nebritova¹, A.N. Morozov¹, I.L. Fufurin¹, ¹Bauman Moscow State Technical University, Moscow; ²Morozov Children's Clinical Hospital, State Budgetary Healthcare Institution, Moscow Healthcare Pulmonology Department, Moscow, Russia

15:10-15:25

Diffuse reflectance spectroscopy for biomedical applications

Dmitriy R. Anfimov, I.L. Fufurin, S.V. Bashkin, A.N. Morozov, Bauman Moscow State Technical University, Russia

15:25-15:40

Internet

Computational experiment on laser diffractometry of erythrocytes

Evgeniy G. Tsybrov, M.S. Lebedeva, S.Yu. Nikitin, Lomonosov Moscow State University, Moscow, Russia

15:40-15:55

Comparative analysis of methods of laser doppler flowmetry and doppler ultrasound measurement of blood flow during the procedure of intermittent pneumatic compression

K.V. Mashkov¹, A.D. Usanov¹, R.G. Chubbarov², A.V. Skripal¹, ¹Saratov State University; ²OOO "Omega clinic", Saratov

15:55-16:10

Internet

Brain activity functional analysis of the FMRI in MDD patients between Stroop and emotion tests

Vladimir S. Khorev^{1,2}, S.A. Kurkin^{2,3}, R. Paunova⁴, D. Semionova⁴, S. Kandilarova⁴, D.S. Stoyanov⁴, ¹Innopolis University, Innopolis; ²Immanuel Kant Baltic Federal University, Kaliningrad; ³Samara State Medical University, Samara, Russia; ⁴Plovdiv Medical University, Plovdiv, Bulgaria

16:10-16:25

Internet

The application of feature selection techniques analysis for human electroencephalograms in epilepsy

Valentin A. Yunusov^{1,2}, S.A. Demin¹, A.V. Minkin³, ¹Institute of Physics, Kazan Federal University, Kazan; ²Institute of Computational Mathematics and Information Technologies, Kazan Federal University, Kazan; ³Yelabuga Institute, Kazan Federal University, Yelabuga, Russia

16:25-16:40

Internet

One-Class SVM for outliers detection in epileptic EEG

Matvey Khoymov¹, V. Grubov^{1,2}, V. Maksimenko^{1,2}, N. Utashev³, D. Andrikov⁴, S. Kurkin^{1,2}, ¹Immanuel Kant Baltic Federal University, Kaliningrad, Russia; ²Innopolis University, Kazan, Russia; ³National Medical and Surgical Center named after N. I. Pirogov, Ministry of Healthcare of the Russian Federation, Moscow, Russia; ⁴Research and Production Company "Immersmed", Moscow, Russia

September 29, Thursday

**JOINT POSTER/INTERNET SESSION AND INTERNET DISCUSSION
(Building 3)**

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

18:00-20:00

- 1BC. **Changes in the dynamics of the recurrent indicator of somnological records in slowly progressive chronic neurodegenerative disease** Anton O. Selskii^{1,2}, M.O. Zhuravlev^{1,2}, A.E. Runnova², A.R. Kiselev³, T. Penzel¹, ¹Saratov State University, Saratov; ²Saratov State Medical University, Saratov; ³"National Medical Research Center for Therapy and Preventive Medicine" of the Ministry of Health of Russia, Moscow, Russia
- 2BC. **Changes in the dynamics of the recurrent indicator of somnological records in cases of sleep apnea** Anton O. Selskii^{1,2}, M.O. Zhuravlev^{1,2}, A.E. Runnova², A.R. Kiselev³, T. Penzel¹, ¹Saratov State University, Saratov; ²Saratov State Medical University, Saratov; ³"National Medical Research Center for Therapy and Preventive Medicine" of the Ministry of Health of Russia, Moscow, Russia
- 3BC. **Dynamics of similarity of brain cortical areas revealed from MEG data with seizures using mutual information function** Daria A. Lachinova¹, G. Luijtelaar², P. Ossenblok³, I.V. Sysoev¹, ¹Institute of Higher Nervous Activity and Neurophysiology of RAS, Moscow, Russia; ²Centre of Cognition, Radboud University Nijmegen, Nijmegen, The Netherlands; ³Stichting Epilepsy Instellingen Nederland, Zwolle, The Netherlands
- 4BC. **Features of recognition of visual images by patients with different types of headaches** Vyacheslav Yu. Musatov¹, A.E. Runnova², R.R. Parsamyan², M.Yu. Novikov², ¹Yuri Gagarin State Technical

- University of Saratov, Saratov; ²Saratov State Medical University, Saratov, Russia
- 5BC. **Application of wavelet bicoherence for diagnosing obstructive sleep apnea syndrome** Maksim O. Zhuravlev^{1,2}, A.E. Runnova^{1,3}, A.R. Kiselev¹, C.S. Samatova³, ¹National Medical Research Center for Therapy and Preventive Medicine of the Ministry of Health of Russia, Moscow; ²Saratov State University, Saratov; ³Saratov State Medical University, Saratov, Russia
- 6BC. **Application of time-frequency signal analysis to detect different stages of sleep** Maksim O. Zhuravlev^{1,2}, A.E. Runnova^{1,3}, A.R. Kiselev¹, A.S. Akimova², ¹National Medical Research Center for Therapy and Preventive Medicine of the Ministry of Health of Russia, Moscow; ²Saratov State University, Saratov; ³Saratov State Medical University, Saratov, Russia
- 7BC. **Search for the beginning of the diastolic rise of the photoplethysmogram using a multilayer recurrent neural network** Vladislav Yu. Gribkov¹, R.Sh. Zatrudina¹, I.B. Isupov², ¹Volgograd State University, Volgograd; ²Volgograd State Medical University, Volgograd, Russia
- 8BC. **Artificial neural network predicts erroneous responses in the task of classifying visual stimuli** Alexander Kuc¹, A. Batmanova², V. Maksimenko^{1,3}, ¹Immanuel Kant Baltic Federal University, Kaliningrad; ²Financial University Under the Government of the Russian Federation, Moscow; ³Innopolis University, Innopolis, Russia
- 9BC. **Detecting sleep episodes in rats ECoG using simple artificial neural network** Nadezhda I. Semenova, K.S. Sergeev, A.V. Slepnev, Saratov State University, Russia
- 10BC. **Features of the local polarization structure of gene-based speckle patterns** Maxim S. Lavrukhin¹, M.G. Inkin¹, O.V. Ulianova¹, M.V. Alonova², D.A. Zimnyakov², A.V. Skripal¹, ¹Saratov State University; ²Yury Gagarin State Technical University of Saratov, Russia.

INTERNET POSTERS

- TMS-related evolution of brain functional networks emerging during motor imagery** Semen A. Kurkin^{1,2}, ¹Immanuel Kant Baltic Federal University, Kaliningrad; ²Samara State Medical University, Samara, Russia
- Machine learning approach for marking seizures on epileptic EEG** Vadim Grubov^{1,2}, S. Afinogenov³, V. Maksimenko^{1,2}, N. Utyashev⁴, ¹Center for Neurotechnology and Machine Learning, Immanuel Kant Baltic Federal University, Kaliningrad; ²Neuroscience and Cognitive Technology Laboratory, Center for Technologies in Robotics and Mechatronics Components, Innopolis University, Innopolis; ³Financial

- University under the Government of the Russian Federation, Moscow; ⁴National Medical and Surgical Center named after N. I. Pirogov, Ministry of Healthcare of the Russian Federation, Moscow, Russia
- Identification and analysis of statistical patterns in human electroencephalogram signals at different degrees of obsessive-compulsive disorder** Alexander A. Elenev^{1,2}, Sergey A. Demin¹, Valentin A. Yunusov^{1,2}, Oleg Y. Panischev¹, ¹Institute of Physics, Kazan Federal University, Kazan, Russia ²Institute of Computational Mathematics and Information Technologies, Kazan Federal University, Kazan, Russia
 - The application of the normalized range method in the analysis of self-similar properties of complex living systems biomedical data** Valentin A. Yunusov^{1,2}, S.A. Demin¹, A.A. Elenev¹, ¹Institute of Physics, Kazan Federal University, Kazan; ²Institute of Computational Mathematics and Information Technologies, Kazan Federal University, Kazan, Russia
 - Prediction of macroscopic dynamics by reservoir computing** Andrey V. Andreev, Immanuel Kant Baltic Federal University, Kaliningrad, Russia
 - Study of brain activity during multimodal stimulus presentation** Vladimir M. Antipov, A.A. Badarin, V.V. Grubov, Baltic Center for Artificial Intelligence and Neurotechnology Immanuel Kant Baltic Federal University Kaliningrad, Russia
 - A study of the brain's adaptive mechanisms during solving prolonged cognitive task based on fNIRS and Eyetracker** Artem A. Badarin, V.M. Antipov, V.V. Grubov Neuroscience and Cognitive Technology Laboratory, Innopolis University, Kazan, Russia
 - Study of eye movement in the Sternberg memory task** Nikita A. Brusinskii¹, A.A. Badarin^{1,2}, V.V. Grubov^{1,2}, A.E. Hramov^{1,2}, ¹Baltic Center for Artificial Intelligence and Neurotechnology, Immanuel Kant Baltic Federal University; ²Neuroscience and Cognitive Technology Laboratory Center for Technologies in Robotics and Mechatronics Components, Innopolis University
 - A graph neural network for brain functional connectivity analysis** Elena N. Pitsik¹, S.A. Kurkin¹, A.E. Hramov², R. Paunova³, D. Simeonova³, S. Kandilarova³, D. Stoyanov³, ¹Samara State Medical University, Samara; ²Institute of Cardiological Research, Saratov State Medical University, Saratov, Russia; ³Plovdiv Medical University, Plovdiv, Bulgaria