

Federal State Autonomous  
Educational Institution of Higher Education  
“National Research Lobachevsky State University of Nizhny Novgorod”



FIRST SCHOOL-CONFERENCE  
WITH INTERNATIONAL PARTICIPATION  
**“NEUROELECTRONICS  
AND NEUROTECHNOLOGIES  
OF THE FUTURE”**

25 — 29 November 2024  
Nizhny Novgorod

November 25, 2024. MONDAY

14:30 – 16:30	Check-in and registration of participants <i>Lobby of Oka Business Center</i>
16:45	Transfer from Oka Hotel to Record Cultural Center <i>From the main entrance of Oka Hotel</i>
17:00	Partner exhibition <i>Record Cultural Center</i>
18:00	Conference Opening Alexander Sinelobov, <i>Minister of Digital Development and Communications of the Nizhny Novgorod Region</i> Mikhail Gryaznov, <i>Vice-Rector for Science and Innovation, Lobachevsky University</i> Victor Kazantsev, <i>Lobachevsky University</i> Valery Cherepennikov, <i>NEYMARK ANO</i> Alexander Tarasenko, <i>Nizhegorodsky Scientific Educational Center ANO</i> Evgeny Fedoseev, <i>Gorky Tech ANO</i> <i>Hall of Record Cultural Center</i>
18:40 – 19:05	NEUROMORPHIC MODELS OF ARTIFICIAL INTELLIGENCE Susanna Gordleeva, <i>Lobachevsky University, NEYMARK</i> <i>Hall of Record Cultural Center</i>
18:05 – 19:30	NEUROELECTRONICS AND NEUROTECHNOLOGIES OF THE FUTURE BASED ON MEMRISTORS Alexey Mikhaylov, <i>Lobachevsky University</i> <i>Hall of Record Cultural Center</i>
19:30	Welcome buffet <i>Record Cultural Center, 2nd floor</i>
22:15	Transfer from Record Cultural Center to Oka Hotel

November 26, 2024. TUESDAY

*Business Hall*

9:15 – 10:00	MODERN TECHNOLOGIES IN NEUROGENETICS Victor Tarabykin, <i>Charité Universitätsmedizin Berlin, Germany</i>
10:00 – 10:45	INVASIVE NEUROINTERFACES: HISTORY AND PERSPECTIVES Mikhail Lebedev, <i>Skolkovo Institute of Science and Technology</i>
10:45 – 11:30	INNOVATIONS IN NEUROREHABILITATION TECHNOLOGIES AFTER SPINAL CORD INJURY Pavel Musienko, <i>Institute of Translational Biomedicine of St. Petersburg State University</i>
11:30 - 11:50	Coffee break
11:50 – 12:15	MEMRISTIVE NANOMATERIALS AND TECHNOLOGIES FOR NEUROMORPHIC MICROELECTRONICS Vladimir Smirnov, <i>Southern Federal University</i>
12:15 – 12:40	GENERATION OF DEFECTS IN HAFNIUM OXIDE LAYERS PRODUCED BY ATOMIC LAYER DEPOSITION METHOD Alexander Rogozhin, <i>NRC Kurchatov Institute – Valiev Institute of Physics and Technology</i>
12:40 – 13:05	INTEGRATED PHOTONICS APPROACHES FOR HARDWARE IMPLEMENTATION OF NEURAL NETWORKS Alexander Sapegin, <i>MERI JSC, IMT RAS</i>
13:05 – 13:30	QUANTUM THEORY OF DIFFUSION MEMRISTORS Nikolay Brilliantov, <i>Skolkovo Institute of Science and Technology</i>
13:30 – 13:55	QUANTUM-CLASSICAL NEURAL NETWORKS FOR IMAGE CLASSIFICATION Marina Bastrakova, <i>Lobachevsky University</i>
13:55 – 14:40	Lunch
14:40 – 15:05	NEUROMORPHIC ARTIFICIAL INTELLIGENCE SYSTEMS Denis Larionov, <i>Cifrum PI (GC) Rosatom, Ulyanov Chuvash State University</i>

15:05 – 15:30	ARNI-X – NEW APPROACH TO CONFIGURATION AND EMULATION OF IMPULSE NEURAL NETWORKS <i>Mikhail Kiselev, Ulyanov Chuvash State University</i>
15:30 – 15:55	ARCHITECTURES OF CMOS AND MEMRISTOR NEUROMORPHIC PROCESSORS <i>Oleg Telminov, MERI JSC</i>
15:55 – 16:20	MAIN APPROACHES TO HARDWARE IMPLEMENTATION OF ARTIFICIAL NEURAL NETWORKS BASED ON MEMRISTIVE DEVICES <i>Sergey Shanikov, Murom Institute Branch of Vladimir State University, Lobachevsky University</i>
16:20 – 16:45	CAD FOR NEUROMORPHIC SYSTEMS <i>Yury Agarkov, Polyketon LLC</i>
16:45 – 17:10	RESEARCH OF SYNAPTIC PLASTICITY IN ZnO MEMRISTOR STRUCTURES FOR NEUROMORPHIC ARTIFICIAL INTELLIGENCE SYSTEMS <i>Roman Tominov, Southern Federal University</i>
	Coffee break <i>Standard Hall</i>
17:10 - 19:30	Poster session <i>Standard Hall</i>
November 27, 2024. WEDNESDAY	
9:30 – 10:15	BIOMORPHIC CYBERNETICS <i>Victor Kazantsev, Lobachevsky University</i>
10:15 – 11:00	FORECAST AND CLASSIFICATION OF COMPLEX SYSTEMS WITH THE USAGE OF RESERVOIR CALCULATIONS: MODELS AND APPLICATIONS IN NEUROSCIENCE <i>Alexander Hramov, Immanuel Kant Baltic Federal University, Pushkin State Russian Language Institute</i>

11:00 – 11:45	HYBRID ARTIFICIAL INTELLIGENCE AND PREREQUISITES FOR ITS DEVELOPMENT <i>Roman Mesheryakov, Trapeznikov Institute of Control Sciences RAS</i>
11:45 – 12:00	Coffee break
12:00 – 12:25	SYNAPTIC FUNCTIONALITY OF MEMRISTORS BASED ON NANOSCALE HfO <sub>2</sub> LAYERS <i>Andrey Zenkevich, Moscow Institute of Physics and Technology</i>
12:25 – 12:50	MEMRISTIVE NANOLAYER COMPOSITIONS FOR ANALOG NEUROMORPHIC ELECTRONIC SYSTEMS <i>Natalia Andreeva, LETI Saint Petersburg Electrotechnical University</i>
12:50 – 13:15	NECESSITY AND PROSPECTS OF CREATING AN ELEMENT BASE FOR TERABIT-SCALE NON-VOLATILE MEMORY MATRICES AND NEUROMORPHIC SYSTEMS <i>Sergey Koveshnikov, IMT RAS</i>
13:15 – 13:40	PHOTOMEMRISTOR SENSORS FOR BROADBAND AUTONOMOUS NEUROMORPHIC VISION <i>Gennady Panin, IMT RAS</i>
13:40 – 14:05	PULSE-WIDTH CONTROL FOR STDP PLAYBACK IN MEMRISTIVE DEVICES <i>Mikhail Mishenko, Lobachevsky University</i>
14:05 - 14:45	Lunch
14:45	Gathering for the city tour
15:00 - 18:00	Nizhny Novgorod city tour <i>End of the tour - Minin Square</i>
19:00	Evening event «Scientific quiz» <i>MTS-startup hub</i>

November 28, 2024. THURSDAY

Business Hall

10:00 – 11:45	<b>CUTTING-EDGE NEUROMORPHIC ENGINEERING TECHNIQUES FOR RESTORING NEURAL FUNCTION</b> <i>Alexander Pisarchik, Universidad Politécnica de Madrid, Spain</i>
11:45 – 11:30	<b>THE CHALLENGE OF STABLE NEUROMORPHIC COMPUTATIONS</b> <i>Ivan Tyukin, Skolkovo Institute of Science and Technology</i>
11:30 – 11:45	Coffee break
11:45 – 12:10	<b>NEUROMORPHIC COMPUTING USING VARIOUS VOLATILE AND NONVOLATILE MEMORY DEVICES</b> <i>Sungjun Kim, Dongguk University, South Korea</i>
12:10 – 12:35	<b>BIOINSPIRED ALFeO<sub>3</sub> MEMRISTOR WITH SENSING, STORAGE, AND SYNAPTIC FUNCTIONALITIES</b> <i>Kumar Mahesh, Indian Institute of Technology Jodhpur, India</i>
12:35 – 13:00	<b>BIOMEMRISTORS BASED ON CARBON-BASED NANOMATERIALS</b> <i>Wang Lu, Heilongjiang University, China</i>
13:00 – 13:25	<b>NEUROMORPHIC ARCHITECTURES USING MEMRISTOR-BASED NEURONS AND SYNAPSES</b> <i>Natasa Samardzic, University of Novi Sad, Serbia</i>
13:30 - 14:20	Lunch
14:20 – 14:45	<b>METASTABILITY IN INTERDISCIPLINARY PHYSICS MODELS</b> <i>Bernardo Spagnolo, University of Palermo, Italy</i>
14:45 – 15:10	<b>SPIKING NEURAL NETWORKS BASED ON MEMRISTIVE DEVICES</b> <i>Juan B. Roldan, Universidad de Granada, Spain</i>

15:10 – 15:35	ON INEFFECTIVENESS OF THE MODERN ANNs COMPARED TO MEMRISITVE SNNs <i>Max Talanov, University of Novi Sad, Serbia</i>
15:35 – 16:00	ENERGY, DEMAND FOR COMPUTING POWER AND THE GREEN WORLD <i>Nikolai Sobolev, Universidade de Aveiro, Portugal</i>
16:00 – 16:25	METHODS OF HARDWARE IMPLEMENTATION OF SPIKE AND DEEP NEURAL NETWORKS WITH ON-CHIP TRAINING. CIRCUIT DESIGN ASPECTS <i>Evgeny Ryndin, LETI Saint Petersburg Electrotechnical University</i>
16:25 – 16:50	MATHEMATICAL AND COMPUTER MODELING OF NEUROMORPHIC SYSTEMS <i>Denis Butusov, LETI Saint Petersburg Electrotechnical University</i>
16:50 - 17:10	Coffee break
17:10 – 17:35	WHAT IS THE LEARNING RULE TO USE IN A NEUROMORPHIC MEMRISTIVE SYNAPSE? <i>Sergey Lobov, Lobachevsky University</i>
17:35 – 18:00	EXPERIMENTAL MODELING OF BRAIN NEURAL NETWORKS USING BRAIN-ON-CHIP TECHNOLOGY <i>Irina Mukhina, Privolzhsky Research Medical University</i>
18:00 – 18:25	REORGANIZATION OF NEURAL-GLIAL NETWORKS IN ADAPTATION TO STRESS FACTORS <i>Elena Mitroshina, Lobachevsky University</i>
18:25 – 18:50	Q-ANALYSIS AS AN EFFECTIVE APPROACH TO IDENTIFY HIGH-ORDER INTERACTIONS IN FUNCTIONAL BRAIN NETWORKS: APPLICATION EXAMPLES <i>Semen Kurkin, Immanuel Kant Baltic Federal University</i>
18:50 – 19:15	EXPLAINABLE ARTIFICIAL INTELLIGENCE IN HUMAN COGNITIVE AGE ESTIMATION <i>Mikhail Ivanchenko, Lobachevsky University</i>
19:30	Conference Closing

20:00 - 22:30	Gala dinner Discussion of the scientific and technical areas and the strategic project development plans within the P2030 roadmap <i>Oka Hotel, 11 floor</i>
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November 29, 2024. FRIDAY

9:30 – 11:30	Lobachevsky University Labs Tour
12:00	Check-out of Oka Hotel



**25 — 29 November 2024**  
**Nizhny Novgorod**