

2023 AFOSR Biophysics Program Review

Dr. Sofi Bin-Salamon | November 13-17, 2023 | College Park, MD

University of Maryland

College Park, MD 20742

Day 1 - Monday, 13 November 2023

TIME	TOPIC	SPEAKER
0830-0850	REGISTRATION	
0850-0900	Remarks	Dr. Sofi Bin-Salamon Program Manager Air Force Office of Scientific Research
0900-0930	Reconstruction of neuron potentials with convolutional neural networks trained on nanoelectrode recordings	Prof. Zeinab Jahed Department of Nanoengineering University of California, San Diego
0930-1000	Quantum Coherence and Quantum Interactions in Microtubules and Surrounding Environment	Prof. Vladislav Yakovlev Department of Biomedical Engineering Texas A&M University
1000-1030	Coherence effects in biological systems: are they real	Prof. Marlan Scully Institute for Quantum Science and Engineering Texas A&M University
1030-1100	BREAK	
1100-1130	Squeezed light enabled imaging and sensing-theory and experiments	Prof. Girish Agarwal Institute for Quantum Science and Engineering Texas A&M University
1130-1200	Multidimensional Spectroscopic Probes of Heme Protein Functionality at Molecular and Cellular Scales	Prof. Jennifer Ogilvie Department of Physics University of Michigan
1200-1230	Quantum Coherence and Dynamics in Biological Processes: Molecular Isomerization in Vision	Prof. Paul Brumer Department of Chemistry University of Toronto
1230-1330	LUNCH	
1330-1400	Fundamental Biophysics Investigations on Upconversion Nanoparticles Modified Photoreceptive Composite Architectures for Enhanced Quantum Optoelectronics	Prof. Bed Poudel Department of Materials Science and Engineering Pennsylvania State University

1400-1430	Light-modulation of biological/semiconductor interfaces for affecting cell growth and artificial retina development	Prof. Thomas Brown Department of Electronic Engineering University of Rome, Tor Vergata
1430-1500	Photothermal label-free dynamic probing and modulation of astrocytes and fibroblast cell models	Prof. Michelle Sander Electrical and Computer Engineering Boston University
1530-1600	BREAK	
1600-1630	Nanomanufacturing Program	Dr. Khershed Cooper Program Director National Science Foundation
1630-1700	Entangled Quantum Sensors in Biology	Prof. Peter Burke Department of Integrated Nanosystem Research University of California, Irvine
1700-1730	Engineering nanodiamonds for superior sensing performance and future scalability	Prof. Philip Hemmer Department of Electrical and Computer Engineering Texas A&M University
1730-1800	DISCUSSION	
1800	MEETING ADJOURNED	

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Day 2 - Tuesday, 14 November 2023

TIME	TOPIC	SPEAKER
0830-0900	REGISTRATION	
0900-0930	Biomolecular condensates as mediators of non-classical sensing at the molecular scale: The microtubule +TIP network	Prof. Holly Goodson Department of Chemistry and Biochemistry University of Notre Dame
0930-1030	Multiscale Electrical Mapping of Biosystems	Prof. Jinglei Ping Department of Mechanical and Industrial Engineering University of Massachusetts Amherst
1030-1100	BREAK	
1100-1130	Research at the University of Maryland from Quantum Science and Engineering to Brain and Behavior	Dr. Gregory Ball Vice President for Research University of Maryland
1130-1200	System outcomes through incorporating state of the art sensors and AI processing	Prof. Ashley Franks Pro-Vice Chancellor (Research Capability) La Trobe University
1200-1230	Radiation Research Program	Dr. Jeffrey Buchsbaum Program Director National Cancer Institute, NIH
1230-1330	LUNCH	
1330-1400	Label-free, high-speed quantitative imaging of astrocyte-neuron networks with optical diffraction tomography and machine learning	Prof. Ishan Barman Department of Mechanical Engineering Johns Hopkins University
1400-1430	Multimodal optical imaging of cryofixed biological samples	Prof. Katsumasa Fujita Department of Applied Physics Osaka University
1430-1500	Detail Mechanism of the Visual Process	Prof. Peter Rentzepis Department of Electrical and Computer Engineering Texas A&M University
1500-1530	BREAK	

1530-1600	Ultraflexible ultrasonic interface for advanced brain stimulation	Dr. Ivano Lucarini Institute for Microelectronics and Microsystems National Research Council of Italy
1600-1615	Investigations of Cell Responses to Extreme Environments Created by 3D Printing	Prof. Zhijian Pei Department of Industrial and Systems Engineering Texas A&M University
1615-1630	Biophysical responses of lung cells to extreme environments created by 3D printing	Prof. Hongmin Qin Department of Biology Texas A&M University
1630-1645	Biophysical responses of brain cells to extreme environments created by 3D printing	Dr. Ana Pêgo Institute of Biomedical Engineering i3S/University of Porto
1645-1700	Non-invasive optical imaging methods to observe cellular responses to extreme environments	Prof. Vladislav Yakovlev Department of Biomedical Engineering Texas A&M University
1700-1730	Lensless Computational Microendoscopy for Minimally-Invasive Hyperspectral Bio-imaging	Prof. Mark Foster Department of Electrical and Computer Engineering Johns Hopkins University
1730	MEETING ADJOURNED	

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Day 3 - Wednesday, 15 November 2023

TIME	TOPIC	SPEAKER
0830-0900	REGISTRATION	
0900-0930	Dissecting the physical principles that control the spatial organization of intracellular signaling	Prof. Lindsay Case Department of Biology Massachusetts Institute of Technology
0930-1000	Quantum correlation microscopy: progressing nanoscopy	Prof. Andrew Greentree ARC Centre of Excellence for NanoBiophotonics Royal Melbourne Institute of Technology University
1000-1030	Hybrid quantum biosensing platforms	Prof. Brant Gibson ARC Centre of Excellence for NanoBiophotonics Royal Melbourne Institute of Technology University
1030-1100	BREAK	
1100-1120	Understanding the "Mission Versatility" of Membrane Proteins and Cells by All-Scale Nanoscopic Imaging	Prof. Qian Chen Department of Materials Science University of Illinois Urbana-Champaign
1120-1140	Application of nanodisc technology to study membrane protein structure & function	Prof. Aditi Das Parker H. Petit Institute for Bioengineering and Biosciences Georgia Tech Research Corporation
1140-1200	Probing and controlling T cell activity for immunotherapy	Prof. Hua Wang Department of Materials Science University of Illinois Urbana-Champaign
1230-1330	LUNCH	
1330-1430	Unifying Light-induced Processes in Biology: Long Time Dynamics, Quantum Chaos, and System-Environment Interactions in Vision and Photosynthesis	Prof. Jennifer Ogilvie Department of Physics University of Michigan Prof. Paul Brumer Department of Chemistry University of Toronto

1430-1500	Investigation of biophotonic cellular communication to understand mechanisms of performance	Dr. Saber Hussain 711th Human Performance Wing Air Force Research Laboratory
1500-1530	BREAK	
1530-1600	Measurement of Cellular Viscosity and Mitochondrial Dynamics using Ultrasensitive Imaging Methods	Prof. Yun Chen Department of Mechanical Engineering Johns Hopkins University
1600-1630	Imaging the living activity of cells	Prof. Warwick Bowen Department of Physics University of Queensland
1630-1700	The effect of matrix stress relaxation on cell migration	Prof. Luo Gu Department of Materials Science and Engineering Johns Hopkins University
1700	MEETING ADJOURNED	

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Day 4 - Thursday, 16 November 2023

TIME	TOPIC	SPEAKER
0830-0900	REGISTRATION	
0900-0930	Label-free, sub-diffraction identification of biomolecules	Prof. Somin Lee Department of Electrical Engineering and Computer Science University of Michigan
0930-1000	Towards the study of the impact of environmental mechanostimulus on oligodendrocyte precursor differentiation and myelination	Dr. Ana Pêgo Institute of Biomedical Engineering i3S/University of Porto
1000-1030	Perspectives and Potential Applications of Micromagnetic stimulation and Quantum Spintronic Sensing for Biophysical Interactions	Prof. Jian-Ping Wang Department of Electrical and Computer Engineering University of Minnesota
1030-1100	BREAK	
1100-1130	Modulation of astrocytes as new paths to dialogue with the brain - ASTROTALK	Dr. Valentina Benfenati Institute of Synthesis and Photoreactivity National Research Council of Italy
1130-1200	Exploring New Biophysical Processes with Quantum Entanglement	Prof. Theodore Goodson Department of Chemistry University of Michigan
1200-1230	Investigation on co-cultured astrocyte and neuron populations by recording ultra-low signals with nanostructured electrodes	Dr. Annalisa Convertino Institute for Microelectronics and Microsystems National Research Council of Italy
1230-1330	LUNCH	
1330-1400	Opportunities for creating Japan-US research collaboration	Dr. Larry Nagahara Vice Dean for Research and Translation Whiting School of Engineering Johns Hopkins University Dr. Kazuyoshi Shimada Director, Washington, D.C. Office Japan Science and Technology Agency

		Ms. Yuko Tsuda Deputy Director, Washington, D.C. Office Japan Science and Technology Agency
1400-1430	US - Italy Cooperation in Science and Technology; and National and European initiatives for strengthening Italy - US research collaboration	Prof. Marco Gilli Science Counselor Embassy of Italy to the United States Prof. Luigi Ambrosio Institute of Polymers, Composites and Biomaterials National Research Council of Italy
1430-1500	Introduction to the Australian National Fabrication Facility, and complexity to clarity: detecting, identifying and analysing complex materials with machine learning	Prof. Paul Pigram Director Centre for Materials Science and Surface Science La Trobe University
1500-1530	BREAK	
1530-1600	Multiscale characterization of collective astrocyte dynamics	Dr. Kate O'Neil Department of Physics University of Maryland
1600-1700	Computing with Controllable Neuro-Glial Networks	Prof. Wolfgang Losert Department of Physics University of Maryland Dr. Corey Hart Advanced Development Programs Lockheed Martin Dr. Christopher Yang Advanced Development Programs Lockheed Martin
1700-1730	DISCUSSION	
1730	MEETING ADJOURNED	

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Day 5 - Friday, 17 November 2023

TIME	TOPIC	SPEAKER
0830-0900	REGISTRATION	
0900-0930	Quantum control of biomolecular vibrations	Prof. Warwick Bowen Department of Physics University of Queensland
0930-1000	Oxygen controlled hydrogel to uncover cellular responses to rapid hypoxia	Prof. Larry Nagahara Whiting School of Engineering Johns Hopkins University Prof. Sharon Gerecht Department of Biomedical Engineering Duke University
1000-1030	High-throughput quantification of protein-nucleic acid binding kinetics at the single molecule level in real-time	Prof. Fangyuan Ding Department of Biomedical Engineering University of California, Irvine
1030-1100	BREAK	
1100-1130	Universal Quantum Standards for Stochastic Biophysics	Prof. James Brozik Department of Chemistry Washington State University
1130-1200	Stochastic Biophysical Interactions within Aquaporin-4 Assemblies	Prof. Grazia Paola Nicchia Department of Bioscience, Biotechnology and Biopharmaceutics University of Bari
1200-1230	From bio-nanomaterials to quantum dots for biosensing and modulating cellular response	Dr. Maria Grazia Raucci Institute of Polymers, Composites and Biomaterials National Research Council of Italy
1230-1330	LUNCH	
1330-1400	Laser-spectroscopic tools for quantum biophotonics	Dr. Alexei Sokolov Institute for Quantum Science and Engineering Texas A&M University
1400-1430	Microwave and nano diamonds to dialogue with astrocytes	Dr. Andrea Candini Institute of Synthesis and Photoreactivity National Research Council of Italy

1430-1500	Innovation in Multi-functional Materials via Scalable Additive Manufacturing	Prof. Jochen Mueller Department of Civil and Systems Engineering Johns Hopkins University
1500-1530	BREAK	
1530-1600	Modeling neural network in vitro using 2D and 3D cultures	Prof. Kan Cao Department of Cell Biology and Molecular Genetics University of Maryland
1600-1630	2D Quantum Material Sensors for Bio Sensing and Imaging	Prof. Cheng Gong Department of Electrical and Computer Engineering University of Maryland
1630-1700	Chemotactic Movement and Organization of Membranes and Protocells	Prof. Ayusman Sen Department of Chemistry Pennsylvania State University
1700-1730	DISCUSSION	
1730	MEETING CONCLUSION	