

2022 AFOSR Biophysics Program Review

Dr. Sofi Bin-Salamon | November 14-18, 2022 | Arlington, VA

Basic Research Innovation and Collaboration Center

4100 North Fairfax Drive (Suite 450)

Arlington, VA 22203

Day 1 - Monday, 14 November 2022

TIME	TOPIC	SPEAKER
0830-0900	REGISTRATION	
0900-0905	Remarks	Dr. Sofi Bin-Salamon Program Manager Air Force Office of Scientific Research
0905-0910	Multi-Disciplinary University Research Initiative: Understanding and Controlling the Coupled Electrical, Chemical, & Mechanical Excitable Networks of Living Systems	Prof. Wolfgang Losert Department of Physics University of Maryland
0910-0930	Dynamics of membrane surface charge regulates cell migration	Prof. Peter Devreotes Department of Cell Biology Johns Hopkins University
0930-0950	Bioelectrical Control of Cell Function	Prof. Wolfgang Losert Department of Physics University of Maryland
0950-1010	Nanotopographic guided cellular responses	Prof. John Fourkas Department of Chemistry and Biochemistry University of Maryland
1010-1030	Inhibition of proliferation and motility through electrostatic modulation of ERK signaling pathway	Prof. Quan Qing Department of Physics Arizona State University
1030-1050	Controlling cell behavior electrically	Mr. Kan Zhu Department of Dermatology University of California, Davis
1050-1105	BREAK	
1105-1120	Cancer as an Excitable System State	Dr. David Zhan Department of Cell Biology Johns Hopkins University
1120-1135	Excitable Systems – a new perspective on the Bioimpacts of Elongate Mineral Particles	Ms. Cathy Gu Department of Physics University of Maryland

1135-1150	Biomechanical Control of Electrical Excitability in Neural Networks	Mr. Sylvester Gates Department of Physics University of Maryland
1150-1205	Label Free Multiomics Analysis	Prof. Quan Qing Department of Physics Arizona State University
1205-1230	MURI Team Summary and Future Directions	Prof. Wolfgang Losert Department of Physics University of Maryland
1230-1330	LUNCH	
1330-1400	Influence of Hydration and Protein Collective Motions on Biological Activities	Prof. Vinh Nguyen Department of Physics Virginia Tech University
1400-1430	Engineering nanodiamonds for superior sensing performance and future scalability	Prof. Philip Hemmer Department of Electrical and Computer Engineering Texas A&M University
1430-1500	Lensless Computational Microendoscopy for Minimally-Invasive Hyperspectral Bio-imaging	Prof. Mark Foster Department of Electrical and Computer Engineering Johns Hopkins University
1500-1530	BREAK	
1530-1600	Label-free, sub-diffraction identification of biomolecules	Prof. Somin Lee Department of Electrical Engineering and Computer Science University of Michigan
1600-1630	Quantum Coherence and Dynamics in Biological Processes: Molecular Isomerization in Vision	Prof. Paul Brumer Department of Chemistry University of Toronto
1630-1700	DISCUSSION	
1700	MEETING ADJOURNED FOR THE DAY	

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Day 2 - Tuesday, 15 November 2022

TIME	TOPIC	SPEAKER
0830-0900	REGISTRATION	
0900-0930	University of Minnesota Research Enterprise and Partnership Opportunities	Prof. Shashank Priya Vice President for Research University of Minnesota
0930-1000	Fundamental Biophysics Investigations on Upconversion Nanoparticles Modified Photoreceptive Composite Architectures for Enhanced Quantum Optoelectronics	Prof. Kai Wang Department of Materials Science and Engineering Pennsylvania State University
1000-1030	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
1030-1100	BREAK	
1100-1130	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
1130-1200	Dissecting the physical principles that control the spatial organization of intracellular signaling	Prof. Lindsay Case Department of Biology Massachusetts Institute of Technology
1200-1230	Investigation of biophotonic cellular communication to understand mechanisms of performance	Dr. Saber Hussain 711th Human Performance Wing Air Force Research Laboratory
1230-1330	LUNCH	
1330-1400	Detail Mechanism of the Visual Process	Prof. Peter Rentzepis Department of Electrical and Computer Engineering Texas A&M University
1400-1430	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

1430-1500	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
1500-1530	BREAK	
1530-1600	Chemotactic Movement and Organization of Membranes and Protocells	Prof. Ayusman Sen Department of Chemistry Pennsylvania State University
1600-1630	Multidimensional Spectroscopic Probes of Heme Protein Functionality at Molecular and Cellular Scales	Prof. Jennifer Ogilvie Department of Physics University of Michigan
1630-1700	DISCUSSION	
1700	MEETING ADJOURNED FOR THE DAY	

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Day 3 - Wednesday, 16 November 2022

TIME	TOPIC	SPEAKER
0830-0900	REGISTRATION	
0900-0930	Understanding the “Mission Versatility” of Membrane Proteins via Nanoscopic Imaging	Prof. Qian Chen Department of Materials Science Univ. of Illinois Urbana-Champaign
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	Opportunities in Biophysics at the University of Colorado Boulder	Prof. Massimo Ruzzene Acting Vice Chancellor for Research & Innovation University of Colorado Boulder
1030-1100	BREAK	
1100-1130	Multiscale Electrical Mapping of Biosystems	Prof. Jinglei Ping Department of Mechanical and Industrial Engineering University of Massachusetts Amherst
1130-1200	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
1200-1230	Tools in Biophysics to Study Device-Tissue Interface and Medical Forecasting: from quantum to clinic	Prof. Tinen Iles Department of Surgery University of Minnesota
1230-1330	LUNCH	

1330-1400	Measurement of Cellular Viscosity and Mitochondrial Dynamics using Ultrasensitive Imaging Methods	Prof. Yun Chen Department of Mechanical Engineering Johns Hopkins University
1400-1430	Measurement of Cellular Viscosity and Mitochondrial Dynamics using Ultrasensitive Imaging Methods	Prof. Warwick Bowen Department of Physics University of Queensland
1430-1500	The effect of matrix stress relaxation on cell migration	Prof. Luo Gu Department of Materials Science and Engineering Johns Hopkins University
1500-1530	BREAK	
1530-1600	Quantum correlation microscopy: progressing nanoscopy	Prof. Andrew Greentree ARC Centre of Excellence for NanoBiophotonics Royal Melbourne Institute of Technology University
1600-1630	Hybrid quantum biosensing platforms	Prof. Brant Gibson ARC Centre of Excellence for NanoBiophotonics Royal Melbourne Institute of Technology University
1630-1700	DISCUSSION	
1700	MEETING ADJOURNED FOR THE DAY	

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Day 4 - Thursday, 17 November 2022

TIME	TOPIC	SPEAKER
0830-0900	REGISTRATION	
0900-0930	Quantum Coherence and Quantum Interactions in Microtubules and Surrounding Environment	Prof. Vladislav Yakovlev Department of Biomedical Engineering Texas A&M University
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	Fluctuations in small systems	Prof. Thomas Thundat Department of Chemical and Biological Engineering University at Buffalo
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	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
1230-1330	LUNCH	
1330-1400	Real-time monitoring of the state of health of live cells using multi-dimensional optical imaging and deep learning	Prof. Bahram Javidi Department of Electrical and Computer Engineering University of Connecticut
1400-1430	Exploring New Biophysical Processes with Quantum Entanglement	Prof. Theodore Goodson Department of Chemistry University of Michigan

1430-1500	Shining light for sensing and control of astrocytes microdomains structure, dynamics and biophysics	Dr. Valentina Benfenati Institute of Synthesis and Photoreactivity National Research Council of Italy
1500-1530	BREAK	
1530-1600	Multiscale characterization of collective astrocyte dynamics	Dr. Kate O'Neil Department of Physics University of Maryland
1600-1630	Computing with Controllable Neuro-Glial Networks	Prof. Wolfgang Losert Department of Physics University of Maryland
1630-1700	DISCUSSION	
1700	MEETING ADJOURNED FOR THE DAY	

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Day 5 - Friday, 18 November 2022

TIME	TOPIC	SPEAKER
0830-0900	REGISTRATION	
0900-0930	Raman microscopy: a new imaging modality using molecular vibrations to expand the visualizable targets in biological systems	Prof. Katsumasa Fujita Department of Applied Physics Osaka University
0930-1000	The National Research Infrastructure Roadmap - Australia's RI Vision	Dr. Jane Fitzpatrick Chief Executive Officer Australian National Fabrication Facility
1000-1030	German Aerospace Center – examples of biophysics research from space for earth	Mr. Oliver Pape DLR Washington Office German Aerospace Center (DLR)
1030-1100	BREAK	
1100-1130	Quantum control of biomolecular vibrations	Prof. Warwick Bowen Department of Physics University of Queensland
1130-1200	Overview of the University of Bari and Italian Recovery Fund Initiatives	Prof. Grazia Paola Nicchia Vice Rector University of Bari Mr. Giulio Busulini Institute of Synthesis and Photoreactivity National Research Council of Italy
1200-1230	Visualizing Basic Research Impacts in the Application Space	Mr. Neil Gupta President Kinetic Analytics
1230-1330	LUNCH	
1330-1430	Emerging Opportunities in Biophysics/Biotechnology and Non-Classical Sensing	Prof. Larry Nagahara Whiting School of Engineering Johns Hopkins University Mr. Usayd Casewit Policy and Global Affairs US National Academies of Sciences

1430-1500	Nanomanufacturing Program	Dr. Khershed Cooper Program Director National Science Foundation
1500-1530	DISCUSSION	
1530	MEETING CONCLUSION	