

# 2016 Life Sciences Program Review

Dr. Sofi Bin-Salamon, Dr. Patrick Bradshaw and Dr. William Roach | October 31 - November 4, 2016 | Dayton, OH

**Marriott at the University of Dayton**  
1414 S Patterson Blvd, Dayton, OH 45409

**Day 1 – Monday, 31 October 2016**  
Session Chair: Patrick Bradshaw, AFOSR

Time	Topic	Speaker
7:30-8:00	Registration	
8:00-8:15	AFRL Introduction	<b>Dr. Morley Stone</b> AFRL
8:15-9:00	Invited Talk	<b>Dr. Rajesh Naik</b> AFRL
9:00-9:15	Introduction to Human Performance Portfolio Review	<b>Dr. Patrick Bradshaw</b> RTB, Human Performance Portfolio
9:15-9:45	Neurobiological Effects of Direct Stimulation	<b>Dr. Ryan Jankord</b> AFRL/RH
9:45-10:15	Examining Mechanisms of Transcranial Direct Current Stimulation through Neurophy	<b>Dr. Andy McKinley</b> AFRL/RH
10:15-10:45	Molecular Mechanistic Elucidation of Neurological and Cognitive Changes Resulted	<b>Dr. Victor Chan</b> AFRL/RH
10:45-11:00	<b>BREAK</b>	
11:00-11:30	Auditory Localization with Modified Spectral Cues	<b>Dr. Griffin Romigh</b> AFRL/RH
11:30-12:00	Localization of Sound by Human Listeners	<b>Prof. William Hartmann</b> University of Michigan
12:00-12:30	Spatial Orientation in Dynamic Motion Environments	<b>Prof. James Lackner</b> Brandeis University
12:30-1:15	<b>LUNCH</b>	
1:15-1:45	Enhancing Biological Performance: Occurrence, Mechanisms and Applications	<b>Prof. Calabrese Kozumbo</b> University of Massachusetts-Amherst
1:45-2:15	Nanoelectropulse-Induced Changes in Cell Excitability – Neuromodulation	<b>Prof. Gail Craviso</b> University of Nevada-Reno
2:15-2:45	Magnetic and Electronic Biological Sensory Function	<b>Dr. Ruth Pachter</b> AFRL/RX
2:45-3:15	Cryptochrome-based Magnetic Sensing	<b>Prof. Peter Hore</b> Oxford UK, <b>Prof. Heinrich Mouritsen</b> Oldenburg Ge
3:15-3:45	Long-Range Geomagnetic Navigation in Sea Turtles	<b>Ken Lohman</b>

		University of North Carolina
3:45-4:00	BREAK	
4:00-4:30	Cryptochromes and Their Role in Magnetic Signal Transduction	Prof. Thorsten Ritz UC Irvine
4:30-5:00	The Magnetic Compass Sense	Prof. Eric Warrant Lund University Sweden
5:00	MEETING ADJOURNED FOR THE DAY	

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**Day 2 – Tuesday, 1 November 2016**  
Session Chair: Patrick Bradshaw, AFOSR

Time	Topic	Speaker
7:30-8:00	Registration	
8:00-8:15	Announcements	<b>Dr. Patrick Bradshaw</b> AFOSR
8:15-8:45	Gene Networks for Attention and Motor Control A Path from Drosophila to Humans	<b>Prof. Ralph Greenspan</b> UC San Diego
8:45-9:15	A New Opportunity to Reverse Engineer Mitochondria	<b>Prof. Michael Teitell</b> UC Los Angeles
9:15-9:45	Mitochondrial Biohybrid	<b>Prof. Michele Vitadello</b> Medgar Evars
9:45-10:00	<b>BREAK</b>	
10:00-10:30	Structure-Function Relationship in Cephalopod-Inspired Materials and Future Vision	<b>Prof. Alon Gorodetsky</b> UC Irvine
10:30-11:00	Molecular Imaging of Human Performance Biomarkers at Cellular Resolution in Vivo	<b>Prof. Adam de la Zerda</b> Stanford
11:00-12:30	<b>LUNCH</b>	
12:30-1:00	Nanoelectronics Innervated Cells, Cell Networks and Three-Dimensional Biomaterial	<b>Prof. Charlie Lieber</b> Harvard
1:00-1:30	Understanding the Bioelectric Aspects of Cytoskeletal Dynamics	<b>Prof. Bozhi Tian</b> University of Chicago
1:30-2:00	Engineering Magnetically-Activated Symbiosis to Enhance Human Performance	<b>Prof. Phil LeDuc</b> Carnegie Mellon <b>Prof. Warren Ruder</b> Virginia Tech
2:00-2:30	Fundamentals and Control of Electron transfer in Microbe	<b>Prof. Moh El-Naggar</b> University of Southern California
2:30-3:00	Physiological, Genetic, Environmental Changes in Shewanella Microbes	<b>Prof. Steve Finkel</b> University of Southern California
3:00-3:30	Dissecting Microbiomes using SIMT (Stimulus Induced Meta-Transcriptomics)	<b>Prof. Ken Neilson</b> University of Southern California
3:30-4:00	Catalysts for Lightweight Solar Fuels Generation	<b>Prof. Dan Nocera</b> Harvard University
4:00-4:30	Stress, Human Ageing and Age-related Disease: May Prolonged Air Flight Affect Health Status and Accelerate the Ageing Process?	<b>Prof. Miriam Capri</b> University of Bologna
4:30	<b>MEETING ADJOURNED FOR THE DAY</b>	

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## Day 3 – Wednesday, 2 November 2016

Session Chair: Pat Roach, AFOSR

Time	Topic	Speaker
8:00-8:30	Registration	
8:30-8:45	Welcome	<b>Dr. Pat Roach</b> AFOSR
8:45-9:15	Artificial Retina: Towards Sight Restoration via Organic and Hybrid Thin Films	<b>Prof. Thomas Brown</b> University of Rome Tor Vergata
9:15-9:45	Understanding Microbial Interactions at an Interface to Drive Community Level Function	<b>Prof. Ashley Franks</b> La Trobe University
9:45-10:15	Bioengineering Microbial Communities in a Mouse Model of Autism to Modulate Challenging Behavior	<b>Prof. Elisa Hill</b> University of Melbourne
10:15-10:30	<b>BREAK</b>	
10:30-11:00	Microfluidics for Processing Cells	<b>Mr. Ryan Pawell</b> Indee, Inc.
11:00-11:30	Functional Nanomaterials for Diagnostic and Sensing Applications	<b>Dr. Lucky Sikhwivhilu</b> MINTEK
11:30-12:00	Creating Model Systems for Examining Biological Processes	<b>Prof. Sally McArthur</b> Swinburne University
12:00-1:30	<b>LUNCH</b>	
1:30-2:00	Organically-Capped Metal Nanoparticles for E-Skin Sensors and Targeted Theronastics	<b>Prof. Wenlong Cheng</b> Monash University
2:00-2:30	Entangled Photon Absorption in Bio-Molecules	<b>Prof. Theodore Goodson</b> University of Michigan
2:30-3:00	BioPhotonic Applications of Hybrid Nanodiamond Materials	<b>Prof. Brant Gibson</b> RMIT University
3:00-3:15	<b>BREAK</b>	
3:15-3:45	Real Time Sensing: Chemical Form and Function	<b>Prof. Andrew Abell</b> University of Adelaide
3:45-4:15	Ultra-flexible Microelectrode Arrays Based on Disordered Silicon Nanowires for Recording Slow Oscillations from the Cerebral Cortex	<b>Dr. Annalisa Convertino</b> National Research Council of Italy
4:15-4:45	Coherent Optical Control of Biological Function in Optogenetic Neurons and Retinal Photoreceptors	<b>Prof. Stephen Boppart</b> University of Illinois
4:45	<b>MEETING ADJOURNED FOR THE DAY</b>	

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Day 4 – Thursday, 3 November 2016

Session Chair: Pat Roach, AFOSR

Time	Topic	Speaker
8:00-8:30	Registration	
8:30-9:00	Synthetic Torpor: Exploiting the Neural Control of Energy Expenditure	<b>Prof. Matteo Cerri</b> University of Bologna
9:00-9:30	Blending Engineering and Physics into Healthcare Research	<b>Dr. Larry Nagahara</b> Johns Hopkins University
9:30-10:00	Seeking Quantum Coherences in Model Biological Systems	<b>Prof. Paul Brumer</b> University of Toronto
10:00-10:15	<b>BREAK</b>	
10:15-10:45	Introduction to the Biophysics Portfolio	<b>Dr. Sofi Bin-Salamon</b> AFOSR
10:45-11:15	Probing the Nature of Coherence in Biological Systems	<b>Prof. Jennifer Ogilvie</b> University of Michigan
11:15-11:45	Nanopore Formation in Lipid Bilayers	<b>Prof. Padmini Rangamani</b> University of California San Diego
11:45-12:15	Cell Response Determinants in Laser-induced Thermal Impacts	<b>Prof. Ralf Brinkmann</b> University of Luebeck
12:15-1:15	<b>LUNCH</b>	
1:15-1:45	Optical Modulation of Neurons using a Fast Thermal Gradient from IR Laser Pulses	<b>Dr. Hope Beier</b> Air Force Research Laboratory
1:45-2:15	Biophysics of Optical Perturbation in the Neural System	<b>Prof. Anita Mahadevan-Jansen</b> <b>Prof. Duco Jansen</b> Vanderbilt University
2:15-2:45	Bio-organic Interface and Device for Studying Neurons and Astrocyte Physiology	<b>Dr. Valentina Benfenati</b> National Research Council of Italy
2:45-3:00	<b>BREAK</b>	
3:00-3:30	Tools for Understanding Molecular Scale Mechanisms in LGICs: Single Molecule Kinetics, Super-Resolution Imaging, and Hidden Markov Walks	<b>Prof. James Brozik</b> Washington State University
3:30-4:00	Improving Optical Measurement and Trapping using Quantum Mechanics	<b>Prof. Warwick Bowen</b> University of Queensland
4:00-4:30	Novel Optical Techniques for Investigating Cellular and Vascular Biophysics	<b>Prof. David Boas</b> Harvard University <b>Prof. James Fujimoto</b> MIT
4:30-5:00	Emergence of Life-Like Behaviors	<b>Prof. Jeremy England</b> MIT
5:00	<b>MEETING ADJOURNED FOR THE DAY</b>	

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**Day 5 – Friday, 4 November 2016**  
Session Chair: Sofi Bin-Salamon, AFOSR

Time	Topic	Speaker
7:30-8:00	Registration	
8:00-8:30	NCI Alliance for Nanotechnology in Cancer Program and Resources for Cancer Nanotechnology Research	<b>Dr. Stephanie Morris</b> National Cancer Institute/NIH
8:30-9:00	Employing Upconverting Nanocrystals to Manipulate Cell Function	<b>Prof. Kelly Nash</b> University of Texas San Antonio
9:00-9:30	Understanding the Interactions of Electromagnetic Energy with Biological Systems	<b>Dr. Hope Beier</b> Air Force Research Laboratory
9:30-10:00	<b>BREAK</b>	
10:00-10:30	Tools for the Investigation of the Mechanisms of Free-electron-mediated Modifications of Biomolecules	<b>Prof. Norbert Linz</b> University of Luebeck
10:30-11:00	Optical Magnetic Imaging of Biological Systems Using Quantum Defects in Diamond	<b>Prof. Ronald Walsworth</b> Harvard University
11:00-12:00	<b>AFOSR PIs and Government Only</b>	
12:00	<b>CONCLUSION</b>	