

2025 AFOSR Joint Review for Materials for Extreme Environments and Condensed Matter Physics

Drs. Ali Sayir/Jiwei Lu | May 19-23, 2025 | Arlington, VA

Basic Research Innovation Collaboration Center (BRICC)
4100 N Fairfax, VA 22203

Agenda Day 1 | Monday, May 19, 2025 | 11 talks

Time	Topic	Speaker
8:30	Check-in	
9:00	Welcome remarks	A. Sayir and J. Lu, AFOSR
9:15	Tailoring Microstructures with Electric Fields	Jian Luo, UCSD
9:45	Understanding, mapping, and generating microstructures with higher-order statistic Euclidean neural networks	Tess Smidt, MIT
10:15	Quantum Magnetotransport in Two-Dimensional Quartic Materials	Haldun Sevincli, Bilkent University
10:45	BREAK	
11:00	Supercritical phase transformations for multiferroic materials	Ashley Bucsek, U. Michigan
11:30	Probe and control of coherent states toward phononics, magnonics, and photonics	Giti Khodaparast, Virginia Tech/ Chris Stanton U. Florida
12:00	LUNCH	
13:30	Design and Control of Atomic Defects in Group II-Oxide Materials	Edo Waks, University of Maryland
14:00	Search for deep center defects for quantum applications in ZnSe	Douglas Irving, NCSU
14:30	Atomic-level design and ultrafast THz E-field control of the emergent ferromagnetism at oxide interfaces	Alexander Gray Temple U.
15:00	BREAK	
15:30	PECASE: Atomic-scale characterization of layered magnetic materials	Pinshane Huang, UIUC
16:00	Metastable phase synthesis via electromagnetic field interactions	Daryoosh Vashae NCSU
16:30	Unlocking the Potential of Freestanding Borophene: Exploring its Reproducible Synthesis, Structure, and Properties	Umut Aydemir, Koc University
17:00	MEETING ADJOURN	

Agenda Day 2 Tuesday, May 20, 2025 11 talks		
Time	Topic	Speaker
8:30	Check-in	
9:00	Piezoelectric Control of Quantum States in Solid-State Defects (PIQS) (MURI)	Edo Waks, University of Maryland
9:30	Atomic-scale Manipulations of Interband Optical Nonlinearities (AtoMs - IONs) (MURI)	Seth Bank, UT Austin
10:00	Gallium Oxide Materials Science and Engineering (GAME) (MURI)	Jim Speck, UCSB
10:30	BREAK	
11:00	EPITAXIAL GROWTH OF VN ON Si ₃ N ₄ /Si (111)	Deniz Cakir, University of North Dakota
11:30	Harnessing solid-state transformation pathways in complex alloys	Emmanuelle Marquis, U. Michigan
12:00	LUNCH	
13:30	Discovering new stable “Mayenite-like” electrides using high-throughput computation	Geoffroy Hautier Dartmouth College
14:00	Microstructural design of light-induced phase transformation materials	Ananya R. Balakrishna, UC Santa Barbara
14:30	Extreme Nonlinearity in Transition Metal Oxides	Alexander Demkov, University of Texas Austin
15:00	BREAK	
15:30	Giulia Galli, University of Chicago	Giulia Galli, University of Chicago
16:00	Realizing quantum spin Hall insulators and correlated topology in ternary transition metal chalcogenides	Qiong Ma, Boston College
16:30	Exploring correlated Topological states with charge density waves	Ken Burch, Boston College
17:00	MEETING ADJOURN	

Agenda Day 3 Wednesday, May 21, 2025 5 talks, 1 flash session and 1 poster session		
Time	Topic	Speaker
8:30	Check-in	
9:00	Semiconductor-based radiant cooling in space environments	Masaru Kuno, U. Notre Dame
9:30	Magnetic-Free Nonreciprocal Photonic Structures	Andrey Chabanov, University of Texas at San Antonio
10:00	High emissivity materials using multilayer oxides	Michelle Povinelli USC
10:30	BREAK	
11:00	Understanding and tuning magnetism in correlated metals	Yu He, Yale U.
11:30	Studying magnetoelectric coupling in Van der Waals/oxide thin film heterostructures	Wencan Jin, Auburn U.
12:00		
12:30	LUNCH	
13:30	New Starts Flash talks session (5 min talk / 2 slides)	
15:00	Poster session	
17:00	MEETING ADJOURN	
18:00	No host networking (Location: TBD)	

New starts		
1	CorTopS - Correlation-driven topological semimetals	BUEHLER-PASCHEN, SILKE, TECHNISCHE UNIVERSITAT WIEN
2	Multi-level electrical resistance switching in ferroelectric field effect devices	AHN, CHARLES, YALE
3	Quantitative Phase Mapping of the Negative Capacitance State in a Ferroelectric Heterostructure	SALAHUDDIN, SAYEED, UC BERKELEY
4	High-Spin States in a One-Dimensional Carbon Host for Qubits	MA, XUEDAN, RICE UNIV.
5	Peering into nonequilibrium pattern formation in irregular eutectic systems	SHAHANI, ASHWIN, U. MICHIGAN

6	Investigation of surface charging mechanisms of dielectric materials used in space environments through a combined experimental and computational approach	OZCELIK, ONGUN, SABANCI UNIVERSITESI
7	Design of Architected Materials with Spinodal Topologies under Uncertainty for Improved Magnetic Performance	ACAR, PINAR, VT
8	Optospintronic control of spin qubits in nuclear spin free hosts	FLATTE, MICHAEL, UNIVERSITY OF IOWA
9	Ion Exchanged Zeolites for Electromagnetic Wave Absorption	VALLA, IOULIA UNIVERSITY OF CONNECTICUT
10	Macroscale modeling of electromagnetic absorption in zeolite-dielectric composites	TILLEY, BURT, WORCESTER POLYTECHNIC INSTITUTE
11	Interface physics of ferroelectric AlBN/Ga ₂ O ₃ and AlBN/GaN stacks for power electronics	BARRETT, NICHOLAS, COMMISSARIAT A L' ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES
12	External stimuli induced metal halide perovskite materials	SARANGEREL DAVAASAMBUU, NATIONAL UNIVERSITY OF MONGOLIA

Agenda Day 4 Thursday, May 22, 2025 6 talks		
Time	Topic	Speaker
8:30	Check-in	
9:00	Two-dimensional molecular crystals for hybrid quantum solids	Jiwoong Park, University of Chicago
9:30	Ferroelectric Creation and Manipulation of Novel Topological States in 2D Heterostructures	Cheng Gong, University of Maryland / Igor Zutic, University at Buffalo
10:00	Hosting one-dimensional topological states with dislocations (MURI)	Rachel Goldman U. Michigan
10:30	BREAK	
11:00	Quantum Coherence and Decoherence in Model Spin Systems	Daniel Silevitch, Cal Tech
11:30	Quadrupole order and dynamics in quantum materials: new insights to electronic nematicity	Ian Fisher, Stanford
12:00	LUNCH	
13:30	Geometry and topology in superlattice materials	Jennifer Cano, Stoney Brook U.
14:00	Probing electron Nematicity in multilayer graphene heterostructures	Jia Li, Brown U.
14:30	Quantum-geometric effects in three-dimensional flat-band superconductors	Menderes Iskin, Koc U.
15:00	BREAK	
15:30	Correlated Phenomena in Layered Materials for Next-Generation Photonics and Microelectronics	Michael Susner, AFRL/RX
16:00	High-temperature topological superconductivity in correlated two-dimensional heterostructure	Subhasish Mandal West Virginia U.
16:30	Generation, Detection, and Control of Coherent Magnon Transport and Condensation in a Two-Dimensional Magnet	Adam Tsen, University of Waterloo
17:00	MEETING ADJOURN	

Agenda Day 5 Friday, May 23, 2025 6 talks		
Time	Topic	Speaker
8:30	Check-in	
9:00	Topological Quantum Electronics and Optoelectronics in Moire Superlattices	Pablo Jarillo-Herrero, MIT
9:30	New Magnetic Interfaces for Quantum Phenomena	Abhay Pasupathy, Columbia University
10:00	Effect of Extreme Electric Fields on Thermal Transport in Wide-gap Semiconductors	Bolin Liao, UCSB
10:30	BREAK	
11:00	Tunable phases in charge-density-wave heteroepitaxial devices	Joe Falson, Cal Tech
11:30	Emergent Phenomena via Magnetism and Topology	Yuri Suzuki, Stanford University
12:00	MEETING ADJOURN	