

2024 AFOSR Joint Review for Materials with Extreme Properties and Condensed Matter Physics

Drs. Ali Sayir/Jiwei Lu | May 6-10, 2024 | Arlington, VA

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

Agenda Day 1 | Monday, May 6, 2024 | 11 talks

Time	Topic	Speaker
8:30	Check-in	
9:00	Welcome remarks	A. Sayir and J. Lu, AFOSR
9:15	Unraveling phonons at the atomic scale - a new tool to explore the science of thermal transport	James Lebeau MIT
9:45	Semiconducting AlN: A new pathway to high voltage, power and temperature ultra-wide bandgap power electronic components	William Doolittle Georgia Tech
10:15	Exploration of novel ultrawide-band gap heterovalent ternary oxide Li-GaO ₂	Hongping Zhao Ohio State U.
10:45	BREAK	
11:00	Terahertz electron paramagnetic resonance ellipsometry defect characterization in UWBG monoclinic gallium oxide and related alloys	Mathias Schubert U. Nebraska
11:30	Ferroelectric control of conductivity in beta-Ga ₂ O ₃ for power electronics	Nicholas Barrett Commissariat L'energie Atomique
12:00	LUNCH	
13:30	Ultra-low oxygen activity environment for metastable oxide phase synthesis	Shriram Ramanathan Rutgers U
14:00	Effect of extreme electric fields on thermal transport in wide-gap Semiconductors	Bolin Liao UC Santa Barbara
14:30	Exploring optical cavities based on Gallium oxide nanomaterials	Bianchi Mendez Complutense University of Madrid
15:00	BREAK	
15:30	Extreme limits of diatom-enabled two-phase thermal management	Lenan Zhang MIT
16:00	Operando studies of atomically precise materials	Ritesh Agarwal U. Pennsylvania
16:30	Advancing graph models for quantification of transparent ceramic microstructures	Veera Sundararaghavan U. Michigan
17:00	MEETING ADJOURN	

Agenda Day 2 Tuesday, May 7, 2024 11 talks		
Time	Topic	Speaker
8:30	Check-in	
9:00	Novel materials and nanostructures for use in high-power electromagnetic systems	Tyson Back AFRL/RX
9:30	Topological vortex structure and piezoelectric enhancements in low dimensional ferroelectrics	Edwin Fohntung RPI
10:00	Unraveling ultrafast magnetization dynamics of nanoscale magnetic textures	Kukreja Roopali UC Davis
10:30	BREAK	
11:00	Spin entropy in strain tuned Rashba semiconductors	Jian Shi RPI
11:30	High-temperature infrared nanoceramics for hypersonic applications	Pierre Lucas U. Arizona
12:00	LUNCH	
13:30	New paradigms for Goniopolar materials	Joshua Goldberger Ohio State U.
14:00	Metallic glass/nanocrystal composites for high temperature applications	Eren Kalay MUTU
14:30	Permittivity gradients, polarization, and gas dynamics in composite electromagnetic heat exchangers	Burt Tilley WPI
15:00	BREAK	
15:30	UV Photostimulation effects on semiconductor defects and transport	Elif Ertekin UIUC
16:00	Strongly correlated electronic structure in large alkali oxocobaltates	Walter Lambrecht CWRU
16:30	Thermal properties of silicon-based ceramic aerogels under different humidity and temperature levels	Cekdar Ahmetoglu IYTE
17:00	MEETING ADJOURN	

Agenda Day 3 Wednesday, May 8, 2024 5 talks, 1 flash session and 1 poster session		
Time	Topic	Speaker
8:30	Check-in	

9:00	Dislocations as nature's quantum wires	Maryam Ghazisaeidi Ohio State U.
9:30	Wavelet-enhanced quantum sensing with solid-state nuclear spins	Ceyhun Bulutay Bilkent U.
10:00	Optical imaging of magnetic quantum phase transitions in 2D materials	Kin Fai Mak, Cornell U.
10:30	BREAK	
11:00	Chemical design of skyrmionic materials	Leslie Schoop Princeton U.
11:30	MURI: Programmable systems with non-Hermitian quantum dynamics	Sahin Ozdmir PSU
12:00	Parity time-symmetry breaking in biological active matter	Aşkin Kocabaş Koc U.
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 (90 MIN)		
1	Probe and control of coherent states toward phononics, magnonics, and photonics	Chris Stanton U. Florida
2	Role of composition on mechanical properties of refractory multi-element layered ceramics	Hanna Kindlund Virginia Tech
3	Understanding, mapping, and generating microstructures with higher-order statistic Euclidean neural networks	Tess Smidt MIT
4	Atomic-level design and ultrafast THz E-field control of the emergent ferromagnetism at oxide interfaces	Alexander Gray Temple U.
5	Discovering new stable “Mayenite-like” electrides using high-throughput computation	Geoffroy Hautier Dartmouth College
6	High emissivity materials using multilayer oxides	Michelle Povinelli USC
7	Semiconductor-based radiant cooling in space environments	Masaru Kuno, U. Notre Dame
8	Supercritical phase transformations for multiferroic materials	Ashley Bucsek U. Michigan
9	Microstructural design of light-induced phase transformation materials	Ananya R. Balakrishna, UC Santa Barbara

10	Metastable phase synthesis via electromagnetic field interactions	Daryoosh Vashaee NCSU
11	Understanding and tuning magnetism in correlated metals	Yu He Yale U.
12	Exploring correlated Topological states with charge density waves	Ken Burch Boston College
13	Quantum-geometric effects in three-dimensional flat-band superconductors	Menderes Iskin Koc U.
14	Studying magnetoelectric coupling in Van der Waals/oxide thin film heterostructures	Wencan Jin Auburn U.
15	High-temperature topological superconductivity in correlated two-dimensional heterostructure	Subhasish Mandal West Virginia U.
16	Probing electron Nematicity in multilayer graphene heterostructures	Jia Li Brown U.

Agenda Day 4 Thursday, May 9, 2024 6 talks		
Time	Topic	Speaker
8:30	Check-in	
9:00	Design and control of atomic defects in group ii-oxide materials (CFIRE)	Edo Waks UMD
9:30	Unveiling and controlling quantum point defects in oxides (CFIRE)	Kai-Mei Fu U. Washington
10:00	Hosting one-dimensional topological states with dislocations (MURI)	Rachel Goldman U. Michigan
10:30	BREAK	
11:00	Dislocations as Interconnects for spin qubits (MURI)	Maryam Ghazisaeidi Ohio State U.
11:30	limiting phonon-induced decoherence in superconducting qubits (yip)	Zhiting Tian Cornell U.
12:00	LUNCH	
13:30	Exploring high-temperature exciton BEC in two-dimensional heterostructures	Feng Wang UC Berkeley
14:00	Topological phase transitions and charge-spin transport in vdW-molded bismuth	Javier Sanchez-Yamagishi UC Irvine
14:30	Visualization and control of unconventional magnons in two dimensions	Chenhao Jin UCSB
15:00	BREAK	
15:30	Picocavity QED: A new materials platform for room temperature control of quantum coherence	Markus Raschke U. Colorado

16:00	Quantum magnetotransport in two-dimensional quartic materials	Haldun Sevincli Bilkent U.
16:30	Discovery and exploration of quantum nitrides	Stephen Wilson UC Santa Barbara
17:00	MEETING ADJOURN	

Agenda Day 5 Wednesday, May 10, 2024 6 talks		
Time	Topic	Speaker
8:30	Check-in	
9:00	Chern number engineering in a layered topological magnet	Cui-Zu Chang, PSU
9:30	Correlated topological states in moiré superlattices of intrinsic magnetic topological insulator	Suyang Xu Harvard U.
10:00	Tuning topological superconductivity in 2M-WS ₂ via non-destructive methods: A first-principles approach	Pratibha Dev, Howard U.
10:30	BREAK	
11:00	Unconventional topological fermions	Emilia Morosan Rice U.
11:30	Interfaces in quantum chiral materials: skyrmion / Weyl systems for efficient spin manipulation (YIP)	Jacob Gayles U. South Florida
12:00	Time reversal symmetry breaking in quantum materials without magnetism	Oliver Monti U. Arizona
12:30	MEETING ADJOURN	