

Telluride science workshop: Enhanced functionalities in 4 and 5d transition metal systems from spin-orbit coupling
June 25-29, 2024. Telluride Intermediate School at 725 West Colorado Ave

Organizers: Sang-Wook Cheong (Rutgers), Valery Kiryukhin (Rutgers), and Jan Musfeldt (Tennessee)

TSRC Host: Executive Director Mark Kozak (970) 708-4426 mark@telluridescience.org

Time Tuesday June 25: topic 1

8:00-8:30 Registration and breakfast at TSRC for participants
8:30-8:45 Welcome and announcements - Valery Kiryukhin
8:45-9:15 Jia Xia - UCI - Intertwined topological and time-reversal-symmetry-breaking states on the surface of Fe-chalcogenide superconductors
9:15-9:45 Sang-Wook Cheong - Rutgers - Altermagnetism
9:45-10:15 Junjie Yang - NJIT - Physical properties of ferro-rotational magnets
10:15-10:45 **Break**
10:45-11:15 Gang Cao - Boulder - Transition between heavy-fermion-strange-metal and quantum spin liquid in a 4d-electron trimer lattice
11:15-11:45 Andrei Kiriliouk - FELIX - Lattice-driven magnetization reversal: phonons, optics, or a combination thereof?

1:30 PM Group hike - Bear Creek Trail

TSRC Town talks at the Telluride Conference Center, Mountain Village: Jenny Yang, University of California Irvine

6:30-7:30 PM Inspired by nature: understanding the chemistry that powers our planet

7:30-9:00 PM Discussion Session -Telluride Intermediate School - "Orbital physics" including altermagnetism and vortex beam

Wednesday June 26:

8:00-8:30 Breakfast at TSRC for participants and welcome
8:30-9:00 Turan Biroli - Minnesota - Multipoles and spin-orbit coupling in altermagnets
9:00-9:30 Liang Wu - Penn - Terahertz spectroscopy on 4d and 5d topological semimetals
9:30-10:00 Daniel Shoemaker - Illinois - Magnetocrystalline anisotropy and torque studies of in-plane metallic antiferromagnets
10:00-10:30 **Break**
10:30-11:00 Daniel Haskel - Argonne - Pressure tuning of magnetism in Kitaev QSL candidate Na₃Co₂SbO₆
11:00-11:30 Je-Geun Park - SNU - 3Q tetrahedral structure in antiferromagnetic van der Waals Co_{1/3}-TaS₂

1:30 Hiking - Sang Cheong

5:30-7:30 PM TSRC picnic at the Telluride intermediate school (725 West Colorado Ave)

Thursday June 27:

8:00-8:30 Breakfast at TSRC for participants
8:30-9:00 Hide Takagi - MPG - Puzzles on 3d, 4d and 5d honeycomb magnet
9:00-9:30 Mark Dean - BNL - Excitonic insulators and quantum spin liquid states in iridates probed by RIXS
9:30-10:00 Paul van Loosdrecht - Cologne -The Kitaev material alpha-RuCl₃: Transient quantum magnetic state, unusual magnetic excitations, chiral phonons, and more
10:00-10:30 **Break**
10:30-11:00 Vivien Zapf - LANL - Potential Kitaev behavior and quantum simulations of Co oxides
11:00-11:30 James Analytis - Berkeley - Frustrated quantum devices; understanding how correlations, complex order and boundary states manifest in novel material functionalities

1:30 PM Excursion to hot springs in Ouray

7:30-9:00 PM Discussion Session -Telluride Intermediate School - New opportunities in optics and imaging

Friday, June 28:

8:00-8:30 Breakfast at TSRC for participants
8:30-9:00 Haiden Wen - Argonne - Ultrafast spin-lattice coupling in van der Waals magnets
9:00-9:30 Michel van Veenendaal - NIU - X-ray absorption and dichroism in iridates
9:30-10:00 Liuyan Zhao - Michigan - Revealing a two-stage magnetic phase transition in a helimagnet
10:00-10:30 **Break**
10:30-11:00 David Vanderbilt - Rutgers - Theory of spin-orbit-coupled phonon and magnon dynamics
11:00-11:30 Randy Fishman - ORNL - Orbital angular momentum of magnons produced by spin-orbit coupling
11:30 - 12:00 Valery Kiryukhin - Rutgers - Imaging antiferromagnetic domains and catching them in action

1:30 Hiking - Sang Cheong

6:30 PM Group dinner at Rustico, Telluride

Saturday, June 29:

8:00-8:30 Breakfast at TSRC for participants
8:00-8:30 Kristjan Haule - Rutgers - High-throughput dynamical mean field theory calculations for altermagnets
8:30-9:00 William Ratcliff - NIST - Topological Hall effect induced by chiral fluctuations in a kagome lattice
9:00-9:30 Andrei Sirenko - NJIT - Vortex beam spectroscopy of magnetic and electric dipoles in magnetic field and in chiral materials
9:30-10:00 **Break**
10:00-10:30 Prashant Padmanabhan - LANL -
10:30-11:00 Jan Musfeldt - Tennessee - Unconventional metal-insulator transition in Mn₃Si₂Te₆
11:00-11:30 Wrap-up discussion -Valery Kiryukhin (Rutgers)