

Telluride science workshop: Enhanced functionalities in 4 and 5d transition metal systems from spin-orbit coupling
June 26-30, 2018. 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 26: Spin-orbit coupling in oxides and chalcogenides

- 8:00-8:30 Registration and breakfast at TSRC for participants
8:30-8:45 Welcome and announcements
8:45-9:15 Singular angular magnetoresistance of a magnetic Weyl semi-metal - Leon Balents (Santa Barbara)
9:15-9:45 Using nonlinear optics to shed new light on Weyl semimetals - Rohit Prasankumar
9:45-10:15 Mechanical control of the band structure of MoTe₂ - William Ratcliff (NIST)
10:15-10:45 **Break**
10:45-11:15 Topological superconductivity on iron-based superconductors - Shik Shin (Tokyo)
11:15-11:45 Orbital molecules in transition metal oxides - Paul Attfield (Edinburgh)
11:45-12:15 Anisotropic exchange and dynamic Rashba effects in Sr₃NiIrO₆ and CsPbCl₃ - David Vanderbilt (Rutgers)

1:30 PM Group hike - Bear Creek Trail

6:30-7:30 PM TSRC Town talks at the Telluride Conference Center, Mountain Village: Sir Fraser Stoddard, Engines through the ages

7:30-9:00 PM Discussion Session -Telluride Intermediate School - Sang-Wook Cheong and Hide Takagi

Wednesday June 27: Coupling trends and control

- 8:00-8:30 Breakfast at TSRC for participants
8:30-9:00 Probing the Kondo dynamics of 5d systems by terahertz time-domain spectroscopy - Manfred Fiebig (ETH)
9:00-9:30 Chemistry or local structure, what regulates metallicity in 4d compounds - James Rondinelli (Northwestern)
9:30-10:00 Controllable anisotropic magnetoresistance in antiferromagnet Sr₂IrO₄ and Sr₂(Ir(1-x)Gax)O₄ - Junming Liu (Nanjing)
10:00-10:30 **Break**
10:30-11:00 Electrical-current control of quantum states - Gan Cao (Boulder)
11:00-11:30 Unusal spin-phonon couplings in 4d and 5d transition metal oxides - Tae Won Noh (SNU)
11:30-12:00 Unidirectional charge order in a doped spin-orbit coupled weak Mott insulator - Liuyan Zhao (Michigan)
12:00-12:30 Some new insights into functional complex palladium oxides - Ram Seshadi (UCSB)

6:00-9:00 PM TSRC picnic at the Telluride intermediate school (725 West Colorado Ave)

Thursday June 28: Multiferroics

- 8:00-8:30 Breakfast at TSRC for participants
8:30-9:00 Broken symmetries, non-reciprocity and multiferroicity - Sang-Wook Cheong (Rutgers)
9:00-9:30 Nonreciprocal optical phenomena with light, spins, and plasma waves - Diyar Talbayev (Tulane)
9:30-10:00 How impurities create a multiferroic phase: two case studies - Randy Fishman (ORNL)
10:00-10:30 **Break**
10:30-11:00 Magnetic field tuning of non-reciprocal and achiral spin waves in iron langasite - Chris Stock (Edinburgh)
11:00-11:30 Multiferroic M₂Mo₃O₈ - Valery Kiryukhin (Rutgers)
11:30 - 12:00 Competing interactions in ruthenates explored by resonant x-ray scattering - Joerg Strempher (Argonne)

1:30 PM Excursion to hot springs in Ouray

Friday, June 29: Frustration and entanglement

- 8:00-8:30 Breakfast at TSRC for participants
8:30-9:00 Anisotropic susceptibilities in the honeycomb Kitaev system α -RuCl₃ - Dave Mandrus (Tennessee/ORNL)
9:00-9:30 Field dependence of magnetic order and excitations in RuCl₃ - Steve Nagler (ORNL)
9:30-10:00 High field phenomena in iridates - Vivien Zapf (LANL)
10:00-10:30 **Break**
10:30-11:00 Liquid and solid states of spin orbital entangled matter in 4d and 5d transition metal oxides - Hide Takagi (Tokyo, Stuttgart)
11:00-11:30 Spin-orbital frustration in d¹ transition metal systems - George Jackeli (Stuttgart)
11:30-12:00 Ba₃CoSb₂O₉ and the dynamical structure factor of the triangular Heisenberg model - Cristian Batista (Tennessee)

6:30 PM Group dinner at Rustico, Telluride

Saturday, June 30: Real space imaging, vortices, domain walls

- 8:00-8:30 Breakfast at TSRC for participants
8:00-8:30 Imaging antiferromagnetic domains using photoemission electron microscopy - Samjeet Dhesi (Diamond)
8:30-9:00 Rust to riches: the physics of magnetic vortices in α -Fe₂O₃ - Paolo Radaelli (Oxford)
9:00-9:30 Metrology of polar displacements across interfaces and domain walls in complex oxides - Nasim Alem (Penn State)
9:30-10:00 **Break**
10:00-10:30 Interface structural modulation by polarization switching in ferroelectric/LaNiO₃ heterostructure - Myung-Geun Han (Brookhaven)
10:30-11:00 Infrared spectrum of a ferroelastic domain wall in a hybrid improper ferroelectric - Jan Musfeldt (Tennessee)
11:00-11:30 Wrap-up discussion -Valery Kiryukhin (Rutgers)