

KITP Conference: Topology, Symmetry and Interactions in Crystals: Emerging Concepts and Unifying Themes

(Apr 3-6, 2023)

Coordinators: Silke Buehler-Paschen, Taylor Hughes, Qimiao Si, and Senthil Todadri

Monday, Apr 3, 2023

Electronic topology, Chair: Jennifer Cano (Stony Brook U)

- 8:50am Mark Bowick (KITP) [Welcome\[Video\]\[CC\]](#)
9:00am Dai Aoki (IMR Tohoku U) [Field-induced phenomena and Fermi surfaces in strongly correlated spin-triplet superconductor UTe₂\[Video\]\[CC\]](#)
9:45am Linda Ye (Stanford) [Flat bands in kagome lattice metals\[Video\]\[CC\]](#)
10:30am **Morning Break**
11:00am Gabriel Aeppli (ETH Zurich) [Observation and anomalous properties of the long sought flat optical mode in a metallic Kagome system\[Video\]\[CC\]](#)
11:45am Xie Chen (Caltech) [Fracton and Chern-Simons theories\[Slides\]\[Video\]\[CC\]](#)
12:30pm **Lunch Break**

Fractons and beyond, Chair: Taylor Hughes (U Illinois)

- 2:00pm Mike Hermele (CU Boulder) [Coarse translation symmetry and exotic renormalization groups in fracton phases\[Slides\]\[Video\]\[CC\]](#)
2:45pm Yong Baek Kim (U Toronto) [Towards fracton-like phases in frustrated magnets\[Video\]\[CC\]](#)
3:30pm **Afternoon Break**
4:00pm Poster Session I
5:30pm **SHUTTLE TO BWSCI**

Tuesday, Apr 4, 2023

Spin liquids, Chair: Lucile Savary (ENS Lyon)

- 9:00am Hidenori Takagi (MPI-FKF) [Thermal transport in quantum spin liquids\[Video\]\[CC\]](#)
9:45am Giulia Semeghini (Harvard) [Exploring topological phases in Rydberg atom arrays\[Video\]\[CC\]](#)
10:30am **Morning Break**
11:00am Xueyang Song (MIT) [Translation-enriched Z₂ and U\(1\) spin liquids\[Video\]\[CC\]](#)
11:45am Leon Balents (KITP) [Thermal Hall effect of phonons via kinetic equation\[Video\]\[CC\]](#)
12:30pm **Lunch Break**

Kondo-driven topology, Chair: Silke Paschen (TU Wien)

- 2:00pm Haoyu Hu (DIPC) Designing non-Fermi liquid topology from strong correlations[Embargoed]
2:45pm Harris Pirie (Oxford) [Visualizing the origin of bulk metallicity in the topological Kondo insulator SmB₆\[Slides\]\[Video\]](#)
3:30pm **Afternoon Break**
4:00pm Diego Zocco (TU Wien) Tuning topology in Weyl-Kondo semimetals[Embargoed]
4:45pm Poster Session II
5:30pm **RECEPTION**
6:00pm **DINNER**
8:00pm **SHUTTLE TO BWSCI**

Wednesday, Apr 5, 2023

Gapless systems, topology and symmetry, Chair: T. Senthil Todadri (MIT)

- 9:00am Charlie Kane (U Penn) [Topology of the Fermi Sea\[Video\]\[CC\]](#)
9:45am Hart Goldman (MIT) [Exact results for metallic quantum critical points\[Video\]\[CC\]](#)
10:30am **Morning Break**
- 11:00am Dam Son (U. Chicago) [Noncommutative field theory of the Tkachenko mode: Symmetries and decay rate\[Slides\]\[Video\]](#)
11:45am Chong Wang (Perimeter Inst.) [Topological phases with average symmetries\[Video\]](#)
12:30pm **Lunch Break**

Moiré systems, Chair: Alex Thomson (UC Davis)

- 2:00pm Andrei Bernevig (Princeton) [The topological heavy fermion principle for interacting flat bands in twisted bilayer graphene and beyond\[Video\]\[CC\]](#)
2:45pm Nick Bultinck (Oxford) [Kekule spiral order in magic-angle twisted bilayer graphene from the interplay between geometry and topology\[Slides\]\[Video\]\[CC\]](#)
3:30pm **Afternoon Break**
- 4:00pm Poster Session III
5:30pm **RECEPTION**
- 6:00pm **DINNER**
- 8:00pm **SHUTTLE TO BWSCI**

Thursday, Apr 6, 2023

Kondo and selective Mott systems, Chair: Qimiao Si (Rice U)

- 9:00am Filip Ronning (LANL) [Exploring the intersection of topology and correlations in f-electron materials\[Video\]\[CC\]](#)
9:45am Sarah Grefe (LANL) [Illuminating signatures of gapless topology and correlations: contrasting nonlinear optical responses\[Video\]\[CC\]](#)
10:30am **Morning Break**
- 11:00am Rebecca Flint (ISU) [Mobile Majorana zero modes in two-channel Kondo lattices\[Video\]\[CC\]](#)
11:45am Ming Yi (Rice U) [Correlated phases in geometrically frustrated lattices\[Video\]\[CC\]](#)
12:30pm **Lunch Break**

Topology and correlations: from 2D to the bulk, Chair: Elio KÅñig (MPI-FKF)

- 2:00pm Qiong Ma (Boston College) [Quantum materials under nonlinear spotlight -- Probing symmetry and quantum geometry\[Video\]\[CC\]](#)
2:45pm Andrea Young (UCSB) [New results on crystalline graphene multilayers: intervalley coherence and emergent spin orbit coupling\[Video\]\[CC\]](#)
3:30pm **Afternoon Break**
- 4:00pm Nandini Trivedi (Ohio State) [Anyons: fractionalization and dynamics\[Video\]\[CC\]](#)
4:45pm Ashvin Vishwanath (Harvard) [From Abelian anyons in moiré matter to non-Abelions in synthetic quantum systems\[Slides\]\[Video\]\[CC\]](#)
5:30pm **CONFERENCE END SHUTTLE TO BWSCI *Also available to SB Airport and SB Airbus, Goleta location.(See Registration Desk BEFORE THURSDAY to sign up.)**

POSTERS

Lei Chen (Rice U)	Emergent flat band and topological Kondo semimetal driven by orbital selective correlations [Abstract] [Poster]
Sanjib Kumar Das (Lehigh U)	Dynamic melting and condensation of topological dislocation modes [Abstract] [Poster]
Zhihuan Dong (MIT)	Excitonic Chern insulator and heavy fermion liquid in MoTe ₂ /WSe ₂ moire bilayer [Abstract] [Poster]
Yi-Hsien Du (U of Chicago)	Nonlinear Bosonization of Fermi Surfaces [Abstract] [Poster]
Shi Feng (The Ohio State U)	Anyon dynamics in field-driven phase of the Kitaev model [Abstract] [Poster]
Jyotsna Gidugu (U of California San Diego)	A study on dissipative models based on τ -matrices [Abstract] [Poster]
Julia Hannukainen (KTH Royal Institute of Technology)	Local Topological Markers in Odd Spatial Dimensions and Their Application to Amorphous Topological Matter [Abstract] [Poster]
Tamaghna Hazra (Rutgers U)	Triplet pairing mechanisms from Hund's-Kondo models - applications to heavy fermion superconductors [Abstract] [Poster]
Jonah Herzog-Arbeitman (Princeton U)	Many-Body Topological Quantum Chemistry Indices in 2D [Abstract] [Poster]
Yixuan Huang (Los Alamos National Laboratory)	Partially polarized chiral spin liquids induced by magnetic fields: application to transition metal dichalcogenide Moire systems [Abstract] [Poster]
Patrick Ledwith (Harvard U)	Vortexable Chern bands and Fractional Chern Insulators in Twisted and Strained Graphene [Abstract] [Poster]
Da-Chuan Lu (UC San Diego)	Definition and Classification of Fermi Surface Anomalies [Abstract] [Poster]
Shuangyuan Lu (the Ohio State U)	Detecting symmetry fractionalization in gapped quantum spin liquids by magnetic impurities [Abstract] [Poster]
Mounica Mahankali (Rice U)	Entanglement Properties as a Characterization of Kondo-driven Quantum Criticality [Abstract] [Poster]
Amin Moharramipour (U of Toronto)	Decorated domain wall construction for quantum phase transitions in 2+1D [Abstract] [Poster]
Seth Musser (Massachusetts Institute of Technology)	Theory of continuous bandwidth-tuned Wigner-Mott transitions [Abstract] [Poster]
Snehasish Nandy (Los Alamos National Laboratory)	Quantum Hall effect in a Weyl-Hubbard model: interplay between topology and correlation [Abstract] [Poster]
Aidan Reddy (Massachusetts Institute of Technology)	Moiré alchemy: artificial atoms, Wigner molecules, and emergent Kagome lattice [Abstract] [Poster]
Chandan Setty (Rice U)	Green's function based symmetry constraints and topological semimetals without quasiparticles [Abstract] [Poster]
Shouvik Sur (Rice U)	Topologically obstructed superconductivity in Dirac semimetals: Application to Iron-based compounds [Abstract] [Poster]
Christopher Waechtler (U of California, Berkeley)	Topological (quantum) synchronization of coupled van der Pol oscillators [Abstract] [Poster]
Yiming Wang (Rice U)	Quantum Criticality in Kondo Lattice Model: A Renormalization Group Study Via Quantum non-Linear Sigma Model [Abstract] [Poster]
Fang Xie (Rice U)	Orbital-selective Mott phase from a dehybridization in a multiorbital Hubbard model [Abstract] [Poster]
Ulrich Zuelicke (Victoria U of Wellington)	Electric, magnetic, and toroidal polarizations in crystals [Abstract] [Poster]