

KAVLI INSTITUTE FOR THEORETICAL PHYSICS
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**KITP Conference: Novel States in Spin-Orbit Coupled Quantum Matter:
 from Models to Materials**

(Jul 27-31, 2015)

**Coordinators: Liang Fu, George Jackeli, Hae-Young Kee,
 Yong-Baek Kim**

Scientific Advisors: Leon Balents, Hidenori Takagi

Monday, Jul 27, 2015

New Directions in Topological Phases, Chair: Liang Fu (MIT)

8:50am	Lars Bildsten (KITP)	Welcome
9:00am	Naoto Nagaosa (RIKEN)	Theory of topological magnets
9:45am	Ashvin Vishwanath (UCB)	Filling enforced topological phases in spin-orbit coupled crystals
10:30am		Morning Break
11:00am	Ali Yazdani (Princeton)	Topological superconductivity and Majorana fermions in atomic chains
11:45am	Zahid Hasan (Princeton)	New forms of matter: Weyl fermions & Fermi arc metals, nodal-line fermions and novel topological superconductors

LUNCH

Spin-Orbit Mott Insulators, Chair: George Jackeli (Stuttgart University)

2:00pm	Giniyat Khaliullin (MPI)	Magnetism and doping effects in spin-orbit Mott insulators
2:45pm	BJ Kim (MPI)	Fermi arcs evolution into d-wave nodes in electron-doped Sr ₂ IrO ₄
3:30pm		Afternoon Break
4:00pm	Nandini Trivedi (OSU)	Novel magnetism in d ₄ Mott insulators
4:45pm	Gang Cao (U Kentucky)	Spin-orbit effects in iridates
5:30pm		SHUTTLE TO BWSCI

Tuesday, Jul 28, 2015

Recent Developments in Iridates I, Chair: Hae-Young Kee (U of Toronto)

- 9:00am Radu Coldea (U Oxford) Unconventional magnetic order in 3D Kitaev materials revealed by resonant x-ray diffraction
- 9:45am Natalia Perkins (U Minnesota) Phase diagram of the Kitaev K1-K2 honeycomb model
- 10:30am **Morning Break**
- 11:00am Eric Lee (U of Toronto) 3D honeycomb iridates: the pursuit of Kitaev
- 11:30am Jeffrey Rau (U of Waterloo) Generic spin model for the honeycomb iridates with trigonal distortion
- 12:00pm Maria Hermanns (U Cologne) Classification of gapless Z2 spin liquids in three-dimensional Kitaev models
- 12:30pm **Lunch Break**

Topological Crystalline Phases, Chair: Mohit Randeria (OSU)

- 2:00pm Vidya Madhavan (U Illinois) Manipulation of the Dirac surface states in topological crystalline insulators by doping and strain
- 2:45pm Yuan-Ming Lu (OSU) Interplay of non-symmorphic symmetry and band topology
- 3:30pm **Afternoon Break**
- 4:00pm Evelyn Tang (MIT) Strain-induced partially flat band, helical snake states, and interface superconductivity in topological crystalline insulators

POSTER SESSION

- 5:30pm **RECEPTION**

- 6:00pm **SPECIAL EVENTS DINNER**

- 8:00pm **SHUTTLE TO BWSCI**

Wednesday, Jul 29, 2015**Platforms for Novel States, Chair: Antoine Georges (College de France)**

- 9:00am Dale Van Harlingen (UIUC) Coherent transport and Josephson phenomena in hybrid superconductor-

- 9: 45am Roser Valenti (U Frankfurt) topological insulator devices
Possible new unconventional superconductors
- 10: 30am **Morning Break**
- 11: 00am Sang-Wook Cheong (Rutgers) Z4xZ2 domains and Z3 vortices in an improper ferroelectric
- 11: 45am Kyle Shen (Cornell U) Interplay of spin-orbit coupling, dimensionality, and Coulomb interactions in iridate thin films and artificial quantum wells
- 12: 30pm **Lunch Break**
- 2: 00pm **FREE AFTERNOON -- SHUTTLE AVAILABLE TO BWSCI**

Thursday, Jul 30, 2015

Dirac and Weyl Systems, Chair: Marcel Franz (UCB)

- 9: 00am Sid Parameswaran (UCI) Signatures of topological semimetals in charge transport
- 9: 45am Andrew Potter (UCB) Quantum oscillations in Weyl and Dirac semimetals
- 10: 30am **Morning Break**
- 11: 00am Xi Dai (Chinese Academy) Weyl semimetal phase in non-centrosymmetric transition metal monophosphides
- 11: 45am Andrei Bernevig (Princeton) A new type of Weyl semimetal
- 12: 30pm **Lunch Break**

Recent Developments in Iridates II, Chair: Stephen Wilson (UCSB)

- 2: 00pm Satoru Nakatsuji (Tokyo) Fermi node, chiral spin liquid, and quantum metal-insulator transition in correlated semimetals
- 2: 45pm Masatoshi Imada (Tokyo) Topological nature of two iridium oxides
- 3: 30pm **Afternoon Break**
- 4: 00pm Jun Fujioka (Tokyo) Metal insulator transition and anomalous domain wall conductance in pyrochlore iridate
- 4: 45pm Ru Chen (UCB) Quadratic Fermi node and topological phases in pyrochlore iridates

5:30pm

RECEPTION

6:00pm

SPECIAL EVENTS DINNER

8:00pm

SHUTTLE TO BWSCI**Friday, Jul 31, 2015****Quantum Spin Ice and Liquid, Chair: Bruce Gaulin (McMaster U)**

9:00am Collin Broholm (JHU)

TBD

9:45am Kate Ross (Colorado State)

Spin excitations in stoichiometric $\text{Yb}_2\text{Ti}_2\text{O}_7$

10:30am

Morning Break

11:00am Lucile Savary (MIT)

Quantum spin liquids in quantum spin ice

11:45am Yukitoshi Motome (Tokyo)

Hunting Majorana fermions in quantum spin liquids: Quantum Monte Carlo studies of Kitaev-type models

12:30pm

Lunch Break**Overview and Outlook, Chair: Yong-Baek Kim (U of Toronto)**

2:00pm Hidenori Takagi (MPI)

Materials Overview

2:45pm Leon Balents (KITP)

Theory Overview

3:30pm

CONFERENCE END/SHUTTLE TO BWSCI