Princeton Center for Theoretical Science

The Princeton Center for Theoretical Science is dedicated to exploring the frontiers of theory in the natural sciences. Its purpose is to promote interaction among theorists and seed new directions in research, especially in areas cutting across traditional disciplinary boundaries.

The Center is home to a corps of Center Postdoctoral Fellows, chosen from nominations made by senior theoretical scientists around the world. A group of senior Faculty Fellows, chosen from science and engineering departments across the campus, are responsible for guiding the Center. Center activities include focused topical programs chosen from proposals by Princeton faculty across the natural sciences. The Center is located on the fourth floor of Jadwin Hall, in the heart of the campus "science neighborhood". The Center hopes to become the focus for innovation and cross-fertilization in theoretical natural science at Princeton and is celebrating its tenth anniversary in 2016.

Faculty Fellows
Paul Steinhardt, Director
Igor Klebanov, Associate Director
Andrei Bernevig
Curtis Callan
Garnet Chan
Pablo Debenedetti
Eve Ostriker
Howard Stone
Herman Verlinde

Center Postdoctoral Fellows
Ian Abel 2013-2016
Timothy Berkelbach 2014-2017
Barry Bradlyn 2015-2018
Jennifer Cano 2015-2018
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Yi Li 2013-2016
Zhiyuan Li 2015-2108
David Limmer 2013-2016
Mark Mezei 2014-2017
Titus Neupert 2013-2016
David Pinner 2014-2017
Curt von Keyserlingk 2014-2017
Yaojun Zhang 2015-2018

To find out more about Center Postdoctoral Fellowships and Programs see: http://pcts.princeton.edu/pcts

“Dirac and Weyl Fermions in Topological Semimetals”

9-11 March 2016
Jadwin Hall, Room 407

Workshop Organizers
B. Andrei Bernevig
M. Zahid Hasan
Yi Li
Titus Neupert
N. Phuan Ong

This workshop is supported in part by PCCM, MRSEC, and the Gordon and Betty Moore Foundation.
### Dirac and Weyl Fermions in Topological Semimetals

#### DAY 1: Wednesday, March 9, 2016

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<tr>
<td>9:00 am</td>
<td>Coffee at PCTS</td>
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<td>9:20 am</td>
<td>Welcoming Remarks</td>
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| 9:30-10:20| “Where the Weyl things are: Smoking gun signatures and search directions for topological semimetals”  
Ashvin Vishwanath, Berkeley University |
| 10:20-11:10| “Chiral symmetry, chiral anomaly and transport in Weyl metals”  
Anton Burkov, University of Waterloo |
| 11:10-11:30| Coffee break                                                           |
| 11:30-12:20| “Determine the chirality of Weyl fermions from the circular dichroism spectra of time-dependent ARPES”  
Xi Dai |
| 12:20-2:00| Lunch at PCTS, Jadwin Hall, Fourth Floor                             |
| 2:00-2:50| “Weyl Fermions from the materials perspective”  
Claudia Felser, MPG |
| 2:50-3:40| “ARPES studies of Weyl semimetals”  
Hong Ding, Beijing National Laboratory for Condensed Matter Physics, CAS |
| 3:40-4:00| Coffee break                                                          |
| 4:00-4:50| “Theoretical and experimental discovery of Weyl fermion, topological nodal-line fermion and Chiral anomaly materials and the new physics frontier”  
M. Zahid Hasan, Princeton University |
| 5:00   | Poster Session and Welcome Reception at PCTS                         |

#### DAY 2: Thursday, March 10, 2016

<table>
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<tr>
<th>Time</th>
<th>Event</th>
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| 9:00-9:50 am| “Topological phenomena in photonics”  
Marin Soljacic, MIT |
| 9:50-10:20| "Transition Metal Dichalcogenides: prospects of observing Weyl Fermions"  
Abhay Pasupathy, Columbia University |
| 10:20-10:40| Coffee break                                                          |
| 10:40-11:30| “Sinking Quasi-particle in a Weyl Sea.”  
Ali Yazdani, Princeton University |
| 11:30-12:00| “Emergence of Dirac Composite Fermions at the Half-Filled Landau Level of the Fractional Quantum Hall Effect”  
Wei Pan, Sandia National Labs |
| 12:00-1:20| Lunch at PCTS, Jadwin Hall, Fourth Floor                             |
| 1:20-2:10| “Correlated states in Weyl loop materials”  
Rahul Nandkishore, University of Colorado at Boulder |
| 2:10-3:00| “Weyl Wiggles: Quantum Oscillatory Studies of Exotic Surfaces States in the Dirac Semimetals”  
James Analytis, Berkeley |
| 3:00-3:20| Break                                                                 |
| 3:20-4:10| “The chiral anomaly in Na₃Bi”  
N. Phuan Ong, Princeton University |
| 4:30-5:30| PHYSICS COLLOQUIUM, Jadwin Hall, Room A-10  
“Surprises with Dirac fermions in condensed matter”  
Dam Thanh Son, University of Chicago |
Dirac and Weyl Fermions in Topological Semimetals

DAY 3: Friday, March 11, 2016

9:00-9:50  “Topological phase transitions and surface states in Weyl- and nodal-line semimetals”
            Shuichi Murakami

9:50-10:40  “Dirac semimetals and Majorana superconductors”
            Liang Fu

10:40-11:10  Coffee Break

11:10-12:00  "Anomalous Hall effect in topological Weyl metals and the half-filled Landau level."
            Duncan Haldane, Princeton University

12:00-12:30  Dirac and Weyl Fermions - recent progress in materials development
            Robert Cava, Princeton University

12:30 pm  Closing Remarks and light Lunch at PCTS