

Massachusetts Institute of Technology
Department of Physics

CONDENSED MATTER THEORY SEMINAR

“Point Group Symmetries in Topological Insulators
and Superconductors”

Chen Fang
Purdue University

Abstract: Different symmetry groups lead to different topological classifications of insulating phases. For non-interacting fermions, the local anti-unitary symmetries are time-reversal and particle-hole conjugation, the presence/absence of which gives ten classes of insulators and superconductors. All possible phases of each class have been exhausted by Schnyder et al and Kitaev. It is an open and interesting question if other discrete symmetries (non-local symmetries) could give us new topological phases. In this talk, I will discuss the role of point group symmetries in topological insulators. I will show that point group symmetries on one hand place constraints on the known topological invariants of the established topological insulators/superconductors, and on the other hand allow us to define new topological invariants, i.e., new topological phases. Some of these phases, however, do not exhibit gapless edge modes in the energy spectrum, but have protected in-gap states in the entanglement spectrum.

References:

1. L. Fu, Phys. Rev. Lett. 106, 106802 (2011)
2. C. Fang, M. J. Gilbert, X. Dai, and B. A. Bernevig, Phys. Rev. Lett. 108, 266802 (2012)
3. Timothy H. Hsieh, Hsin Lin, Junwei Liu, Wenhui Duan, Arun Bansil, Liang Fu, Nat Commu 3, 982 (2012)
4. C. Fang, M. J. Gilbert and B. A. Bernevig, Phys. Rev. B 86, 115112 (2012)
5. C. Fang, M. J. Gilbert and B. A. Bernevig, Phys. Rev. B 87, 035119 (2013)

2:00 PM
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