

Condensed Matter Theory Center Seminar



Tuesday, March 10
2:00 – 3:00 pm
2205 Toll Physics Building

Vladimir Juricic

Utrecht University

“Topological Crystalline Quantum Matter”

Topological band insulators are bulk insulating states of matter, which in the presence of time-reversal symmetry feature metallic states at their edge or surface. This state of quantum matter has been experimentally realized in the HgTe/CdTe quantum wells and various (mostly) Bismuth-based compounds. I will first introduce the concept of topological band insulators and then discuss the role of crystal symmetries in the physics of these states of quantum matter. I will derive the classification of topological band-insulators protected not only by time-reversal, but also by space group symmetries [1]. As a result, there are three broad classes of topological states: (a) Gamma-states robust against general time-reversal invariant perturbations; (b) Translationally-active states protected from elastic scattering, but susceptible to topological crystalline disorder; (c) Valley (crystalline) topological insulators sensitive to both elastic and crystalline disorder. I will also discuss probing of the topological states in the bulk by magnetic pi-fluxes and lattice dislocations both in two [2] and three dimensions [3]. Finally, some experimental implications of our classification scheme will be considered.

[1] R.-J. Slager, A. Mesaros, V. Juricic, and J. Zaanen, *Nature Physics* 9, 98 (2013).

[2] V. Juricic, A. Mesaros, R.-J. Slager, and J. Zaanen, *Phys. Rev. Lett.* 108, 106403 (2012).

[3] R.-J. Slager, A. Mesaros, V. Juricic, and J. Zaanen, *Phys. Rev. B* 90, 241403(R) (2014).

Host: Bitan Roy

Web: <http://www.physics.umd.edu/cmte/seminars.html>

(All are welcome to attend)

