北京大学量子材料科学中心

International Center for Quantum Materials, PKU

Informal Seminar

Topological Insulator Heterostructures: Searching for Exotic Particles on a Bench Top

Nitin Samarth

Physics at Penn State University

Time: 4:00pm, Oct. 30, 2012 (Tuesday)

时间：2012年10月30日 （周二）下午4:00

Venue: Room 607, Conference Room A , Science Building 5

地点：理科五号楼607会议室

Abstract

A triumph of contemporary physics is the highly successful description of the most fundamental constituents of Nature and their excitations. Recent theories of “topological insulators” [1,2] have shown that in the complex and emergent world of condensed matter physics, one can engineer the interplay between fundamental symmetries, band structure and spin-orbit coupling to create novel energy-spin-momentum relationships for band electrons and to yield effective realizations of exotic particles predicted but yet unobserved in Nature. This Colloquium will describe the experimental routes we are pursuing in this context to build "detectors" for such particles, by coupling the surface states of a topological insulator with the gauge symmetry breaking effects of superconductivity [3] and the time-reversal symmetry breaking effect of magnetism [4.5].

1. M. Z. Hasan and C. L. Kane, Rev. Mod. Phys. 82, 3045 (2010).
2. Xiao -Liang Qi and Shou-Cheng. Zhang, Rev. Mod. Phys. 83, 1057 (2011).
3. Duming Zhang et al., Phys. Rev. B 84, 165120 (2011).
4. Su-Yang Xu et al., Nature Physics 8, 616 (2012).
5. Duming Zhang et al., arxiv: 1206.2908.

About the speaker

Nitin Samarth is Downsbrough Department Head and Professor of Physics at Penn State University. His awards include election to Fellow of the American Physical Society, Faculty Scholar Medal (Penn State), George Atherton Award for Excellence in Teaching (Penn State) and Outstanding Physics Alumnus Award (Purdue University). Dr. Samarth has pioneered the epitaxial growth and nanopatterning of conventional semiconductors, magnetic semiconductors and ferromagnetic metals to advance our fundamental understanding of semiconductor spintronics and artificial frustrated magnets. His current research focuses on probing the interaction between topological insulators, ferromagnets and superconductors.