



清华大学高等研究院

Institute for Advanced Study, Tsinghua University

学术报告

- Title:** Exotic quantum phase transition of strongly interacting topological insulator
- Speaker:** Cenke Xu (UCSB)
- Time:** 4:00pm, Friday, Dec 25, 2015
- Venue:** Conference Hall 322, Science Building, Tsinghua University

Abstract

It is well-known that quantum phase transition between noninteracting topological insulator and trivial insulator is described by one (or multiple flavors of) gapless free Dirac fermion. In this talk we discuss how strong interaction can fundamentally change this well-studied scenario. With both numerical and analytical studies, we demonstrate that interaction can drastically change this picture, and lead to a novel quantum phase transition with only gapless boson modes but no gapless fermion modes. We will design a series of lattice models which can be simulated very reliably using quantum Monte Carlo, and these models will explicitly demonstrate the physics described above. We will also derive the effective quantum field theory description of these quantum phase transitions. Our model also has another continuous quantum phase transition between gapless semimetal and a fully gapped state without condensing any fermion-bilinear mass operator, this result has been independently verified by the lattice-QCD community.