Chez Pierre

Presents ...

Monday, April 10, 2017

12:00pm noon

MIT Room 4-331

Chez Pierre Seminar

Ashvin Vishwanath - Harvard University

"Two Unusual Routes to Insulating Behavior in Crystals"

The simplest model of an insulating crystal has electrons filling localized (Wannier) orbitals. We discuss two settings where this `atomic insulator' picture fails. First, in filling enforced Quantum band Insulators, noninteracting electrons form filled bands in momentum space, but at electron fillings where no atomic insulator can exist. The resulting band structure is forced to be topological with nontrivial quantum entanglement. Next, we discuss how Dirac semimetals such as two layer graphene can form a correlated insulator that respects all symmetries, in the presence of strong interactions. We report progress towards a theory of this metal-insulator transition, called symmetric mass generation, at which fractionalized excitations and emergent non Abelian gauge bosons are predicted.