

Massachusetts Institute of Technology
Department of Physics

Condensed Matter Theory Seminar

“Strain-induced Helical Flat Band and Interface Superconductivity in Topological Crystalline Insulators”

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Abstract: Topological crystalline insulators in IV-VI compounds host novel topological surface states, that at low energy, consist of multi-valley massless Dirac fermions. We show that strain generically acts as an effective gauge field on these Dirac fermion surface states and creates pseudo-Landau orbitals without breaking time-reversal symmetry. We predict this is naturally realized in IV-VI semiconductor heterostructures due to the spontaneous formation of a misfit dislocation array at the interface, where the zero-energy Landau orbitals form a nearly flat band. We propose that the high density of states of this topological flat band gives rise to the experimentally observed interface superconductivity in IV-VI semiconductor multilayers at temperatures that are unusually high for semiconductors, and explains its non-BCS dependence on dislocation array period.

Ref: cond-mat/1403.7523

12:00noon
Wednesday, April 16, 2014*
Duboc Seminar Room (4-331)

*Please note that this is the talk previously announced for April 8th