

Condensed Matter Theory Center Seminar



Wednesday, February 25
2:00 – 3:00 pm
2205 Toll Physics Building

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“Kondo topological insulators”

Fractional quantum Hall systems may not be any more the only known correlated topological materials: samarium hexaboride, a "heavy fermion" material, appears to be a topological insulator. I will first present the latest neutron scattering experiment on samarium hexaboride, which maps the dispersion of its intriguing paramagnon mode throughout much of the first Brillouin zone. This mode reveals both the strong correlations and non-trivial topology of samarium hexaboride through the lenses of a perturbative slave boson theory. Then, I will discuss the numerous possible imprints of heavy electron correlations on the topologically enhanced dynamics. One could view the topologically protected surfaces of heavy fermion TIs as two-dimensional Dirac "heavy fermion" systems. Quantum criticality spanning different Fermi and non-Fermi liquid metallic states, magnetic orders, superconductivity, and exotic algebraic or non-Abelian spin liquids can be anticipated on adequately prepared Kondo TI boundaries. I will give a few specific examples and reasons for the anticipation of such states. If time permits, I will also discuss quantum wells made of correlated topological insulators. These fully gapped two-dimensional systems could host $SU(2)$ vortex lattices, and non-Abelian incompressible quantum liquids of novel type whose description requires a generalization of the well-known Chern-Simons theory.

Host: Bitan Roy

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

(All are welcome to attend)

