

Colloquium

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Search for New Excitations in Topological Places

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In recent years the desire to find new modalities of computation has pushed efforts to find new platforms for quantum information processing. Particularly attractive are topological states, where new long range and protected entanglement should be possible. The excitations needed also require understanding and controlling entirely new states of matter. In this talk, I will outline why materials with strong spin-orbit coupling and electron correlations are quite promising in this regard. In particular they could precipitate a variety of highly unusual electronic phases in solids, including topological and quantum spin liquid states. Such states are predicted to produce Majorana Zero modes, whose statistics are direct evidence of the topological nature of the ground states. In this talk I will briefly outline our efforts to pursue novel quasi-particles at the interface between high T_c superconductors and topological insulators. I will then focus on our efforts to find a Kitaev quantum spin liquid and its associated fractional excitations in RuCl_3 . Specifically using IR and Raman spectroscopy we have confirmed this material has the right ingredients. Most interesting Raman provides direct evidence for the fractional nature of the excitations. However the material reveals low temperature magnetic order, as such I will also discuss our efforts to search for a true spin liquid in this material via mechanical exfoliation.

Monday, November 14, 2016 at 3:00pm

SERC, Room 116

Refreshments served at 2:45pm