

Massachusetts Institute of Technology
Department of Physics

Condensed Matter Theory Seminar

“Interacting Rashba Fermi gases, from Majorana zero-modes to non-Fermi liquids”

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Abstract: In this talk I will discuss interacting Fermi gases with Rashba spin-orbit coupling.

In the first part of my talk I will consider one-dimensional Fermi gases, similar to those where Majorana zero-modes have recently been observed. However, I will consider replacing the proximity coupling to an external bulk superconductor by intrinsic attractive interactions. I will show that despite particle number conservation and the absence of a single particle gap the interactions give rise to a novel topological state.

In the second part of my talk I will switch to two-dimensions, where I will consider the fate of the gas in the low density limit with repulsive interactions. I will show that despite strong renormalization of the interactions and regardless of how weak their bare value is, they give rise to a verity of liquid crystal phases, including a nematic-ferromagnet, nematic and spin-density wave. I will also argue that all of the above phases are expected to show strong deviations from Fermi liquid theory with a special emphasis on the nematic-ferromagnetic phase which is stable against a paring instability. "

12:00pm
Monday, December 15, 2014
Low Seminar Room (6C-333)