

Massachusetts Institute of Technology
Department of Physics

Condensed Matter Theory Seminar

“Nematic quantum criticality in a 2+1-dimensional metal”

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Abstract: Evidence continues to mount that quantum critical points lie beneath the superconducting “dome” of both the iron-based and cuprate high temperature superconductors. Further, these putative critical points appear intimately related to anomalous properties of both the superconducting and normal (metallic) states of these materials. We consider a model for a quantum critical point in a 2+1-dimensional metal with an Ising nematic order parameter, which captures the spontaneous breaking of fourfold rotational symmetry known to occur in the above materials. We simulate this model using numerically exact, sign-problem-free Quantum Monte Carlo techniques, and find evidence of a strongly coupled quantum critical point with nontrivial scaling exponents. At this fixed point, the fermions are strongly, perhaps singularly renormalized, consistent with the expected breakdown of Fermi liquid theory.

12:00noon
Tuesday, October 6, 2015
Duboc Seminar Room (4-331)