Massachusetts Institute of Technology
Department of Physics

Condensed Matter Theory Seminar

"Non-Fermi Liquids at Quantum Critical Points"

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Abstract: We study the problem of disorder-free metals near a continuous quantum critical point. We depart from the standard paradigm of Hertz, and treat both metallic quasiparticles and order parameter fluctuations on equal footing. We construct a Wilsonian effective field theory that integrates out only high energy boson and fermion modes. Below the upper critical dimension of the theory ($d=3$ spatial dimensions), we find new fixed points in which the bosons are described by the Wilson-Fisher fixed point and are coupled to a non-Fermi liquid metal. We describe subtleties with the renormalization group flow of four-Fermi interactions, which can be surmounted in a controlled large N limit. In this limit, we find that the theory has no superconducting instability. We will also discuss different large N limits, which exhibit rather different IR scaling behavior.

12:00 pm
Tuesday, November 5, 2013
Duboc Seminar Room
Room 4-331

Host: Senthil Todadri