

**Massachusetts Institute of Technology**  
**Department of Physics**

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**Condensed Matter Theory Seminar**

"Progress on Quantum Critical Metals"

**Erez Berg**, Weizmann Institute of Science

**Abstract:** Metallic quantum critical phenomena are believed to play a key role in many strongly correlated materials, including high temperature superconductors. Theoretically, the problem of quantum criticality in the presence of a Fermi surface has proven to be highly challenging. However, it has recently been realized that many models used to describe such systems are amenable to numerically exact solution by quantum Monte Carlo (QMC) techniques, without suffering from the fermion sign problem. I will review the status of the understanding of metallic quantum criticality, and the recent progress made by QMC simulations, focusing on the cases of spin density wave and Ising nematic criticality. The results obtained so far will be described, as well as their implications for superconductivity, non-Fermi liquid behavior, and transport in the vicinity of metallic quantum critical points. Some of the outstanding puzzles and future directions are highlighted.

**12:00pm noon**  
**Tuesday, November 27, 2018**  
**Duboc Room (4-331)**

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Host: Debanjan Chowdhury