

Chez Pierre

Presents ...

Monday, October 16, 2017

12:00pm Noon

MIT Room 4-331

Chez Pierre Seminar

Erez Berg - University of Chicago

“Bad metals and bad insulators: a view from the large-N limit”

In normal metals, the electron's mean free path is much larger than its wavelength, allowing a semiclassical treatment of transport. Conversely, whenever scattering is so strong that the mean free path becomes comparable to the electron's wavelength, the concept of a quasiparticle becomes ill defined, and a new theoretical framework is needed. I will introduce a family of lattice models for interacting electrons that can be solved exactly in the limit of a large number of interacting electron flavors and/or phonon modes. Depending on details, these models exhibit either "resistivity saturation" at high temperatures to a value of the order of the quantum of resistance, or "bad metallic behavior" where the resistivity grows without bound with increasing temperature. Translationally invariant higher-dimensional generalizations of the Sachdev-Ye-Kitaev model can capture a variety of phenomena arising purely from electron-electron interactions, including local criticality, non-Fermi liquid, and marginal Fermi liquid behavior. I will describe the implications of these results for the problem of non-quasiparticle transport at large, local quantum criticality, and the relation between transport and the development of quantum chaos.

