Massachusetts Institute of Technology
Department of Physics

Condensed Matter Theory Seminar

"Quantum Monte Carlo studies of normal state properties of the Hubbard model"

Edwin Huang, Stanford University

Abstract: Many of the outstanding challenges in understanding strongly correlated quantum matter stem from their unusual behavior in the normal state. We investigate this topic from the perspective of numerical simulations of paradigmatic model Hamiltonians. In the first part of my talk, I will present large scale determinantal quantum Monte Carlo (DQMC) and density matrix renormalization group (DMRG) calculations demonstrating fluctuating spin stripes in both the Hubbard and Emery models on a 2d square lattice. Our results provide new perspectives for the phenomenology of high-Tc cuprate superconductors. We also highlight the stripes' sensitive dependence on tuning the non-interacting band structure of the model. In the second part, I will discuss transport properties of the 2d Hubbard model evaluated by analytic continuation of DQMC data. Our data, extending to temperatures around an order of magnitude below the Fermi temperature, shows features reminiscent of the strange metal phase observed in unconventional superconductors, including linear-T dependence and violation of the Mott-Ioffe-Regel limit.

12:00pm noon
Tuesday, February 26, 2019
Duboc Room (4-331)

Host: Liang Fu