

Massachusetts Institute of Technology
Department of Physics

Condensed Matter Theory Seminar

“Ultrafast dynamics in heavy fermions and electron doped cuprates”

Inna Vishik, Massachusetts Institute of Technology

Abstract: Ultrafast spectroscopies have emerged as important tools for studying quantum materials, and one of the key capabilities of ultrafast techniques is identifying relaxation processes in the time domain which are relevant to the formation of exotic states such as high temperature superconductivity. I will present ultrafast pump-probe spectroscopy studies of the heavy fermion superconductor CeCoIn_5 and the electron-doped cuprate $\text{La}_{2-x}\text{Ce}_x\text{CuO}_4$ (LCCO). In these experiments, a 70-femtosecond 800nm-wavelength pulse creates transient electronic excitations whose decay is probed by studying changes in reflectivity as a function of time. Both materials exhibit characteristic changes in pump-probe relaxation dynamics across the key temperatures in the phase diagram—the Kondo coherence temperature in CeCoIn_5 and T_c and T_N in LCCO. In both material systems, the low temperature state contains two components—heavy/light electrons in CeCoIn_5 and superconductivity/antiferromagnetism in LCCO—which can be distinguished via their unique time-domain signatures.

12:00pm
Tuesday, December 8, 2015
Duboc Seminar Room (4-331)