Columbia University

Department of Physics Seminar

"Probing interactions with thermal transport"

Thermal and thermoelectric conductivities are ideal probes of interaction effects in correlated electron systems. This is because, in contrast to an electric current, a heat current can be transmitted also by neutral quasiparticles. For instance, energy can be carried by excitations that mediate interactions between other quasiparticles. In my talk I will present two examples of the dramatic effect of interactions on thermal and thermoelectric transport phenomena. The first is the Nernst effect in the vicinity of the superconducting phase transition. I will demonstrate that the giant Nernst signal, experimentally observed in amorphous films far above Tc, is caused by the fluctuations of the superconducting order parameter. Moreover, I will discuss the anomalous behavior of the Nernst effect near the magnetic-field-induced quantum critical phase transition. The second example is thermal conductivity in spin liquids. Spin liquids can form in the vicinity of the Mott metal-insulator transition when the charge is gapped while the spin degrees of freedom strongly fluctuate. These low energy excitations, dubbed spinons, can conduct heat. The spinons also exhibit a magnetic interaction that leads to non-Fermi liquid behavior. I will show that even in the absence of disorder this strong interaction provides an efficient relaxation mechanism for heat and spin currents, keeping them finite at the lowest temperatures

Karen Michaeli, MIT

When: Wednesday, February 27, 2013, 2:10 PM
Where: 831 Pupin Hall