Massachusetts Institute of Technology
Department of Physics

Condensed Matter Theory Seminar

"Magnetically Mediated Cooper Pairing in Heavy Fermion Superconductors"

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Abstract: While magnetically mediated Cooper pairing is the conjectured basis of heavy-fermion superconductivity, no direct verify exists. In this talk, I will demonstrate how one can use the heavy-fermion band structure derived from quasiparticle interference (QPI) imaging to determine the momentum-space structure of the *f*-electron magnetic interac- tions in the heavy fermion material $CeCoIn_5$. Solving the superconducting gap equations on its two heavy-fermion bands with the hypothesis that these interactions mediate the Cooper pairing, yields a series of quantitative predictions about the superconductive state, such as the momentum structure of the superconducting gap, T_C, phase sensitive QPI, the position of the magnetic resonance, and the spin-pattice relaxation rate. The agreement between these diverse predictions and the measured characteristics of superconducting $CeCoIn_5$ provides strong and direct evidence that its Cooper pairing is mediated by the *f*-electron magnetism.

3:00pm
Wednesday, February 18, 2015
Low Room (6C-333)

Host: Patrick A Lee