

Chez Pierre

Presents ...

Wednesday, December 17, 2008

10:00am

MIT Room 4-331



Francis Niestemski
Boston College

“Bringing Cooper Pairs Together and Keeping Them Apart, A STM Study on High-Tc Superconductors”

When two electrons come together to form a Cooper pair they become a single boson. No longer prohibited by Pauli exclusion, bosons are free to condense into a single ground state in the phenomenon known as superconductivity. In the low temperature case (BCS) a lattice deformation acts as the intermediary to bring these electrons together. In the high temperature superconductor case this intermediary is still unknown, possibly not existing at all. These electrons will continue to pair at all temperatures below the critical temperature. Far above the critical temperature these electrons are kept apart. In a modest range above this critical temperature (pseudogap phase) though, it is unclear what is happening. Is temperature keeping these electrons apart or is something else denying this union?

With a low temperature scanning tunneling microscope we explore these questions on both electron and hole-doped high temperature cuprates. We discuss features which support the idea that magnetic interactions are keeping these electrons together and charge ordering may be competing to keep these electrons apart.