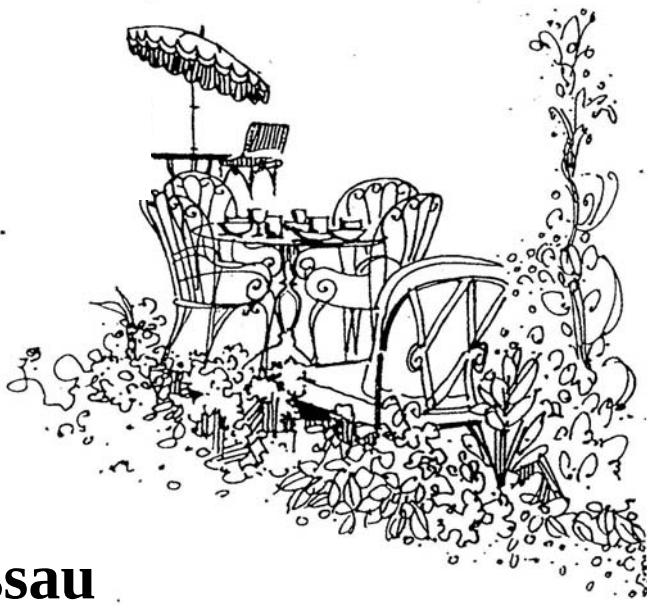
Chez Pierre

Presents ...

Monday, October 6, 2008
12:00pm
MIT Room 4-331



Daniel Dessau

University of Colorado at Boulder

"Phun with Photoelectrons – Electronic Structure of High Tc superconductors"

Einstein's famous photoelectric effect has turned into the most direct and powerful method of uncovering the momentum-dependent electronic structure of a solid, with the recent advent of using lasers in the method further improving its capabilities. In particular laser-ARPES allows us to dramatically improve the momentum and energy resolution, as well as increasing bulk sensitivity and reducing backgrounds [1]. With this we obtain the intrinsic spectral lineshapes, scattering rates, and mean free paths, as well as their temperature dependences [1,2]. Strong coupling to the phonon degrees of freedom is fingerprinted by the means of isotope substitution [3,4], and the origin of the "waterfalls" in the dispersion is uncovered [5].

[1] J. D. Koralek et al., "Laser Based Angle-Resolved Photoemission, the Sudden Approximation, and Quasiparticle-Like Spectral Peaks in Bi2Sr2CaCu2O8+d" Phys. Rev. Letters 96, 017005 (2006)
[2] P. A. Casey, J. D. Koralek, Nick Plumb, D.S. Dessau and Philip W. Anderson **"**Accurate theoretical fits to laser-excited photoemission spectra in the normal phase of high temperature superconductors" Nature Physics **4**, 210 (2008).
[3] J.F. Douglas et. al., "Unusual oxygen isotope effects in cuprates?" Nature 446, E5 (2007)
[4] H. Iwasawa, J.F. Douglas et al., "An isotopic fingerprint of electron-phonon coupling in high temperature superconductors" arXiv:0808.1323 Phys Rev Lett (to appear)
[5] Q. Wang, Z Sun, E Rotenberg, H. Berger, D.S. Dessau "Energy-dependent scaling of incoherent spectral weight and the origin of the waterfalls in high Tc cuprates"