Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Interband Transitions in $La_{2-x}Sr_xCuO_4$ observed by Resonant Inelastic X-Ray Scattering D.S. ELLIS, JUNGHO KIM, H. ZHANG, University of Toronto, S. WAKIMOTO, JAERI, J.P. HILL, Brookhaven National Lab, Y. ANDO, S. KOMIYA, CRIEPI, D. CASA, T. GOG, Argonne National Lab, Y.-J. KIM, University of Toronto — Resonant inelastic x-ray scattering measures the energy and momentum dependence of electronic excitations, whose probabilities are resonantly enhanced, in this study, by utilizing hard x-rays at the Cu K-edge absorption energy. Three main features in the resonant inelastic x-ray scattering spectrum of $La_{2-x}Sr_xCuO_4$ were observed to develop as the doping x increased from the underdoped to the overdoped region of the high-temperature superconductor phase diagram. Measured at the zone-boundary momentum transfer (π 0), the spectra consist of three main peaks: one peak below an isosbestic point at 2.2 eV which strengthens at high doping, and two broad peaks above - one at 3.3 eV increasing in energy and decreasing in intensity, and the other stationary at higher energy. Taking a cue from existing band structure calculations, these peaks are interpreted as the transitions between stationary bands of non-bonding Oxygen, a Zhang-Rice singlet type band at the Fermi level, and the upper Hubbard band. These transitions are also discussed in the context of existing angle-resolved photoemission data.

David Ellis
University of Toronto

Date submitted: 01 Dec 2008 Electronic form version 1.4