Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Intrinsic Scattering Rates and the "Filling" Gap of Bi2212 T.J. REBER, N.C. PLUMB, Z. SUN, Y. CAO, Q. WANG, Univ. of Colorado, H. IWASAWA, M. ARITA, HiSor, J.S. WEN, Z.J. XU, G. GU, Brookhaven National Lab, Y. YOSHIDA, H. EISAKI, Aist Tsukuba Central, Y. AIURA, Hiroshima Synchrotron Radiation Center, D.S. DESSAU, Univ. of Colorado — As a direct measure of the electronic interactions in a solid, knowledge of the electronic scattering rates is essential for understanding a material's behavior. Since angle resolved photoemission spectroscopy (ARPES) can probe an individual momentum state, it holds great promise for the most detailed and accurate measurements of the k-dependent electron scattering rates. Unfortunately, the scattering rates determined from ARPES are typically an order of magnitude greater than those obtained from other probes, (e.g. optical spectroscopy). Here we present a new type of spectrum, the ARPES tunneling spectrum (ATS), which resolves this discrepancy, as well as provides a qualitatively different understanding of the gaps and scattering rates along the Fermi surface. Applying this technique to the study of Bi2212, we find that the scattering rates are approximately independent of Fermi surface position but grow exponentially with temperature. Furthermore, we find that this strongly temperature dependent scattering rate is the source of the long observed but not understood "filling" of the superconducting gap in the cuprates.

Theodore Reber
Univ. of Colorado

Date submitted: 29 Dec 2010 Electronic form version 1.4