Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Exploiting Resonances in Laser Photoemission[1] J.I. DADAP, M.B. YILMAZ, K. KNOX, N. ZAKI, R.M. OSGOOD, Columbia University, P.D. JOHNSON, Brookhaven National Laboratory — Laser photoemission is attracting new interest due to its ability to increase photoemission probe depth and to gain insight into surface-electron dynamics. We present new data on the use of energy levels that are resonant with the excitation-photon energy. Our surface system is the regular array of nanometer-scale steps on Cu(775), which yield information on surface electron confinement. We probe this nanostructured system with 2-photon photoemission. Our tunable, fs optical parametric amplifier (OPA) source allows resonance mapping with photon energies $\sim$ 4.2-4.6 eV to obtain a comprehensive map of the unoccupied state manifold. We observe, in addition to the surface state and image states, bandfolding from Umklapp due to the periodic steps, and, for the first time, the existence of a weak unoccupied state. The OPA allows observation of even this relatively weak unoccupied state as well as the rapid interrogation of electronic structure. The origin of this intermediate state is discussed. In addition, we present the intensity dependence of the measured linewidth and the position of the resonances.

[1]This work is supported by DOE contracts DE-FG02-04ER46157 and DE-AC02-98CH10886.

Mehmet Yilmaz
Columbia University

Date submitted: 30 Nov 2007 Electronic form version 1.4