MAR05-2004-001990

Abstract for an Invited Paper
for the MAR05 Meeting of
the American Physical Society

An Isotope Dependent Study of the Quasiparticle Dynamics in High Temperature Superconductors

ALESSANDRA LANZARA, University of California Berkeley and Materials Sciences Division, Lawrence Berkeley National Laboratory

The effect of oxygen isotope substitution on the electronic properties of double layer Bi2212 high temperature superconductor is studied by means of angle resolved photoemission spectroscopy (ARPES). This new approach allows us to unambiguously and directly extract information on the role and the nature of the electron-lattice interaction in these highly correlated materials. Data as a function of temperature, momentum and doping are presented. The isotope-induced changes of the electron spectral function together with their energy, momentum, and temperature dependences, as well as the *local* nature of the electron-lattice interaction are discussed. A dynamic spin-Peierls picture [1,2], where the singlet pairing of the electrons and the electron-lattice coupling mutually enhance each other is presented. This work was done in collaboration with G. –H. Gweon, T. Sasagawa, H. Takagi and D. H. Lee. This work was supported by DOE, Contract No. DE-AC03-76SF00098, NSF Grant No. DMR-0349361 and Sloan Foundation. [1] G. H. Gweon *et al.* Nature **430**, 187 (2004) [2] A. Seidel *et al.* cond-mat/0408665 (2004)