Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Bogoliubov angle and visualization of particle-hole mixture in superconductors. KAZUHIRO FUJITA, Cornell University, ILYA GRIGORENKO, Los Alamos National Laboratory, JINHO LEE, MIAO WANG, Cornell University, JIAN XIN ZHU, Los Alamos National Laboratory, J.C. DAVIS, Cornell University, Brookhaven National Laboratory, HIROSHI EISAKI, AIST. Tsukuba, SHIN-ICHI UCHIDA, The University of Tokyo, ALEXANDER V. BALATSKY, Los Alamos National Laboratory — We propose a new technique to visualize particle-hole mixture in high temperature superconductor $Bi_2Sr_2CaCu_2O_{8+\delta}$, using the Spectroscopic Imaging Scanning Tunneling Microscopy (SI-STM). Depending on the polarity of bias voltage, SI-STM can sample the particle and hole content of a superconducting excitation, Bogoliubov quasiparticle. 'Bogoliubov angle' (BA) is a measure of the relative weight of particle and hole amplitude in the Bogoliubov quasiparticle, which is determined by taking ratio of the differential conductance at positive and negative biases. BA allows one to measure directly the energy and position dependent particle-hole admixture and therefore visualize robustness of superconducting state locally. We will demonstrate the power of this new technique and discuss the momentum space (q-space) electronic structure in the talk.

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Date submitted: 03 Jan 2008 Electronic form version 1.4