Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Competing Orders: Origin of the Non-Universal Low-Energy Pseudogap Phenomena in Cuprate Superconductors[1] CHING-TZU CHEN, A. D. BEYER, N.-C. YEH, California Institute of Technology — The contrasting low-energy pseudogap phenomena and quasiparticle spectral characteristics between the electron- and hole-type cuprates remain an open issue in cuprate superconductivity. Here we review the experimental manifestation of various non-universal properties and show that a phenomenological model of coexisting density-wave orders with superconductivity can consistently explain these disparate observations. By incorporating quantum phase fluctuations and adopting realistic bandstructures, numerical simulations of the quasiparticle tunneling spectra reproduce the empirical observations for both types of cuprates. Specifically, by tuning the ratio of the density waves to superconductivity, we can account for the absence of low-energy pseudogap in electron-type cuprates and the presence of pseudogap in hole-type cuprates. We therefore conclude that competing orders play an important role in the rich phenomenology of cuprate superconductivity.

[1]This work is supported by NSF Grant DMR-0405088.

Ching-Tzu Chen
California Institute of Technology

Date submitted: 25 Nov 2006 Electronic form version 1.4