Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Evidence for Quantum Criticality (QC) and Universal Field-Induced Quantum Fluctuations (QF) in Cuprate Superconductivity (SC)[1]
H. YANG, A.D. BEYER, Physics Dept., Caltech, Pasadena, CA, V.S. ZAPF, NHMFL-LANL, Los Alamos, NM, M.S. PARK, K.H. KIM, S.-I. LEE, Physics Dept., Pohang University, Korea, N.-C. YEH, Physics Dept., Caltech, Pasadena, CA —
We present experimental evidence for universal field-induced QF among cuprate superconductors as the result of their proximity to QC and the coexistence of SC and competing orders. We employ various experimental techniques to derive the in-plane magnetic irreversibility field in hole- and electron-type cuprate superconductors of varying doping levels and numbers of CuO_2 layers per unit cell, and we find strong suppression of the extrapolated zero-temperature in-plane irreversibility field relative to the paramagnetic field in all cuprates, suggesting universal field-induced QF. The irreversibility fields follow a universal dependence on a parameter that combines the effect of the doping level, electronic anisotropy, and charge imbalance in multi-layer samples.

[1]Work at Caltech is supported by NSF Grant DMR-0405088 and at LANL by NSF and Florida State through the NHMFL

Huan Yang
Physics Department, California Institute of Technology

Date submitted: 30 Nov 2006 Electronic form version 1.4