Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Measurements of the anisotropic irreversibility field in the electron-doped high-T_c superconductor $Pr_{2-x}Ce_xCuO_{4-y}$ GUOQING WU, W.G. CLARK, S.E. BROWN, UCLA, R.L. GREENE, U. Maryland, H. BALCI, U. of Illinois, Urbana, A.P. REYES, P. KUHNS, W.G. MOULTON, NHMFL, Tallahassee — We report measurements of the irreversibility field ($H_{\rm irf}$) in single crystals of the electron-doped high-T_c superconductor (HTSC) $Pr_{2-x}Ce_xCuO_{4-y}$ ($x = 0.15$ and 0.17) with an applied magnetic field (B_0) up to 28 T, using the method of the shift in a nuclear magnetic resonance (NMR) probe circuit resonance frequency (f) caused by the susceptibility of the sample. It is observed that $H_{\rm irf}$ is highly anisotropic, and that as the temperature $T \to 0$ the upper critical field $[H_{c2,\|c}(T \to 0)]$ at $B_0 \parallel c$ is far less than the Pauli limit and very different from that at $B_0 \perp c$. A phase diagram that involves the vortex solid and/or vortex liquid states depending on the alignment of B_0 relative to the lattice c-axis is proposed, and the obtained anisotropic H_{c2} character along with the evaluated zero T coherence length $[\xi_{ab(c)}(T \to 0)]$ and penetration depth $[\lambda_{ab(c)}(\ T \to 0)]$ at $B_0 \parallel ab(c)$ is compared with that of hole-doped HTSCs. This work is supported at UCLA by NSF Grants DMR-0334869 (WGC) and 0520552 (SEB), at U. Maryland by 0352735 (RLG), and NHMFL by 0084173 and the State of Florida.

Guoqing Wu
UCLA Physics & Astronomy

Date submitted: 01 Dec 2007 Electronic form version 1.4