

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Unusual diamagnetic response in p-wave superconductors

Sr_2RuO_4 LU LI, JOSEPH CHECKELSKY, W. F. BRINKMAN, Department of Physics, Princeton University, M. KRIENER, Y. MAENO, Department of Physics, Kyoto University, Kyoto 606-8502, Japan, NAI PHUAN ONG, Department of Physics, Princeton University — The magnetization \mathbf{M} of the *p*-wave superconductor Sr_2RuO_4 has not been measured previously in the geometry with magnetic field $\mathbf{H}\parallel\mathbf{c}$ because of the small upper critical field ($H_{c2} \sim 660$ Oe) and low T_c (1.4 K). We have used high-resolution torque magnetometry to study in detail the magnetization curves in this geometry. We find that, in the superconducting state, the M - H curves display highly unusual hysteretic behavior. In the critical state, whenever H crosses zero, we observe a break in the slope $\partial M/\partial H$. In a broad field interval $[-H_0, H_0]$ bracketing zero field, M is reversible (to our resolution) under reversal of sweep direction. This anomalous behavior is not encountered in conventional type-II superconductors, where the critical-state behavior is always non-reversible. A possible interpretation of these unusual features is the existence of reversible edge currents. We also discuss the magnetization curves with $\mathbf{H}\parallel\mathbf{ab}$, where M jumps sharply at $H = H_{c2}$. Research supported by NSF grant DMR 0213706.

Lu Li
Department of Physics, Princeton University

Date submitted: 27 Nov 2007

Electronic form version 1.4