

Abstract Submitted  
for the MAR09 Meeting of  
The American Physical Society

**Magnetic response of  $\text{Sr}_2\text{RuO}_4$  nanocrystals: search for chiral currents and fractional vortices**<sup>1</sup> D. J. BAHR, M. J. A. STOUTIMORE, R. BUDAKIAN, D. J. VAN HARLINGEN, University of Illinois at Urbana-Champaign, Urbana IL, Y. MAENO, Kyoto University, Kyoto, Japan — The ruthenate superconductor  $\text{Sr}_2\text{RuO}_4$  may have a chiral order parameter of the form  $p_x \pm ip_y$ , making it a candidate for nucleation of excitations with non-Abelian statistics that could enable topologically protected quantum computing. To test this scenario, we have measured the magnetic response of  $\text{Sr}_2\text{RuO}_4$  nanocrystals to search for spontaneous chiral currents and half-integer vortices. Each nanocrystal ( $1\mu\text{m} \times 1\mu\text{m} \times 0.5\mu\text{m}$ ) was extracted from a large single crystal with bulk transition temperature in the range 1.2K-1.4K. We then glued it into the pickup loop of a flux transformer or a gradiometer that is inductively coupled to a dc-SQUID magnetometer. We have observed the diamagnetic screening of the crystal and the entry of discrete vortices in an applied magnetic field. We report on our search for spontaneously generated currents, chiral domain dynamics and the nucleation of half-integer vortices, which we should be sensitive to due to the small size of the crystal.

<sup>1</sup>Work supported by DOE BES grant DEFG02-07ER46453.

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Date submitted: 21 Nov 2008

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