

Abstract Submitted
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Characterizing Chiral Domains in Sr₂RuO₄ via Nanoscale Josephson Junctions¹ D. BAHR, University of Illinois, J.D. STRAND, Syracuse University, D.J. VAN HARLINGEN, University of Illinois, Y. MAENO, Kyoto University — There is substantial evidence that the ruthenate superconductor Sr₂RuO₄ has a chiral order parameter of the form $p_x \pm ip_y$ and forms chiral domains. In order to verify this picture and determine the size of the domains, we have fabricated Josephson junctions on the order of and smaller than the domain width of $\sim 1\mu\text{m}$ implied by Josephson interferometer experiments. Using Focused Ion Beam milling, we have patterned Sr₂RuO₄-Cu-PbIn junctions ranging in size from $0.5\mu\text{m} \times 0.5\mu\text{m}$ to $4\mu\text{m} \times 4\mu\text{m}$ on the edge face of a Sr₂RuO₄ crystal. By measuring the magnetic field modulation of the Josephson critical current, we can probe the phase anisotropy across the junction and determine the size and dynamics of chiral domains. Our data is consistent with the predicted domain width but also exhibits signatures that suggest the formation of chiral domain structure along the c-axis. The theoretical model of domain wall movement proposed by Bouhon and Sigrist is supported by our data.

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