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Limits on the Superconducting Order Parameter in $NdFeAsO_{1-x}F_y$ and $SmFeAsO_{1-x}$ from Scanning SQUID Microscopy
THOMAS LIPPMAN, CLIFFORD HICKS, Geballe Laboratory for Advanced Materials, Stanford University, Stanford, California, 94305, USA, MARTIN HUBER, Departments of Physics and Electrical Engineering, University of Colorado Denver, Denver, Colorado, 80217, USA, ZHI-AN REN, ZHONG-XIAN ZHAO, National Laboratory for Superconductivity, Chinese Academy of Sciences, P.O. Box 603, Beijing 100190, P.R. China, KATHRYN MOLER, Geballe Laboratory for Advanced Materials, Stanford University, Stanford, California, 94305, USA — As a test of the symmetry of the order parameter of the ferric oxyarsenide family of superconductors $RFeAsO_{1-x}F_y$, where R is a rare earth, we perform scanning SQUID microscopy on dense polycrystalline samples of $NdFeAsO_{0.94}F_{0.06}$ and $SmFeAsO_{0.85}$. Dominant d- or p-wave orders, for example, would result in direction-dependent phase shifts in tunneling. In well-coupled polycrystalline samples, these phase shifts would result in spontaneous orbital currents and magnetization in the superconducting state. We do not find any spontaneous currents in $NdFeAsO_{0.94}F_{0.06}$ or $SmFeAsO_{0.85}$, ruling out order parameters with direction-dependent phase shifts in tunneling.

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