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Scanning SQUID Microscopy of Sr_2RuO_4 Under Uniaxial Pressure[1] CHRISTOPHER A. WATSON, HILARY NOAD, Stanford Institute for Materials and Energy Sciences, SLAC National Accelerator Laboratory, Menlo Park, CA, USA, ALEXANDRA GIBBS, ANDREW P. MACKENZIE, CLIFFORD W. HICKS, Max Planck Institute for Chemical Physics of Solids, Dresden, Germany, KATHRYN A. MOLER, Stanford Institute for Materials and Energy Sciences, SLAC National Accelerator Laboratory, Menlo Park, CA, USA — The superconducting order parameter of Sr_2RuO_4 is thought to be $p_x \pm ip_y$ in the absence of a symmetry breaking field, owing to a degeneracy of the p_x and p_y components that results from tetragonal lattice symmetry. This order parameter would manifest as a cusp in the superconducting critical temperature, T_c, as a function of orthorhombic lattice distortion, applied through uniaxial pressure. T_c has been found to respond sensitively to uniaxial pressure; however, the strain resolution of bulk measurements so far appears to be limited by inhomogeneity of the applied strain field and/or intrinsic sample inhomogeneity, such that the expected cusp might not have been observable. Here, we use scanning SQUID microscopy to resolve the low pressure response of T_c on micron length scales, rendering the measurement insensitive to longer range spatial inhomogeneity. Furthermore, we report the dependence of T_c on uniaxial strain to temperature and strain resolution sufficient to resolve the predicted cusp, thereby demonstrating the extent to which the symmetry protected degeneracy is lifted locally.

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