MAR05-2004-002124

Abstract for an Invited Paper
for the MAR05 Meeting of
the American Physical Society

Low temperature scanning SQUID microscopy studies of Sr_2RuO_4[1]

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We present direct imaging of magnetic flux structures in the anisotropic, spin-triplet superconductor Sr_2RuO_4 using a scanning SQUID microscope. We detected magnetic flux above the crystallographic ab plane in the superconducting state, at temperatures between 0.35 K and 1.35 Kelvin. Magnetic fields as high as 70 G were applied inplane. Individual quantized vortices were resolved at low perpendicular magnetic fields. At intermediate fields direct imaging revealed coalescing vortices forming flux domains. Based on our observations, we suggest that a pinning mechanism intrinsic to the material stabilizes the flux domains against the repulsive vortex-vortex interaction. Topological defects like domain walls may provide the pinning, implying proof for unconventional chiral superconductivity. We will discuss our observations in view of the predicted vortex domain state in time reversal symmetry breaking superconductors.

[1]Work done in collaboration with V.O. Dolocan, C. Veauvy, Y. Liu, F. Servant, P. Lejay and D. Mailly, supported by CNRS, DGA, Région Rhône Alpes, ONR, NSF.