

Abstract Submitted
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Pauli Limiting and Multi-Band Superconductivity in KFe_2As_2 Studied by Small-Angle Neutron Scattering¹ M.R. ESKILDSEN, S.J. KUHN, University of Notre Dame, H. KAWANO-FURUKAWA, M. ONO, Ochanomizu University, Japan, E.M. FORGAN, E. JELLYMAN, R. RIYAT, University of Birmingham, United Kingdom, C.H. LEE, K. KIHOU, AIST, Japan, F. HARDY, TH. WOLF, C. MEINGAST, Karlsruhe Institute of Technology, Germany, J.L. GAVILANO, Paul Scherrer Institute, Switzerland — We have studied the intrinsic anisotropy of the superconducting state in KFe_2As_2 , using used small-angle neutron scattering to image the vortex lattice (VL) as the applied magnetic field is rotated towards the FeAs planes. The anisotropy is found to be strongly field dependent, indicating multi-band superconductivity. Furthermore, the high field anisotropy significantly exceeds that of the upper critical field, providing further support for Pauli limiting in KFe_2As_2 for field applied along the basal plane. Finally, we are able determine the contribution to the field modulation in the mixed state due to Pauli Paramagnetic Effects by measuring both the non-spin flip and spin flip VL scattered intensity. This represents the first instance where all the effects listed above have been obtained simultaneously and in a comprehensive manner by a single experimental technique.

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