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Small Angle Neutron Scattering Studies of the Vortex Lattice in $CeCoIn_5$ with $H \perp c$ M.R. ESKILDSEN, P. DAS, University of Notre Dame, IN, USA, A.T. HOLMES, E.M. FORGAN, University of Birmingham, UK, A.D. BIANCHI, Universite de Montreal, Canada, J.S. WHITE, S. GERBER, M. KENZELMANN, J.L. GAVILANO, M. ZOLLIKER, Paul Scherrer Institute, Switzerland, C. WANG, E.D. BAUER, J.L. SARRAO, Los Alamos Natl. Lab., NM, USA, C. PETROVIC, Brookhaven Natl. Lab., NY, USA — We report on small-angle neutron scattering measurements on the vortex lattice (VL) in the mixed state of $CeCoIn_5$ with the magnetic field (H) along [100] and [110]. For both field orientations a distorted hexagonal VL is observed, reflecting the penetration depth anisotropy of the screening current plane. With $H \parallel [100]$ the VL is oriented with Bragg reflections along the [001]-axis at all fields. For $H \parallel [110]$ the same VL orientation is observed at low fields, followed by a 90° first-order reorientation transition as H is increased. We attribute this behavior to Fermi surface anisotropy coupled with non-local effects. For $H \parallel [100]$ we obtain the field dependence of the form factor ($|F|^2$) both within (50 mK) and outside (350 mK) the magnetic Q-phase. At both temperatures $|F|^2$ varies with H in a manner similar to $H \parallel [001]$ [J.S. White *et al.*. New J. Phys. **12**, 023026 (2010)], due to the competition between Pauli paramagnetism and the antiparallel spin alignment of d-wave pairing giving rise to "magnetized" VL cores.

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