

## Vortex Lattice Studies in CeCoIn<sub>5</sub> with $H \perp c$

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We report on small-angle neutron scattering measurements on the vortex lattice (VL) in the mixed state of CeCoIn<sub>5</sub> 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. 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 a paramagnetic alignment of the unpaired electron spins in the vortex cores. Inside the  $Q$ -phase we observe an increased disordering of the field cooled VL indicating a subtle coupling to the magnetic phase.