

Exploring the Antiferromagnetic Superconducting Phase in CeCoIn₅

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CeCoIn₅ is a heavy fermion type-II superconductor showing clear signs of Pauli-limited superconductivity. CeCoIn₅ is also very close to a magnetically ordered ground state; this can be achieved by, for instance, doping with Cd. A variety of measurements give evidence for a transition at high magnetic fields inside the superconducting state, when the field is applied either parallel to or perpendicular to the c axis. In the latter case, antiferromagnetic order develops on the high-field side of the transition, with a magnetic wavevector of $(q \ q \ 0.5)$, where $q = 0.44$ reciprocal lattice units [1]. We show that this order remains as the field is rotated out of the basal plane, but that the associated moment eventually disappears above 17°, indicating that anomalies seen with the field parallel to the c axis are not related to this magnetic order [2]. Our measurements emphasise the fragility of this magnetic order. [1] M. Kenzelmann et al., Science 321, 1652 (2008). [2] E. Blackburn et al., Phys. Rev. Lett. 105, 187001 (2010).