Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Pauli Paramagnetic Effects in the Mixed State of $CeCoIn_5$ Revealed by Small Angle Neutron Scattering P. DAS, M.R. ESKILDSEN, L. DEBEER-SCHMITT, University of Notre Dame, IN, USA, J.S. WHITE, E.M. FORGAN, University of Birmingham, UK, A.D. BIANCHI, Universite de Montreal, Canada, M. KENZELMANN, J.L. GAVILANO, M. ZOLLIKER, S. GERBER, J. MESOT, ETHZ & Paul Scherrer Institute, Switzerland, C. WANG, E.D. BAUER, J.L. SARRAO, Los Alamos Natl. Lab., NM, USA, C. PETROVIĆ, Brookhaven Natl. Lab., NY, USA — We report on extensive small-angle neutron scattering measurements on the vortex lattice (VL) in the mixed state of $CeCoIn_5$ with the magnetic field (H) both parallel and perpendicular to the c-axis. We obtain the H- and temperature (T)-dependence of the form factor ($|F|^2$) - a measure of the field contrast in the mixed state. At low T, competition between Pauli paramagnetism and the antiparallel spin alignment of d-wave pairing gives "magnetized" VL cores, causing $|F|^2$ to increase with H [L. DeBeer-Schmitt *et al.*, Phys. Rev. Lett. **99**, 167001 (2007); A.D. Bianchi *et al.*, Science **319**, 177 (2008)]. However, $|F|^2$ falls again near to H_{c2}; the fall-off extends outside the proposed FFLO region and is believed to arise from expansion of the magnetized cores. This core expansion may also explain the sequence of VL phase transitions observed in this material. At higher T, we observe a crossover towards more conventional behavior.

Pinaki Das
University of Notre Dame, IN, USA

Date submitted: 21 Nov 2008 Electronic form version 1.4