Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Anisotropy of the Vortex Magnetic Field Distribution in $LuNi_2B_2$

M. R. ESKILDSEN, L. DEBEER-SCHMITT, University of Notre Dame, K. ROVIRA, Florida International University, N. JENKINS, University of Geneva, Switzerland, C. D. DEWHURST, Institut Laue-Langevin, France, S. L. BUD'KO, P. C. CANFIELD, Ames Laboratory and Iowa State University — It is well known that the vortex lattice (VL) symmetry and orientation in type-II superconductors is very sensitive to any anisotropy within the screening current plane. A classic example is the sequence of transitions from hexagonal to rhombic to square symmetry, which was first observed in the borocarbide superconductors and explained by a Fermi surface anisotropy coupled with the non-local electrodynamics responsible for vortex-vortex interactions. Recently, however, this is mounting experimental evidence for a strong gap anisotropy and possible point nodes in the basal plane of these materials. Here we report on small-angle neutron scattering studies of the VL in a carefully annealed, high quality $LuNi_2B_2C$ single crystal, which permitted us to measure the VL form factor for a large number of reflections. These measurements allow a reconstruction of the real space profile of the magnetic field around the vortices, reflecting the basal plane anisotropy of the screening currents in $LuNi_2B_2C$. The results will be compared to predictions for both Fermi surface and gap anisotropies, and will serve as a valuable reference for more complicated compounds as e.g. Sr_2RuO_4, heavy fermions and high-T_c's.

Morten Ring Eskildsen
University of Notre Dame

Date submitted: 27 Nov 2007 Electronic form version 1.4