Contribution ID: **261** Type: **invited talk**

Flux line lattice studies of UPt3 using small-angle neutron scattering

Thursday, 19 September 2013 14:30 (30 minutes)

The heavy-fermion material UPt3 can be considered as a paradigm for unconventional superconductivity. The Cooper pairs in this material are believed to form a triplet, introducing an addition degree of freedom and leading to the formation of three distinct superconducting phases. Despite intense studies the exact nature of the order parameter in this material have remained elusive.
We have used small-angle neutron scattering (SANS) to study the vortex lattice (VL) in UPt3. The vortices reflect the properties of the host material and SANS can therefore be used as a bulk probe of the superconducting state.
Measurements of the temperature dependent VL scattering allow a deconvolution of the contributions to the VL form factor from currents along the a* and c-axes, and gives direct information about the nodal structure of the order parameter. The results are consistent with a linear temperature dependence at low temperatures of the c-axis penetration depth and support the assignment of E2u symmetry to the superconducting state of UPt3.
Studies with the fields along the crystalline c-axis show a rotation of the VL and a subtle dependence on magnetic field history. The results indicate a coupling between the VL orientation and the chirality of the superconducting state, differing between vortices with screening currents circulating with or against the chiral direction.

Primary author: Prof. ESKILDSEN, Morten Ring (University of Notre Dame)

Co-authors: Mr GANNON, W. J. (Northwestern University); Prof. HALPERIN, W. P. (Northwestern University)

Presenter: Prof. ESKILDSEN, Morten Ring (University of Notre Dame)

Session Classification: Strongly Correlated Electron Systems: Novel Interaction Phenomena