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Temperature Dependence of the London Penetration Depth and Nodal Gap Structure of  $UPt_3$  from Small Angle Neutron Scattering<sup>1</sup> W.P. HALPERIN, W.J. GANNON, Northwestern University, C. RASTOVSKI, K.J. SCHLESINGER, C. STEINER, M.R. ESKILDSEN, University of Notre Dame, A.B. VORONTSOV, Montana STate University, J. HLEVYACK, Loyola University, J. GAVILANO, U. GASSER, G. NAGY, Paul Sherrer Institut — Despite the fact that the heavy-fermion superconductor UPt<sub>3</sub> has attracted substantial experimental and theoretical attention for nearly thirty years, the nature of the unconventional superconducting order parameter is not settled. There are many theories that attempt to explain the superconducting state, all of which differ in the nodal structure of the superconducting gap. Our recent measurements of the temperature dependence of the small angle neutron scattering from the superconducting vortex lattice provides a bulk measurement of the anisotropic temperature dependence of the London penetration depth and thus a direction specific probe of quasi particle excitations sensitive to gap nodes. Our measurements and their theoretical analysis favor an odd parity, time reversal symmetry breaking order parameter with  $E_{2u}$  symmetry.

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> W.P. Halperin Northwestern University

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