Bulk Magnetization in the Superconducting State of UPt$_3$\textsuperscript{1}

WILLIAM GANNON, WILLIAM HALPERIN, Northwestern University, Department of Physics and Astronomy, USA, CATHERINE RASTOVSKI, MORTEN ESKILDSEN, University of Notre Dame, Department of Physics, USA, PENGCHENG DAI, University of Tennessee, Department of Physics and Astronomy, USA, ANNE STUNAULT, Institut Max von Laue-Paul Langevin, France — The unconventional superconductor UPt$_3$ has long been thought to have an odd parity orbital, and triplet spin state. An important signature of such a state is the temperature independence of the spin susceptibility across the superconducting transition temperature. Here, we report bulk measurements of the susceptibility of UPt$_3$ for magnetic fields along the crystal a-axis performed with polarized neutron diffraction. Temperature independence at all magnetic fields is observed, suggesting a spin triplet superconducting state for the entirety of the phase diagram, with equal spin pairs in the crystal basal plane. These results will be discussed in the context of existing theories for the superconducting state of this paradigm heavy fermion material [Graf et. al., PRB 62, 14393; Tsutsumi et. al., JPSJ 81, 074717 (2012)].

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William Gannon
Northwestern University, Department of Physics and Astronomy, USA

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