

Abstract Submitted
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Observation of the transition between real and complex superconducting order parameter phases in UPt_3 ¹ J.D. STRAND, D.J. BAHR, D.J. VAN HARLINGEN, Department of Physics, University of Illinois at Urbana-Champaign, J.P. DAVIS, W.J. GANNON, W.P. HALPERIN, Department of Physics and Astronomy, Northwestern University — The heavy fermion superconductor UPt_3 provides a rich system for studying the competition between superconductivity and other forms of electronic order because it has an unconventional pairing mechanism, coexistence of anti-ferromagnetism and superconductivity, and two distinct superconducting phases characterized by different order parameter symmetries. We have fabricated Josephson tunnel junctions on the as-grown surfaces of UPt_3 single crystals at a series of angles in the basal plane. By measuring their critical current, we map out the magnitude of the superconducting order parameter as a function of k-space direction and temperature. We observe a sharp node in the superconducting gap at 45° with respect to the a-axis in the high temperature phase and the onset of an out-of-phase component creating a complex order parameter in the low temperature phase.

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