Observation of Broken Time-Reversal Symmetry in the B Phase of the Heavy Fermion Superconductor UPt$_3$

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A key step toward determining the symmetry of the order parameter of an unconventional superconductor involves resolving the question of whether its superconducting phases preserve or break time-reversal symmetry (TRS). We tested for an asymmetry between the indices of refraction of left and right circularly polarized light reflected from a single crystal of UPt$_3$ at normal incidence. This so-called polar Kerr effect is direct evidence for broken TRS, and in our experiments appears only below the transition to the lower temperature B-phase. The high-resolution required for this measurement is made possible by the further development of the Sagnac interferometer under CPN support.

REFERENCE: