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Hidden magnetism and quantum criticality in the heavy fermion superconductor $CeRhIn_5$[1] J.D. THOMPSON, T. PARK, F. RONNING, Los Alamos National Laboratory, H.Q. YUAN, M.B. SALAMON, University of Illinois, R. MOVSHOVICH, J.L. SARRAO, Los Alamos National Laboratory — We report the dependence on pressure and magnetic field of the specific heat and electrical resistivity of the pressure-tuned heavy-fermion superconductor $CeRhIn_5$. Above a critical pressure, where long-range antiferromagnetic order (AFM) abruptly disappears, application of a field brings back magnetism inside the superconducting state. As a function of pressure at low temperatures, the set of fields required to induce magnetism defines a line of quantum-phase transitions that separates a phase of coexisting AFM and SC from a purely unconventional superconducting phase. This quantum-transition line and the upper critical field boundary, above which superconductivity is suppressed, merge at a quantum tetracritical point where another quantum-phase boundary separates magnetically ordered and disordered normal phases. The quasiparticle mass diverges as this normal-state quantum boundary is approached, and crossing it produces a change in the Fermi-surface volume. [1]
[1] H. Shishido et al., J. Phys. Soc. Jpn. **74**, 1103 (2005).

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