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Pressure studies of the quantum critical alloy $Ce_{0.93}Yb_{0.07}CoIn_5$[1]
Y.P. SINGH, D.J. HANEY, X.Y. HUANG, Kent State University, B.D. WHITE, M.B. MAPLE, University of California, San Diego, M. DZERO, C.C. ALMASAN, Kent State University — We performed experimental and theoretical studies of the effect of pressure on the heavy fermion quantum critical alloy $Ce_{0.93}Yb_{0.07}CoIn_5$. As observed in resistivity measurements, the $Ce_{1-x}Yb_xCoIn_5$ system exhibits non-Fermi liquid behavior with two distinct contributions to resistivity (linear-in-T and square-root-in-T). Our measurements suggest that linear in T resistivity is governed by heavy/large Fermi surface and is suppressed with pressure, together with the suppression of the quantum fluctuations with pressure in $Ce_{0.93}Yb_{0.07}CoIn_5$. The square-root-in-T dependence originates from two different physics: (i) the $\sqrt{T}$ dependence just above T_c is suppressed with the application of pressure, and is a result of superconducting fluctuations; (ii) the higher temperature $\sqrt{T}$ contribution to resistivity remains insensitive to pressure, indicating that the scattering processes in this T range are governed by the scattering of light electrons from the small Fermi surface. We demonstrate that the growth of the coherence temperature with pressure, as well as the decrease of the residual resistivity, can be accurately described by employing the coherent potential approximation for a disordered Kondo lattice.

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