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Magnetic-field quantum phase driven transitions in CeBiPt and $CeCu_{6-x}Au_x$

HILBERT V. LÖHNEYSEN, Physikalisches Institut, Universität Karlsruhe, D-76128 Karlsruhe

The half-Heussler compounds CeBiPt and LaBiPt are semimetals with very low charge-carrier concentrations as evidenced by Shubnikov-de Haas (SdH) and Hall-effect measurements. Elastic neutron-scattering results reveal a simple antiferromagnetic structure in CeBiPt below $T_N = 1.15$ K. The band structure of CeBiPt sensitively depends on temperature, magnetic field, and stoichiometry. Above a certain, sample-dependent, threshold field ($B > 25$ T) the SdH signal disappears and the Hall coefficient reduces significantly. These effects are absent in the non-$4f$ compound LaBiPt. Electronic-band-structure calculations can well explain the observed behavior by a $4f$-polarization-induced Fermi-surface modification. $CeCu_{6-x}Au_x$ orders for $x > 0.1$ with an incommensurate antiferromagnetic structure. Here we compare the magnetic fluctuation spectrum obtained from inelastic neutron scattering for a field-driven quantum phase transition at $x = 0.2$ with that for zero-field transition at the critical concentration $x_c = 0.1$.

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