

Exotic state in a dilute Kondo metal

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The Kondo effect has been a central topic in the condensed matter physics and is one of universal quantum mechanical phenomena emerging in various scales. Here we have experimentally studied the dilute Kondo system $\text{Ce}_{0.02}\text{La}_{0.98}\text{Cu}_{6-x}\text{Au}_x$ over a wide range of the Au concentration x , and found an “exotic state” in a finite range of x . In the exotic state, we observed a new phenomenon which cannot be understood within the conventional framework of the Kondo physics[1].

The discovery of the exotic state may provide a new clue to unveil the long-standing mystery in the strongly correlated electron systems, i.e., the origin of the non-Fermi liquid of heavy-fermion material $\text{CeCu}_{6-x}\text{Au}_x$ [2].

Furthermore, we observed a magnetic-field-over-temperature scaling with respect to the uniform magnetic susceptibility in the exotic state. A similar scaling behaviour was observed in the heavy-fermion system $\text{CeCu}_{6-x}\text{Au}_x$ [2], Au-Al-Yb approximant crystal[3] and Ag-In-Ce approximant crystal[4]; these materials exhibit unusual quantum critical phenomena which are concerned with the fate of local f electrons. A new universal physics may underlie these various materials.

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[4] Manuscript in preparation.