Examples of metallic states that are generated by disorder in the Kondo alloys

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Several classes of disordered metals have recently been found that display unusual low-temperature behaviors. Ranging from doped metals with hybridization gap (*e.g.*, Kondo insulators) [1], to Kondo alloys [2], to non-Fermi liquids [3], to half-metallic ferromagnets [4], local moments and disorder are simultaneously present.

In the cases of Kondo-like metals if disorder were not present, there are two possibilities: (i) the compound has long-range magnetic order if the RKKY interaction predominates the Kondo interaction, (ii) if the Kondo interaction is sufficiently large, the hybridization between the localized *f*-electron and the *5d-6s* conduction states can lead to a formation of a coherent heavy-Fermi liquid or to a gap formation at the Fermi level when temperature T0. In both cases the compound will be paramagnetic due to the quenching of the magnetic moments.

There are also several heavy-fermion systems that show the non-Fermi liquid (NFL) behavior due to the more complex effects of disorder.

In view of the role of disorder in the formation of the non-Fermi liquid state we have investigated the microscopic disorder in CeRhSn - a new NFL system. Another compound, CeRhAl, which displays an atomic disorder, which provokes unusual temperature dependences of the low-T magnetic susceptibility and electrical resistivity is presented too.

We also discuss an atomic disorder in Fe_2TiSn alloy, which leads to the half-metallic ferromagnetic ground state properties.

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