KONDO LATTICE MODELS FOR RARE-EARTH AND ACTINIDE SYSTEMS

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There is a strong competition between the Kondo effect, magnetic order and eventually spin glass or frustration effect in anomalous rare-earth and actinide systems. The Kondo-magnetism competition has been extensively studied within a mean field treatment of the normal Kondo Lattice model with localized $S_f = 1/2$ spins, which is applied successfully to Cerium or Ytterbium compounds. On the other side, some actinide compounds, like UTe, Np_2PdGa_3 or UCu_2Si_2 have a large Curie temperature T_c of order 100K and present also a Kondo behavior. We have developed firstly an Underscreened Kondo Lattice (UKL) model with $S_f = 1$ spins for the 5f-electrons and we have recently improved it by deriving, by the Schrieffer-Wolff transformation, a 5f-band with a finite bandwidth. The UKL model can account for properties of some Uranium and Neptunium compounds and in particular the variation of T_c with pressure in UTe. Then, we have studied the properties of disordered Cerium alloys like $CeCu_xNi_{1-x}$ or $CeRh_xPd_{1-x}$ by considering the Kondo effect, a ferromagnetic order and a spin glass behavior described by several approaches. The van Hemmen approach gives a good explanation of the properties of Cerium alloys and we are presently developing a first description of the magnetic glass clusters which occur in both spin glass and ferromagnetic phases. Finally, we present a new description of a frustrated Kondo Lattice model, which can account for the behavior of some Ytterbium compounds under pressure.