Metamagnetism and magnetic field dependence of quasiparticle effective mass within periodic Anderson model

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We apply the extended Gutzwiller method to the periodic Anderson model subject to an applied magnetic field. Our results concerning the ferromagnetic solutions show that the applied magnetic field strongly affects the low-energy excitations in the system. We find that for large values of hybridization strength the system enters the so-called *locked heavy fermion state*. In this state the chemical potential lies in the spin-up hybridization gap and as a consequence the system is insensitive to further increase of magnetic field. We show that for a sufficiently strong magnetic field strength h_c the system leaves the locked state and becomes fully polarized. This is observed as a sudden jump in the total magnetization as well as decrease of effective mass of quasiparticles. In particular, we observe the suppression of effective mass of spin-up band by as much as 20% in the fully polarized state at fields above 60-100T.

9.7 cm

13.4 cm

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