Jörg Sichelschmidt
(Max-Planck-Institute for Chemical Physics of Solids, Dresden)

Electron Spin Resonance in Kondo-lattice compounds

It was commonly believed that in intermetallic compounds with concentrated rare earth ions, Kondo-lattice compounds, the Electron Spin Resonance (ESR) signal cannot be detected. This common belief is experimentally well manifested and can also be justified by the strong electronic correlations, which arise from the hybridization between $4f$- and conduction electrons. However, certain Kondo-lattice compounds show a well-defined ESR signal with clear local magnetic moment properties despite it is observed well below the temperature where the local $4f$ moments are expected to be screened via the Kondo effect [1]. It was shown that this unexpected observation is related to the presence of strong ferromagnetic correlations [2]. We review various experimental approaches that focus on tuning the interaction between $4f$- and conduction electrons in $YbRh_2Si_2$, assuming that these interactions are the basic source for the ESR line broadening mechanism. This has been successfully realized by investigating the linewidth as a function of externally applied pressure and by chemical doping with Co on the Rh site. We show that the strong anisotropic exchange coupling between $4f$- and conduction electrons enables a narrow spin resonance of heavy itinerant quasiparticles in the presence of ferromagnetic correlations. Therefore, in these systems, ESR turns out to be a prime method for a direct access to the heavy fermion spin dynamics as is experimentally evidenced clearly by extraordinary ESR properties at low temperatures.

[1] J. Sichelschmidt et al., Phys. Rev. Lett. **91**, 156401 (2003);
J. Phys. Cond. Mat. **19**, 016211(2007)
[2] C. Krellner et al., Phys. Rev. Lett **100**, 066401 (2008)

9. Juni 2009, 13:00 Uhr

Universität Stuttgart, NWZII, Raum 3.531
Pfaffenwaldring 57, 70569 Stuttgart