QUANTUM CRITICALITY IN SLIGHTLY Ir- AND Co-DOPED $YbRh_2Si_2$

M. Brando

Max-Planck-Institute for Chemical Physics of Solids, 01187 Dresden, Germany

The heavy fermion compound $YbRh_2Si_2$ shows antiferromagnetic (AFM) order below $T_N = 70$mK. It can be suppressed by a critical magnetic field $B_c = 0.05$T where a quantum critical point (QCP) is approached. Recent results point to the presence of multiple vanishing energy scales, $T_N(B)$, $T_{LFL}(B)$ and $T^*(B)$, at the magnetic-field-driven QCP. These scales can directly be observed in thermodynamic, transport and magnetic measurements, among them the dc-magnetization M, the AC susceptibility χ and the resistivity ρ versus the magnetic field B. Slight doping with isoelectronic Co as well as with Ir on the Rh site leads to a volume change, which tunes the strength of the magnetic interaction; this shifts the $T_N(B)$ line in the $T-B$ phase diagram without introducing much disorder in the single crystals. However, little is known about the behavior of the $T^*(B)$ line in the doped compounds. We present a systematic analysis of the M, χ and ρ measurements for the stoichiometric, Co- (7%) and Ir-doped (6%) samples to observe whether the two energy scales are still approaching zero at the same point in the doped compounds. These suprising results provide new information about the nature of the AFM state and the character of the quantum critical fluctuations at the QCP.