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High-temperature signatures of quantum criticality in heavy-fermion systems J. KROHA, L. BORDA, Universitat Bonn, M. KLEIN, F. REINERT, Universitat Wurzburg, P. SIMON, Universite Joseph Fourier, Grenoble, O. STOCKERT, Max-Planck-Institut CPfS, Dresden, H. VON LÖHNEYSEN, Karlsruhe Institute of Technology, Germany — We propose a new criterion for distinguishing the Hertz-Millis (HM) and local quantum critical (LQC) scenarios of magnetic quantum phase transitions (QPT) in heavy-fermion systems from their high-temperature behavior [1]. The criterion is based on our finding, using perturbative and numerical renormalization group techniques, that the complete screening of a single Kondo spin can be suppressed by the RKKY coupling to the surrounding magnetic ions even without magnetic ordering. As a consequence, the signature of Kondo breakdown can be observed in spectroscopic measurements above the lattice coherence and magnetic ordering temperatures, where fluctuations of the Fermi surface and quantum critical fluctuations do not play a role. We show that the predicted dependence of the screening scale T_K on the RKKY coupling agrees in detail with recent scanning tunneling microscopy (STM) results on two-impurity Kondo systems. Applying the resulting high-temperature criterion to high-resolution photoemission measurements on $CeCu_{6-x}Au_x$ suggests that the QPT in this system is dominated by the LQC scenario.
[1] M. Klein *et al.*, PRL **101**, 266404 (2008); PRB **79**, 075111 (2009).

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