Quantum criticality in heavy-fermion systems

Philipp Gegenwart*

I. Physik. Institut, Universität Göttingen, D-37077 Göttingen

Quantum criticality in f-electron based heavy-fermion (HF) systems arises from the competition of the on-site Kondo with the inter-site exchange interaction. The essential question is how the heavy quasiparticles evolve if these materials are tuned from the paramagnetic into the antiferromagnetically ordered state. The traditional picture describes a spin-density-wave transition at which the quasiparticles retain their itinerant character. Unconventional quantum criticality, which qualitatively differs from the predictions of standard theory, may arise due to a destruction of Kondo screening. The latter may lead to a decomposition of the heavy quasiparticles into conduction electrons and local magnetic moments. I will report a comparative low-temperature study on different quantum critical HF metals with particular focus on $YbRh_2Si_2$.

*Work in collaboration with T. Westerkamp, C. Krellner, Y. Tokiwa, S. Paschen, C. Geibel, F. Steglich, E. Abrahams and Q. Si.