Quantum criticality in heavy-fermion systems

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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$_2$Si$_2$.