

Signature of quantum criticality in photoemission spectroscopy at elevated temperature

When a magnetic phase transition in a metal is driven to absolute zero temperature, e.g., by pressure or composition, the quantum fluctuations of the order parameter induce new universality classes and, possibly, new ground states of matter. Recent experiments suggest that near such a quantum phase transition (QPT) in heavy-fermion (HF) compounds, notably $\text{CeCu}_{6-x}\text{Au}_x$, the HF quasiparticles, formed by the Kondo effect below the Kondo temperature T_K , disintegrate. The conditions for this breakdown have, however, remained obscure. Here we report the first measurements of T_K in $\text{CeCu}_{6-x}\text{Au}_x$ by ultraviolet photoemission spectroscopy at elevated temperatures without the complications of lattice coherence. Surprisingly, T_K exhibits an abrupt step near the quantum critical Au concentration of $x_c=0.1$. This step originates from a highly non-linear renormalization of the local spin coupling at each Ce site, induced by spin fluctuations on neighboring sites. It provides a high-temperature indicator for HF quasiparticle breakdown at a QPT