

Measurement of the Fano resonance and hybridization gap in URu₂Si₂ with point-contact spectroscopy

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The hidden order transition in the Kondo lattice URu₂Si₂ remains a mystery after more than two decades of study. Our reproducible point contact spectroscopic measurements reveal a direct measurement of the Fano resonance and hybridization gap as a distinct double-peaked structure, opening at $T \sim 27$ K, smoothly growing with decreasing temperature to ~ 12 meV at 4.2 K. [1] There is no detectable signature when crossing the hidden order transition at 17.5 K, although this transition is clearly seen in the resistivity vs. temperature data. Intriguingly, when fitting our data to a recent theoretical model [2], the renormalized f-level is found to cross the Fermi level at the hidden order transition temperature thereby providing a link, and constraints, on the relationship between the hybridization gap and hidden order parameter. Theoretical analysis [3] of scanning tunneling spectroscopic results [4,5] assigns a gap opening as the hidden order parameter, but more recent STS results show their observed gap is due to the hybridization [6]. Relationships between our measured hybridization gap and the hidden order will be discussed.

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