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**Hybridization gap and dual nature of the heavy-fermion compound $UPd_2Al_3$**[1] WAN KYU PARK, Florida State University, NARENDRA JAGGI, Illinois Wesleyan University, OMAR MEHIO, MATTHEW DWYER, University of Illinois at Urbana-Champaign, LAURA GREENE, RYAN BAUMBACH, Florida State University, PAUL TOBASH, ERIC BAUER, JOE THOMPSON, Los Alamos National Laboratory — We present results from point-contact spectroscopy in the non-superconducting state of $UPd_2Al_3$, a heavy-fermion antiferromagnetic superconductor [1]. Spectroscopic signatures are clearly observed including the distinct asymmetric double-peak structure arising from a hybridization gap opening with the formation of a coherent heavy Fermi liquid. While the hybridization gap is extrapolated to remain finite up to ∼28 K, close to the temperature around which the magnetic susceptibility forms a broad peak, the conductance enhancement vanishes at ∼18 K, slightly above the antiferromagnetic transition temperature. Our analysis suggests that the conductance enhancement weakens rapidly as the $T_N$ is crossed from below because the junction is tuned away from the ballistic regime due to increased scattering off magnons associated with the localized U $5f$ electrons. This shows that while the hybridization gap opening is not directly associated with the antiferromagnetic ordering, its visibility is greatly affected by the temperature-dependent magnetic excitations. Our results not only support a $5f$ dual nature scenario proposed for understanding properties of this compound but also shed new light on the interplay between the itinerant and localized electrons. [1] N. Jaggi *et al.*, arXiv:1610.08601.

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