Fano resonance and the hidden order in URu$_2$Si$_2$ probed by quasiparticle scattering spectroscopy* W. K. PARK, L. H. GREENE, Univ. of Ill. at Urbana-Champaign, E. D. BAUER, P. H. TOBASH, F. RONNING, X. LU, J. L. SARRAO, J. D. THOMPSON, Los Alamos Nat. Lab. — The nature of the hidden order transition occurring at 17.5 K in URu$_2$Si$_2$ remains puzzling despite intensive investigations over the past two and half decades. Recent experimental and theoretical developments render it a timely subject to probe the hidden order state using quasiparticle tunneling and scattering techniques. We report on the Fano resonance in pure and Rh-doped URu$_2$Si$_2$ single crystals using point-contact spectroscopy. The conductance spectra reproducibly reveal asymmetric double peak structures slightly off-centered around zero bias with the two peaks merging well above the hidden order transition temperature. An analysis using the Fano resonance model in a Kondo lattice [1] shows that the conductance peaks arise from the hybridization gap opening. Our estimated gap size agrees well with those reported from other measurements. We will present experimental results over a wide parameter space including temperature and doping dependences and discuss their underlying physics.


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