

Abstract Submitted
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Tunneling into clean Heavy Fermion Compounds: Origin of the Fano Lineshape¹ PETER WOLFLE, Institute for Theory of Condensed Matter and Center for Functional Nanostructures, Karlsruhe Institute of Technology, D-76128 Karlsruhe, Germany, YONATAN DUBI, ALEXANDER BALATSKY, Los Alamos National Lab — Recently observed tunneling spectra on clean heavy fermion compounds show a lattice periodic Fano lineshape similar to what is observed in the case of tunneling to a Kondo ion adsorbed at the surface. We show that the translation symmetry of a clean surface in the case of *weakly correlated* metals leads to a tunneling spectrum given by the superposition of the local weighted density of states of all energy bands involved, which does not have a Fano lineshape. In particular the spectrum will show any hybridization gap present in the band structure. By contrast, in a *strongly correlated* heavy fermion metal the heavy quasiparticle states will be broadened by interaction effects. The broadening grows as one moves away from the Fermi surface, up to a value of the order of T_K , the Kondo scale. We show that the hybridization gap is completely filled in this way, and an ideal Fano lineshape of width T_K results, similar to the impurity case. We also discuss the possible influence of the tunneling tip on the surface, in (i) leading to additional broadening of the Fano line, and (ii) enhancing the hybridization locally, hence adding to the impurity type behavior. The latter effects depend on the tip-surface distance.

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