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Signatures of inelastic tunnelling in a uranium-based heavy fermion unconventional superconductor MATTHEW NEAT, ANA MALDONADO, J.-PH. REID, University of St Andrews, ANDREW HUXLEY, University of Edinburgh, PETER WAHL, University of St Andrews — Scanning tunnelling microscopy and spectroscopy of uranium-based heavy fermion materials has enabled imaging of the heavy fermion bands as well as spectroscopic insight into the many body effects [1,2]. Here, we use low temperature scanning tunnelling microscopy/spectroscopy (STM/STS) on an unconventional uranium-based heavy fermion superconductor down to 20 mK and in magnetic fields up to 10 T [3]. Spectroscopic measurements reveal strong signatures of inelastic tunnelling, consistent with phonons and excitations seen in optical measurements such as Raman scattering. I also discuss quasiparticle interference of the heavy electron bands. [1] Imaging the Fano lattice to hidden order transition in URu₂Si₂, Schmidt et al, Nature, 2010. [2] Visualising the formation of the Kondo lattice and the hidden order in URu₂Si₂, Pegor Aynajian and Ali Yazdani et al, PNAS, 2010. [3] Construction and performance of a dilution-refrigerator based spectroscopic-imaging scanning tunnelling microscope, U. R. Singh, Review of Scientific Instruments, 2013.

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