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(I) Tunneling processes through Yu-Shiba-Rusinov states of magnetic atoms on superconductors

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Magnetic atoms on superconductors induce an exchange coupling, which leads to states within the superconducting energy gap. These so-called Yu-Shiba-Rusinov (YSR) states can be probed by scanning tunneling spectroscopy at the atomic scale. Here, we investigate single magnetic adatoms on a superconducting Pb surface.
As YSR states are within the superconducting energy gap, their excitation by electrons requires a subsequent inelastic relaxation process. At strong tunnel coupling, thermal relaxation is not sufficiently fast and resonant Andreev processes become the dominant tunneling process [1]. We obtain direct evidence of these two transport regimes by inserting GHz radiation into the STM junction and analyzing the photon-assisted tunneling maps [2,3].
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