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Yu-Shiba-Rusinov States of Magnetic Fe Adatoms on Superconducting Ni Kagome Lattice

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Topological superconductors are important materials in condensed matter physics and have potential applications in quantum computing and technology. Introducing magnetic impurities to a superconductor induces magnetic exchange interaction coupling with the Cooper pairs in superconductor. In this work, we have studied the Yu-Shiba-Rusinov (YSR) states of Fe adatoms on Ni Kagome lattice on Pb(111) substrate by scanning tunneling microscopy/spectroscopy (STM/STS) with a superconducting tip. From the STM topographic overview, two types of Fe atomic structures were observed, which are defined as monomer and trimer. We applied a deconvolution method to remove the superconducting tip gap from the dI/dU spectra to obtain the original YSR states from the sample. Spatial mapping of the dI/dU provided us with the opportunity to directly visualize the contributions of different orbitals to the YSR states, which have been further supported by theoretical calculations.

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