

Abstract Submitted
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Coherent long-range magnetic bound states in a superconductor GERBOLD MENARD, Univ Pierre et Marie Curie, SEBASTIEN GUISSART, Laboratoire de physique des solides, CHRISTOPHE BRUN, STEPHANE PONS, VASILY STOLYAROV, FRANCOIS DEBONTRIDDER, MATTHIEU LECLERC, Institut des nanosciences de Paris, ETIENNE JANOD, LAURENT CARIO, Institut des Materiaux Jean Rouxel, DIMITRI RODITCHEV, Institut des nanosciences de Paris, PASCAL SIMON, Laboratoire de physique des solides, TRISTAN CREN, Institut des nanosciences de Paris — Using low temperature scanning tunneling spectroscopy we accessed to localized states called Shiba states associated to magnetic impurities as well as their spatial dependence [1]. We studied samples of superconducting NbSe₂ containing a really small concentration of native magnetic impurities. We observed the appearance of star-shaped structures around individual impurities with a size of the order of the coherence length of the superconductor ($\simeq 10$ nm). The fine study of our data revealed an oscillation of the density of states along the star branches. To further analyze our results, we performed tight-binding calculations which reproduced the observed spatial symmetry. A semi-analytical calculation also enabled us to establish a relation between the different spatial scales observed and the physical quantities associated to superconductivity, and to understand the role of dimensionality in such systems. [1] Nature Physics (2015), DOI:10.1038/NPHYS3508

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