Single spin chains on solid surfaces studied by the scanning tunneling microscope

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Scanning tunneling microscopy (STM) has proved to be a mature technique for the study of magnetic impurities on different substrates. STM allows us to manipulate the atoms and assemble magnetic structures of atomic dimensions that are going to behave differently depending on their geometrical and chemical composition. We build the chains in such that form a highly correlated spin doublet ground state exhibiting a Kondo resonance. Recently, the introduction of new impurity states in the superconducting gap has received a lot of attention. Magnetic adatoms can be considered as impurities that weaken the binding of superconducting Cooper pairs leading to impurity levels in the gap: so-called Yu-Shiba-Rusinov (YSR) states. By applying our STM techniques to the study of magnetic spectra on superconducting surfaces, we reveal the orbital properties of the YSR states associated with the magnetic impurities. The influence of the atoms on the superconducting electronic structure is revealed as well as the interactions at work. Such magnetic impurities on different substrates allow us to explore many-body effects and exotic phenomena in different experimental spin systems giving an understanding on the parameters on each system.