

Andreev bound states at nonmagnetic impurities in superconductor/antiferromagnet heterostructures

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Andreev bound states can occur at single impurities in superconductors if the impurities suppress superconductivity for a given system [1]. In particular, well-known Yu-Shiba-Rusinov states occur at magnetic impurities in conventional s-wave superconductors [2-4]. Here we demonstrate that nonmagnetic impurities in S/AF heterostructures with conventional intraband s-wave pairing also produce Andreev bound states. Analogously to the Yu-Shiba-Rusinov bound states the bound states in S/AF bilayers are spin split, but the spin of a particular bound state is determined by the sublattice to which the impurity belongs. The standard decay of the bound state LDOS is superimposed by atomic oscillations related to the staggered character of the exchange field in the host material and by another oscillating pattern produced by finite-momentum Neel triplet pairing [5] generated at the impurity.

The work is supported by RSF project #24-22-00186

References

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