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Proximity effect in normal metal high-Tc superconductor contacts TOMAS LOFWANDER, Institut fuer Theoretische Festkoerperphysik, Universitaet Karlsruhe, 76128 Karlsruhe — We study the proximity effect in good contacts between normal metals and high-Tc ($d_{x^2-y^2}$-wave) superconductors. We present theoretical results for the spatially dependent order parameter and local density of states, including effects of impurity scattering in the two sides, s-wave pairing interaction in the normal metal side (attractive or repulsive) and subdominant s-wave paring in the superconductor side. For the [100] orientation, a real combination $d + s$ of the order parameters is always found. The spectral signatures of the proximity effect in the normal metal include a suppression of the low-energy density of states and a finite-energy peak structure. These features are mainly due to the impurity self-energies, which dominate over the effects of induced pair potentials. For the [110] orientation, for moderate transparencies, induction of a $d + is$ order parameter on the superconductor side leads to a proximity induced is-order parameter also in the normal metal. The spectral signatures of this type of proximity effect are potentially useful for probing time-reversal symmetry breaking at a [110] interface.

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