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Long range proximity effect in High Tc Josephson NanoJunctions : a quantitative study. JEROME LESUEUR, NICOLAS BERGEAL, MARCO APRILI, UPR5-CNRS ESPCI 10 rue Vauquelin, 75005 Paris (France), TAKIS KONTOS, LPA-CNRS ENS 24 rue Lhomond 75005 Paris (France), MARTIN SIRENA, UPR5-CNRS ESPCI 10 rue Vauquelin, 75005 Paris (France), GIANCARLO FAINI, Route de Nozay, 91460 Marcoussis (France), JEAN PIERRE CONTOUR, UMR-CNRS/THALES, Route N128, 91120 Palaiseau (France) — Proximity effect (PE) between a superconductor (S) and a normal metal (N) has been a powerful tool to study conventional superconductors. In High Tc (HTc) compounds, low quality interfaces and poor Fermi wave-vector match with most of common metals usually considerably reduce the proximity effect, and make really difficult its study. We have designed Josephson NanoJunctions in which two S reservoirs are connected through an N layer at a nanoscale, where N is a lightly disordered HTcS, whose Tc has been reduced by ion irradiation. In these SNS junctions, Cooper pairs propagate through the N layer by PE. In this situation with no metallurgical interfaces within the same material, we have shown that a long range PE takes place, which can be quantitatively described by the quasi-classical approach of the diffusive Usadel equations. The Josephson coupling temperature can be computed. The role of the order parameter symmetry will be also discussed.

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