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Proximity effect and Josephson current in clean strong/weak/strong superconducting tri-layers FRANK MARSIGLIO, LUCIAN COVACI, University of Alberta — Recent measurements of the Josephson critical current through LSCO/under-doped LSCO/LSCO thin films showed an unusually large proximity effect. Using the Bogoliubov-de Gennes (BdG) equations for a tight binding Hamiltonian we describe the proximity effect in weak links between a superconductor with critical temperature T_c and one with critical temperature T'_c , where $T_c > T'_c$. The weak link (N') is considered to be a superconductor above its critical temperature and the superconducting regions can have either s-wave or d-wave symmetry. We observe that the proximity effect is enhanced due to the presence of superconducting correlations in the weak link. The dc Josephson current is also calculated, and we observe a non-zero value for temperatures greater than T'_c for sizes of the weak links that are greater than the conventional coherence length. This effect alone is unable to explain the experimental results, instead, we also consider pockets of superconductivity in the weak link.

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