Confirmation of the discrepancy between experiment and theory in the superconducting proximity effect MANJIANG ZHANG, Dept. of Physics and Astronomy, Univ of Southern California, GO TATEISHI, GERD BERGMANN — The transition temperature T_c of a superconducting film S is reduced when it is covered with a normal metal N. Recently we investigated the superconducting proximity effect in double layers of Pb and alkali metals and found the initial slope dT_c/dd_n of T_c as a function of the thickness of the normal metal d_n was smaller than the theoretical value by a factor of 2 . The theory shows that the \QTR normalized initial slope $S_{sn} = (d_s/T_s)|dT_c/dd_n| = \Gamma_{sn} * (N_n/N_s)$ depends only on the density of states ratio of the two metals, N_n/N_s, but not on the mean free paths or the interface. A literature search showed that this initial slope is rarely measured. The few experiments in the literature where the initial slope can be derived yield the same disagreement with the theory. In the present work we investigated systematically the initial slope of S/N sandwiches (S for Pb and N for the normal conductor) and also extended the investigation to S_1/S_2 sandwiches (S_1=Pb, S_2= Cd, Zn, Al, In, Sn). The normalized initial slope S_{sn} is confirmed to be independent of the Pb thickness. Again for S/N sandwiches the value of Γ_{sn} is more than a factor 2 smaller than the theoretical value. For the S_1/S_2 sandwiches this discrepancy decreases with increasing T_c of S_2.

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