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**Anomalous Meissner effect in superconductor-ferromagnet proximity systems.**[1] MACHIEL FLOKSTRA, RHEA STEWART, STEVE LEE, Univ of St Andrews, GAVIN BURNELL, Univ of Leeds, NATHAN SATCHELL, SEAN LANGRIDGE, Rutherford Appleton Laboratory, HUBERTUS LUETKENS, THOMAS PROKSCHA, ELVEZIO MORENZONI, Paul Scherrer Institut — We previously reported on induced magnetism in a normal metal using a superconducting spin-valve structure [Nature Physics 12, 57-61 (2016)] where a superconductor (S=Nb) separates a normal metal (N=Au) from a Co-based ferromagnetic (F) double layer. When cooling to below the superconducting transition temperature we observe an induced moment in the Au, opposite to the applied field and strongest near the Au/Nb interface. This result is in contradiction with theory and the mechanism behind it is unclear. To identify the requirement for this effect we measured simpler structures and found that in a N/S/F trilayer the flux expulsion is greatly enhanced (>500%) compared to the Meissner flux expulsion of a N/S bilayer. While the spatial distribution of the expulsion and its dependence on applied field suggest an enhancement of the Meissner effect, measurements close to zero applied field suggest there is also an additional effect. Moreover, when modifying the S/F interface region by placing a thin (few nm) insulating oxide barrier between the S and F layer we significantly enhance the flux expulsion, while in contrast placing a thin Pt layer instead the flux expulsion is significantly decreased. We believe that these results show the origin of the observed induced magnetism.

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