

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Anomalous Meissner Screening Probed using Low Energy Muon Spin Spectroscopy¹ R. STEWART, M. G. FLOKSTRA, S. L. LEE, University of St Andrews, UK, N. SATCHELL, S. LANGRIDGE, ISIS, UK, G. BURNELL, University of Leeds, UK, H. LUETKENS, T. PROKSCHA, E. MORENZONI, PSI, CH — In mesoscopic systems the Meissner response of a superconducting film can be very different from bulk. For normal metal (N) superconducting (S) bilayers screening can be enhanced depending on material properties.² It has been shown that if N is replaced by an inhomogeneous ferromagnet (F) an inverse Meissner response is possible³. Low Energy Muon Spin Spectroscopy has recently been used to observe this effect⁴. We present low energy muon spin spectroscopy measurements on bi and trilayer systems where an enhancement of 300 % is observed in the Meissner response when compared with an S layer. Using the quasiclassical approach we compare these results with calculations. Whilst for the N/S system theory and experiment are consistent, a large discrepancy results when adding an F layer to form an N/S/F trilayer. Rather than finding a reduction in the Meissner response we observe a 500 % increase in flux expulsion. Moreover, this F layer enhancement can be tuned by modifying the interface. These observations contradict current SF proximity theory and are valuable for understanding more complex S, F, N systems in which there is much current interest.

¹EP/1007002/1, EP/J01060X, EP/I031014/1

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Date submitted: 11 Nov 2016

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