Long Range Longitudinal Proximity Effects in Superconducting/Normal-Metal Bilayers

JOHN SADLEIR, NASA GSFC & UIUC Physics, JOHN CLEM, Ames National Lab and Iowa State Physics Dept, STEPHEN SMITH, CAROLINE KILBOURNE, NASA GSFC — Measurements are presented of the temperature and magnetic field dependence of critical current measured over 7 orders of magnitude on square Mo/Au bilayers ranging in length from 8 to 290 microns. We find our measurements have a natural explanation in terms of a spatially varying order parameter that is enhanced in proximity of the higher transition temperature superconducting leads (the longitudinal proximity effect) and suppressed in proximity to the added normal metal structures (the lateral inverse proximity effect). We also discuss the implications of our results on transition-edge sensors for high-energy-resolution imaging-spectrometry currently under development at NASA for future space-based X-ray astrophysics observatories.