Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Influence of Domain Width on Vortex Nucleation in Superconductor/Ferromagnet Hybrid Structures[1] S. MOORE, J. FEDOR, Physics Department, Temple University, Philadelphia, PA 19122, V. NOVOSAD, J. PEARSON, S.D. BADER, Materials Science Division, Argonne National Laboratory, Argonne, IL 60439, G. KARAPETROV, Physics Department, Drexel University, Philadelphia, PA 19104, M. IAVARONE, Physics Department, Temple University, Philadelphia, PA 19122 — We have investigated the effects of spatially inhomogenous magnetic fields on vortex nucleation, domain wall superconductivity and reverse domain superconductivity in magnetically coupled superconductor/ferromagnet hybrid structures. Using low temperature scanning tunneling microscopy and spectroscopy (LT-STM/STS) we have studied Pb/[Co-Pd] systems with varying magnetic domain widths. Visualization of the underlying magnetic template structure is achieved through field dependent conductance maps. In the case of zero applied fields these maps reveal the absence of vortices below a threshold domain width. In those systems with insufficient domain width to support generation of vortices in zero applied fields, nucleation can be restored through the application of an external magnetic field. We also observe that the domain wall superconductivity is strongly affected by the ferromagnetic domain size.

[1]This work was supported by US DOE Grant No. DE-FG02-10ER46710 and UChicago Argonne, LLC, Operator of Argonne National Laboratory. Argonne, a U.S. Department of Energy Office of Science Laboratory, is operated under Contract No. DE-AC02-06CH11357.

S. Moore
Physics Department, Temple University, Philadelphia, PA 19122

Date submitted: 14 Nov 2013 Electronic form version 1.4