Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Proximity Induced Superconductivity in Ferromagnetic Nanowires: Magnetoresistance Oscillations and Steps in I-V Characteristics[1] MEENAKSHI SINGH, Pennsylvania State University, MINGLIANG TIAN, University of Science and Technology of China, Hefei, JIAN WANG, Pennsylvania State University, HE LIN, Beijing Normal University, Beijing, MOSES CHAN, Pennsylvania State University — Ferromagnetic order requires electronic spins to be aligned parallel whereas singlet superconducting order requires spins to be aligned antiparallel. This spin incompatibility limits the superconducting proximity effect to $\sim$1 nm in bulk ferromagnets. In ferromagnetic nanowires contacted with superconducting W electrodes however, the proximity effect is seen to extend to $\sim$ 400 nm [Wang et al., Nat. Phys. 6, 389 (2010)]. The mechanism behind the long range proximity in these systems is not certain. We have studied single crystalline Co nanowires contacted with normal electrodes with a single superconducting W strip patterned on the nanowire. The long range proximity effect is found to persist in this geometry. Robust magnetoresistance oscillations were found when an external field parallel to the axis of the wire was applied. In addition, regularly spaced peaks were seen in the dI/dV vs. V characteristics of the sample. The origin of the oscillations and the peaks is not understood.

[1]This work was supported by NSF under grant no. DMR-0820404.

Meenakshi Singh
Pennsylvania State University

Date submitted: 10 Nov 2011 Electronic form version 1.4