Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Crossed Andreev Reflection in Quantum Wires with Strong Spin-Orbit Interaction KOJI SATO, University of California, Los Angeles, DANIEL LOSS, University of Basel, YAROSLAV TSERKOVNYAK, University of California, Los Angeles — We theoretically study tunneling of Cooper pairs from an s-wave superconductor into two semiconductor quantum wires with strong spin-orbit interaction under magnetic field, which approximate helical Luttinger liquids. The entanglement of the two electrons within a Cooper pair can be detected by the electric current cross correlations in the wires. By controlling the relative orientation of the wires, either lithographically or mechanically, on the substrate, the ensuing current correlations can be tuned, as dictated by the initial spin entanglement. This proposal of a spin-to-charge readout of quantum correlations is alternative to a recently proposed utilization of the quantum spin Hall insulator.

Koji Sato
University of California, Los Angeles

Date submitted: 28 Oct 2011 Electronic form version 1.4