Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Spin-orbit effects on electronic transport in superconductor/normal metal heterostructures[1] NAYANA SHAH, KUEI SUN, University of Cincinnati — Electronic transport in superconductor/normal metal (S/N) heterostructures has been extensively investigated for understanding its coherent nature and application on probing quantum entanglement. Recent works have focused on a semiconductor nanowire with a proximity-induced superconducting gap on its part, which makes such device an effective S/N heterostructure with the presence of spin-orbit couplings (SOC) due to the material properties. The SOC splits the energy spectrum in a momentum-dependent pseudo-spin space and thus plays an essential role on the system's Fermi points as well as the group velocities of propagating particles and holes. We study the effects of Rashba and Dresselhaus SOCs and their interplay with the interfacial barriers on various transport processes, including normal/Andreev reflections on the N side and quasi-particle/hole transmissions on the S side. We obtain analytic results for the small SOC regime and numerically calculate experimental observables such as an I/V curve in a wide parameter space. Our results ought to advance the current study on such systems, especially that exploring Majorana zero modes on superconducting nanowires or spin transport in helical liquids.

[1]Supported by the University of Cincinnati and by the DARPA-ARO Award No. W911NF-07-1-0464

Kuei Sun
University of Cincinnati

Date submitted: 07 Nov 2013 Electronic form version 1.4