Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Long range p-wave proximity effect into a disordered metal[1] AYDIN CEM KESER, CMTC, Univ. of MD, VALENTIN STANEV, CMTC, Univ.of MD, VICTOR GALITSKI, CMTC and JQI, Uni. of MD & School of Physics, Monash Uni. — We use quasiclassical methods of superconductivity to study the superconducting proximity effect from a topological p-wave superconductor into a disordered one-dimensional metallic wire. We demonstrate that the corresponding Eilenberger equations with disorder reduce to a closed non-linear equation for the superconducting component of the matrix Green's function. Remarkably, this equation is formally equivalent to a classical mechanical system (i.e., Newton's equations), with the Green function corresponding to a coordinate of a fictitious particle and the coordinate along the wire corresponding to time. This mapping allows to obtain exact solutions in the disordered nanowire in terms of elliptic functions. A surprising result that comes out of this solution is that the p-wave superconductivity proximity-induced into the disordered metal remains long-range, decaying as slowly as the conventional s-wave superconductivity. It is also shown that impurity scattering leads to the appearance of a zero-energy peak.

[1]This research was supported by DOE-BES DESC0001911 (VG & VS), NSF-CAREER DMR- 0847224 (ACK), and Simons Foundation.

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Date submitted: 11 Nov 2014 Electronic form version 1.4