Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Zero-bias peak and soft superconducting gap in differential conductance calculations of semiconductor-based Majorana nanostructures JOHN STENGER, TUDOR STANESCU, West Virginia University — Recent experiments on semiconductor wire-superconductor hybrid structures aiming to realize and detect zero-energy Majorana bound states have revealed the presence of a substantial sub-gap conductance, in addition to the predicted zero-bias anomaly that appears, as expected, above a certain critical magnetic field. The origin of this soft gap is controversial and remains highly problematic. It has recently been suggested [1] that the coupling of the semiconductor nanowire to a large normal-metal lead is, in fact, the reason for the soft gap. Here, we confirm this mechanism by explicitly calculating the differential conductance of a normal metal – semiconductor wire – superconductor hybrid structure and we discuss the dependence of the soft gap on the relevant system parameters.

[1] Tudor D. Stanescu, Roman M. Lutchyn, and S. Das Sarma, arXiv:1311.2075 (2013).

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Date submitted: 15 Nov 2013 Electronic form version 1.4