Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Visualizing One-Dimensional Electronic States and their Scattering in Semi-conducting Nanowires[1] HAIM BEIDENKOPF, JONATHAN REINER, ANDREW NORRIS, ABHAY KUMAR NAYAK, NURIT AVRAHAM, HADAS SHTRIKMAN, Department of Condensed Matter Physics, Weizmann Institute of Science — One-dimensional electronic systems constitute a fascinating playground for the emergence of exotic electronic effects and phases, within and beyond the Tomonaga-Luttinger liquid paradigm. More recently topological superconductivity and Majorana modes were added to that long list of phenomena. We report scanning tunneling microscopy and spectroscopy measurements conducted on pristine, epitaxialy grown InAs nanowires. We resolve the 1D electronic band structure manifested both via Van-Hove singularities in the local density-of-states, as well as by the quasi-particle interference patterns, induced by scattering from surface impurities. By studying the scattering of the one-dimensional electronic states off various scatterers, including crystallographic defects and the nanowire end, we identify new one-dimensional relaxation regimes and yet unexplored effects of interactions. Some of these may bear implications on the topological superconducting state and Majorana modes therein.

[1]The authors acknowledge support from the Israeli Science Foundation (ISF)

Jonathan Reiner
Weizmann Institute of Science

Date submitted: 21 Dec 2015 Electronic form version 1.4