Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Nanoscale Andreev Reflection Spectroscopy on Bismuth-Chalcogenide Topological Insulators[1] C. R. GRANSTROM, I. FRIDMAN, University of Toronto, R. X. LIANG, University of British Columbia, H. LEI, C. PETROVIC, Brookhaven National Laboratory, SHUO YANG, K. H. WU, Chinese Academy of Sciences, J. Y. T. WEI, University of Toronto & Canadian Institute for Advanced Research — Andreev reflection (AR) is the basic mechanism underlying the superconducting proximity effect which, at the interface between a topological insulator (TI) and a spin-singlet superconductor, can induce chiral *p*-wave pairing in the TI. Despite this novel importance, it is not well understood how AR is affected by the unique attributes of a three-dimensional TI, namely the Dirac dispersion and helical spin-polarization of its surface states. In this work, we use both *s*-wave and *d*-wave[2] superconducting tips to perform AR spectroscopy at 4.2 K on flux-grown Bi_2Se_3 and Bi_2Te_3 single crystals, as well as epitaxial Bi_2Se_3 thin films grown on $SrTiO_3$ substrates by molecular beam epitaxy. These AR measurements are complemented by scanning tunneling spectroscopy, in order to characterize the superconducting tip as well as the doping level and surface condition of the TI sample. Our data are analyzed using BTK theory, in light of the characteristic band structure of bismuth chalcogenides, to elucidate how the band structure affects the AR process.

[1]Work supported by: NSERC, CFI-OIT, the Canadian Institute for Advanced Research, and the Department of Energy.
[2]C. S. Turel et al., **Appl. Phys. Lett.** 99, 192508 (2011)

Chris Granstrom
University of Toronto

Date submitted: 23 Nov 2015 Electronic form version 1.4