Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Quantum transport in topological insulator nanoribbon field effect and Josephson devices MORTEZA KAYYALHA, Purdue University, LUIS JAUREGUI, Purdue University, Harvard University, ALEKSANDER KAZAKOV, Purdue University, MICHAEL PETTES, University of Connecticut, IRENEUSZ MIOTKOWSKI, Purdue University, LI SHI, University of Texas at Austin, LEONID ROKHINSON, YONG CHEN, Purdue University — The spin-helical topological surface states (TSS) of topological insulators have attracted great attention in the past few years as an excellent platform to study topological transport and other exotic physics such as Majorana fermions. Here we present experiments studying quantum transport of TSS in topological insulator nanoribbon (TINR) field effect devices with normal as well as superconducting contacts. In Bi_2Te_3 NRs with normal contacts, we observe that the conductance vs. axial magnetic field exhibits Aharonov-Bohm (AB) oscillations with an alternating phase of zero and π, depending periodically on the Fermi momentum k_F tuned by an applied back-gate voltage, consistent with the 1D sub-band structure formed by circumferentially quantized TSS [1]. We also investigated the Josephson effects in $BiSbTeSe_2$ TINRs with superconducting Nb contacts. We measured the gate voltage and temperature dependence of the supercurrent and multiple Andreev reflections (MAR), to probe phase coherent transport via TSS. [1] L. A. Jauregui et al., arxiv:1503.00685.

Morteza Kayyalha
Purdue University

Date submitted: 06 Nov 2015 Electronic form version 1.4