Abstract Submitted for the MAR17 Meeting of The American Physical Society

Magnetotransport in 3D Topological Insulator Nanowires¹ RAPHAEL KOZLOVSKY, University of Regensburg, Institute for Theoretical Physics, COSIMO GORINI, KLAUS RICHTER, University of Regensburg — We investigate the transport characteristics of nanowires in external electric and magnetic fields. In particular, we are interested in systems consisting of three-dimensional topological insulator (3D TI) materials, which we model by bulk and surface Hamiltonians. In such 3D TI nanowires, a magnetic field along the wire leads to prominent Aharonov-Bohm oscillations that indicate the surface nature of the Dirac states forming due to a non-trivial topological invariant. We investigate their transport properties with specific focus on wires with a non-constant radius along the wire direction giving rise to a spatial variation of the enclosed magnetic flux and implying novel quantum transport phenomena.

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Date submitted: 10 Nov 2016

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