Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Two Dimensional Transport Induced Linear Magneto-resistance in Topological Insulator Bi_2Se_3 Nanoribbons[1] DONG LIANG, HAO TANG, RICHARD QIU, XUAN GAO, Dept of Physics, Case Western Reserve University, Cleveland, OH 44106 — Bulk Bi_2Se_3 has been proposed and confirmed as a type of three-dimensional (3D) topological insulators (TI's) with a single Dirac cone for the surface state. Although the existence of topological surface state in Bi_2Se_3 has been established by surface sensitive techniques (ARPES, STM), the transport properties of two dimensional (2D) surface state in 3D TI's has been plagued by the dominating conductivity from bulk carriers. Here, we report the study of a novel linear magneto-resistance (MR) under perpendicular magnetic fields in Bi_2Se_3 nanoribbons, and show that this linear MR is purely due to 2D transport by angular dependence experiments. The 2D magneto-transport induced linear MR in Bi_2Se_3 nanoribbons is in agreement with the recently discovered linear MR from topological surface state in bulk Bi_2Te_3, and the MR of other gapless semiconductors and graphene. We further show that the linear MR of Bi_2Se_3 nanoribbons persists up to room temperature, underscoring the potential of exploiting TI's for room temperature magneto-electronic applications.

[1]The authors thank ACS PRF grant #48800-DNI10 for partial funding support.

Xuan Gao
Case Western Reserve University

Date submitted: 16 Dec 2010 Electronic form version 1.4