Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

**Dirac Semimetal Films as Spin Conductors on Topological Substrates**[1] XIAOXIONG WANG, Nanjing University of Science and Technology, GUANG BIAN, University of Illinois at Urbana-Champaign, PENG WANG, Shandong University of Science and Technology, T.-C. CHIANG, University of Illinois at Urbana-Champaign — Spin-momentum locked states, notably those found on the surfaces of topological insulators, are promising for low-power electronic devices based on spin transport. Here we report a much more versatile case involving a Dirac semimetal film on a topological insulator substrate. Such a film can carry highly spin-polarized conduction channels by electronic coupling to the substrate. The spin channel width, defined by the film thickness, is at the designer's disposal, thus permitting optimization of the system parameters. The concept and underlying physics of such quasi-bulk spin channels are confirmed by calculations of a model system involving $Bi_2Se_3$ as the substrate and its low-Z substitute as the overlayer film. The results demonstrate Dirac semimetals as an important class of material for spintronic applications.

[1]This work was supported by the National Natural Science Foundation of China (No. 11204133), the Jiangsu Province Natural Science Foundation of China (No. BK2012393).

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Date submitted: 09 Nov 2014 Electronic form version 1.4