Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Voltage driven magnetic bifurcations in nanomagnet-topological insulator composite structure[1] YURIY G. SEMENOV, XIAOPENG DUAN, KI WOOK KIM, North Carolina State Univ — Multiplicity of magnetization dynamics in thin ferromagnetic insulator (FMI) deposited on topological insulator (TI) has been studied as an effect of electron flow through the interface. The intrinsic spin polarization of TI surface current evokes the magnetization precession, which in turn modifies the TI electron spin polarization and current intensity. The net effect of this self-consistent behavior of FMI magnetization and TI surface itinerant electrons results in auto oscillations, magnetization reversal or magnetic deviation from equilibrium state according to the applied DC voltage. These phenomena are also accompanied with strong anomalous Hall effect and they are separated by the threshold voltages of magnetization bifurcations. Comparisons with spin transfer torque and spin-Hall-based mechanisms of magnetization reversal/oscillation reveal significant advantage in power efficiency of this proposed electrical control of magnetization dynamics.

[1]This work was supported, in part, by the US Army Research Office and FAME (one of six centers of STARnet, a SRC program sponsored by MARCO and DARPA).

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Date submitted: 15 Nov 2013 Electronic form version 1.4