Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Spin-torque-driven excitations in magnetic thin films[1] C. WANG, H. SEINIGE, T. STAUDACHER, M. TSOI, Physics Department, University of Texas at Austin — Spin transfer torque (STT) refers to a novel method to control and manipulate magnetic moments using an electrical current. For the past decade it has proven to be a fascinating domain of research with a number of manifestations in various systems interesting both from fundamental science's point of view as well as for technological applications. In ferromagnetic/nonmagnetic (F/N) multilayers a dc electrical current can switch and/or drive its constituent F parts into high-frequency precession which is of interest for microwave and magnetic recording technologies. Interestingly, application of high-frequency currents can also drive the multilayer, e.g., into ferromagnetic resonance (STT-FMR) precession. In our experiments we use point contacts to inject high microwave currents into a variety of magnetic thin films including NiFe/Cu/NiFe/IrMn and NiFe/Cu/Co spin valves, and single ferromagnetic (NiFe or Co) films. The resulting magnetodynamics are detected electrically when a small rectified dc voltage appears across the contact at resonance. We find that in addition to a standard FMR, the microwave currents can excite other resonance modes in our point contacts. We study the behavior of the excitations as a function of applied magnetic field, dc bias current, and microwave frequency.

[1]Supported in part by NSF grants DMR-06-45377

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Date submitted: 18 Nov 2010 Electronic form version 1.4