Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Ferromagnetic Resonance of a Single Nanoscale Magnet Driven by an RF Spin-Transfer Torque. JACK SANKEY, Cornell University, P.M. BRAGANCA, I.N. KRIVOROTOV, A.G.F GARCIA, D.C. RALPH, R.A. BUHRMAN — By applying a spin-polarized RF current through Py/Cu/$Py_{0.65}Cu_{0.35}$ spin-valve nanopillar devices approximately 100 nm in cross section, we have excited ferromagnetic resonance modes in the Cu-doped Py "free" layer. We detect the resonance via a DC voltage generated through mixing of the RF current and the oscillating magnetoresistance from the precessing magnetization. We find two different regimes of behavior. For small applied DC currents, we observe simple ferromagnetic resonance. The frequency-widths of the resonant peaks are related to the intrinsic magnetic damping, with the damping decreasing approximately linearly with DC current. In this regime we can also characterize the nonlinearities of the resonances from peak-shape analysis at larger RF currents. For DC currents large enough to excite spontaneous magnetic precession, we find a second regime in which the applied RF current produces phase locking, with a distinctive line shape. In both regimes, we observe dynamical modes not seen previously in DC-driven dynamical measurements.

Jack Sankey
Cornell University

Date submitted: 30 Nov 2005 Electronic form version 1.4