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The effect of temperature on the dynamics of spin transfer switching of a Py nanomagnet NATHAN EMLEY, ILYA KRIVOROTOV, JACK SANKEY, SERGEY KISELEV, DAN RALPH, ROBERT BUHRMAN, Cornell University — Current-induced magnetization dynamics and switching have drawn much focus recently as the spin transfer effect shows promise for MRAM type applications. A recent experiment measuring the time-resolved dynamics of current-driven magnetization reversal at ambient temperature [1] has indicated that a current threshold exists delineating thermally activated and spin-torque driven regimes. To directly investigate the role of temperature on nanomagnet switching, we make time-resolved measurements of the switching dynamics in a temperature range from 4K to 300K. The switching is studied in IrMn/Py/Cu/Py exchange-biased spin-valve nanopillars of elliptical shape (130nm x 60nm). The exchange bias direction is set approximately at 45 degrees to the long axis of the nanopillar. In this geometry, the thermal distribution of the initial magnetization direction of the free Py layer does not have a strong effect on the initial phase of the coherent oscillations. This allows us to average over multiple time traces without loss of the oscillatory signal. We will report on this dynamic signal measured as a function of temperature and current magnitude in the spin-torque driven regime of switching. [1] R. H. Koch, J. A. Katine, and J. Z. Sun, Phys. Rev. Lett. 92, 088302 (2004).

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