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Time domain studies of aperiodicity in spin-torque driven vortex oscillations VLAD PRIBIAG, B. WILLIAMS, A. STEHURA, D.C. RALPH, R.A. BUHRMAN, Cornell University, CORNELL TEAM — Previous studies of current-driven magnetic vortex oscillations in nanopillars [1] and point contact geometries [2] have been restricted to detection of the *average* envelope of the oscillations. In this talk we discuss aperiodic features of the vortex oscillations that were studied based on single-shot time domain measurements of the oscillating GMR signal. These measurements reveal stochastic mode jumping at 10's of μs mean duty cycles between several closely spaced frequencies. The power spectrum of the time traces indicates that the shape and amplitude of the oscillation's spectral peaks change abruptly as the function of time, corresponding to aperiodic modulation of these oscillations on the μs time scale. Due to the very narrow *long-time* linewidths of the oscillations it is possible to detect clearly these fine modulations of the peak shape, frequency and amplitude. From these studies of the spin-torque-driven vortex oscillator stability we seek to obtain insights for the design and fabrication of spin-torque vortex oscillators with even narrower linewidths. [1] V.S. Pribiag *et al., Nature Phys.* **3**, 498 (2007). [2] Q. Mistral *et al.*, *Phys. Rev. Lett.* **100**, 257201 (2008).

Vlad Pribiag
Cornell University

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