Abstract Submitted
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Macrospin model of spin-transfer oscillators: an energy space approach[1] DANIELE PINNA, ANDREW KENT, DANIEL STEIN, New York University — A direct current applied to a nanomagnet produces a spin-transfer torque that drives the magnetization out of equilibrium. In this talk we discuss an effective theory to characterize the magnetization dynamics by focusing on its diffusive evolution over the energy landscape. The procedure allows us to model macrospin behavior with a one dimensional stochastic differential equation. We model spin-transfer oscillators (STOs) with a spin-current at an angle to the easy plane of a biaxial magnet (i.e. have a component along the magnet's hard axis). We trace the properties of stable out-of-plane precessional states and discuss their hysteretic behavior on applied current. We discuss the structure of the expected linewidth and phase noise, along with how the oscillator frequency is expected to depend on applied current. Finally, contributions due to thermal noise will be outlined and some thermally activated properties described. D. Pinna, A. D. Kent, D. L. Stein, Phys. Rev. B 88, 104405 (2013).

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