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Switching Distributions in all perpendicular spin-valve nanopillars under thermal activation and spin-transfer torques
DANIEL GOPMAN, DANIEL BEDAU, Department of Physics, New York University, STEPHANE MANGIN, C. LAMBERT, Institute Jean Lamour, UMR CNRS 7198, Nancy University, ERIC FULLERTON, CMRR, University of California at San Diego, JORDAN KATINE, San Jose Research Center, Hitachi-GST, ANDREW KENT, Department of Physics, New York University — The free layer switching field distributions of spin-valve nanopillars with perpendicular magnetization have been studied. The distributions are consistent with expectations of a model based on thermal activation over a single field dependent energy barrier. However, at zero applied current there is a strong asymmetry between the P and AP states and the reverse, with energy barriers more than 50% higher for P to AP transitions. The inhomogeneous dipolar field from the polarizer is demonstrated to be at the origin of this symmetry breaking[1]. I will show results on the effects of varying lateral geometry on this symmetry breaking. Also, I will introduce a low-cost method for studying the switching current distributions that applies a continuous waveform to sweep the dc current and simultaneously probe the magnetoresistance. This method permits the acquisition of over 10^6 switching events in six hours, which presents the possibility to obtain deep statistics on the reversal process. The effect of the magnitude and direction of applied dc currents on the thermal stability of a nanomagnet has been investigated and the results will be examined within the acquired statistics. Supported by NSF Grant DMR-1006575.

Daniel Gopman
Department of Physics, New York University

[1]D. B. Gopman et al, arXiv:1111.1342v1 [cond-mat.mes-hall]

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