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Thermally Activated Decay of Magnetic Vortices JACOB BURGESS, DENYS GROMBACHER, DAVID FORTIN, JOHN DAVIS, Department of Physics, University of Alberta, MARK FREEMAN, Department of Physics, University of Alberta and National Institute of Nanotechnology — We experimentally probe thermally activated decay of magnetic vortices, by observing annihilations within an array of $Ni_{80}Fe_{20}$ discs through hysteresis measurements. Specifically, the statistics of vortex annihilation are mapped as a function of the magnitude of, and the dwell time at, the peak fields applied during hysteresis scans. Magnetic vortices in micro- and nano-scale thin film ferromagnetic elements exhibit interesting and complex behavior. Demagnetization interactions make understanding processes like the annihilation of a vortex during magnetic switching challenging. Recent work has shown that the annihilation process can take place over an extended period of time[1] implying that there is a characteristic decay process, likely thermally governed. Through application of an Arrhenius model we extract information about the energy barrier preventing decay, and hence information about the energetic contributions of the demagnetization effects. We anticipate that this information will be useful in extending analytical models of magnetic vortices.

[1]Z. Liu, R.D. Sydora and M.R. Freeman, PRB 77, 174410 (2008).

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