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Nanomagnetic Spin Fluids[1] SKOMSKI RALPH, University of Nebraska, A. ENDERS, R. D. KIRBY, D. J. SELLMYER — The dynamics of conventional magnets is governed by the static micromagnetic response to an external magnetic field, with corrections due to thermal excitations. For example, permanent magnets undergo aging (magnetic viscosity), and magnetic recording media lose some of the stored bits due to thermal excitation. Essential deviations from this Arrhenius (or Né el- Brown) behavior occur on a length scale below about 2 nm. The relaxation no longer obeys Kramer's escape-rate theory and must be replaced by path-integral considerations with nontrivial activation-entropy contributions. This presentation investigates several theoretical and experimental aspects of unusual magnetization dynamics in small-scale wires, thin films and dots. The first explicit example is the formation of liquid-like droplets, observed in ultrathin films with perpendicular magnetic anisotropy and characterized by 180° domains of well-defined chirality. (The one-dimensional equivalent of this phenomenon is a hard-core gas with particle-number conservation.) The second example is of theoretical nature and links the phenomenon of slow magnetization dynamics to the concept of fractional kinetics. A general feature of the considered nanomagnets is their resemblance to fluids (liquids or gases), as opposed to the glassy dynamics of conventional magnets.

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