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Effect of size distribution on metastability in magnetic nanoparticles YOH YAMAMOTO, KYUNGWHA PARK, Virginia Tech, Blacksburg, VA — Magnetic nanoparticles that have been synthesized using various methods have size distributions. This results in distributions in the magnetic anisotropy of magnetic nanoparticles. Considering the particle size distributions, we investigate metastability in magnetic nanoparticles at low temperatures. To model this system, we use a spin $S = 1$ ferromagnetic Blume-Capel model on a square lattice with periodic boundary conditions. The particle size distribution is incorporated in the model such that the uniaxial magnetic anisotropy parameter has a Gaussian distribution. We perform kinetic Monte Carlo simulations of the Blume-Capel model with the Glauber dynamic to explore magnetization relaxation in the regime where a single droplet of flipped spins forms a critical droplet. We present the lifetime of the metastable state as a function of temperature and standard deviation of the magnetic anisotropy distribution as well as a finite-size effect on the lifetime.

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