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Measuring Disorder in Artificial Kagome Ice STEPHEN DAUNHEIMER, JOHN CUMINGS, Dept. of Materials Science & Engineering, University of Maryland — Artificial spin ice is proving to be a valuable tool in understanding magnetic interactions on the nanoscale. It can directly show the interactions responsible for geometric frustration, and different geometries have been used to model real pyrochlore spin ice compounds and other lattices. The strength in the approach lies in the ability of a synthetic material, fabricated from macroscopic artificial "atoms," to mimic real materials, where atoms are essentially identical with low disorder from lattice site to lattice site. However, in artificial spin ice materials there can be substantial variation among the artificial atoms in relevant quantities such as coercive field, with some systems showing standard deviations as high as 20%. By carefully studying the reversal process of artificial kagome ice along specific crystallographic directions, we can directly measure the distribution of coercivities of the individual nanoscale magnets. By using a lattice of connected magnets fabricated from Ni80Fe20, we find that the coercivity distribution can have a deviation of less than 5%. These narrow deviations should allow the observation of behavior that mimics more closely what would be expected in real spin ice materials.

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