Abstract Submitted
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Effective Thermodynamics of Artificial Spin Ice[1] CRISTIANO NISOLI, RUIFANG WANG, JIE LI, WILLIAM F. MCCONVILLE, PAUL E. LAMMERT, PETER SCHIFFER, VINCENT H. CRESPI, Department of Physics, Penn State University — We analyze the effective thermodynamics of artificial spin ice: a recently realized lattice of nanoscale single-domain ferromagnetic islands that are arrayed along the edges of a square lattice[1]. After demagnetization, the moments in this model system have a static disordered configuration similar to the frozen state of the spin ice materials. We demonstrate that this athermal state has extensive degeneracy and we introduce a formalism that can predict both the entropy and an effective temperature. The theory also predicts the populations of local states and short-distance correlations of this ice-like system with no adjustable parameters.

References:
[1] R. F. Wang, C. Nisoli, R. S. Freitas, J. Li, W. McConville, B. J. Cooley, M. S. Lund, N. Samarth, C. Leighton, V. H. Crespi and P. Schiffer, Nature (London) **439**, 303.

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