Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Comparing frustrated and non-frustrated clusters of single-domain ferromagnetic islands[1] JIE LI, SHENG ZHANG, JASON BARTELL, Pennsylvania State University, CRISTIANO NISOLI, Los Alamos National Lab, PAUL LAMMERT, VINCENT CRESPI, PETER SCHIFFER, Pennsylvania State University — We have studied the magnetic moment configurations of different geometry clusters of single-domain ferromagnetic islands. The microstates of small clusters can be exhaustively enumerated, which opens the system to additional modes of analysis, as compared to extended systems, both in terms of effective thermodynamic treatments and models of the kinetics of the annealing. Each of these clusters consisted of 4 islands arranged on the two perpendicular sides of a square, taken from the lattice of artificial spin ice [1, 2]. The magnetic moment configurations are imaged by magnetic force microscopy after effectively annealing through ac demagnetization. We then compared the results for cluster geometries with and without frustration of the magnetostatic interactions between the island moments. We find that non-frustrated clusters more readily achieve their lowest energy states than frustrated clusters and their moment configurations can be better described by a simple Boltzmann distribution.

[1] R. F. Wang et al., Nature 439, 303 (2006).
[2] X. Ke et al., Phys. Rev. Lett. 101, 037205 (2008).

[1]Supported by the Army Research Office and MRSEC at Penn State.

Jie Li
Pennsylvania State University

Date submitted: 02 Feb 2010 Electronic form version 1.4