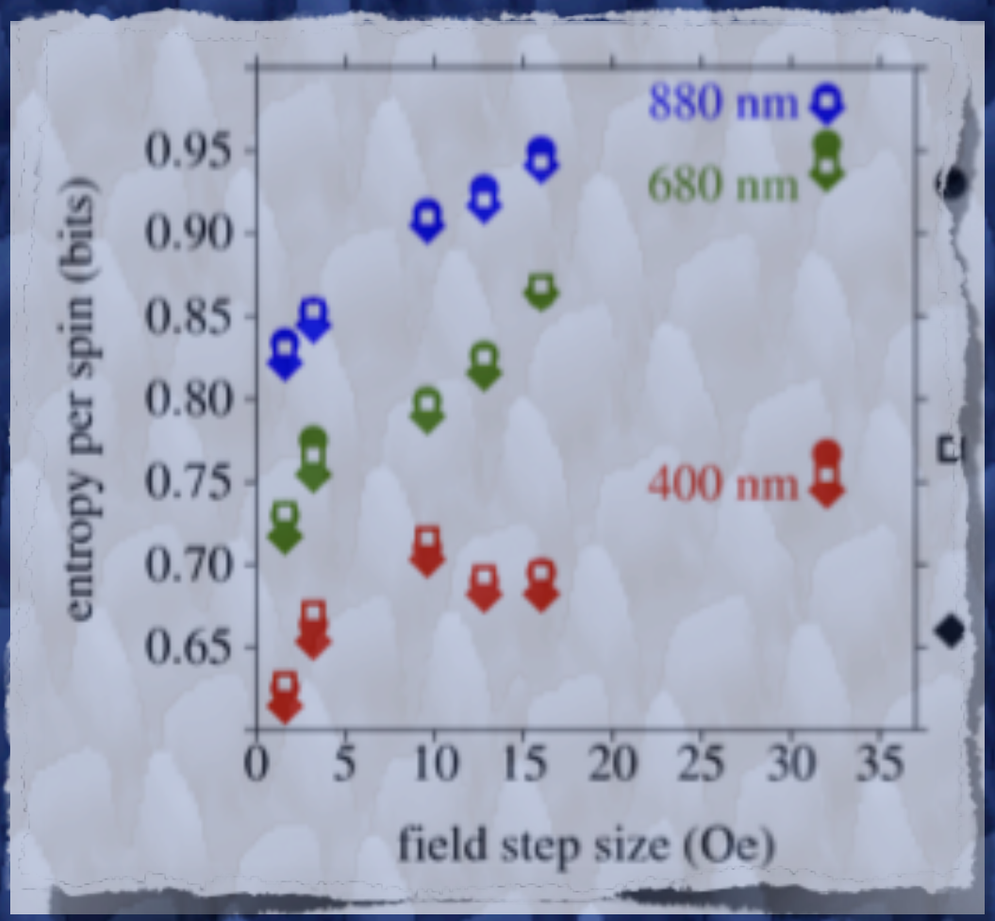

C. Nisoli, J. Li, X. Ke, D. Garand, P. Schiffer and V. H. Crespi, *Effective Temperature in an Interacting Vertex System: Theory and Experiment on Artificial Spin Ice*, Phys. Rev. Lett. **105**, 047205 (2010)

P. E. Lammert, X. Ke, J. Li, C. Nisoli, D. Garand, V. H. Crespi and P. Schiffer, *Direct entropy determination and application to artificial spin ice*, to appear in Nature Phys., (2010) doi:10.1038/nphys1728

Artificial spin-ice is patterned array of thousands of interacting nanoscale magnetic islands, made with methods similar to those used to fabricate computer chips, in which the island magnetic moments are constrained to point along the axes of the islands. This constraint means that artificial spin ice can reproduce the behavior of traditional magnetic materials, but on a length scale a thousand times larger, big enough that each magnetic spin can be individually resolved – an impossibility for traditional atomic-scale materials. MRSEC researchers have used two complementary approaches explore the behavior of the magnetic state. One finds that an effective temperature governs the distribution of island moments, with intriguing dependence how hard the moments are “shaken” by an external magnetic field. The other uses information theory to measure the entropy of the island array – the first time that such an entropy has been measured directly, without measuring heat. These nanoscale magnetic island arrays could find application in information storage and as models of atomic-scale magnetic materials.

DMR-0820404