Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Dimensionality Reduction in Artificial Spin Ice[1] IAN GILBERT[2], YUYANG LAO, ISAAC CARRASQUILLO, University of Illinois at Urbana-Champaign, LIAM O'BRIEN[3], JUSTIN WATTS, MICHAEL MANNO, CHRIS LEIGHTON, University of Minnesota, ANDREAS SCHOLL, Lawrence Berkeley National Laboratory, CRISTIANO NISOLI, Los Alamos National Laboratory, PETER SCHIFFER, University of Illinois at Urbana-Champaign — Over the past ten years, square and hexagonal arrays of single-domain nanomagnets, known as artificial spin ice, have been used to study the microscopic properties of geometrical frustration. Here we describe the fabrication of a new type of artificial spin ice, the tetris lattice. The ground state configuration of the nanomagnets' moments was determined with photoemission electron microscopy. This lattice is designed such that its vertices (small clusters of nanomagnets) cannot all simultaneously achieve their ground state. As a consequence, the lattice decomposes into alternating ordered and disordered one-dimensional bands of moments. The disordered bands can be described by a thermal one-dimensional Ising model, underscoring the emergent dimensionality reduction found in this lattice.

[1]This work was primarily supported by the US DOE. Work at UMN was supported by NSF MRSEC.
[2]Present affiliation: National Institute of Standards and Technology
[3]Also University of Cambridge

Ian Gilbert
University of Illinois at Urbana-Champaign

Date submitted: 06 Nov 2015 Electronic form version 1.4