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Real time dynamic behavior of vertex frustrated artificial spin ice. YUYANG LAO, JOSEPH SKLENAR, University of Illinois at Urbana-Champaign, IAN GILBERT, National Institute of Standards and Technology, ISAAC CARRASQUILO, University of Illinois at Urbana-Champaign, ANDREAS SCHOLL, ANTHONY YOUNG, Lawrence Berkeley National Laboratory, CRISTIANO NISOLI, Los Alamos National Laboratory, PETER SCHIFFER, University of Illinois at Urbana-Champaign — Artificial spin ice systems comprise two dimensional arrays of nanoscale single domain ferromagnets designed to have frustrated interactions among the moments. By decimating islands from the common square artificial spin ice, one can design lattices with so called 'vertex frustration'. In such lattices, the geometry prevents all vertices from occupying local ground states simultaneously. Using Photoemission Electron Microscopy (PEEM), we access the real time thermally induced dynamics of the moment behavior in those lattices. Operating at a proper temperature, the moment direction of each island fluctuates with a sufficiently slow frequency that it can be resolvable by acquiring successive PEEM images. We can extract information regarding the collective excitations of the moments and understand how they reflect the frustration of lattice. Supported by the US Department of Energy, Office of Basic Energy Sciences, Materials Science and Engineering Division under grant no. DE-SC0010778. The work of C.N. was carried out under the auspices of the US Department of Energy at LANL under contract no. DE-AC52-06NA253962. The ALS is supported by the Director, Office of Science, Office of Basic Energy Sciences, of the US Department of Energy under contract no. DE-AC02-05CH11231.

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