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Nanomagnetic field-driven thermal mobility of emergent monopoles in artificial spin ice. SOPHIE MORLEY, MARK C. ROSAMOND, University of Leeds, DIEGO ALBA VENERO, ISIS, ALES HRABEC, Universite Paris Sud, JOSE MARIA PORRO, ISIS, MI-YOUNG IM, CXRO, LBNL and DGIST, PETER FISCHER, UC Santa Cruz, SEAN LANGRIDGE, ISIS, CHRISTOPHER H. MARROWS, University of Leeds — Artificial spin ices are nanomagnetic islands confined in 2D and their size means they can be considered as single domain and Ising-like. In the square geometry, each vertex has four nanomagnets which can point either in or out. The lowest energy arrangement consists of two-in and two-out and obeys the so-called 'ice-rule'. It is possible to construct an ordered state by tiling such vertices, above which it is possible to have ice-rule-violating excitations known as emergent magnetic monopoles. It is their propagation which has been imaged with a transmission X-ray microscope and, due to a novel on-membrane heater, elevated temperatures applied up to 700 K. Square ice arrays were fabricated on a SiN membrane, the CoFeB islands were 80x250 nm, 10nm thick and had lattice spacings in the 350-500nm. Increased avalanche length and faster string velocities were observed for both stronger interaction and increased temperature. We have also been able to define a magnetic mobility in our systems and observed increased mobility in more interacting systems or elevated temperature. The largest change in the magnetic mobility was found for the most strongly interacting array, increasing by $1.7 \pm 0.7 mm^2 \mathrm{A}^{-1}\mathrm{s}^{-1}$ for $\Delta \mathrm{T} \approx 30$ K.

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