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Magnetic reversal of an artificial square ice: dipolar correlation and charge ordering JASON MORGAN, University of Leeds, AARON STEIN, Center for Functional Nanomaterials, SEAN LANGRIDGE, ISIS,, CHRISTOPHER MARROWS, University of Leeds — Artificial spin ices are lithographically patterned arrays of single domain nanomagnets [1-4]. The elongated elements form a 2D system of interlinked vertices at which Ising-like dipole moments meet with incompatible interactions. They are directly analogous to 3D bulk spin ice materials [5]. We report on the magnetic reversal of an athermal artificial square ice pattern subject to a sequence of magnetic fields applied slightly off the diagonal symmetry axis, investigated via magnetic force microscopy of the remanent states that result [1]. From an initial diagonally polarised state, sublattice independent reversal is observed via bulk-nucleated incrementally-pinned flipped moment chains along parallel channels of magnetic elements, as evident from analysis of vertex populations and dipolar correlation functions. Weak dipolar interactions between adjacent chains favour antialignment and give rise to weak charge ordering of "monopole" vertices during reversal.

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