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Dynamics of Artificial Kagome 'Spin Ice' In Geometrically Frustrated Permalloy Nano Structures YI QI, TODD BRINTLINGER, JOHN CUMINGS[1], Materials Science and Engineering, University of Maryland, College Park — Thin films of ferro-magnetic material with lithographically designed geometries can be used as an analog for the study of spin ice or frustrated systems. Here we study the magnetic structure and magnetization dynamics of permalloy thin films in a frustrated, hexagonal geometry using Transmission Lorentz Microscopy. The permalloy films are evaporated through patterns defined by conventional electron beam lithography to form single domain elements. These elements interact absent the effects of inhomogeneity and disorder associated with multi-domain magnetic elements and their grain structures. The mapping of in-plane magnetic moments through Lorentz microscopy show these magnetic structures to be governed by spin ice rule usually found in Kagome lattice systems. The switching process of these magnetic structures is observed using in-situ application of magnetic fields. The spin ice rule is shown to be valid as the exchange energy between elements is minimized in this artificially designed geometry.

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