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The Role of Geometric Defects in Frustrated Artificial Spin Ice Systems[1] NOAH GREENBERG, ANDREW KUNZ, Marquette University — Artificial spin ice systems consist of small islands of magnetization arranged in a lattice to order to create frustrated states at the vertices where the islands meet. In square ice magnetic islands have been removed to create the Shatki and Tetris lattices which alter the degree of frustration. In this work we introduce and investigate the effects of randomly removing magnetic islands in hexagonal spin ice by implementing the Metropolis-Hastings Monte Carlo Method to find equilibrium states over a wide temperature range. The geometric defects remove frustration at some of the vertices impacting the transition between the various charge ordered phases which is evident by a change in the transition temperature observed in heat capacity calculations. The inclusion of geometric defects also impacts the magnetization reversal properties leading to interesting dynamical phenomena not observed in the complete array. The random removal of islands leads to several different types of defects; large loops are often formed which induce a long range ordering, and single magnets are sometimes attached at only one vertex which can oscillate between two states. The various types of defects and their implications to the equilibrium states and reversal dynamics are investigated.

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Andrew Kunz
Marquette University

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