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Geometric frustration on a $1/9^{th}$ site depleted triangular lattice[1]
JOHN HOPKINSON, Brandon University and University of Manitoba, JARRETT BECK, Brandon University — In the searches both for new spin liquid and spin ice (artificial and macroscopic) candidates, geometrically frustrated two-dimensional spin systems have played a prominent role. Here we present a study of the classical antiferromagnetic Ising (AFI) model on the sorrel net, a $1/9^{th}$ site depleted and $1/7^{th}$ bond depleted triangular lattice. The AFI model on this corner-shared triangle net is found to have a large residual entropy per spin $\frac{S}{N} = 0.48185 \pm 0.00008$, indicating the sorrel net is highly geometrically frustrated. Anticipating that it may be difficult to achieve perfect bond depletion, we investigate the physics resulting from turning back on the depleted bonds (J_2). We present the phase diagram, analytic expressions for the long range partially ordered ground state spin structure for antiferromagnetic J_2 and the short range ordered ground state spin structure for ferromagnetic J_2, the magnetic susceptibility and the static structure factor. We briefly comment on the possibility that artificial spin ice on the sorrel lattice could by made, and on a recent report [T. D. Keene *et al.*, Dalton Trans. **40** 2983 (2011)] of the creation of a $1/9^{th}$ depleted cobalt hydroxide oxalate.

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