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Classical antiferromagnet on a hyper-kagome lattice JOHN M. HOPKINSON, SERGEI V. ISAKOV, HAE-YOUNG KEE, YONG BAEK KIM, University of Toronto — Motivated by recent experiments on $Na_4Ir_3O_8$ [Takagi, unpublished], we study the classical antiferromagnet on a frustrated three-dimensional lattice obtained by selectively removing one of four sites in each tetrahedron of the pyrochlore lattice. This "hyper-kagome" lattice consists of corner-sharing triangles. We present the results of large-N mean field theory and Monte Carlo computations on $O(N)$ classical spin models. We find the classical ground states to be highly degenerate. Nonetheless, at low temperatures, nematic order emerges via "order by disorder" in the Heisenberg model (N=3), representing the dominance of coplanar spin configurations. Above this transition, the spin-spin correlations show a dipolar form which can be understood to arise from a generalized "Gauss' law" constraint. Implications for future experiments are discussed.

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