Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Spin and emergent magnetic charge ordering in single and stacked layers of dipolar kagome spin ice JAMES HAMP, CLAUDIO CASTELNOVO, University of Cambridge — Kagome Ising systems with long range (dipolar) interactions can host interesting phases with unusual ordering features driven by frustration. These include intermediate-temperature states where order and disorder coexist, arising from spin "fragmentation", and low-temperature states with novel spin textures, that are sometimes accompanied by pronounced freezing. Often these ordering phenomena are best understood in terms of emergent magnetic charges and the effective interactions between them. In this work, by means of analytical and phenomenological arguments combined with Monte Carlo simulations, we investigate a family of models on the kagome lattice in two and three dimensions, where the Ising easy axes of the spins can be tuned from in-plane to out-of-plane. In two dimensions, we elucidate low-temperature ordering and freezing phenomena with an effective charge picture and appropriate order parameter. In three dimensions, emergent charges order in a sodium-chloride-like structure in the intermediate temperature regime. The low-temperature ordering behaviour depends on the level of canting, including a novel spin texture. We discuss the relevance of our results for experiments on artificial arrays and the new tripod kagome lattice compounds (which include Dy3Mg2Sb3O14).

James Hamp
Univ of Cambridge

Date submitted: 11 Nov 2016 Electronic form version 1.4