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Normal Modes of Frustrated Spins on a Kagome Lattice ASHWATHI IYER, Cornell University, VADIM OGANESYAN, College of Staten Island, MICHAEL LAWLER, Binghamton University, Cornell University — We study the normal modes of spins in a classical kagome antiferromagnetic Heisenberg model (KAHM), seeking evidence for the canonical and gauge-like zero modes predicted by the constrained spin model of Ref. [1]. We do so by splitting the degeneracy of the low energy configuration space through the introduction of Dzyaloshinski-Moriya (DM) interactions of strength D, performing a Monte-Carlo calculation to find the new ground state configuration, expanding the Hamiltonian to quadratic order about the minimum and diagonalizing the resulting problem to obtain the normal modes. We find that the resulting spectrum splits up into modes that scale with J, the strength of the Heisenberg interactions, and modes that scale with D and D^2/J. The latter two types of modes map directly into the canonical and gauge-like modes of the constrained spin model. In addition, we find clear evidence for "edge modes," which involve the motion of the dangling triangles, in agreement with the conjecture of Ref. [1]. Our calculations shed much light on how the low energy spin dynamics of the classical KAHM behaves like a gauge theory.

[1] Michael J Lawler, Emergent Gauge Dynamics of Highly Frustrated Magnets, arXiv:1104.0721

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