Abstract Submitted
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Spin order of the classical Kagome antiferromagnet: via effective Hamiltonians CHRISTOPHER L. HENLEY, Cornell Univ. — The classical Heisenberg Kagomé-lattice antiferromagnet (KAF) is only known to have a coplanar "spin nematic" (or octupole [1]) order, so that low-energy states are labeled by colorings. Contrary to accepted phenomenology,[1] I propose that these colorings develop *long-range order*. [2] First, from the spin-wave Hamiltonian up to 4th order, most modes are integrated out, leaving an effective quartic Hamiltonian Q for just the "soft" (zero at harmonic order) modes. Writing it $Q = Q_0 + Q'$, where only Q' depends on the discrete coplanar state, Q' is treated as a perturbation, and its expectation in the Q_0 ensemble becomes an effective Hamiltonian Φ for the colorings. The couplings in Φ are estimated using "Coulomb phase" coarse-grainings.[2] Following Huse & Rutenberg, [3] I observe the unweighted coloring model sits at a roughening transition, hence Φ drives the KAF to long-range order of the $\sqrt{3} \times \sqrt{3}$ type (modulo the inevitable gradual orientation fluctuations of the spin plane). A similar effective Hamiltonian exists for related $d = 3$ lattices, [4] but cannot produce order.

[1]M. E. Zhitomirsky, Phys. Rev. B 78, 094423 (2008).
[2]C. L. Henley, arxiv:0811.0026.
[3]D. A. Huse and A. D. Rutenberg, Phys. Rev. B 45, 7536 (1992).
[4]C. L. Henley, arxiv:0809.0079.

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