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Monte Carlo Simulations of FCC Kagome Lattice: Competition Between Triangular Frustration and Cubic Anisotropy[1] MARTIN LEBLANC, MARTIN PLUMER, JOHN WHITEHEAD, Memorial University of Newfoundland — The impact of an effective local cubic anisotropy [1] on the magnetic states of the Heisenberg model on the FCC kagome lattice are examined through classical Metropolis Monte Carlo simulations. Previous simulations revealed that the macroscopic degeneracy of the 2D kagome exchange-coupled co-planar spin system persists in the 3D case of ABC stacked layers [2] giving rise to a discontinuous (possibly order-by-disorder) phase transition. Local cubic anisotropy is shown to reduce this degeneracy by re-orienting the spins out of the co-planar configuration. In addition, the re-oriented states are shown to carry a uniform magnetic moment. The effect of anisotropy on the order of the phase transition will also be reported. These results are relevant to Ir-Mn alloys which have been widely used by the magnetic storage industry in thin-film form as the antiferromagnetic pinning layer in GMR and TMR spin valves [2].
[1] L. Szunyogh, B. Lazarovits, L. Udvardi, J. Jackson, and U. Nowak, Phys. Rev. B 79, 020403(R) (2009).
[2] V. Hemmati, M.L. Plumer, J.P. Whitehead, and B.W. Southern, Phys. Rev. B 86, 104419 (2012).

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