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Phase Diagram of the Spatially Anisotropic Heisenberg Model on a Triangular Lattice SEDIGH GHAMARI, CATHERINE KALLIN, Dept. of Physics and Astronomy, McMaster University, SUNG-SIK LEE, Dept. of Physics and Astronomy, McMaster University and Perimeter Institute for Theoretical Physics, ERIK SORENSEN, Dept. of Physics and Astronomy, McMaster University — The spatially anisotropic spin-1/2 Heisenberg model on a triangular lattice is examined using a renormalization group (RG) analysis in the limit of weak interchain coupling ($J'/J \ll 1$ or large anisotropy). In agreement with a previous similar study, a collinear antiferromagnetic (CAF) state is found for large anisotropies. Retaining a marginal term that was not previously included, elucidates the strong competition between spiral and CAF order and suggests a direct transition at a fairly large anisotropy to incommensurate spiral order with a significantly renormalized wave vector that smoothly connects to the commensurate spiral state at the isotropic point. The significant renormalization of the ordering vector of this incommensurate spiral phase is argued to explain why many numerical studies found spin liquid behavior close to the isotropic point, (i.e. $J'/J \sim 0.85$). The agreement between the predictions of our RG analysis for the correlation function of the staggered magnetization on next-nearest-neighbor chains with DMRG results for small anisotropies further supports this picture. Finally, the effect on the phase diagram of Dzyaloshinskii-Moriya interactions, relevant to Cs_2CuCl_4, will be discussed.

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