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Spin-Density-Wave Order and Slow Dynamics in $Ca_3Co_2O_6$ CRISTIAN BATISTA, YOSHITOMO KAMIYA, Theoretical Division, T4 and CNLS, Los Alamos National Laboratory — We study a frustrated quantum Ising model relevant for $Ca_3Co_2O_6$ that comprises a triangular lattice of weakly coupled ferromagnetic chains [Y. Kamiya and C. D. Batista, PRL **109**, 067204 (2012)]. Our quantum Monte Carlo simulation shows that the chains become ferromagnetic and form a three-sublattice "up-up-down" structure in the lowest temperature regime $T \leq T_{CI}$ due to a quantum effect. In contrast, long-wavelength spin-density-wave (SDW) modulations along the chains are stabilized for $T_{CI}<T<T_c$ in agreement with recent experiments. We also discuss a simple mean-field theory revealing quasi-continuous change of the modulation periodicity as a function of T and implying the existence of metastable states in the SDW phase, which explains the slow low-temperature dynamics that has been observed in $Ca_3Co_2O_6$. The closely related multiferroic materials Ca_3CoMnO_6 and Lu_2CoMnO_6 will also be discussed.

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