Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Magnon spectrum in a spiral magnetic order on the pyrochlore lattice: application to $CdCr_2O_4$ EUNSONG CHOI, GIA-WEI CHERN, NATALIA PERKINS, University of Wisconsin, Madison — Recent neutron scattering measurement on a geometrically frustrated antiferromagnet $CdCr_2O_4$ observed an unusual ground state in which a spiral magnetic order characterized by an incommensurate wavevector $\mathbf{Q} = (0, \delta, 1)$ is accompanied by a tetragonal lattice distortion [1]. These results can be consistently explained by a model of Heisenberg interaction with anisotropic exchange constants perturbed by the Dzyaloshinski-Moriya interaction [2]. Based on this spin Hamiltonian, we numerically integrate the Landau-Lifshitz-Gilbert equation to obtain the linear magnon spectrum [3]. Exact diagonalization based on the conventional Holstein-Primakoff transformation is ineffective in our case due to the lack of translational symmetry in the magnon Hamiltonian. We also compare the numerical spectrum with the experimental results and discuss its implications on the model Hamiltonian.

[1] J.-H. Chung *et al.* Phys. Rev. Lett. **95**, 247204 (2005).
[2] G.-W. Chern, C. J. Fennie, and O. Tchernyshyov. Phys. Rev. B. **74**, 060405 (2006).
[3] M. Mochizuki, N. Furukawa, and N. Nagaosa. Phys. Rev. Lett. **104**, 177206 (2010).

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Date submitted: 20 Dec 2010 Electronic form version 1.4