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Dynamical properties of the anisotropic triangular quantum antiferromagnet with Dzyaloshinskii-Moriya interaction RASTKO SKNEPNEK, DENIS DALIDOVICH, JOHN BERLINSKY, JUNHUA ZHANG, CATHERINE KALLIN, Department of Physics and Astronomy, McMaster University, Hamilton, Ontario, Canada L8S 4M1 — We present a detailed study of the anisotropic triangular quantum antiferromagent with Dzyaloshinskii-Moriya (DM) interaction building on earlier work by Veillette, James and Essler [Phys. Rev. B, **72**, 134429 (2005)]. The DM interaction generates an easy-plane anisotropy and opens a gap in the spin-wave spectrum at the incommensurate ordering wave vector $\vec{Q}$. Our calculation utilizes the Holstein-Primakoff representation of spins and goes beyond linear spin wave theory by taking into account magnon-magnon interactions in a $1/S$ expansion. We calculate renormalized dispersion relations for the magnons to order $1/S$ for different values of the DM interaction and pay particular attention to the interesting case of zero DM interaction. The dynamical structure factor is calculated to order $1/S$. It is found that, compared to linear spin wave theory, a significant fraction of the scattering intensity is shifted to higher energies. We compare our findings with the recent neutron scattering data measured on the frustrated quantum antiferromagnet Cs_2CuCl_4, [R. Coldea, *et. al.*, Phys. Rev. B, **68**, 134424, (2003)].

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