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Theory of triplon dynamics in the quantum magnet $BiCu_2PO_6$
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We provide a theory of triplon dynamics in the valence bond solid ground state of the coupled spin-ladders modeled for $BiCu_2PO_6$. Utilizing the recent neutron scattering experimental data as guides and a theory of interacting triplons via the bond operator formulation, we determine a minimal spin Hamiltonian for this system. It is shown that the splitting of the low energy triplon modes and the peculiar magnetic field dependence of the triplon dispersions can be explained by including substantial Dzyaloshinskii-Moriya and symmetric anisotropic spin interactions. Taking into account the interactions between triplons and the decay of the triplons to the two-triplon continuum via anisotropic spin interactions, we provide a theoretical picture that can be used to understand the main features of the recent neutron scattering experimental data.

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