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(G*) (POS-25) Magnetic interactions in AB-stacked kagome lattices: magnetic structure, symmetry, and duality

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We present the results of an extensive study of the phase diagram and spin wave excitations for a general spin model on a hexagonal AB-stacked kagome lattice. Depending on the strength of the spin-orbit coupling (SOC), some spin and lattice rotations may become decoupled, leading to considerably larger symmetry groups than typical magnetic groups. Thus, we provide a detailed symmetry description of the magnetic Hamiltonian in the limit of negligible, weak, and intermediate strength of SOC. The spin symmetry in these three cases has a strong effect on the splittings observed in the spin excitation spectra and is therefore relevant to the interpretations of future experimental studies. We further identify a large number of self-duality transformations that map the Hamiltonian onto itself. These transformations describe the symmetry of the parameter space and provide exact mappings between the properties of different magnetic orders. Finally, we discuss the physical relevance of our findings in the context of Mn_3X compounds.

Keyword-1

Kagome

Keyword-2

Duality

Keyword-3

Magnetic phases

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