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Frustration and Dzyaloshinsky-Moriya anisotropy in the kagome francisites $Cu_3Bi(SeO_3)_2O_2X$) ALEXANDER TSIRLIN, National Institute of Chemical Physics and Biophysics, Tallinn, Estonia, IOANNIS ROUSOCHATZAKIS, Max Planck Institute for Complex Systems, Dresden, Germany, RONALD ZINKE, JOHANNES RICHTER, Institute for Theoretical Physics, University of Magdeburg, Germany — Kagome spin lattice is an abundant source of magnetic frustration. We will present density-functional as well as analytical and numerical calculations that elucidate the microscopic magnetic model of spin-1/2 francisite materials $Cu_3Bi(SeO_3)_2X_2$ (X = Cl, Br). Their weakly distorted kagome lattice features ferromagnetic nearest-neighbor and antiferromagnetic next-nearest-neighbor couplings that result in an infinitely degenerate classical ground state for the isotropic spin model restricted to Heisenberg exchanges. This degeneracy is lifted by quantum fluctuations, although the canted magnetic order observed experimentally is only marginally lower in energy than other competing states. We argue that in francisites this canted state is primarily stabilized by the Dzyaloshinsky-Moriya (DM) anisotropic exchange. We derive the hierarchy of the DM exchanges in francisites and explain qualitatively the anisotropic magnetic response of these frustrated quantum magnets.

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