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Interplay between Lattice Distortion and Spin-Orbit Coupling in Double Perovskites TYLER DODDS, University of Toronto, TING-PONG CHOY, Universiteit Leiden, YONG BAEK KIM, University of Toronto — We develop anisotropic pseudo-spin nearest-neighbour antiferromagnetic Heisenberg models for monoclinically distorted double perovskites. We focus on these $A_2BB'O_6$ materials that have magnetic moments on the $4d$ or $5d$ transition metal B′ ions, which form a face-centred cubic lattice. In these models, we consider tetragonal distortion of B′-O octahedra, affecting relative occupancy of t_{2g} orbitals, along with geometric effects of the distortion and spin-orbit coupling. The resulting pseudo-spin-1/2 models are solved in the saddle-point limit of the Sp(N) generalization of the Heisenberg model. The spin S in the SU(2) case generalizes as a parameter κ controlling quantum fluctuation in the Sp(N) case. We consider two different models that may be appropriate for these systems. In particular, using Heisenberg exchange parameters for La_2LiMoO_6 from a spin-dimer calculation [T. Aharen *et al.*, Phys. Rev. B **8**1, 224409 (2010)], we conclude that this $S = 1/2$ system may order, but must be very close to a disordered spin liquid state.

Tyler Dodds
University of Toronto

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