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Spin phonon induced colinear order and magnetization plateaus in triangular and kagome antiferromagnets. Applications to $CuFeO_2$ FA WANG, ASHVIN VISHWANATH, Department of Physics, University of California at Berkeley; Material Sciences Division, Lawrence Berkeley National Laboratory — Coupling between spin and lattice degrees of freedom are important in geometrically frustrated magnets where they can lead to degeneracy lifting and novel orders. We show that moderate spin-lattice couplings in triangular and Kagome antiferromagnets can induce complex colinear magnetic orders. When classical Heisenberg spins on the triangular lattice are coupled to Einstein phonons, a rich variety of phases emerge, including the experimentally observed four sublattice state and the five sublattice 1/5th magnetization plateau state seen in the magneto-electric material $CuFeO_2$. In addition we predict magnetization plateaus at 1/3, 3/7, 1/2, 3/5 and 5/7 at these couplings. Strong spin-lattice couplings induce a striped colinear state, seen in α-$NaFeO_2$ and $MnBr_2$. On the Kagome lattice, moderate spin-lattice couplings induce colinear order, but an extensive degeneracy remains.

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