Abstract Submitted
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Generalizations of the Kitaev-Heisenberg model and connections to experiment ITAMAR KIMCHI, University of California, Berkeley, YI-ZHUANG YOU, Institute for Advanced Study, Tsinghua University, Beijing, China, ASHVIN VISHWANATH, University of California, Berkeley — Generalizations of Kitaev-Heisenberg spin models are both interesting on their own right and potentially relevant for the Mott insulating layered Iridates A_2IrO_3 (A=Na,Li) and other complex oxides of 5d transition metal compounds. To describe Na_2IrO_3 and Li_2IrO_3 we propose the Kitaev-Heisenberg-J_2-J_3 model, a combination of the Kitaev honeycomb model and the Heisenberg model with all three nearest neighbor couplings J_1, J_2 and J_3. A rich phase diagram is obtained at the classical level, including the experimentally suggested *zigzag* ordered phase; as well as the *stripy* phase, which extends from the Kitaev-Heisenberg limit to the J_1-J_2-J_3 one. Combining the experimentally observed spin order with the optimal fitting to the uniform magnetic susceptibility data gives an estimate of possible parameter values, which in turn reaffirms the necessity of including both the Kitaev and farther neighbor couplings in describing the materials. Generalizations for other spin-orbit coupled Mott insulating 5d transition metal oxides with Kitaev-Heisenberg type models exhibit related magnetically ordered phases as well as different spin liquid phases.

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