

Abstract Submitted
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Study of Kitaev-Heisenberg model with second-neighbor Heisenberg coupling by DMRG simulations and slave-particle theories YI-FAN JIANG, Tsinghua University, HONG-CHEN JIANG, KITP, UCSB and Tsinghua University, HONG YAO, Stanford University and Tsinghua University — We study the effect of second-neighbor Heisenberg coupling J_2 to the first neighbor Kitaev-Heisenberg model on the honeycomb lattice by doing DMRG simulations and slave-particle theories. In the Kitaev limit, we find that the gapless spin liquid phase at $J_2 = 0$ survives up to a finite critical value J_{2c} . In an intermediate range, namely $J_{2c} < J_2 < J'_{2c}$, our results show that a new exotic (possibly a gapped chiral spin liquid) phase emerges. When J_2 is further increased beyond J'_{2c} , the ground state orders magnetically by spontaneously breaking spin-rotational and lattice translational symmetries. Possible implications of our results to the real materials Na_2IrO_3 and Li_2IrO_3 will also be discussed

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