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Density-Matrix Renormalization Group Study of Effective Spin Model for Na_2IrO_3 KAZUYA SHINJO, Yukawa Institute for Theoretical Physics, Kyoto University, SHIGETOSHI SOTA, RIKEN AICS, TAKAMI TOHYAMA, Yukawa Institute for Theoretical Physics, Kyoto University — The Kitaev-Heisenberg honeycomb lattice model has recently been proposed to describe magnetic properties in A_2IrO_3(A=Na,Li). The model includes an isotropic Heisenberg term and strongly anisotropic Kitaev terms. The Kitaev terms give a spin-liquid ground state. With increasing the strength of Heisenberg coupling, the ground state first turns into a stripy antiferromagnetic phase and then into a Neel antiferromagnet. The x-ray and neutron scattering experiments indicate that the ground state of Na_2IrO_3 is most likely characterized by a zig-zag spin structure. However, this type of magnetic order cannot be theoretically explained by the Kitaev-Heisenberg model. It is necessary to introduce further neighbor Heisenberg couplings and/or trigonal distortion of the oxygen octahedra. We study an extended Kitaev-Heisenberg model including these additional terms, by using two-dimensional density-matrix renormalization group method. Calculating spin correlation functions, we find that the zigzag order appears in a parameter regime relevant to Na_2IrO_3.

Kazuya Shinjo
Yukawa Institute for Theoretical Physics, Kyoto University

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