

Abstract Submitted
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Order by disorder in Kitaev-Heisenberg models on the honeycomb lattice¹ NATALIA PERKINS, YURIY SIZYUK, SAMUEL DUCATMAN, Univ of Minnesota, Minneapolis, PETER WOELFLE, Institute for Condensed Matter Theory and Institute for Nanotechnology, Karlsruhe Institute of Technology — Recent diffuse magnetic x-ray scattering data in Na₂IrO₃ [1] clearly determined the spin orientation in this zigzag state and showed that, unexpectedly, it is along the 44.3 degrees direction with respect to a axis, which is approximately half way in between the cubic x and y axes. This experiment provides an important check of the validity of any model proposed to described the magnetic properties of Na₂IrO₃ as the model should correctly predict not only the type of the magnetic order but also its orientation in space. We propose that order by disorder mechanism in quantum J1-K1-J2-K2-J3 model [2] gives the experimentally observed direction along cubic face diagonals. Our findings are based on both the calculation of the contribution of thermal fluctuations of quantum spins into free energy obtained by Hubbard-Stratonovich transformation and the zero-point correction to the ground state energy due to quantum spin fluctuations obtained by the spin-wave expansion at zero temperature. [1] S. H. Chun et al, Nature Physics10,1038 (2015).? [2] Y. Sizyuk, C. Price, P. Woelfle, and N. B. Perkins,?Phys. Rev. B 90, 155126 (2014).

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