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Magnetic Phase Diagram of the Classical Kitaev-Heisenberg (KH) Model CRAIG PRICE, The Pennsylvania State University, NATALIA PERKINS, The University of Wisconsin - Madison — In this work, we numerically study the low-temperature magnetic properties of the Kitaev-Heisenberg model using classical Monte-Carlo simulations. Due to the discreteness of the KH model caused by the Kitaev interaction while in zero magnetic field, the model is magnetically ordered at low temperatures for all non-zero values of the Kitaev interaction except at two special points. The ordered phase is stabilized entropically by an order-by-disorder mechanism where thermal fluctuations of classical spins select collinear magnetic states that point along a cubic direction. We computed the H-T phase diagrams of the KH model for different orientations of the magnetic field and estimated the saturation field and its directional dependence in each phase. The low-temperature magnetic phase diagram is significantly modified both by the presence of external magnetic fields and the field's orientation with respect to cubic axes. In the Kitaev limit, the external field continuously changes the classical ground-state manifold of the geometrically frustrated classical Kitaev, thus it stabilizes different magnetic states at different strengths of the magnetic field. Our results can be used to understand the physics of Li_2IrO_3 and Na_2IrO_3 in an applied magnetic field.

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