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【165】Broken-Symmetry Ground States of the Heisenberg model on the Pyrochlore Lattice

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The spin-1/2 Heisenberg model on the pyrochlore lattice is debated to possess a spin-liquid ground state. We contest this hypothesis with a numerical investigation using exact diagonalization and variational techniques: RVB-like Monte Carlo ansatz and convolutional neural network for (variational) calculations up to 4×4^3 spins. We determine the phase transition between the putative spin-liquid phase and the neighboring ordered phase and characterize the ground state in terms of symmetry-breaking. We find indications of spontaneously broken inversion and rotational symmetry, calling the scenario of a featureless quantum spin-liquid into question. This showcases how variational techniques allow to make progress in answering challenging questions about 3D frustrated magnets.

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