

Abstract Submitted
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Unexpected z-direction Ising antiferromagnetic order in a frustrated spin-1/2 J₁-J₂ XY model on the honeycomb lattice ZHENYUE ZHU, University of California, Irvine, DAVID HUSE, Princeton University, STEVEN WHITE, University of California, Irvine — Using the density matrix renormalization group (DMRG) on wide cylinders, we study the phase diagram of the spin-1/2 XY model on the honeycomb lattice, with first-neighbor ($J_1 = 1$) and frustrating second-neighbor ($J_2 > 0$) interactions. For the intermediate frustration regime $0.22 < J_2 < 0.36$, we find a surprising antiferromagnetic Ising phase, with ordered moments pointing along the z axis, despite the absence of any $S_z S_z$ interactions in the Hamiltonian. Surrounding this phase as a function of J_2 are antiferromagnetic phases with the moments pointing in the $x - y$ plane for small J_2 and a close competition between an $x - y$ plane magnetic collinear phase and a dimer phase for large values of J_2 . We do not find any spin liquid phases in this model.

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