Abstract Submitted
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Cubic Interactions and Quantum Criticality in Dimerized Antiferromagnets S. WESSEL, RWTH Aachen University, Germany, L. FRITZ, Unversitaet zu Koeln, Germany, R.L. DORETTO, Universidade Estadual Paulista, Brazil, S. WENZEL, EPFL, Switzerland, S. BURDIN, Universite de Bordeaux, France, M. VOJTA, TU Dresden, Germany — Dimerized quantum antiferromagnets can be driven through a quantum phase transition from a dimerized phase into a magnetically ordered state upon tuning the exchange parameters. In recent years, the critical properties in such dimerized antiferromagnets were examined in detail, based on large-scale quantum Monte Carlo simulations, which reported deviations from O(3) universality for specific two-dimensional geometries, in particular for the staggered-dimer antiferromagnet. Symmetry arguments and microscopic calculations exhibit that a nontrivial cubic term arises in the relevant order-parameter quantum field theory, related to three-particle interactions among the triplet excitations within the paramagnetic phase of this model. The consequences of such cubic terms are explored using a combination of analytical and numerical methods. Complemented by finite-temperature quantum Monte Carlo simulations, these results lead to the conclusion that critical exponents in dimerized antiferromagnets are identical to that of the standard O(3) universality class, but with anomalously large corrections to scaling for these specific dimerization geometries.

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