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Excitation Modes and Gap Scaling in Quantum Critical Dimerized Antiferromagnets STEFAN WESSEL, MAXIMILIAN LOHOEFER, RWTH Aachen University — Results are presented from large-scale quantum Monte Carlo simulations on the excitation modes in two- and three-dimensional quantum antiferromagnets of coupled spin dimers accross their quantum critical points. The identification of the amplitude (Higgs) mode from dynamical spin and singlet spectral functions are contrasted in dependence of the systems's dimensionality and compared to universal scaling predictions. For the three-dimensional case, we furthermore identify characteristic multiplicative logarithmic corrections in the exciation gap scaling atop the leading mean-field behavior. These are in accord with field-theoretical predictions based on an effective description of the quantum critical spin system in terms of an asymptotically-free field theory. The width of the Higgs mode resonance is observed to scale linearly with the Higgs mass near criticality, indicative of this critically well-defined excitation mode of the symmetry broken phase.

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