

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Quantum Criticality in Coupled Spin-Dimer Systems STEFAN

WESSEL, Stuttgart University, SANDRO WENZEL, EPFL Lausanne — We examine the properties of coupled quantum spin-dimers in two dimensions within the quantum critical regime. We find that depending on the dimer arrangement, further terms appear in addition to the quantum non-linear sigma model in the low-energy effective action. While not present for a columnar dimer pattern and other previously studies dimerizations, they arise for a staggered arrangement of dimers. We propose further models, the dimerized honeycomb lattice and the herringbone lattice, where similar such terms appear. Our large-scale quantum Monte Carlo simulations show that the presence of such terms consistently leads to deviations from the expected universal scaling in the quantum critical regime. In addition, we contrast the spectral properties of these systems, and their response to non-magnetic impurities.

Stefan Wessel
Stuttgart University

Date submitted: 20 Nov 2009

Electronic form version 1.4