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Relevance of Disorder to Critical Behavior of Antiferromagnets
OMID NOHADANI, University of Southern California, STEFAN WESSEL, University Stuttgart, Germany, STEPHAN HAAS, University of Southern California —
We study the magnetic-field-induced antiferromagnetic order in cubic dimer systems with bond disorder. The critical exponents, in absence of randomness, were reported to be mean-field-like in 3D. Using stochastic series expansion quantum Monte Carlo simulations at ultra-low temperatures, we investigate the relevance of disorder to the critical behavior in the vicinity of a quantum critical point. Furthermore, we demonstrate that in the presence of bond disorder, a new Bose-glass phase separates the dimer spin liquid regime from the antiferromagnetically ordered phase. Since most of the experimentally probed compounds reveal traces of disorder, our results are significant for quantum phase transition studies.

Omid Nohadani
University of Southern California

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