Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Random-singlet phases beyond one spatial dimension KEVIN BEACH, University of Alberta — When the linear Heisenberg spin chain is given non-uniform exhange couplings, its ground state becomes frozen in a quasi-static singlet bond pattern. This so-called random-singlet phase has long been understood via a renormalization-group (RG) procedure that decimates the bonds from strongest to weakest; the flow equations indicate that even infinitesimal disorder drives the system toward an infinite-randomness fixed point. We present an non-RG construction, based on the large-N limit of SU(N), that reproduces the linear-chain result, but which also generalizes to lattices in higher spatial dimension. Beyond a threshold in disorder D and rank N, a random-singlet phase exists and exhibits spin correlations that decay algebraically with characteristic exponents. The predictions in two and three dimensions are verified using Quantum Monte Carlo.

Kevin Beach
University of Alberta

Date submitted: 24 Nov 2009 Electronic form version 1.4