Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Breakdown of antiferromagnetism and the Coulomb phase for RVB states on anisotropic three-dimensional lattices K.S.D. BEACH, University of Mississippi — Nearest-neighbor (NN) resonating-valence-bond (RVB) wave functions often serve as prototype ground states for various frustrated models in two dimensions because of their lack of long-range magnetic correlations. In three dimensions, these states are generally not featureless, and their tendency is toward antiferromagnetic order. On the cubic and diamond lattices, for example, the NN RVB state exhibits both antiferromagnetism and power law dimer correlations characteristic of the "Coulomb phase" (in analogy with classical hardcore dimer models). The introduction of strong spatial anisotropy, however, leads to the destruction of these long-range and algebraic correlations, leaving behind an apparent short-range spin liquid state. We characterize the critical exponents at the phase boundaries for wave functions built from products of SU(2) singlets as well as their SU(N) generalizations and discuss attempts to construct a field theory that describes the transitions.

Kevin Beach
University of Mississippi

Date submitted: 14 Nov 2014 Electronic form version 1.4