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Title:
Valence-bond states: Link models

An isotropic anti-ferromagnetic quantum state on a square lattice is characterized by symmetry arguments only. By construction, this quantum state is the result of an underlying valence bond structure without breaking any symmetry in the lattice or spin spaces. A detailed analysis of the correlations of the quantum state is given (using a mapping to a 2D classical statistical model and methods in field theory like mapping to the non-linear sigma model or bosonization techniques) as well as the results of numerical treatments (regarding exact diagonalization and variational method (ii) experimentally from neutron scattering on cuprates in the anti-ferromagnetic insulator phase.

Reference: Annals of Physics, vol. 324, Issue 9, September 2009, Pages 1875-1896