Optimized resonating valence bond state in square lattice: correlations & excitations

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Abstract
We consider RVB state as a variational estimate for the ground state of Heisenberg antiferromagnet in square lattice. We present numerical calculation of energy, spin-spin correlation function and spin excitation spectrum. We show, that the quantum fluctuations reduce 35% of magnetization respect to Neel order. Our results are in good agreement with other methods such as spin-wave calculation and series expansions.

Keywords: resonating valence bound (RVB), antiferromagnetic, Heisenberg model, variational Monte Carol method, square lattice

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