

# Towards spin-wave like approach to the $J$ - $J'$ Heisenberg antiferromagnet in terms of composite spins

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Conventional spin-wave approach relies on an expansion around a relevant classical (un-entangled) ground state or equivalently the ground state in the mean field approximation (MFA) for the quantum model. However for systems which may admit valence bond ground states, such as the staggered  $J$ - $J'$  Heisenberg antiferromagnet, single site MFA is obviously an incorrect zeroth order approximation. In this paper, we introduce a MFA for clusters consisting of two spins connected by a strong bond in the afore-mentioned model. We identify the quantum critical point and calculate the ground state magnetization within this cluster MFA in one and two dimensions. Furthermore, since each chosen cluster can be viewed as a composite spin- $\frac{3}{2}$ , we discuss the possibility of a spin-wave like expansion around the cluster MFA ground state.

← 13.4 cm →

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9.7 cm