QUANTUM PHASE TRANSITIONS IN FRUSTRATED FERRO- AND FERRIMAGNETS

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9.7 cm

Low-dimensional frustrated quantum magnets have attracted much attention in recent time [see, e.g., 1,2] since they are candidates for zero-temperature quantum order-disorder transitions driven by frustration. We study the ground state properties of frustrated Heisenberg ferro- and ferrimagnets using density matrix renormalization group and exact diagonalization techniques. The frustration is introduced by competing second neighbor antiferromagnetic bonds J_2. In the limit of weak frustration for both systems the ground state belongs to macroscopic total spin ($S \propto N$) and exhibits magnetic long-range order. On the other side, the ground state is a singlet ($S = 0$) in the limit of large J_2. We find indications that this transition to a singlet state is of first order in the frustrated ferromagnet in $D = 1$, $D = 2$ and $D = \infty$. On the other hand, in the frustrated ferrimagnet our results indicate also a first order transition in $D = 1$ but a second order transition in higher dimensions.

[1] D.V. Dimitriev, V.A. Krivnov and A.A. Ovchinnikov, Phys. Rev. **B 56**, 5985 (1997)
[2] N.B. Ivanov, J. Richter and U. Schollwöck, Phys.Rev. **B 58**, 14456 (1998)

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