The quantum spin-1/2 Heisenberg antiferromagnet on a triangular lattice with some bonds removed in a translationally invariant manner - ground state and lowest excitations.

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This work is aimed at demonstrating the ground state and lowest-excitation states properties of the quantum spin-1/2 Heisenberg antiferromagnet on a 2D triangular lattice with some bonds removed in a translationally invariant manner which results in 2 non-equivalent types of sites with 4 or 6 nearest neighbours (n.n). The calculations were performed using an exact diagonalization (ED) approach in the complete RVB and non-complete short-range RVB (SRRVB) basis. The main question was whether the reduced basis leads to reasonable ground state and low temperature properties. Mean singlet length is slightly above 1 and almost insensitive with respect to the size of the system, which indicates that the ground state can in principle be described properly by SRRVB. The ground state energy was calculated both in the SRRVB and in the RVB basis. For 16-spin system the former is -7,598058 (-0,474879 per spin) and the latter -7,654240 (-0,478390 per spin) (the SRRVB value is 99,3% of the exact value). For 32-spin system the values are -15,031844 (-0,469745 per spin) and ...[IN CALC.], respectively. To give an answer whether the lowest excitations of the system can be described properly in the n.n. basis, specific heat was calculated, which showed that the lower part of the excitation spectrum seems to be well described in the SRRVB basis.

9.7 cm

13.4 cm

Subject category :

6. Theory of Magnetism

Presentation mode :

poster

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