Quantum Monte Carlo Simulation of Antiferromagnetic Binary Alloy System with Random Exchange Interactions

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Abstract

Finite temperature properties of the 1D Antiferromagnetic Binary alloy of the type A(p)B(1–p) with random spin-spin interactions have been investigated by means of a Quantum Monte Carlo (QMC) simulation based on stochastic series expansion method. First, thermal variations of heat capacity and susceptibility have been calculated for a small system with exact diagonalization and QMC simulation. Next, influences of the finite-size on the thermodynamic variables have been discussed. QMC results show that values of the spin-spin interaction terms and concentration p of the magnetic atoms play a crucial role on the system characteristics. A hundred of random configurations have been used for each simulation data for all system sizes.

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