Interchain Coupling Induced Dimerization on Frustrated 1D Heisenberg Chains

R. Werner and C. Gros

Universität Dortmund, Institut für Physik, D-44221 Dortmund, Germany

In copper germanate the interchain coupling is known to be only one order of magnitude smaller than the nearest neighbor (n.n.) superexchange within the copper oxide chains. The ground state of the 1D Heisenberg chain with next nearest neighbor (n.n.n.) induced frustration is known to be a singlet dimerized state for the n.n.n. exchange being half the n.n. interaction. In one dimension the critical temperature of the ordering is at 0 degree Kelvin. The interaction of fluctuating dimers on neighboring chains can shift the critical temperature to finite values. We study the effect by phenomenologically describing the dimerized order of the chains by a mean field parameter. An approximate mapping on the Ising problem indicates the existence of a second order phase transition at finite temperatures. Simulating the propper integral equation of the order parameter by the Monte Carlo method permits the evaluation of the transition temperature.