

A Monte Carlo study of critical properties of strongly diluted magnetic semiconductor (Ga,Mn)As

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Within a Monte Carlo technique we examine critical properties of diluted bulk magnetic semiconductor (Ga,Mn)As modeled by a strongly diluted ferromagnetic Heisenberg spin- $\frac{5}{2}$ system on a face centered cubic lattice. We assumed that 5% of Ga atoms is substituted by Mn atoms and the interaction between them is of the RKKY-type. The considered system is randomly quenched and a double average was performed: firstly, over the Boltzmann probability distribution and secondly - over 2048 configurations related to the quenched disorder. We estimated the critical temperature: $T_c = 97 \pm 6$ K, which is in agreement with the experiment. The calculated high value of critical exponent ν seems to point to a possibility of non-universal critical behavior. Note that similar behavior was observed for Heisenberg spin glasses.

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