

On the universality class of 3d Ising model with long-range-correlated disorder

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In our report we analyze a controversial question about the universality class of the 3d Ising model with long-range-correlated disorder. Whereas both analytical and numerical studies performed so far support an extended Harris criterion [1] and bring about the new universality class, the numerical values of the critical exponents differ essentially [2,3]. To resolve this discrepancy we perform extensive Monte Carlo simulations of a 3d Ising model with non-occupied sites (impurities) arranged as lines with random orientation along the axes of the lattice. We apply Swendsen-Wang algorithm accompanied by a histogram reweighting technique and make use of the finite-size scaling to extract the values of critical exponents governing the second-order phase transition. Our estimates for the exponents [4] differ from the results of the two numerical simulations performed till now [2,3] and are in favour of a non-trivial dependency of the critical exponents on the peculiarities of impurities long-range correlations decay.

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