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Damage Spreading in the Ising Model with a Special Metropolis Dynamics Approach

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Abstract: The time evolution of the Hamming distance (damage spreading) for the S=1/2 and S=1 Ising models on the square lattice is performed with a special metropolis dynamics algorithm. Two distinct regimes are observed according to the temperature range for both models: a low-temperature one where the distance in the long-time limit is finite and seems not to depend on the initial distance and the system size; a high-temperature one where the distance vanishes in the long-time limit. Using the finite size scaling method, the dynamical phase transition (damage spreading transition) temperature is obtained as $T_c \cong 1.675 \pm 0.025$ for the S=1 Ising model.

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