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Dynamical correlation functions of the transverse Ising model with next-nearest-neighbor interactions P. R. C. GUIMARES, Universidade Federal de Viosa, Minas Gerais, Brazil, J. A. PLASCAK, University of Georgia, Athens - GA, USA, O. F. DE ALCANTARA BONFIM, University of Portland, Portland, Oregon, USA, J. FLORENCIO, Universidade Federal Fluminense, Niteri, RJ, Brazil — We investigate the effects of next-nearest-neighbor (NNN) interactions on the dynamics of the one-dimensional spin-1/2 transverse Ising model in the high temperature limit. Using exact diagonalization of finite chains, we obtain the time-dependent transverse correlation function and the corresponding spectral density for a tagged spin. Our results for chains of 13 spins with periodic boundary conditions produce results which are valid in the infinite-size limit. In general we find that the NNN coupling produces slower dynamics accompanied by an enhancement of the central mode behavior. Even in the case of a strong transverse field, if the NNN coupling is sufficiently large there is a crossover from collective mode to central mode behavior. We also obtain several recurrants for the continued fraction representation of the relaxation function.

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