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Non-equlibrium energy dynamics in spin chains and ladders FABIAN HEIDRICH-MEISNER, STEPHAN LANGER, MARKUS HEYL, LMU Munich, Germany, IAN MCCULLOCH, U Queensland, Brisbane, Australia — We investigate the real-time dynamics of the energy density in spin-1/2 chains and ladders, starting from initial states with an inhomogeneous profile of bond energies, extending our previous work on the dynamics of spin-density wave packets [1]. These simulations are carried out using the adaptive time-dependent density matrix renormalization group algorithm. We analyze the time-dependence of the spatial variance of the bond energies which yields necessary criteria for ballistic or diffusive energy dynamics. In the case of the XXZ chain, our results are consistent with ballistic behavior, both in the massless and the massive phase. For the massless regime, we compare our numerical results to predictions from bosonization for, e.g., the velocity that the initial perturbation spreads with. In the case of ladders, we find an involved dynamics whose qualitative interpretation is still under scrutiny.

[1] Langer et al. Phys. Rev. B 79, 214409 (2009)

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