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Dynamical correlations of spin-1/2 chains RODRIGO PEREIRA, University of British Columbia, STEVEN WHITE, UC Irvine, IAN AFFLECK, University of British Columbia — We show that the long-time behavior of the self-correlation function $\langle 0|S^z_j(t)S^z_j(0)|0\rangle$ of the S=1/2 XXZ model in the critical regime is dominated by high-energy excitations. We relate the exponents of the long-time decay to phase shifts which are known exactly from the Bethe ansatz. The same exponents are connected with the singularities of the dynamical structure factor $S^{zz}(q,\omega)$. By combining the analytical results with the time-dependent density matrix renormalization group (tDMRG), we calculate $S^{zz}(q,\omega)$ to very high precision.

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