

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Dynamical spin structure factor for the anisotropic spin-1/2 chain

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The longitudinal spin structure factor for the XXZ-chain at small wave-vector q is obtained using Bethe Ansatz, field theory methods and the Density Matrix Renormalization Group. It consists of a peak with peculiar, non-Lorentzian shape and a high-frequency tail. We show that the width of the peak is proportional to q^2 for finite magnetic field compared to q^3 for zero field. For the tail we derive an analytic formula without any adjustable parameters and demonstrate that the integrability of the model directly affects the lineshape.

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Date submitted: 22 Nov 2006

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