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.