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Dynamics of Heisenberg chains: from the Bethe Ansatz to inelastic neutron scattering

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Abstract

We review recent progress on the calculation of dynamical correlation functions for Heisenberg quantum spin chains using integrability, both for finite lattices and in the thermodynamic limit. Particular emphasis will be given on new results for the zero-field case at zero temperature, including four-spinon contributions to the structure factor of the isotropic antiferromagnet, and the two-spinon one for the gapped antiferromagnet. Relations to field theory for the correlation functions of the general finite field anisotropic case will also be discussed, as well as related results for other exactly solvable models. Comparisons with experimental inelastic neutron scattering measurements will also be presented.