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Quasi-soliton scattering in quantum spin chains DAVIDE FIORETTO, Institut fr Theoretische Physik, Friedrich-Hund-Platz 1, 37077 Gttingen, Germany, ROGIER VLJIM, Institute for Theoretical Physics, University of Amsterdam, Science Park 904, 1090 GL Amsterdam, The Netherlands, MARTIN GANAHL, Perimeter Institute for Theoretical Physics, 31 Caroline Street North, ON N2L 2Y5, Canada, MICHAEL BROCKMANN, MASUD HAQUE, Max-Planck-Institut fr Physik komplexer Systeme, Nthnitzer Strae 38, 01187 Dresden, Germany, HANS-GERD EVERTZ, Institut fr Theoretische Physik, Technische Universitt Graz, Petersgasse 16, 8010 Graz, Austria, JEAN-SBASTIEN CAUX, Institute for Theoretical Physics, University of Amsterdam, Science Park 904, 1090 GL Amsterdam, The Netherlands — The quantum scattering of magnon bound states in the anisotropic Heisenberg spin chain is shown to display features similar to the scattering of solitons in classical exactly solvable models. Localized colliding Gaussian wave packets of bound magnons are constructed from string solutions of the Bethe equations and subsequently evolved in time, relying on an algebraic Bethe ansatz based framework for the computation of local expectation values in real space-time. The local magnetization profile shows the trajectories of colliding wave packets of bound magnons, which obtain a spatial displacement upon scattering. Analytic predictions on the displacements for various values of anisotropy and string lengths are derived from scattering theory and Bethe ansatz phase shifts, matching time evolution fits on the displacements. The TEBD algorithm allows for the study of scattering displacements from spin-block states, showing similar displacement scattering features.

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