The $\mathfrak{su}(2|2)$ dynamic S-matrix

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Abstract

We derive and investigate the S-matrix for the $\mathfrak{su}(2|3)$ dynamic spin chain and for planar $\mathcal{N}=4$ super Yang–Mills. Due to the large amount of residual symmetry in the excitation picture, the S-matrix turns out to be fully constrained up to an overall phase. We carry on by diagonalizing it and obtain Bethe equations for periodic states. This proves an earlier proposal for the asymptotic Bethe equations for the $\mathfrak{su}(2|3)$ dynamic spin chain and for $\mathcal{N}=4$ SYM.

1   Introduction and conclusions

In general, computations in perturbative field theories are notoriously intricate. Recently, the discovery and application of integrable structures in planar four-dimensional gauge theories, primarily in conformal $\mathcal{N}=4$ super Yang–Mills theory, has led to drastic simplifications in determining some quantities. In particular, planar anomalous dimensions of local operators can be mapped to energies of quantum spin chain states thus establishing some relation to topics of condensed matter physics. The Hamiltonian of this system is completely integrable at one loop [1, 2] and apparently even