

One-loop integrable S-matrices from tree-level

Wednesday, 25 September 2024 13:00 (25 minutes)

Integrable quantum field theories in 1+1 dimensions play a central role in many areas of physics. They provide examples of exactly solvable models, whose S-matrices can be conjectured through the so-called S-matrix bootstrap program. While this axiomatic program allowed in the past decades for the determination of the S-matrices of several integrable theories, there is now growing evidence that many S-matrices are hardly obtained through the bootstrap, as is the case for many non-linear sigma models defined on the worldsheet of superstrings. In this talk I will propose an alternative way to construct the S-matrices of 1+1 dimensional integrable theories which relies on standard perturbation theory; starting from the assumption that the theory is integrable at the tree level I will show how to write sums of one-loop diagrams in terms of tree amplitudes and I will derive in this way a universal formula for the one-loop two-to-two S-matrices in terms of tree S-matrices. I will show how this method works for integrable bosonic Lagrangians with polynomial interactions.

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