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A new Quantum Spectral Curve for AdS3/CFT2

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One of the major achievements of the study of integrability in AdS/CFT has been the development of the Quantum Spectral Curve (QSC): a powerful set of equations which give access to the full planar spectrum of N=4 SYM at finite coupling. These equations, which have the form of a nonlinear Riemann-Hilbert problem, are the central mathematical structure of integrability, and recent results indicate that they can be used to compute not only the spectrum, but also correlation functions.

A new version of the QSC was also found for the ABJM theory, but the generalization to integrable AdS3/CFT2 dual pairs remained an open problem. The main obstacle was the presence of massless modes in the integrable description of the worldsheet theory, which made it impossible to follow the usual derivation.

Recently, we proposed a Quantum Spectral Curve for string theory on AdS3xS3xT4 with pure Ramond-Ramond flux, using a new logic. The conjecture is based on symmetry principles and general properties of the QSC deduced from the AdS4 and AdS5 cases, and was shown to pass very nontrivial tests. Intriguingly, the new equations require to drop some of the assumptions on the solutions of the Riemann-Hilbert problem: the branch points are no longer of square-root type. This minimal modification was enough to rederive the highly complex dressing phases of the worldsheet S-matrix in the massive sector.

This proposal, if confirmed, opens the way to precision spectroscopy to reveal the properties of the still elusive dual CFT, for which there is no Lagrangian.
I will discuss in detail how we came to this conjecture, the evidence it is correct, and the many perspectives for the future. Based on 2109.05500, with N. Gromov, B. Stefanski and A. Torrielli.

Type of contribution

Contributed Talk or Poster

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