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Non-perturbative Methods for Planar $N=4$ SYM at Conformal Point

Friday, 18 October 2024 14:00 (45 minutes)

In this pedagogical talk, we discuss non-perturbative methods to study planar $N=4$ SYM theory. Focusing on the four-point correlation function of the stress-energy tensor at the conformal point, we show how sum rules based on dispersion relations can be used to numerically bootstrap various objects in the theory, such as OPE coefficients, the four-point correlation function, and the energy-energy correlator. We show, for the first time, rigorous non-perturbative results for the planar OPE coefficients of single-trace operators, as well as the correlation function at various points in cross-ratio space. Additionally, focusing on the energy-energy correlator (EEC), we present rigorous bounds for its spin-2 and spin-3 Legendre coefficients, as well as the full EEC function at various angles. These results were obtained for a wide range of 't Hooft couplings, highlighting the power of the bootstrap in probing the non-perturbative aspects of planar $N=4$ SYM theory.

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