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Title:

“On the one-loop curvature function in the $sl(2)$ sector of $N=4$ SYM”

Abstract:

We consider twist J operators with spin S in the $sl(2)$ sector of $N=4$ SYM. The small spin expansion of their anomalous dimension defines the so-called slope functions. Much is known about the linear term, but the study of the quadratic correction, the curvature function, started only very recently. At any fixed J , the curvature function can be extracted at all loops from the $P\mu$ -system formulation of the Thermodynamical Bethe Ansatz. Here, we work at the one-loop level and follow a different approach. We present a systematic double expansion of the Bethe Ansatz equations at large J and small winding number. We succeed in fully resumming this expansion and obtain a closed explicit simple formula for the one-loop curvature function. The formula is parametric in J and can be evaluated with minor effort for any fixed J . The result is an explicit series in odd-index ζ values. Our approach provides a complete reconciliation between the $P\mu$ -system predictions and the large J approach.