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Three Point Functions in ABJM Theory-Weak Coupling Computation

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We develop an integrability-based framework to compute structure constants of two subdeterminant operators and a single-trace non-BPS operator in ABJM theory in the planar limit. In this part of work I will introduce them at weak coupling using a relation to an integrable spin chain. We first develop a nested Bethe ansatz for an alternating SU(4) spin chain that describes single-trace operators made out of scalar fields. We then apply it to the computation of the structure constants and show that they are given by overlaps between a Bethe eigenstate and a matrix product state. We conjecture that the determinant operator corresponds to an integrable matrix product state and present a closed-form expression for the overlap, which resembles the so-called Gaudin determinant. We also provide evidence for the integrability of general sub-determinant operators. The techniques developed in this paper can be applied to other quantities in ABJM theory including three-point functions of single-trace operators.

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