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Lagrangians insertions: cusp anomalous dimension and large spin

Wednesday 25 September 2024 14:00 (17 minutes)

In the context of planar conformal gauge theory, we study five-point correlation functions between the interaction Lagrangian and four of the lightest single-trace, gauge-invariant scalar primaries. After performing two light-cone OPEs, we express this correlator in terms of the three-point functions between two leading-twist spinning operators and the Lagrangian. For finite values of spin, we compute these structure constants in perturbation theory up to two loops in N = 4 Super Yang–Mills theory. Large values of spin are captured by null polygon kinematics, where we use dualities with null polygon Wilson loops as well as factorization properties to bootstrap the universal behavior
of the structure constants at all loops. We find explicit maps that relate the Lagrangian structure constants with the leading-twist anomalous dimension. From the large-spin map, we recover the cusp anomalous dimension at strong and weak coupling, including genus-one terms.

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