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Higgs-regulated amplitudes in N = 4 SYM, the generalized cusp anomalous dimension and bound states of W-bosons

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We consider massive scattering amplitudes on the Coulomb branch of N = 4 SYM theory, obtained by giving a general vacuum expectation value to the scalars fields of the theory. Dual conformal invariance is still present in four-point amplitudes and the generalized cusp anomalous dimension characterizes its planar IR divergencies. The angle theta measures the relative orientation for Coulomb branch expectation values associated to pairs of external W-bosons. We check explicitly at three-loop the expected expression of the cusp anomalous dimension. Furthermore, using Regge theory and dual conformal invariance, we discuss bound states of W-bosons as functions of theta, both at weak and strong coupling.

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