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Ansätze and Five-Point Two-Loop Amplitudes: W+two-jets Production at the LHC.

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Over the coming decade, the experimental program at the LHC will reach unprecedented levels of precision. To match this on the theory side, extremely complicated amplitude calculations must be performed. Recently, we have witnessed a boom in analytic calculations of scattering amplitudes, pushed forward by the application of finite fields and Ansatz methodology. These approaches have made possible the computation a number of five point amplitudes at two-loop relevant for NNLO QCD corrections at the LHC. This modern paradigm allows one to efficiently compute both the differential equations that control the master integrals and the decomposition of the amplitudes in terms of said integrals.

In this talk, we discuss the recent application of this approach in the case of two-loop amplitudes for the production of a W boson in association with two jets at the LHC. We briefly describe the construction of the differential equation for the master integrals and thereafter elaborate on the modern reconstruction approach for the calculation of the amplitude coefficients, which makes use of efficient Vandermonde-based sampling and a univariate partial fractions decomposition.

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