NNLO QCD corrections for the production of a heavy-quark pair in association with a massive boson

Friday 19 April 2024 10:00 (30 minutes)

The current frontier of NNLO computations is represented by $2 \to 3$ processes with external massive legs. In this talk we will present recent progresses in NNLO QCD computations for processes where a heavy-quark pair is produced in association with a massive boson, mainly focusing on $t\bar{t}H$, $Wb\bar{b}$ and $Wt\bar{t}$ production.

The achievement of a complete NNLO calculation for this class of processes is a challenging task since it requires the availability of the corresponding scattering amplitudes as well as an efficient method to handle and cancel infrared singularities. In our framework, the latter is achieved thanks to the well-established q_T-subtraction, properly extended to the case of heavy-quark production in association with a colourless system. Despite recent remarkable progress in multi-loop calculations, the computation of two-loop amplitudes for $2 \to 3$ and higher-multiplicity processes, with several masses involved, is still at the frontier of current techniques.

We will discuss the approximations we adopted to circumvent the bottleneck of the missing double-virtual contribution, mainly focusing on a *soft-boson approximation* and the *massification* technique. Finally, we will present results for the total cross section and phenomenologically relevant distributions.

Primary authors: SAVOINI, Chiara (University of Zurich); MAZZITELLI, Javier; Dr BUONOCORE, Luca (University of Zurich); ROTTOLI, Luca (University of Zurich); GRAZZINI, Massimiliano (University of Zurich); DEVOTO, Simone (UNIMI); KALLWEIT, Stefan (Università degli Studi di Milano-Bicocca)

Presenter: SAVOINI, Chiara (University of Zurich)

Session Classification: Plenary 4