ICHEP 2022 BOLOGNA

ICHEP 2022
XLI
International Conference
on High Energy Physics
Bologna (Italy)

6
13 07 2022

Contribution ID: **837**

Type: **Parallel Talk**

Three-loop four-particle QCD amplitudes

Friday, 8 July 2022 09:30 (15 minutes)

Scattering amplitudes are the fundamental building blocks of collider observables. Comparing high precision measurements to theory predictions requires computing them to high perturbative order. The growth in the number of loops significantly increases the complexity of the problem. Using novel mathematical methods allowed to compute QCD corrections to four-point massless processes at state-of-the-art three-loop order. We will describe these modern tools and show their example application to recently published diphoton production in gluon fusion channel. This particular process is a leading background for Higgs production in the discovery channel. The analytic amplitude which we have computed can be used to derive fully differential NNLO hadronic cross section, since the subtraction schemes are already available. Because of the interference with the signal, it can put stronger bounds on the Higgs width.

In-person participation

Yes

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Session Classification: Formal Theory

Track Classification: Formal Theory