Contribution ID: 37

## Locally finite two-loop amplitudes for Higgs production in gluon fusion process

Thursday 18 April 2024 16:30 (30 minutes)

A universal numerical approach for computing loop amplitudes would permit to achieve high precision in theoretical predictions for a wide range of phenomenologically relevant processes. A major obstacle in developing such methods is the treatment of infrared and ultraviolet singularities. These need to be removed at the integrand level before numerical integration becomes feasible. In this talk, I will present a framework under development to construct locally finite two-loop amplitudes for arbitrary processes. It is based on the universality of infrared singularities, realizing infrared factorization manifestly on the local level. As a specific example, I will explain the construction of locally finite two-loop amplitudes for gluon-fusion processes with an arbitrary number of Higgs final states. We find that the infrared singularities of the QCD amplitudes reside in graphs of a simpler "scalar"QED theory and that the IR counterterms are simple amplitudes for well-known 2  $\rightarrow$  1 processes. Anticipating a generalization of our method to more complicated classes of QCD processes, I will also discuss our progress on the intricate problem of enabling Ward identity cancellations of collinear singularities locally with the introduction of novel "Feynman rules".

**Primary authors:** VENKATA, Aniruddha; ANASTASIOU, Babis; STERMAN, Geroge; KARLEN, Julia (ETH Zurich)

Presenter: KARLEN, Julia (ETH Zurich)

Session Classification: Parallel 8