

Event Generators and Resummation

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DESY Hamburg

Scientific Programme

At the LHC, QCD effects are crucial in the production and/or decay of the particles being measured or sought and in calculating the (often huge) backgrounds. A precise understanding of and ability to calculate QCD contributions is therefore vital to the success of the LHC.

With regard to high multiplicity final states, in particular, one has two main approaches: general purpose Monte Carlo algorithms and analytical resummation methods. The Monte Carlos try to simulate high multiplicity event in a fully exclusive way including the summation of large logarithms via the use of a parton shower. Unfortunately the accuracy of this summation is not entirely clear beyond the control of leading logarithmic terms. On the other hand analytic resummation programs make precise predictions by summing up large logarithms at least at next-to-leading logarithmic level but can be performed for a relatively small class of observables.

Topics:

Validating Monte Carlos against known analytic results.

Developing analytical ideas and using those developments to better understand the accuracy provided by event generators.

Discuss the accuracy of the different shower schemes with respect to resummation of large logarithms and understand their limitations.

Using event generators for resumming large logarithms at least at NLL level and going beyond leading colour.

Categorizing observables according to their analytic properties and their relations to event generators.

Parton distribution functions in event generators.

Continued development of better MC event generators.