19th MCnet Meeting

Report of Contributions

https://indico.cern.ch/e/822710
Simulating Double Parton Scattering

Presentation based on 1906.04669.

Primary author: CABOUAT, Baptiste (University of Manchester)
Presenter: CABOUAT, Baptiste (University of Manchester)
W^+W^- pair production in $k_t$-factorisation in the SM and beyond

In this talk, I will present a summary of our calculations for the production of $W^+W^-$ pairs through leptonic decay channels $W^+W^- \rightarrow l^+\nu_l + l^-\nu_l$ in the framework of $k_t$-factorization. The calculations are performed using the TMD-PDFs of KMR, in different kinematic setups and the results are compared against their counter-part collinear predictions (from HERWIG7 event generator) as well as the existing experimental data from the ATLAS and the CMS collaborations for 8 and 13 TeV. A similar attempt has been made for the case of $W$-boson pair production through the $gg \rightarrow H \rightarrow W^+W^-$ channel, which is of considerable phenomenological interest at the NNLO QCD accuracy, for both the SM and BSM. We particularly target this NNLO sub-process, since its BSM sensitivity is of critical importance. It will be shown that our present SM predictions for the $W^+W^-$ boson pair production signal would provide the necessary and reliable SM base-line for the future BSM studies.

Primary author:  Dr MASOUMINIA, Aidin (IPPP, Durham)

Presenter:  Dr MASOUMINIA, Aidin (IPPP, Durham)
The helicity-flow method

It is well-known that the spinor-helicity method can significantly simplify the calculations of both Feynman diagrams and scattering amplitudes. In this work, we attempt to further simplify the Feynman-diagram calculation by converting the spinor-helicity method into a flow method, allowing a one-line journey from Feynman diagram to inner products. The cases of massless QED and QCD will be discussed.

**Primary author:** LIFSON, Andrew (Lund University)

**Co-authors:** REUSCHLE, Christian (Florida State University); SJODAHL, Malin (Lund University)

**Presenter:** LIFSON, Andrew (Lund University)
Equilibration in QCD with an effective kinetic theory event generator for proton-proton and heavy ion collisions

This presentation will cover a short introduction of myself and a brief overview of the PhD project that I have recently started working on. This project consists of constructing and implementing a complete event generator for proton-proton, proton-ion and ion-ion collisions in the multi-purpose event generator SHERPA. The main part of the project is to implement an effective kinetic theory describing weakly coupled QCD plasmas in thermal field theory, which will be supplemented with suitable initial conditions and a hadronisation prescription.

Primary author: TÖRNKVIST, Robin (Lund University)

Presenter: TÖRNKVIST, Robin (Lund University)
Observables and status of heavy-ion physics

We discuss observables present in the heavy-ion community today and the challenges associated with it for event generators, specifically for PYTHIA.

**Primary authors:** Ms CHAKRABORTY, Smita (Lund University); BIERLICH, Christian (Lund University (SE)); GUSTAFSON, Gosta (Lund University); LÖNNBLAD, Leif (Lund University (SE))

**Presenter:** Ms CHAKRABORTY, Smita (Lund University)
Hadronic rescattering in Pythia

We have developed a framework for hadronic rescattering in Pythia. Our goal is to study how rescattering can account for QGP-like effects such as flow, jet quenching, etc. In this presentation I will outline our algorithm and present some preliminary results.

Primary authors: UTHEIM, Marius (Lund University); SJOSTRAND, Torbjorn
Presenter: UTHEIM, Marius (Lund University)
Introducing myself to MCnet collaboration

I’m going to give a short presentation of my master thesis studies about threshold resummation for double differential cross sections. Afterwards the main lines of this Ph.D. project, about loop induced processes, are introduced.

**Primary author:** Mr VILLANI, Simon Luca (University of Göttingen)

**Presenter:** Mr VILLANI, Simon Luca (University of Göttingen)
High Energy resummation for Higgs plus dijets

Higgs boson production in association with two jets is an interesting process to measure the Higgs to weak-boson coupling (WBF). However at the LHC the inclusive production of Hjj is dominated by the gluon fusion component, where the Higgs boson couples to the gluon via a top loop. The gluon fusion component is typically reduced by cuts requiring a large invariant dijet mass. Such mass cuts force the phase space in a region of large rapidity separations between the jets, where a logarithm ln(s/t) becomes relevant.

I will present the latest efforts of resumming even Next-to-Leading logarithmic contributions, as implemented in the generator High Energy Jets (HEJ). Since the limit of large top-mass and the high energy limit commute, the full top mass dependence can be retained in the predictions. The effect of the finite top mass is a further 10% reduction of the cross section, on top of the ~40% reduction within the WBF cuts of the results obtained with the HEJ resummation compared to the results at NLO.

**Primary author:** HEIL, Marian (IPPP, Durham)

**Presenter:** HEIL, Marian (IPPP, Durham)