

# 19th MCnet Meeting



## Report of Contributions

Contribution ID: 57

Type: **not specified**

## Simulating Double Parton Scattering

*Thursday, 5 September 2019 13:20 (20 minutes)*

Presentation based on 1906.04669.

**Primary author:** CABOUAT, Baptiste (University of Manchester)

**Presenter:** CABOUAT, Baptiste (University of Manchester)

**Session Classification:** Student Talks

Contribution ID: 58

Type: **not specified**

## $W^+W^-$ pair production in $k_t$ -factorisation in the SM and beyond

*Thursday, 5 September 2019 13:40 (20 minutes)*

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)

**Session Classification:** Student Talks

Contribution ID: 59

Type: **not specified**

## The helicity-flow method

*Thursday, 5 September 2019 10:50 (20 minutes)*

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)

**Session Classification:** Student Talks

Contribution ID: 60

Type: **not specified**

## Equilibration in QCD with an effective kinetic theory event generator for proton-proton and heavy ion collisions

*Thursday, 5 September 2019 11:10 (20 minutes)*

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)

**Session Classification:** Student Talks

Contribution ID: **61**

Type: **not specified**

## Observables and status of heavy-ion physics

*Thursday, 5 September 2019 14:00 (20 minutes)*

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); LÖNNBLAD, Leif (Lund University (SE)); BIERLICH, Christian (Lund University (SE)); GUSTAFSON, Gosta (Lund University)

**Presenter:** Ms CHAKRABORTY, Smita (Lund University)

**Session Classification:** Student Talks

Contribution ID: 62

Type: **not specified**

## Hadronic rescattering in Pythia

*Thursday, 5 September 2019 14:20 (20 minutes)*

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)

**Session Classification:** Student Talks

Contribution ID: 63

Type: **not specified**

## Introducing myself to MCnet collaboration

*Thursday, 5 September 2019 11:30 (20 minutes)*

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)

**Session Classification:** Student Talks



Contribution ID: 64

Type: **not specified**

## High Energy resummation for Higgs plus dijets

*Thursday, 5 September 2019 15:50 (20 minutes)*

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 Higgs 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)

**Session Classification:** Student Talks

Contribution ID: 65

Type: **not specified**

## A New Biasing Method for Variance Reduction of Compton Events in GEANT4

*Thursday, 5 September 2019 15:30 (20 minutes)*

In this talk, we present a new biasing method which is used to reduce the variance of low and high angle Compton scattered events from a pencil beam of X-rays interacting with a sample. The method is used to provide more accurate scatter kernels at lower computational cost than is achievable using standard GEANT4 biasing methods.

A scatter kernel is the point spread function described by the scattering of x-rays from a pencil beam through interaction with a sample. These kernels are used in medical image processing to provide a digital correction of scatter which has been shown to outperform traditional methods of physical scatter rejection using an anti-scatter grid (ASG).

In order to provide an accurate estimate of the scatter, low variance kernels must be generated in GEANT4. Due to the low probability of high angle scatter, the computational cost of producing such kernels is high. This new Compton biasing method has been proven to give both a reduction in variance and a lower computational cost.

**Primary author:** Mr KUMAR, Sunil (Panjab University (IN))

**Presenter:** Mr KUMAR, Sunil (Panjab University (IN))

**Session Classification:** Student Talks

Contribution ID: 66

Type: **not specified**

## HEJ: Status Update

*Thursday, 5 September 2019 10:00 (20 minutes)*

I will present the results and new features that now exist within HEJ since the last MCnet meeting at CERN. In the past year, a new public release, HEJ2, as well as finite quark mass effects have been included.

I will also present briefly the ongoing work within the HEJ collaboration, including the steps towards NLL.

**Primary author:** BLACK, James (IPPP)

**Presenter:** BLACK, James (IPPP)

**Session Classification:** Generator Updates

Contribution ID: 67

Type: **not specified**

## Madgraph update

*Thursday, 5 September 2019 09:20 (20 minutes)*

I will present a new feature that is being implemented in madgraph, the possibility to generate polarised scattering events in order to perform polarisation studies and take advantage of the fact that certain physics is polarisation sensitive.

**Primary author:** MANTANI, Luca (UCLouvain)

**Presenter:** MANTANI, Luca (UCLouvain)

**Session Classification:** Generator Updates

Contribution ID: 68

Type: **not specified**

## Uncertainties in NLO Merging Schemes

*Thursday, 5 September 2019 16:10 (20 minutes)*

Uncertainties in NLO calculations are often estimated by variations of the renormalization scale. The same can be done in parton showers. I talk about the consistent treatment of renormalization scale variations in the unitary merging of NLO matrix element calculations and parton showers. Furthermore, I discuss some freedom in reweighting NLO corrections and compare different unitary merging prescriptions.

**Primary author:** GELLERSEN, Leif (Lund University)

**Presenter:** GELLERSEN, Leif (Lund University)

**Session Classification:** Student Talks

Contribution ID: **69**

Type: **not specified**

## **Recoil and Kinematics in Parton Showers**

*Thursday, 5 September 2019 14:40 (20 minutes)*

I will talk about kinematic mapping for dipole parton showers and recoil mechanisms comparing local and global recoil and Herwig. I will also briefly discuss the extension of this to the two emission case.

**Primary author:** SIMPSON DORE, Emma (KIT)

**Presenter:** SIMPSON DORE, Emma (KIT)

**Session Classification:** Student Talks

Contribution ID: 70

Type: **not specified**

## Soft Photon Resummation in SHERPA

*Thursday, 5 September 2019 16:30 (20 minutes)*

I will discuss the resummation of soft photon via the YFS algorithm for ISR in Sherpa

**Primary authors:** PRICE, Alan; KRAUSS, Frank Martin (University of Durham (GB))

**Presenter:** PRICE, Alan

**Session Classification:** Student Talks

Contribution ID: 71

Type: **not specified**

## 4 lepton measurement designed for reinterpretation

*Thursday, 5 September 2019 16:50 (20 minutes)*

4 lepton measurement designed for reinterpretation

**Primary author:** HUANG, Joanna (University of London (GB))

**Presenter:** HUANG, Joanna (University of London (GB))

**Session Classification:** Student Talks