

# 21st MCnet Meeting



## Report of Contributions

Contribution ID: 74

Type: **not specified**

## Calculating the QCD Primary Lund Jet Plane Density

*Wednesday, 9 September 2020 14:00 (20 minutes)*

The primary Lund Jet Plane has for several decades been a powerful tool for jet parton showers, jet substructure, and resummation. In 2018, Dreyer, Salam, and Soyez promoted this tool to a substructure observable used to discriminate boosted electroweak particles from the QCD background. Recently, Salam, Soyez, and I calculated the QCD density of emissions at next-to-leading logarithmic accuracy. This talk will focus on the recent work available at <https://arxiv.org/abs/2007.06578>, part of which formed my master's thesis in 2018.

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

**Presenter:** LIFSON, Andrew (Lund University)

**Session Classification:** Student Talks

Contribution ID: 75

Type: **not specified**

## String shoving in jets in PYTHIA8

*Wednesday, 9 September 2020 14:20 (20 minutes)*

Jet observables in dijet events are excellent probes to study collision dynamics in dense systems. Interacting Lund strings will affect jet observables and suggests a new common mechanism responsible for jet modification in p-A and A-A. In this talk, we present our new implementation of the string shoving mechanism in PYTHIA8 which lets us study the effects on jet observables in p-p and nuclear collisions. We also present preliminary results for di hadron correlation studies and show the effects in hadron-jet correlation studies.

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

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

**Session Classification:** Student Talks

Contribution ID: 76

Type: **not specified**

## Colorful event deconstruction

*Wednesday, 9 September 2020 14:40 (20 minutes)*

I review the HYTREES approach, an improved implementation of the Shower/Event deconstruction method by including hard matrix elements with multiple jet emissions. I further discuss how this can be improved by subleading colour corrections in parton shower reconstruction.

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

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

**Session Classification:** Student Talks

Contribution ID: 77

Type: **not specified**

## Unit testing in HEP

*Wednesday, 9 September 2020 15:20 (20 minutes)*

Most software in HEP are developed over many years by multiple authors. It is therefore easy to accidentally introduce bugs. In this talk I will give an overview of the existing tools for unite testing and continues integration, which can help to at least not break working code.

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

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

**Session Classification:** Student Talks

Contribution ID: 78

Type: **not specified**

## **Rivet3 and HEPMC3**

*Thursday, 10 September 2020 13:30 (30 minutes)*

**Presenter:** BUCKLEY, Andy (University of Glasgow (GB))

**Session Classification:** Discussion session

Contribution ID: 79

Type: **not specified**

## **Issues and conventions for variation weights**

*Thursday, 10 September 2020 14:00 (30 minutes)*

**Presenter:** GUTSCHOW, Christian (UCL (UK))

**Session Classification:** Discussion session

Contribution ID: **80**

Type: **not specified**

## **Future of MCnet**

*Thursday, 10 September 2020 15:20 (40 minutes)*

**Presenter:** SCHUMANN, Steffen (Georg-August-Universität Göttingen)

**Session Classification:** Discussion session



Contribution ID: **81**

Type: **not specified**

## **Feedback from Machine Learning School**

*Thursday, 10 September 2020 14:50 (30 minutes)*

**Presenters:** SJODAHL, Malin (Lund University); PRESTEL, Stefan

**Session Classification:** Discussion session

Contribution ID: **82**Type: **not specified**

## Efficient Multi-Jet Merging at High Multiplicities

*Wednesday, 9 September 2020 15:40 (20 minutes)*

I will present an implementation of the CKKW-L multi-jet merging technique to so-called sector showers as implemented in the Vincia antenna shower. The bijective nature of sector showers allows for efficient multi-jet merging at high multiplicities, as any given configuration possesses only a single shower history. After briefly reviewing the idea of sector showers, I will demonstrate that the complexity of constructing histories for these develops only an effective linear scaling with the number of final-state particles. Using the example of weak boson+jets at the LHC, I will demonstrate that the overall event generation time and the memory footprint of the new implementation remain approximately constant when including additional jets. This talk will be based on [arxiv.org/abs/2008.09468](https://arxiv.org/abs/2008.09468).

**Primary author:** PREUSS, Christian (Monash University)

**Co-authors:** Dr BROOKS, Helen; SKANDS, Peter (Monash University (AU))

**Presenter:** PREUSS, Christian (Monash University)

**Session Classification:** Student Talks

Contribution ID: **83**

Type: **not specified**

## **Global Recoil in Dipole Showers**

*Thursday, 10 September 2020 10:50 (20 minutes)*

I will discuss recent work on the implementation of global recoil methods in the Herwig dipole shower.

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

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

**Session Classification:** Student Talks

Contribution ID: **84**Type: **not specified**

## Diffractive Cross-Sections in Herwig

*Thursday, 10 September 2020 09:00 (20 minutes)*

We implement a model for diffractive cross-section in Herwig. We combine this model with a two-channel eikonal model including enhanced pomeron contributions and compare the result to cross section measurements at 7 TeV and 8 TeV. We further discuss an analytical expression which relates unresolved cross sections (pomeron exchanges) to resolved cross sections (soft, hard, diffractive).

**Primary author:** KIRCHGAESSER, Patrick

**Presenter:** KIRCHGAESSER, Patrick

**Session Classification:** Student Talks

Contribution ID: 85

Type: **not specified**

## Using measurements to constrain new physics with CONTUR

*Thursday, 10 September 2020 09:20 (20 minutes)*

A huge amount of effort and person-power goes into searching for evidence of beyond-the-SM (BSM) theories at the LHC. A search may take a large team over a year to produce, and even then may only focus on the model's most spectacular signature. But many BSM theories would probably already have been ruled out, because they would have caused measurable distortions to well-understood spectra of "standard" processes. If one could quickly check how a signal would have manifested itself in the myriad of LHC measurements to date, a huge amount of person-power could be liberated to focus instead on the remaining models which are not already ruled out. CONTUR is a tool which uses Herwig to generate events all 2->2 processes for a given BSM model, and runs the events through the bank of >150 LHC measurements which are preserved in Rivet+HEPdata, to very quickly gauge which parts of a model's parameter space is already ruled out. In this talk, I will give an overview of this powerful new approach. I will then highlight the results from a recent CONTUR paper (<https://arxiv.org/abs/2006.07172>), where we use this method to tackle a whole class of "Vector-like Quark" models, and show complementary results to the direct search program.

**Primary author:** Dr CORPE, Louie Dartmoor (UCL (GB))

**Co-authors:** BUTTERWORTH, Jonathan (UCL); HUANG, Joanna (University of London (GB)); BUCKLEY, Andy (University of Glasgow (GB))

**Presenter:** Dr CORPE, Louie Dartmoor (UCL (GB))

**Session Classification:** Student Talks

Contribution ID: 86

Type: **not specified**

## Interfacing Pythia with URQMD, a hadronic rescattering MC

*Thursday, 10 September 2020 09:40 (20 minutes)*

In Monte Carlo generators for pp physics, the possibility of hadronic rescatterings after hadronization is often neglected, but in heavy ion collisions such effects are ubiquitous. I will present a recent exploratory study, where the Pythia heavy ion model Angantyr was interfaced with the URQMD MC for hadronic rescatterings, which revealed large effects for jet observables, often attributed to “jet quenching” effects from a Quark-Gluon Plasma, as well as for flow.

The study points to the necessity of including hadronic rescattering effects when modeling soft observables in heavy ion collisions, but possibly also in high-multiplicity pp.

**Primary author:** BIERLICH, Christian (Lund University (SE))

**Presenter:** BIERLICH, Christian (Lund University (SE))

**Session Classification:** Student Talks

Contribution ID: 87

Type: **not specified**

## Sherpa generator studies for HWW analyses.

*Thursday, 10 September 2020 10:30 (20 minutes)*

In  $H \rightarrow WW$ , several event generators are used to optimize the analysis and estimate the expected yields of signal and backgrounds, as well as their associated systematic uncertainties. We are interested in Sherpa MC event generator for Higgs+jets simulation and WW+jets simulation because of its capability to produce higher jet multiplicities at NLO accuracy. This will help us to understand if with these samples the theoretical uncertainties associated with the migration among jet bins can be reduced as this is one of the major uncertainties in  $H \rightarrow WW$  analyses, where events are categorized in jet multiplicity bins.

**Primary author:** KAUR, Amandeep (Panjab University (IN))

**Presenter:** KAUR, Amandeep (Panjab University (IN))

**Session Classification:** Student Talks

Contribution ID: **88**

Type: **not specified**

## **Uncertainty on jet vetoes in $W+W-$ Vector Boson Scattering**

*Wednesday, 9 September 2020 16:00 (10 minutes)*

Introduction about myself and the project - I will start a short-term MCnet studentship in October, in Durham

**Primary author:** LIZZO, Mattia (Universita e INFN, Firenze (IT))

**Presenter:** LIZZO, Mattia (Universita e INFN, Firenze (IT))

**Session Classification:** Student Talks



Contribution ID: **89**

Type: **not specified**

## **B-Physics processes with SHERPA**

*Wednesday, 9 September 2020 16:10 (10 minutes)*

Please welcome me to this amazing community! In this talk, I will give a brief description about this brand new project for improving and developing the B-Physics processes using SHERPA event generation.

**Primary author:** OZCELIK, Ozlem (Bogazici University (TR))

**Presenter:** OZCELIK, Ozlem (Bogazici University (TR))

**Session Classification:** Student Talks

Contribution ID: 90

Type: **not specified**

## Measurement of differential cross-sections in four lepton events in 13 TeV pp collisions with the ATLAS detector

*Thursday, 10 September 2020 11:10 (20 minutes)*

I will present the unfolded measurements of four-lepton differential and integrated fiducial cross-sections, corresponding to events with two same-flavour, opposite-charge electron or muon pairs. The final-state has contributions from a number of interesting Standard Model processes that dominate in different four-lepton invariant mass regions, including single  $Z$  boson production, Higgs boson production and on-shell  $ZZ$  production, with a complex mix of interference terms, and possible contributions from beyond-the-Standard Model physics. The differential cross-sections include the four-lepton invariant mass inclusively, in slices of other kinematic variables, and in different lepton flavour categories. Also measured are di-lepton invariant masses, transverse momenta, and angular correlation variables, in four regions of four-lepton invariant mass, each dominated by different processes.

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

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

**Session Classification:** Student Talks