

Cascade developer meeting

- Hope that you are all ok !

Next Conferences/workshops

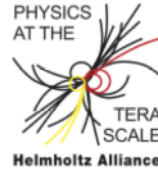
- REF 2021 15-19 Nov 2021 <https://indico.desy.de/event/28334/>

PB TMD with CASCADE - Monte Carlo school

Helmholtz Alliance

PHYSICS AT THE TERASCALE

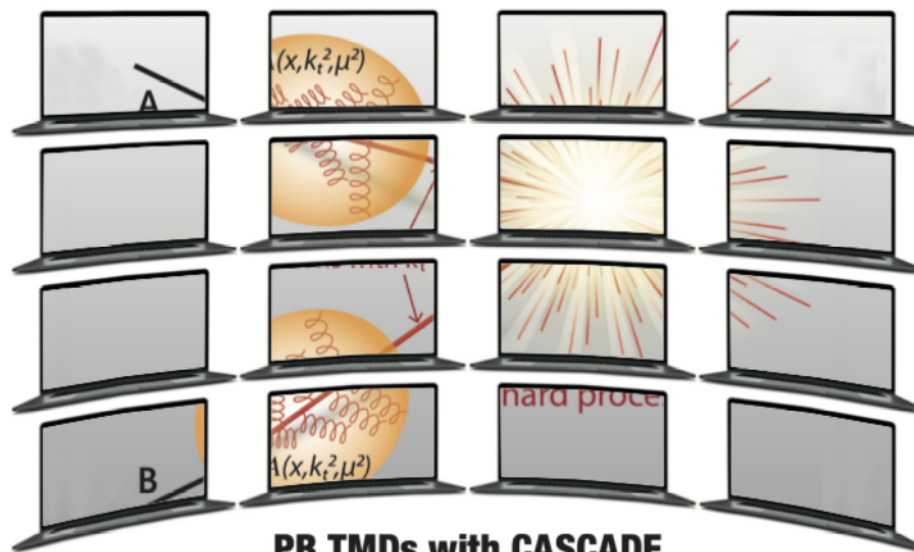
Deutsches Elektronen-Synchrotron DESY +++ Karlsruher Institut für Technologie - Großforschungsbereich +++ Max-Planck-Institut für Physik +++ Rheinisch-Westfälische Technische Hochschule Aachen
+++ Humboldt-Universität zu Berlin +++ Rheinische Friedrich-Wilhelms-Universität Bonn +++ Technische Universität Dortmund +++ Technische Universität Dresden +++ Albert-Ludwigs-Universität
Freiburg +++ Justus-Liebig-Universität Gießen +++ Georg-August-Universität Göttingen +++ Universität Hamburg +++ Ruprecht-Karls-Universität Heidelberg +++ Karlsruher Institut für
Technologie - Universitätsbereich +++ Johannes Gutenberg-Universität Mainz +++ Ludwig-Maximilians-Universität München +++ Universität Regensburg +++ Universität Rostock +++ Universität
Siegen +++ Julius-Maximilians-Universität Würzburg +++ Bergische Universität Wuppertal +++



- 54 registrations until now
- very diverse:
 - students (from summerstudents)
 - PhD students
 - Postdocs
 - Senior scientists

Virtual Monte-Carlo School 2021

8-12 November 2021 (on Zoom)



Programme:

- Intro to MC techniques and Parton Shower (S. Prestel, Lund)
- Intro to Parton Branching TMDs (F. Hautmann, Oxford/Antwerp)
- Intro to CASCADE (A. Bermudez Martinez, DESY)
- Physics at future colliders (M. Mangano, CERN)
- Exercises on high pT di-jets at LHC energies
- Results of exercises will be presented at REF2021 workshop and published

Organisation Team: Armando Bermúdez Martínez (DESY), Hannes Jung (DESY), Sara Taheri Monfared (DESY), Qun Wang (DESY)

Please register on <https://indico.desy.de/event/31877/>

www.terascale.de/mc2021

PB TMD with CASCADE - Monte Carlo school

	8 Nov 2021		9 Nov 2021		10 Nov 2021		11 Nov 2021		12 Nov 2021	
AM										
PM	13:00	Lecture: Intro to Monte Carlo (until 15:00) () $\mathcal{Q}$ -	13:00	Lecture: Intro to PB TMDs and CASCADE (until 16:00) () $\mathcal{Q}$ -	13:00	Exercises on Dijets at LHC (until 15:00) () $\mathcal{Q}$ -	13:00	Exercises on Dijets at LHC (until 15:55) () $\mathcal{Q}$ -	13:00	Summary - preparation of contribution (until 15:00) () $\mathcal{Q}$ -
	13:00	Lecture: Intro to Monte Carlo - Stefan Prestel (Lund University) () $\mathcal{Q}$ -	13:00	Lecture: Intro to PB TMDs - Francesco Hautmann (Oxford/Antwerpen) Francesco Hautmann (Oxford/Antwerpen) () $\mathcal{Q}$ -	13:00	Exercises on Dijets at LHC () $\mathcal{Q}$ -	13:00	Exercises on Dijets at LHC () $\mathcal{Q}$ -	13:00	Summary - preparation of contribution () $\mathcal{Q}$ -
	15:00	Technical setup (until 16:00) () $\mathcal{Q}$ -	15:00	Introduction to CASCADE - Armando Bermudez Martinez (CMS (CMS Fachgruppe QCD)) () $\mathcal{Q}$ -			16:00	Physics at future colliders - Michelangelo Mangano (CERN) () $\mathcal{Q}$ -		
	15:00	Technical setup () $\mathcal{Q}$ -	16:00	Technical setup (until 16:30) () $\mathcal{Q}$ -			17:30	Science & Society Seminar: Science for Peace - Rolf Heuer (CERN) () $\mathcal{Q}$ -		
			16:00	Technical setup () $\mathcal{Q}$ -						

Exercises

Goals of the Parton Branching (PB) TMD school

- using PB TMDs inside a MC event generator
- identifying region of importance for TMDs
- understanding the role of PB TMDs and PB TMD parton shower
- uncertainties coming from PB TMDs and PB TMD shower

Hands-On Exercises

Run PB TMD MC event generator CASCADE3 for high pt dijet production at the LHC.

Analysis is performed with Rivet package.

We use MG5aMCatNLO (MC@NLO) LHE files for dijet production.

With a small plugin (dijets.cc), the features of high pt jet production is studied:

- Jet pt spectrum
- Dijet transverse momentum pt
- Dijet Delta phi correlation

Exercises (first day - all)

- Goals (using dijets.cc and CMS plugins for high pt jet production)
 - predictions from fixed NLO (fNLO) (using CASCADE3 to process fNLO LHE files for producing HepMC files for usage in Rivet)
 - predictions from MC@NLO at unphysical LHE level (after subtraction)
 - predictions from MC@NLO using TMDs and TMD shower
- Procedure:
 - run CASCADE3 in batch (on naf) for 1 LHE file applying different input cards
 - use pre-produced large statistics histogram (yoda) files to compare predictions

Exercises (2nd day - working groups)

1. study of effect of initial state TMD parton shower: TMDs + ISR + FSR
 - change in submit script: Onshell=1, SpaceShower=1, TimeShower=1
2. Scale and TMD uncertainties – shower uncertainties ?
 - change in submit script: errorTMD=0
3. comparison with Pythia8
 - running pythia8 with P8 subtracted LHE files
4. CASCADE3 and merging
 - running LO 1+2+3 MG5 LHE files with steering_merging.txt
5. KaTie with off-shell matrix elements
 - using pre-produced KaTie LHE files with steering_Katie.txt

Exercises (3rd day - all)

Collect all results

Understand predictions

Prepare presentation for REF 2021 workshop

Technical Instructions:

get your school account and passwd from:

<https://syncandshare.desy.de/index.php/f/377153229>

-> Mark the account you have selected

login to bastion (needed as gateway to DESY):

```
ssh -X schoolXX@bastion.desy.de
```

```
ssh -X pal.desy.de
```

```
mkdir mycascade
```

```
cd mycascade
```

```
cp -rp /afs/desy.de/user/j/jung/public/mcschool2021/cascade3 .
```

PB TMD with CASCADE – Exercise sessions

- MCatNLO+CAS3 yoda files are produced
 - full, TMD+ISR, TMD, LHE
- 100 MCatNLO LHE files are accessible for use in school
- LHE files for merging ?
- LHE files for KaTie ?

Additional pieces needed

- splitting of fNLO LHE files ?
 - 60 GB for 1 files, split into 1000 ?
- KaTie LHE files ?
- merge LHE files at LO ?