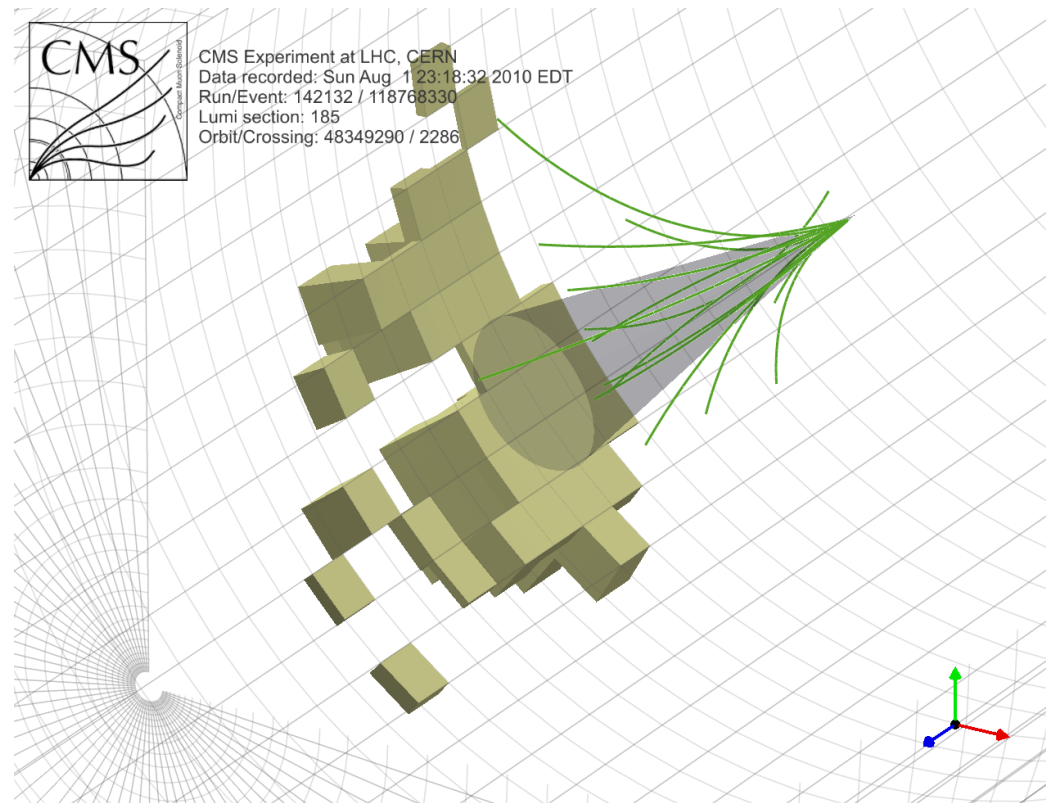


Tutorial category: Normal mode

MadAnalysis 5 + FastJet

MadAnalysis 5 + FastJet



Version 1.0

Date 24/07/2016

Official MadAnalysis 5 website : <https://launchpad.net/madanalysis5/>

Goals of this tutorial

- Installing the FastJet package in MadAnalysis 5
- Applying a jet-clustering algorithm on the top of the events before analysis them.
- Saving the processed events into a file
- Producing the ME/PS merging validation plots.

Requirements

- MadAnalysis 5 is installed on your system and has been launched successfully at least one time. The collection of example samples is installed too.
- Knowledge of the MadAnalysis 5 main concepts (see tutorials for beginners).



Part 1

Applying a jet-clustering algorithm

Installation of FastJet

It could be installed in a easy way by using the MadAnalysis console:

```
ma5> install fastjet
```

The last release of FastJetContrib will be also installed.

Launching MadAnalysis in reconstruction-level mode

For using FastJet, you should launch MadAnalysis with the `-R` argument.

```
bash> ./bin/ma5 -R
```

Setting the jet-clustering algorithm

- Large selection of jet algorithms

```
ma5> set main.clustering.algorithm =
      antikt                cdfjetclu          genkt      kt
      cambridge            cdfmidpoint       gridjet     siscone
```

- Adopting a jet algorithm → new options appear corresponding to algorithm & object-identification parameters

```
ma5> set main.clustering.algorithm = antikt
ma5> set main.clustering.ptmin     = 5
ma5> set main.clustering.radius    = 1
ma5> set main.clustering.bjet.efficiency = 0.5
```

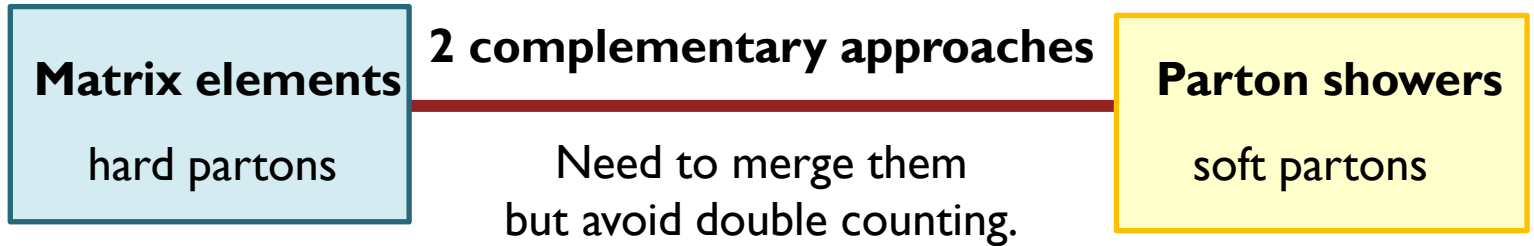
- Possibility to save the clustered events in to a “simplified” LHE

```
ma5> set main.outputfile = mysample.lhe.gz
```


Part 2

ME/PS merging validation plots

ME/PS merging validation plots



- **Merging matrix-elements with 0, 1, 2, 3, extra jets**
 - Study of the smoothness of the differential jet rate (DJR) distributions.
 - The scale for which an event goes from a $N \rightarrow N+1$ jet configuration.
 - Extremely sensible to the merging procedure.
 - This validates the choices for the merging parameters.
- **Running MadAnalysis 5 in reconstruction-level mode: `bin/ma5 -R`**

```
ma5> set main.merging.check = true
ma5> set main.merging.njets = 4
```

ME/PS merging validation plots

Example: drell-yan production with **MG5_aMC@NLO**

MG5_aMC@NLO

```
mg5> generate      p p > l+ l- @ 0  
mg5> add process  p p > l+ l- j @ 1  
mg5> add process  p p > l+ l- j j @ 2  
mg5> add process  p p > l+ l- j j j @ 3  
mg5> add process  p p > l+ l- j j j j @ 4
```

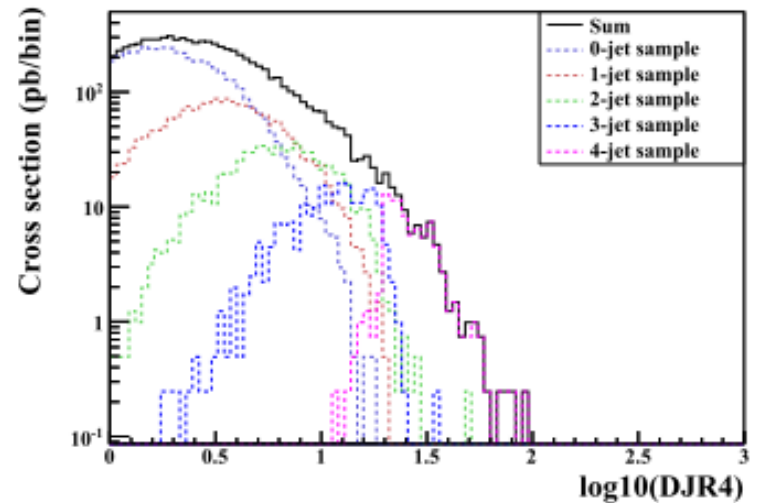
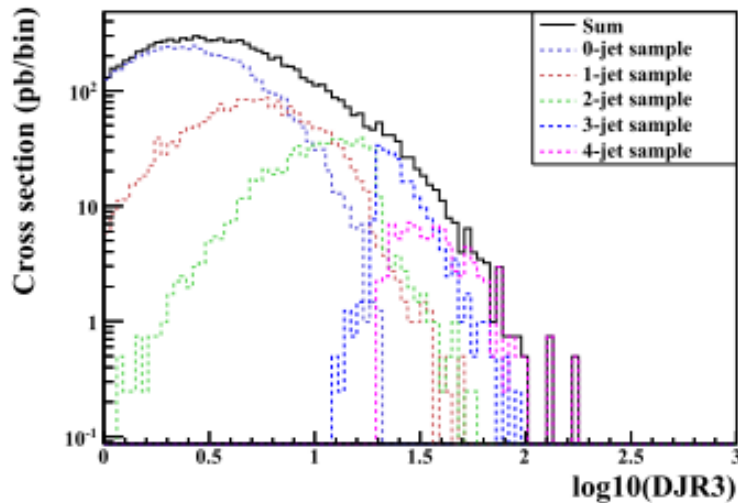
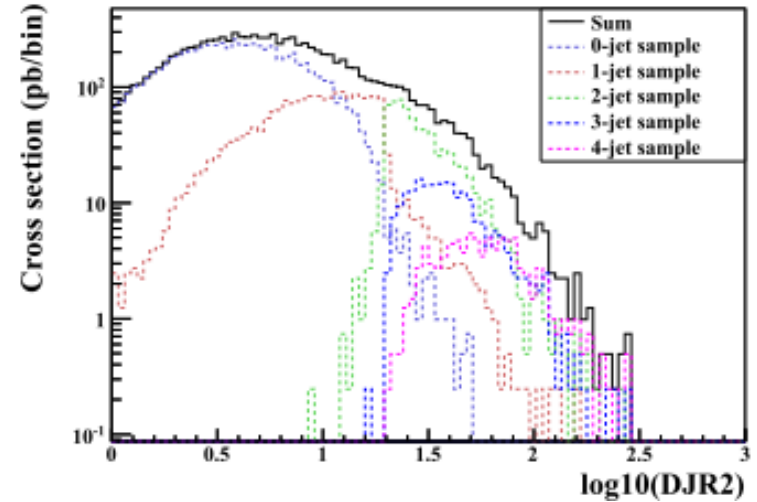
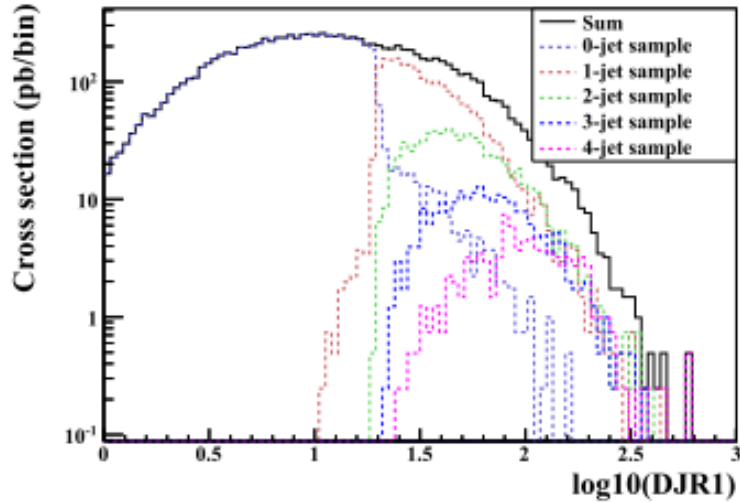
Pythia

MadAnalysis 5

ME/PS merging validation plots

Drell-yan production with 0, 1, 2, 3, 4 extra jets

MadAnalysis 5 + FastJet





About this document

- The present document is a part of the tutorial collection of the package MadAnalysis 5 (MA5 in abbreviated form). It has to be conceived to explain in a practical and graphical way the functionalities and the various options available in the last public release of MA5.
- The up-to-date version of this document, also the complete collection of tutorials, can be found on the MadAnalysis 5 website :

<https://madanalysis.irmp.ucl.ac.be/wiki/tutorials>

- Your feedback interests ourselves (bug reports, questions, comments, suggestions). You can contact the MadAnalysis 5 team by the email address : ma5team@iphc.cnrs.fr

