

# Delphes Tutorial

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**27 November 2015**

- Install ROOT (and load environment):

```
source [path-to-root-installation]/bin/thisroot.sh
```

- Download, unpack and install latest Delphes version

```
wget http://cp3.irmp.ucl.ac.be/downloads/Delphes-3.3.1.tar.gz  
tar xzvf Delphes-3.3.1.tar.gz  
cd Delphes-3.3.1  
make -j 4
```

- To run you need an hadron-level input file (produced by MG+Py/Herwig).  
Delphes accepts both \*.hep or \*.hepmc format.

You can download a small example sample from here (or generate one):

```
wget http://cp3.irmp.ucl.ac.be/downloads/z_ee.hep.gz  
gunzip z_ee.hep.gz
```

- And run with the default CMS detector card:

```
./DelphesSTDHEP cards/delphes_card_CMS.tcl output.root z_ee.hep
```

↓  
detector card

↓  
output file

↓  
input event file

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- Follow README file for a quick start tutorial, starting from section “Simple analysis [...]”

# Running Event Display



- Inside Delphes, run:

```
make display
```

- Run event display

```
root -l examples/EventDisplay.C ("cards/delphes_card_CMS.tcl", "delphes_output.root")
```

- Click on “Event control” tab and browse events. You can also zoom/rotate the different views

# Running Boosted analysis



- If you run Delphes with any default card (in cards dir), a jet collection is produced by default. In the Delphes card you can change some of the FastJet parameters.
- With MG5+Pythia6, generate 1k ttbar and dijet events, with a pt cut = 400 GeV (for ttbar you will have to use the ptheavy parameter). This will generate boosted events.

- Unzip the samples (with gunzip). The samples are located in

```
gunzip [..]/Events/run_[]/tag_1_pythia_events.hep.gz
```

- Run Delphes on this samples with the default CMS card. Open event display on ttbar events and appreciate boosted (3-prong) events.
- Open the default CMS card, locate the FastJetFinder module, and:
  - change the jet radius to  $R = 1.0$
  - set ComputeNsubjettiness 1 (this will activate computation of N-subjettiness)
- Compare the events and jet multiplicity distribution obtained in both cases.
- Compare tau3/tau1 for dijet and ttbar (download Nsub.C from wiki):

```
root -l examples/Nsub.C'("tt.root","dijet.root")'
```