

Jet Tutorial

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Preparation: link root files

1. Login to the NAF (ini cmssw, cd CMSSW-2-2-13, cmsenv etc.)
2. Link the following two files:
 `ln -s /scratch/current/cms/hegner/SM.root`
 `ln -s /scratch/current/cms/hegner/BSM.root`
3. Here you will also find two other files to copy:
 `cp /scratch/current/cms/hegner/HOWTO .`
 `cp /scratch/current/cms/hegner/example.C .`

1st task: look at events via fireworks

- Install and run fireworks:
 - `cd /tmp`
 - `wget http://cern.ch/cms-sdt/fireworks/cmsShow22.tar.gz`
 - `tar xzf cmsShow22.tar.gz`
 - `cd cmsShow22`
 - `./cmsShow /scratch/current/cms/hegner/SM.root`
- Just have a look at several events to get a feeling, how the jets (and other variables) look like
- For a nice demo video, you can watch here (not now! Take it as a homework...):

<http://cms-service-sdtweb.web.cern.ch/cms-service-sdtweb/fireworks/demo.mov>

2nd task: compare variables of different jet algorithms

- Read in the 1st file using FWLite
- Fill histograms with the following variables for SISCONe (R=0.5) and kTJets (D=0.4 and 0.7) for uncorrected jets (see example.C:
 - p_T (of highest p_T jet)
 - p_T (of 2nd highest p_T jet)
 - η (of highest p_T jet)
 - η (of 2nd highest p_T jet)
 - ϕ between the two jets
 - Invariant dijet mass
- Compare these histograms for the different jet algorithms

3rd task: influence of the jet energy scale

- Have another look at the invariant mass: what particle might this be?
 - Apply the different jet corrections and watch the development of the invariant mass:
 - raw (done previously)
 - off - L1Offset offset correction
 - rel - L2Relative relative inter eta correction
 - abs - L3Absolute absolute pt correction
 - emf - L4Emf correction as a function of the jet emf
 - had - L5Flavour hadron level correction for gluons, light quarks, charm, beauty
 - ue - underlying event correction for gluons, light quarks, charm, beauty
 - part - L7Parton parton level correction for gluons, light quarks, charm, beauty
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4th task:
Find a new particle
with it's correct mass

- Read in the 2nd file using FWLite
- Apply the previously calculated jet energy scale and fill histograms with the following variables for SISCONe (R=0.5 and 0.7) and kTJets (D=0.4 and 0.6):
 - p_T (of highest p_T jet)
 - p_T (of 2nd highest p_T jet)
 - η (of highest p_T jet)
 - η (of 2nd highest p_T jet)
 - ϕ between the two jets
 - Invariant dijet mass
- What is the mass of your new particle?