Tutorial and Tools for Jet Resolution Studies

- Example of how to use the StNtuple
- Redo clustering

→ *Parton, Hadron, JetClu, MidPoint KtClus*

- Apply correction algorithms in one job

→ *L5, H1, and Particle Flow*

- Make direct comparisons between the different algorithms
- Framework to validate and study performance

→ *Compare to hadron level jets*

- Work towards interfacing code to both StNtuple and TopNtuple

Documentation at:

`http://ncdf76.fnal.gov/~chlebana/ana/higgs/DataAccess/Tutorial/`

Tutorial Features

Read StNtuple from a file

```
chain->AddFile("/data/ncdf76/b/higgs/bhgs1c/stntuple/bc028202.0001hgs1",
               TChain::kBigNumber);
```

Read StNtuple from a remote server

→ Access to samples used for jet energy scale studies

Samples generated with range of ZMass (light quarks and $b\bar{b}$)

```
chain->AddFile("root://fcdfdata120.fnal.gov//export/data8/qcd/bhatti/zmass/zmass.0009.stn",
               TChain::kBigNumber);
```

Access StNtuple Jet Blocks

→ *Eample of using the StNtuple*

Reapply Clustering code

→ *Clustering-on-the-fly*

Needed for studies (parton and hadron level jets)

Apply Jet corrections
→ *JES Corrections, H1, PFA, NN?*

Produce output ntuple
→ *Convienient for studies*

→ *Contains a subset of jet variables making it easier to study the performance*

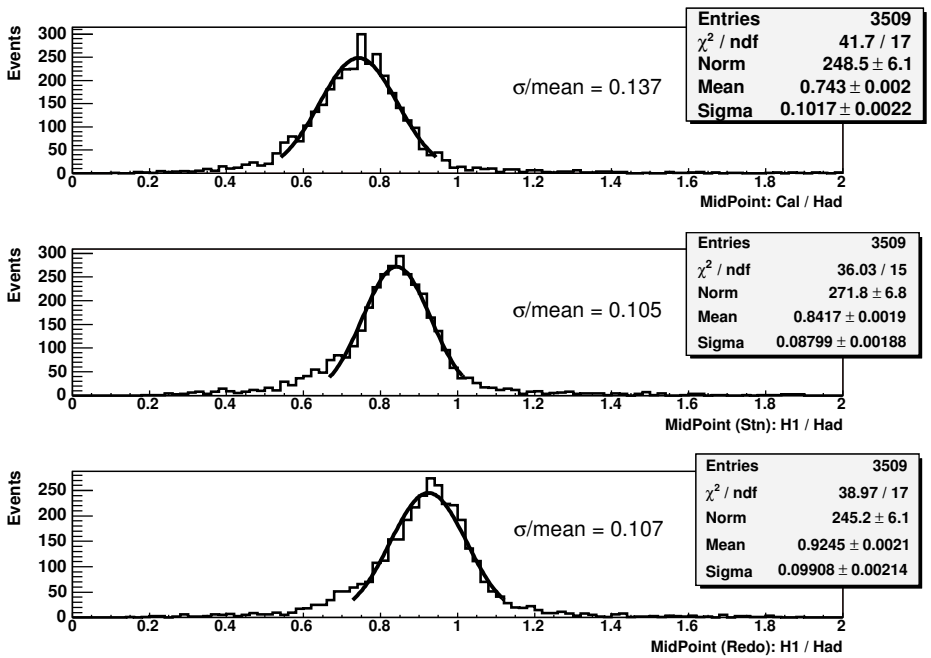
Access output ntuple and generate plots
→ *Example macros to produce plots*

Some Random Comments...

StNtuples are not all generated with the same jet clusters

Missing: Parton/Hadron level jets, H1-JetClu jets

Very useful to be able to recluster jets "on the fly"

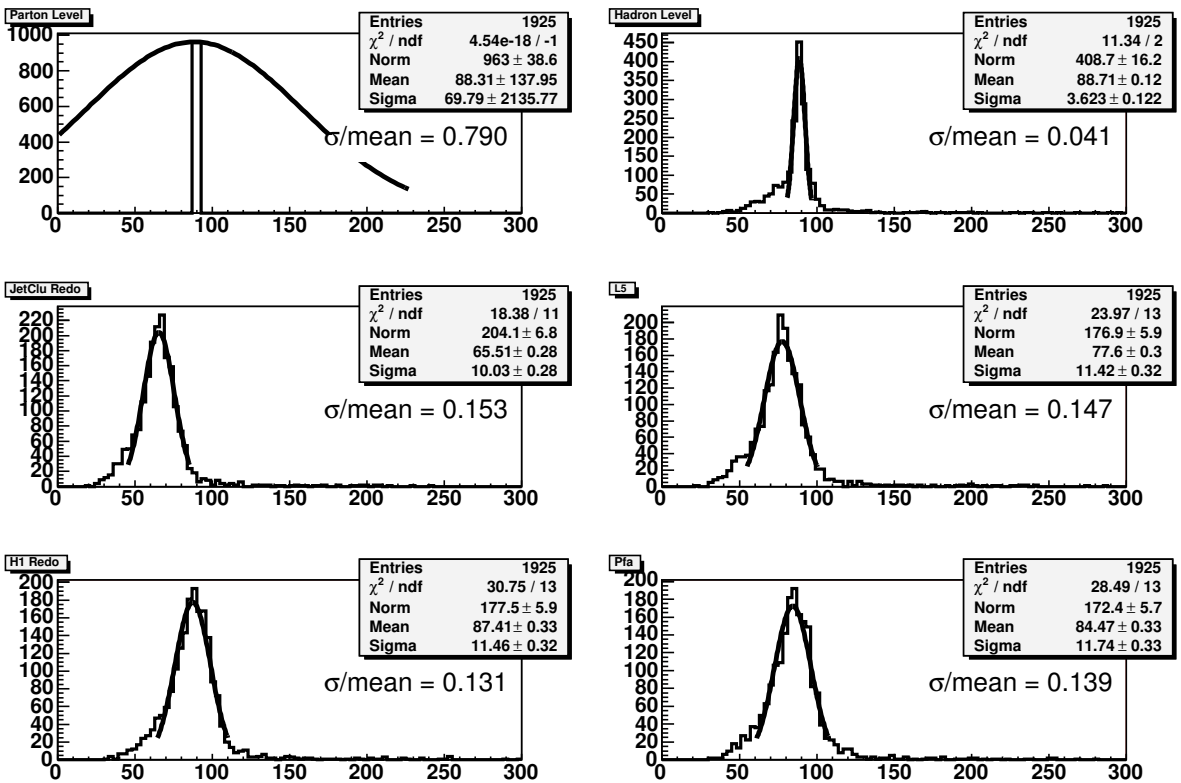


Once you apply the correction at the AC++ level you are stuck with what you get...

More flexable to be able to apply the correction at the ntuple level

See better results when applying H1 correction to the StNtuple

Dijet Mass of the ZMASS=90 (light quarks) MC sample



JetClu cone 0.7

Raw

L5

H1

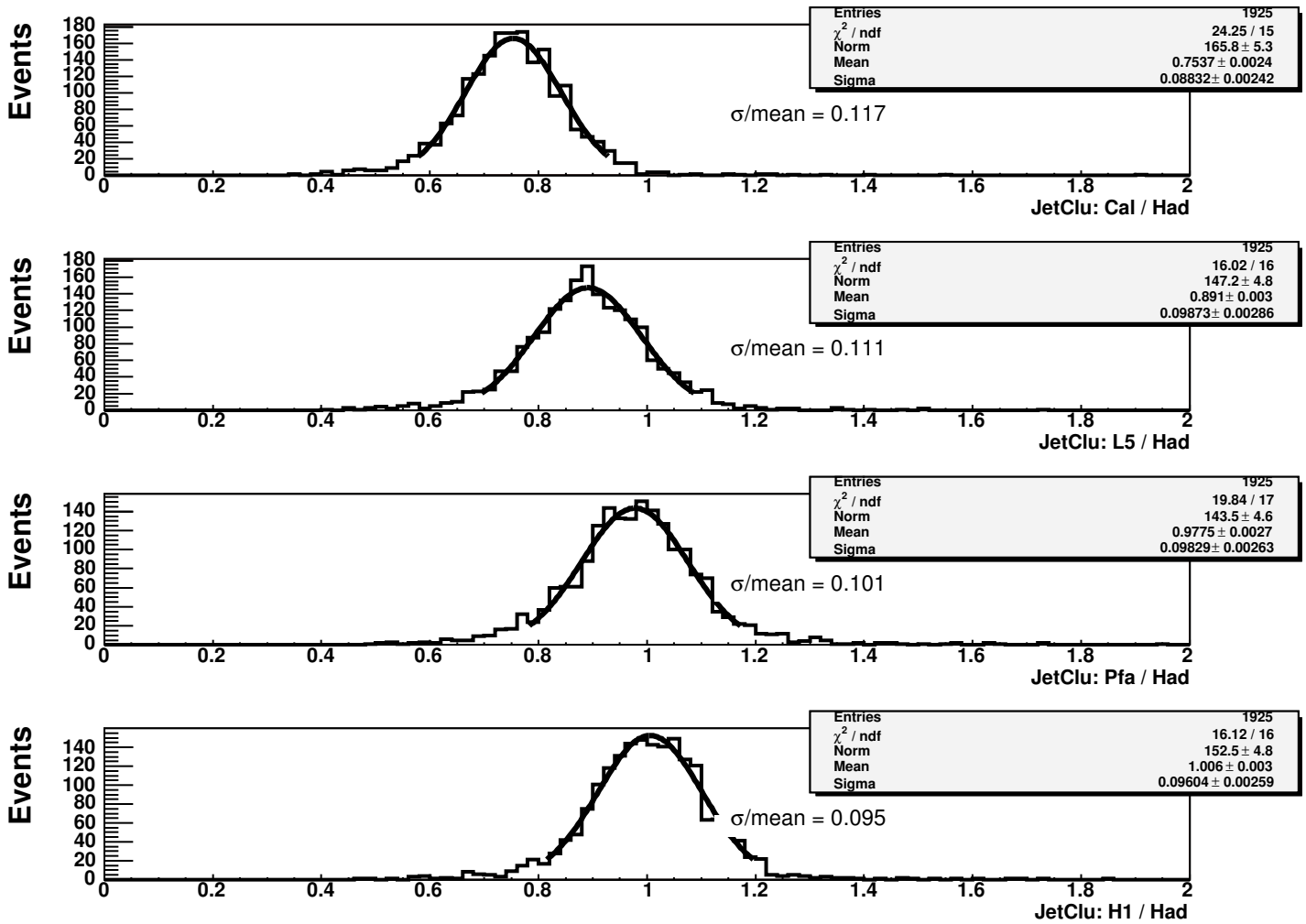
Pfa

What is the best metric to look at?

Want to compare the reconstructed dijet mass to the hadron level dijet mass

$$\frac{\sigma\ (\ Reco(M_{jj})/Hadron(M_{jj})\ )}{<Reco(M_{jj})/Hadron(M_{jj})>}$$

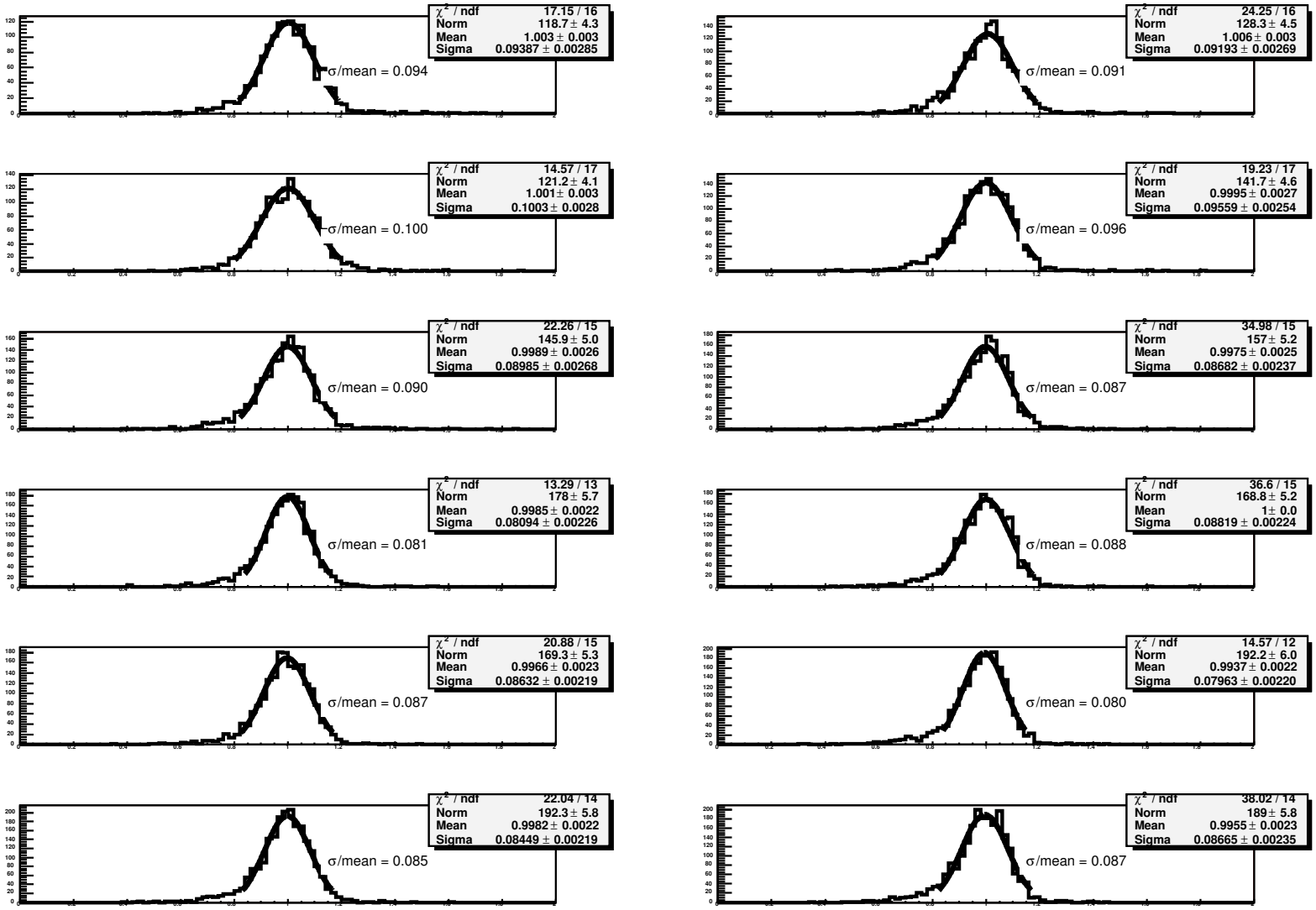
Reco(M_{jj}) / Hadron(M_{jj}) for different correction methods



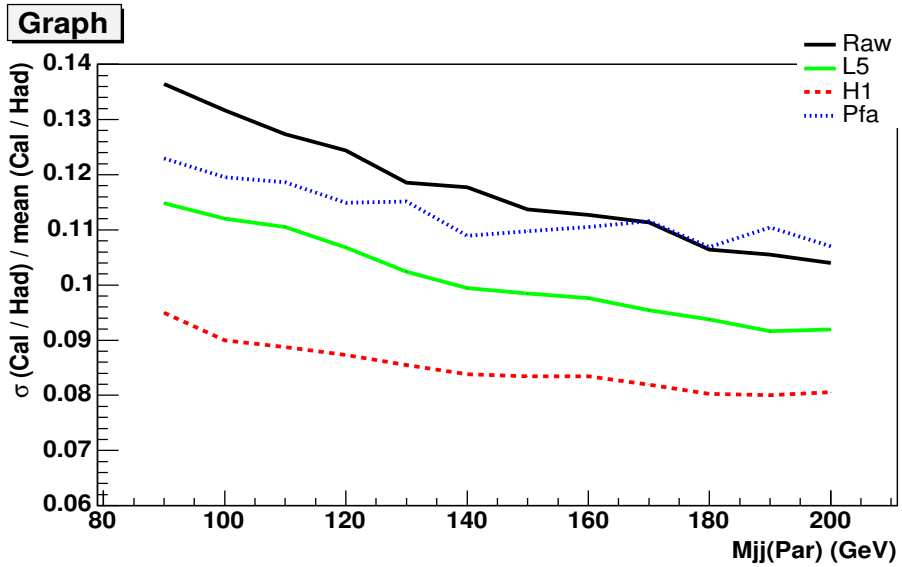
H1 gives very good results "out of the box"

mean $= 1.006 \pm 0.003$
$\sigma/\text{mean} = 0.095$

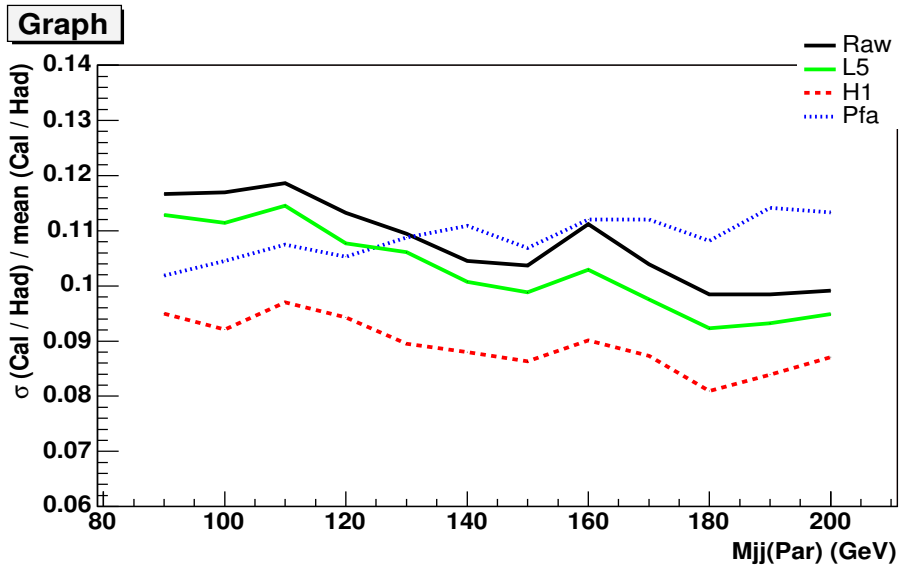
σ/mean in different M_{jj} bins ranging from 90 - 200 GeV



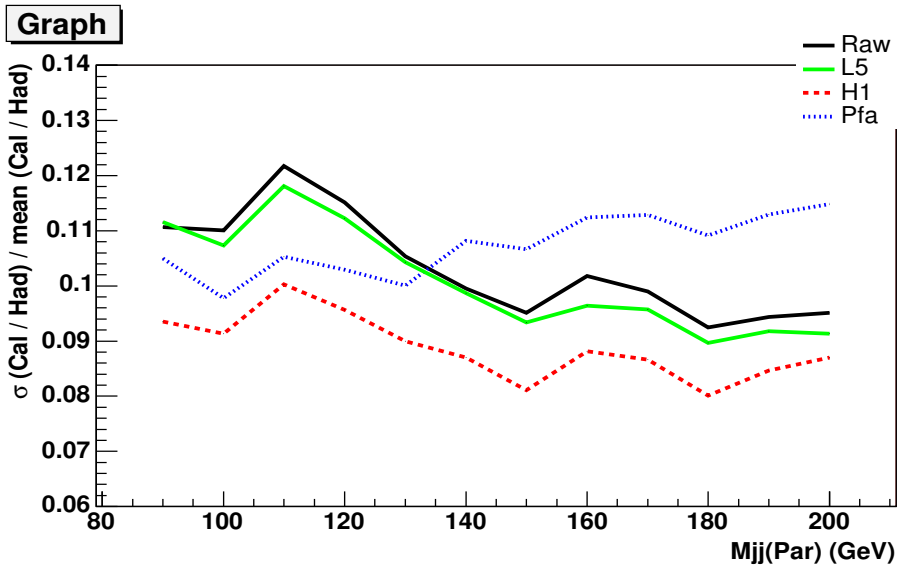
All Eta



Central $|DetEta| < 1$



Central $|DetEta| < 0.7$



To Do...

Need to have a well defined starting point that is reproducable

Validate results
Put code into cvs
Specify initial settings

Interface to StNtuple and TopNtuple

Provide interface to StNtuple
Define ntuple independant interface
Add missing information to TopNtuple
Longer term support issues

Work through systematic error estimate

Demonstrate improvement in an analysis

Study alernative jet algorithms/cone size

Summary

Not all Jet Collections and Corrected Jets are available in the ntuple

→ *Need tools to call corrections from the ntuple*

Can run H1 from StNtuple level

→ *In order to take advantage of the best performing version of the H1 algorithm you need to apply it to the ntuple*

Need to have a reproducable starting point

→ *Need to put code in cvs and make sure we track versions*

Need to understand Pfa results

Add Neural Net example...

Provide a ntuple independant interface (TopNtuple and StNtuple)