

Testing the Hadronic Calibration on $t\bar{t}$ events

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- ▶ Introduction
- ▶ Creating ESDs and AODs
- ▶ $t\bar{t}$ analysis example job



Introduction

- ▶ The main aim of this work is to study hadronic calibration using $t\bar{t}$ events
- ▶ $t\bar{t}$ events provide
 - jets (invariant mass)
 - b-jets (Energy scale)
 - light flavour jets
 - top mass (combined b-jets + 2 jets)
- ▶ This is a good physics sample to study/understand the effects of the calorimeter calibration



Useful web pages ... so far

► Tutorials, howto, etc. etc.

- See e.g.
<https://uimon.cern.ch/twiki/bin/view/Atlas/UKTopWorkingGroup>
- Page written by Ketevi A. Assamagan:
<http://www.usatlas.bnl.gov/PAT/tutorial904.html>
with useful “tutorials” and links on “howto”
- NIKEF main top web page
http://www.nikef.nl/pub/experiments/atlaswiki/index.php/Main_Page
- Sven’s MPI talk:
<http://cds.mppmu.mpg.de/cdsagenda/askArchive.php?base=agenda&categ=a0567&id=a0567s1t0/transparencies>
“How to make new jets from calibrated Topo clusters”



First step create ESDs and AODs I

- ▶ The first step to study the effects of the hadronic calibration on $t\bar{t}$ events was to create ESDs and AODs with and without modified calo reco
- ▶ To create ESDs and AODs I have followed the information given by Sven in his MPI talk
- ▶ Release used to run the code: 11.0.41
- ▶ Data of used: `/castor/cern.ch/grid/atlas/datafiles/rome/digit/rome.004520.digit.ttbarWm/rome.004520.digit.ttbarWm._00001.pool.root.1`



First step create ESDs and AODs II

► Our case:

- Producing ESD from digit files takes a long time
- The ESD contains all calo cells, so the ESD can be used to re-reconstruct any higher calo reco object
- The strategy to test/evaluate/compute calibration constants is:
 - Produce default ESD with **RecExCommon** from digit files
 - Make a second ESD from the default ESD with modified calo reco (e.g. topo clusters with local hadron calibration, jets made with topo clusters etc.)
 - Produce AODs from both ESDs and run AOD analyses on the two AODs



Problem in re-clustering on ESD

- ▶ The RecExCommon creates default ESD
- ▶ It used to work in the release 10.0.4 and crashes in 11.0.X
- ▶ Problem reported in the Calorimeter and Performance meeting on the 1st of March, see: <http://agenda.cern.ch/fullAgenda.php?ida=a061321>
- ▶ Problem solved by Sven. New created tags: CaloUtils-00-02-60 for 11.X.0, and CaloUtils-00-02-57-01 for 11.0.X
- ▶ A first set of ESDs and AODs with only 50 events have been created



$t\bar{t}$ analysis job example I

- ▶ To start running a $t\bar{t}$ analysis, I have used the $t\bar{t}$ job example in:
[11.0.41/PhysicsAnalysis/AnalysisCommon/AnalysisExamples/AnalysisExamples-00-11-05](#)
- ▶ This $t\bar{t}$ example demonstrates a $g g \rightarrow l\nu b jj b$ reconstruction
- ▶ I have used the default `ttbarExample_jobOptions.py` given in
[11.0.41/PhysicsAnalysis/AnalysisCommon/AnalysisExamples/AnalysisExamples-00-11-05/share](#)



tt̄ analysis job example II

► Basic cuts used in the `tt̄` code (see `ttbarExample_jobOptions.py`):

```
# Author: Ketevi A. Assamagan
# BNL, July 16, 2004
# job options for ttbar -> jjb lnub analysis example
...
# User analysis steering algorithm
# Missing ET calibration options: "Raw" = uncalibrated, "H1" or "Region"
theApp.TopAlg          += [ "ttbar" ]
ttbar                  = Algorithm( "ttbar" )
ttbar.PreSelectedElectrons = "MyPreSelectedElectrons"
ttbar.PreSelectedMuons   = "MyPreSelectedMuons"
ttbar.PreSelectedBJets   = "MyPreSelectedBJets"
ttbar.PreSelectedJets    = "MyPreSelectedParticleJets"
ttbar.OutputLevel       = ERROR
ttbar.MissingEtObject    = "MET_Final"
ttbar.MissingEtCut       = 18.0*GeV
ttbar.EventWeight        = 1.0
ttbar.DeltaMjj           = 25.0*GeV
ttbar.HistDirectoryName = "ttbar"

# The AOD input file
EventSelector.InputCollections = [
    "/afs/cern.ch/user/k/ketevi/w0/aod/ttbar/dc2.003026.A0_top.g4dig807.aod870._00001.pool1.root"
```

