

Table of Contents

HCAL Data analysis (performance) group.....	1
Introduction.....	1
Tutorials.....	1
Documentation.....	1
Development of codes for the following topics.....	2
Performance studies in the following topics. Many are overlapped with other groups and will come up exact list of work in this group.....	2
Algorithms for something else.....	3
Heading 1.....	3
Subheading 1.....	3
Contacts.....	3
Review status.....	3

HCAL Data analysis (performance) group

An area for Offline Guide information

Introduction

At present the goal of this group is develop code to for Run-II data analysis. So, this is not only running existing code, but also develop the code itself.

To have a basic idea of HCAL subsystem and its readout channels, please look on * [CMS_note_2005/006](#)

Tutorials

Two example codes are given in the following area,

`/afs/cern.ch/work/m/majumder/anal/CMSSW_6_2_0/src/Test/`

to look on

A. HcalDigiReader : Digitised signal in HCAL subsystem (HBHE, HO and HF)

This code contains topic,

1. Pedestal from data base
2. Access Digitised sample (fC) in these subsystem
3. Create histogramme of time profile of towers with same ieta (phi-averaged)
4. Python files to run job at CERN :
 1. For data : `digiread_data.py`
 2. For MC : `digiread_mc.py`

B. HcalRecoReader : RECO signal in all subsystem

1. Accessing RECO signal (GeV) in each tower
2. Entries in each tower
3. Average signal (GeV) in each tower
4. RMS in each tower
5. Occupancy with a threshold
6. Average signal above a certain threshold
7. RECO signal in individual tower
8. Position of each tower using geometry information
9. Energy in exact eta-phi plane
10. Python files to run job at CERN :
 1. For data : `recoead_data.py`
 2. For MC : `recoread_mc.py`
11. `Position = cms.untracked.bool(True)` : To have have true eta, phi map
12. `IndEnergy = cms.untracked.bool(True)` : To have individual RECO signal of each tower
13. `RECO = cms.untracked.bool(True)` : For RECO sample, for AOD, this is False

Documentation

Development of codes for the following topics

*. Noise filter for HO. At present we have developed code for monitoring tools to identify a new problems and now moving towards the algorithm to identify noise (Sandeep). (preliminary report)

*. Relative weight factor of HO with respect to HB or total JET energy. Here two approaches are taken,

- ♦ Use official PF technique used for existing PF calibration, where minimisation of total energy sum is used to calculate relative weight factor of HO (Swagata) (detector note) [↗](#) and
- ♦ We expect this correction is not linear, thus simple χ^2 method might not be a proper way to get this wet. Thus, it is trying to estimate from the view of longitudinally segmented calorimeter (NIM A409(98) 621) (Pawan).

*. Pileup subtraction in digitised signal : In PF algorithm, energy share in tracker and Calorimeter is based on the excess energy deposit in Calorimeter. In the correction of jet energy, pileup is subtract after this, which is not logical. Thus, here we are trying to estimate pileup in each digi/reco signal in HCAL, before it enter into PF candidate selection. This correction depends only on bunch train information and ieta (Ibrahim Soner).

*. Layerwise clustering algorithm : In phase-II, HCAL will have 4-5 readout in depth for each eta-phi tower and SLHC software code has the algorithm to make cluster in each depth separately. In 2012 data one can verify this. In endcap, we have readout in 2-3 depths.

Job : Using Z->mumu events, verify that this concept is correct and code is properly incorporated. Looks like there is an issue in this super cluster algorithm as well as identification of PFCandidate::h0 (slides). [↗](#)

*. Observed PT distributions of AK5PFJet in different period of 2012 runs are not same. That discussion is going on JetMET and HCAL group. Recently JetMET group has increased the error band to incorporate this discrepancy, but it is expected that main reason of this discrepancy is coming from noise/calibration in ECAL/HCAL system. By looking the spectrum of digi/reco sample, can we identify the source of this discrepancy ?

Job : Look for events, which passed and failed by official JetMET recommendation. Using that try to identify source of the discrepancy (slides). [↗](#)

Performance studies in the following topics. Many are overlapped with other groups and will come up exact list of work in this group.

Here are some examples,

1. Measurement and monitoring of large signal in Global in HBHE, HO, HF run and determination of source of the signal e.g. HPD noise, RBX noise, cosmic muon, Shower, 1) HBHE 2) HO, 3) HF (Sanjeev Kumar). First look on the comparison of large signal in April Global Run and November runs

2. Measurement and monitoring of coherent noise in HBHE, HF (already Sandeep is working for HO, will extend in other two cases). First look on correlated noise in RM and RBX noise in April Global Run and November runs

3. Measurement and monitoring of spectrum of random HCAL noise, from pedestal noise O(100MeV) to TeV scale noise in Global run. Code will be develop in topic 5 in previous of development (Prolay Mal). First look on the comparison of noise in April Global Run and November runs

4. Studies of HB response to cosmic muon (already code exist and as a part of calibration work people are looking this for HO and it is very difficult for HF (first presentation) [↗](#)-- Nadeesha Manohari Wickramage.

Average signal in HCAL tower (crossed towers near the front face of HCAL) in April global Run and Nov run (upto 3rd Nov).

5. MC Studies of HF PMT hits and fiber bundle hits, including a development of the HF PMT hit simulation.
6. Look in details at the data collected with the new PMTs in HF during Run I
7. HE radiation damage studies with collision data and development of monitoring tool
8. Analysis of 2014 test beam data with the QIE8 to measure the time slewing and pulse shapes
9. Analysis of Run 1 data to check the time synchronization of the channels in HBHE, with the goal to measure the precision with which we need to time-in the HBHE for 25ns reconstruction.
10. Using existing standard code, setup data mixing tools particularly for HCAL system.

- link to another doc page - another short explanation

Algorithms for something else

- link to a doc page - short explanation

Heading 1

Subheading 1

Contacts

- Subgroup home page:
- Conveners:
- Hypernews forum: <https://hypernews.cern.ch/HyperNews/CMS/get/xxx.html>

Review status

Reviewer/Editor and Date (copy from screen)	Comments
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Responsible: ResponsibleIndividual

Last reviewed by: Most recent reviewer

This topic: CMSPublic > HCALDataAnalysis

Topic revision: r13 - 2015-01-26 - GobindaMajumder



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