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ECAL Shifting Notes

Before an ECAL Shift

To request a shift, go to the shiftlist monthly view, and sign up for a week of ECAL_DG Lieutenant followed by a week of ECAL_DOC. Exclusive preference is given to this combination. Then send an email to Andre David (andre.david@cernNOSPAMPLEASE.ch) and Cristina Bino (Cristina.Biino@cernNOSPAMPLEASE.ch) to officially request the shifts.

There are several things to do before your first DGL/DoC shift. First of all, ensure that you have a way to get to the run meeting at P5. The CERN Carshare service may be of use for this. Note they only provide manual transmission vehicles. It is also possible to rent a PH or CERN car, which are 15-20CHF/day, and the PH cars may be taken home (email phcars.service@cernNOSPAMPLEASE.ch or stop by Bat. 124). However, you evidently need to reserve them far in advance. There is also the option to rent a car through a commerical car rental agency, but the cost is around 45CHF/day (stop by Bat. 130). The meeting is at 9:30AM Monday-Thursday, and 10:00AM on Friday-Sunday, and takes place in building SCX5. Go in the main door and turn right. You need to be at the first meeting to exchange phones.

As a DGL, you can connect to the meetings by EVO, but it may be easier to talk with the DoC if you are at the meeting in person. You can find the meeting on EVO by searching for "CMS Run Meeting." It is password protected, so you should ask the DoC what the latest password is a few days ahead of time. They are trying to switch the meeting over to Vidyo which needs to be installed, and you can find a link to the particular meeting on Indico (the password is listed on the Indico page).

In addition, acccess to SCX5 requires requires EDH approval. The first thing to do is complete the safety training. To access P5 and the control room, you need basic safety (levels 1 and 2), as well as level 3 and 4C (4C is specific to CMS). Note that it can take some time to go through the safety information and take the tests, so be sure to do this before your first shift.

Once you complete the training, go to EDH and, click the "Access Request" tab. Request access to LHC/LEP P5, then select CMS control room.

You also need a security certificate to get access to the DQM plots. It is recommended that you use Firefox. Follow these instructions for a CERN CA certificate. You can also get a grid certificate here from the DOE. Then follow the procedures listed on the USCMS page. For accessing DQM plots, a CERN CA certificate seems to be enough (?).

Subscribe to ECAL e-log updates by clicking the Config button, and check off "ECAL," and "Shift Leader," then click save on the top left. The page does not automatically refresh, so it's helpful to get automatic updates when there is an entry.

Helpful Links

Summary of what is going on at P5 can be found here:

http://cms-project-ecal-p5.web.cern.ch/cms-project-ECAL-P5/

Most of the links (left side of the page) you need to can be found from here. The first thing to look at is the RFM (DoC used to be called RFM) manual.

One of the main things the DGL is supposed to do is look at the Data Quality Management (DQM) plots, which can be found here. At least for Ecal Barrel (EB)/Ecal Endcap (EE), there is also the "Describe" button, which gives you info for each histogram.

Instructions for examining DQM plots

These are some basic instructions given to me by the DoC which describe which plots to look at:

DQM Shifter view:
Workspace Summary & then double-click on EB or EE.... => histogram Set & then also Layouts 00 Shift
ES ==> Standard "complete" set

DQM Workspace EcalBarrel ==> Layouts: 01 ECAL Shift
Normally check all the Folders: 01-09
At least for the 1-D plots, you should find References (Green) - albeit at lower Lumi/Pile-Up...
EcalEndcap ==> Layouts: 01 ECAL Shift
Normally check all the Folders: 01-09
At least for the 1-D plots, you should find References (Green) - albeit at lower Lumi/Pile-Up...
EcalCalibration ==> Layout: EcalCalibration: 3 folders - supposed to be "obvious" - occasional Red bits OK...!
EcalPrershower ==> I think ALL the histograms immediately appear on the "top" Page... - supposed to be "obvious"

There are two main categories of 2D plots: integrity plots and occupancy plots, and these involve different color schemes to see whether things are working correctly, described below:

1. Most things should go RED when they go wrong, Yellow means poor statistics, and White means empty (no events in that bin) - but this MAY be OK, in some circumstances.
2. Some "occupancy" plots are "just" in Blue, so you should look for localised dark (High occupancy) regions, or extensive regions too pale...

Some plots display quanitites such as the energy, and these plots may be "temperature" plots where the z axis is color scaled, in which case red doesn't necessarily mean bad, so look at the description carefully.

It's a good idea to "practice" on known good runs. Ask the DoC for a recent good run to look at.

Note that the green reference lines just come from a good previous run.

There are two DQM pages that can help understand the plots. This page is somewhat out of date however. This page has some complementary information.

Pedestal Runs

Every week, when we don't have beam we need to calibrate ECAL with pedestal runs.

Ask shift leader if we can have local control of ECAL.

Run Control Monitoring system

user:***

psswd: ****
check to make sure that there is no one else using ECAL. So go to Running Configurations

go to Configuration Chooser/ LocalReadout/Default/ECAL/CH4 ==>Create

Unlock

Initialize
Take Pedestal_TTCci run

Choose subdetector, so for example EE+ / EE-, so that the DQM job can finish, click apply ==> Configure. Then start.
Next do EB+ pedestal, same set of instructions.

Test Pulse_TTCci

When finished click destroy

Check ECAL private DQM
Update ECAL Log. Use WMB to check run numbers.

Tell shift leader we are done and that he can put ECAL back into global.

Notes on the ECAL system

Overview

Calibration

Calibration of ECAL occurs at a global level, meaning the whole detector and a channel to channel level, which is referred to as intercalibration. Channels are calibrated from labratory measurements of the cyrstals and

electronics for a first step. This reduces variation in light yield in the barrel from 15% to 5% and in the end cap from 25% to 10% Further calibration was performed on all 36 supermodules using cosmic rays. The idea is that a cosmic ray muon deposits roughly 250MeV when it passes through the full length of the crystal. To test the intercalibration coefficients, 9 of the supermodules were exposed to 90 and 120GeV electron beams. The experiment was performed twice, with a one month time interval, and this gave an RMS spread in intercalibration coefficients of 0.27%

Crystal transparencies can change over the course of a physics run due to irradiation. As a result, an independent measuring system is needed, which is what the laser system is used for.

Laser Monitoring System

ECAL PbWO4 cyrstals show a small variation in transparency when irradiated. This variation can be severe (10% at high luminosity, in the endcap), and thus must be corrected for. To accomlish this, a laser pulse is injected into each crystal using a fiber optic cable. The light measured by APD diodes is then normalized to PN diodes, which are moe stable than the APD diodes. Because scintillation light has different characteristics than laser light, an additional correction is made, taking advantage of the power law relationship between laser light and scintillator light, S/So=(R/Ro)^alpha. Electron data was used to measure scintillation response, S/So, and laser data to measure R/Ro, and thus the parameter alpha=1.6 was extracted.

The laser system includes three lasers: two blue (440nm) and 1 near IR (796nm). The lasers are pulsed, with a FWHM of 30ns, and can be operated at a rate of 80Hz, and can be sycnced with the LHC bunch trains. The intensity of the pulse corresponds to photons of differing energy, so an attenuator is used to calibrate a range from 1.3TeV-13GeV.

Energy Resolution

The energy resolution sigma is given by: (sigma/E)^2=(S^2/E)+(N/E)^2+C^2, where S is the stochastic term, N the noise term, and C the constant term.

Stocastic Term

The stocastic term has contributions from event containment is typically on the order of a few percent, depending on how many crystals are summed. There are also contributions due to photodector noise and the number of photoelectrons, and some dependence on the preshower absorber.

Noise Term

This term has contributions from electronics, digitization, and pileup.

Constant Term

The contributions to this term include non-uniformity of light collection along the crystal, intercalibration errors, and energy leaking back to the crystal.

Test Beam

A test beam with energies from 20GeV-250GeV was used to test a supermodule in 2004, and the parameters extracted.

Abreviations

There are lots of abreviations to learn, and CMS has a page with lots of helpful abreviations and acroynms here. I have listed a few that will be useful for ECAL shifiting below.

EB - ECAL barrel

EE - ECAL endcap

ES - ECAL pre-shower

IT - Integrity task, used for examining data quality (example EBIT stands for ECAL barrel integrity task)

OT - Occupancy task used for determing whether there is data in a given channel (example EBOT stands for ECAL barrel occupancy task)

APD - Avalanche photodiodes

PN - Another kind of diode used for looking at LASER calibration signal, more stable than APDs

Rechit - Reconstructed hit

Digi - Digitized raw data

DCC - Data Concentration Card

DCS - Detector Control System

DSS - Detector Safety System

DQM - Data Quality Management

TP - Trigger primitives

ZS - Zero Supression

FED - Front End Driver

CCS - Clock Control System

TCC - Trigger concentrator card

PTM - Precision Temperature Monitoring

HM - Humidity Monitoring

FSM - Finite State Machine

ESS - ECAL Safety System

ttcci (?)

This topic: Main > PersonalECALNotes
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