

HCal Reconstruction and Related Topics

Niels Meyer, DESY
HCal Main Meeting
December 11, 2008

- HCal reconstruction:
 - Response curves for saturation correction
 - Temperature effects on MIP and Gain constants
- HCal simulation
 - Birks' law
 - Detector timing
- Tracking
- Central Reconstruction
- New CALICE tools
- National Analysis Facility

Saturation Curve Scaling

- Found that SiPMs are not illuminated completely and therefore saturate at lower amplitudes than test-bench measurements w/o tile
- Strategy: use test-bench response curve and scaling factor
- Current implementation:
 - Search conditions collection with measured values
 - If channel is not found, search collection with 'default'
 - If still not found, use hard-coded value
- Status: available from calice_reco v04-06-04
Default steering: Hard-coded value 80% everywhere

Temperature Correction

- Current calibration allows detector-wide scaling factor for MIP and Gain constants, private versions extended for layer-wise factors
- Good for proof-of-principle analysis, but not good for large-scale (= automated) calibration
- Implementation is underway and will heavily change the internal code of the HCal calibration processors
- Nothing will change when your analysis starts at reconstructed data, but be alert when you run the reconstruction by yourself!

Temperature Correction

- There is no un-ambiguous definition of temperature on the level of an individual channel, have to find the best
 - calorimeter vs. layer average vs. closest sensor
 - calibration necessary? Improvement from profile fit?
- Correction algorithms have to be flexible for changes of temperature definition
- Need to store calibration constants with conditions at measurement - decided to do that in terms of run #'s
- Temperature difference then is evaluated at run-time using the same T-definition for calibration and beam data

- Birks' law
 - Available in beta version of Geant4
 - Seems to be significant
 - Geant4 developers: Need to tune parameters to our scintillator
- Detector timing
 - Tests indicate that the deviation of LHEP and QGSP-Bertini almost vanishes when detector shaping time is considered in digitization
- Status: under study, not ready for production

- Recent bug fixes, tracking now works technically for all periods and for both data and MC
 - requires calice_reco v04-06-05
 - simulation for CERN only for TB models with names including _dchxy and the MOKKA HEAD (tag to come)
- However, there are issues with the tracking constants
 - Beam profiles in CERN data do not match online plots
 - Simulation introduces 20mm offset
 - Very limited experience/feedback on FNAL
- Please use the TBTrack code and report any observation to Paul Dauncey - feel free to cc myself

Central Reconstruction

- Never ending story... Every time you think you are ready to go another problem pops up
- Currently fix alignment constants for CERN 2007 and try to understand several small issues
- If there are no further delays, the HCal will be reconstructed without T correction (unless another longer delay occurs)
- If waiting for the official reco is reason for delay of your analysis: I can provide pre-processing with the status as is or help you to run the reconstruction yourself

- New directory `calice_tools` in CVS repository with
 - **RootTreeWriter**
MARLIN processor to create ROOT tree from LCIO data stream, can be customized by your engine
 - **dbview**
browser for the conditions database
 - **calice_run**
collection of shell scripts
 - Create a production-like steering files for conversion and reconstruction
 - GRID-ready script to run any MARLIN job
 - Based on self-maintained software tar-ball, contains only `calice_userlib` and `calice_reco` for now

- National Analysis Facility of the Helmholtz Alliance
“Physics at the Terascale”
⇒ login via GRID proxy from German institute only
- Offers GRID resources, batch cluster, and work group servers for interactive analysis for ATLAS, CMS, LHCb, and ILC (including CALICE)
- General information: <http://naf.desy.de/>
- ILC core software installed by DESY IT, FLC keeps installation of CALICE software, which works on NAF
- No experience yet with user compiled code, there might be an issue with 32 vs. 64bit