

FCC Week

- SW Calorimetry Plans

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FCC software meeting

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What do we want to do?

In general: Calo performance studies

- Study single particle and physics events
 - ◆ With sliding window algorithm (electrons/photons)
 - ◆ With topo-clustering algorithm (hadrons, jets)
 - ◆ Combine information with tracker

- Describe everything (software included) in the CDR -> FCCSW v0.10 should contain everything mentioned and used

What is the status in FCCSW?

FCCSW = [master](#) + [PRs](#)

Detectors are included for the FCChh baseline:

- Inclined ECal barrel
- HCal barrel and extended barrel
- LAr endcaps and forward detector

Small change to implementation of geometry in [PR#273](#)

- Addition of envelopes for endcap/forward that allows z-position retrieval

Tools to analyse the detectors:

- Measure the sampling fraction
- Calculate material deposited in front of calorimeter ([PR#274](#))

Digitisation and reconstruction tools:

→ Energy deposits → cells

- ◆ Calibration (with one or more, e.g. layer dependent, constant value(s))
- ◆ Addition of noise
 - Electronics noise (read from ROOT file)
 - Pileup noise (estimated per cell, read from ROOT file)

→ Cells → clusters

- ◆ Sliding window algorithm for electrons and photons
 - Working regardless of the detector segmentation
 - Sharing / splitting of the cell energy between clusters

What is the status in FCCSW?

FCCSW = [master](#) + [PRs](#)

Combined calorimetry + tracker

- [ExtrapolationTest](#) exists

BUT

- ctest currently disabled and pending update of tracking geometry ([issue#260](#))

What needs to be done for CDR/FCC Week?

Detectors:

- Small change to HCal implementation to substitute segmentation with physical volumes (**started**)
- Saving the truth information of particles entering the calorimetry for debugging (**to be done**)
- Optimisation of η/φ ECal segmentation (**to be done**)

Digitisation and reconstruction tools:

- Topo-clustering algorithm (**ongoing validation**)
- Cluster → corrected cluster (currently included in analysis outside FCCSW)
 - ◆ Correction of the energy (for energy deposited in front of calo)
 - ◆ Correction of the pseudorapidity position (recalculation)
- Pile-up noise extraction from min-bias event (**started**)

What needs to be done for CDR/FCC Week?

Alternatives to barrel ECal:

- integration of Silicon analogue and digital ECal (ongoing, soon PR)
 - ◆ a Geometry of silicon / absorber
 - ◆ a sensitive detector class which can handle both digital and analogue readout where the .time is overwritten with the number of particles in a pixel and .energy is the total energy deposited
 - ◆ a reco class which can split out the digital or analogue CaloHits into 2 CaloHit objects
 - ◆ reco classes to analyse the digital and analogue output

Others

Unlisted (as not-yet-known) necessary changes, additions, corrections...