Quick status on reco software

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• Quick words on Tracking
• Status of noise studies and MC reconstruction
• Plans for the technical part of the paper
Quick word on Tracking

• Interface to database now implemented.

• Constants for DESY have been written for all energies: will now run on all runs.

• Constants for CERN are set to 0: hits will exist but with wrong alignment. Studies to find the right constants and reconstruct tracks can be done on the reconstructed files.

• Once the right constants are found, please contact me to dump them in the database.

• Will send that to Roman before the week-end. Still need to check it runs on new cern data and on 64 bit machines!
Noise studies

• Way of filling automatically the database with noise per cell, calculated in the DATA signal events, for use in the MC reconstruction, now implemented.

• Noise definition finally chosen to be *gaussian fit of noise hits*
  i.e. Raw value < 18 ADC counts and < 1.8*noise
  fit between [mean-5σ, mean+1σ]. Results should be within
  (4.5 < |σ| < 20 and |mean| < 6) or chi2/ndf < 3

• If no fit converged, **value set to 6.0** and histogram saved in rootfile histos/Noise_RunXXXXXXX.root to understand why.
Example of weird cases

Layer 17, wafer 2 (M=3, S=1), cell 31 (J=6, I=2) : weird binning of ADC counts distribution. Happens also for several cells in wafers 1, 4 and 5.

~ 1/5\textsuperscript{th} ADC counts per bin

\begin{tabular}{|c|c|}
\hline
\textbf{ADC counts, for cell 31} & \textbf{p\_Ped\_l16\_waf2\_cell31} \\
\hline
Entries & 77391 \\
Mean & -0.2856 \\
RMS & 5.495 \\
Underflow & 0 \\
Overflow & 0 \\
Integral & 7.738e+04 \\
$\chi^2$/ndf & 3.254e+04 / 100 \\
Prob & 0 \\
Constant & 1240 \pm 10.6 \\
Mean & -2.331 \pm 0.026 \\
Sigma & 2.578 \pm 0.016 \\
\hline
\end{tabular}

~ 1 ADC counts per bin

\begin{tabular}{|c|c|}
\hline
\textbf{ADC counts, for cell 31} & \textbf{p\_Ped\_l16\_waf2\_cell31} \\
\hline
Entries & 77391 \\
Mean & -0.284 \\
RMS & 5.498 \\
Underflow & 0 \\
Overflow & 0 \\
Integral & 7.739e+04 \\
$\chi^2$/ndf & 404.3 / 29 \\
Prob & 0 \\
Constant & 5106 \pm 23.1 \\
Mean & 0.7585 \pm 0.0533 \\
Sigma & 6.287 \pm 0.033 \\
\hline
\end{tabular}
Some clearly bad ones

Could pass the cuts!! Need to think more carefully to how to discard this kind of cases....

Where is that coming from?
Ex. of noise per layer obtained

Run 230101

Layer 0

Layer 5

Layer 7

Layer 13
Ex. of noise per layer obtained

Run 300195

Layer 0

Layer 14

Layer 5

Layer 29
To do list on noise model

- Still need to extract an error on the measured value per cell.
- Will study linearity of noise when all runs are processed and all values in the database.
- Need to compare with the values of the noise calculated during the reconstruction throughout the pedestal correction procedure, as a cross check.
- How to deal with remaining coherent noise due to crosstalk (SIPS effect) in MC? Simulate or just add coherent noise?
- Comparison between data and MC at raw hit level with a clean sample of events in the data.
Status of implementation for MC reconstruction

- Same as tracking: want to provide a working version before the week-end.
- RunInfoProcessor: need to run on DATA and MC. Energy retrieving now implemented for 2006 data. Need the info for 2007 data please! Experts ???

And still need to solve how to pass the run number for the MC to the processor other than by steering parameter !! The still unanswered question remains: MOKKA ??? Strict rule on input file name with the run number in it ???

NEED AN ANSWER/DECISION FROM PEOPLE DOING THE MC PRODUCTION.

- Will allow the reconstruction on a bigger scale than until now.
- Still need further studies for how to deal with remaining coherent noise: should we simulate the crosstalk or so-called “SIPS” effects?
One idea for the reconstruction chain

• Following last meeting talk from Paul, and concerning noise/calibration issues:
  - Could be valuable to have an output saving RawCalorimeterHits with the basic “stable” cut: ADC>18 (18 being actually 0.5*the smallest calibration constant of all cells) at SimpleHitSearch level => reasonable size.
  - This would allow to process only CalibrateAndApplyThreshold processor on the reconstructed file: much faster and easier for anyone to study the influence of changing gain and noise in their analyses in a consistent way.
Second part:
about the technical part of the paper
Proposal of outline

- Mainly based on the LCWS paper
  - The obvious structure is:
    I- Description of the ECAL prototype: mechanical design, hardware description
    II- Description of the testbeam setups (DESY+3CERN)
    III- Summary of the data collected: scans and data quality
    IV- Calibration and reconstruction
  - Less obvious:
    V- MC simulation, digitisation and reconstruction
    VI- Tracking

Items in blue/purple: still to be done & NEED VOLUNTEERS!

More details next pages
More details for part IV:

calibration and reconstruction

**Items in blue/purple: still to be done & NEED VOLUNTEERS!**

1. Gain calibration: dataset, procedure and results, uniformity, stability in time/temperature, uncertainties on the measured values.

2. Pedestal: extraction procedure, instabilities, uncertainties on the pedestal subtraction.

3. Noise: coherent noise and crosstalk, description of the correction procedure implemented in the data, uniformity, stability in time, uncertainties.

4. Reconstruction procedure.
More details for part V: MC simulation, digi and reco

1. description in Mokka at DESY and CERN

2. digitisation and reconstruction: description, noise model, influence of the gain stability and error, check of the correction procedures implemented in the data (Signal Induced Pedestal Shifts + global pedestal shifts), simulation of crosstalk?, comparison with Data to validate the noise model.

3. influence of missing row of wafers (but presence of tungstene) in 2006 data

Items in blue/purple: still to be done & NEED VOLUNTEERS!
Conclusion

• Anything important missing?

• Code will very very soon be eventually in a good shape to allow easier studies!

• Need volunteers to converge!

Anyone interested by any of the previous items?