

CALICE/AHCAL Software

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- Many changes in the AHCAL software in the last months

New Reconstruction

- Based on developments from Beni
- Released on 1st of April

MappingProcessor

CellDescriptionProcessor

SiPMTemperatureProcessor

PedestalProcessor

SiPMCalibrationsProcessor

SiPMCalibrateProcessor

CorrectPositionProcessor

New Digitisation

- Cross-checked with the old digitisation; results presented in the AHCAL group meeting

MappingProcessor

CellNeighboursProcessor

CellDescriptionProcessor

SiPMTemperatureProcessor

SiPMCalibrationsProcessor

AppendNoiseProcessor

AhcGangingProcessor

AhcDigitisationProcessor

SiPMCalibrateProcessor

CorrectPositionProcessor

- Newly introduced: class *AhcAmplitude* which offers amplitude in different units
 - ADC counts
 - ADC - pedestal
 - MIPs (not T° temperature, before saturation correction)
 - MIPs (T° corrected, before saturation correction)
 - GeV
- For usage, please see [CALICE software FAQ](#)
- Also new: relation between reconstructed *CalorimeterHits* and generated *SimCalorimeterHits*

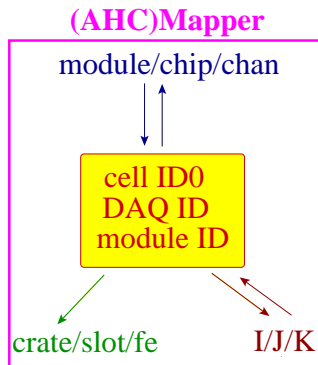
AHCAL Software News - continued

- **Advantages** of the new framework:

- clear and structured code
- documented with doxygen
- useful **mapping**: easy conversion from one ID to another
- useful algorithm to find the **neighbours** (in the same modules, and in close modules)

- **Disadvantages**:

- very slow code (few Hz) **in the moment**
- feel free to `(git) blame` me for this
- this is the next thing to be improved



AHCAL Alignment

- In the new AHCAL reconstruction framework, AHCAL position calculated with:

$$\vec{r}_{detector} + \vec{r}_{module} \cdot \mathcal{M}_{zshift} + \vec{r}_{cell} \cdot \mathcal{M}_{rotation}$$

where the detector position is taken from the data base

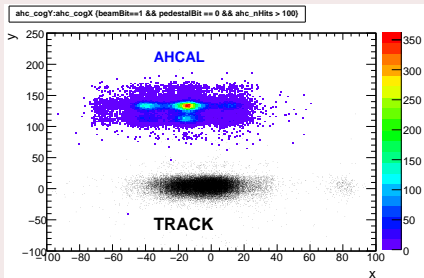
- But data base info is from the elog (often incorrect)
⇒ AHCAL detector not aligned to the beam
- Need to do the alignment by hand. This means:
 - Reconstruct data with the elog information
 - Calculate the offsets: $x/y_{offsets} = x/y_{AHCAL} - x/y_{track}$, using first 5 AHCAL layers, and good quality tracks
 - Fill the offsets in a new data base folder
 - Rerun the reconstruction with the new offsets
- In the moment, done only for a few 2007 runs (thanks to Nils)
- Note: misalignment is not expected for FNAL runs, where a laser system was used

AHCAL Alignment - continued

- Example: run 350137, 20 GeV e^+

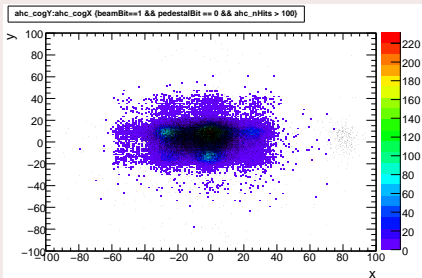
Default AHCAL position in db

$x = -8.8$ cm
 $y = 6.2$ cm



NEW AHCAL position in db

$x = -7.4$ cm
 $y = -6.3$ cm



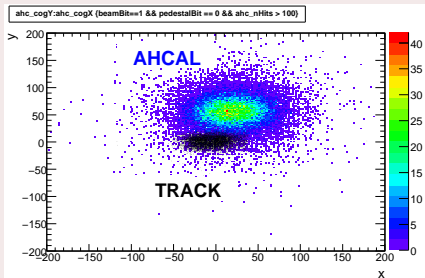
AHCAL Alignment - continued

- Example: run 330770, 20 GeV π^-

Default AHCAL position in db

$x = 3.0$ cm

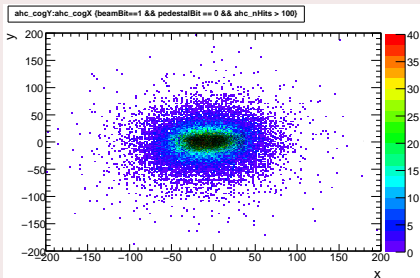
$y = 3.0$ cm



NEW AHCAL position in db

$x = 0.3$ cm

$y = -2.4$ cm



- **Event display:**

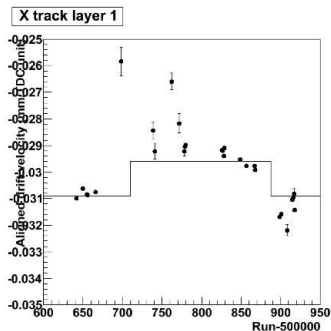
- Developed by Nils and Beni for AHCAL and TCMT
- See here [DESY AHCAL doxygen documentation](#) for description
- Kaloyan showed interest in developing it for the ECAL

- New package **calice_calib**:

- **fitMip** directory: classes developed by Boris for the MIP fitting
- **calib** directory: processors to extract intercalibration factors and saturation curves (for the first time in the official software)

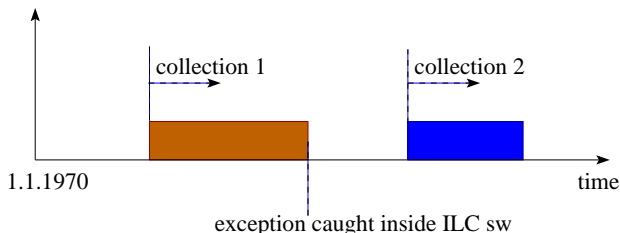
CALICE Software News: FNAL Tracking

- Paul Dauncey and Daniel Jeans work towards a working FNAL tracking
- Daniel: work on scattering effects, needed to fit the error matrix including correlations
- Used the Si-W ECAL in the alignment
- Problem: results unstable to large degree (not clear if due to environmental influences, non-modeled scattering material or something else)
- Need more reconstructed runs (preferably with scintillator ECAL) and studies
- Nice reaction from the central reconstruction task force (Amjad, Daniel, Kaloyan) - rest of runs reconstructed within few days
- and from Satoru: already several discussions towards release of the scintillator ECAL code



Next CALICE Software Release?

- So why not a new release already?
- Waited for the new ILC software release (v01-09), which brings important changes in LCCD
- Until now: collection valid until a new collection available, no NULL pointer thrown - not optimal



- After many and long discussions with the ILC core software developers, agreed on using a **default** (empty or not) **collection** in case no collection is available

Next CALICE Software Release? - continued

- Latest changes in LCCD available in the middle of last week
- Helpful discussions with Steve Aplin (many thanks) to understand the implications
- CALICE classes dealing with the data base need to be updated
- I need first to understand how they work
- After first panic attack, decided to follow:

Don't panic; All will become clear with time (Bjarne Stroustrup, "The C++ Programming Language", advice 1 on page 43, third edition)

Conclusions

- To be fixed:
 - reading of the data base issue
 - AHCAL reconstruction (and digitisation) speed
- The next CALICE software release: depends on you
 - Can be done now with ILC software version v00-08-01
 - Will be done later for the latest ILC software version

And next?

- **Shaojun** kindly took over the software responsibilities in the **DESY group**
- Please contact him for any **AHCAL software** related issues