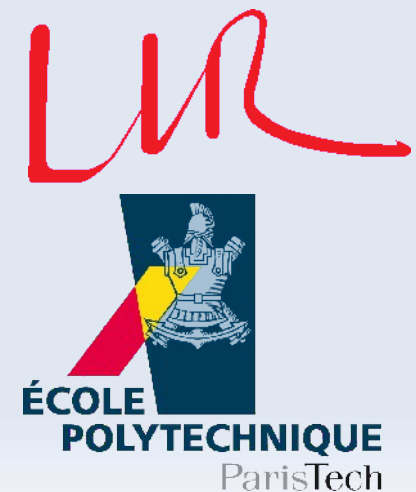


PFA needs for a SDHCAL

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**LC SW Meeting
CERN, 02/02/2011**



PFA: Needs for a SDHCAL

1) Performant Calibration scheme

- Huge number of channels: 48 layers, 1 cm² cell size → 70M channels
- Huge number of constants. Per channel:
 - ▶ Geometry: 3 floats
 - ▶ «Energy». DHCAL → 2 floats (μ, ϵ)
SDHCAL → 3-6 floats ($\omega_{1,2,3}$) or (μ, ϵ)_{1,2,3}
 - ◆ RawCaloHit → CaloHits with Estimated Energy
- Size: 70M × 3-6 floats → 0.9-1.7 GB table
 - ▶ Can probably be compressed / fact 10...
($\epsilon \sim 0.95 \pm \dots$, $\mu = 1 + \dots$, $x \rightarrow \delta x$, 4-8 bits enough ?)
 - ▶ Use of GPU lookup table ?
 - ▶ Use of smoothing functions ?

PFA: needs for a SDHCAL

2) Scheme for variable cell size

- Studies should allow for optimal cell size (electronic cost $\propto 1/(\Delta x)^2$)
- 1 simulation, many reconstructions ?
 - ▶ Simulation can be done with very fine granularity
 - ◆ Hits storing or small cell size (avalanche size $\sim 1.2 \times 1.2 \text{mm}^2$)
 - ▶ Reconstructed cell size done by digitisation module
- Technical implications
 - ▶ Separated ECAL & HCAL digi modules in Marlin
 - ◆ Should have been from the start (e.g. \neq collections)
 - ▶ Digi module needs information about border cells
 - ◆ #SimCells or Sensor dimensions per plane
 - ◆ not now in Gear. Call to Mokka ?
 - ▶ RecCellSize \neq SimCellSize
 - ◆ \rightarrow new parameters in Gear to be modified by Digi module and stored.
 - to be reset at for each new event.
 - ▶ Handling of CellId & filiation ? *To be closely looked at...*

PFA: needs for a SDHCAL

3) Improved Videau geom in Pandora

- Videau geometry poorly handled in PandoraPFAnew (v00-08)
 - ▶ for example no crack handling...
 - ◆ ~ BoxGap for TESLA geom ?
 - ▶ DHCAL granularity fixed at 'COARSE'
 - ◆ Modifiable? (requires more scrutinisation)
- S-DHCAL not used:
 - ▶ Digital or Analog;
 - ◆ Digital \equiv constant cell energy
 - ◆ Analog requires EM and HAD cell scales
 - ▶ Additional flag needed for appropriate coding
- Pandora standard procedure not well adapted for (S)DHCAL:
 - ◆ Clustering requires a calibrated detector
 - ◆ Calibration requires clustering
 - ▶ Requires extra (physicist effort) + help from Pandora experts...

PFA: needs for a SDHCAL

4) and others...

■ Gear in LCIO file

▶ Advantages:

- ◆ low cost: few kB in 10's of MB files
- ◆ Avoid separate files (and mistakes, searches, ...)

▶ Disadvantages ??

▶ Technical implications

- ◆ Very easy (Gabriel) → RunHeader
- ◆ ↔ with variable RecCellSize ?
“Is the header of the rec LCIO file written before the 1st event ?”

▶ Alternative: usage of LCCD

- ◆ OK for TB but for simulation ?

■ Tracks In Calo

- ▶ see Gabriel's slides