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Calibration

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Things to calibrate…

Several "Calibration" activities:

- **Digital Timing**
  - compensates for internal cable & electronics delays
  - checks internal data paths
- ** **Analogue pulse peak timing**
  - phase and delay to capture
- ** **Analogue Pulse Shape**
  - Preprocessor BCID settings
- ** **Analogue Pulse Energy Calibration**
  - Tower builder delay/gain equalisation
  - Preprocessor LUT conversion factors to GeV
  - Integrity of tower building chain.

Threads

- **Mechanisms: Murrough, Thomas & I are working on a document, intended to be a joint publication with calorimeter groups:**
  - Which calorimeter calibration system are used;
  - How do LVL1 electronics/computers interact with calorimeter electronics & computers during a calibration;
  - How is the calibration steered (run control, sequences, checkpoints,…)
- **Algorithms: Eric & I started a discussion on the calculations and decisions that the software needs to perform.**
  - This is what I'm now talking about

Boundary Conditions

- **The overall algorithm must generate values for all our parameters (internal trigger + analogue chain) for all reasonable calorimeter states.**
  - This implies an agreed (by Atlas) way of handling defective parts of the calorimeter, calibration system and analogue readout chain.
  - "Defective" could include dead, unstable, low gain, ….

- **Calo groups probably know (in a database) which raw cells are faulty. But they don't have access to data passing though the readout to LVL1, so can't know about this data path.**
  - So we have to be prepared to assess routinely the condition (gain, timing) of every calo cell to the trigger tower data.

Handling Dead Calo Cells

- **In the LAr, up to ~60 cells contribute to a trigger tower.**
  - Probably desirable to turn off (at tower builder) dead, oscillating, and uncalibrated cells.
  - Make compensating change to tower LUT or thresholds?
- **In other calorimeters, loss of a cell can be a big fraction of the energy. What do we do?**

- **Probably some (Monte Carlo) studies are needed to make the choices.**

Timing & Amplitude

- **We need to start developing some algorithms and c++ to analyse a sampled analogue pulse. It should…**
  - Extract peak timing;
  - Extract energy;
  - Extract BCID coefficients;
- **…because we need to know how CPU intensive they are, and also how they can be overlapped to use the same data.**
  - Does any code exist to do this?
- **Then we can complete the agreements with calorimeter groups on the mechanisms.**

Internal Timing

- **We will also need, quite soon, code to optimise the internal timing of various components in the trigger system.**
  - Need not be complex;
  - But will need to be tuned to handle all the timings for all our links
  - …including some timing checks on those that adjust themselves automatically.

End

The End