Sdhcal meeting
Ecal-Sdhcal common reconstruction

Antoine Pingault

Department of Physics and Astronomy
Ghent University

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Data

ECAL
- \{run\_number\}__build.root in:
- /eos/project/s/siw-ecal/TB2018-09/Common/ECAL/\{Particle\}__\{Energy\}GeV

SDHCAL
- DHCAL\_Trivent\_Ecal\_{run\_number}.root in:
- /eos/user/a/apingaul/CALICE/Data/SPS\_09\_2018/Trivent/ (personnal eos)
- /calice/users/a/apingaul/data/SPS\_09\_2018/Trivent/ (dirac grid)
  - eos is probably not accessible to everyone, I can ask to replicate on the sdhcal eos
  - Grid should be accessible to anyone with a calice grid certificate
Merging of the data

- bcid in sdhcal is **reversed** compared to ecal (sdhcal data is read from the trigger end).
- Added `reversed_bcid` variable for each hit/event in the sdhcal root files.
  - Defined as $Reverved\_bcid = Acquisition\ Time - bcid$
  - **Acquisition Time** being the length of the trigger/spill (in 200ns frames)
- Iterate through data from each calorimeter trigger by trigger
  - Associate each sdhcal event with all the ecal events and compute:
    $\Delta_{BCID} = ecal_{bcid} - sdhcal_{reversed\_bcid}$
- There seem to be some kind of sync...
Delta BCID distribution

- There seem to be some kind of sync... modulo $8192 \ (2^{13})$ clocks
**BCID distribution**

- Plotting the **bcid** values of each calo:
  - bcid of sdhcal grows continually, ecal doesn’t
  - Ecal seems to “reset to 0” (actually ≈2488) each 8192 clocks
  - Will have to see with ecal people what to do about ecal data outside this window...
Corrected BCID distribution

- If $sdhcal_{bcid} > n \times 8192 \rightarrow ecal_{bcid} = ecal_{bcid} + n \times 8192$
Corrected BCID distribution

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Corrected BCID distribution in both calorimeters (Stacked histograms) - Run=744283
Delta BCID distribution

- $\Delta_{BCID}$ distribution with slices of $2^{13}$ clocks
- After correction of the ecal bcid: One main peak at 2488 clocks.
- Corresponds to the “start” of the ecal bcid
Delta BCID distribution

- Remaining peaks are due to the ecal events with uncorrected $bcid < 2488$ or $bcid > 2488 + 2^{13}$

\[ \Delta_{BCID}(ecal - sdhcal) \text{ distribution (Stacked histograms)} - \text{Run}=744283 \]
Common Evts Muons

Run=744211 - trig/spill=9 - ecal_evt=167 - sdhcal_evt=32

Front view
Top view
Side view
Common Evts Pi 70GeV
Common Evts Pi 70GeV

Run=744318 - trig/spill=661 - ecal_evt=27228 - sdhal_evt=14935
Common Evts Pi 70GeV
Common Evts Pi 70GeV

Run=744318 - trig/spill=466 - ecal_evt=19389 - sdhcal_evt=10559

Front view

Top View

Side View

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Common Evts Pi 70GeV

Run=744318 - trig/spill=447 - ecal_evt=18579 - sdhcal_evt=10113

Front view

Top View

Side View

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Common Evts Pi 70GeV

- Started interacting in ecal

Run=744318 - trig/spill=280 - ecal_evt=11379 - sdhcals_evt=6266
Troubleshoot

- ecal bcid correction, any reason for $2^{13}$, their clock buffer is $2^{12}$...
- ecal Data with $bcid < 2488$ and $> 2488 + 8192$ ?
- Why the 2488 clock shift?
- Barely any data in 4 middle layers (They had trouble syncing them if I remember well)
- Fine tune alignment