

Sdhcal meeting

Ecal-Sdhcal common reconstruction

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Data

ECAL

- `{run_number}_build.root` in:
- `/eos/project/s/siw-ecal/TB2018-09/Common/ECAL/{Particle}_{Energy}GeV`

SDHCAL

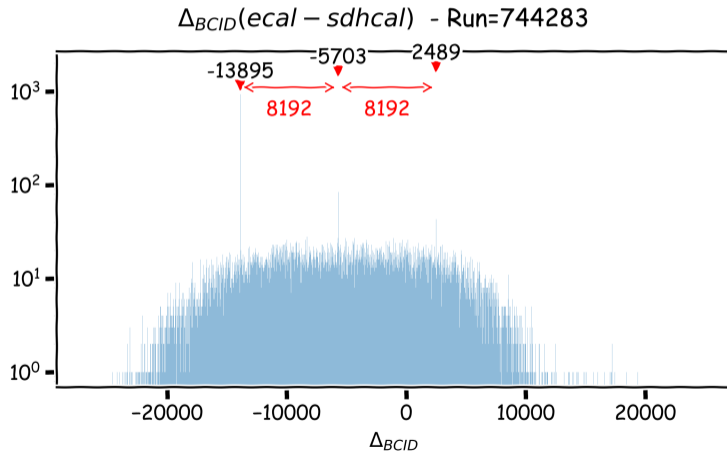
- `DHCAL_Trivent_Ecal_{run_number}.root` in:
- `/eos/user/a/apingaul/CALICE/Data/SPS_09_2018/Trivent/` (personal eos)
- `/calice/users/a/apingaul/data/SPS_09_2018/Trivent/` (dirac grid)
 - eos is probably not accessible to everyone, I can ask to replicate on the sdhcal eos
 - Grid should be accessible 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 $Reverved_bcid = AcquisitionTime - bcid$
 - **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. . .

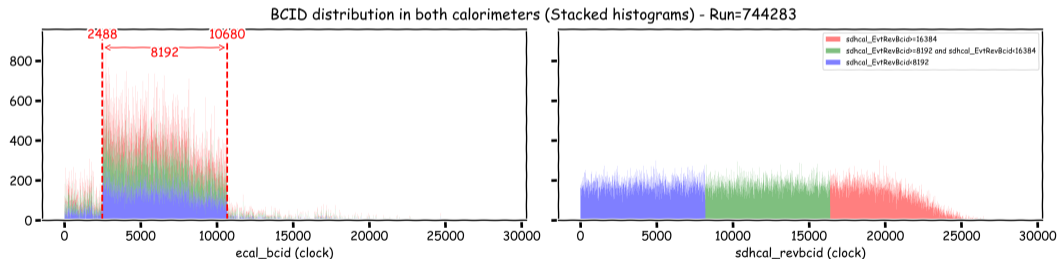
Delta BCID distribution

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



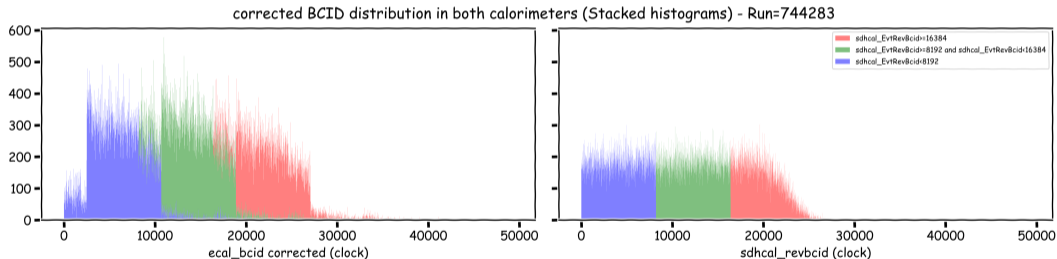
BCID distribution

- 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

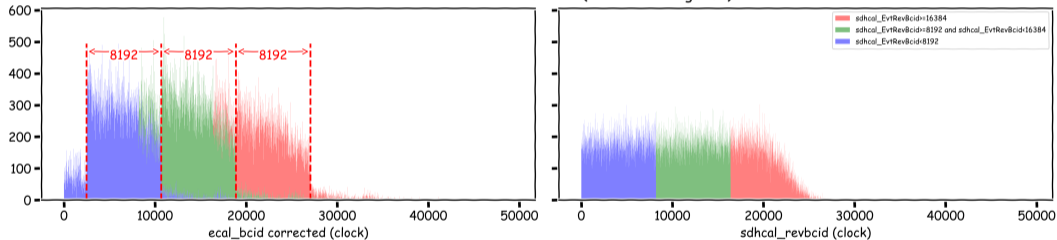
- If $sdhcal_{bcid} > n * 8192 \rightarrow ecal_{bcid} = ecal_{bcid} + n * 8192$



Corrected BCID distribution

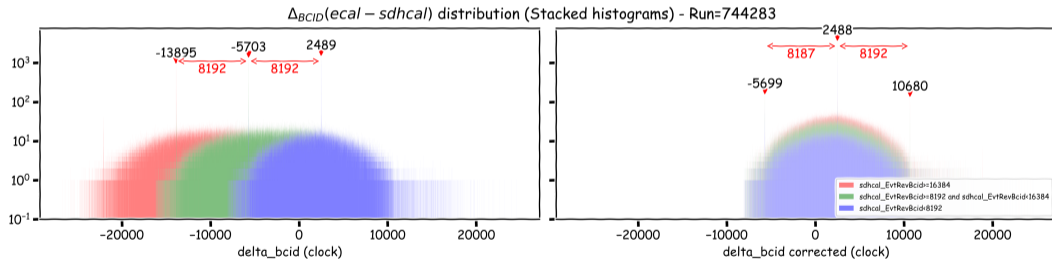
- If $sdhcal_{bcid} > n * 8192 \rightarrow ecal_{bcid} = ecal_{bcid} + n * 8192$

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



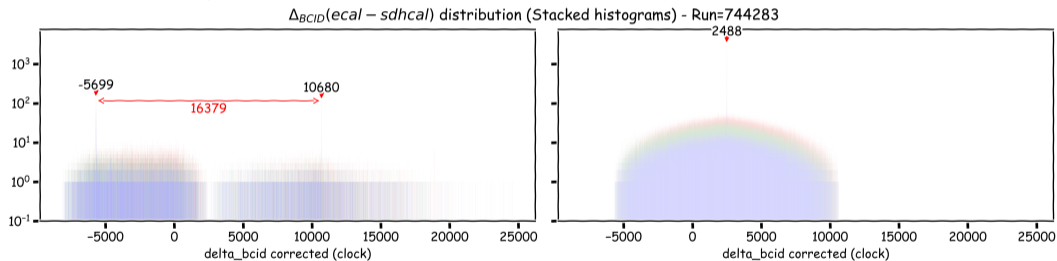
Delta BCID distribution

- Δ_{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



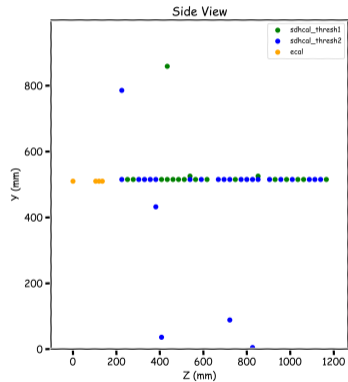
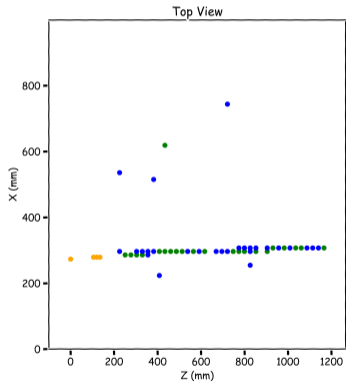
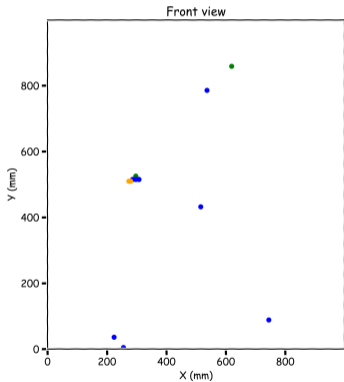
Delta BCID distribution

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



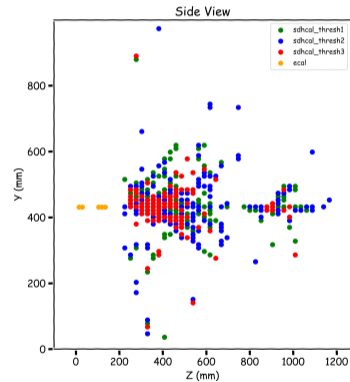
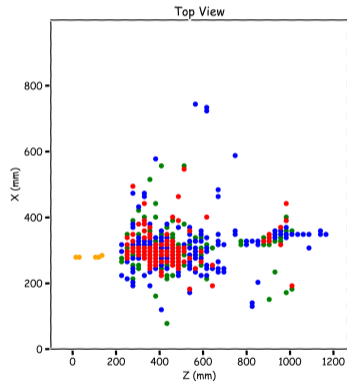
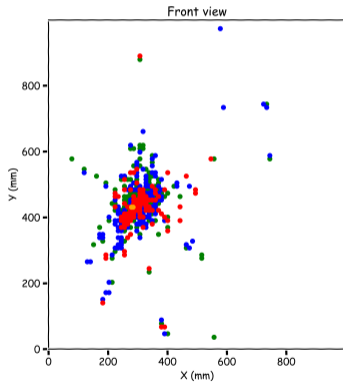
Common Evt's Muons

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



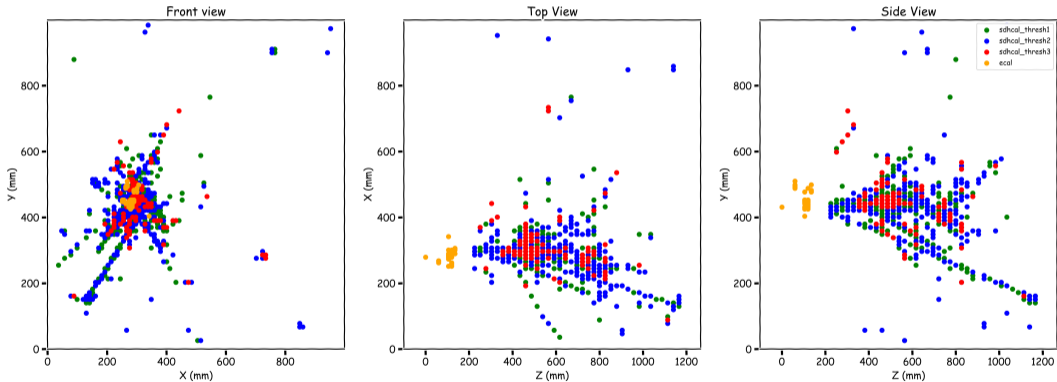
Common Evt's Pi 70GeV

Run=744318 - trig/spill=243 - ecal_evt=9941 - sdhcal_evt=5439



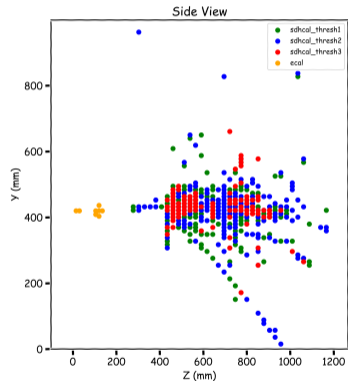
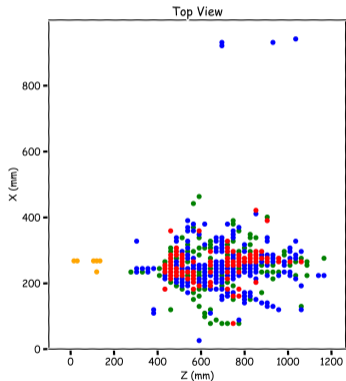
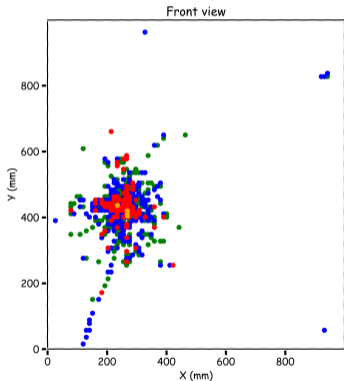
Common Evt's Pi 70GeV

Run=744318 - trig/spill=661 - ecal_evt=27228 - sdhcal_evt=14935



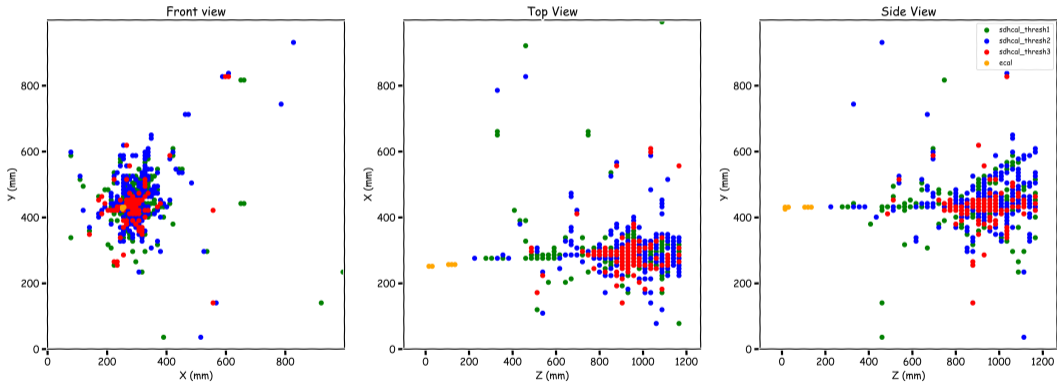
Common Evt's Pi 70GeV

Run=744318 - trig/spill=625 - ecal_evt=25645 - sdhcal_evt=14151



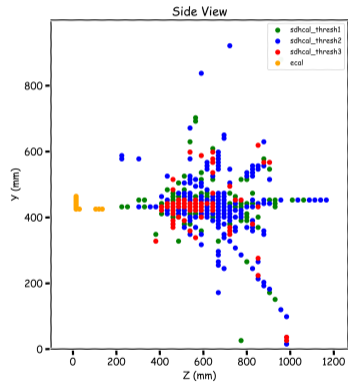
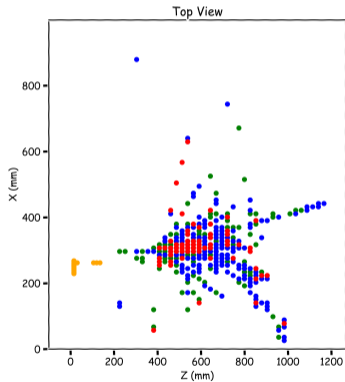
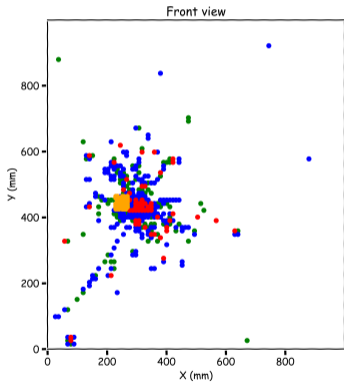
Common Evts Pi 70GeV

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



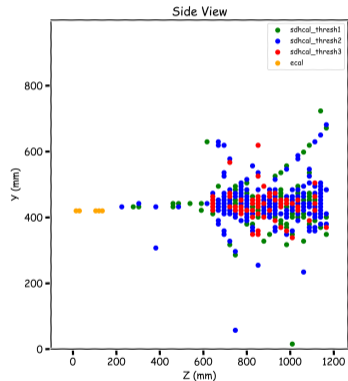
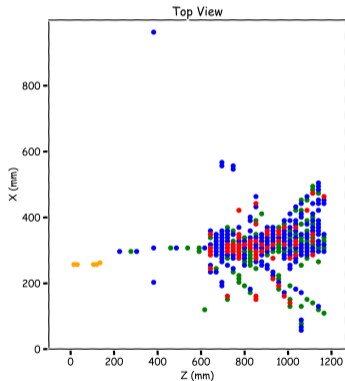
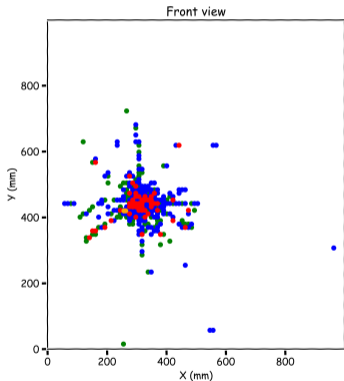
Common Evt's Pi 70GeV

Run=744318 - trig/spill=466 - ecal_evt=19392 - sdhcal_evt=10555



Common Evt's Pi 70GeV

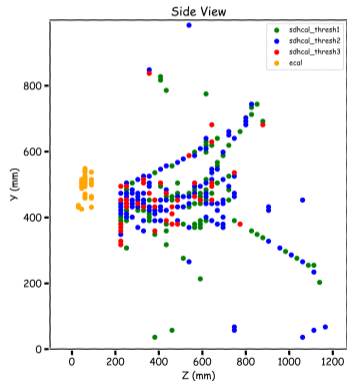
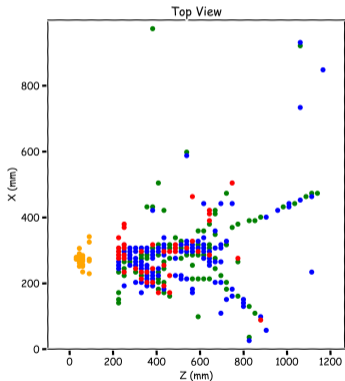
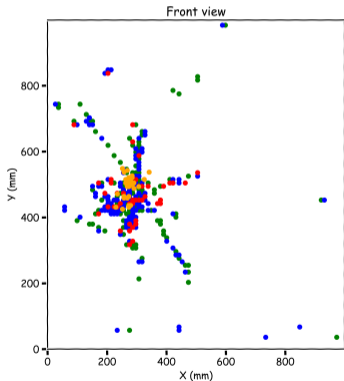
Run=744318 - trig/spill=447 - ecal_evt=18579 - sdhcal_evt=10113



Common Evt's Pi 70GeV

- Started interacting in ecal

Run=744318 - trig/spill=280 - ecal_evt=11379 - sdhcal_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