

Beamtest DESY 2022-03 analysis

Outtakes from the slack channel

Jonas Kunath (LLR). 19.04.2022.



Overview

- Empty events
- Chip hits split
- SIM-vs-data / monitoring

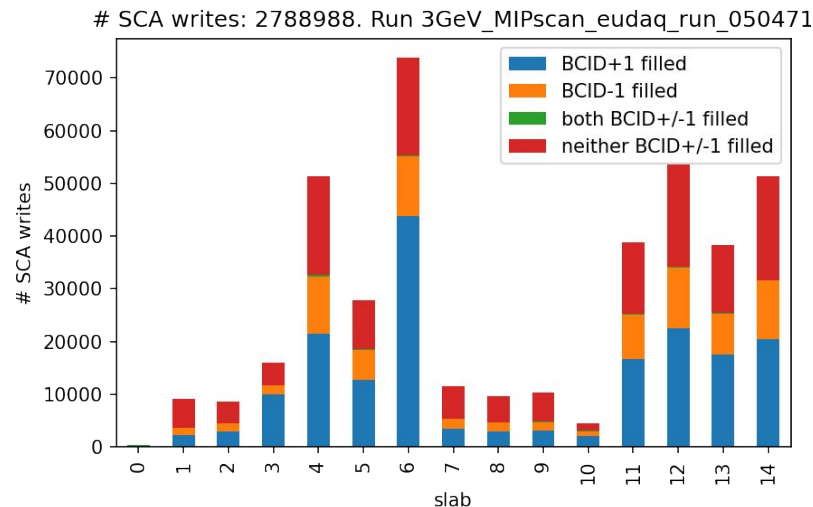


Empty events



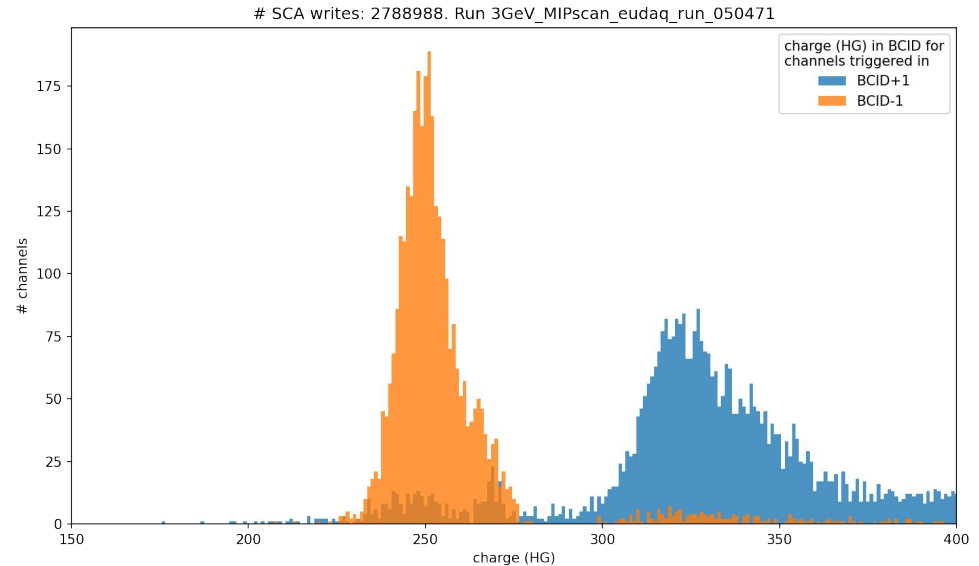
SCAs without hits (and their neighbours)

- **BCID empty, BCID+1 filled**
 - digital connection issue?
- **BCID empty BCID-1 filled**
 - (analog) delay cells
 - well & long known, Stéphane can explain it better ([2016 CALICE meeting](#))
- **both BCID+/-1 filled**
 - most of the times probably just a retriggering train
 - sometimes not
- **neither BCID+/-1 filled**
 - ???
 - I found that *other chips* tend to have SCA readouts on this BCID
- Effect much smaller for Skiroc2a (vs Skiroc2)



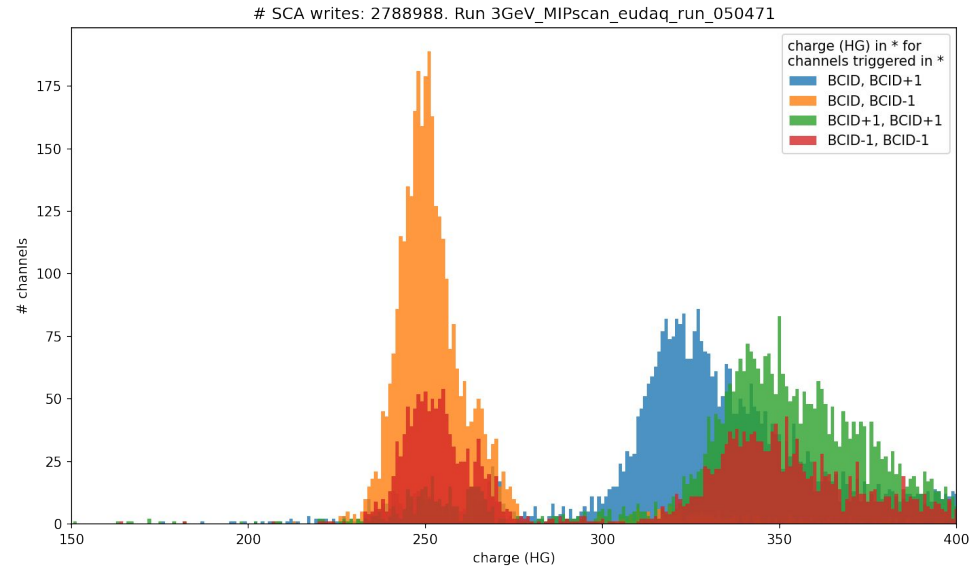
Charges in the empty events

- The following plots on layer 7 only.
- Charges from triggered channels
before/after an empty event



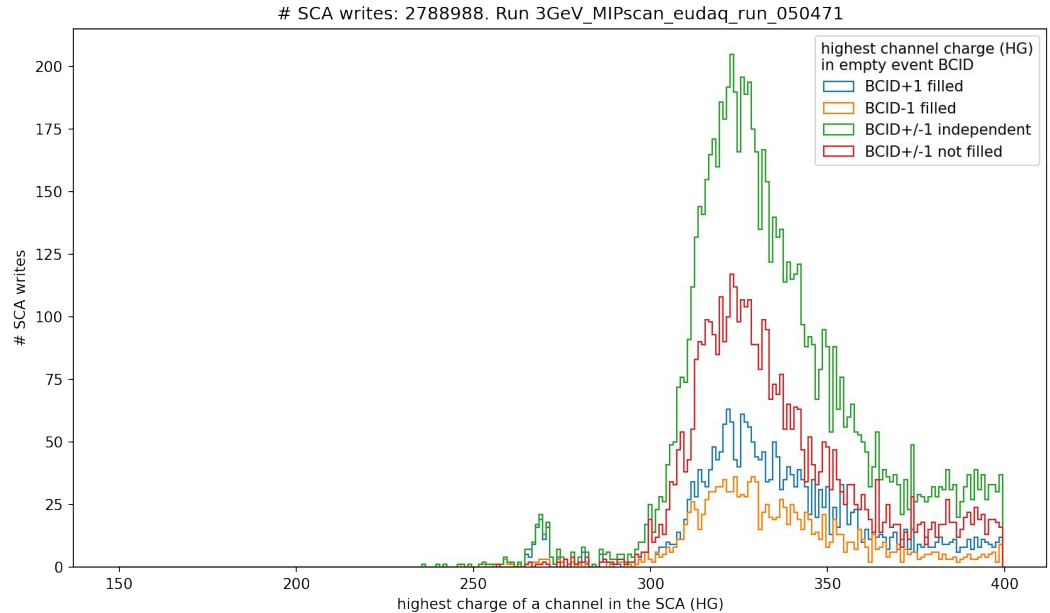
Charges in the empty events

- The following plots on layer 7 only.
- Charges from triggered channels **before/after** an empty event
- The charge histograms from **empty SCA** frames look less good
- Especially **triggered SCA with hits** better than **empty triggered SCA before it**



Highest charge per readout

- Here, plotted only highest charge per SCA
- All histograms look rather similar



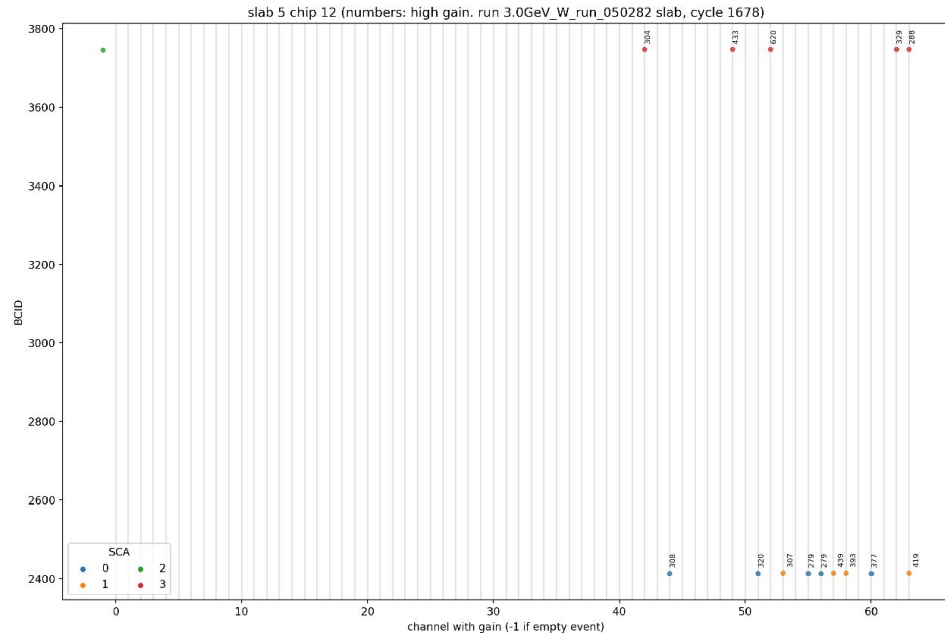


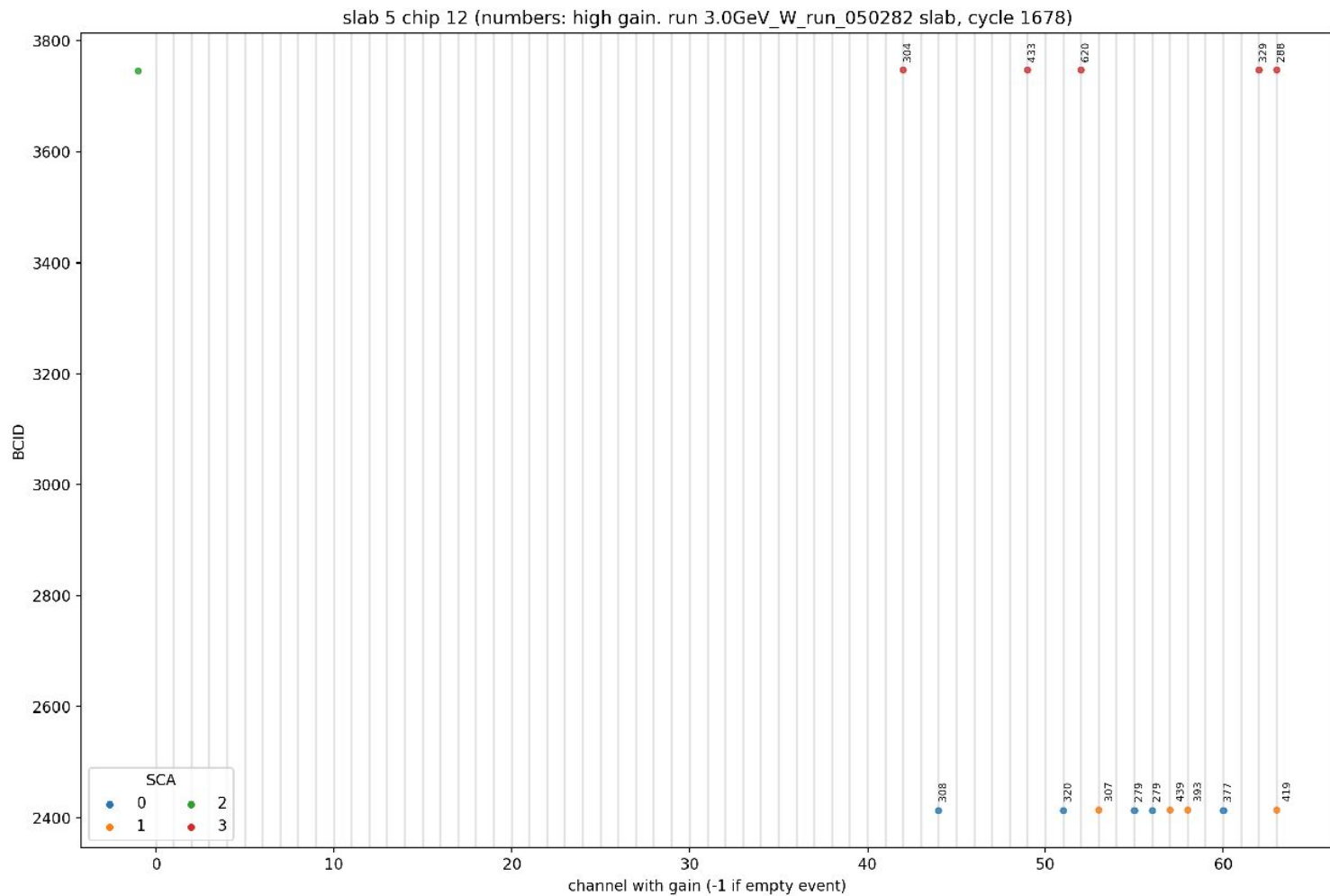
Chip hits split



Chip hits split over multiple BCIDs/SCAs

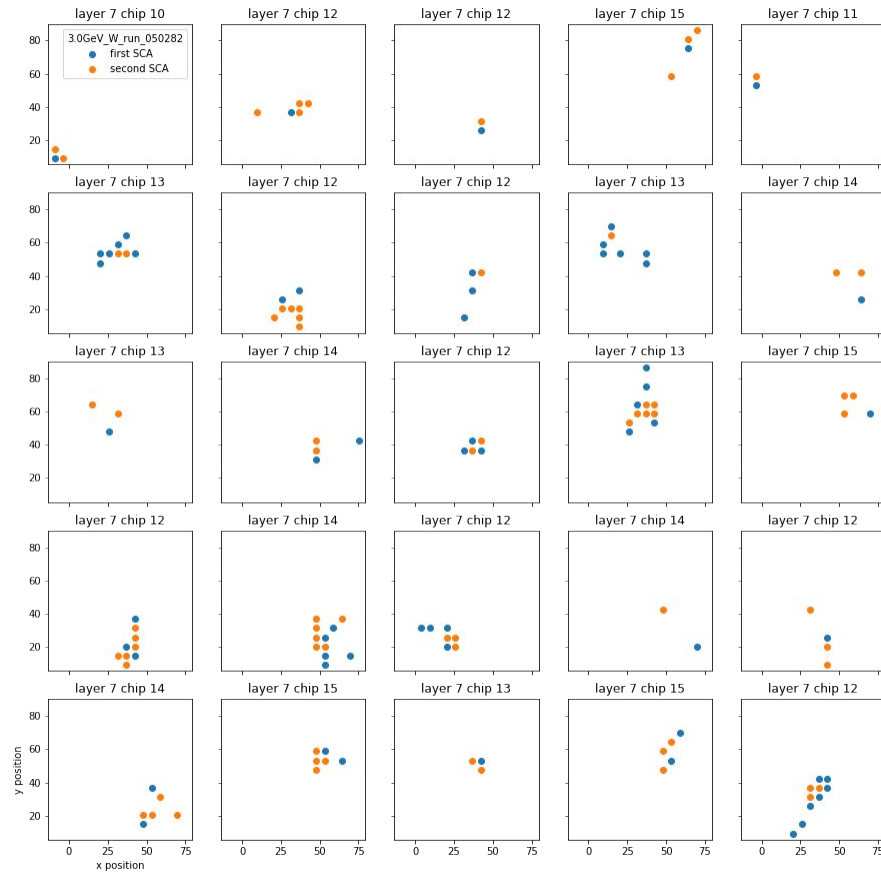
- Triggers on *different* channels in consecutive BCIDs
- If more than 2 SCAs in a row, probably retiggering effects
- Due to Delay box?





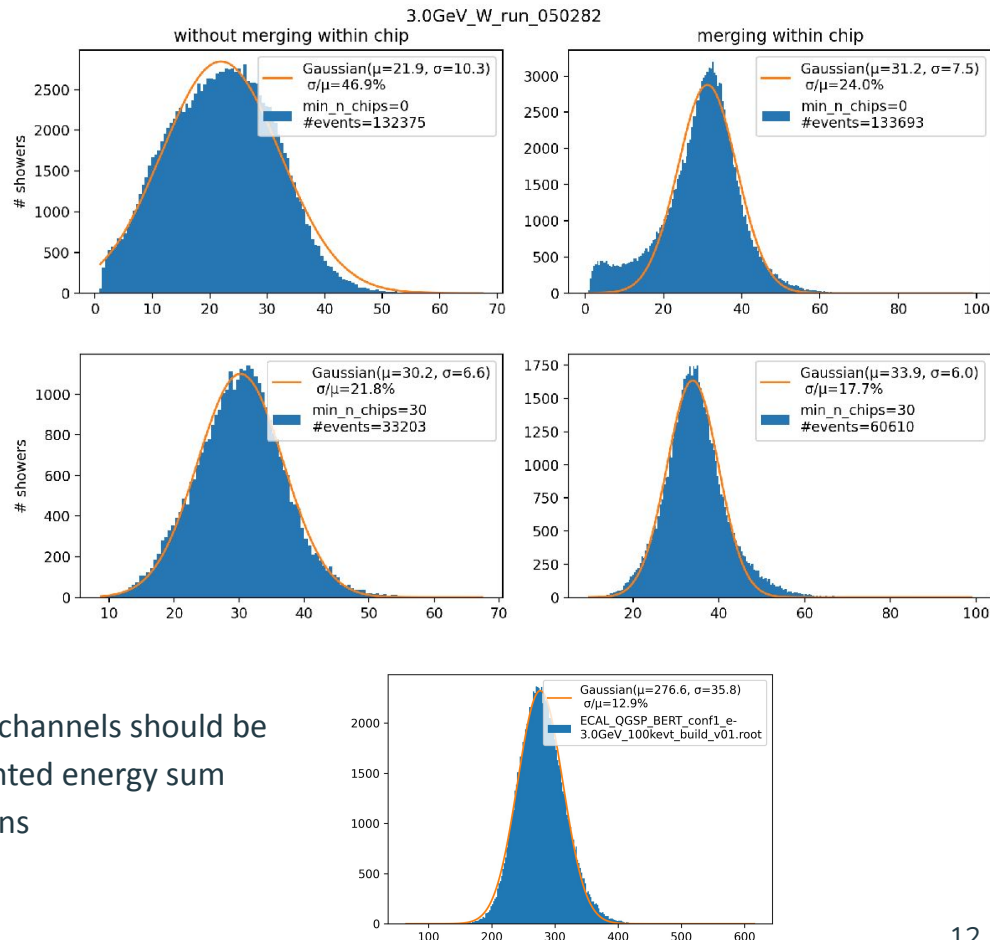
Chip split in x-y

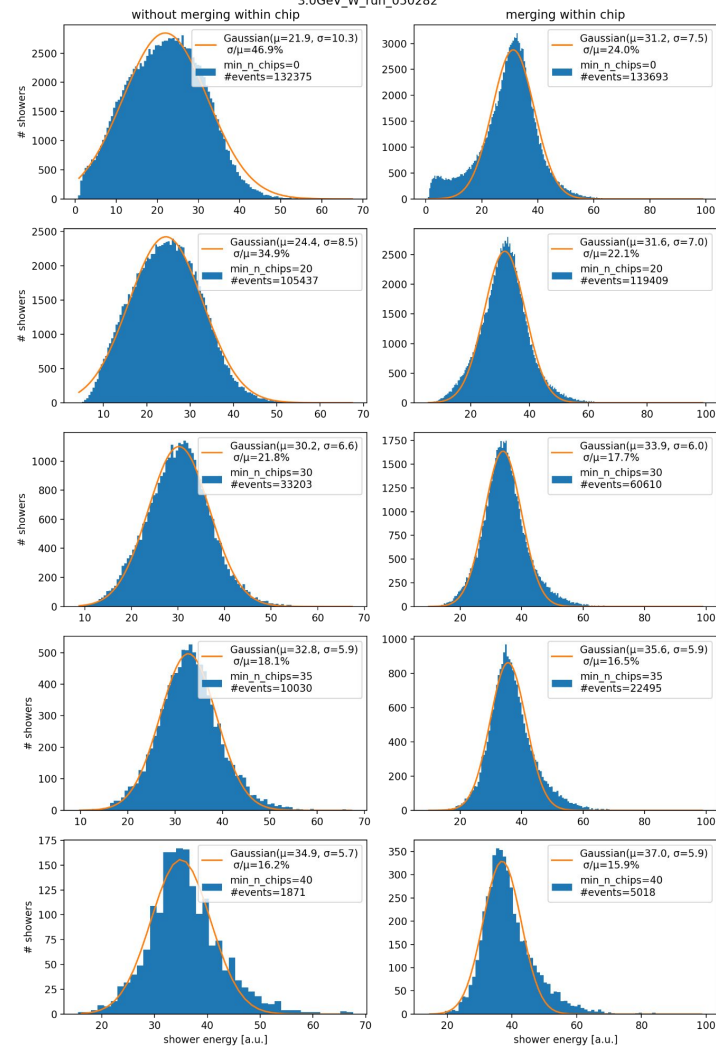
- No obvious pattern for first/second SCA of the splitted event in x vs y



Energy spread

- Left: before within chip merging
- Clearly, the merging is necessary
- Some chips not great: require ***min_n_chips*** for improvements
- Lowest: Comparison with Simulation @Fabricio (here: before any digitisation, masking, ...)
- Caveats
 - At these low energies, counting hit channels should be better than sampling-fraction weighted energy sum
 - Preliminary MIP & Pedestal calibrations
 - No correction for masked cells here







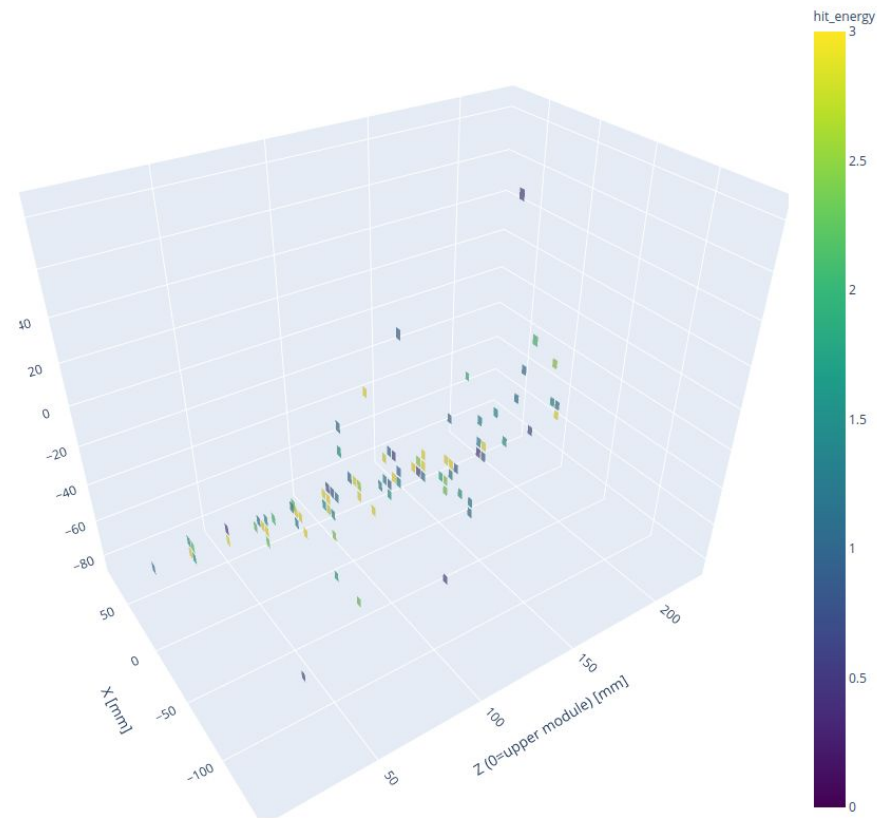
Easy comparisons of SIM/Data



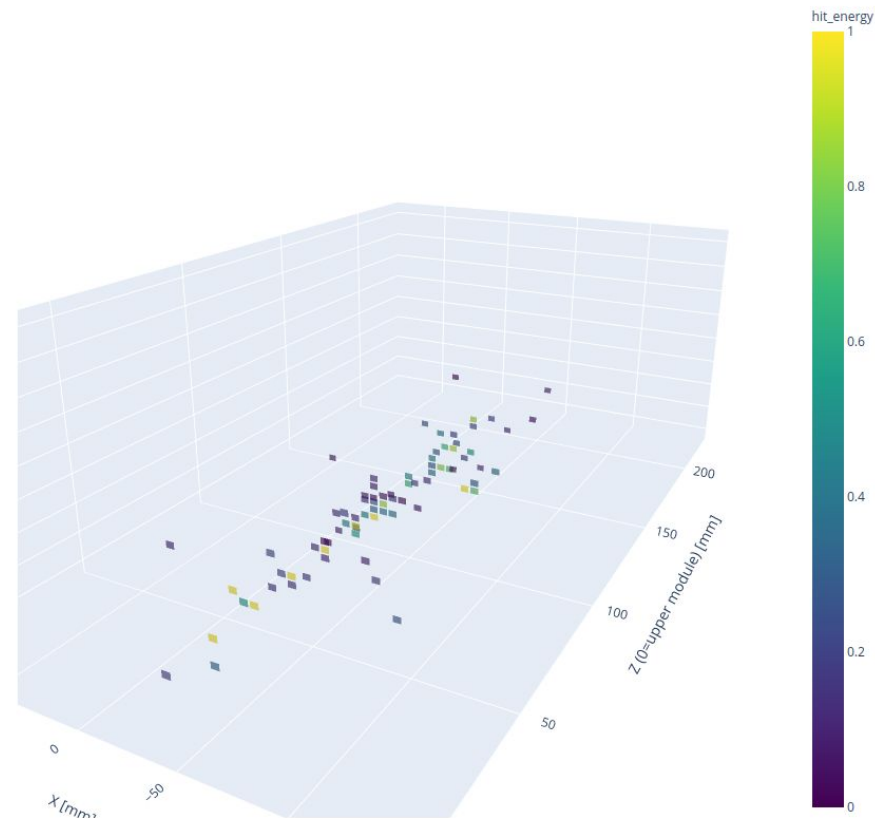
Comparing Simulation with data: build.root files

- E.g. energy spread plots from before
- New monitoring scripts to create the build.root file *while the run is ongoing*
- simulation.lcio → sim_build.root written by Fabricio
- Next slide: Event displays real data (left) & simulation @3GeV

Event display Run_name_1 #Hits=86 #Coincidences=15



Event display Run_name_2 #Hits=78 #Coincidences=1



SiWECAL-TB-monitoring for just-in-time event building

- steering file per SiW-ECAL setup
- Constant feedback

```
[INFO 09:28:32] Logging to file /afs/cern.ch/user/j/jokunath/public/
[DEBUG 09:32:39] Channel masks written to /afs/cern.ch/user/j/jokunath/public/
[INFO 09:32:39] The run has finished. Monitoring will try to catch u
[DEBUG 09:33:42] New converted file converted_3GeV_MIPscan_eudaq_run_
[DEBUG 09:33:59] New event file build_3GeV_MIPscan_eudaq_run_050471
...
[DEBUG 10:03:31] A new monitoring snapshot is ready: full_run.root at /afs/c
[INFO 10:03:31] The run has finished. The monitoring has treated all files.
```

```
monitoring.cfg
1  [monitoring]
2  max_workers = 10
3  output_parent = data
4  skip_dirty_dat = False
5  # Only used if the raw data is in raw.bin_XXXX format. -1 for no split.
6  binary_split_M = 50
7  # Needs some extra python packages, and adds some extra time. For batch
8  # finished runs, you might want to set this to 'quality_info' = False'.
9  quality_info = True
10
11  [snapshot]
12  after = 1, 10
13  every = 50
14  # Setting this to True can save some disk space for long runs.
15  delete_previous = False
16
17  # Any field in 'default_eventbuilding.cfg' can be overwritten here.
18  # That is also where you can find explanations of their meaning.
19  # (local) ./continuous_event_building/SiWECAL-TB-analysis/eventbuilding/
20  # (online) https://github.com/SiWECAL-TestBeam/SiWECAL-TB-analysis/tree/
21  [eventbuilding]
22  min_slabs_hit = 6
23  # Tungsten thickness in mm. A single number is interpreted as per layer
24  w_config = 2.8,2.8,2.8,2.8,2.8,2.8,2.8,4.2,4.2,4.2,4.2,4.2,4.2,4.2
25  asu_versions = 13,13,COB,COB,11,11,11,12,12,12,12,11,11,10,11
26  max_entries = -1
27  no_lg = False
28  zero_suppress = True
29  merge_within_chip = True
30  pedestals_file = ..... example/dummy_calibration/Pedestal_dummy_highgain.t
31  mip_calibration_file = ..... example/dummy_calibration/MIP_dummy_highgain.t
32  pedestals_lg_file = ..... example/dummy_calibration/Pedestal_dummy_lowgain.t
33  mip_calibration_lg_file = ..... example/dummy_calibration/MIP_dummy_lowgain.t
34  mapping_file = ..... continuous_event_building/SiWECAL-TB-analysis/
35  mapping_file_cob = ..... continuous_event_building/SiWECAL-TB-analysis/
```

Summary

- Empty SCAs: (most of the time, at least for event building): just take the BCID-neighbouring, non-empty SCA
- hit splitting on same chip: if exactly 2 consecutive SCAs: take the union of triggered channels
- New JIT-build-monitoring tools