Beam Test Analysis – II

Calice Collaboration Meeting @ Valencia
Apr 22, 2022

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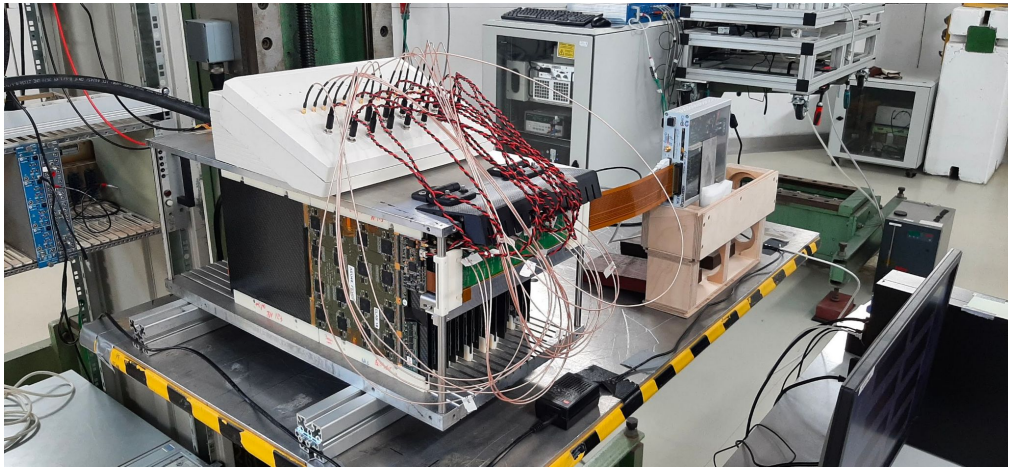
Affiliation:

In collaboration with:


DESY Test Beam March 2022

Data Quality Checks

- Mapping of the COBs
  - Done during the beam test
  - Rotation of mappings in Chip 13 & 15
- Determination of Hit Rates
  - Offline beam rate measurements
  - cycles → sec
  - Data quality checks



Mapping

Mapping

Mapping Issue

- Chip 13 & 15 were identified to have mapping issue during the test beam.
- Without proper mapping, one cannot identify the correct beam spot.
- The issue could only be identified during the test beam since cosmic rays will not create a spot, wide enough to show the mapping structure.

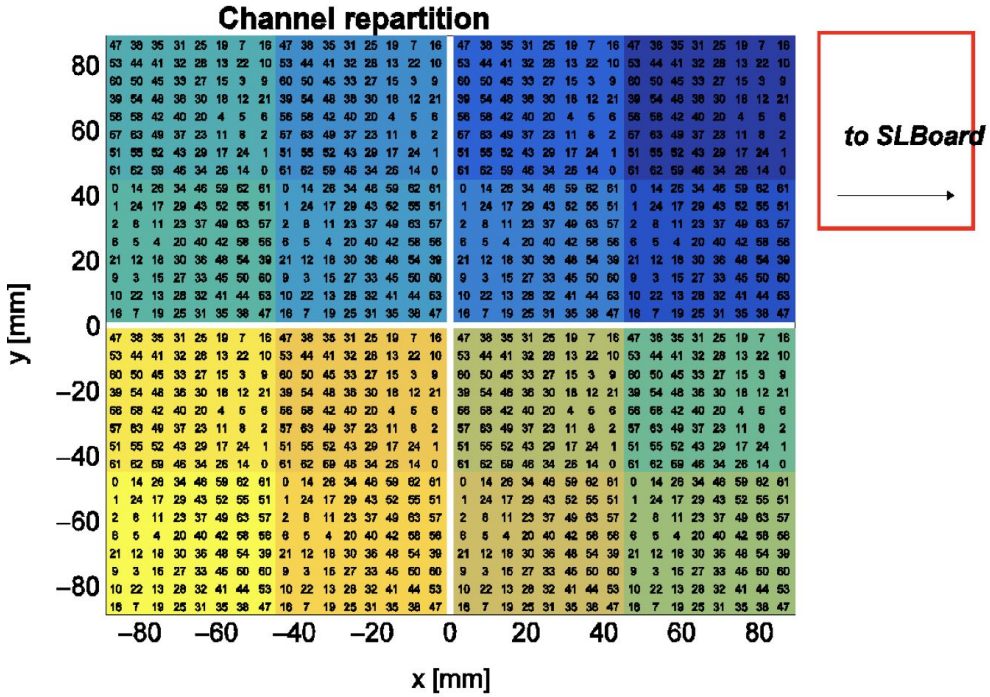


Fig: Channel mapping of **FEV 11** (not COB)

Mapping

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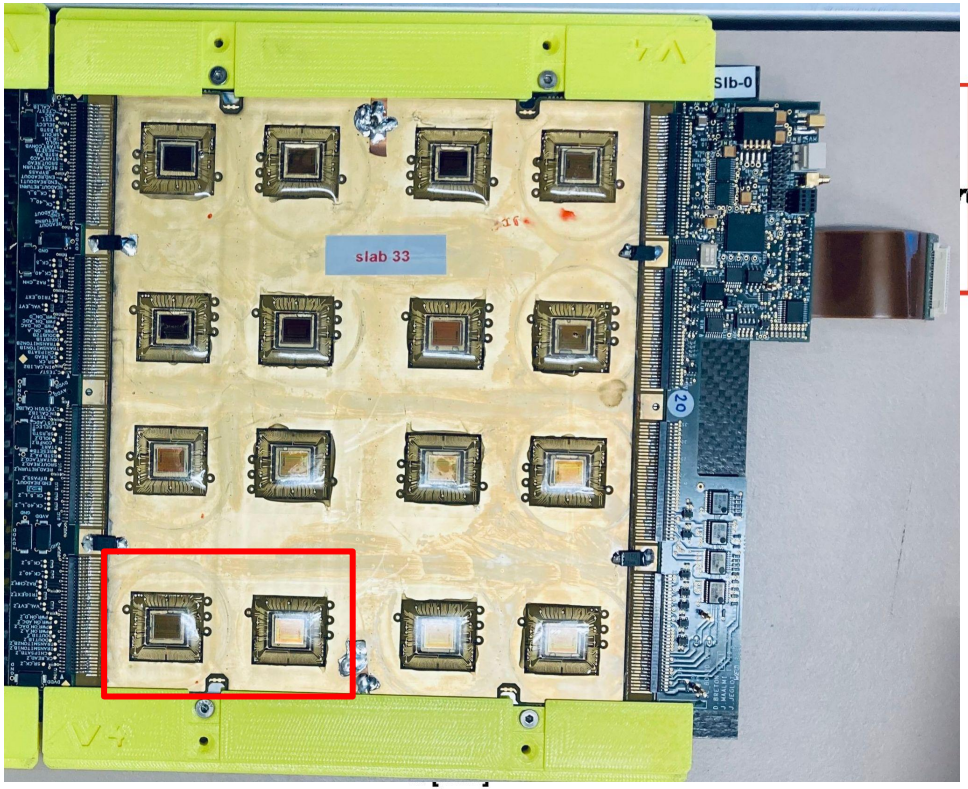
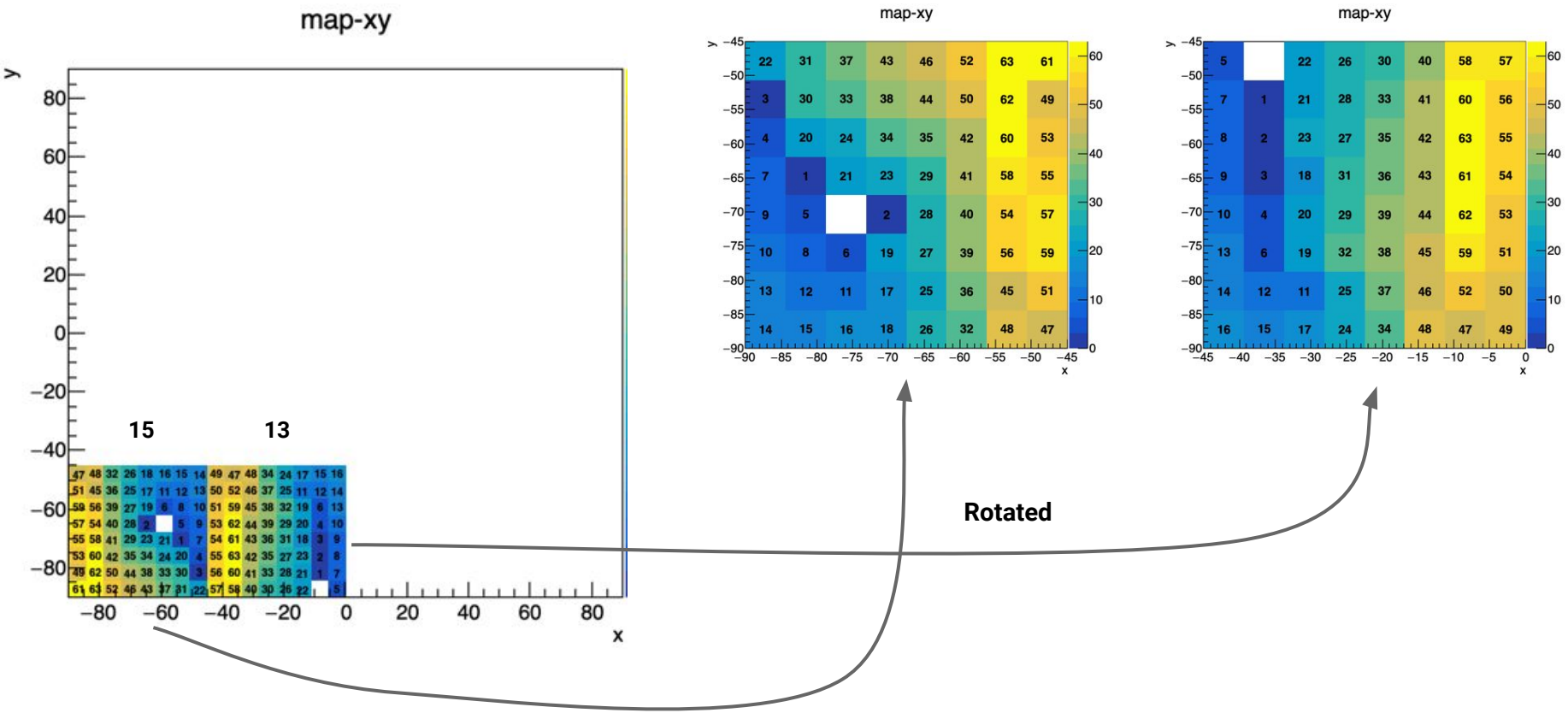
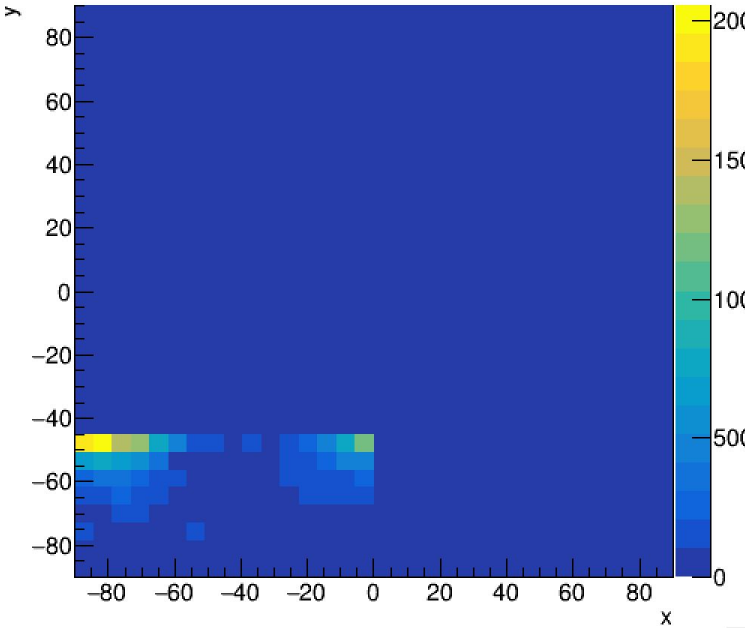


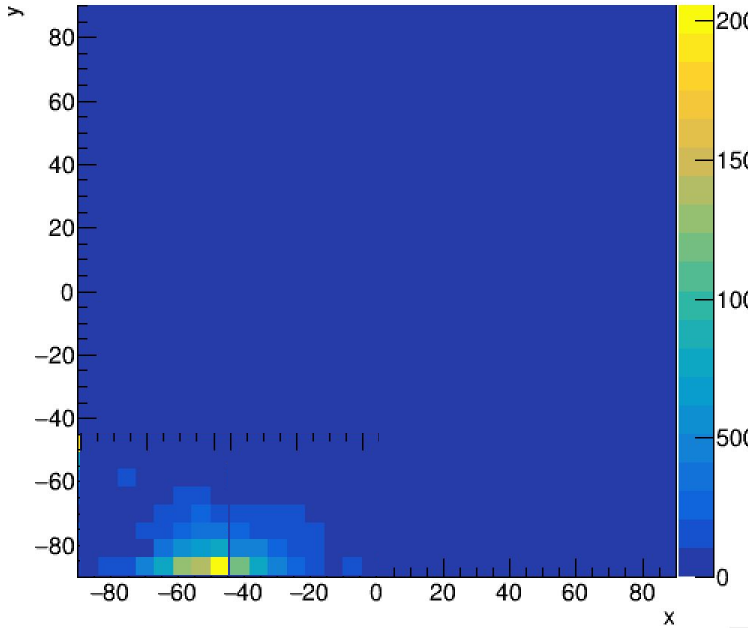
Mapping



Mapping

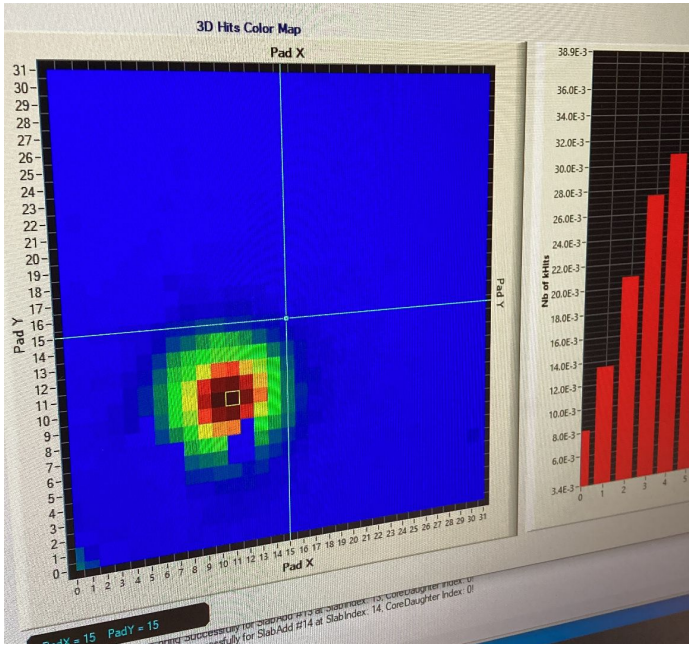
Layer 2 : 3.0GeV MIP Position Scan

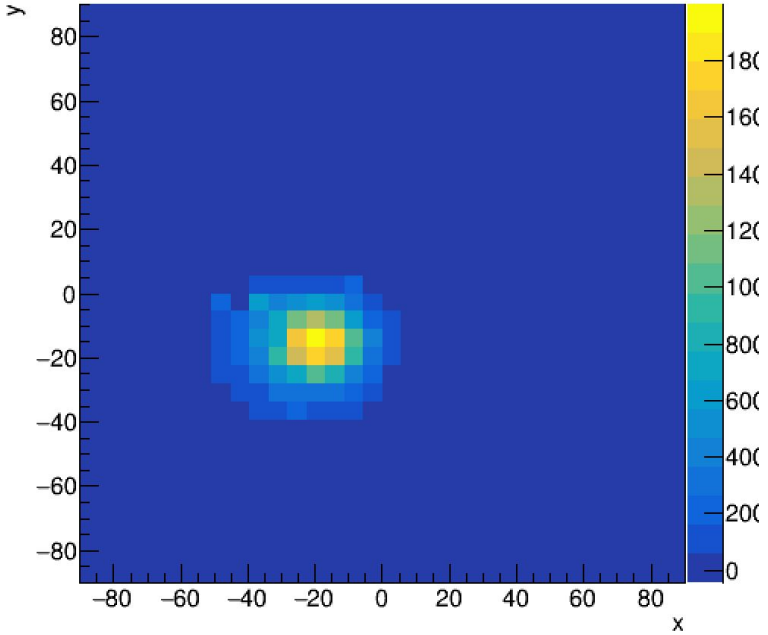




Supposed to see

Mapping


3D Hits Color Map
Pad X
Pad Y
Nb of Hits
PadX = 15
PadY = 15


y
x
80
60
40
20
0
−20
−40
−60
−80
−80 −60 −40 −20 0 20 40 60 80

Hit Rate

Hit Rate

Hit Rate Checks

- **Hit rate** is used to check the **data quality** of the signals.
  - During the beam test, the hit rate of the first layer was used to estimate the read beam rate.
  - DAQ software is already equipped with online hit rate monitoring.
  - The attempt was made to check data quality **offline**.
- Evaluation of **Noise Rate**
  - One needs to know the noise ratio of the detector to evaluate the background events from the data.
  - Combined with noise rate observed from the off-beam analysis, one can estimate the background during the beam test.
    - This requires hit rate information.
- eg) 1 ms window + 10ms delay = 11 ms / cycle

Hit Rate

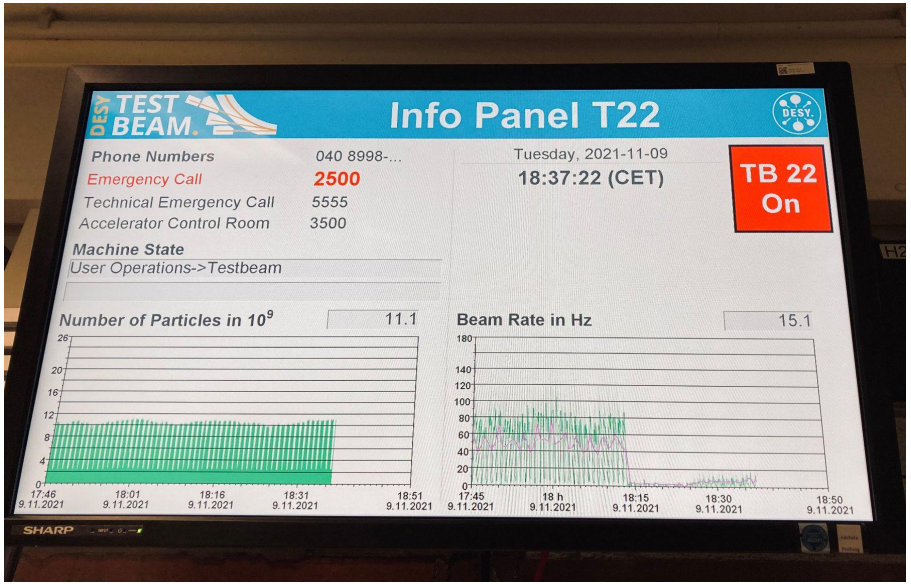


Photo: Beam Monitor at DESY site (From TB2021-11)

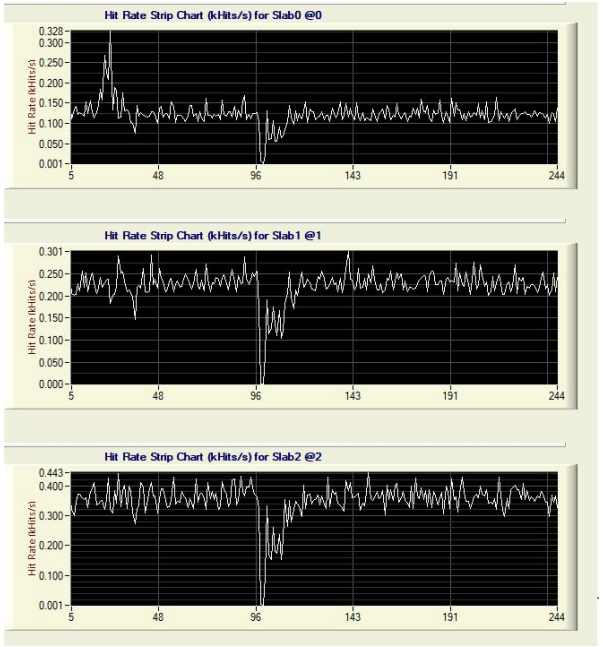
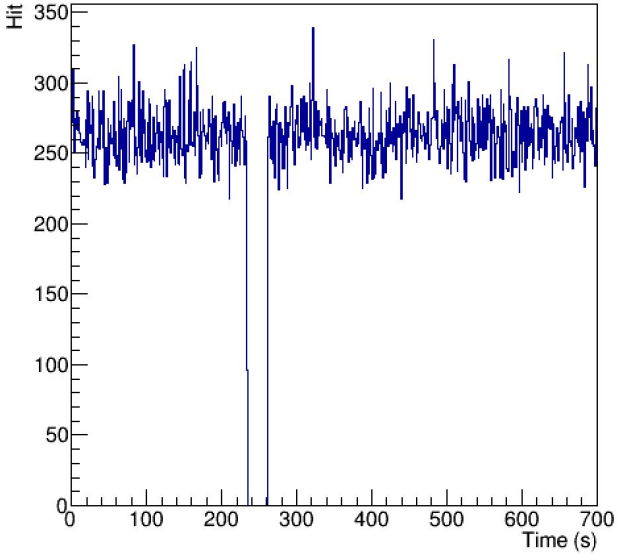


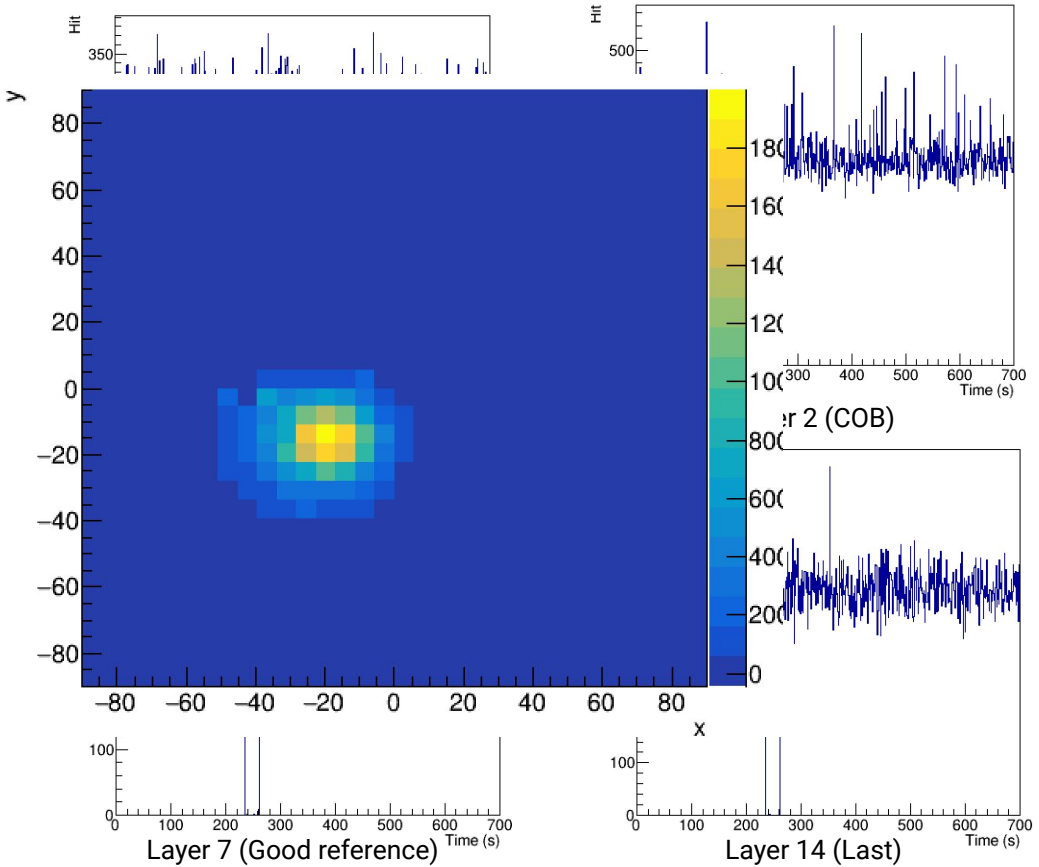
Fig: DAQ software (4.6 GeV Energy Scan)

Hit Rate

Position Scan (1)



Layer 0 (First)



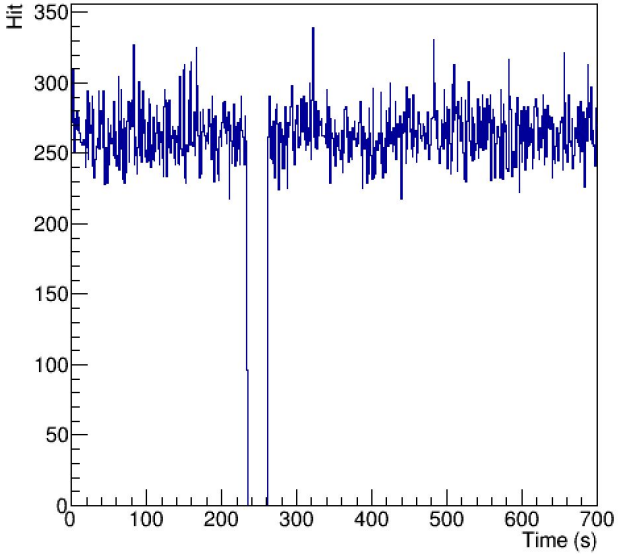
Layer 7 (Good reference)

Layer 14 (Last)

Sample) 3GeV_MIPscan_eudaq_run_050480

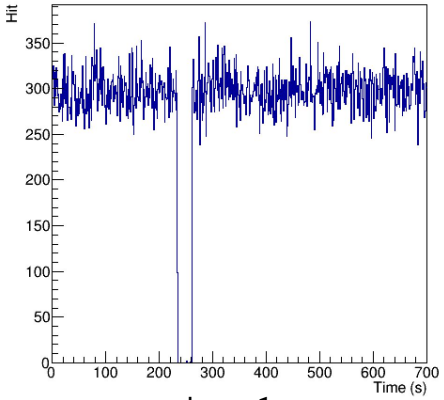
Hit Rate

Position Scan (1)

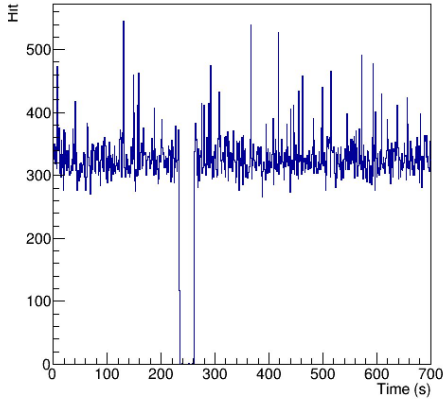


Layer 0 (First)

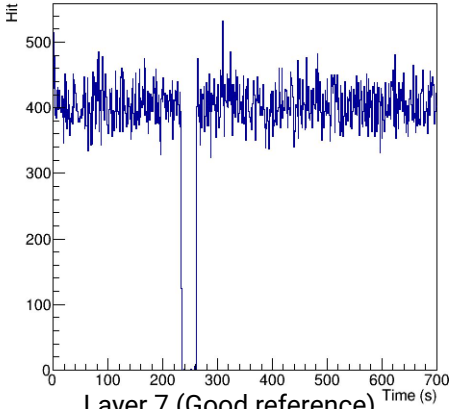
Sample) 3GeV_MIPscan_eudaq_run_050480



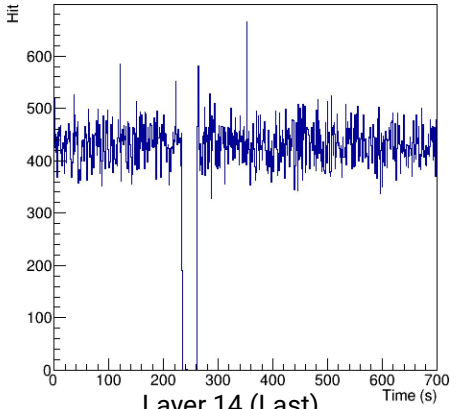
Layer 1



Layer 2 (COB)



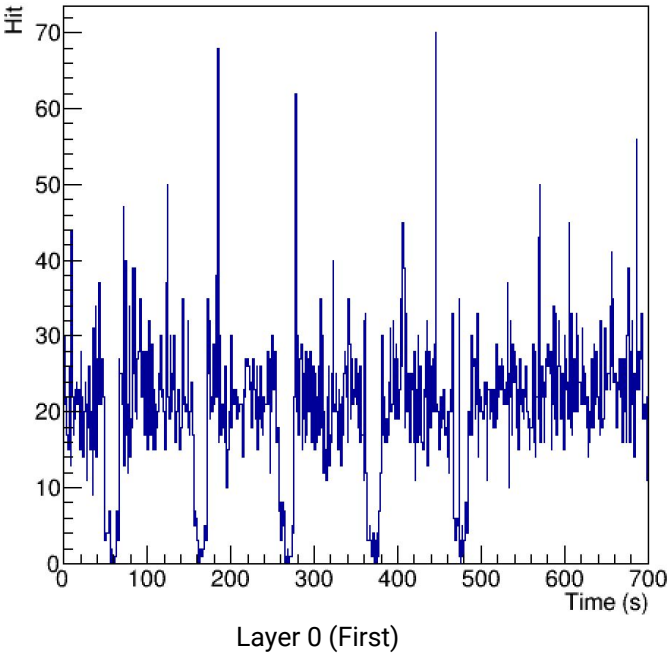
Layer 7 (Good reference)

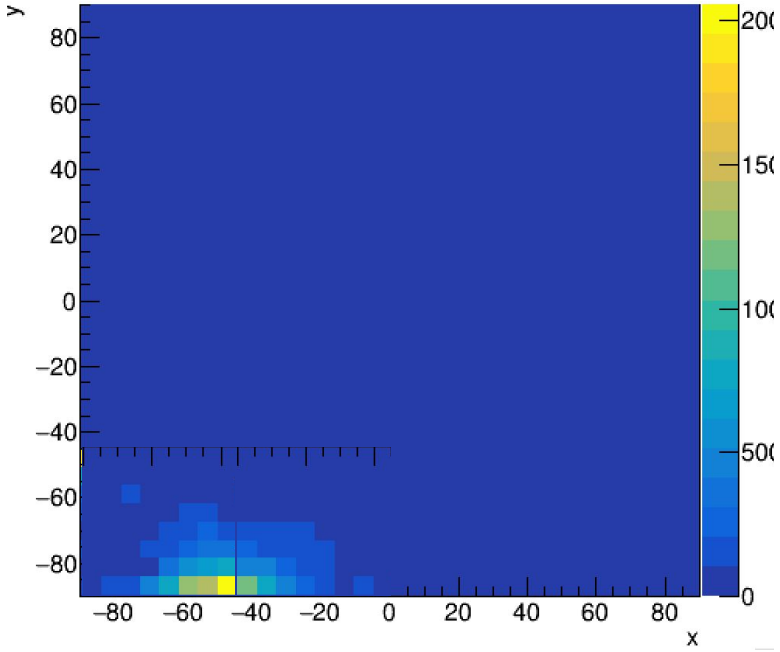


Layer 14 (Last)

Hit Rate

3GeV_MIPscan_eudaq_run_050490





Summary

- **Mapping**
  - COB mapping was corrected with rotating mapping of chip 13 & 15
- **Hit Rate**
  - Offline hit rate monitoring was examined.
  - Assist data quality check
  - Noise analysis is to be done with the hit rate information obtained from the beam test.

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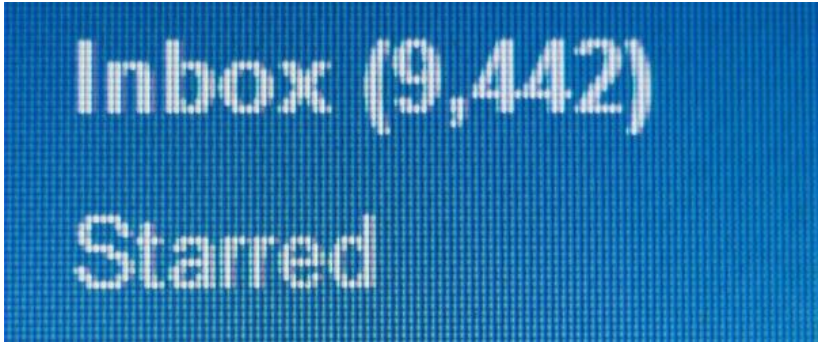

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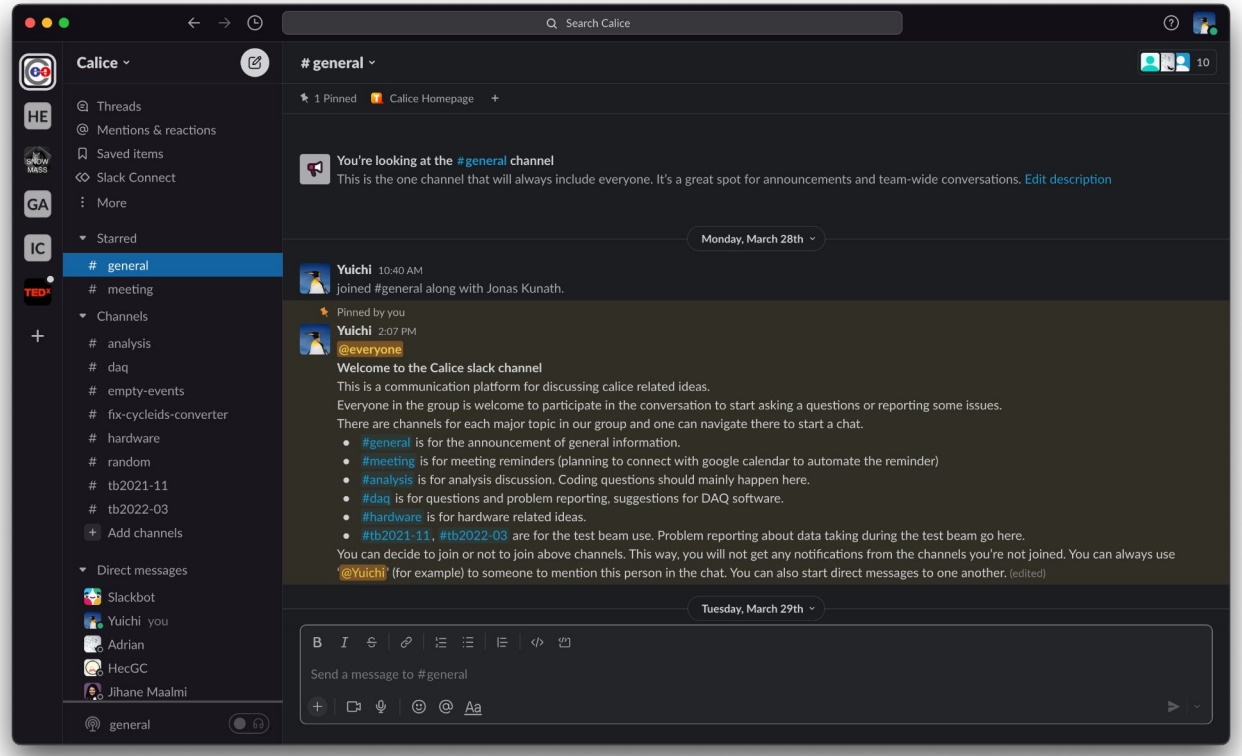

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