VTX-ITR report

CNAO2023

Dead map

- VTX
  - From run 6061 to 6113: low threshold
  - From run 6061 to 6123: sensor 3 excluded
  - ➡ After run 6123: threshold max (255) and sensor 3 included
  - ➡ Considered as noisy pixel when firing more then 0.5% of the events
- ITR
  - From run 6061 to 6113: low threshold
  - From run 6061 to 6113: some sensors excluded
  - ➡ After run 6113: threshold max (255) and all sensors included
  - ➡ Considered as noisy pixel when firing more then 1% of the events

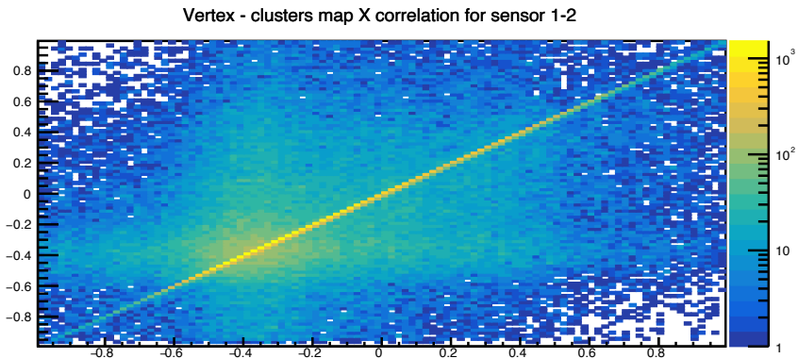
➡ Dead map updated and pushed in shoe

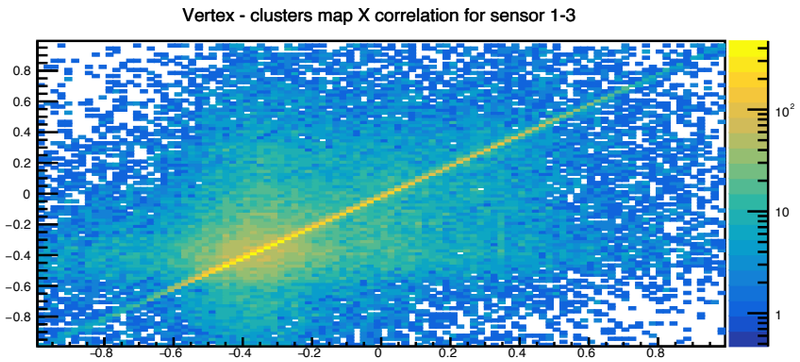
Vertex

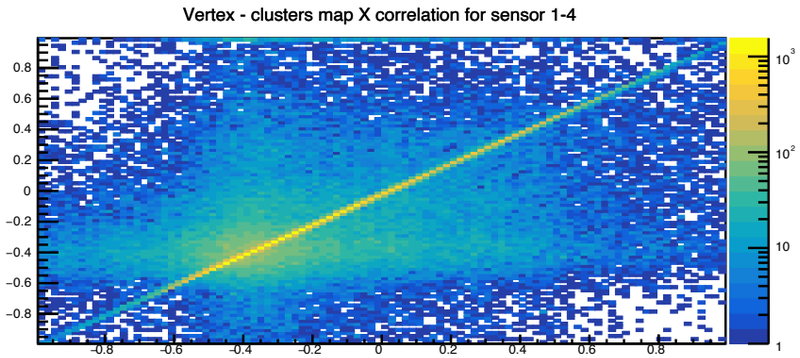
Correlation (i)

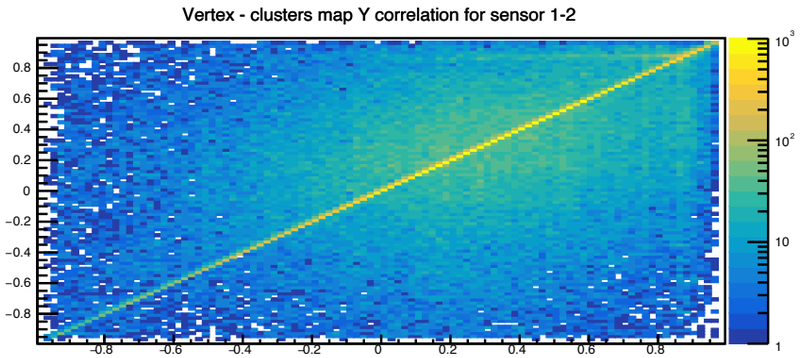
- Correlation position btw 2 VTX's sensors in the detector framework

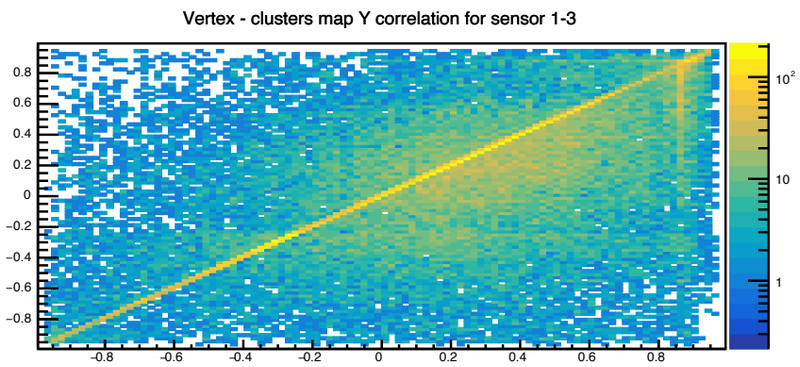
Run 6309

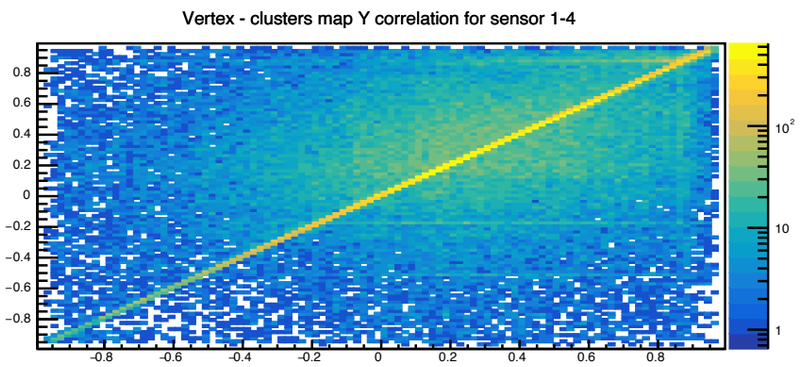


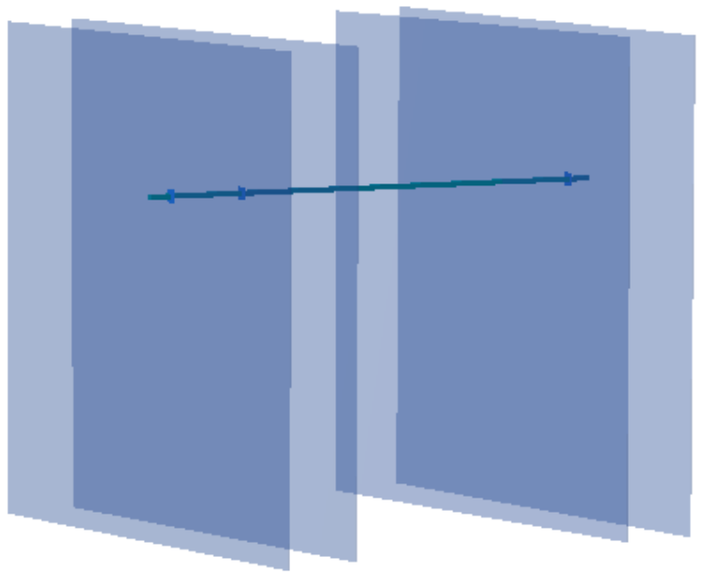








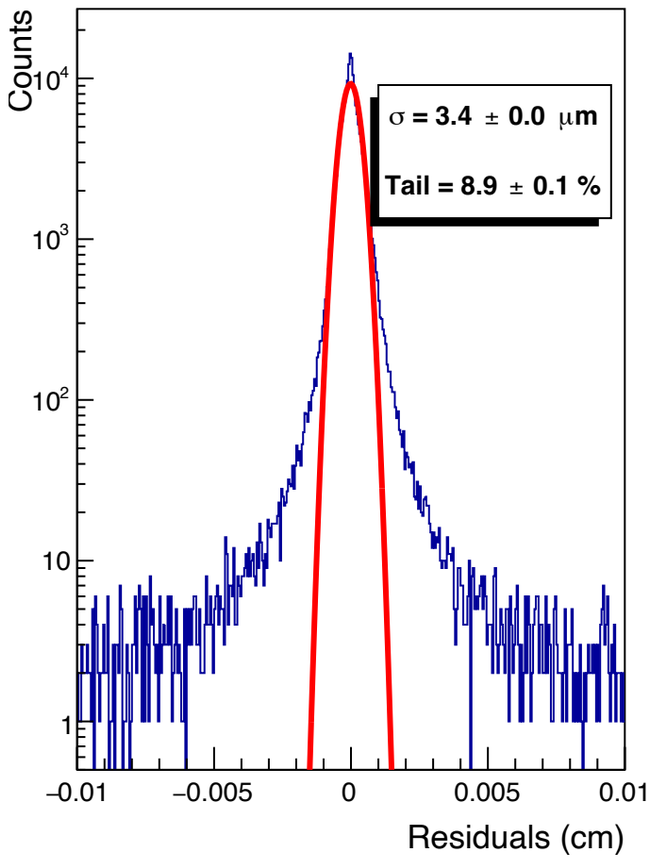


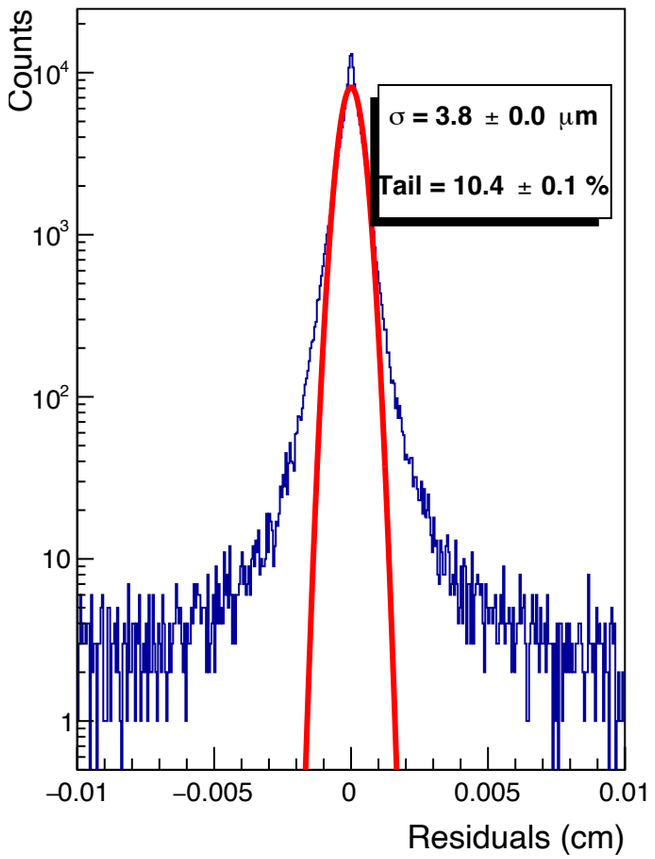


- Correlation btw all sensor in X & Y

Alignment

- VTX:
  - Taken a fragmentation run (6144), cut on cluster size (> 15)

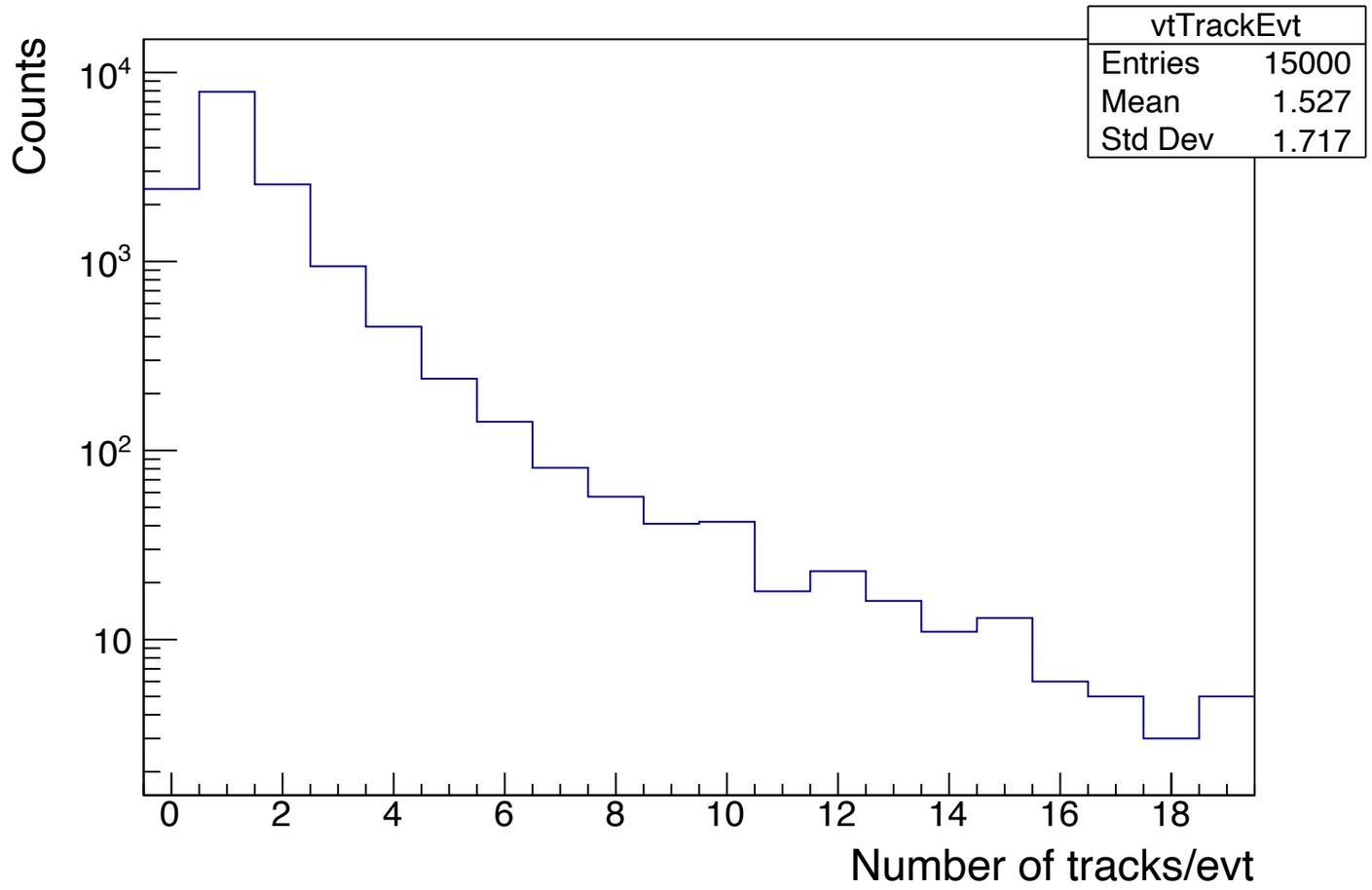




  - ~1 μm worse compare to GSI data, same tails

Tracking (i)

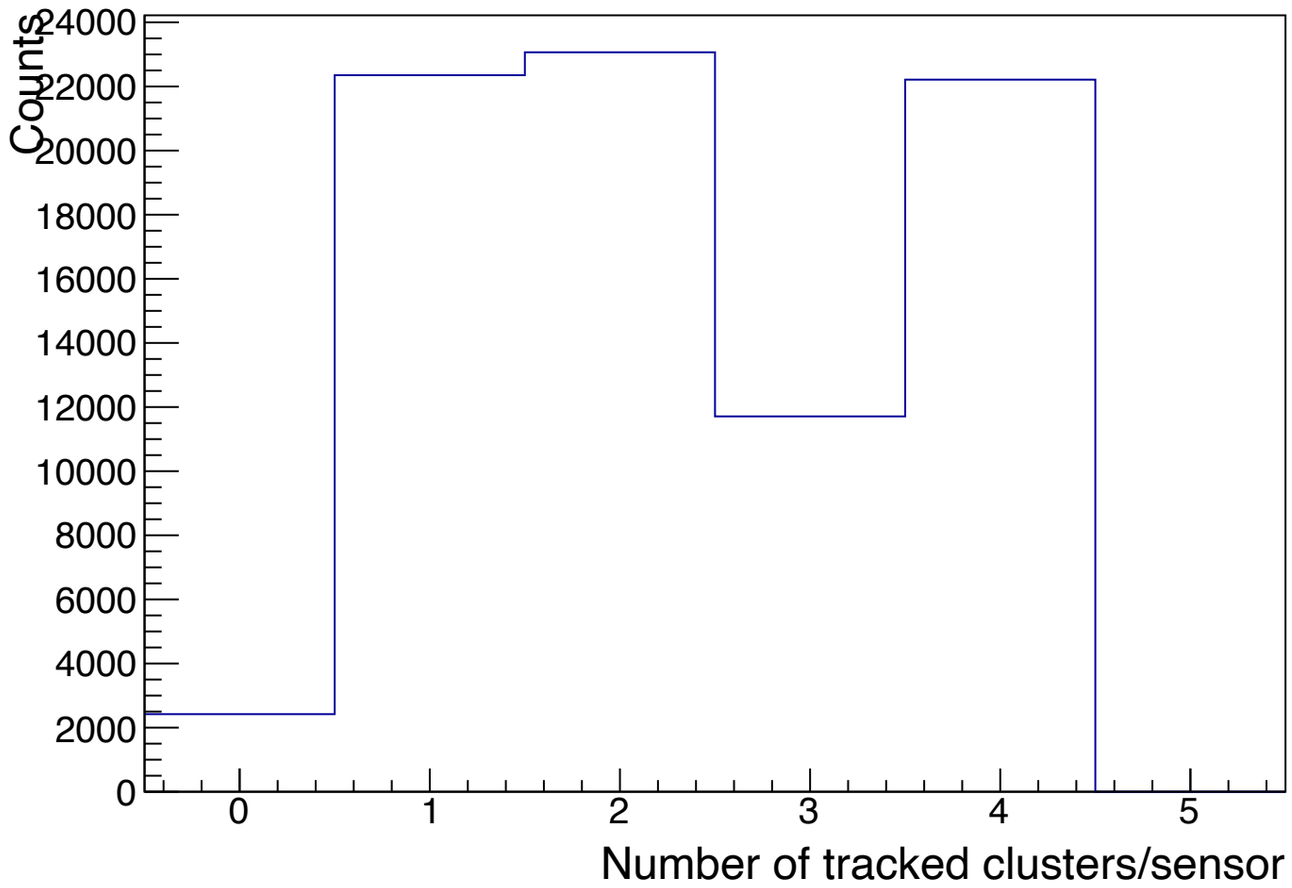
- VTX: run6144 (Frag. Trigger)
  - Number of tracked per event



➡ 50 % contains only one track

Tracking (ii)

- VTX: run6144 (Frag. Trigger)
  - Number of tracked cluster per sensor



➡ 15 % of events with no tracks (tracks out of VTX acceptance)

➡ All sensors has same efficiency except sensor 3, drop to 52 %

Tracking (iii)

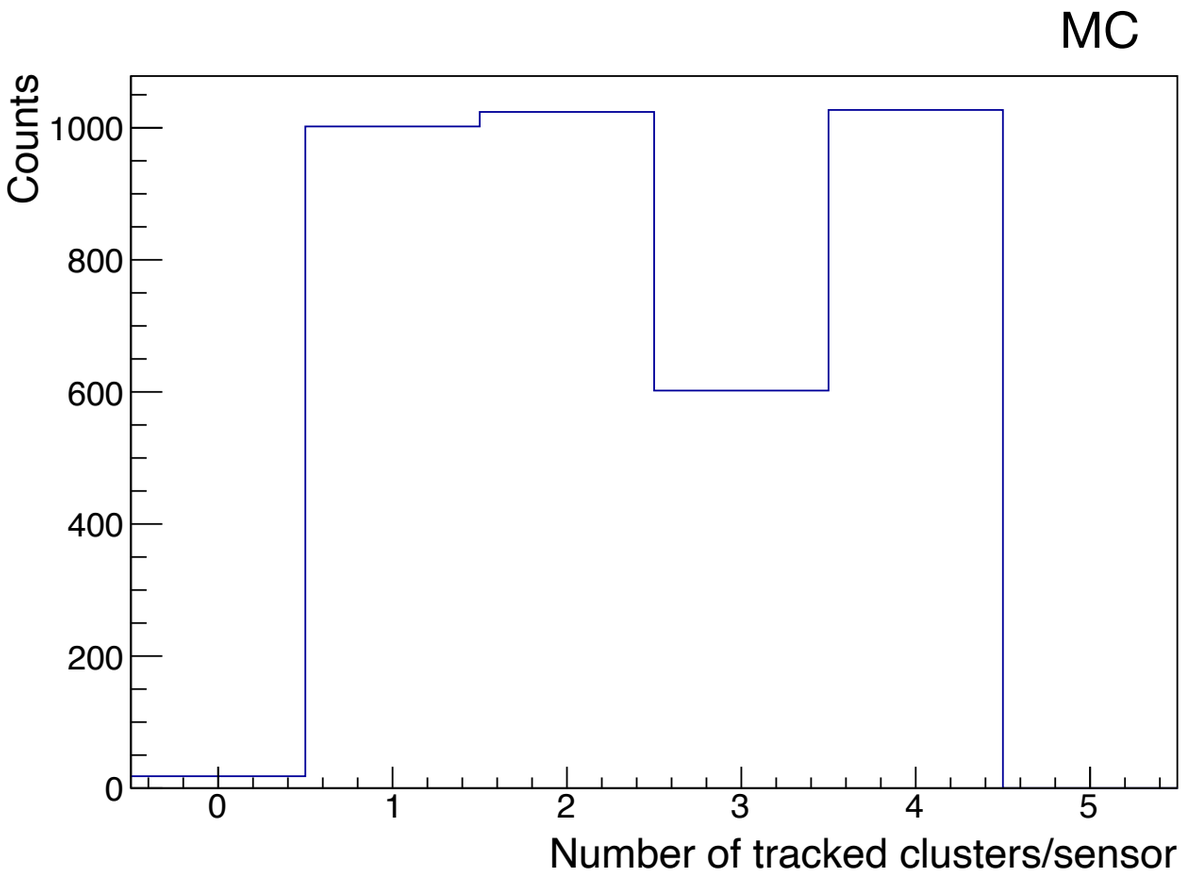
- Reconstruction
  - Add calibration file for VTX, **pixel** efficiency per quadrant (TAVTdetector.cal)

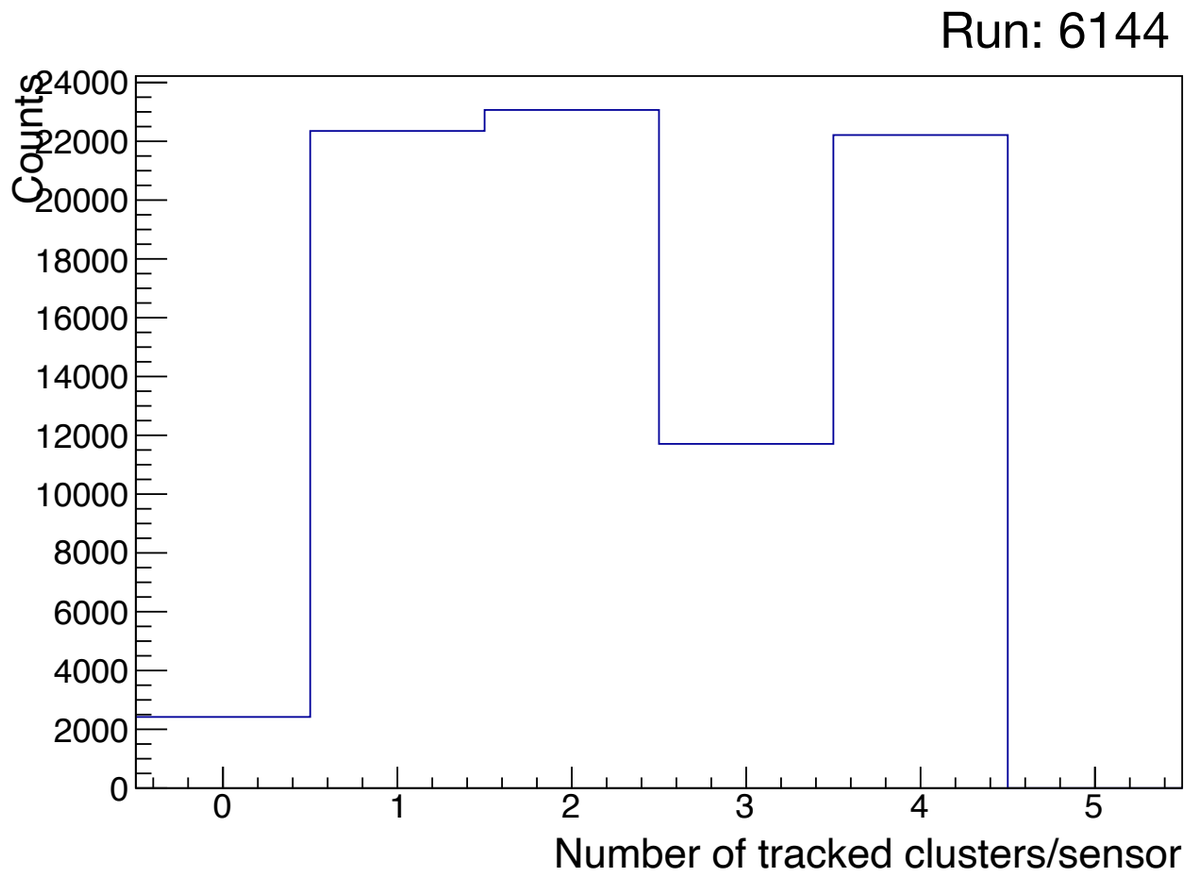
```
# Landau parameter for pixels number
# Add quenching parameter in Landau
# assuming a weak dependance on energy
#
chargesN: 6
#        Cst      MPV    Sigma   Quench
charge 1:  264    6.1    0.43    0.001
charge 2:  419    8.8    0.54    0.002
charge 3:  463   11.0    0.62    0.012
charge 4:  673   13.3    0.68    0.017
charge 5: 1377   15.8    0.70    0.009
charge 6: 204771 18.5    0.83    0.004

########################################
# sensor efficiency per quadrant
sensorsN: 4
sensor 1: 1.   1.   1.   1.
sensor 2: 1.   1.   1.   1.
sensor 3: 0.   0.1  1.   1.
sensor 4: 1.   1.   1.   1.
```

➡ Implement in shoe

Tracking (iv)
(CNAO2023_MC)

- VTX:
  - Number of tracked cluster per sensor



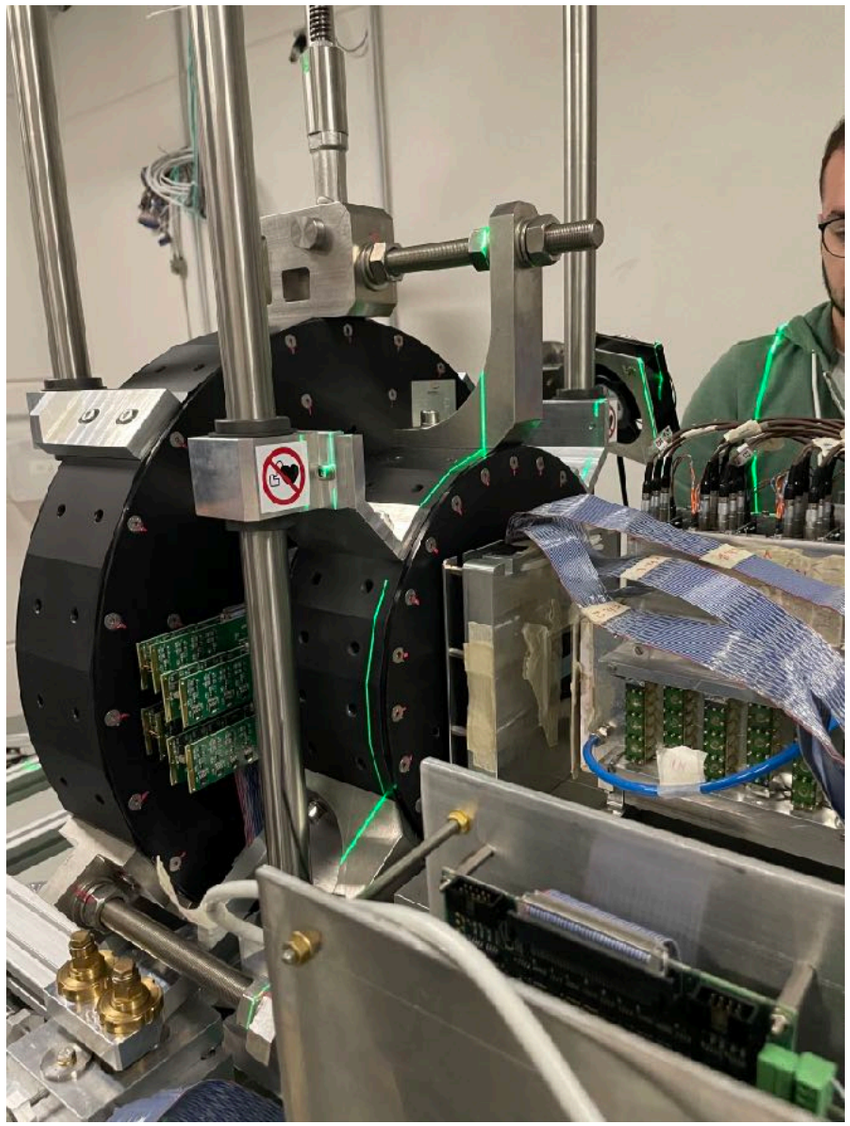


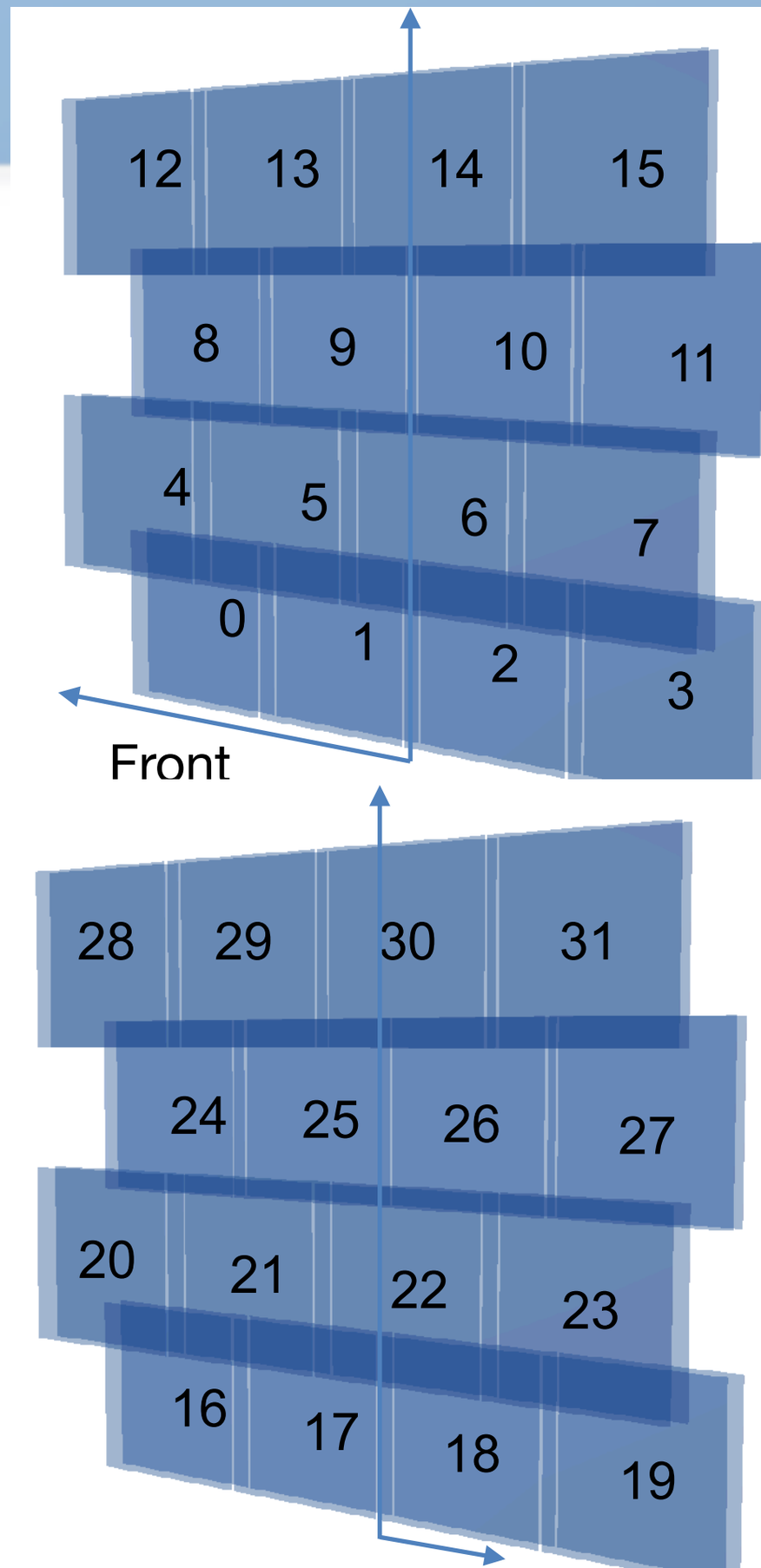
➡ The parameters can be tuned to reproduced the data

Inner Tracker

Numbering (i)

- Numbering in raw data

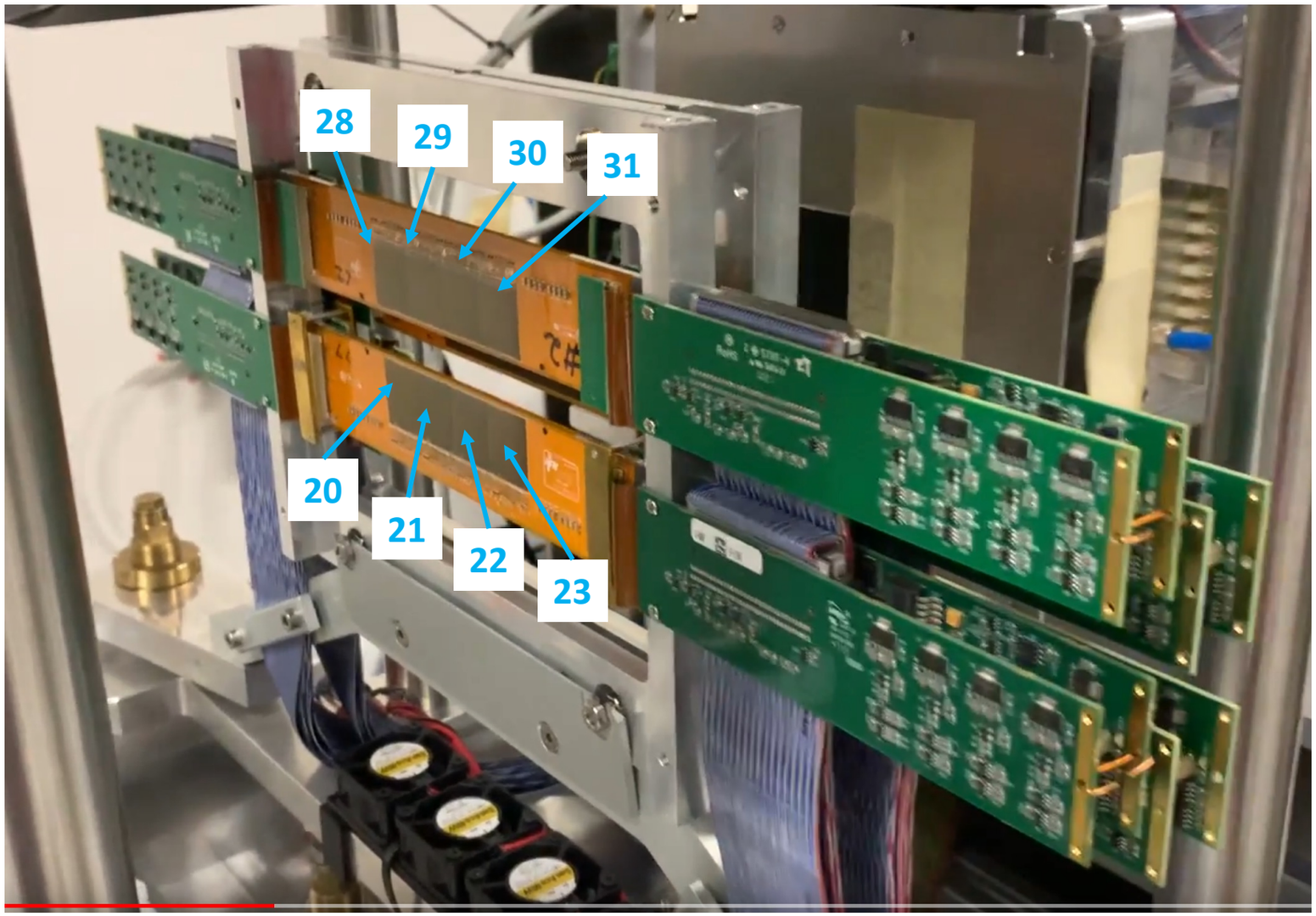


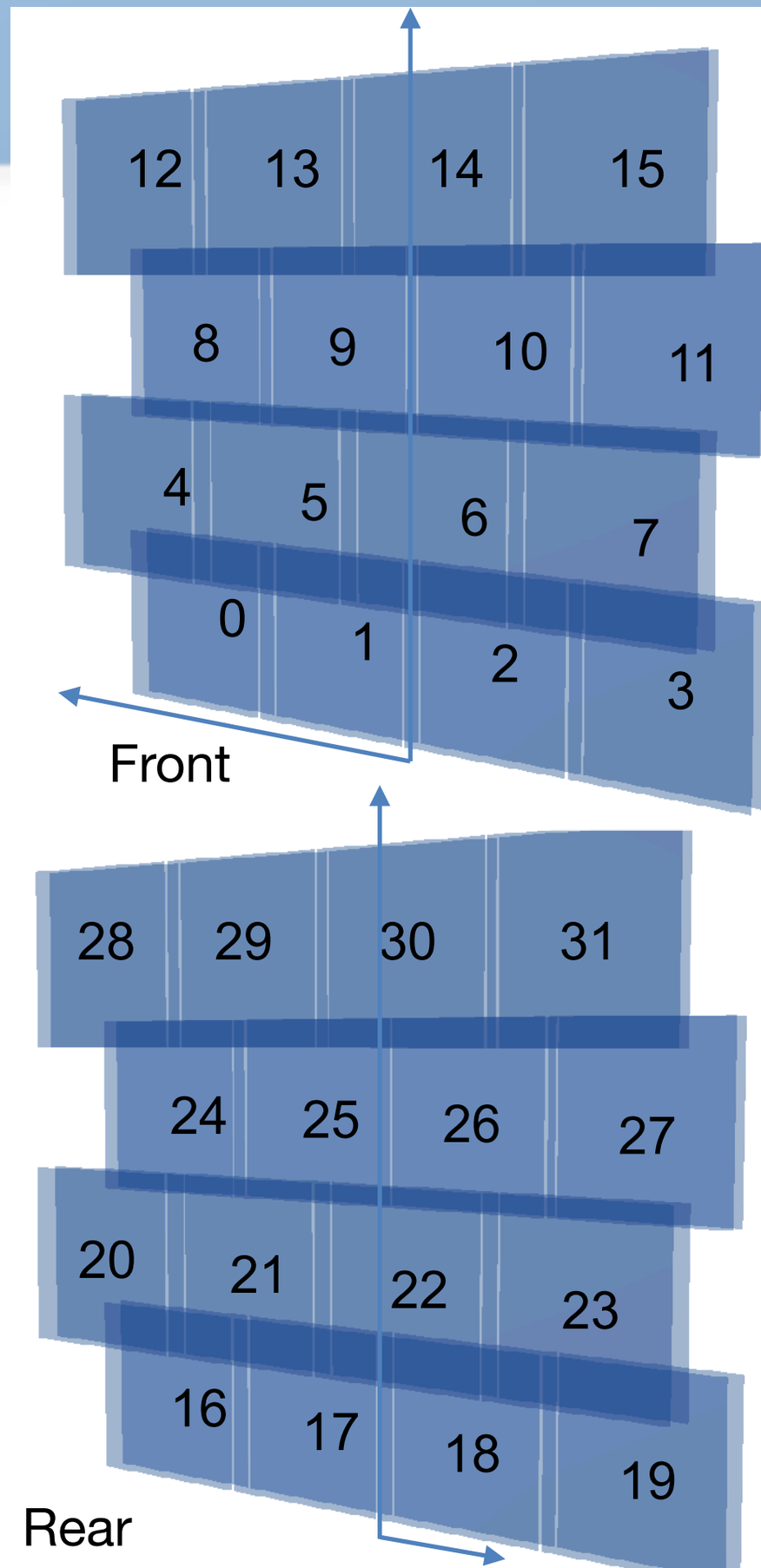


➡ Change since last meeting

Numbering (ii)

- Numbering from MC simulation (Giuseppe)

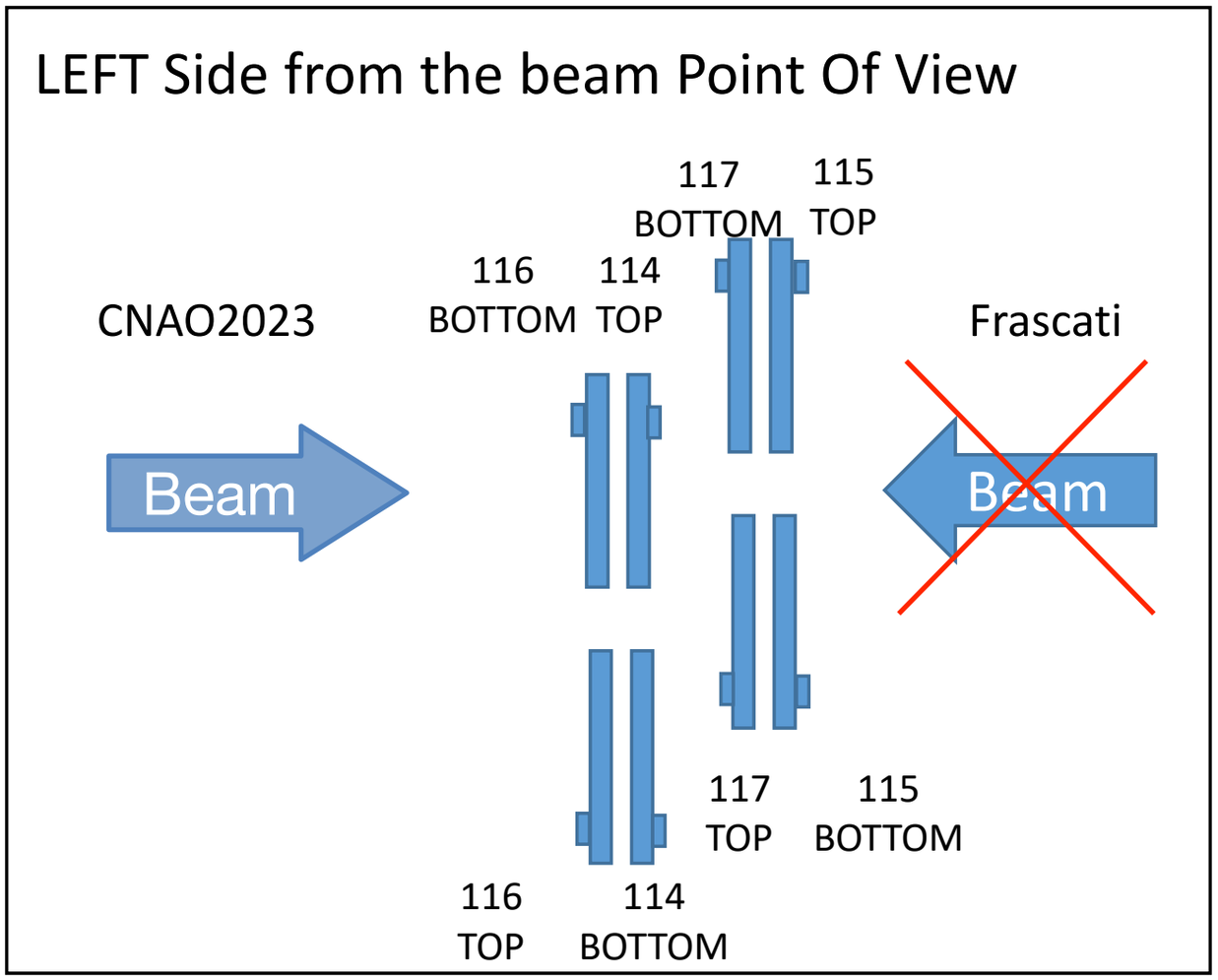


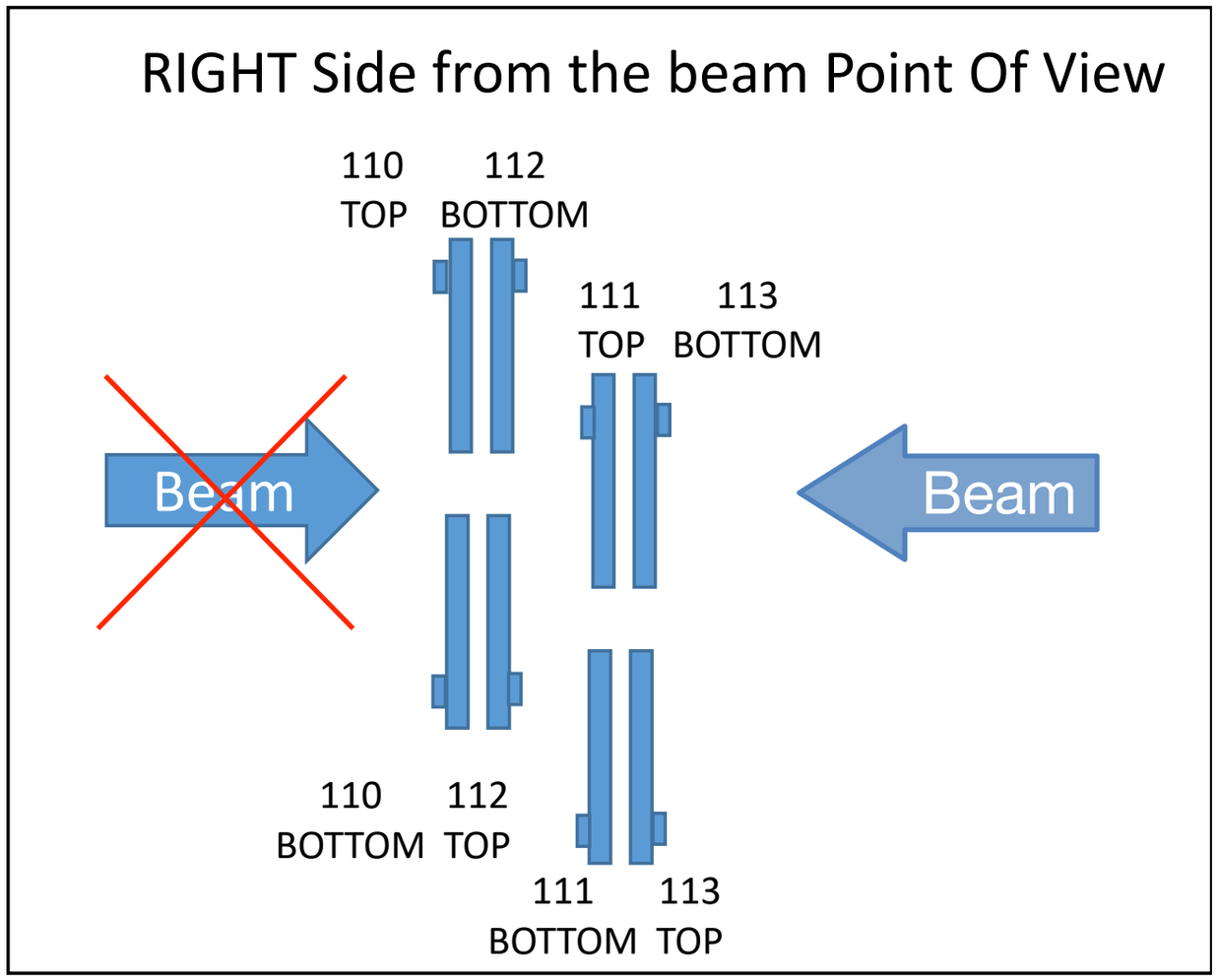


➡ Seems now coherent

Mapping (i)

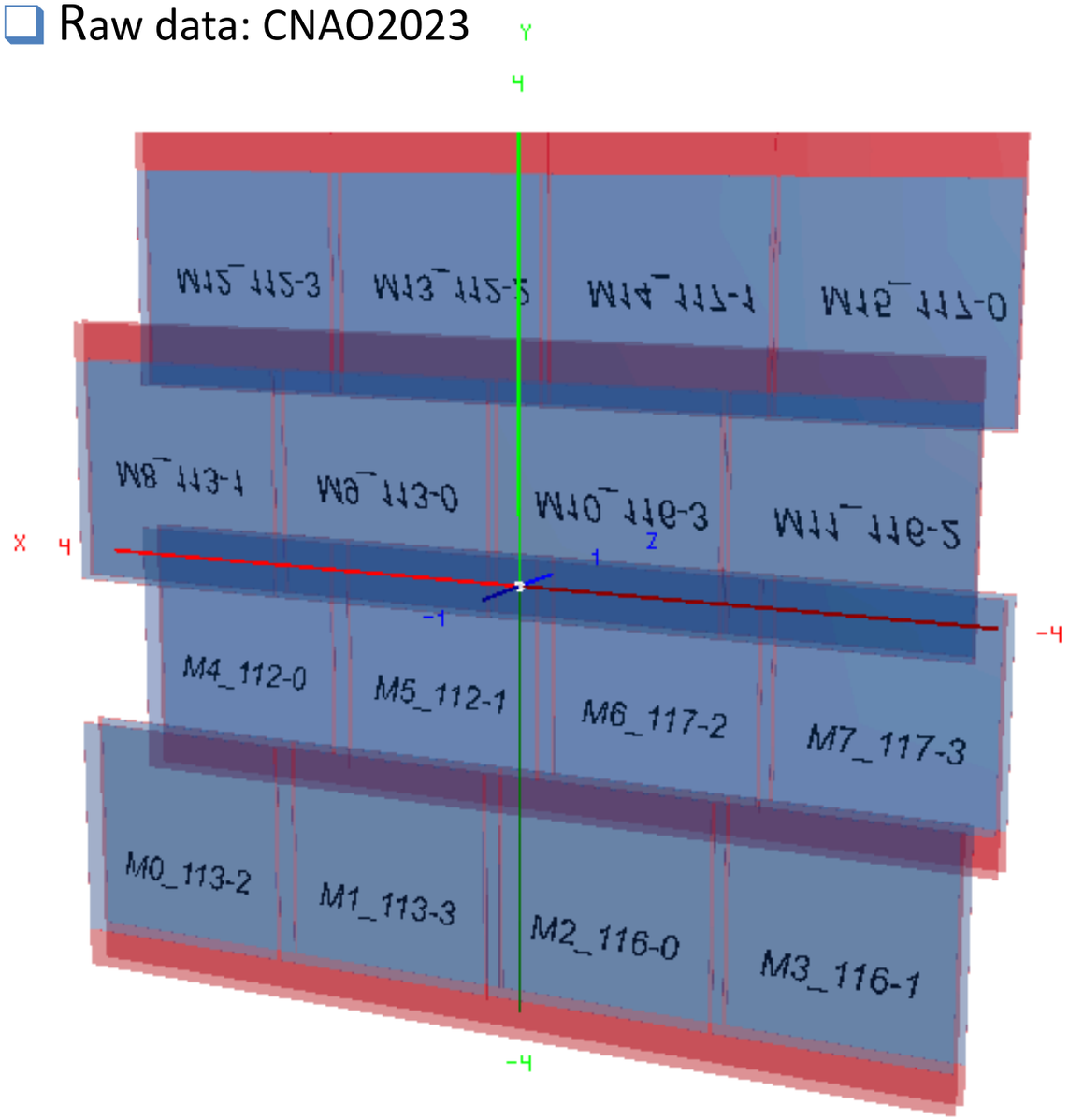
- Sketch:



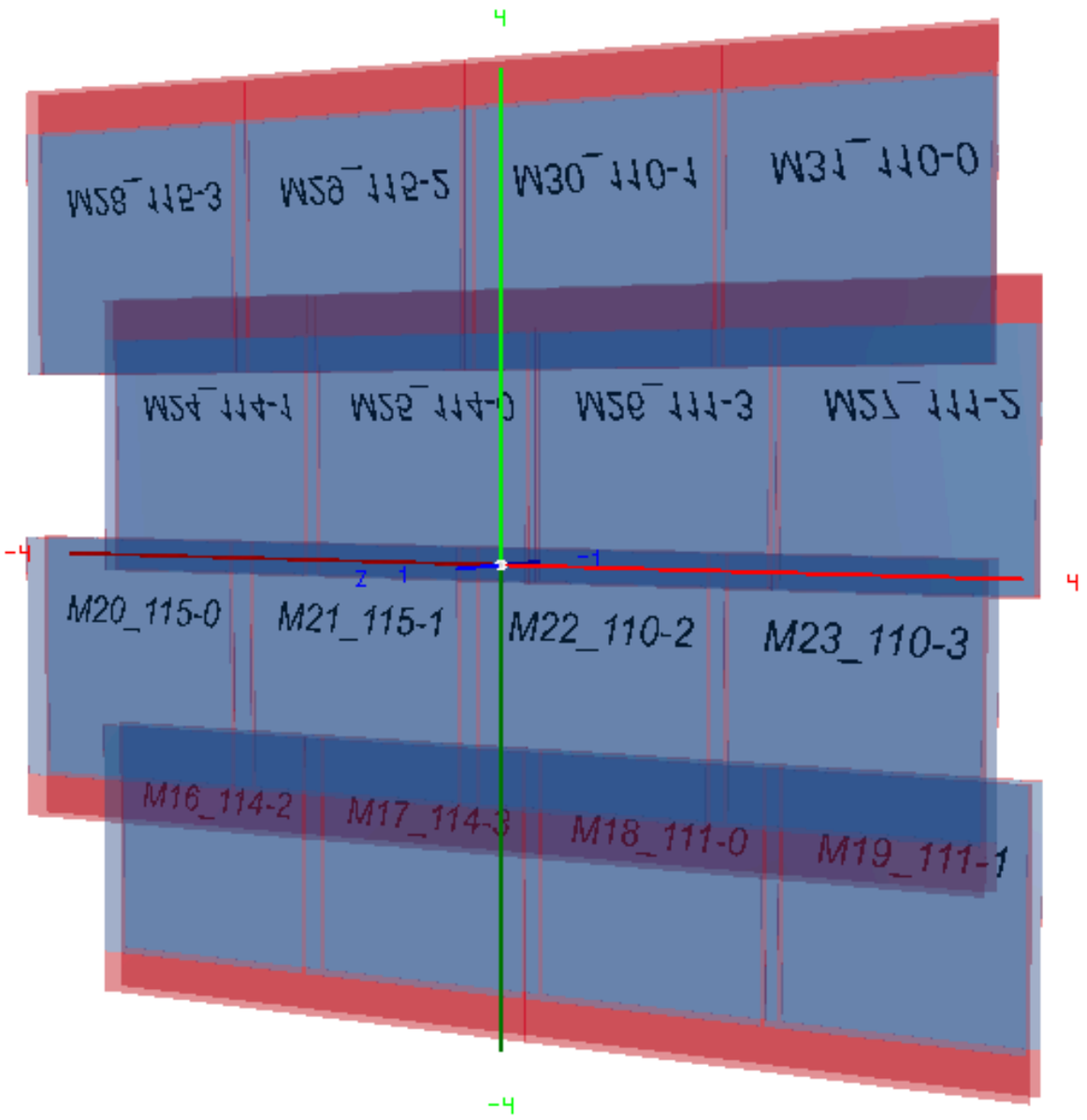


Mapping (ii)

- Raw data: CNAO2023



Front

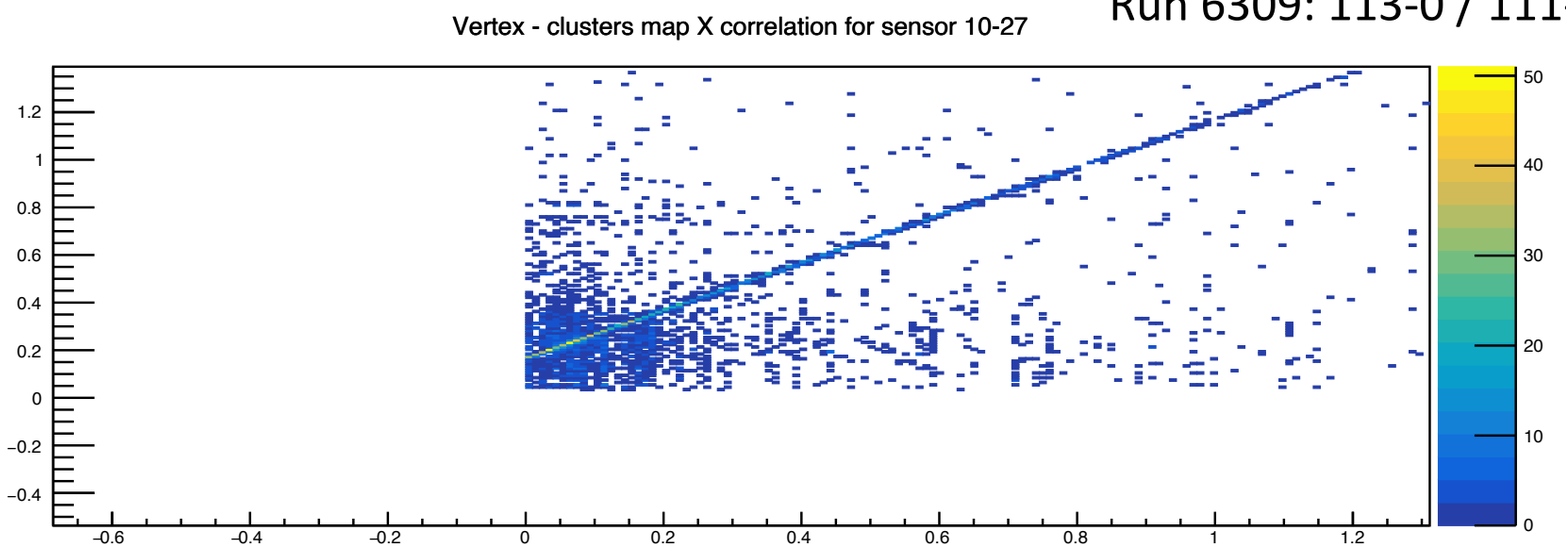


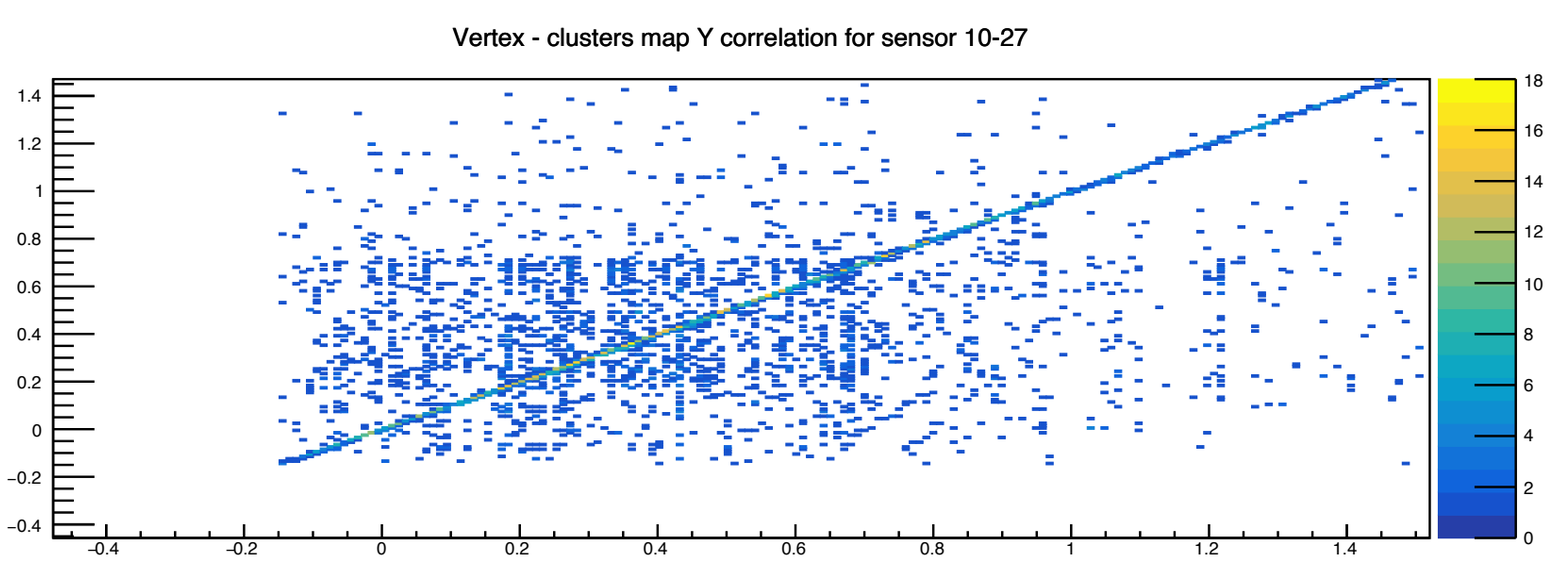
Rear

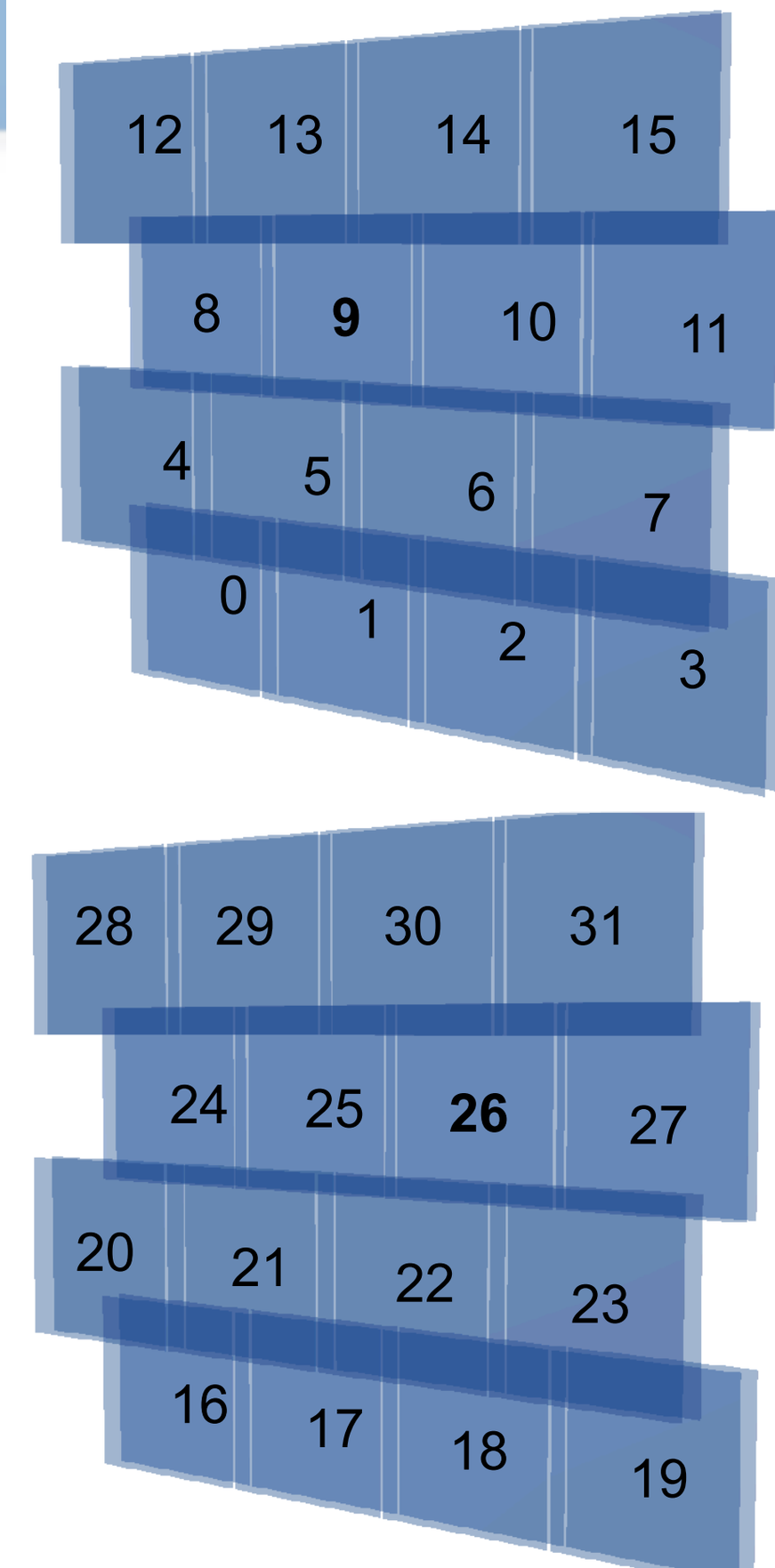
Correlation (ii)

- Correlation position btw 2 ITR's sensors in the detector framework

Run 6309: 113-0 / 111-3







➡ Correlation btw two boards front/rear side

Inner Tracker

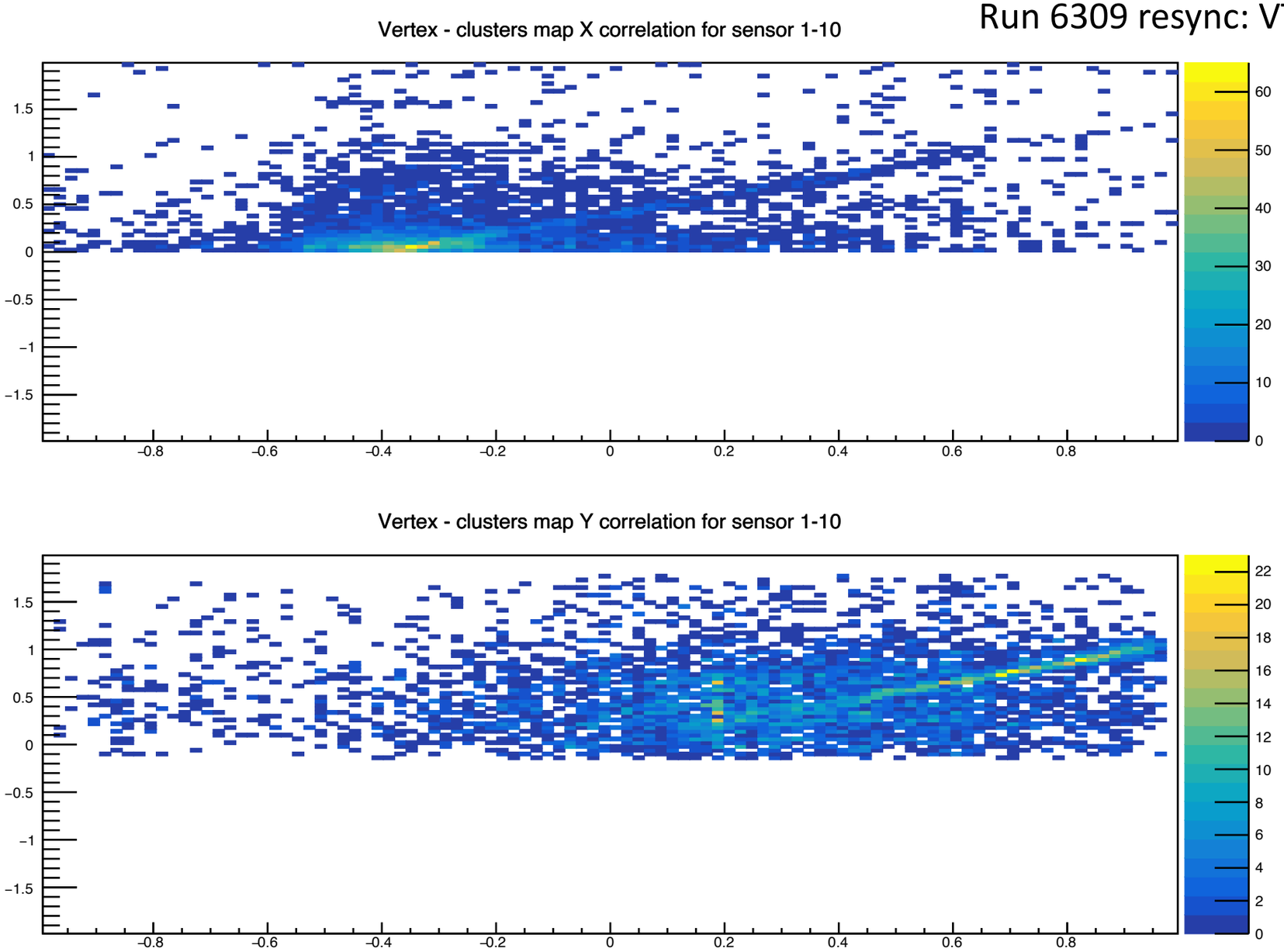
+

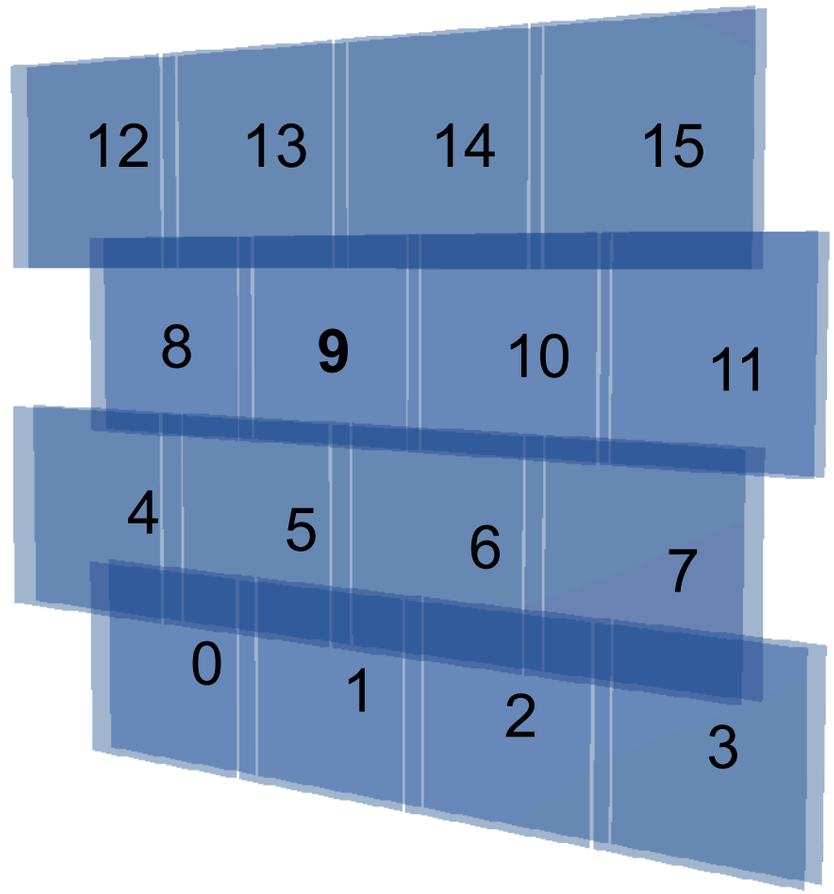
Vertex

Correlation (iiic)

- Correlation position btw 1 VTX & 1 ITR sensor

Run 6309 resync: VTX1 & ITR10 (113-0)

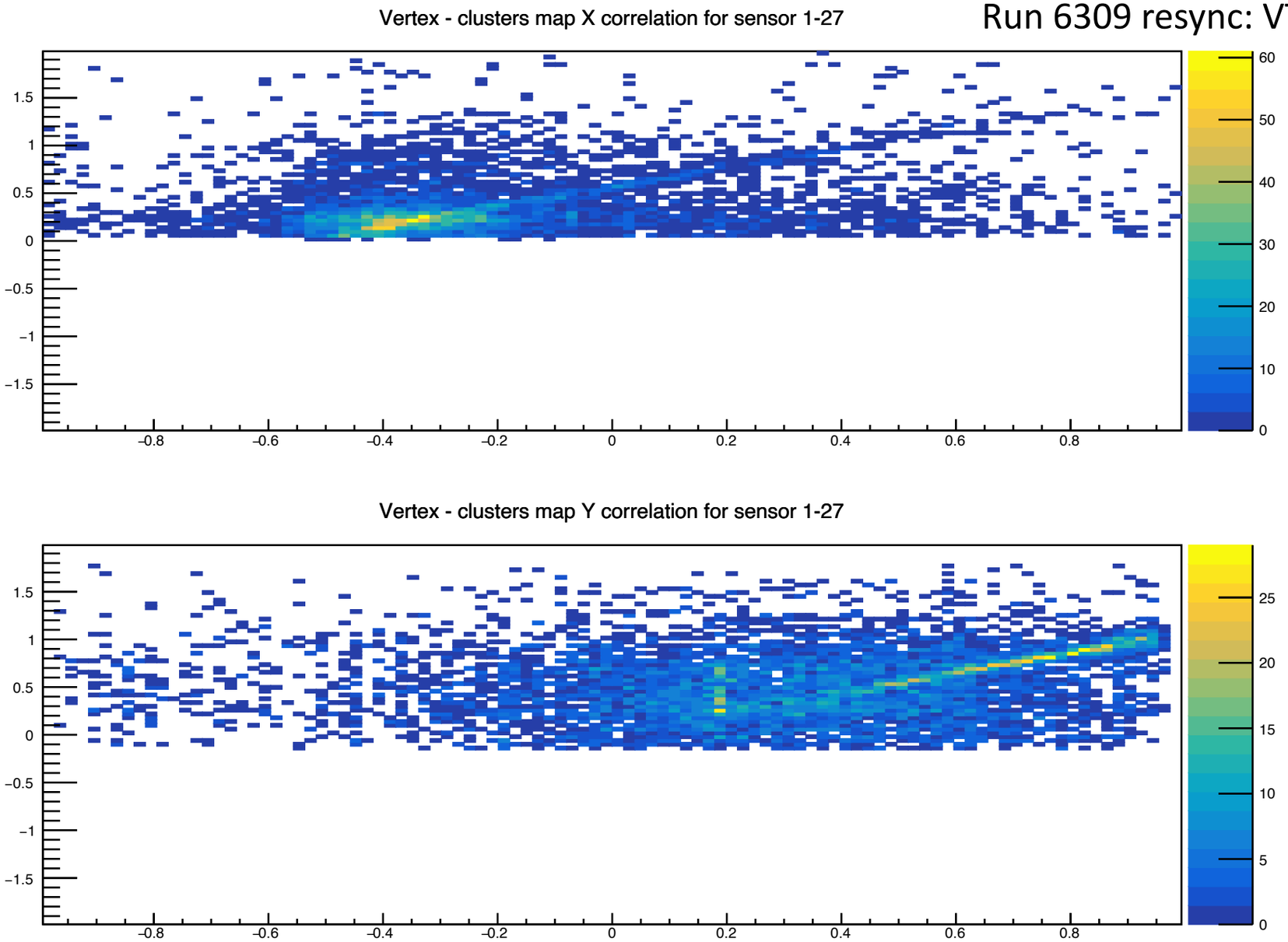




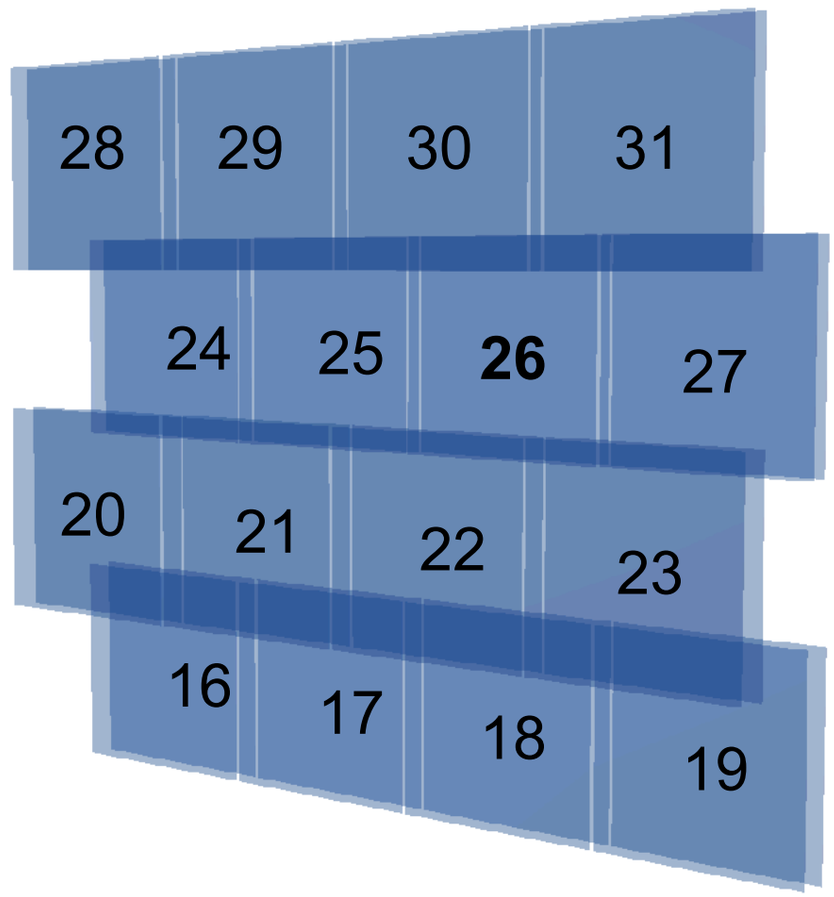
➡ Correlation btw one sensor of VTX with one of ITR (front)

Correlation (iiid)

- Correlation position btw 1 VTX & 1 ITR sensor



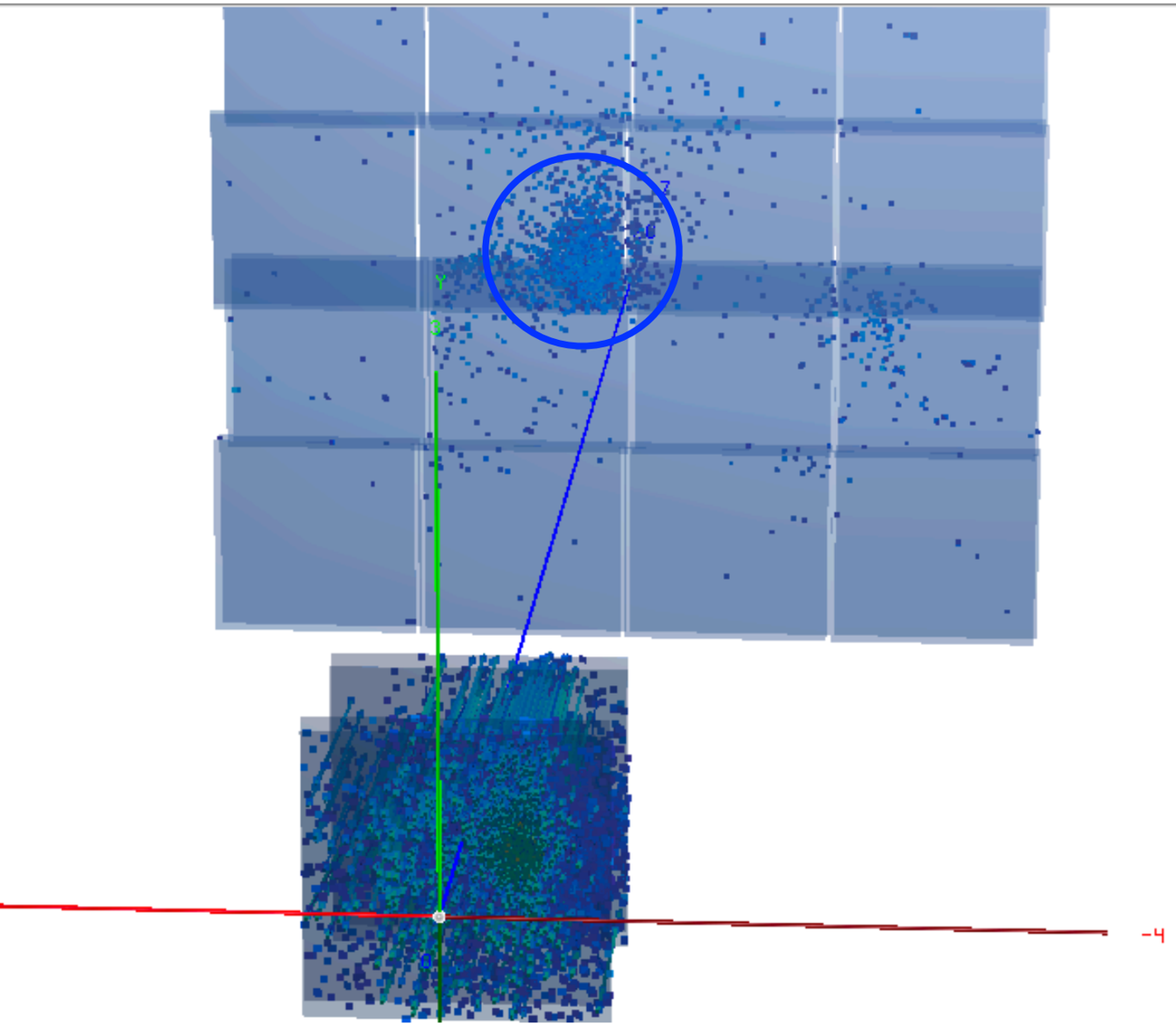
Run 6309 resync: VTX1 & ITR26 (111-3)



➡ Correlation btw one sensor of VTX with one of ITR (rear)

Display

- VTX+ITR: run6144 (Frag. Trigger)



- Beam is greater than the acceptance of the VTX
- Displacement in X, ITR vs VTX.

Conclusions

- Dead map: VTX+ITR
  - ➡ Update file in shoe
- Alignment parameters: VTX
  - ➡ Update file in shoe
- Pixel efficiency
  - ➡ Tune for pixel inefficiency of quadrants (sensor 3)
- Correlation
  - ➡ Btw sensors of VTX or ITR and btw both detectors
  - ➡ Pb with X direction for ITR, a displacement of 0.4 cm
- VTX+ITR worked smoothly at CNAO2023
  - ➡ Check ITR geometry with mechanical drawings
  - ➡ Work under progress ….