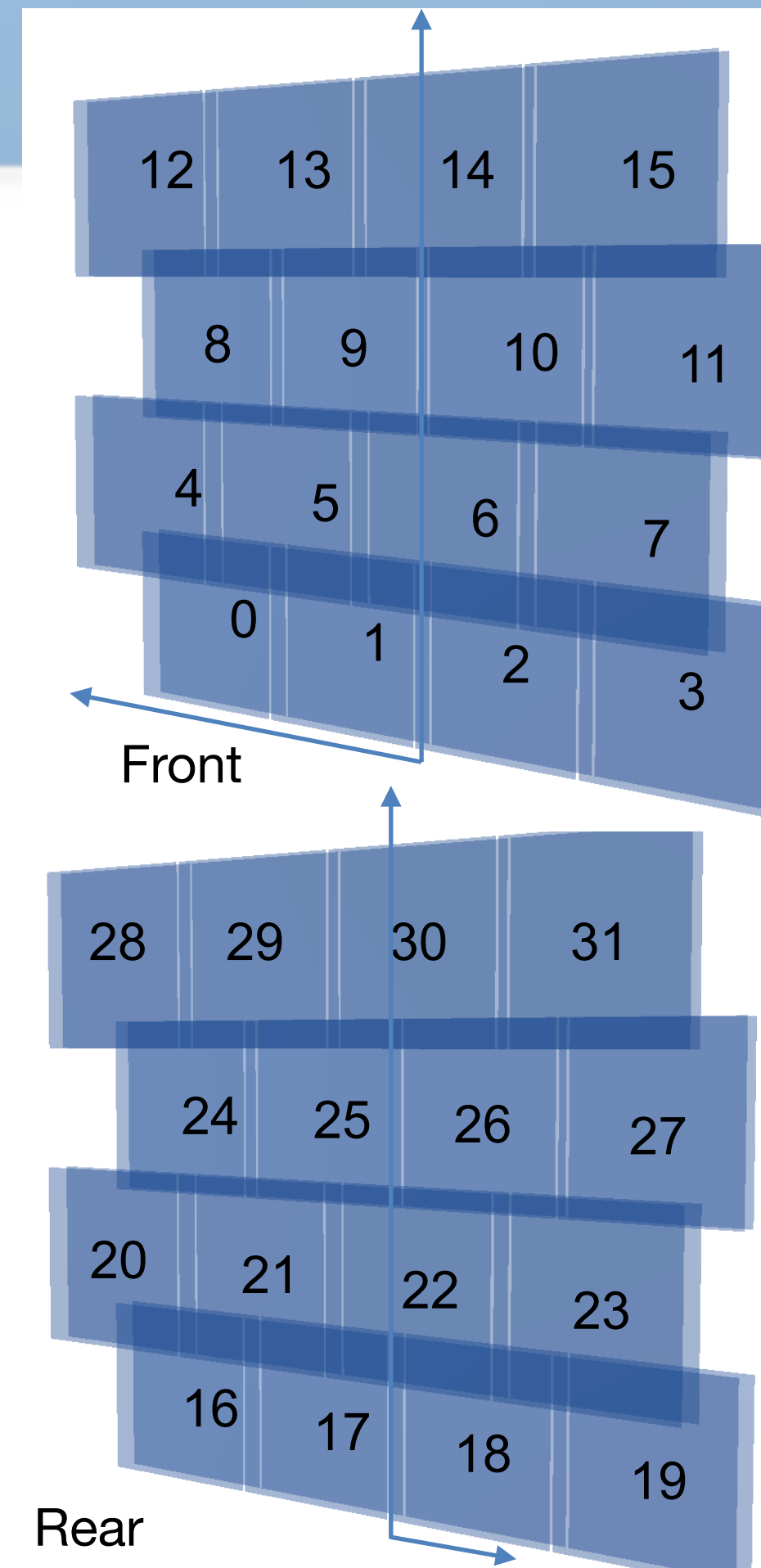
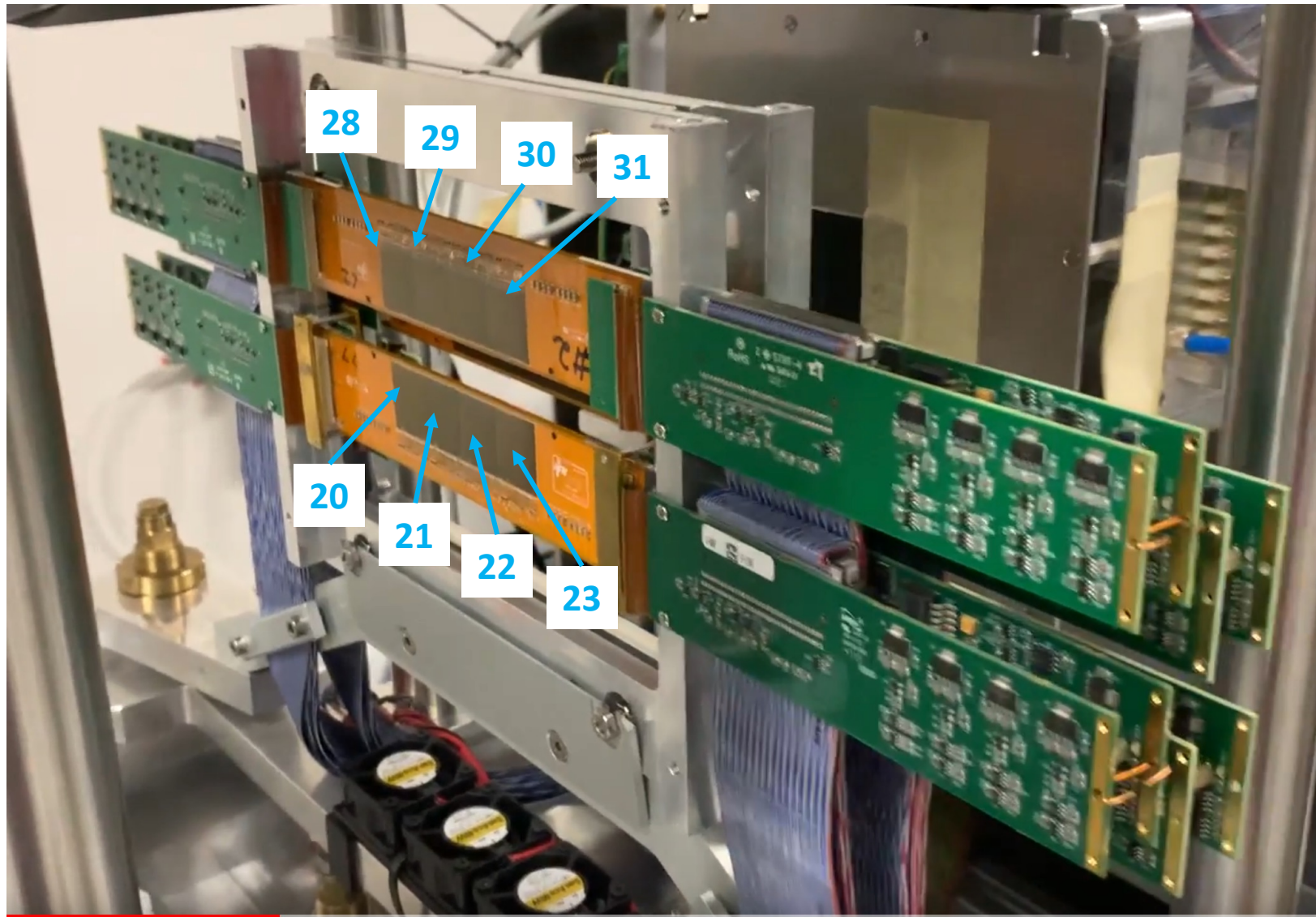


# Update on Inner Tracker

# Numbering

## Setup



# Decoding

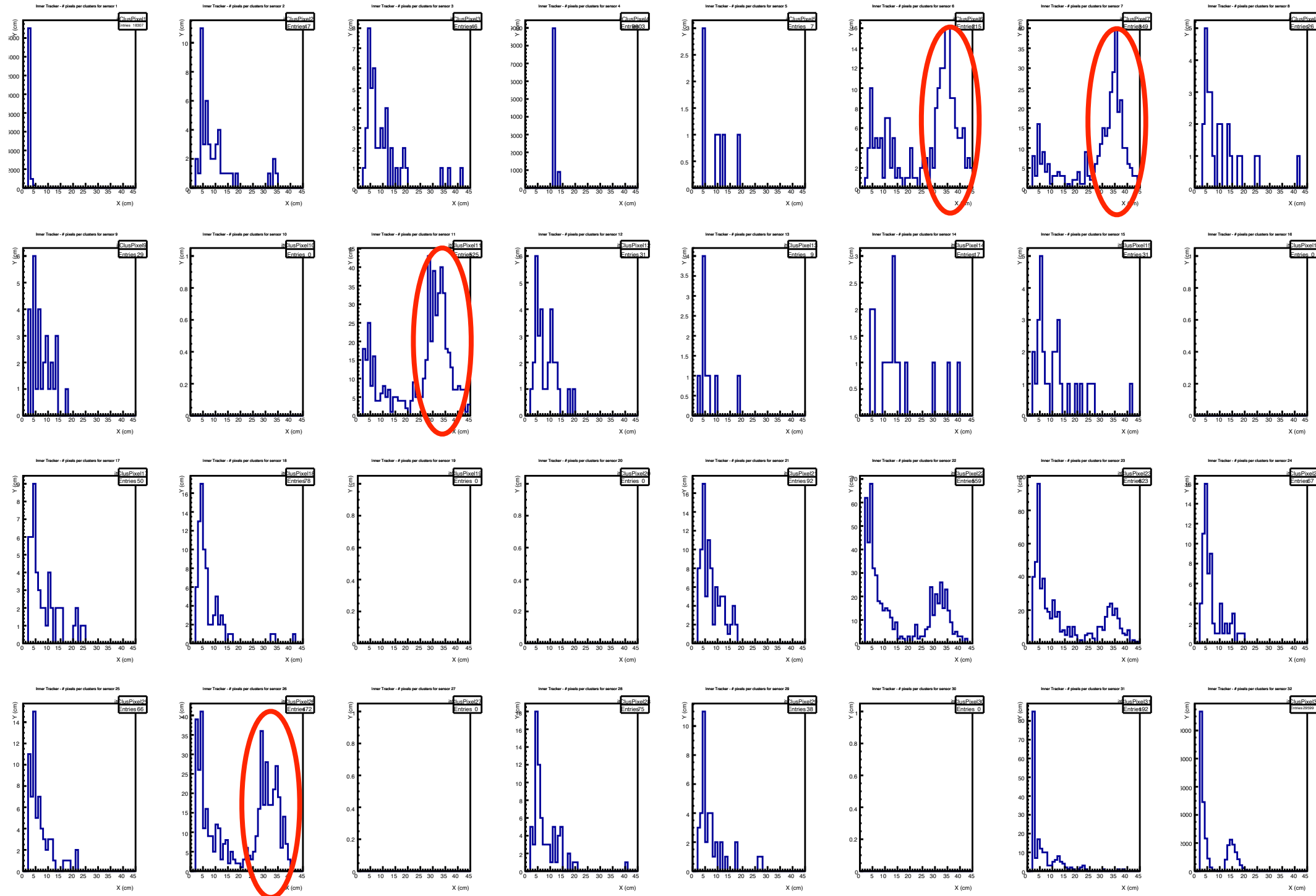
## □ Data format:

|         |          |          |          |          |
|---------|----------|----------|----------|----------|
| 0003640 | e1a5550a | fafafafa | 80008000 | 00000000 |
| 0003660 | 00000000 | e1a5550a | 80088007 | 00000001 |
| 0003700 | e1a5552a | 000ac519 | 00000000 | aaa8aaa7 |
| 0003720 | 80088007 | 00000001 | e1a555e3 | 000ac51a |
| 0003740 | 00000000 | aaa8aaa7 | 80088007 | 00000001 |
| 0003760 | e1a5569d | 000ac51b | 00000000 | aaa8aaa7 |
| 0004000 | 8bb08bb0 | 80018001 | 00000000 | 00000000 |
| 0004020 | e1a5550a | 80088007 | 00000001 | e1a5556c |
| 0004040 | 000abb34 | 00020002 | 0d381171 | 02242d71 |
| 0004060 | aaa8aaa7 | 80088007 | 00000001 | e1a55625 |
| 0004100 | 000abb35 | 00050005 | 0e110331 | 0e0f0341 |
| 0004120 | 0e0f0351 | 0e0f0361 | 0e110371 | aaa8aaa7 |
| 0004140 | 80088007 | 00000001 | e1a556df | 000abb36 |
| 0004160 | 00000000 | aaa8aaa7 | 8bb18bb1 | 80028002 |
| 0004200 | 00000000 | 00000000 | e1a5550a | 80088007 |
| 0004220 | 00000001 | e1a55589 | 000ab0ba | 00010001 |
| 0004240 | 07480db1 | aaa8aaa7 | 80088007 | 00000001 |
| 0004260 | e1a55643 | 000ab0bb | 00010001 | 0ae02e91 |
| 0004300 | aaa8aaa7 | 80088007 | 00000001 | e1a556fc |
| 0004320 | 000ab0bc | 00010001 | 02141941 | aaa8aaa7 |
| 0004340 | 8bb28bb2 | 80038003 | 00000000 | 00000000 |
| 0004360 | e1a5550a | 80088007 | 00000001 | e1a5559c |
| 0004400 | 000aa548 | 00000000 | aaa8aaa7 | 80088007 |
| 0004420 | 00000001 | e1a55655 | 000aa549 | 00000000 |
| 0004440 | aaa8aaa7 | 80088007 | 00000001 | e1a5570f |
| 0004460 | 000aa54a | 00000000 | aaa8aaa7 | 8bb38bb3 |
| 0004500 | abcdabcd | 00463630 | 673d2eeb | 0001a6df |
| 0004520 | 00000000 | 12341234 | 0000030b | fafafafa |
| 0004540 | 00aaaa00 | 00000000 | 00000001 | fafafafa |
| 0004560 | fafa0113 | 00000033 | 00000001 | 0102ba3b |
| 0004600 | 80008000 | 00000000 | 00000001 | 0102ba3b |
| 0004620 | 80088007 | 00000000 | 0102b8b7 | 000347ca |

- Two pb:
    - Extra chunk of data
    - Missing sensor structure when sensor set off
- ➔ Pb fixed with help of Riccardo and co.

# Cluster size

■ CNAO2024: run 7074 (threshold:  $10 \times \sigma$ )

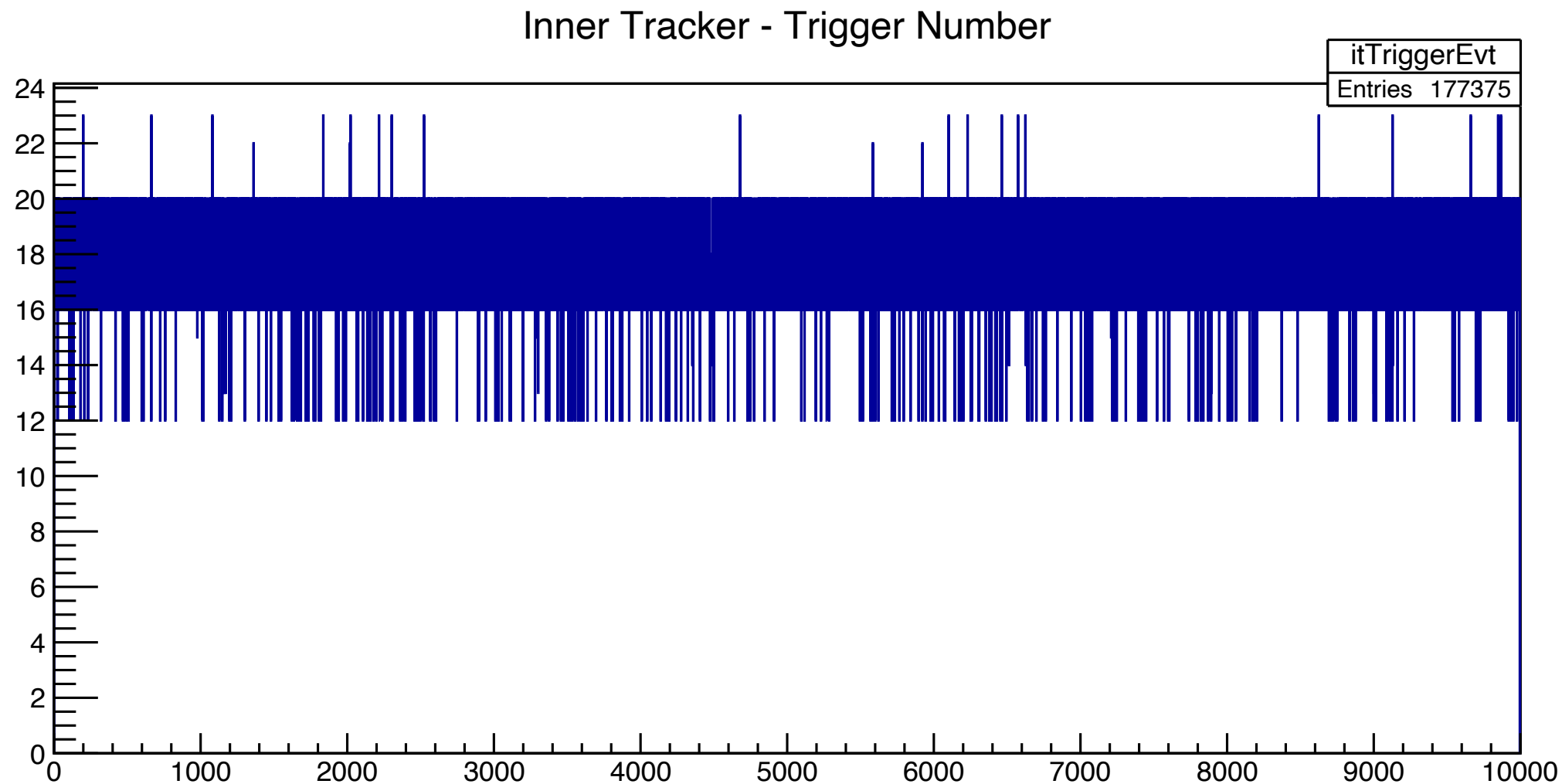


Beam: (start @ 1)  
6, 7 & 11, 23

Beam:  
~35 pixels/cluster

# Trigger number

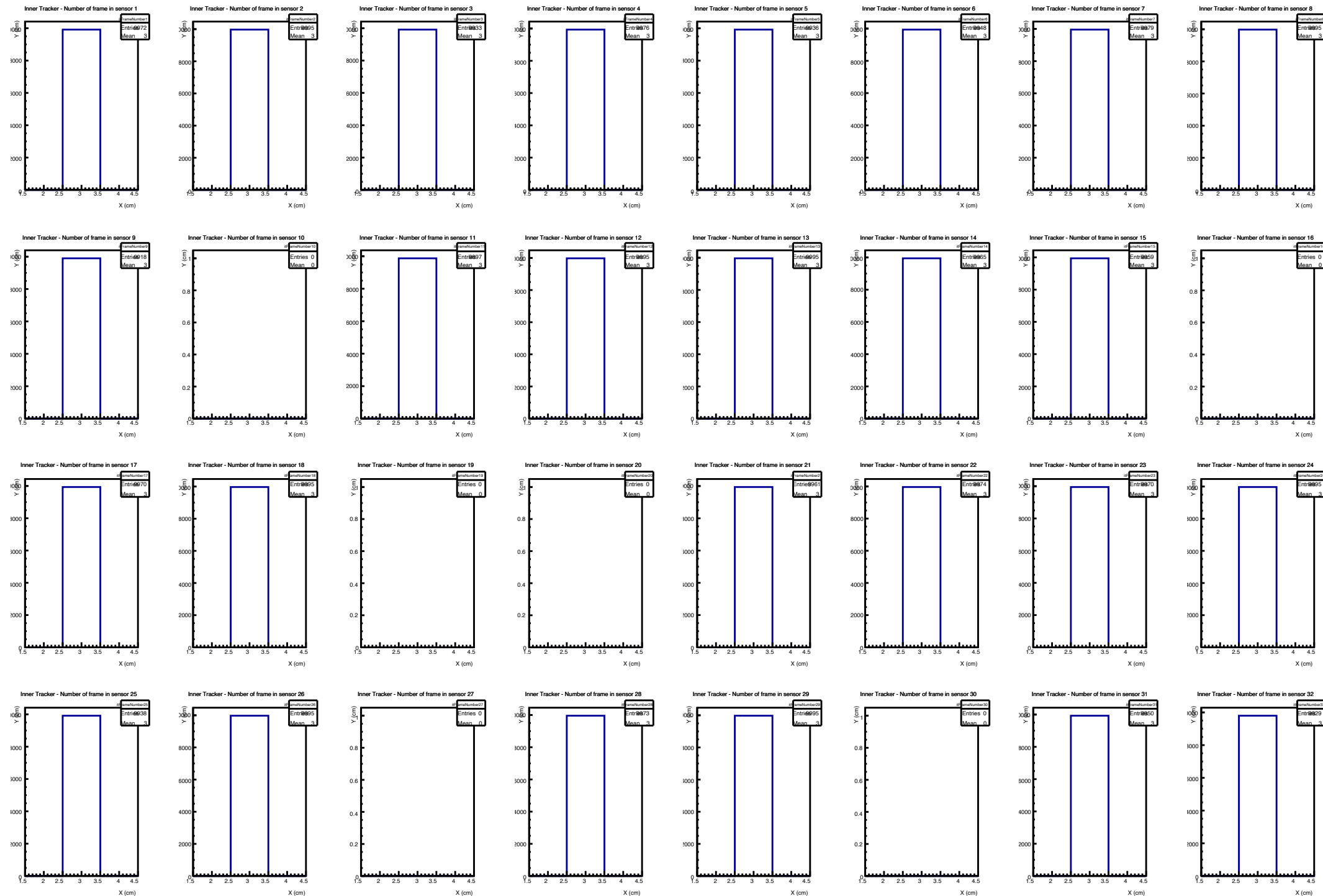
□ CNAO2024: run 7074: over 10kEvs



➡ Seems to be ok, do not loose any trigger

# Frame number per sensor

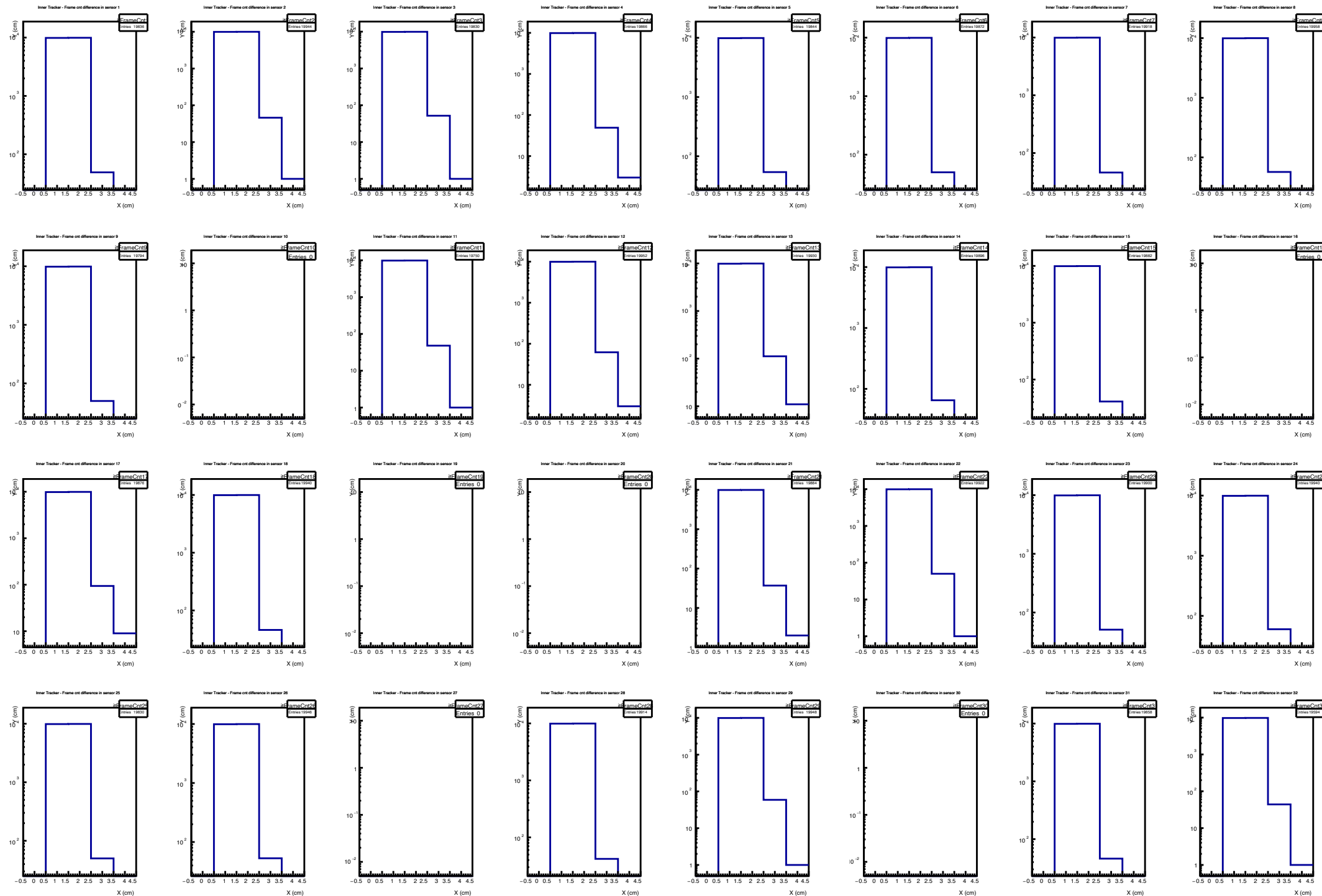
□ CNAO2024: run 7074 (threshold:  $10 \times \sigma$ )



All 3 frames

# Frame counter difference per sensor

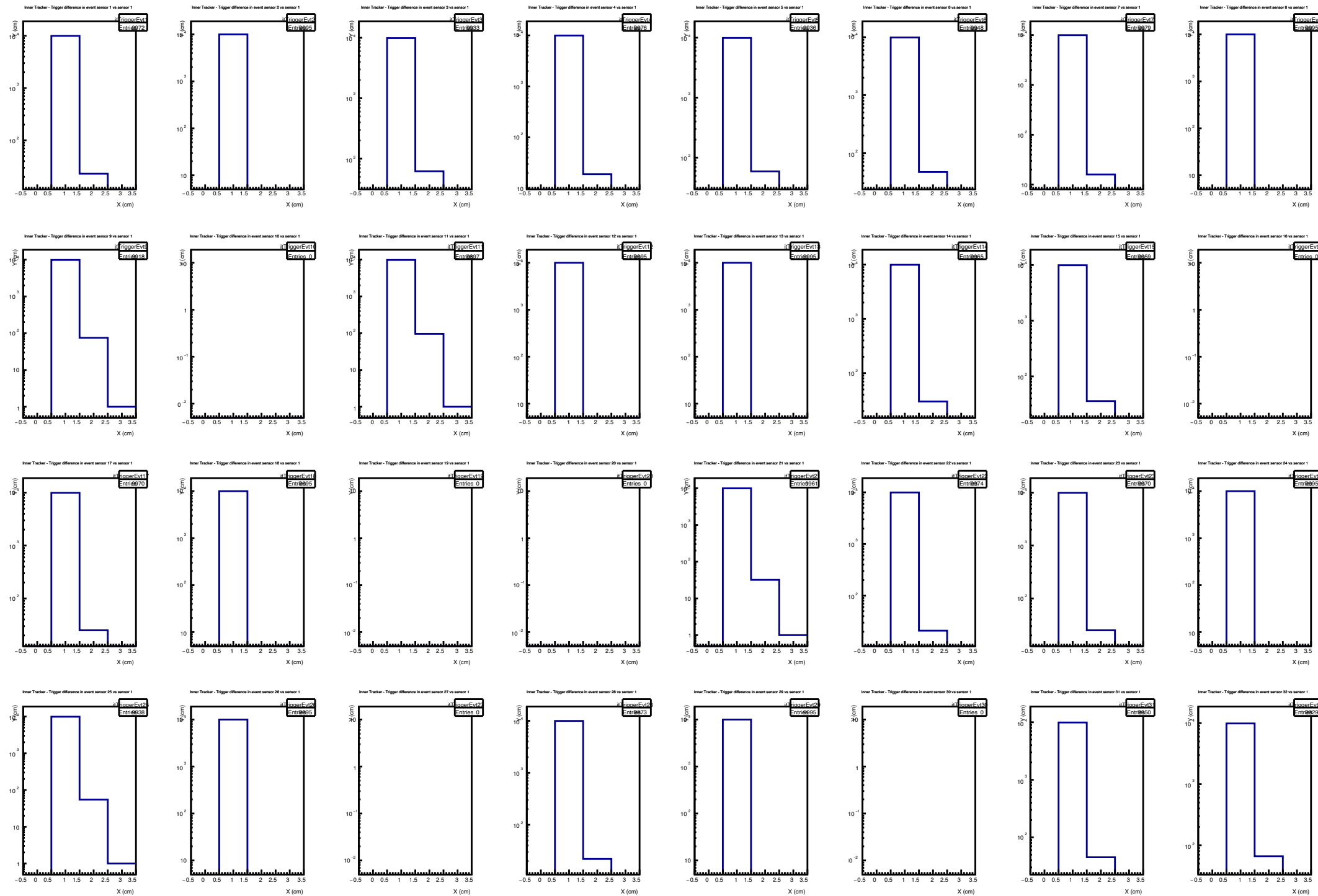
■ CNAO2024: run 7074 (threshold:  $10 \times \sigma$ )



**$\leq 3$  as expected**

# Frame trigger difference per sensor

■ CNAO2024: run 7074 (threshold:  $10 \times \sigma$ )



**Consecutive  
Triggers > 99%**

# Frame errors per sensor

CNAO2024: run 7074 (threshold:  $10 \times \sigma$ )

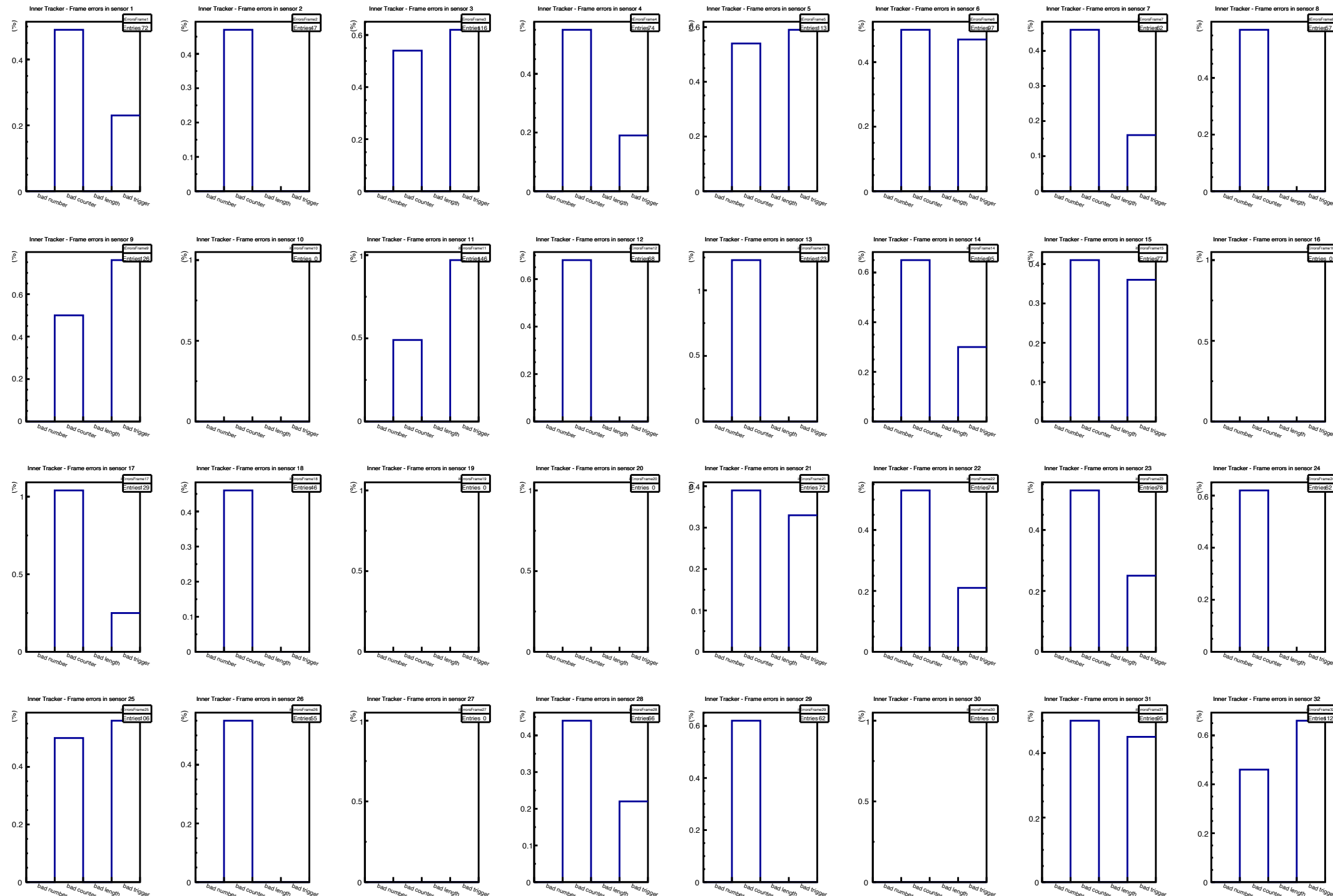
1: bad frame number

2: bad frame counter

3: bad frame length

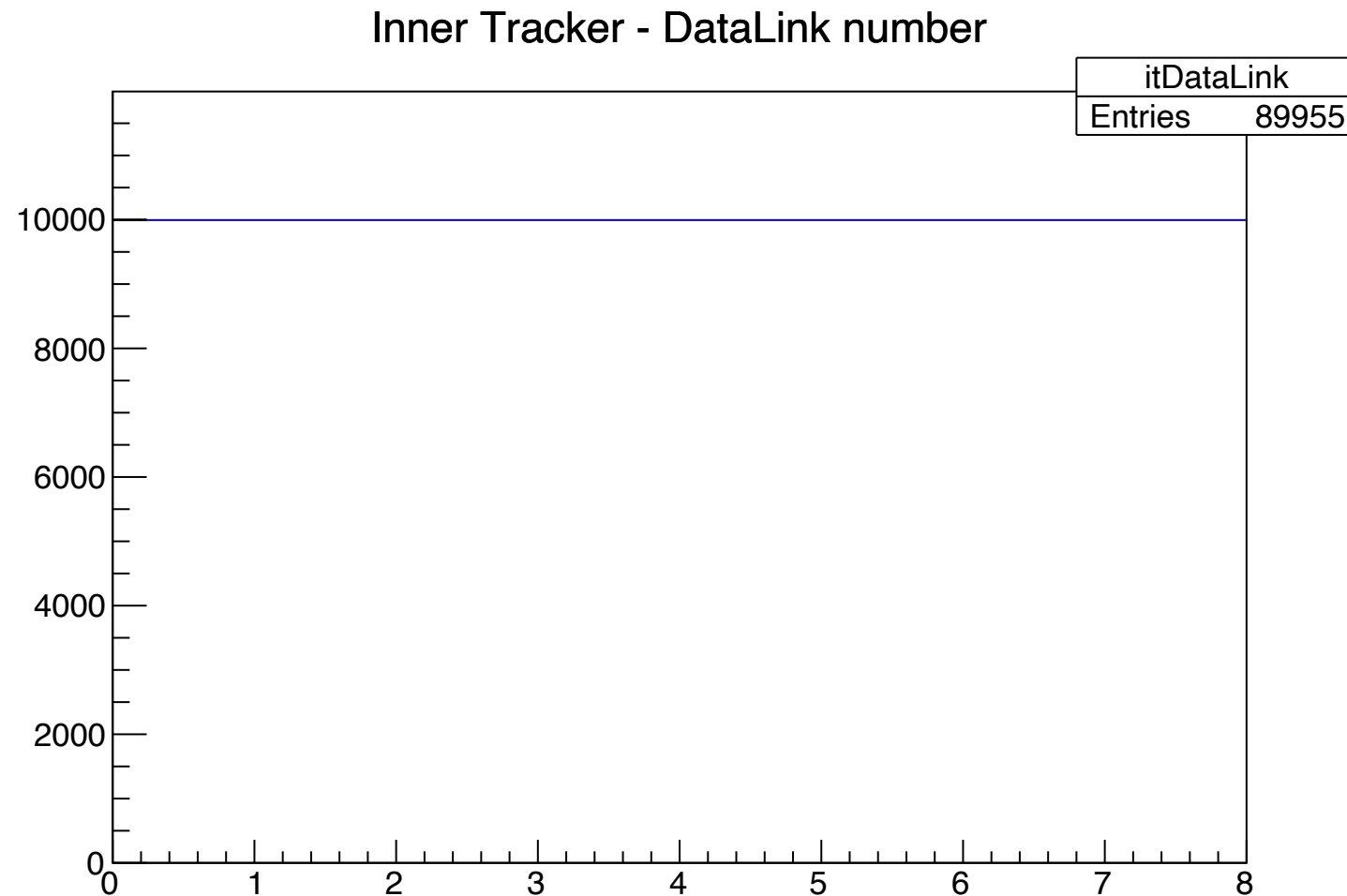
4: bad frame trigger

< 1 %



# Data link number

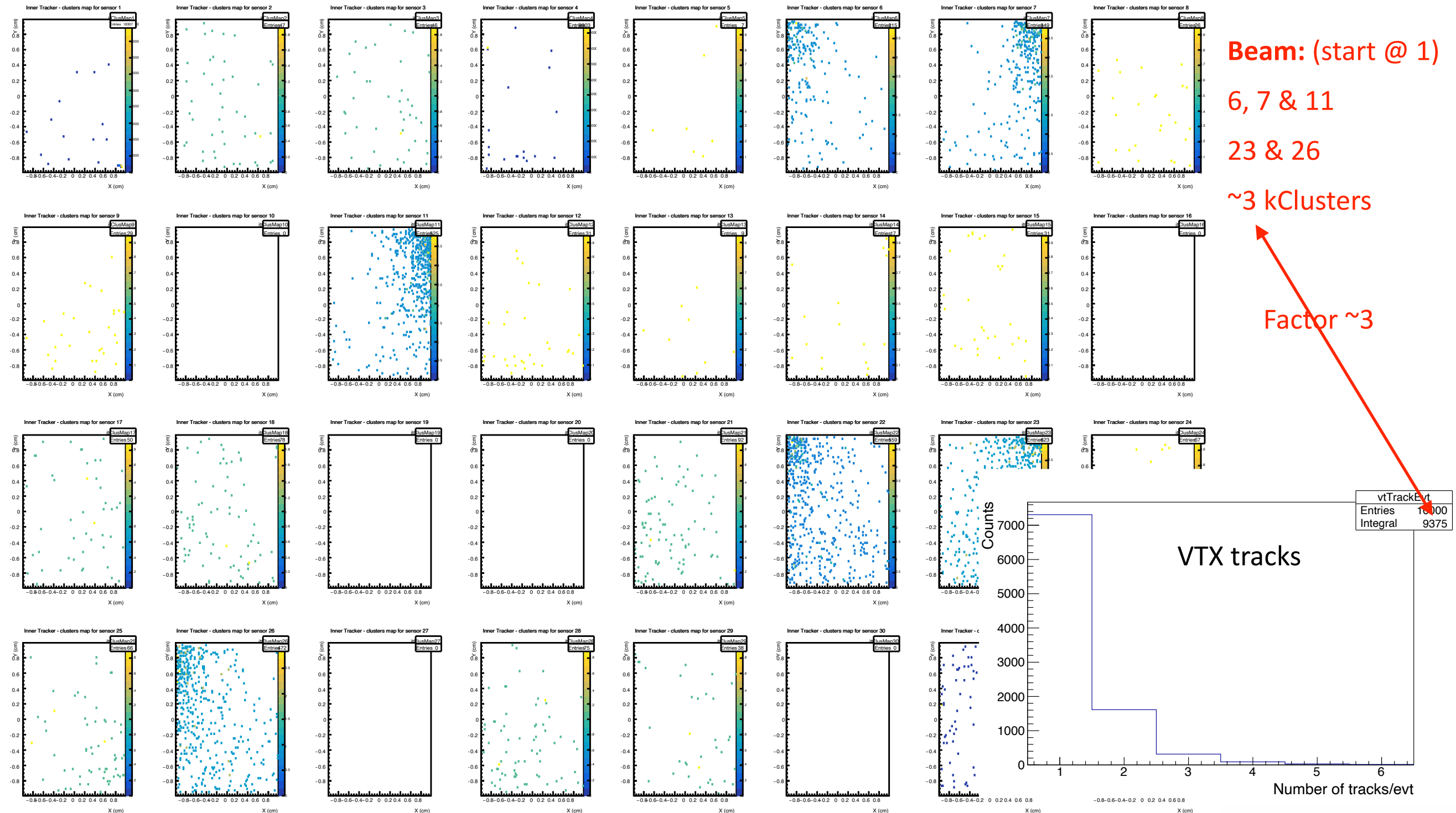
□ CNAO2024: run 7074 (threshold:  $10 \times \sigma$ )



➡ All data links present in each event

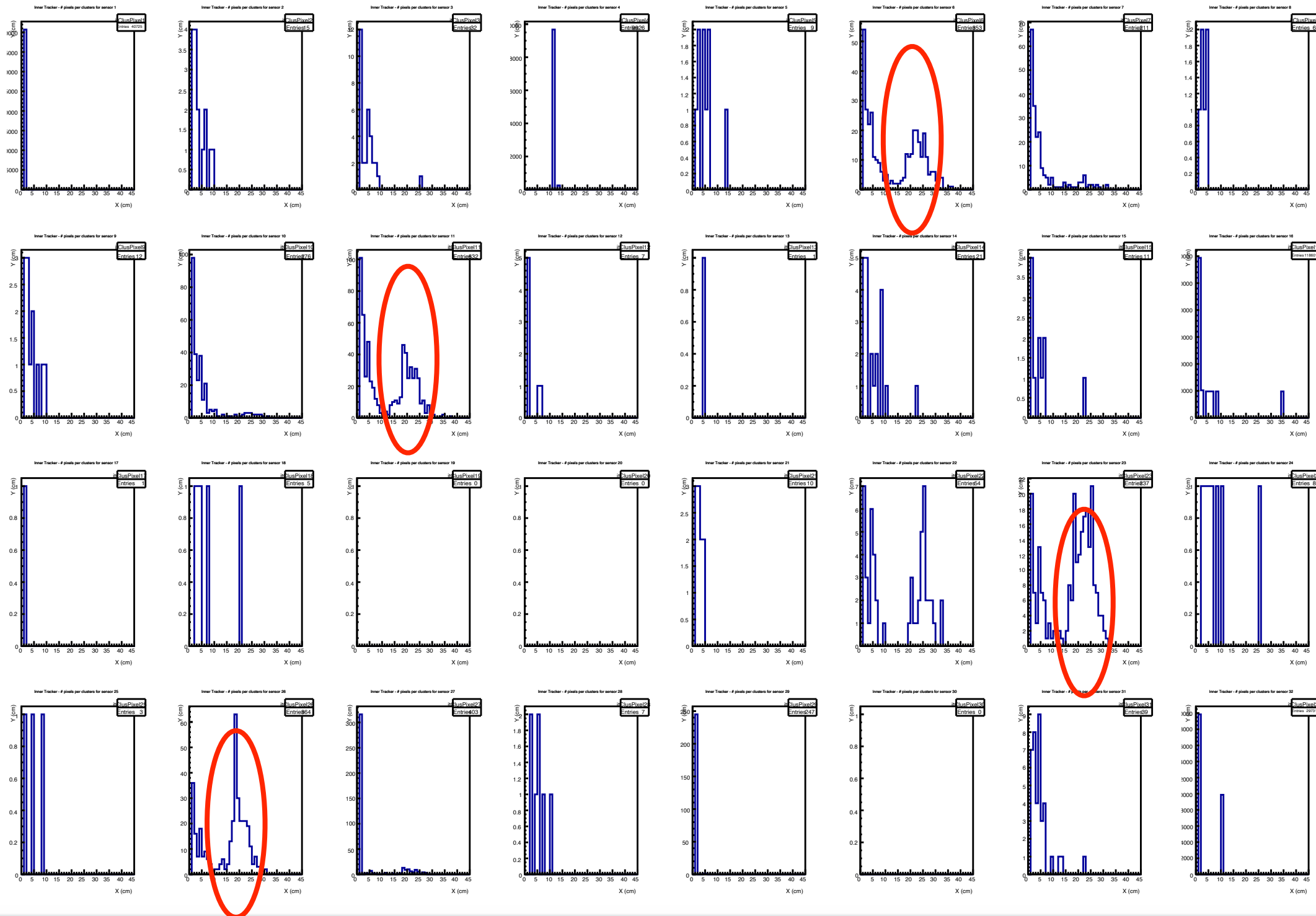
# Cluster map

■ CNAO2024: run 7074 (10 kEvts, threshold:  $10 \times \sigma$ )



# Cluster size

■ CNAO2024: run **6962** (10 kEvs, BTF config)



Beam: (start @ 1)

6 & 11

23 & 26

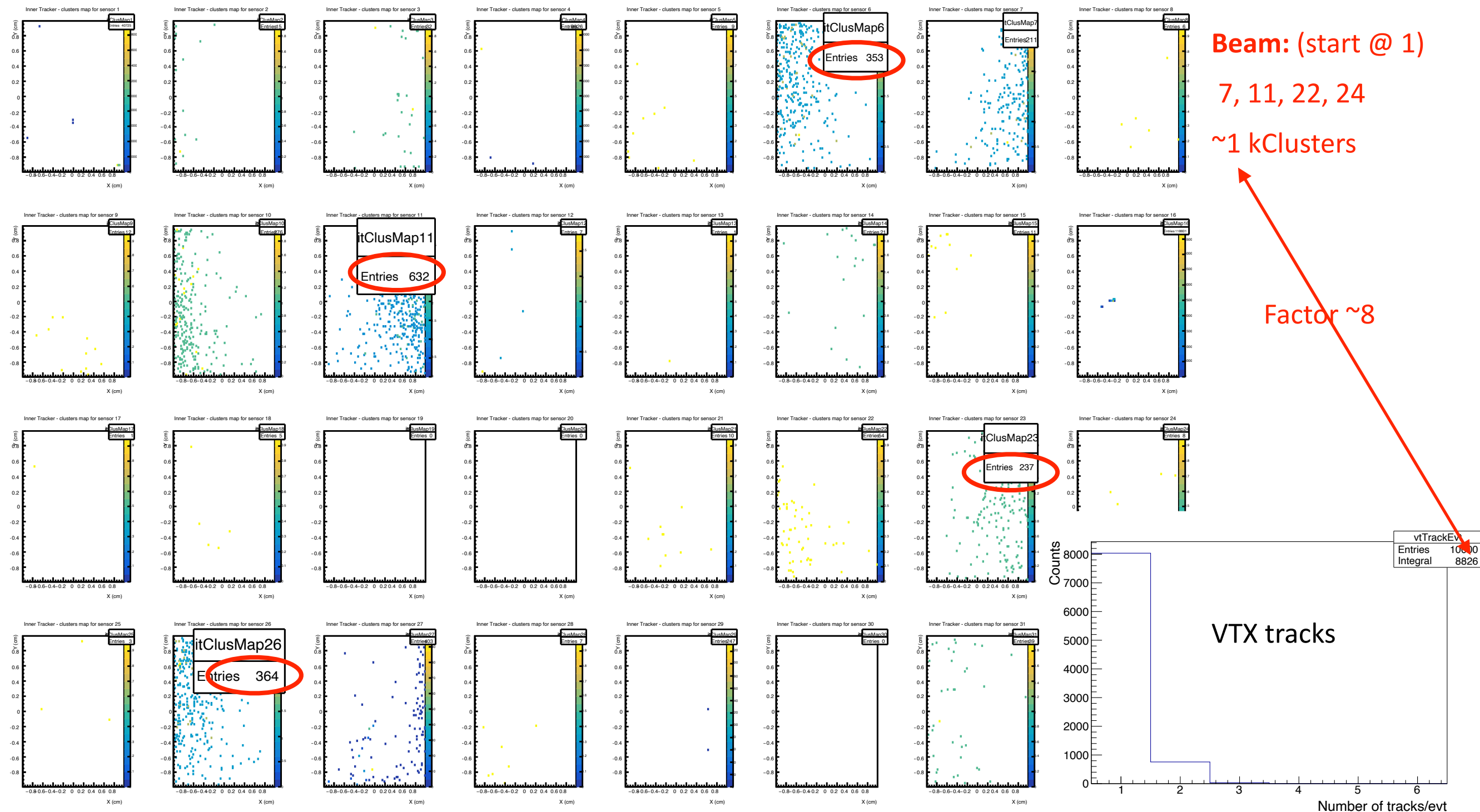
Beam:

~25 pixels/cluster

Less than for  $10\sigma$

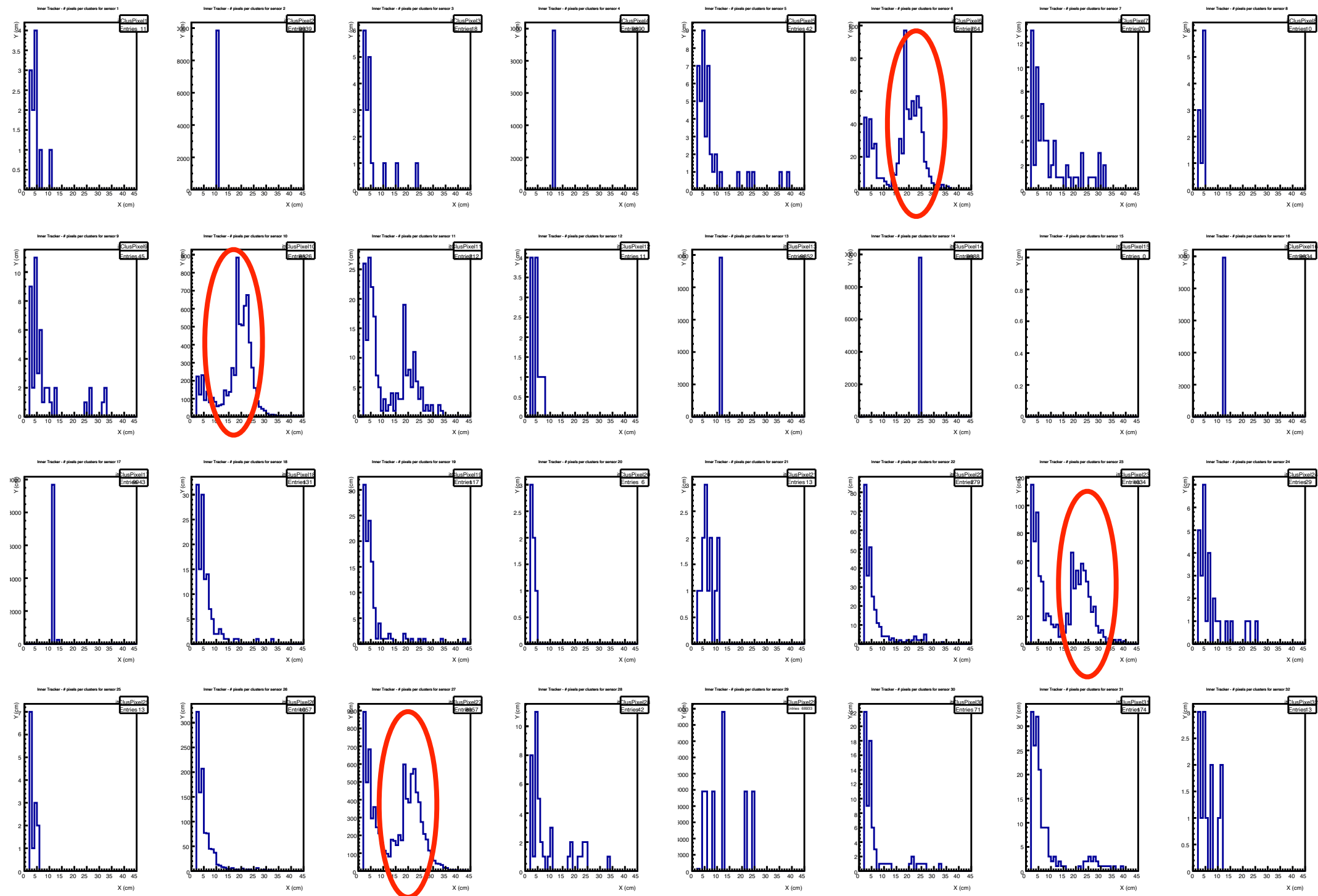
# Cluster map

□ CNAO2024: run 6962 (10 kEvs, BTF config)



# Cluster size

■ **CNAO2023:** run 6144 (25 kEvs, config threshold max ?)



Beam: (start @ 1)

6 & 10

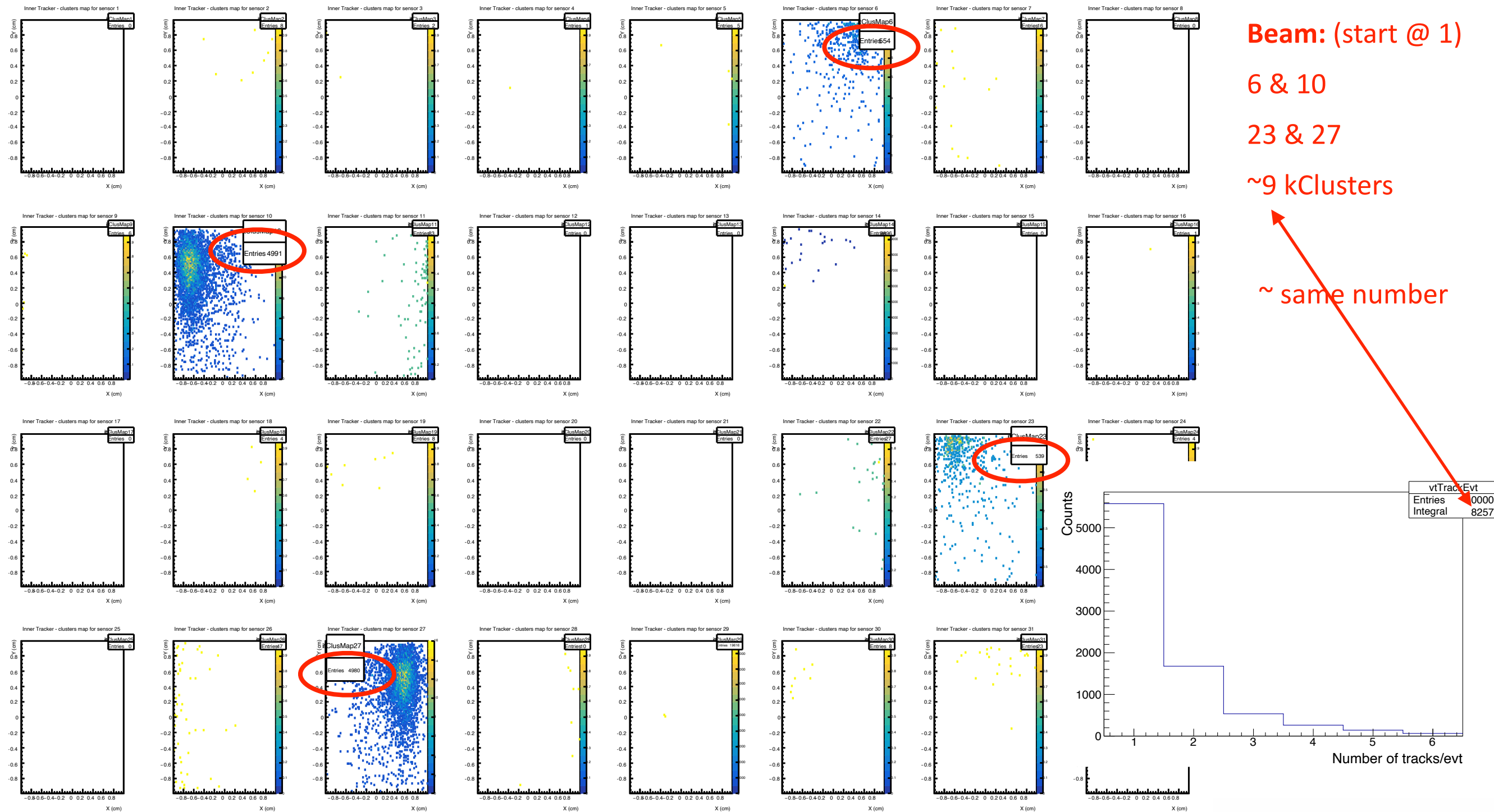
23 & 27

Beam:

~25 pixels/cluster

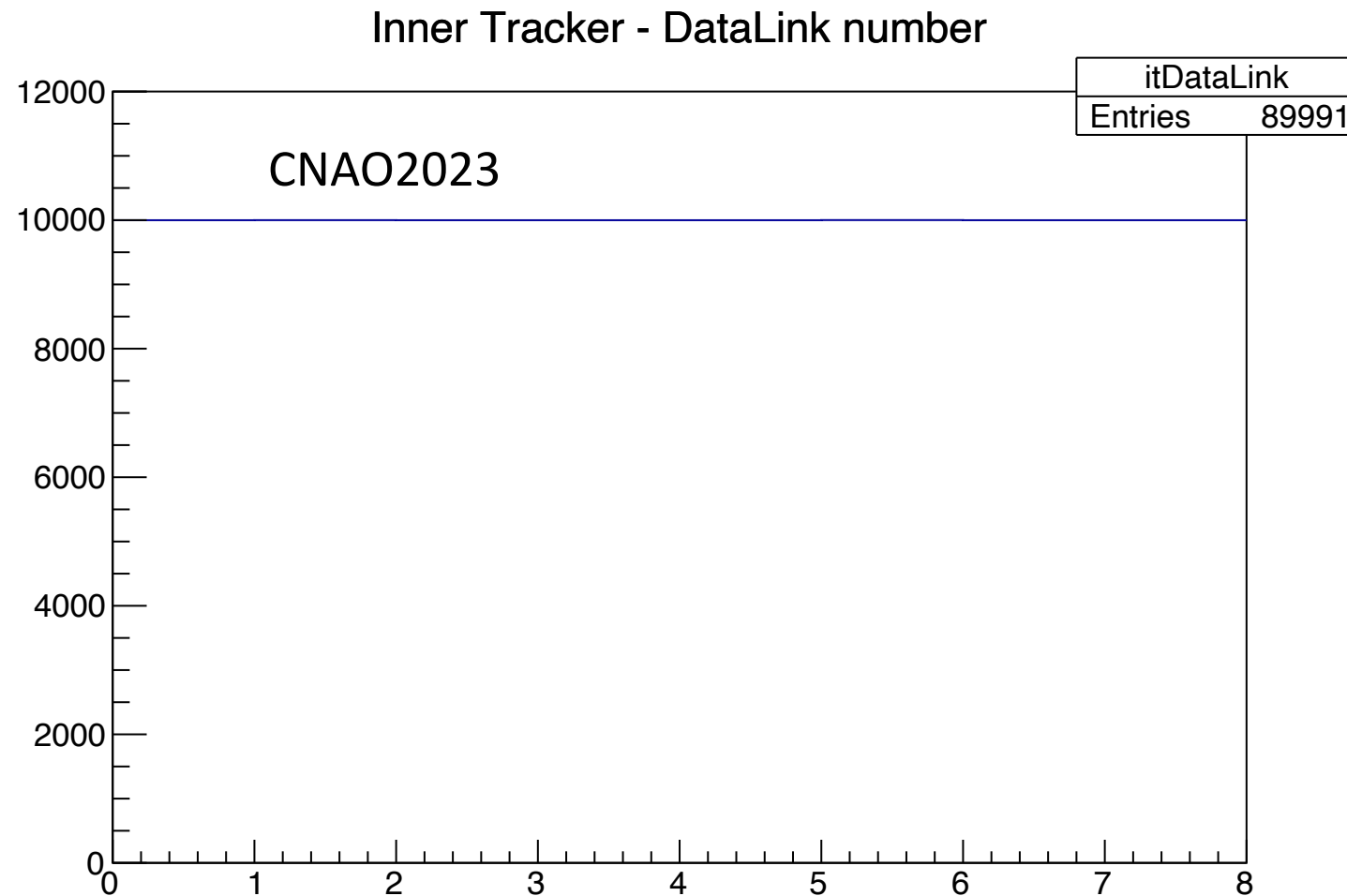
# Cluster map

❏ **CNAO2023:** run 6144 (25 kEvs, cluster size > 10, config threshold max ?)

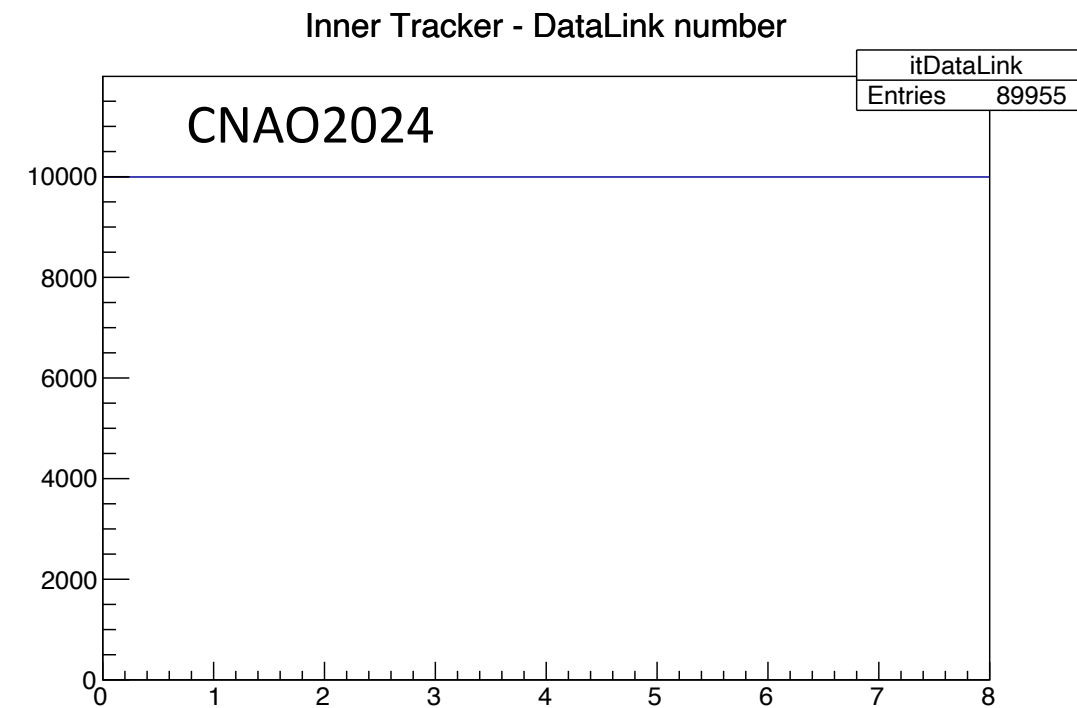


# Data link number

■ **CNAO2023**: run 6144 (10 kEvts, config threshold max ?)



■ CNAO2024: run 7074 (threshold:  $10 \times \sigma$ )



➡ All data links present in each event (as for CNAO2024)

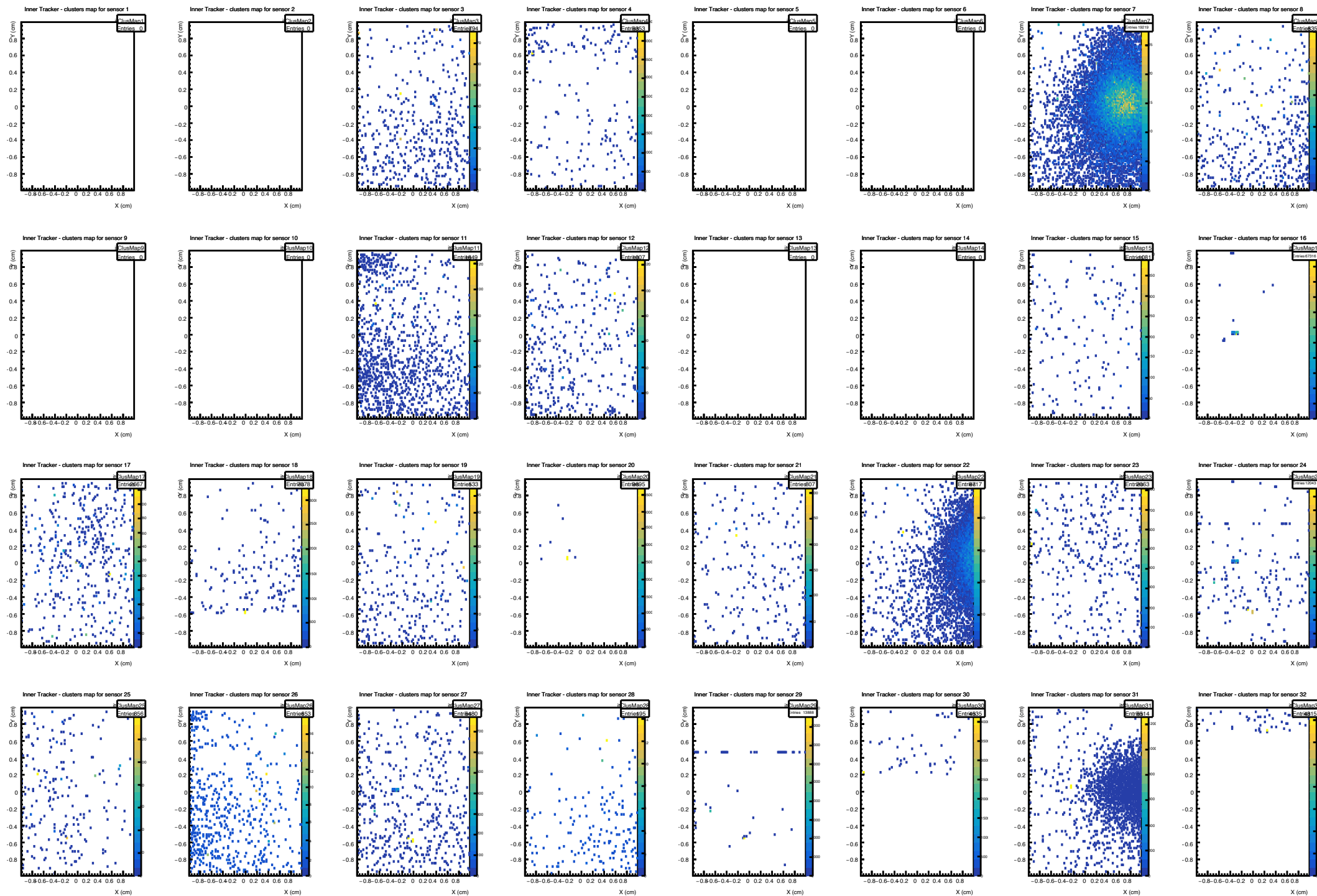
# Cluster map

Frascati (e-beam): run 5786 (6kEvs)

Beam: (start @ 1)

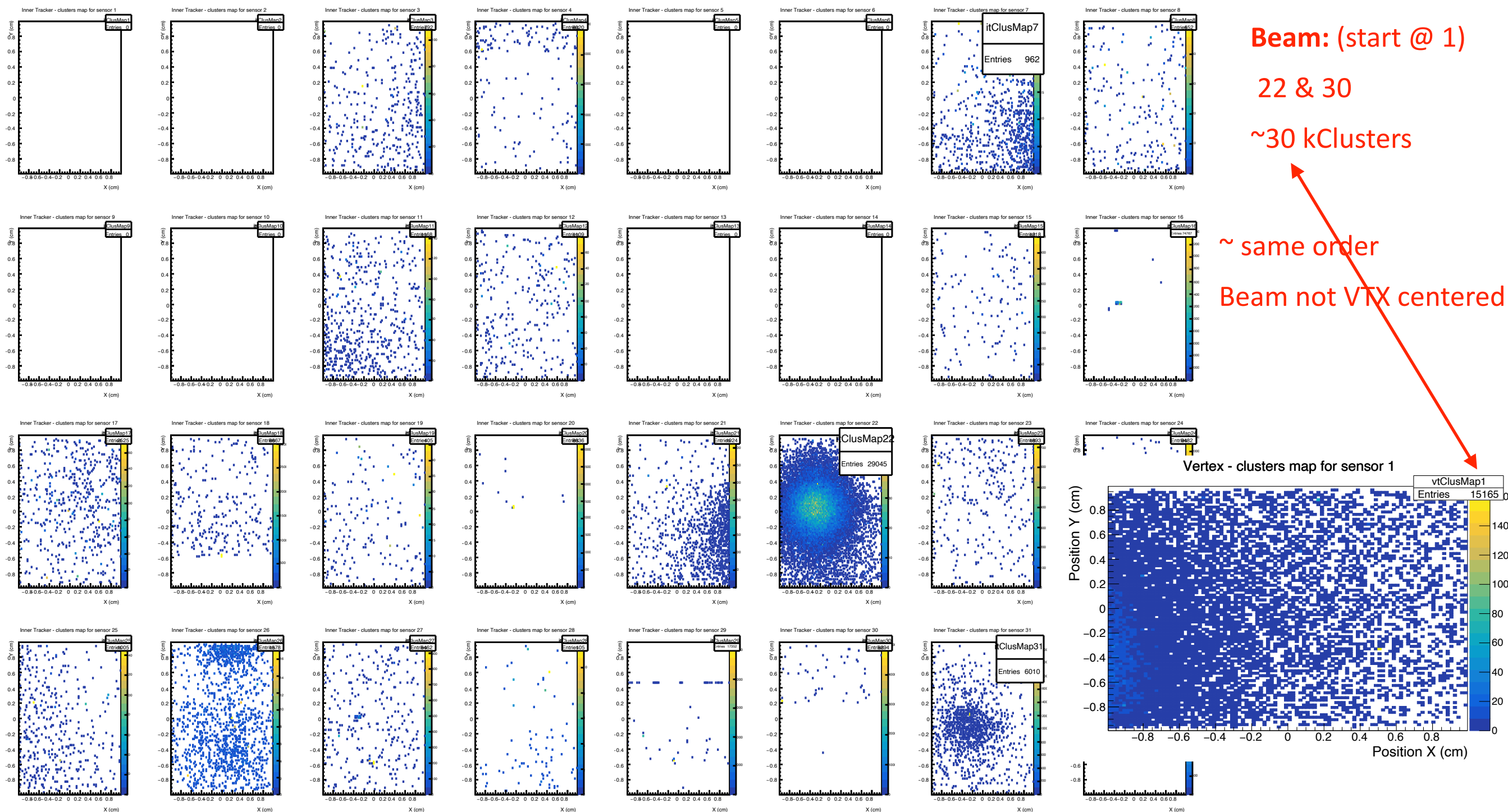
7, 22, 31

~40 kClusters



# Cluster map

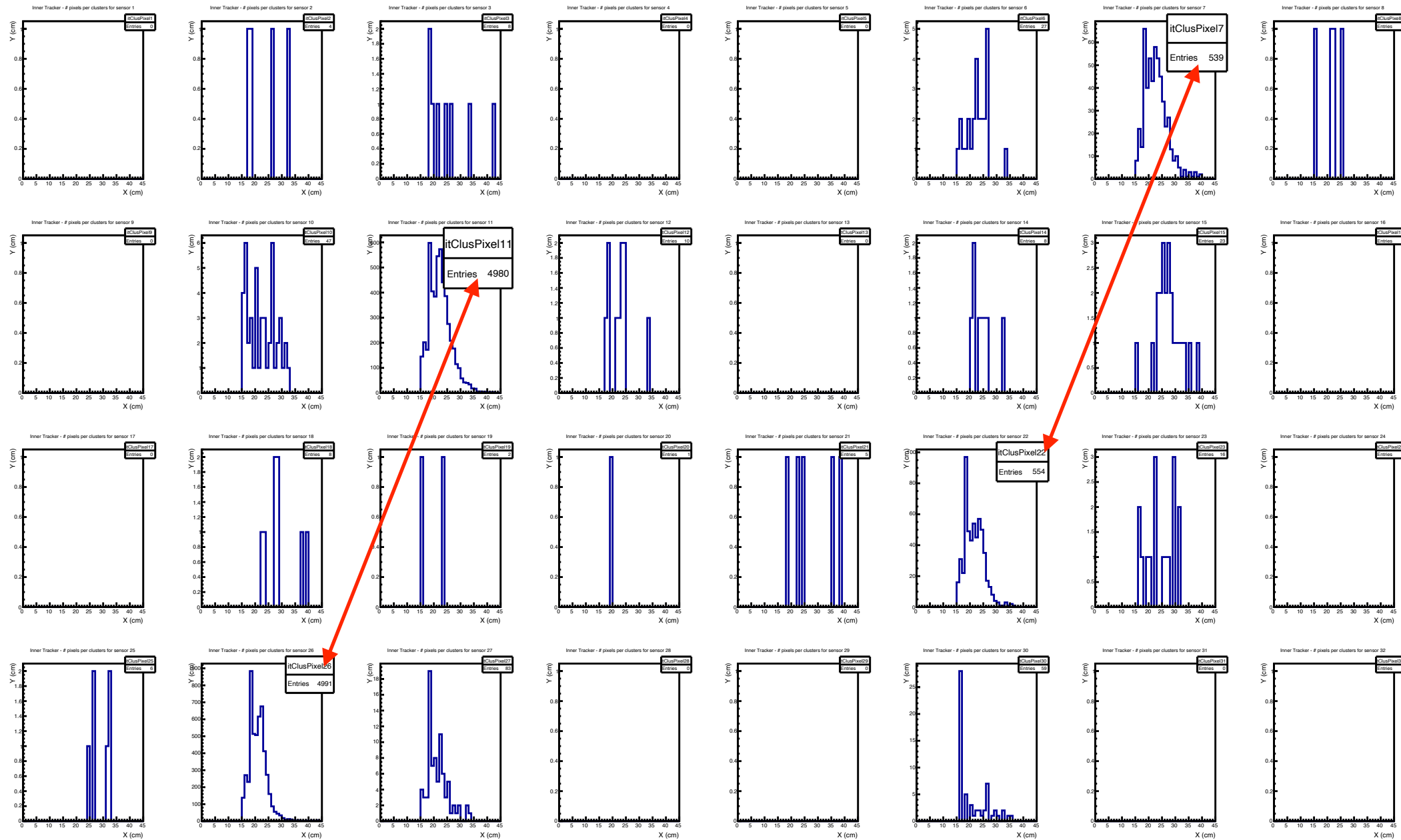
Frascati (e-beam): run 5783 (6.5kEvs)



# Mapping

■ **CNAO2023**: run 6144 (25 kEvs, cluster size > 15, config threshold max ?)

- Cluster size with new mapping



Beam: (start @ 1)

7 & 11

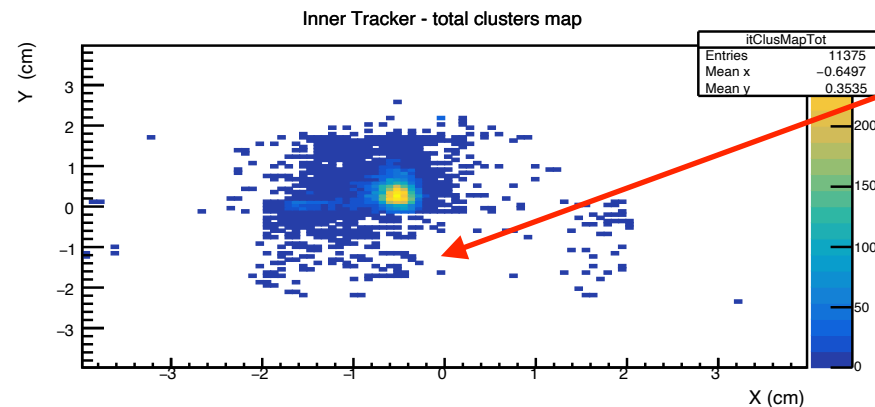
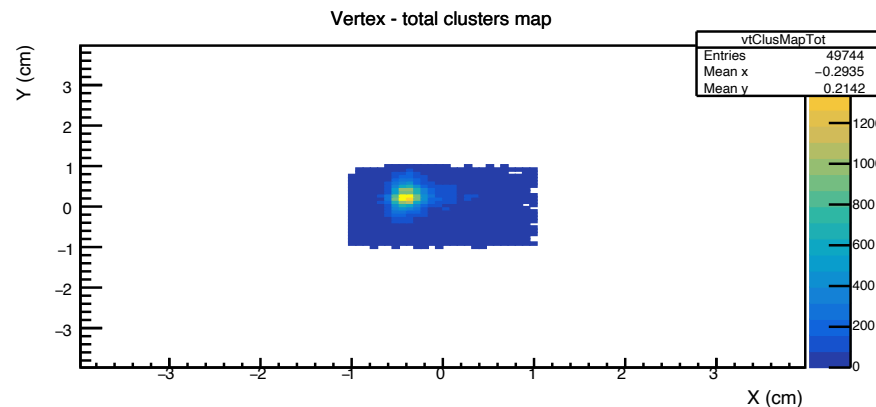
22 & 26

Beam crossing mostly 11 & 26 sensor (which are back to back)

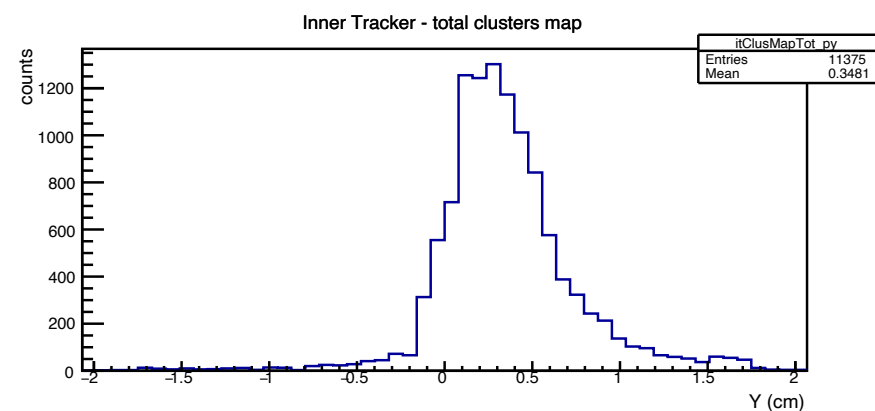
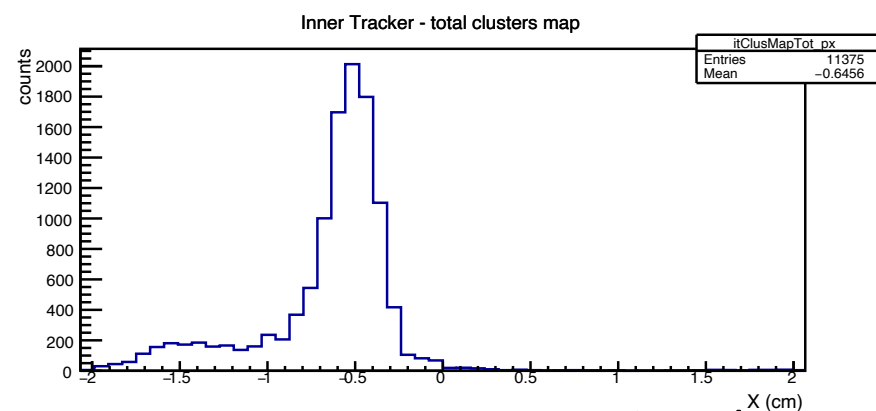
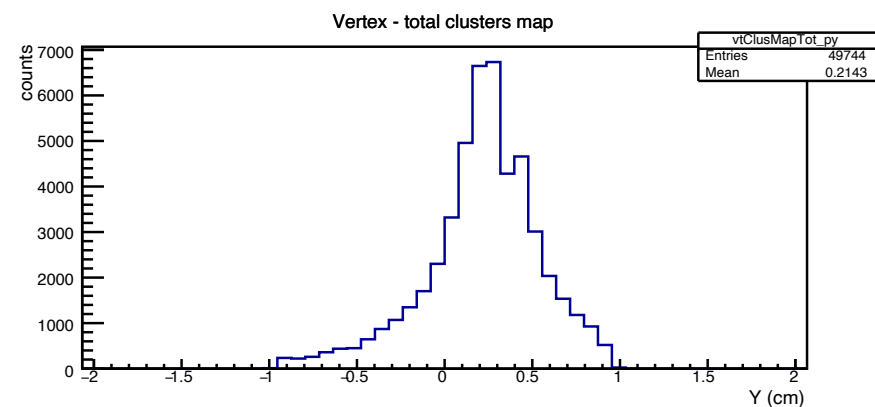
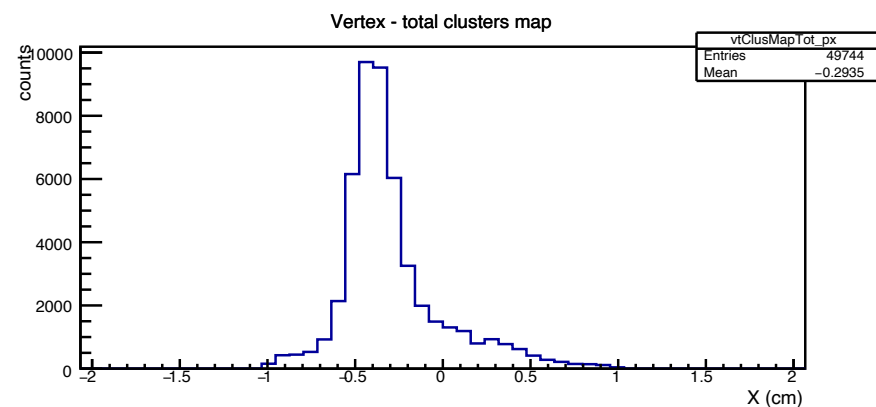
# Mapping

❑ **CNAO2023**: run 6144 (25 kEvs, config threshold max ?)

- Project on VTX and ITR with new mapping



Missing sensors



➡ Beam spot at ~same position !

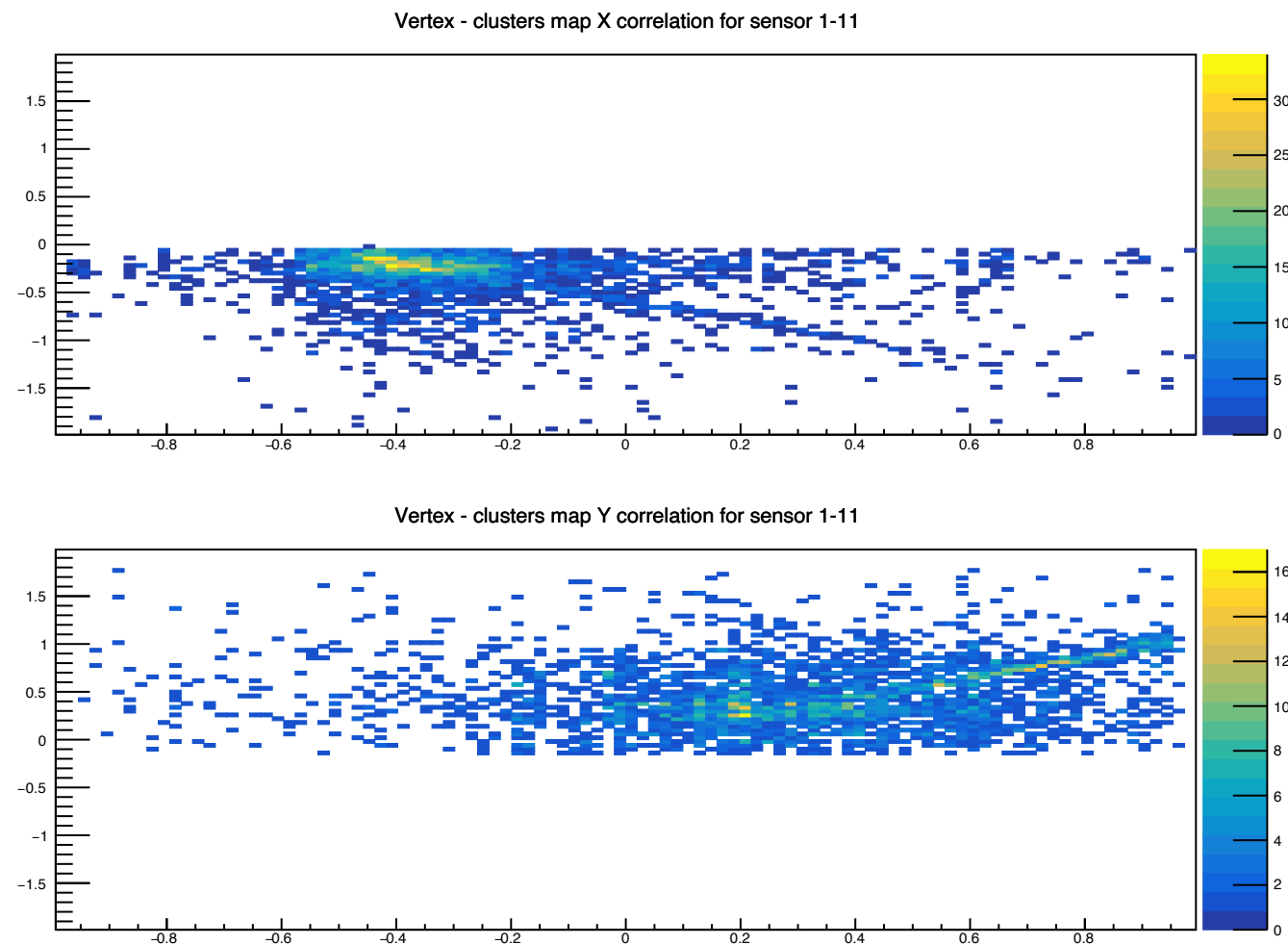
➡ Direction of X inverted

➡ This run has no correlation btw VTX & ITR

# Mapping

❑ **CNAO2023:** run 6309 (20 kEvts, config threshold max ?)

- Correlation btw VTX & ITR

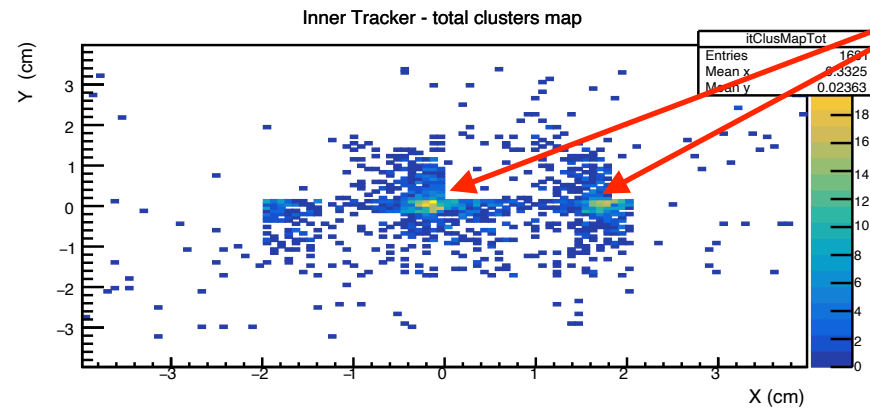
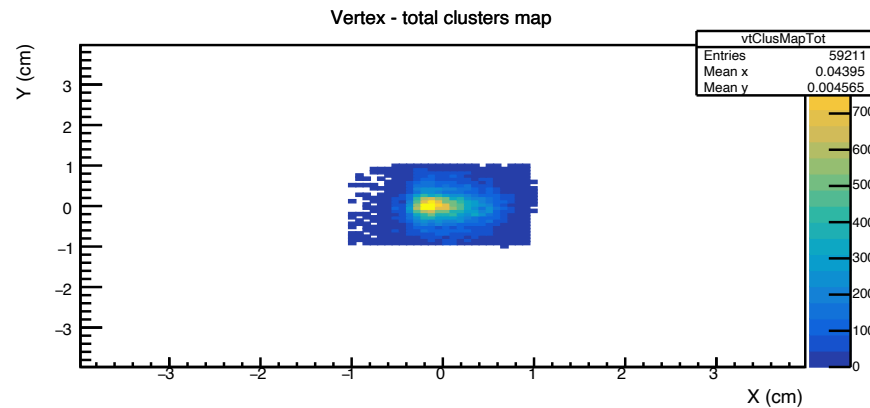


- ➡ Clearly see an anti-correlation in X
- ➡ Since the IT has been flipped by 180° respect to Y-axis  
(Need a change in the FOOT.geo file)

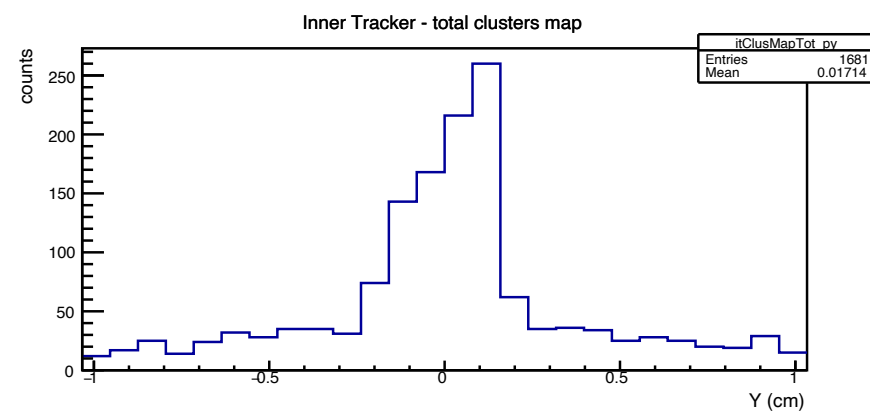
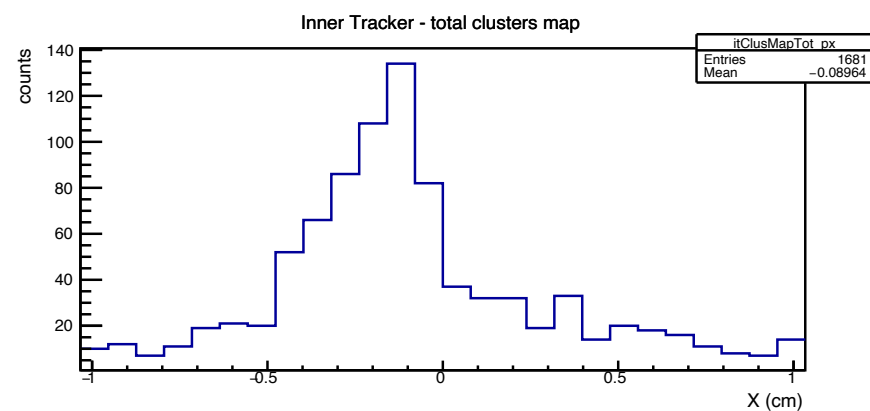
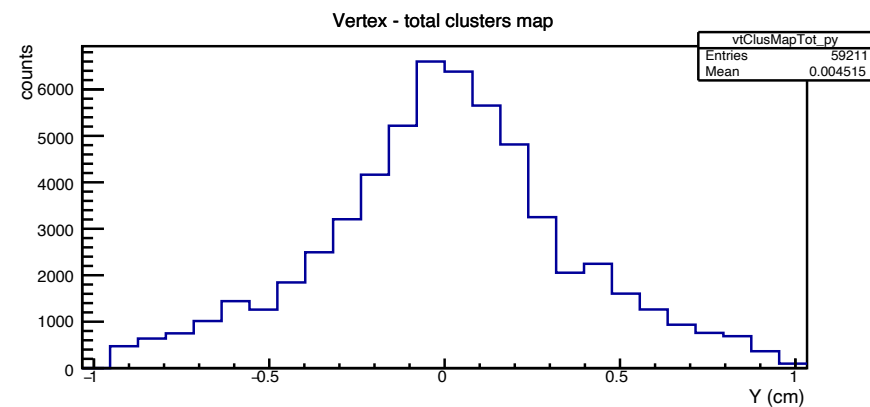
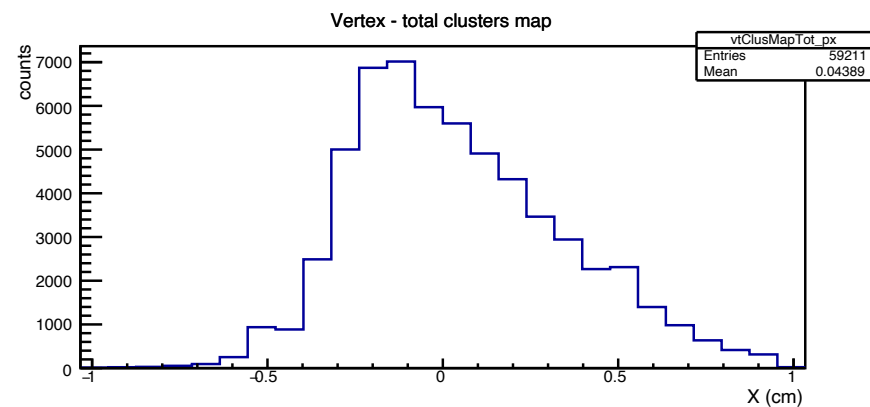
# Mapping

□ CNAO2024: run 7074 (10 kEvts cluster size > 15, threshold:  $10 \times \sigma$ )

- Project on VTX and ITR



Two peaks



➡ Still pb with mapping or change w.r.t CNAO2023 ?

# Conclusions

## ❑ Decoding

- Trigger number ✓
- Frame number ✓
- Frame errors < 1 %
- See threshold effect on cluster size
  - ➡ ITR working fine
- Start debugging mapping

## ❑ Efficiency

- Frascati/CNAO2023 beam: number of hits coherent with VTX
- Clearly not the case for CNAO2024 data
  - ➡ Missing the beam (sensor out at beam position)
- ➡ Need dedicated (beam) time for ITR with experts of VTX/ITR/DAQ for debugging mapping/geometry/hot\_pixels

**Backup**