Event BCO space Run3AuAu

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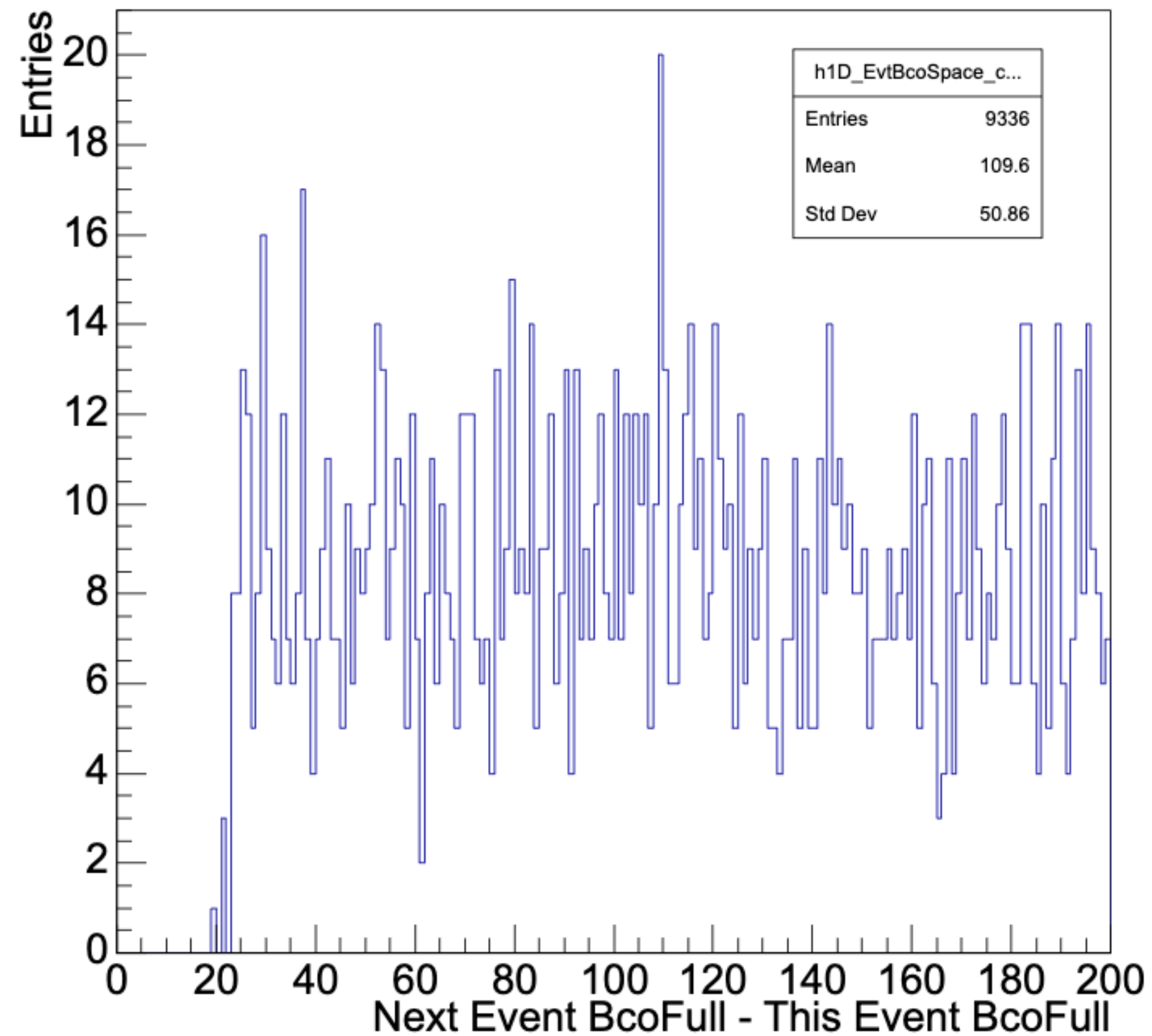sPHENIX INTT sPHENIX 國立中央大學 National Central University RIKEN

Run3AuAu, Run 68970 (2025/July/5)
Trigger rate ~ 10 kHz

Run2AuAu, Run 54280
Trigger rate ~ 3000 Hz
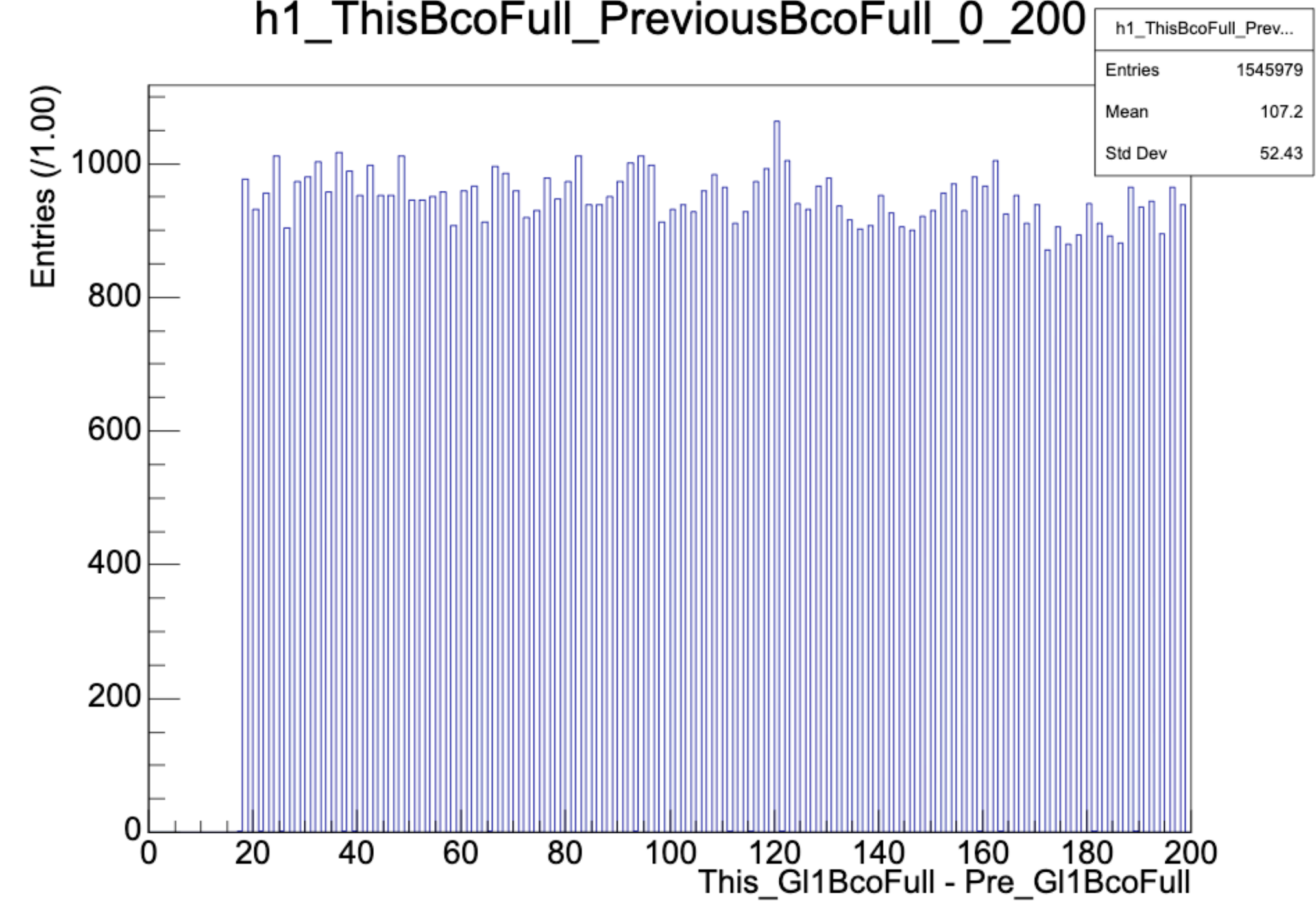
The set busy window seems to be the same (something like 15 BCOs)

The busy window
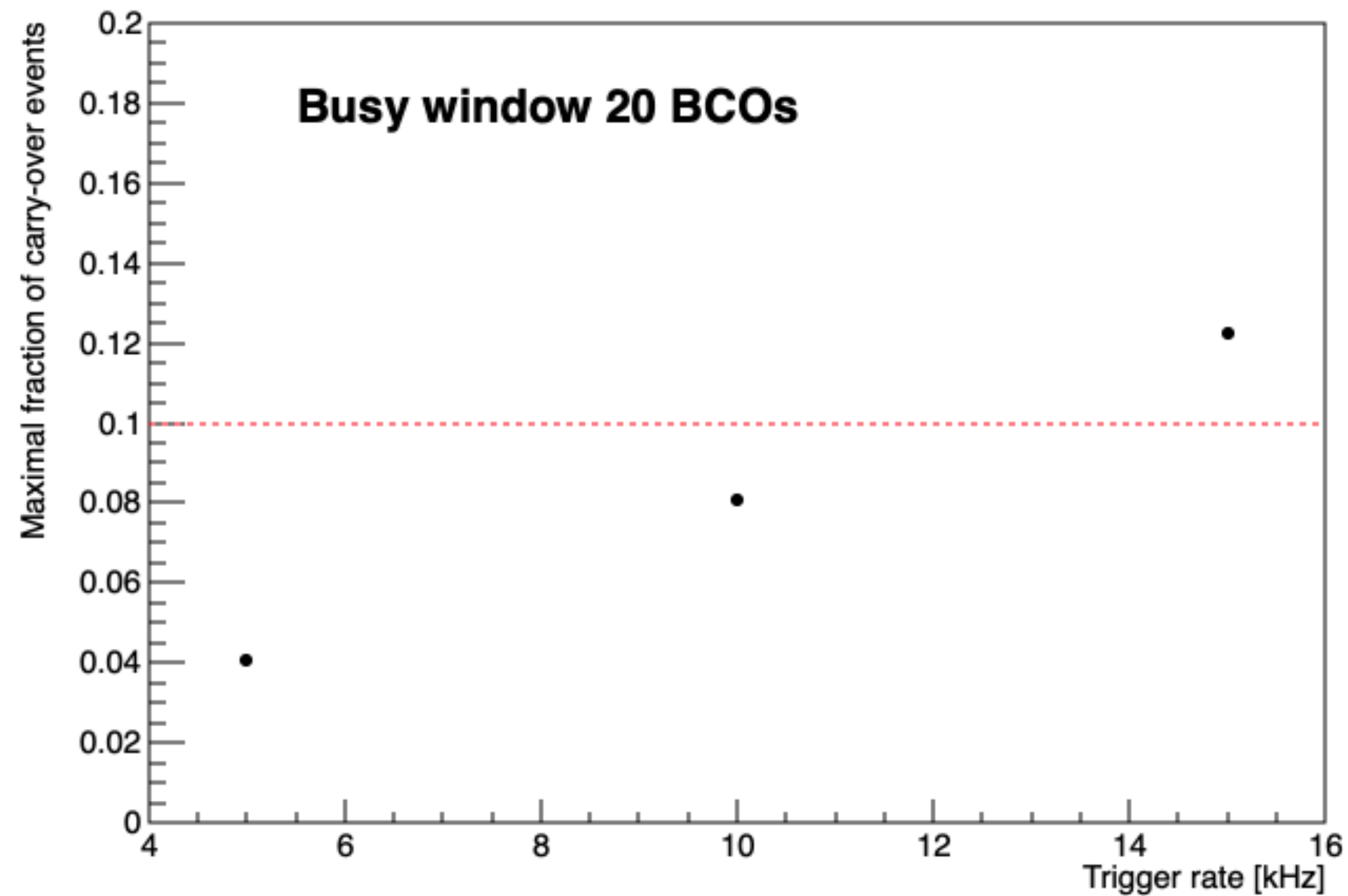
Busy window 20 BCOs

If the busy window is still something like 20 BCOs, up to ~10% of events could have the hit carried-over issue

In reality, the fraction could be much lower (< 5%, I think) due to the diverse event activity. But the important thing is, I think we might not be able to just remove the carry-over events only, as it could potentially introduce centrality bias. Therefore, we might still need to count on the `event_bco_space cut`, then the number will be 10%.

The event bco space of local-mode runs

Run 68008
Trigger rate: expected to be ~ 15kHz
ncollision: 127, open_time: 127
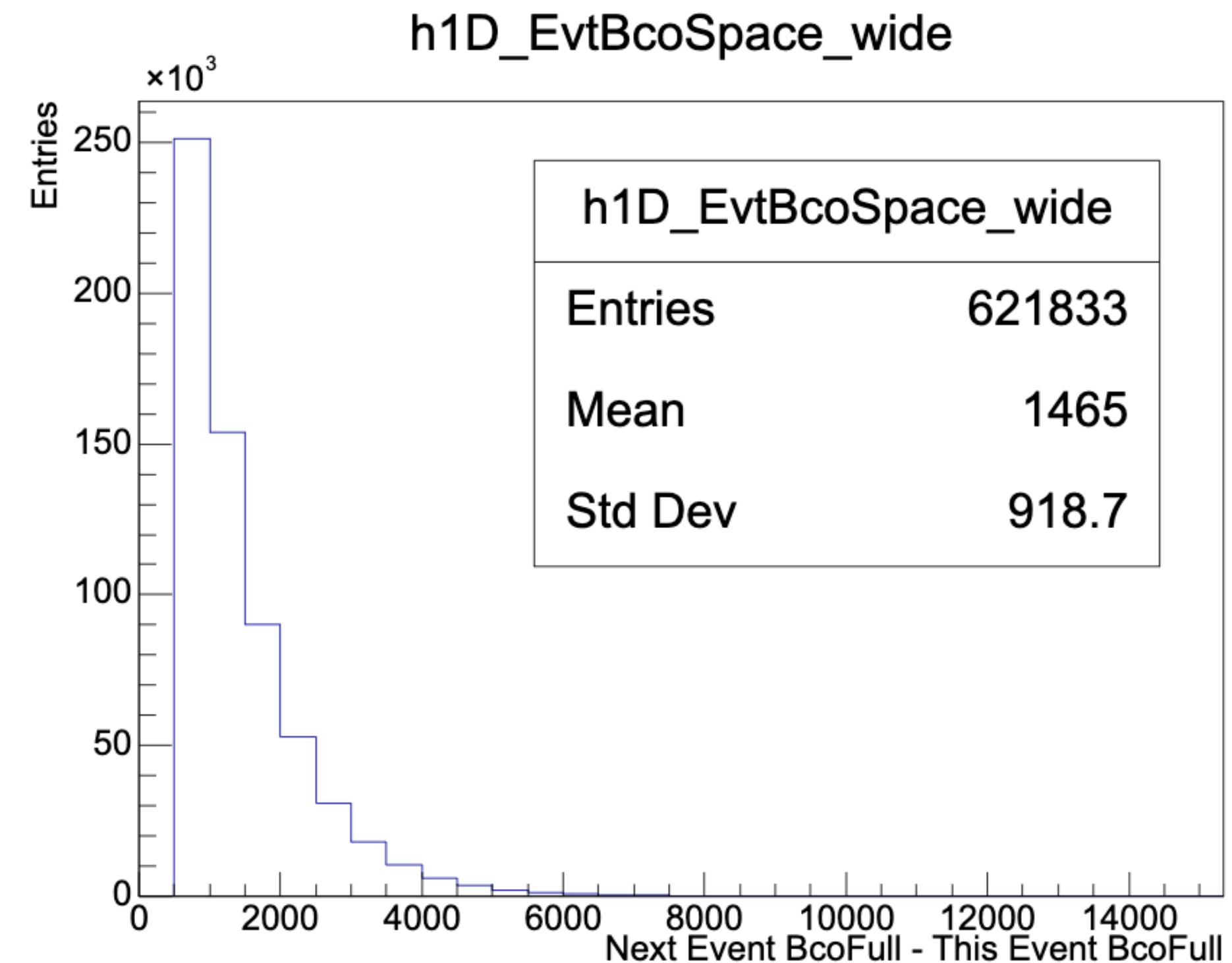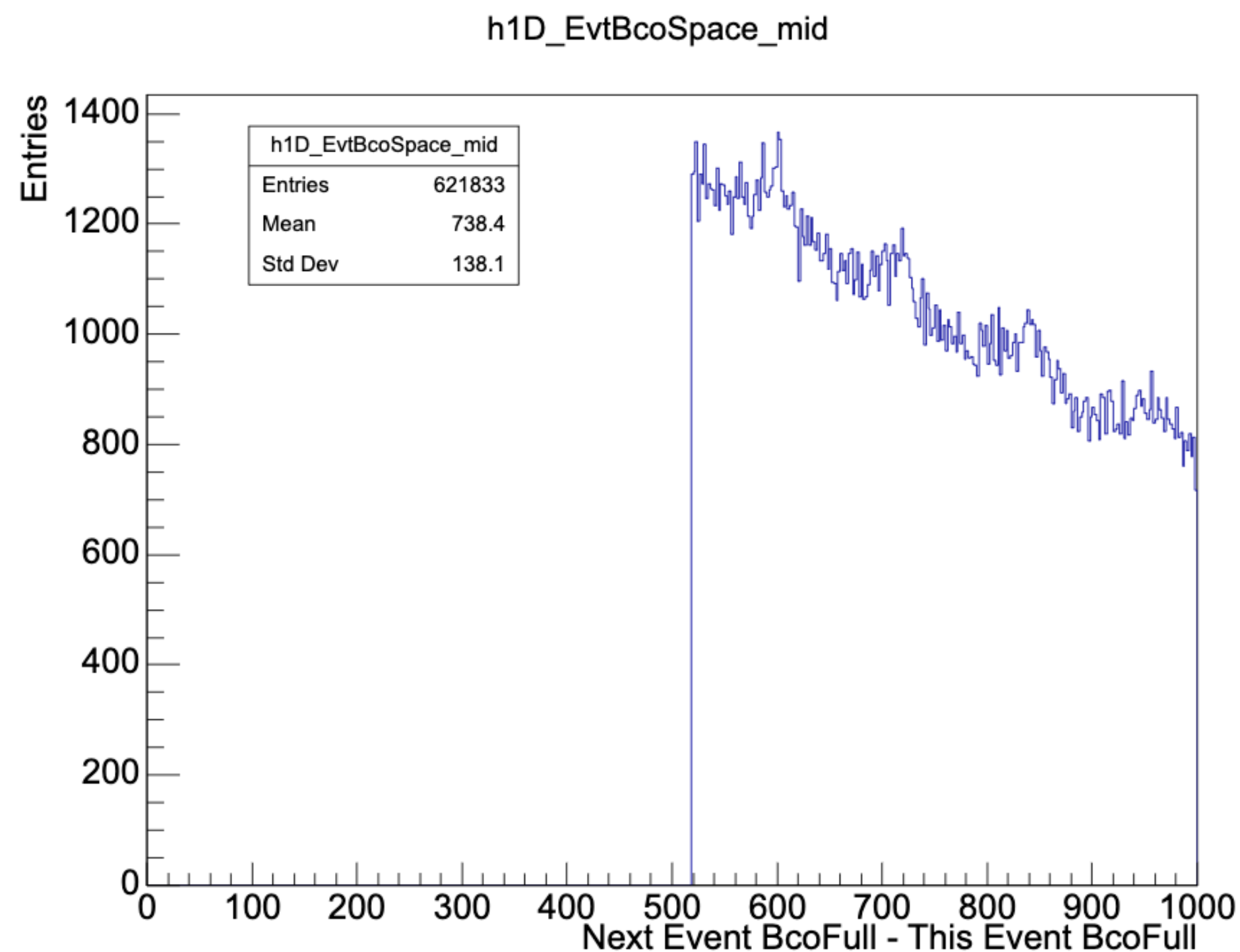
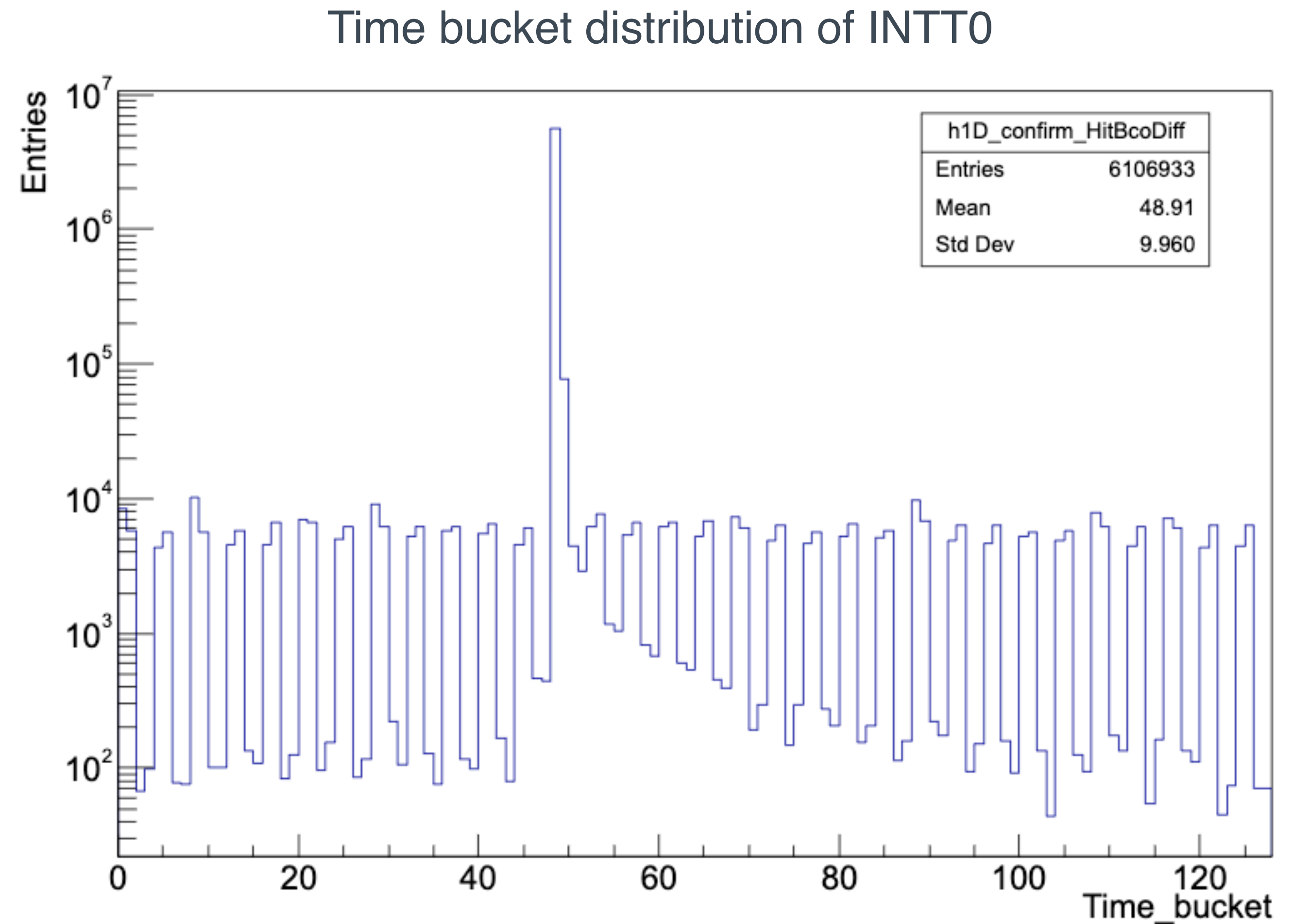Trigger rate according to INTT data: 1. / (1465 BCO) = 6440 Hz
Somehow the minimal event BCO space is > 500 BCOs when taking data in the local mode

Todo

- Pre Akitomo's suggestion:
  - check the data volume per minutes of the nominal global runs, and also check the local-mode runs
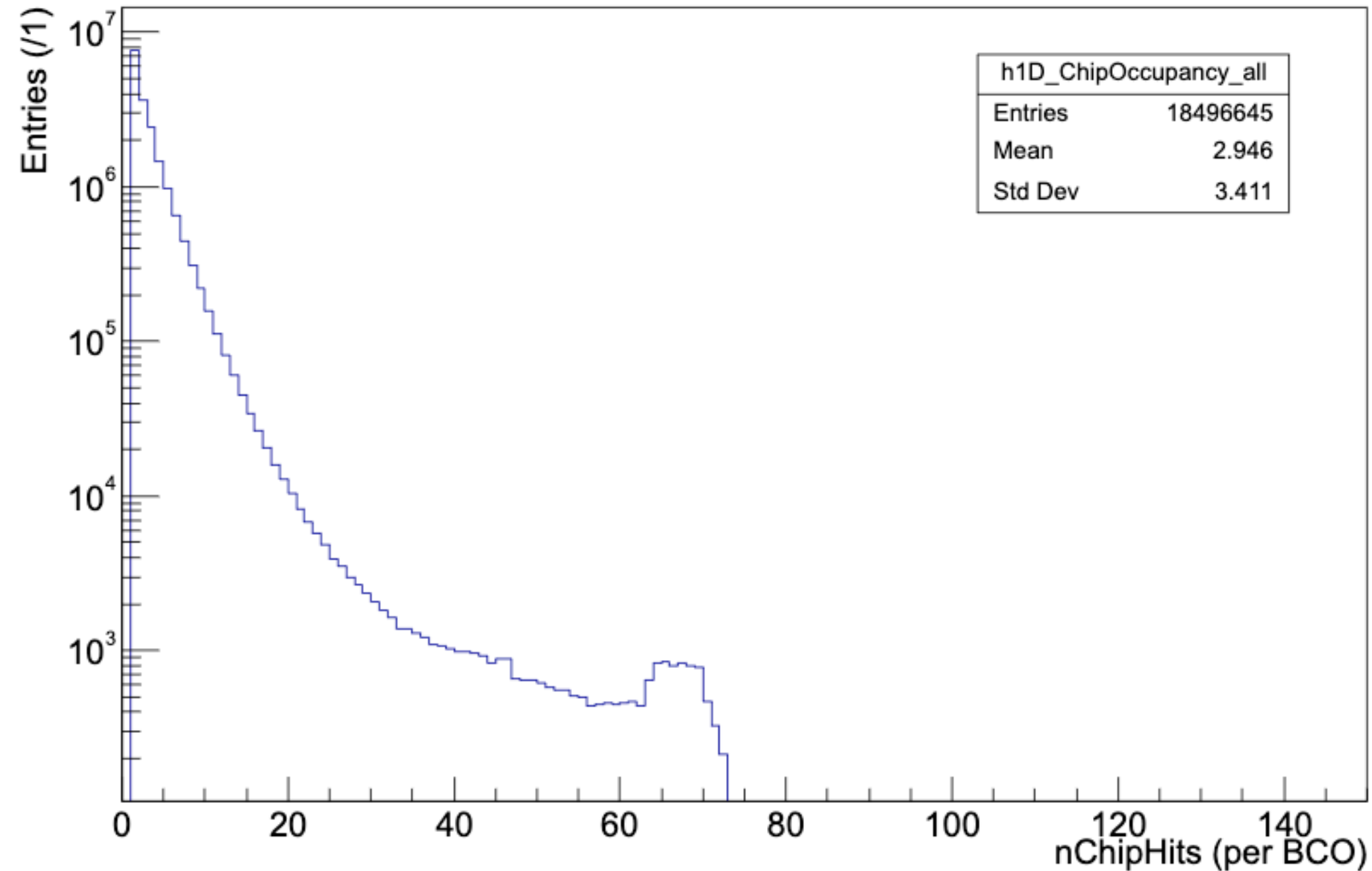
Back up

Additional check - run 8020

- The run 8020 was checked
  - Data taking time : May 23, 2023
  - Duration : 5 minutes
  - L1Delay : 0
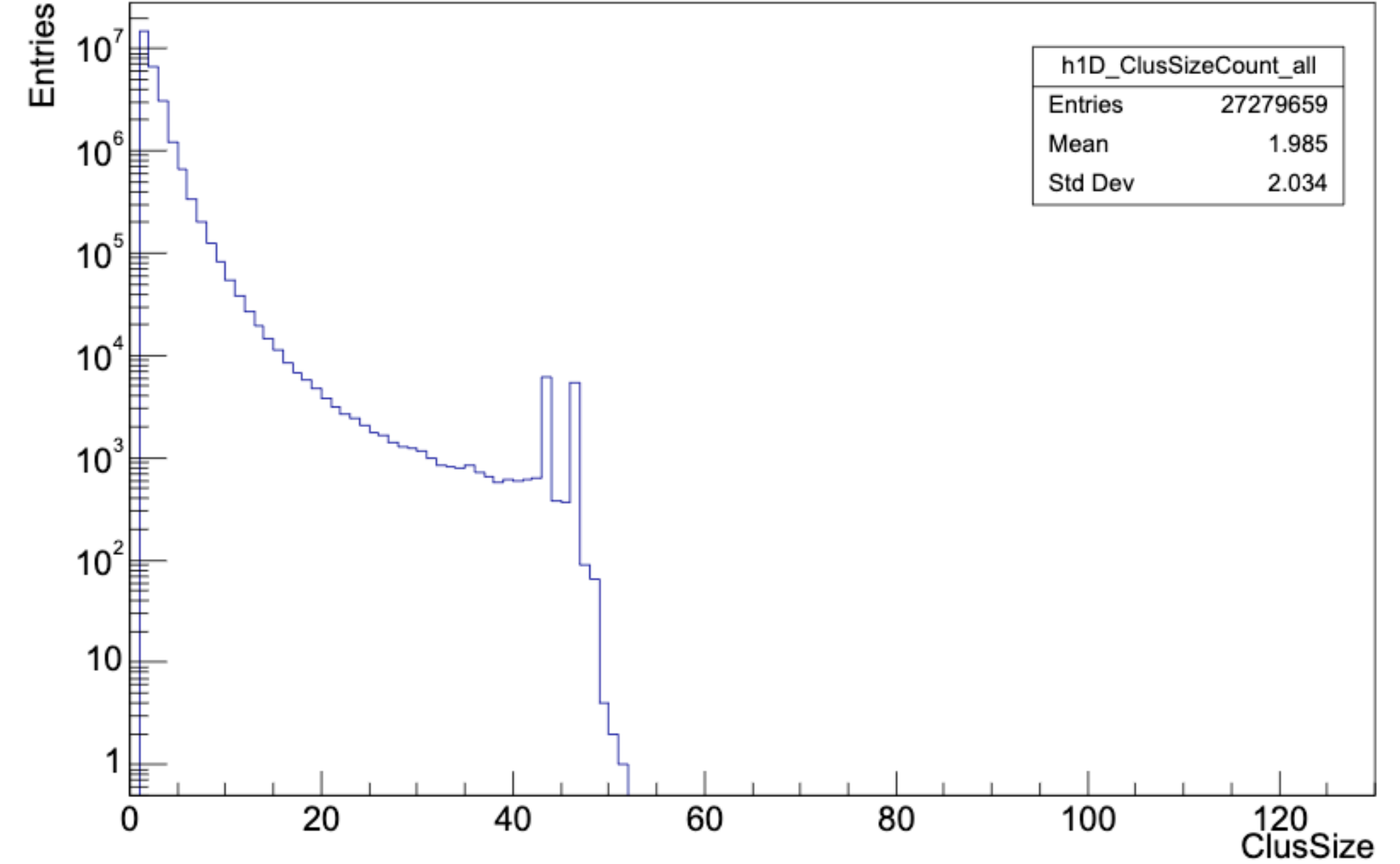 - ncollision : 127
  - open_time : 120

Time bucket distribution of INTT0

nChipHits per BCO of all chips

Cluster phi size of all chips

Setting open_time to 127 seems able to mitigate the saturation issue
The two spikes in the cluster phi size distribution still exist → other sources contributing to this?
We should still try to do the open_time scan in the beginning of run25
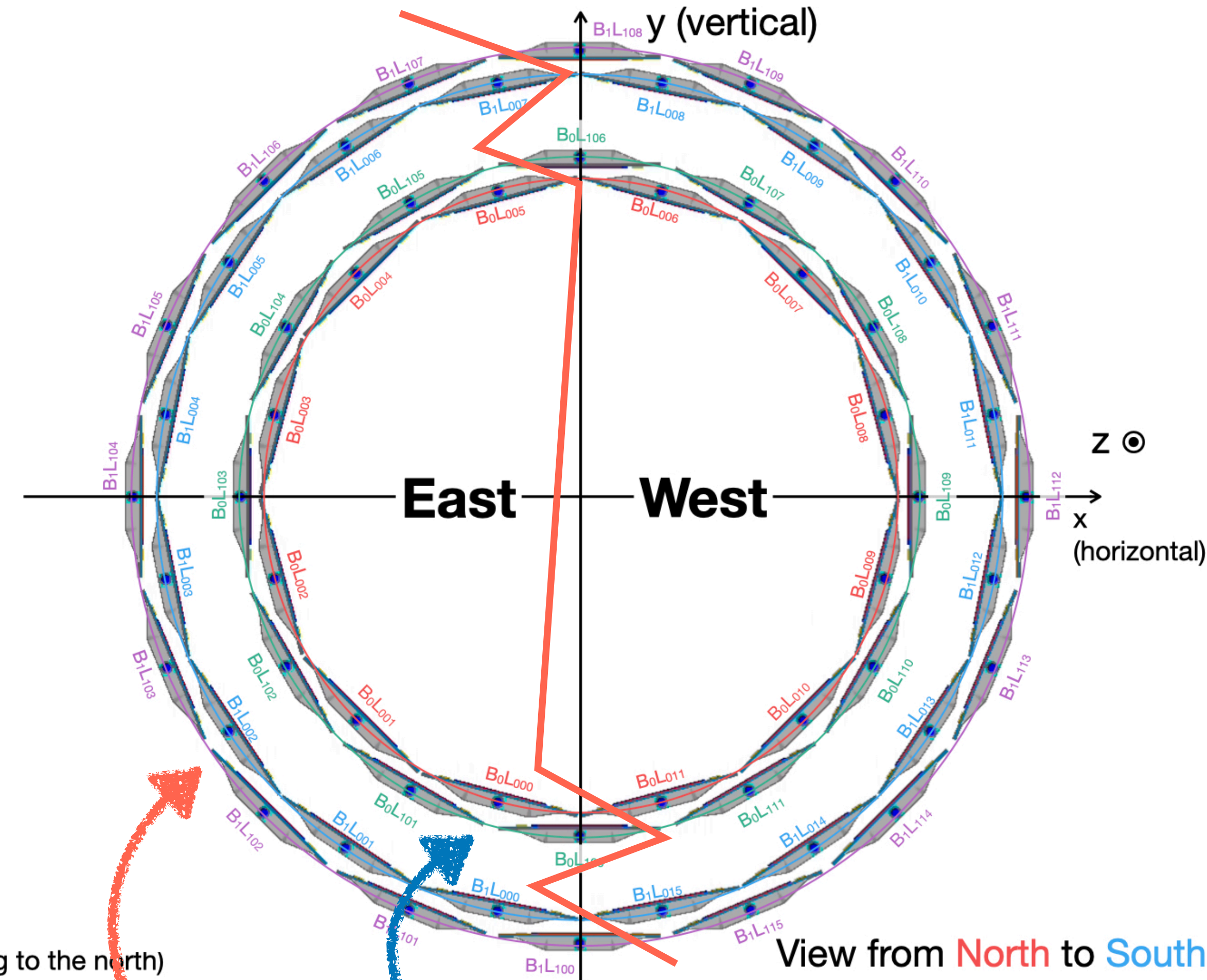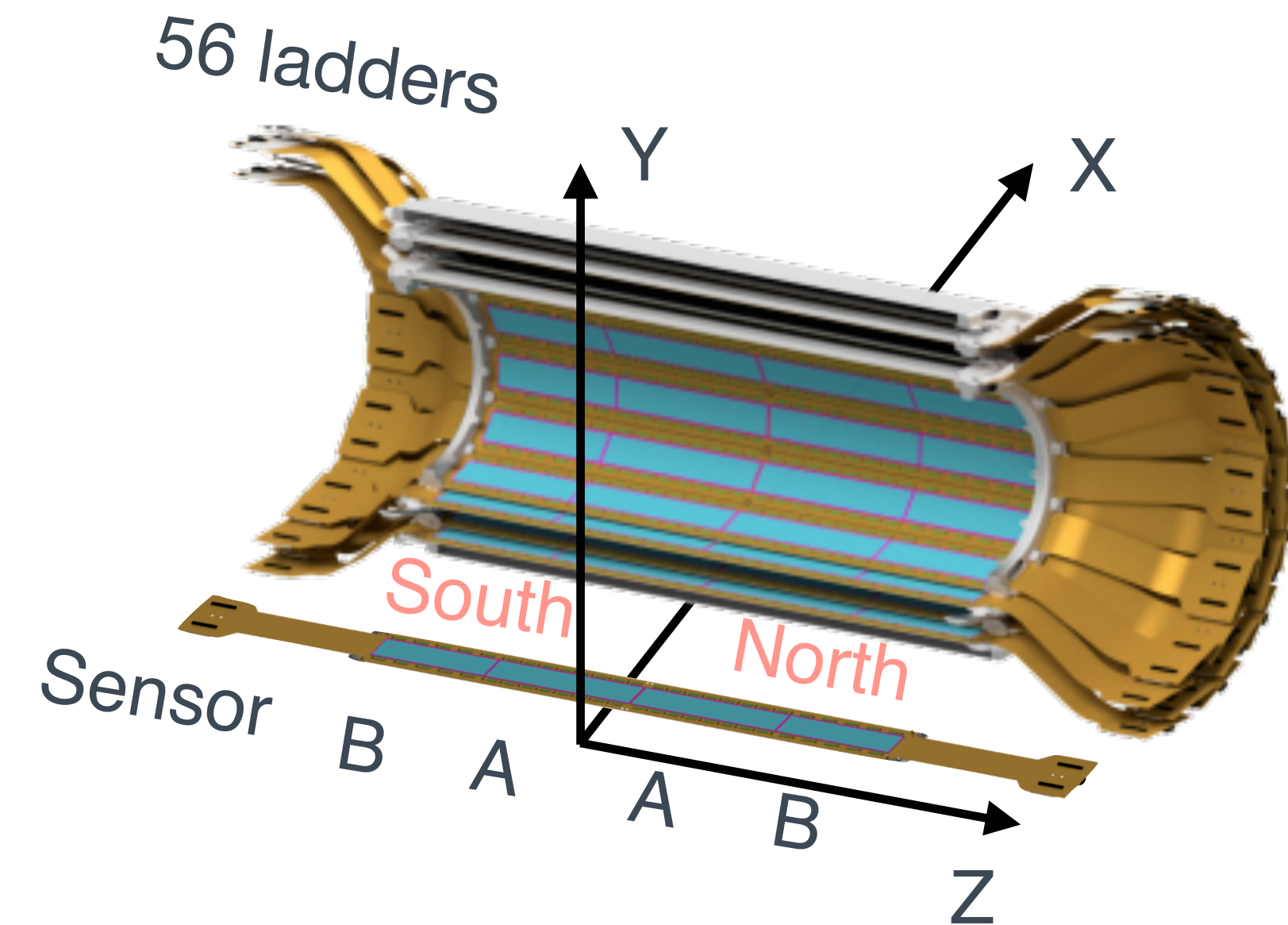
Run 54280, with the open_time 60

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Back up

INTT geometry
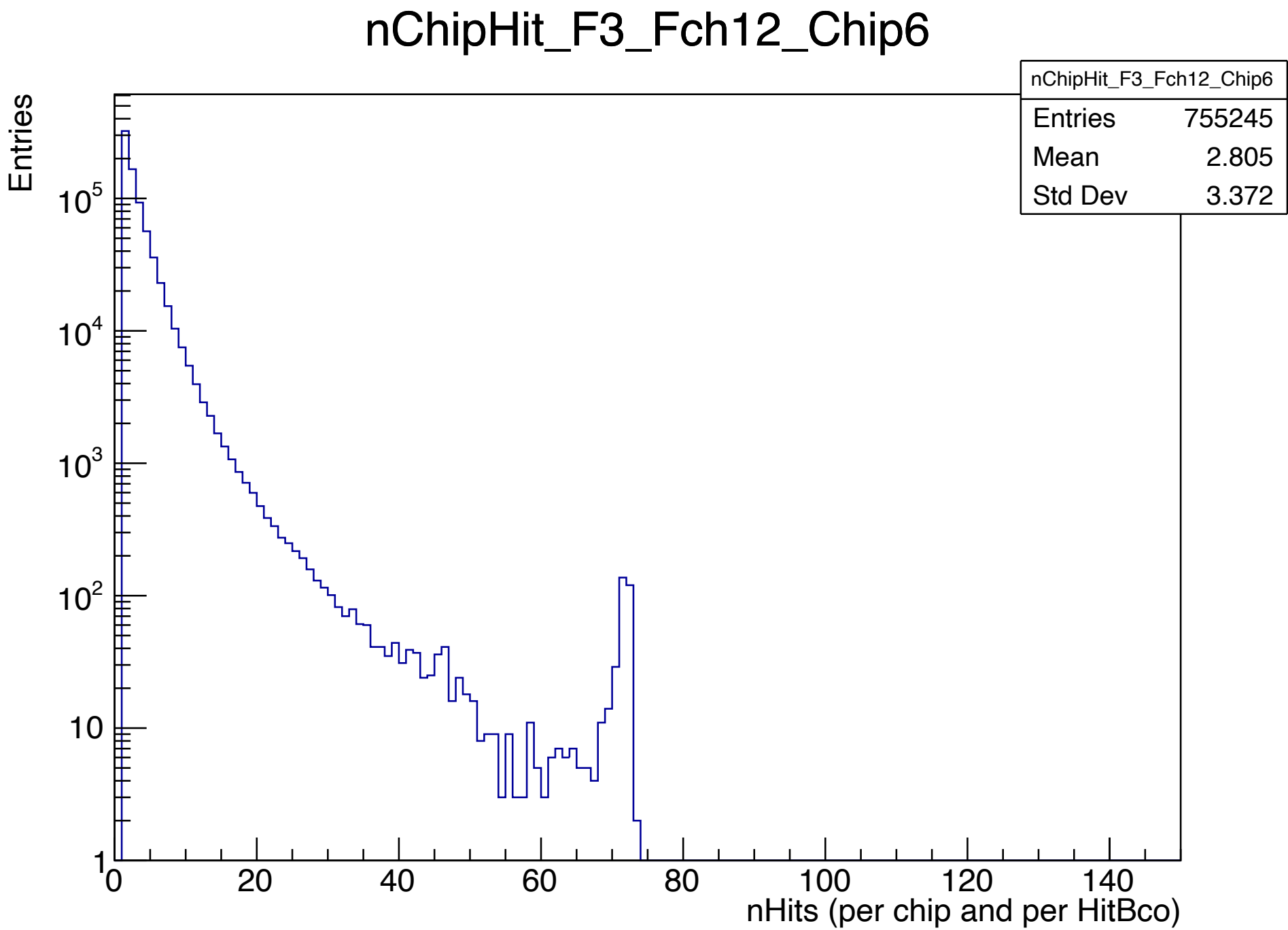
INTT: 2 sensors X 2 sides of half-ladders X 56 ladders = 224 sensors

Notation: B_xL_{yzz}
- x: Barrel ID (0 for inner or 1 for outer)
- y: Layer ID (0 for inner or 1 for outer)
- zz: Ladder ID (from 0 to 15)

56 ladders

Sensor

Axis (Right-haded coordinate)
- x-axis: $\vec{y} \times \vec{z}$
- y-axis: Vertically upward direction
- z-axis: The blue beam direction (pointing to the north)

Outer barrel   Inner barrel