CLUSTER Z SIZE STUDY

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BACKGROUND

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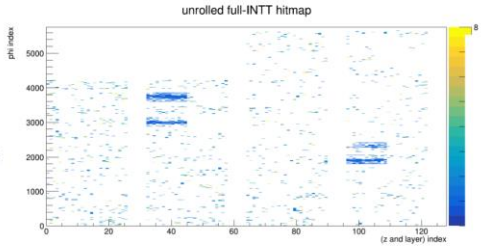
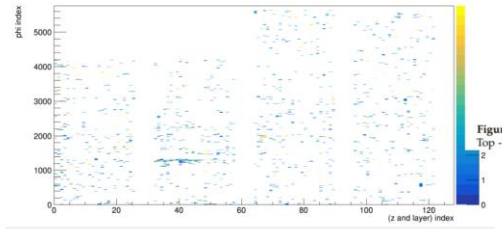
Some INTT clusters with large Cluster Z size was found.

Streaks in TrkrHit distribution in data

- "Streak" = at least 5 consecutive TrkrHits in z direction
- Occurs in roughly 10% of events
- One type: large diffuse ADC=0 line



- Another type: thin line with higher ADC values
- Both types affect reco and analysis, since they create many near-duplicate clusters



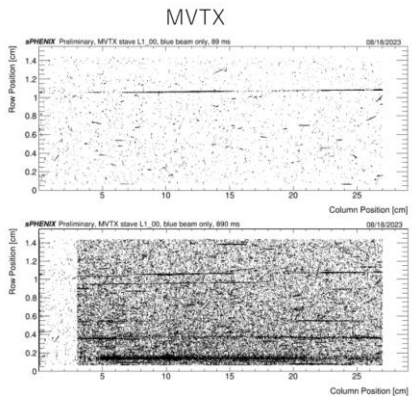
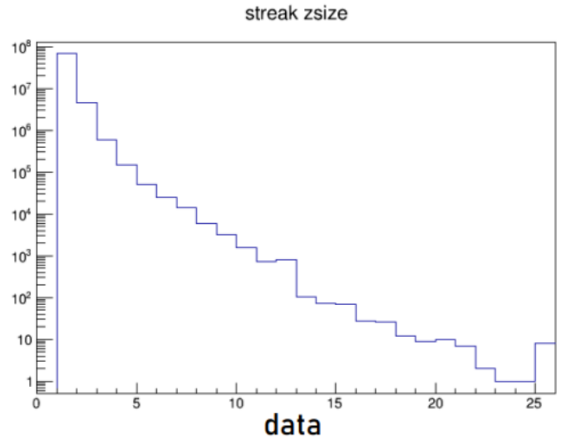


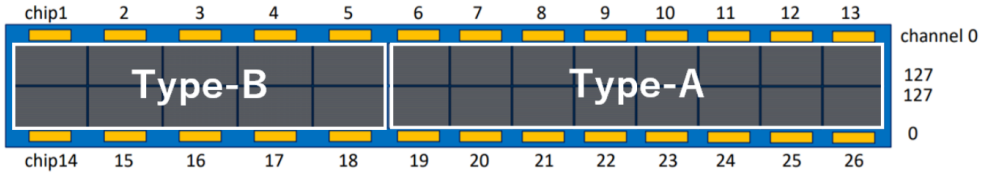
Figure 50: Hit map from Stave L1 00 taken during a fill with only the blue beam and no collisions. Top - data recorded over 89 ms. Bottom - data recorded over 890 ms.

https://indico.bnl.gov/event/20205/attachments/49212/84264/Commissioning_Status_August_2023_1.0RC.pdf

https://indico.bnl.gov/event/22228/contributions/86854/attachments/52510/89831/dndeta_20240205.pdf

- "streak zsize" = number of conse
- Long streaks present in data, but





https://indico.bnl.gov/event/22520/contributions/87895/attachments/52884/90476/dndeta_20240226.pdf

PURPOSE

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Study clusters with large Cluster Z size are noise or not

- Investigation items
- (1) Z cluster size distribution
- (2) Hit positions of Z cluster size = 8 ~using event display
- (3)Relationship between ADC and Z cluster size

- Data used
- Run20869 ,number of events is 540,000or 10000.

(1) Z CLUSTER SIZE DISTRIBUTION

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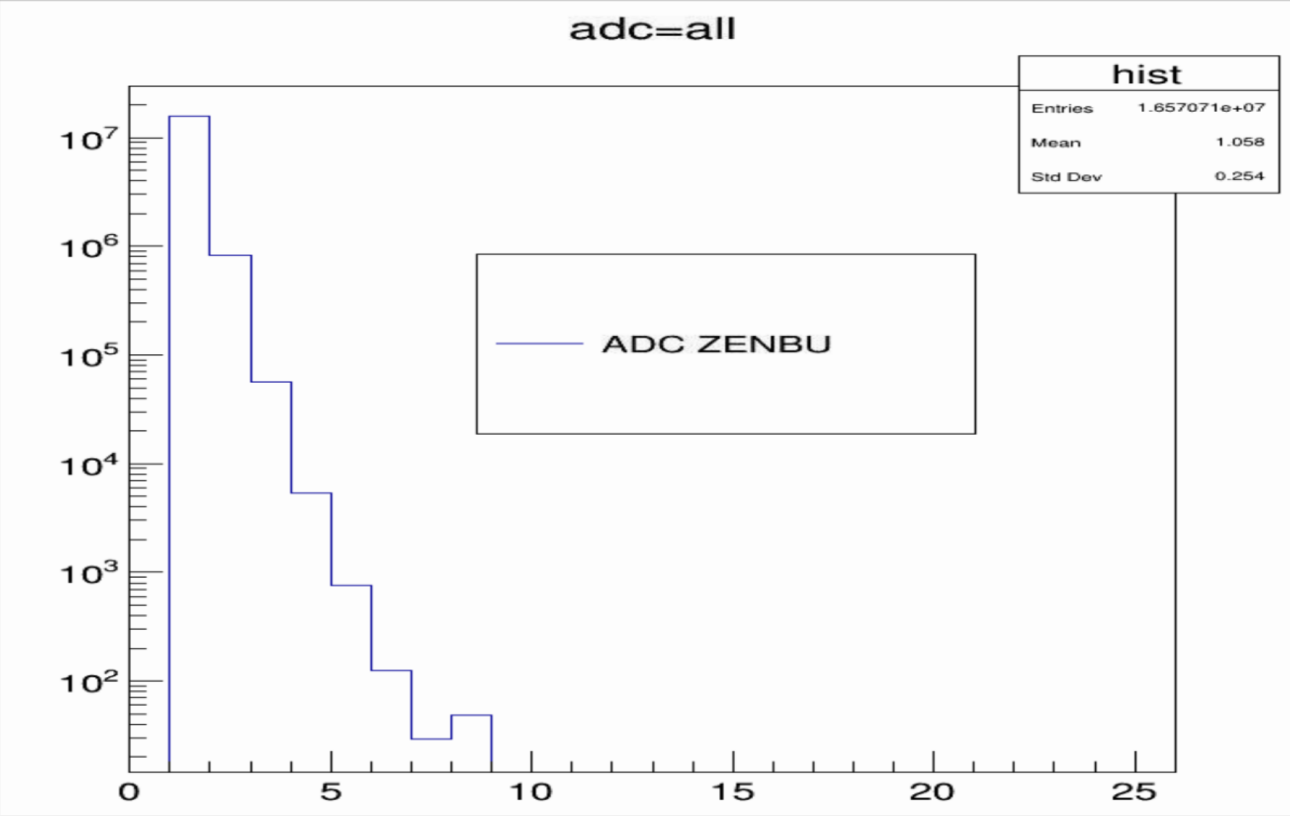
There are clusters that pass through 8 Chip.

10000 event



- This figure shows the distribution of z size. The horizontal axis is z size.
- The MAX value of cluster z size is 8.
- →②When looking at the next hit position, I focused on z size=8.
- For every 1 increase in Z size, the count number (vertical axis) drops by 1 digit.

HIT POSITIONS OF Z CLUSTER SIZE = 8

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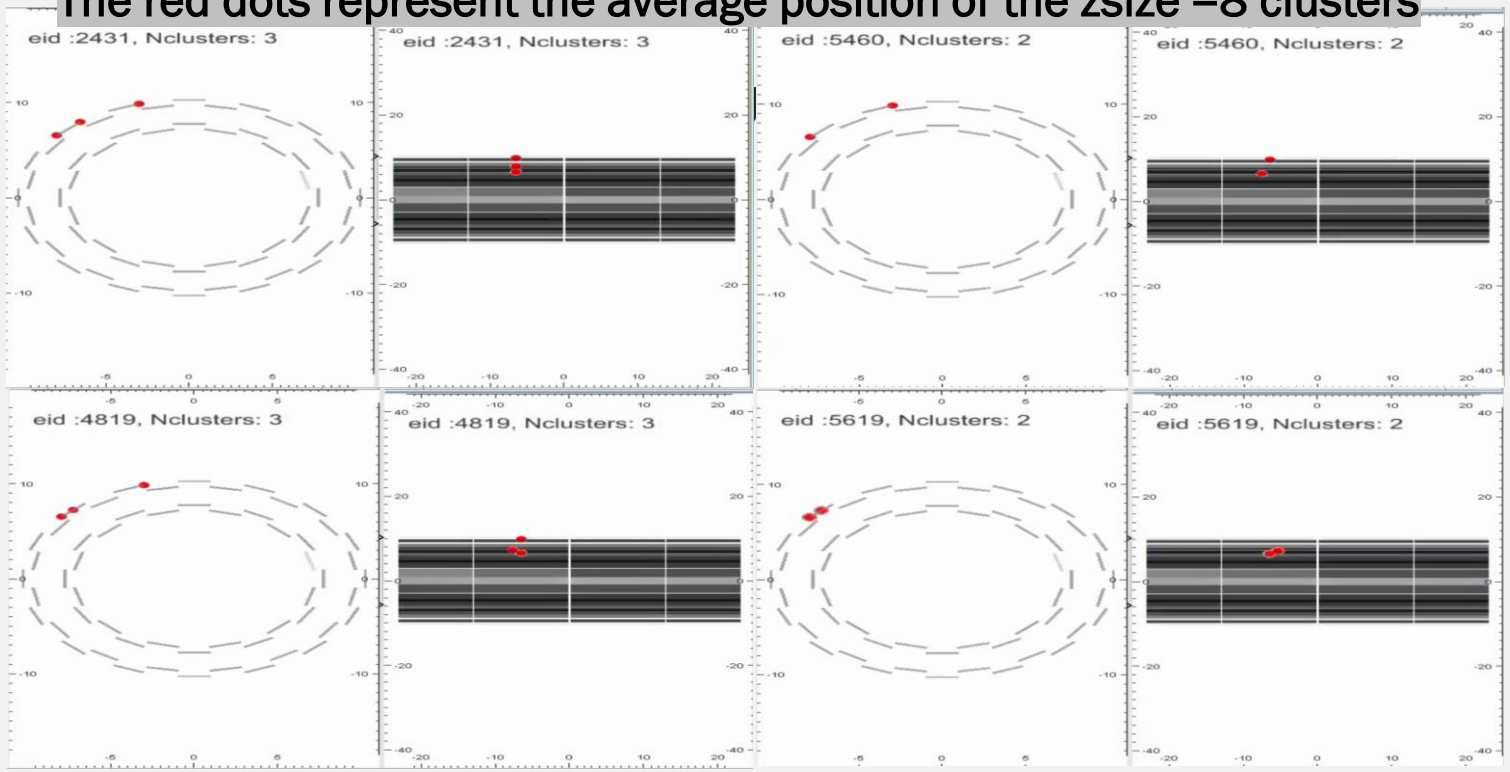
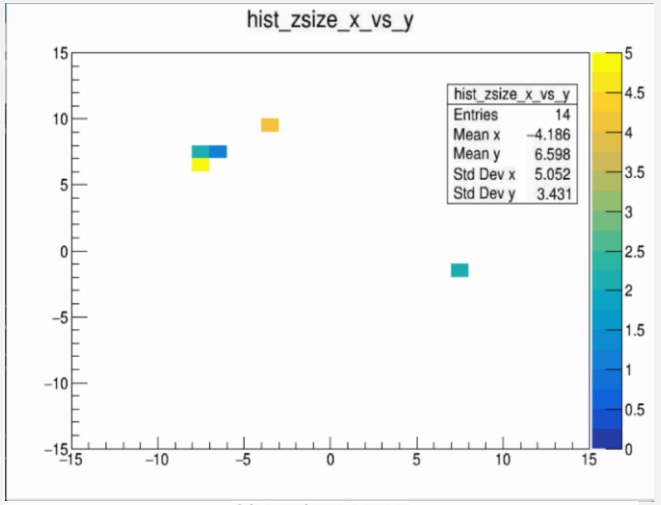
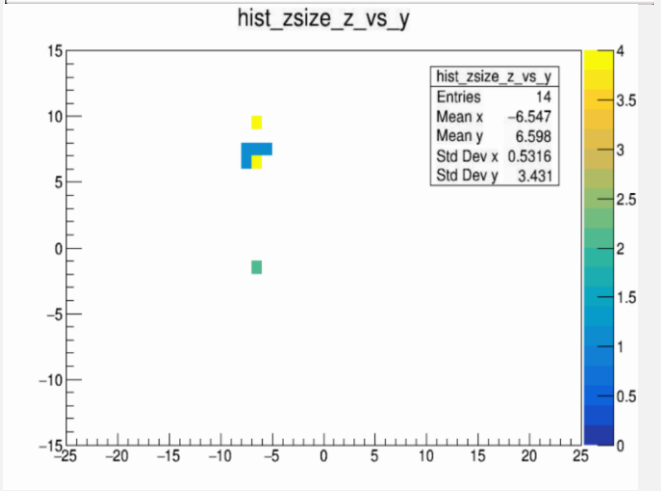
Z size=8 is in the same area -> noise? Outer layer -> not halo.

Clusters with zsize =8 were displayed for each event in event display.
The red dots represent the average position of the zsize =8 clusters







Right
2-D histogram of the average coordinates of z size=8 filled

ZSIZE VS ADC

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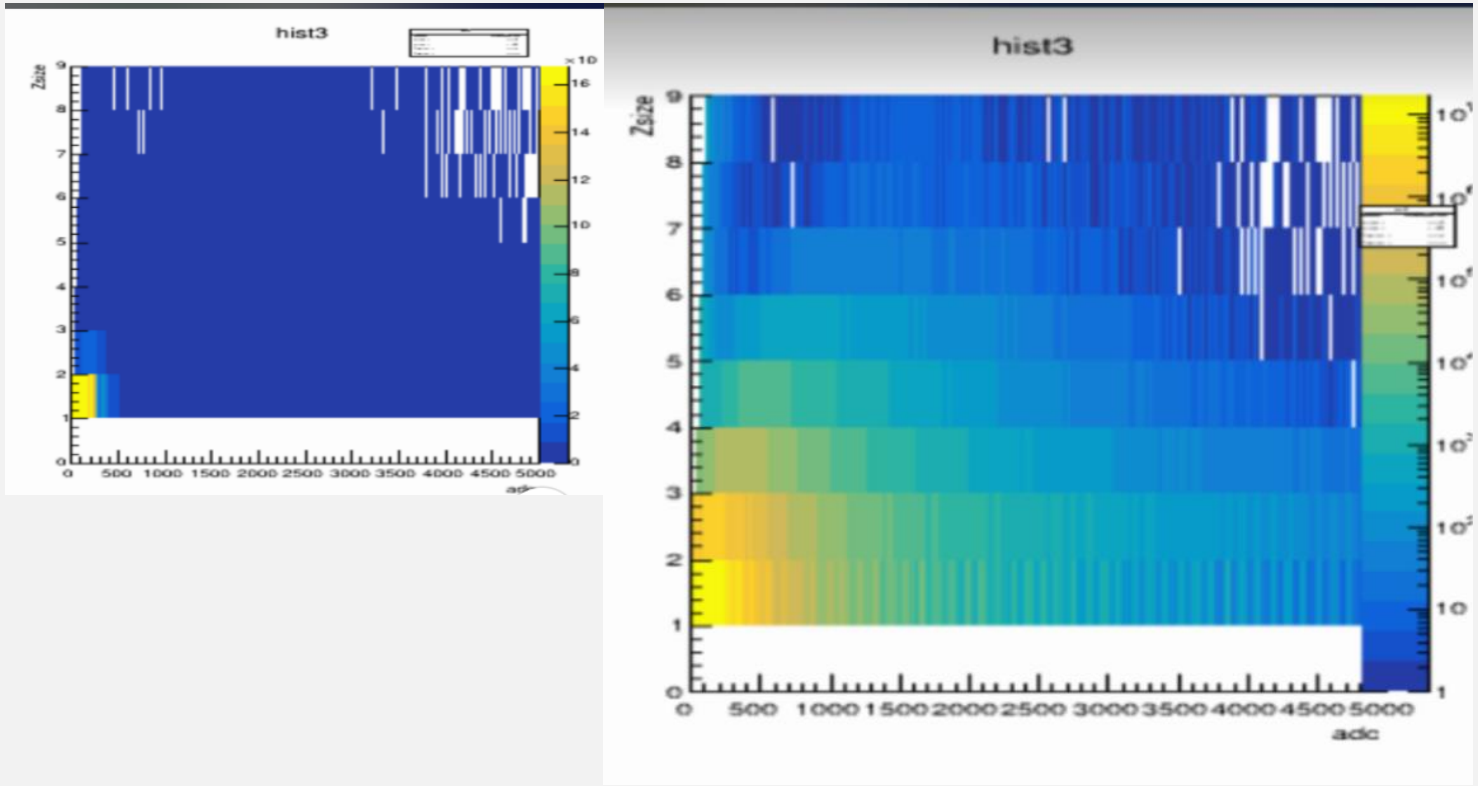
Zsize vs ADC

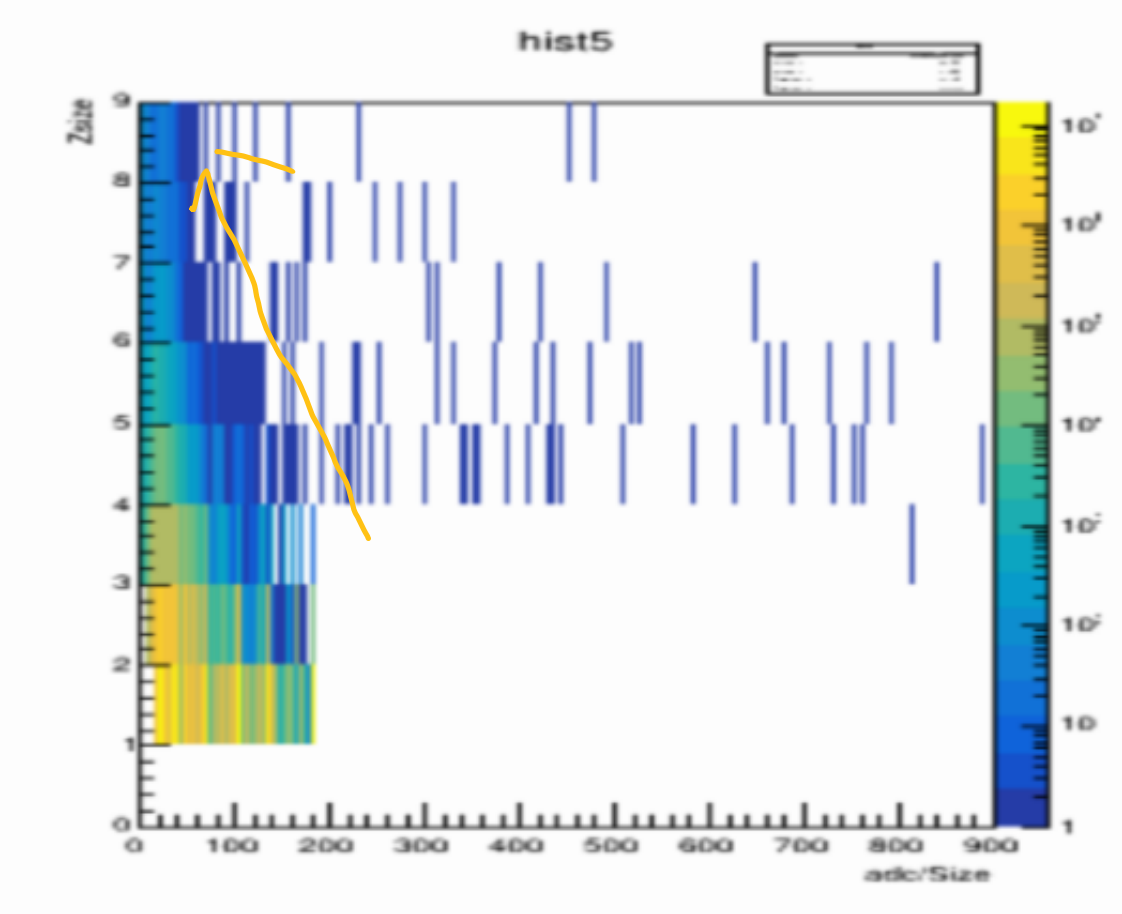


- 2-dimensional histgram with vertical axis z size and horizontal axis ADC.
- The right figure is a log z version of the left figure.
- Even z size=8 may have relatively high ADC.

ZSIZE VS ADC/SIZE

ポイント

Zsize =8 does not originate from the beam halo



- Figure of horizontal axis adc divided by size as shown earlier.
- In other words, it shows the figure of ADC per strip.Z

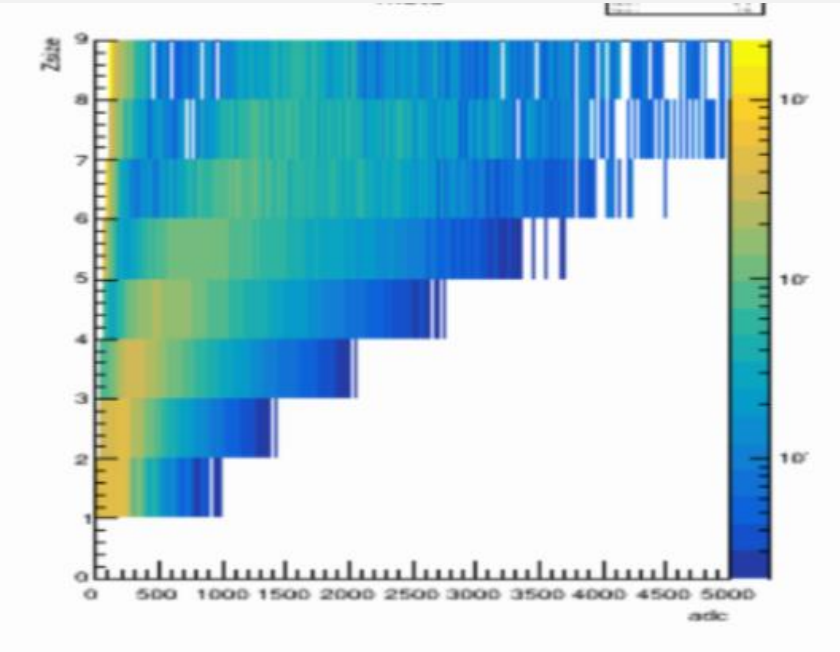
- size=8 has small ADC per strip.
- ⇔ It is considered to be noise that is not originated from beam halo.

```
-bash-4.2$ cat dac_2023.txt
15
30
60
90
120
150
180
210
```

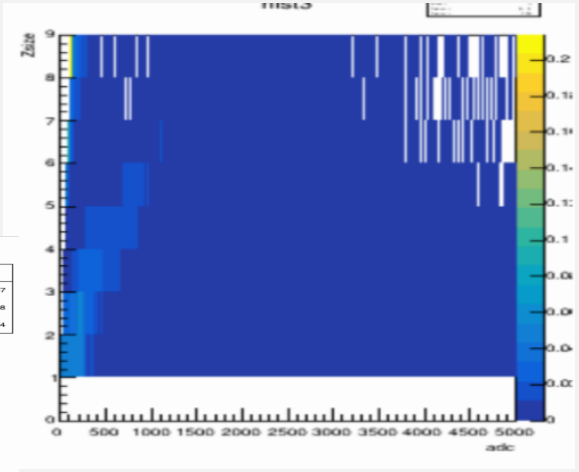
Z SIZE VS ADC NORMALIZED VERSION

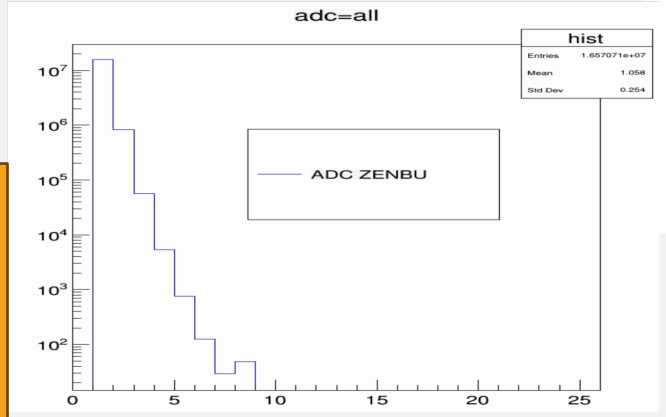
ポイント

For zsize>5, the percentage of noise is likely to be high.



- When zsize is high, adc tends to be high.
- But for zsize>5, the area of adc=15*Zsize increases.
- → higher percentage of noise.





1.created a 2-dimensional histogram of ADC vs. Zsize
2. separate the data by Zsize value and normalize by the number of hits
3. combined the data created in step 2 into a single 2-dimensional histogram

SUMMARY

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Clusters with Z size = 8 are considered to be noise.

- Clusters with Z size =8 are more likely to be noise not originated by beam halo
- .Rationale for Z size =8 being noise.
- 1 There is bias in the event display.
- 2 Zsize=>5 increases the area of adc=15*Zsize.
- 3 Low ADC per strip makes it difficult to consider it as a beam halo.

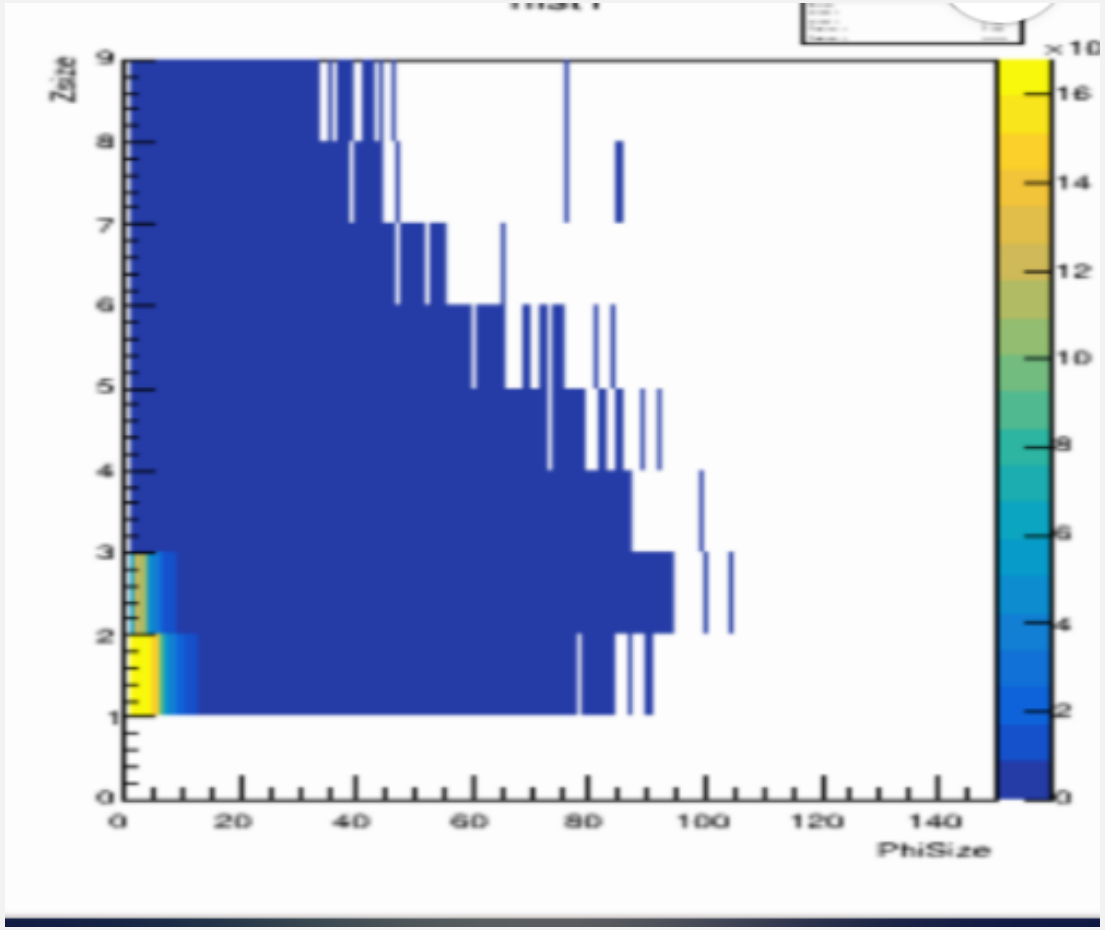
- Currently, the origin of clusters with large zsize is not known.
- →I will check the the number of ways (Probability) fitting and the hit distribution constituting the clusters.

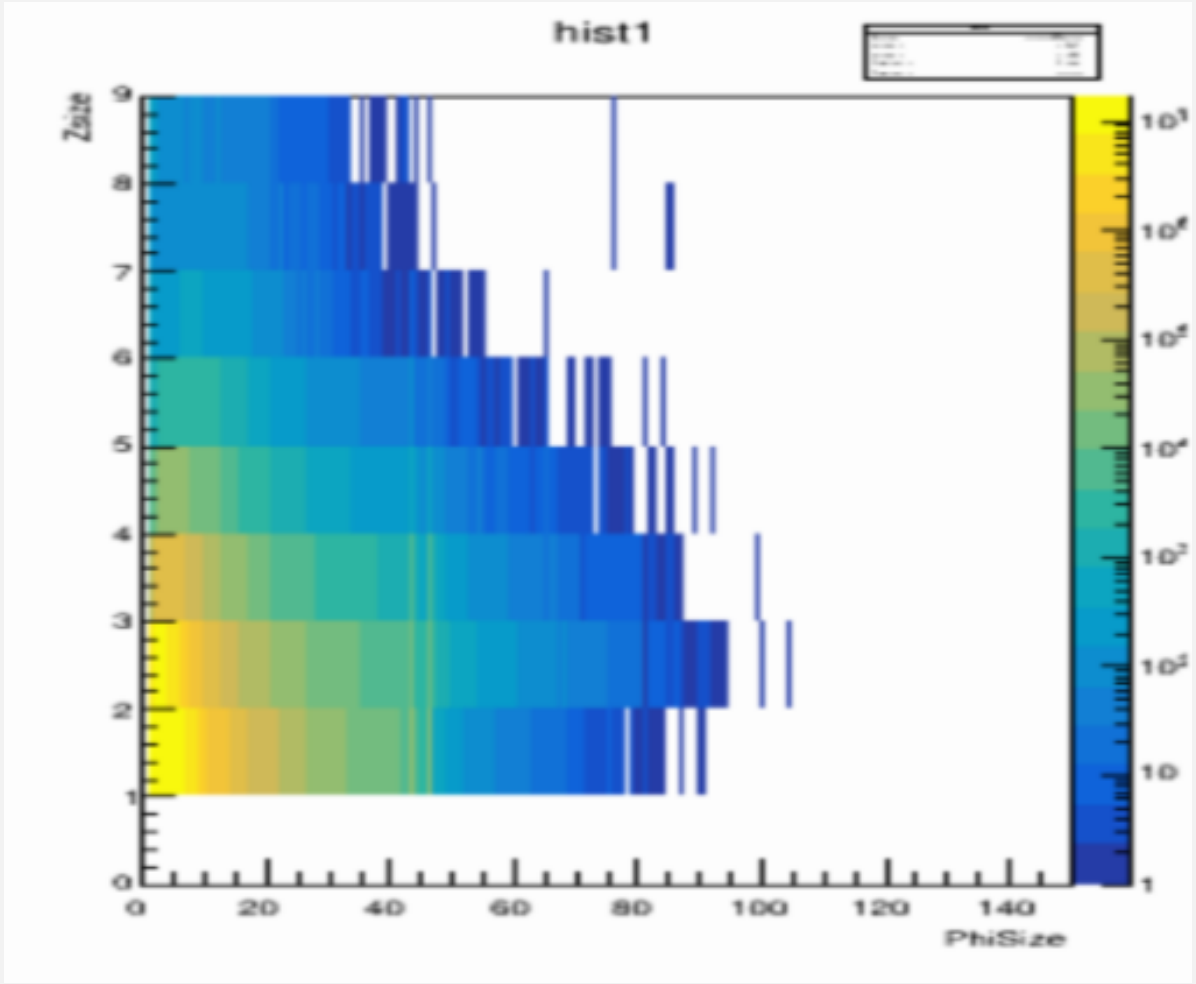
バックアップ

ZSIZE VS PHI SIZE

ポイント

Z size=8はPhiに大きく広がっていない





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- 図 1

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- 図１

図１説明

- 図２

図２説明