A STUDY OF CLUSTER SIZE IN Z-DIRECTION AND THE POSTER AT RHIC&AGS MEETING

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INTRODUCTION

- Poster Title: INTT performance
- I Plan to use these two plots.
- 1 Z size distributions for gold-gold and proton-proton collisions.
- 2 Model comparison, created based on probabilities from real data.

- Motivation.
- Zsize>3 or larger is confirmed for INTT. Large clusters are also observed for MVTX and TPC.

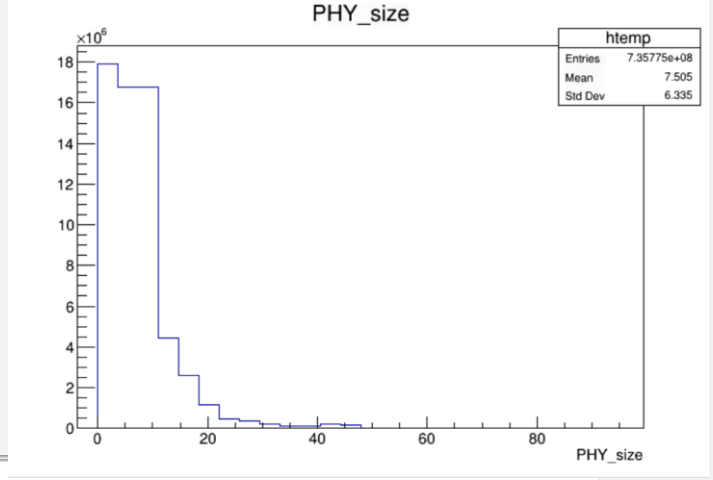
I believe that clusters with large Z size are caused by the hit rate of the chip.

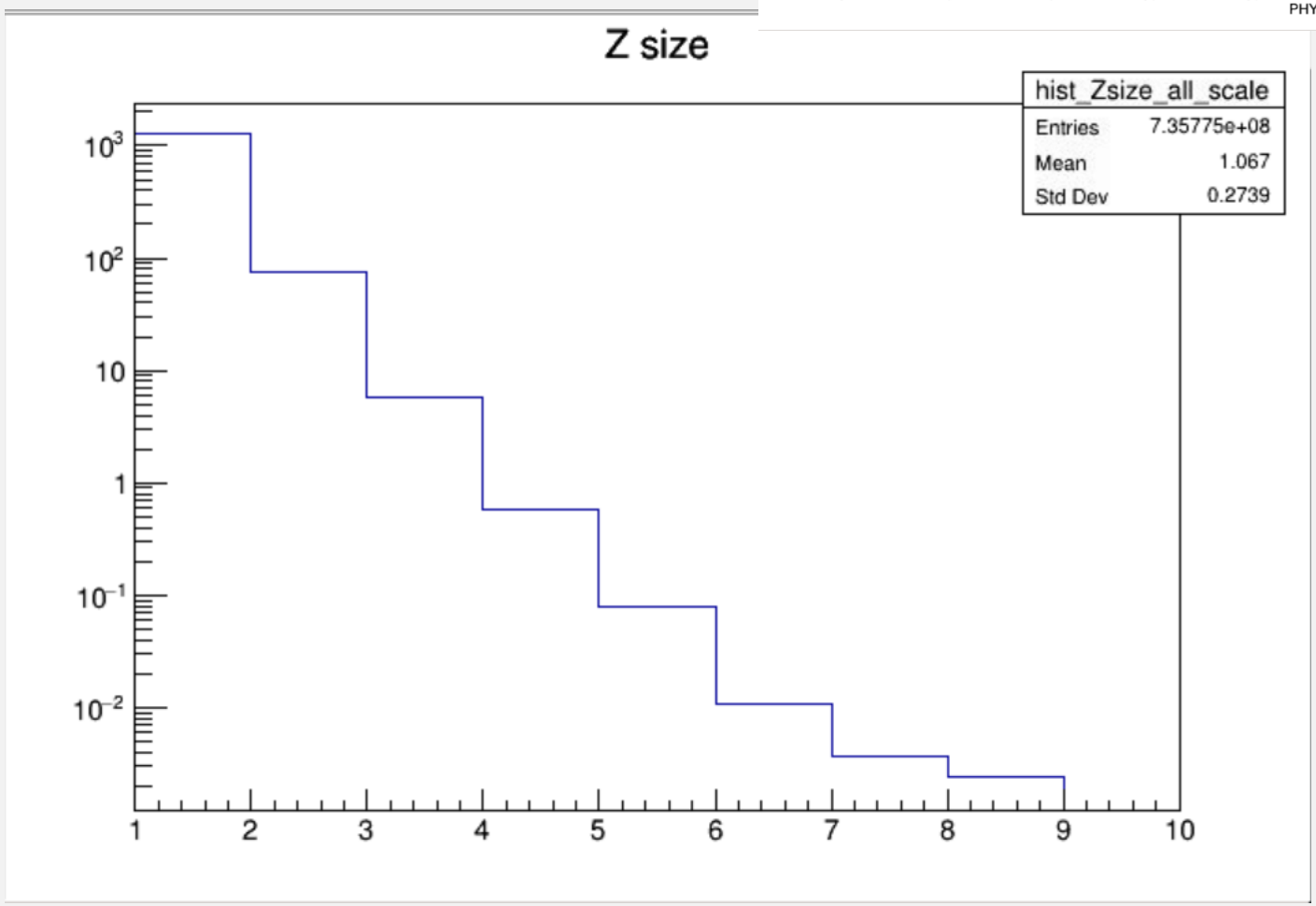
Au+Au Z SIZE

- in Au+Au collisions,Z size distribution.
- Run 20869

- Number of Event= 550108
- X axis is Number of hits per event.
- Y axis is Cluster Z size.

- Hot channels have been removed.
- BCO Full-Bco cut was applied.



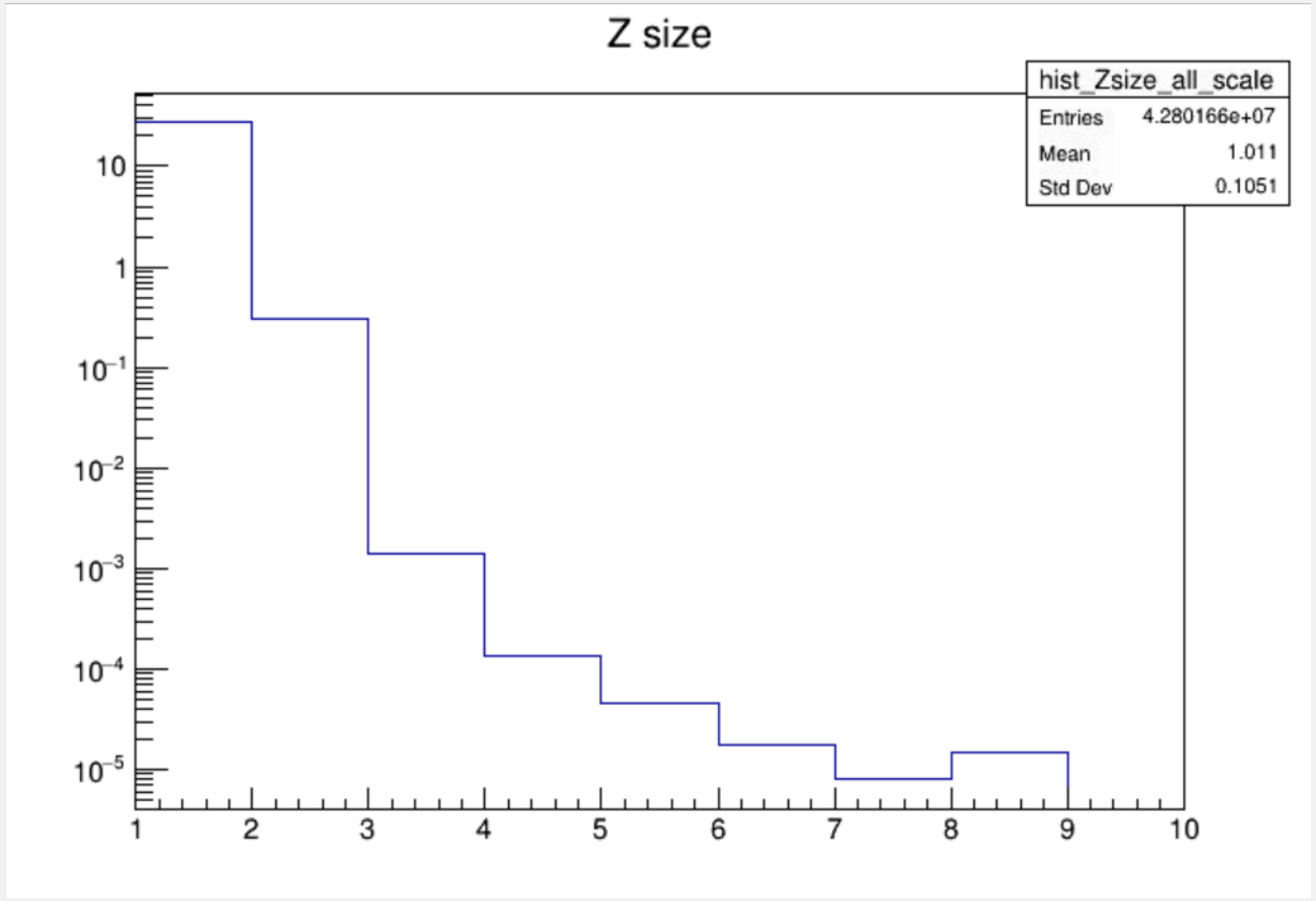


P+P Z SIZE

- I used three P+P data. for example 41651,41652,41653.
- X axis is Number of hits per event.
- Y axis is Cluster Z size.

- Hot channels have been removed.
- BCO Full-Bco cut was applied.

Run number	Number of event
41651	500000
41652	500000
41653	500000



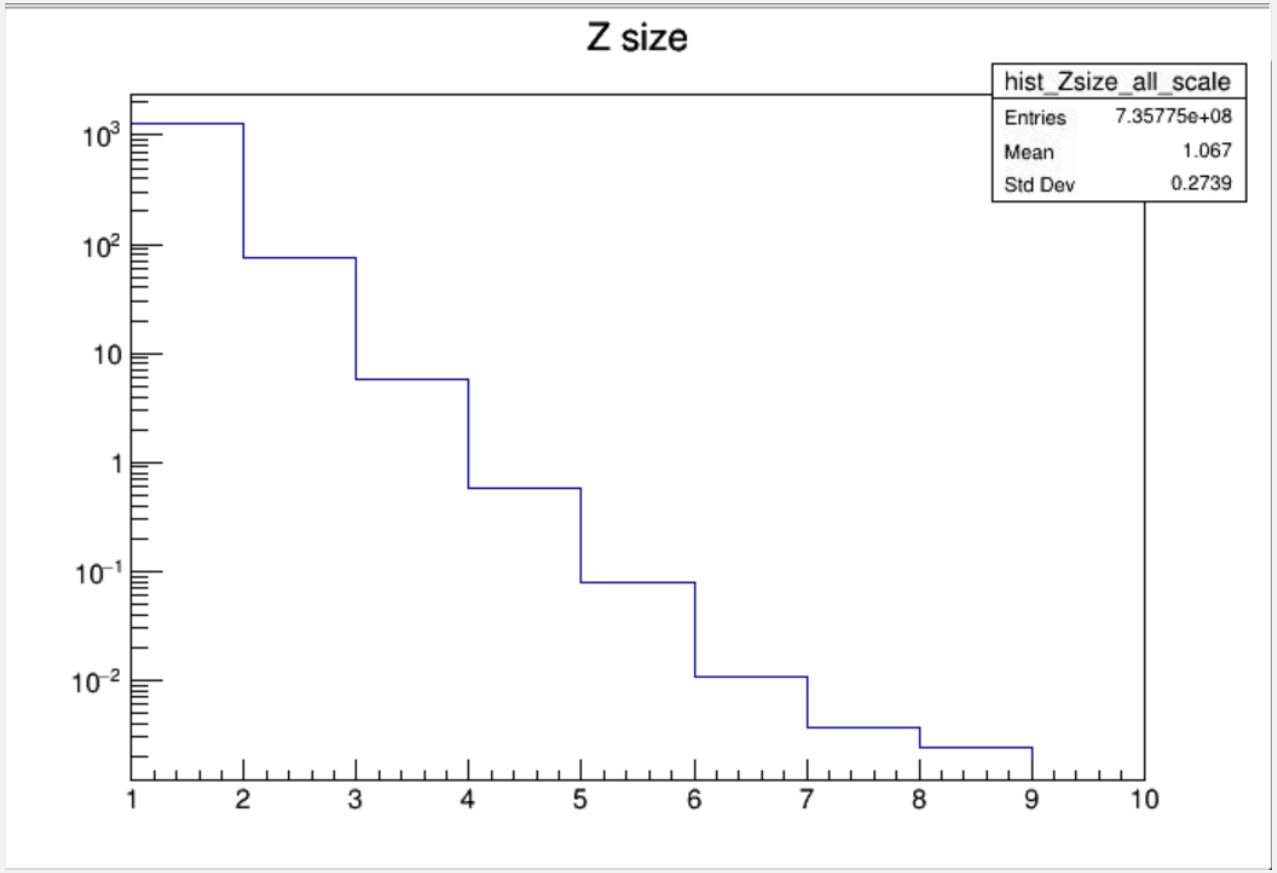
PURPOSE OF MODEL

- Model Objective
- The number of hits drops by x1/10 as Z size increased

However, after z size 4, the slope is changed .

This is thought to be caused by the difference in hit rates by chip.

Therefore, the model simulates the Z size distribution using the hit rate for each chip, A toy Monte Carlo model is created that takes into account the difference of hit rates.



Au+Au Zsize run20869

MODEL DESIGN

- Model Design
- ① In 1event, 26 chips and 128 channels is assigned a hit flag of 0 or 1 using their hit rate as probability.
- ② The hit flag is used to determine if a channel in a chip is adjacent to the channel in the next chip.

✱The judgment is made whether the three candidates (right, diagonally down, diagonally up) are adjacent to each other

③ If the channels are sequentially numbered, only the youngest channel number is used to determine if it is adjacent to a channel in a neighboring chip.

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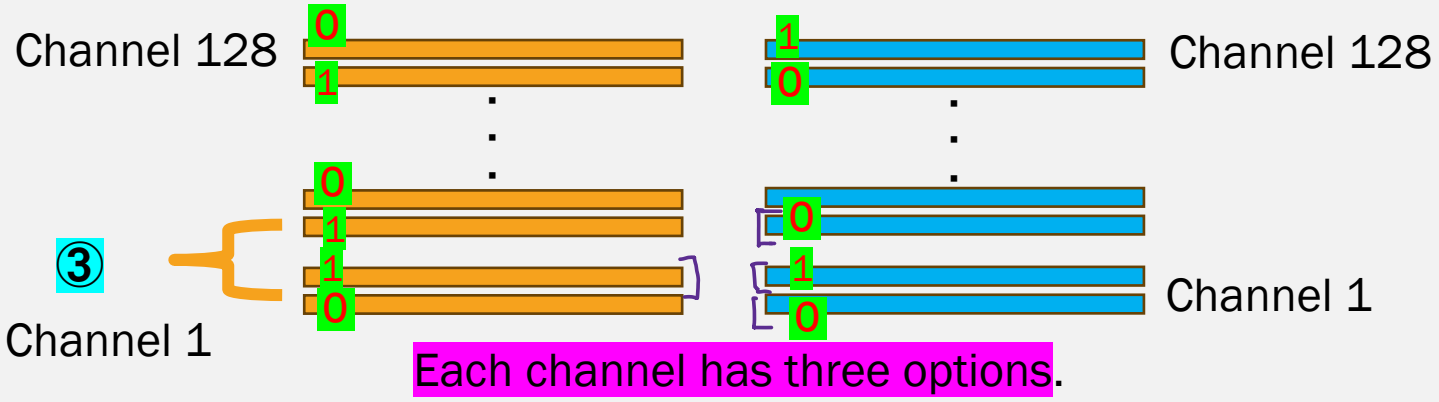
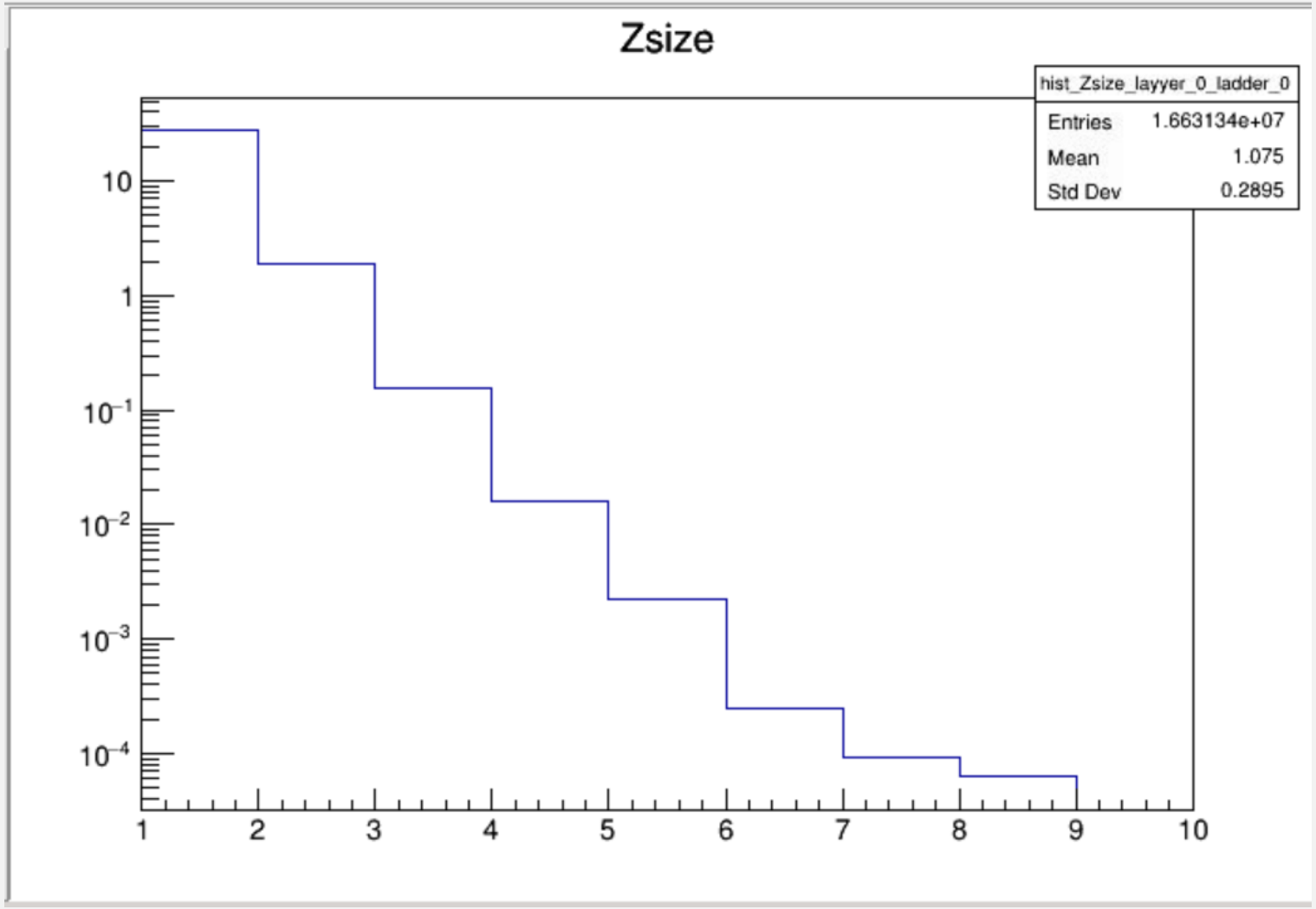


Au+Au,ladder=0 && layer=0 used for hit rate extraction

- Layer =0, ladder=0 z size distribution.
- A single ladder was taken for demonstration.



HOW TO DECIDE THE HIT RATE.

- Calculate the probability:
- number of hits/total number of events/128 for each chip.
- (1) Since chip information could not be obtained for clusters in DST, z-distribution with the ladder was created.
- (2) There are 26 peaks.
- (3) The peak value of 10^5 or more was used as the number of hits of the chip. The number of hits/total number of events/128 was used as hit rate.
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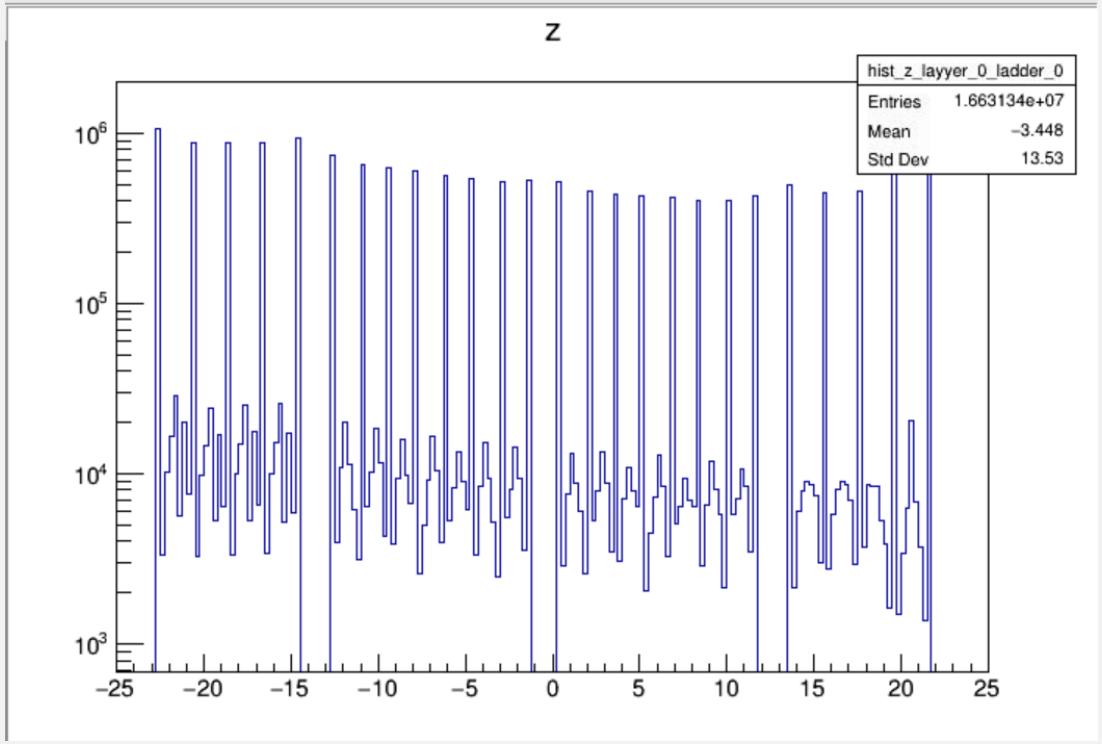
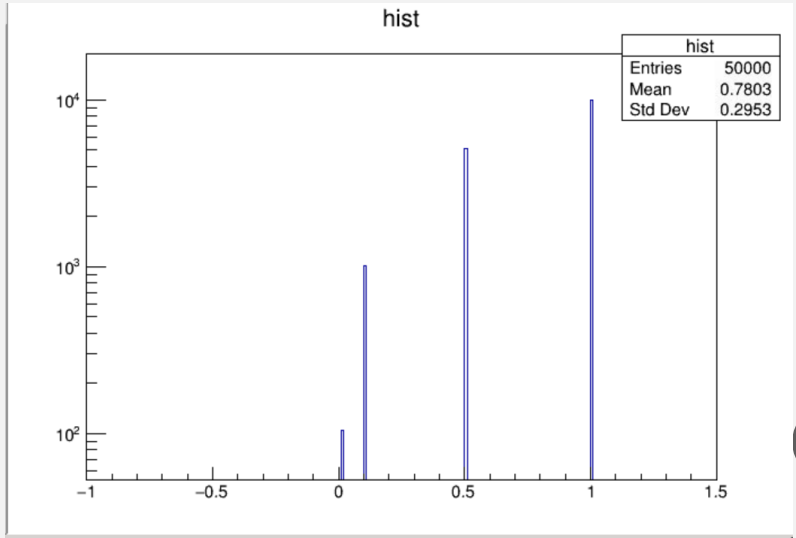
- I wrote a program based on a function which returns 0 or 1 using given hit rate as probability.
- The program's operation was verified in the figure on the right.
- The X axis is the hit rate entered into the variable, and the Y axis is the number of occurrence of 1. It was tested for 10000 times.
- And this result was same as expected.



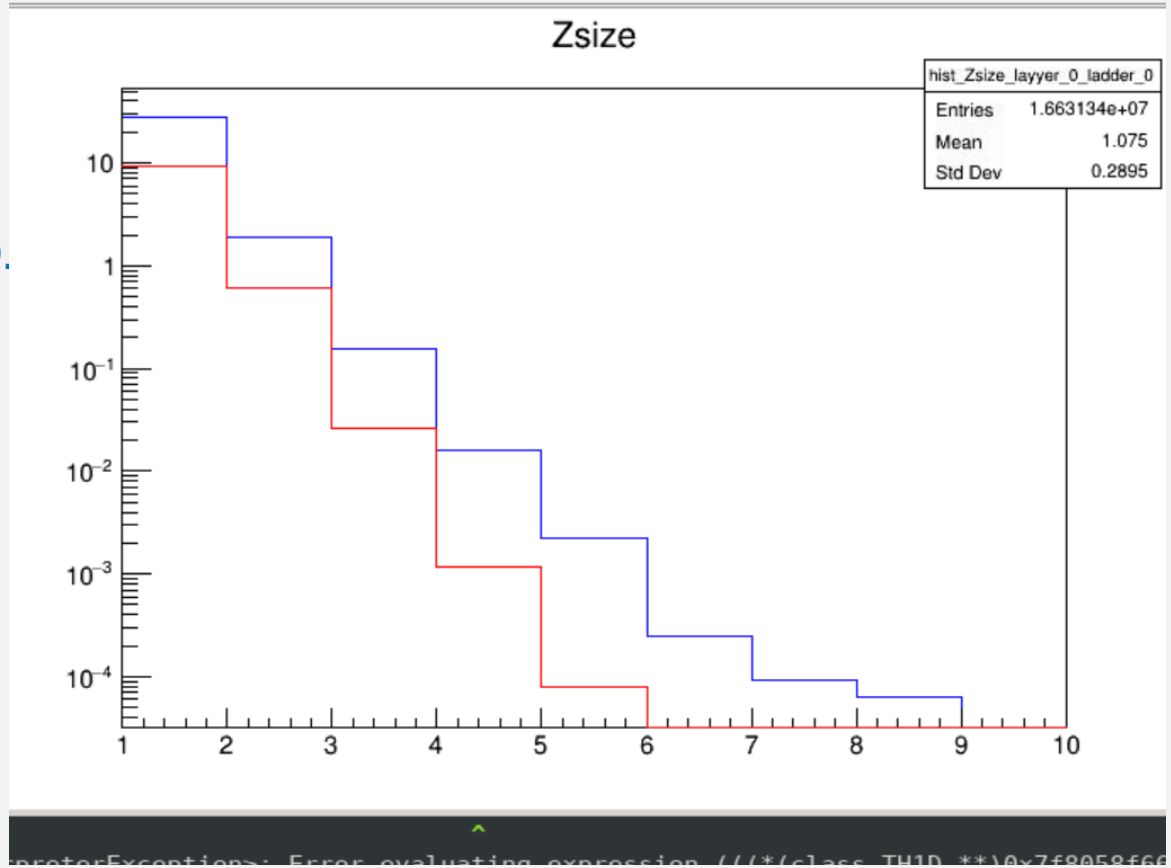


RESULT OF MODEL

- 100,000 events were simulated.

- The X axis is normalized by the number of each event.
- Blue line: Au+Au collision 550,000 events, ladder=0&&layer=0.
- Red line: model 100,000 events.

- Number of hits per event with Z size ==1 does not match.
- The line of the model falls faster than that of Au+Au.



IDEA FOR IMPROVEMENTS

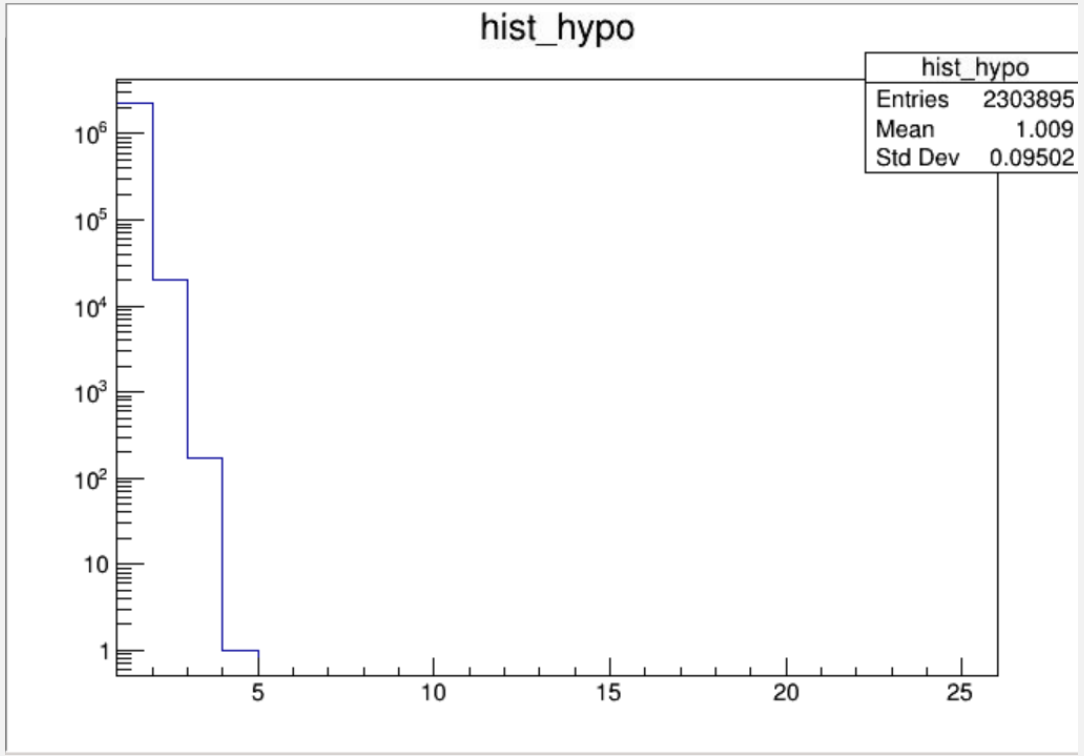
- The fact that z size=1 does not match suggests that I need to consider about the hit rate.
- The model determines channel responses independently. In other words, I have not included charge sharing in the model.
- Therefore, improvements should be made so that the probability of firing channel reflects the distribution of phi size.

タイトル

point

ポイント

- モデル１の設計
- ①　chipが26個に独立の 0,1(=hit)を渡す。
- ②　1が鳴ったchipを記録し、chipとchipが隣合うかを判断し、　Z sizeを判断する。
- ③　①と②の処理を
- ④　Channel 128個分繰り返す。
- ⑤



- モデルに足りないこと。
- 1

タイトル

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ポイント

- 図 1

タイトル

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ポイント

- 図１

図１説明

- 図２

図２説明