Mixup

2023/10/04

INTTMT

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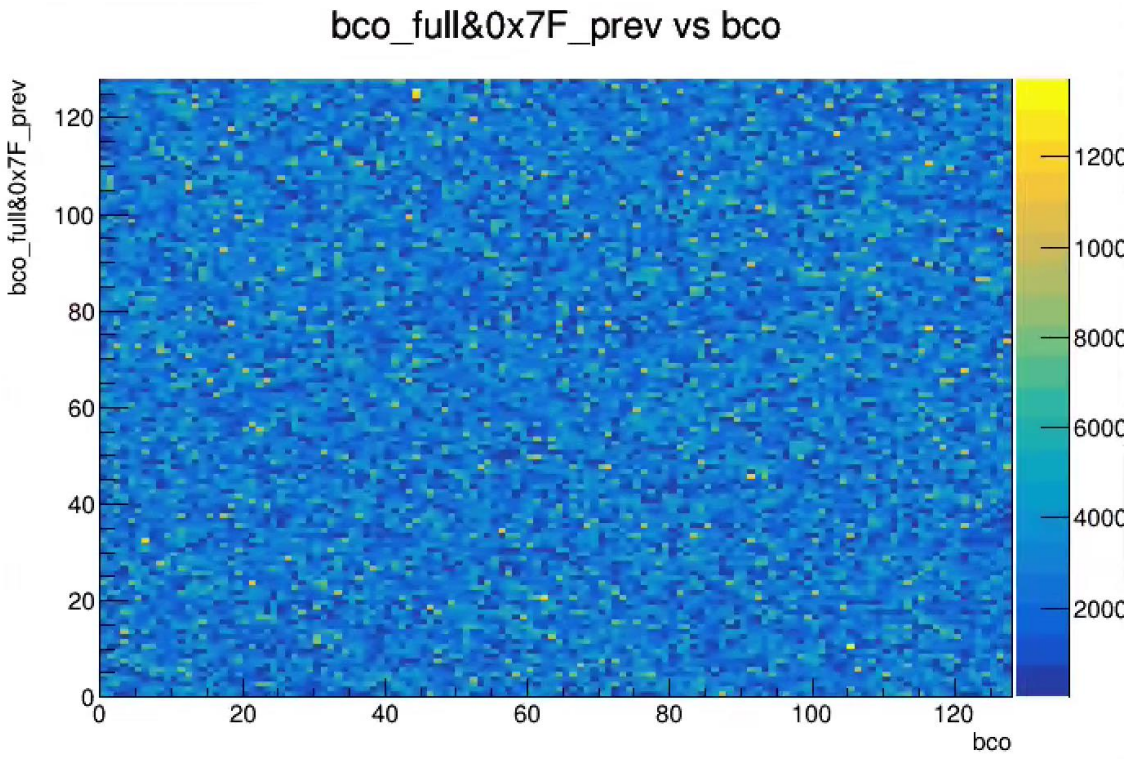
Purpose

- Mixup is a situation in which the processing of data from the next beam collision starts before the current processing is completed and the collision data from the previous and next collisions are mixed up.
- Mixup degrade the performance of INTT
- However, as reported last time, Mixup seems to have occurred, so I will report the results of my investigation.

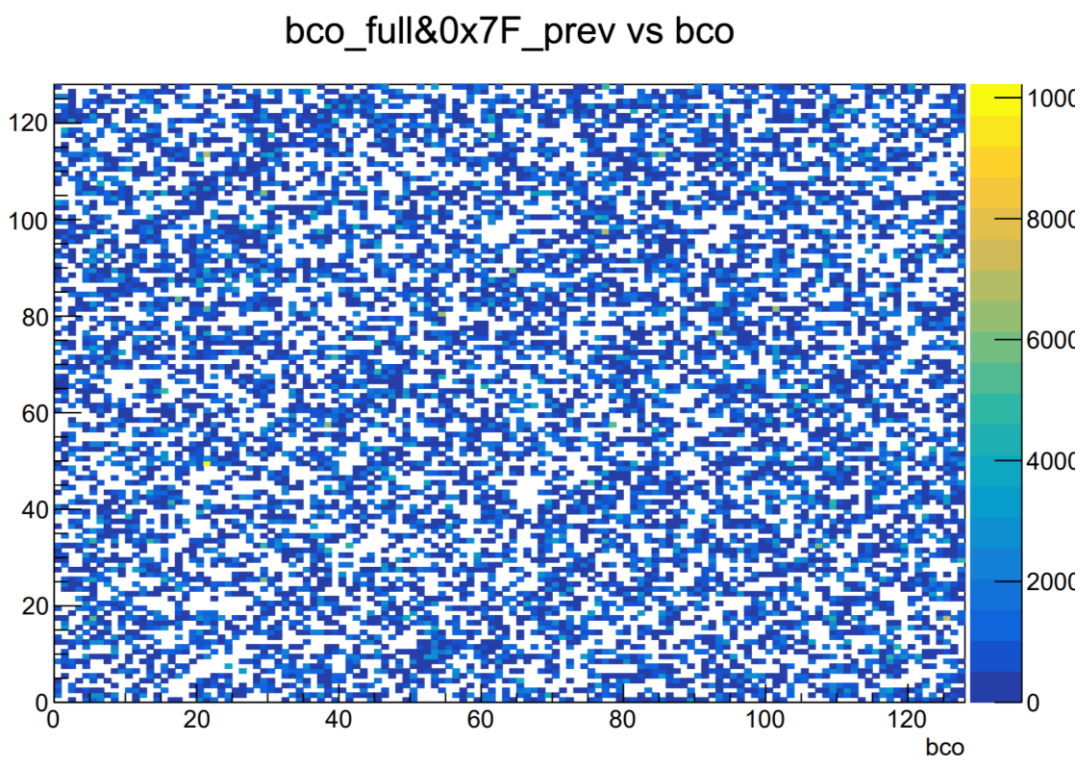
- Last time I made a plot of BCO vs BCO_full of one previous event, this time I made a plot of BCO vs BCO_full of the next event.

BCO vs previous event BCO_full （I showed last time ）

No Mixup Run23648

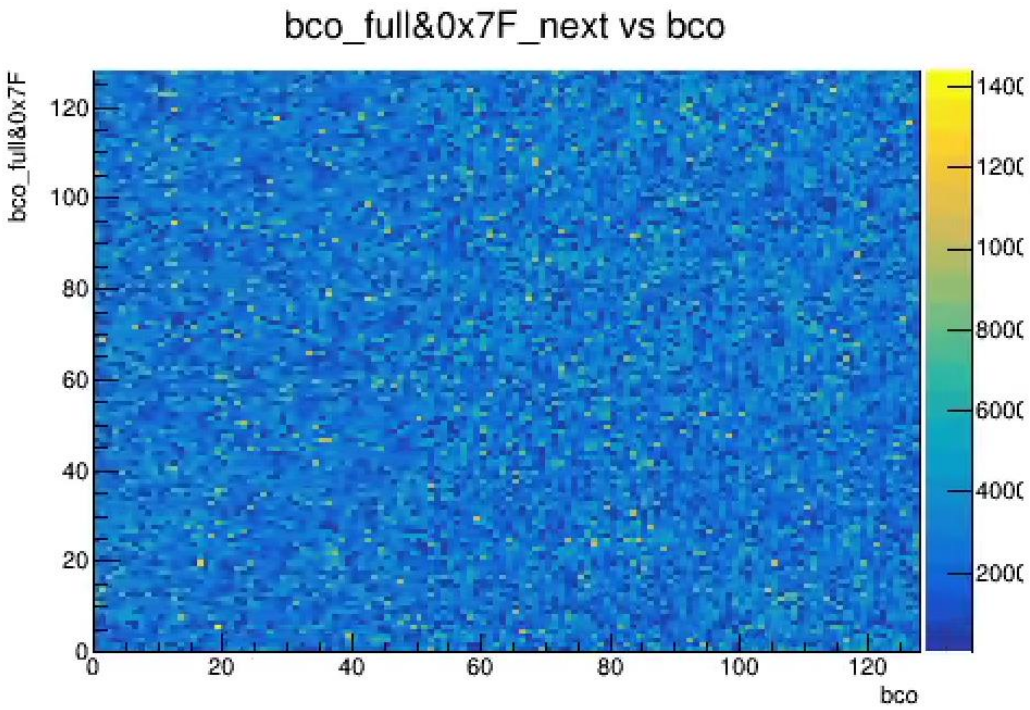


Mixup Run23901

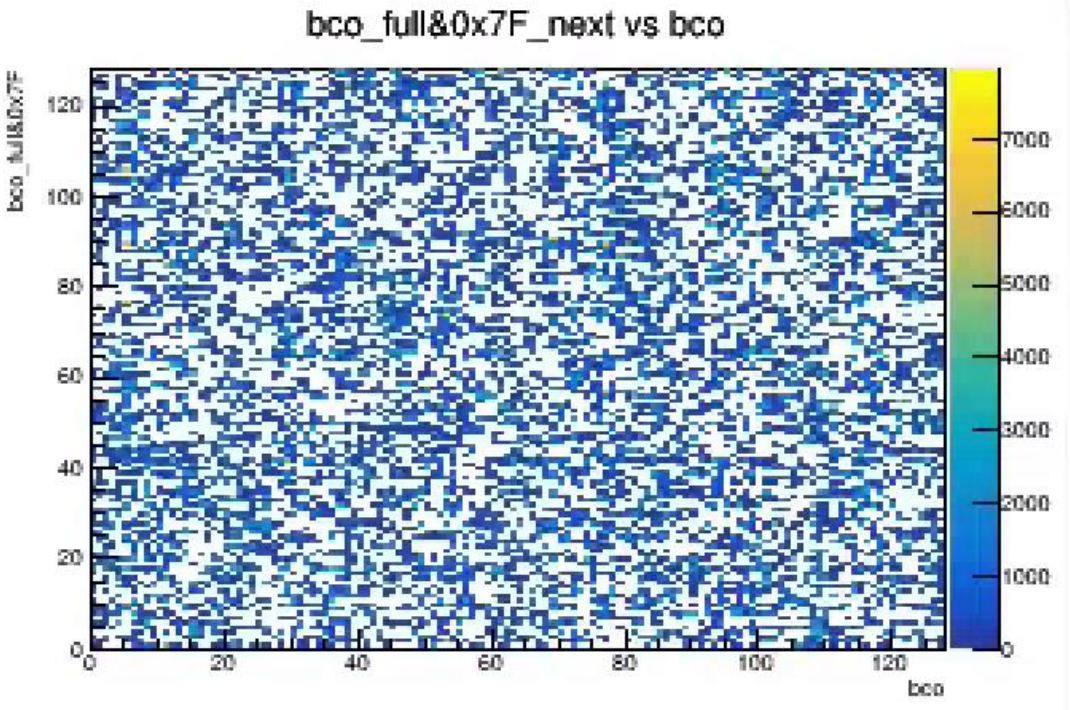


BCO vs next event BCO_Full

No Mixup Run23648



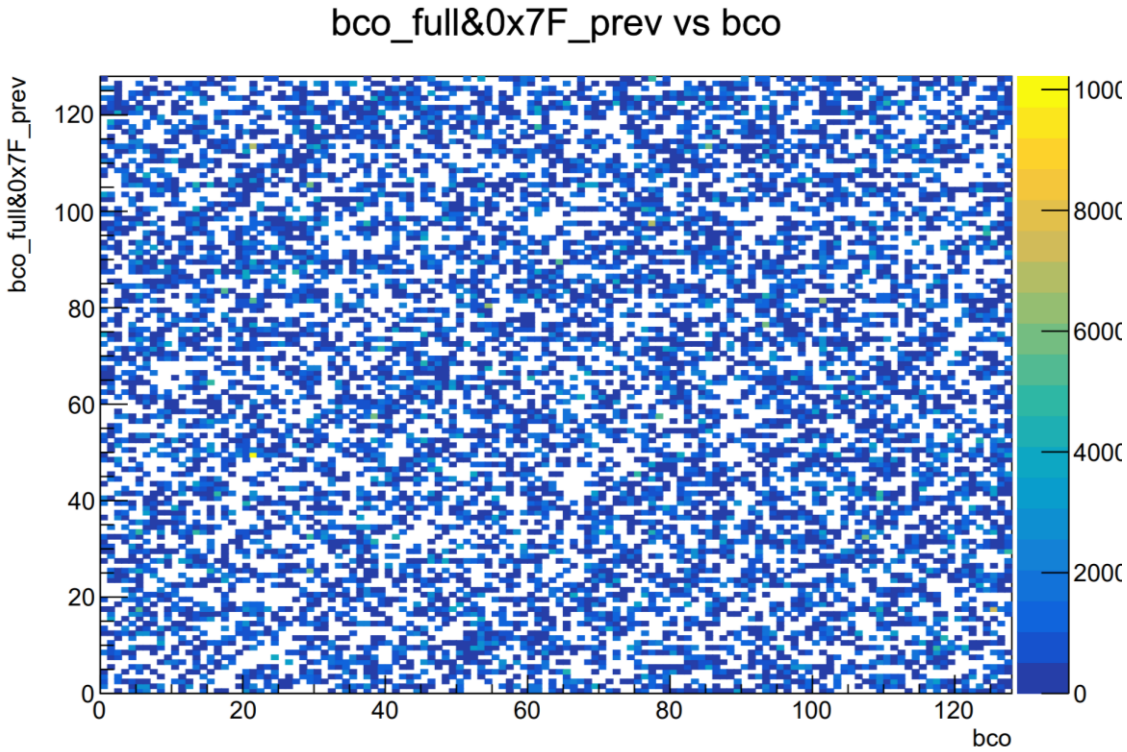
Mixup Run23901



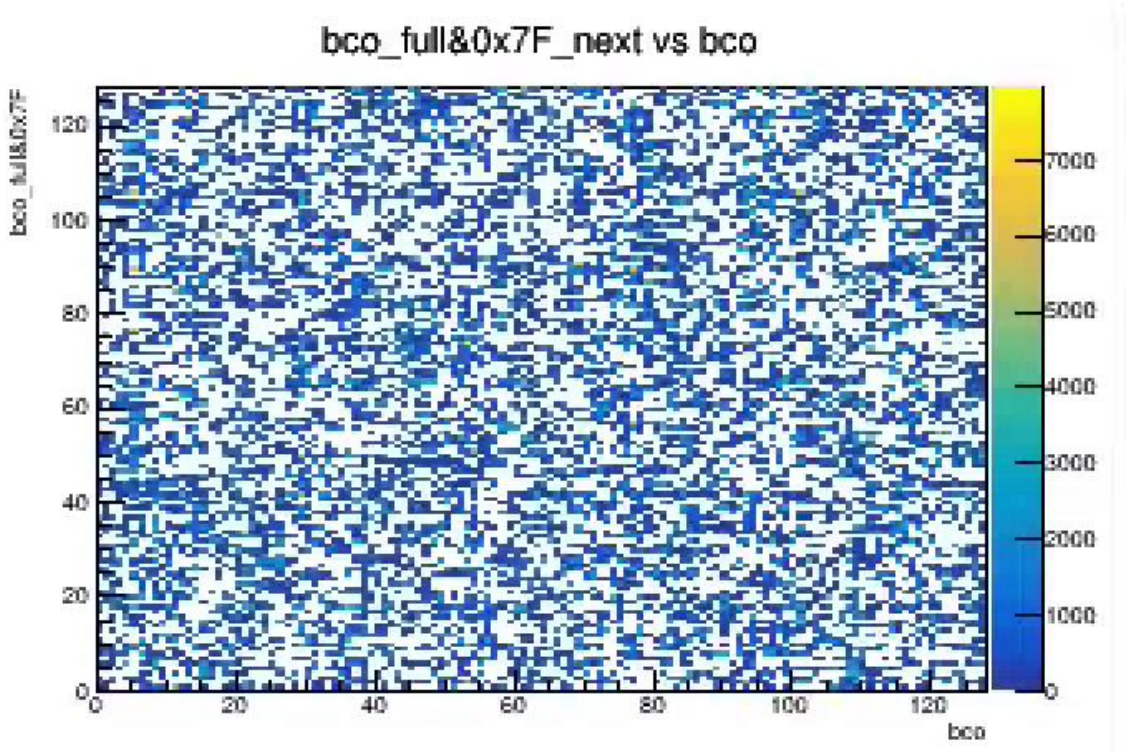
These are the plots I made this time. x-axis is BCO and y-axis is next event BCO_Full .
The data no mixup is still the same, but the results of the data that have mixup are no longer correlated.

Run23901 Mixup

BCO vs previous event BCO_Full



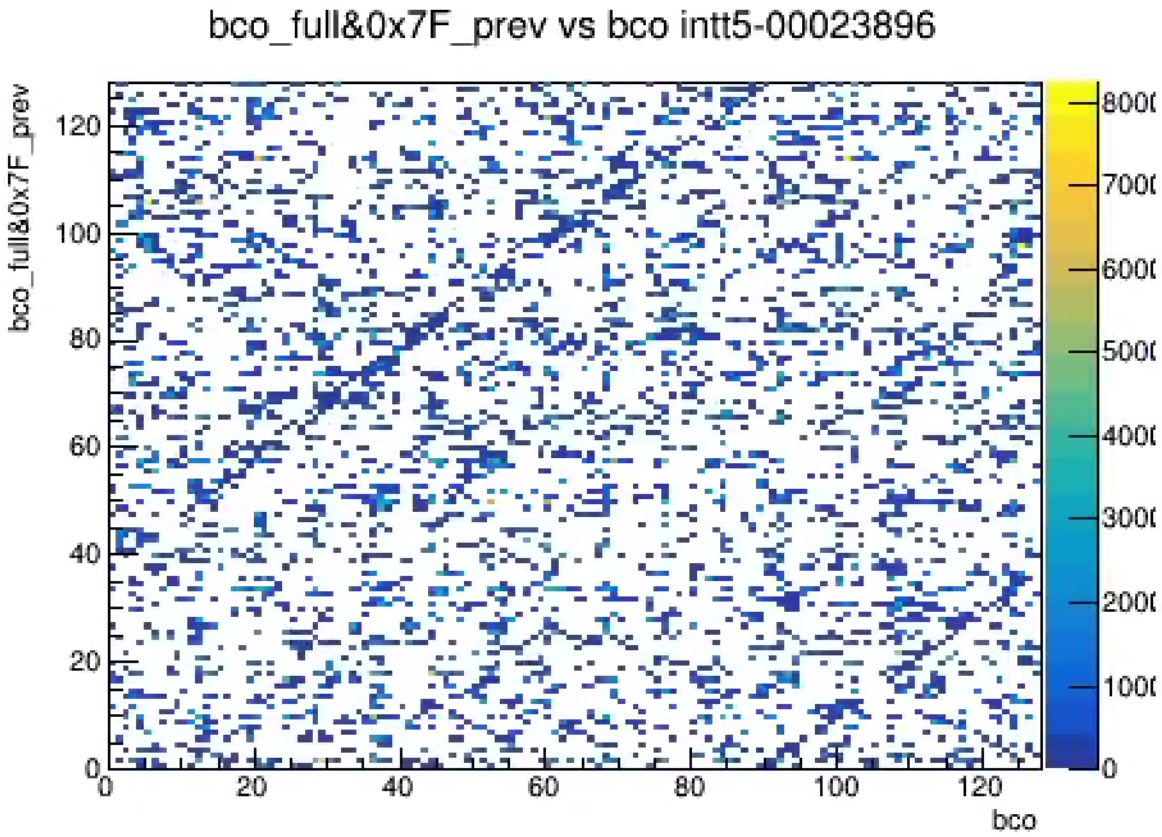
BCO vs next event BCO_Full



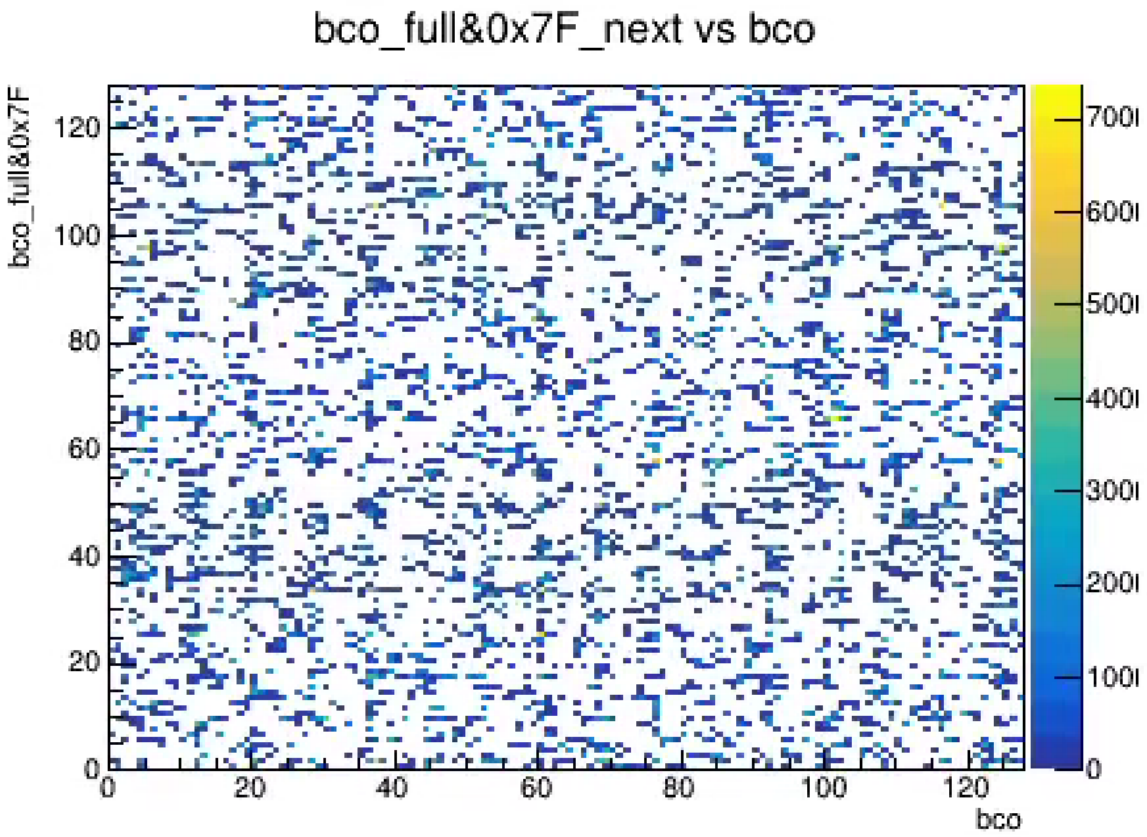
When I use the next event BCO_Full, the line of correlation disappeared.

Run23896 Mixup (more easily to see the correlation.)

BCO vs previous event BCO_Full



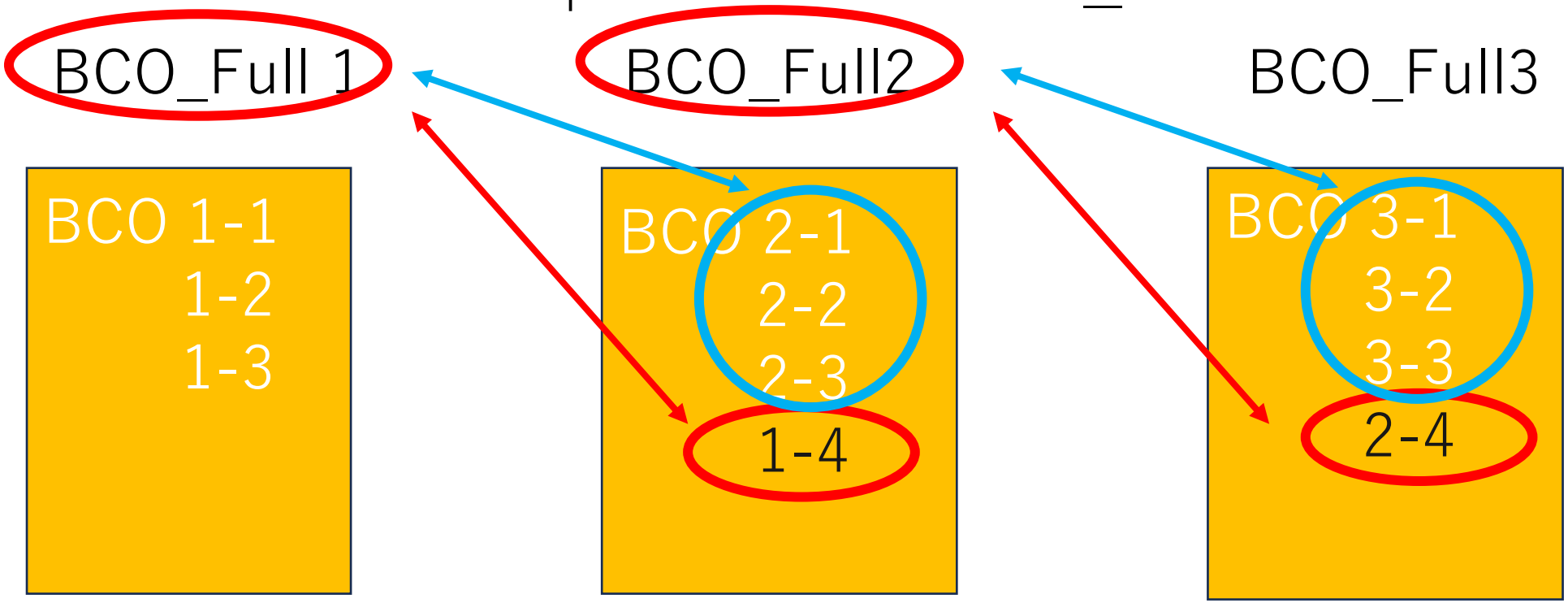
BCO vs next event BCO_Full



When I use the next event BCO_Full, the line of correlation disappeared.

Why did the correlation disappear?

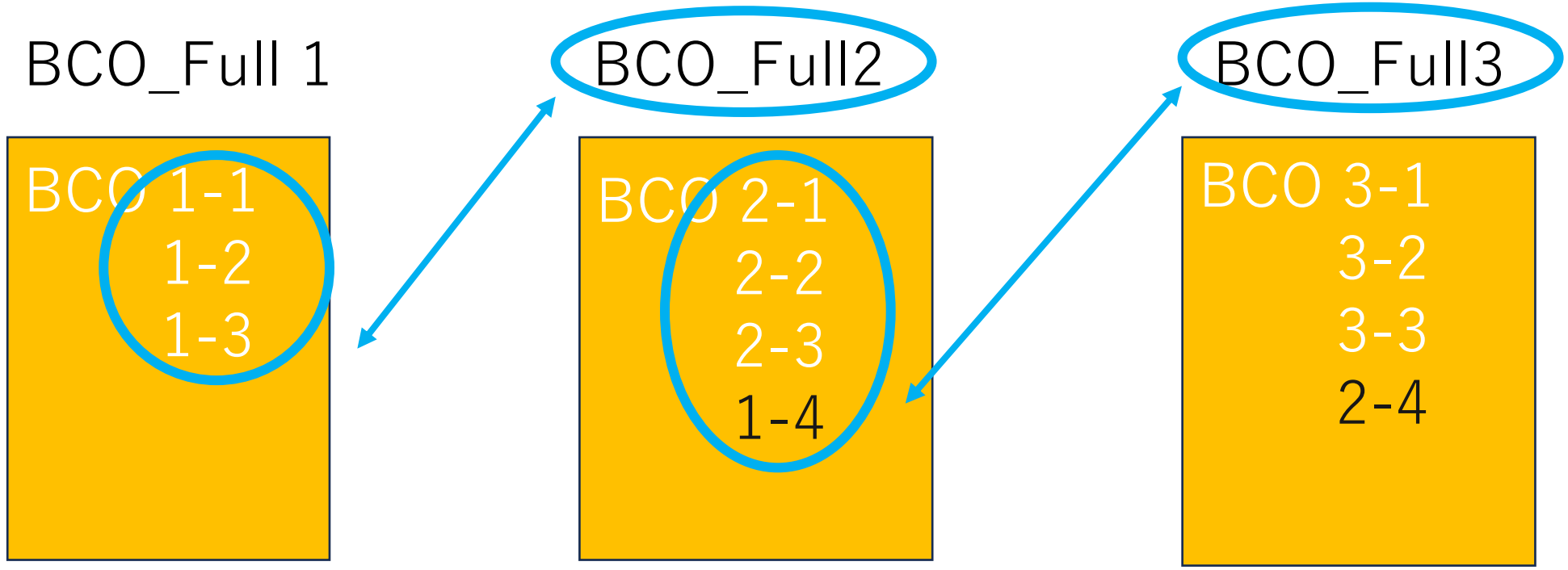
BCO vs prev event BCO_Full



The red circled areas are correlated because the information is from the same collision.

The blue circled area do not match, so there is no correlation.

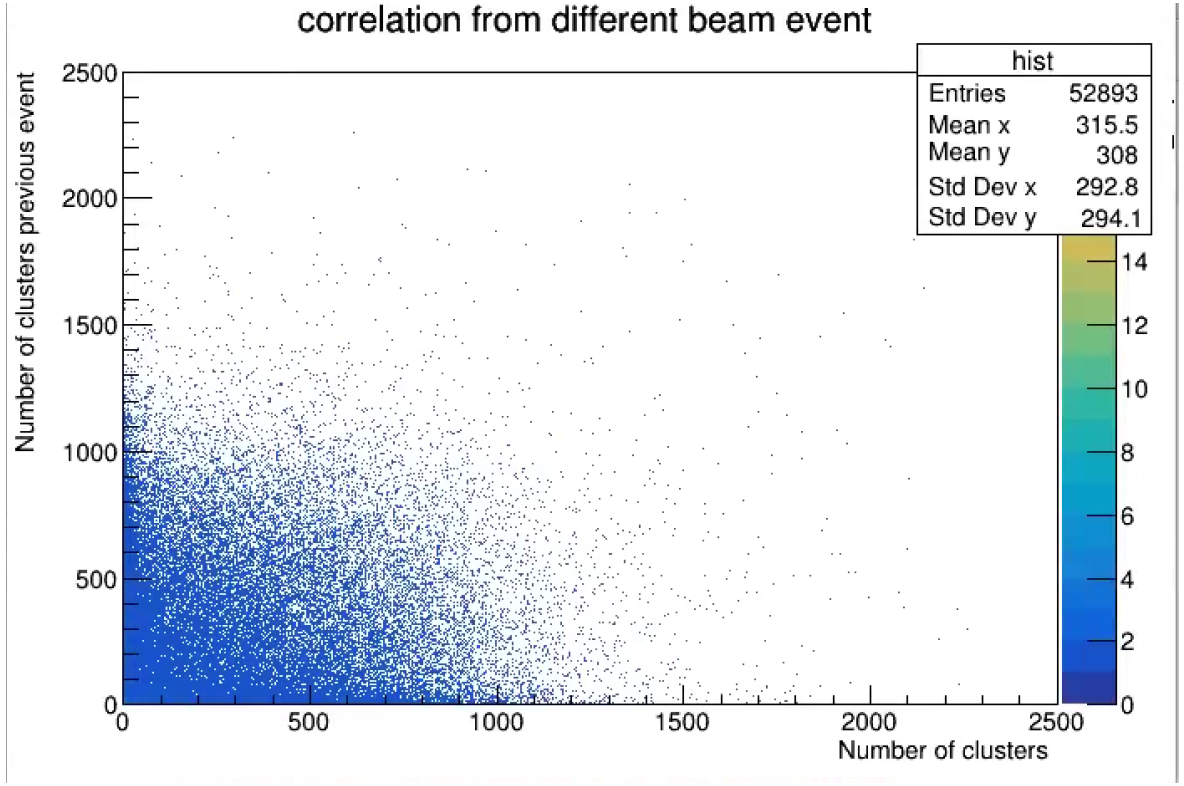
Why did the correlation disappear?
BCO vs next event BCO_Full



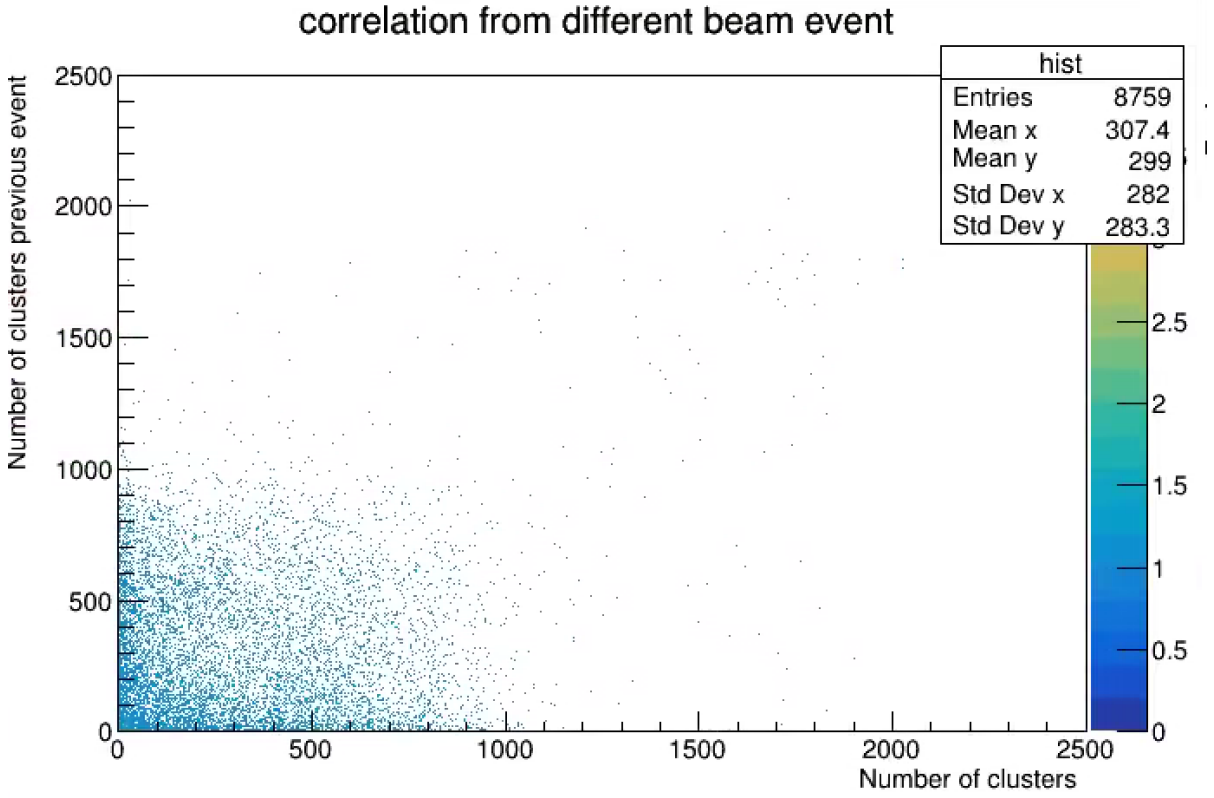
There is no longer any combination of data for the same collision and there is no correlation because the labels do not match, as shown in the blue circles.

Correlation of number of clusters for all events (y axis: previous event)

No Mixup

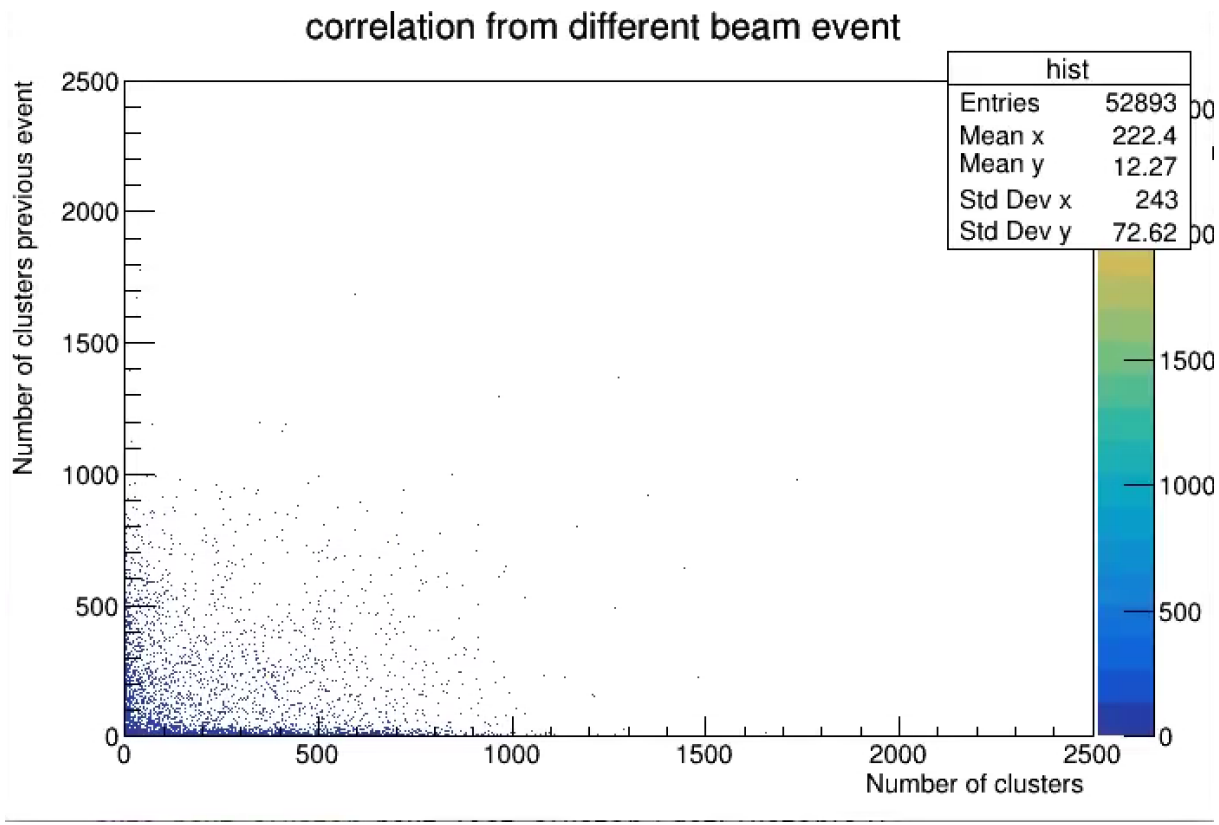


Mixup

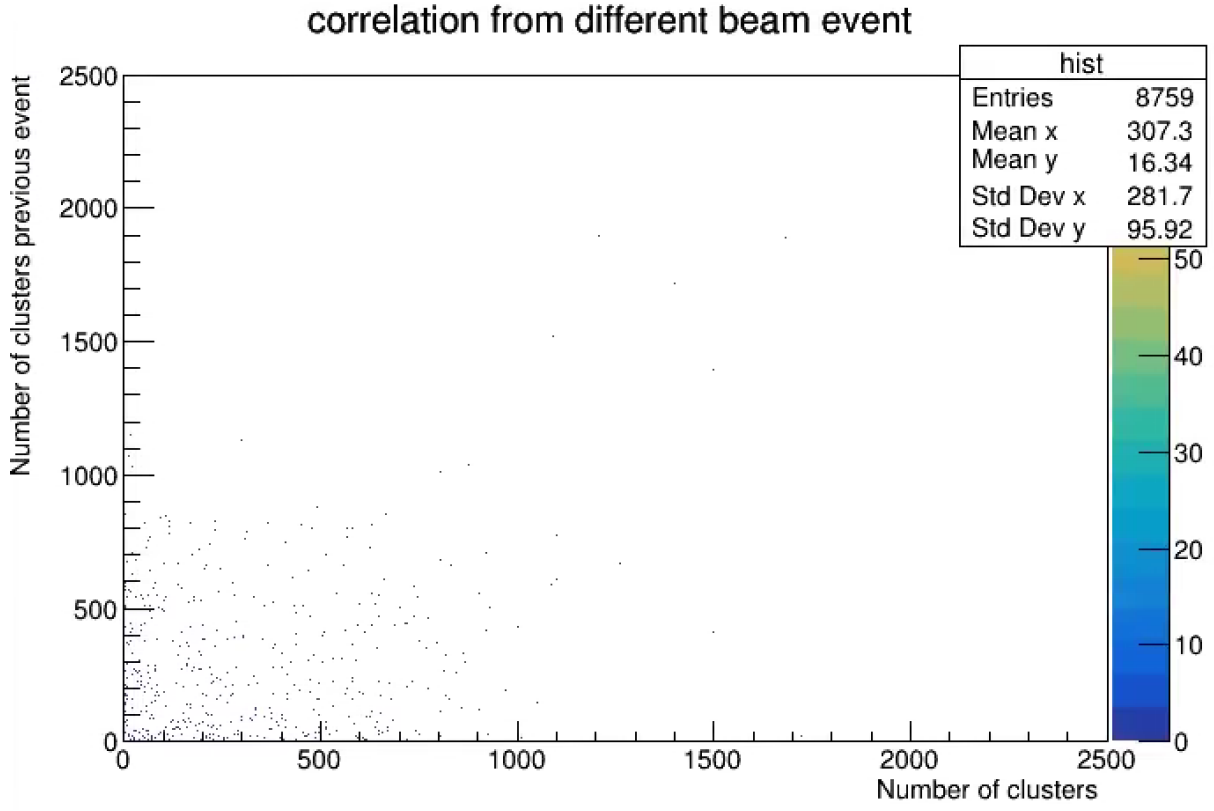


Correlation of the number of clusters that chose the event of the collision (determined by BCO vs prev_BCO_Full)

No Mixup



Mixup

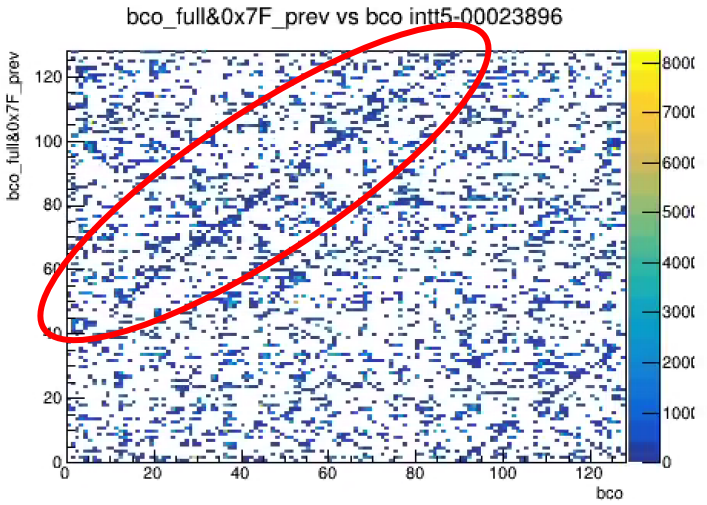


No correlation was found in the data with possible Mixup.

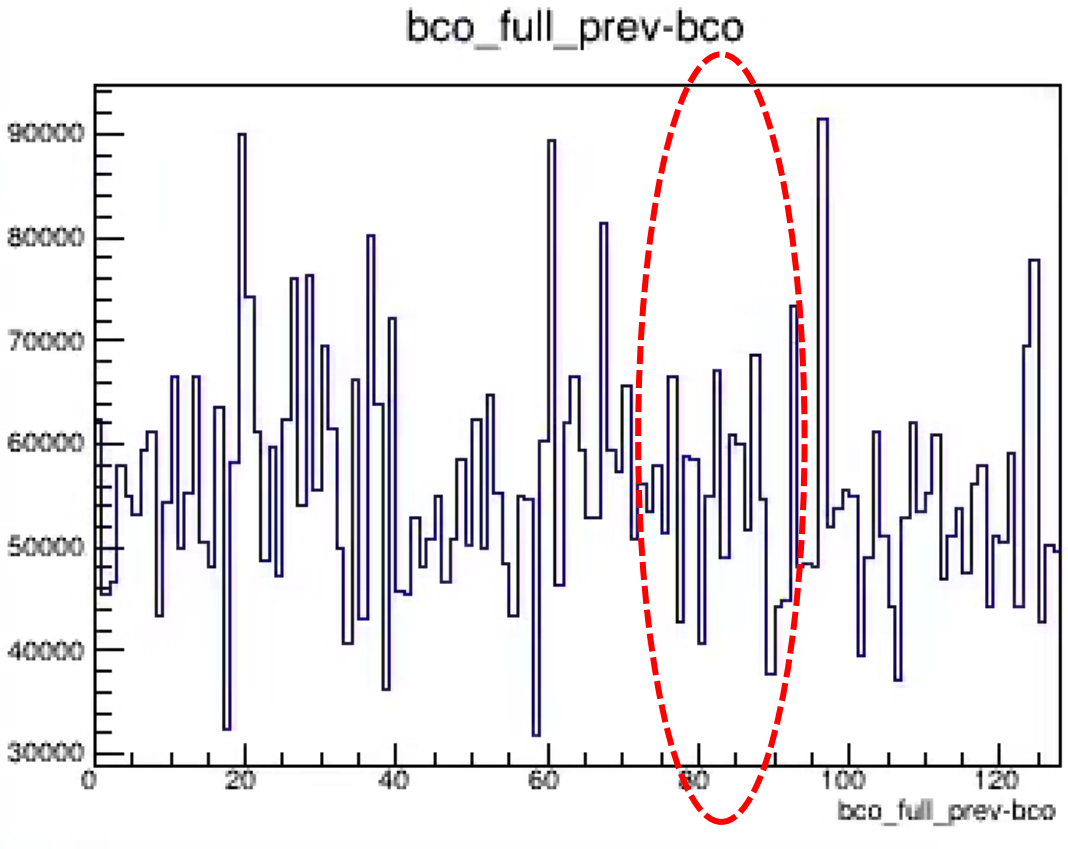
About Correlation

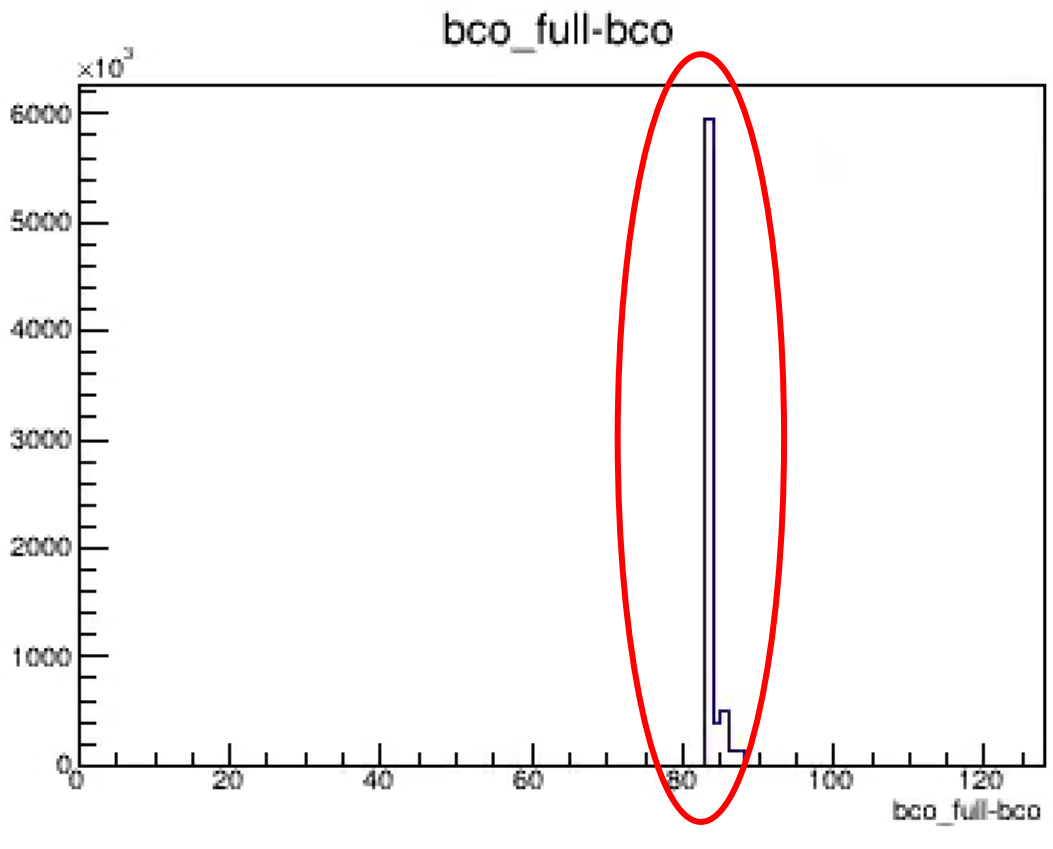
- Is there really a correlation that could be considered a mixup?
- To confirm, I made a plot of previous event BCO_Full-BCO .

?



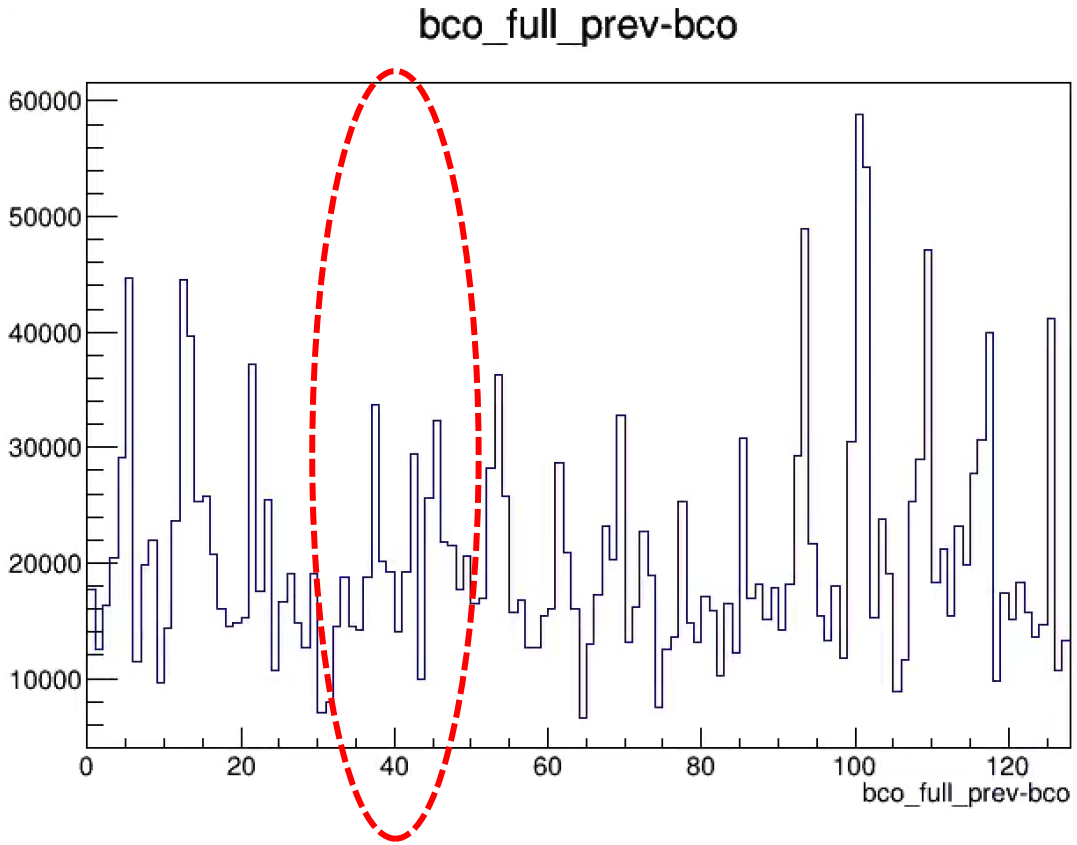
Run#23901 Mixup

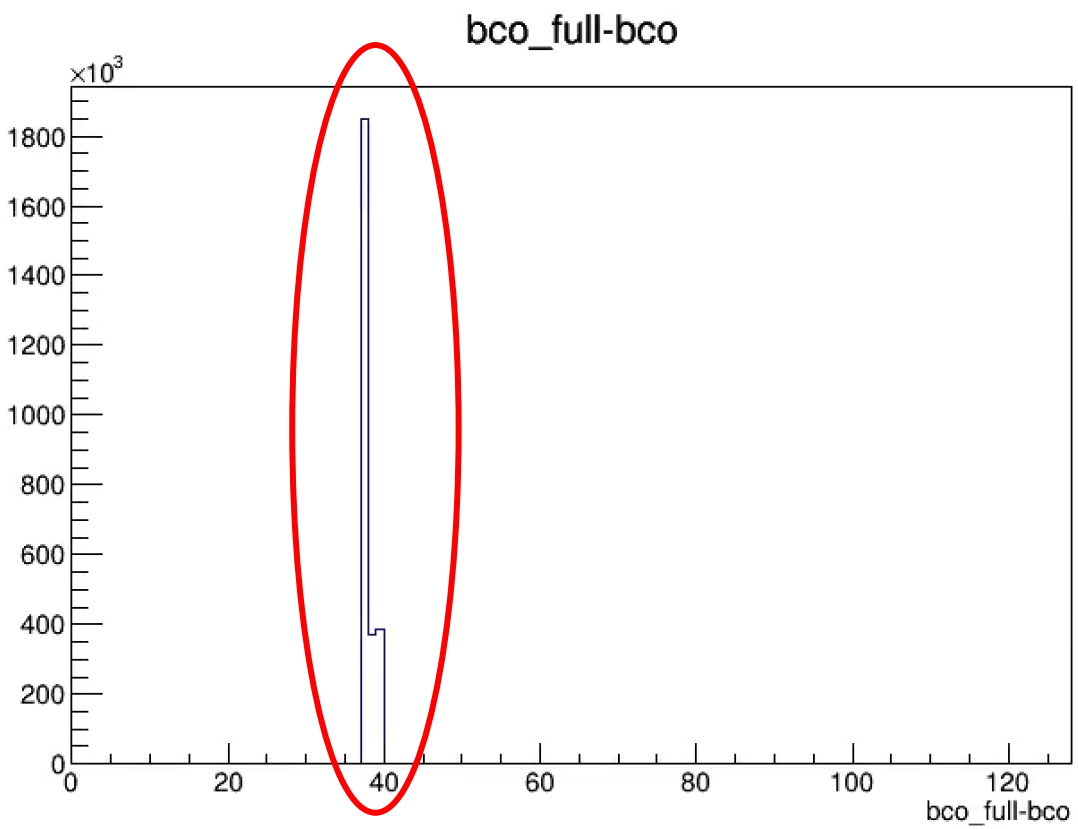




The peak on the right is where the correlation was found in BCO vs BCO_FUll, the part of the collision data, but the peak could not be seen in the same location in the left figure.

Run#23896 Mixup

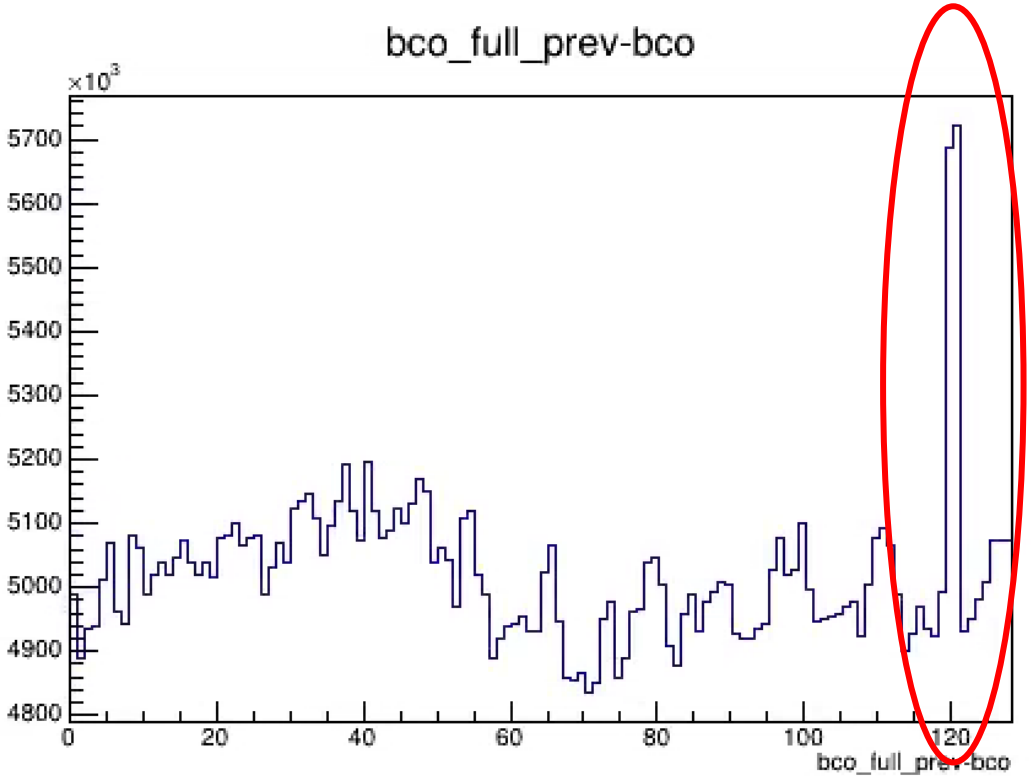


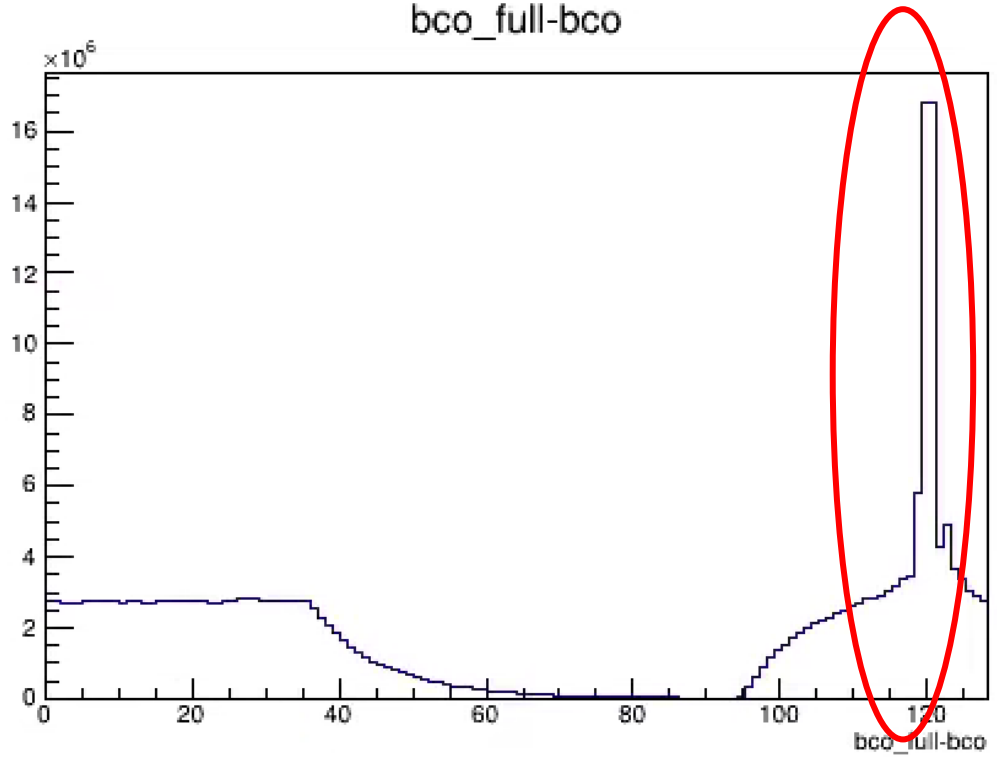


The results of the data that appeared to show another mixup occurring did not show a peak in the same location.

Run#20444 Mixup

I selected the data with the highest number of events and made a plot, and was able to confirm the peak at the same position .





In the previous two cases, the peak was not visible because the number of events was low. Since the peak was observed when the number of events was high, the correlation observed in BCO vs previous event BCO_Full was probably due to Mixup.

Summary

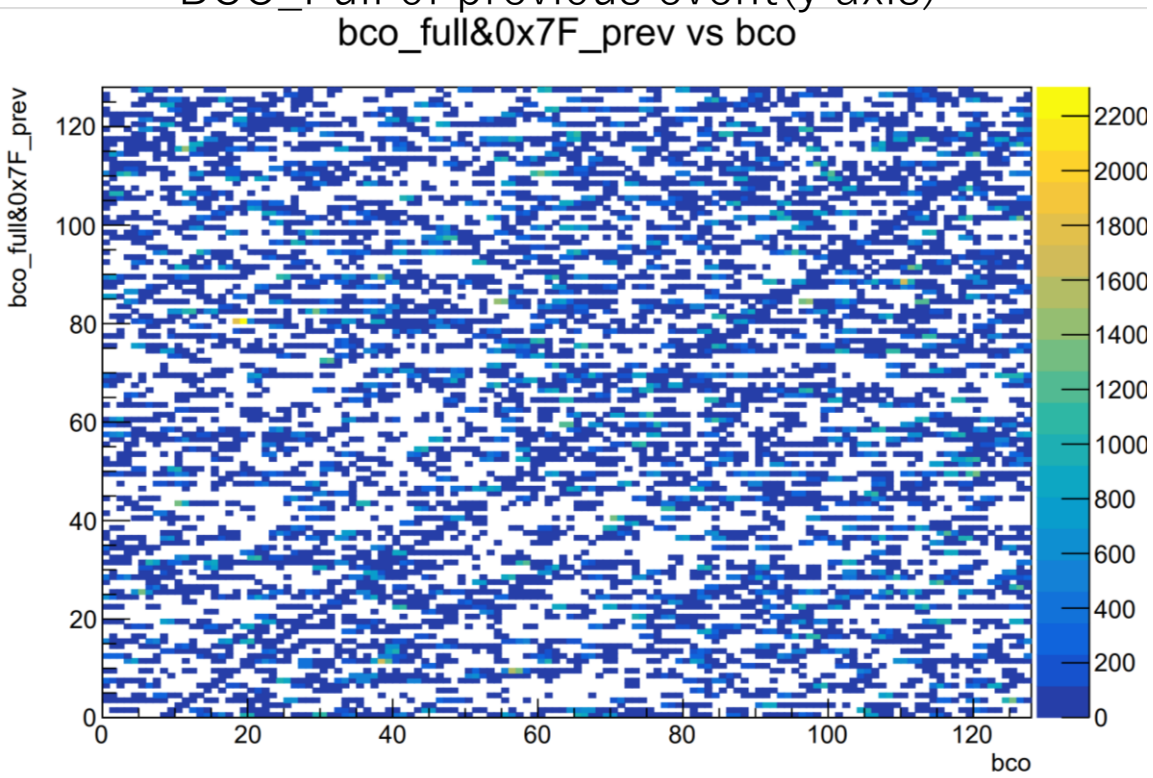
- The plot of BCO vs next event BCO_Full confirms that there is no correlation.

- In the correlation of number of clusters, the correlation by mixup could not be confirmed.

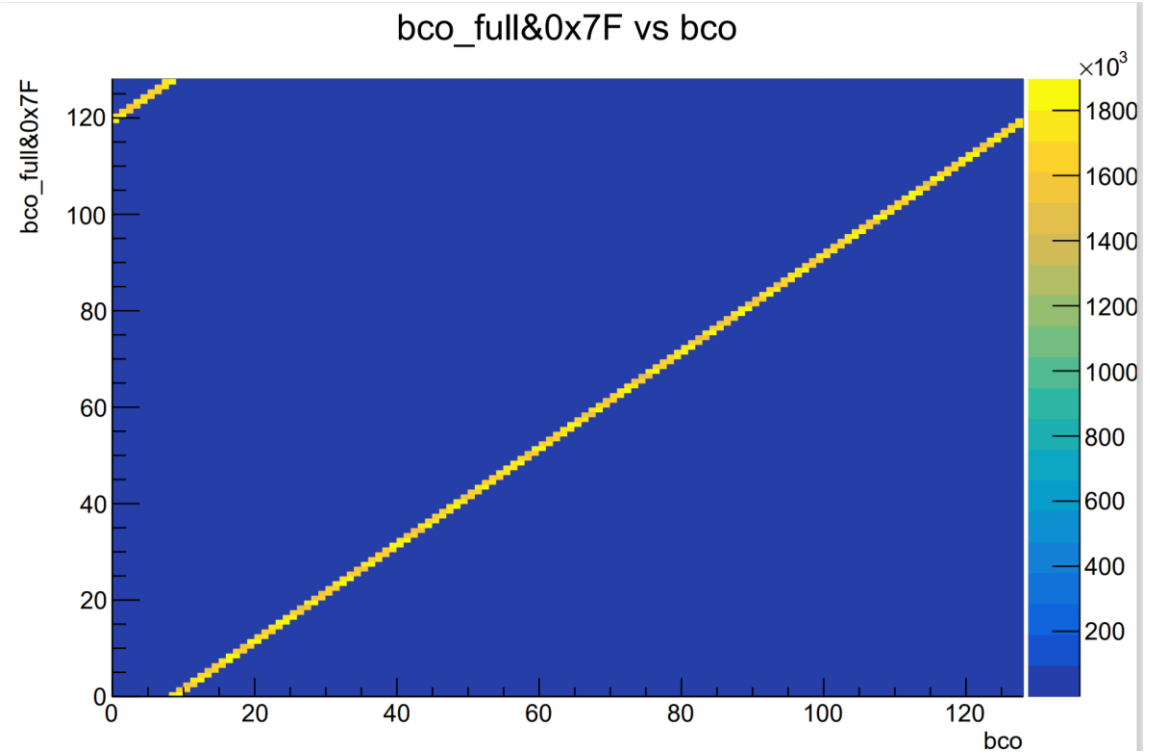
- I checked for a real correlation in the previous event BCO_Full vs BCO plot, and there was a correlation in the data with a large number of events.

Run#20444(06/29) intt5 n_collision=127 Modebit=79 60min

BCO of one event (x axis)
vs
BCO_Full of previous event(y axis)



BCO vs BCO_Full of same event



Correlation is seen in the left figure at the same location as the right figure.
→ Pileup is occurring.