

Pileup

2023/09/06

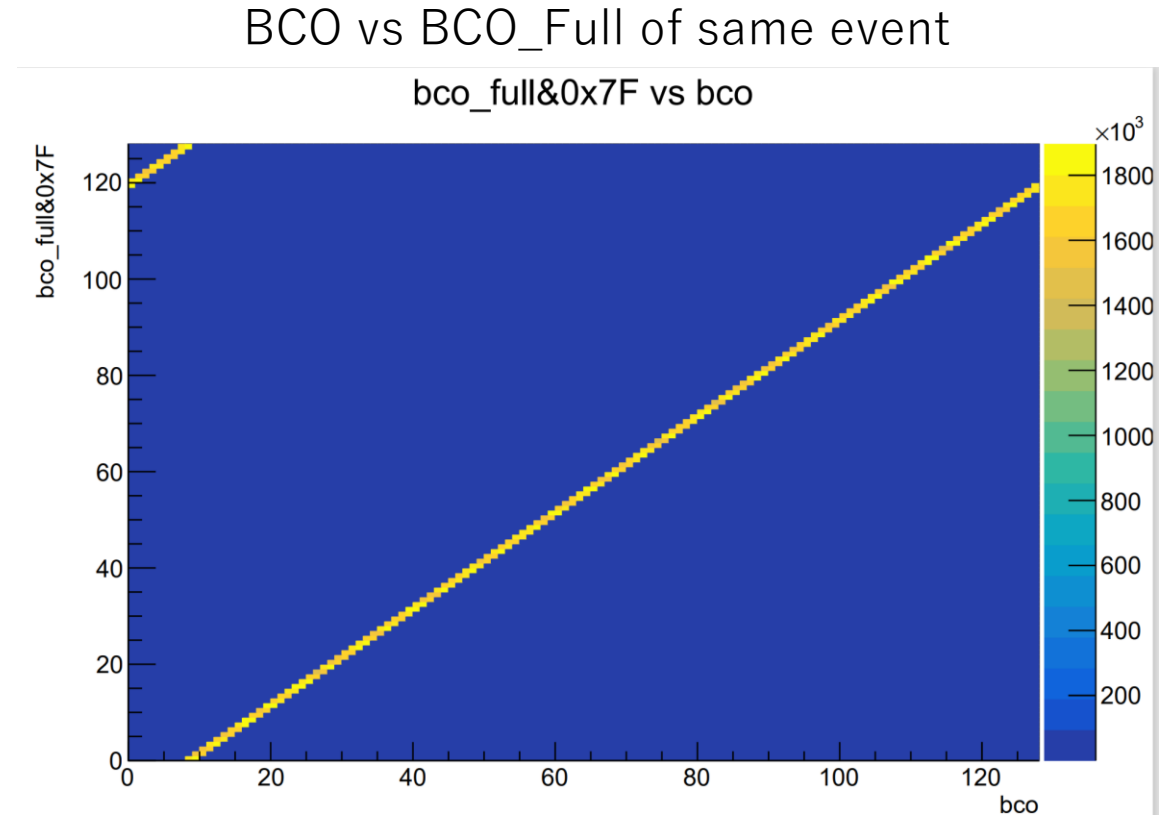
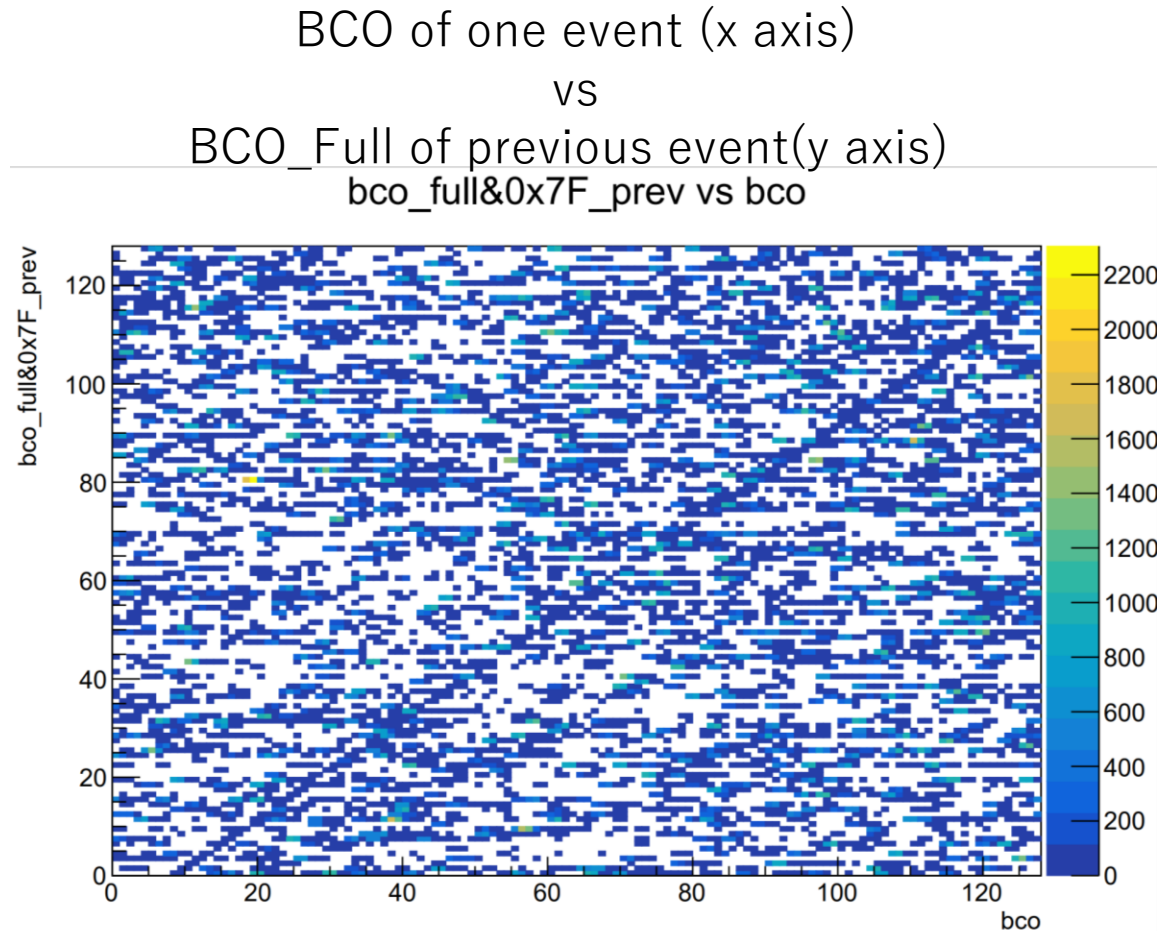
INTTMT

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Purpose

- Pileup is the processing of previous events even after the next beam collision occurs because it takes time to collect the signal charge.
- I want to make sure Pileup is not occurring with INTT.
- I made plots with the BCO of one event and the BCO_Full of the previous event.
- If there was a correlation, then information from the previous event was mixed in with the next event. → Pileup is occurring.

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



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

Runs and results (only intt5)

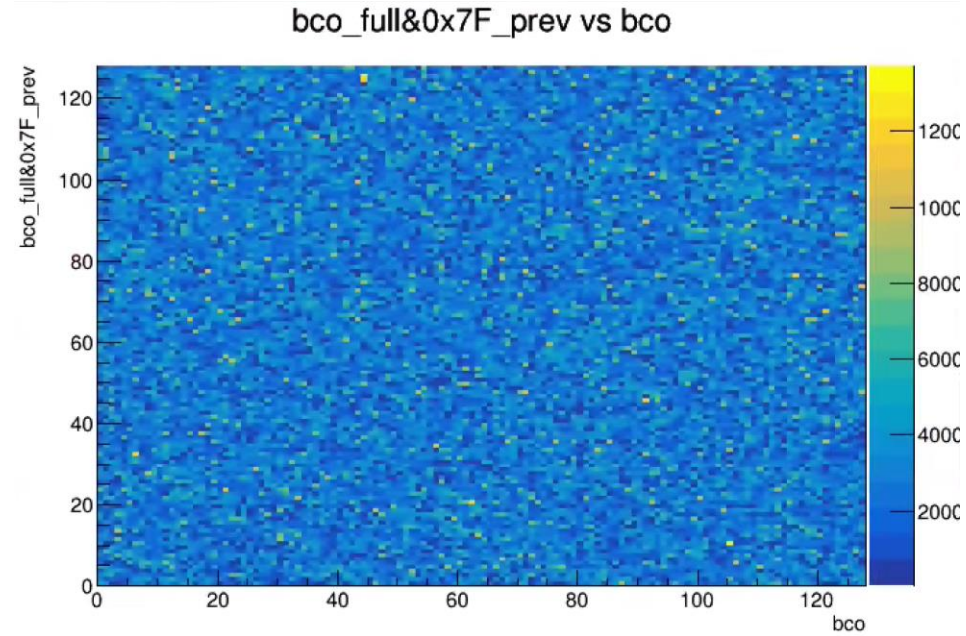
Run#	n_collision	Modebit		Pileup
23648	127	79	Timing scan	No
23658	2	92	//	No
23661	0	91	//	Yes
23662	0	91	//	No
23666	0	91	Schedular change	No
23896	3	92		Yes
23901	3	92	The magnets had already begun to decrease in current value.	Yes
23902~	3	92	//	No
23907	3	92	//	

In run number 23907 I saw 8 Felix with the same result.

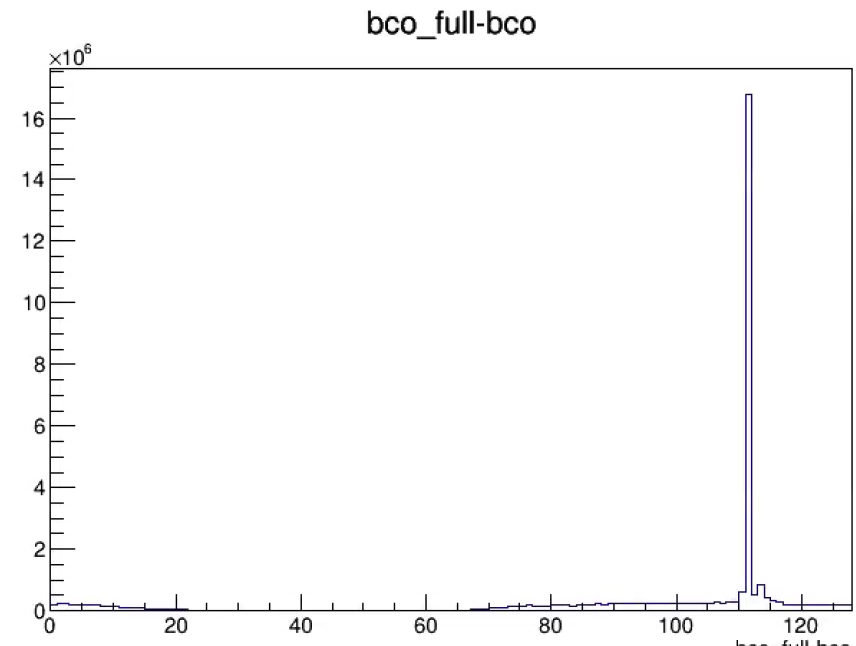
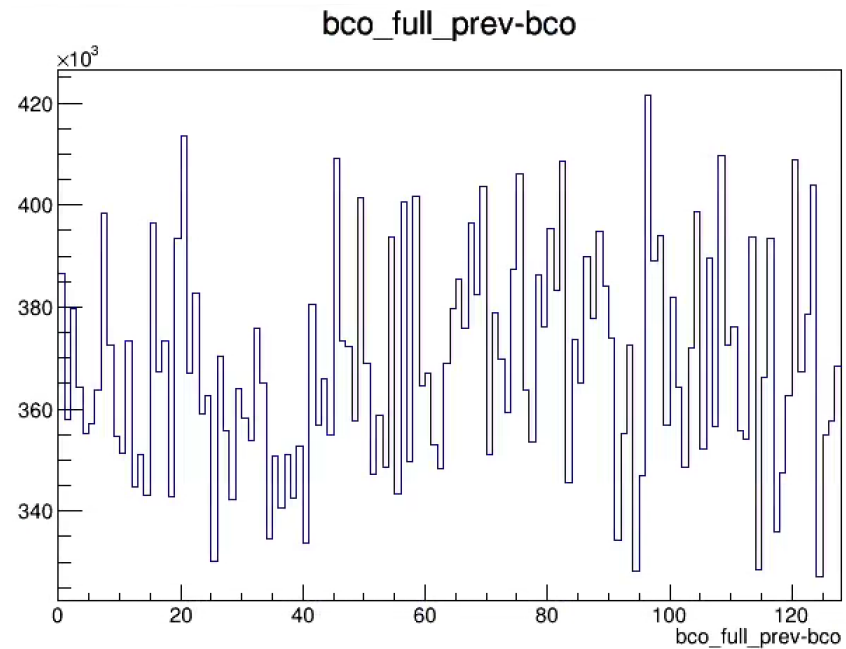
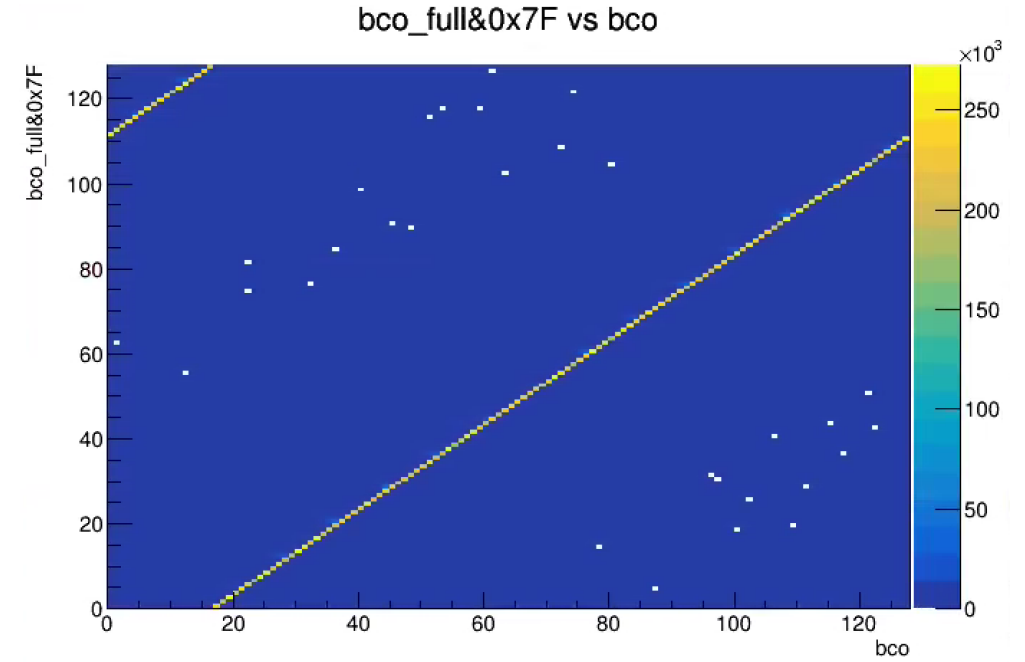
Plots from the next slide

- The upper row is a histogram of x-axis is BCO of one event and y-axis is BCO_Full of the same event or the previous event.
- The lower panel is a histogram of BCO_Full or BCO_Full minus BCO of one previous event.
- BCO_full-BCO is +128 when it is less than 0.

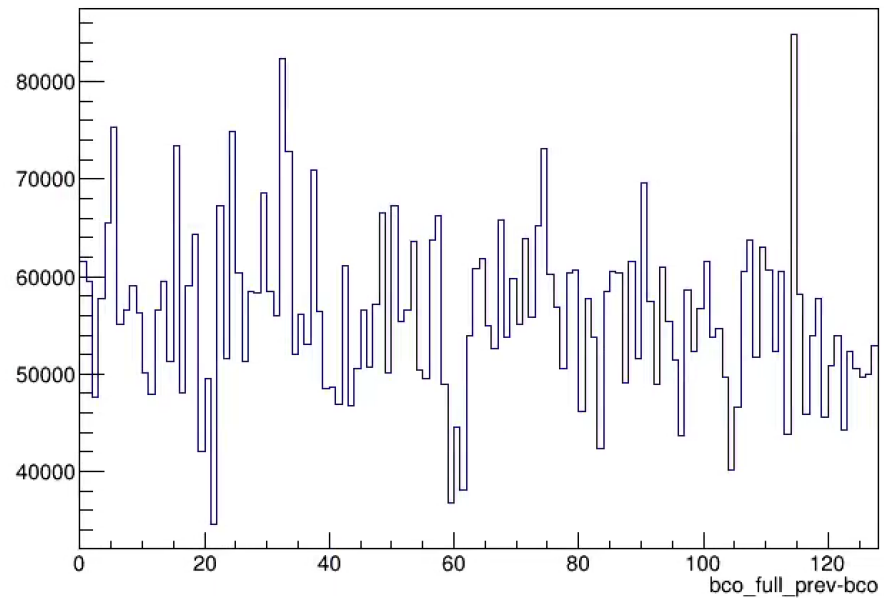
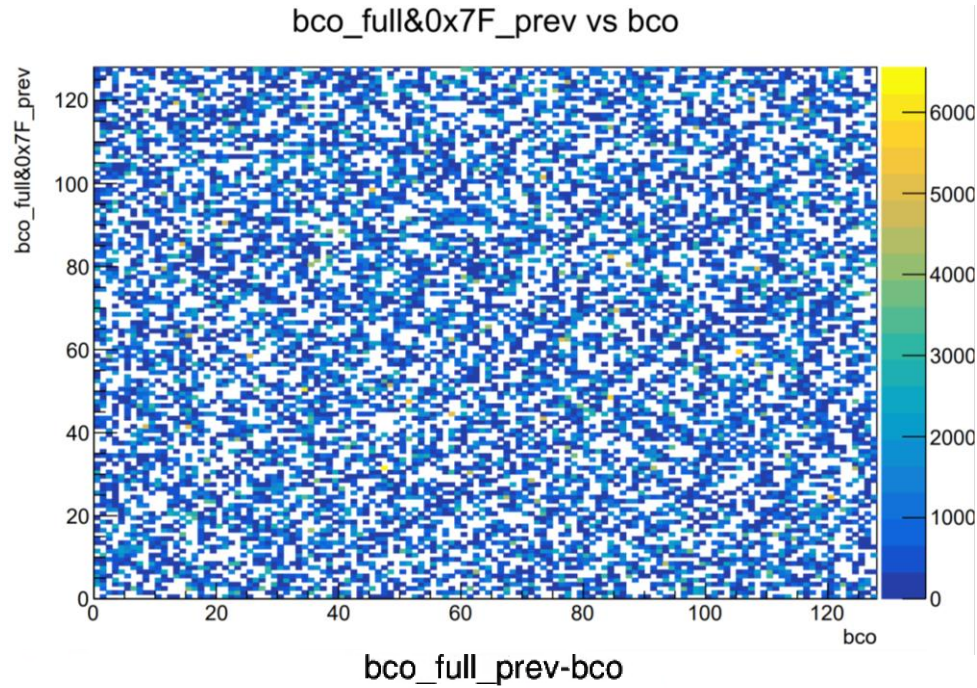
Run#23648 intt5 n_collision=127 Modebit=70



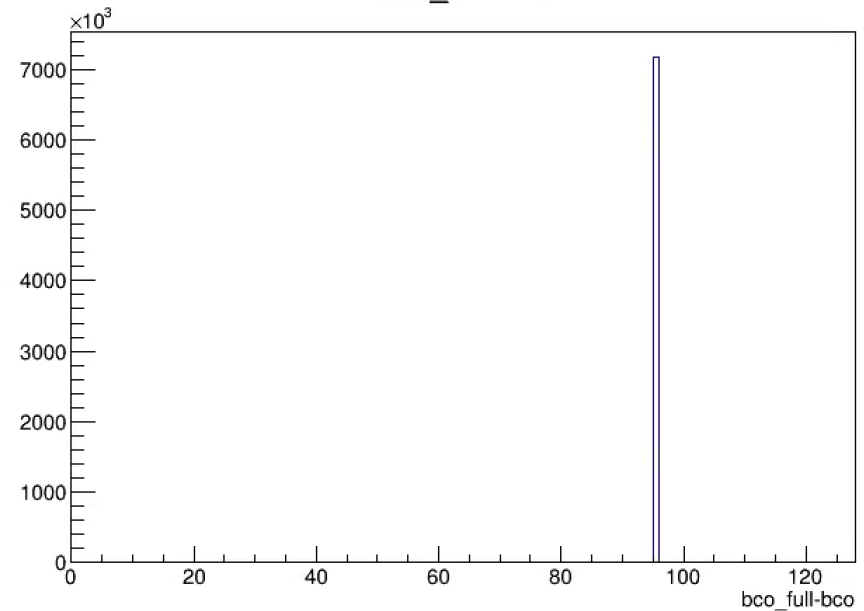
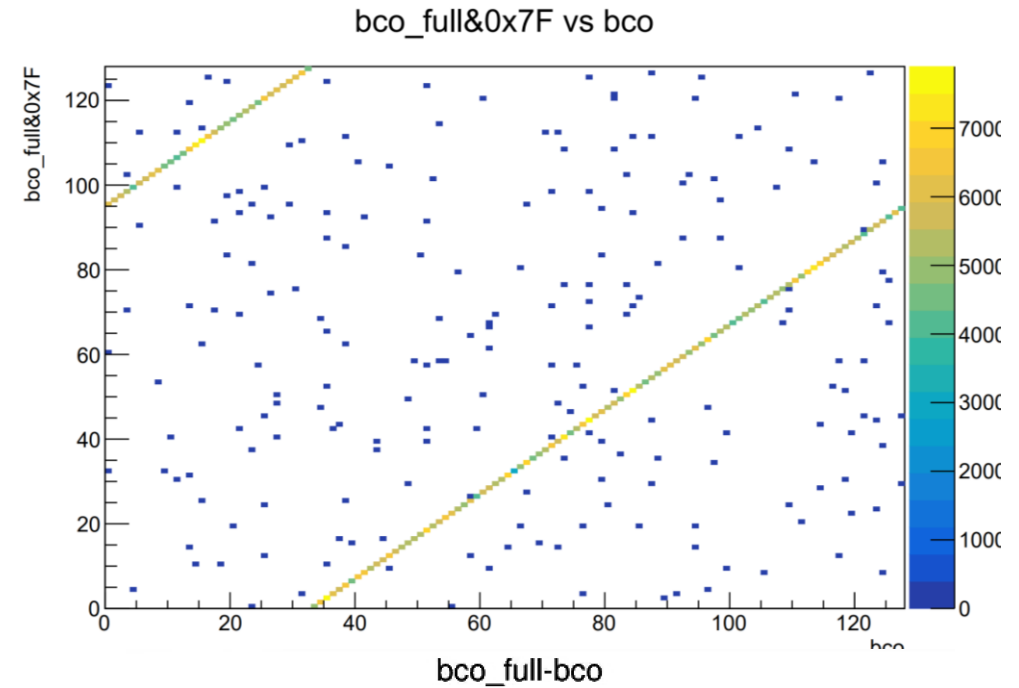
Pileup no



Run#23661 intt5 n_collision=0 Modebit=91

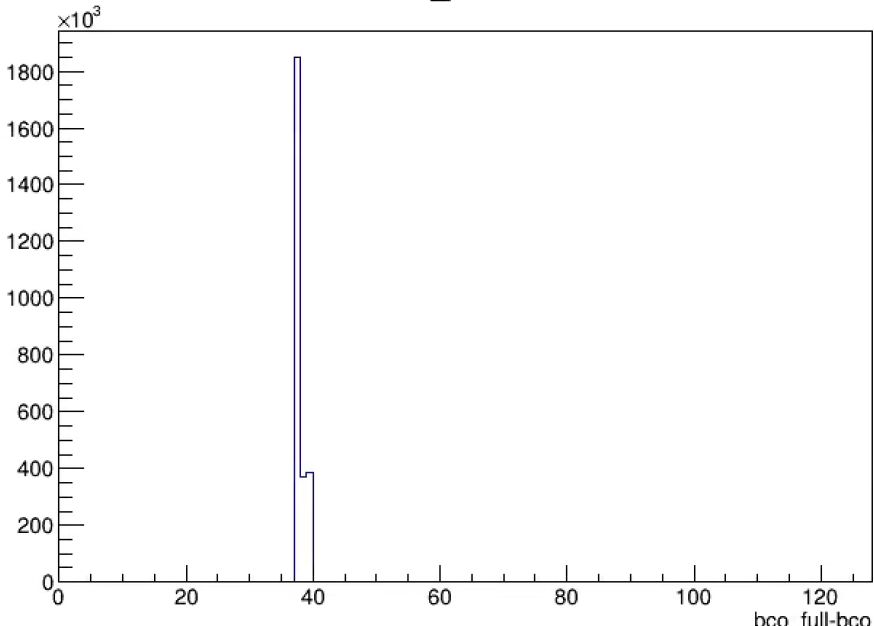
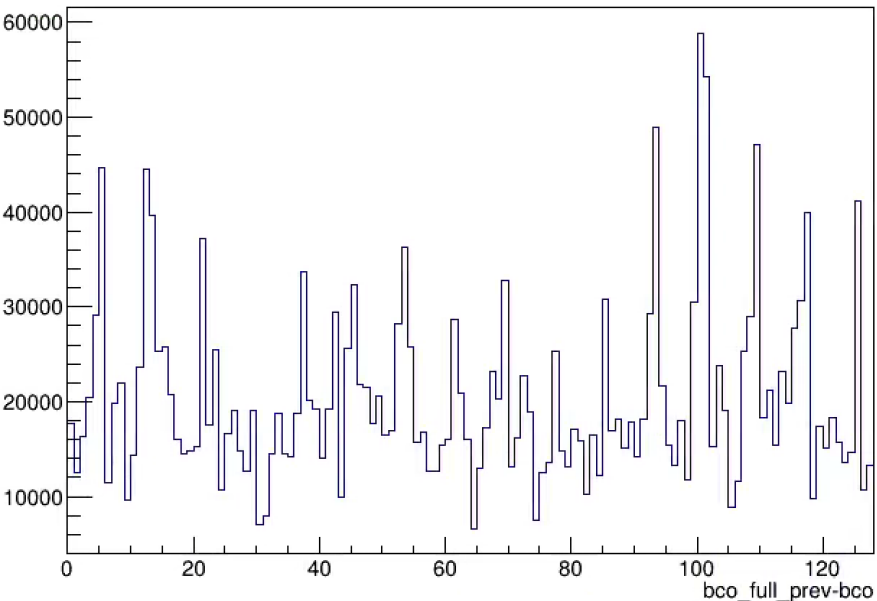
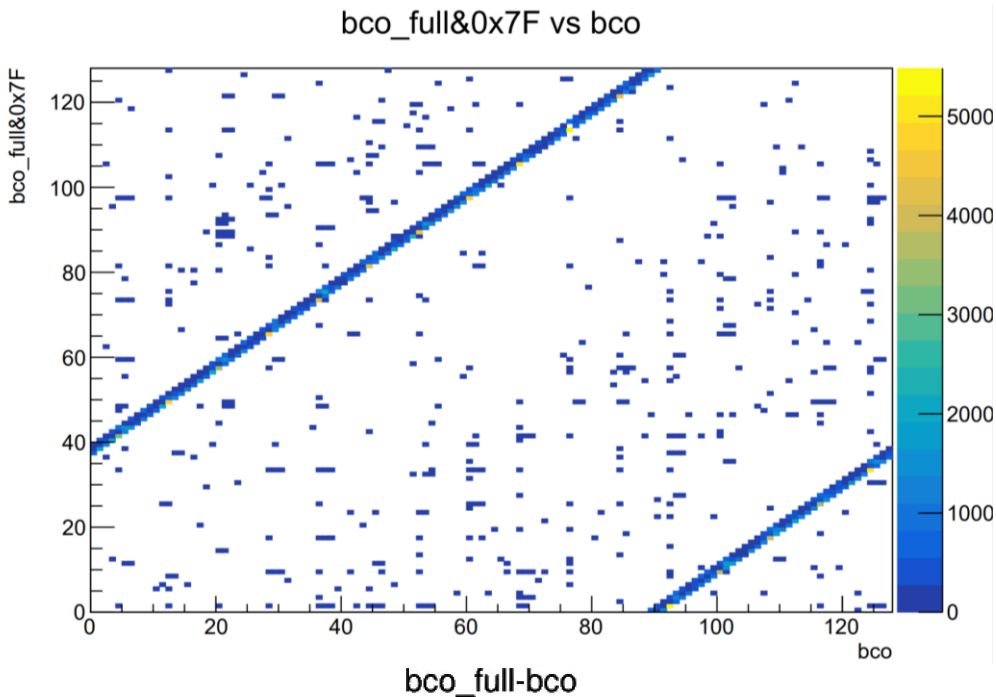
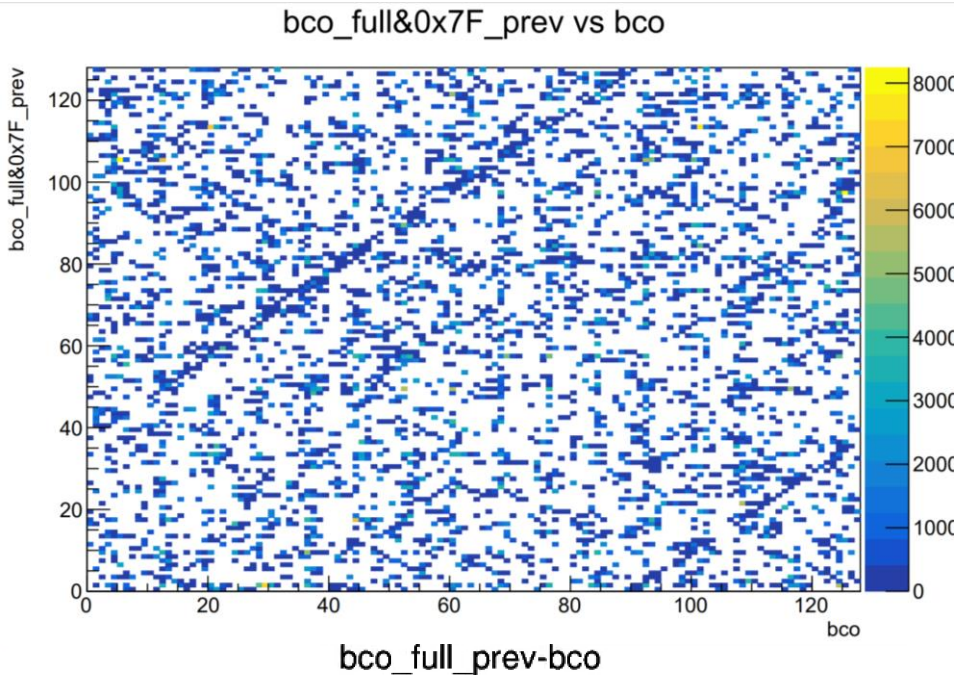


Pileup yes



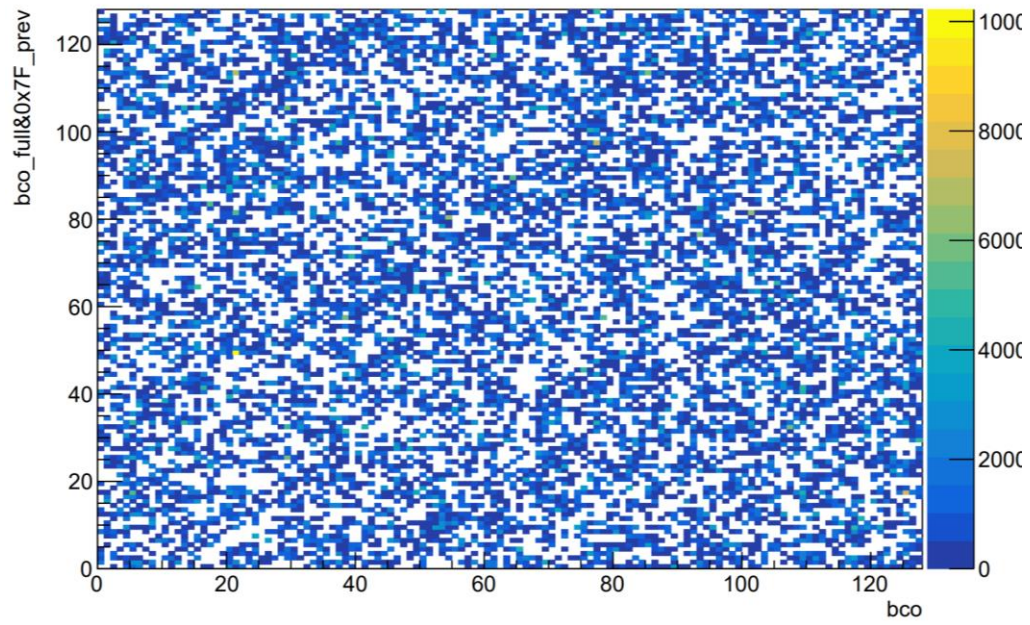
Run#23896 intt5 n_collision=3 Modebit=92

Pileup yes

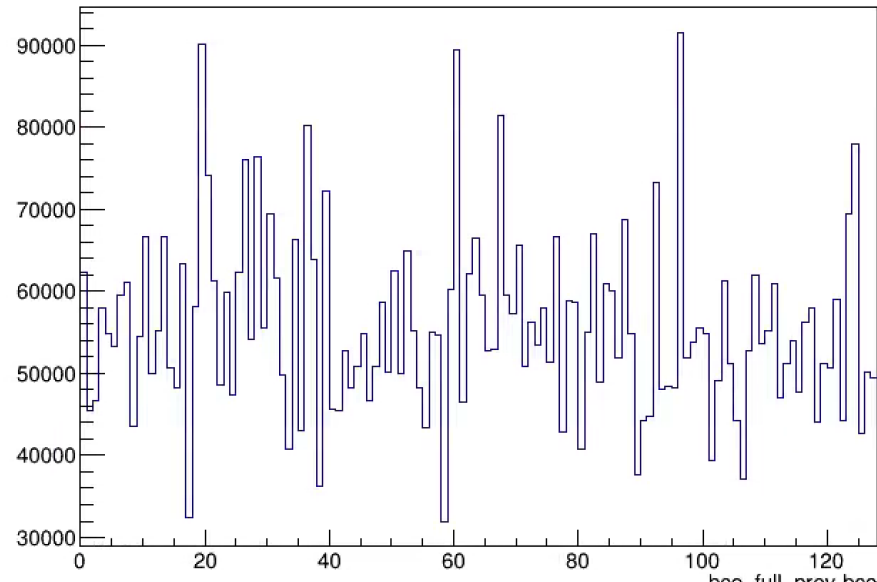


Run#23901 intt5 n_collision=3 Modebit=92

bco_full&0x7F_prev vs bco

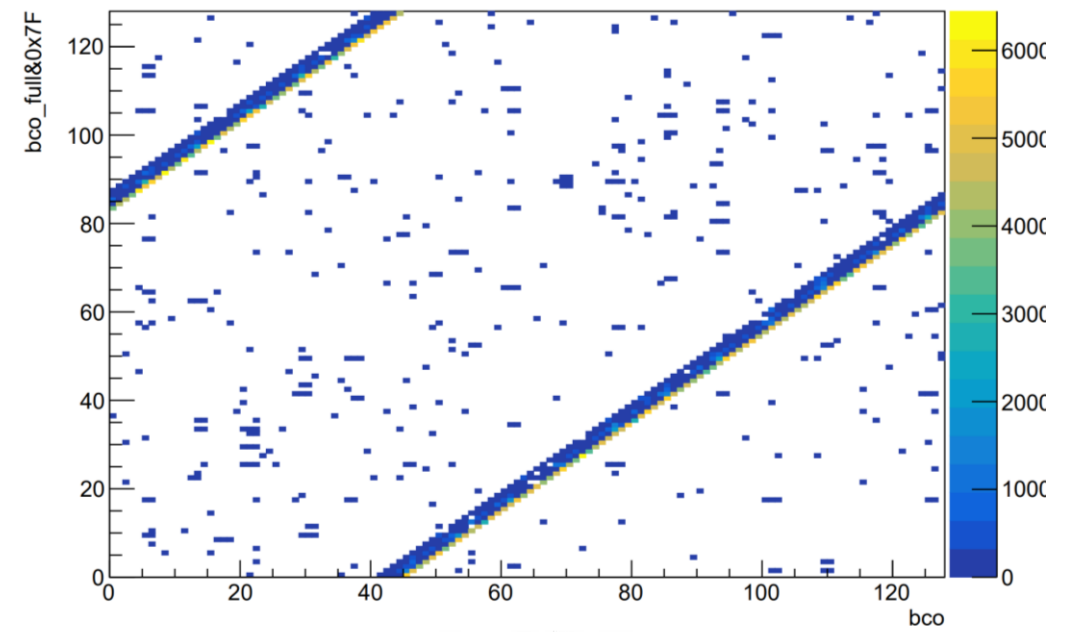


bco_full_prev-bco

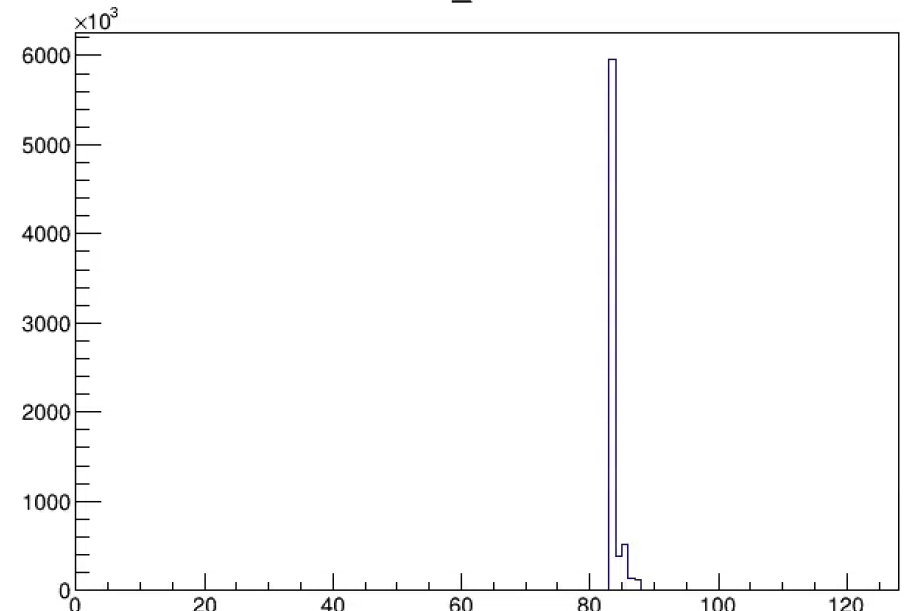


Pileup yes

bco_full&0x7F vs bco

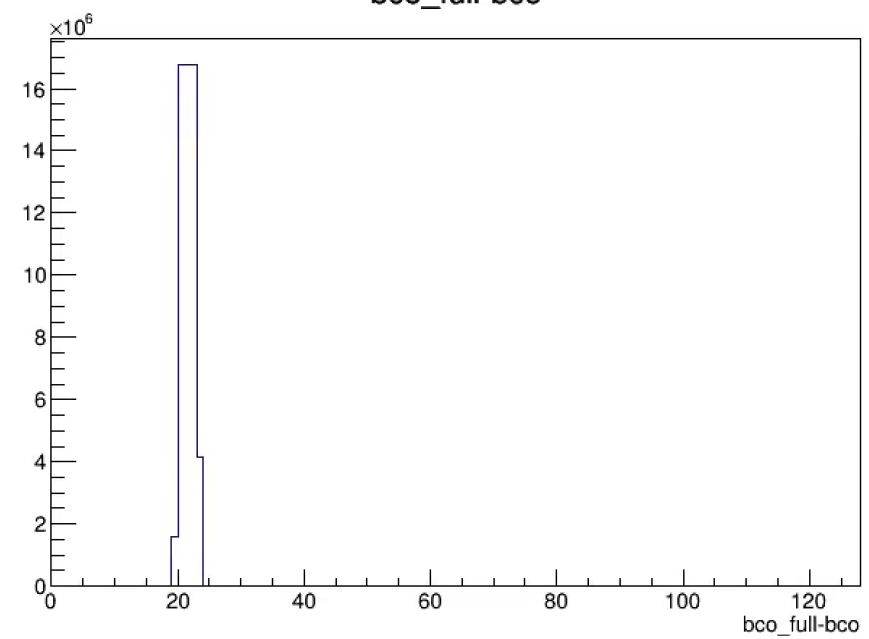
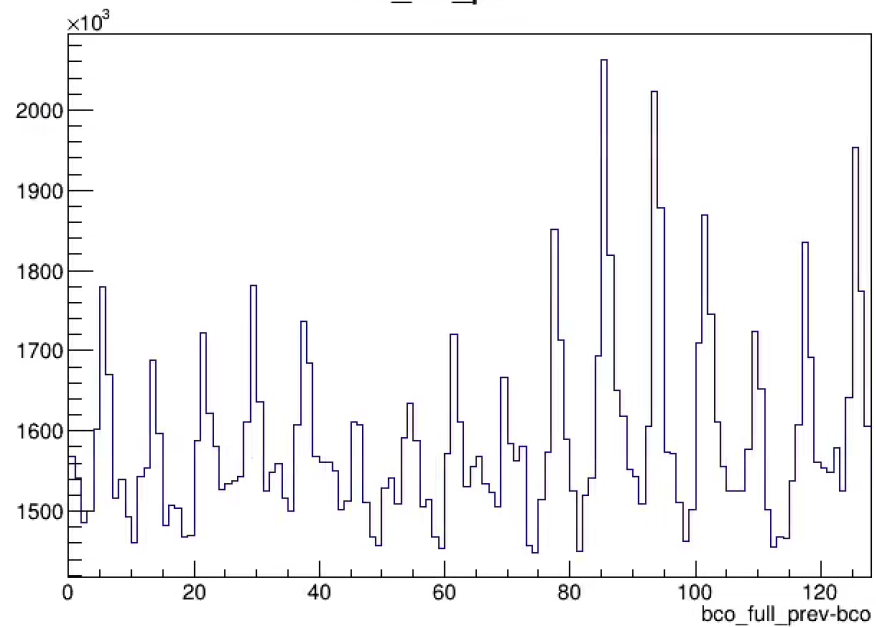
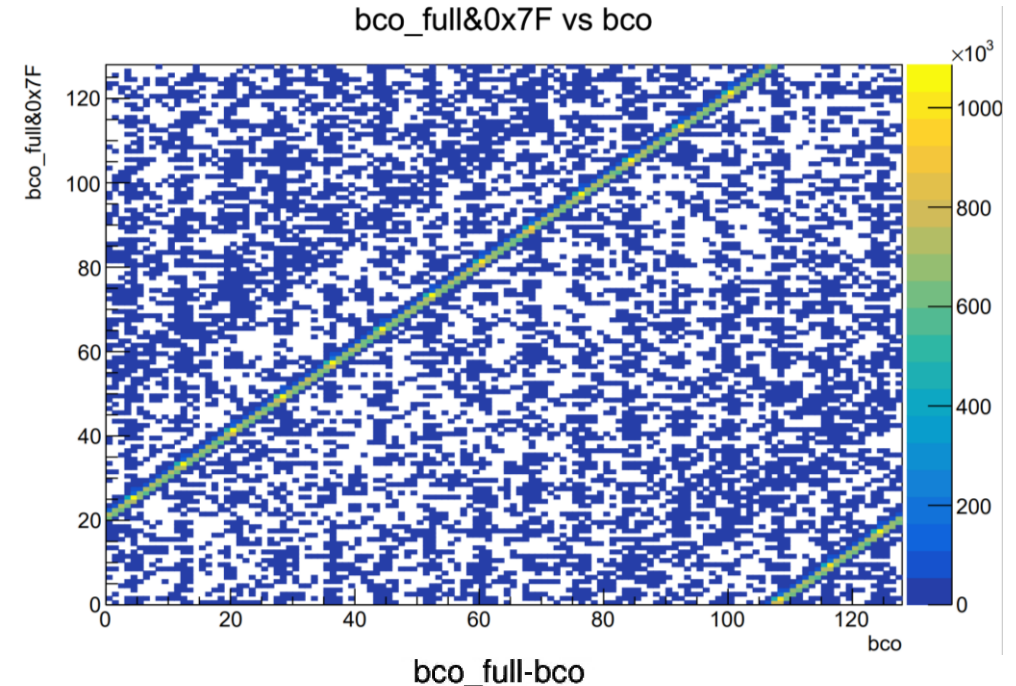
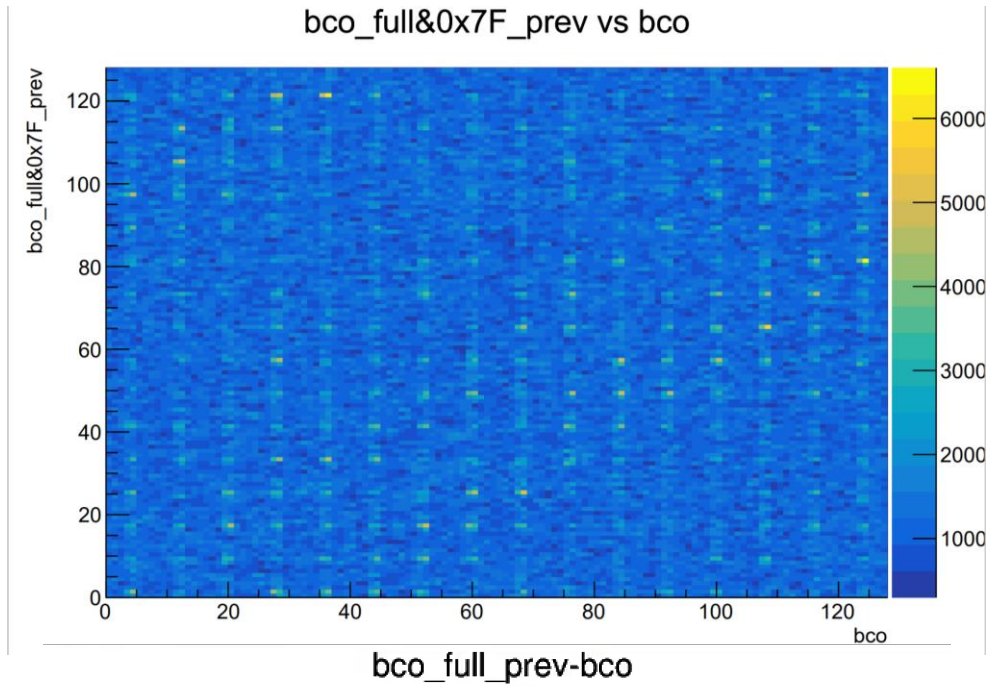


bco_full-bco

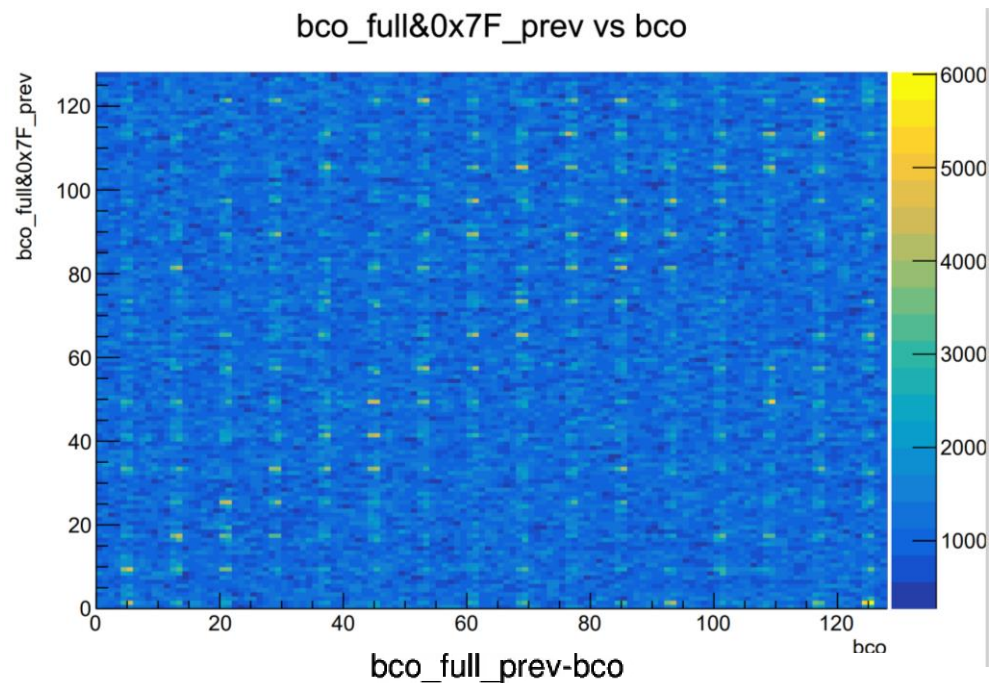


Run#23906 intt5 n_collision=3 Modebit=92

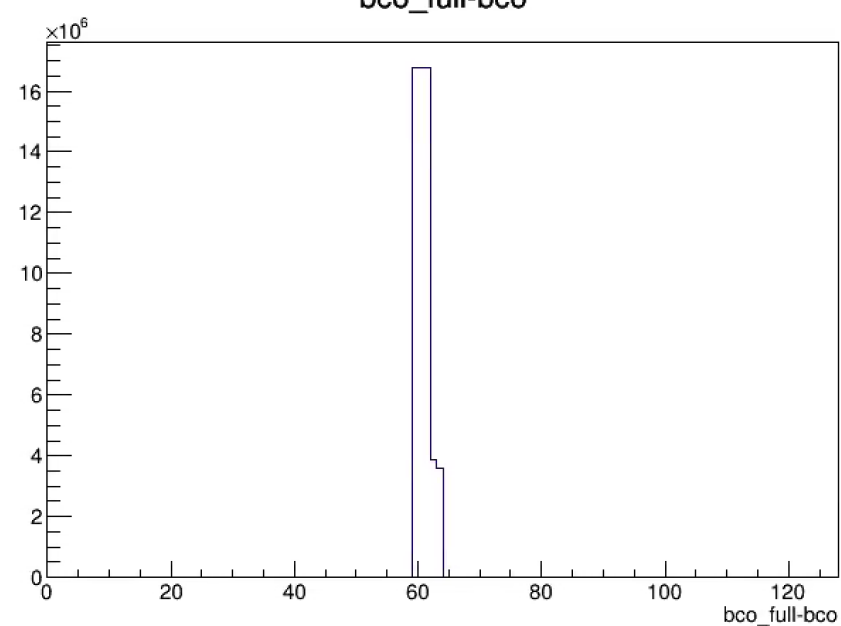
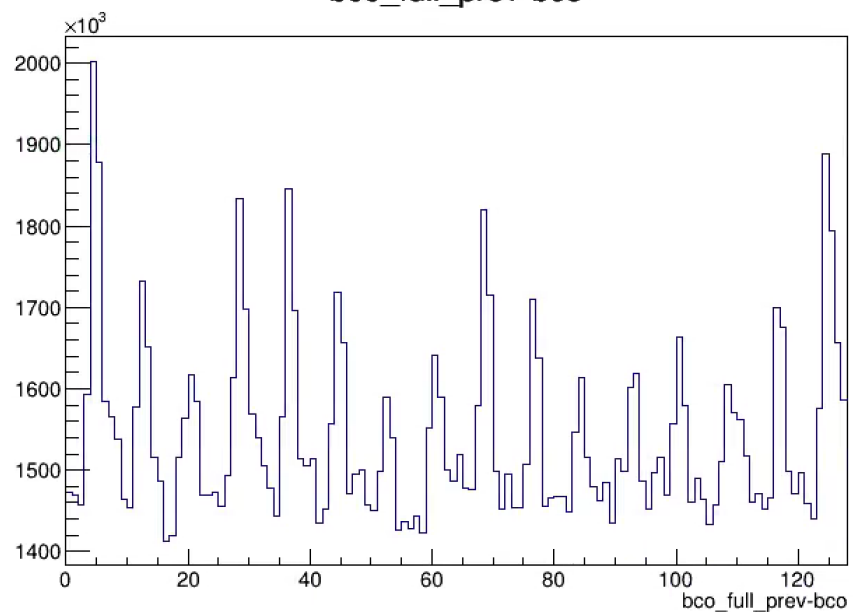
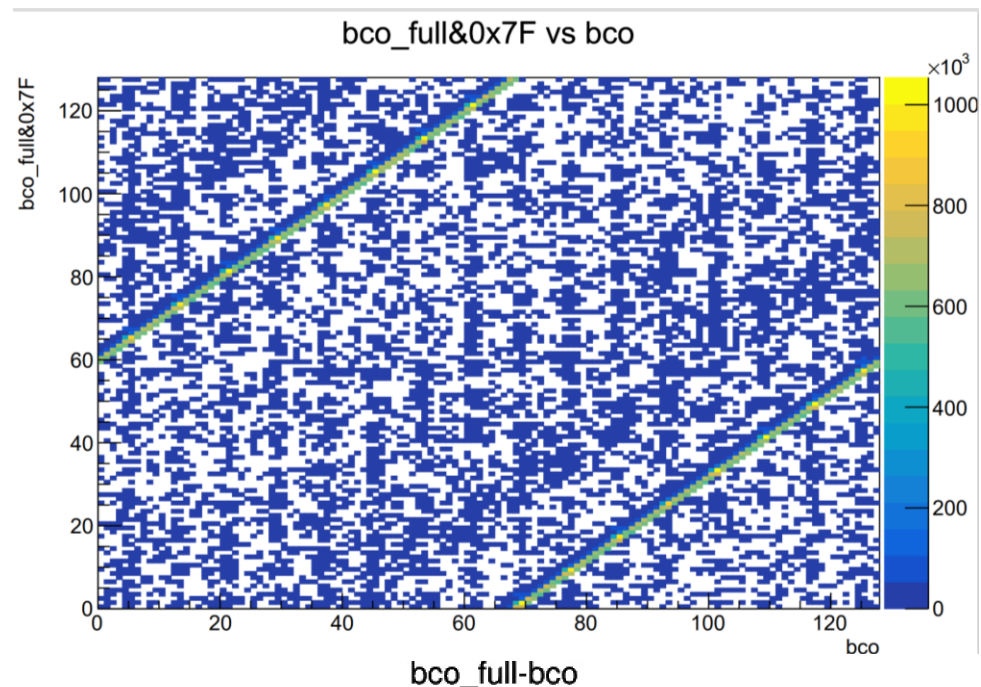
Pileup no



Run#23907 intt5 n_collision=3 Modebit=92



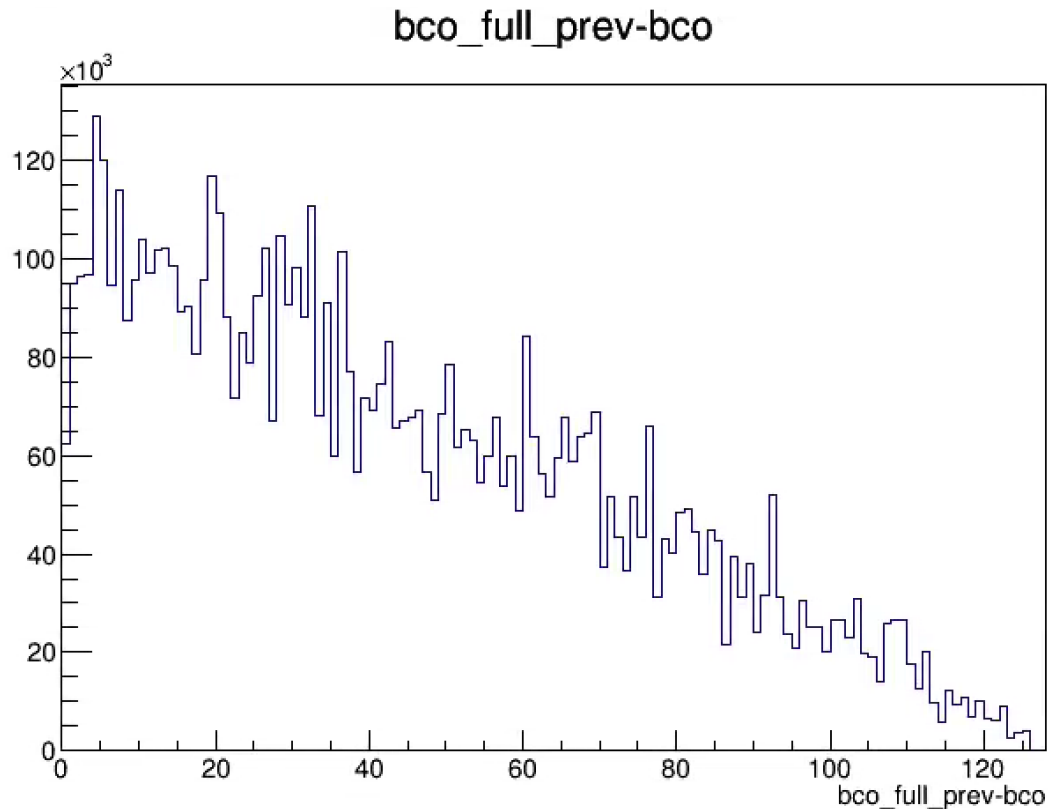
Pileup no



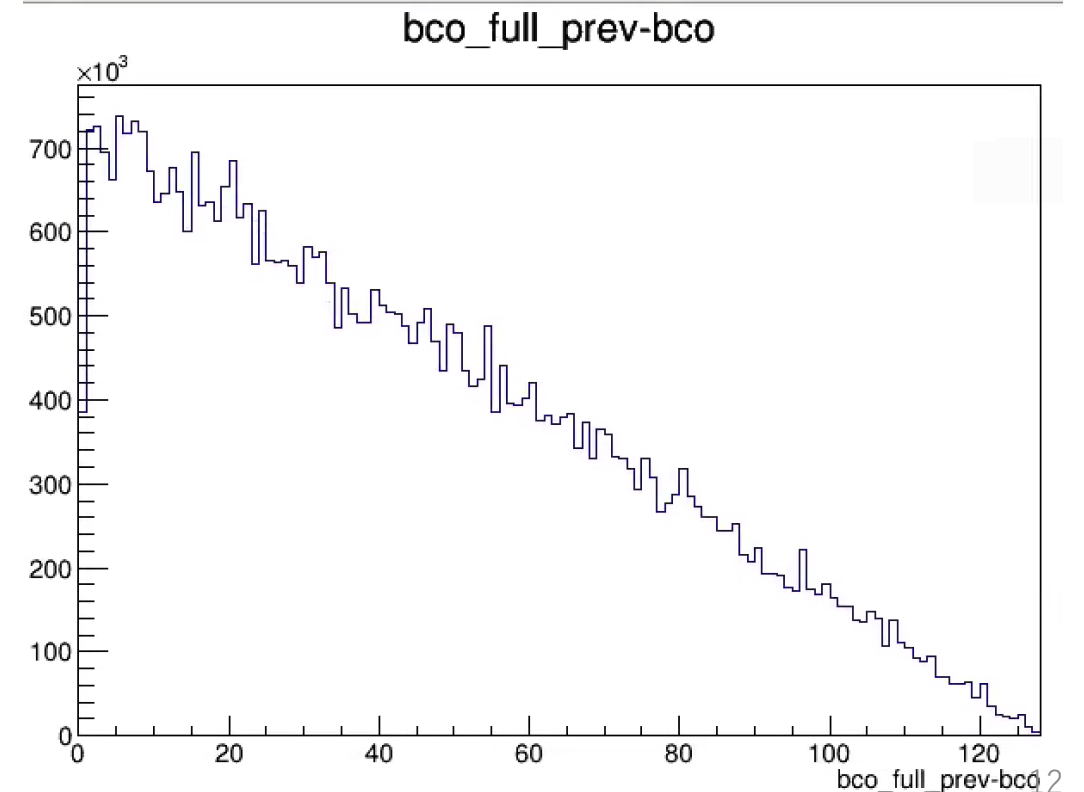
Another plot of BCO_full_prev-BCO

The previous page had +128 when the value was <0 . This is the result of histograms of absolute values of BCO_full_prev-BCO values.

Run#23901 Pileup



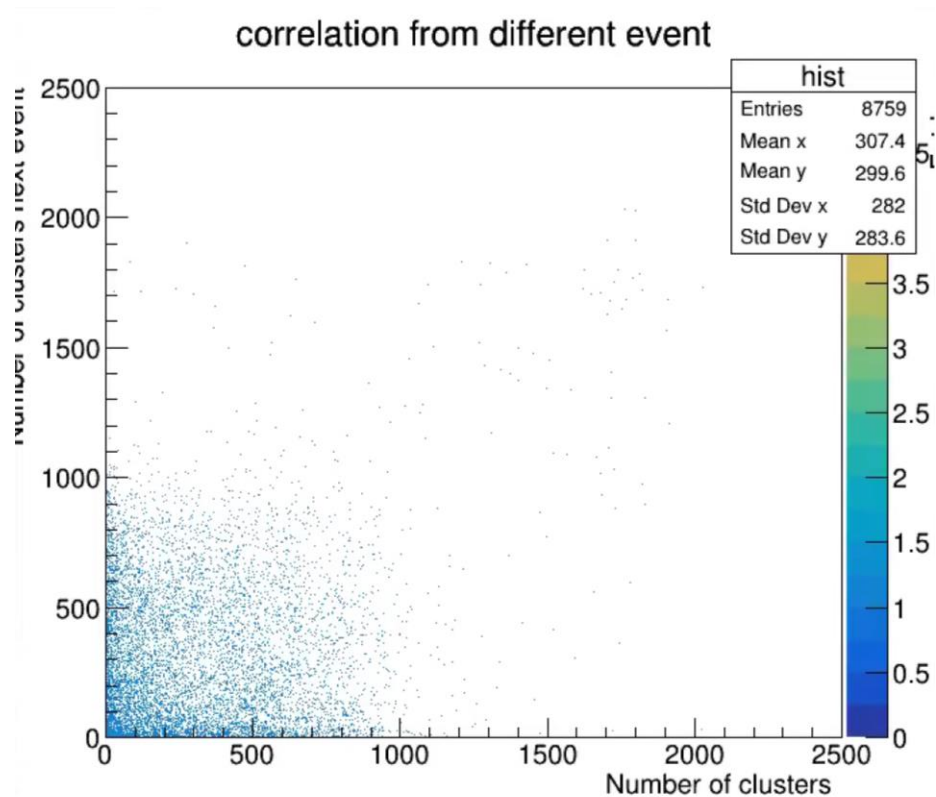
Run#23648 no Pileup



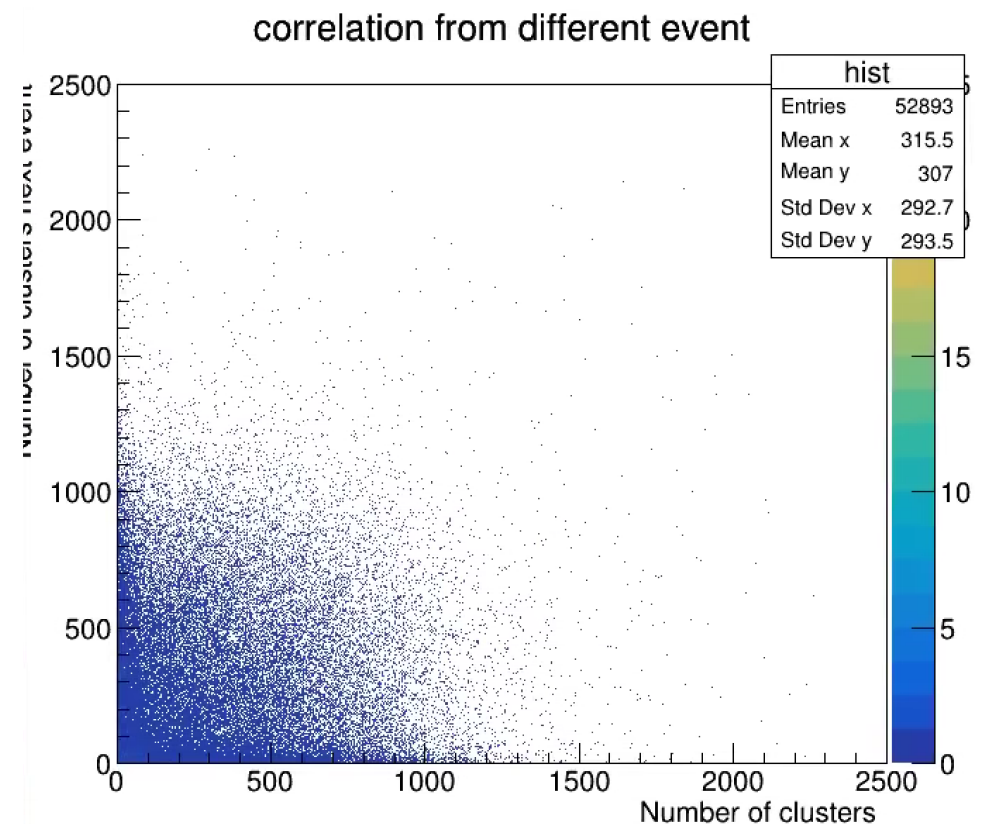
Multiplicity vs multiplicity of next event

These plots with the number of clusters for one event on the x-axis and the number of clusters for the next event on the y-axis.

Run#23901 Pileup



Run#23648 no Pileup



Summary

- Confirmed that Pileup is happening on some beam runs, but not sure under what conditions.
- The value on the y-axis is lower when Pileup is occurring and higher when it is not occurring on the plot of previous event $\text{BCO_Full} - \text{BCO}$.
- I will check the charge distribution of the MBD during events where correlation is seen.