

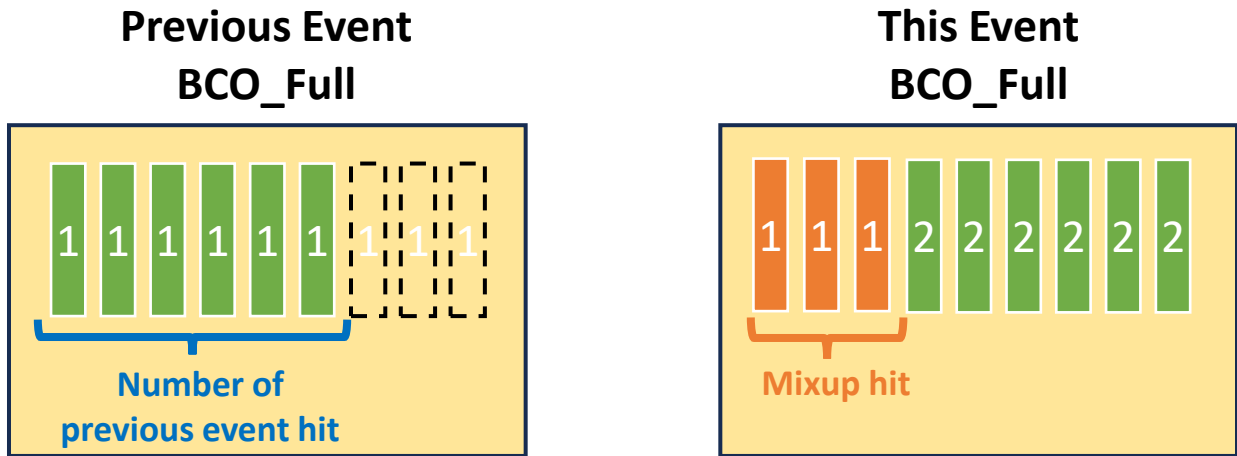
WIP plots for JPS (Event Mixup)

20250314

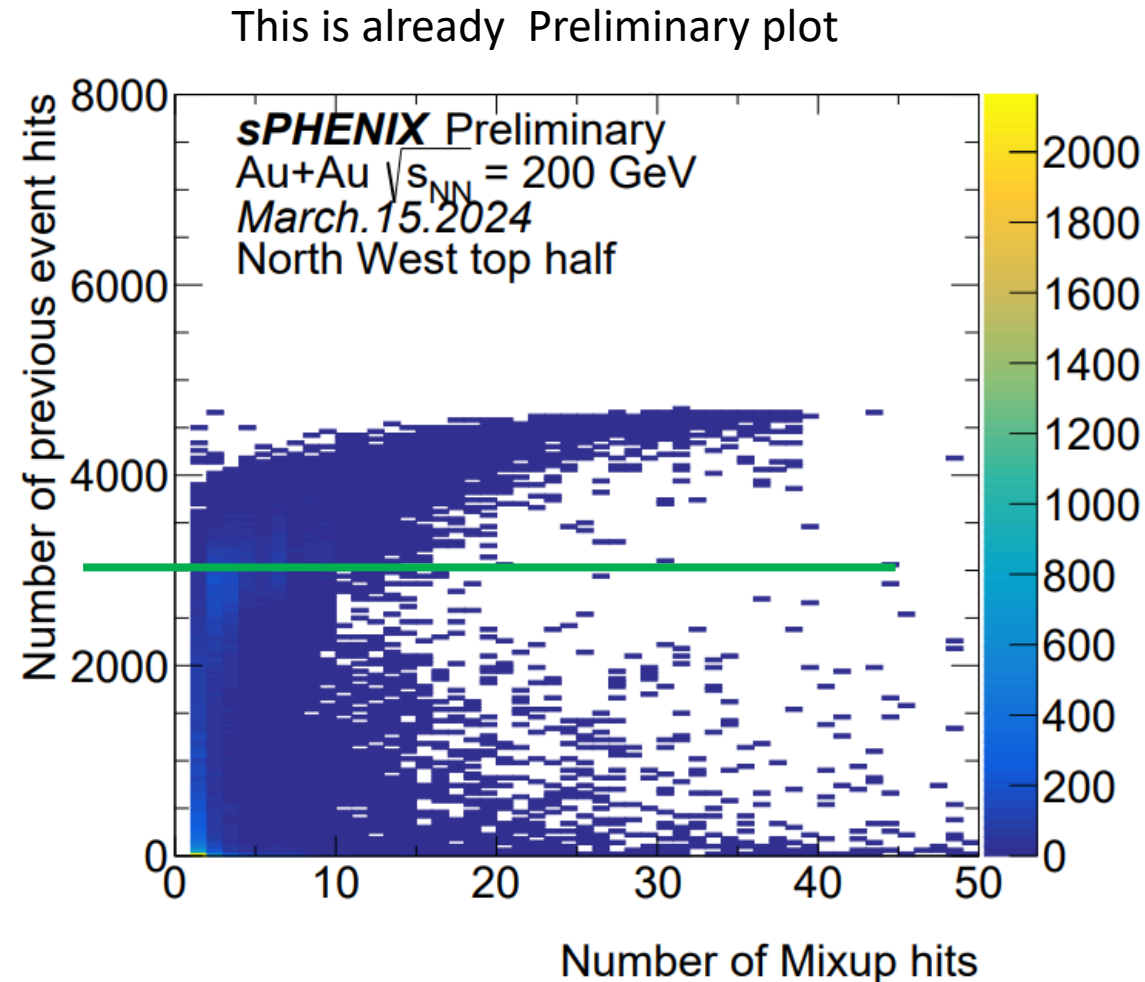
INTT MT

NWU Mai Kano

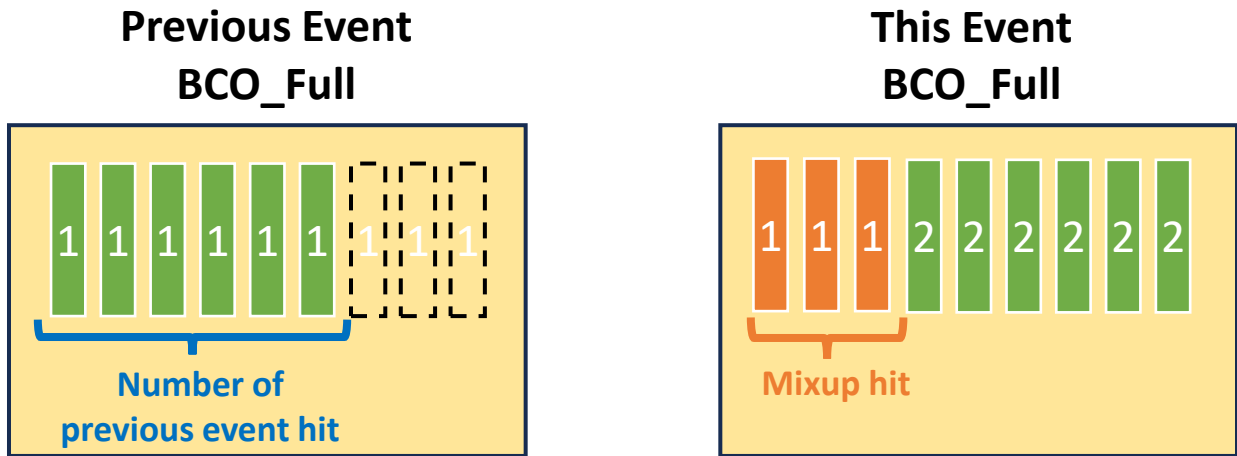
Hit Multiplicity Dependence Run23 Au+Au



It can be confirmed that there is a correlation between number of mixup hits and number of previous event hits when the number of hits of the previous event is 3000 or more.



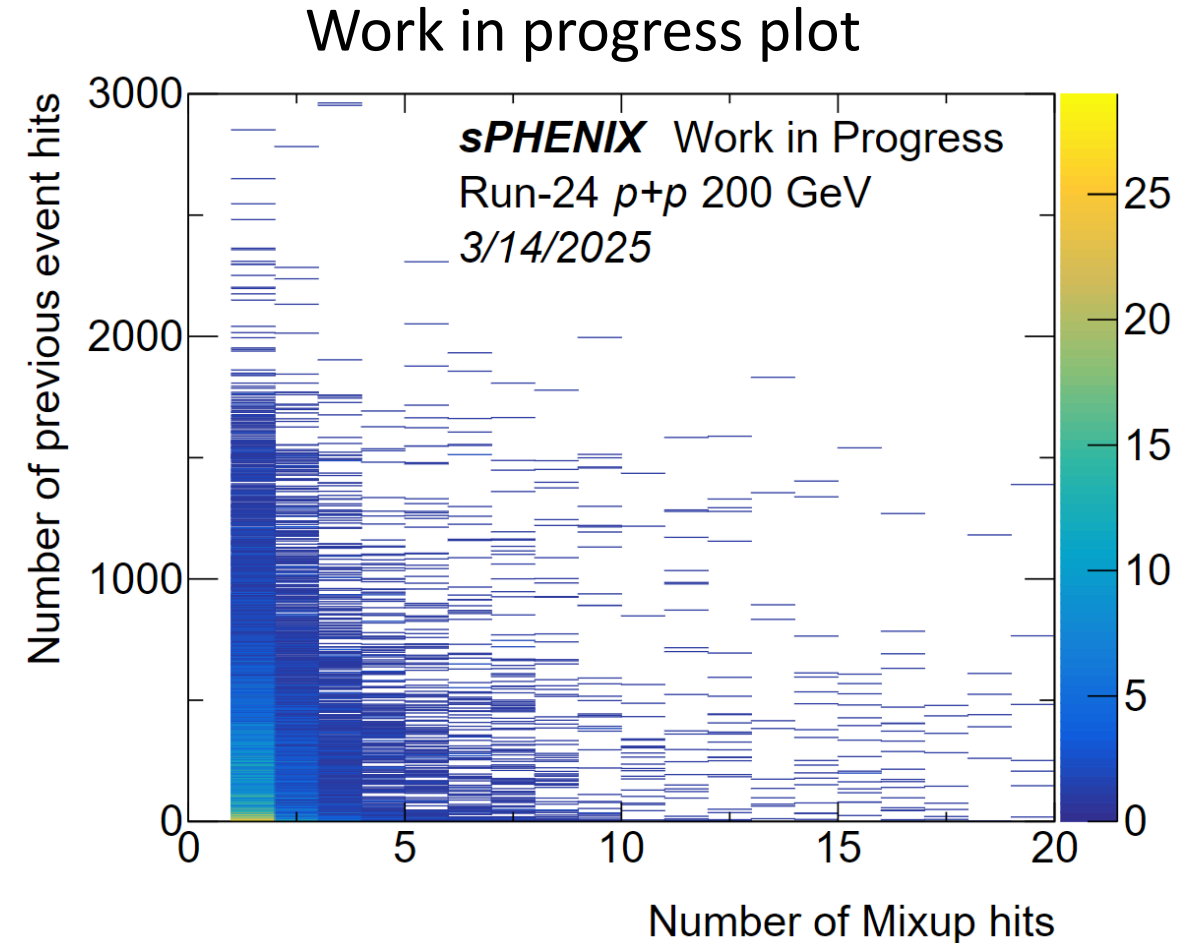
Hit Multiplicity Dependence Run24 Au+Au



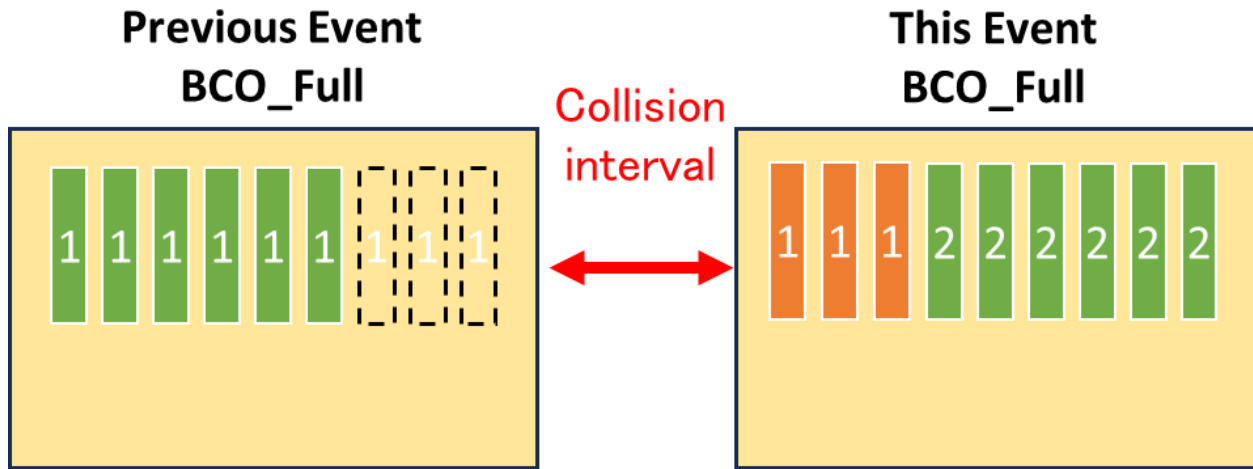
Event mixup also occurred in Run24 Au+Au, but the Hit Multiplicity dependence was not confirmed.

Possible reasons are that the DAC0 was set higher than in Run23, so the number of hits per event is no longer more than 3000.

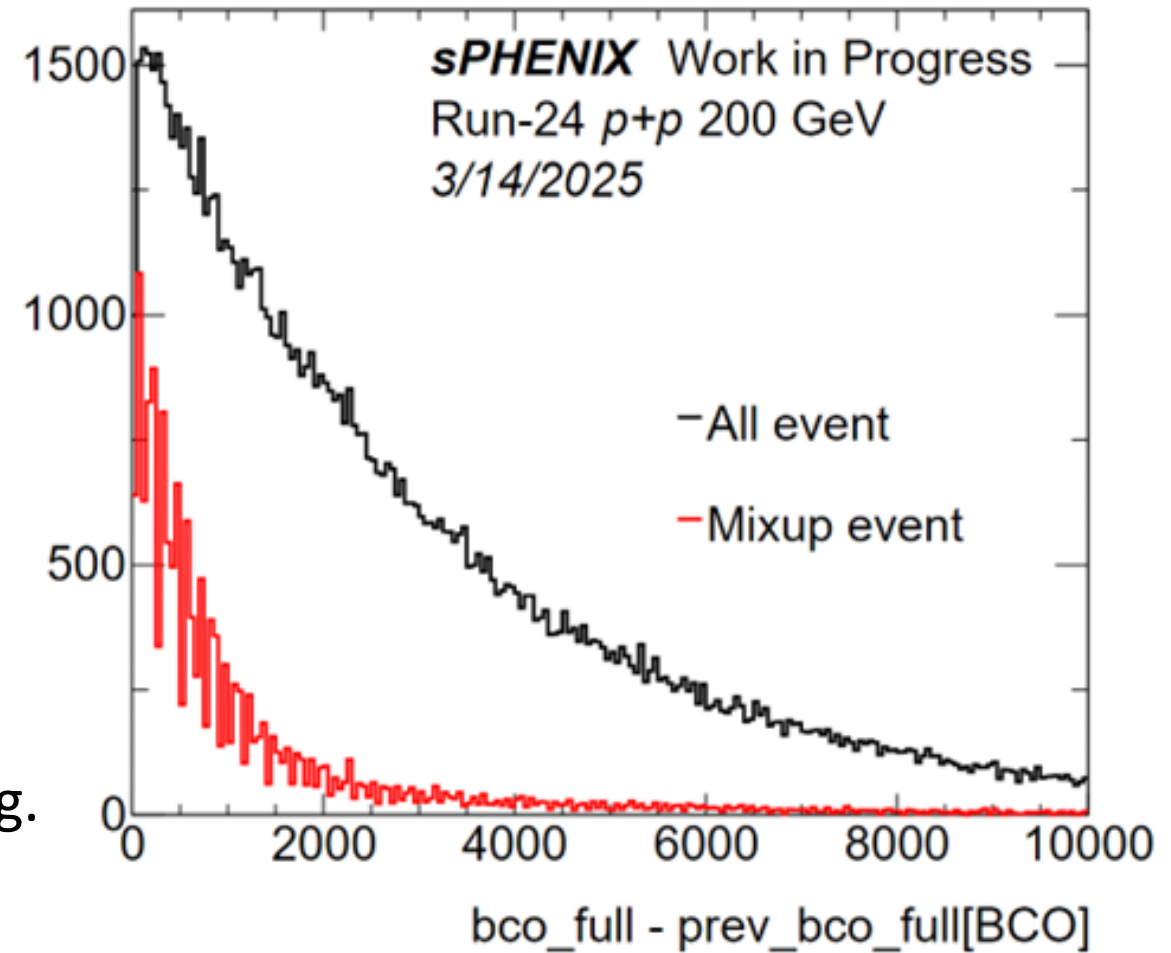
Also, the number of hits that can be processed per event has increased by setting a longer open time.



Collision interval Dependence Run24 Au+Au



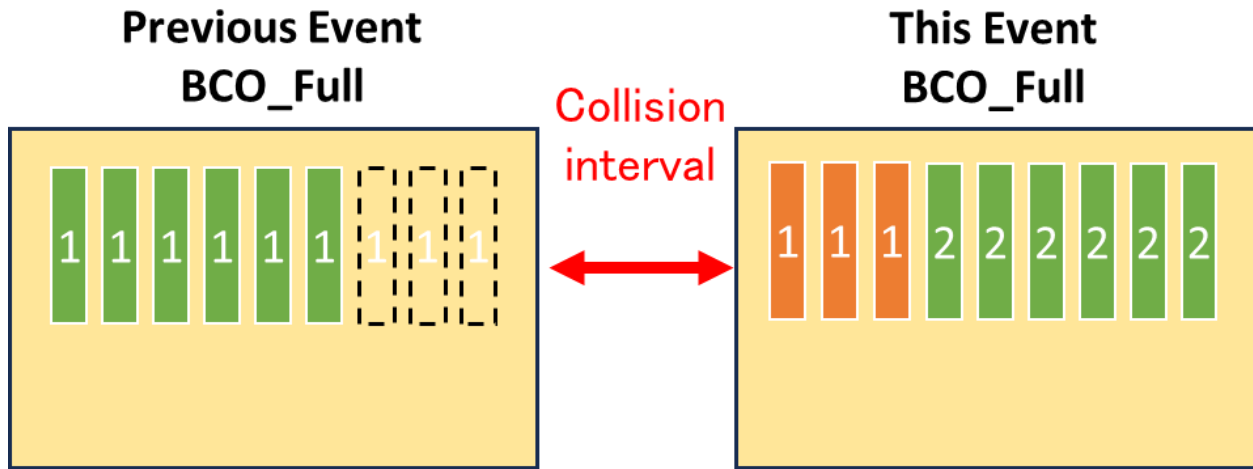
Work in progress plot



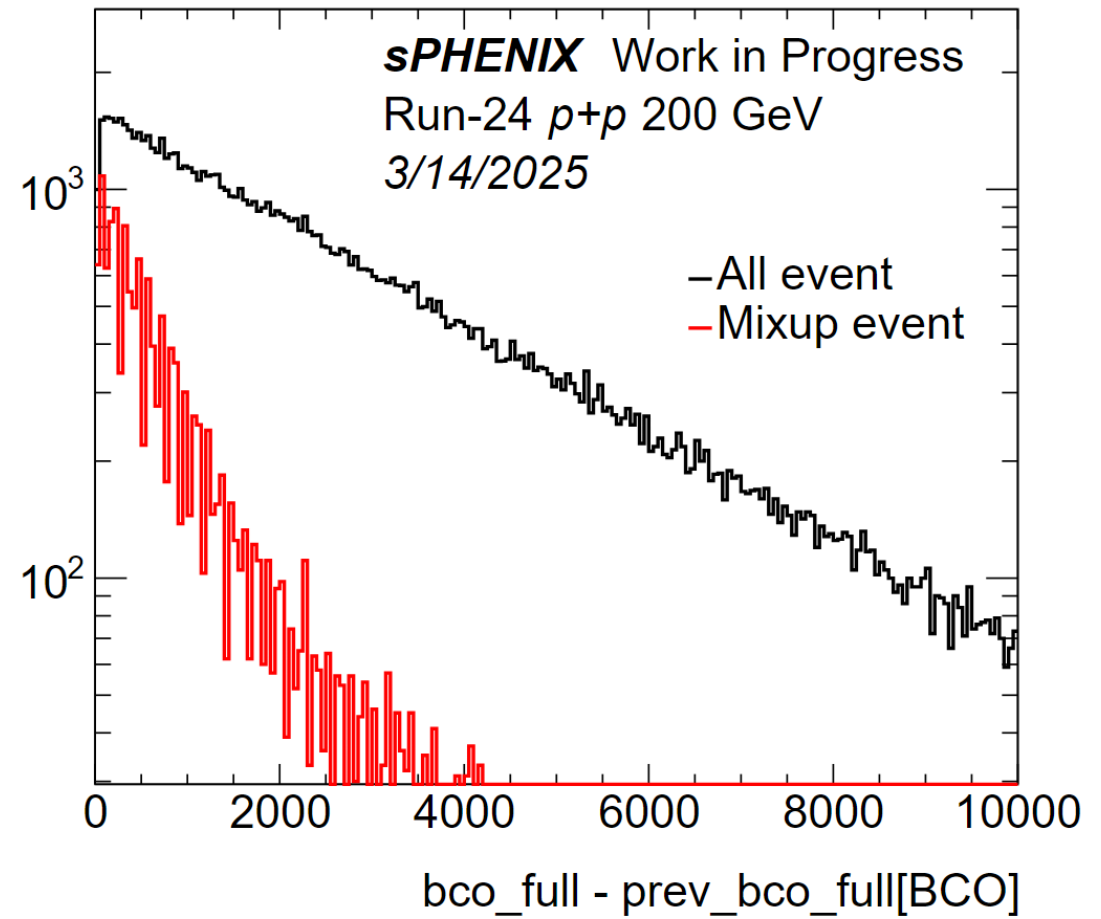
Mixup events tend to have shorter intervals from the previous event than all events

To make the slope of the distribution easier to understand, the vertical axis was set to liner and log.

Collision interval Dependence Run24 Au+Au



Work in progress plot

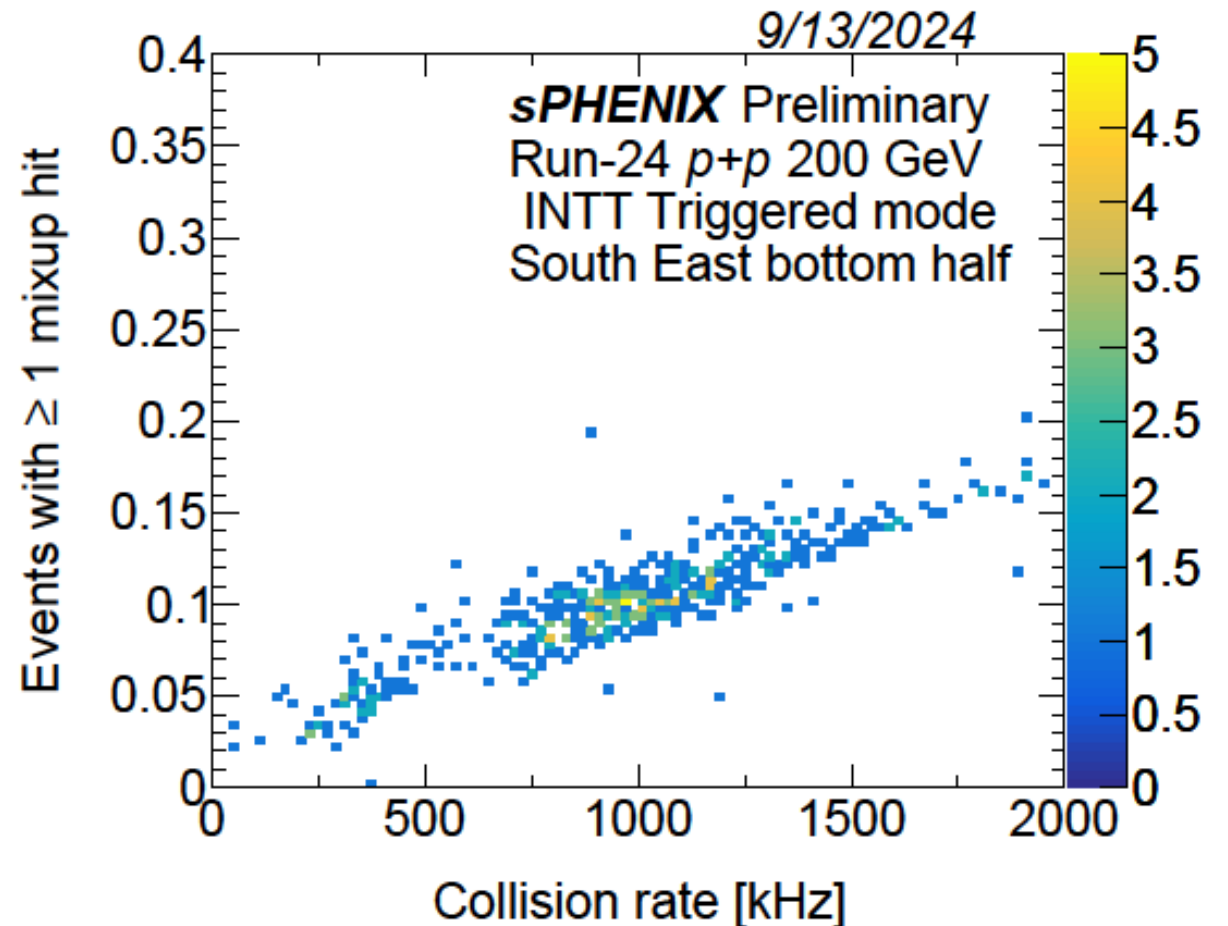
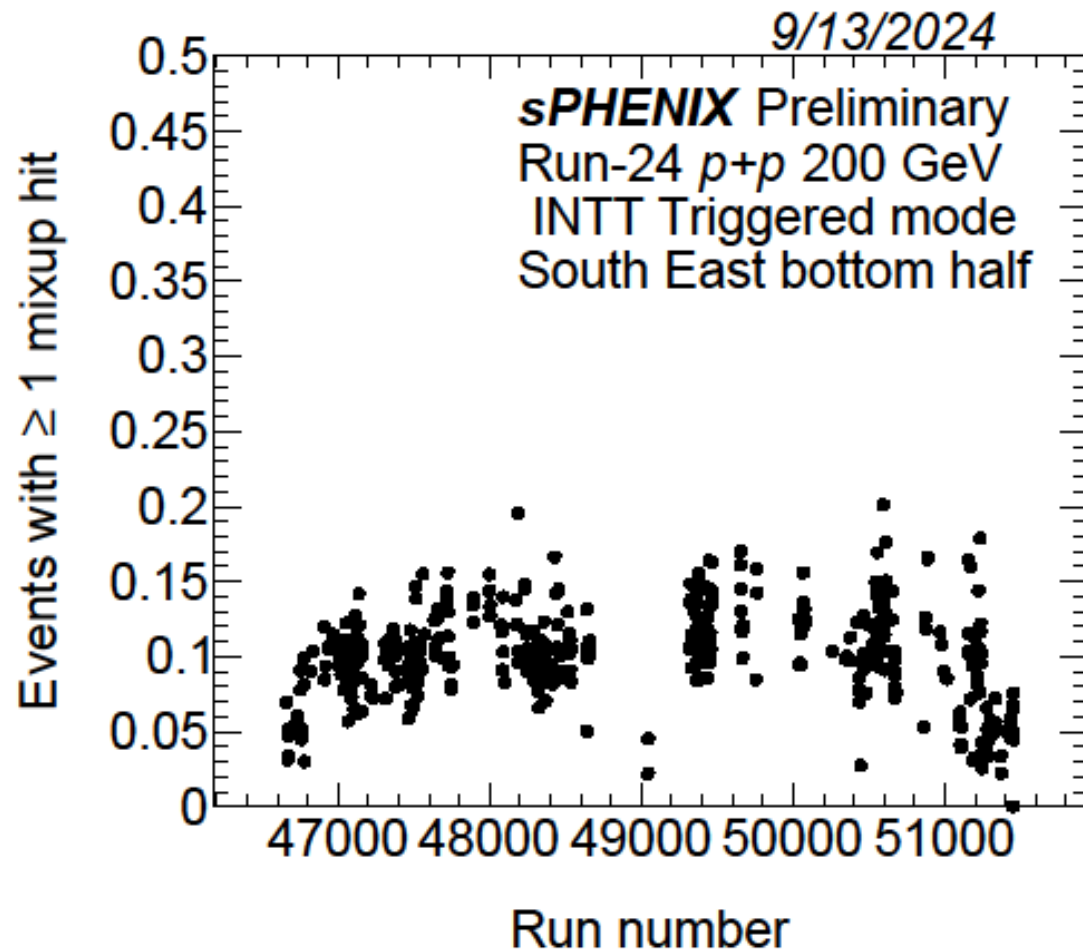


Mixup events tend to have shorter intervals from the previous event than all events

To make the slope of the distribution easier to understand, the vertical axis was set to liner and log.

Mixup Event Fraction

These plots that took the Preliminary previously were calculated with the BG included, so I made the results with the BG removed.

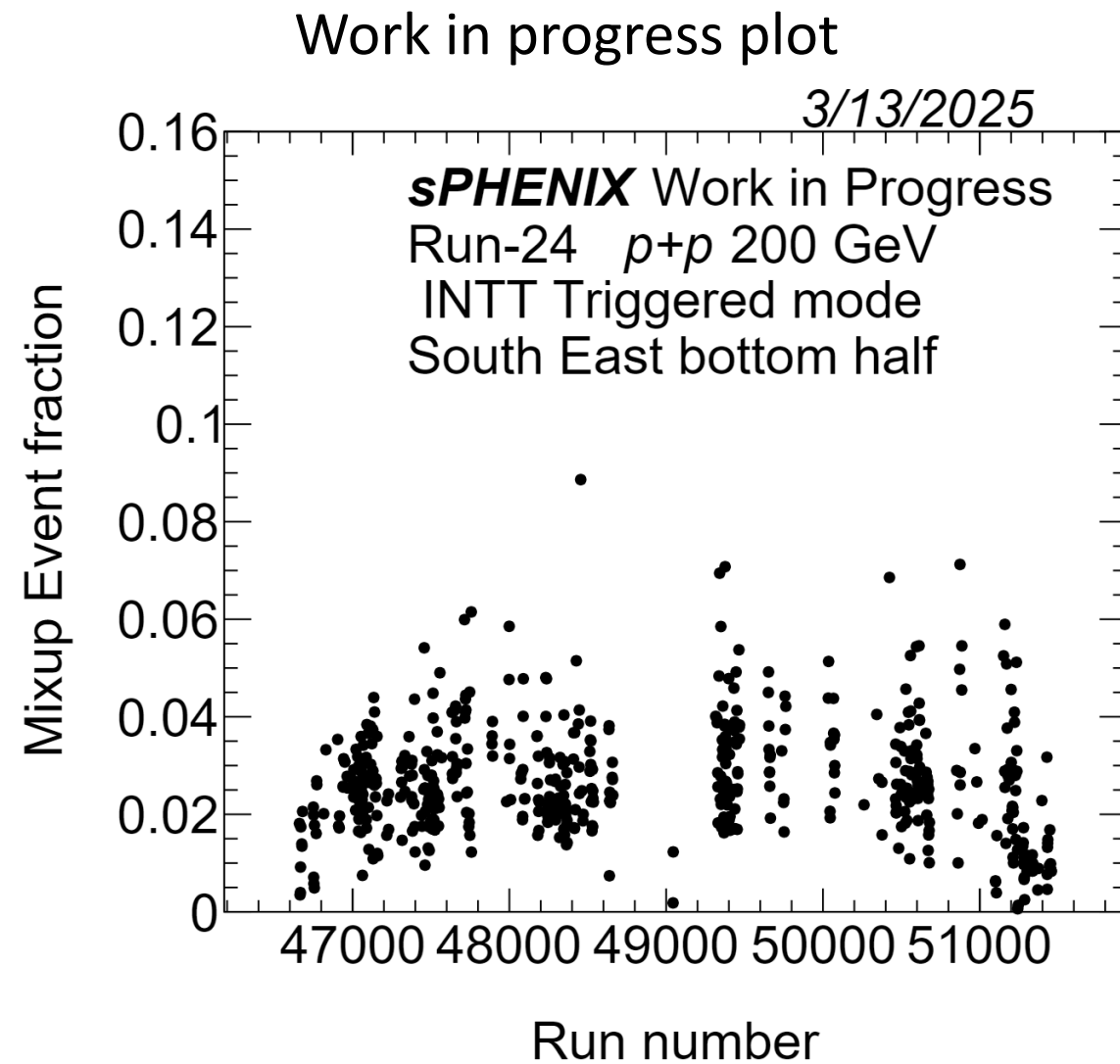
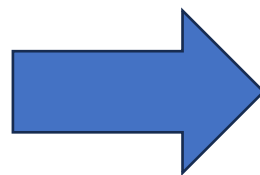
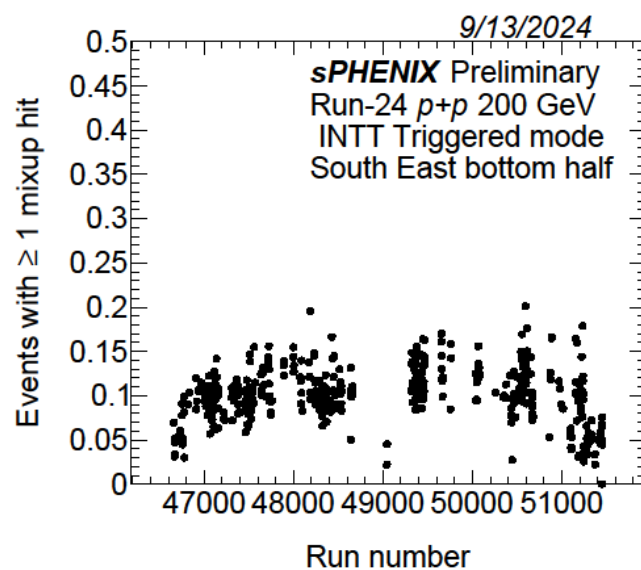


Mixup Event fraction

Percentage of events for which Event Mixup occurred.

$$\frac{\text{Number of Mixup Event}}{\text{Number of All Event}}$$

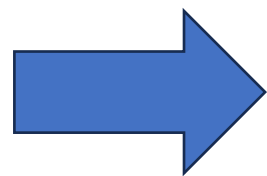
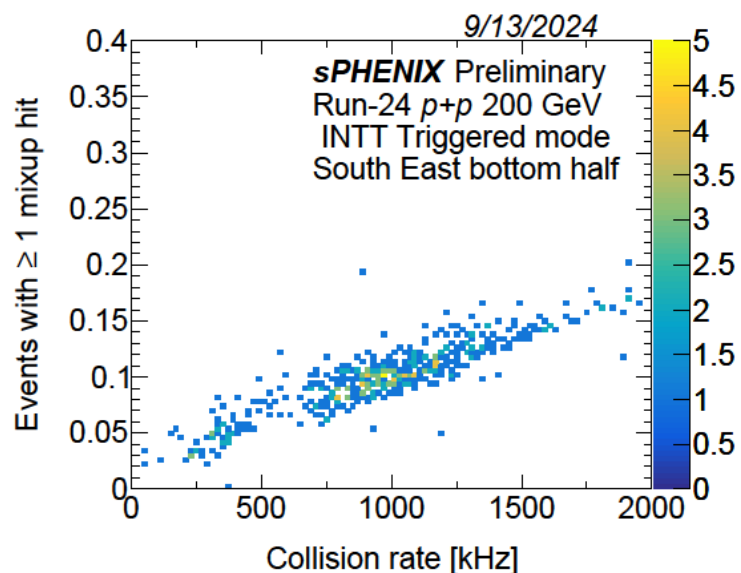
- Mixup fraction is less than 10%



Mixup Event fraction vs collision rate

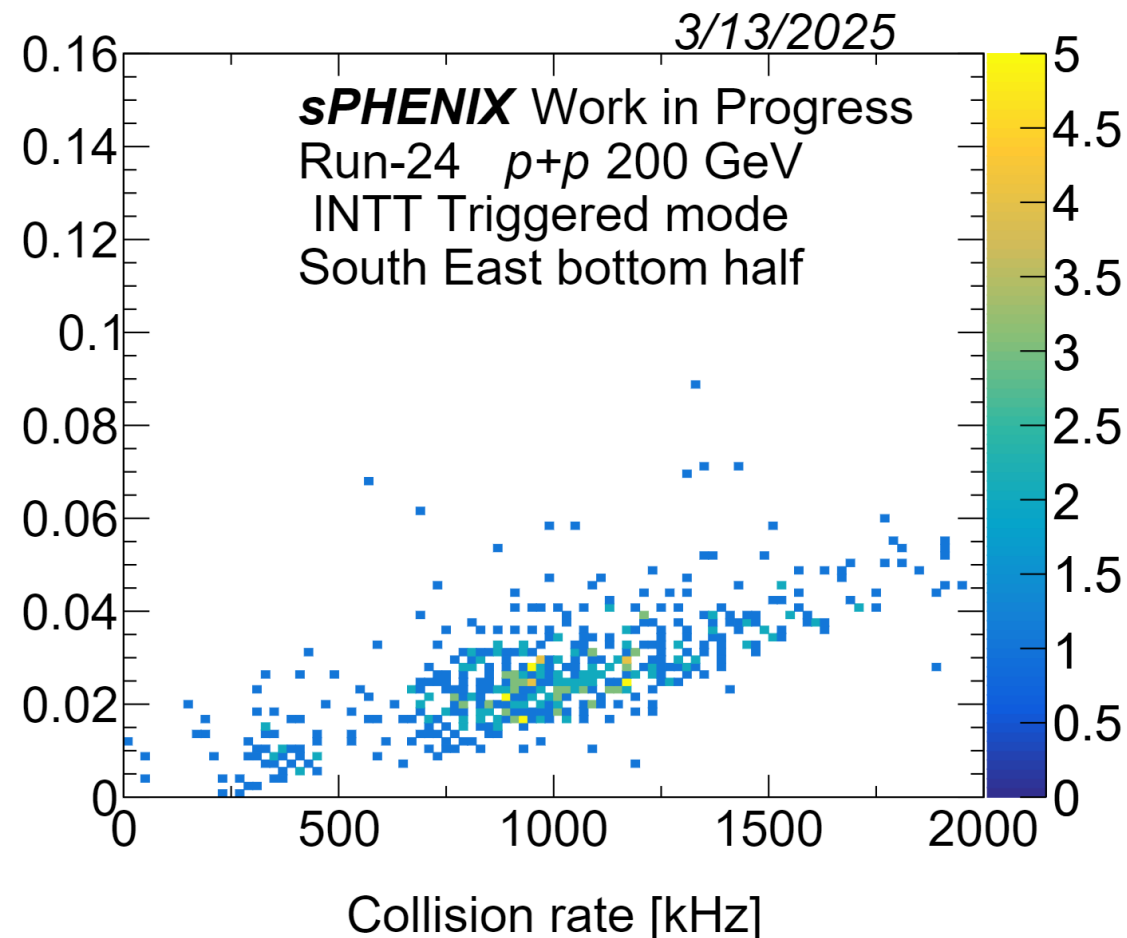
Correlation between Mixup Event fraction and collision rate

→ The shorter the interval between collision events, the more likely Event Mixup will occur.



Mixup Event fraction

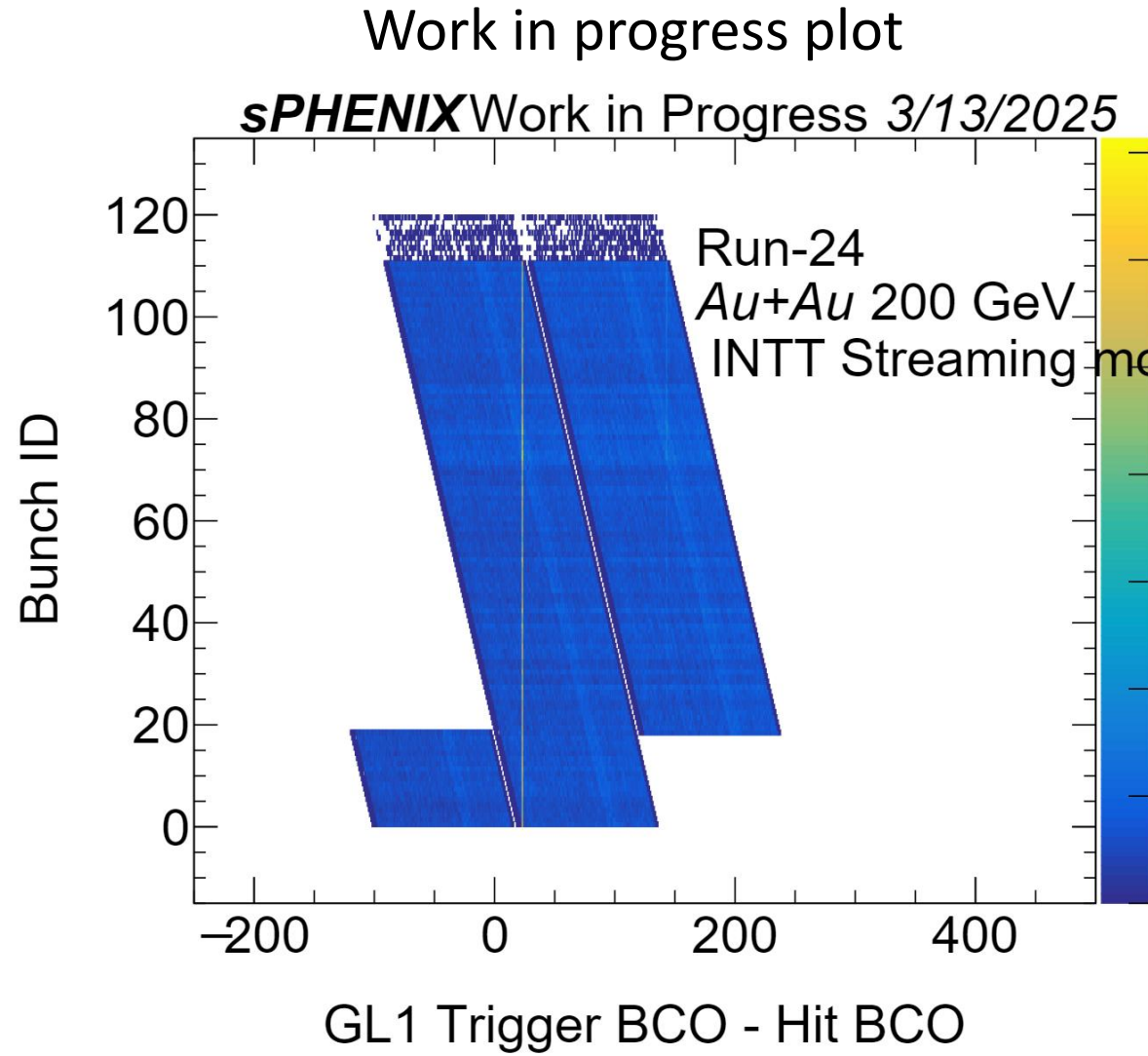
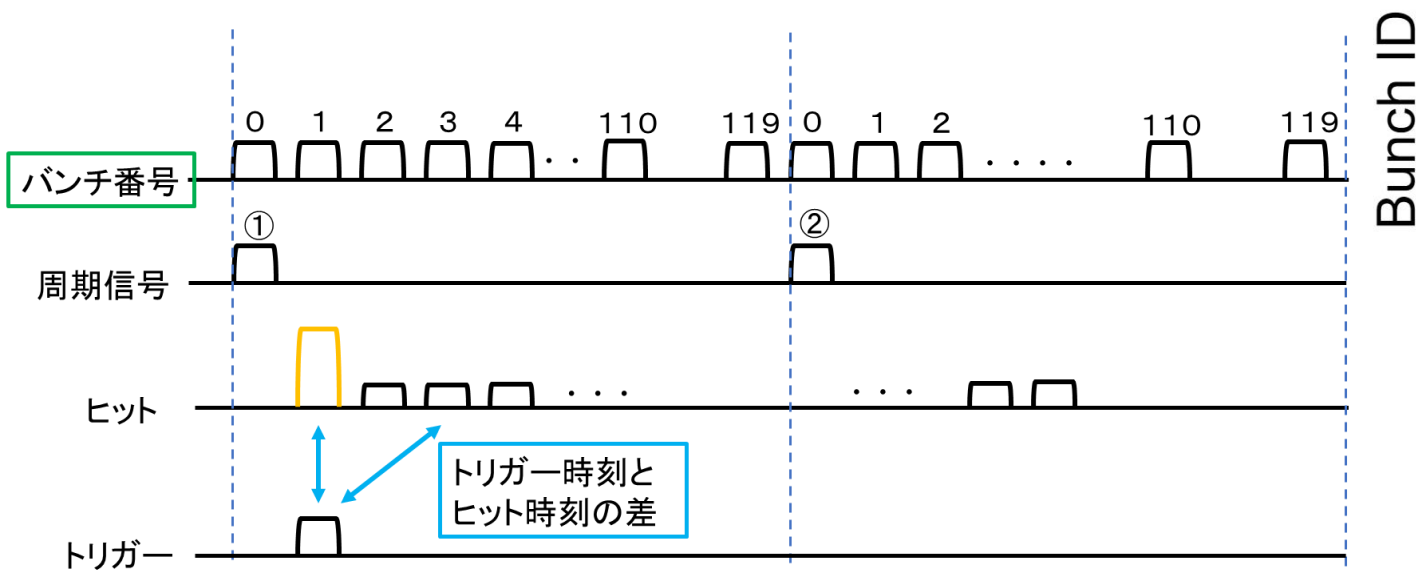
Work in progress plot



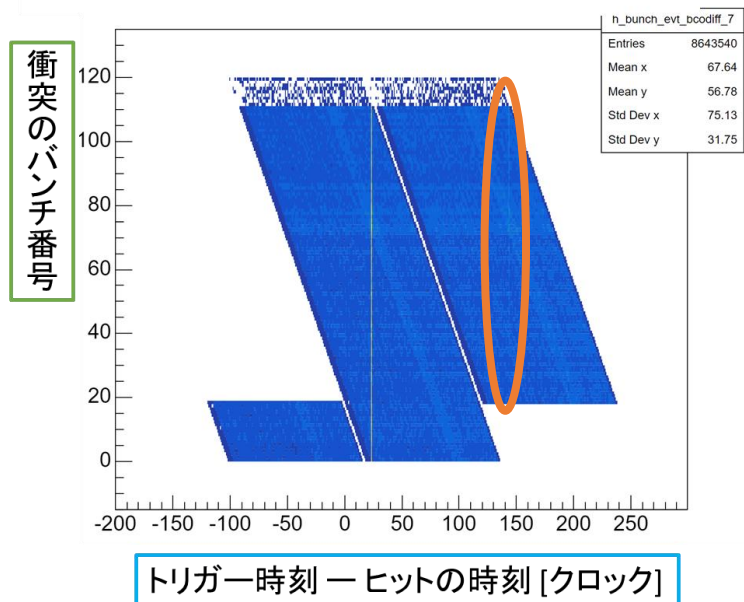
Event Mixup of Streaming readout

The yellow line indicates a hit that matched the GL1 trigger.

The slightly more entries that appear after that 120BCO indicate an Event Mixup



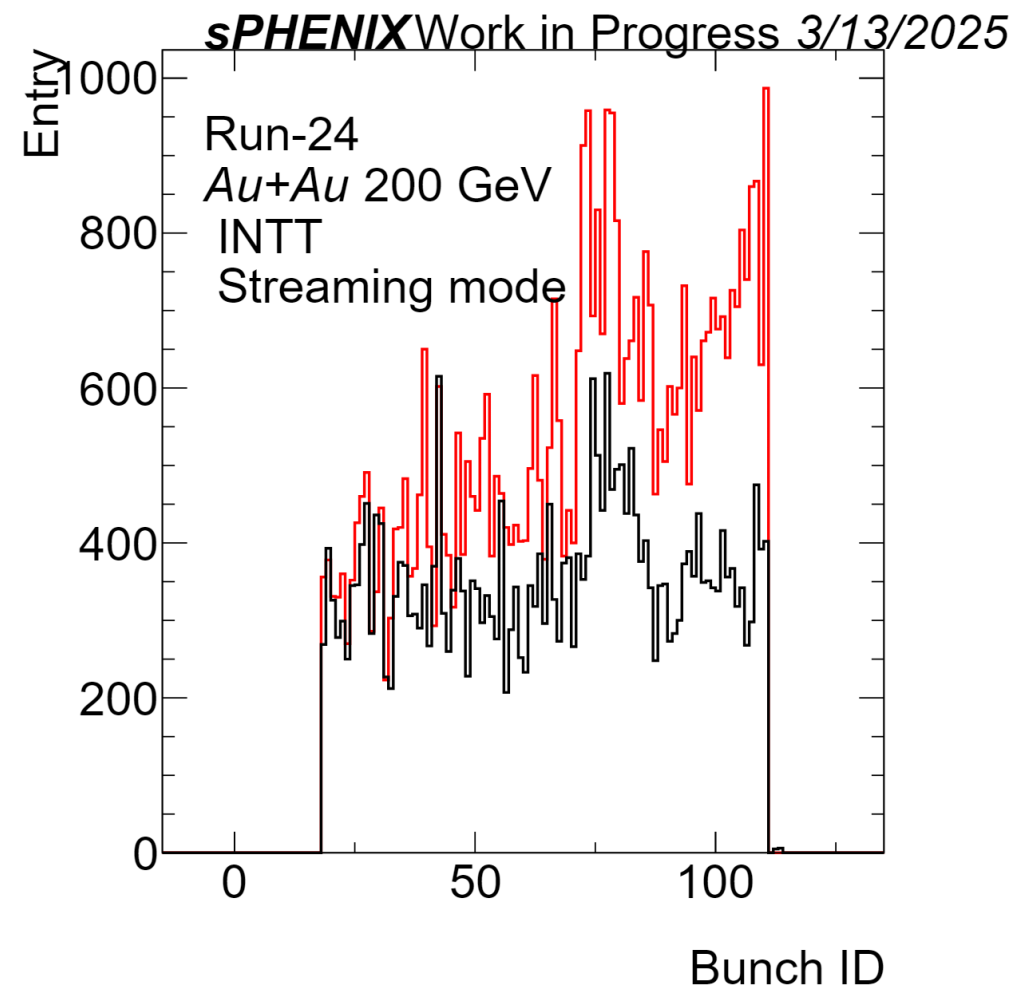
Event Mixup of Streaming readout



The distribution of mixup hits (Value on horizontal axis = 143 in the above figure) and (red),
distribution of non-mixup hits (Value on horizontal axis = 140) (black).

It can be seen that the distribution of non-mixup hits is constant, but mixup hits increase with bunch number.

Work in progress plot

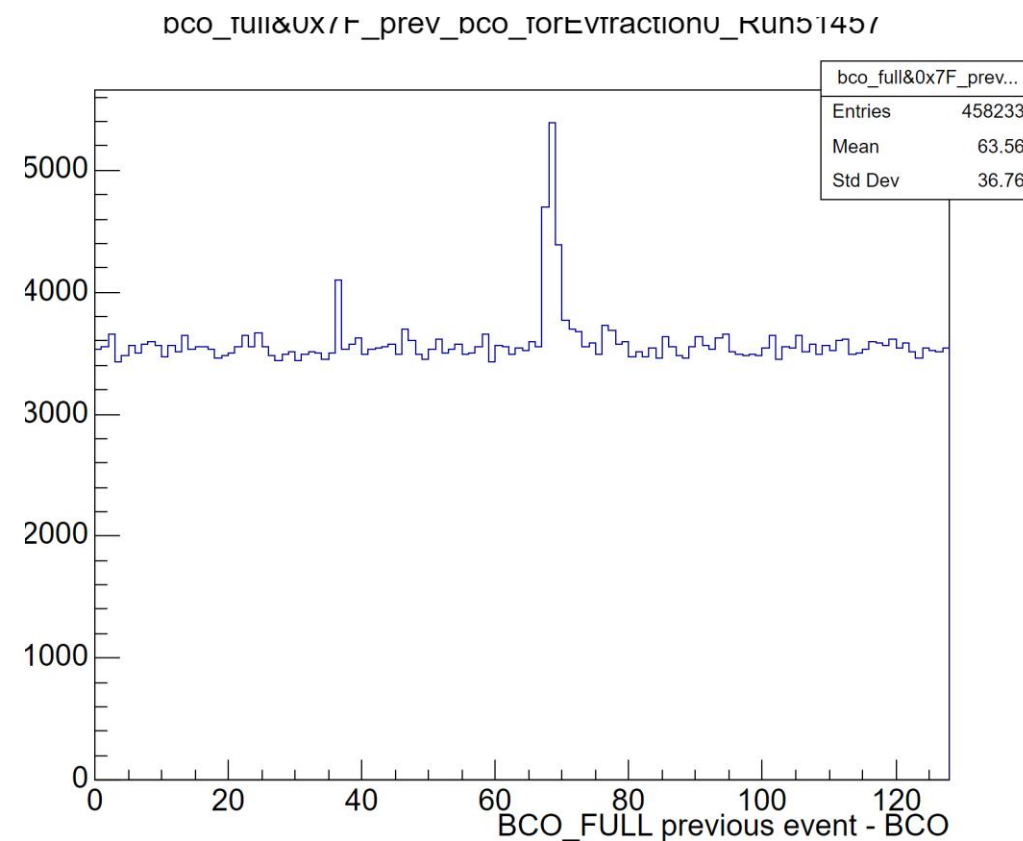
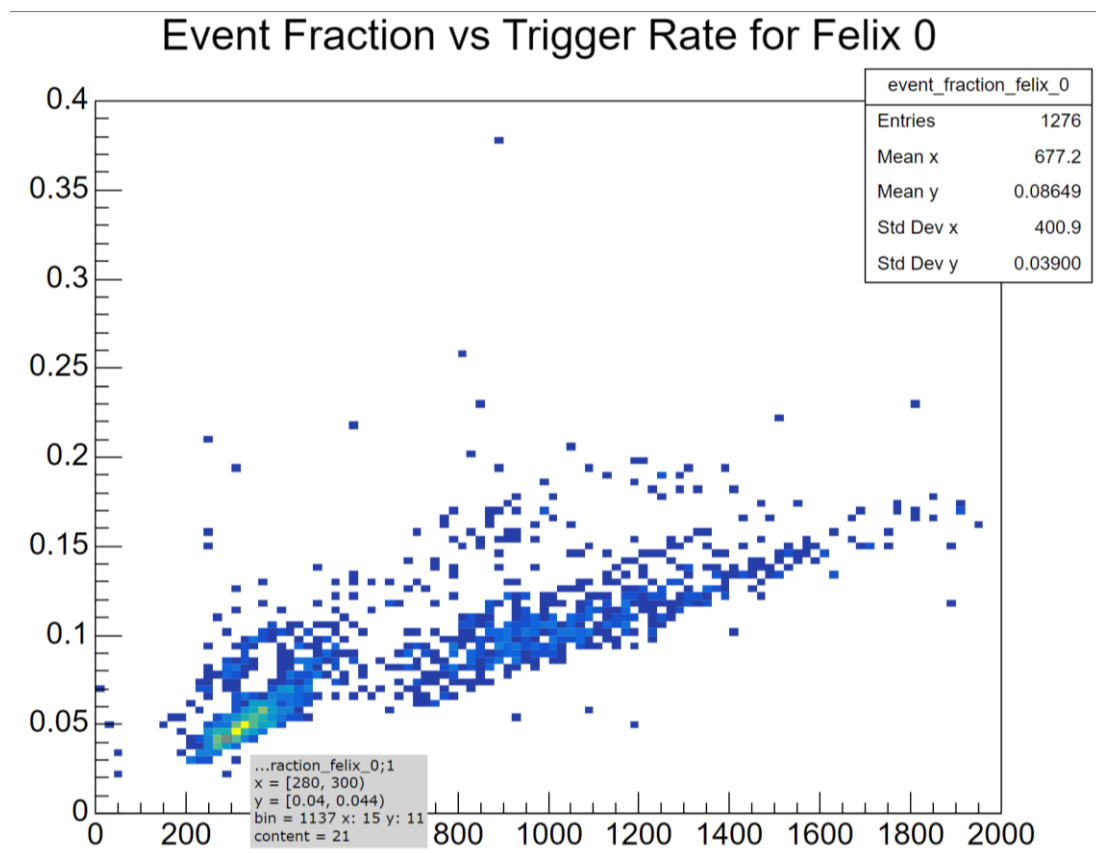


For Event fraction

- BGを引いていない相関図で低い所に位置するRun
- BGの割合は0.03268

BG引いた
Event fraction BGの割合

0.00833, 0.03268,



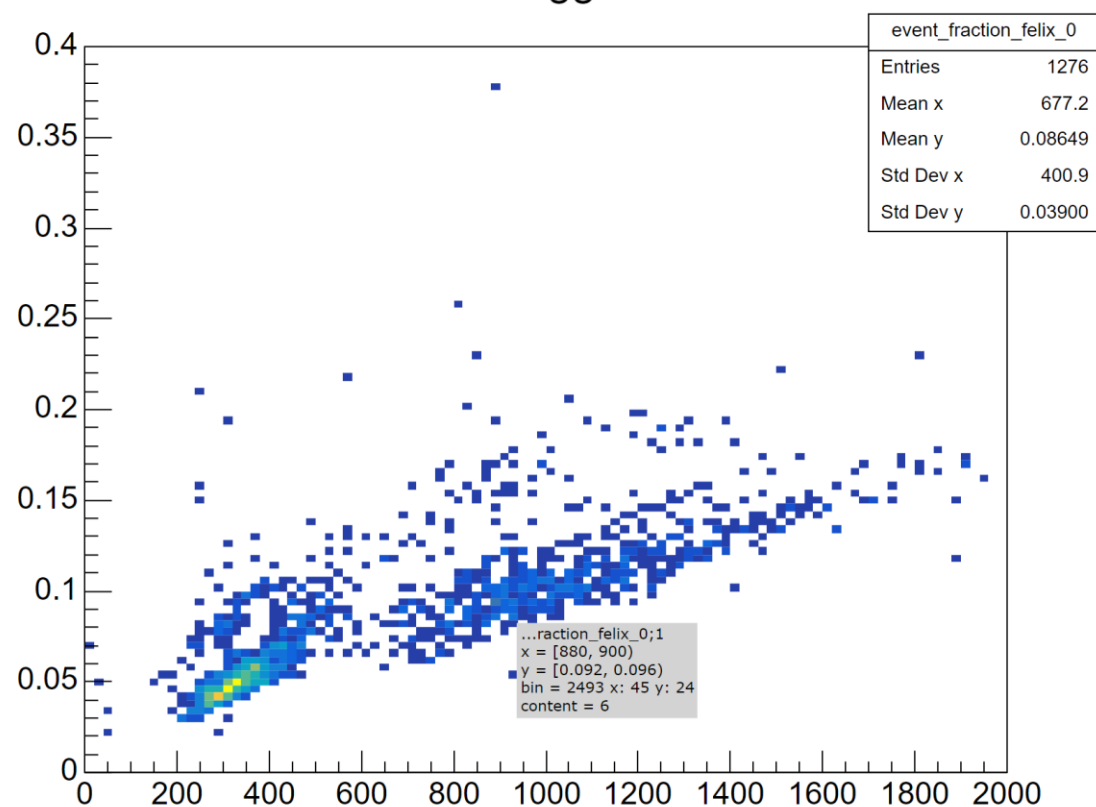
For Event fraction

- BGを引いていない相関図で中間に位置するRun
- BGの割合は0.0693225

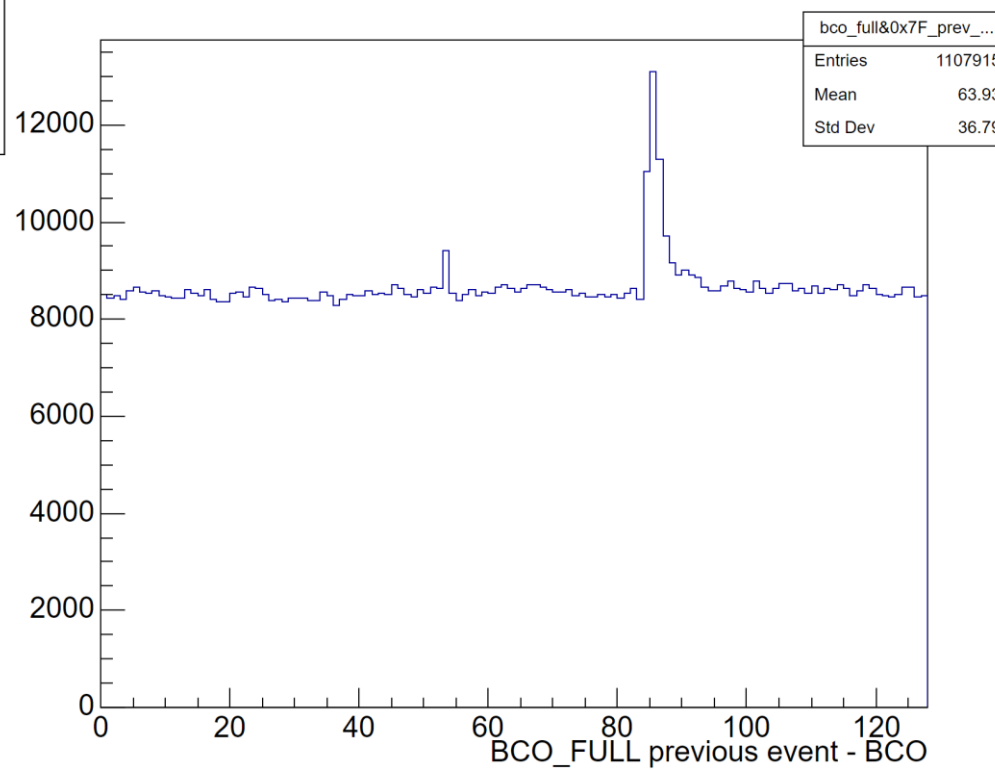
BG引いた
Event fraction BGの割合

0.0247075, 0.0693225,

Event Fraction vs Trigger Rate for Felix 0



bco_full&0x7F_prev_bco_forEvfraction0_Run47334



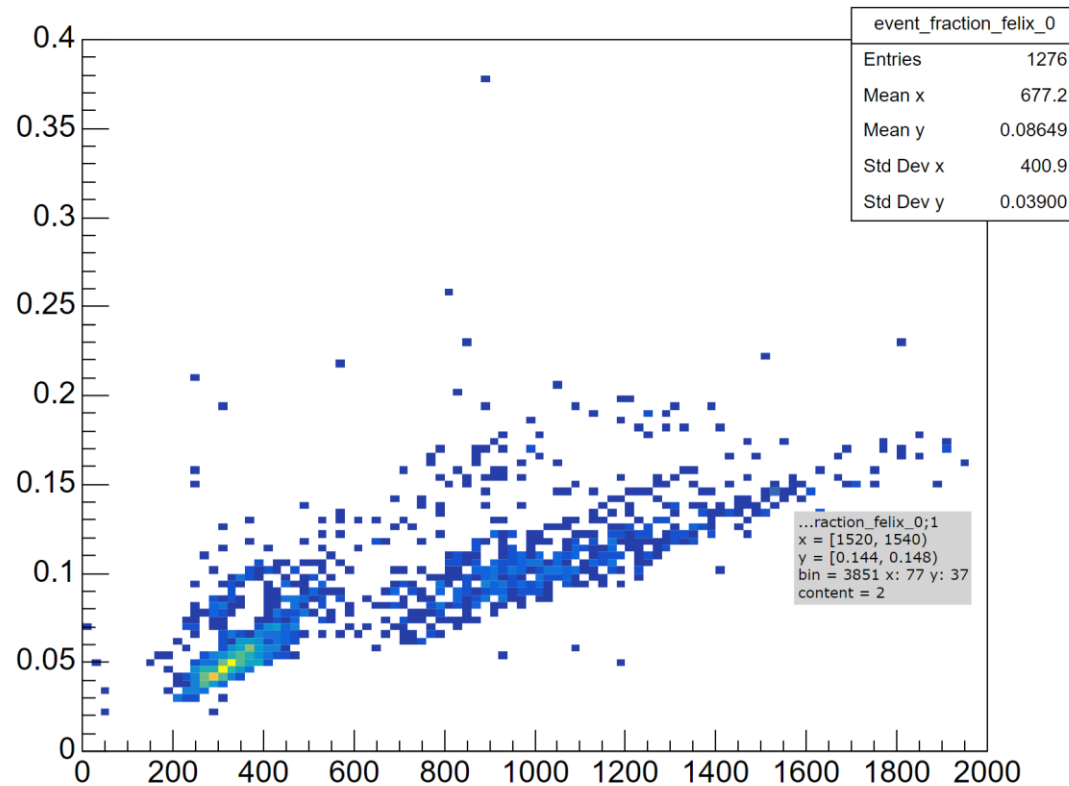
For Event fraction

- BGを引いていない相関図で高い所に位置するRun
- BGの割合は0.10194
- Rateが高くなるとBGの割合も高くなる

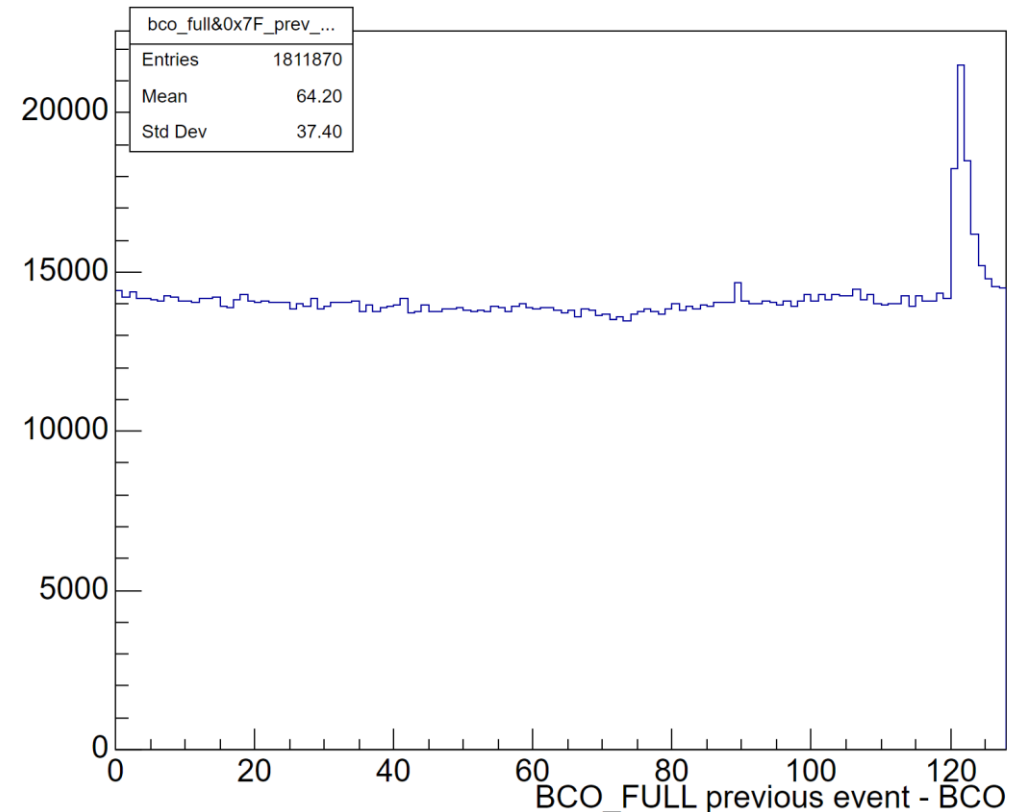
BG引いた
Event fraction BGの割合

0.04482, 0.10194,

Event Fraction vs Trigger Rate for Felix 0

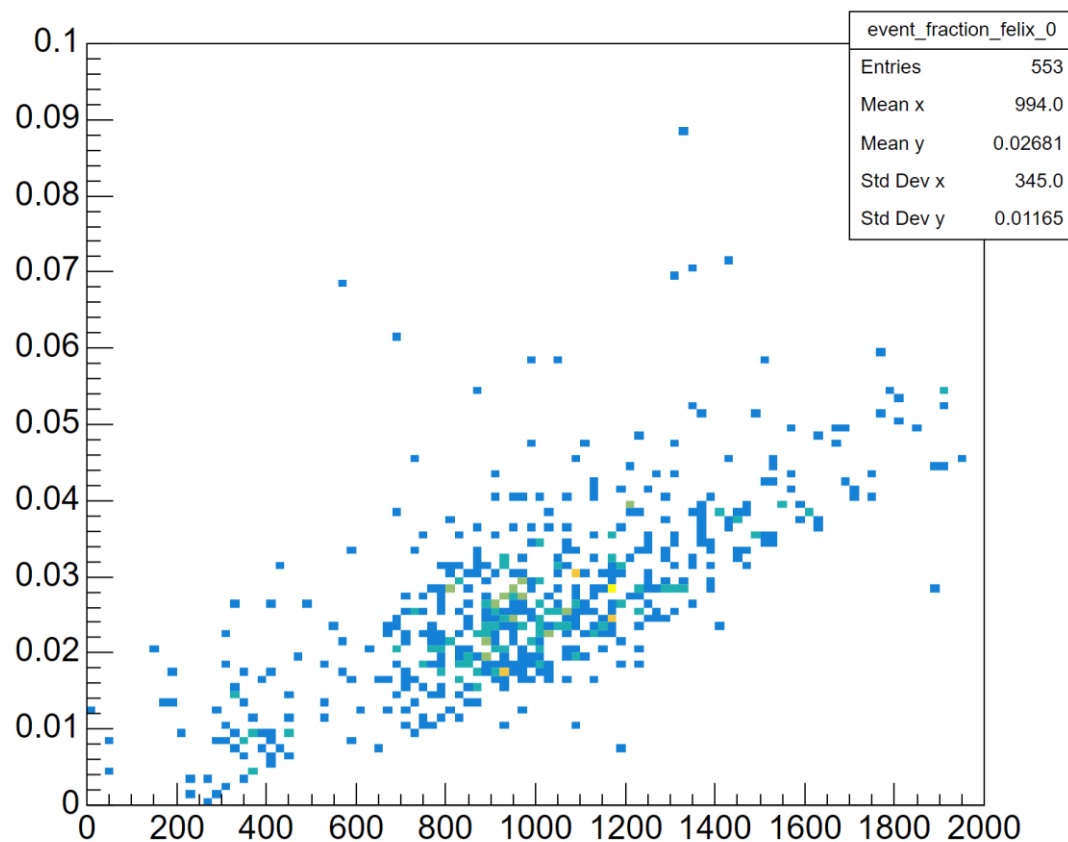


bco_full&0x7F_prev_bco_forEvfraction0_Run4/513



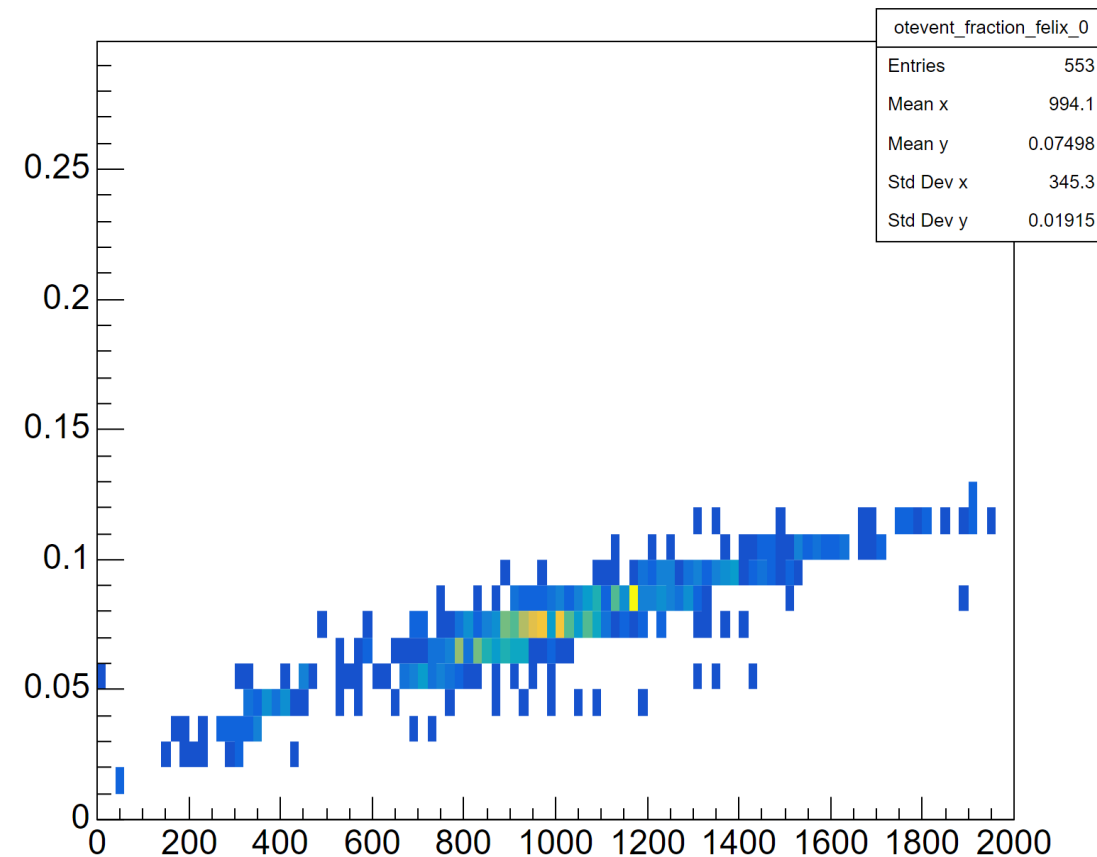
BG引いたEvent fraction

Event Fraction vs collision Rate for Felix 0



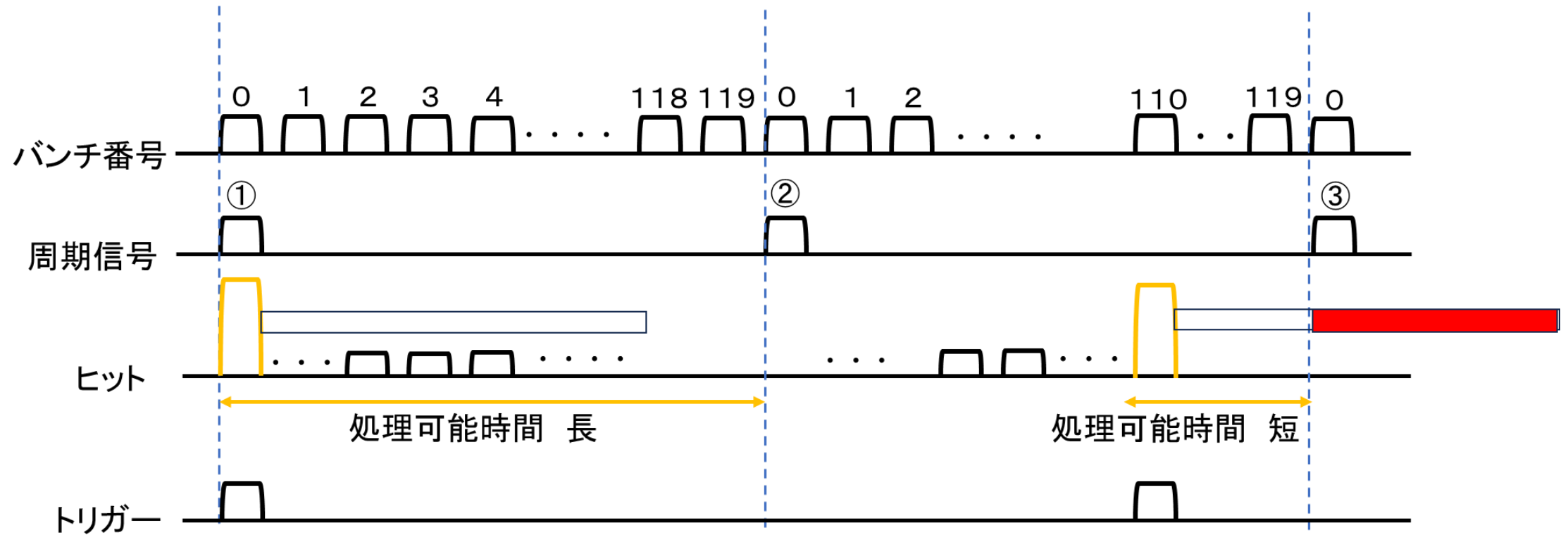
BGのfraction

otEvent Fraction vs Trigger Rate for Felix 0



Event fractionの相関とBGの相関の傾きは異なる

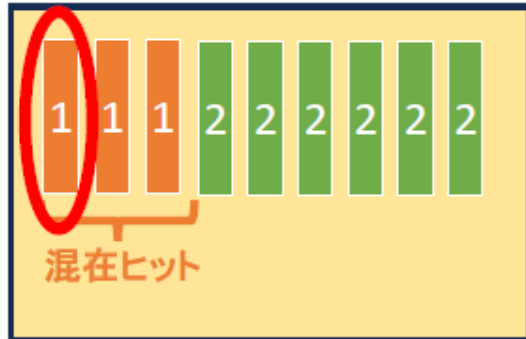
ストリーミングにおけるイベントミックスアップ



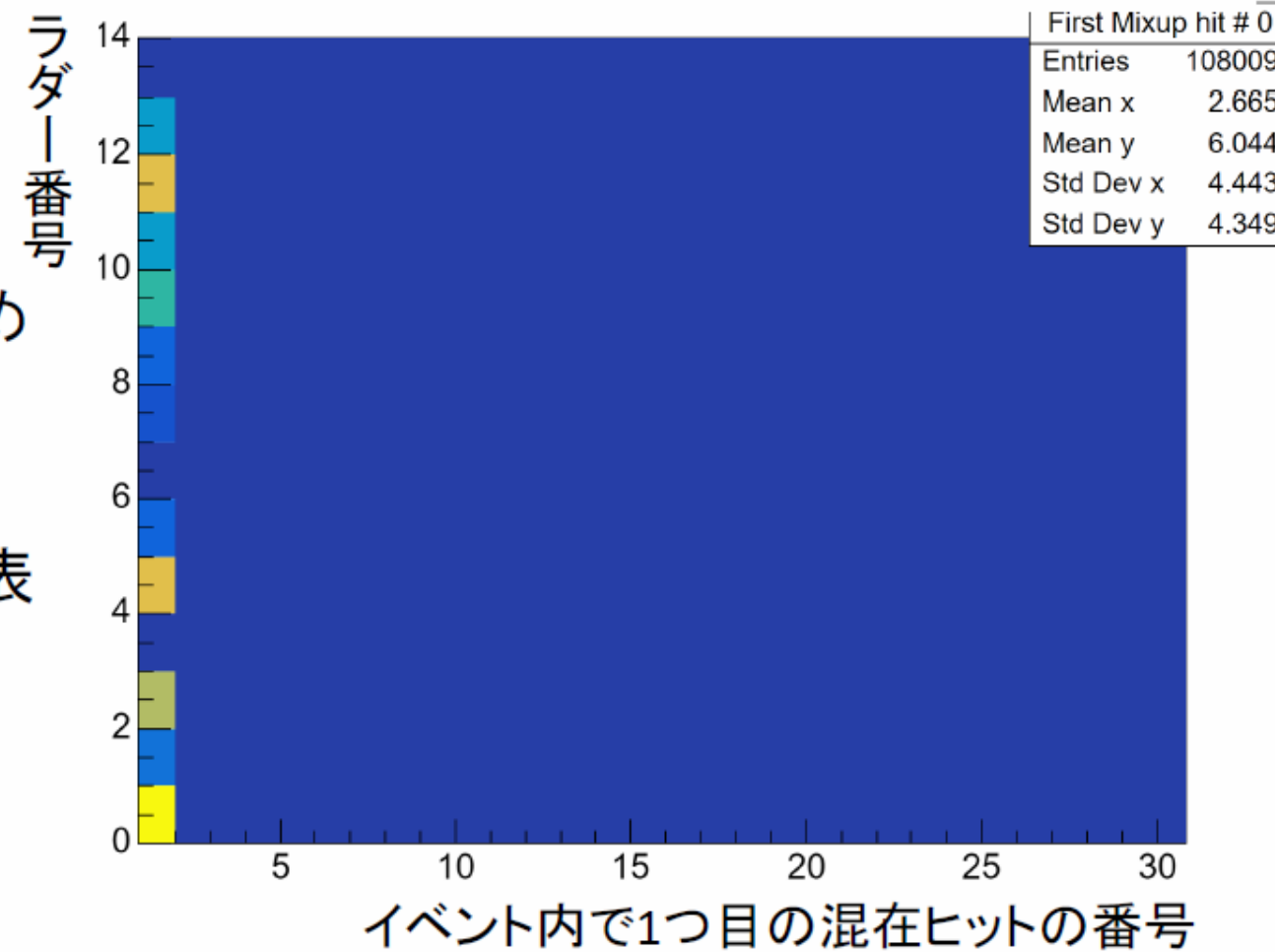
- トリガーの衝突によるヒットはヒット数が多く、全て処理するのに時間がかかる
- データ収集の早いタイミングで発生した衝突のヒットは、十分に処理可能時間があるため全て処理できる
- しかし遅いタイミングで発生したトリガーの衝突のヒットは処理が間に合わず、次のデータ収集へ混在する
- バンチ番号が大きい(データ収集内で後ろ)ほど、混在ヒットが増えると予想
- バンチ番号毎のヒット数の変化を調査

ヒットの処理順序 2024年金+金データ

今のイベント



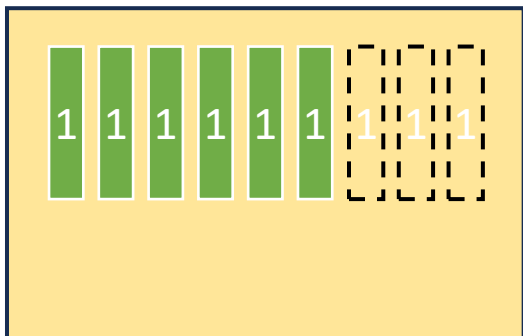
- イベントミックスアップ対処方法の検討のため
ヒットがどのように処理されているか調べた
- 混在ヒットはイベント内で最初のヒットとして表
れる
- ラダー毎にミックスアップヒットを見ると
識別することができる



MixupRate vs CollisionRate 相関

- 以前のBG込みと、このプロットを比較
- 何が違うか。 どう変わってきたか
- 最初： BG込みのため、 BGの影響が見えていた
- Ver2: BGを差し引いて、 MIXUPの効果をを見た。
 - レートが高、中、低を選んでみたところ、レートとBGに相関が見えることを目で確認した
 - 全Runを使った、 Mixup vs rate相関は見えていない。
- Ver3: BGを差し引いて、MixUp vs Rate相関を見た。
 - 相関プロットを作るマクロにバグがあったので修正した。(バグ: ひいていなかった)
- データ = Mixup + BG
 - 最初: データ vs CollRate
 - v3 : Mixup vs CollRate、 BG vs Rate
 - V2で見た結果(高中低)とv3の結果が一致していることの確認
 - これが Data = Mixup + BG になっていることの確認
 - Mixup vs Rateの傾きと、 BG vs Rateの傾きに違いがあるかどうか検証
- (もし余裕があれば)
 - データ順番解析のアップデート
 - $N_{hit} > 1500$ (相関が斜めになるところ) のときの、 Collision間隔
 - $n_{collision}$ が100以外のデータがもし解析可能な状態でしたら、そのランでintervalプロットを作ってみてもらえますか? Cheng-Weiの仮説が正しいなら、Mixup-Eventがない領域が32から変化するはずです。

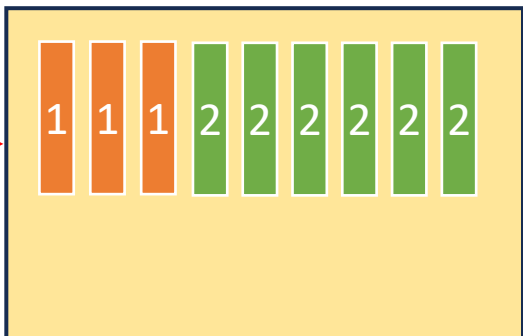
Previous Event
BCO_Full



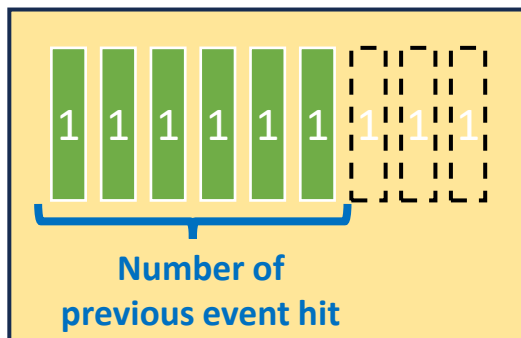
Collision
interval



This Event
BCO_Full



Previous Event
BCO_Full



This Event
BCO_Full

