# Preliminary Performance on INTT Hit Carryover

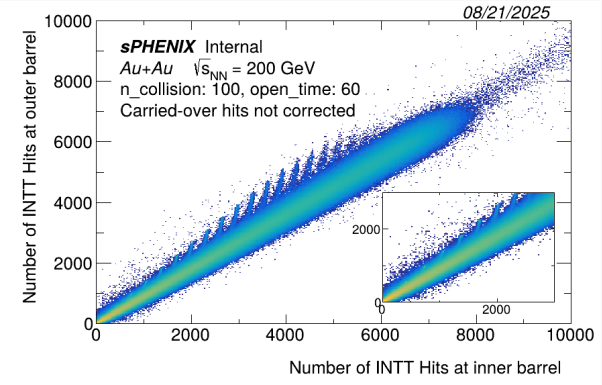
Ryotaro Koike
Kyoto University

# Overview



- **I'd like to request an approval of performance preliminary for these plots which demonstrate the cause of INTT hit carryover and its offline recovery.**

① before correction

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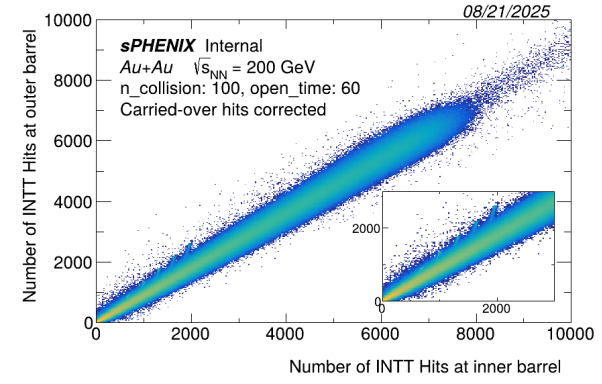
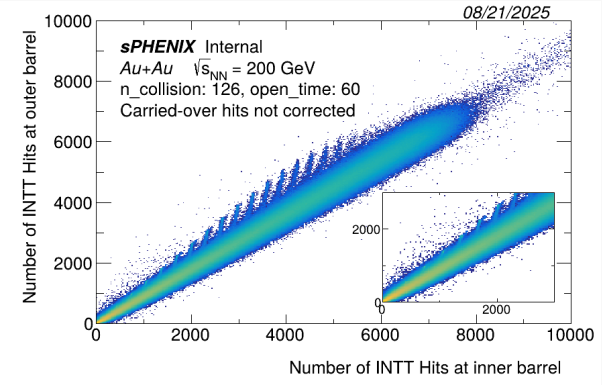



Previous default parameter

③ before

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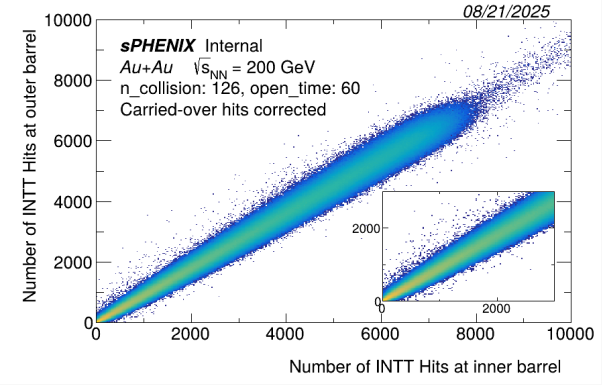
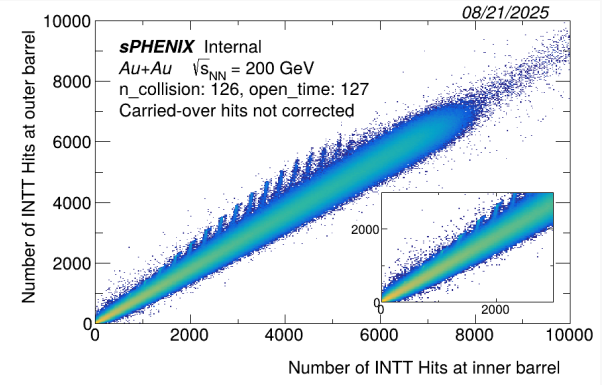



Different parameter

⑤ before

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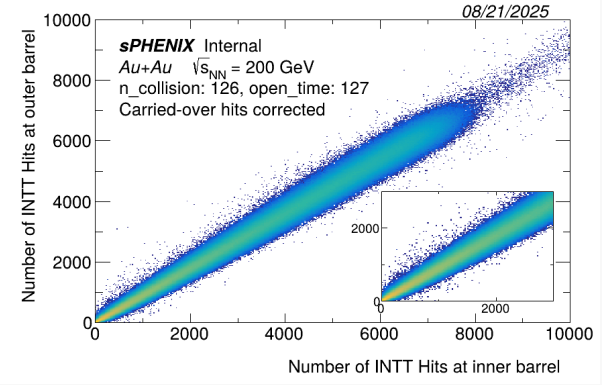
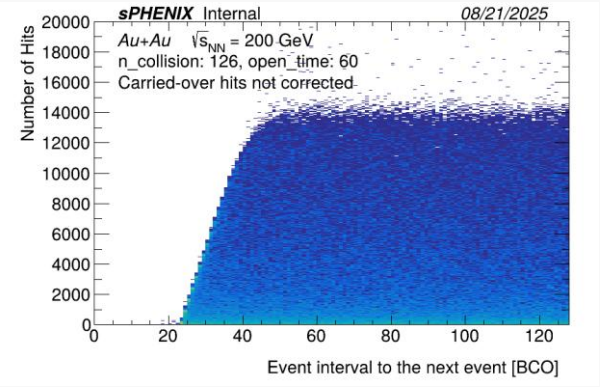



⑦




Current default parameter

# Condition



- **INTT special runs for hit carryover study**

**Table 1:** List of runs used for the analysis.

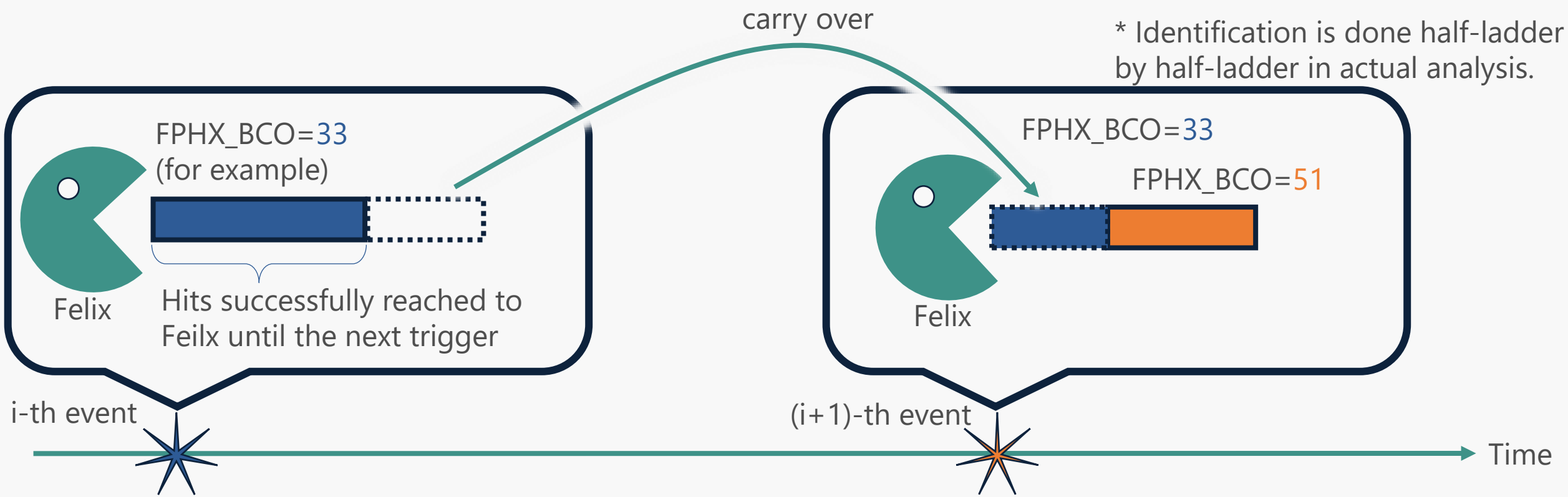
| Run | n_collision [BCO] | open_time [2 BCO] |
|---|---|---|
| 71345 | 100 | 60 |
| 71346 | 126 | 60 |
| 71347 | 126 | 127 |

- **Run condition:**
  - 111 x 111 Au+Au collision, $\sqrt{s_{NN}} = 200$ GeV (Run-25)
  - INTT in the big partition.
  - Trigger mode
- **Event selection**
  - First 10 M events were used.
  - MBD z-vertex $< 10$ m cut was applied.
- **Analysis note:** https://sphenix-invenio.sdcc.bnl.gov/records/j8nm3-wwz77

# Mechanism of hit carryover



- **Felix carries over hits in i-th event to the (i+1)-th event if the hits could not reach to felix until next trigger comes.**
- **Felix starts the process of (i+1)-th event with those carried-over hits.**



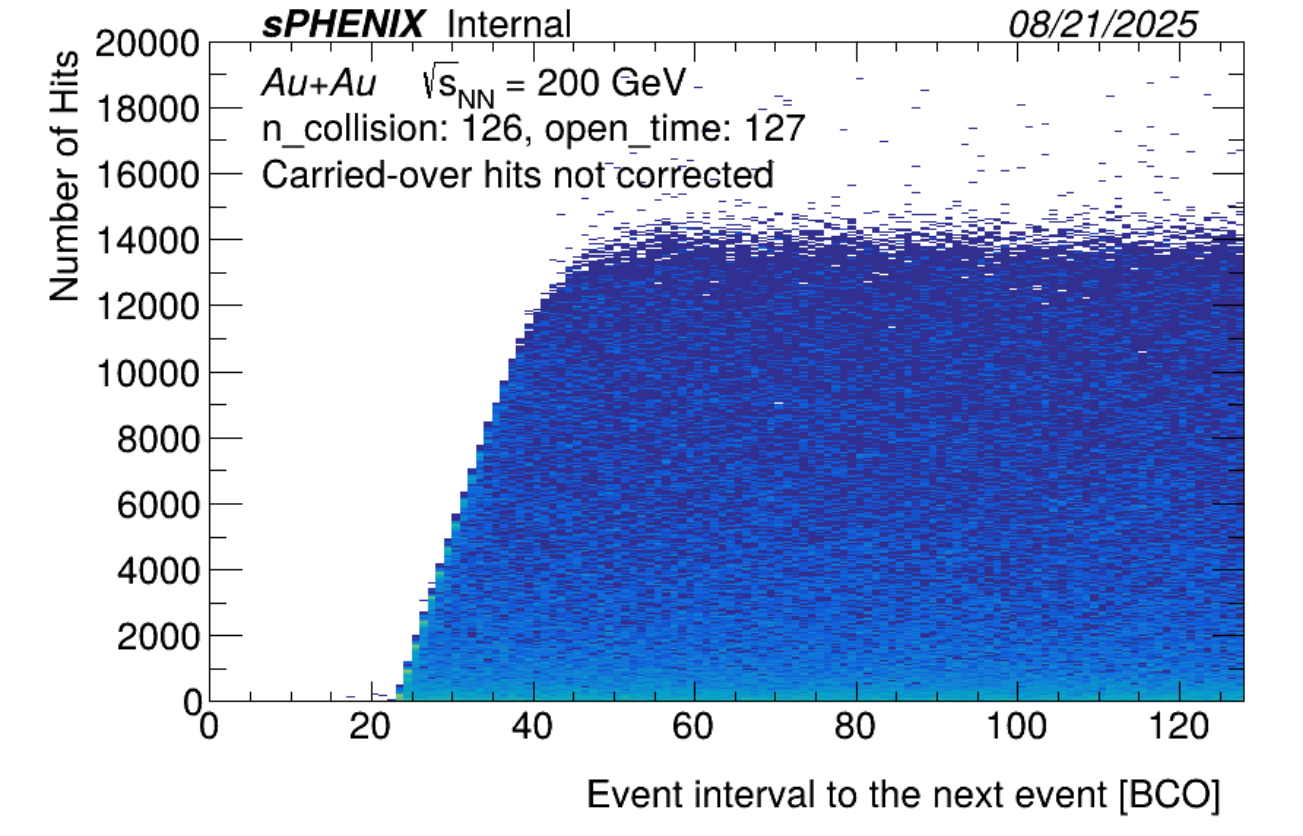
# The cause of INTT hit carryover



**What this plot shows: Number of hits (successfully) recorded as a function of interval to the next event.**

**Multiplicity (~the y-axis) is independent from the event interval (the x-axis).**

**Step-function-like upper limit exist due to a limitation from the transmission rate per BCO** ⑦



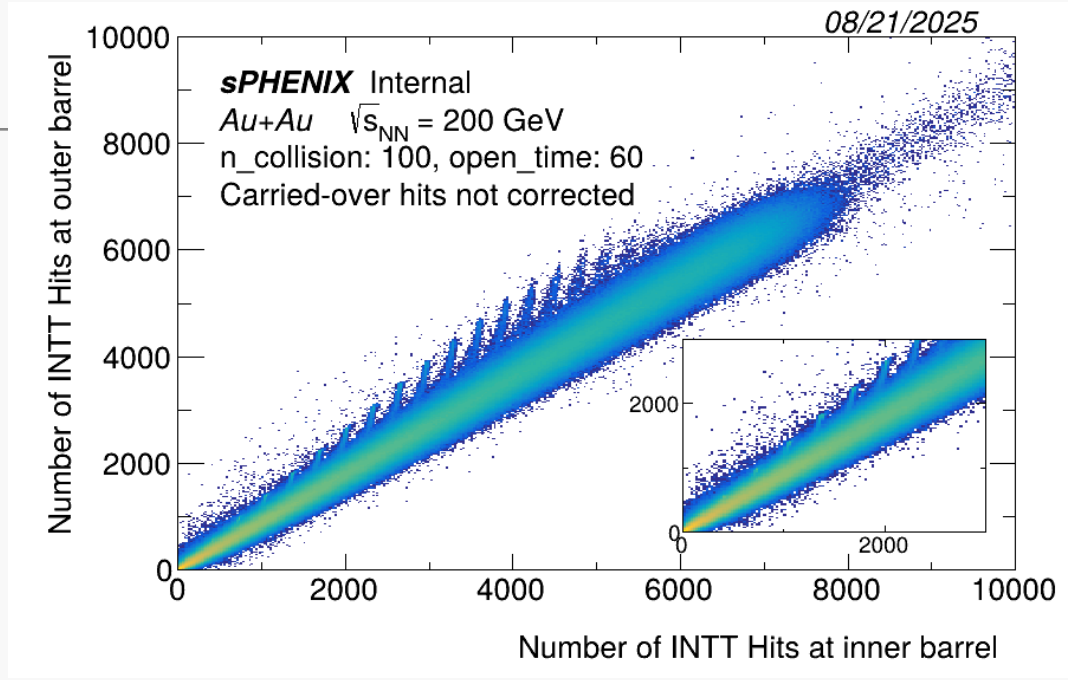

- **This plot is a proof that our understanding of the mechanism is right.**

# Correction to hit counts



- We corrected the number of hits by the number of carried-over hits.
- Some branches remained in the previous default parameter setting.

① before correction

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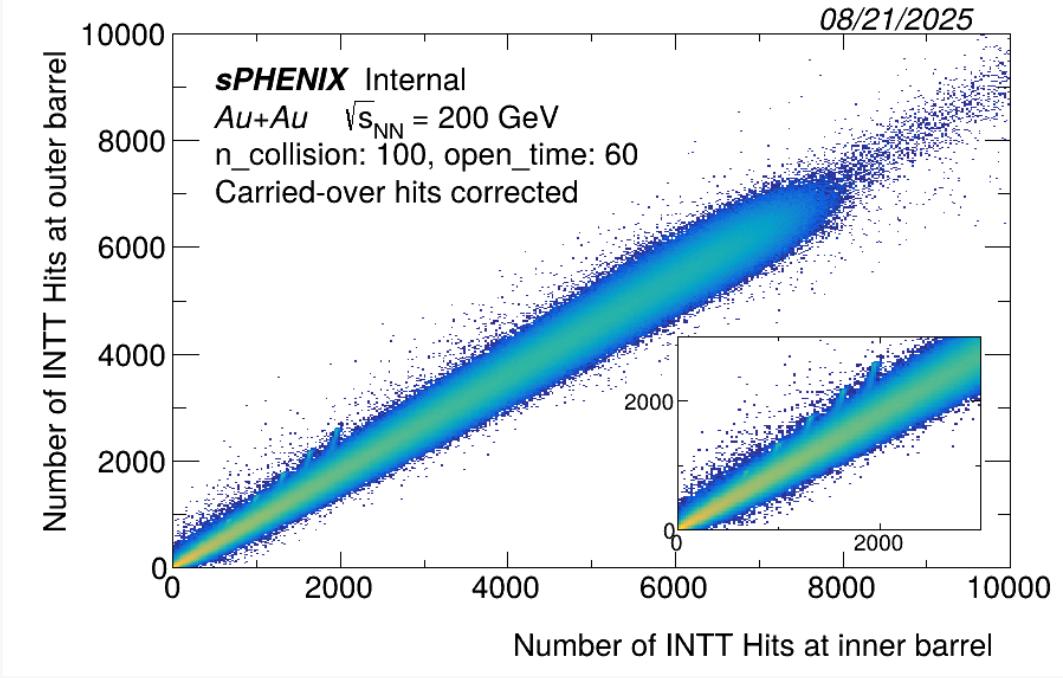

# Correction to hit counts



- **All branches returned back to the normal position if we extend n_collision.**

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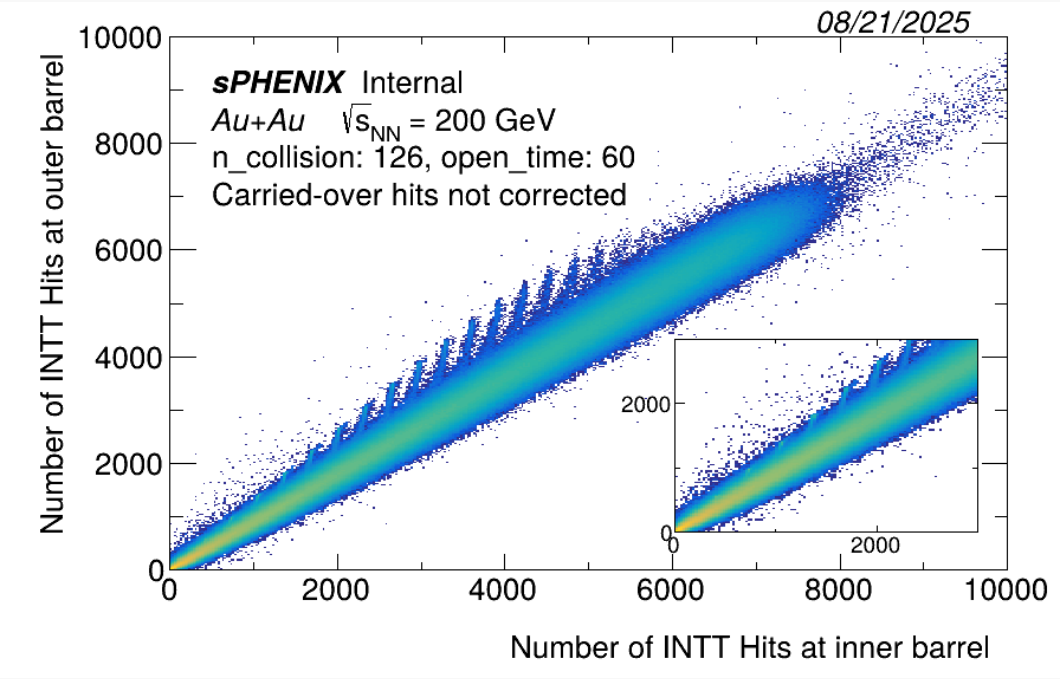


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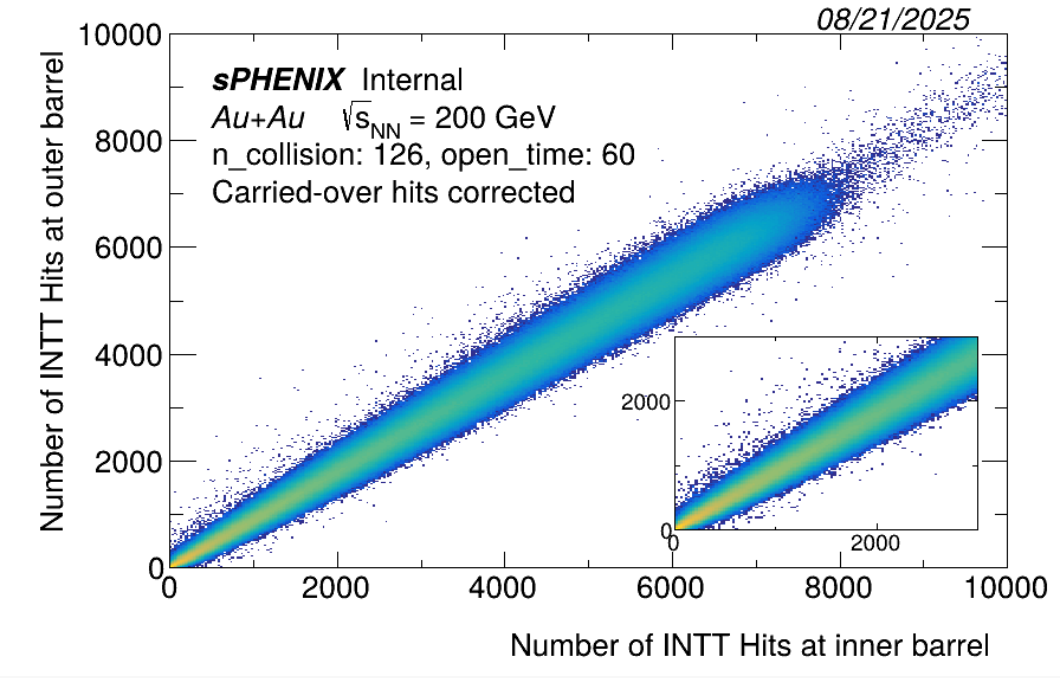

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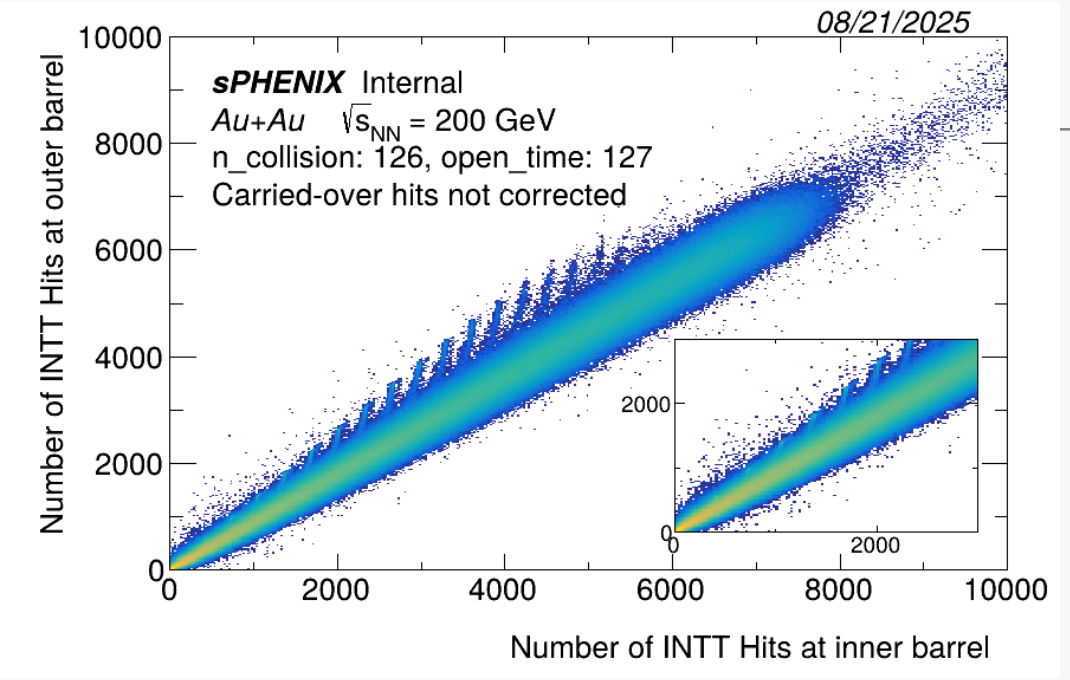


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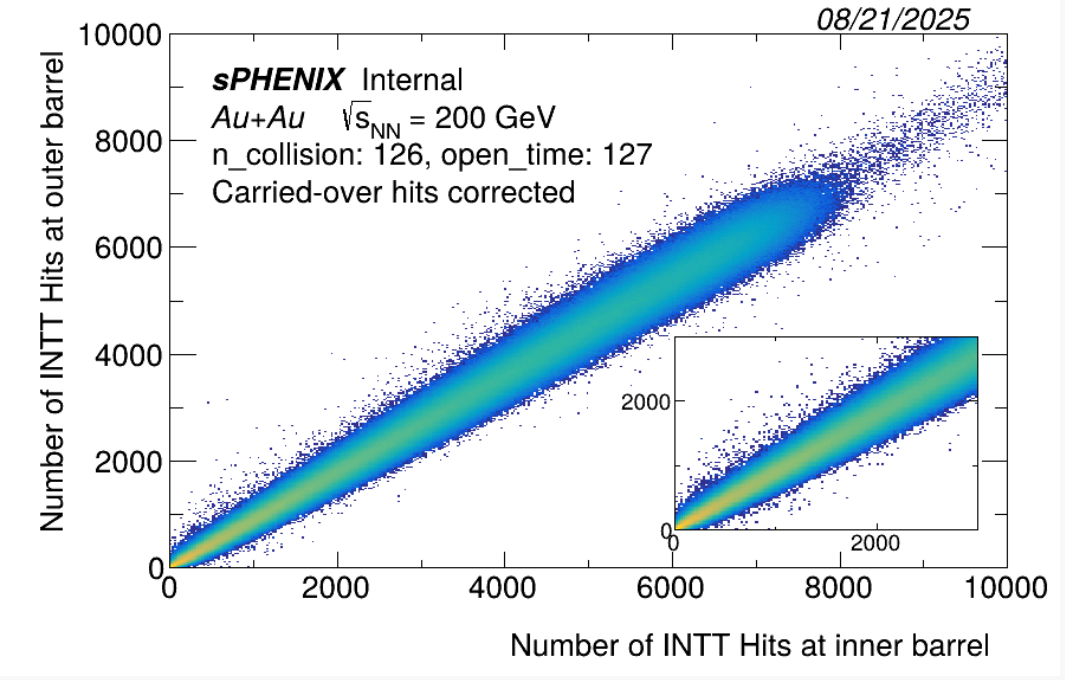

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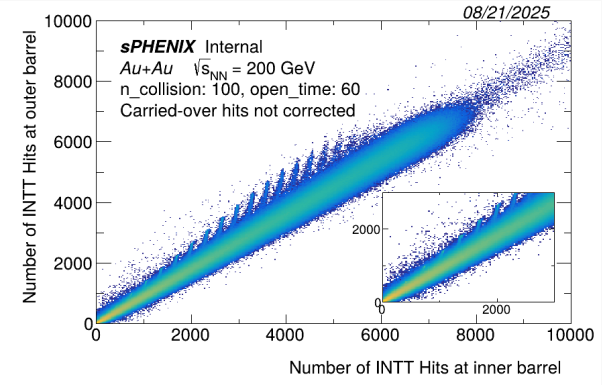


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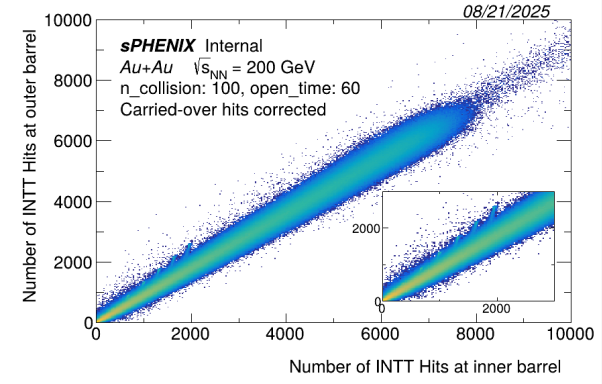


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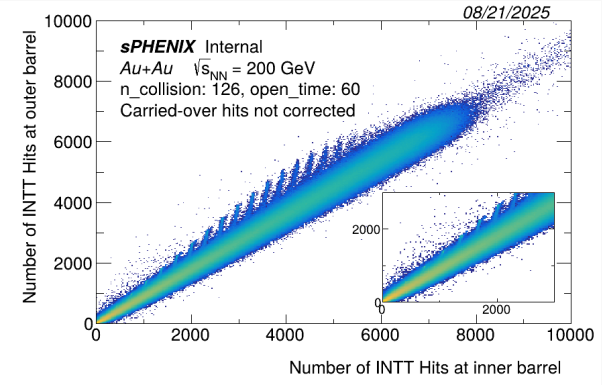


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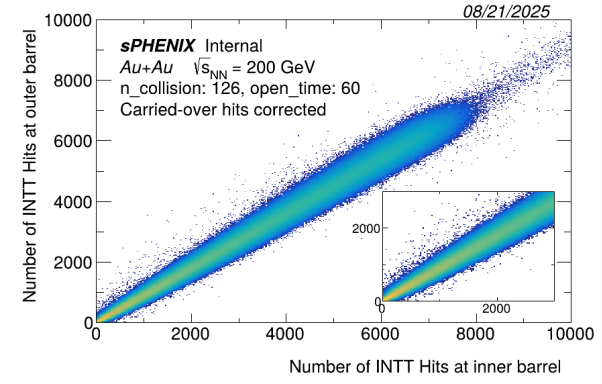


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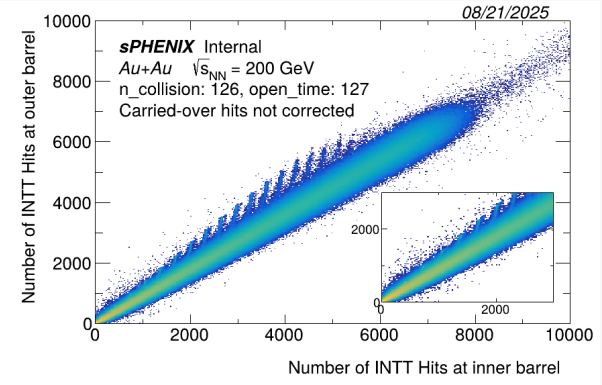


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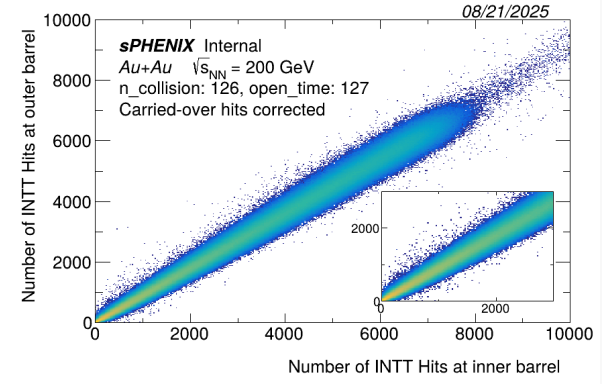
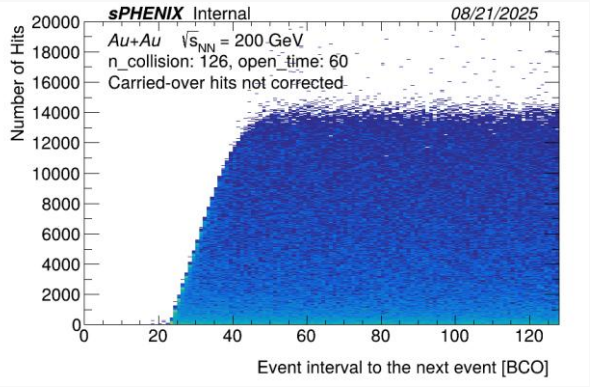



⑦




Current default parameter

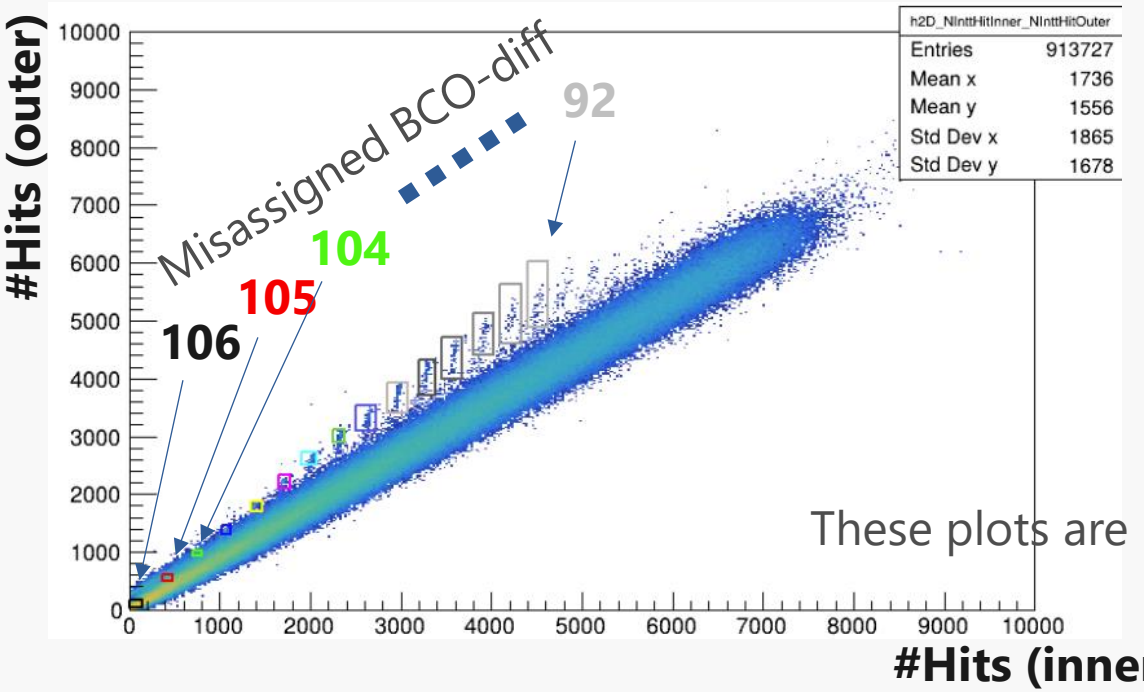
# Backup

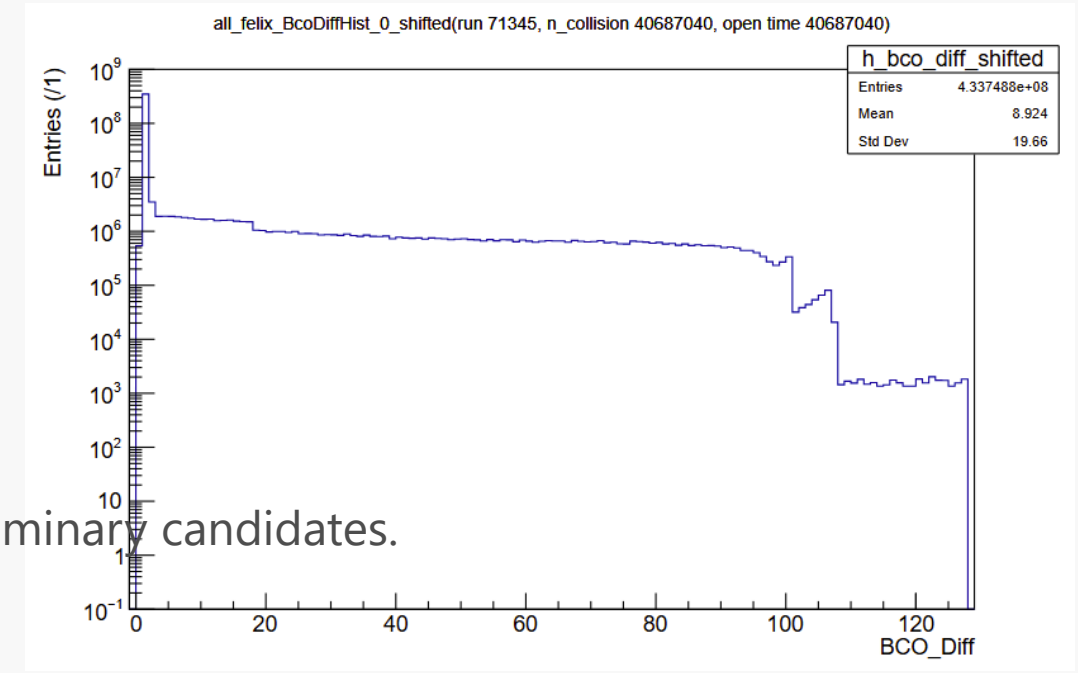
# Reason we can push carried-over hits back now



- Extending n_collision to 126 from 100 was effective.
- Q: Why?
- A: Carried-over hits were rejected in the next event according to n_collision, since a wrong BCO_diff value was attached to those hits.

$$(\text{misassigned BCO diff}) = (\text{fphx bco})_{\text{carried-over hits from i th evvent}} - (\text{BCO full})_{i+1 \text{ th event}}$$



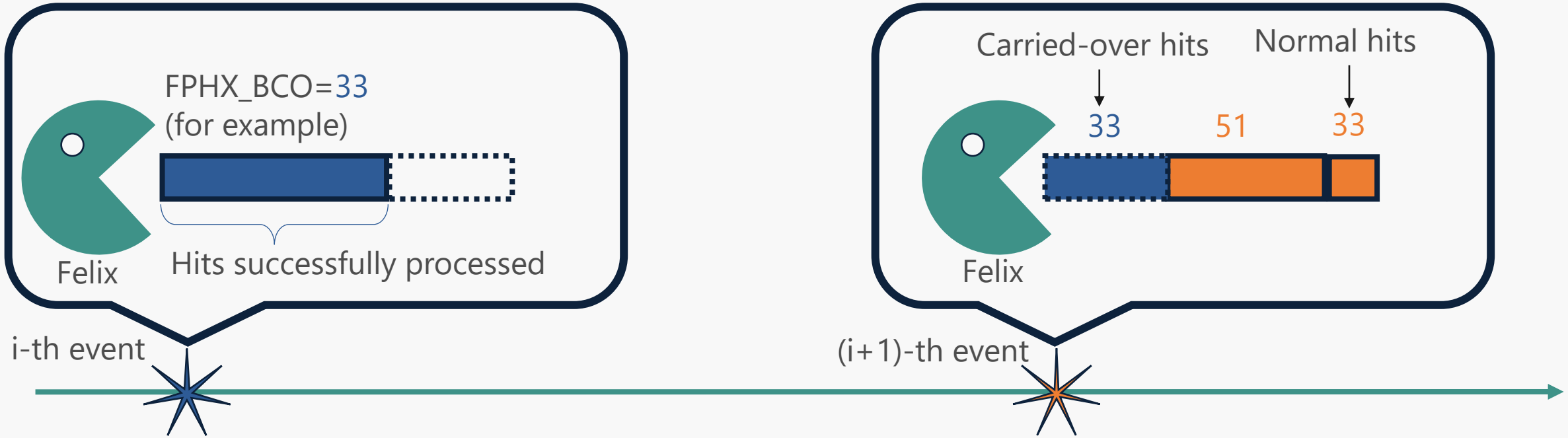

These plots are **not** preliminary candidates.

# Identification of carried-over hits.



- **A hit in (i+1)-th event is considered as carried-over hit**
  - if its fphx_bco is the same as the major hits of i-th event,
  - but only if no hits with different fphx_bco were recorded before that hit.

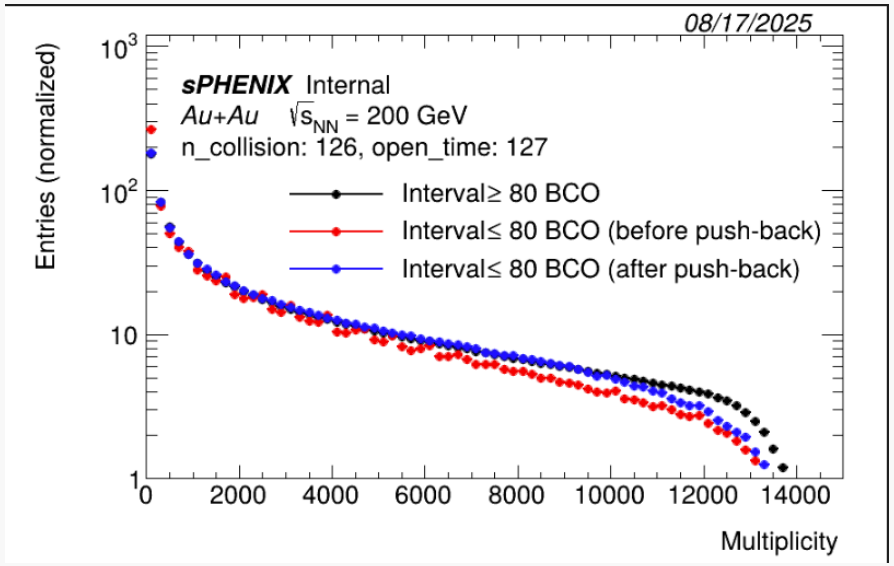
* Identification is done half-ladder by half-ladder in actual analysis.

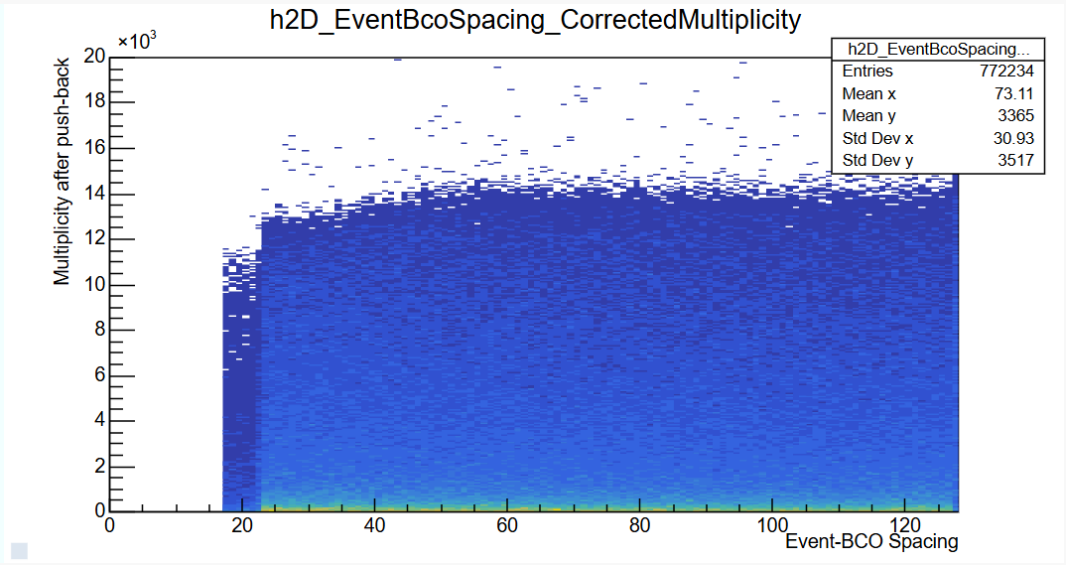


# Difference between identification methods



First N hits




All hits that have the same bco