INTT Publications and Plan

RIKEN/RBRC
Itaru Nakagawa
on behalf of INTT team

Ladder NIM (Published) ✓

Nuclear Instruments and Methods in Physics Research A 1082 (2026) 171020

Contents lists available at ScienceDirect

Nuclear Inst. and Methods in Physics Research, A

journal homepage: www.elsevier.com/locate/nima

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Full Length Article

The ladder and readout cables of intermediate silicon strip detector for sPHENIX

Y. Akiba [a,b], H. Aso [g,a], J.T. Bertaux [i,b], D. Cacace [c], K.Y. Chen [d], K.Y. Cheng [d,b], A. Enokizono [a], H. Enyo [a,b], K. Fujiki [g,a], Y. Fujino [g,a], M. Fujiwara [e,a], T. Hachiya [e,b], T. Harada [g,a], S. Hasegawa [f], M. Hata [e,b], B. Hong [k], J. Hwang [k,b], T. Ichino [g,a], M. Ikemoto [e,a], D. Imagawa [g,a], H. Imai [g,a,b], Y. Ishigaki [e,a], M. Isshiki [e], K. Iwatsuki [e,a], R. Kan [e], M. Kano [e,a], T. Kato [g,a], R. Kawashima [g,a], T. Kikuchi [g,a], T. Kondo [h], C.M. Kuo [d], H. Kureha [e], T. Kumaoka [a], H.S. Li [i], R.S. Lu [j], E. Mannel [c], H. Masuda [g,a], G. Mitsuka [b], N. Morimoto [e,a], M. Morita [e,b], I. Nakagawa [a,b,*], Y. Nakamura [g,a], G. Nakano [g,a], Y. Namimoto [e,b], D. Nemoto [g,a], S. Nishimori [e], R. Nouicer [c], G. Nukazuka [a], I. Omae [e,a], R. Pisani [c], Y. Sekiguchi [a], M. Shibata [e,b], C.W. Shih [d,b], K. Shiina [g,a], M. Shimomura [e], R. Shishikura [g,a], M. Stojanovic [i,b], K. Sugino [e], Y. Sugiyama [e], A. Suzuki [e,b], R. Takahama [e,b], L.S. Tsai [j], W.C. Tang [d,b], Y. Terasaka [e], T. Todoroki [b], H. Tsujibata [e,a], M. Tsuruta [g,a], Y. Yamaguchi [b], H. Yanagawa [g,a], M. Watanabe [e,b], R. Xiao [i], W. Xie [i]

sPHENIX/INTT wiki

Publications [edit | edit source]

INTT Barrel Performance [edit | edit source]
- in preparation (overleaf)

INTT Tohoku Beam Test [edit | edit source]
- 2025/8/31 preprint arXiv:2509.00908

INTT Ladder and Readout Cables [edit | edit source]
- 2025/10/1 published NIMA1082(2026)171020

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@article{Nakagawa2025,
SerialNo={11},
author={Akiba, Y. and others},
year={2026},
title={The ladder and readout cables of intermediate silicon strip detector for sPHENIX},
journal={{\rvtissnNuclear} {\rvtissnInstrument} Meth. A},
volume={1082},
 pages={171020},
post={\myehost{http://arxiv.org/abs/2503.09105}[arXiv:2503.09105]},
primaryClass={physics.ins-det},
doi={10.1016/j.nima.2025.171020},
}
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- 2025/3/12 preprint arXiv:2503.09105

Bus Extender (Electrical Characteristics) [edit | edit source]
- Development of Long and High-Density Flexible Printed Circuits (Trans. Jpn. Inst. Electron. Packag.)

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@article{Takashi Kondo2022,
  title={Development of Long and High-Density Flexible Printed Circuits},
  author={Takashi Kondo and Kohei Fujiwara and Takashi Hachiya and Hikaru Imai and Miu Morita and Itaru Nakagawa and Naoyuki Sato and Masato Tsuruta and
Daisuke Yanagawa},
  journal={Transactions of The Japan Institute of Electronics Packaging},
  volume={15},
  number={ },
  pages={E21-007-1-E21-007-10},
  year={2022},
  doi={10.5104/jiepeng.15.E21-007-1}
}
```

Thanks to team members in R&D/Construction phase of INTT

Proposed plan for INTT Publications

Topics	Target Journal	Leading Author	Timeline	Status
Bus Extender ✓ (Electrical)	The Japan Institute of Electronics Packaging	Takashi Kondo (TIRI)	2022/Aug	Published
2021 Beam Test✓	ELPH Ann. Rprt.	Genki/Cheng-Wei/Yuka	2022/Winter	Published
INTT Ladder✓	NIM	Itaru	2025/Sept.	published
2021 Beam Test	NIM	Genki/Cheng-Wei	2025/Summer	Submitted
INTT Barrel	**NIM**	**Itaru/Rachid**	**2025/Fall**	**In preparation**
Bus Extender (Mechanical)	NIM	Takashi	2025?	Final evaluation of the yield rate

Author List

- Either INTT team authors or sPHENIX Collaboration
- This is the 1st Detector paper using collision data, so INTT team author list is allowed.
- Many INTT team authors who contributed to the barrel construction phase will be dropped from the sPHENIX collaboration author list.
- I personally prefer INTT team authors to credit their contributions and acknowledge to BNL/sPHENIX crews.

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Scope for the Barrel NIM

Hardware Configuration

- Introduction (Itaru, Rachid)
- Barrel Structure (Rachid, Dan)
- Beam Clock Distribution (Itaru)
- LV/Bias power system (Itaru, Ivan)
- Cooling System and heat removing performance (Rachid, Rob)
- ~~ROC~~
- Felix (Itaru, Raul)
- ~~RC-DAQ~~

Beam Commissioning

- # of live/good channels (Jaein)
- Trigger/Extended Trigger/Stream readout modes, Timing resolution (Ryotaro, Genki?)
- ~~DAC Scan ()~~
- ~~Half entry (Tomoki)~~
- ~~FPHX Chip saturation (Shang-Yu)~~
- Signal to noise ratio (Cheng-Wei)
  - Noise hit rate from the abort gap.
- ~~Cluster size ()~~
- Hit multiplicity correlation inner_outer and/or w/ MBD/MVTX? (Genki?/Cheng-Wei)
- Tracklet(Genki?) ADC, etc…
- Z-vertex reconstruction performance (Mahiro?)
- XY-Vertex reconstruction (Cheng-Wei)
- Efficiency? (Takahiro/?)
- Cosmic ray event display (Cheng-Wei)

Dead and Hot Channel Maps

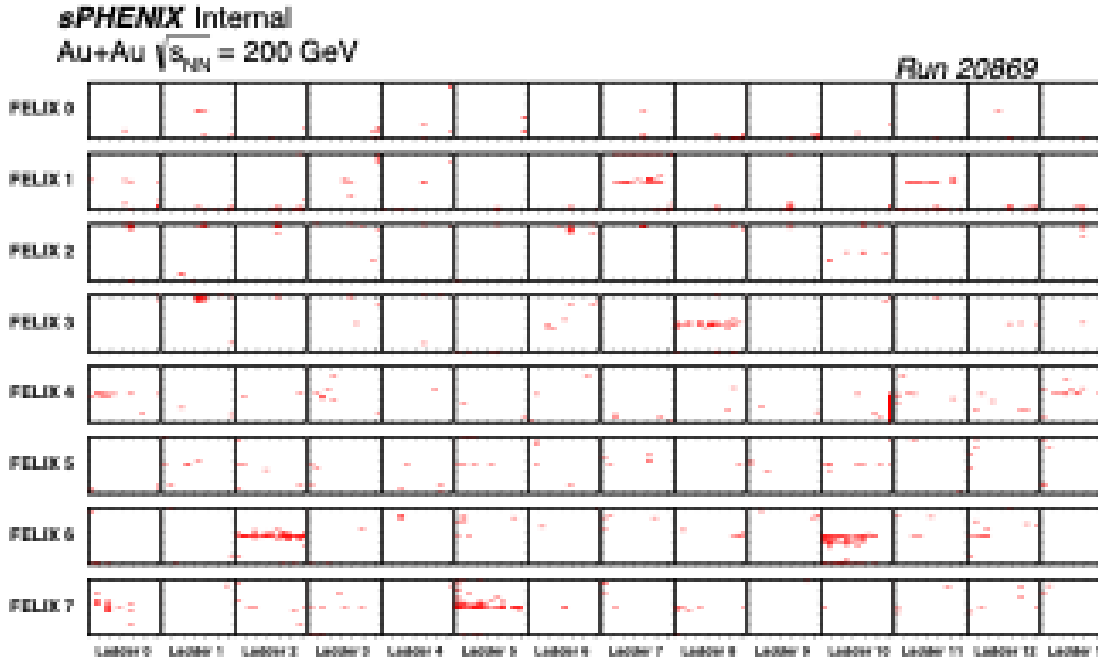


Figure 6: The map of hot channels of run 20869.

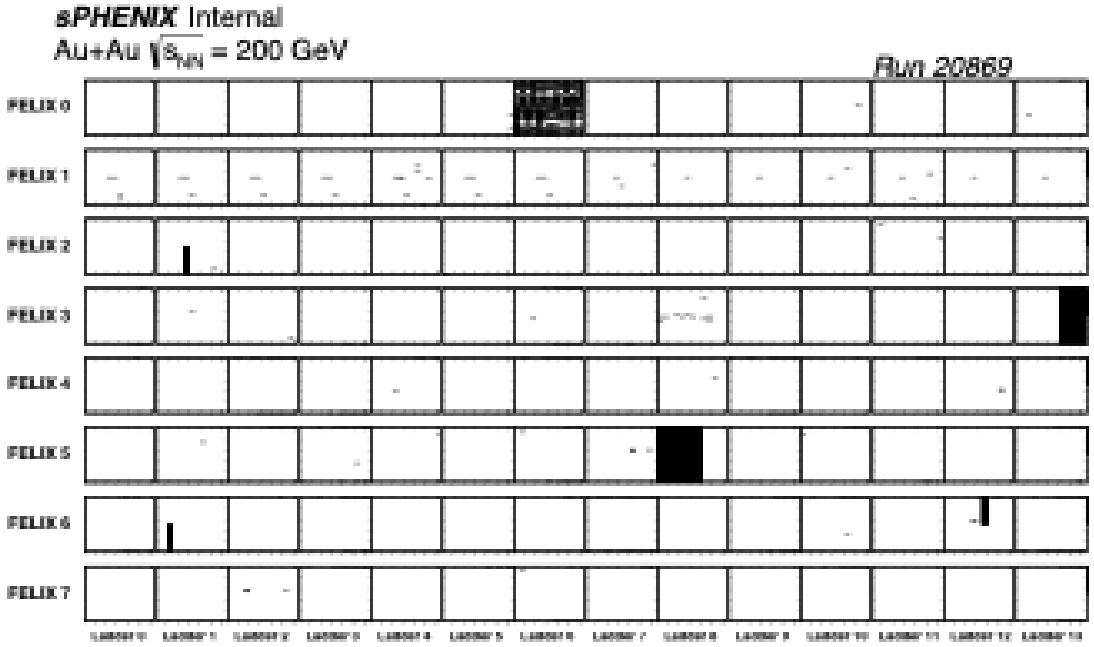
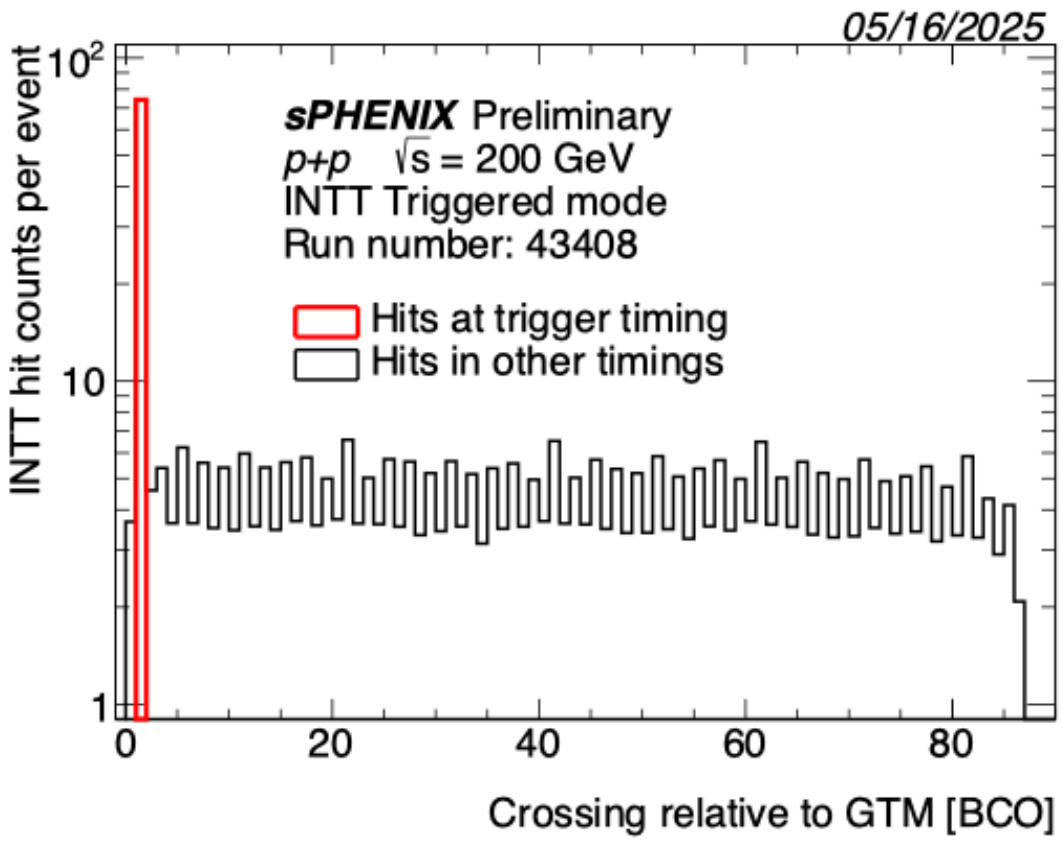


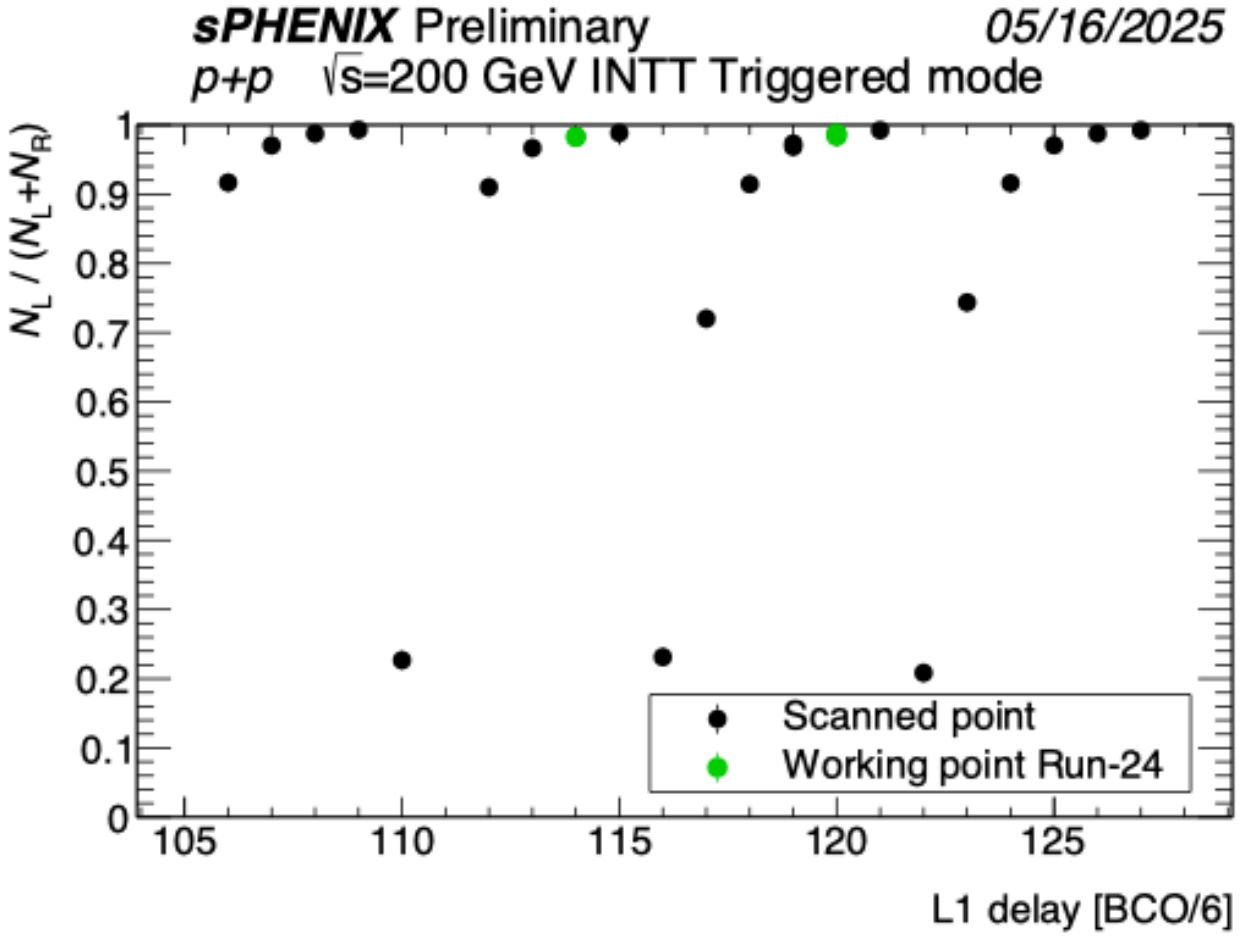
Figure 7: The map of dead channels of run 20869.

Phi distributions

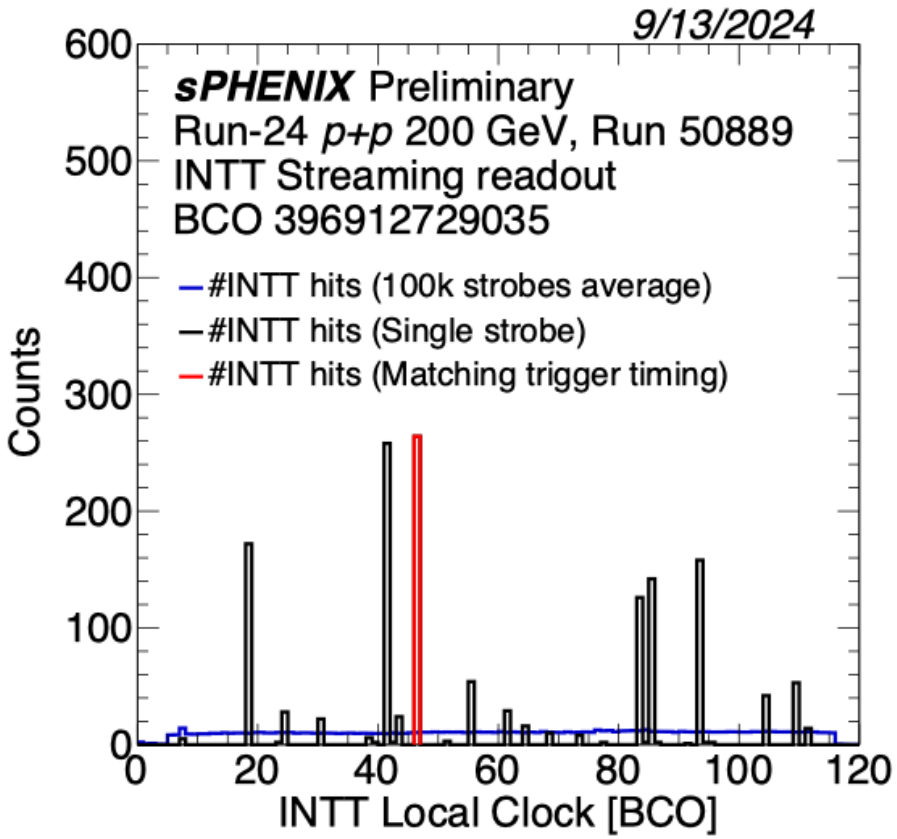
Plots from PPG02 Analysis Note Ver.1.0.

Timing Plot

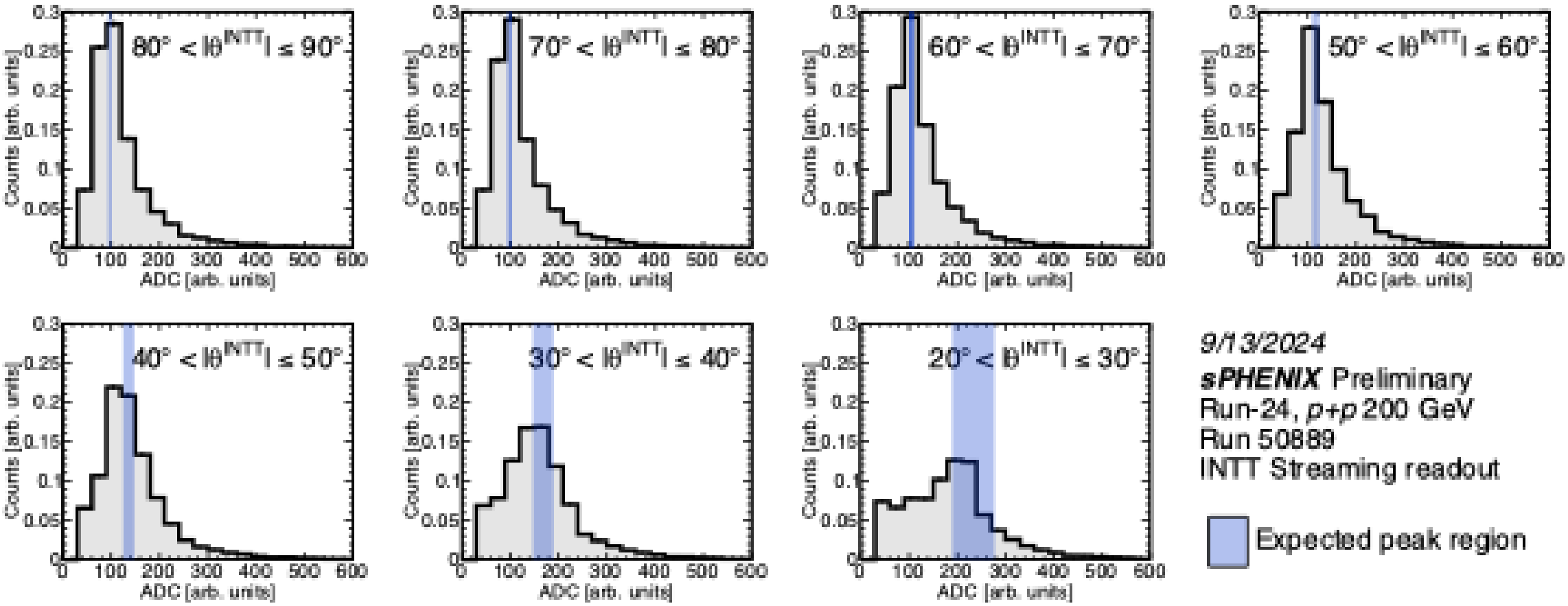

05/16/2025
sPHENIX Preliminary
p+p √s = 200 GeV
INTT Triggered mode
Run number: 43408
Hits at trigger timing
Hits in other timings
INTT hit counts per event
Crossing relative to GTM [BCO]


sPHENIX Preliminary
05/16/2025
p+p √s=200 GeV INTT Triggered mode
Scanned point
Working point Run-24
L1 delay [BCO/6]

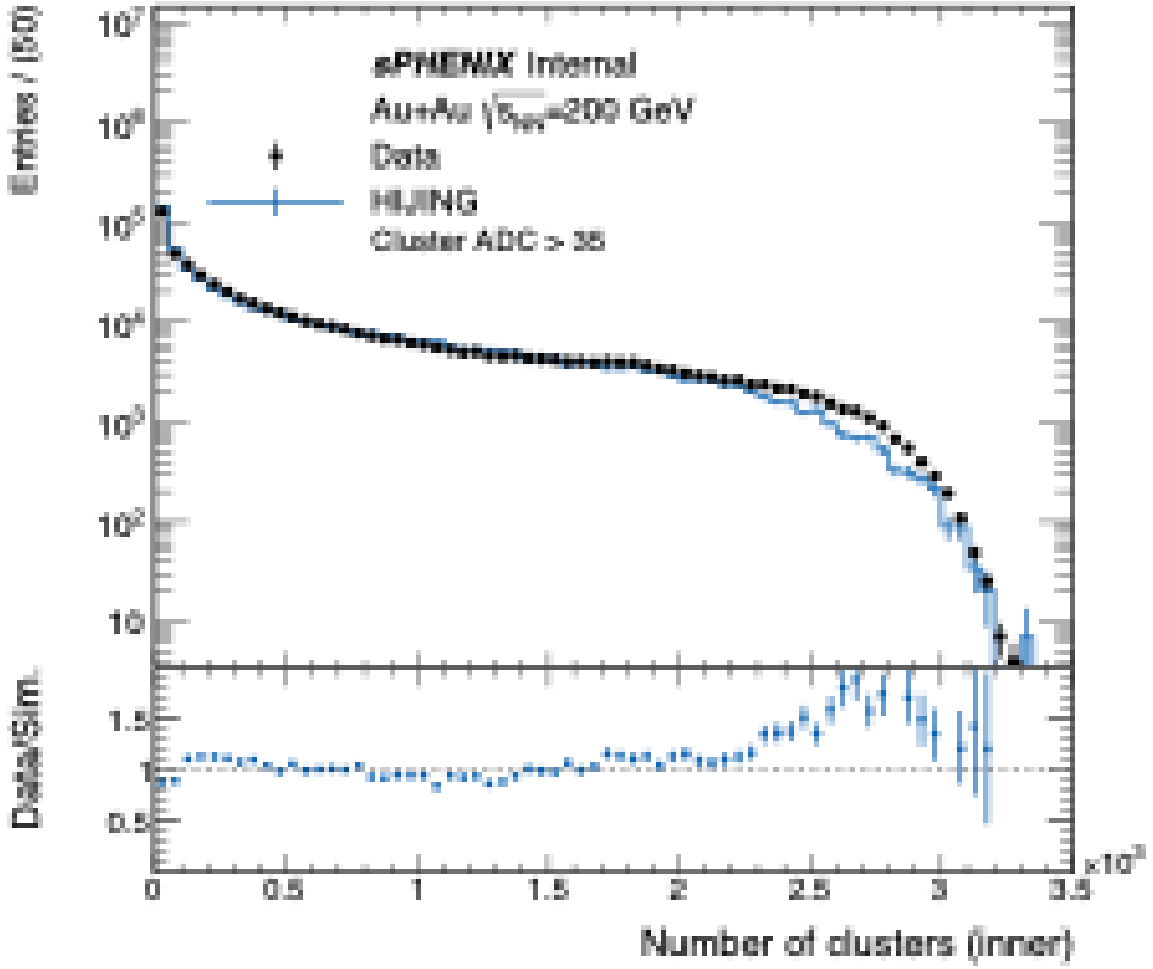
Stream Readout

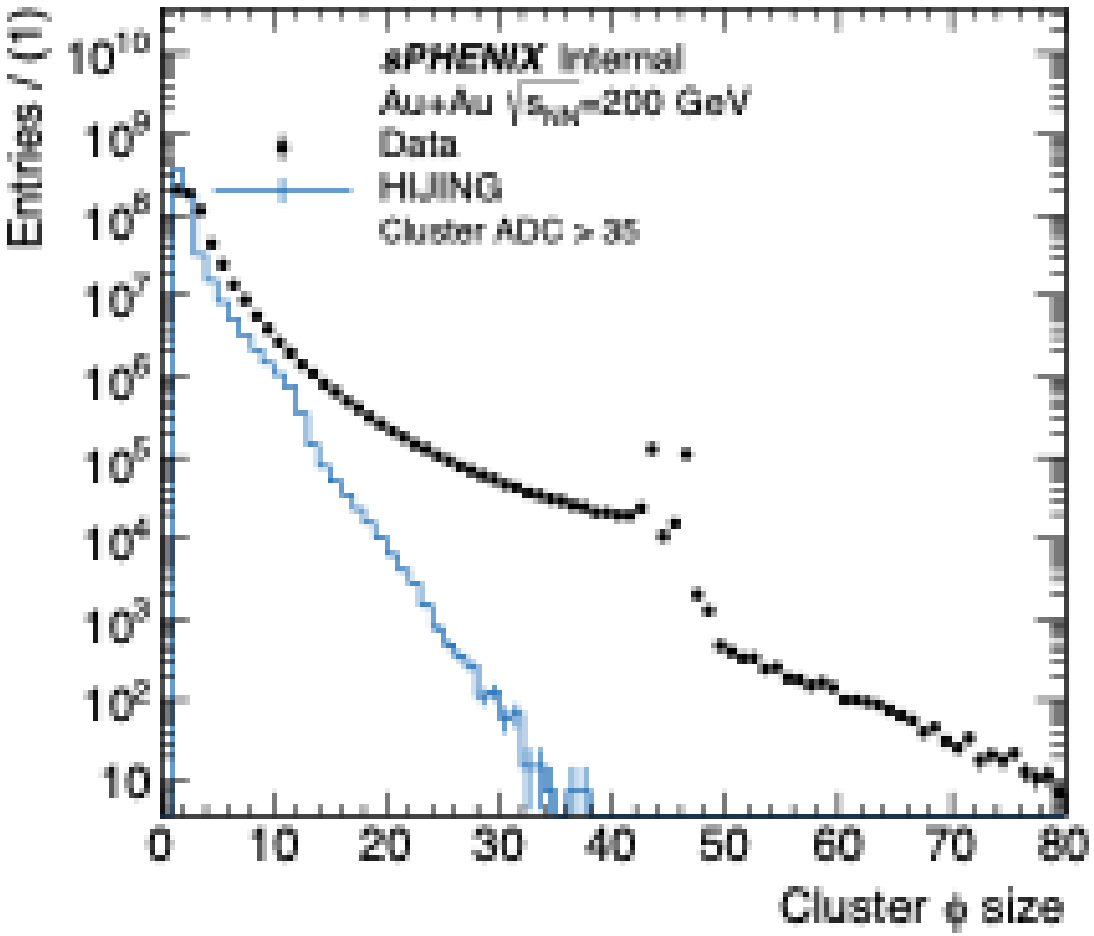


ADC Distribution

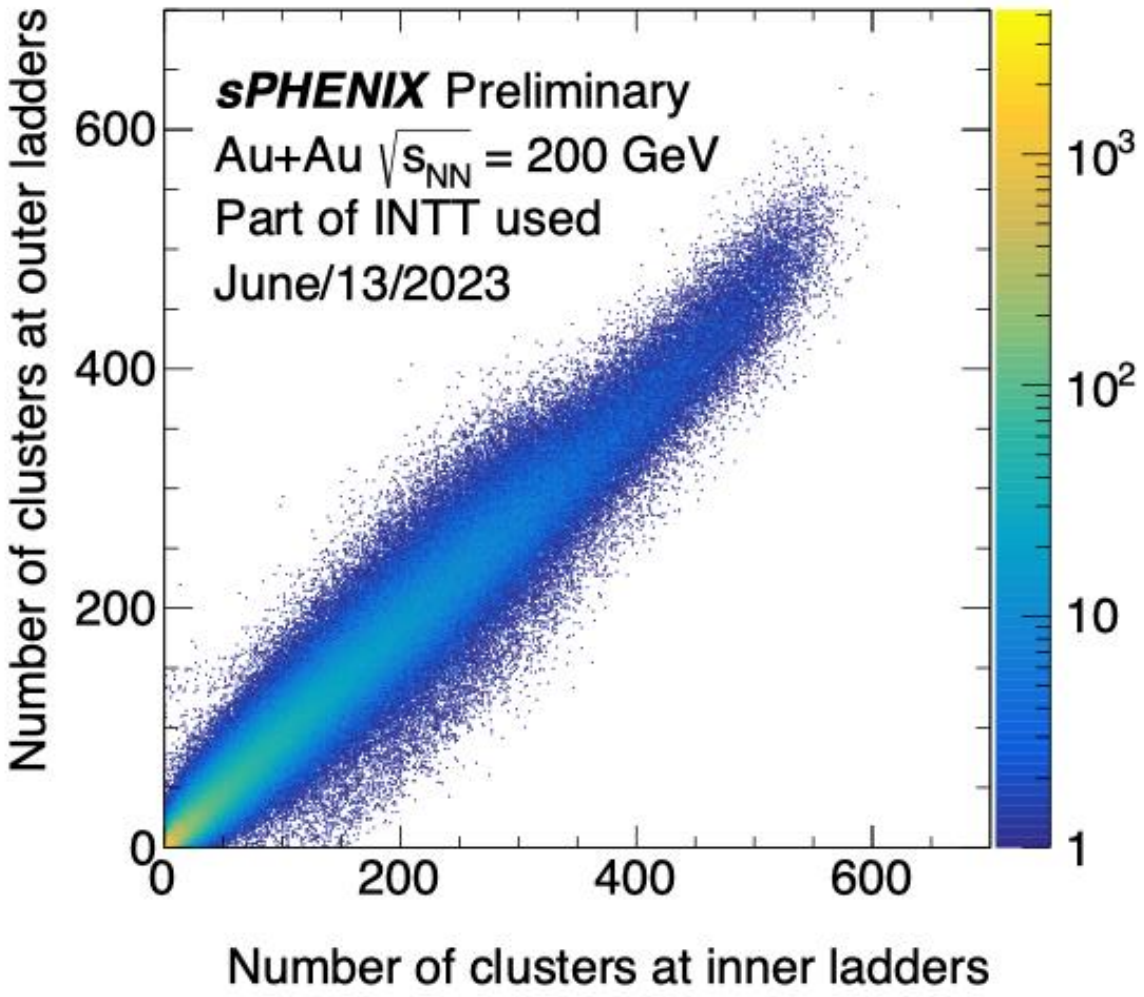


Cluster Distributions





INTT hits Inner vs Outer



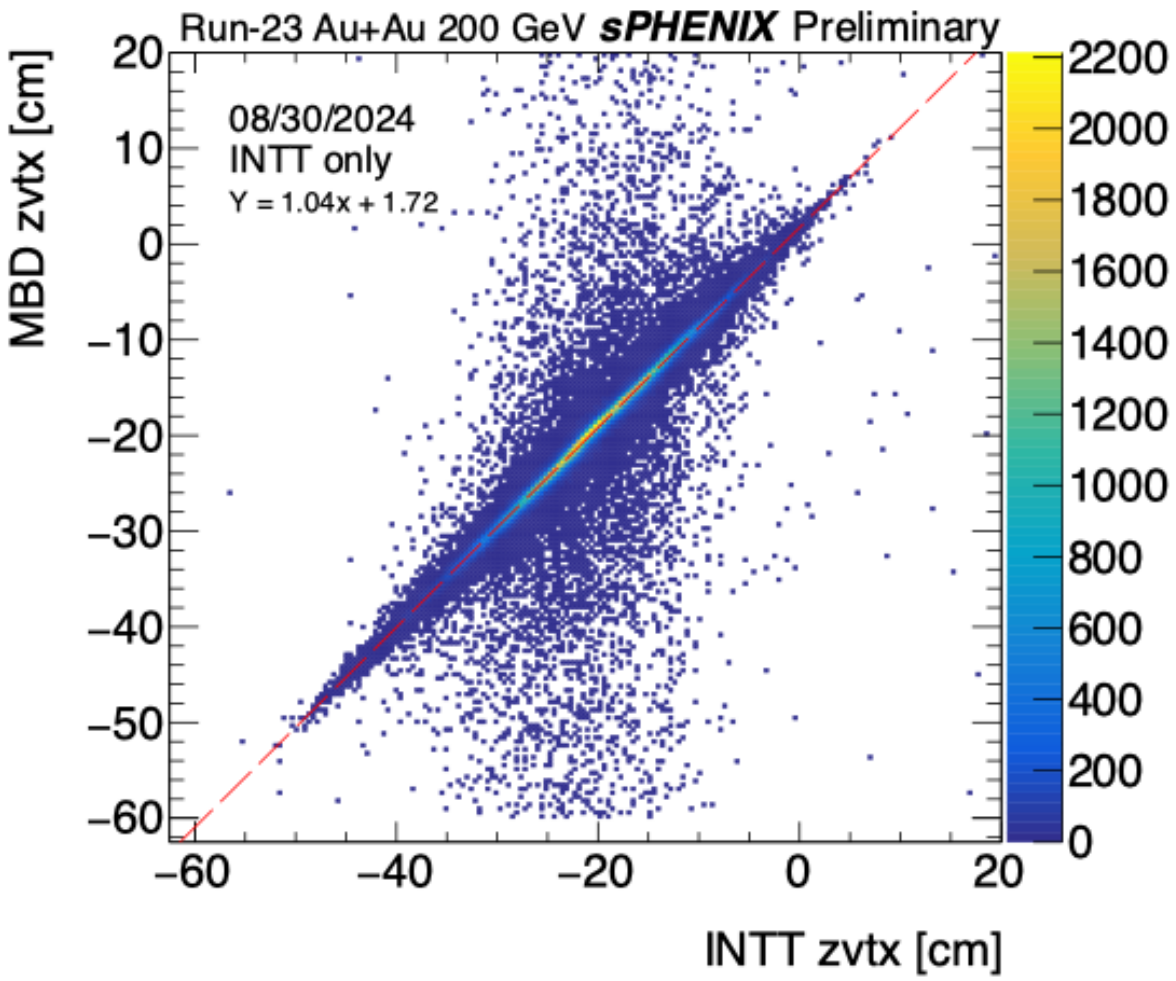
Should update with full INTT

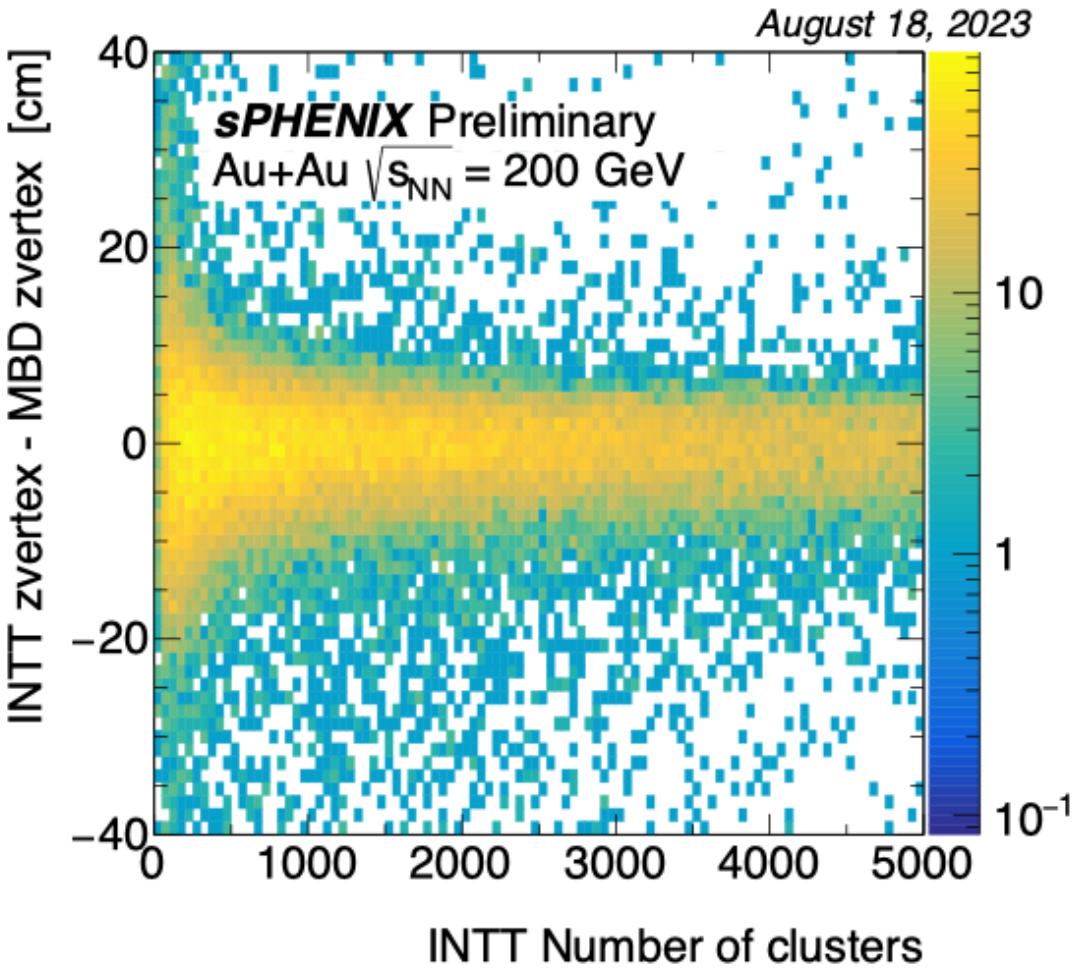
INTT vertex Reconstruction

- Z-vertex reconstruction resolution with INTT half detector method (Mahiro)

INTT vs MBD Vertex

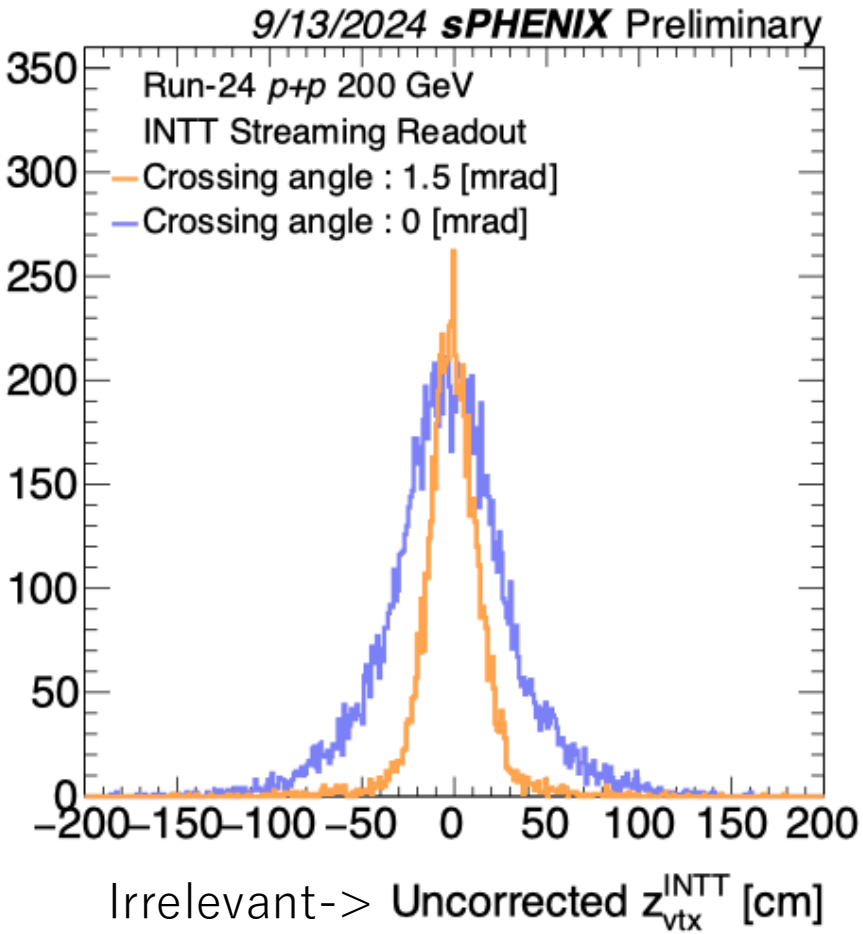
Committee's decision
Include available plots as much as possible.



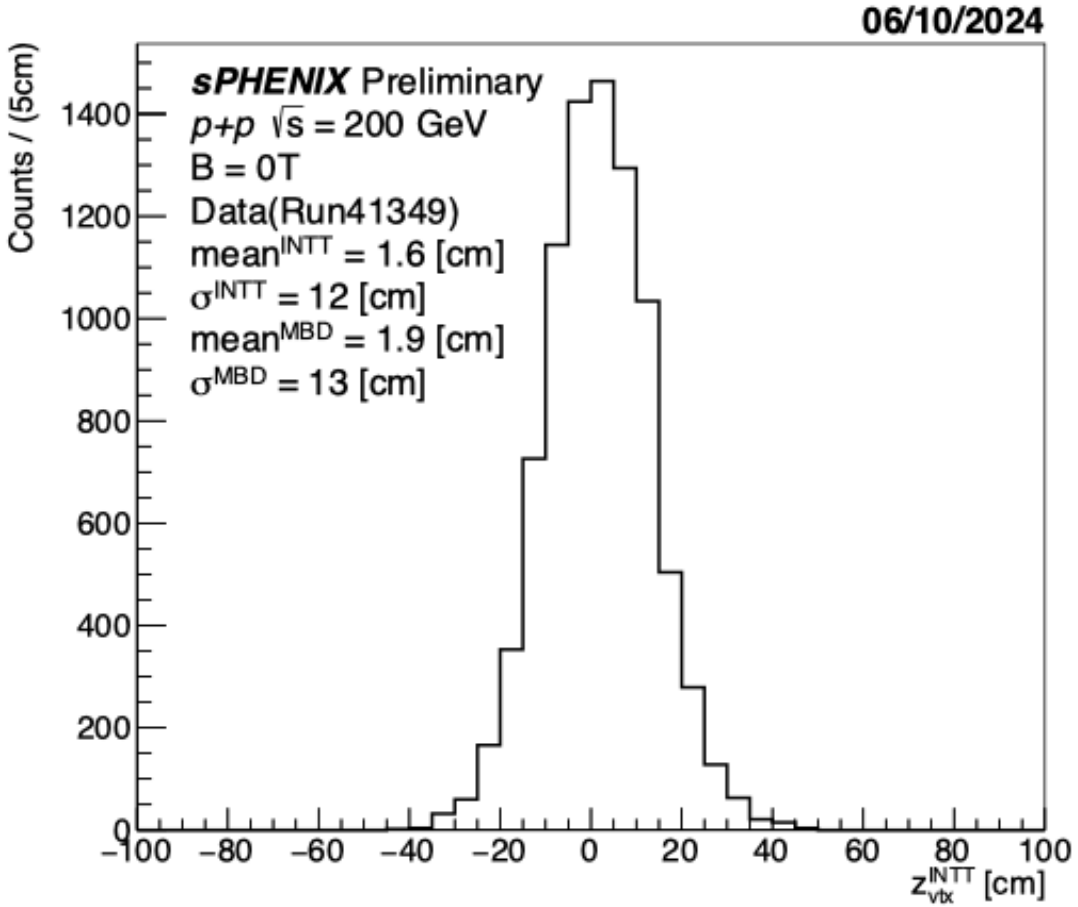


Vertex Reconstruction

Mahiro is in charge
Field off.



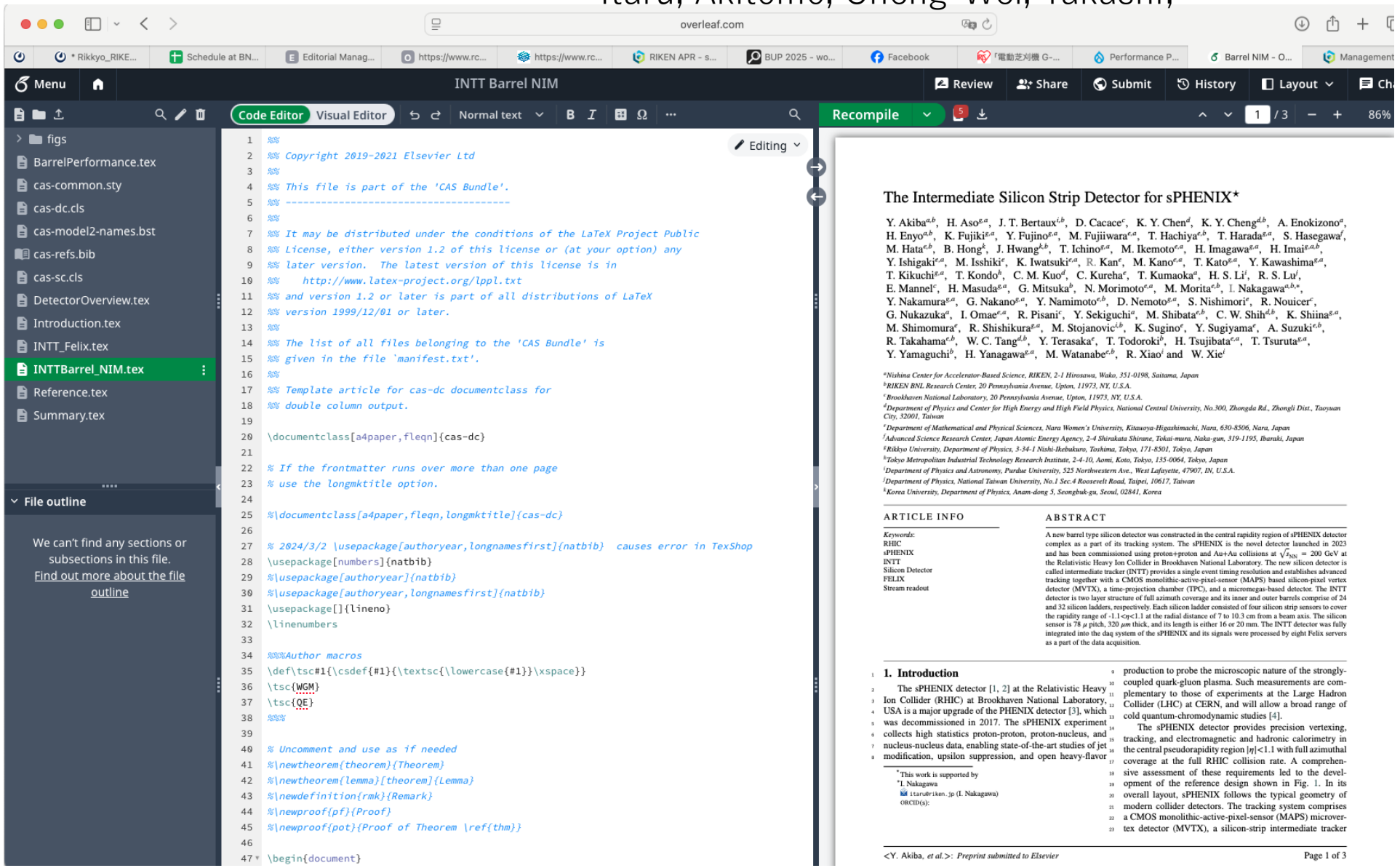
INTT-determined vertex (streaming, field on)



NTT-determined vertex (triggered, field off)

Overleaf

Editing Committee Volunteers ?
Itaru, Akitomo, Cheng-Wei, Takashi,

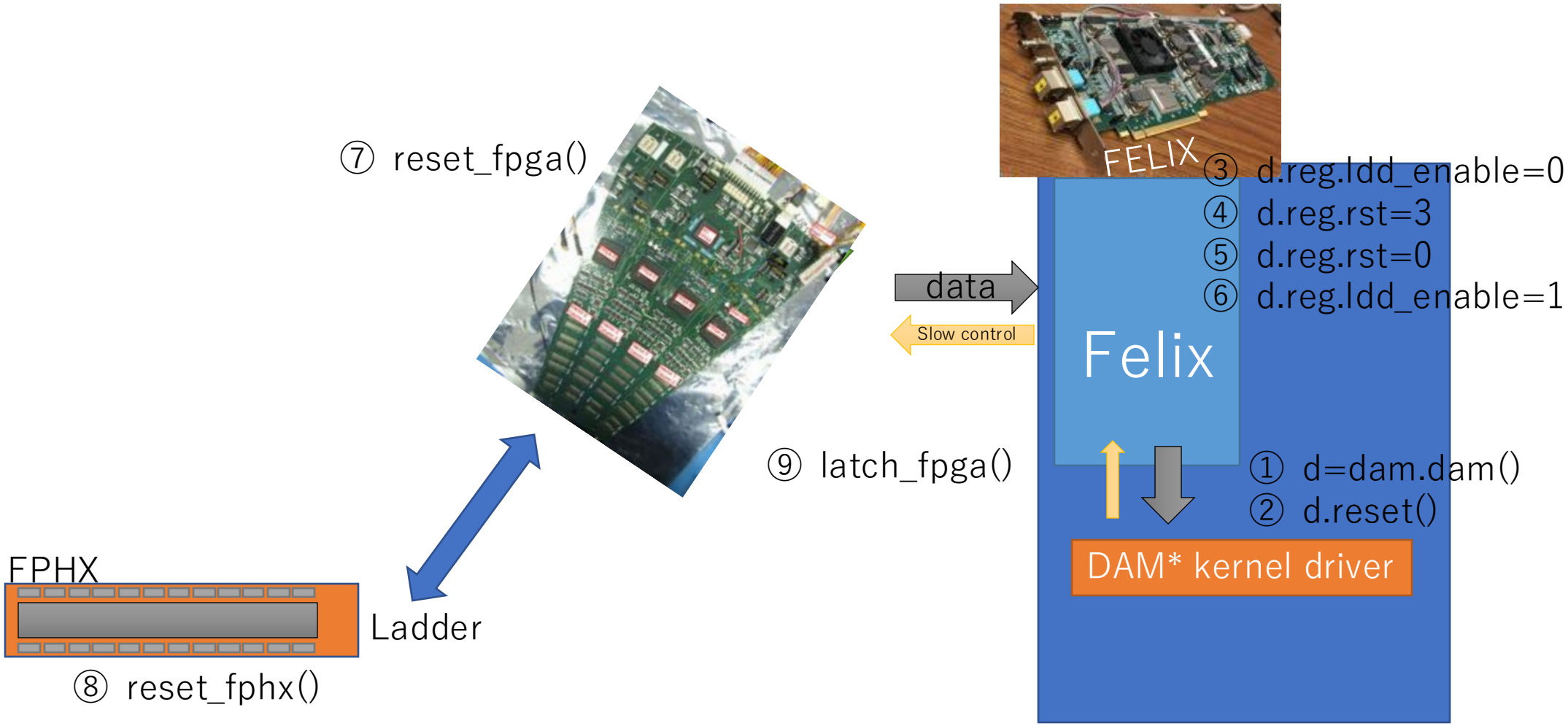


https://www.overleaf.com/project/67a453c2ba41620d1e577315

Schedule

- Material Preparation : October ~ December
- Editing : ~ End of Feb 2026
- 1st Release to INTT group review : beginning of March 2026
- 1st Release to sPHENIX collaboration review : End of April 2026
- Submission to NIM : May 2026

Felix Readout System Initialization Routine (I)



We would like to have any response flag from each initialization steps as much as possible so that we will know which process failed in the initialization sequence.

Lognote P110