

PDVD geometry check

Xuyang Ning

PDVD; wire geometry check

Xin's observation

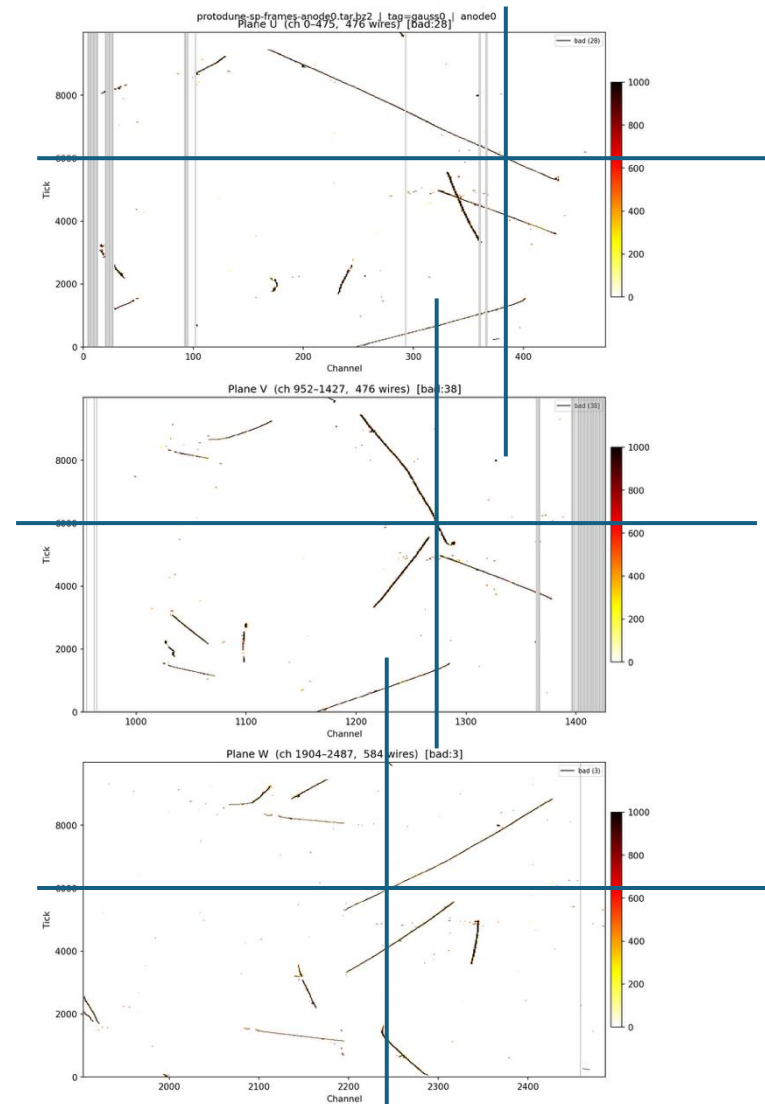
- The U/V wires should be shifted along the **z** direction:
 - **Anodes 0, 2, 5, 7:** ($z - 9.8$) mm
 - **Anodes 1, 3, 4, 6:** ($z + 13.2$) mm

Calibration using data

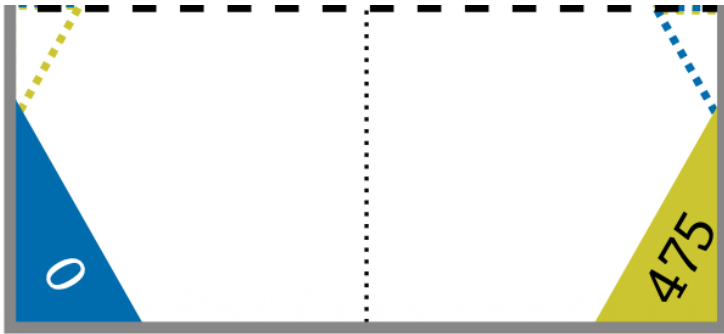
- Select the same time region across all three wire planes.
- Determine the **y-z** positions of the fired wires.
- The three fired wires are expected to intersect at the same point.

Cross-check

- I verified this by selecting one reference point in each anode.

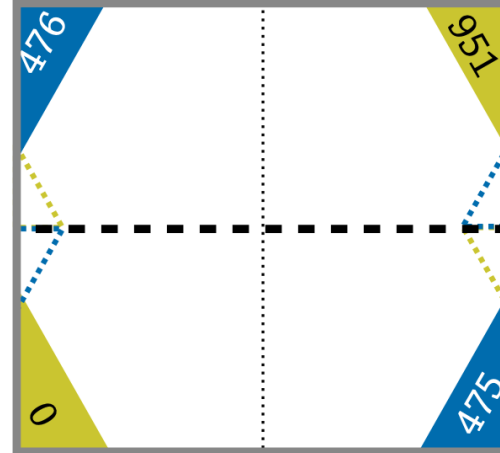


PDVD geometry formation

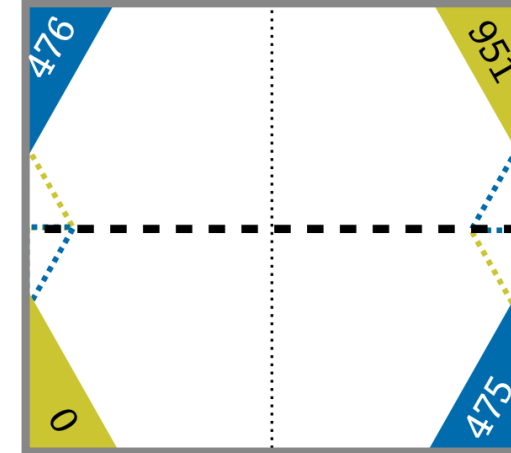


- The **A CRU U wires** are used as the reference geometry.
- The remaining anodes are derived by rotation, translation, and mirroring.
- Therefore, an incorrect base wire offset propagates to all anodes, creating the observed pattern in which some anodes are shifted upward and others downward.

CRP2

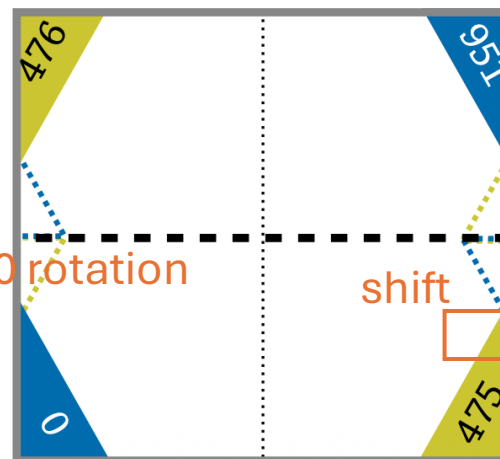


CRP3

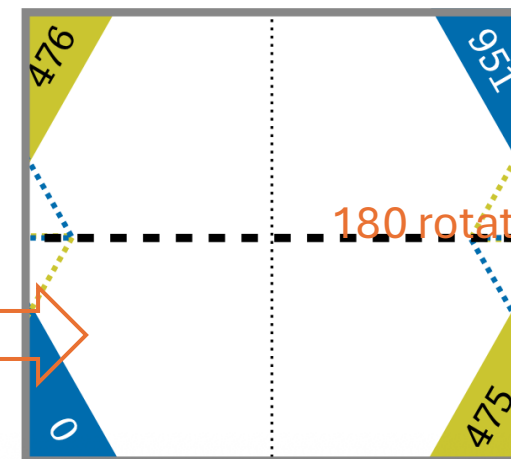


View 0
View 1
View 2

CRP5



CRP4



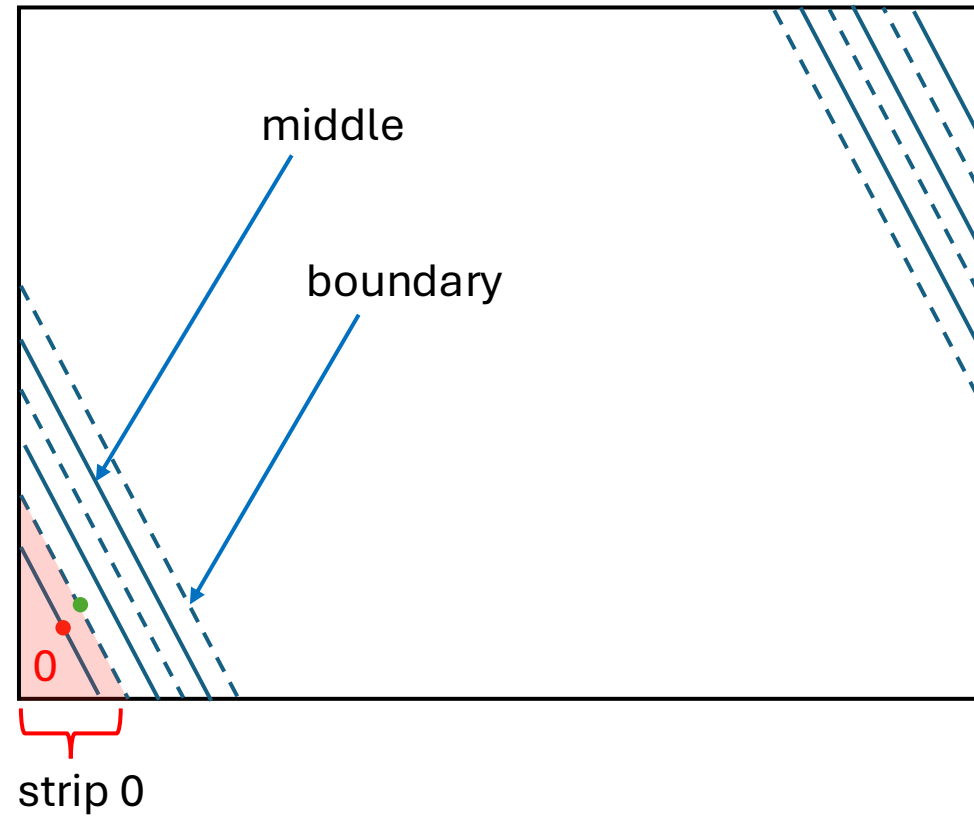
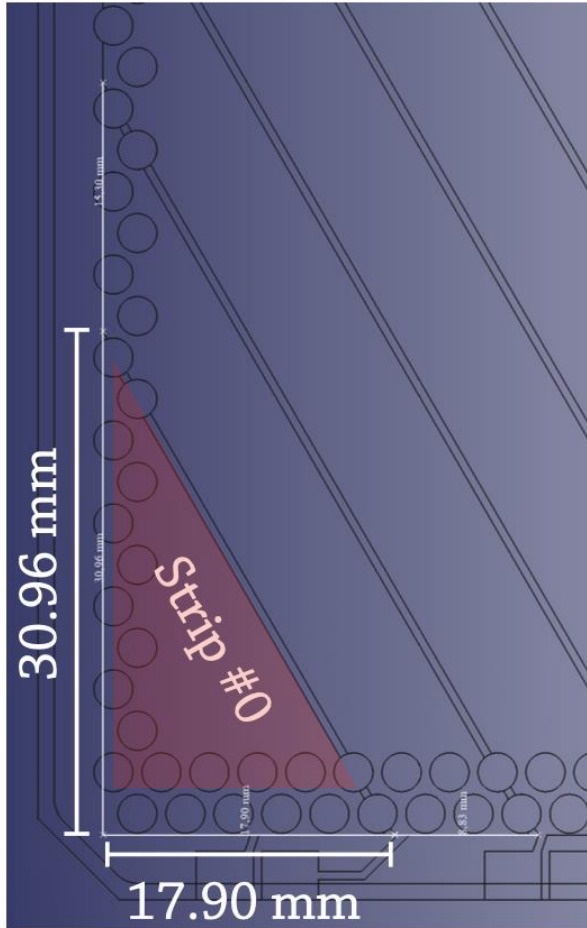
180 rotation

shift

180 rotation

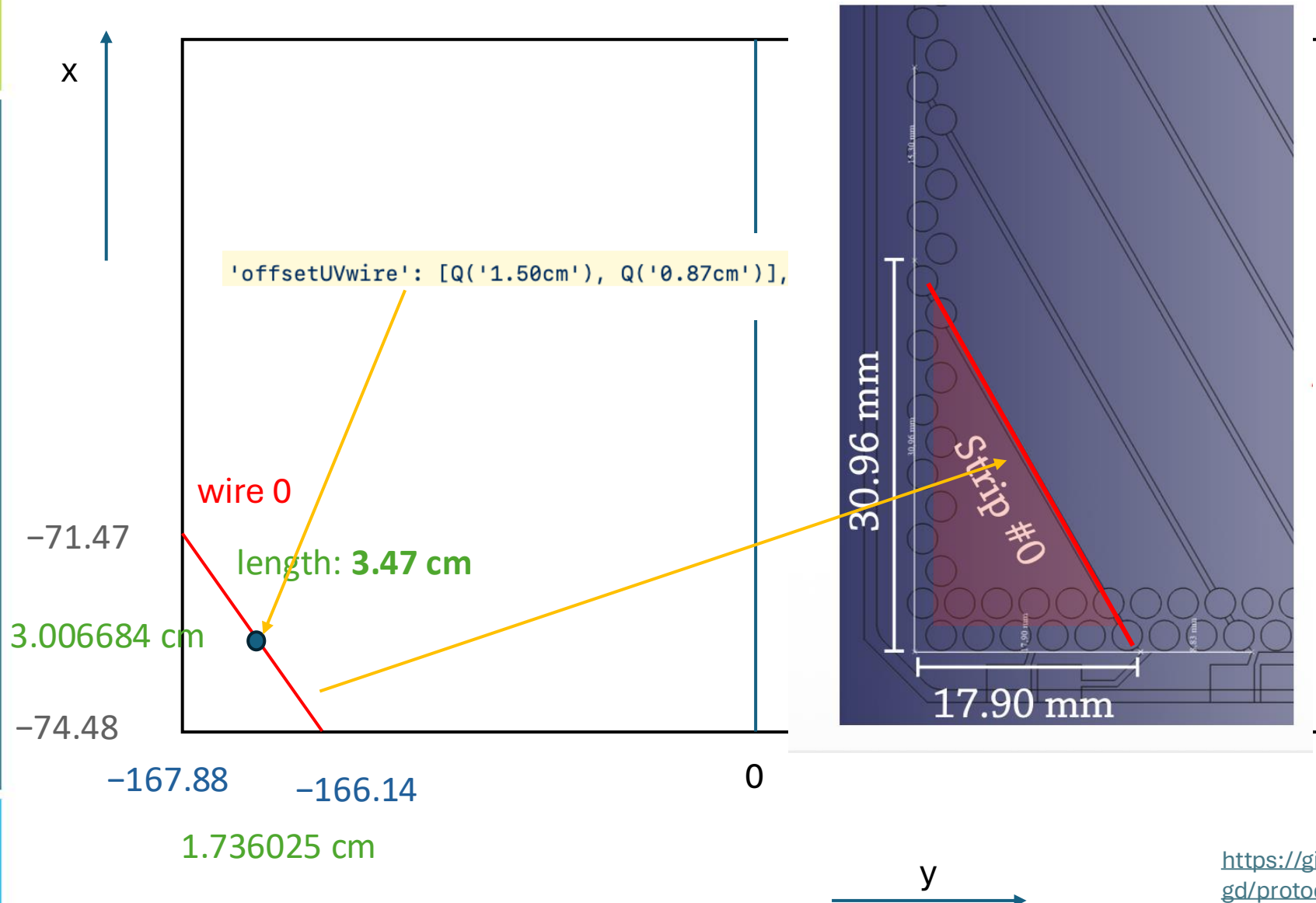


PDVD induction view offset



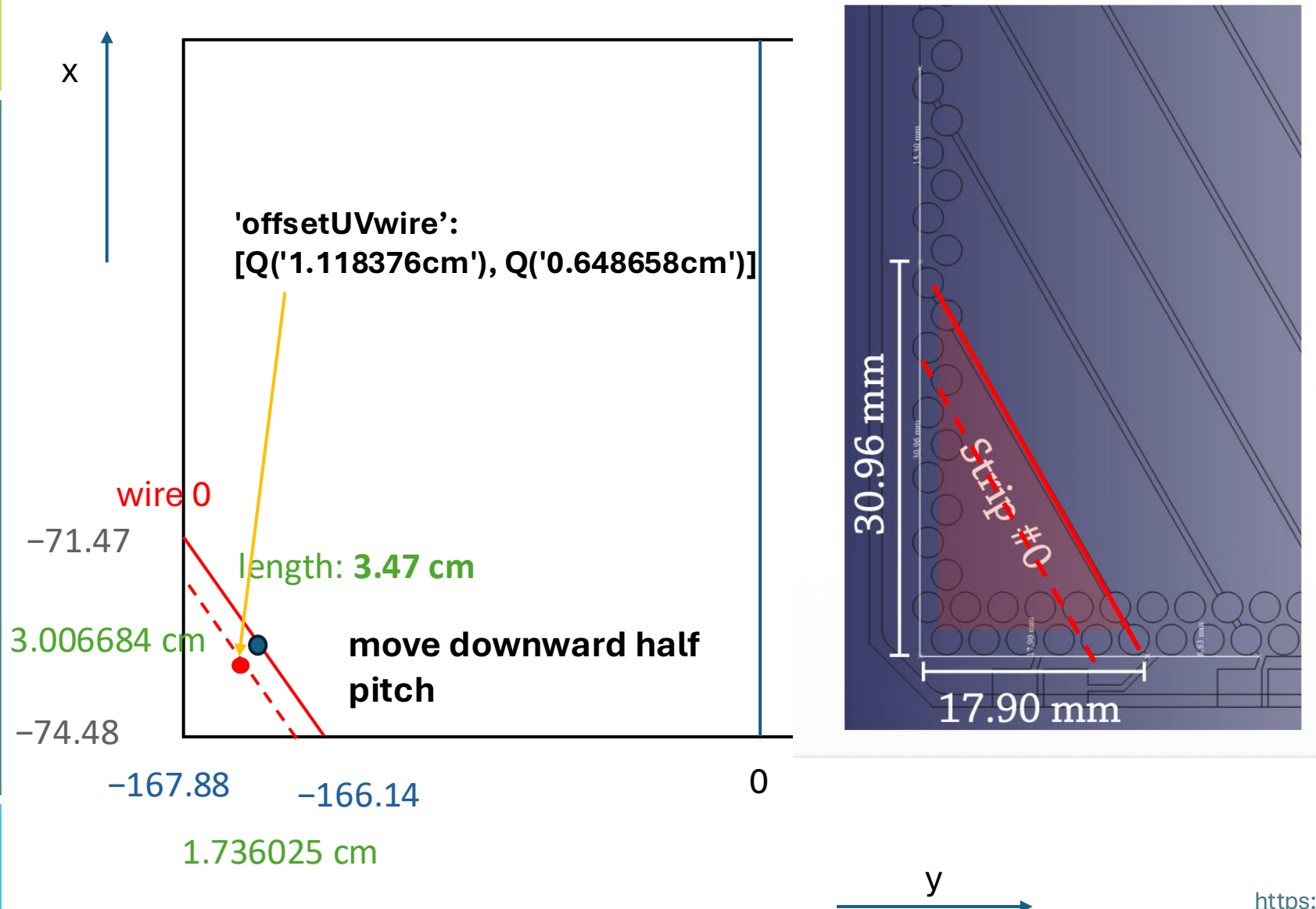
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Extracted coordinate from base CRU in geometry



- In the current official geometry, **Wire 0 is defined at the strip edge.**
- All wire positions are then defined relative to this edge.
- In Wire-Cell, **Wire 0 should be located at the strip center.**
- This initial misalignment is propagated through the rotation and mirroring operations, affecting all derived anodes.

Updated offset:

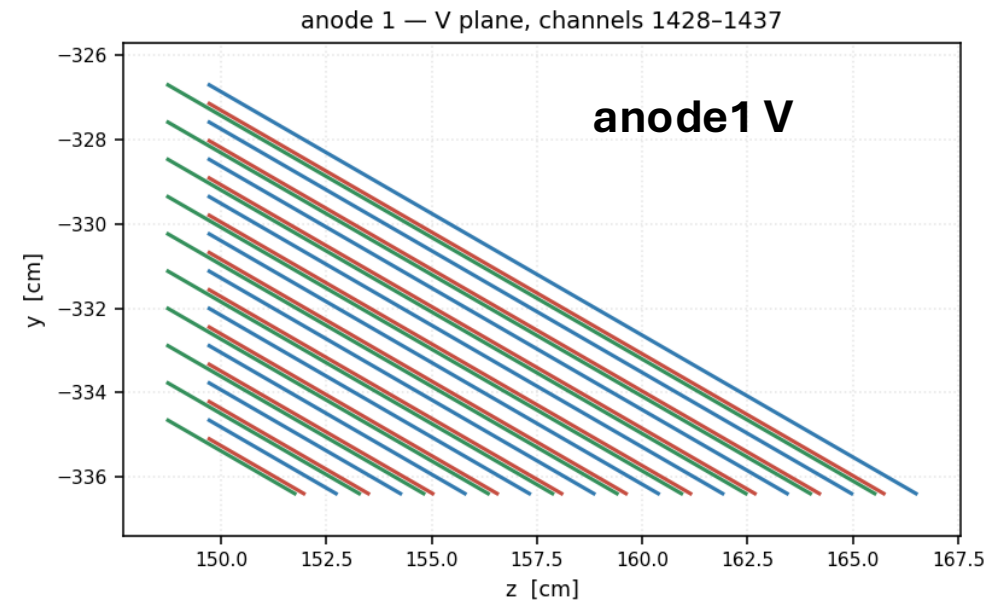
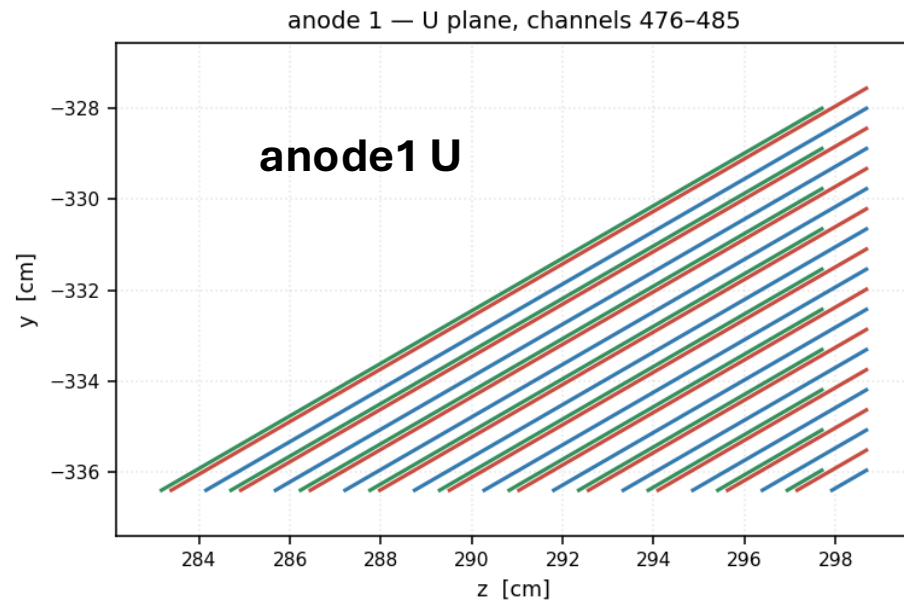
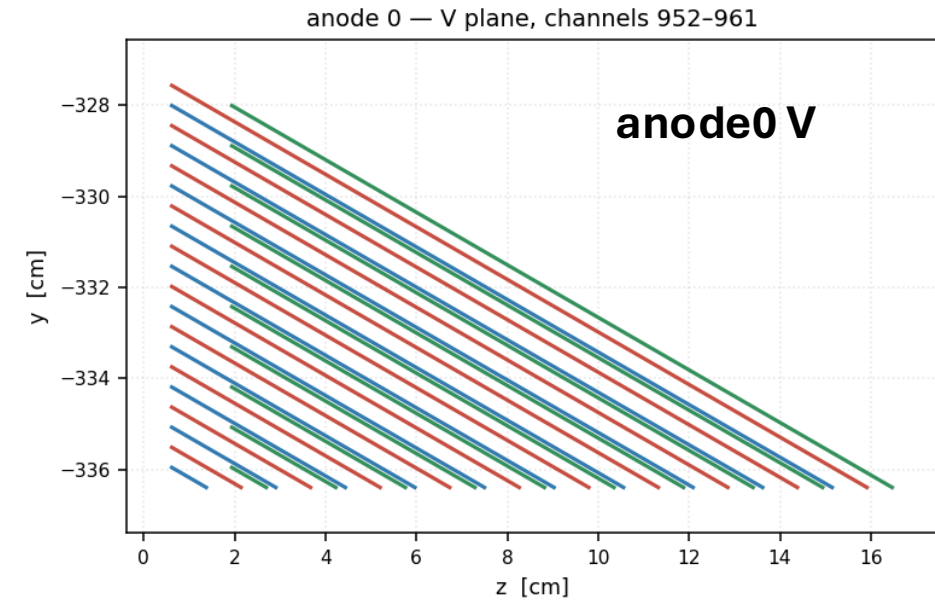
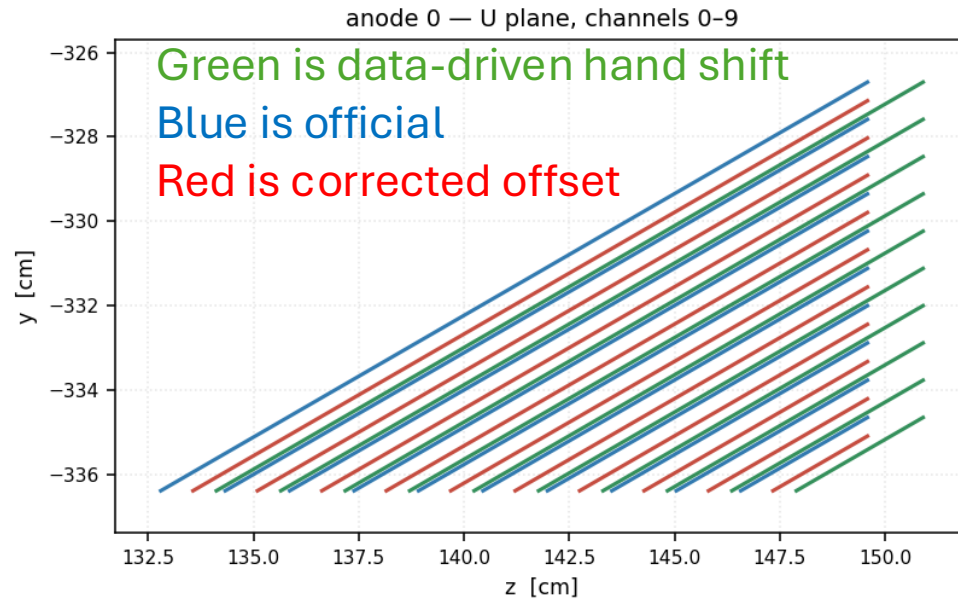


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shift visualize:

ProtoDUNE-VD — first 10 U and V wires per anode, yz projection (page 1/2: anodes 0-3)

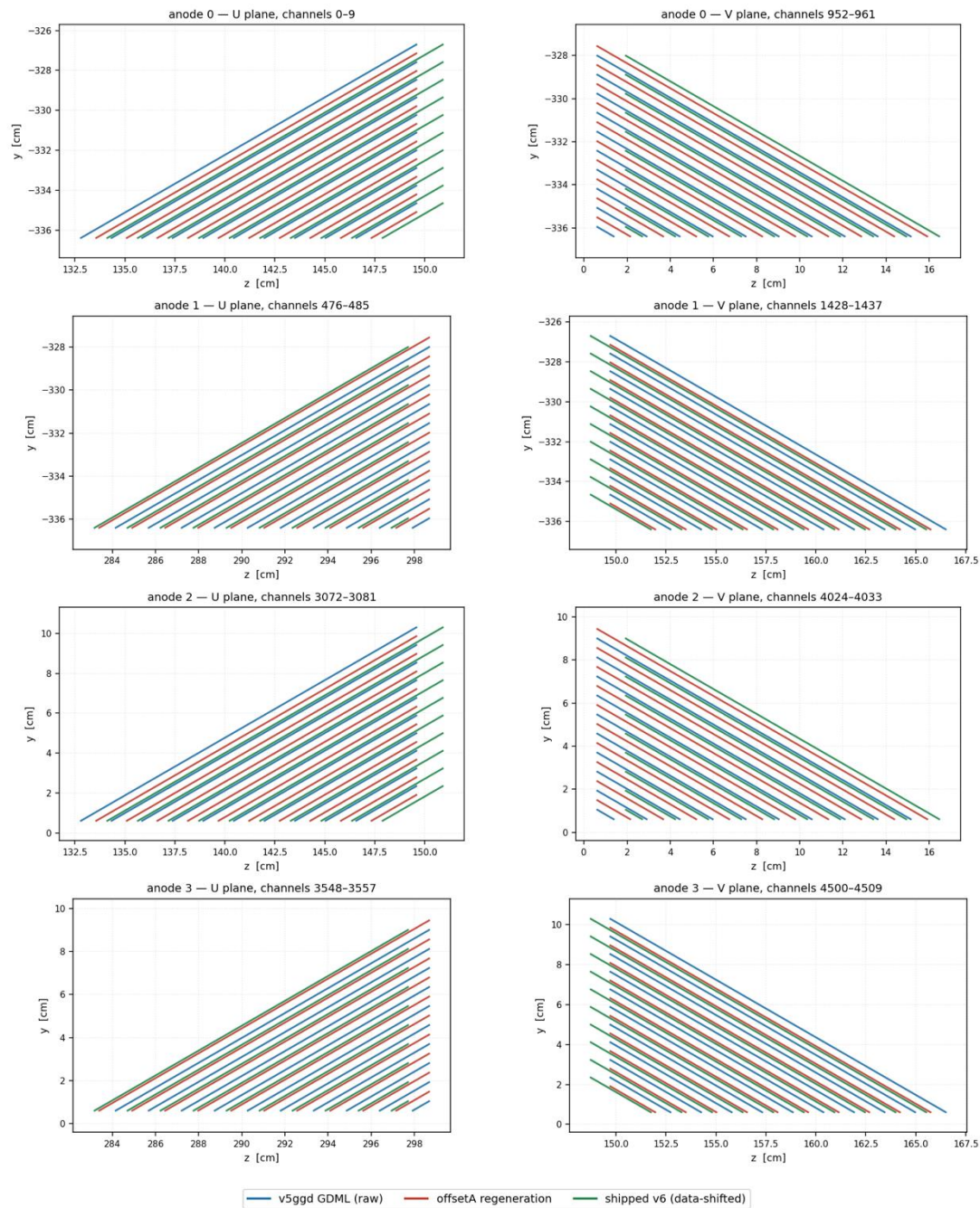
anode0 U



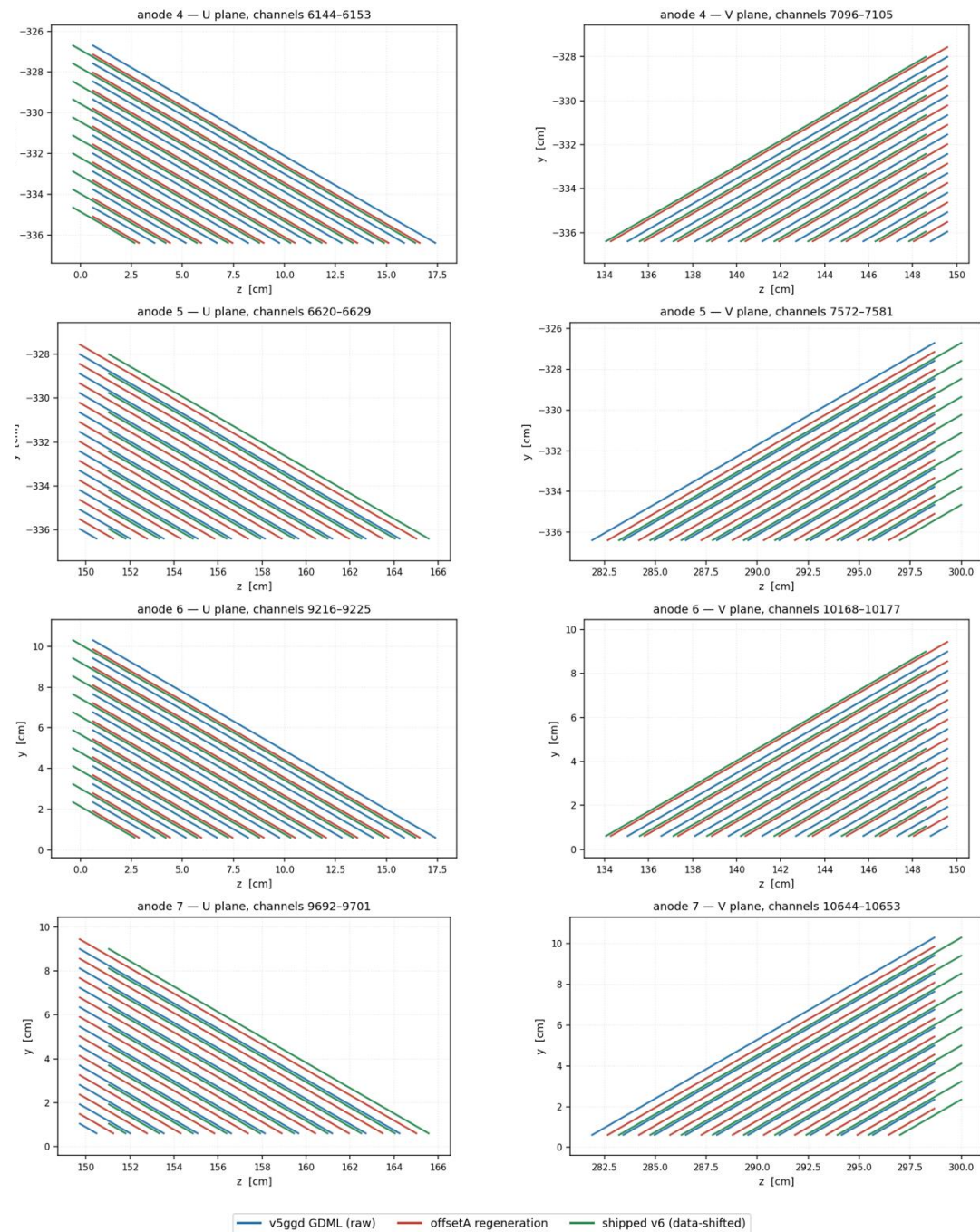
red lines become more closer to the green lines

overall shift visualize:

ProtoDUNE-VD — first 10 U and V wires per anode, yz projection (page 1/2: anodes 0-3)



ProtoDUNE-VD — first 10 U and V wires per anode, yz projection (page 2/2: anodes 4-7)



current official gdml

CRP5

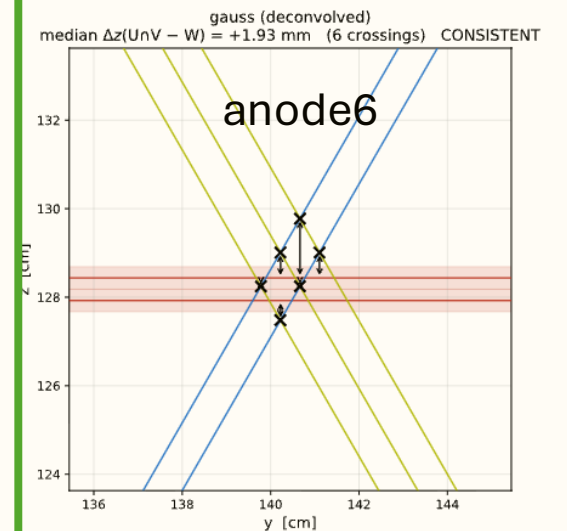
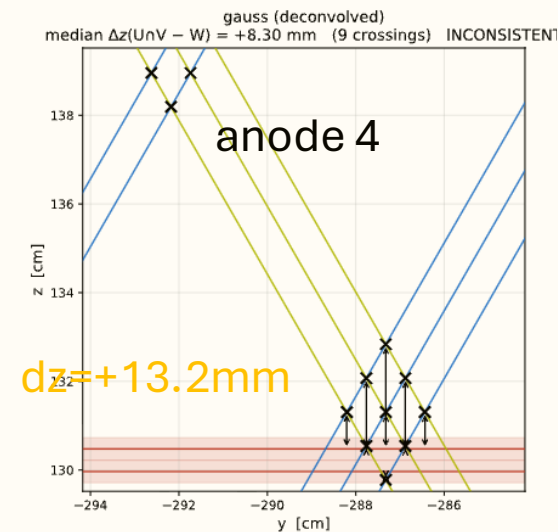
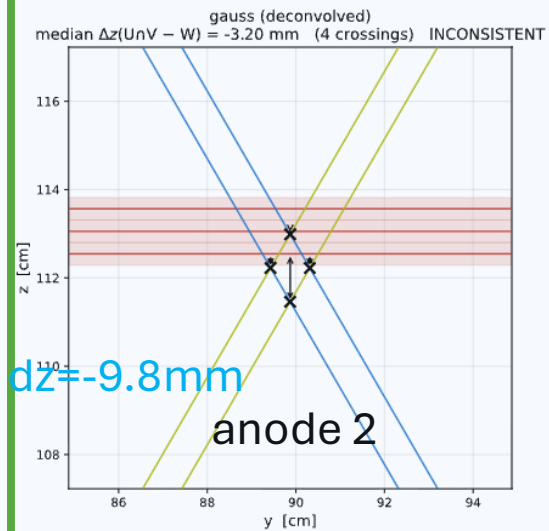
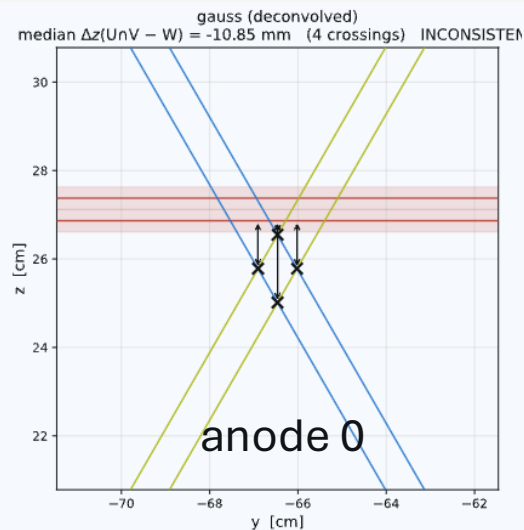
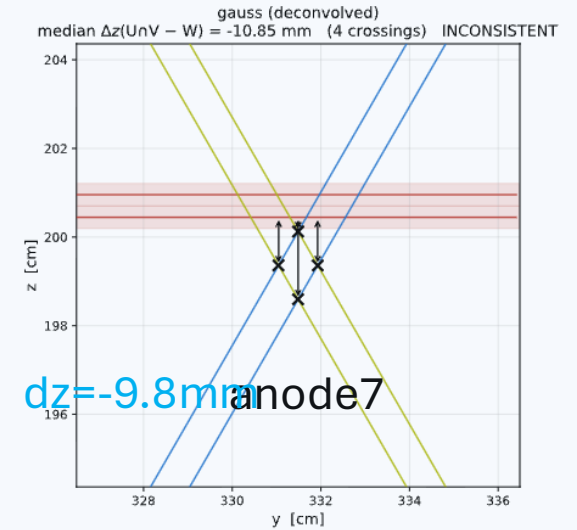
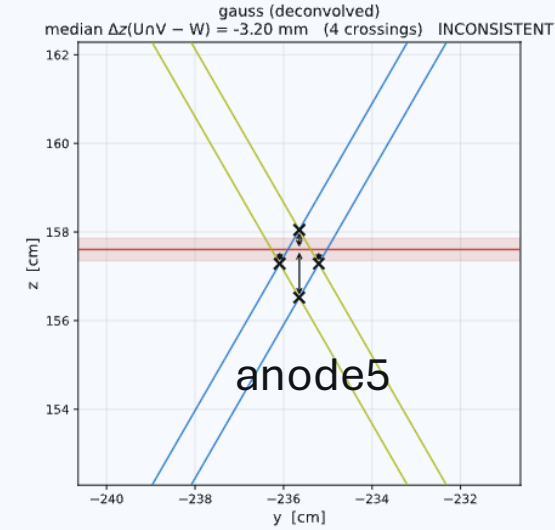
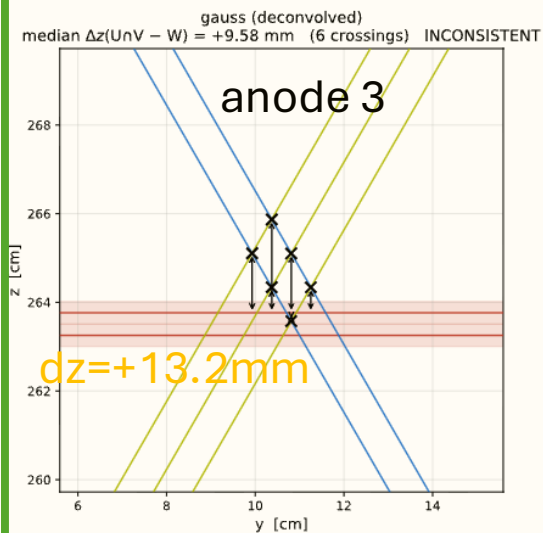
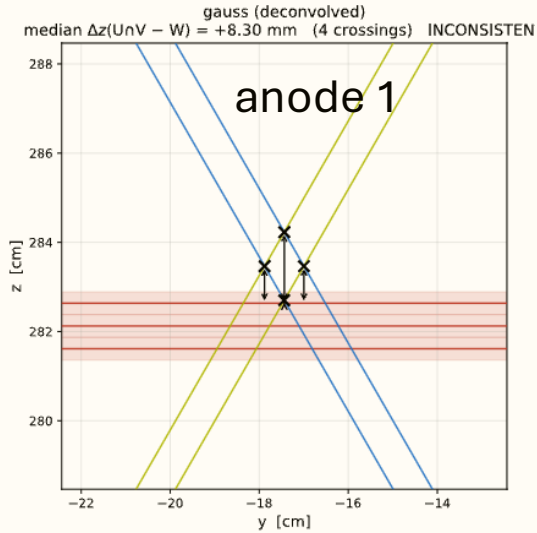
bottom

CRP4

CRP2

top

CRP3



After correct offset; based on CAD file

bottom

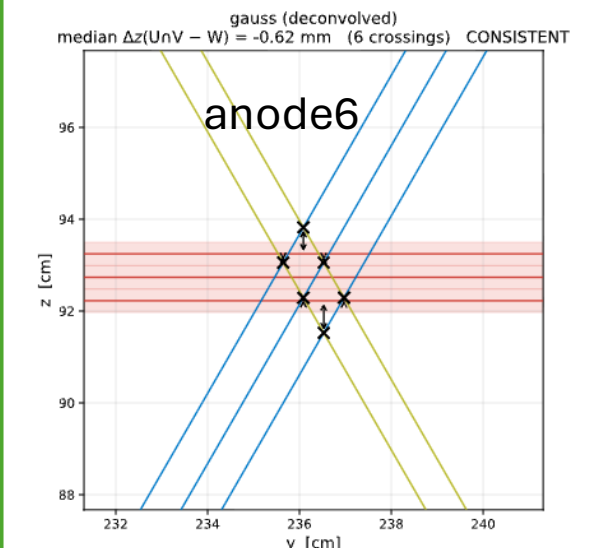
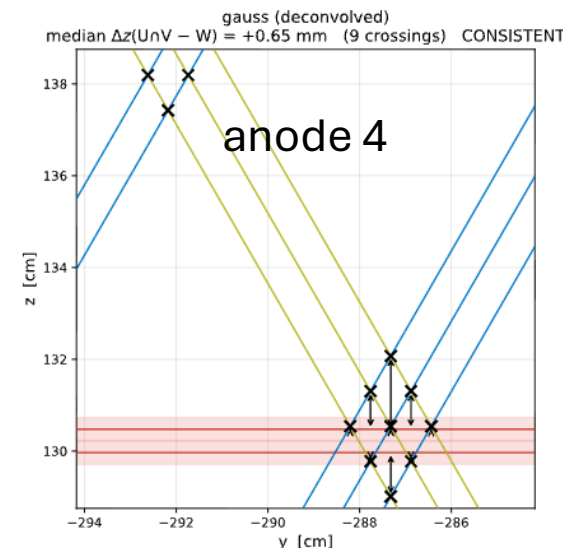
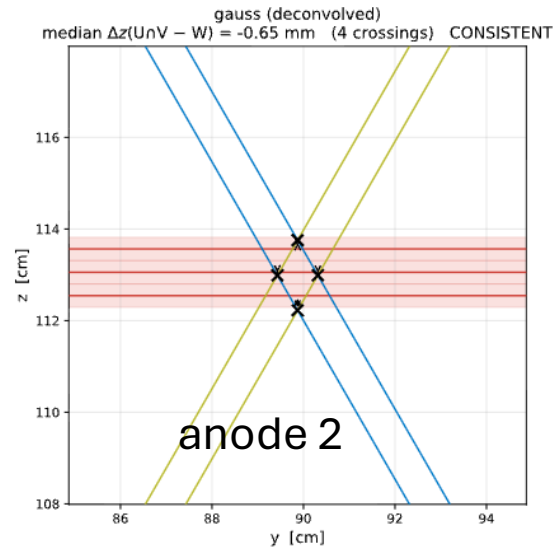
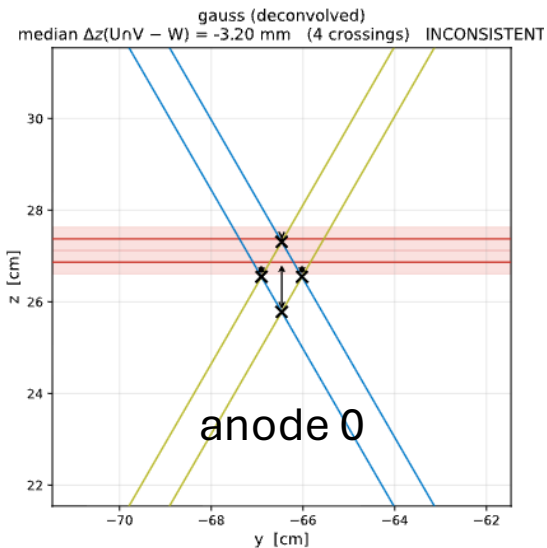
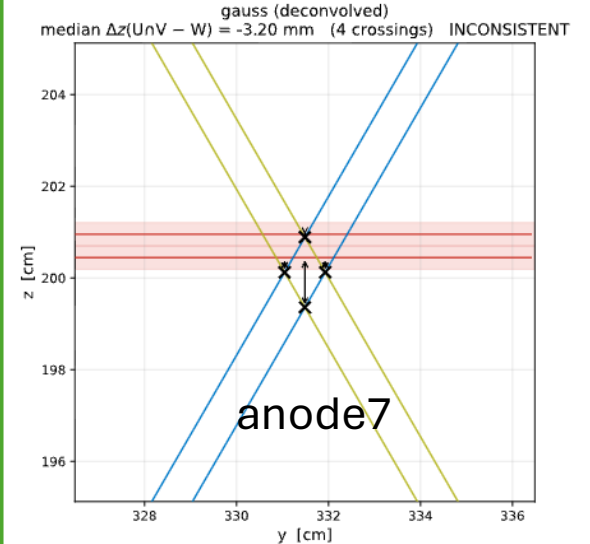
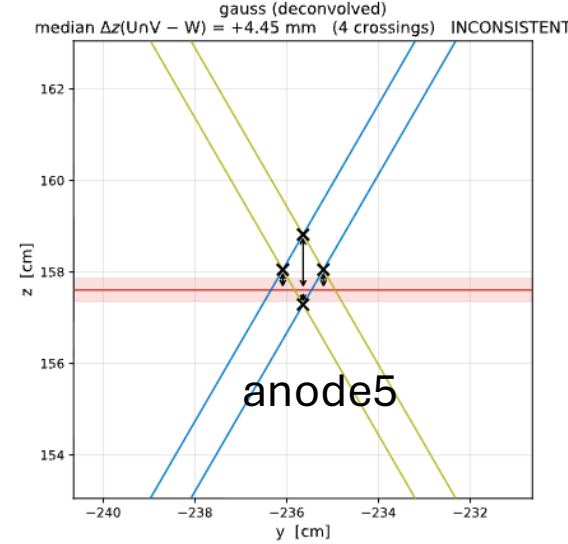
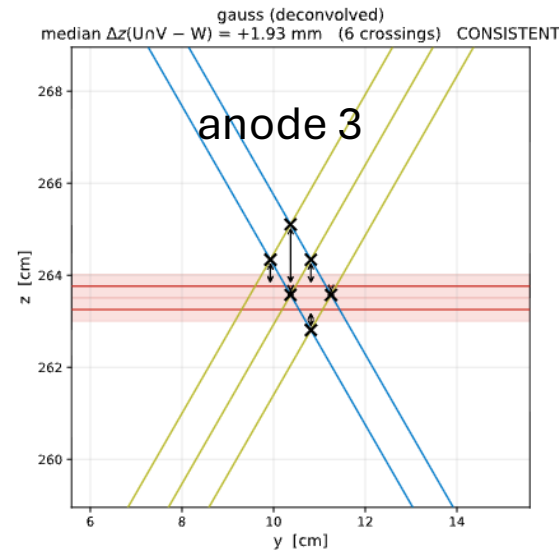
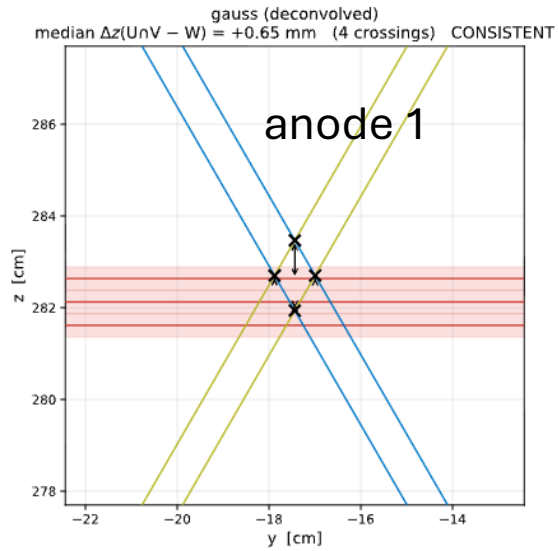
top

CRP5

CRP4

CRP2

CRP3



data-driven, wirecell-v6

bottom

top

CRP5

CRP4

CRP2

CRP3

