

Time Distribution Fits

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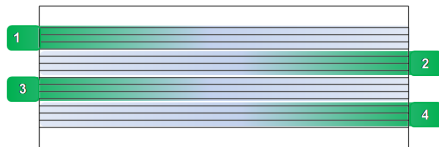
February 24, 2020

Reminders and Updates

- ▶ Goal: check if the signal propagation speed is z-dependent
- ▶ Steps:
 - ▶ Use the data from run 10 and run 17 and focus on layer 2
 - ▶ Find events with an XV cluster to get z position
 - ▶ Measure the distance from the cluster to the readout

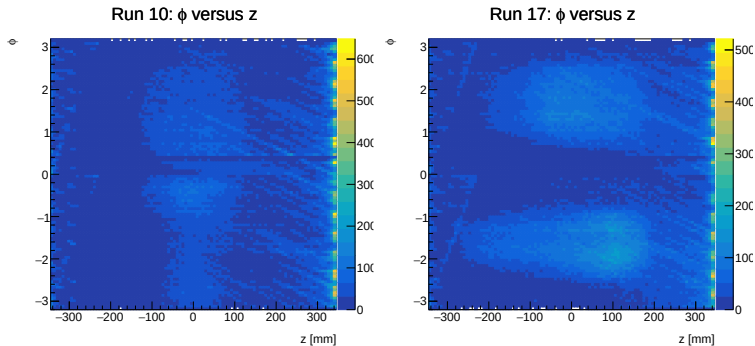
CONNECTOR SCHEME

X STRIP



- ▶ Split the data into east and west sided readouts
- ▶ Fit the time distributions for bins of distance to the readout

Positions of Clusters in the Detector

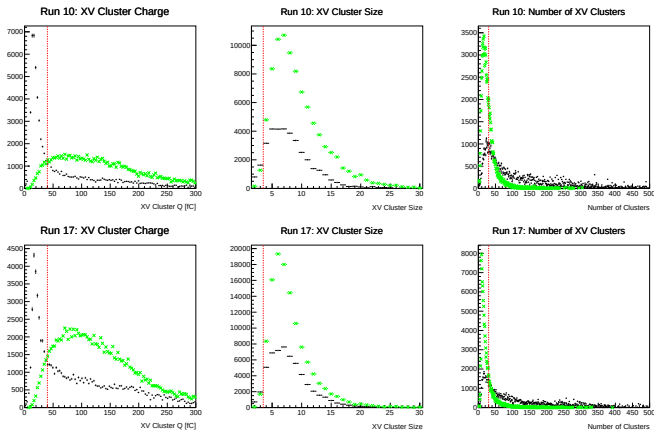


Only require layer 2

There appear to be quite a few noisy v strips

Variables to Reduce Noise

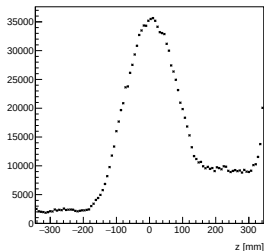
- Events in the middle of the z distribution are green, apparent noise from the edge of the z distribution is black



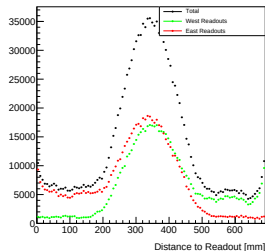
$Q_{XV} > 40 \text{ fC}$, $Size_{XV} > 3$, $N_{Clusters} < 50$ for remainder of talk

Z Position in Detector and Distance to Readout

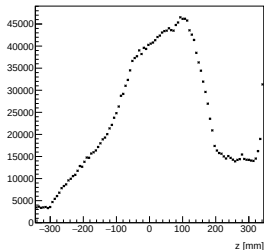
Run 10: z Location from XV Cluster



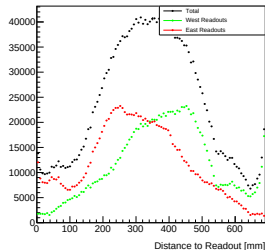
Run 10: Distance to Readout



Run 17: z Location from XV Cluster

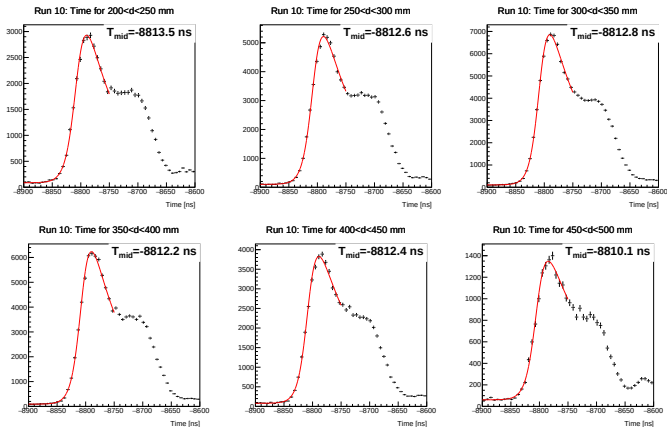


Run 17: Distance to Readout



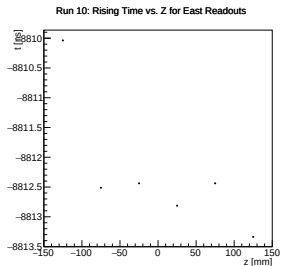
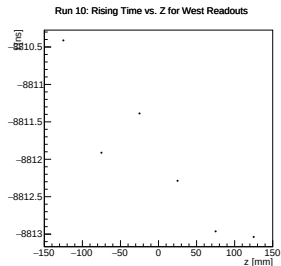
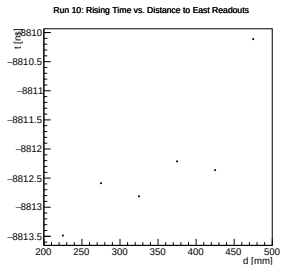
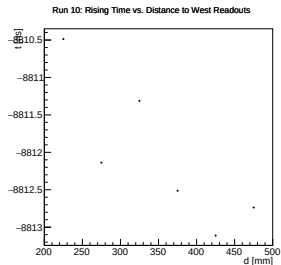
Fit 200 mm to 500 mm range - seems to have less noise

Sample of Fitting Plots



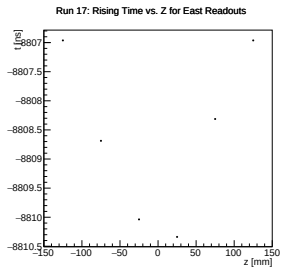
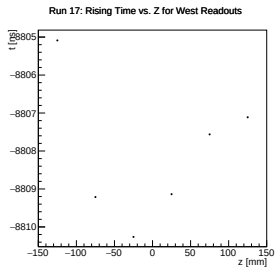
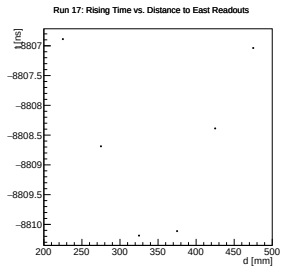
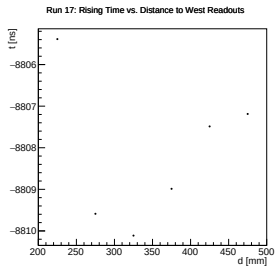
- ▶ Fits for run 10 with readouts on the east side
- ▶ Fits for the west side look the same (backup slides)
- ▶ Run 17 fits also look similar (backup slides)

Run 10 Results



West side doesn't make sense - time should increase with d and z

Run 17 Results



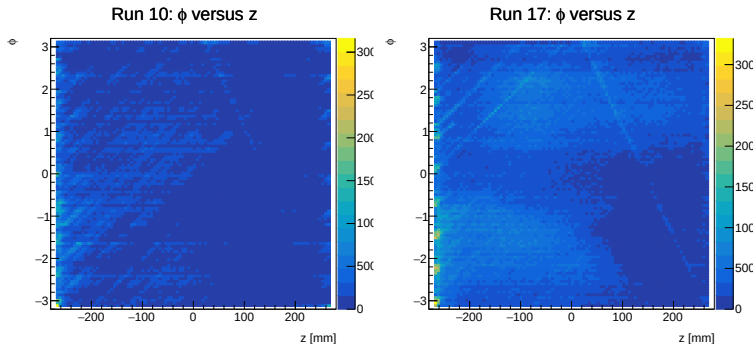
Strange trends for readouts on both sides

Summary and Conclusions

- ▶ Appear to have a linear behavior for time vs distance to readout for run 10 data
 - ▶ Trends don't match expectations
 - ▶ Are the times here the time the readout electronics measure a signal, or have they already been corrected for the z position?
- ▶ No clear trends for run 17
 - ▶ Appears to have a lot of noise
 - ▶ Strange z distributions
 - ▶ Is the setup for each run documented somewhere?
 - ▶ How did the setup change between run 10 and run 17?
 - ▶ More variables to improve noise rejection?

Backup

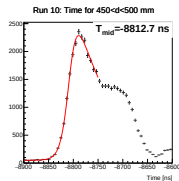
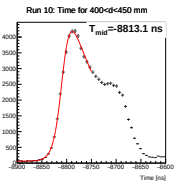
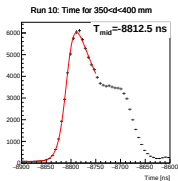
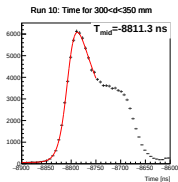
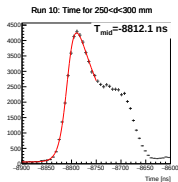
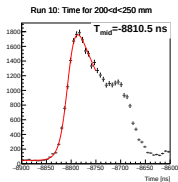
Plots of ϕ versus z for Layer 1



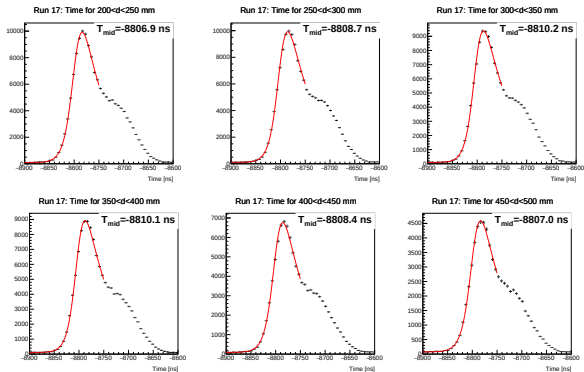
Lia suggested the noise on the right edge for layer 2 could be from combinatorics

The noisy spots are on the left for layer 1

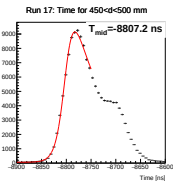
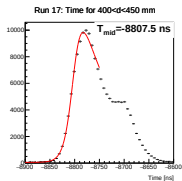
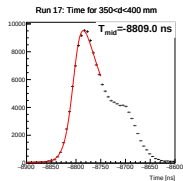
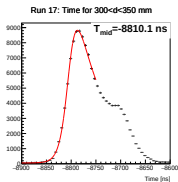
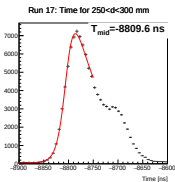
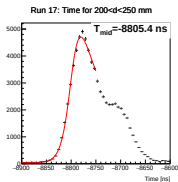
Time Fits for 50 mm Bins in Z with West Readouts



Time Fits for 50 mm Bins in Z with East Readouts

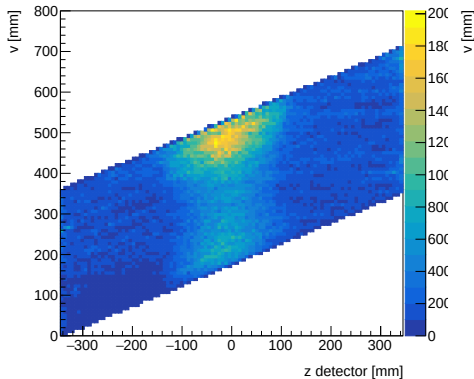


Time Fits for 50 mm Bins in Z with West Readouts

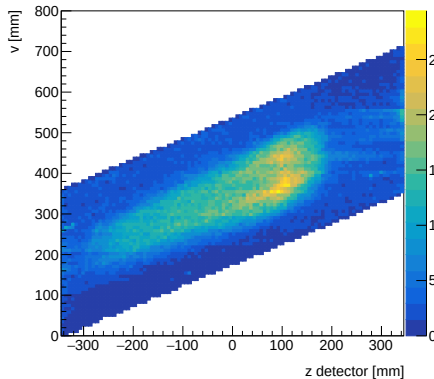


V vs Z in Detector Layer 2 Sheet 1 for Good Clusters

Run 10: V versus ZDetector



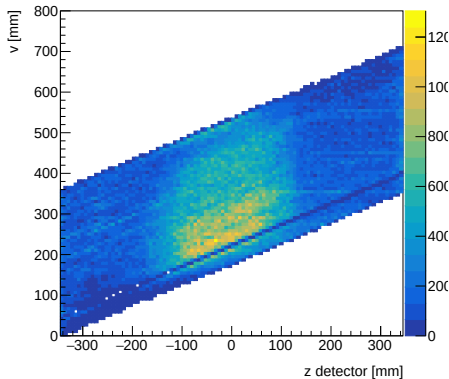
Run 17: V versus ZDetector



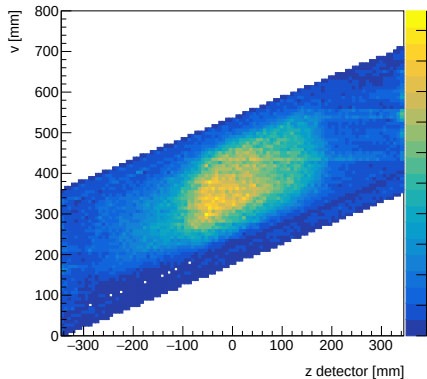
Run 10 on left, run 17 on right
Run 17 has more noisy v strips

V vs Z in Detector Layer 2 Sheet 2 for Good Clusters

Run 10: V versus ZDetector



Run 17: V versus ZDetector



Run 10 on left, run 17 on right
Run 17 has more noisy v strips