

Time Distribution Fits

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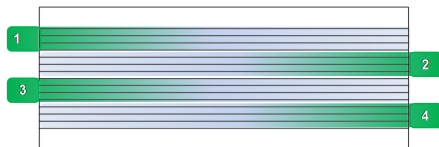
April 2, 2020

Overview of Method

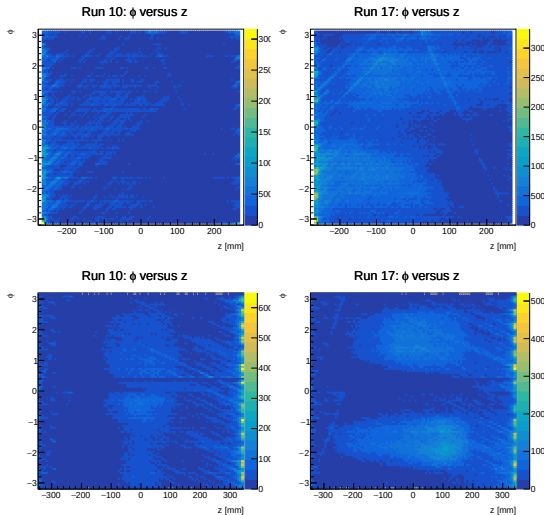
- ▶ Combine data from runs 11-17 for each readout
- ▶ Look at time distributions for different bins of distance to readout
- ▶ Find events with an XV cluster to get z position
- ▶ Measure the distance from the cluster to the readout
- ▶ Just using layer 2 for now

CONNECTOR SCHEME

X STRIP



Positions of Clusters in the Detector



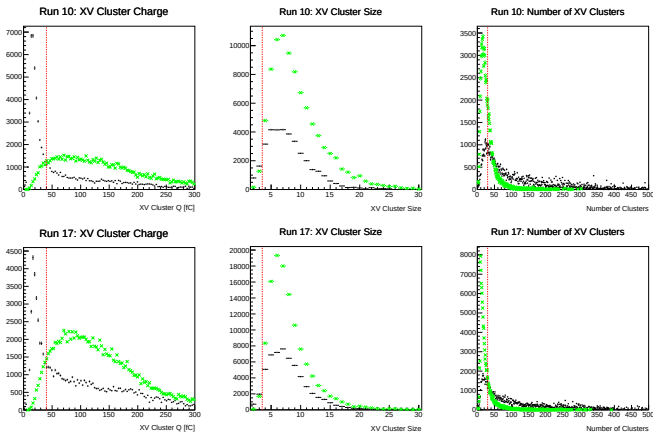
There appear to be quite a few noisy v strips

Top row is layer 1, bottom is layer 2

Layer 2 has noise on the right, whereas layer 1 has it on the left

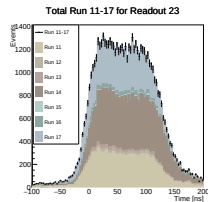
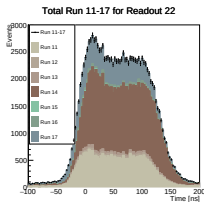
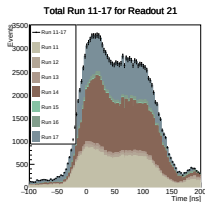
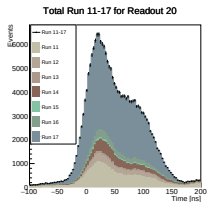
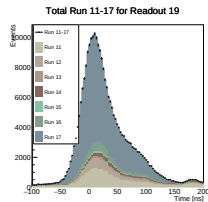
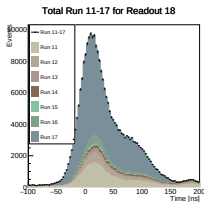
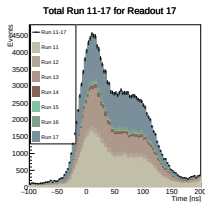
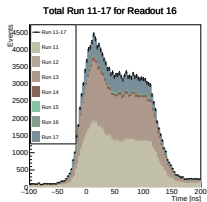
Event Selection

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



$$Q_{XV} > 40 \text{ fC}, \text{Size}_{XV} > 3, N_{Clusters} < 50$$

Combining Runs 11-17



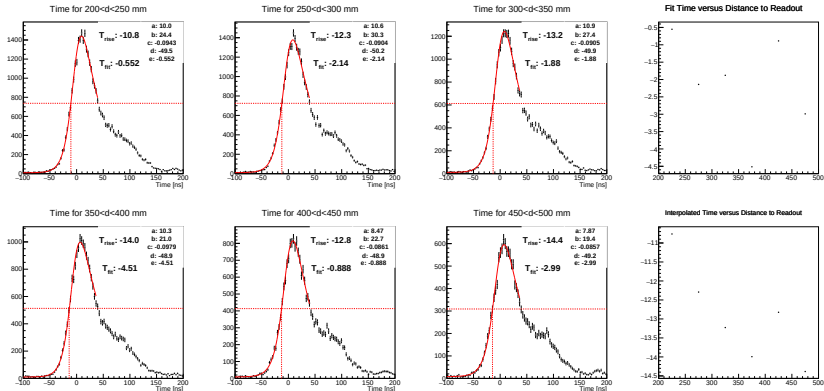
- ▶ Combine data from different runs by subtracting the calibration times for the sheet/layer
- ▶ The different colors show the time distributions for different runs

Fitting Method

- ▶ Those plots show the total time distribution for all values for the distance to the readout
- ▶ We need to break these into 6 bins of z , so we will have about $1/6$ the statistics for the fit
- ▶ Several readouts already have low statistics or broad peaks
- ▶ Only use the four readouts with the largest statistics for now
 - ▶ Readouts: 18, 19 (backup), 33 (backup), 34 (backup)
- ▶ Improves fit convergence
- ▶ Also calculate the time at half maximum by interpolating the two bins closest to half max
- ▶ Function

$$a + \frac{be^{-c(x-d)}}{1 + e^{-(x-e)/f}}$$

Fit Results and Time for FEB 18

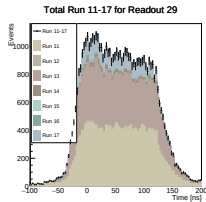
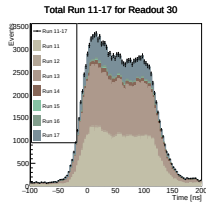
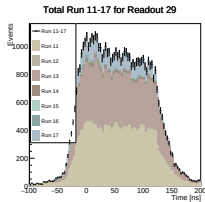
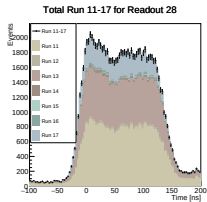
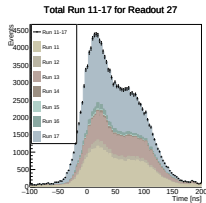
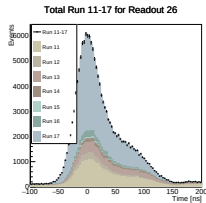
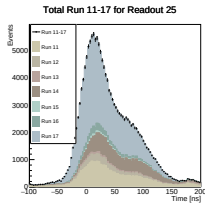
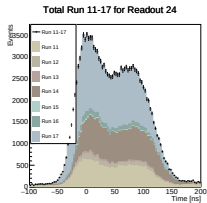


- ▶ Horizontal line shows half maximum
- ▶ Vertical line shows the time
- ▶ Column on the right shows the time versus distance to the readout for readout 18

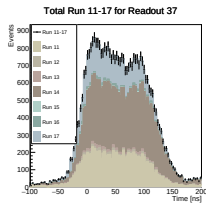
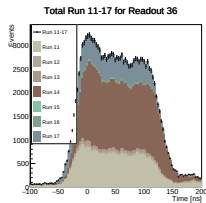
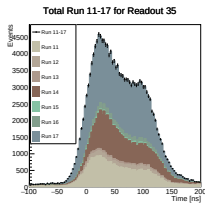
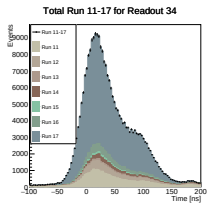
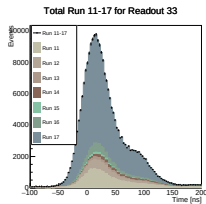
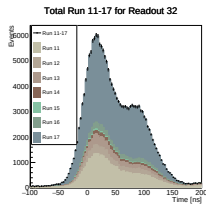
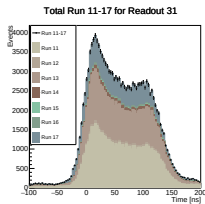
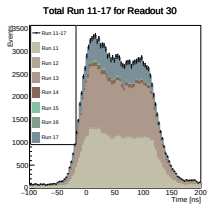
Summary

- ▶ Combining runs 11-17 gives enough statistics to do fits readout by readout
- ▶ Several readouts have really broad peaks
- ▶ The time versus distance to readout graphs still do not match expectations

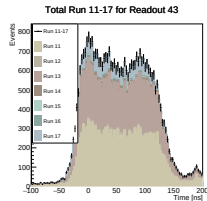
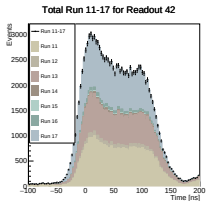
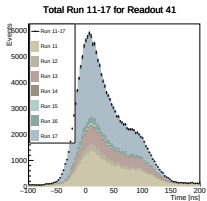
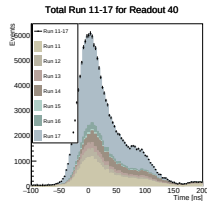
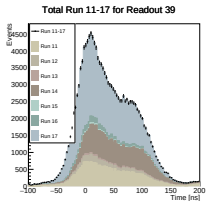
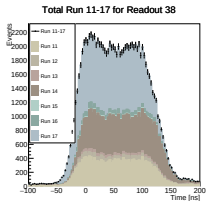
Combining Runs 11-17



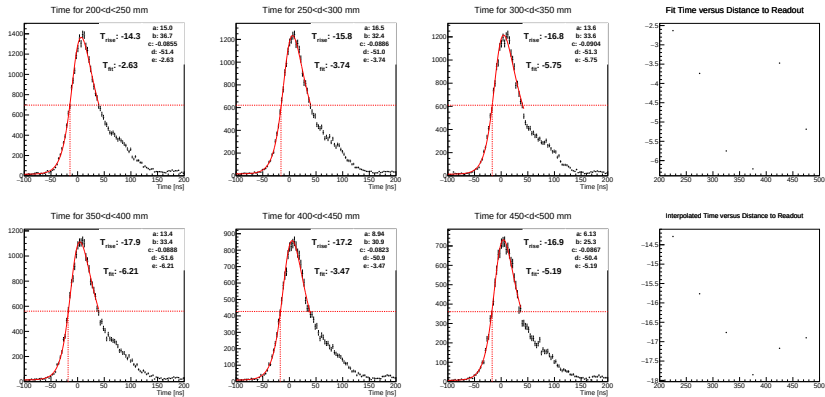
Combining Runs 11-17



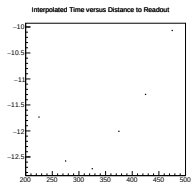
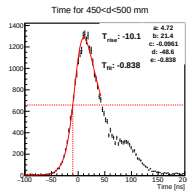
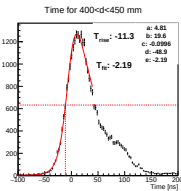
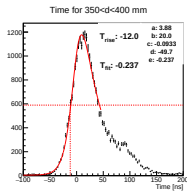
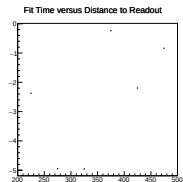
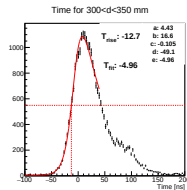
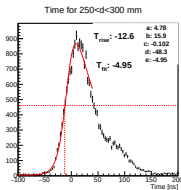
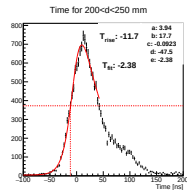
Combining Runs 11-17



Fit Results and Time for FEB 19



Fit Results and Time for FEB 33



Fit Results and Time for FEB 34

