Propagation Velocity Updates

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Current Status

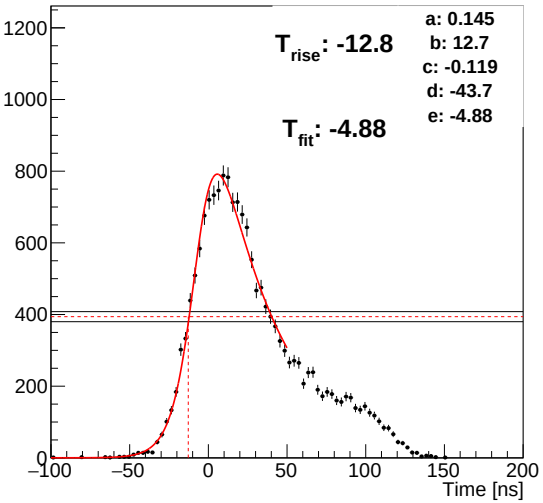
- Want propagation velocity for each strip
- Currently group them by FEBs to increase statistics
- Get z position from XV cluster
- Use LUT to get readout location
- Bin in distance to the readout
- Have preliminary results for x strips
- Next: repeat things for v strips

Event Selection

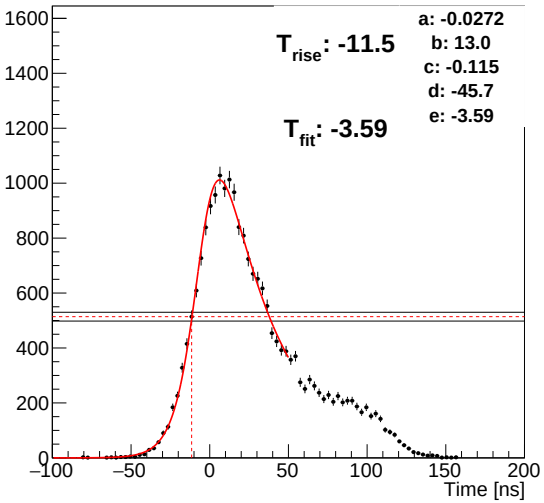
- XV cluster has at least 3 strips
- Strip charge of at least 10 fC to reject noise
- The number of XV clusters in the event has to be less than 50
- The total XV cluster charge has to be at least 40 fC

X Strips - Fits to Bins of Z

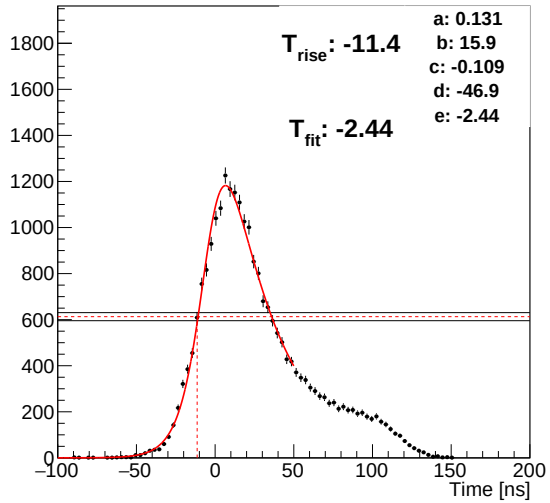
Readout 40 Time, 200<d<250 mm



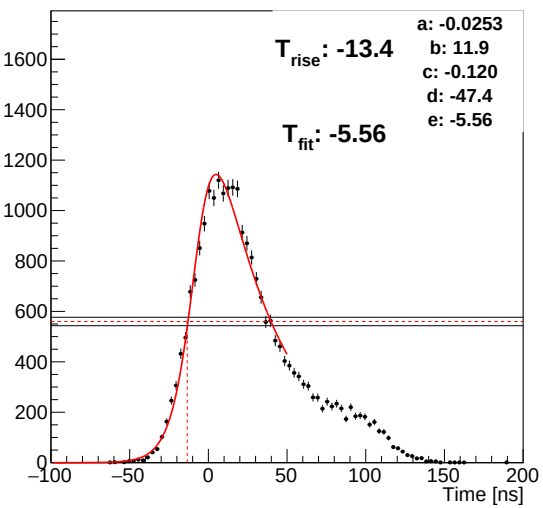
Readout 40 Time, 250<d<300 mm



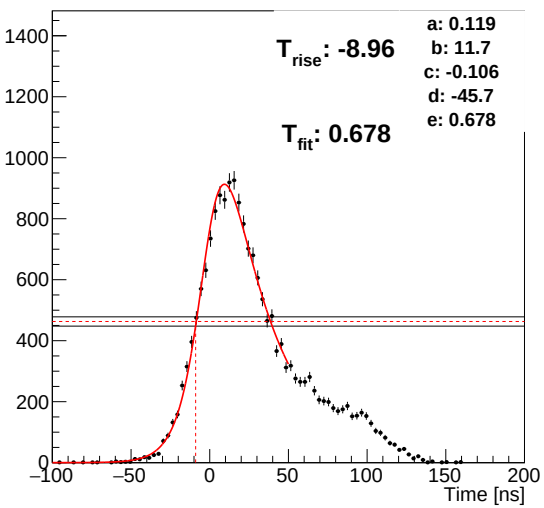
Readout 40 Time, 300<d<350 mm



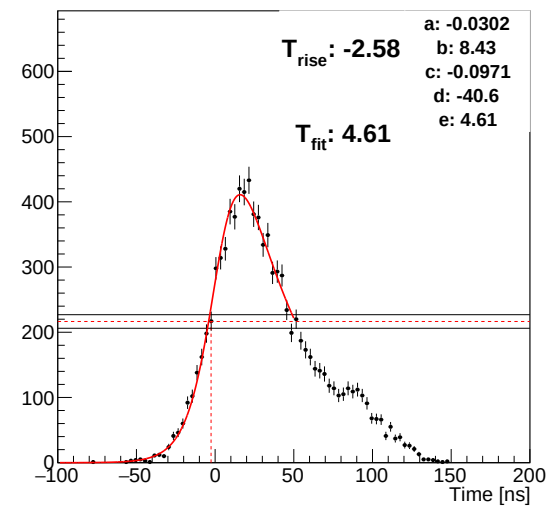
Readout 40 Time, 350<d<400 mm



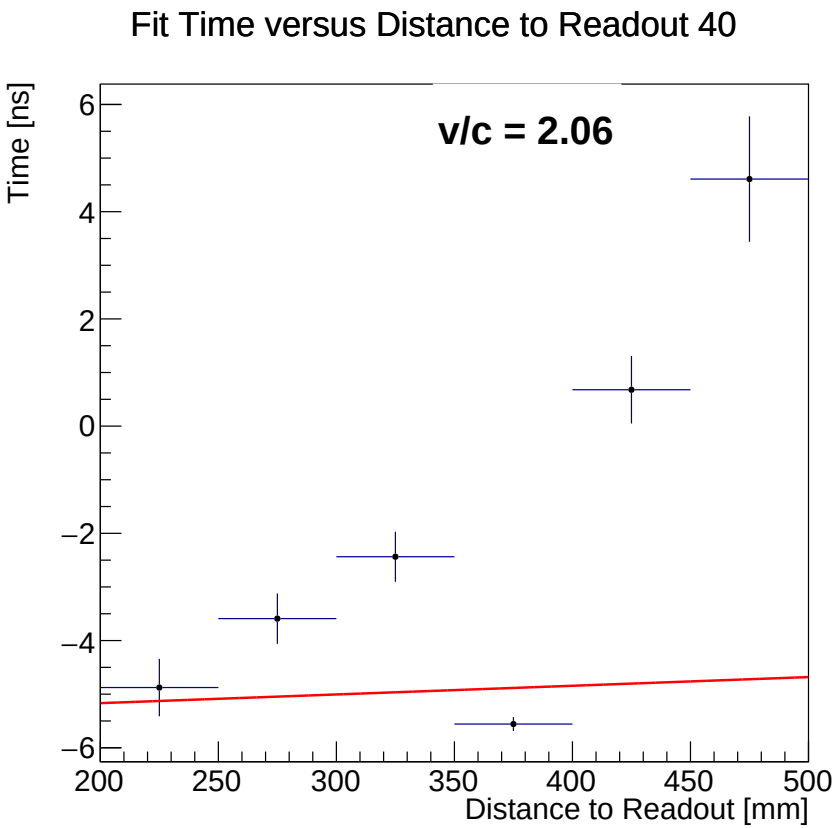
Readout 40 Time, 400<d<450 mm

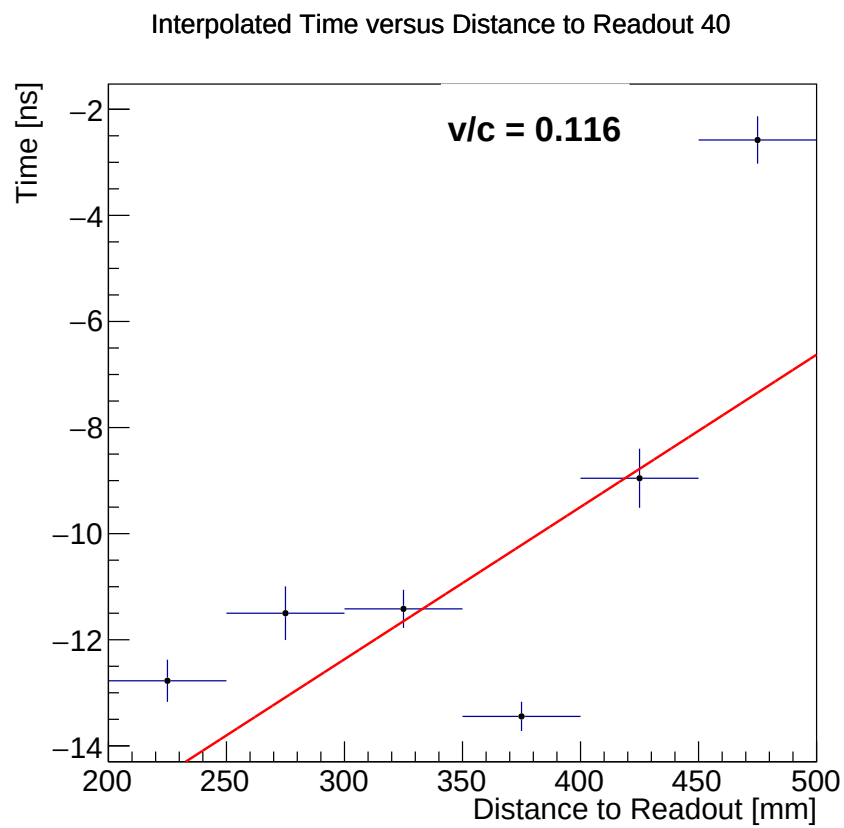


Readout 40 Time, 450<d<500 mm



X Strips

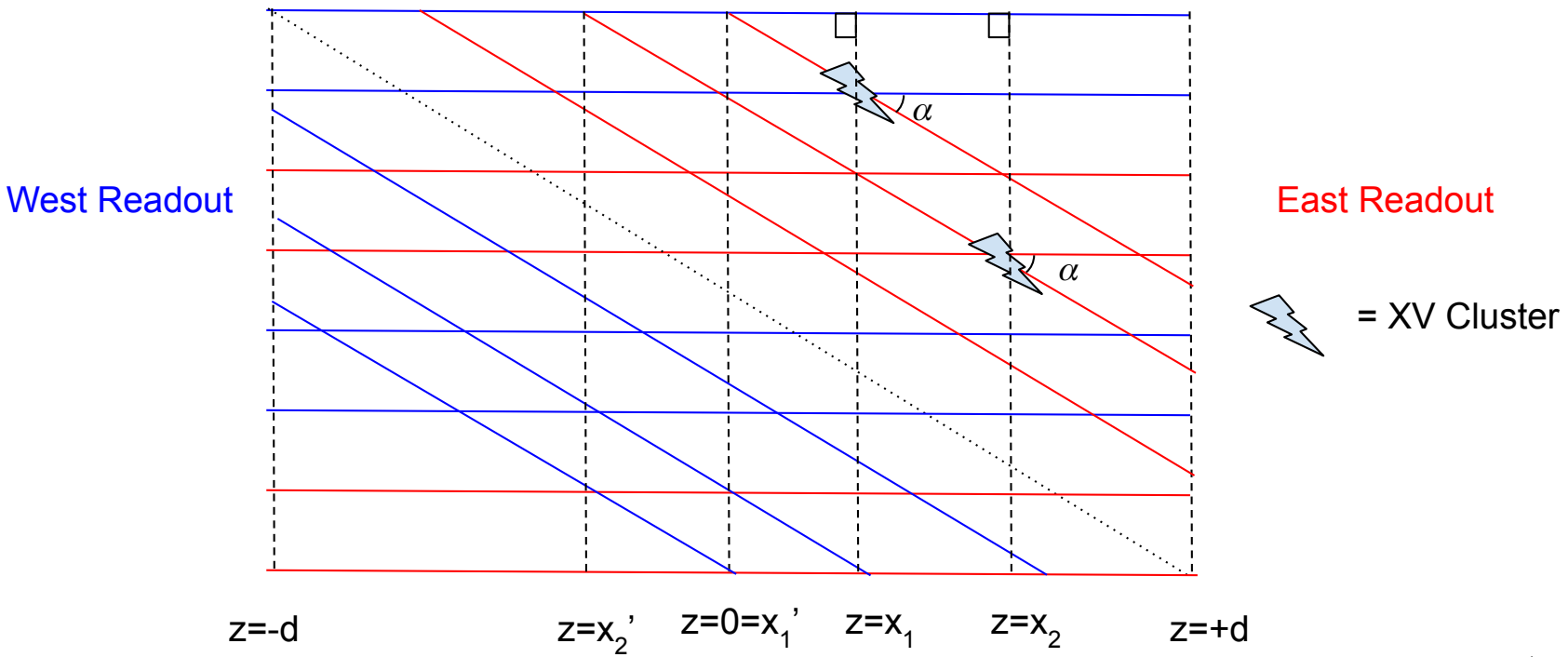




- Points now look more linear
- Still need to adjust for time walk

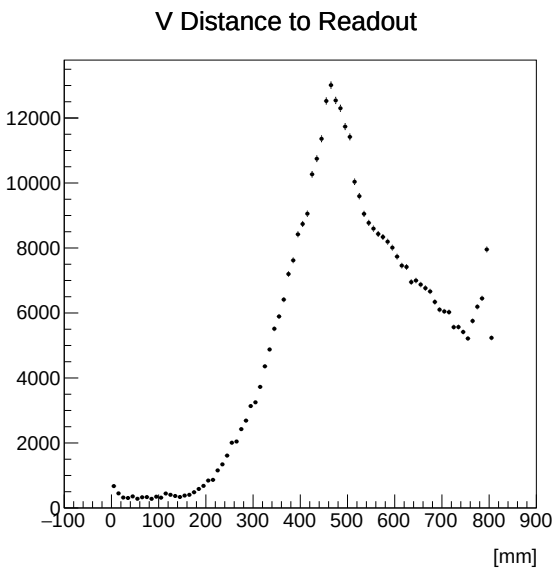
V Strips

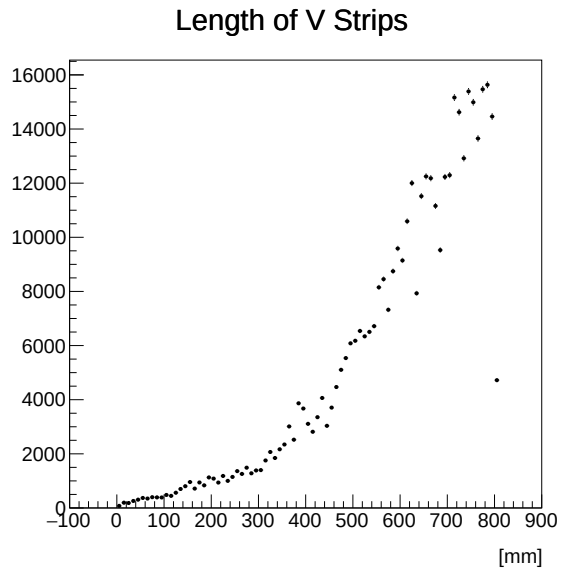
- Have code working for z strips
- Need to implement for v strips as well
- V distance calculation: 1. Measure distance $z_d = d - x_1$ from cluster to readout in z direction 2. Divide by $\cos\alpha$, so $v_d = \frac{d-x_1}{\cos\alpha}$

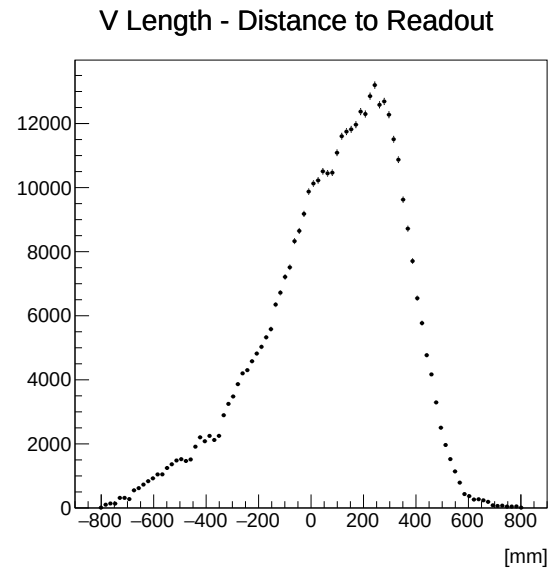


V Strips Problem

- The distance along v all have reasonable values
- Use Liangliang's getVStripLength function to get v_ℓ
- In many cases, $v_d >> v_\ell$

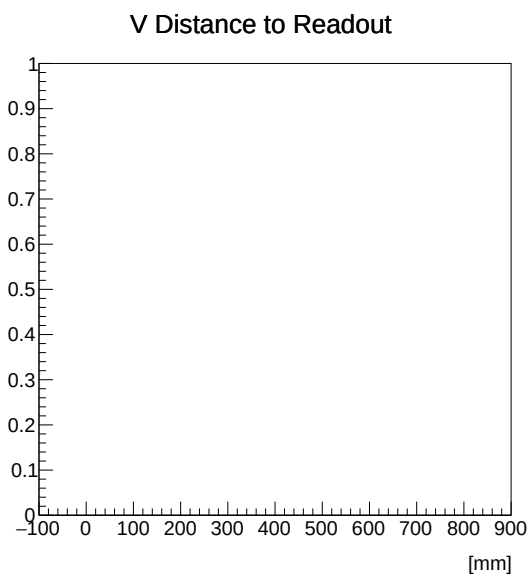


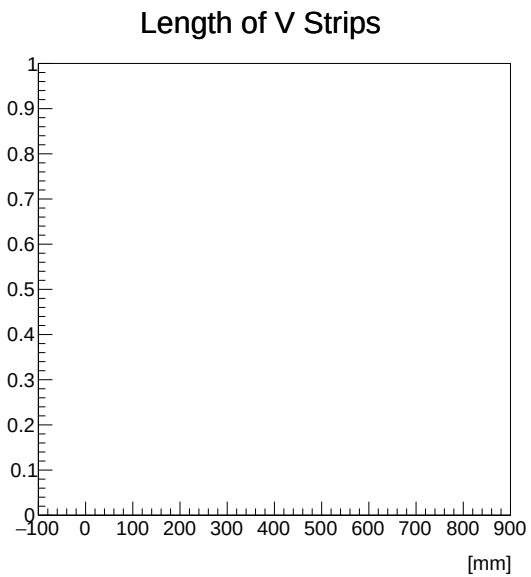


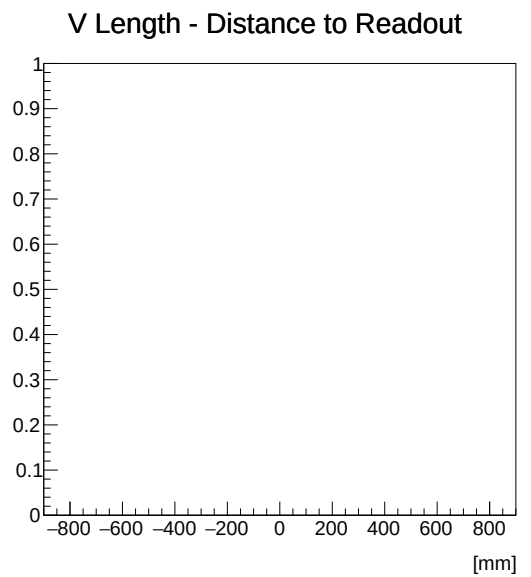


Issue Found with LUT

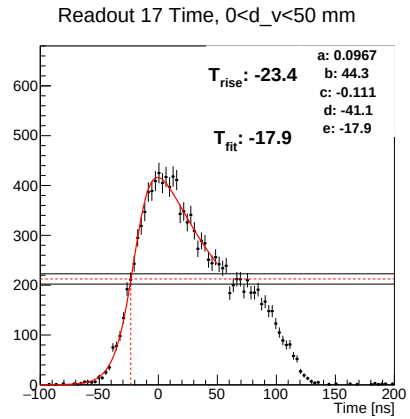
- East and west were flipped in LUT (being updated)
- This is what caused the distance to readout to be longer than the v strip lengths
- Flipping east and west back completely fixes the issue
- Plots below are for FEB 17 (used in fits in next slides)

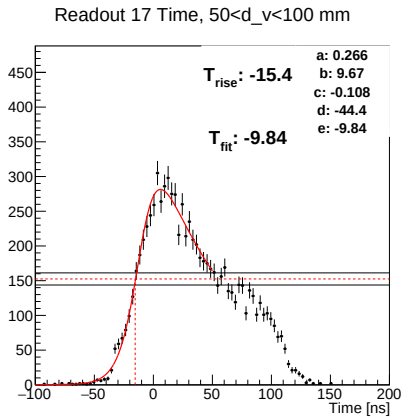


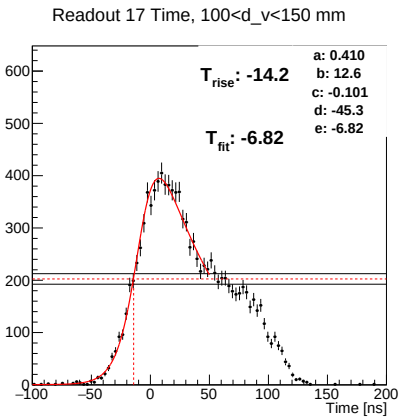


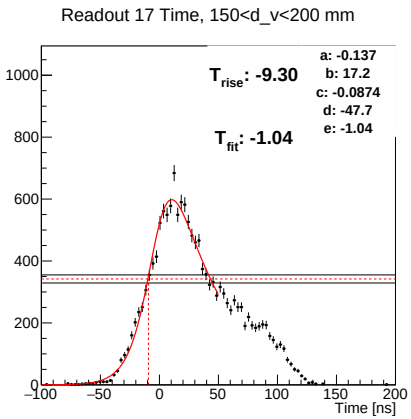


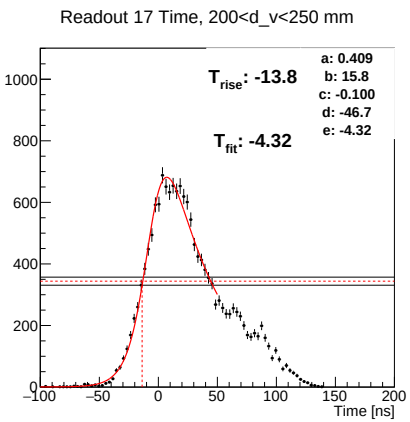
Fitting to V Strips for FEB 17

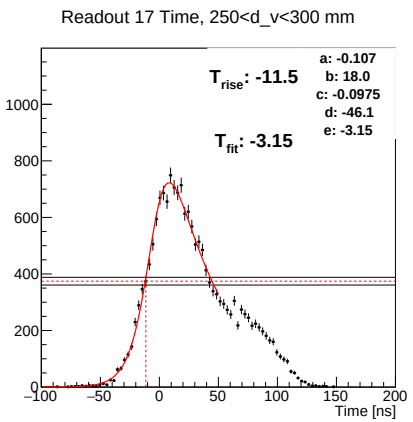


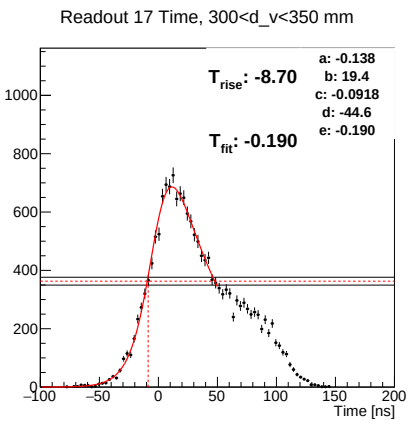


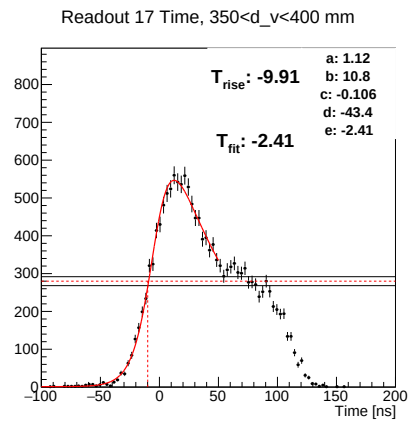




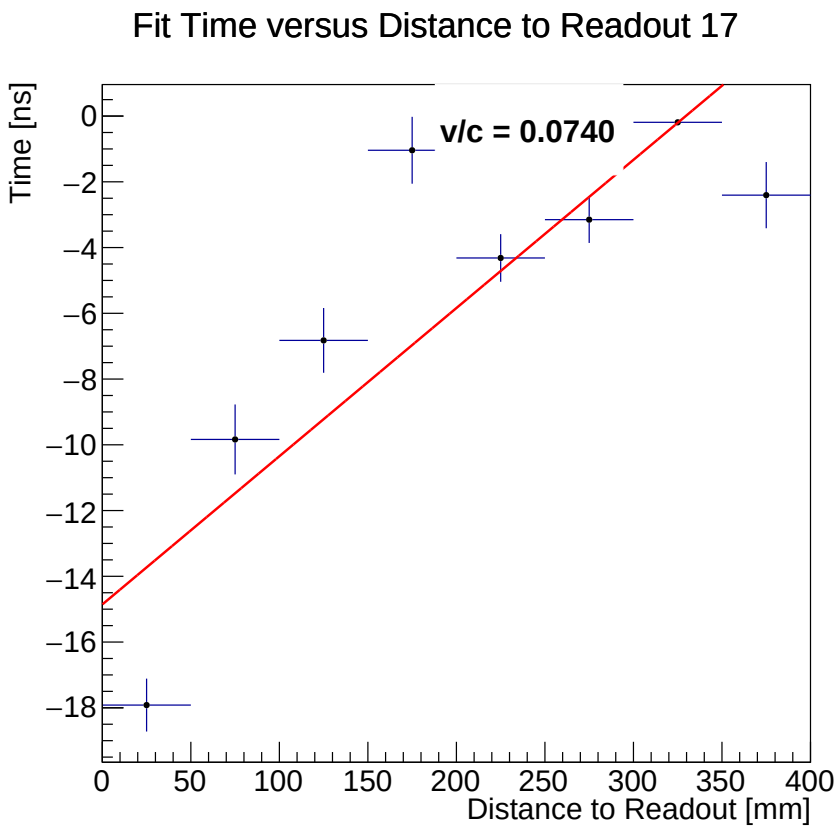


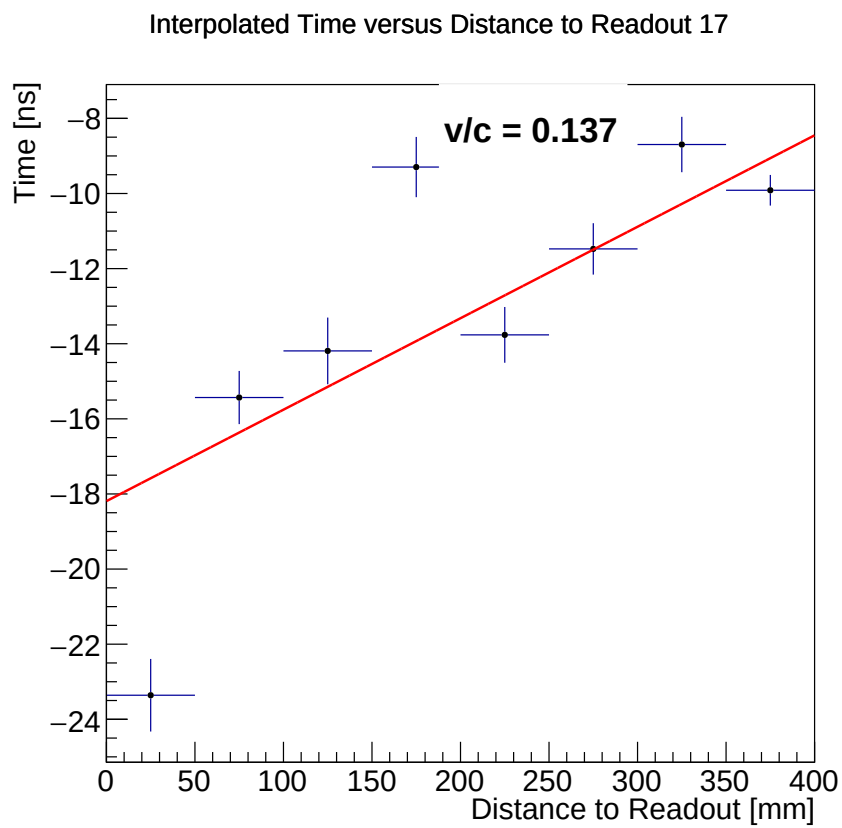






V Strips

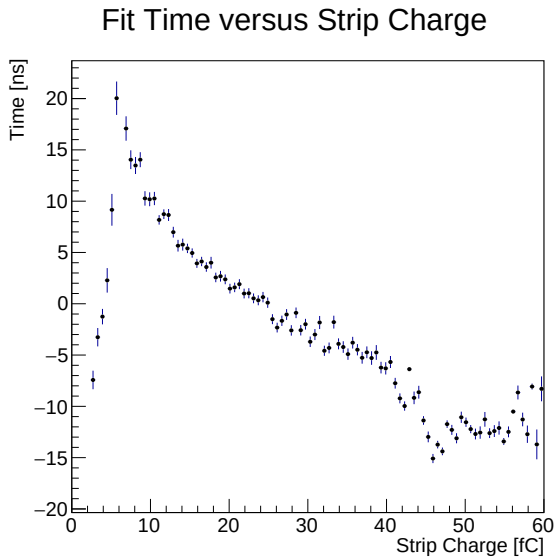


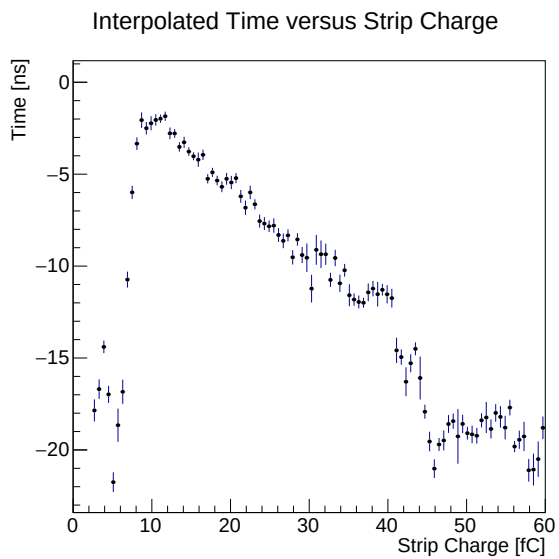


- Points are fairly linear

How large is the time walk effect?

- Did same fitting procedure in bins of 5 fC for x strips
- To get propagation velocity, we need to measure a time of $\approx$ 1 ns.
- Time walk can be up to 10 ns, so it is seems hard to get the propagation velocity before this is corrected





Summary

- Code is essentially done for propagation study
- Issue with readout location is fixed now
- Reprocessed data improved the data quality a lot
- Don't use line fit
  - line fit works only for small number of events, jobs with $>\approx$ 50,000 events are held
  - Reprocessed data has less noise, so it seems less necessary
  - Fit would also reduce statisitics greatly
- Would be better to do this after time walk corrections