

Definition:
U, V is the position not the direction.
For example, x wire is perpendicular to x-axis.

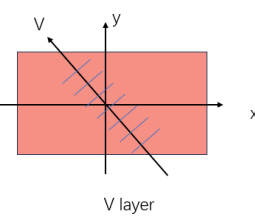
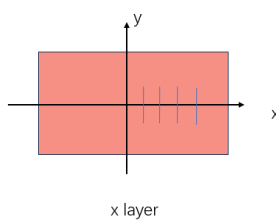
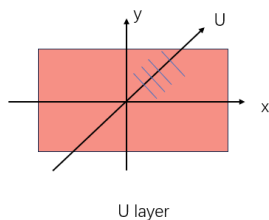


Figure 1: alt text

My results have large errors because I didn't filter the data.

This seems to be data-related; I don't know why the plot below looks so strange.
The x-axis range is small because the data range is small, but why is the y-axis range so large?

I want to see the log of the experiment.

And I want to try to identify the x, y, z axes.

— Begin spatial resolution analysis (sigma_U) —

Found 14 peaks.

Successfully fitted 14 peaks.

Final weighted mean spatial resolution (sigma_U) = 1.0990 +/- 0.0169 mm

Analysis complete! Results saved to: ./output/data0074.ridf_pdc_tdc_tot.root_resolution.root
the bin width = 1 mm.

(Negative Slope) = -34.22 +/- 3.36 TDC counts/mm

(Positive Slope) = 31.68 +/- 3.58 TDC counts/mm

— Begin spatial resolution analysis (sigma_U) —

Found 10 peaks.

— Begin average peak spacing calculation —

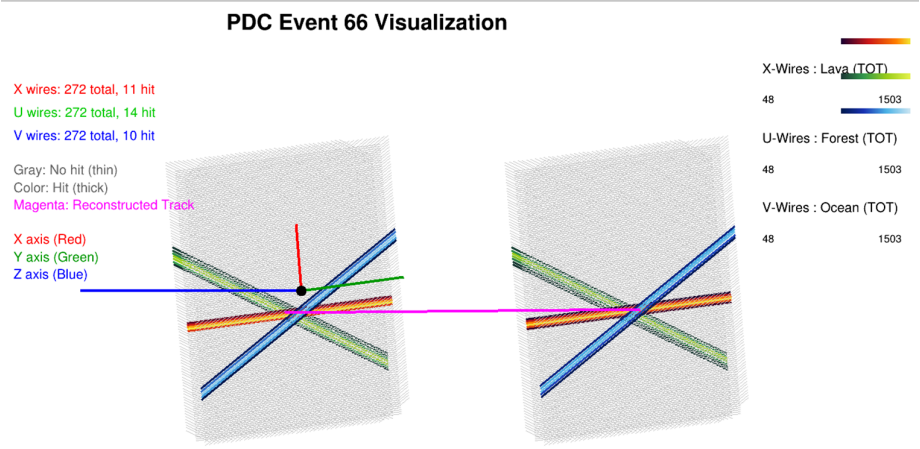


Figure 2: alt text

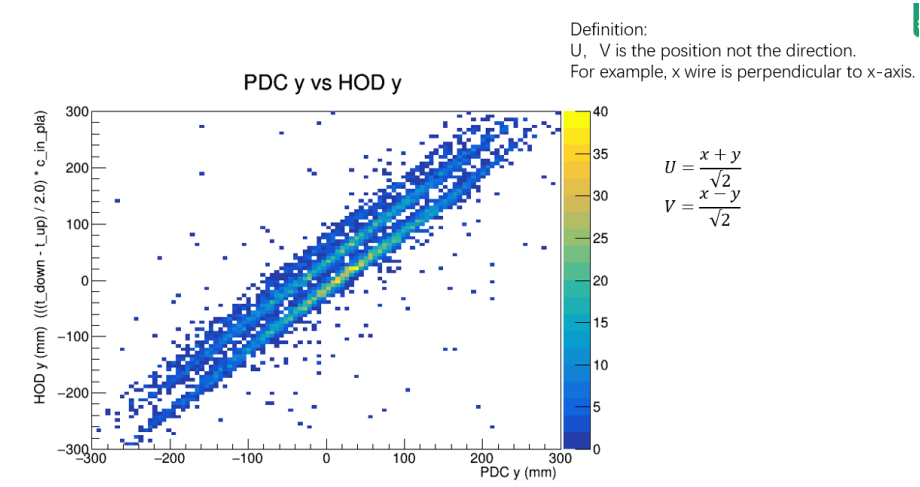


Figure 3: alt text

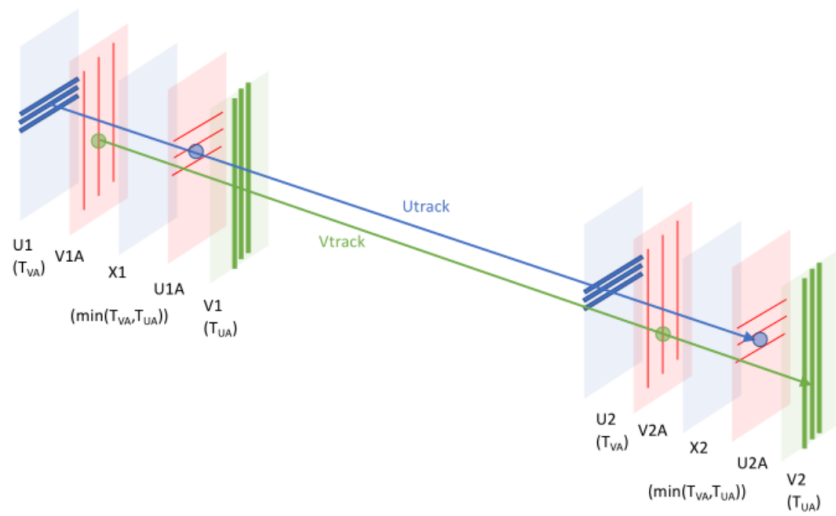


Figure 4: alt text

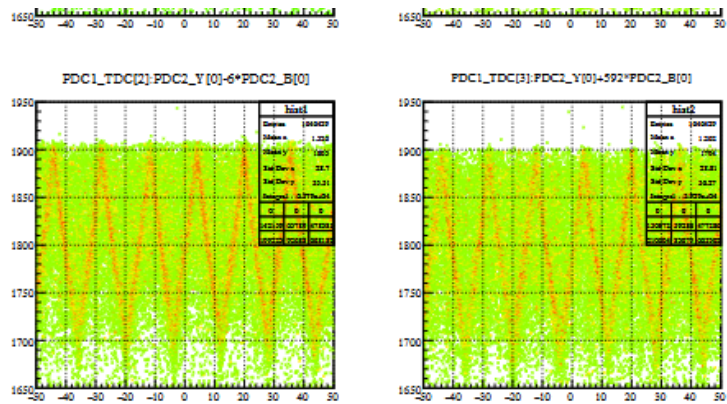


Figure 5: alt text

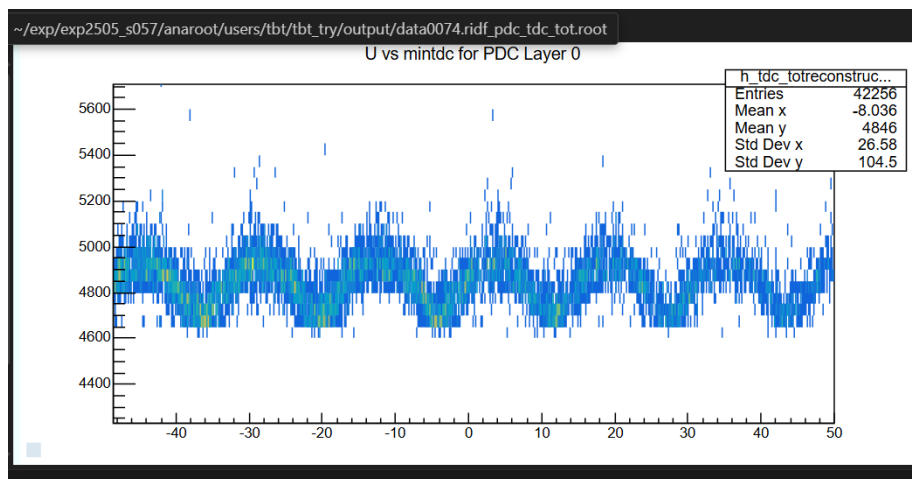


Figure 6: alt text

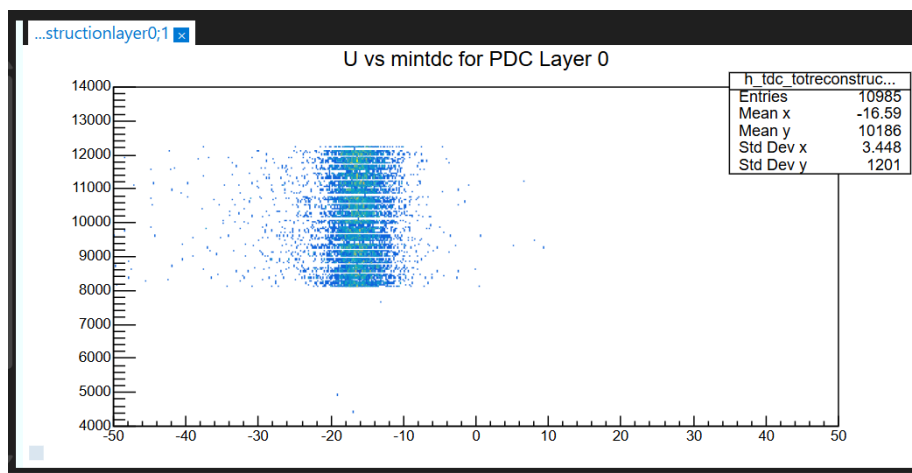


Figure 7: alt text

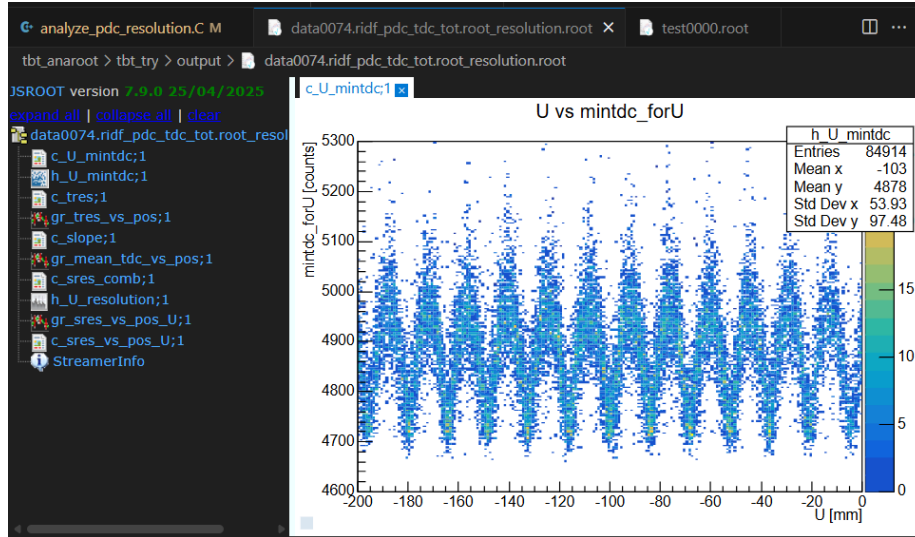


Figure 8: alt text

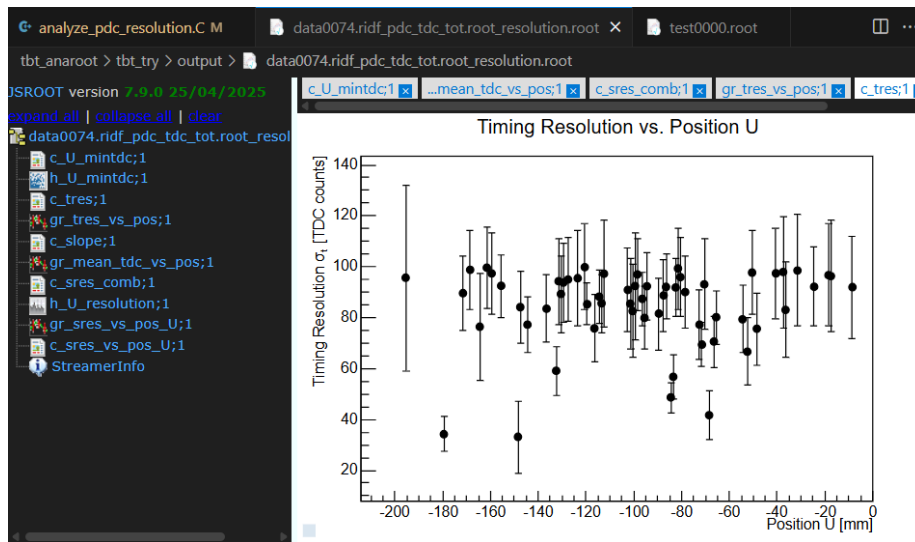


Figure 9: alt text

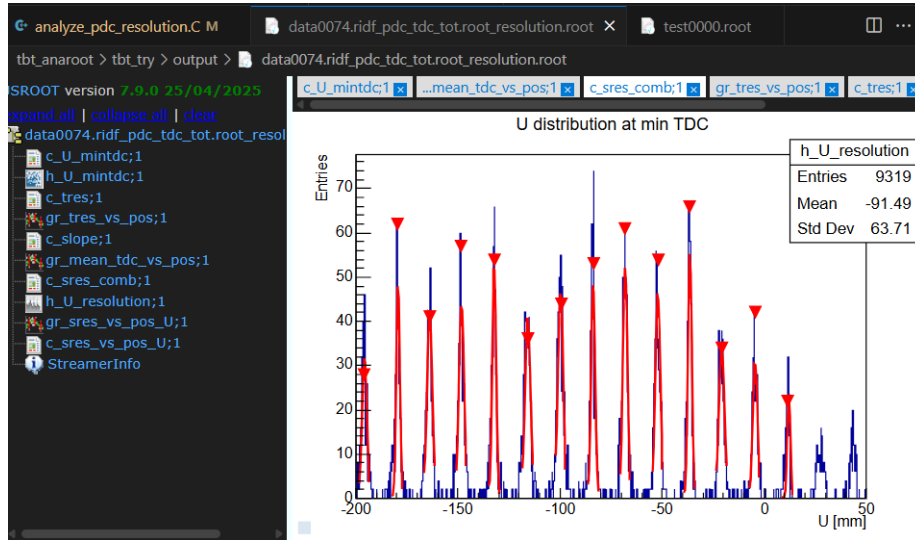


Figure 10: alt text

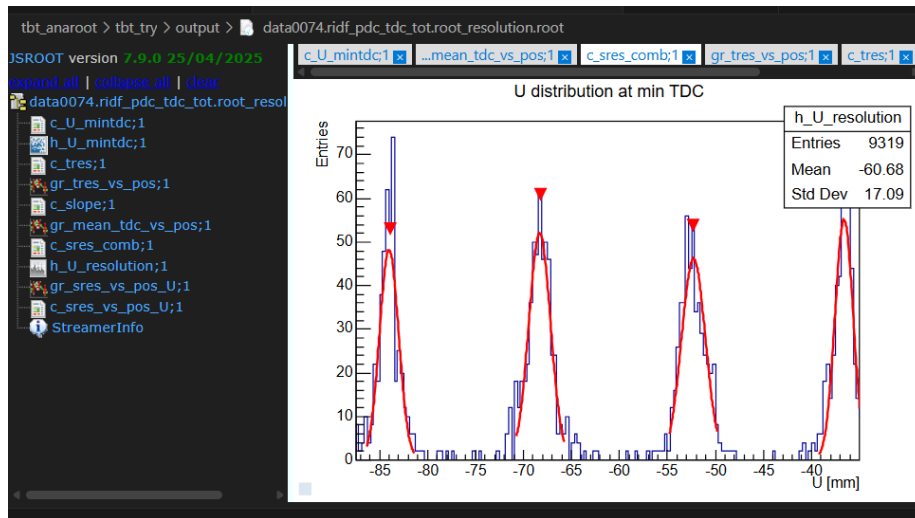


Figure 11: alt text

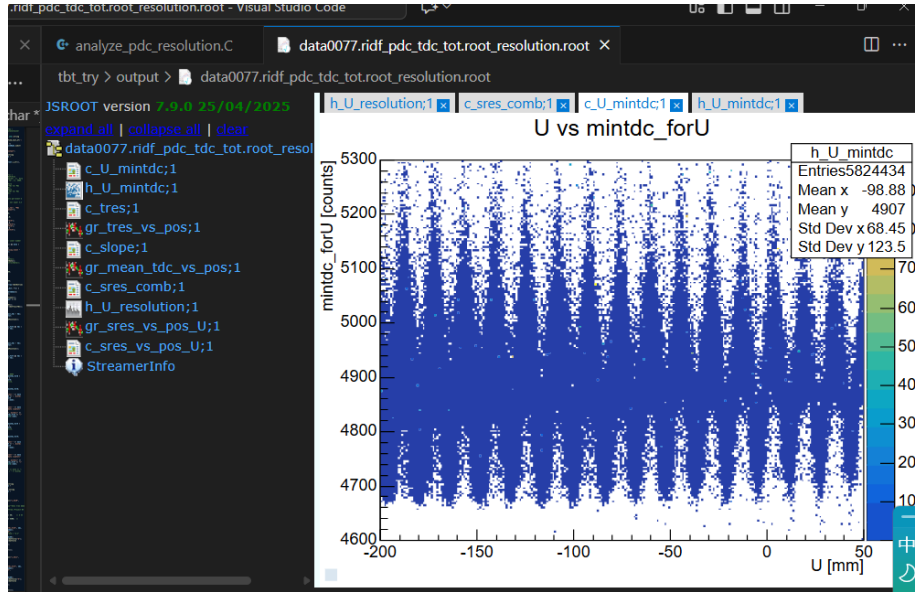


Figure 12: alt text

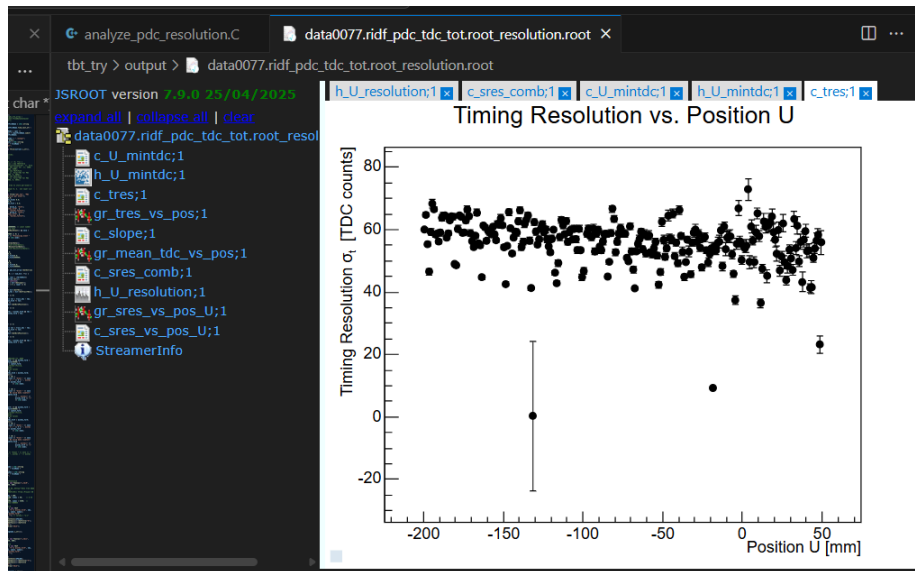


Figure 13: alt text

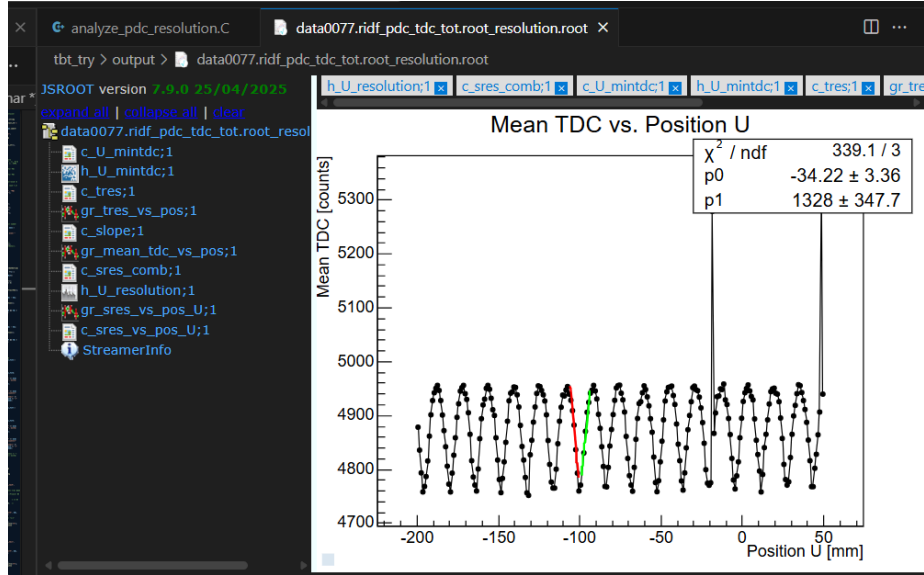


Figure 14: alt text

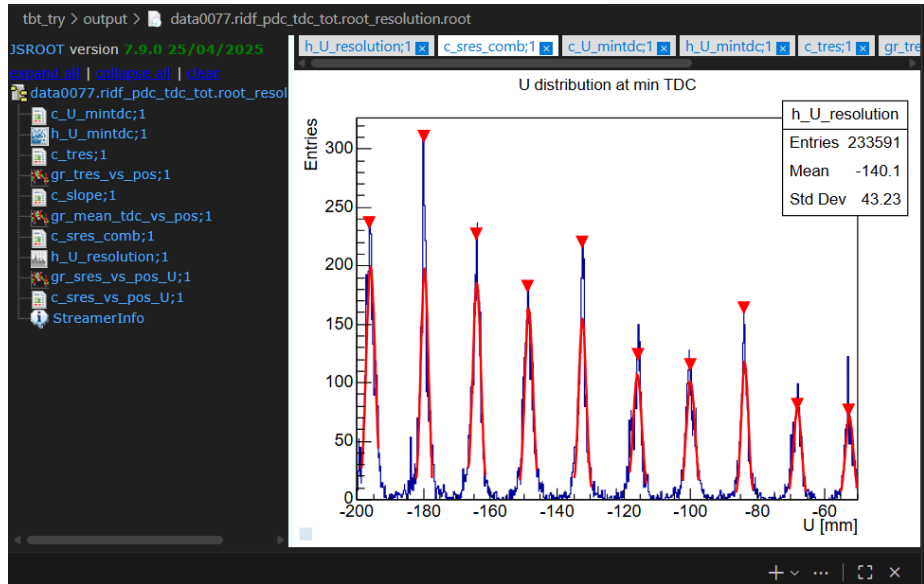


Figure 15: alt text

$$\text{Average Peak Spacing} = 15.9375 \pm 0.4086 \text{ mm}$$

Fitting all peaks individually to compute resolution...

Successfully fitted 10 peaks.

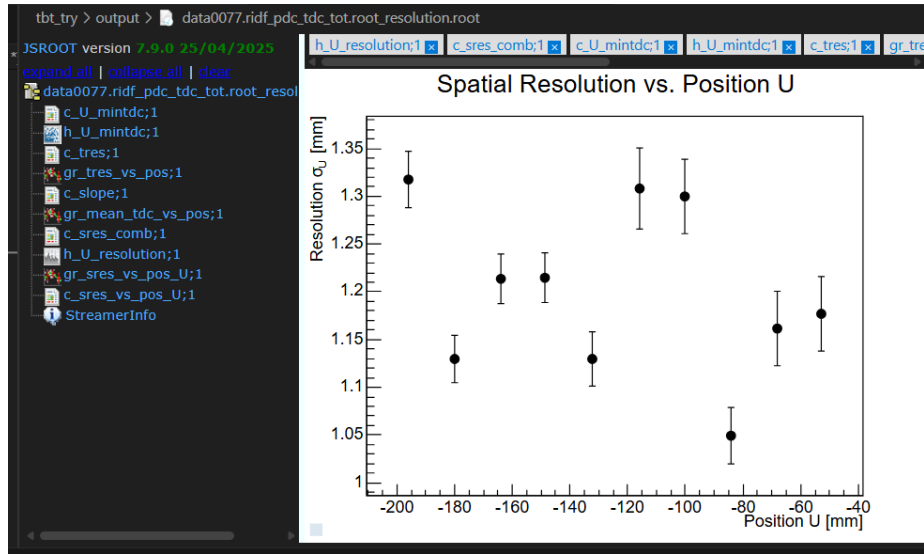


Figure 16: alt text

**Final weighted mean spatial resolution (σ_U) = 1.1894
 ± 0.0097 mm**

Analysis complete! Results saved to: `./output/data0077.ridf_pdc_tdc_tot.root_resolution.root`

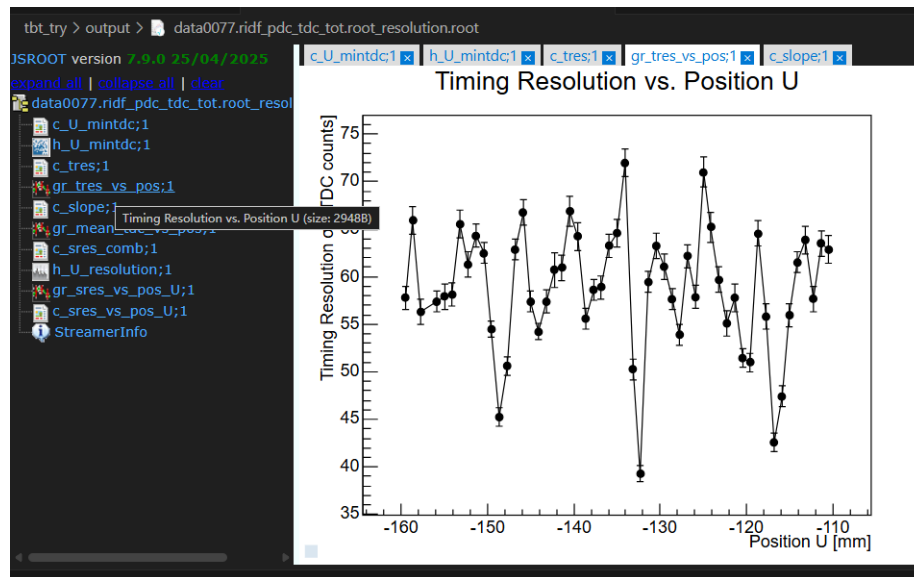
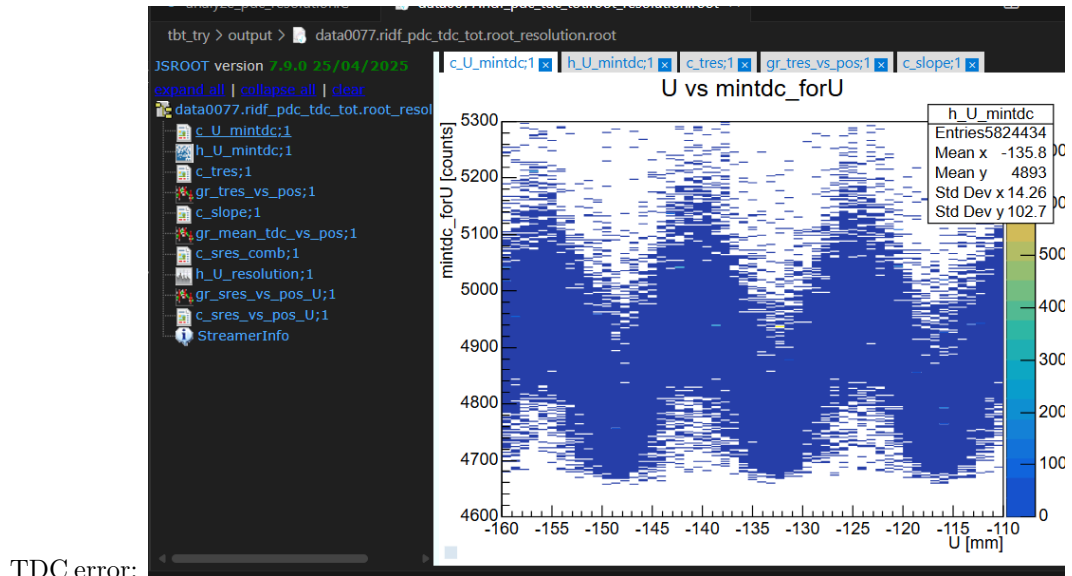


Figure 17: alt text

Step 1: Use Lomb-Scargle periodogram to precisely estimate the period...

Based on prior knowledge, focus the period scan range to $[12, 18]$ mm

Lomb-Scargle analysis complete. Strongest signal frequency = 0.0632 mm^{-1}

-> Corresponding precise period $T = 15.8233 \text{ mm}$

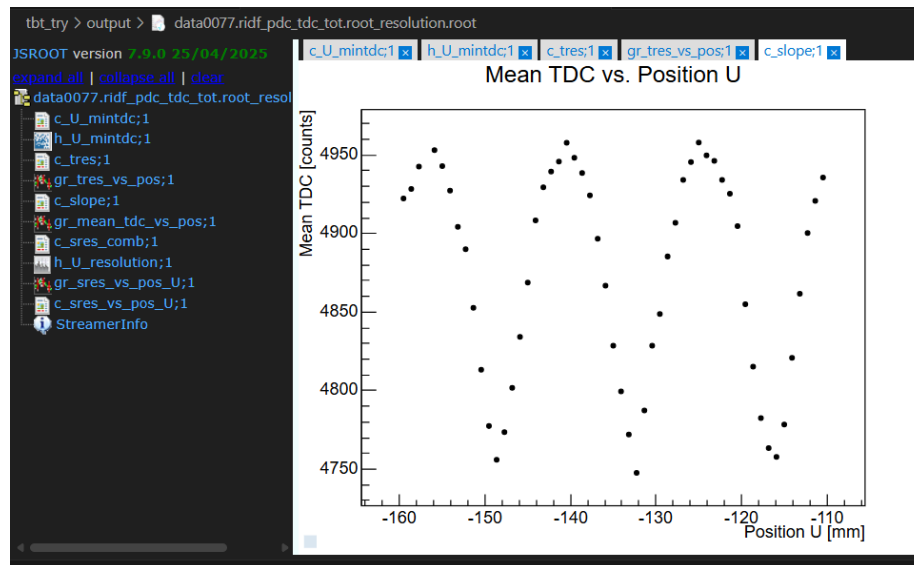


Figure 18: alt text

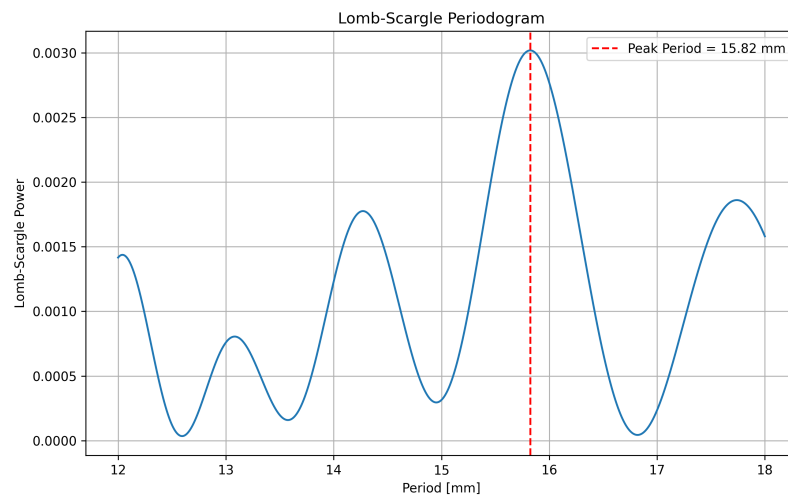


Figure 19: alt text

Folding all periods' data to the center and aligning valleys...

Searching for valley using Gaussian fit on the lowest 1% TDC data...

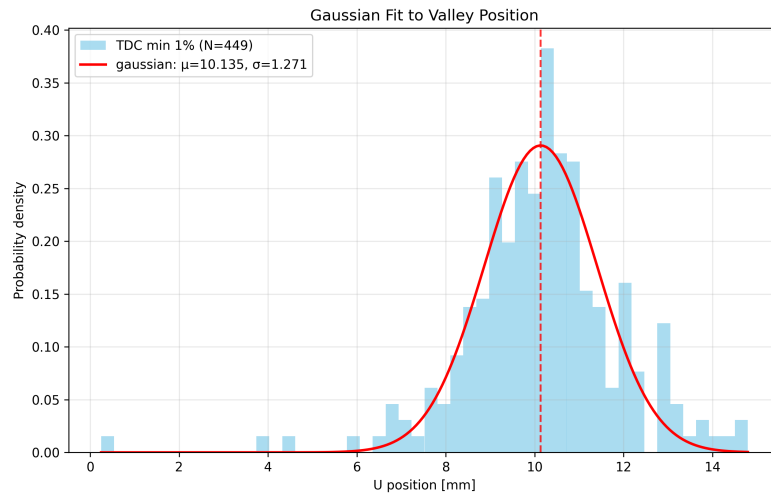


Figure 20: alt text

```
# Apply phase shift so that valley_position is moved to zero
u_folded = ((u_data - valley_position + lomb_scargle_period / 2.0) % lomb_scargle_period) -
```

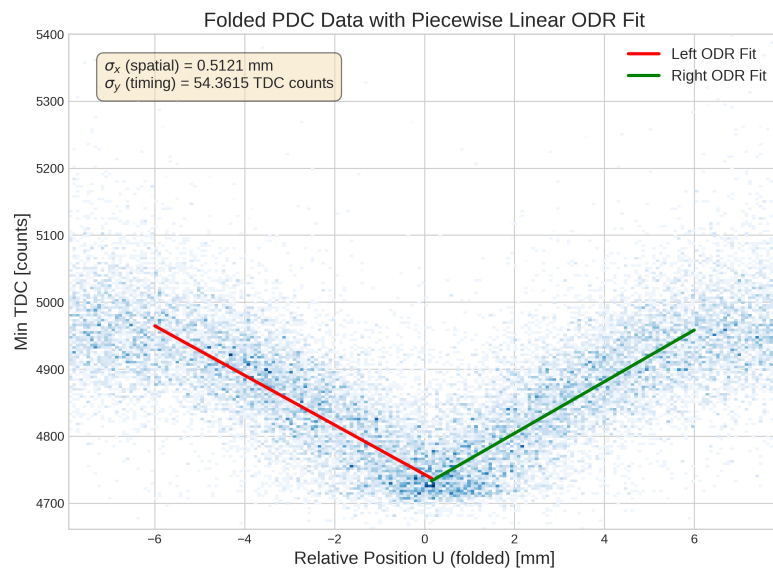


Figure 21: alt text