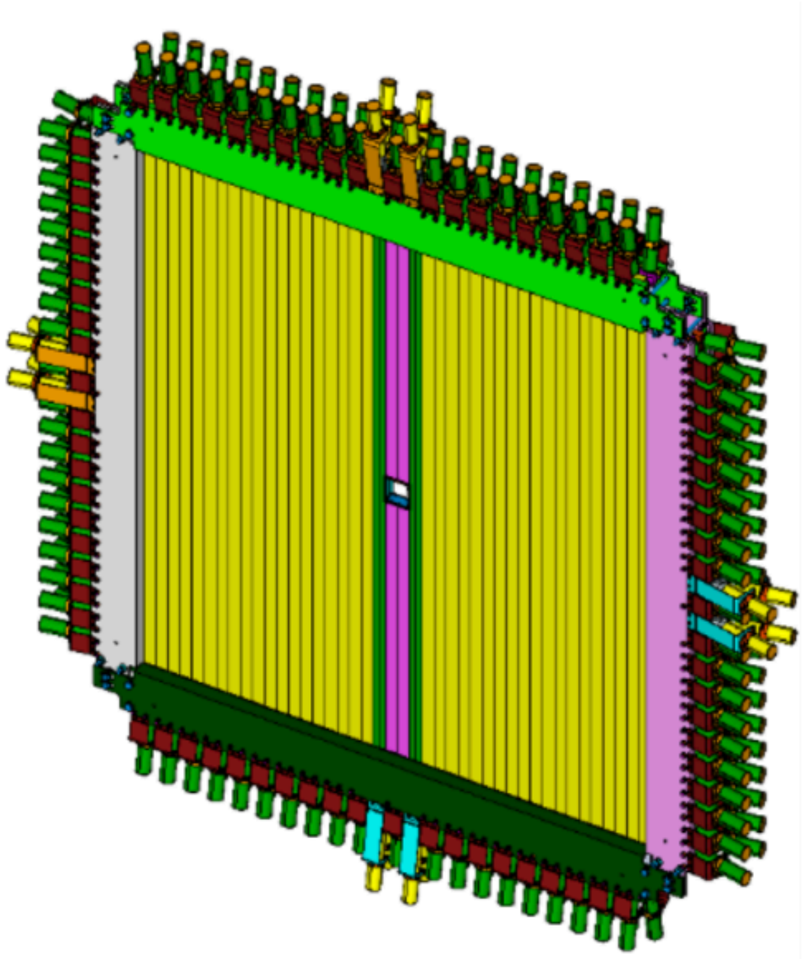
GlueX TOF Calibration

Jackson Pybus

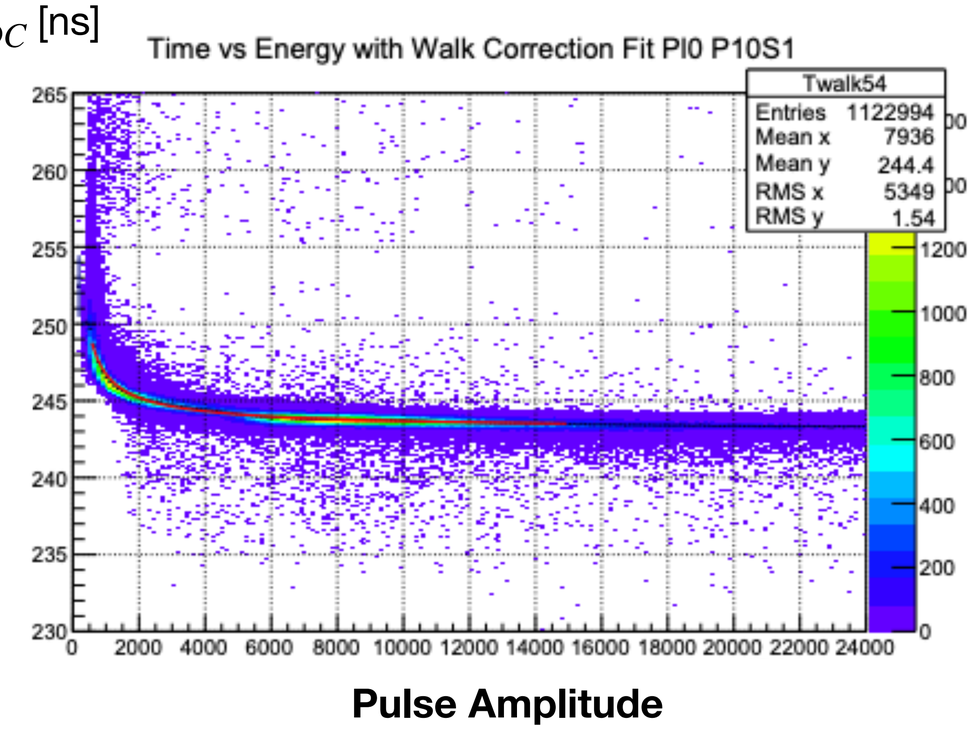
Time-of-Flight Detector

- Two layers of 2.5 meter scintillator panels
- One horizontal, one vertical
- Provide timing information for forward-going (< 11°) particles



Time-Walk Correction

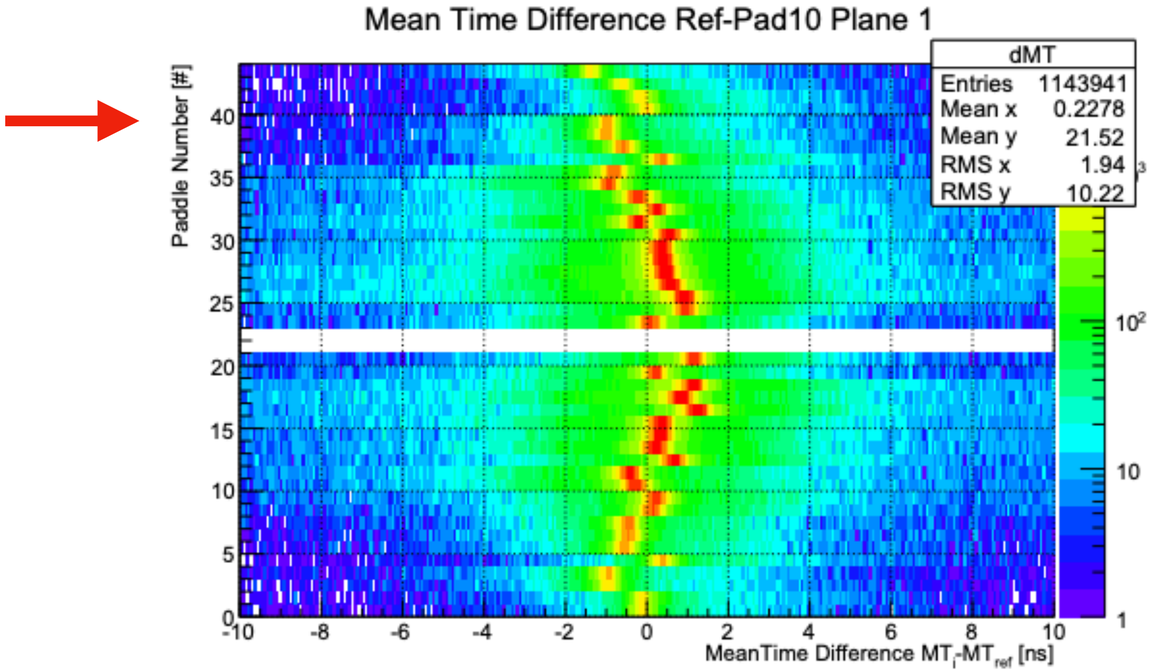
- Flash ADC and TDC both provide timing information for a hit
- TDC better resolution than ADC, but subject to time-walk from pulse amplitude
- TDC calibration requires correcting for amplitude-dependence
- Carried out for each PMT
- Need to ensure robust functional form



Mean-Time Calibration

1. Select reference paddle from Plane 2
2. Plot mean time difference (for coincidence hits) between reference paddle and each paddle in Plane 1
3. Adjust timing of each paddle in Plane 1 to line up at $\Delta t = 0$ ns
4. Select reference paddle from Plane 1, and repeat process for paddles in Plane 2

This leaves all paddles calibrated in relation to one another



Time-Difference Calibration

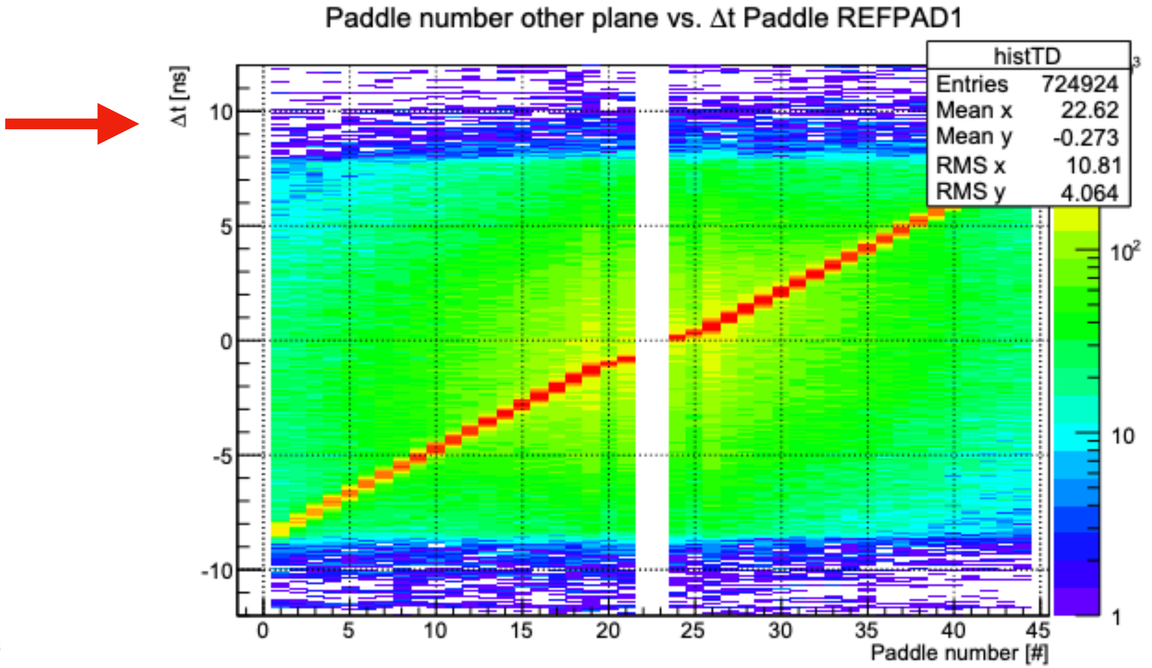
For calibration of individual PMTs:

1. Select paddle from a given plane

2. Plot time difference between PMTs as a function of hit paddle from other plane

3. Correct timing difference to provide linear relationship between hit position and timer difference

This provides sufficient information to calibrate each PMT individually



Single-Readout Paddles

1. Apply walk correction and timing calibration to double-readout paddles

2. Take hits in center of paddles, which intersect single-readout paddles

3. Use those hits to calibrate single-readout paddles' PMTs with respect to existing calibrations