

HGTD hybrids climate chamber tests



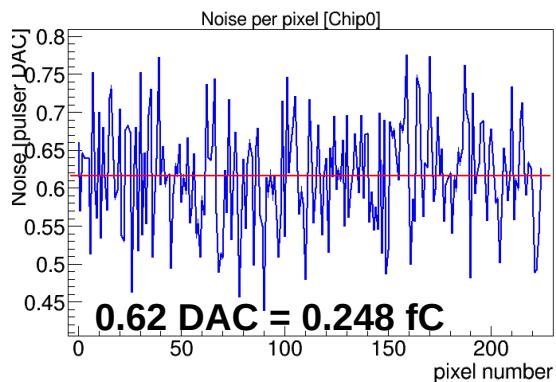
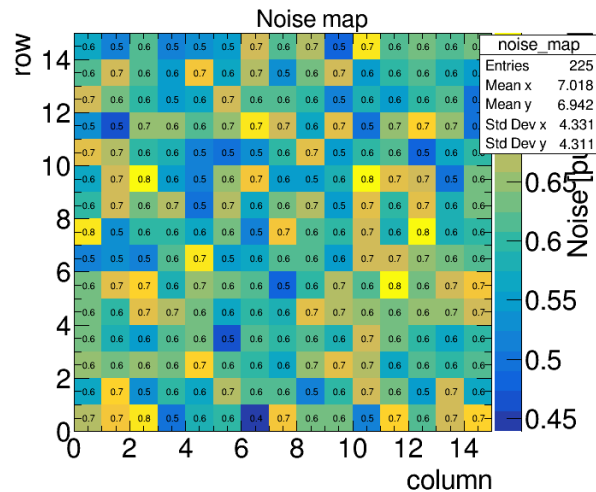
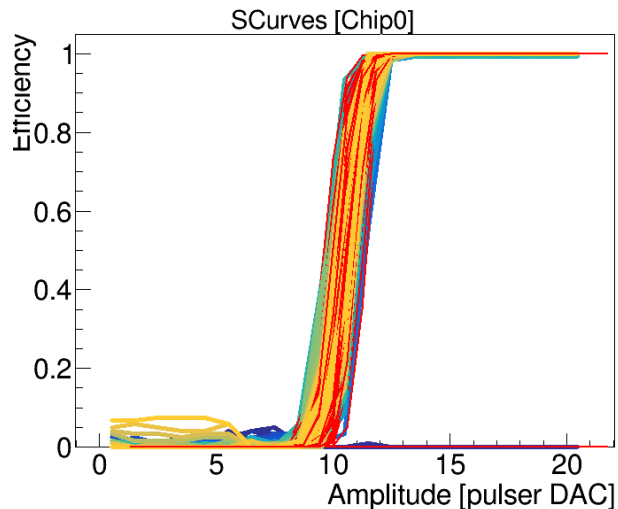
Setup is now (almost) fully operational

- Starting to test at low temperatures
- Reference is currently calibrated only at room temperature 44 ps (low=41 ps, high= 48 ps, CI=95%)
- Need to repeat calibration at -30°C

Modified ALVin software

- ALVin is now ran in batch mode to process data in chunks rather than recording everything at once
 - This allows filtering of events per chunk which speeds up acquisition (events outside window are discarded)
 - Oscilloscope uses segmented memory to temporarily store events
 - Application on PC then filters events based on ASIC data and downloads only valid waveforms (10% of total)
 - Improved reliability
 - Can somewhat mitigate glitches with electronics as chip is configured and reset on every chunk
 - Storage in HDF5 files, both parsed ASIC data and waveforms

Testing with 20WASHP11643254



First tests at -30°C

- Device tuned to 10 DAC (large C inj. - 4 fC)
- $U = 100$ V, $I = \sim 400$ nA
- Good noise performance, compatible with previously measured values

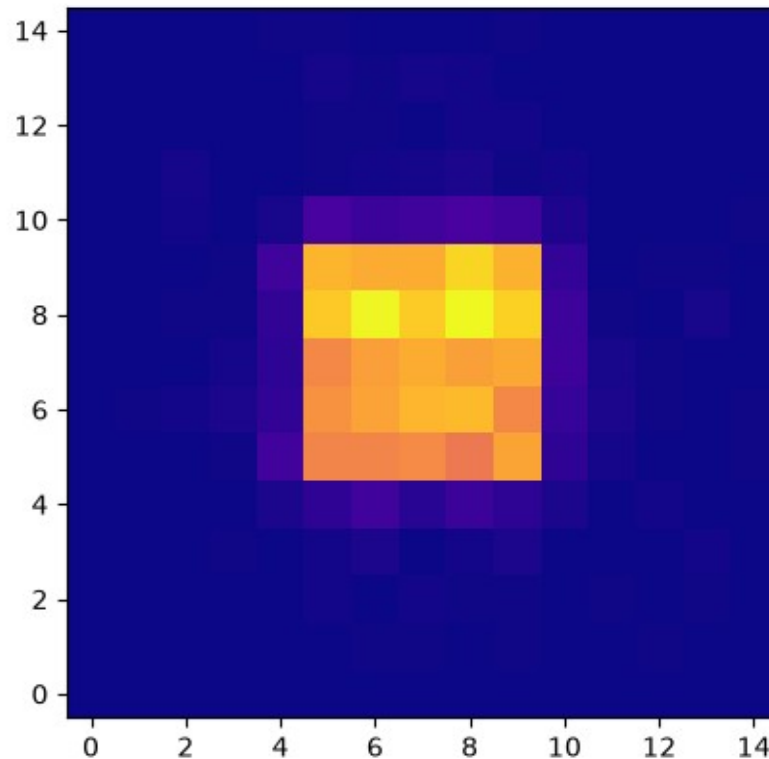
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Two plane ^{90}Sr setup

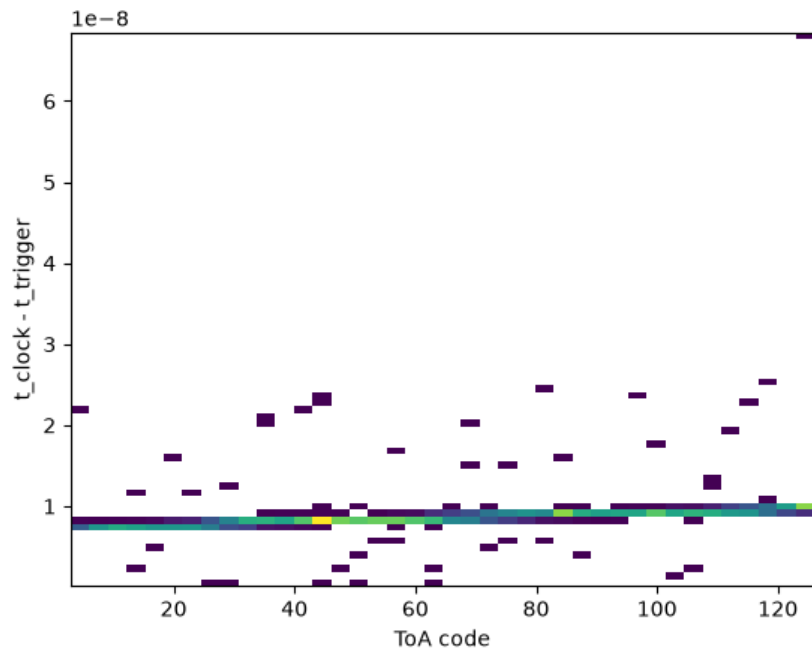
- Hybrid on top plane (near source)
- 2x2 LGAD (W42 IP3) as trigger/reference

Captured 7k valid events (events inside time window)

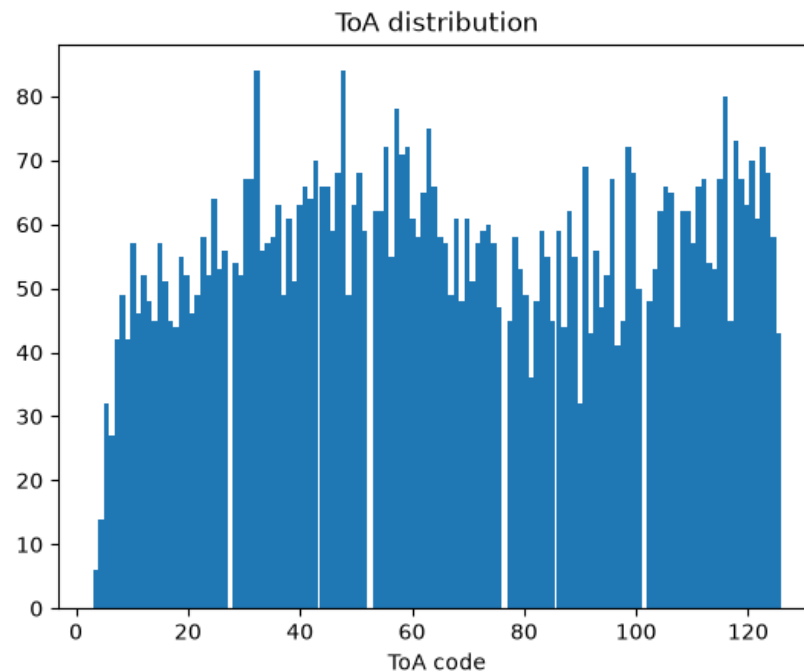
- 307 events in pixel with most events
- Testable region size is limited by PCB cutout size



ToA distribution

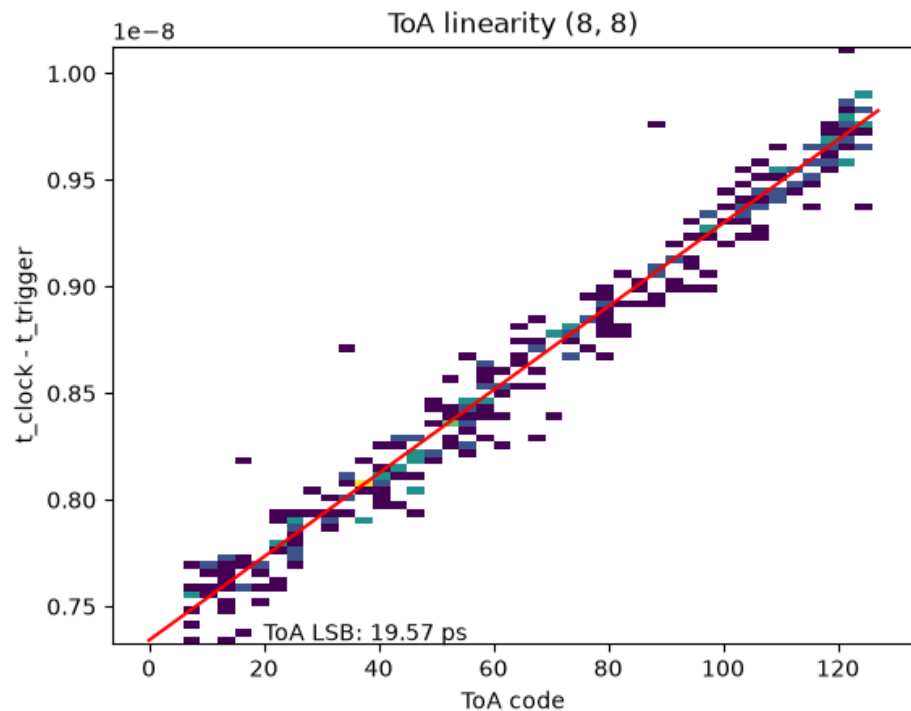


Vast majority of events have good correlation with trigger.

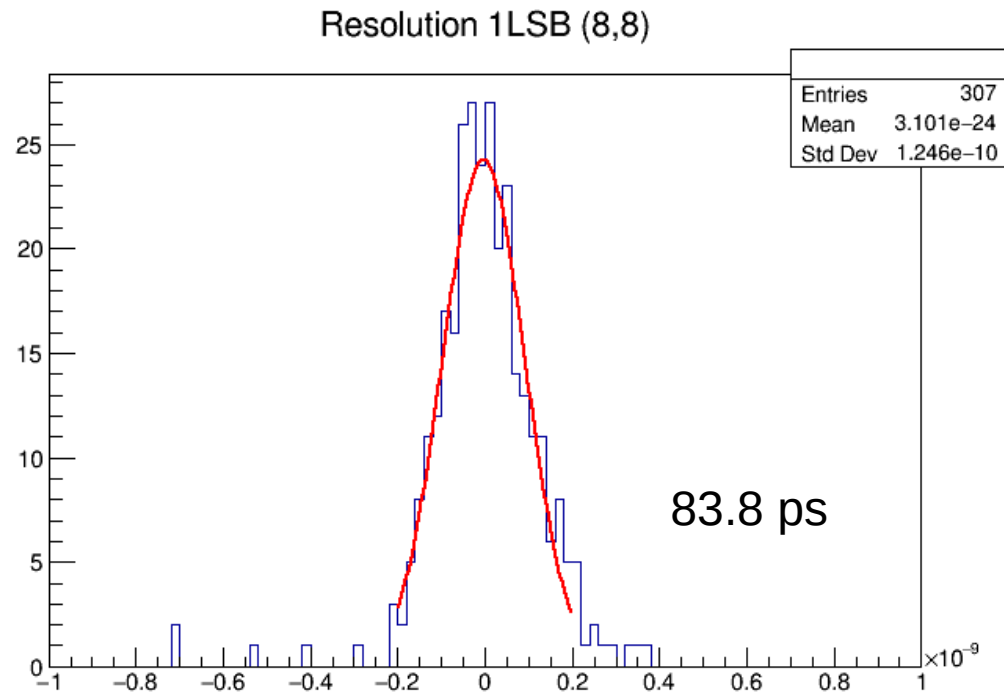


ToA distribution is wavy. No HV fix was implemented on testboard.

Pixel data

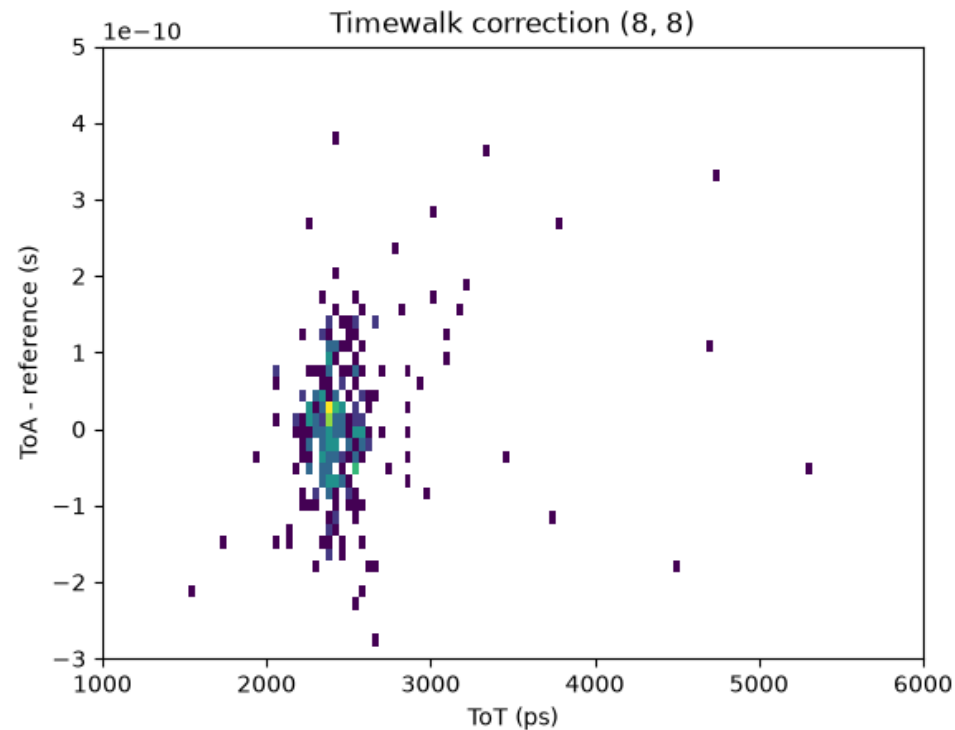
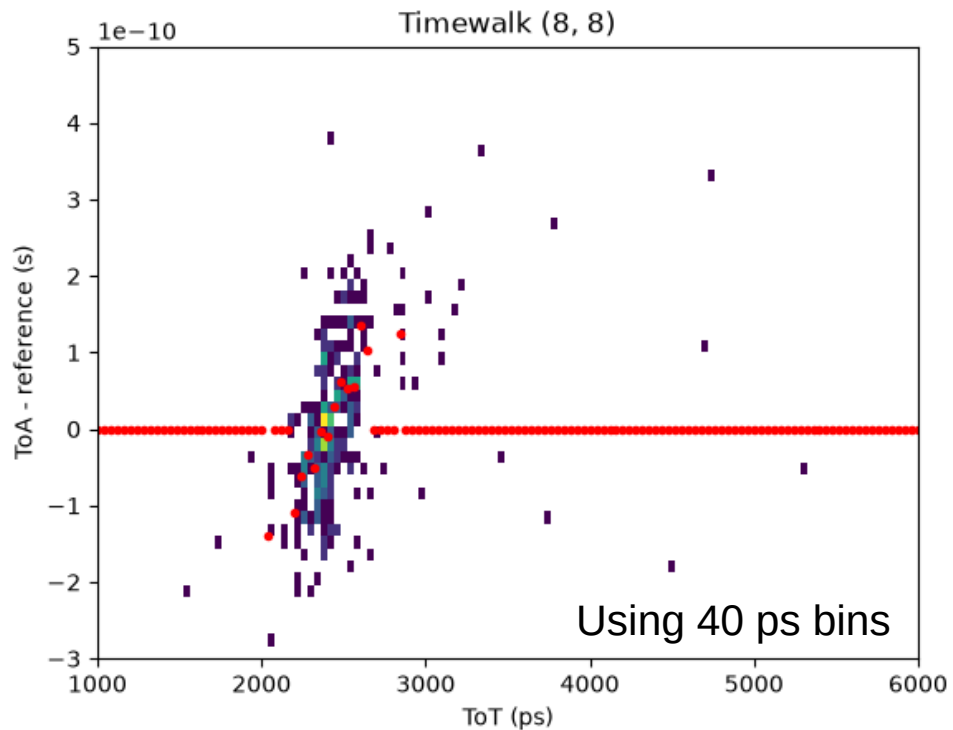


Toa linearity of one pixel, LSB close to 20 ps.

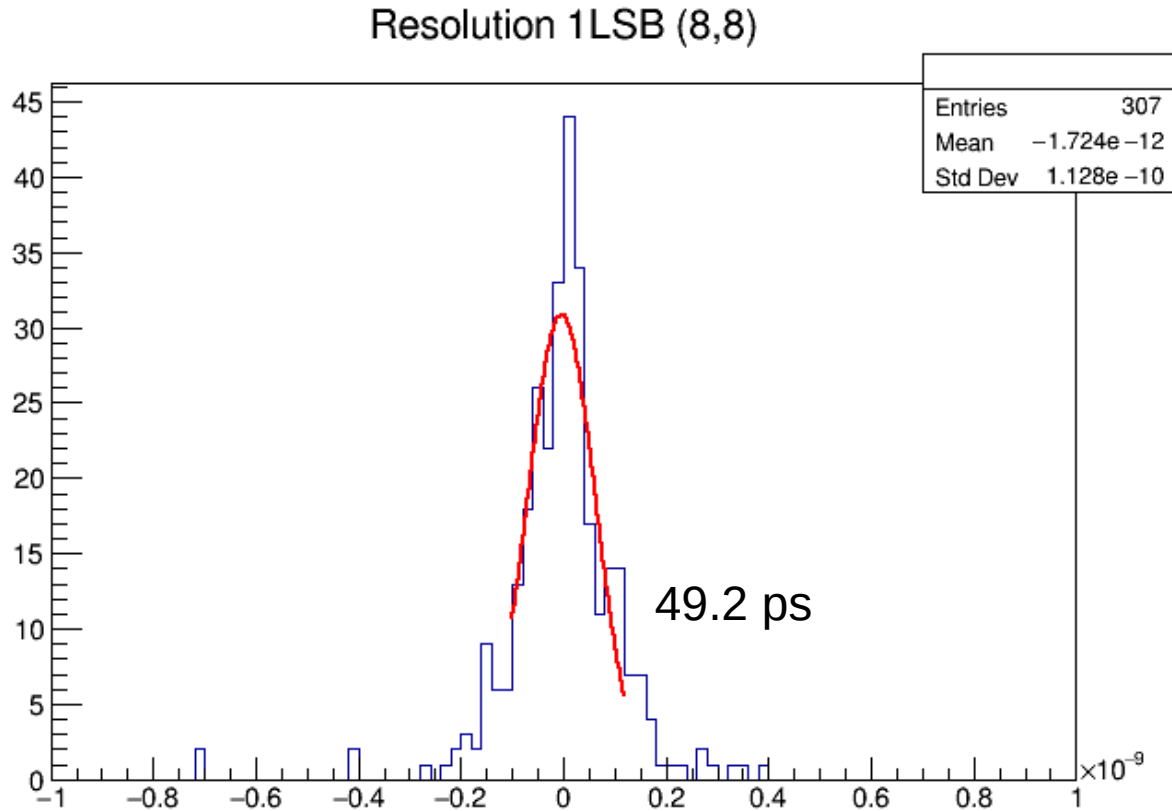


Timing resolution without time-walk correction.

Time-walk correction



TW corrected time resolution



Applying time-walk correction significantly improves time resolution results

- Statistics is low
 - Started testing with more active source to gather more events
- Long distribution tails
 - Could be related to wavy ToA distribution