

HallC analyzer Github:

<https://github.com/JeffersonLab/hcana/blob/develop/src/THcRawAdcHit.cxx>

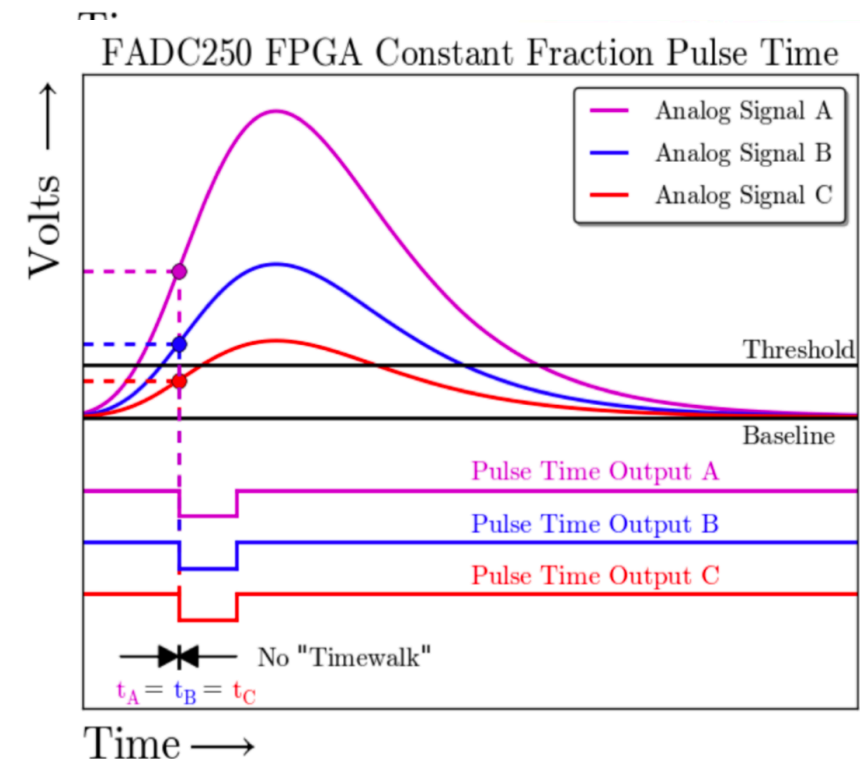
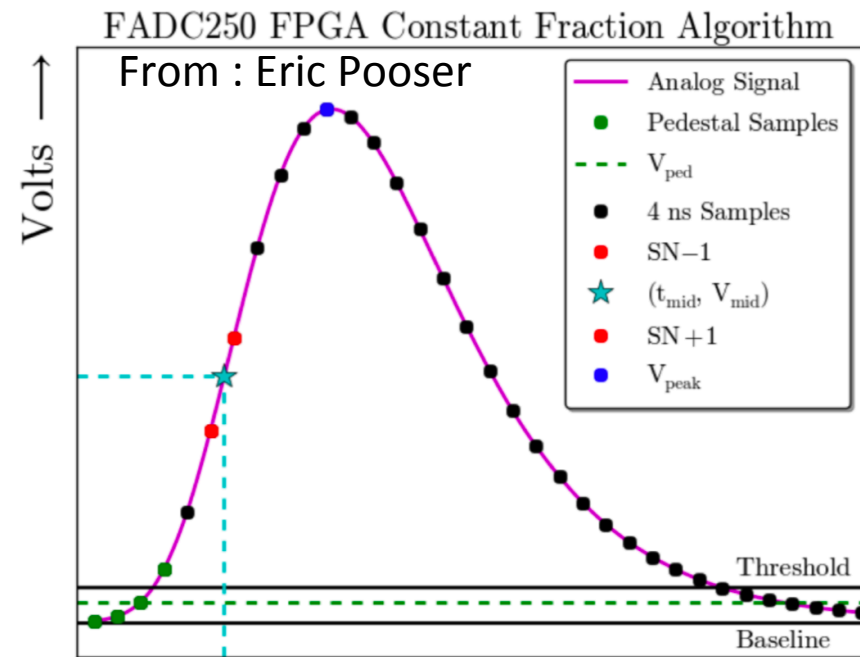
- NSAT = Number of Samples above Threshold o For FADC configuration NSAT=1
- o HCANA can set NSAT with default = 2
- Pedestal determined by the average of ADC in first four time bins.
- Threshold is 10mV above pedestal.
- HCANA can set the threshold.
- TC = Threshold Crossing is first bin in the NSAT that is above threshold relative to the pedestal
- NSB = Number of Samples Before TC
- NSA = Number of Samples After TC
- In F250 configuration NSB=3 (12ns) and NSA=26 (104ns).
- HCANA can set NSB and NSA. Default is to use the F250 configuration.

Explanation of the variables in the code: <https://redmine.jlab.org/attachments/download/1424/HCANA-FADC-Firmware-update.pdf>

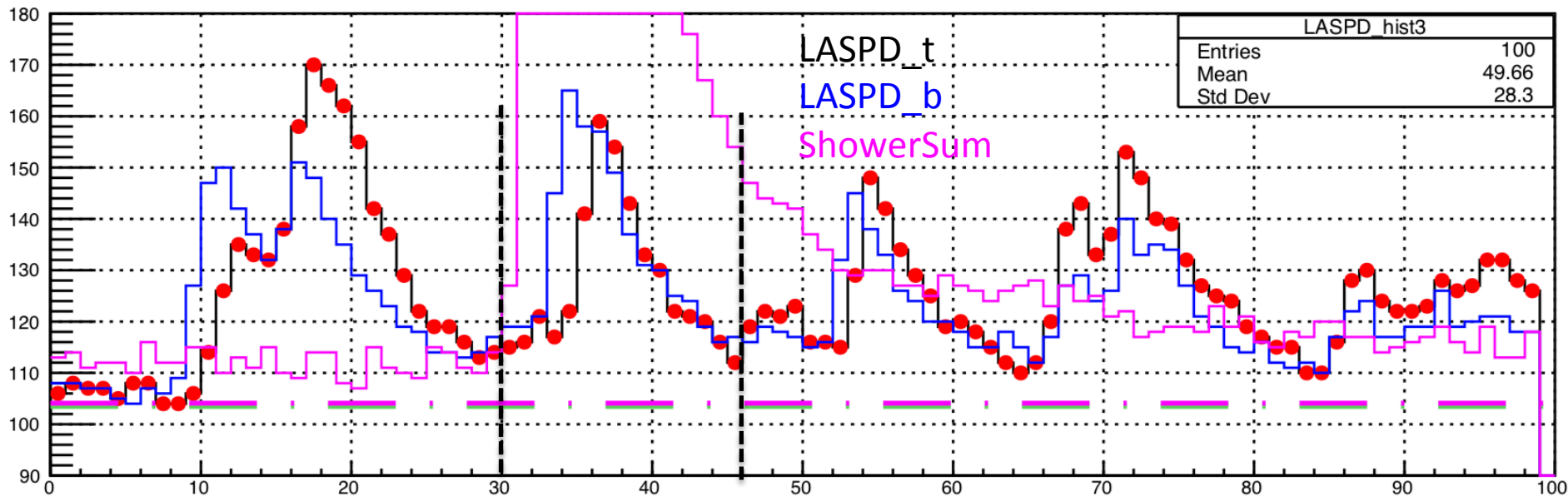
FADC250: Production Mode (9)

- With V_{ped} & V_{peak} known, the half amplitude V_{mid} is computed: $V_{mid} = (V_{peak} - V_{ped}) / 2$
- Samples before and after V_{mid} are determined: **SN-1 & SN+1**
- The 4 ns time between $V(SN-1)$ & $V(SN+1)$ is divided into 64 sub-samples (62.5 ps)
- The high resolution time (t_{mid}) corresponding to V_{mid} is determined *via.* linear interpolation
- $t_{mid} = 64 * (V_{mid} - V(SN-1)) / (V(SN+1) - V(SN-1))$
- The fine time is time-walk independent (CFD)
- Coarse time is reported as the time in which $V(SN-1)$ occurred (4 ns jitter)
- If the high resolution pulse time algorithm fails, the time reported is the TC time (coarse) and time quality bits are set

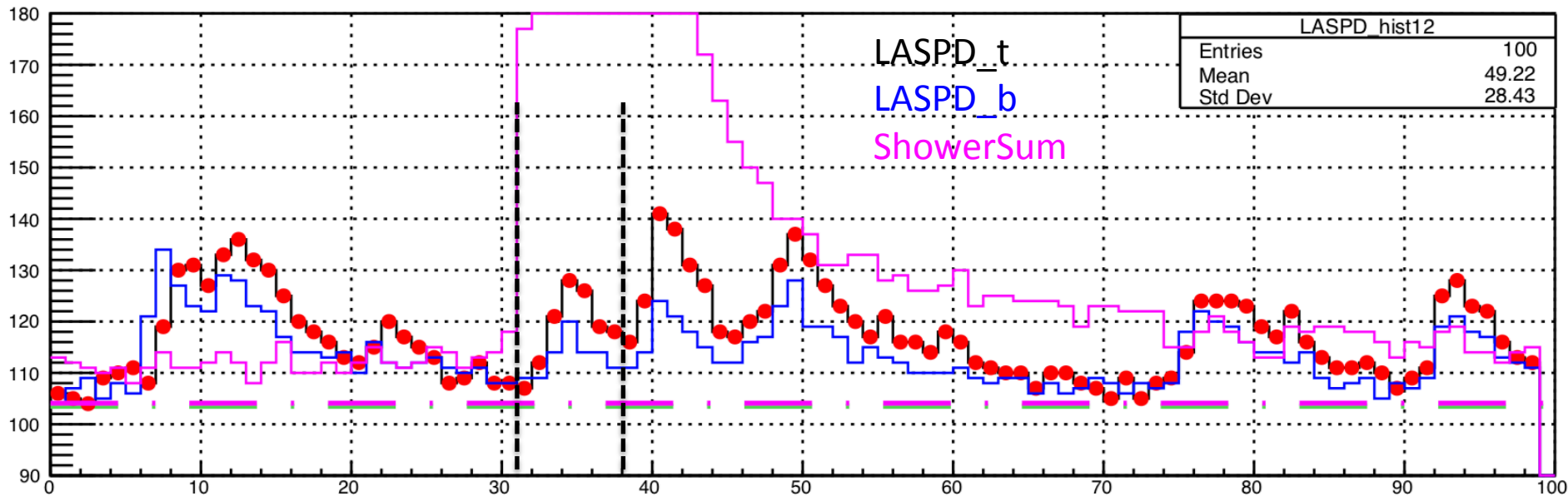
$$\text{Time} = 64 * (\text{SN}-1) + \text{int}(t_{mid})$$



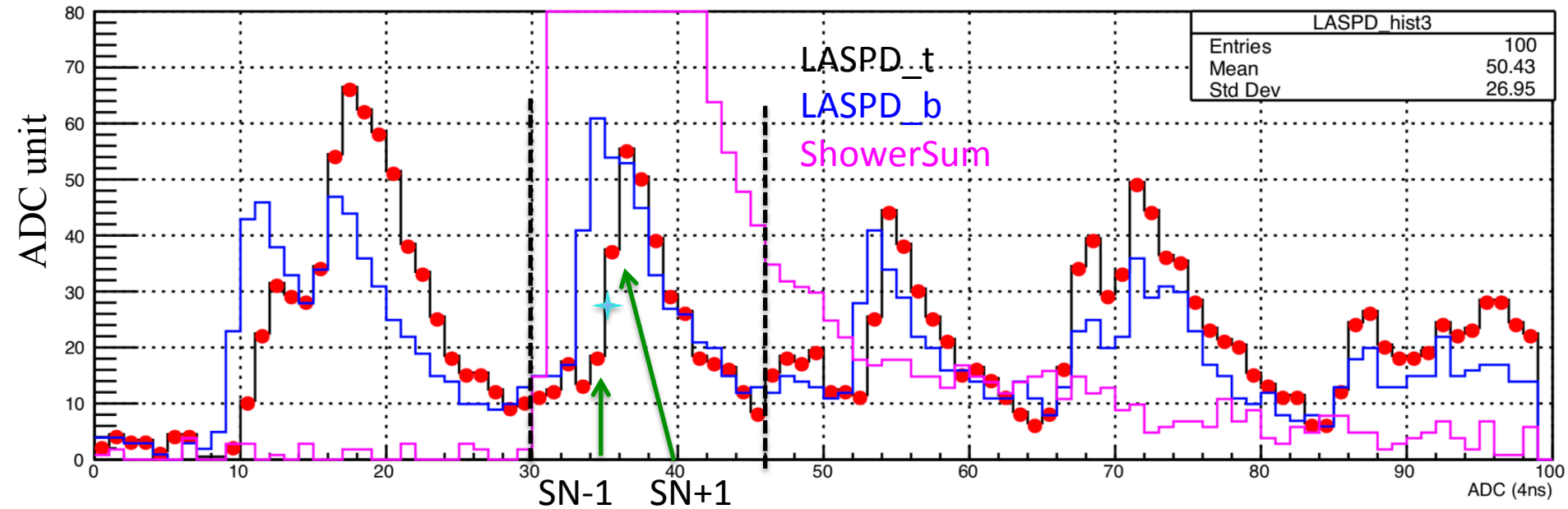
5uA event=4704 PreSh_t=1185.60, Shower_t=2626.20, LASPD_t=906.50



5uA event=9970 PreSh_t=857.50, Shower_t=2480.40, LASPD_t=111.00



5uA event=4704 PreSh_t=1185.60, Shower_t=2626.20, LASPD_t=906.50



$$V_{\text{mid}} = \text{LASPD}_t.\text{peaks.height}/2 = 55.5/2 = 27.75$$

$$\text{Time} = 64 * 35 + \text{int}(64 * (27.75 - 18) / (37 - 18)) = 2272 * 62.5 \text{ ps} = 1.42e^5 \text{ ps}$$

- Use a fixed pedestal from the database
- Use threshold 10 ADC? New cook files 6 ADC
- Use LASPD_t.peaks.left and LASPD_t.peaks.pos range to find the V(SN-1) and V(SN+1).