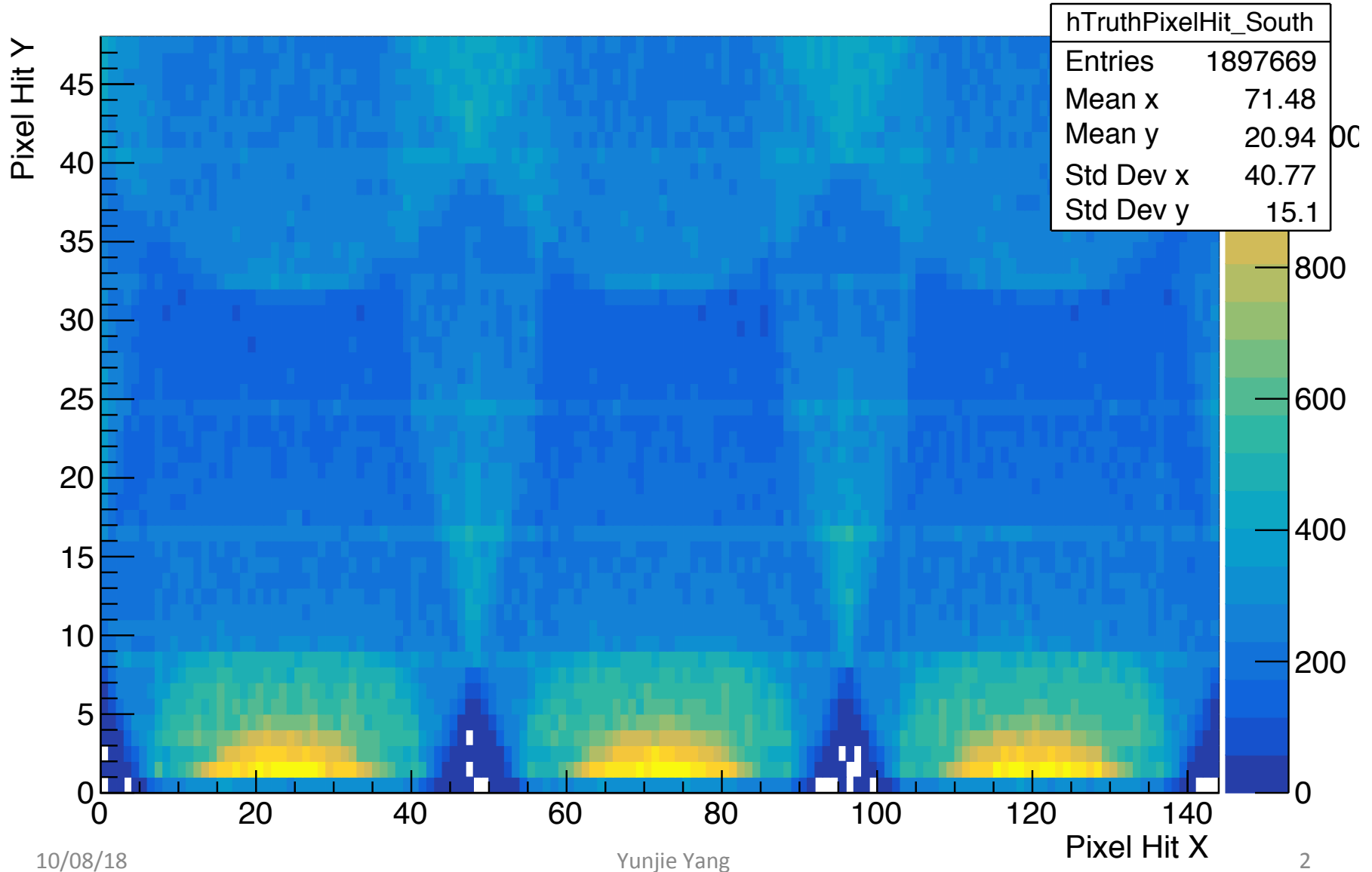


DIRC LED status updates

- LED generator refined:
 - 405nm
 - Square diffuser shape + opening angle updated
- A framework of hit time smearing established, including:
 - PMT timing resolution
 - LED pulse shape
 - Delay among different feedthroughs

Occupancy

South Box



LED generator

- Square diffuser + opening angle:
 - Need to match the final “as-built” configuration
- Detailed code comparison with Ahmed’s study in progress

Hit time smearing

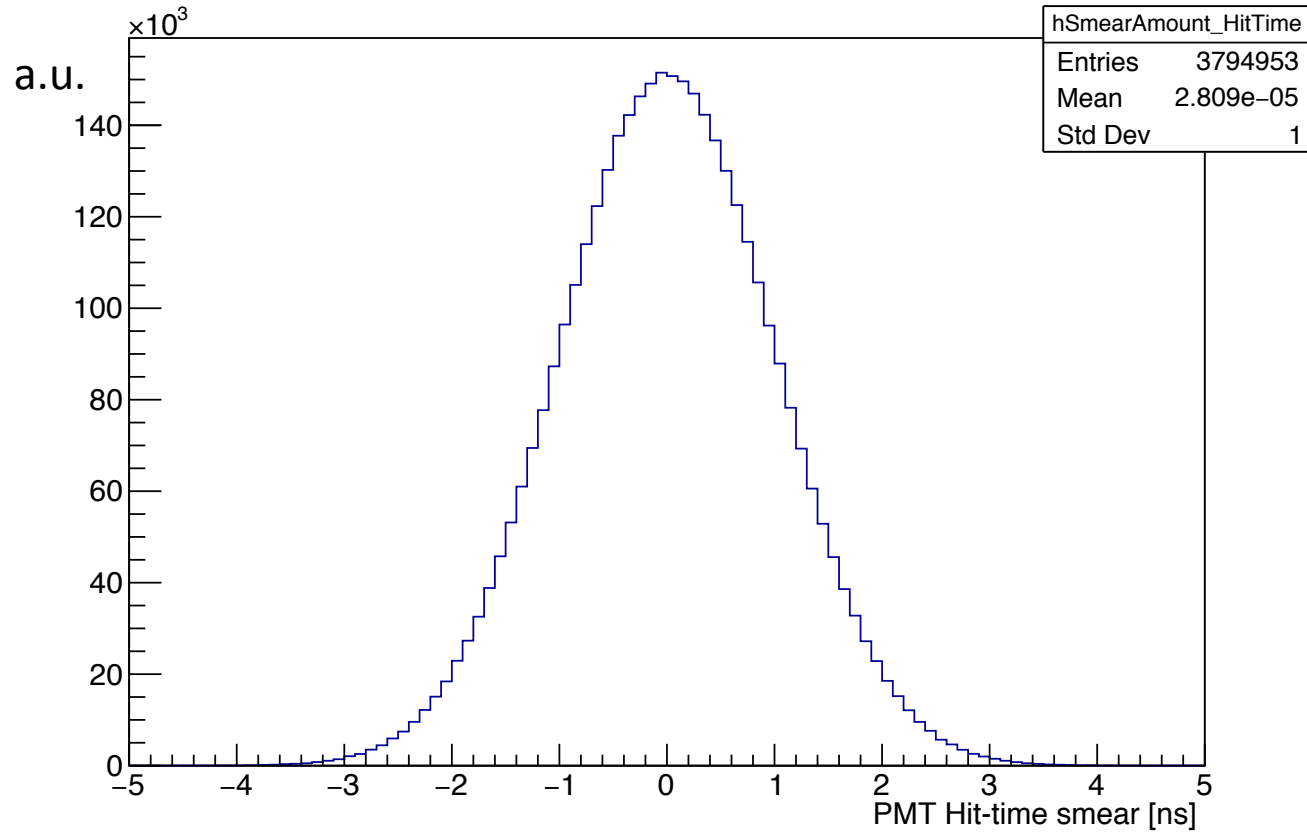
- Smearred hit time model:

$$t_{\text{smearred}} = t_{\text{Geant}} + t_{\text{PMT}} + t_{\text{LED}} + t_{\text{delay}}$$

- t_{Geant} : hit time value taken directly out of HDGeant4
- t_{PMT} : PMT hit time smear amount, sampled from a PMT time resolution PDF
- t_{LED} : LED pulse shape smear, sampled from a LED pulse shape PDF
- t_{delay} : delay due to coming from different feedthroughs

t_{PMT}

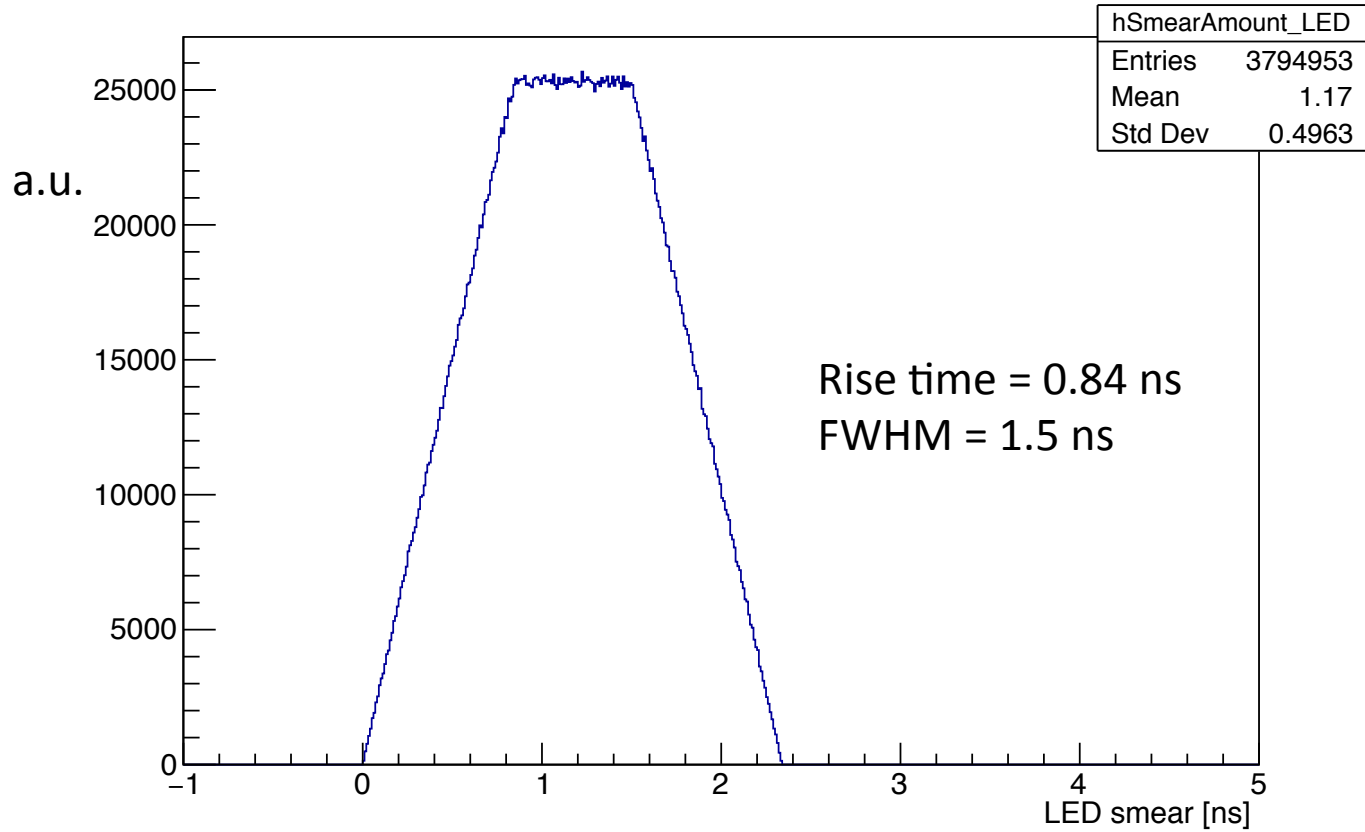
Hit Time Smear



$$t_{\text{PMT}} \sim \mathcal{N}(0, 1 \text{ ns})$$

t_{LED}

LED time smear



t_{LED} is sampled from the above PDF

$$t_{LED} \geq 0$$

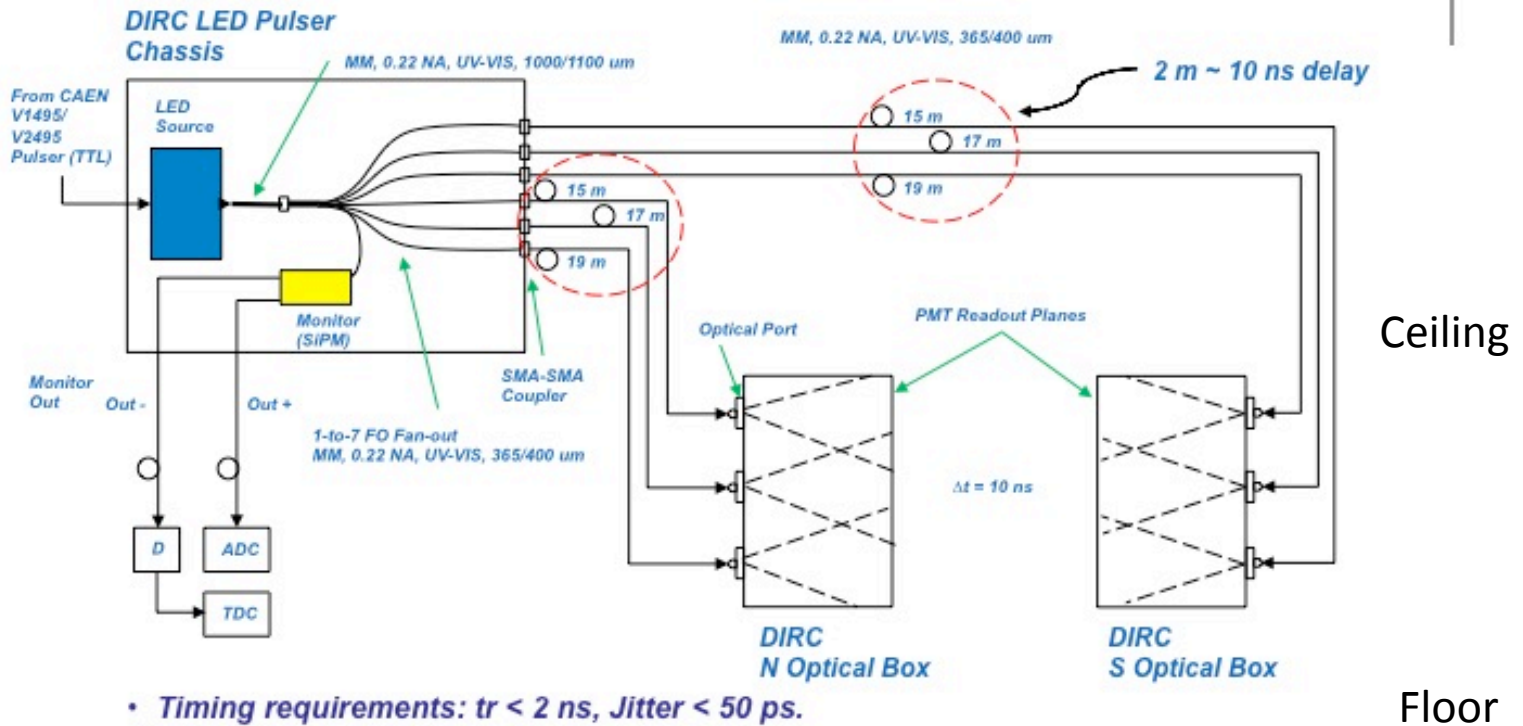
t_{delay}

Hall D Collaboration

FJ Barbosa

Electronics

DIRC Calibration System



- **Timing requirements:** $t_r < 2 \text{ ns}$, Jitter $< 50 \text{ ps}$.
- **LED source has cost advantages.**
- **Monitor – Allows checking source & FO performance.**
- **One Optical Calibration Chassis.**
- **Uses same Hall D infrastructure as other pulsers in the hall: V2495, MPOD**

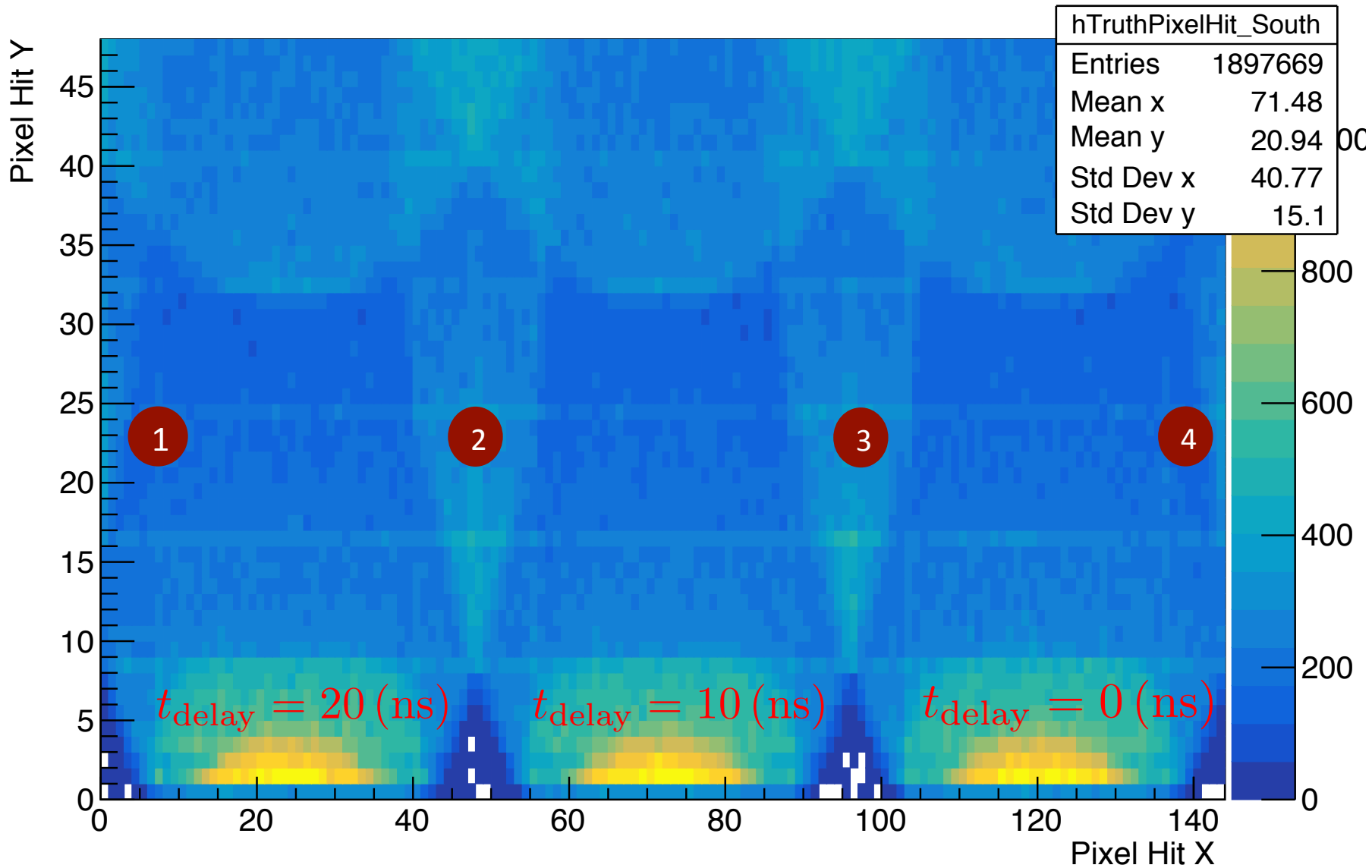
27 September 2018

Jefferson Lab

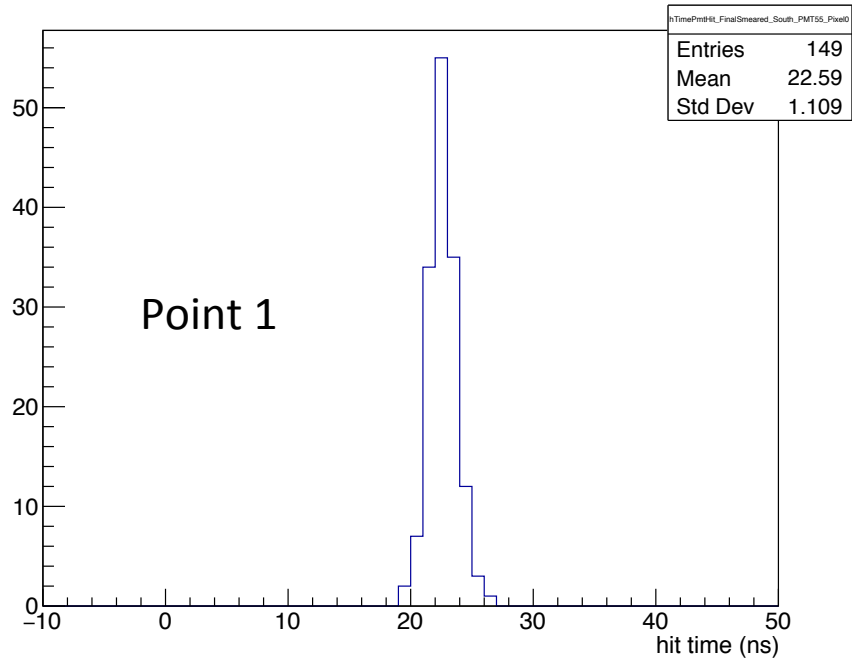
6

$$t_{\text{delay}} = 0, 10, 20 \text{ (ns)}$$

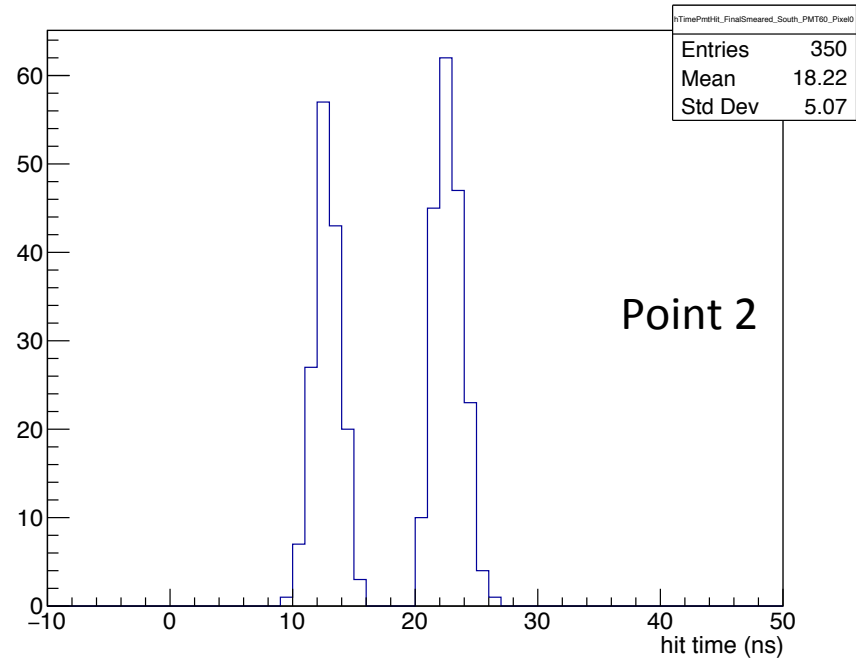
South Box



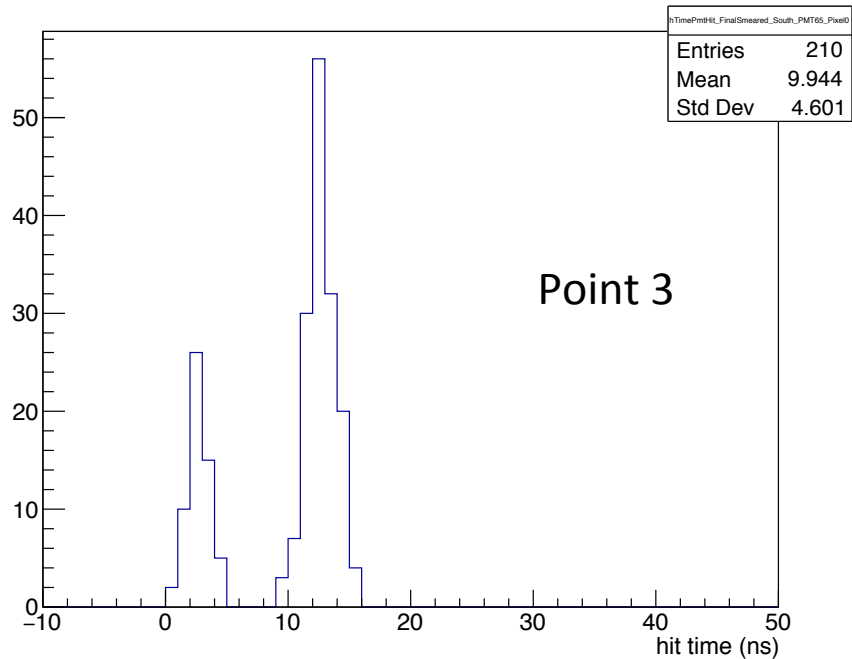
hTimePmtHit_FinalSmearred_South_PMT55_Pixel0



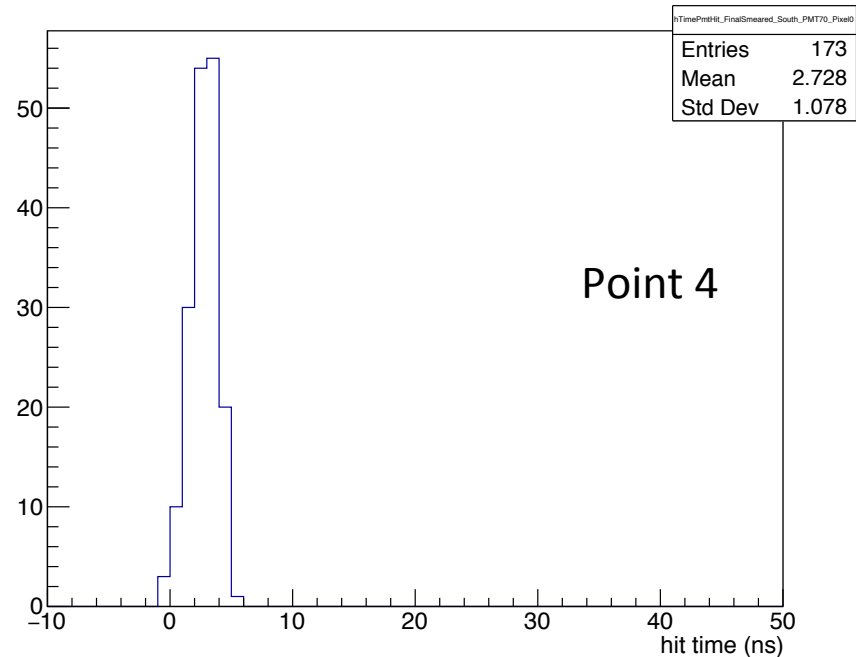
hTimePmtHit_FinalSmearred_South_PMT60_Pixel0



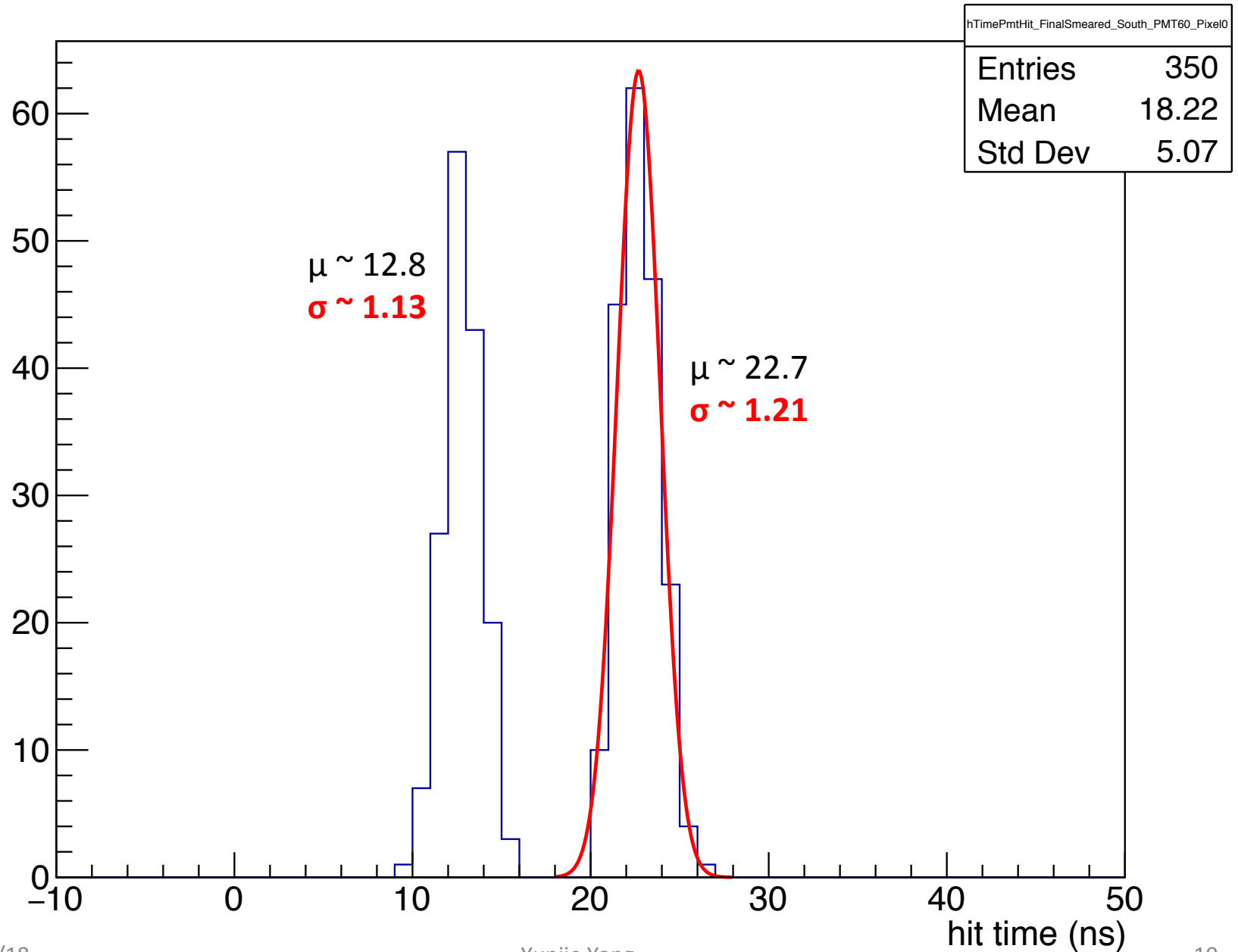
hTimePmtHit_FinalSmearred_South_PMT65_Pixel0



hTimePmtHit_FinalSmearred_South_PMT70_Pixel0



hTimePmtHit_FinalSmeared_South_PMT60_Pixel0



Timing calibration

- Basic framework established and details to be refined
- Comparison with Ahmed's study in progress