

# Suggested TOF Plots for System Performance Paper

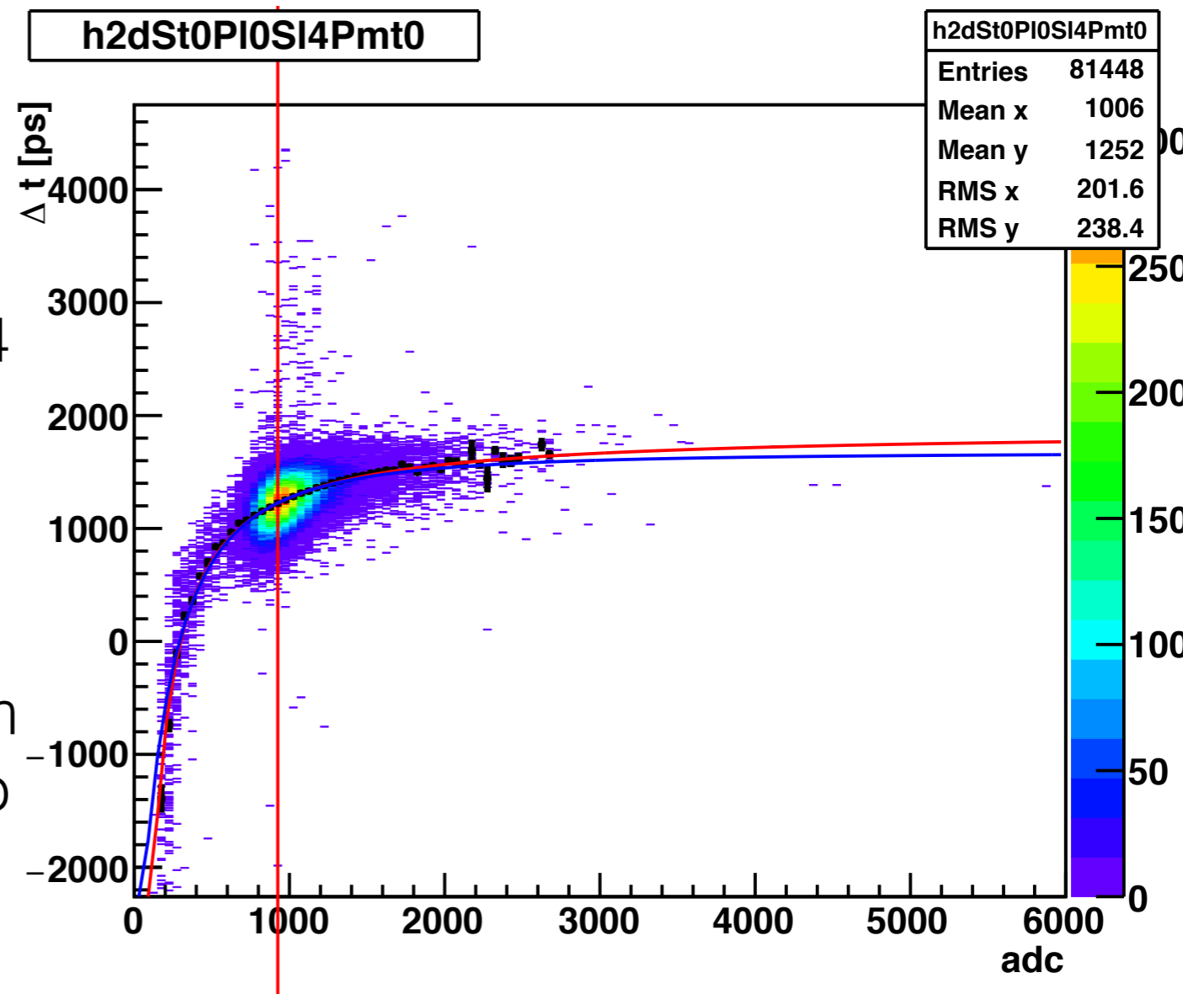
Viktor Pěč

June 26, 2018

Analysis workshop before CM51

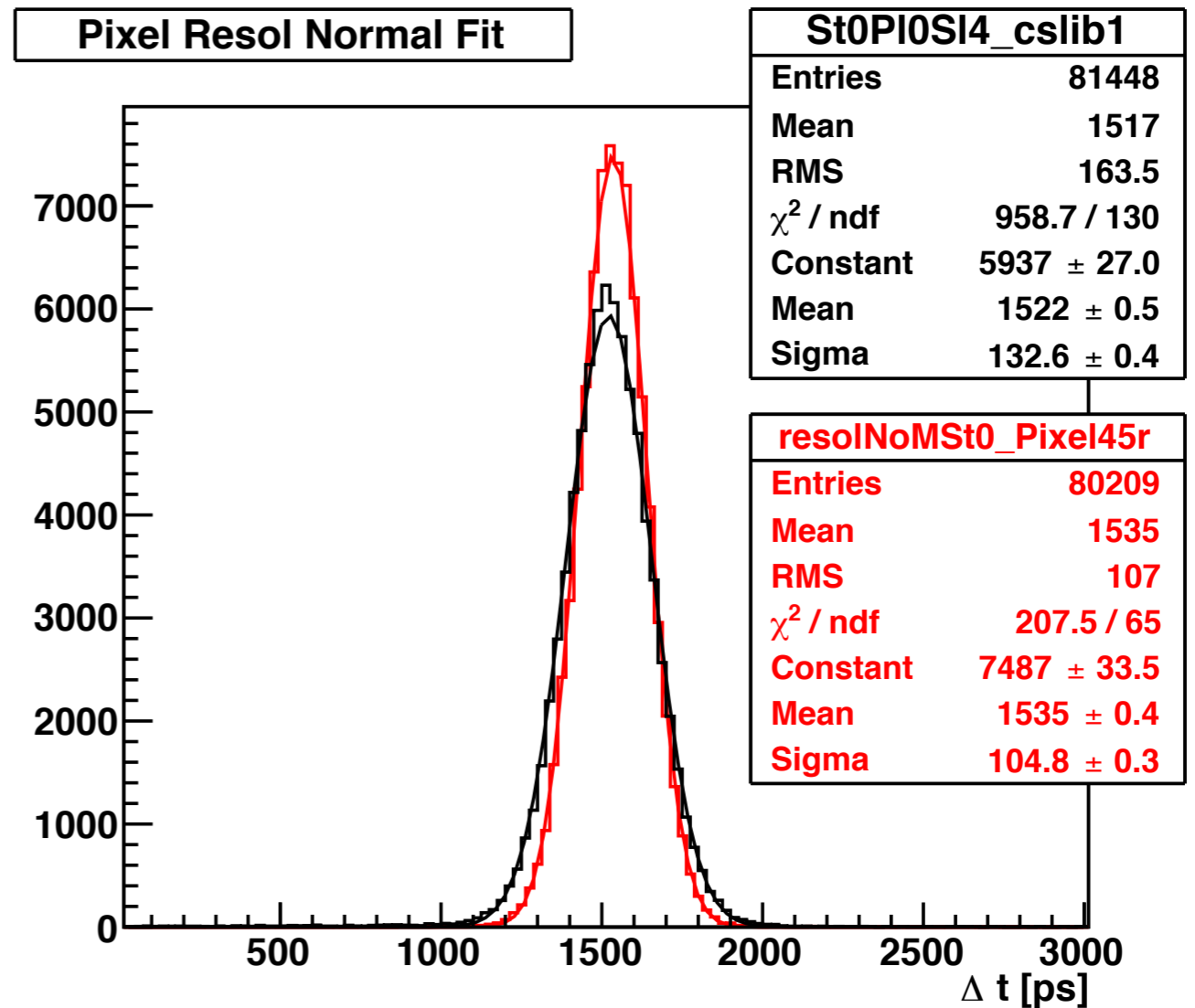
# Time Walk Calibration

- Show example of TW for a channel (TOF0 Plane 0 Slab 4 PMT 0)
- $DT = T_{ref} - T_{pmt}$
- $T_{ref}$  is TW corrected PMT from a reference slab (Plane 1 slab 5 in this case)



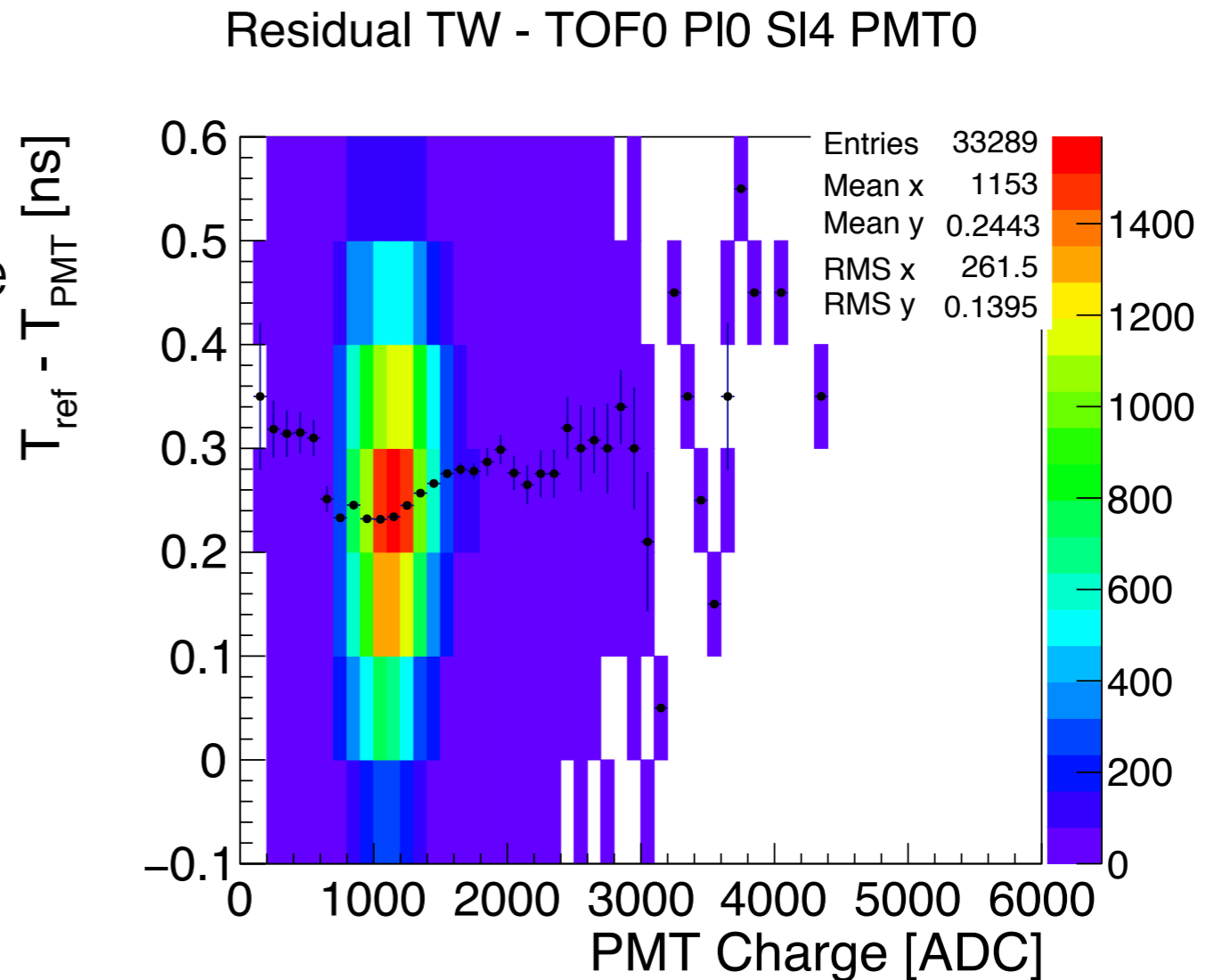
# Slab DT

- Show how time resolution of a pixel change after TW correction
- TOF 0, pixel 4, 5



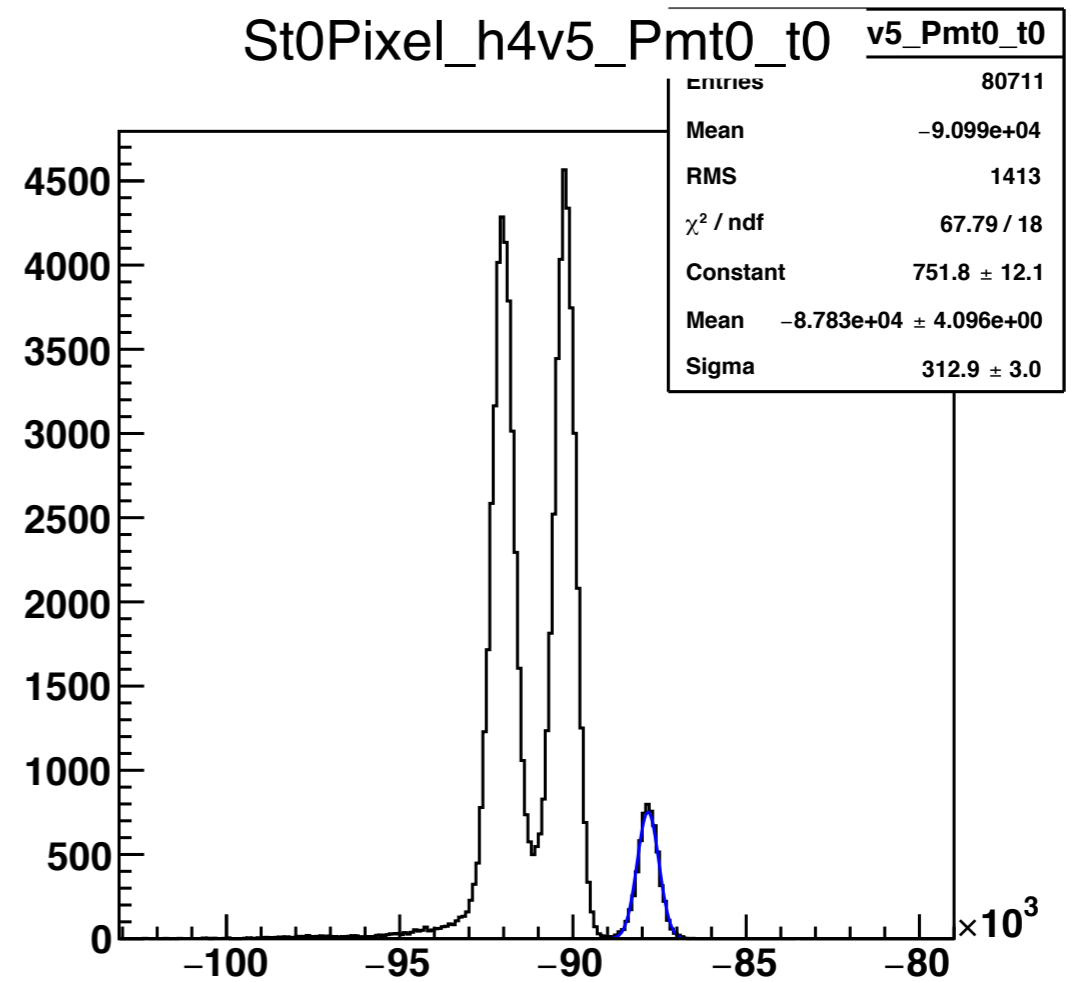
# Residual Time Walk

- Example channel residual time walk taken from a physics data run
- Reconstructed time of PMT w.r.t. reconstructed time of reference slab



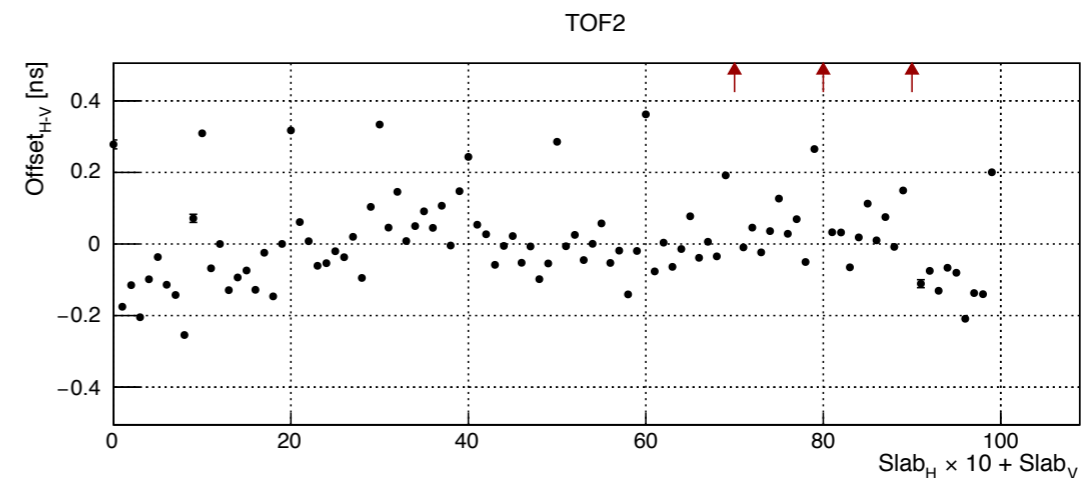
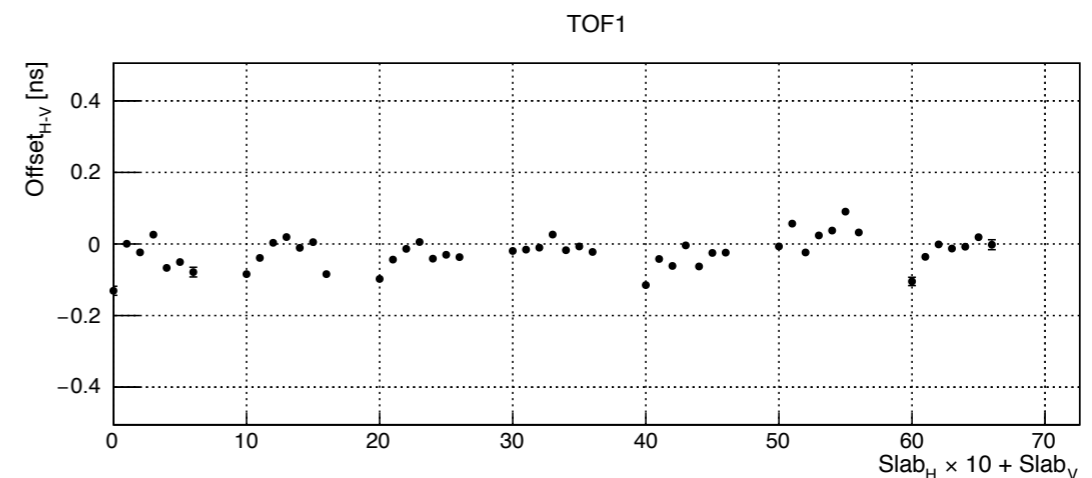
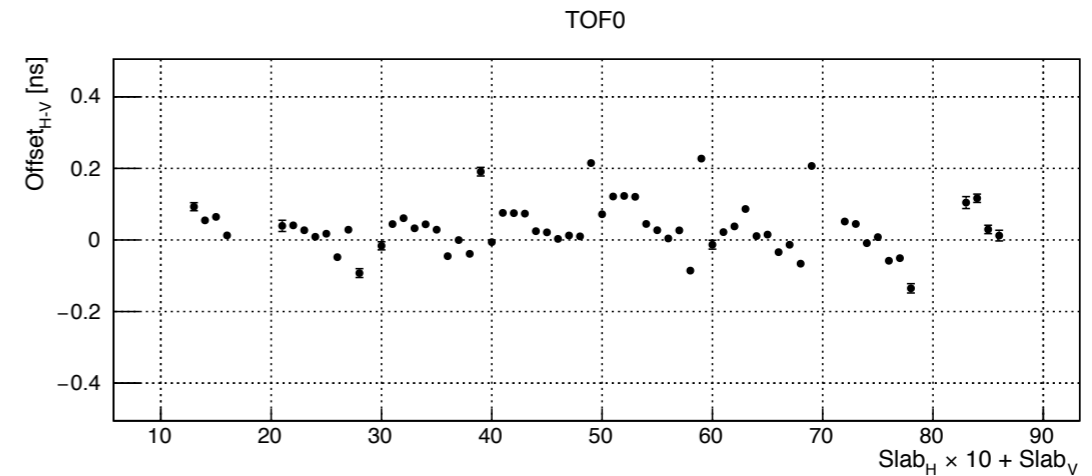
# T0 correction

- Example channel from TOF0
- Show electron peak selection



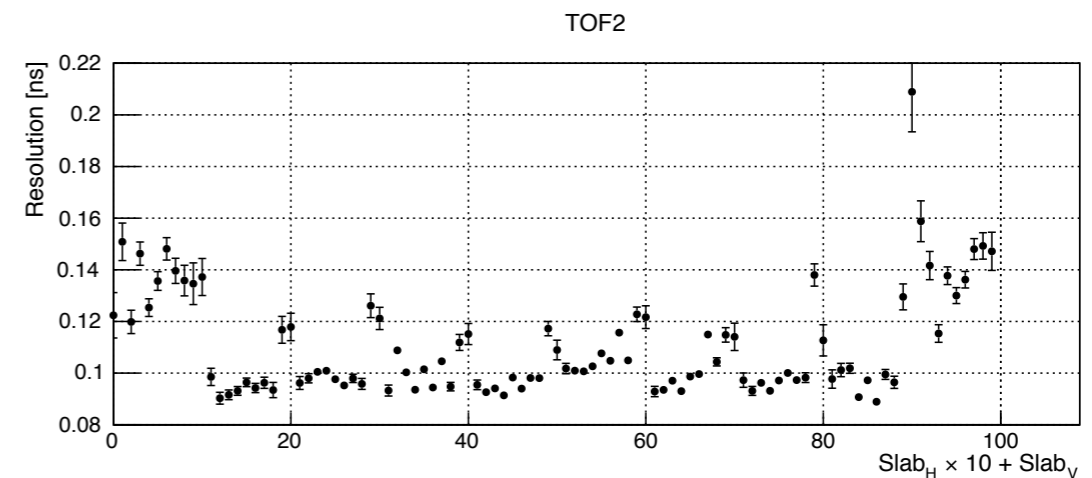
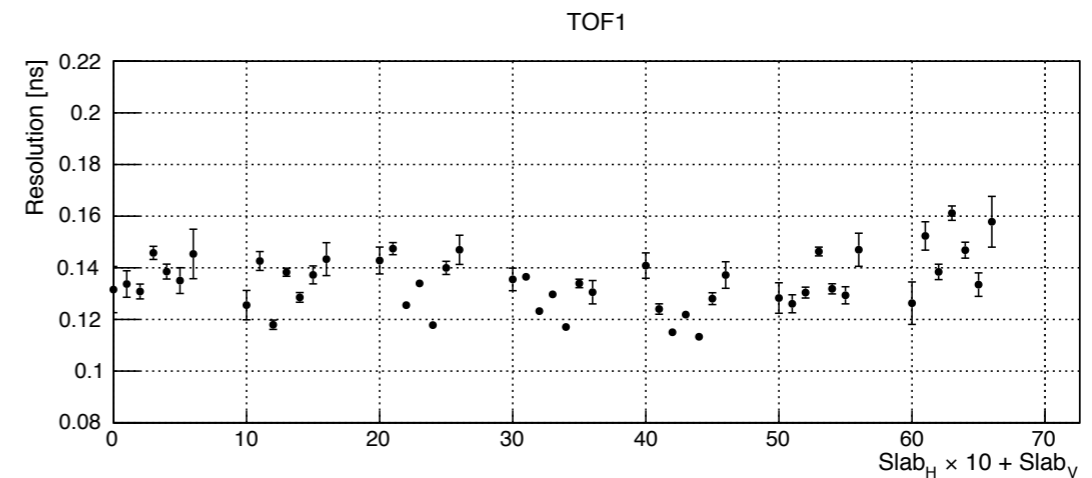
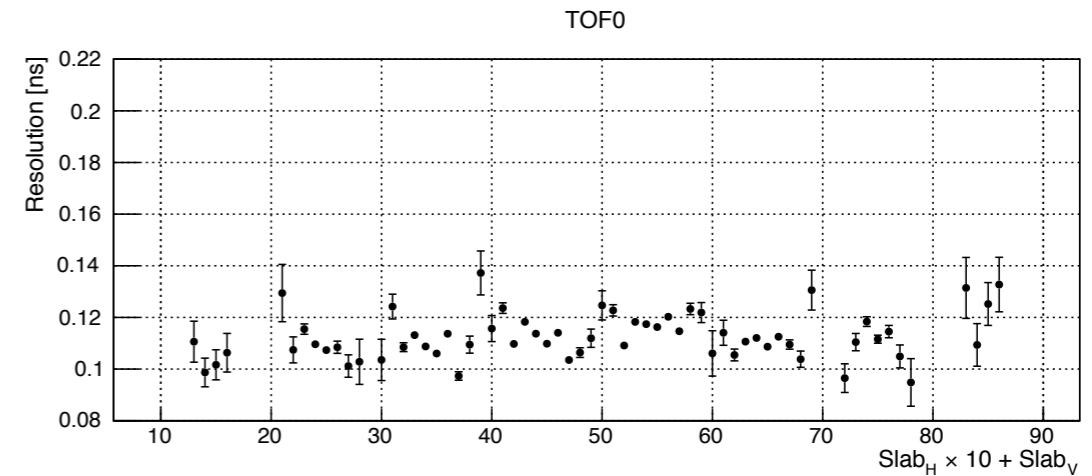
# Slab DT

- Slab DT mean for all pixels
- shows “quality” of calibration
- indicates systematic uncertainty on T-o-F measurement

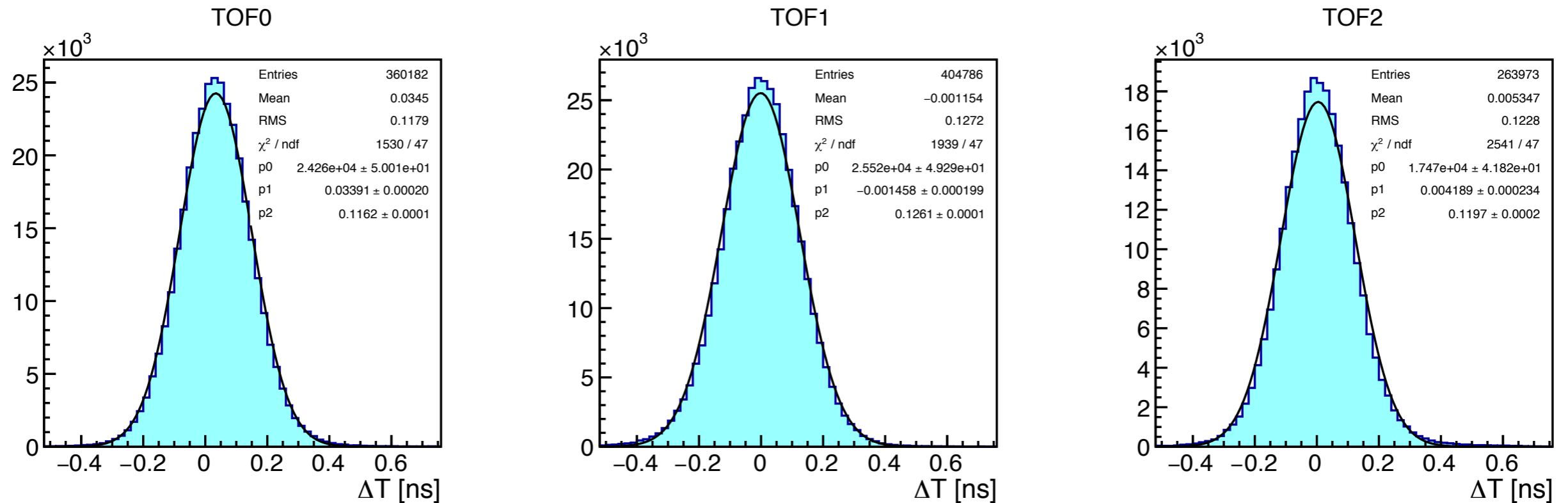


# Slab DT Resolution

- Slab DT spread for all pixels
- large variations caused by residual TW
- Ideally, we want to show all pixels have similar time resolution



# Overall Slab DT

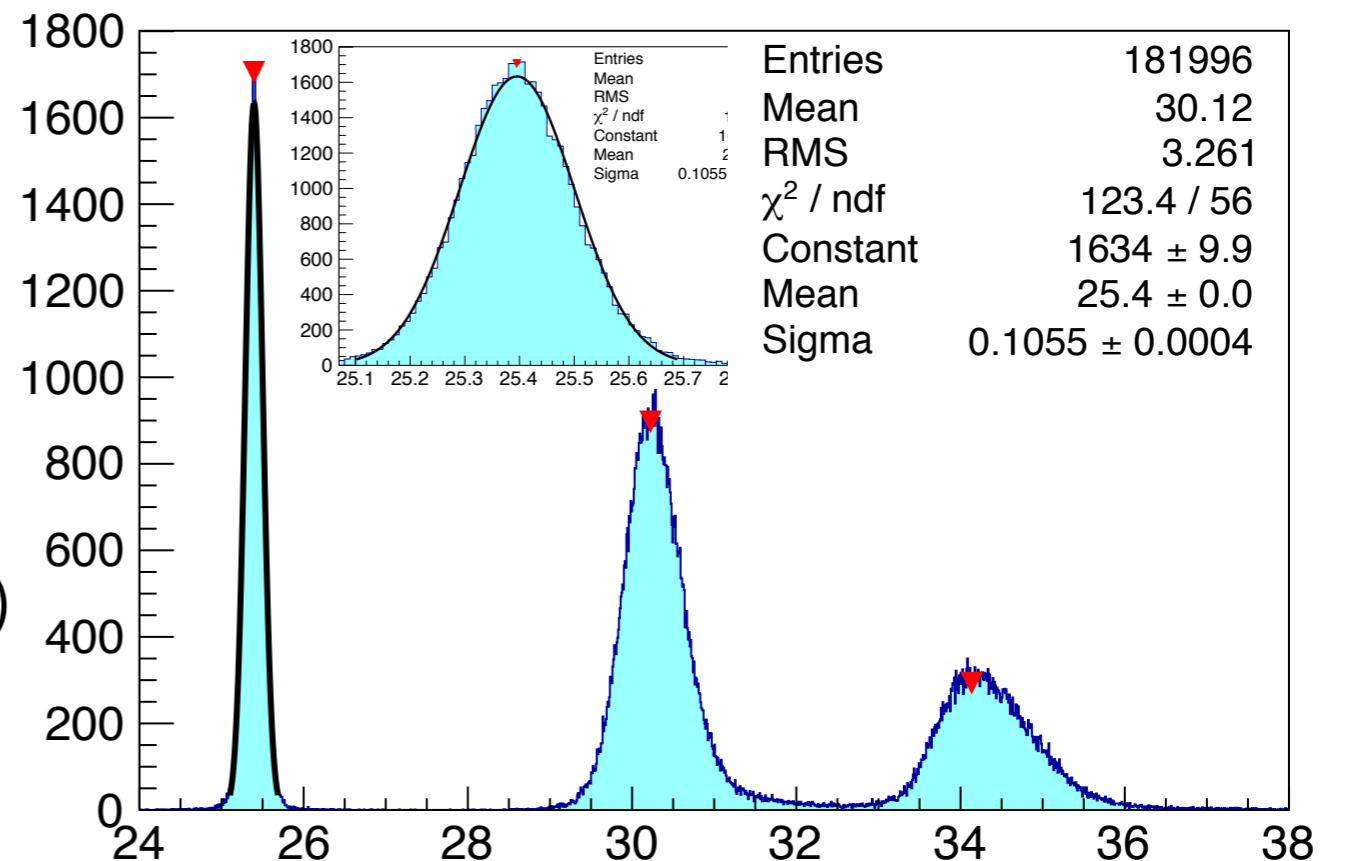


- More positive plots
- overall Slab DT (all pixels together) centred around zero
- overall resolution similar-ish across all TOFs

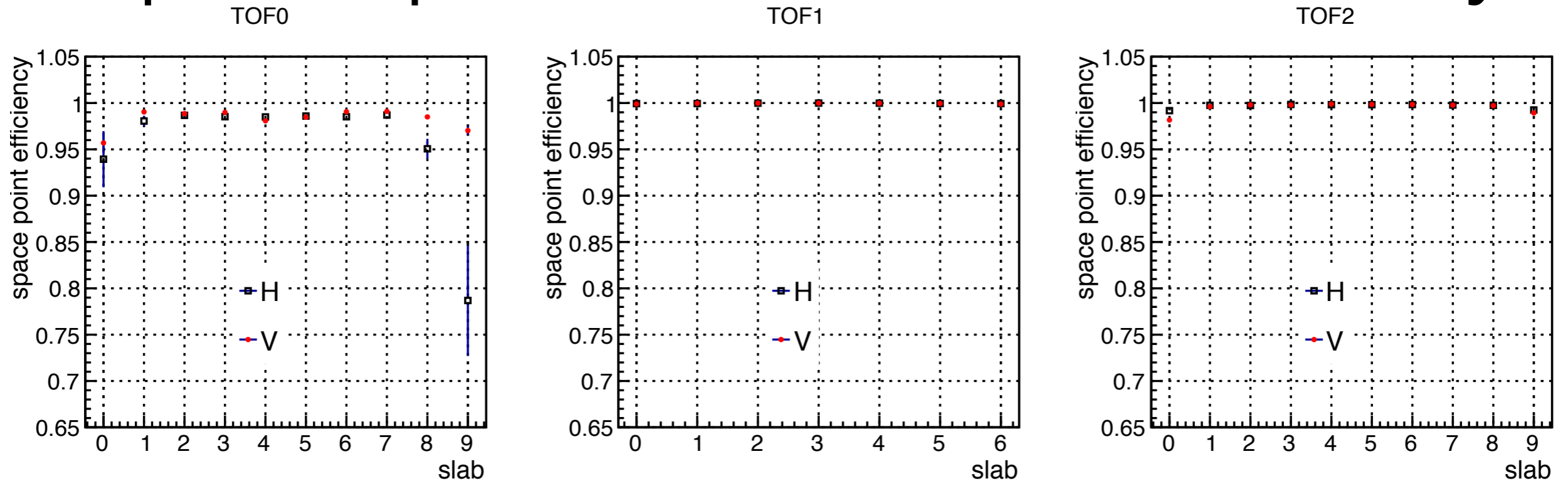


# Time of Flight Resolution

- Resolution of TOF1 - TOF0 measurement
- based on electron peak
- this is example for TOF1 (3,3) pixel and TOF0 (4,4) pixel



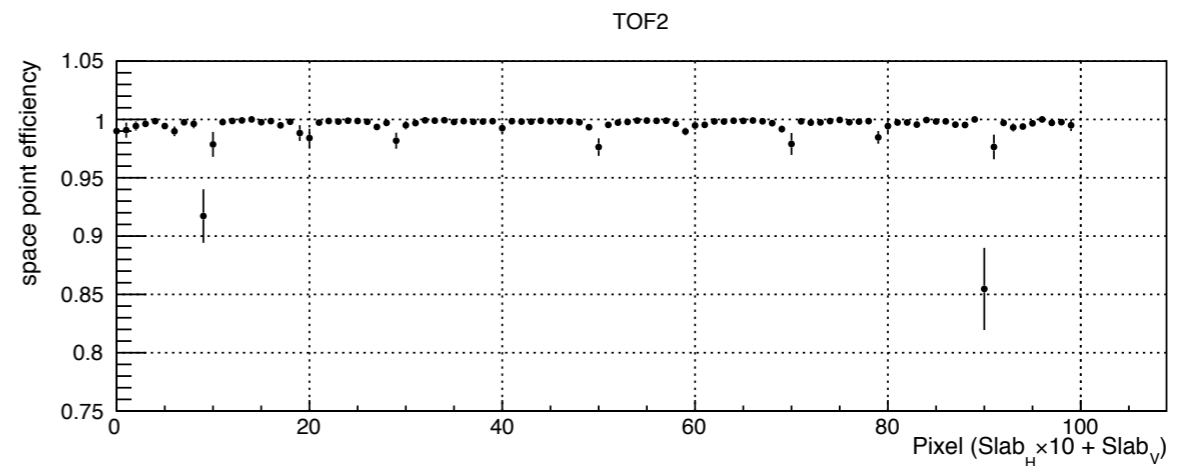
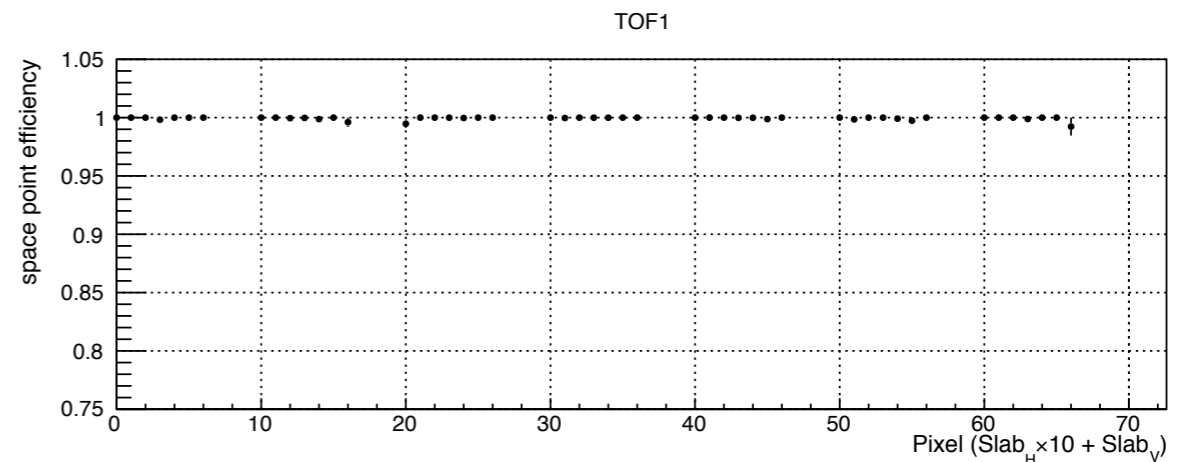
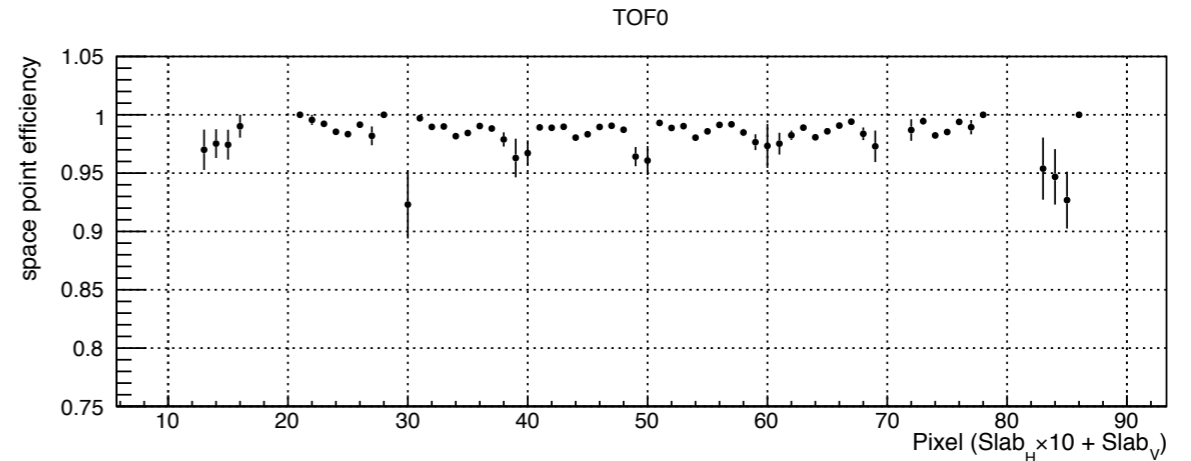
# Space point creation efficiency



- When 1 slab hit in each plane, was a space point created?
- SP not created when slabs not close in time (Slab DT > 3 ns in this case)
- “Inefficiency” in these plots comes from two particles hitting only one slab each
- Therefore, more than efficiency, these plots show that sometimes, particles create hit in only one plane (in edge slabs)
- This mostly happens in TOF0, as it is closest to the beam start
- For TOF1 events, exactly 1 TOF0 space point was required => this limits number of particles that can arrive at TOF1 and therefore it seems to be ~100% efficient

# Space point creation efficiency

- Same thing as on previous plot
- “Efficiency” plotted by pixel



# Particle detection efficiency

- Ideally pixel map of particle detection efficiency
- should show near 100%
- don't know how to get from the data

