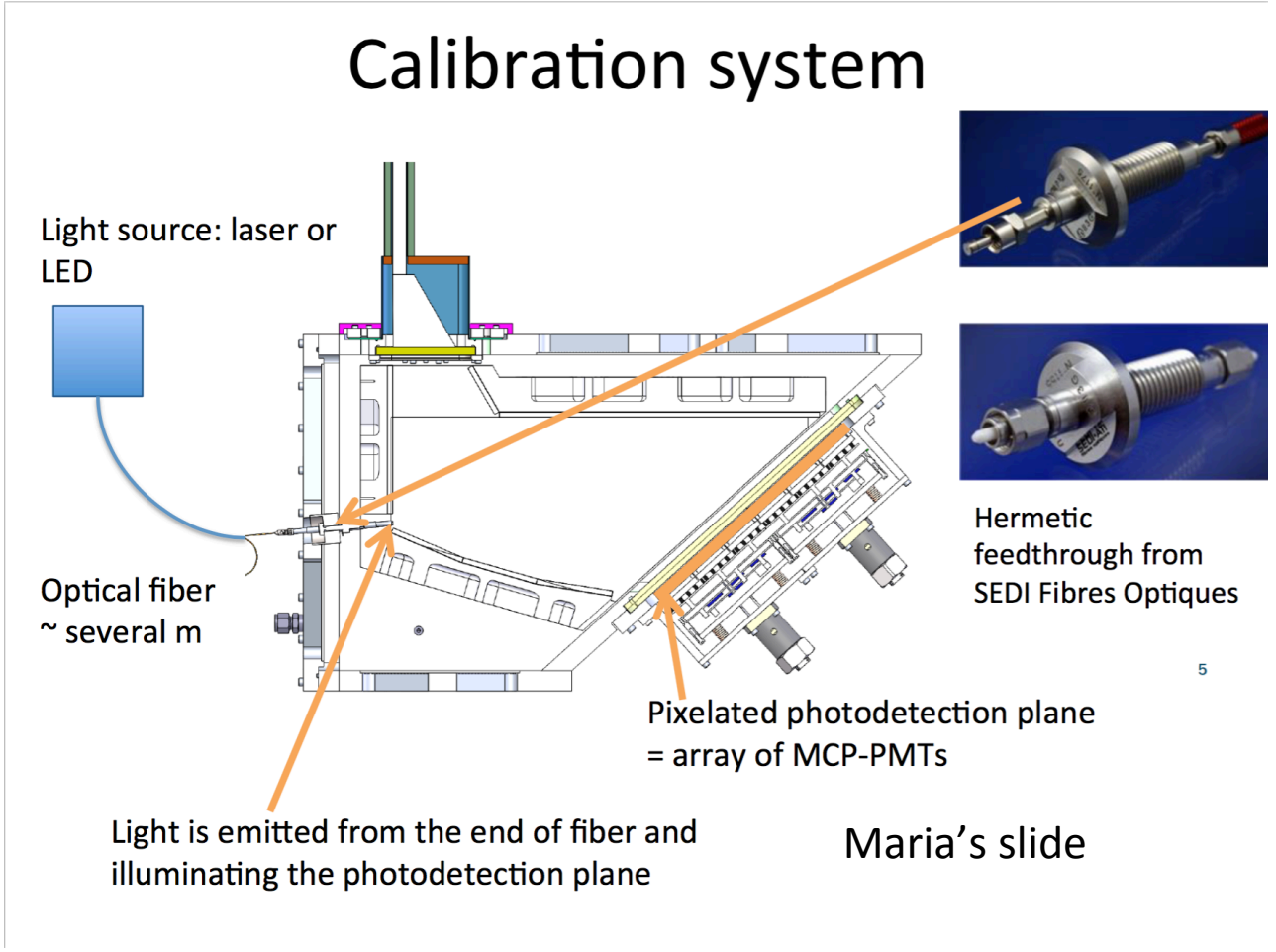
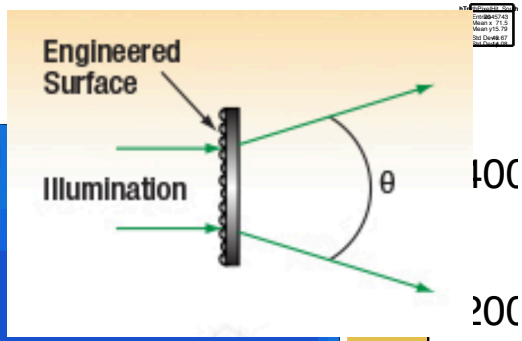
# LED generator update

- Optical feedthroughs' inclination angle DoF added



# Occupancy

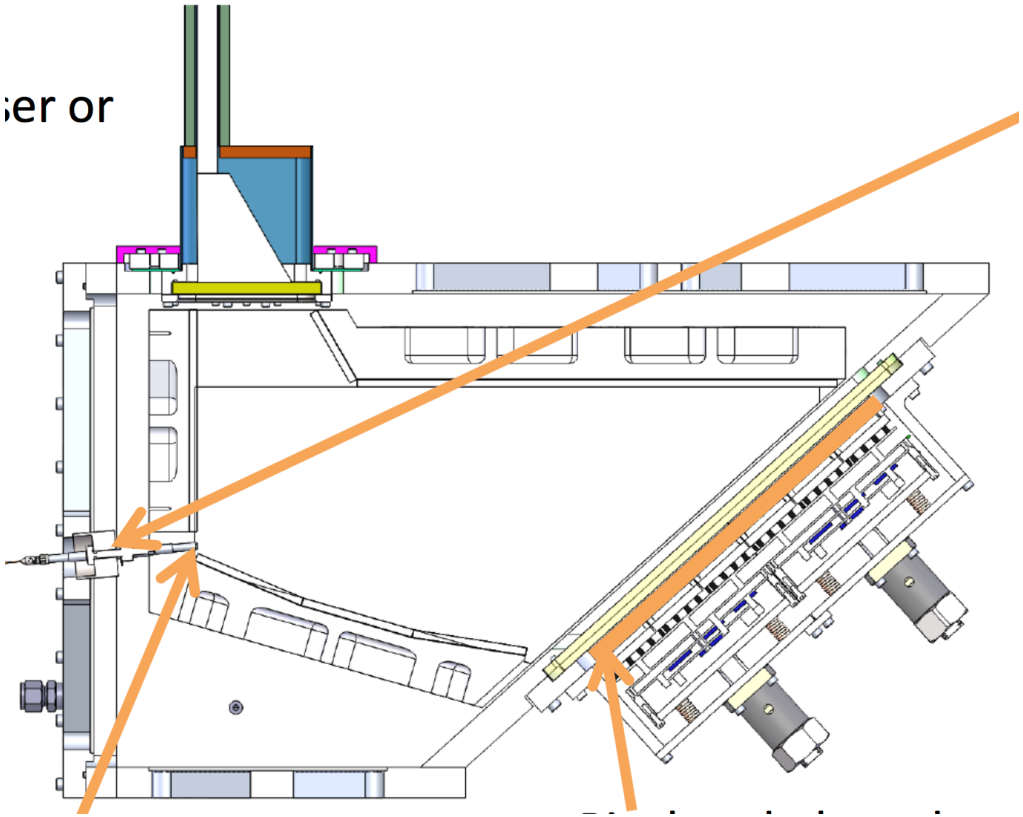
South Box

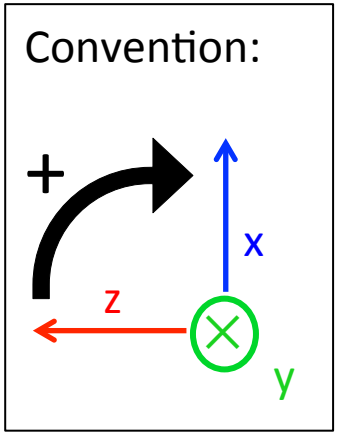



Information on the exact as-built configuration is pending:

- Diffuser shape, position and "opening angle"
- Feedthrough inclination angle

# Effects of inclination angle

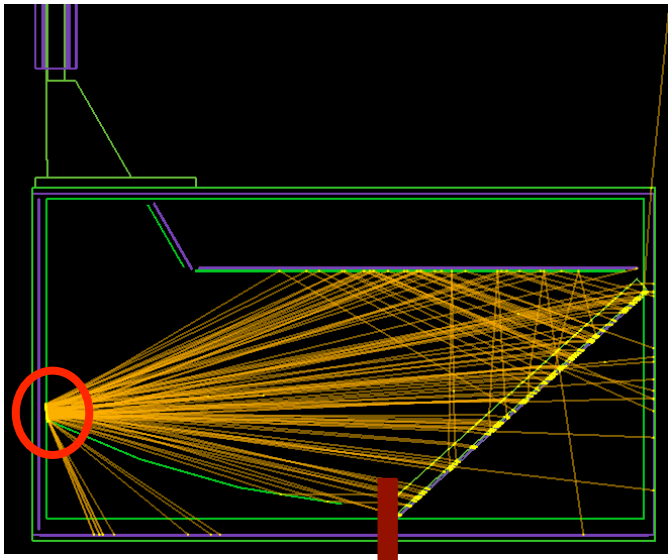


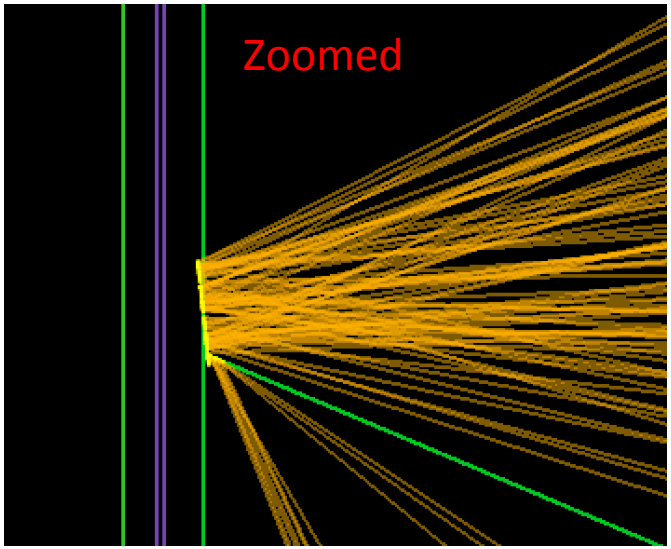




Inclination angle: -6°

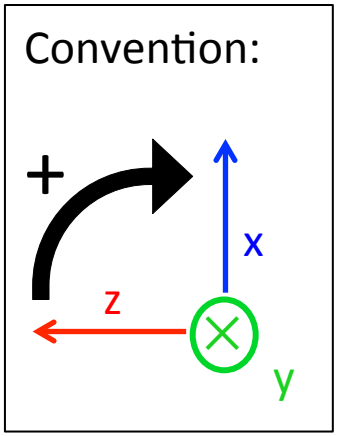
Z-position: ?? (depends on the diffuser)

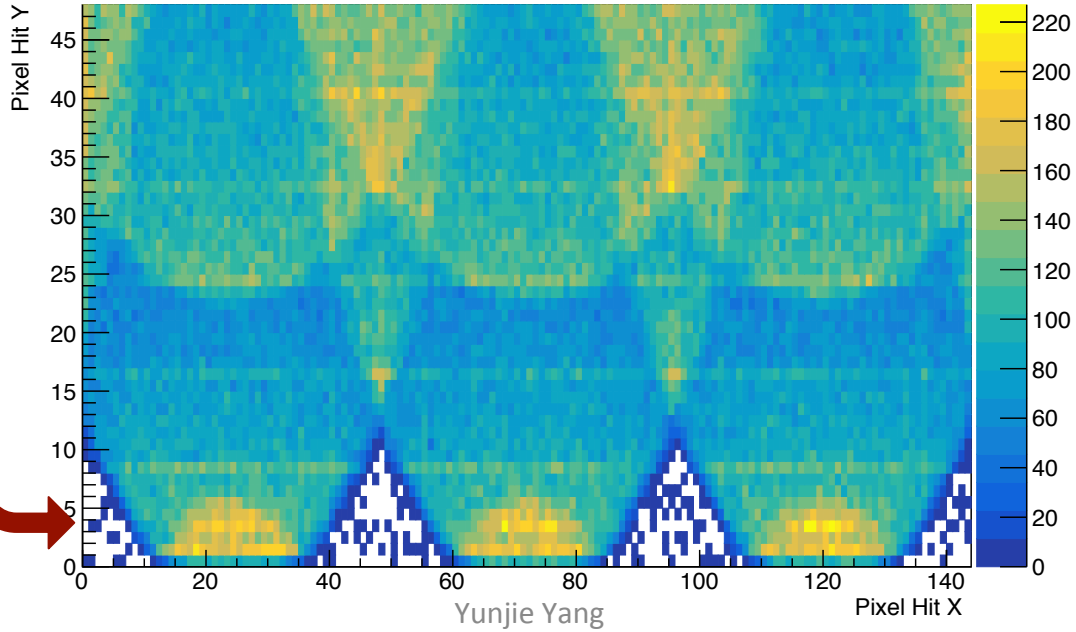
# Config: -6°, z = 0



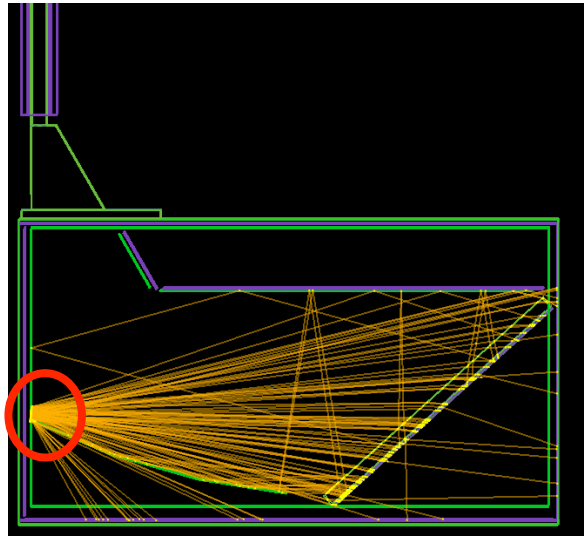


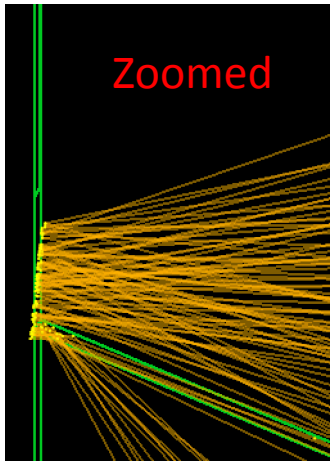

South Box



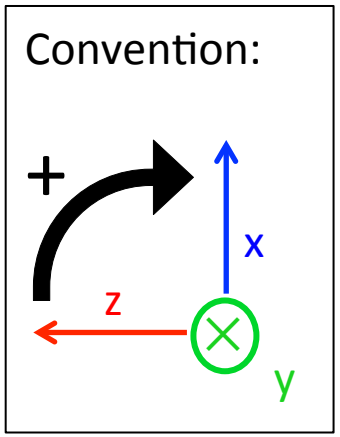



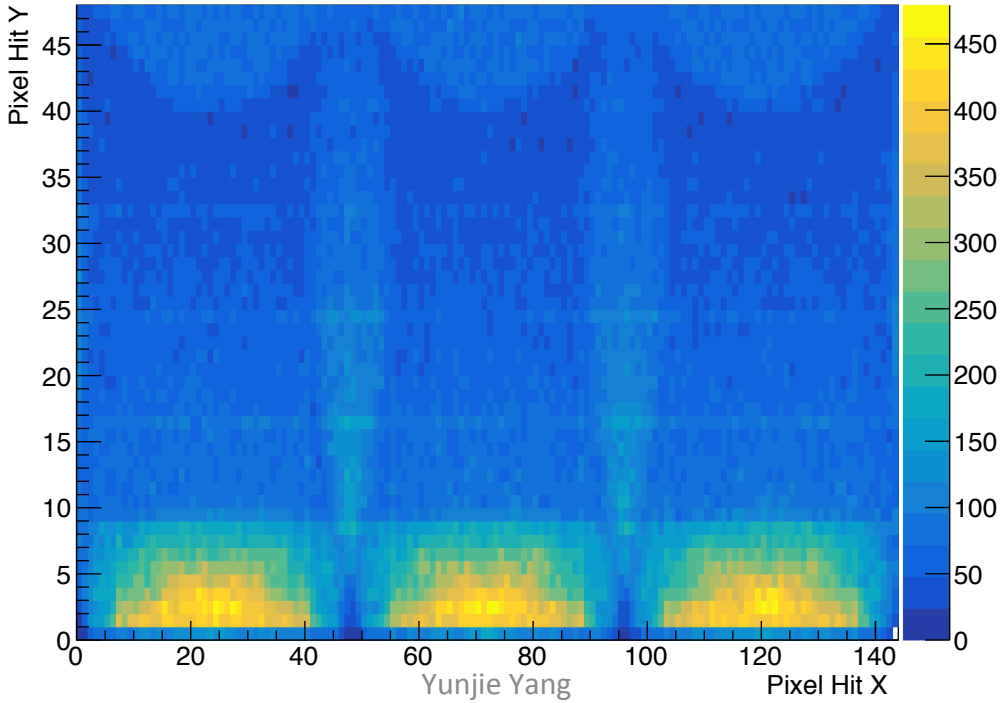
# Config: +6°, z = 0



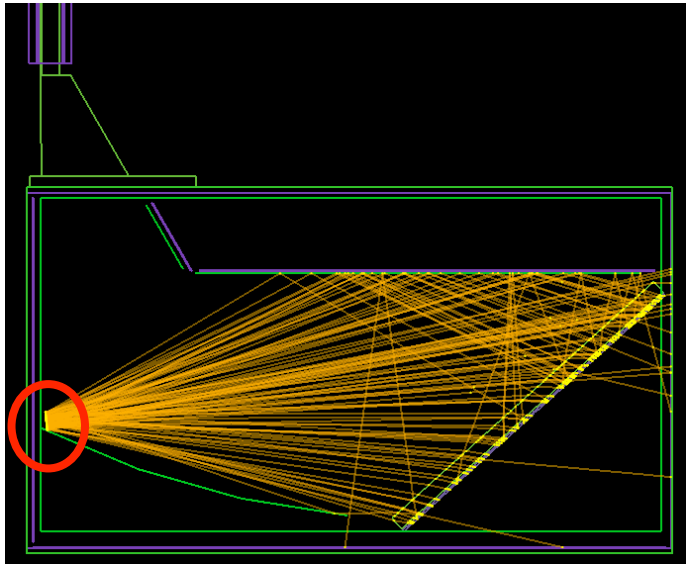


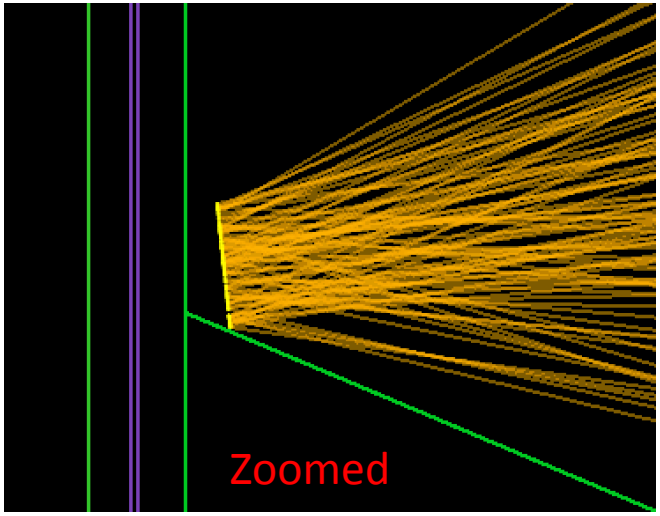

South Box

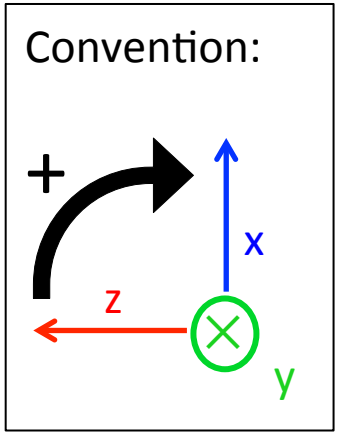


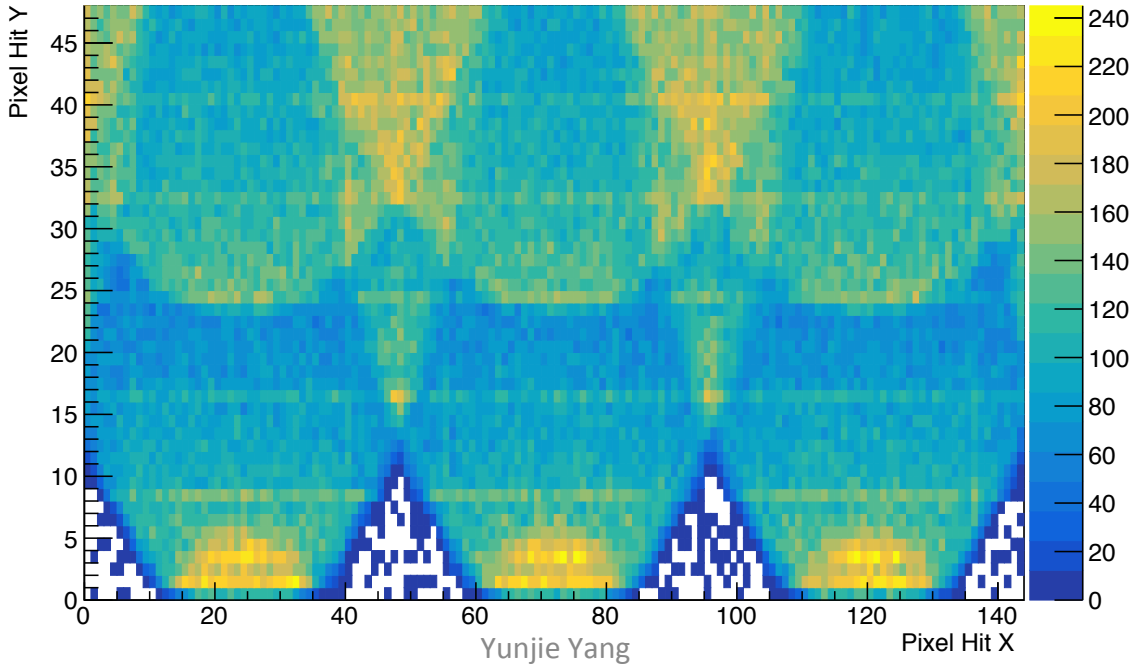
# Config: -6°, z = -5mm



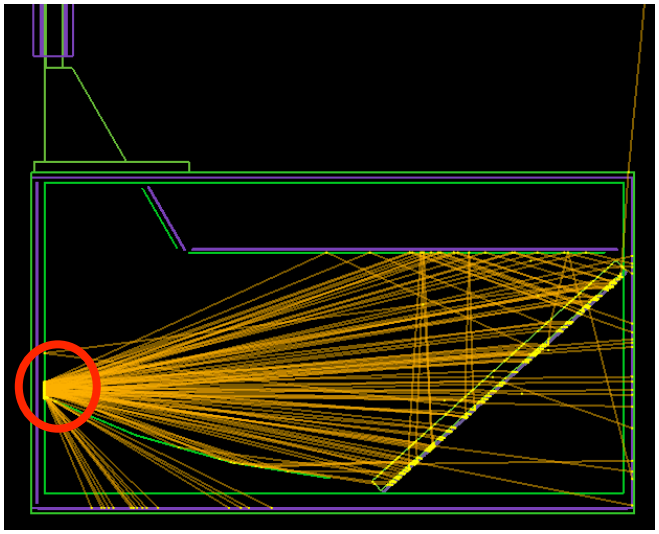


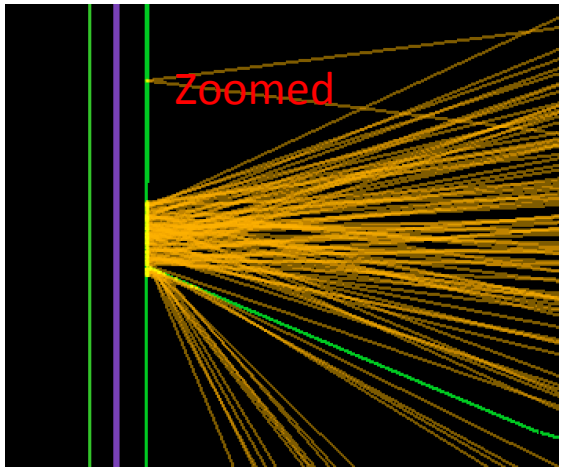



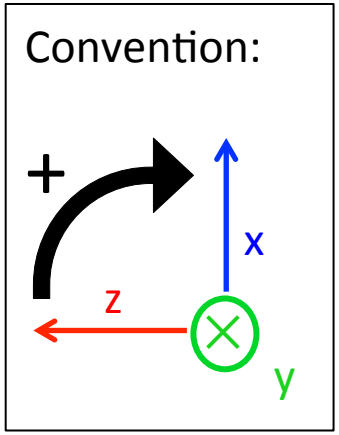

South Box



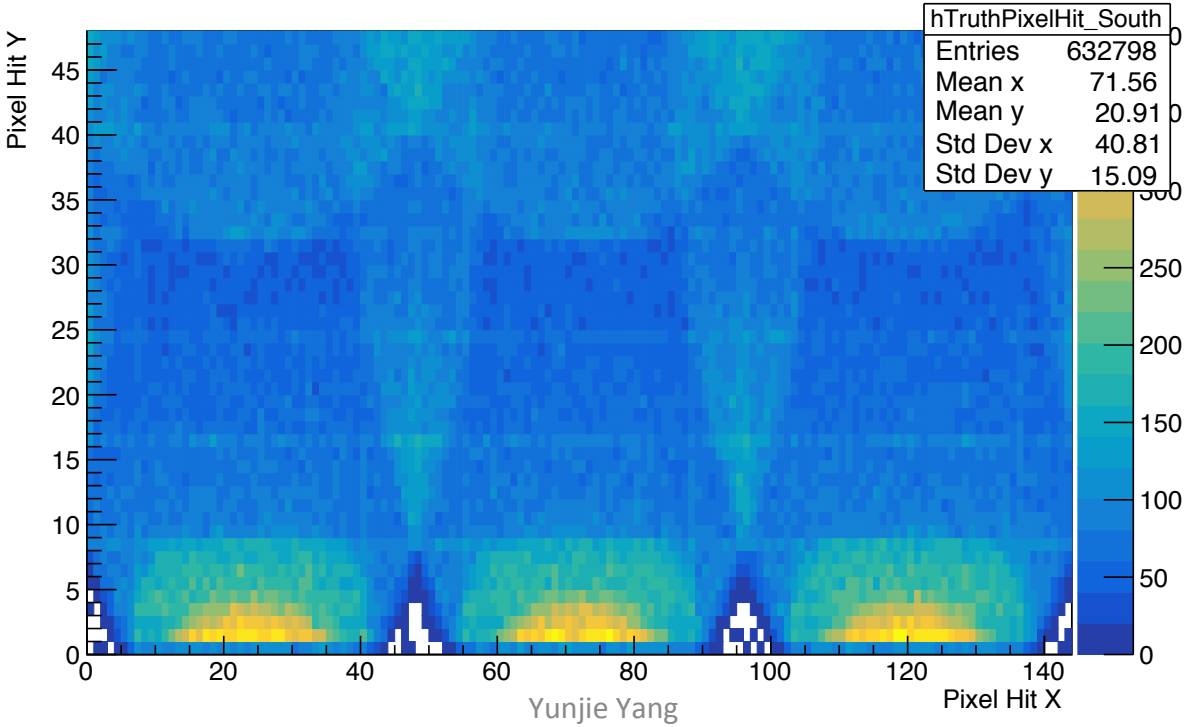
# Config: 0°, z = 0






South Box



# Reminder: smeared hit time

- Smeared hit time model:
  $$t_{\mathrm{smeared}} = t_{\mathrm{Geant}} + t_{\mathrm{LED}} + t_{\mathrm{delay}} + t_{\mathrm{PMT}}$$

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

# Reminder: smeared hit time

- Smeared hit time model:

$$t_{\mathrm{smeared}} = \underbrace{t_{\mathrm{Geant}}}_{\text{in generator}} + \underbrace{t_{\mathrm{LED}} + t_{\mathrm{delay}} + t_{\mathrm{PMT}}}_{\text{in plugin}}$$

Currently:

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

# Reminder: smeared hit time

- Smeared hit time model:

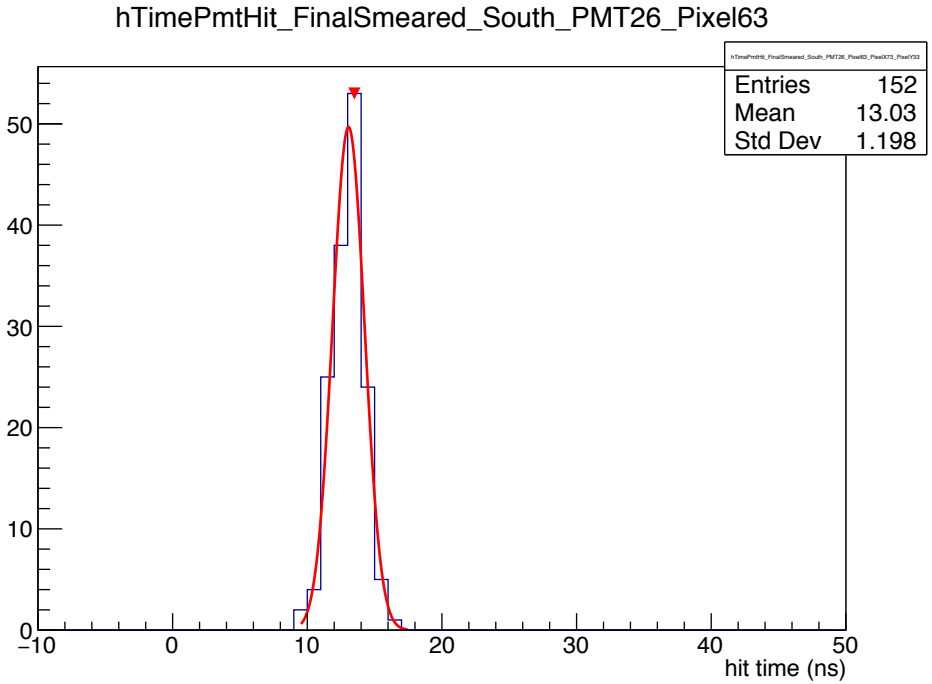
$$t_{\text{smeared}} = t_{\text{Geant}} + t_{\text{LED}} + t_{\text{delay}} + t_{\text{PMT}}$$

Eventually: in generator; in mcsmear

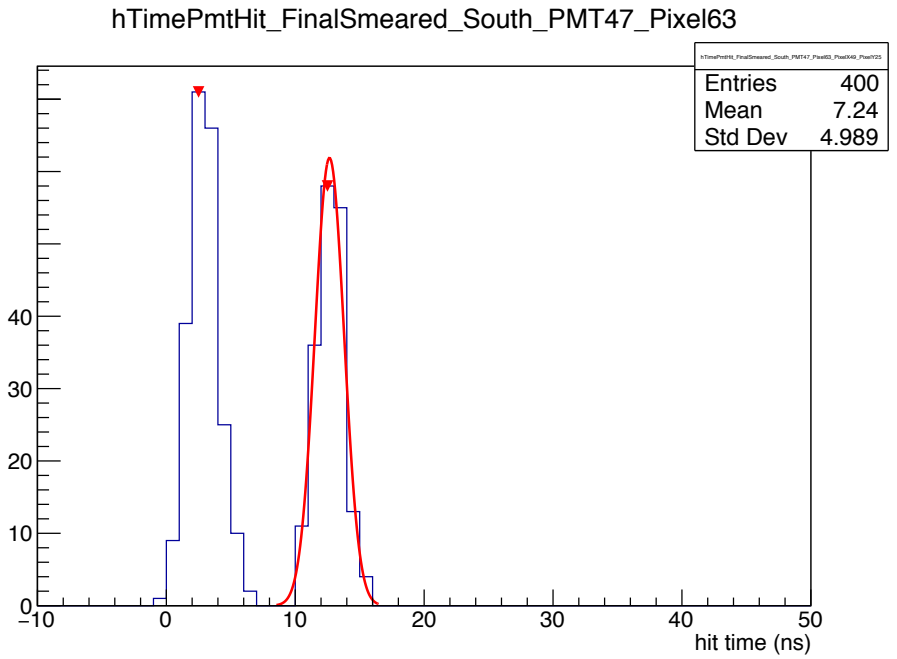
Currently: in generator; in plugin

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

# For each pixel:

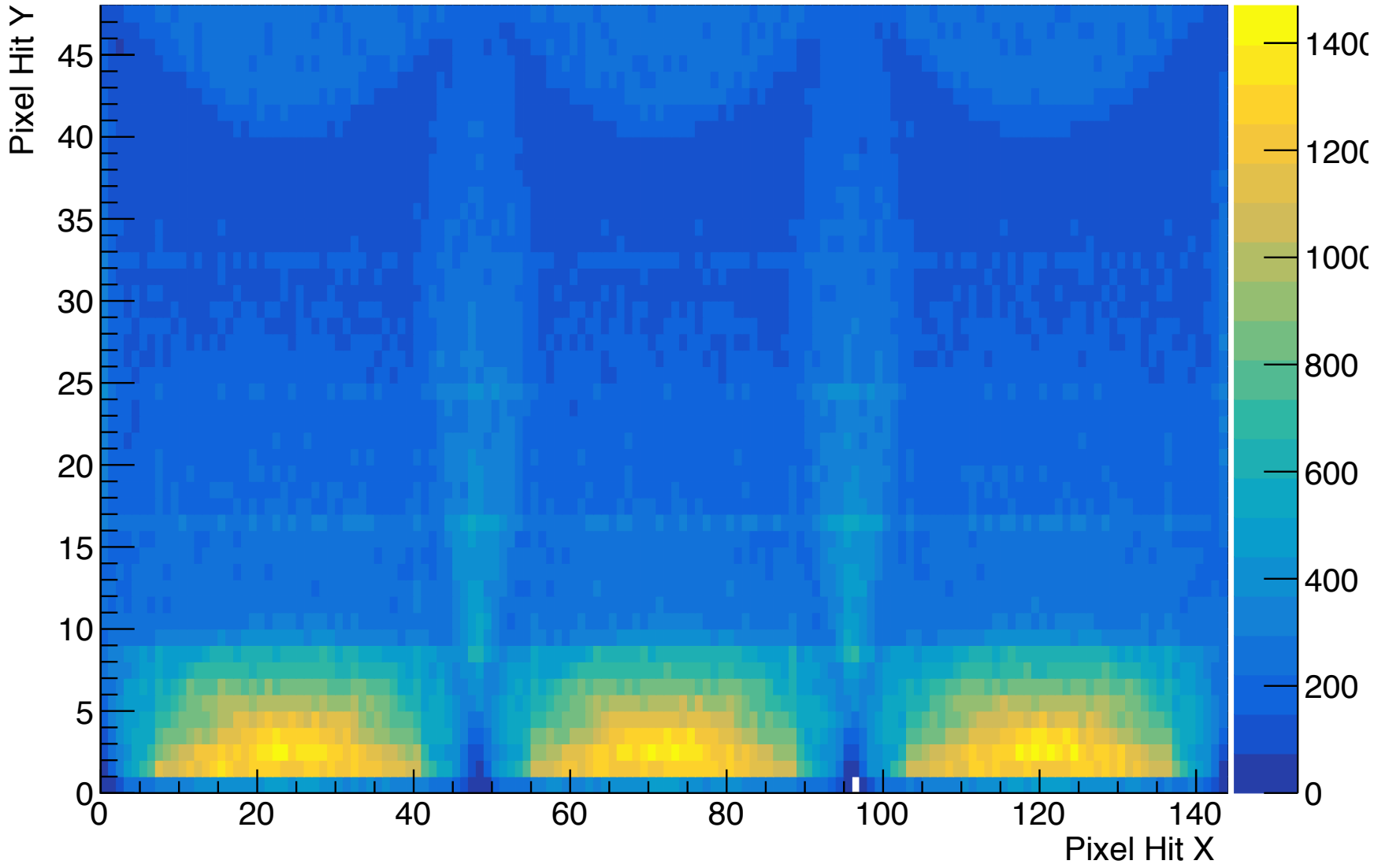



or

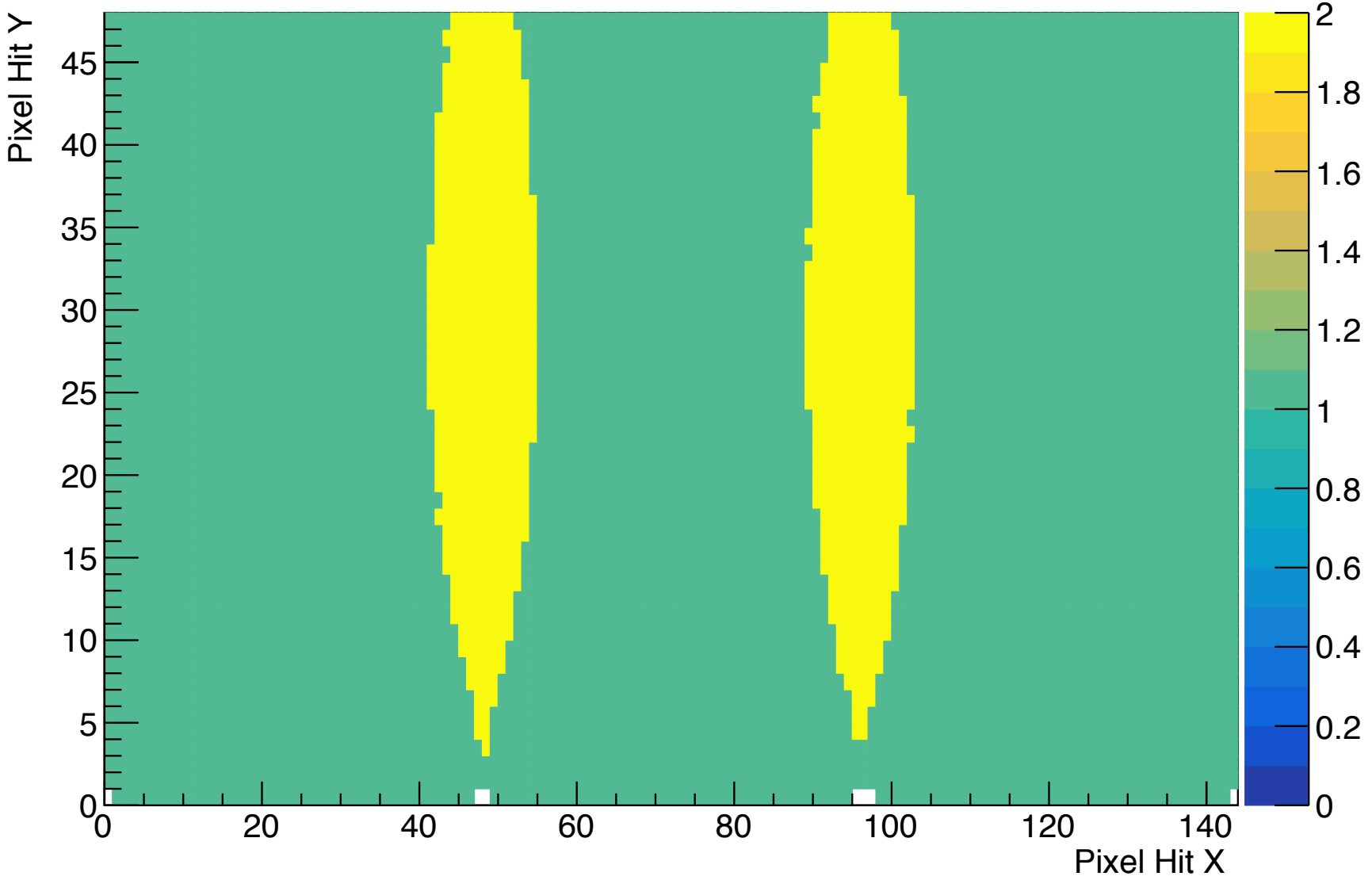


# Occupancy

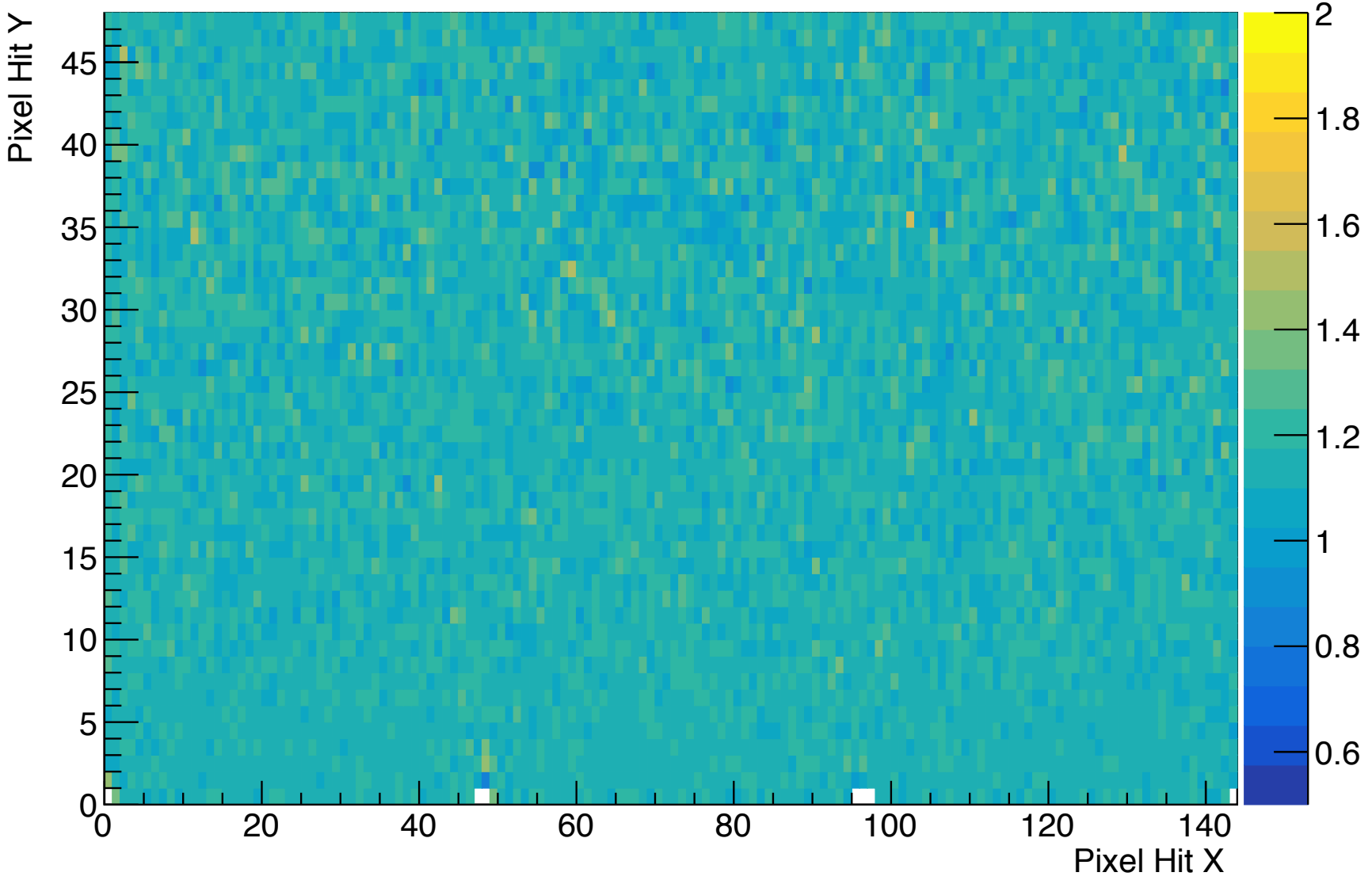
## South Box



# Number of peaks (South Box)



# Widths (South Box)



# Timing calibration

- Details to be refined
  - "Which contribution in which part"
  - Model PDFs
  - Fitting function
- Putting in fake timing offsets by hand, and see how well we can determine t0