Hodoscope Calibrations

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Overview

- Introduction
- Calibration Procedure
- Correct for time walk
- Correct for travel time in the bar
- Summary and Future Plans

Introduction

- **Importance**
  - **HGC Calibration**
  - **Calorimeter Calibration**
  - **Trigger**
  - **Timing Information**
- **Trying to run the code on carbon data in different run periods.**
- **Run Numbers are located in**

  Jlab_HallC_replay/UTIL_BATCH/InputRunLists/Carbon_ALL
- **Only looking at SHMS hodoscope calibrations at this point.**

Calibration Procedure

1. **Run Full replay of run**
2. **Run TimeWalkHistos.C**
3. **Run fitHodoCalib.C** ← Makes Time Walk Correction
4. **Run Full Replay with new Time Walk parameters**
5. **Run TimeWalkCalib.C** ← Makes other Corrections and summary plots
6. **Run Final Replay** ← To check the effect on Beta peak

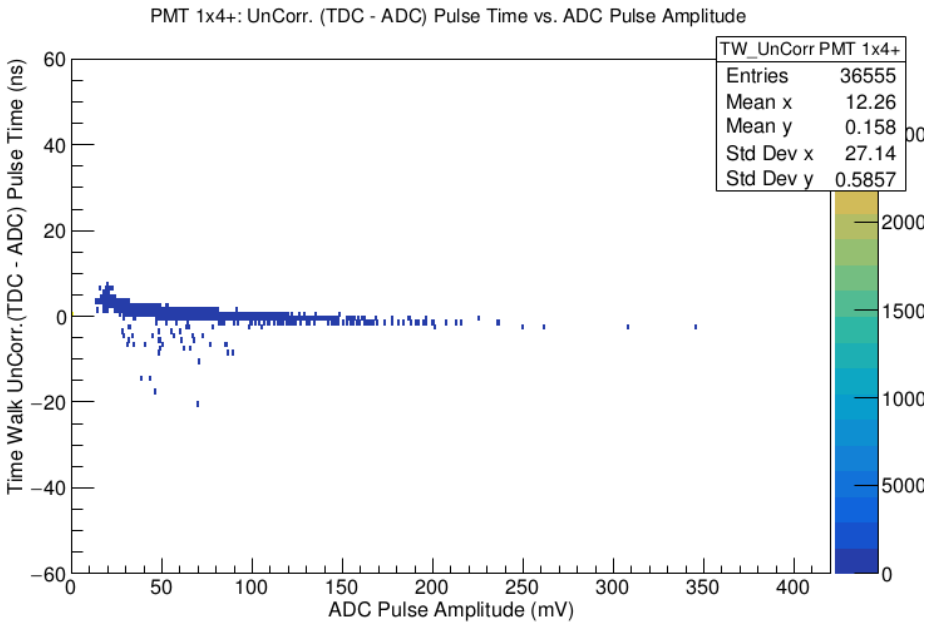
These are all found in /CALIBRATIONS/(s)hms_hodo_calib/

Stephen has made batch script to do this all in one!

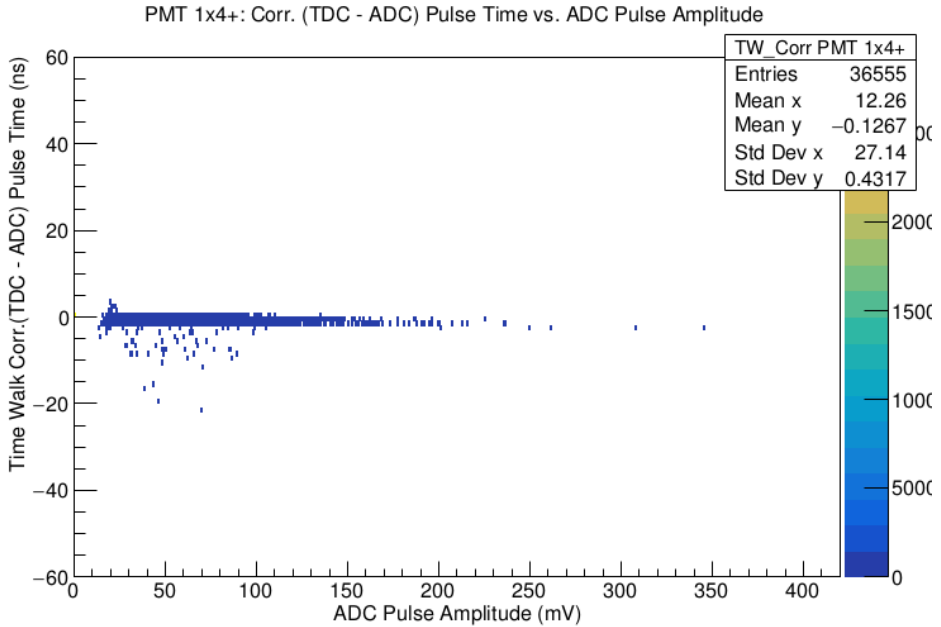
Time Walk

$$f_{TW}(a) = c_1 + \frac{1}{(\frac{a}{TDC_{Thrs.}})^{c_2}}$$

Run # 5158 (Good Correction)



Before

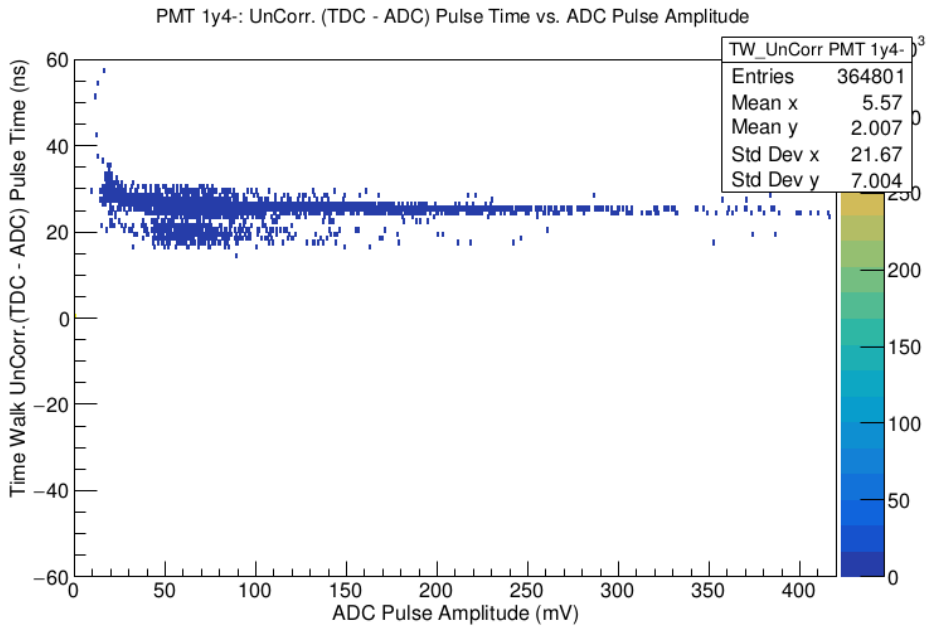


After

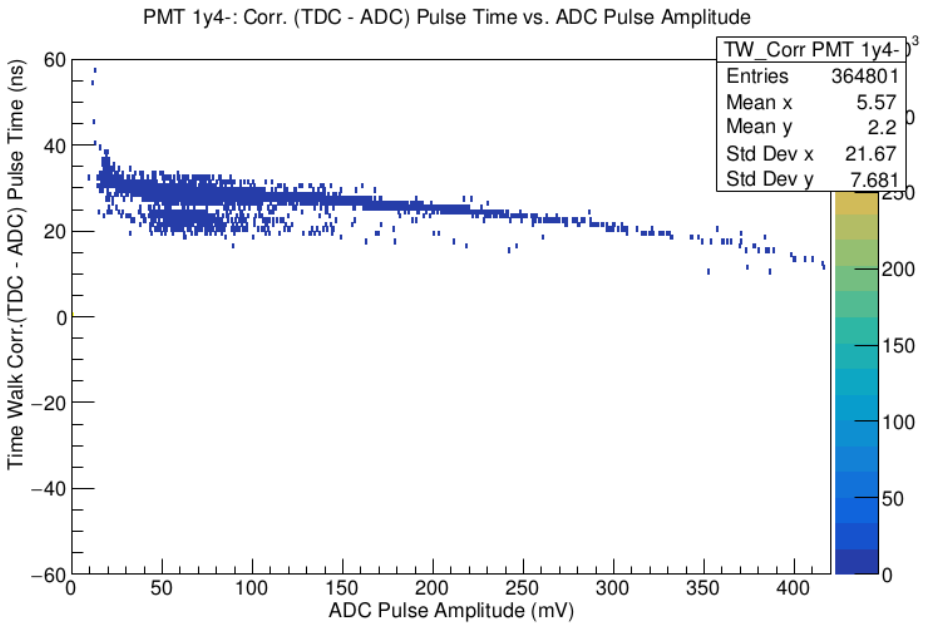
Time Walk

$$f_{TW}(a) = c_1 + \frac{1}{(\frac{a}{TDC_{Thrs.}})^{c_2}}$$

Run # 7950 (Bad Correction)



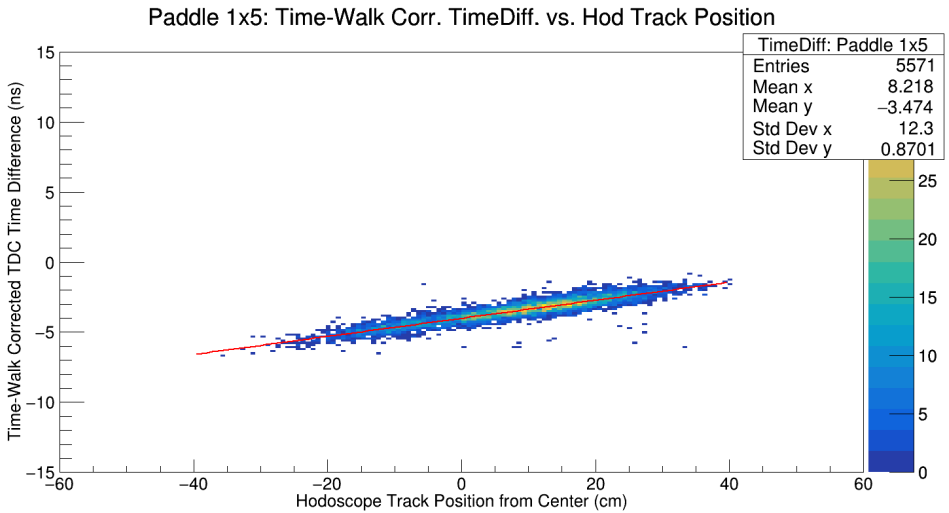
Before



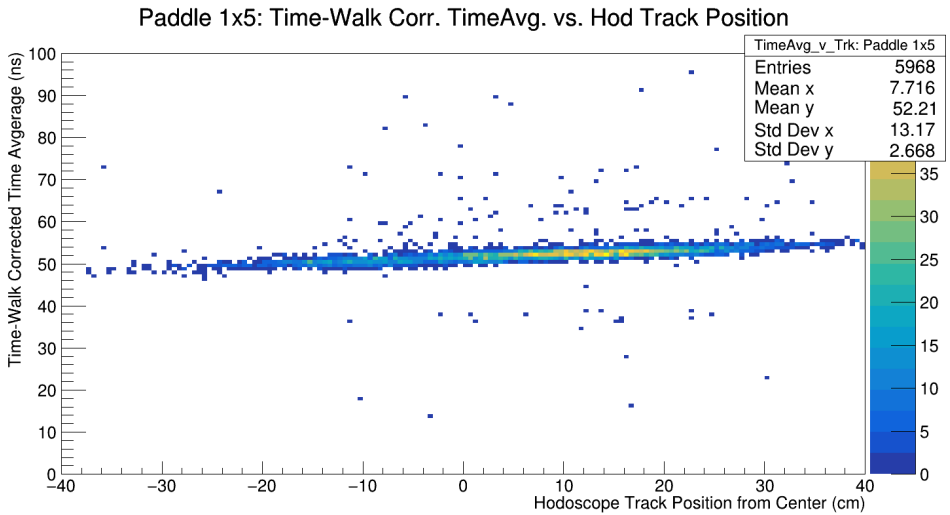
After

Travel Time

Run # 5158 (Good Correction)



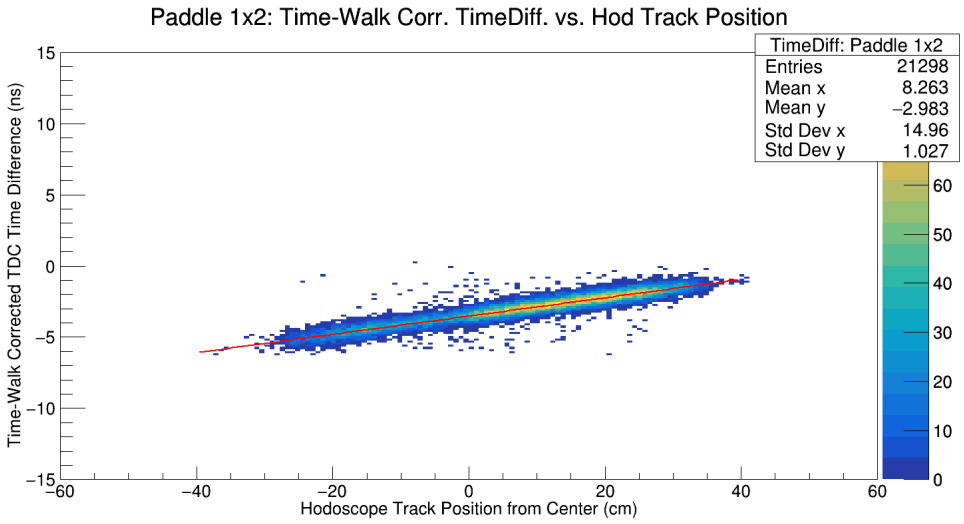
$$t_i = \frac{T_{TW}^{(+)} + T_{TW}^{(-)} - 2t_{Cable}}{2}$$



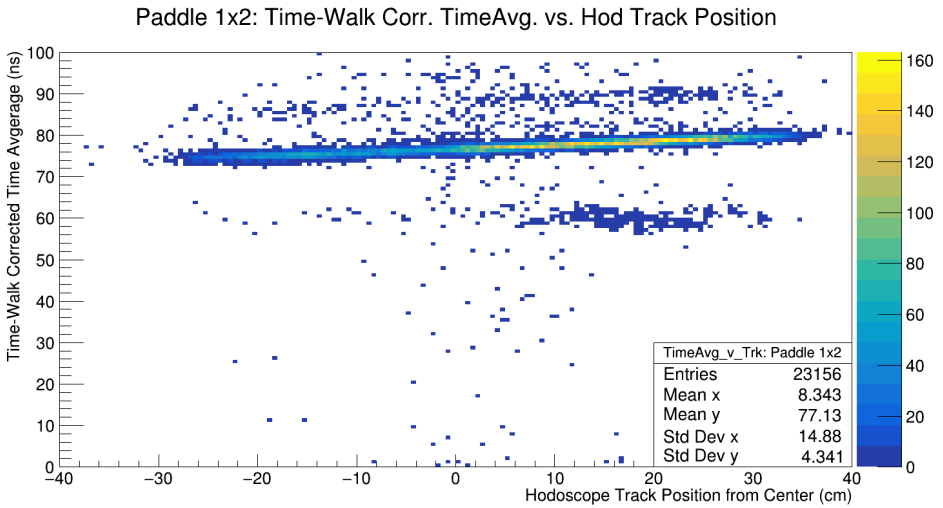
$$t_{avgCorr} = \frac{1}{2}(t_{Corr.}^{(+)} + t_{Corr.}^{(-)}) = \frac{1}{2}(t_{TWC_{orr.}}^{(+)} + t_{TW_{Corr.}}^{(-)})$$

Travel Time

Run # 7950 (Bad Correction)



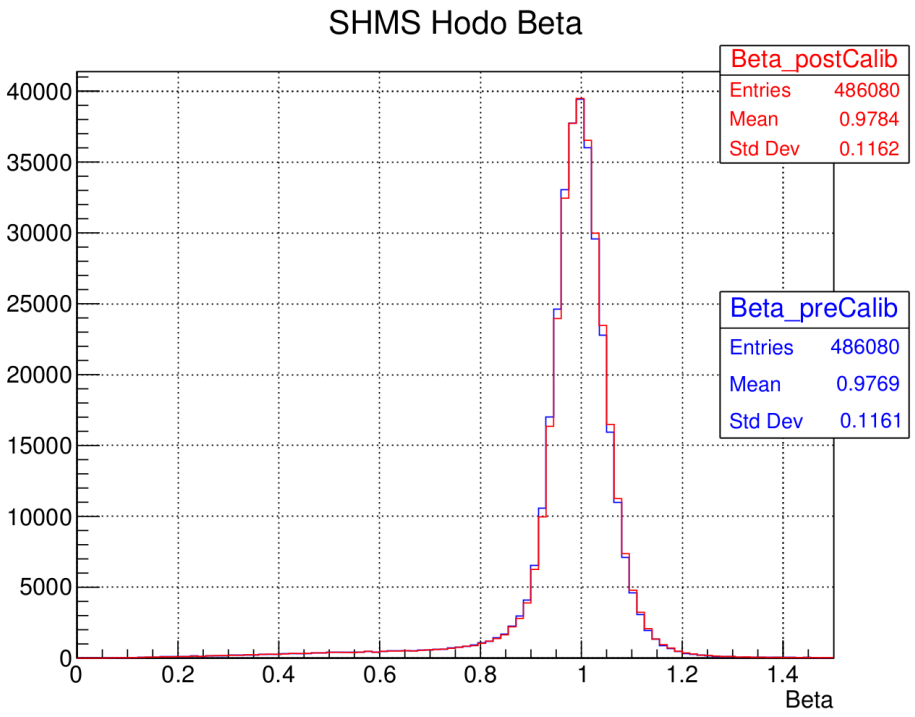
$$t_i = \frac{T_{TW}^{(+)} + T_{TW}^{(-)} - 2t_{Cable}}{2}$$



$$t_{avgCorr} = \frac{1}{2}(t_{Corr.}^{(+)} + t_{Corr.}^{(-)}) = \frac{1}{2}(t_{TWC_{orr.}}^{(+)} + t_{TW_{Corr.}}^{(-)})$$

Checking Calibrations

Run # 5158 (Good Correction)



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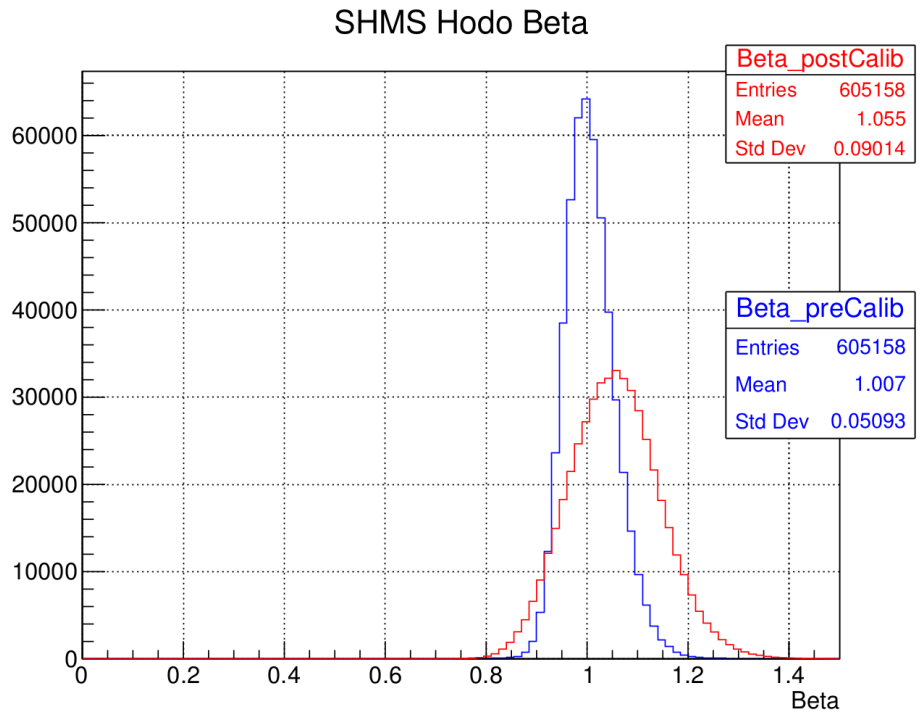
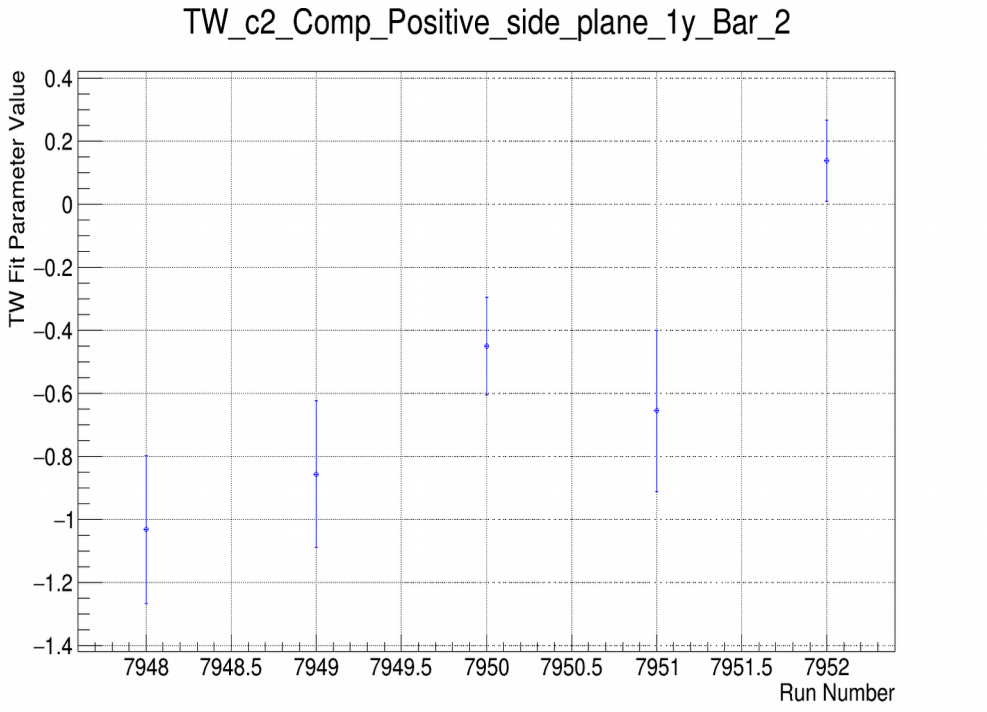
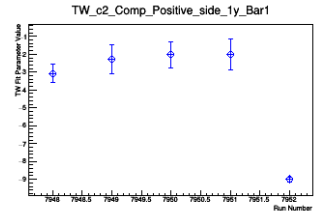


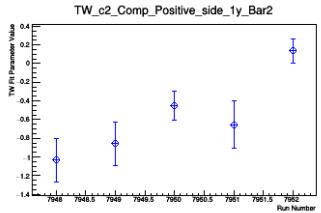
Stability of One Run Period

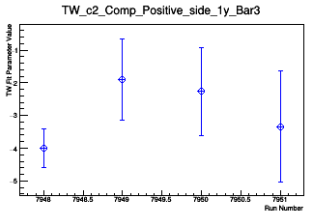
- **Plot of the Time Walk parameter vrs. run number.**
- **This is done for all the PMTs and can be used to check when a new calibration is required.**
- **Run Numbers**
  - 7848,7849, 7850, 7851, 7852

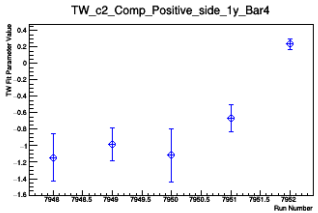


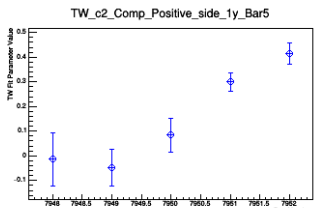
Stability of all Positive PMT in 1Y-Plane (1 Run Period)

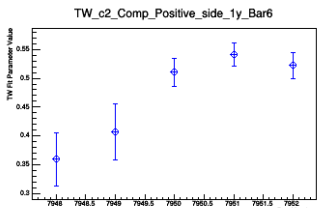


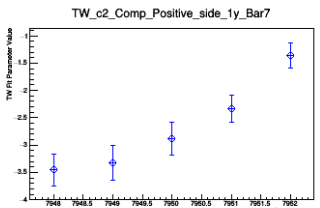


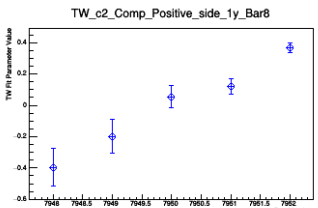


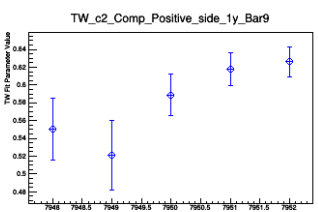


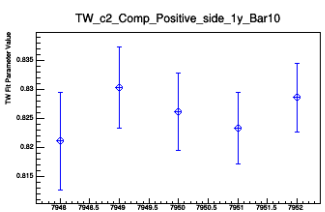


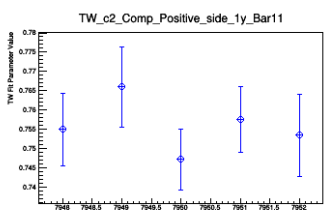


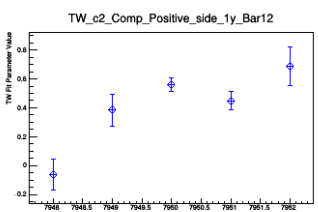


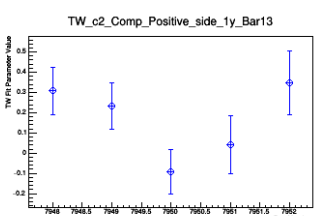








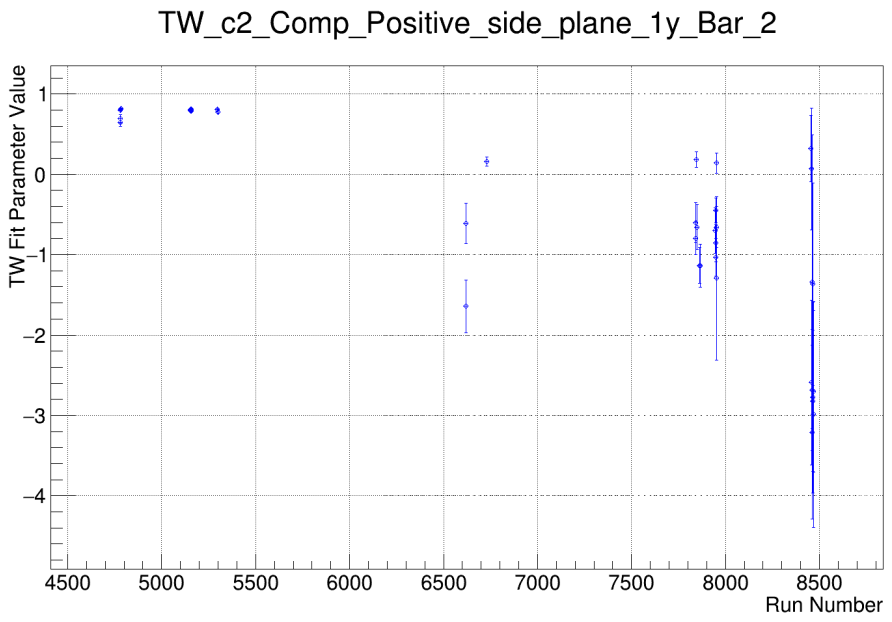




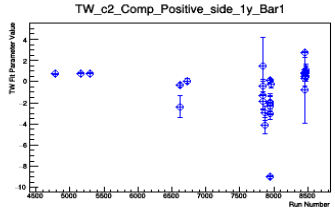
Stability of All Carbon Runs

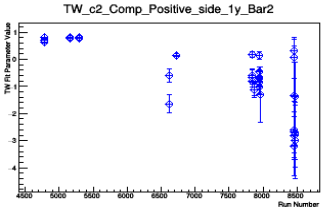
Plot of the Time Walk parameter vrs. run number.

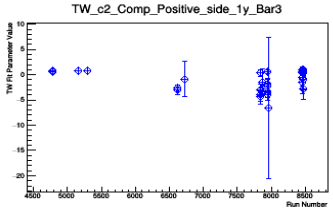
This is done for all the PMTs and can be used to check when a new calibration is required.

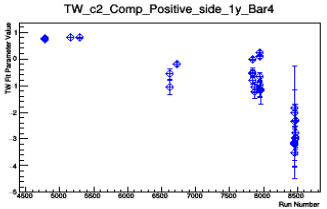


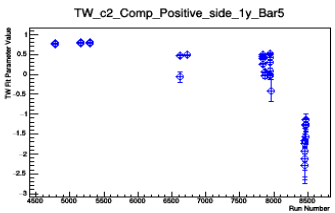
Stability of all Positive PMTs in 1Y-Plane (Carbon_All)

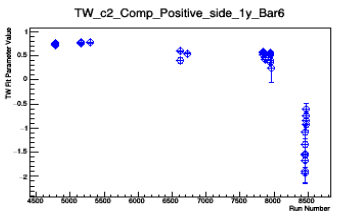


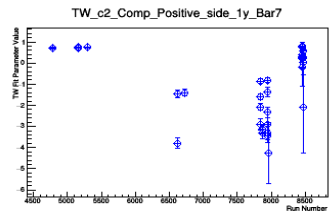


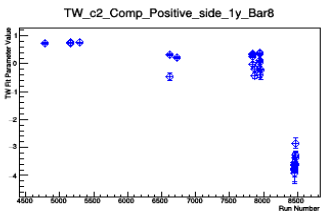


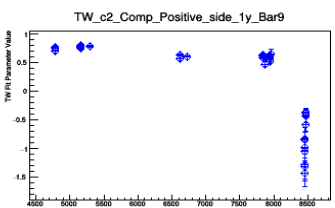


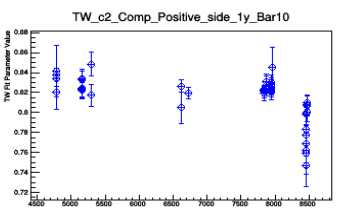


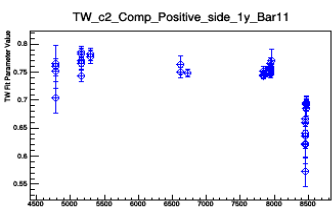


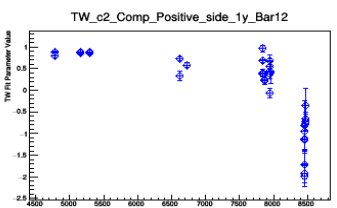


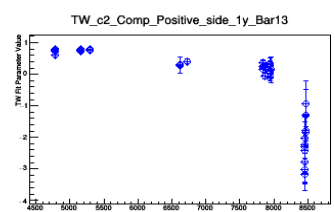












Summary and Future Plans

- Managed to run the code for SHMS Carbon runs.
- Callibrations are not yet accurate as some of the run numbers are good and some are still bad.
- Need to understand the source of second band in most plots.
- Need to look into correction for additional time difference.
- Need to improve the calibrations for all the carbon runs and then look at the other runs as well.
- Also need to start working on calibrating the HMS hodoscopes as well.