

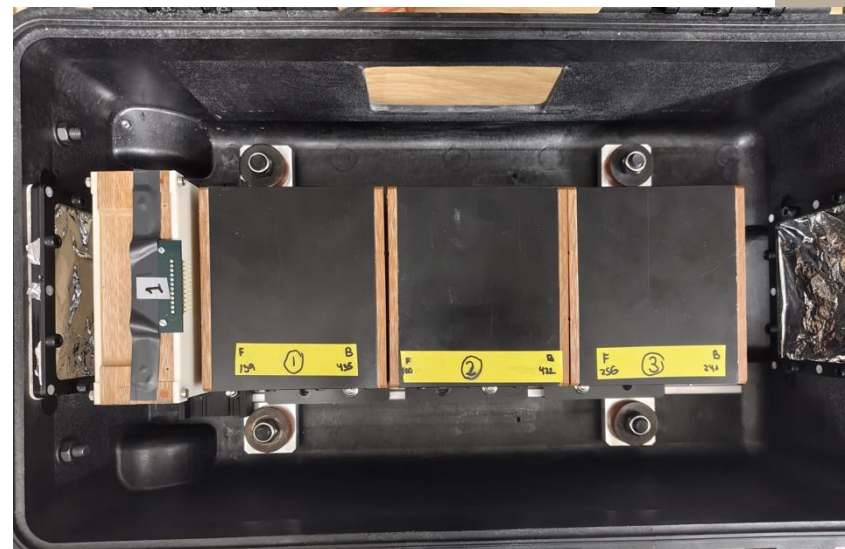


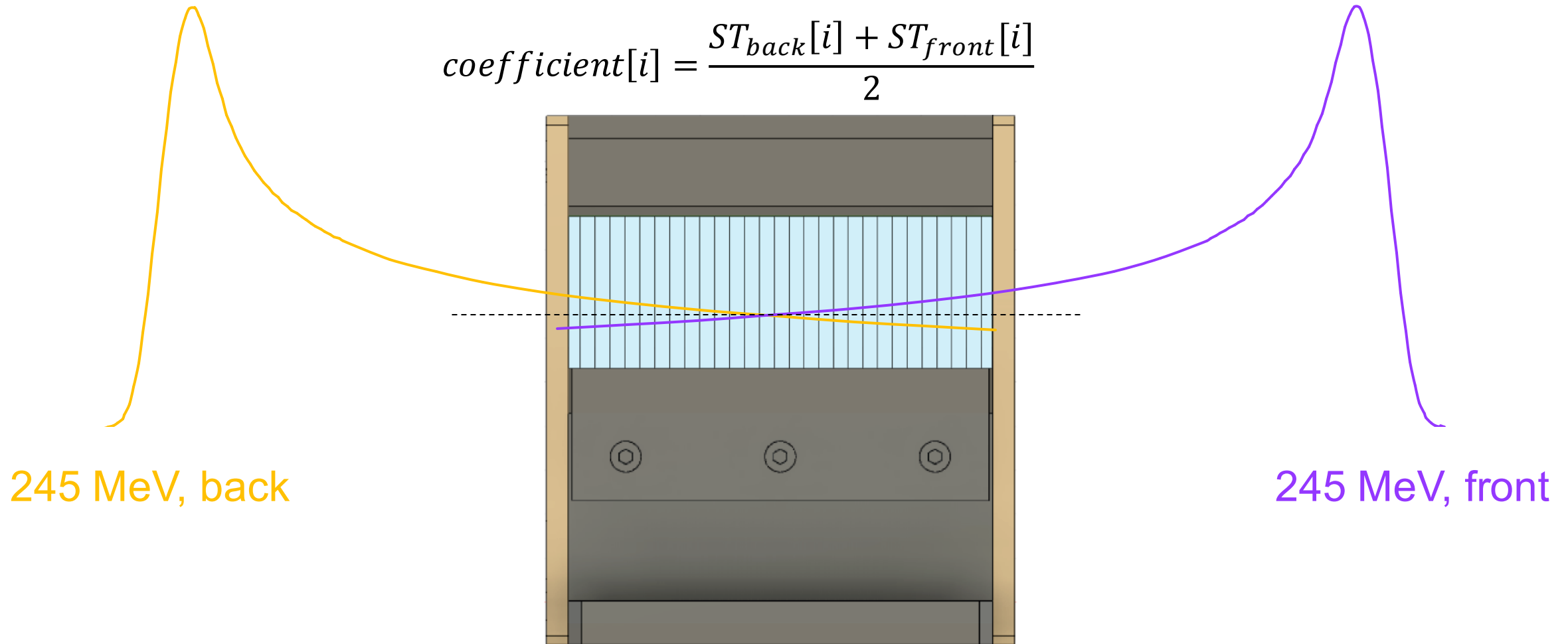
UCL PBT Meeting

29-10-2025

Joe Bateman
University College London

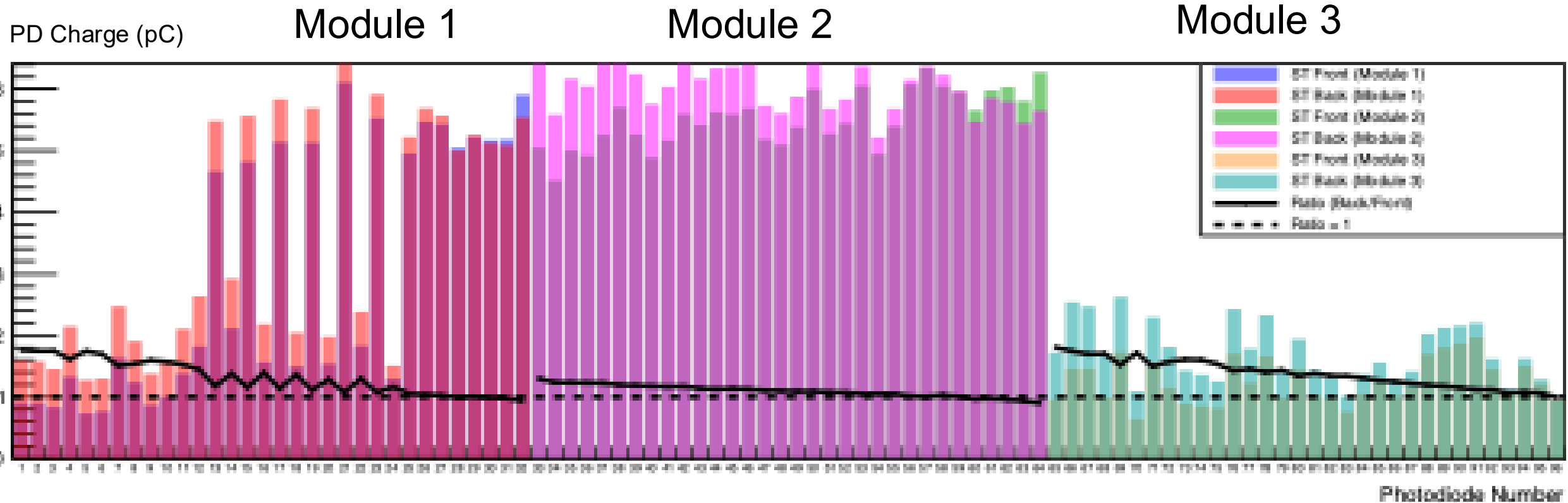
- 3 nights of measurements in the research room at Trento PTC
 - Night 1: QuARC
 - Calibrations and **Bragg Peak measurements** scaling current up to FLASH (briefly).
 - Night 2: Combined QuARC + SciFi:
 - Dynamic range testing (fibres at low gain)
 - Beam position measurements
 - Night 3: SciFi Measurements
 - Dynamic range testing (fibres at high gain)
 - Different spot sizes (varying energy)





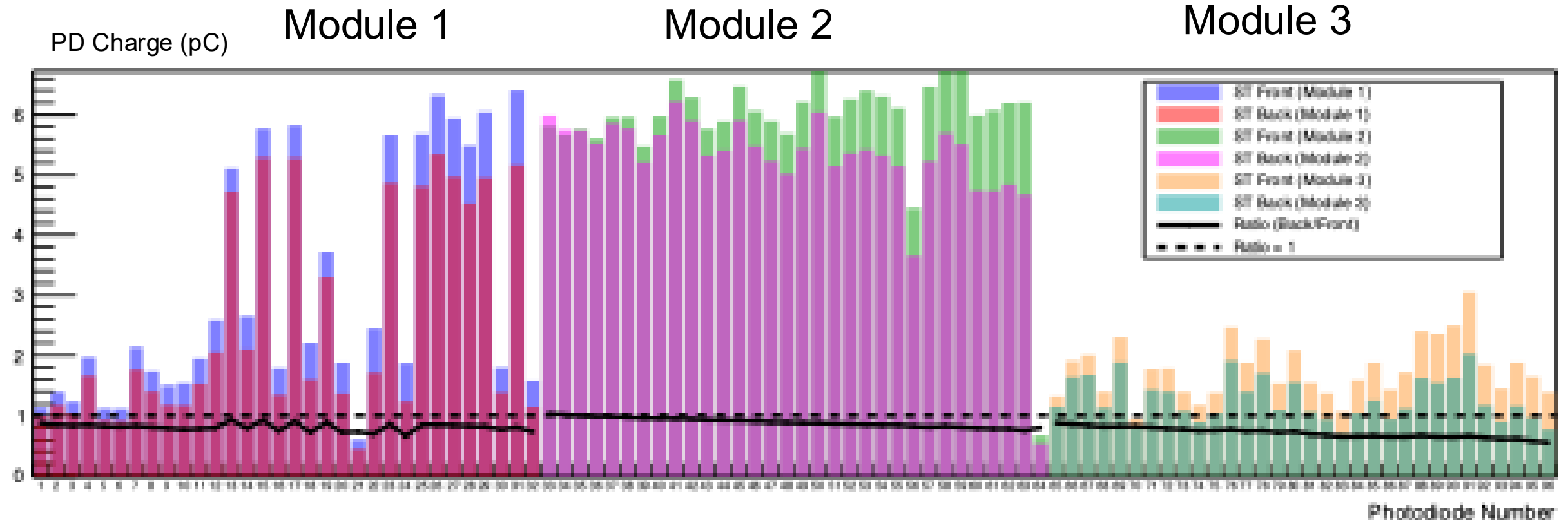


Side A Shoot through comparisons



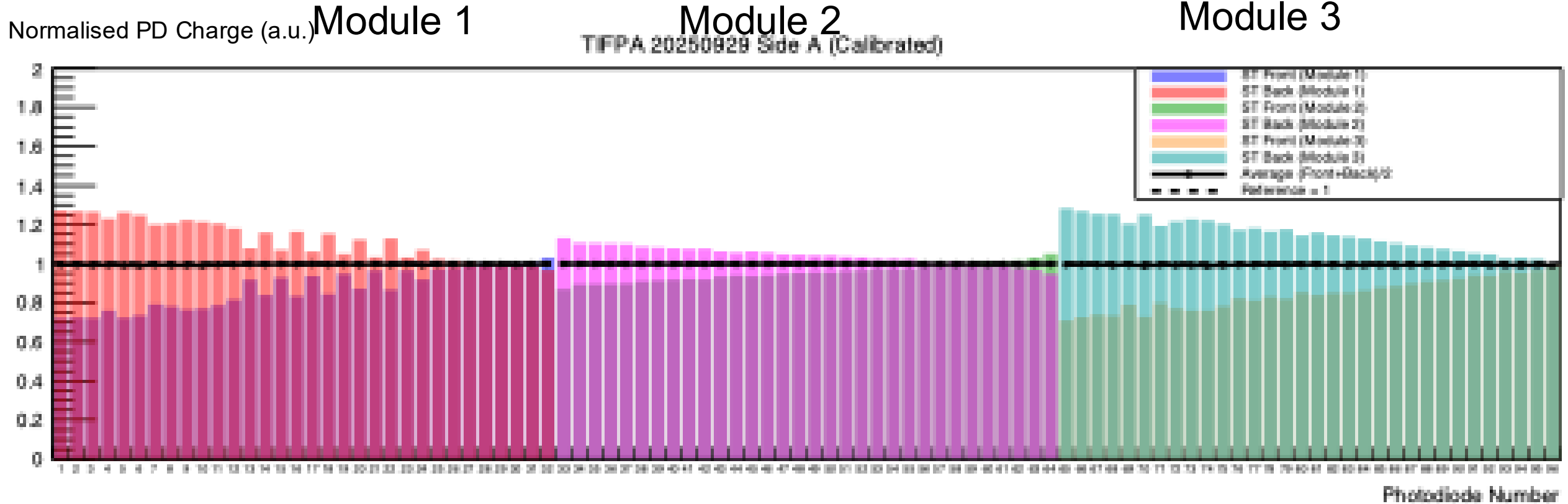


Side B Shoot through comparisons





Side A Calibrated





Side B Calibrated

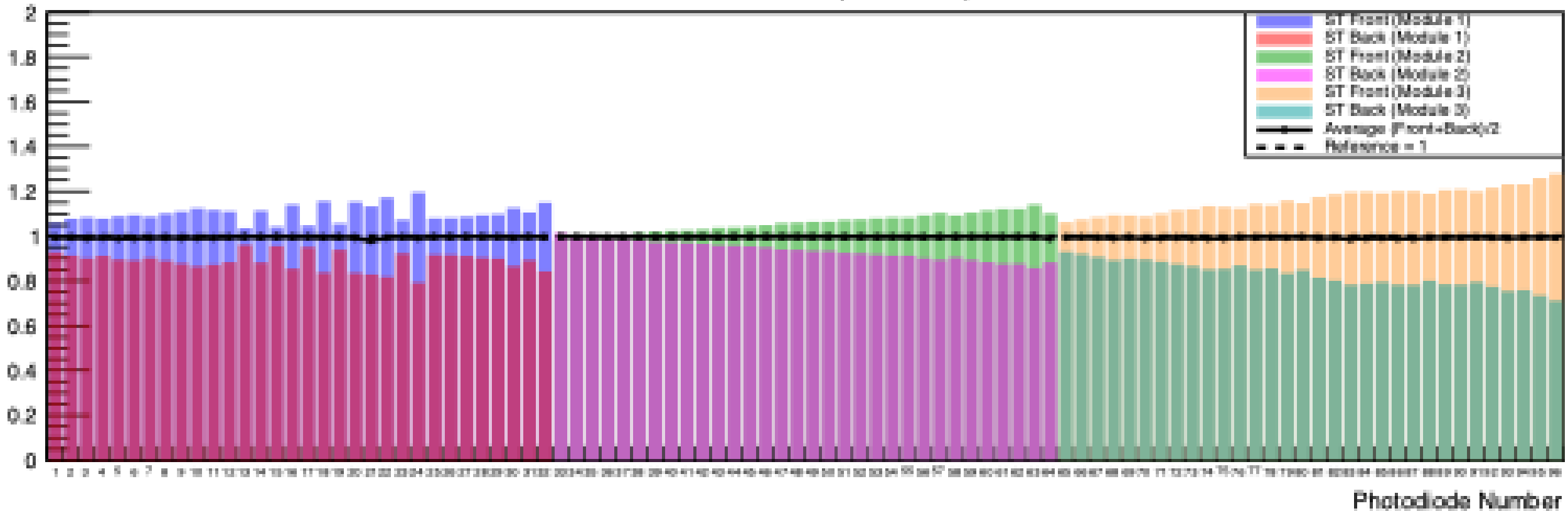
Module 1

Module 2

Module 3

Normalised PD Charge (a.u.)

TIFPA 20250929 Side B (Calibrated)

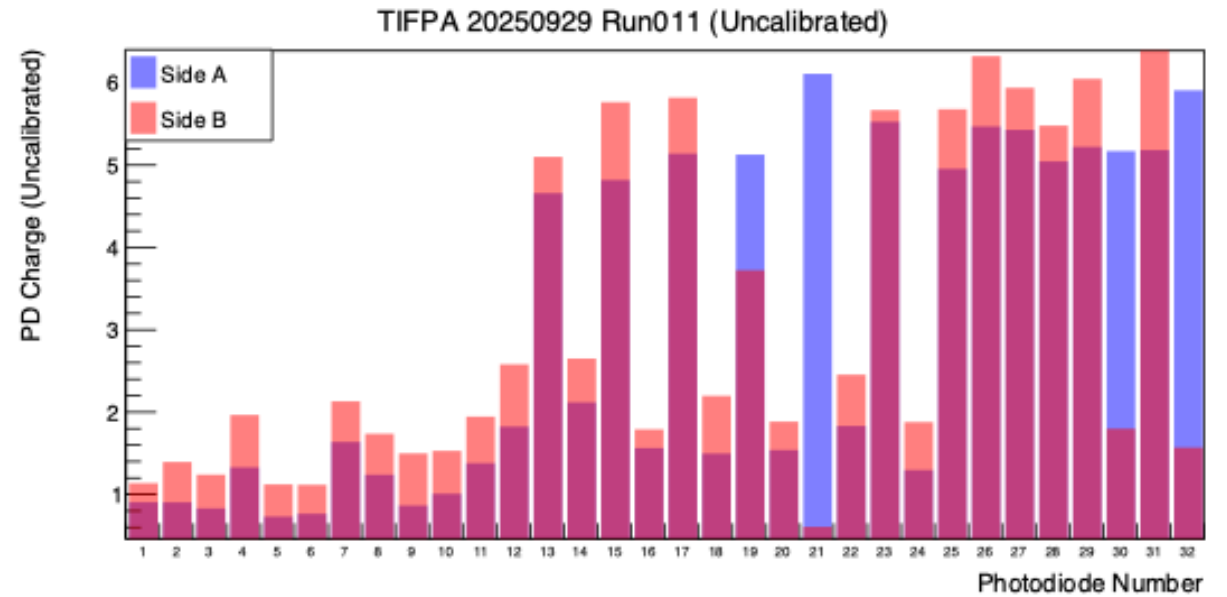




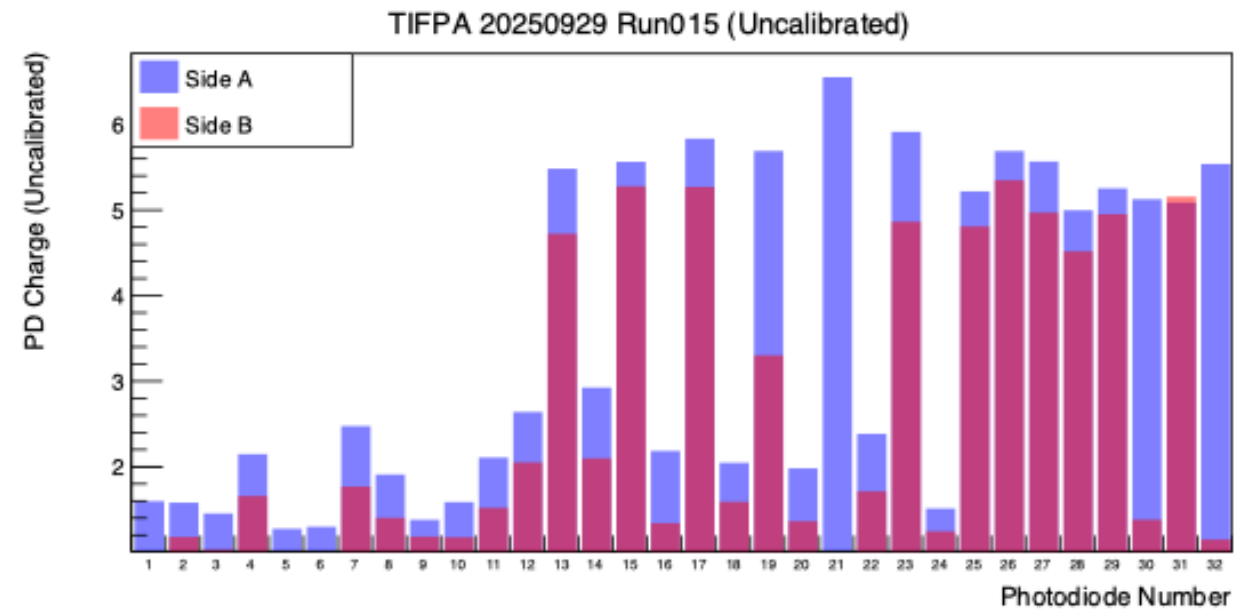
Module 1



ST Front

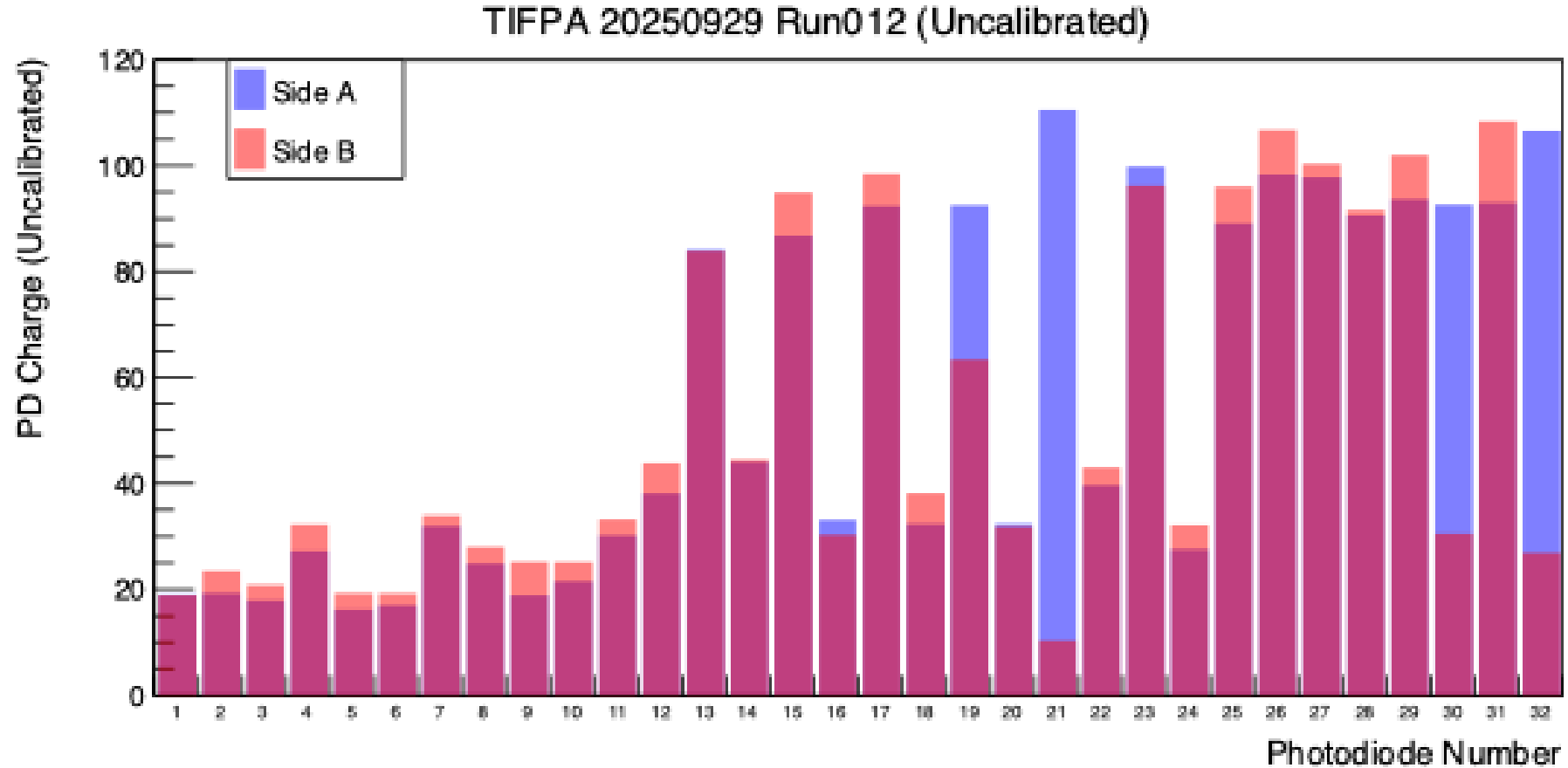


ST Back





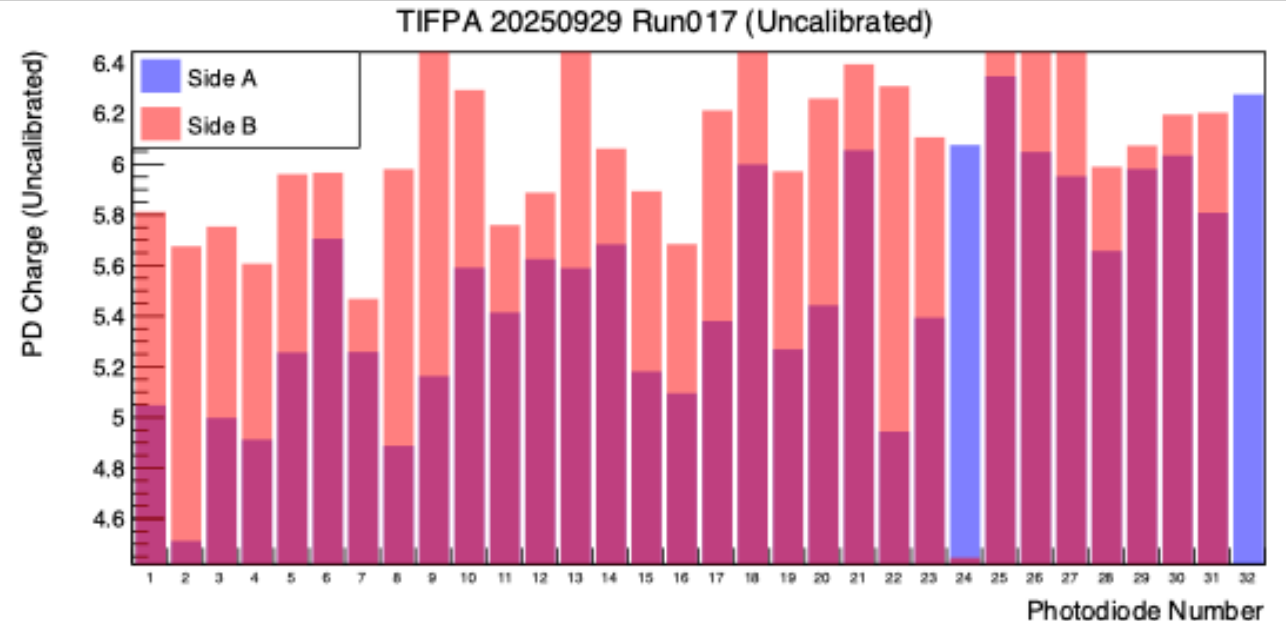
Module 1 High Current ST Front



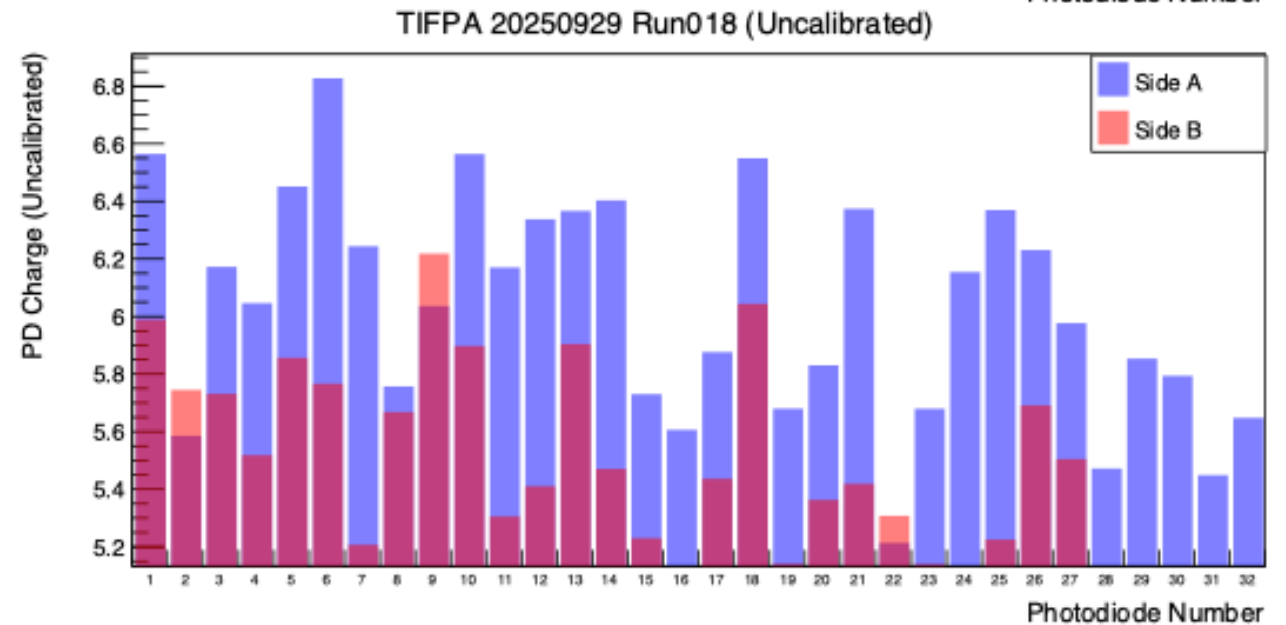


Module 2

ST Front



ST Back

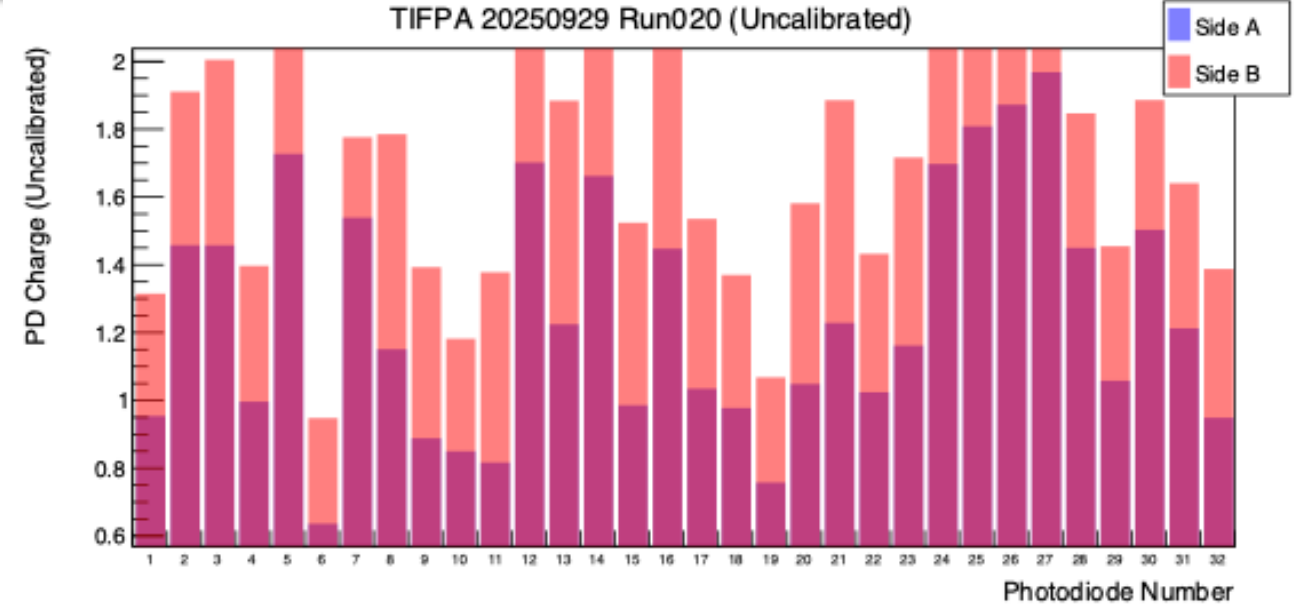




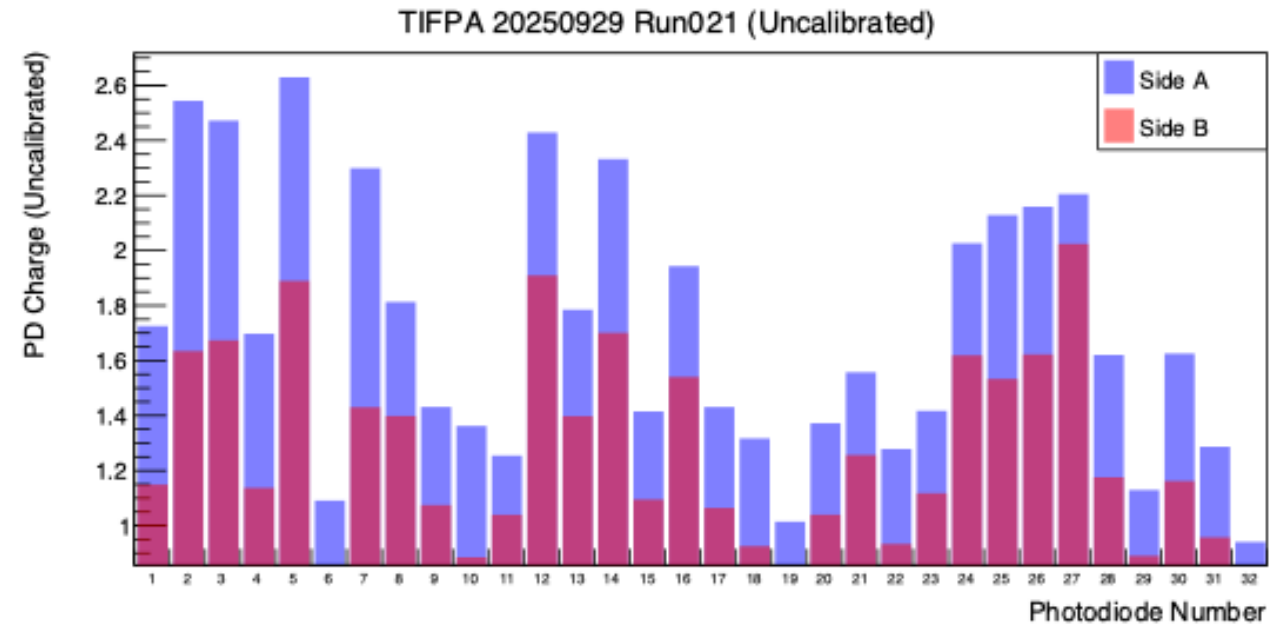
Module 3



ST Front



ST Back

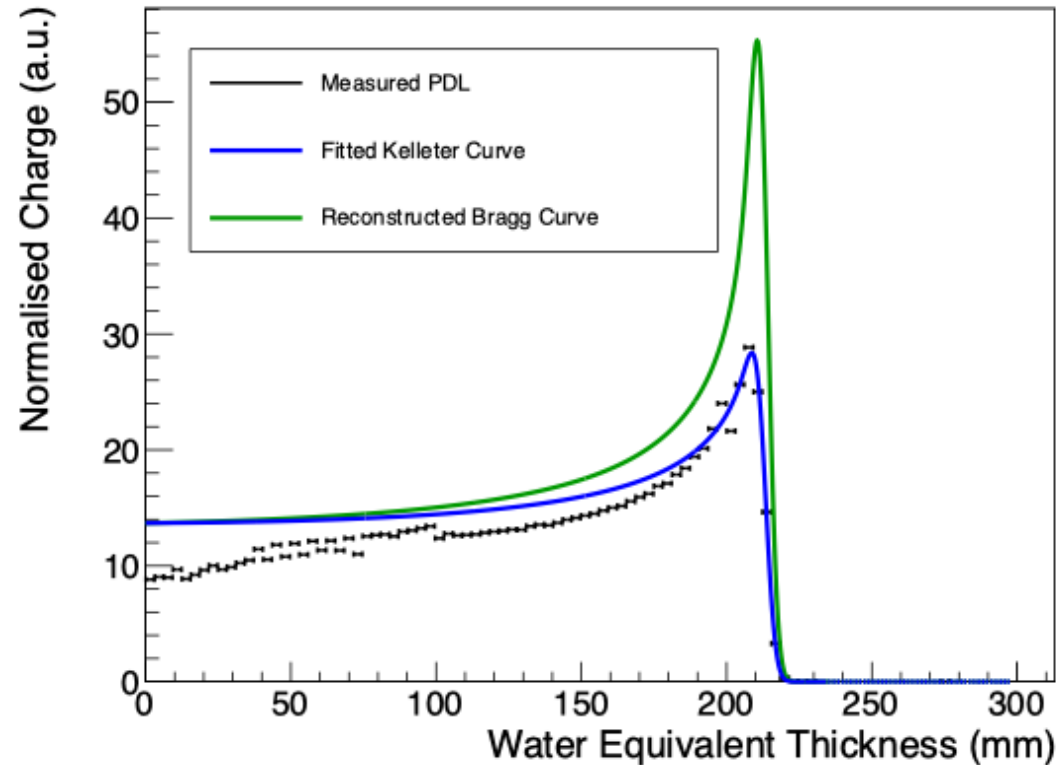




179 MeV 300 nA Side A

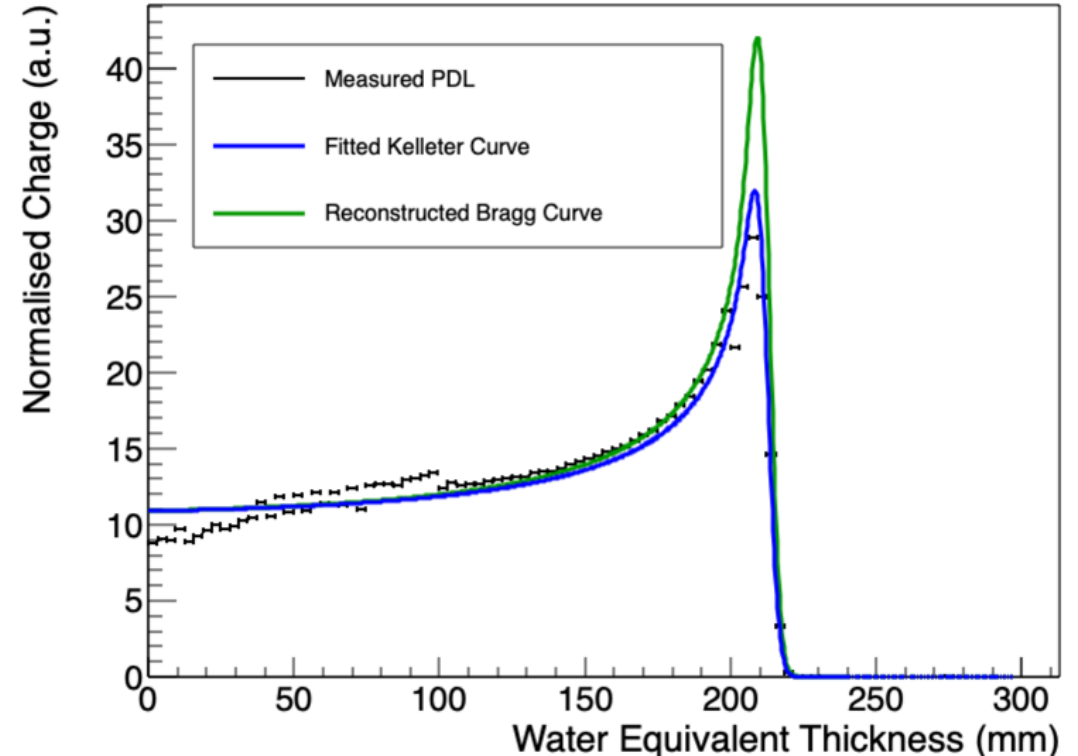


Fit restricted to +/- 5mm of peak



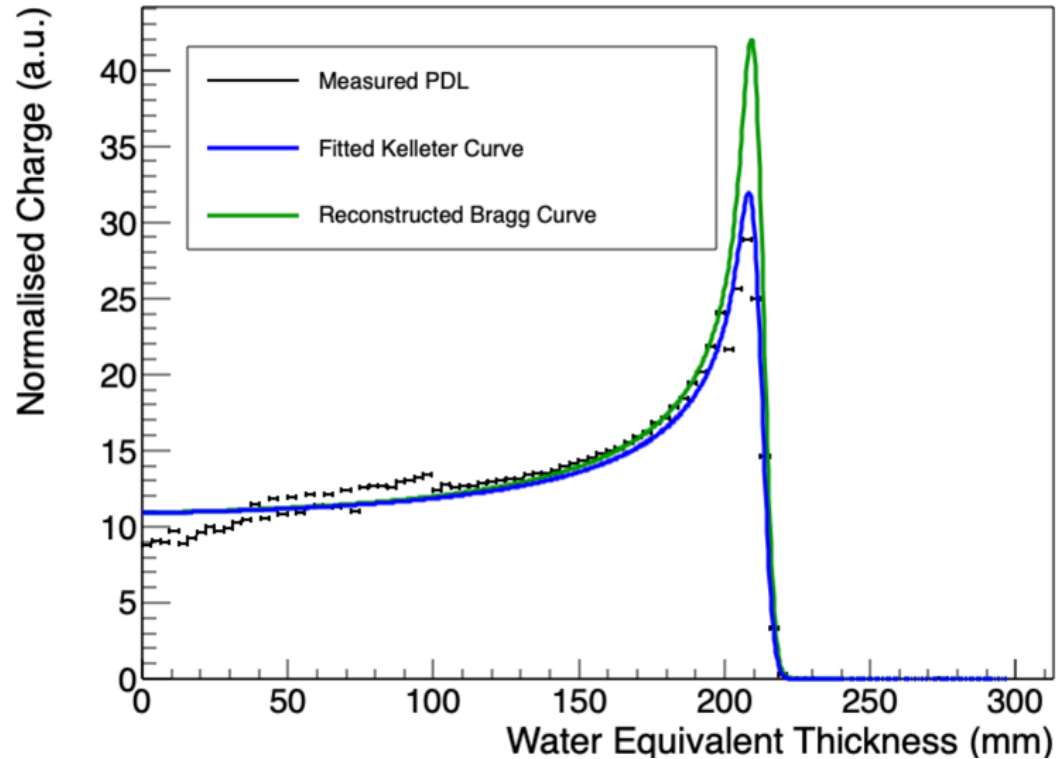
$$E_0 = 178.68 \text{ MeV}$$
$$kB = 0.10169$$

Fit over entire data set



$$E_0 = 178.18 \text{ MeV}$$
$$kB = 0.0995859$$

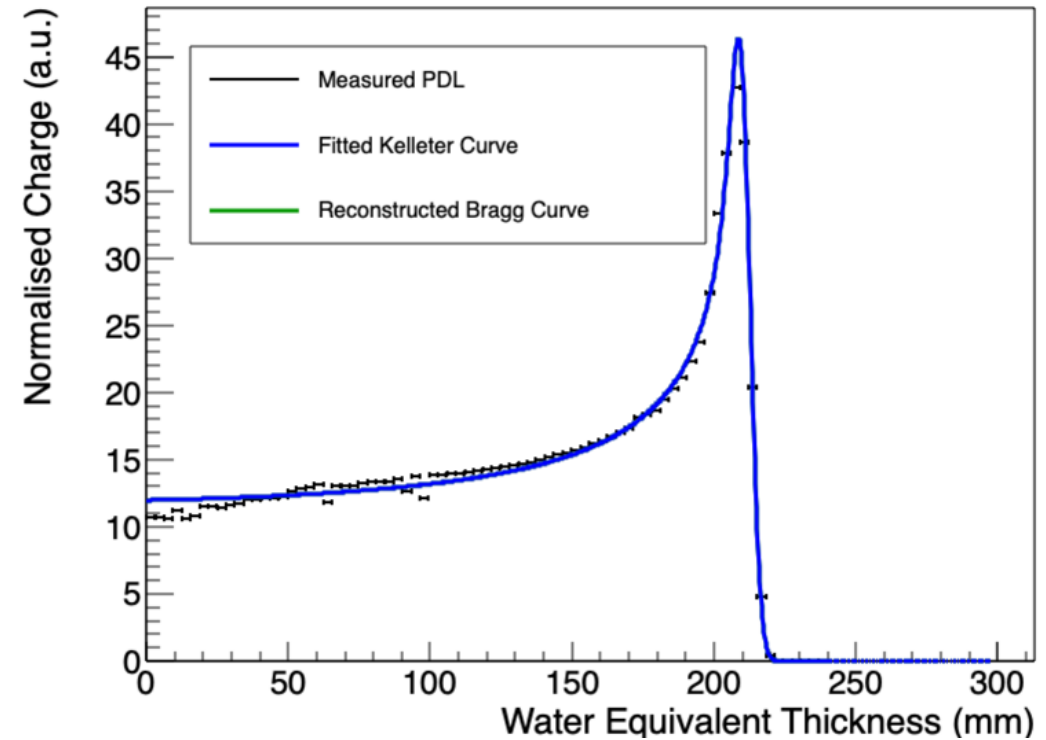
Side A



$$E_0 = 178.18 \text{ MeV}$$

$$kB = 0.0995859$$

Side B



$$E_0 = 177.9 \text{ MeV}$$

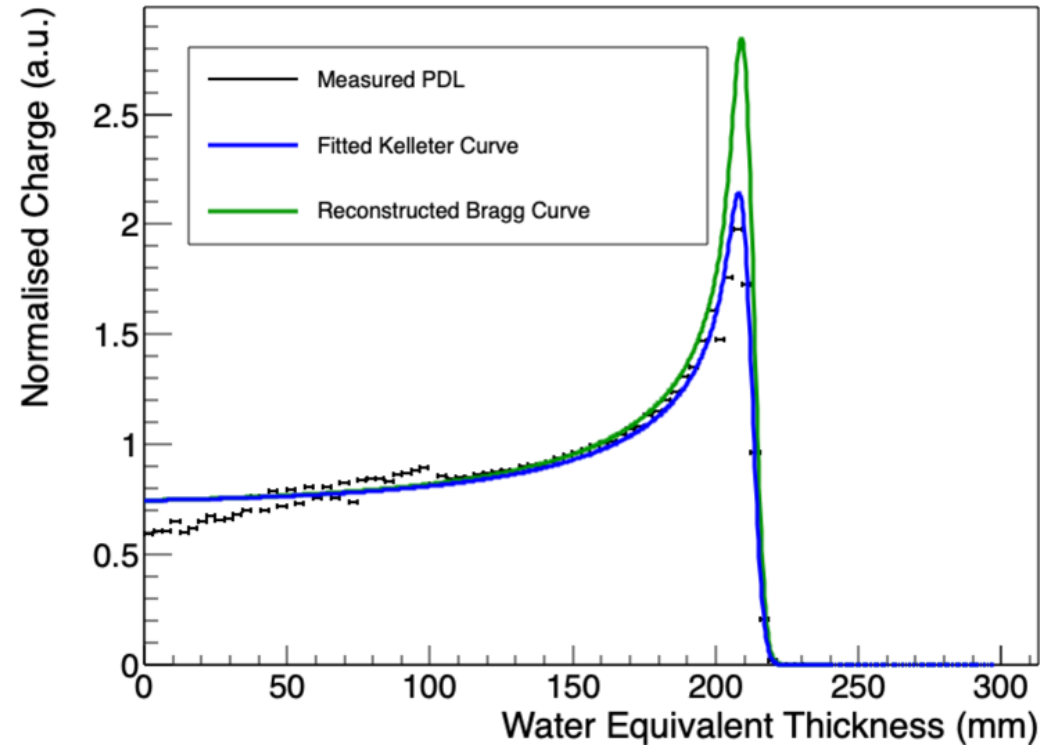
$$kB = 1.87366e-05$$



179 MeV 20 nA

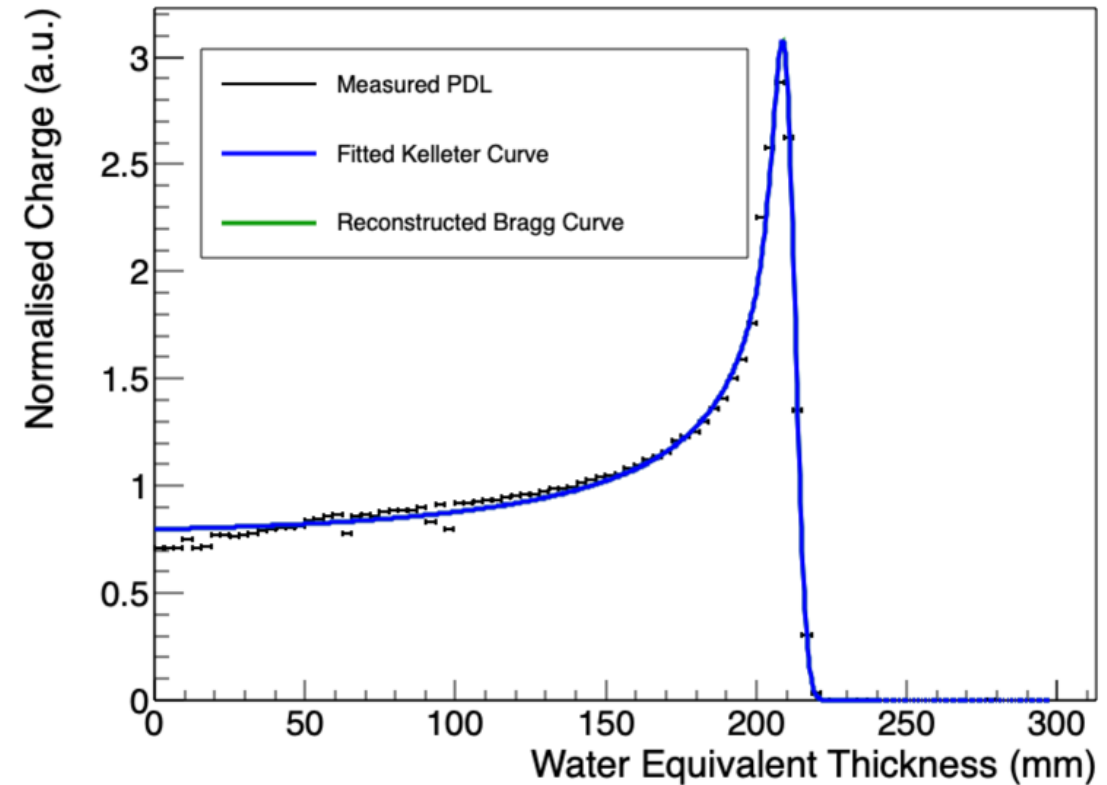


Side A



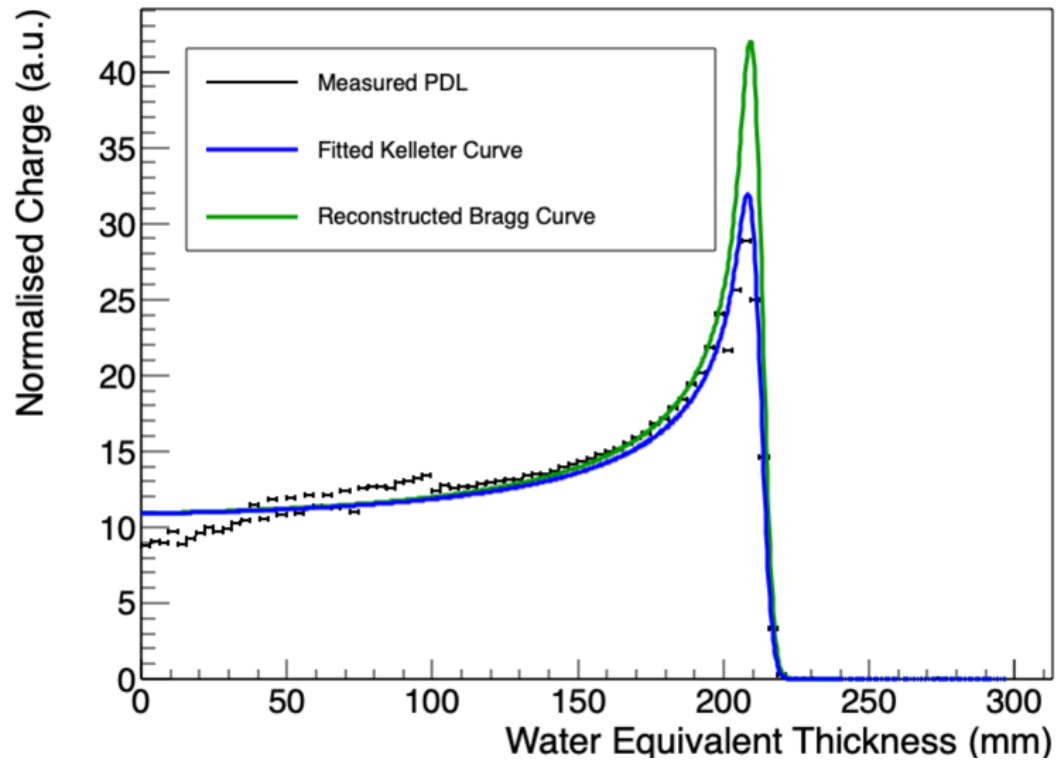
$$kB = 0.105512$$
$$\text{Sigma}_0 = 3.11298$$

Side B



$$kB = 7.32185e-06$$
$$\text{Sigma}_0 = 3.03636$$

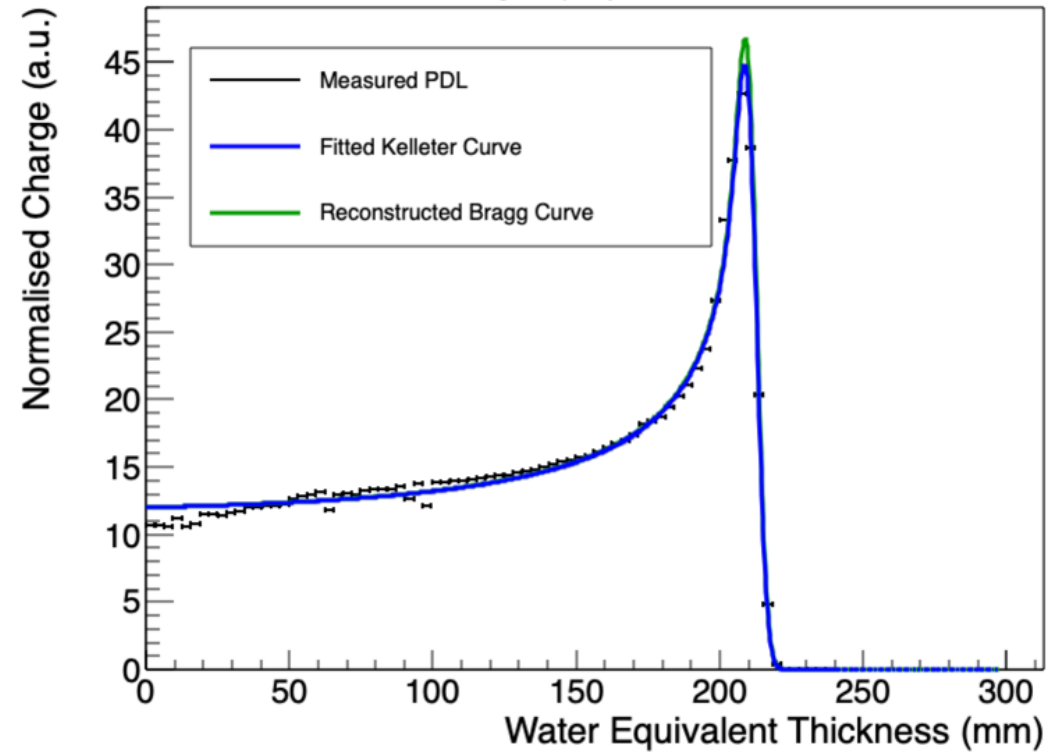
Side A



$$E_0 = 178.18 \text{ MeV}$$

$$kB = 0.0995859$$

Side B

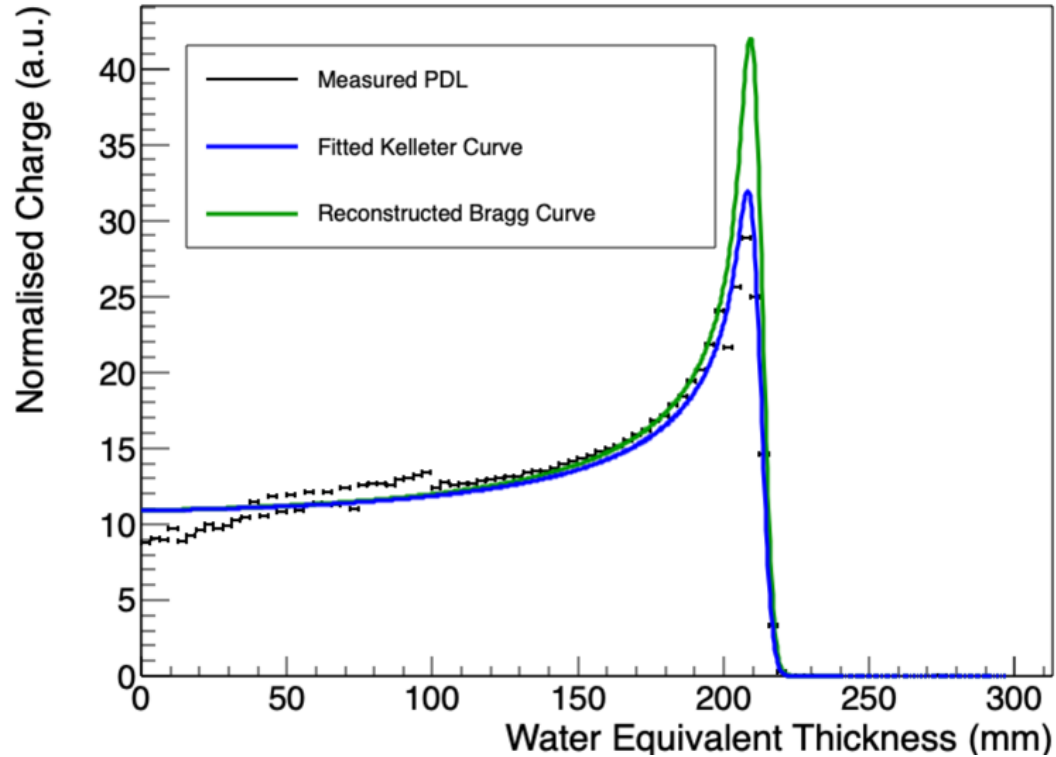


$$E_0 = 179.98 \text{ MeV}$$

$$kB = 0.01$$

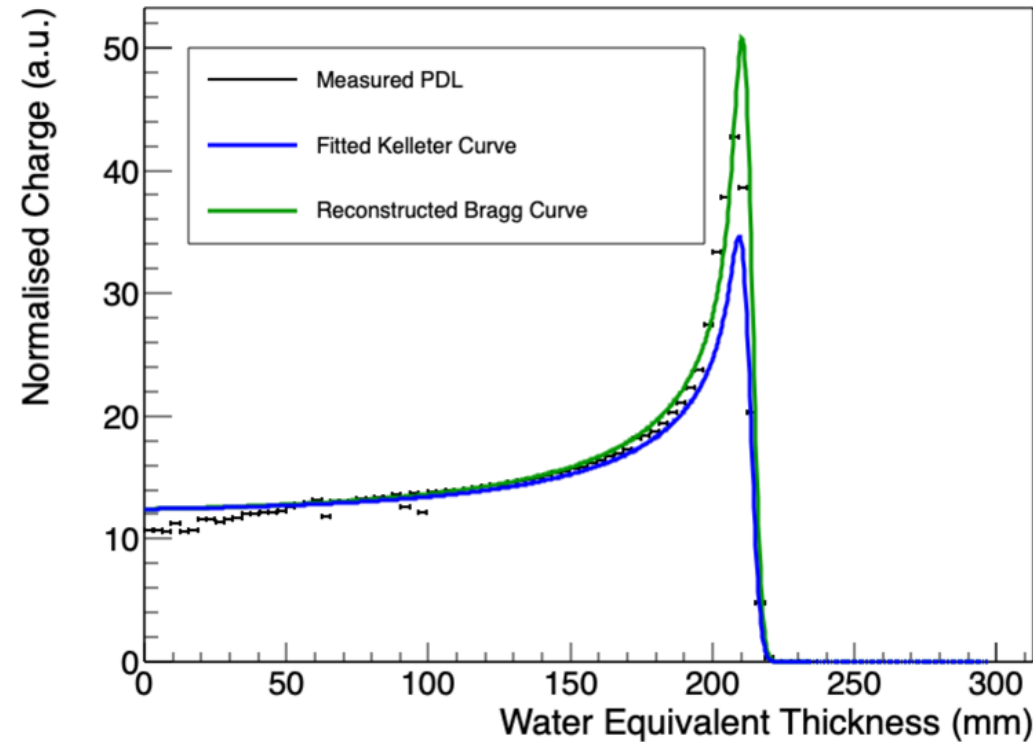
(lower limit of restricted range: 0.01 – 0.15)

Side A



$$E_0 = 178.18 \text{ MeV}$$

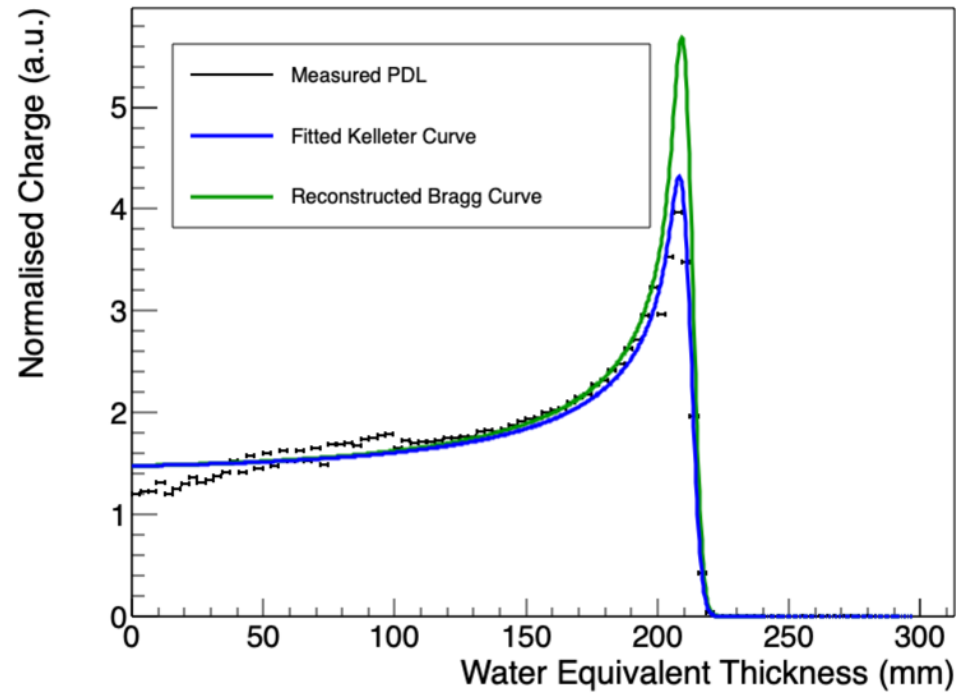
$$kB = 0.0995859$$



$$E_0 = 178.59 \text{ MeV}$$

$$kB = 0.15 \text{ (upper limit of restricted range: 0.05 – 0.15)}$$

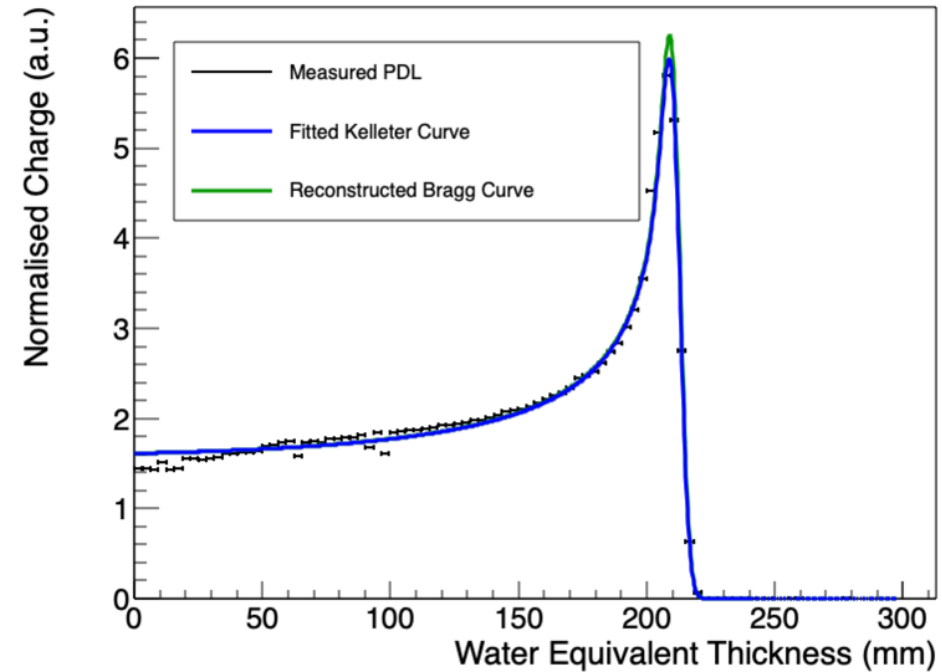
Side A



$$E_0 = 178.18 \text{ MeV}$$

$$kB = 0.10059$$

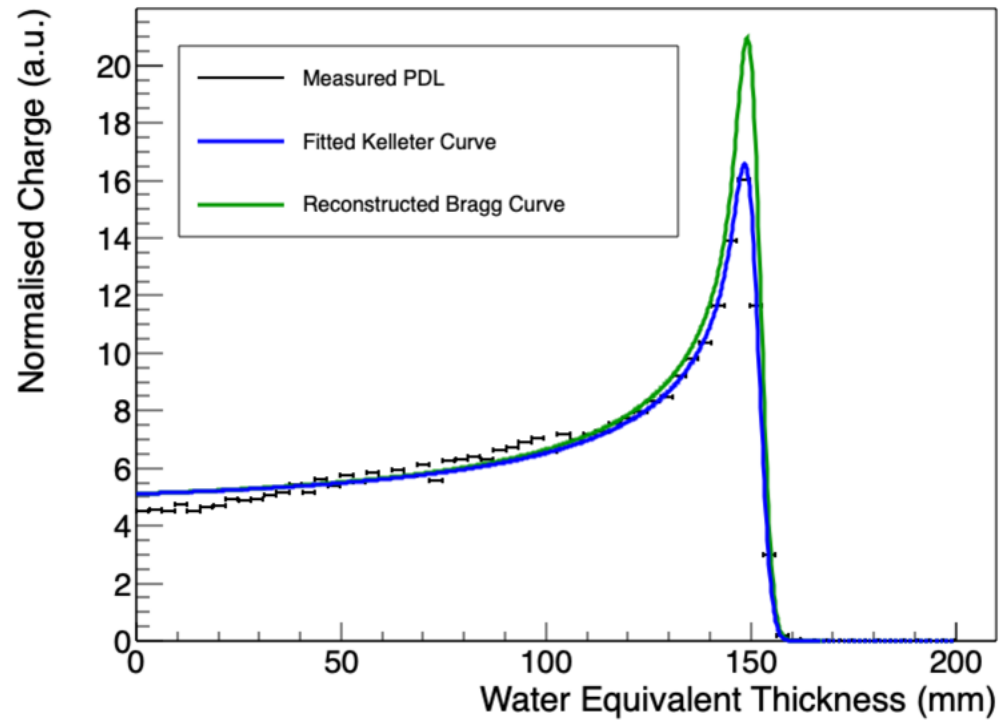
Side B



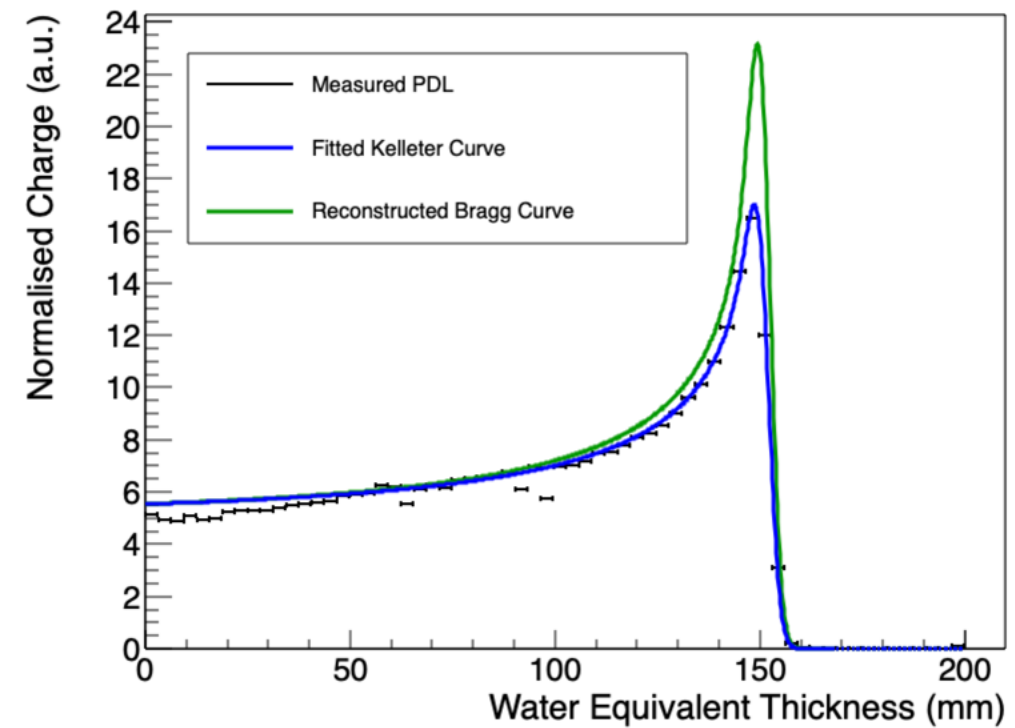
$$E_0 = 178.03 \text{ MeV}$$

$$kB = 0.01 \text{ (lower limit of range)}$$

A



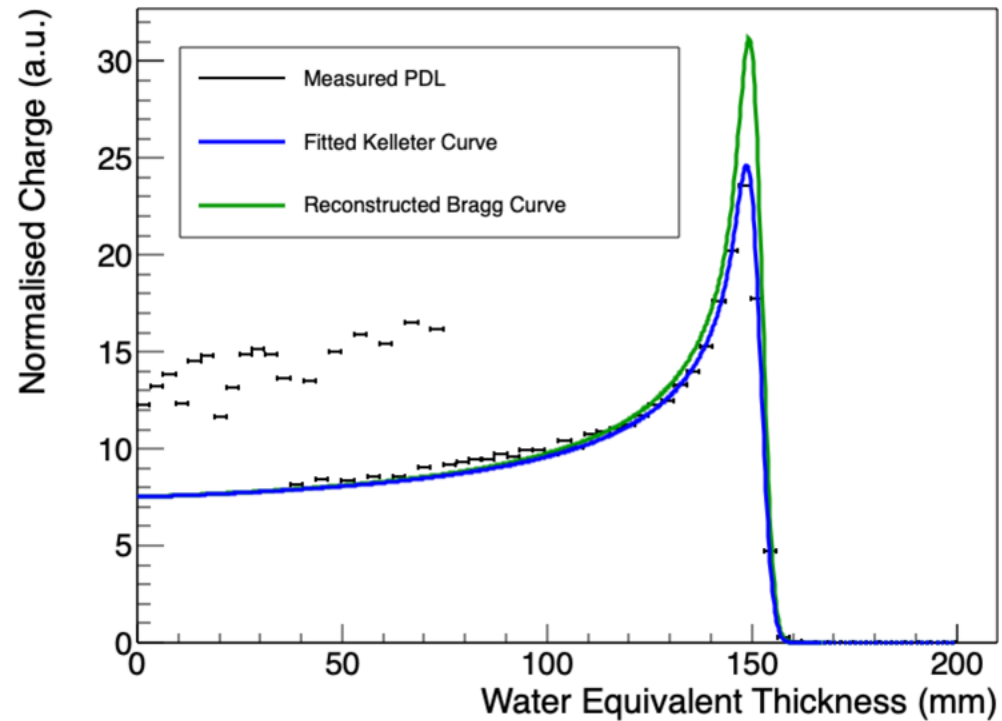
B



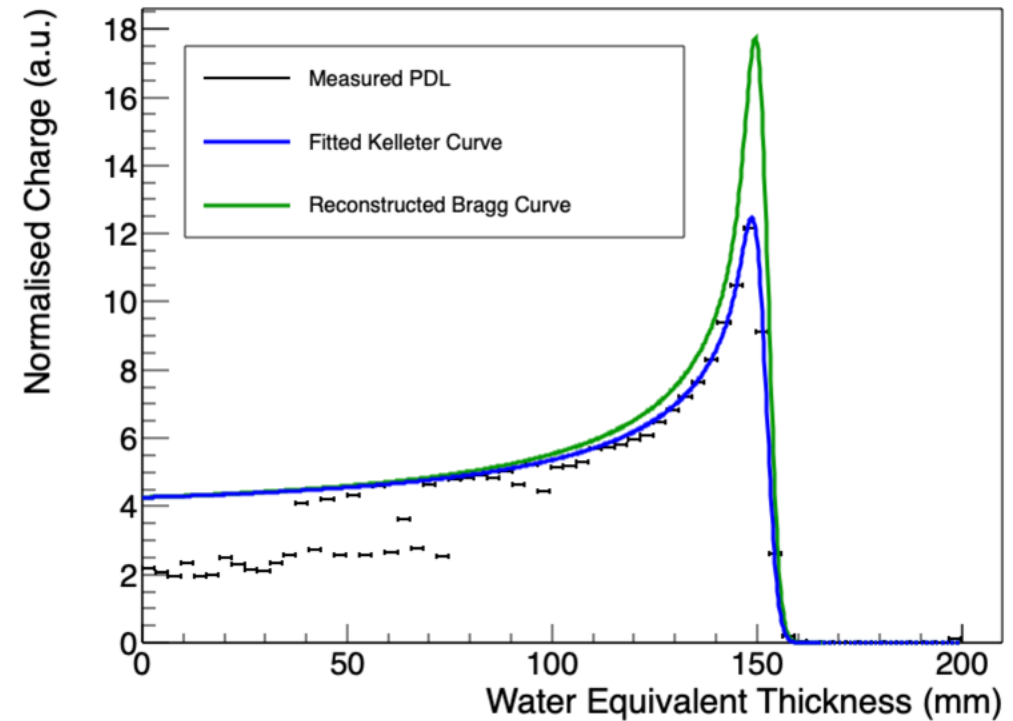


149 MeV Beam Spot 20 mm to right

A



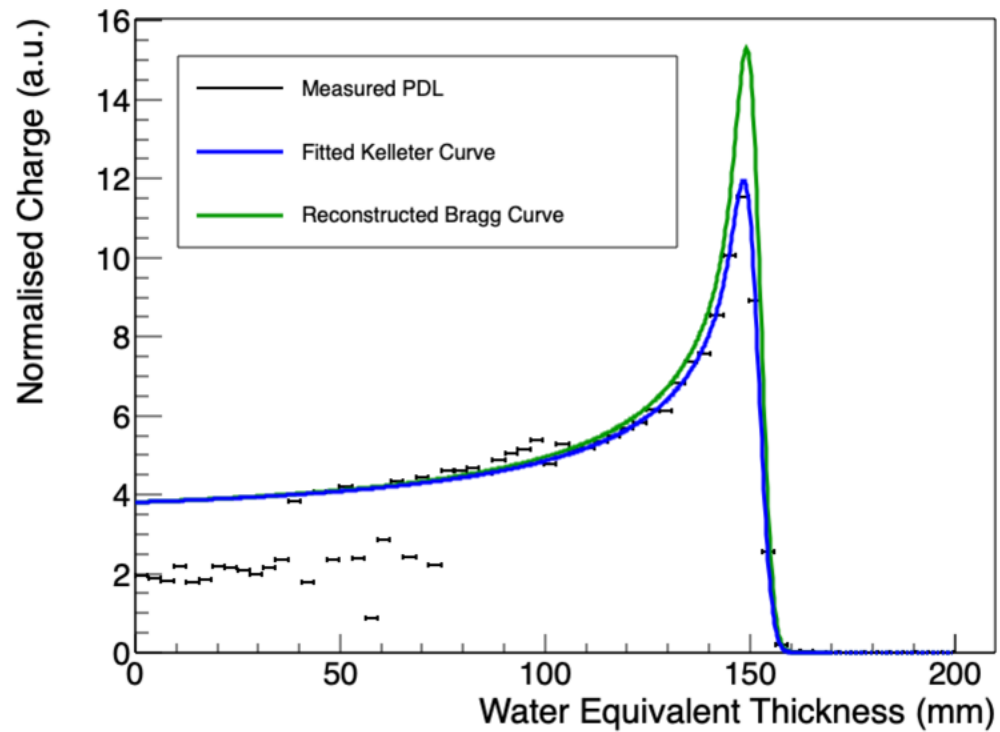
B



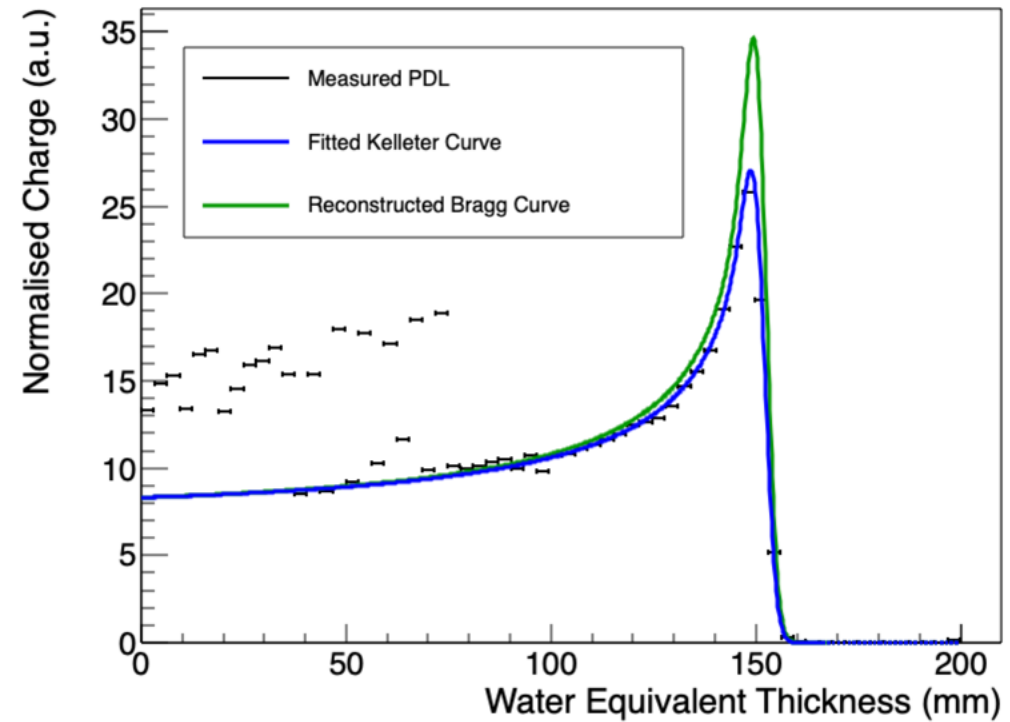


149 MeV Beam Spot 20 mm to left

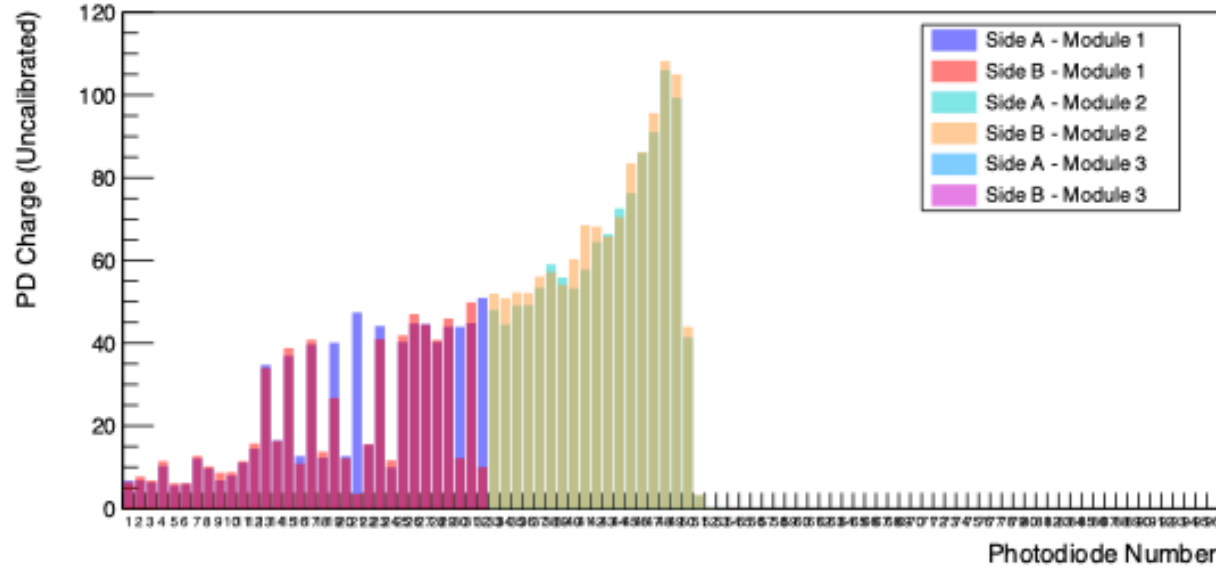
A



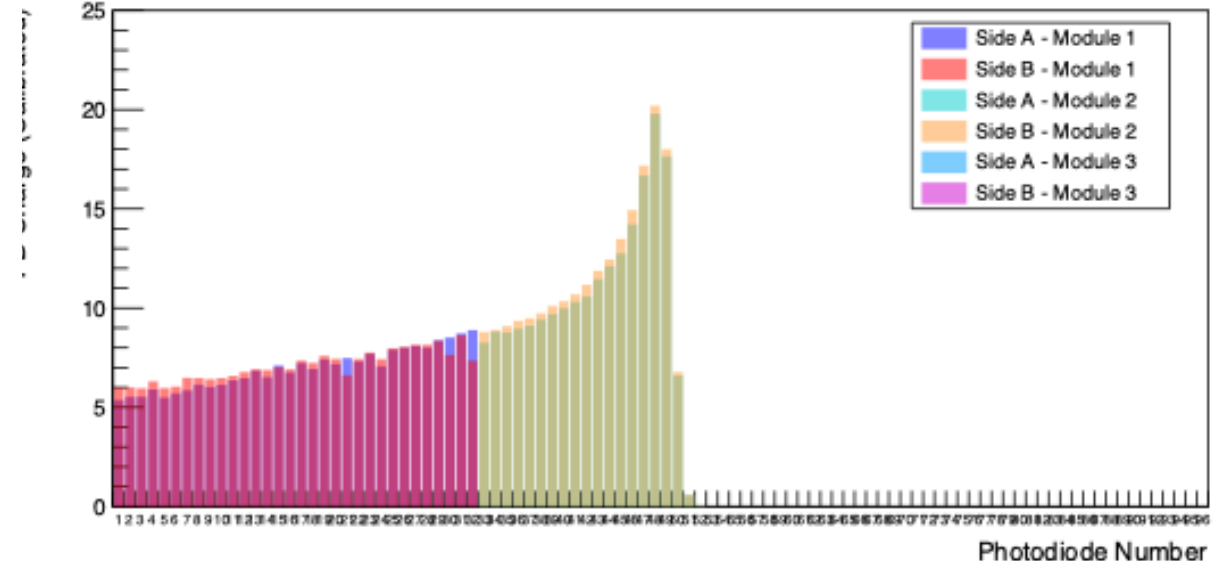
B



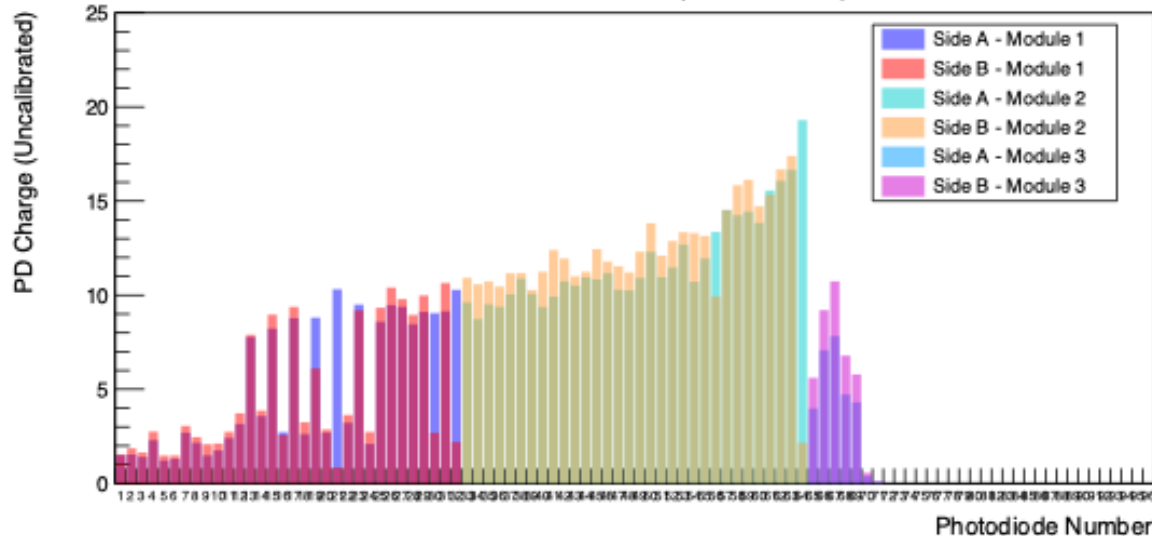
TIFPA 20250929 Run036 (Uncalibrated)



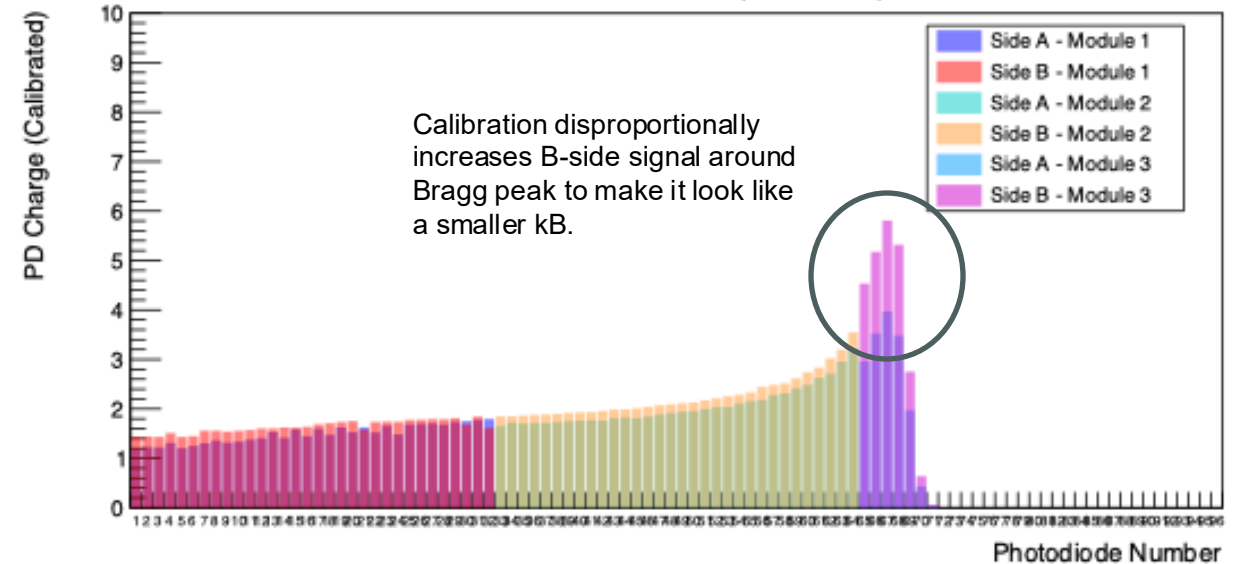
TIFPA 20250929 Run036 (Calibrated)



TIFPA 20250929 Run034 (Uncalibrated)



TIFPA 20250929 Run034 (Calibrated)

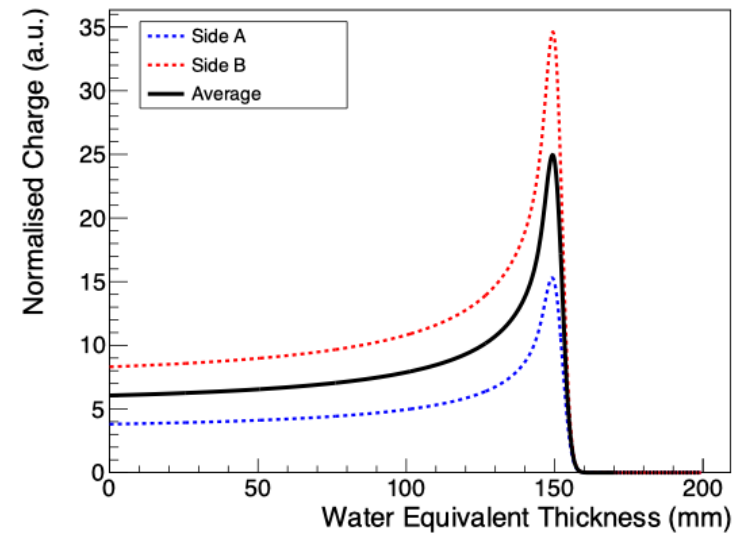




Position Scan - reconstructed 148 MeV Bragg Curves



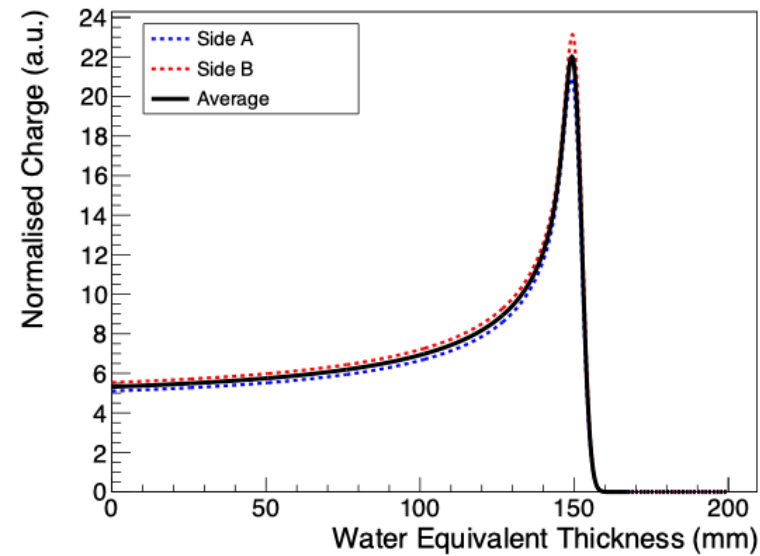
Reconstructed Bragg Curves - TIFPA 20250930 Run037



Beam 20mm to left

A: $R_0 = 151.47$ mm, $E_0 = 146.91$ MeV
B: $R_0 = 151.51$ mm, $E_0 = 146.93$ MeV
Avg: $R_0 = 151.49$ mm, $E_0 = 146.92$ MeV

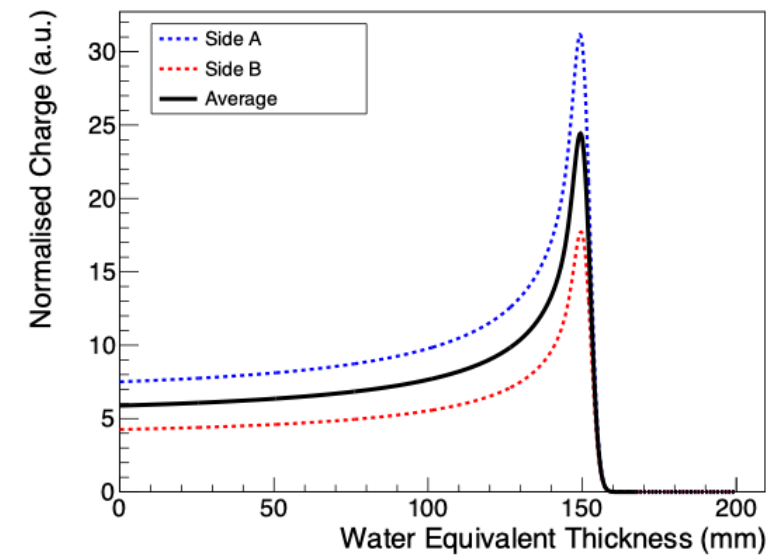
Reconstructed Bragg Curves - TIFPA 20250930 Run028



Beam in centre

A: $R_0 = 151.29$ mm, $E_0 = 146.81$ MeV
B: $R_0 = 151.51$ mm, $E_0 = 146.93$ MeV
Avg: $R_0 = 151.4$ mm, $E_0 = 146.87$ MeV

Reconstructed Bragg Curves - TIFPA 20250930 Run032



Beam 20mm to right

A: $R_0 = 151.46$ mm, $E_0 = 146.9$ MeV
B: $R_0 = 151.73$ mm, $E_0 = 147.05$ MeV
Avg: $R_0 = 151.595$ mm, $E_0 = 146.975$ MeV

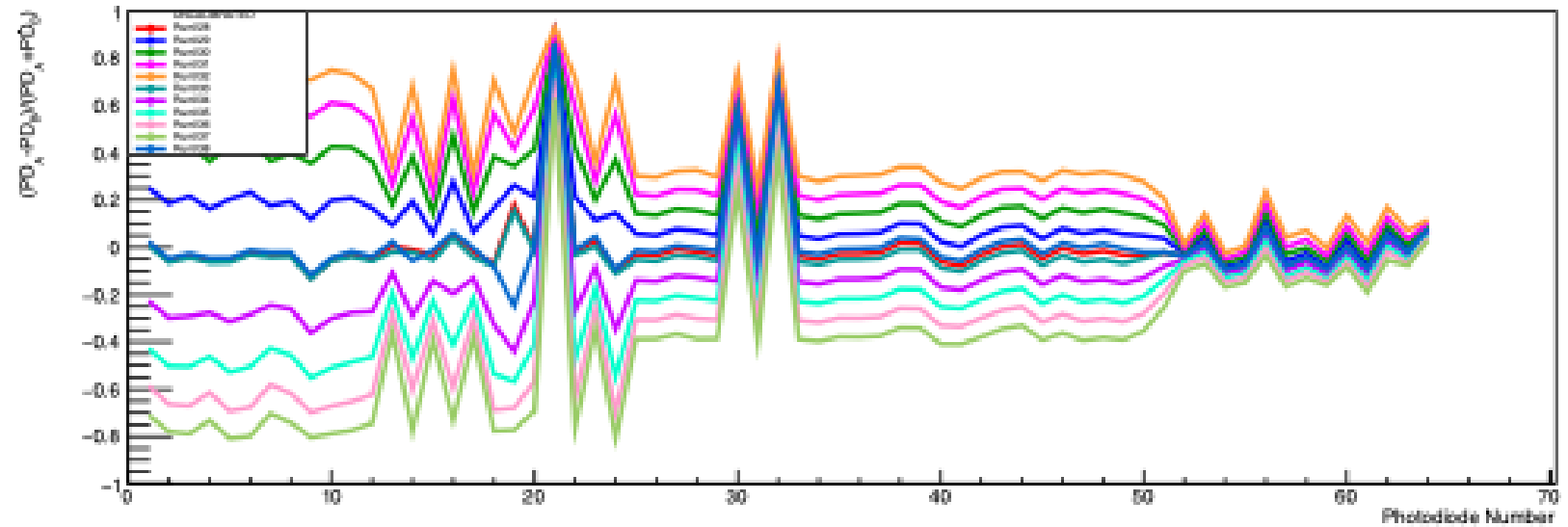


QuARC Δ/Σ Measurements

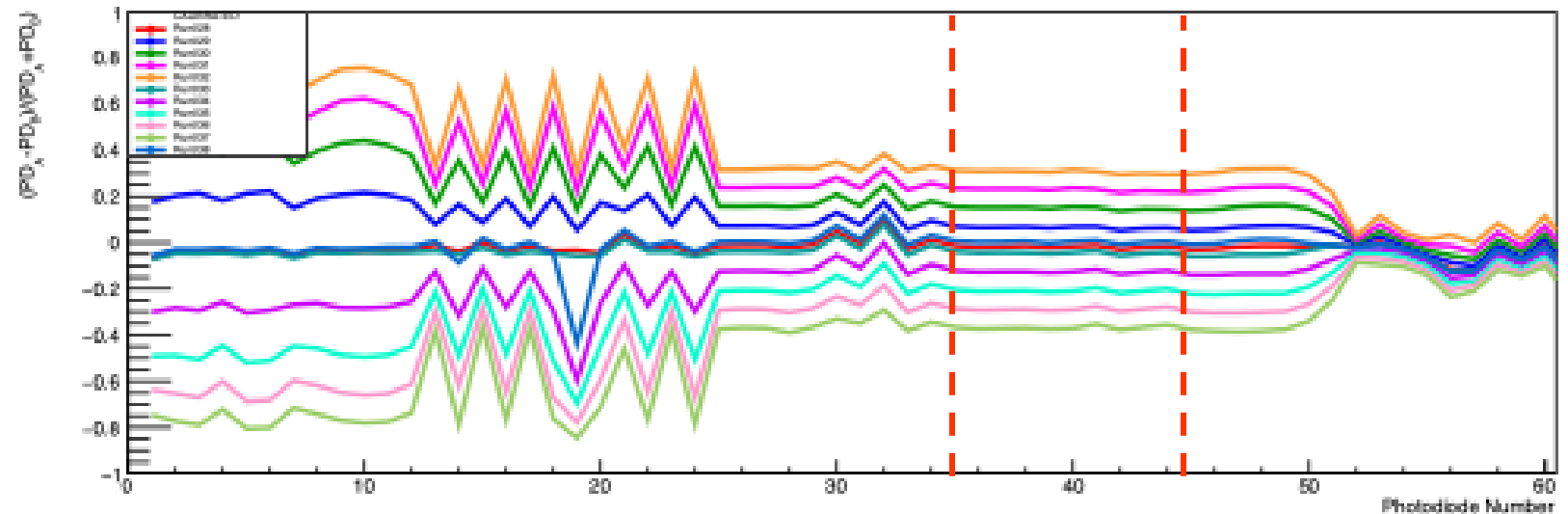


$$\text{shift}[i] = \frac{PD_A[i] - PD_B[i]}{PD_A[i] + PD_B[i]}$$

Uncalibrated

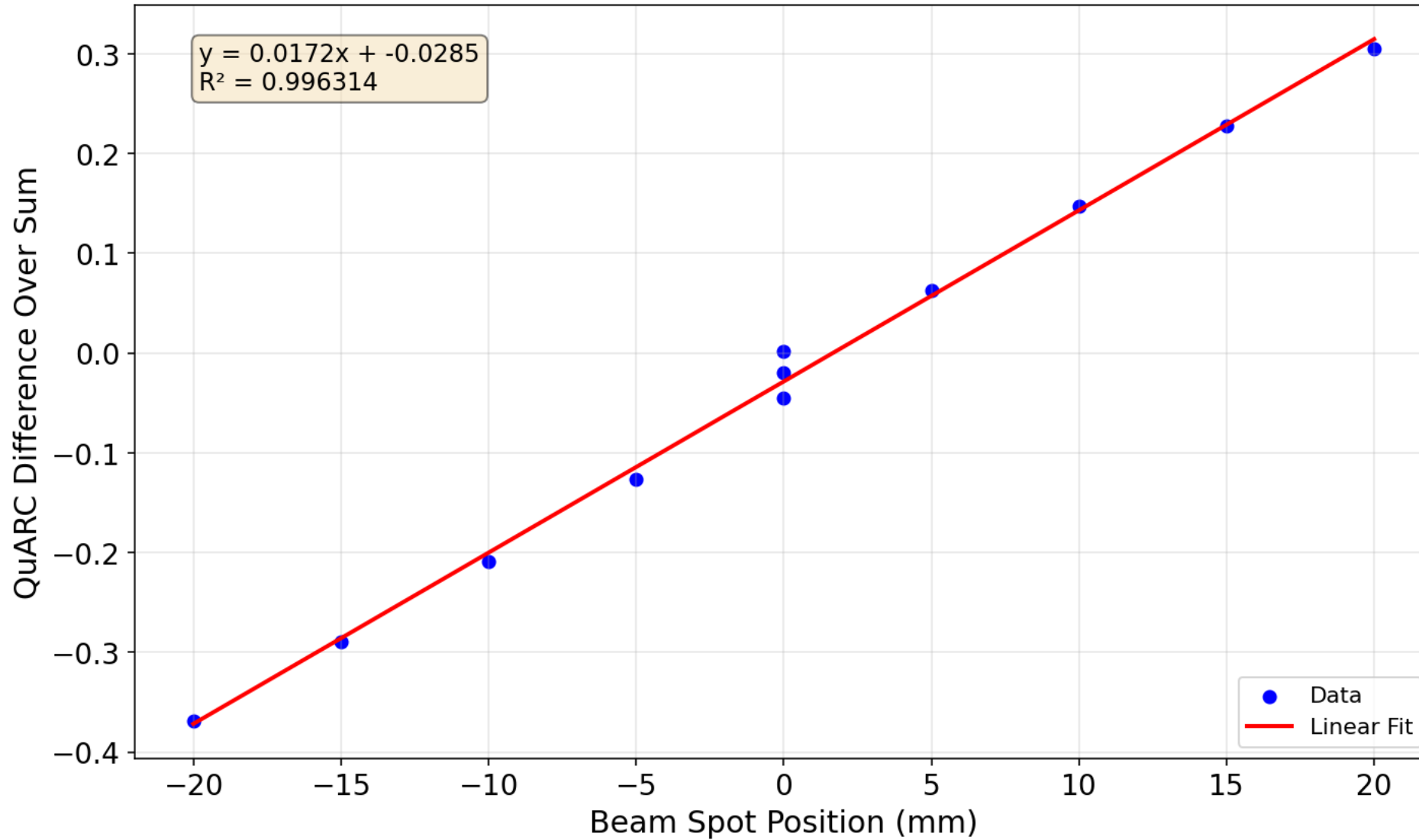


Calibrated





QuARC Δ/Σ Measurements



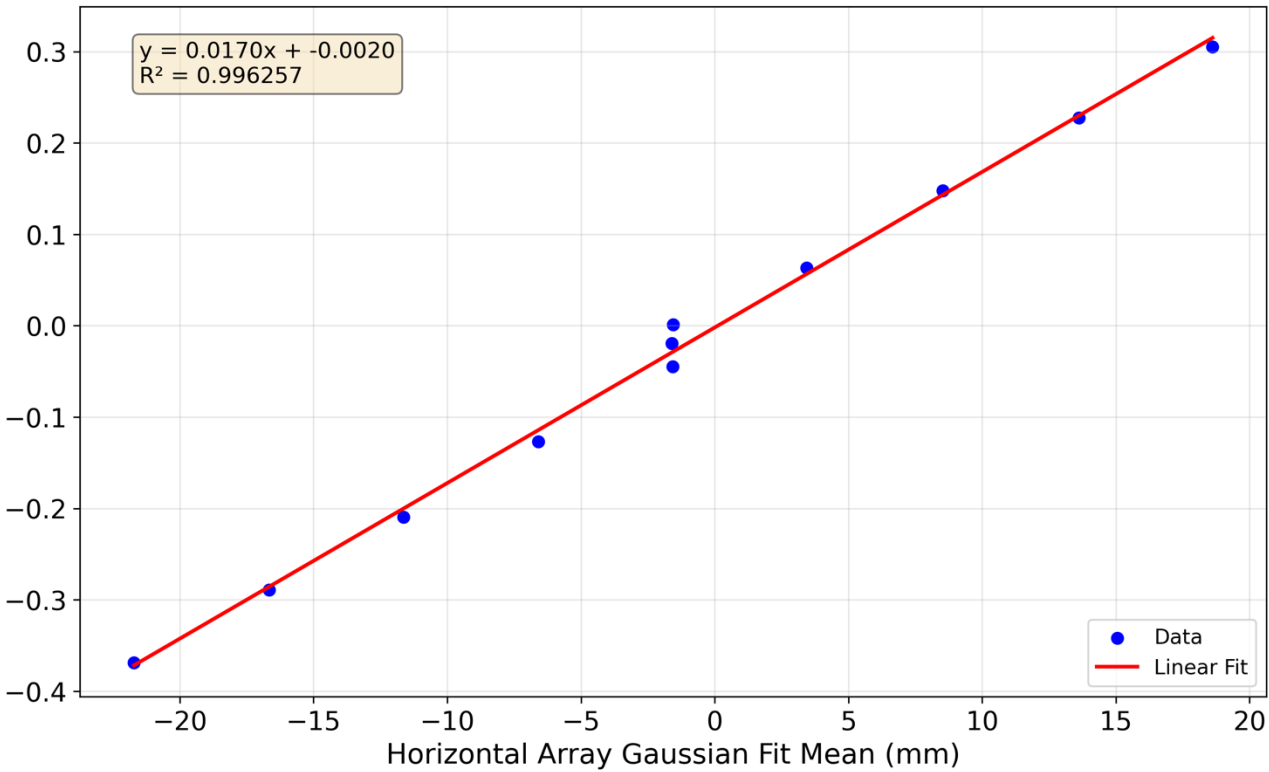


QuARC and Fibre Correlation

25

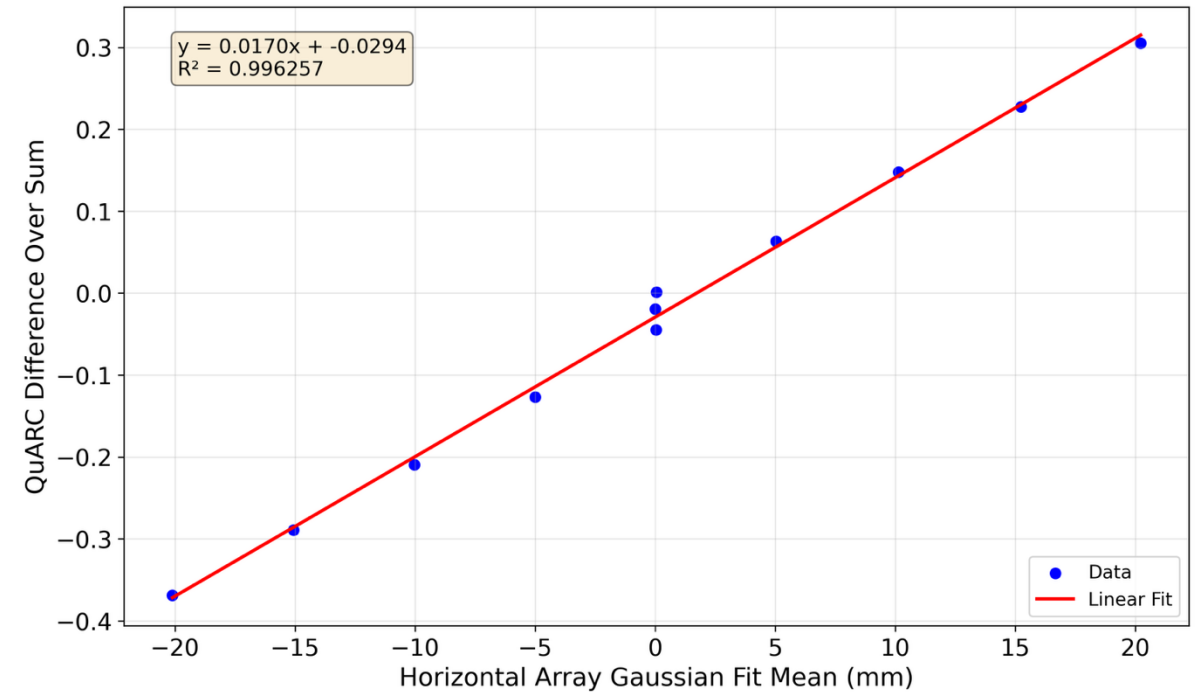


Uncentred



Centred

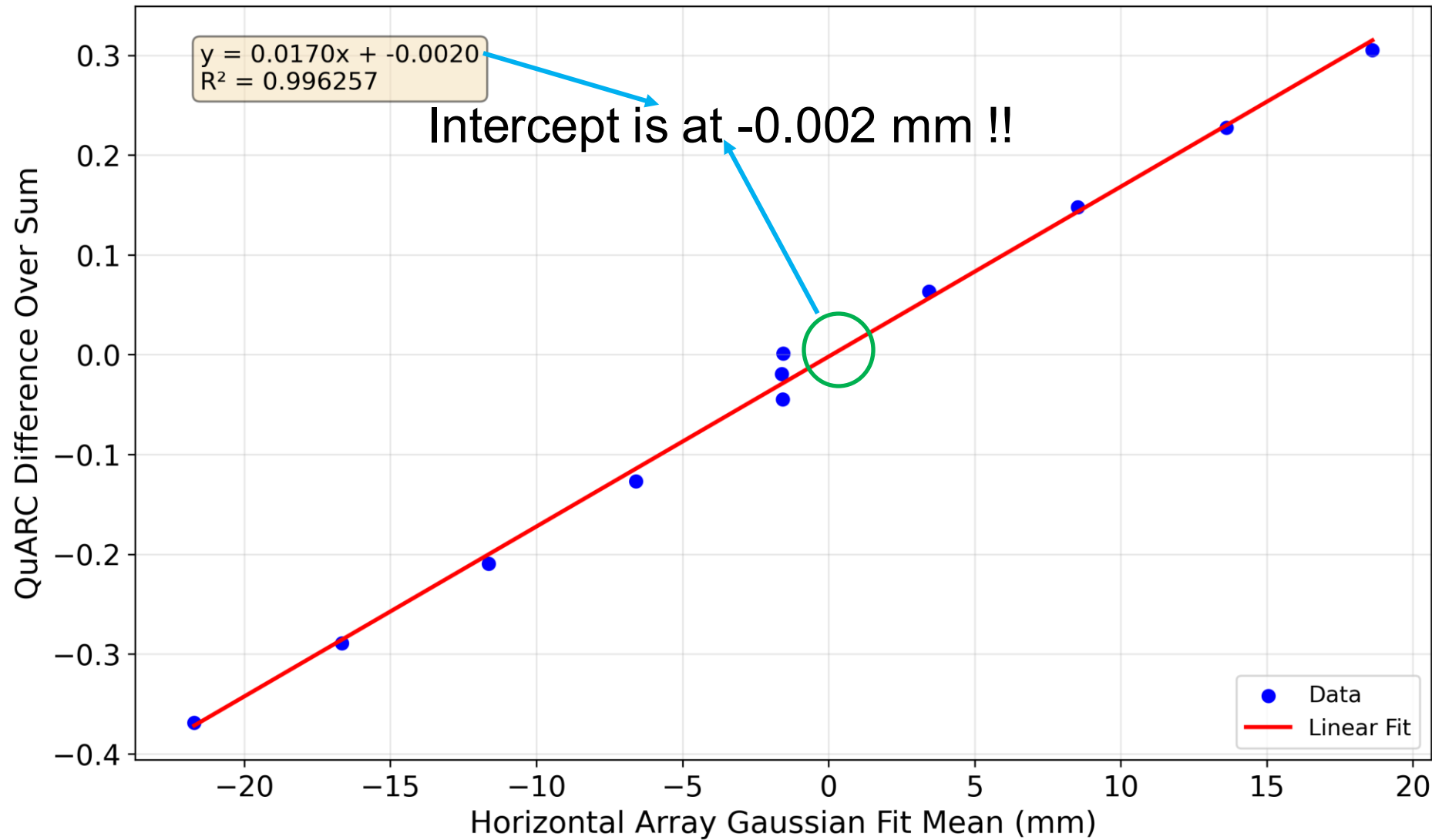
(fibre mean shifted by 1.60 mm)





QuARC and Fibre Correlation

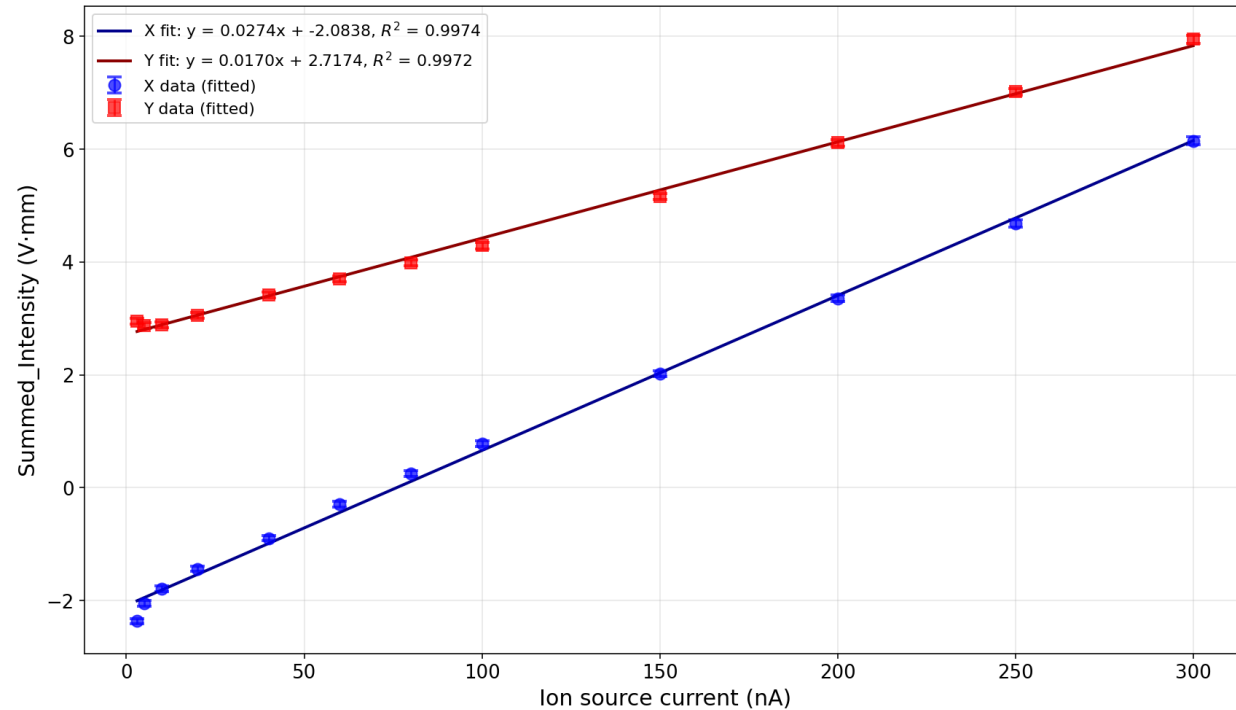
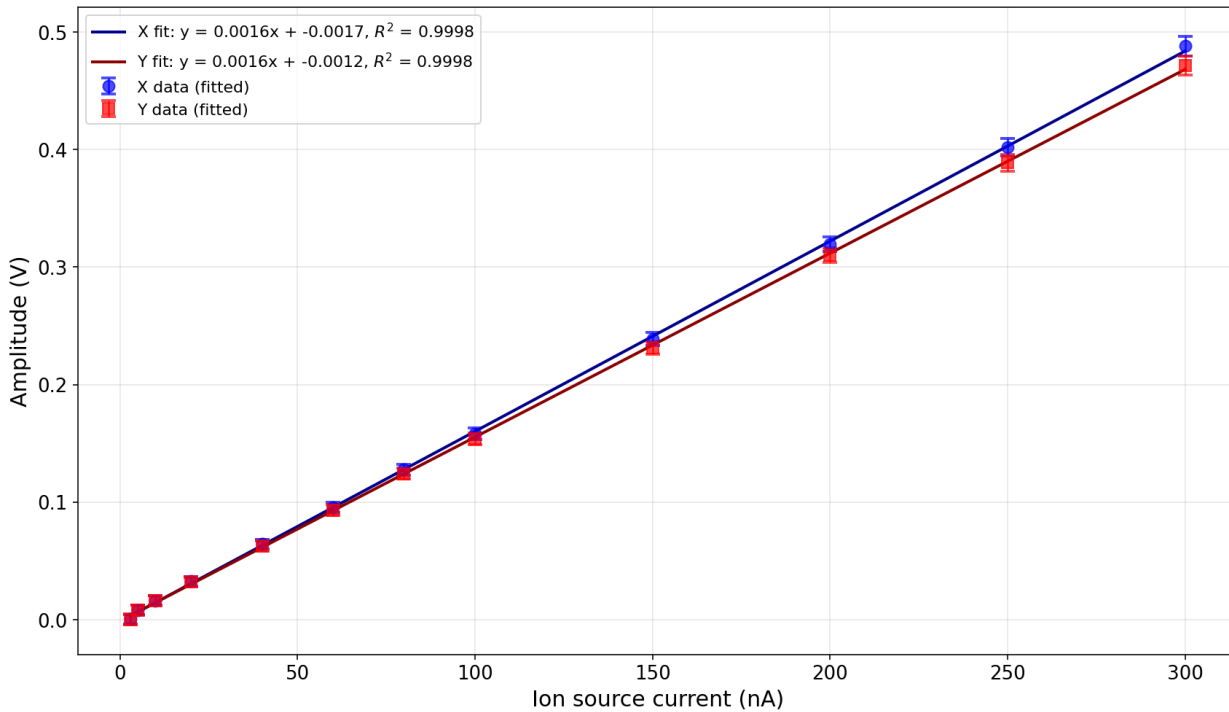
Uncentred





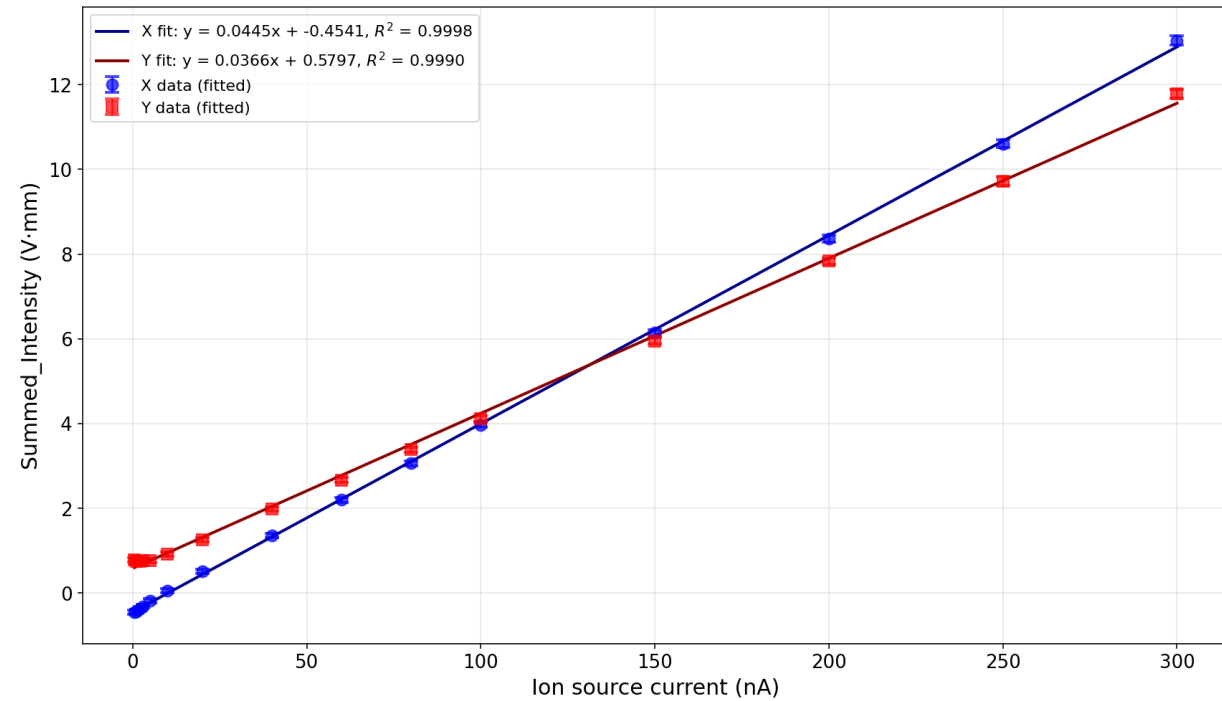
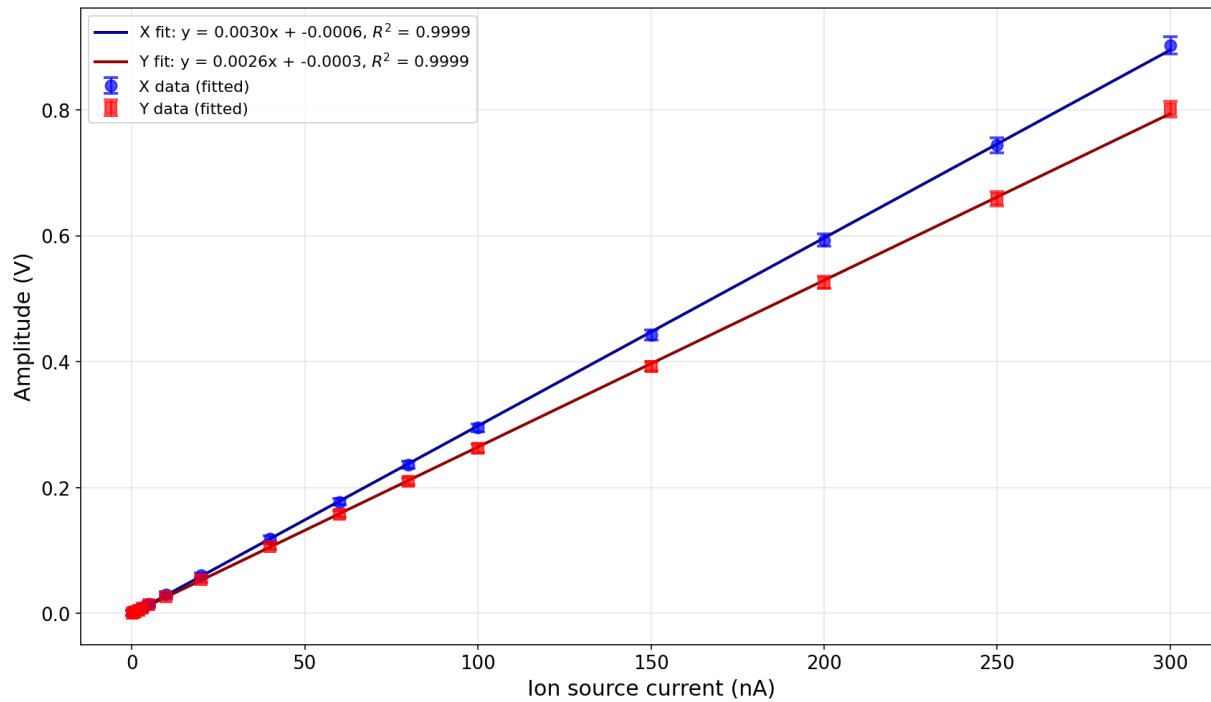
Fibre Linearity – 148 MeV Low Gain

27



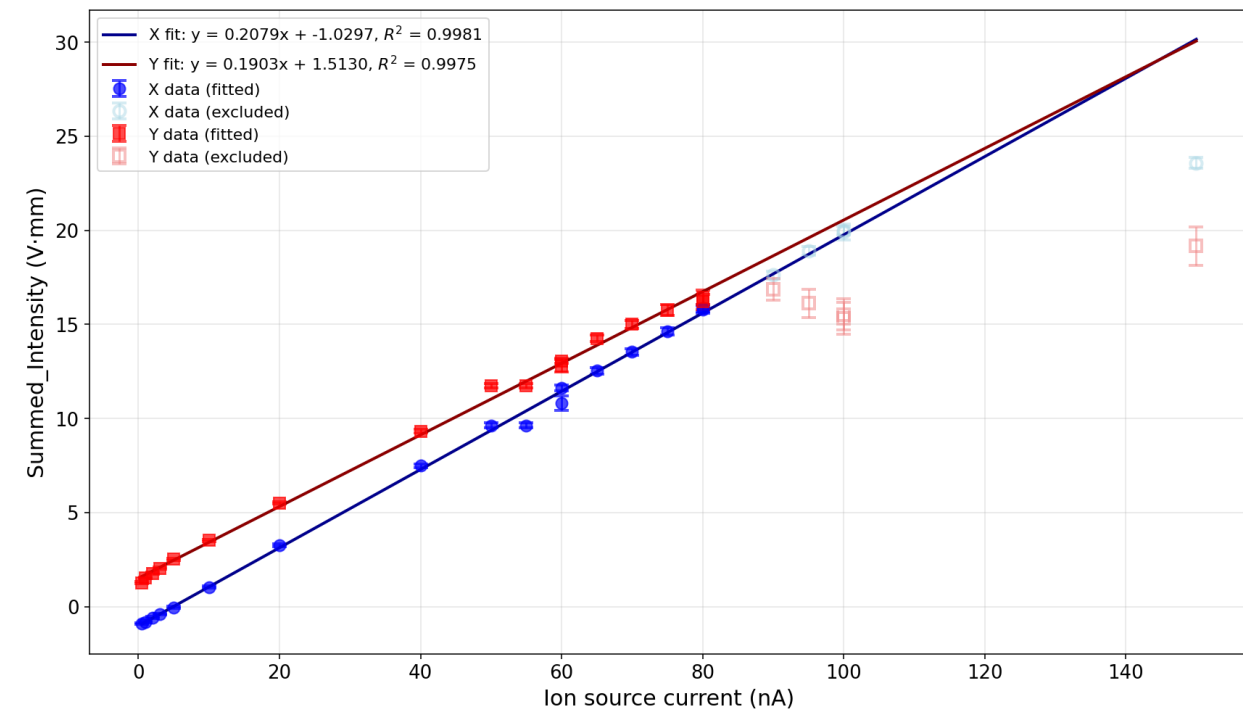
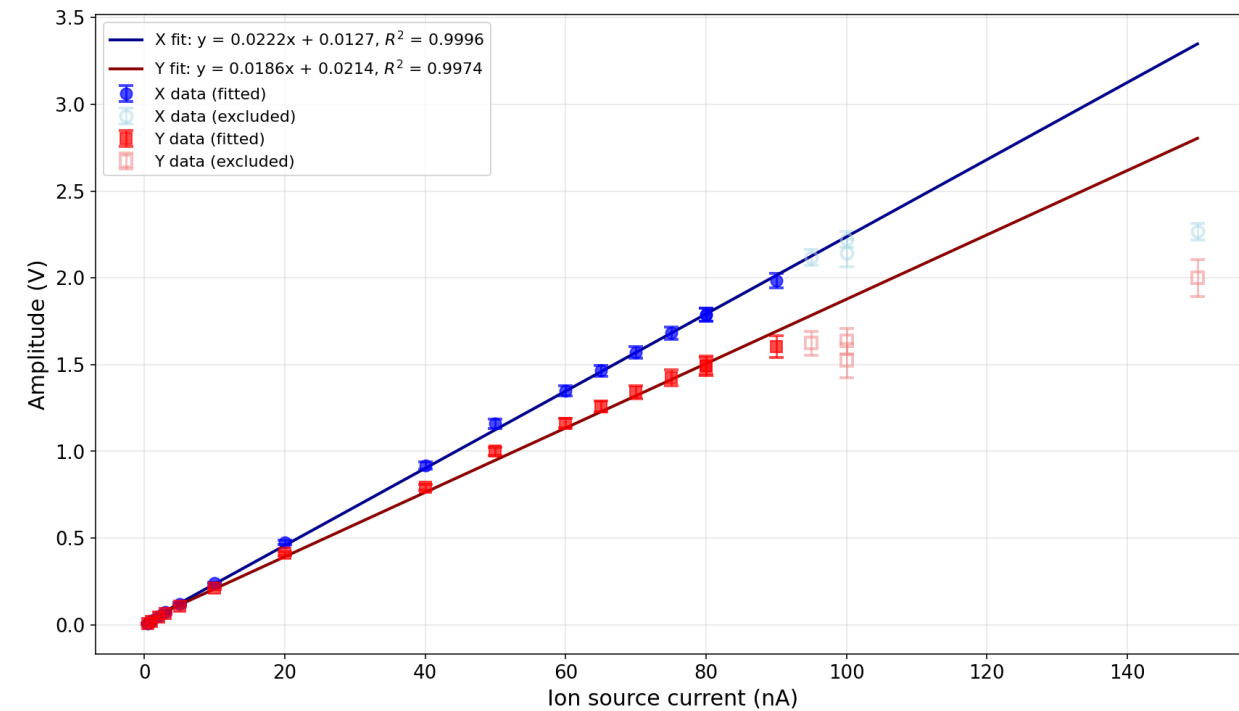


Fibre Linearity – 148 MeV High Gain





Fibre Linearity – 228 MeV High Gain





30/10 Run007 (300 nA 149 MeV)

30

