



# 11B Analysis with S455 Setup

Tobias Jenegger

R3B Collaboration  
Meeting  
30. Nov. 2020

Setup and Detectors

Particle Identification

$^{12}\text{C}(p,2p)^{11}\text{B}$  reaction

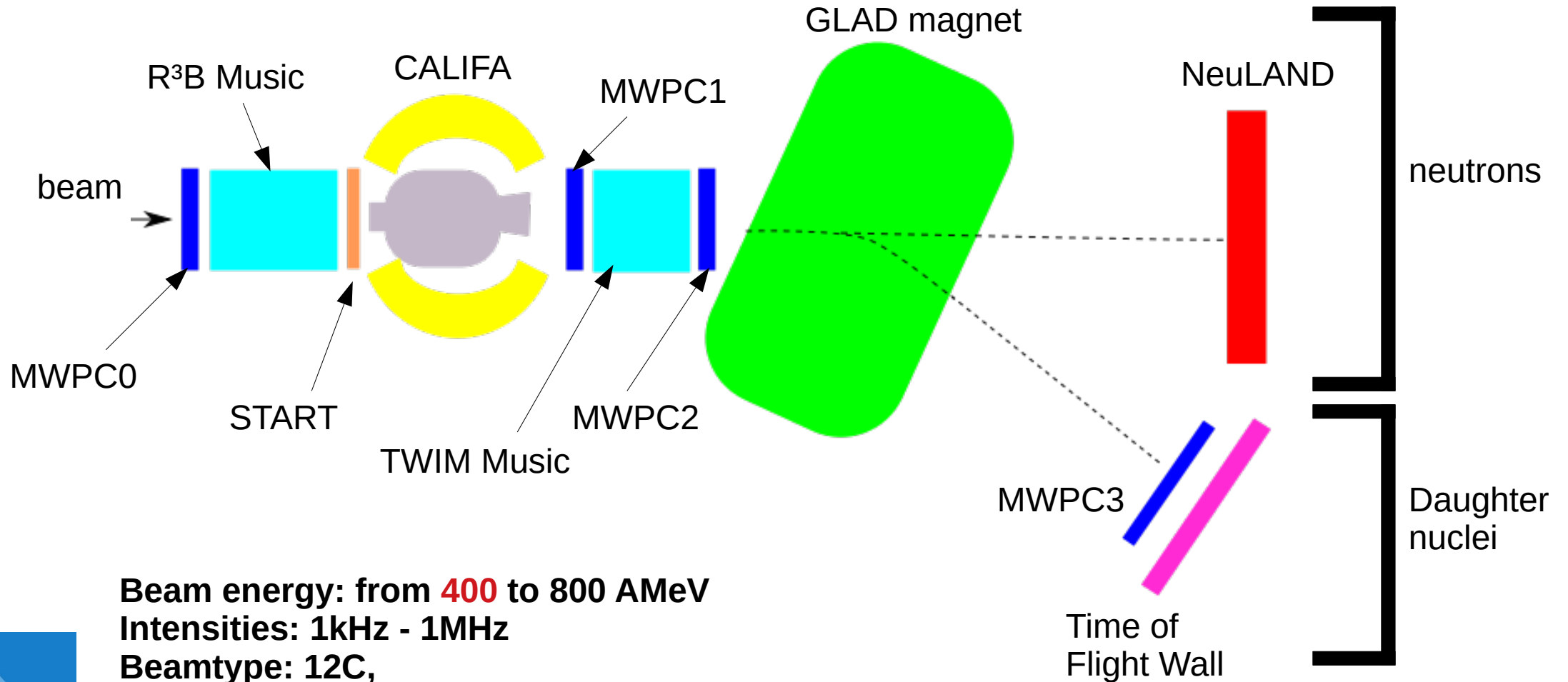
Summary & Outlook

Supported by BMBF 05P15WOFNA and 05P19WOFN1.

The results presented here are based on the experiment s444/s473, which was performed at the beam line/infrastructure Cave C at the GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt (Germany) in the frame of FAIR Phase-0.



# The S455 Setup (February 2020)



Beam energy: from **400** to 800 AMeV  
Intensities: 1kHz - 1MHz  
Beamtype: 12C,  
Target: C, **CH2**

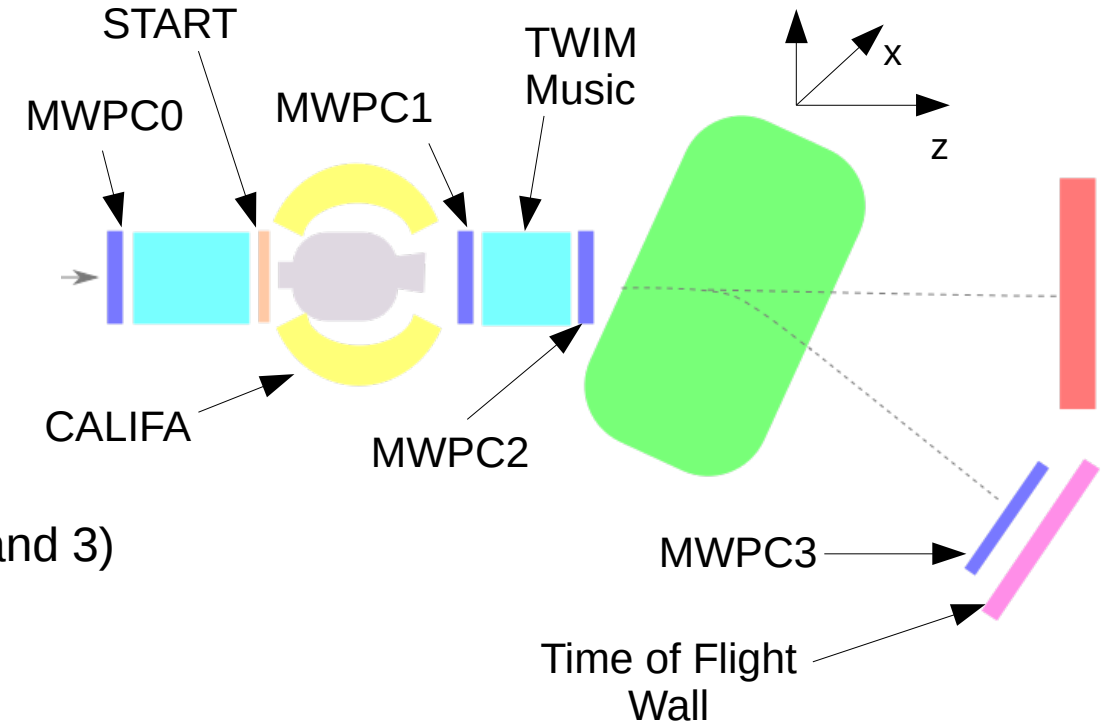


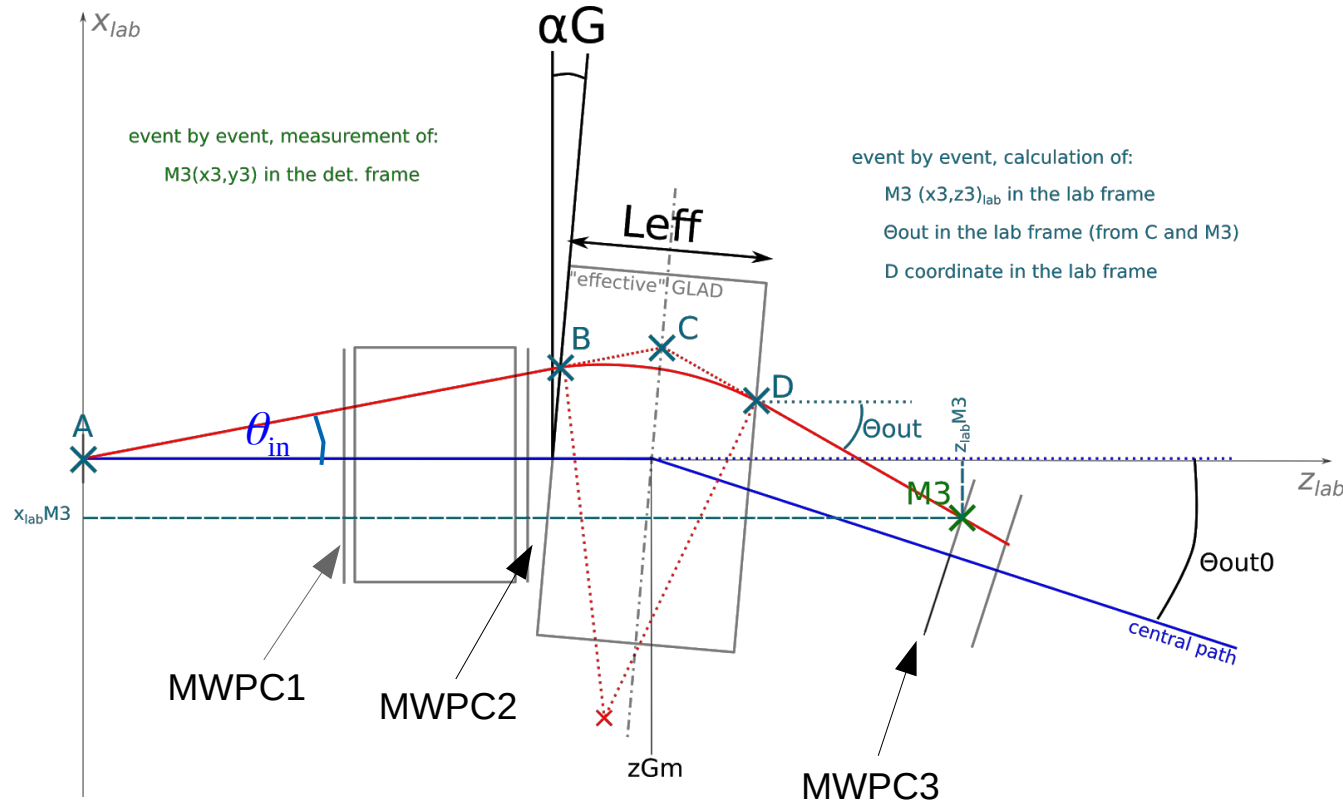
$$B\rho = \frac{\beta \gamma M}{q}$$

Time of Flight Measurement: Start to TOFW

Flight-path Reconstruction: Tracking Detectors (MWPC1, 2 and 3)

Charge Measurement : TWIM Music





Radius Reconstruction:

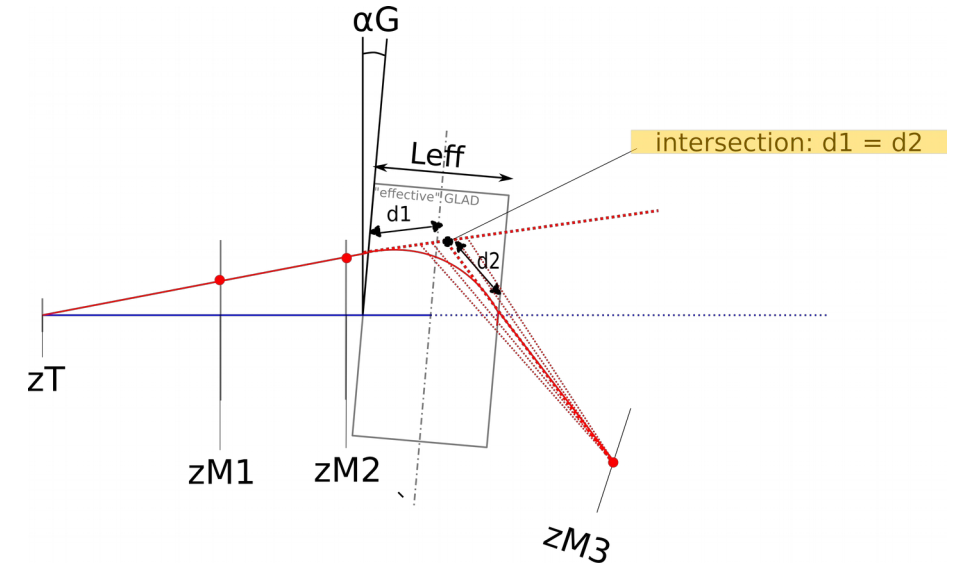
$$R = \frac{L_{eff}}{2 \sin\left(\frac{\theta_{in} + \theta_{out}}{2}\right)}$$

Known:

- position and inflight angle ( $\theta_{in}$ ) before GLAD
- position after GLAD (MWPC3)

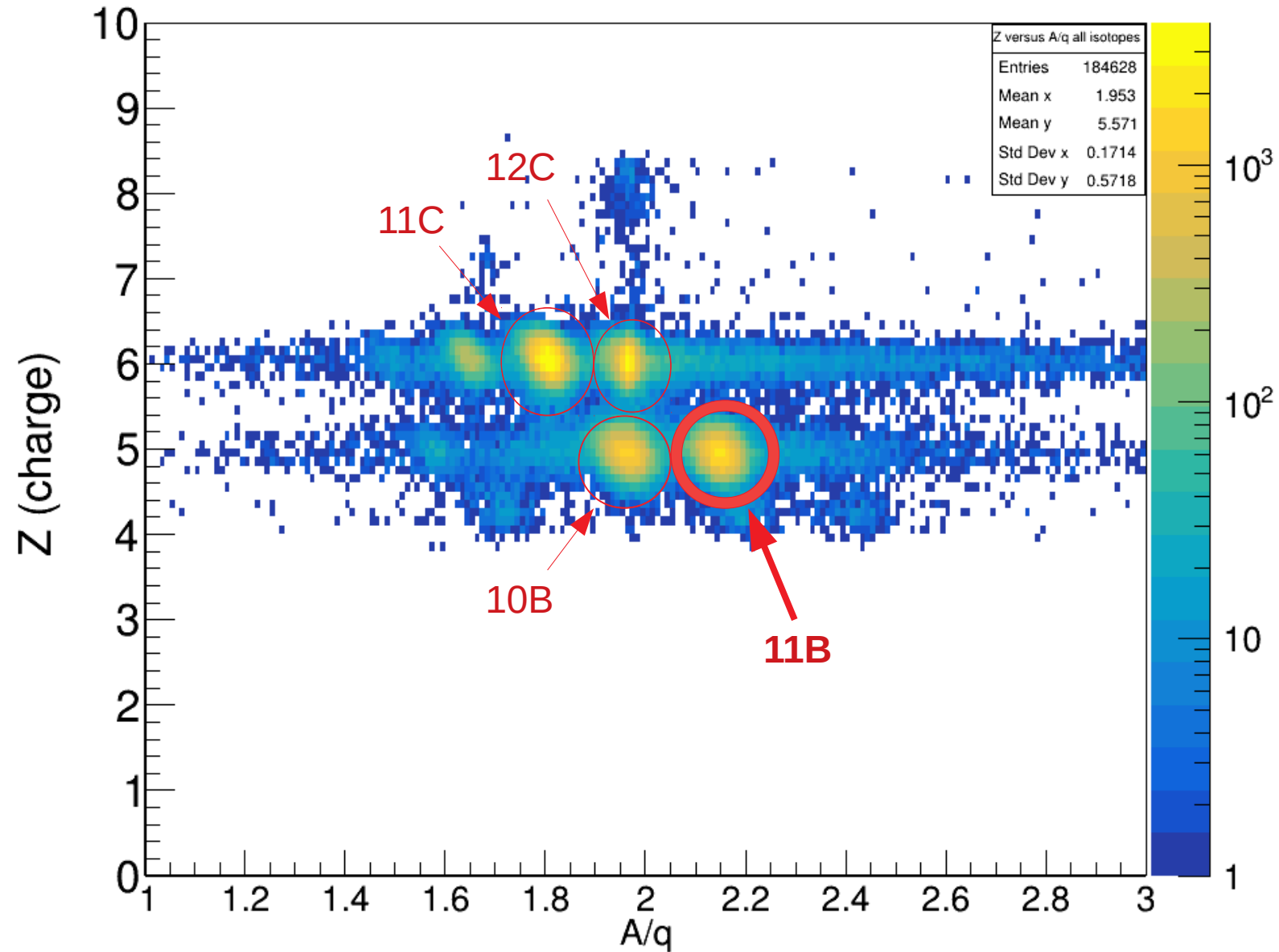


compute  $\cos(\theta_{out})$  iteratively:



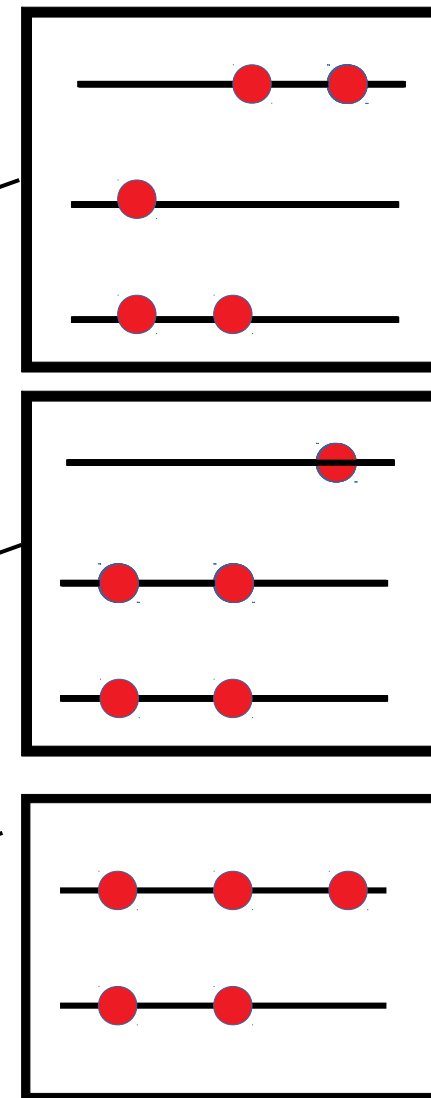
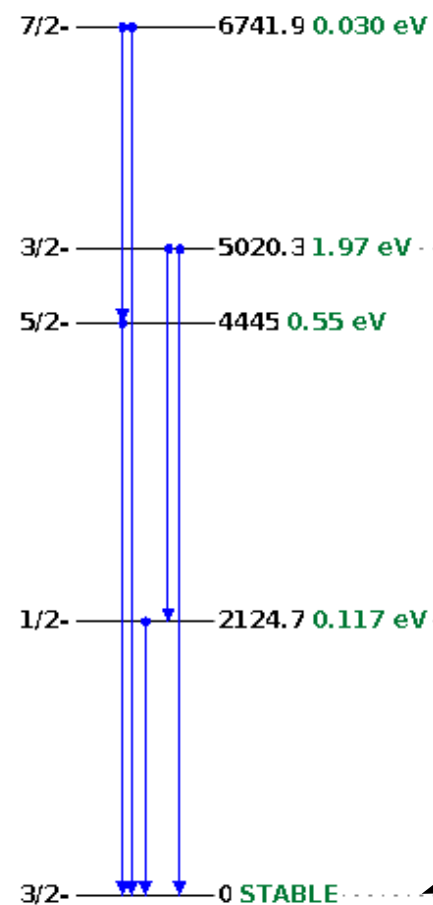
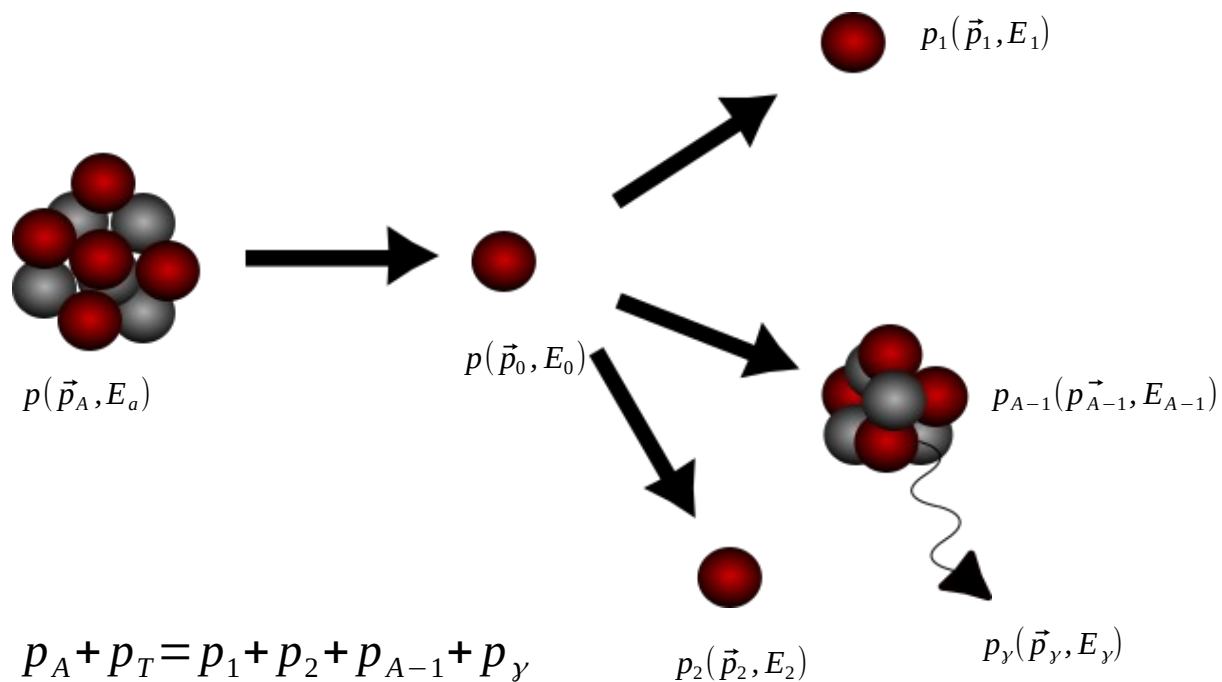


# Charge versus $A/q$



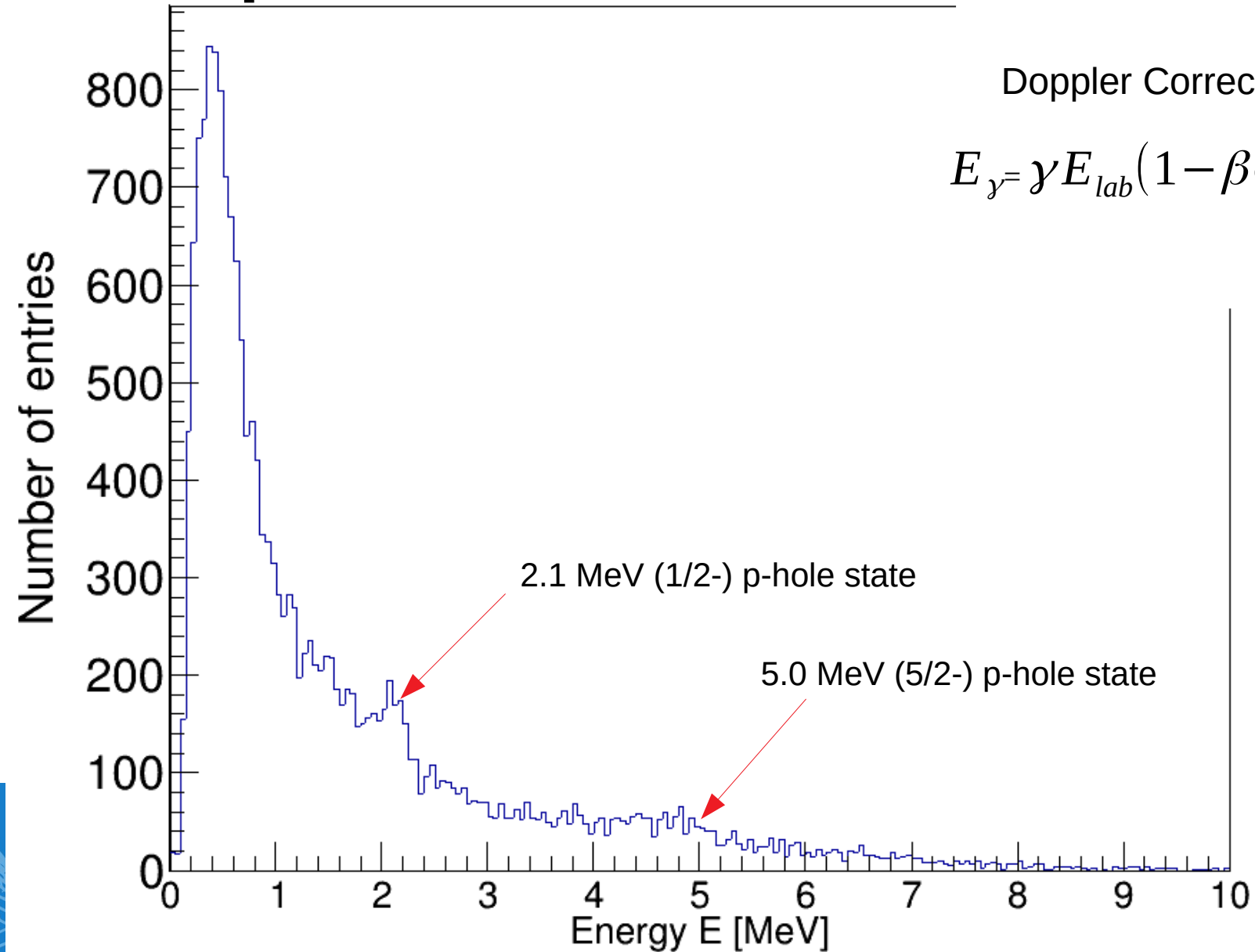


# 12C(p,2p)11B reaction





# Gamma Spectrum of $^{11}\text{B}$

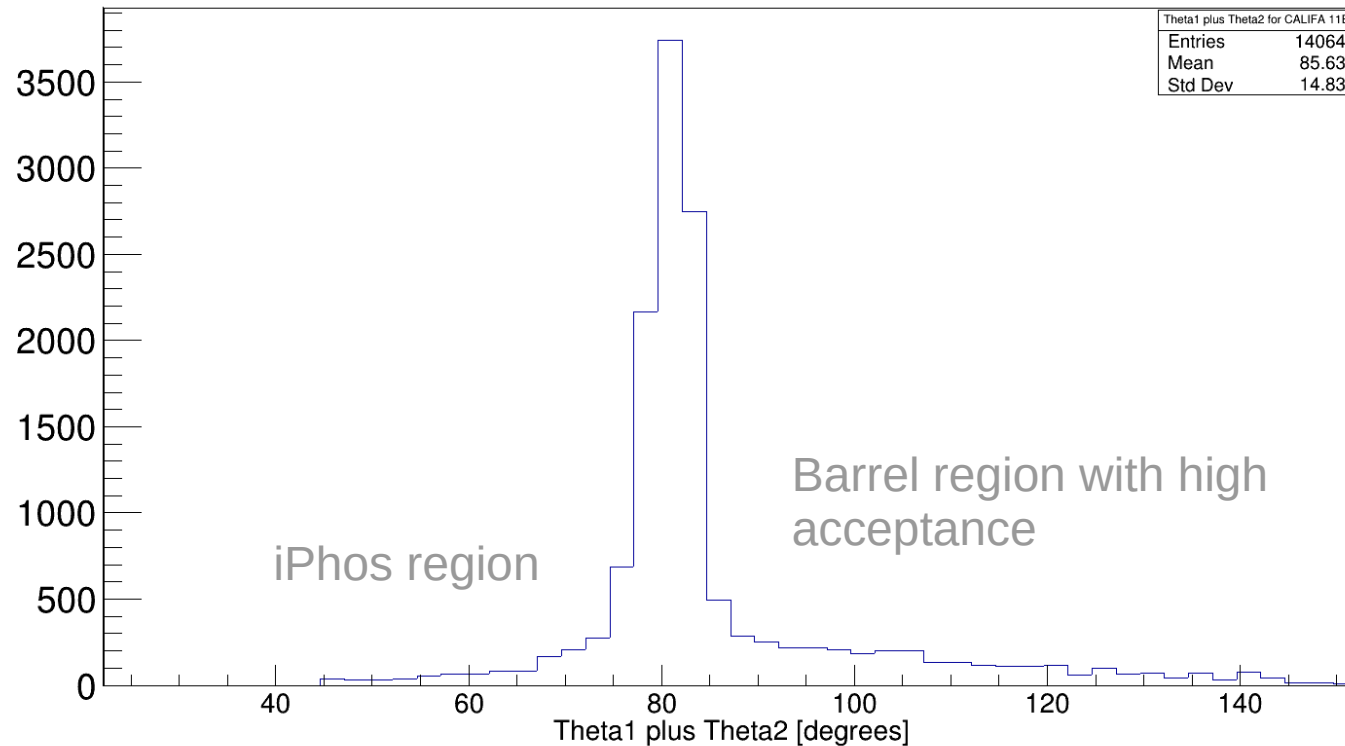
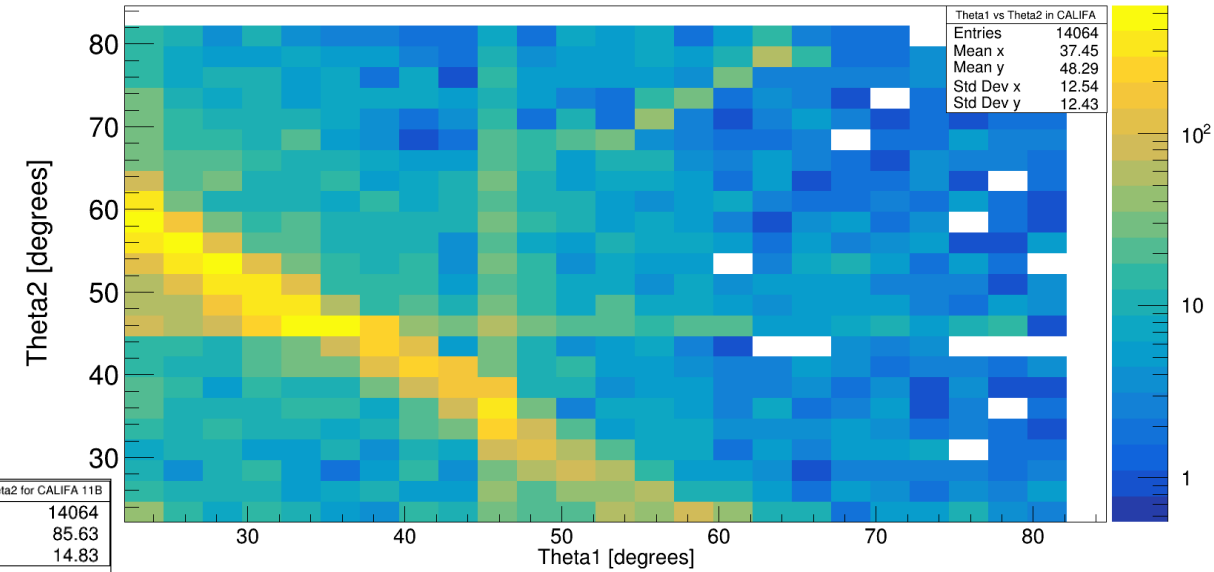
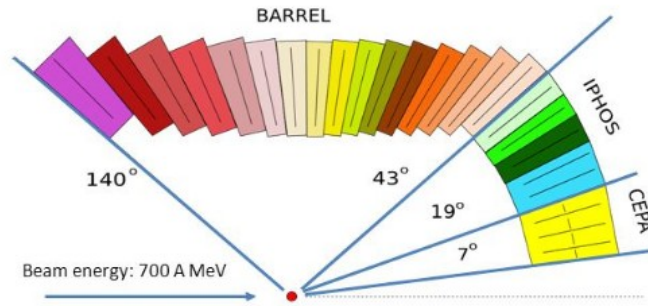




# Polar Angular Distribution of protons for $^{12}\text{C}(p,2p)^{11}\text{B}$



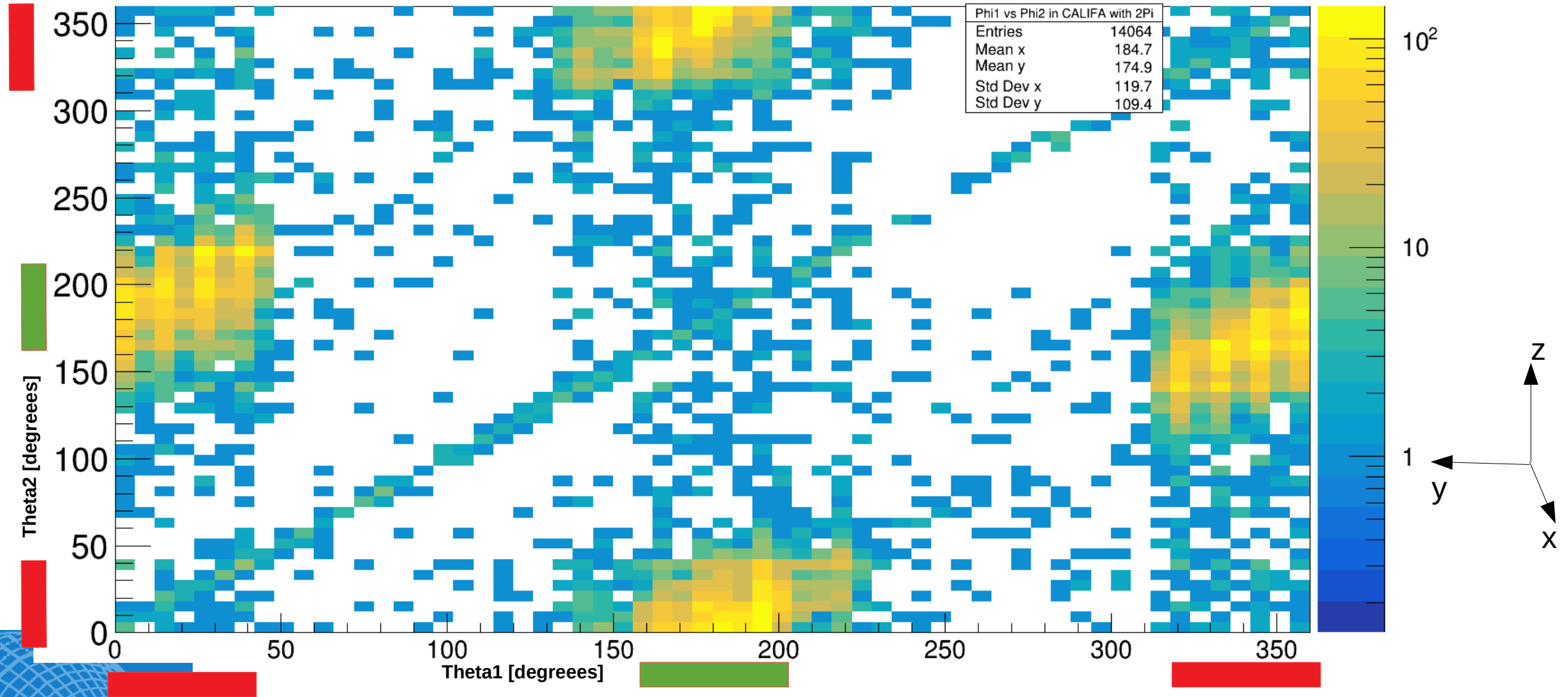
Theta1 vs Theta2 in CALIFA





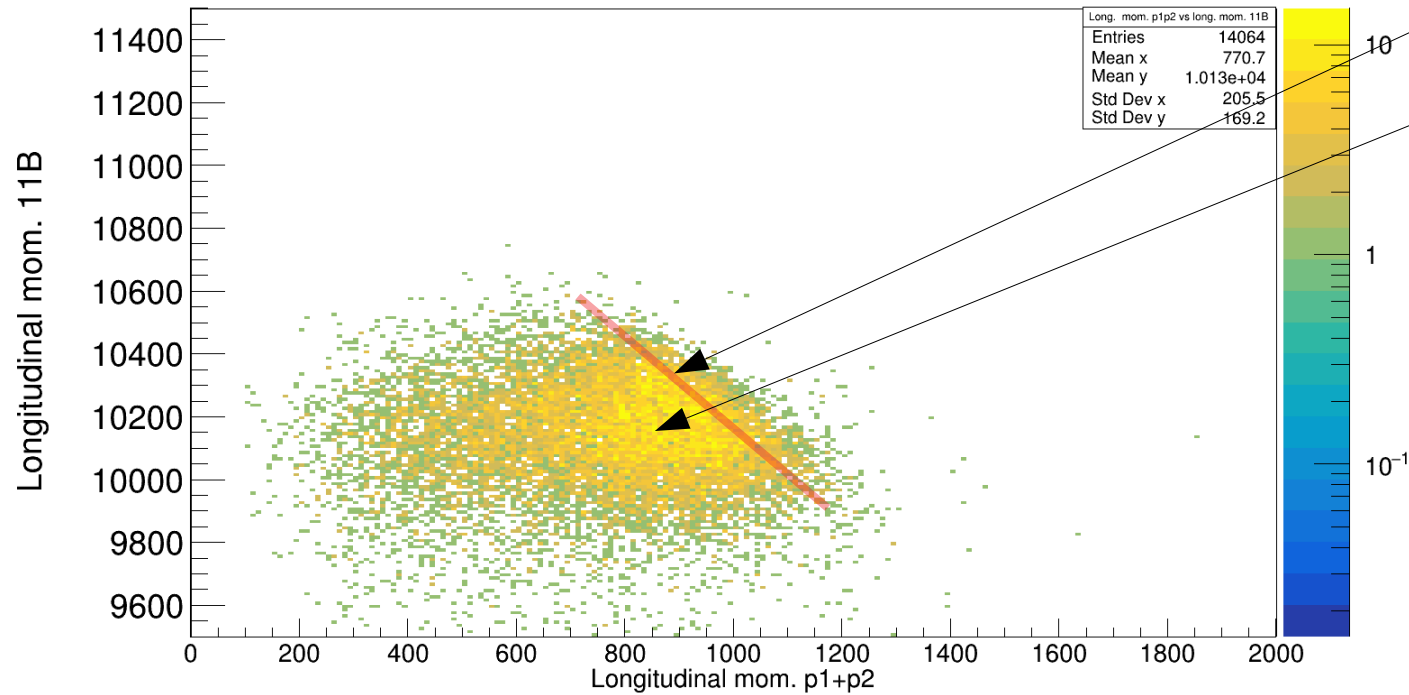


# Arzimuthal Distribution of protons for $^{12}\text{C}(p,2p)^{11}\text{B}$



- CALIFA left half (90°) iPhos
- CALIFA right half (45°) iPhos

Long. mom. p1p2 vs long. mom. 11B



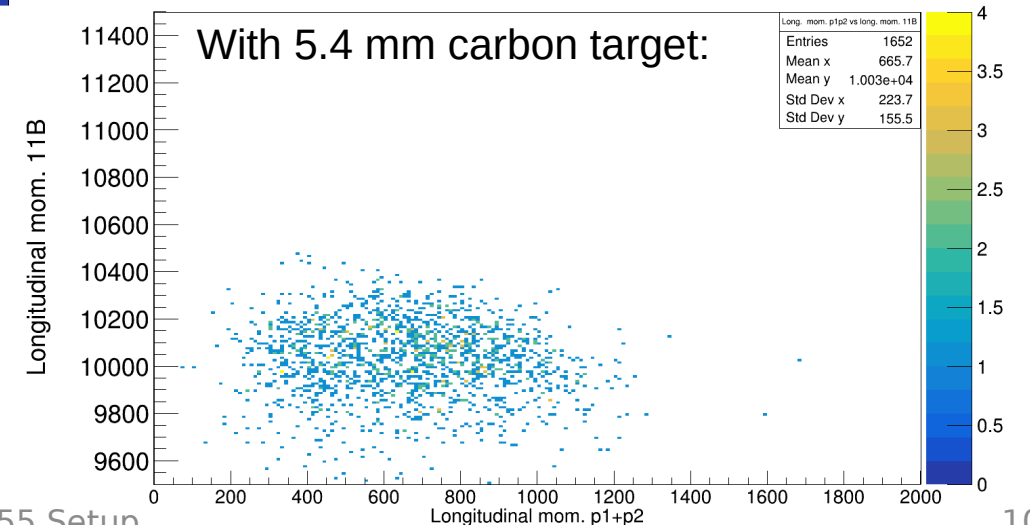
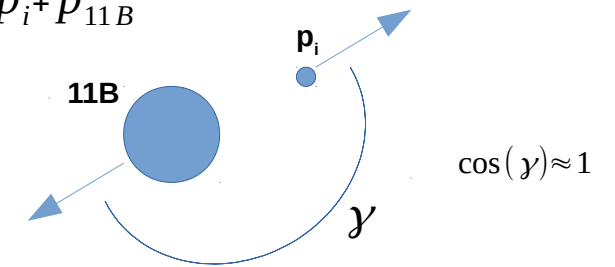
expected: barrier line

Explanation for smearing needed:

→ use simulation

→ boosting to 12C frame:

$$p_{12C} = p_i + p_{11B}$$



With 5.4 mm carbon target:



# Summary & Outlook



- Particle Identification works out
- Gamma spectrum and angular distribution plots look reasonable
- Further investigations for momenta distributions of the outgoing particles needed
- Expand analysis towards  $^{10}\text{B}$  isotope





# Thank you!

**CALIFA @ Technical University of Munich (TUM)**

Roman Gernhäuser, Lukas Ponnath, Philipp Klenze, Tobias Jenegger





# Backup

