



First look at the CNAO2022 data taking

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CNAO2022 sample



Physics runs:

- C @ 200 MeV/u on 5mm C - MB
- C @ 200 MeV/u on 5mm C – Fragmentation

Calibration → CALO equalization:

- C @ 115, 200, 300 MeV/u, no target – MB
- P @ 227 MeV, no target - MB

- **Only WaveDAQ detectors!**
(SC + TW + CALO)
- **dE-TOF GSI2021 calibration**

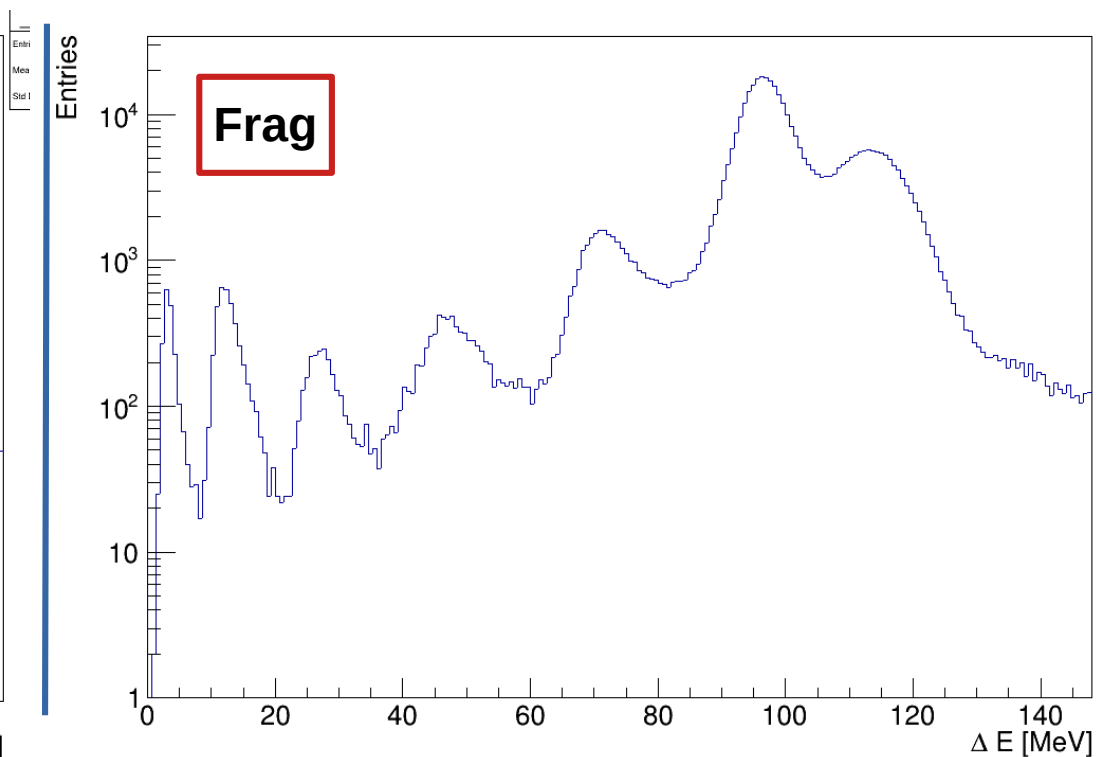
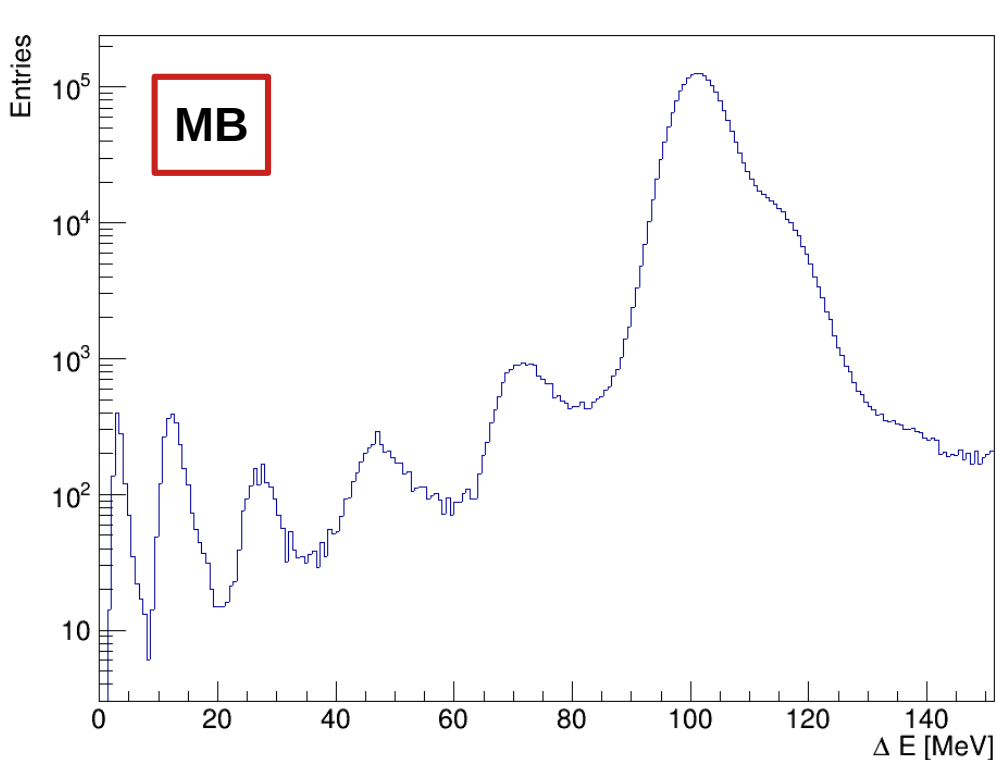
SHOE not used at this stage, so a lot of stuff is missing!!



CNAO2022 → C200 on 5mm C



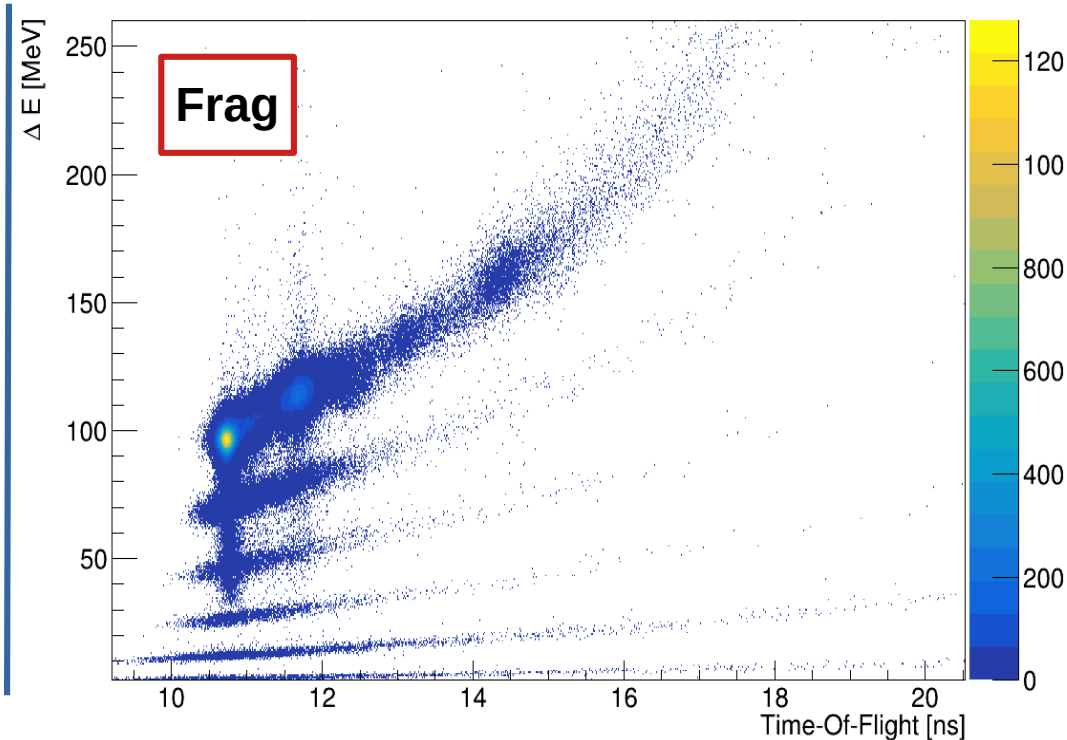
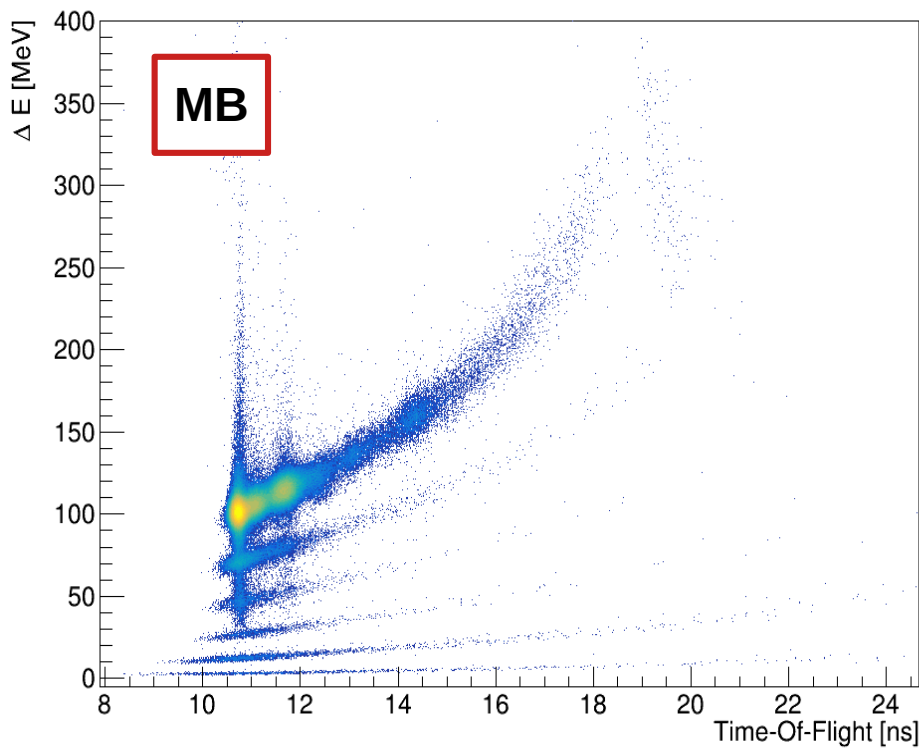
Energy loss



CNAO2022 → C200 on 5mm C



Energy loss vs TOF

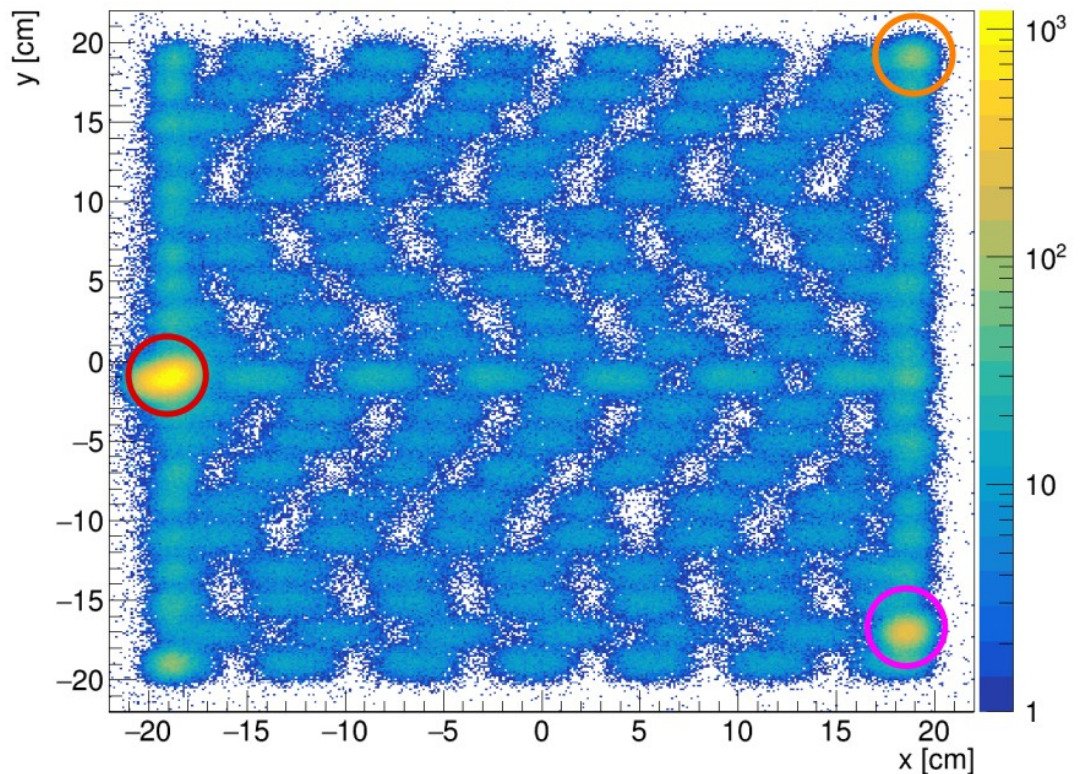
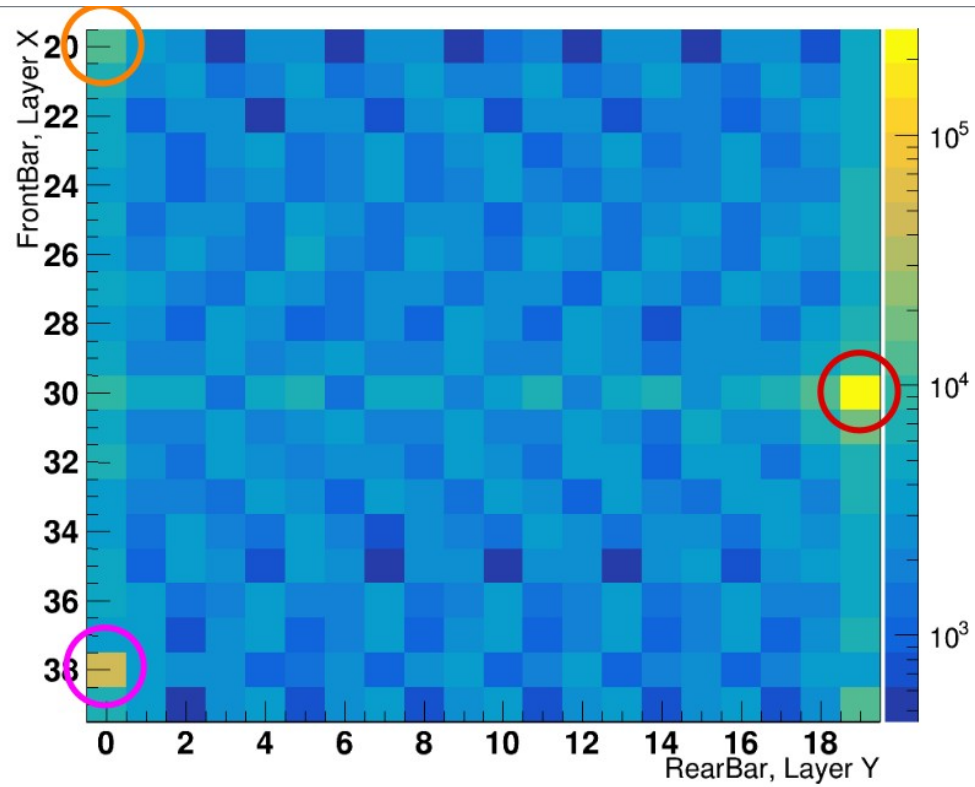


CNAO2022 → C200 on 5mm C



Position reconstruction

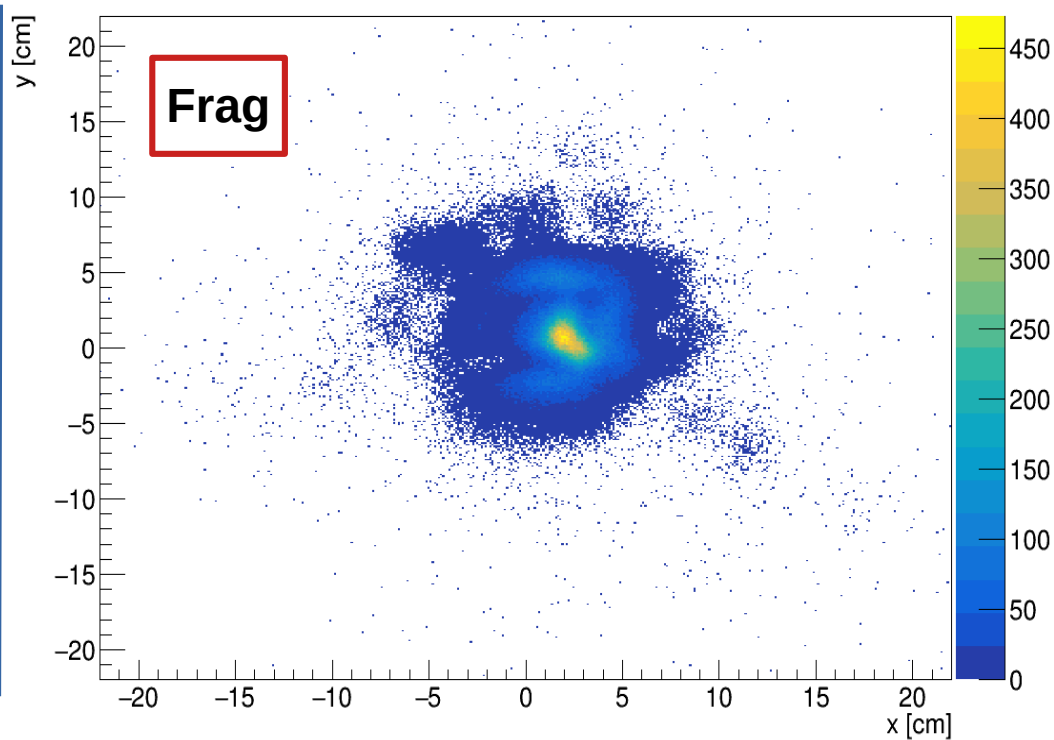
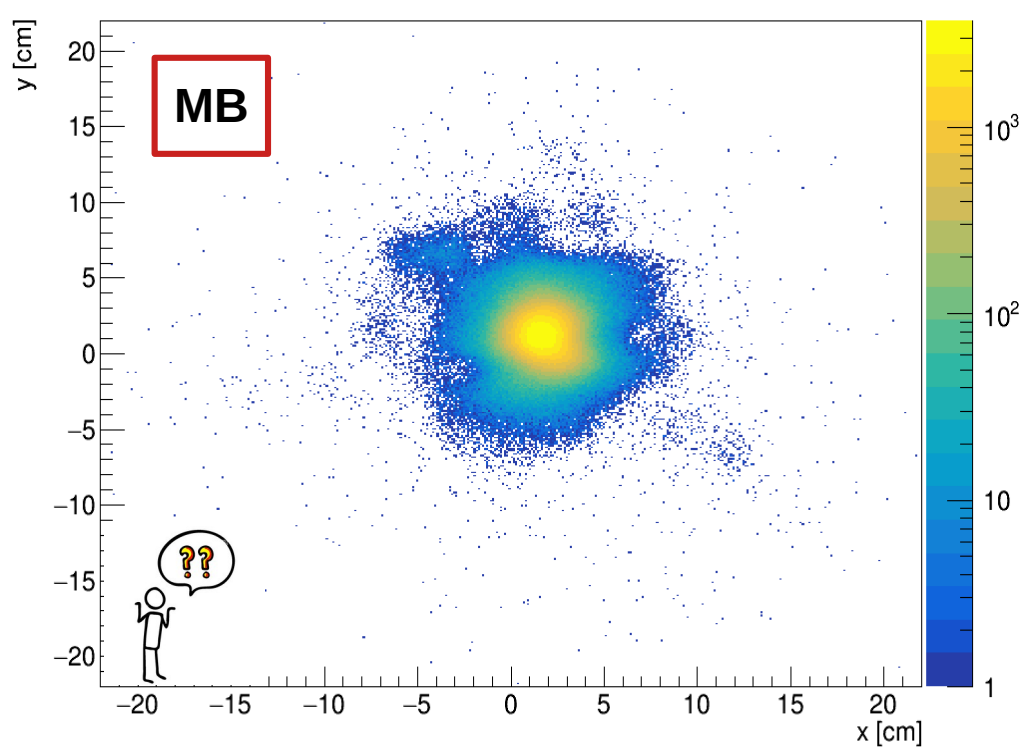
GSI2021!!



CNAO2022 → C200 on 5mm C



Position reconstruction



CNAO2022 – Mass reconstruction



Test for mass reconstruction with only TOF and E_{CALO} :

- TW calibration (dE-TOF) from GSI2021 data
- Subtraction of SC-TGT constant Time-Of-Flight
- CALO crystals raw energy equalization
- TW crossing - CALO crystal “nominal” association

A lot of approximations!!

$$M = \frac{E_k}{c^2(\gamma - 1)} \propto \frac{E_{\text{CALO}}}{(\gamma - 1)}$$

CNAO2022 – Mass reconstruction



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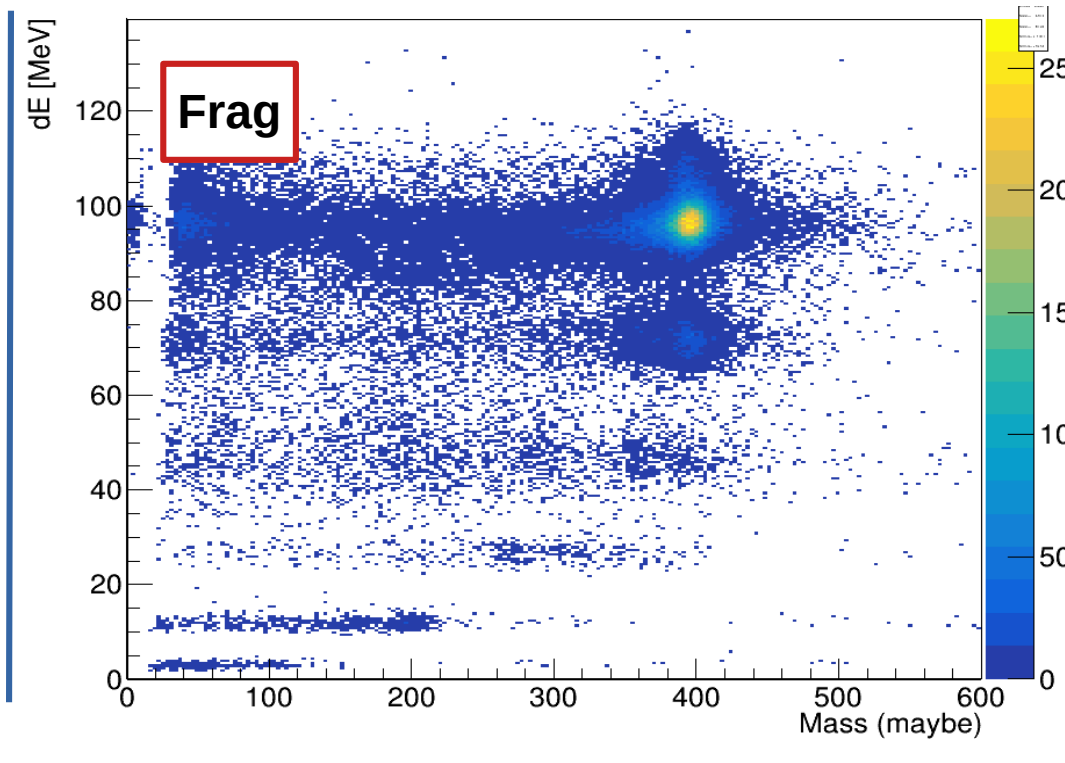
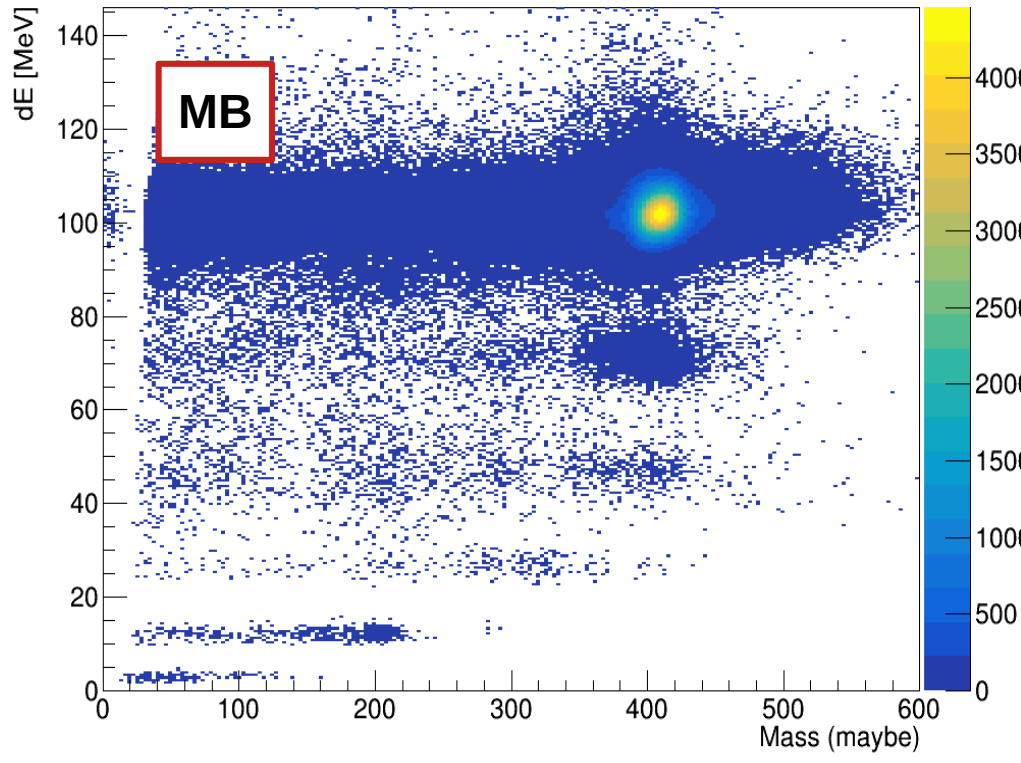


But I will take credit if you like this...

CNAO2022 → C200 on 5mm C



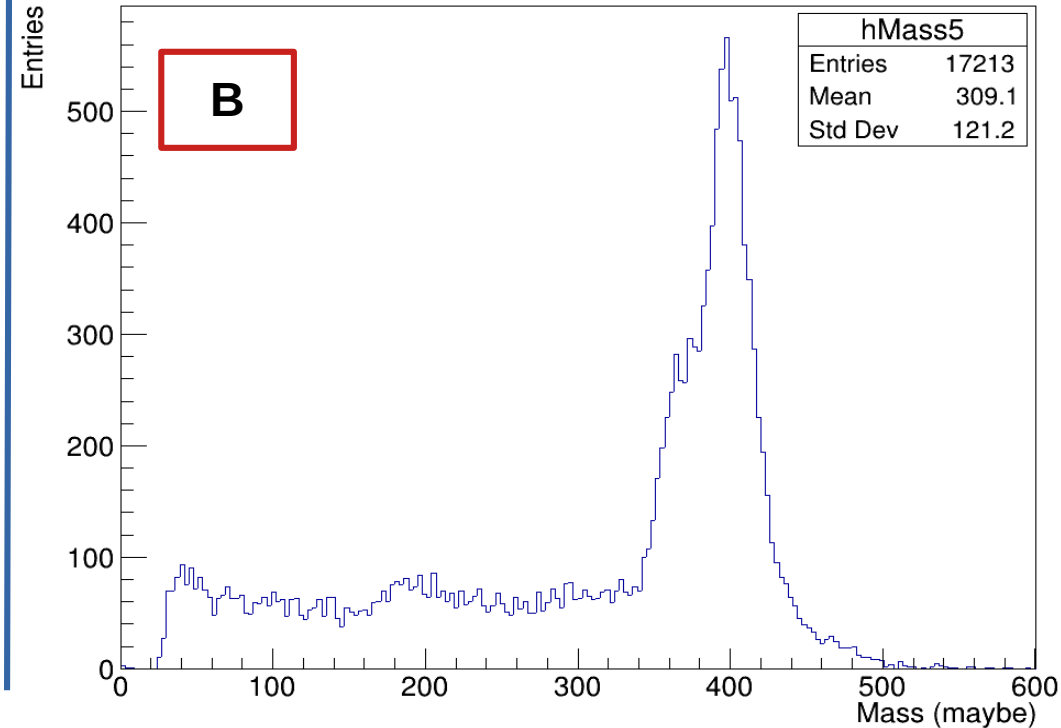
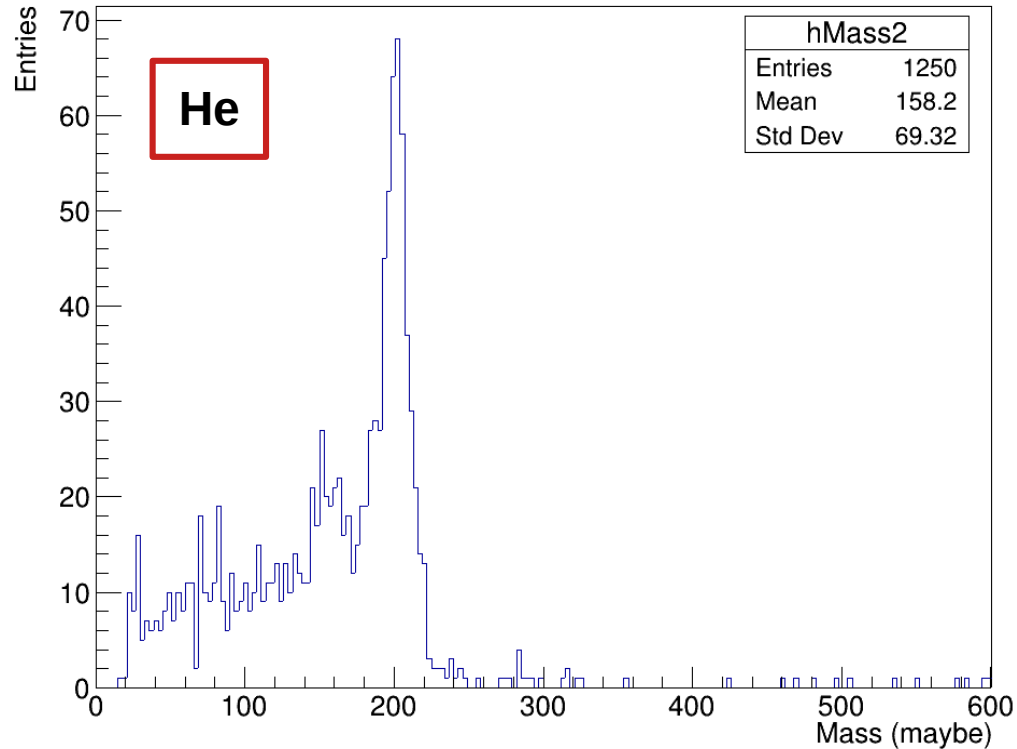
Energy loss vs Mass(?)



CNAO2022 → C200 on 5mm C



Mass(?) - All (MB + frag)



CNAO2022 – TW & CALO scan



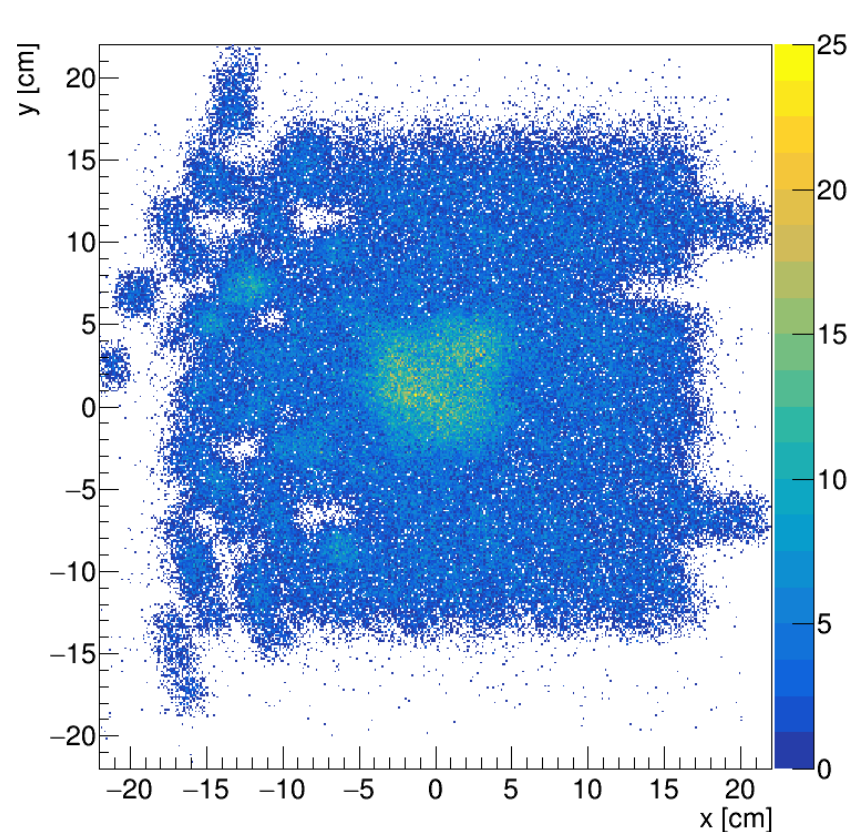
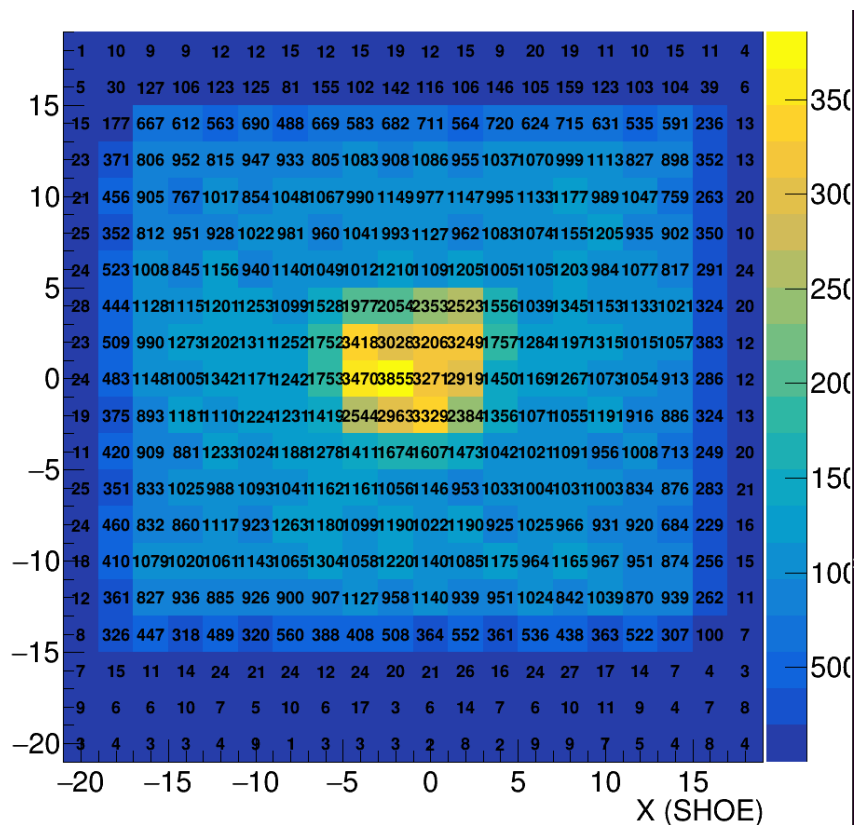
- Used CNAO scanning magnets to irradiate large area of the detectors
- Max area reached is about 35x 35 cm²
- C @ 115, 200, 300 MeV/u and p @ 227 MeV
- Scanning worked well and is very efficient! (~30 mins per beam)
- Extremely useful for detector calibration in future

- **Evaluated TW time and energy resolution**
- *CALO data not checked (by me!) up to now*

CNAO2022 → TW & CALO scan



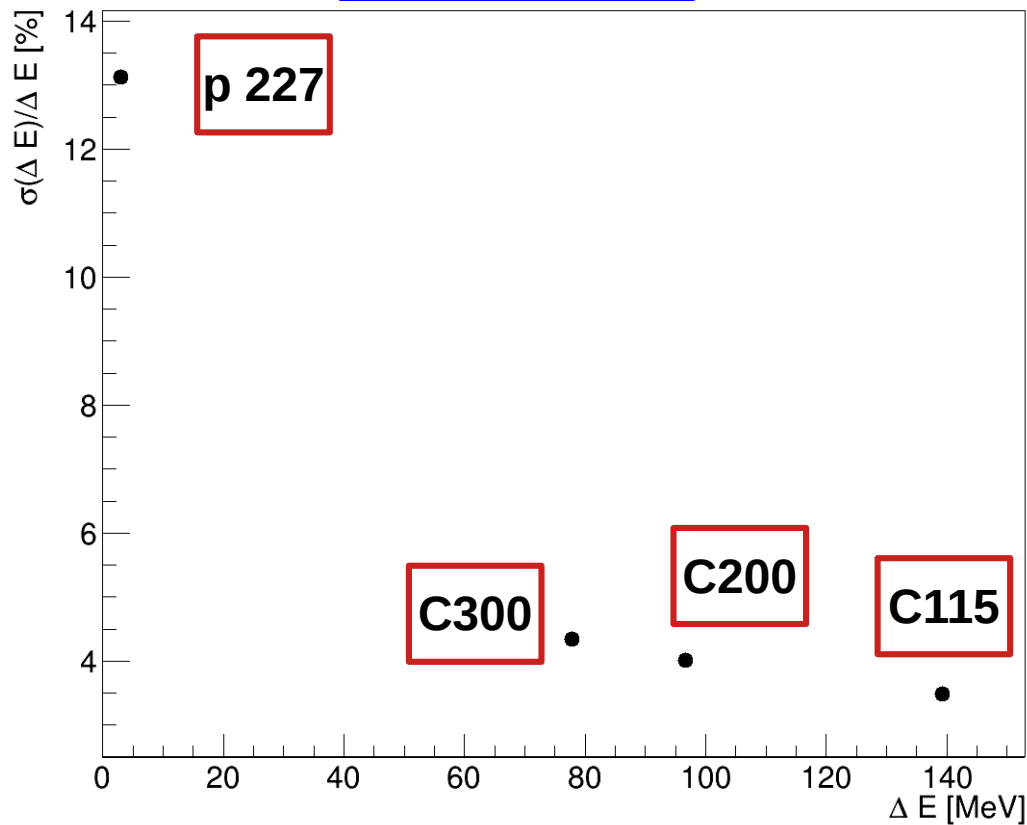
Position reconstruction



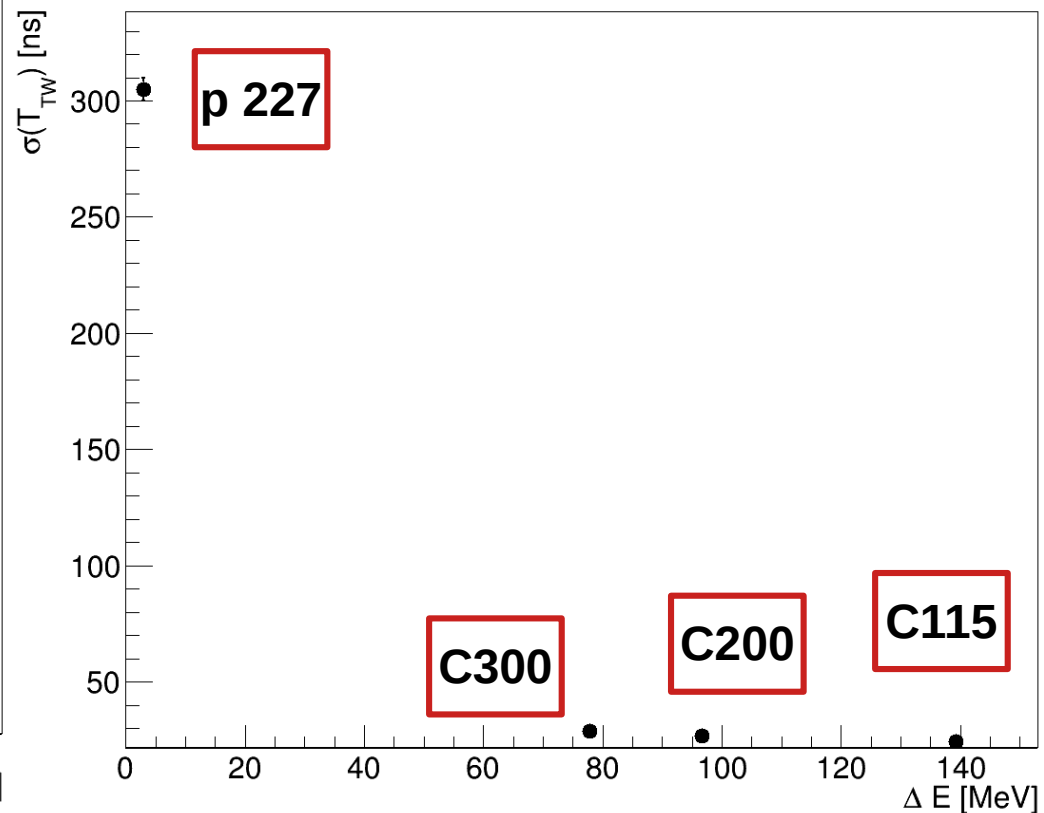
CNAO2022 – TW resolution



Energy loss



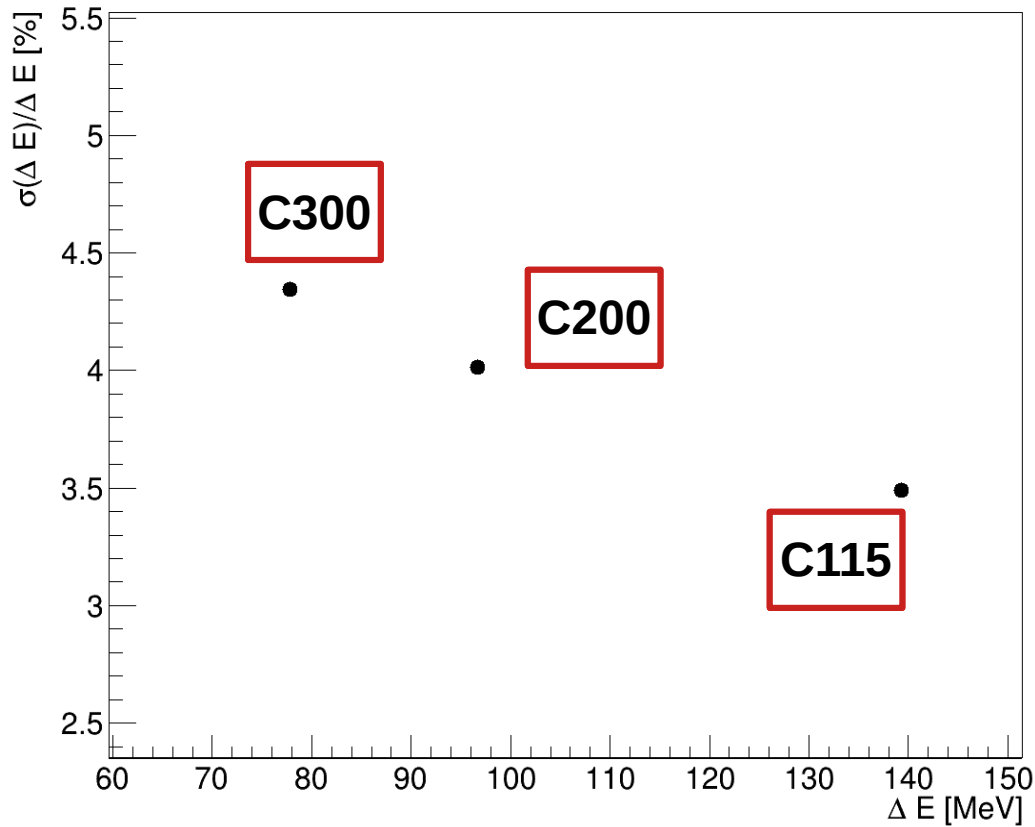
Time



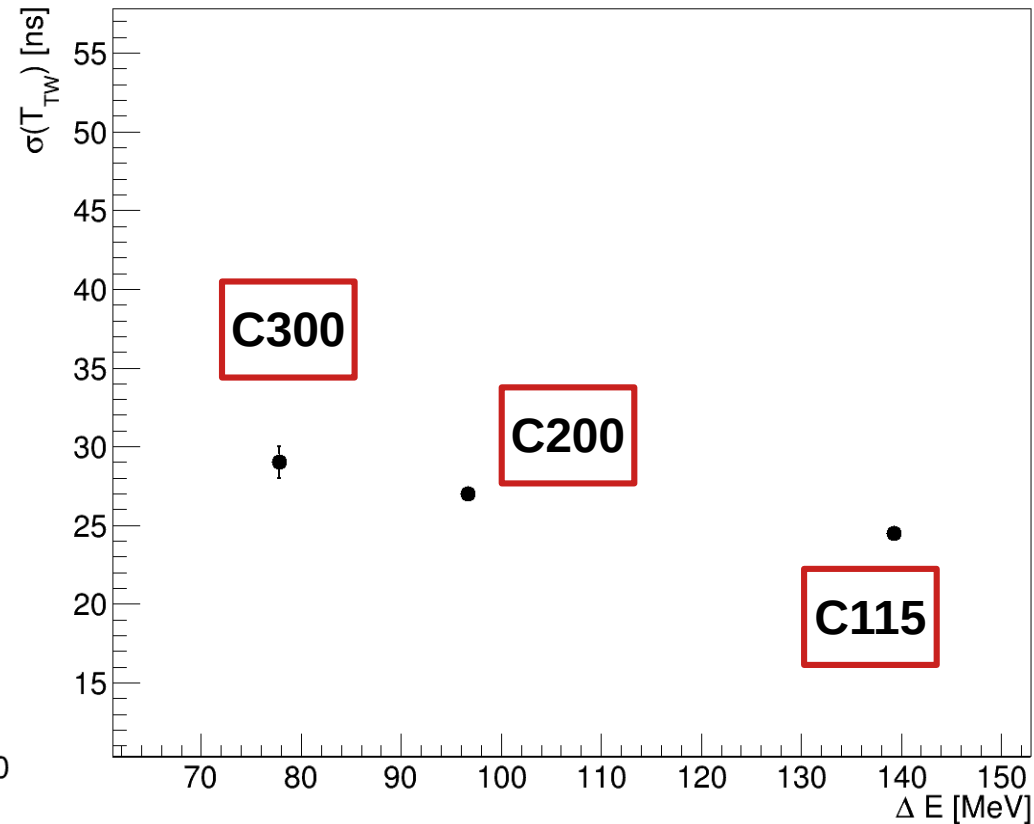
CNAO2022 – TW resolution



Energy loss



Time



Conclusions

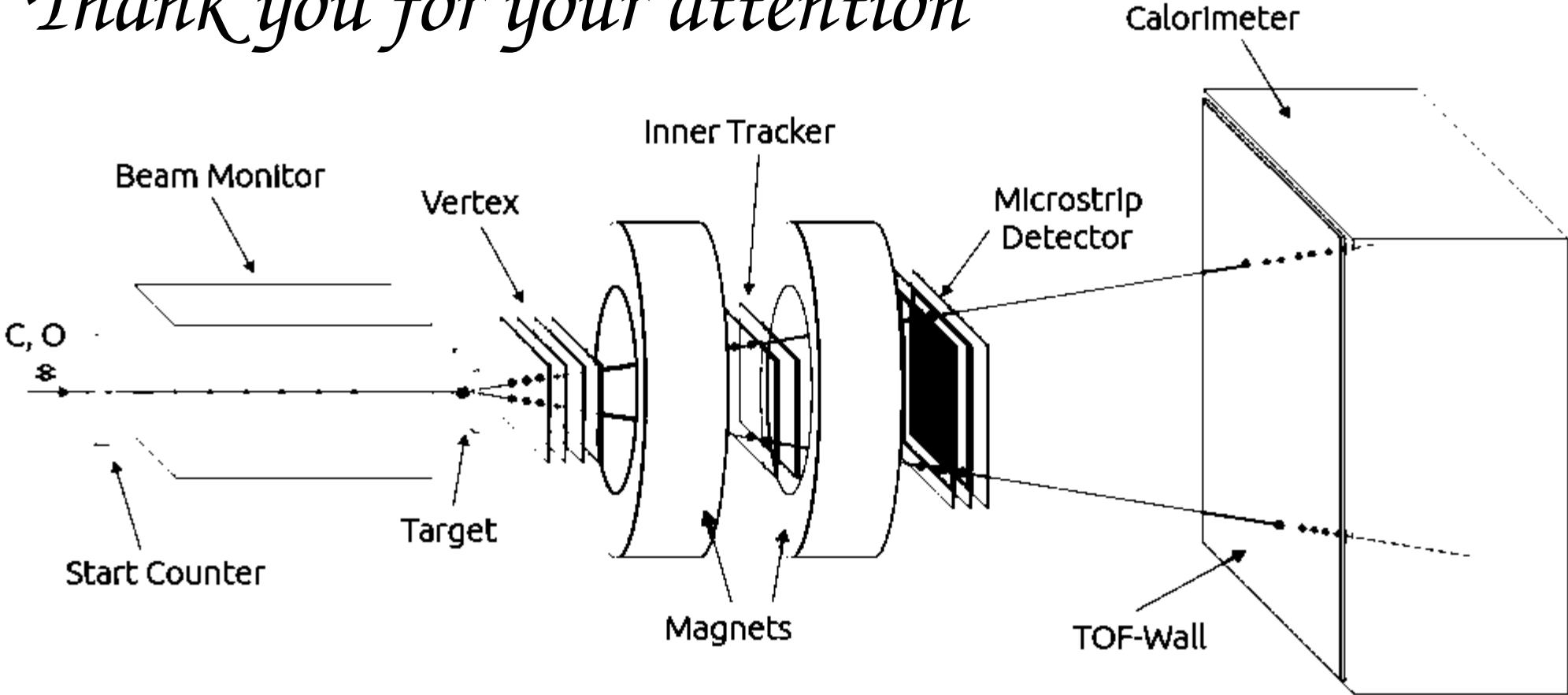


Very preliminary look at CNAO data:

- GSI dE and TOF calibrations seem reasonable
- Many primaries hit “something”, likely VT support
 - possible to remove with TOF check and global reconstruction
- Tried first mass reconstruction “on the fly” – CALO calibration needed
- Position reconstruction shows some issues → re-check calibration
- Preliminary TW dE and Time resolution reasonable



Thank you for your attention





Backup slides

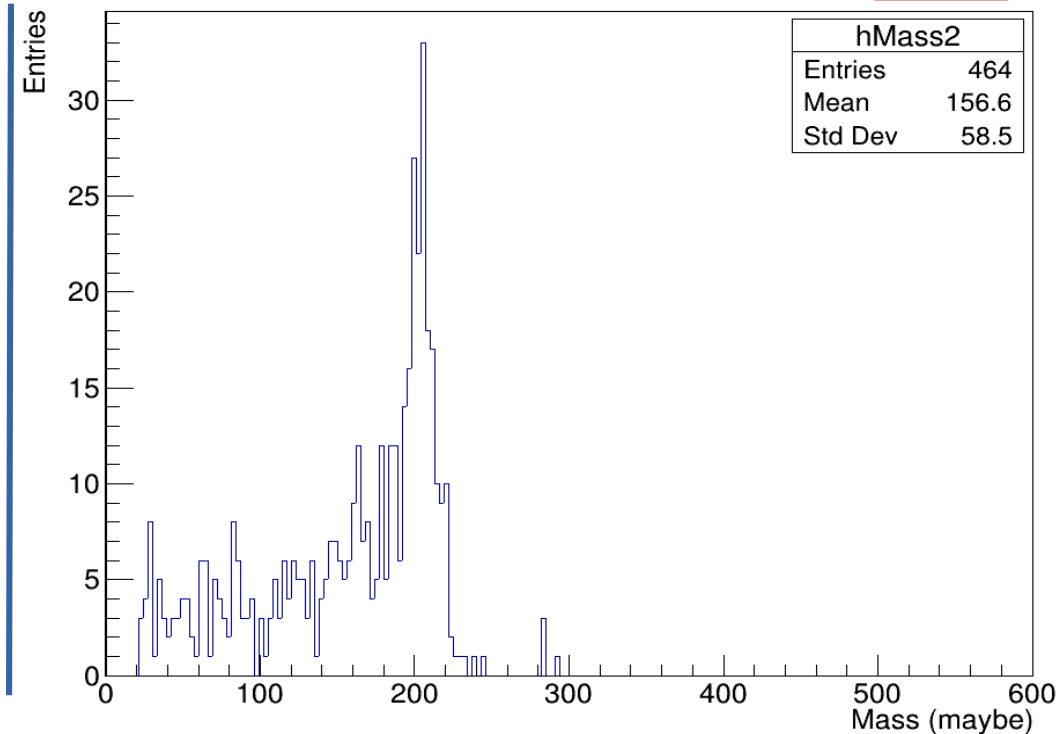
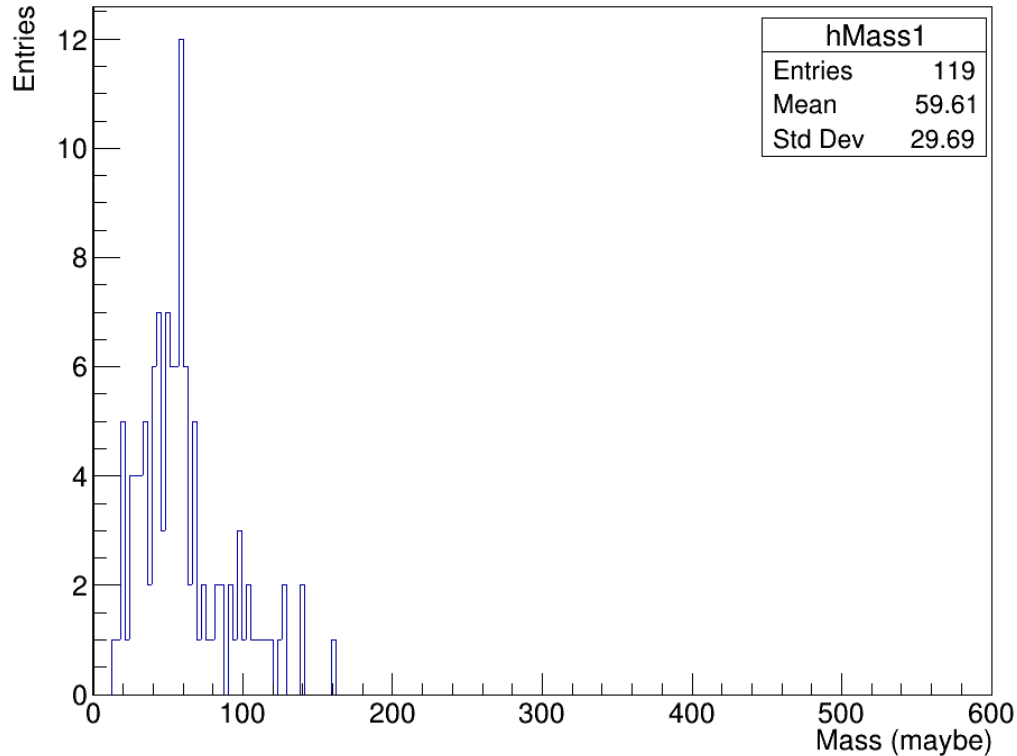
CNAO2022 → C200 on 5mm C



Mass(?) - MB trigger

H

He



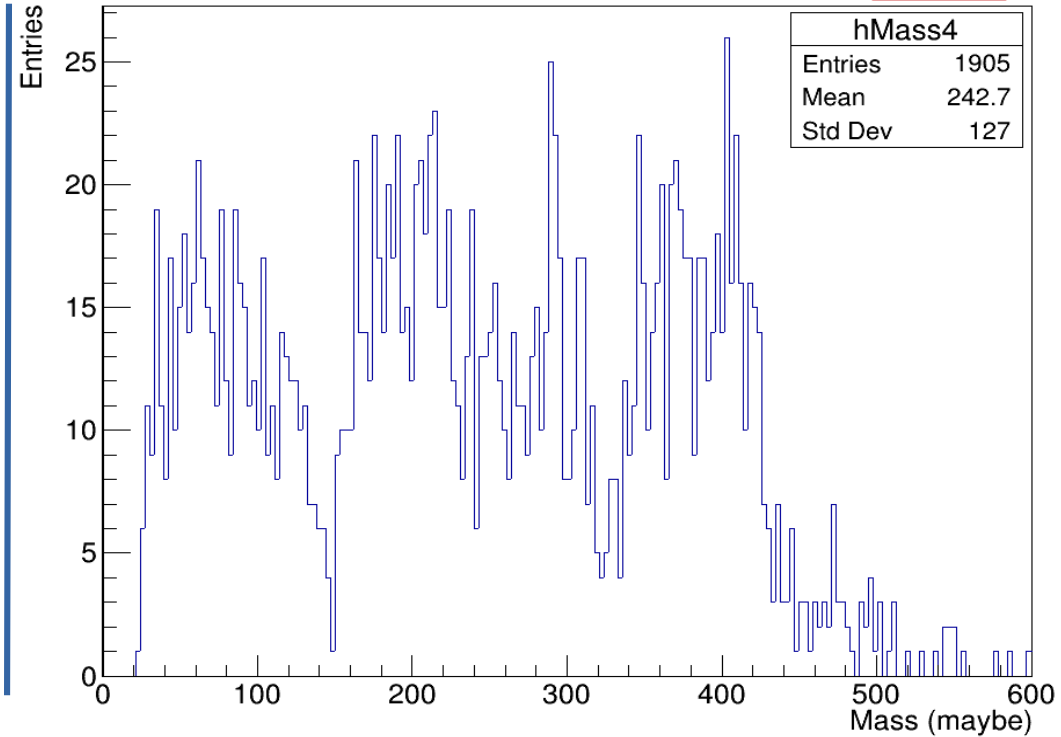
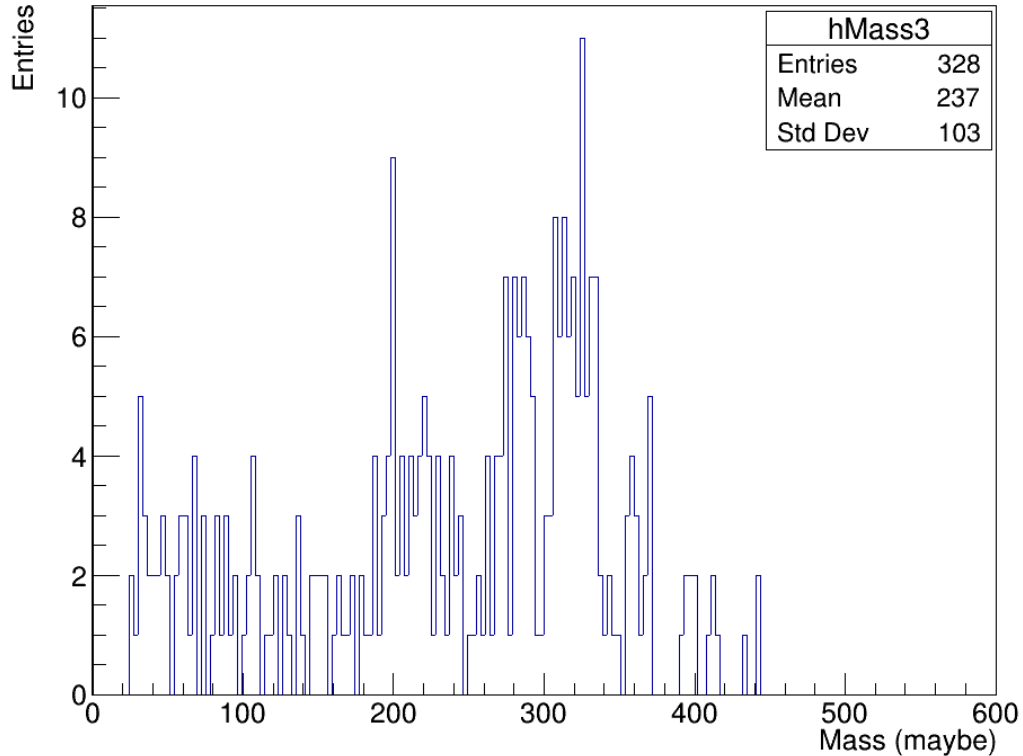
CNAO2022 → C200 on 5mm C



Li

Mass(?) - MB trigger

Be



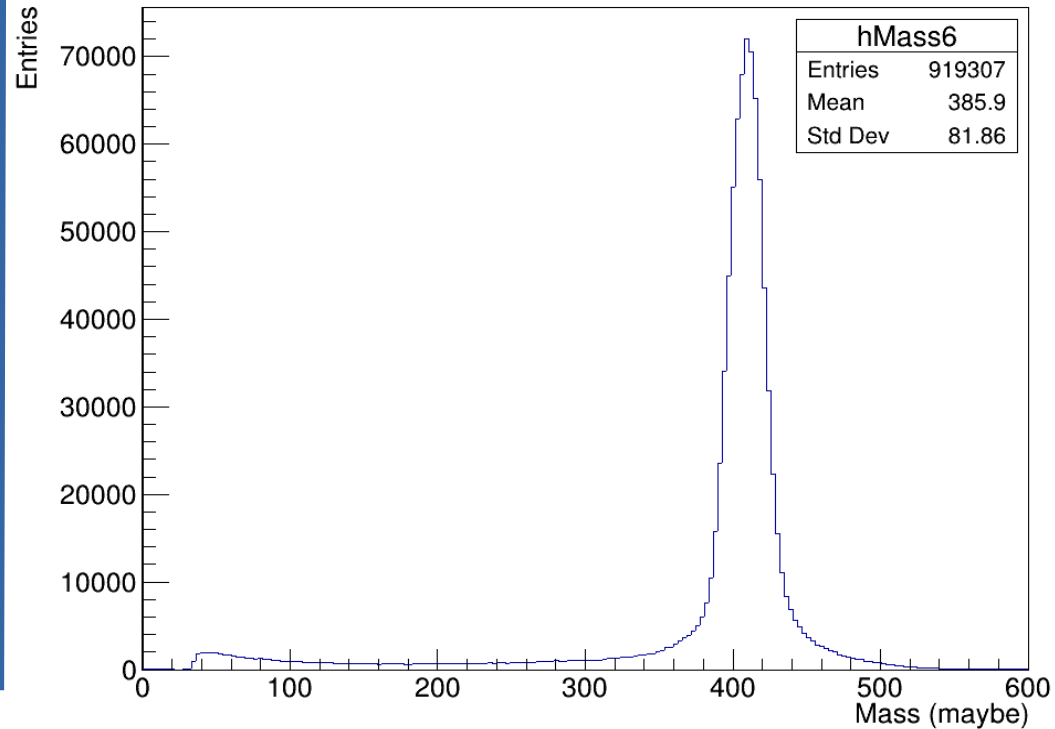
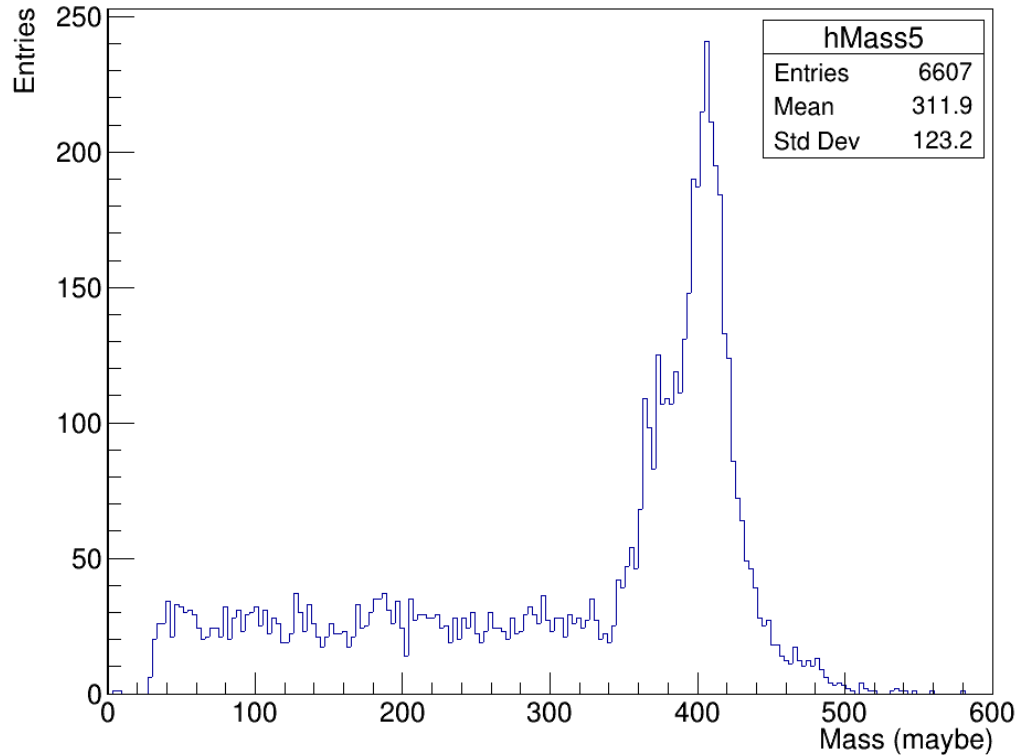
CNAO2022 → C200 on 5mm C



B

Mass(?) - MB trigger

C



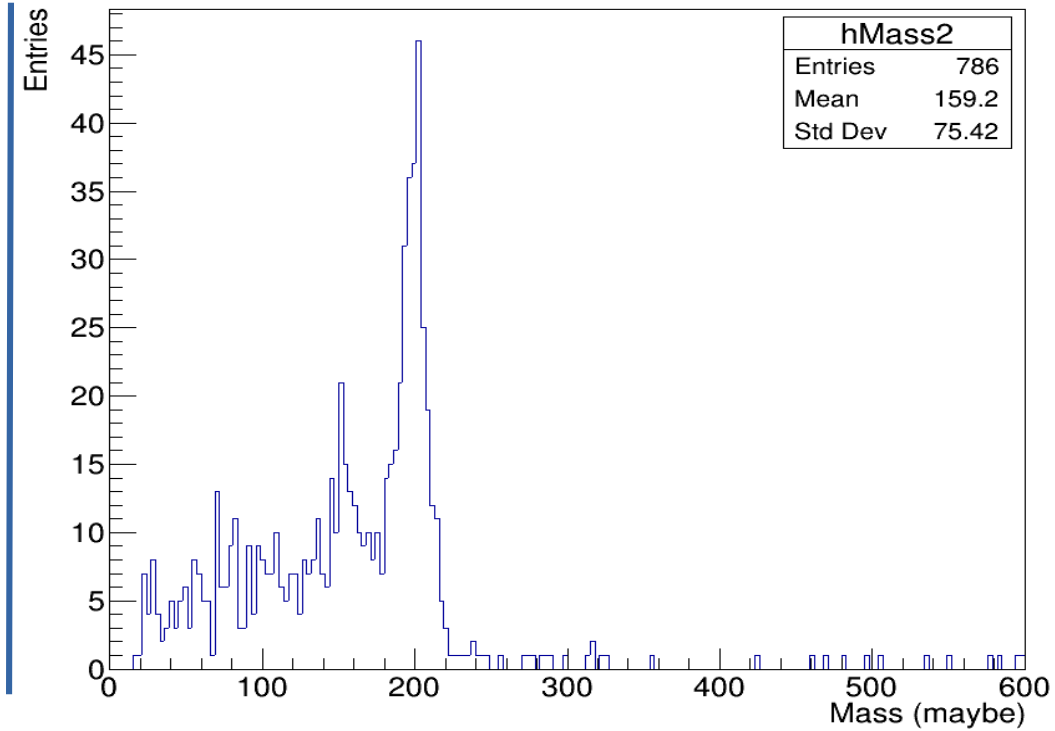
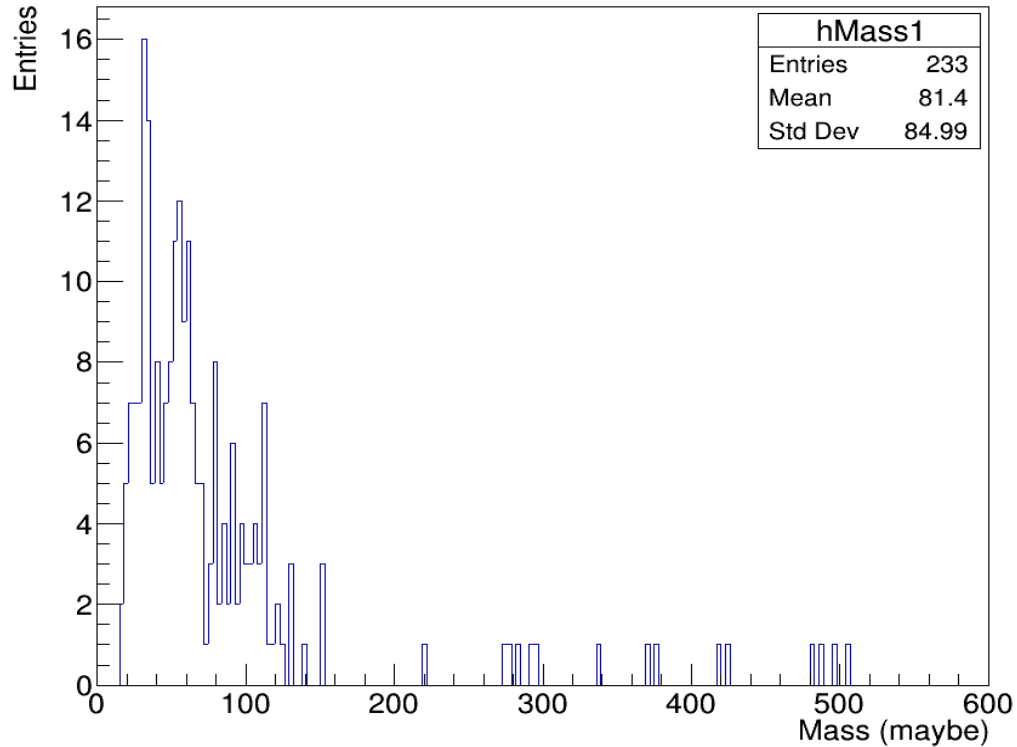
CNAO2022 → C200 on 5mm C



H

Mass(?) - Frag trigger

He



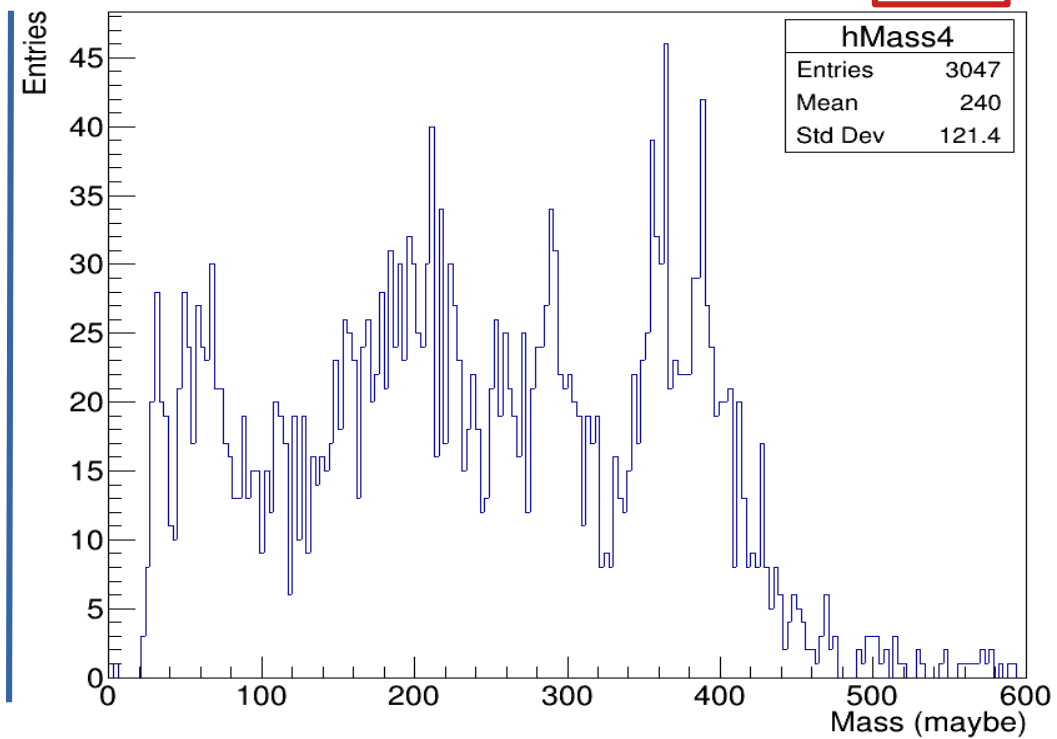
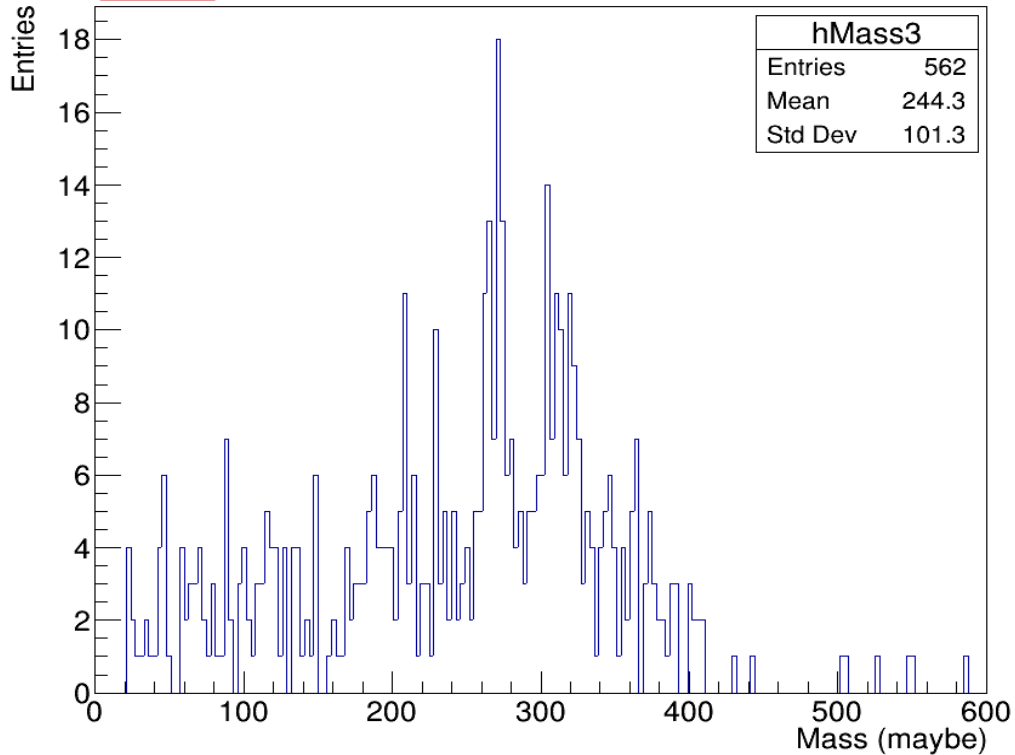
CNAO2022 → C200 on 5mm C



Li

Mass(?) - Frag trigger

Be



CNAO2022 → C200 on 5mm C



B

Mass(?) - Frag trigger

C

