



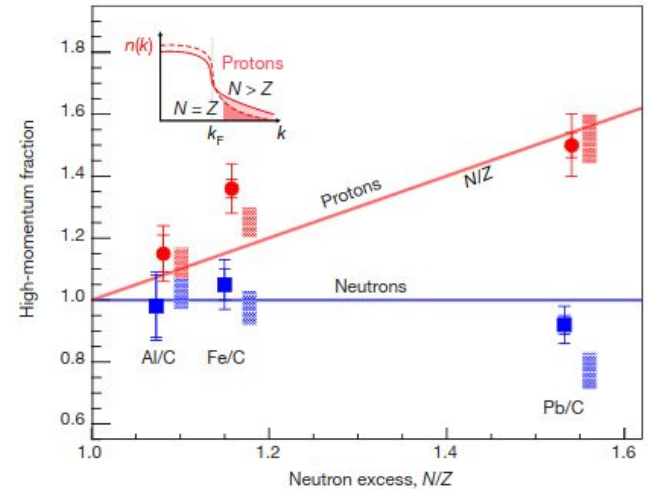
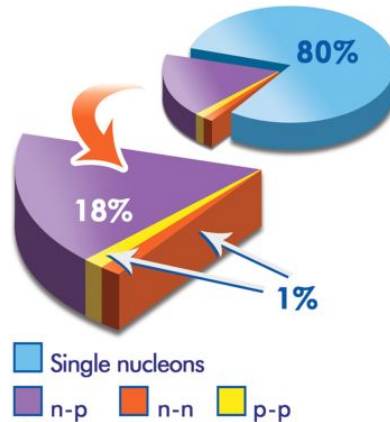
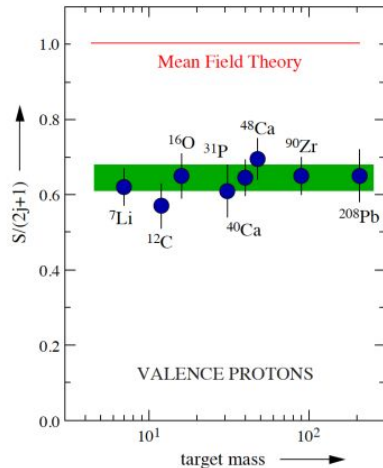
S091 Analysis report

Matthew Whitehead

R3B July 2024

Probing Short Range correlations via (p,pd) Quasi Free Scattering reactions

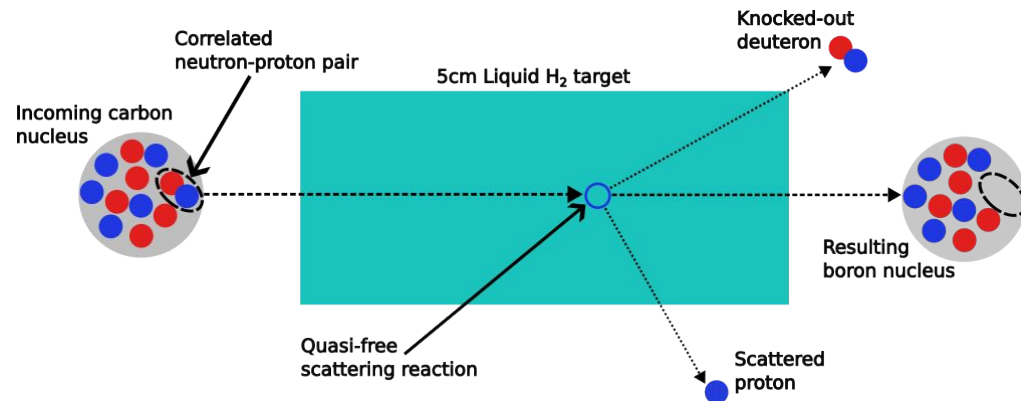
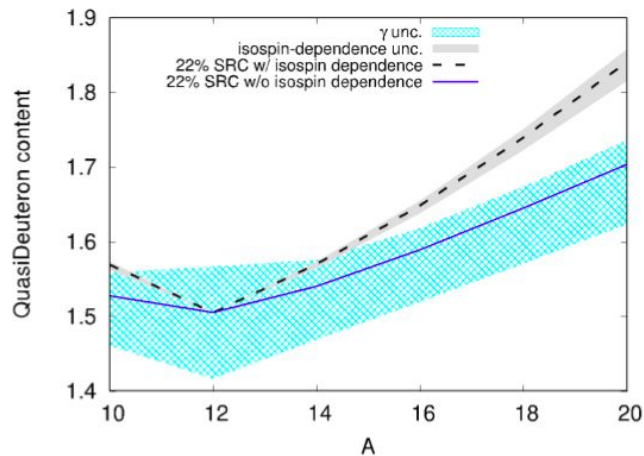
- Reduction in spectroscopic factors due to depletion of single-particle states via nucleon-nucleon correlations.
- Increasing fraction of high momentum protons with the asymmetry of the nuclei attributed to nucleons forming SRC neutron-proton pairs.
- Phenomenological analysis showed this is consistent with the reduction in spectroscopic factors.



Probing Short Range correlations via (p,pd) Quasi Free Scattering reactions

Aims

- Investigate the SRC dependence on isospin.
- Measure (p,pd) QFS cross section of $^{10,14,16}\text{C}$ relative to ^{12}C .
- Utilise R3B setup to employ exotic beams in inverse kinematics.

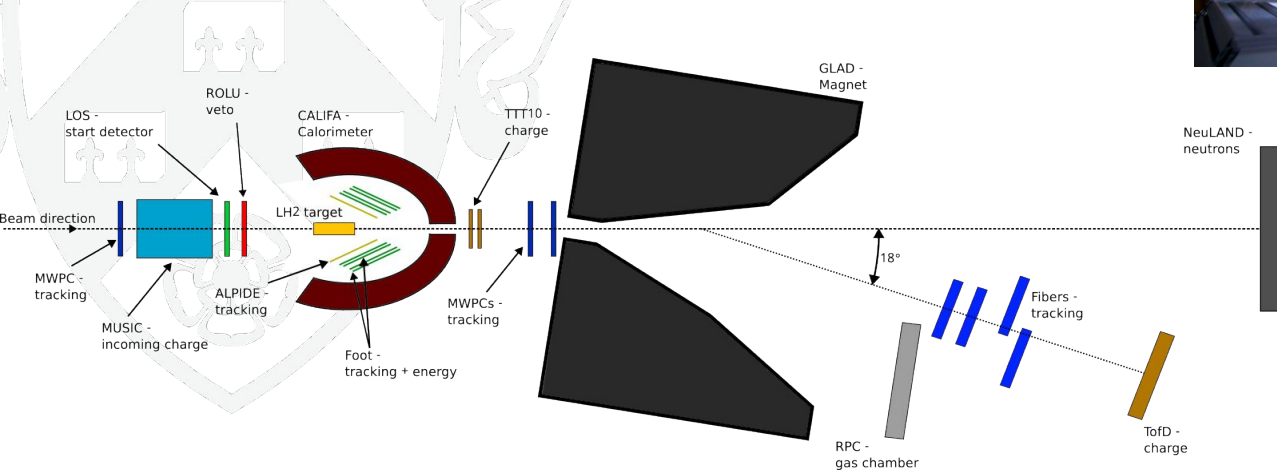


Probing Short Range correlations via (p,pd) Quasi Free Scattering reactions

R3B Setup for 2024 experimental campaign
First experimental campaign using CEPA and
ALPIDE pixel detectors.

TTT10 for charge measurement after target.

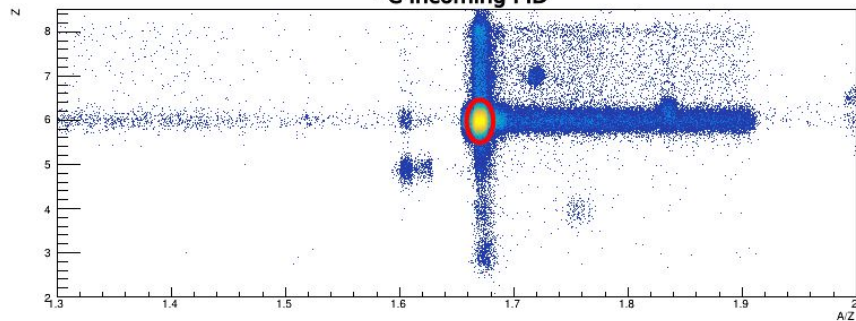
- 400MeV/u $^{10,12,14,16}\text{C}$ beam from $^{12}\text{C}/^{18}\text{O}$ primary.



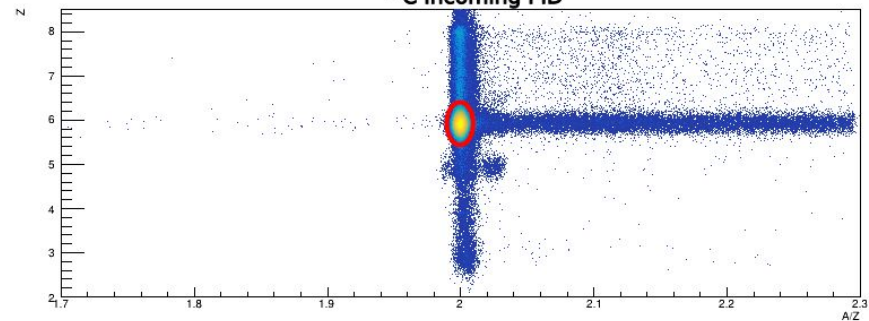
Incoming PID

Trigger reference time for S2 taken from Los CFD due to jittering effect seen during experiment

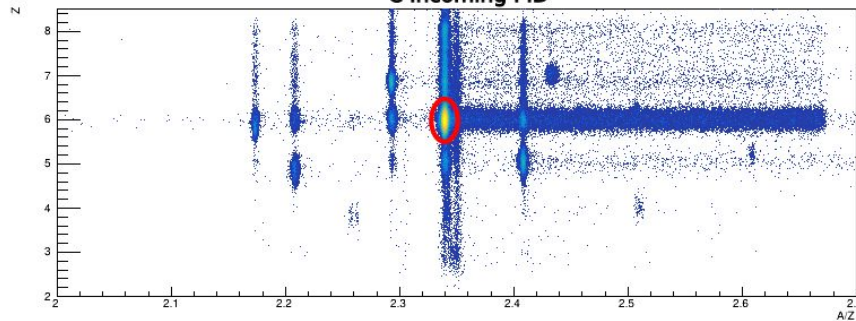
¹⁰C Incoming PID



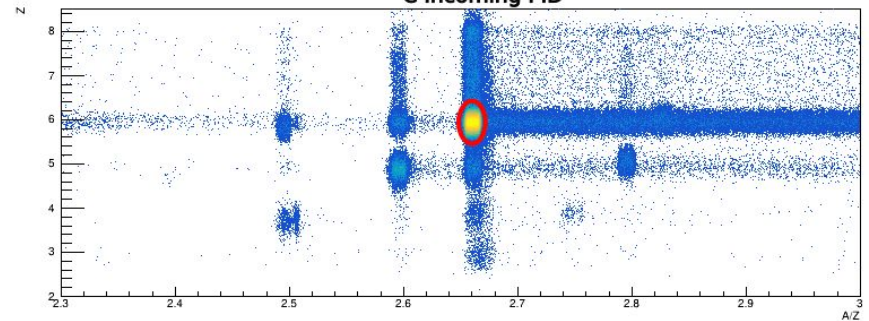
¹²C Incoming PID



¹⁴C Incoming PID



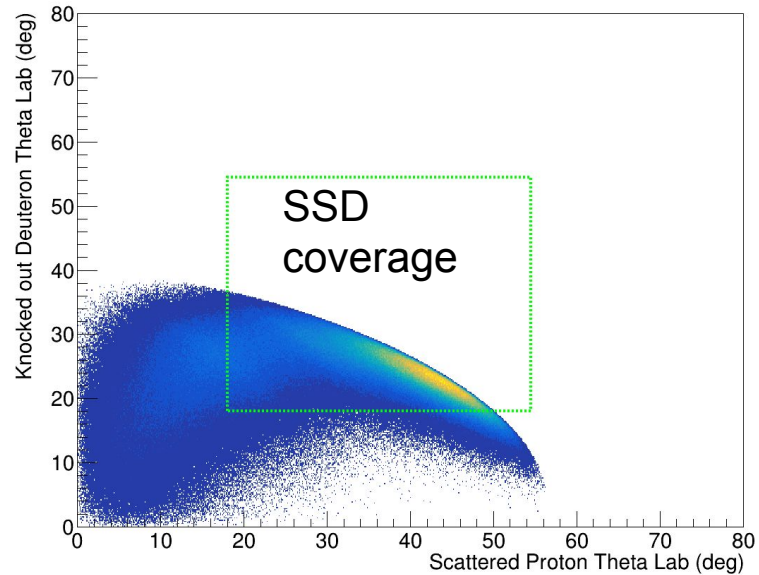
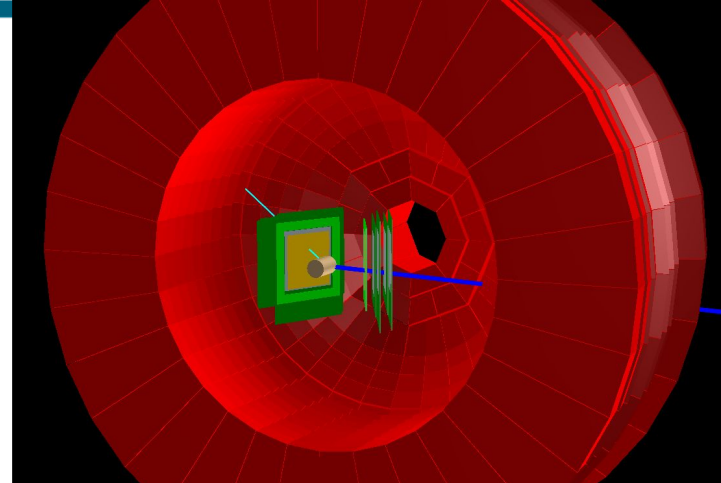
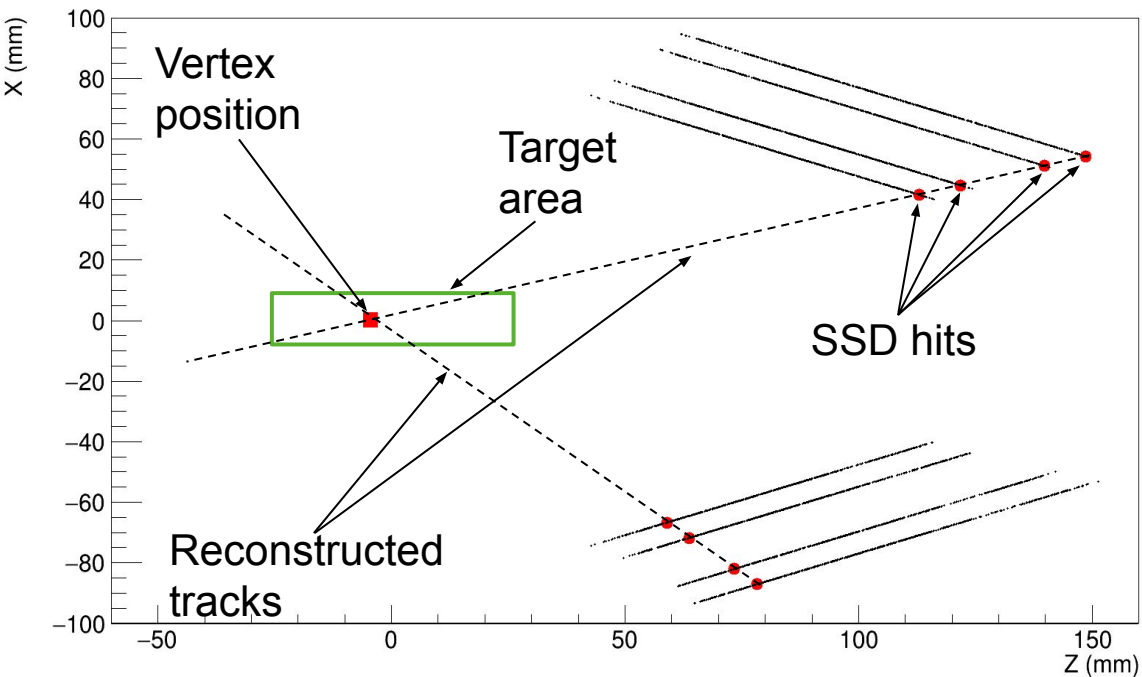
¹⁶C Incoming PID



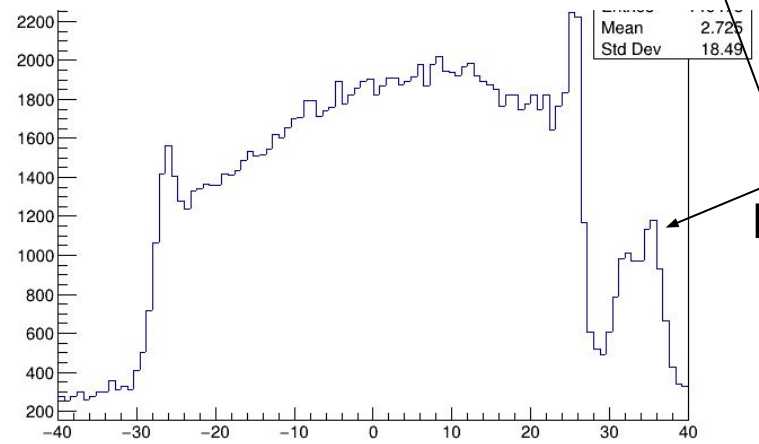
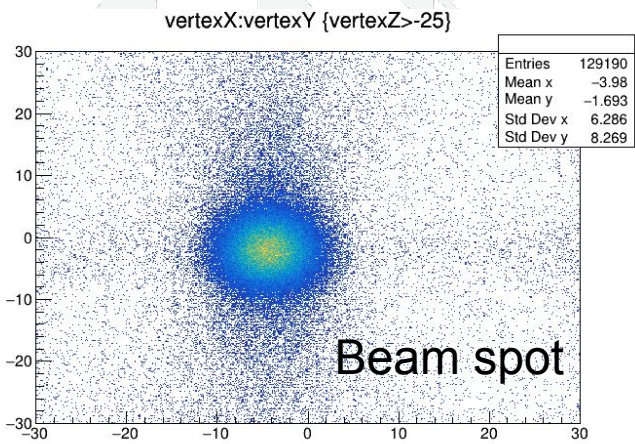
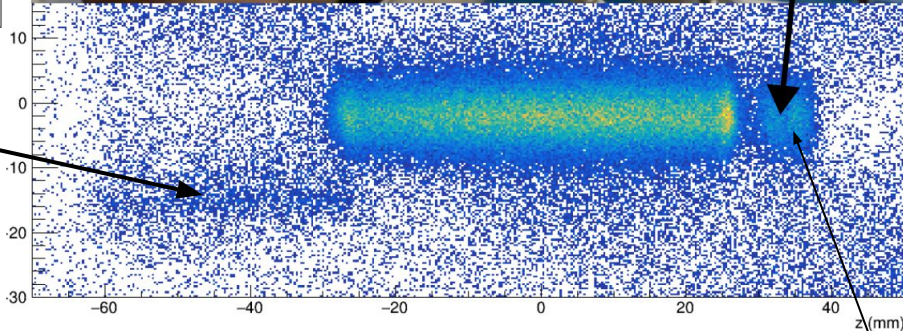
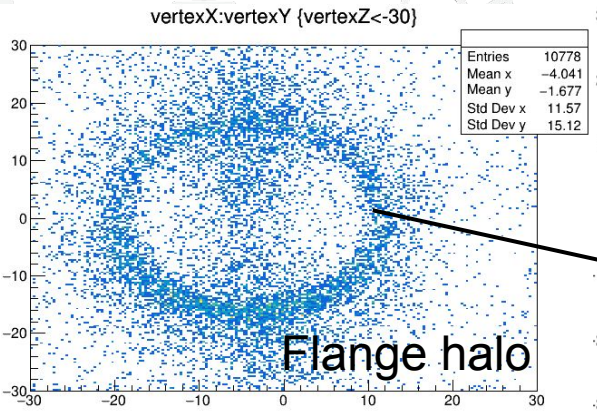
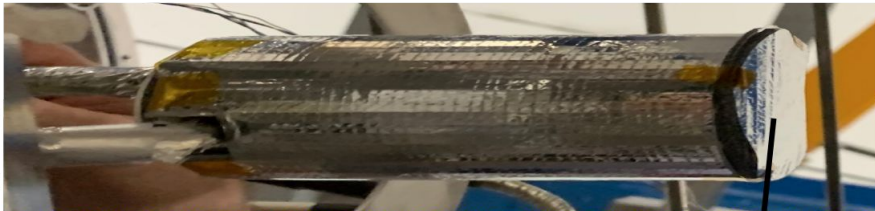
Foot vertex

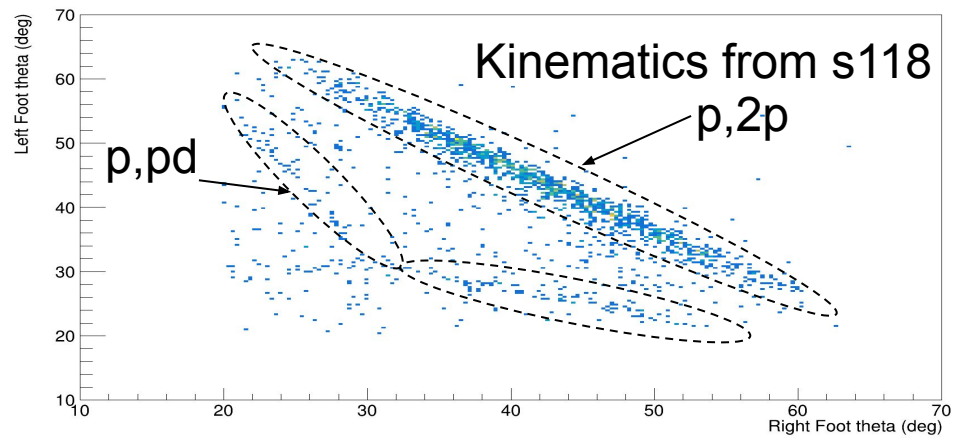
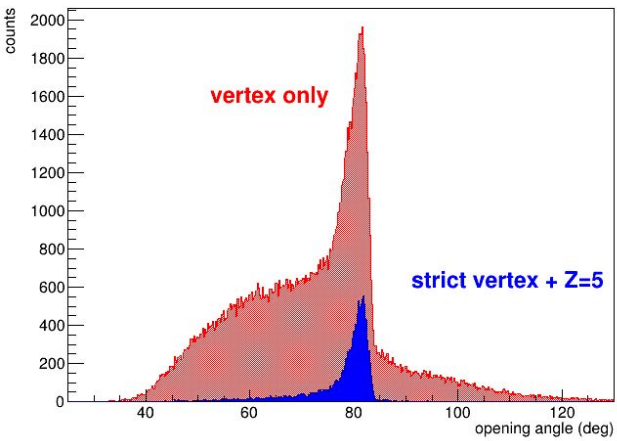
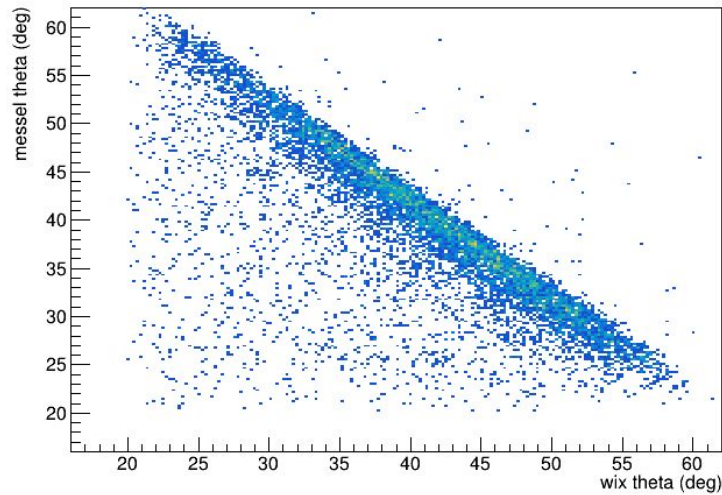
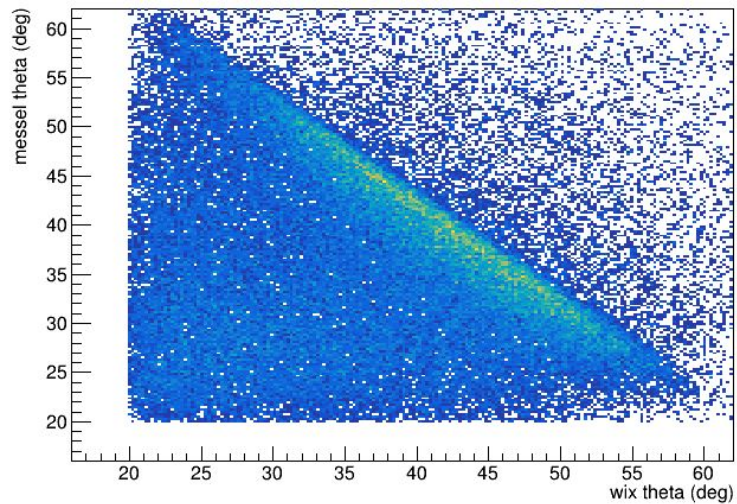


Example vertex reconstruction



Foot vertex



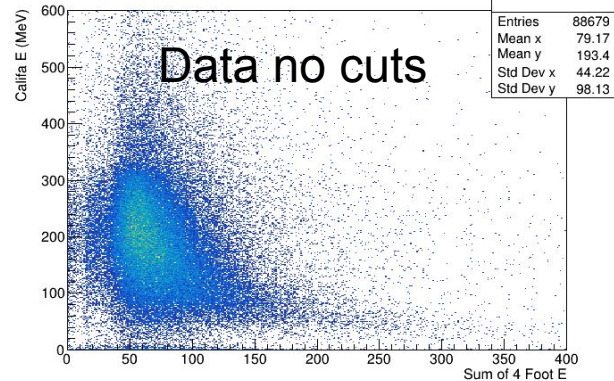


4 Foot dE Sum vs Califa E

P,2p simulation

h_p2p_energy	
Entries	255720
Mean x	0.6618
Mean y	167.3
Std Dev x	0.2738
Std Dev y	69.75

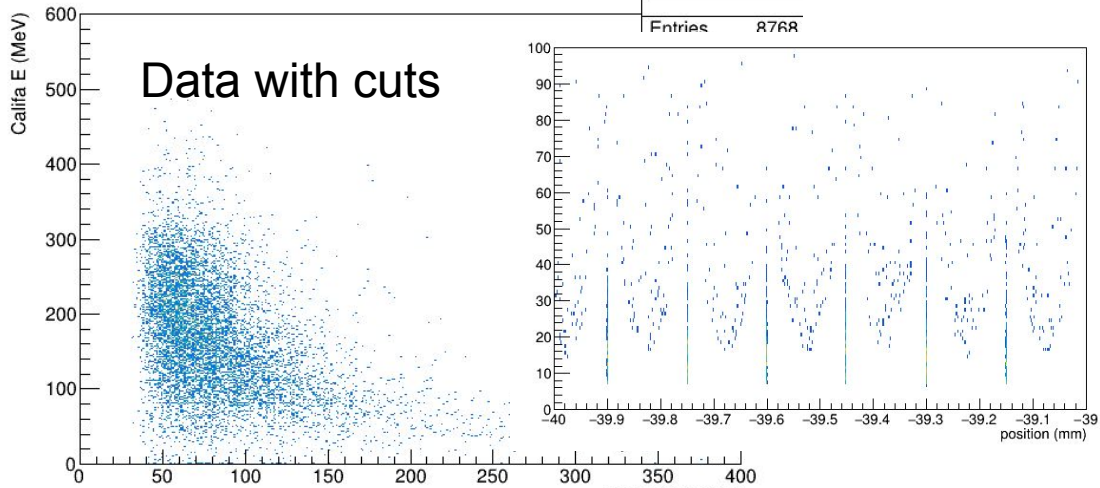
Can we use Foot
dE vs Califa E for
PID?



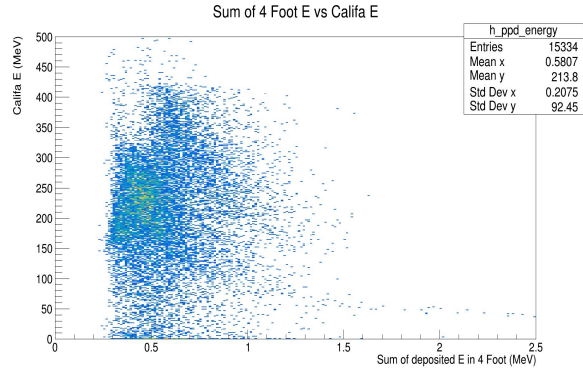
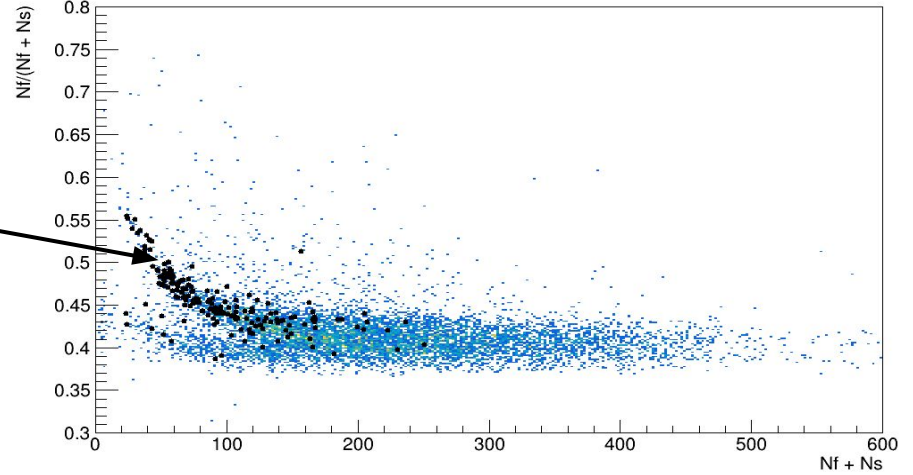
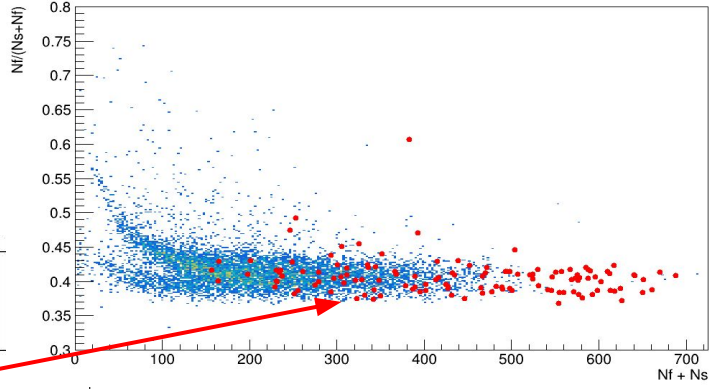
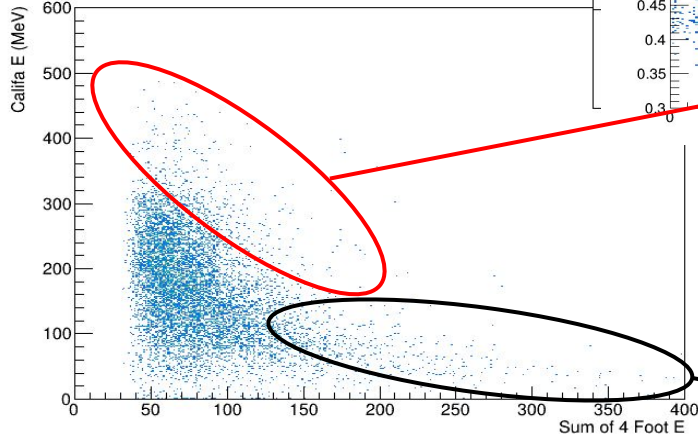
Sum of 4 Foot E vs Califa E

p,pd simulation

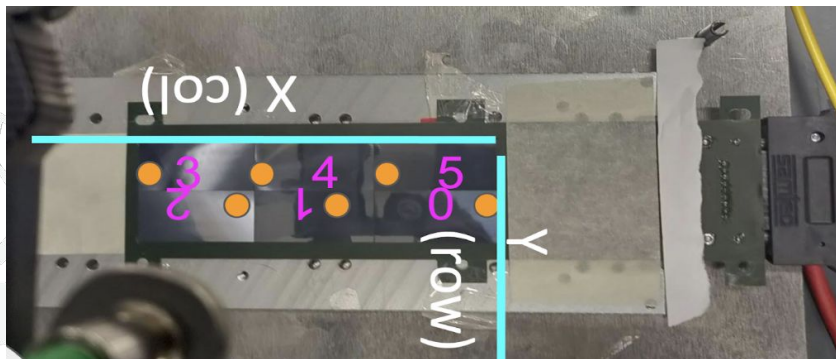
h_ppd_energy	
Entries	15334
Mean x	0.5807
Mean y	213.8
Std Dev x	0.2075
Std Dev y	92.45



QPID

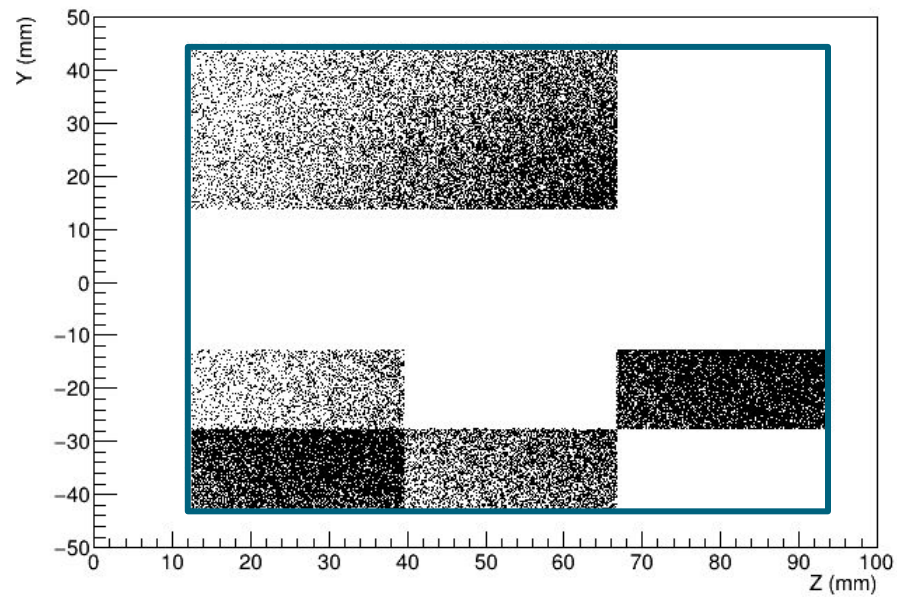
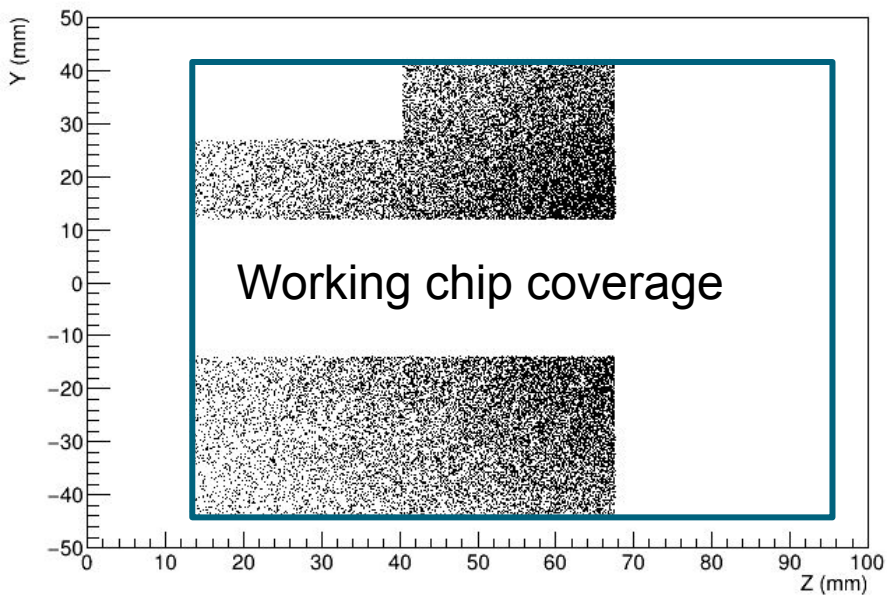


ALPIDE



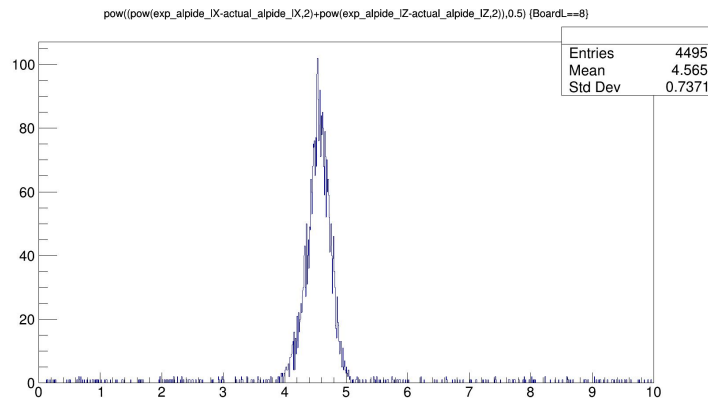
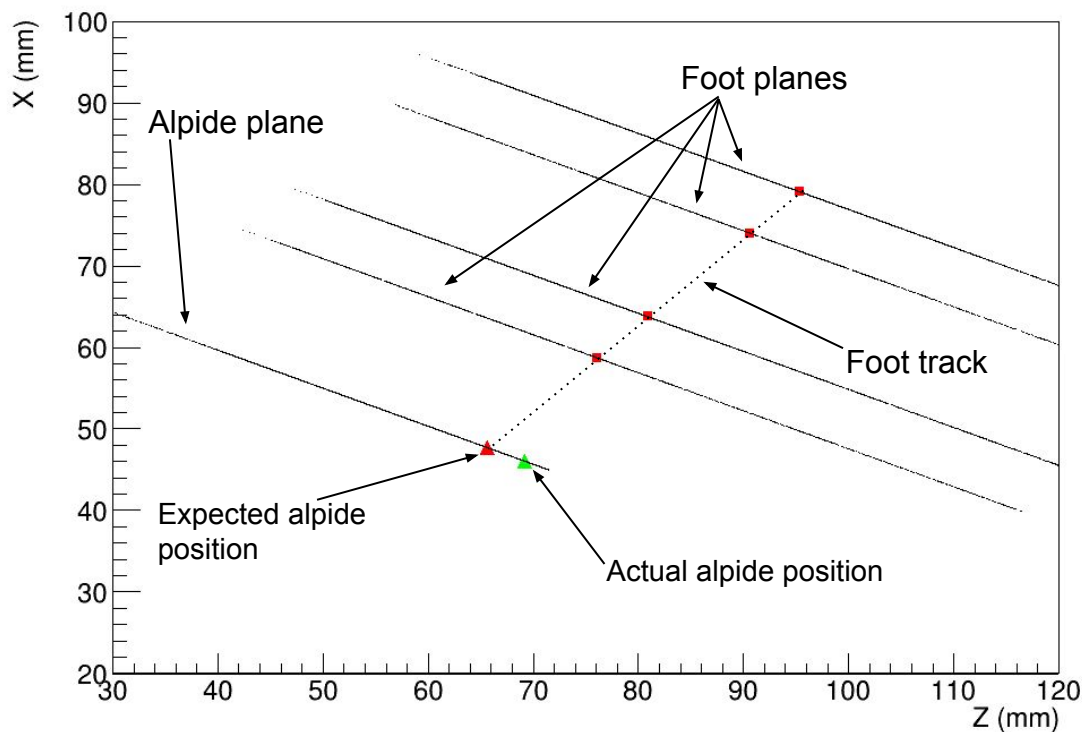
Messel arm

Wixhausen arm



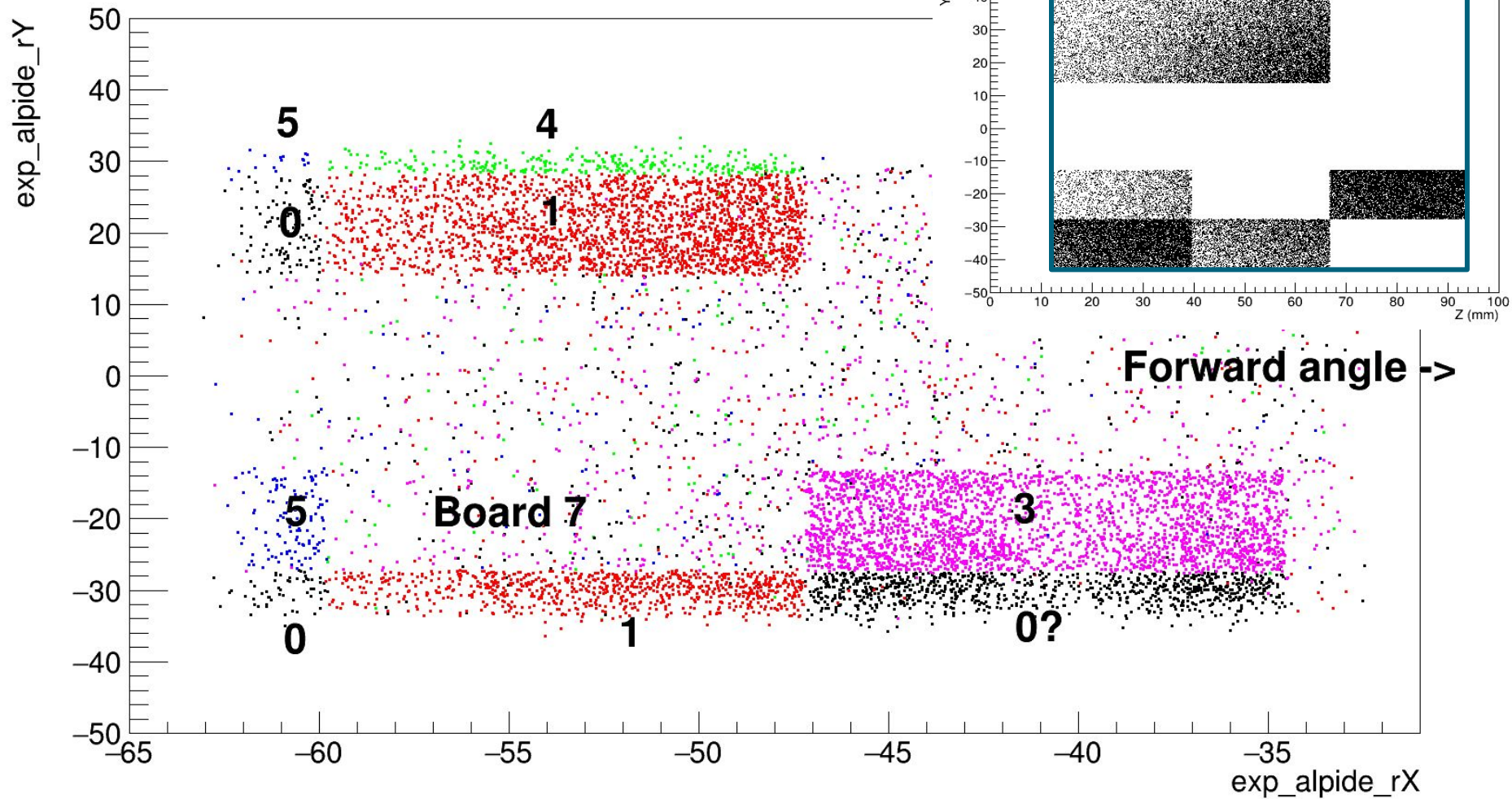
ALPIDE alignment

Alignment with Foot

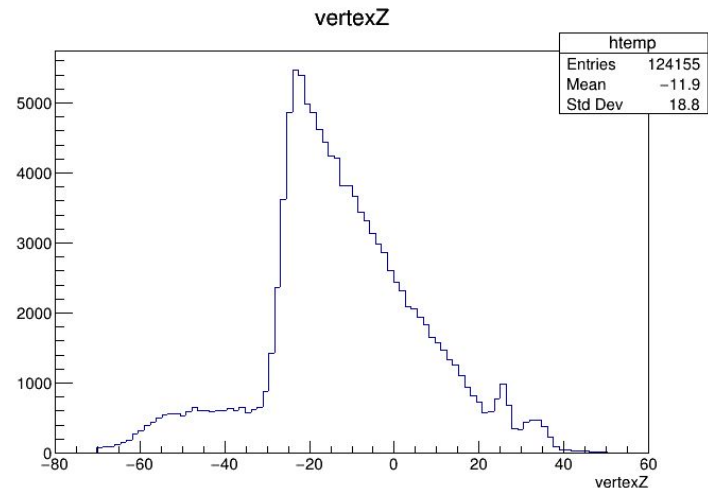
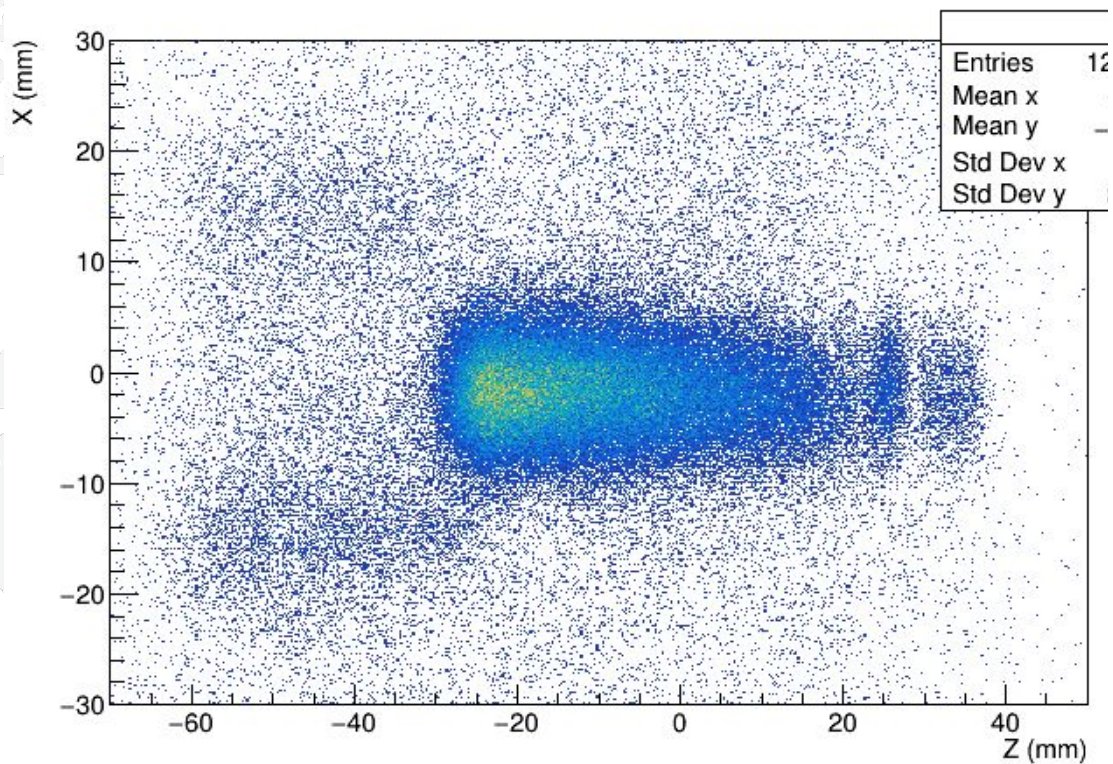


Compare expected position from Foot track with position from drawings - few mm offset in xz and y.

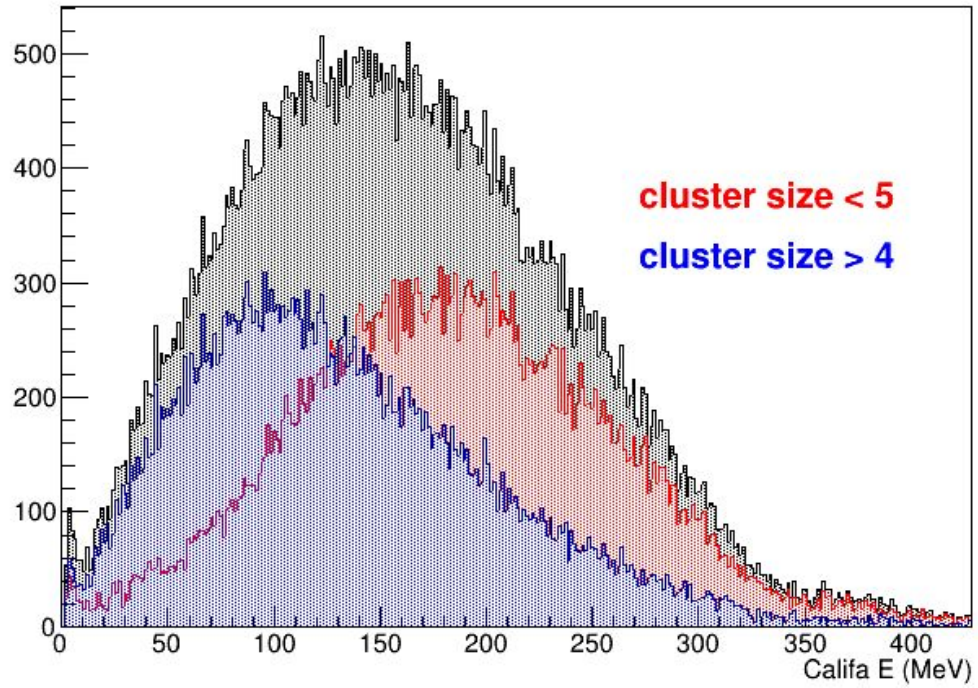
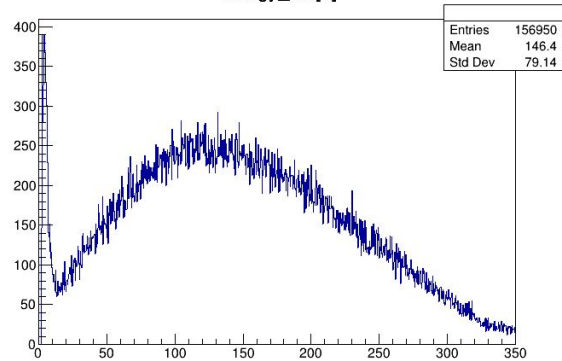
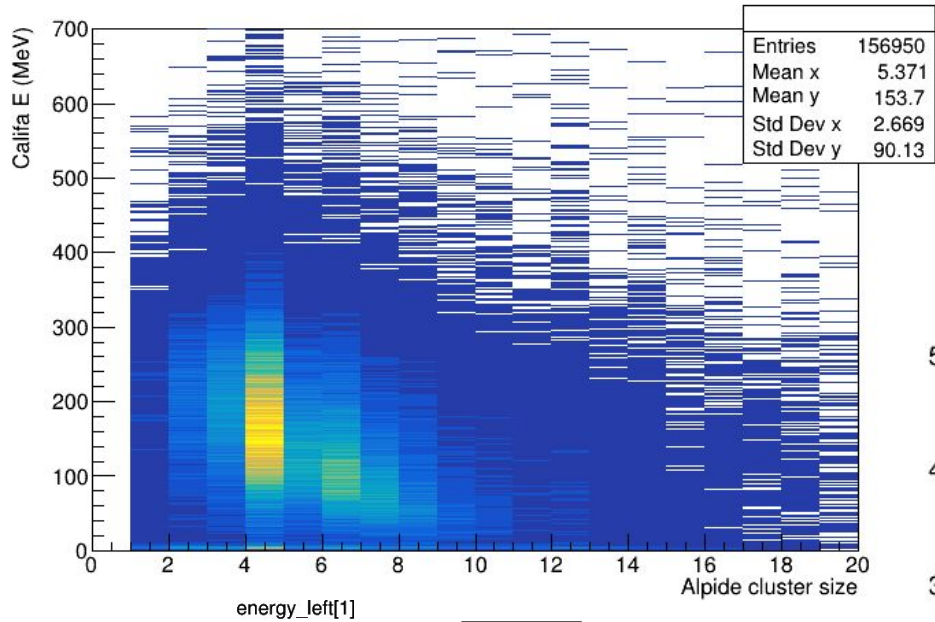
exp_alpide_rY:exp_alpide_rX {BoardF



ALPIDE-CALIFA vertex reconstruction

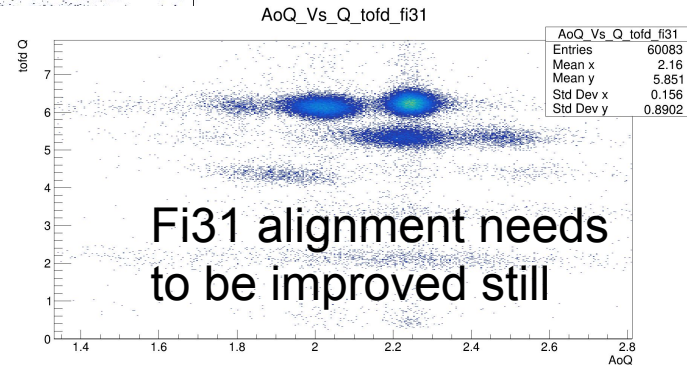
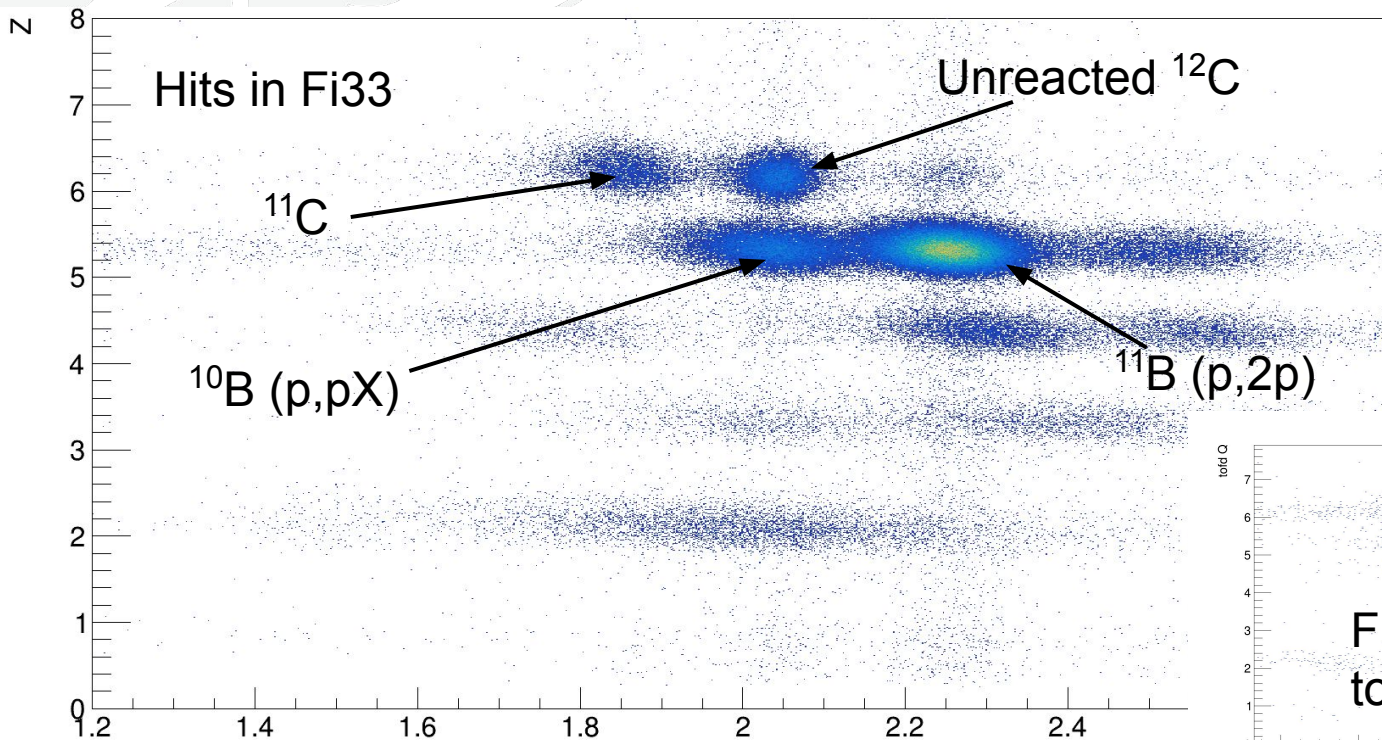


Reduction in downstream reactions due to lack of forward angle coverage



Fragment PID

Outgoing PID obtained using ToF and tracking before and after magnet - MDF function developed for s522/s509.





Thank you for your attention!