
Target Studies for Muon Production



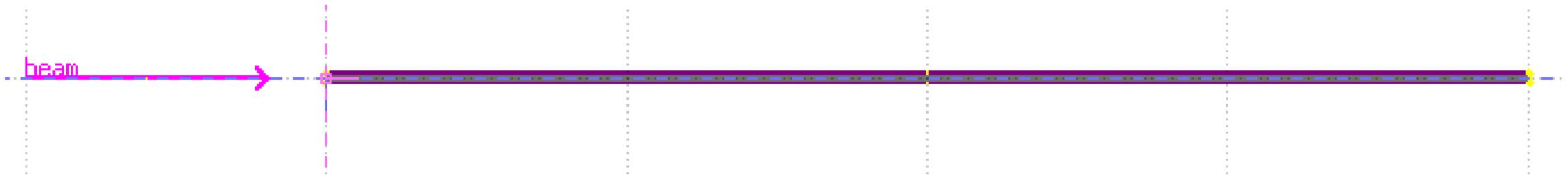
2/10/2025

Ruaa Alharthy

Shielding Module.

Simulation setup

- Material = Graphite
- Length = 40 cm (one interaction length)
- Radius = 0.15 cm
- No magnetic field
- 10,000 primaries



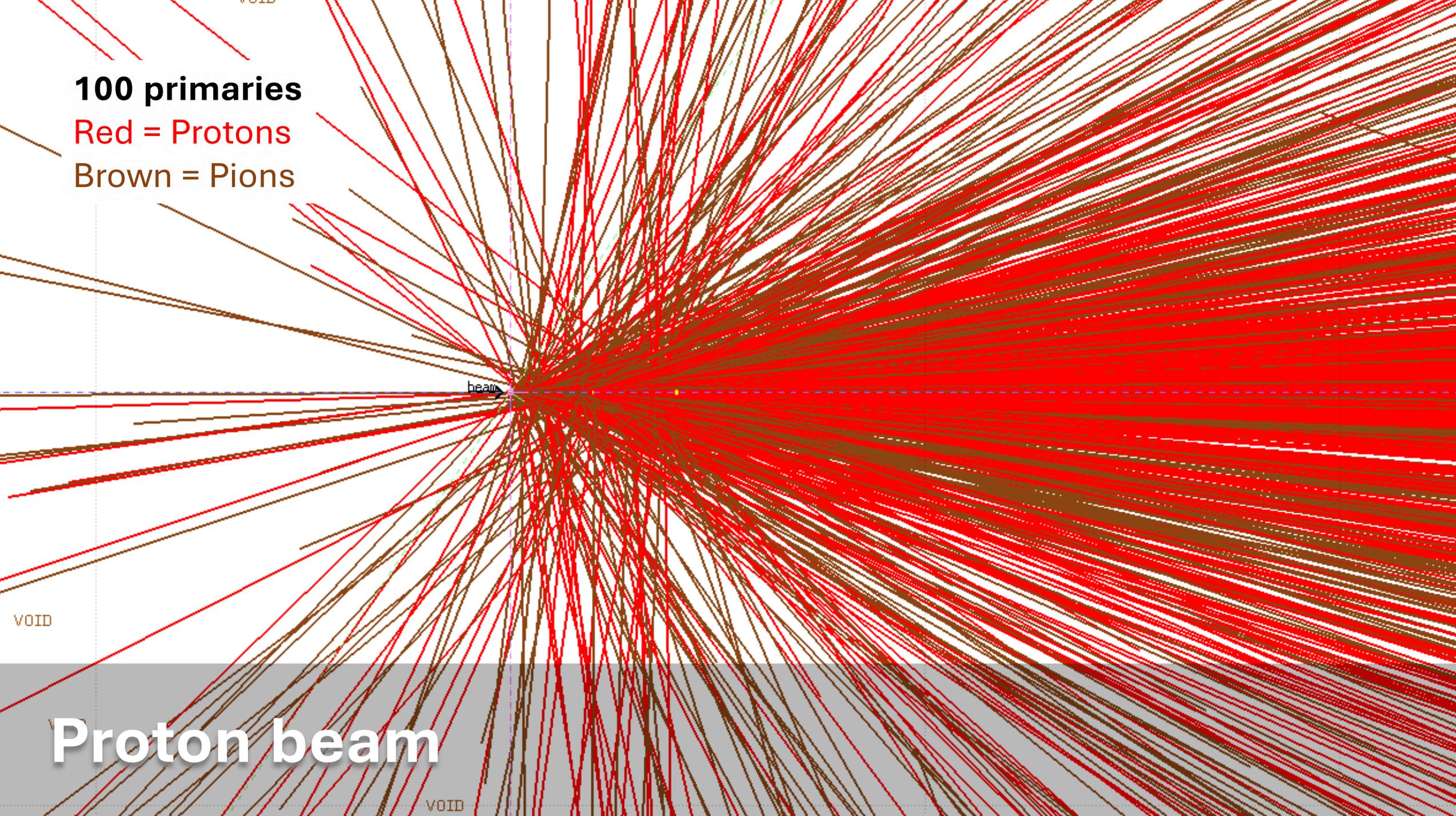
100 primaries

Red = Protons

Brown = Pions

beam

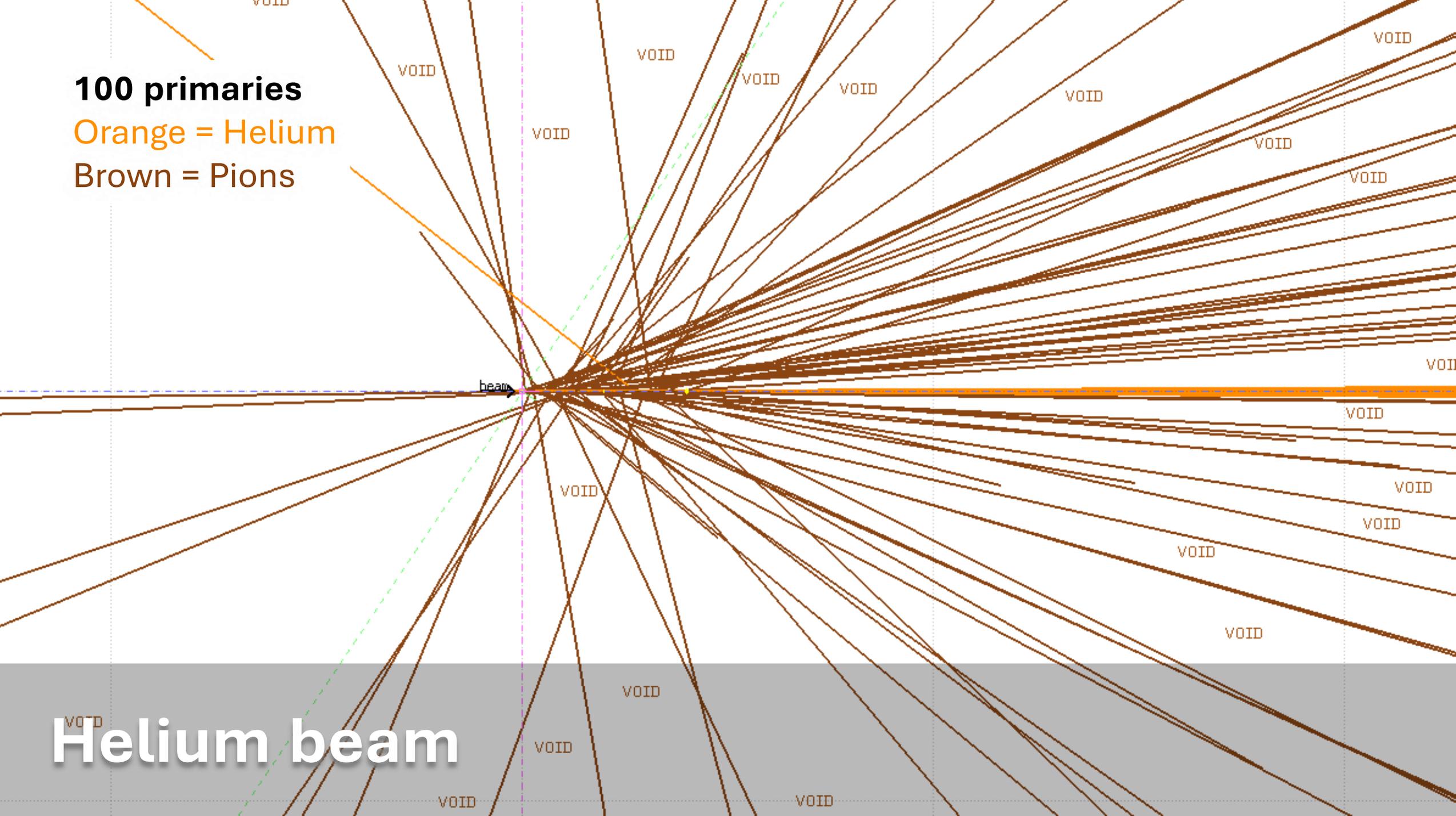
Proton beam



100 primaries

Orange = Helium

Brown = Pions



VOID
Helium beam

100 primaries

Green = Lithium

Brown = Pions

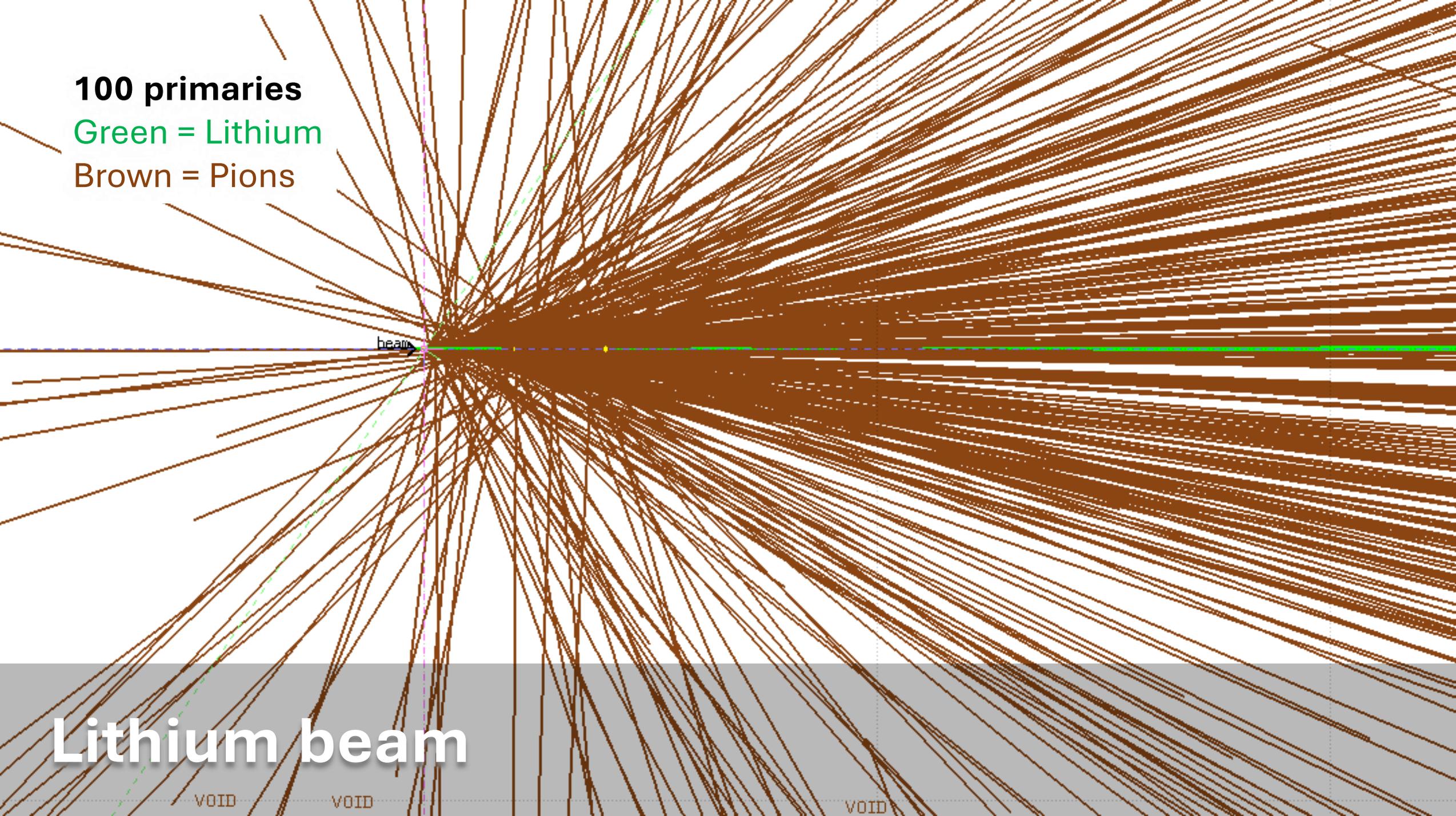
beam →

Lithium beam

VOID

VOID

VOID



100 primaries

Green = Gold

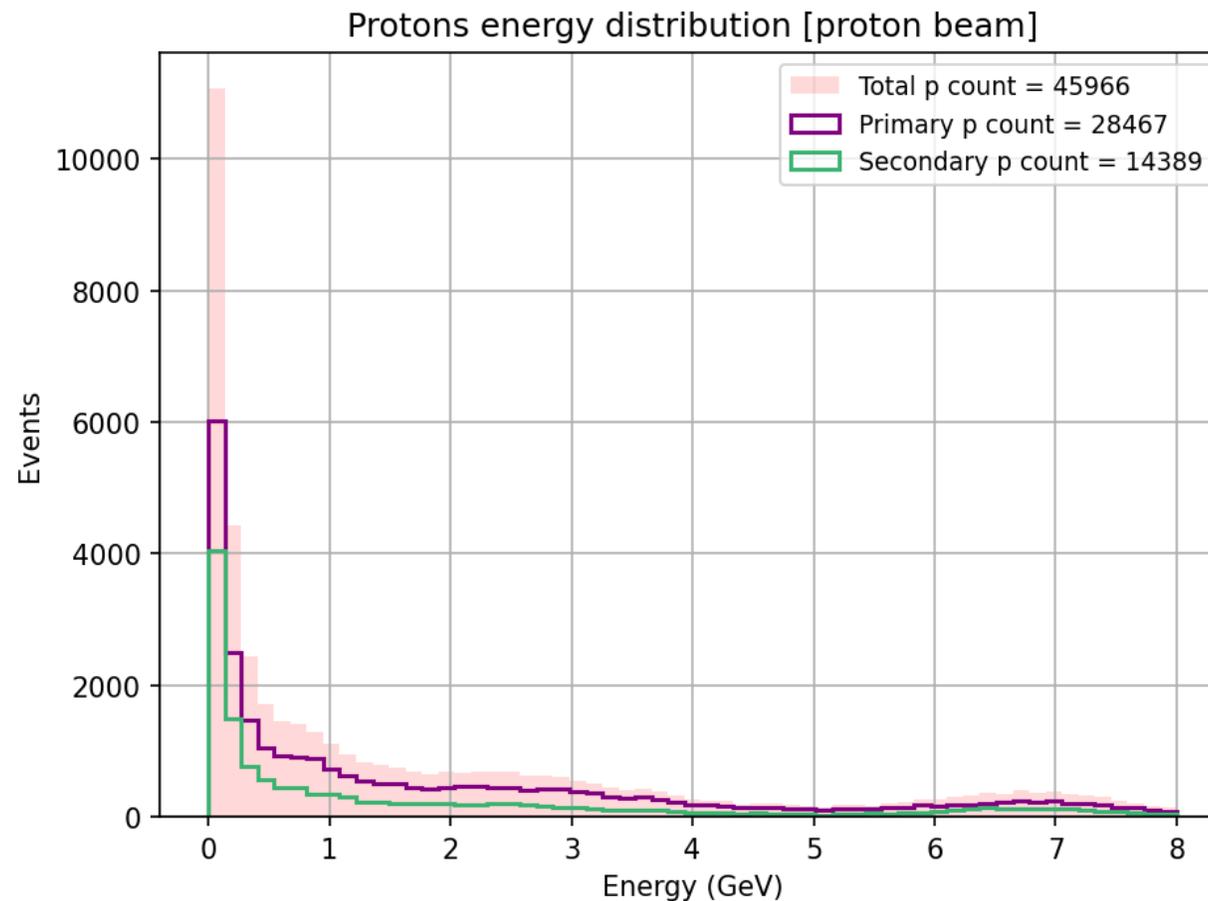
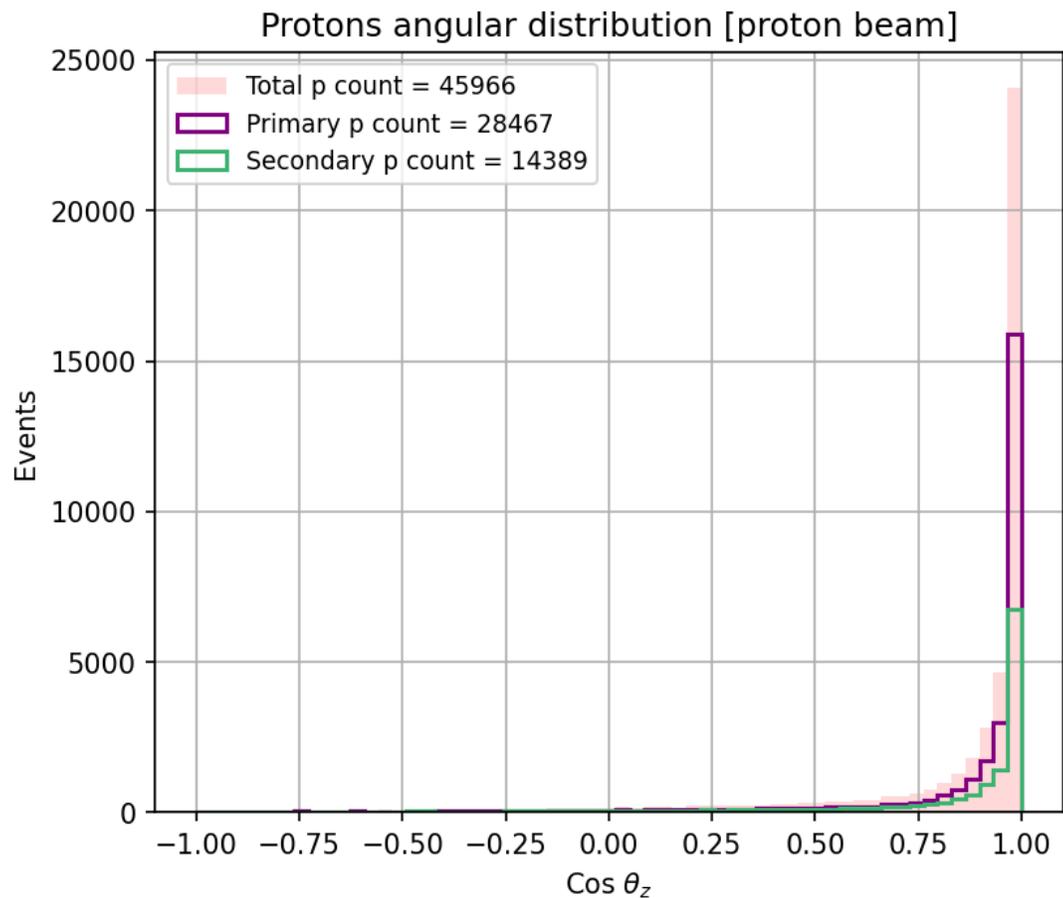
Brown = Pions

beam

Gold beam

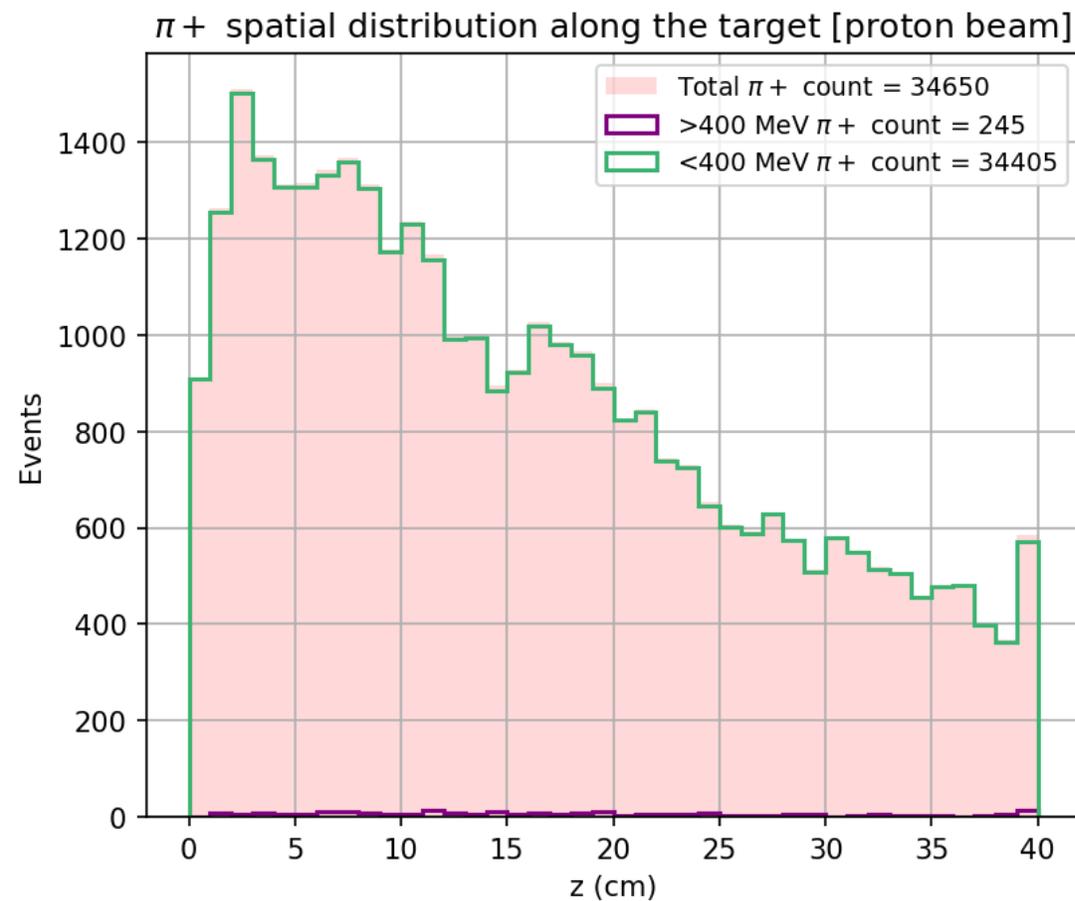
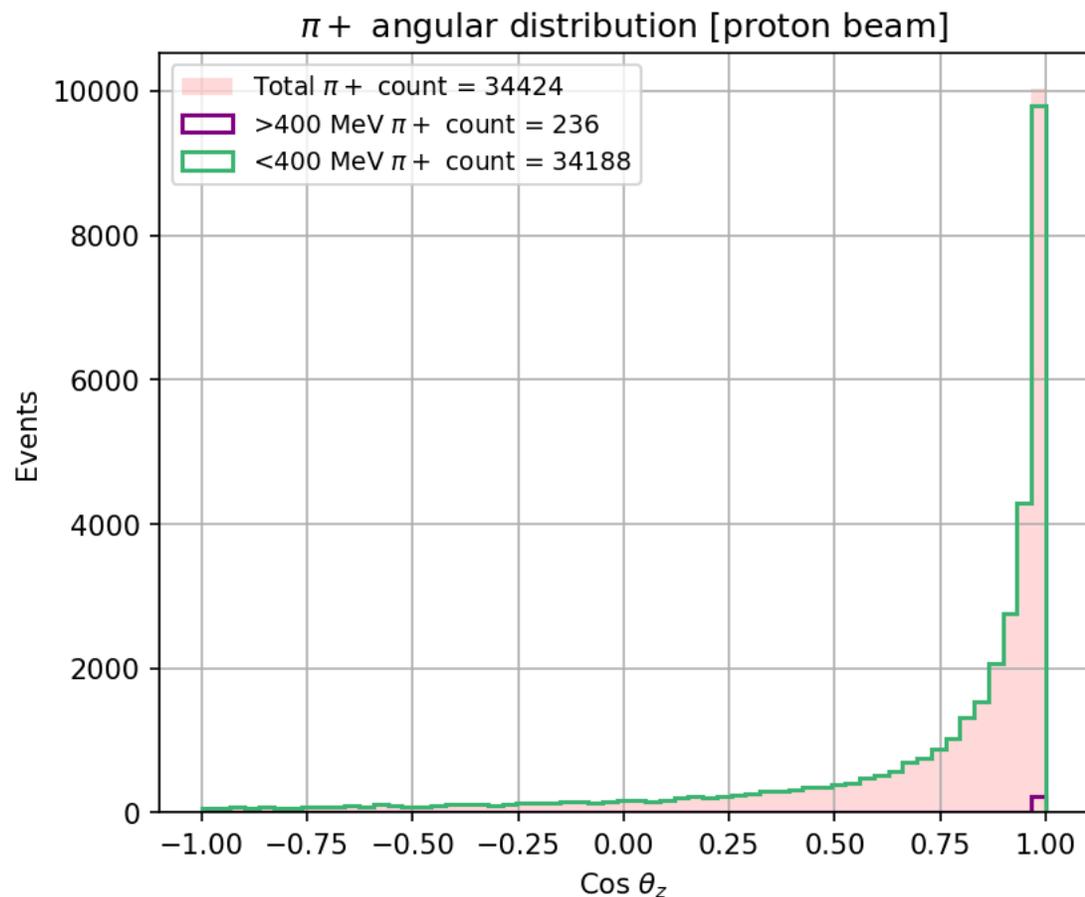
Proton beam ($p = 8 \text{ GeV}/c$) [Graphite]

→ Protons



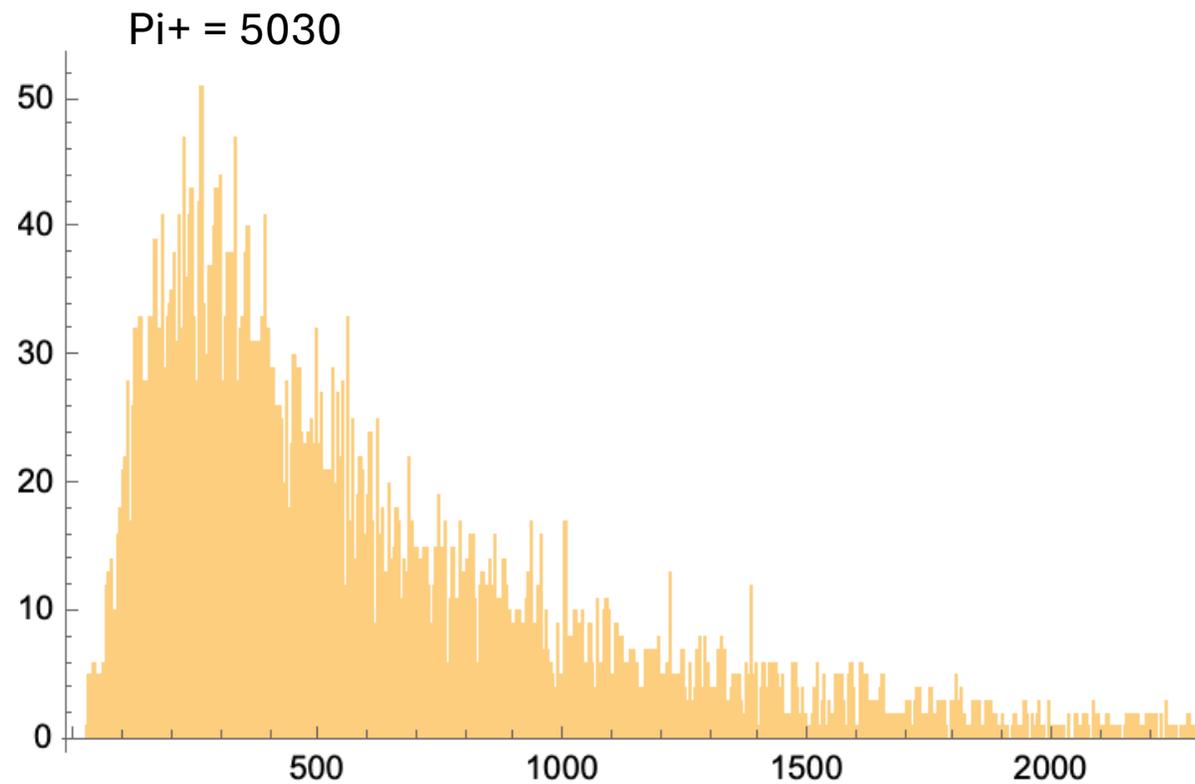
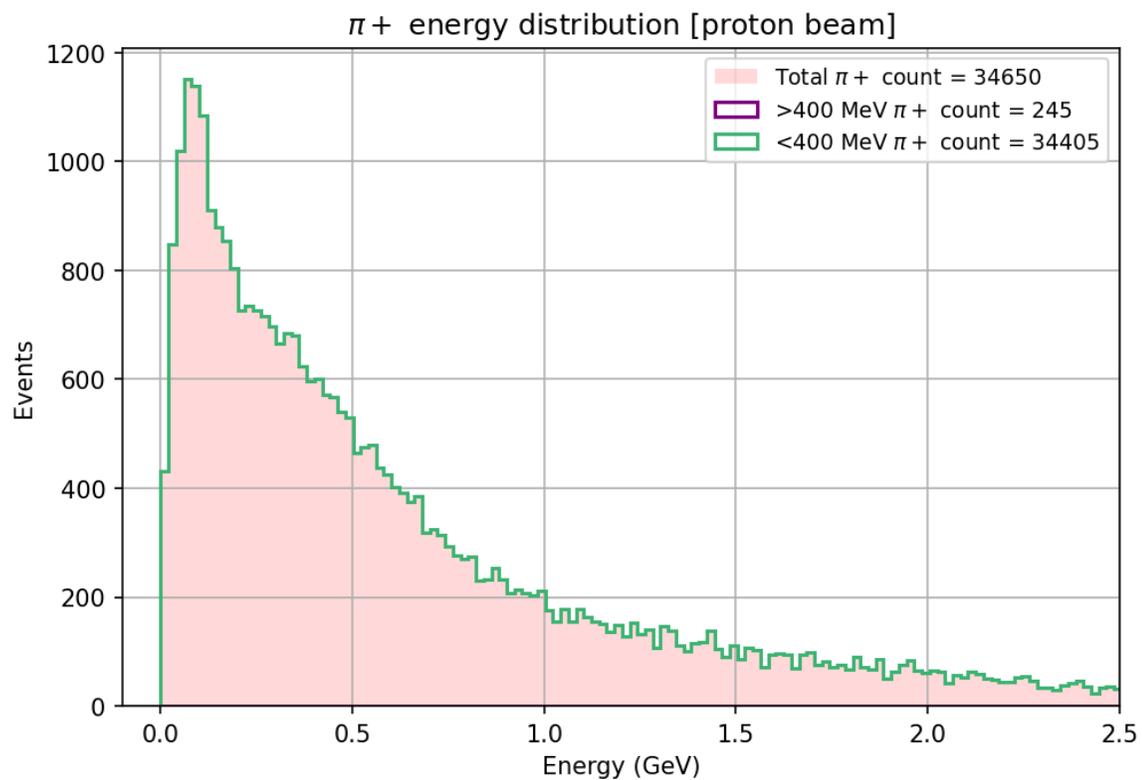
Proton beam ($p = 8 \text{ GeV}/c$) [Graphite]

→ Pions



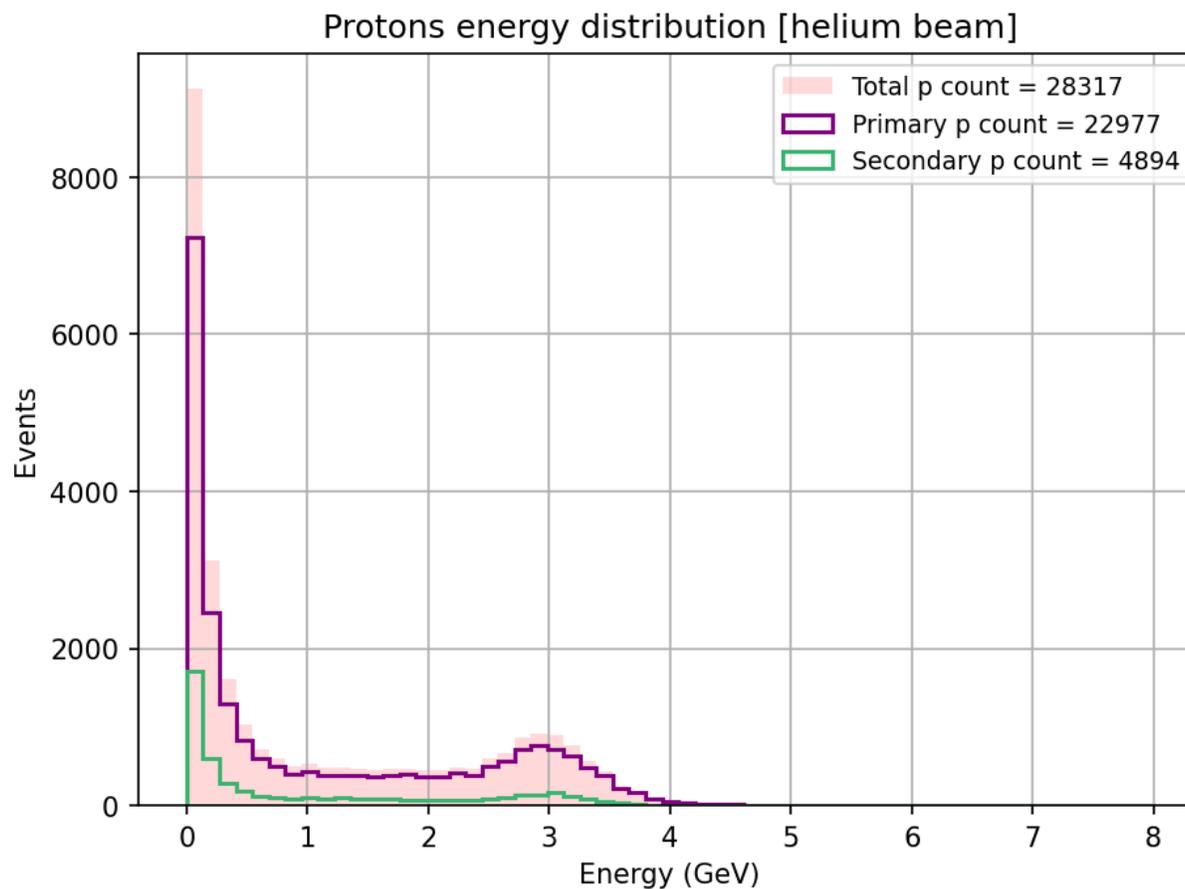
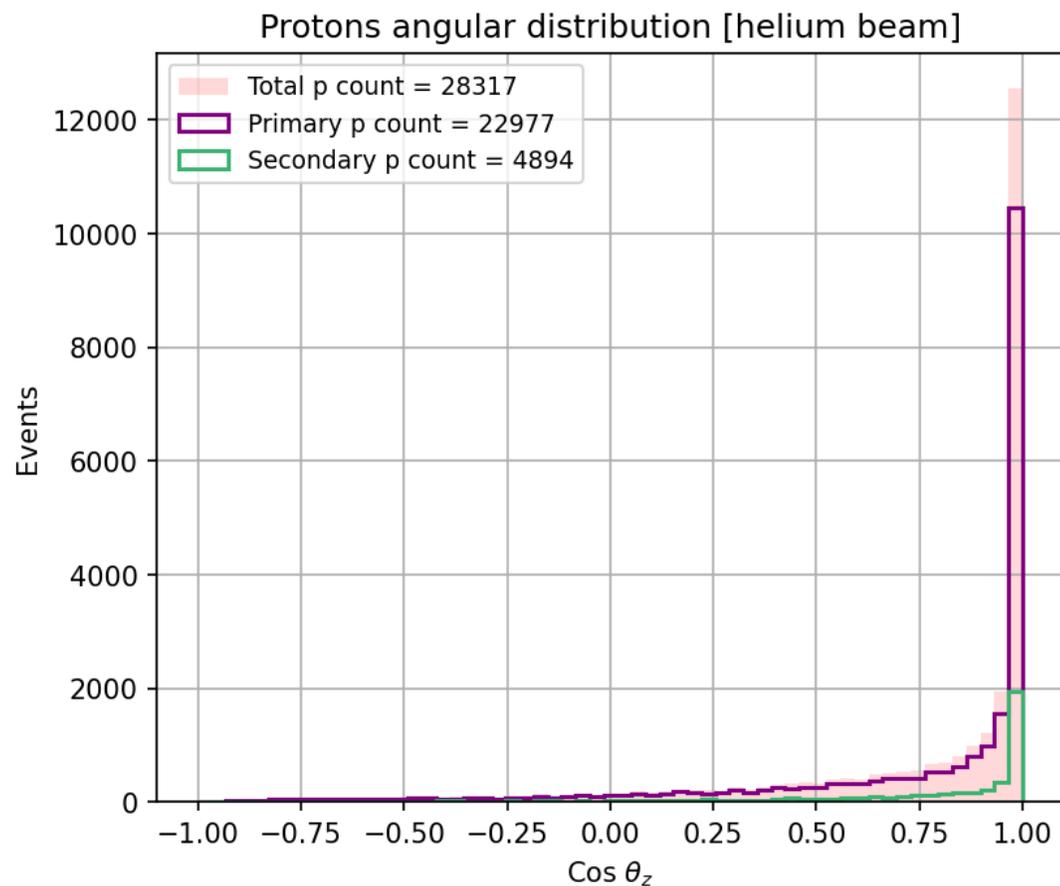
Proton beam ($p = 8 \text{ GeV}/c$) [Graphite]

→ Pions



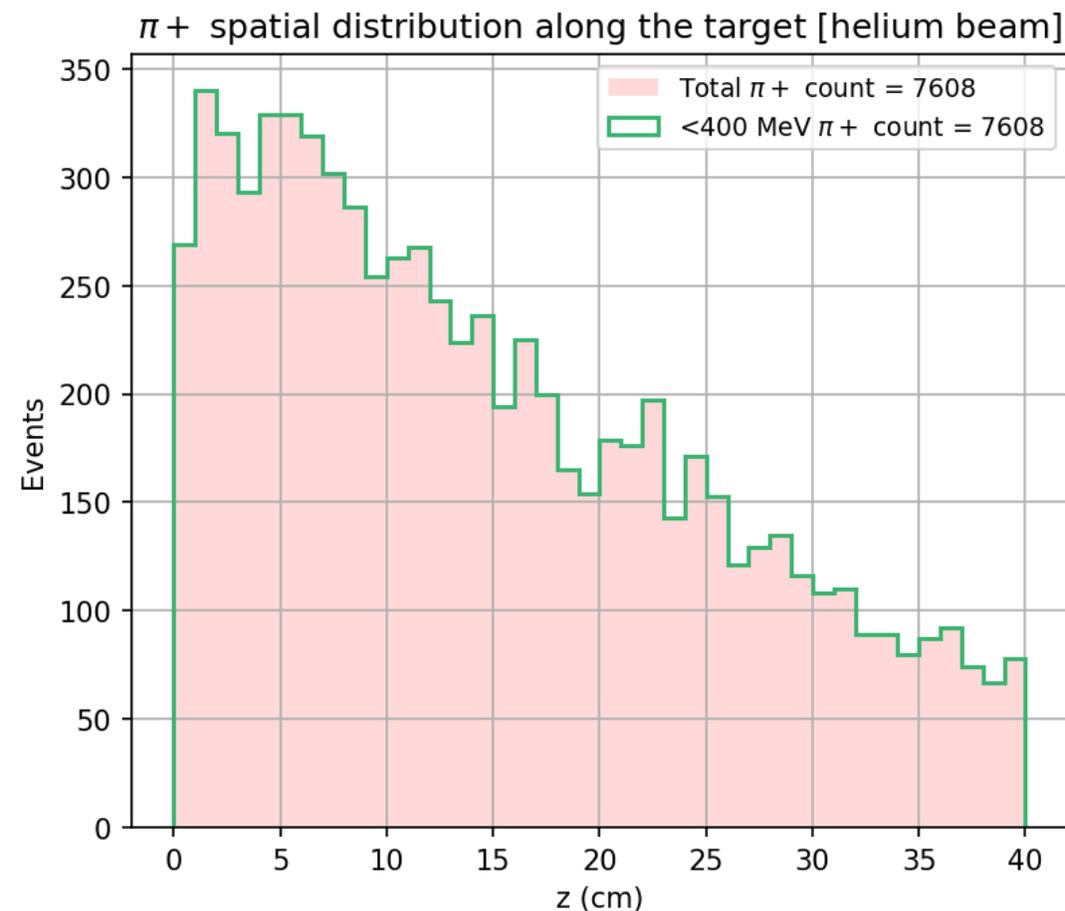
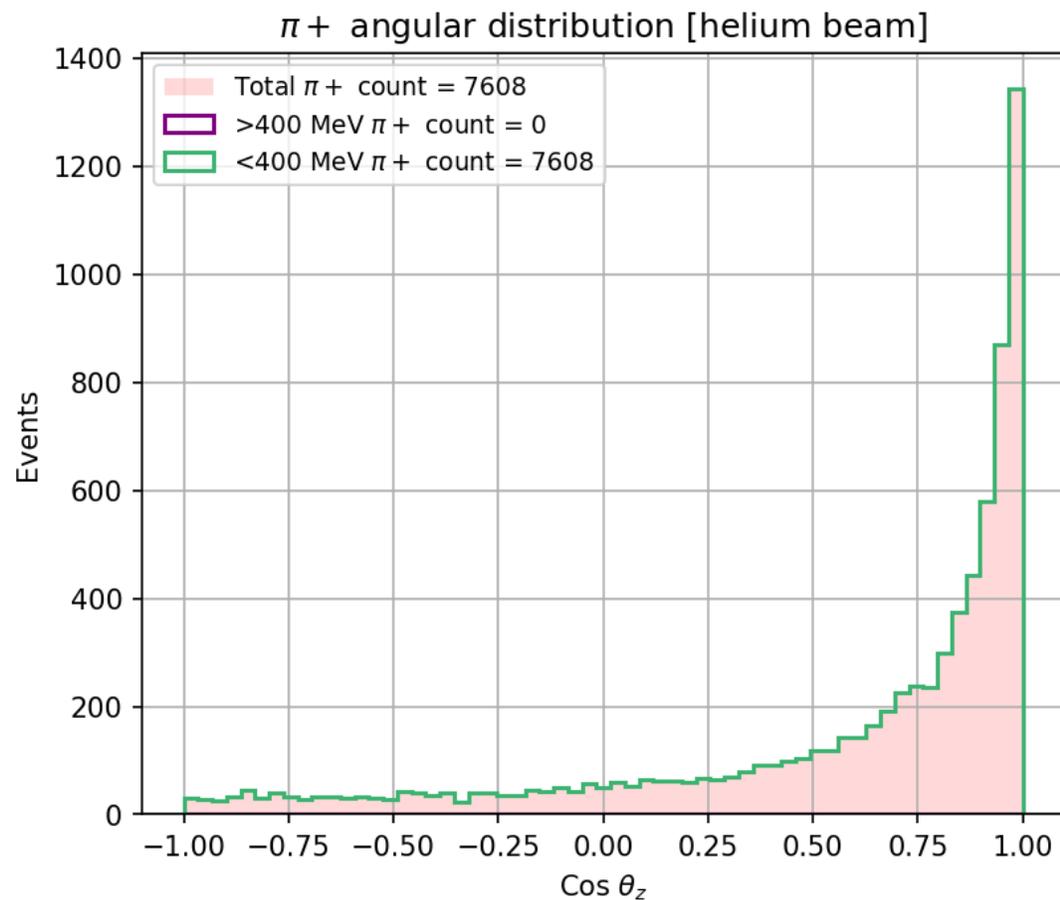
Helium beam ($p = 16 \text{ GeV}/c$) [Graphite]

→ Protons



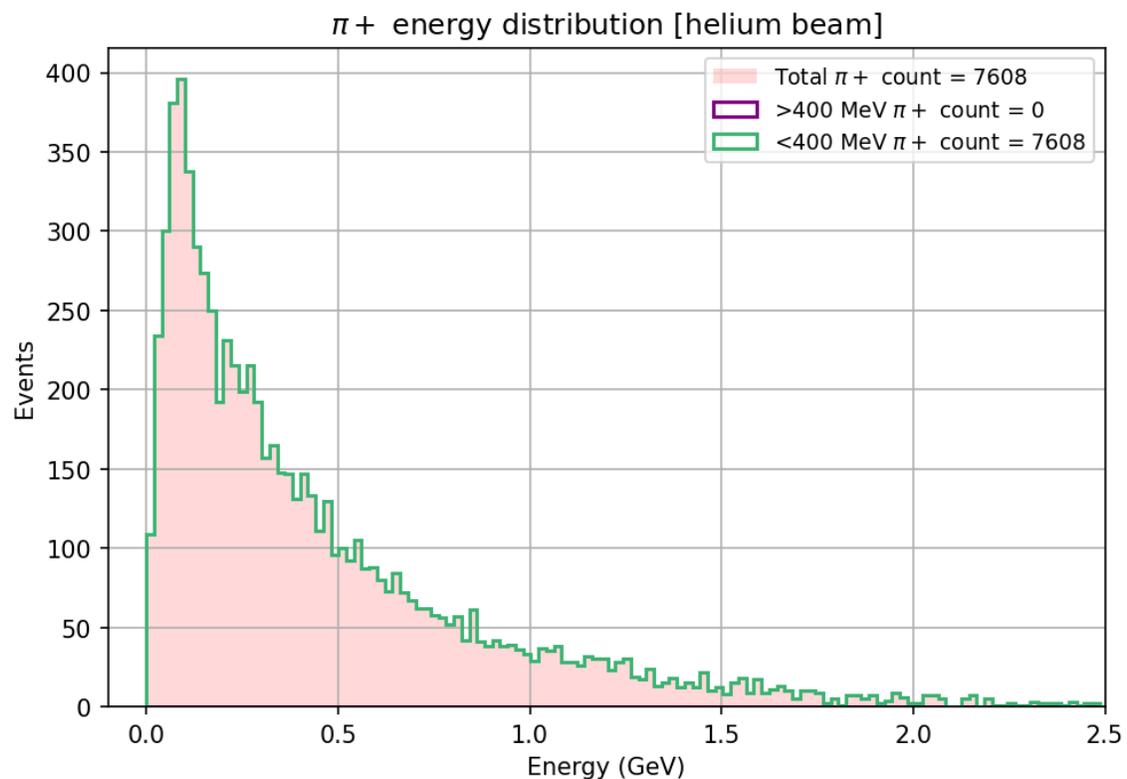
Helium beam ($p = 16 \text{ GeV}/c$) [Graphite]

→ Pions

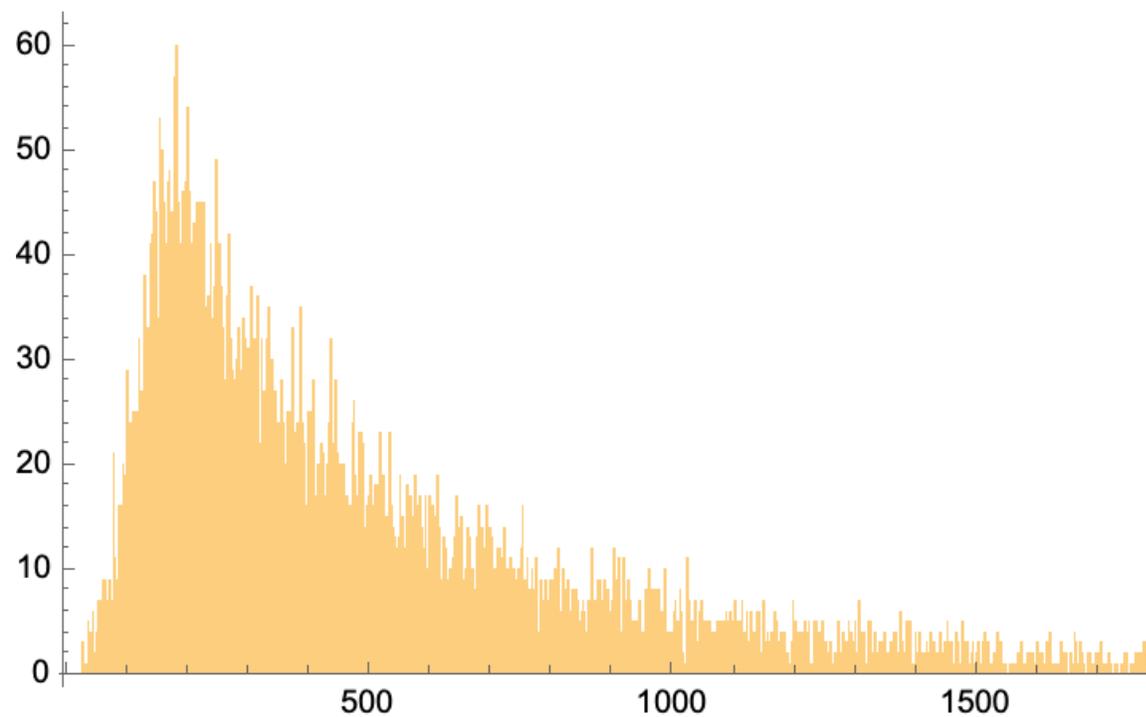


Helium beam ($p = 16 \text{ GeV}/c$) [Graphite]

→ Pions

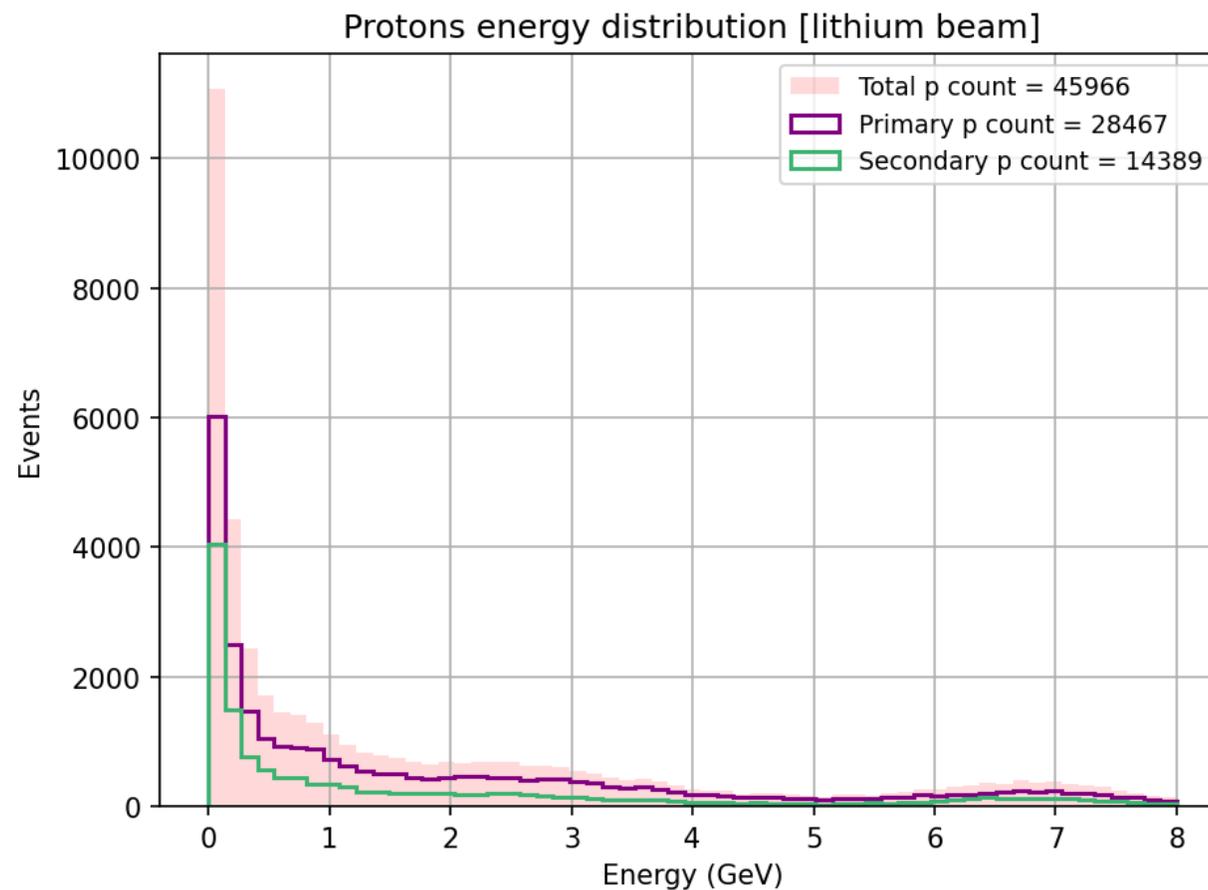
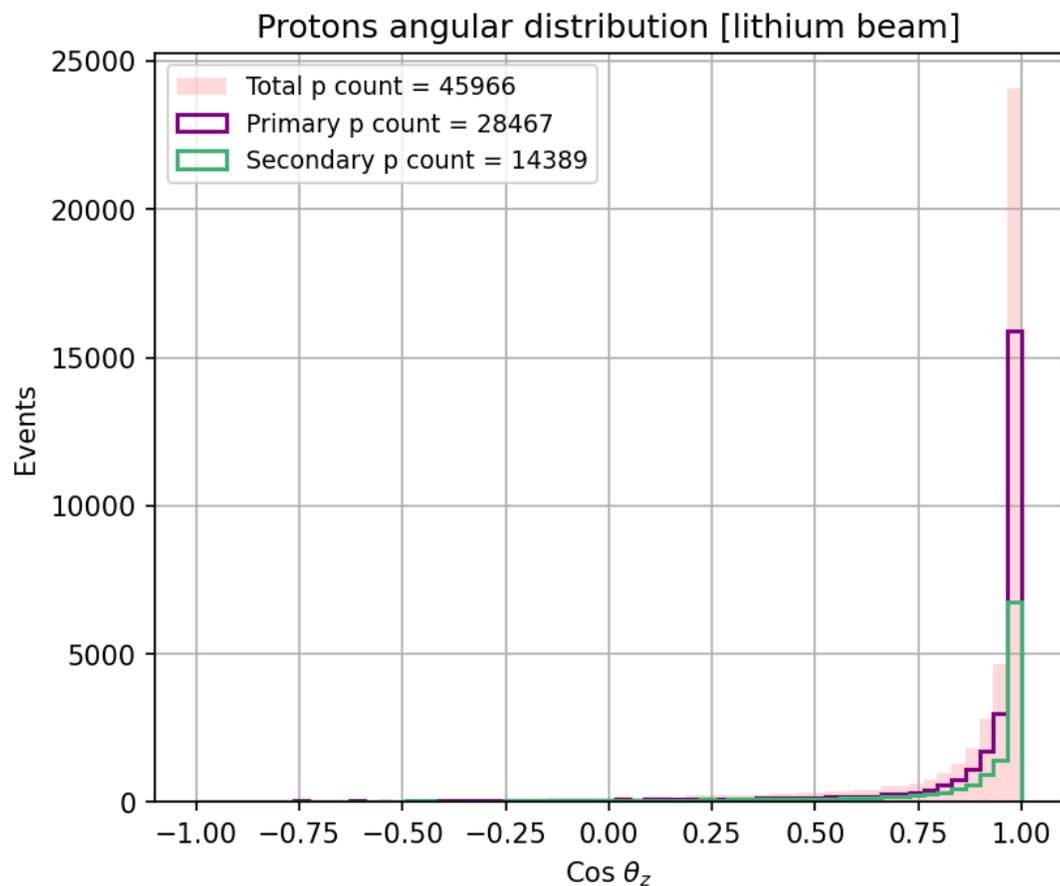


$\text{Pi}^+ = 9388$



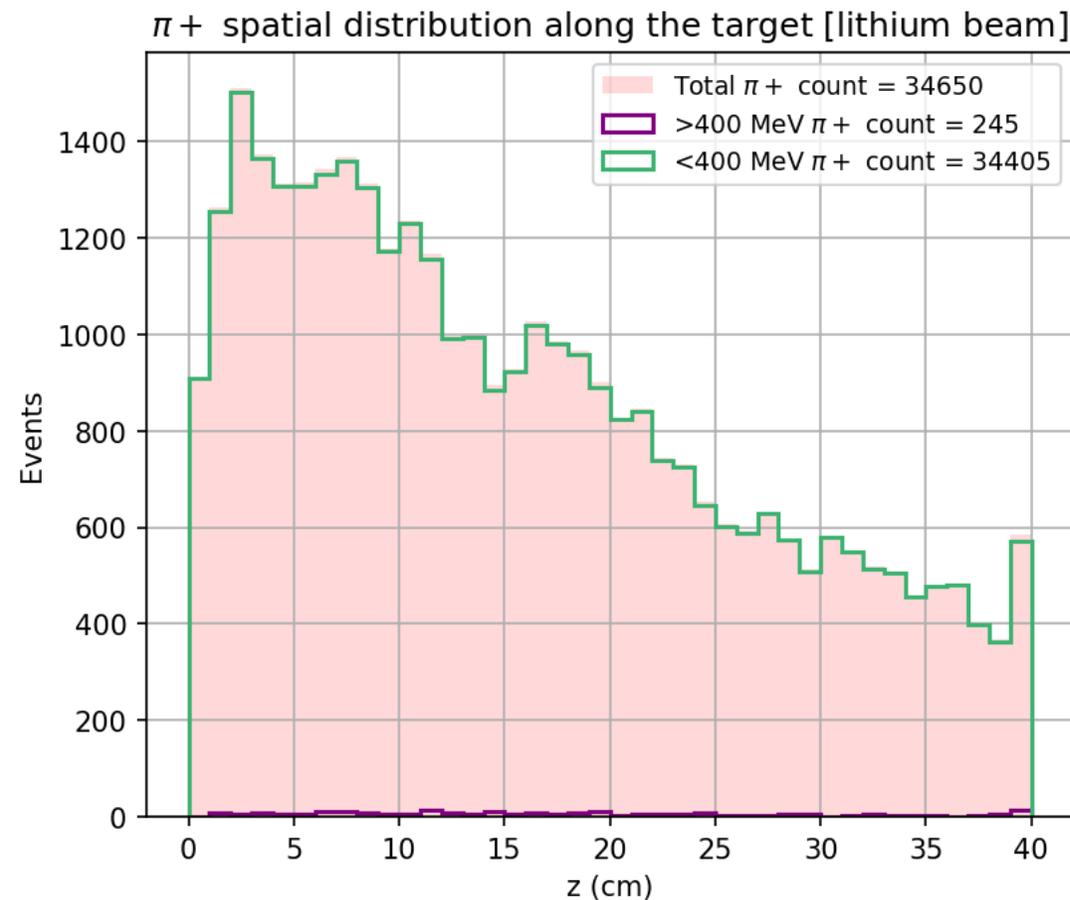
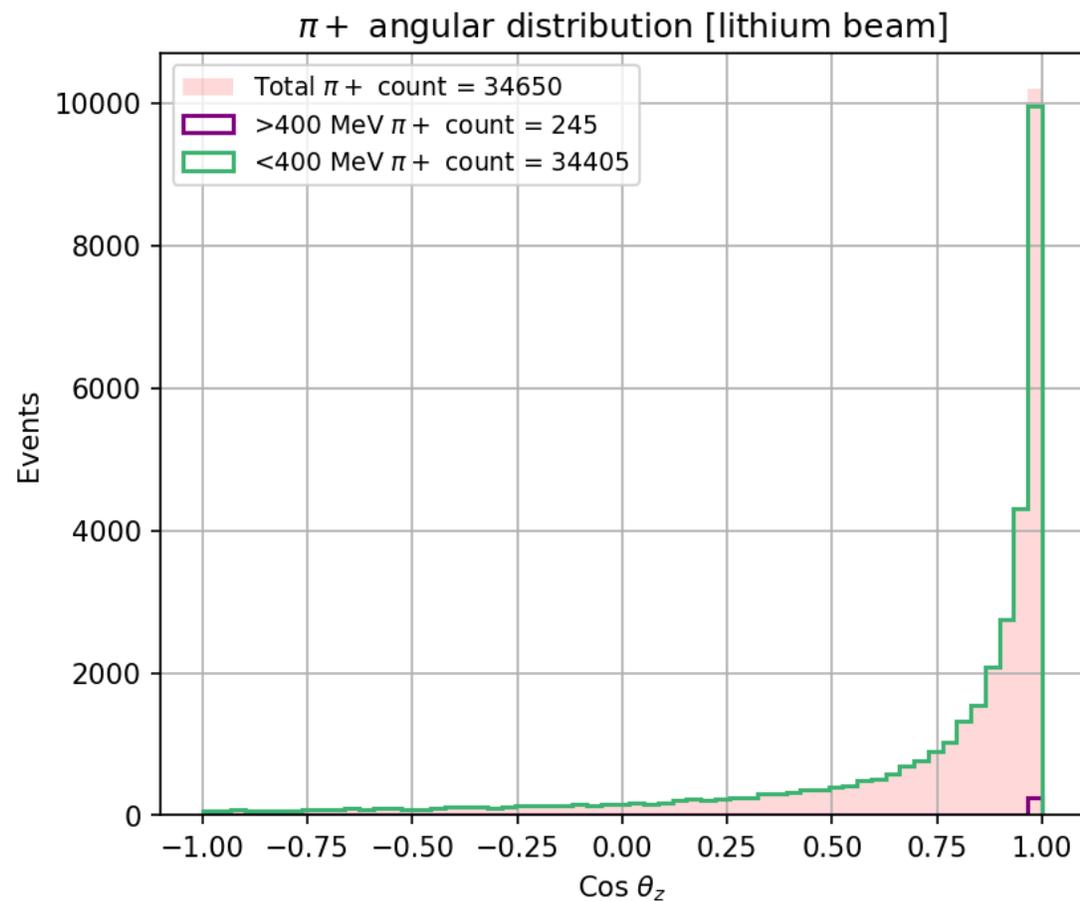
Lithium beam ($p = 24 \text{ GeV}/c$) [Graphite]

→ Protons



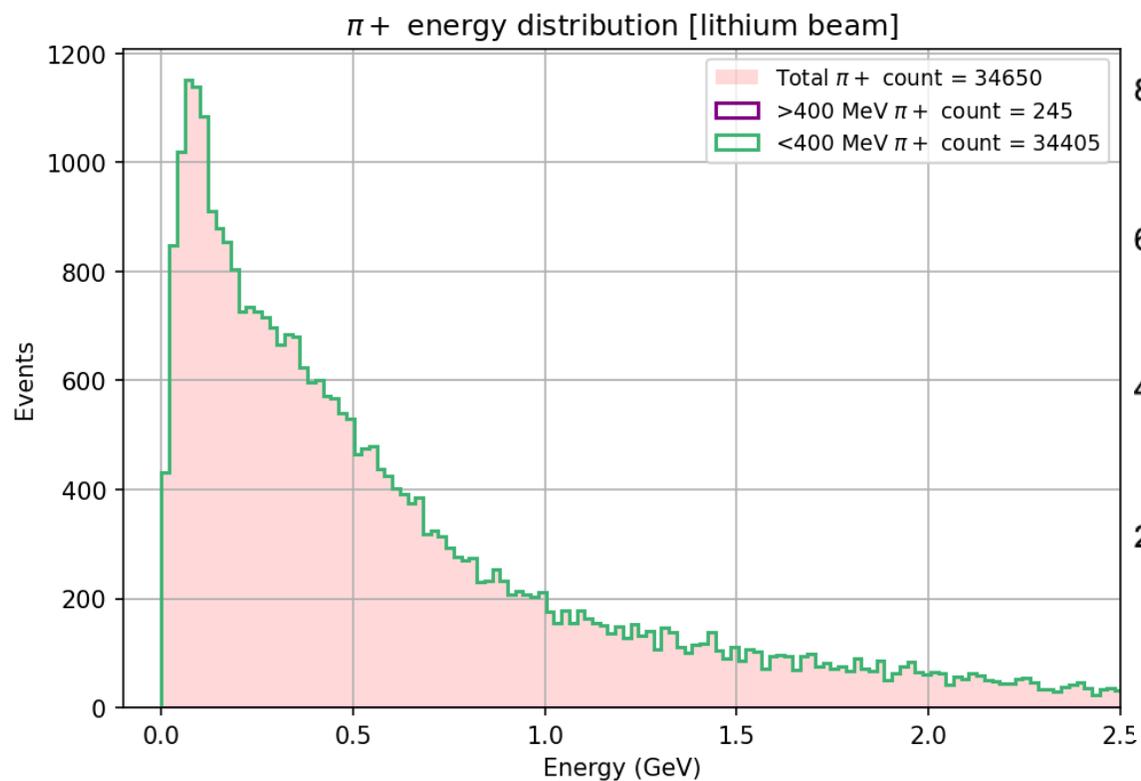
Lithium beam ($p = 24 \text{ GeV}/c$) [Graphite]

→ Pions

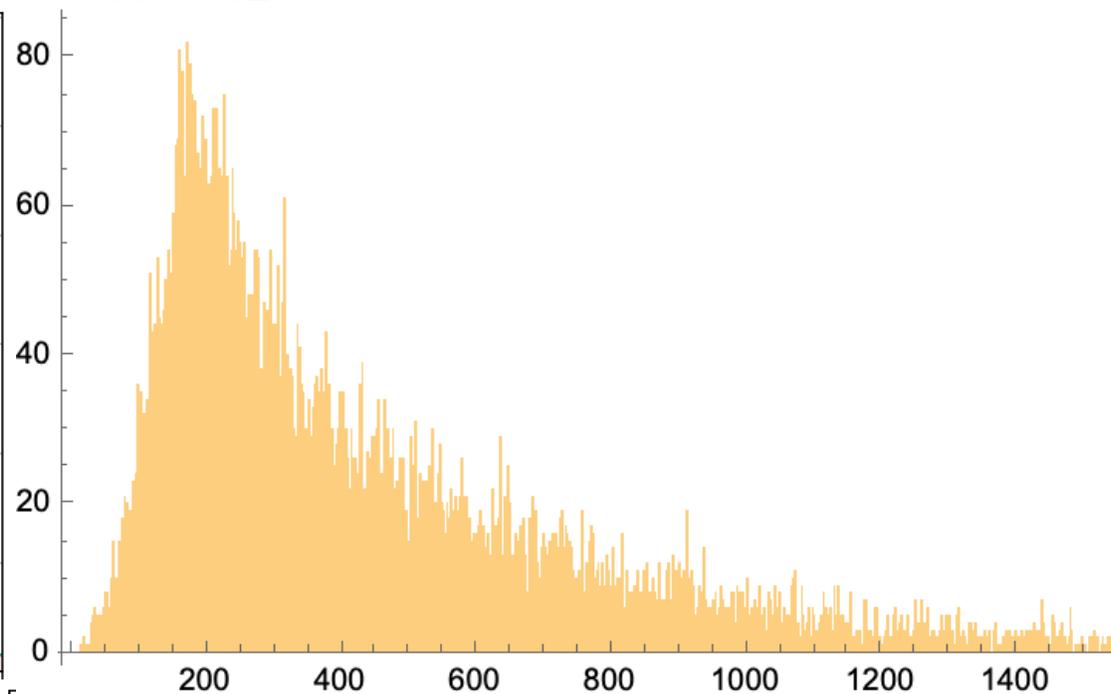


Lithium beam ($p = 24 \text{ GeV}/c$) [Graphite]

→ Pions



$\text{Pi}^+ = 12765$



Notes

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- Last week, my simulations took very long to finish
 - Met with Micheal Hedges to go over my Fluka setup
 - Simplified the study to learn more about the characteristics of pions created by targets
 - This week's results look drastically different than what I had last week:
 - I used a different function to extract data (mgdraw instead of fluscw)
 - Maybe these two functions use different models?
 - I think there are bugs with my code. I started to work on it on Sunday but couldn't fix it yet