
Target Studies for Pion Production



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Shielding Module.
Target heads

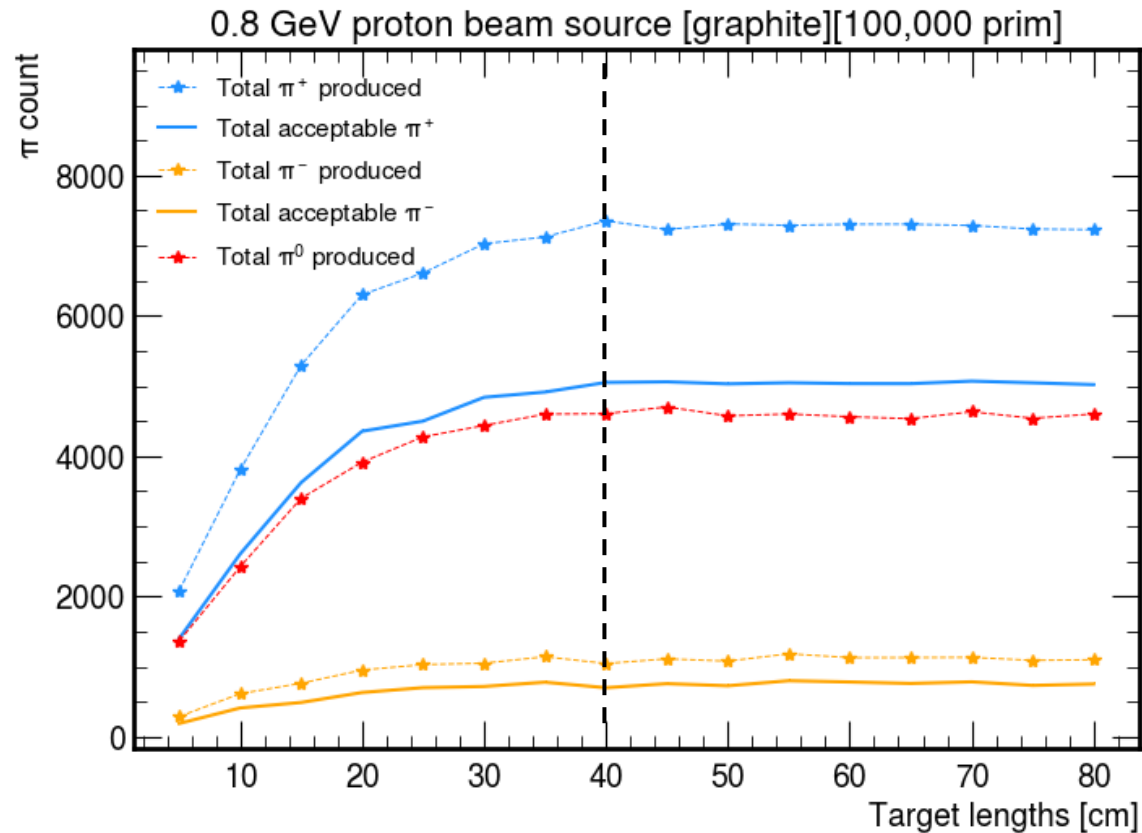
Simulation setup

- Material = *Graphite / Tungsten*
- Length = *Varying length*
- Radius = *Varying radius*
- No magnetic field
- 100,000 primaries
- 0.8 GeV and 8 GeV/c (7 GeV) proton beams

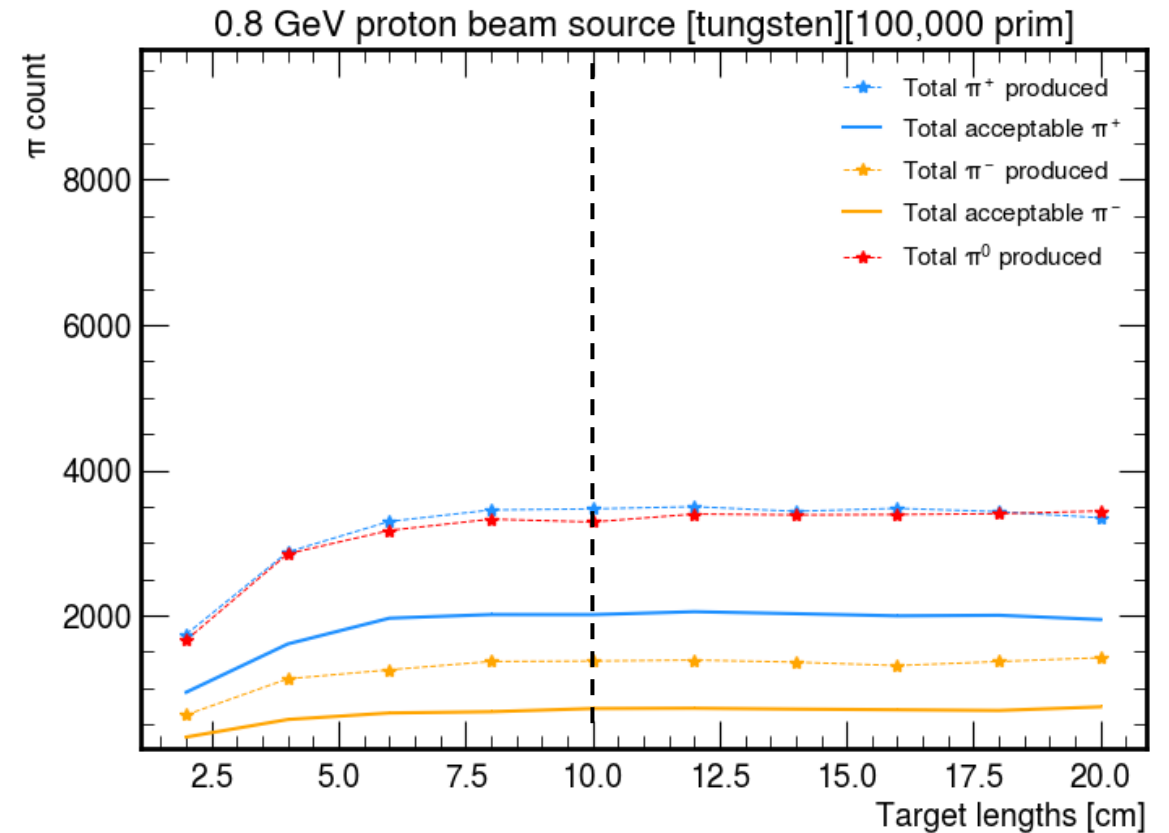


π yields for different target lengths (0.8 GeV), $r = 0.15$ cm - Graphite vs Tungsten

(Graphite)

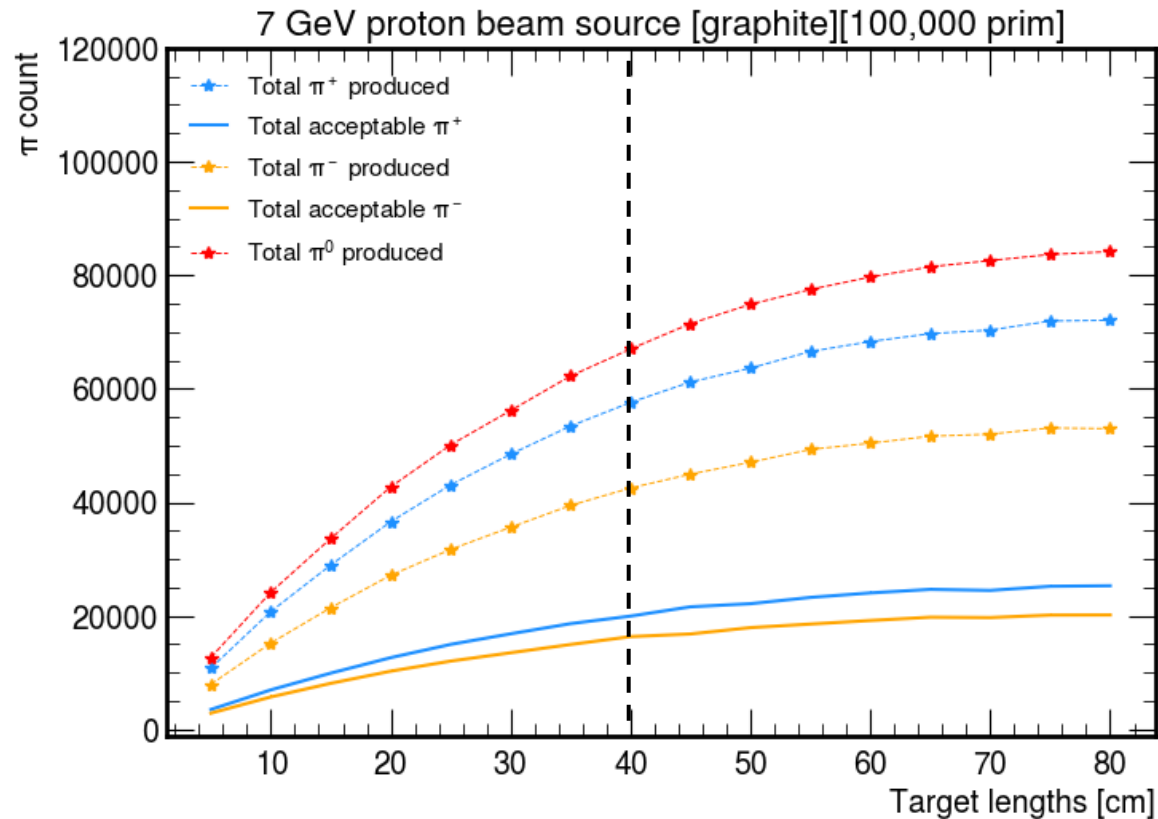


(Tungsten)

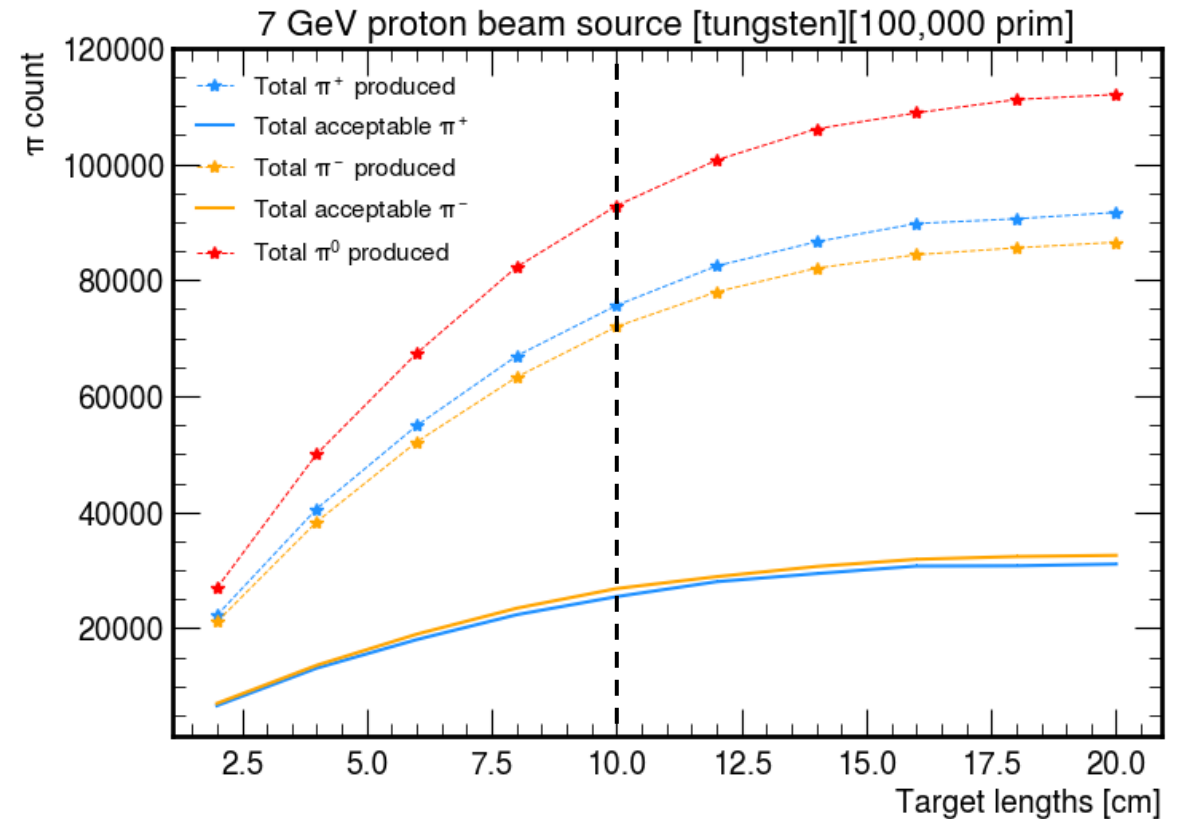


π yields for different target lengths (7 GeV = 8 GeV/c), $r = 0.15\text{cm}$ - Graphite vs Tungsten

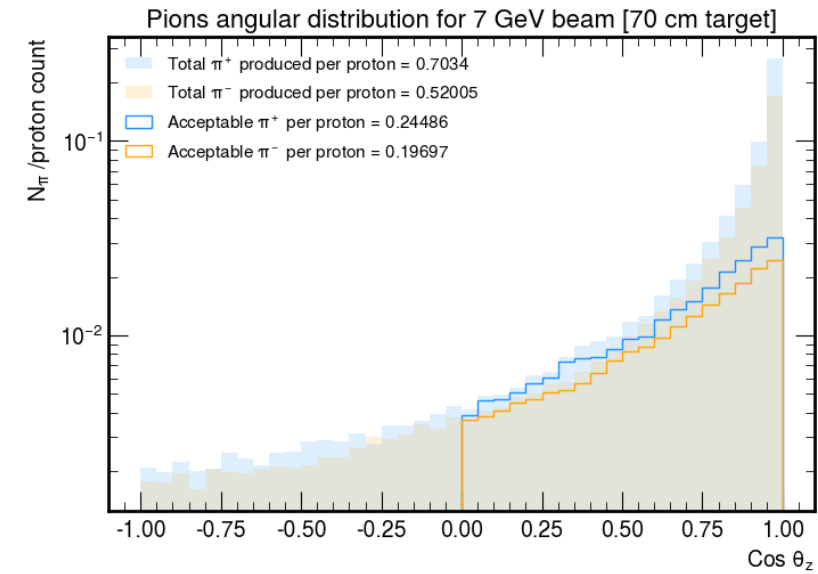
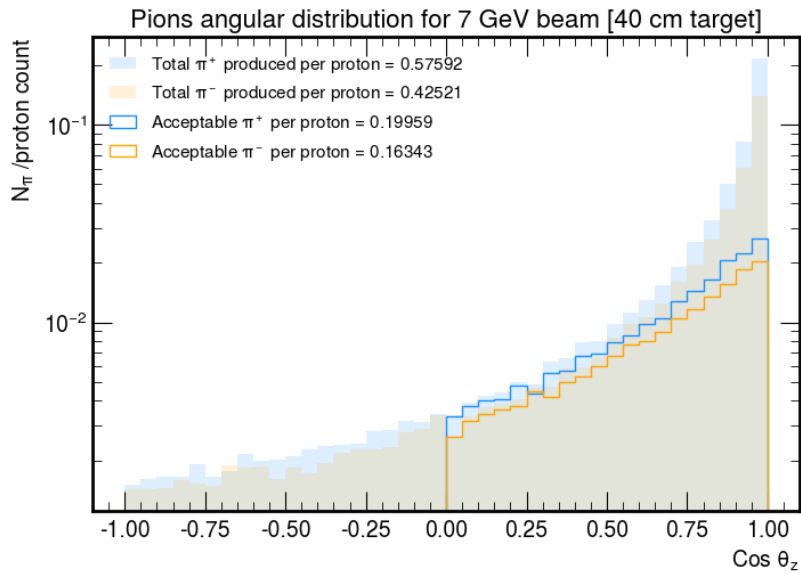
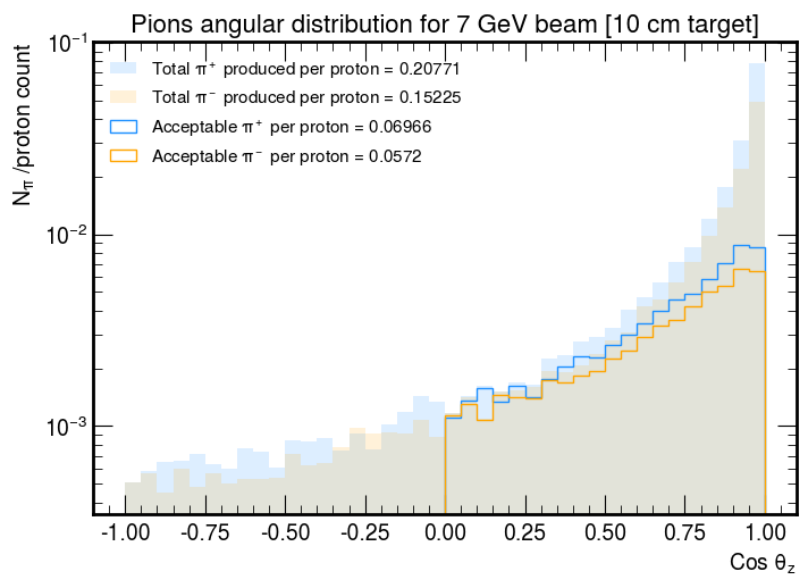
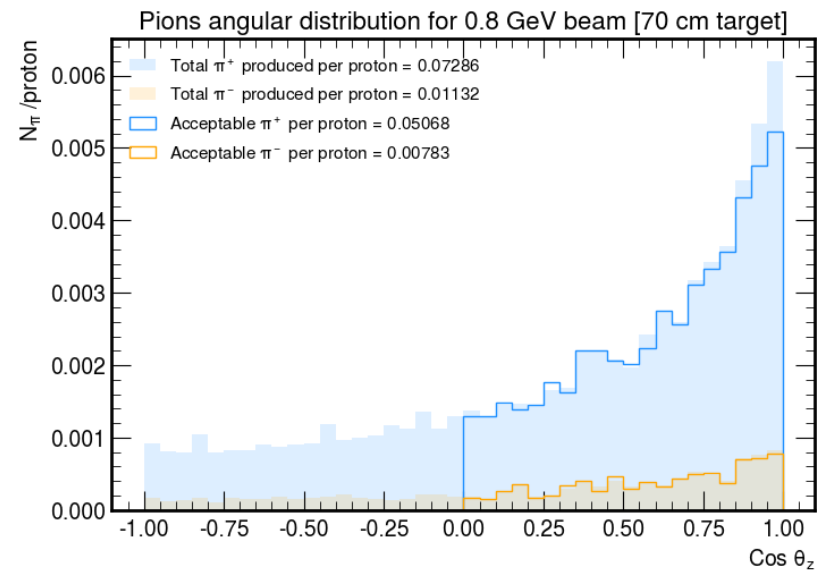
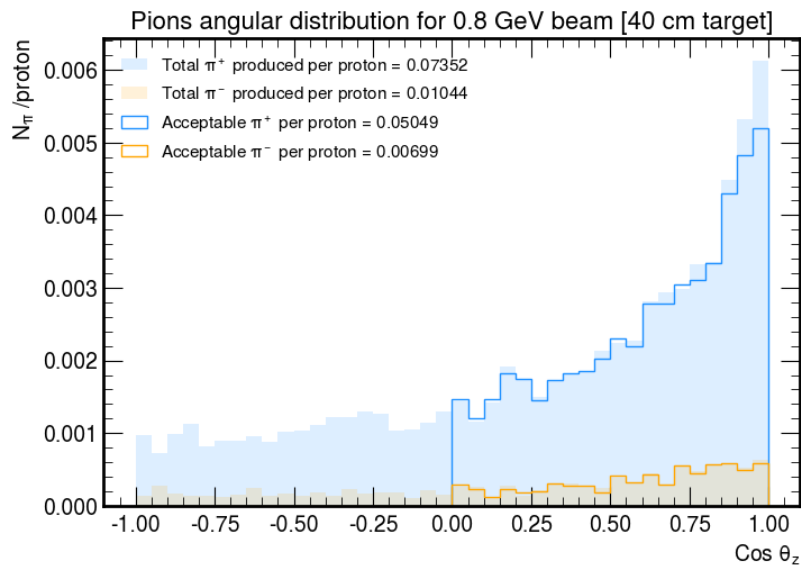
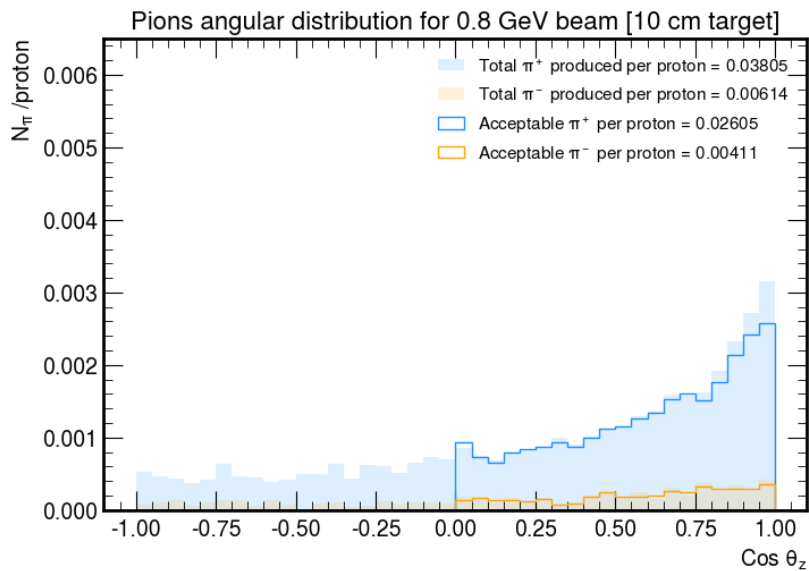
(Graphite)



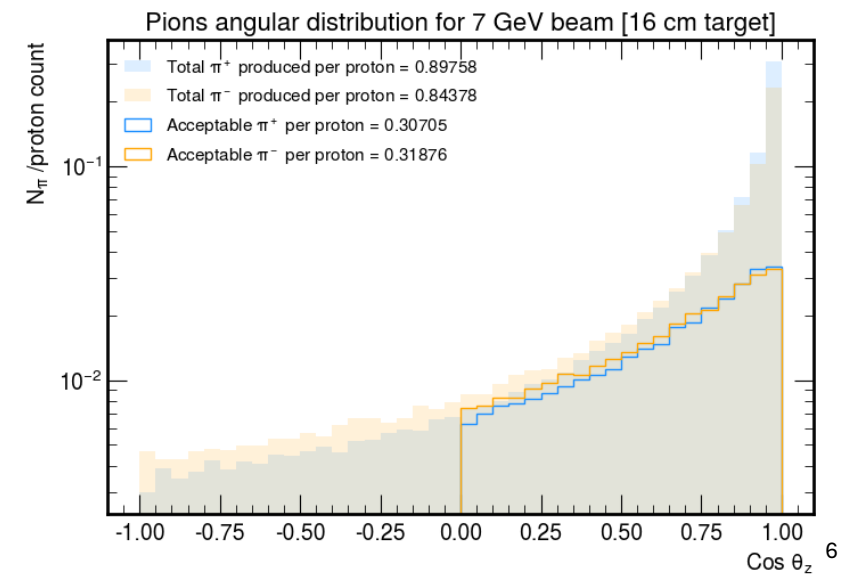
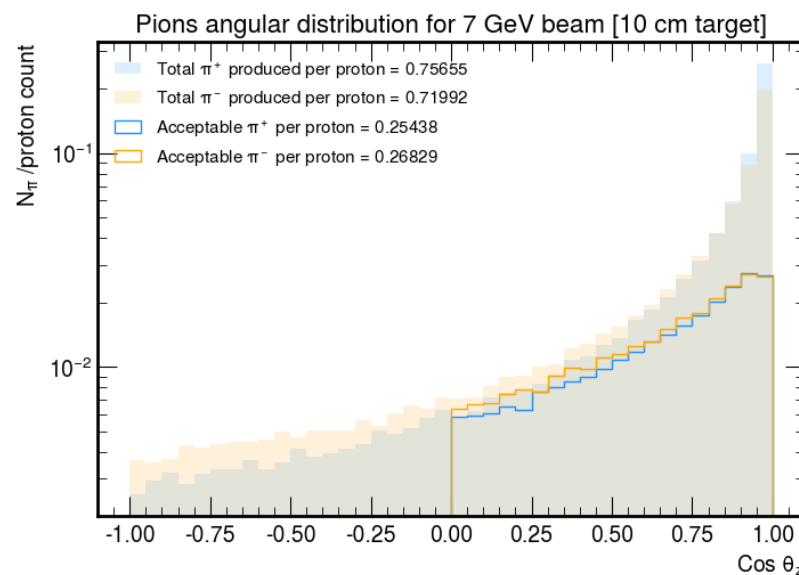
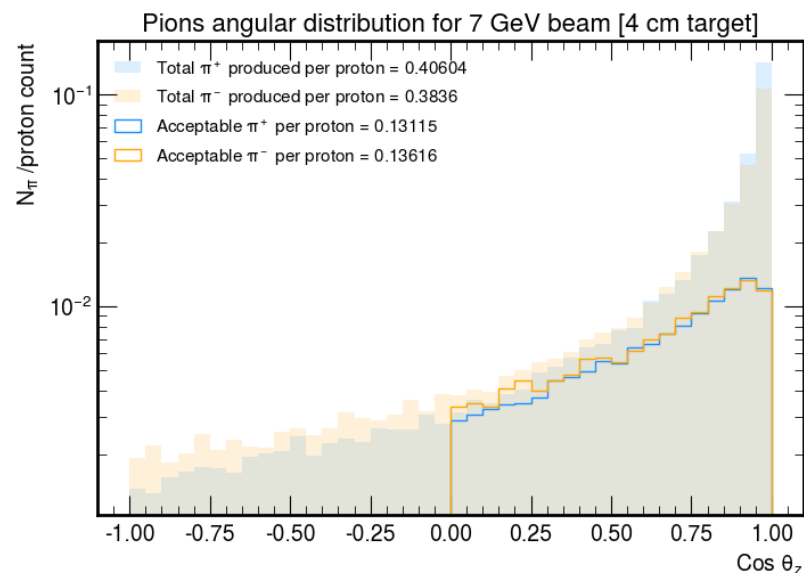
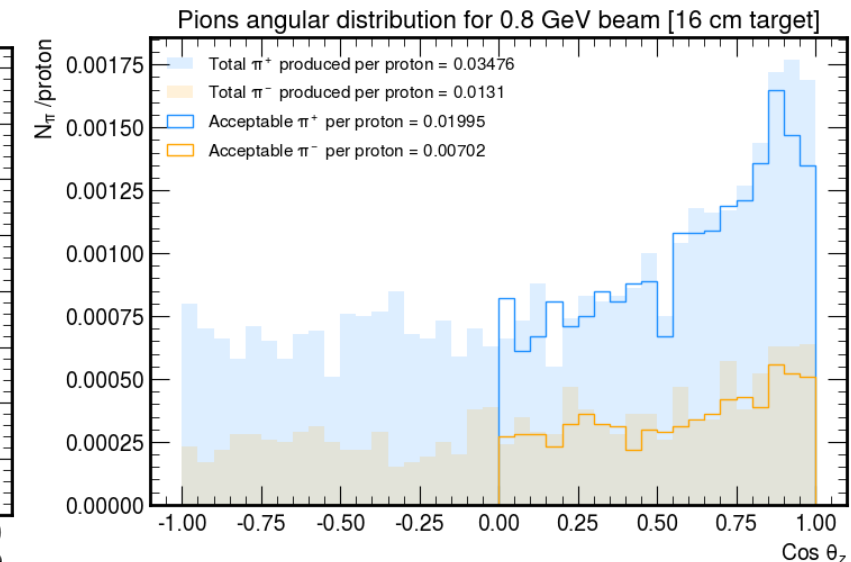
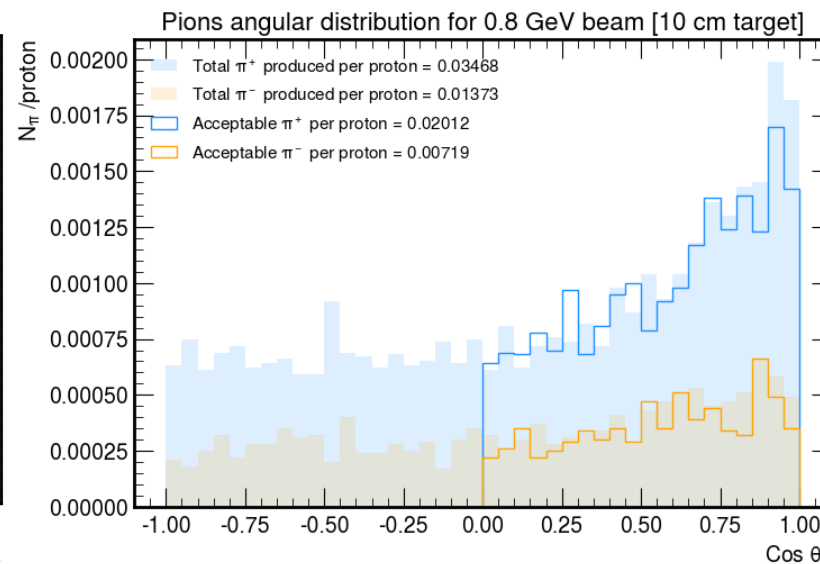
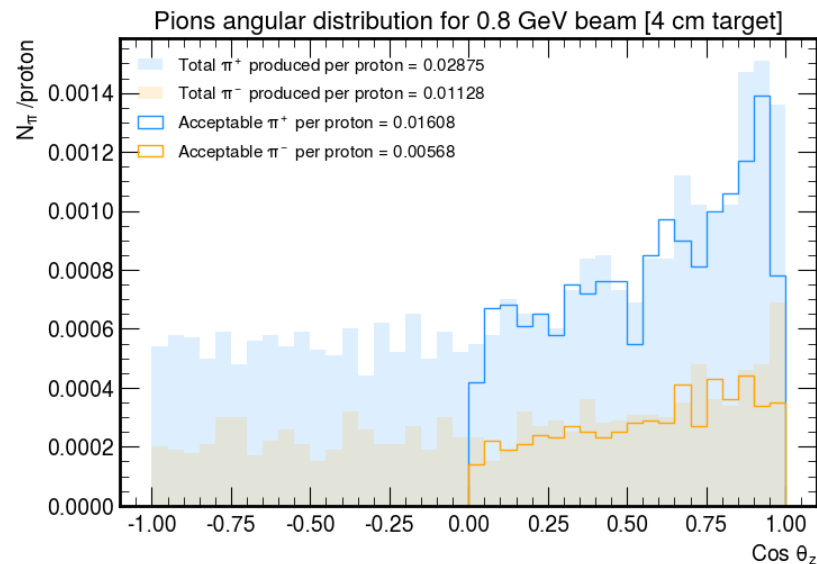
(Tungsten)



Effect of length on pion production for a proton beam fired onto a graphite target

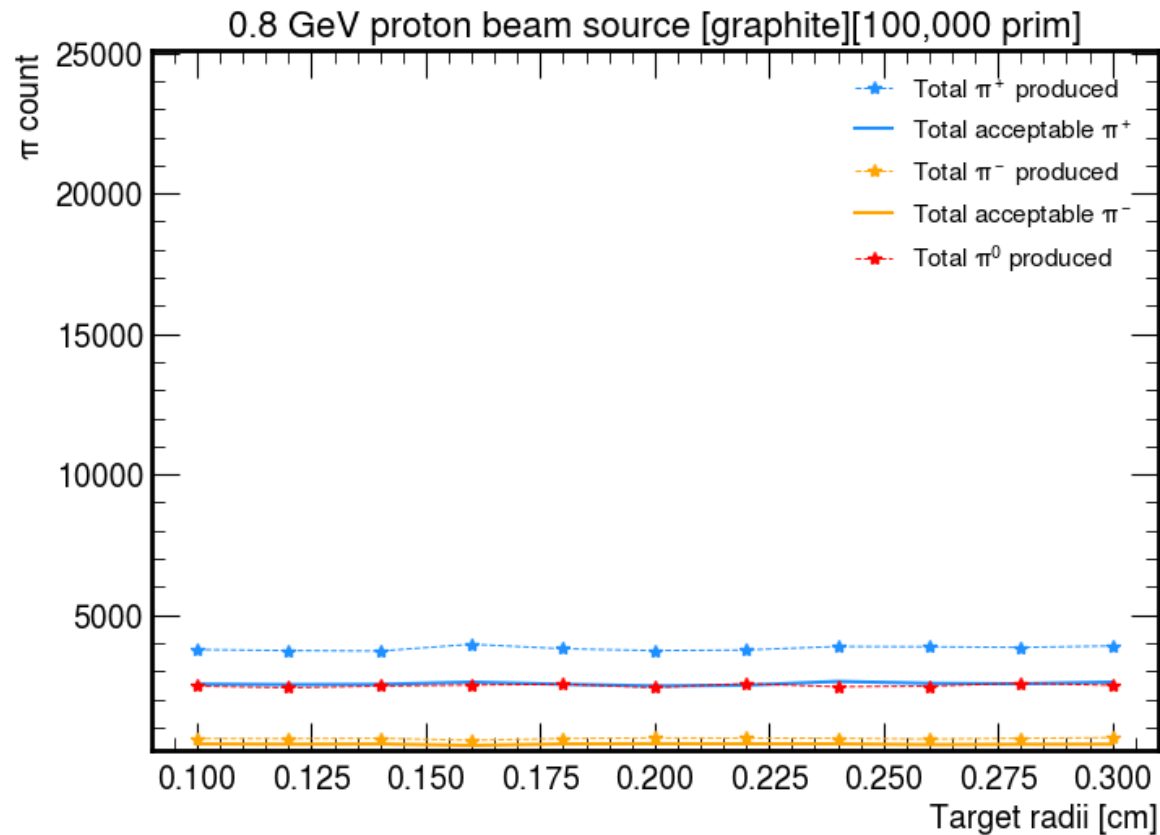


Effect of length on pion production for a proton beam fired onto a tungsten target

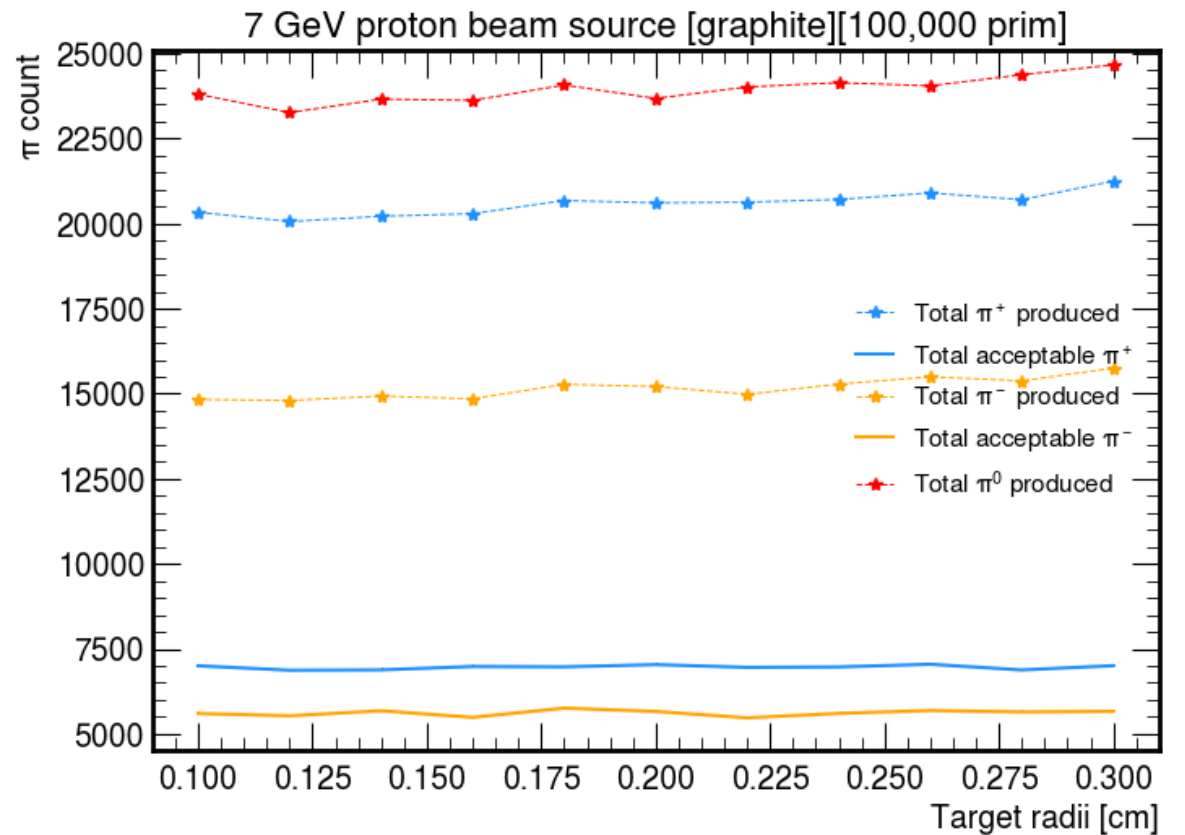


π yields for different target radii, $L = 10$ cm 0.8 vs 7 GeV

(0.8 GeV)

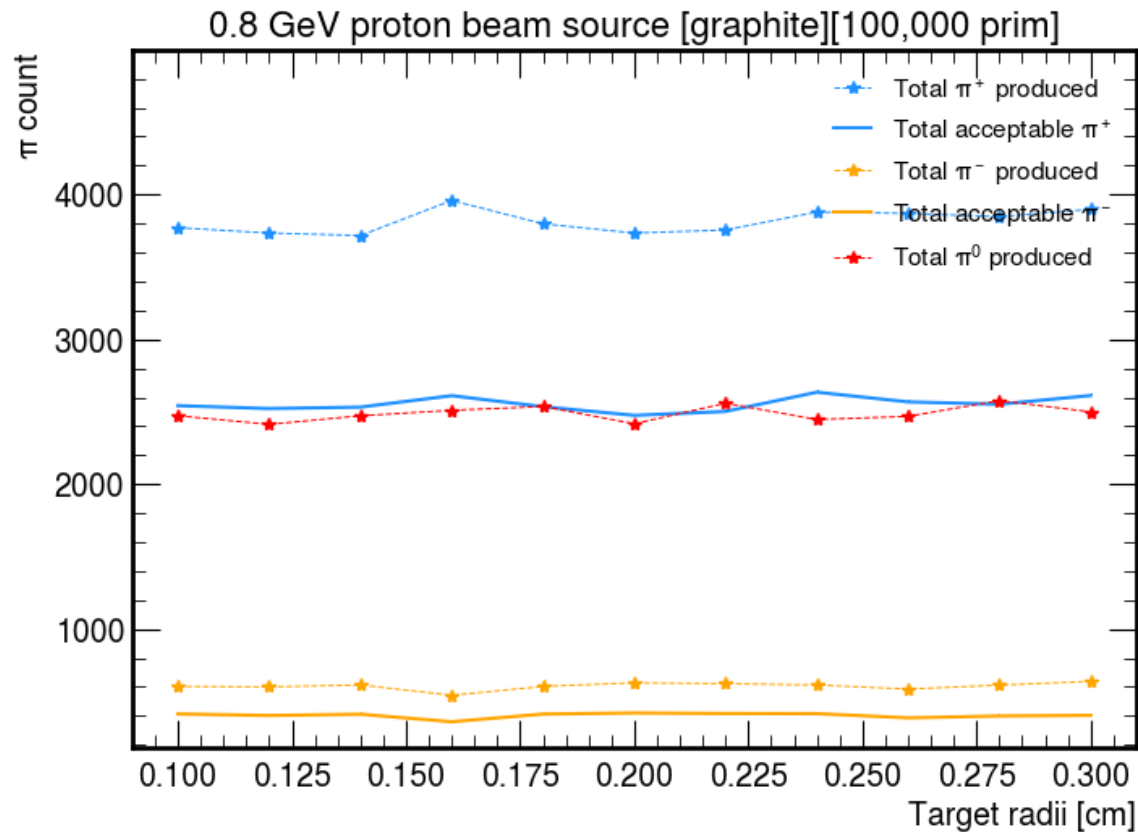


(7 GeV)

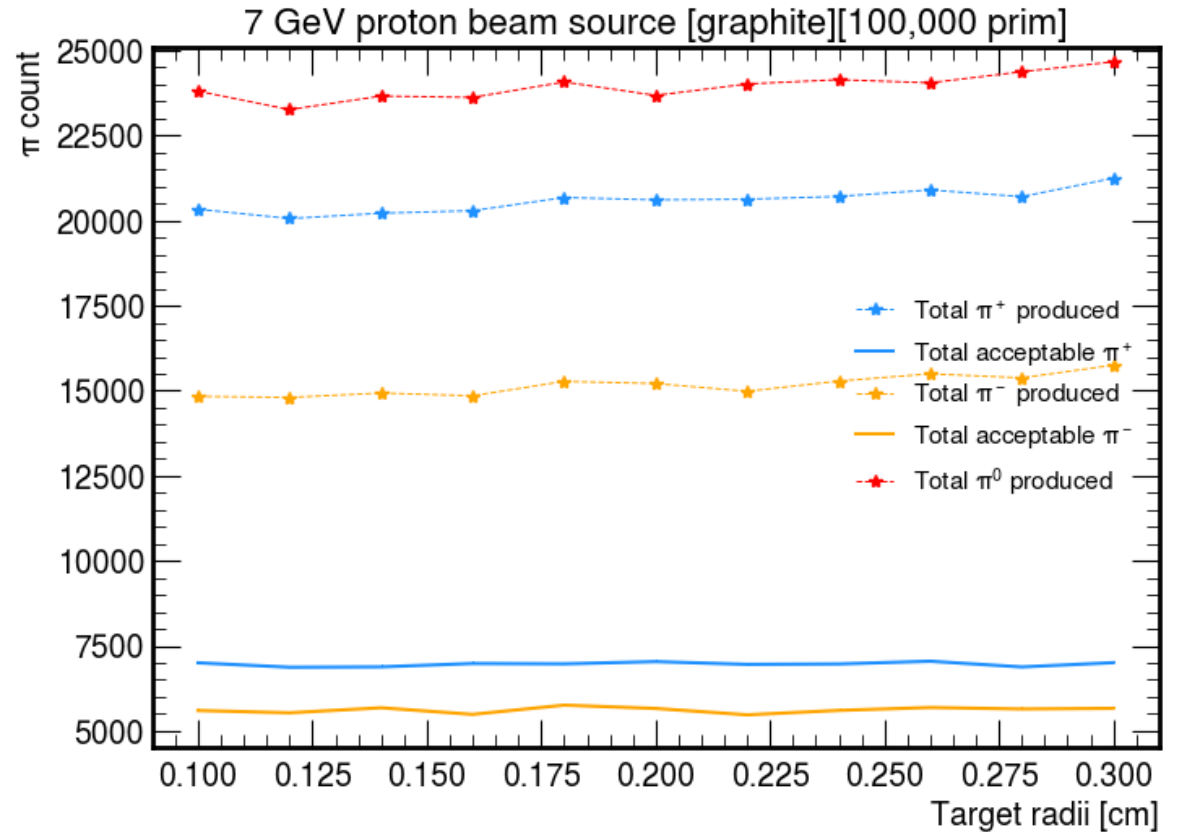


π yields for different target radii, $L = 10$ cm 0.8 vs 7 GeV

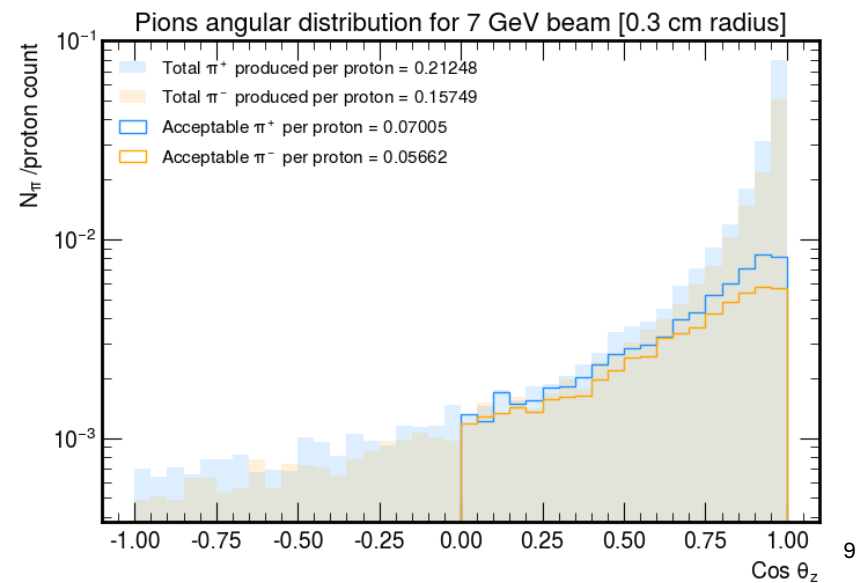
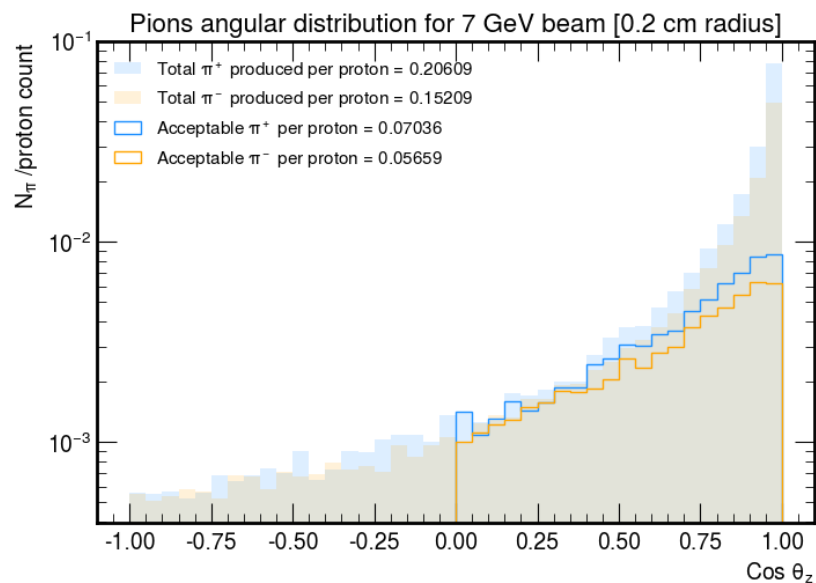
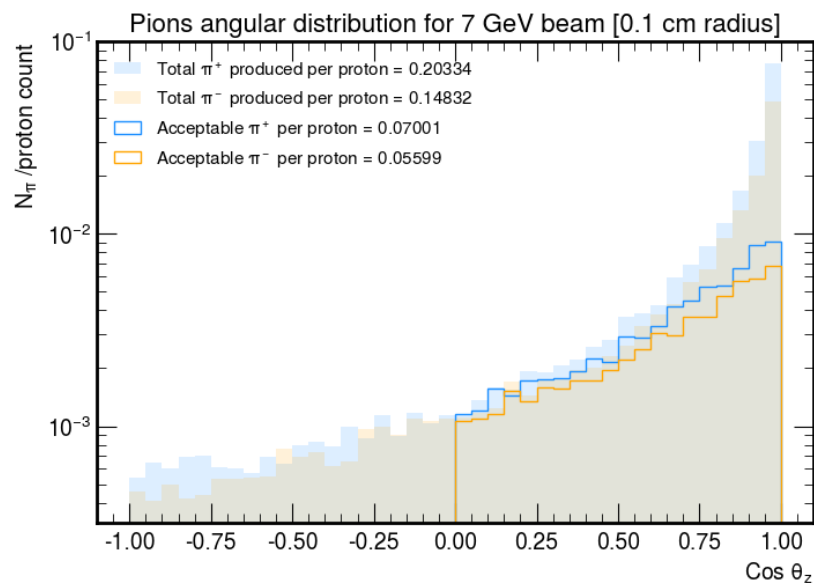
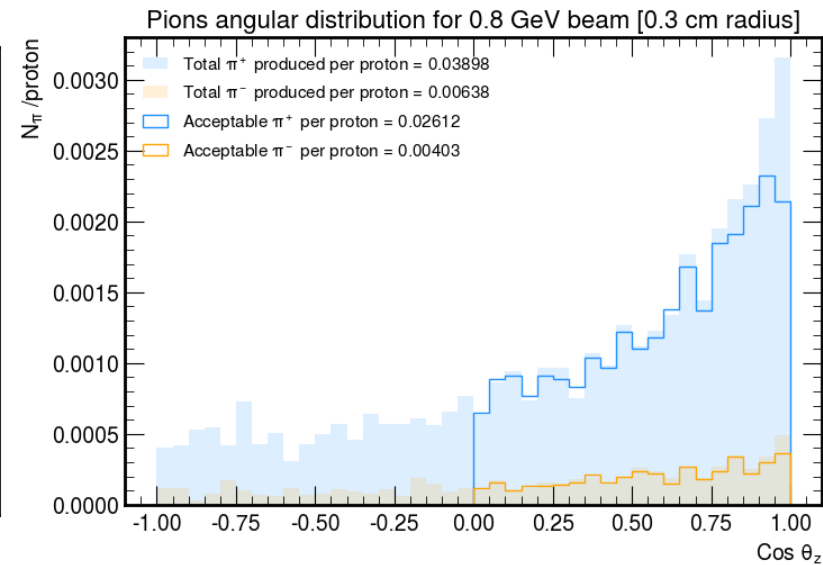
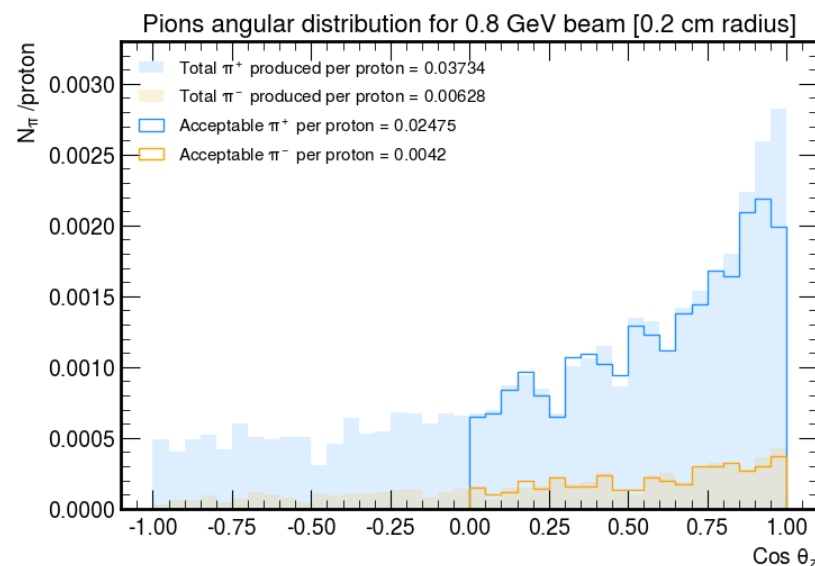
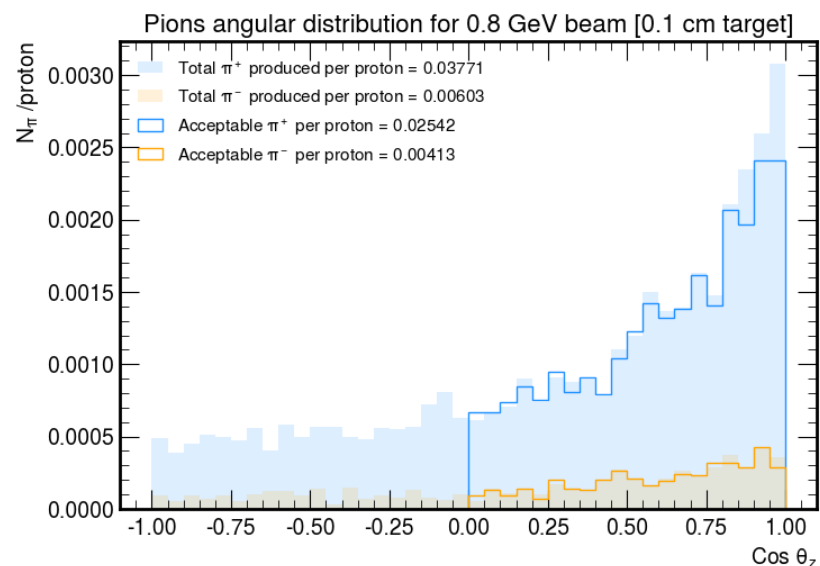
(0.8 GeV)



(7 GeV)



Effect of radius on pion production for a proton beam fired onto a graphite target



Delta resonance

→ Delta++ Baryon: $\Delta^{++} = uuu$

→ Delta++ baryon production: $p + p \rightarrow \Delta^{++} + X \rightarrow p + \pi^+ + X$

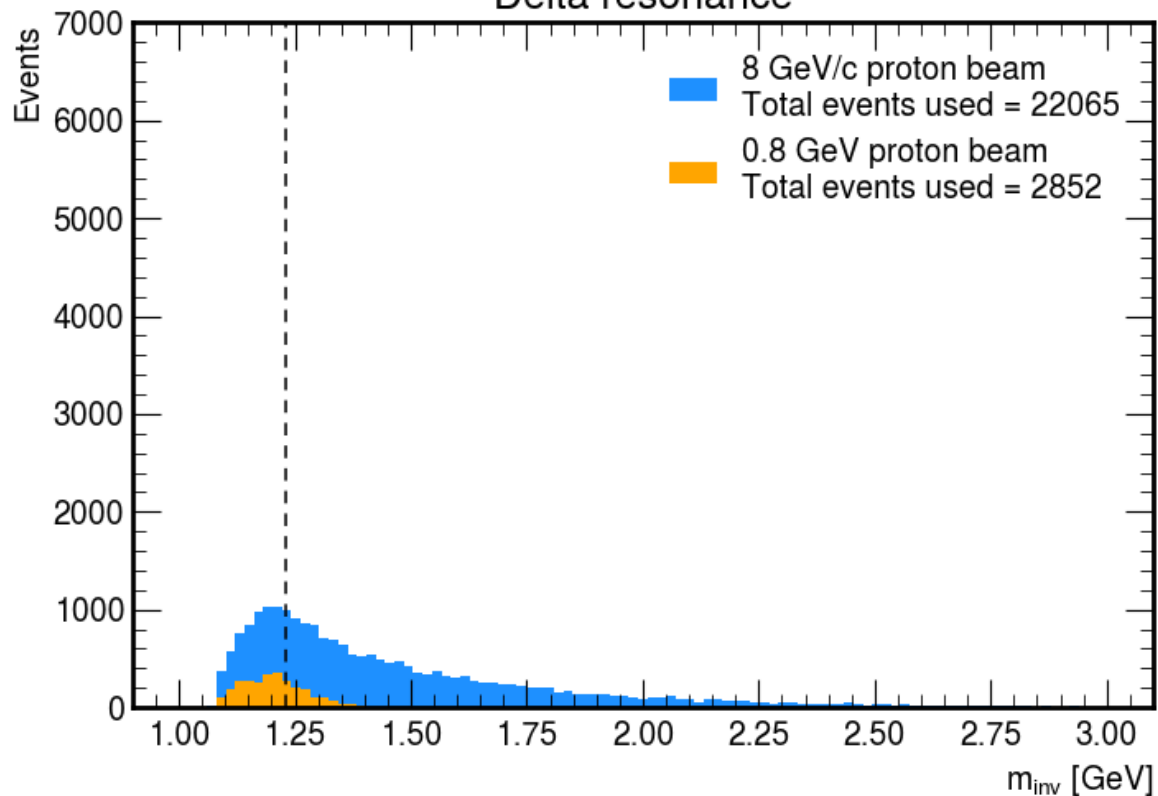
→ What to detect from the simulation: $\Delta^{++} \rightarrow p + \pi^+$

→ Build the invariant mass: $m^2 = (E_p + E_\pi)^2 - |\vec{p}_p + \vec{p}_\pi|^2$

Delta resonance

Graphite

Delta resonance



Tungsten

Delta resonance

