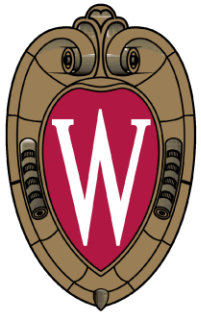
FLUKA Horn Simulation



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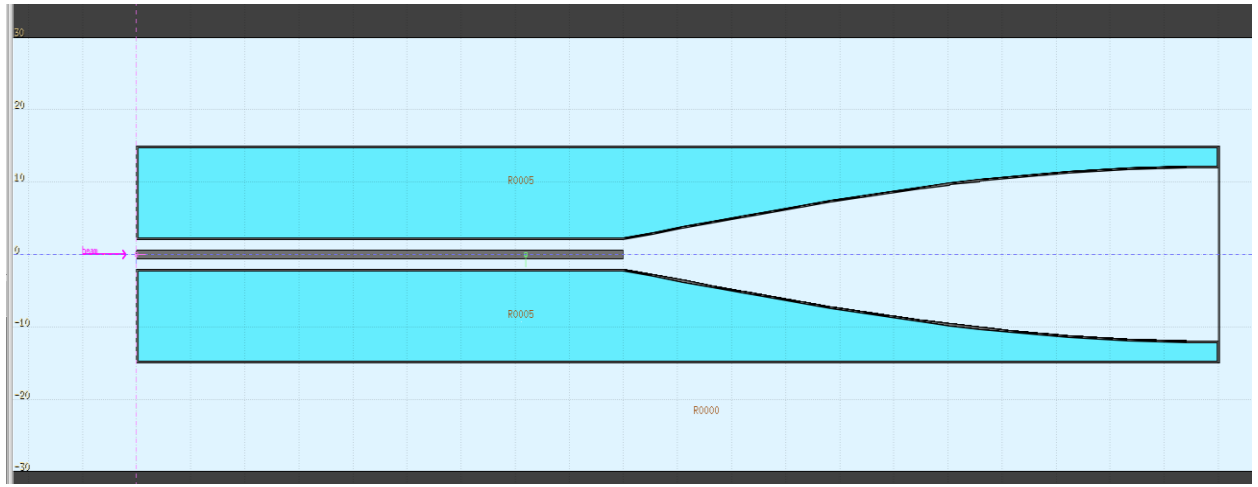
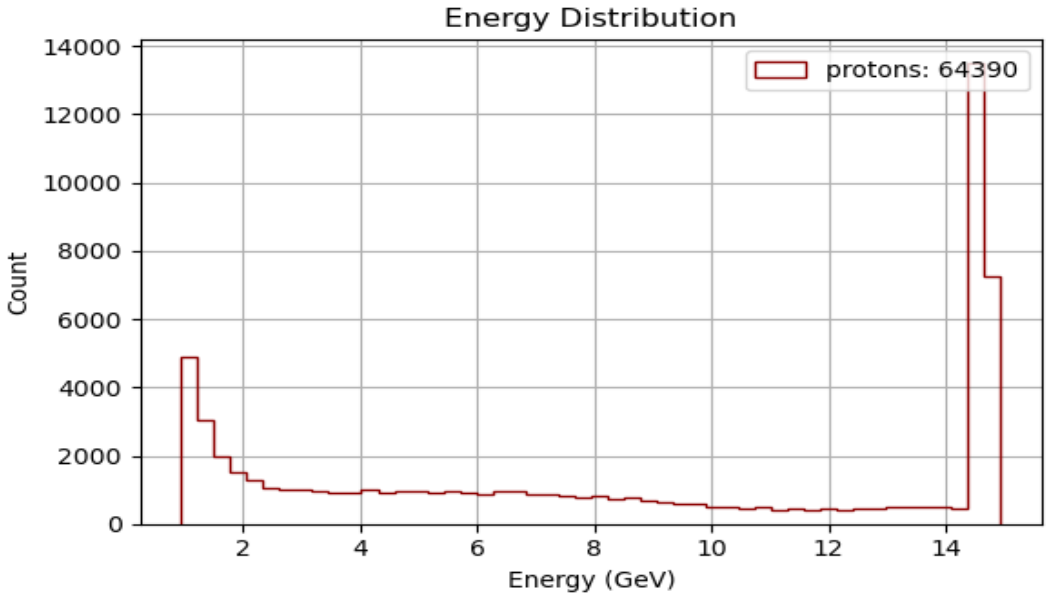
IMCC Horn Design



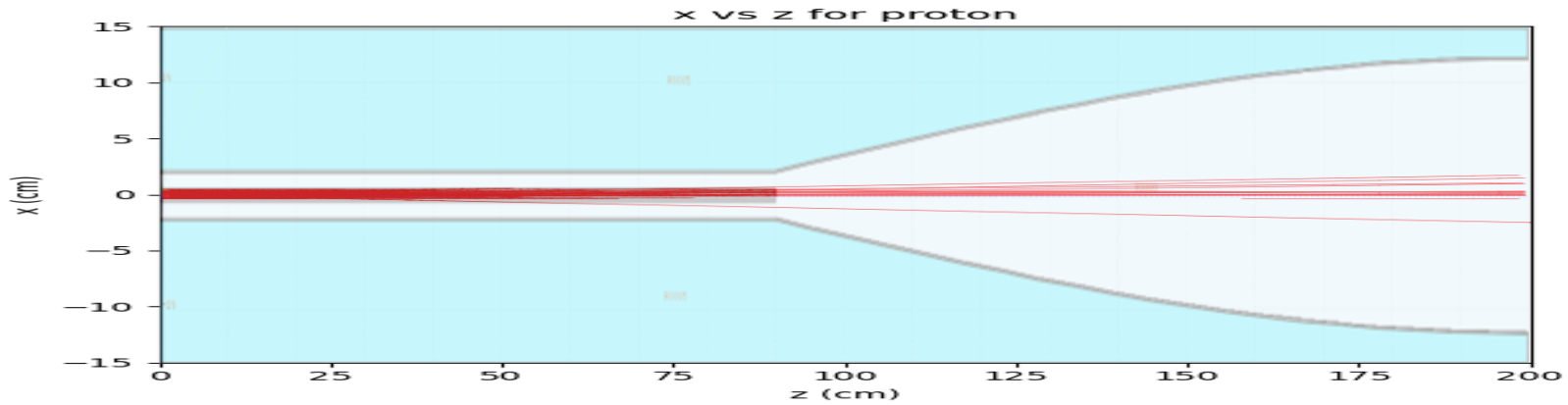
- 1. Design Parameters:
  - Target material: Graphite
  - Cylindrical target: r = 0.6 cm
    length = 90 cm
  - Neck region: 0 cm ⟶ 90 cm @ r = 2 cm
  - Outer Cylinder: 200 cm @ r = 15 cm
  - Parabolic section: spanning from z = 90 cm ⟶ 200 cm @ $2\ \text{cm} \leq r \leq 12\ cm$
  - Material Inside the conducting region: Argon (gas)

- 2. Beam Parameters:
  - Proton Beam @ 14 GeV at z = -10 cm
  - Gaussian Beam: $\boldsymbol{\sigma}$ = 0.47 cm

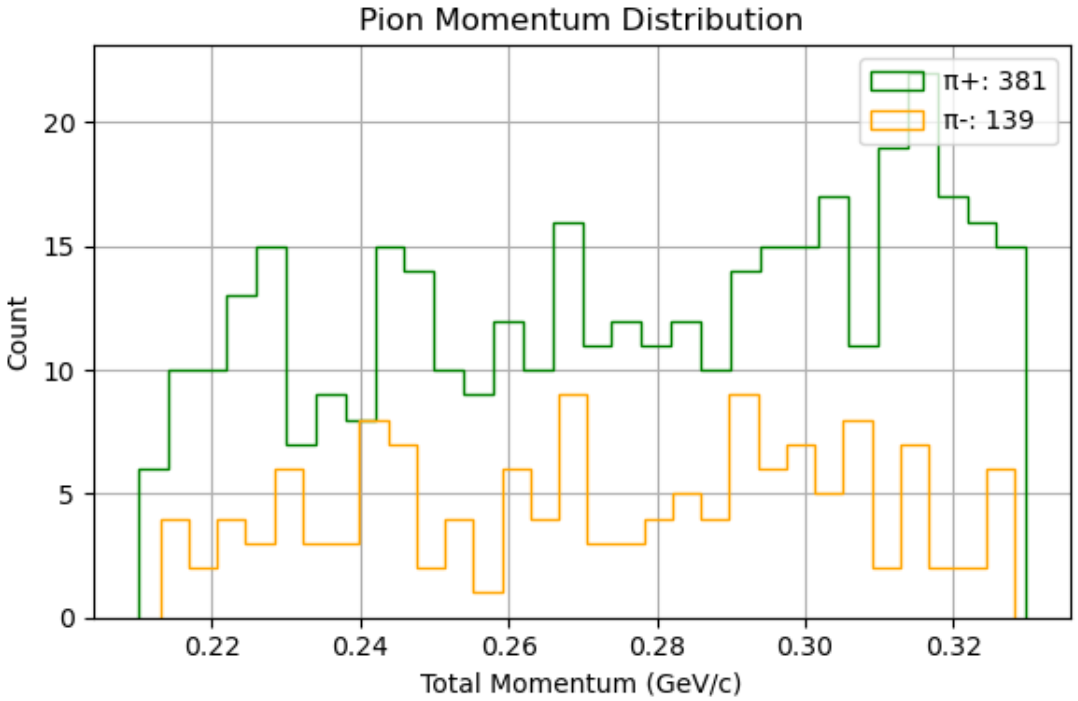
Proton Track



100,000 Primaries



100 Primaries



Beam Output

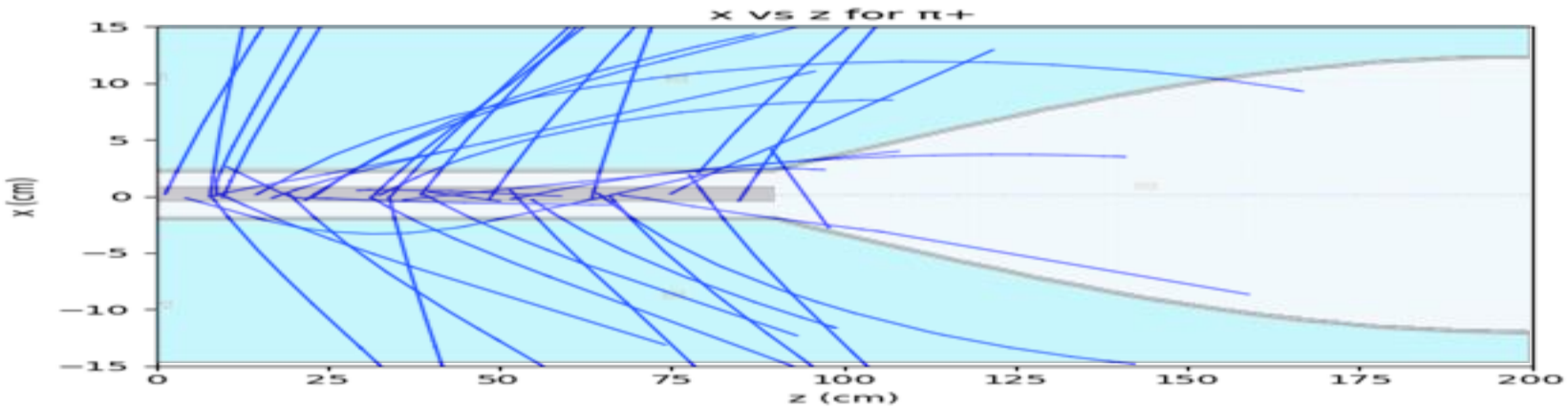
Left: Pions and muons with $210\ MeV/c \leq P \leq 330\ MeV/c$

1. Current = 220 kA

2. Pion yield (in 210-330 MeV/c range and 2 mm rad transverse acceptance): **3.8×10^{-3} π^+/POT**

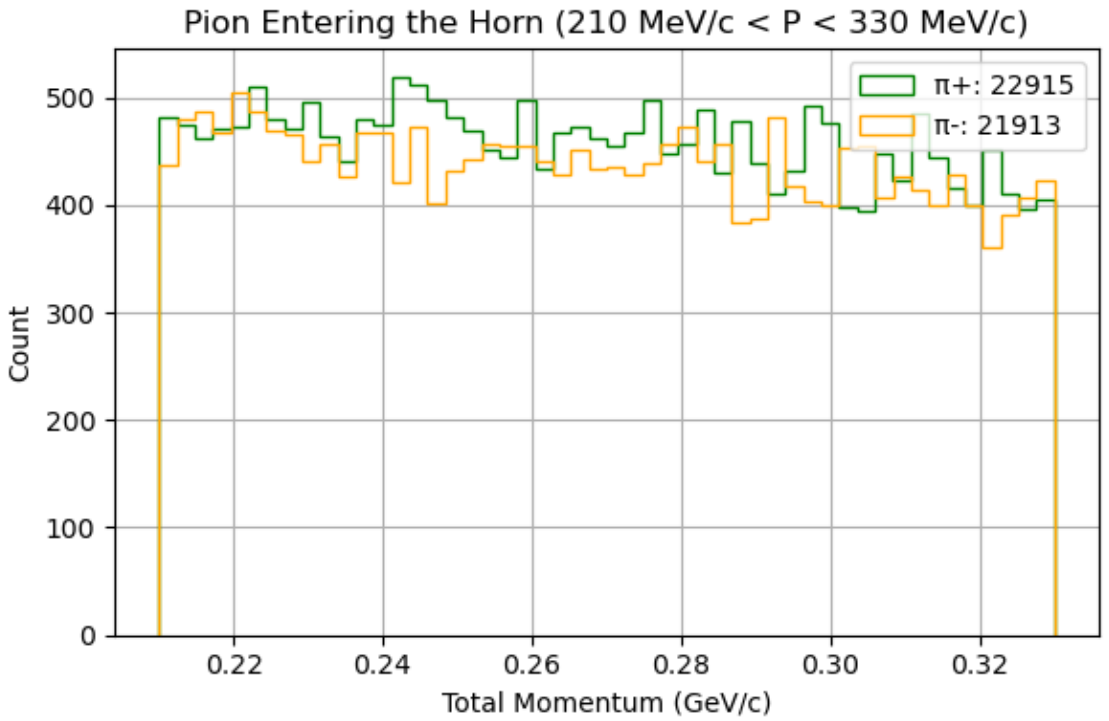
Comparison: In the Slides by Paul Jurj, Pion yield under similar constraints = **7.9×10^{-4} π^+/POT**

Pion Tracks (with 100 primaries)



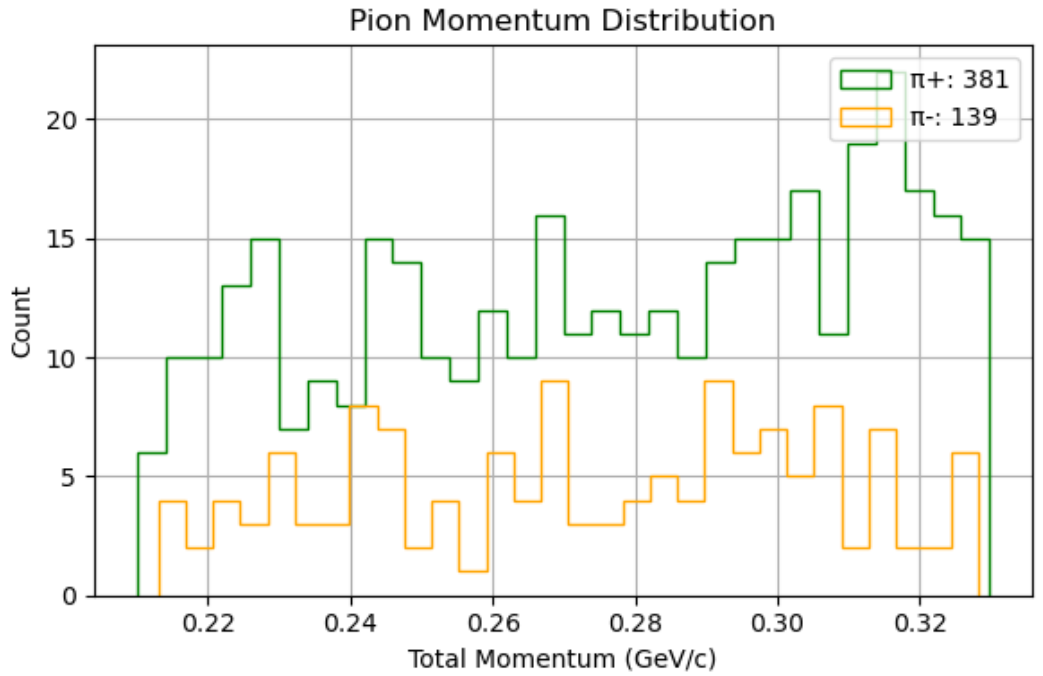
All the Pions (π+) entering the Horn

Exiting the Target



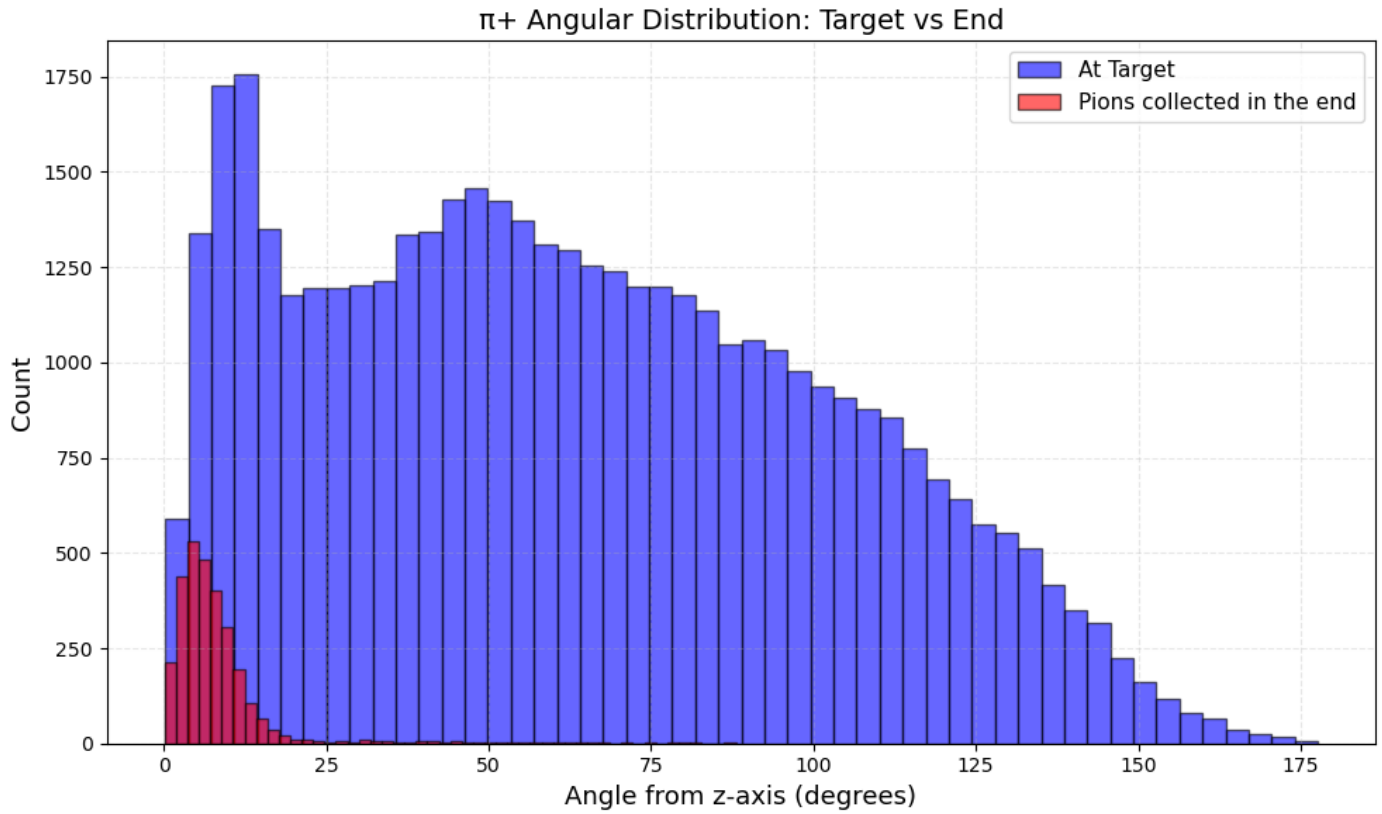
v/s

Exiting the Horn

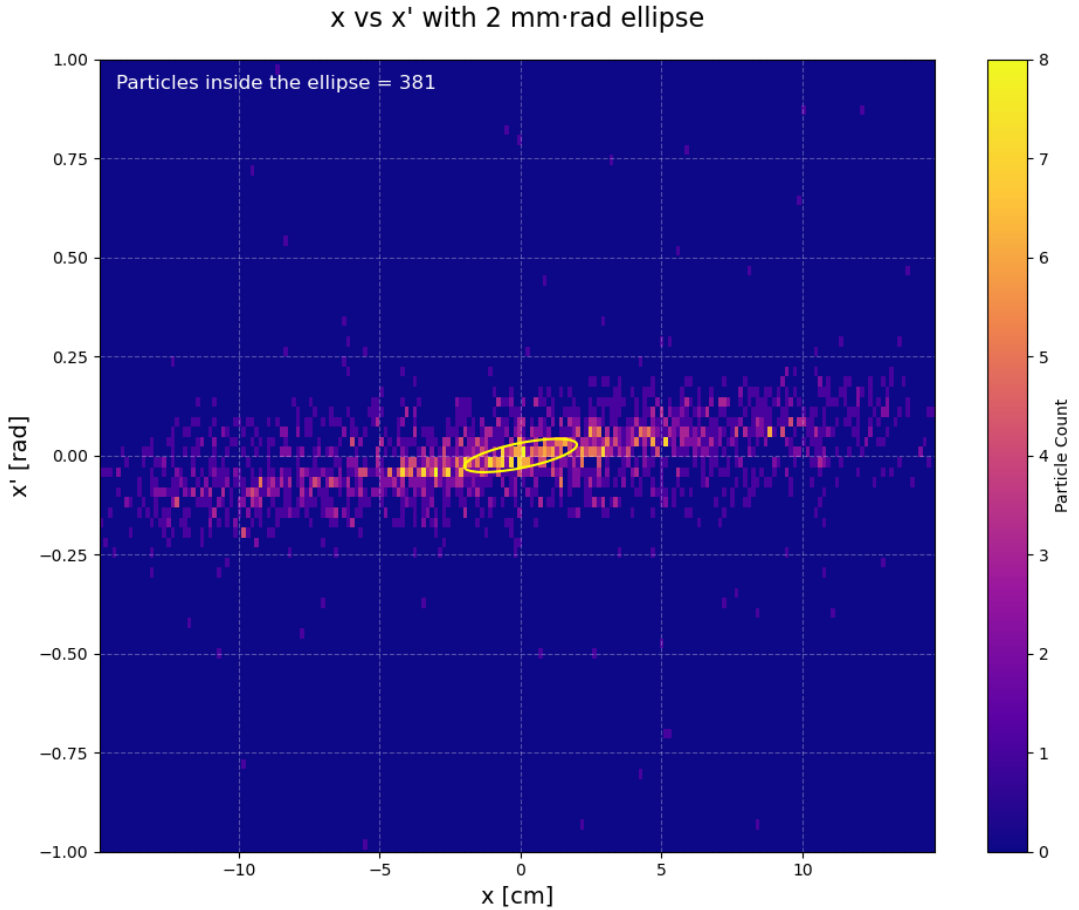


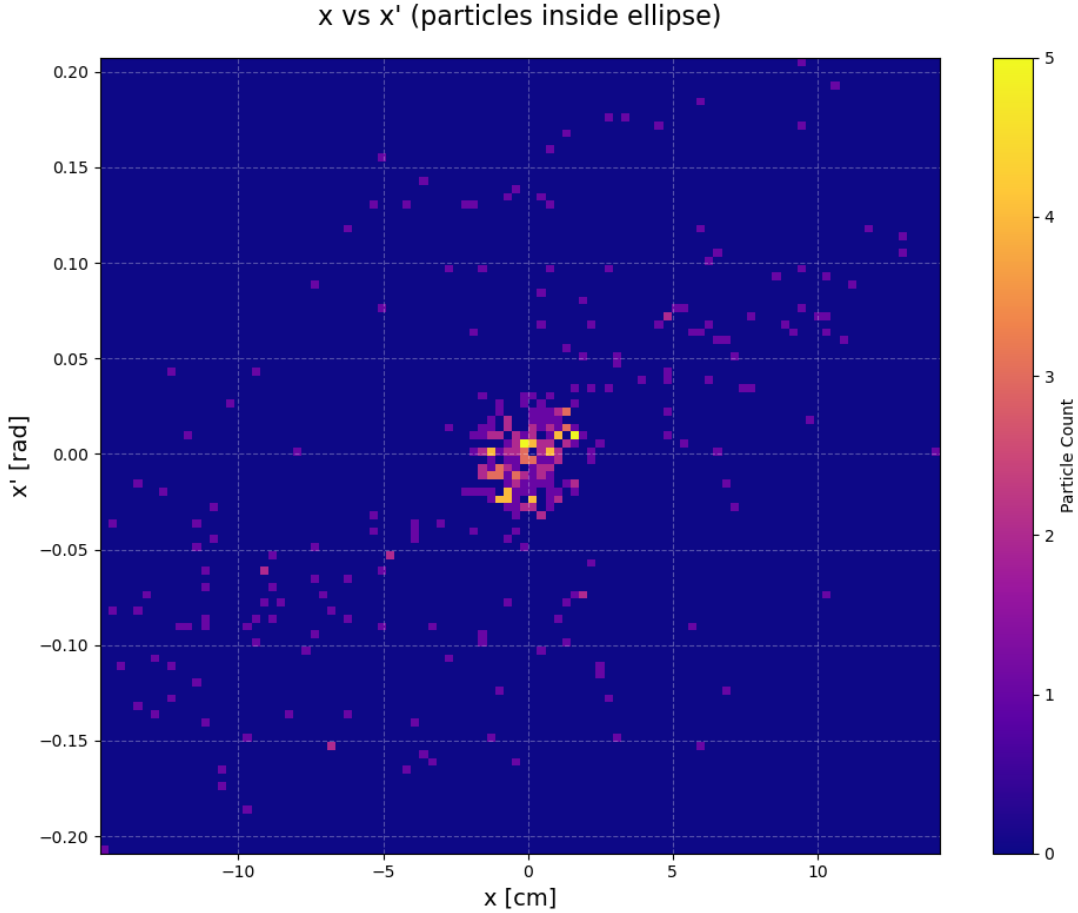
Pion Angular Distribution

210 MeV/c< P < 330 MeV/c



Pion Beam Phase Space





Pion beam time structure

$(220\,MeV/c \leq P \leq 330\,MeV/c)$