

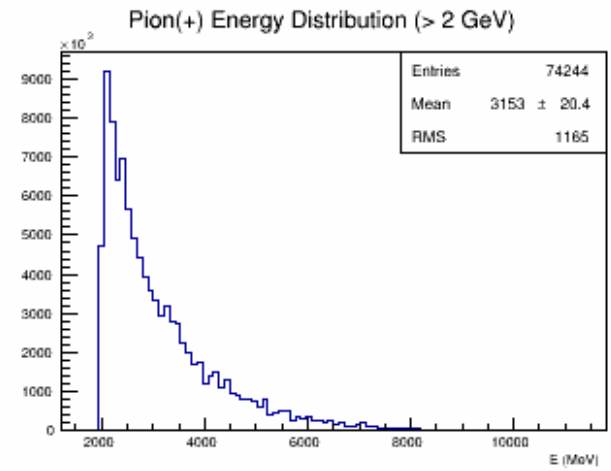
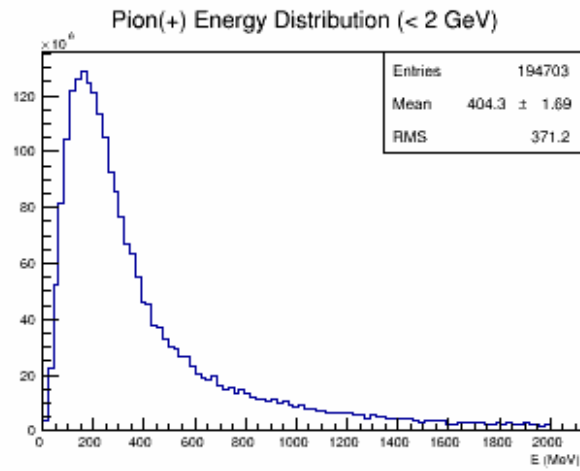
# Pions(+) Background Study - 2

Update

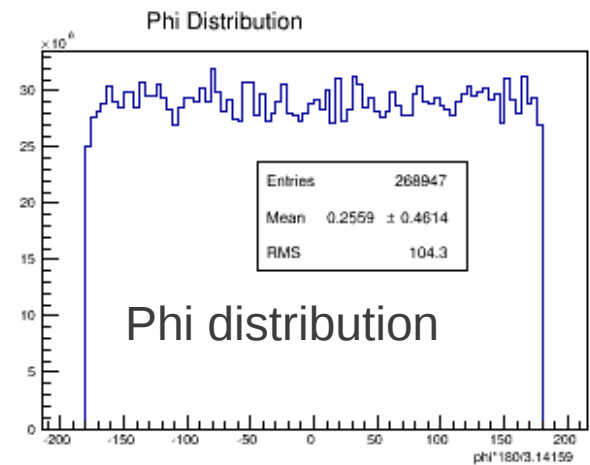
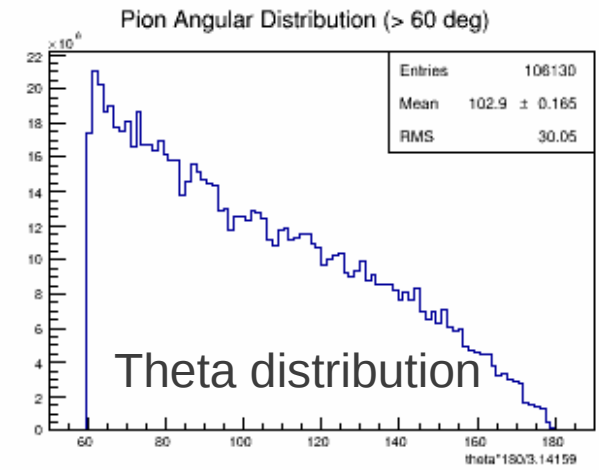
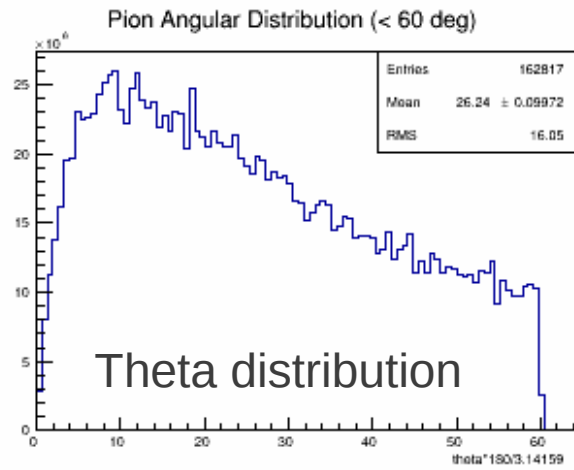
# Input Summary

- Pions(+) generated with following input conditions,
  - LD2 target
  - Luminosity  $540 \times 10^{36}$  Hz/cm<sup>2</sup> or 22 uA
  - Incident electron beam energy: 11 GeV
  - Target length: 40 cm
  - Raster:  $2 \times 2$  mm<sup>2</sup>
  - 1 million events

# Input Summary



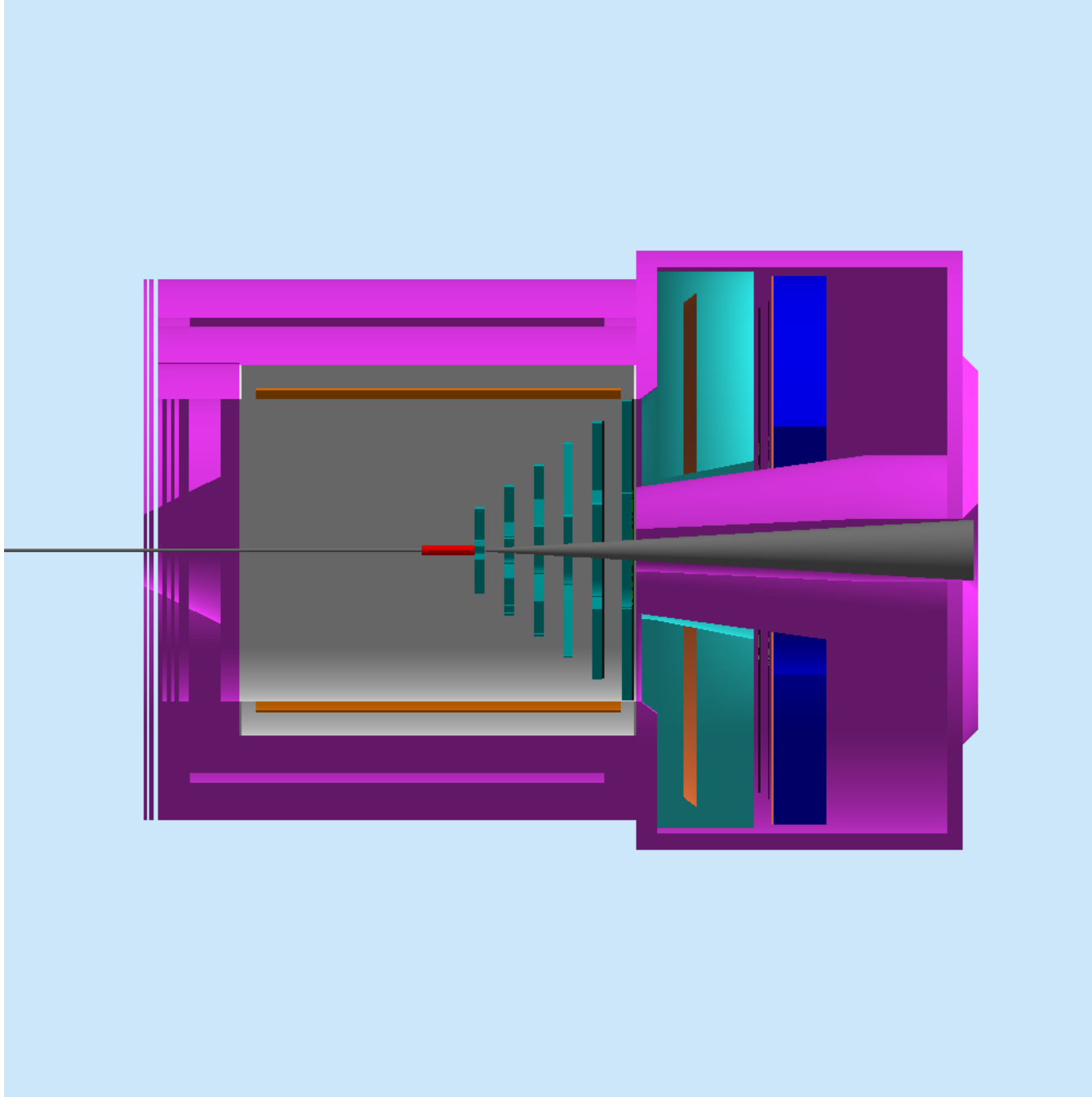
Pions(+) Energy Distribution (MeV)



# Simulation Summary

- Used solgemc and results are weighted using the pion rate
- Things included in the simulation,
  - CLEO solenoid
  - Target
  - AI Beamline
  - Pb Baffles
  - Cerenkov
  - GEM (4 GEMs)
  - EC forward-angle
- Field is ON
- Ran about 1 million events

# Simulation Summary

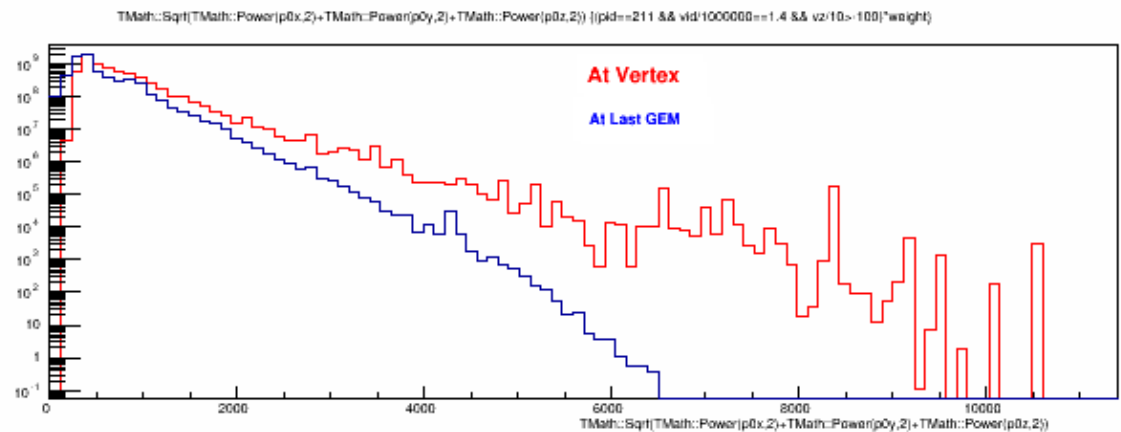
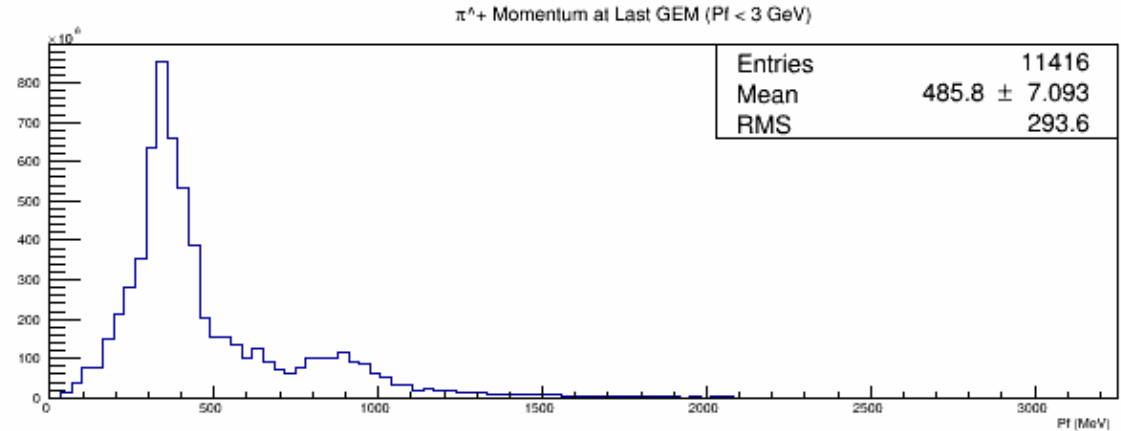
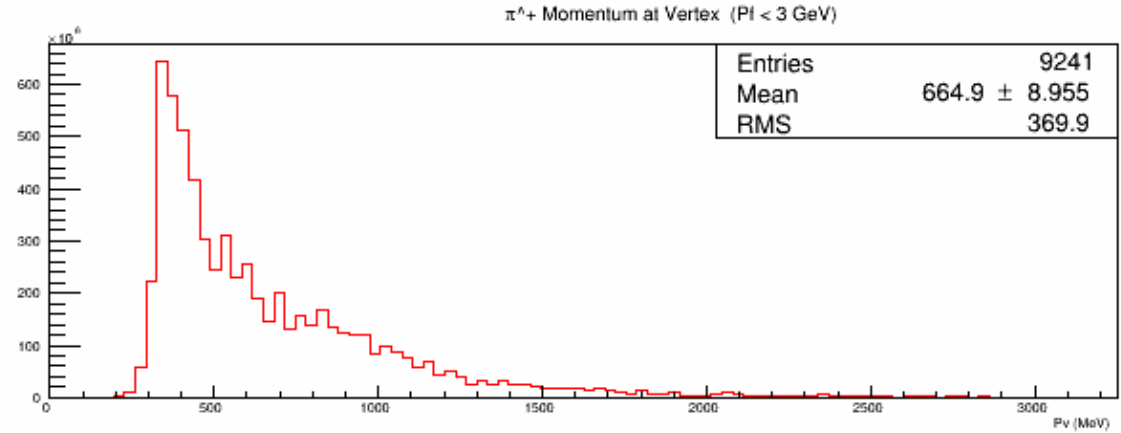


# Momentum for Pion Detected at last GEM

1. Momentum at primary vertex

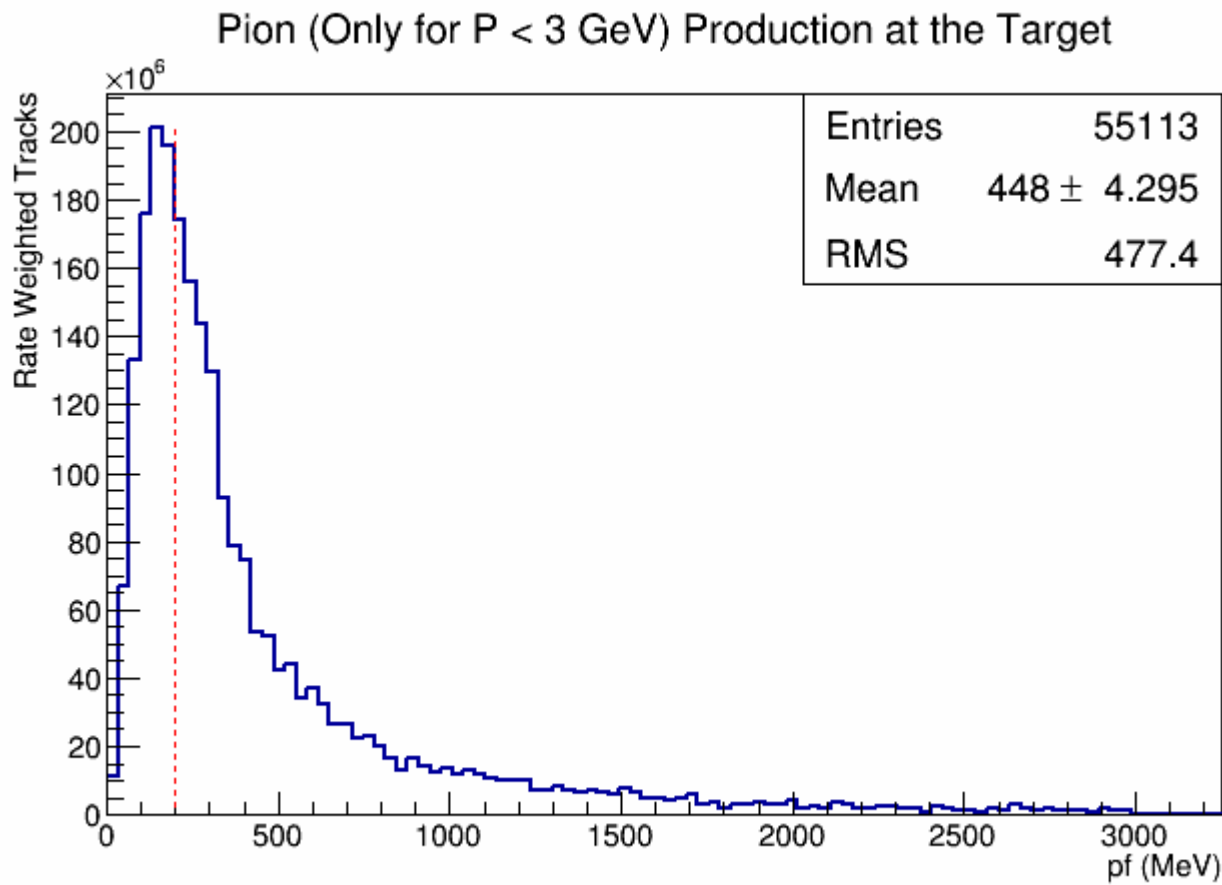
2. Momentum at last GEM

3. Comparison between vertex and last GEM momentum



# Generated Pion Momentum

- This is the momentum distribution input into the simulation
- Pions of energies above the vertical line are seen at the last GEM



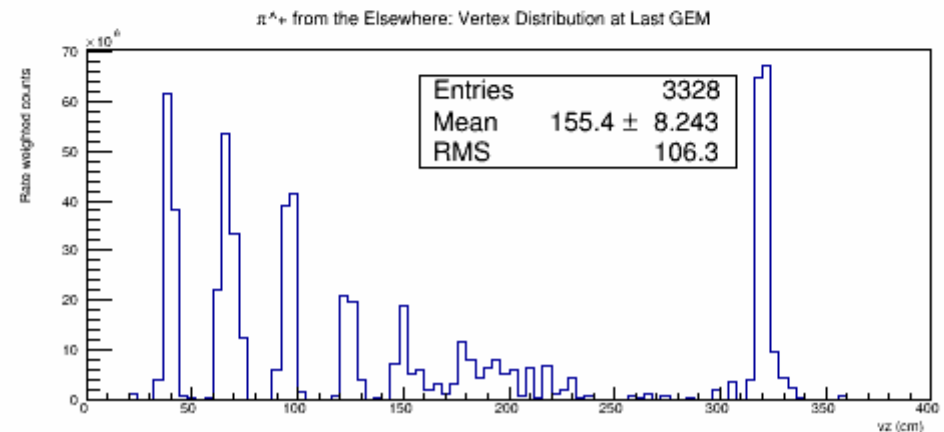
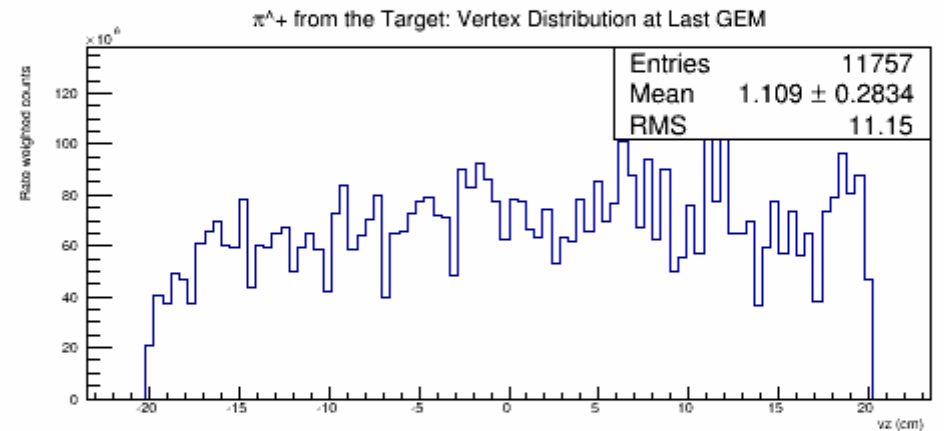
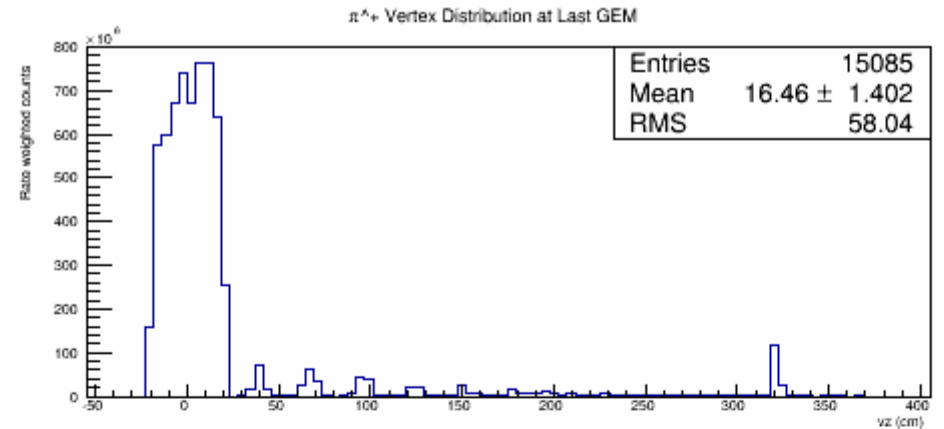
# Pions(+) Vertex Distribution Histogram at Last GEM

## With Lead Baffles

1. Total pions seen:  
294 MHz/uA

2. Pions from the target:  
265 MHz/uA

3. Pions from elsewhere:  
29 MHz/uA





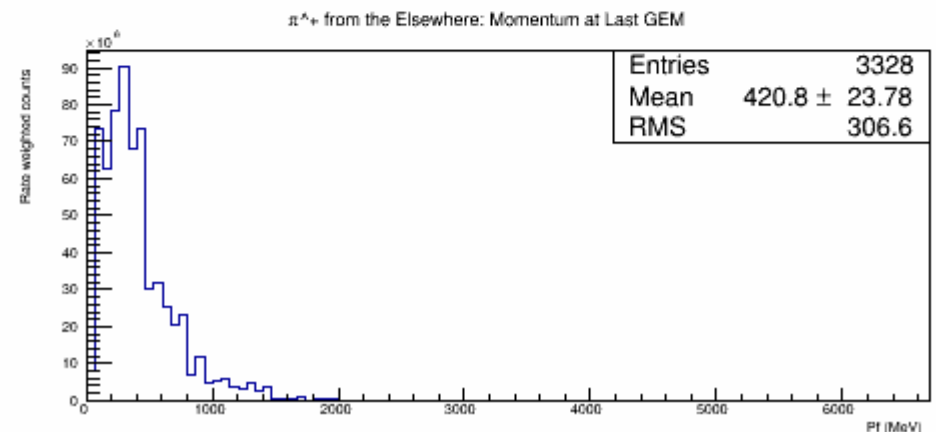
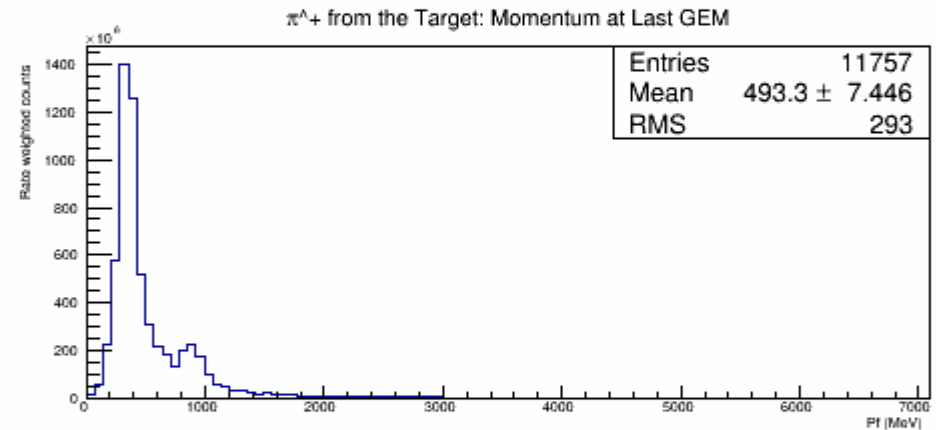
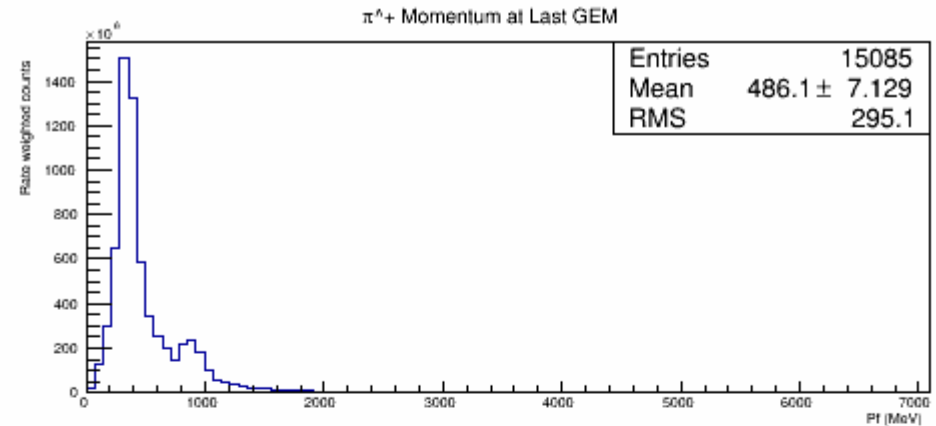
# Pions(+) Energy Distribution Histogram at Last GEM

## With Lead Baffles

1. Total pions seen:  
294 MHz/uA

2. Pions from the target:  
265 MHz/uA

3. Pions from elsewhere:  
29 MHz/uA



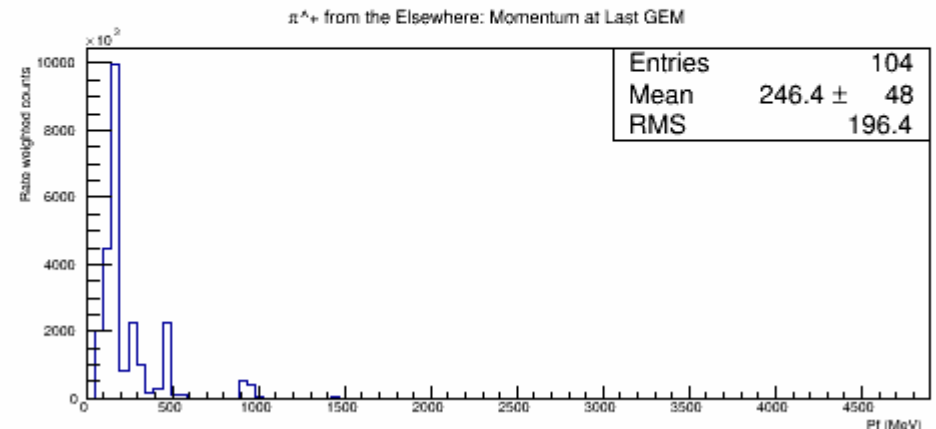
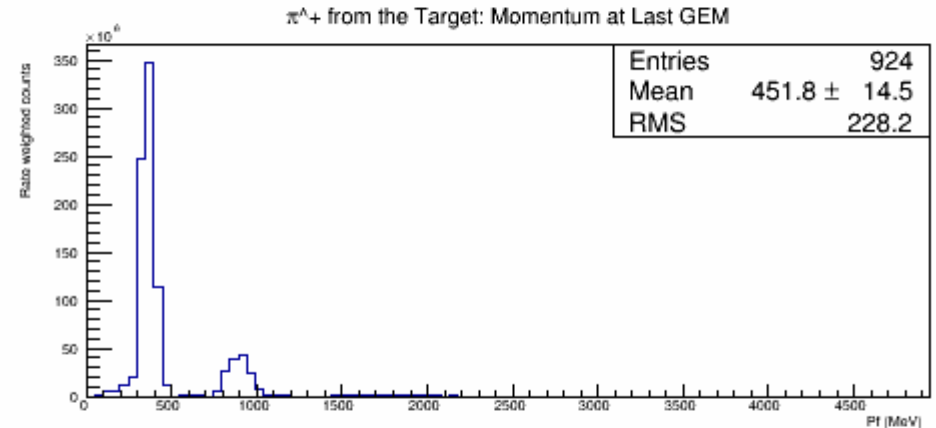
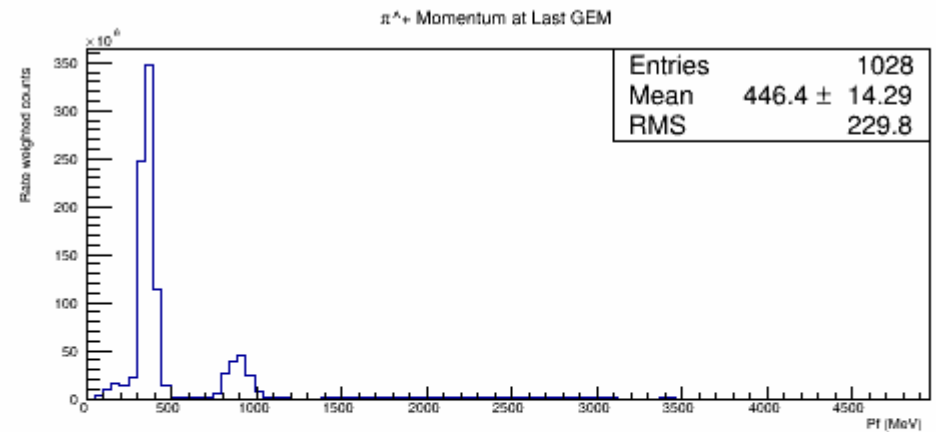
# Pions(+) Energy Distribution Histogram at Last GEM

With Kryptonite Baffles

1. Total pions seen:  
43 MHz/uA

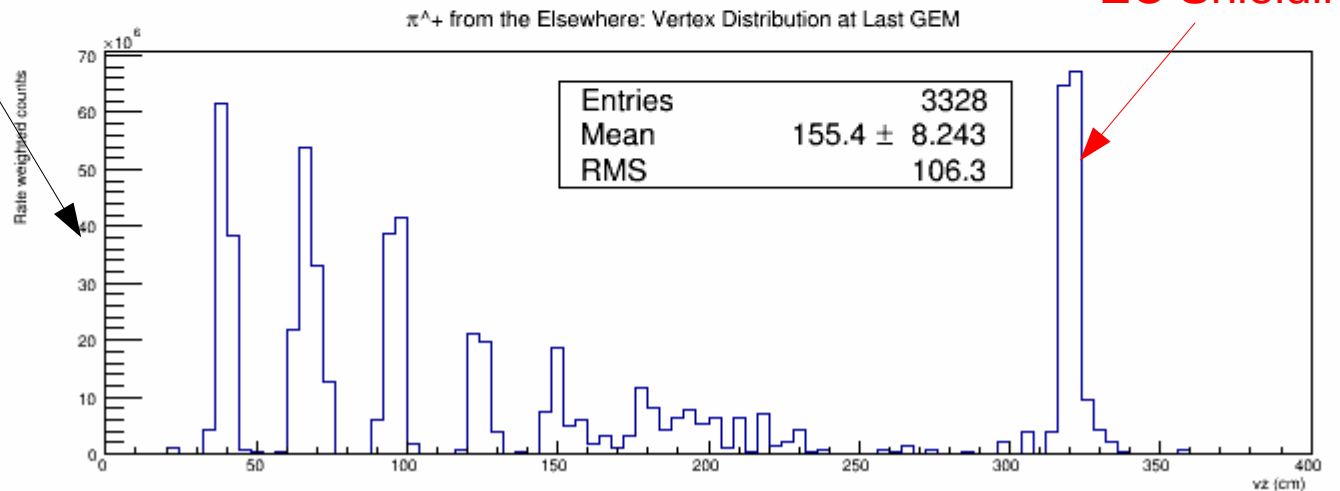
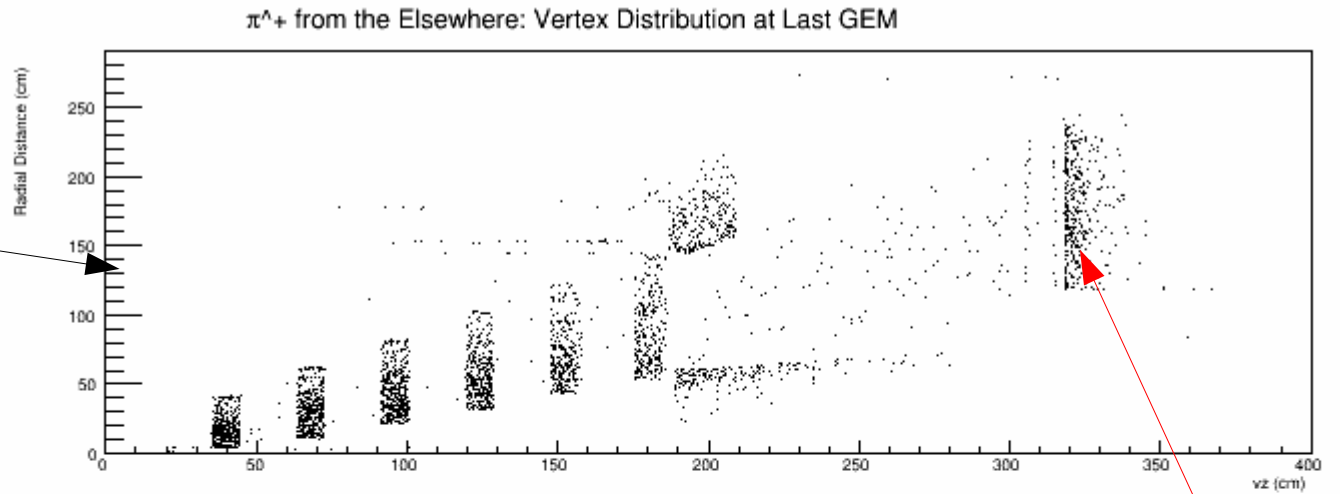
2. Pions from the  
target: 42 MHz/uA

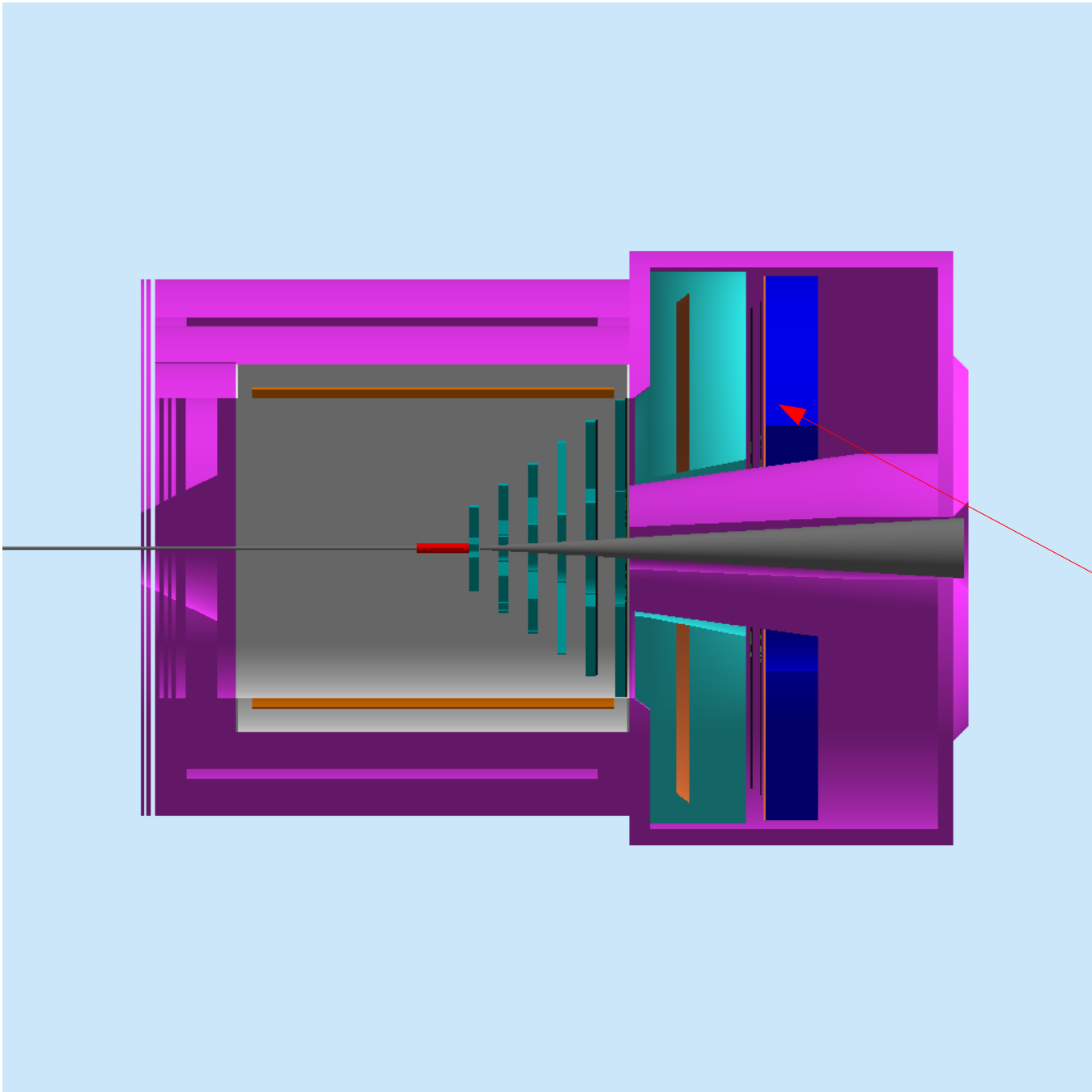
3. Pions from  
elsewhere: 1 MHz/uA



# Pions(+) at Last GEM from Elsewhere

Pions(+) generated outside of the target  
With Lead Baffles



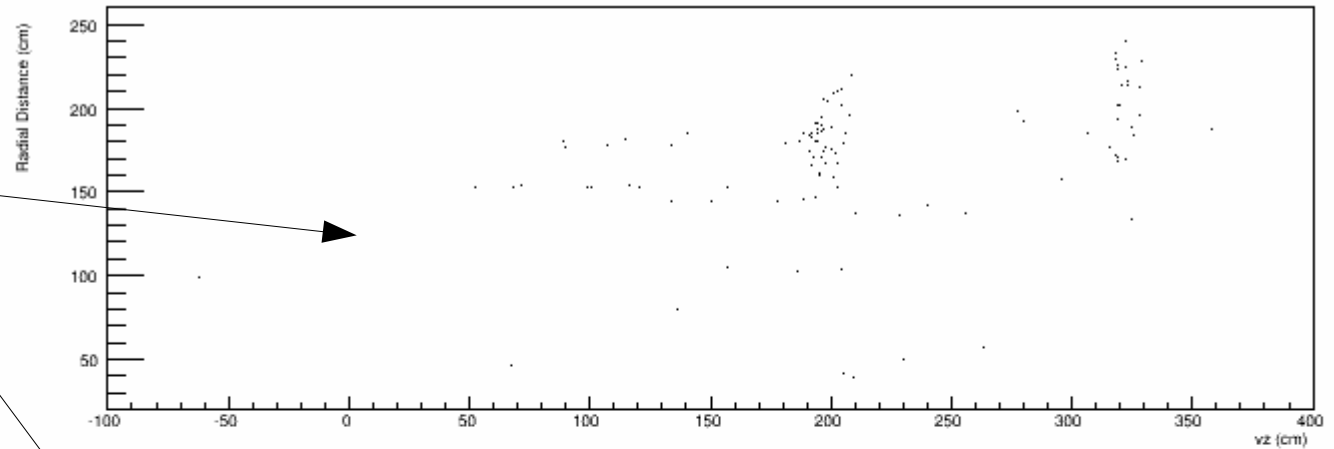


EC Shielding ?

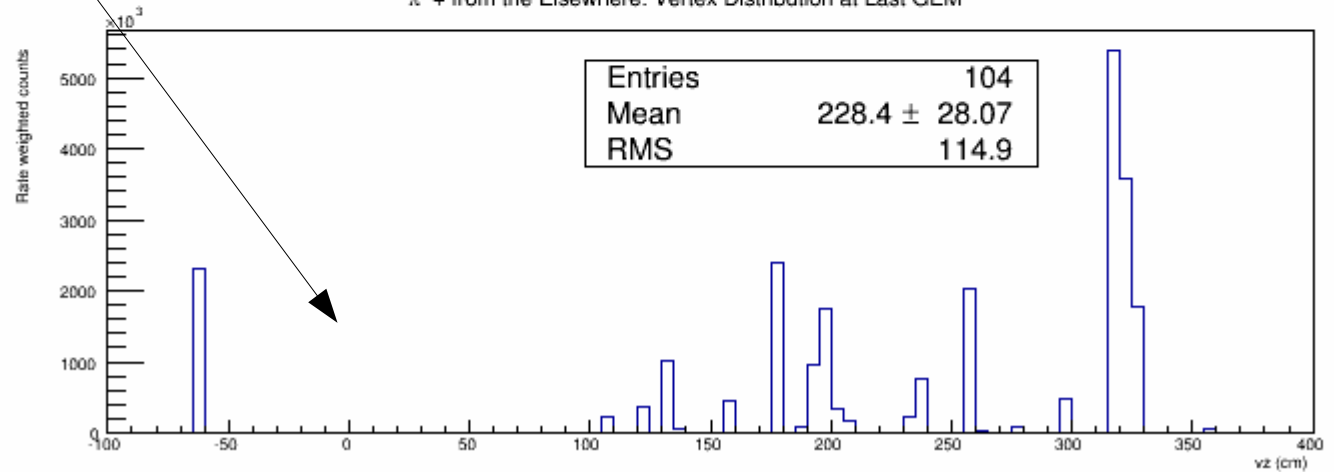
# Pions(+) at Last GEM with Kryptonite

Less Pions(+) are generated outside of the target With Kryptonite Baffles

$\pi^+$  from the Elsewhere: Vertex Distribution at Last GEM



$\pi^+$  from the Elsewhere: Vertex Distribution at Last GEM



# Pi+ Rate Summary

Process	Baffle Geometry	
	Lead (MHz/uA)	Kryptonite (MHz/uA)
$\pi^+$ (p > 0.3 GeV)	235	40
$\pi^+$ (p > 1 GeV)	17	1
$\pi^+$ (p > 2 GeV)	1	0.02
$\pi^-$ (all)*	3	0.1

\* Only  $\pi^-$  generated by  $\pi^+$

# Pi- Rate Summary

Process	Baffle Geometry	
	Lead (MHz/uA)	Kryptonite (MHz/uA)
$\pi^-$ ( $p > 0.3$ GeV)	178	25
$\pi^-$ ( $p > 1$ GeV)	31	15
$\pi^-$ ( $p > 2$ GeV)	3	2
$\pi^+$ (all)*	3	0.2

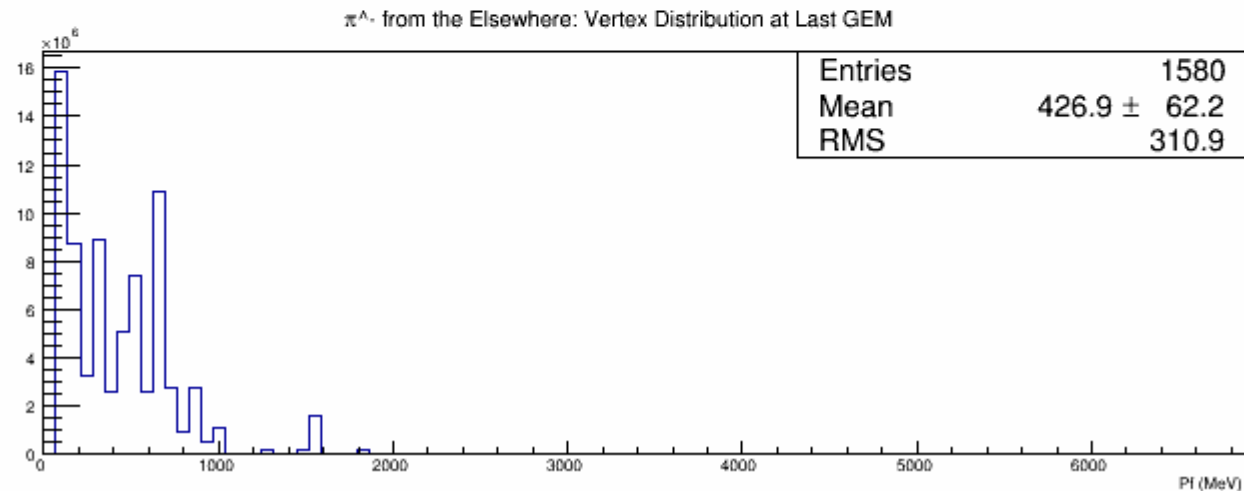
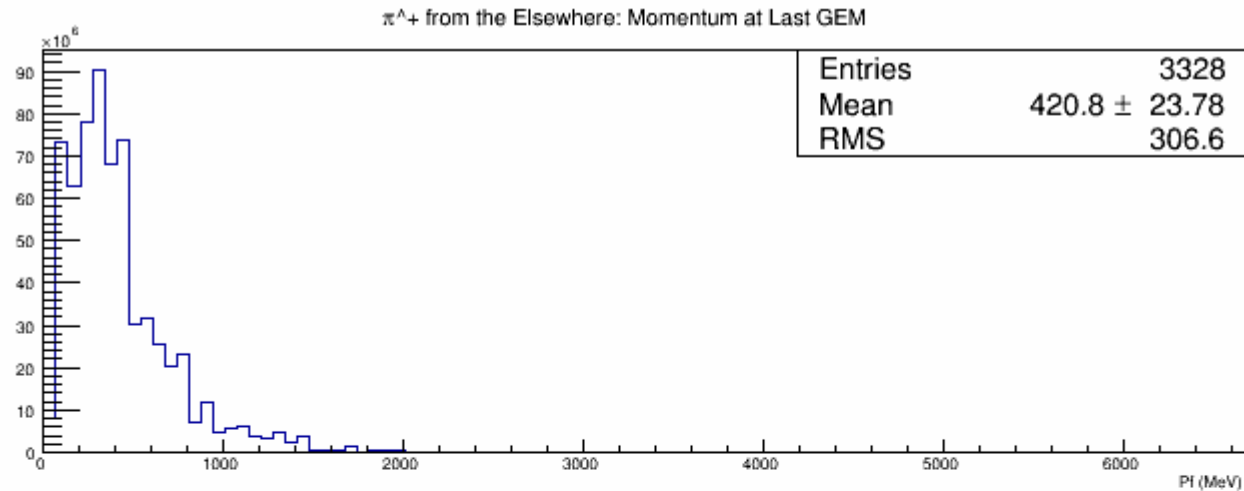
\* Only  $\pi^+$  generated by  $\pi^-$

# Supplementary



# Comparison with Pion(-)

- Compare Pion(+) with Pion(-) energies With Lead Baffles
- Almost all the Pi(-) are generated outside of the target
- Pi- rate : 2.7 MHz



# Input Generation