

Neutrino Beam System Update

LBNE Beam Group
FNAL

Outline

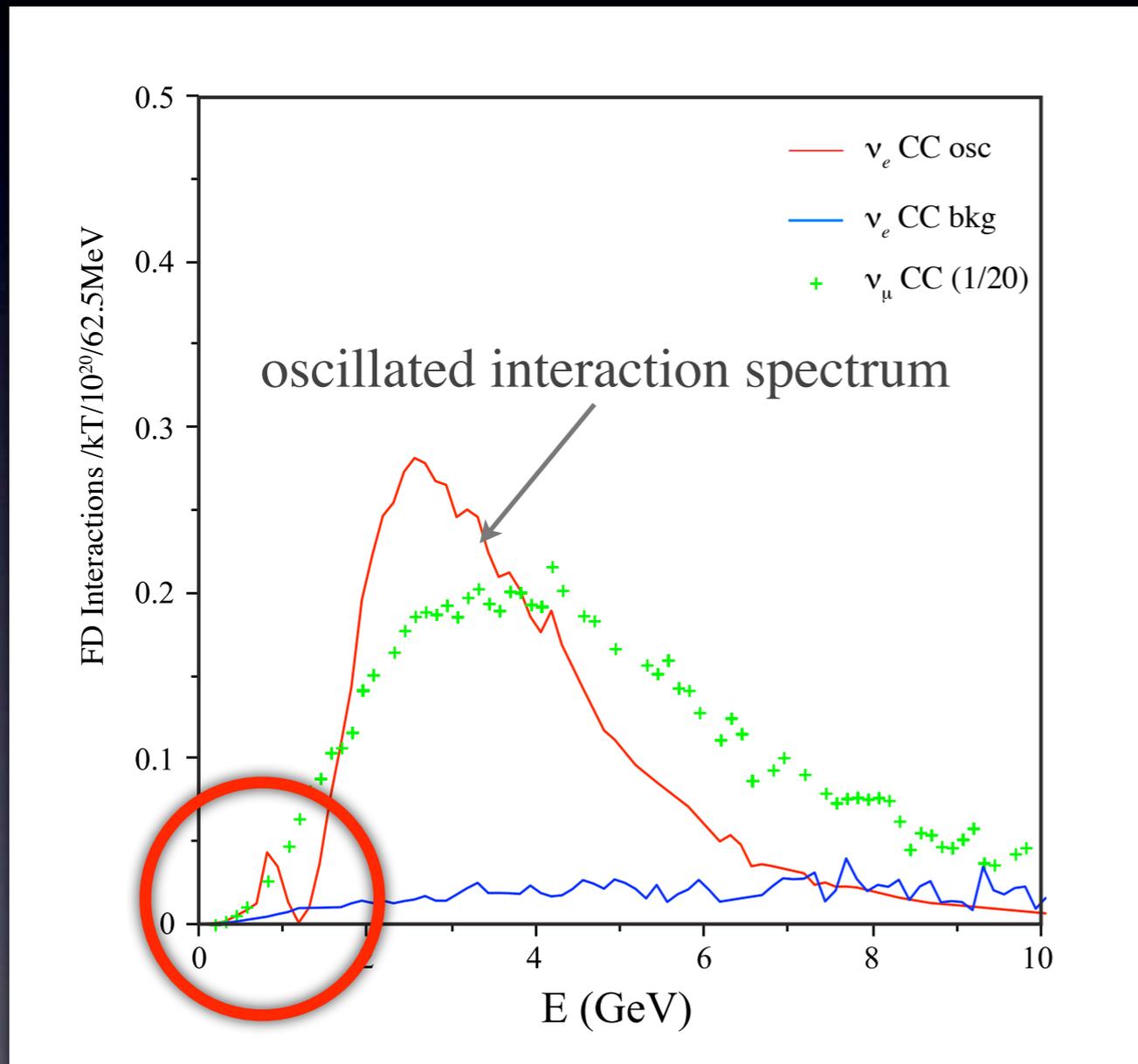
- Update: Horn Configuration
- Decay Region : Unwanted Sources

Horn Configuration

- Restrict to common horn PS
- Maximize LE neutrino flux at Far Det.
- use IHEP target design 1.5 cm \varnothing x 96.6 cm
- all 2 horn systems

I - Maximize 2nd Osc Peak

Peak

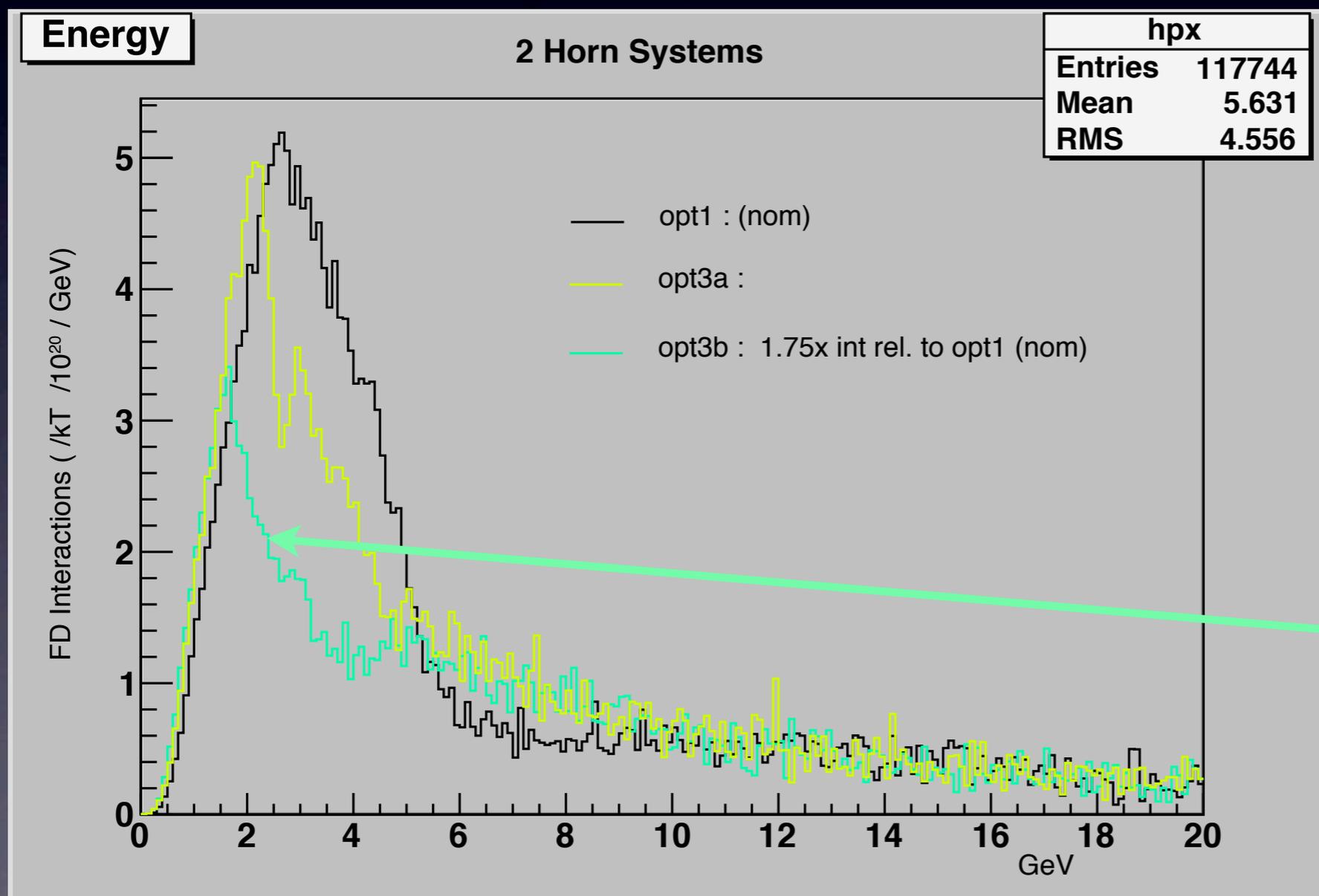


Neutrino energies of interest :

$$0.5 < E_\nu < 6 \text{ GeV}$$

I - Maximize 2nd Osc Peak

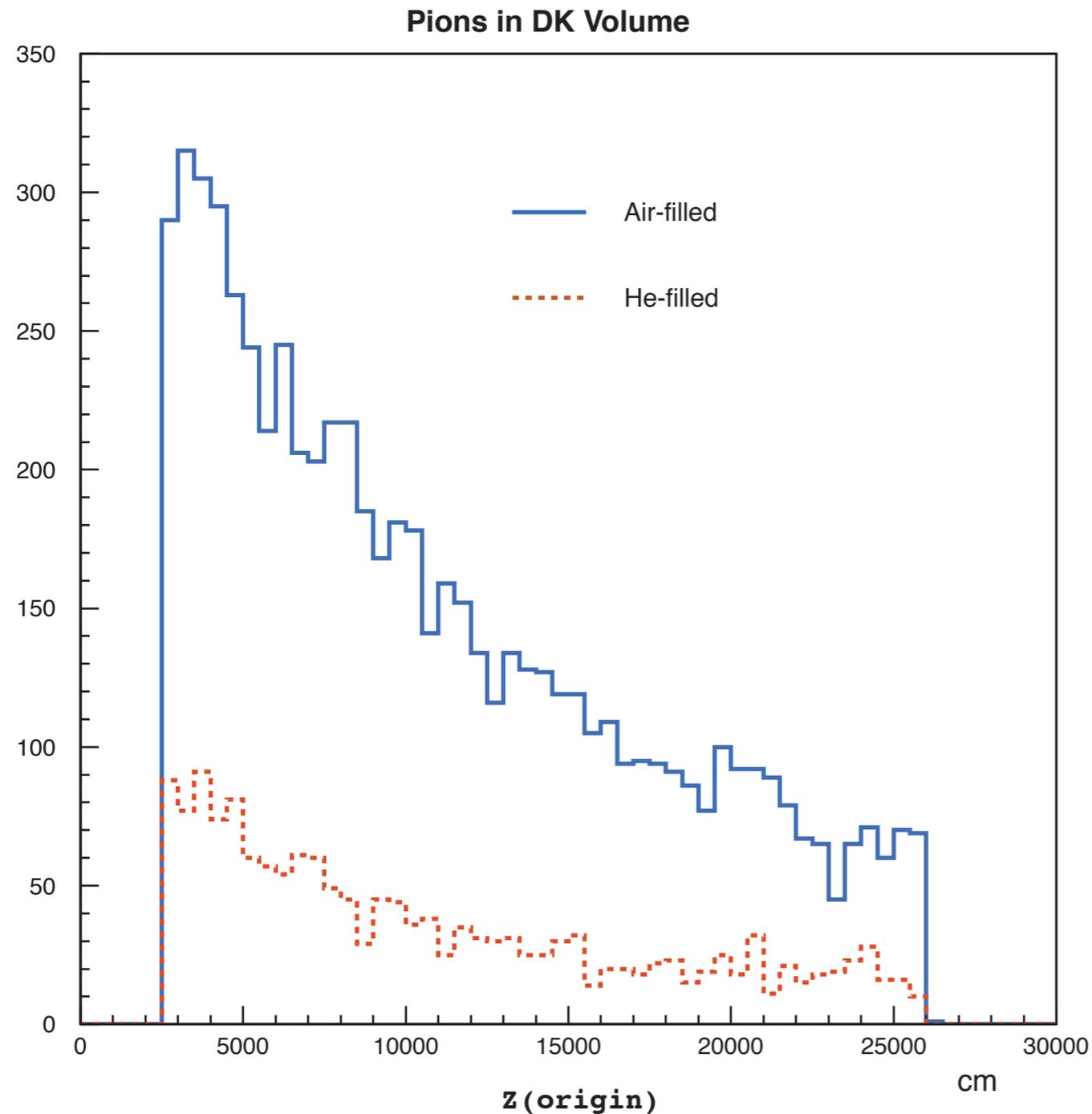
Peak



Best solution has ~1.8x the no. of events below 1 GeV

But it is a “degenerate” solution

Unwanted Sources of Pions

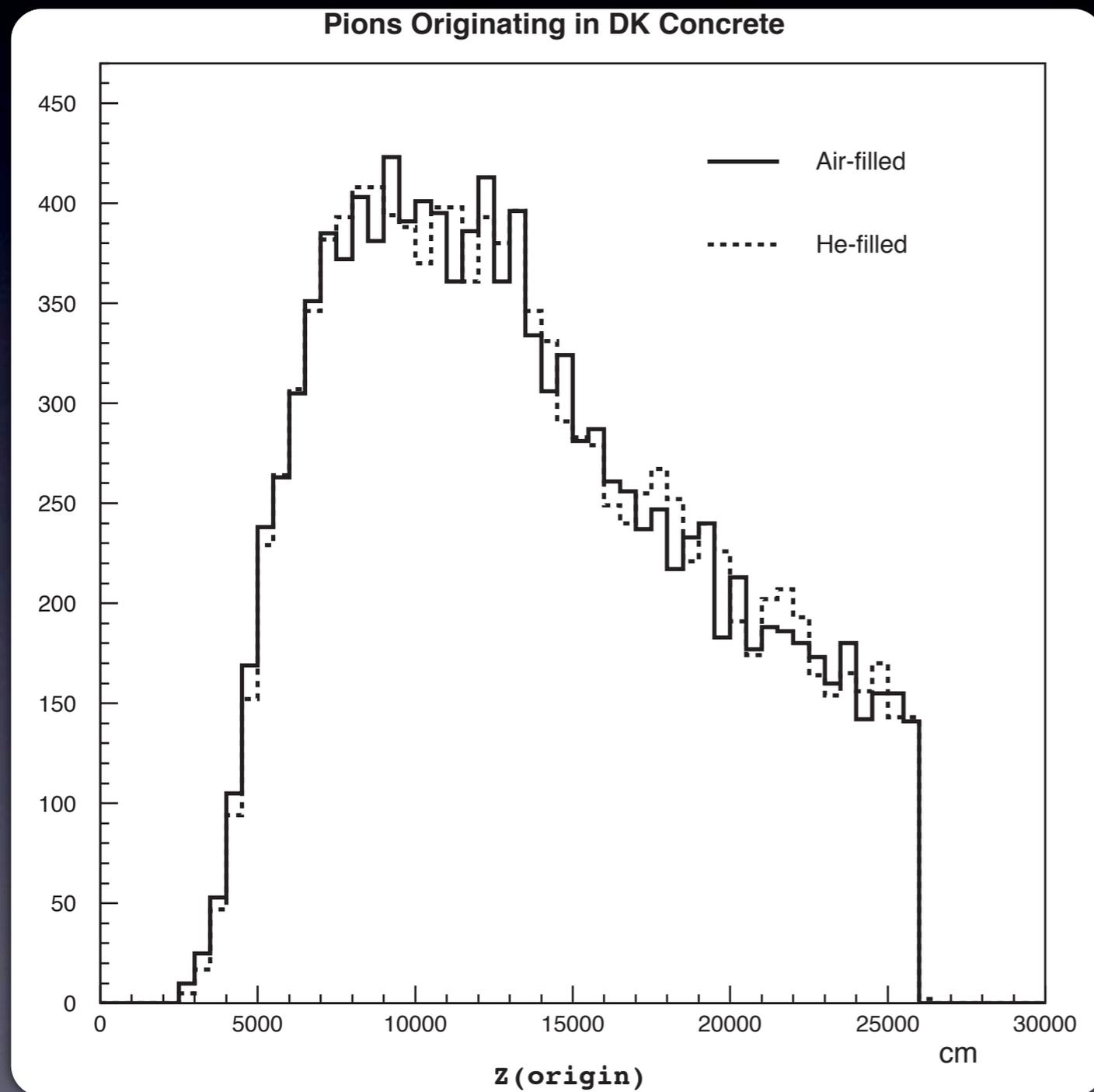


In following plots:
Tagged pions in DK
pipe
- checked creation pt.

Compare Air to He
in DK pipe: pions
originating in gas

Expect He/Air ~ 0.21
result ~ 0.26

Unwanted Sources of Pions



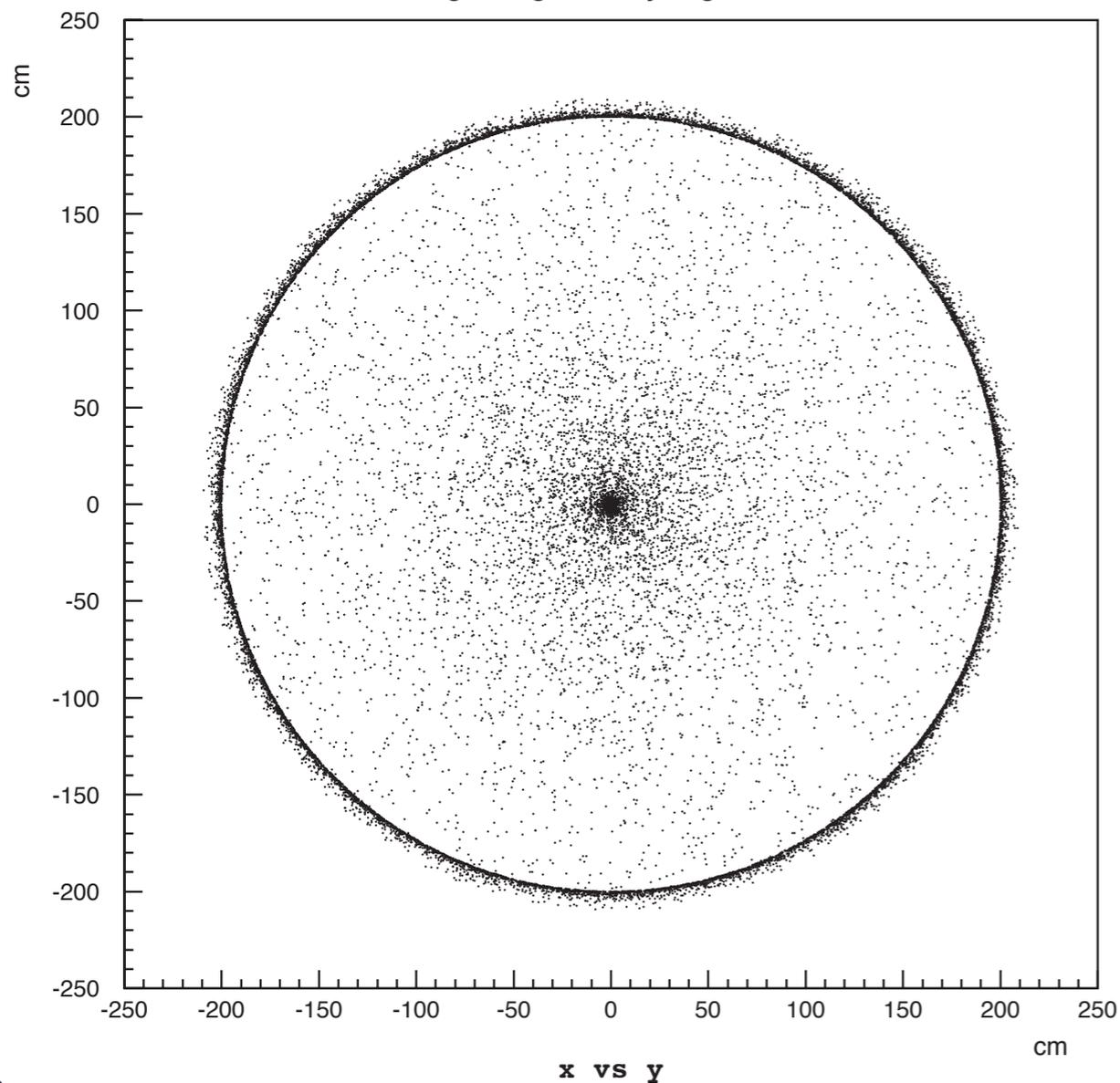
Pions originating in DK
concrete or steel:

No difference expected

Unwanted Sources of Pions

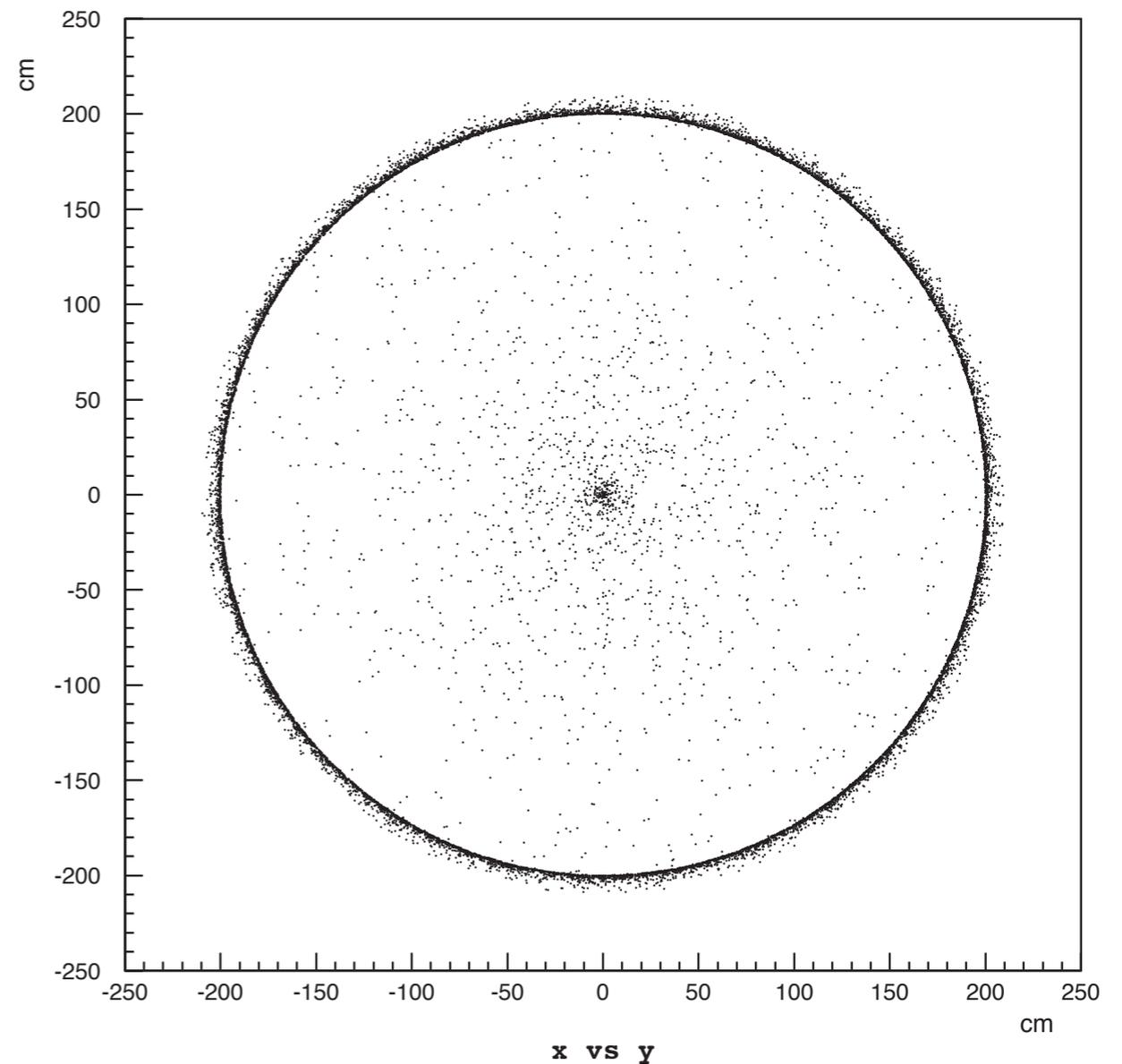
Pions originating in DK region: project on x-y plane

Pions Originating in Decay Region - Air-filled



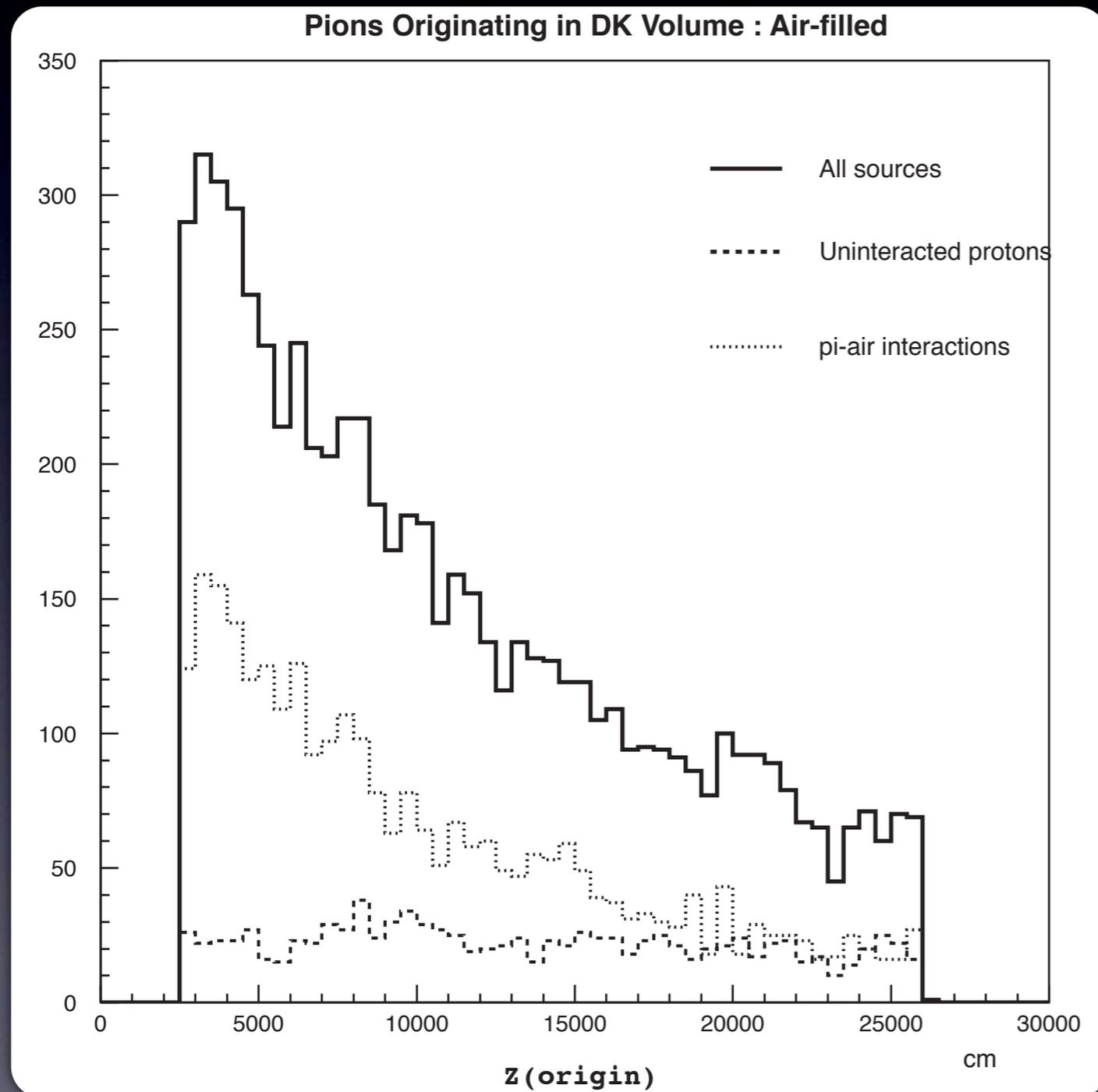
Air-filled

Pions Originating in Decay Region - Helium-filled



He-filled

Unwanted Sources of Pions



Separate Sources of
pions originating in
DK Pipe

Most come from 2^{ry}
particles interacting

Need to check abs.
normalization : spectra
from sources very
different!

Common Horn PS

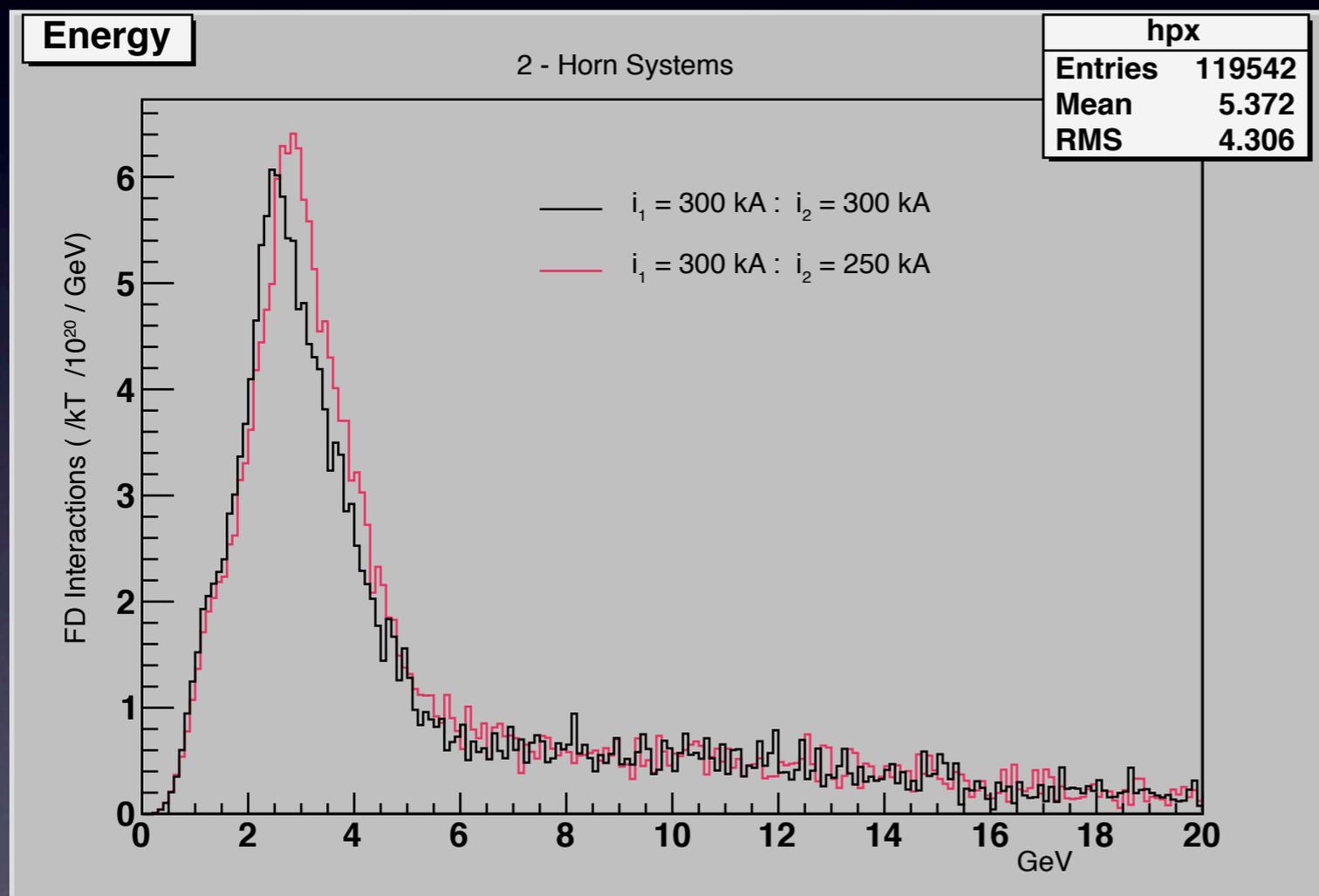
Net effects:

1- Lose 20% @ 4 GeV

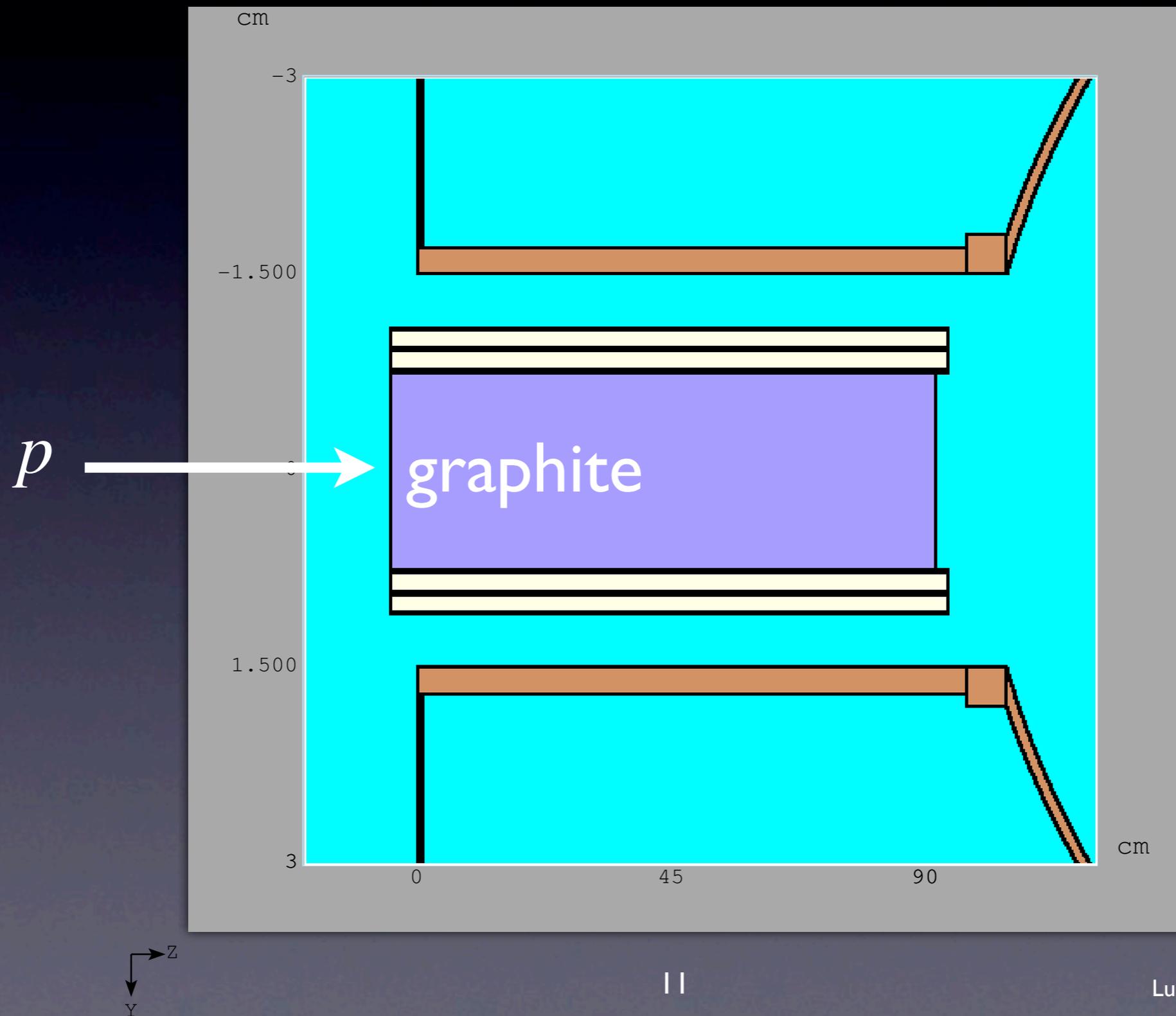
2- Gain 20% @ <1 GeV

Can get almost same solution increasing z of horn 2

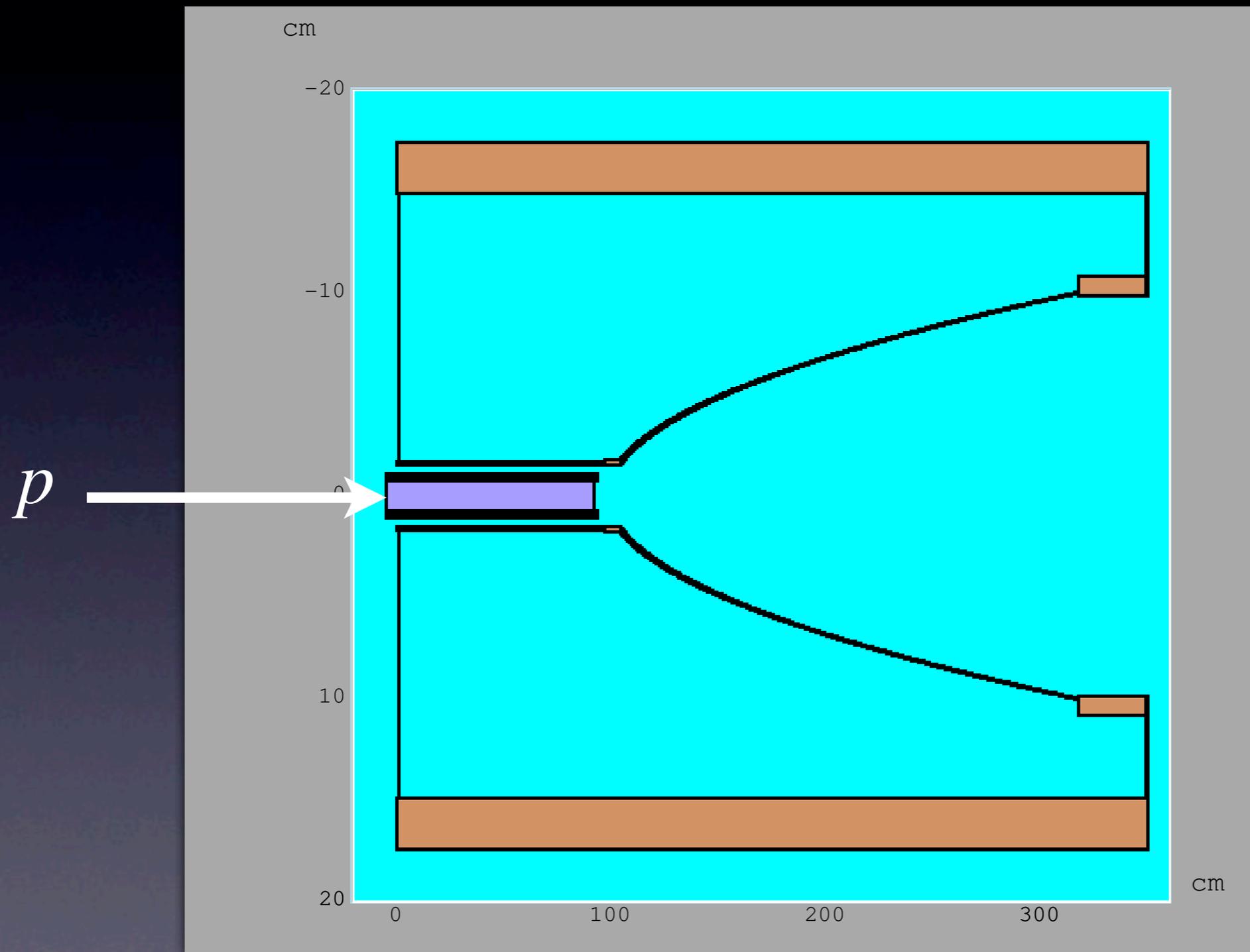
Not a big concern



Target Model



Target Model



Focussing System Summary

- 2-horn system seems adequate
- cannot find a superior 3-horn config.
- more flux $E_\nu < 1$ GeV “degenerate”

Summary & Comments

- Common Horn PS (2 horn system) OK
- Need to study extra-target pion sources
- Absorber E-dep : coordinate with Nikolai
- Baffle accident E-dep : ?