LAr Tert. Beam – Initial Thoughts
G4beamline Simulations

units: mm, MeV/c (unless otherwise noted)

D. A. Jensen

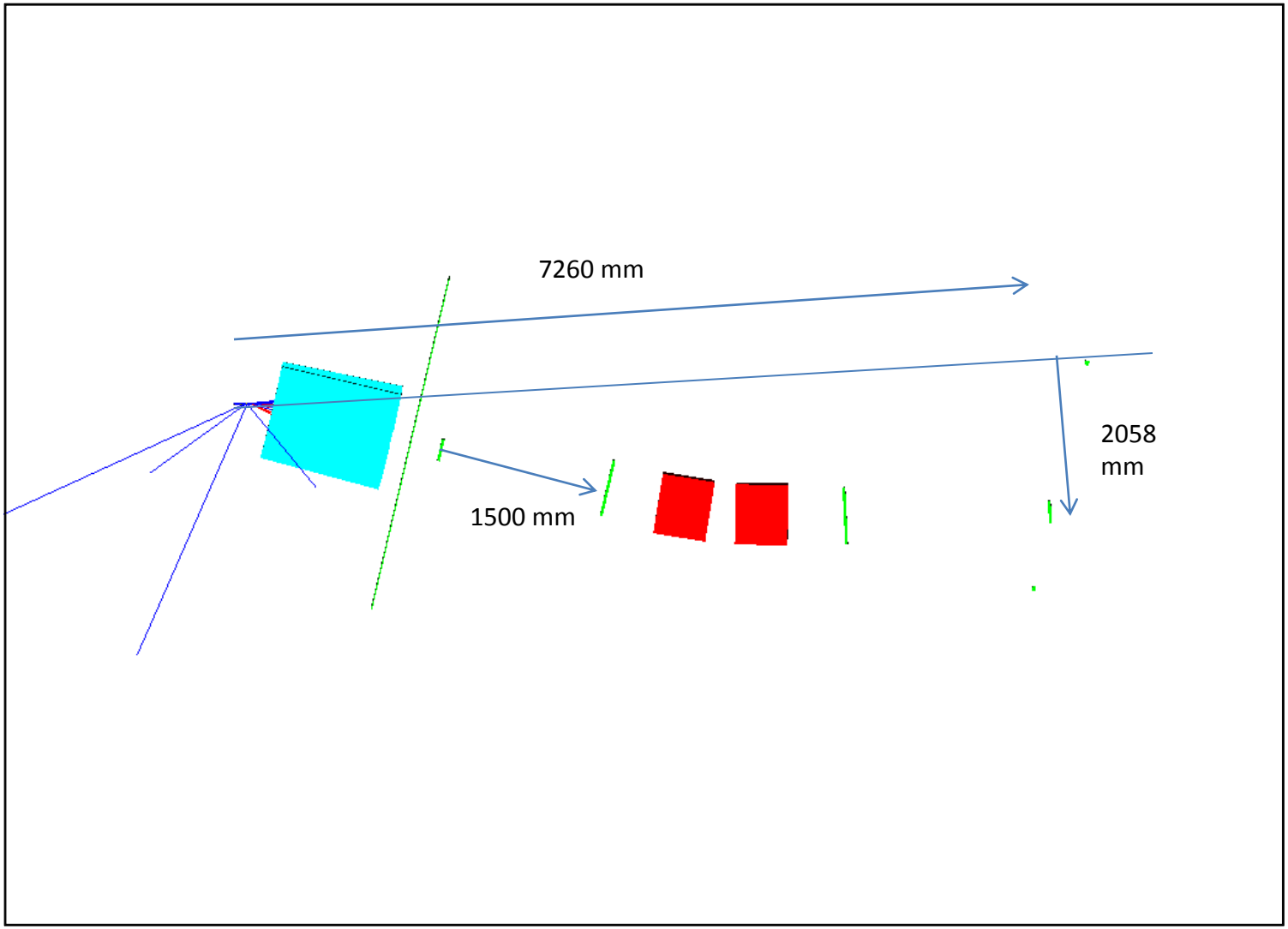
July 25, 2012

Nominal Tertiary Spectrometer

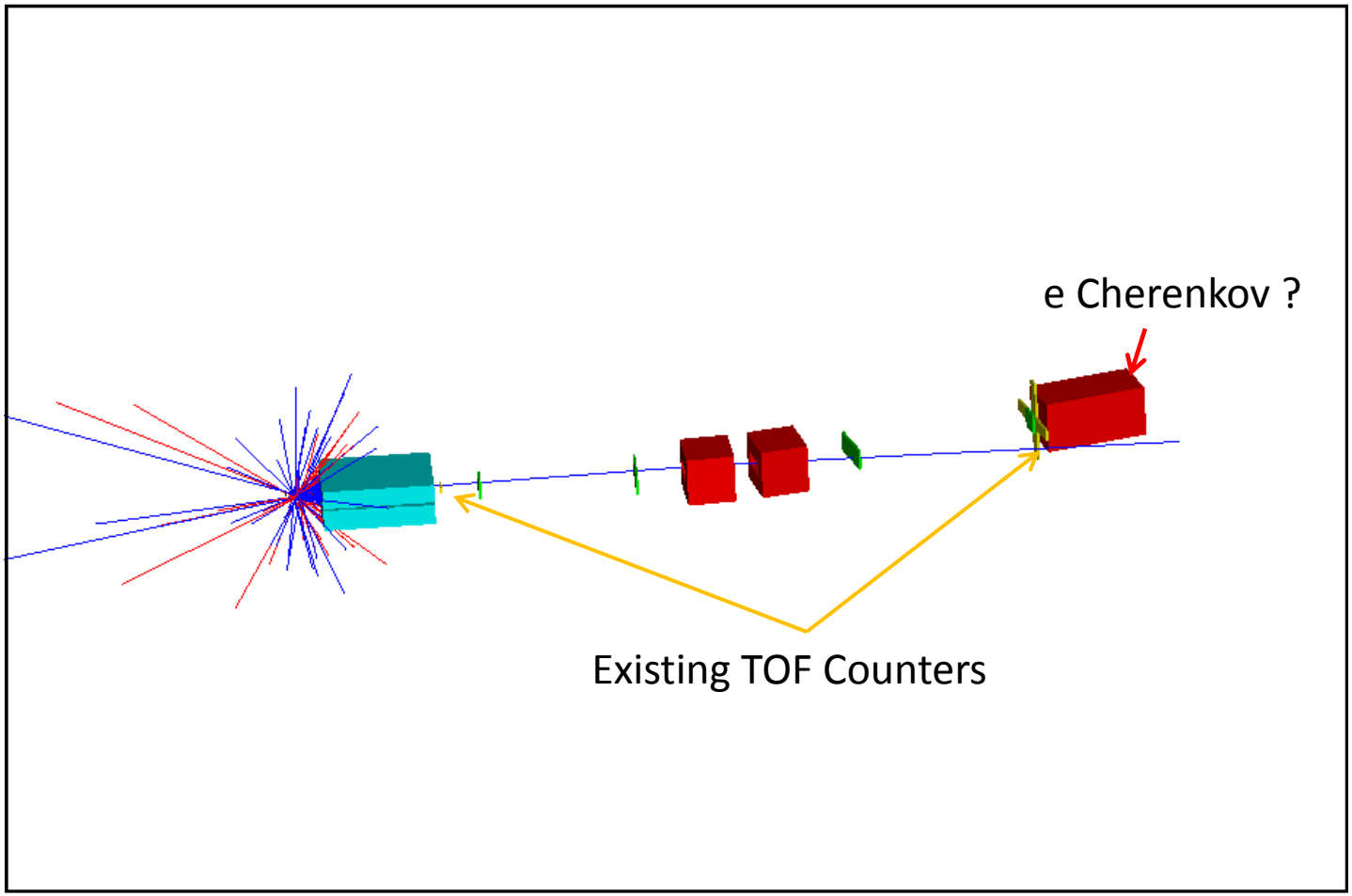
may change parameters, but starting here …

- Cu Target in a secondary beam, p_{sec} = 8 GeV/c (or higher…)
- Collimator at 16 degrees
- Pair of NDB magnets, Field integral = 62.12 MeV/c each
  current = 100 Amps. Geometry >> Bend = 16 degrees.
- MWPCs for tracking
- Momentum resolution ~ 1 to 2 % (with care)
- Straightforward to reconfigure: length, bend angle, …

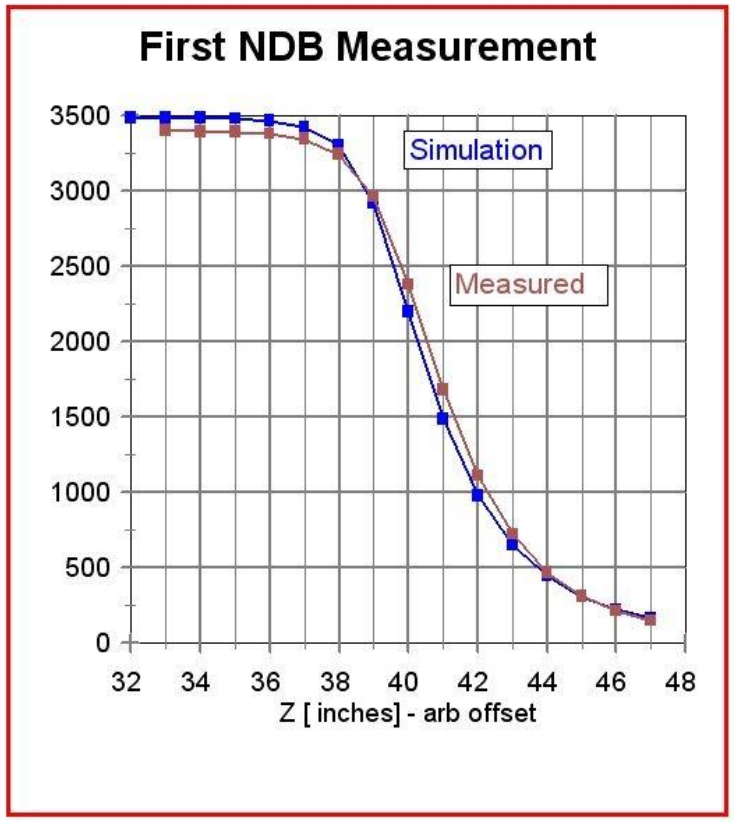
- **Secondary beam - ~300K particles/spill max**
- **1 spill / minute, spill lasts ~ 4 sec**

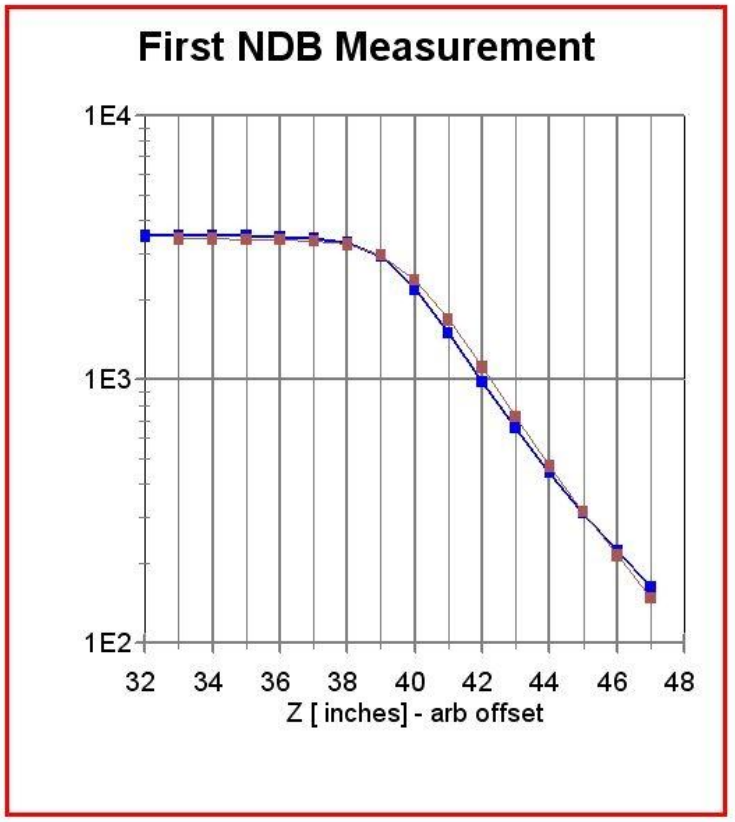

7260 mm
2058
mm
1500 mm

Detector with TOF counters
Cherenkov ?



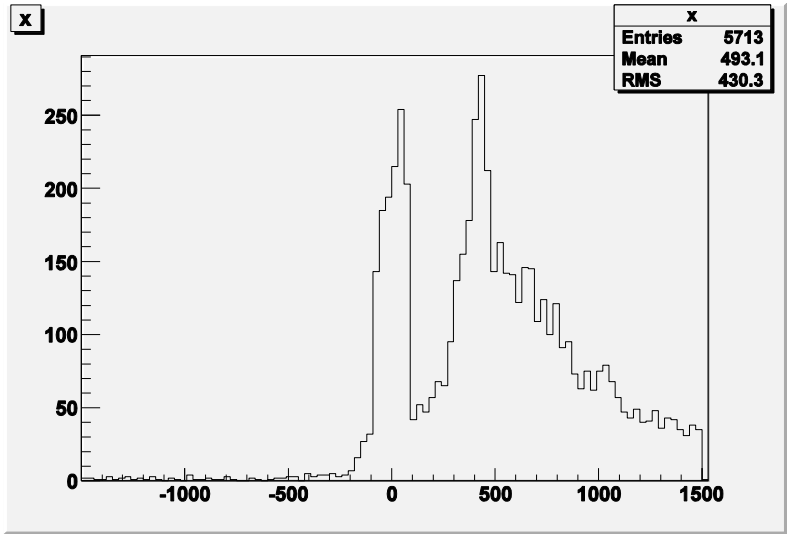
NDB magnets simulated, measured



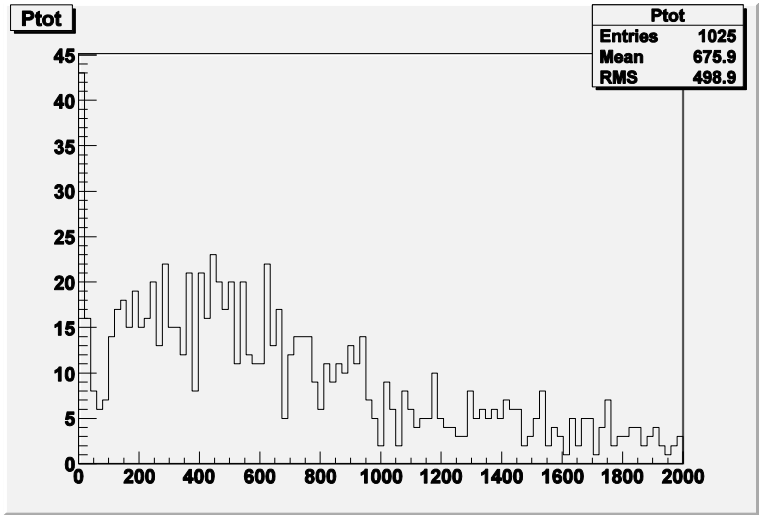


What Comes Out ? Det0, Det1

At Det 0, see punch through tracks. More punch through at higher momentum.

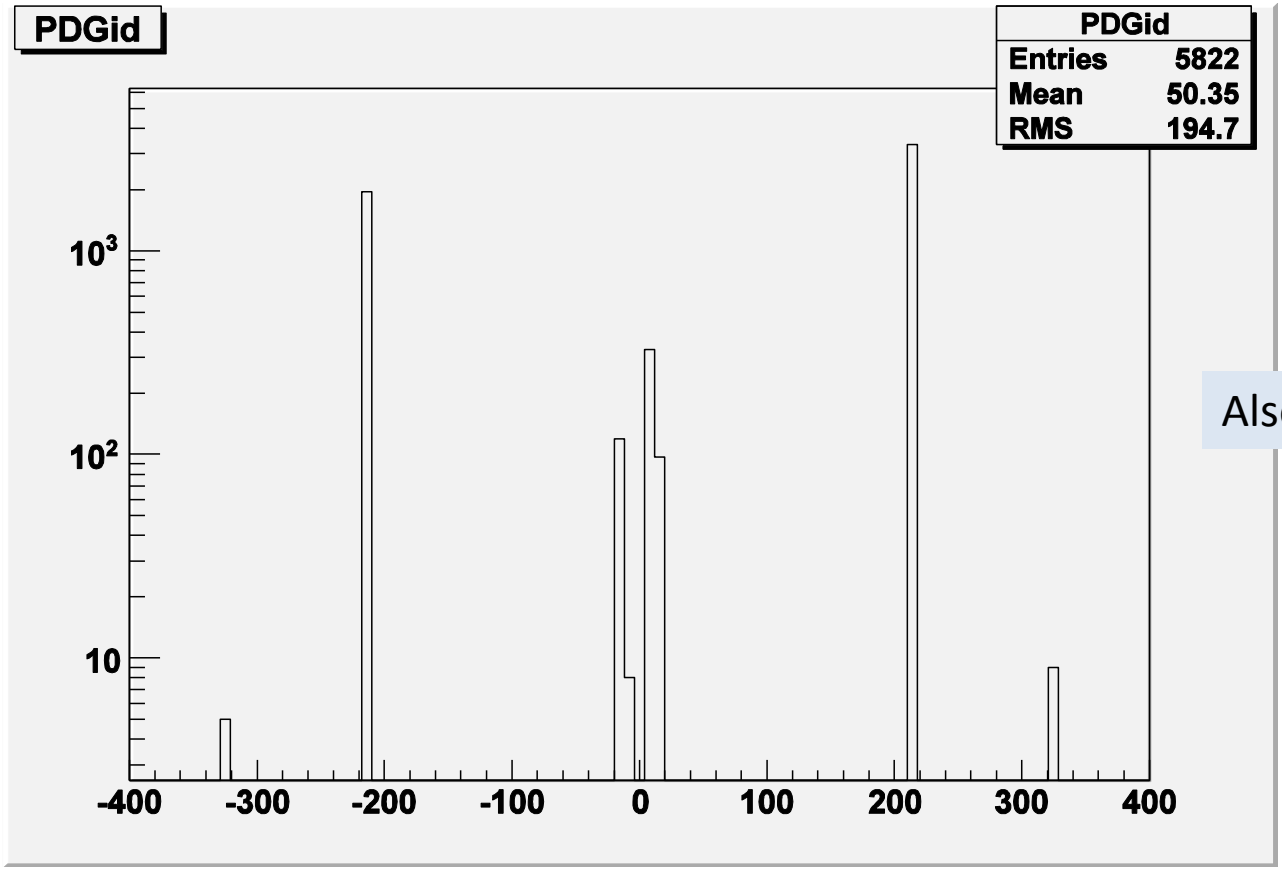


Momentum spectrum at the exit of the collimator. The geometry and magnet current settings impose cuts



At Det1 - PDGid. Photons not saved

10^6 8 GeV/c π^- incident.

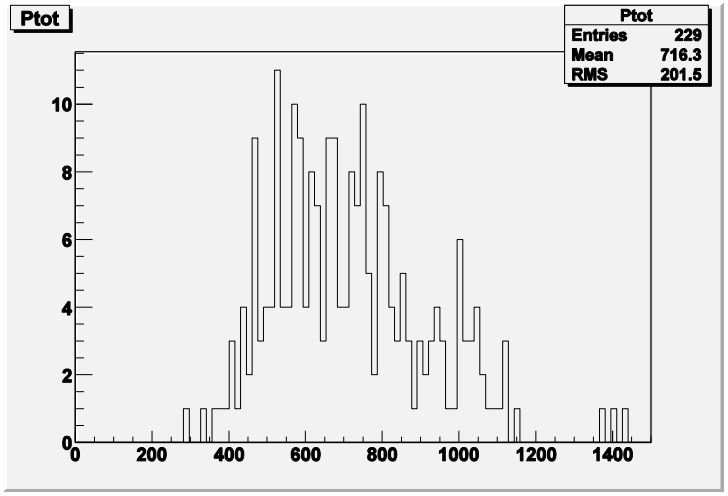


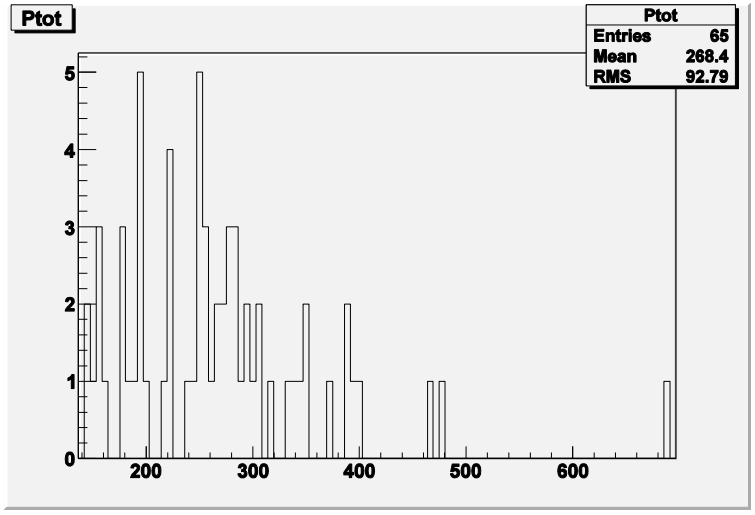
Also 787 protons

Nominal Rates and momentum spectra. All tertiaries included in the plots

- Throw 600K π^+, about 2 spills of nominal intensity
- Top plot Nominal, magnets at full

  38 p, 112 π^+ …
- Lower plot, magnets at half current.

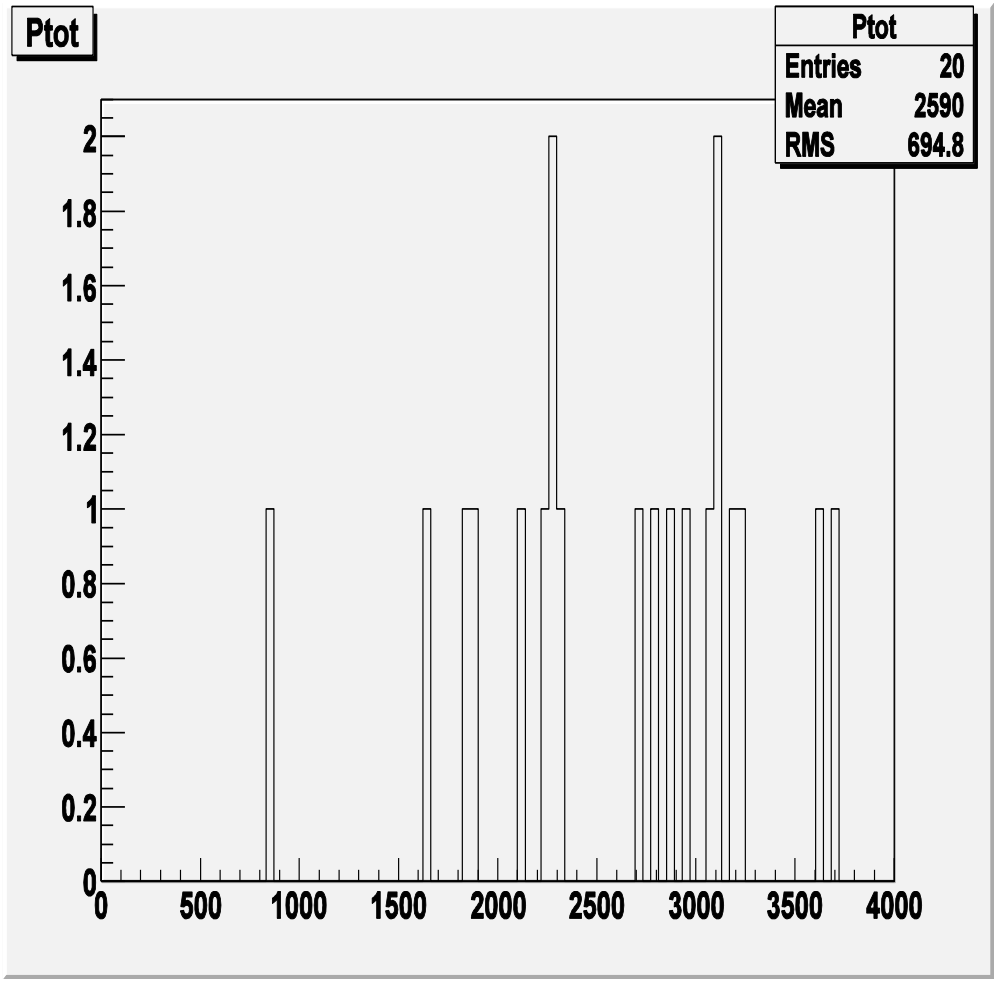




Searching for anti_protons

- $2x10^6$ 32 GeV/c π^- on the target
- Look for anti-protons coming out of the collimator
- Beware p acceptance

- 2x rate for p_π = 64 GeV/c
- .2x rate for p_π = 16 GeV/c



Discussion …

- TOF resolution ~ 200 ps
- Is a Cherenkov needed for $e^{\pm}$ identification ?
- Smaller (<16 deg) bend ?

  accept higher p, poorer $\Delta p/p$
- Detailed geometry still needs work

  LAr vessel exact aperture, …

There are many details available based on Minerva running and on simulations.