Analysis of e1-6 Run Data

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Single pion electroproduction.

E1-6 Run.

E=5.754 GeV

Outline.

- Motivation;
- CLAS detector;
- Data analysis;
- Summary.

Motivation

- Nuclear resonance's - one of the most prominent phenomena in QCD.
- Nuclear resonance's coupling to pion channel ~ 90%.
- Data available for double pion electroproduction for

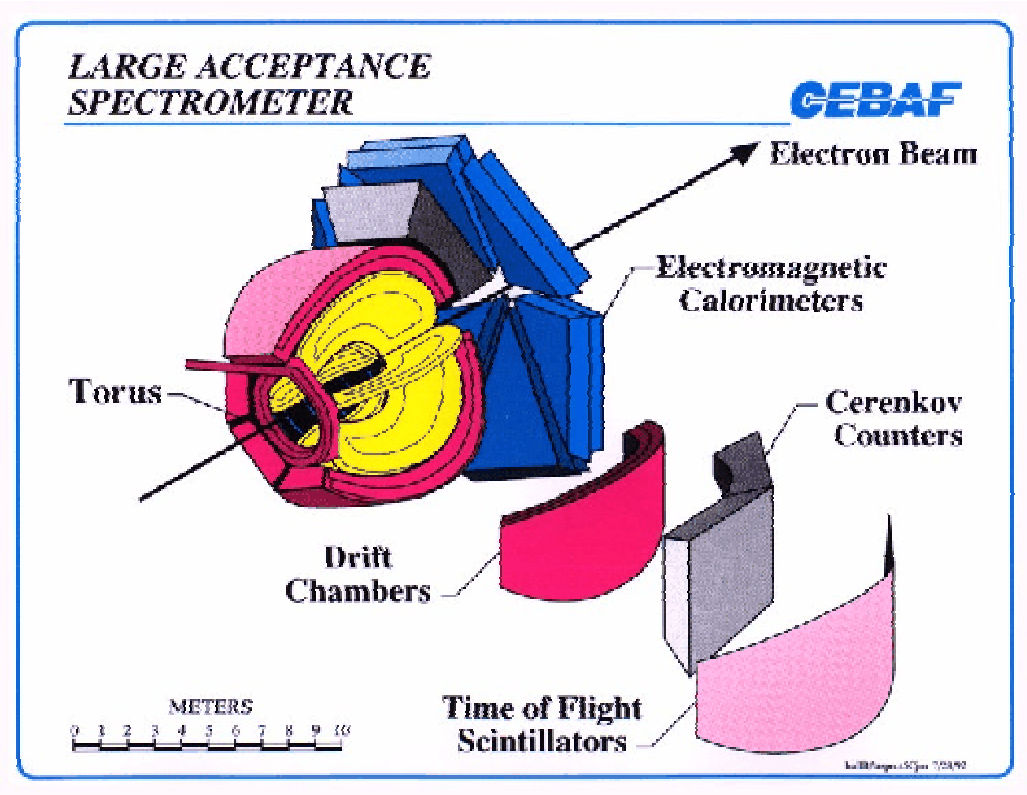
  $W<2.1$ GeV; $0.5<Q^2<1.5$ GeV^2

  For single pion production we have smaller region.

  Expected region after performing analysis
- $W<2.1$ GeV; $0.5<Q^2<3$ GeV^2
- Combined analysis of both channels can help extract background, since it's totally different in these channels;
- Signal of "missing resonance" $3/2^+$ 1720 in double pion channel.

CLAS detector.

Detector structure.



- Drift chambers: trajectory;
- Cherenkov counters: distinguishing between electron and negative charged pion, electron trigger;
- TOF: time measuring;
- EM calorimeter: detection and triggering electrons, photons and neutrons.

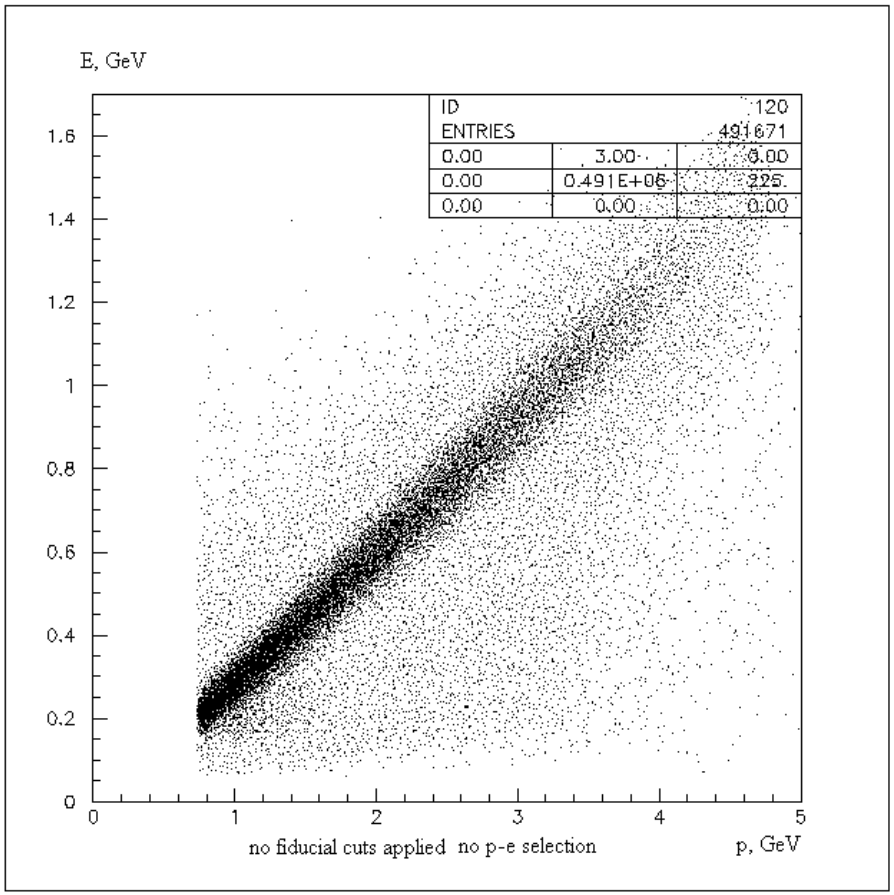
Data analysis steps:

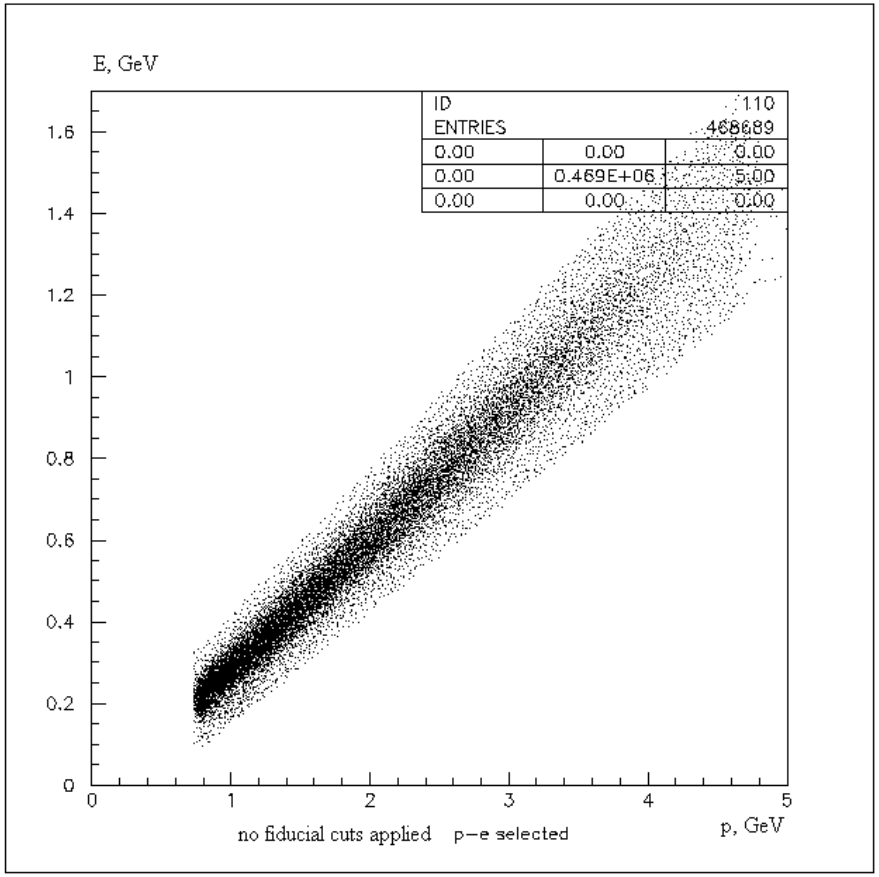
- Particle ID;
- Fiducial cuts;
- Radiative corrections;
- Simulation.

Particle ID.

- Applying various kinematical, missing mass and other cuts to identify particles.

Energy loss in calorimeter vs momentum of negative charged particle:

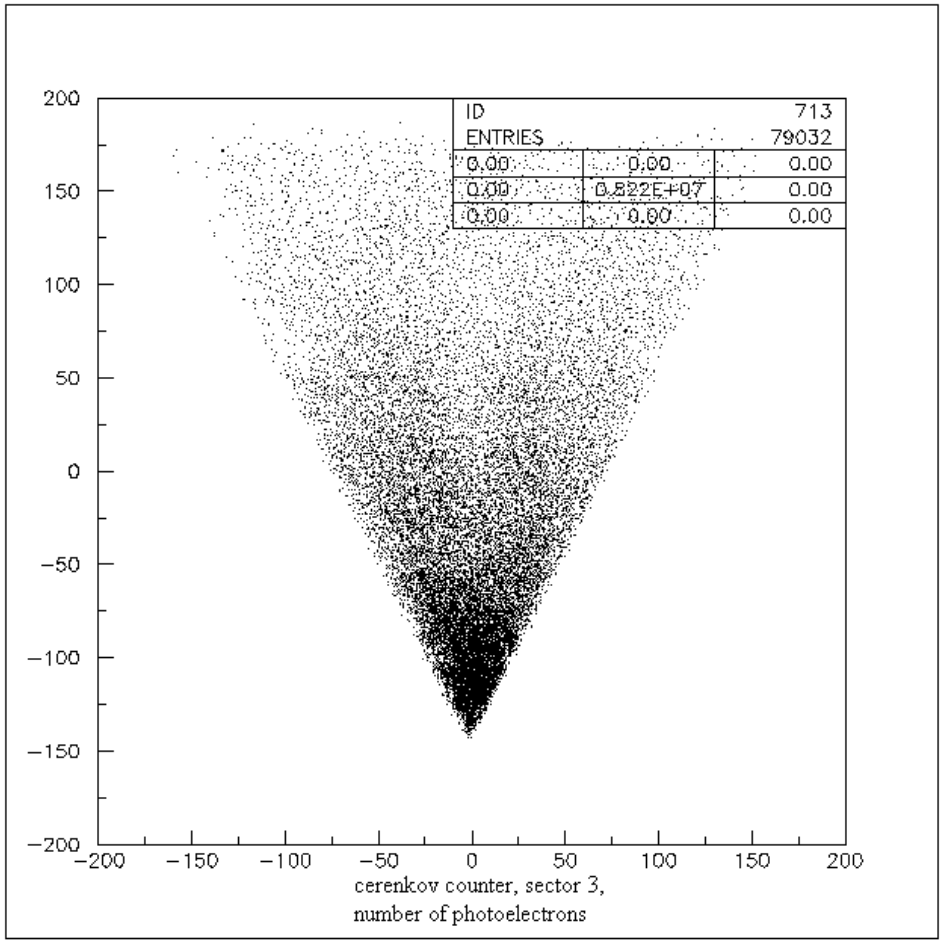


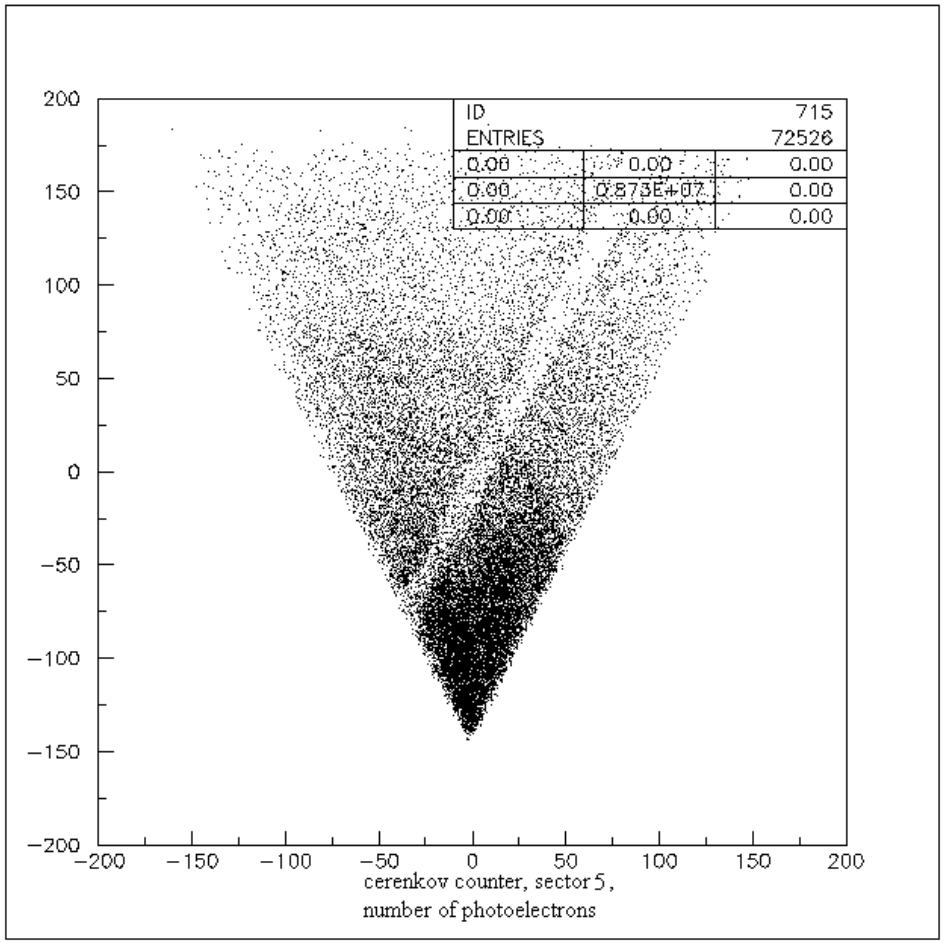


Cherenkov fiducial cut.

- Area of all 6 sectors of Cherenkov counter were divided in regions, size 5cm*5cm, and for each area number of photoelectrons were calculated. Areas, where mean number was less, then 5 were excluded from next steps of analysis.

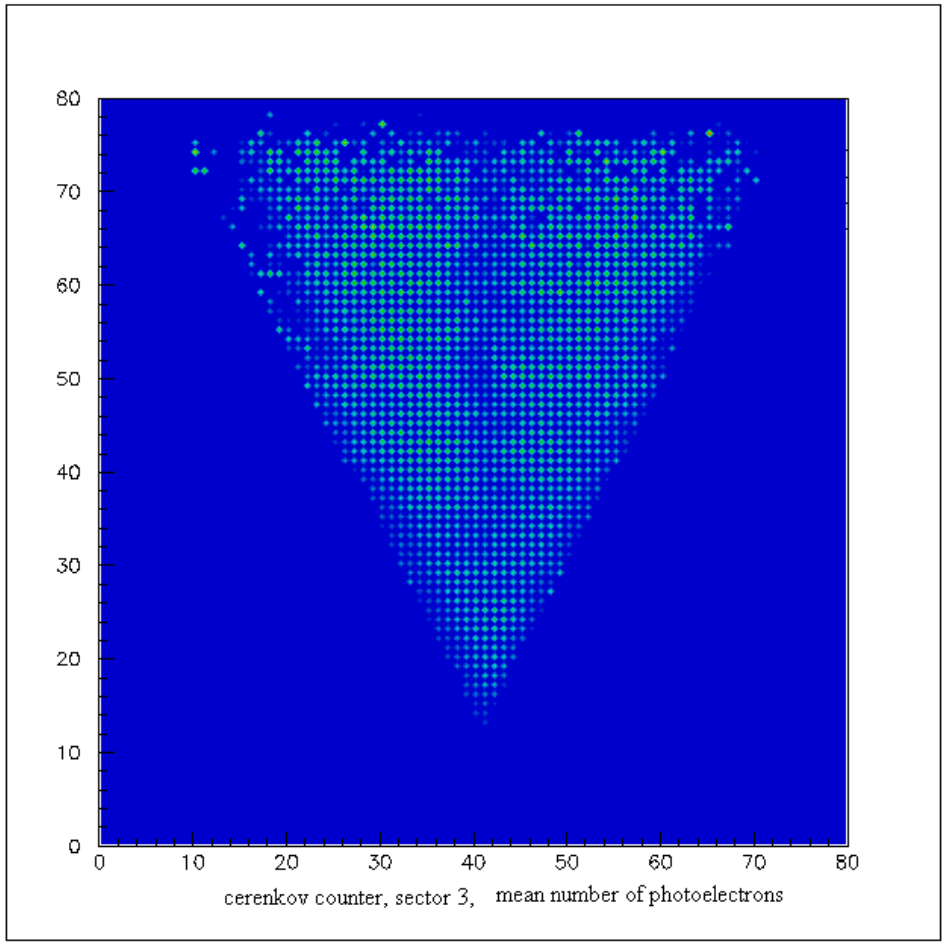
Cherenkov Counter.
Number of photoelectrons in one sector.

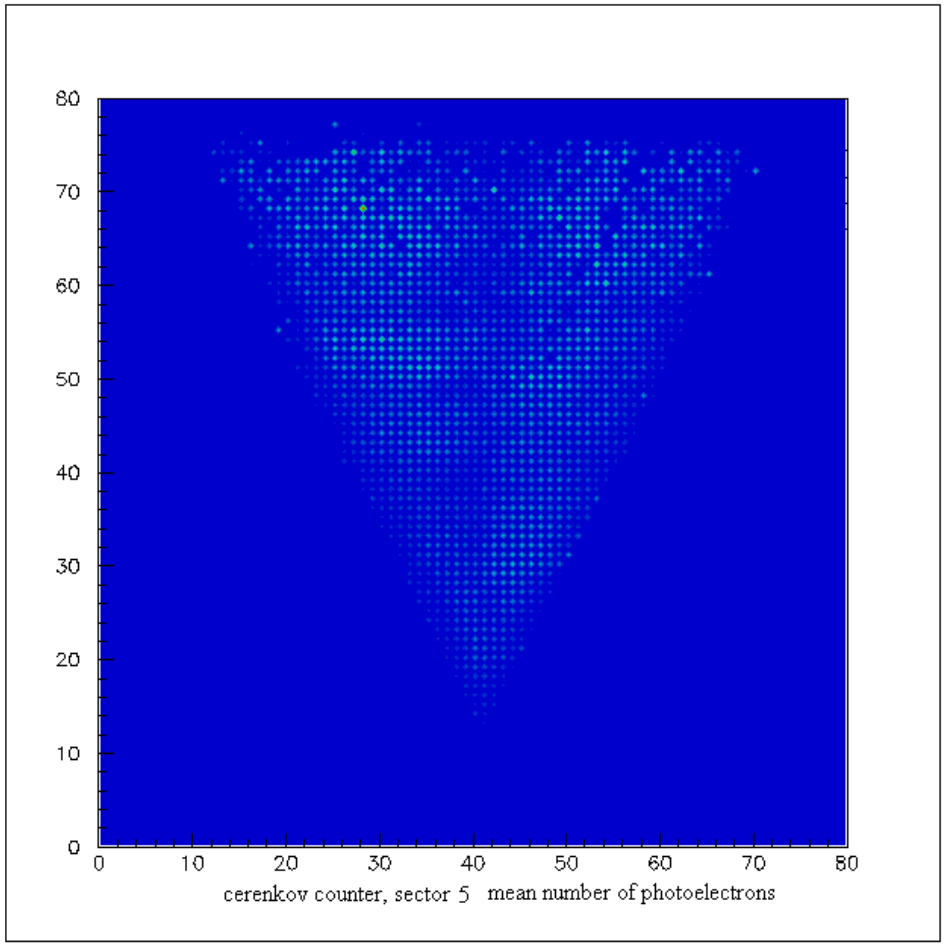




Stripe on right picture.

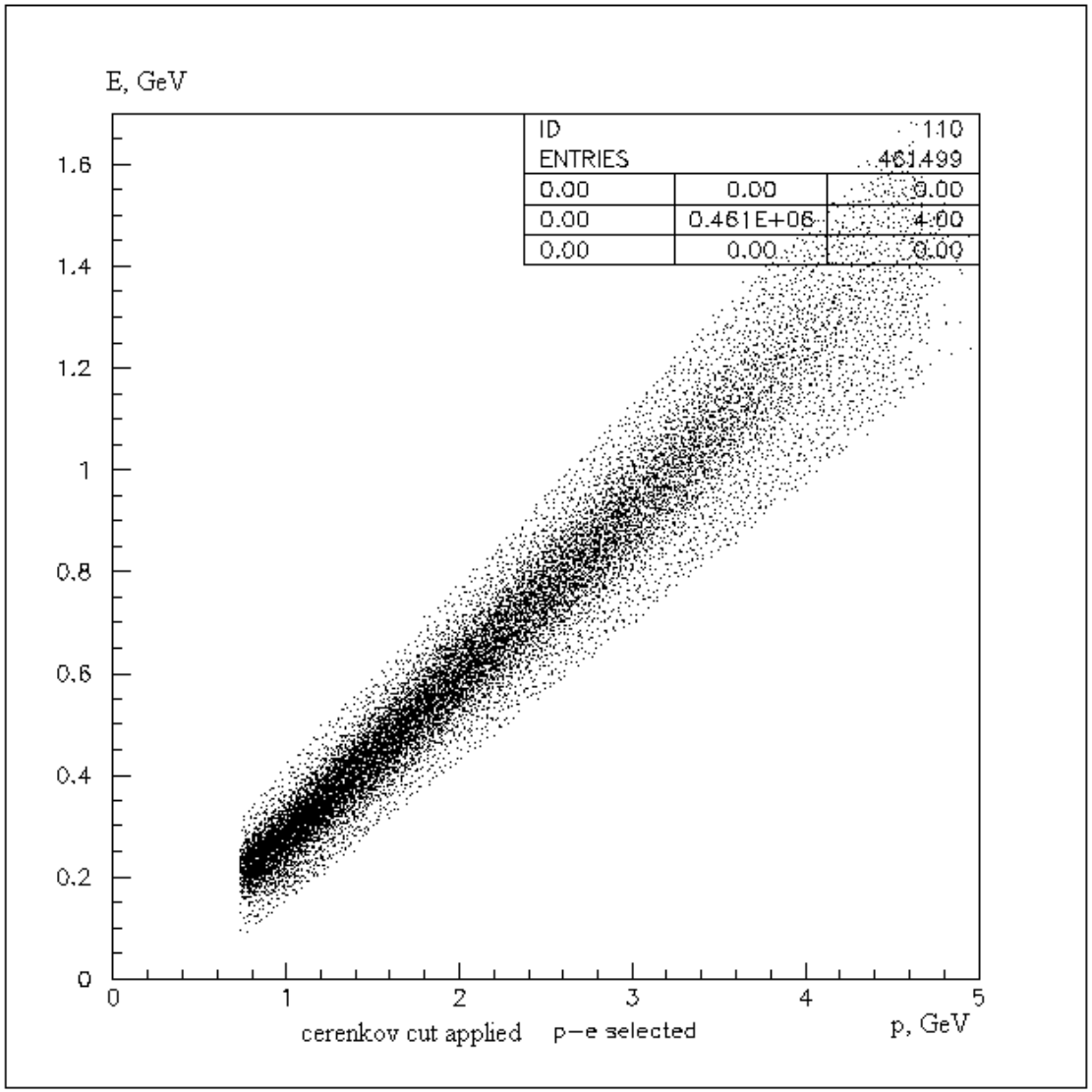
Cherenkov fiducial cut. Number of photoelectrons per event for different region of counter.



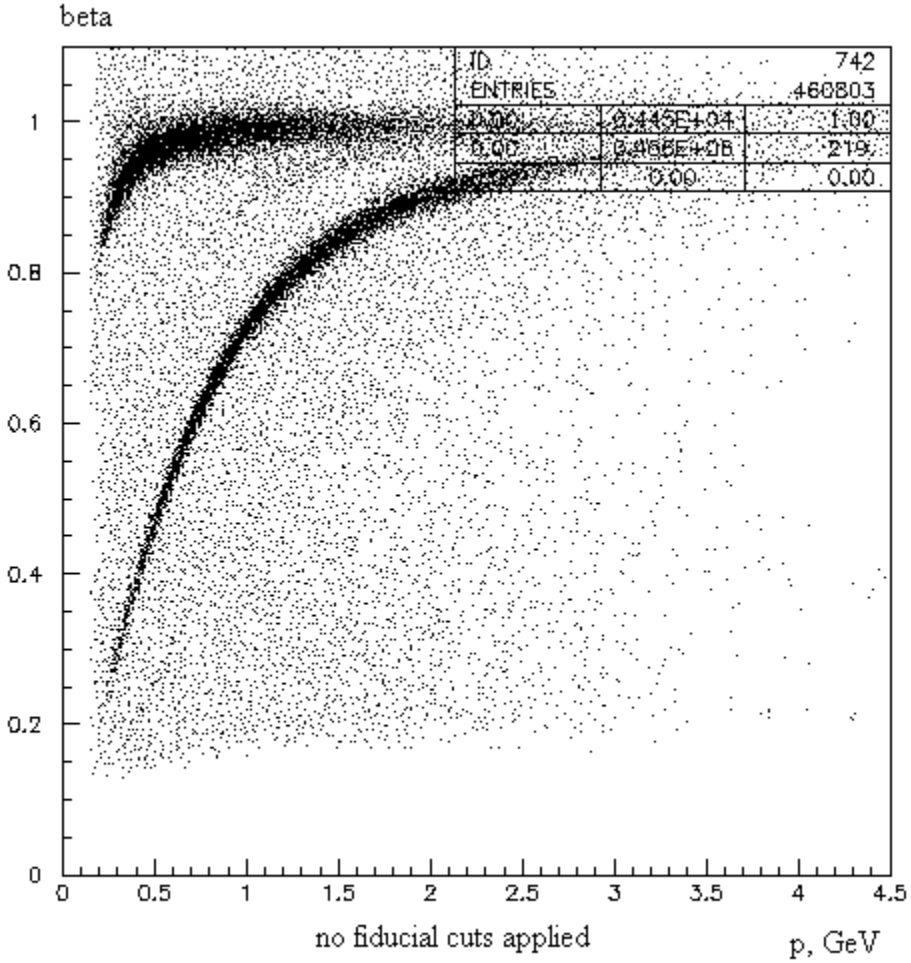


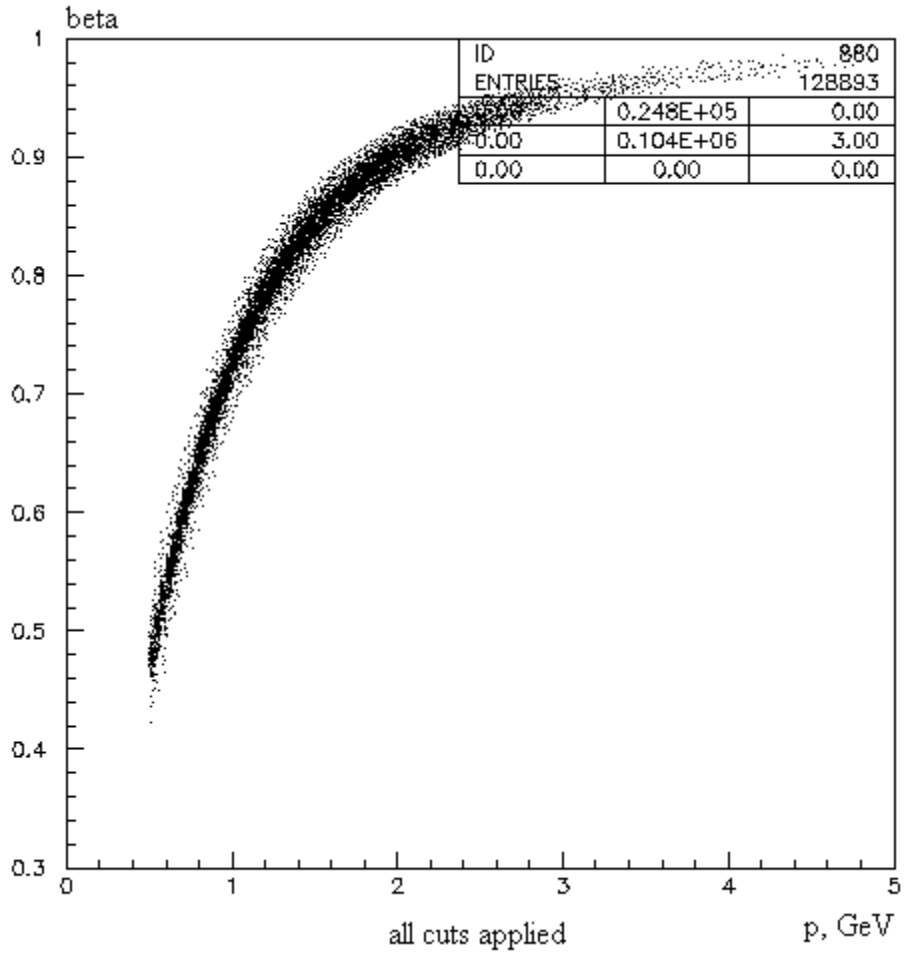
Same stripe, as on previous plot.

After fiducial cuts.



Proton identification.





Summary.

- Performed electron identification;
- Performed proton identification;
- Applied fiducial cuts;

Next steps.

- Pion identification (using missing mass technique);
- Radiation corrections;
- Simulation.