Analysis strategies and status

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Beam test analysis strategy

Purpose of the TOF

- *To start the data acquisition to the experiment and to distinguish at the trigger level protons from higher charge nuclei.*
- *To measure the absolute charge of the particle in addition to the measurement done by the silicon tracker and by the RICH.*
- *To measure the time of flight of the particles traversing the detector*
- *To distinguish upward from downward going particles at a level of at least 10^{-9}.*

Beam data analysis strategy

- *Efficiency of the fast trigger*
- *Measurement of the absolute charge*
- *Measurement of beta*
- *Determination of the direction of flight of the particles*
  (100,000,000 events -> $10^{-(7\div8)}$)

Procedure

Preliminary analysis on TRACKER416 and TRACKER280 data sets
Protons, 400 GeV, 39 million events

1. *Select events with one good reconstructed track and write DST root files (12.3 million selected events)*
2. *Transfer the DST root files on a local computer fo further analysis*

3. *Apply additional cuts to select particles traversing the detector with negative z-direction but without putting biases on beta sign.*

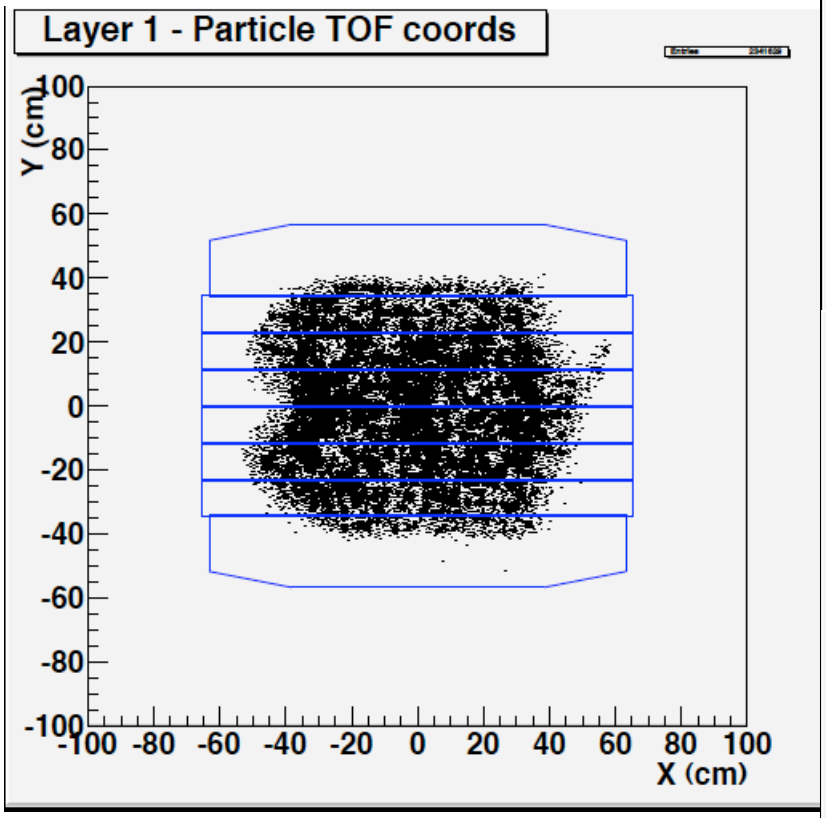
Very preliminary results: single counter efficiency

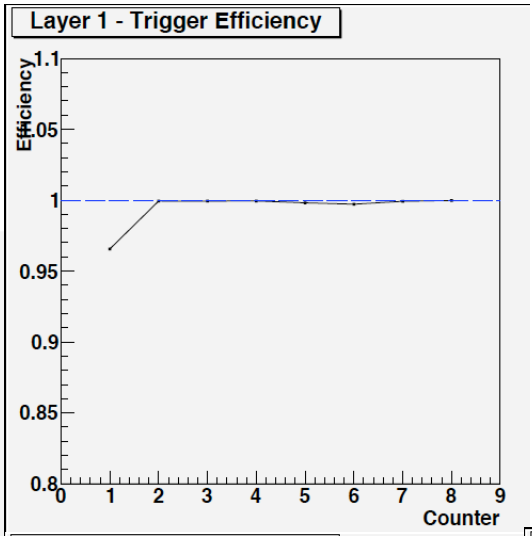
Method:

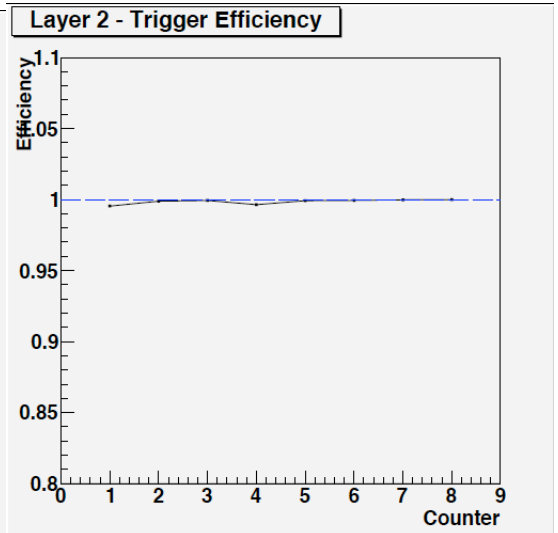
a) particle hitting 4 planes

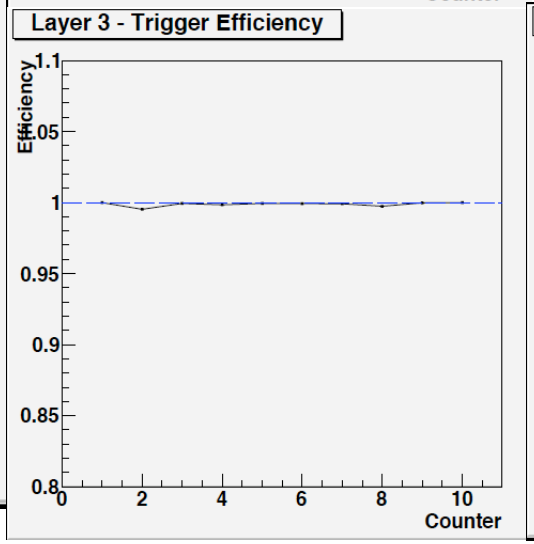
b) 3 planes with HT fired

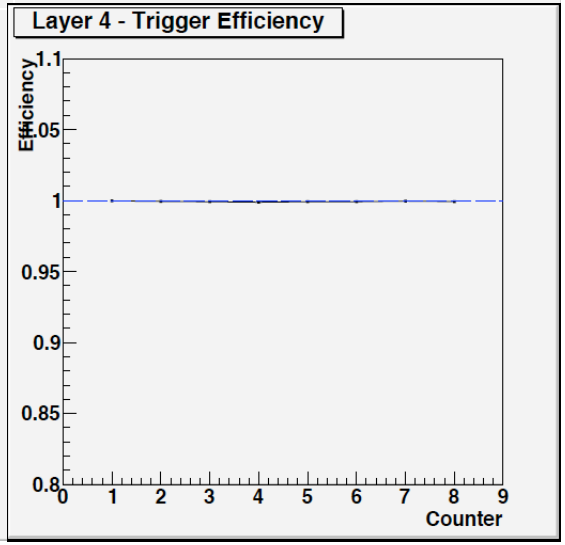
c) use the fourth plane as spectator





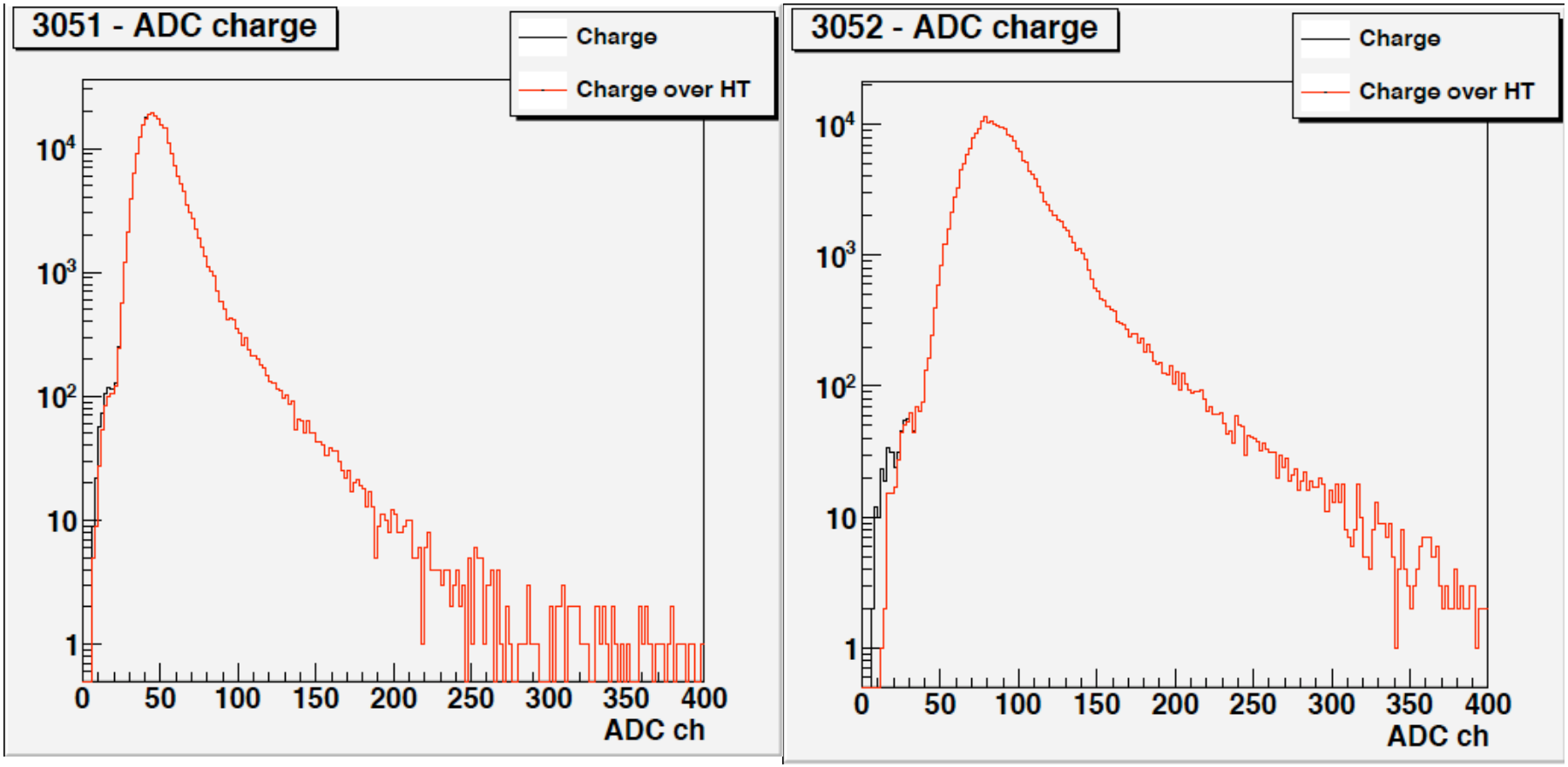






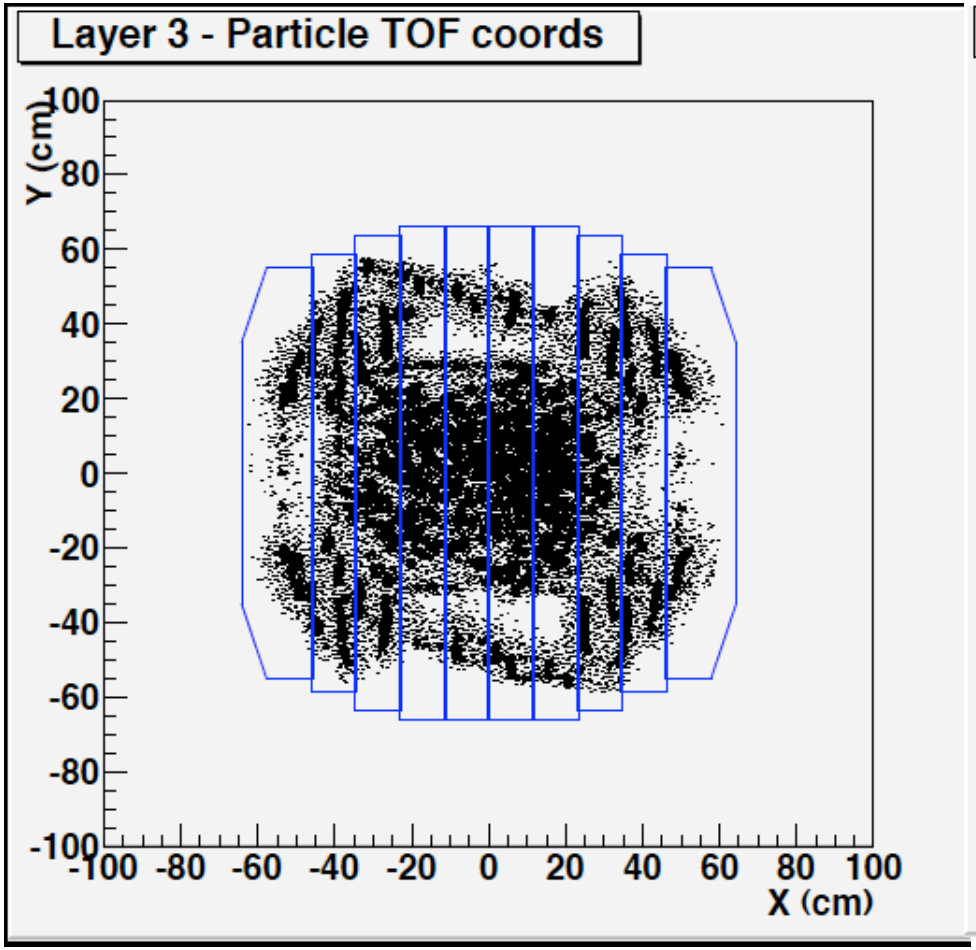
Very preliminary results: inefficiency

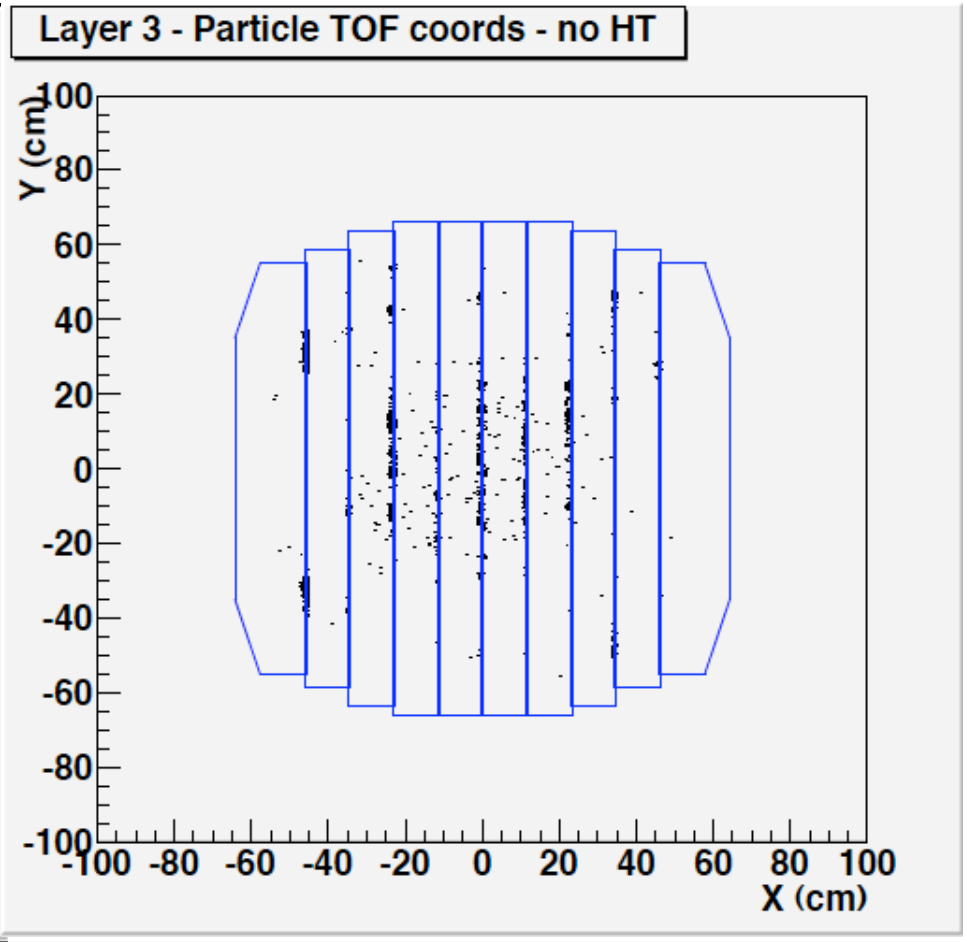
Examples



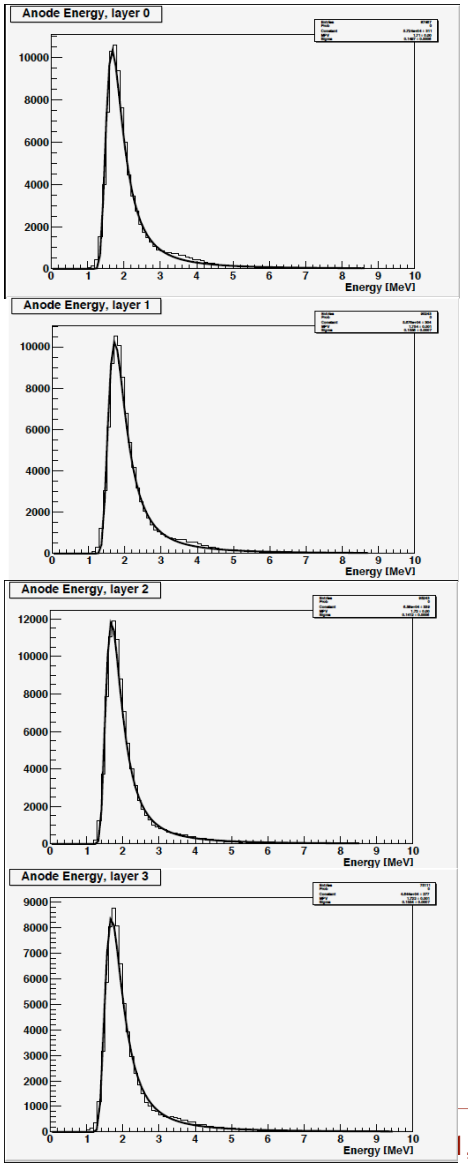
Very preliminary results: inefficiency

Mostly at counter edges (can be due to bad track matching)



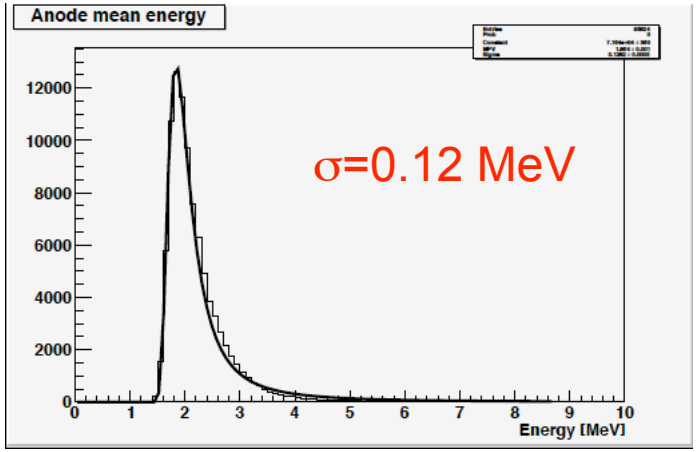


Very preliminary results: charge measurement

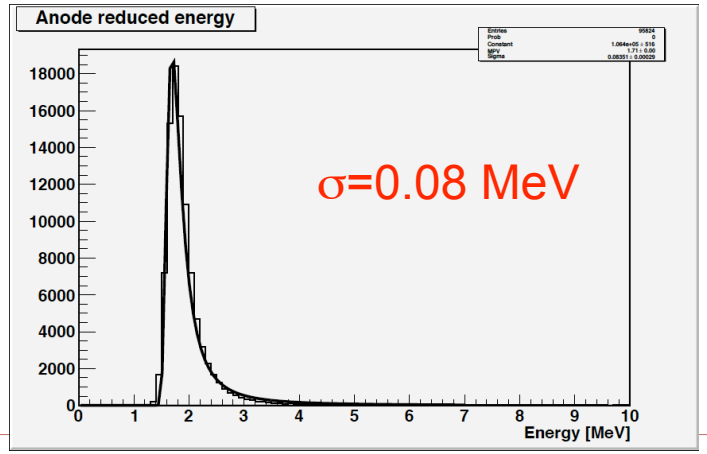


single plane
peak = 1.7 MeV
σ=0.15 MeV

mean energy

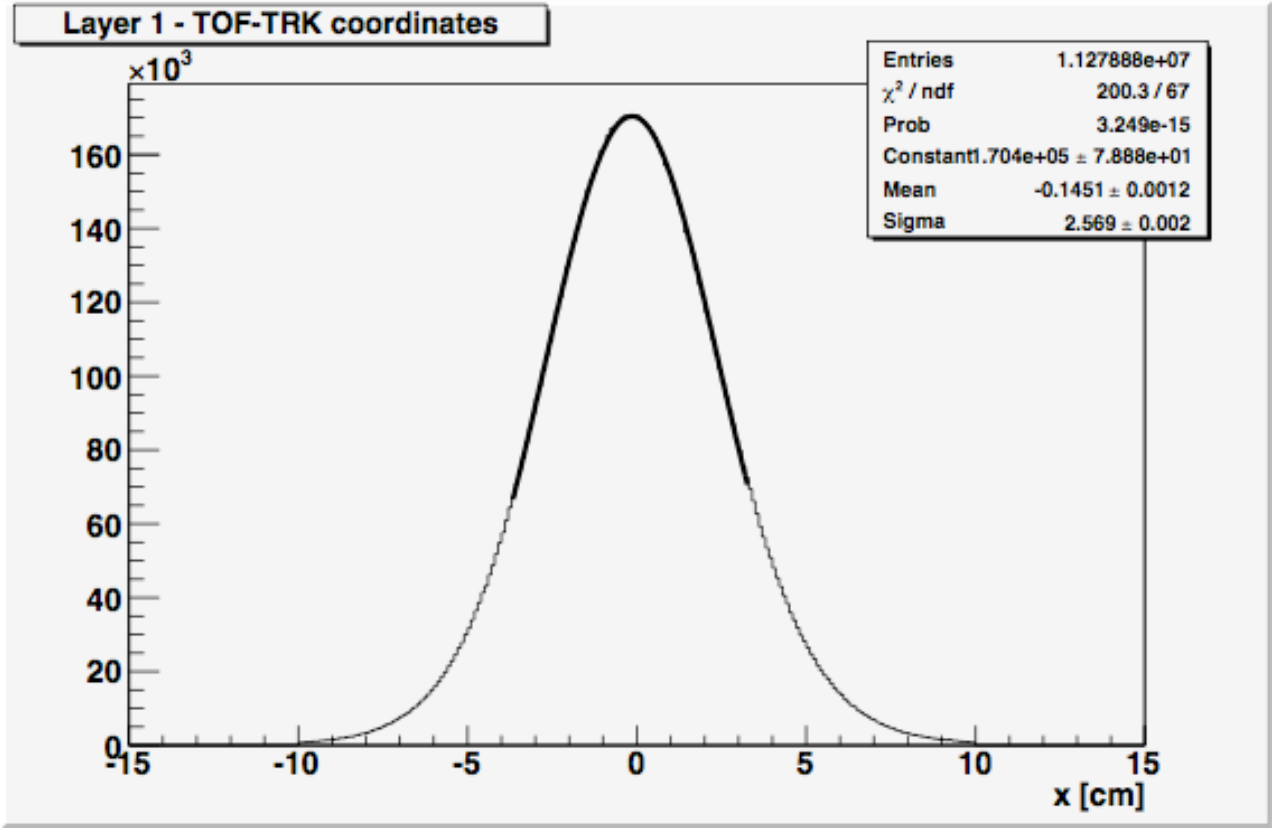


reduced energy (lower 3 out of 4)



Very preliminary results: position measurement

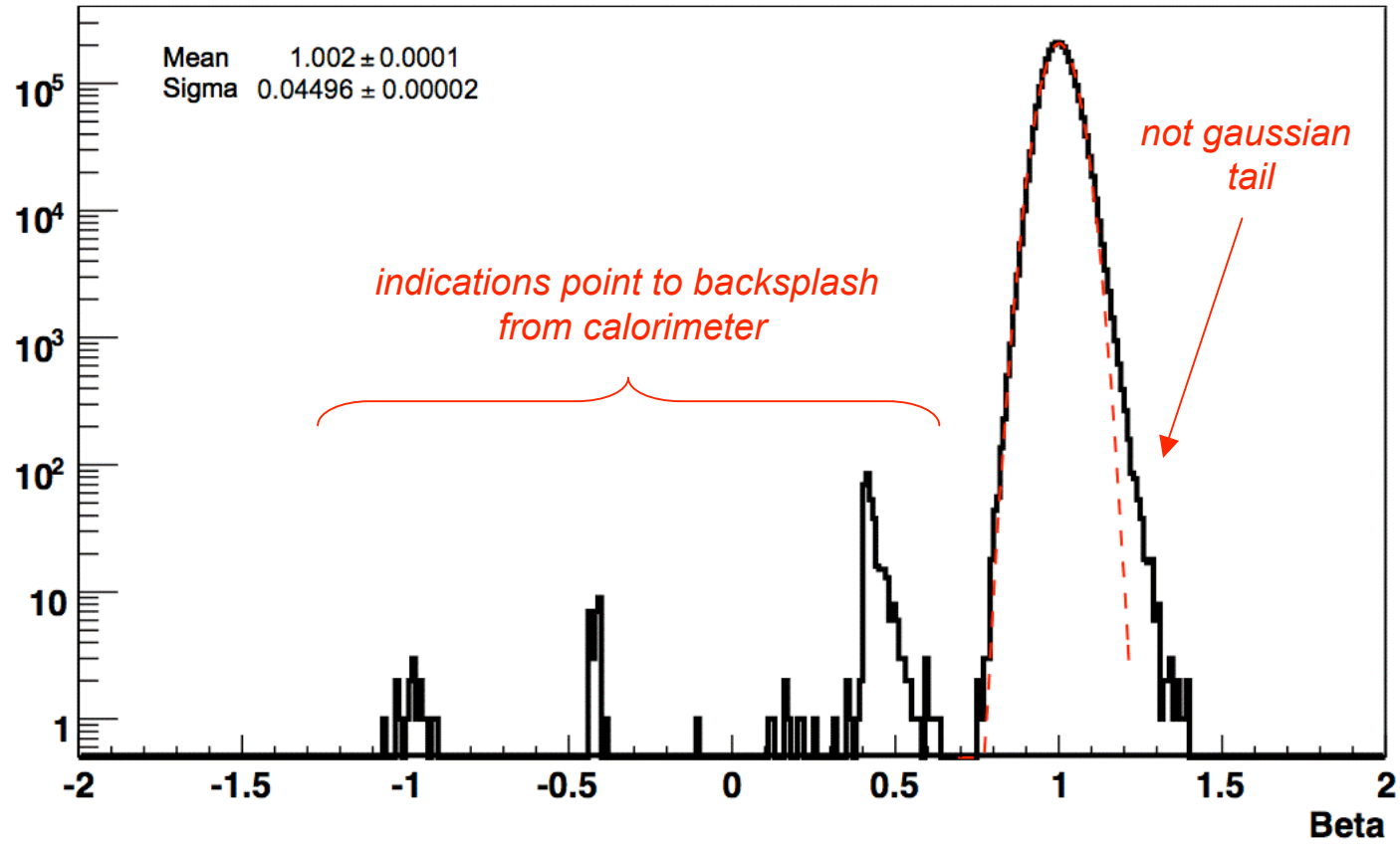
Consistent with expected time resolution



Very preliminary results: beta measurement

Event selection:

a) *good beta measurement (3/4 TOF planes)*
b) *charge 1 on TOF*
c) *$0° < \theta < 30°$ and $150° < \theta < 180°$*
d) *rapidity within beam momentum ±30%*



Very preliminary results: up-down discrimination

Before doing this:

1. *beta measurement has to be completely understood*
2. *track selection has to be refined*

Problems and future work

Problems:

1. *Lack of stable and reliable data and reconstruction program sets (expected at this moment due to heavy program development)*
2. *Lack of communication (several groups making – maybe – similar things)*
3. *Lack of an analysis chain on CNAF computers*

Future:

1. *Understand data*
2. *Analyse all data sets and finalize plots*
3. *Implement the analysis chain on CNAF computers*