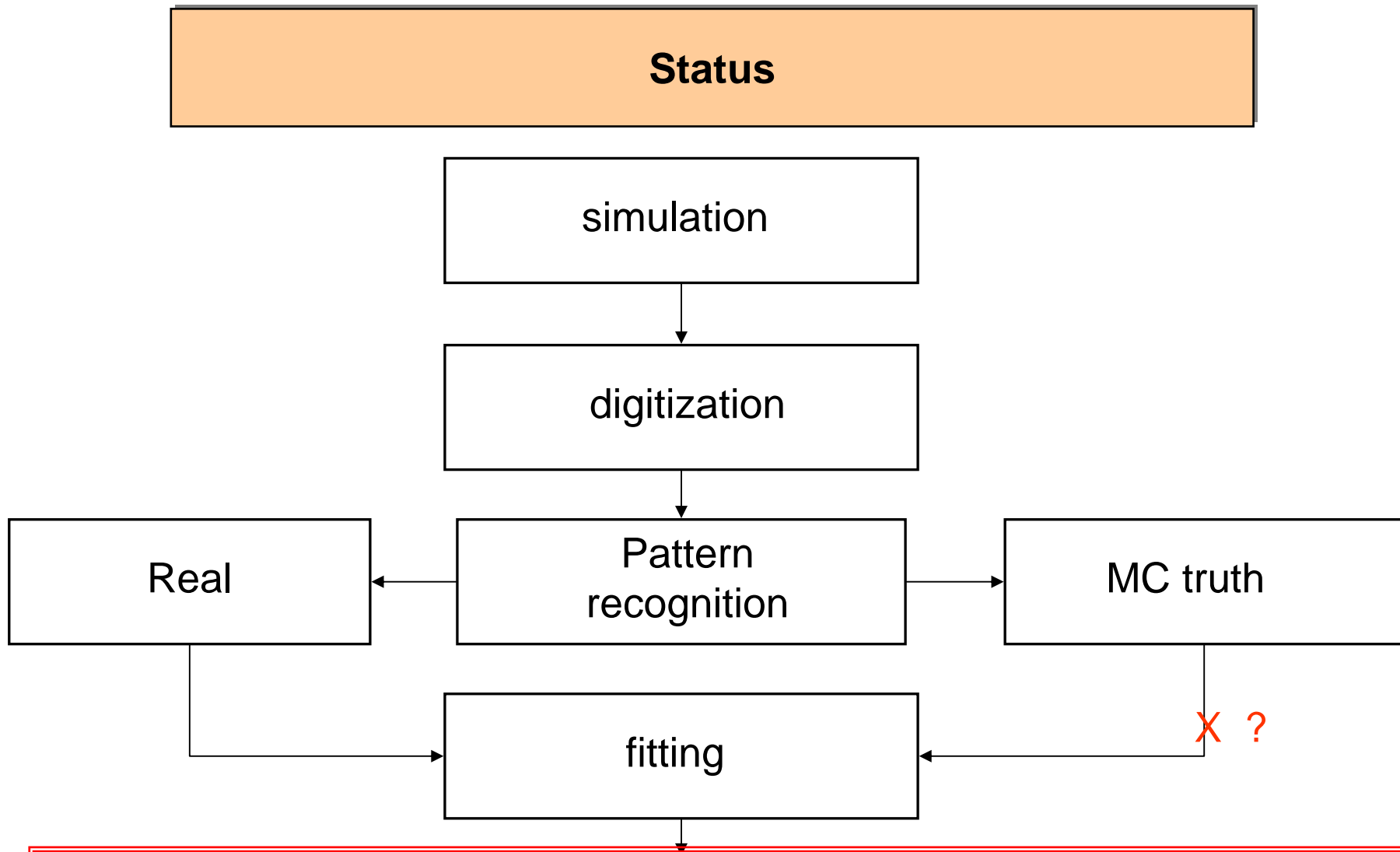


# Tracking related progress in Mokka-Marlin





Minimal requirements - track parameters at IP , outermost point for calorimeter extrapolation, at all special points along the track ..

## Simulation

- Up to now TPC driver (sensitive detector) in Mokka was implemented as array of rings with constant step in radius corresponding to a pad height ( 6.2mm )

### ADVANTAGES

- fast

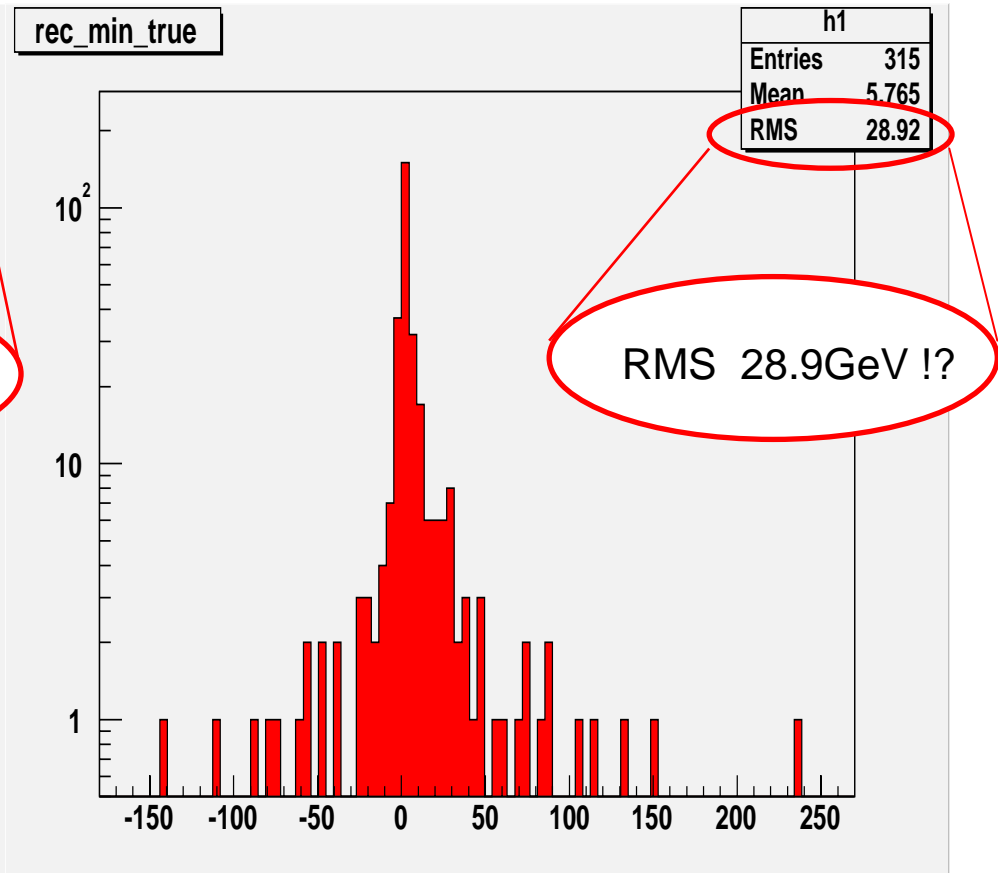
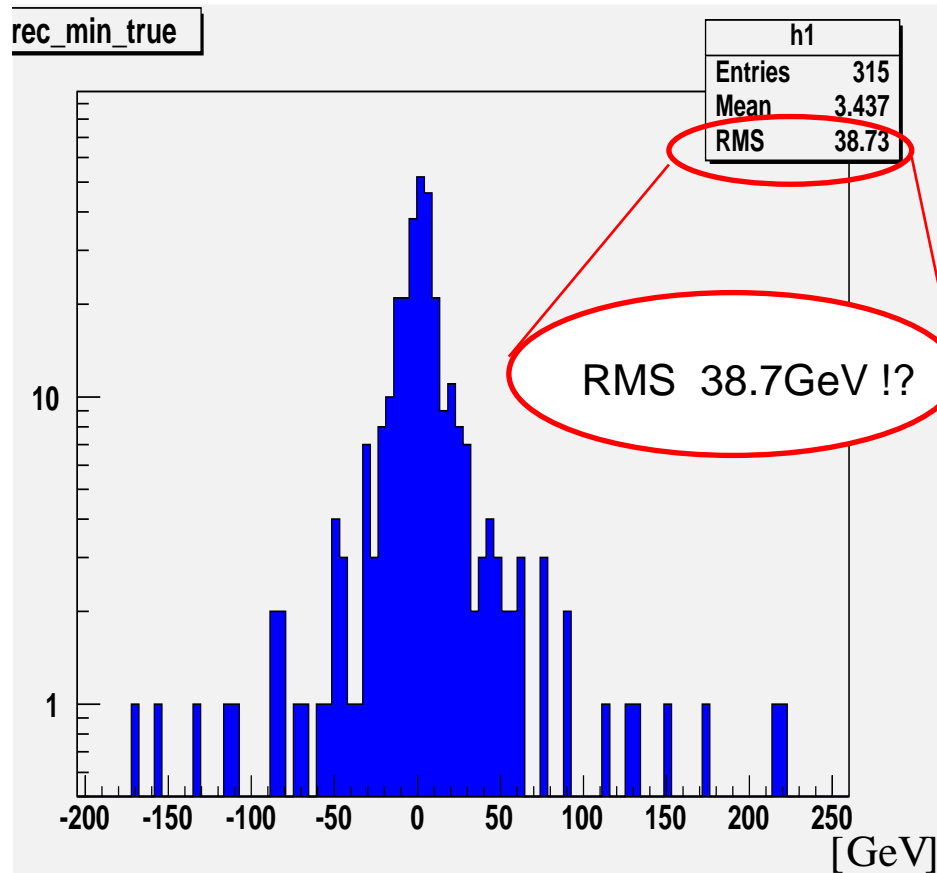
### DISADVANTAGES

- generation of hits on “ strange” places
  - not enough hits in some cases
  - **Fitting was necessary even for true tracks !!**
- disadvantages cannot be remedied by post simulation procedure !!

# Status

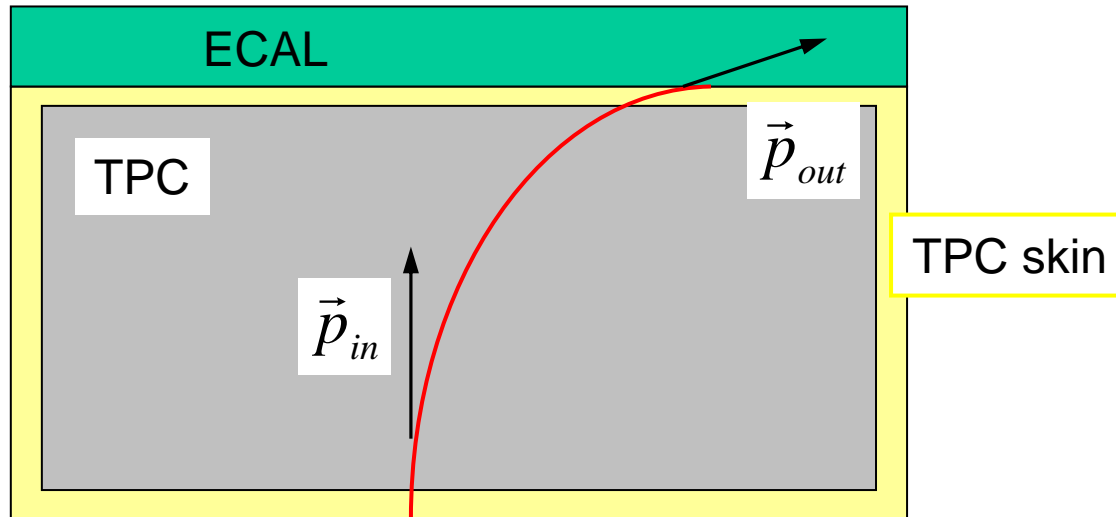
Fitting in track cheater

no fitting in track cheater  
( copy of MC information at IP)



[Cambridge talk](#)

## Solution



- Use LCIO option to store a momentum in tracker hit. Separate TPC in two volumes outer skin just for having true information with the Same stepping driver as in inner region .

## Simulation

- TPC driver with step limitation ( 5mm at the moment ) rewritten to support the requirements and brought a bit closer to reality

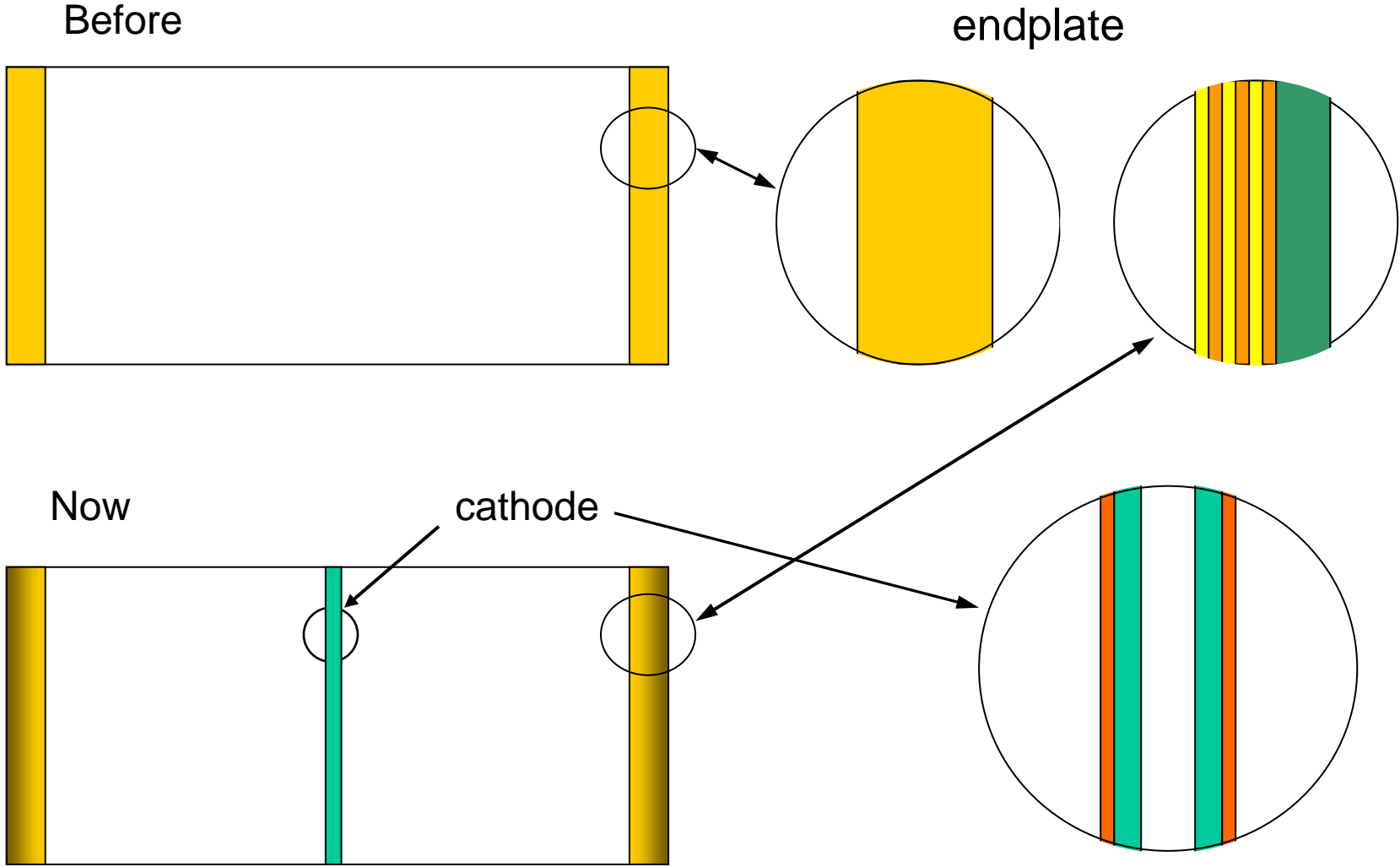
### ADVANTAGES

- all hits exactly on the track
- no empty regions on the track

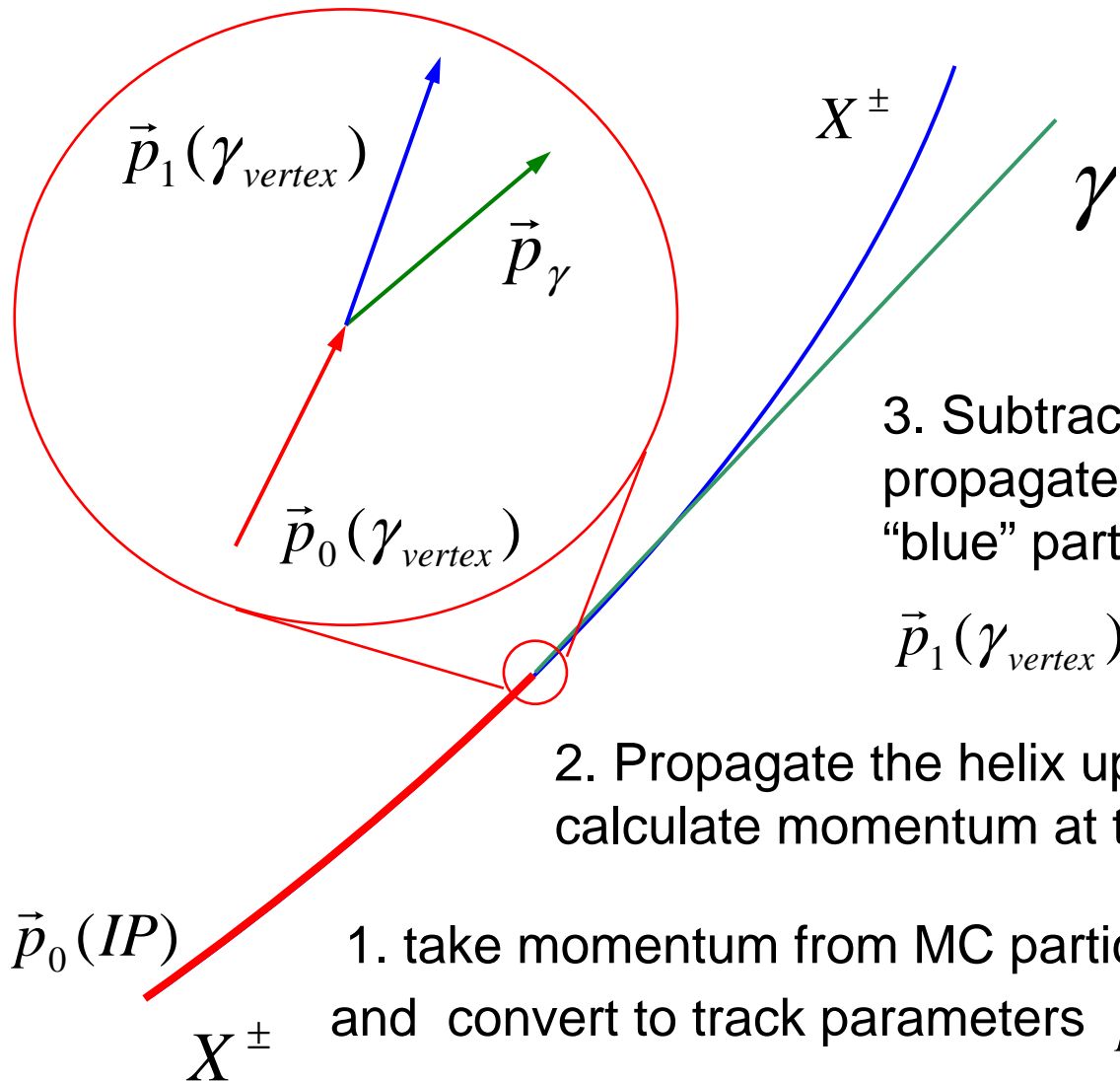
### DISADVANTAGES

- a bit slower and files tend to be bigger – compromise solution to store the momentum only in skin
  - **more clever digitization is necessary**
  - careful choice of step length is necessary
- 
- Much more knowledge about exact detector and reconstruction procedure needed

# Simulation



## Bremsstrahlung



4. If there is another one loop through the steps again with  $\vec{p}_0(IP) \rightarrow \vec{p}_i(\gamma_i^{vertex})$

3. Subtract photon momentum from propagated one and assign to the "blue" part of track

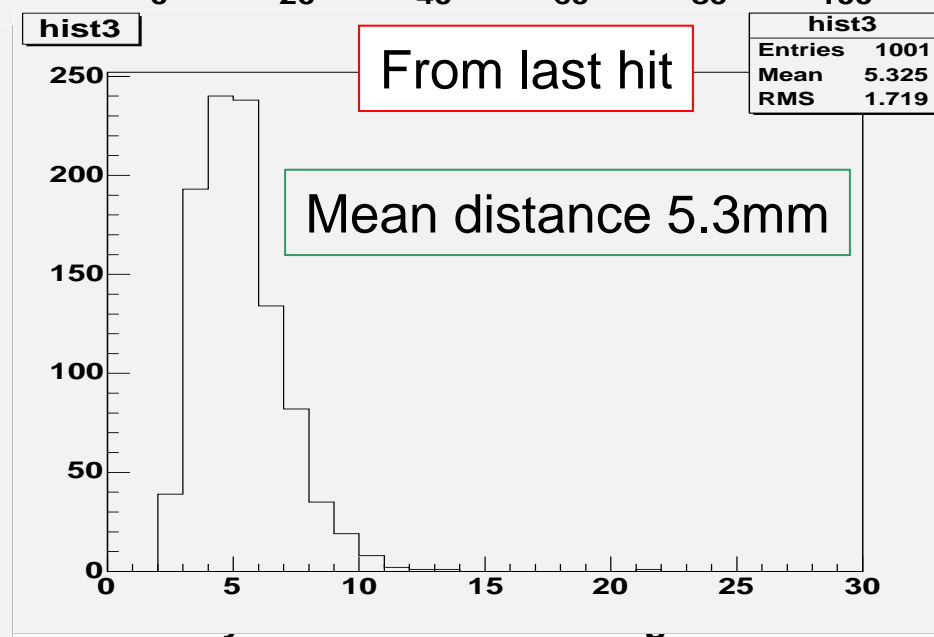
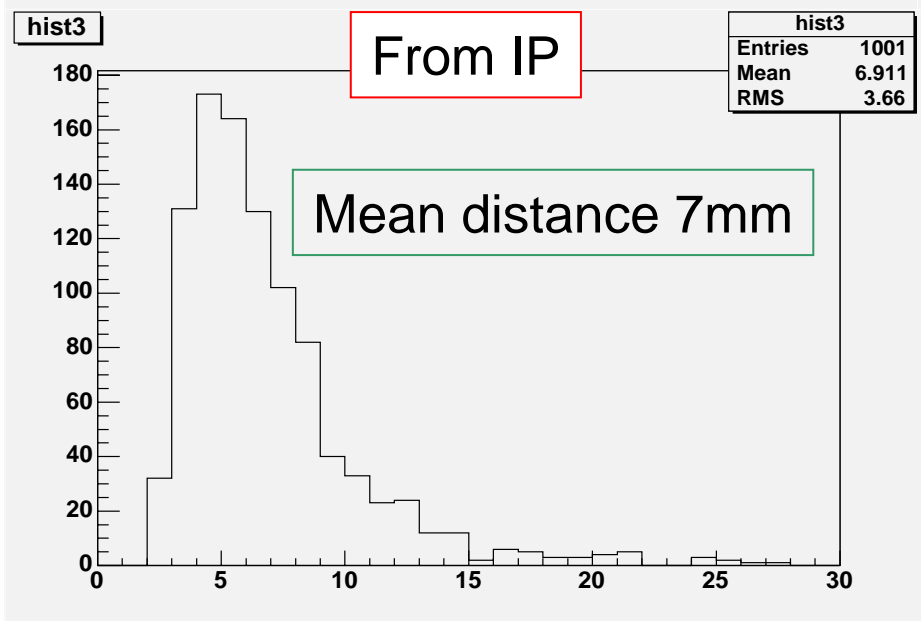
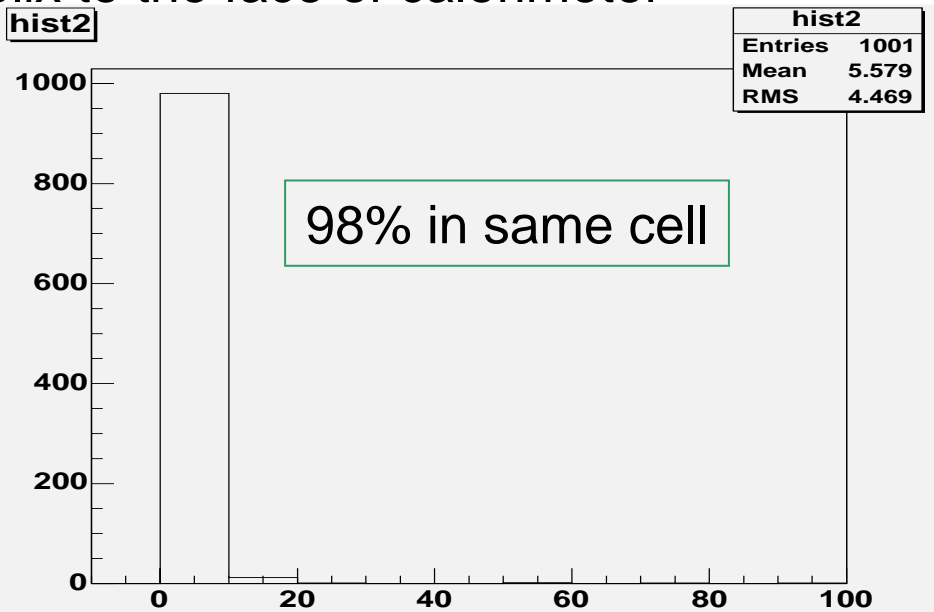
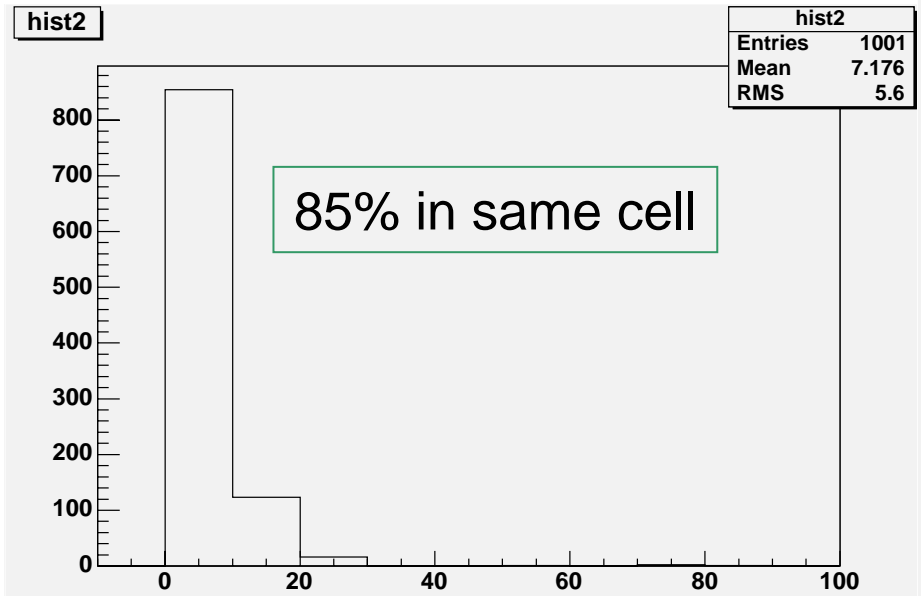
$$\vec{p}_1(\gamma_{vertex}) = \vec{p}_0(\gamma_{vertex}) - \vec{p}_\gamma$$

2. Propagate the helix up to the gamma vertex and calculate momentum at this point  $track \rightarrow \vec{p}_0(\gamma_{vertex})$

1. take momentum from MC particle at starting point and convert to track parameters  $\vec{p}_0(IP) \rightarrow track$



3GeV muons randomly shoot from IP. Distance from the first hit calculated for extrapolation of the helix to the face of calorimeter



## Conclusion

- full new chain => driver => digitizer => track cheater  
to be available soon allowing correct input for reconstruction  
( driver will be in the new detector model together with the fixed HCAL)
- finally “true” information is true one
- TPC geometry closer to reality
- more correct digitization ( z dependence of point resolution )
- additional features needed for further development of tracking software available