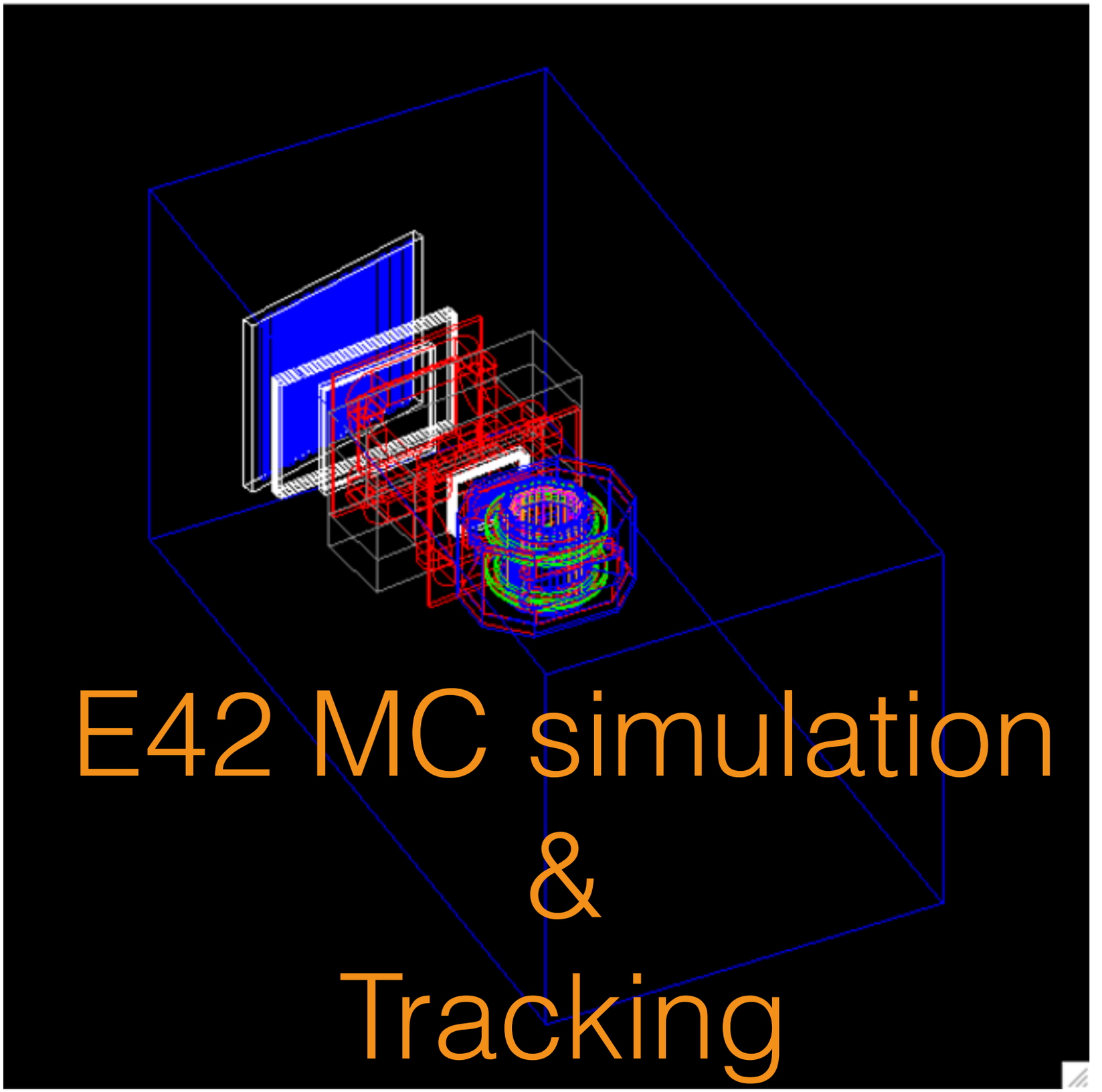
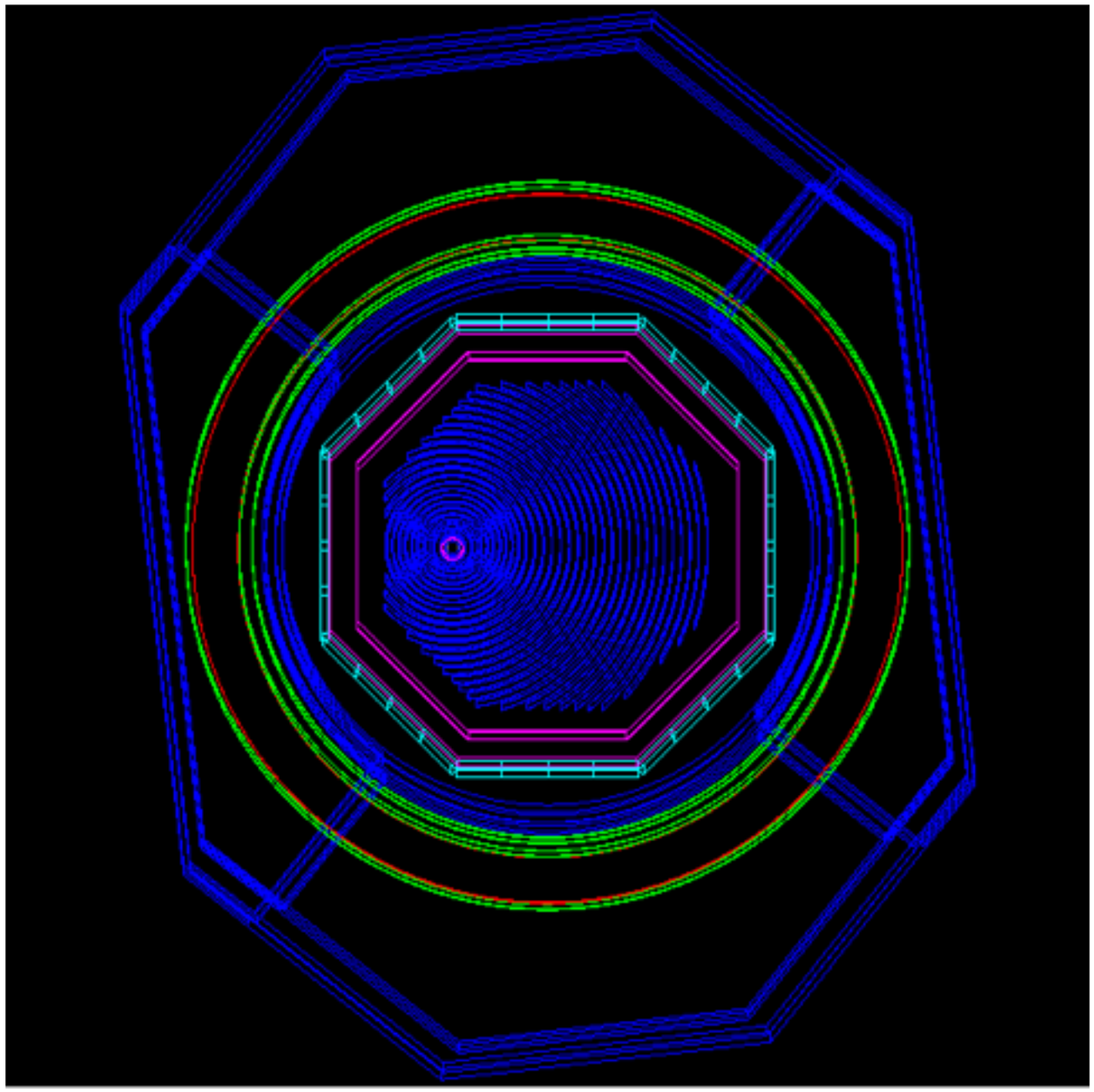

E42 MC simulation
&
Tracking

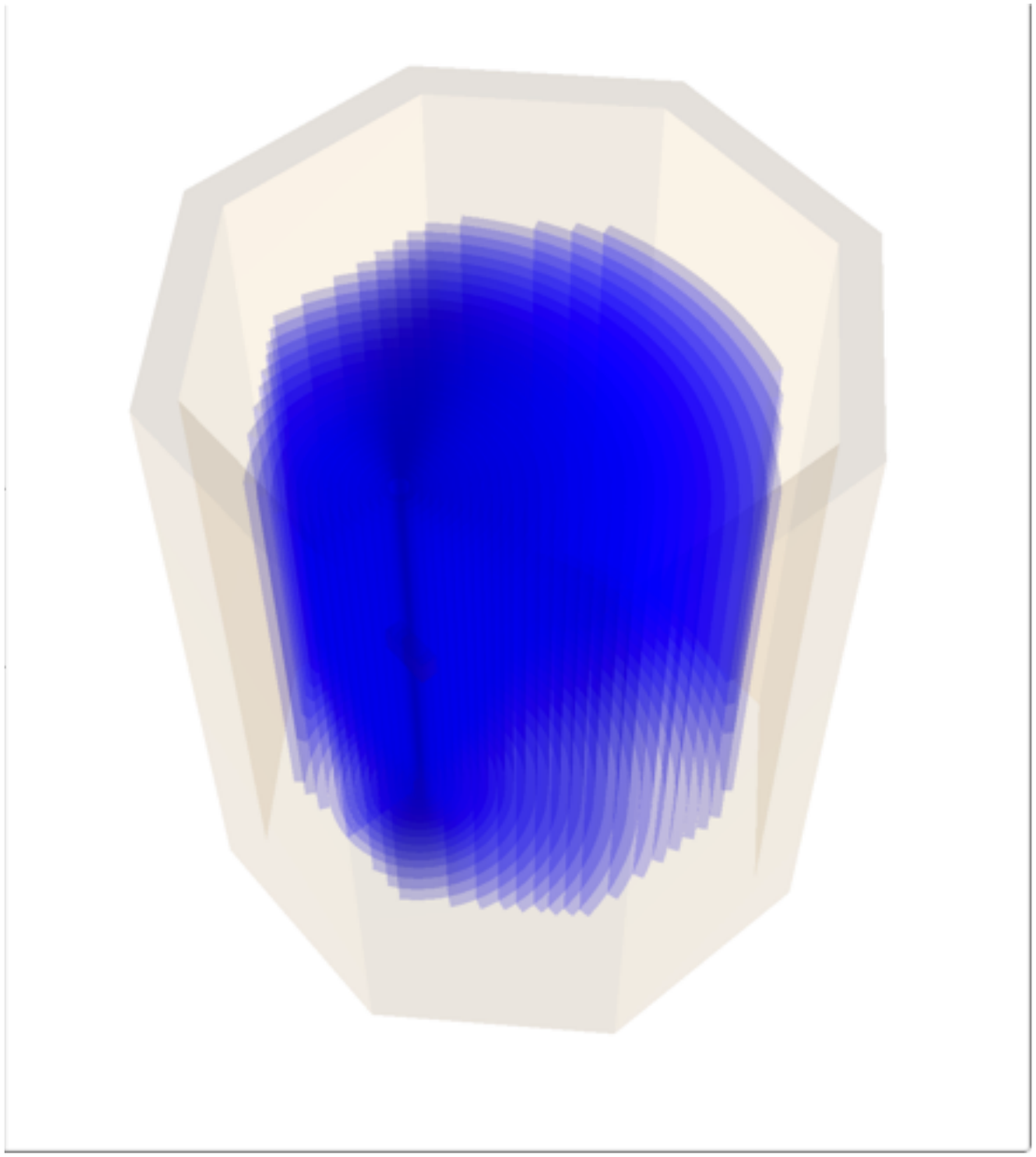
E42 MC status - subjects

1. **Magnetic field : A variable magnetic field by position was adopted.**
    1. Set positions, rotations via .mac script : done
    2. Magnetic field superposition : done
    3. Magnetic field map : Helmholtz magnet(done), Kurama(done), merged version(yet)
2. **Detector/Magnet definition**
    1. TPC : done
    2. Scinti. array : done (Needed to set thickness)
    3. TOF array, CH: done
    4. Helmholtz magnet : done (material setting remained, current setting is steel.)
    5. Kurama magnet : done
    6. Draft chambers : Defined by plains, more information are required.
    7. FAC : Defined as plain. No photo statics.
3. **Detector response : Not yet.**
4. **Event generator : X -> K+ Be + H-dibaryon , H->2 lambda, H->Sigma- + n**

TPC data - Track fitting

TPC setting in MC

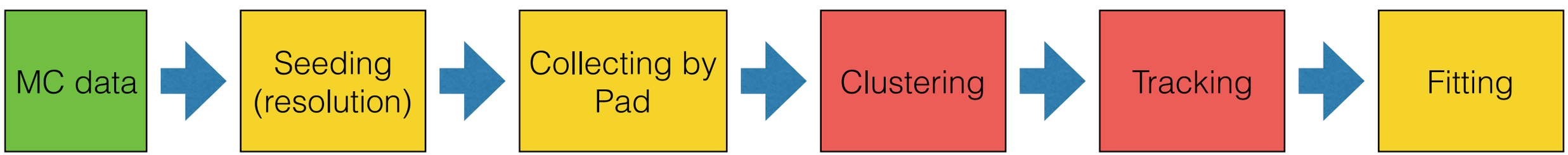




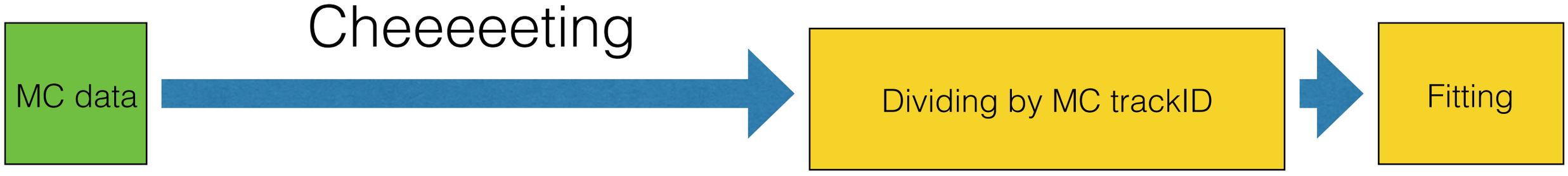
TPC event tracking

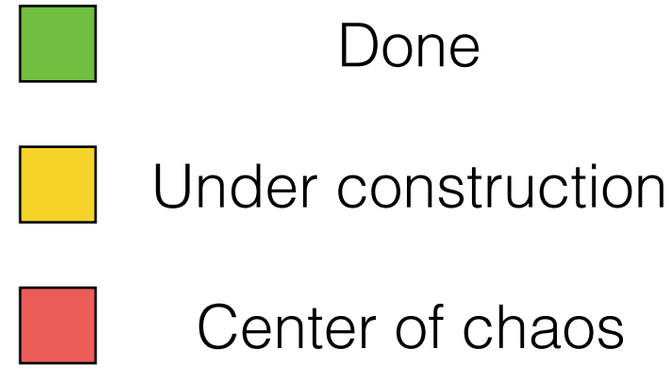
TPC event reconstruction (MC)

Ideal case



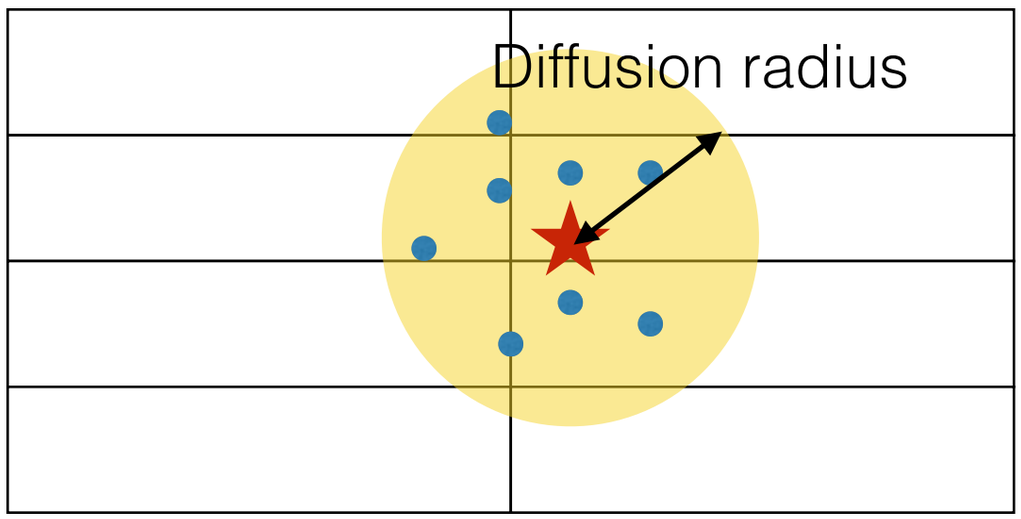
Currently…



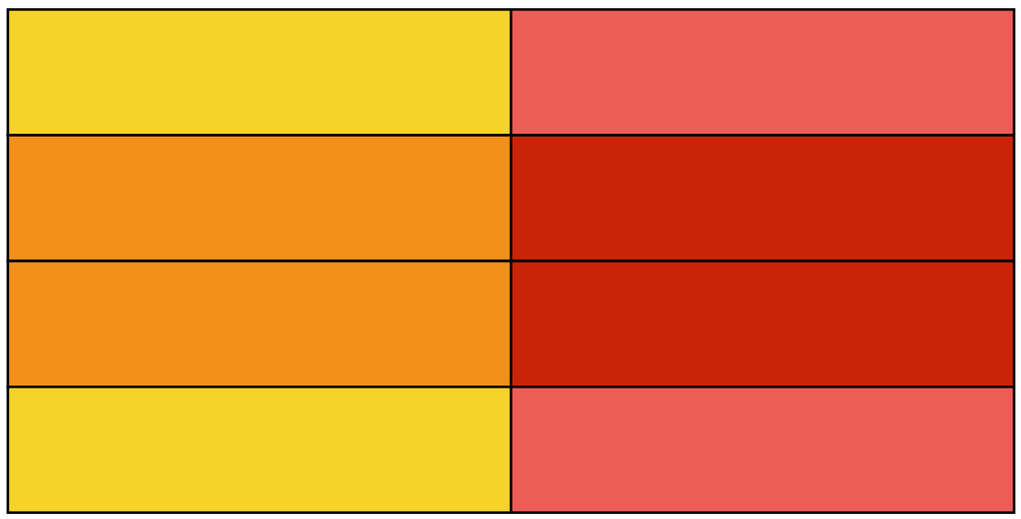


MC Hit -> TPC hit -> TPC

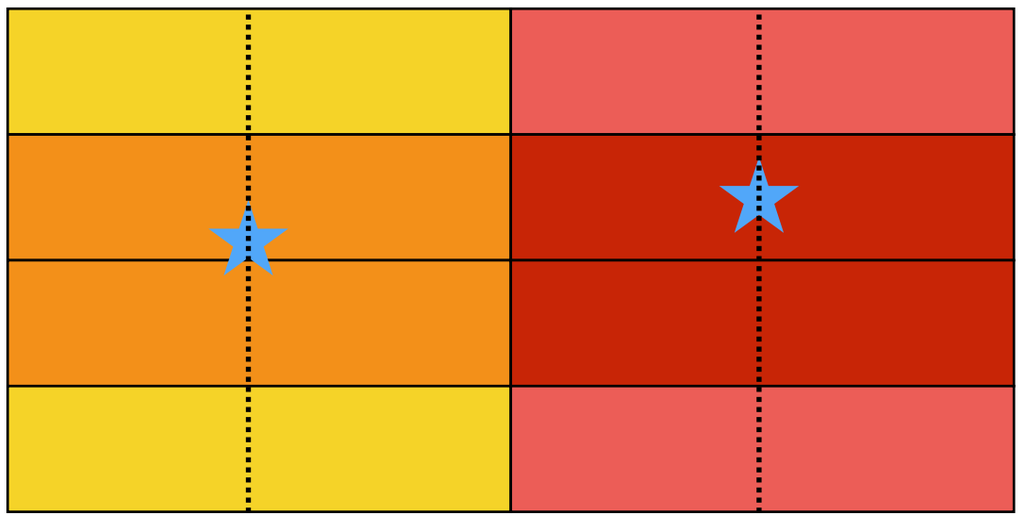
Generate pseudo-electron hits from MC hit



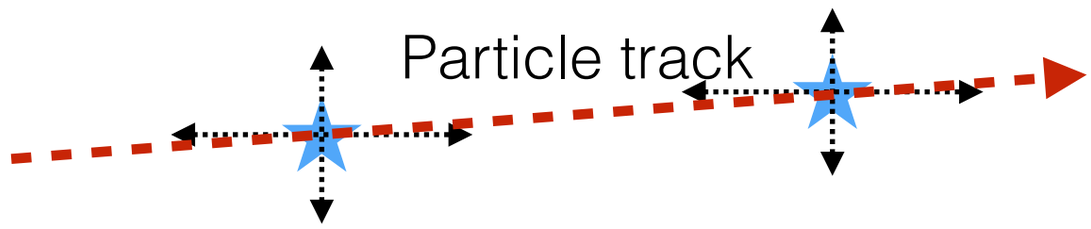
Convert hit data to Pad data



Clustering in row and get mean value

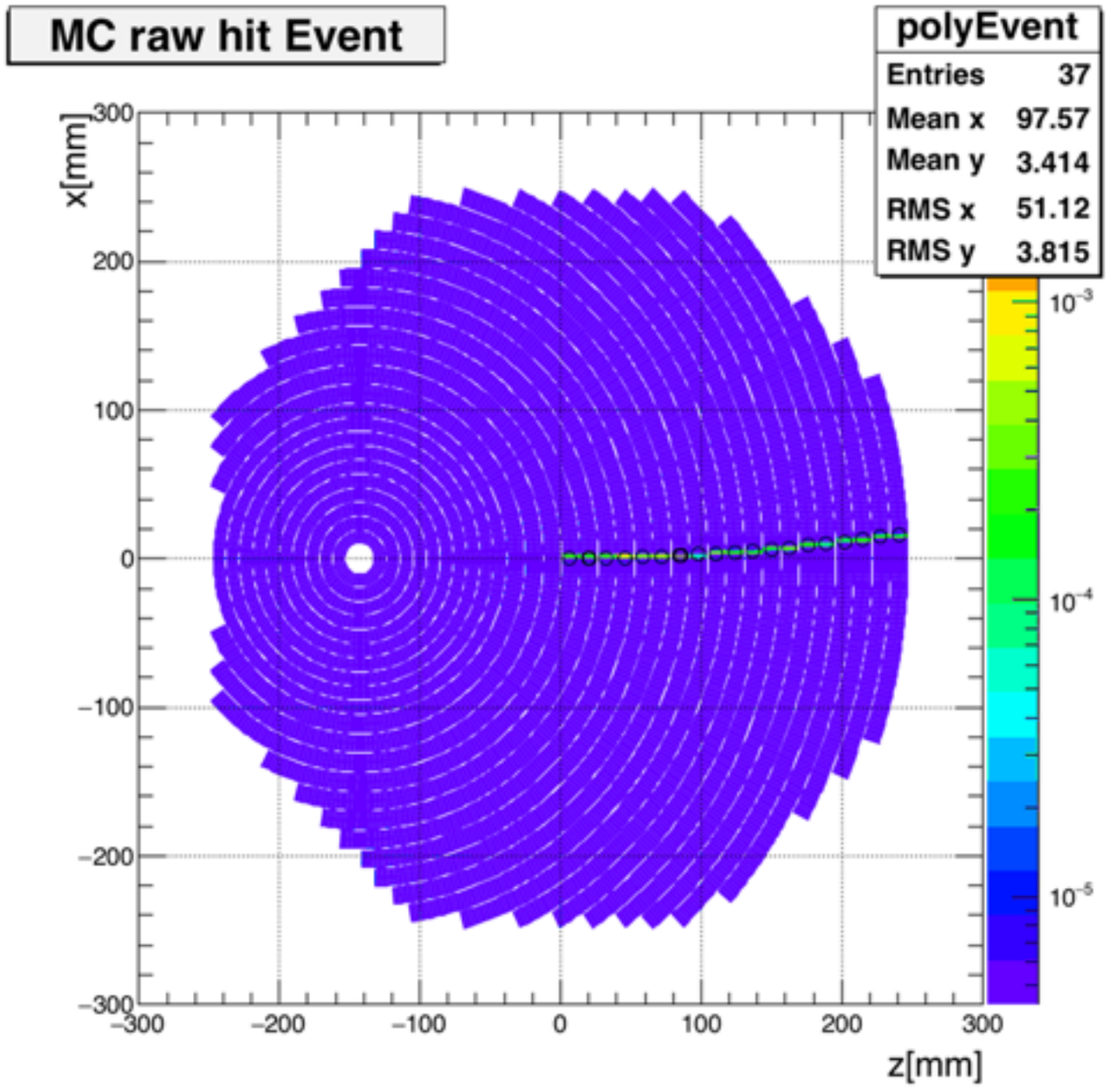


Set Hit point for each row & Set Error

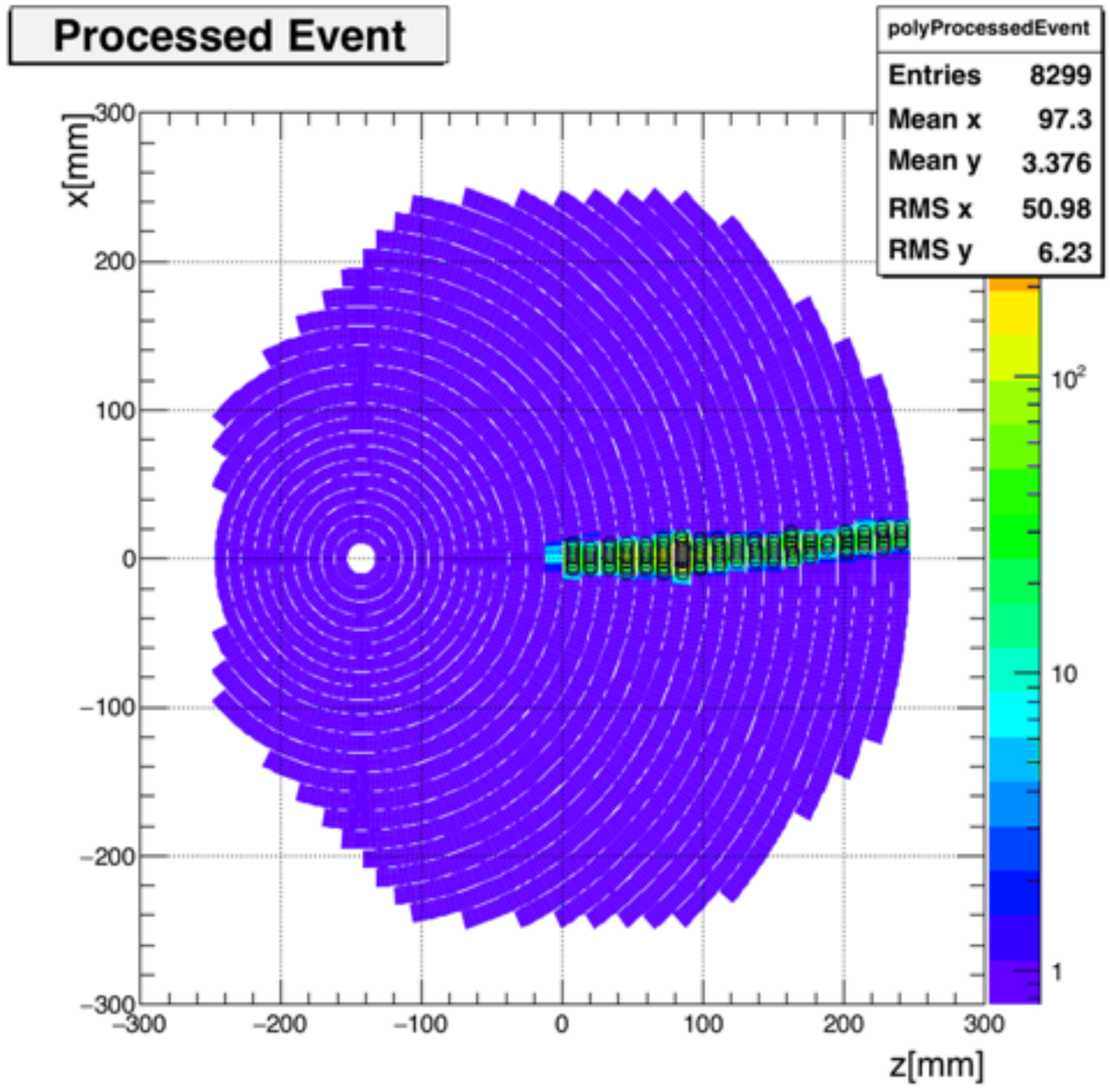


MC Hit -> TPC hit -> TPC Pad data

Raw Hit data

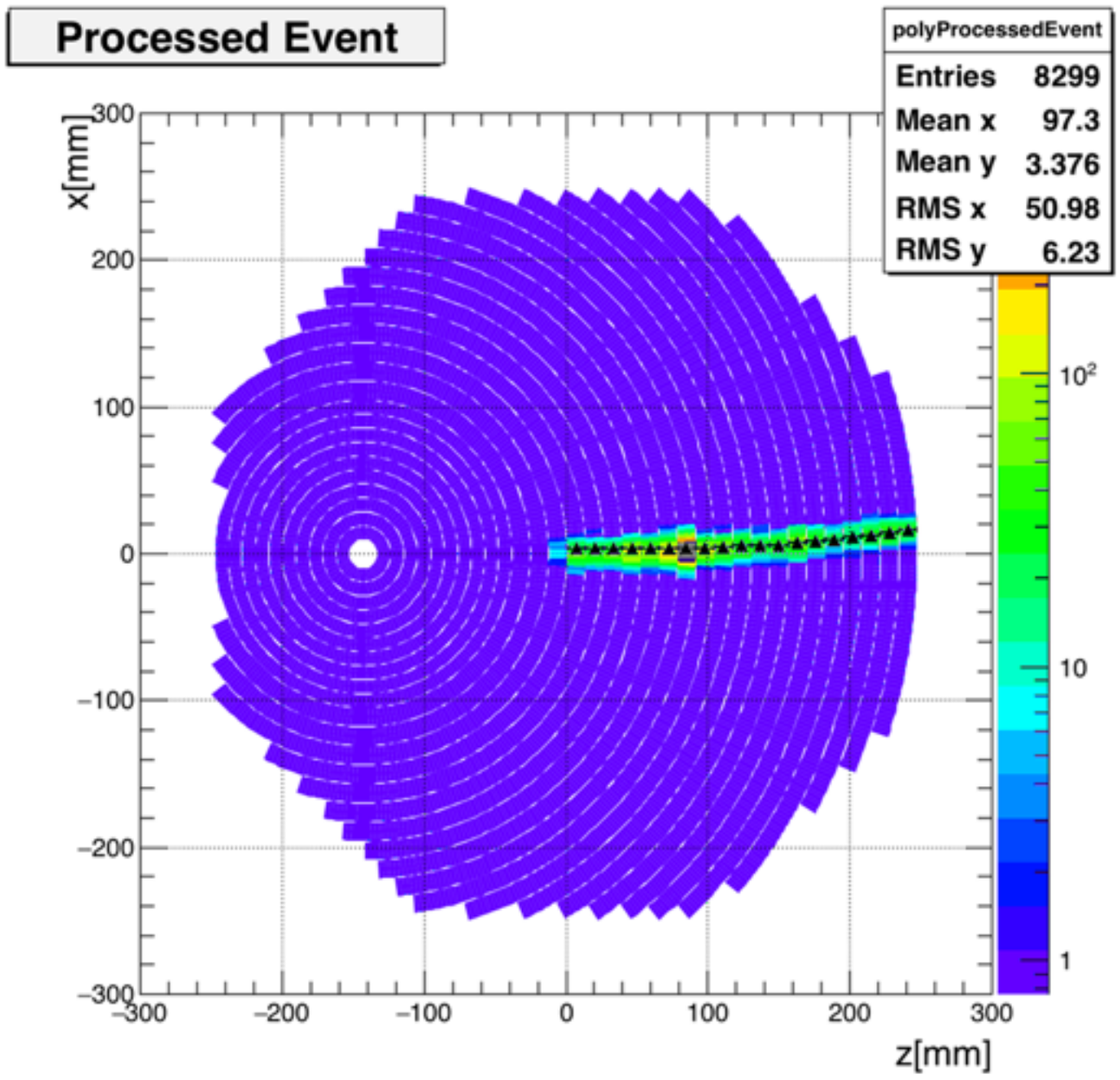


Pad data



Data structure

Track view



Track

Track ID
Starting position

Cluster

Cluster ID
Row ID
Number of Pad in row
Mean x,(y),z,(time)
DepE sum

Hit

Hit ID
Pad ID
x, y, z
DepE

Track initial fitting

Fitting method

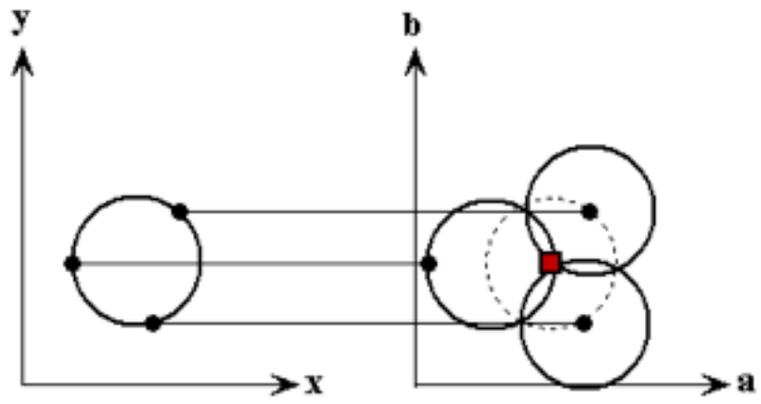
1. Minimum Chi^2 method

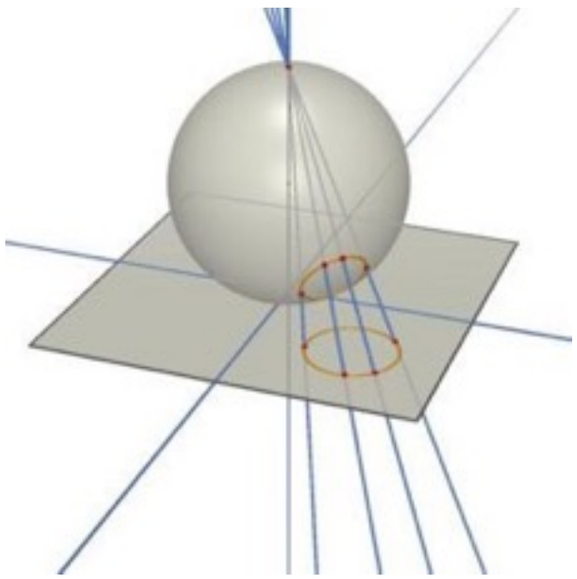
2. Hough transform

3. Riemann projection

4. …

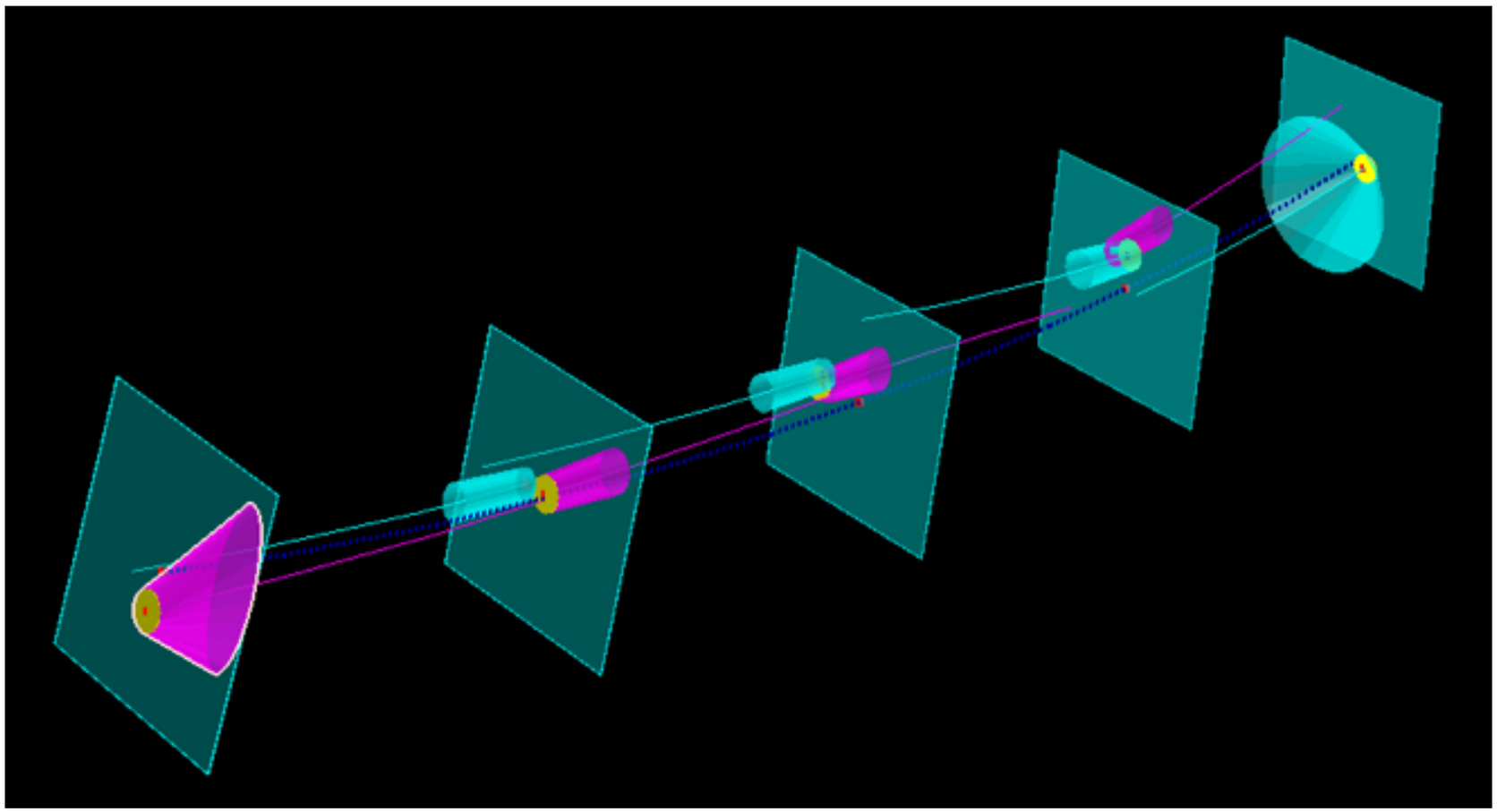
➡ Under developing & studying





Test GenFit for track fitting

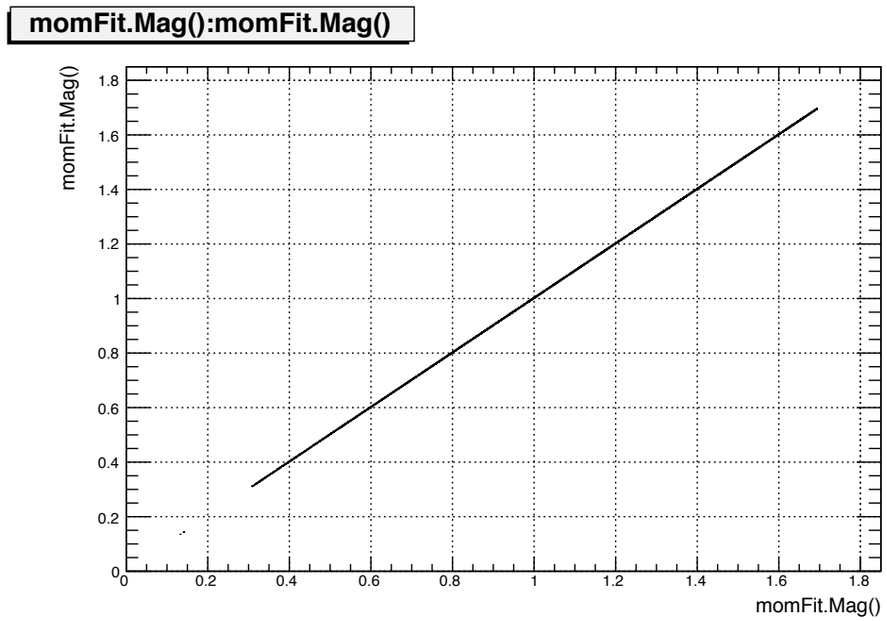
GenFit : A generic Track-Fitting toolkit



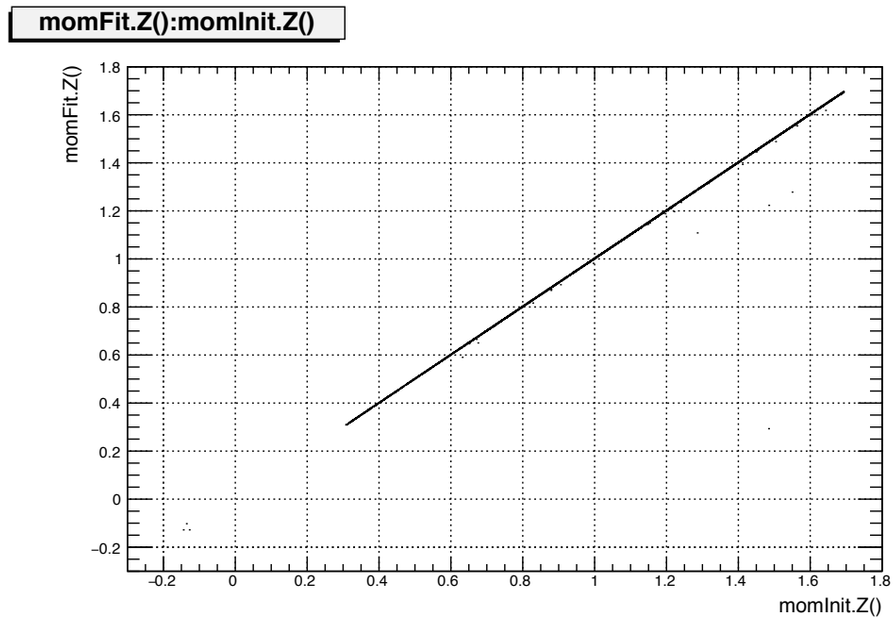
Test with MC data

1. Input data : Raw hit information from gsim4test_forE42.
2. Randomize initial positions and momentum.
3. Proton beam with various initial momentum in z direction.(No perpendicular component)

Fitted P vs True P

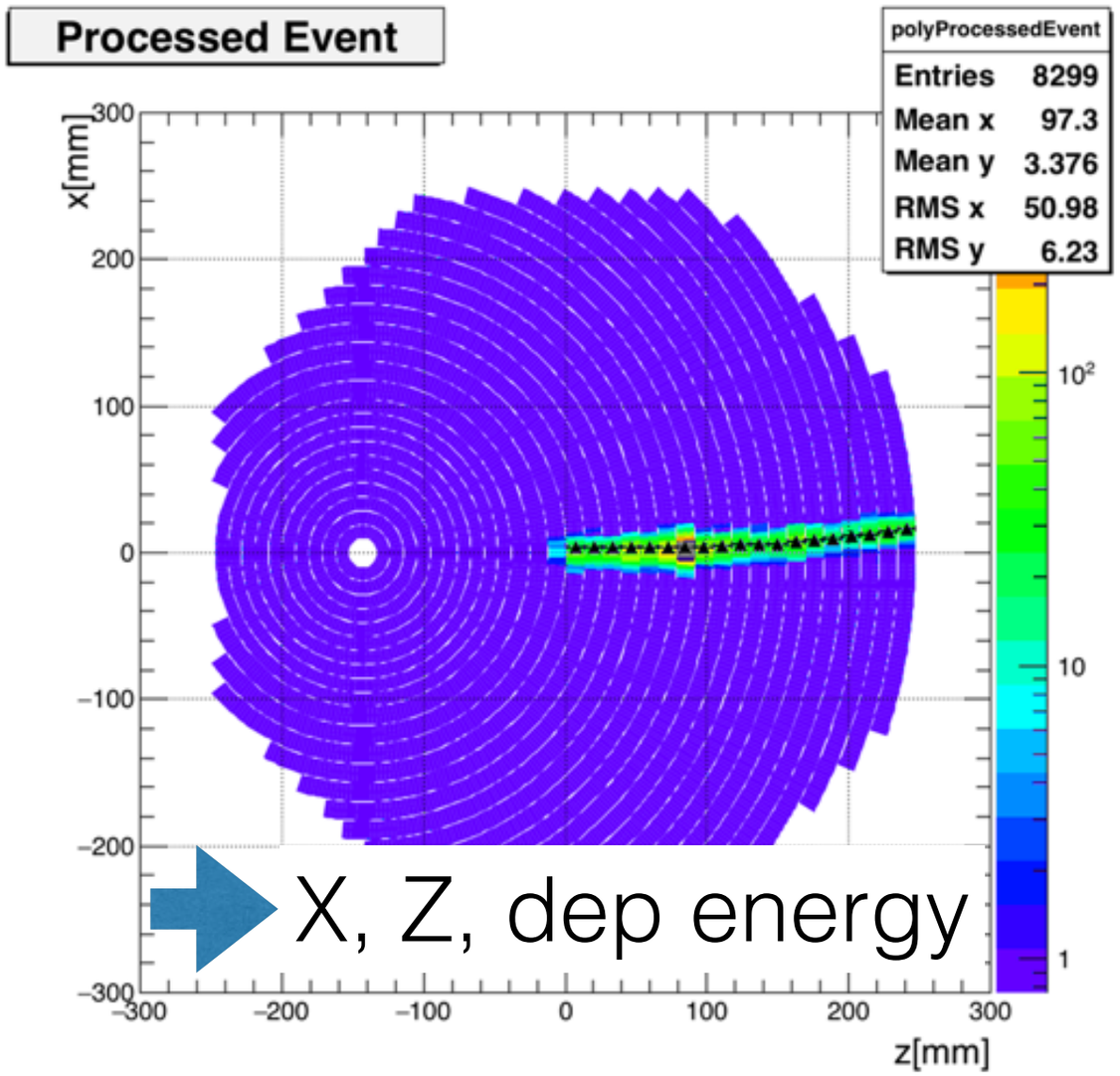


Fitted P_z vs True P_z



Fitting algorithm works well…?

Problems

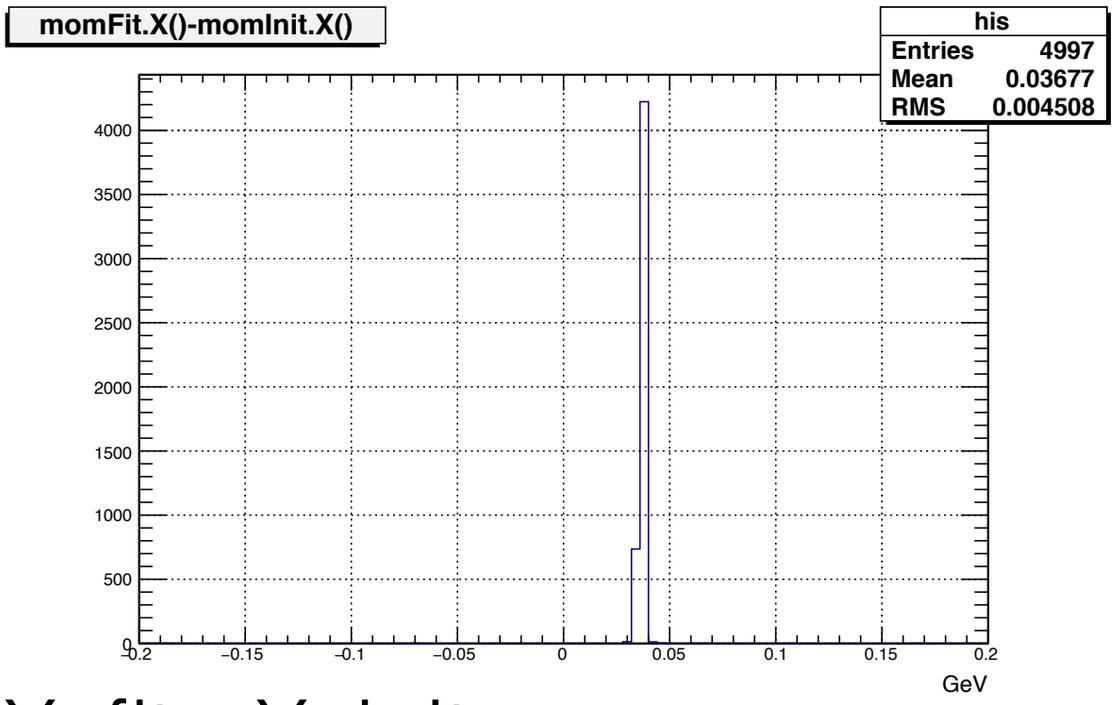


1. Track fining / initial fitting program required.

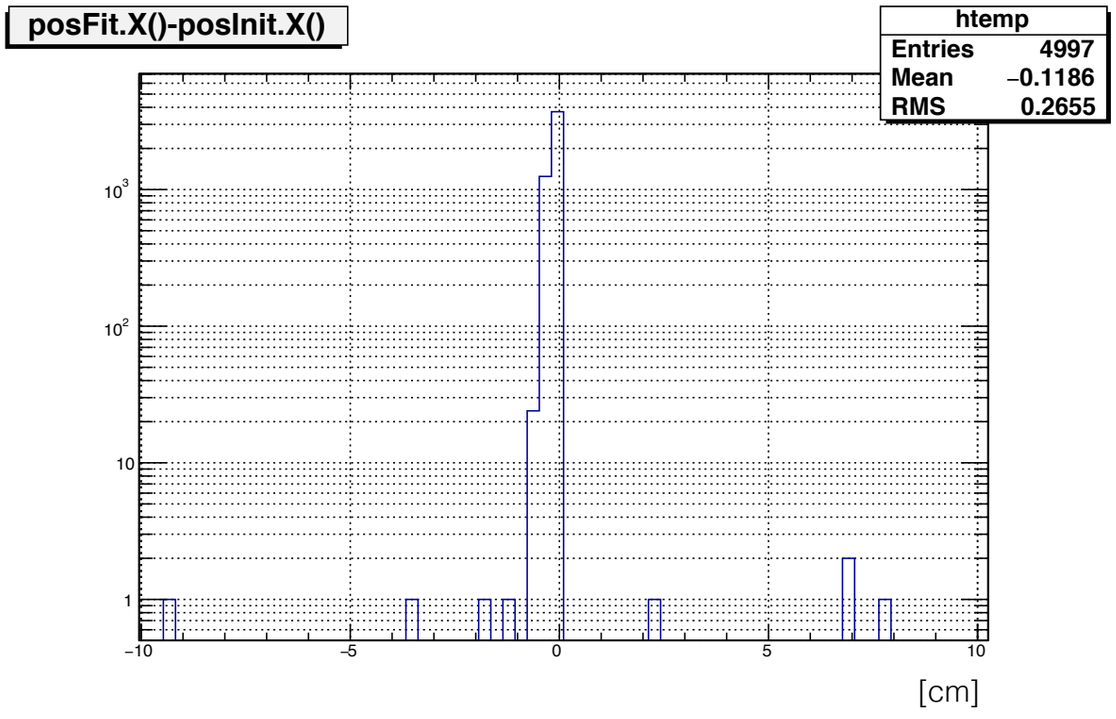
2. TPC Pad view : x, z, and deposit energy information
   ->How about y, time, energy energy?
   ->Making histogram for energy, time, position?

Problem : P_x offset

Px_fit - Px_init



X_fit - X_init



1. The fitted momentum had x component of 36 MeV.

2. No difference between the fitted position and the true position
(mean =0.1cm)

3. Now struggling with GenFit framework.

Summary

1. A track fitting program for the TPC data is under developing.

2. Data containers for the track fitting, TPCHit, TPCCluster, and TPCTrack, were defined.