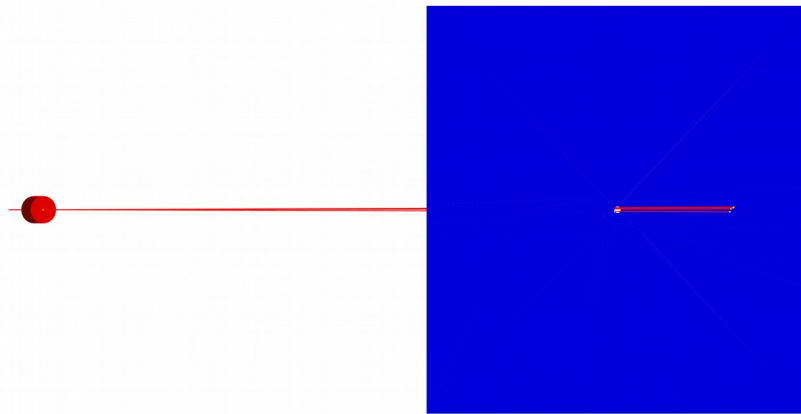


- Simulation
- Target position variance v.s. beam energy variance
- High angle z vertex reconstruction

Simulation setup and model test

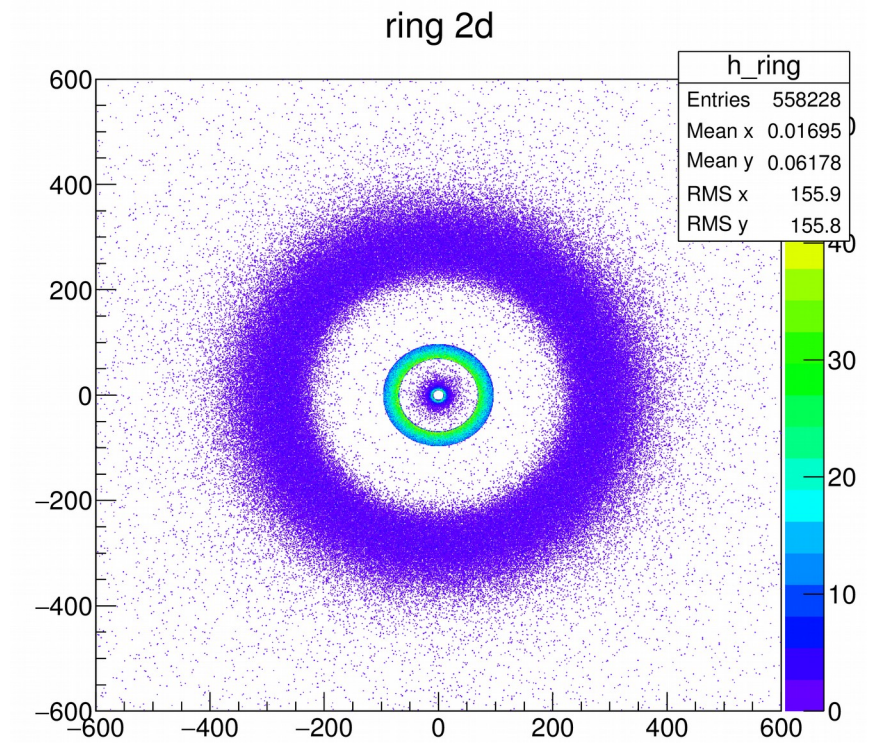
Purpose:

Try to reproduce the bump in small angle:



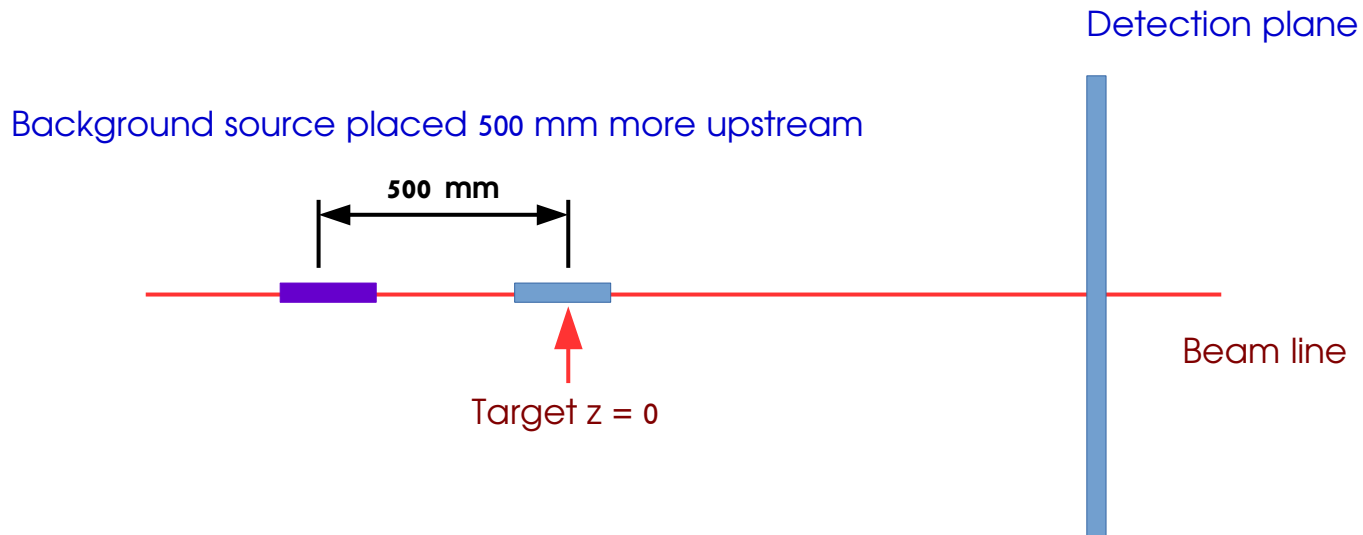
Setup

Test



Moller ring from simulation

Simulation

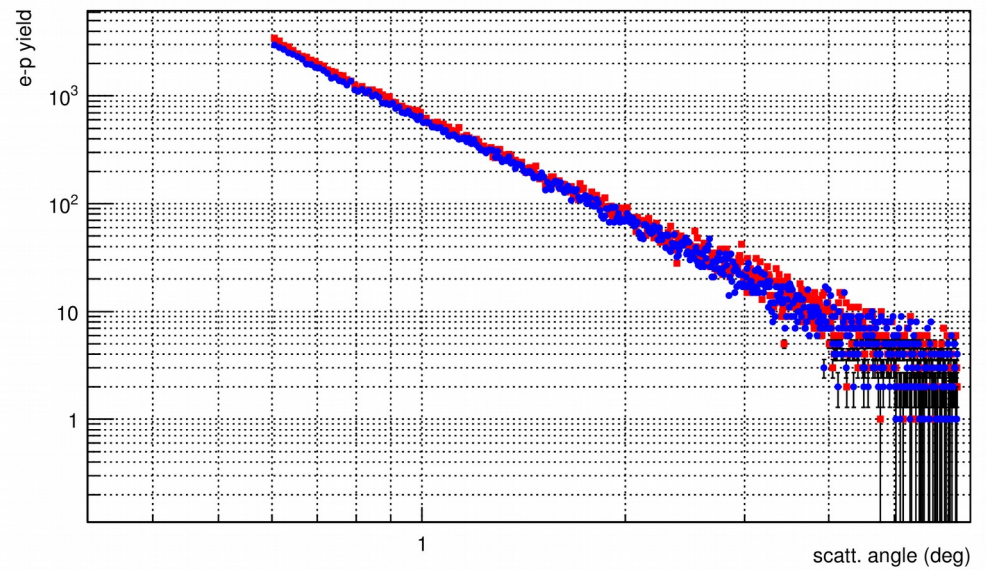


Strategy:

- put target at 0, get a reference e-p yield
- move target toward upstream by 200mm, 500mm, etc, when reconstructing scattering angles, suppose target is still at 0.

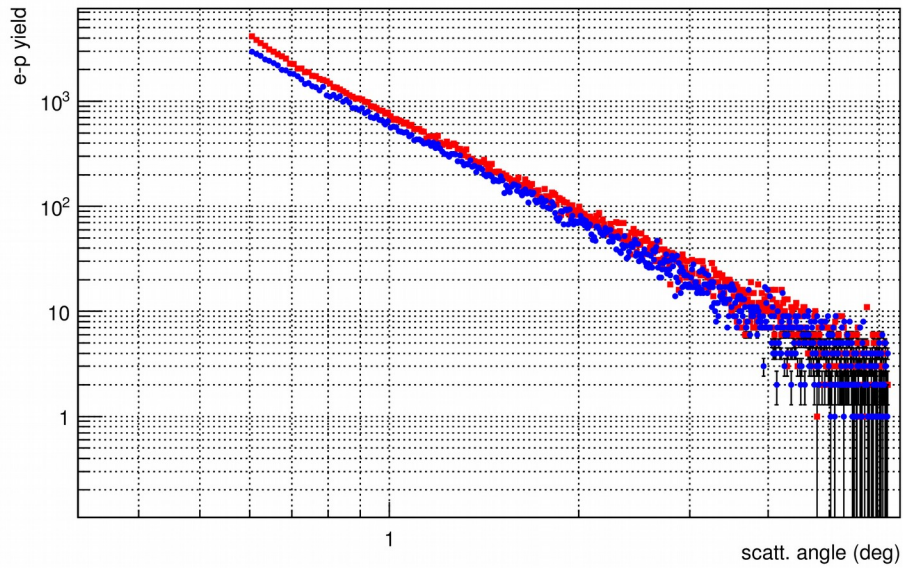
Simulation

Red line = source placed 0.2 meter more upstream
Blue line = target placed at 0

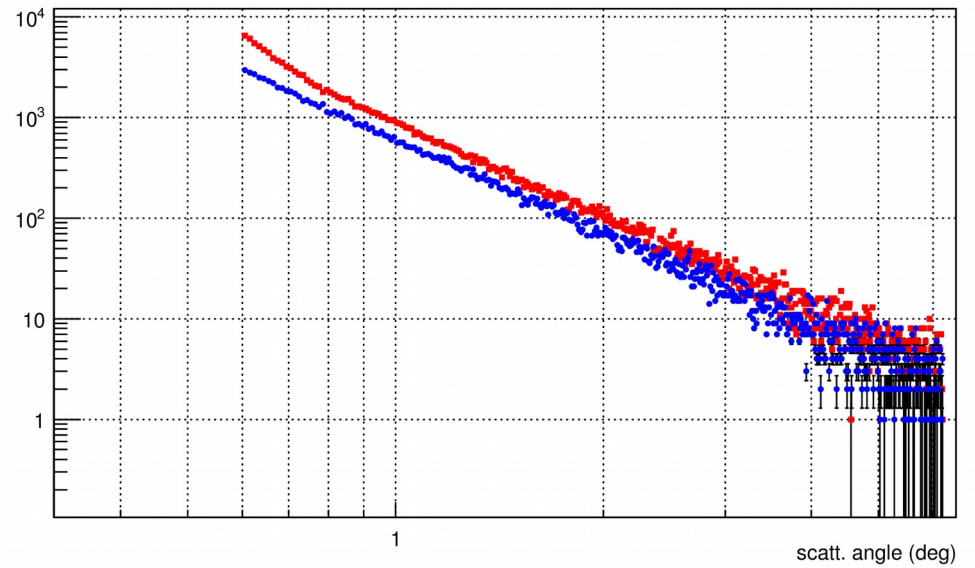


Simulation

Red line = source placed 0.5 meter more upstream
Blue line = target placed at 0

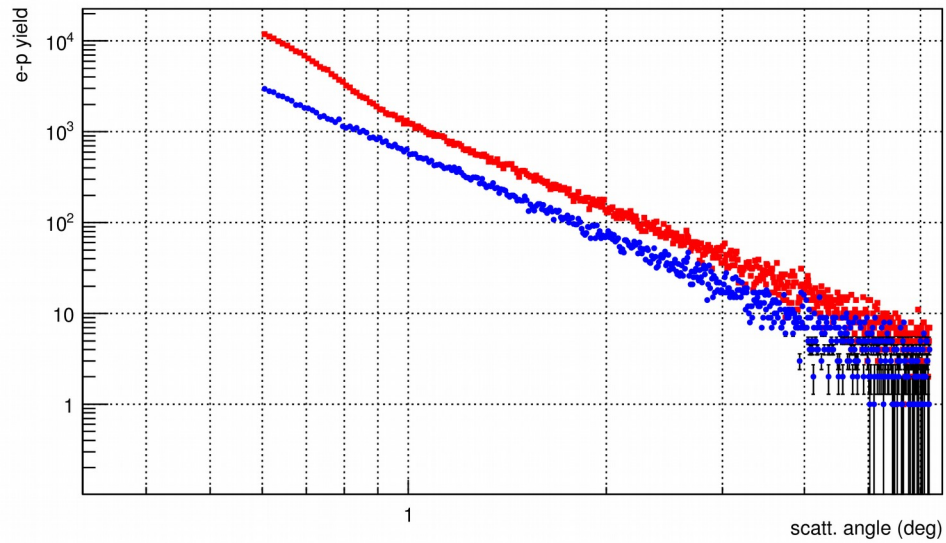


Red line = source placed 1.0 meter more upstream
Blue line = target placed at 0

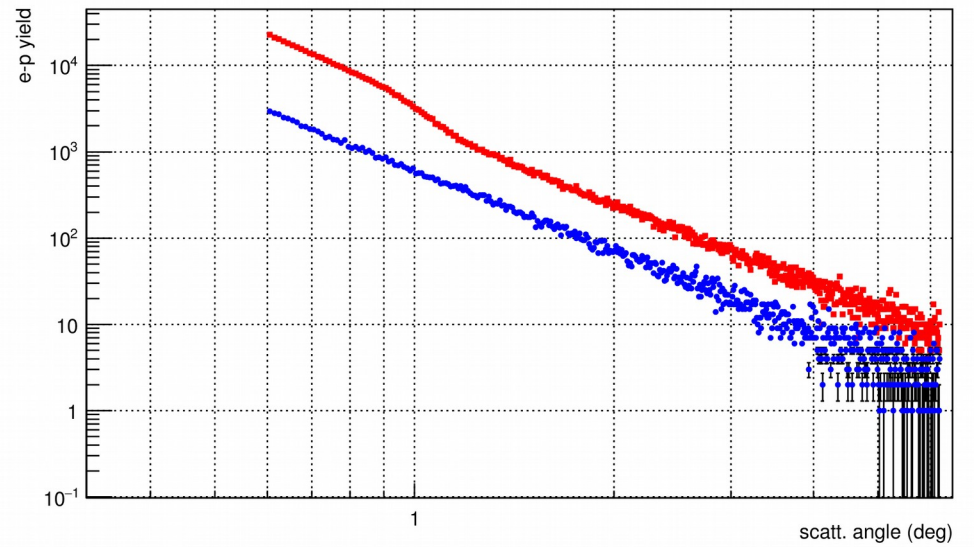


Simulation

Red line = source placed 2.0 meter more upstream
Blue line = target placed at 0

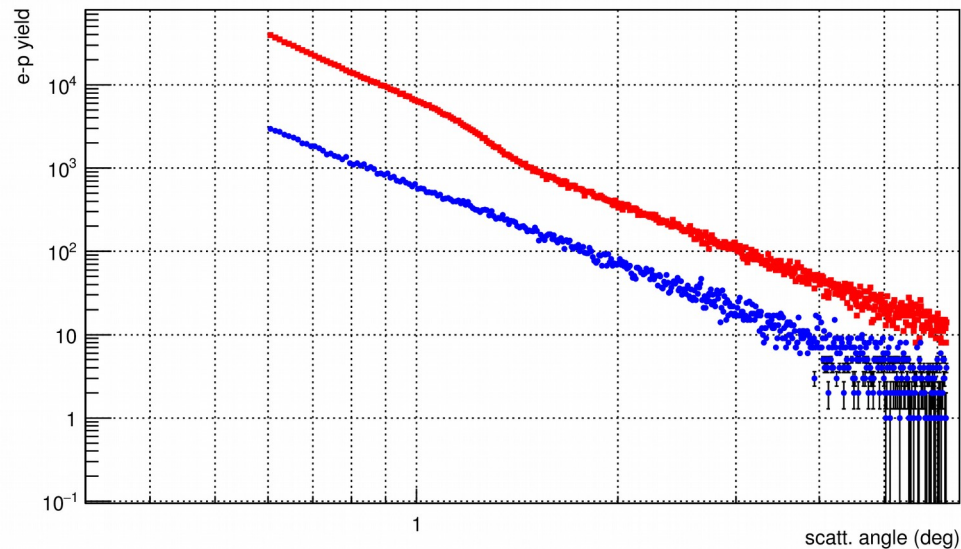


Red line = source placed 4.0 meter more upstream
Blue line = target placed at 0

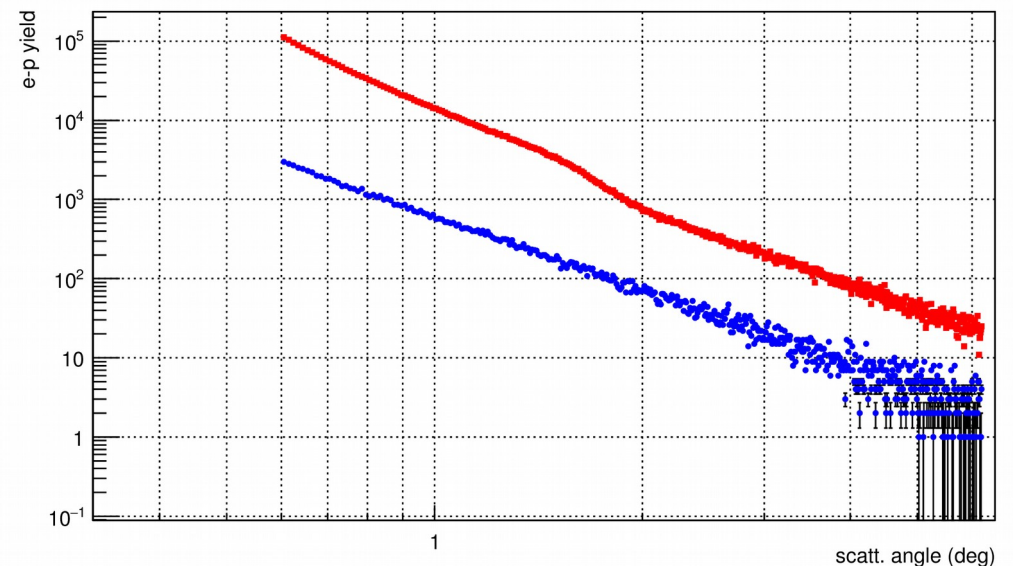


Simulation

Red line = source placed 6.0 meter more upstream
Blue line = target placed at 0



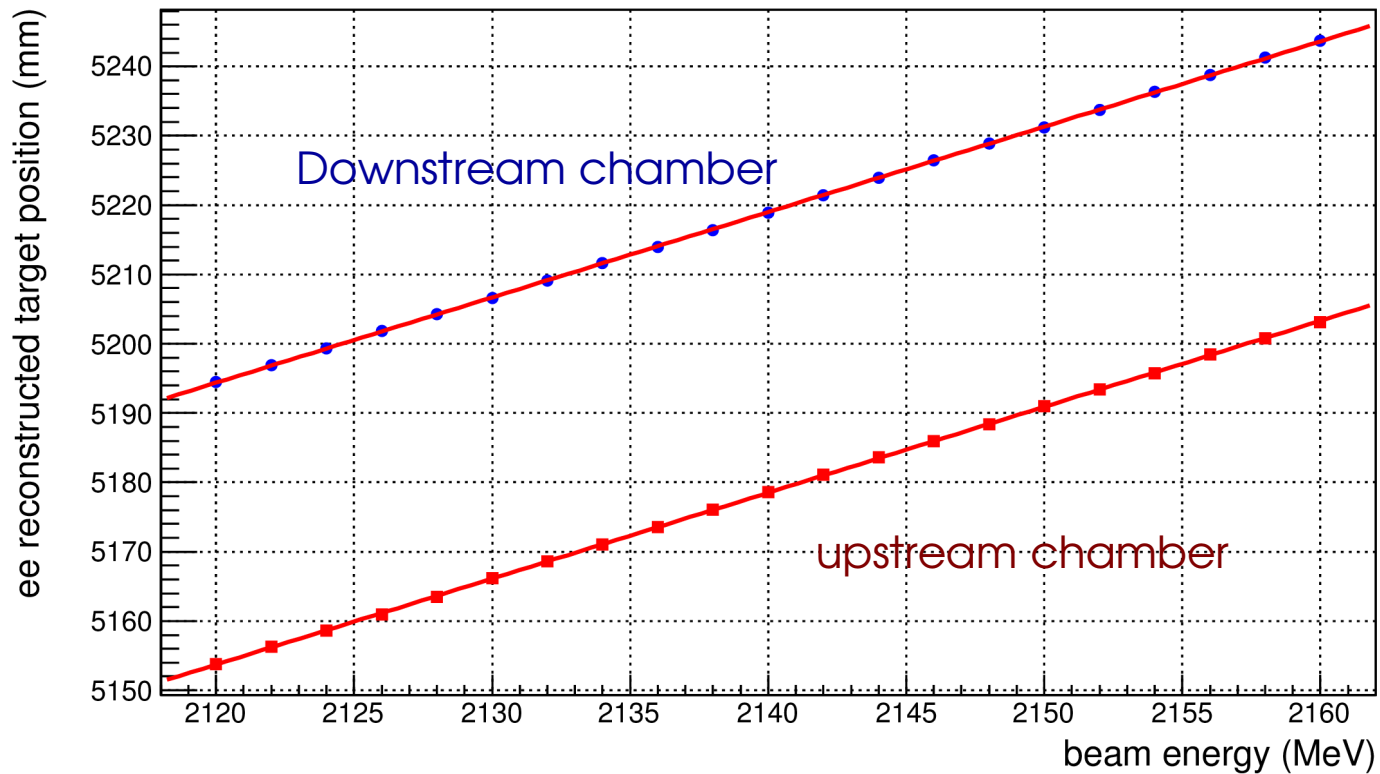
Red line = source placed 9.5 meter more upstream
Blue line = target placed at 0



For now:

- Move background towards downstream won't produce bump
- Due to experimental resolution, if we have background upstream at <500 mm, there seems to be no bump
- In combination with the empty target run, the background source is likely in upstream more than 5 meter.

e-e events reconstructed target position vs beam energy



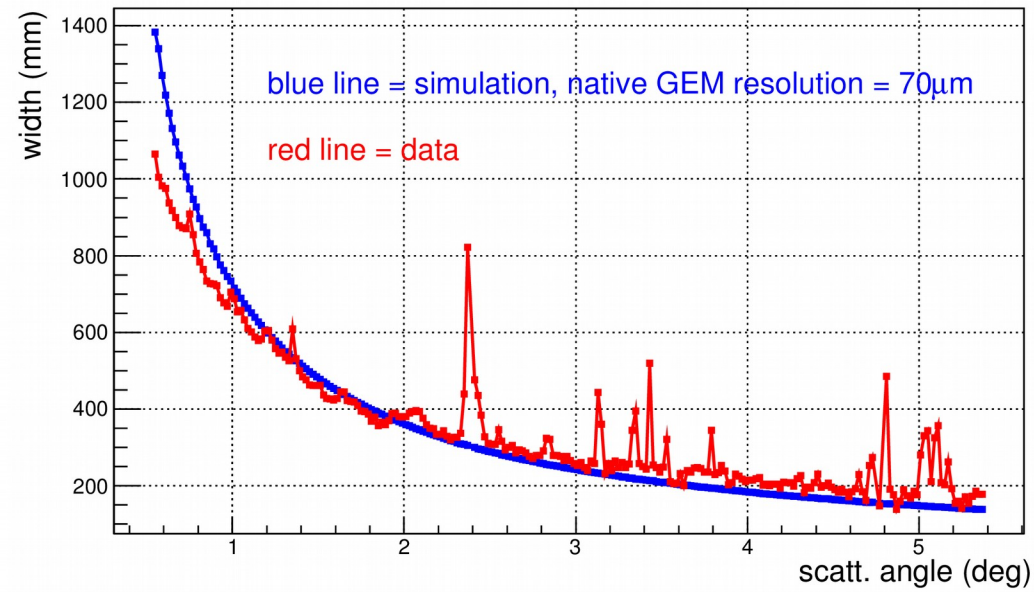
From fitting:

Upstream chamber: slope = 1.24

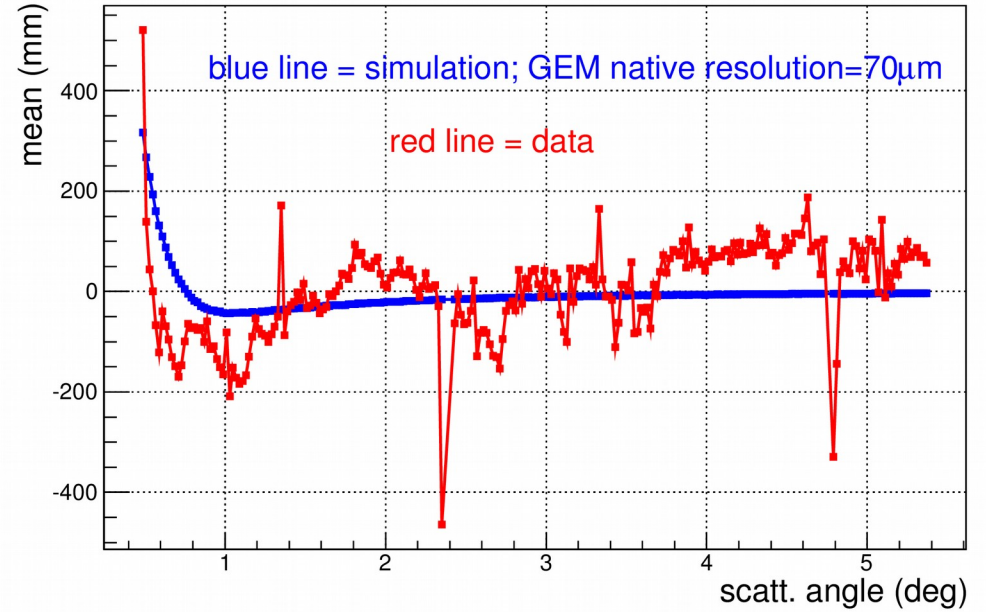
Downstream chamber: slope = 1.23

Beam energy change 1MeV, moller reconstructed target position will change ~1.23 mm

Z vertex using overlap GEM events

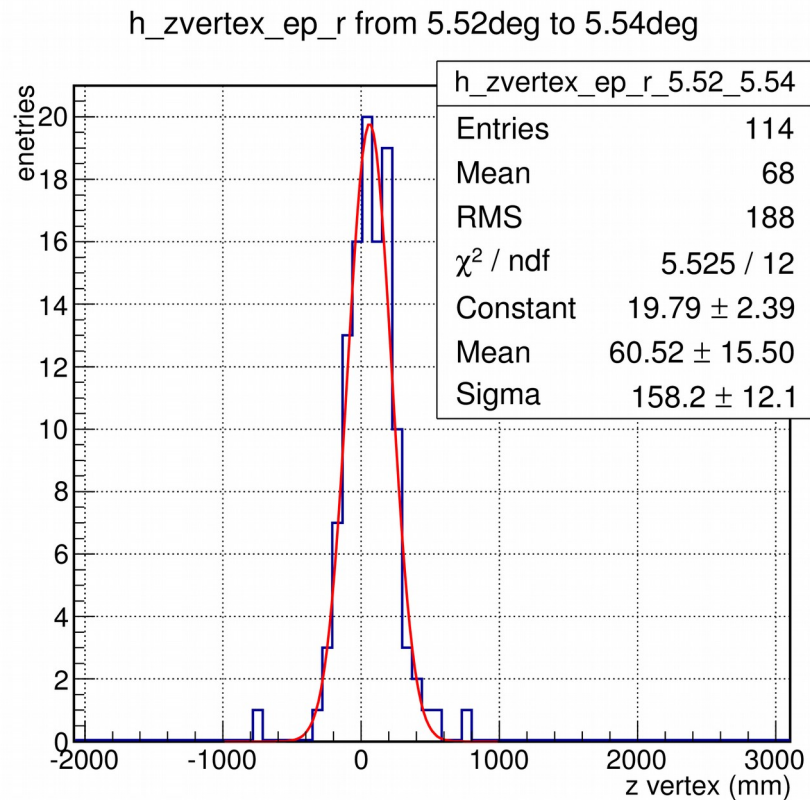
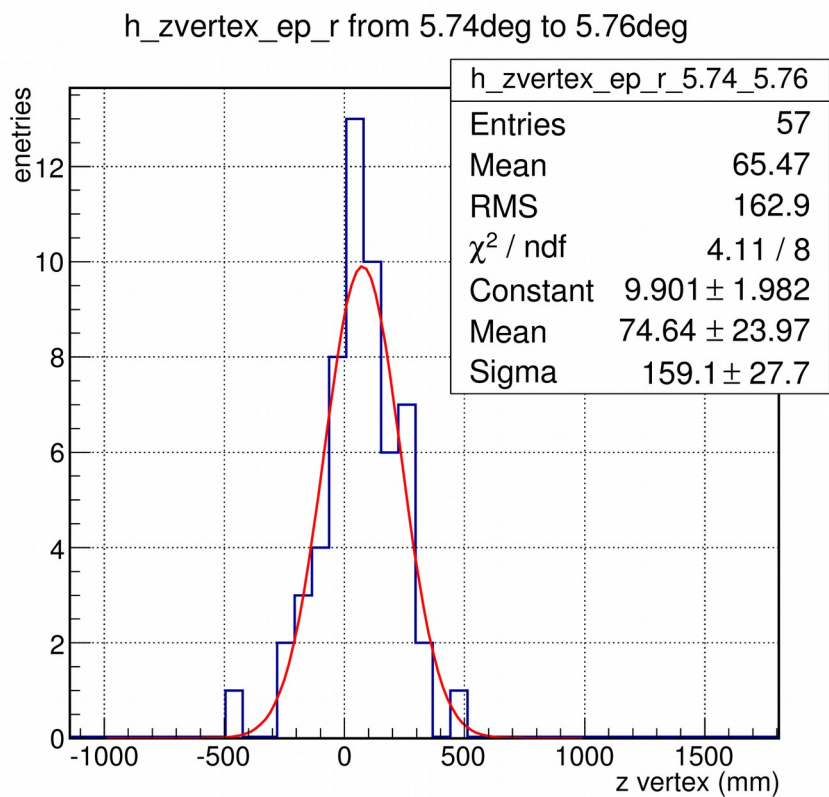


Distribution width



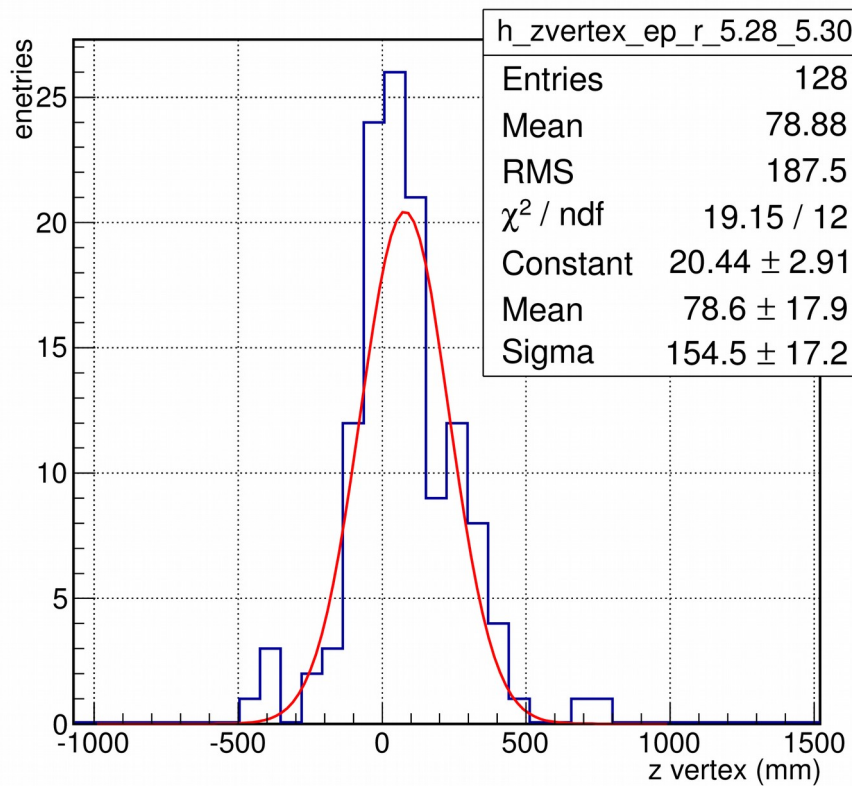
Distribution average

A few reconstructed z vertex at high angle

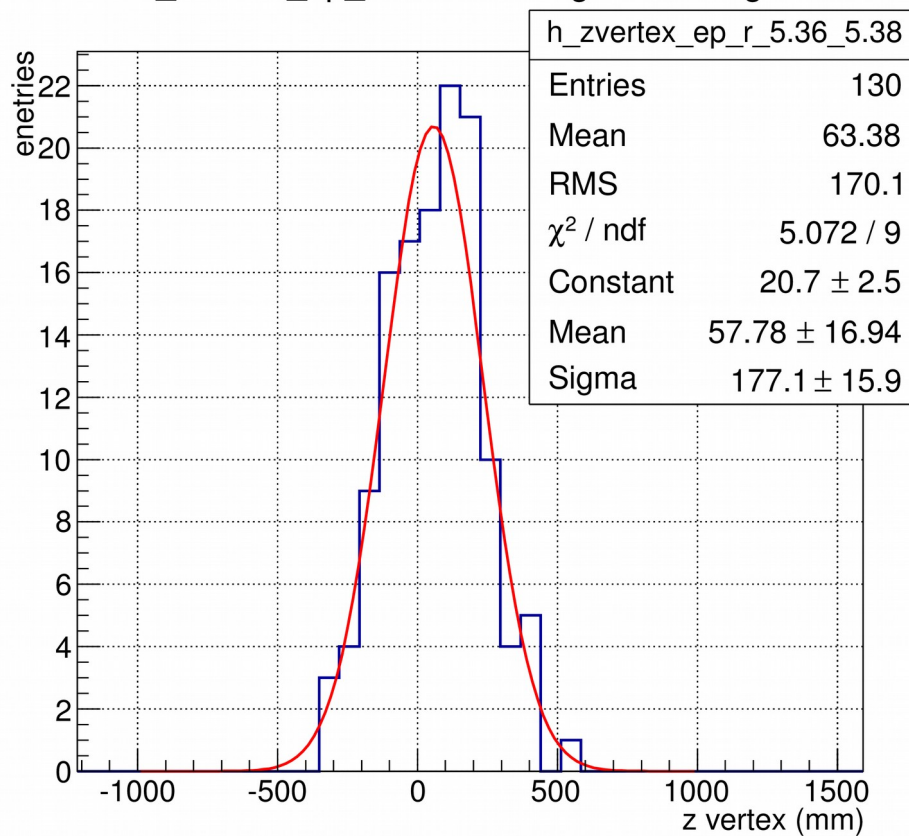


A few reconstructed z vertex at high angle

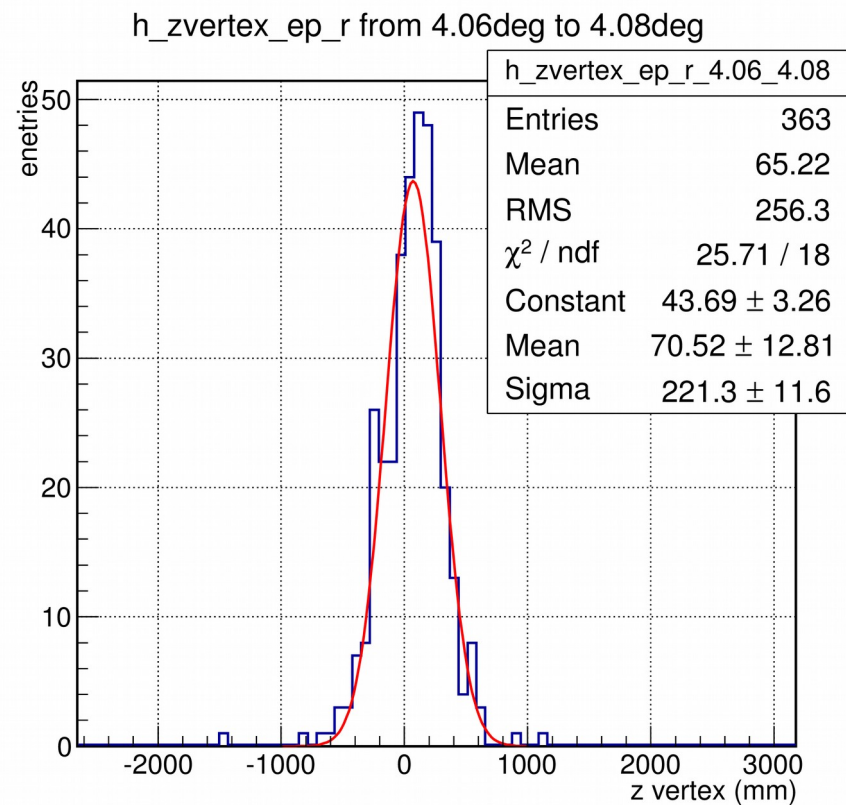
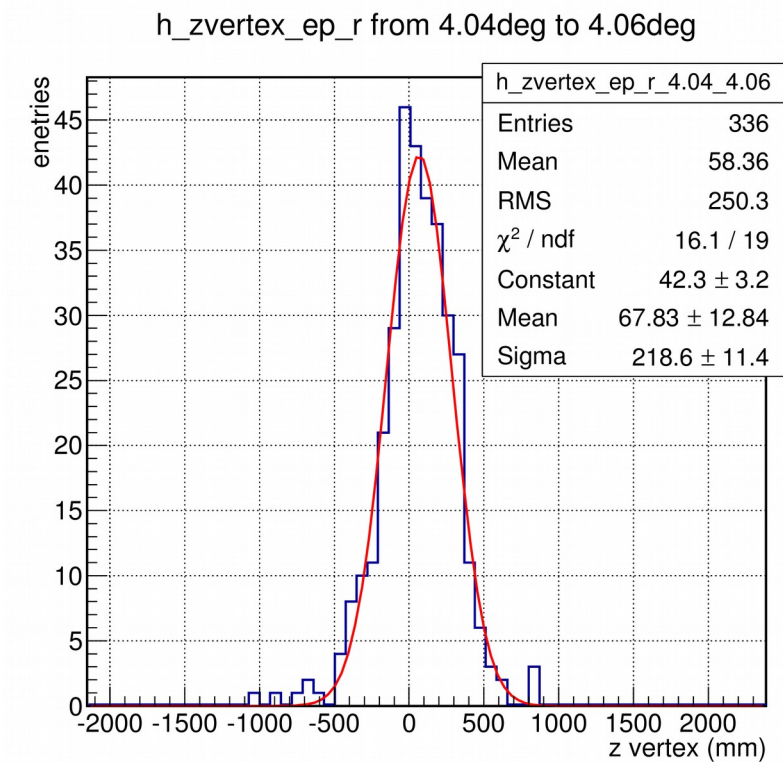
h_zvertex_ep_r from 5.28deg to 5.30deg



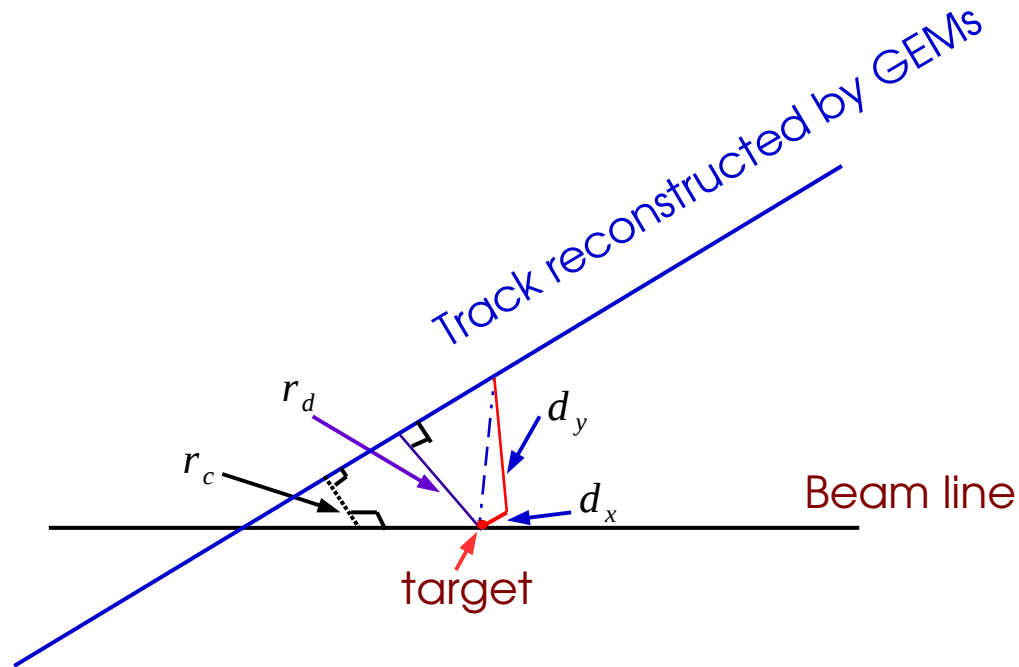
h_zvertex_ep_r from 5.36deg to 5.38deg



A few reconstructed z vertex at high angle



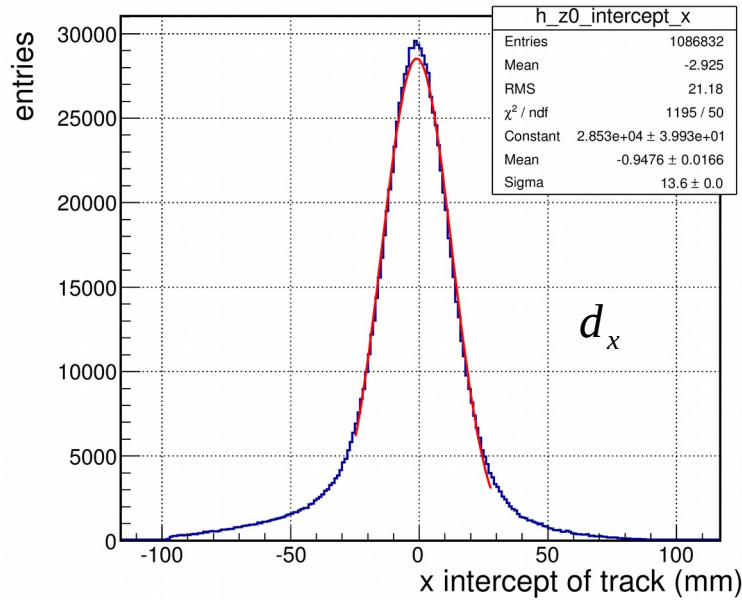
Tracks reconstructed by overlap GEMs



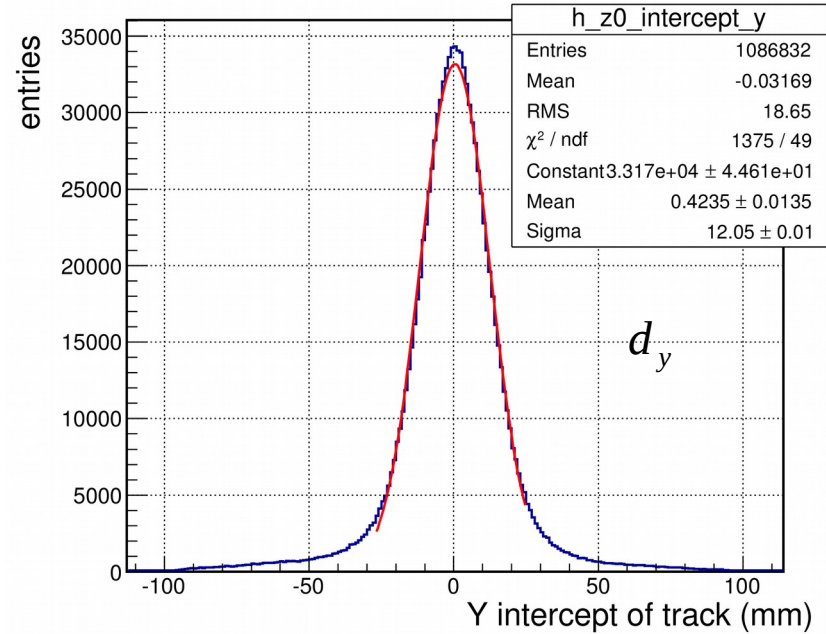
- r_c : the closest distance between beam line and track
- r_d : the distance from target to track
- d_x : X intercept of track at target ($z=0$)
- d_y : Y intercept of track at target ($z=0$)

Tracks reconstructed by overlap GEMs ^{12}C run

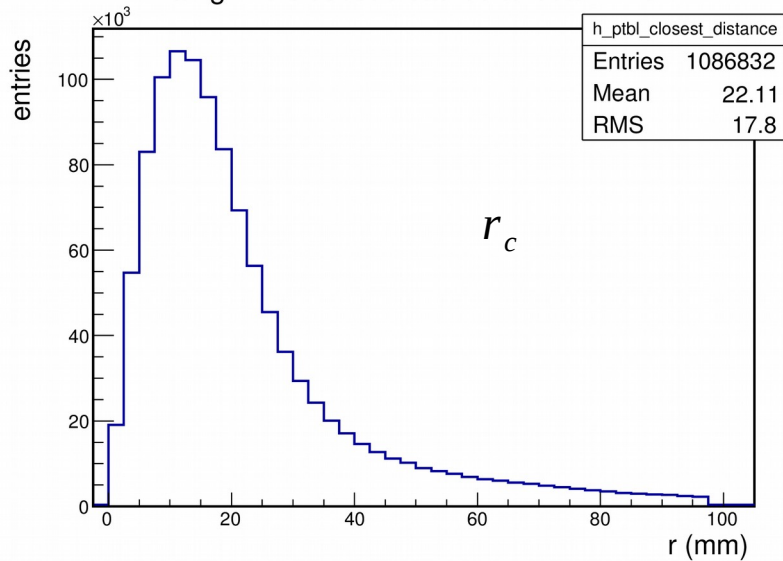
fitting line x value at z = 0 only gem



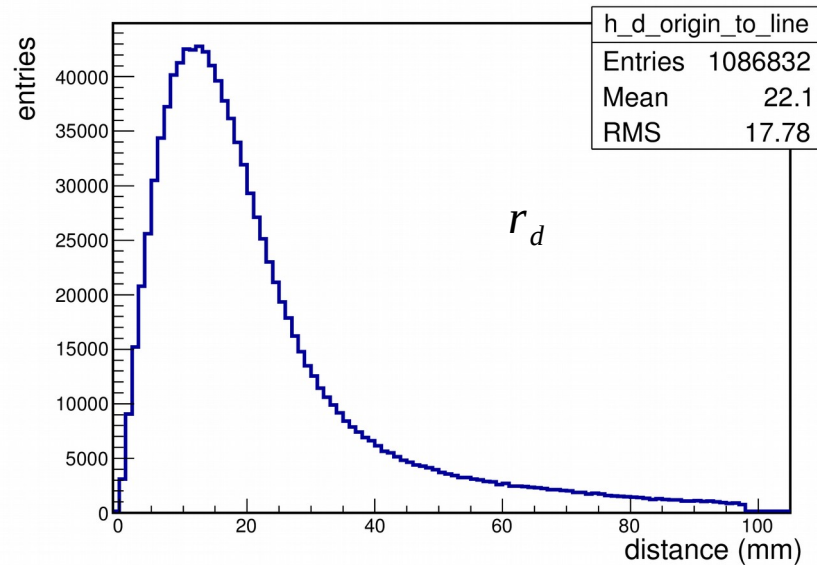
fitting line y value at z = 0 only gem



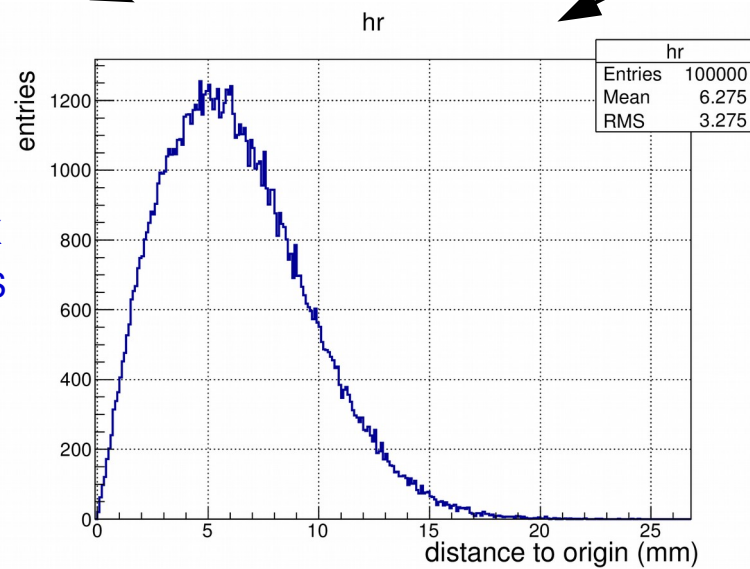
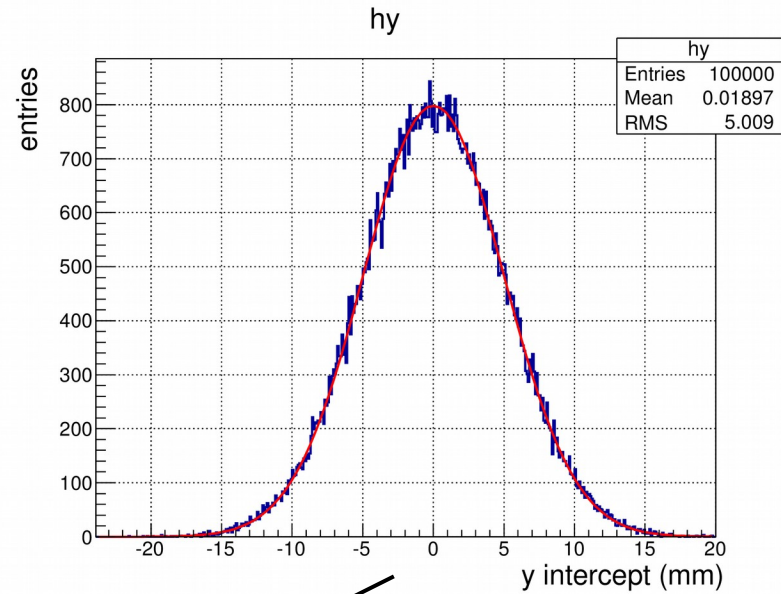
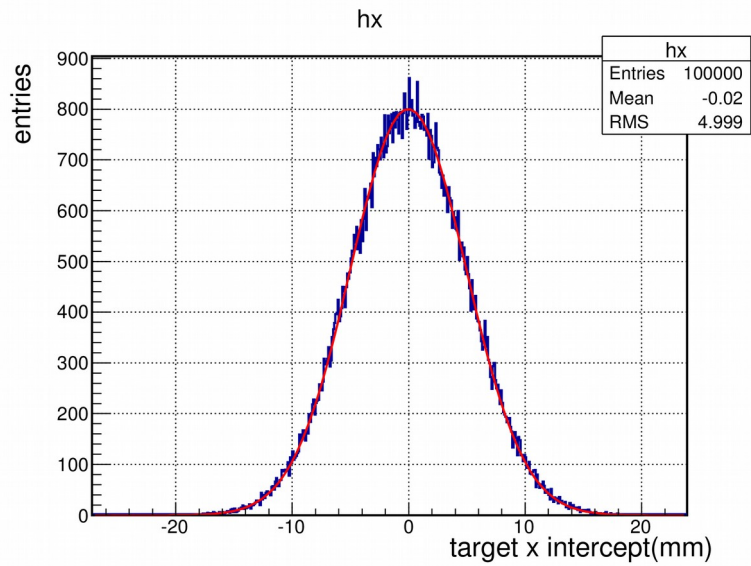
fitting line closest distance to beam line



distance between origin and fitting line at z = 0 only gem



Simulation



Distance from target to track will not be 0, even if x and y is centered at 0