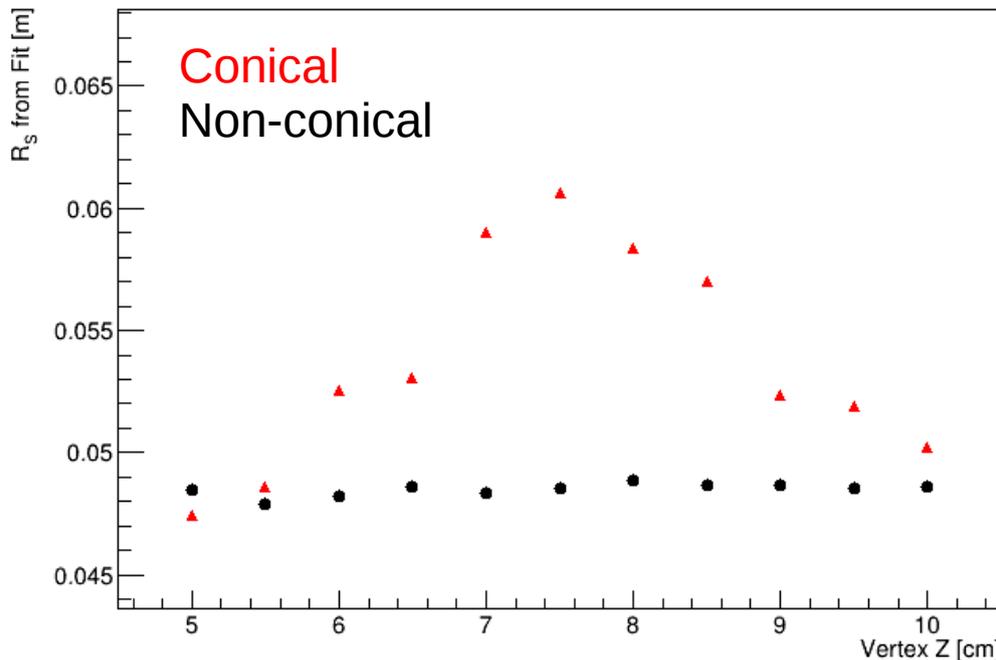
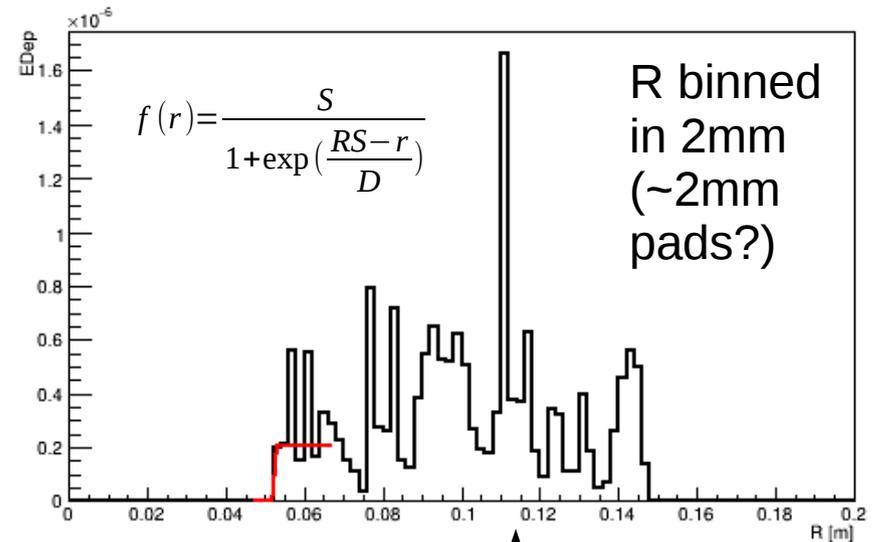
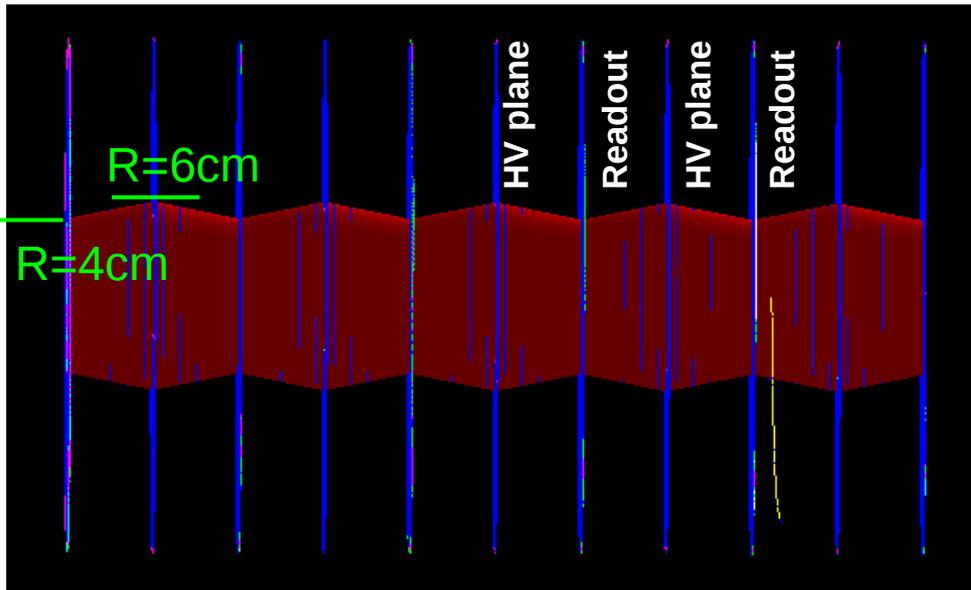


# Montgomery – TDIS Conical Update 25/02/20

## Reminder

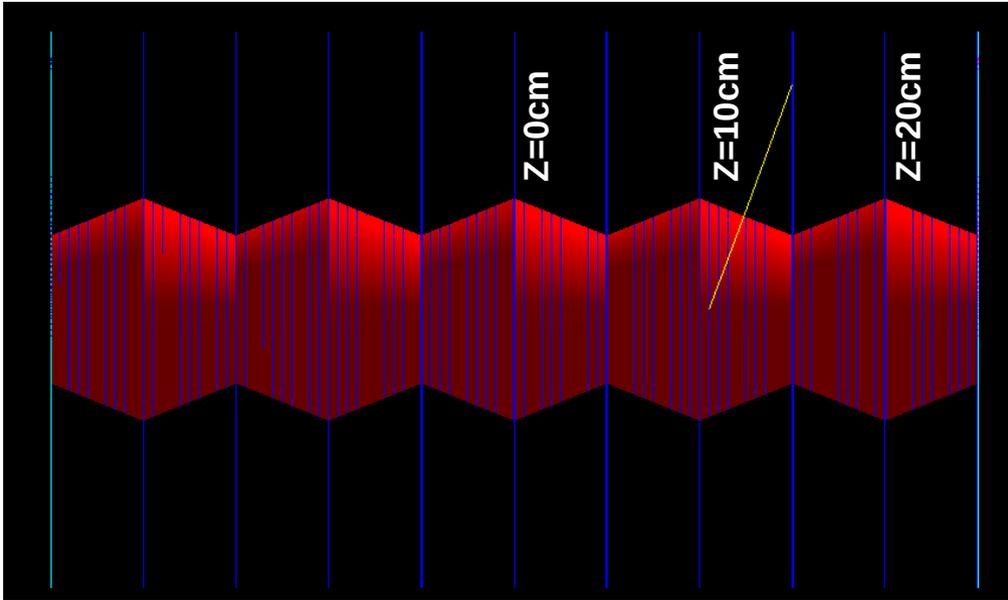
Looking at individual tracks in conical design to look at z-resolution



Edep vs R for each hit along an individual track, fitted with a step function to find  $R_s$  – location of first Edep in gas volume

$R_s$  fit results for different vertex z-positions of tracks

## Scan Vertex in Z – Further Analysis



Track vertex scanned in z in 0.5cm steps

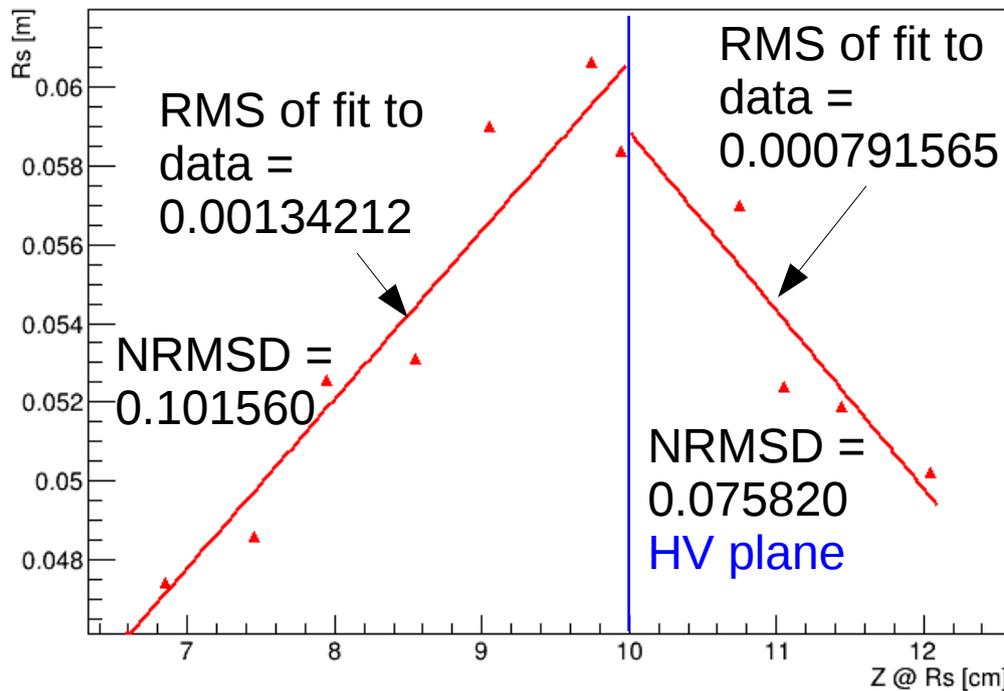
Step fit performed at each step

Rs plotted against z@Rs

Fitted triangular profile:

$$R_s = [0]*(z-z_c) + [1]$$

Where  $z_c$  is position of conical shape change and is fixed by known geometry



Gradient of different wall section fits always differs (is this an issue?)

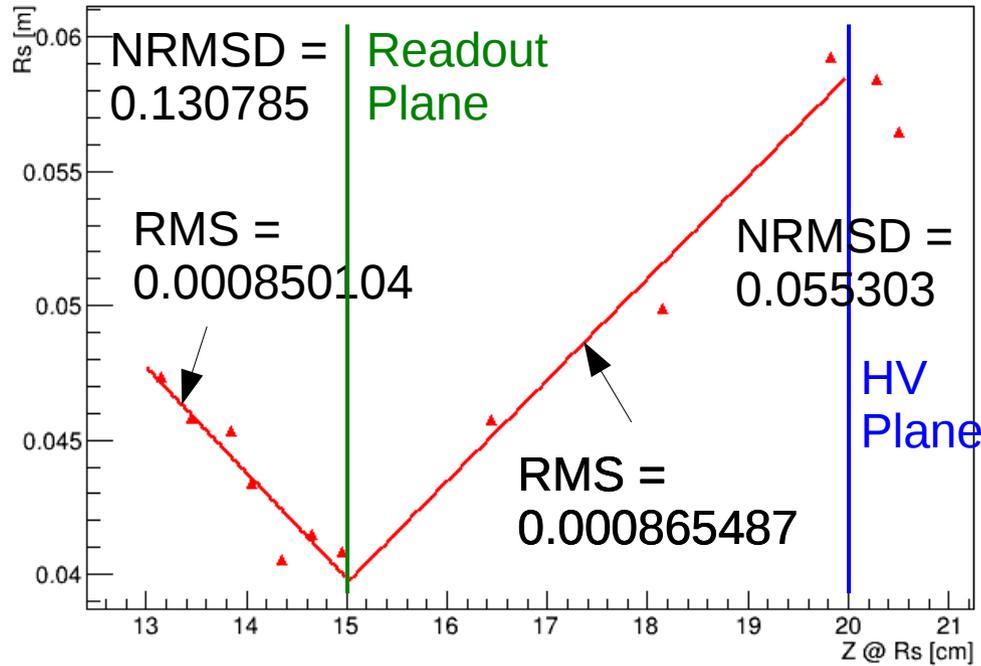
Currently fit both sections separately, should we try to combine?

Shown left:

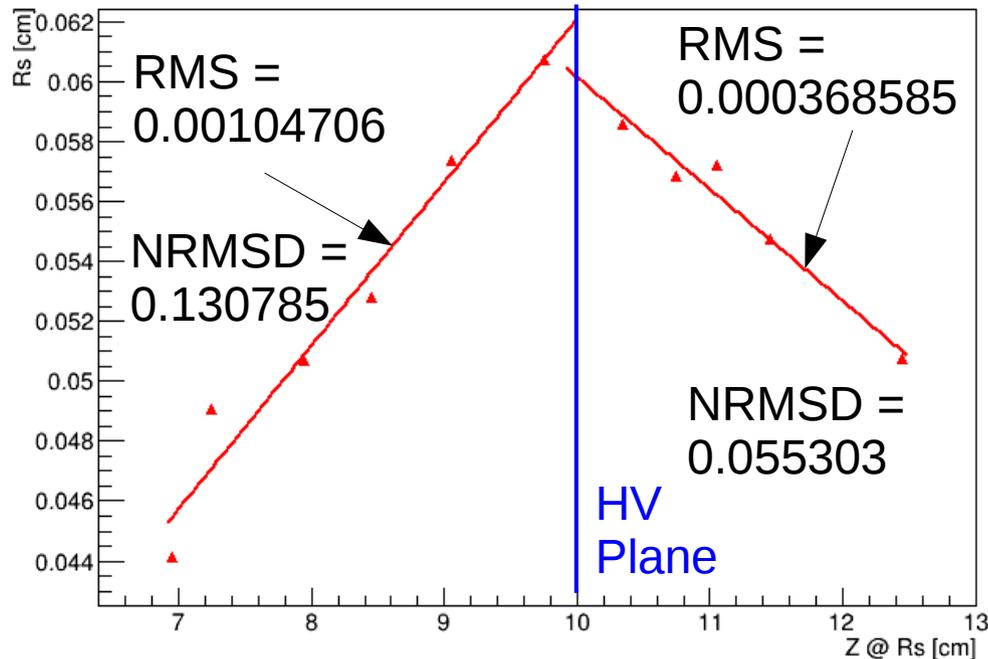
400MeV/c, solenoid on, phi 45 degrees, theta 70 degrees

$$\text{NRMSD} = \text{RMSD}/(y_{\text{max}}-y_{\text{min}})$$

# Scan Vertex in Z – Further Analysis

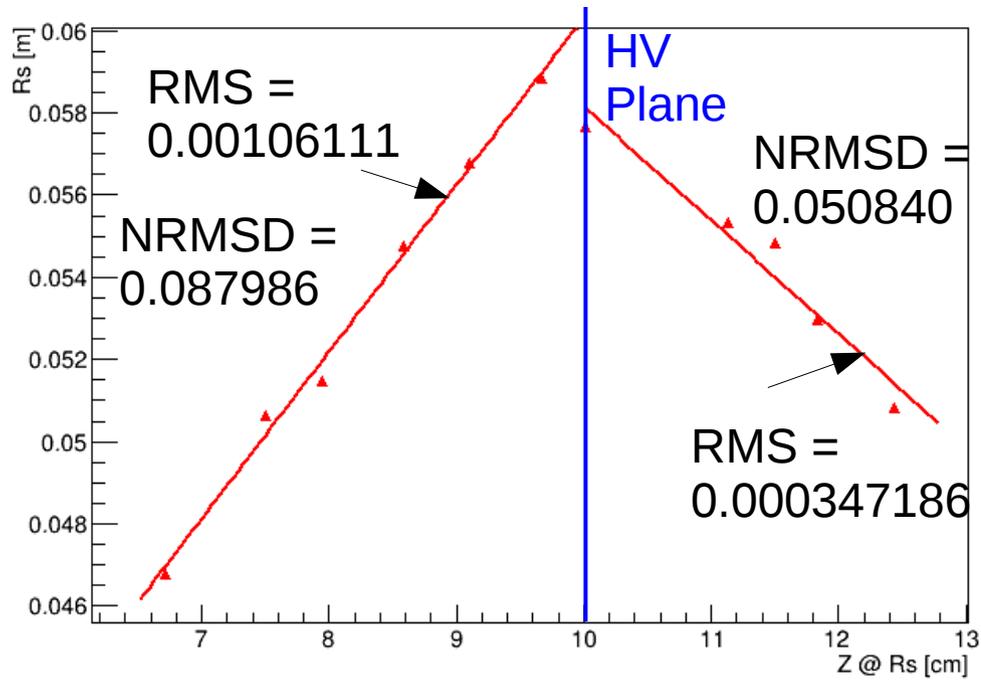


Shown left:  
400MeV/c, solenoid on, phi 45 degrees, theta 30 degrees



Shown left:  
400MeV/c, solenoid off, phi 45 degrees, theta 70 degrees

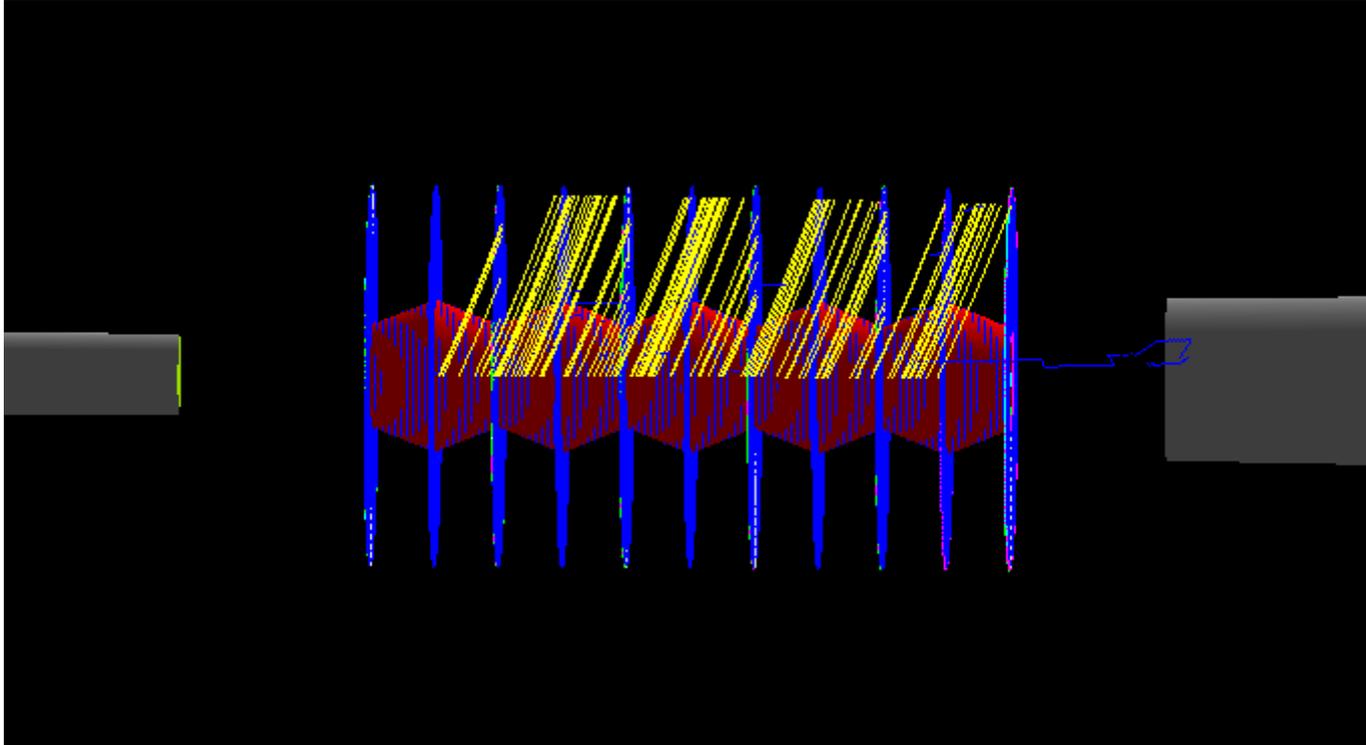
## Scan Vertex in Z – Further Analysis



Shown left:  
100MeV/c, solenoid on, phi 45  
degrees, theta 37 degrees

## Multi-Event Runs

10k tracks were generated randomly along target to see how well z-vertex is smeared  
 $p=400\text{MeV}/c$ ;  $\phi=45\text{degrees}$ ;  
Looked at 10k events for  $\theta=30, 50, 70$  degrees cases separately (solenoid was on)

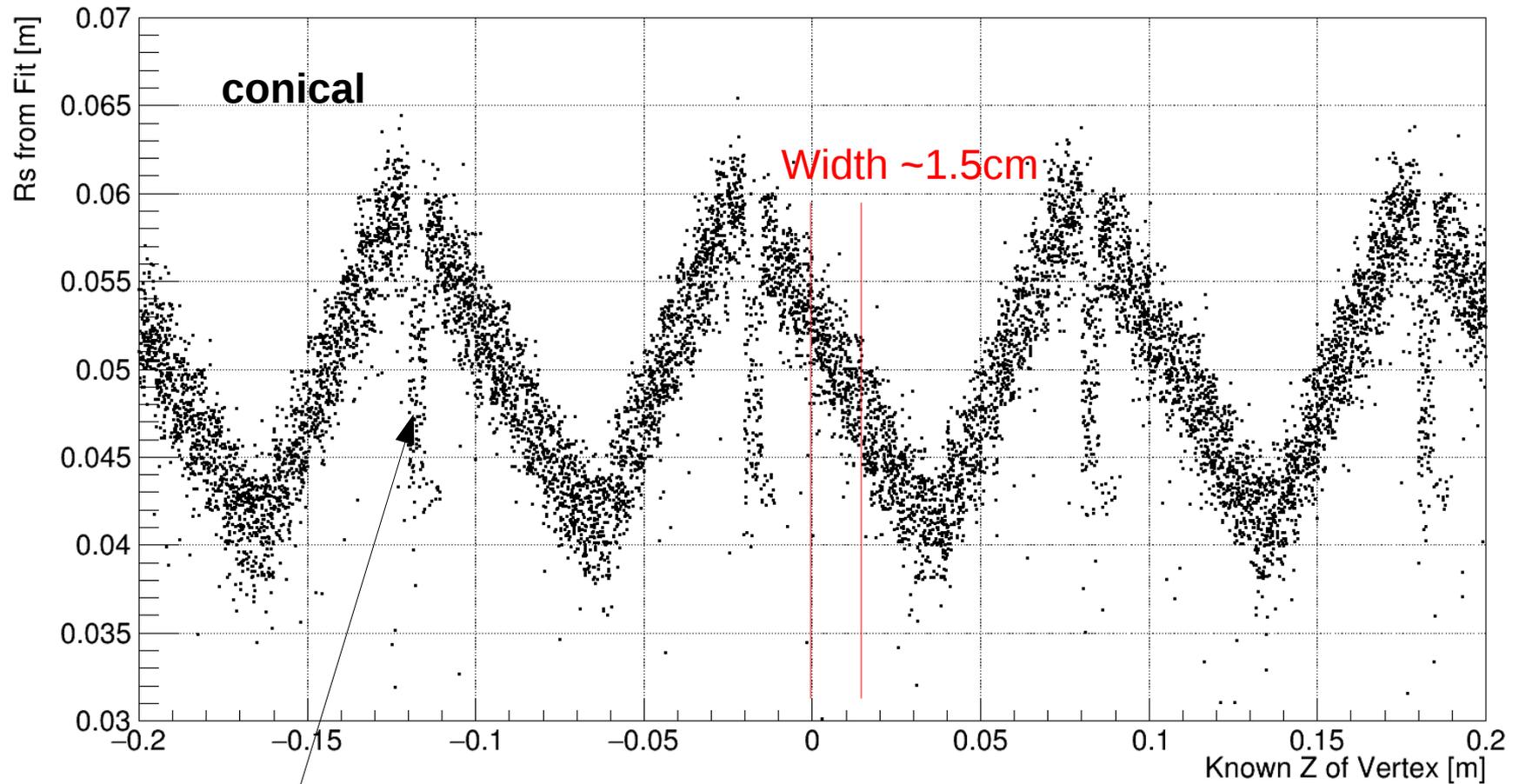


Analysis:

For each of 10k tracks an individual Rs analysis was performed ie step function was fitted to Edep vs R for each of 10k track

Time of drift arrival at readout plane for Rs step location subsequently calculated (refer to Montgomery\_Update\_TDIS\_021219.pdf for more details on fit/drift time)

# Theta = 70degrees

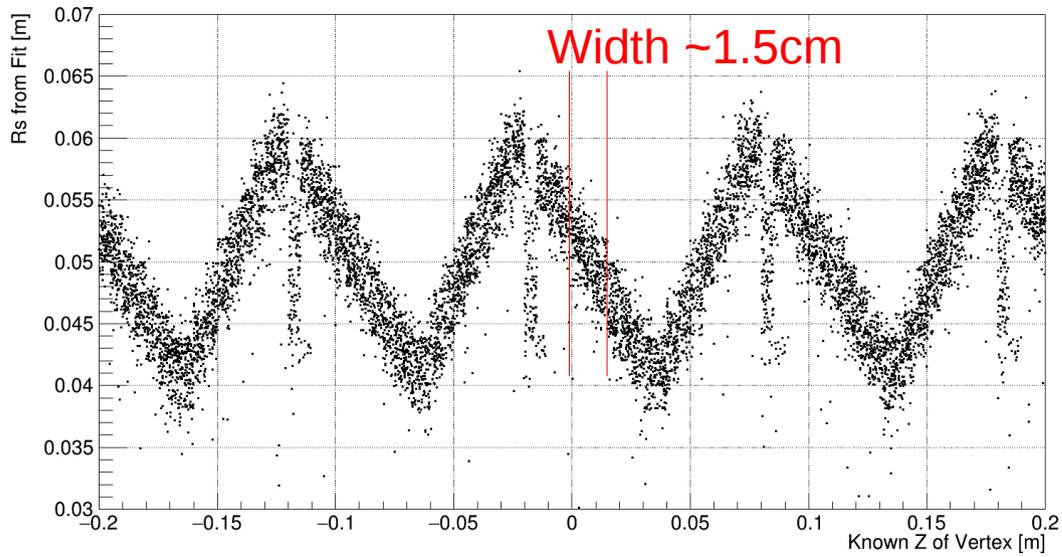


These are close to locations of HV planes, where track is not killed, resulting Edep V R graphs sometimes have failed fits

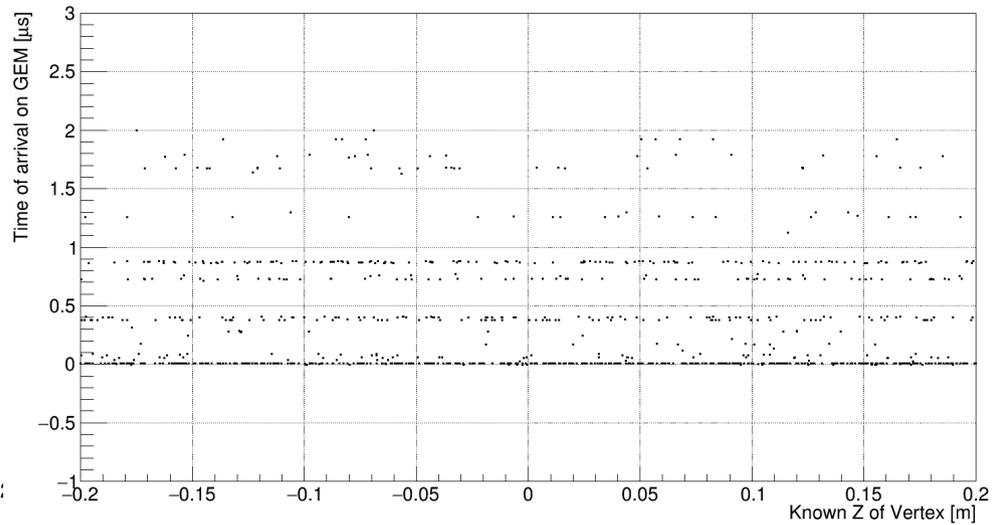
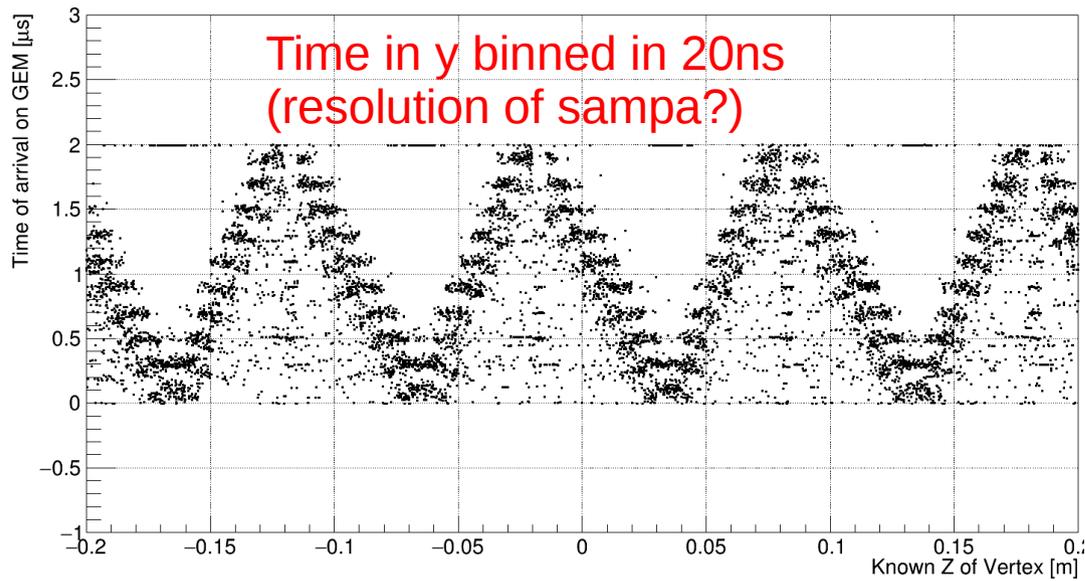
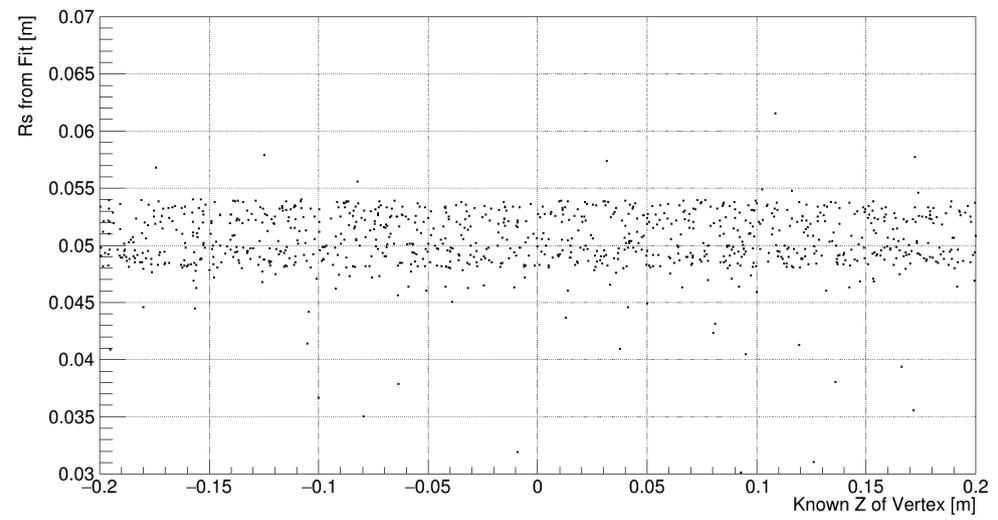
Graph is binned in 2mm bins in y-axis, ie ~2mm pad sizes  
In x-axis bins are 1mm arbitrarily

# Theta = 70degrees

## conical

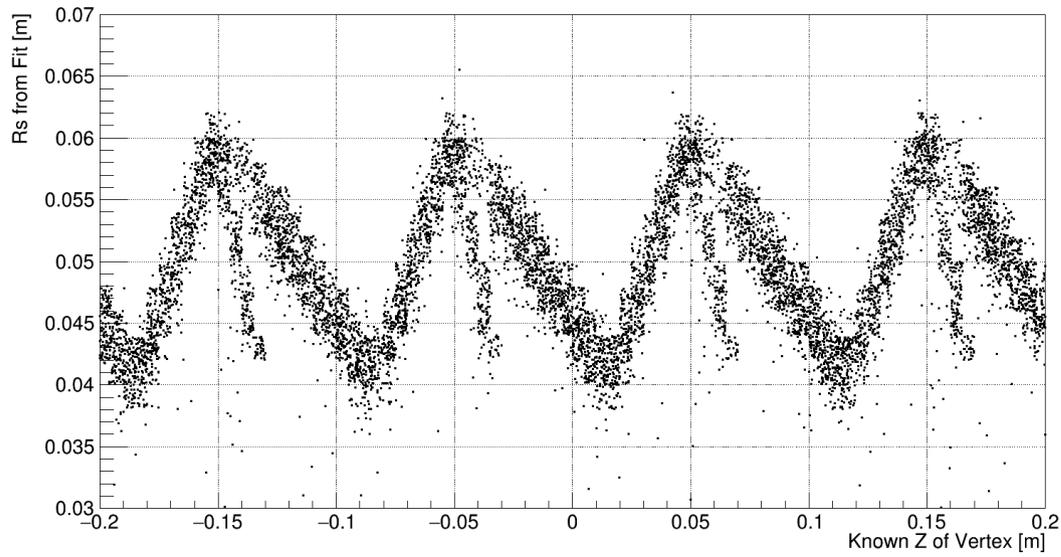


## non-conical

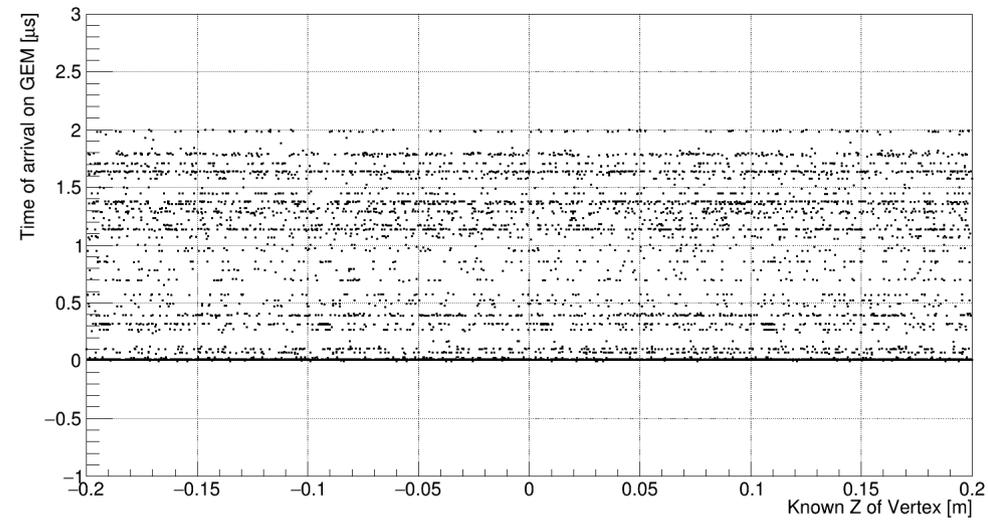
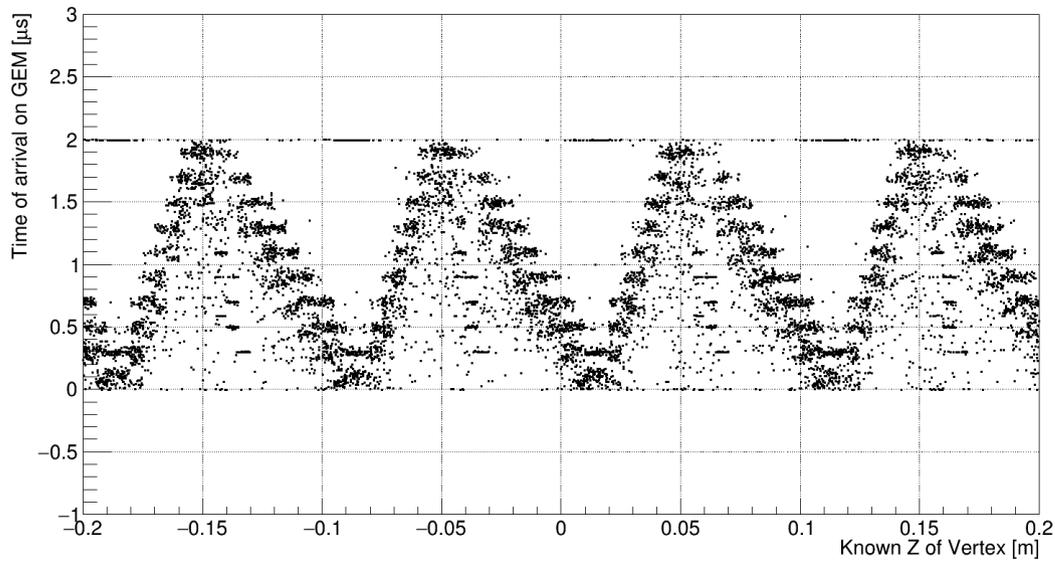
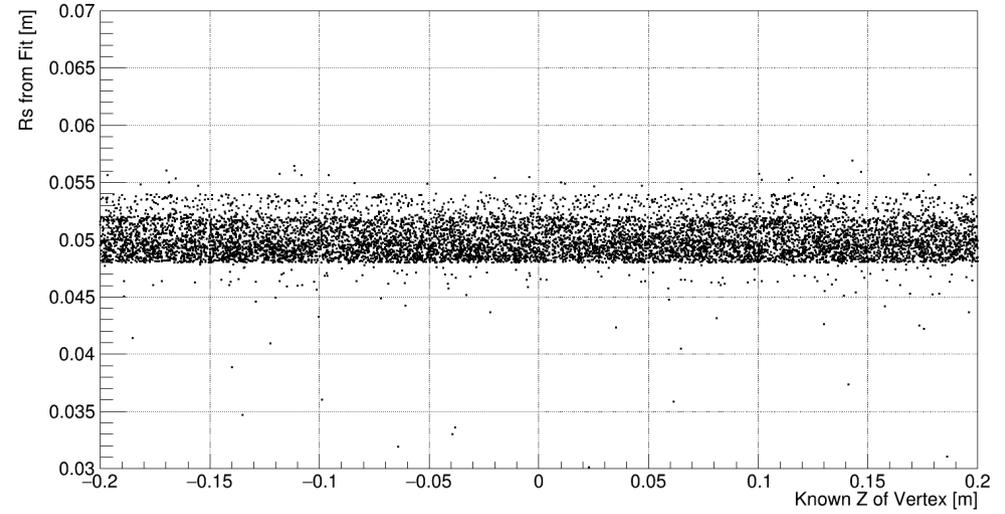


# Theta = 50degrees

## conical



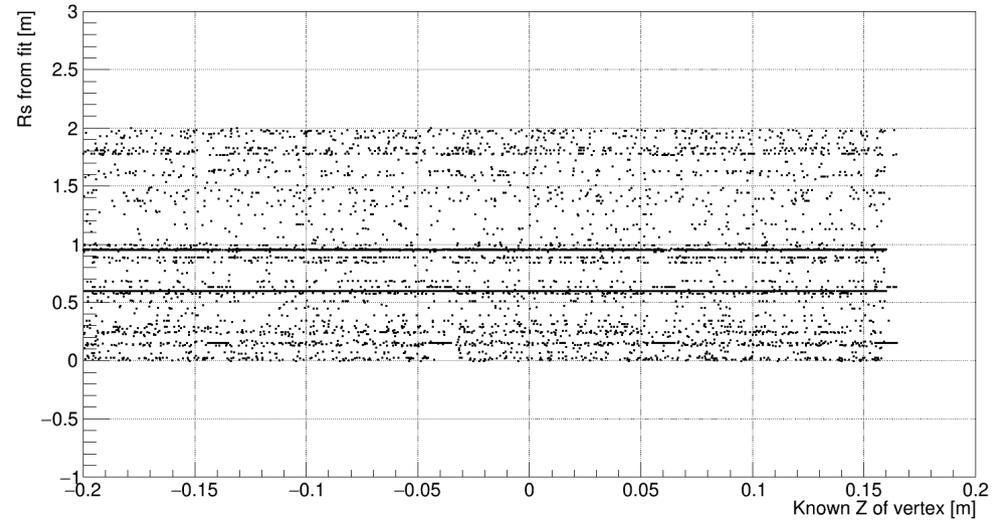
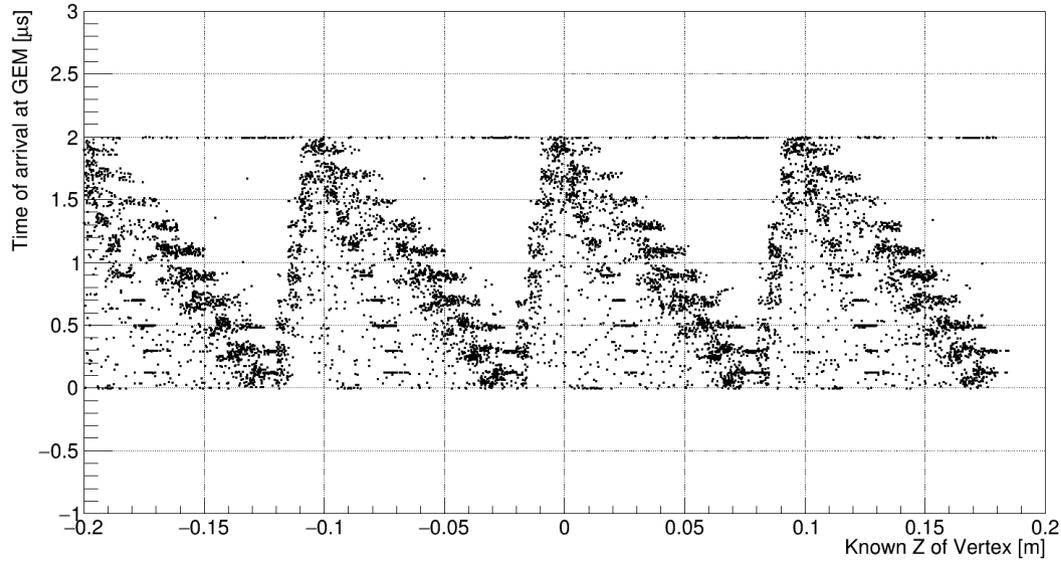
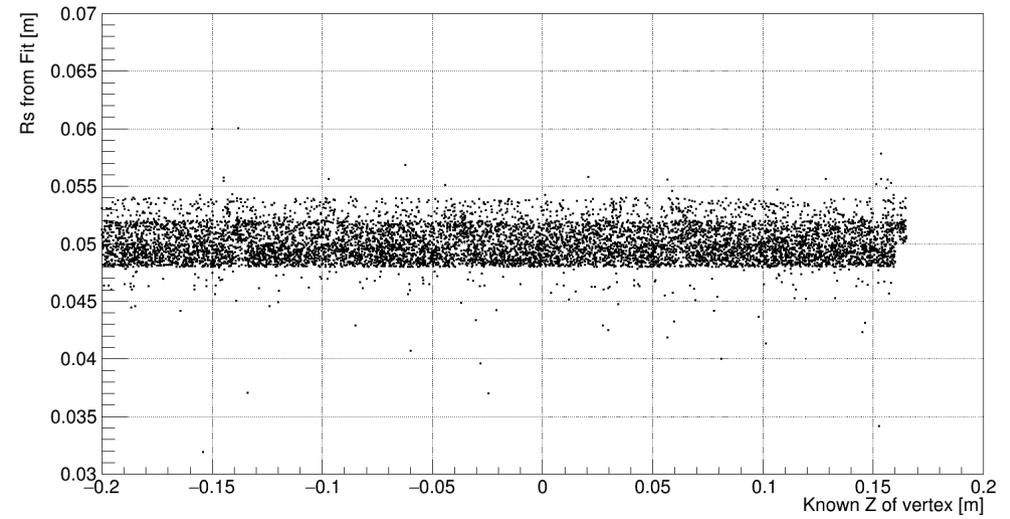
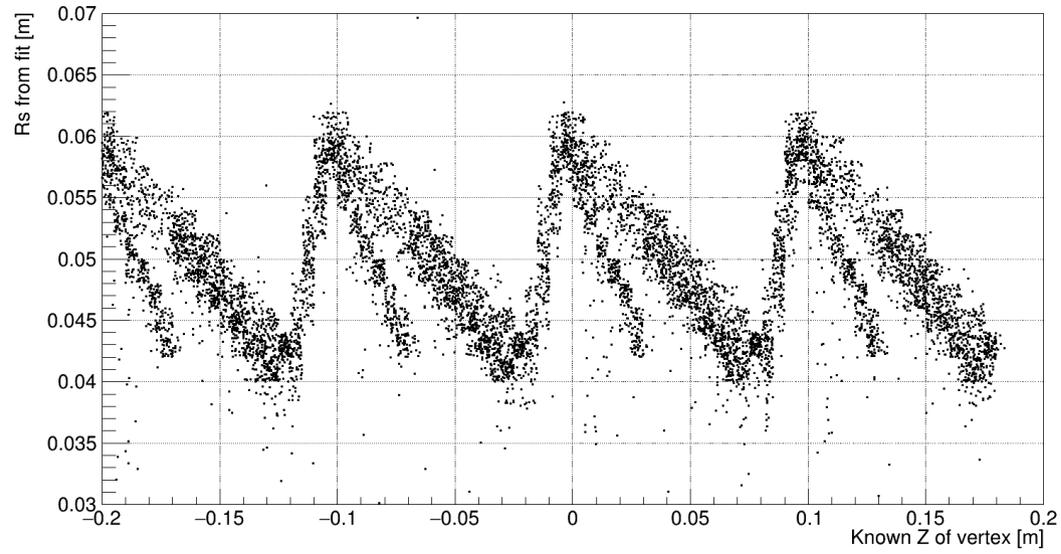
## non-conical



# Theta = 30degrees

## conical

## non-conical



## Summary/ Next Steps

Shown that relation relating  $R_s$  and  $Z$  can be found

Origin of angle dependence unknown – still under consideration, but if known can account for (is it a field effect?)

Next step will be to determine resolution of relation between  $R_s$  and  $Z$

Next step will also include determining fraction of events in g4sbs which do not pass through hv plane or readout plane ie which solid angles we cannot reconstruct

These two parameters (resolution and fraction of lost tracks should determine necessity of conical shape)