ePIC Barrel Imaging Calorimeter (BIC) Workshop

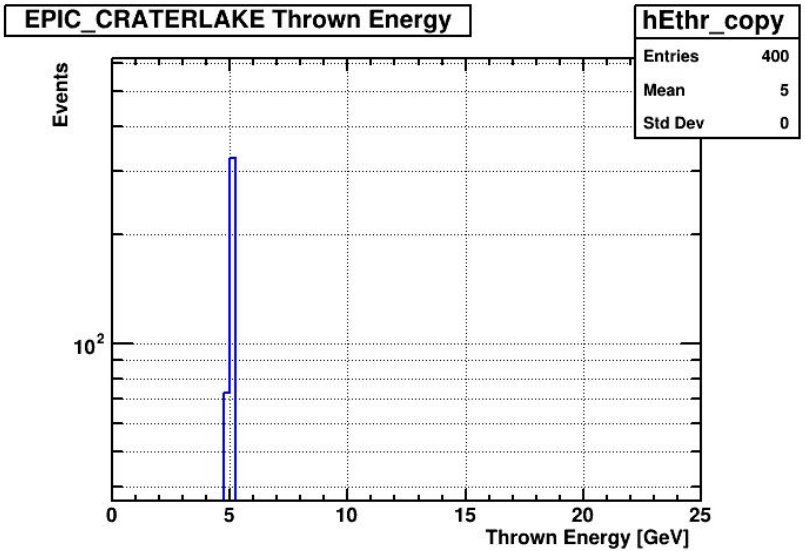
May 14 -17,2024

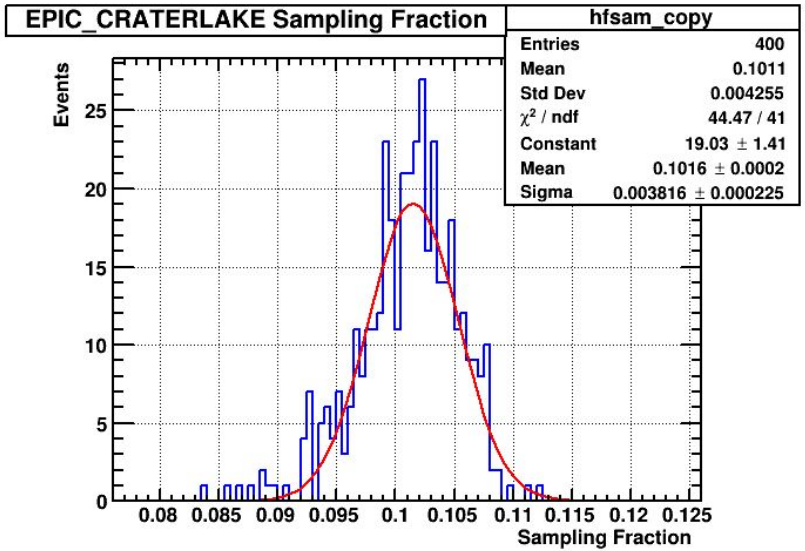
BIC Reconstruction Studies

Akshaya Vijay
Advisor: Dr. Wouter Deconinck

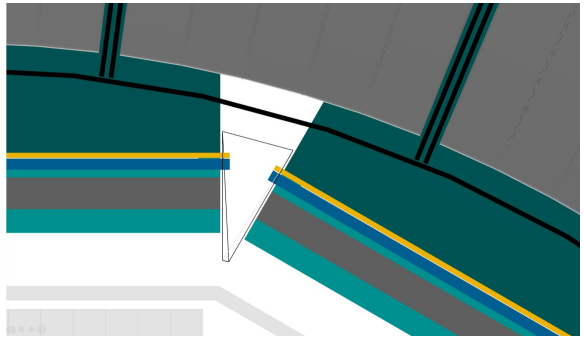
Sampling Fraction of ePIC-Craterlake

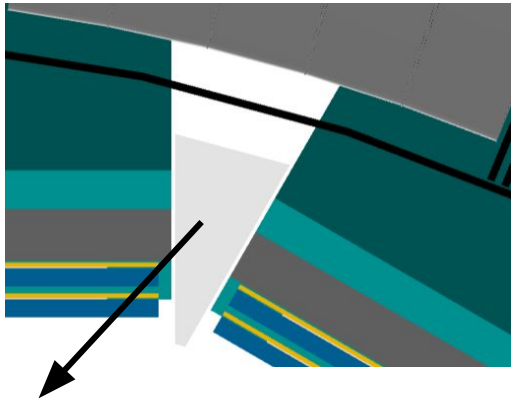
✔Performed simulations to calculate the Sampling fraction.



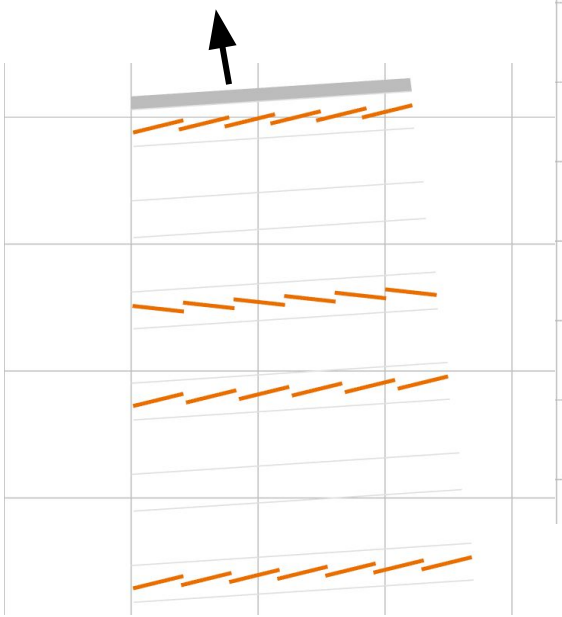


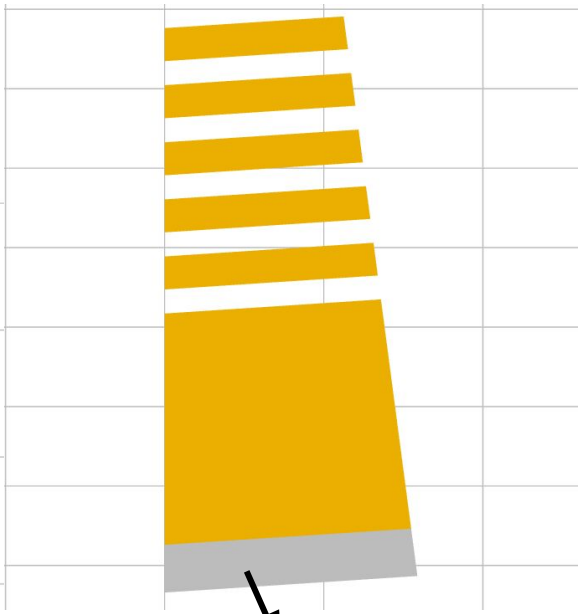
Geometry Updates





Front Support Thickness 0.5*cm





Back Support Thickness =3cm

DIRC_thickness = 3.1*cm
Position of the rail, x=20mm ; y =0 ; z =0

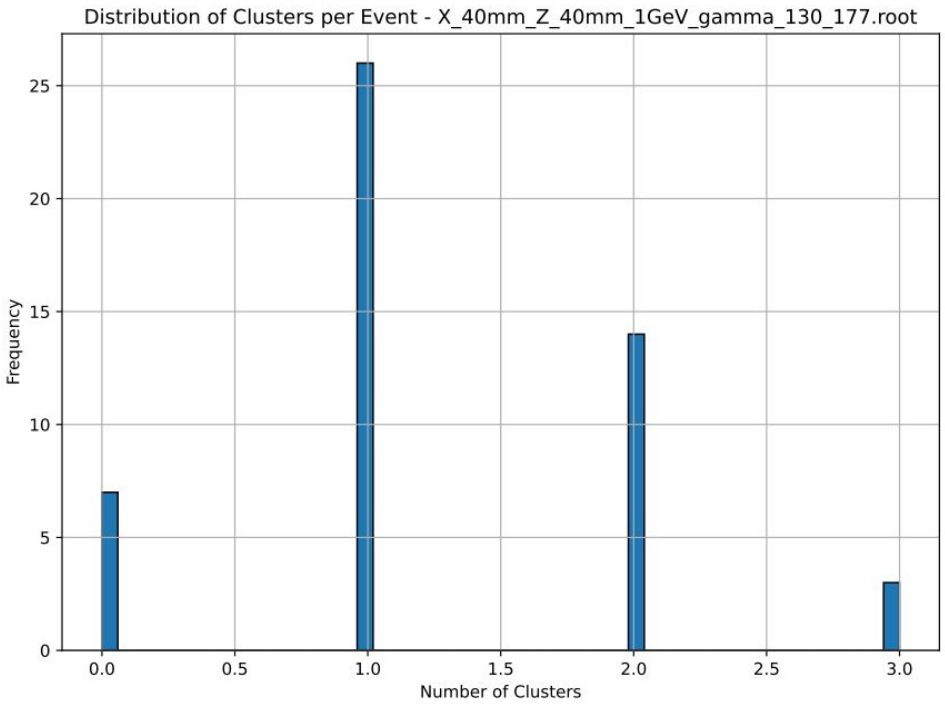
Excessive cluster splitting at high pseudorapidity in EcalBarrelScFi

Simulation info:

```
SIM.gun.etaMin = -2
SIM.gun.etaMax = -0.8
SIM.gun.distribution = "cos(theta)"
SIM.gun.energy = 1*GeV
SIM.gun.particle = "gamma"
SIM.gun.phiMin = 130*deg
SIM.gun.phiMax = 177*deg
```

Clustering Parameters:

```
.sectorDist = 50. * dd4hep::mm,
.localDistXZ = {40 * dd4hep::mm, 40 * dd4hep::mm},
.splitCluster = false,
.minClusterHitEdep = 5.0 * dd4hep::MeV,
.minClusterCenterEdep = 100.0 * dd4hep::MeV,
```



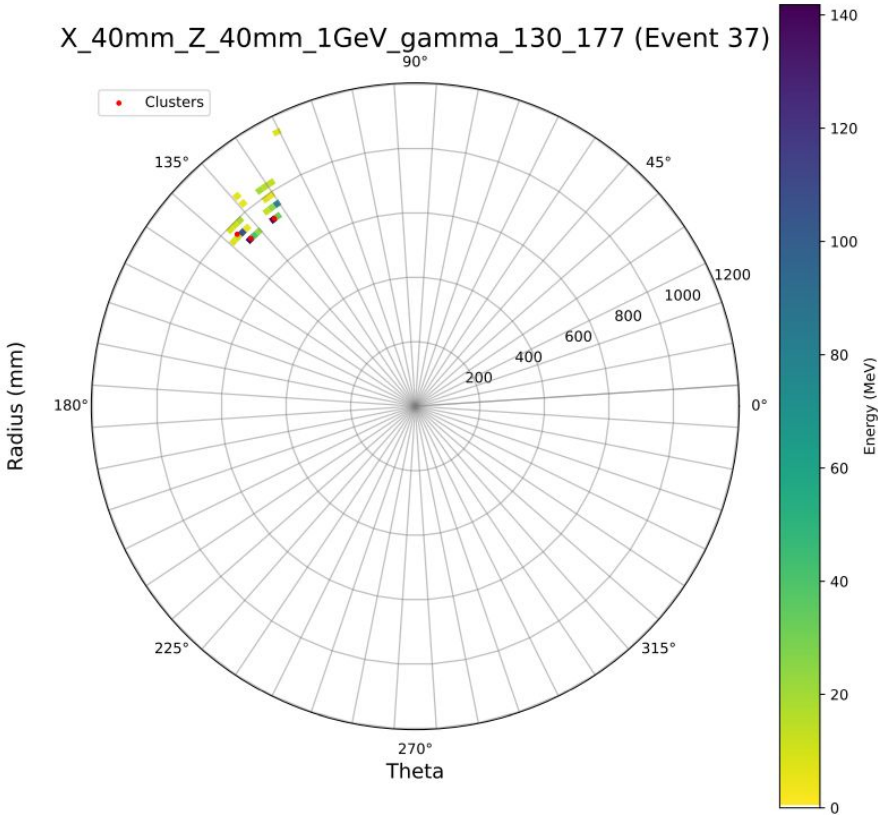
Excessive cluster splitting at high pseudorapidity in EcalBarrelScFi

Simulation info:

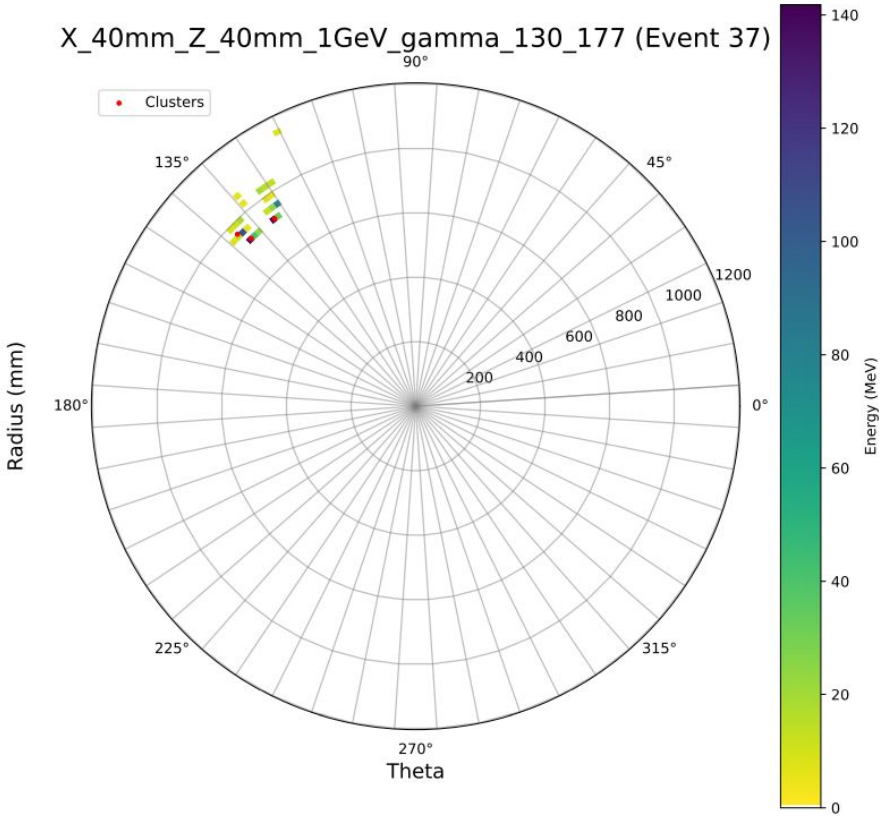
```
SIM.gun.etaMin = -2
SIM.gun.etaMax = -0.8
SIM.gun.distribution = "cos(theta)"
SIM.gun.energy = 1*GeV
SIM.gun.particle = "gamma"
SIM.gun.phiMin = 130*deg
SIM.gun.phiMax = 177*deg
```

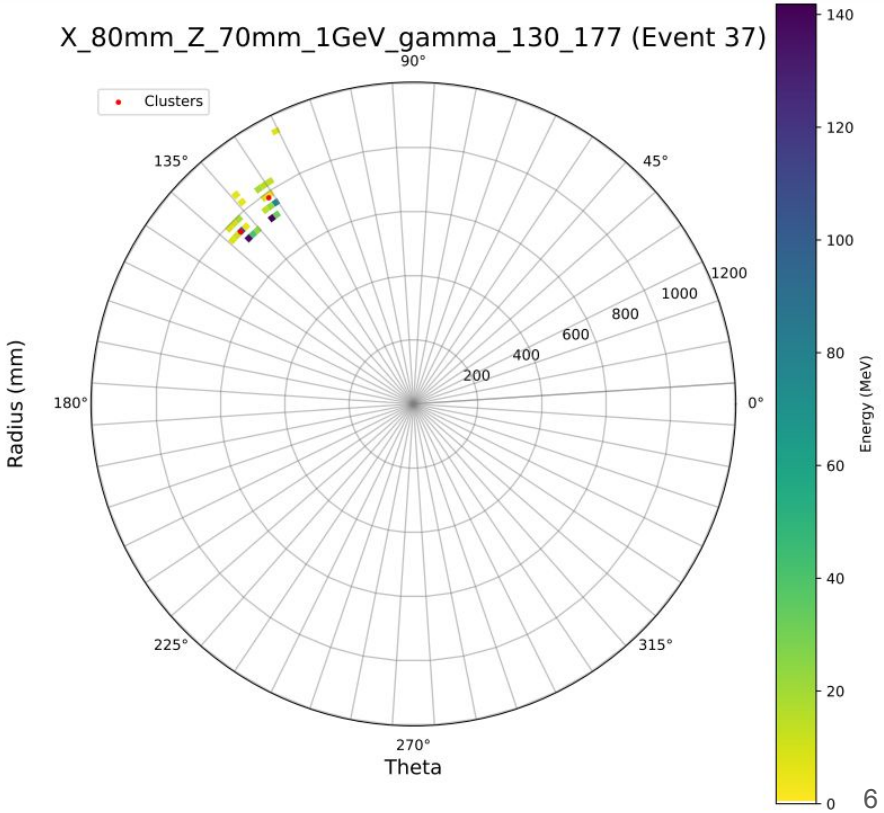
Clustering Parameters:

```
.sectorDist = 50. * dd4hep::mm,
.localDistXZ = {40 * dd4hep::mm, 40 * dd4hep::mm},
.splitCluster = false,
.minClusterHitEdep = 5.0 * dd4hep::MeV,
.minClusterCenterEdep = 100.0 * dd4hep::MeV,
```

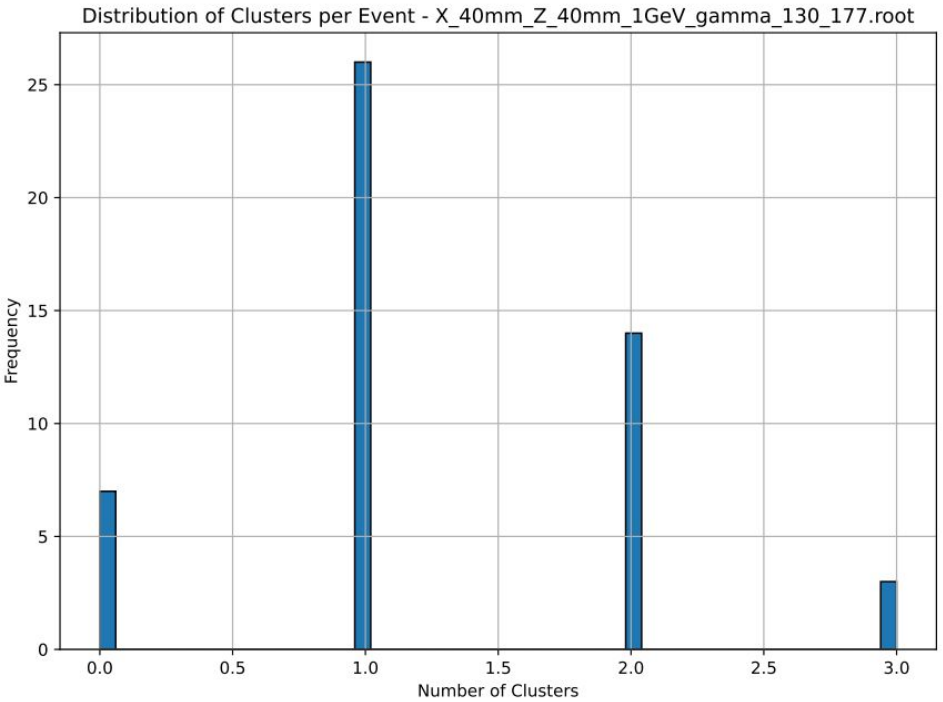


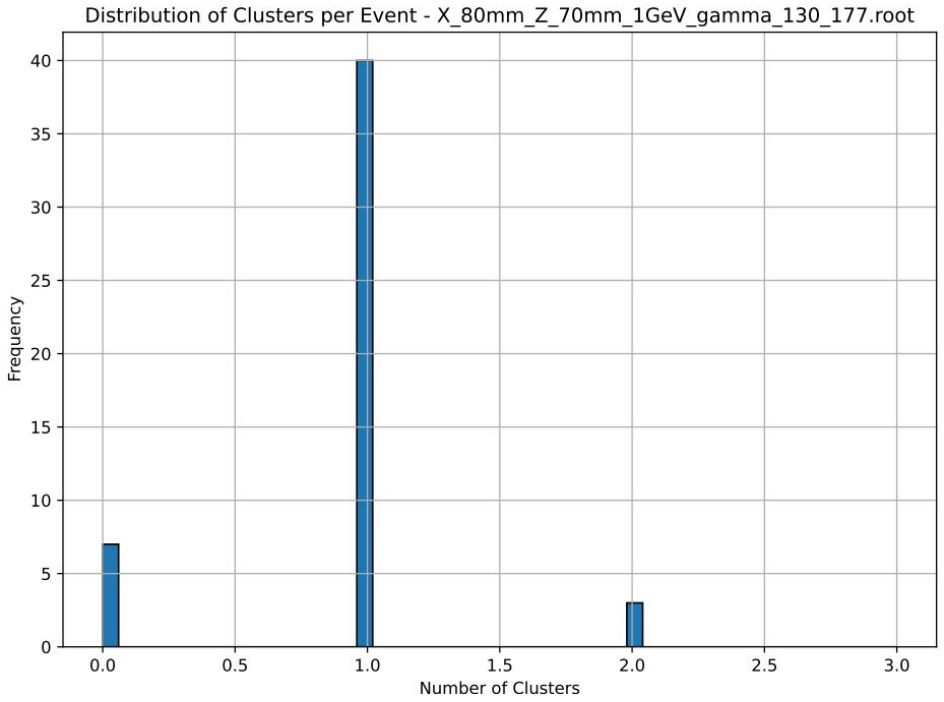
Checked for cluster splitting for a different value of localDistXZ parameter



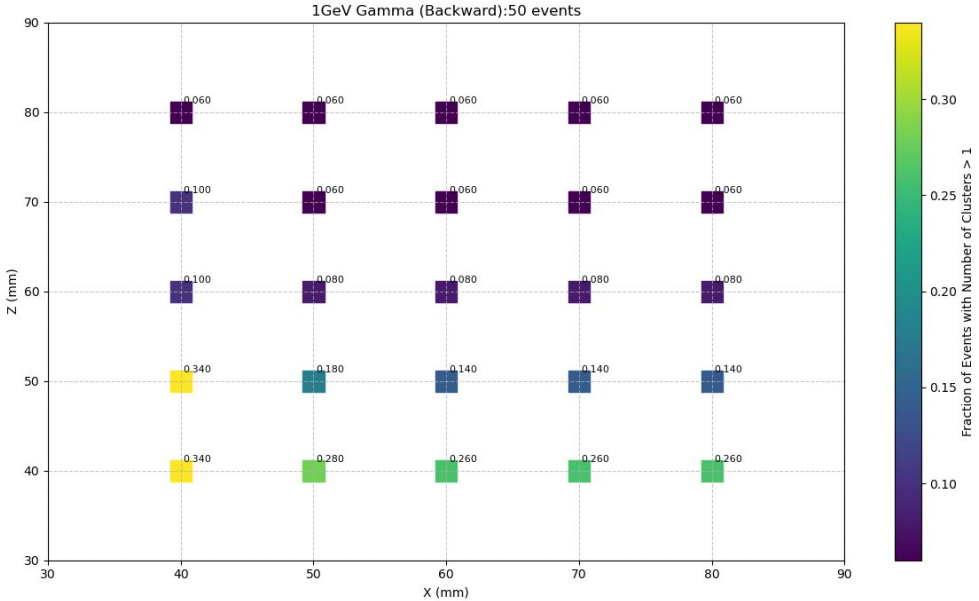


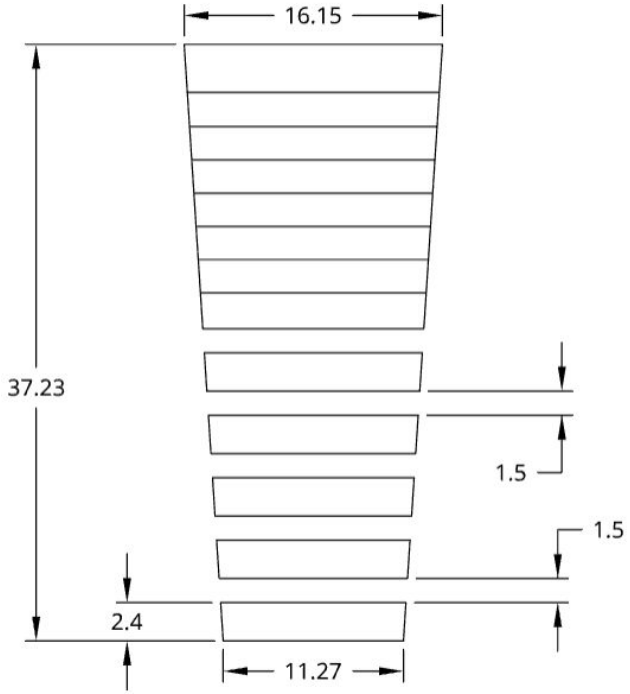
Cluster distribution per event before and after the parameter change



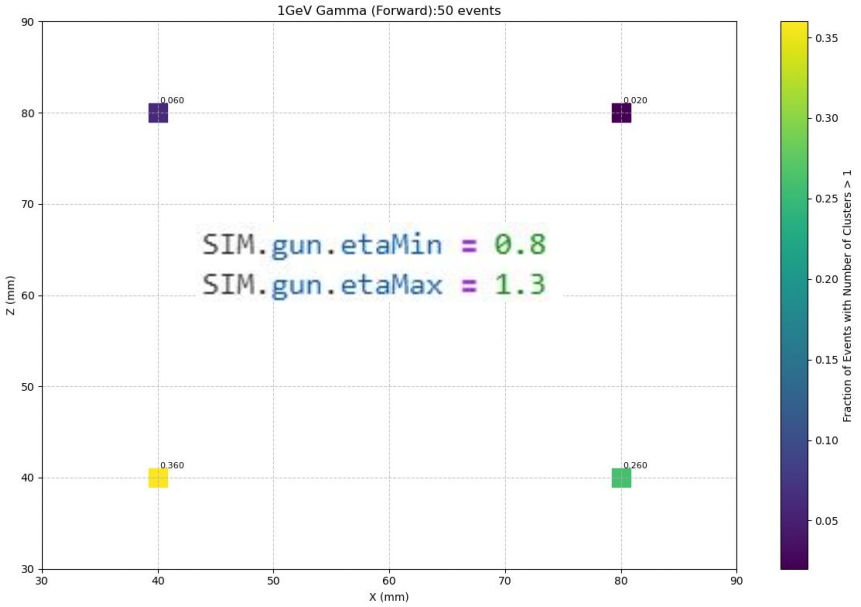


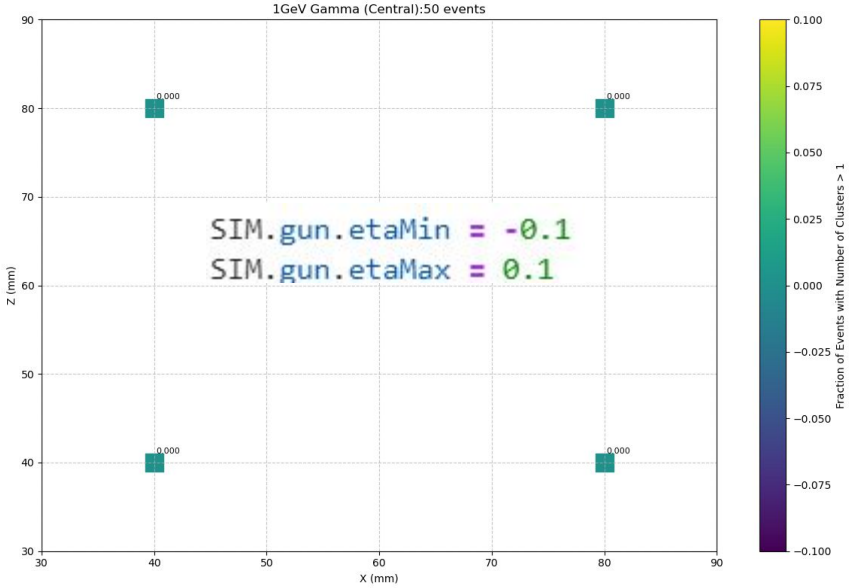
Checked for cluster splitting for different values of localDistXZ parameter for pseudorapidity at backward region





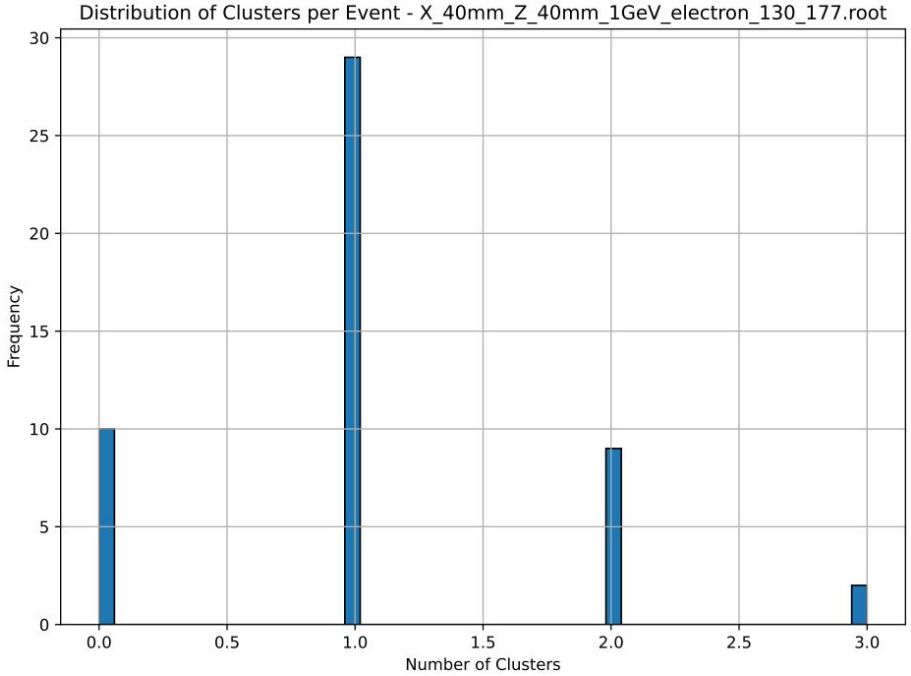
Checked for cluster splitting for different values of localDistXZ parameter for pseudorapidity at forward and central region

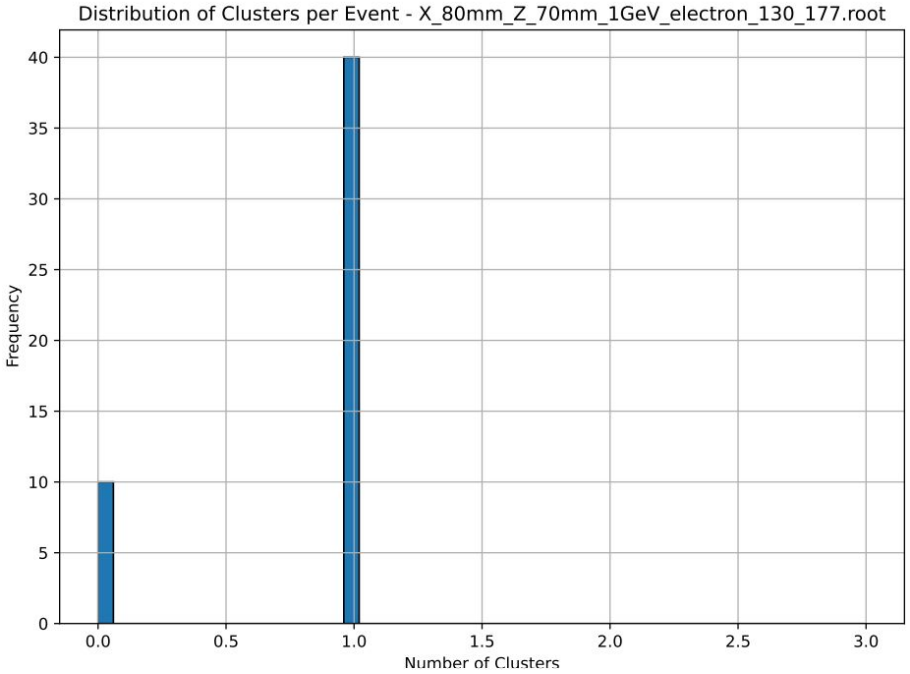




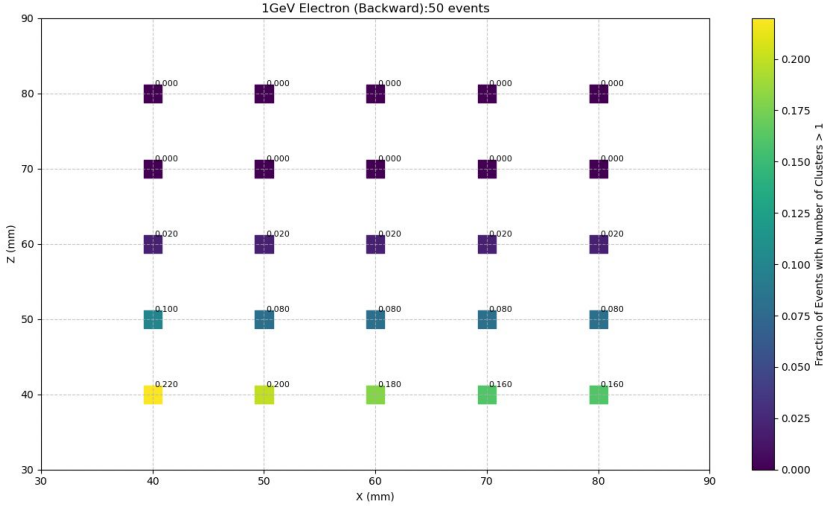
Repeated to 1GeV Electron

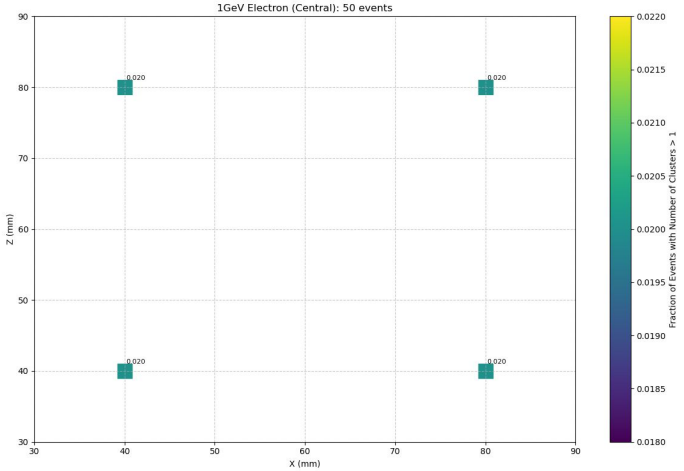
Cluster distribution per event before and after the parameter change

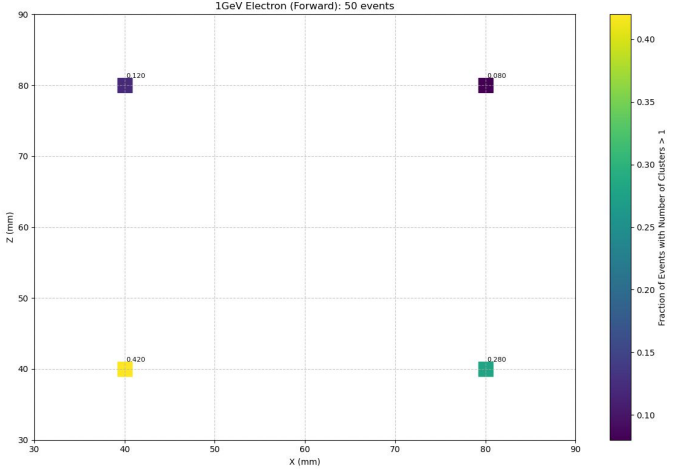




Checked for cluster splitting for different values of localDistXZ parameter for pseudorapidity at forward and central region for 1GeV Electron







Next Steps...

- Repeat the cluster splitting simulations for larger number of events (Completed the simulations for the pseudorapidity at the backward region and need to repeat for central and forward region)

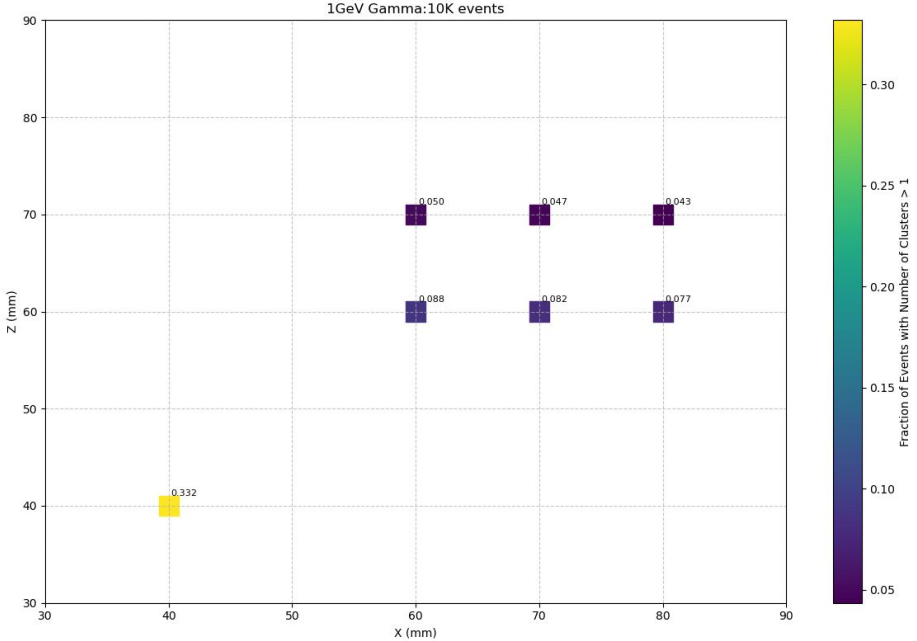
- Find the PID of the particle forming multiple clusters and include it in the event display.

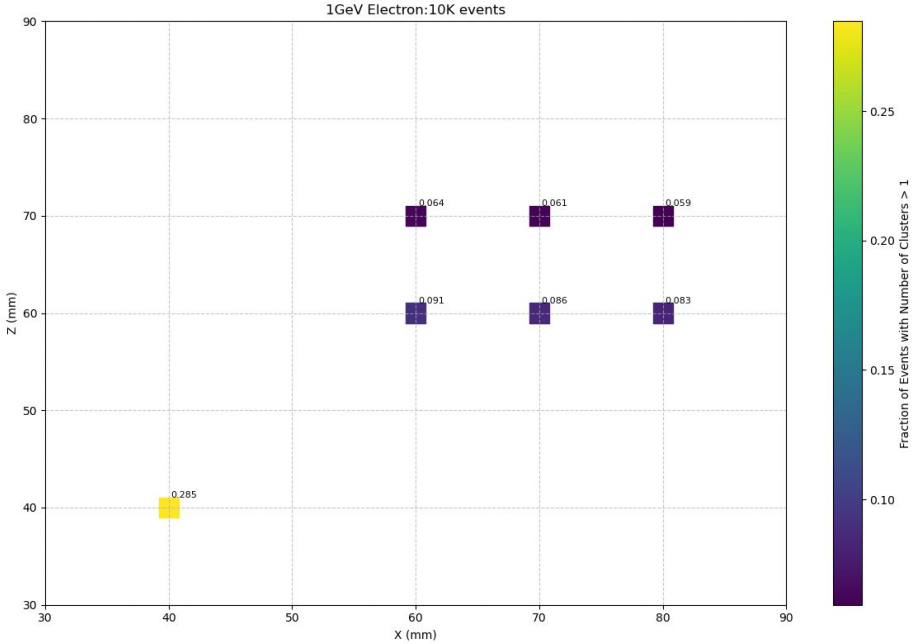
- Start to work towards the Pb/ScFi module model construction in summer at UofM

Thank you for Listening...

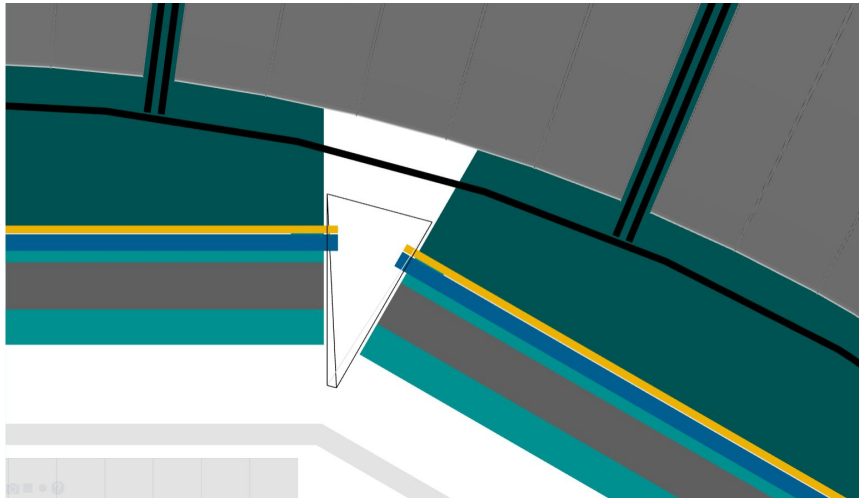
Back up

cluster splitting for different values of localDistXZ parameter for 10K events for pseudorapidity at backward region

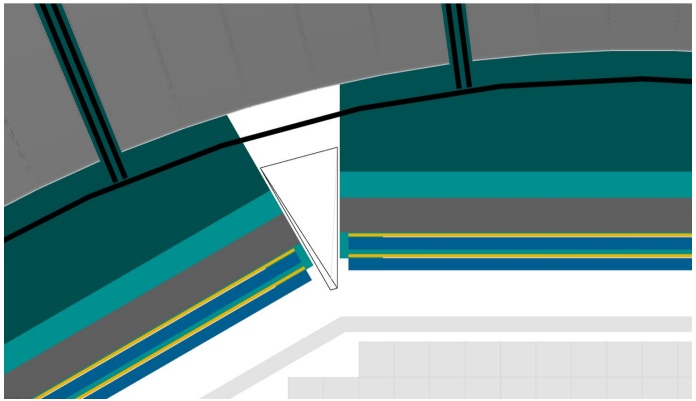
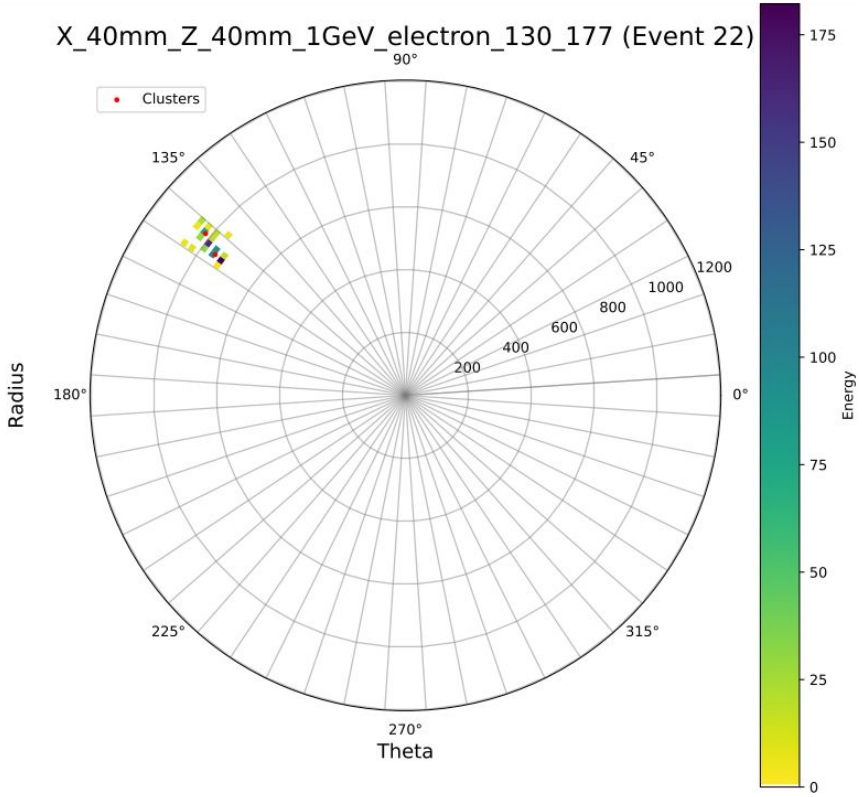
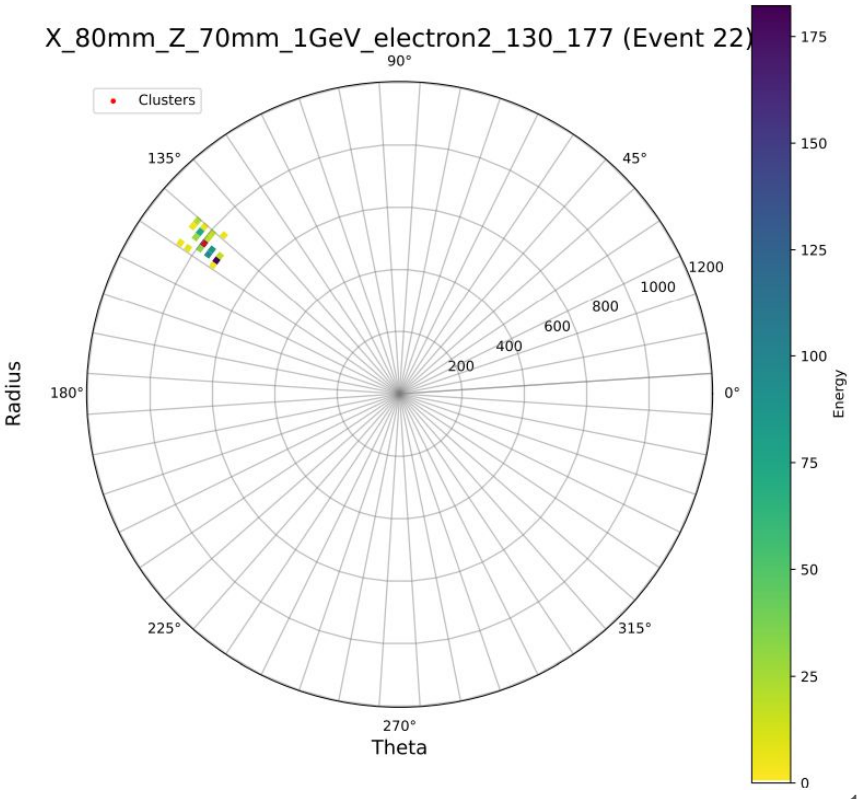




```
features:
  fields:
    marco:
  pid:
    dirc:
  tracking:
    definitions:
    mpgd_barrel:
    mpgd_dirc:
  ecal:
    barrel_sciglass:
    backward_PbWO4:
```



```
features:
  fields:
    marco:
  pid:
    dirc:
  tracking:
    definitions_craterlake:
    mpgd_outerbarrel:
    mpgd_barrel:
  ecal:
    barrel_sciglass:
    backward_PbWO4:
```



Checked for cluster splitting for a different value of localDistXZ parameter for pseudorapidity at backward region (Electron)