

Studies of Number of Hits/Lever Arm

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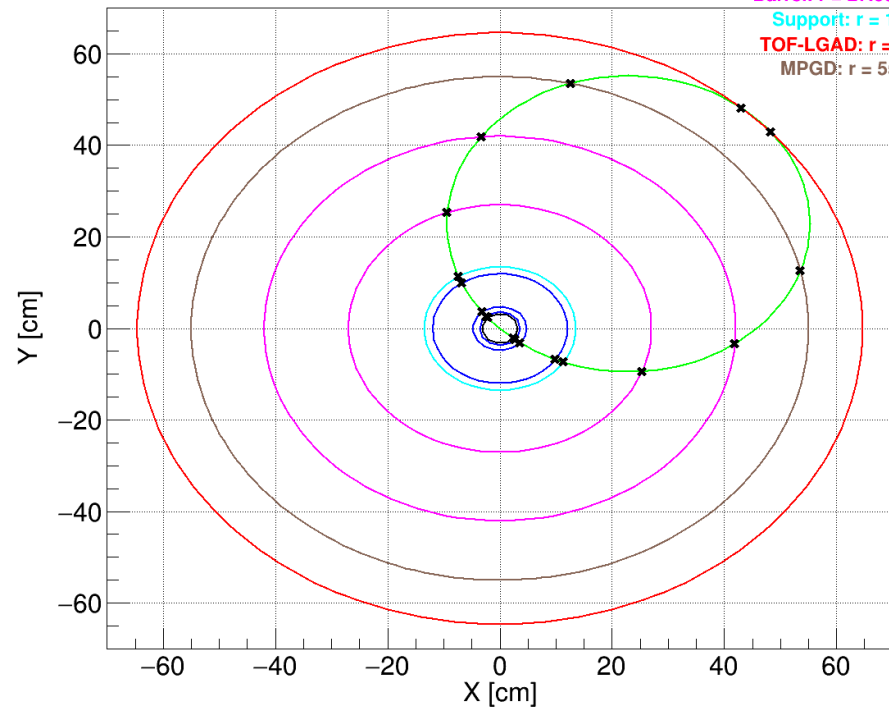
EPIC Configuration

epic_brycecanyon.xml with calorimeters and far forward detectors removed

Curling tracks

Track $p_T = 0.1650$ (GeV/c)

Beam Pipe: $r = 3.18$ cm
Vtx: $r = 3.60, 4.80, 12.00$ cm
Barrel: $r = 27.00, 42.00$ cm
Support: $r = 13.50$ cm
TOF-LGAD: $r = 64.60$ cm
MPGD: $r = 55.00$ cm

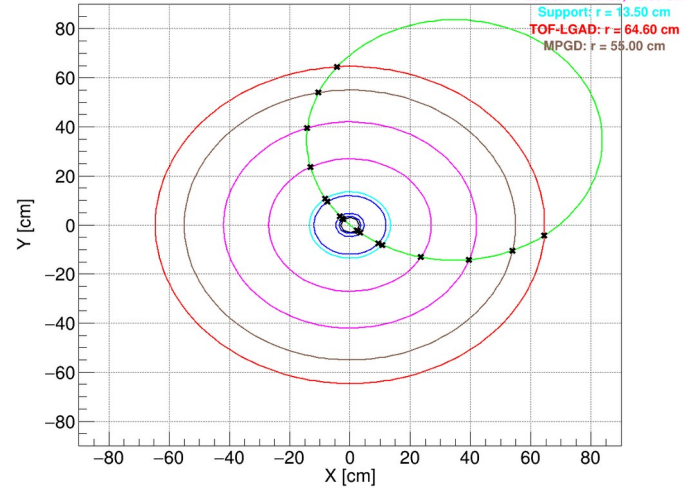


```
shyam@shyam:~/eic/epic$ git tag -l  
22.10.0  
22.10_rc1  
22.11.0
```

```
shyam@shyam:~/eic/epic$ git checkout 22.10.0  
shyam@shyam:~/eic/epic$ git pull origin main
```

Track $p_T = 0.2500$ (GeV/c)

Beam Pipe: $r = 3.18$ cm
Vtx: $r = 3.60, 4.80, 12.00$ cm
Barrel: $r = 27.00, 42.00$ cm
Support: $r = 13.50$ cm
TOF-LGAD: $r = 64.60$ cm
MPGD: $r = 55.00$ cm



<https://github.com/eic/epic/blob/main/compact/definitions.xml>

```
<constant name="Solenoid_rmin" value="1420.0*mm"/>
```

$$p_{T\min} = 0.3 \cdot 1.7 \cdot 1.42 / 2 = 0.3621 \text{ GeV/c}$$

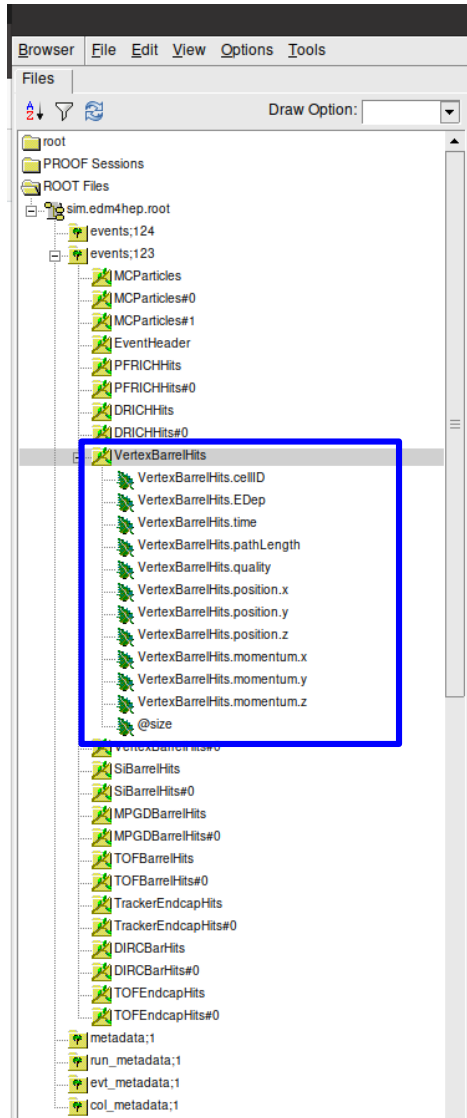
```
field_map="fieldmaps/MARCO_v.6.4.1.1.3_1.7T_Magnetic_Field_Map_2022_11_14_rad_coords_cm_T.txt"  
url="https://github.com/eic/epic-data/raw/64b7ca6306b138b7f000e696c82bd8f72db1da56MARCO_v.6.4.1.1.3_1.7T_Magnetic_Field_Map_2022_11_14_rad_coords_cm_T.txt"
```

Simulation Details

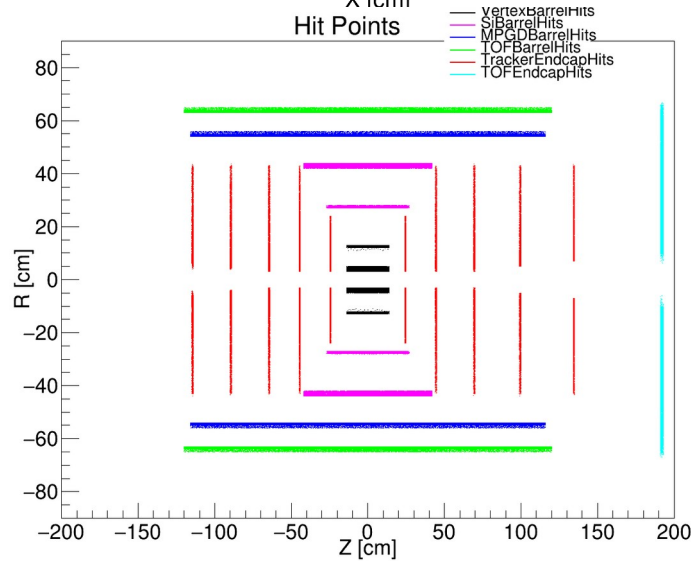
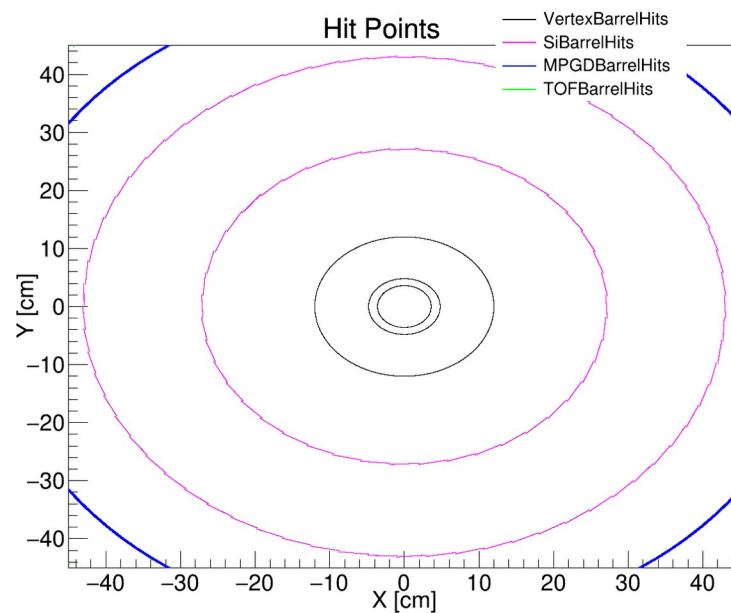
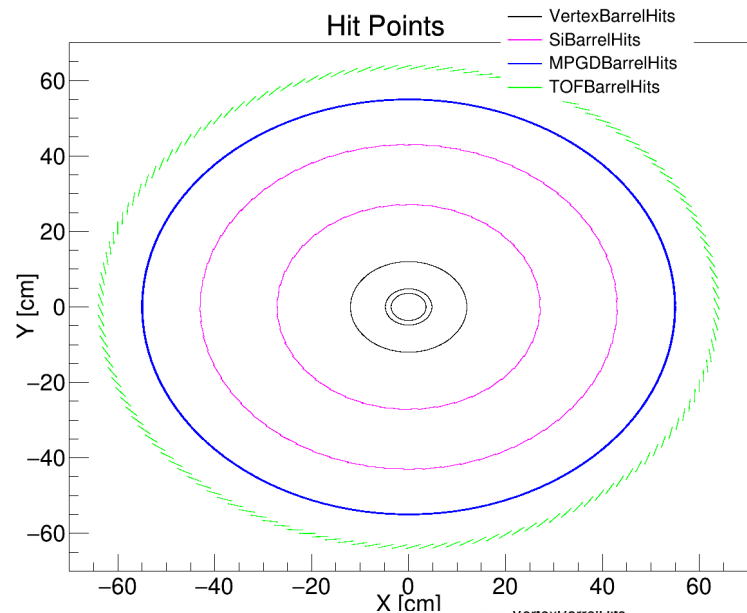
3M mu- in the momentum range [0.1,10.] GeV/c and η [-3.5,3.5]

No trackId of hits: Very hard to find hits belong to which track

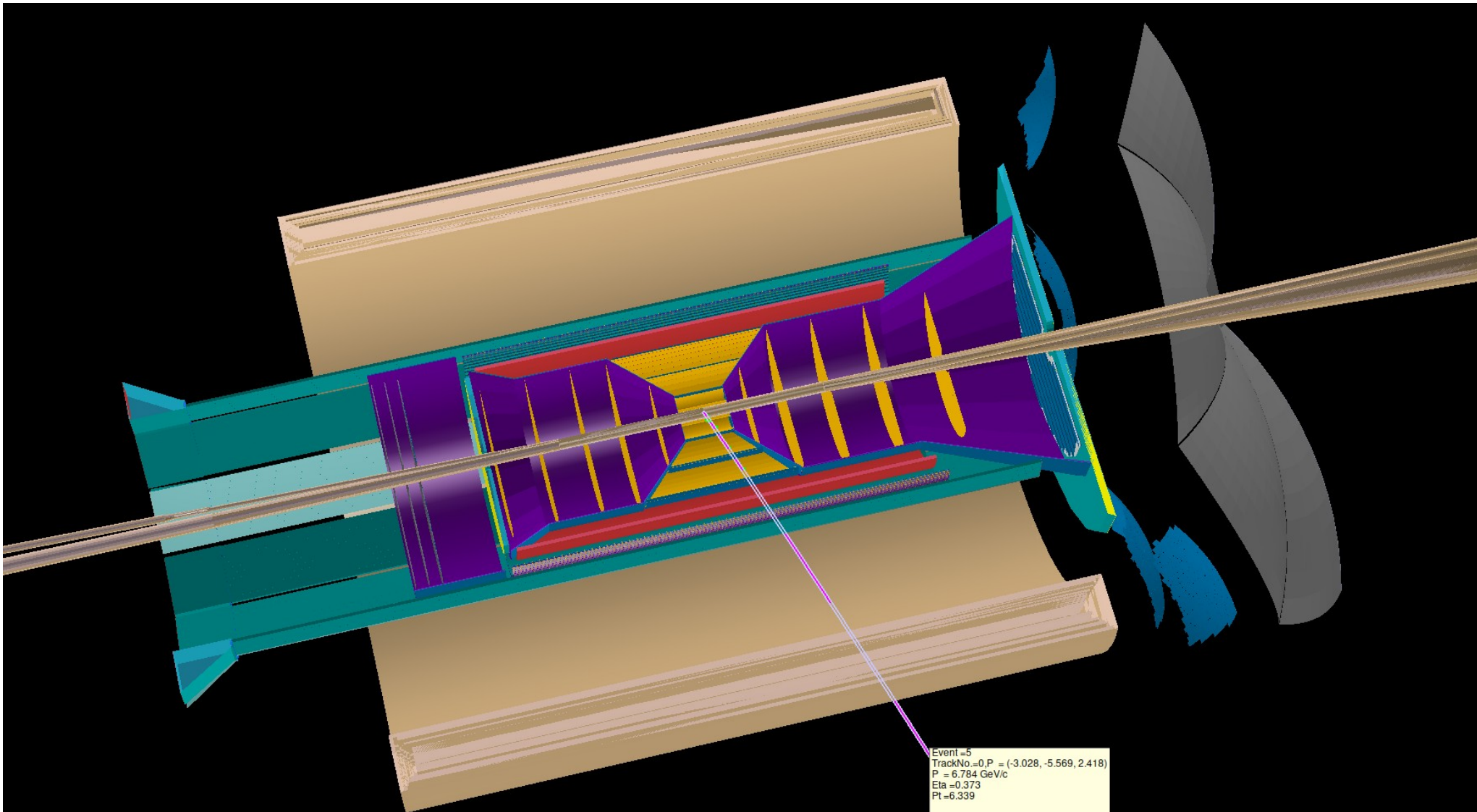
Generated many muons and selected events where we have only single particle: No Secondaries



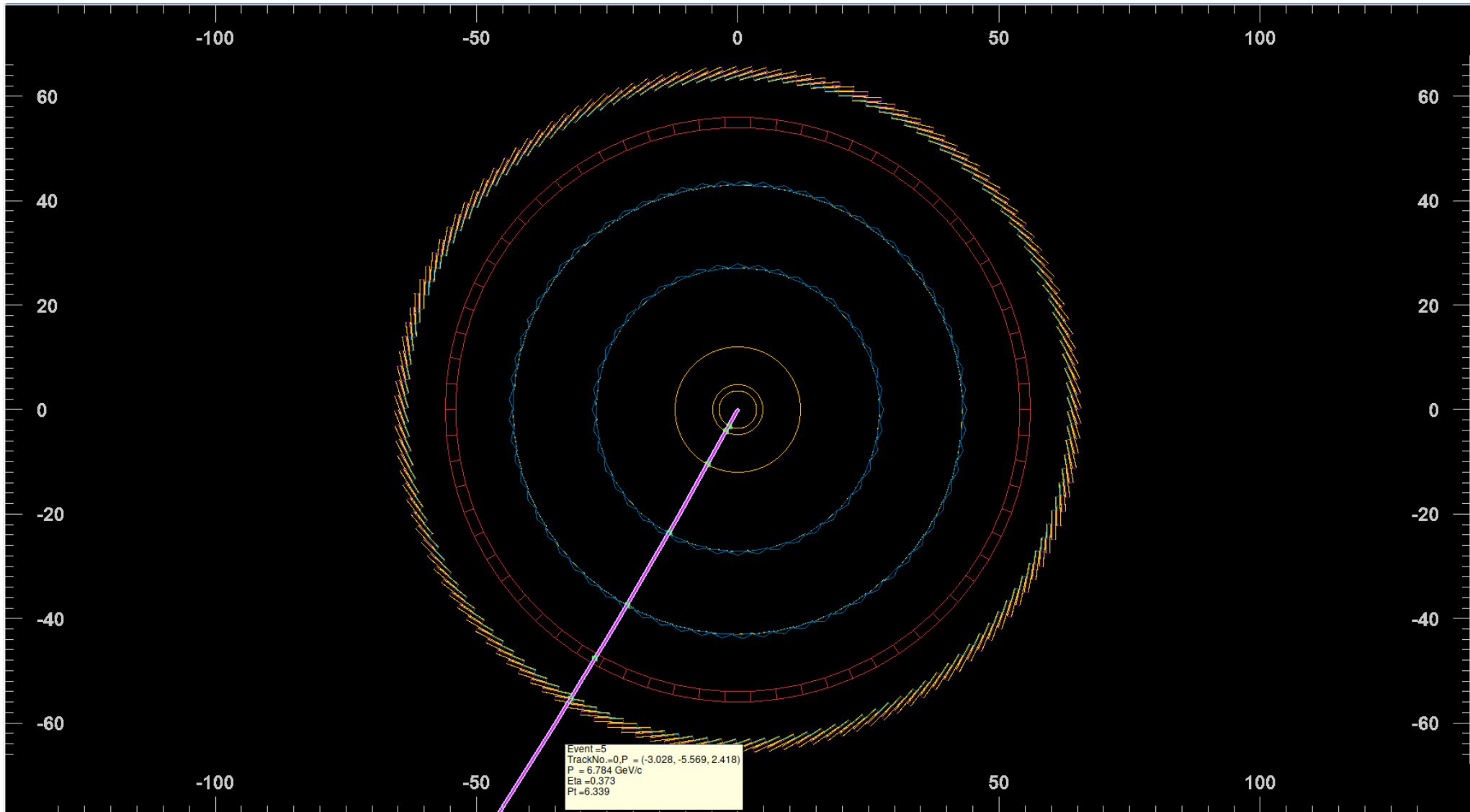
Hit Points



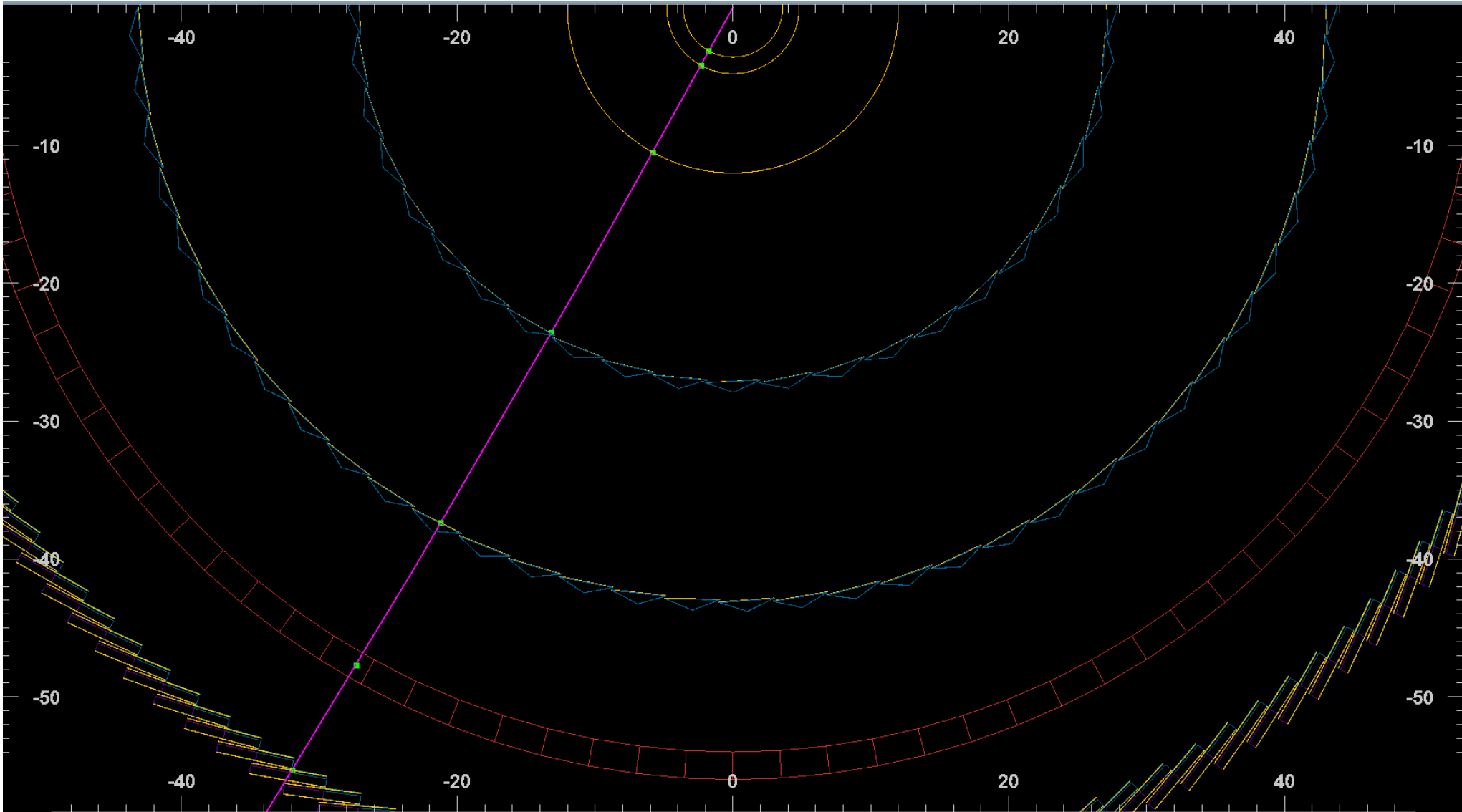
Event Display (Event 5)



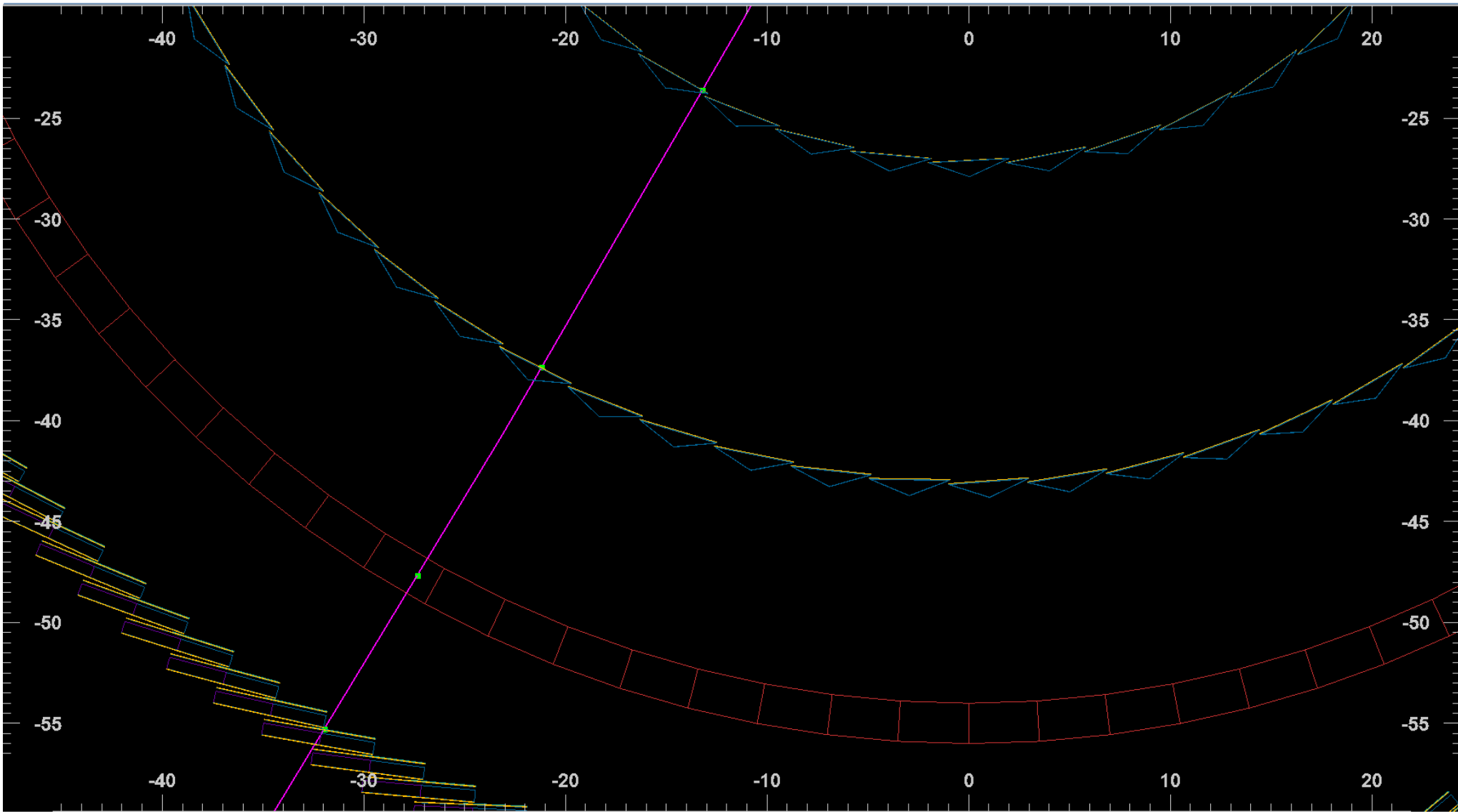
Event Display (Event 5)



Event Display (Event 5)

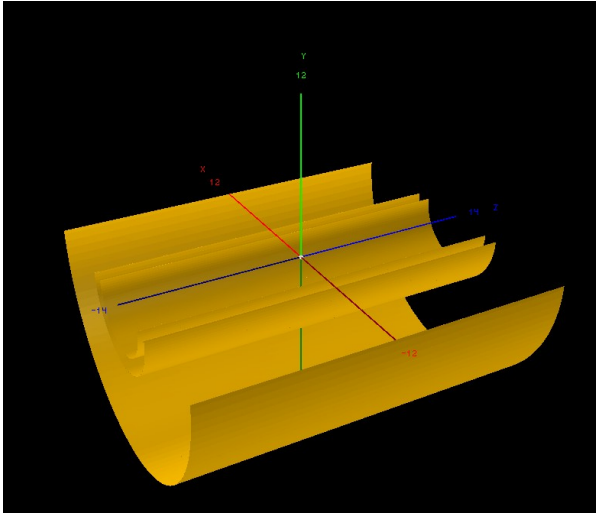


Event Display (Event 5)

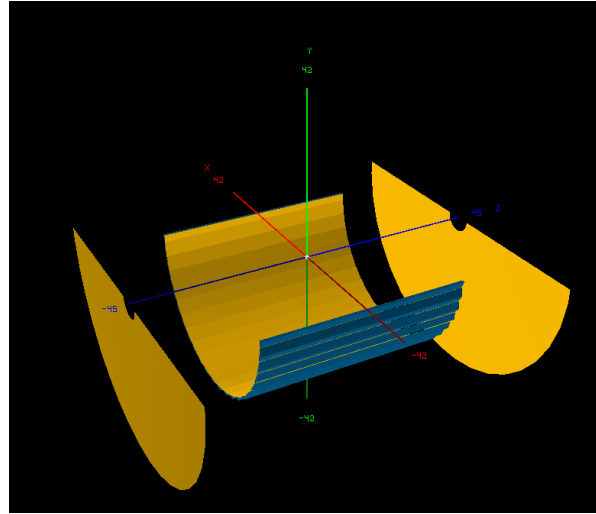


Material Map

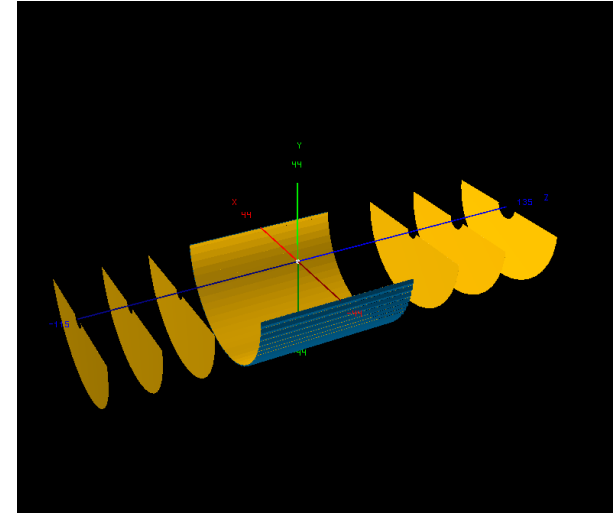
VertexBarrelSubAssembly



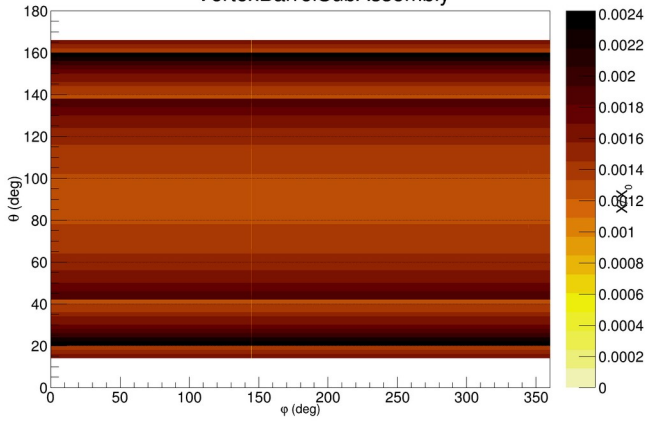
MiddleSiTrackerSubAssembly



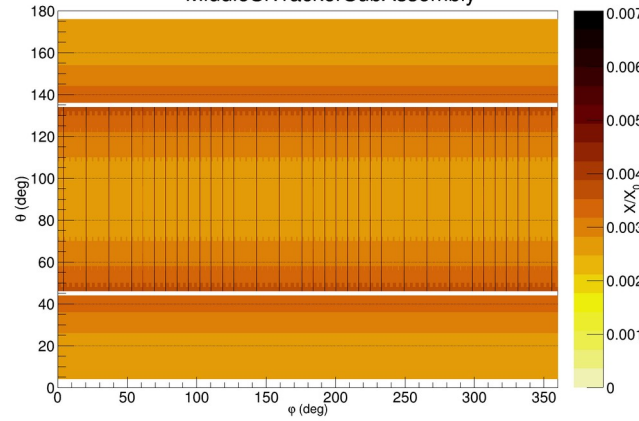
OuterSiTrackerSubAssembly



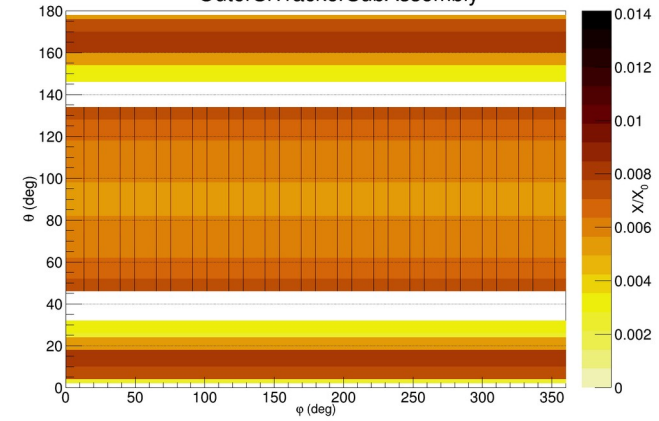
VertexBarrelSubAssembly



MiddleSiTrackerSubAssembly

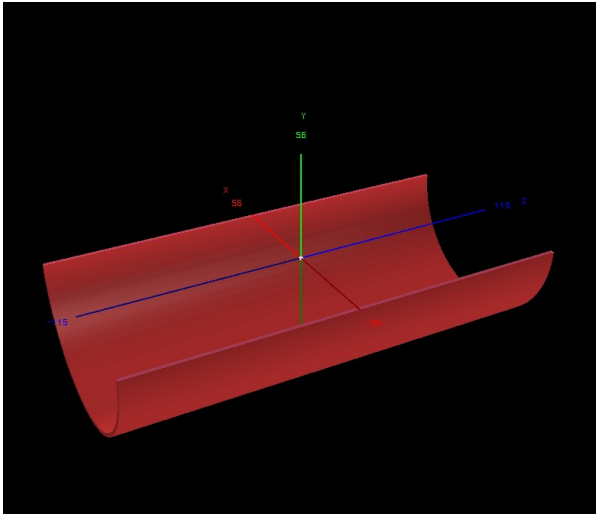


OuterSiTrackerSubAssembly

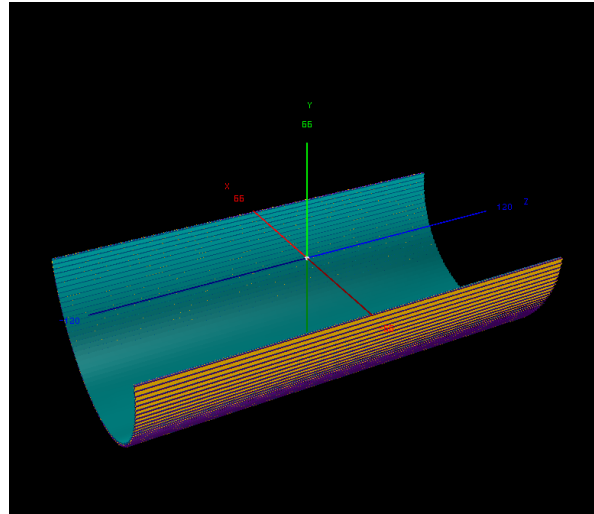


Material Map

InnerMPGDSubAssembly



BarrelTOFSubAssembly



Silicon Barrel Hits (Expected 2 hits)

Event No. 66741

Track Momentum: 1.41818
 Track Eta: 0.184973 Barrel Hit Size: 3
 Hit Momentum: 1.41786
 Hit Momentum: 1.41777
 Hit Momentum: 1.41767

Event No. 67700

Track Momentum: 1.0128
 Track Eta: 0.156054 Barrel Hit Size: 3
 Hit Momentum: 1.01248
 Hit Momentum: 1.01238
 Hit Momentum: 1.01206

Event No. 67710

Track Momentum: 1.51196
 Track Eta: -0.487785 Barrel Hit Size: 7
 Hit Momentum: 1.5116
 Hit Momentum: 1.51085
 Hit Momentum: 0.000590384
 Hit Momentum: 0.000567914
 Hit Momentum: 0.000534109
 Hit Momentum: 0.000406274
 Hit Momentum: 0.000277013

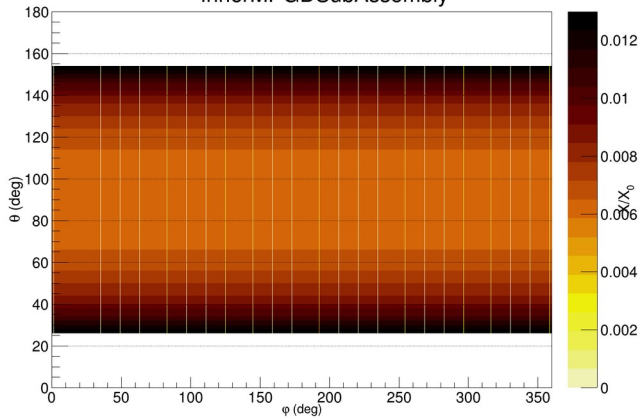
Event No. 67881

Track Momentum: 1.12075
 Track Eta: -0.641744 Barrel Hit Size: 4
 Hit Momentum: 1.12043
 Hit Momentum: 1.1203
 Hit Momentum: 0.000843017
 Hit Momentum: 0.000801152

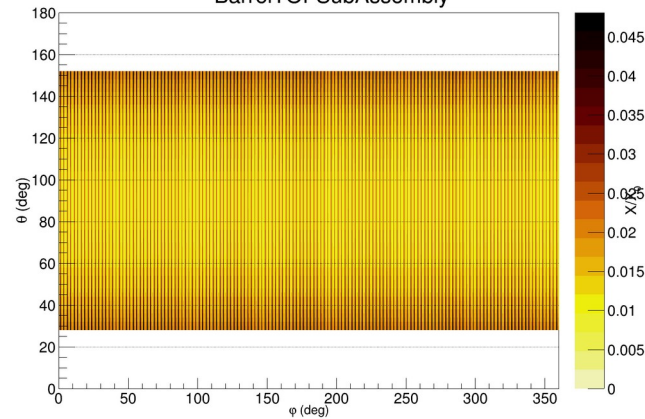
Event No. 69703

Track Momentum: 1.26078
 Track Eta: 0.226723 Barrel Hit Size: 3
 Hit Momentum: 1.26049
 Hit Momentum: 1.26027
 Hit Momentum: 0.000102186

InnerMPGDSubAssembly



BarrelTOFSubAssembly



Event Display (Event 394331)

Vertex Hits

```
*****  
* Event * Instance * Radius * Z * Momentum  
*****  
* 394331 * 0 * 3.6004198 * 0.0907091 * 1.8608571 *  
* 394331 * 1 * 4.8006888 * 0.1210571 * 1.8608408 *  
* 394331 * 2 * 12.002956 * 0.3032004 * 1.8608143 *
```

Total 3

SiBarrel Hits

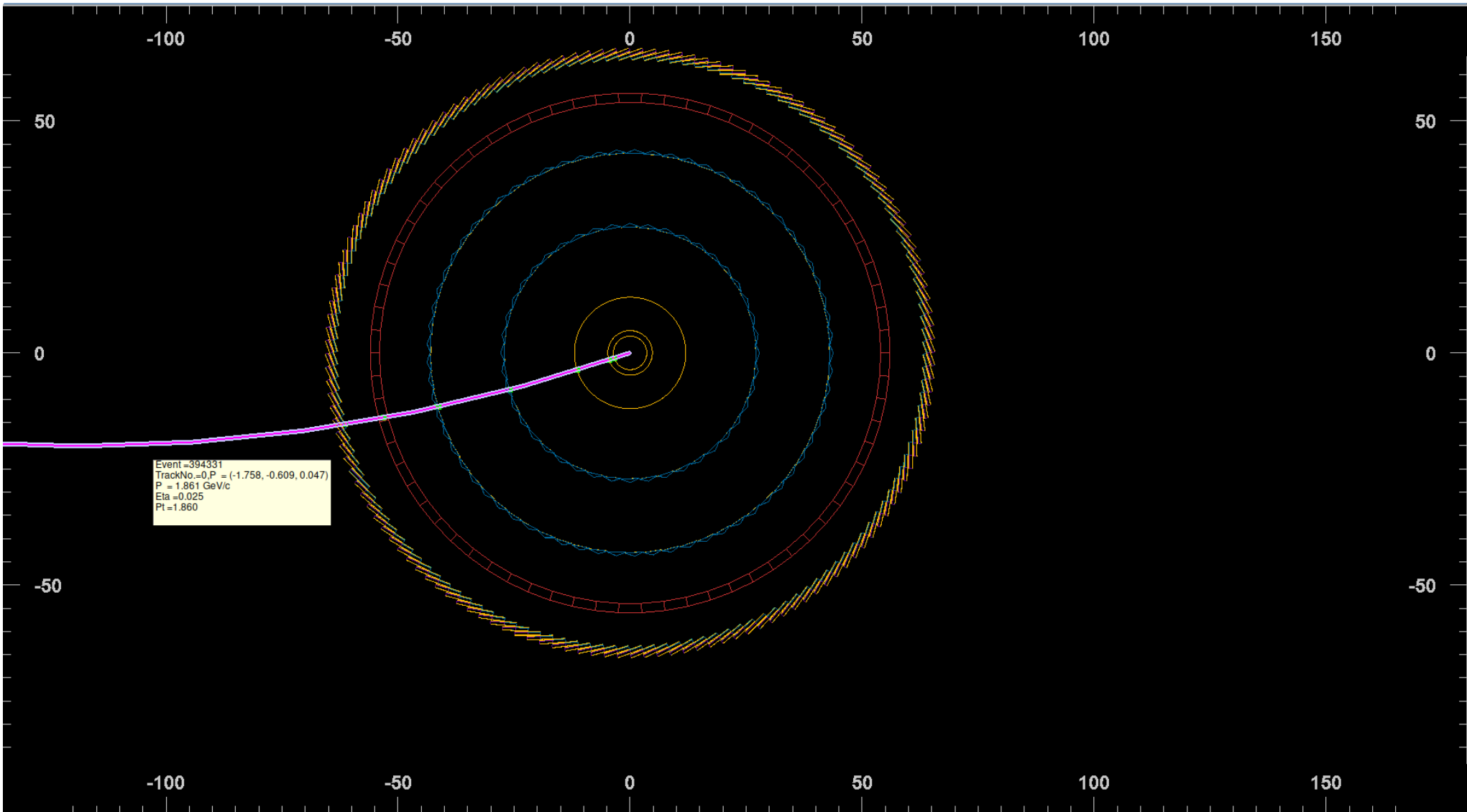
```
*****  
* Event * Instance * Radius * Z * Momentum  
*****  
* 394331 * 0 * 27.079196 * 0.6854094 * 1.8607567 *  
* 394331 * 1 * 42.923385 * 1.0866848 * 1.8606156 *  
* 394331 * 2 * 43.127448 * 1.0918183 * 1.8604056 *  
*****
```

Total 3

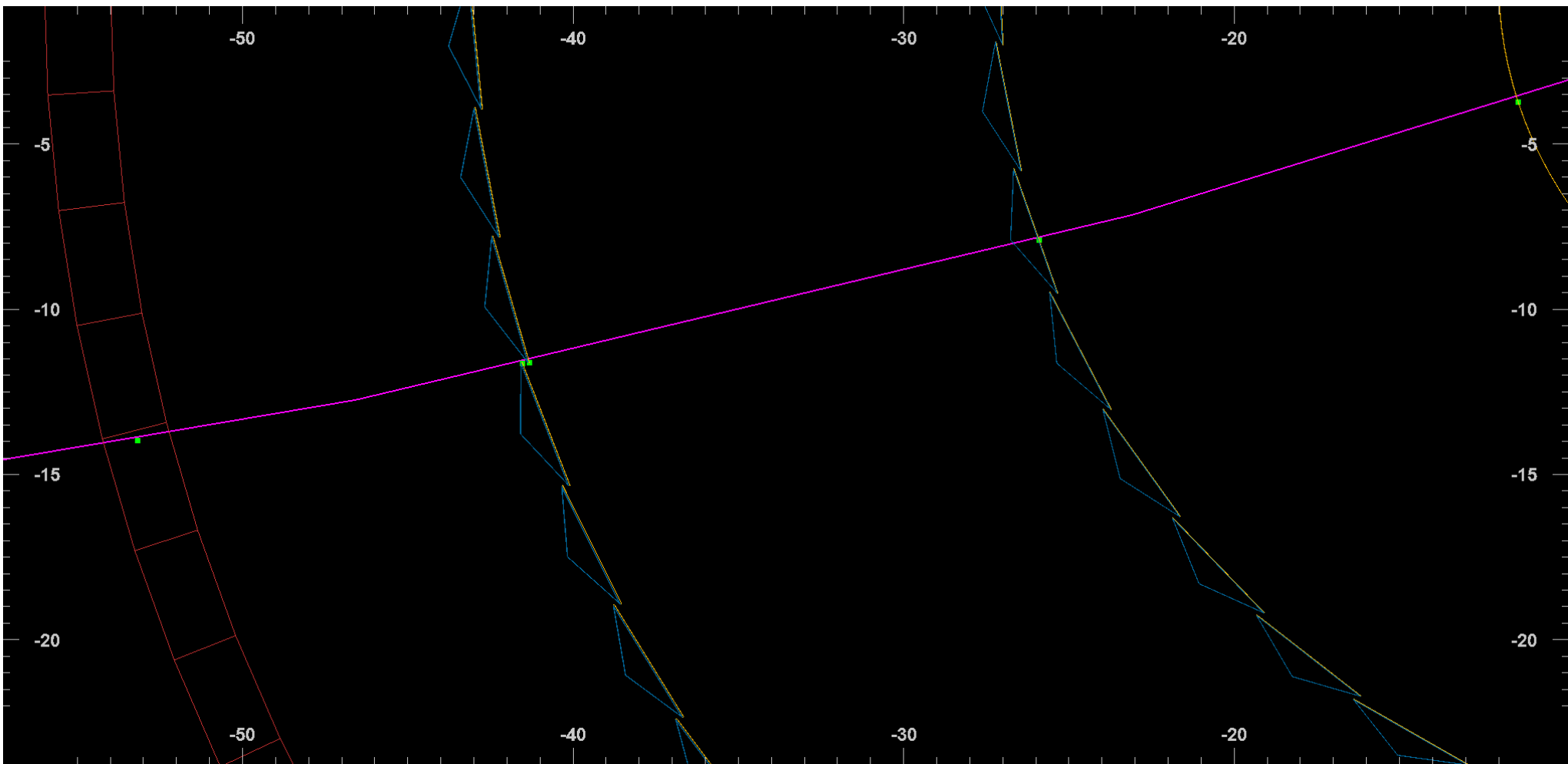
MCParticles

```
=====> EVENT:394331  
MCParticles = (vector<edm4hep::MCParticleData>*)0x563246a20580  
MCParticles.PDG = 13  
MCParticles.generatorStatus = 1  
MCParticles.simulatorStatus = 33554432  
MCParticles.charge = -1.000000  
MCParticles.time = 0.000000  
MCParticles.mass = 0.105658  
MCParticles.vertex.x = 0  
MCParticles.vertex.y = 0  
MCParticles.vertex.z = 0  
MCParticles.endpoint.x = -30000  
MCParticles.endpoint.y = -1789.17  
MCParticles.endpoint.z = 509.863  
MCParticles.momentum.x = -1.758097  
MCParticles.momentum.y = -0.608656  
MCParticles.momentum.z = 0.046799
```

Event Display (Event 394331)



Event Display (Event 394331)



Silicon Barrel and MPGD

```

SiBarrelHits = (vector<edm4hep::SimTrackerHitData>*)0x559f167eab90
SiBarrelHits.cellID = 18107191041705664827, 17907767618434011452
SiBarrelHits.EDep = 0.000016, 0.000022
SiBarrelHits.time = 1.109258, 1.760665
SiBarrelHits.pathLength = 0.049153, 0.049244
SiBarrelHits.quality = 0, 0
SiBarrelHits.position.x = 194.662, 313.107
SiBarrelHits.position.y = 187.899, 293.828
SiBarrelHits.position.z = 193.02, 306.378
SiBarrelHits.momentum.x = 2.091407, 2.144327
SiBarrelHits.momentum.y = 1.923854, 1.864486
SiBarrelHits.momentum.z = 2.027674, 2.027629
SiBarrelHits#0 = (vector<podio::ObjectID>*)0x559f16e9de80
SiBarrelHits#0.index = 0, 0
SiBarrelHits#0.collectionID = 1, 1
MPGDBarrelHits = (vector<edm4hep::SimTrackerHitData>*)0x559f16bfb9e0
MPGDBarrelHits.cellID = 18393686010551664957, 18393826748040020285
MPGDBarrelHits.EDep = 0.000000, 0.000002
MPGDBarrelHits.time = 2.260291, 2.253979
MPGDBarrelHits.pathLength = 3.422425, 0.809253
MPGDBarrelHits.quality = 0, 1073741824
MPGDBarrelHits.position.x = 404.866, 403.754
MPGDBarrelHits.position.y = 371.915, 370.909
MPGDBarrelHits.position.z = 392.371, 391.139
MPGDBarrelHits.momentum.x = 2.183349, -0.000005
MPGDBarrelHits.momentum.y = 1.818330, 0.000012
MPGDBarrelHits.momentum.z = 2.027305, -0.000070
MPGDBarrelHits#0 = (vector<podio::ObjectID>*)0x559f17058660
MPGDBarrelHits#0.index = 0, 0
MPGDBarrelHits#0.collectionID = 1, 1

```

TOF Hits

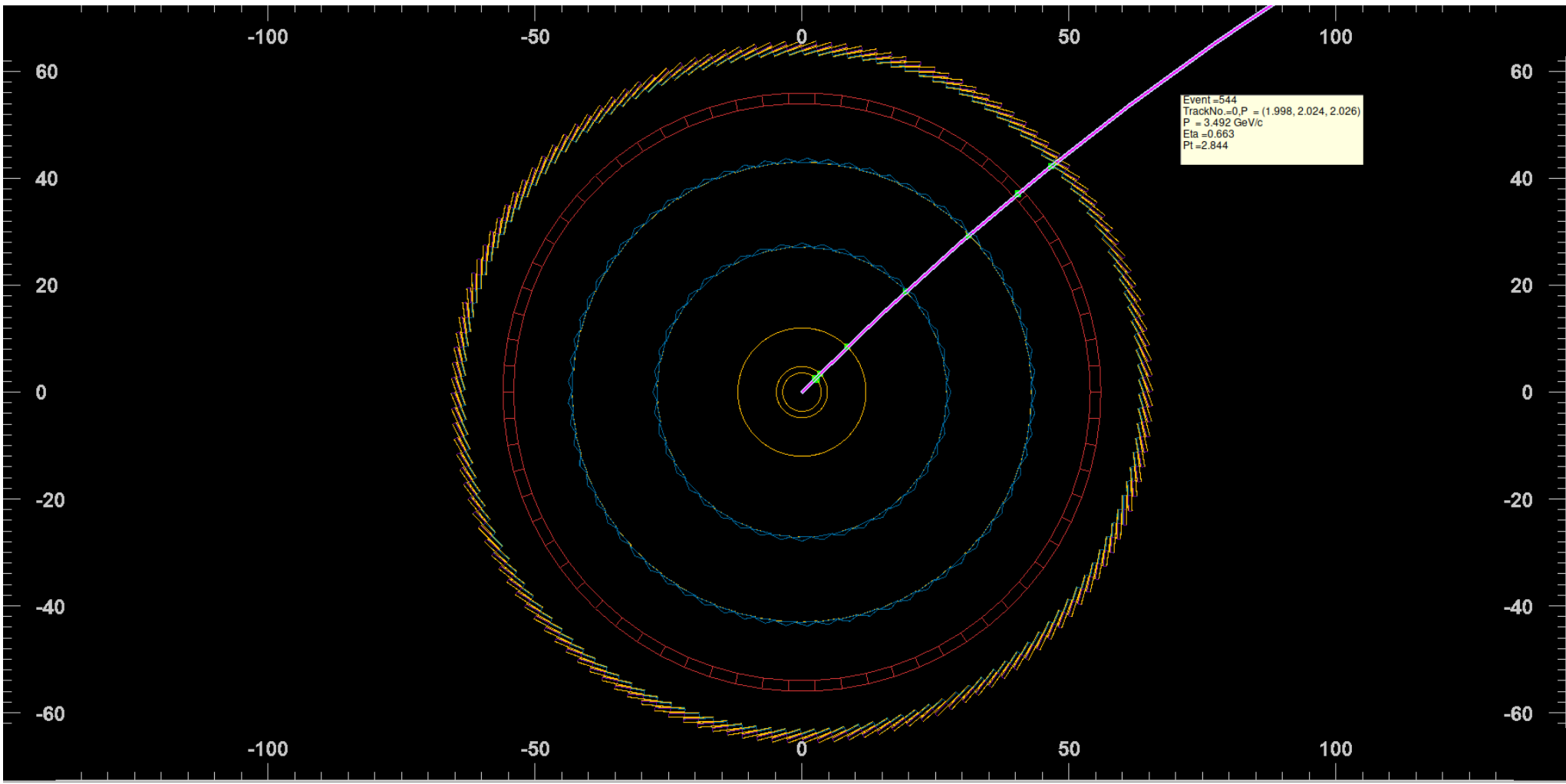
```

TOFBarrelHits = (vector<edm4hep::SimTrackerHitData>*)0x559f17355710
TOFBarrelHits.cellID = 18434358496146297180, 18433796830388101468
TOFBarrelHits.EDep = 0.000108, 0.000136
TOFBarrelHits.time = 2.586475, 2.626753
TOFBarrelHits.pathLength = 0.394866, 0.402995
TOFBarrelHits.quality = 0, 0
TOFBarrelHits.position.x = 467.323, 474.959
TOFBarrelHits.position.y = 423.16, 429.327
TOFBarrelHits.position.z = 450.032, 457.05
TOFBarrelHits.momentum.x = 2.208508, 2.209325
TOFBarrelHits.momentum.y = 1.786363, 1.782240
TOFBarrelHits.momentum.z = 2.027994, 2.029991
TOFBarrelHits#0 = (vector<podio::ObjectID>*)0x559f174342f0
TOFBarrelHits#0.index = 0, 0
TOFBarrelHits#0.collectionID = 1, 1

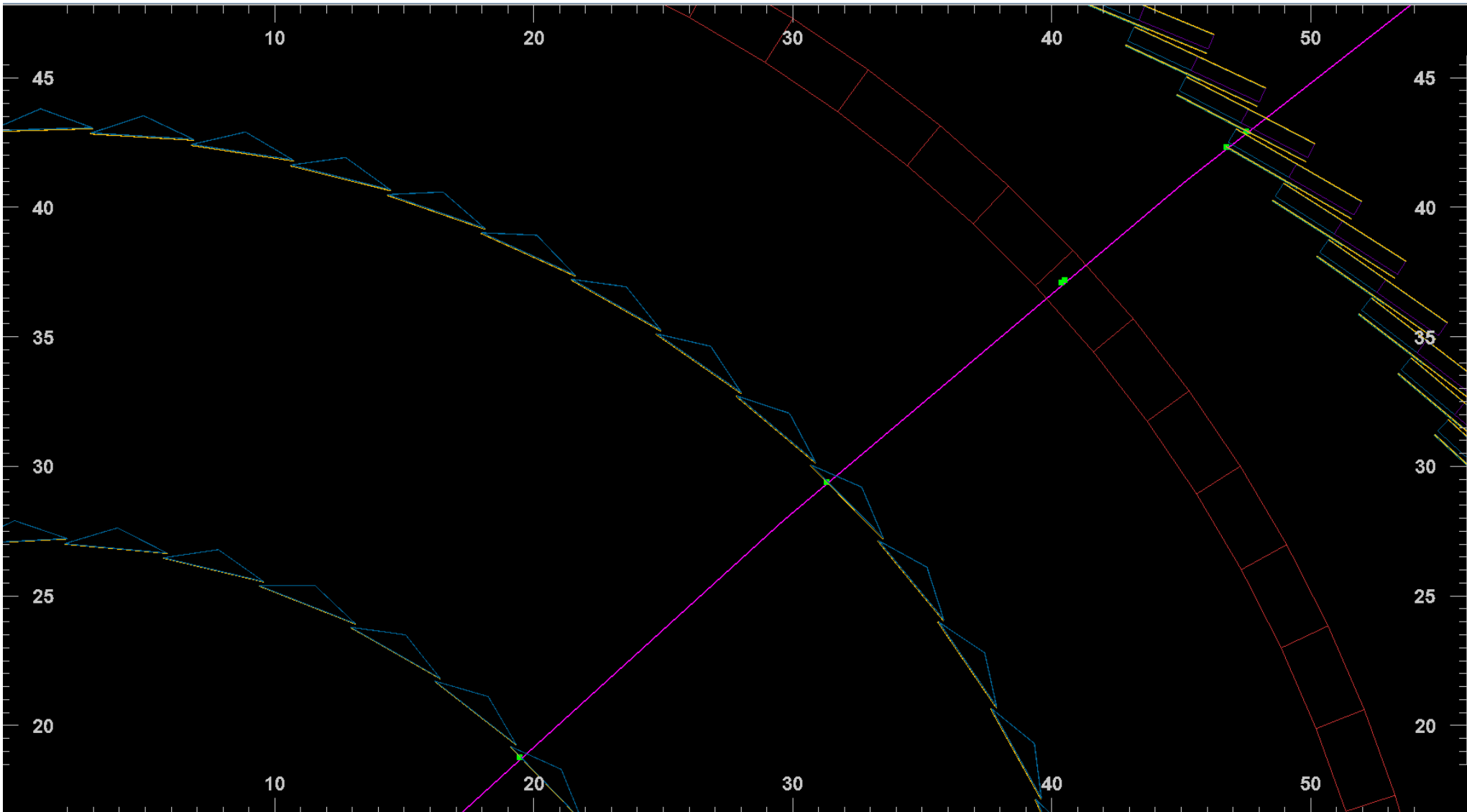
```

Event Number: 544
Vertex layer Hits: 22
Barrel layer Hits: 2
MM layer Hits: 2
BTOF layer Hits: 2

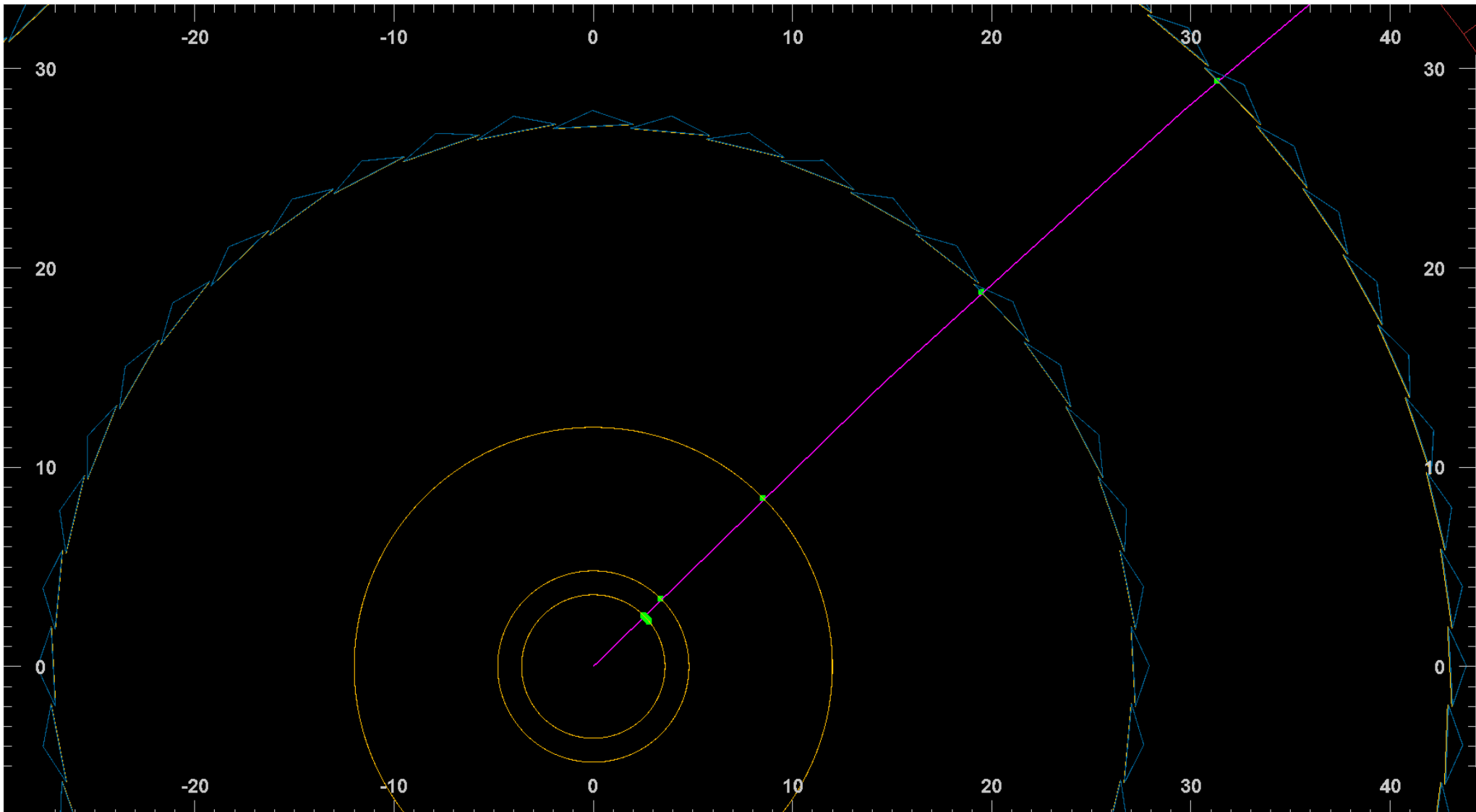
Event Display R-Phi View (Event 544)



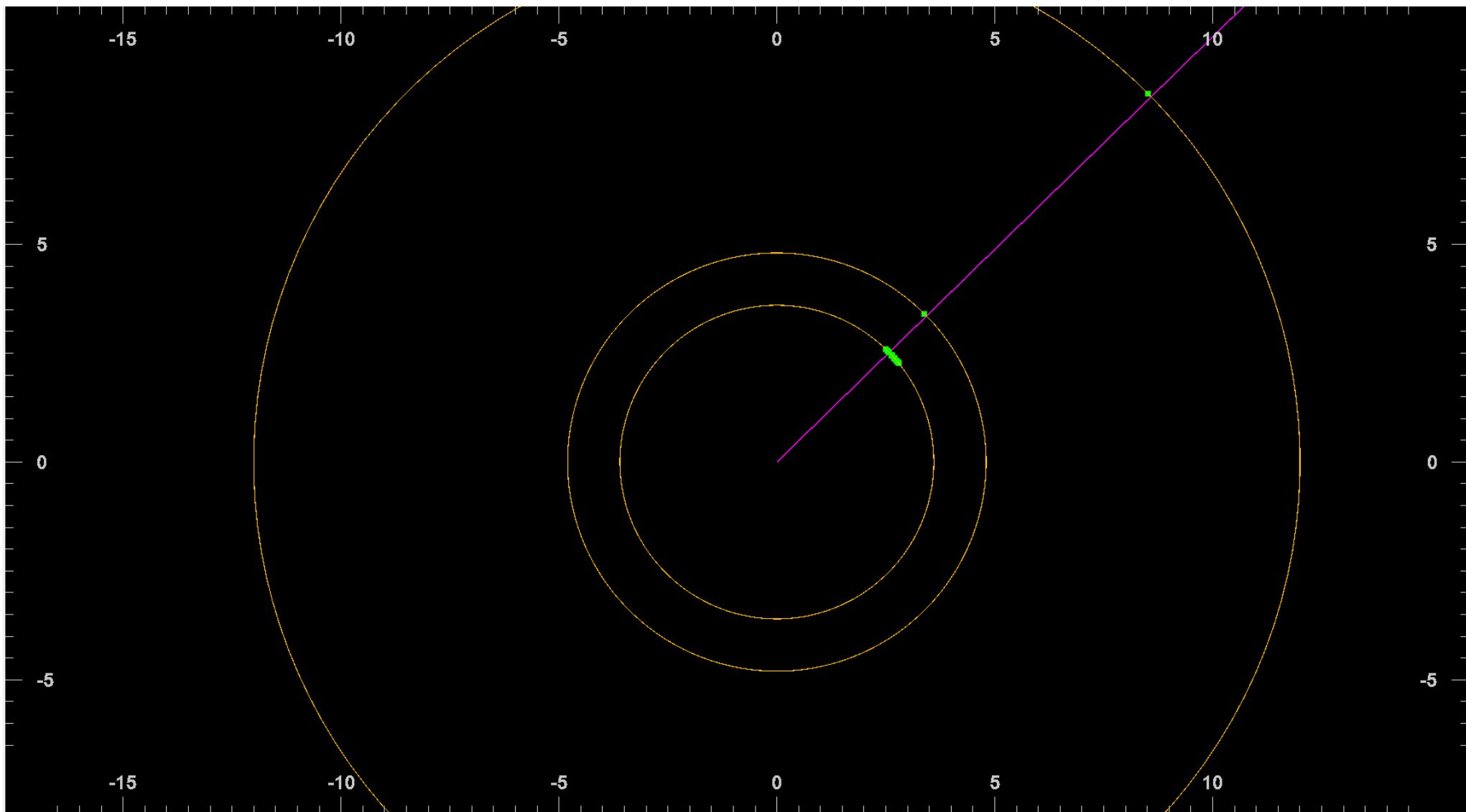
Event Display R-Phi View (Event 544)



Event Display R-Phi View (Event 544)



Event Display R-Phi View (Event 544)

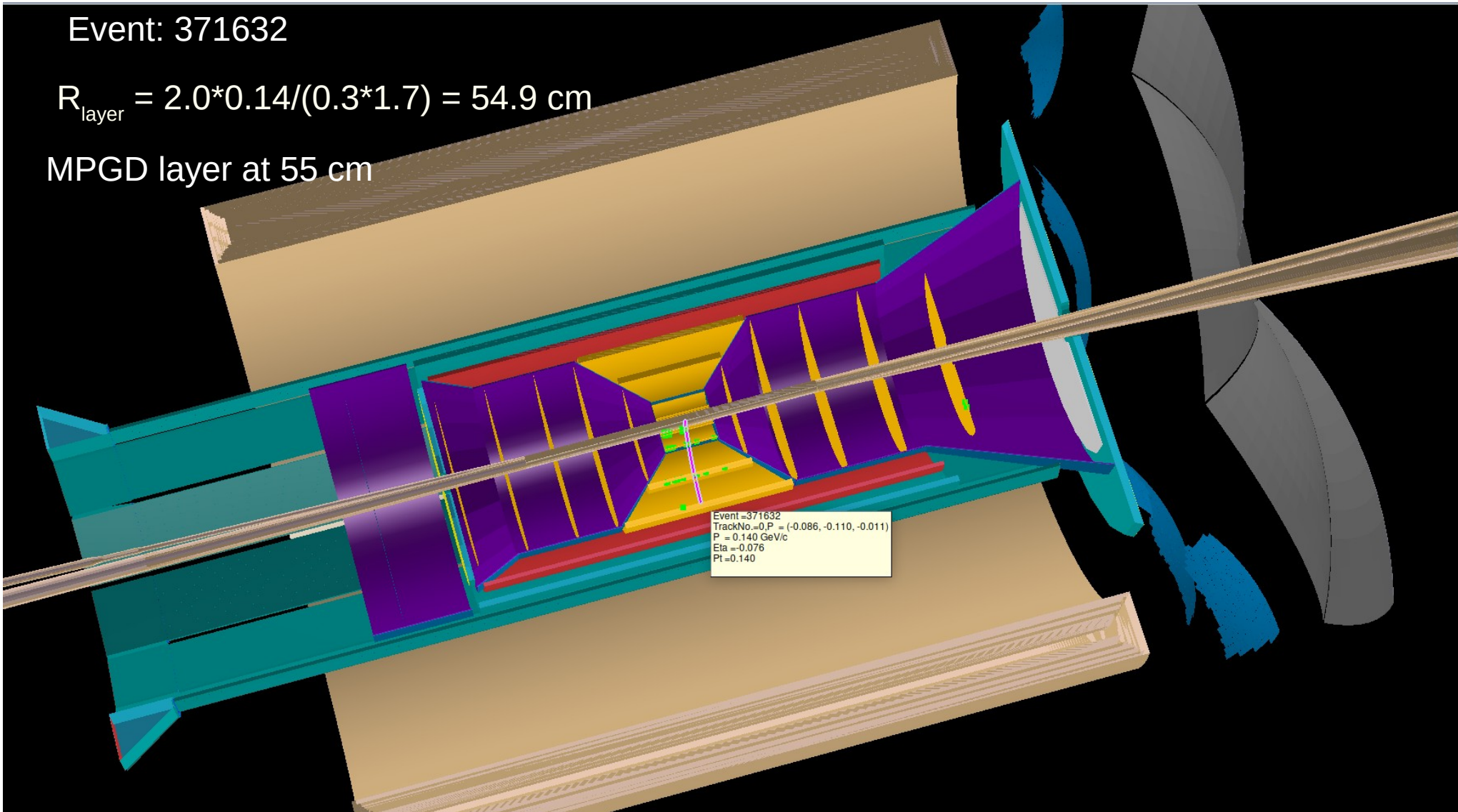


Event Display (3D-View)

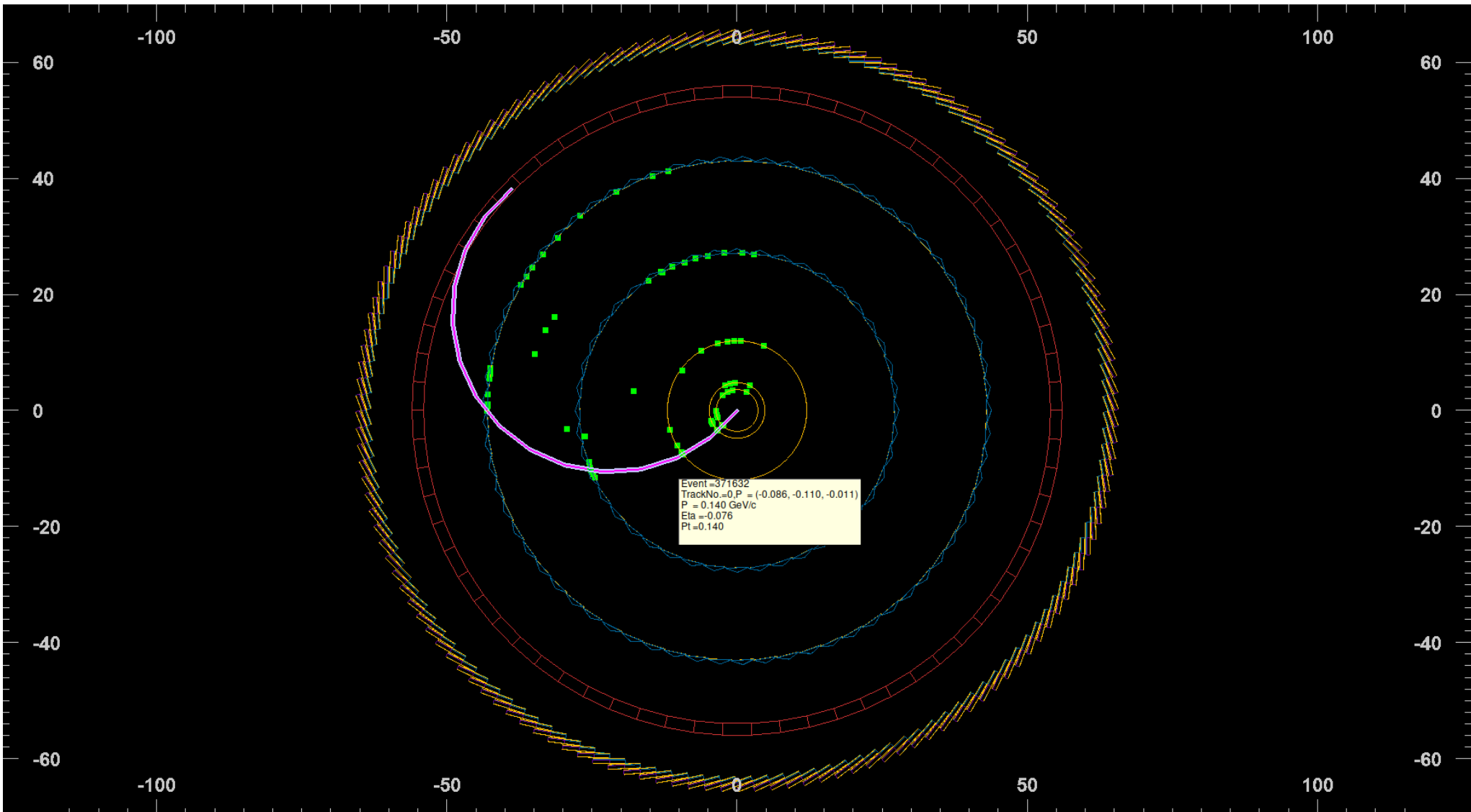
Event: 371632

$$R_{\text{layer}} = 2.0 \cdot 0.14 / (0.3 \cdot 1.7) = 54.9 \text{ cm}$$

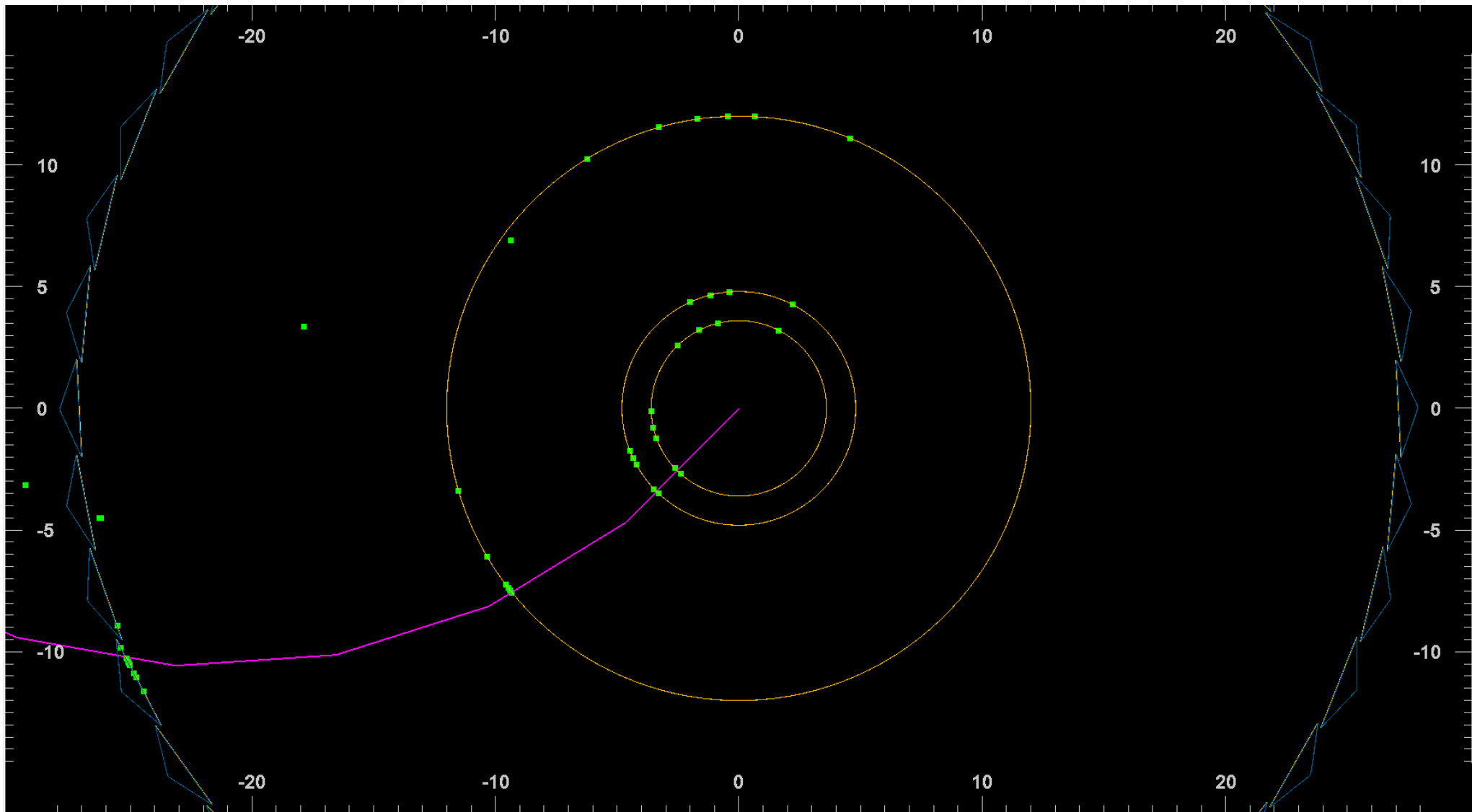
MPGD layer at 55 cm



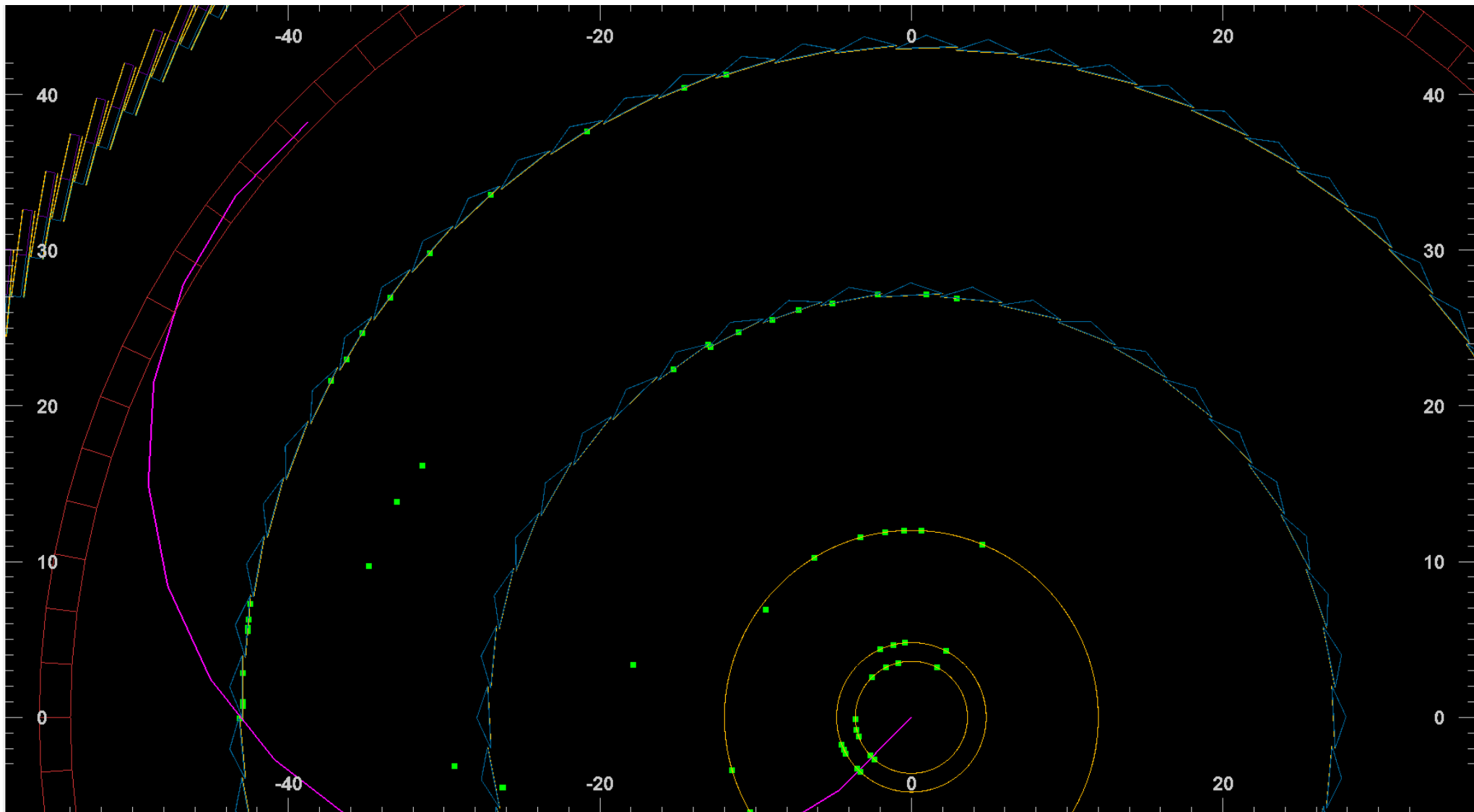
Event Display (Event 371632)



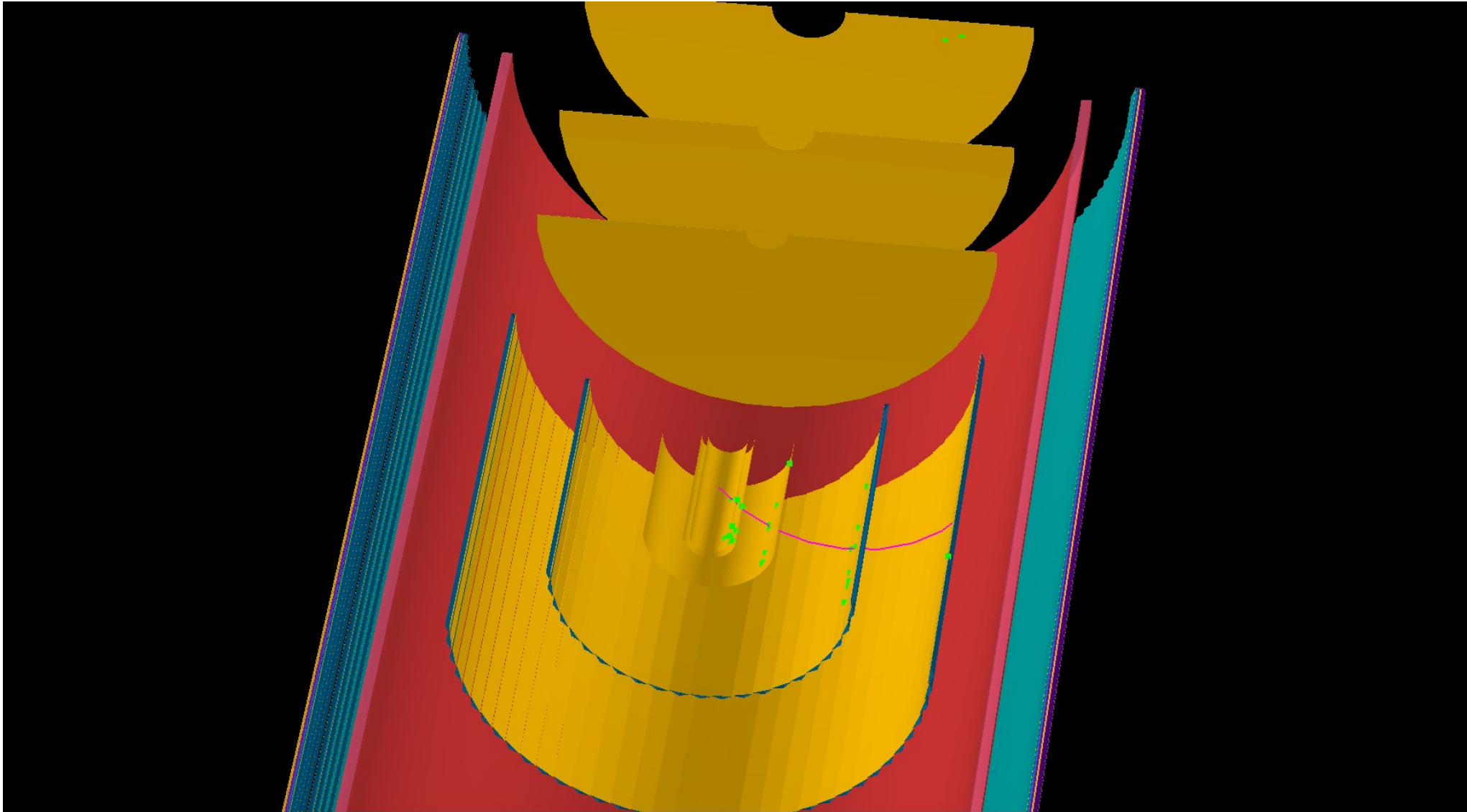
Event Display (Event 371632)



Event Display (Event 371632)



Event Display (Event 371632)



MCParticles

=====> EVENT:371632

MCParticles = (vector<edm4hep::MCParticleData>*)0x559f0fdc1570

MCParticles.PDG = 13**MCParticles.generatorStatus = 1**

MCParticles.simulatorStatus = 16777216

MCParticles.charge = -1.000000

MCParticles.time = 0.000000

MCParticles.mass = 0.105658

MCParticles.vertex.x = 0

MCParticles.vertex.y = 0

MCParticles.vertex.z = 0

MCParticles.endpoint.x = -153.285

MCParticles.endpoint.y = 20.3725

MCParticles.endpoint.z = 1910.77

MCParticles.momentum.x = -0.085597**MCParticles.momentum.y = -0.110360****MCParticles.momentum.z = -0.010665**

MCParticles.momentumAtEndpoint.x = 0.000000

MCParticles.momentumAtEndpoint.y = -0.000000

MCParticles.momentumAtEndpoint.z = -0.000000

MCParticles.spin.x = 0.000000

MCParticles.spin.y = 0.000000

MCParticles.spin.z = 0.000000

MCParticles.colorFlow.a = 0

MCParticles.colorFlow.b = 0

MCParticles.parents_begin = 0

MCParticles.parents_end = 0

MCParticles.daughters_begin = 0

MCParticles.daughters_end = 0

```

VertexBarrelHits = (vector<edm4hep::SimTrackerHitData>*)0x559f0fdf00f0
VertexBarrelHits.cellID = 75435160631583007, 95701865760891423,
225462182211810335, 2726366461227537439, 2861474355559363103,
2884273837262860575, 3008685776969203999, 3026418447098905119,
3127187270445364255, 3274398678969877535, 3216977839555490335,
3207126017802133791, 3159838049916191007, 3149704701646516767,
3097068743562683423, 2642487605362566175, 2588725322170130975,
2578029616652529951, 2526519021604720927, 2504564321313661471
VertexBarrelHits.EDep = 0.000026, 0.000013, 0.000014, 0.000018, 0.000020, 0.000014,
0.000017, 0.000013, 0.000010, 0.000018, 0.000020, 0.000035, 0.000022, 0.000014,
0.000032, 0.000018, 0.000018, 0.000028, 0.000034, 0.000023
VertexBarrelHits.time = 0.151065, 0.201577, 0.507587, 6.511541, 6.817606, 6.868255,
7.168765, 7.219525, 7.525605, 26.563057, 26.895140, 26.957073, 27.201982, 27.264568,
27.598799, 32.750137, 33.093452, 33.163803, 33.369316, 33.439819
VertexBarrelHits.pathLength = 0.040176, 0.040362, 0.041286, 0.040717, 0.040102,
0.040101, 0.040095, 0.040062, 0.040808, 0.040115, 0.043550, 0.048966, 0.049040,
0.043657, 0.040177, 0.040022, 0.046264, 0.060598, 0.059325, 0.046088
VertexBarrelHits.quality = 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
VertexBarrelHits.position.x = -23.95, -32.8784, -93.8343, 45.5668, 22.101, 16.4569, -
26.2837, -34.7778, -93.171, 6.52684, -3.93509, -8.45018, -33.8662, -42.0172, -95.7927, -
4.66565, -11.7495, -16.3431, -35.141, -43.372
VertexBarrelHits.position.y = -26.8791, -34.9823, -74.8196, 111.013, 42.6134, 32.0236, -
24.607, -33.104, -75.6279, 119.824, 47.8447, 34.9955, -12.2101, -23.2164, -72.2825,
119.916, 46.5399, 32.0844, -7.86419, -20.5638
VertexBarrelHits.position.z = -2.67058, -3.40255, -8.01424, -96.8452, -101.651, -102.463, -
106.883, -107.512, -111.099, -116.327, -114.287, -113.936, -112.246, -111.891, -110.016, -
93.8757, -91.9585, -91.5928, -89.7489, -88.9721
VertexBarrelHits.momentum.x = -0.101169, -0.105467, -0.125879, -0.026452, -0.061596, -
0.067034, -0.095076, -0.098372, -0.119916, 0.002184, -0.034559, -0.041079, -0.064318, -
0.069826, -0.094938, 0.008251, -0.029289, -0.036717, -0.055635, -0.062385
VertexBarrelHits.momentum.y = -0.096133, -0.091321, -0.059975, -0.134322, -0.122202, -
0.119294, -0.097584, -0.094282, -0.064634, -0.114198, -0.108819, -0.106488, -0.092764, -
0.088665, -0.060925, -0.109298, -0.105570, -0.103179, -0.093147, -0.088727
VertexBarrelHits.momentum.z = -0.008262, -0.008643, -0.009263, -0.009070, -0.009213, -
0.009007, -0.007566, -0.006932, -0.006643, 0.003440, 0.002971, 0.002883, 0.003204,
0.002895, 0.002638, 0.003093, 0.002785, 0.002832, 0.005605, 0.005349

```

Vertex Hits

```

*****
* Event No * Instance * Radius * Z * Momentum
*****
* 371632 * 0 * 3.6001293 * -0.267058 * 0.1398027 *
* 371632 * 1 * 4.8007858 * -0.340254 * 0.1397766 *
* 371632 * 2 * 12.001192 * -0.801424 * 0.1397439 *
* 371632 * 3 * 12.000061 * -9.684516 * 0.1372016 *
* 371632 * 4 * 4.8003706 * -10.16505 * 0.1371584 *
* 371632 * 5 * 3.6004707 * -10.24628 * 0.1371341 *
* 371632 * 6 * 3.6004697 * -10.68825 * 0.1364526 *
* 371632 * 7 * 4.8014333 * -10.75122 * 0.1364338 *
* 371632 * 8 * 12.000173 * -11.10993 * 0.1363876 *
* 371632 * 9 * 12.000170 * -11.63273 * 0.1142704 *
* 371632 * 10 * 4.8006231 * -11.42866 * 0.1142134 *
* 371632 * 11 * 3.6001302 * -11.39355 * 0.1141729 *
* 371632 * 12 * 3.6000105 * -11.22464 * 0.1129259 *
* 371632 * 13 * 4.8004651 * -11.18906 * 0.1128959 *
* 371632 * 14 * 12.000411 * -11.00161 * 0.1128363 *
* 371632 * 15 * 12.000624 * -9.387565 * 0.1096523 *
* 371632 * 16 * 4.8000082 * -9.195853 * 0.1095925 *
* 371632 * 17 * 3.6007024 * -9.159278 * 0.1095539 *
* 371632 * 18 * 3.6010209 * -8.974892 * 0.1086416 *
* 371632 * 19 * 4.8000021 * -8.897213 * 0.1085955 *
* 371632 * 20 * 12.000627 * -8.557491 * 0.1085358 *
* 371632 * 21 * 12.000154 * -3.545156 * 0.1044354 *
* 371632 * 22 * 4.8001735 * -2.987797 * 0.1043824 *
* 371632 * 23 * 3.6003558 * -2.859011 * 0.1043196 *
* 371632 * 24 * 3.6004562 * -2.640166 * 0.1042319 *
* 371632 * 25 * 4.8012051 * -2.500055 * 0.1041691 *
* 371632 * 26 * 12.003193 * -1.935652 * 0.1041164 *
* 371632 * 27 * 12.001612 * 2.8505284 * 0.0997080 *
* 371632 * 28 * 12.000275 * 3.2103013 * 0.0995922 *
* 371632 * 29 * 12.000214 * 10.351890 * 0.0944356 *
* 371632 * 30 * 12.000395 * 11.645821 * 0.0943166 *
    
```

Total 31

Barrel Hits

```

*****
* Event No * Instance * Radius * Z * Momentum
*****
* 371632 * 0 * 27.224623 * -1.883735 * 0.1396521 *
* 371632 * 1 * 27.059138 * -8.646589 * 0.1373113 *
* 371632 * 2 * 27.146351 * -11.84257 * 0.1362822 *
* 371632 * 3 * 27.161480 * -14.99989 * 0.1340729 *
* 371632 * 4 * 27.153226 * -16.09665 * 0.1273445 *
* 371632 * 5 * 27.238000 * -16.59920 * 0.1247323 *
* 371632 * 6 * 27.105181 * -15.53009 * 0.1170170 *
* 371632 * 7 * 27.056050 * -12.20383 * 0.1144104 *
* 371632 * 8 * 27.160072 * -10.64101 * 0.1127083 *
* 371632 * 9 * 27.117737 * -9.821444 * 0.1097924 *
* 371632 * 10 * 27.117534 * -7.849381 * 0.1083917 *
* 371632 * 11 * 27.055371 * -4.526565 * 0.1045724 *
* 371632 * 12 * 27.073374 * -0.763592 * 0.1039531 *
* 371632 * 13 * 27.103168 * 2.5611452 * 0.0998291 *
* 371632 * 14 * 27.173303 * 3.515599 * 0.0994443 *
* 371632 * 15 * 27.262342 * 9.0514709 * 0.0949143 *
* 371632 * 16 * 27.059033 * 9.0693639 * 0.0945973 *
* 371632 * 17 * 27.055383 * 13.186935 * 0.0936684 *
* 371632 * 18 * 27.063452 * 21.974791 * 0.0878889 *
* 371632 * 19 * 42.941997 * -3.205518 * 0.1393893 *
* 371632 * 20 * 42.932715 * -7.268940 * 0.1375622 *
* 371632 * 21 * 43.123702 * -12.88996 * 0.1359751 *
* 371632 * 22 * 42.970252 * -14.59292 * 0.1344584 *
* 371632 * 23 * 42.934514 * -16.10680 * 0.1269614 *
* 371632 * 24 * 43.029978 * -16.53955 * 0.1250821 *
* 371632 * 25 * 43.035652 * -14.70666 * 0.1166648 *
* 371632 * 26 * 43.059999 * -13.05892 * 0.1147134 *
* 371632 * 27 * 42.965355 * -10.49892 * 0.1121004 *
* 371632 * 28 * 42.966302 * -10.15166 * 0.1101489 *
* 371632 * 29 * 43.081005 * -6.757510 * 0.1079619 *
* 371632 * 30 * 42.969395 * -6.080748 * 0.1049037 *
* 371632 * 31 * 43.050598 * 1.7768196 * 0.1002370 *
* 371632 * 32 * 43.004356 * 5.0377679 * 0.0989764 *
* 371632 * 33 * 43.029905 * 7.1108131 * 0.0952828 *
* 371632 * 34 * 42.975041 * 15.993401 * 0.0927414 *
* 371632 * 35 * 42.936792 * 18.774403 * 0.0884259 *
*****
    
```

Total 36

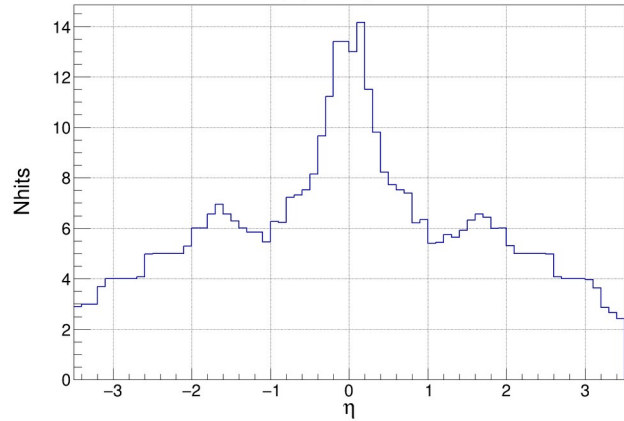
Event Details: 371632

```
SiBarrelHits = (vector<edm4hep::SimTrackerHitData>*)0x559f167eab90
SiBarrelHits.cellID = 33150606306812219, 152133075990524219, 208347703904674107, 263886999751016763, 283185219819905339, 292020130756481339,
273207611359338811, 214707369353990459, 187202592063988027, 172774663045308731, 138082859280867643, 79651435536507195, 13456171209957691,
18401691305605394747, 18384894719302934843, 18287525508600103227, 18287210124856586555, 18214767568604991803, 18060170126296154427,
56414021787726140
SiBarrelHits.EDep = 0.000019, 0.000022, 0.000025, 0.000010, 0.000174, 0.000015, 0.000013, 0.000017, 0.000018, 0.000016, 0.000028, 0.000022, 0.000029, 0.000020,
0.000018, 0.000014, 0.000023, 0.000022, 0.000024, 0.000026
SiBarrelHits.time = 1.195956, 5.831190, 8.211300, 12.782865, 15.186623, 19.407249, 21.870047, 25.835594, 28.339212, 32.006798, 34.534428, 38.126415, 40.675198,
44.173752, 46.673649, 50.159477, 50.170464, 52.490887, 55.916981, 2.082473
SiBarrelHits.pathLength = 0.050206, 0.045577, 0.048523, 0.043741, 0.048860, 0.043258, 0.048658, 0.046535, 0.050184, 0.045226, 0.049420, 0.046431, 0.048957,
0.044109, 0.048893, 0.041412, 0.043246, 0.043618, 0.041687, 0.068627
SiBarrelHits.quality = 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
SiBarrelHits.position.x = -253.902, 28.9384, -250.155, 9.79389, -250.536, -21.5745, -247.481, -50.5712, -250.903, -72.3627, -248.372, -89.4696, -244.451, -110.851, -
251.58, -130.764, -129.071, -255.366, -152.611, -429.304
SiBarrelHits.position.y = -98.243, 269.04, -105.428, 271.438, -104.696, 271.524, -110.554, 265.792, -103.992, 261.344, -108.846, 255.332, -116.363, 247.326, -102.695,
239.216, 237.823, -89.3726, 223.501, 9.98396
SiBarrelHits.position.z = -18.8374, -86.4659, -118.426, -149.999, -160.967, -165.992, -155.301, -122.038, -106.41, -98.2144, -78.4938, -45.2657, -7.63593, 25.6115,
35.156, 90.5147, 90.6936, 131.869, 219.748, -32.0552
SiBarrelHits.momentum.x = -0.137618, 0.054080, -0.135162, 0.060581, -0.126382, 0.069365, -0.116031, 0.076264, -0.111154, 0.080361, -0.107146, 0.079744, -
0.103007, 0.080402, -0.098599, 0.073503, 0.072626, -0.093093, 0.067647, -0.081995
SiBarrelHits.momentum.y = 0.022097, -0.125899, 0.016330, -0.119566, 0.015624, -0.103666, 0.014382, -0.085171, 0.018540, -0.074751, 0.015659, -0.067371,
0.011720, -0.059144, 0.012655, -0.059551, -0.060128, 0.004290, -0.054731, 0.112411
SiBarrelHits.momentum.z = -0.008700, -0.008906, -0.006121, -0.003071, -0.000157, 0.000097, 0.004795, 0.004416, 0.002059, 0.002954, 0.004819, 0.006117, 0.007652,
0.001838, 0.002682, 0.007723, 0.007663, 0.009439, 0.012367, -0.008372
SiBarrelHits#0 = (vector<podio::ObjectID>*)0x559f16e9de80
SiBarrelHits#0.index = 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
SiBarrelHits#0.collectionID = 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1
```

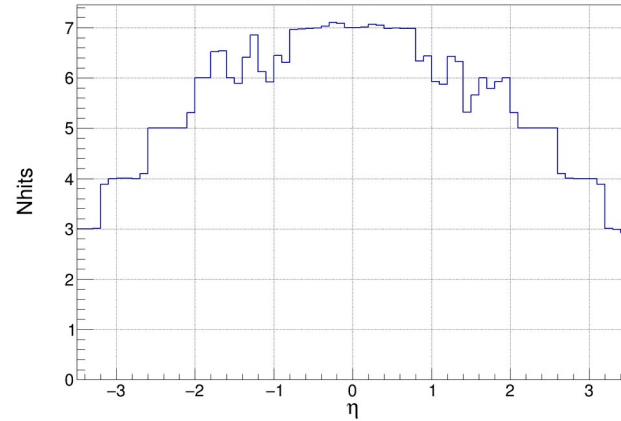
Nhits (Generation Level)

Double_t pcut = 0.5*pmin;

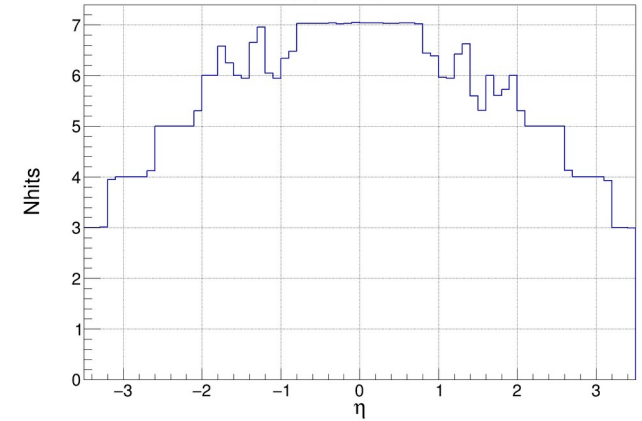
0.2 < p (GeV/c) < 0.4



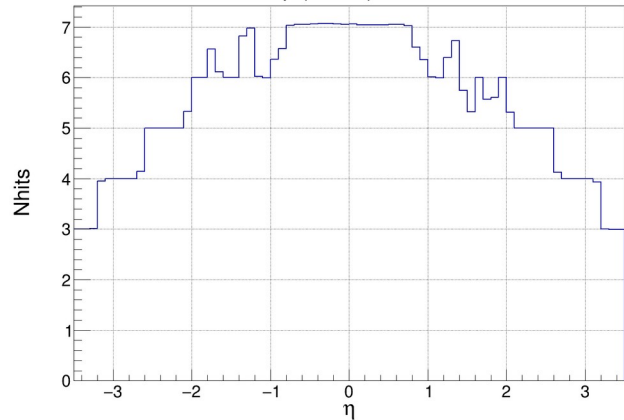
0.4 < p (GeV/c) < 0.6



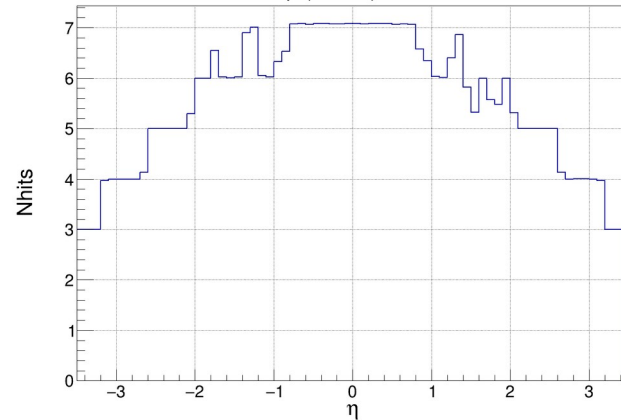
0.6 < p (GeV/c) < 0.8



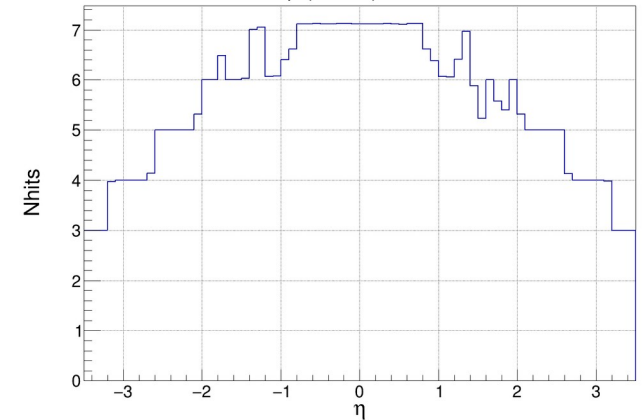
0.8 < p (GeV/c) < 1.0



1.0 < p (GeV/c) < 2.0



9.0 < p (GeV/c) < 10.0



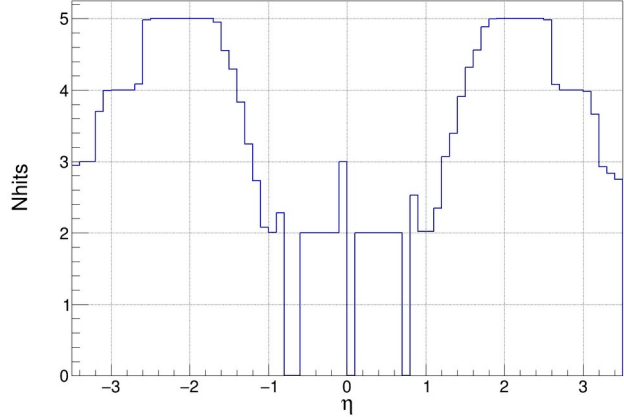
Nhits and Lever Arm for Disks (Generation Level)

Double_t pcut = 0.5*pmin;

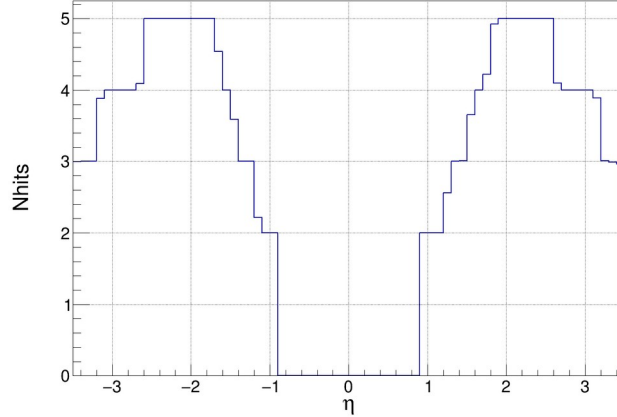
Positive eta DiskZ: [25,45,70,100,135]

Negative eta DiskZ: [-25,-45,-65,-90,-115]

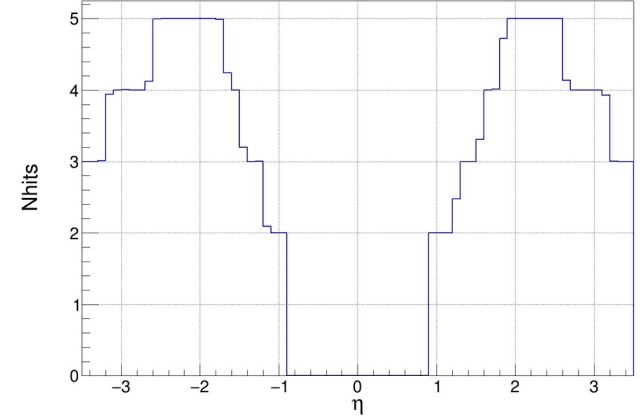
0.2 < p (GeV/c) < 0.4



0.4 < p (GeV/c) < 0.6



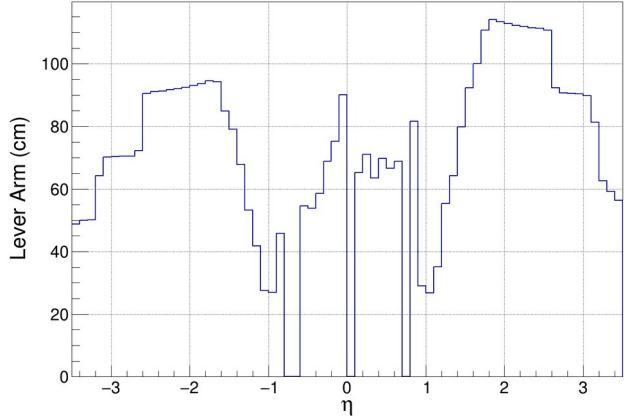
0.6 < p (GeV/c) < 0.8



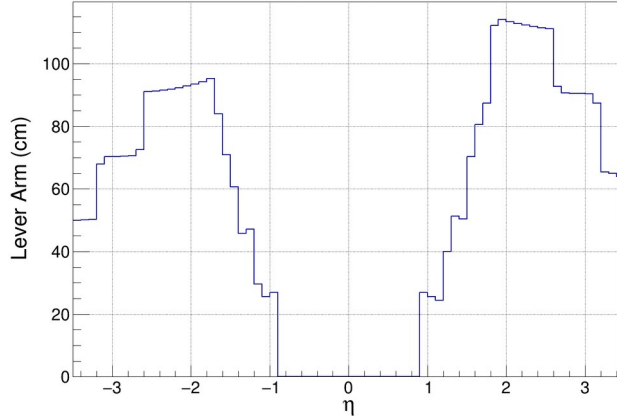
$$\frac{\Delta p_T}{p_T} |_{m.s.} = \frac{N}{\sqrt{(N+1)(N-1)}} \frac{0.0136 \text{ GeV}/c}{0.3 \beta B_0 L_0} \sqrt{\frac{d_{tot}}{X_0 \sin \theta}} \left(1 + 0.038 \ln \frac{d}{X_0 \sin \theta} \right)$$

Lever Arm is larger for $\eta > 0$ which improves momentum resolution

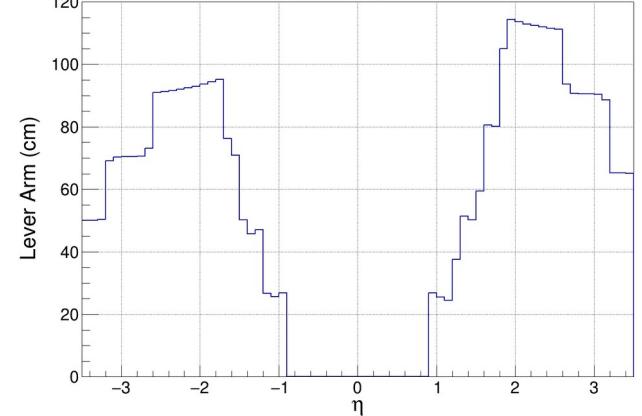
0.2 < p (GeV/c) < 0.4



0.4 < p (GeV/c) < 0.6



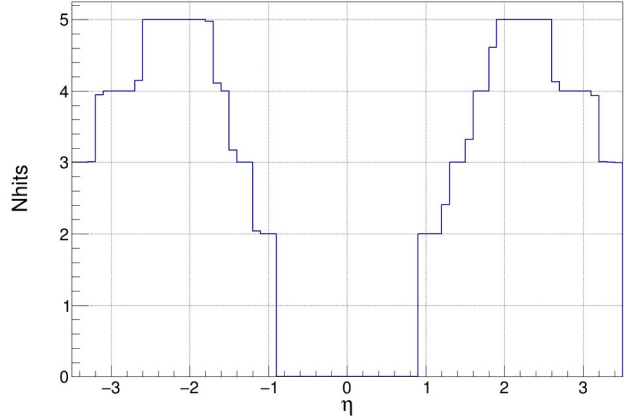
0.6 < p (GeV/c) < 0.8



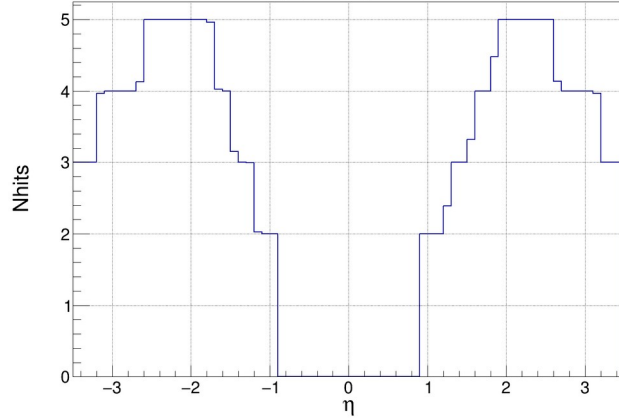
Nhits and Lever Arm for Disks (Generation Level)

Double_t pcut = 0.5*pmin;

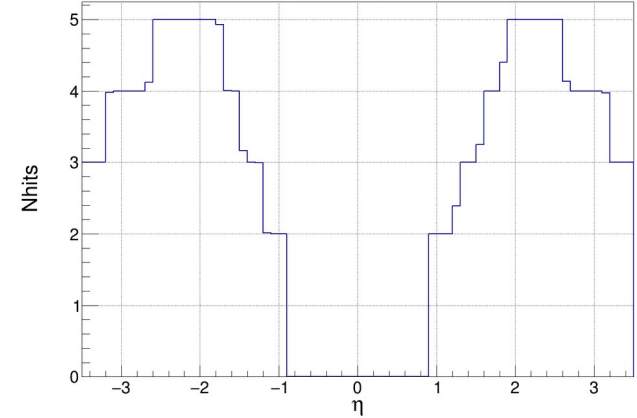
0.8 < p (GeV/c) < 1.0



1.0 < p (GeV/c) < 2.0



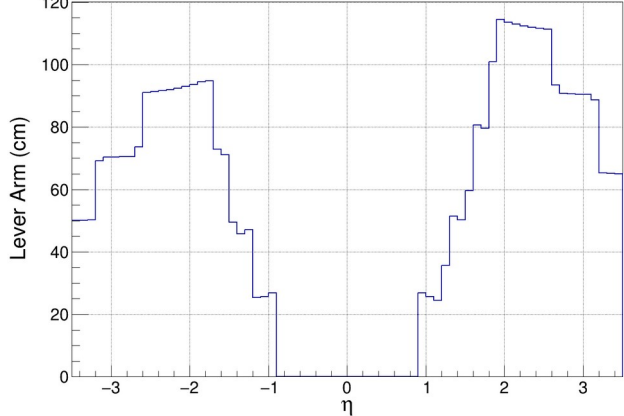
2.0 < p (GeV/c) < 3.0



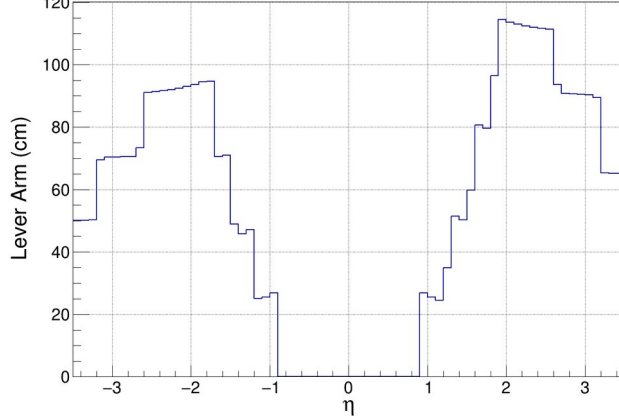
$$\frac{\Delta p_T}{p_T} \Big|_{m.s.} = \frac{N}{\sqrt{(N+1)(N-1)}} \frac{0.0136 \text{ GeV}/c}{0.3 \beta B_0 L_0} \sqrt{\frac{d_{tot}}{X_0 \sin \theta}} \left(1 + 0.038 \ln \frac{d}{X_0 \sin \theta} \right)$$

Lever Arm is larger for $\eta > 0$ which improves momentum resolution

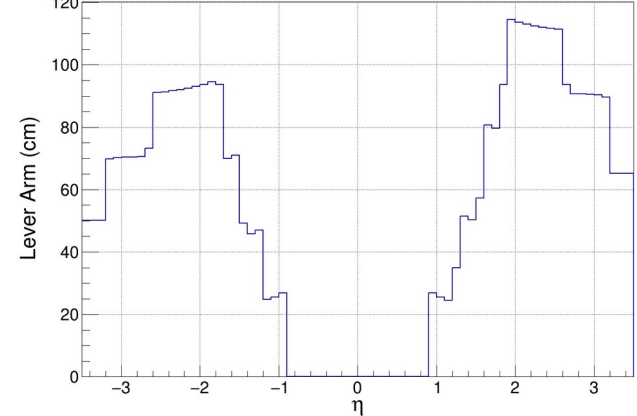
0.8 < p (GeV/c) < 1.0



1.0 < p (GeV/c) < 2.0



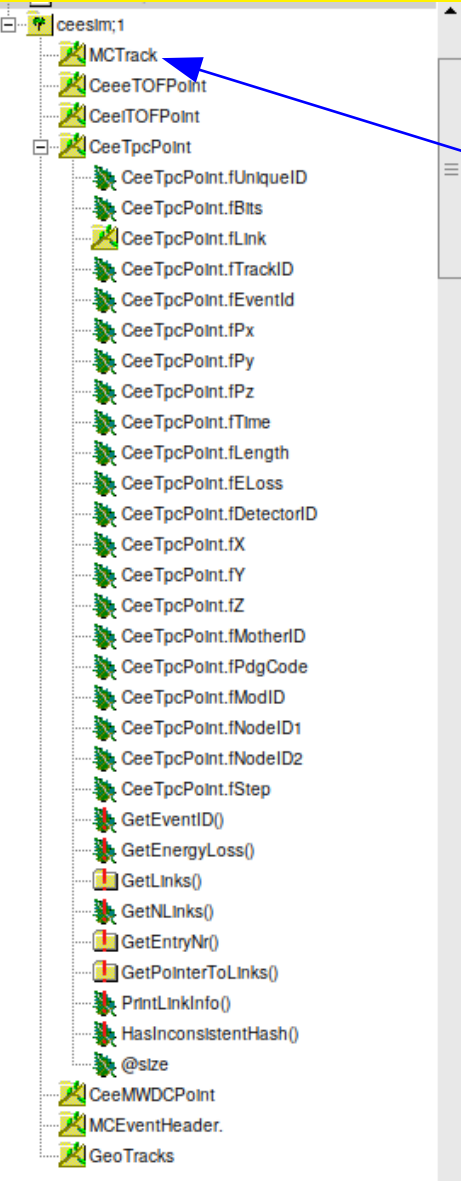
2.0 < p (GeV/c) < 3.0



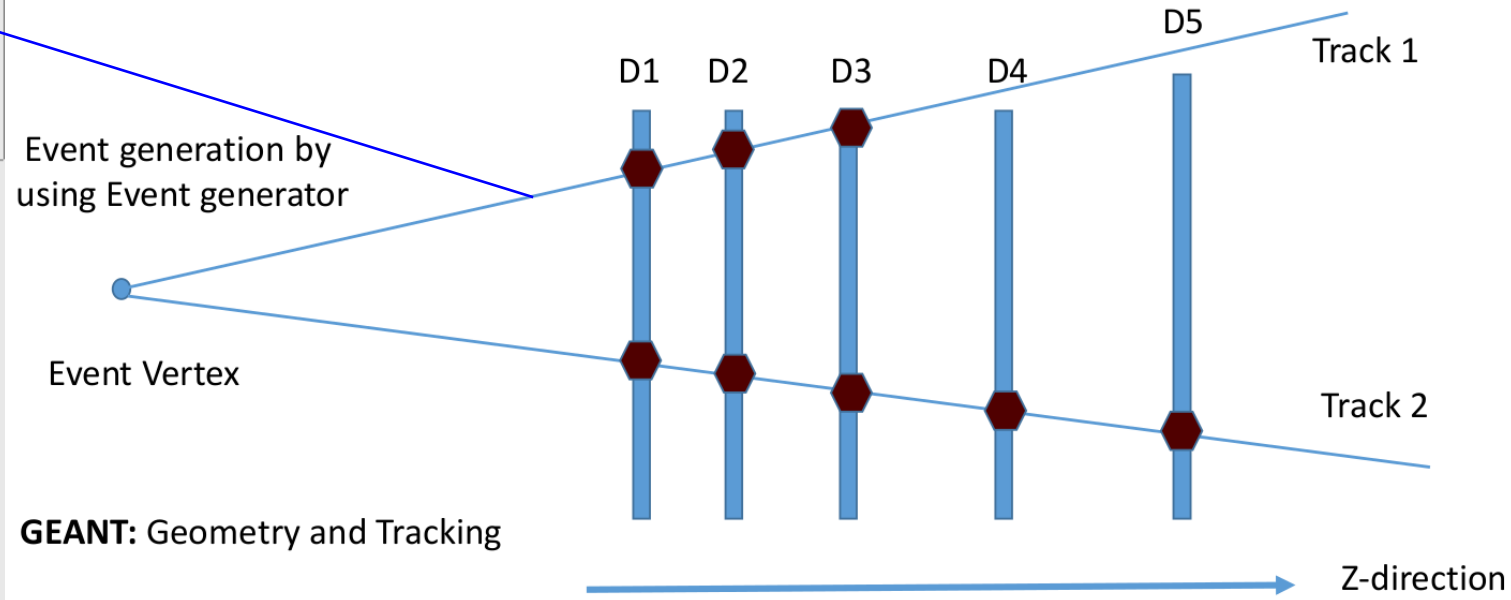
Summary

- Checked the number of Hits and Lever Arm using Monte Carlo points
- MC Tracks and Hits are not one to one correspondance
- **Things to be done:**
 - We should store the MCId/TrackId of Each Hit otherwise hits are always mixed
 - Next Check the number of reco hits used in fitting and chi2/ndf (chi2 is still not stored)

Backup



MC Point on the detectors (D1, D2, D3, D4, D5) created by the track1 and track 2



Tracks information stored in MCTrack: Track Index, Pdg, Momentum, MotherId. Etc.

Track Index, Pdg, Momentum, MotherId. etc. are stored for each MC Points

Based on my old work