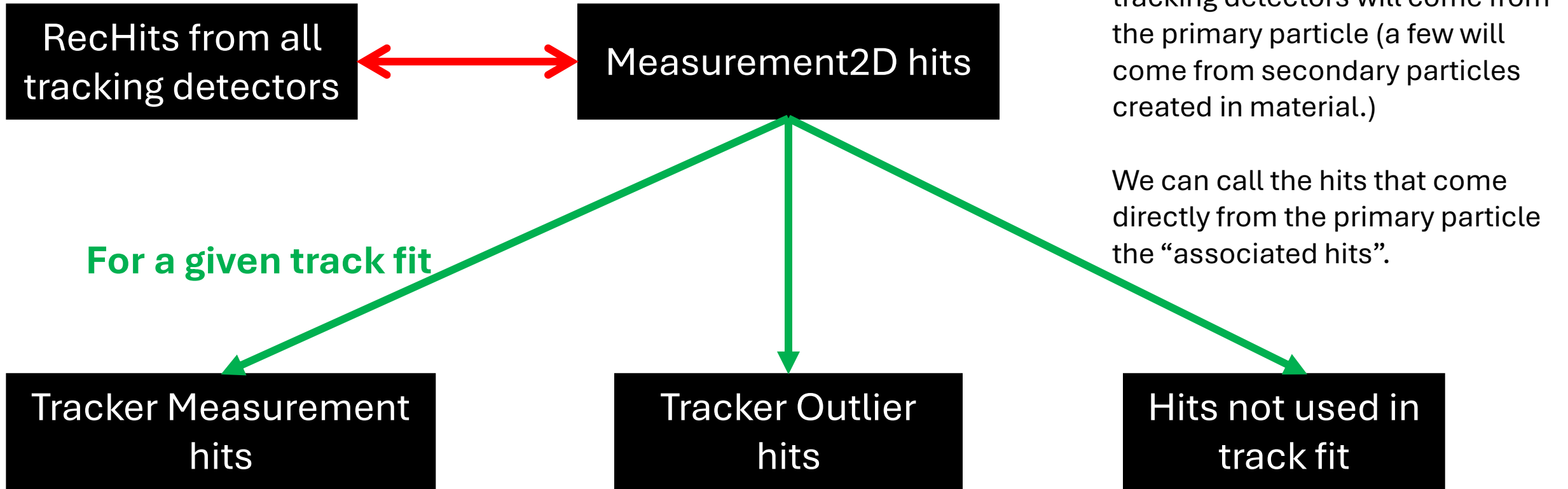


# Update on hits missing from track fits

Barak Schmookler

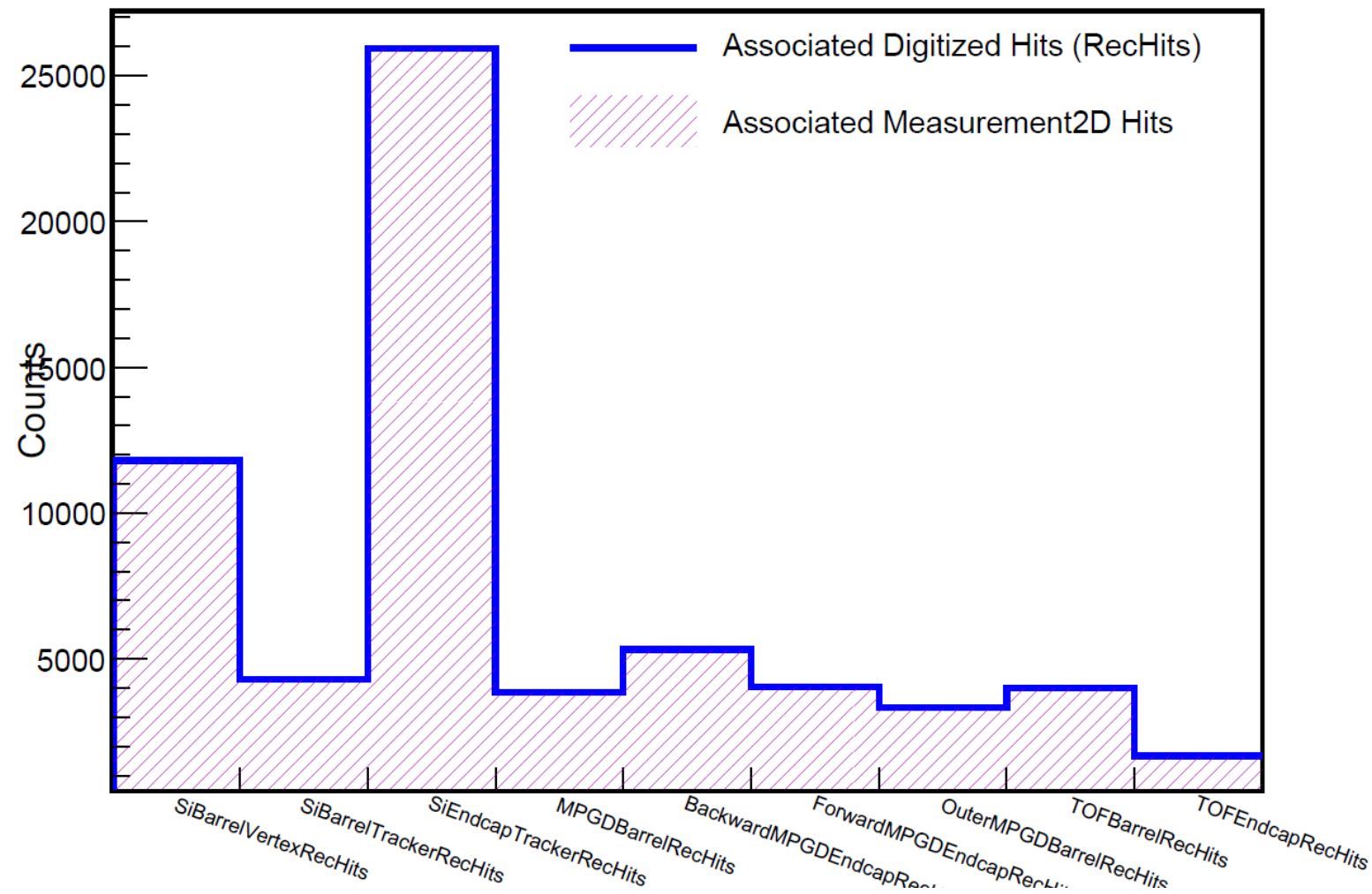
# Tracking hit classification



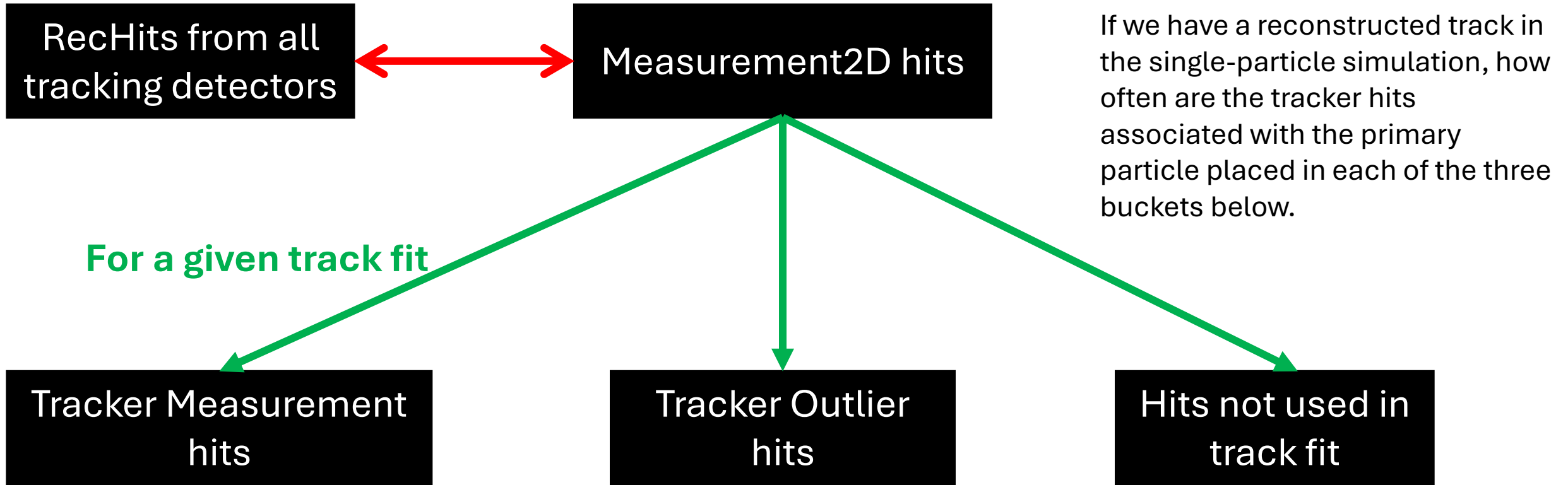
# Efficiency of RecHits to Measurement2D conversion

10k single negative muon events  
Eta = [-4,4], Phi = [0,2Pi]  
P = 2GeV/c  
(vx,vy,vz) = (0,0,0)

Latest software build (i.e.  
nightly build from this week)



# Tracking hit classification

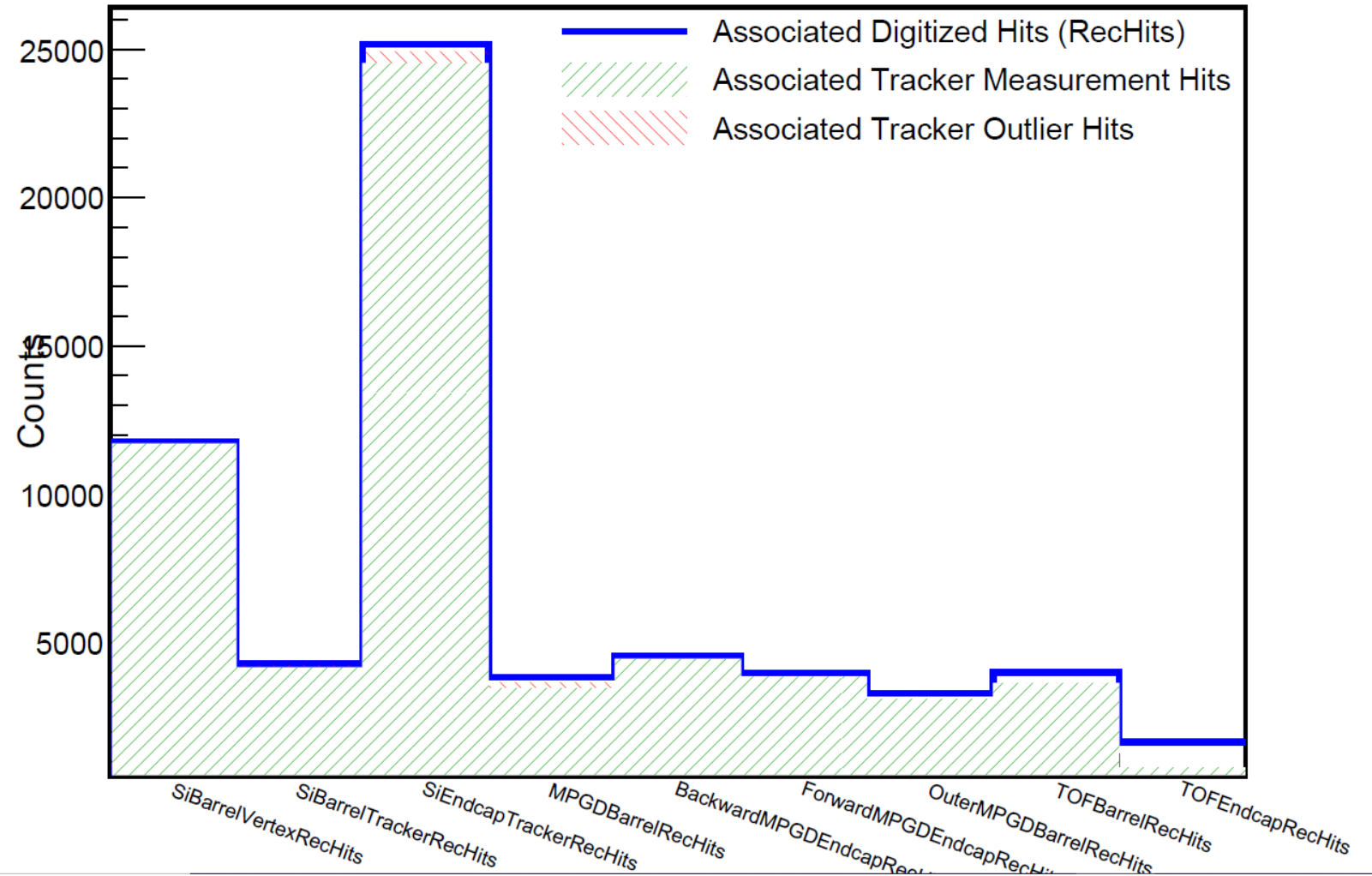


# Which associated tracker hits are used in the track fit

Events with a reconstructed track

10k single negative muon events  
Eta = [-4,4], Phi = [0,2Pi]  
P = 2GeV/c  
(vx,vy,vz) = (0,0,0)

Latest software build (i.e. nightly build from this week), **following modification back to MPGD pixel-style digitization.**



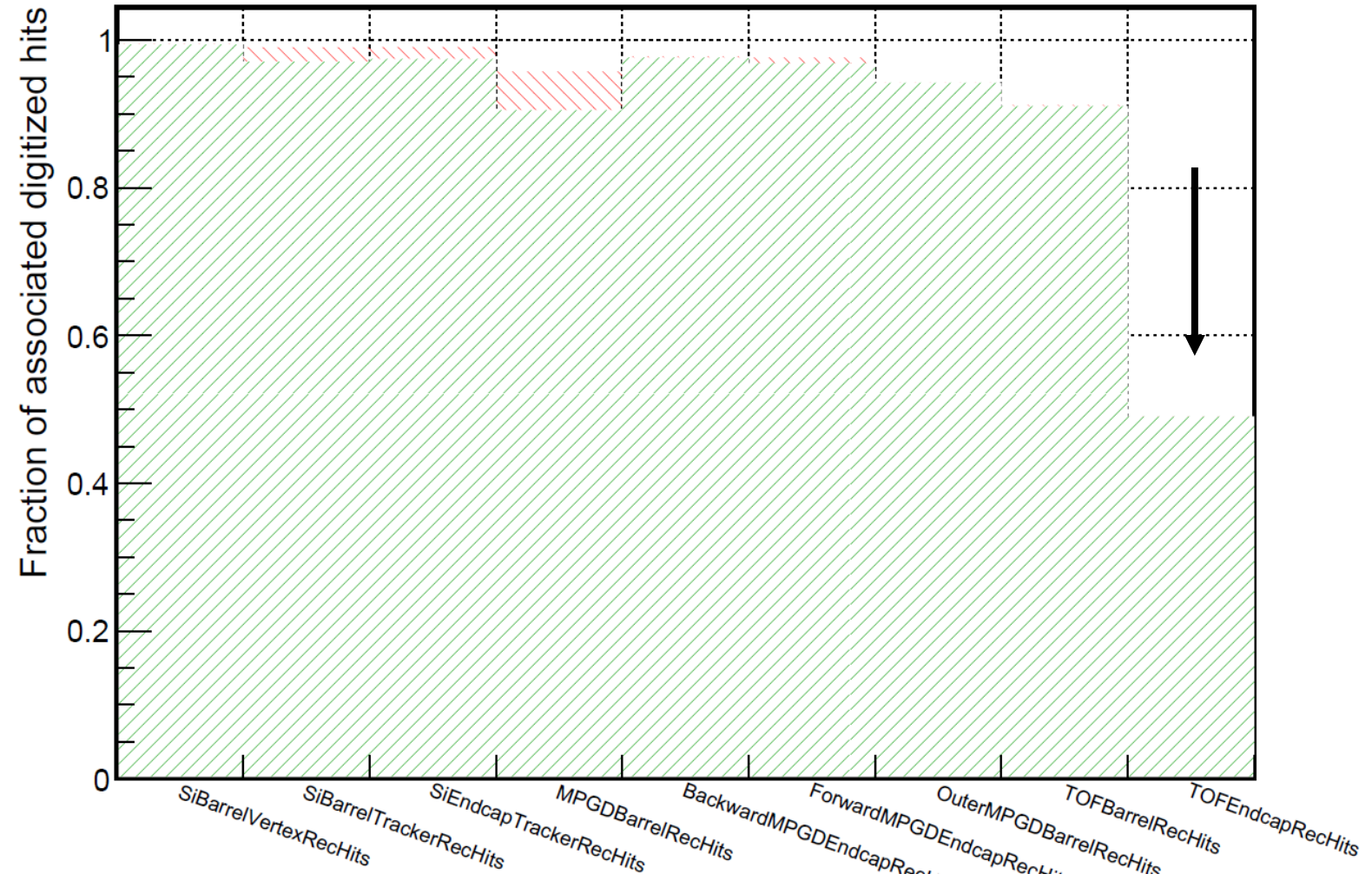
# Which associated tracker hits are used in the track fit

Associated Tracker Measurement Hits  
Associated Tracker Outlier Hits

10k single negative muon events  
Eta = [-4,4], Phi = [0,2Pi]  
P = 2GeV/c  
(vx,vy,vz) = (0,0,0)

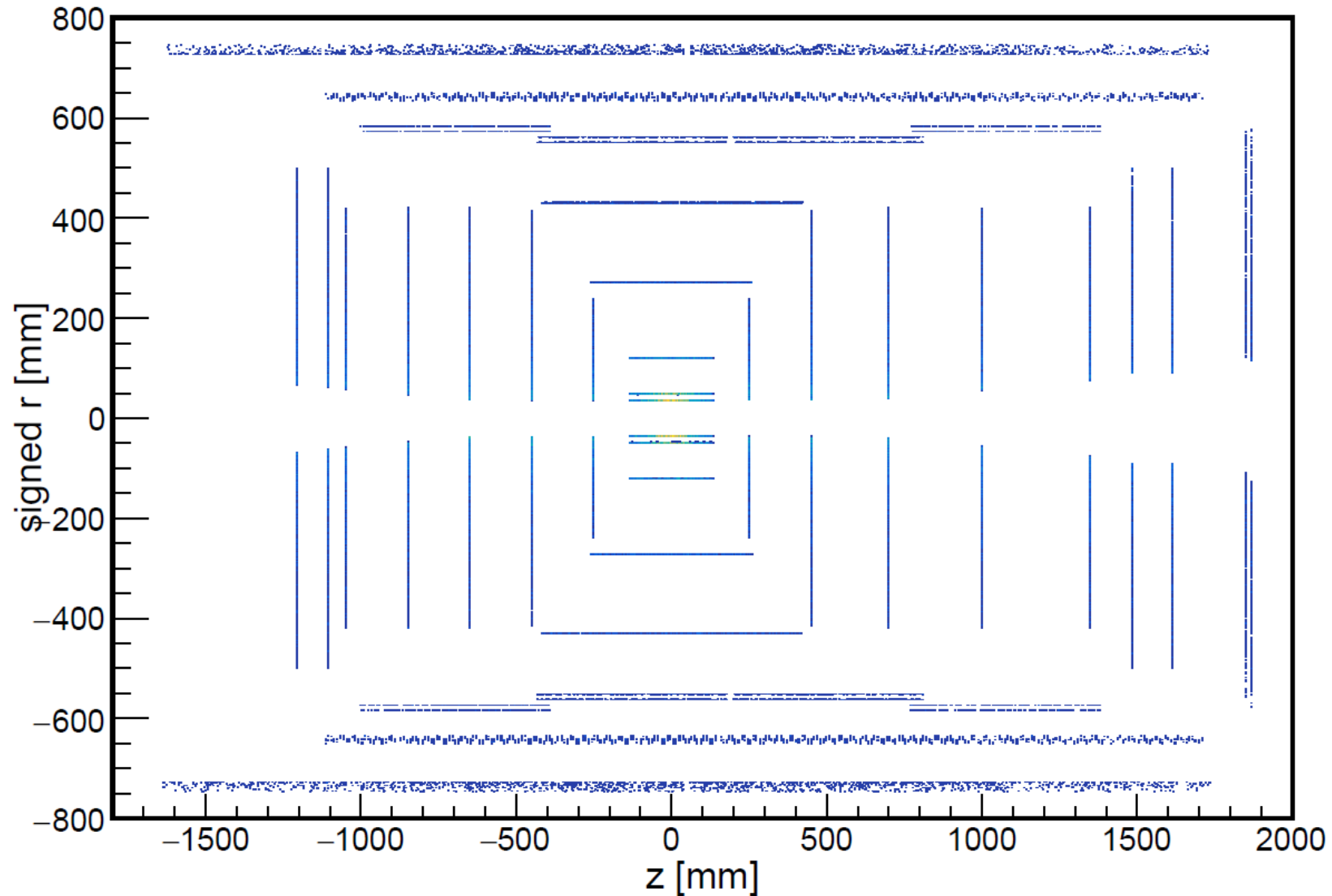
Latest software build (i.e. nightly build from this week), **following modification back to MPGD pixel-style digitization.**

Events with a reconstructed track



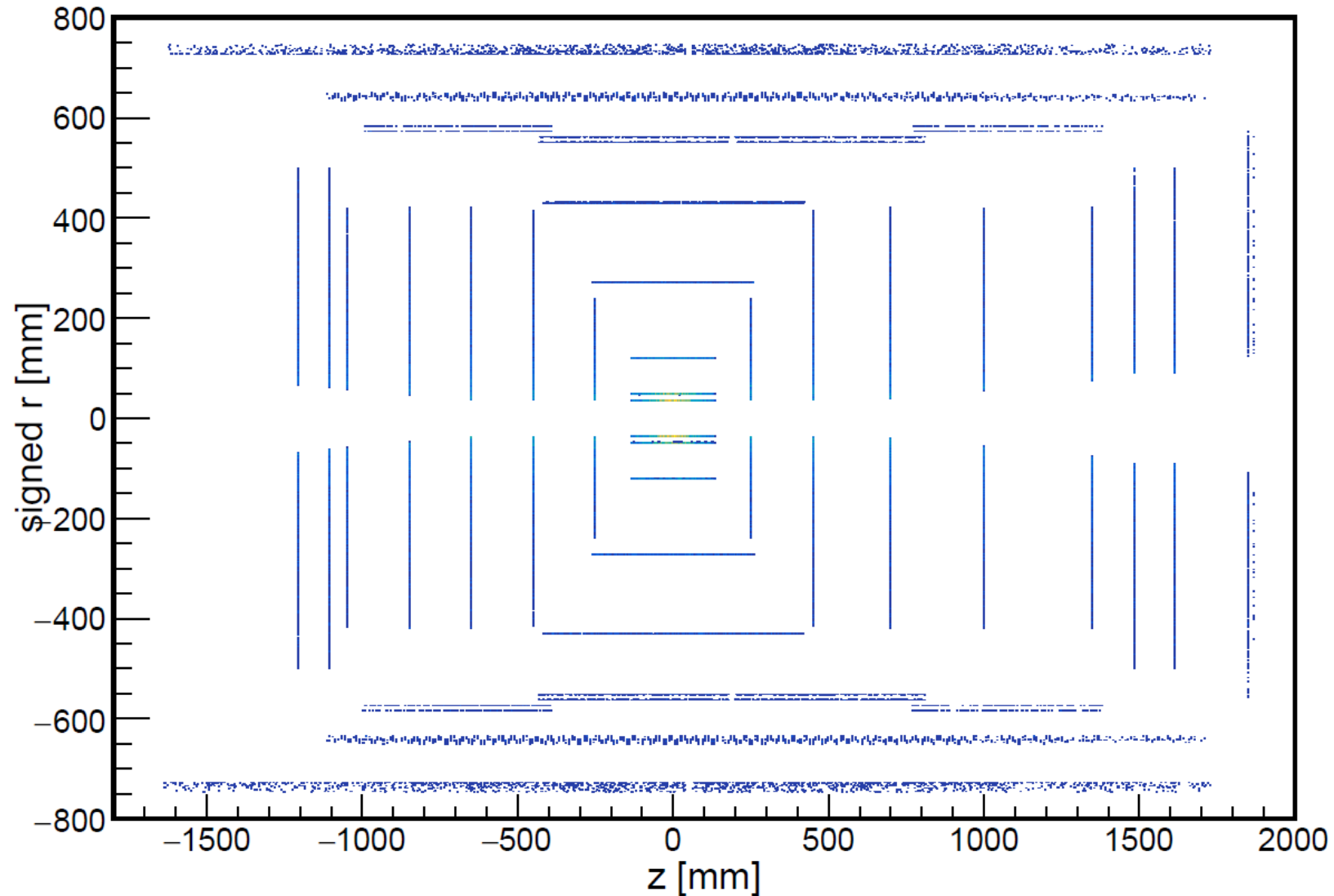
# Location of missing hits?

All associated digitized hits



# Location of missing hits?

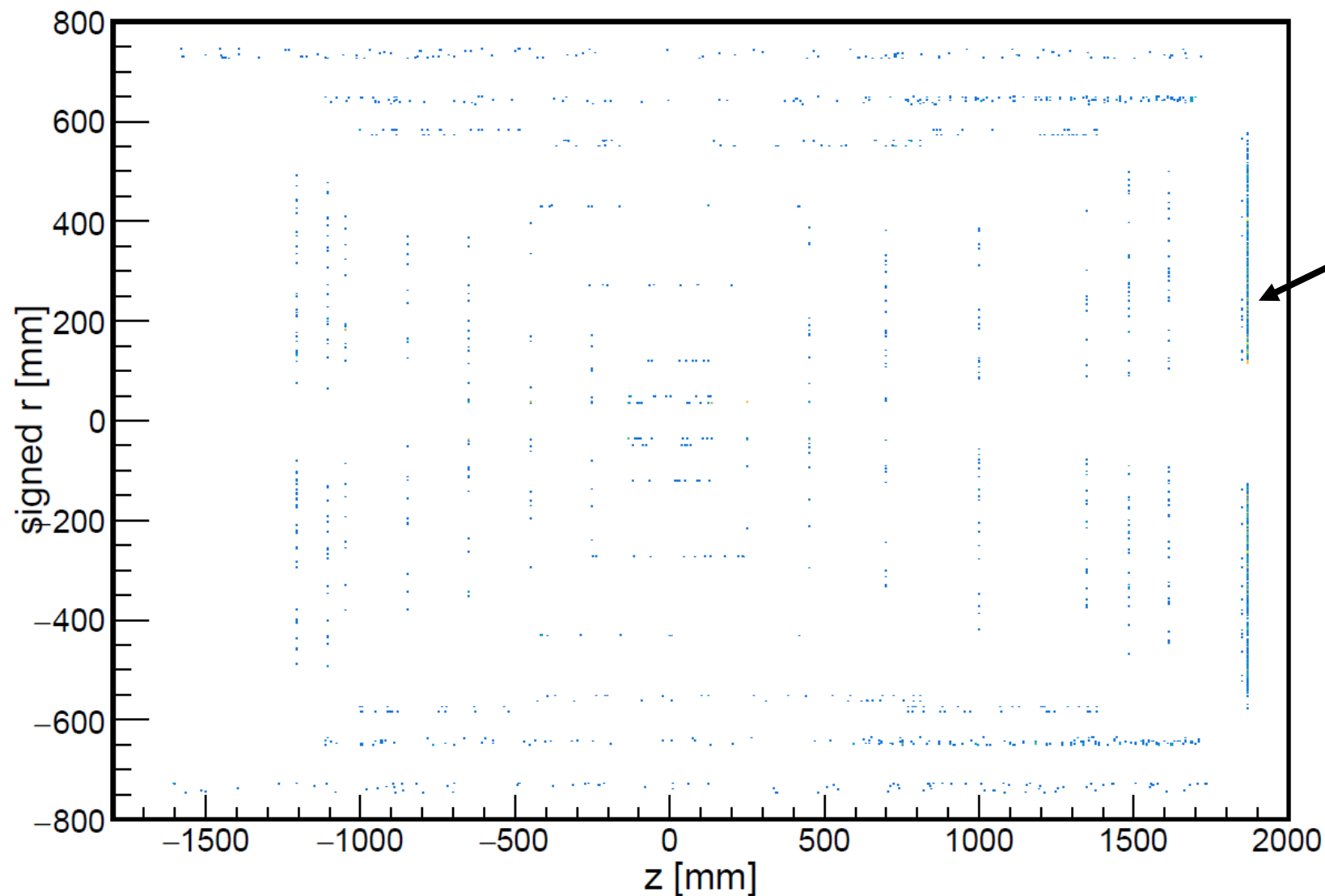
Associated track measurement hits





# Location of missing hits?

Associated digitized hits missing from track



# Quick diagnosis: TOF endcap layers

```
659 <readouts>
660   <readout name="TOFEndcapHits">
661     <segmentation type="CartesianGridXY" grid_size_x="1*mm" grid_size_y="0.8*cm" />
662     <id>system:8,layer:4,module:2,idx:5,idy:5,ids:6,x:36:-12,y:-16</id>
663   </readout>
664 </readouts>
```

```
TOFEndcapRecHits = (vector<edm4io::TrackerHitData>*)0x20
TOFEndcapRecHits.cellID = 18446462804945551738
TOFEndcapRecHits.position.x = 293.198517
TOFEndcapRecHits.position.y = 76.901039
TOFEndcapRecHits.position.z = 1870.150024
TOFEndcapRecHits.positionError.xx = 0.083333
TOFEndcapRecHits.positionError.yy = 5.333333
TOFEndcapRecHits.positionError.zz = 0.000000
TOFEndcapRecHits.time = 6.323000
```

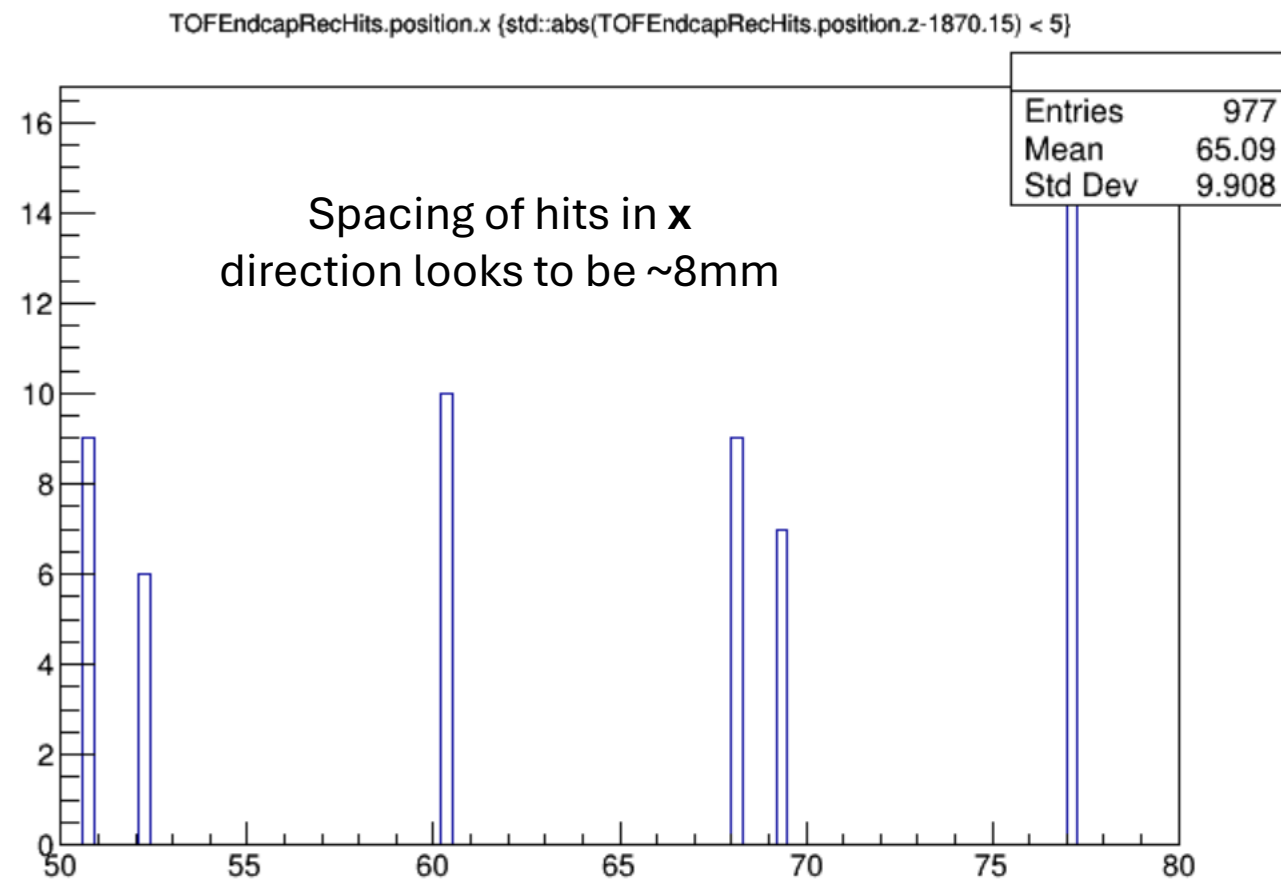
$$\text{For x direction, } 0.0833 \text{ mm}^2 = \frac{1\text{mm} \times 1\text{mm}}{12}$$

$$\text{For y direction: } 5.33 \text{ mm}^2 = \frac{8\text{mm} \times 8\text{mm}}{12}$$

# Quick diagnosis: TOF endcap layers

```
659 <readouts>
660   <readout name="TOFEndcapHits">
661     <segmentation type="CartesianGridXY" grid_size_x="1*mm" grid_size_y="0.8*cm" />
662     <id>system:8,layer:4,module:2,idx:5,ldy:5,lds:6,x:36:-12,y:-16</id>
663   </readout>
664 </readouts>
```

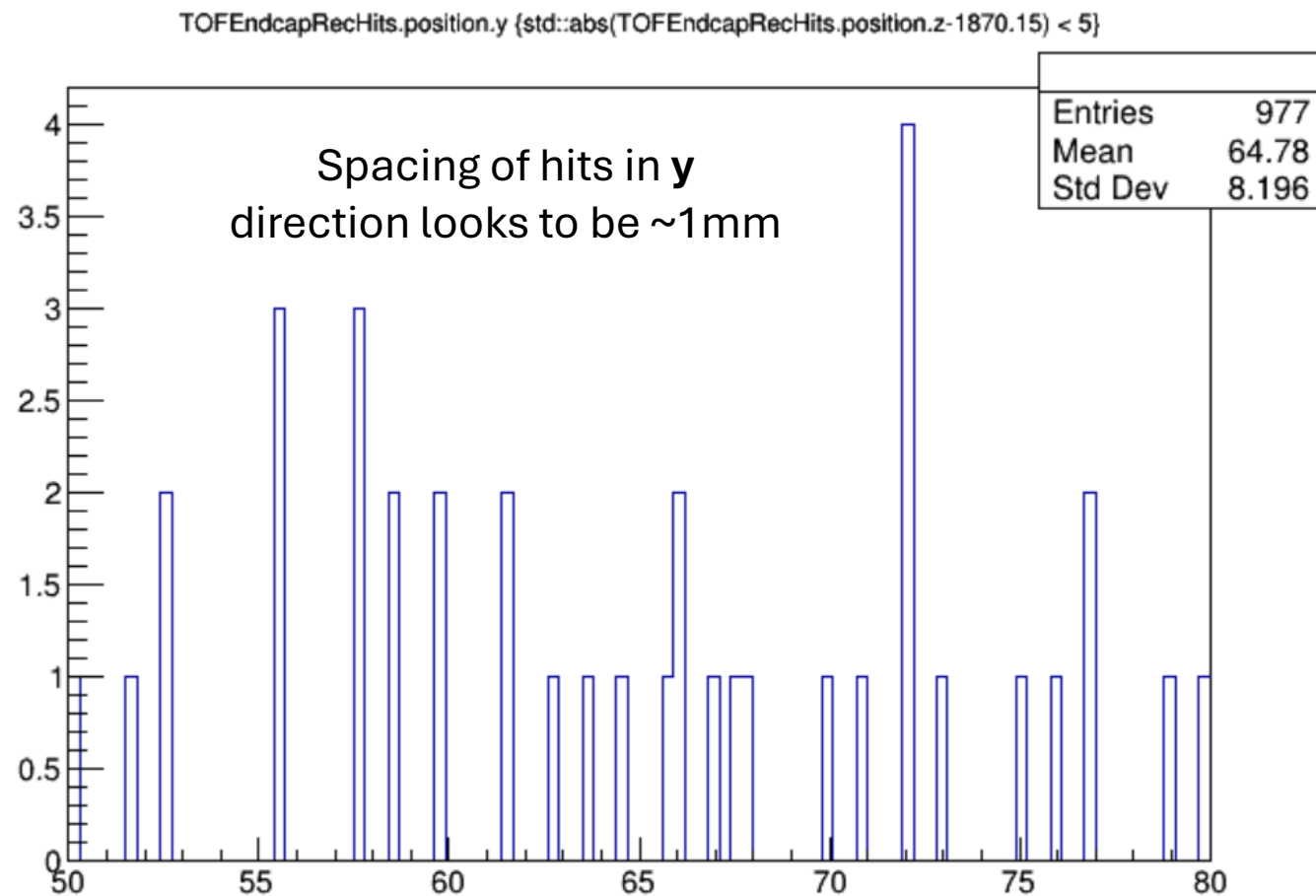
```
TOFEndcapRecHits = (vector<edm4C1C::TrackerHitData>*)0x20
TOFEndcapRecHits.cellID = 18446462804945551738
TOFEndcapRecHits.position.x = 293.198517
TOFEndcapRecHits.position.y = 76.901039
TOFEndcapRecHits.position.z = 1870.150024
TOFEndcapRecHits.positionError.xx = 0.083333
TOFEndcapRecHits.positionError.yy = 5.333333
TOFEndcapRecHits.positionError.zz = 0.000000
TOFEndcapRecHits.time = 6.323000
```



# Quick diagnosis: TOF endcap layers

```
659 <readouts>
660   <readout name="TOFEndcapHits">
661     <segmentation type="CartesianGridXY" grid_size_x="1*mm" grid_size_y="0.8*cm" />
662     <id>system:8,layer:4,module:2,idx:5,idy:5,ids:6,x:36:-12,y:-16</id>
663   </readout>
664 </readouts>
```

```
TOFEndcapRecHits = (vector<edm4C1C::TrackerHitData>*)0x20
TOFEndcapRecHits.cellID = 18446462804945551738
TOFEndcapRecHits.position.x = 293.198517
TOFEndcapRecHits.position.y = 76.901039
TOFEndcapRecHits.position.z = 1870.150024
TOFEndcapRecHits.positionError.xx = 0.083333
TOFEndcapRecHits.positionError.yy = 5.333333
TOFEndcapRecHits.positionError.zz = 0.000000
TOFEndcapRecHits.time = 6.323000
```



# Summary

- Good barrel MPGD hits that were previously missing from the track fits are now present after adjustment of digitization algorithm.
- We still see hits not used in the track fit for the outermost TOF endcap layer.
- We should check if there is an issue in the (x,y) cell sizes.
- Working to add (some of) these plots as a benchmark.