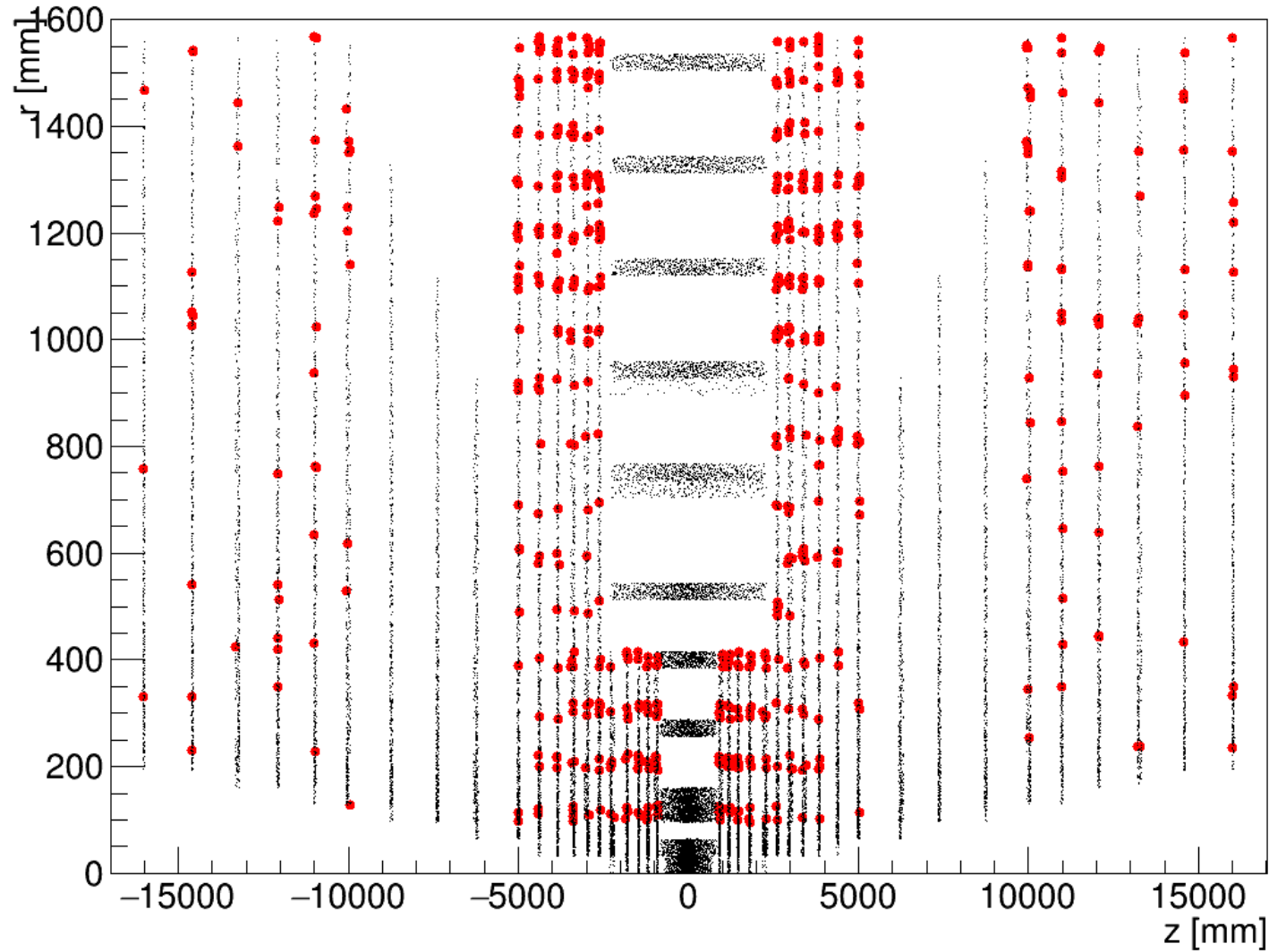


FCCSW meeting

22.11.2017

Julia Hrdinka

Duplicated Hit Positions - Geantinos



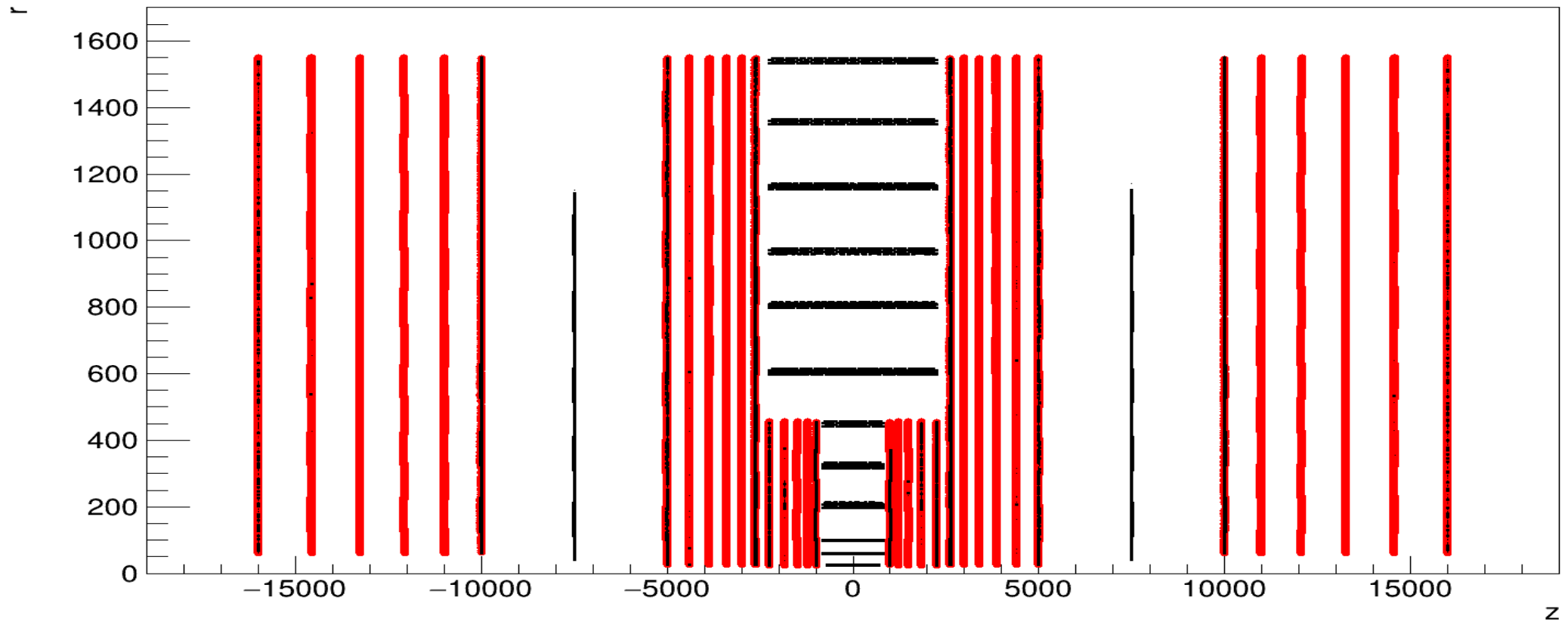
Duplicated
Unique

Finding detector elements

Not found
Found

Inside ACTS

r:z



Geantino Simulation step-by-step

Duplicated Hits occur already in [Sensitive Detector](#)

- No Problem when writing/reading from/to EDM or writing to file

Duplicated hits occur only in certain directions

- shoot into one direction & make step-by-step verbose screen output
 - Happens when step length equals zero (pre step = post step point)
 - The next step has also same pre & post step point
 - Although the positions are the same, different volume (different names & different volumeID) are accessed
 - When writing the top transformation matrix of the volumes is the same

Geometry Problem ?

Screen-output in sensitive detector

Step

```
-----SimpleTrackerSD::ProcessHits()-----  
Prestep(x,y,z)      : (-300.144,-37.5018,1458.13)  
Poststep(x,y,z)     : (-300.144,-37.5018,1458.13)  
TrackID             : 1  
cellID              : 45342690493231138  
volID               : 159778  
Name Physical Volume Prepos: component_856  
Name Physical Volume Postpos: component_856  
DetUtils::volumeID: 159778  
DetUtils::physical volume logical mother name: disc  
DetUtils::sensitive Detector: InnerECAPpos  
Extent radius: 59.4894  
TopTransform of Touchable: Transformation:  
rx/x,y,z: 0.195091 3.26795e-07 -0.980785  
ry/x,y,z: -0.980785 8.94655e-17 -0.195091  
rz/x,y,z: -6.37546e-08 1 3.20516e-07  
tr/x,y,z: 9.29628e-05 -1458.14 -250.156
```

Next Step

```
-----SimpleTrackerSD::ProcessHits()-----  
Prestep(x,y,z)      : (-300.144,-37.5018,1458.13)  
Poststep(x,y,z)     : (-300.144,-37.5018,1458.13)  
TrackID             : 1  
cellID              : 45342690493120546  
volID               : 49186  
Name Physical Volume Prepos: component_208  
Name Physical Volume Postpos: component_208  
DetUtils::volumeID: 49186  
DetUtils::physical volume logical mother name: disc  
DetUtils::sensitive Detector: InnerECAPpos  
Extent radius: 59.4894  
TopTransform of Touchable: Transformation:  
rx/x,y,z: 0.195091 3.26795e-07 -0.980785  
ry/x,y,z: -0.980785 8.94655e-17 -0.195091  
rz/x,y,z: -6.37546e-08 1 3.20516e-07  
tr/x,y,z: 9.29628e-05 -1458.14 -250.156
```

Duplicated Hits Muons

Duplicated hits distributed all over the detector

- Physics processes occur
- Implement digitization

Geant4Hits in DD4hep deprecated

1. Use [Geant4Hits](#)
 - would support it, if we use it
2. Use [Geant4Data](#)?
 - Does not inherit from G4VHit
 - possibility to attach EDM hit directly to G4HitsCollection
 - Avoid temporary memory duplication
3. Create our own Geant4Hit

Readout

- System ID should have length 4 (=16 Subdetectors)
 - Tracker has 5 of these available
(InnerBarrel, InnerEndcap, OuterBarrel, OuterEndcap, ForwardEndcap)
 - Currently 11 system IDs needed in Tracker
 - [Grouping together Endcaps](#): still 7 needed (Helper EC, first Barrel)
1. Group together Tracker to use only one or two Ids (Tracker/InnerTracker, OuterTracker)
 - Generic DD4hep Readout does not work for that
 - Would need to write our own complex Readout (Correlating cellIDs with detectors correctly)
 2. Change output of TkLayout
 3. Change system length to 5 (has impact on all other systems)