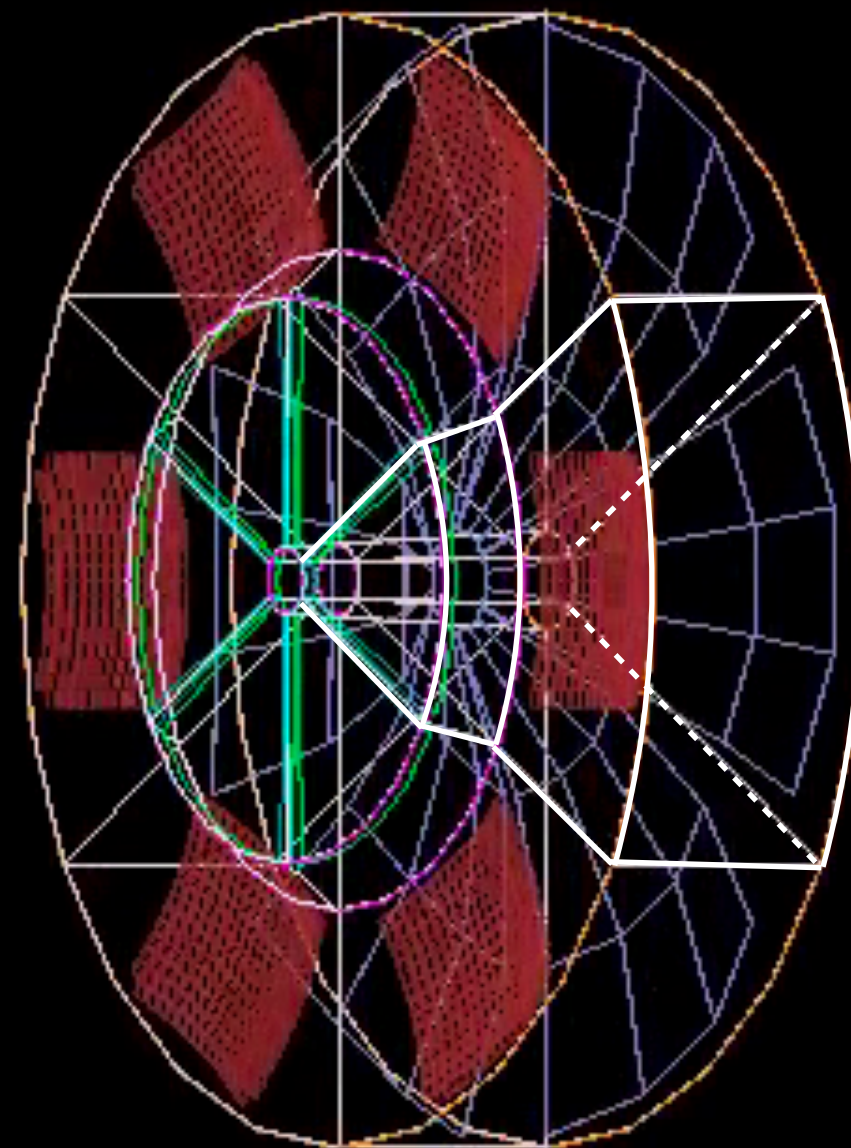


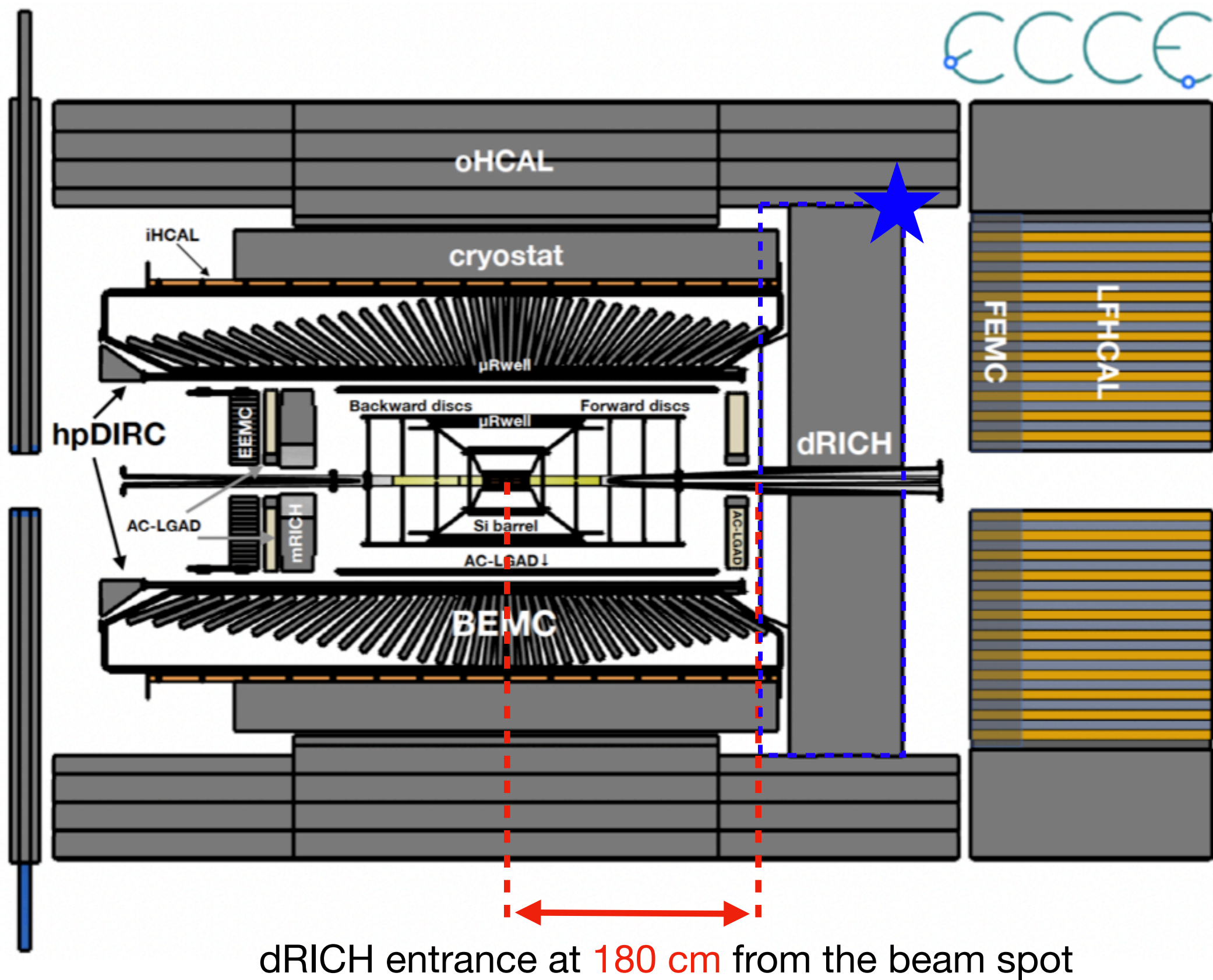


# ECCE DRICH GEOMETRY

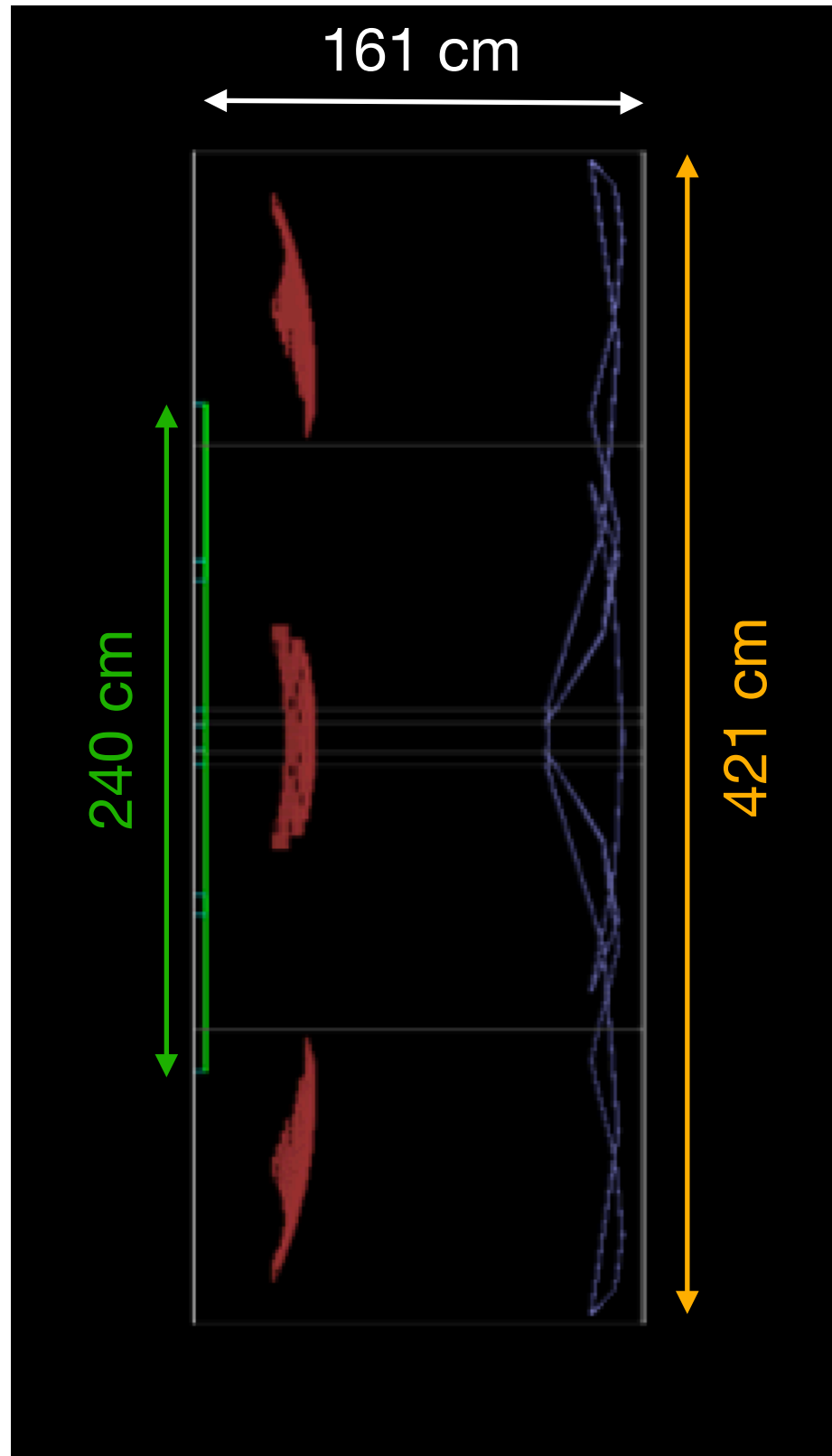
---



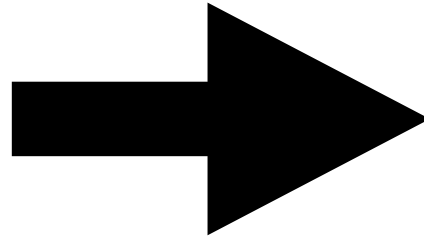
SEBASTIAN TAPIA, JUN 17, 2022



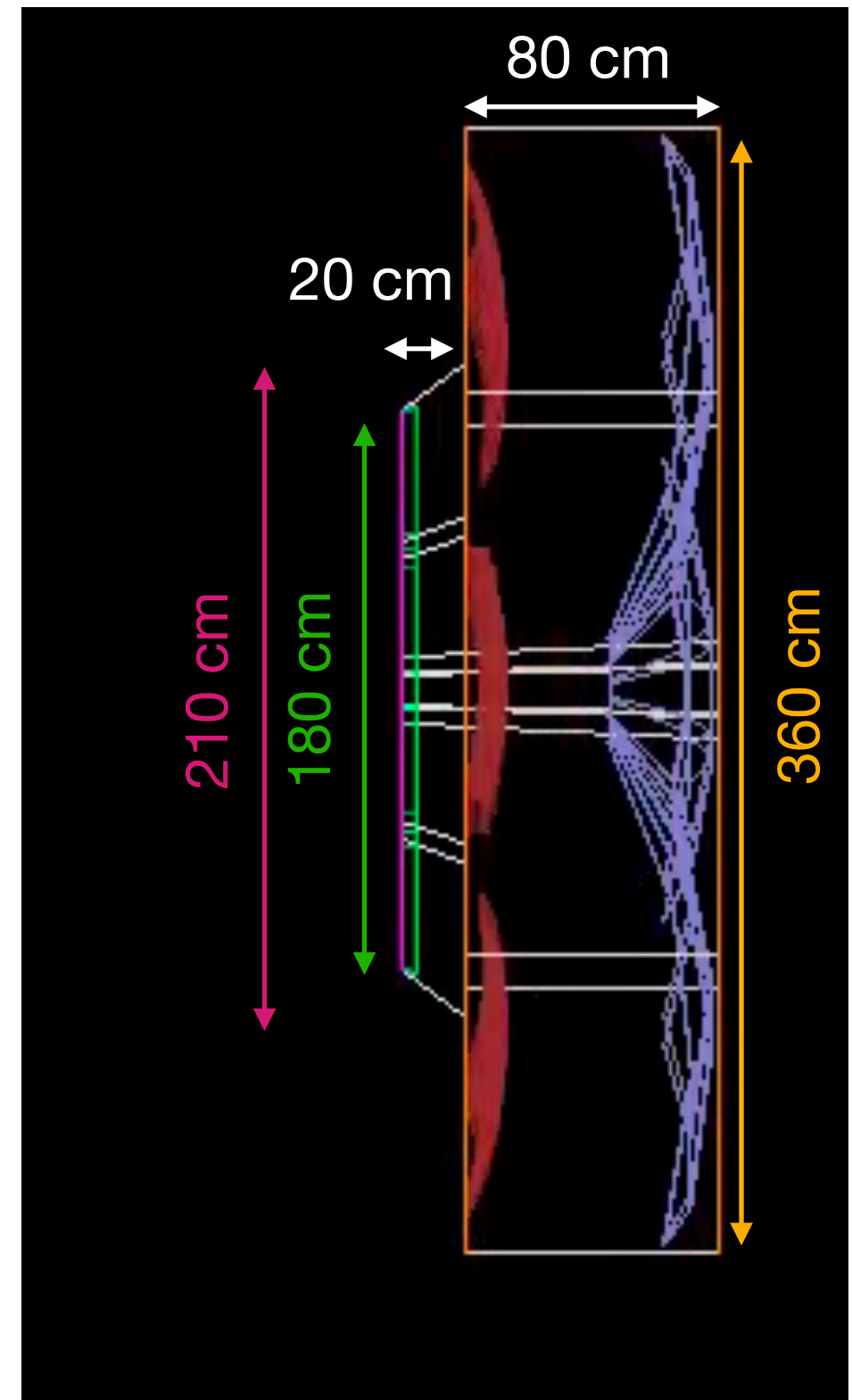
Original geometry  
(YR & eRD14)



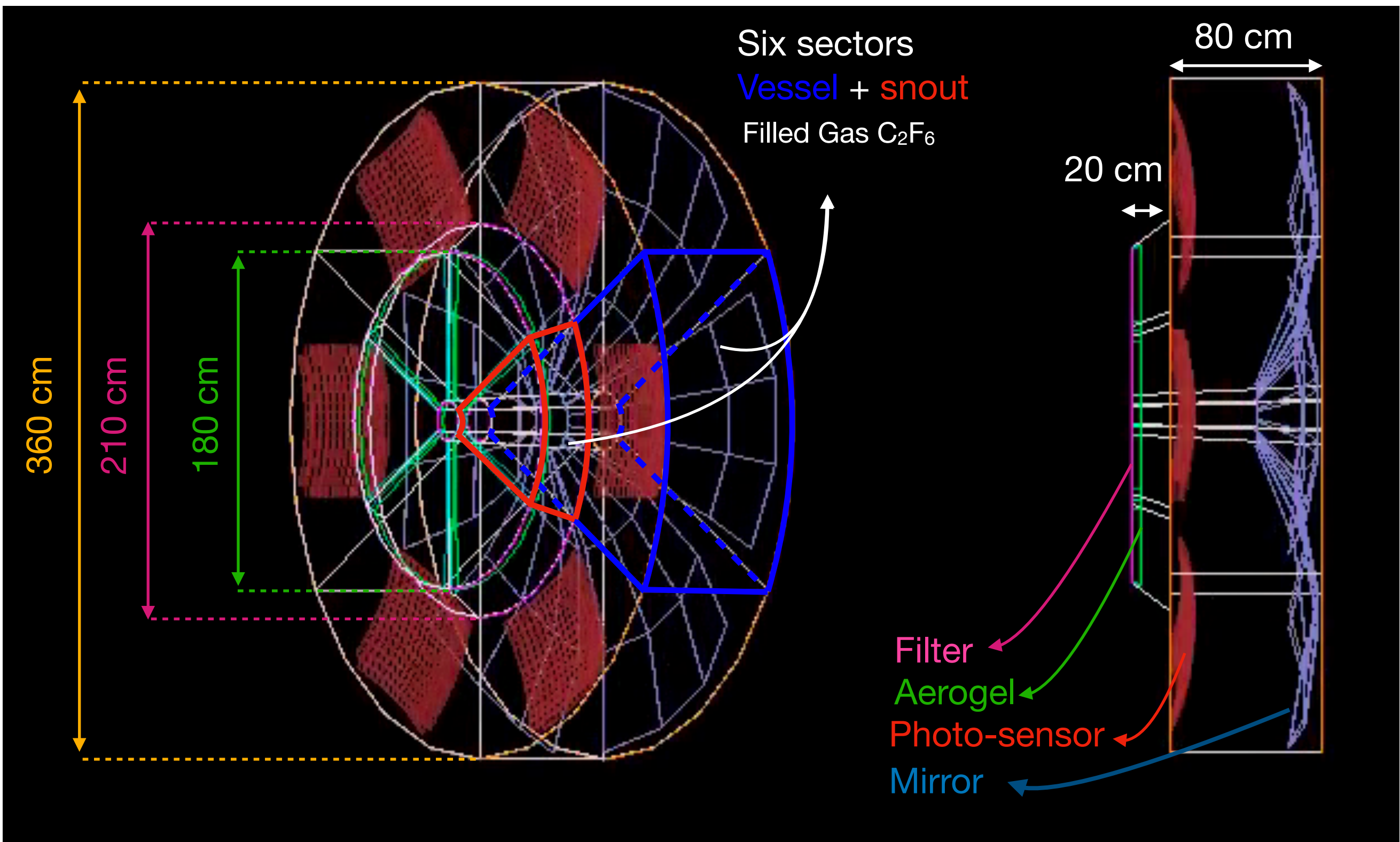
Scaled down

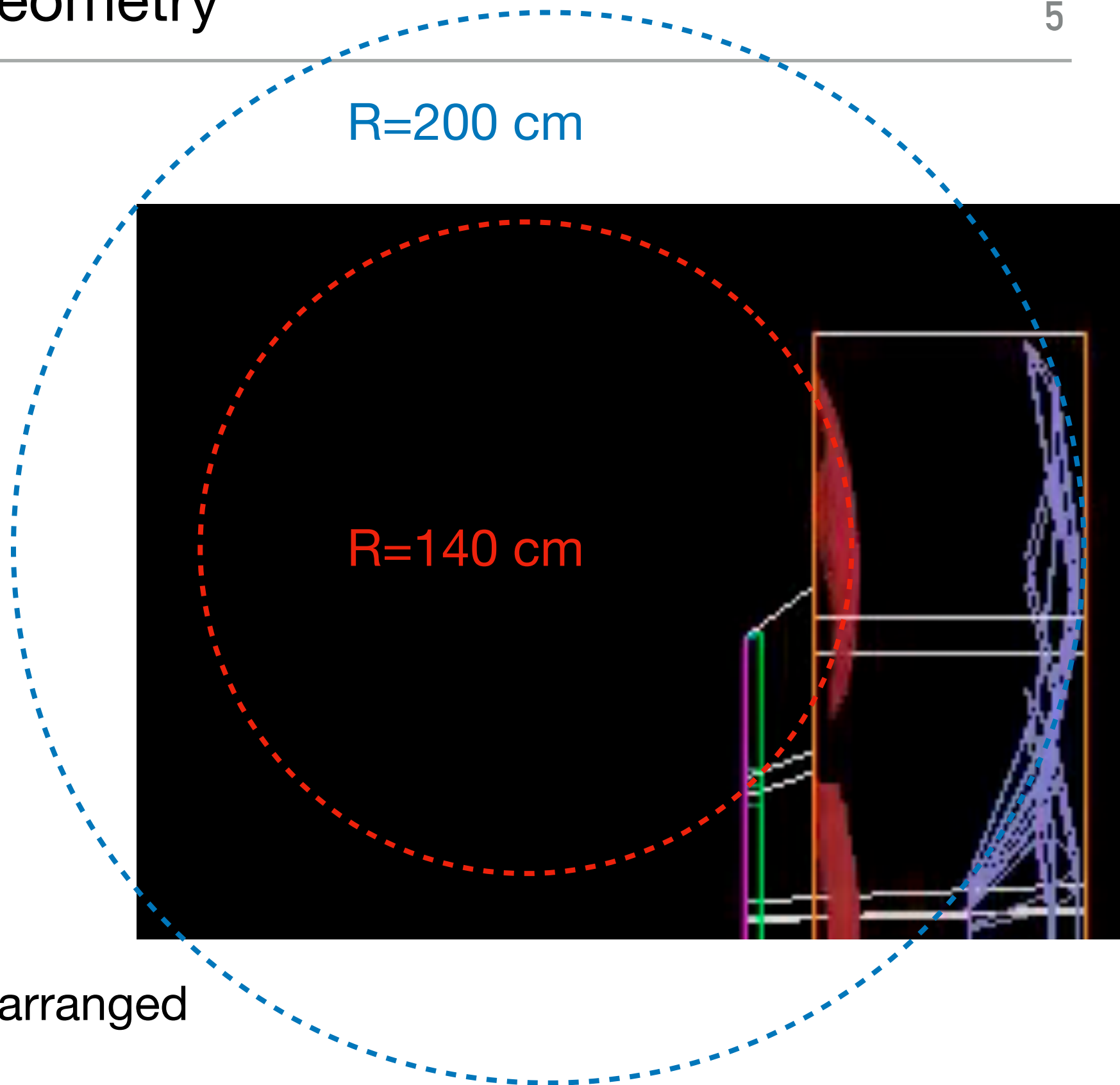
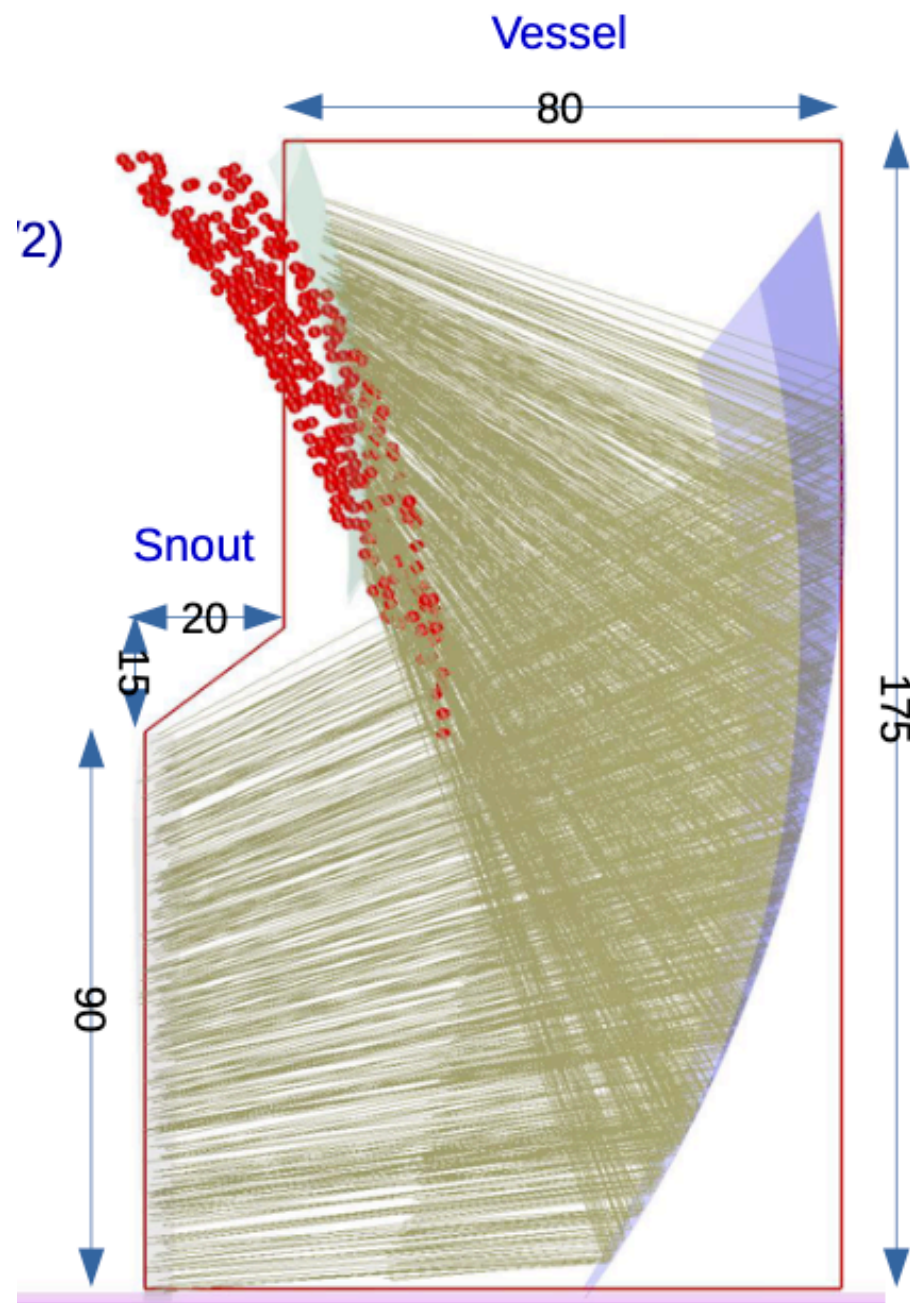


ECCE geometry









- Mirror and photo-sensors arranged in sphere geometry.
- Optimized with ray-tracing software by Evaristo

# dRICH in ECCE — implementation

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## dRICH Core

[https://github.com/eic/fun4all\\_eicdetectors/tree/master/simulation/g4simulation/g4drich](https://github.com/eic/fun4all_eicdetectors/tree/master/simulation/g4simulation/g4drich)

## dRICH geometry configure from txt file

[https://github.com/ECCE-EIC/calibrations/tree/main/dRICH/mapping/drich-g4model\\_v5.txt](https://github.com/ECCE-EIC/calibrations/tree/main/dRICH/mapping/drich-g4model_v5.txt)

## Volumen definition

```
// aerogel
```

```
:VOLU $aerName CONS $aerogelInRadius+0.0*mm $aerogelOutRadius-4.9*mm $aerogelInRadius+0.5*mm $aerogelOutRadiu  
:COLOR $aerName 0.0 1.0 1.0 0.4  
:CHECK_OVERLAPS $aerName ON
```

```
// filter
```

```
:VOLU $filterName CONS $filterInRadius $aerogelOutRadius $filterInRadius $aerogelOutRadius $acrylicFilterThic  
:COLOR $filterName 0.0 1.0 0.0 0.5
```

```
:CHECK_OVERLAPS $filterName ON
```

—————→ Overlap checks supported

```
// spherical mirror
```

```
:VOLU $mirrorName SPHERE $mirrorInRadius $mirrorRadius $mirrorPhiStart $mirrorPhiDelta $mirrorTheta0 $mirrorT  
:COLOR $mirrorName 0.5 0.5 0.8 1.0  
:CHECK_OVERLAPS $mirrorName ON
```

```
// photo-sensor single tile
```

```
:VOLU $sensorTName BOX $sensorTileLengthX/2. $sensorTileLengthY/2. $sensorTileThickness/2. $sensorMatName  
:COLOR $sensorTName 0.6 0.2 0.2 0.5  
:CHECK_OVERLAPS $sensorTName ON
```

## GEANT4 GEOMETRY FROM TEXT DOCUMENTATION

[https://geant4.web.cern.ch/sites/default/files/geant4/collaboration/working\\_groups/geometry/docs/textgeom/textgeom.pdf](https://geant4.web.cern.ch/sites/default/files/geant4/collaboration/working_groups/geometry/docs/textgeom/textgeom.pdf)



# dRICH in ECCE — implementation

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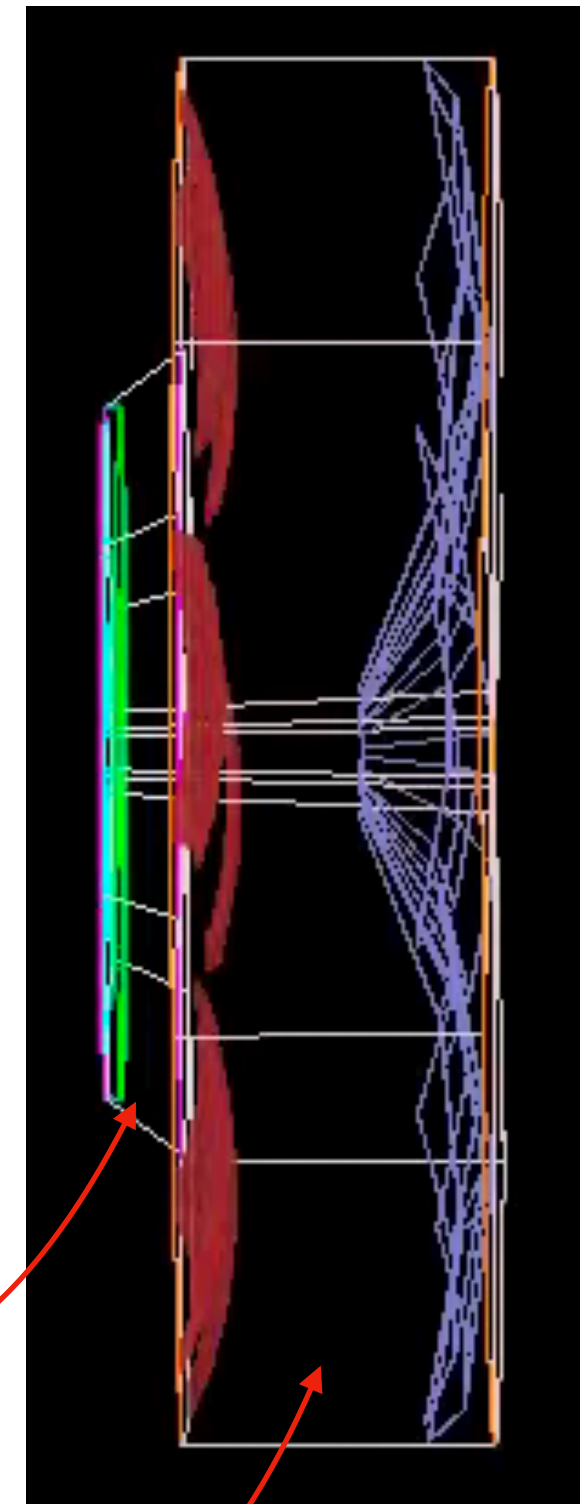
Adding each part into the main volumen

```
// place volumes in petals
:PLACE $aerName 1 $petalName1 R1 0. 0. $aerogelZ0
:PLACE $filterName 2 $petalName1 R1 0. 0. $acrylicFilterZ0
:PLACE $mirrorName 1 $petalName2 RMIR $mirrorCenterX 0. $mirrorCenterZ
:PLACE $sensorTName 1 $petalName2 R1 114.0*cm -37.50*cm -33.5651*cm
:PLACE $sensorTName 2 $petalName2 R1 114.0*cm -32.50*cm -32.2696*cm
:PLACE $sensorTName 3 $petalName2 R1 114.0*cm -27.50*cm -31.1689*cm
:PLACE $sensorTName 4 $petalName2 R1 114.0*cm -22.50*cm -30.2584*cm
:PLACE $sensorTName 5 $petalName2 R1 114.0*cm -17.50*cm -29.5343*cm
:PLACE $sensorTName 6 $petalName2 R1 114.0*cm -12.50*cm -28.9937*cm
:PLACE $sensorTName 7 $petalName2 R1 114.0*cm -7.50*cm -28.6345*cm
:PLACE $sensorTName 8 $petalName2 R1 114.0*cm -2.50*cm -28.4552*cm
:PLACE $sensorTName 9 $petalName2 R1 114.0*cm 2.50*cm -28.4552*cm
```

up to \$sensorTName ~200

Snout = Petal1

Vessel= Petal2

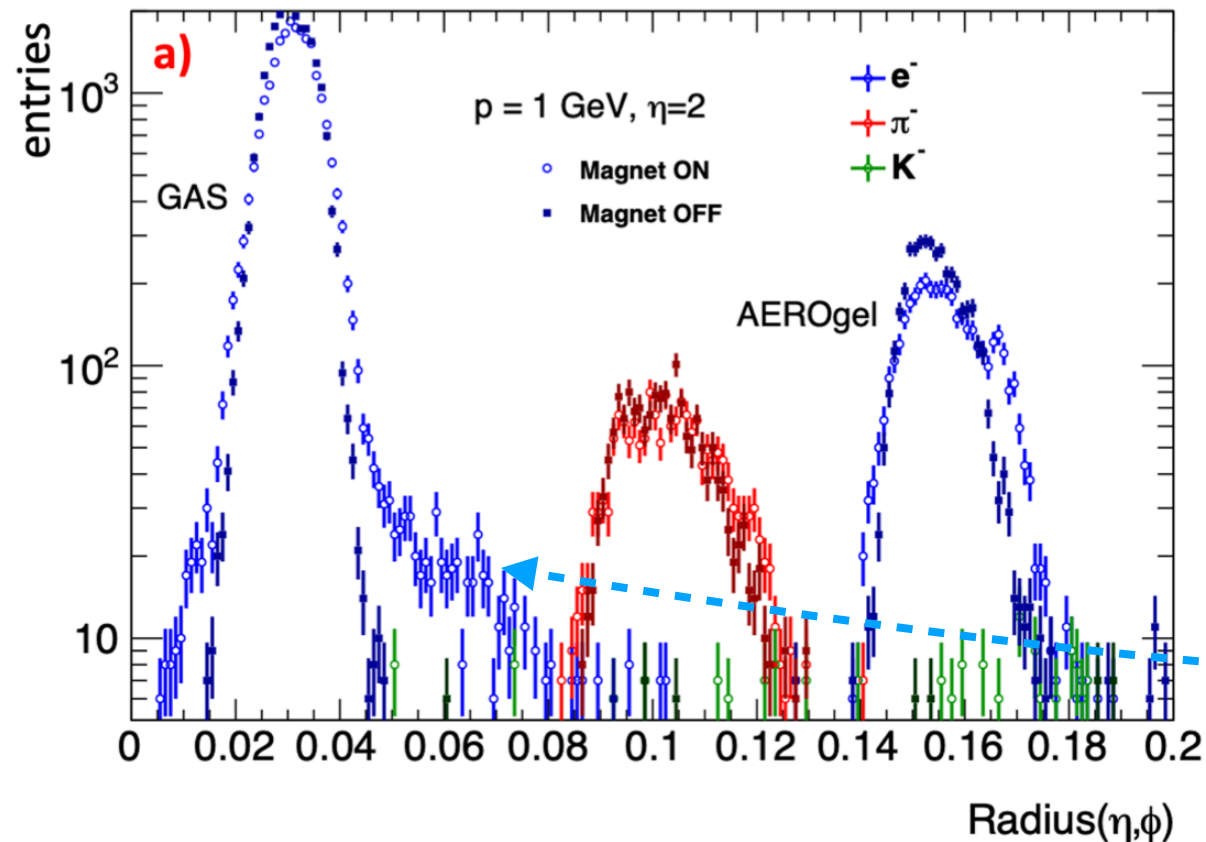
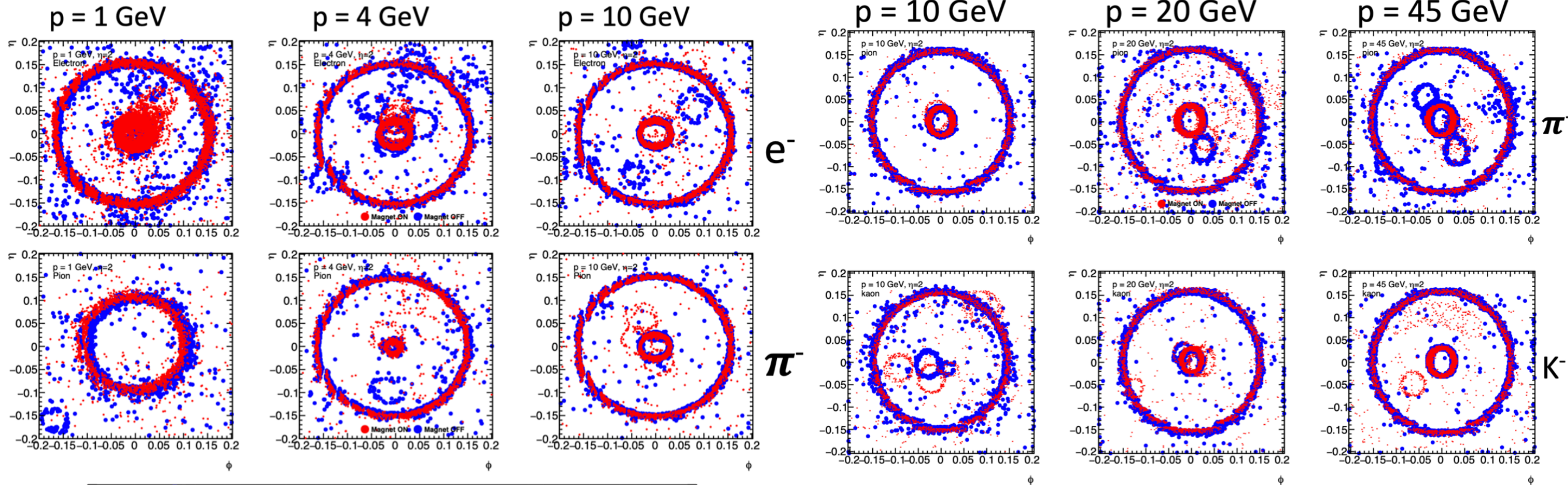


# dRICH in ECCE — magnetic field impact

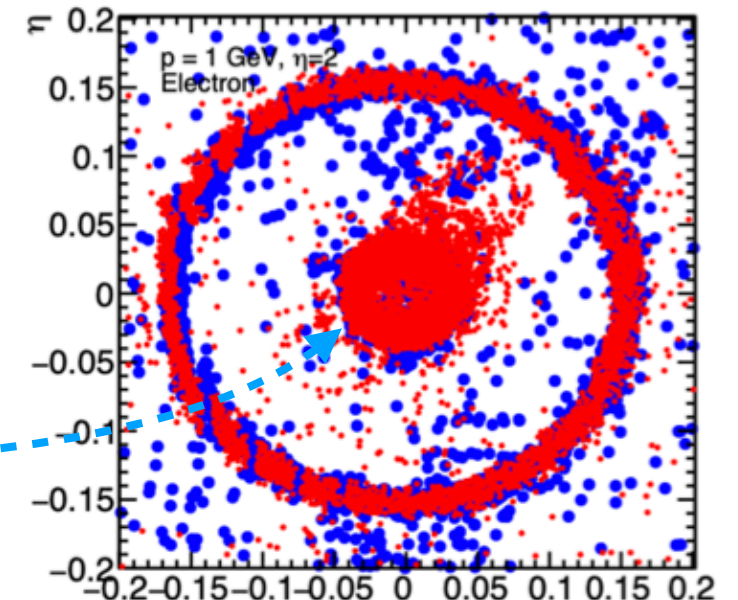
8

Low  $p$ ,  $e^-$  and  $\pi^-$

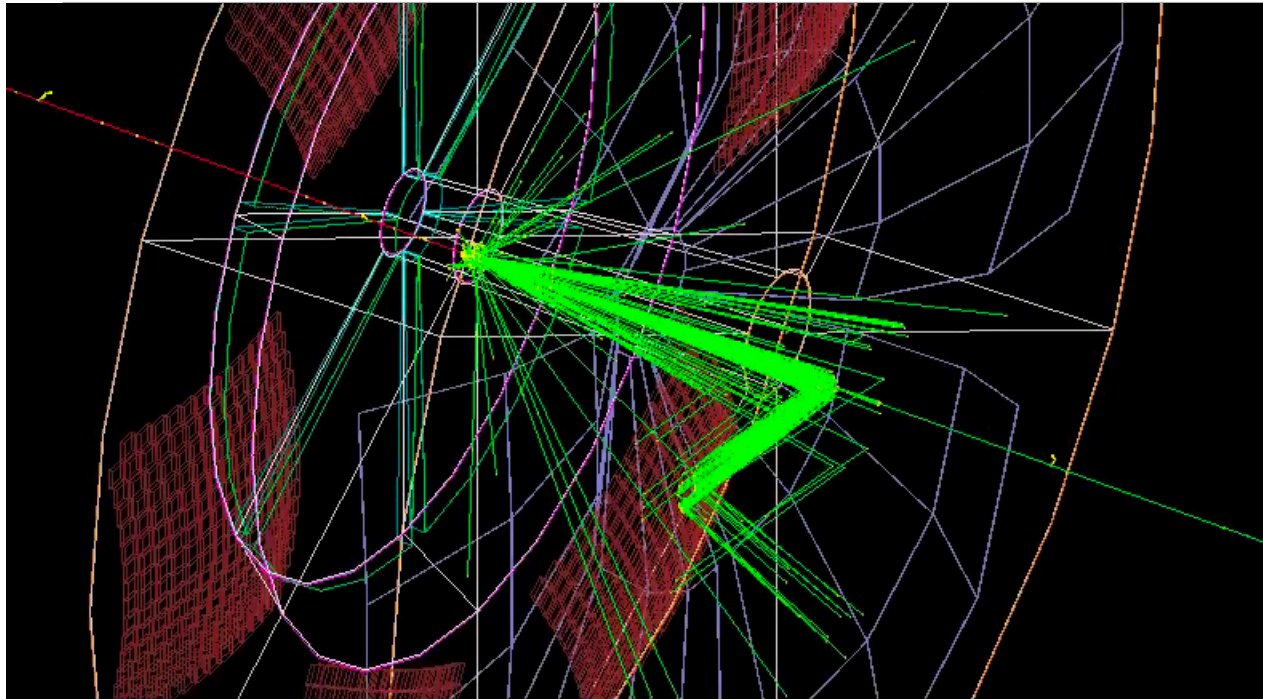
High  $p$ ,  $\pi^-$  and  $K^-$



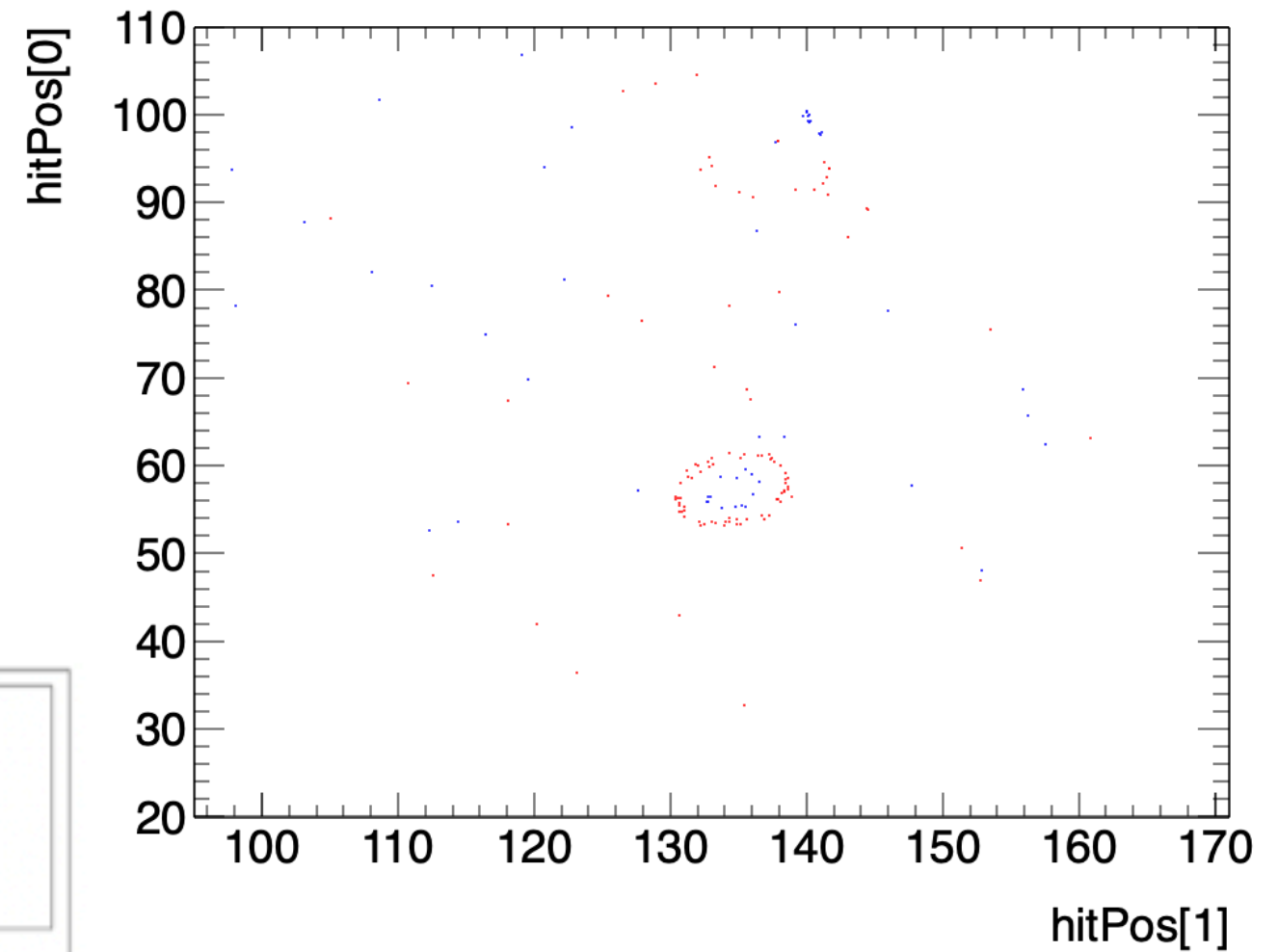
Magnetic field **ON** **OFF**  
Small impact for low  $p$  (1 GeV) electron  
gas-photons



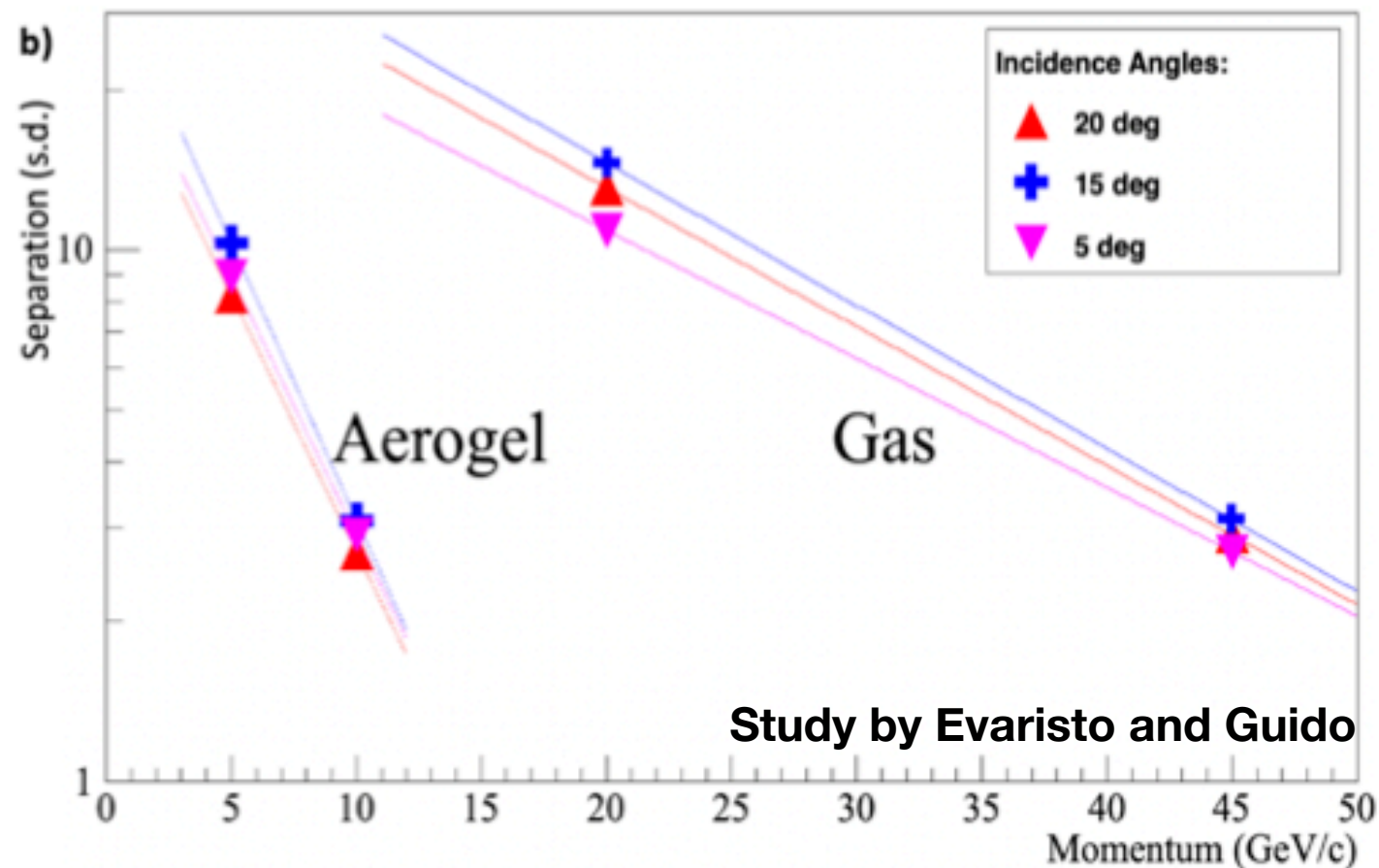




Single event  
5 GeV, **Pion** and **Kaon**



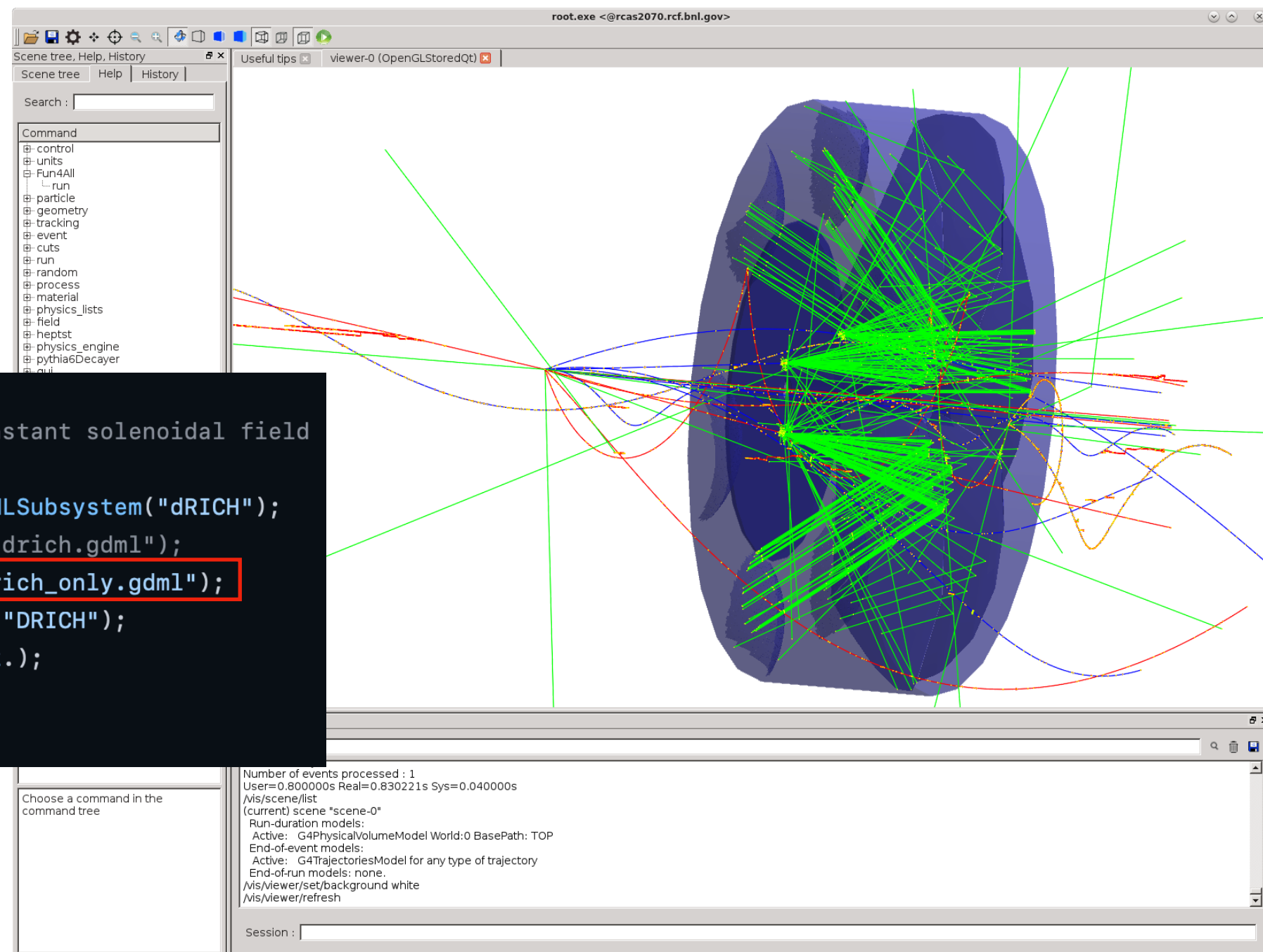
Pion/Kaon separation



TGeo/GDML detector should be relatively simple to import to Fun4All (digitization and reco are the harder parts).

Example of ATHENA dRICH following Chris' work:

[https://github.com/ECCE-EIC/analysis/blob/master/dRICH/TestImports/Fun4All\\_G4\\_dRICHImport.C](https://github.com/ECCE-EIC/analysis/blob/master/dRICH/TestImports/Fun4All_G4_dRICHImport.C)



**Additional slides**



