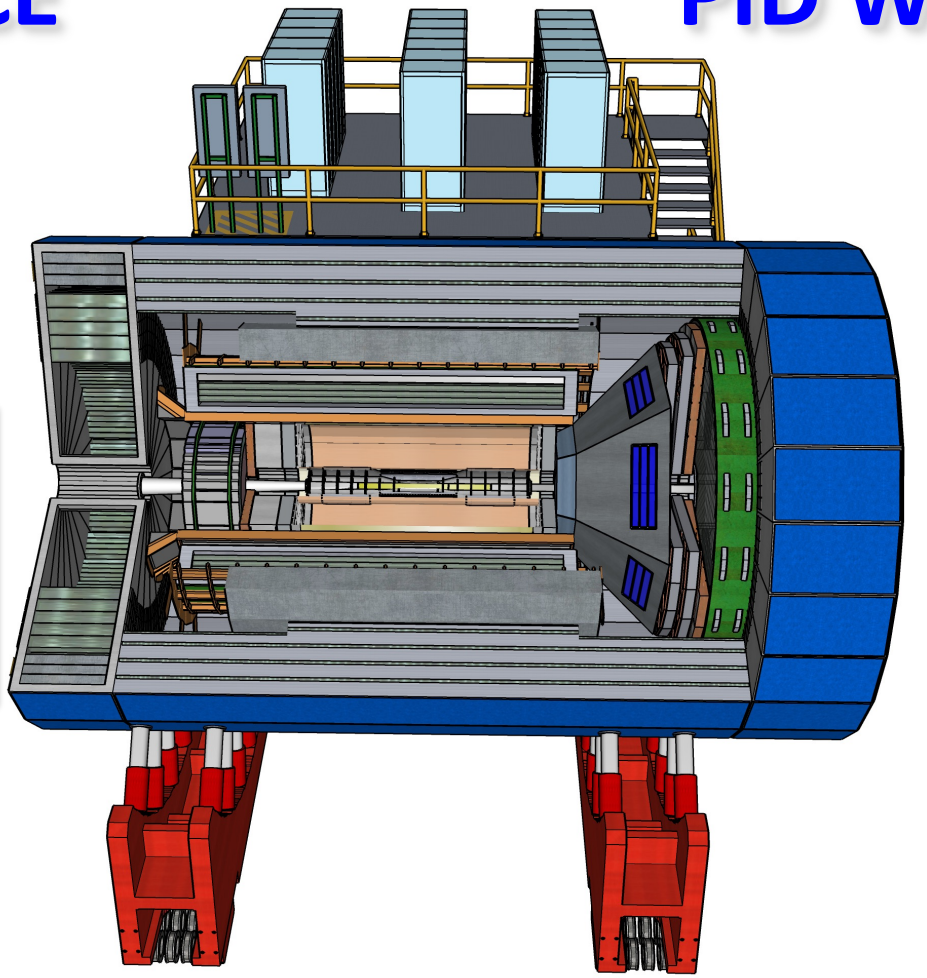
PID@ECCE

PID WG Meeting



Greg Kalicy — CUA

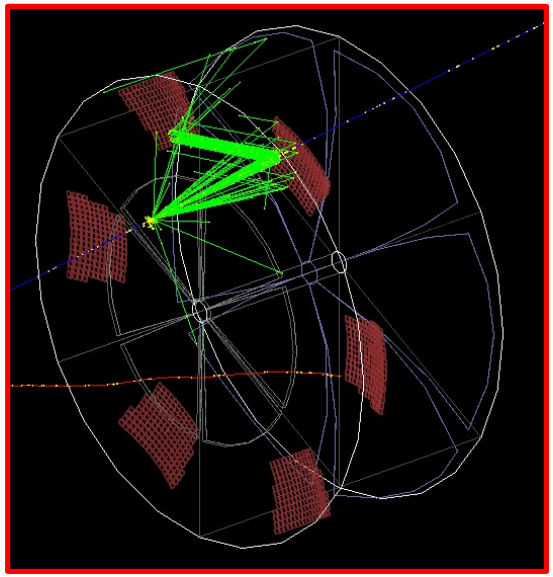
Xiaochun He — Georgia State University

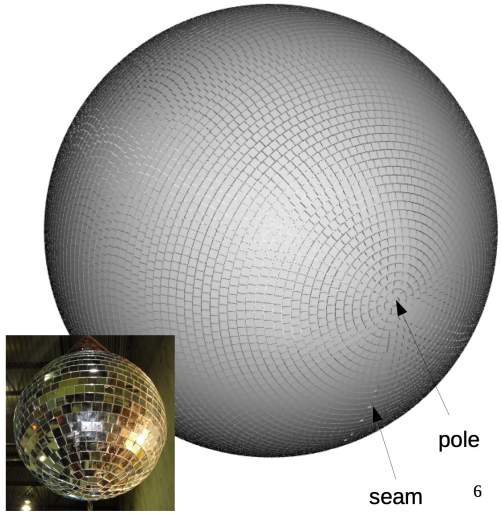
- dRICH Integration
- Simulation status

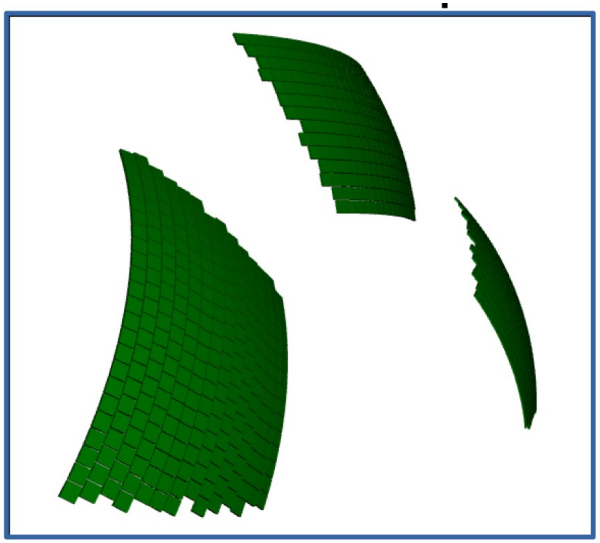
July 16th 2021

DRICH@ECCE F4A

- **Wednesday (7/13 https://wiki.bnl.gov/eicug/index.php/PID_Meetings) we had four dRICH progress reports:**
  - **Sebastian Tapia** is working on reproducing performance plots with stand alone F4A code
  - **Cameron Dean** ported dRICH to ECCE F4A and is trying to make it part of new build. It is compiling now within ECCE framework after sorting some local variable issues and cleaning up the code.
  - **Chris Dilks** is working on improving of the design.
  - **Evaristo Cisbani** looked at radial size issue.

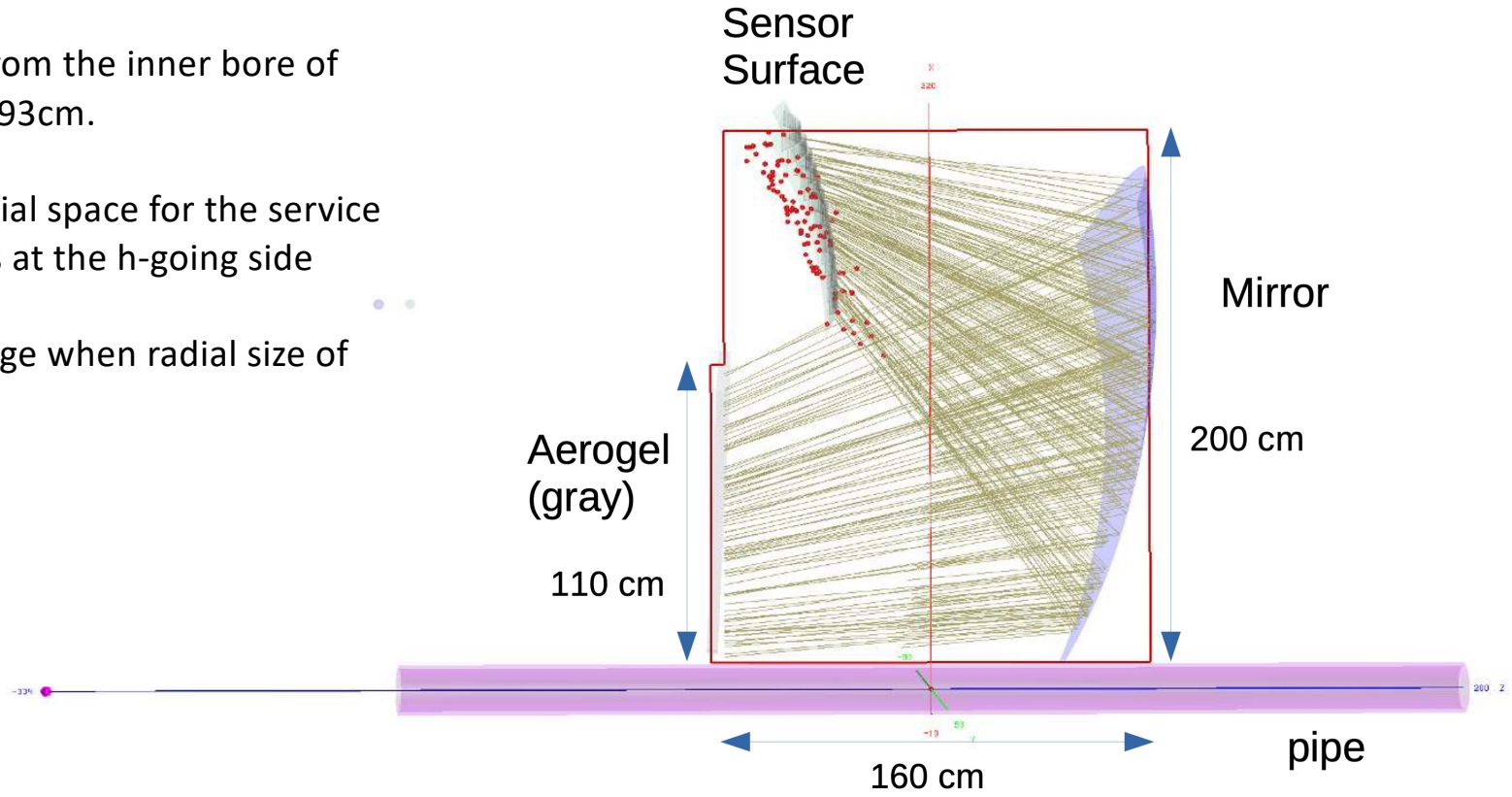






dRICH Radial Size

- Current 200 cm (+ 10 cm beamline) radial size is too much!
- The maximum radius constraint from the inner bore of outer hadronic calorimeter is R=193cm.
- dRICH should also leave some radial space for the service and cabling of the inner detectors at the h-going side
- Evaristo studied impact on covarage when radial size of dRICH is max 175 cm



dRICH Radial Size

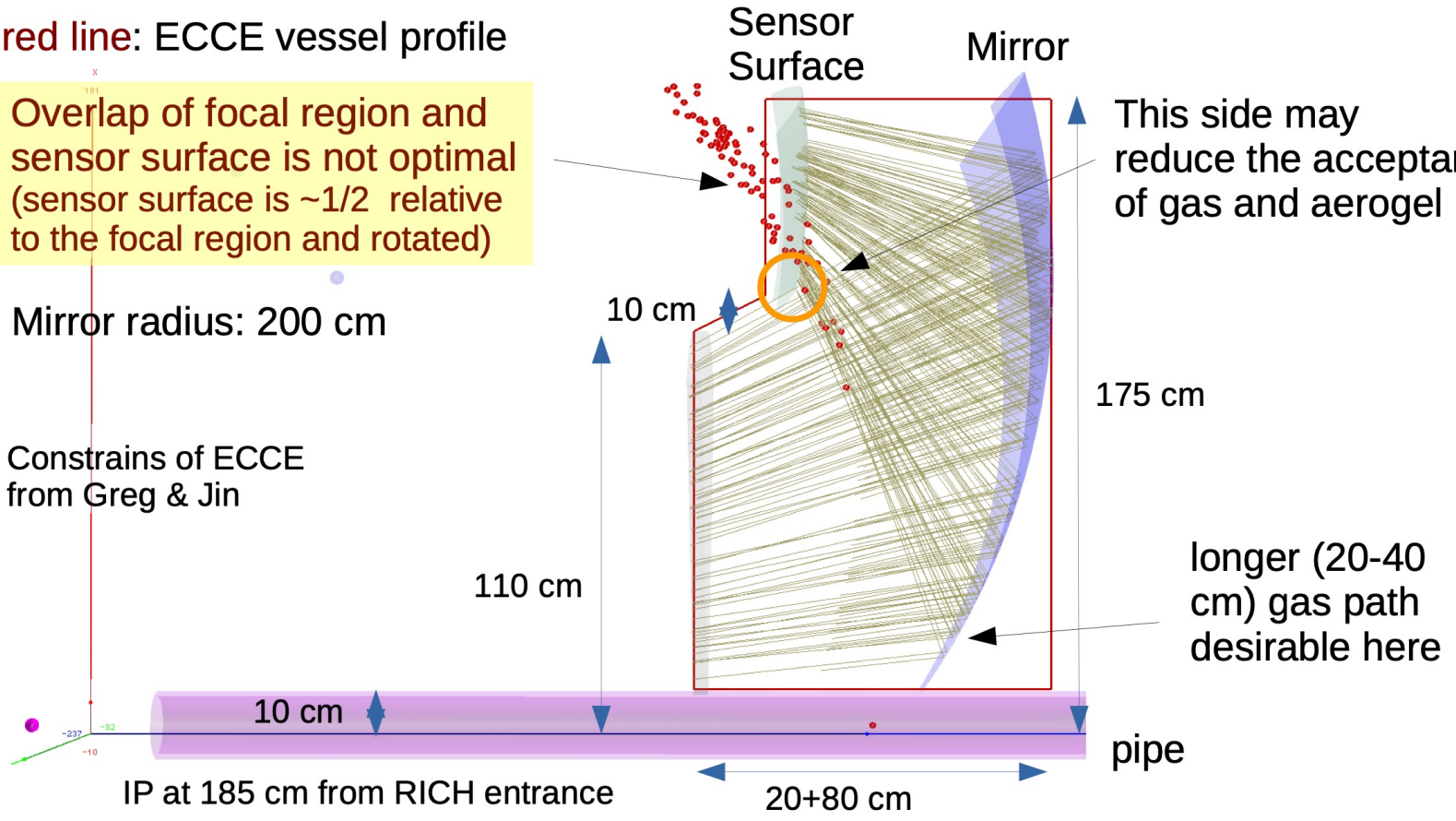
red dots: focal region (approx.)
yellow lines: photons at **gas Cherenkov** angles relative to charger particles direction from IP

red line: ECCE vessel profile

Overlap of focal region and sensor surface is not optimal (sensor surface is ~1/2 relative to the focal region and rotated)

Mirror radius: 200 cm

Constrains of ECCE from Greg & Jin

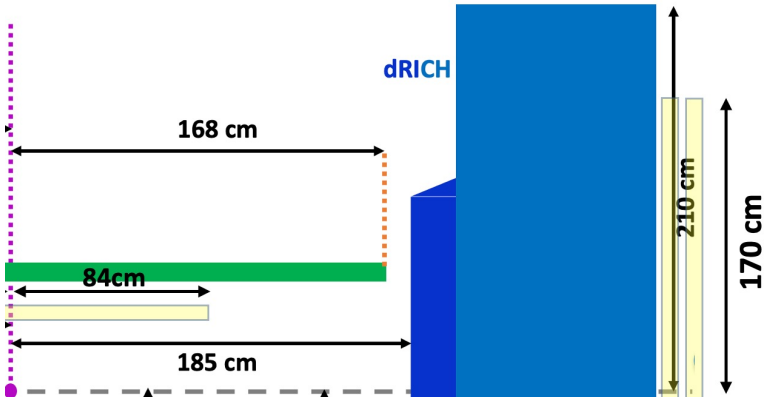


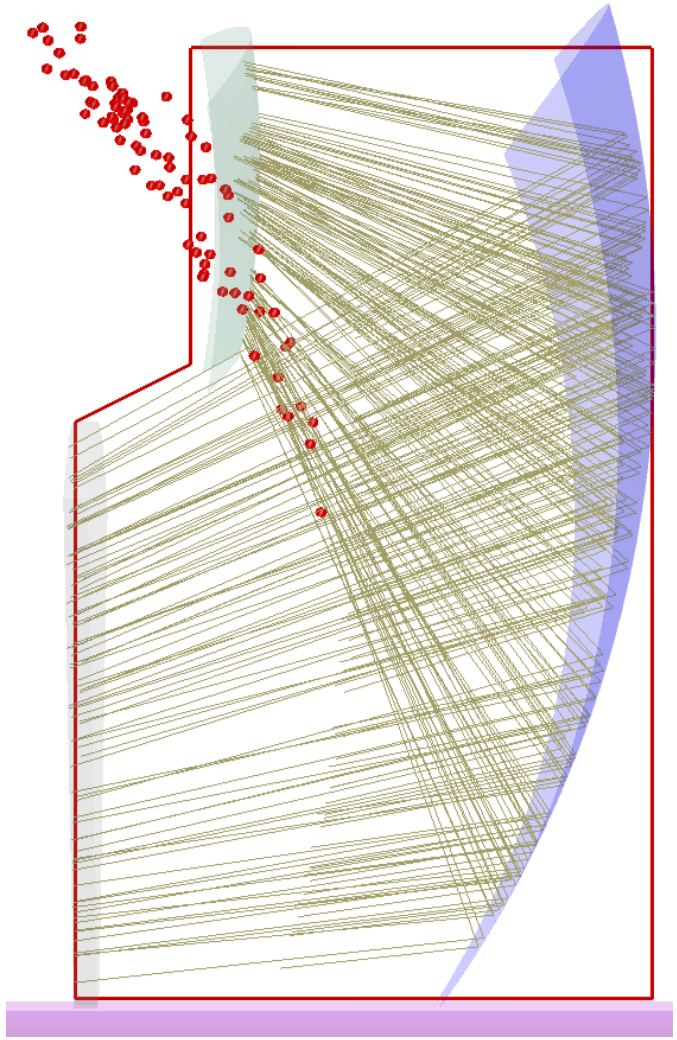
dRICH Radial Size

- In HERMES, LHCb and CLAS12, a matrix of smaller mirrors are used.
  - we shall consider the possibility to have decreasing radius of the mirrors on the matrix going from the bottom to the top
  - this comes with potential side effects that need to be evaluated (RECONSTRUCTION - shadowing, variable chromaticity ...)

- Other solution would be to decrease acceptance by making aerogel window ~85cm (part of lost phase space hpDIRC could cover but at lower momentum!)

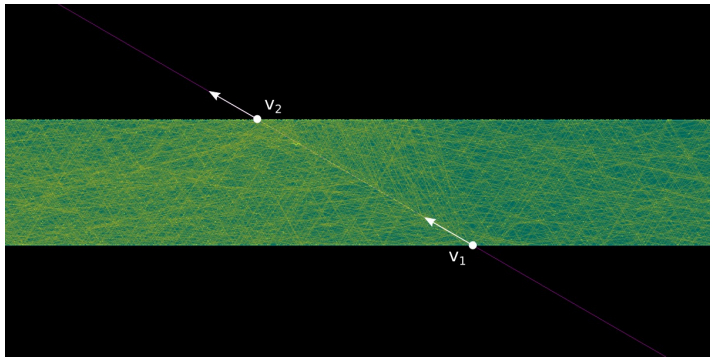
- **Additional transverse (and longitudinal) space would help simplifying the design and get better performances**

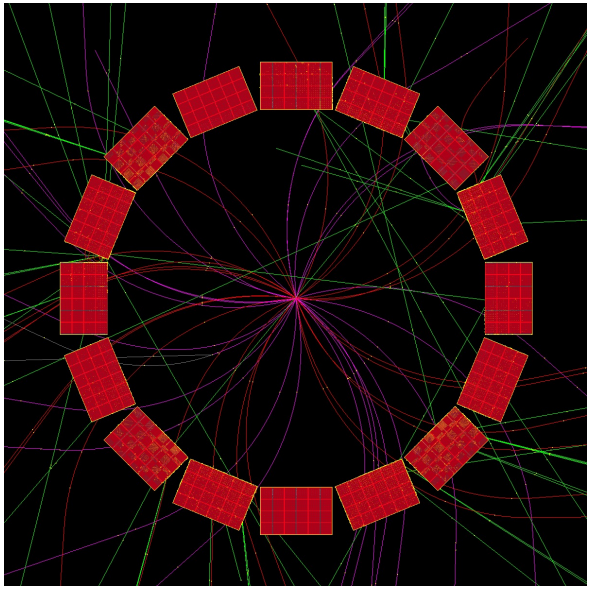


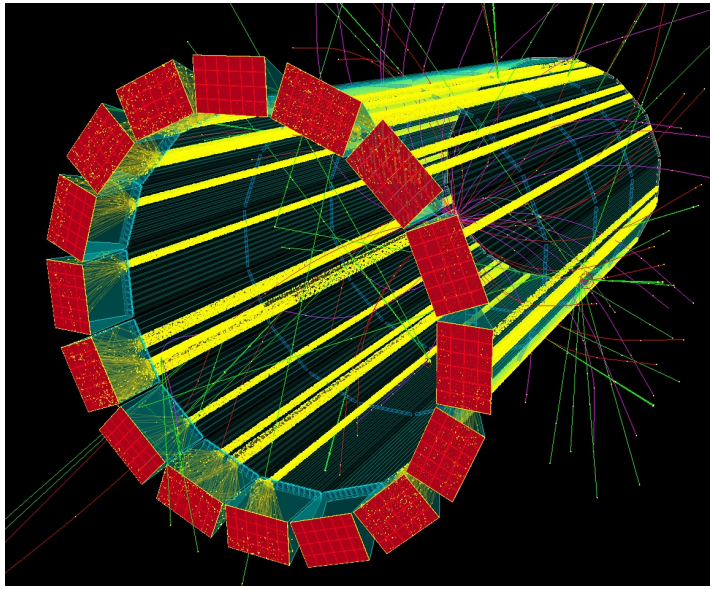


HPDIRC@ECCE F4A

- **Roman Dzhygadlo** is working in stand alone G4 on impact of magnetic field, multiple scattering in lower momenta, and connected to it extra tracking point post hpDIRC
- **Nilanga Wickramaarachchi** is working on porting hpDIRC to ECCE F4A. Crosscheck of processes, efficiencies and general hit patterns looks great. Now working on saving information for full reconstruction.







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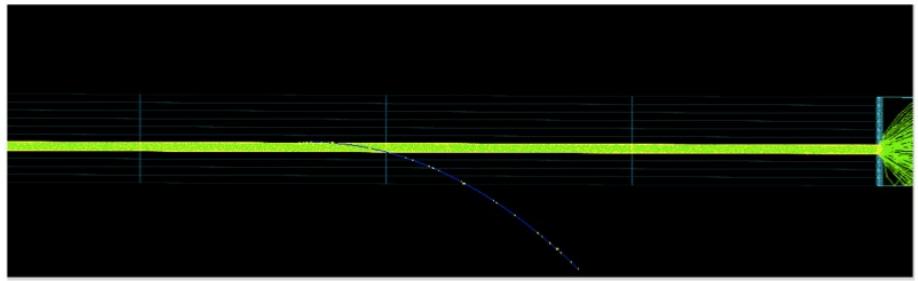
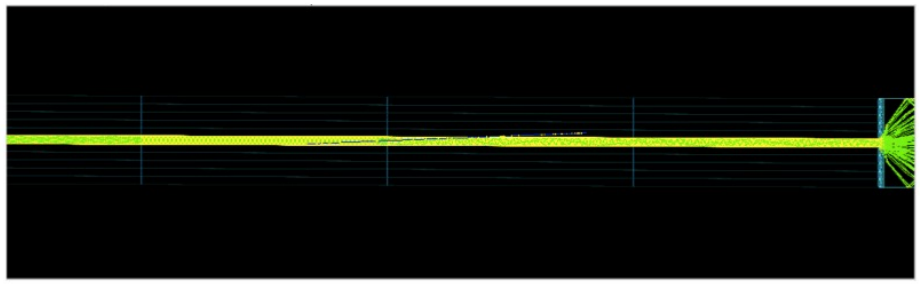


B=1.5 T

F4A



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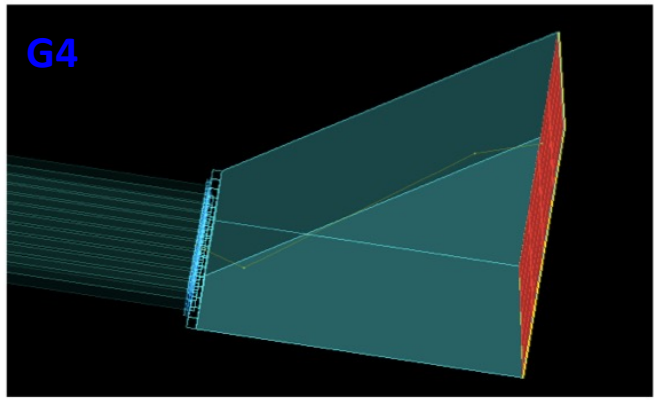
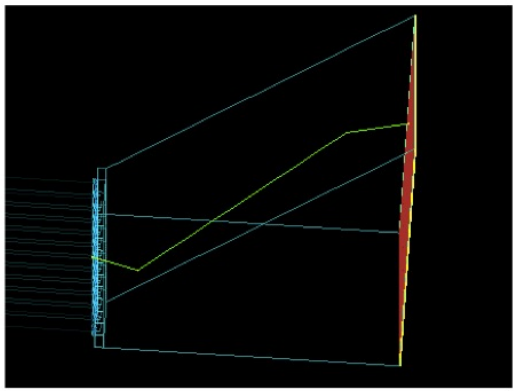
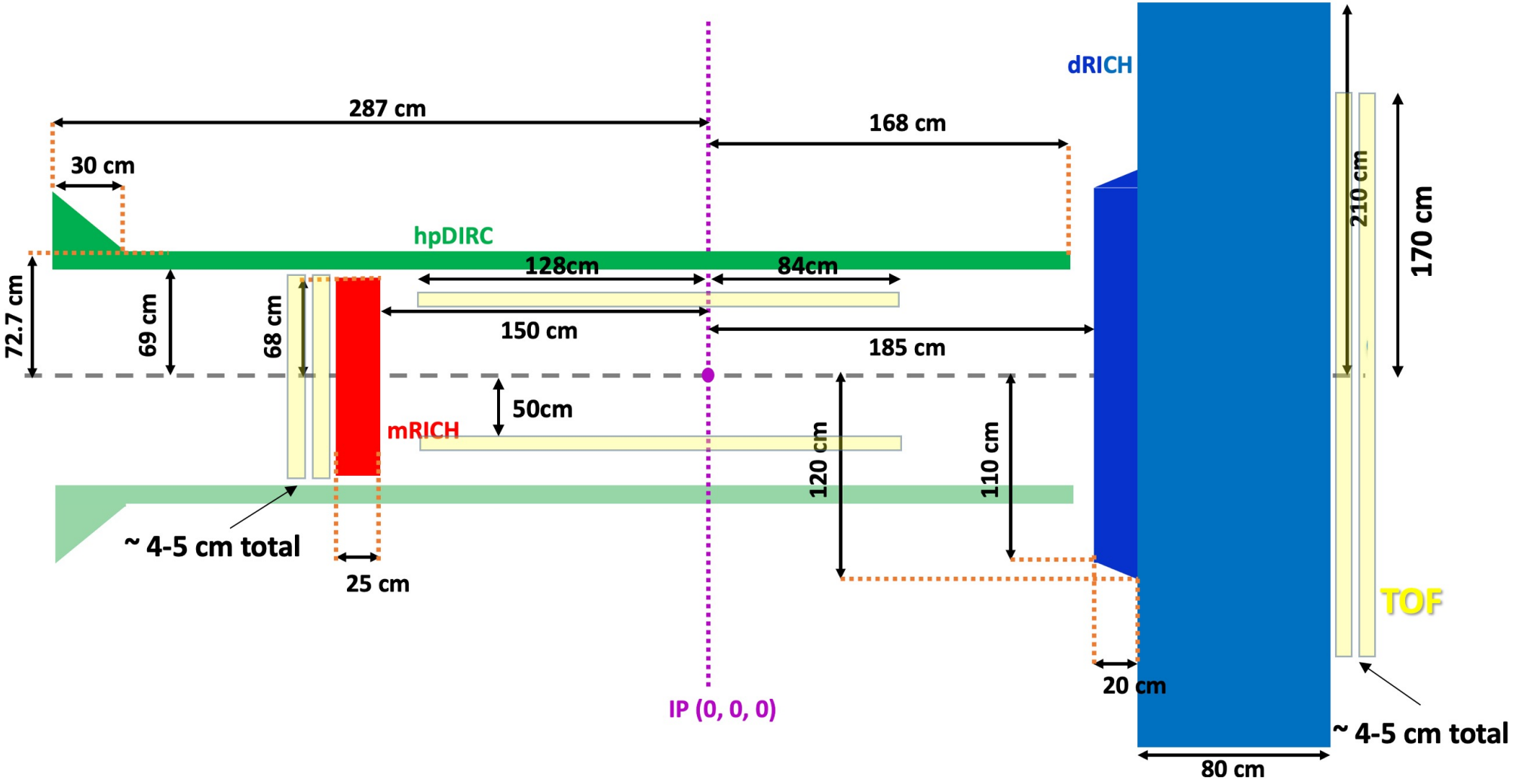


F4A



PID@ECCE


dRICH
287 cm
168 cm
30 cm
hpDIRC
128cm
84cm
72.7 cm
69 cm
68 cm
150 cm
185 cm
50cm
mRICH
120 cm
110 cm
210 cm
170 cm
~ 4-5 cm total
25 cm
TOF
20 cm
IP (0, 0, 0)
~ 4-5 cm total
80 cm

ECCE SketchUp Design