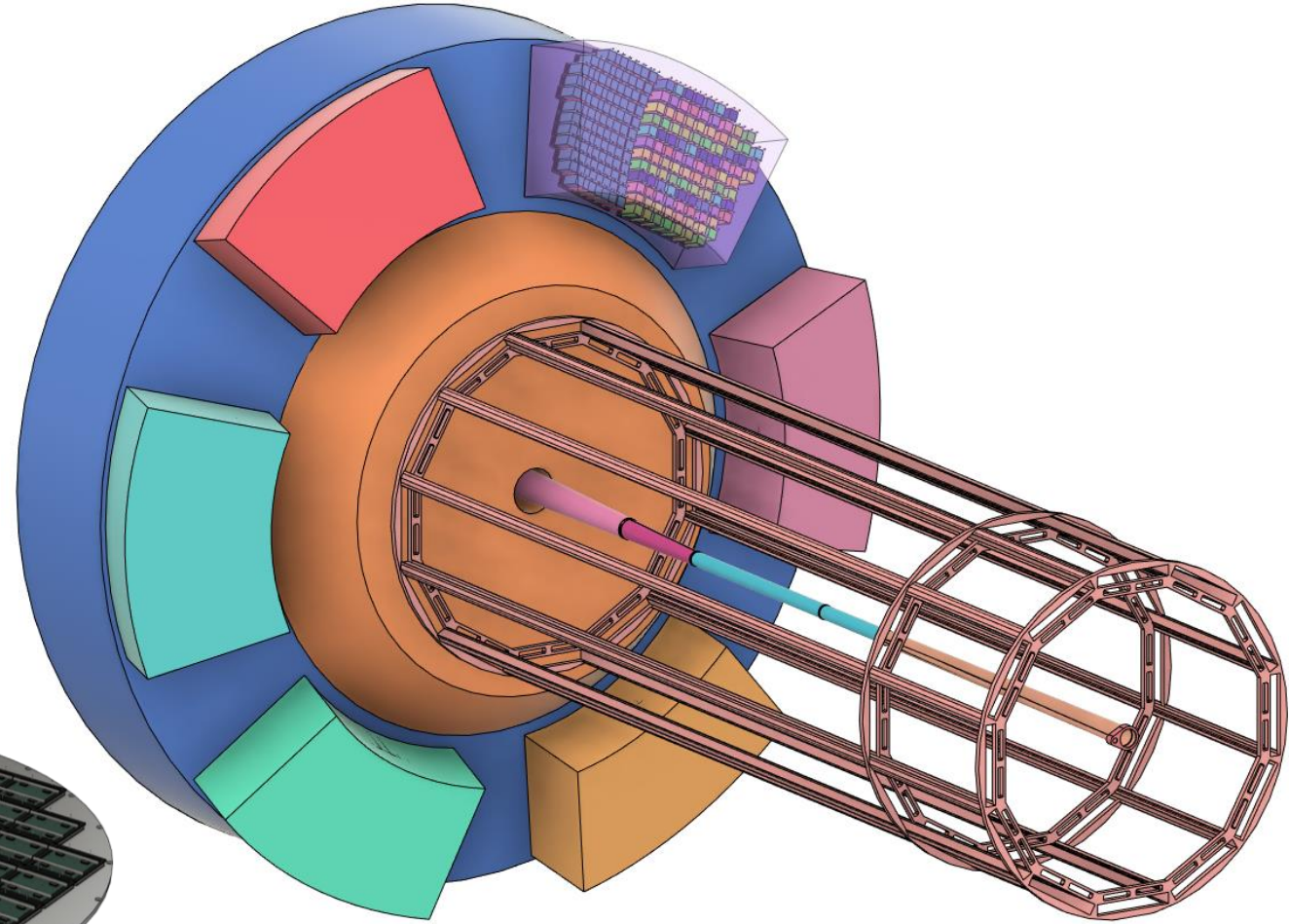
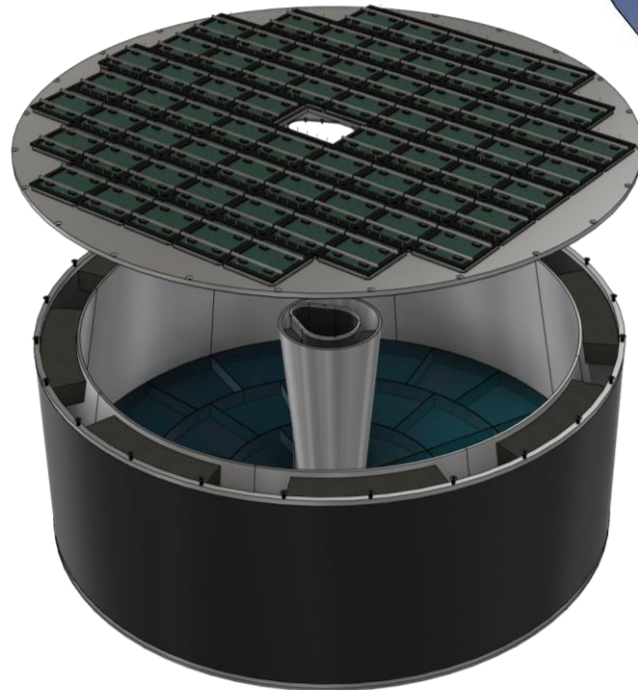


ePIC Constraints for PID

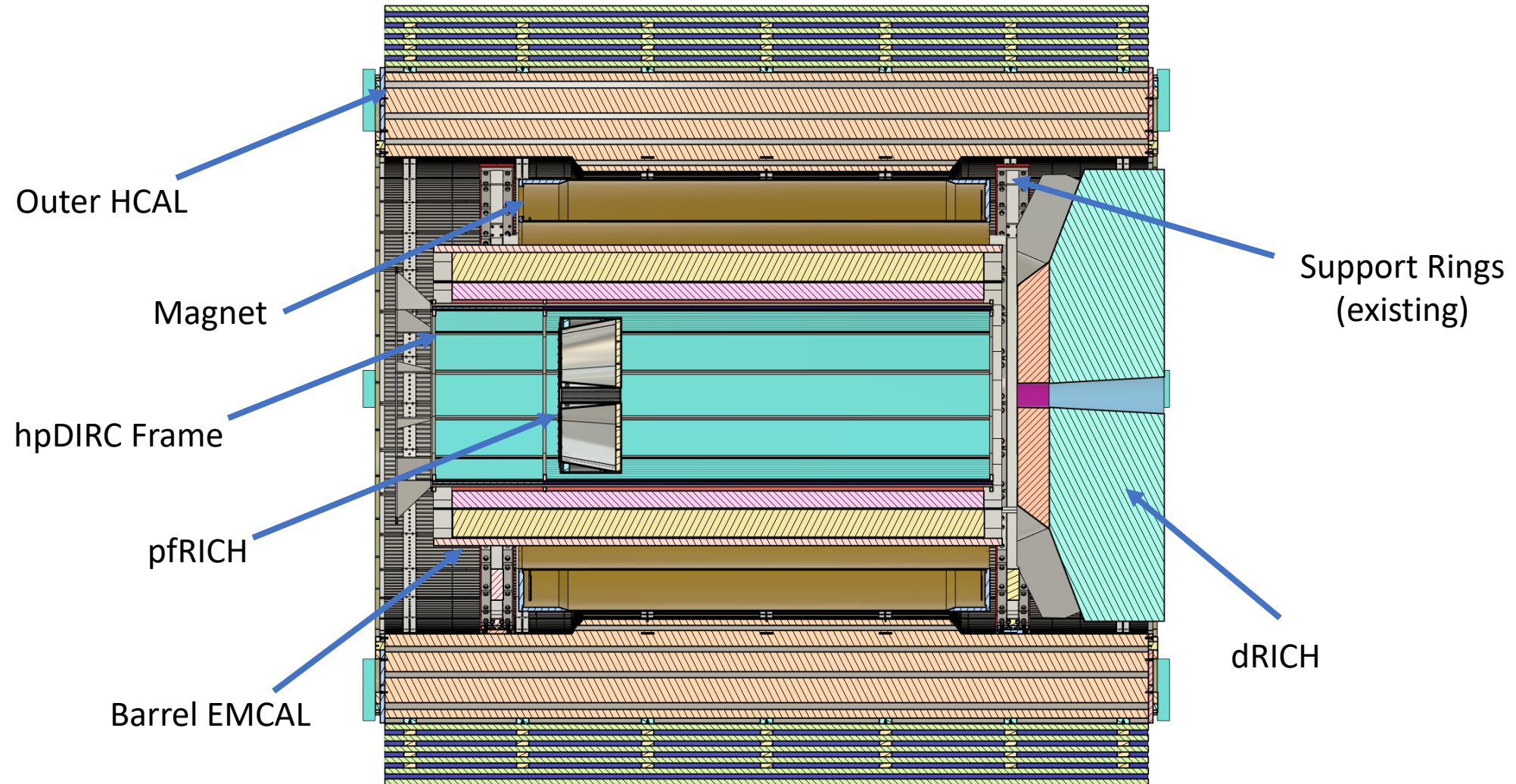
Alex Eslinger (Jlab), Rahul Sharma (BNL), Roland Wimmer (BNL)

Today's Discussion

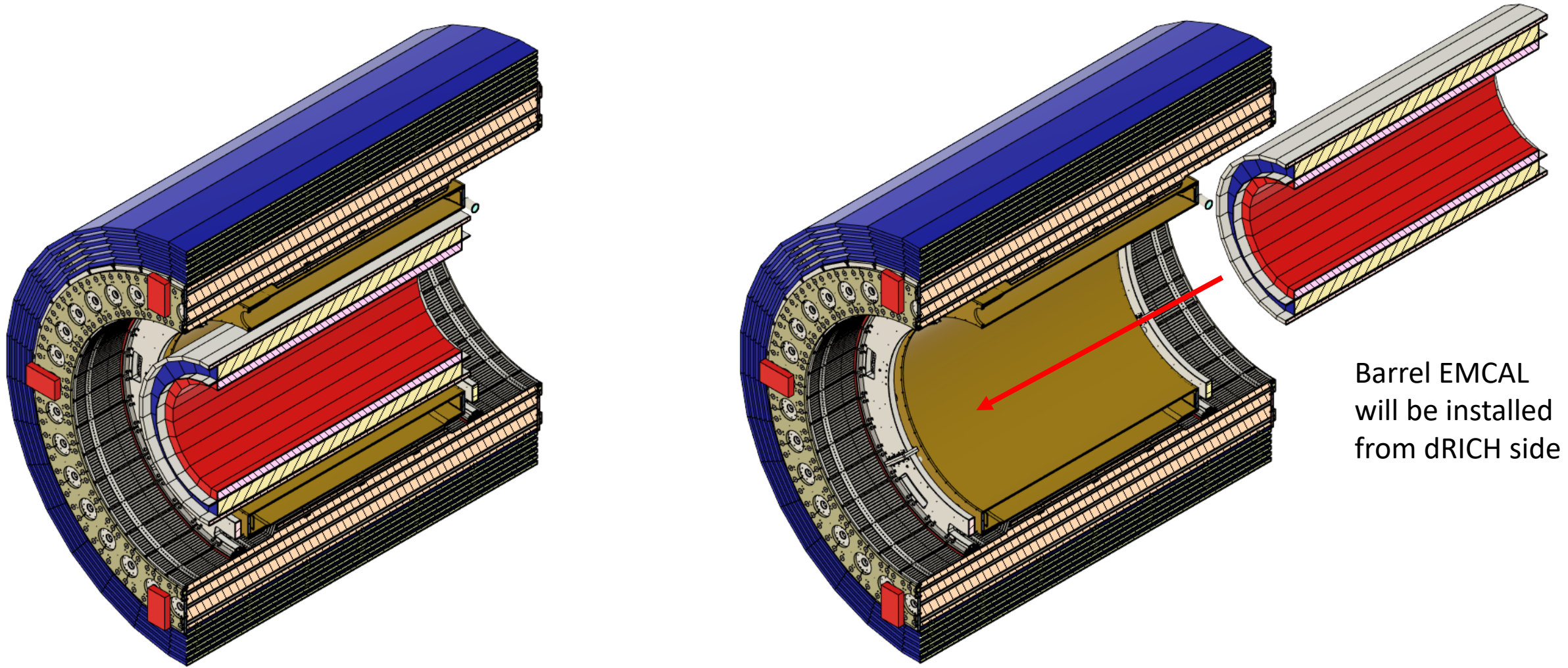
- dRICH Integration Status
- hpDIRC Integration Status
- pfRICH Integration Status



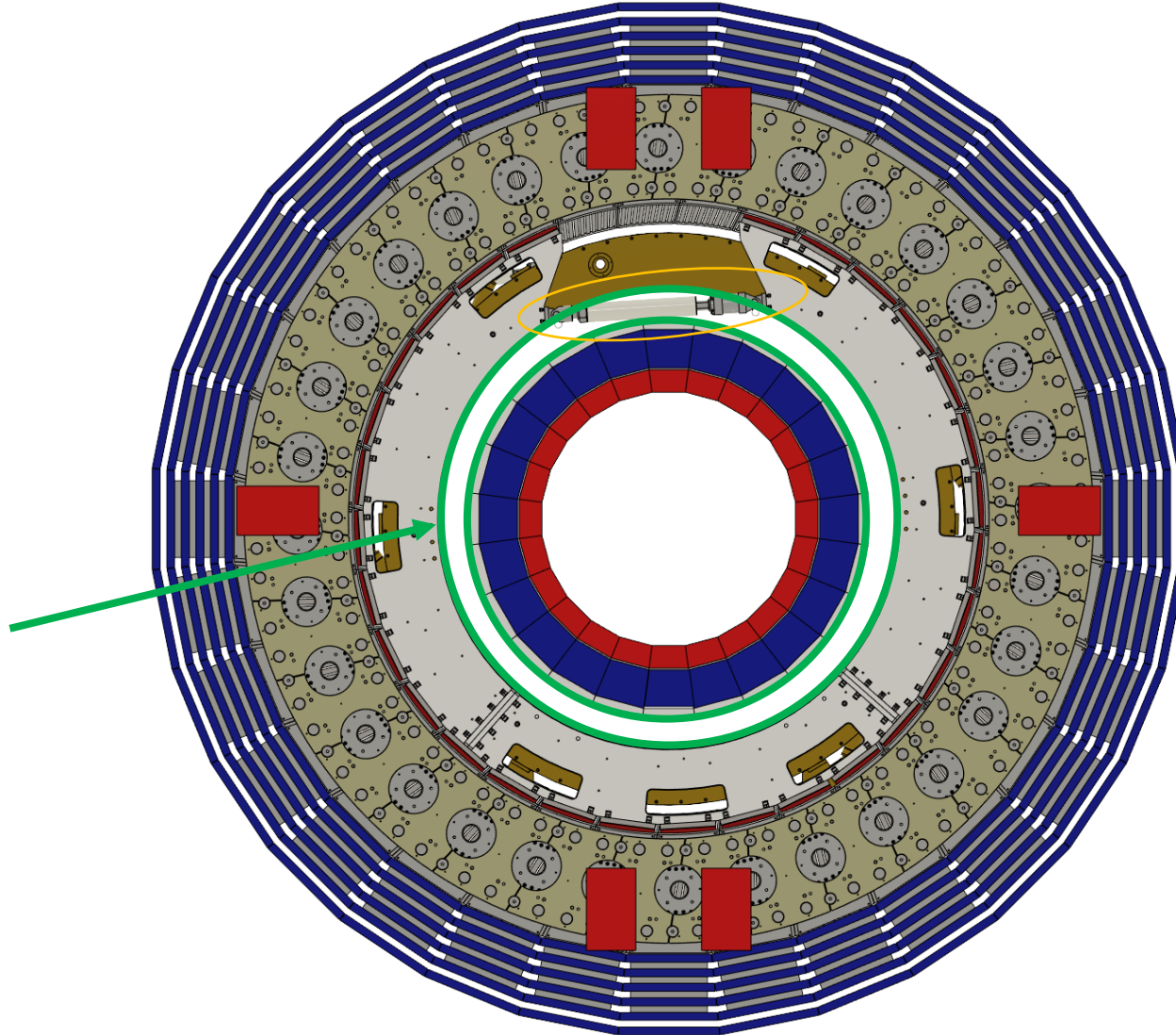
Overall Model



Barrel EMCAL Installation

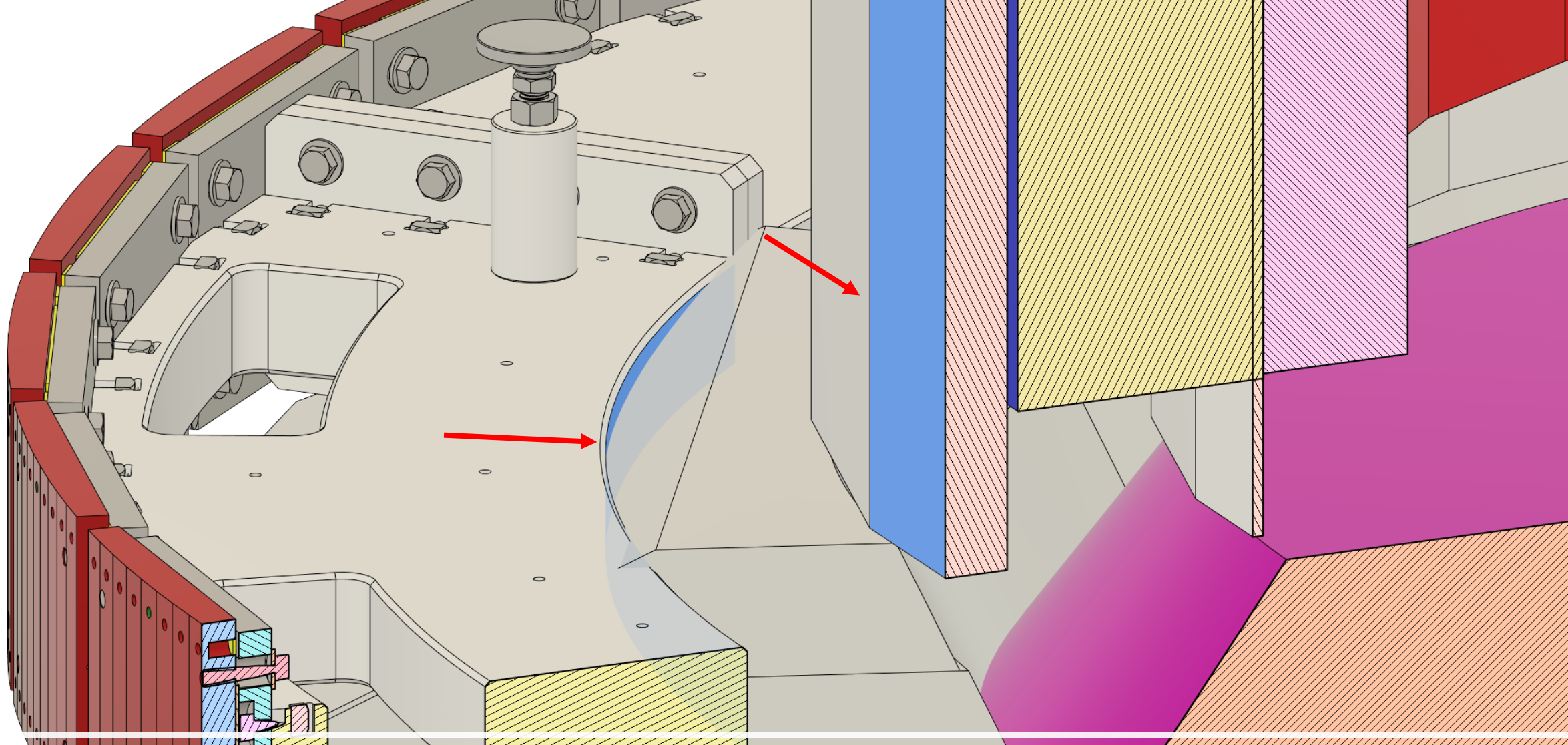


Barrel EMCAL Support



Support structure for ~55T Barrel EMCAL will be tied to the support ring (green); actuator (orange) will not be in place after outer HCAL has been assembled

Based on the direction of installation and the mounting location, there will be a plate (thickness TBD) and hardware on the inner radius of the support ring that needs to be accounted for in the dRICH boxes.

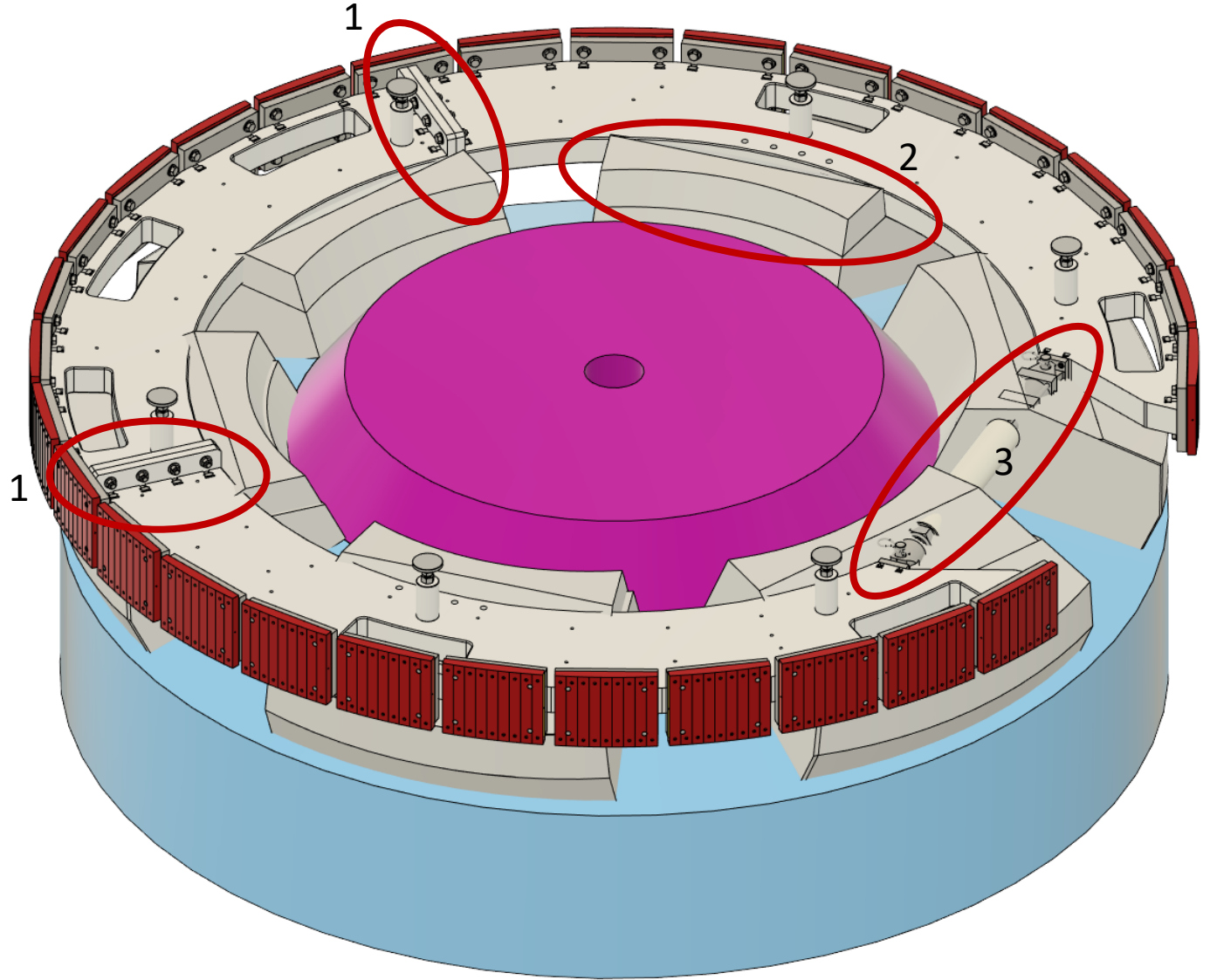


The highlighted blue surfaces show where the support between the support ring and the Barrel EMCAL will end up

Support Ring/dRICH

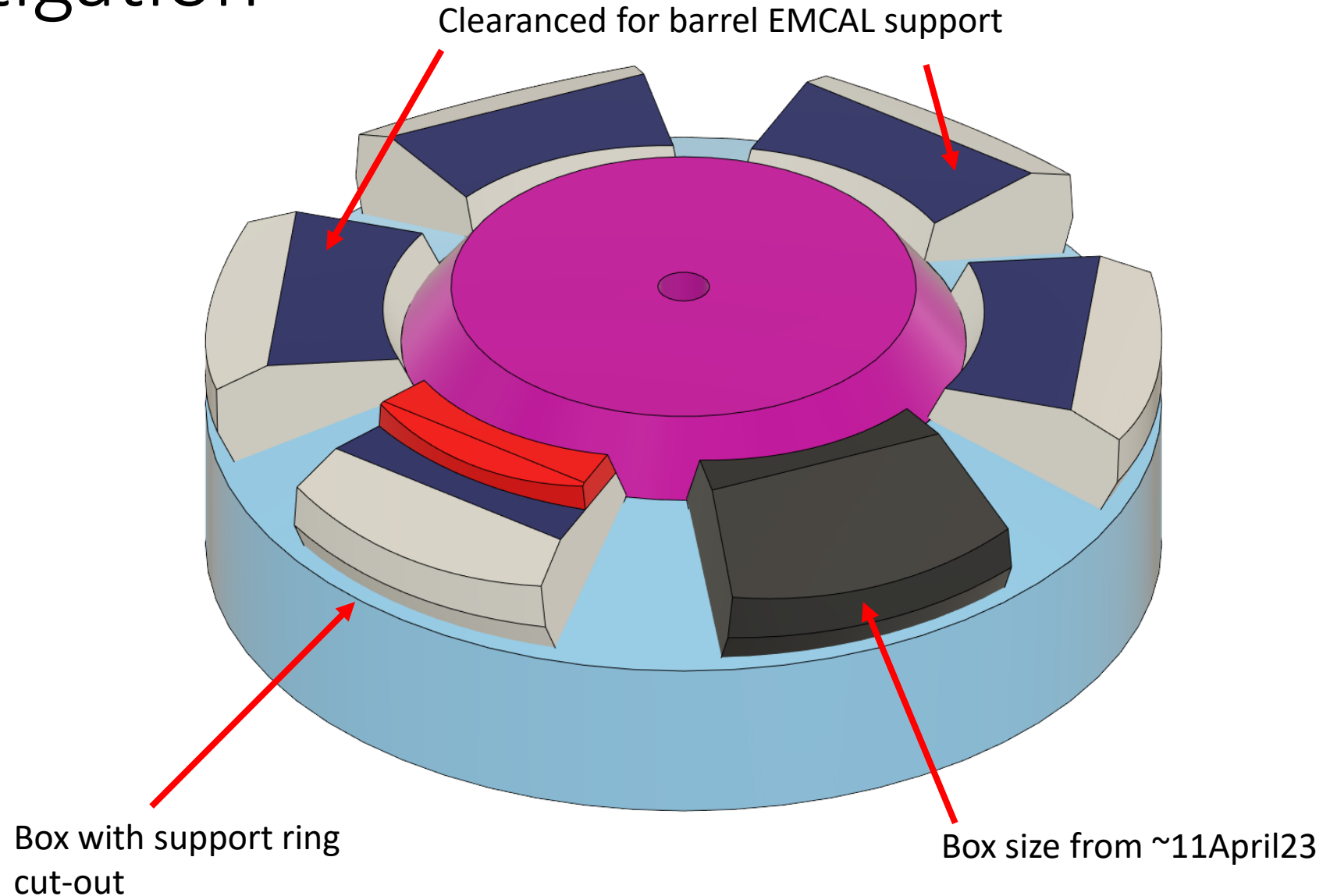
Points of interference with the support ring (with no modifications to boxes):

1. The support ring bolting flanges
2. The inner radius (all the way around)
3. The actuator (which will NOT be in place)



Support Ring Mitigation

- Before the workshop, I took the original box (shown in black) and made a cut to accommodate the support ring.
- The grey/blue/red box represents what we looked at recently.
- The blue-faced boxes are the current “worst case scenario” and represent the boxes having no volume inside the radius of the support ring

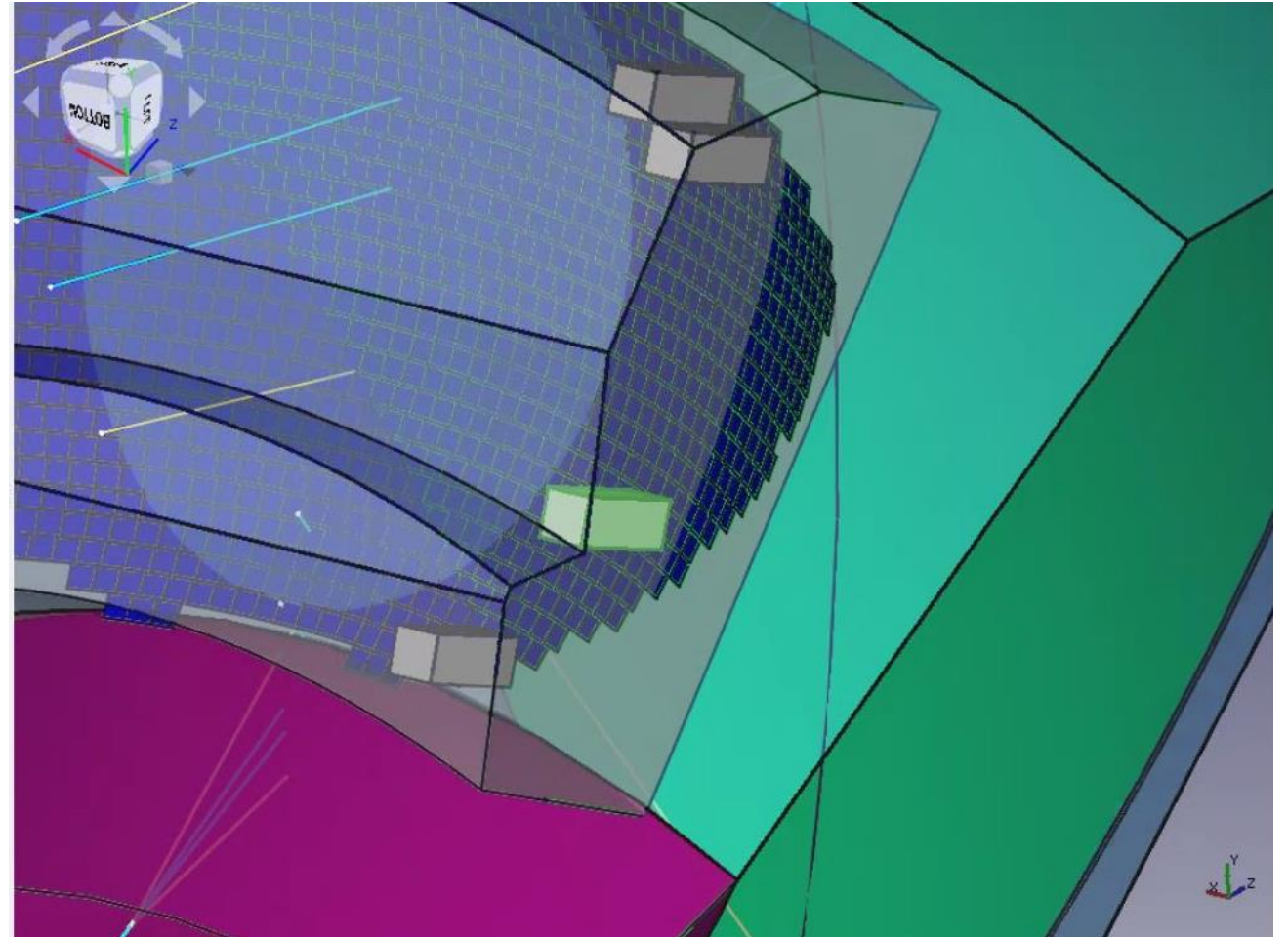


Support Ring Mitigation (Cont'd)

On the right is a screenshot from a recent dRICH meeting where we discussed whether the sensor boxes could still be accommodated in the cut-out version of the sensor boxes (red/blue/grey box in the last slide)

The consensus was that it may be possible to fit the sensors within the boxes with the cutout for the support ring

However, this picture and cutout **does not** consider the Barrel EMCAL support structure location

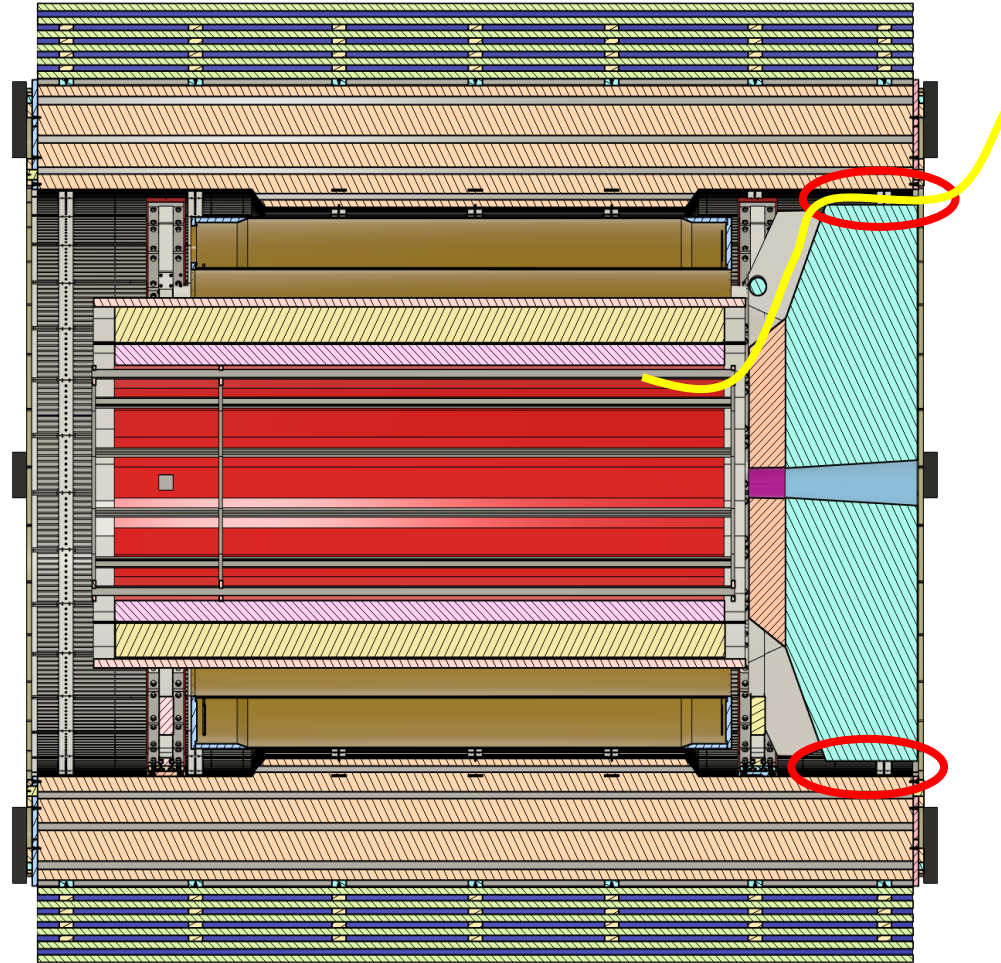


Services/dRICH

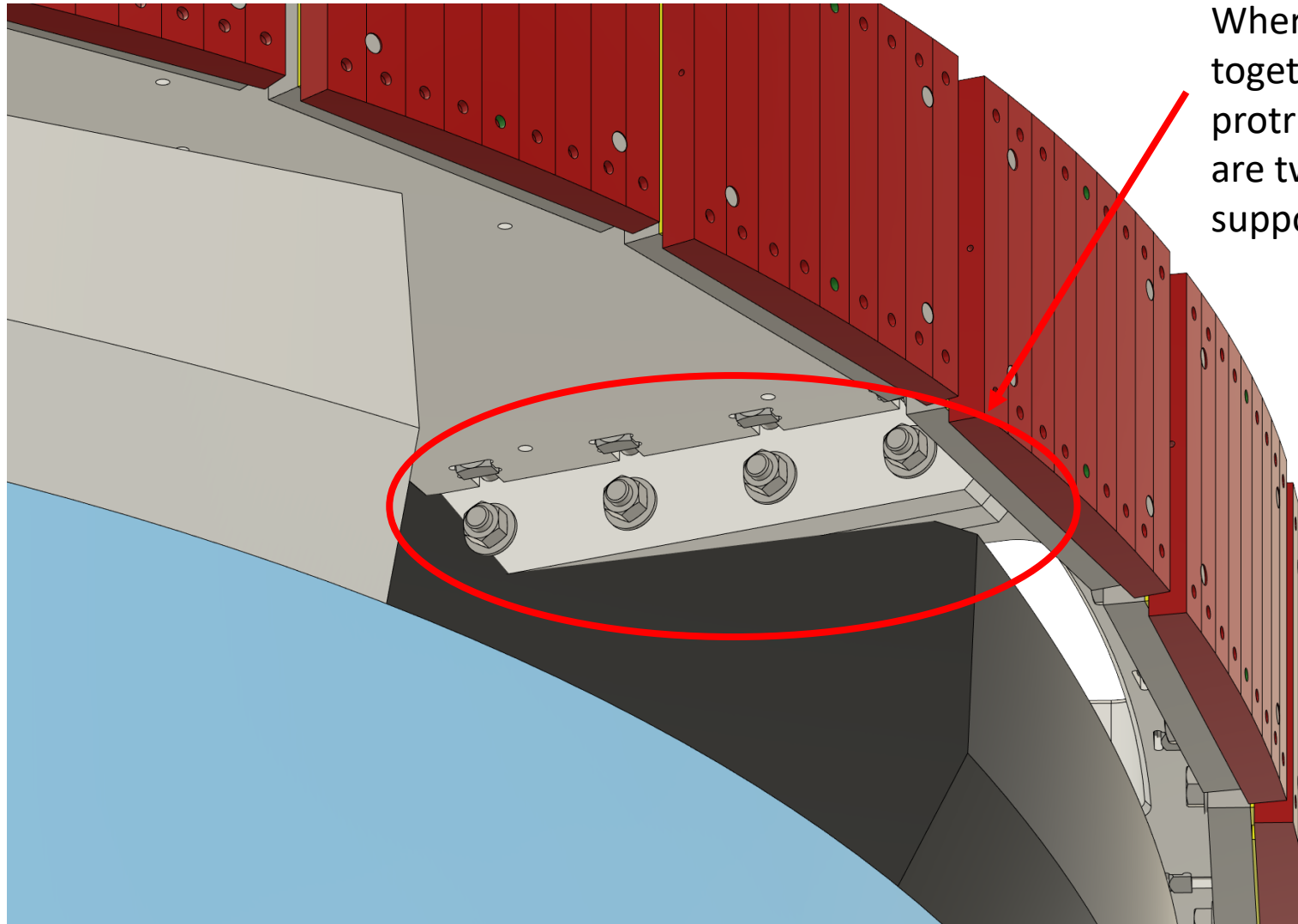
Services for the inner detectors are planned to route out from the hpDIRC frame, between the sensor boxes, and then out between the outer HCAL and the dRICH (approximated by yellow line).

After looking at the planned services, there was already a ~92% fill at the outer radius of the dRICH (red circles).

In order to have room for services to exit, we need to shrink the overall outer diameter from 370cm to 360cm. The fill between the boxes (as sized) seems to be adequate.



Support Ring Flanges/dRICH



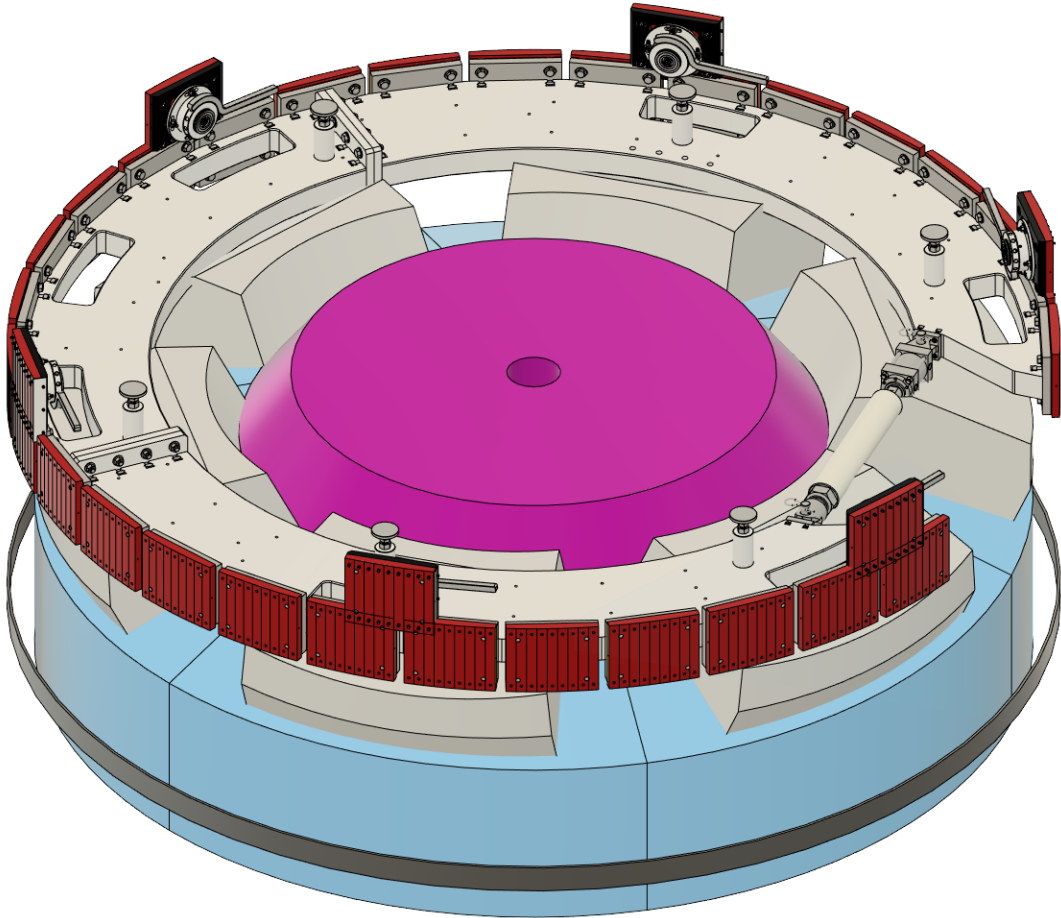
Where the support ring bolts together, there is a flange that protrudes into the boxes. There are two of these flanges on the support ring.

Rotating the dRICH could avoid one of these flanges, but not both.

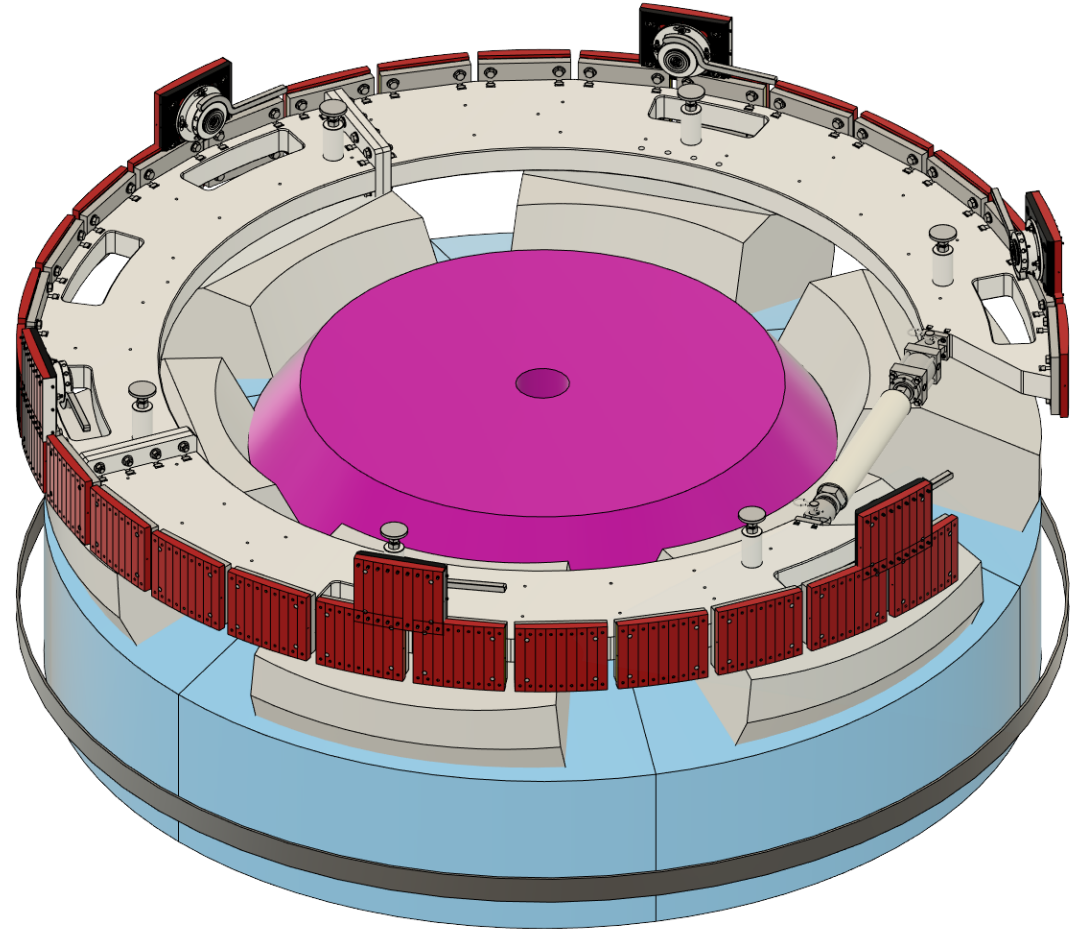
Possible Solutions (dRICH)

- One possible solution to dRICH interferences is to move the entire dRICH assembly away from the IP (in Z) between 5 and 10 cm. (The effect of this movement has not yet been studied by the dRICH team)
- The total movement (in Z) depends entirely on box geometry, which is changing as simulations are being run.
 - The boxes from January would clear the support ring with ~5cm
 - The boxes from a month ago need ~10cm.
 - The box design is dependent on the optical setup of the dRICH and the final sensor design

Possible Solutions (dRICH)



5cm Movement (April Boxes Unmodified)



10cm Movement (April Boxes Unmodified)

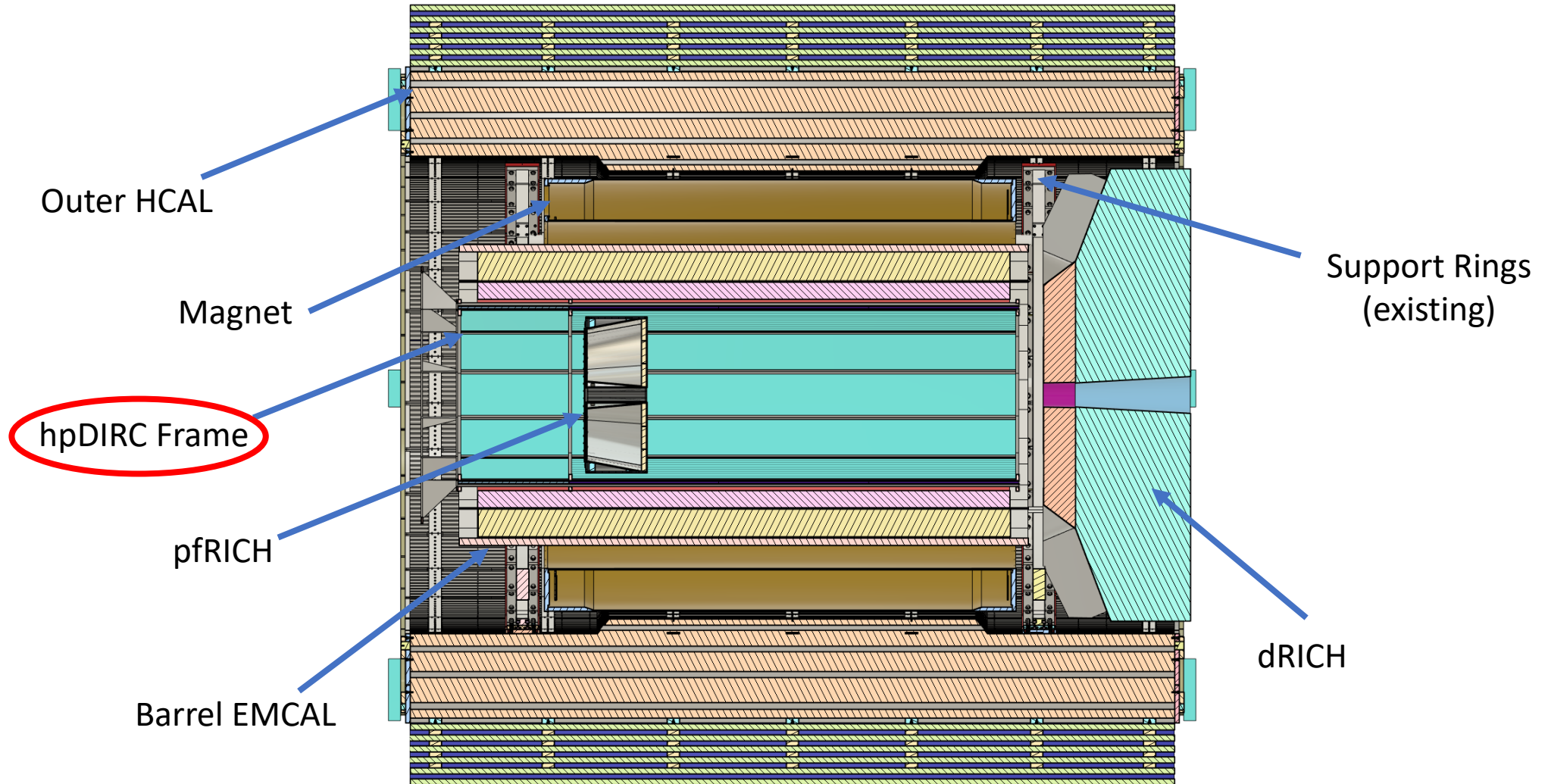
Other Ideas

1. Can we combine the magnet support jacks with the support ring to move the support ring further away from the dRICH?
2. Can we regain some of the space between the support ring and dRICH by only clearancing for the flange and mounting hardware?
3. Investigation of other support structure options for the Barrel EMCAL that might minimize interferences for dRICH sensor boxes.

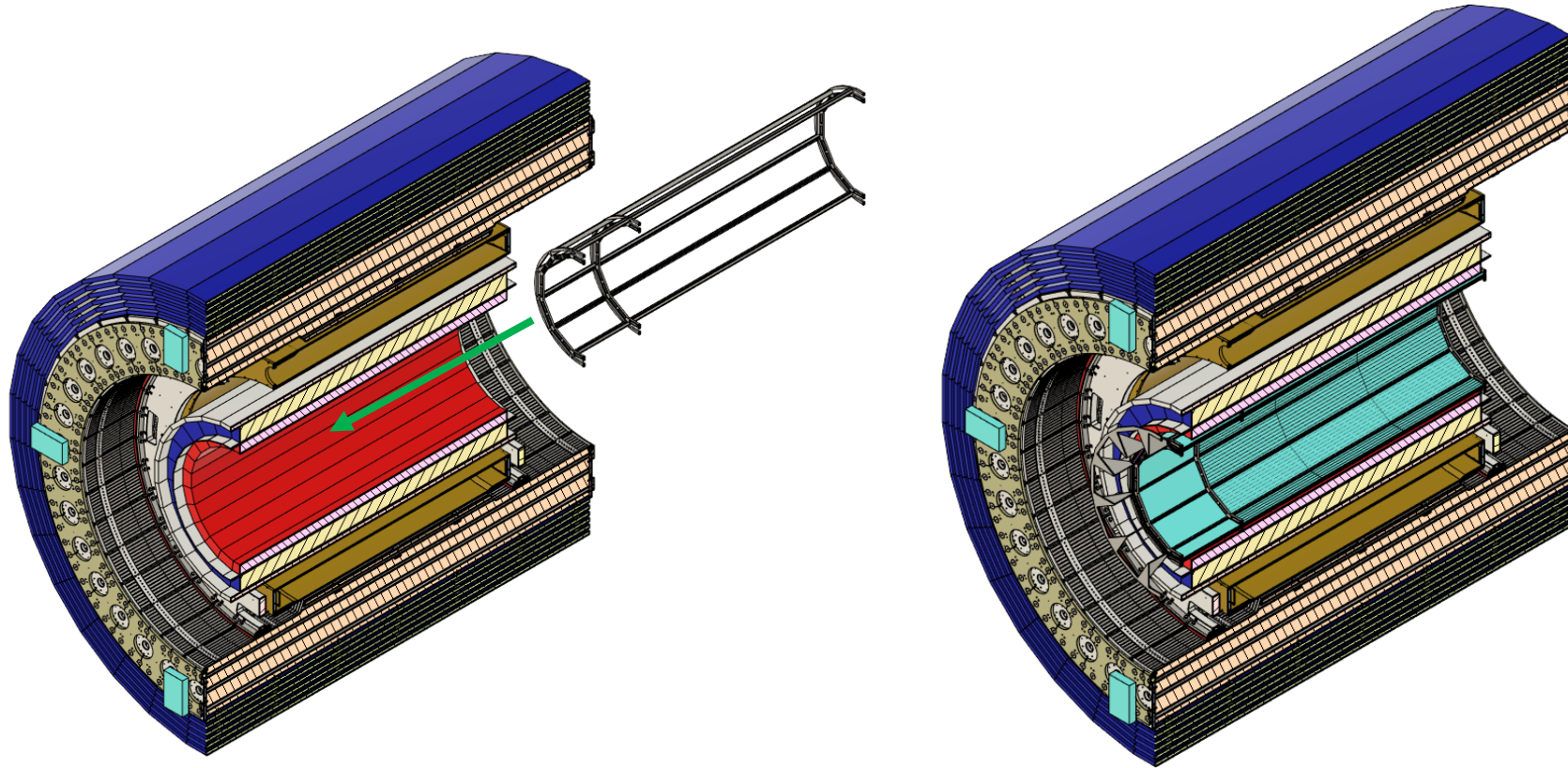
Still need to know/In progress

- Magnet design is still in the works; more details soon
- Barrel EMCAL design is still being developed (electronics/supports are most critical for dRICH)
- How will the Barrel EMCAL support the hpDIRC on the dRICH end?

Overall Model



hpDIRC Support Installation



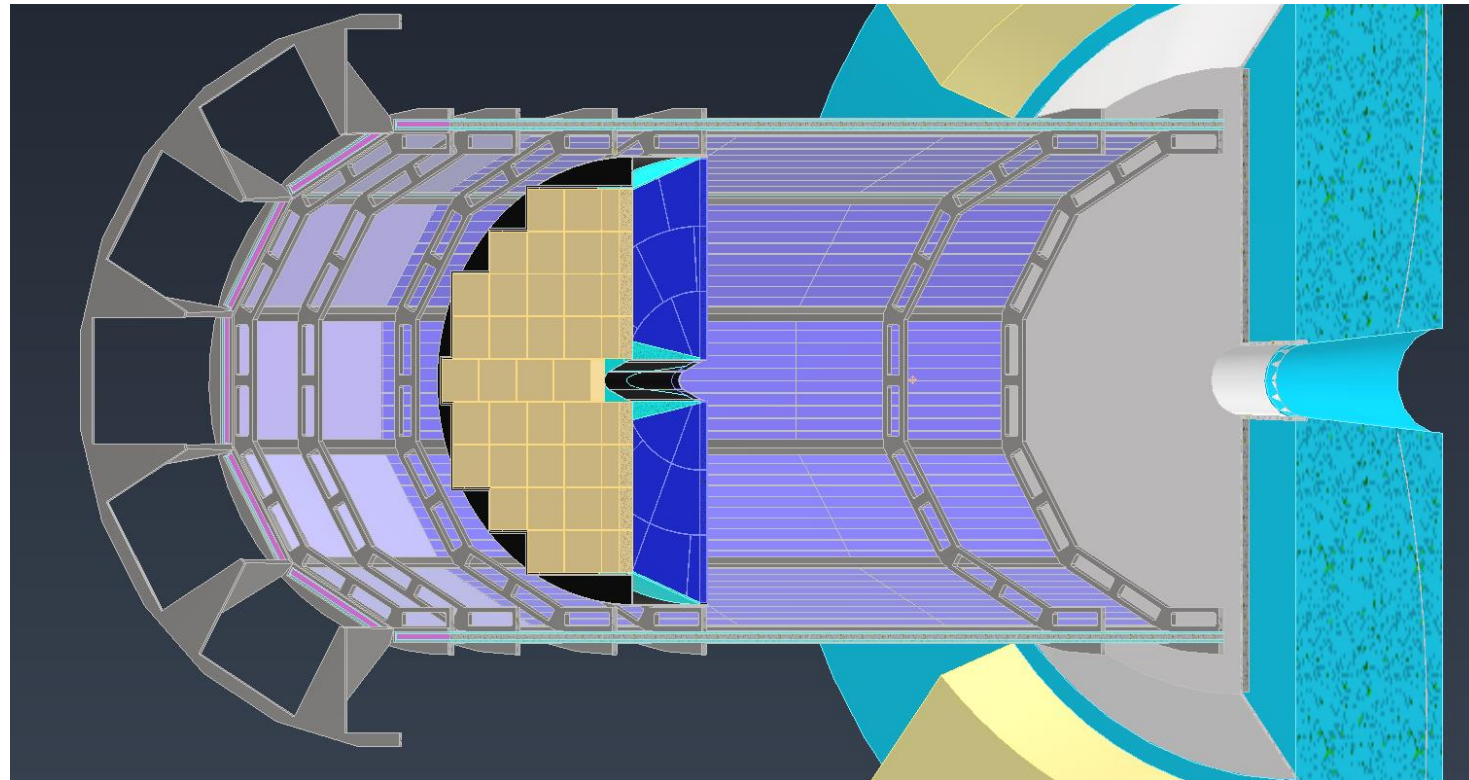
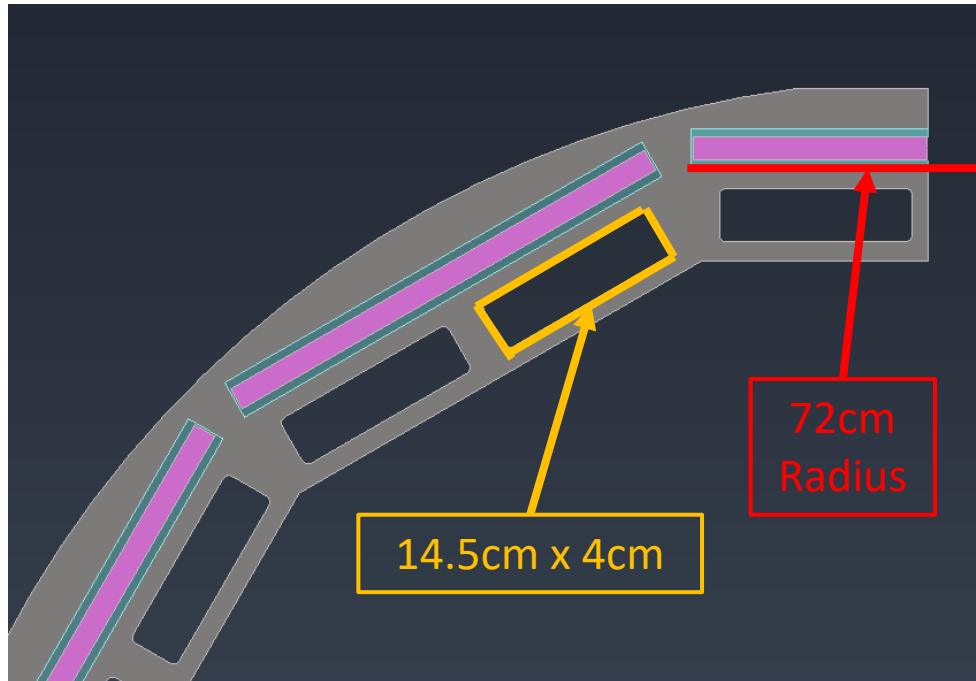
The plan is to install the hpDIRC in this direction. When the frame is being installed, the readout/prism support will not be in place and will be affixed afterwards.

hpDIRC Support

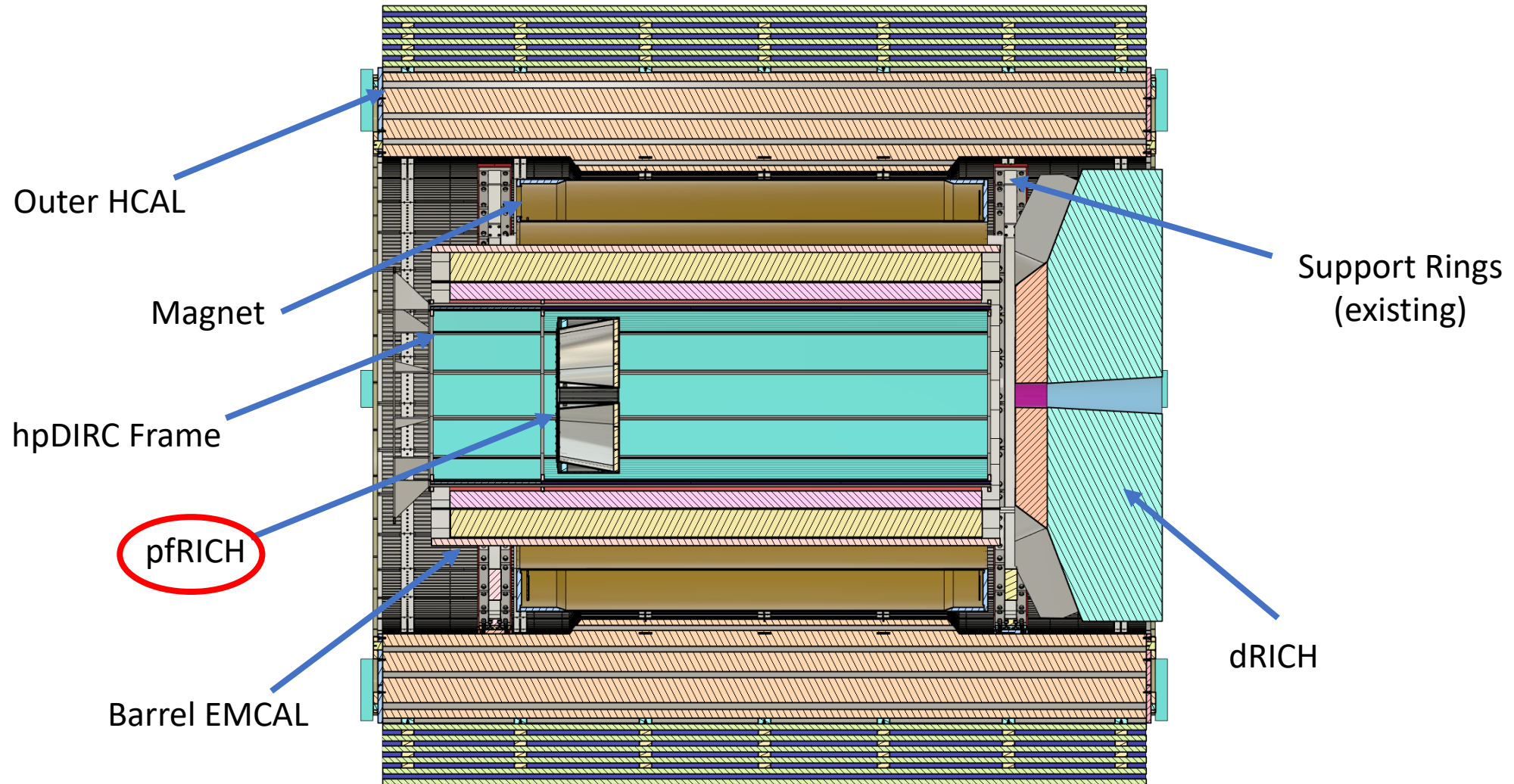
- The supporting frame is being analyzed to determine material type and deflection based on the estimated detector weights that it will be supporting
- Additional rings will be added internally (along the Z) as mounting points for detectors within its frame
- The manufacturability of the frame geometry is currently being investigated
- The current thought process is to create a supporting structure between the barrel EMCAL and the DIRC

hpDIRC Support Integration

- The removal of the mu-Rwell detector meant the DIRC bar boxes could be moved 'outward' radially to a radius of 72cm.
- This allowed for the services cutouts to be made larger to 14.5cm x 4cm
- The inner and outer radii of the support have not changed
- Avishay Mizrahi will be working on the support structure moving forward

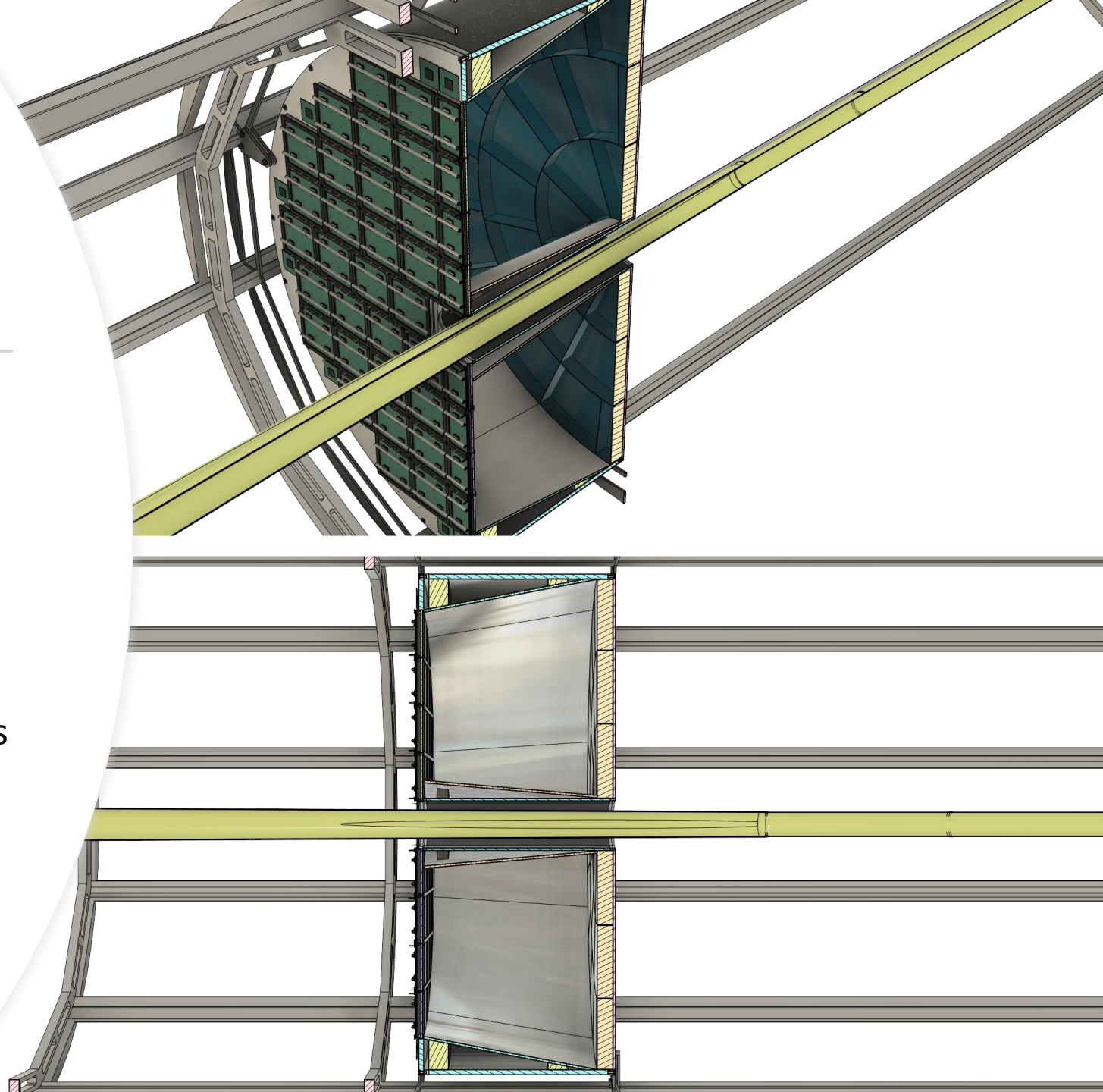


Overall Model



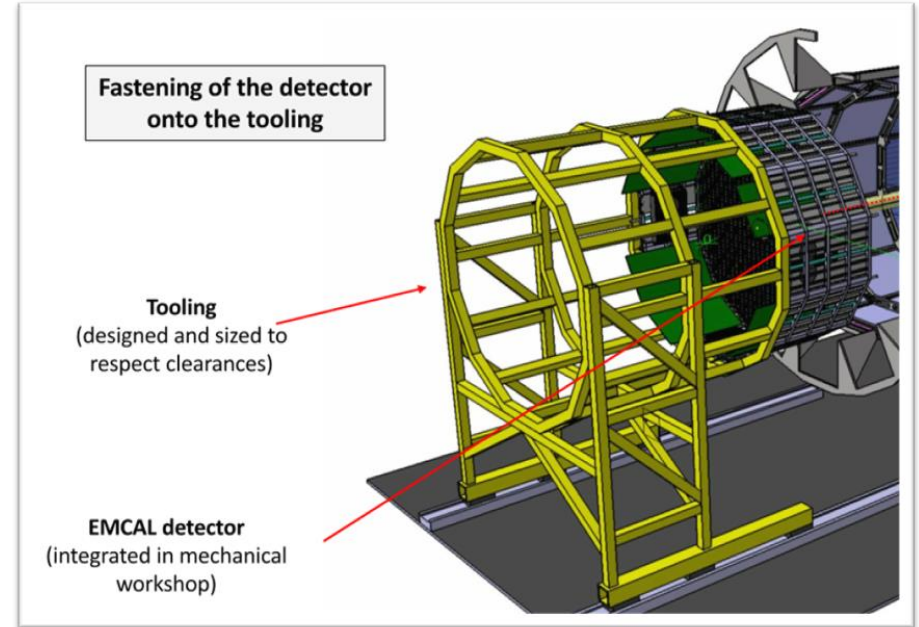
pfRICH Integration

- The backwards RICH technology was just reviewed by GD/I Committee (21 March 2023) and the pfRICH was selected as the baseline over the mRICH
- During the Engineering Workshop (10-12 May 2023), the integration and installation were reviewed with no major issues discovered
- However, the installation and integration has not been fully developed, only the initial concepts
- Work on integration and installation design will happen concurrently with the pfRICH design development

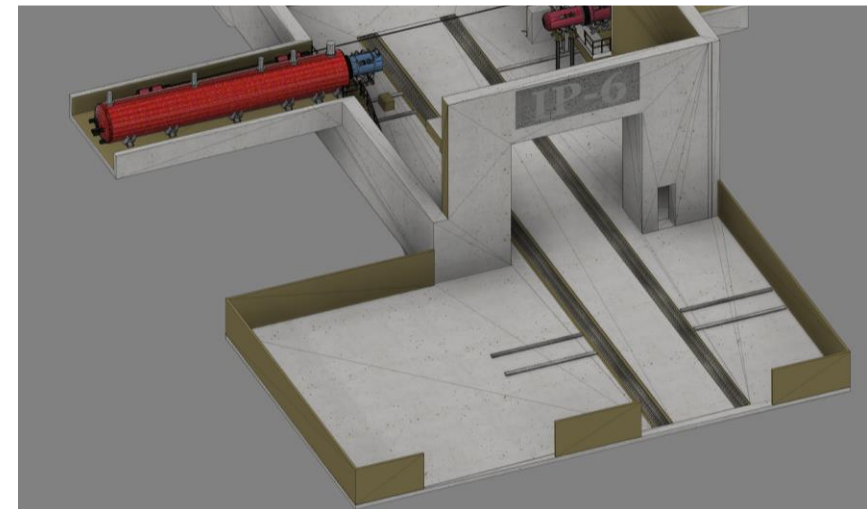


pfRICH Detector Installation

- Backwards EMCAL is downstream of pfRICH and must be removed in the assembly hall due to space constraints
- pfRICH can collaborate with backwards EMCAL for tooling and railings
 - Utilize the same railings for both detectors
 - Backwards EMCAL estimated at 3T; pfRICH estimated at 100-200kg
- Install the detector in one piece on the tooling (to be designed)
- Utilize the aluminum sensor plate as a fixturing location for the tooling

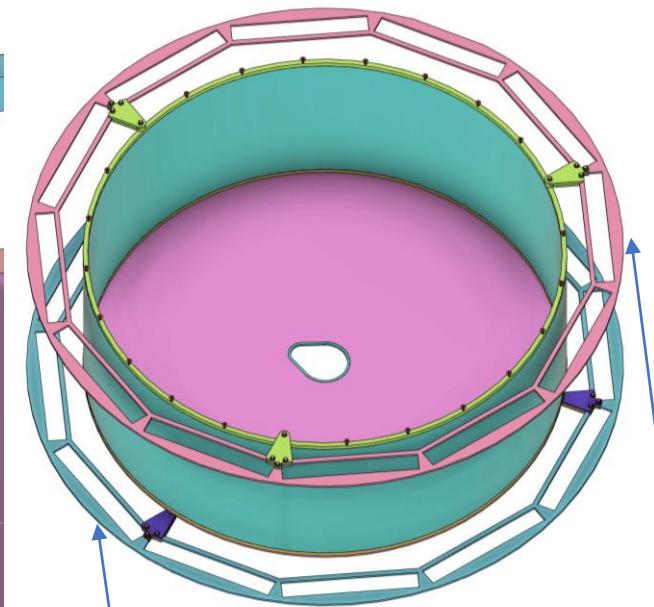
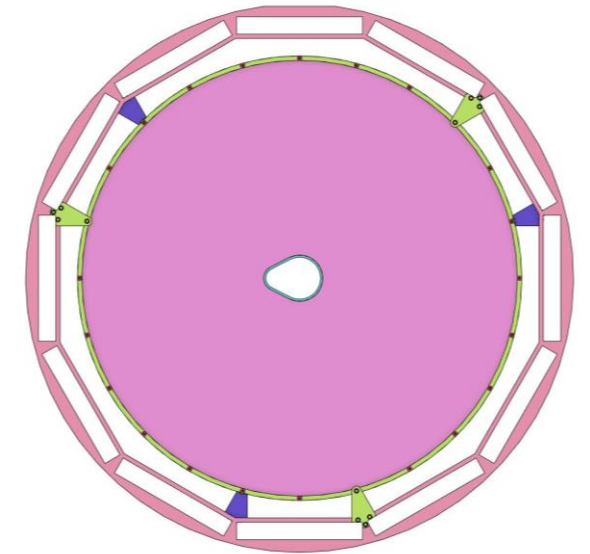
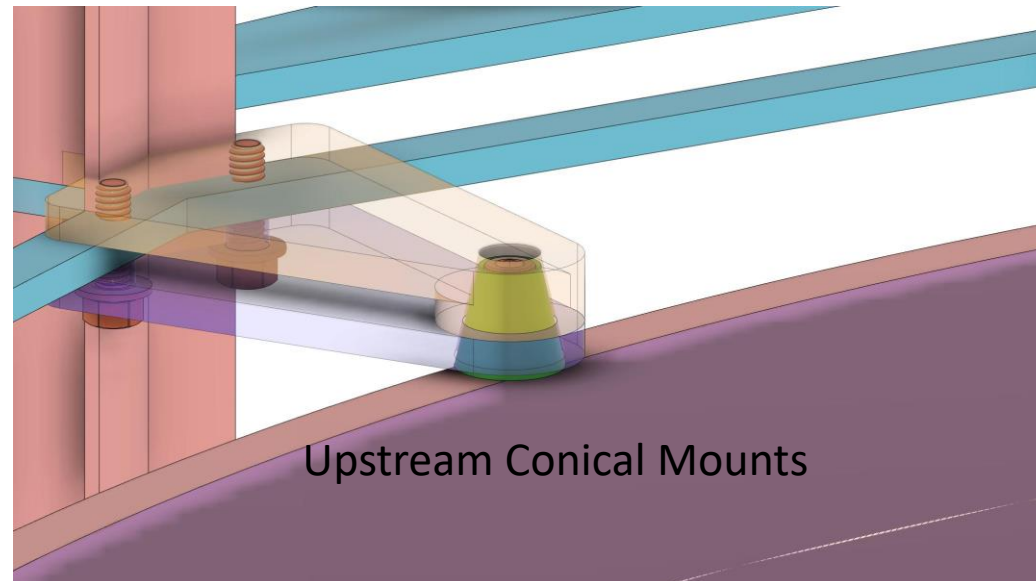
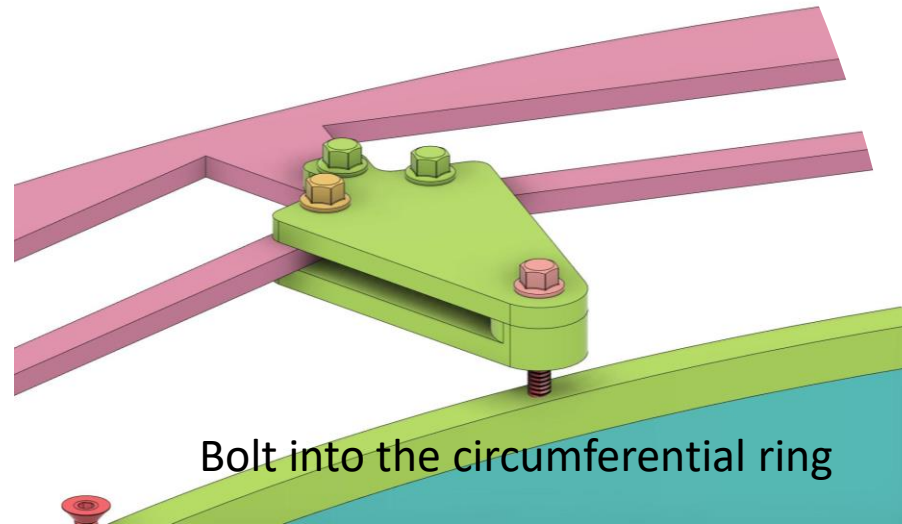


Obtained from J. Bettane's EIC Calorimetry Review slide on December 6-7, 2022.



pfRICH Detector Support

- Propose we add two additional rings into the DIRC structure at the specified locations.
- Conical mounting mechanism on the upstream side
- Bolt through into the half-inch circumferential ring on the downstream side
- Easily scalable depending on final requirements



Proposed additional support rings

Questions?