Beam Pipe Bore Options

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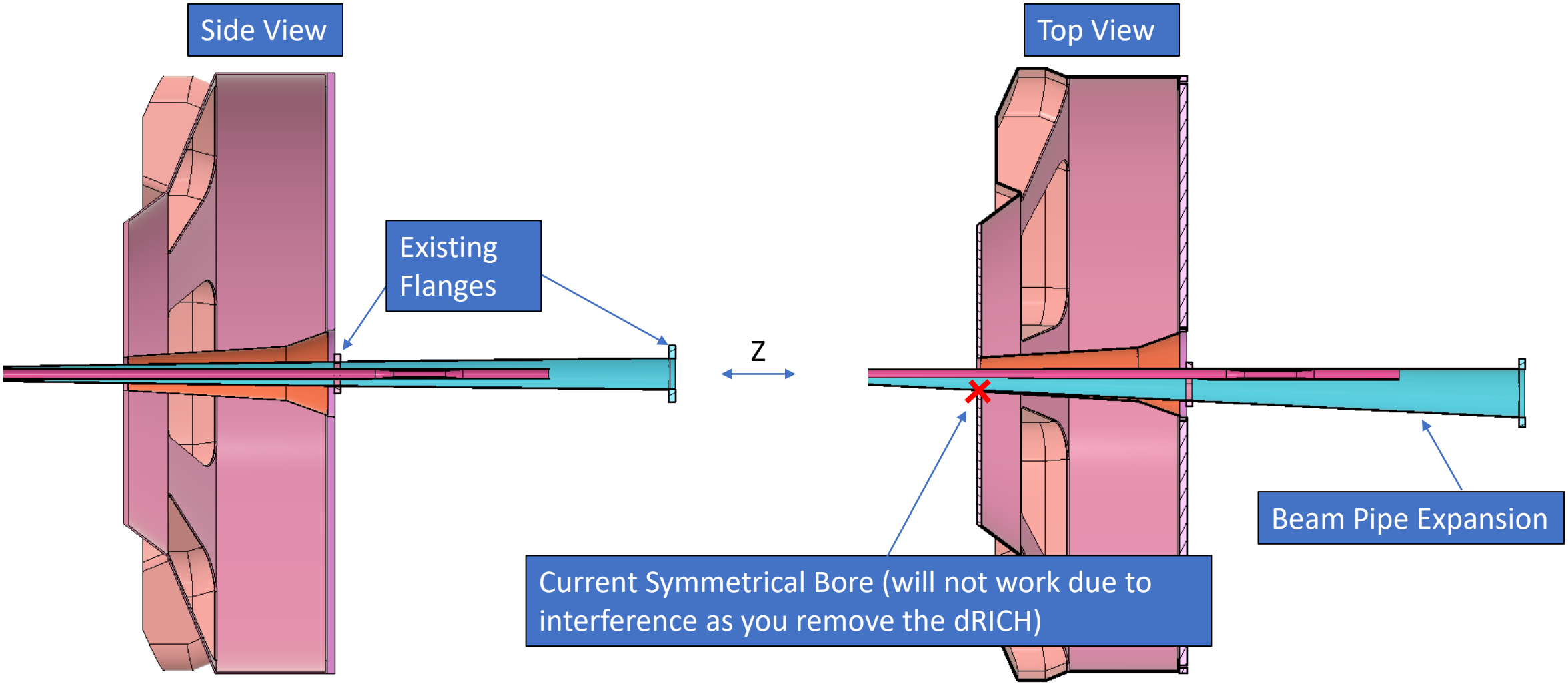
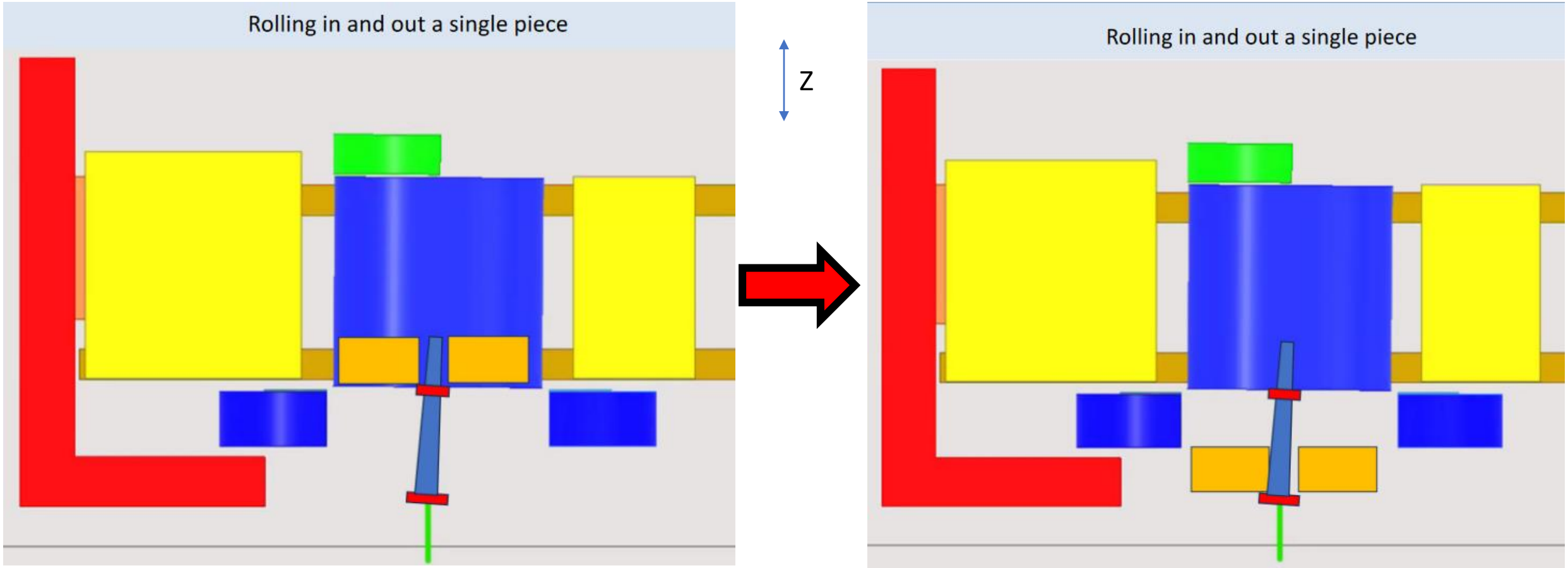
Motivation

- As an addendum to the dRICH split information, I investigated the required beam pipe/inner bore dimensions
- Two scenarios are being investigated:
  1. Keep the dRICH as one piece
     - Move the dRICH back as far as practical (to the gate valve location)
     - Allow for maintenance to take place inside the barrel
  2. Split the dRICH in two halves (vertically)
     - Design the beam pipe to have the flange in front of the dRICH instead of directly behind.
     - Move the dRICH out of the barrel and clear existing services
     - Split the dRICH apart and pull the halves out of the way
     - Allow for maintenance to take place inside the barrel
- Both options allow for periodic maintenance in the IR without breaking the beam pipe vacuum or rolling out the barrel.

Symmetrical Inner Bore (Current)



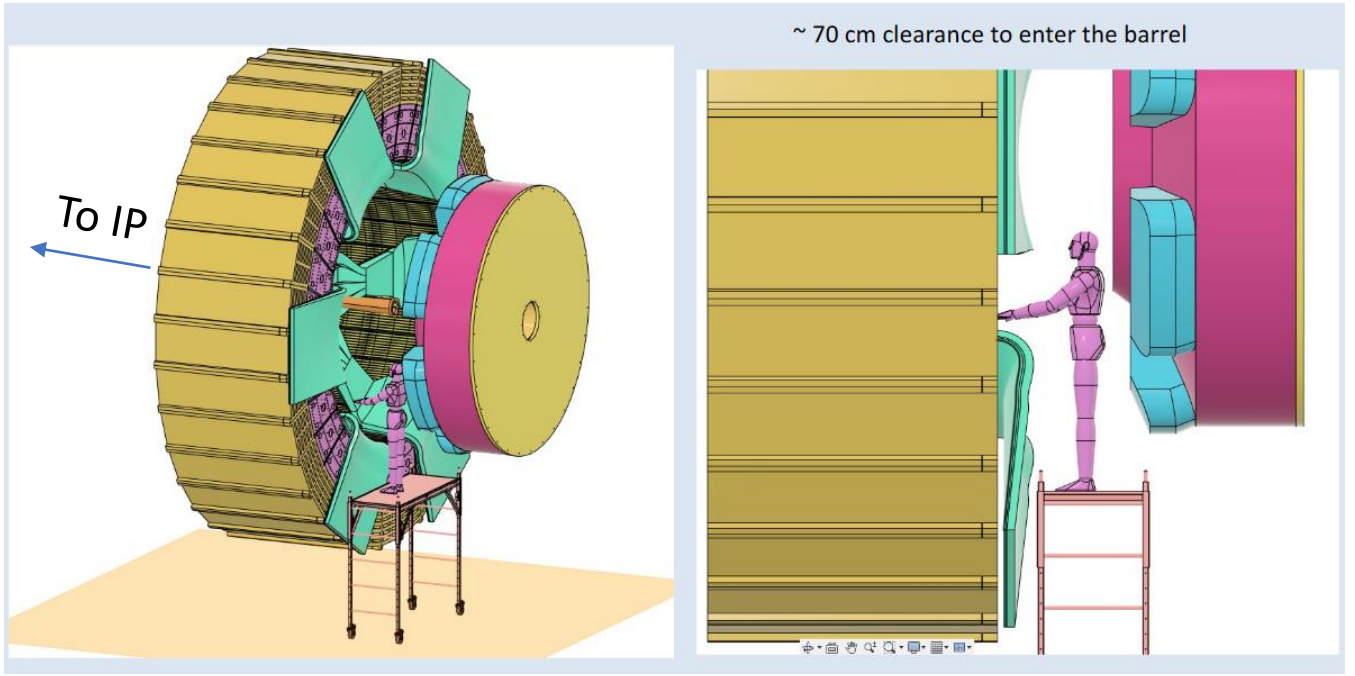
Option 1: Beam Pipe Flange Remains/One-Piece dRICH



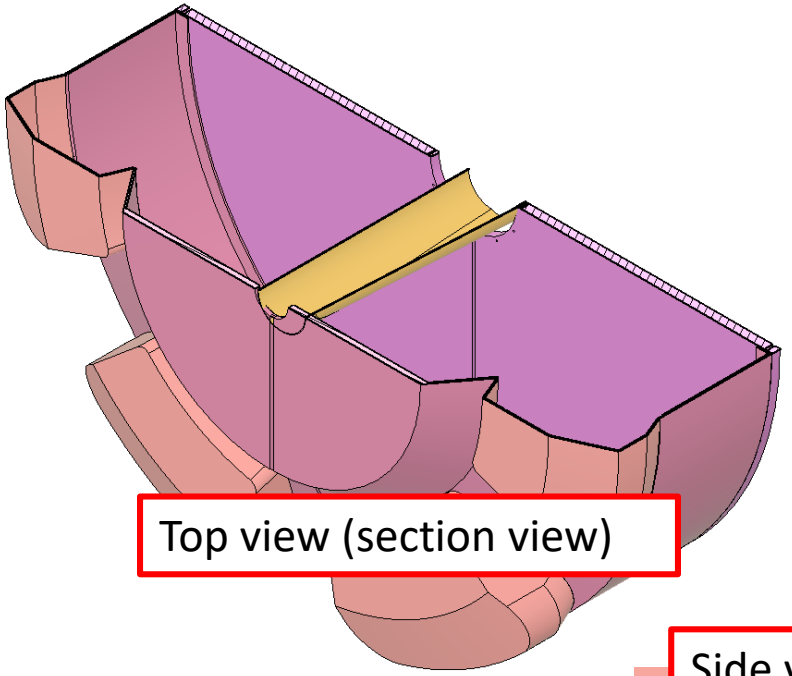
Top View of IR Hall

Option 1: Beam Pipe Flange Remains/One-Piece dRICH

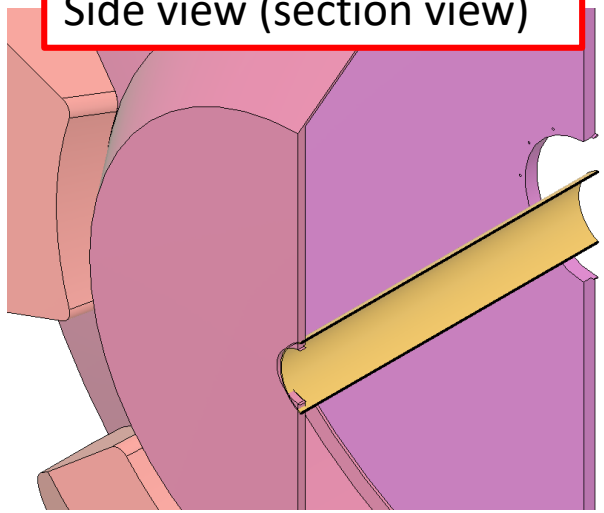
1. The dRICH is pulled back to it's "maintenance location" which is around the second flange (where the end cap typically sits in the running position). (198cm)
2. The inner bore of the dRICH needs to account for the first flange behind it as well as the expansion of the beam pipe.
3. 5mm clearance is added radially for every feature that needs to clear the beam pipe



Option 1: New Inner Bore

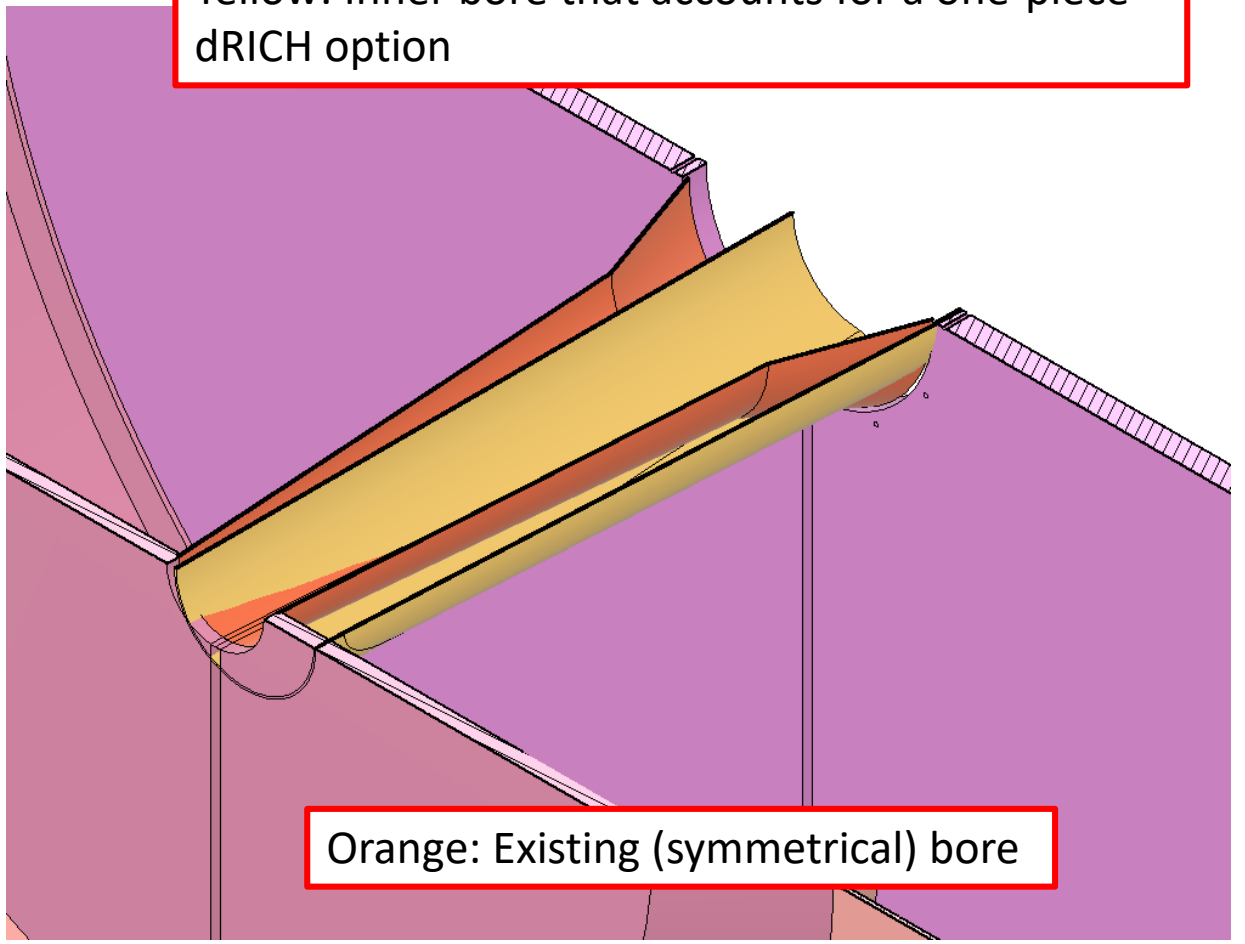


Top view (section view)



Side view (section view)

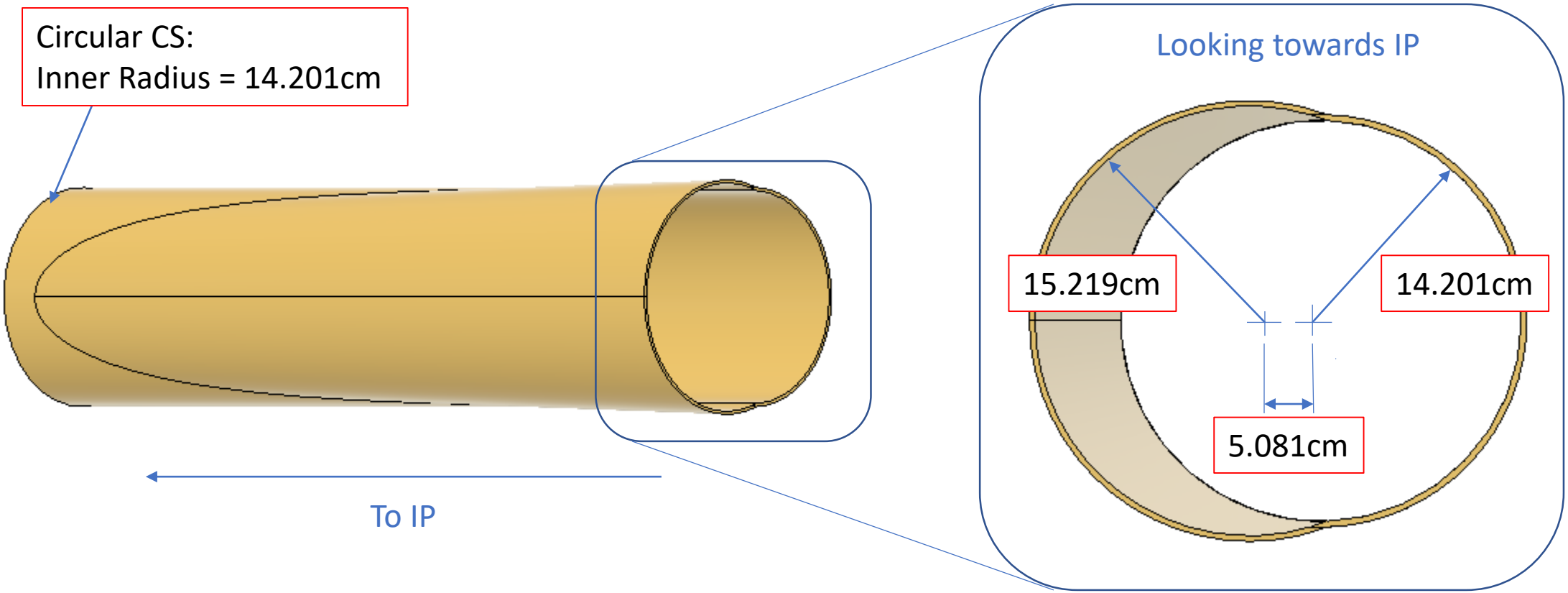
Yellow: Inner bore that accounts for a one-piece dRICH option



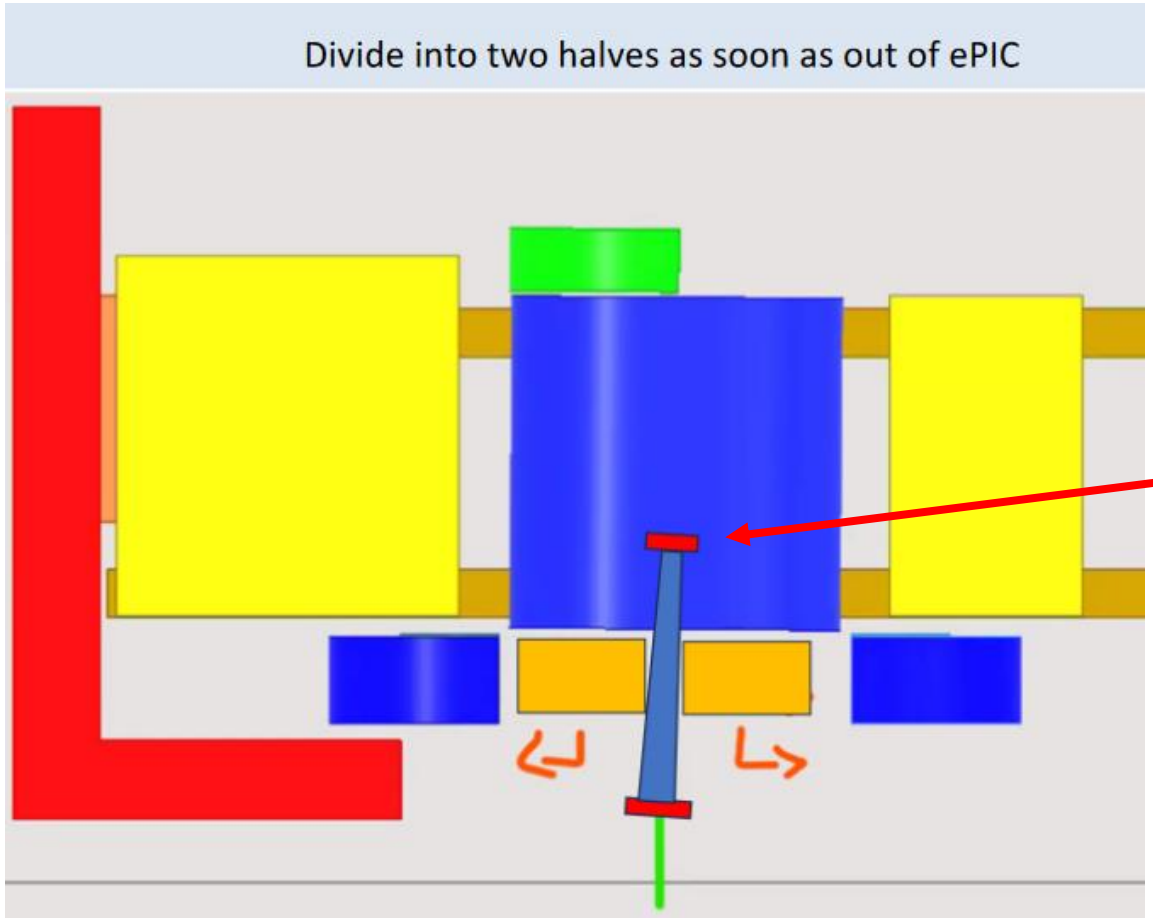
Orange: Existing (symmetrical) bore

This is the smallest bore available to us for the first option. It assumes that the dRICH is pulled out 198 cm from its nominal location. It has an included 5mm clearance from the beam pipe at each location.

Option 1: New Inner Bore



Option 2: Beam Pipe Flange Moves/Two-Piece dRICH

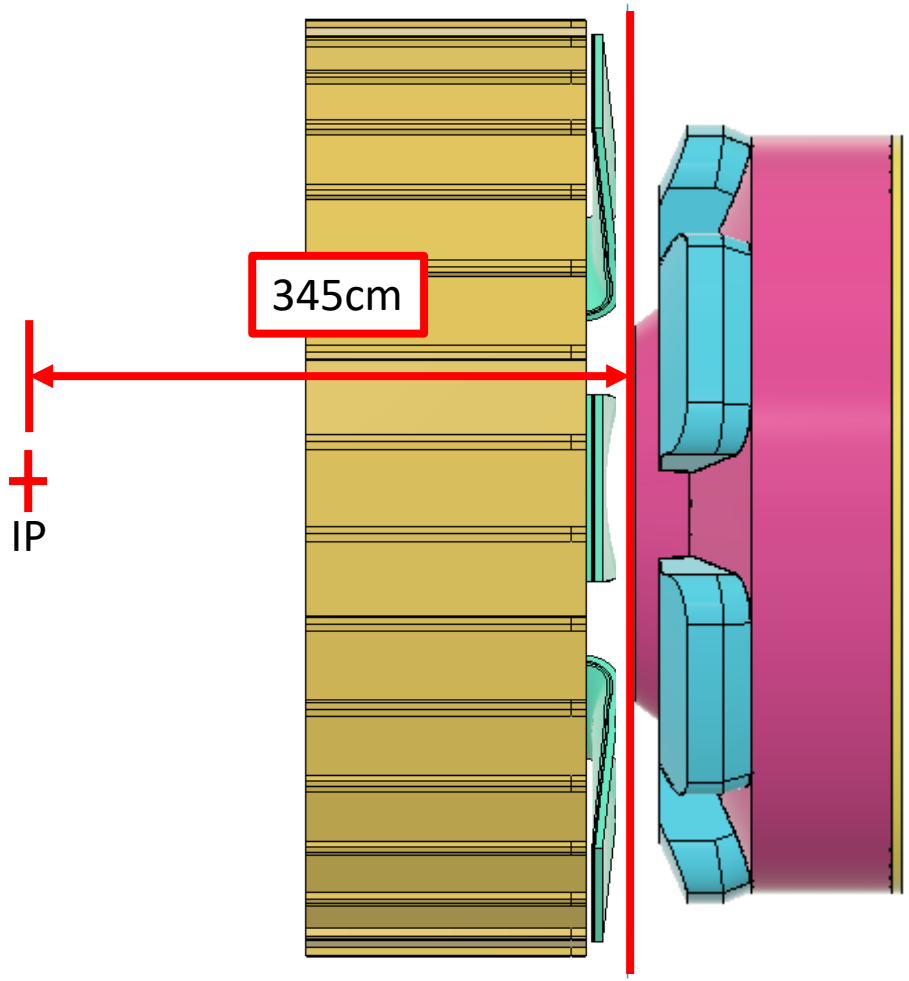


Note: Since the dRICH splits, we can move the flange to the front of the dRICH

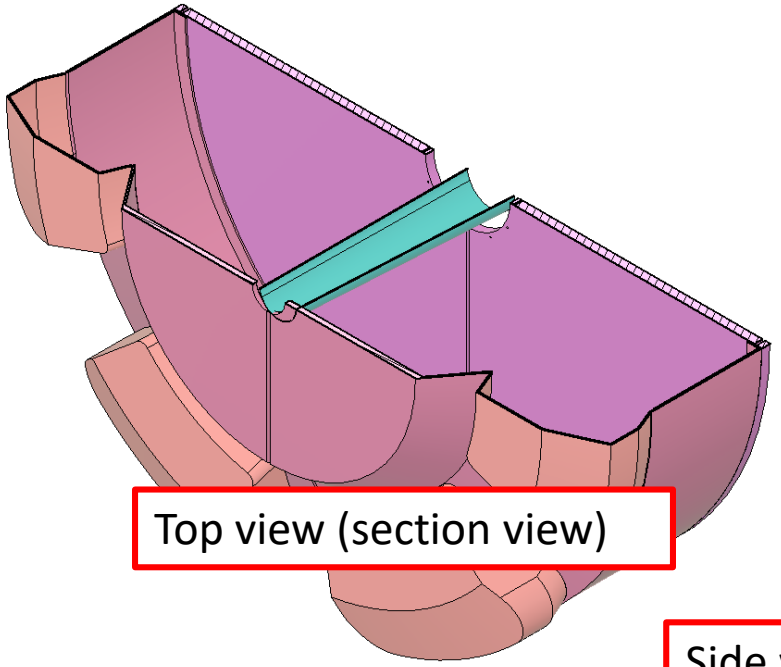
Top View of IR Hall

Option 2: Beam Pipe Flange Moves/Two-Piece dRICH

1. The dRICH is pulled back to it's "removal location" which is just far enough back to clear the inner detector services (150cm)
2. The first beam pipe flange is relocated to just in front of the dRICH
3. 5mm clearance is added radially for every feature that needs to clear the beam pipe

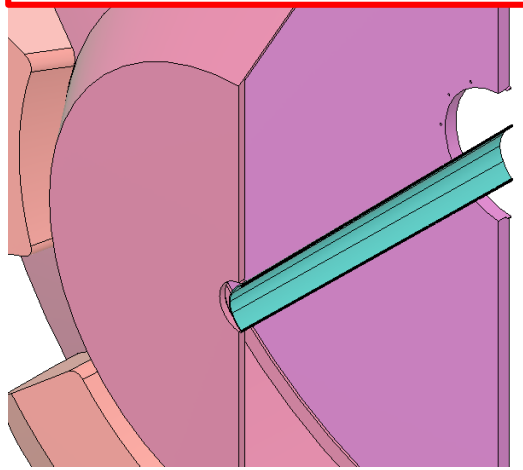


Option 2: New Inner Bore

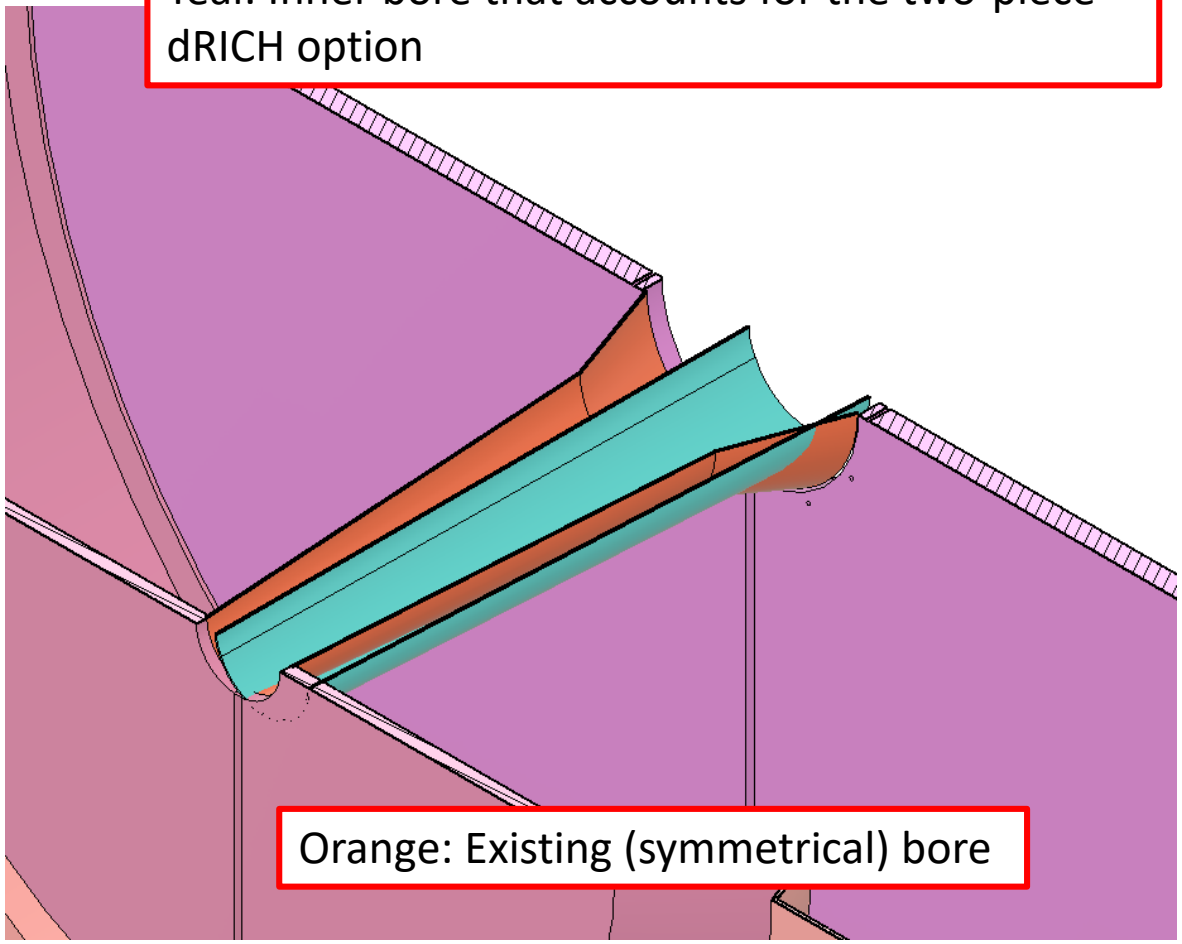


Top view (section view)

Side view (section view)



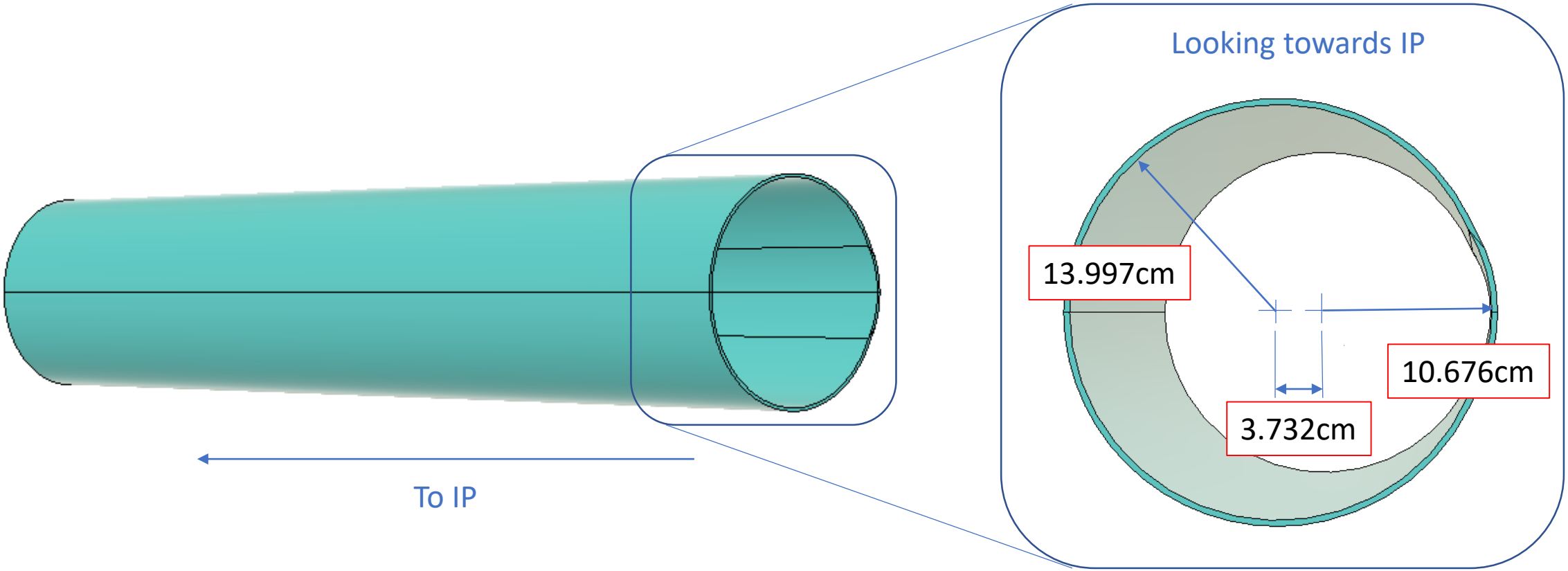
Teal: Inner bore that accounts for the two-piece dRICH option



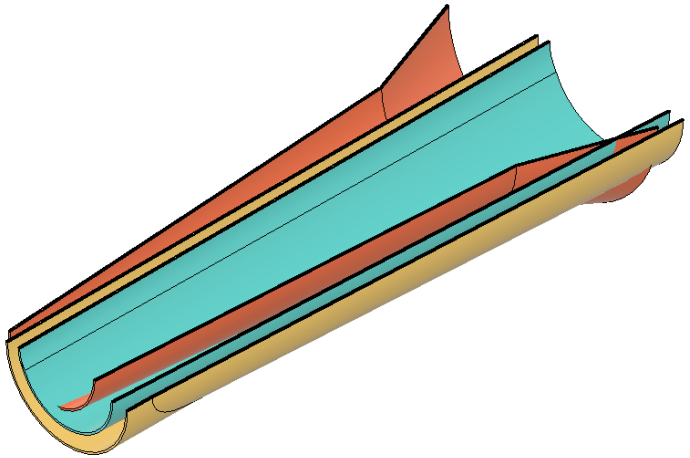
Orange: Existing (symmetrical) bore

This is the smallest bore available to us for the first option. It assumes that the dRICH is pulled out 150 cm from its nominal location (to clear services). It has an included 5mm clearance from the beam pipe at each location.

Option 2: New Inner Bore

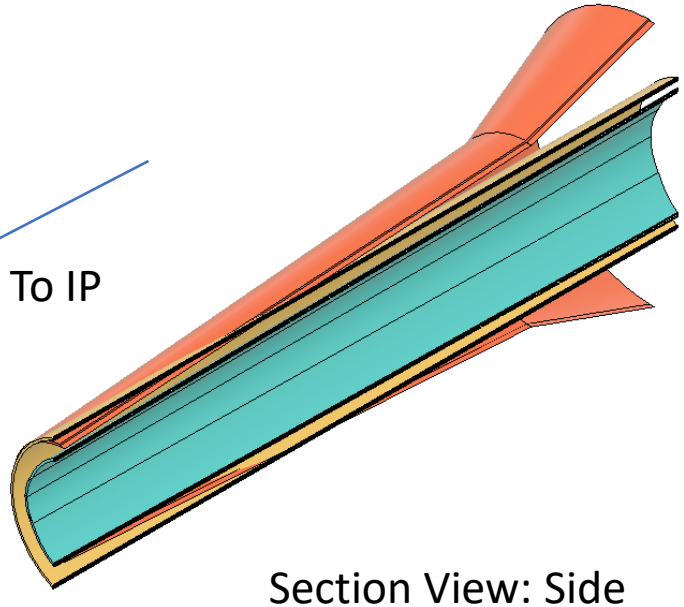


Comparison/Overlay

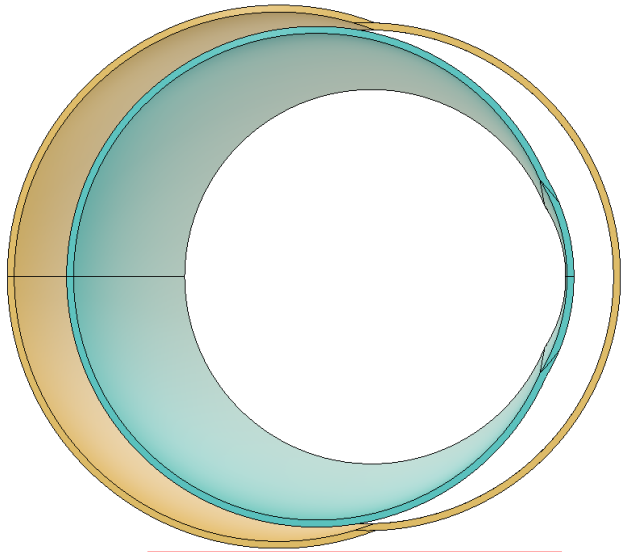


Section View: Top

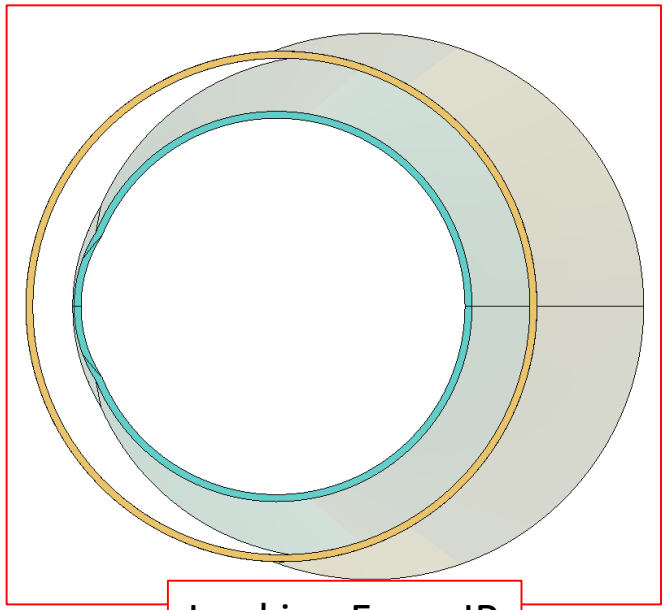
To IP



Section View: Side



Looking Towards IP



Looking From IP

Summary

- As expected, moving the flange to the front of the dRICH allows for the smallest bore overall. However, the dRICH will need a dividing wall for the split which may negate some of the advantages from the smaller bore.
- The CAD models for both of these bore options have been sent to Marco to be investigated to determine the way ahead (along with the slides regarding the clearances and considerations for the dRICH split).

Questions?