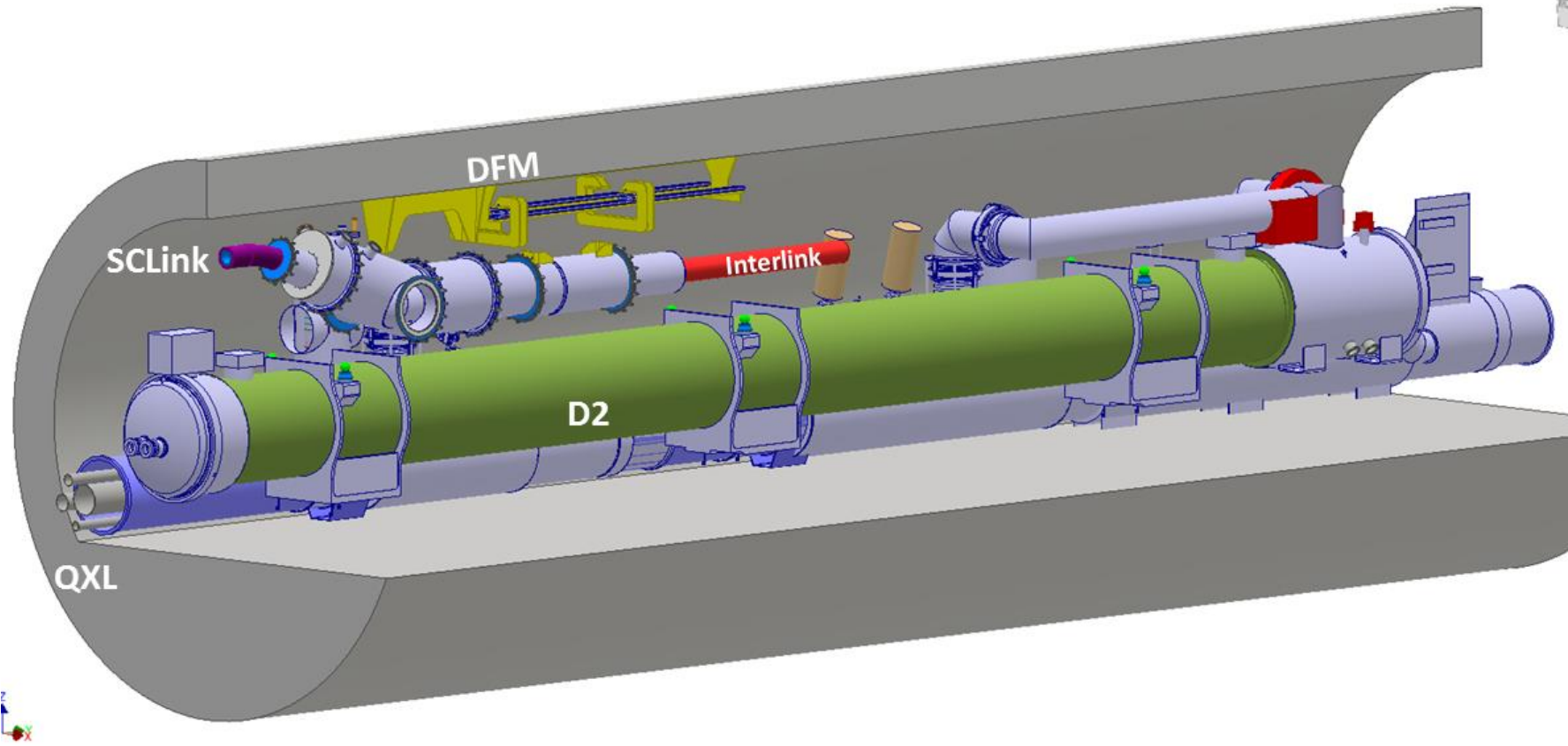


DFM Concept Proposal v0.2

Y. Leclercq, A. Kolehmainen, DFH-DFM meetings members

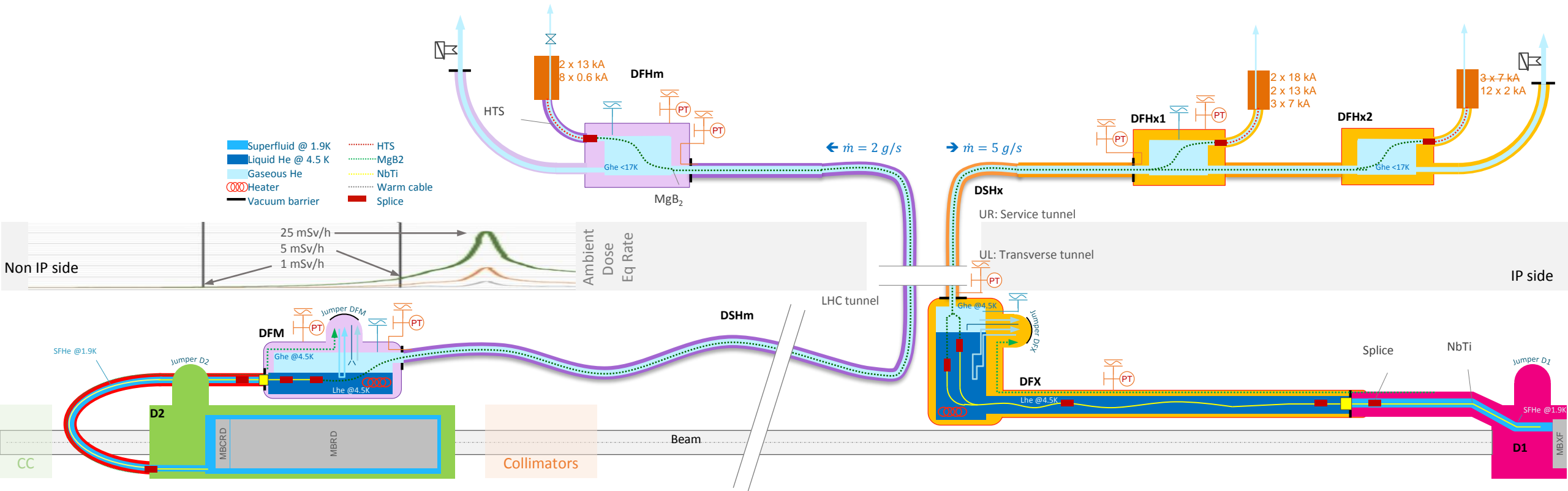
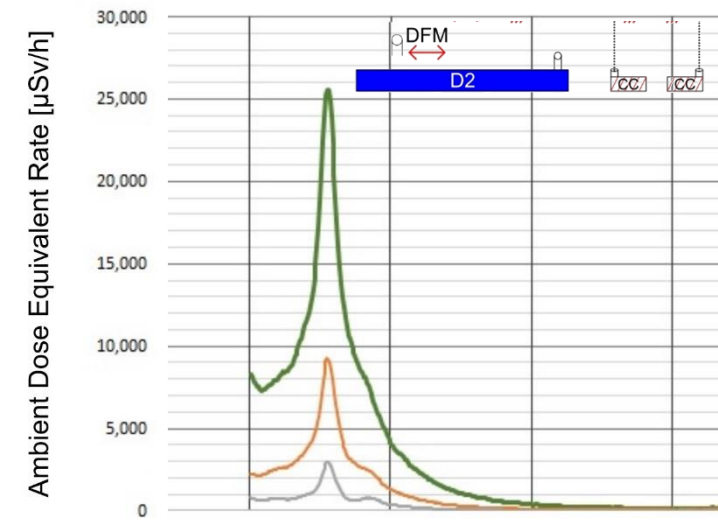
8th DFH-DFM meeting : 3 Apr. 2019



DFM environment

Courtesy M.Sisti
C. Adorisio

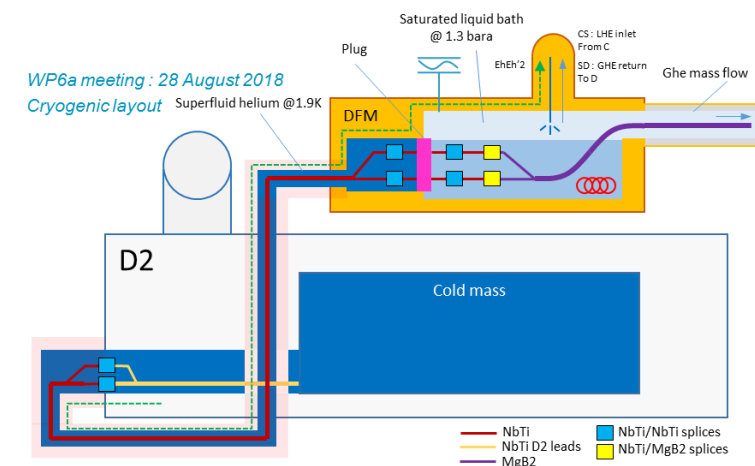
- Location : 45m non IP side of SCLinks inlet shaft
- Interface with :
 - DSHm (cables & cryogenics volume)
 - D2 (cables & cryo piping)
 - QXL (cryo piping)
 - Integration (tunnel, Collimators, Crab Cryomodules)
- Radiation : Dose ≈ 1 MGy, Neutron f. $\approx > 1.10^{15}$ cm⁻², up to 25 mSv/h



DFM concept

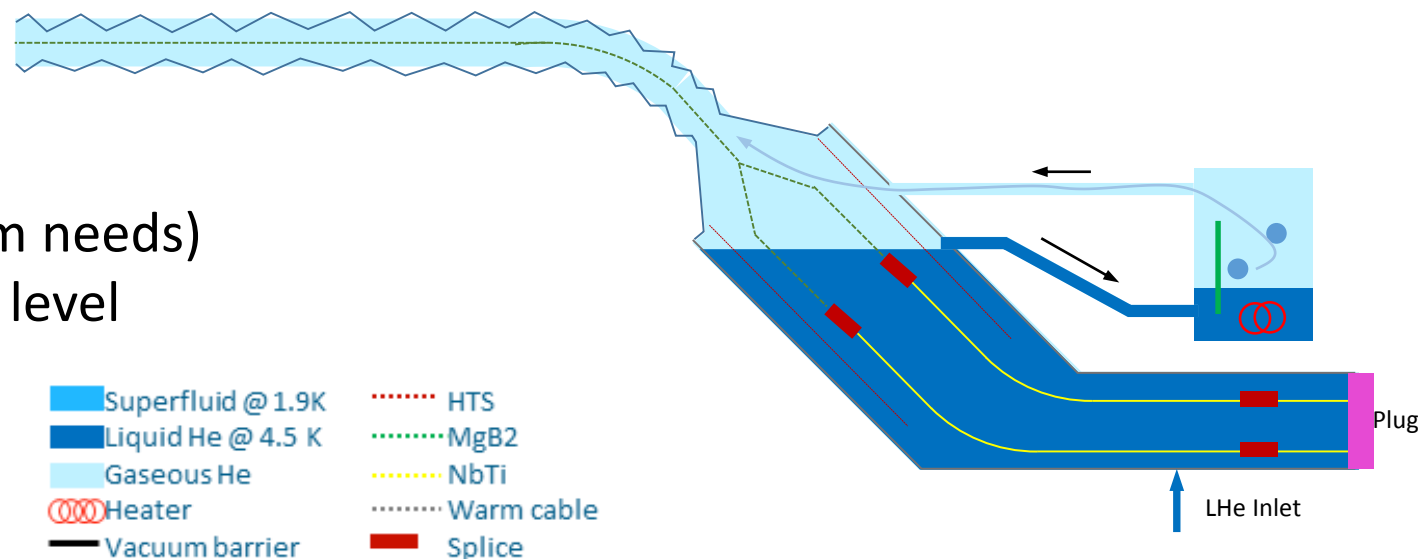
- Concept v0.2 key features:

- Same Interlink & cryo concept
- Inclined concept
- DDFX principle : Ghe mass flow created in a separated reservoir
- “Fountain” design to gain vertical height
- SCLink interface as for DFX:
 - MgB2-NbTi splices protected in perforated cylinder
 - Only NbTi leads accessible



- Basic concept

1. LHe injection in splice volume
2. Level flows in side reservoir by gravity
3. Heater vaporises liquid (based on DFHm needs)
4. Level gauge control LHe inlet to ensure level



Nominal configuration

Electrical:

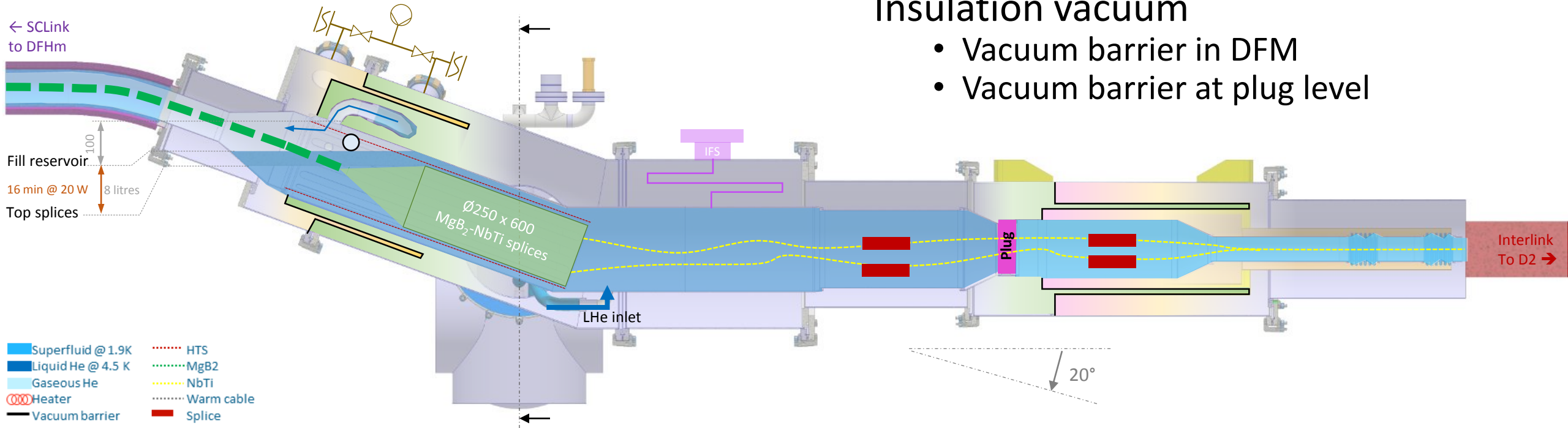
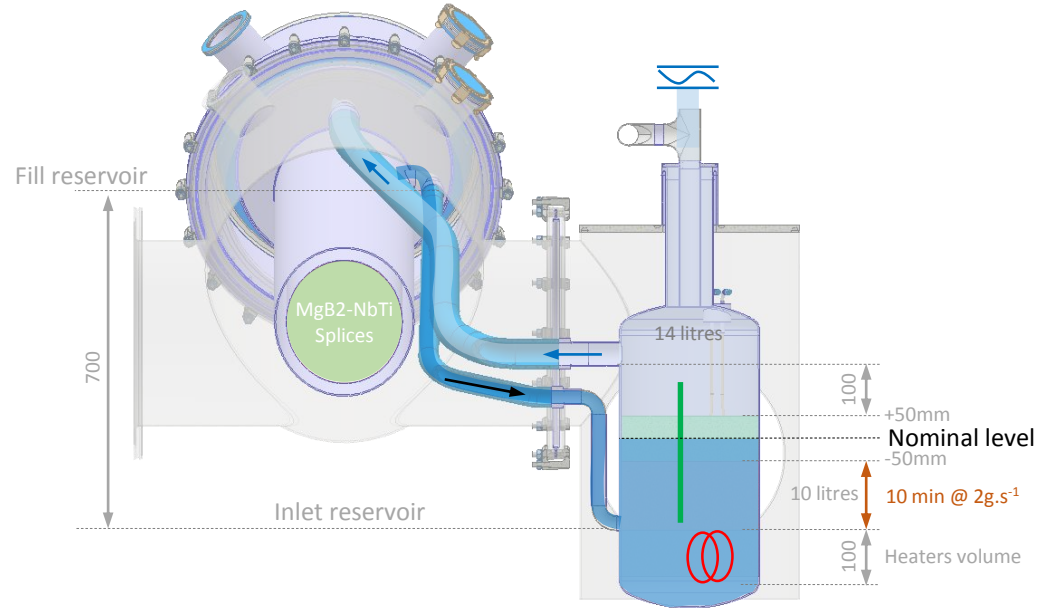
- MgB_2 -NbTi Splices protected
- NbTi-NbTi splices on either side of plug

Cryogenics:

- Superfluid in interlink
- Splices immersed in LHE
- Fountain principle
- 10 min buffer at nominal conditions

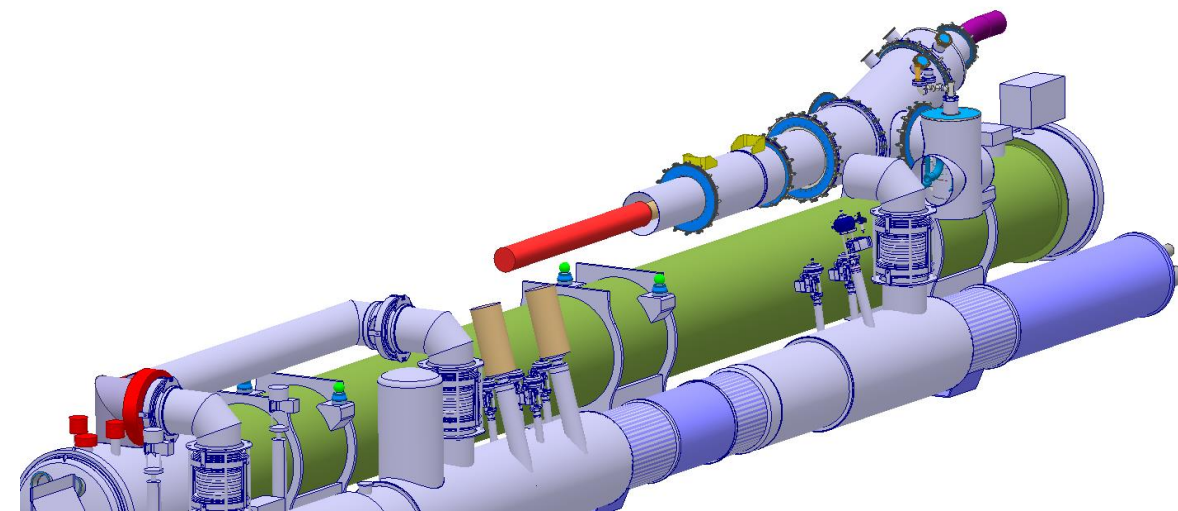
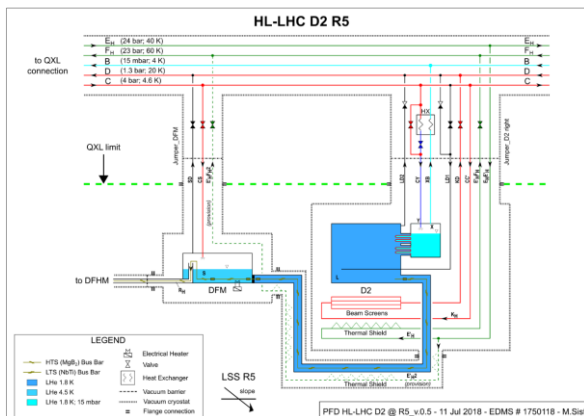
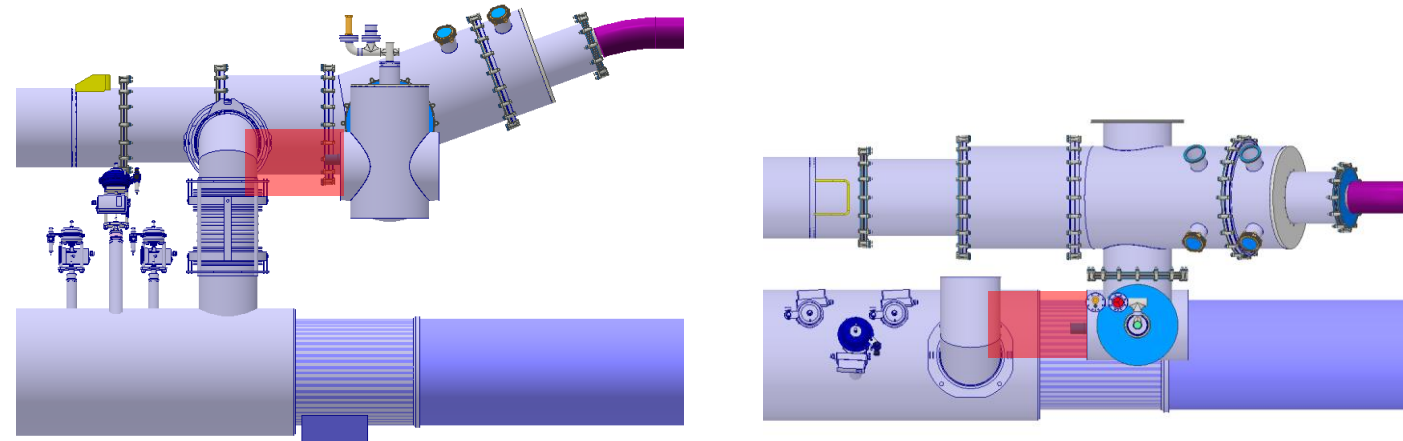
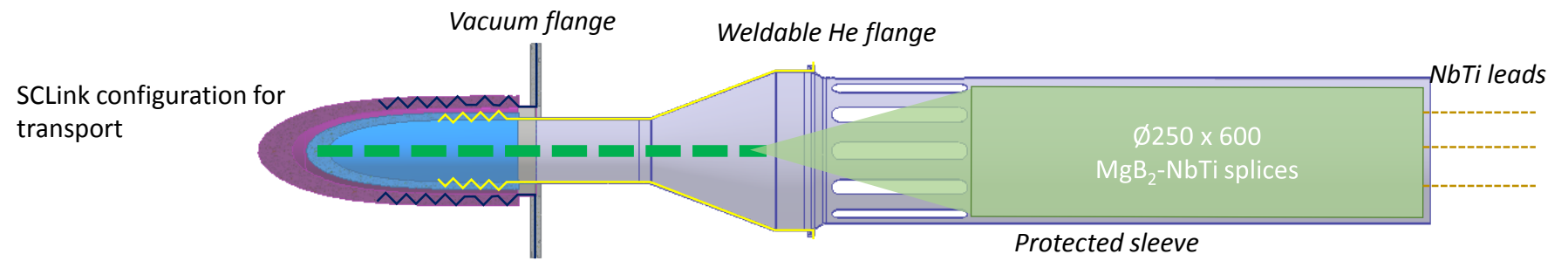
Insulation vacuum

- Vacuum barrier in DFM
- Vacuum barrier at plug level



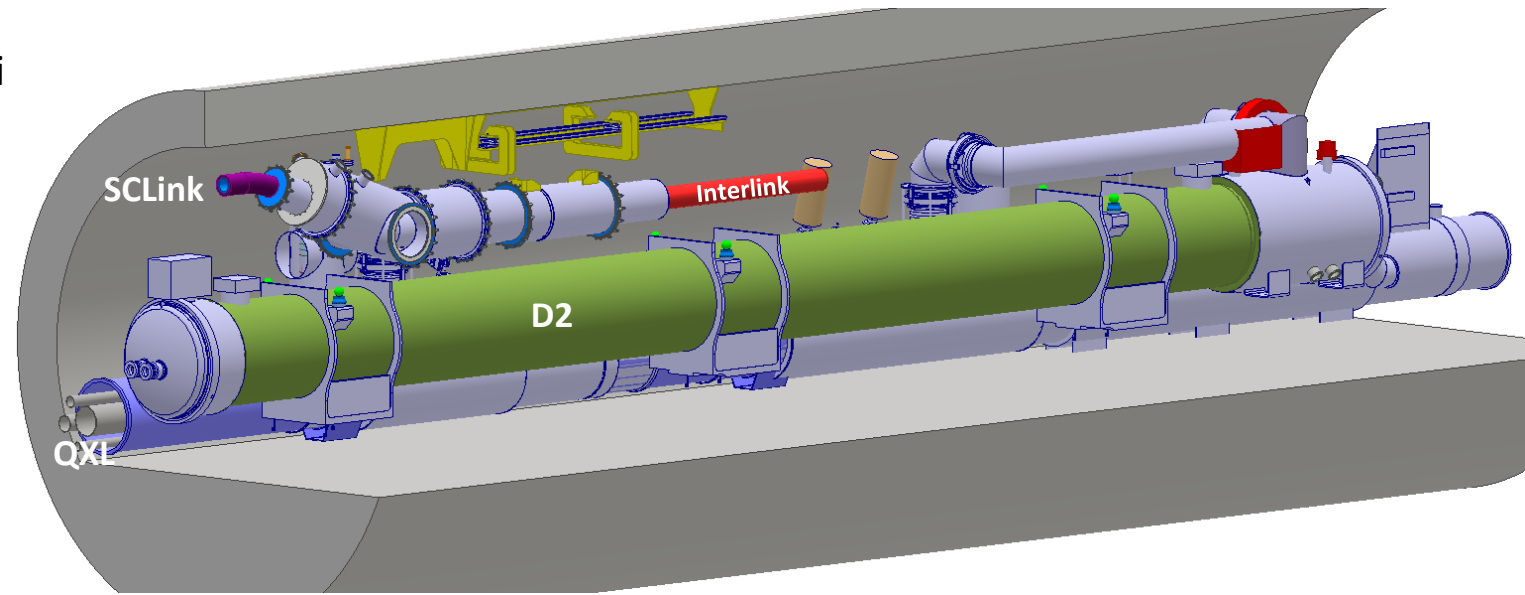
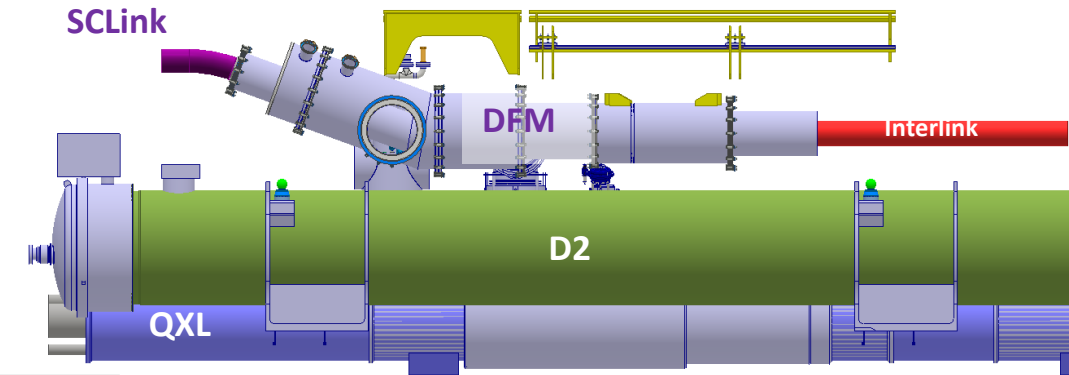
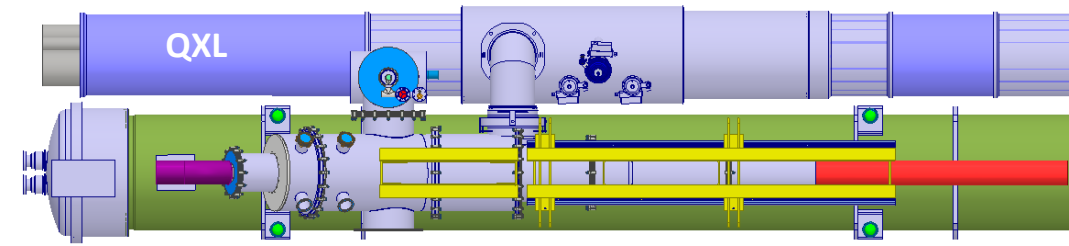
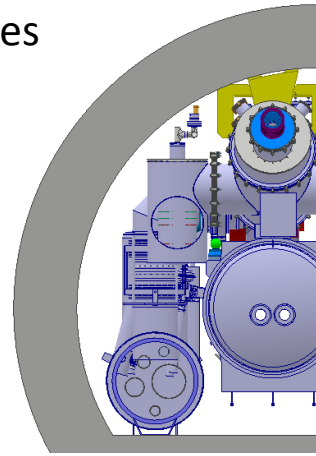
Interfaces

- SCLink:
 - As for DFX
 - Independent inner and outer flexibles
 - MgB₂-NbTi protected
 - Insulation vacuum on DFM side
- Cryogenics:
 - Jumper on reservoir side
 - 1 x LHE In + 1 x GHE out + 1 x TS_{Interlink} + 2 x 4-6 Heat Ex.
 - Location : close to today's jumper proposal (work on going)



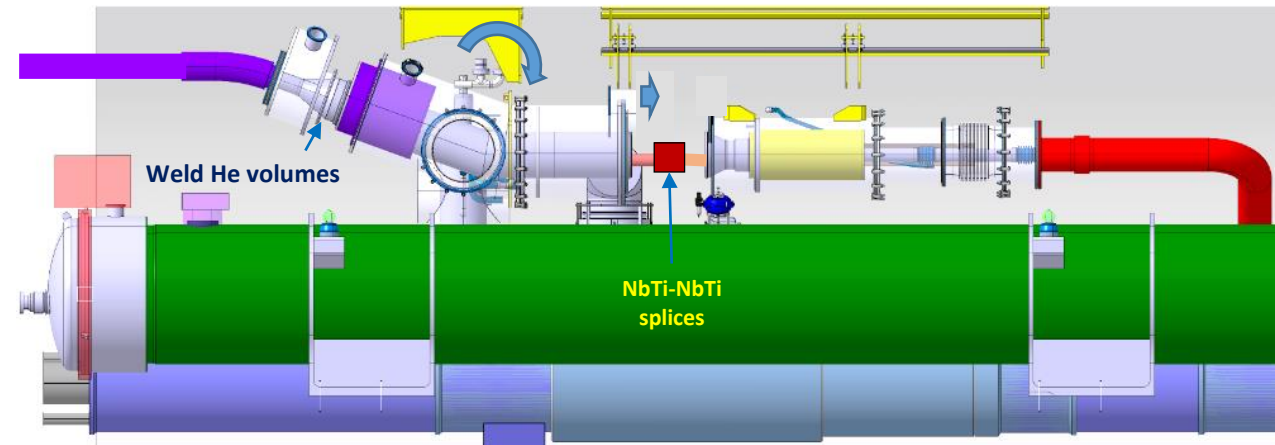
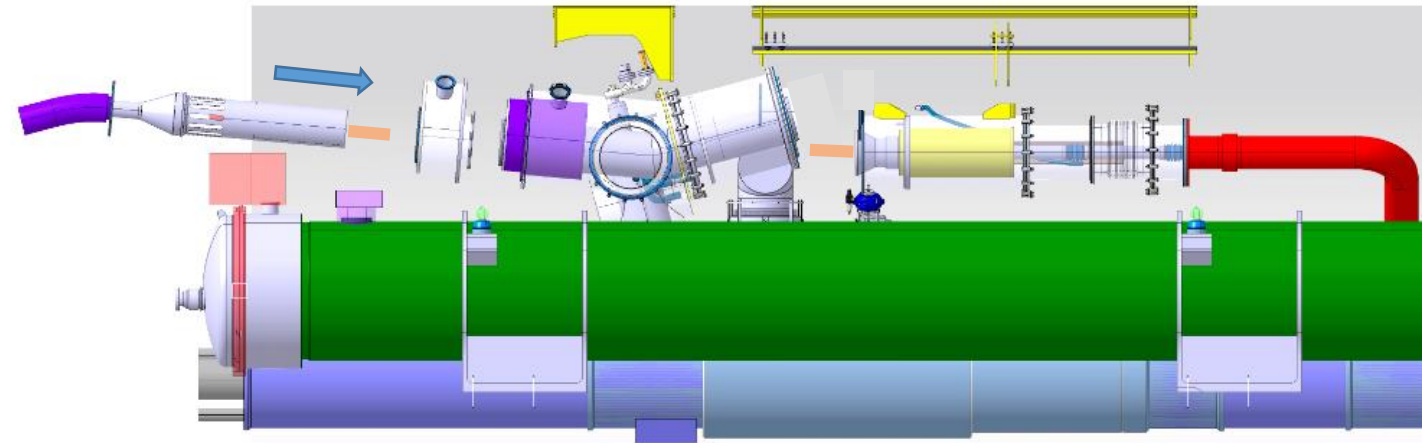
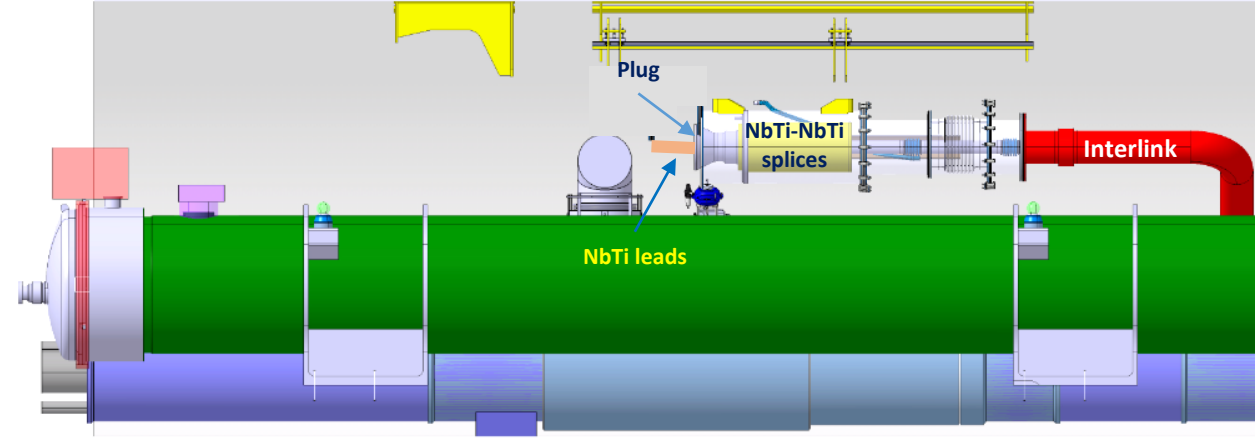
Integration on going work

- DFM located above D2
 - Distant enough to allow independent assemblies
- Longitudinal position in discussion
 - Not relevant for concept within $\approx 1\text{-}2\text{m}$
- Cryo interface:
 - 1 dedicated jumper (Details TBD)
- SCLink interface:
 - As for DFX concept
- Interlink interface:
 - Plug at DFM level (interlink work on going)
- Maintenance:
 - Pumps, safety devices, V-taps and instru accessi
 - Cryo maintenance access TBD
- Integration proposal: (TBD)
 - Roof support
 - Independent assembly D2-DFM
 - Compatible with QXL maintenance ?



Assembly preliminary sequence

1. Initial conditions:
 - D2 present
 - Interlink installed until plug
2. DFM installed rotated of 10 deg
3. SCLink insertion with limited angle
4. DFM rotation to nominal
5. Weld jumper interfaces
6. NbTi-NbTi splices
7. He and Vacuum vessels closure

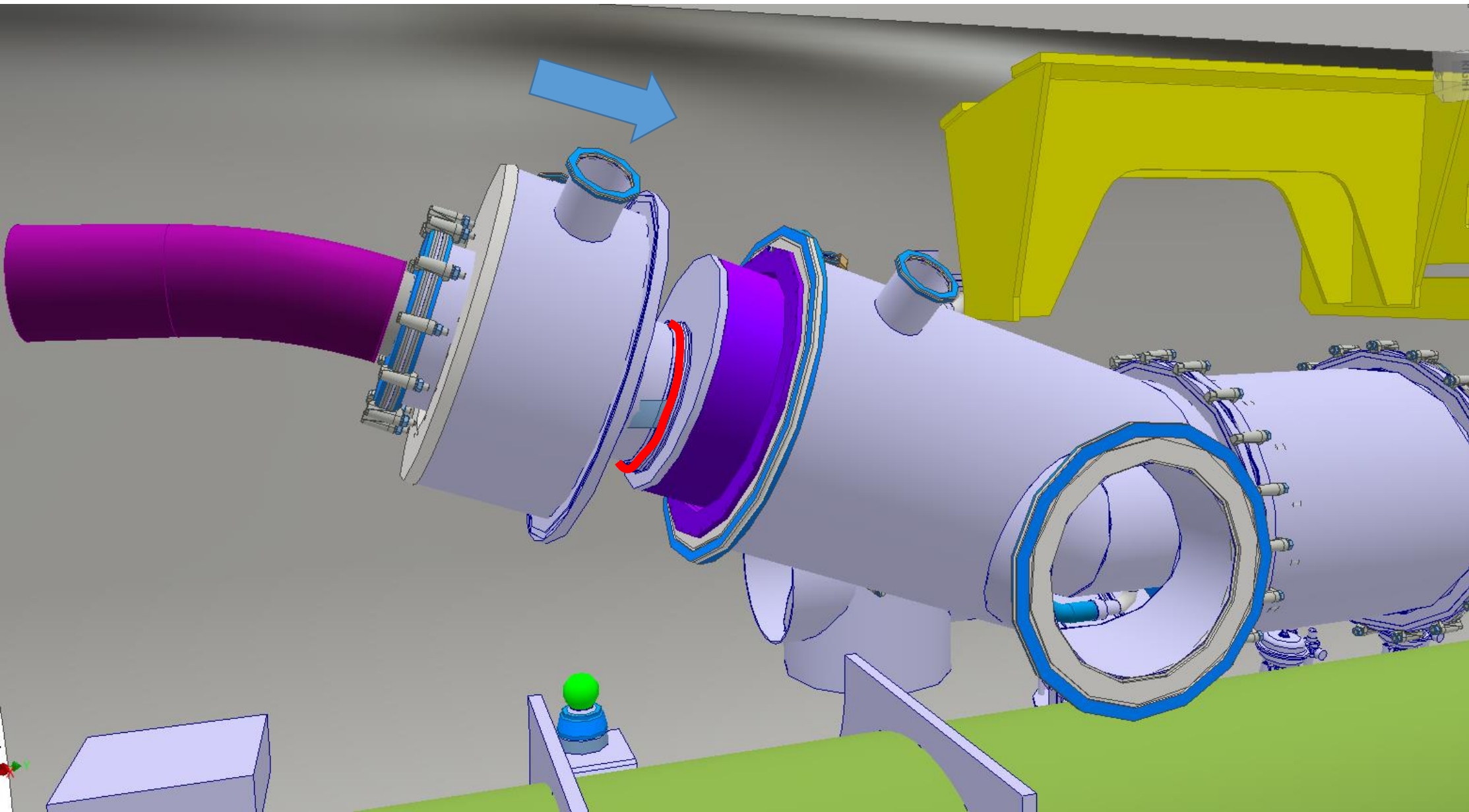


Next Steps

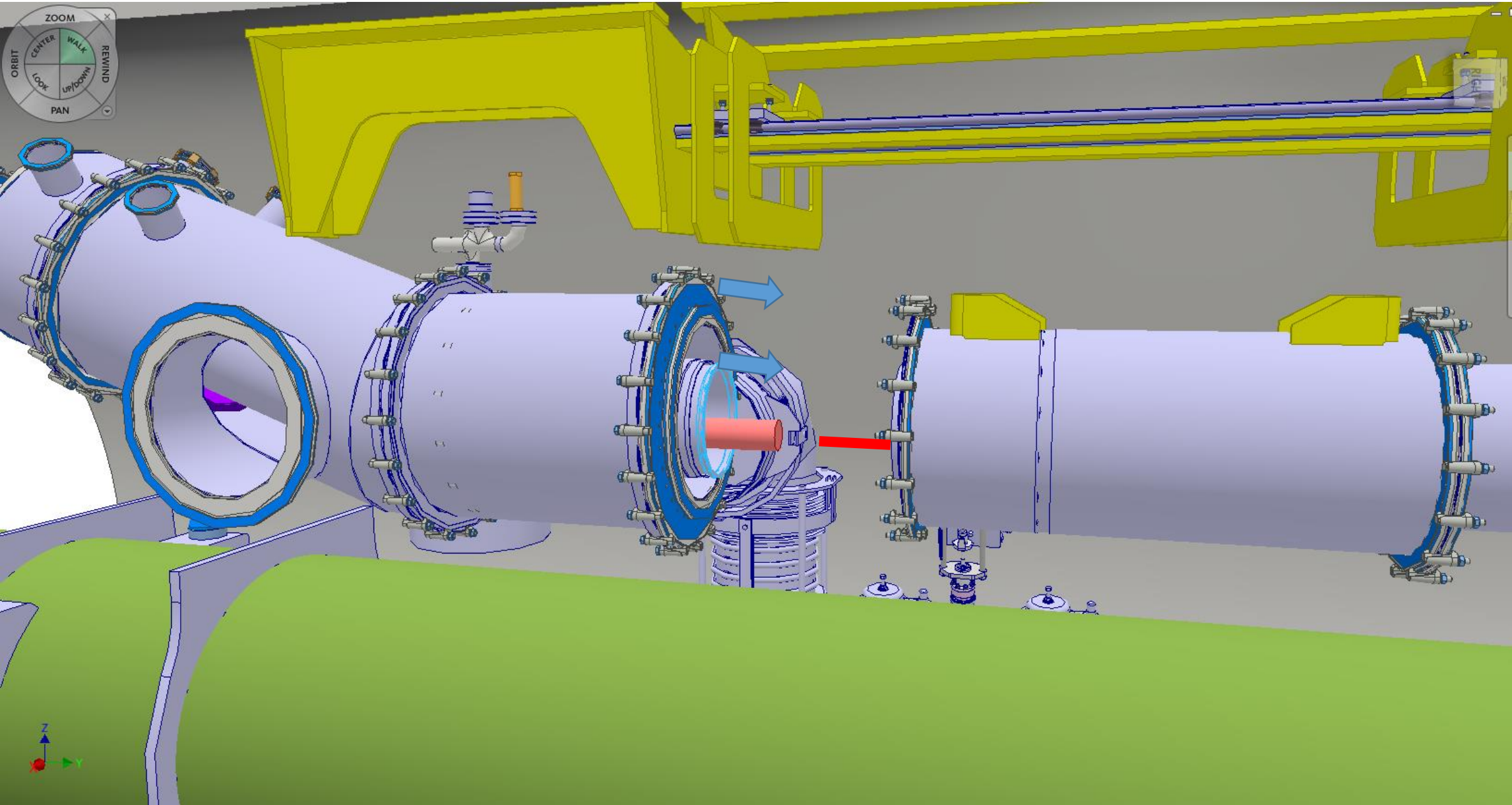
- Interlink integration and access for maintenance to QXL
- Interface with Cryolines
- Interface with integration / tunnel / D2
- Assembly sequence detailed
- IFS design

Spare slides

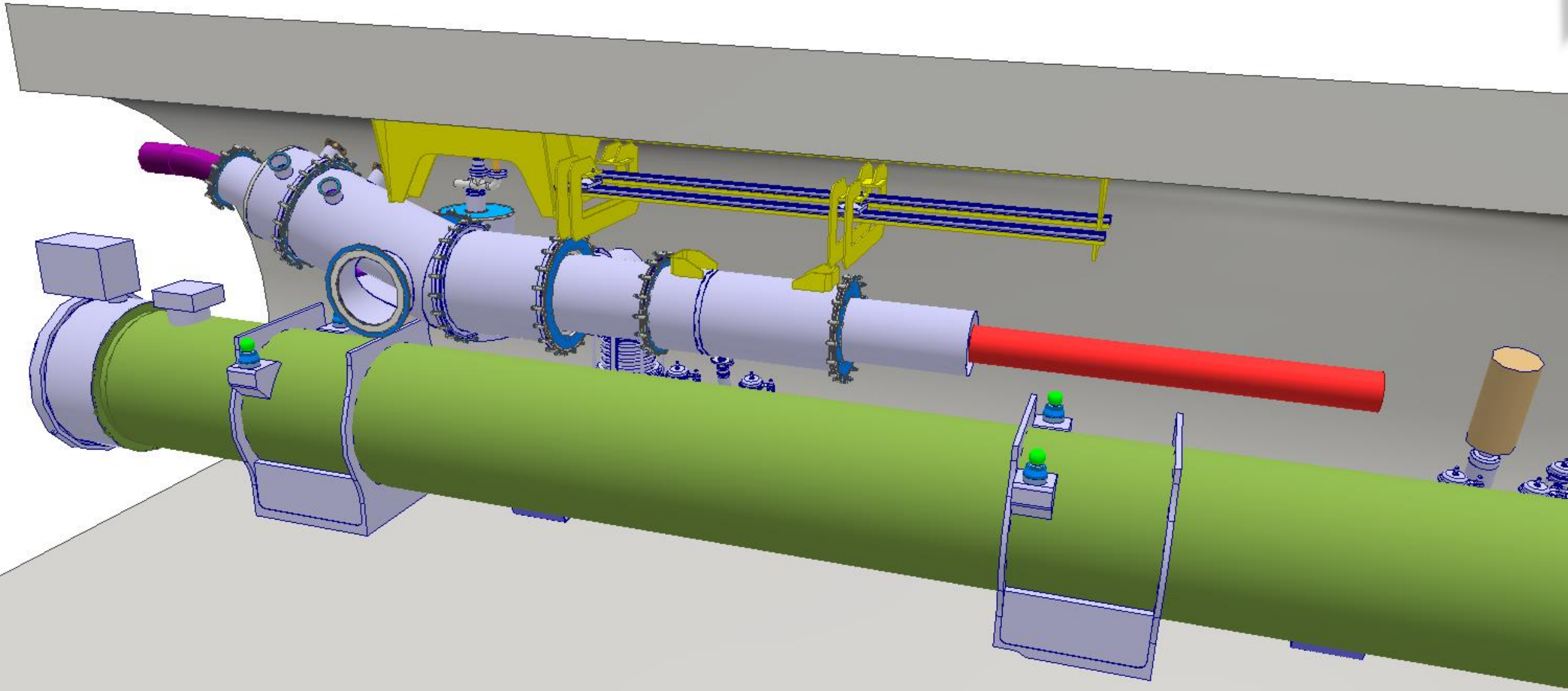
SCLink He jacket welding to DFM helium vessel



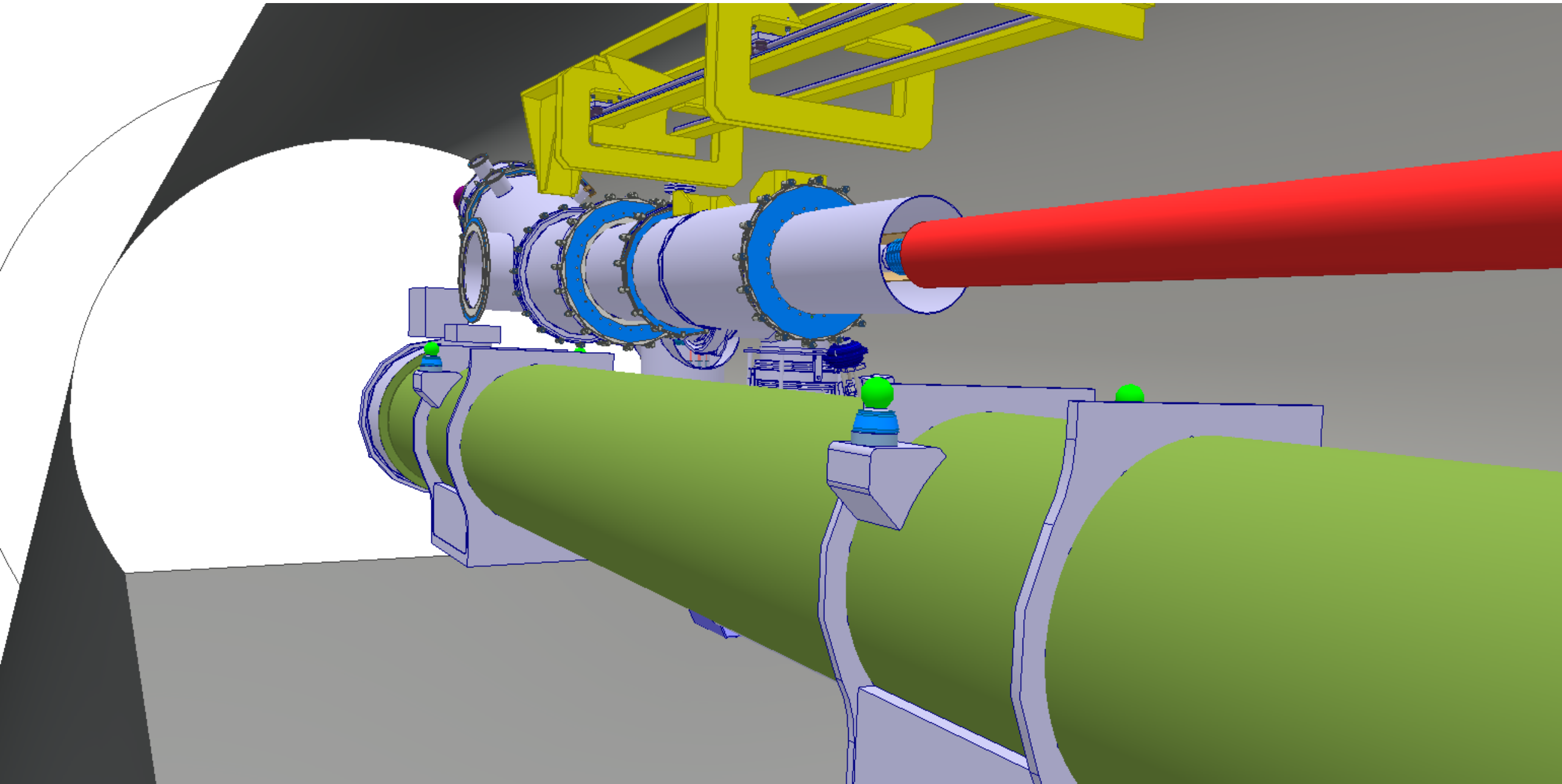
SCLink NbTi leads soldering to Plug NbTi leads



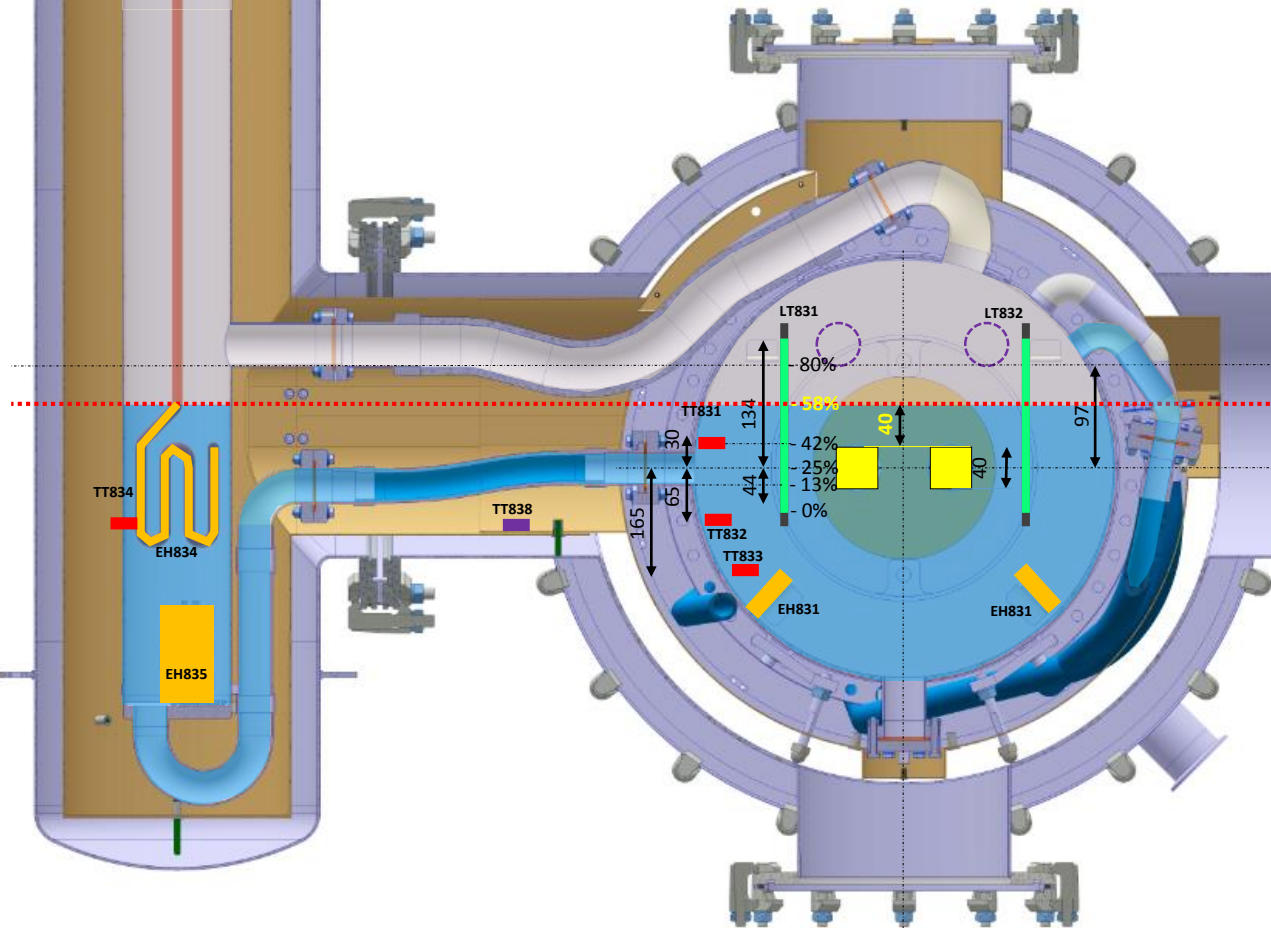
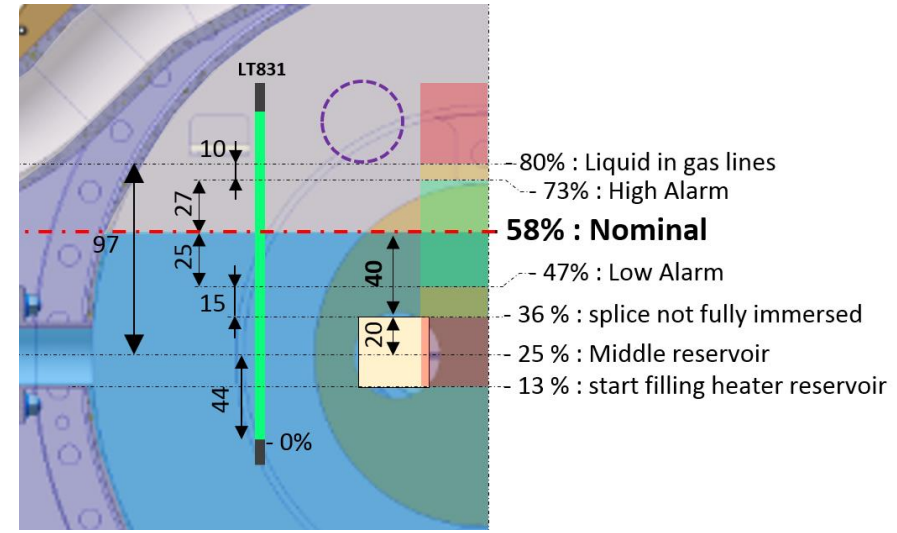
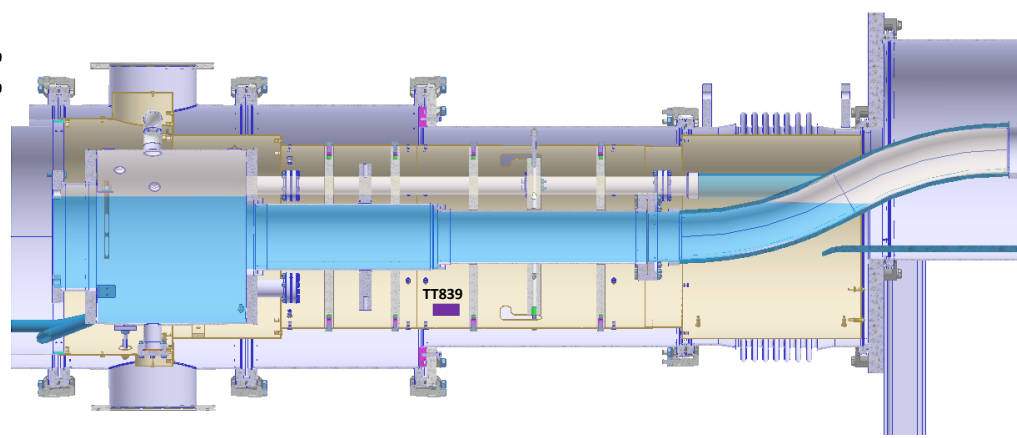
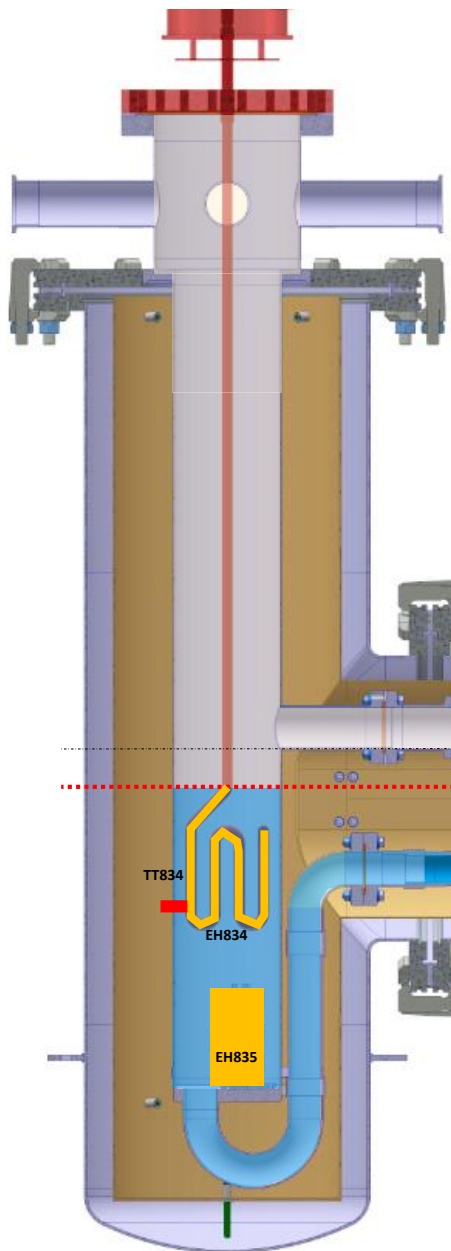
Nominal configuration



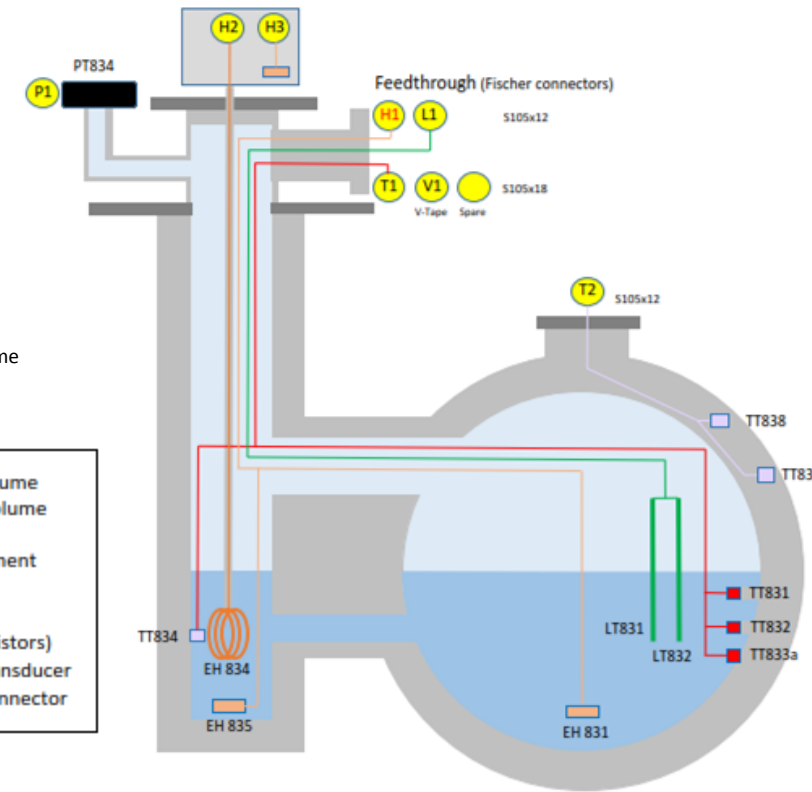
View from tunnel



DDFX cryo layout



- 80% : limit for gas lines
- 58% : Nominal
- 42% : TT831
- 25% : Middle plane / max ϕ
- 13% : start filling heater volume
- 0% : min level reading



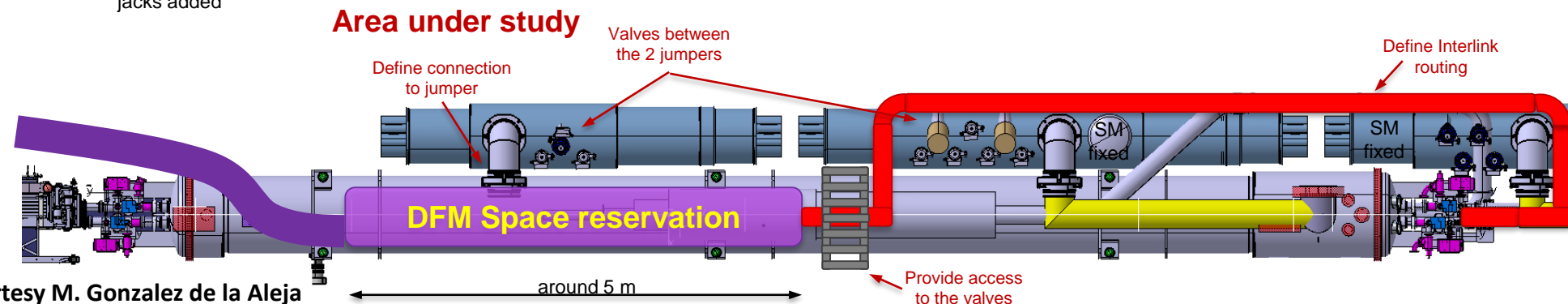
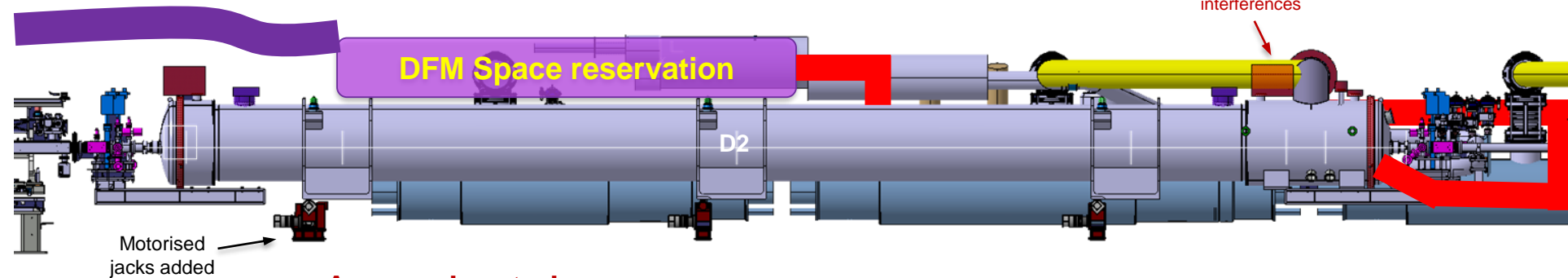
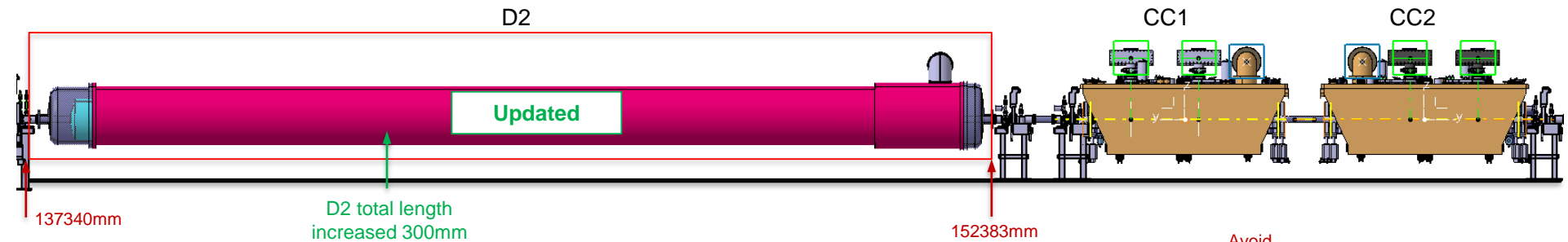
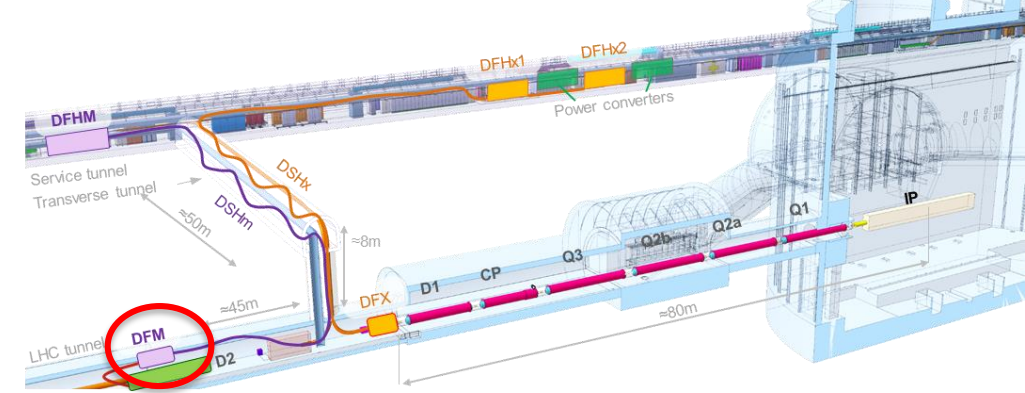
DFM environment (not today's key topic)

Busy area (radiation, QXL, D2, SCLink)

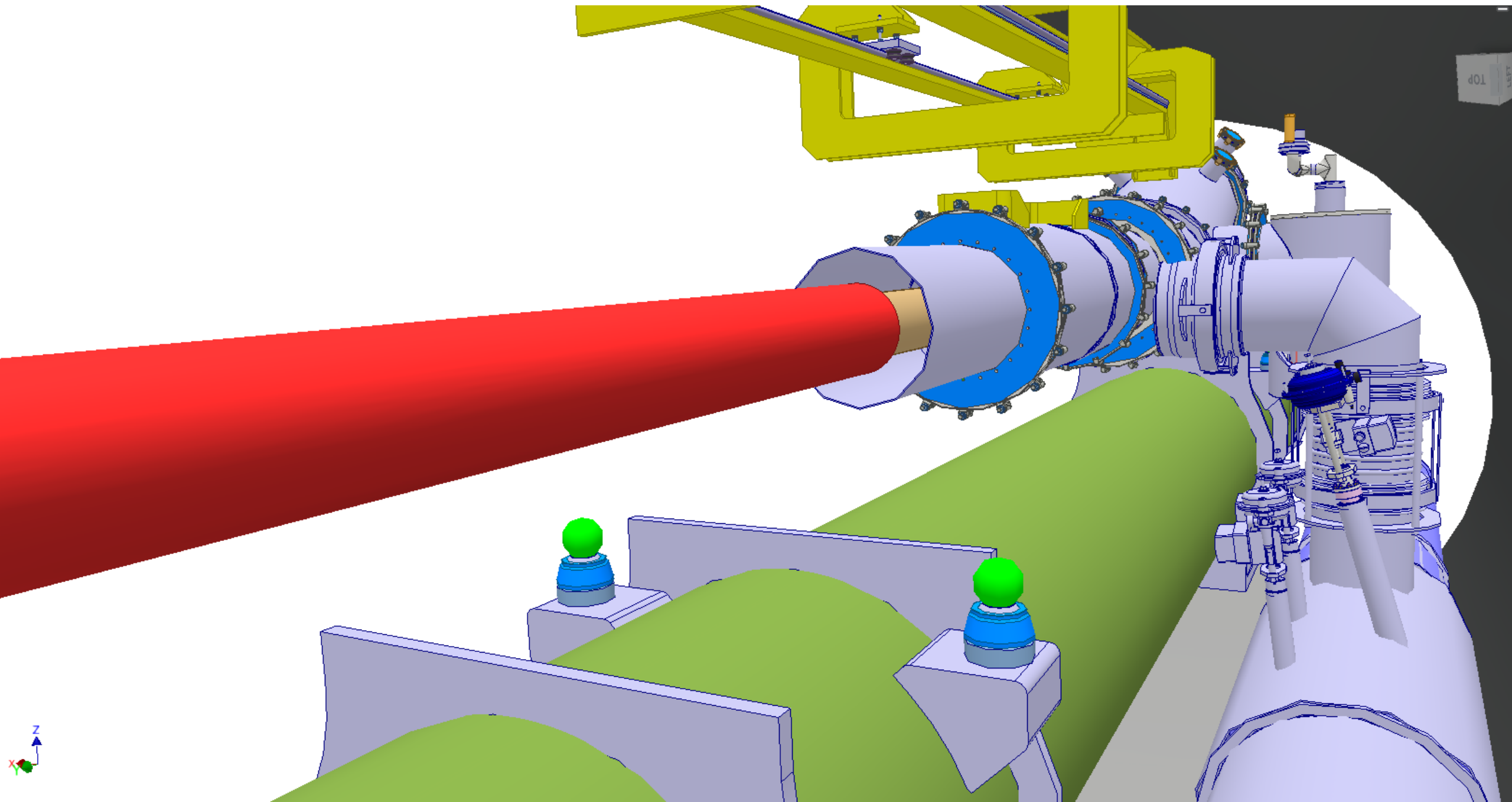
On going discussions to study feasibility

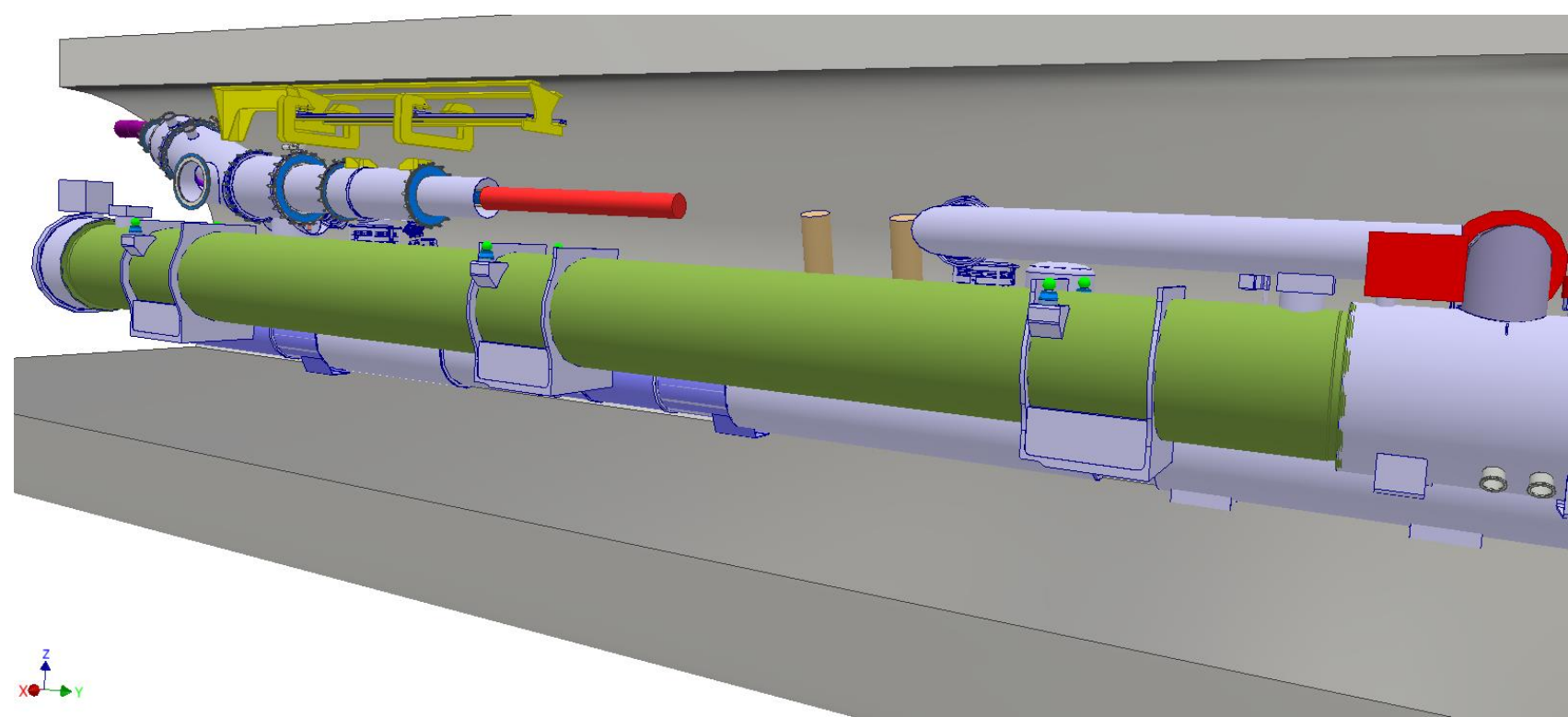
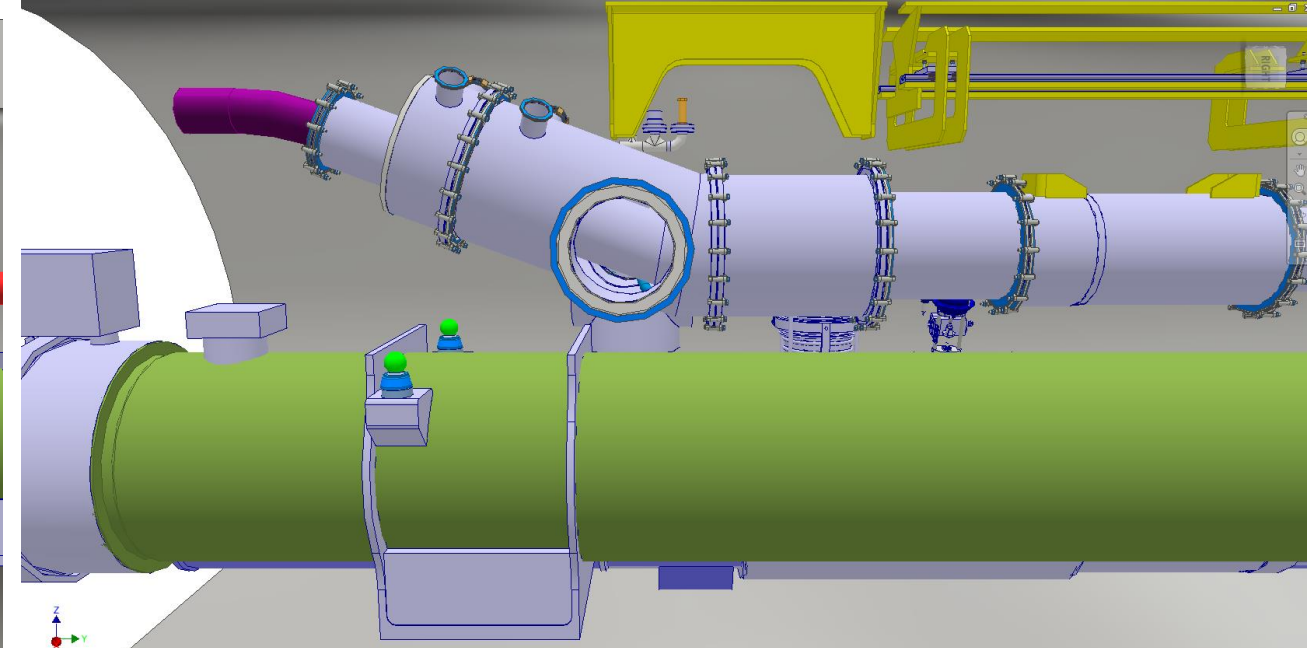
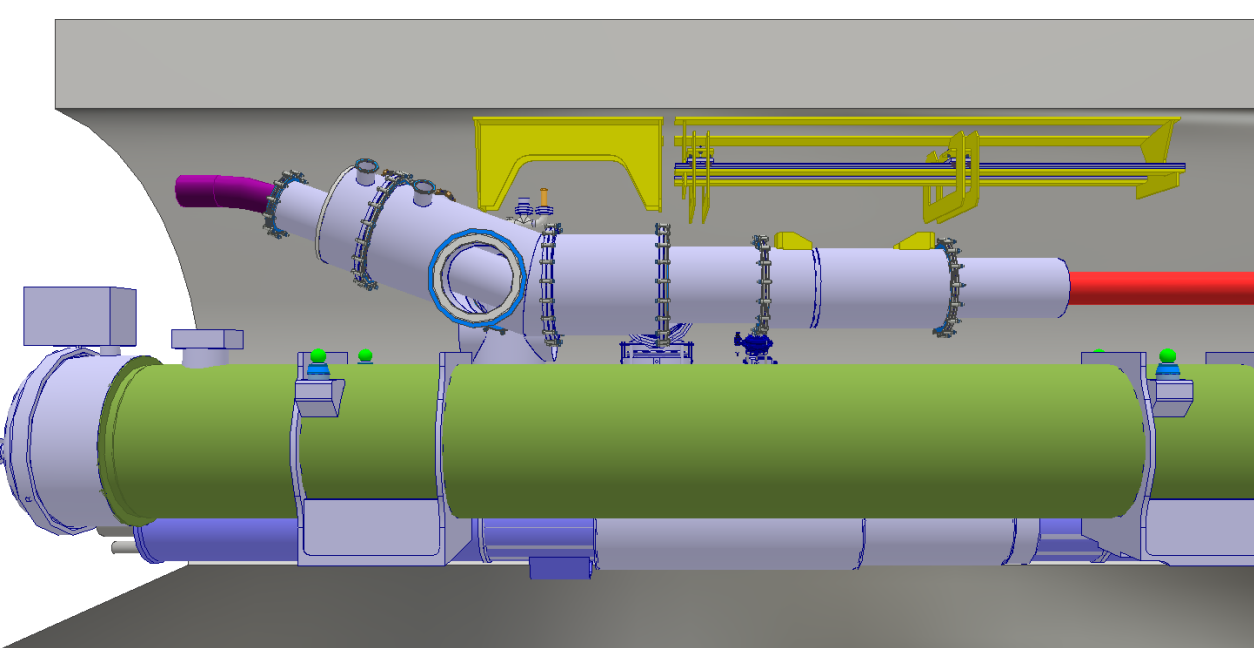
Sequence:

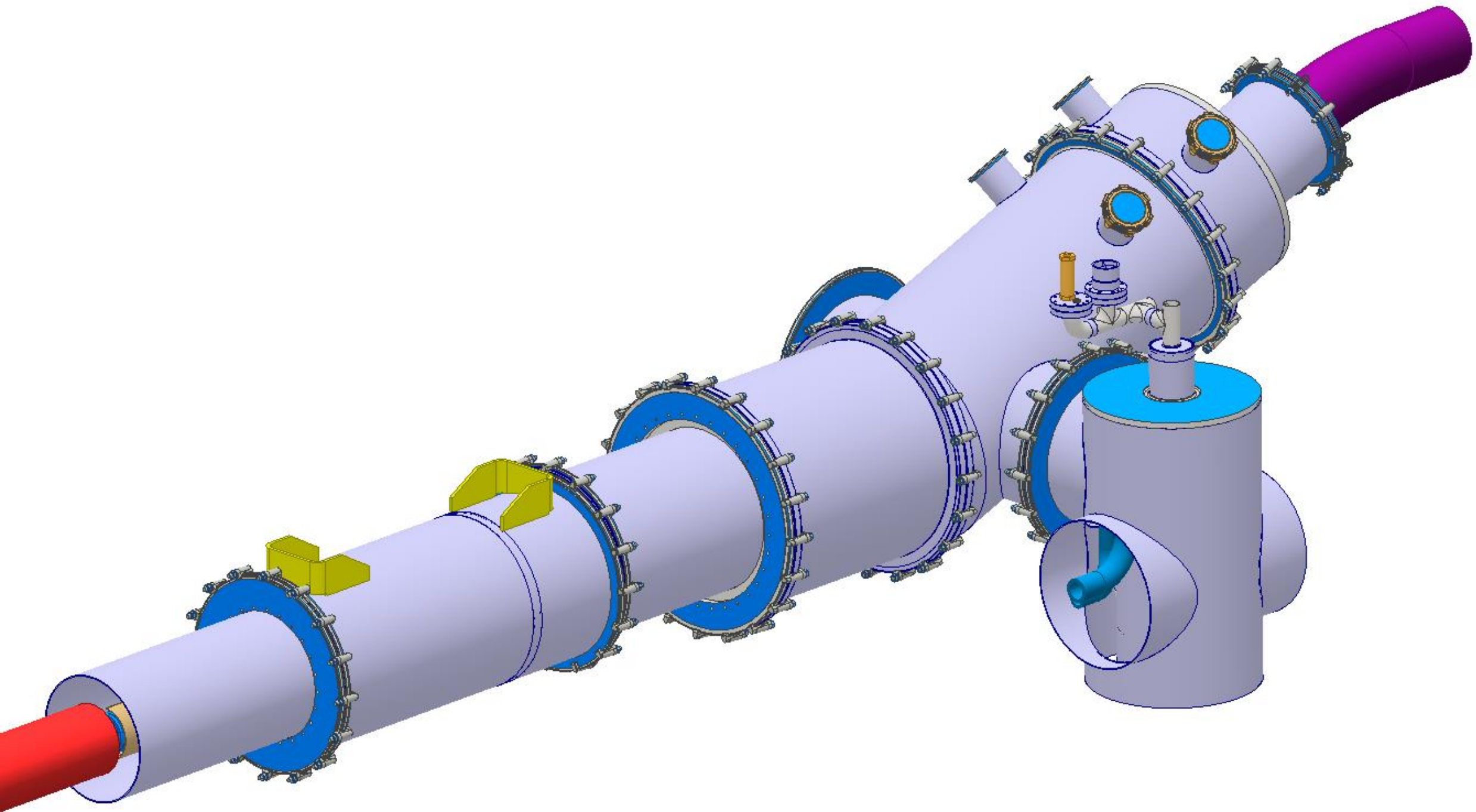
- DFM concept
- DFM integration
- Iterations WP15

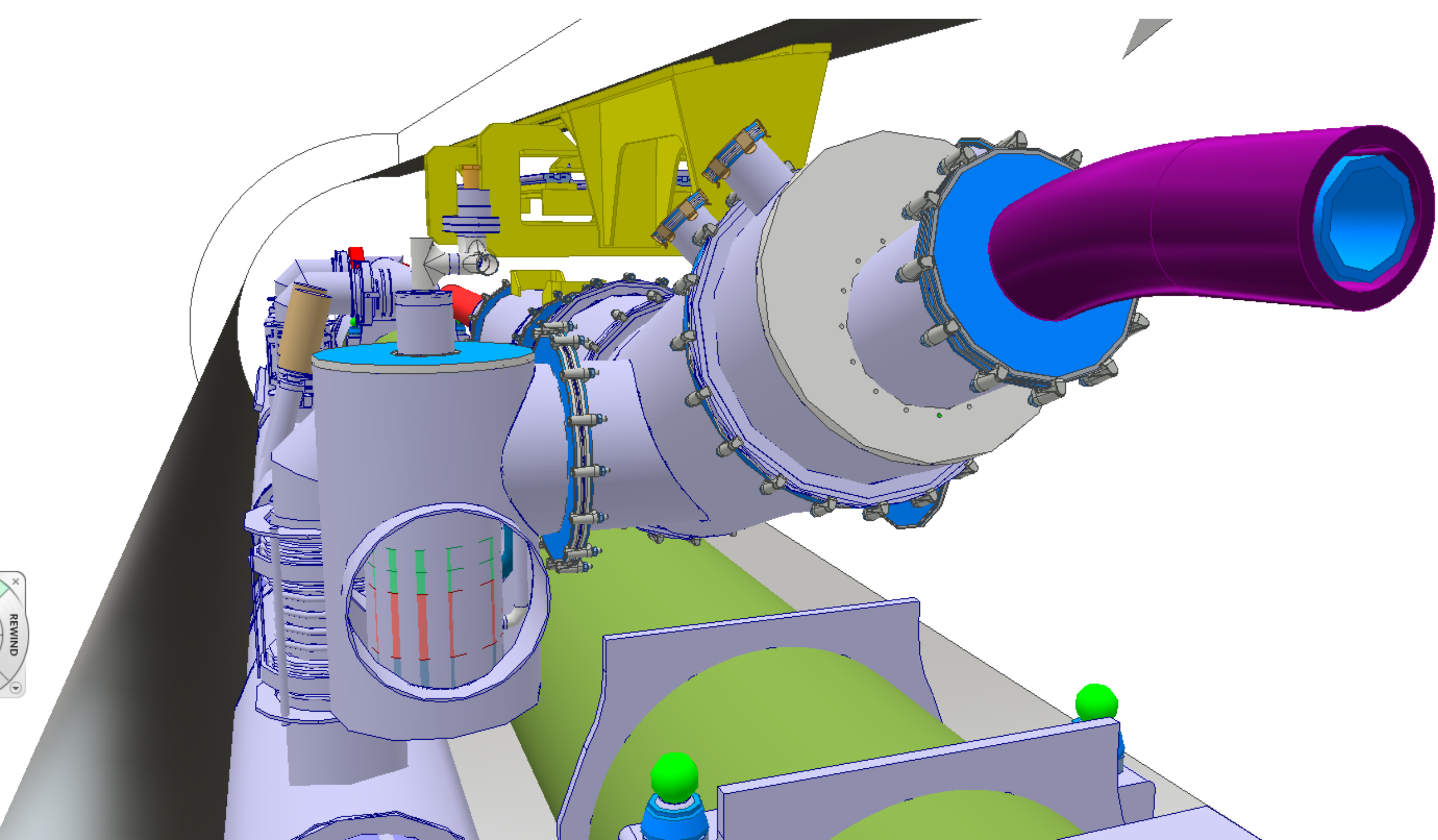


Courtesy M. Gonzalez de la Aleja









DFM concept

- 4th DFH-DFM meeting actions:
 - Reduce distance between outer and inner SCLink flanges
 - Study supporting options

