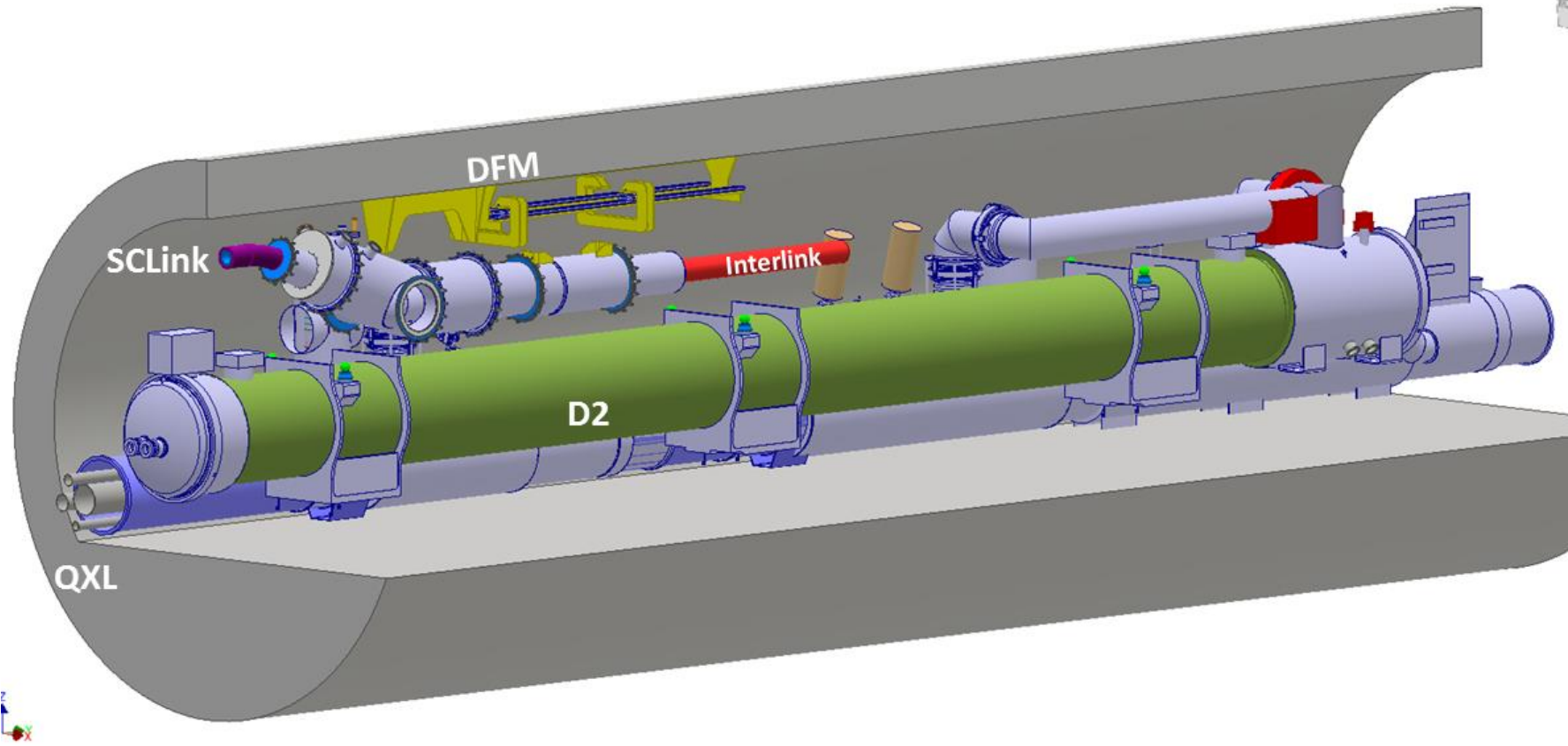


# DFM Concept Proposal v0.2

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

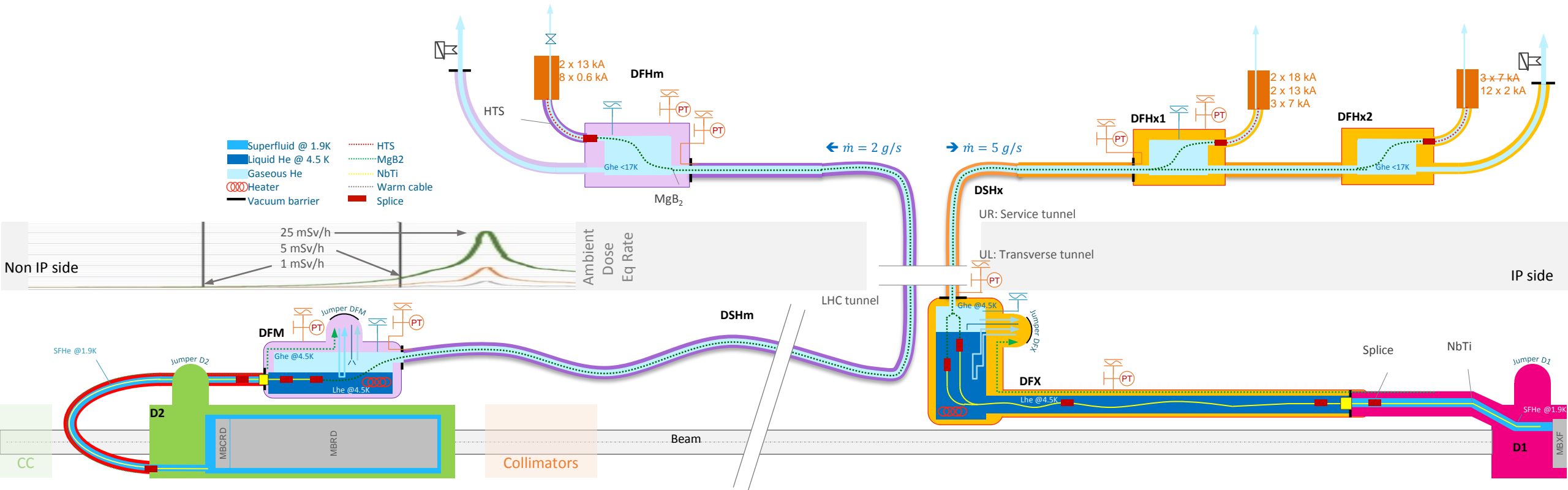
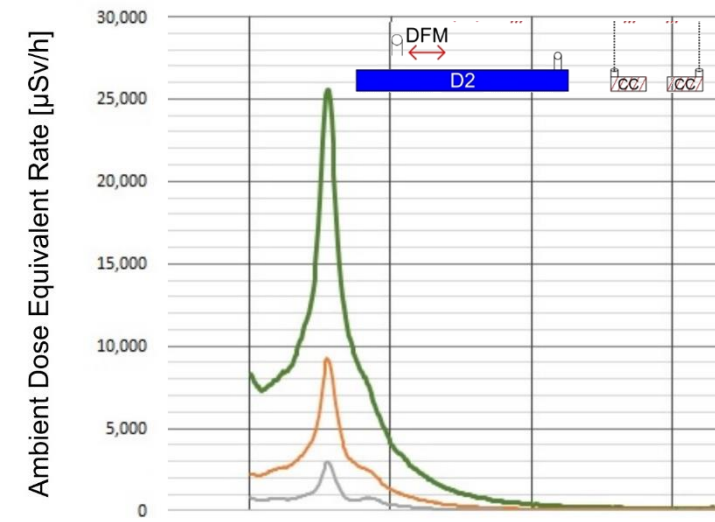
8<sup>th</sup> DFH-DFM meeting : 3 Apr. 2019



# DFM environment

Courtesy M.Sisti  
C. Adorisio

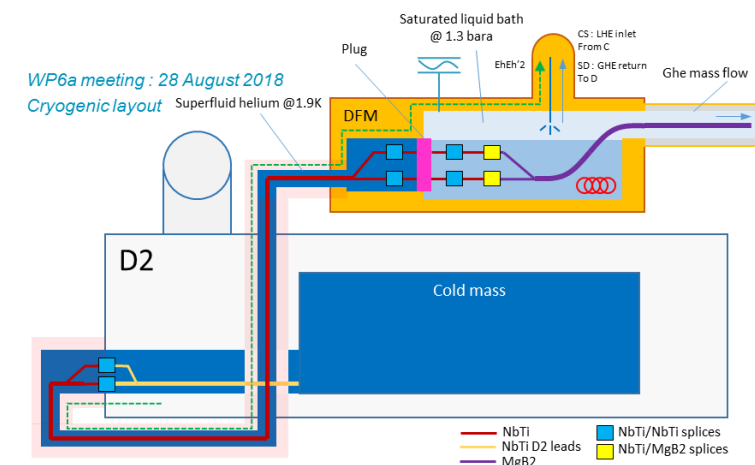
- Location : 45m non IP side of SCLinks inlet shaft
- Interface with :
  - DSHm (cables & cryogenics volume)
  - D2 (cables & cryo piping)
  - QXL (cryo piping)
  - Integration (tunnel, Collimators, Crab Cryomodules)
- Radiation : Dose  $\approx 1$  MGy, Neutron f.  $\approx > 1.10^{15}$  cm<sup>-2</sup>,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



# DFM concept

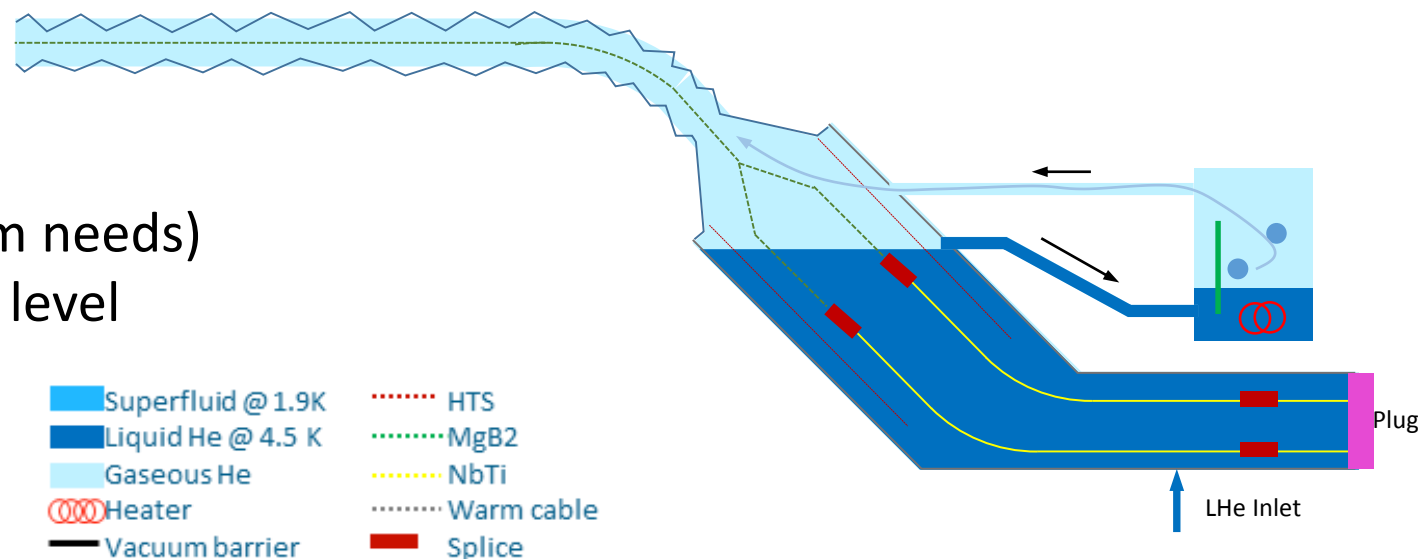
- Concept v0.2 key features:

- 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:

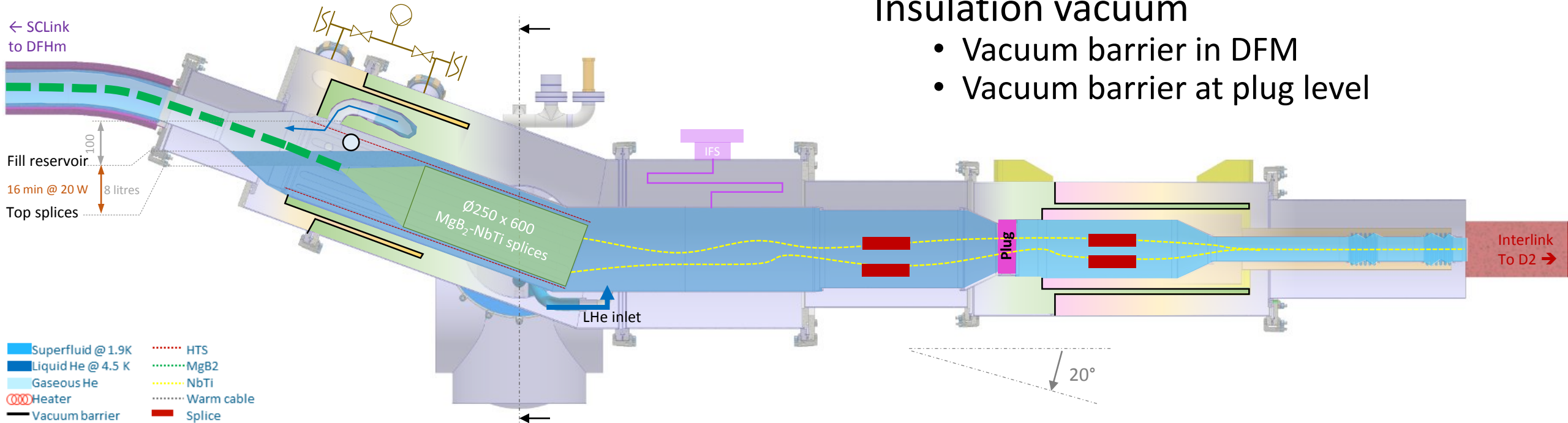
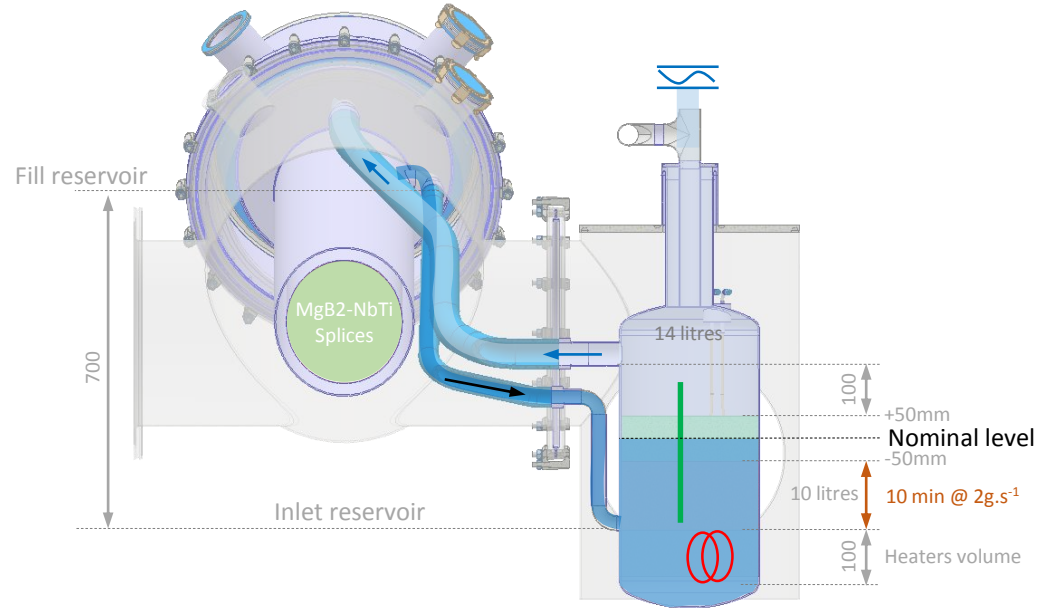
- $\text{MgB}_2$ -NbTi Splices protected
- NbTi-NbTi splices on either side of plug

## 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

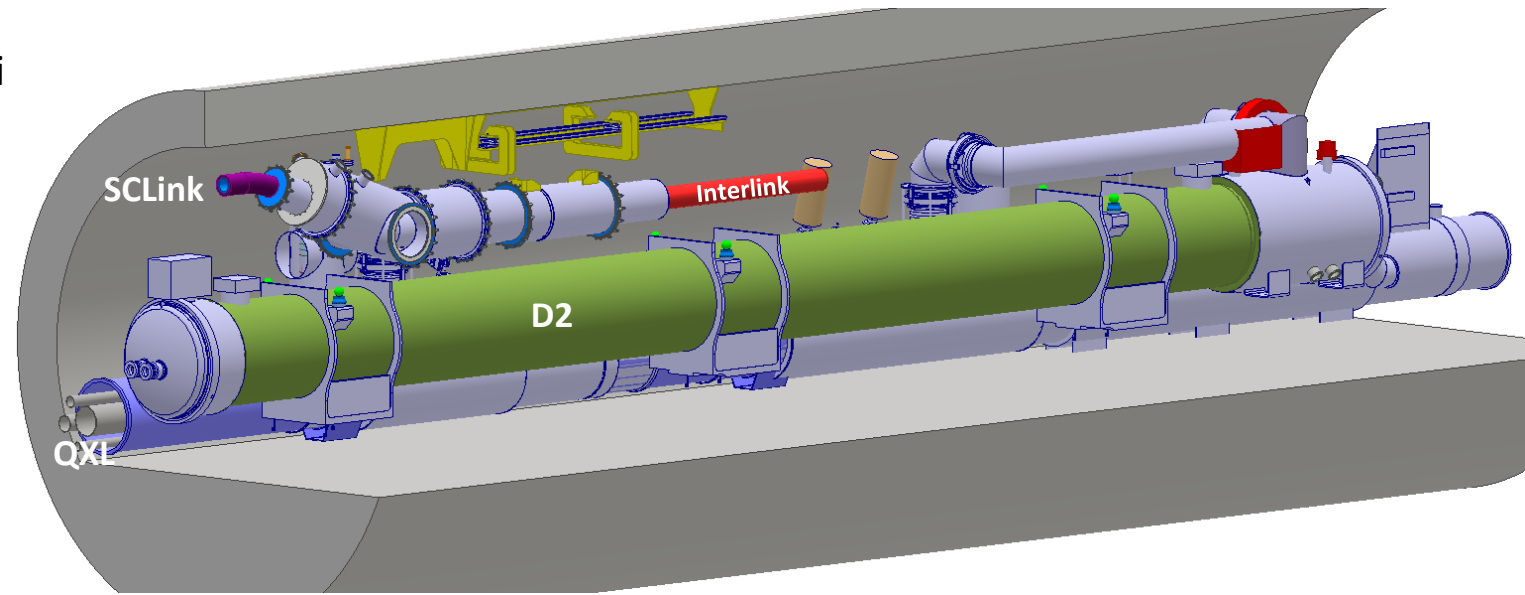
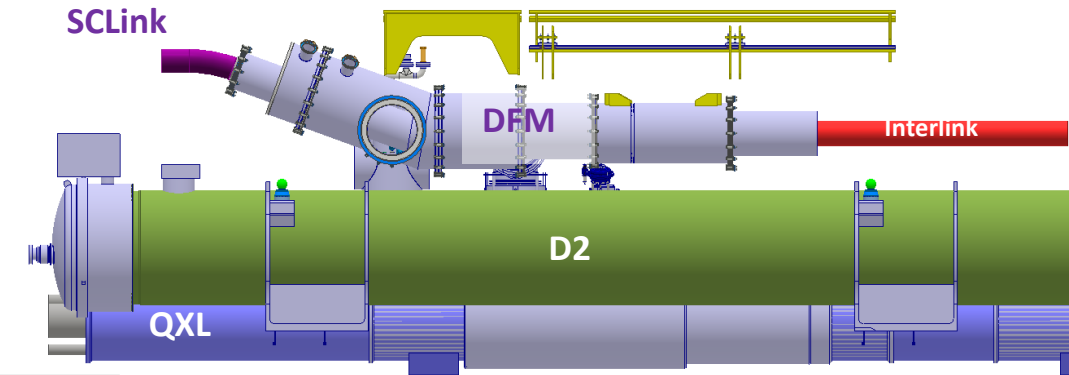
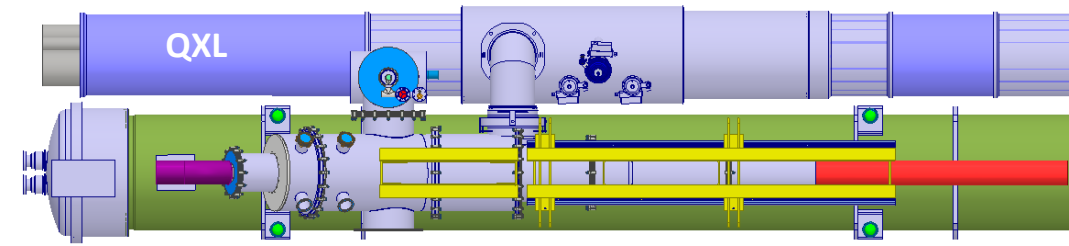
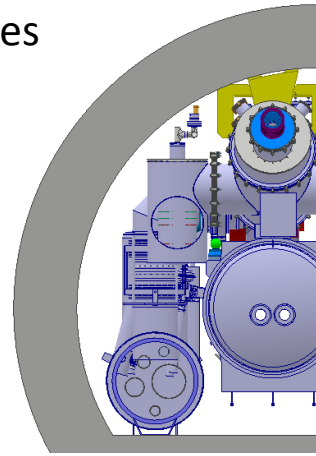






# Integration on going work

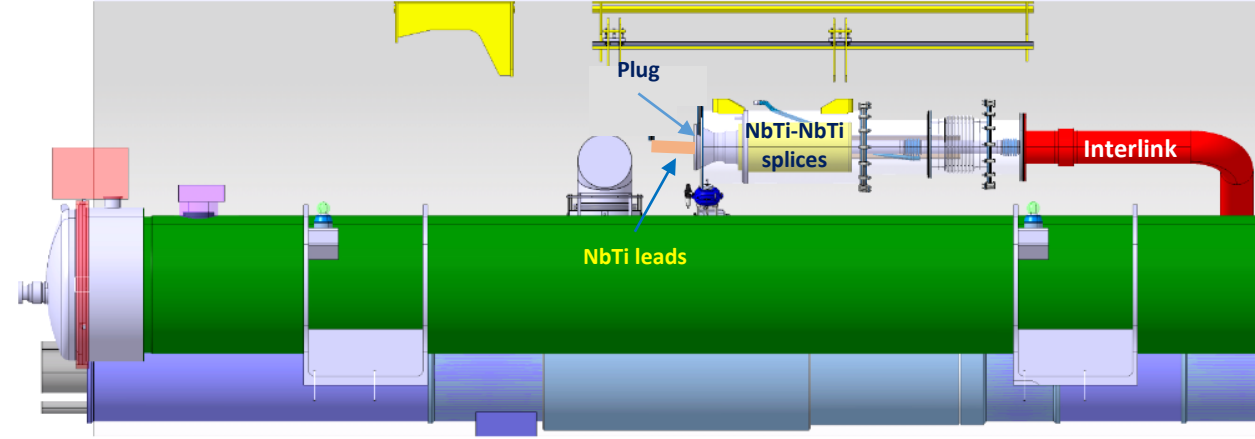
- DFM located above D2
  - Distant enough to allow independent assemblies
- Longitudinal position in discussion
  - Not relevant for concept within  $\approx 1\text{-}2\text{m}$
- Cryo interface:
  - 1 dedicated jumper (Details TBD)
- SCLink interface:
  - As for DFX concept
- Interlink interface:
  - 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

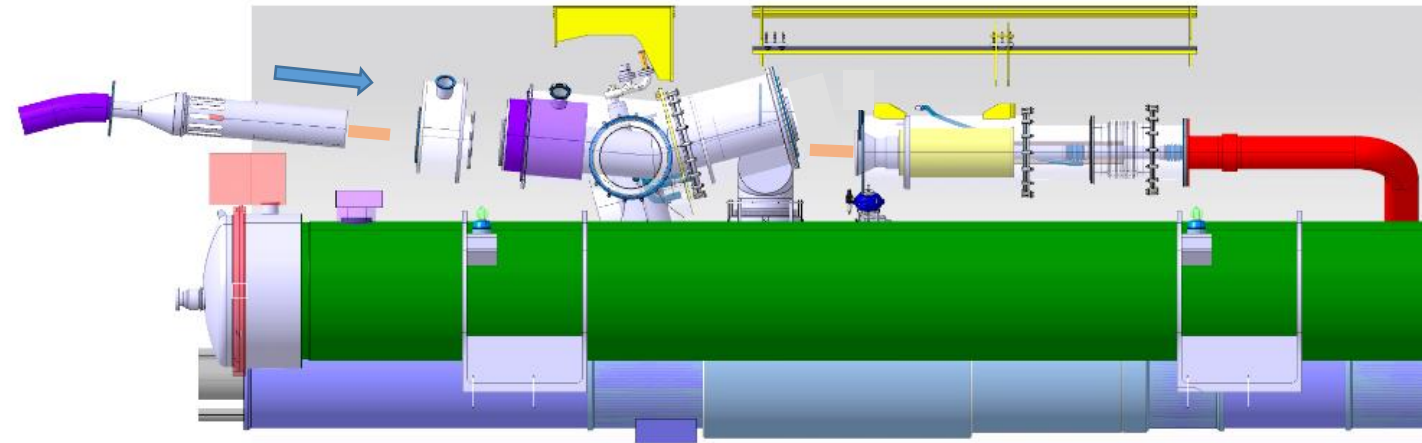
## 1. Initial conditions:

- D2 present
- Interlink installed until plug



## 2. DFM installed rotated of 10 deg

## 3. SCLink insertion with limited angle

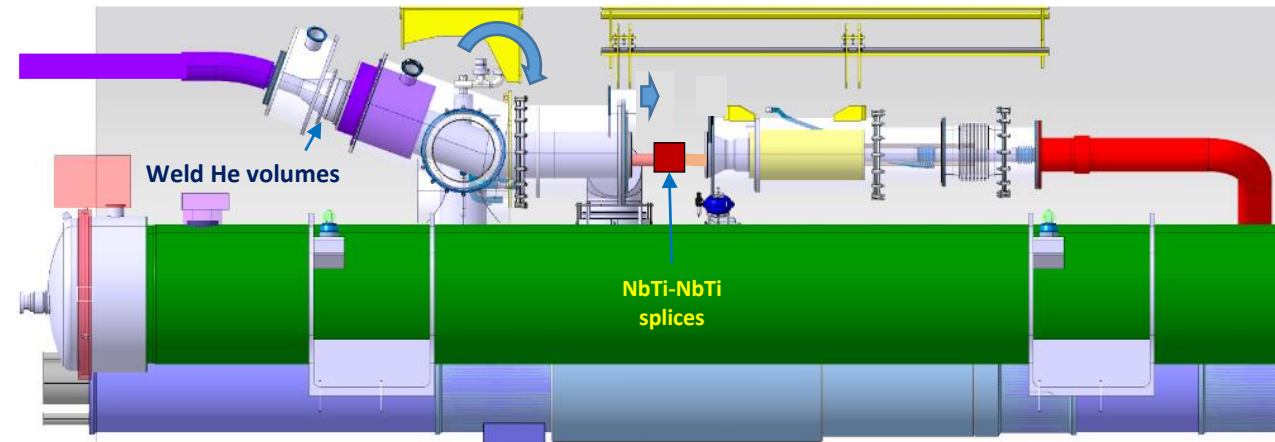


## 4. DFM rotation to nominal

## 5. Weld jumper interfaces

## 6. NbTi-NbTi splices

## 7. He and Vacuum vessels closure



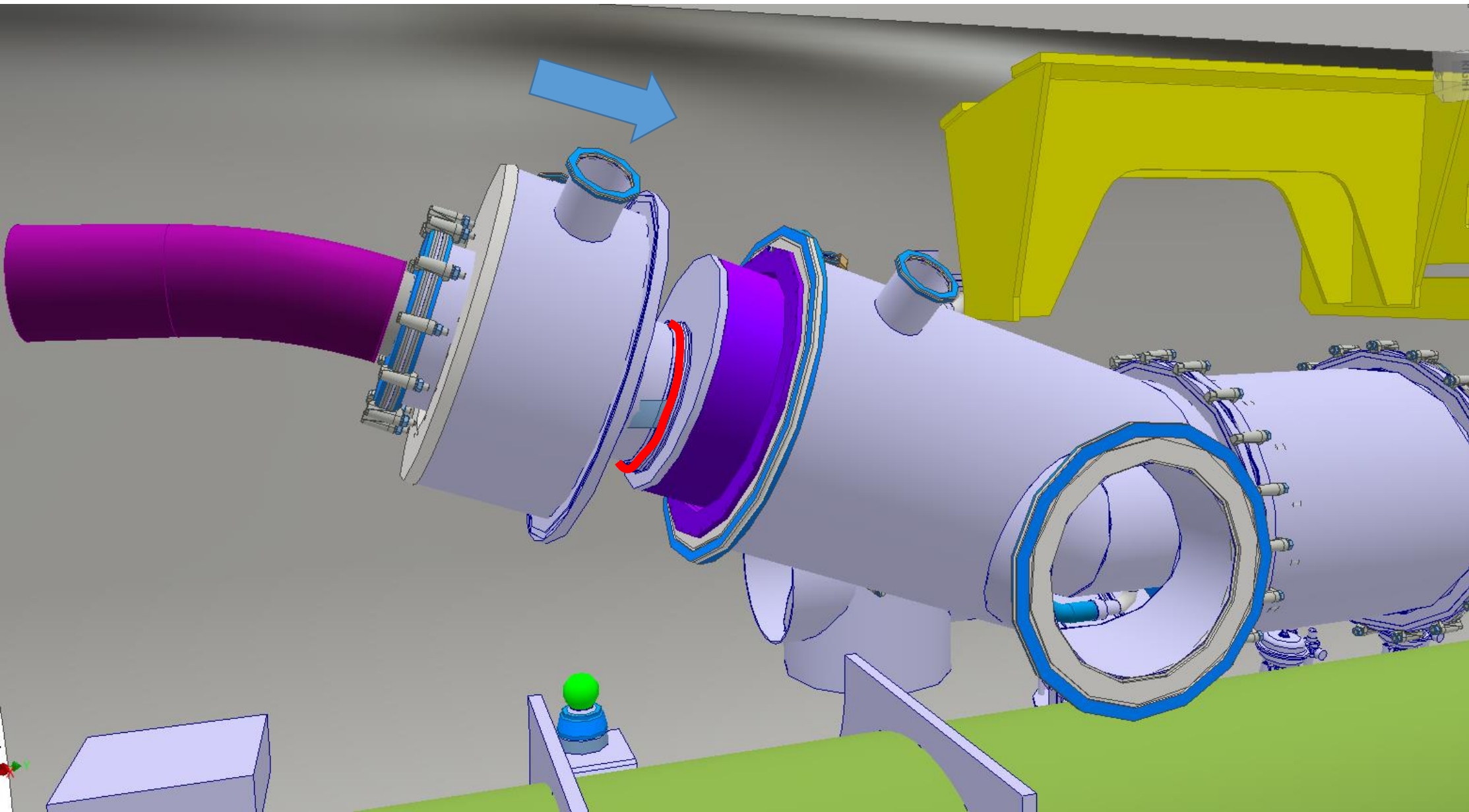
# Next Steps

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

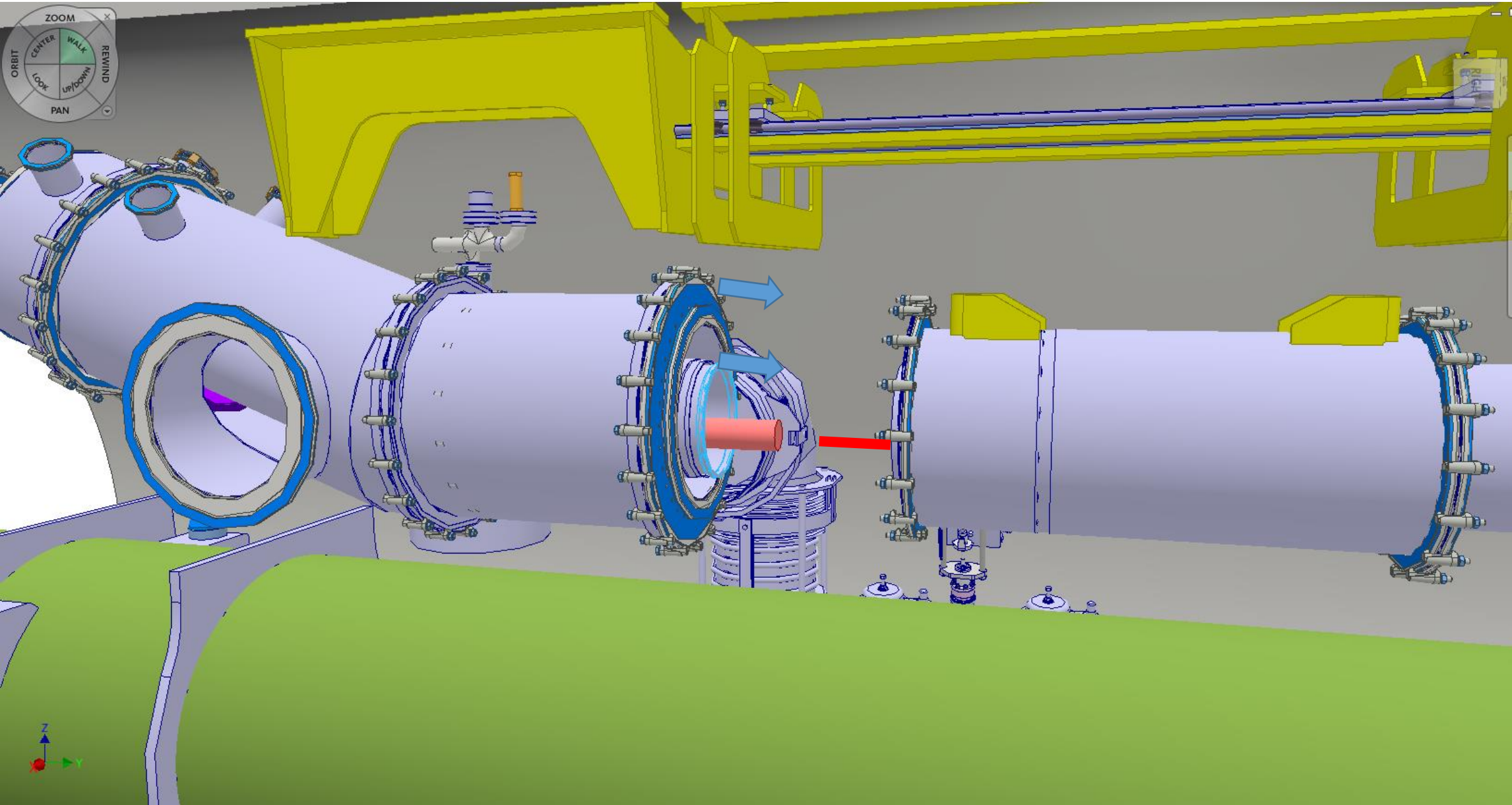


Spare slides

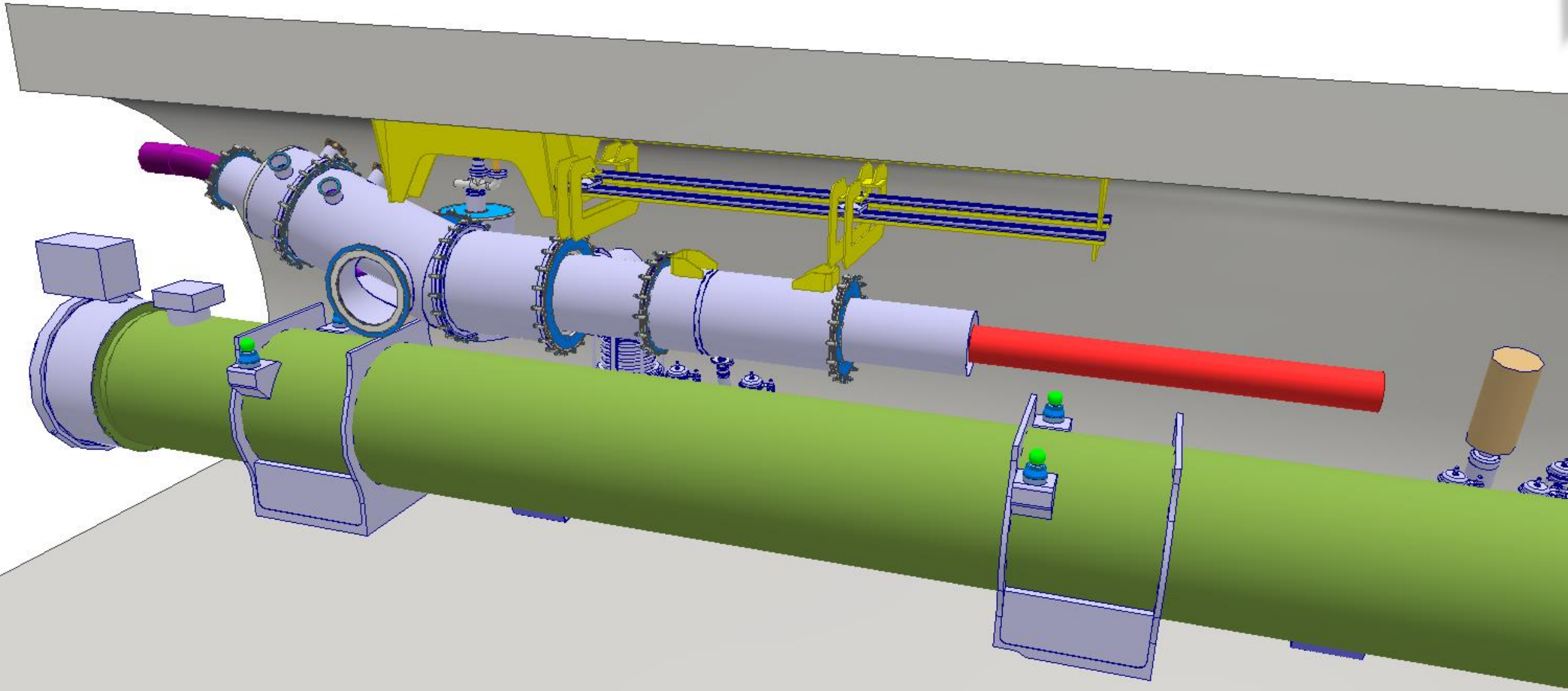
# SCLink He jacket welding to DFM helium vessel



# SCLink NbTi leads soldering to Plug NbTi leads

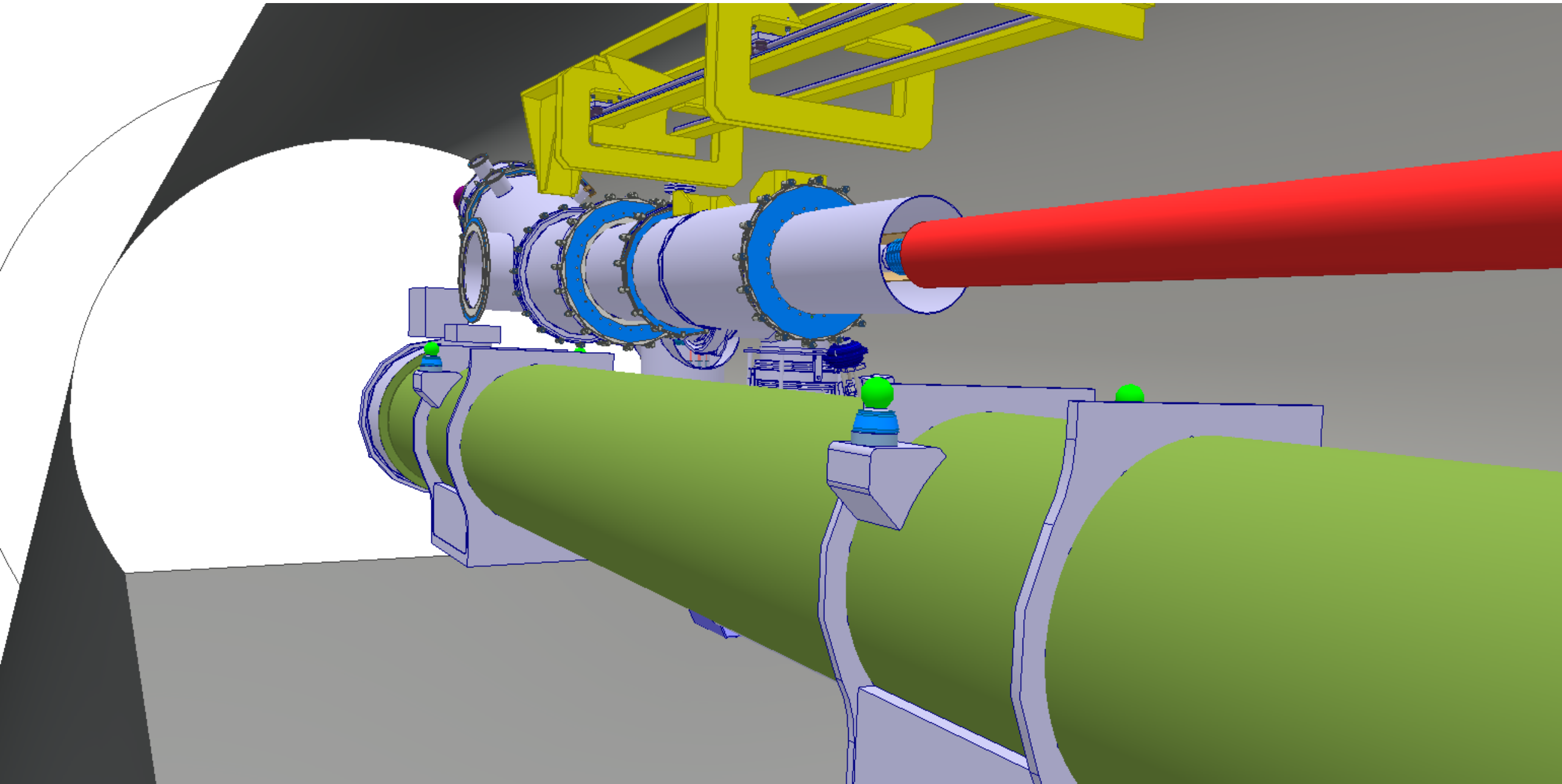


# Nominal configuration



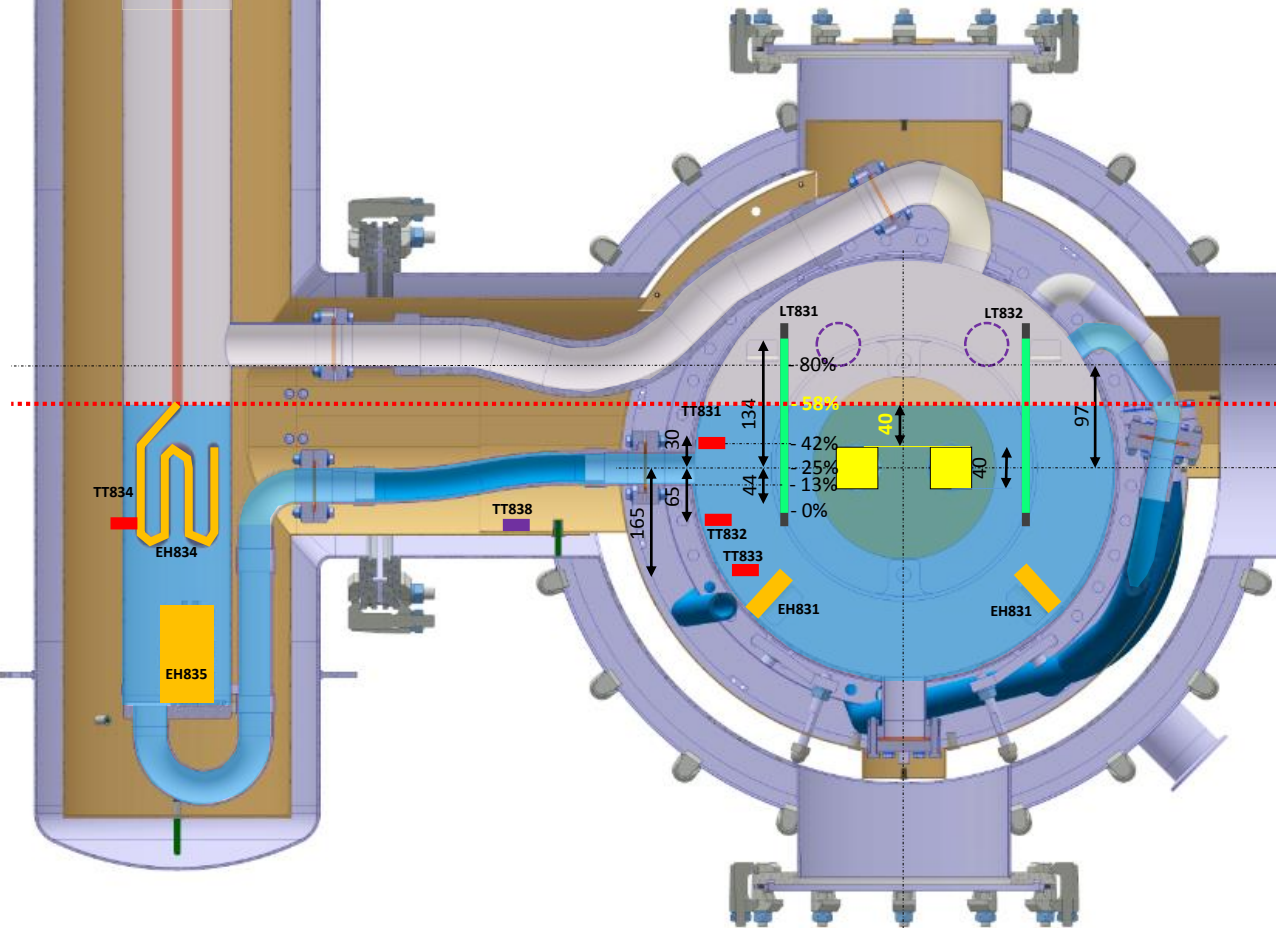
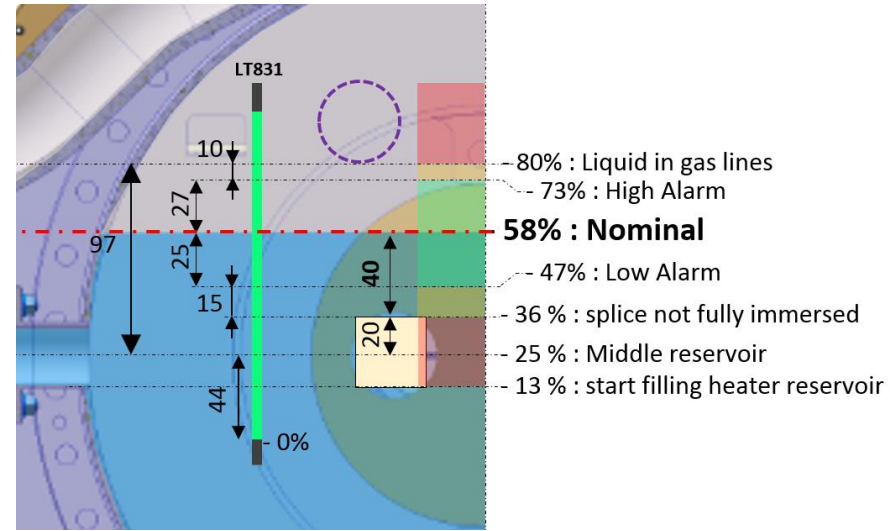
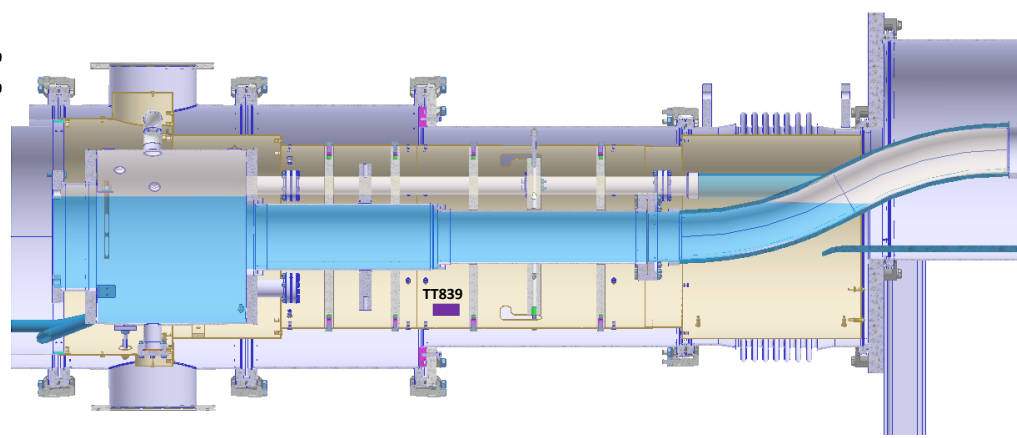
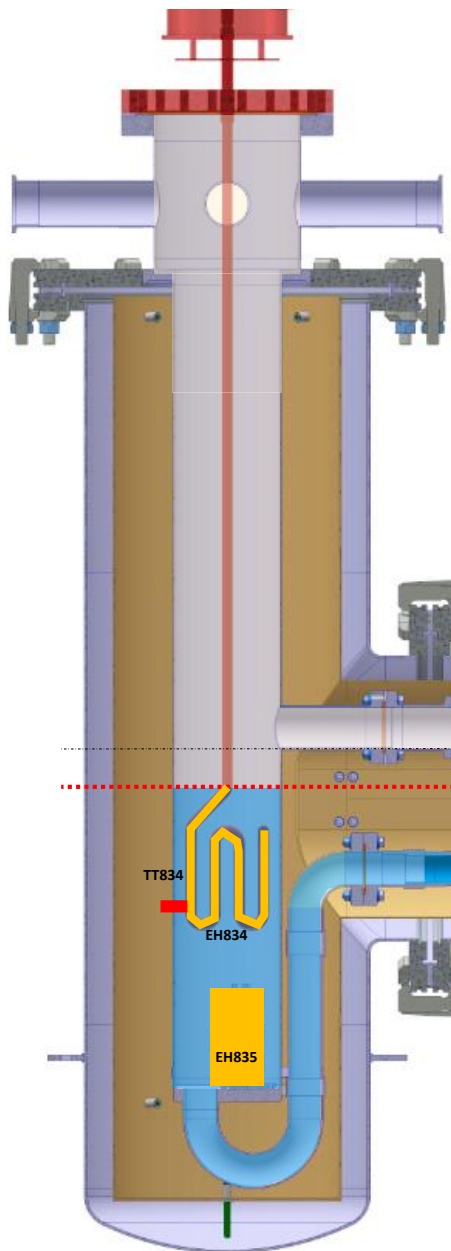


# View from tunnel

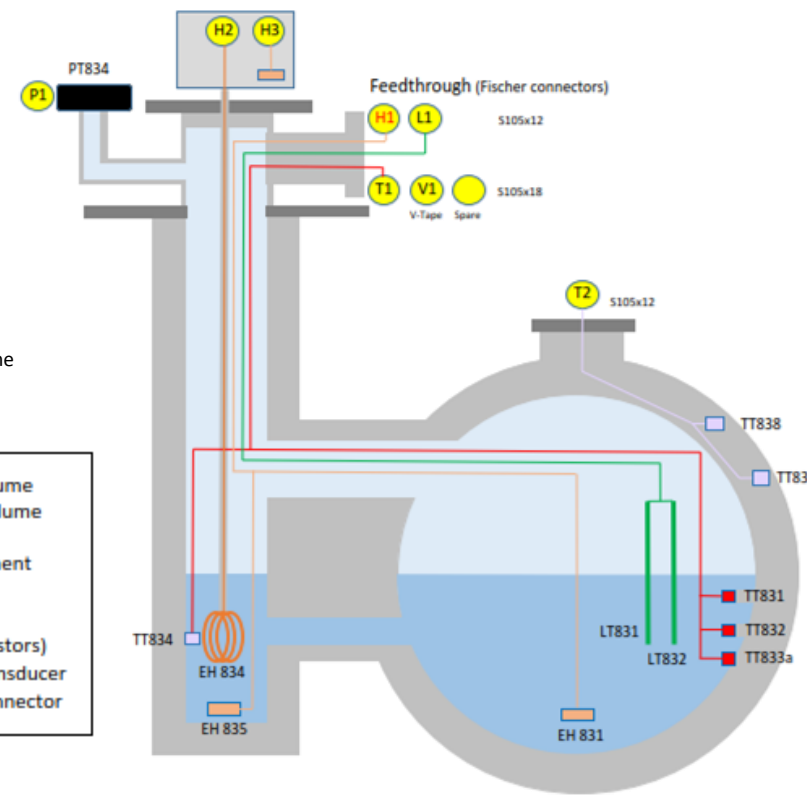
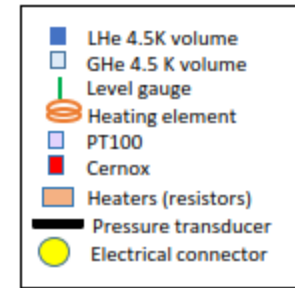




# DDFX cryo layout



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



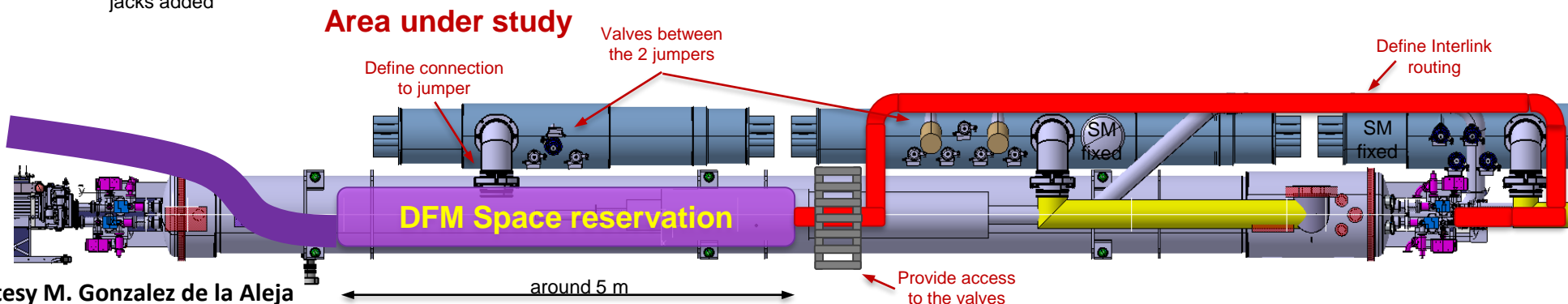
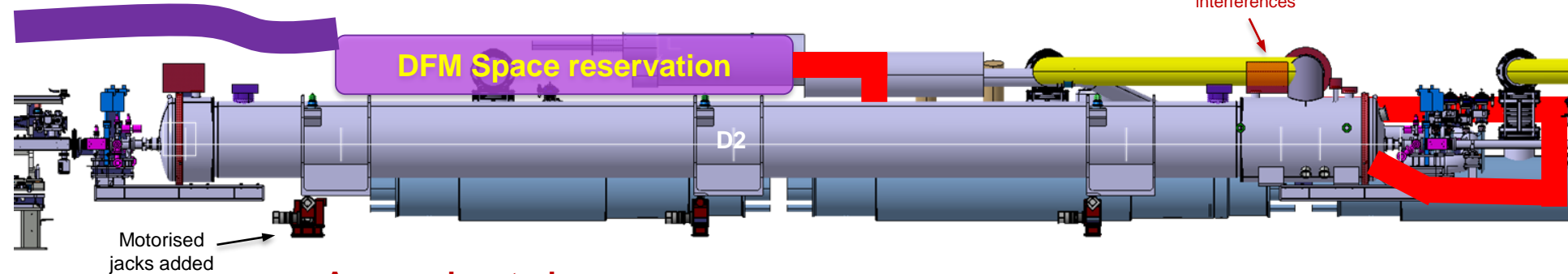
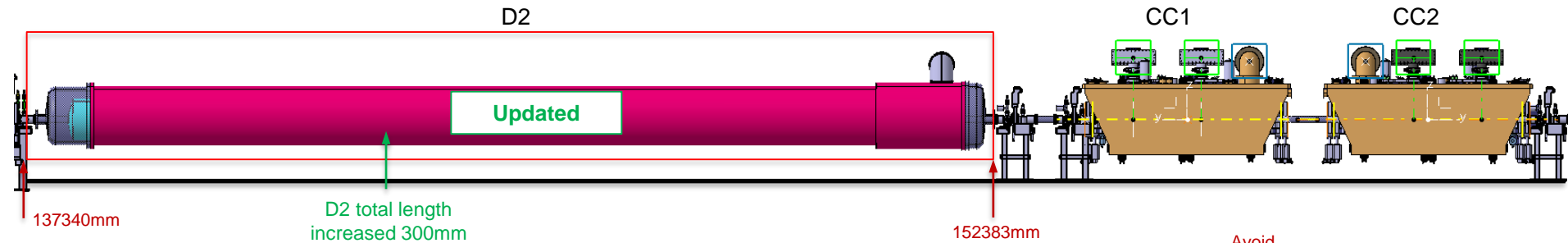
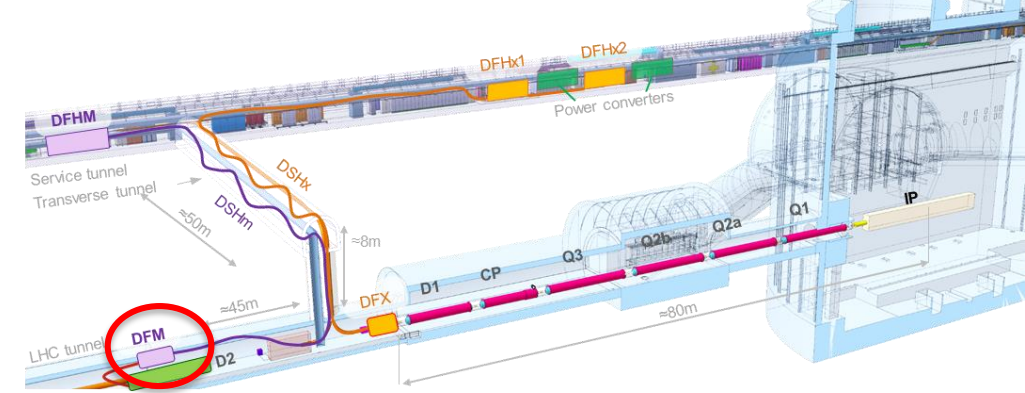
# DFM environment (not today's key topic)

Busy area (radiation, QXL, D2, SCLink)

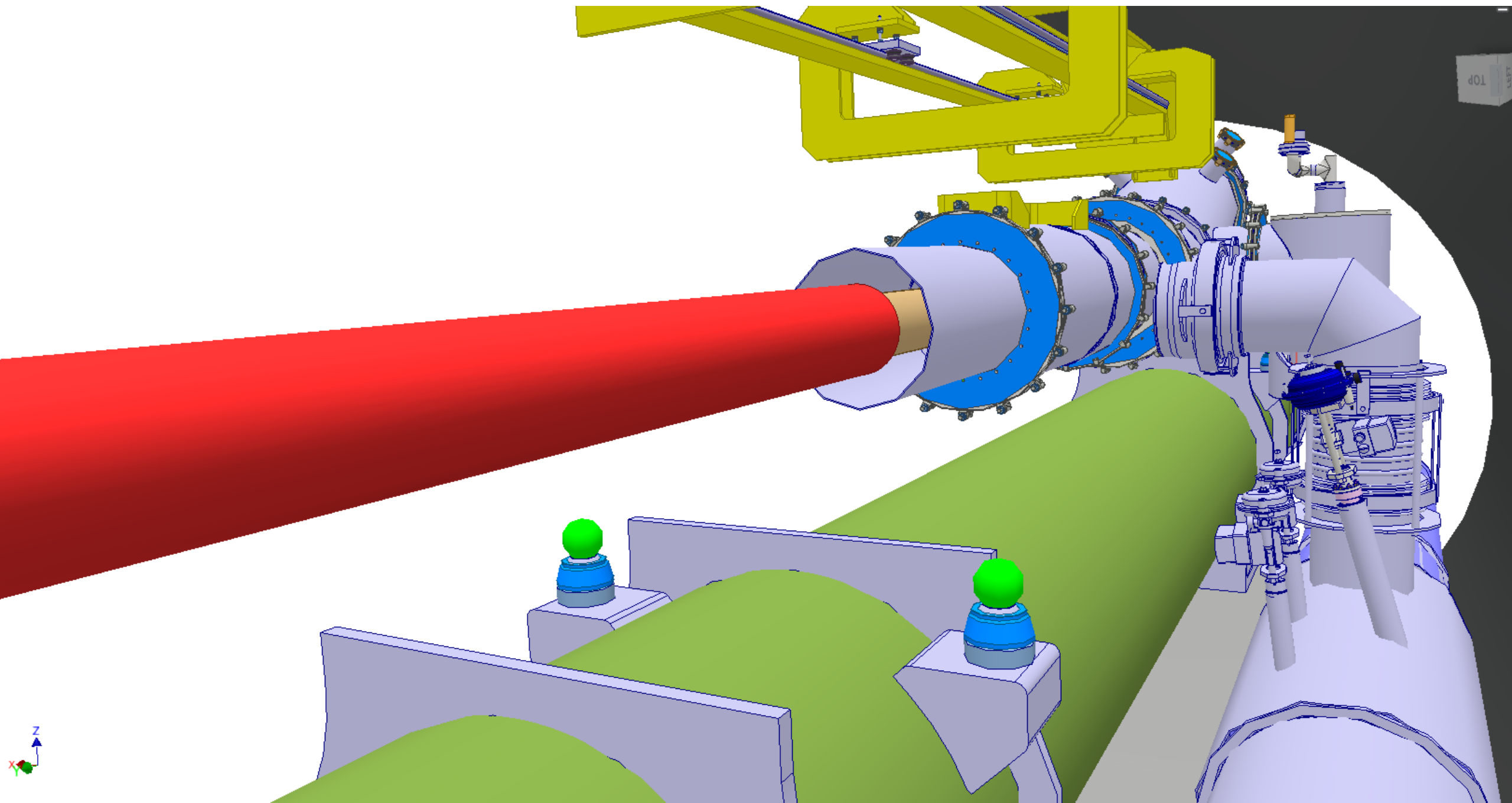
On going discussions to study feasibility

Sequence:

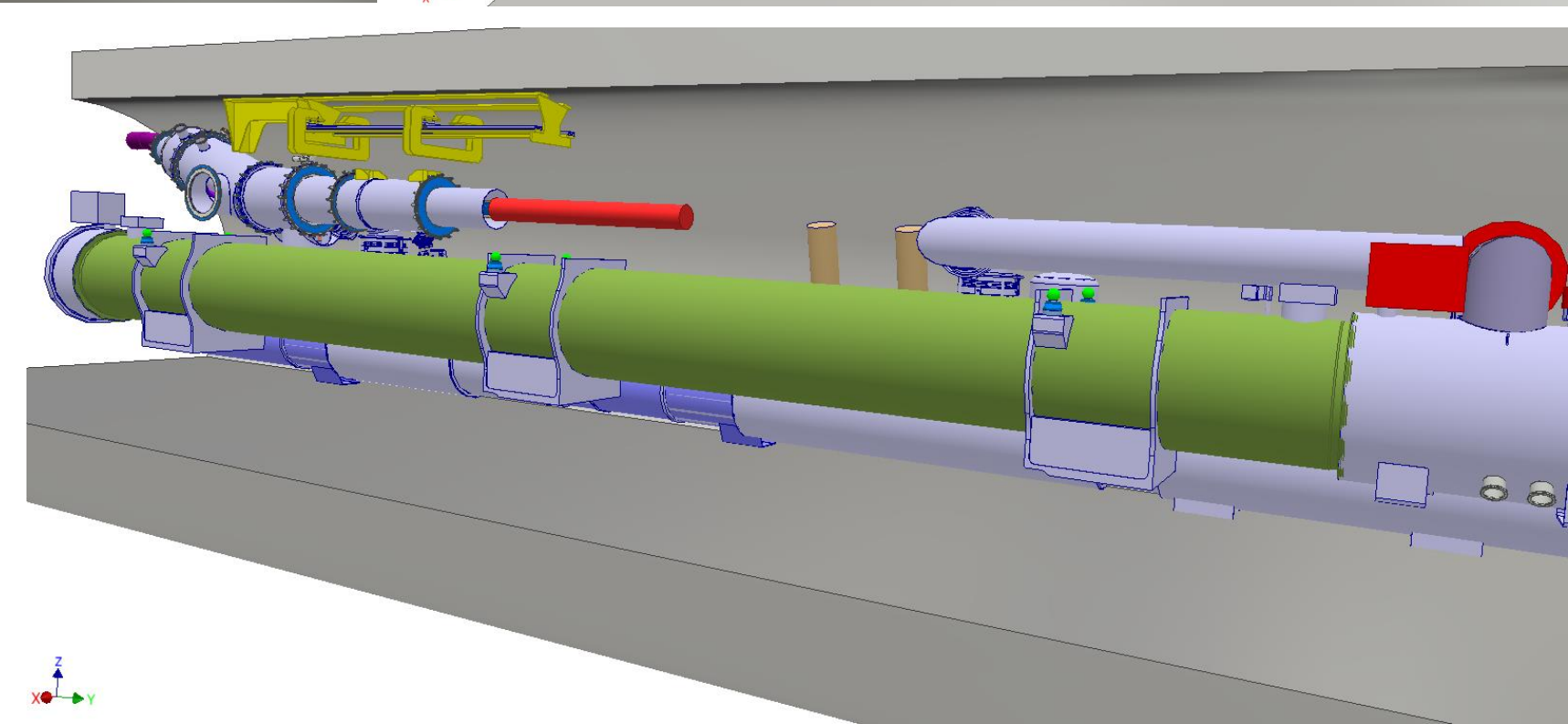
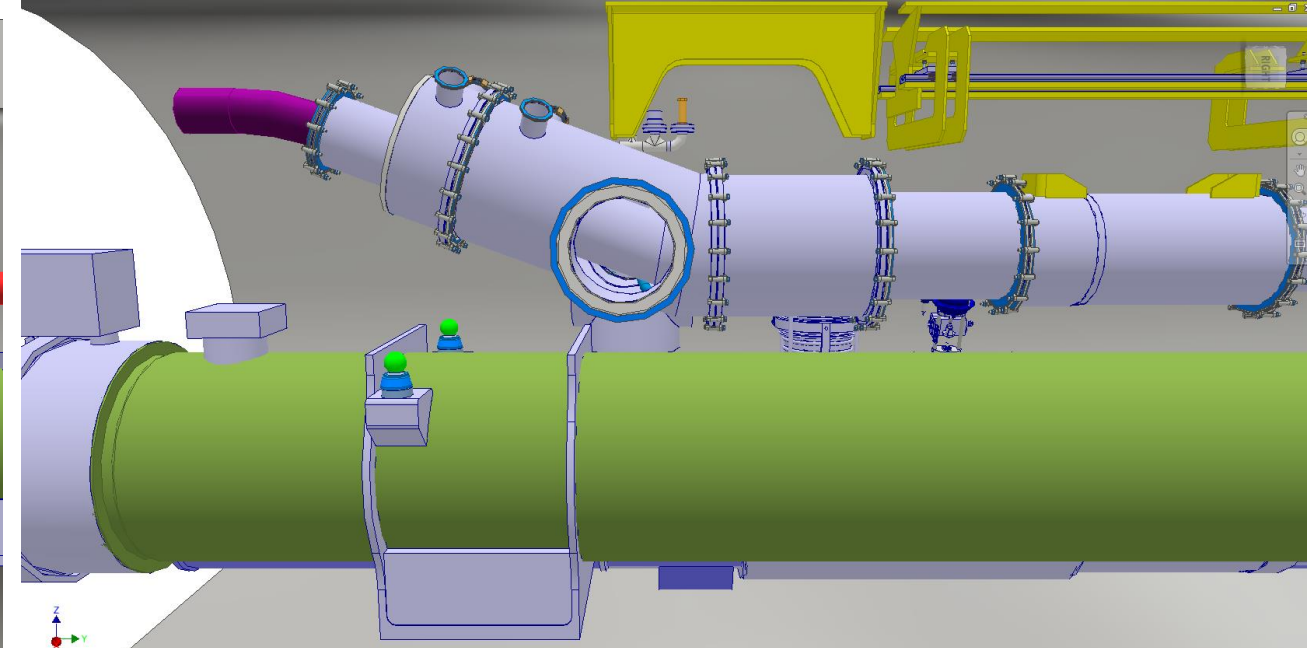
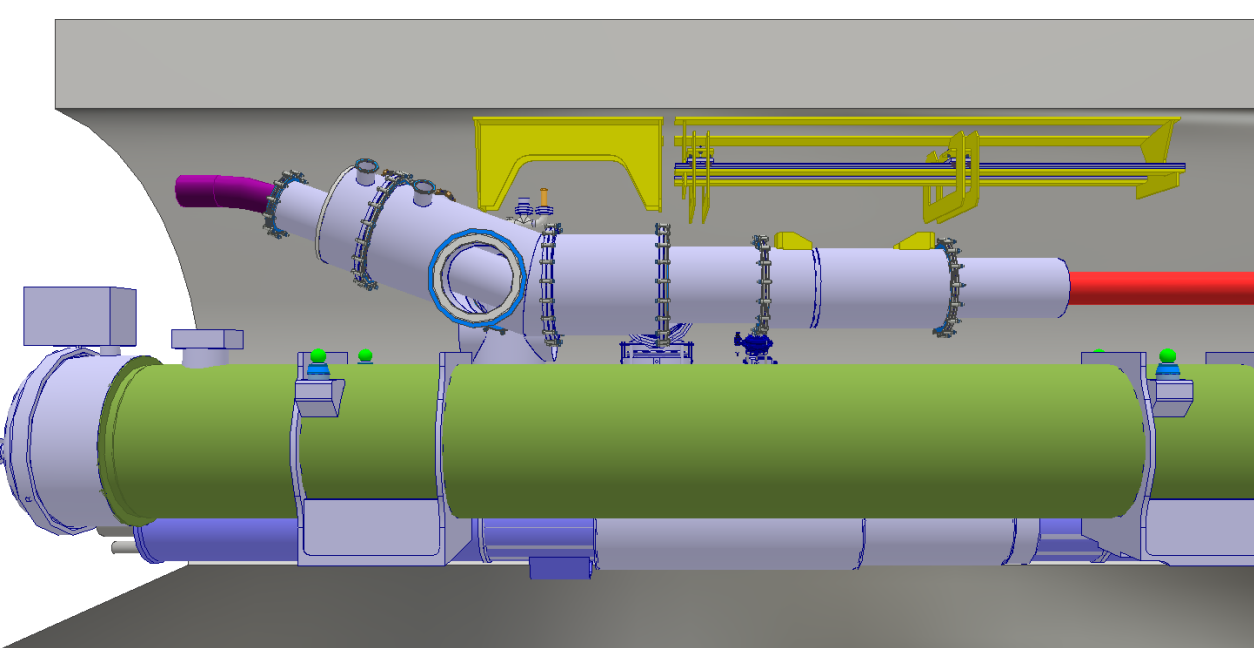
- DFM concept
- DFM integration
- Iterations WP15

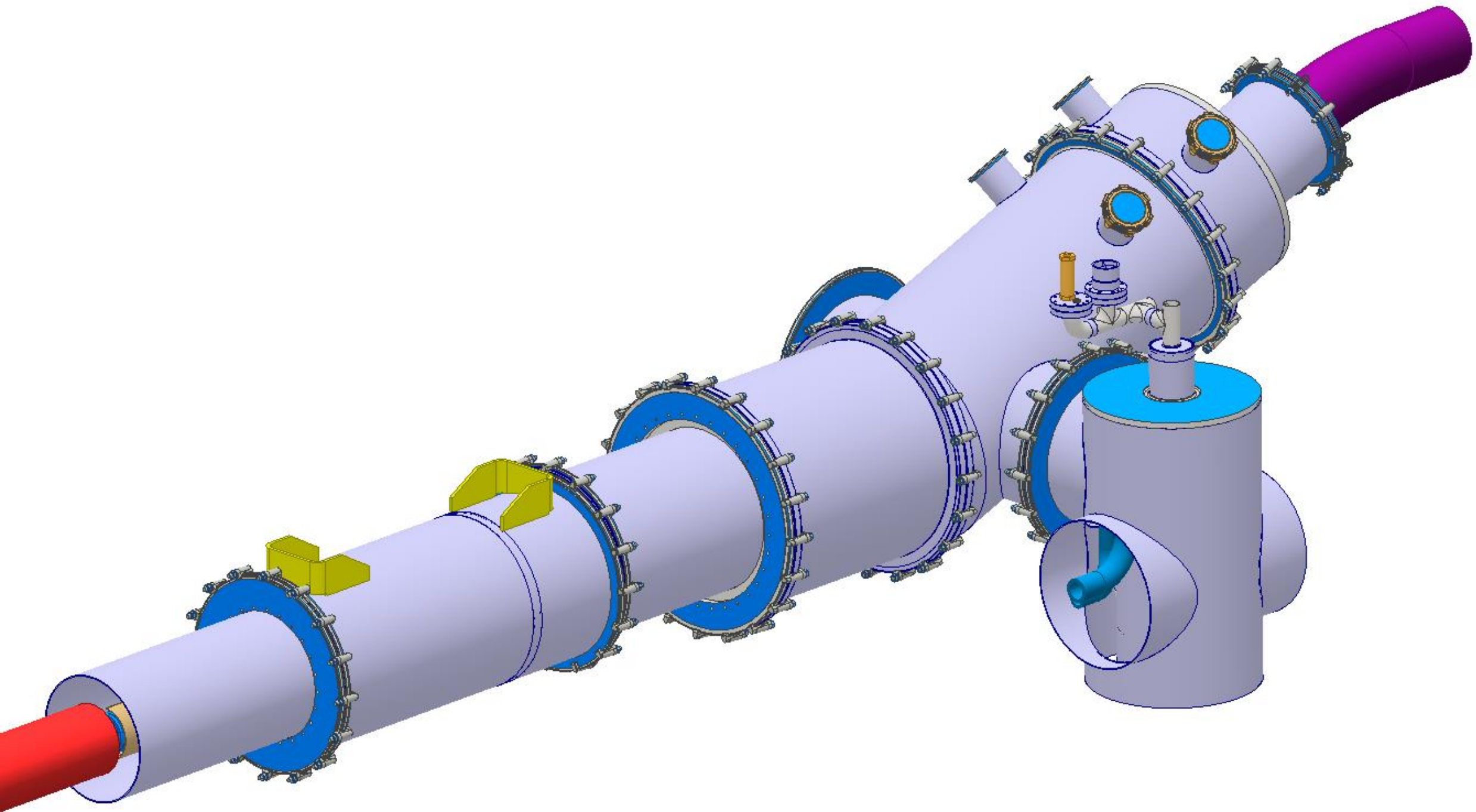


Courtesy M. Gonzalez de la Aleja

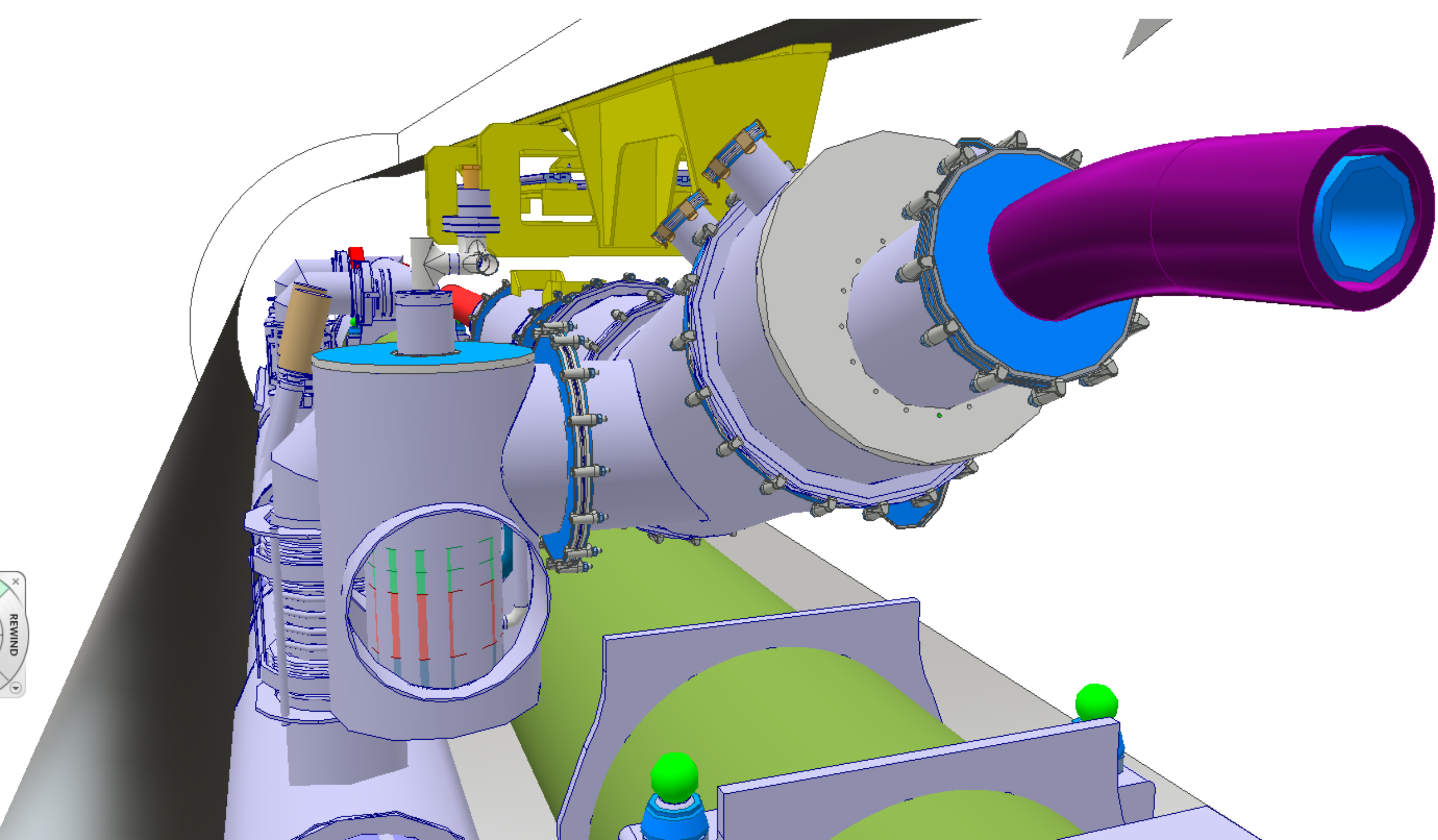












# DFM concept

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

