

# LHC Injectors Upgrade





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# PSB Injection Mock-up Area & Stripping Foil Test Stand

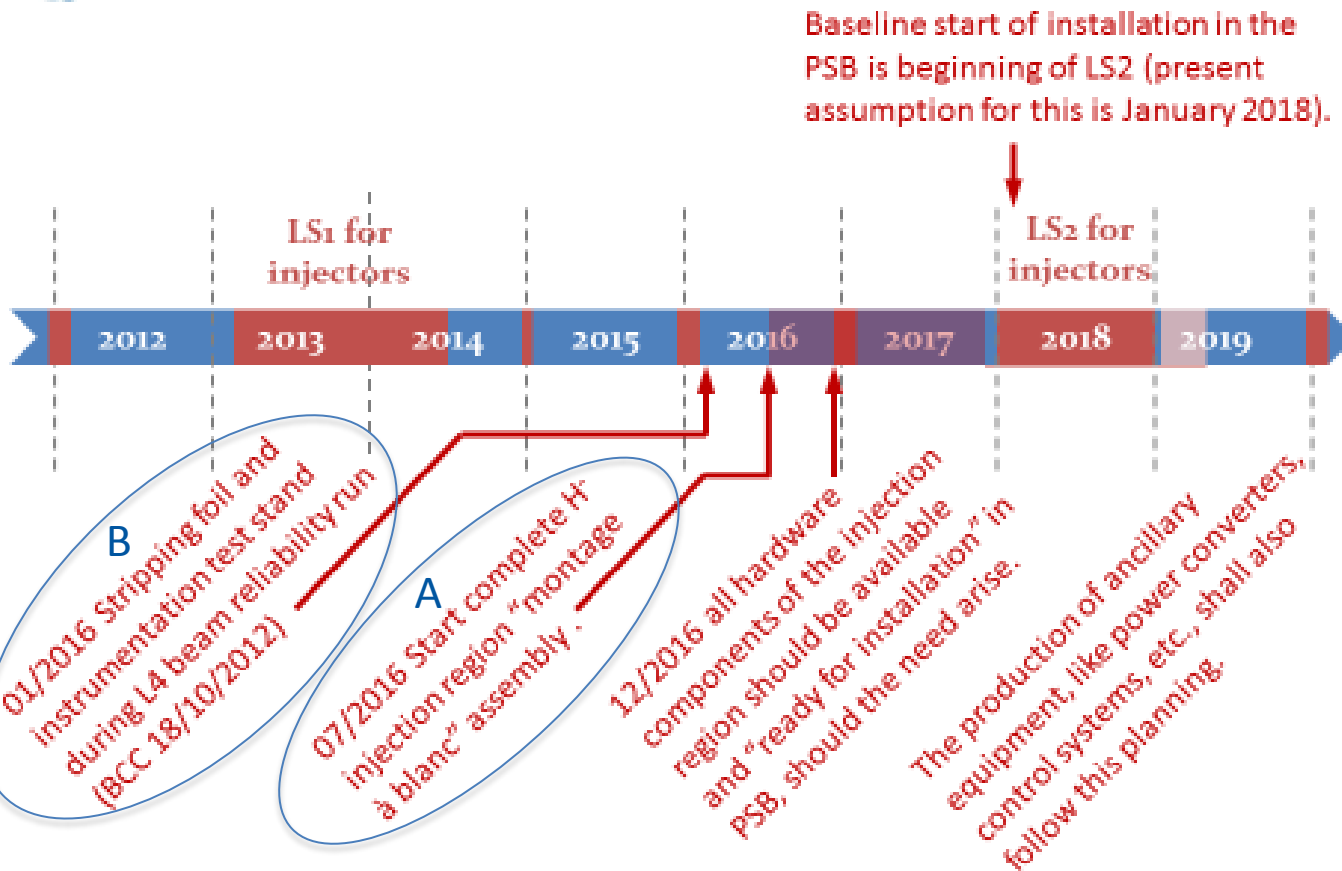




# Introduction



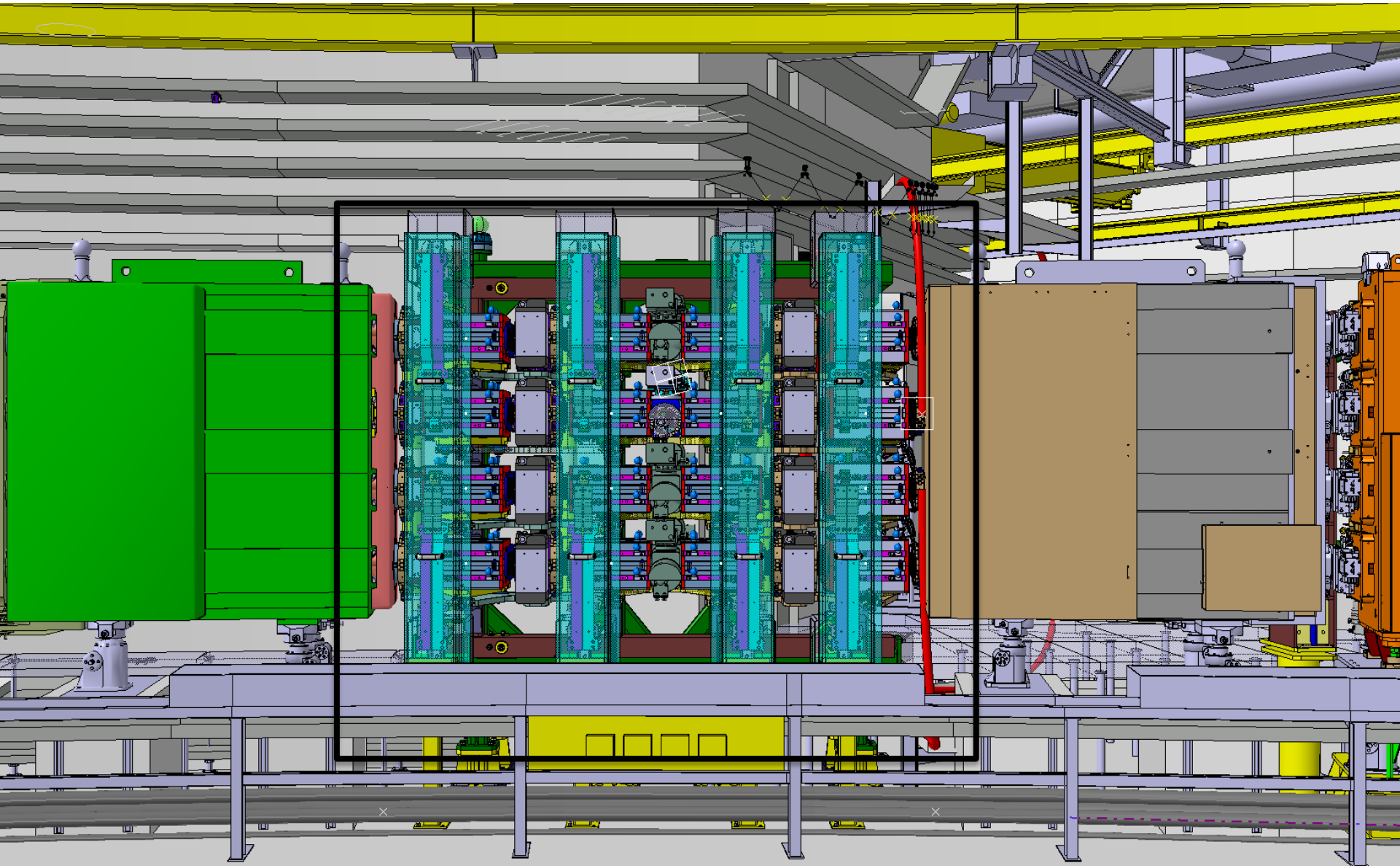
## LIU Project Timeline



- A. Make a complete pre-assembly of the PSB Injection Area
- B. Installation of a permanent Stripping Foil Test Stand in the L4 Transfer Line



# PSB Injection Mock-up Area – Area Concerned

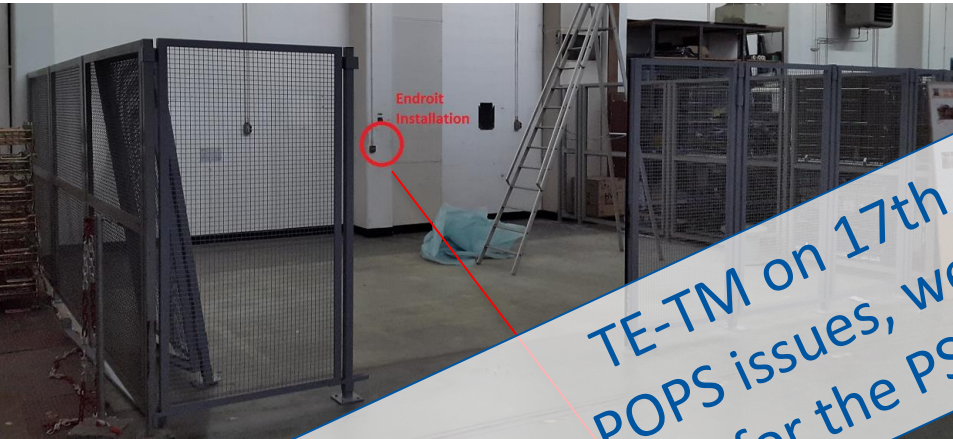




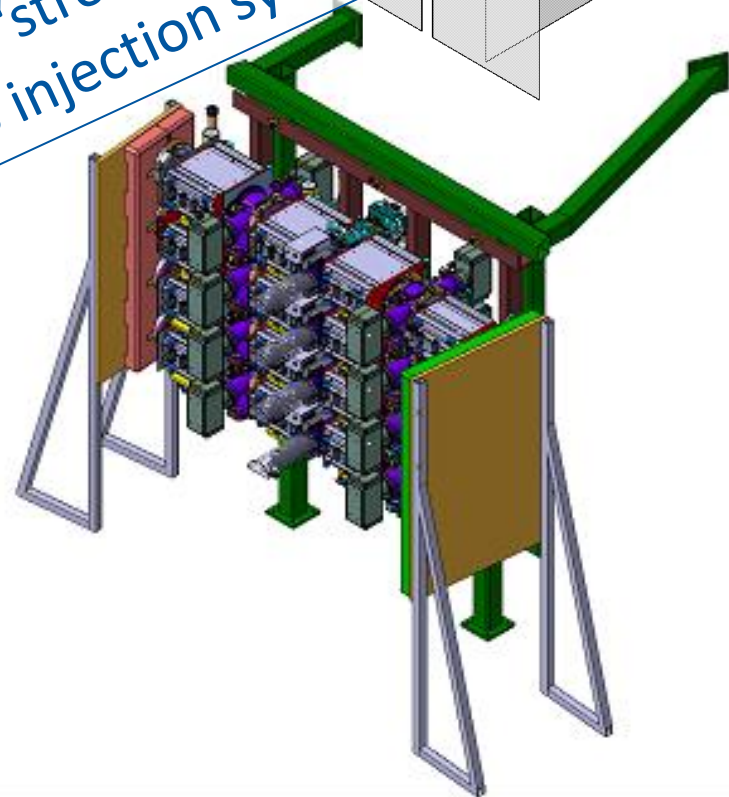
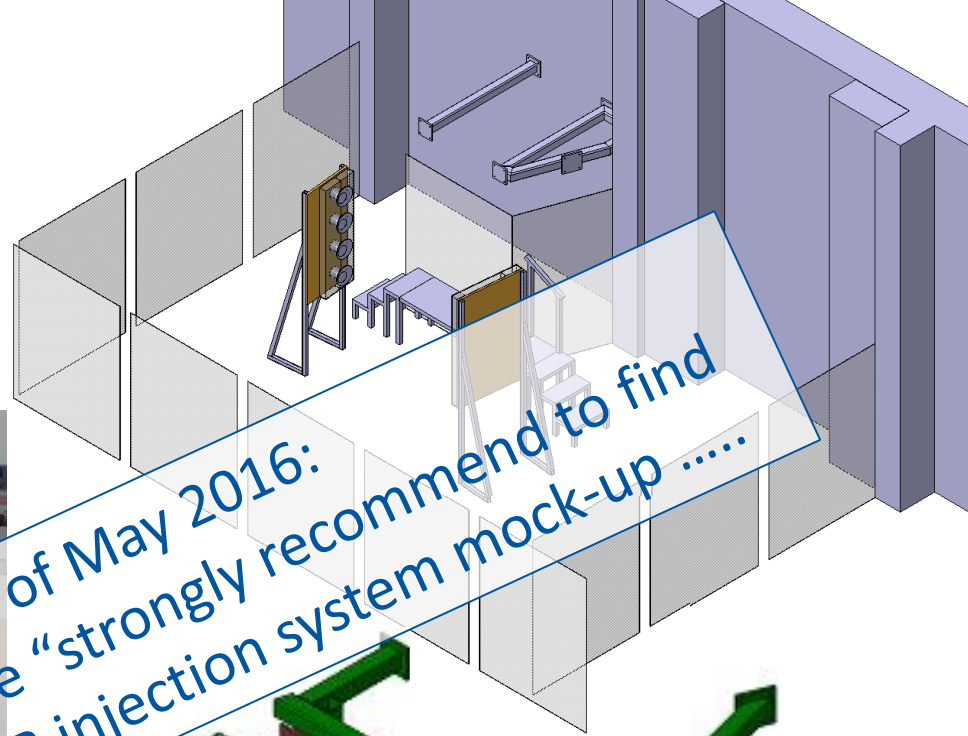
# PSB Injection Mock-up Area

Initially mock-up assembly

Was planned in Building 355



TE-TM on 17th of May 2016:  
In view of the POPS issues, we “strongly recommend to find alternative space” for the PSB injection system mock-up .....

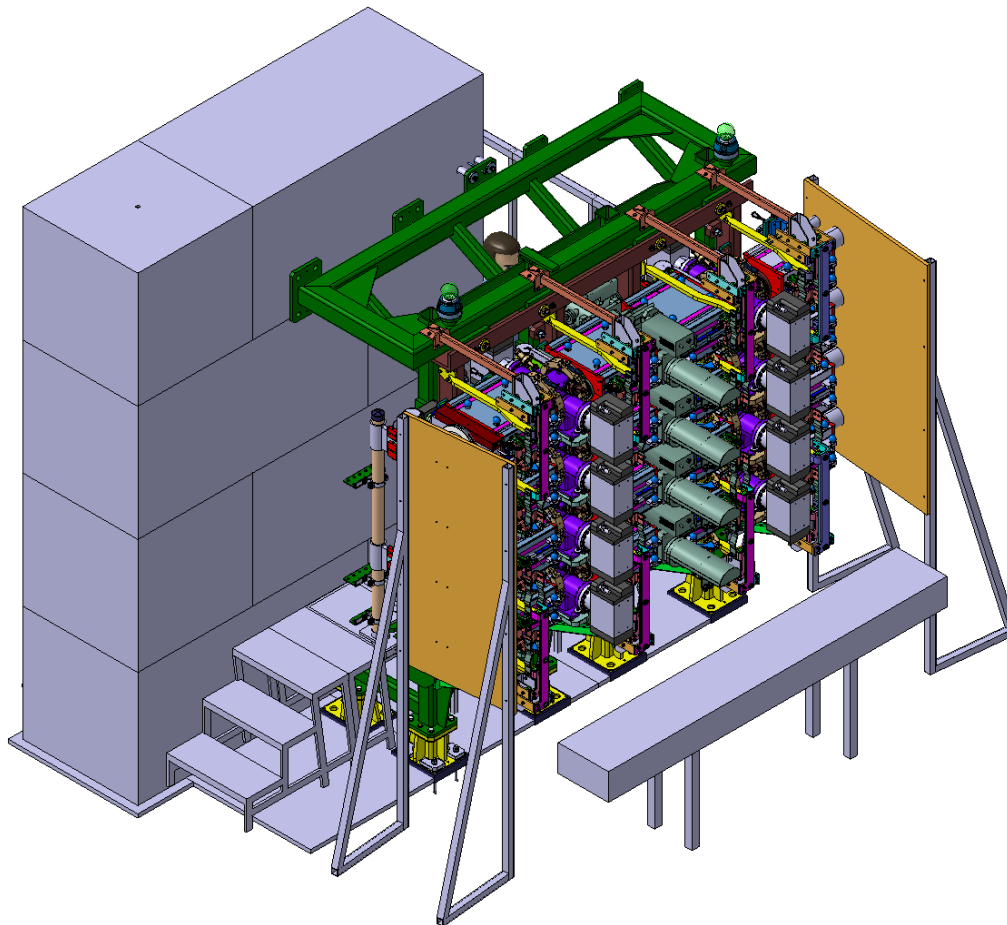




# PSB Injection Mock-up Area

New space was found in building 867-R-P76

(Thanks to TE-VSC for quick release of the room)

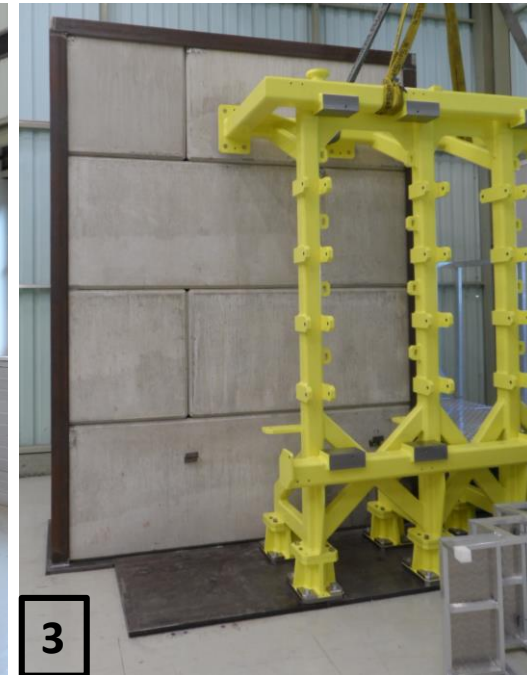


1. Installation of concrete blocks to act as PSB tunnel wall;
2. Platform to simulate the external 'caillebotie' walk way;
3. Installation of the support structure;
4. Wooden mock-up of BHZ magnets and PSB bus-bars;
5. Installation of injection region equipment.



# PSB Injection Mock-up Area – Status

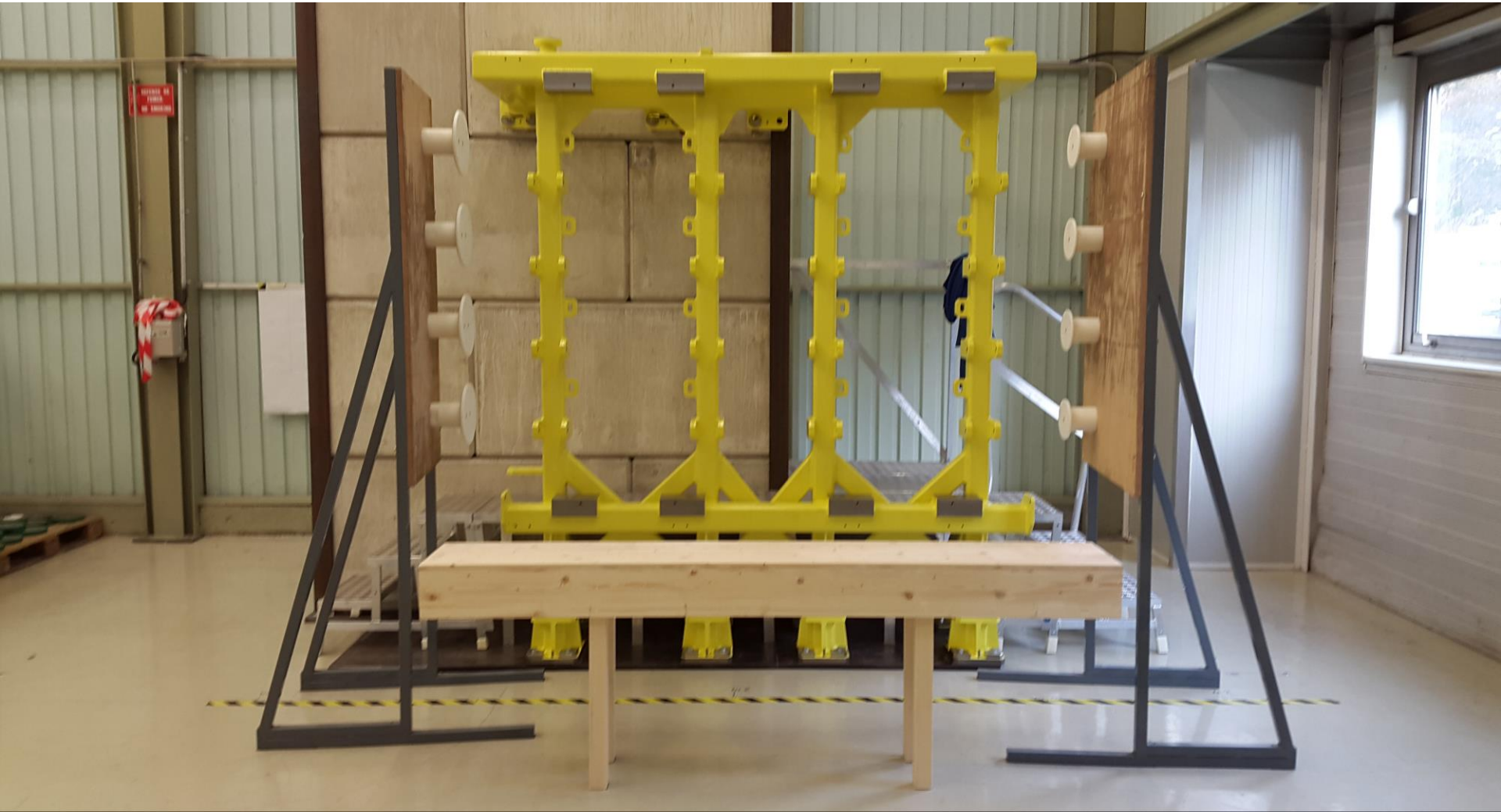
1. Installation of concrete blocks to act as PSB tunnel wall - **Done**;
2. Platform to simulate the external 'caillebotie' walk way - **Done**;
3. Installation of the support structure – **To be completed**;





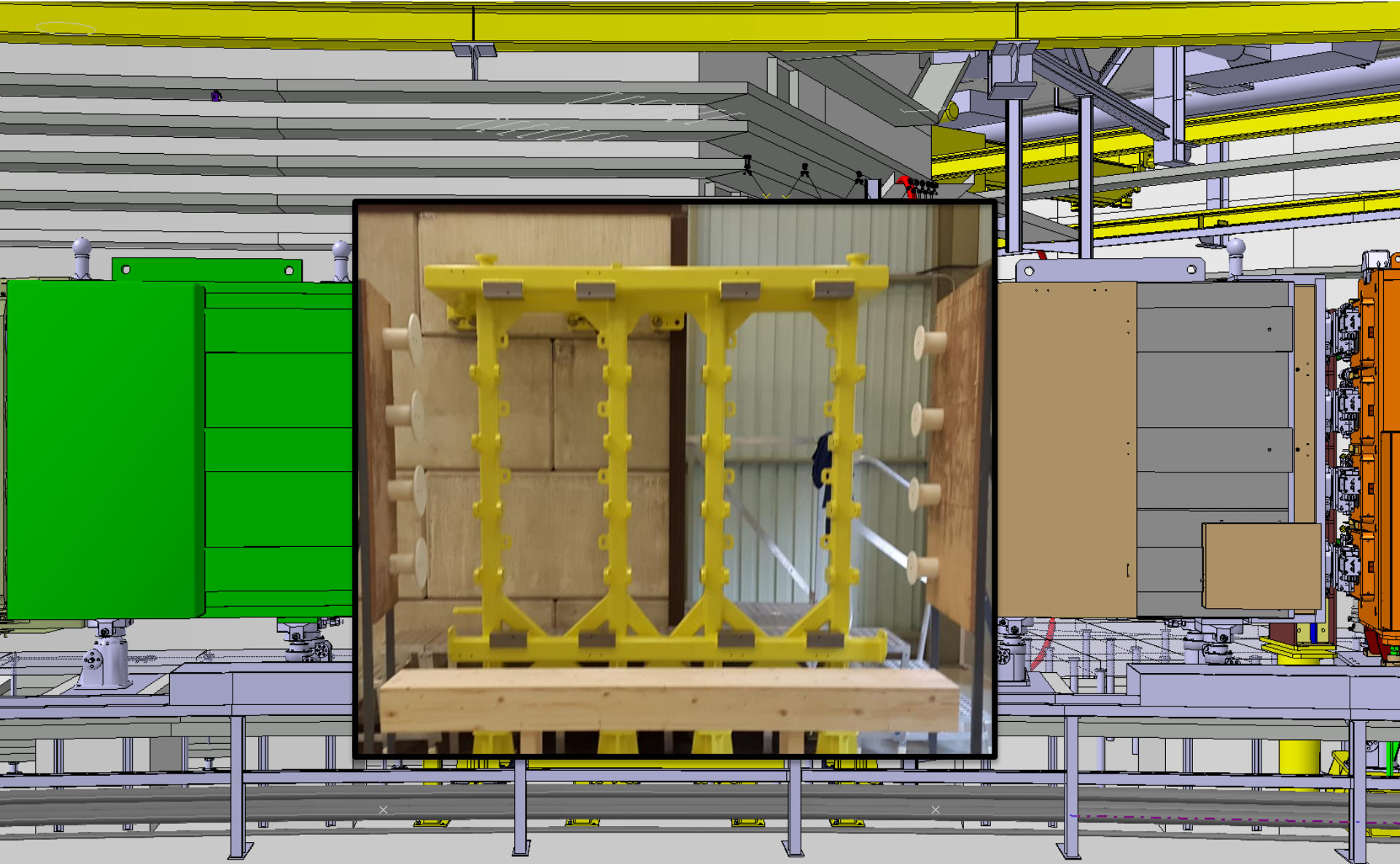
# PSB Injection Mock-up Area - Status

4. Wooden mock-up of BHZ magnets and PSB bus-bars – Done;
5. Installation of injection region equipment – To be done.





# PSB Injection Mock-up Area – Area Involved





# PSB Injection Mock-up Area – Conclusion

- A full assembly of the H<sup>-</sup> Injection region will be installed in 867-R-P76
- The “environment” has been created by installing:
  - A concrete wall;
  - A raised walk way;
  - Wooden mock-up of the BHZ magnets with bus-bars;
- The assembly of the support structure to be completed by end 10/2015;
- All work-unit and equipment owners are welcome to visit and:
  - Install their equipment;
  - Simulate interventions;
  - Test installation tooling.

Room Supervisor:  
Yves Sillanoli - 163224



# Stripping Foil Test Stand

A stripping foil test stand will be installed in the Linac4 transfer line allowing tests with a 160 MeV H<sup>-</sup> Linac4 commissioning beam:

- Testing from 2015, prior to final PSB installation (>2018)
- The foil changing mechanism as well as the interlocking functions can be assessed;
- Gain experience with these very fragile foils;
- Test different foil materials and thicknesses;
- Evaluate the lifetime of the foils and foil holders;
- Measure the stripping efficiency and emittance growth of the beam through the stripping foil.



LHC Injections Upgrade

INTDS2014

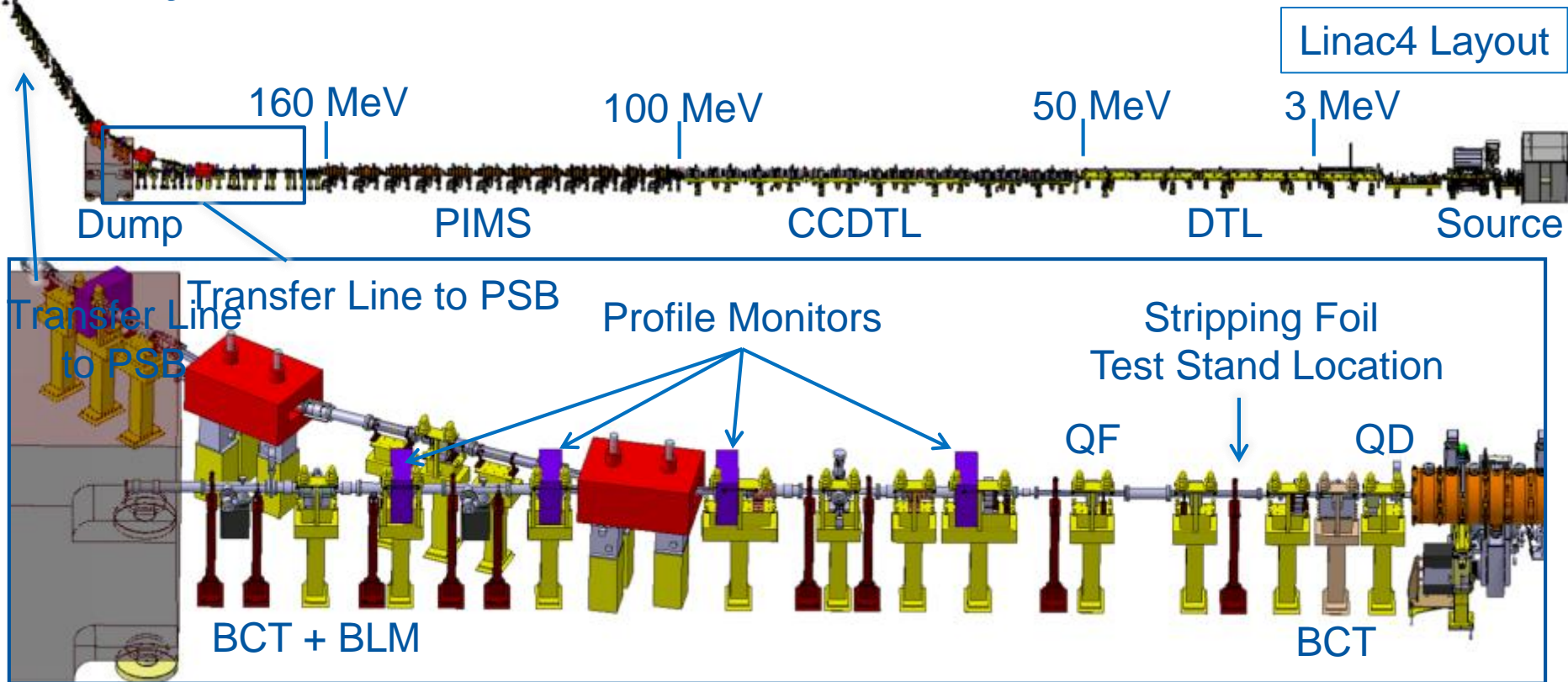
The Stripping Foil Test Stand in the  
Linac4 Transfer Line

01/09/2014  
W. Weterings

7

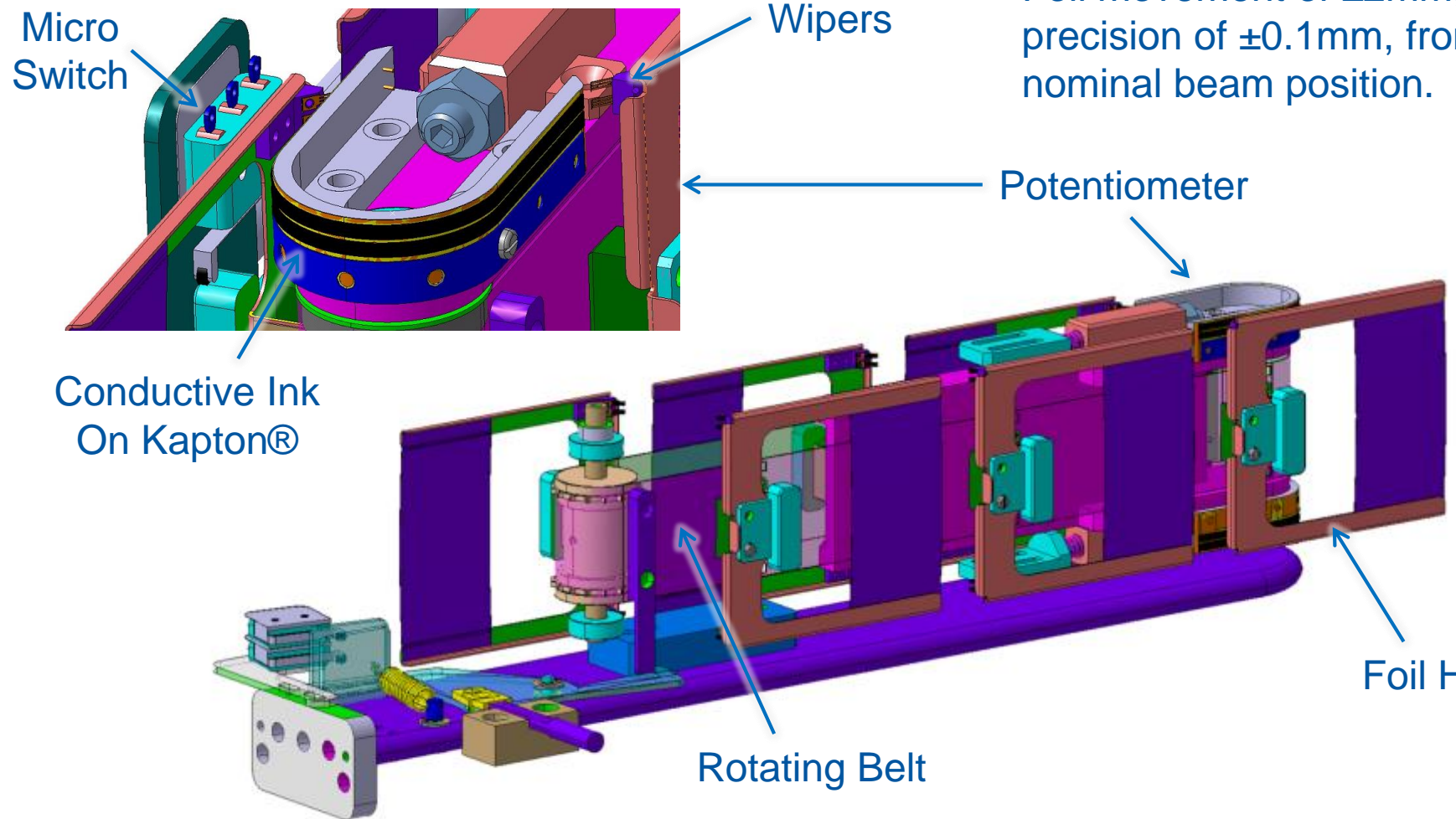


# Layout & Instrumentation

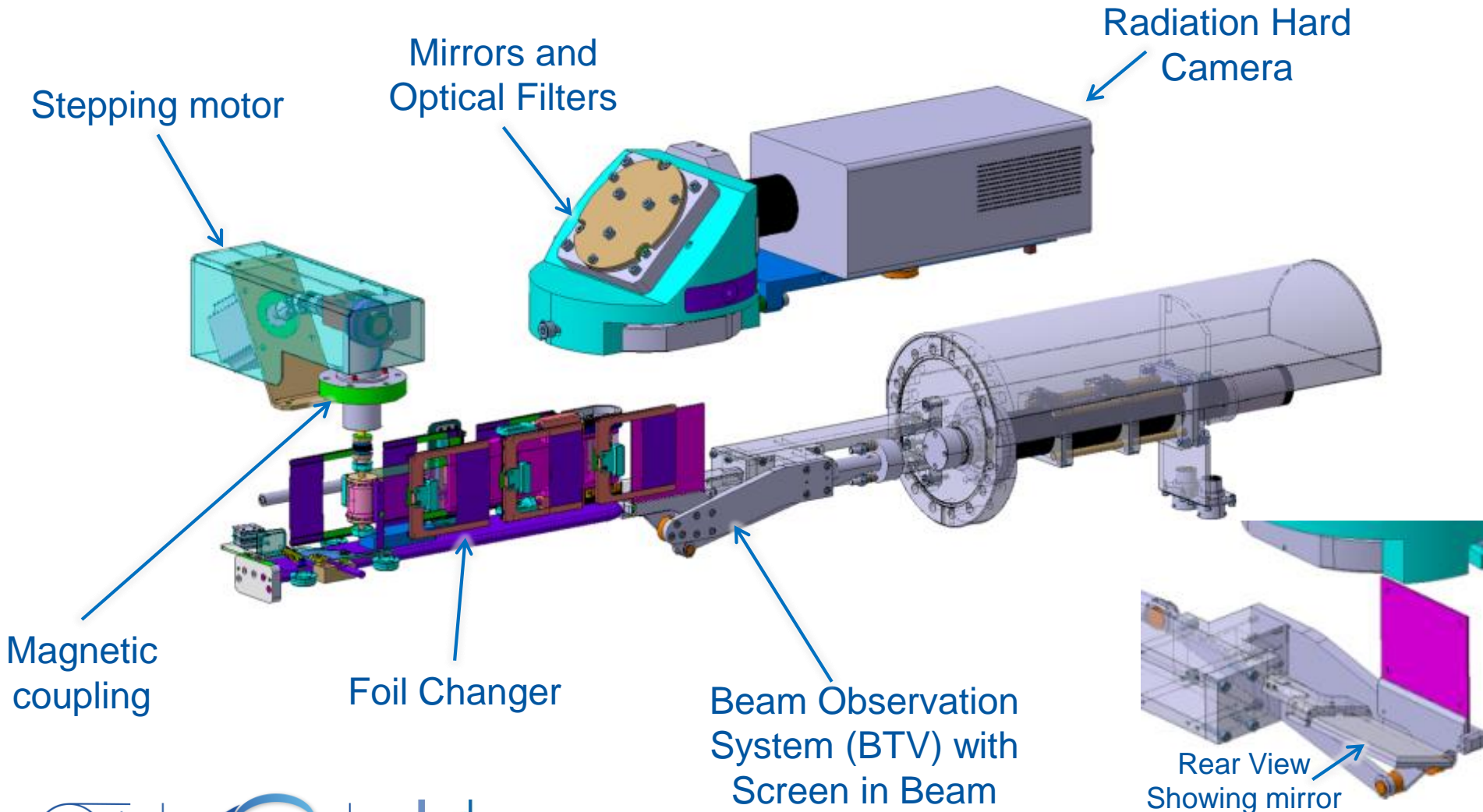


- Stripping efficiency is measured by current decrease between cross-calibrated Beam Current Transformers (BCT) and by taking the electrical signal from the foil holder.
- Emittance growth is estimated using Secondary Electron Monitor (SEM) profile.
- The upstream defocusing quadrupole (QD) is used to vary the beam size.

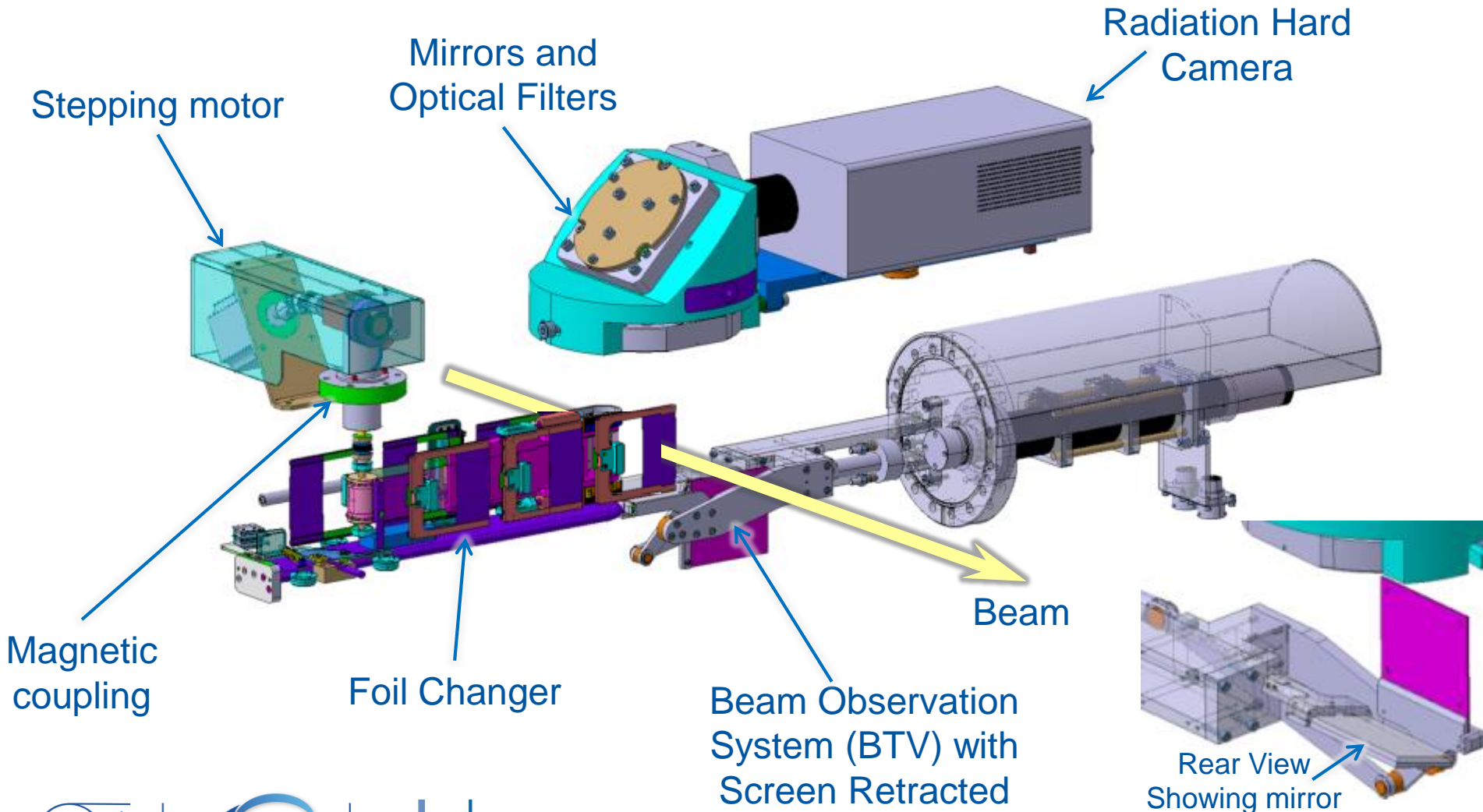
# Foil Handling Mechanism



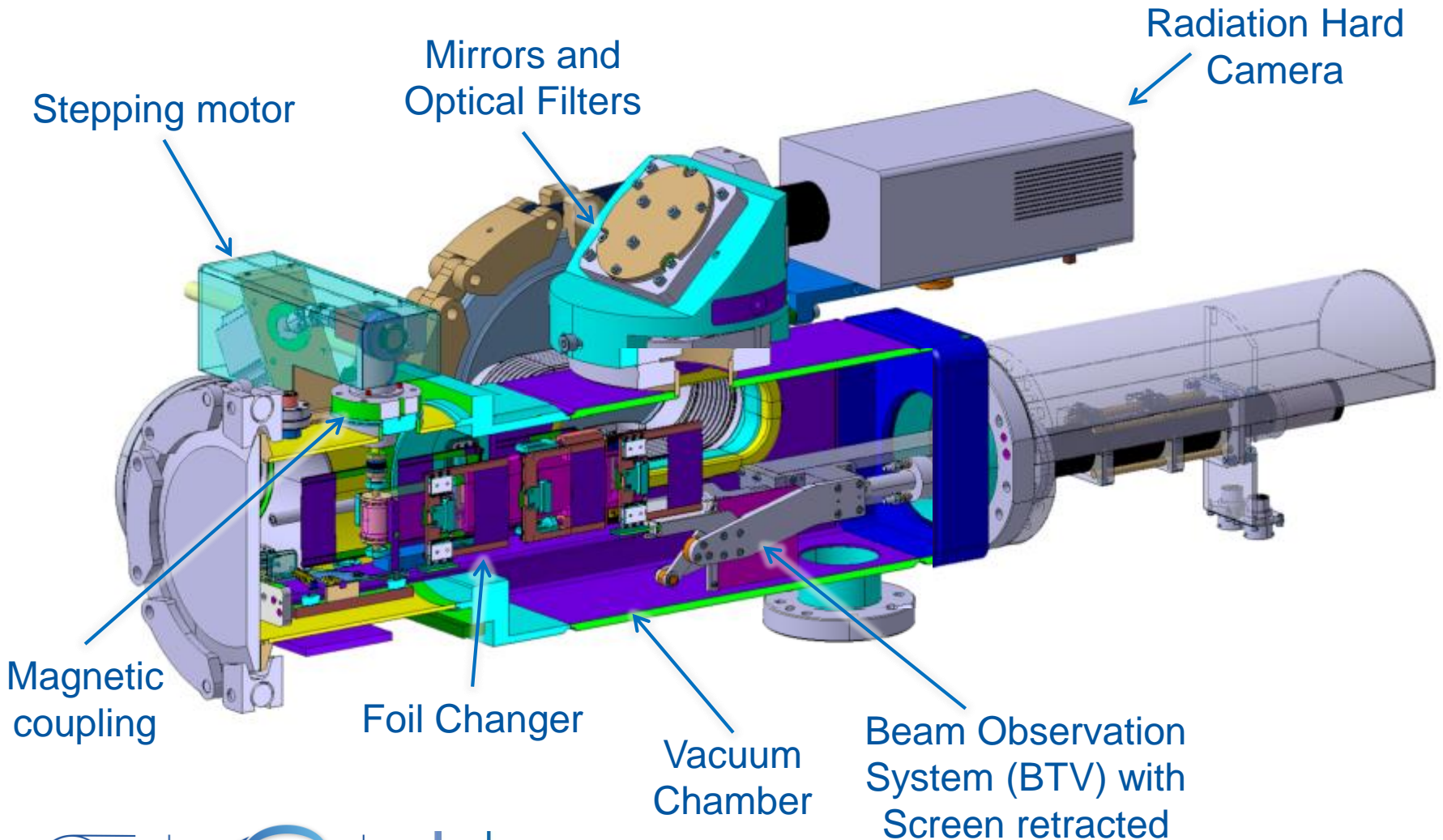
# Foil Handling Mechanism



# Foil Handling Mechanism

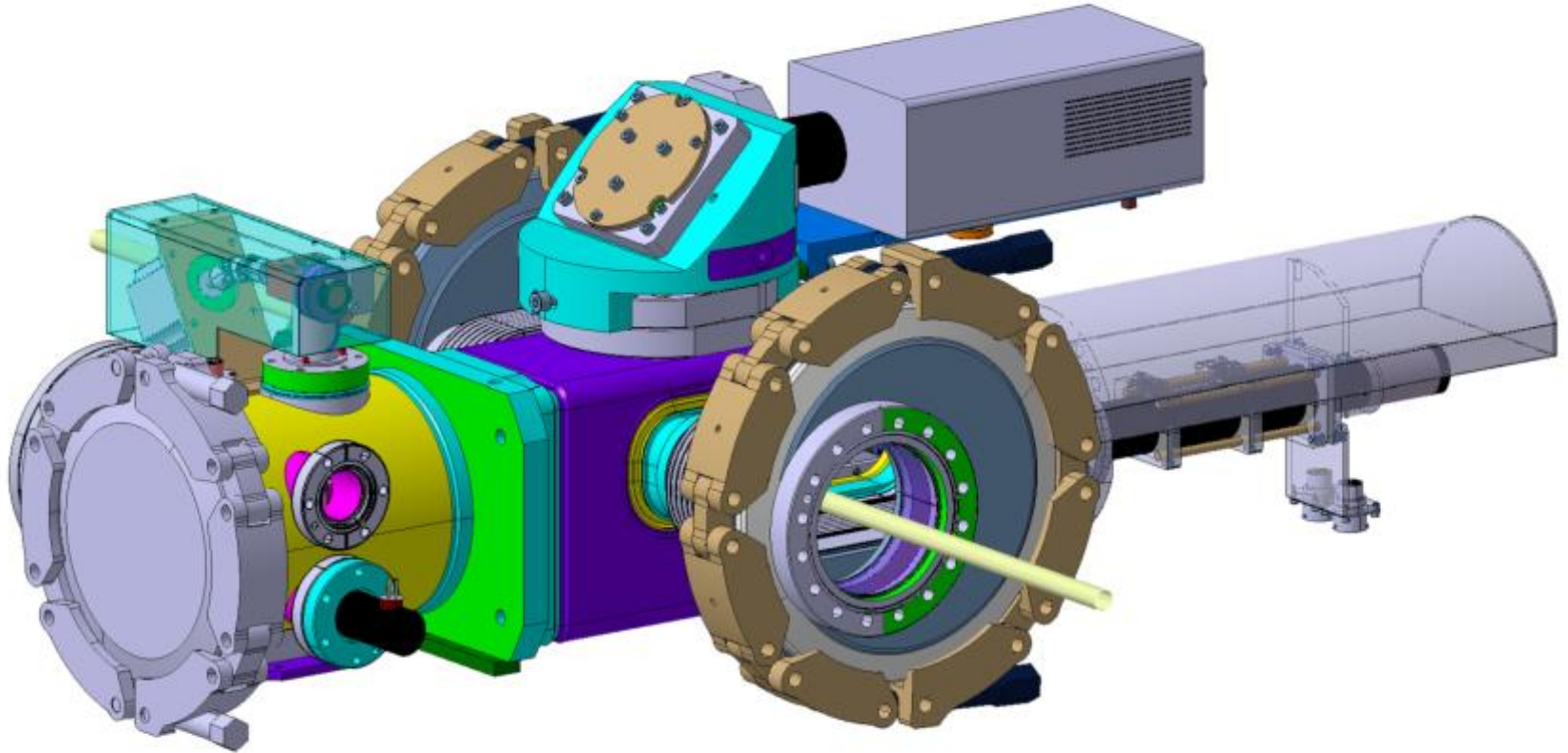


# Foil Handling Mechanism

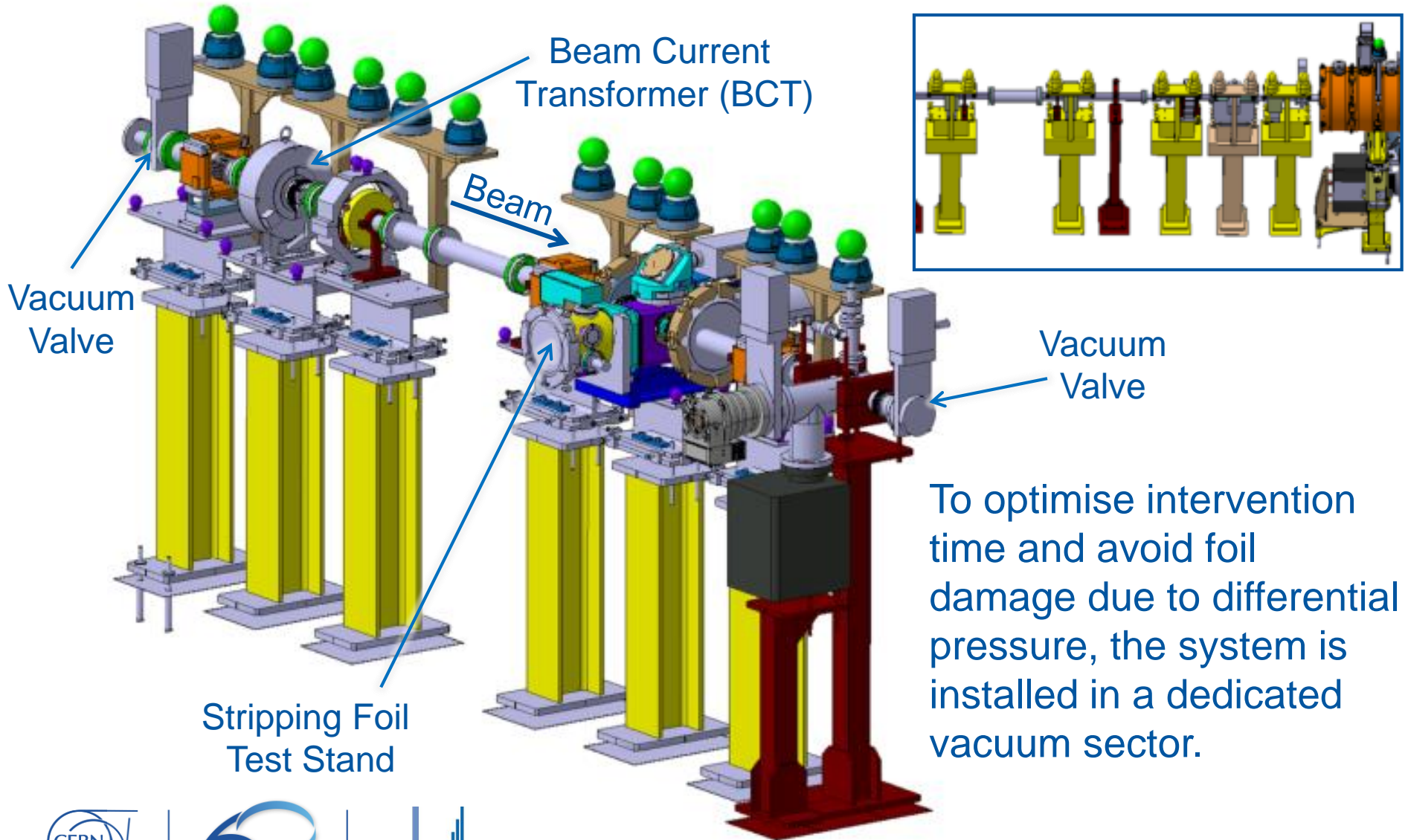




# Foil Handling Mechanism



# Configuration L4T sector 1.1



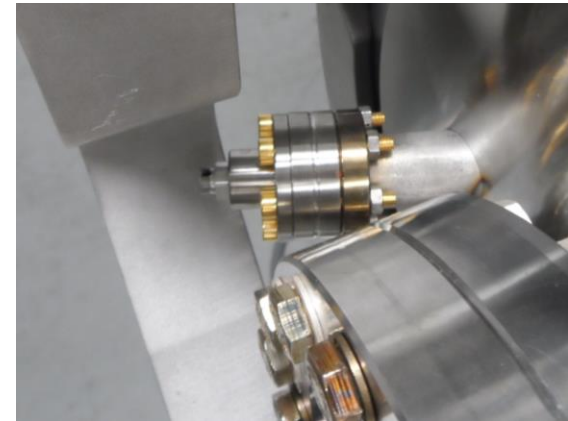


# Stripping Foil Test stand Installation



<- Issue with  
DN16 Flange

Solved ->

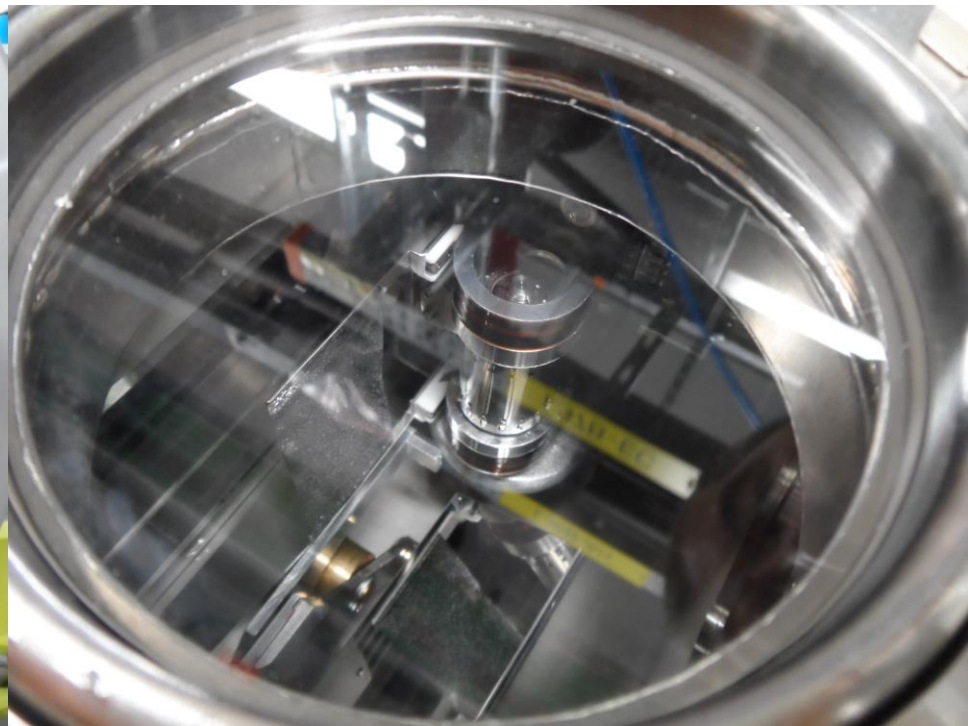
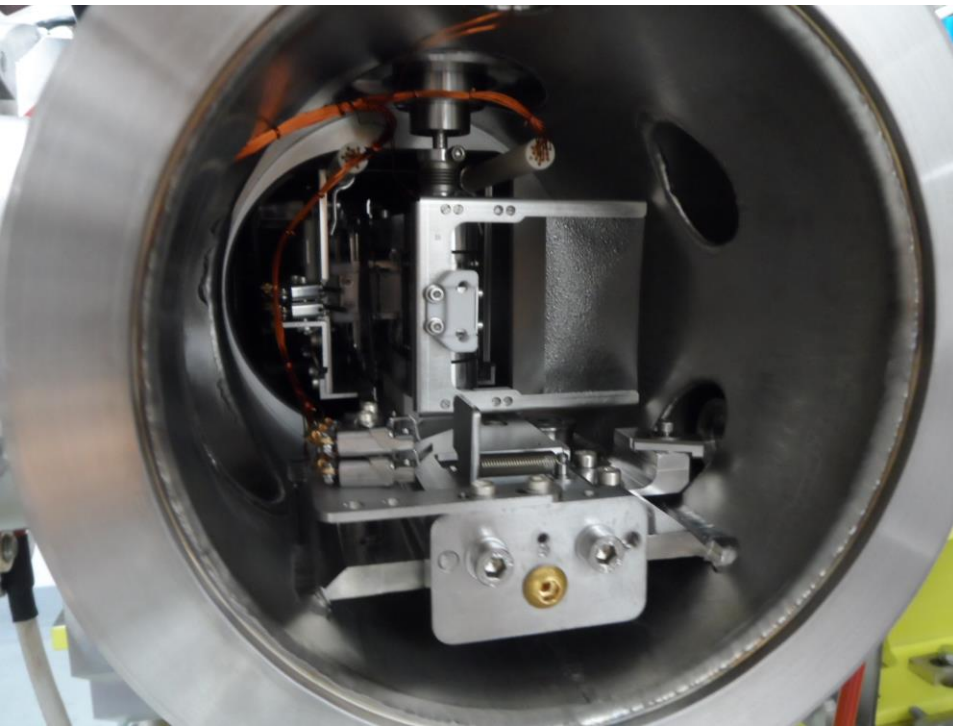




# Stripping Foil Test stand - Foils

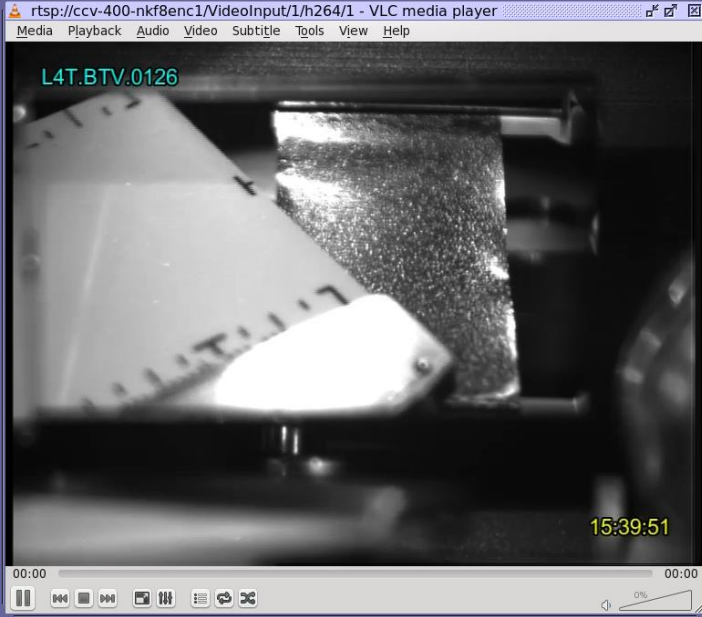
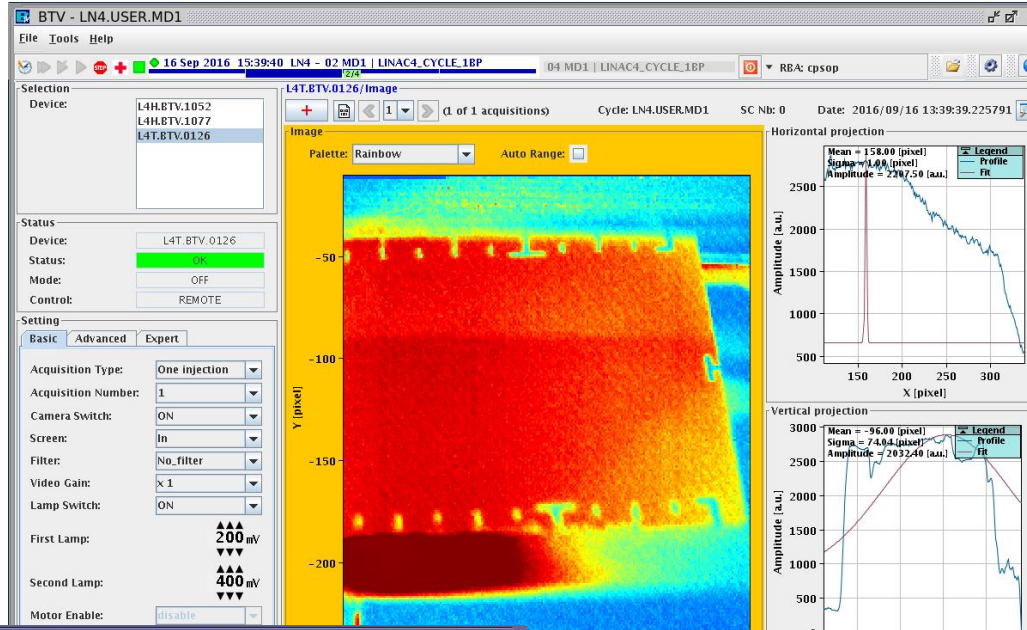
Very limited space  
for foil movements

View through  
BTV window





# Stripping Foil Test stand - Conclusion



Camera Switch: RAD ON Screen: In Video Gain: x 1 First Lamp: OFF Filter: No\_filter Second Lamp: OFF  
Save Continuous Saving user/shops/obs/SPS\_DATA/OP\_DATA/BTV  
ue = 4095. Reduce Video Gain and use Filters!

Test Stand is operational and waiting for 1<sup>st</sup> Beam

