Some Updates on Mechanical Design

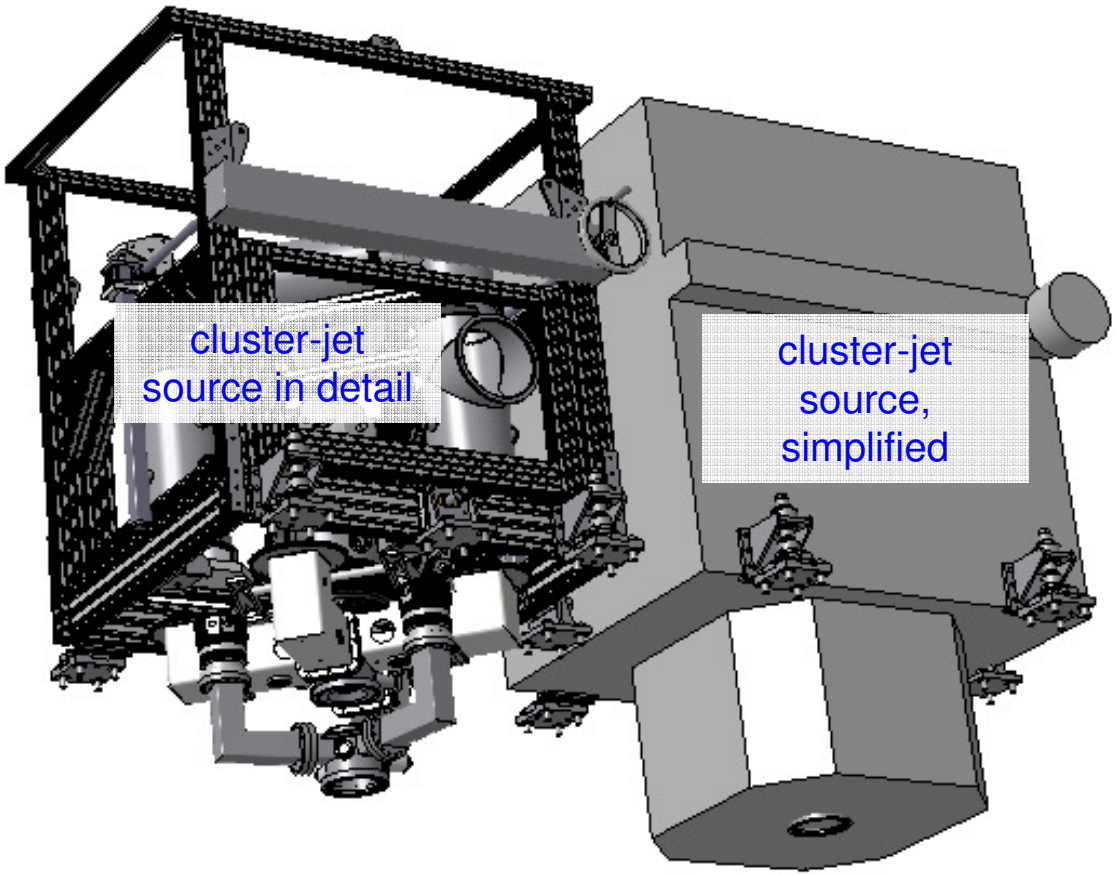
J. Lühning

- Changes in EDMS since the last Collaboration Meeting
- Interface between Target Spectrometer and Muon-Filter
- Pumping in the Muon-Filter area

Changes in EDMS since the last Collaboration Meeting

Cluster Jet Target

Posted by Münster on 2013-12-19 (https://edms.cern.ch/document/1333069/1)



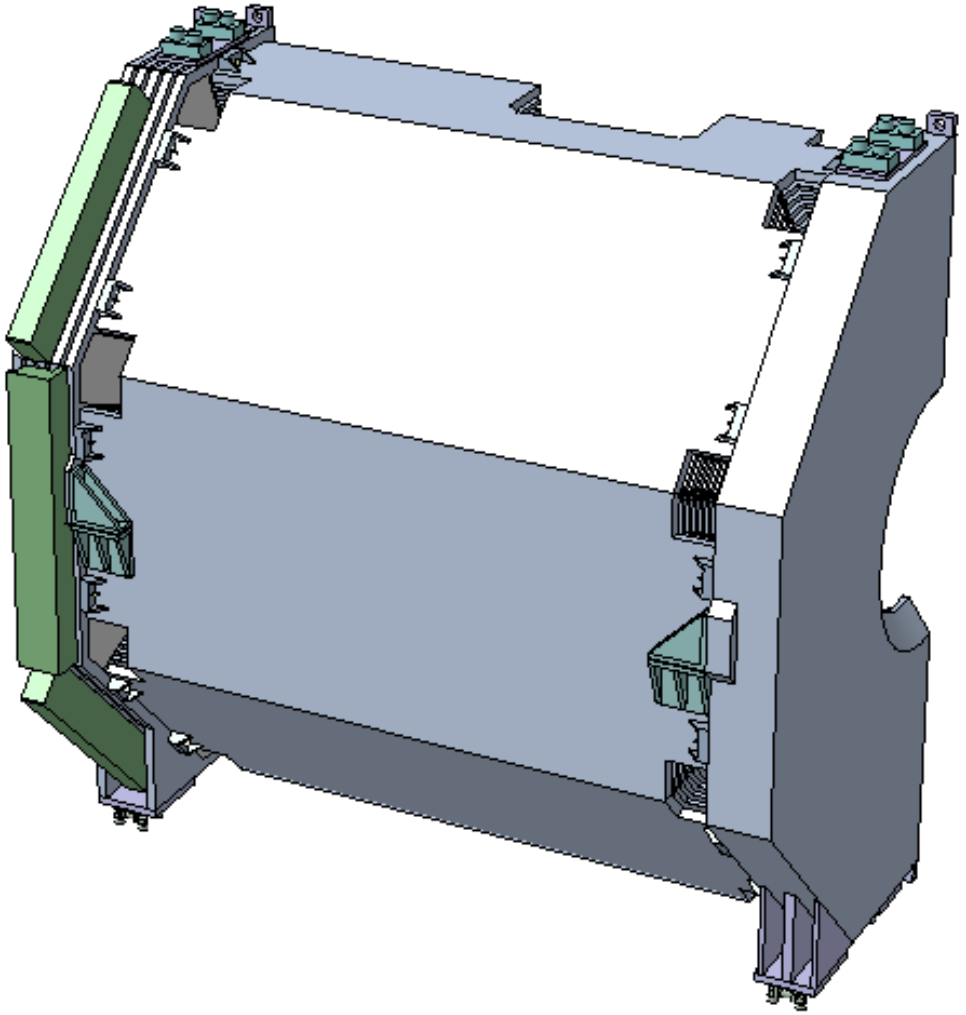
Changes in EDMS since the last Collaboration Meeting

Solenoid Yoke

Posted by Dubna on 2014-02-12
(https://edms.cern.ch/document/1064509/2)

Main changes:

- bigger apertures at both ends of the barrel
- radial extension of doors slightly reduced
- one big vertical suspension for each door wing

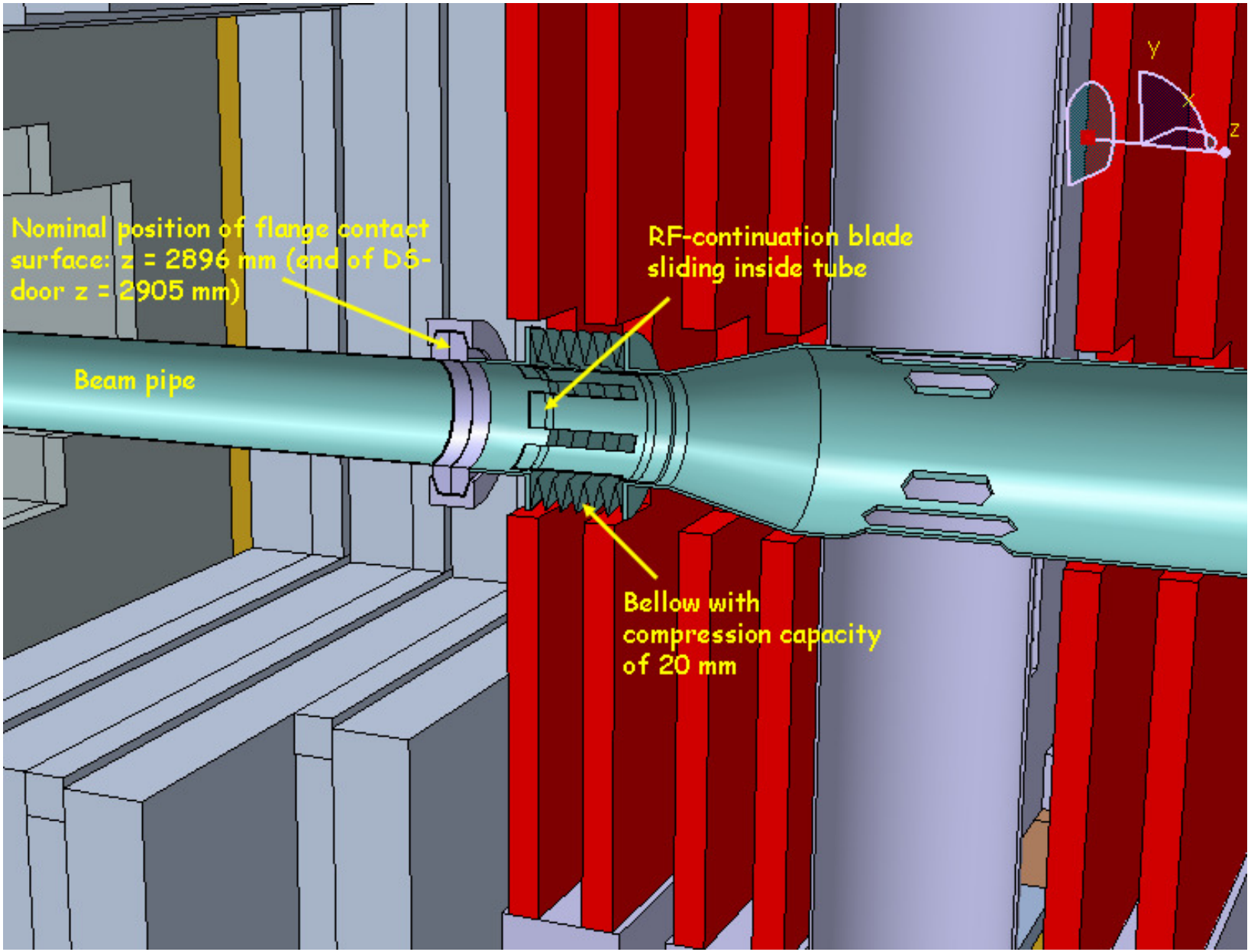


Interface between Muon-Filter and Target Spectrometer

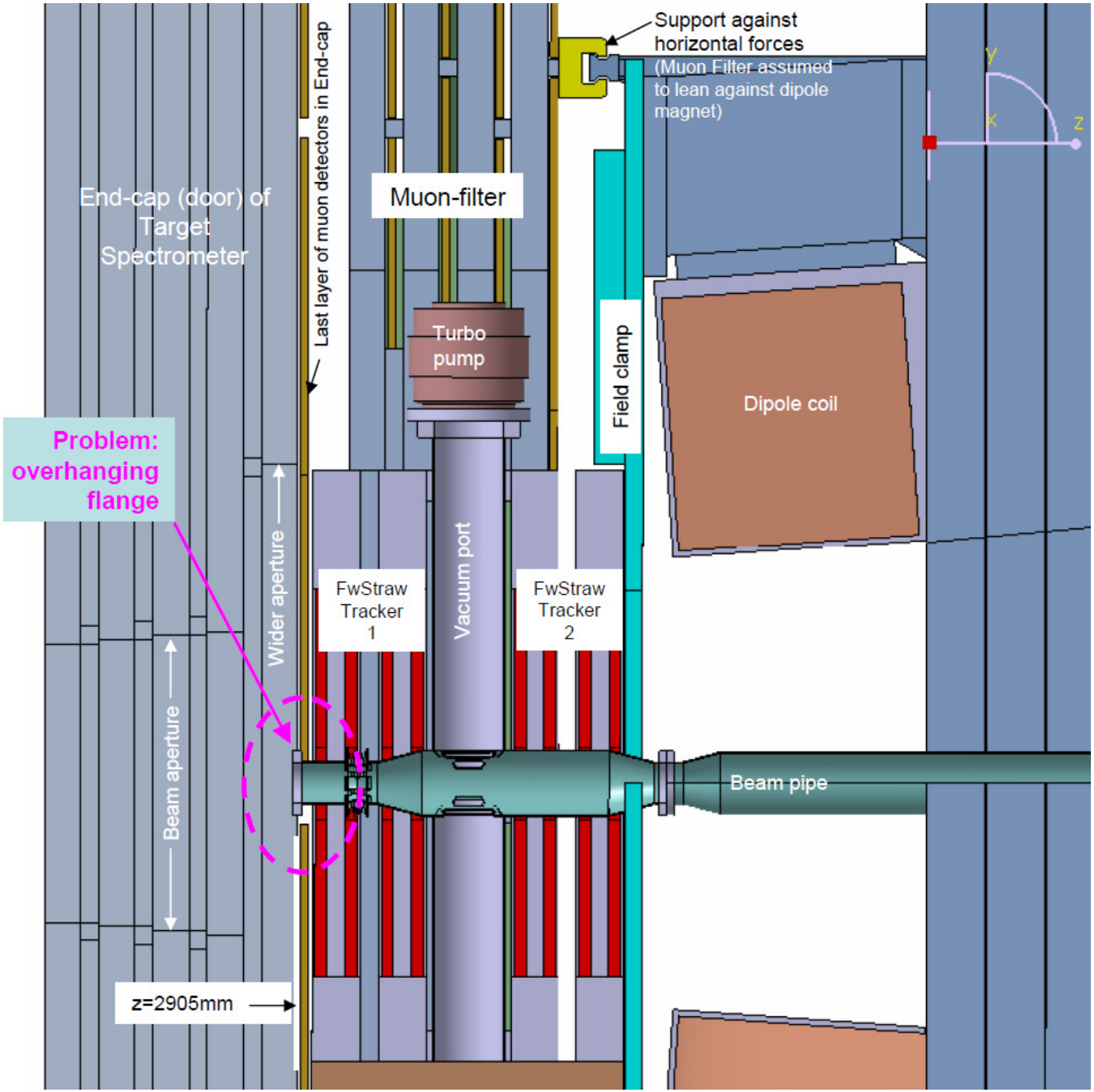
Some issues to be considered:

- When moving into maintenance position the Target Spectrometer has to pass the Muon-Filter, which stays in place. (The 2 halves of the Muon-Filter can be moved aside in order to get access to the Downstream Door of the TS but they will stay near to the fixed position of the PANDA Dipole.)
- The Straw Trackers FT1 and FT2, which enclose a part of the beam-line, will be mounted to the dipole field-clamp. In order to avoid re-adjustments these detectors should stay in place when the TS is moved.
- Before moving the TS the beam-line has to be opened between TS-door and Muon-Filter. At the present design there is a problem with the flange connection, s. the following pages:

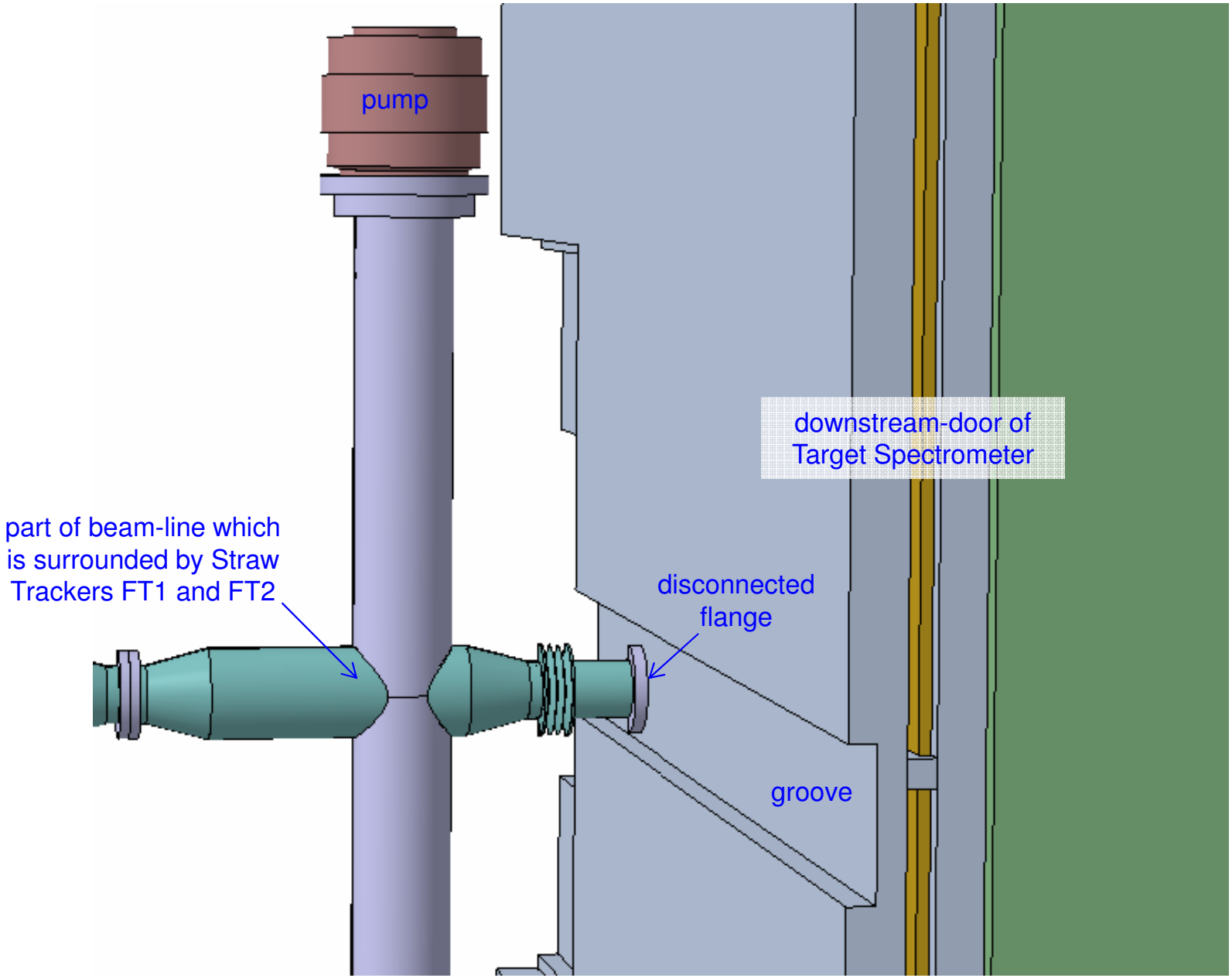
Beam-line in the area between Target Spectrometer and Muon-Filter



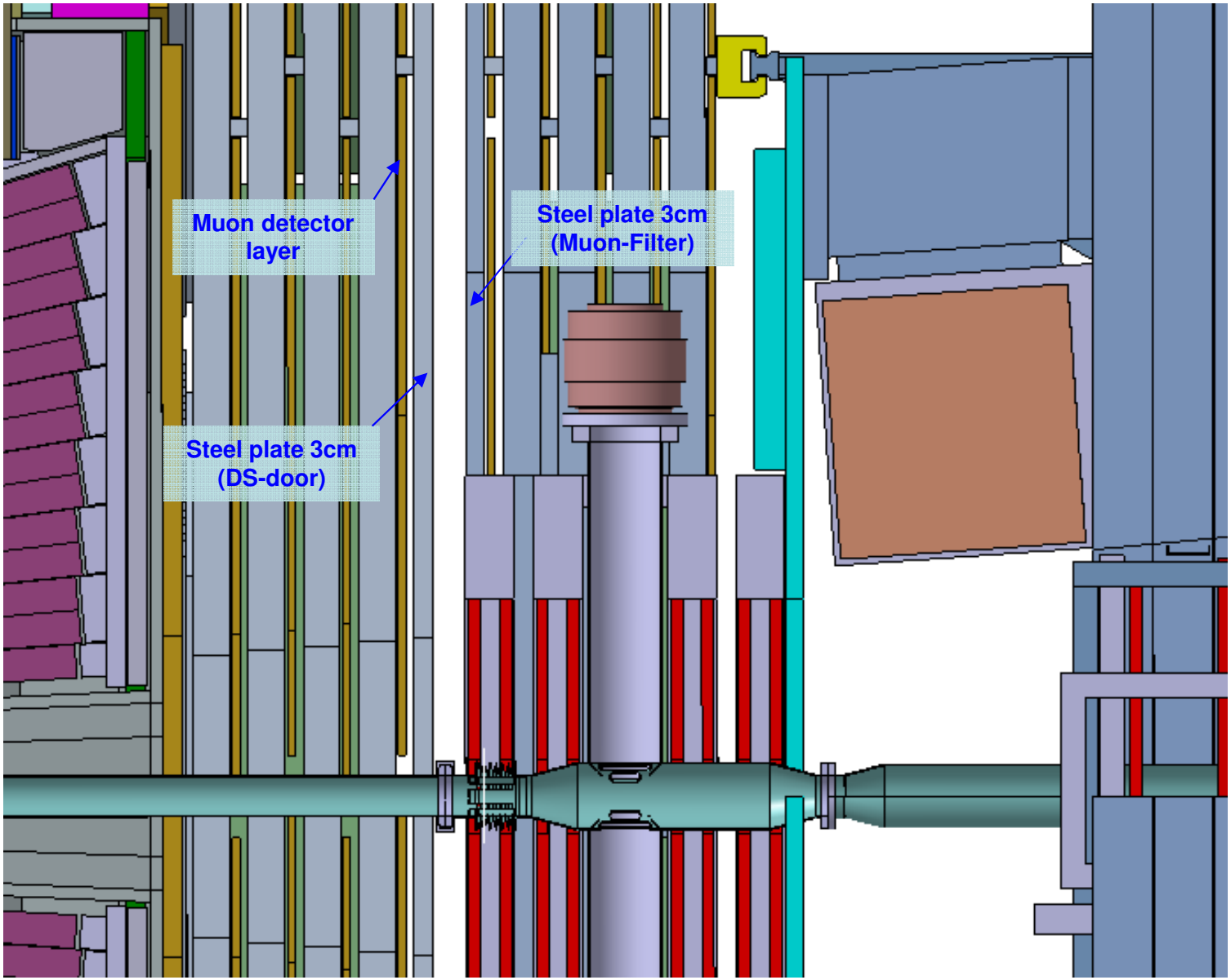
Area between Target Spectrometer and Dipole Magnet



A groove in the DS door of the TS, one solution in order to avoid a collision with the disconnected flange



Two thinner plates (each 3cm), another solution in order to avoid a collision with the disconnected flange



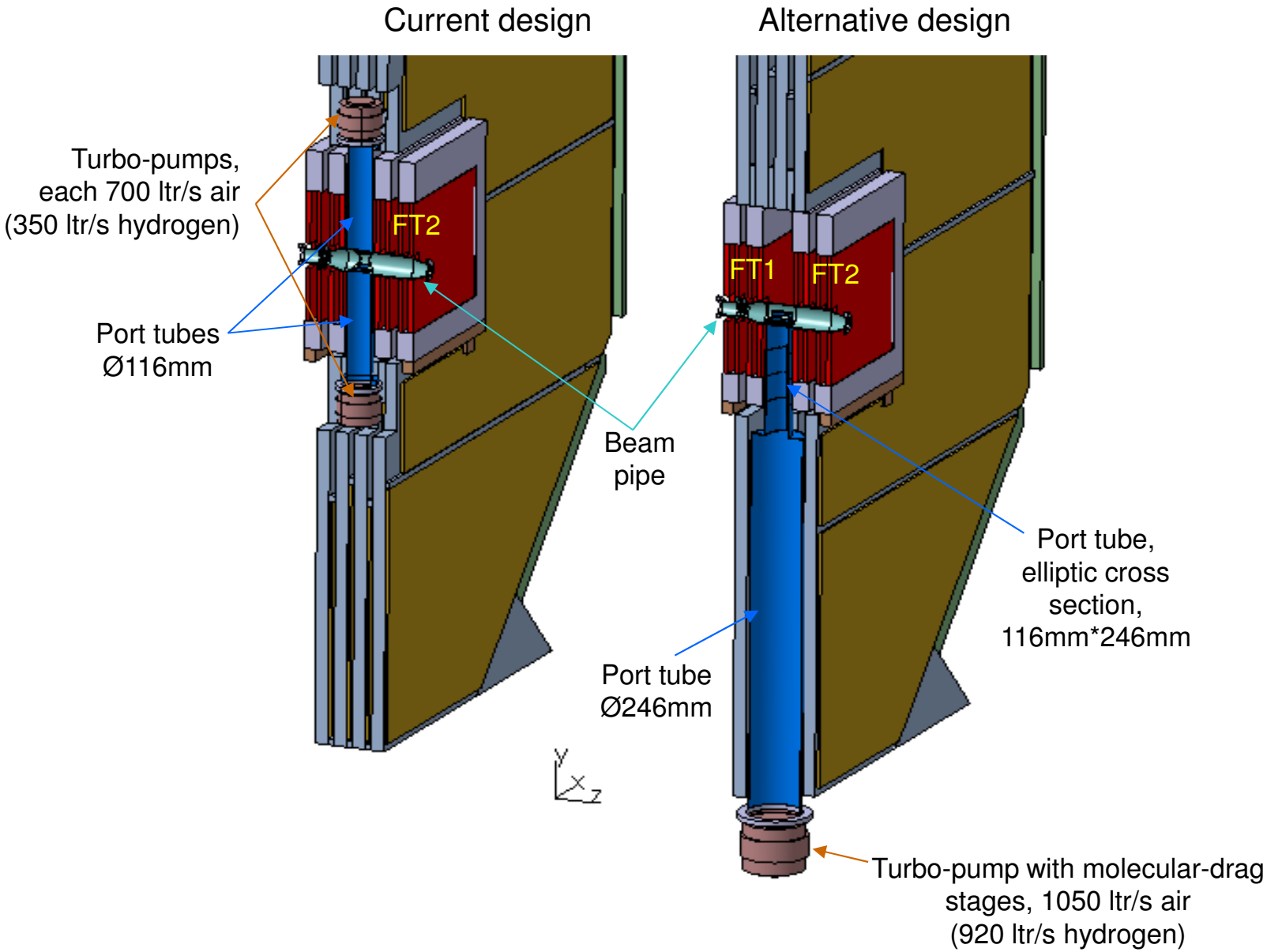
Pumping in the Muon-Filter area

Current design:

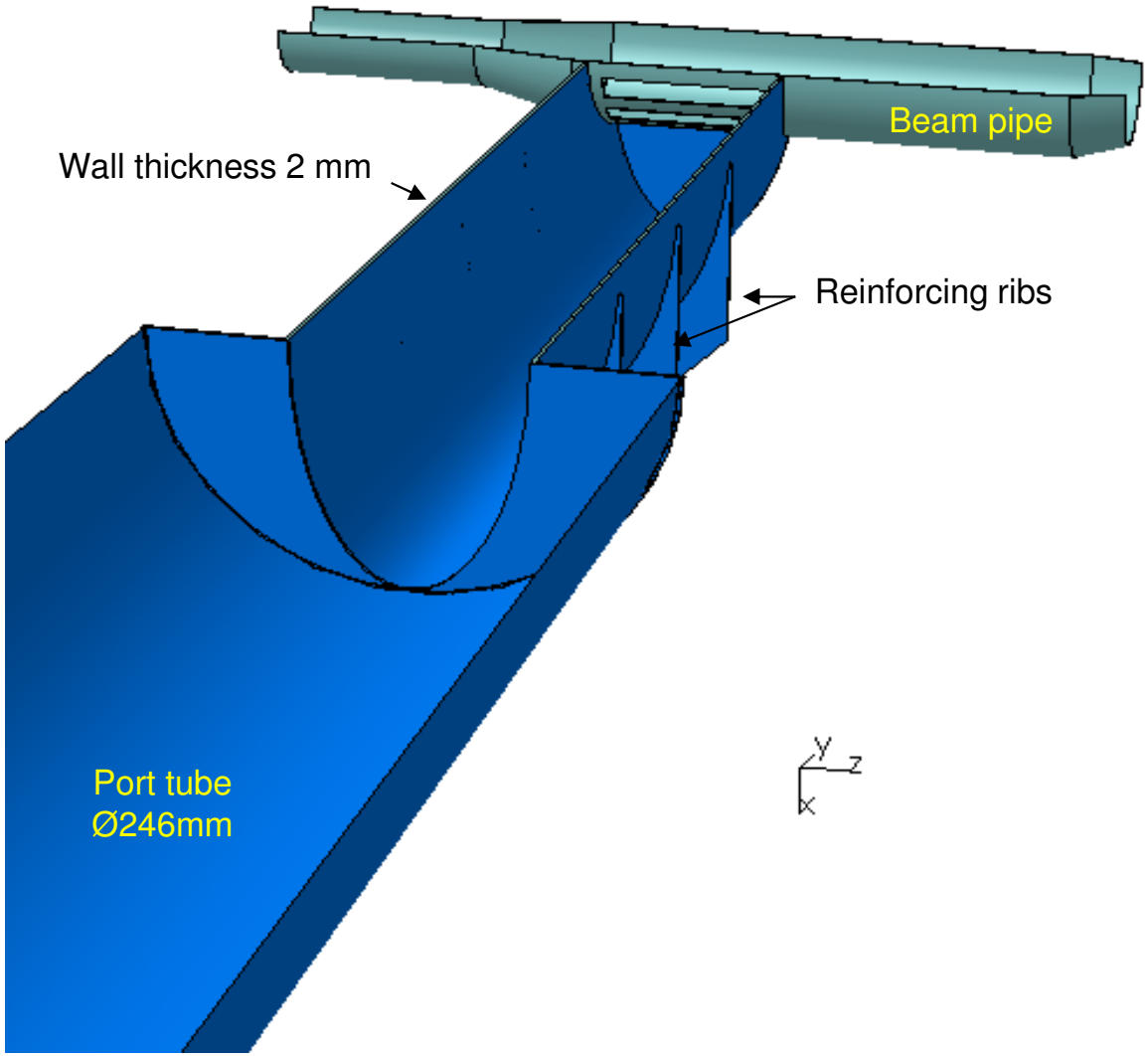
- two ports with turbo-pumps, total pumping capacity 480 ltr/s
- pumping ports between forward trackers FT1 and FT2 (the nearest space available downstream of the IP)
- 120 mm space available for ports between FT1 and FT2

Disadvantages of the current design:

- pumps located inside of the Muon-Filter
- no space for shutters
- magnetic shielding needed
- forced cooling of pumps needed


Current design
Alternative design
Turbo-pumps,
each 700 ltr/s air
(350 ltr/s hydrogen)
Port tubes
Ø116mm
FT2
FT1
FT2
Beam
pipe
Port tube,
elliptic cross
section,
116mm*246mm
Port tube
Ø246mm
Turbo-pump with molecular-drag
stages, 1050 ltr/s air
(920 ltr/s hydrogen)

Alternative design, view from the bottom



Molecular-flow conductance for hydrogen

Current design: conductance of port tubes 2 * 690 ltr/s

Alternative design: conductance of port tube 1180 ltr/s

Current design: total capacity including pumps 480 ltr/s

Alternative design: total capacity including pump 510 ltr/s

A small disadvantage of the alternative design is a reduction of molecular-flow conductance for nitrogen/air.

Including pump(s), the effective capacity is:

Current design	292 ltr/s
Alternative design	242 ltr/s

However, the load from nitrogen and other gases is expected to be 2 orders of magnitude lower than the load from hydrogen. In order to achieve the same air capacity as in the current design the alternative design would need a tube with a diameter of 346mm instead of 246mm, or an appropriate elliptical cross section, or a bigger pump.