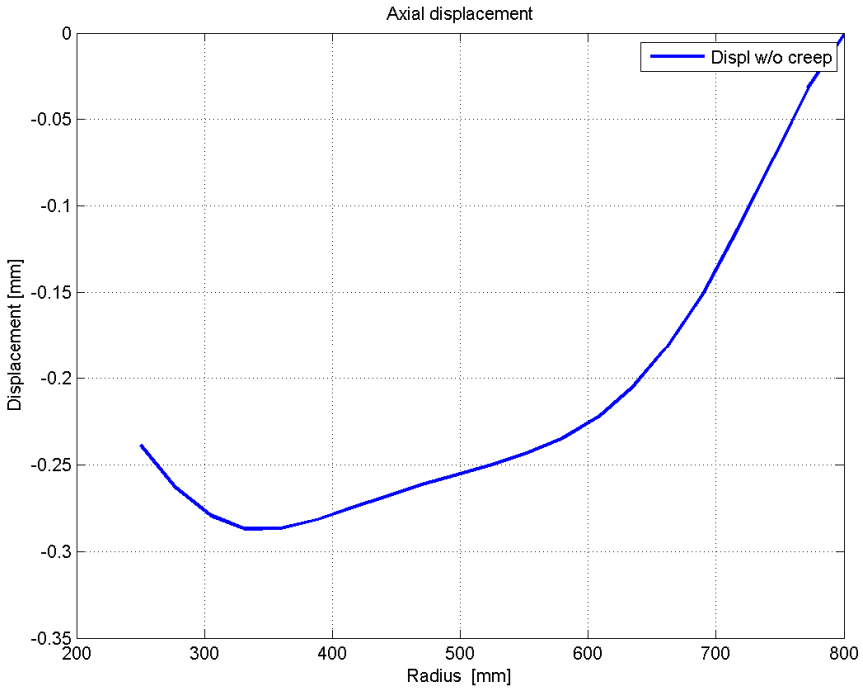
Update on DCH mechanics and integration

Summary

- Upgrade on mechanics model
- Differents endplate profiles
- Gas holes detail
- Integration and considerations on DCH structure

FEM Analysis upgrade
Spherical

Wire type	Mat	d (mm)	N° Wires	Sag. (mm)	Avg length	T(gr)
Field	Aluminium	0.090	22914	0.2	2500	≈70
Sense	Molybdenum (AU coated)	0.025	7638	0.2	2500	≈21

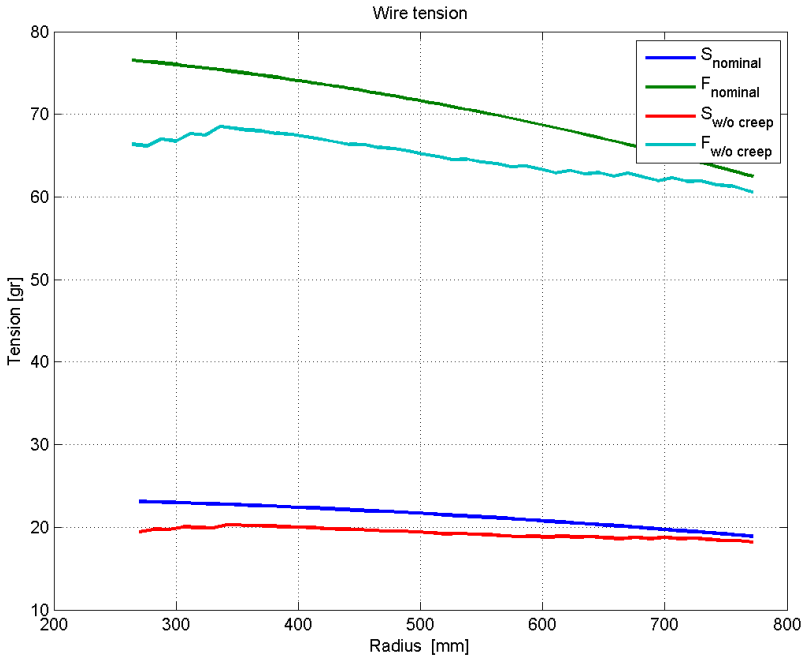


Max displacement: 0.19mm -> 0.28mm

Total nominal load: 14268 N -> 17631 N

Total load after stringing:
13893 N -> 16823 N (+20%)

Sagitta and wire tension

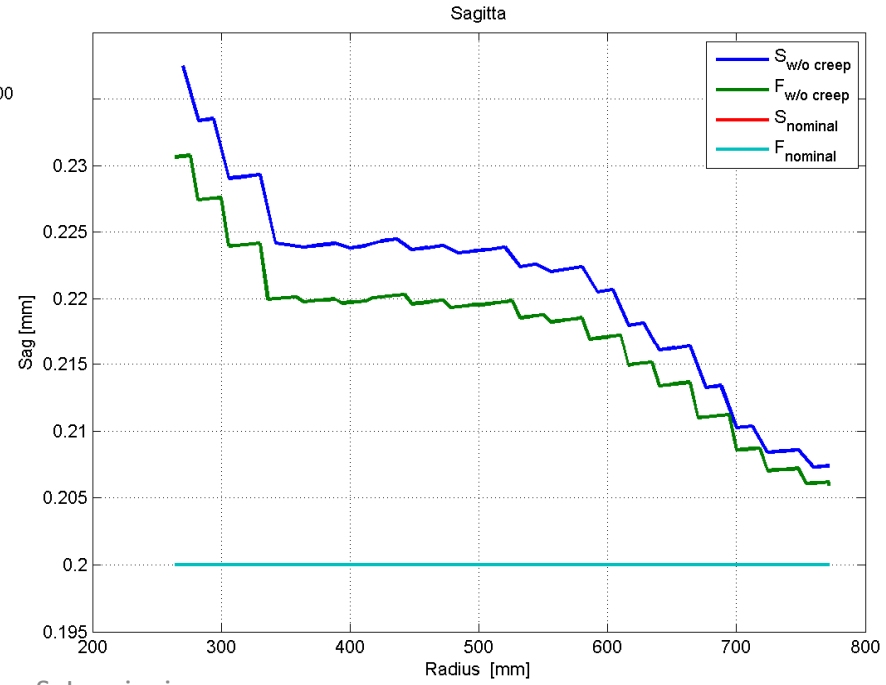


Max sag: 0.235
Min sag: 0.21

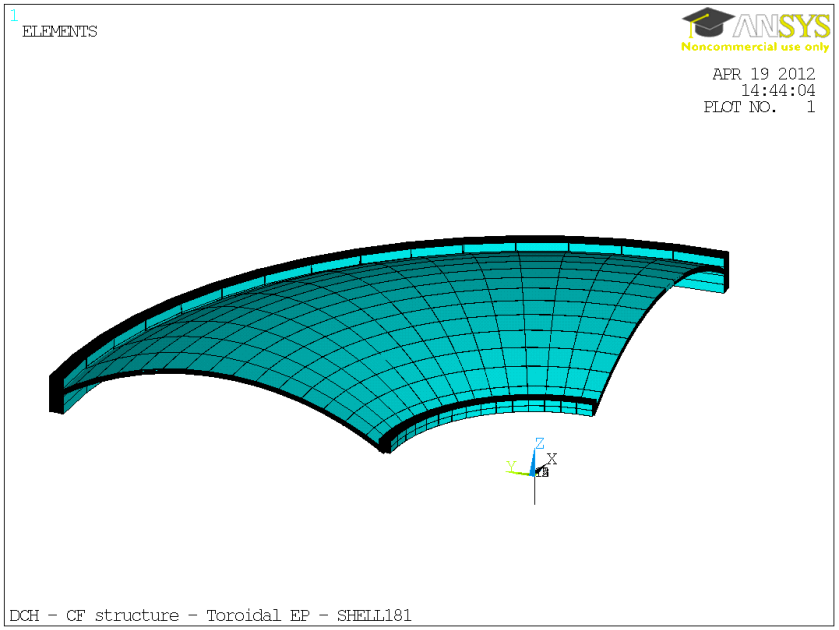
Creep effect is not considered

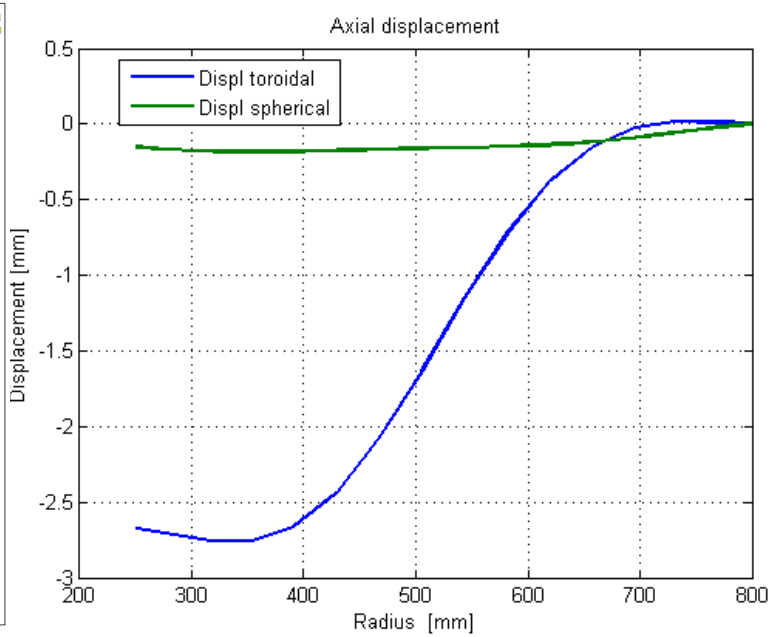
Because stringing process takes a lot of time, creep happens during the chember construction.

A mechanics model will be developed to understand the effect on the endplates and wire sagitta



Analisys on differents endplate profile
Toroidal

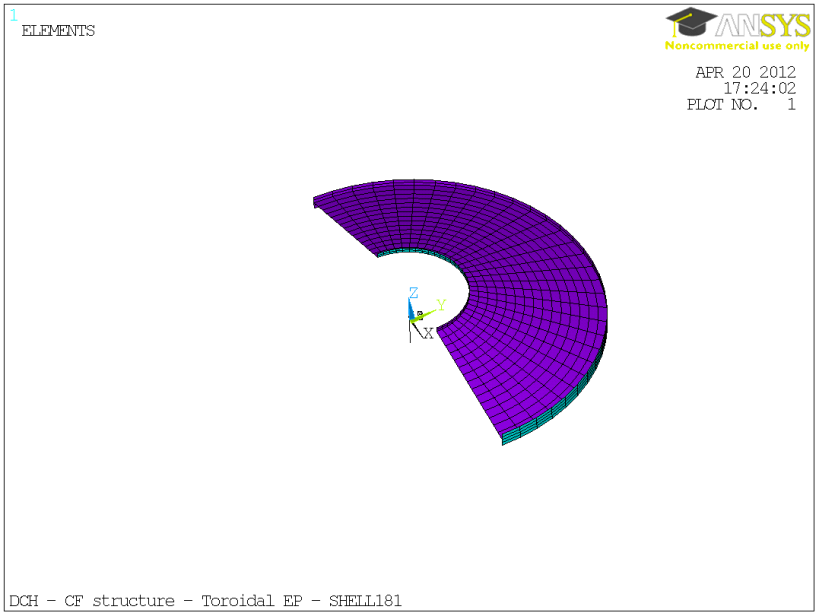


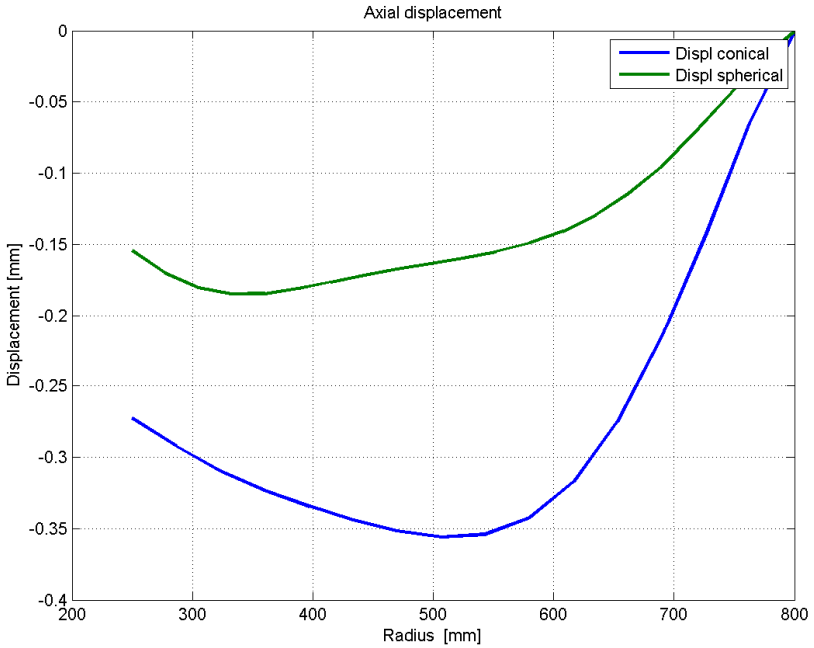


Thickness: 8mm
Radius: 500mm

Max displacement: 2.7mm

Analisys on differents endplate profile
Conic

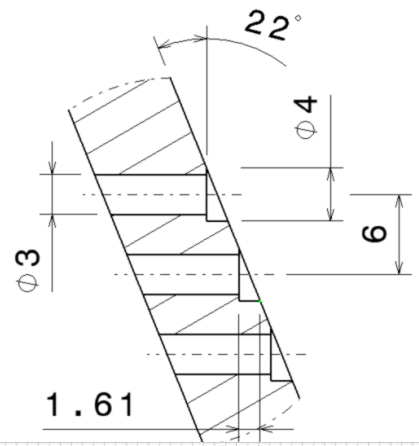




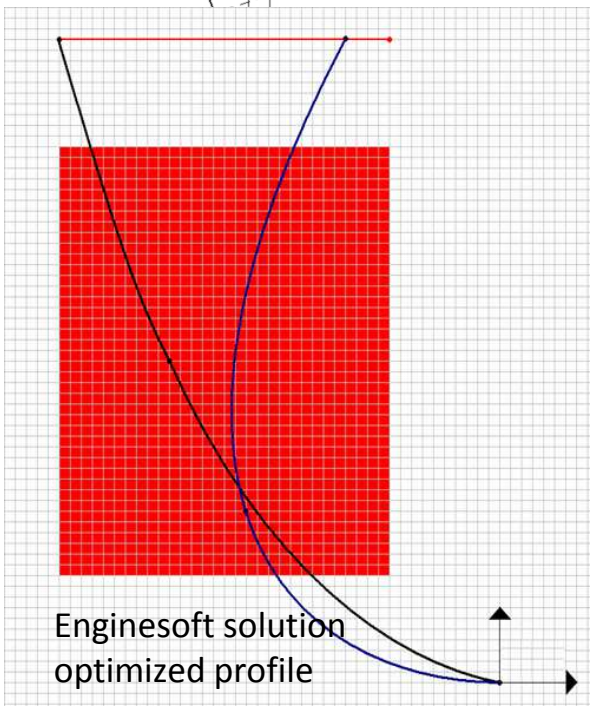
Thickness: 8mm
Angle: 15°

Max displacement: 0.35mm*(to be corrected)

Feedthrough holes effect on EP profile



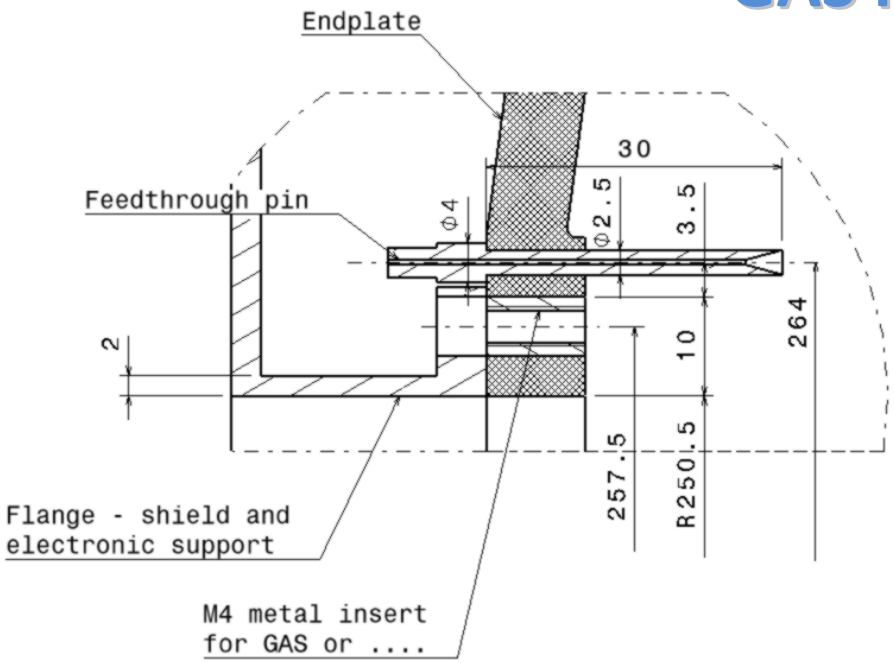
Counterboured hole doesn't allow to use a profile with a tangential angle greater than ≈20° – too much material loss



- Optimized profile cannot be used if the counterbore is necessary

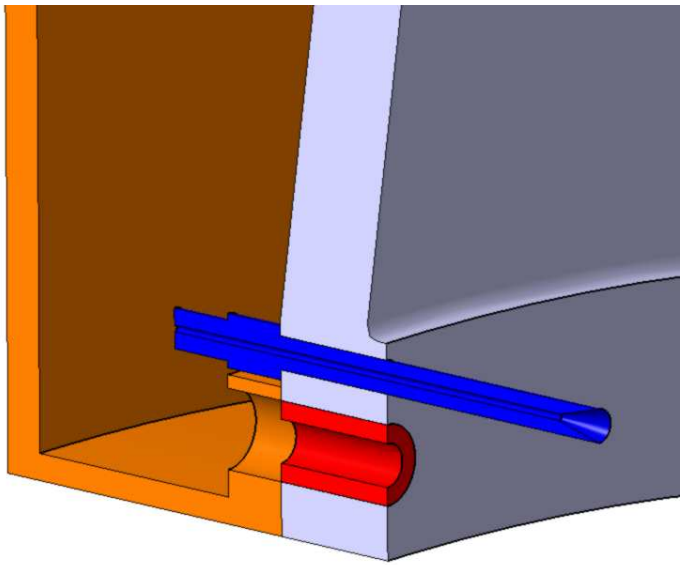
- Drilling will be an important part of the total cost

GAS holes



Babar GAS holes
Rear endplate (input)
2xØ5mm at radius 246.5 mm

Front endplate (outlet)
2xØ5mm at radius 246.5 mm

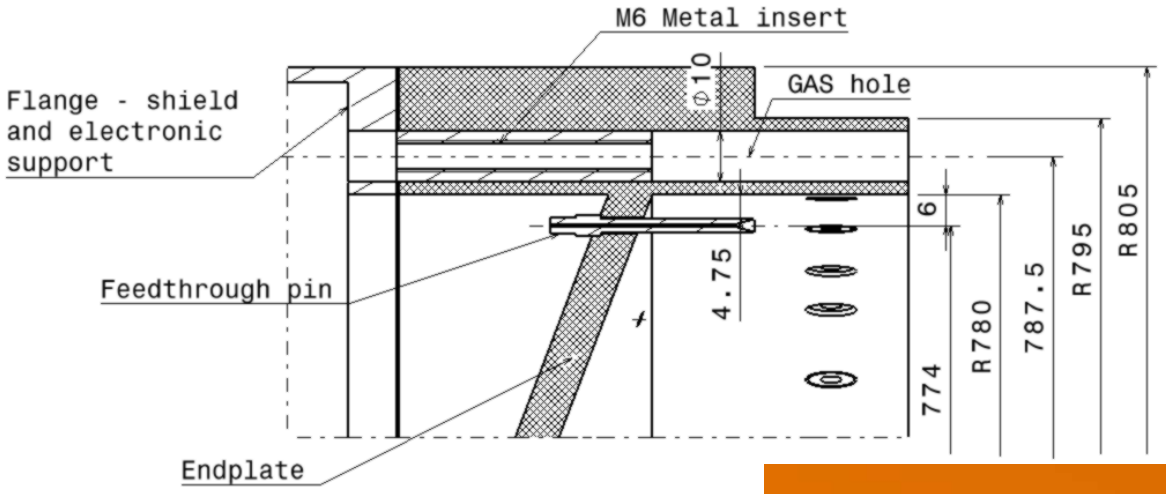


Superb GAS holes
Rear endplate (input)
2xØ4mm at radius 257.5 mm

Front endplate (outlet)
2xØ4mm at radius 257.5 mm

Guard layer radius: 264mm (13.5mm needed from inner radius to first wire)

GAS holes



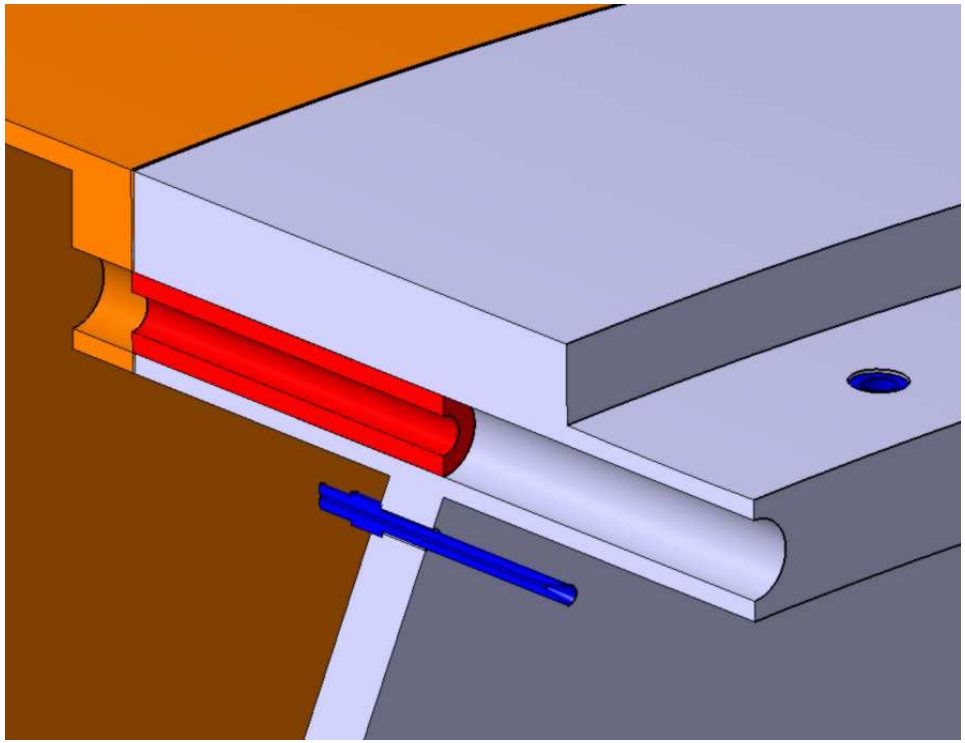
Babar GAS holes
Rear endplate (input)
4xØ5mm at radius 797 mm

Front endplate (outlet)
16xØ5mm at radius 797 mm

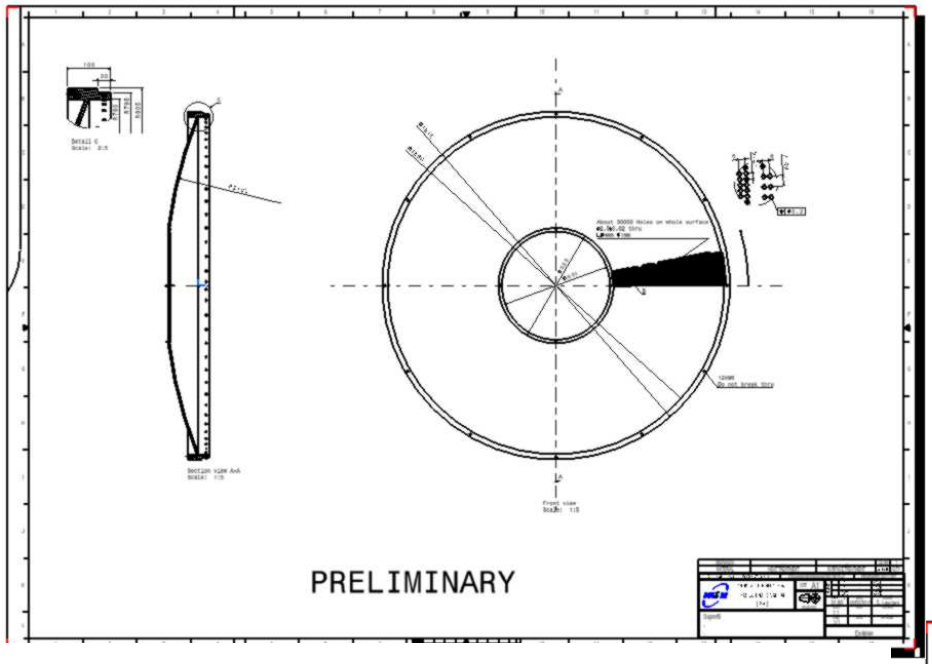
Superb GAS holes
Rear endplate (input)
2xØ6mm at radius 787.5

Front endplate (outlet)
16xØ6mm at radius 787.5 mm

Guard layer radius: 774mm

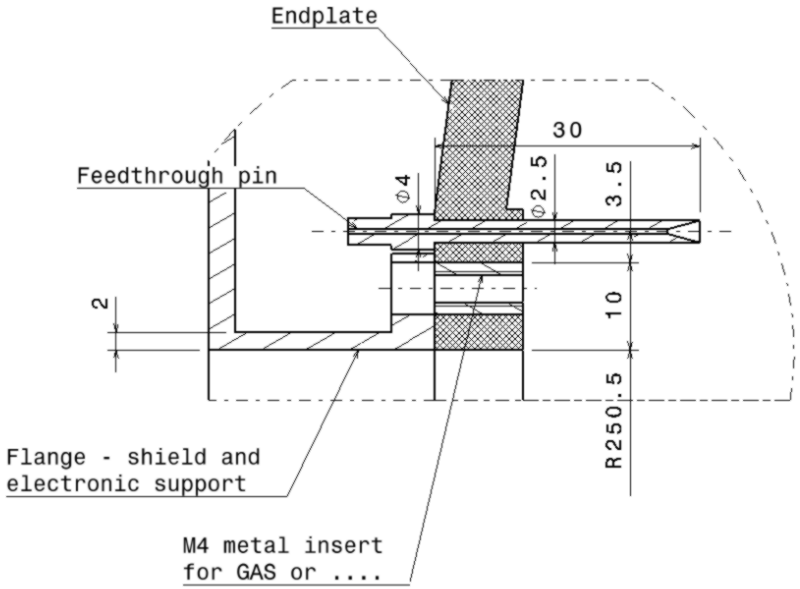


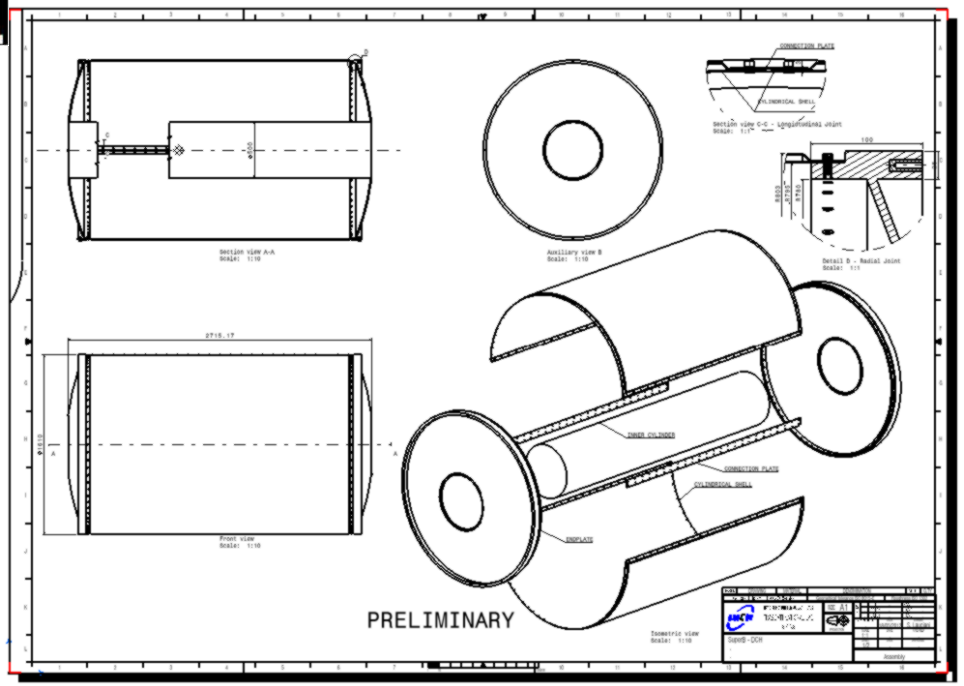
Mechanical drawings



Preliminary drawings ready to ask for an estimate

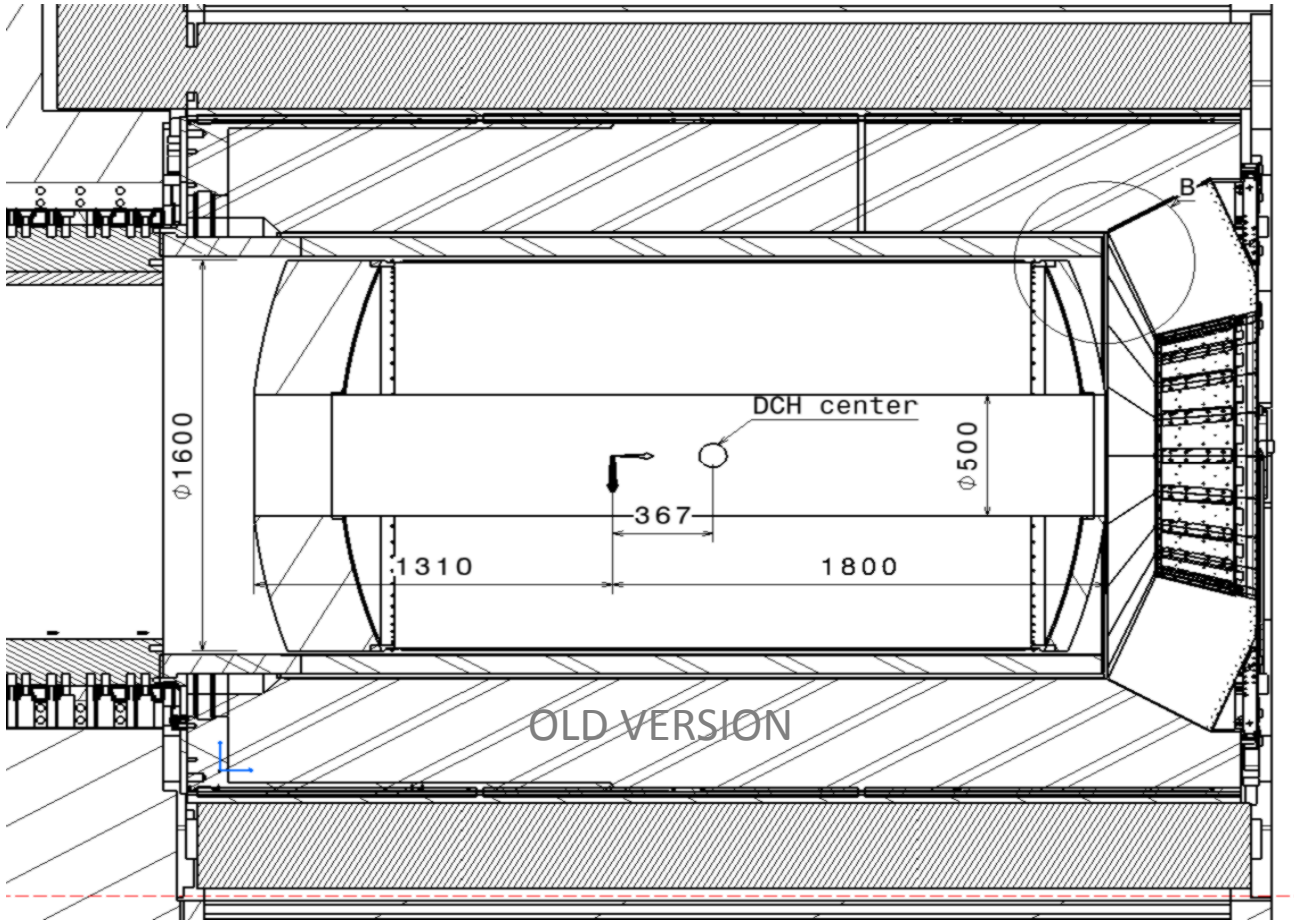
Two comapnies (Plyform Salver) conctacted





Integration of Tungsten tube and PID

DCH Dimensions

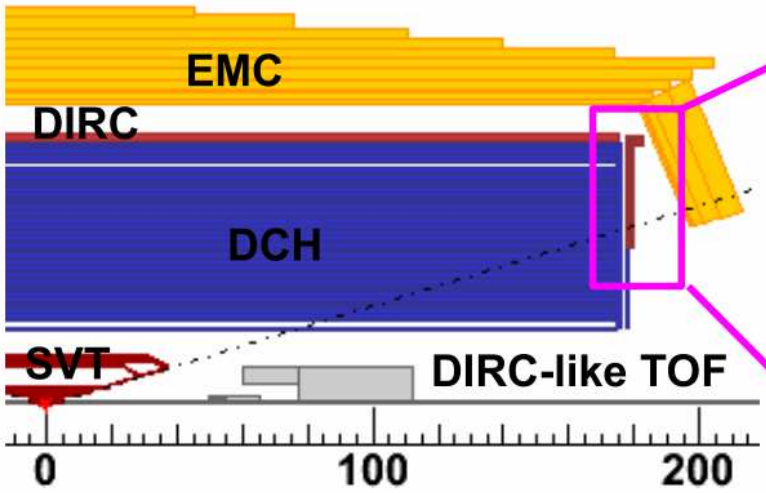


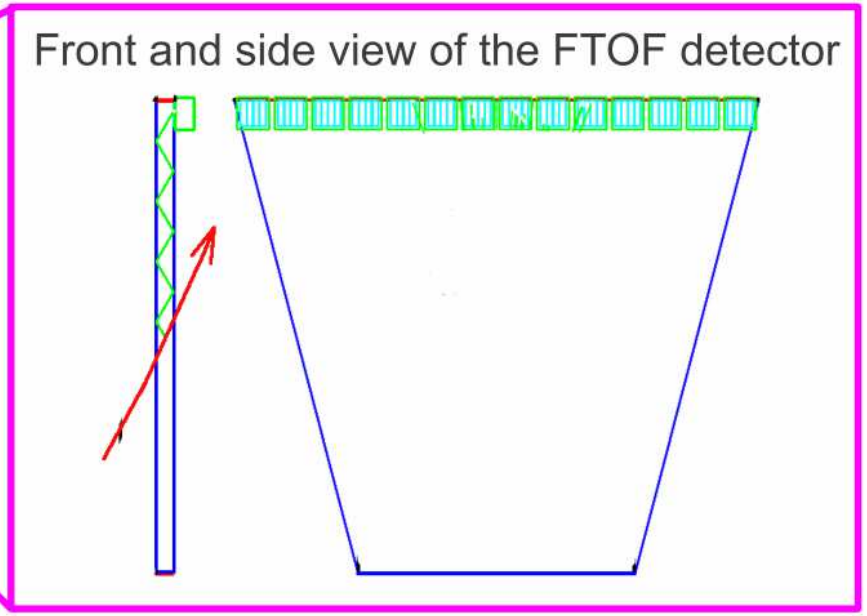
Old dimensions

- Z: -1310mm -> +1800mm
- Spherical shape of electronic and shielding

- r_int: 250 mm
- r_ext: 800 mm

Reminder





- PID device (K/π separation)
- Detector made of 12 quartz sectors
- Polar angle coverage is about 10° (15°–25°)
- Each sector is readout by 14 MCP – PMT SL10 (TTS~35ps)
- Thickness of the detector 1.5cm (12% of X_0)

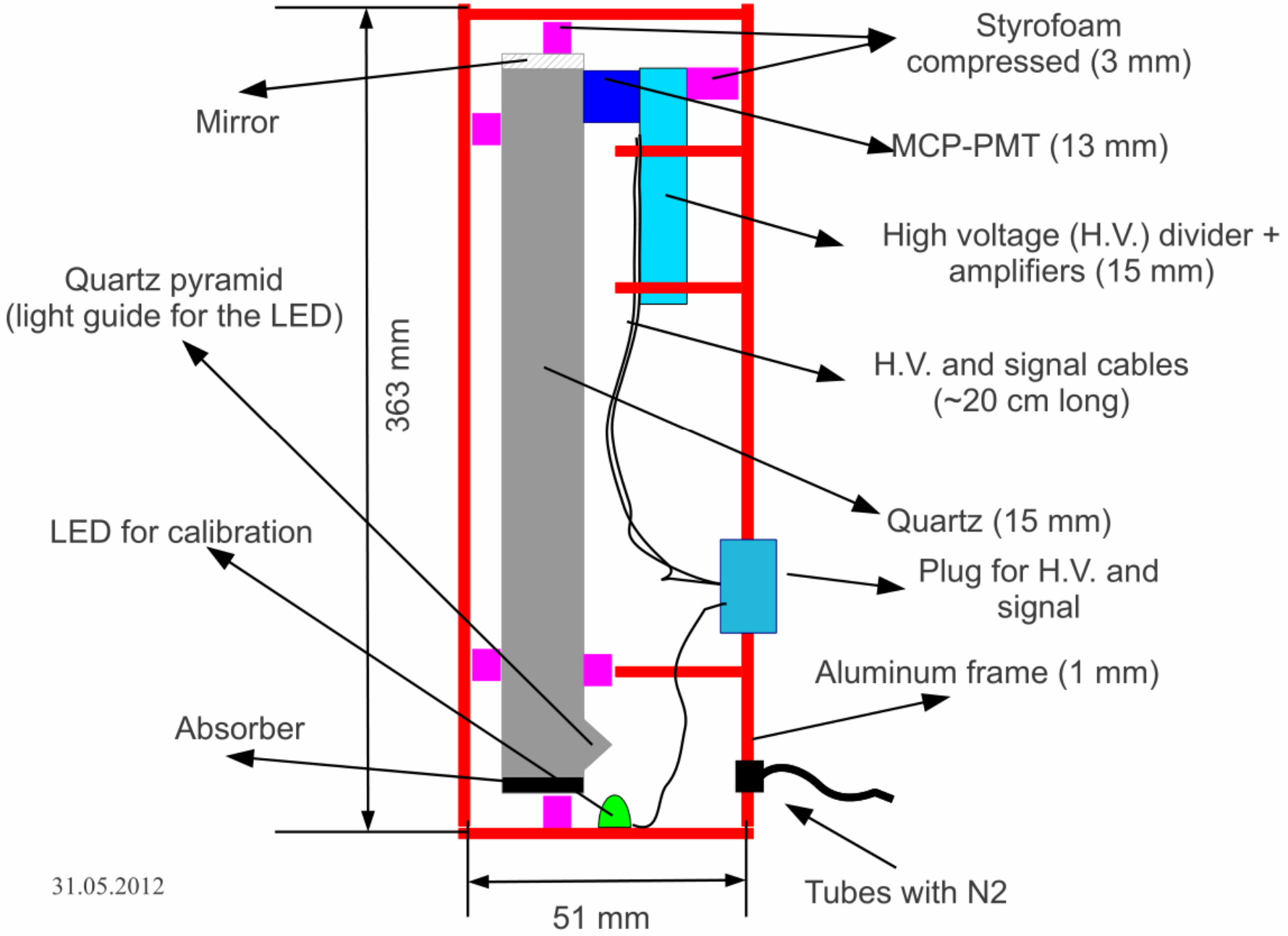
R_{max}	90 cm
R_{min}	50 cm
θ_{max}	26.0°
θ_{min}	15.7°
z_{max}	175.0 cm
z_{min}	180.0 cm

FTOF optimization

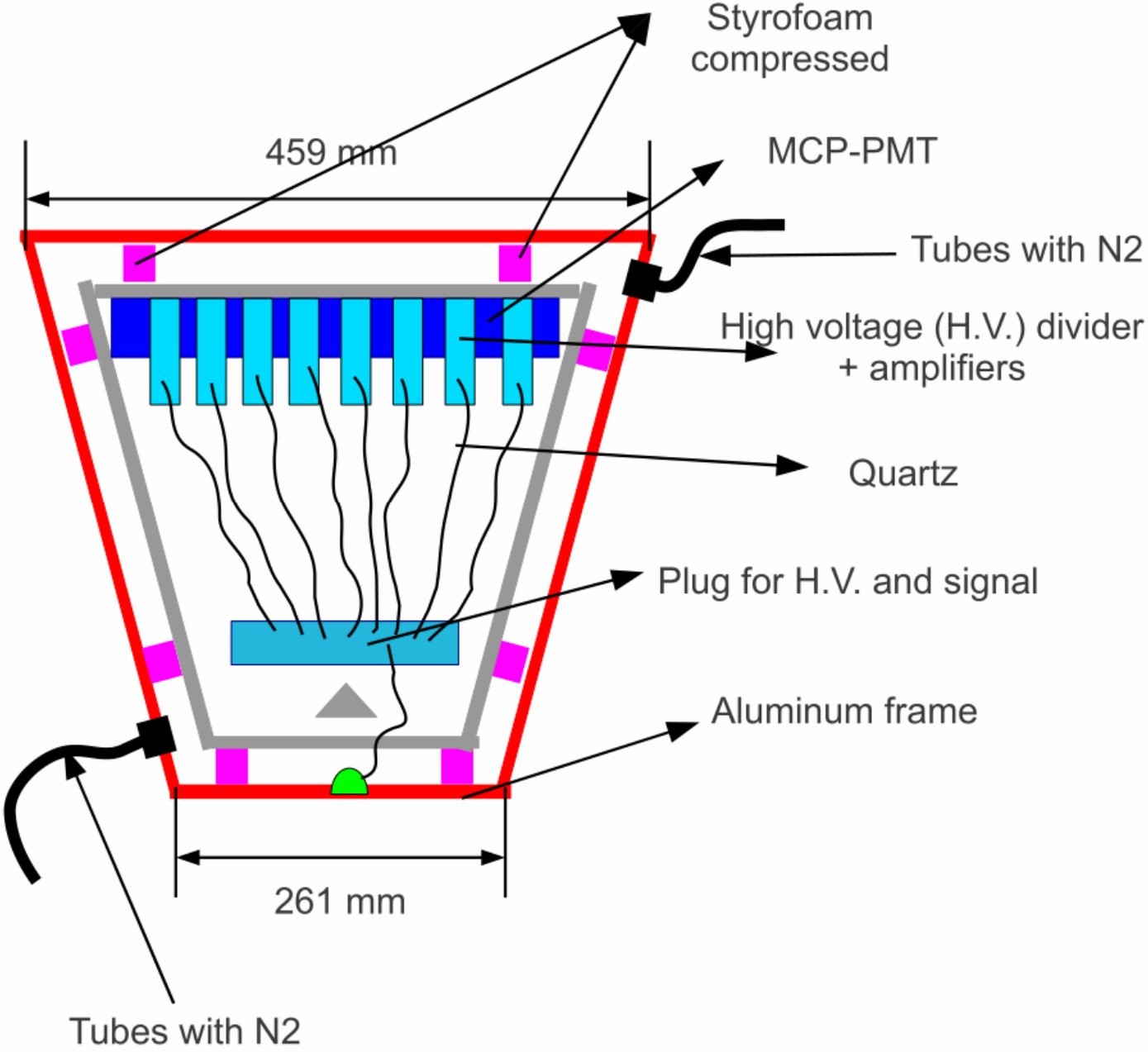
→ increase p.e. yield.

→ minimize timing jitter.

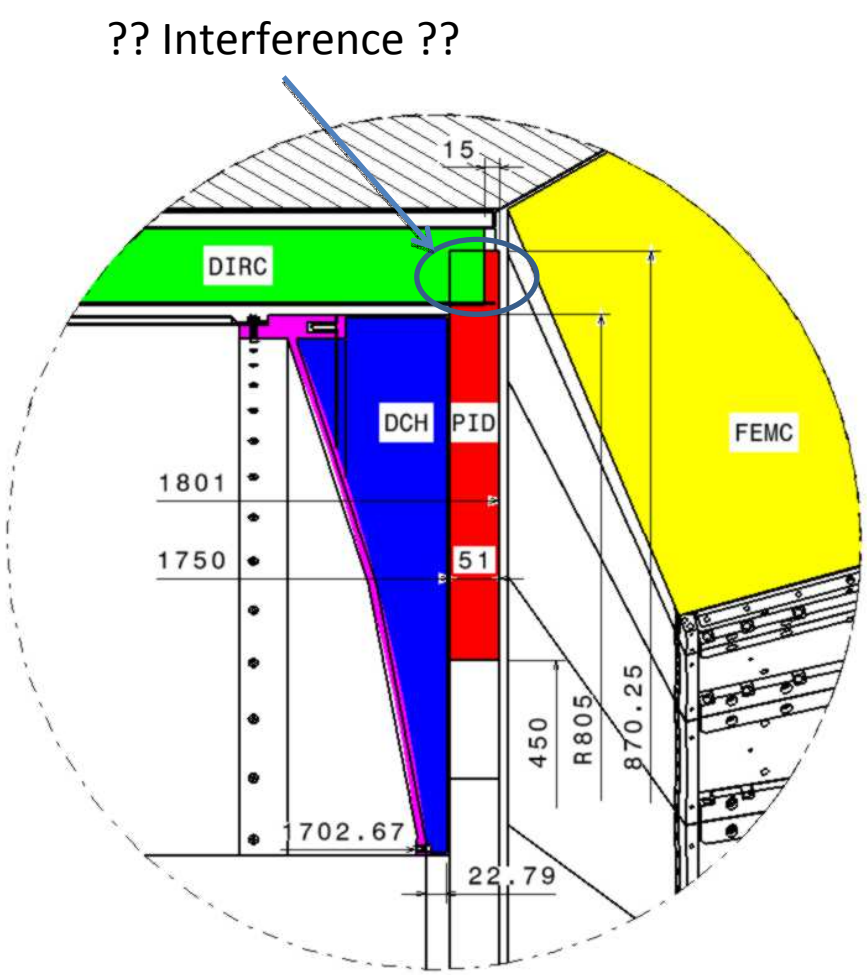
Side view of the FTOF detector

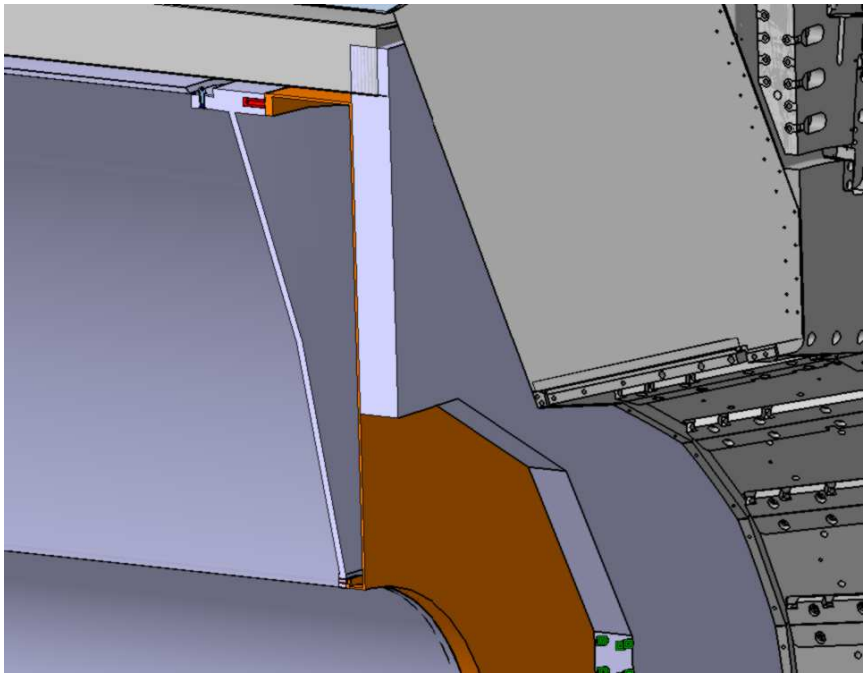


Front view of the FTOF detector



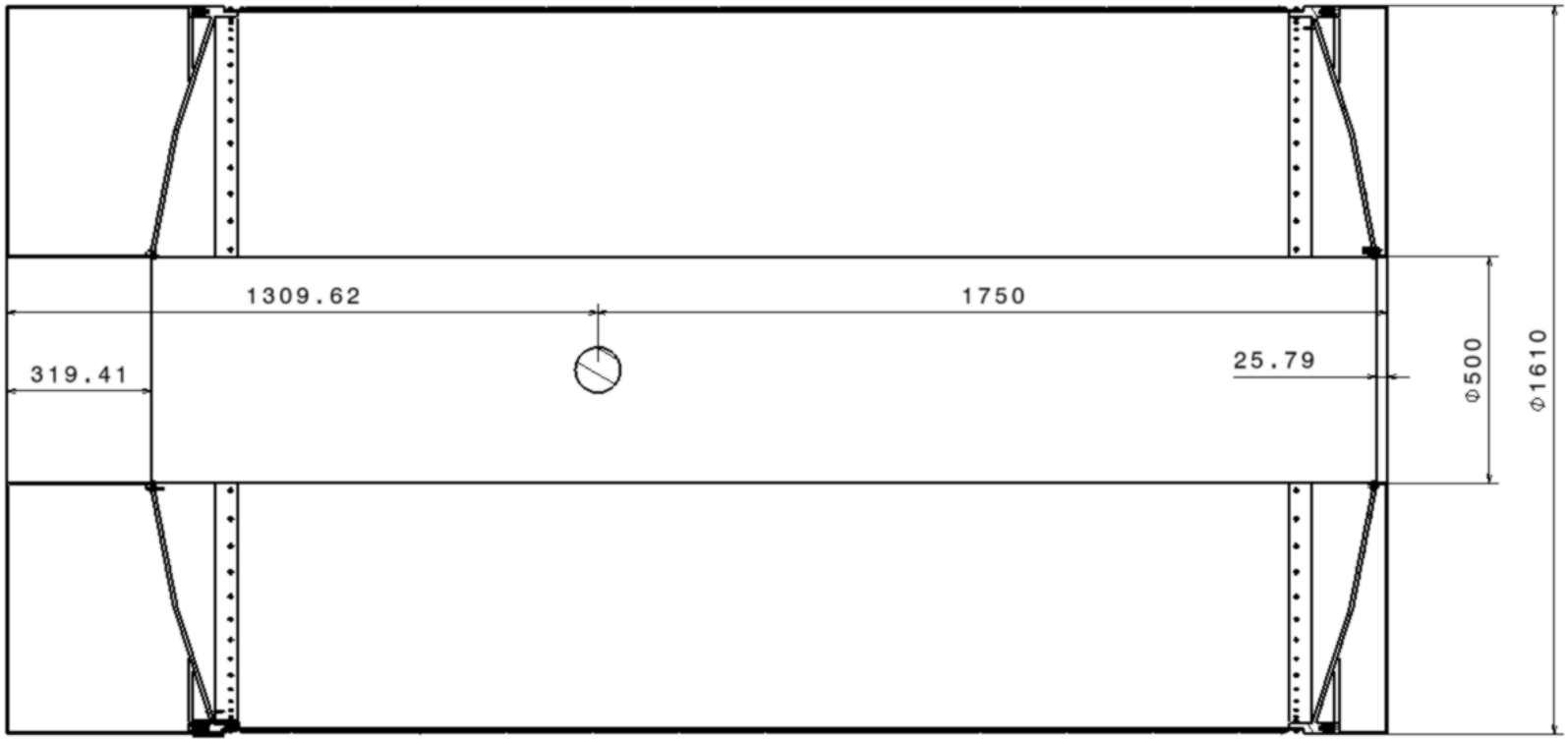
PID-DCH integration



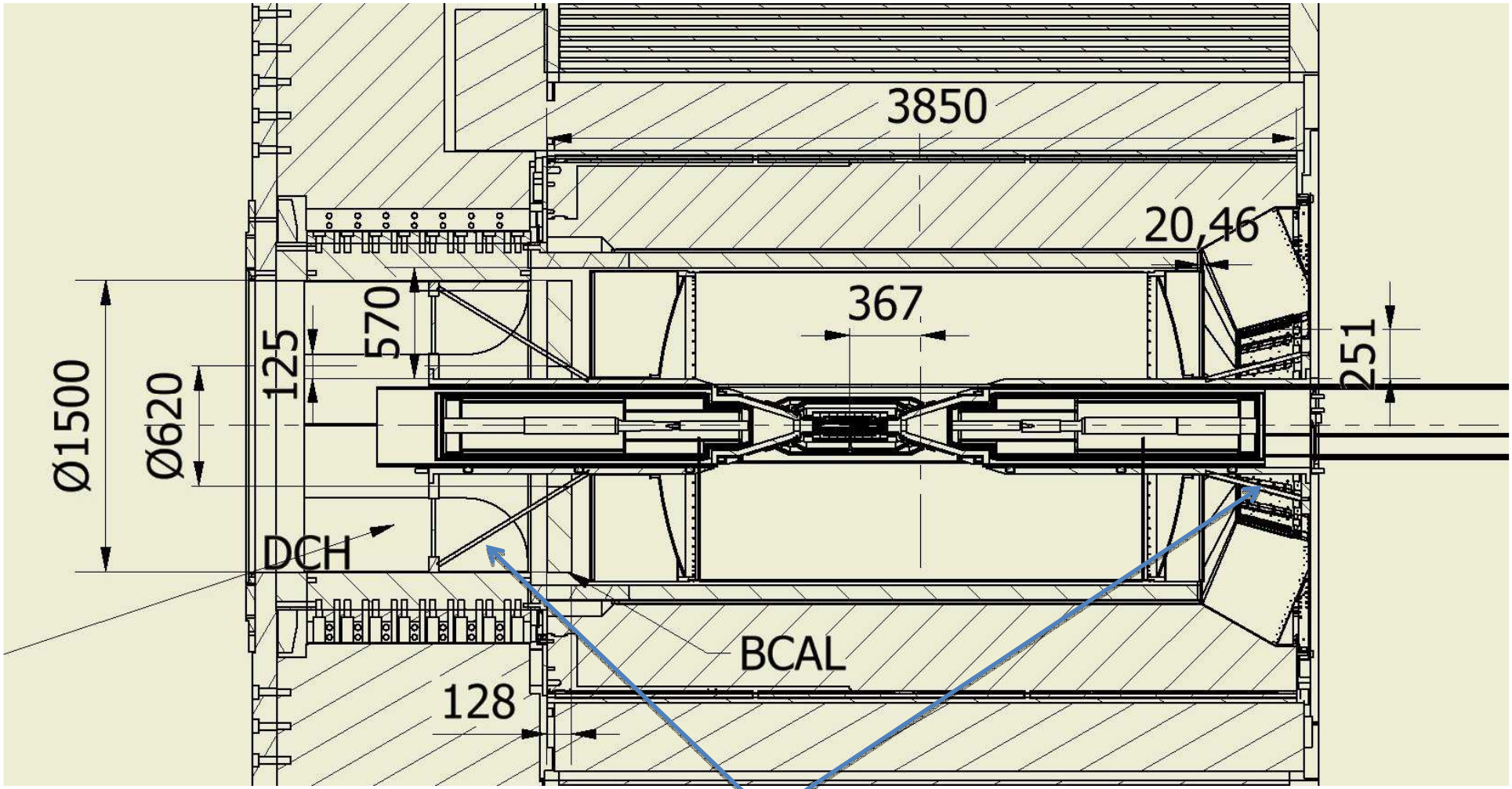


Zmax: 1800mm -> 1750mm
Flat chamber shape
Outside diameter: 800 -> 805mm
DIRC-DCH clearance: 15mm -> 10mm

Preliminary DCH design



21 May 2012 – Integration Meeting



Integration - Summary

Forward:

- There is no space for HV
- Limited access (once a year??)
- Chamber supports PID or viceversa?

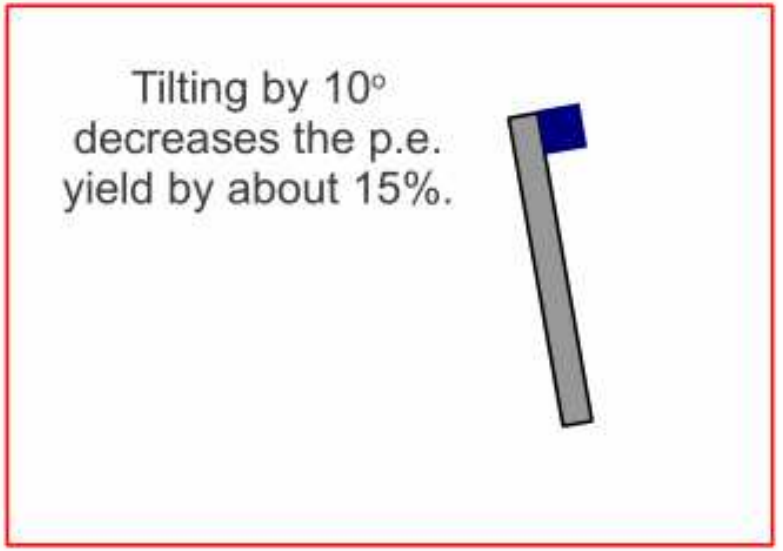
Backward:

- Probably only the RF shield should be reduced
- Limited access due to tungsten support

Latest news 31/05/2012

-PID needs to be tilted

-SVT radius 245mm -> 260mm (Wshield)



Considerations on DCH design

- Chamber needs to be redesigned on FWD side
- Different endplates on FWD and BWD is a possible solution, but it results in higher costs (two different molds are required)
- Inner cylinder R250mm -> R265mm
- First wire(guard) R264mm -> R279mm
- DCH needs to be shortned