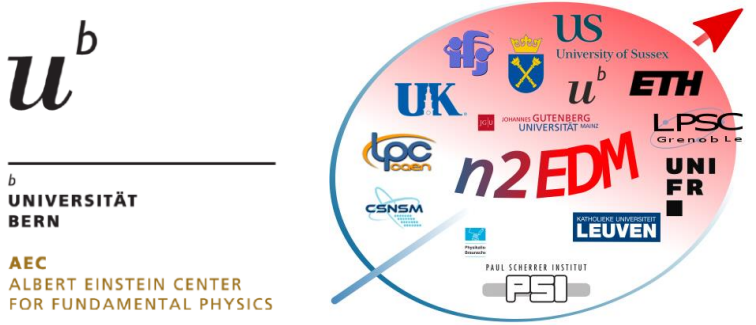


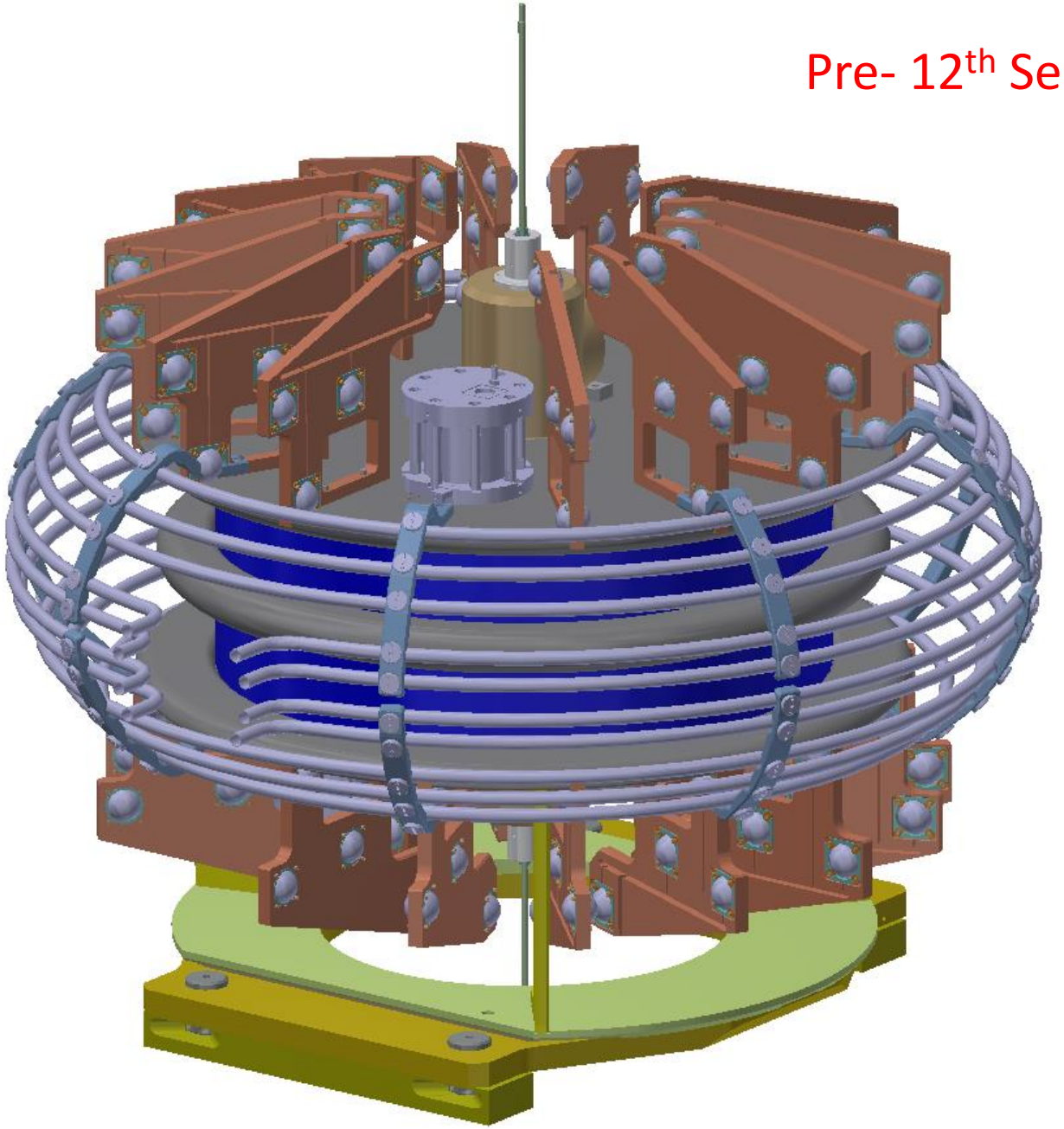
n2EDM Precession Chamber and Feedthrough

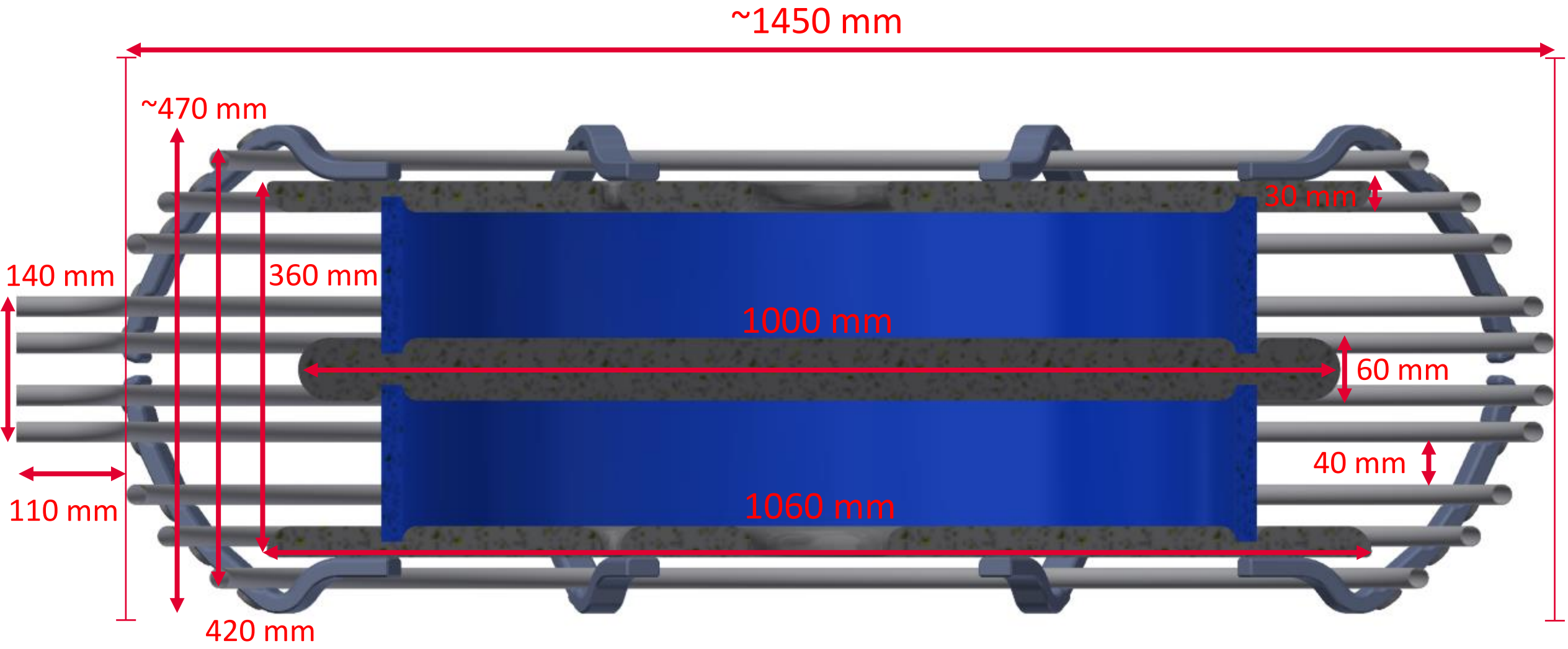
JACOB THORNE

Before we can move forward

- Determine all geometric requirements for interfaces with each other.
- Resolve all remaining geometric adaptions/conflicts.
- Collect all necessary information for the FDR of the Ramsey Chamber.
- Installation plan for Ramsey Chamber and each component.

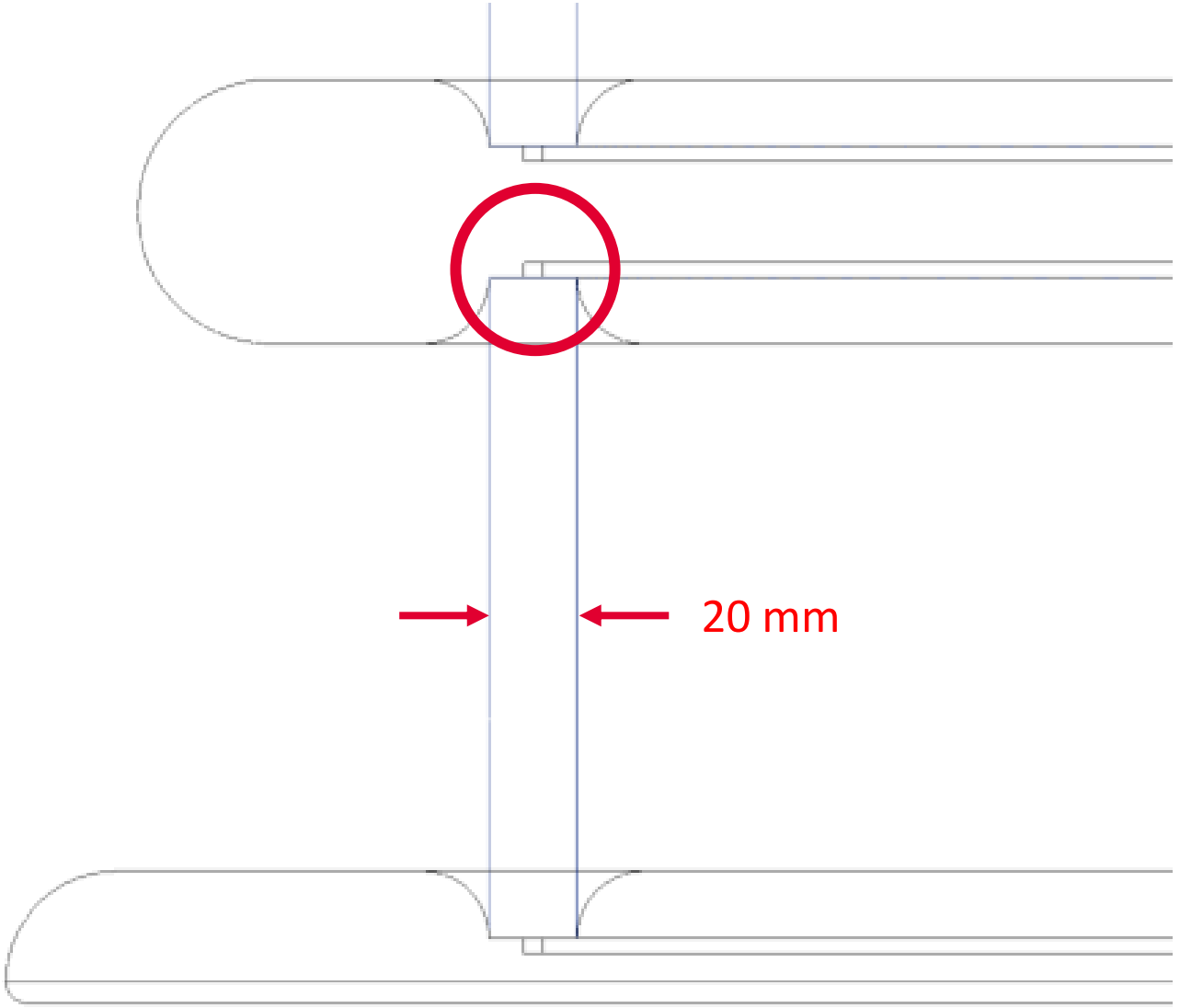
Pre- 12th September 2019 design




~1450 mm
~470 mm
140 mm
360 mm
30 mm
1000 mm
60 mm
40 mm
110 mm
1060 mm
420 mm

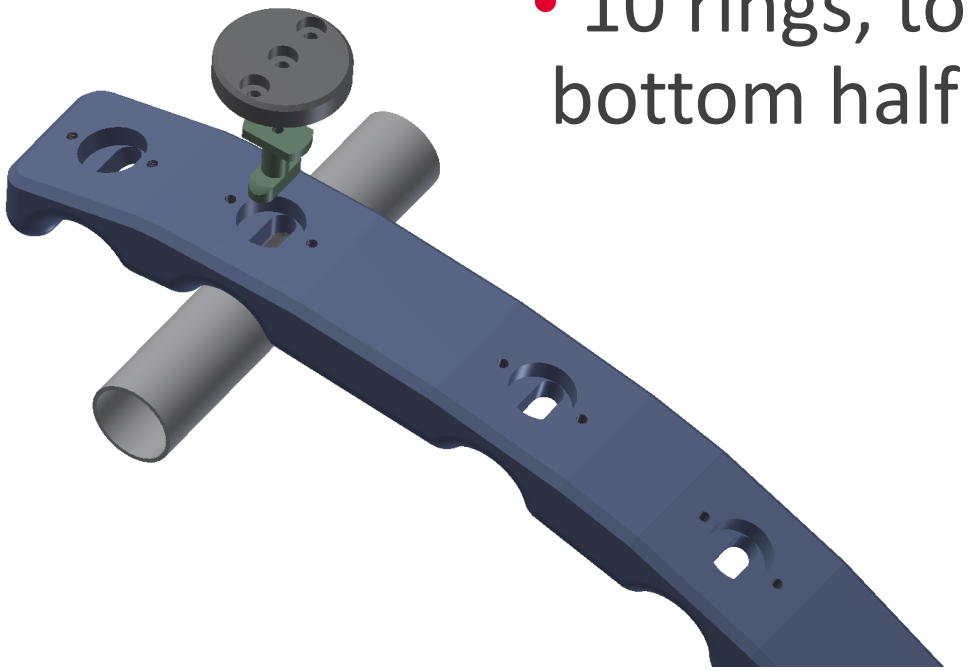
O-ring sealing

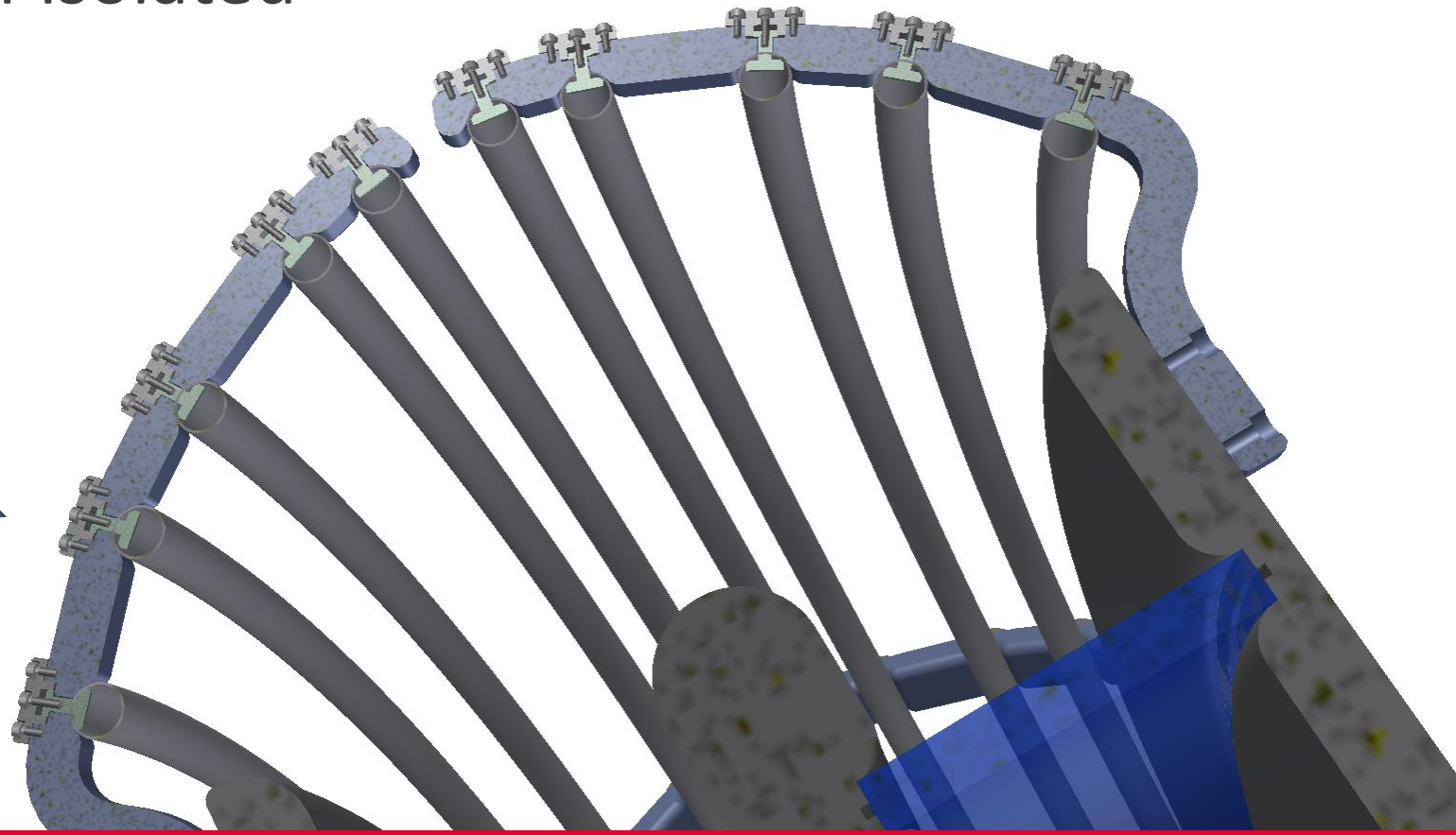
- Position moved to bottom of groove
- Compression done by weight of electrodes
- Groove designed so o-ring completely compressed and insulator is flush



Ground ring fixing

- 10 rings, top and bottom half isolated



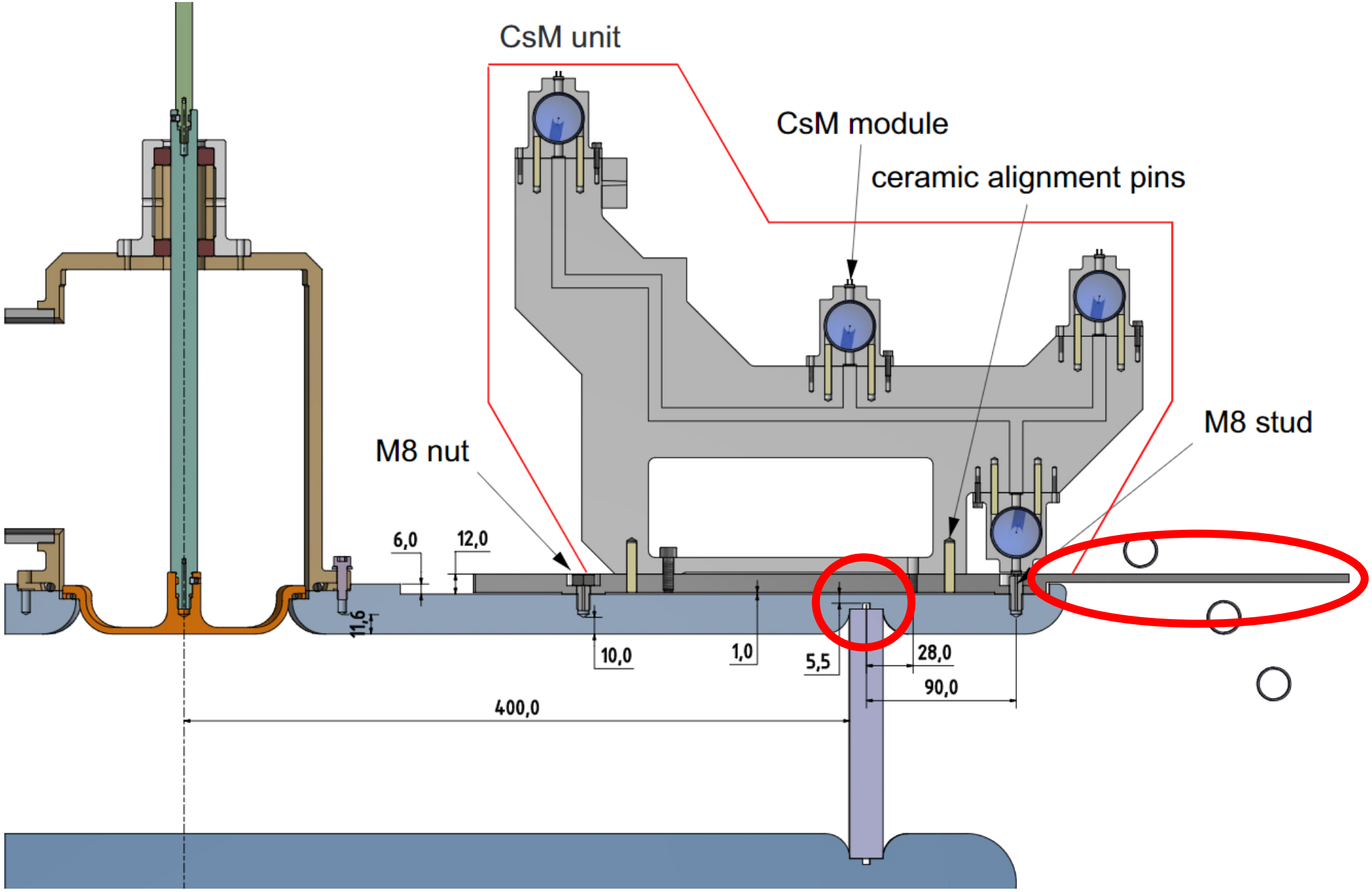


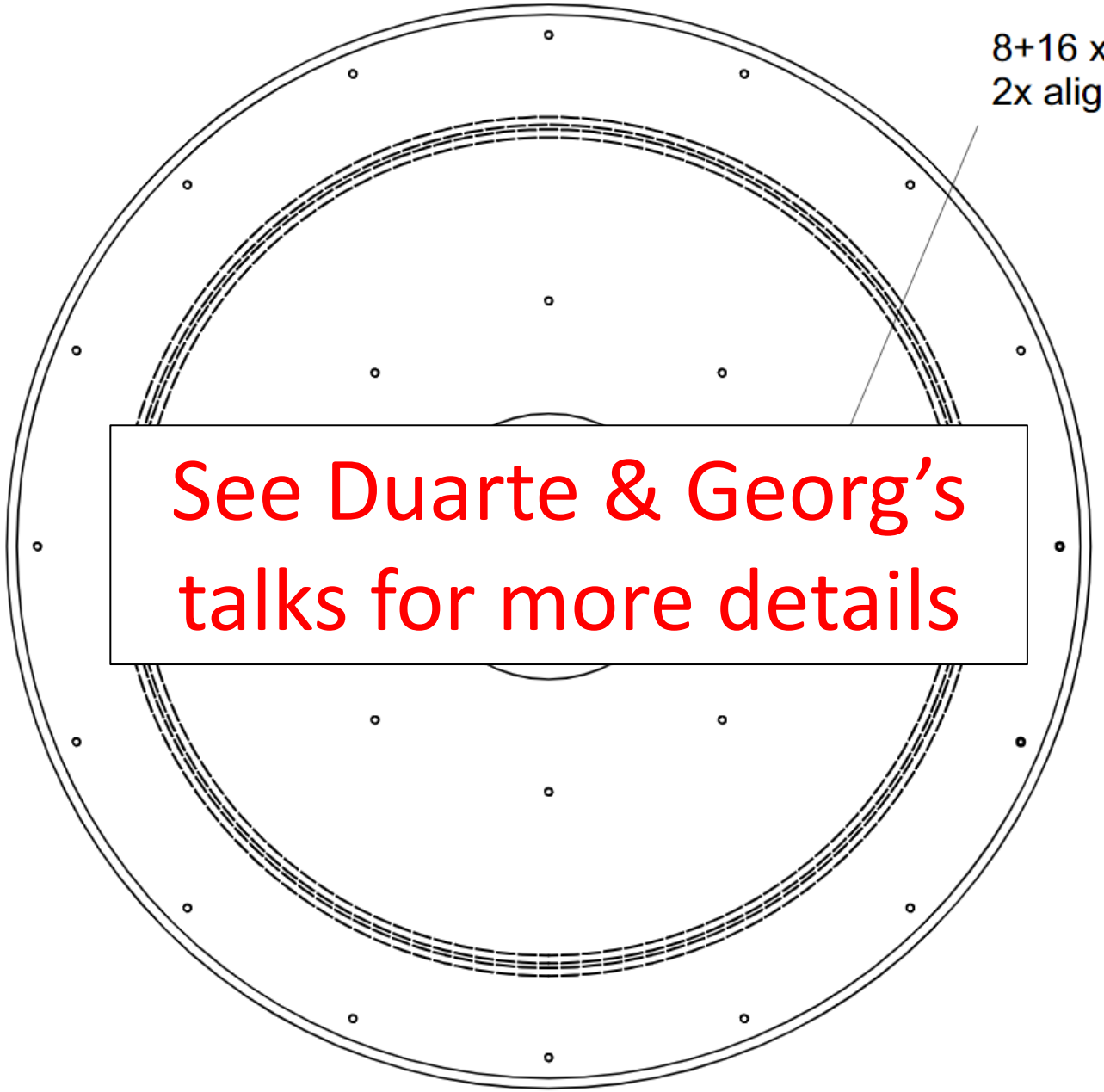
- Rings fixed by plug, bolted onto bracket

Questions before the Bern meeting

Cs array intermediate plate

- Mounting, hole positions, is it segmented or one plate?
- Does it affect the HV simulations?
- What is the plate made out of?
- How to align the position of the Cs magnetometers?


CsM unit
CsM module
ceramic alignment pins
M8 nut
M8 stud
6,0
12,0
11,6
10,0
1,0
5,5
28,0
90,0
400,0



See Duarte & Georg's talks for more details

Discussion during Bern meeting

Hg polariser

- Determined that the Hg polariser will be mounted to its own intermediate plate to attached to electrode. Design on going.
- Position and diameter of the Hg chimney discussed, however, is on going.

Discussion during Bern meeting

Insulator

- Tolerances for the electrode grooves are determined, insulator will be machined to fit

UCN plug/guide

- The final design and position of the UCN shutter is determined
- Discussion of installation plan for these components, detailed plan on going

See Bernhard's talk on UCN shutter and guides

Discussion during Bern meeting

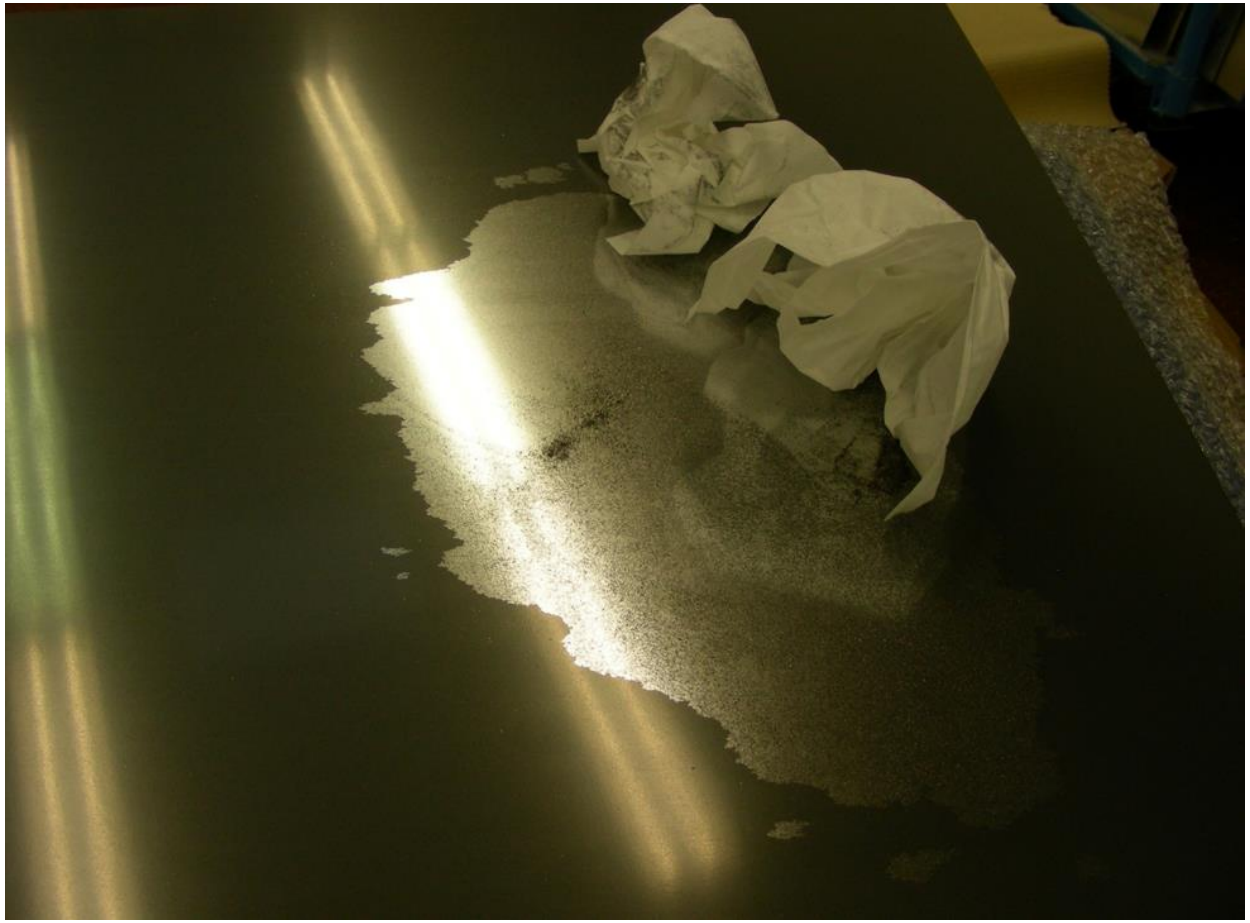
Electrodes

- Surface finishing method: flat sections diamond milled, corona normally machined, maybe polished
- Cleaning method determined, use large ultra sonic bath at PSI

Discussion during Bern meeting

DLC coating

- Company that coats guides, can fit electrodes inside chamber
- Possible inhomogeneous coating thicknesses
- If flaking occurs after coating, major risk



Discussion during Bern meeting

Precession chamber supports

- Design discussed, what material the supports need to be, does this effect the Cs if made of aluminium?
- Support will be fixed onto the Cs intermediate plate
- Design on going

Under discussion with PSI

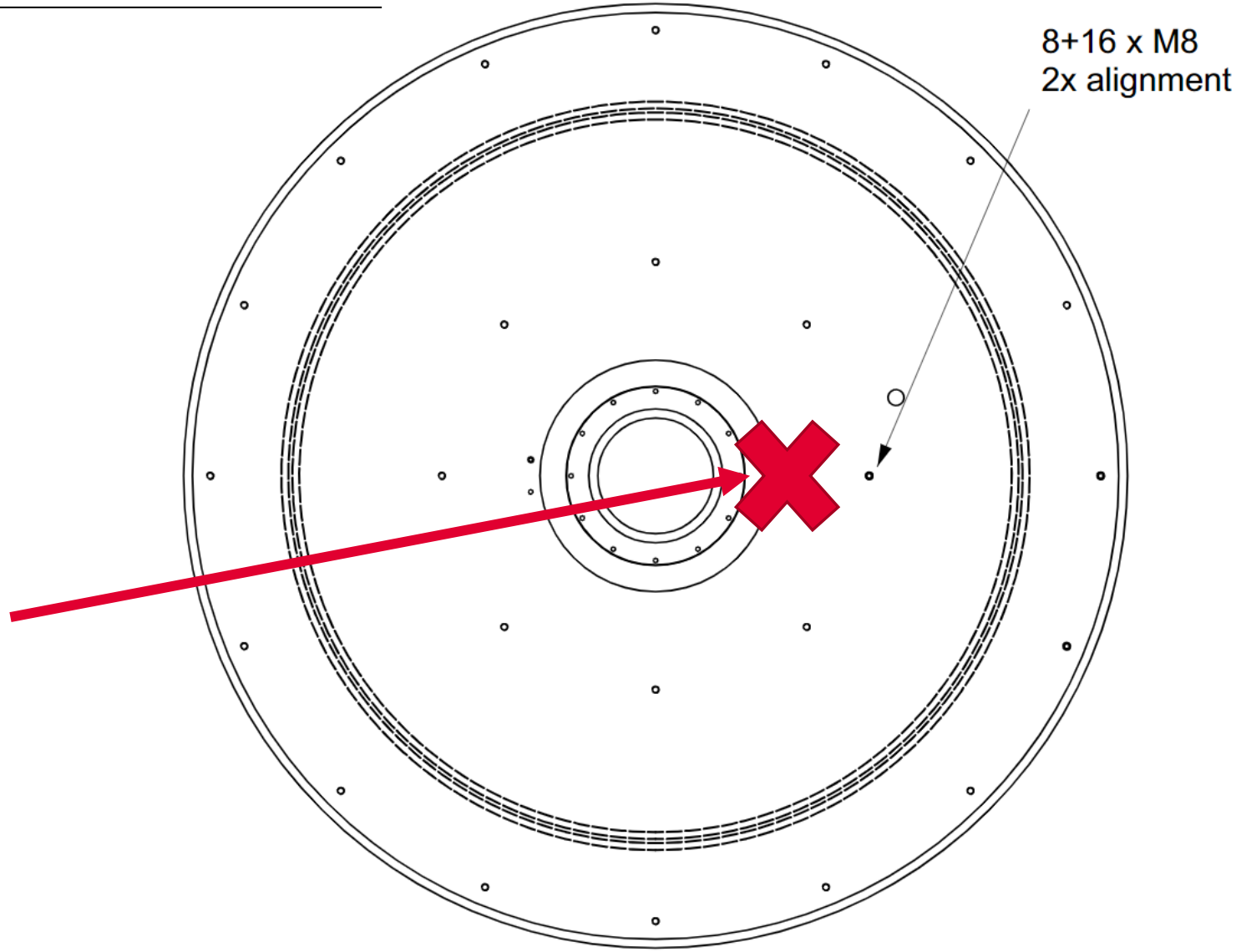
Discussion during Bern meeting

Ground shell

- See Grenoble talk on RF simulations

Leakage current monitor

- Connection determined for ground electrodes

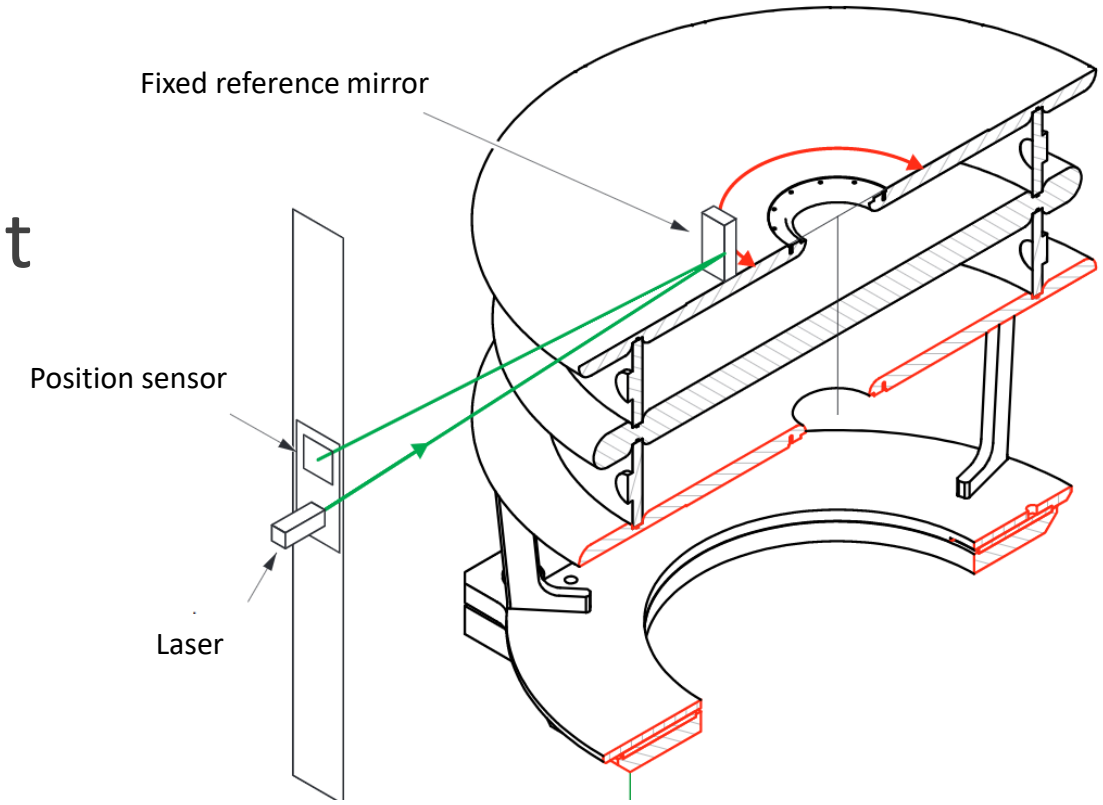


Discussion during Bern meeting

Alignment of the Ramsey Chamber

- Position of the Cs array is important
- Discussed using laser positioning system to determine this

See Georg's talks for more details



Summary

Still open questions:

- Cs intermediate plate finalized design?
- Hg polarizer chimney position?
- Alignment method?
- Precession Chamber support structure?

Feedthrough

- Initial testing performed
- Stable up to 140 kV but breakdowns beyond this, still working to solve this
- Possible vacuum issues using POM-C insulator (outgasing)
- Working on improvement, possibly switch aluminium rod to titanium

Feedthrough interface

- Aluminium rod connects to the HV electrode using banana plug
- Ball is to shield end of the feedthrough
- Currently under testing

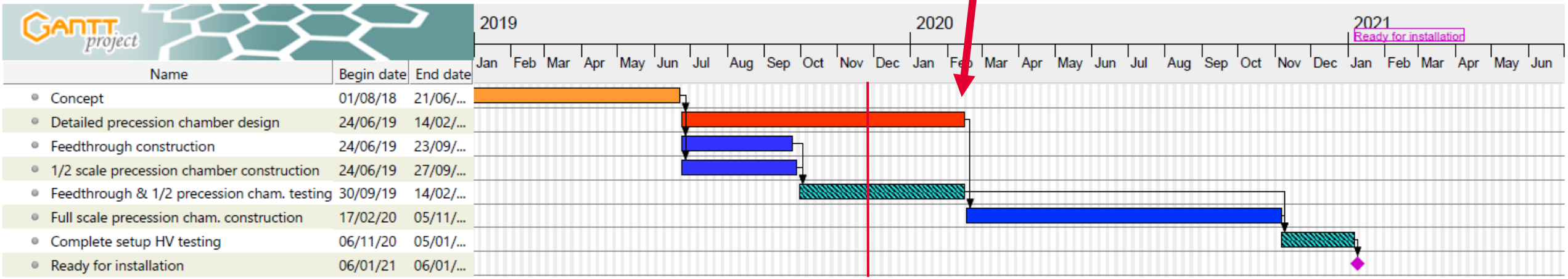
Timeline

If everything is confirmed today

Simplified n2EDM timeline

22-Nov-2019

Gantt Chart

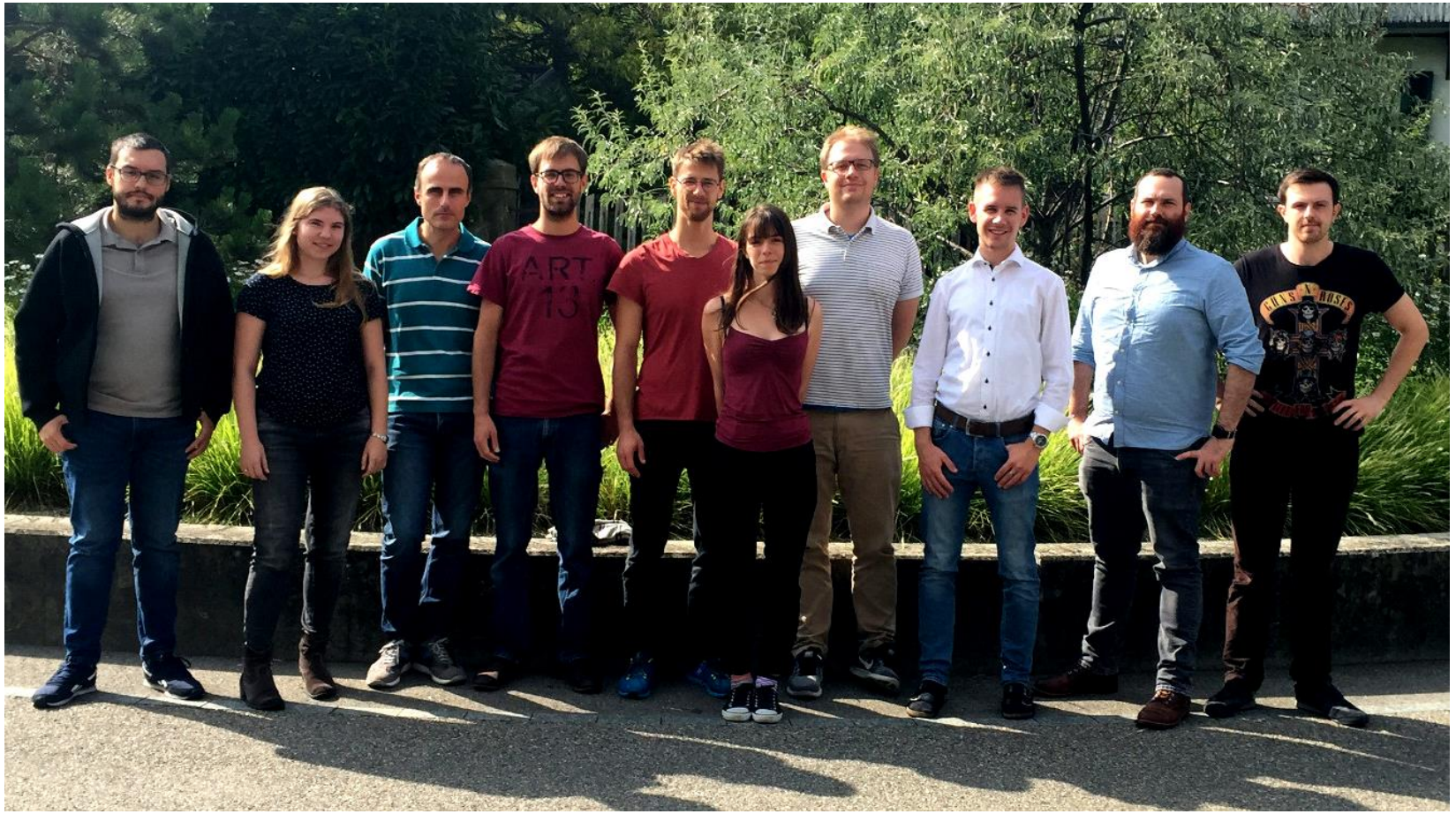


Name	Begin date	End date
Concept	01/08/18	21/06/...
Detailed precession chamber design	24/06/19	14/02/...
Feedthrough construction	24/06/19	23/09/...
1/2 scale precession chamber construction	24/06/19	27/09/...
Feedthrough & 1/2 precession cham. testing	30/09/19	14/02/...
Full scale precession cham. construction	17/02/20	05/11/...
Complete setup HV testing	06/11/20	05/01/...
Ready for installation	06/01/21	06/01/...

= Design concept = Detailed design* = Machining = Characterisation

*input required from collaboration

Thanks for your attention!



Backup slides