



Istituto Nazionale di Fisica Nucleare  
SEZIONE DI FERRARA



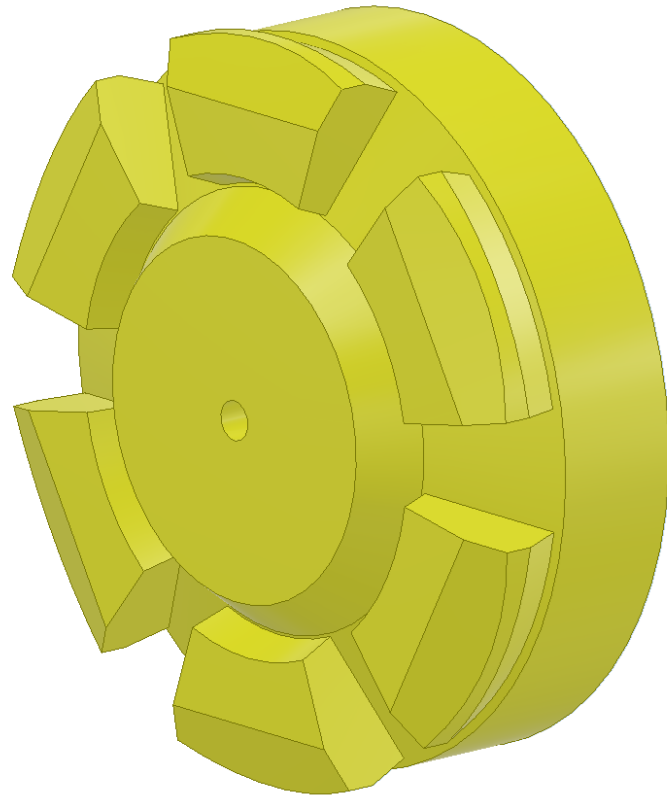
Università  
degli Studi  
di Ferrara

**dRICH**

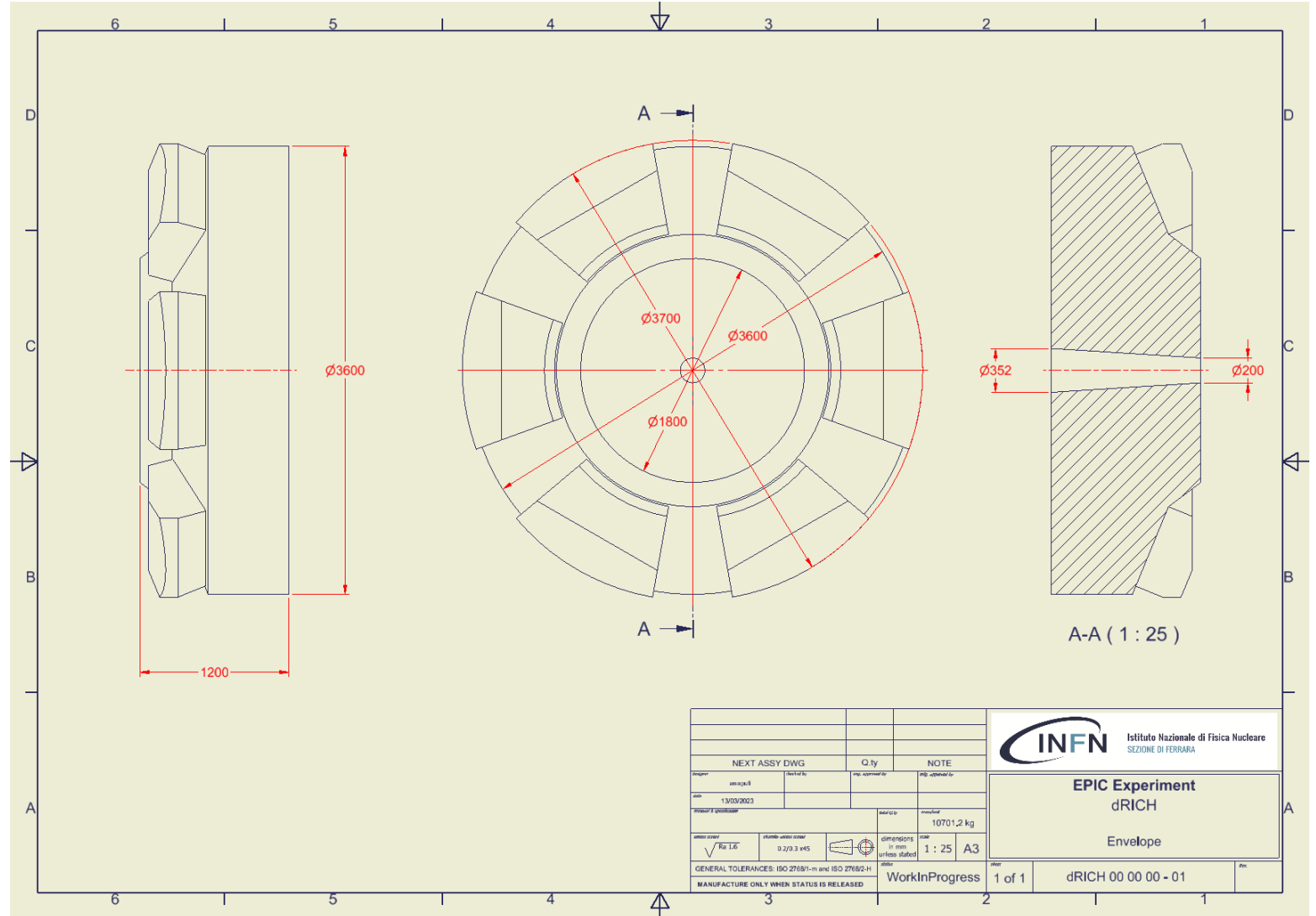
**Mechanics**

# dRICH: (preliminary) gas enclosure requirements and dimensions

- Envelope overall sizes:  $\Phi 3600$  mm x L1200 mm
- Operating pressure up to 200 Pa
- Operating temperature of 22 °C

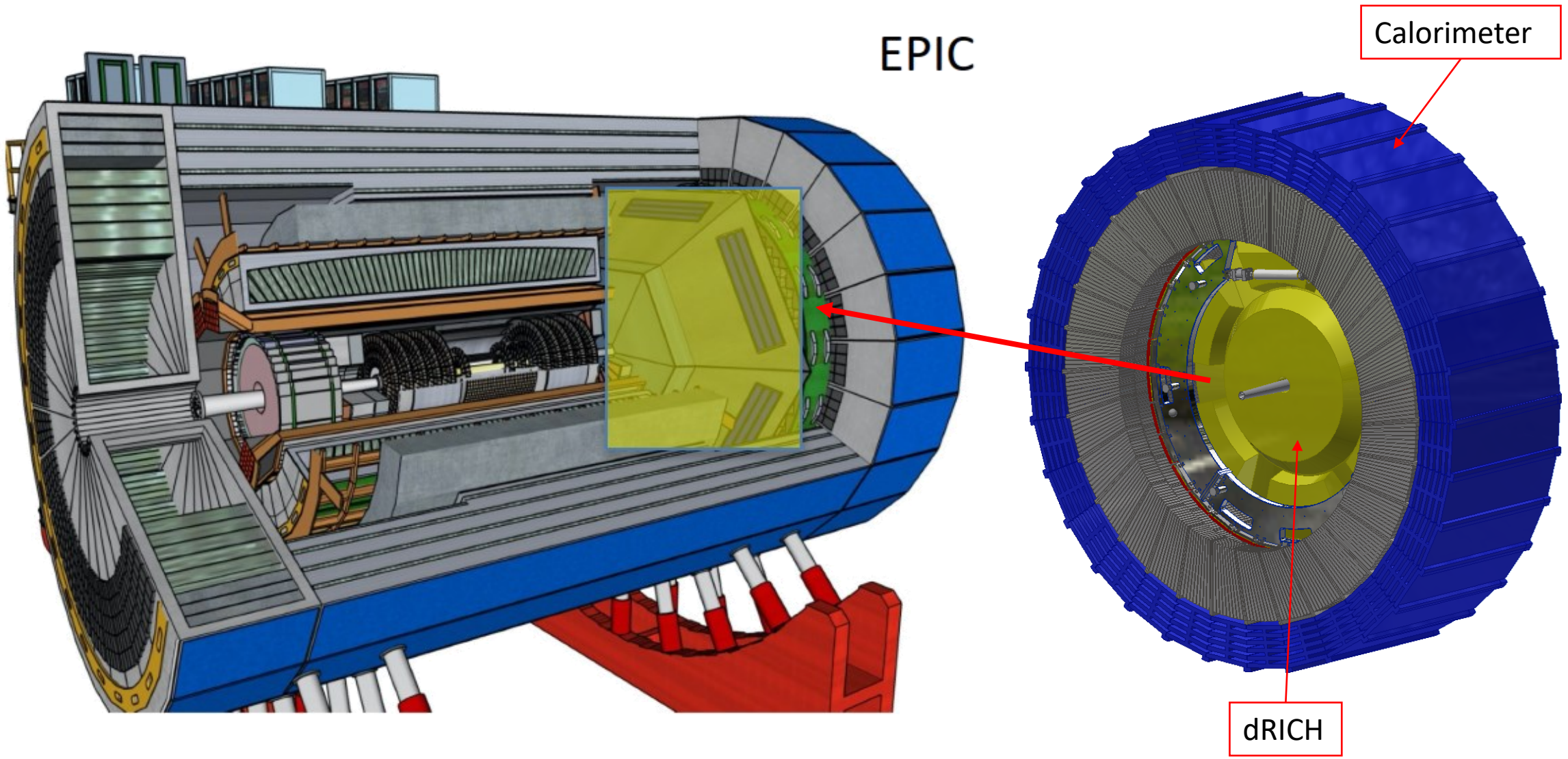


dRICH envelope



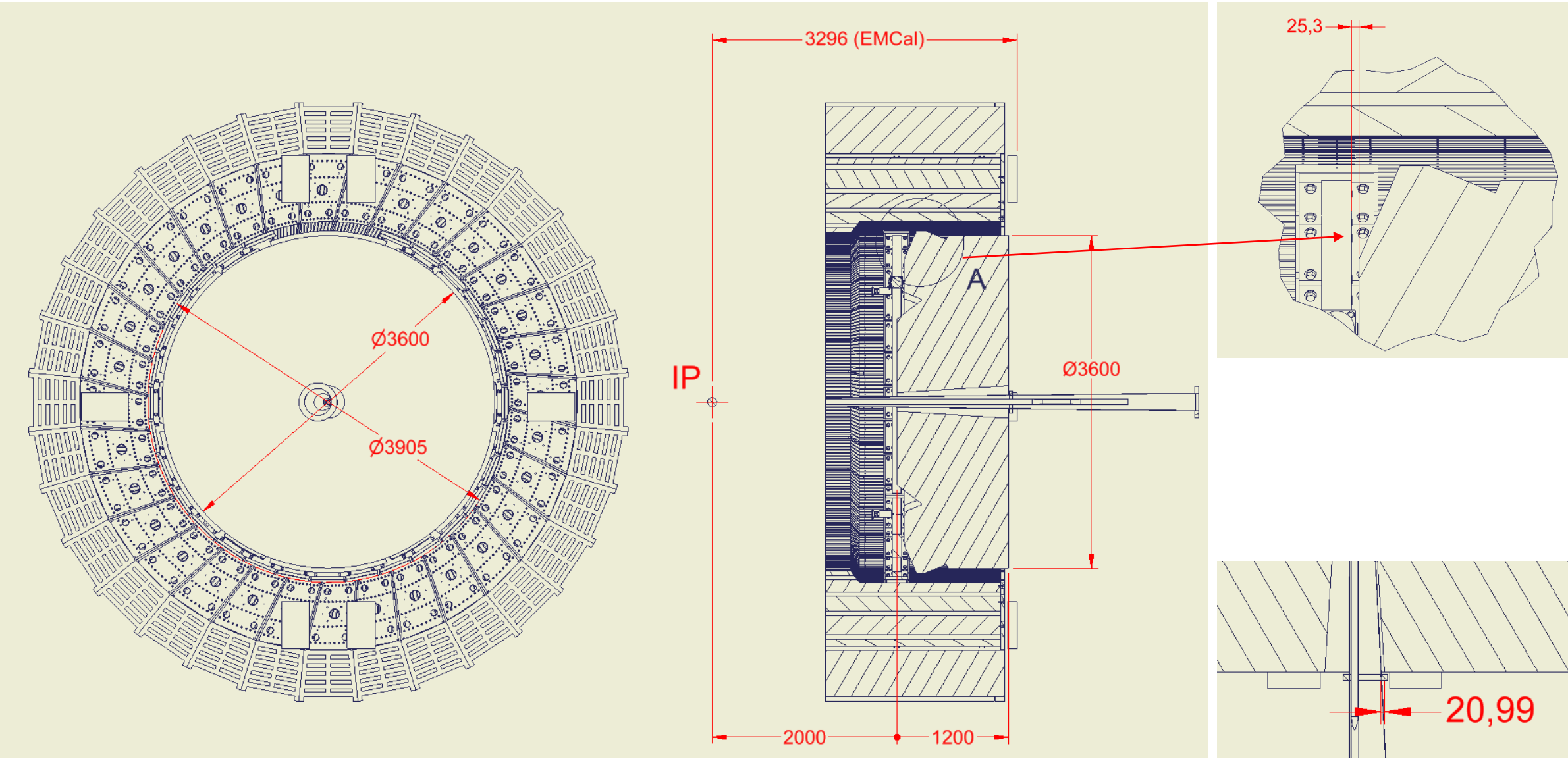
# dRICH: concept design

nil volentibus arduum

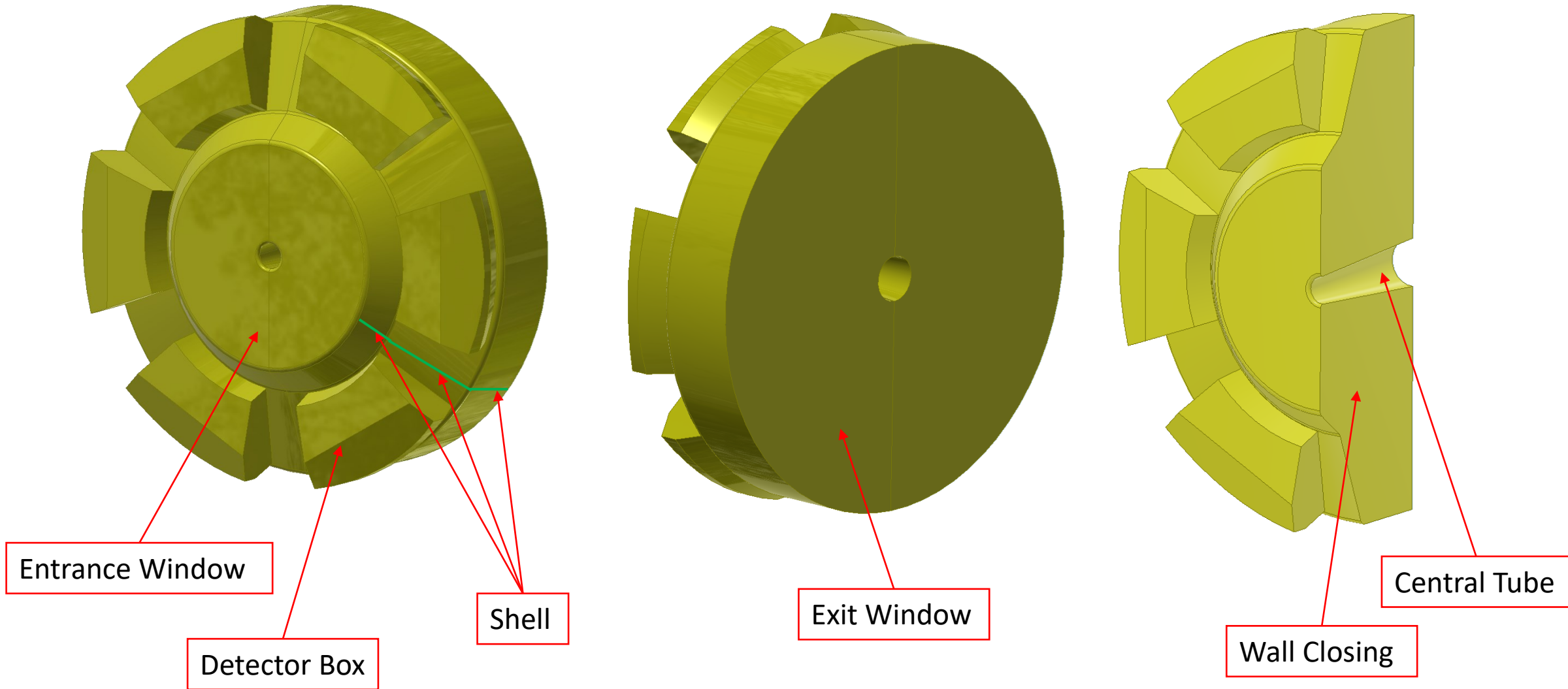


# dRICH: positioning and clearances

nil volentibus arduum

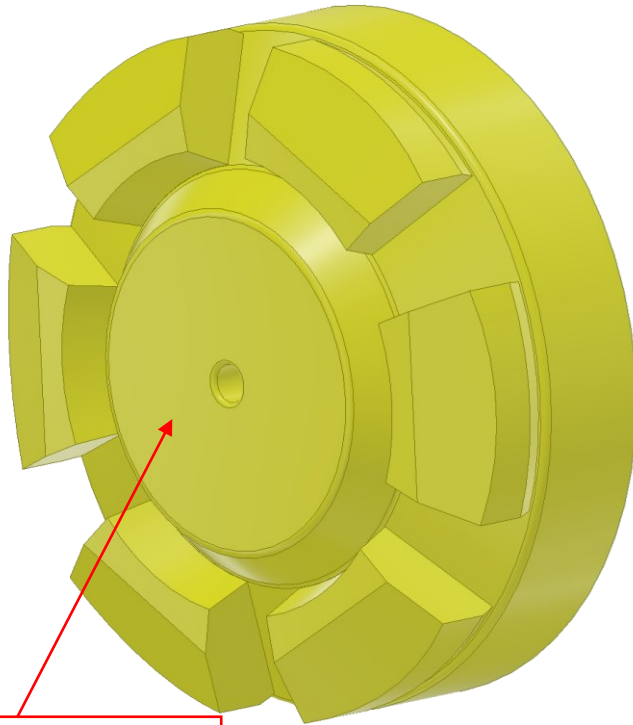


# dRICH: parts naming

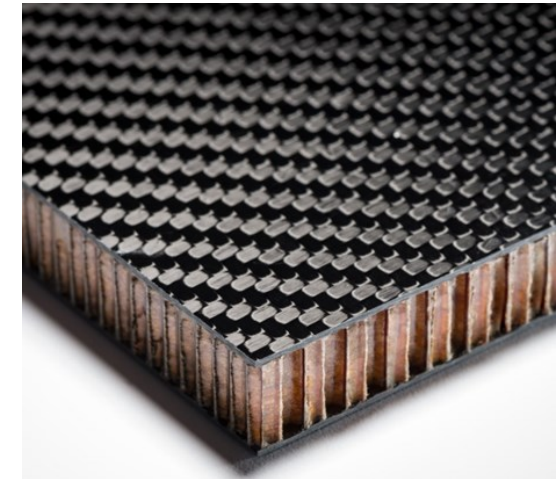
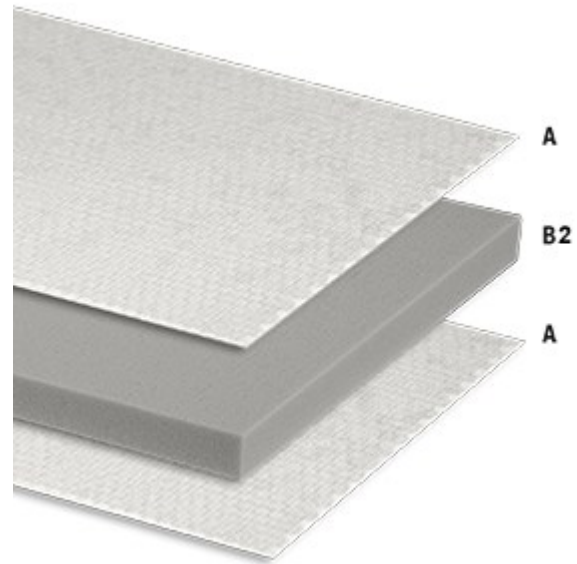


# dRICH: entrance window

The Entrance Window could be a sandwich panel made of two  $A=1\div 1.5$  mm thick carbon fibre reinforced epoxy skins separated by  $B2=28$  mm thick polymethacrylimide (PMI) foam (or by  $B2=28$  mm thick aluminium honeycomb). Each skin is made from two layers of balanced weave laminate, with fibres oriented to give  $0^\circ/90^\circ$  in one layer overlapped with  $\pm 45^\circ$  in the other layer. This is in order to generate skins with as close to uniform a stiffness in the plane as possible.

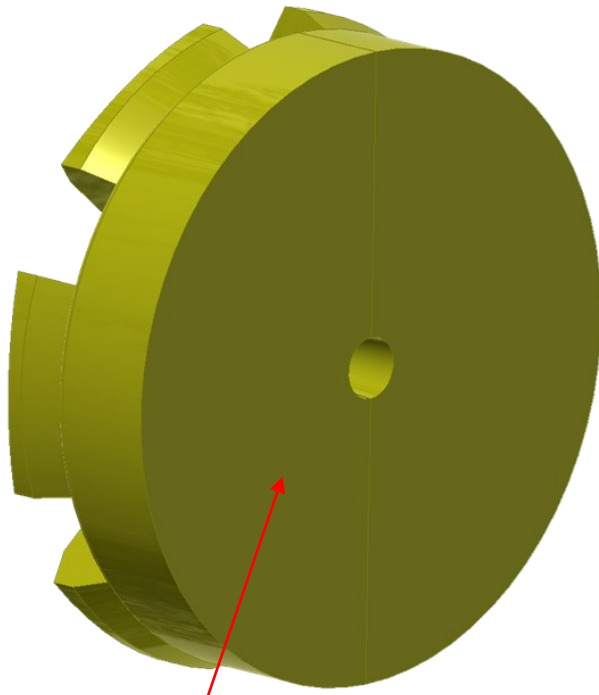


Entrance Window

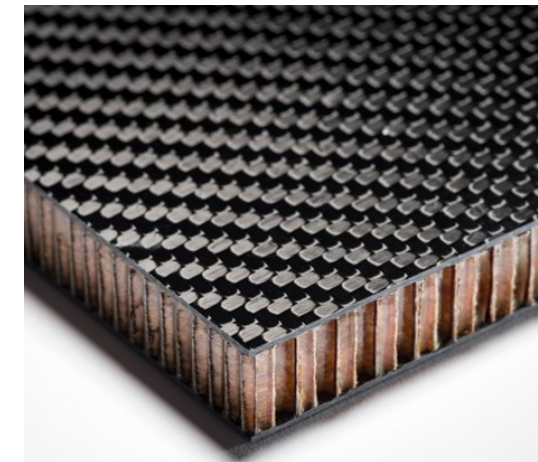
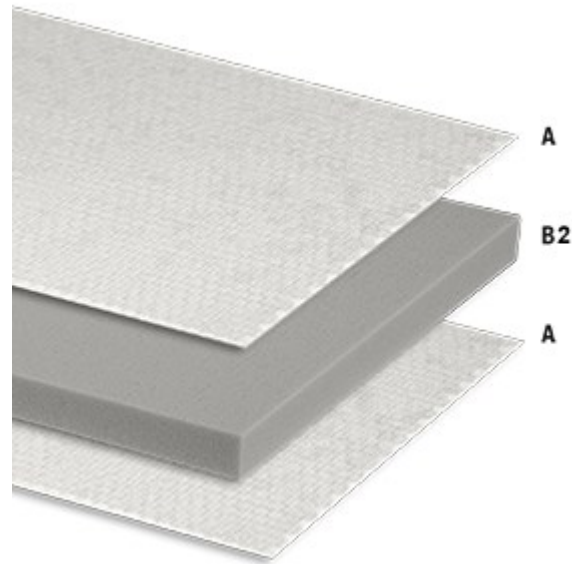


# dRICH: exit window

The Exit Window could be a sandwich panel made of two  $A=1.5\div 2$  mm thick carbon fibre reinforced epoxy skins separated by  $B2=30$  mm thick polymethacrylimide (PMI) foam (or by  $B2=28$  mm thick aluminium honeycomb). Each skin is made from two layers of balanced weave laminate, with fibres oriented to give  $0^\circ/90^\circ$  in one layer overlapped with  $\pm 45^\circ$  in the other layer. This is in order to generate skins with as close to uniform a stiffness in the plane as possible.



Exit Window

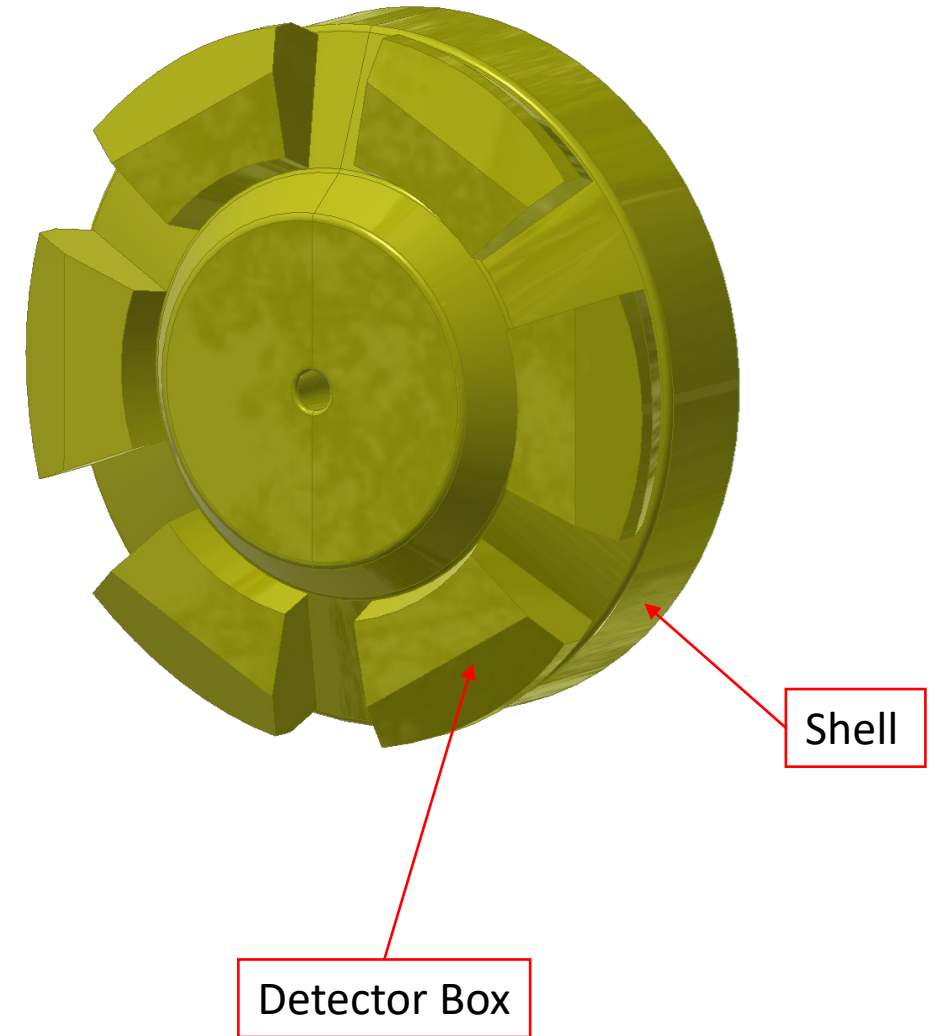


# dRICH: Shell and Detector Boxes

The Shell could be made from 8÷10 mm thick carbon fibre epoxy composite.

The Detector Boxes could be made from 5÷8 mm thick carbon fibre epoxy composite.

Each laminate could be made from two layers of balanced weave laminate, with fibres oriented to give 0°/90° in one layer overlapped with ±45° in the other layer.

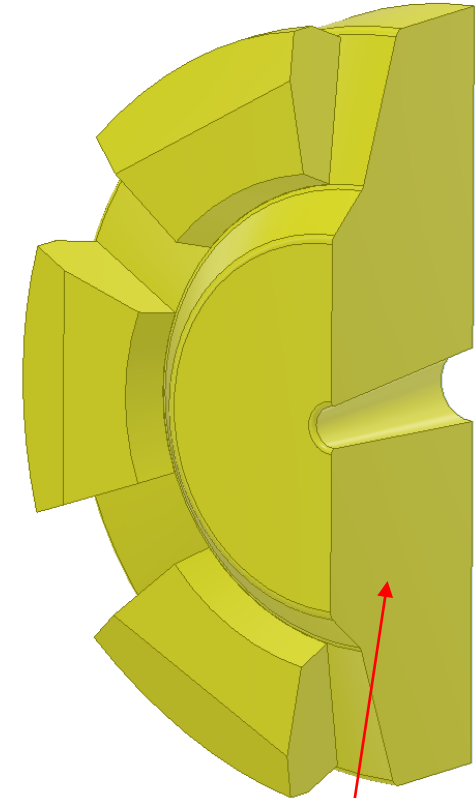




# dRICH: Wall Closing

The Wall Closing could be made from 6÷8 mm thick carbon fibre epoxy composite or by a sandwich panel made of two A=1.5÷2 mm thick carbon fibre reinforced epoxy skins separated by B2=30 mm thick polymethacrylimide (PMI) foam (or by B2=28 mm thick aluminium honeycomb).

The laminate could be made from two layers of balanced weave laminate, with fibres oriented to give 0°/90° in one layer overlapped with ±45° in the other layer.

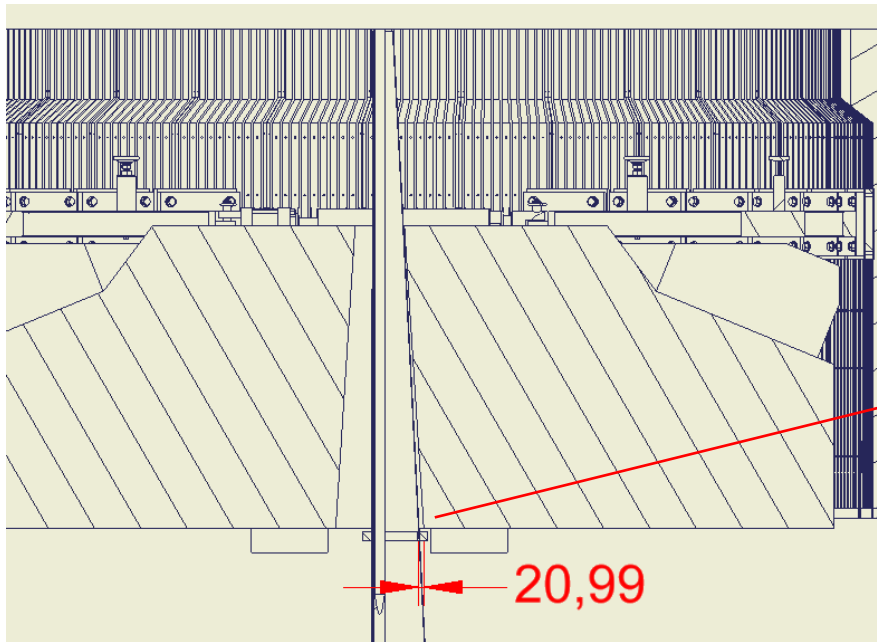


Wall Closing

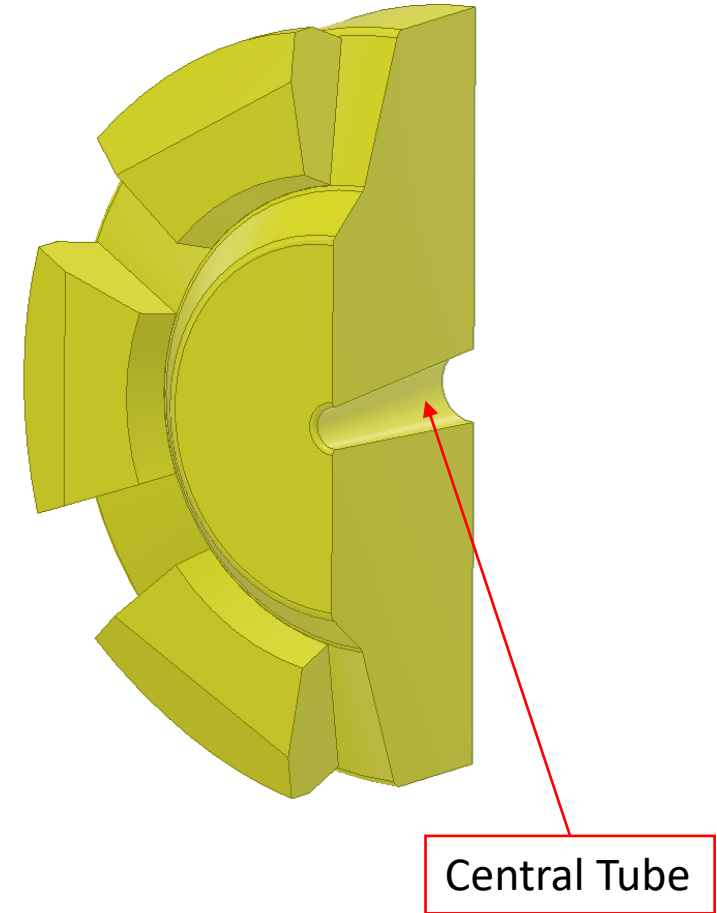
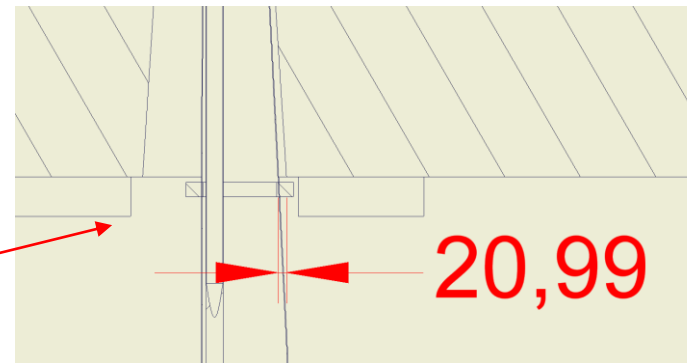
# dRICH: Central Tube

The two windows could be connected to each other by a central tube.

The Central Tube could be made from 3÷4 mm thick carbon fibre epoxy composite, and has an inside diameter of 200 mm at the entrance window tapering to 352 mm at the exit window. This achieves a radial separation between the vacuum chamber and central tube of ~21 mm.



Top View



## **PMI Foam**

- The core material for both windows is a poly-methacrylimide (PMI) foam known as Rohacell 51 IG.
- Density: 0.052 g/cc

## **Glue**

- The glue is a glycidyl-type Epoxy Resin mixed with a polyoxypropylene-diamine “D400” hardener.
- Epoxy Resin Density: 1.2 g/cc

## **CFRP**

- The carbon fibre laminate to be used will be constructed either from unidirectional or woven prepreg. In either case the fibre type will be T300 and the laminate will contain a nominal 55% fibres by volume.
- Density of T300 carbon fibres: 1.76 g/cc

All information provided by this document are the results of very preliminary calculation then, they can change during the project development.



**Thank You!!**

