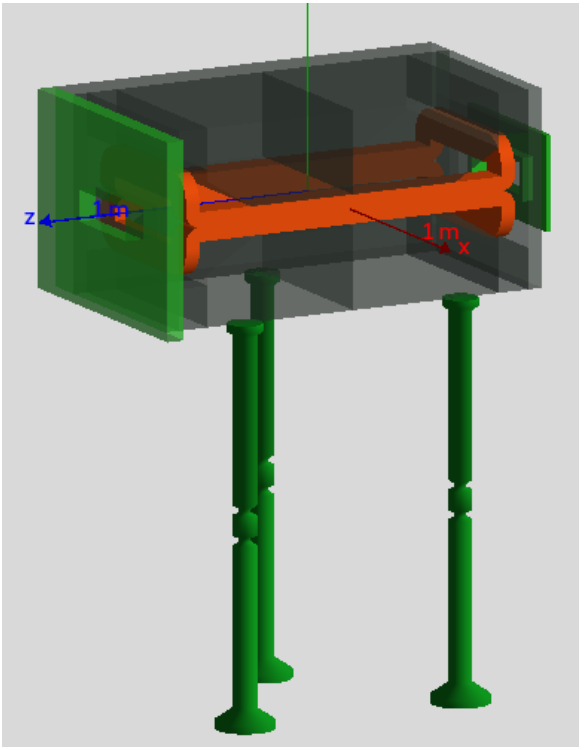
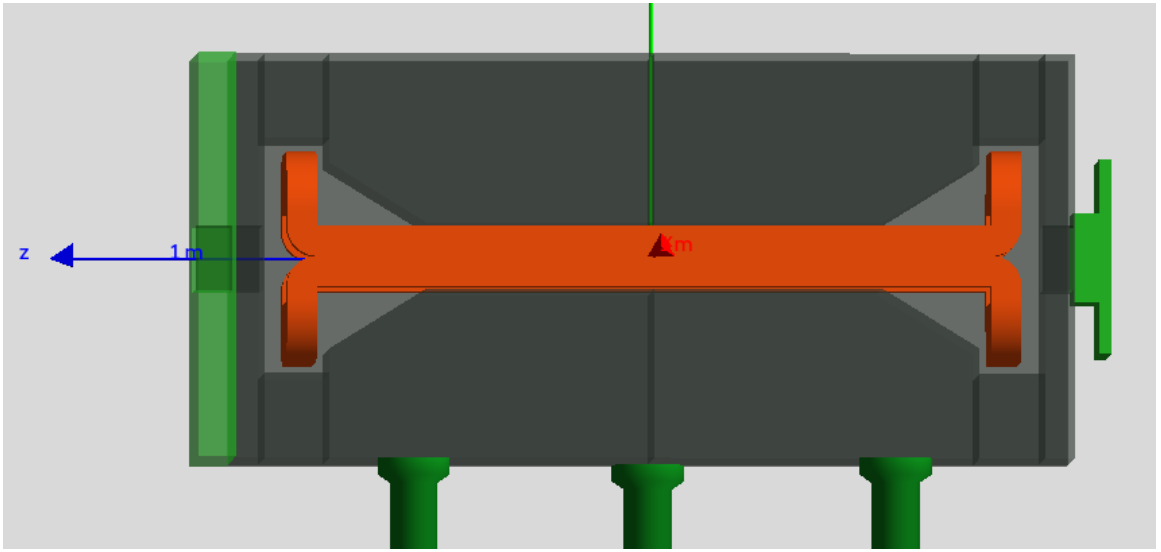
Update in GEANT4 LUXE Geometry

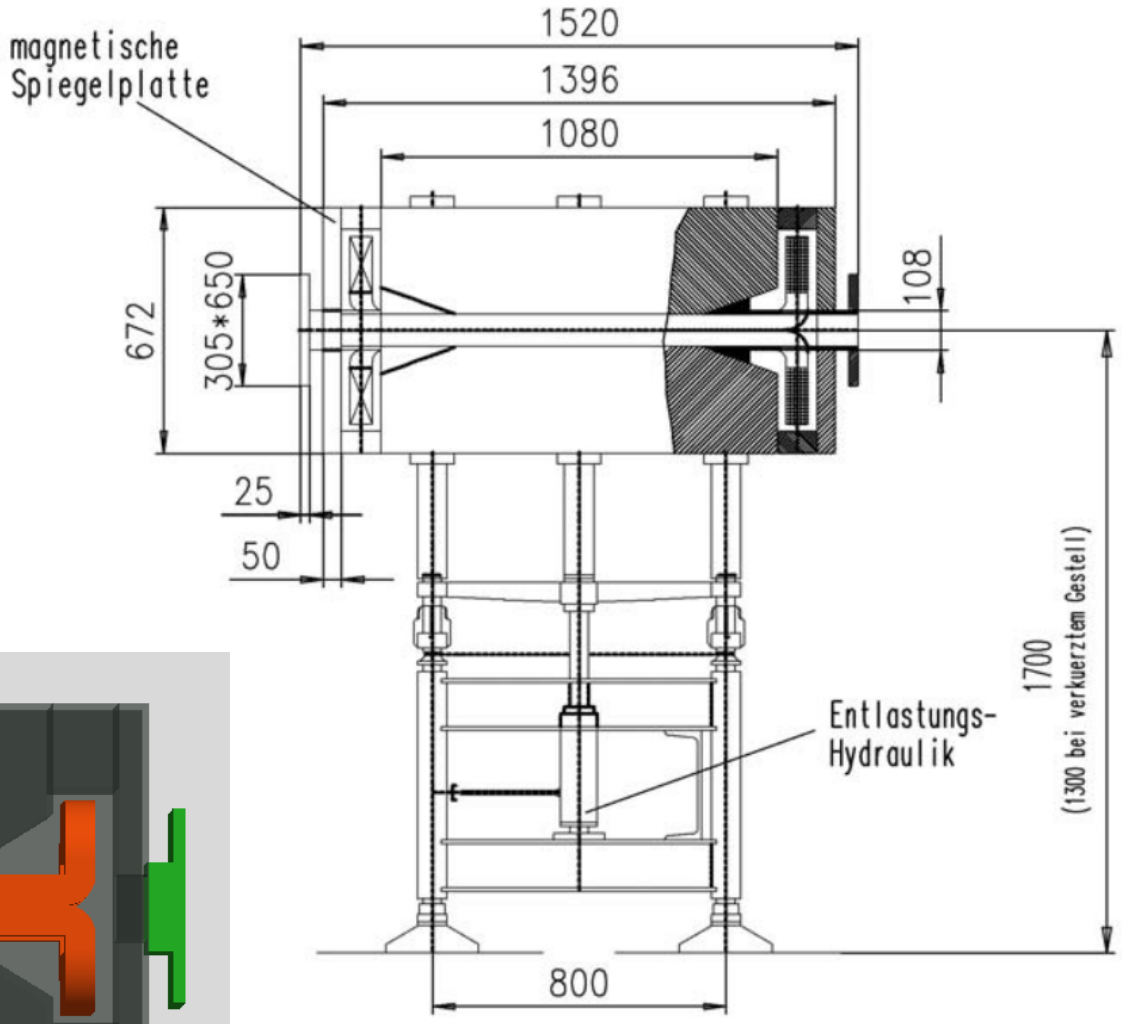
Oleksandr Borysov

LUXE meeting
February 19, 2020

Magnet implementation

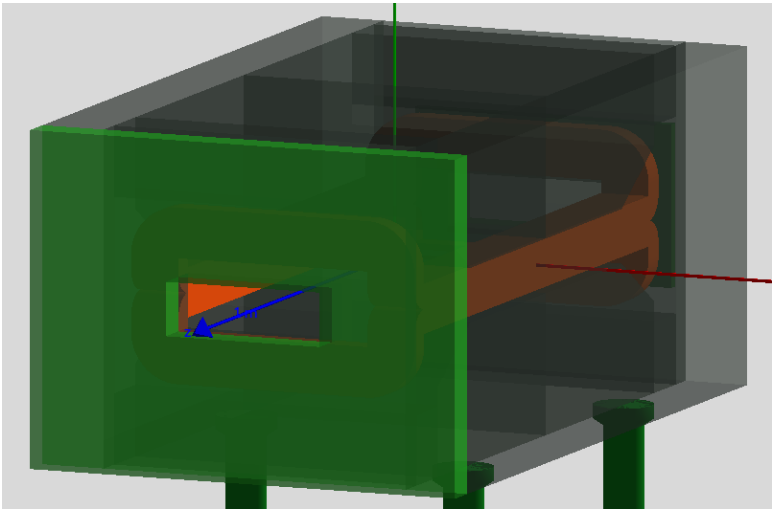






Magnet implementation

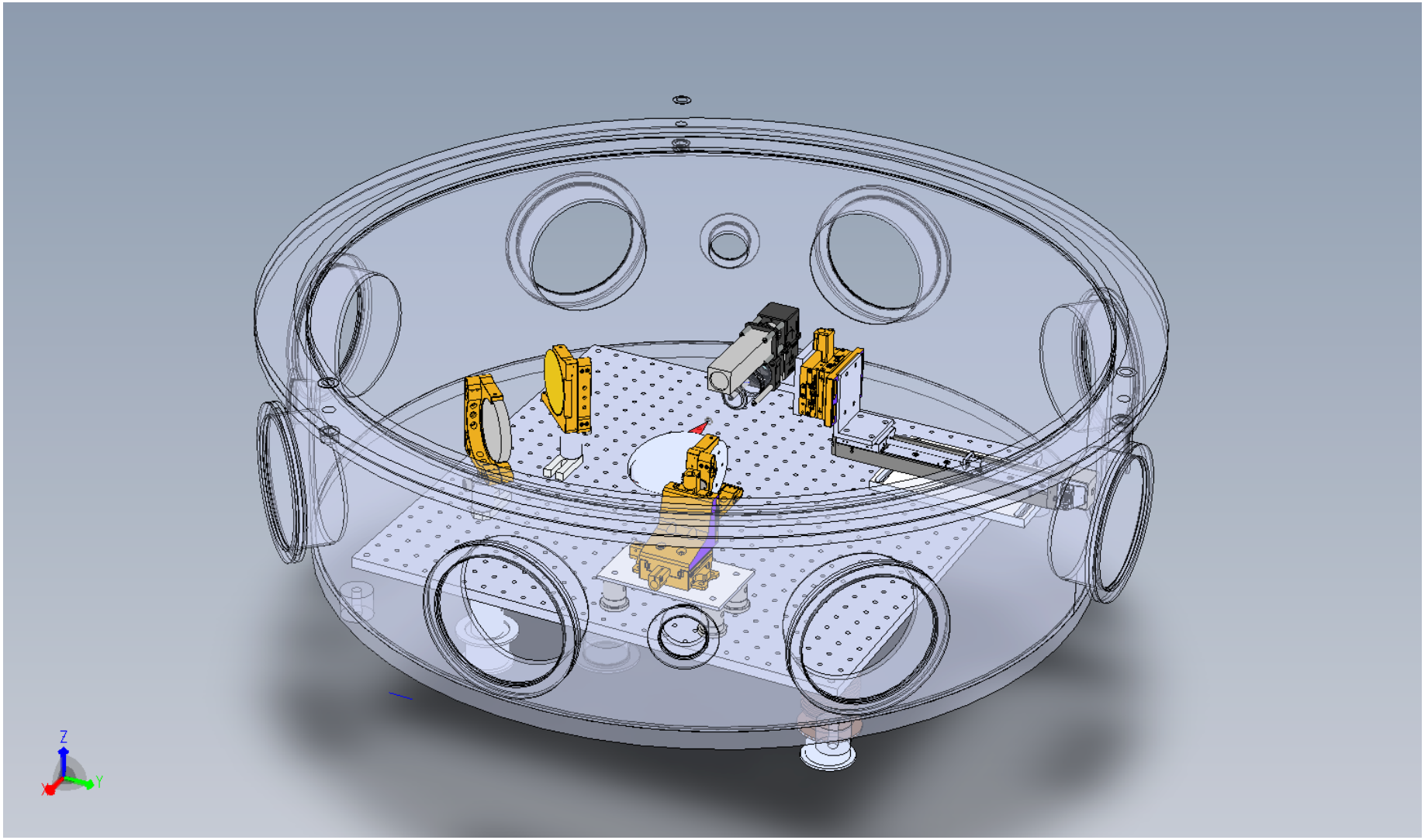
Feld	2.24	T
Luftspalt	108	mm
Eisenlänge	1080	mm
Magnetlänge (eff.)	1029	mm
Gesamtlänge	1520	mm
Gesamtgewicht	7500	kg



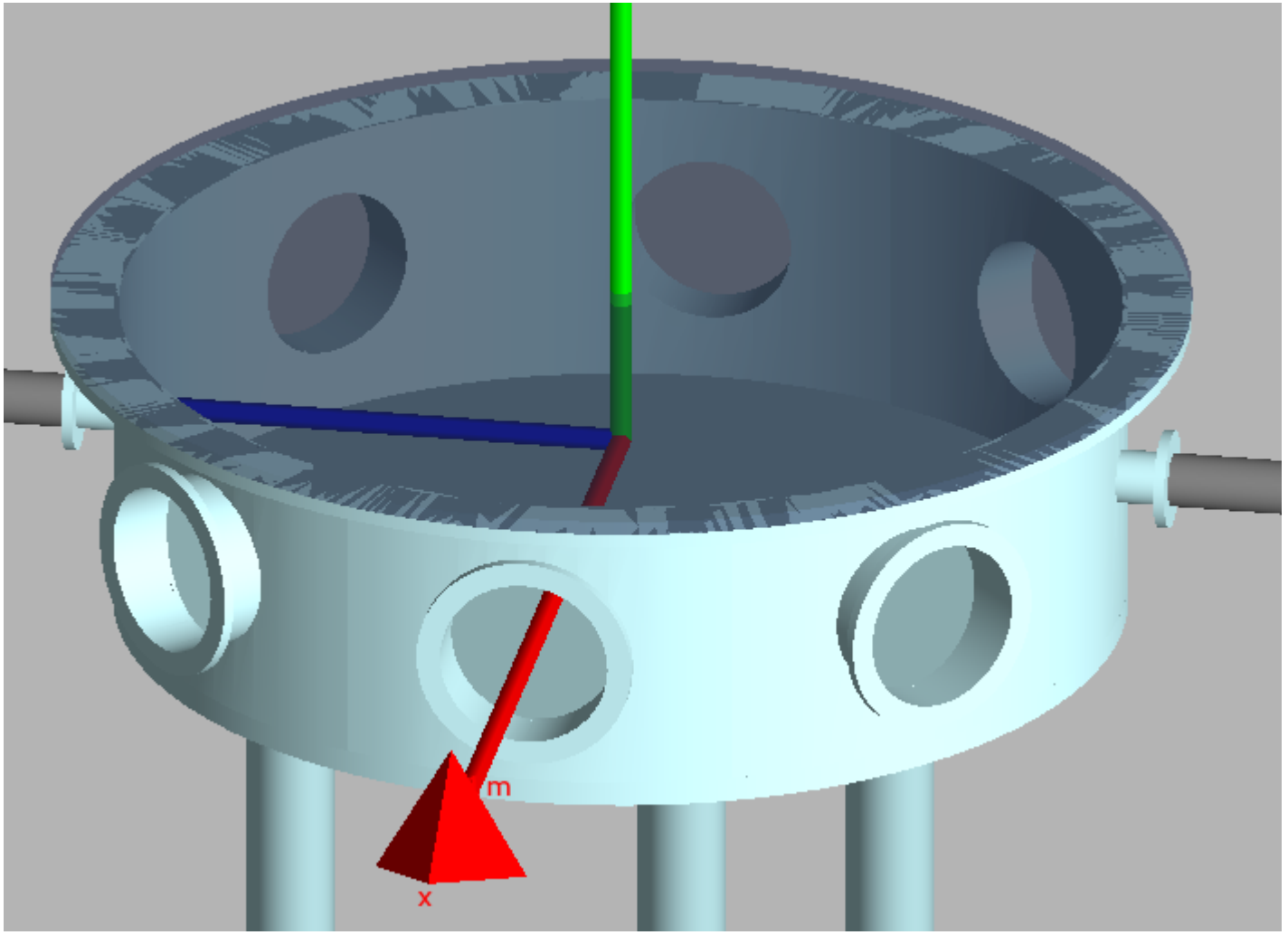
Pipe with D > 100 mm (or H > 100 mm) probably would not fit...

Interaction Chamber

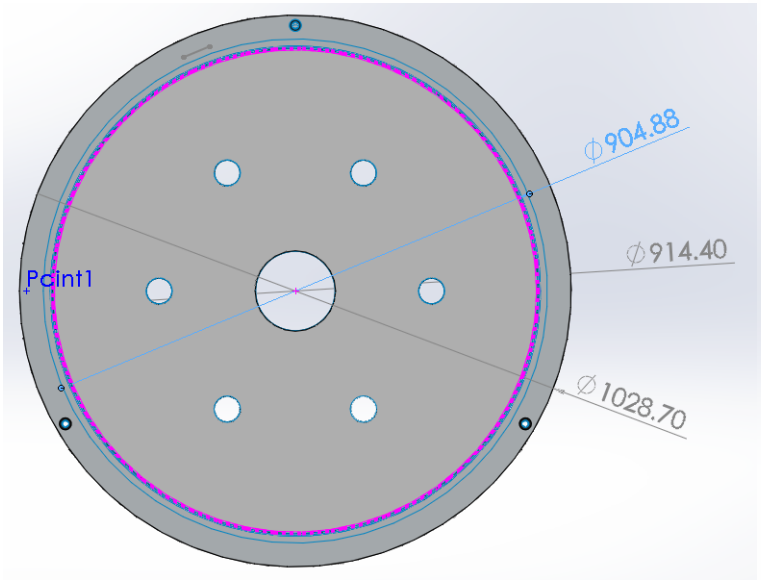
- Exported from SOLIDWORS 3D CAD;
- Assembly contains more than 50 components.

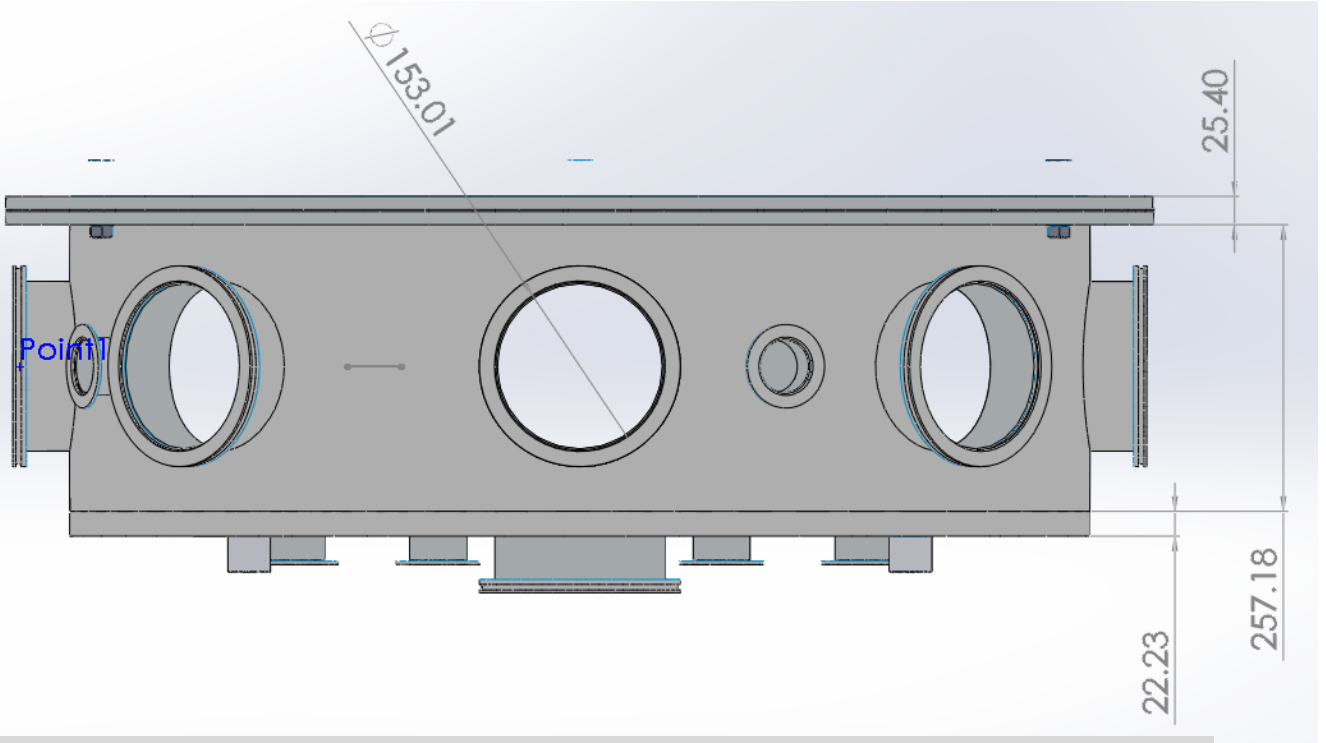


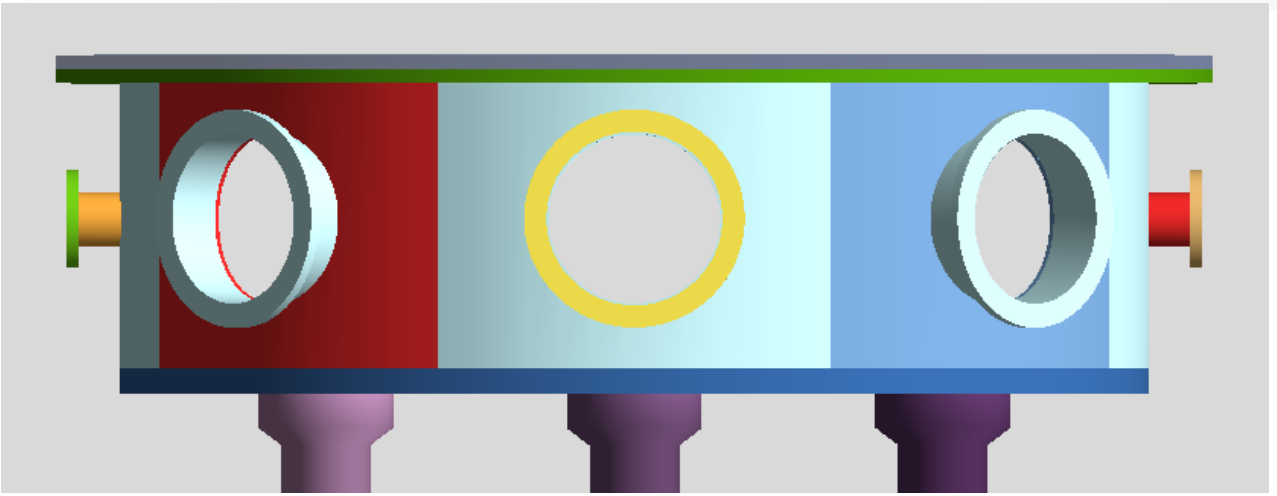
Interaction Chamber GEANT4 (CSG)



Dimensions from SOLIDWORKS and GEANT4 (CSG)







Geant4 model imported from GDML

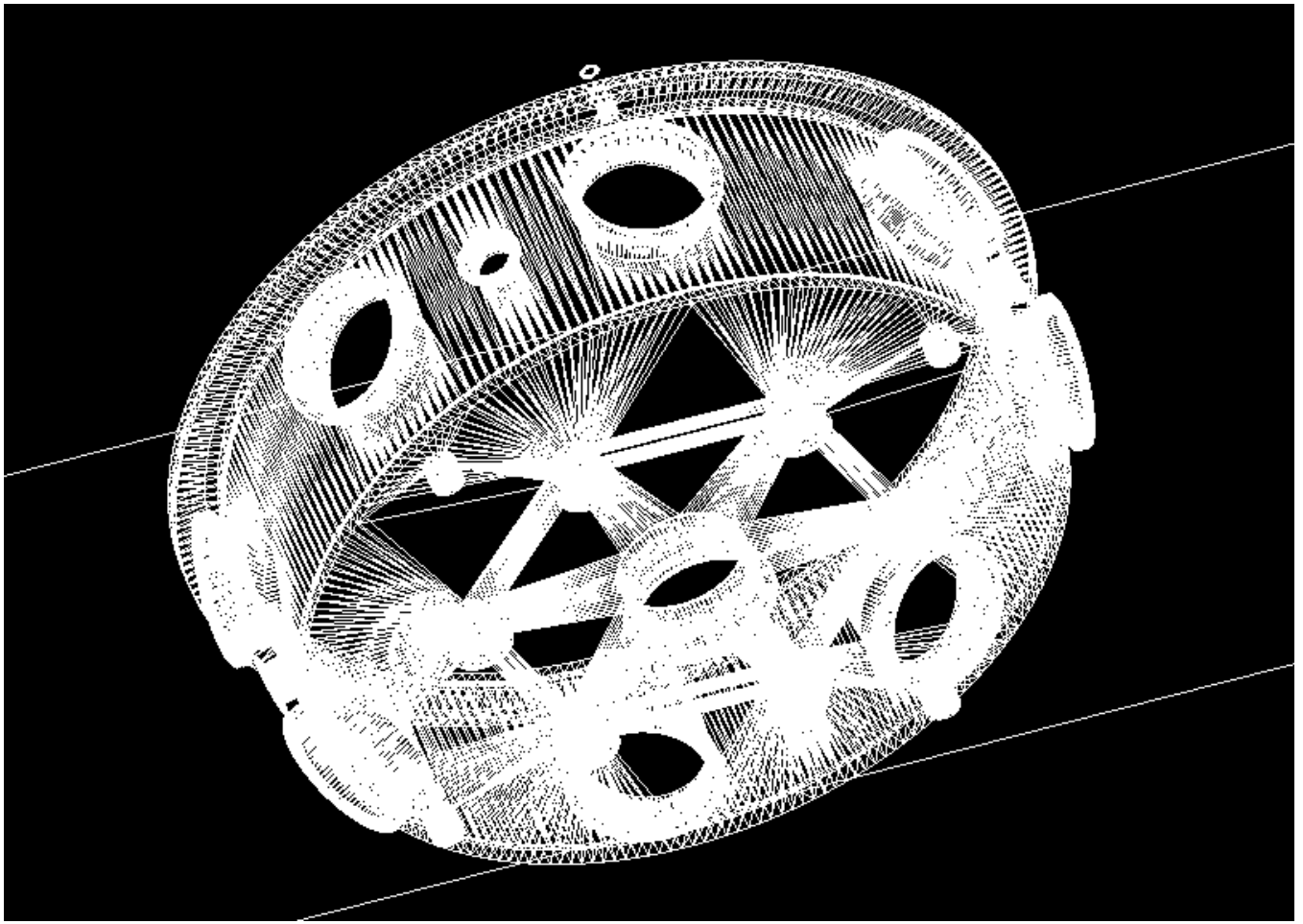
Geant4 documentation suggests a chain:
3D CAD -> STL -> GDML;

The first step is simple, almost all 3D CAD can export a model to STL (for 3D printing);

STL file format encodes the surface geometry of a 3D object approximated with triangles;

There are some tools to convert STL to GDML, but those which are relatively simple did not work for me...

FreeCAD could export to html and then several pipes with sed could convert it to GDML.

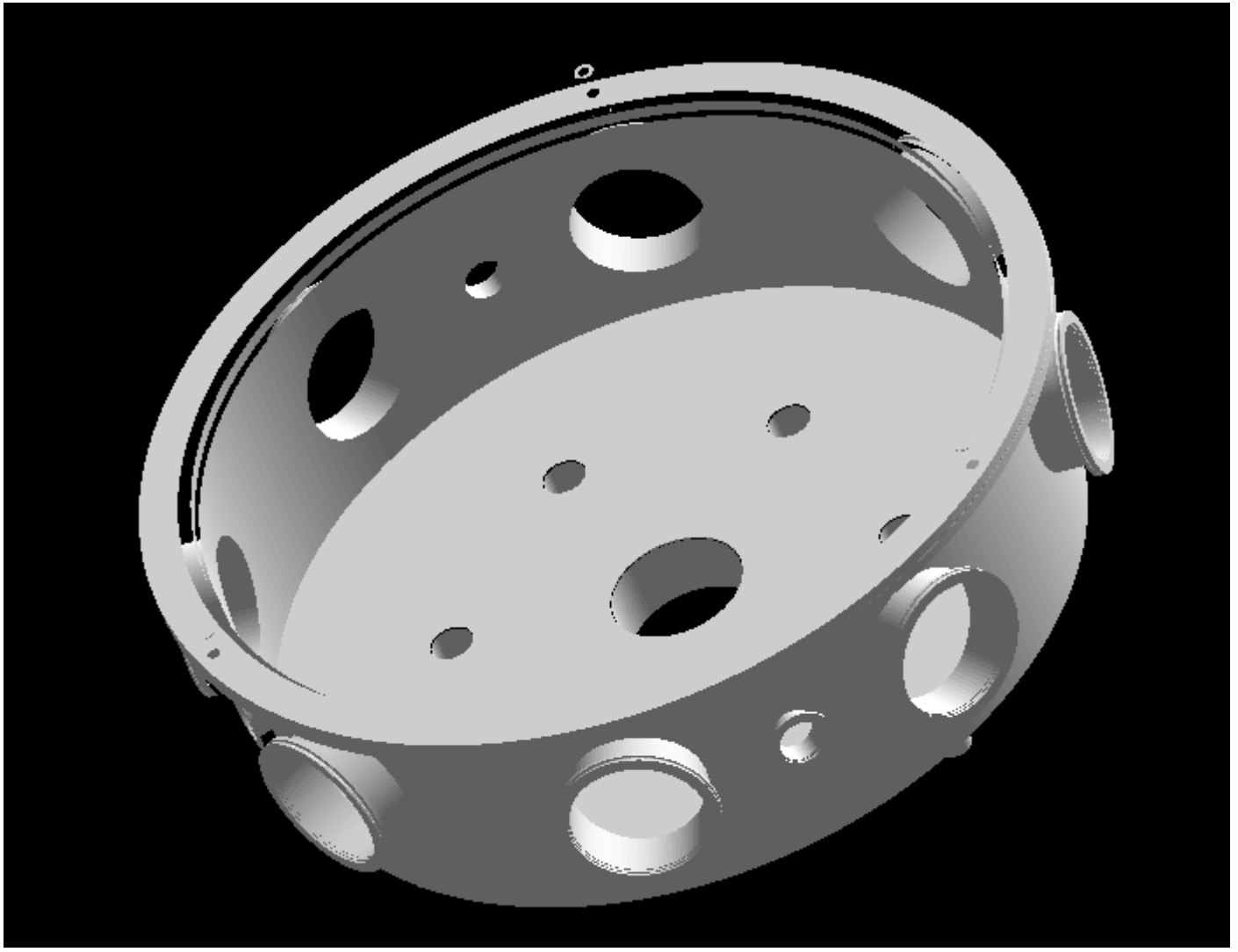


For the chamber:

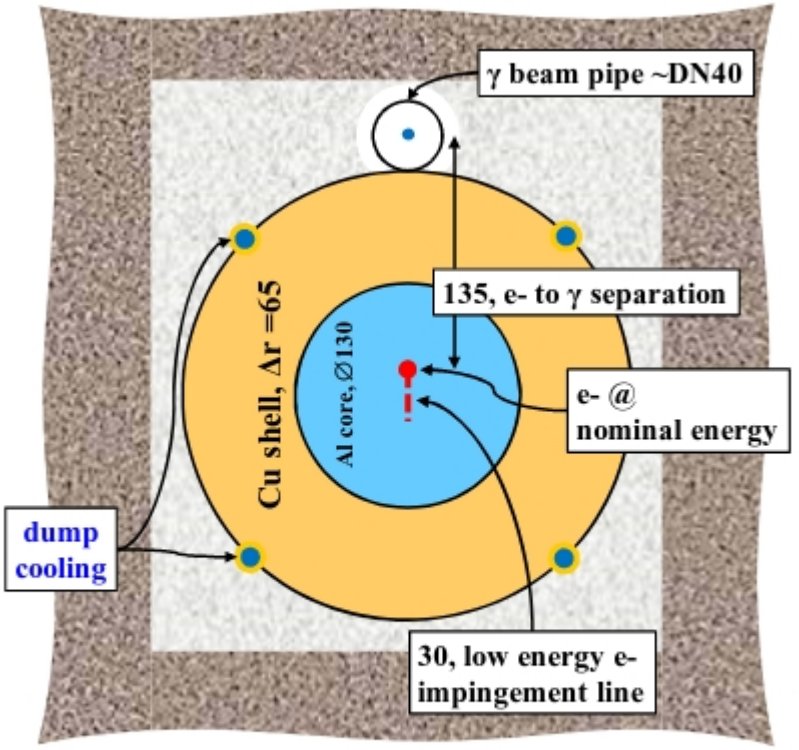
- 80047 vertexes;
- 152299 tessellated triangles.

Geant4 model imported from GDML

Surface view

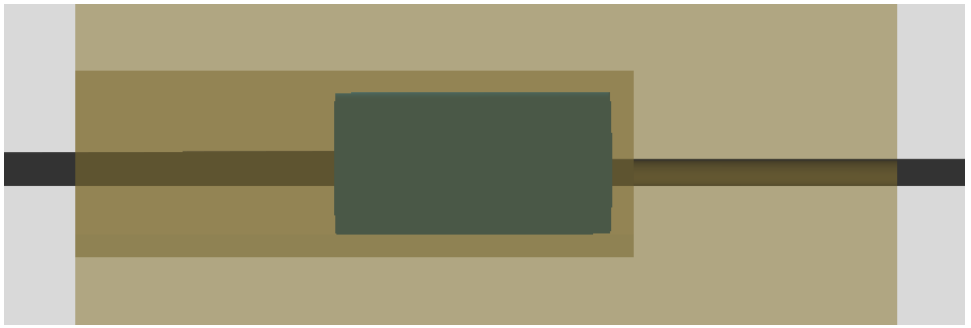


Dump and Shielding



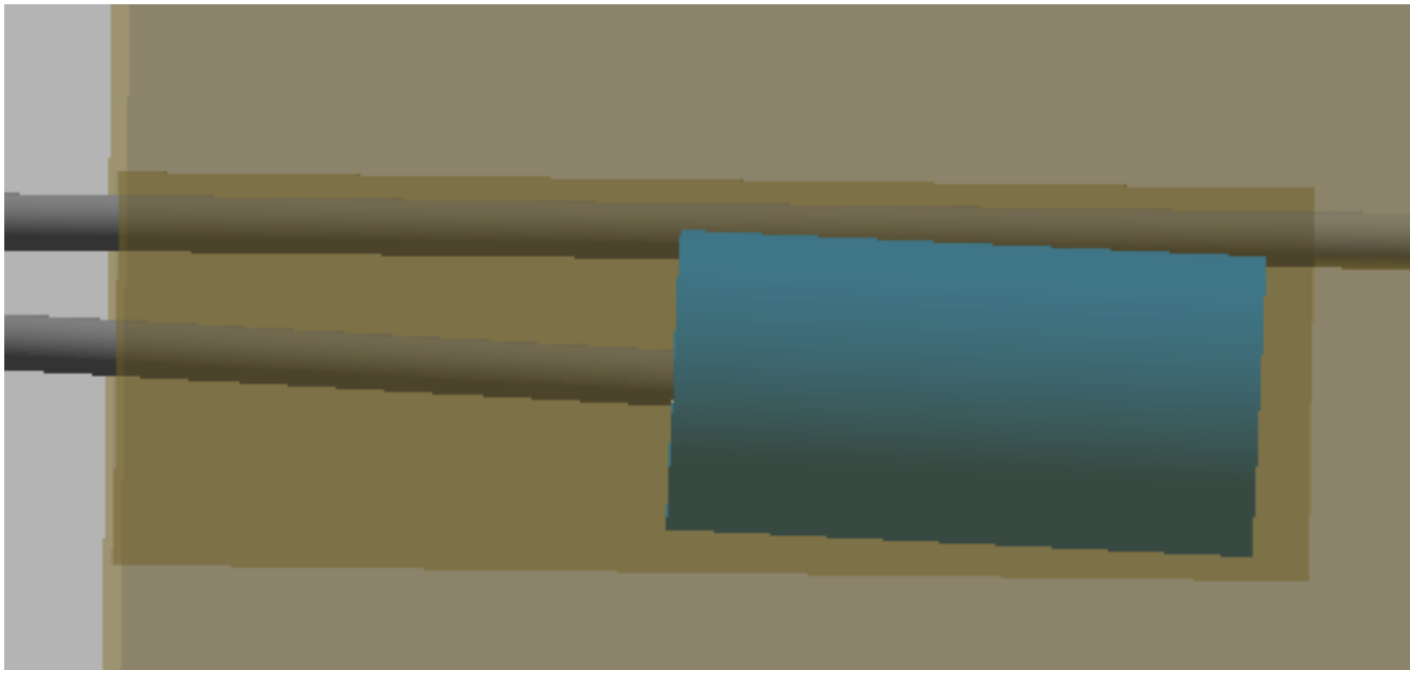
Front View

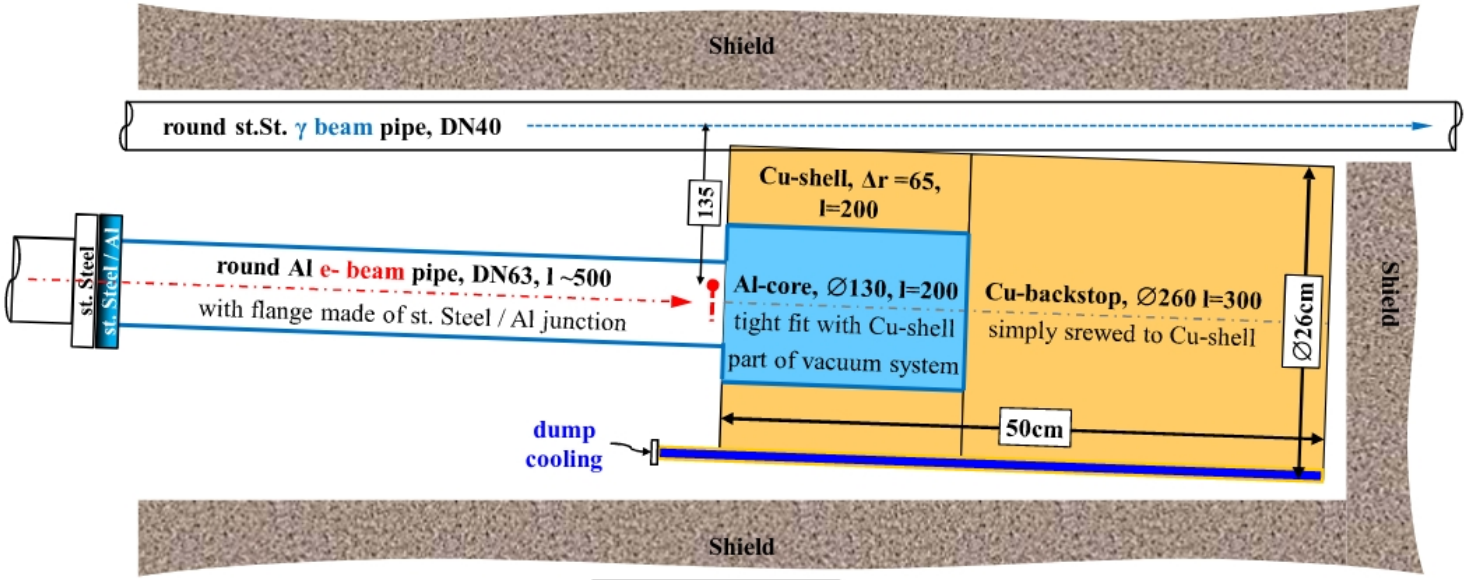
lenghts without units are in mm



- If it is in vertical plane the magnet has to be rotated.
- Is it possible (practical)?

Dump and Shielding

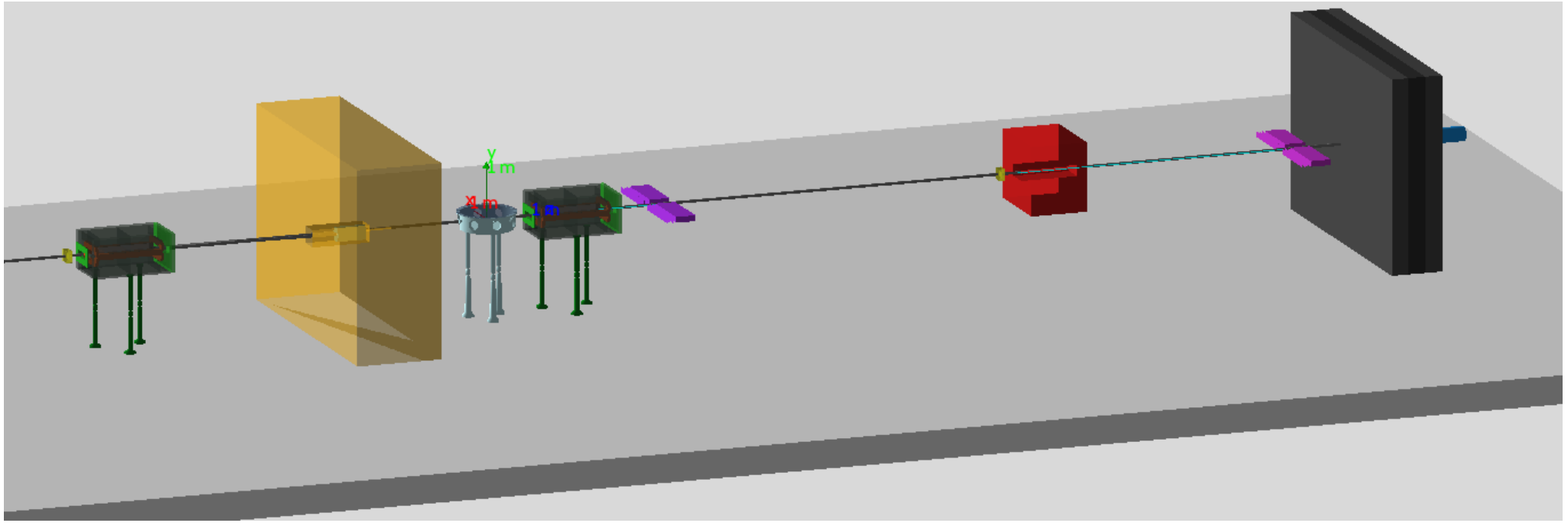




Longitudinal Cut

lenghts without units are in mm

LUXE Setup



Backup

CSG vs BREP

CSG - Constructive Solid Geometry;
GEANT4 approach.

BREP - advanced boundary representation;
3D CAD approach.

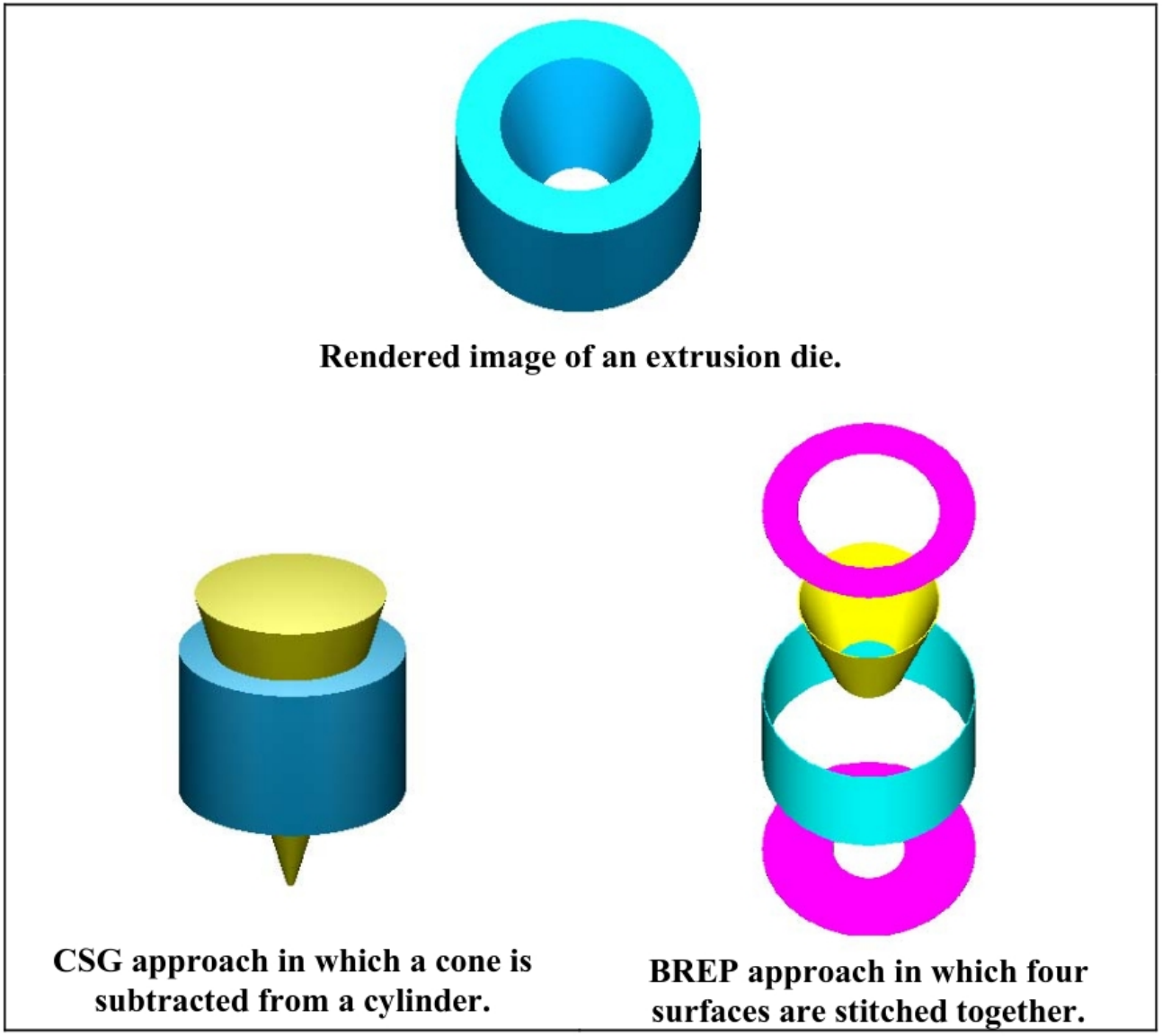


Figure 1. CSG and BREP approaches to representing an extrusion die (Tanenbaum, 2001).