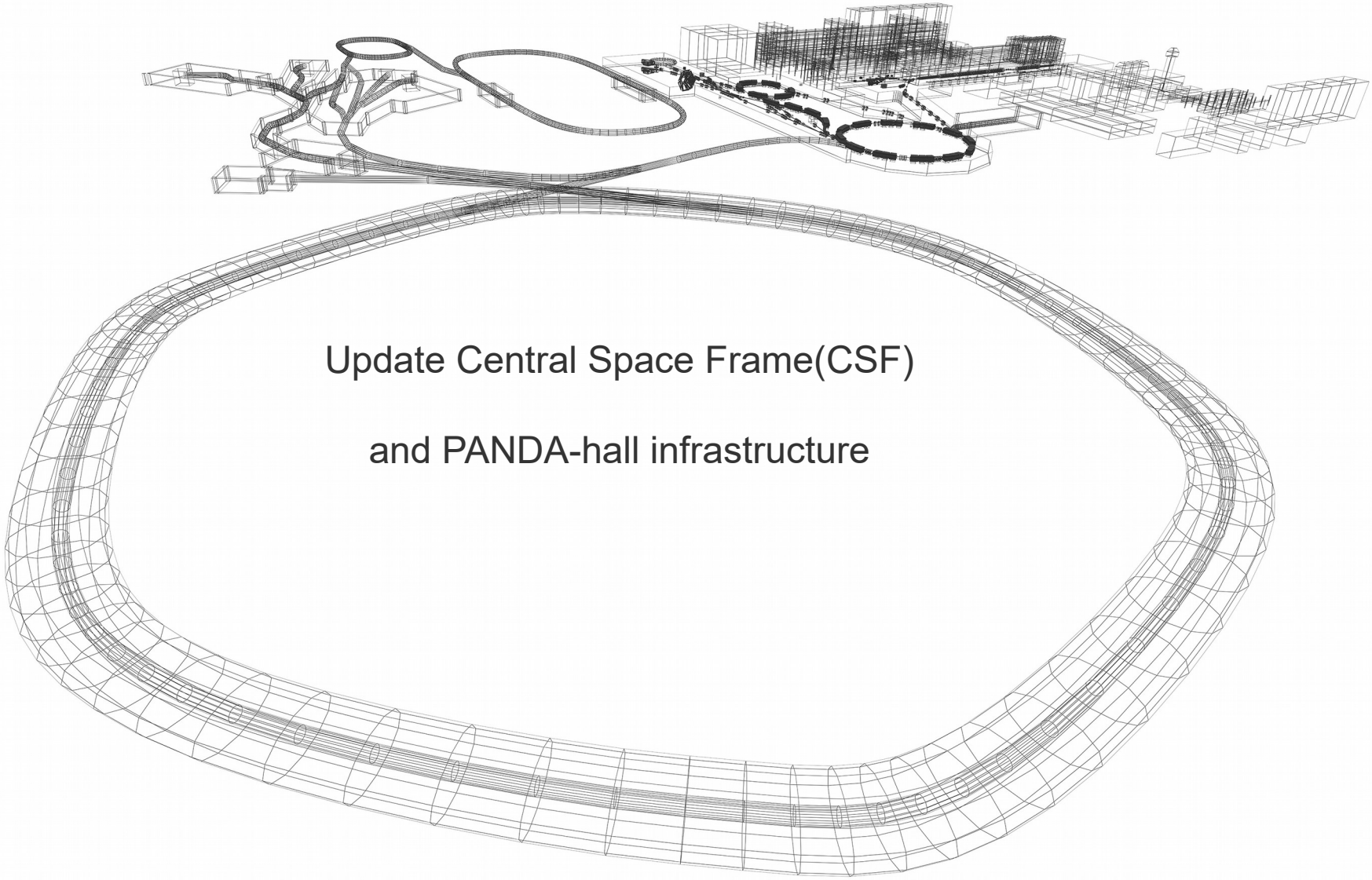
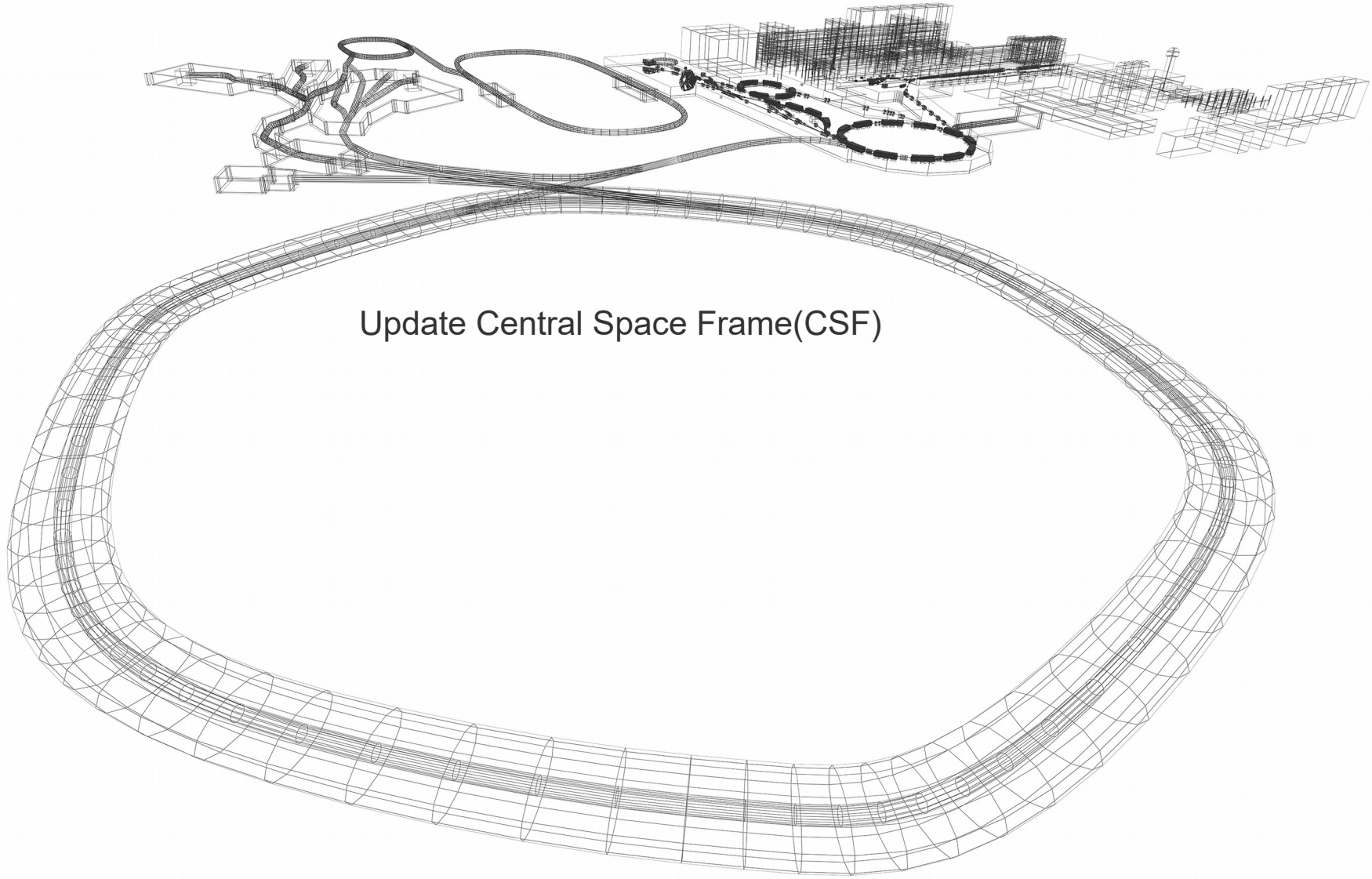


Update Central Space Frame(CSF)

and PANDA-hall infrastructure



Update Central Space Frame(CSF)

Requirements:

- CSF has to carry the STT, the MVD and possibly the DCDC and the GBT electronics

  Electronic: ~180kg in its center of gravity 1506 mm upstream from the interaction point

  STT: ~80kg

  MVD: ~30kg

- The volume of material has to be preferably low

- The material of the frame should have a low density and a low nuclear charge number

Material comparision

- The first step is a decision which materials are acceptable for this project.
- In this presentation we focused on materials which make a good compromise between strength, stiffness, density and a low nuclear charge number.
- A shortlist of suitable materials is shown in the following chart:

Material	Titan	Aluminium	CFRP (carbon composite)
density	4,5 g/cm³	2,7 g/cm³	~1,6 g/cm³
Nuclear charge number	22	13	6*
E-Modul	105 GPa	80 GPa	≥ 125 GPa

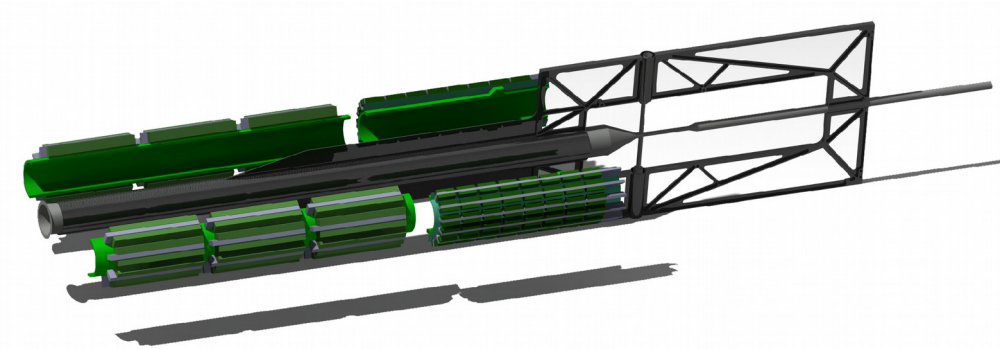
Material comparision

- Regarding to the requirement described, carbon composite seems to be the best choice for the central space frame. Special properties like radiation hardness have to be clarified.

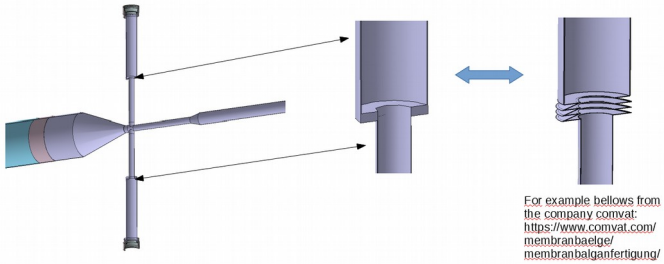
Material	Titan	Aluminium	CFRP (carbon composite)
density	4,5 g/cm³	2,7 g/cm³	~1,6 g/cm³
Nuclear charge number	22	13	6*
E-Modul	105 GPa	80 GPa	≥ 125 GPa

Suggestions:

1. A frame in combination with an additional support structure for the electronics. It could release the beam pipe of the critical torque without any further needs for suspensions during transport or mounting.



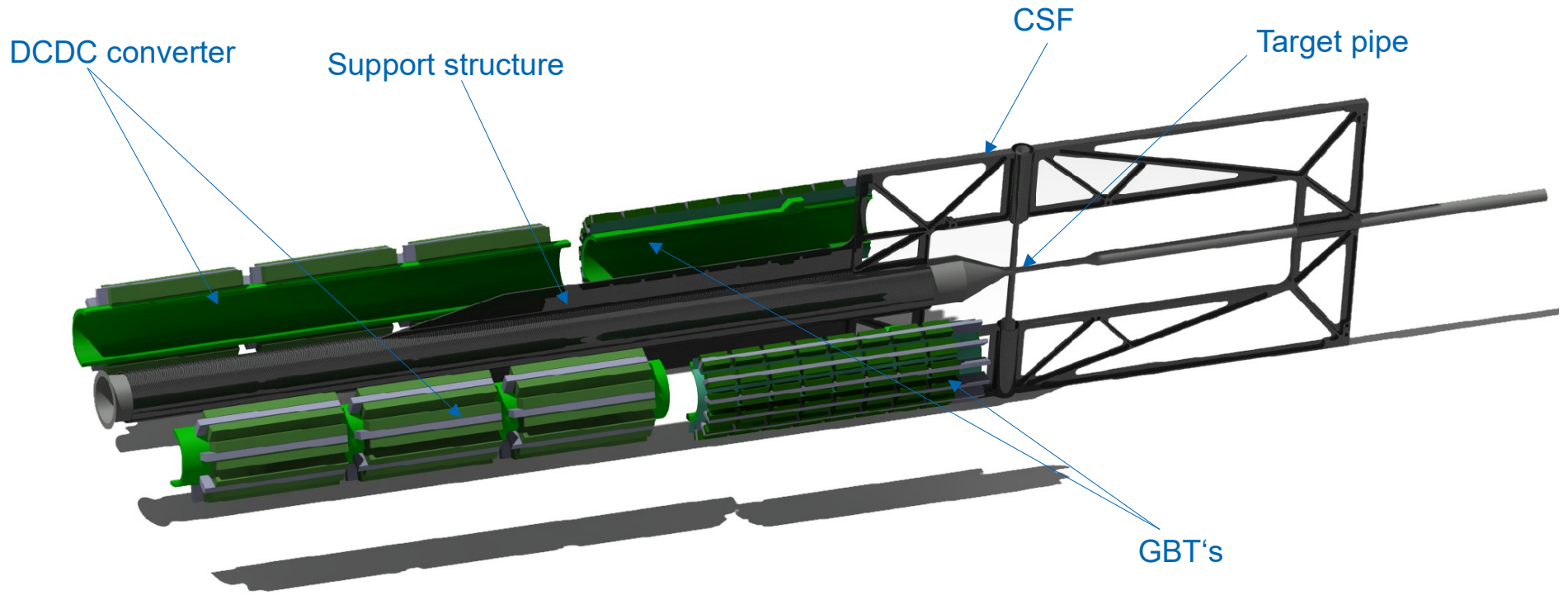
2. With two bellows perpendicular to the target pipe, instead of the current welded flange, critical stresses in the target cross could be avoided.



New concept of the frame

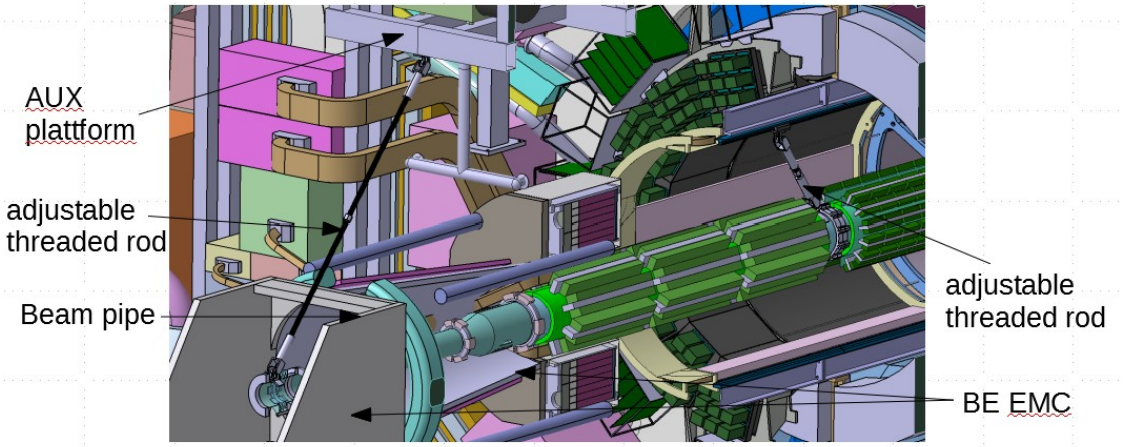
Suggestion :

A frame in combination with an additional support structure for the electronics. It could release the beam pipe of the critical torque without any further needs for suspensions during transport or mounting.



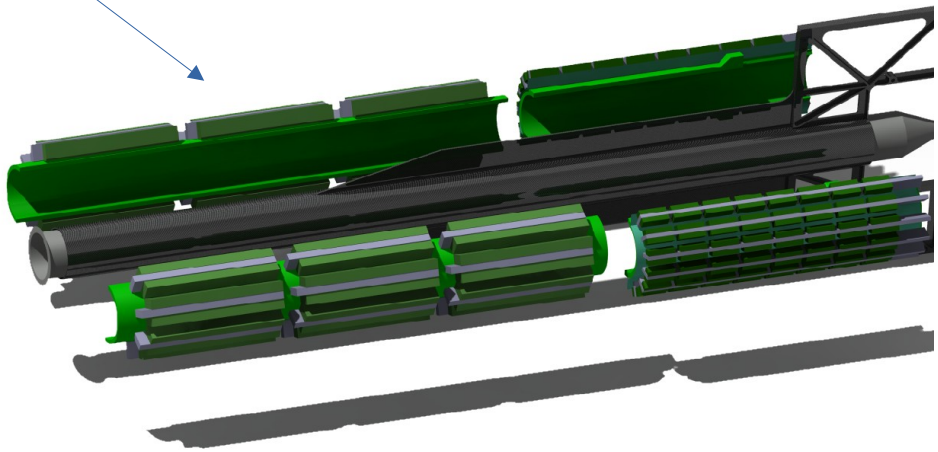
New concept of the frame

Suggestion :



Old concept

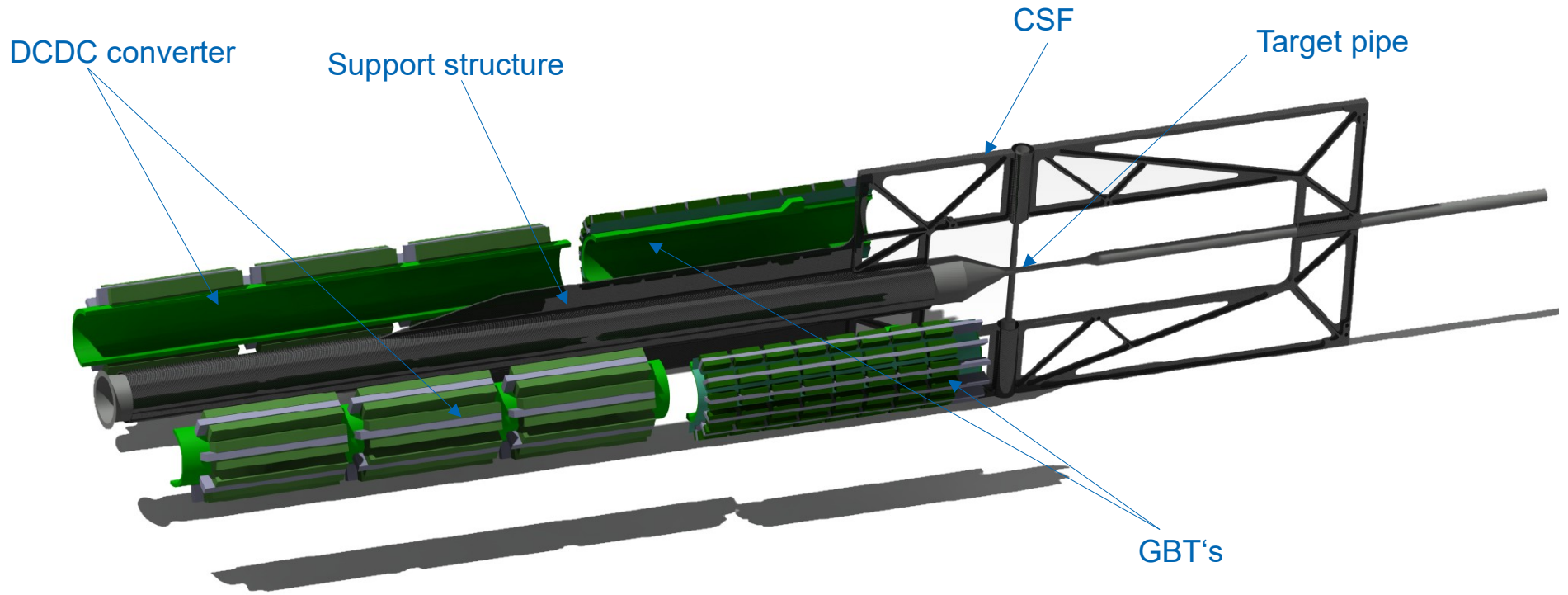
New concept



New concept of the frame

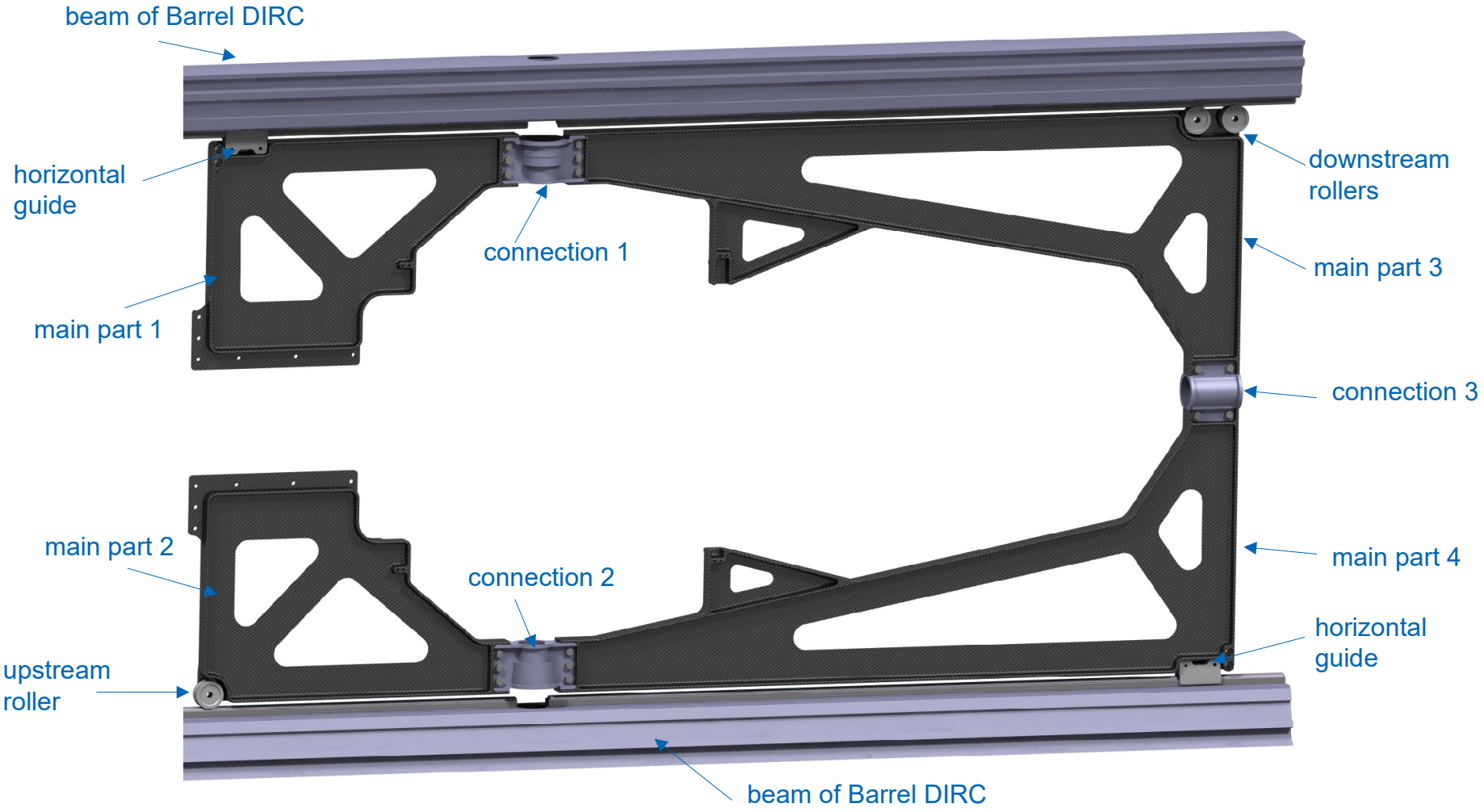
Suggestion :

A frame in combination with an additional support structure for the electronics. It could release the beam pipe of the critical torque without any further needs for suspensions during transport or mounting.



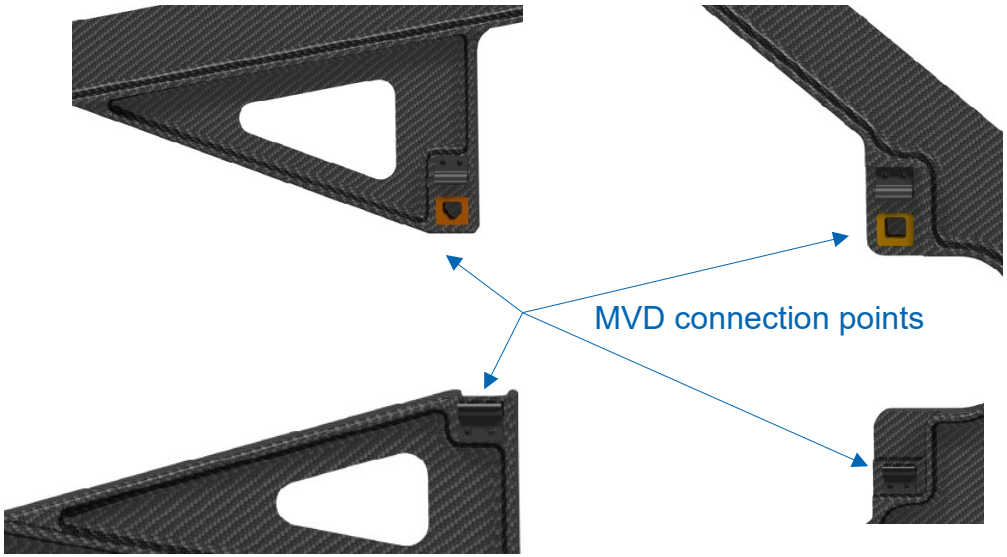
Current status

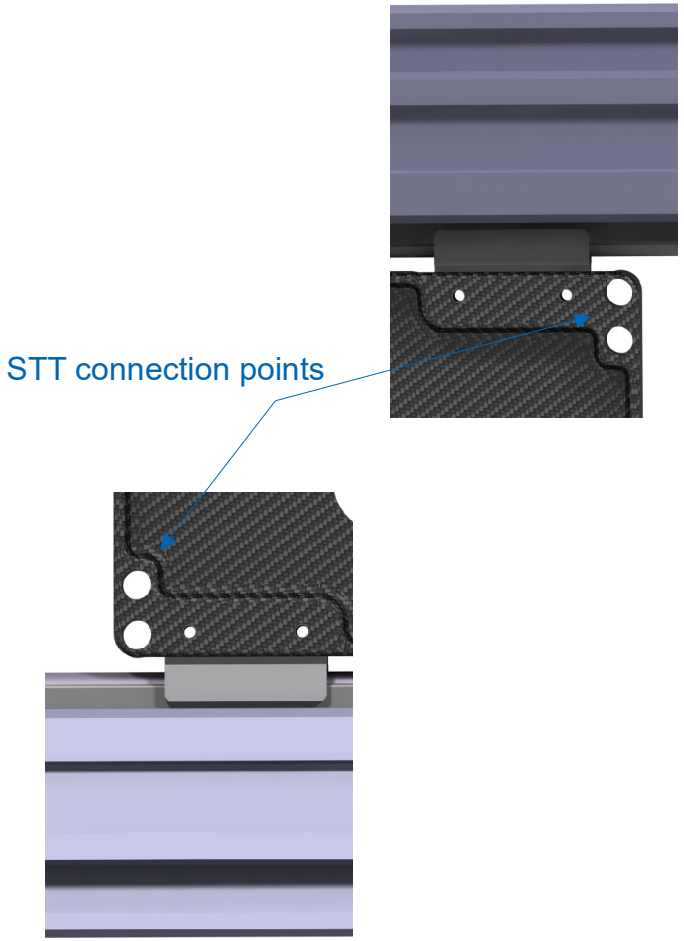
The mainframe is made out of four carbon composite main parts and six connectors made out of aluminum



Current status

Integrated in the system are the four connection points for the MVD and the STT.

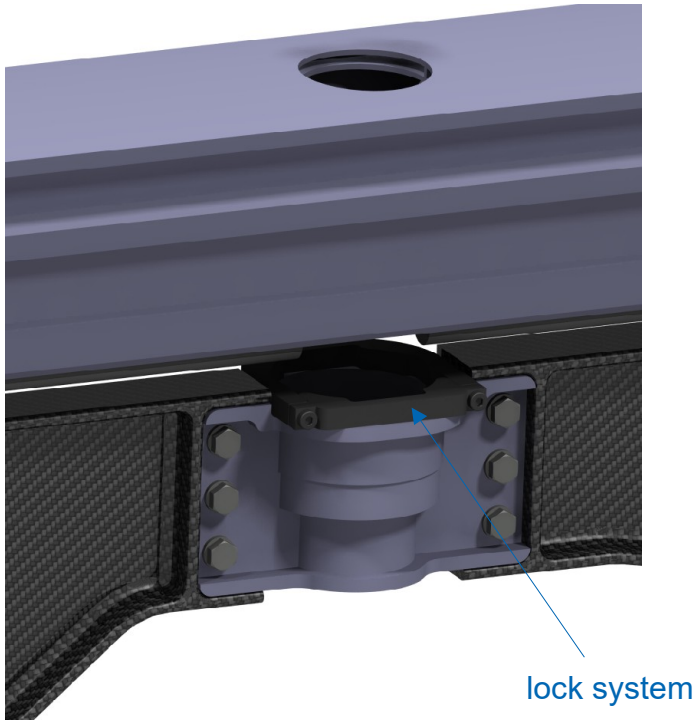




Current status

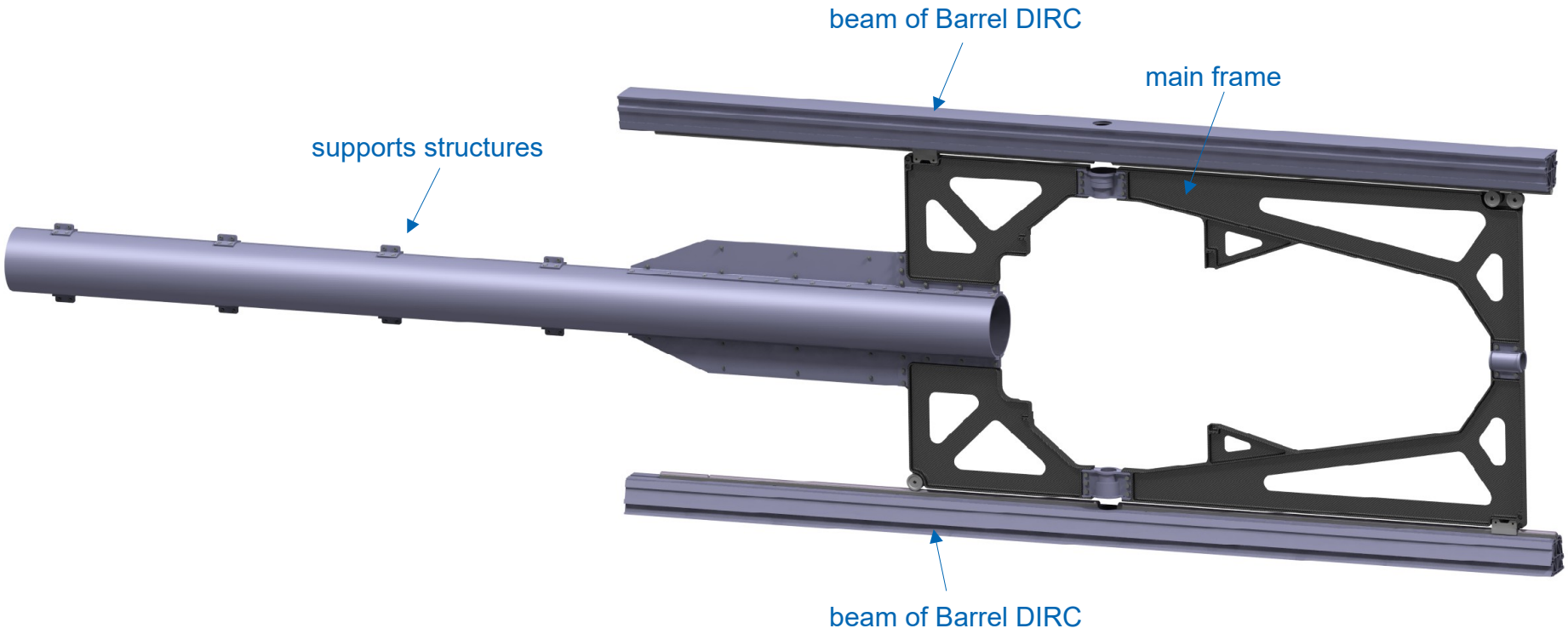
Also integrated in the structure will be two lock systems, which are consider to fix the target pipe against turning while the connection process of the bayonet seal.

The lock system was developed in the ZEA1 in Jülich and will be tested there.



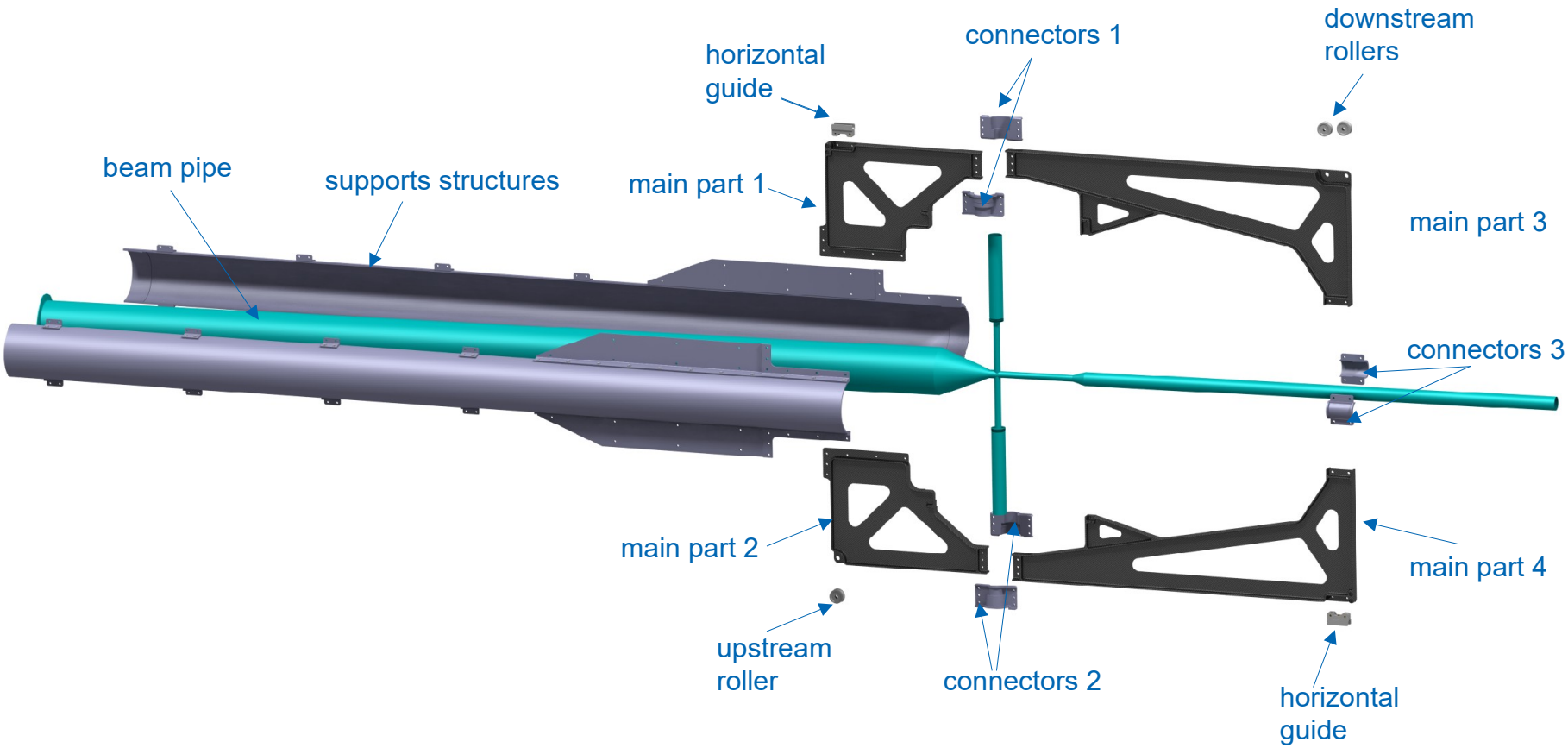
Current status

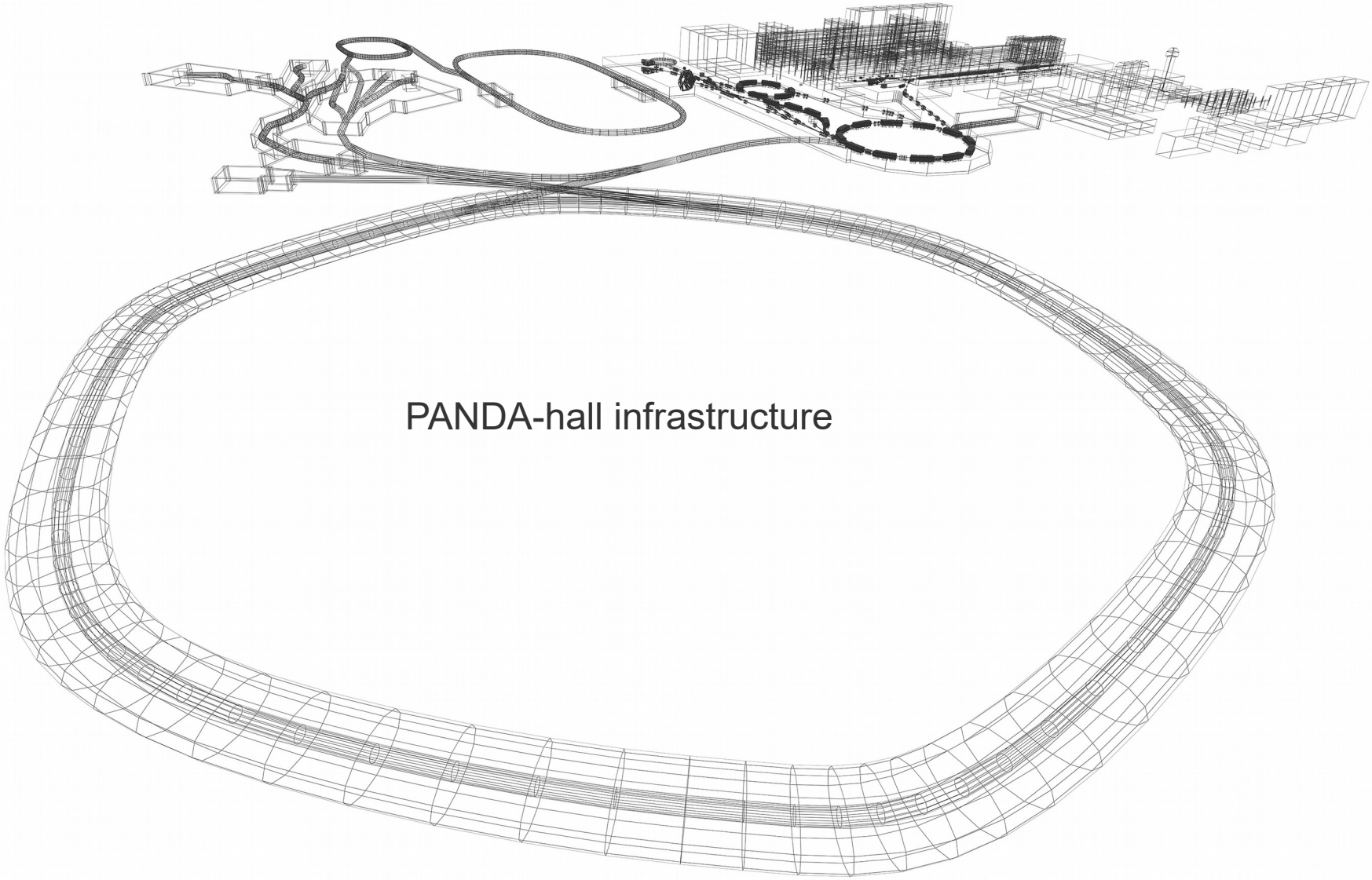
Together with two additional support structures,made out of aluminum as well, the CSF formed stiff and stable unit



Current status

The following picture shows an exploded view of the assembly with the beam pipe



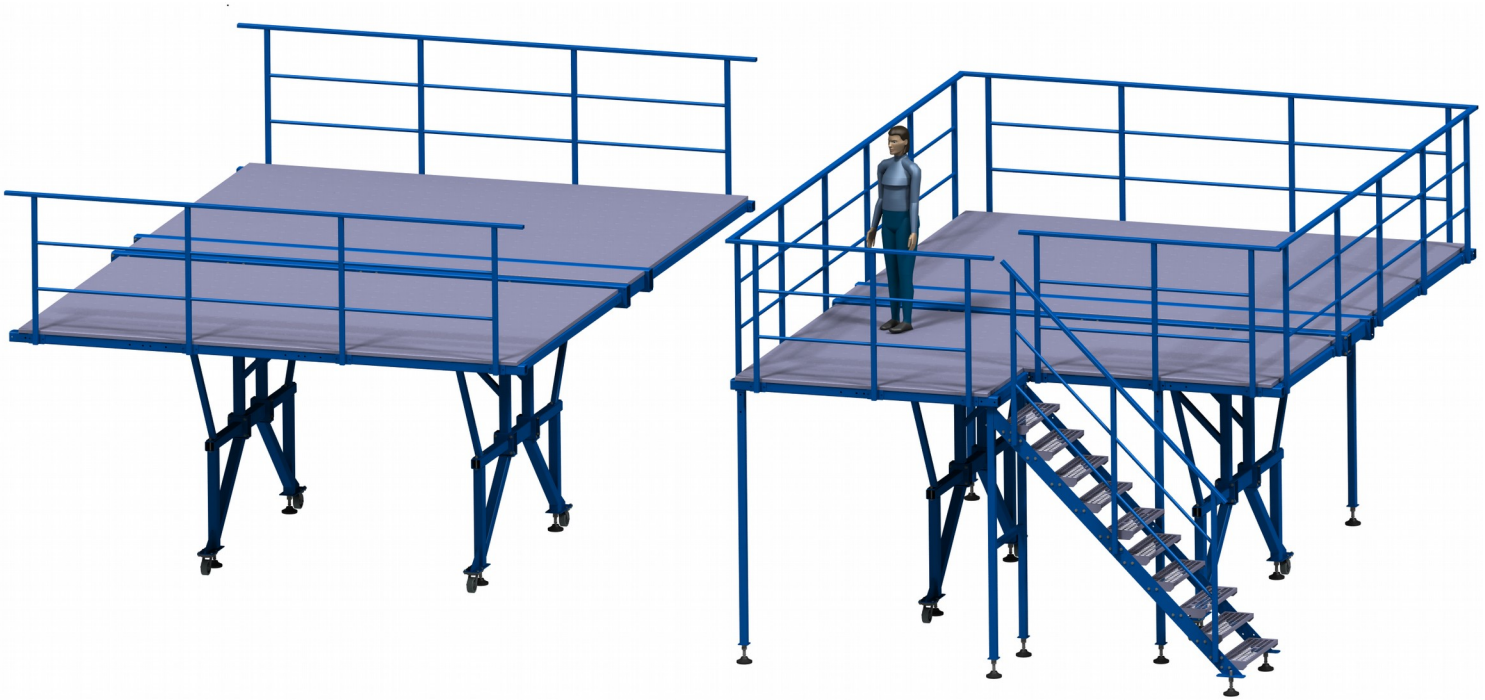


PANDA-hall infrastructure

PANDA-hall infrastructure

Installation platform:

The platform consists of two movable assemblies



PANDA-hall infrastructure

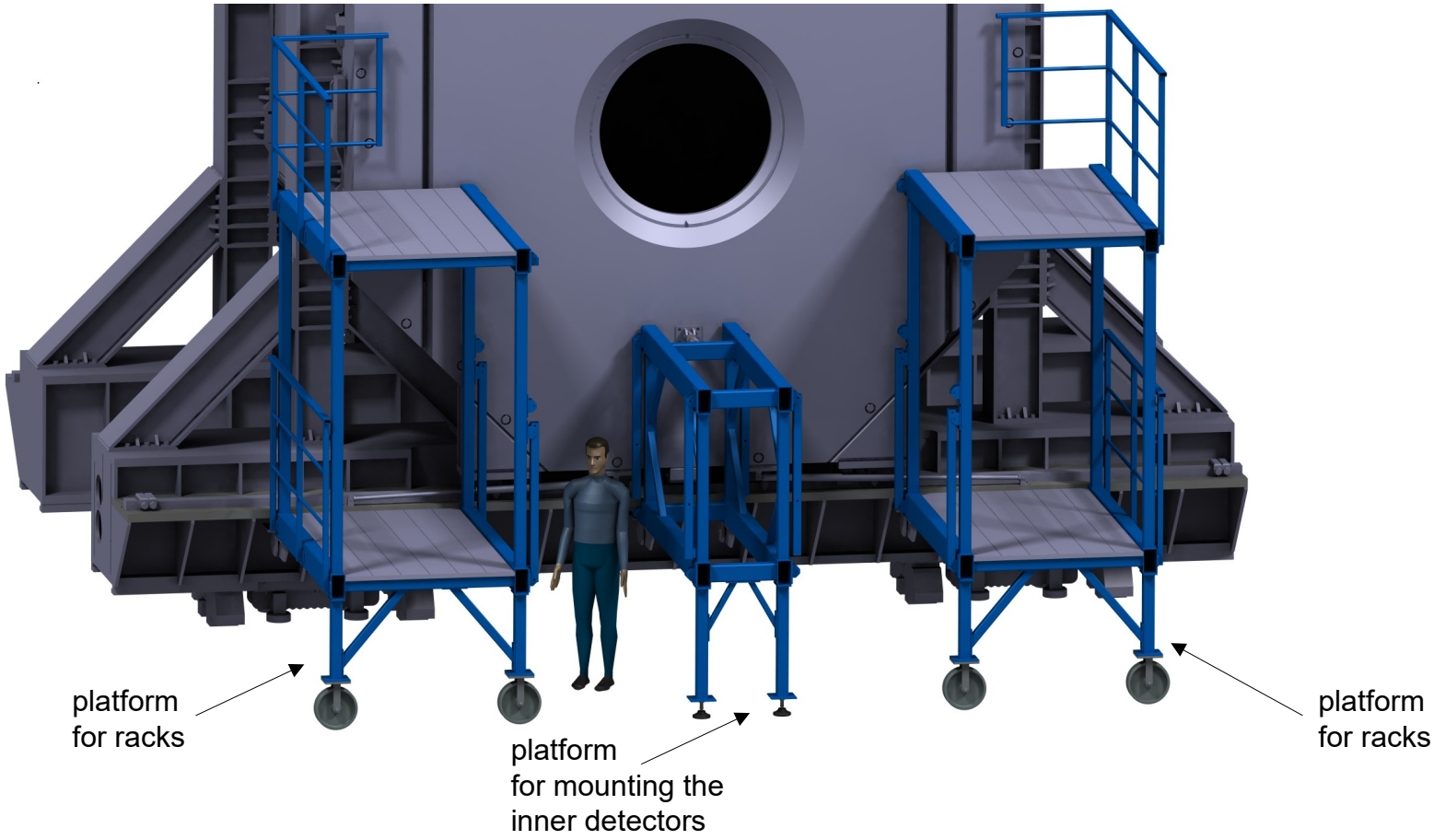
Installation platform:

For the mounting of the inner detectors the platforms will be connect to each other

PANDA-hall infrastructure

Auxiliary platform:

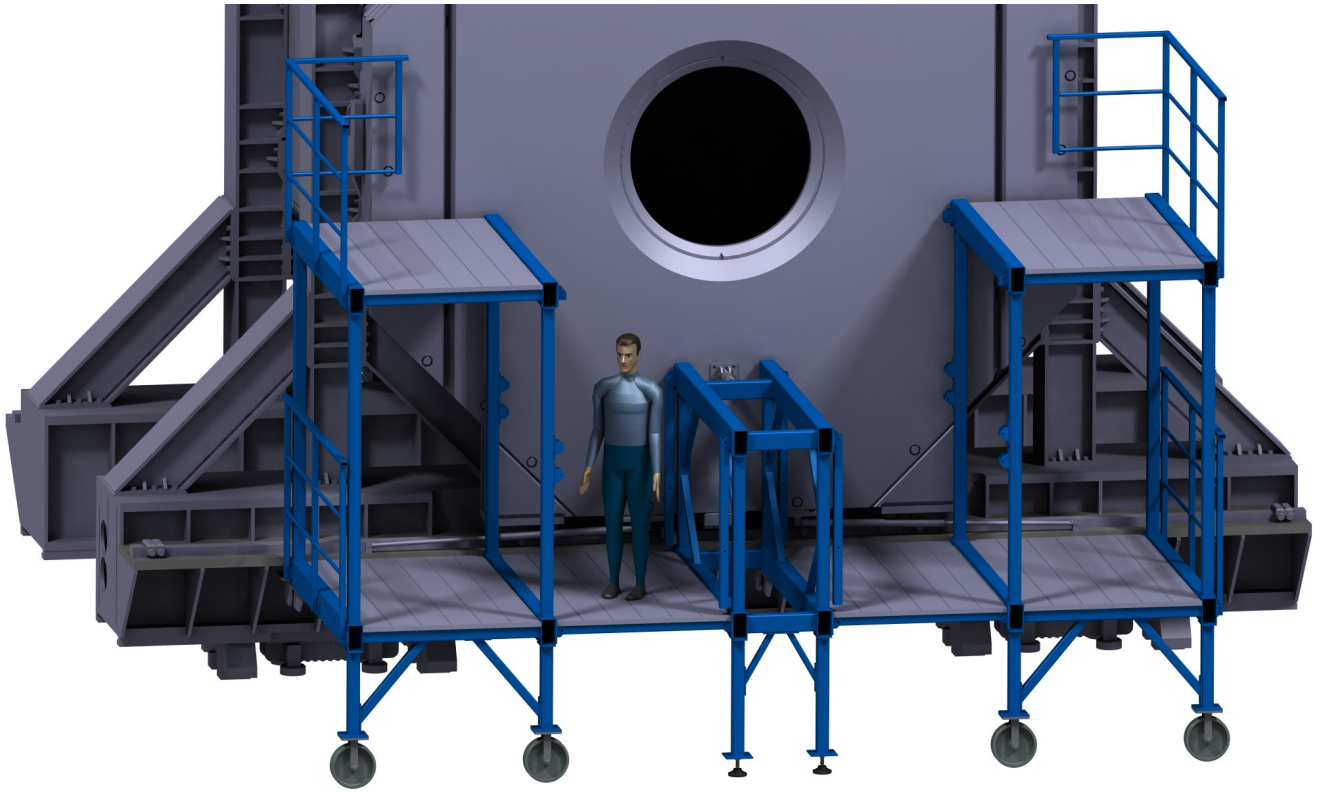
The three parts of the platform are attached to the solenoid



PANDA-hall infrastructure

Auxiliary platform:

As required, several connections between the platform can be mounted temporary

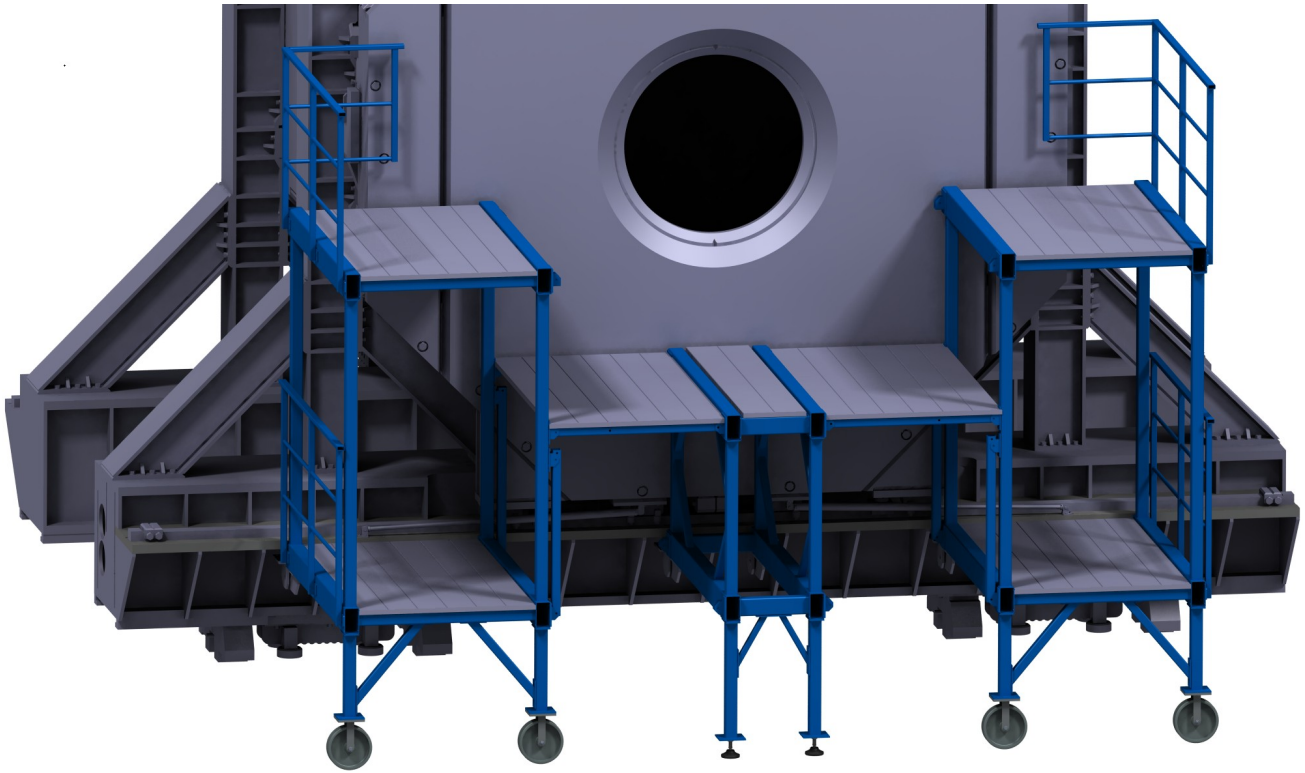


Level 2 for the service of the lower racks

PANDA-hall infrastructure

Auxiliary platform:

As required, several connections between the platform can be mounted temporary

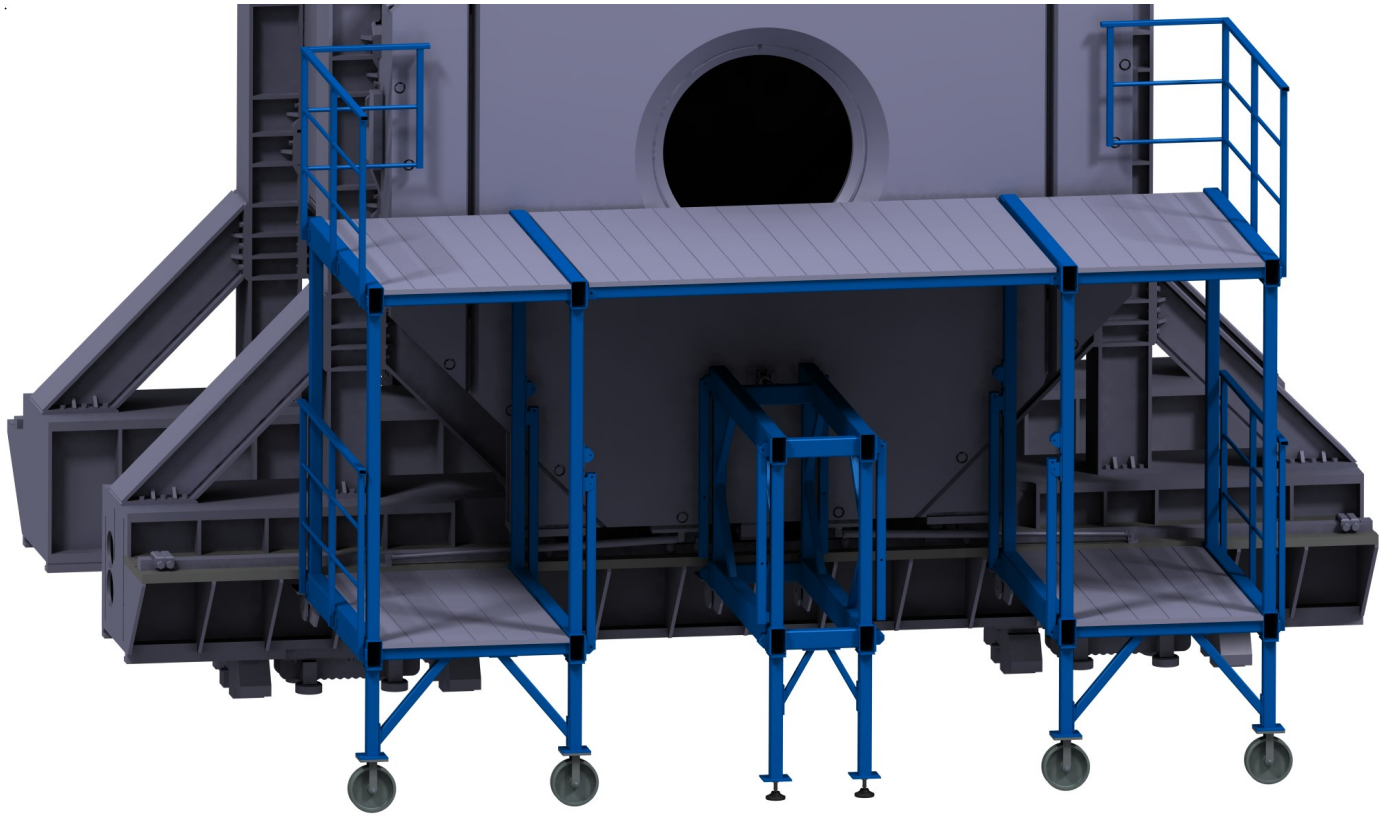


Level 3 for the mounting of the inner detectors

PANDA-hall infrastructure

Auxiliary platform:

As required, several connections between the platform can be mounted temporary

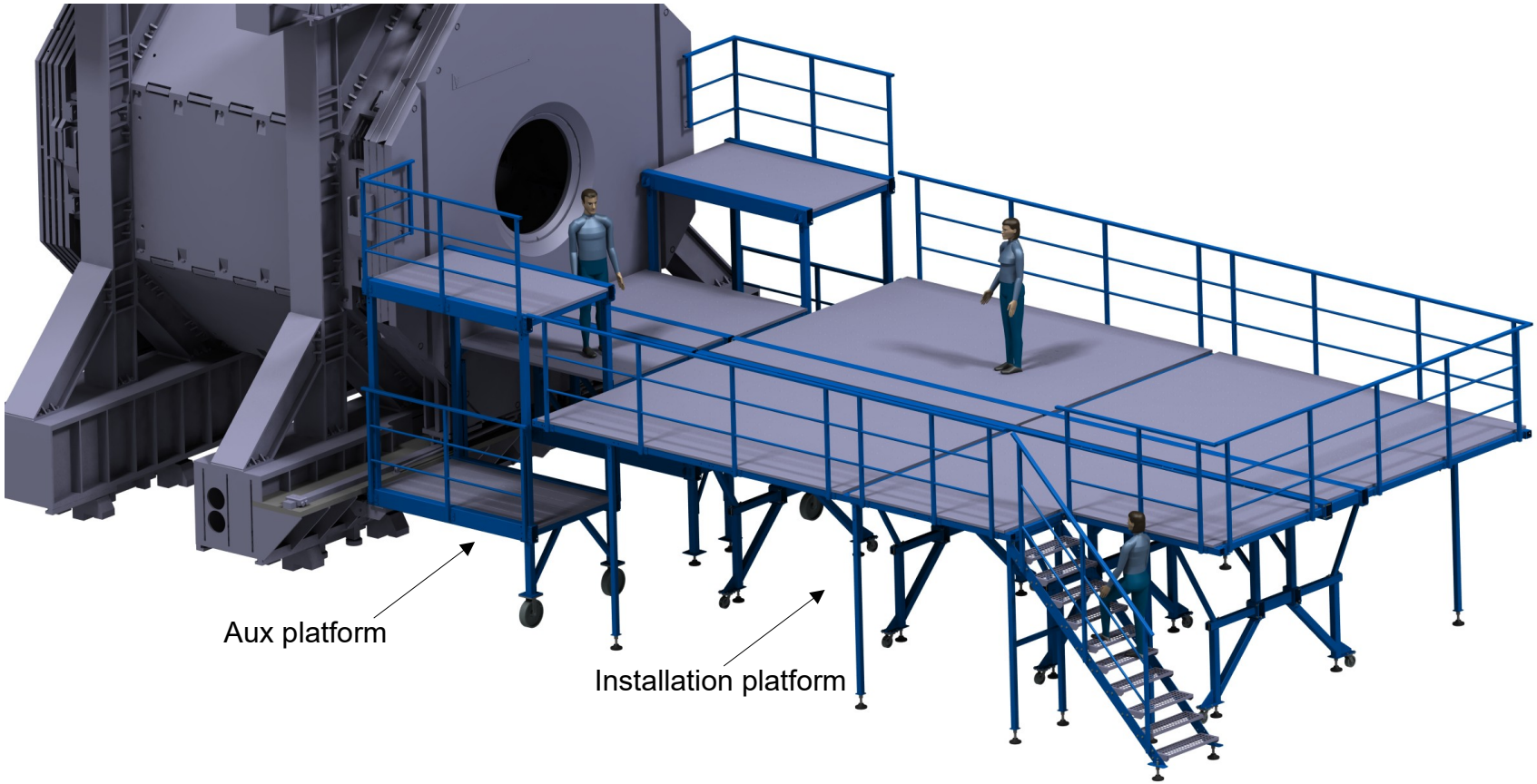


Level 4 for the service of the upper racks

PANDA-hall infrastructure

Auxiliary platform:

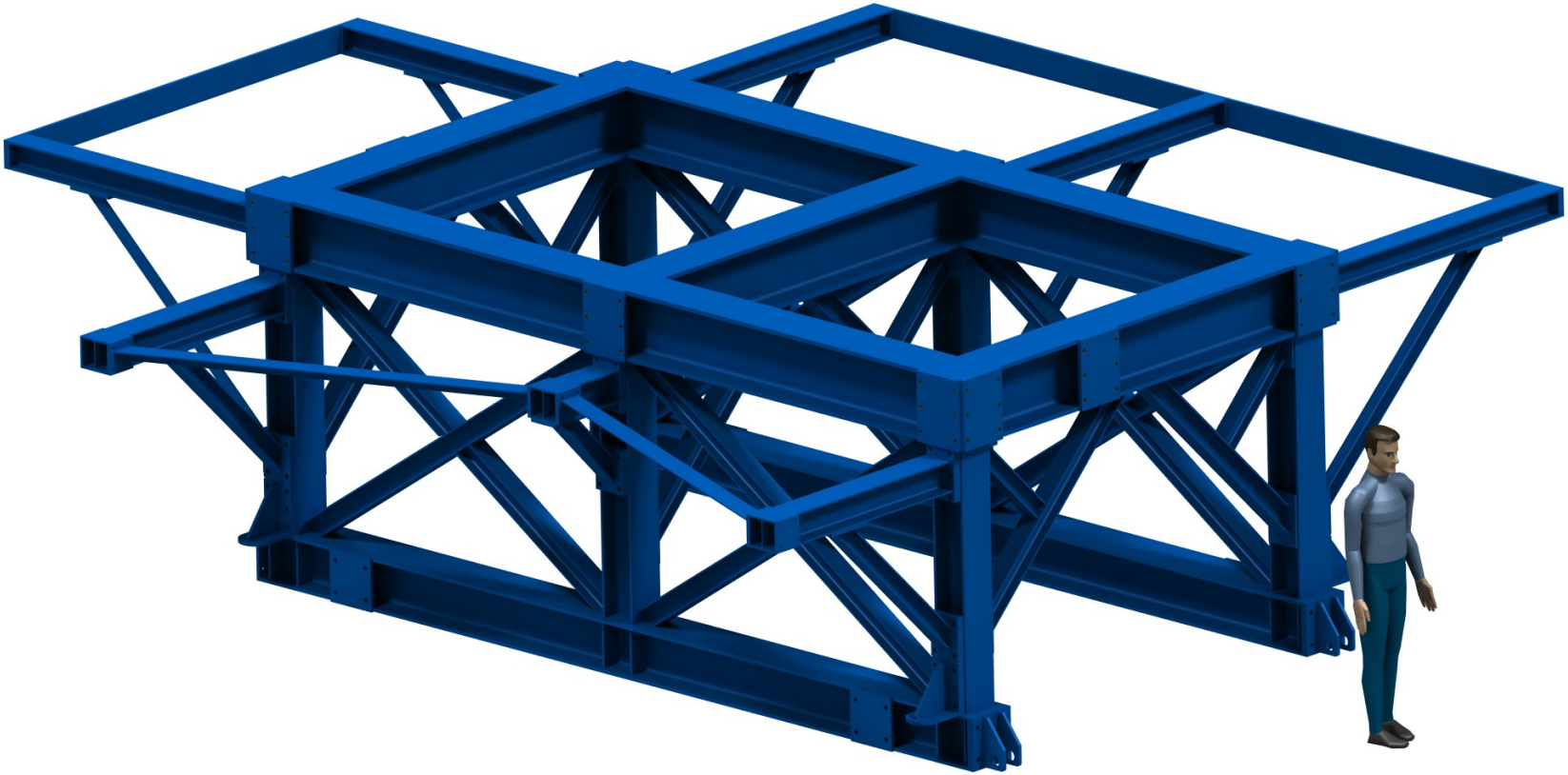
The picture below shows the aux platform level 3 in combination with the installation platform



PANDA-hall infrastructure

Forward platform:

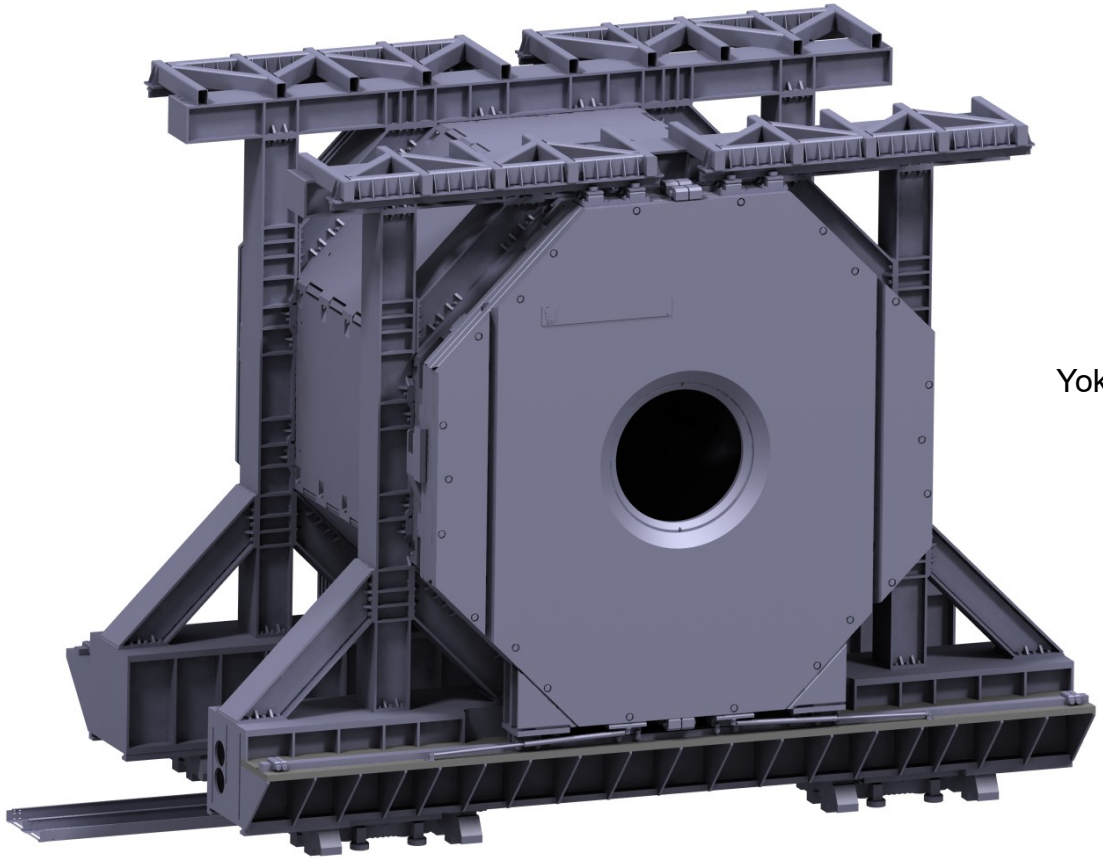
A first Design for the platform was made for cost estimating, the detailed boundary conditions has to clarify



PANDA-hall infrastructure

Support structures on the solenoid yoke:

Supports on the solenoid Yoke are needed for racks, target system and mounting areas

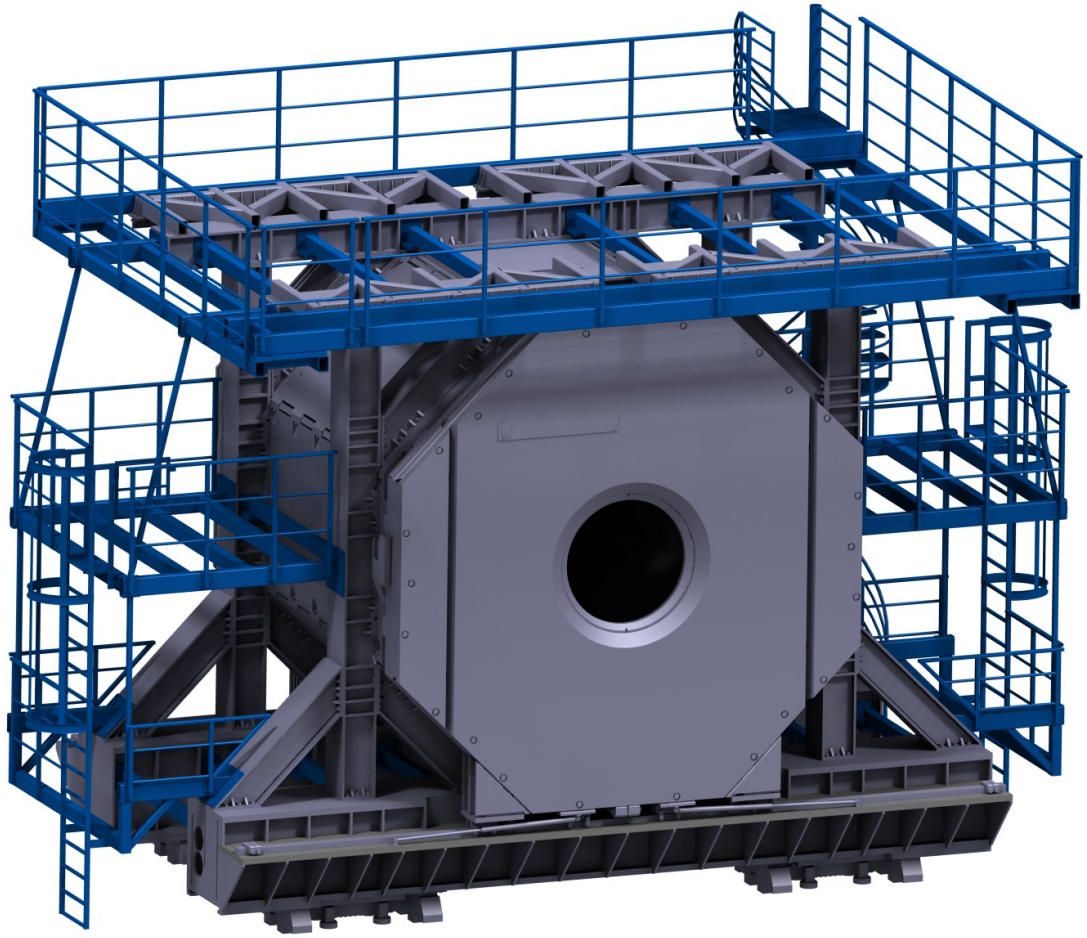


Yoke without supports

PANDA-hall infrastructure

Support structures on the solenoid yoke:

Supports on the solenoid Yoke are needed for racks, target system and mounting areas

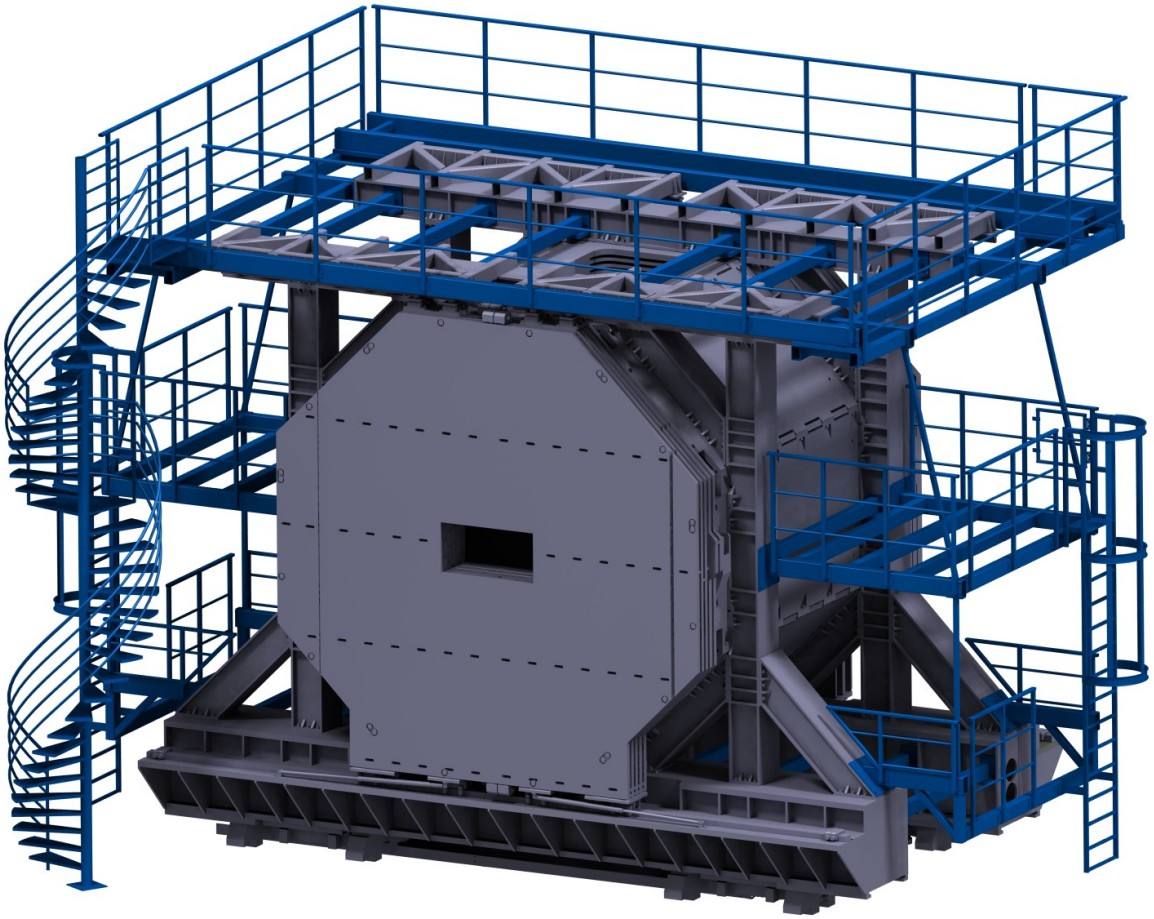


Yoke with supports
(front view)

PANDA-hall infrastructure

Support structures on the solenoid yoke:

Supports on the solenoid Yoke are needed for racks, target system and mounting areas

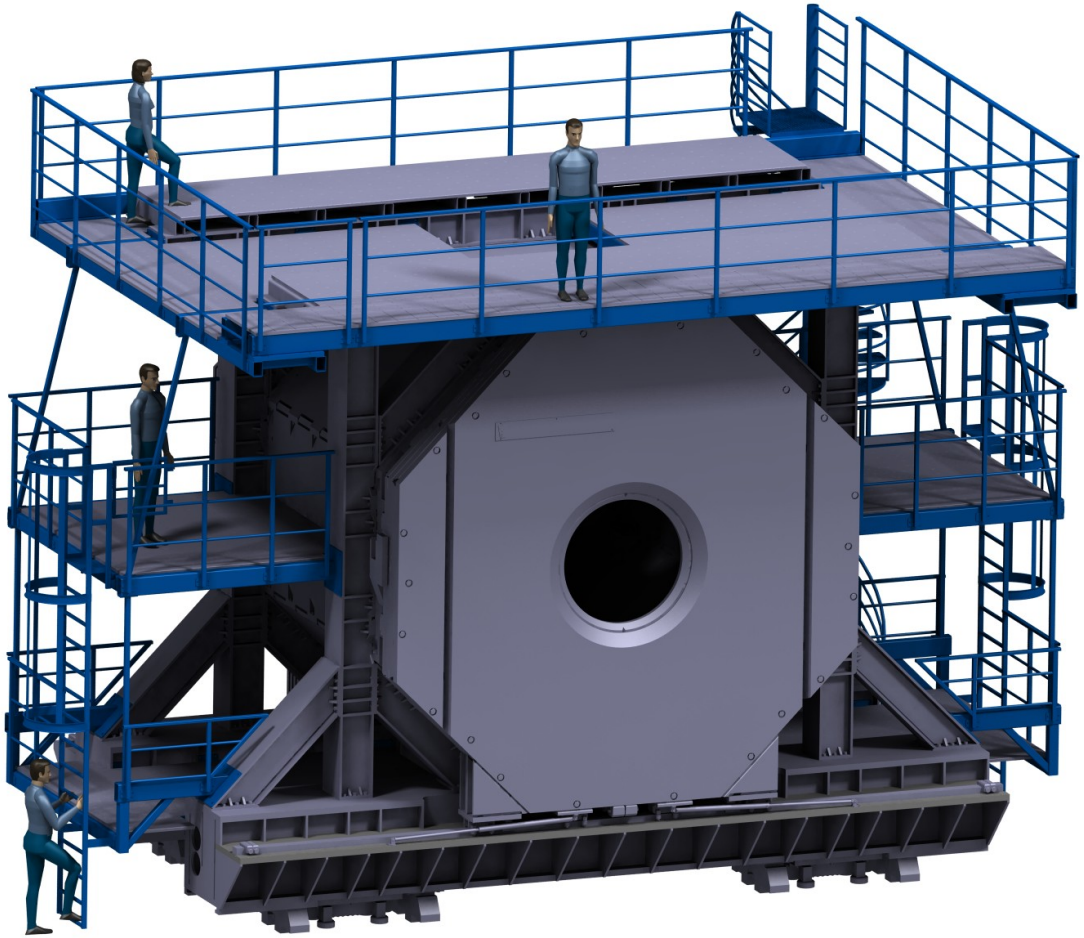


Yoke with supports
(back view)

PANDA-hall infrastructure

Support structures on the solenoid yoke:

Supports on the solenoid Yoke are needed for racks, target system and mounting areas

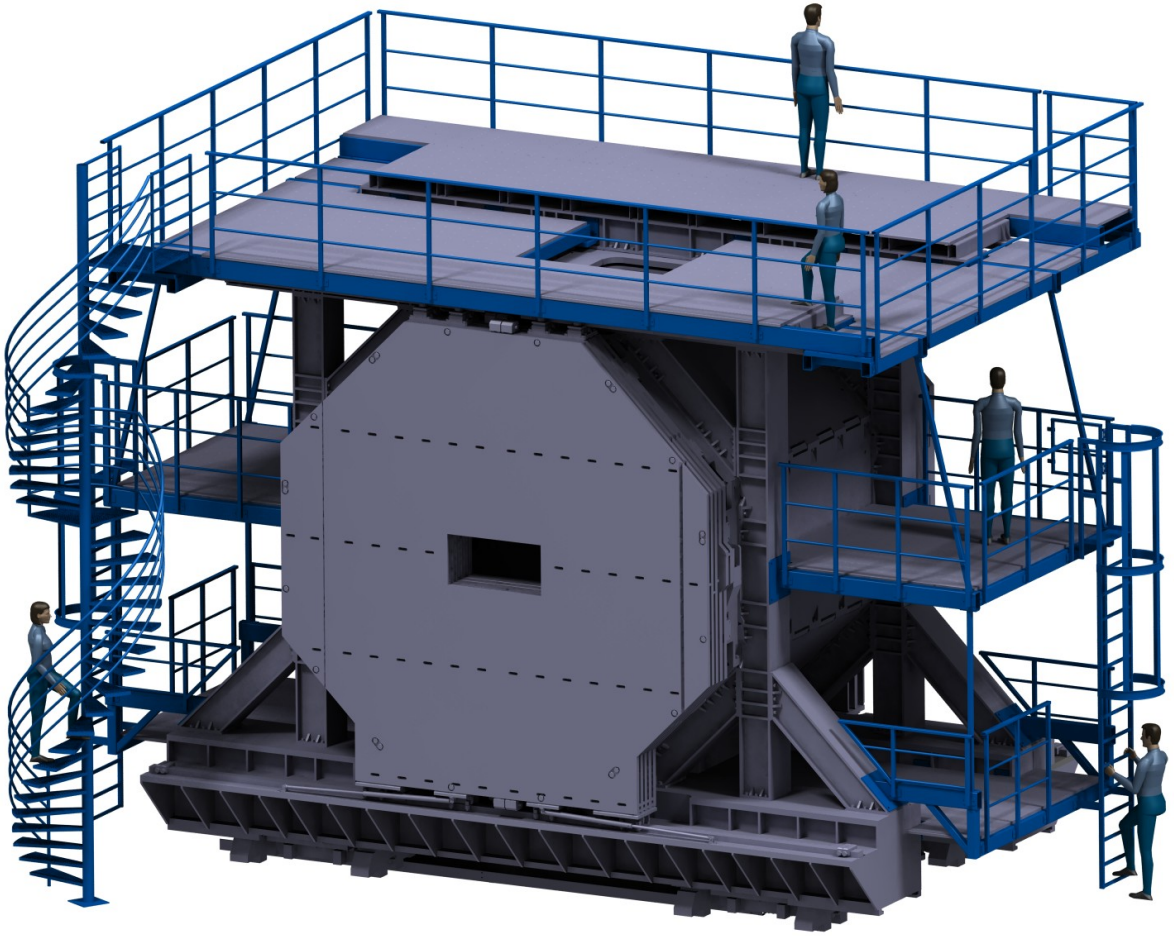


Yoke with supports and safety panels (front view)

PANDA-hall infrastructure

Support structures on the solenoid yoke:

Supports on the solenoid Yoke are needed for racks, target system and mounting areas



Yoke with supports and safety panels
(back view)

PANDA-hall infrastructure

The last picture shows an overview over the support structures in the PANDA hall