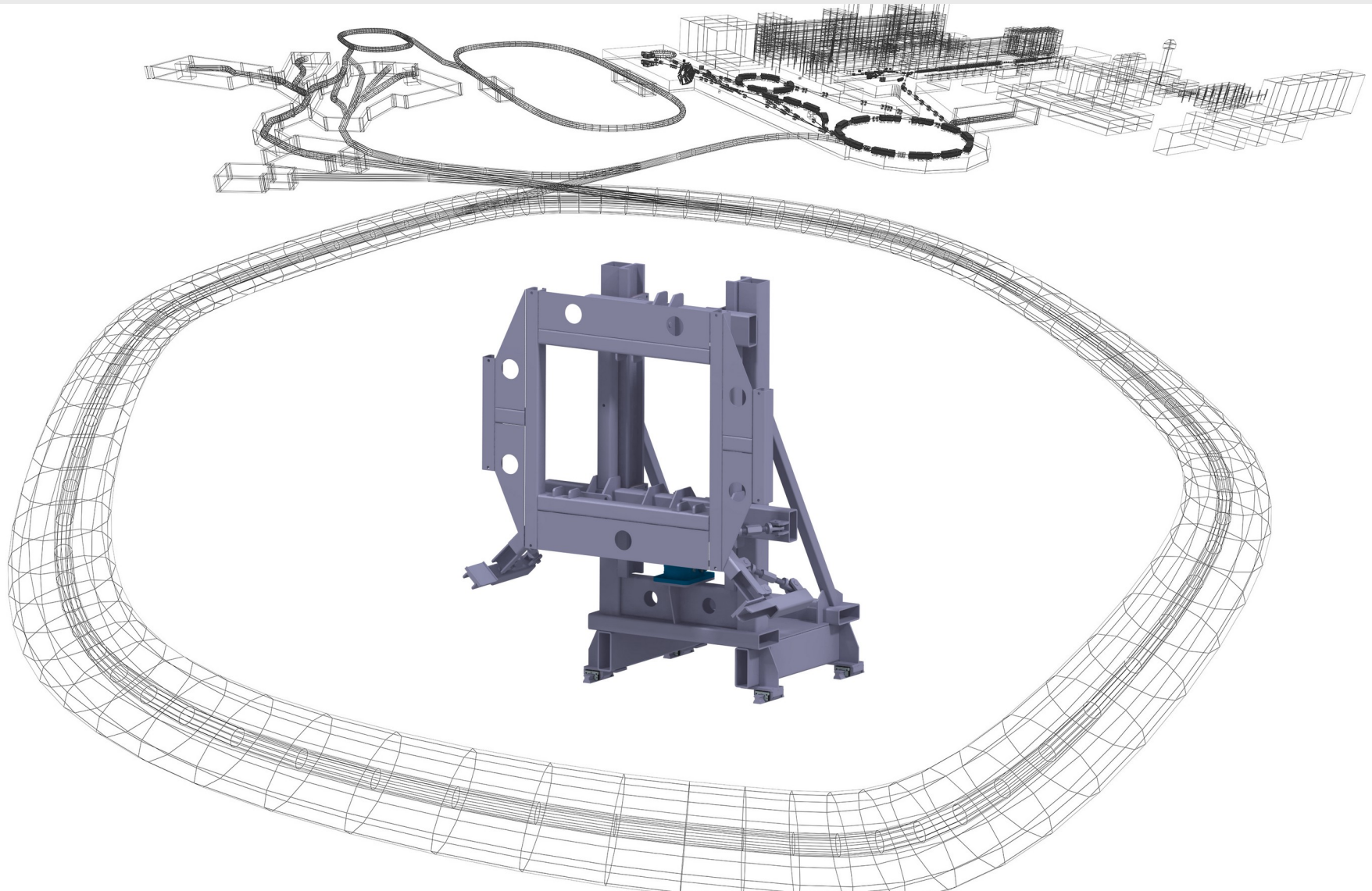
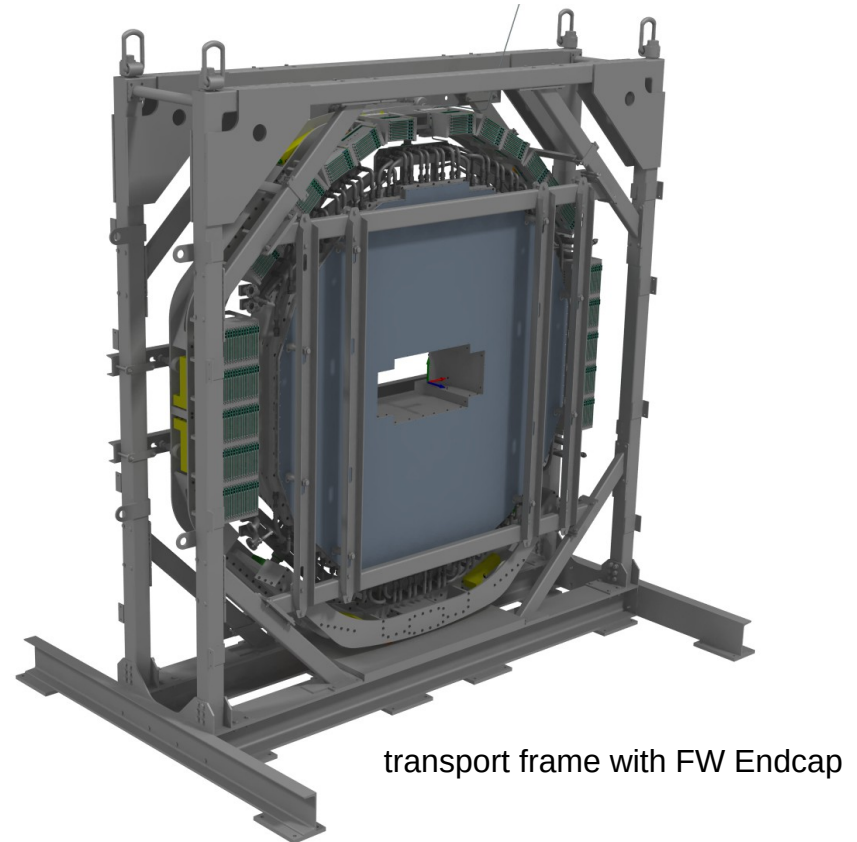
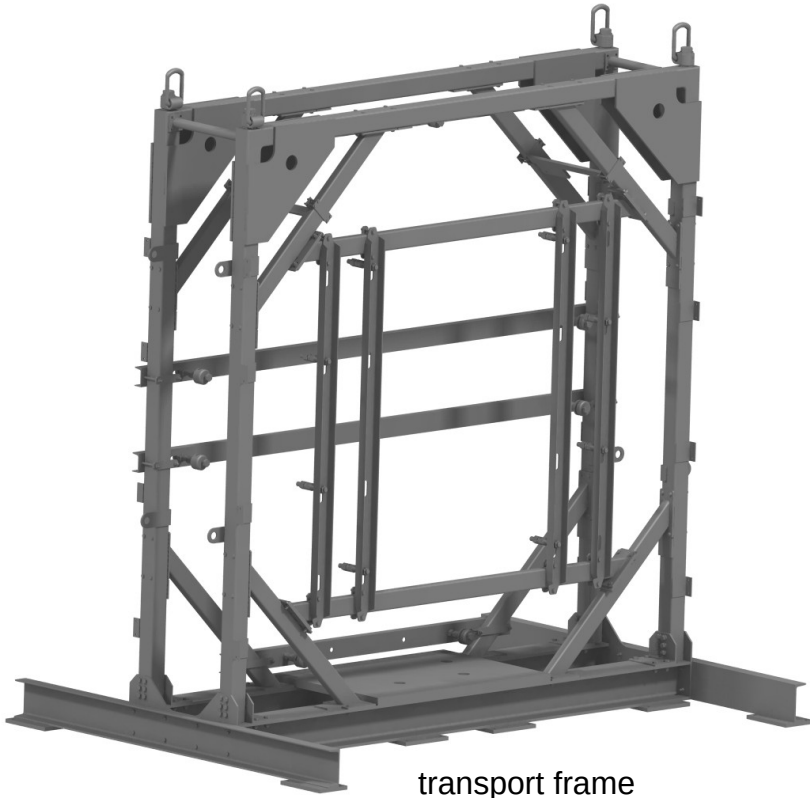


Mounting device for Forward Endcap installation



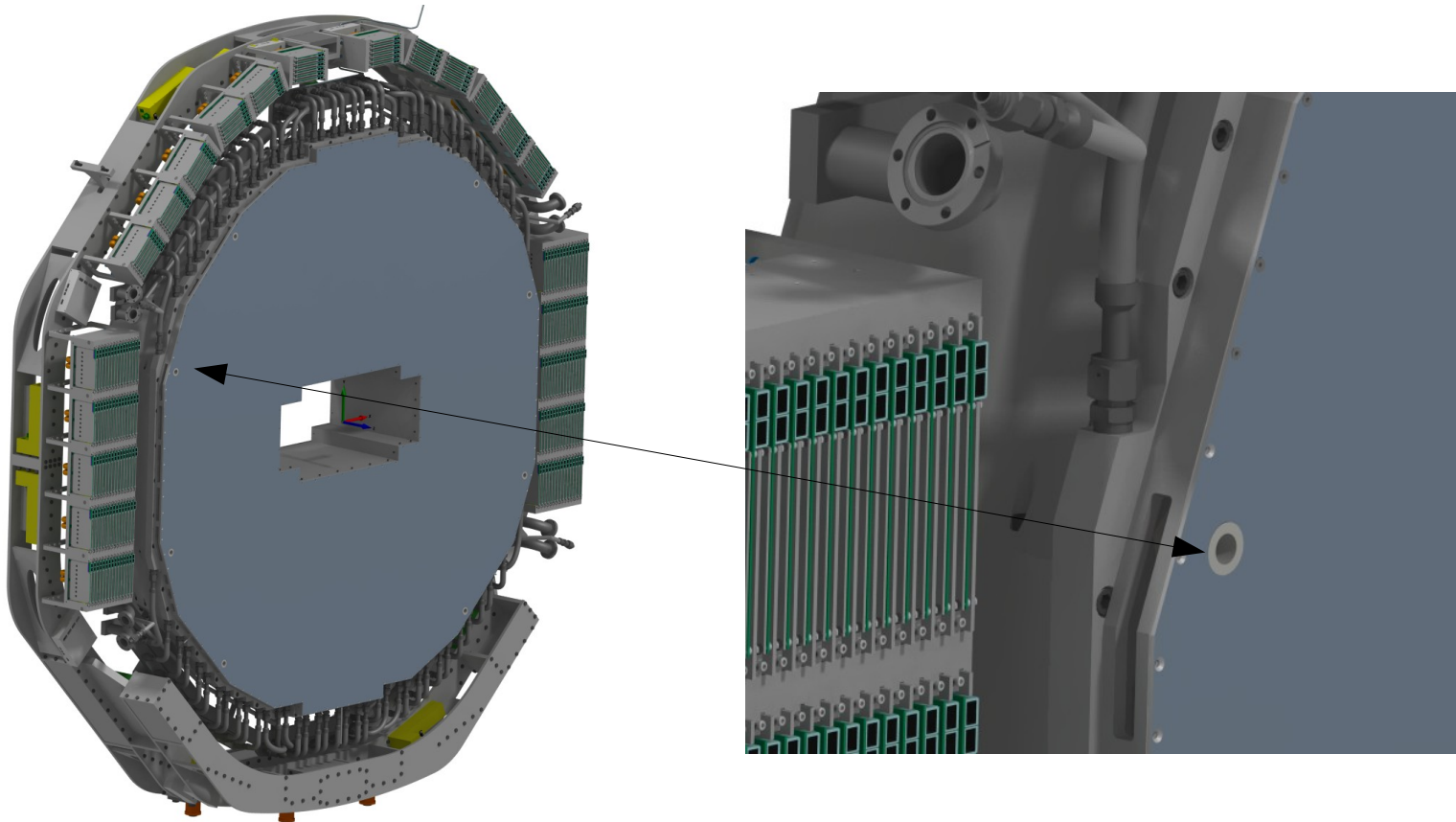
Requirements

- For the installation of the Forward Endcap into the Targetspectrometer, a special device is needed.
- The detector will be delivered via an special transport frame.



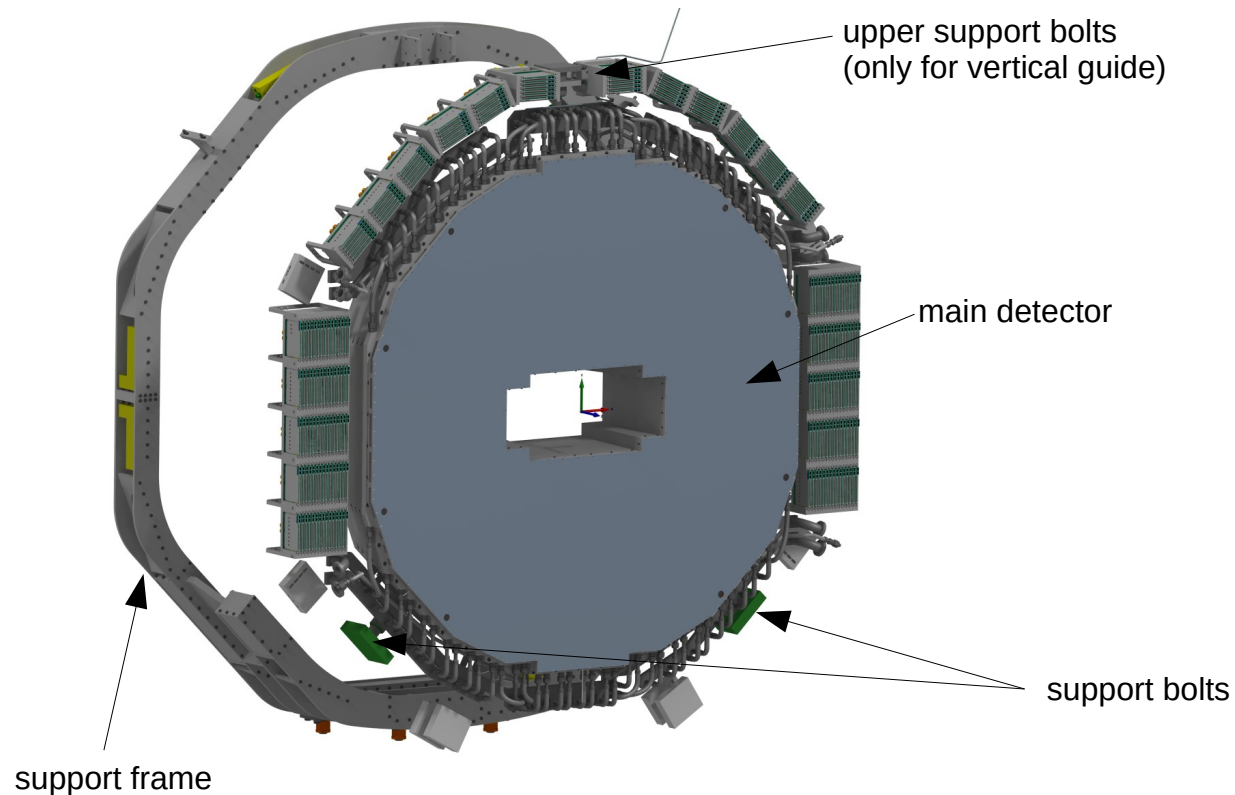
Requirements

- For the mounting device, 8 x M16 thread holes in the backplane can be used. This thread holes are also used as attachment points for the transport frame.



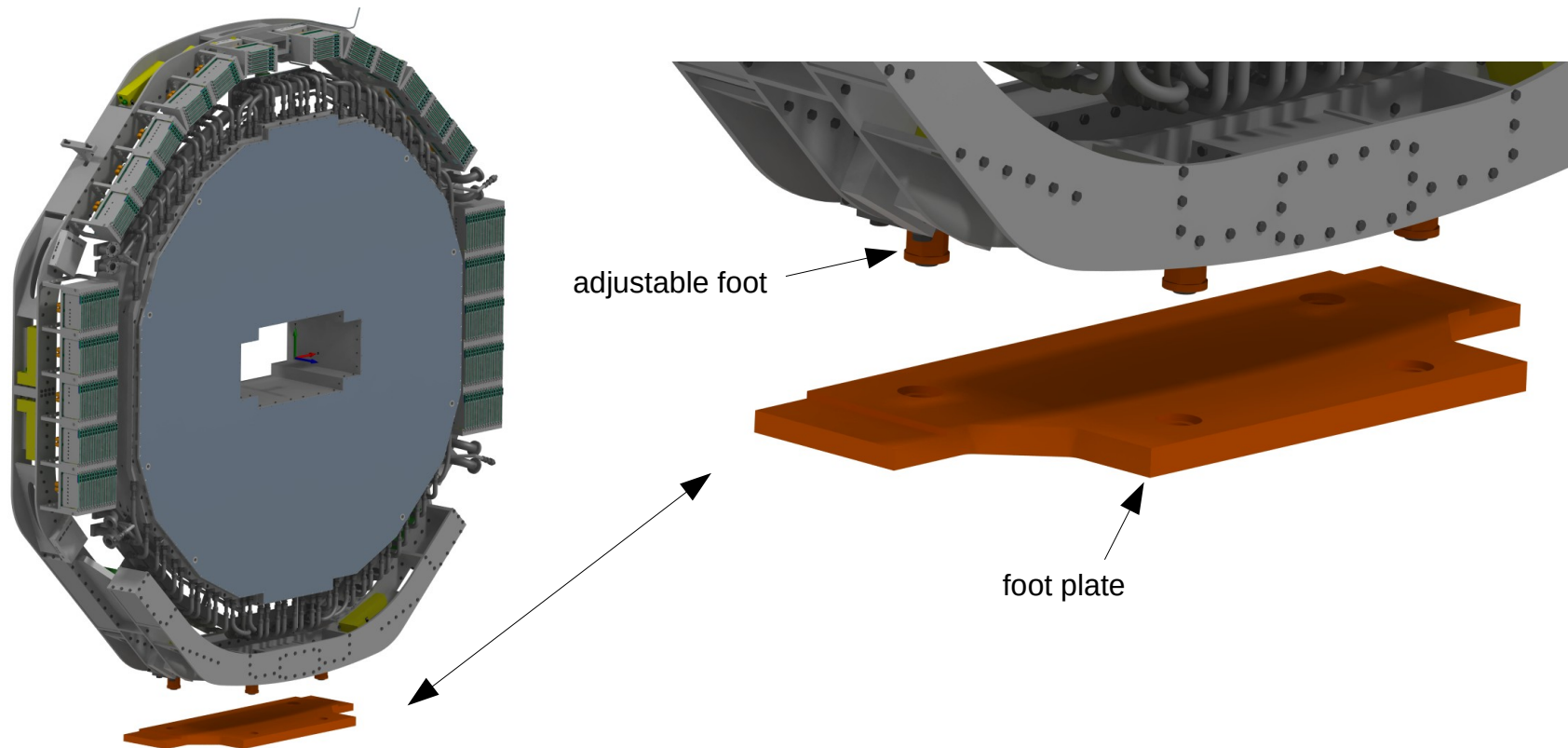
- The main detector has no rigid connection to the outer support frame, but is placed on it with two 45-degree supports and secured against falling over.

Because of that, the mounting device has to ensure that the support frame will keep its origin position to the main detector while moving and adjusting. Not least to prevent damages to cable and pipe components which will be attached to both assemblies.



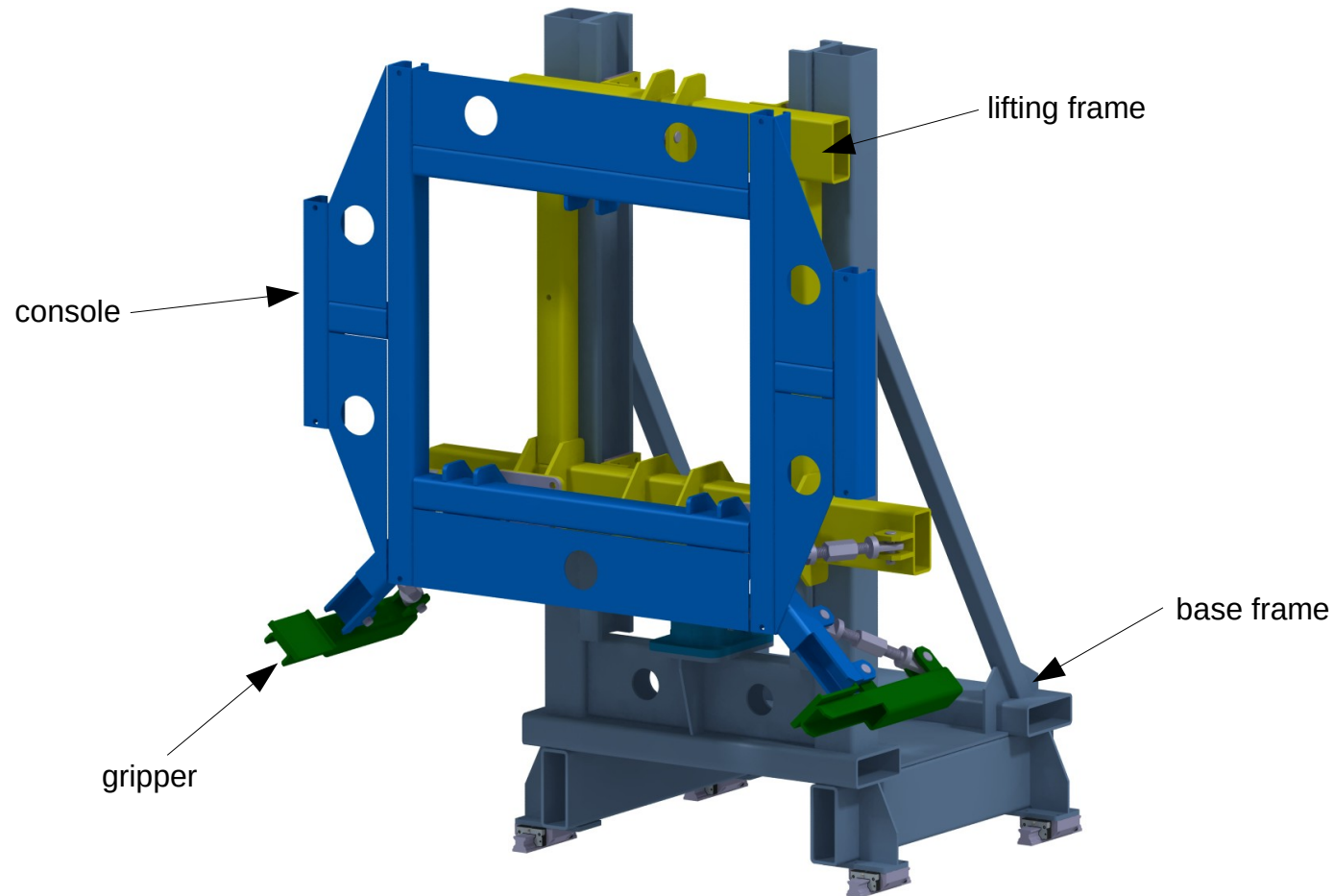
- The final position of the FW Endcap will be on a foot plate which is integrated in the Solenoid yoke. That connection will be realized via four adjustable feet and holes in the footplate.

The gap between the feet and the holes is only 1 mm. For that reason, the mounting device should be able to provide to adjust the relative position of the detector to the foot plate.



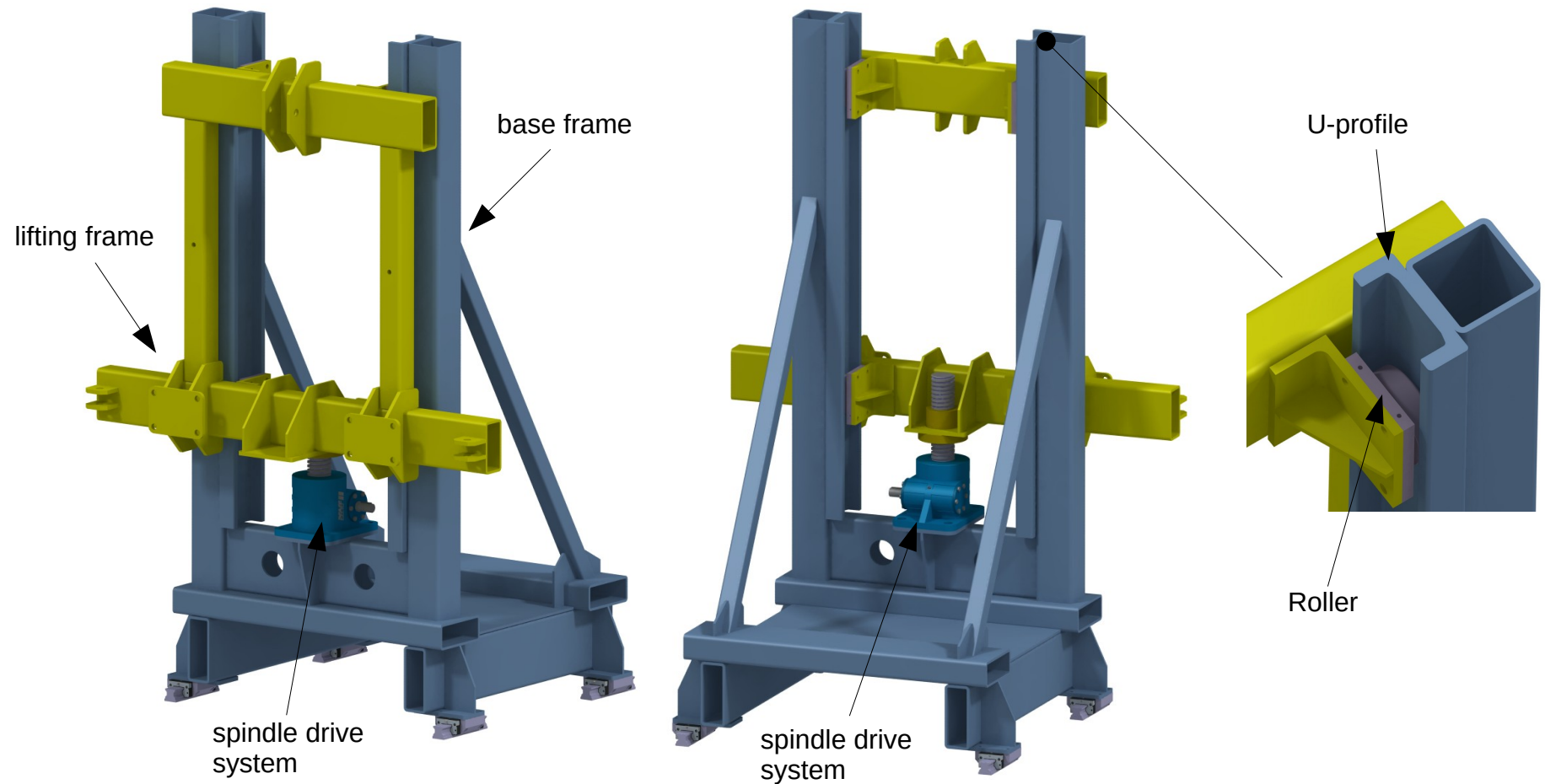
First Design of the mounting device

- The mounting device consists primary of four several welding assemblies and several bolt connections.



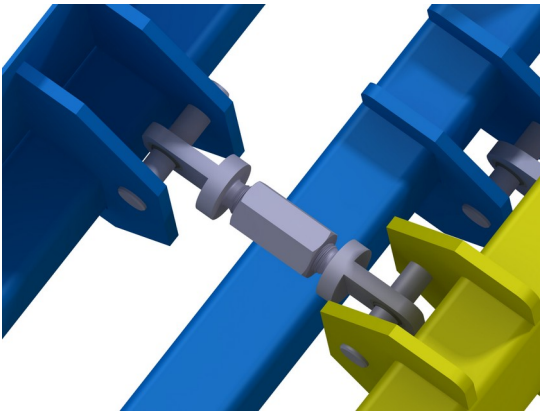
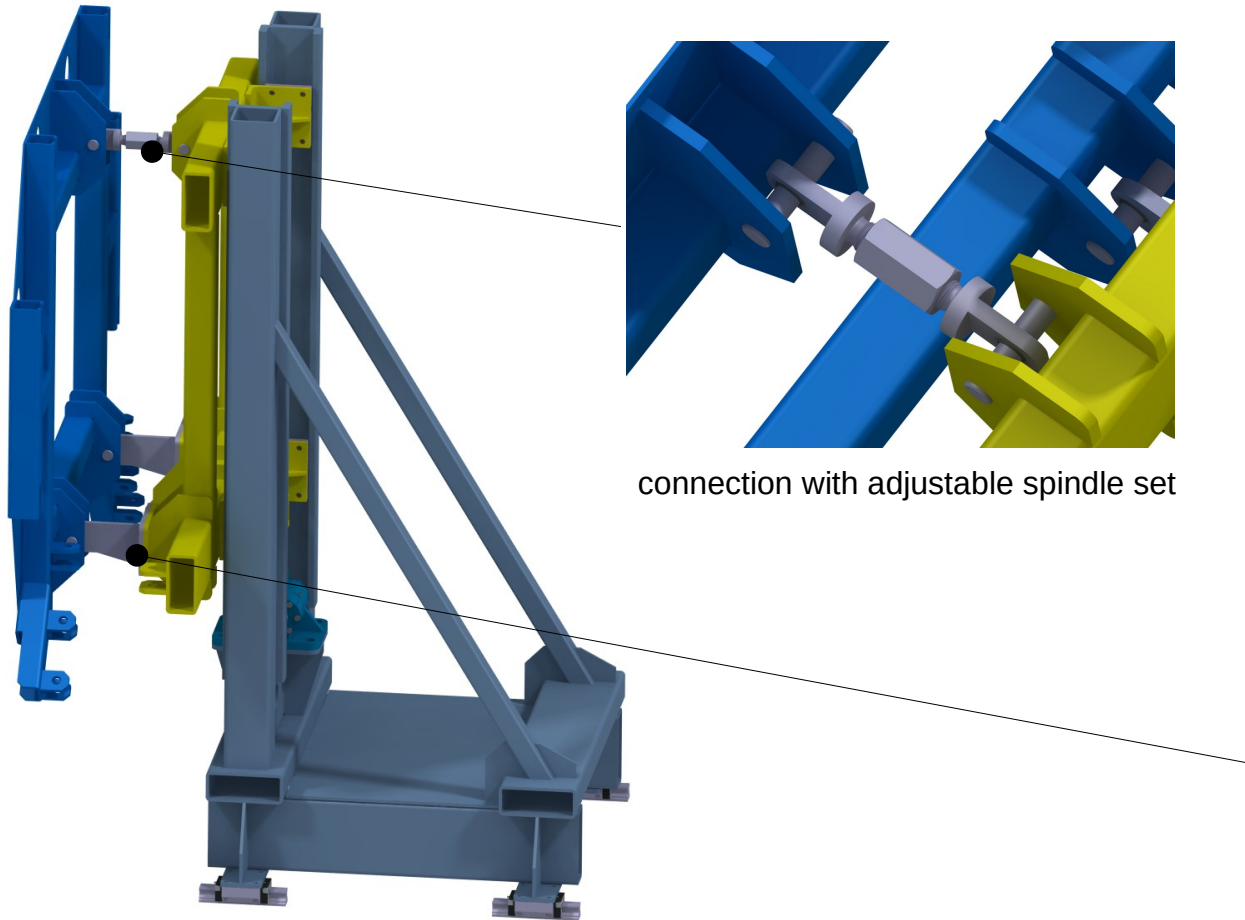
First Design of the mounting device

- For lifting up the detector, a spindle drive system is be foreseen. The guiding works via roller and U-formed profiles. The movement of the spindle can be powered by hand, for example with a wheel.



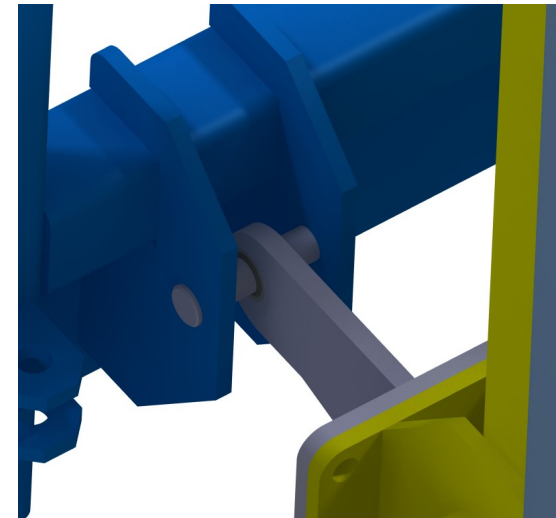
First Design of the mounting device

- The console is attached to the lifting frame via three bolt connections. Two lower with rigid connections to the lifting frame and a upper with a adjustable spindle set to adjust the angle.



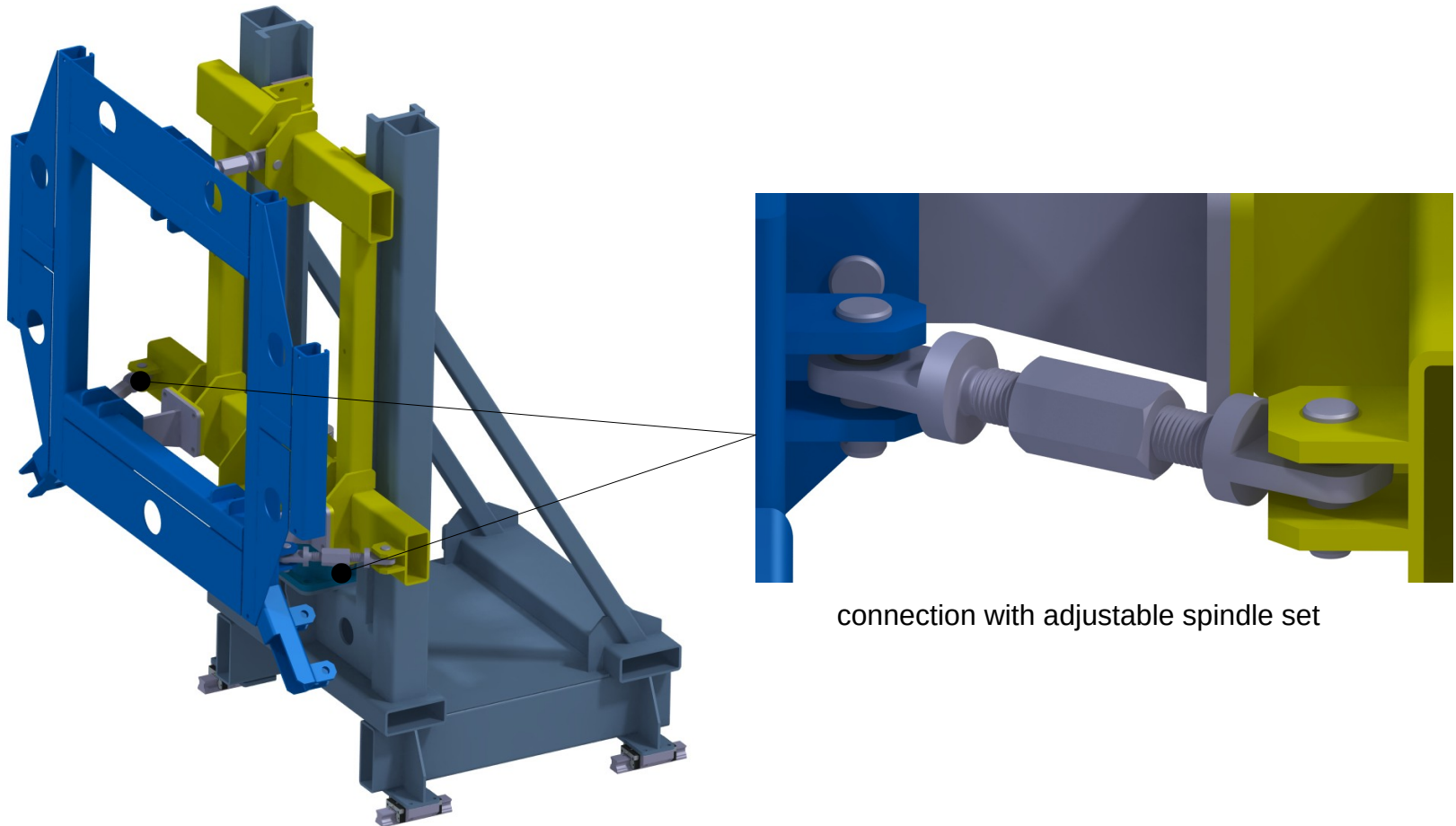
connection with adjustable spindle set

2 x connection rigid to lifting frame
and with bolt to console



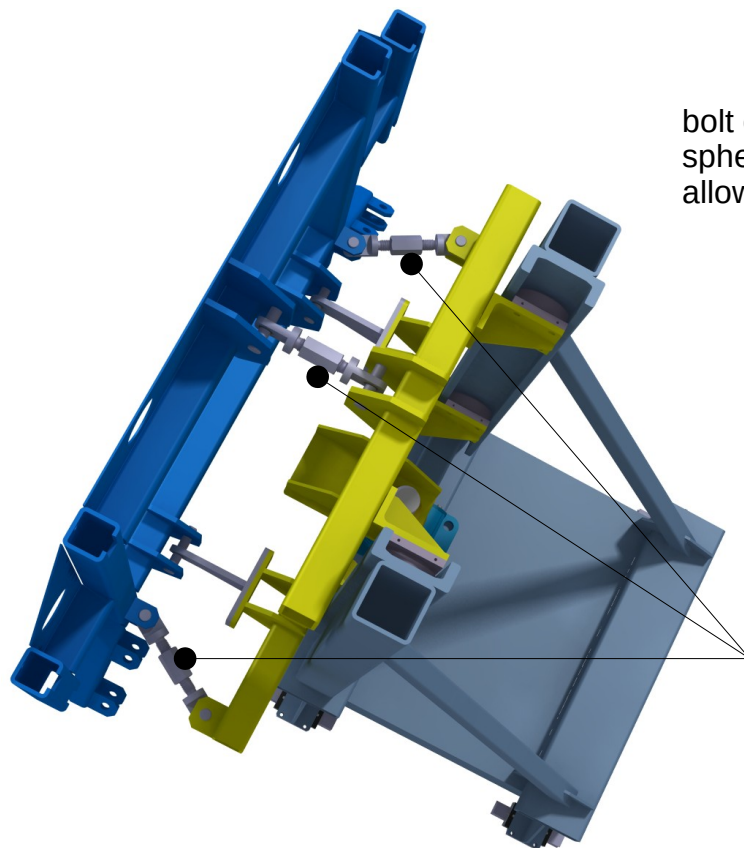
First Design of the mounting device

- For the manipulation of the other angles, two additional adjustable spindle sets will be attached between console and lifting frame via bolt connections



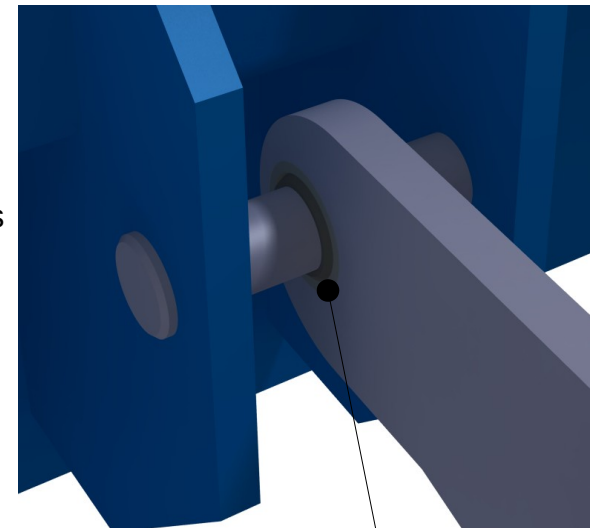
First Design of the mounting device

- These three spindle sets in combination of the spherical bearings in the bolt connections allows a fine adjustment in all directions. That will be important to assure that the lower foots of the detector will fit in the holes of the foot plate on the solenoid yoke.



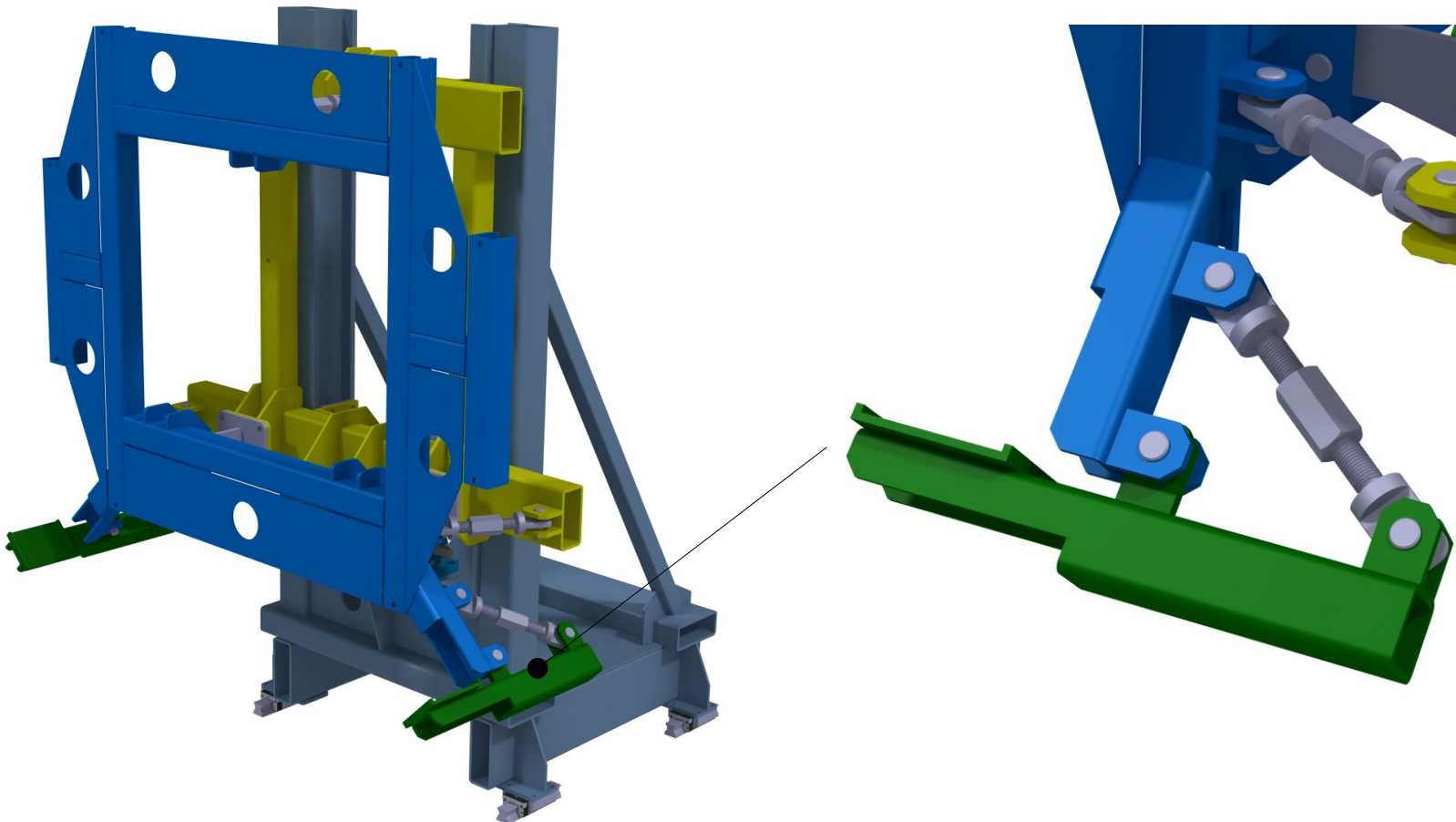
bolt connections have spherical bearings which allows angular displacements

three adjustable spindle sets for alignment



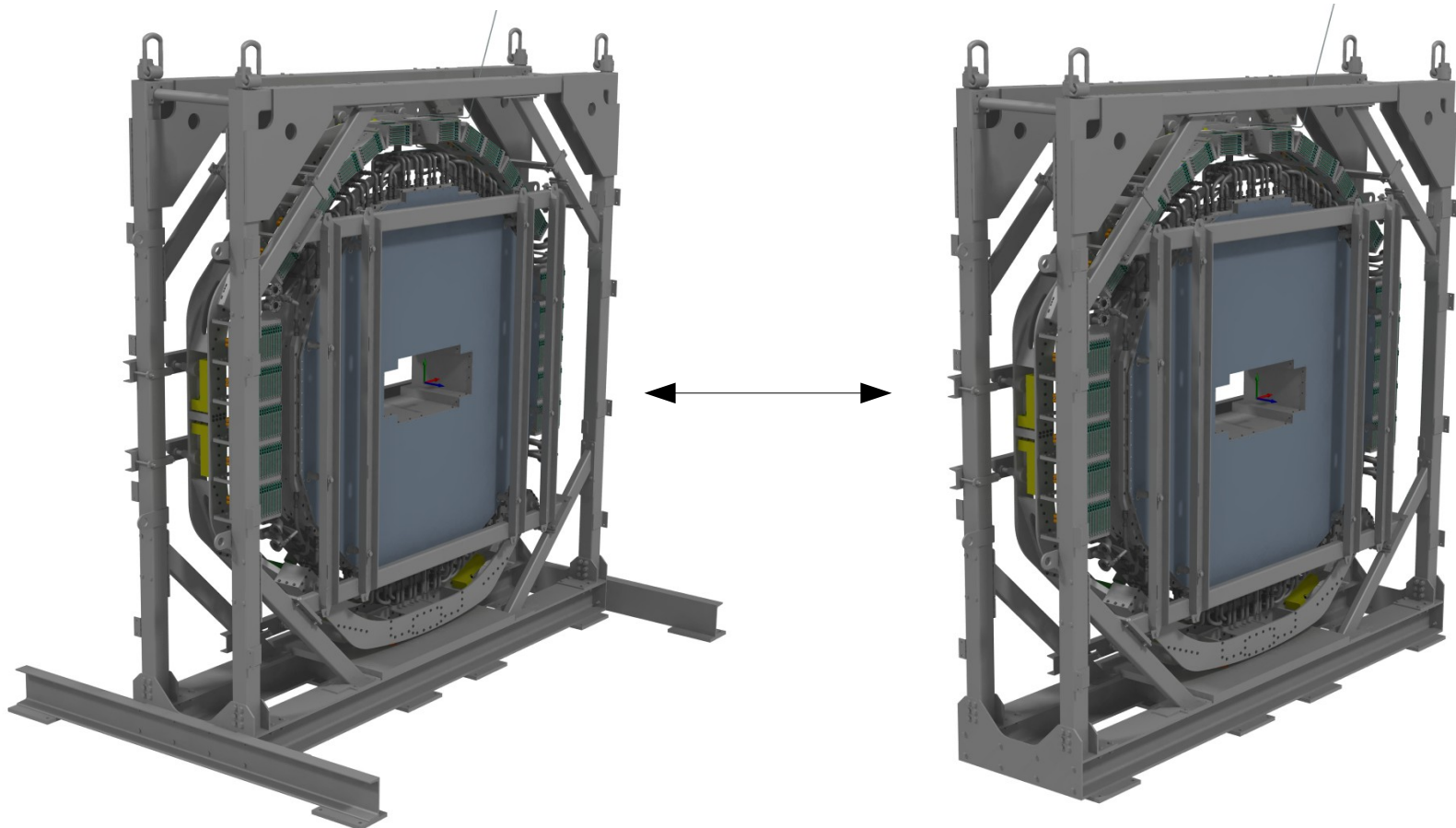
First Design of the mounting device

- For the fixation of the support frame, two grippers will be attached to the console via bolt connections. An additional spindle for each gripper allows to move its arms.

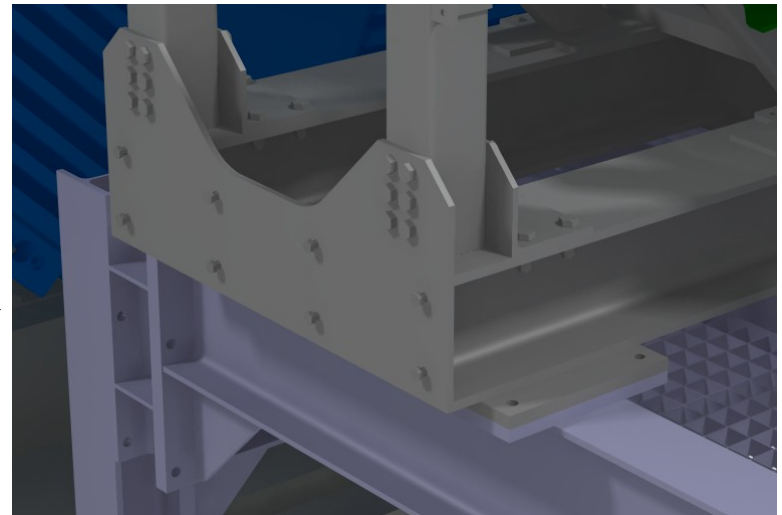
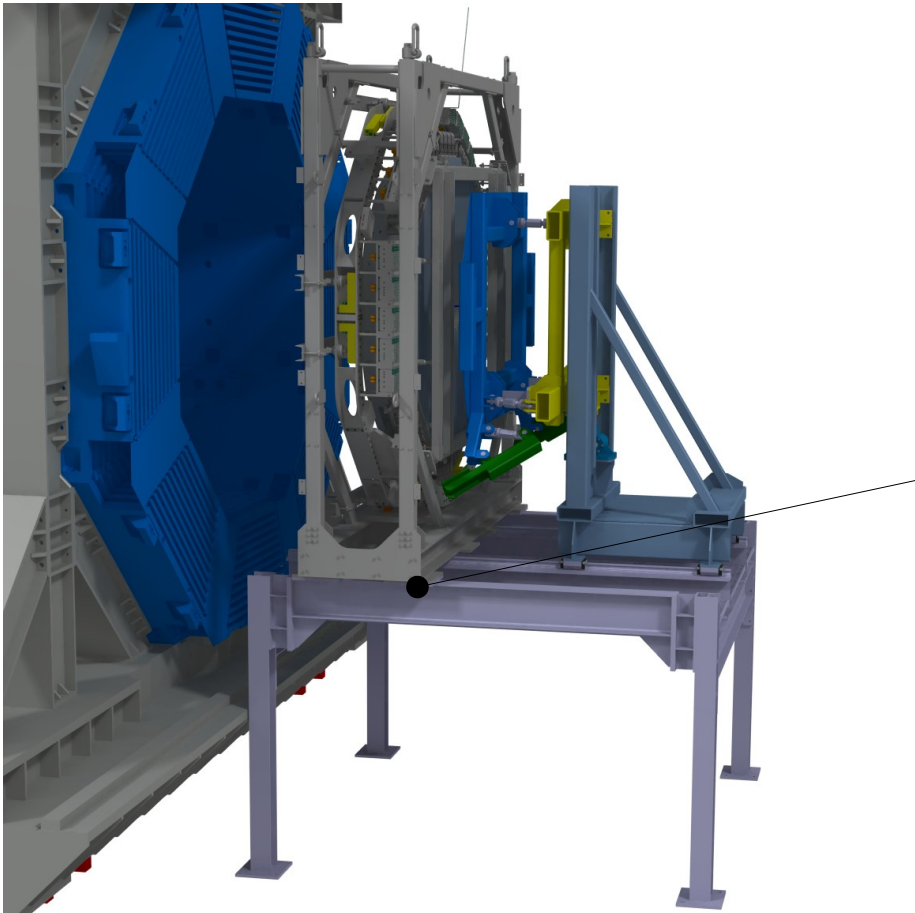


Installation procedure

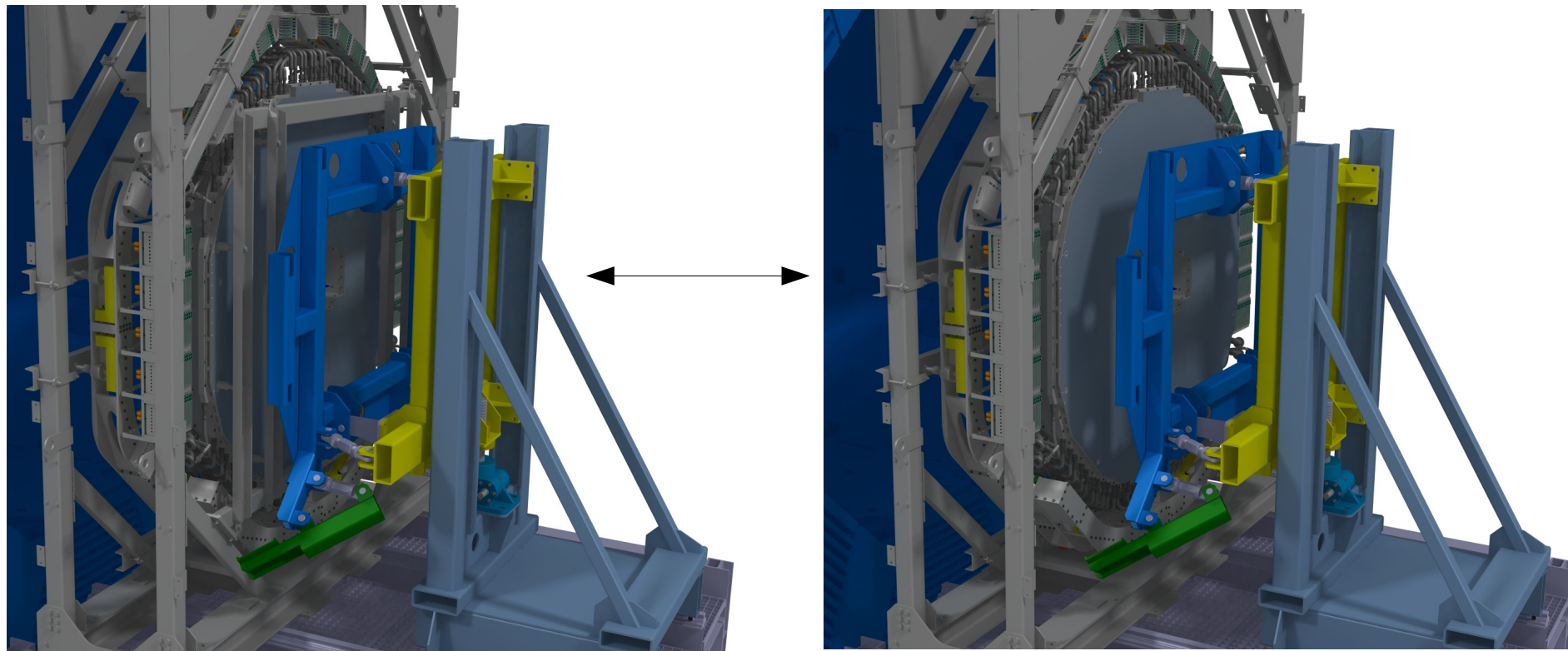
- In the first step, the outer beams from the transport frame can be dismantled. This should be possible while the frame is still connected to the crane.



- Next the transport frame with the detector can be put on special plates, which are foreseen on the mounting support. After that the transport frame will be fixed via screws to avoid that it falls over.

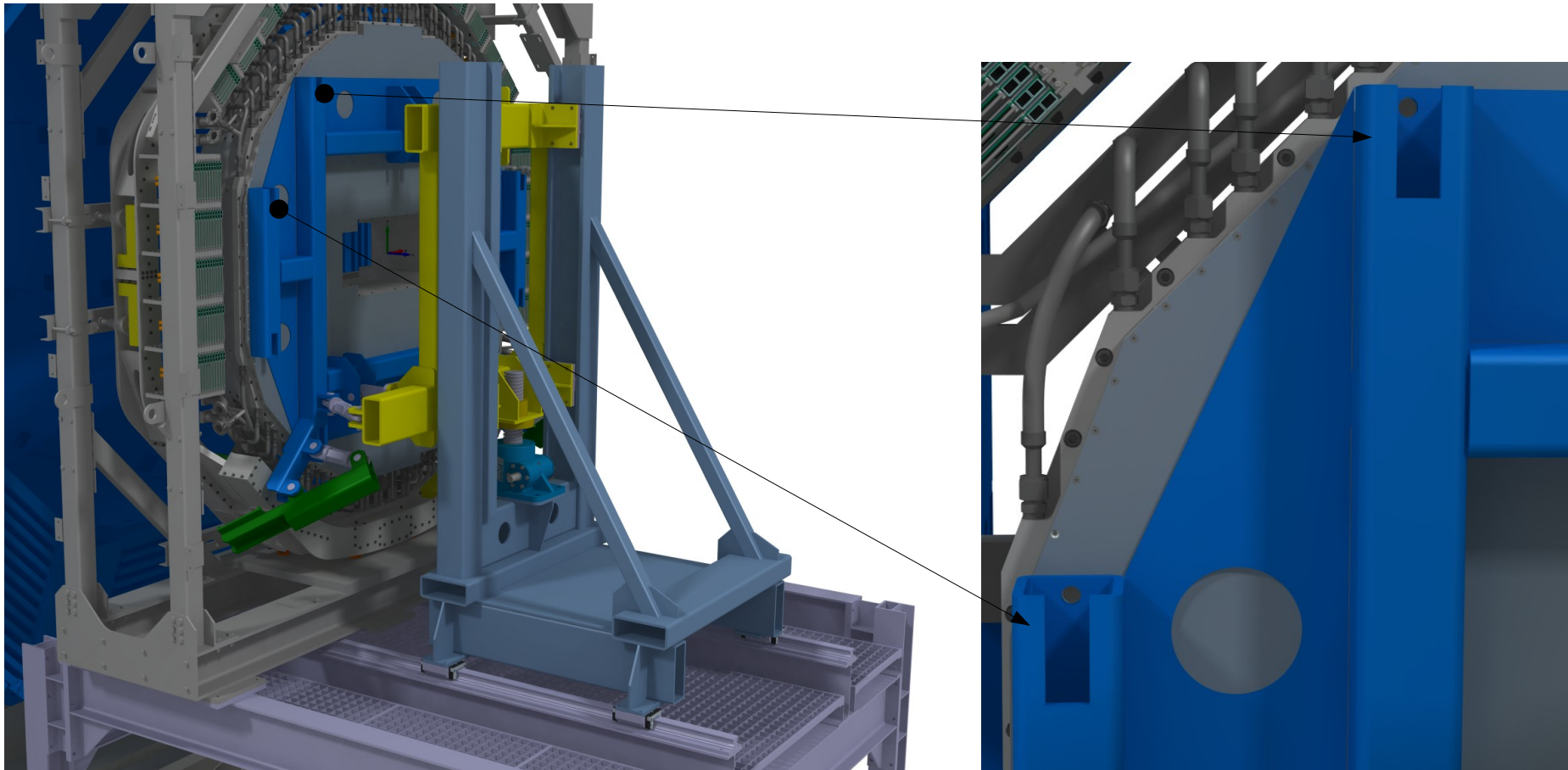


- Then, some of the downstream components of the transport frame will be dismantled to allow access by the mounting device. The detector will be still stable and safe against tilt over.



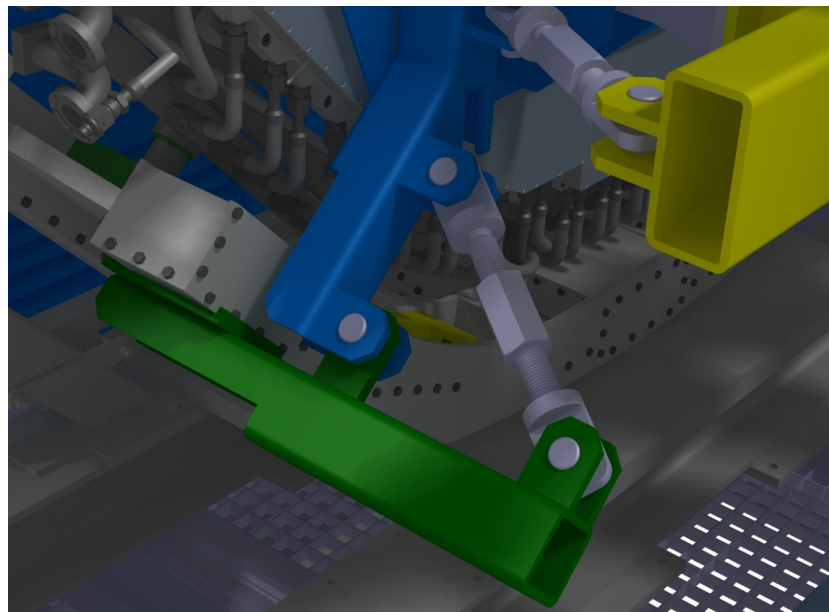
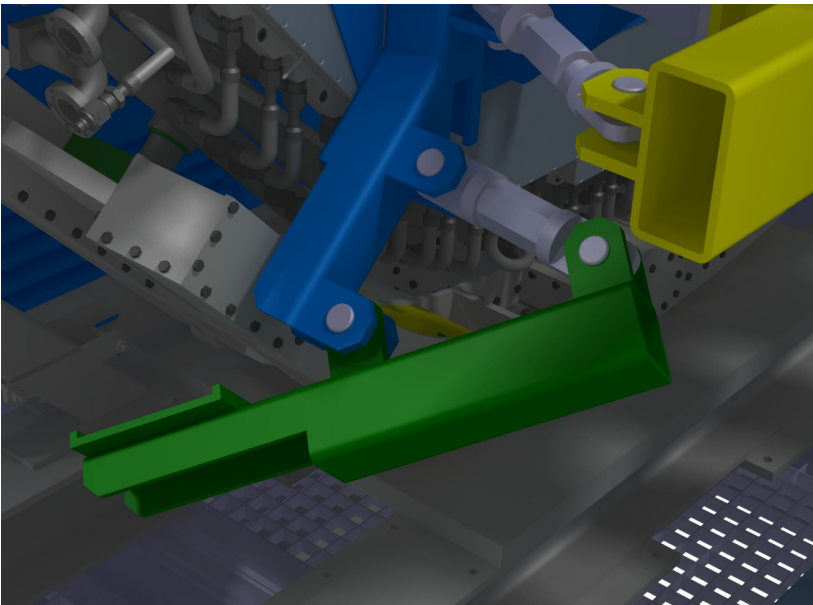
Installation procedure

- After that, the mounting device will move forward and the console will be attached to the backplane via 8 x M16 screws.

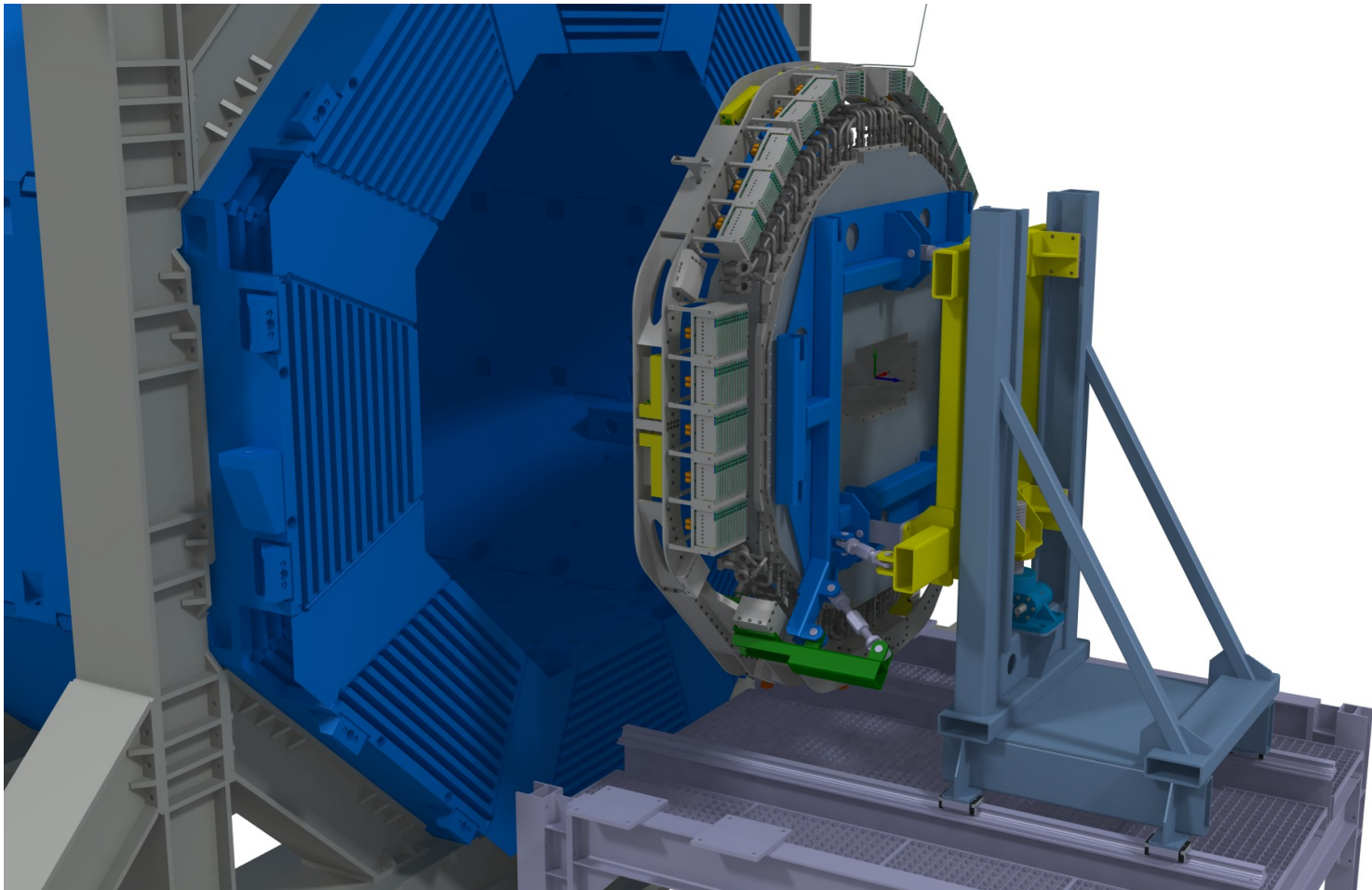


Installation procedure

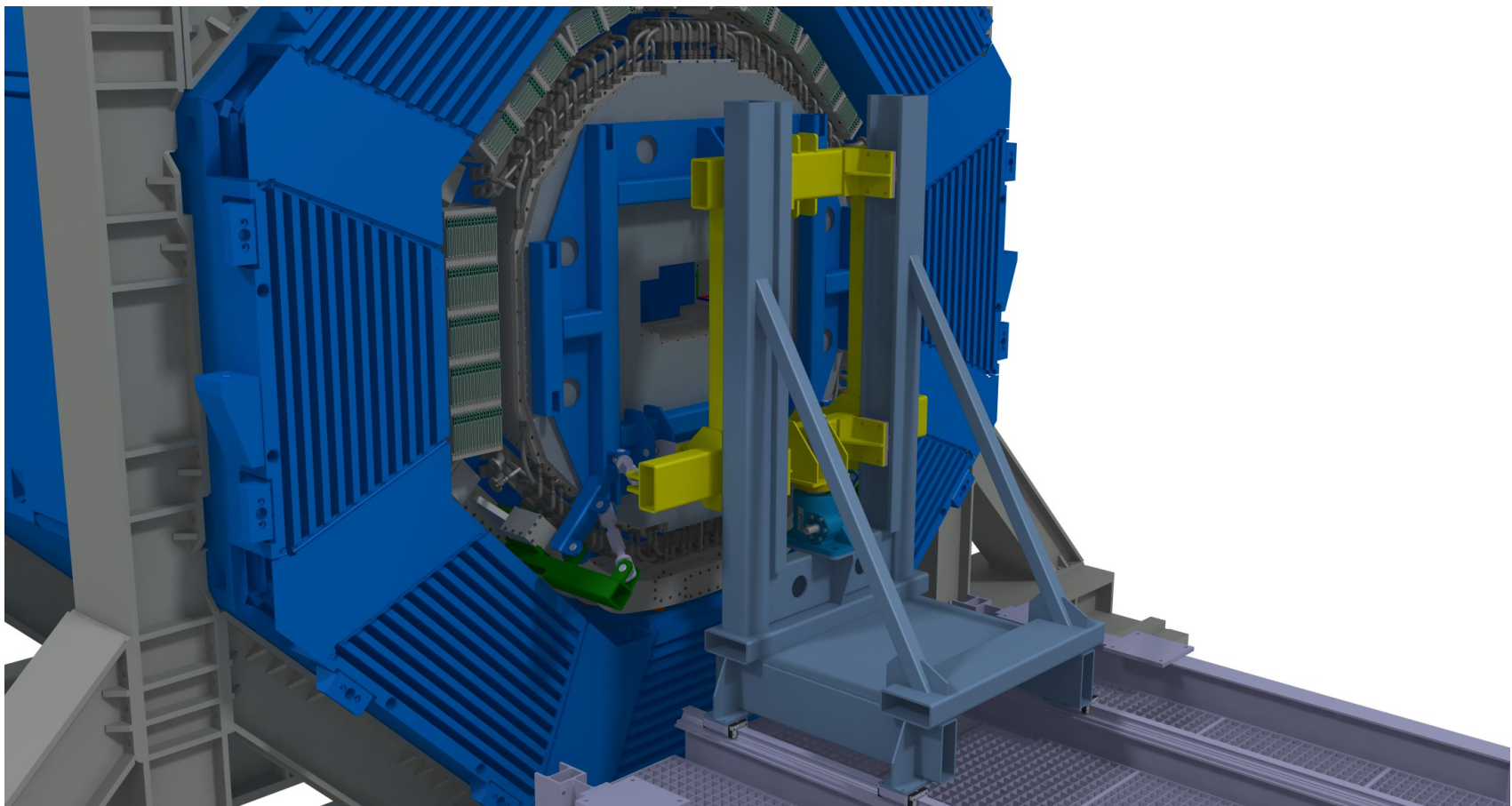
- When the main detector with includes most of the weight, is connected to the console, the both grippers will be moved to the outer support frame and make sure that there are no relative movements between the both components.



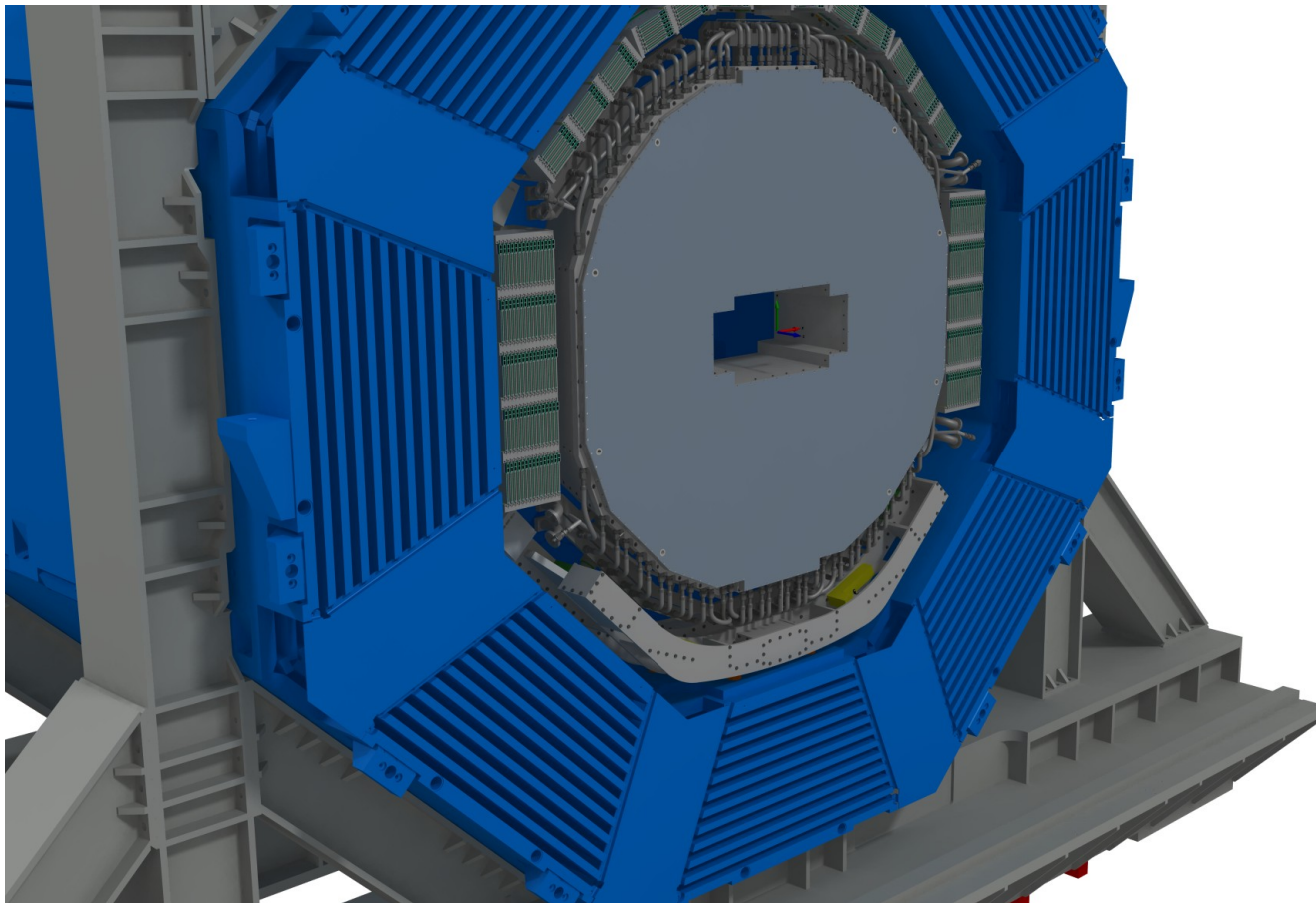
- After that, the transport frame can be dismantled and the vertical spindle system of the mounting device lift up the detector.



- Then, the device will move with the detector to the final position in the spectrometer. For the final alignment, the three adjustment spindle sets will ensure that the feet will fit to the holes in the foot plate.



- After the final positioning, the mounting device and its support can be dismantled and be stored.



Conclusions:

- This was a first suggest how such a device could look like.
- More details and specifications has to clarified.
- An Advantage of the modular design is, that we could use the same device for installation of the GEM by exchanging the console with an other adapter.

Open points:

- We have not decided yet, how to move the mounting device itself. There are many possibilities like spindle drive, rack and pinion drive or cable pull. Movement per hand should be possible as well, as because of the low friction of the profile rail, the needed force is just about 40 kg.
- If we decide to proceed with this concept, for the final design we have to make calculation regarding to stress and deformation.
- If we decide to use the same mounting device for the GEM, we have to clarify the boundary conditions for that installation procedure as well.

Thank you for your attention