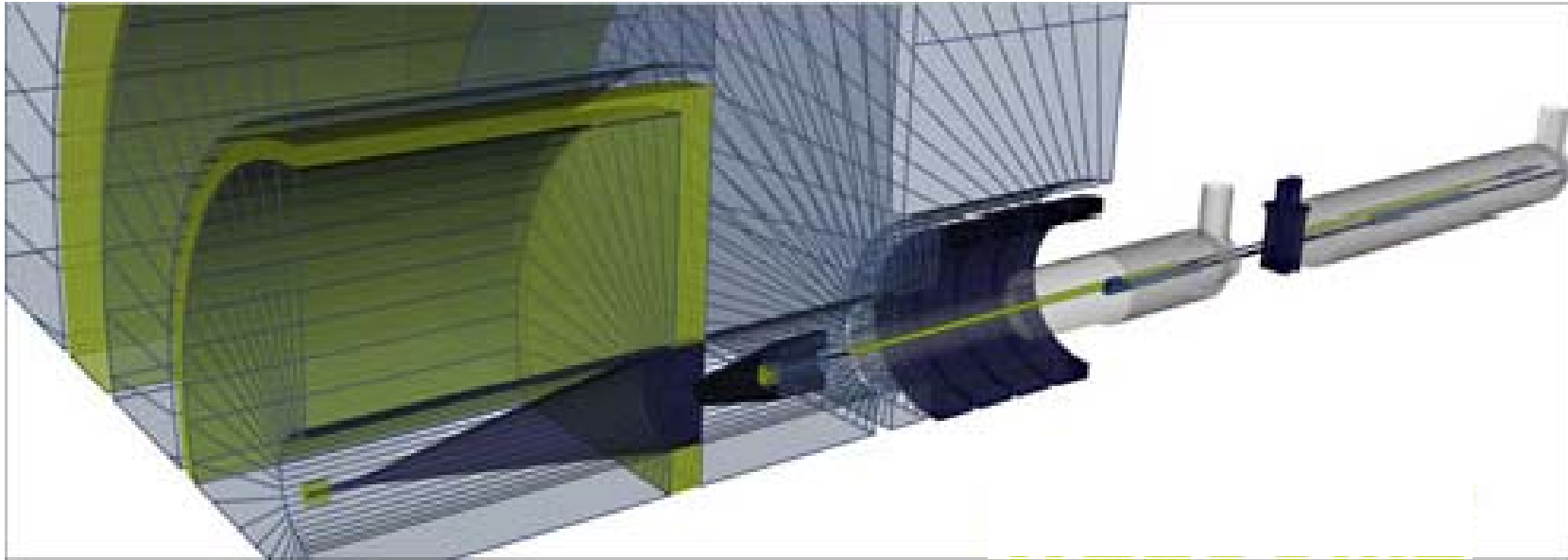


SiD Collaboration Meeting

January 28-30, 2008
Stanford Linear Accelerator Center



Forward Region Engineering



Marco Oriunno, SLAC



Introduction (outlook)

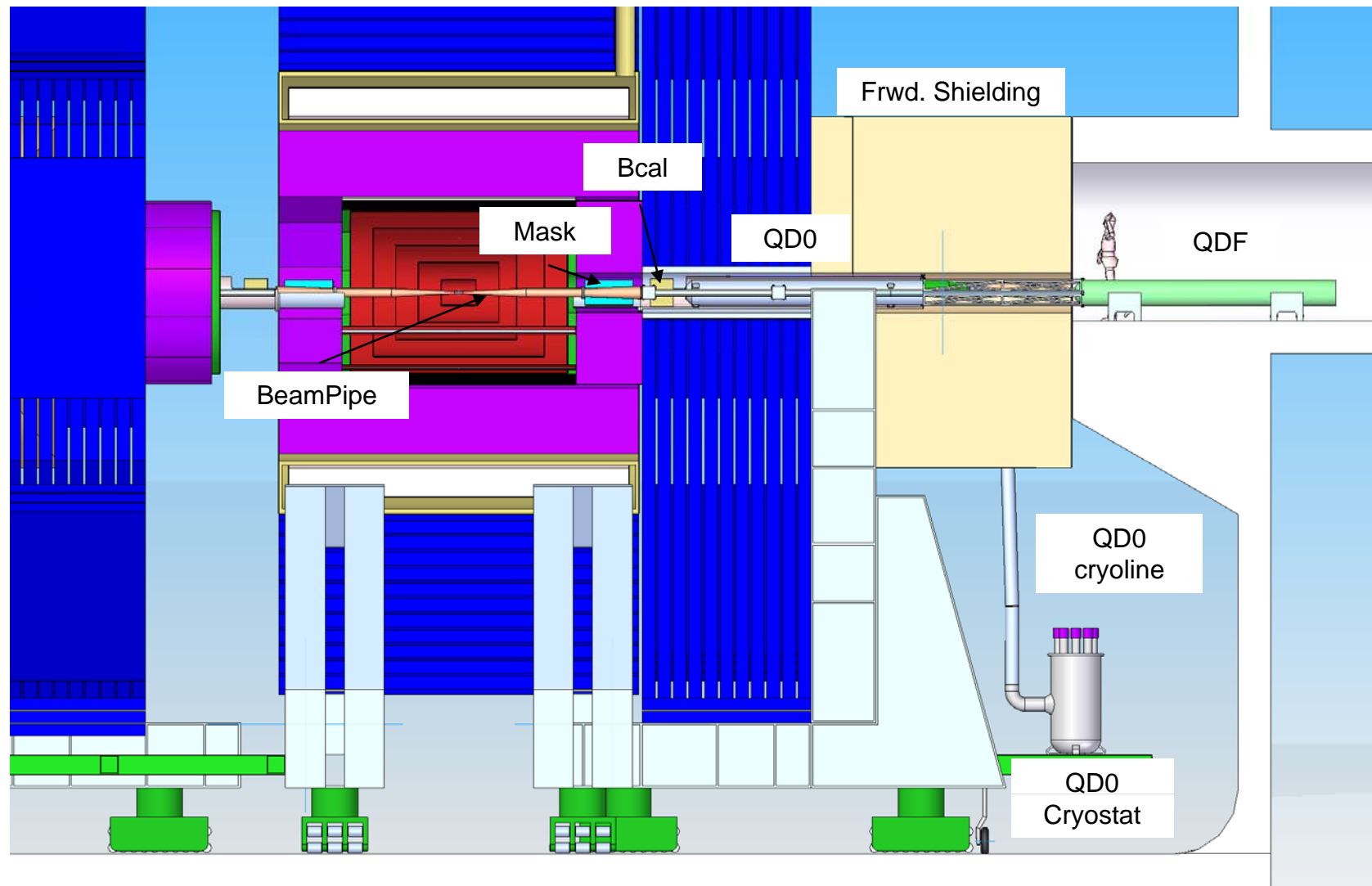
Forward Region Engineering deals with the integration, the assembly and the maintenance of:

- Machine-Detector Interfaces
- Experimental vacuum chamber
- Luminosity Monitors and near beam physics
- L* quadrupoles (supports, cryogenics, alignment)
- Shielding
- Detector opening and accessibility (Maintenance)

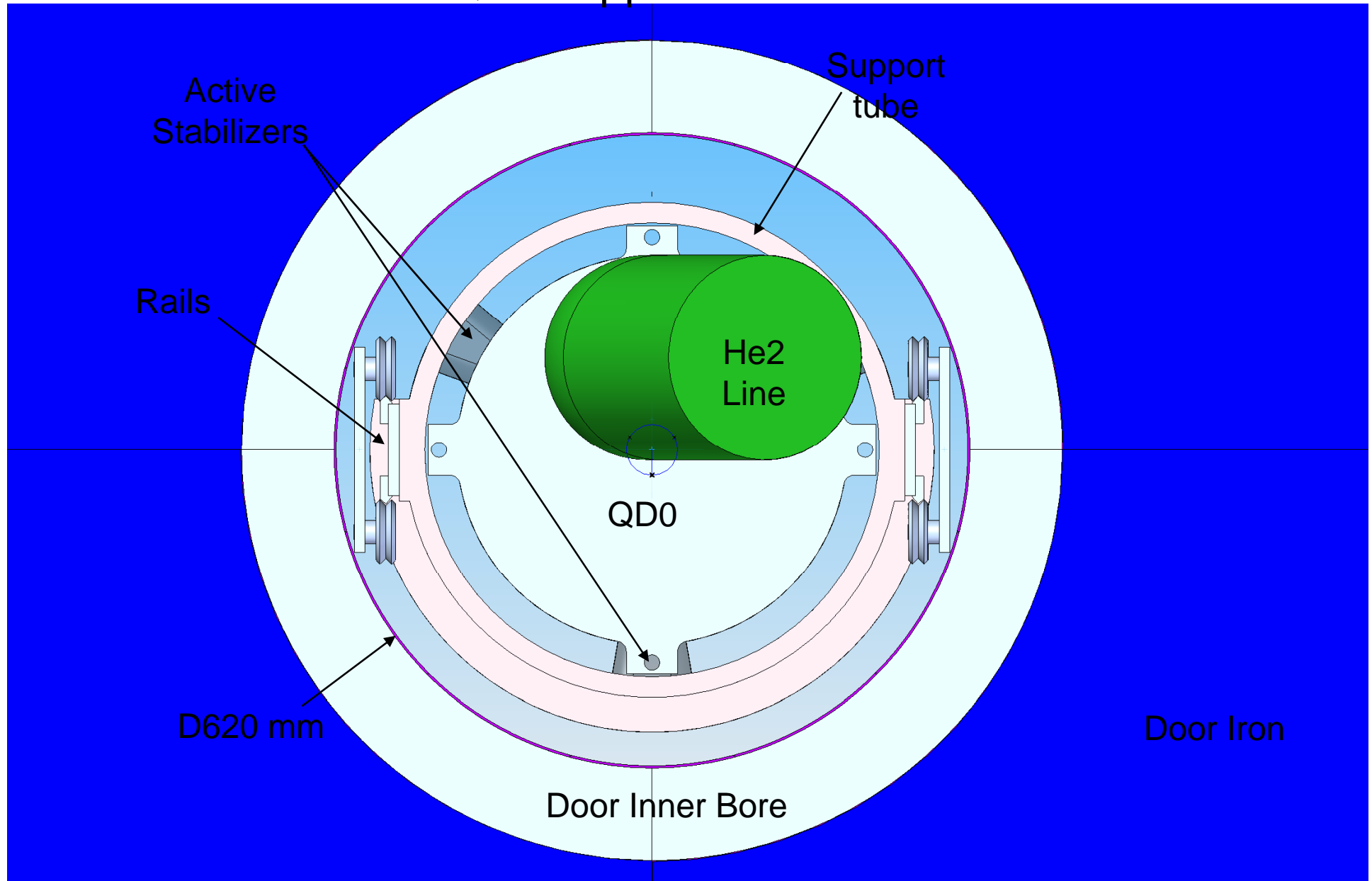
The push-pull feature increase substantially the list of the above requirements, but I will not cover explicitly this last subject

Machine-Detector Interfaces

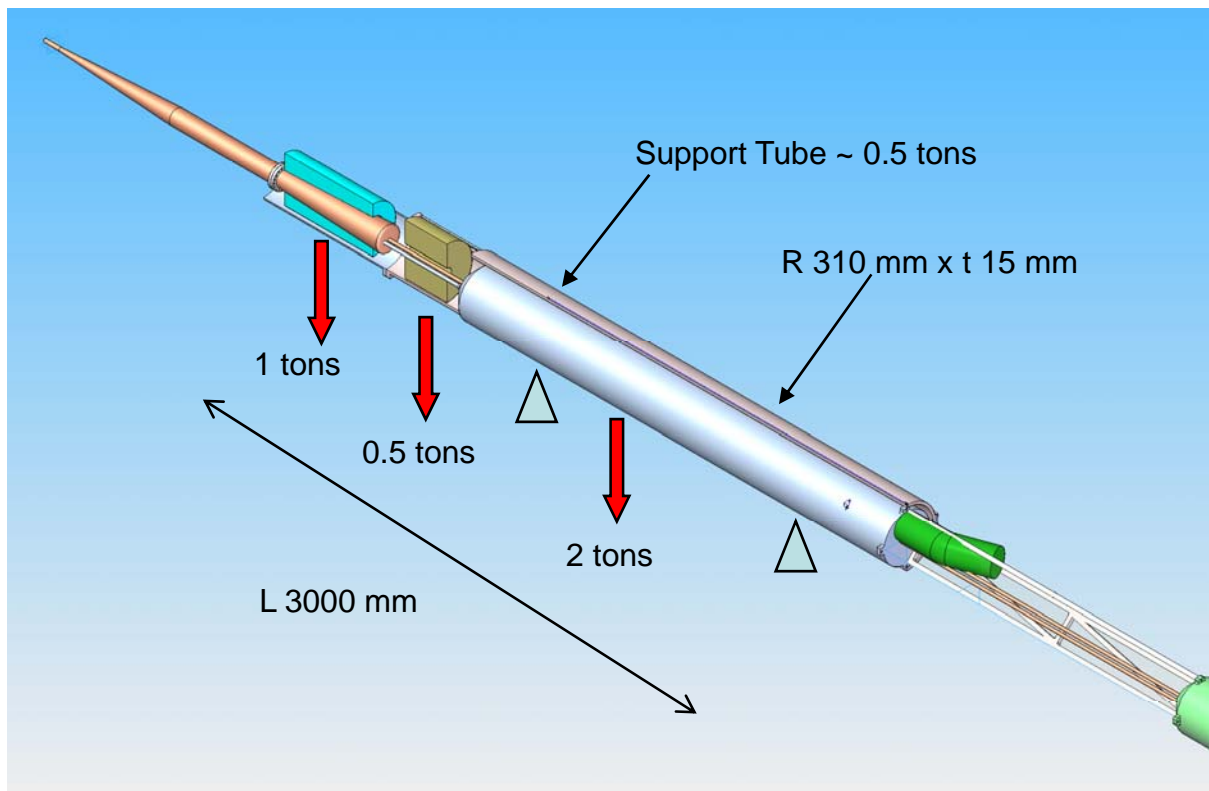
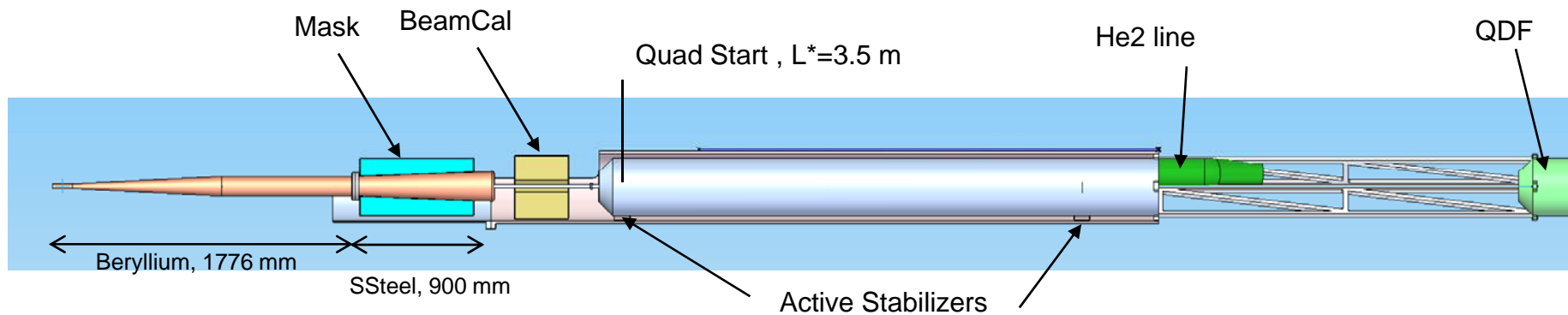
The first step is to translate the parameters in an engineering model, formulating technical solutions, clearances and components integration



QD0 support in the door



Support Tube for QDO and Frwd instrumentations

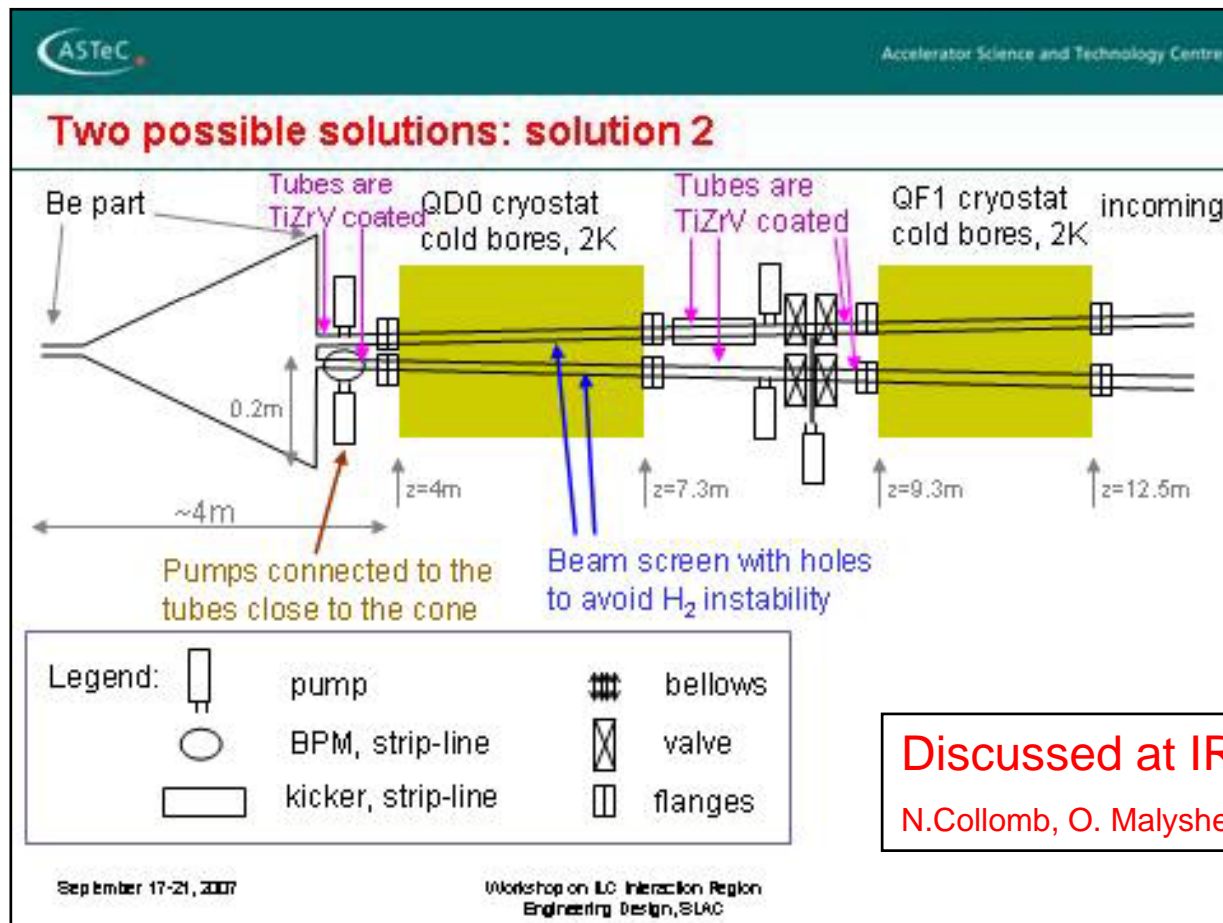


- The support tube provide an interface to the door to support for QDO,
- In addition provide the supports for the vacuum chamber, the beam instrumentation and the forward detectors
- Alternative option having sliding rail directly on the QDO cryostat and cantilever from the Qd0 front the vacuum and detector instrumentations. Actuators directly on the door.

Experimental Beam Pipe and vacuum issues

Central vacuum chamber design is related to the tracker and the vertex performances-integration (see B.Cooper talk)

Forward vacuum chamber bound to the technical choices adopted in the design of the IR vacuum layout (several talks from the IRENG07 workshop)



Questions to be addressed :

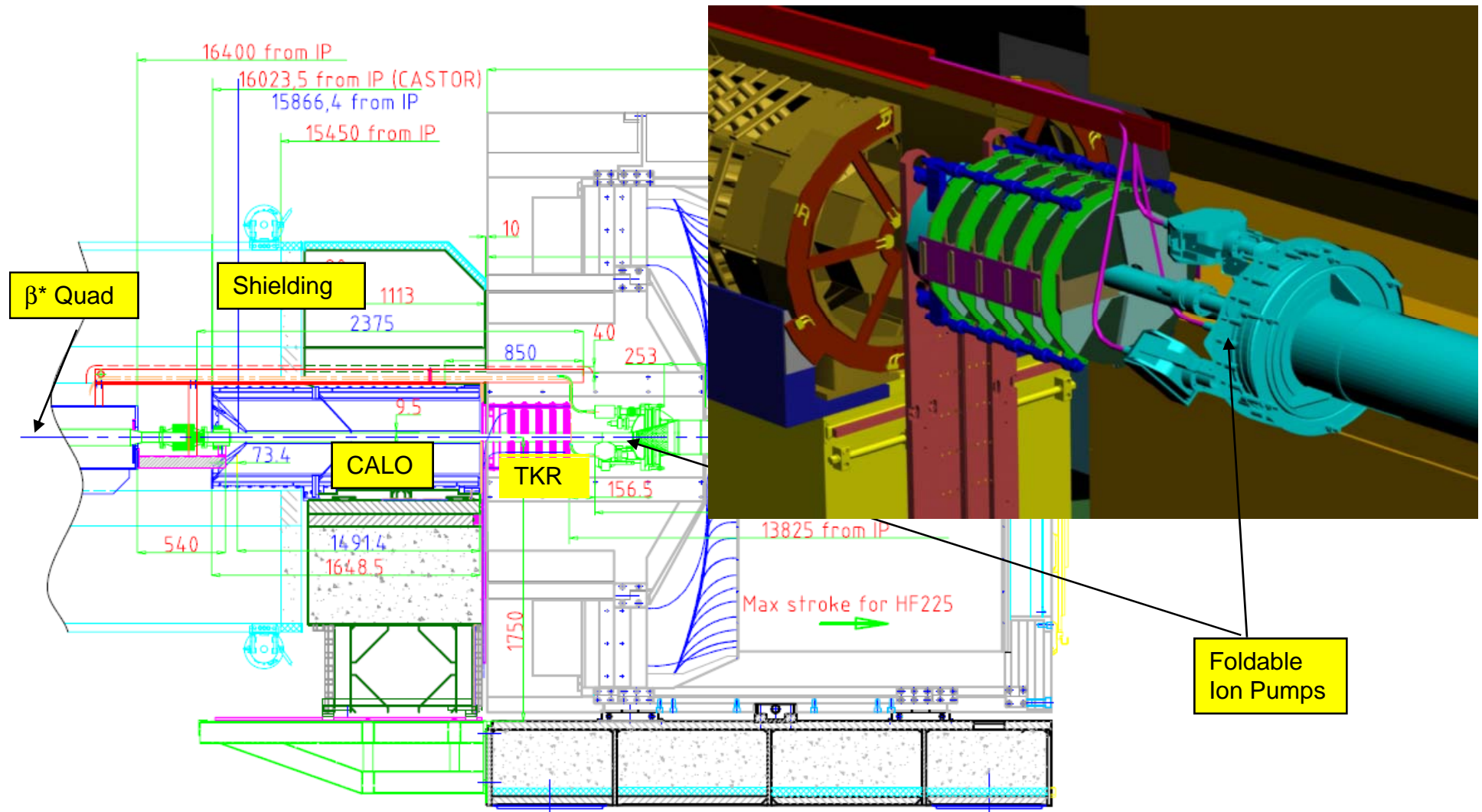
- Can we rely on the cryopumping speed from QD0 ?
- Do we need lumped ion pumps close to the BeamCal ?
- Beam instrumentation needed ?
- Beam current and Secondary Emission Yield -> do we need NEG coating ?
- Shut-off valves when detector is open ?
- Bake out in situ following a push-pull ?

Discussed at IRENG07

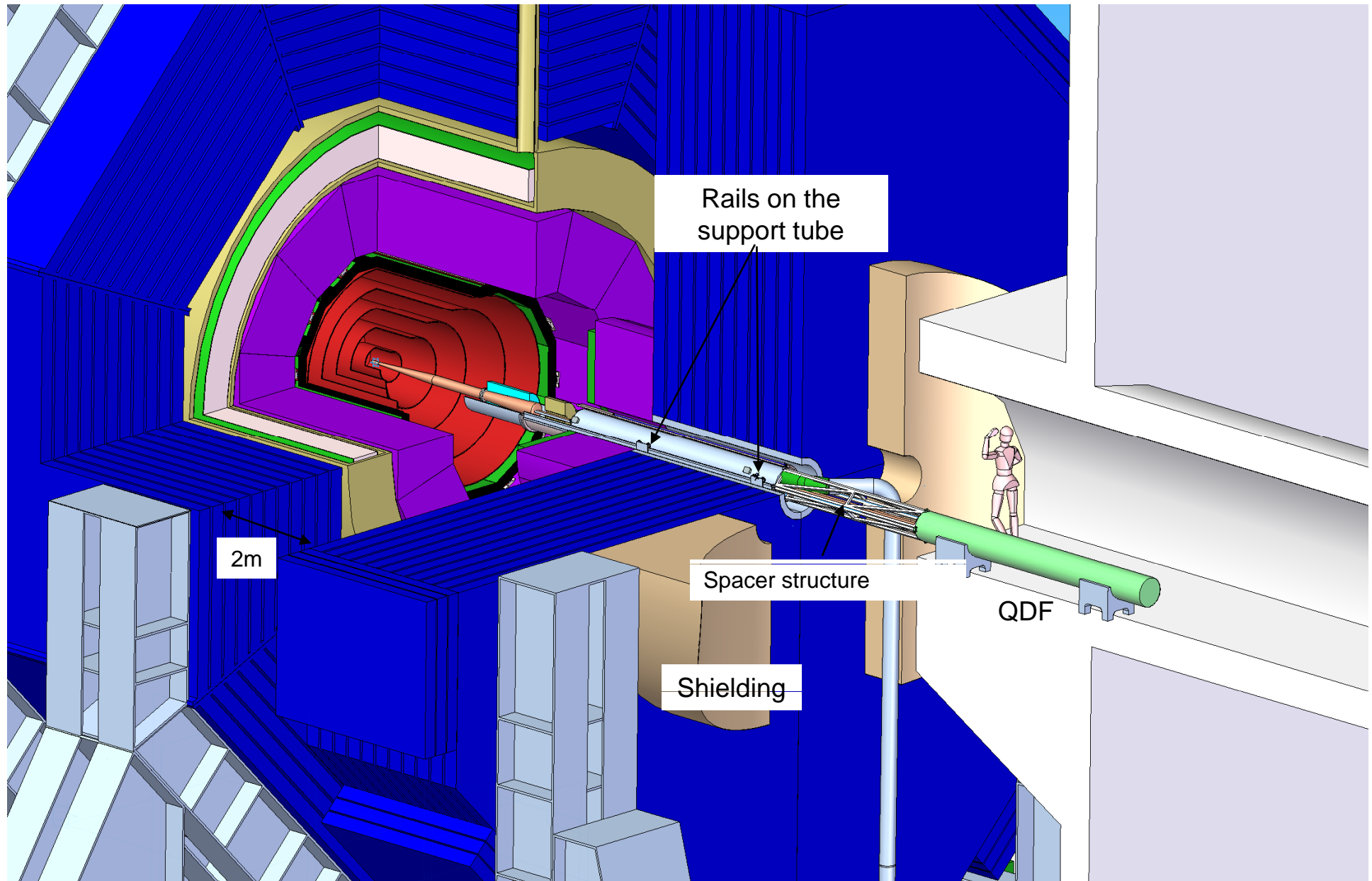
N.Collomb, O. Malyshev et al.

In the meantime progress can be made based on the experience accrued in the forward regions of other experiments at Tevatron, LHC and SLC

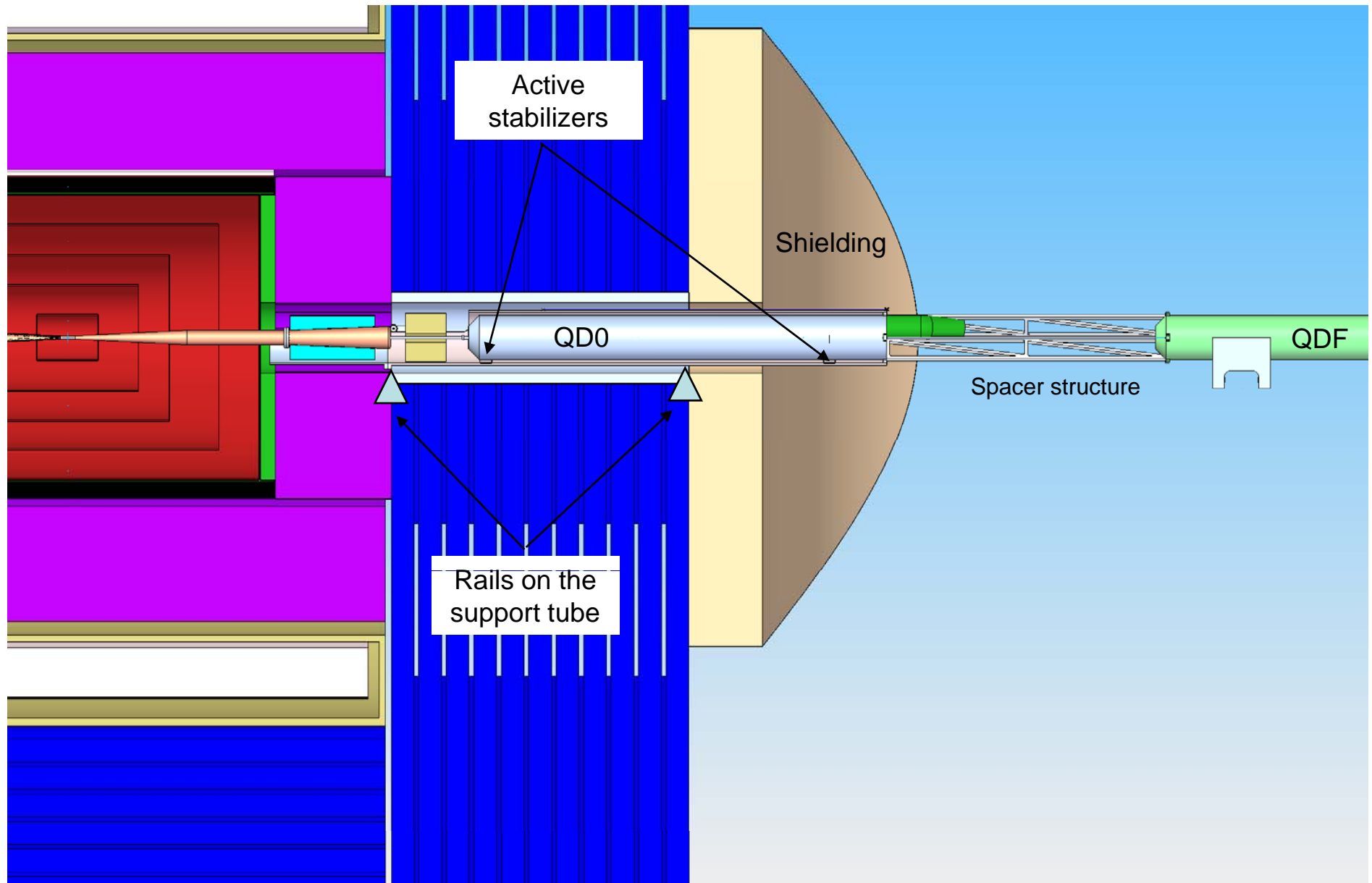
CMS is the case I know best, but it worth for a pp machine, high beam current with high radiation background (too penalizing)



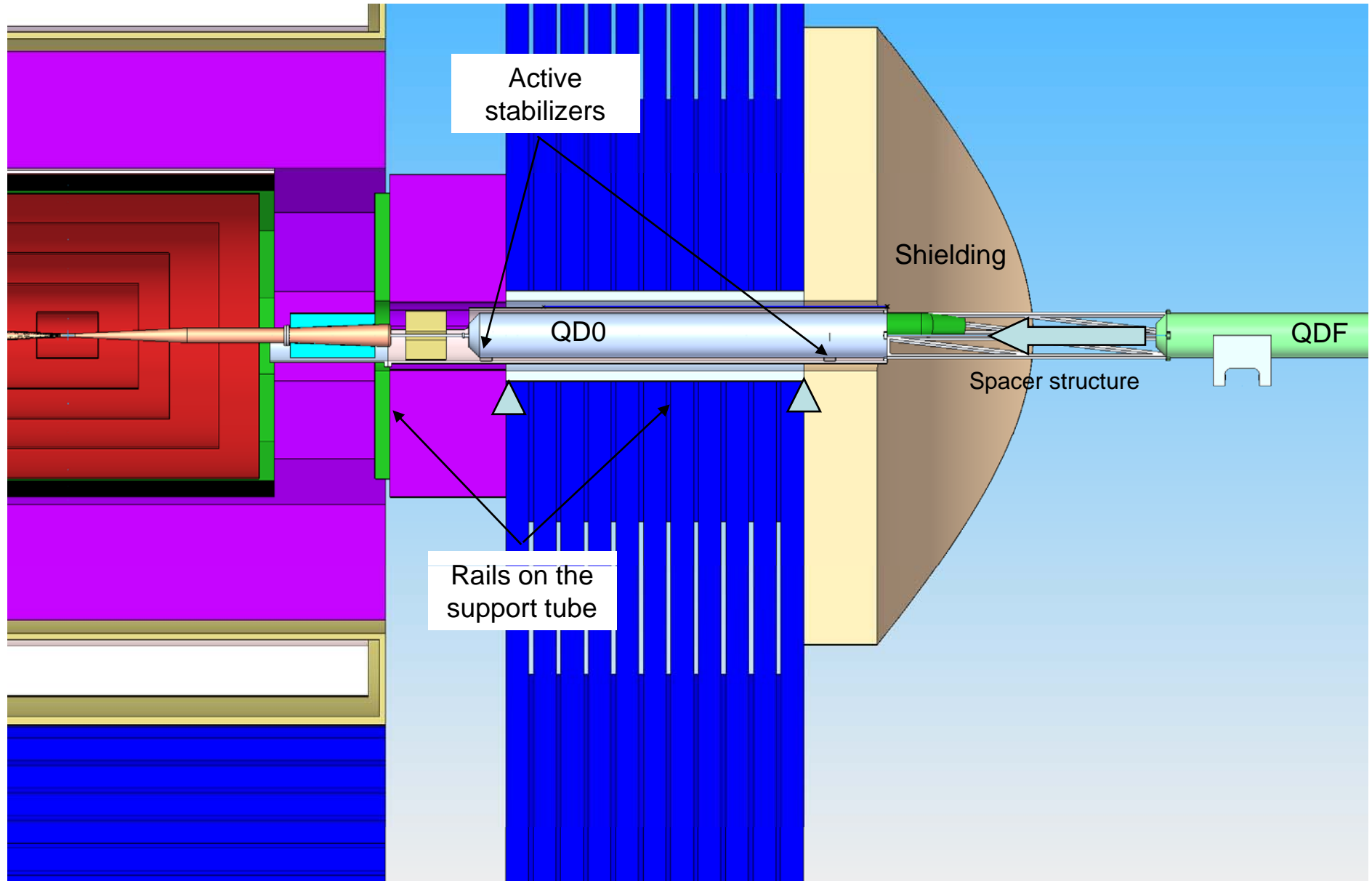
2m Door opening Procedure, on the beam



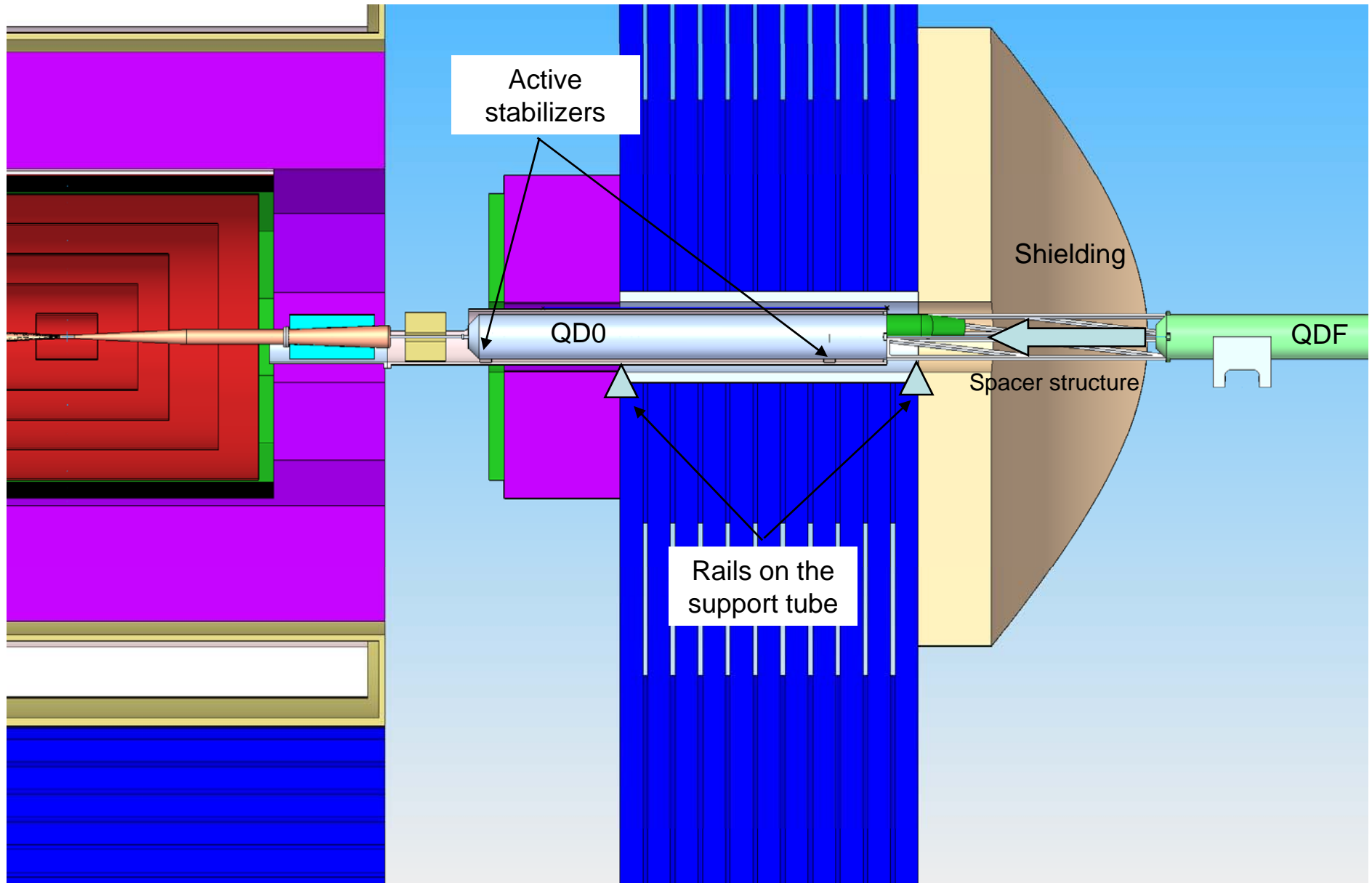
2m Door opening Procedure, on the beam I



2m Door opening Procedure, on the beam II



2m Door opening Procedure, on the beam III

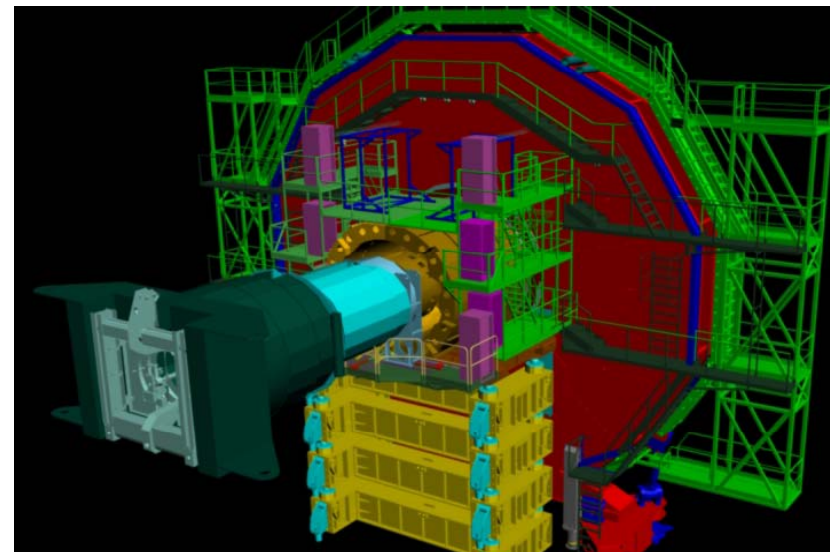
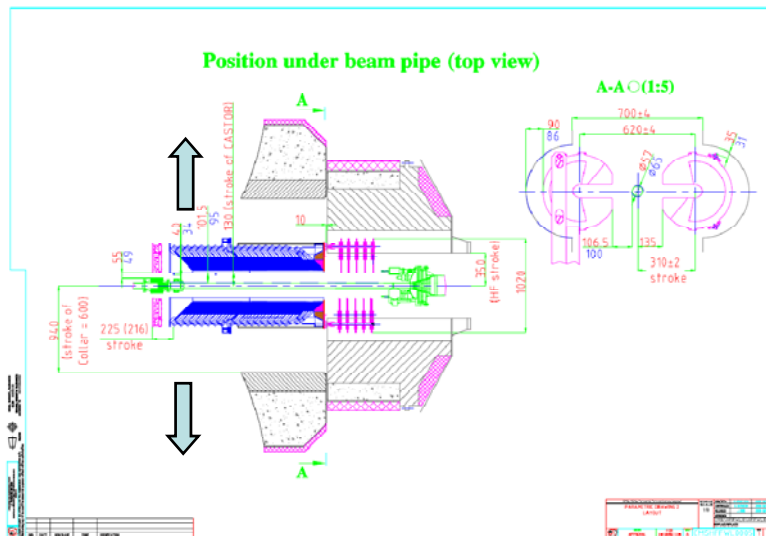
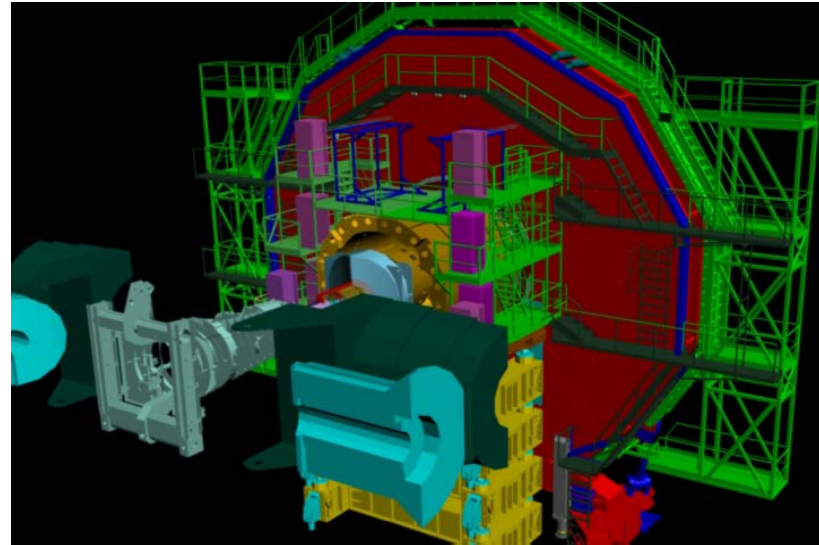


Forward Shielding (Pacmen) I

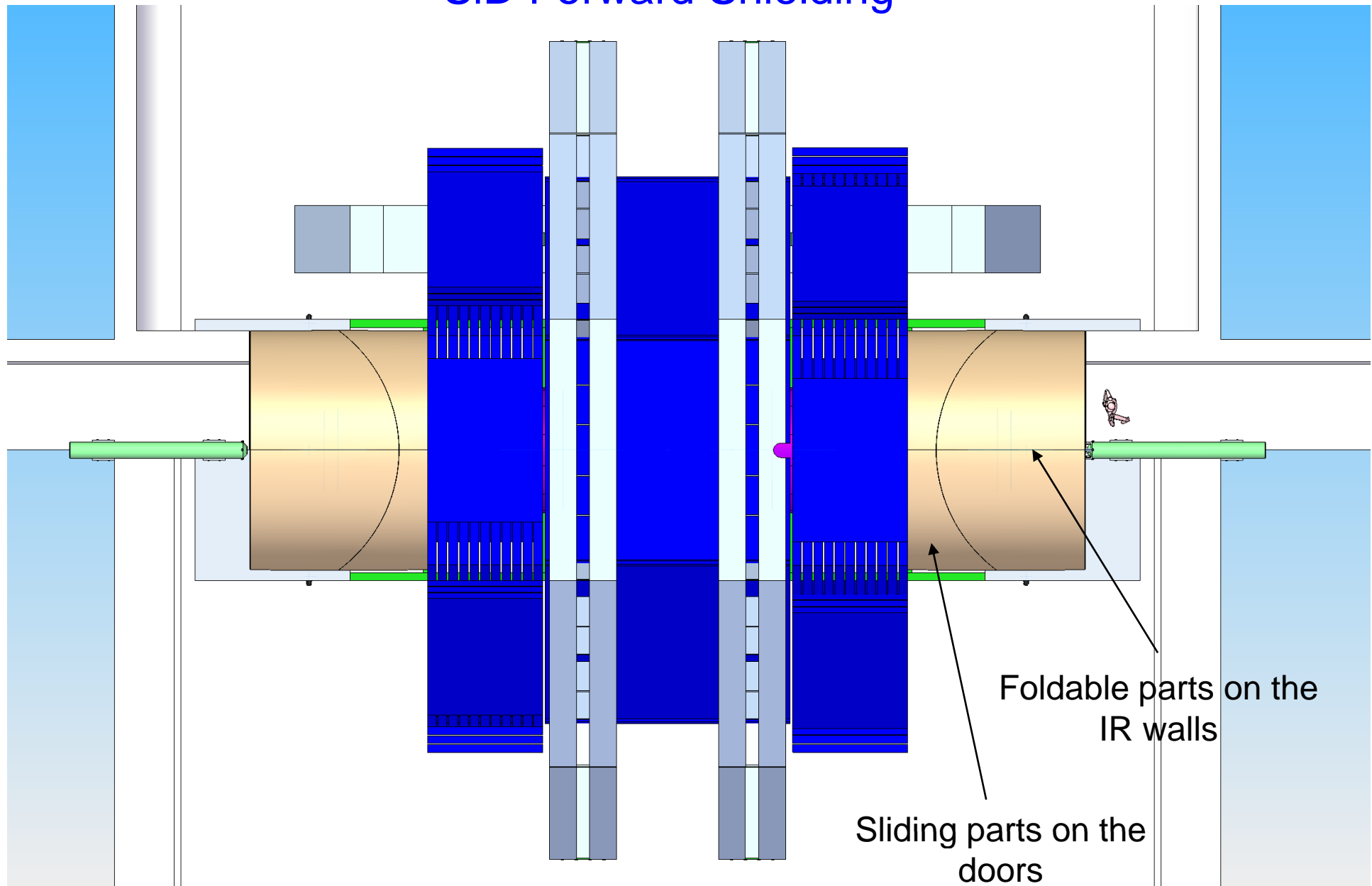
- Final dimensions dictated from the radiation background simulations (iron inner bore + borated concrete+ polyethylene)
- For safe and proper operations and alignment on the beam , it must include the mechanical tolerances of the closed experiment vs. the machine
- With the push-pull feature, it become must be partially or even totally integrated on the doors. Can we end up with two different Pacmen design for each push-pull experiments.
- Expected from the MDI group the definition of these interfaces.
- The He2 cryoconnection of QD0 must be integrated through the Pacmen
- Routing of other services like Vacuum, beam and detector instrumentation.

Forward Shielding (Pacmen) II

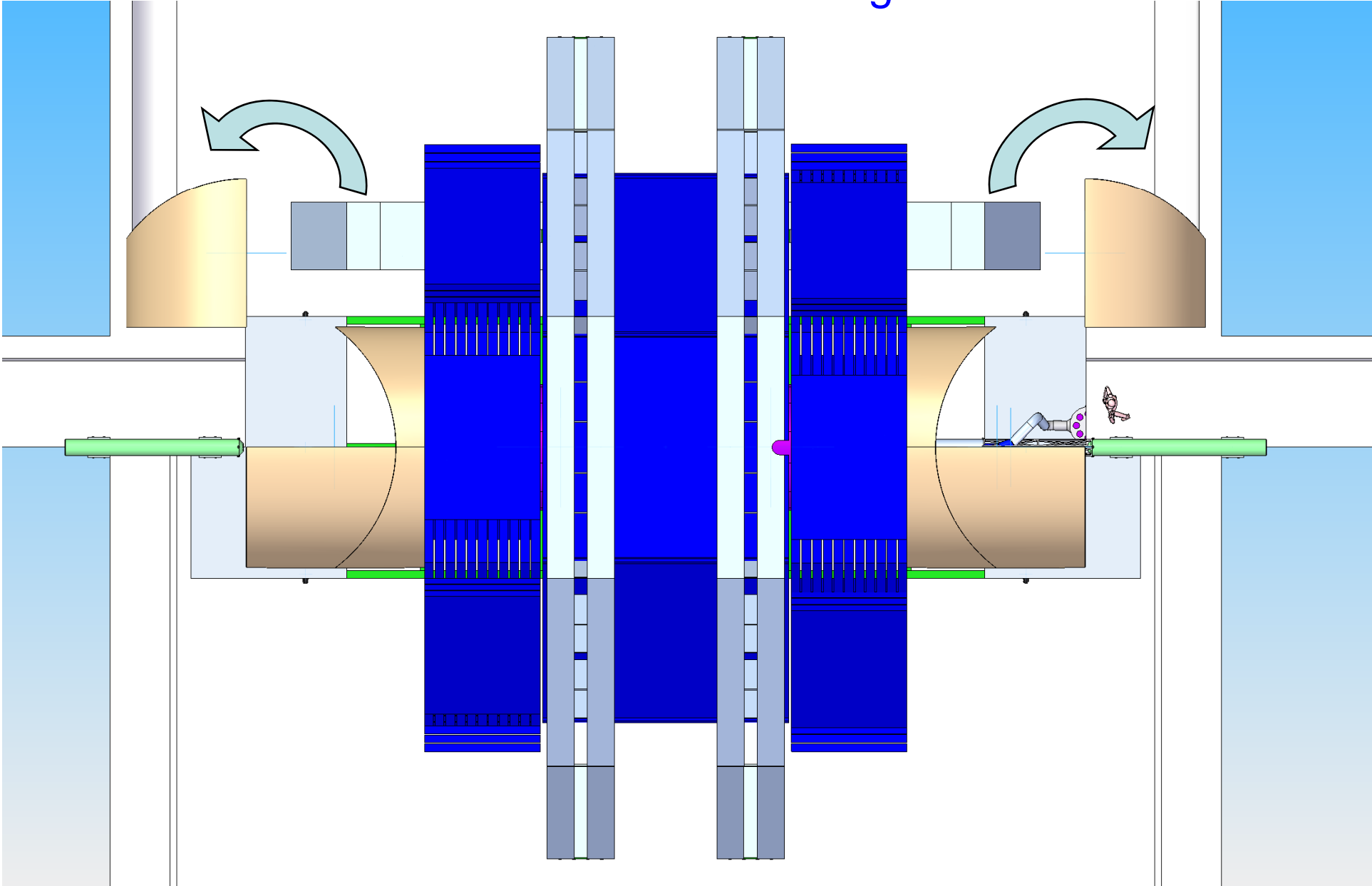
(CMS Rotating Shielding)



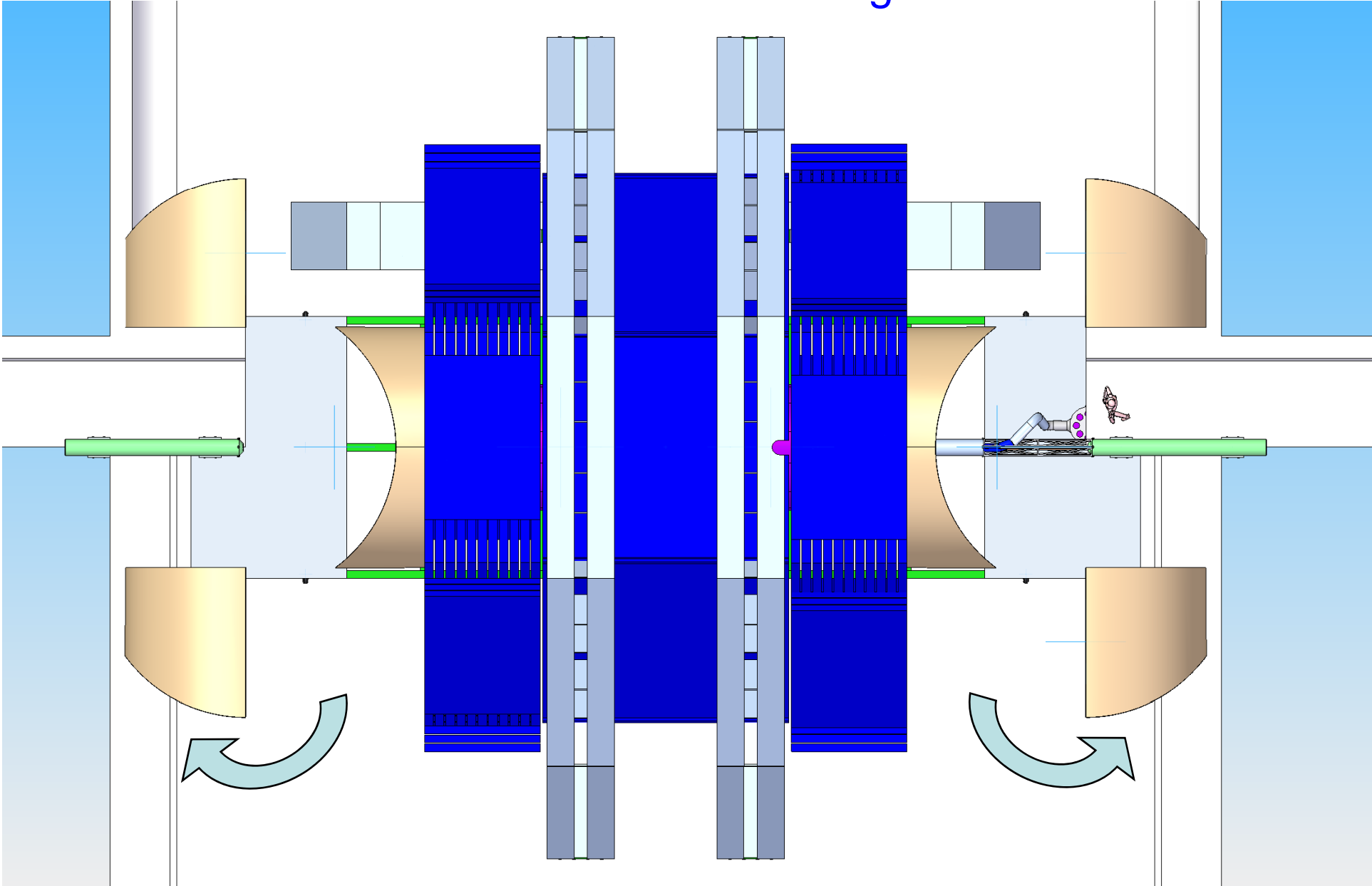
SiD Forward Shielding



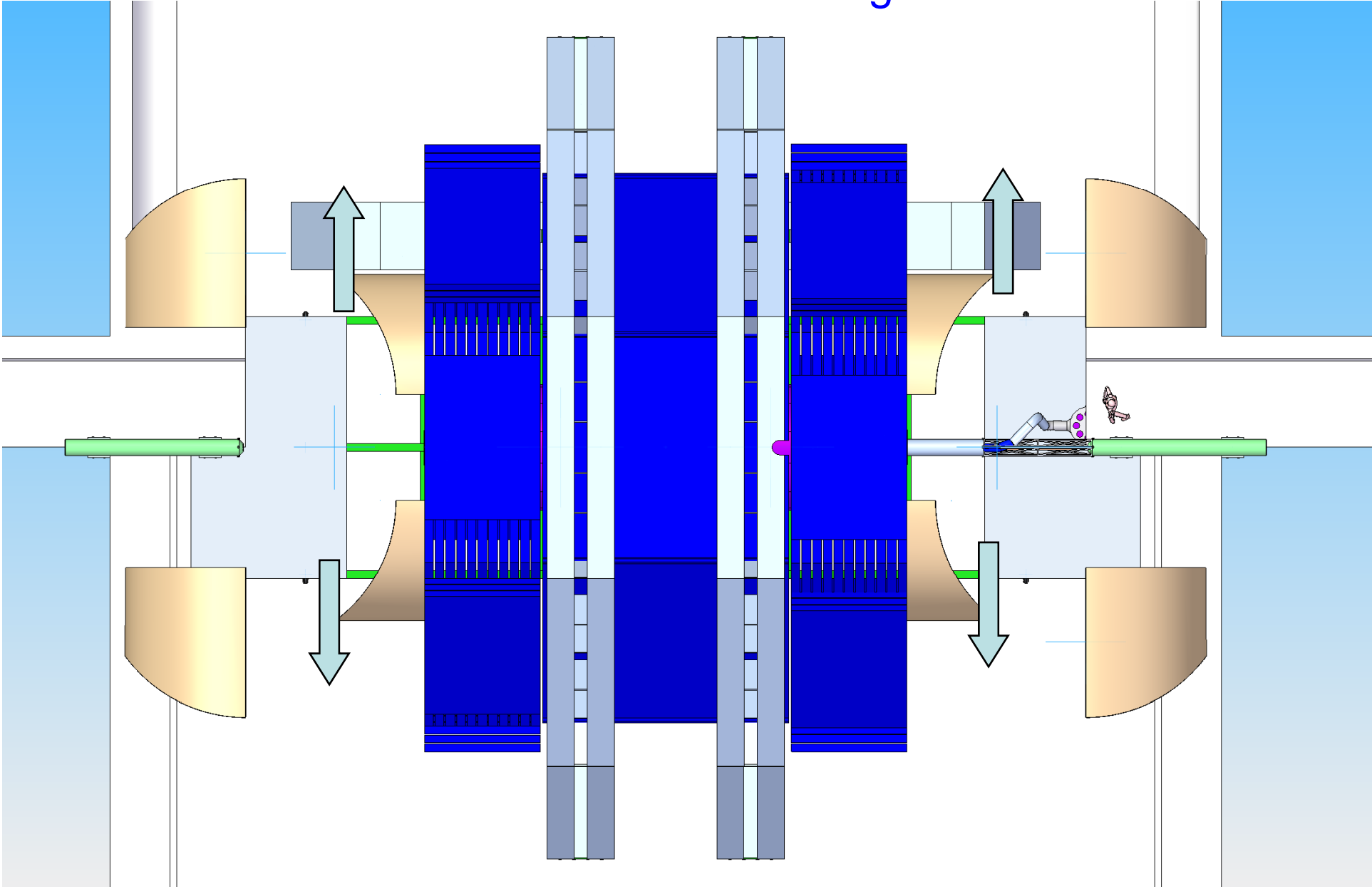
SiD Forward Shielding



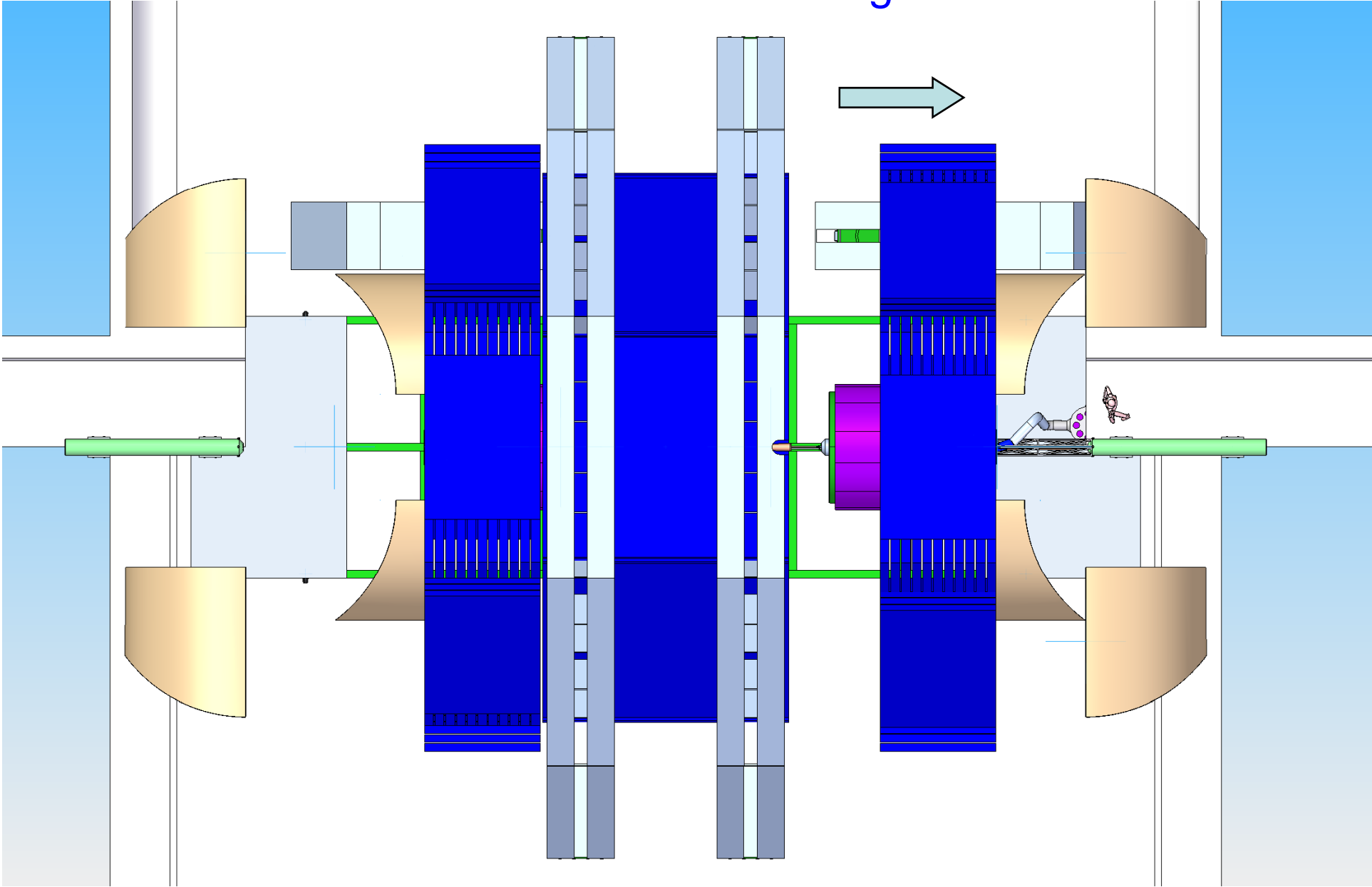
SiD Forward Shielding



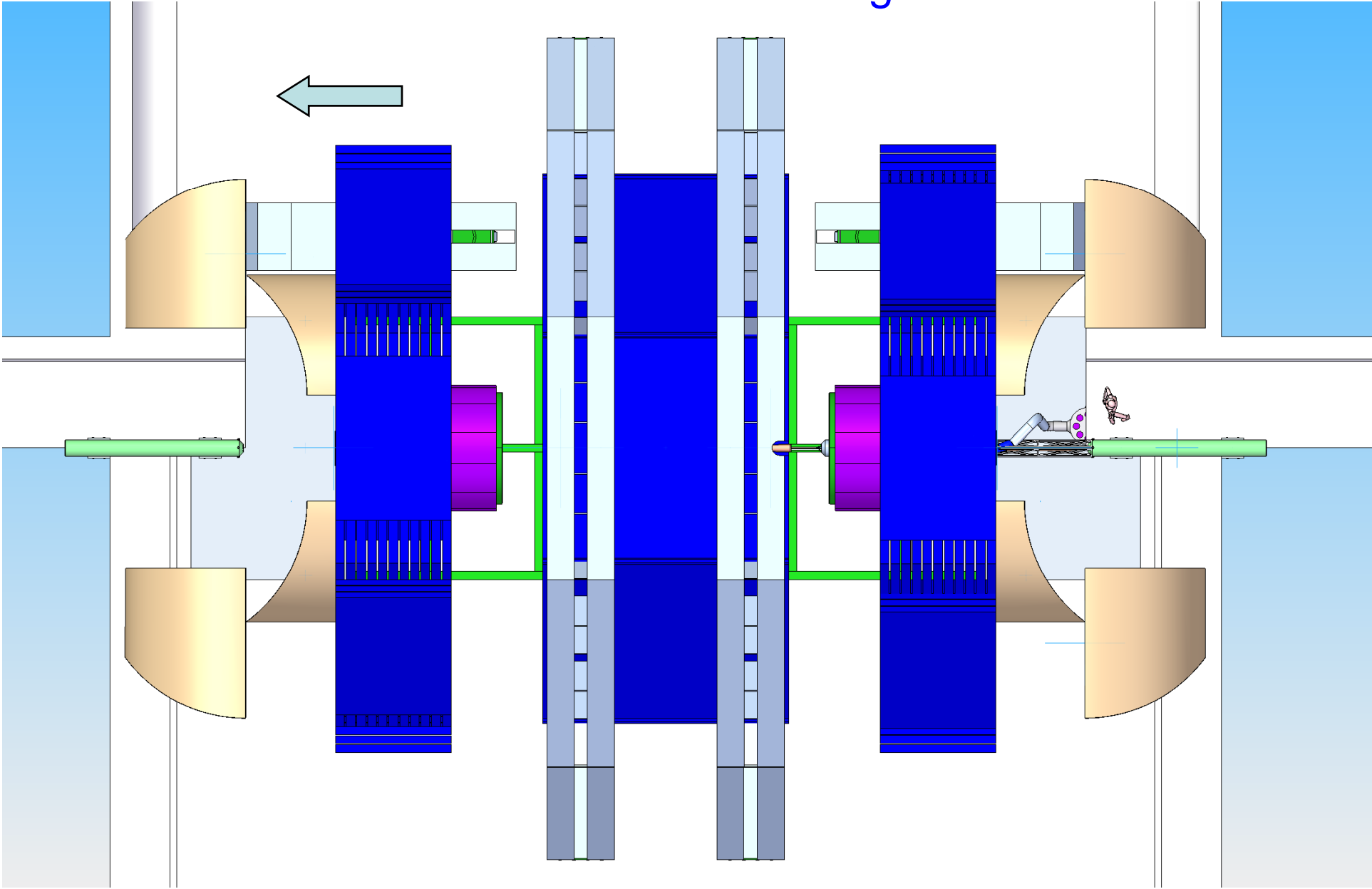
SiD Forward Shielding



SiD Forward Shielding



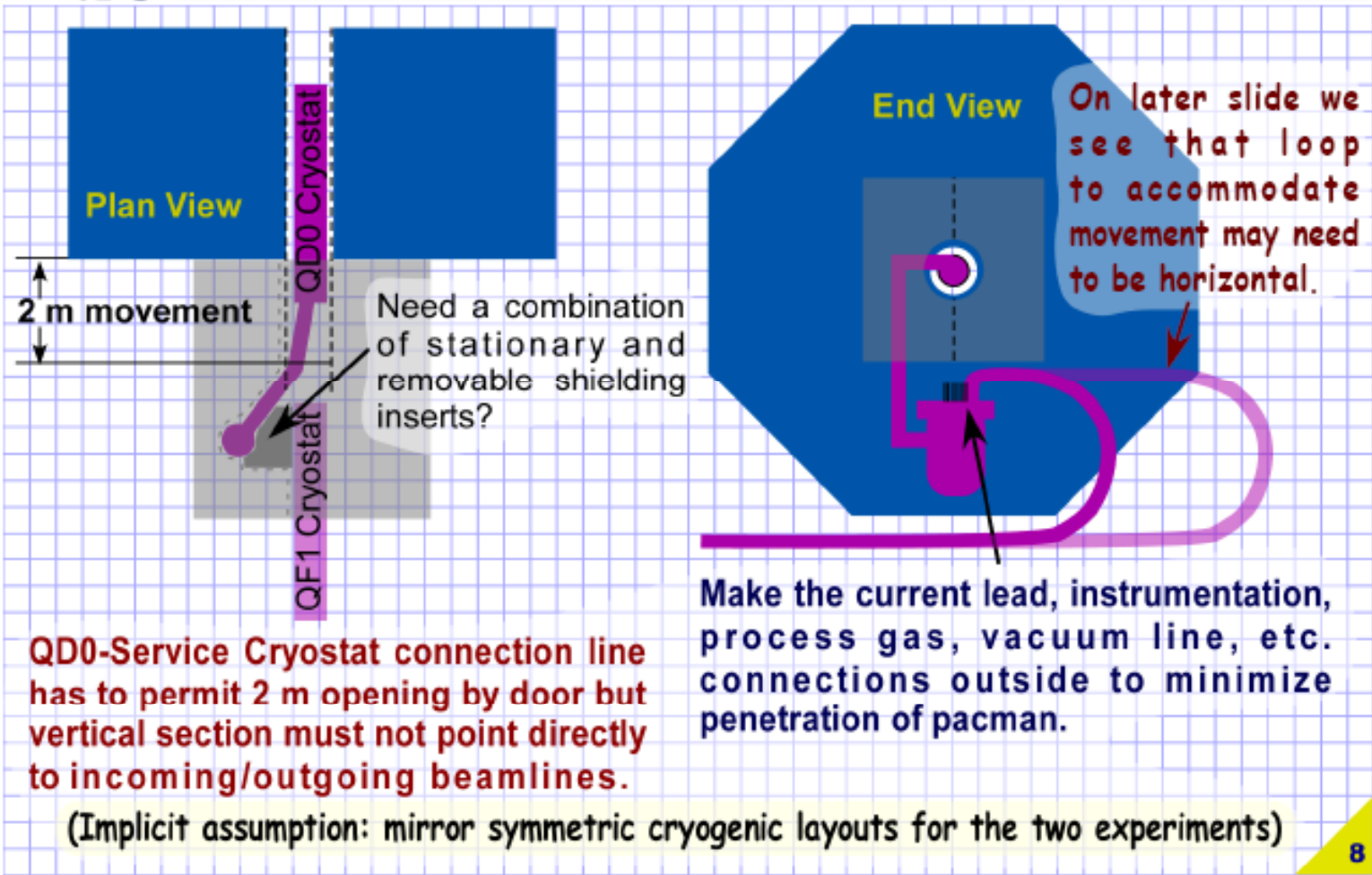
SiD Forward Shielding



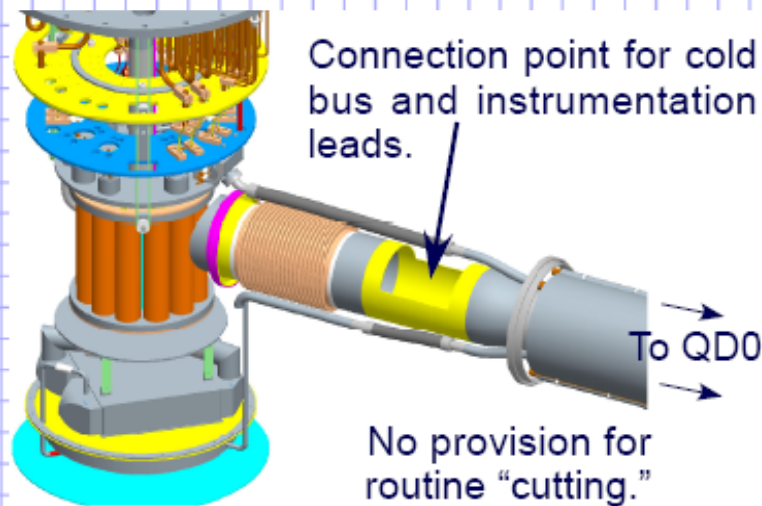


Design Constraints: Opening the detector for access and allowing for self shielding.

BROOKHAVEN
NATIONAL LABORATORY
Superconducting
Magnet Division



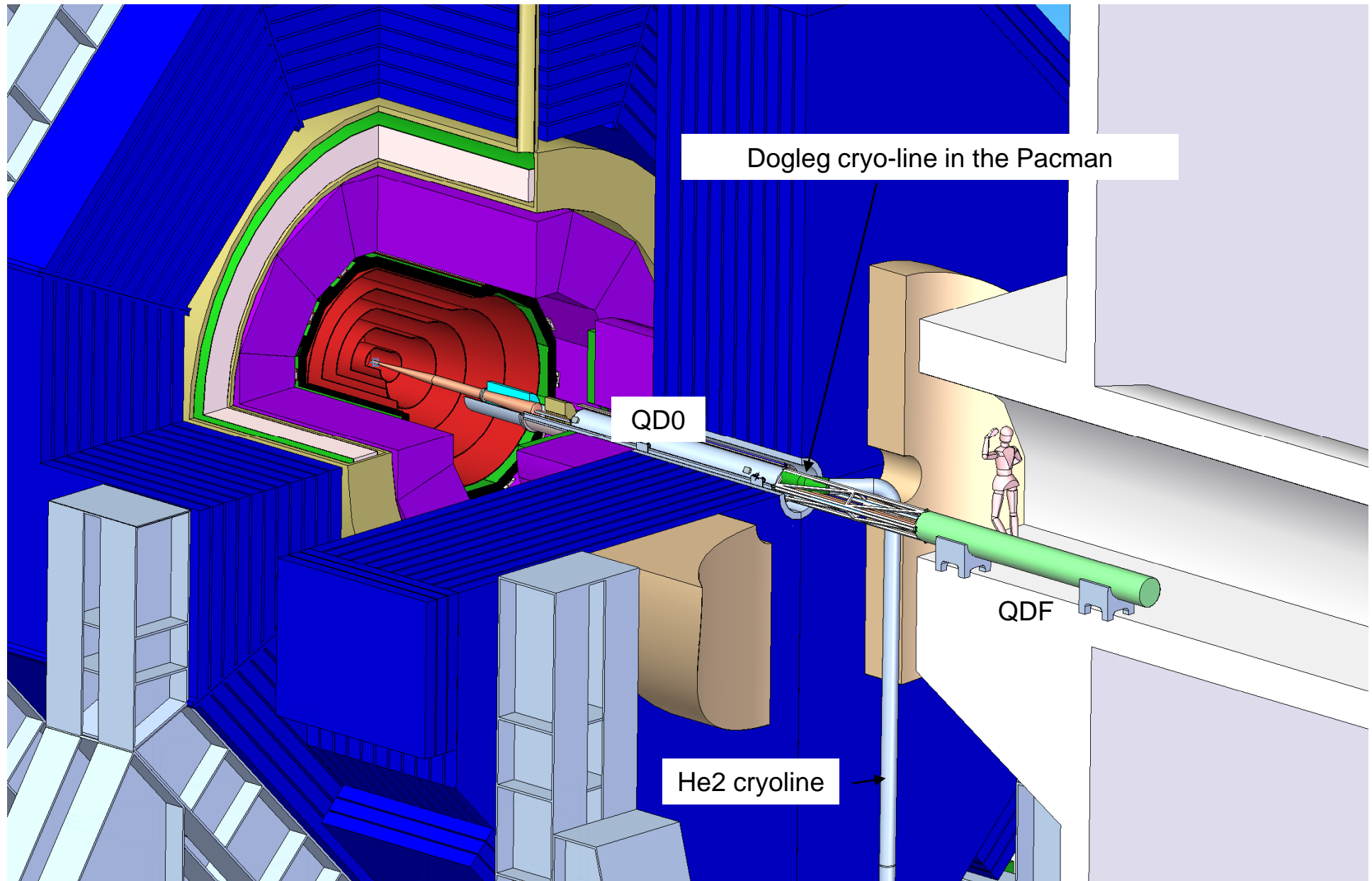
Service cryostat connection is taken apart only a few times during lifetime.



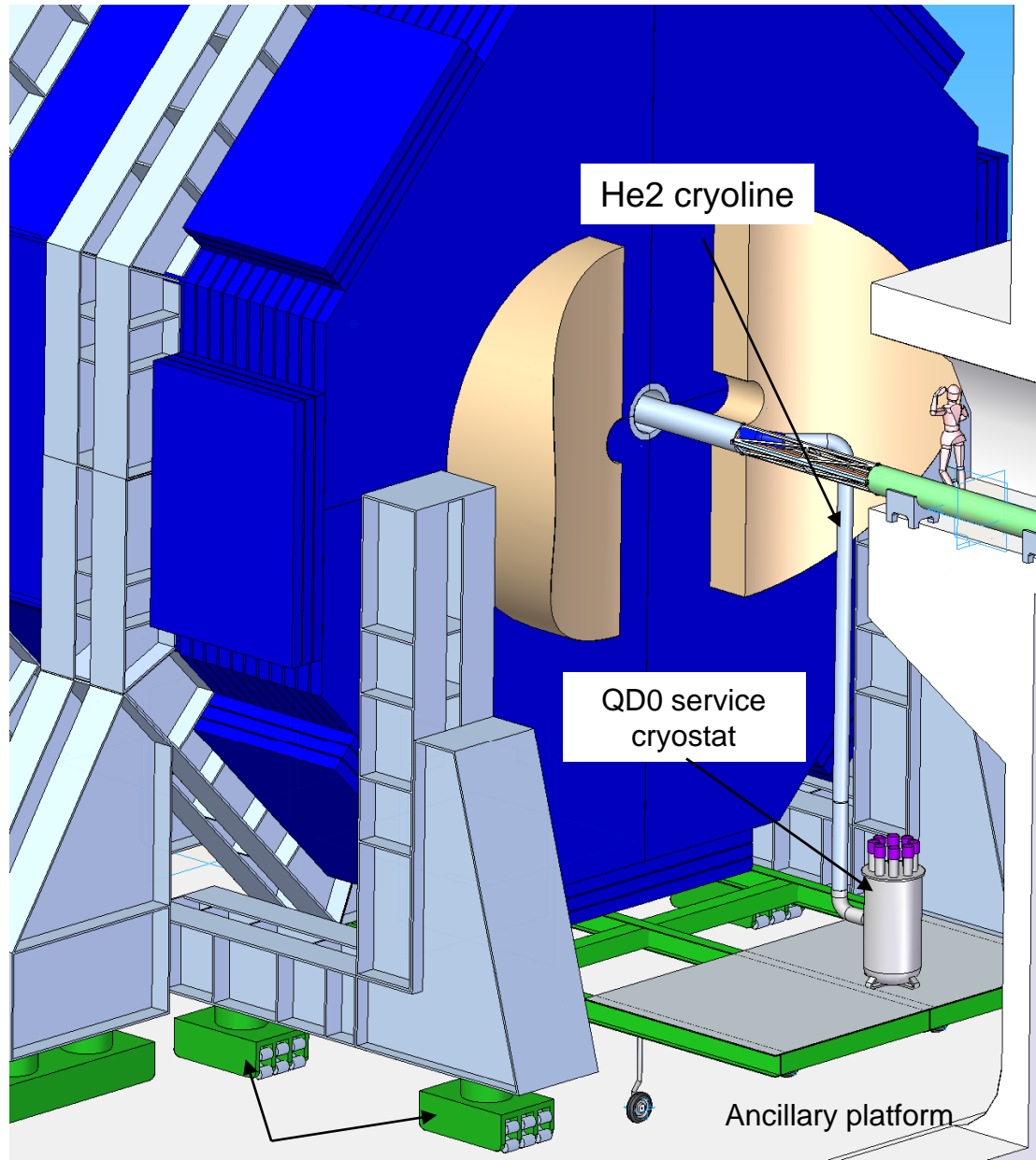
There are a large number of cold bus conductors and instrumentation leads running between the service and QD0 cryostats in the 1.9 K He-II channel. Breaking/remaking these connections is a reliability issue. We do not assume that this is done for any routine operation.

Note this also has implications for detector access in the off-beam "park" position. If QD0 has to be moved, then the service cryostat has to move with QD0 even if the service cryostat is itself disconnected from its helium supply and vacuum return lines.

Integration of the QD0 cryoline



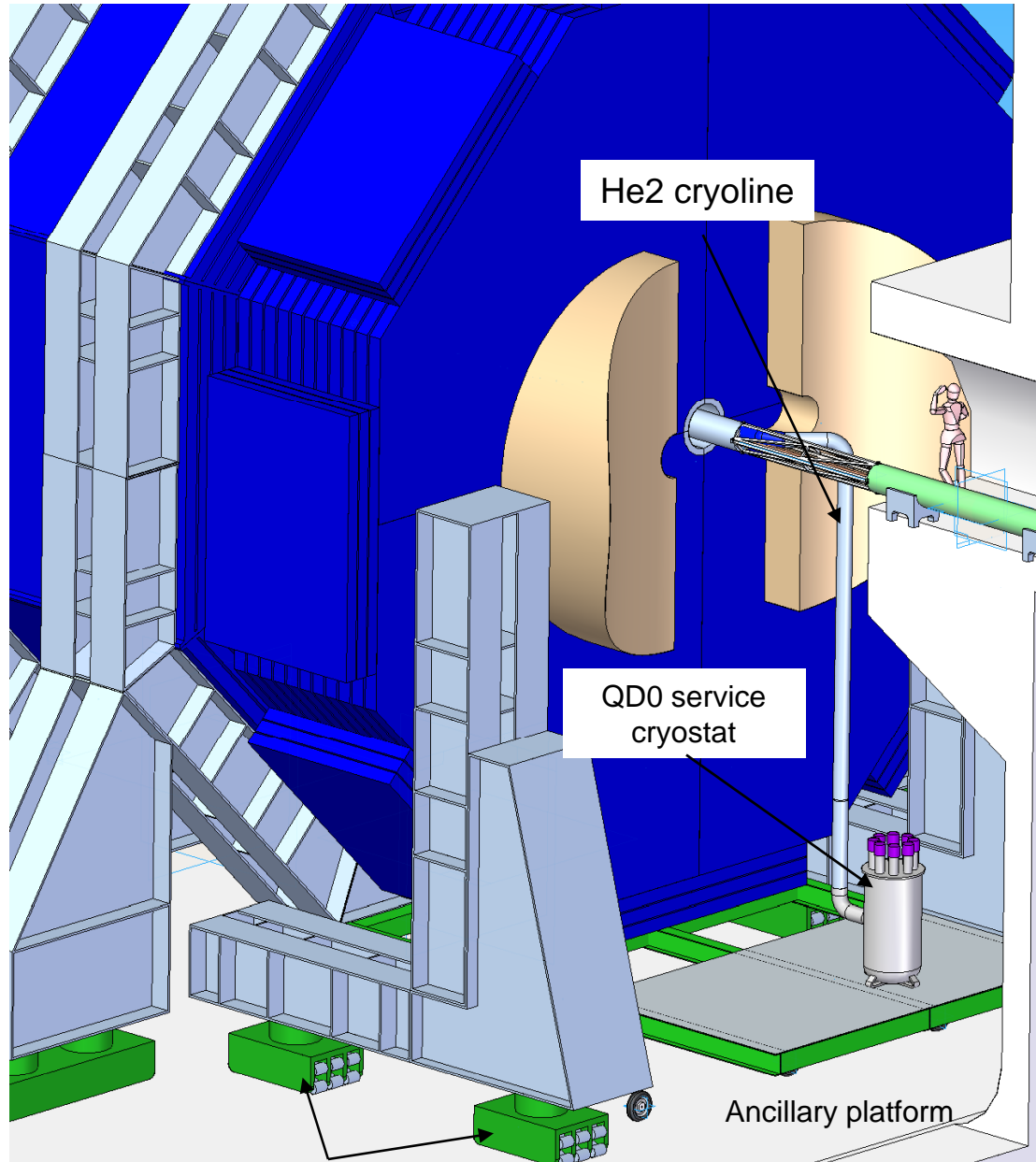
Integration of the QD0 cryoline



2 m opening on the beam,

1. The QD0 service cryostat on ancillary platform, fixed to the SiD barrel infrastructure
2. He2 cryoline rigid connected to QD0 through the Pacman
3. No relative movement between QD0 and He2 line when door opens.
4. The ancillary platform allows the QD0 cryogenics to travel with detector during push-pull
5. Additional space for racks, controls et al.

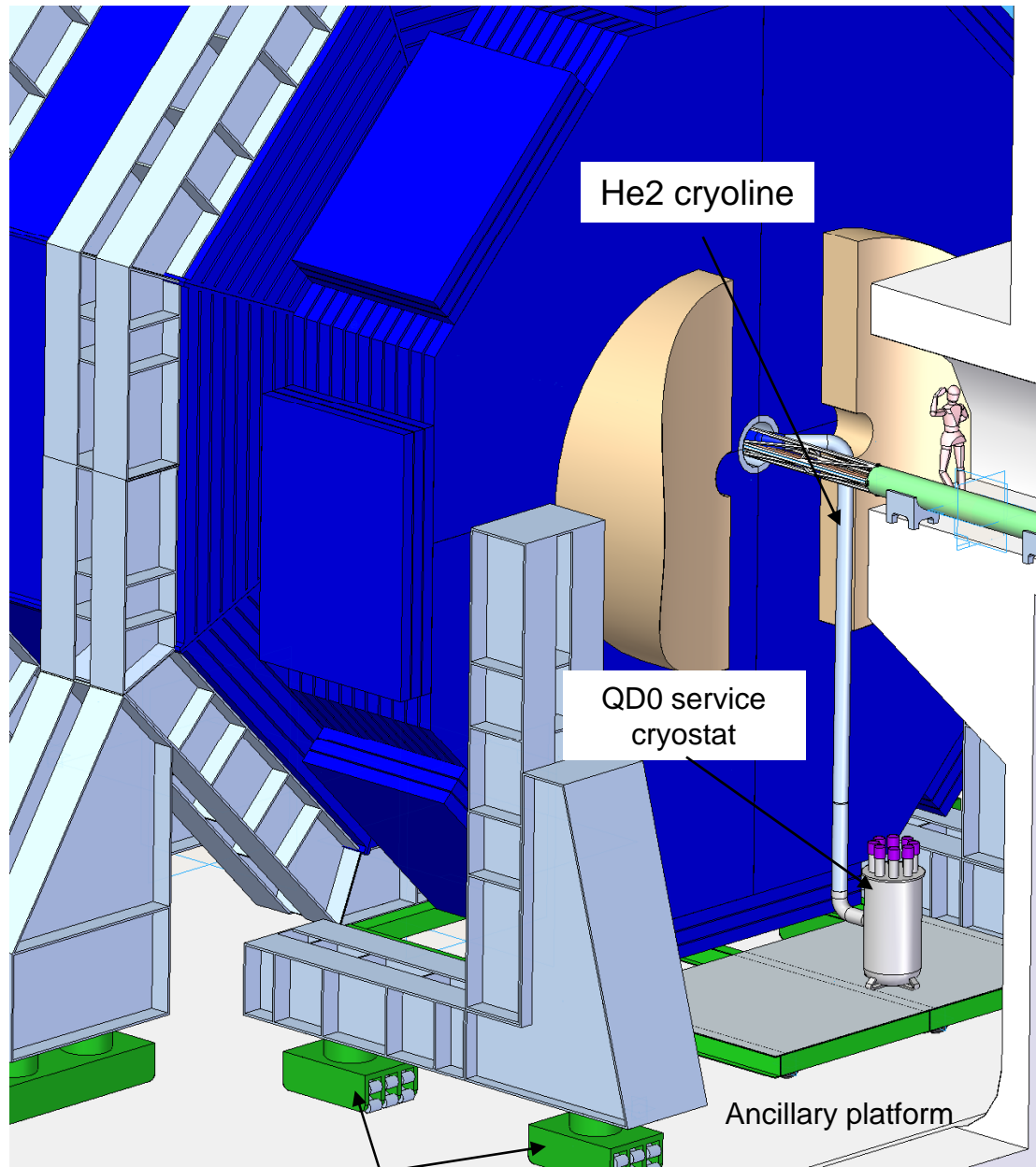
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Conclusion

Complete the study for operation of push-pull

Maintenance off-beam,

Umbilicals

Alignment

For more detailed engineering Inputs are required on :

Vacuum issues

Beam instrumentation

Radiation shielding, Pacmen size

Forward detectors specifications

MDI interface common to both detectors

Many thanks !