

Instrument project status ICB June-2020

Content

- ESS review process
- Description of primary spectrometer
- Description of secondary spectrometer
- Procurements status, planning of future procurements
- CSPEC organization and communication flow
- Work packages to allocate
- Challenges
- Hazards analysis

ESS review process TG2 to TG3

CTV

- **Call for tender verification**
- Clearly define requirements for detailed design & Design risks mitigation plan
- Clearly define interfaces to other components, and ESS.
- Approval for procurement from NSS Lead Engineer

PDR
IDR

- **Preliminary/Intermediate design review**
- Clear compliance of design requirements.
- Presentation of technical solutions.
- Quality, manufacturing and testing plans.
- Installation plans.
- Prototypes manufacturing.
- Supplier generates technical content, CSPEC generates ESS documentation.

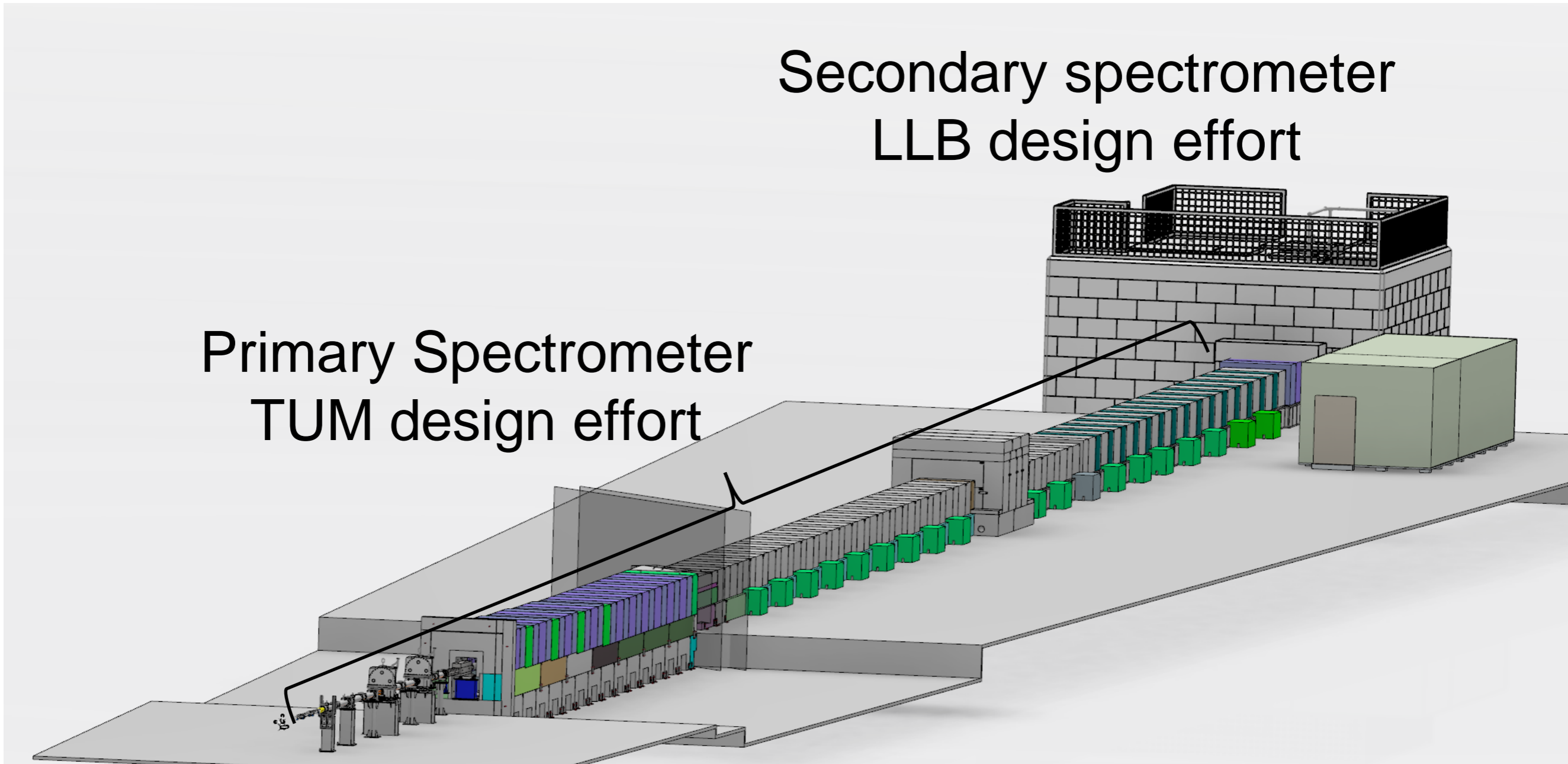
CDR
SUB-TG3

- **Critical design review / Sub tollgate 3**
- All previous documentation is presented in the final version
- Manufacturing drawing and manufacturing 3D models are integrated to ESS data base.
- Supplier generates technical content, CSPEC generates ESS documentation.
- Approval for complete scope manufacturing from NSS Lead Engineer.

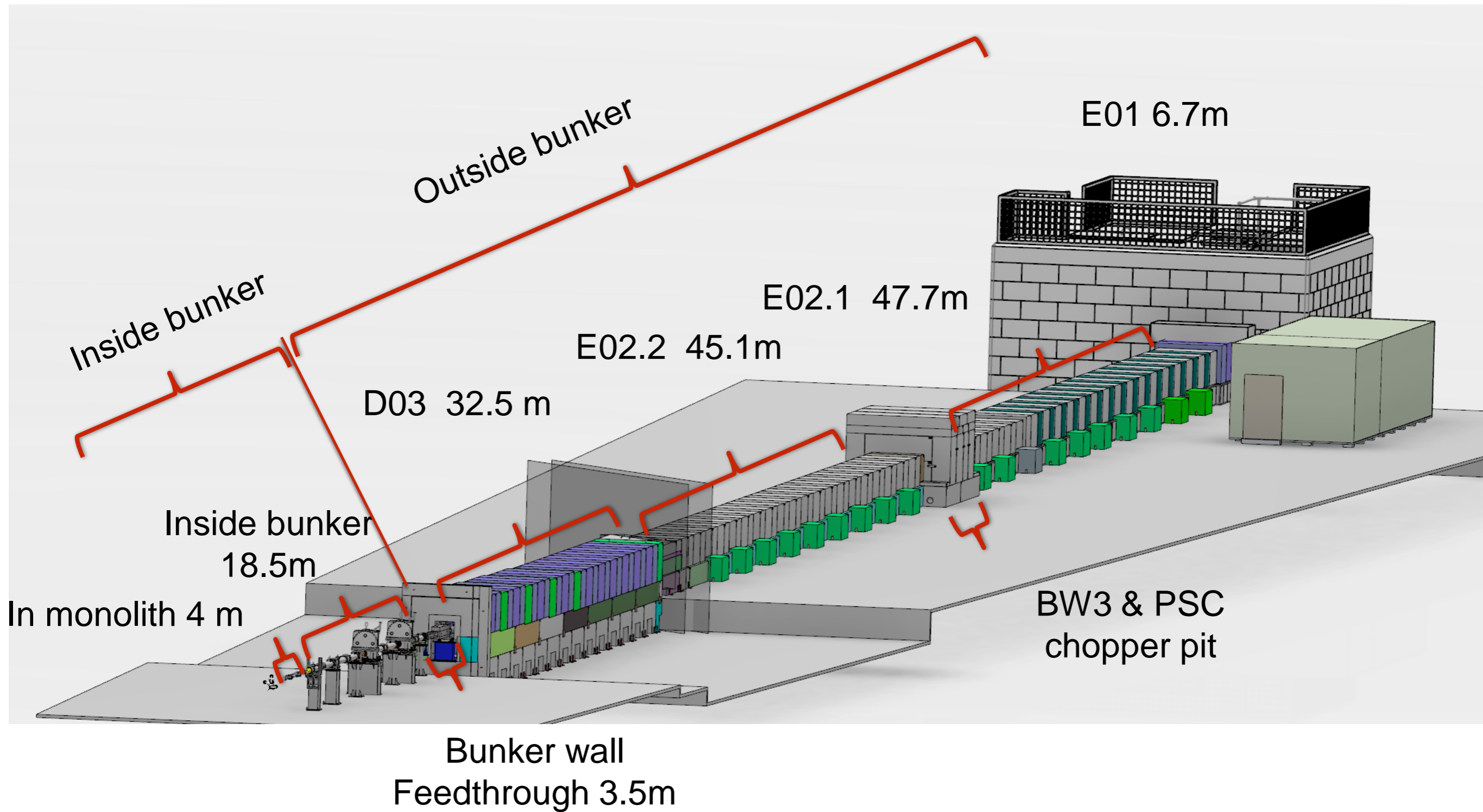
CSPEC main design packages division

Secondary spectrometer
LLB design effort

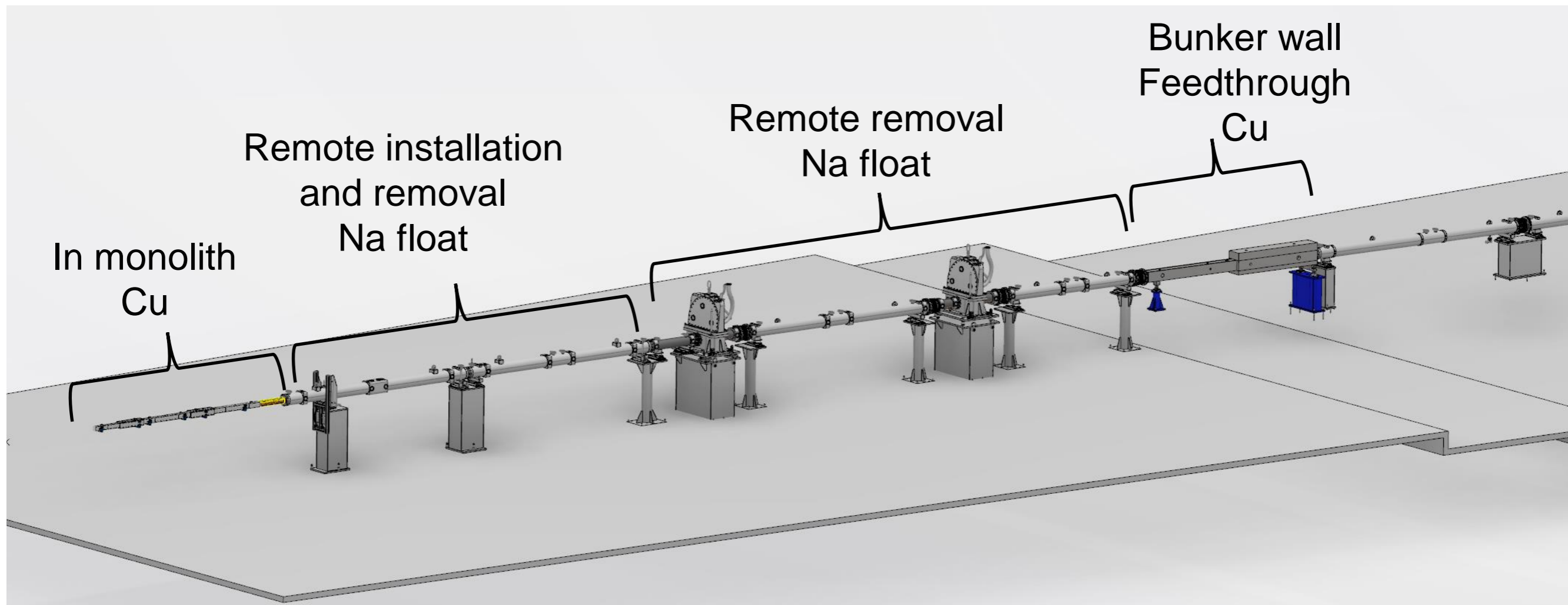
Primary Spectrometer
TUM design effort



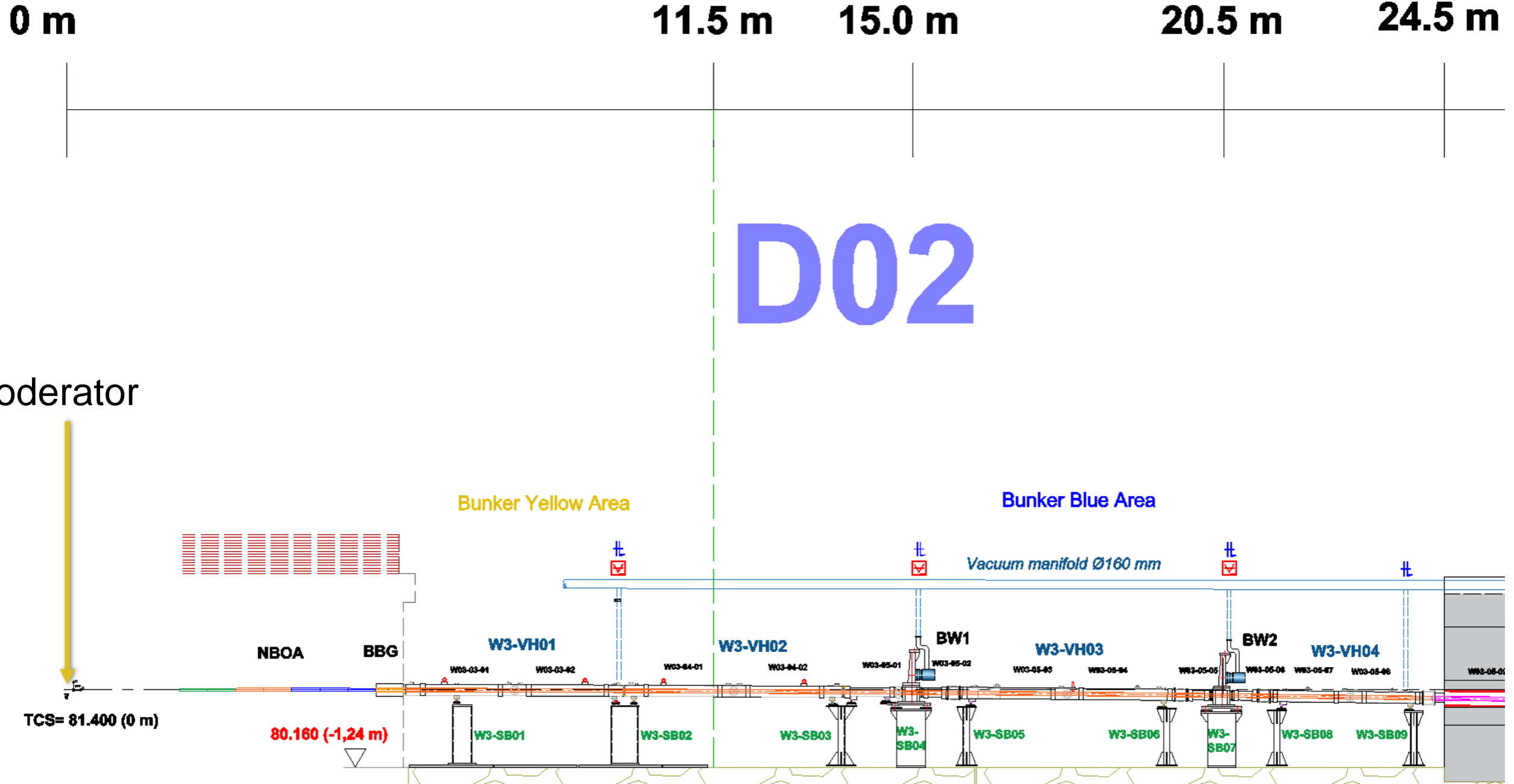
Primary spectrometer



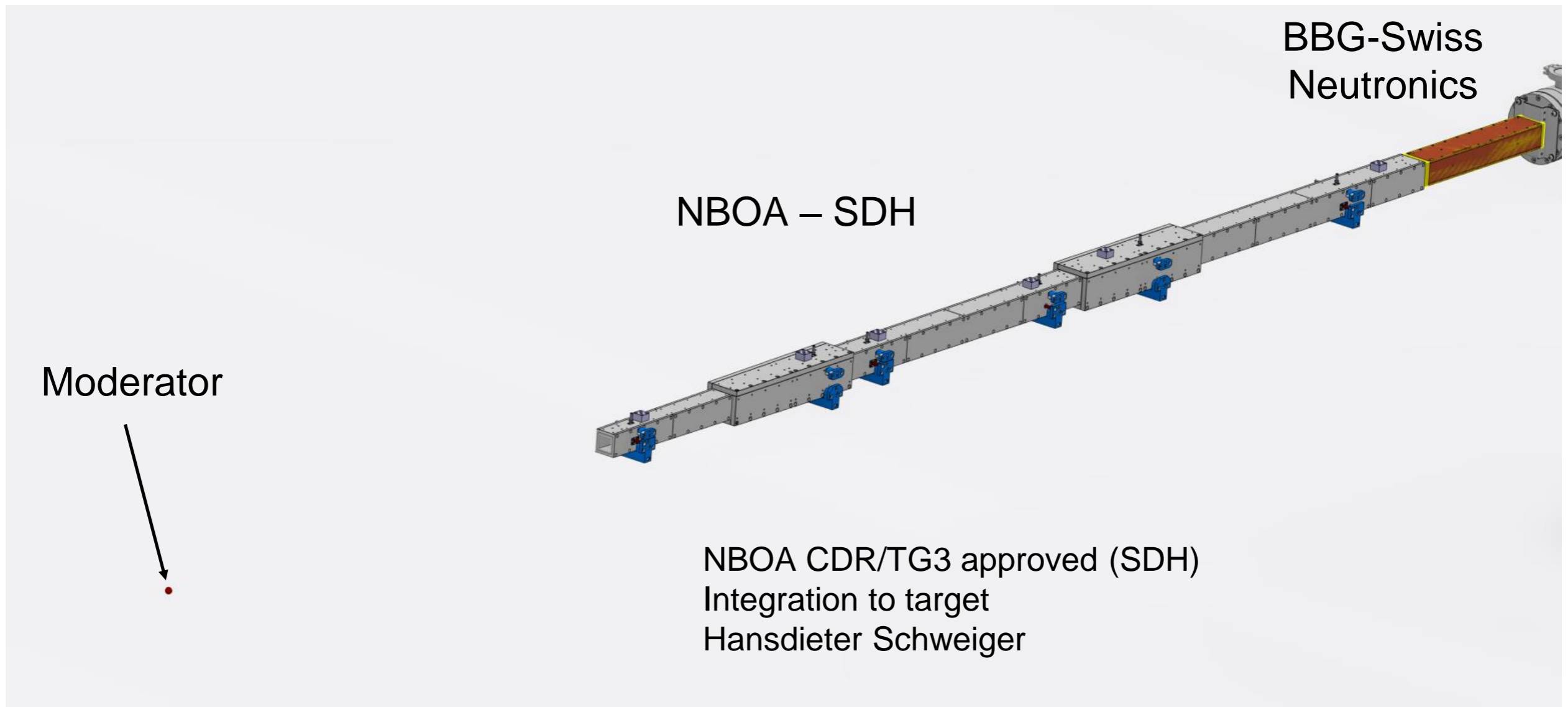
Inside bunker beamline main characteristics



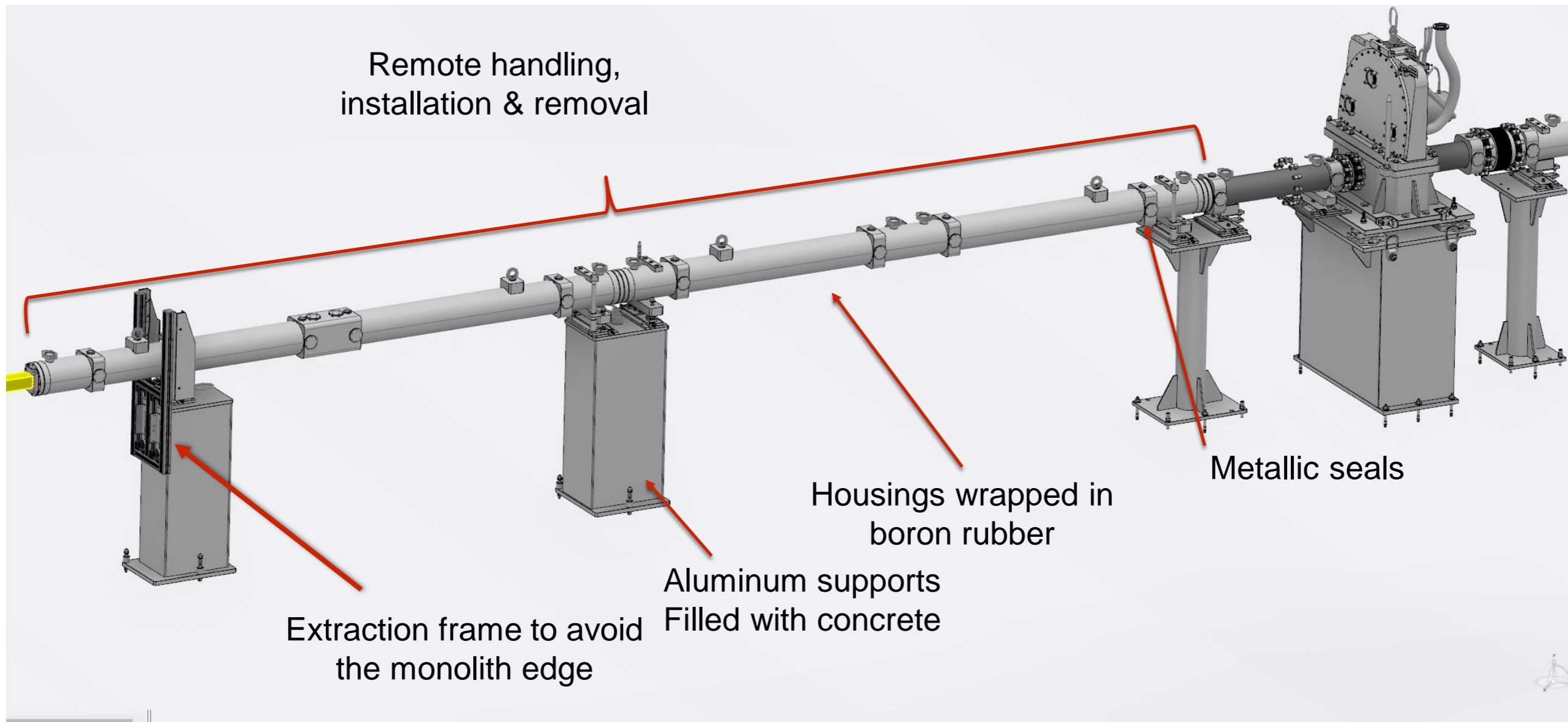
CSPEC simplified vertical cut view



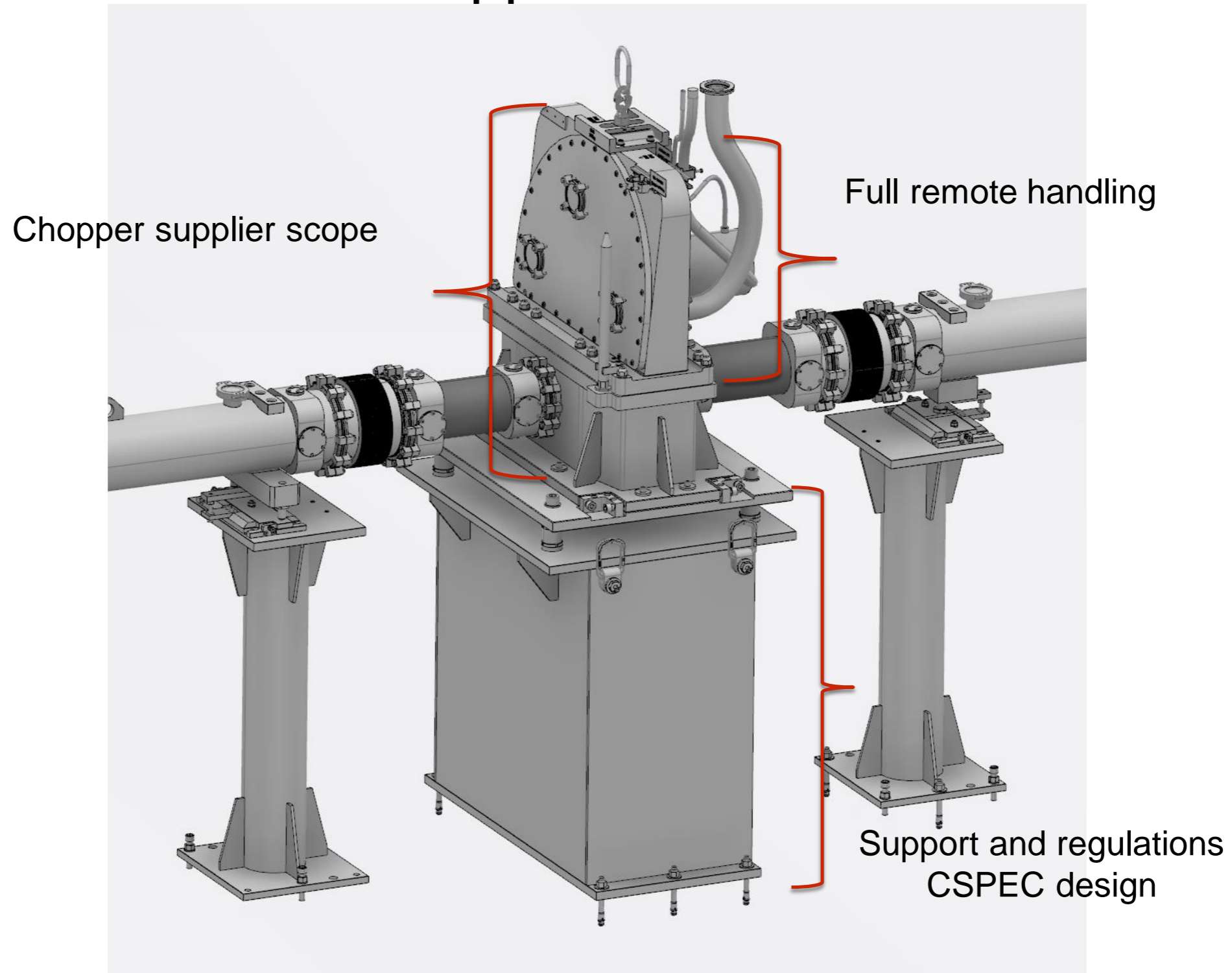
In monolith neutron guides Copper substrate



Vacuum Housings for neutron guides inside bunker

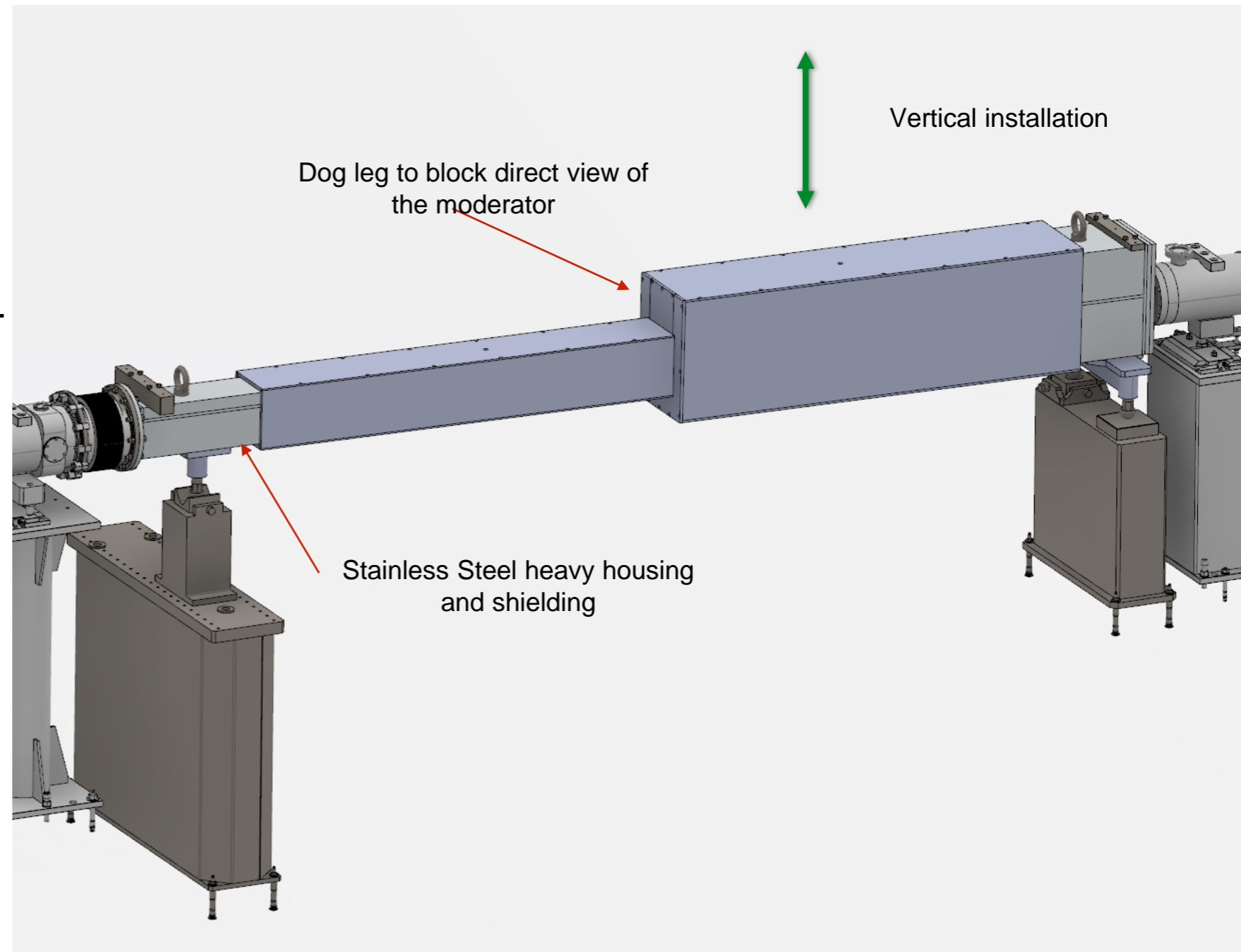


Bandwidth chopper 1&2 inside bunker

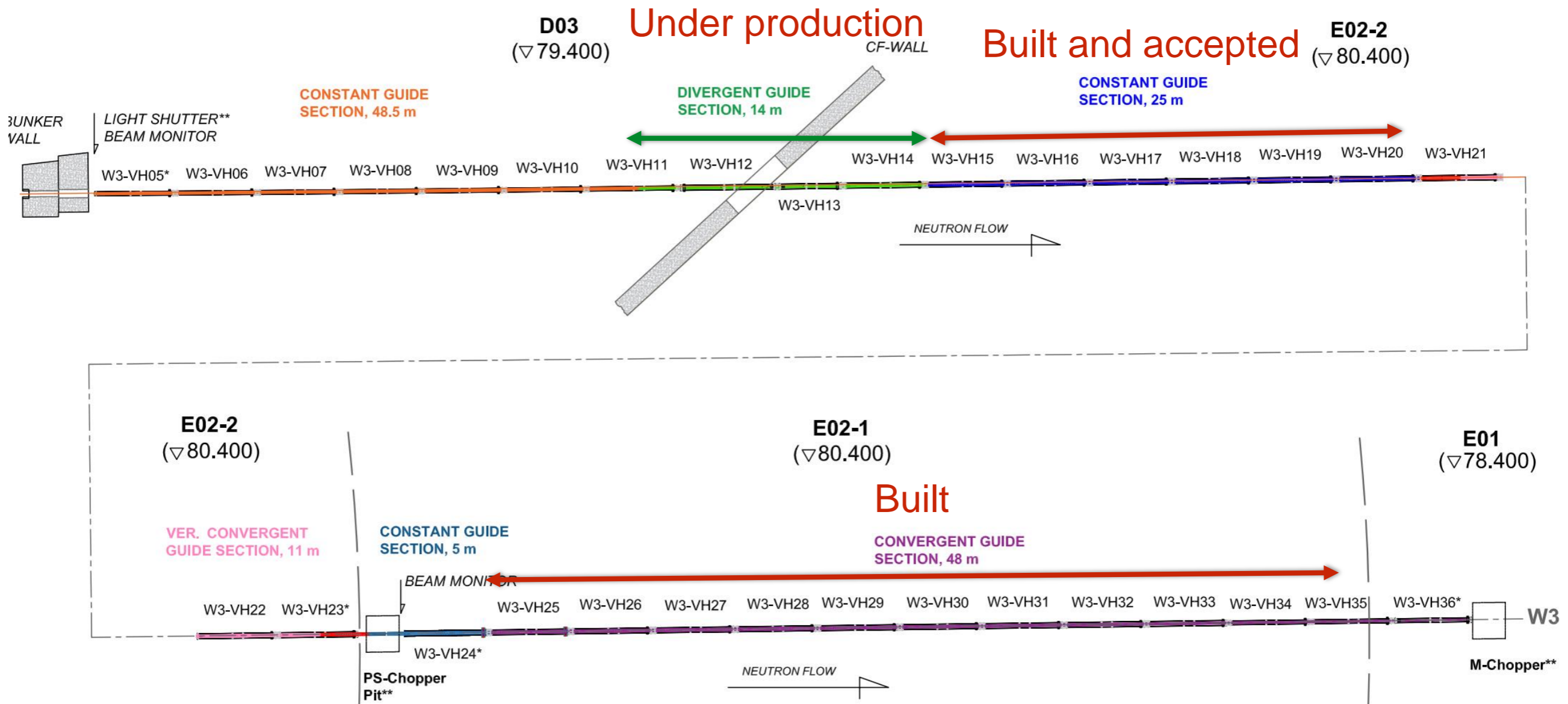


NBOA, bunker wall feedthrough, BBG

- COVID delays 4 months
- -----
- Optics and housing awarded to Swiss neutronics. 230KE
- Delivery estimated in April-2020 – also BBGOA.

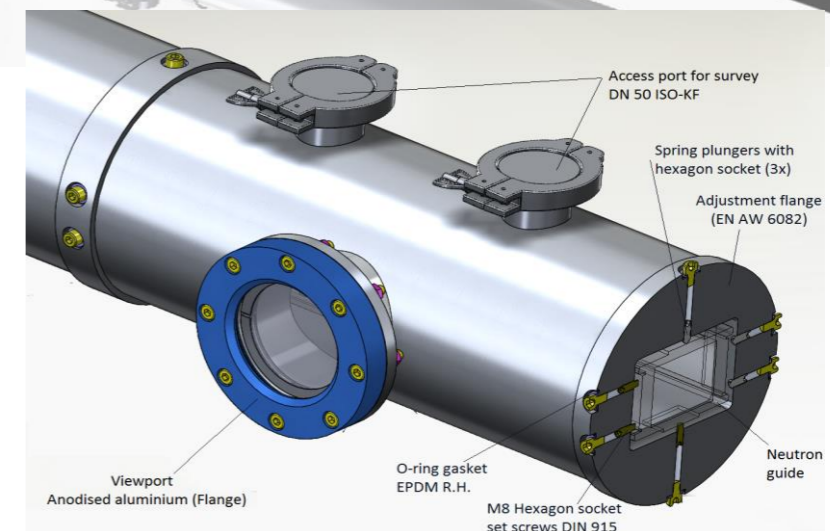
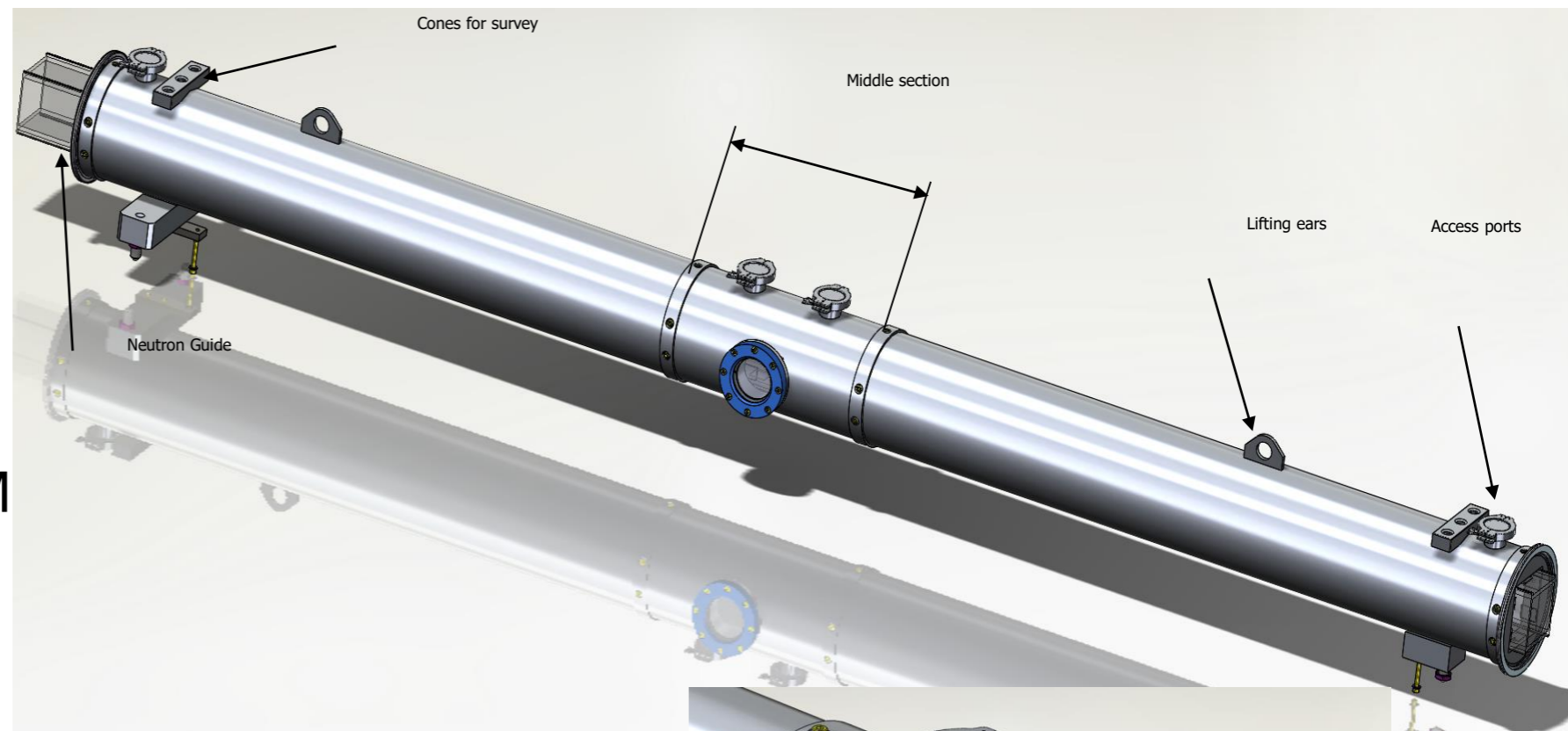


Neutron guides outside bunker Production at TUM NOG

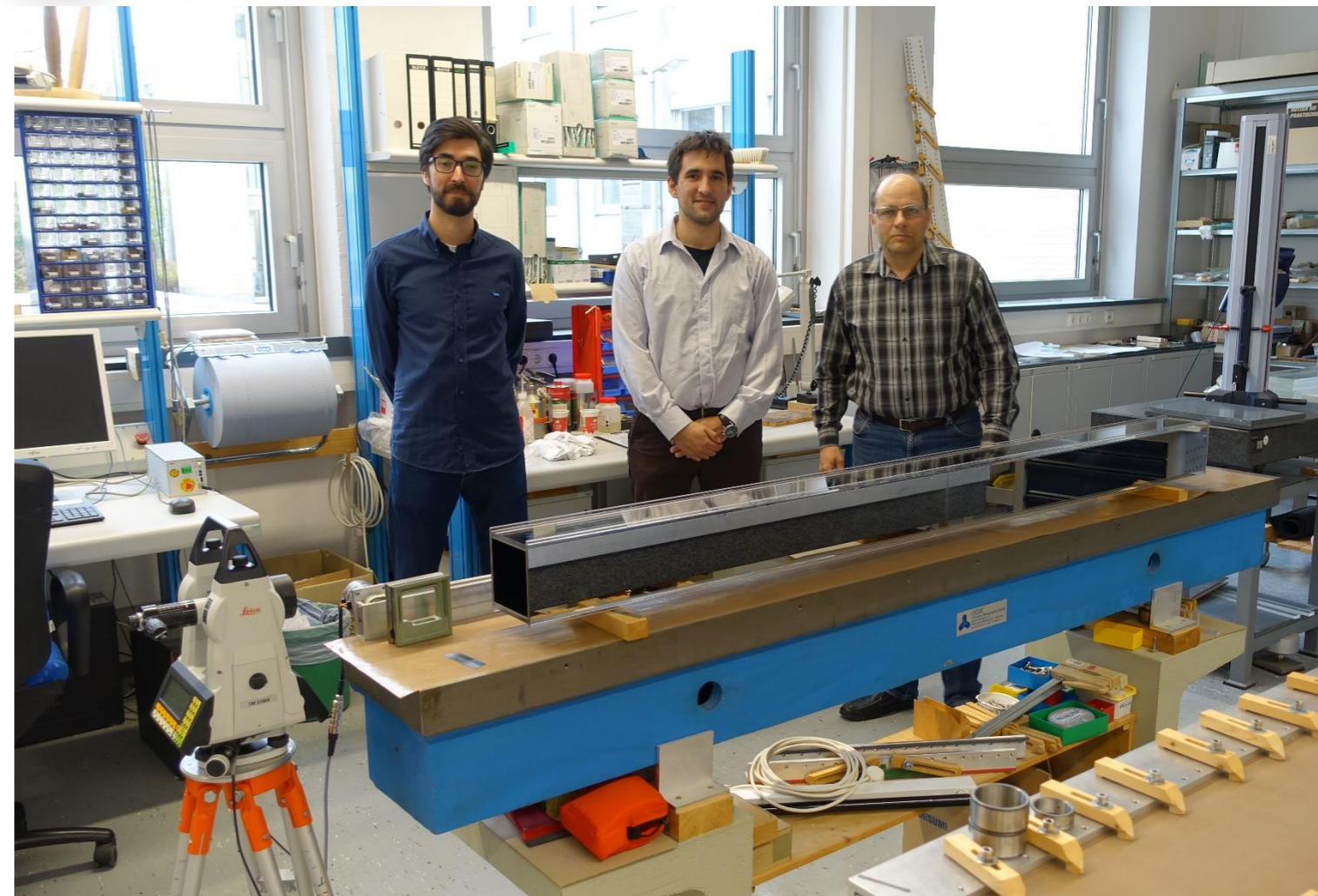
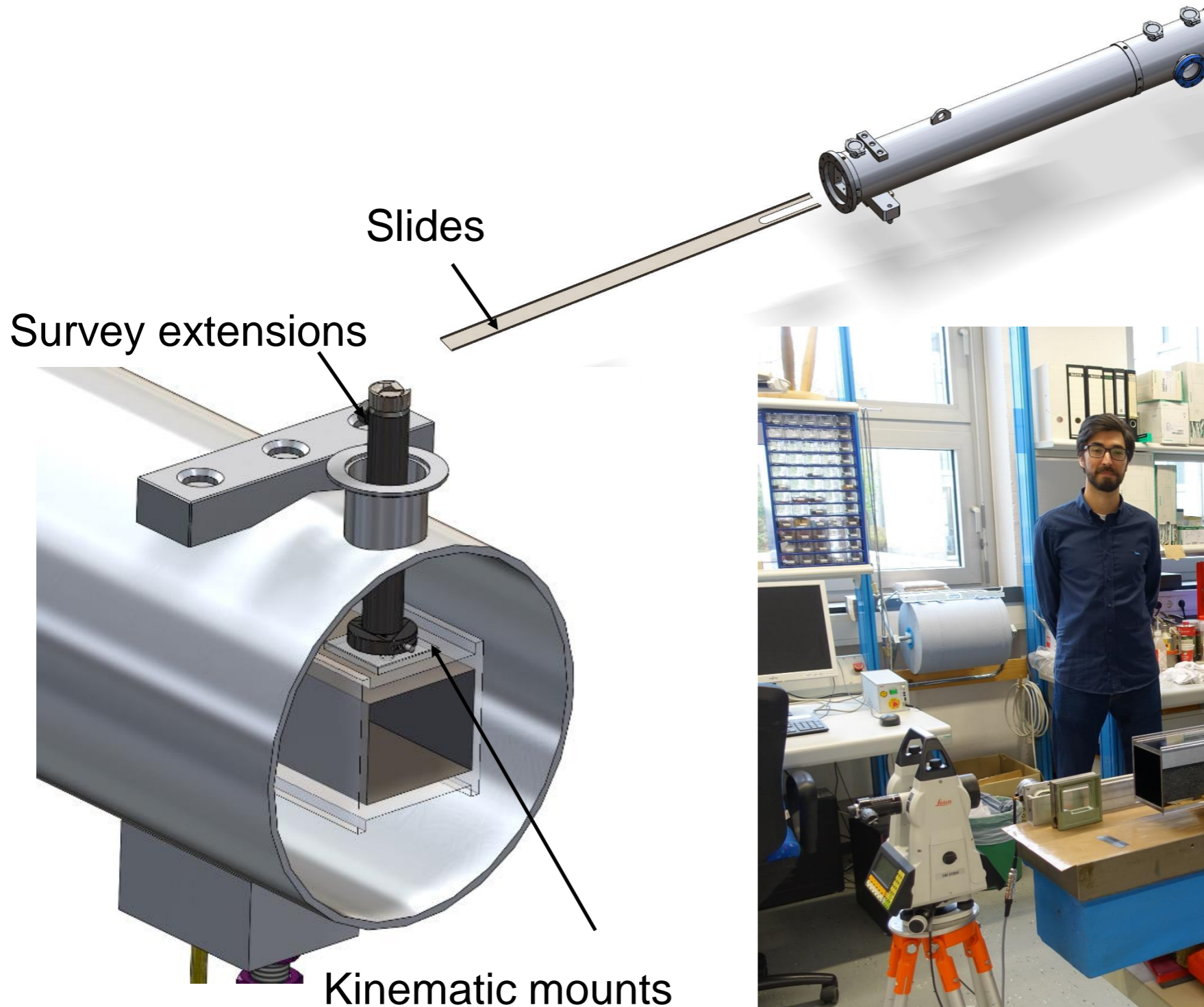


Vacuum Housings for neutron guides outside bunker

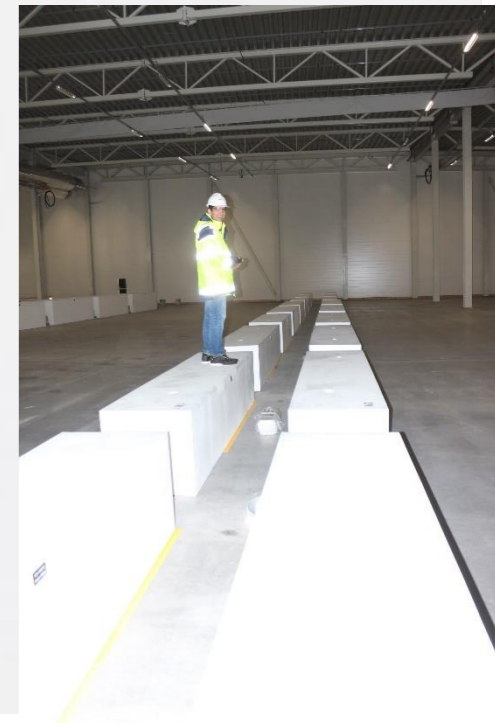
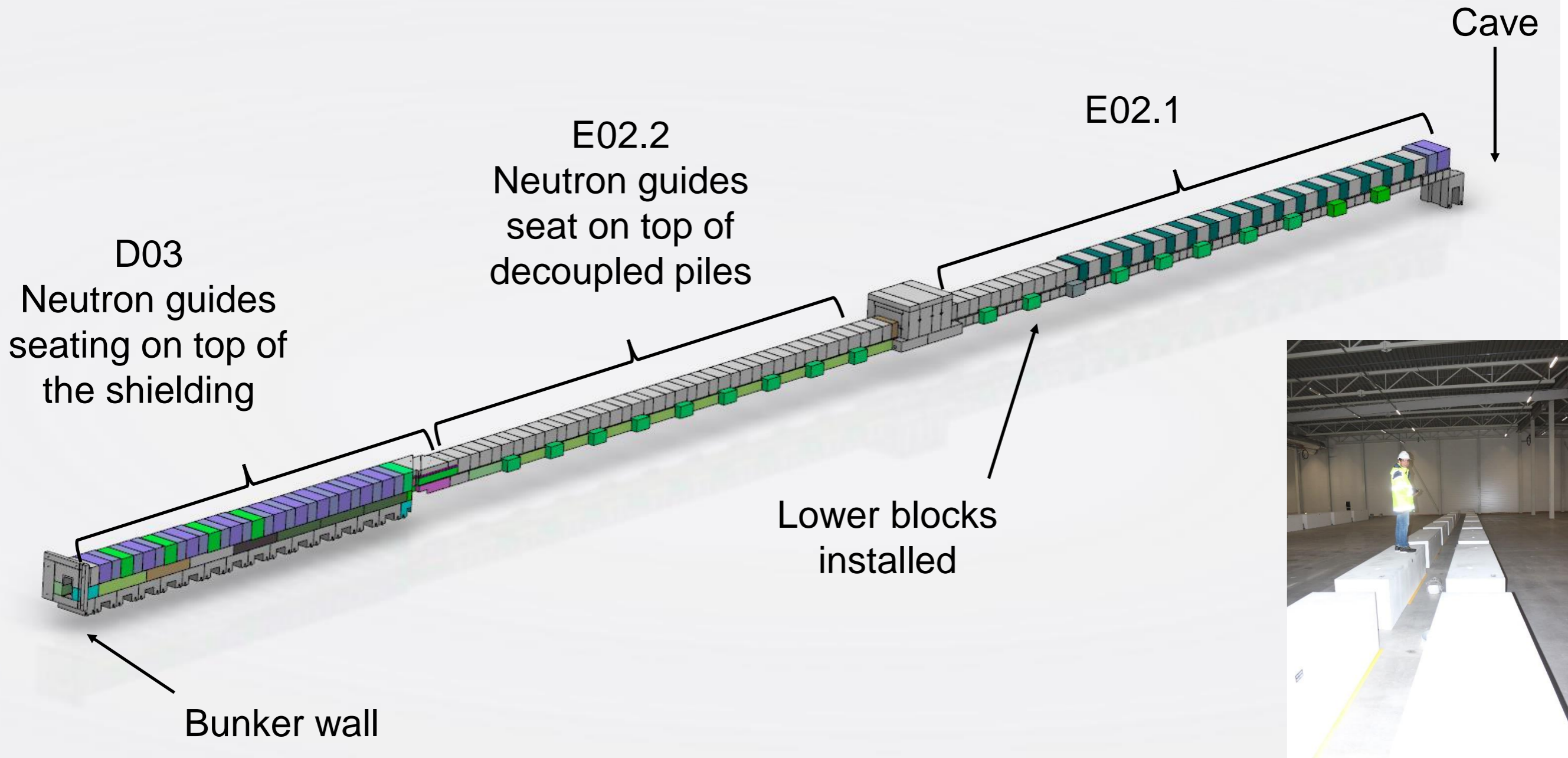
- CECOM- 505KE
- IDR aproved
- Pilot construction on going
- Pilot to be assembled at TUM NOG
- Luis design allowed 300KE saving.
- Communication with CECOM is very good.
- Complete batch delivery earlier.
- Extension of contract for the in-bunker housings.



Neutron guides installation protocols & pilot testing

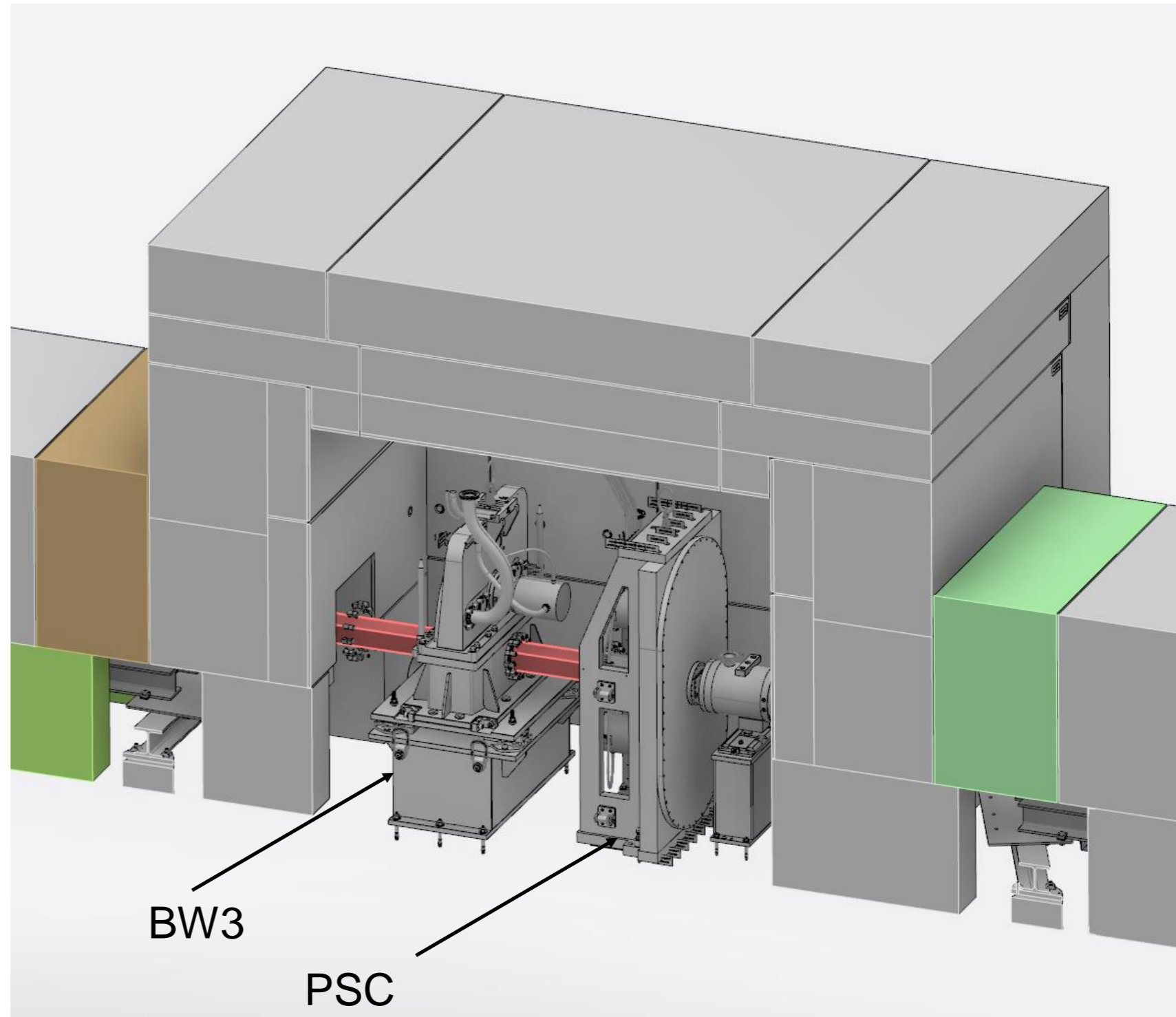


Common Shielding

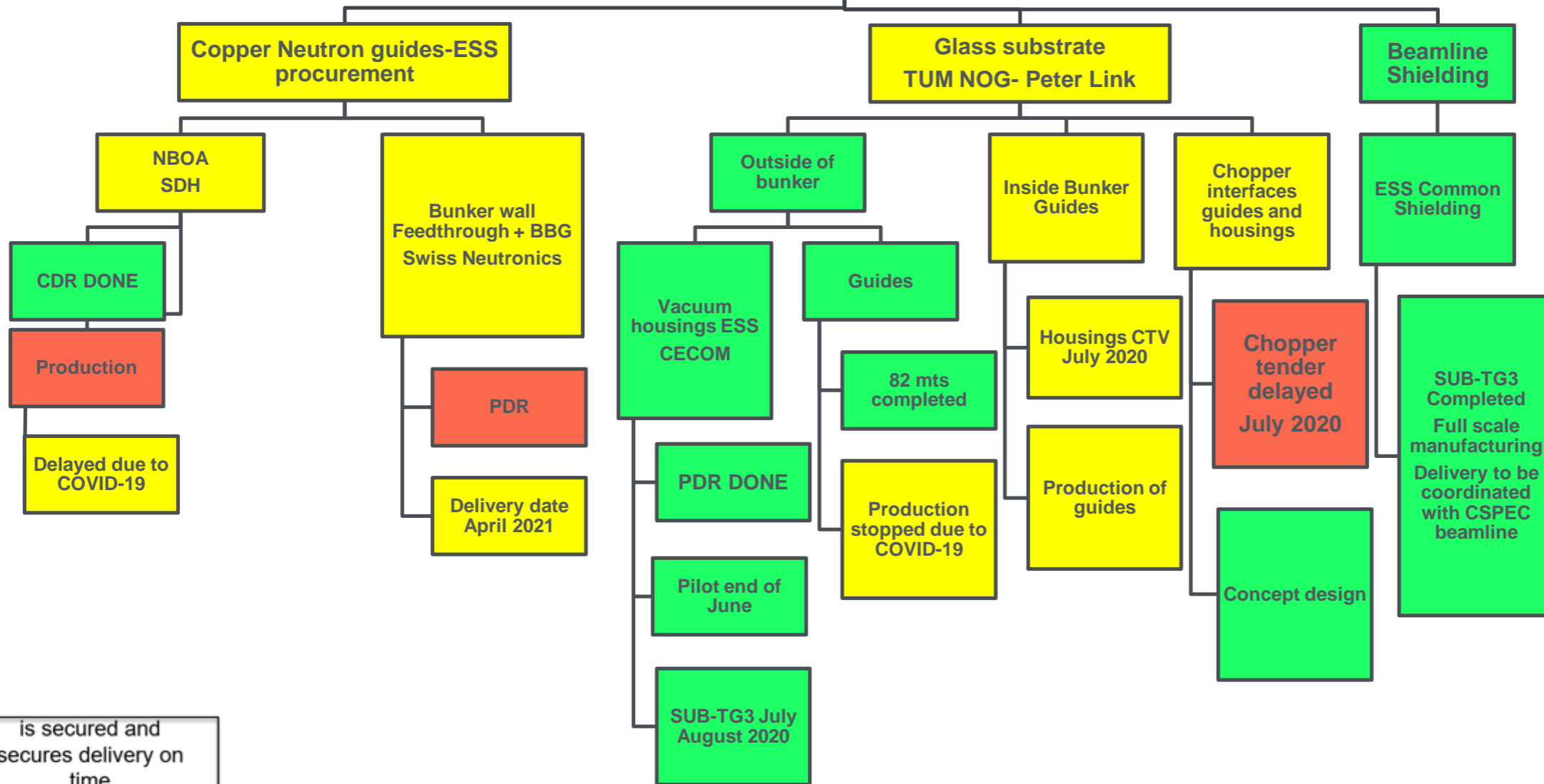


Common Shielding

- Optimized design
- Approved sub-TG3
- First instrument to complete TG3 readiness for manufacturing
- Excellent communication



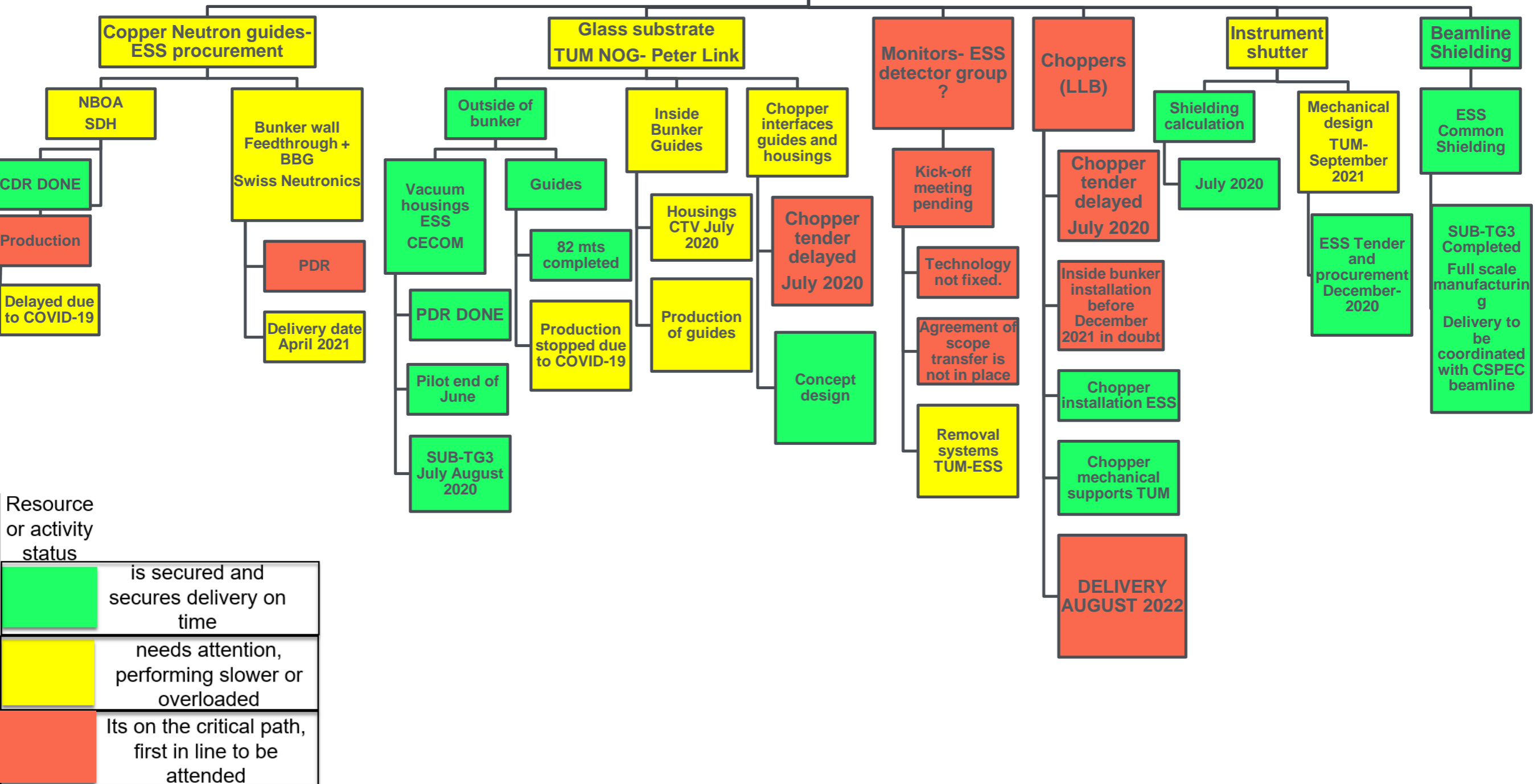
Primary Spectrometer TUM design effort – procurement ESS and LLB



Resource or activity status

| | |
|--|--|
| | is secured and secures delivery on time |
| | needs attention, performing slower or overloaded |
| | Its on the critical path, first in line to be attended |

Primary Spectrometer TUM design effort – procurement ESS and LLB



Summary of challenges regarding primary spectrometer

- Contract and delivery of choppers.
- Delivery of neutron guides on time for in-bunker installation slot.
- Beamline installation team. Installation leader availability.
- Integration of choppers, mechanical assembly.
- Integration of instrument shutter.
- Integration of monitors.
- Get our documentation ready for sub-TG4.
- Prepare IRRs.

ESS review process TG3 to TG4

FAT

- **Factory acceptance test-** Guarantees that the components are built up to the specification.
- All testing and quality protocols are handled to CSPEC.
- CSPEC/specialists perform specific testing at the suppliers factory.
- Component is accepted at factory and can be delivered to ESS site

IRR

- **Installation readiness review**
- The installation is fully defined and all risks, resources and coordination is put in place
- Presentation of clear and detailed work order. RAMS –Risk Assessment Method Statement.
- Presentation of personnel involved and certifications. Training is done to access ESS work site
- Supplier provides all details, CSPEC lead engineer acts as EPL handles ESS communication.

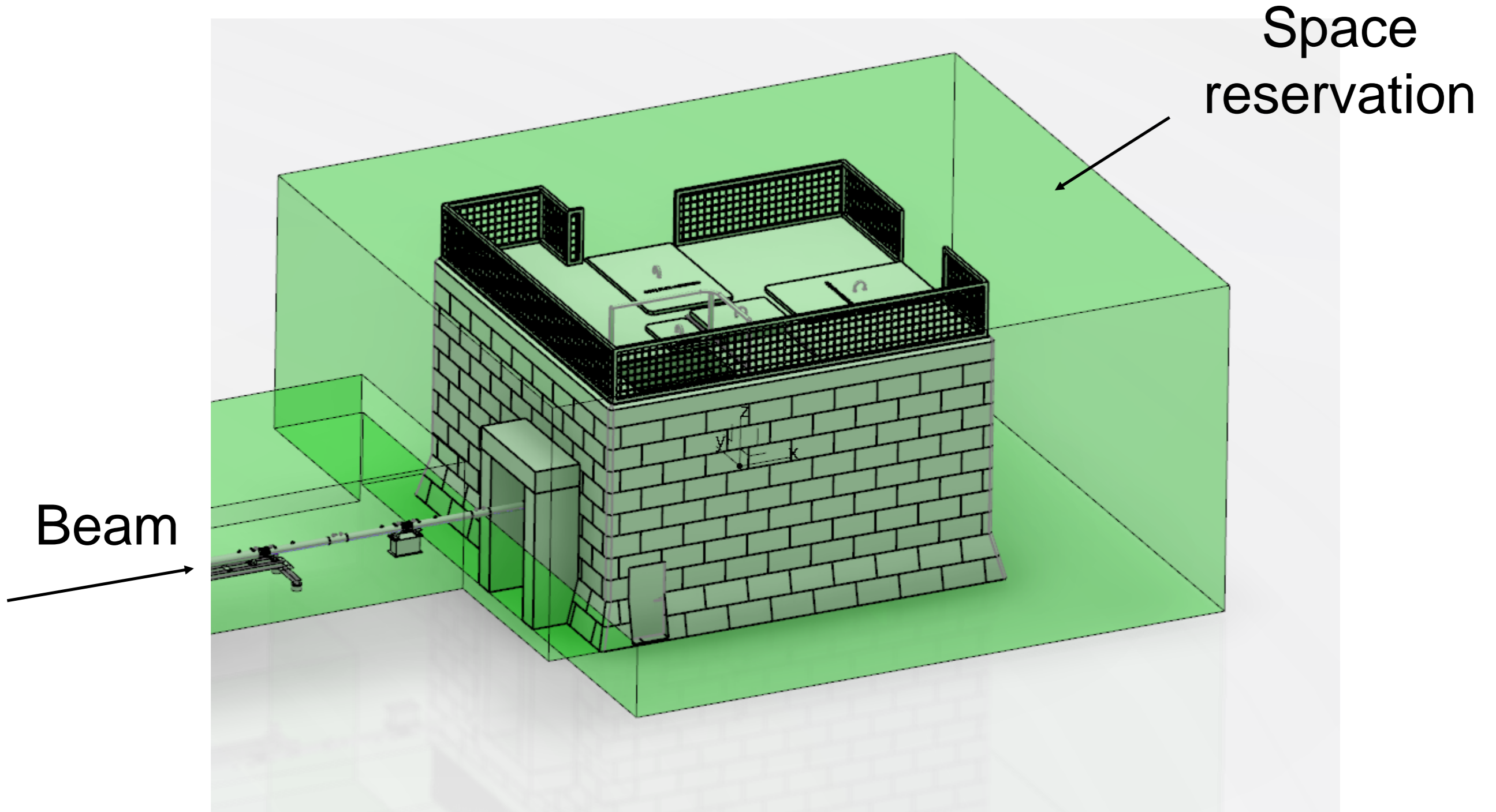
SAT

- **Site Acceptance test-** The components are integrated in CSPEC and tested.
- On site predefined testing are performed and uploaded to ESS data system
- Transfer of property to ESS and beginning of guarantee period from the supplier.
- Documentation of subcomponent is ready for TG5.

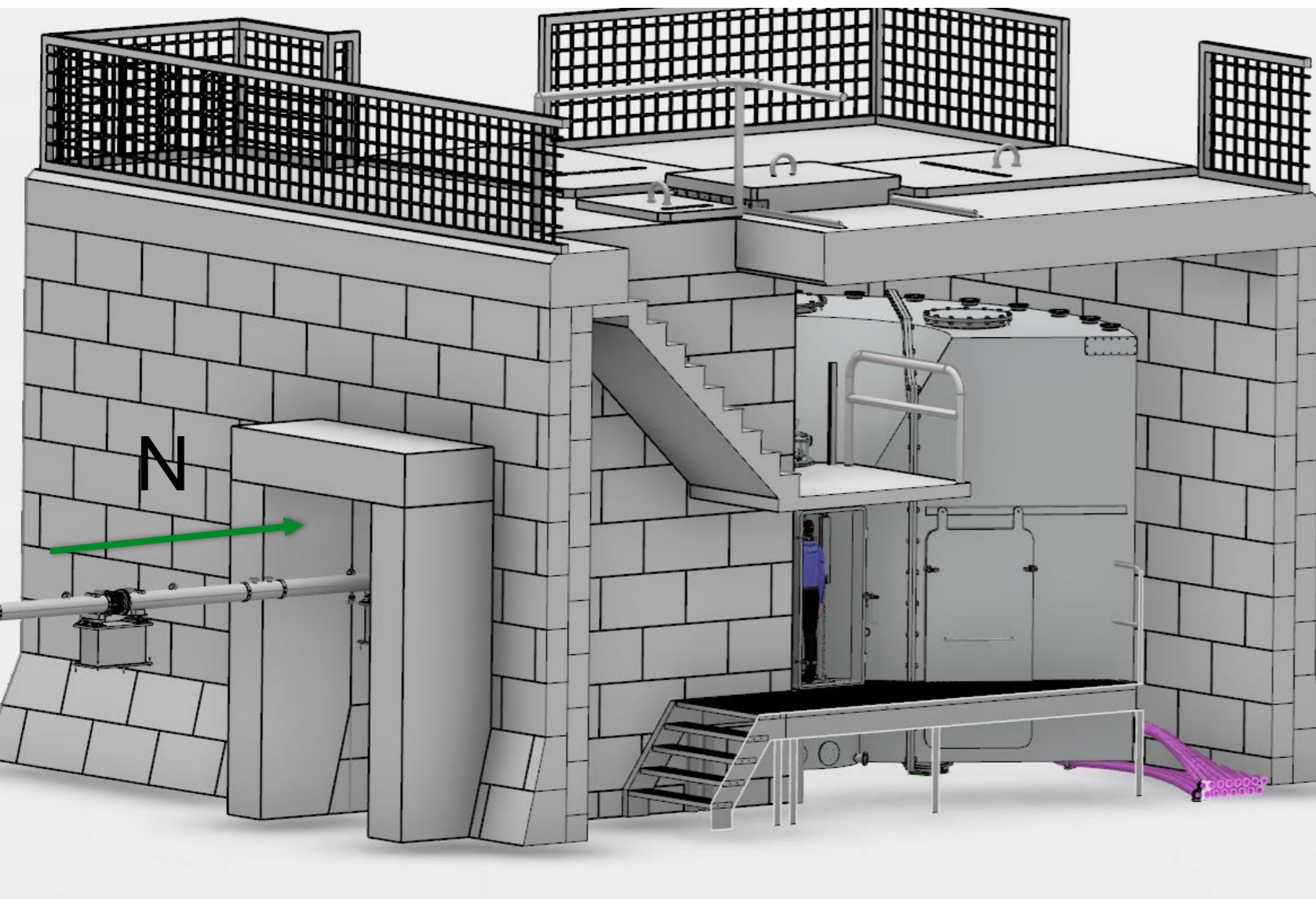
Summary of achievements regarding primary spectrometer

- Procurement and CDR NBOA
- Procurement of Bunker wall feedthrough and BBG.
- Procurement of Outside of bunker neutron guides vacuum housings,
IDR approved
- Integration to common shielding and sub-TG3
- Integration risks have been mitigated.

Secondary spectrometer

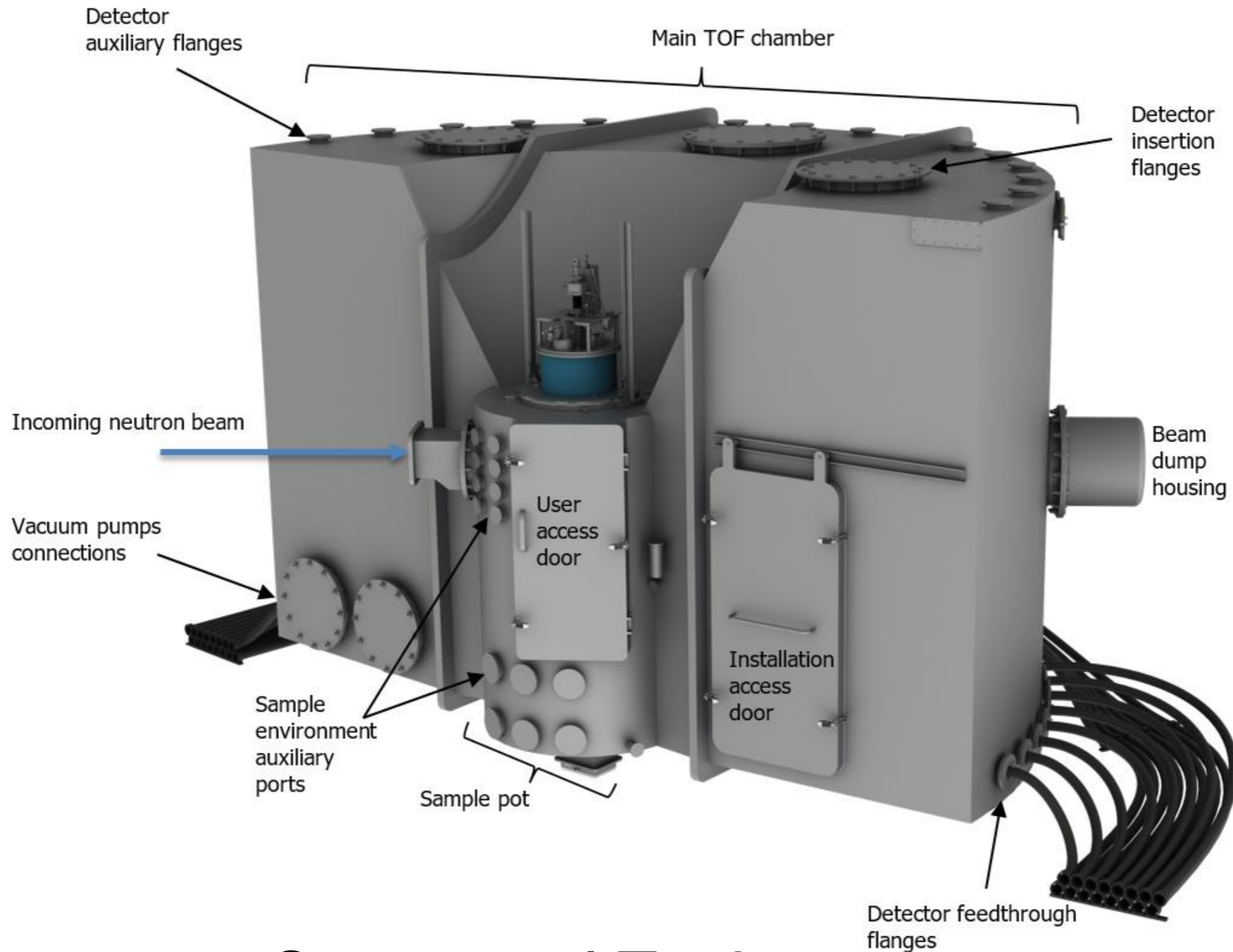


Secondary spectrometer cave concept



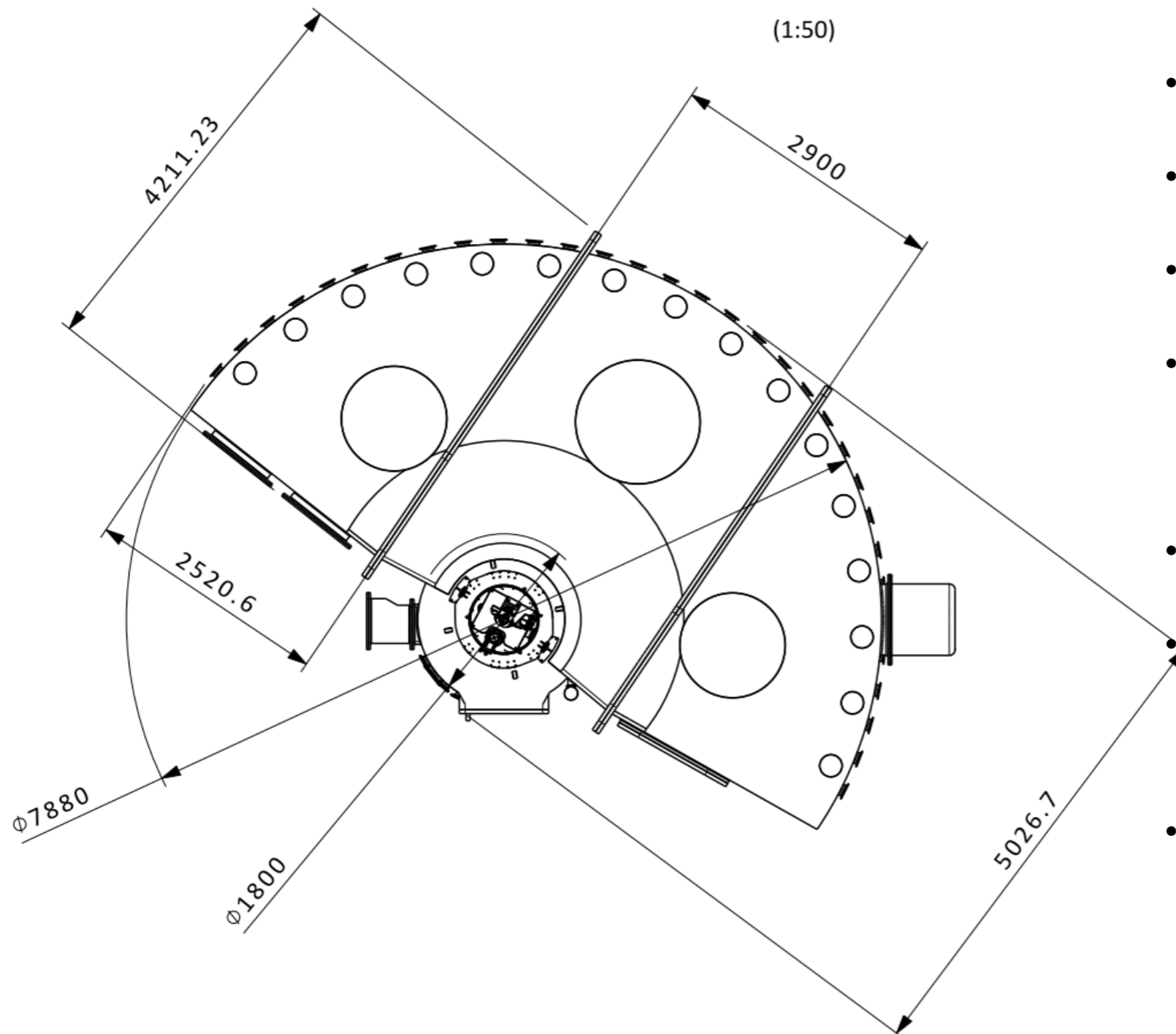
- Cave shielding calculations pending. Preliminary 1 mt of regular concrete
- 3 levels access
- Dog leg access in 3 levels
- Sliding top shielding for magnet insertion
- Non permanent construction
- 1 wall dismountable without losing mechanical stability


Main TOF high vacuum chamber



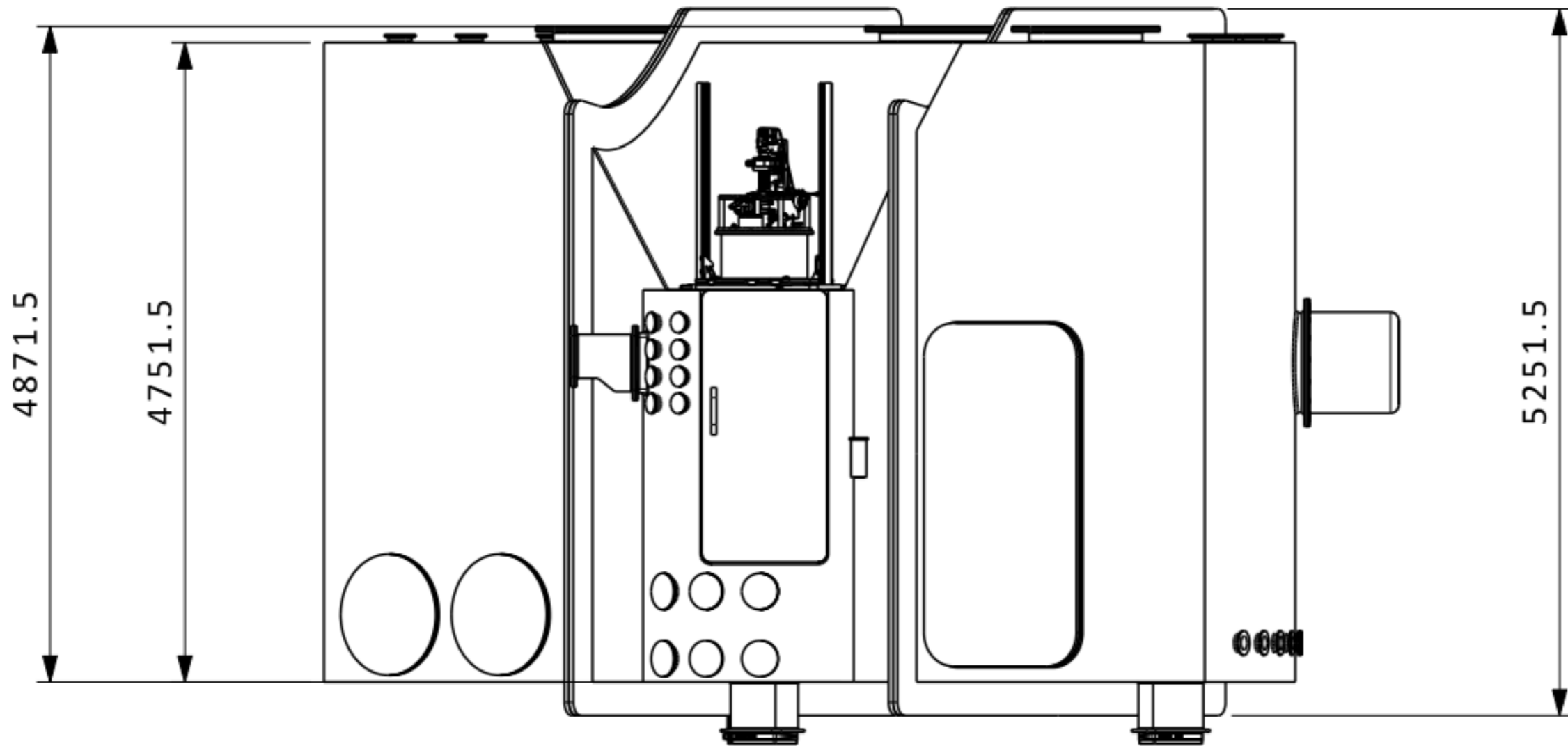
Conceptual Tank

Main TOF chamber dimensions

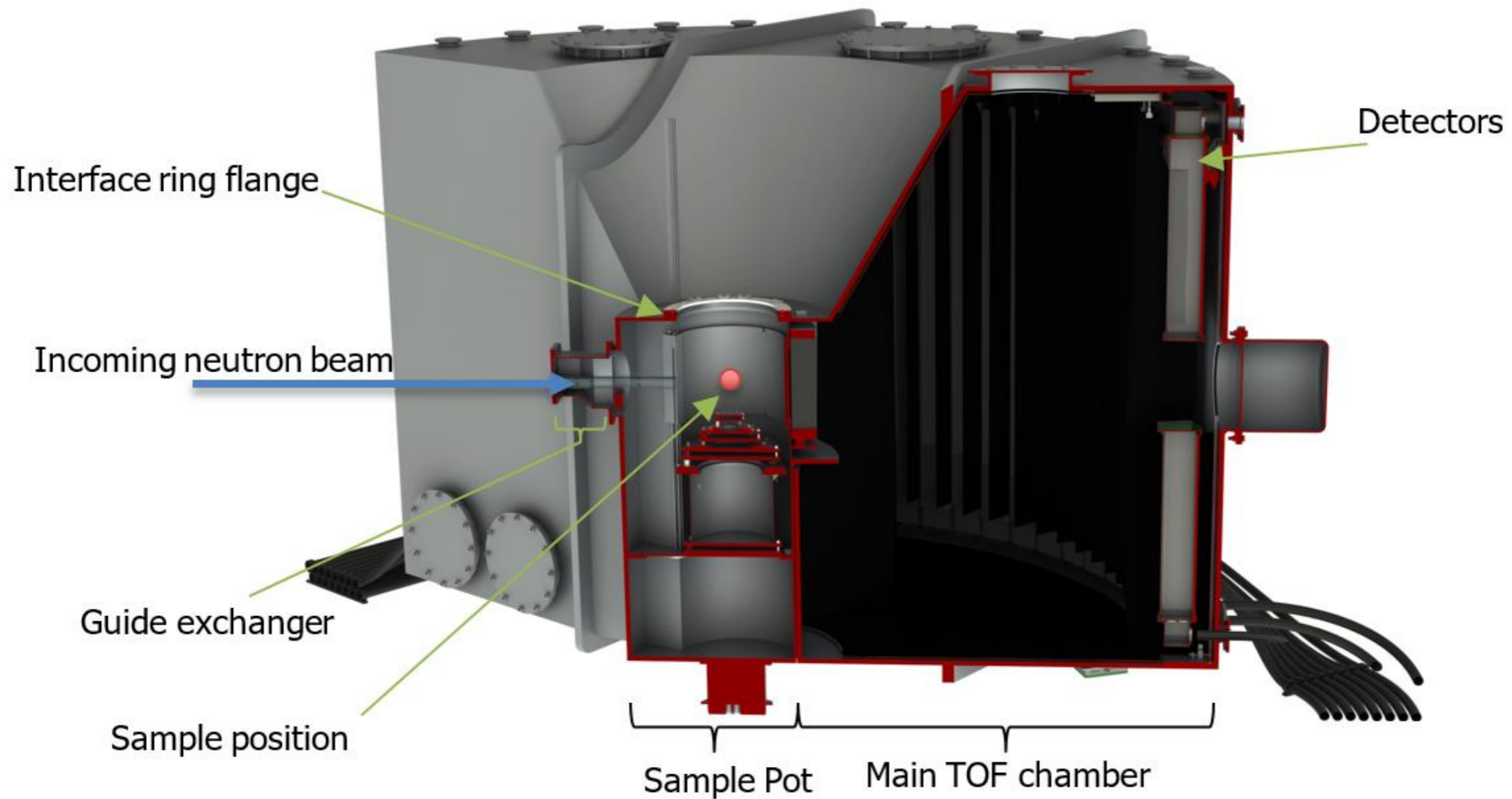


- 10^{-4} mbar
- Split in 3 parts
- Bolted or welded on site
- Stainless steel construction with strict magnetic requirements
- Aluminium
 -  Strict requirements on deformation
- Detailed design is outsourced

Main TOF chamber dimensions



Main TOF chamber– vertical cut



Main TOF chamber— horizontal cut

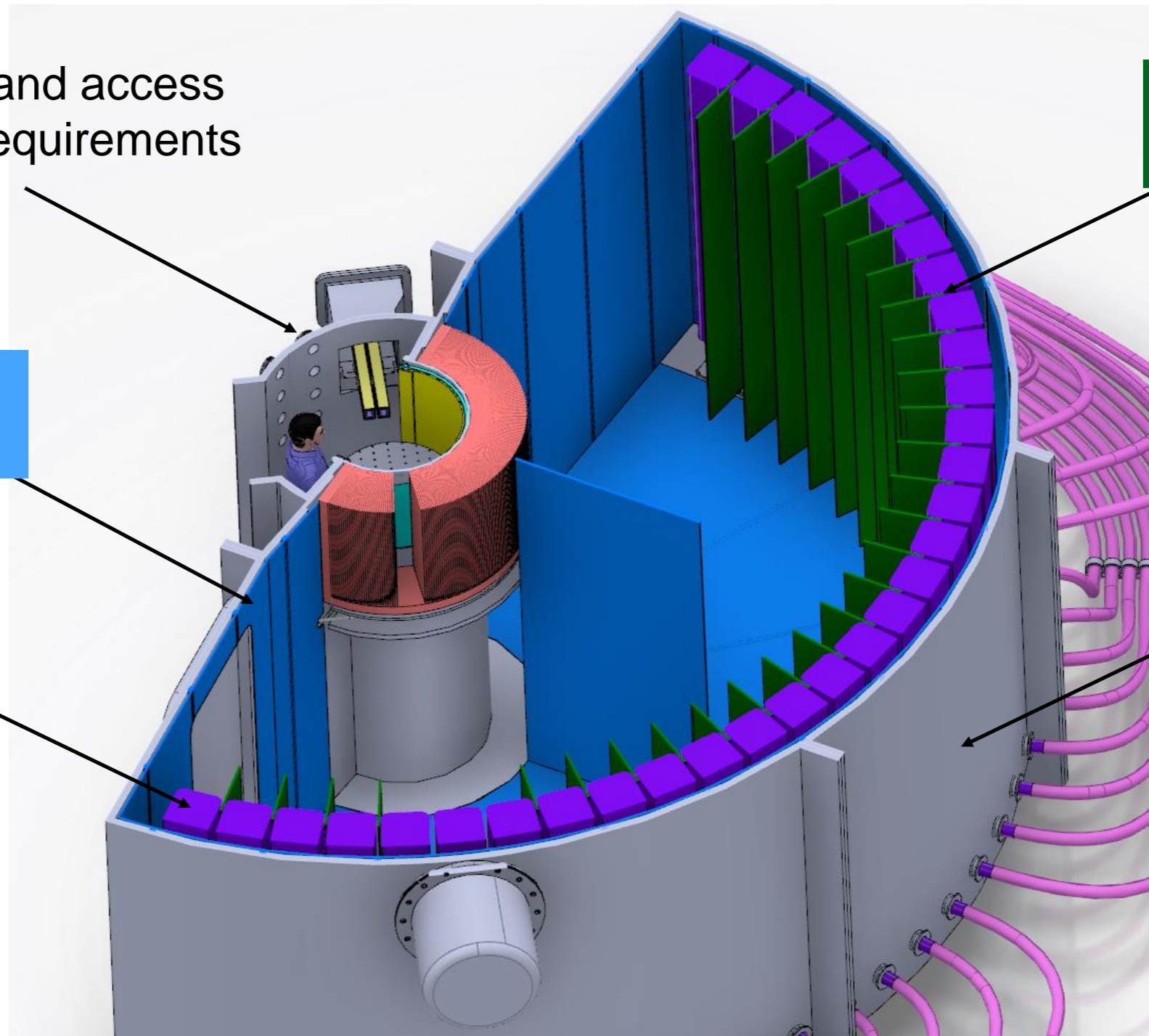
Enlarged sample pot and access
Complying with SAD requirements

Collimation
Vanes

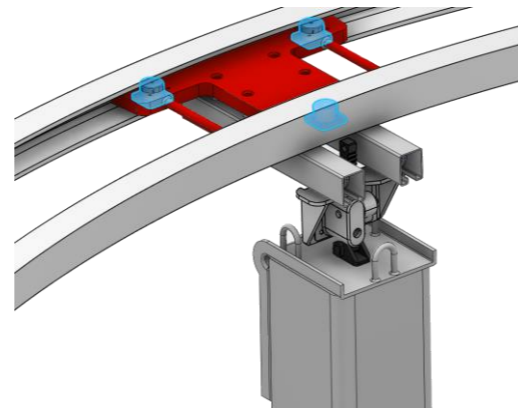
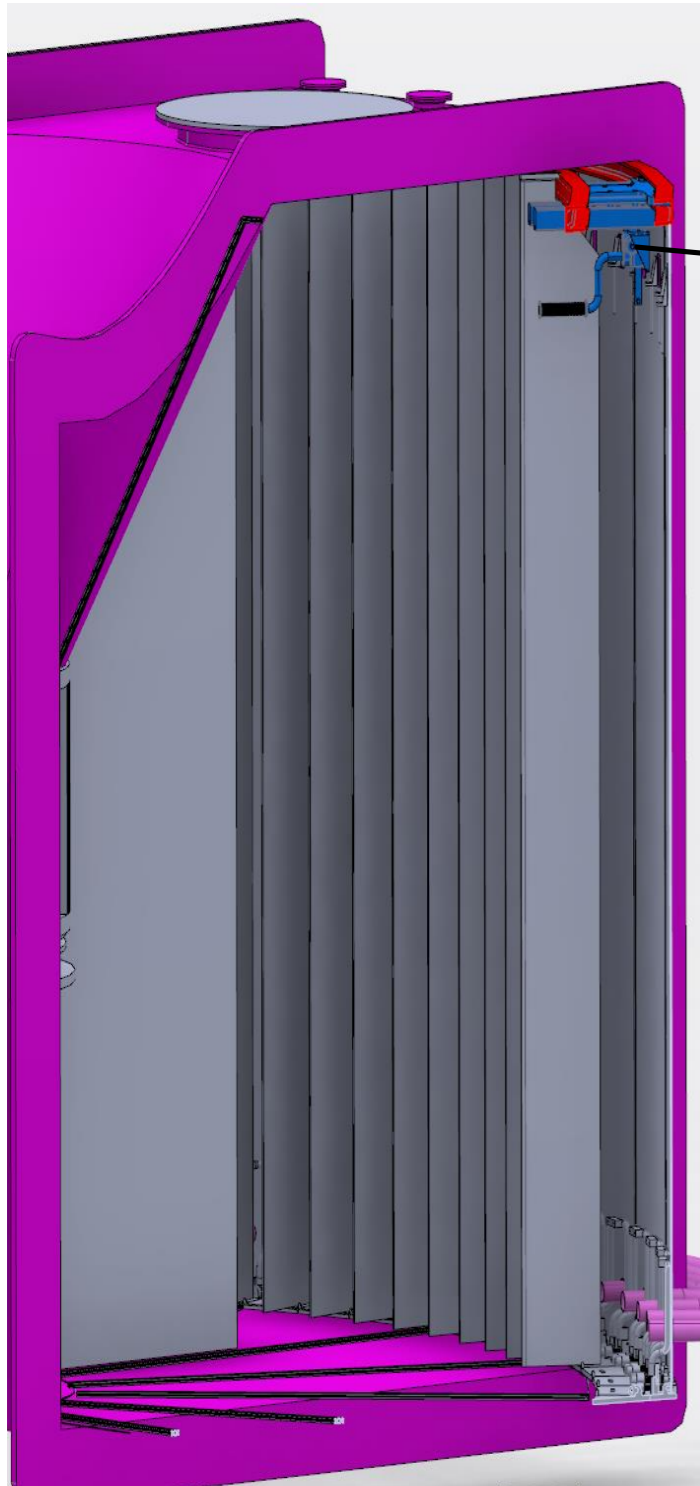
Cd inner
dressing

Detectors

Main TOF
chamber



Internal installation

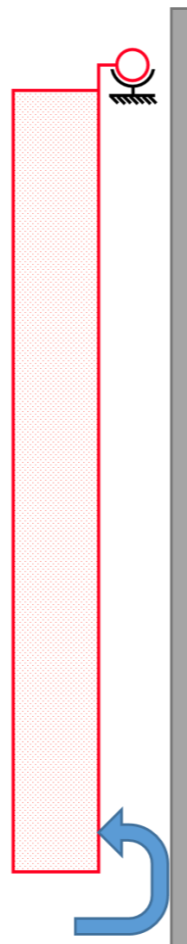


Customized hoist due to height restrictions

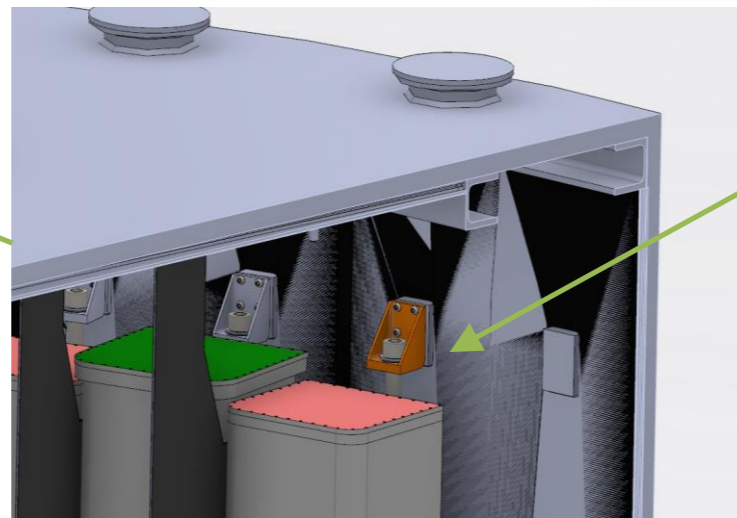
Detectors hanging concept and vanes prototypes in the list of priorities

2 mm deformation at the hook
Deformation expected to be repeatable

A plan for alignment will be developed using a prototype

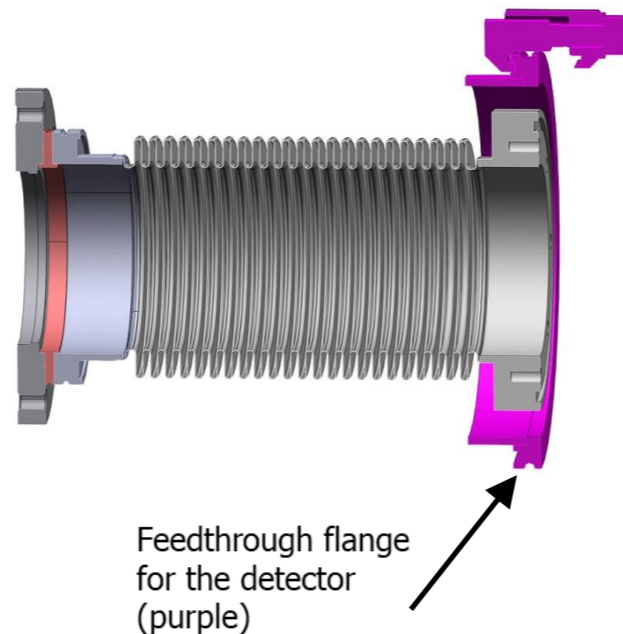


Detector installation



Hanging hook for the detector

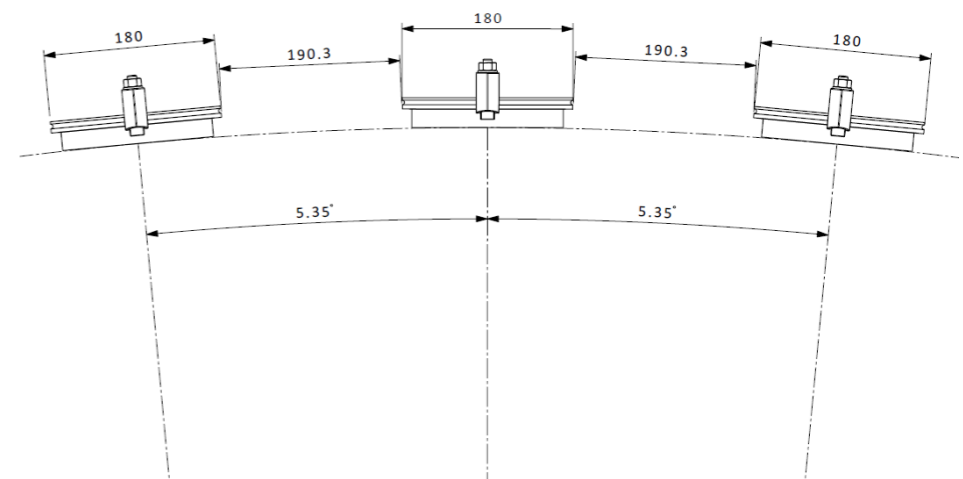
Cut view feedthrough bellow of the detector



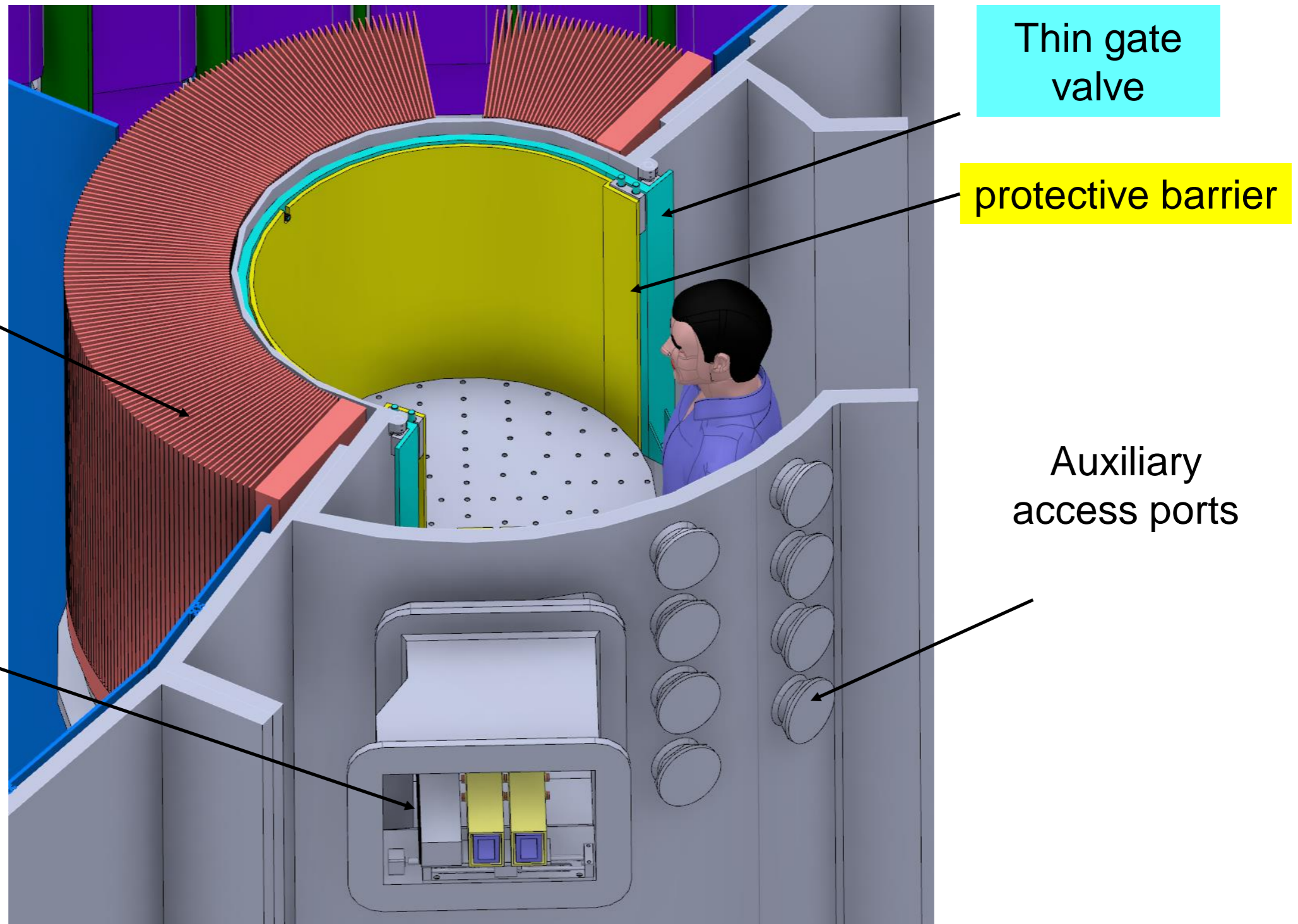
Feedthrough flange for the detector (purple)

DN 160 ISO-K

Angle between the detectors feedthrough flanges



Sample pot access



Radial
oscillating
collimator
 $0,1\text{Hz} \pm 1^\circ$

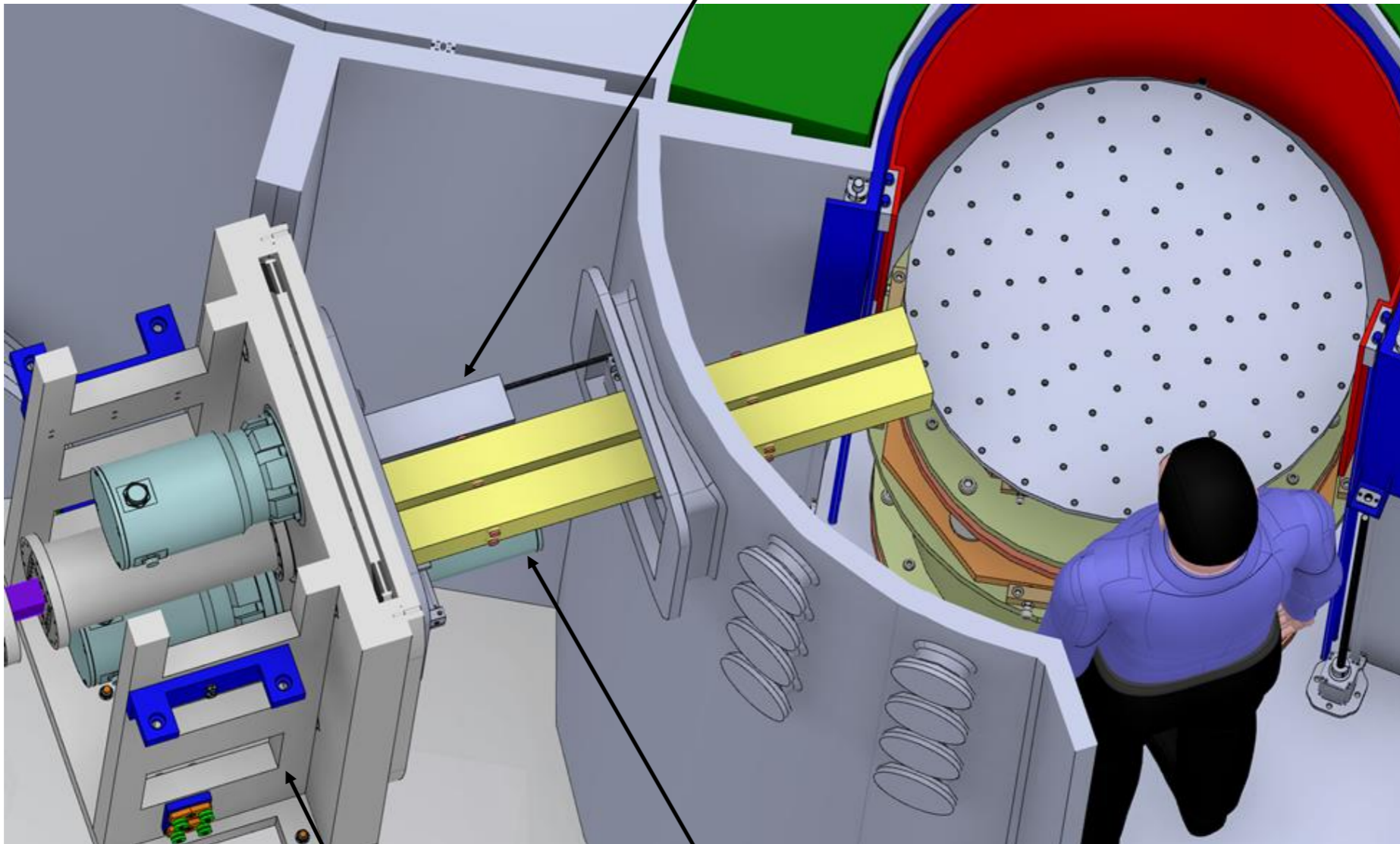
Concept of
linear guide
exchanger
3 positions

Thin gate
valve

protective barrier

Auxiliary
access ports

Recent changes in monitor position, a new concept needs to be developed



High Speed chopper
3 Carbon fiber disks

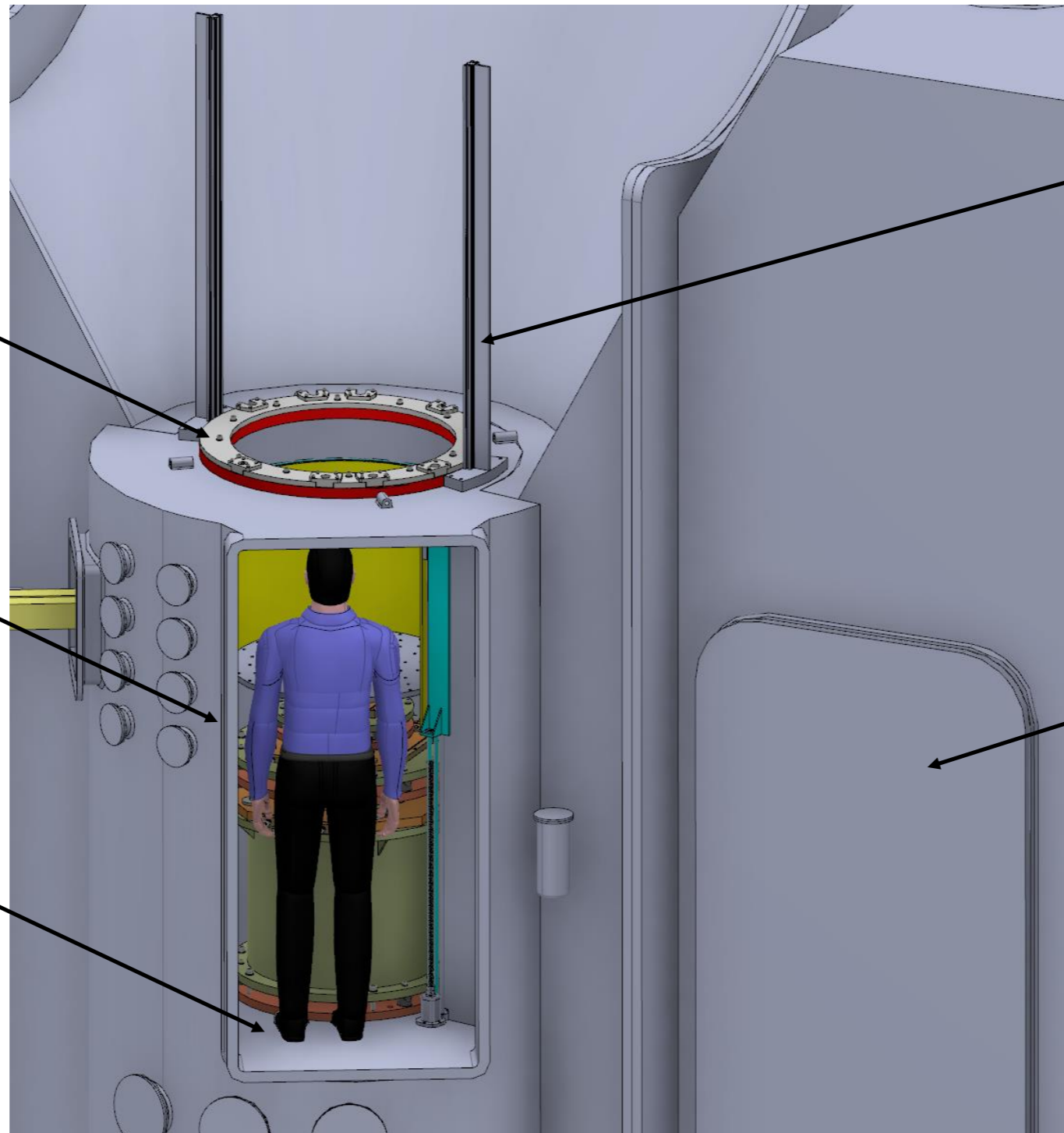
Space available for
magnetization path
uncertain

Sample pot access

X Y
adjustable
flange to
interface
sample
environment

Routinary
access

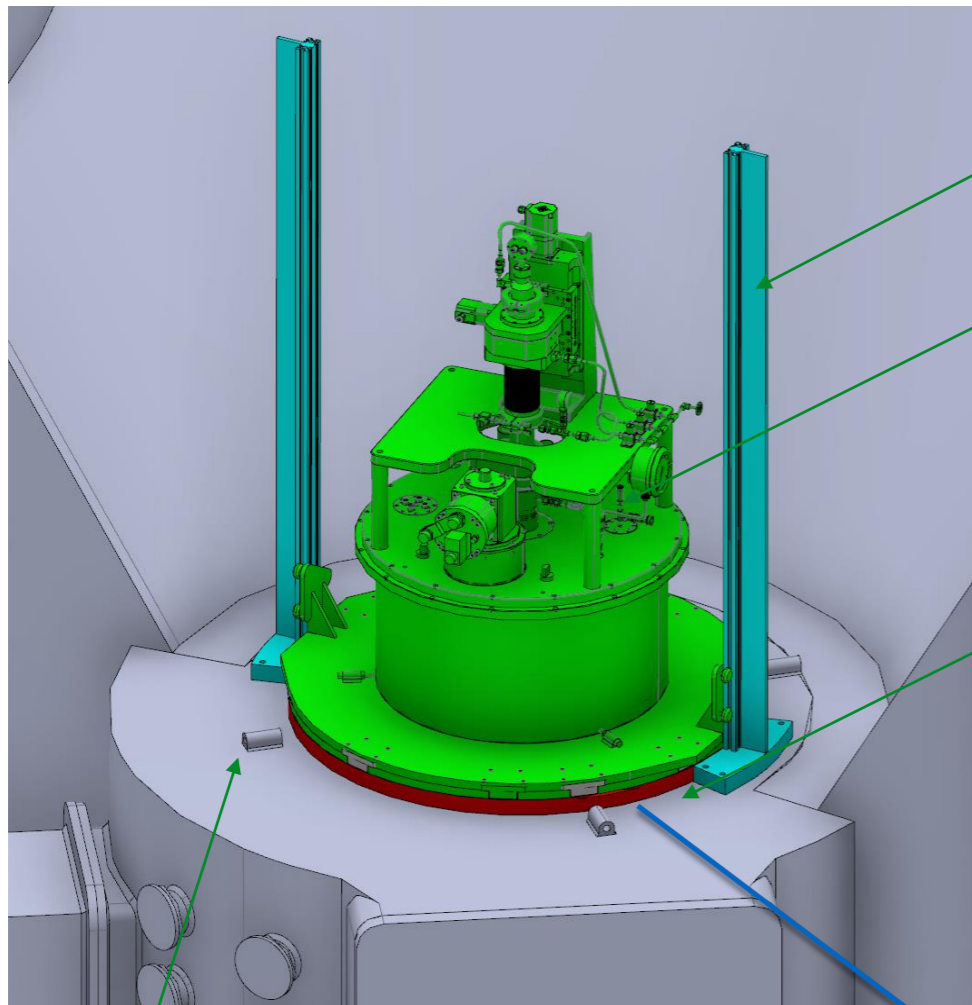
Removable
floor



Guiding
slides for
flange top
loading

Non
routinary
access
+ view ports

Top mounting installation



Concept of rails for top loading

Concept of high field magnet, max weight 1 ton

Top Surface of the sample pot maximum deformation 2 mm

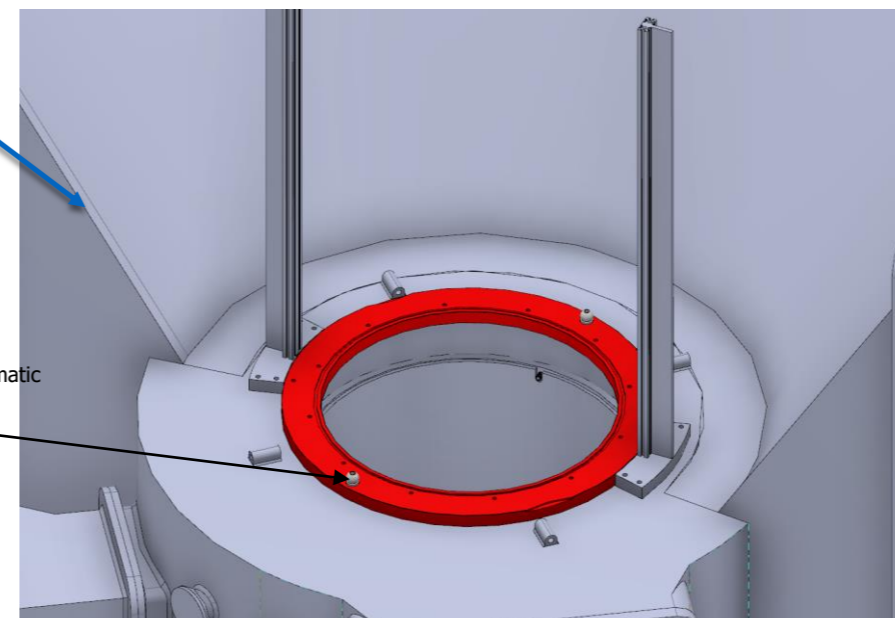
Interface ring flange

Top surface interfaces of the ring defined by ESS-SAD

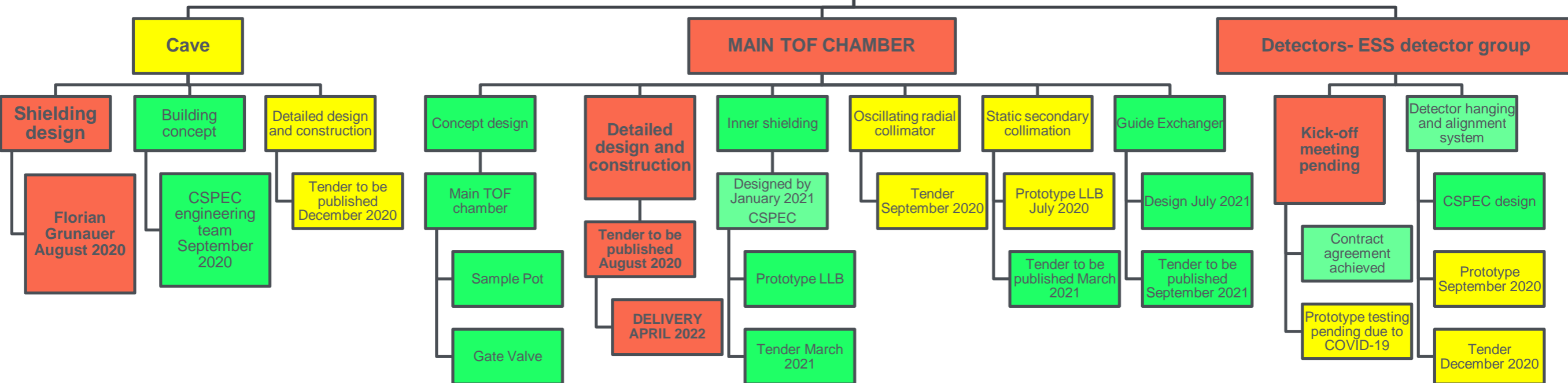
Bottom surface seal to be designed by seller

X Y adjustment concept

Interfaces to ESS-SAD top loading kinematic mount



Secondary Spectrometer LLB design effort – procurement LLB



Resource or activity status

| | |
|--|--|
| | is secured and secures delivery on time |
| | needs attention, performing slower or overloaded |
| | Its on the critical path, first in line to be attended |

Challenges regarding secondary spectrometer

- Contract with a qualified supplier for the TOF chamber. Within budget.
- Contract with a qualified supplier for the cave, within budget.
- Prototype mounting and alignment systems for detectors and secondary collimation.
- Communication with the detectors group, testing and delivery coordination
- Integration of shielding and smaller components.
- Integration of supplies into the cave.
- Schedule of delivery vs human resources.
- Communication to LLB/CEA procurement department.
- LLB mechanical designer working part time at ESS site. Support from French colleagues.

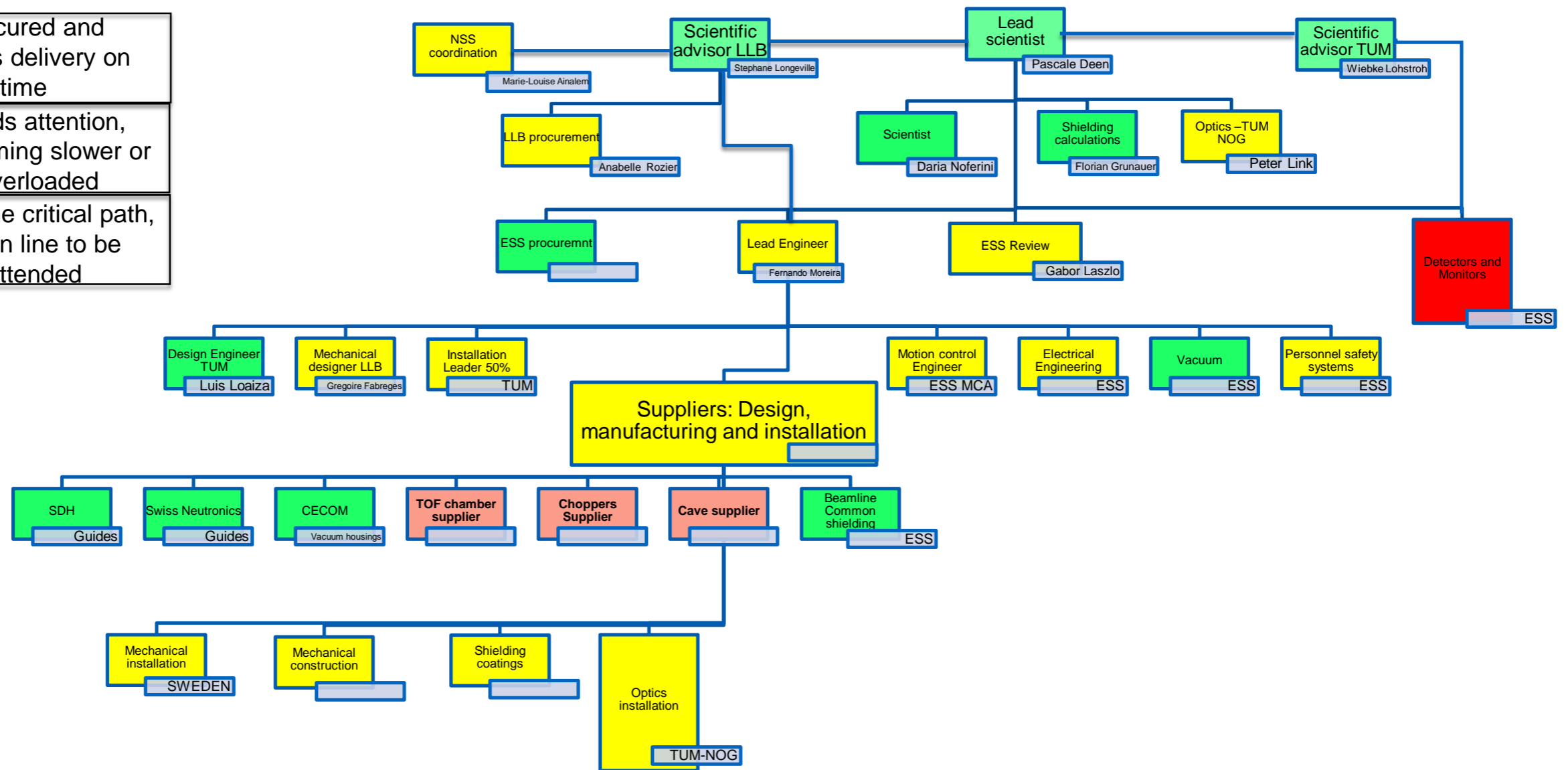
Main achievement on the secondary spectrometer

- Concept design of the main chamber integrates all scientific requirements expected and represents an improvement to other spectrometers. All interfaces to ESS have been addressed
- TOF chamber CTV approved.
- Clear definition of materials and scope to the suppliers.
- Integration of all components have been deeply reviewed and all design risks have been mitigated. Guide exchanger, cave, high speed chopper, detectors, inner shielding, magnets, radial collimators, supplies, gate valve and protective gate.

CSPEC communication flow

Resource
or activity
status

| | |
|--|--|
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Motion control

- A new updated motion table with more axis has been handled to ESS MCA
- A clear definition of the scope of work for the motion control engineer needs to be developed
- An agreement of scope transfer needs to be addressed for the LLB TA modification.

Electrical engineering

- An offer from NSS electrical engineer –Stuart birch is on the way
- A clear definition of the scope of work for the electrical engineering package needs to be developed
- An agreement of scope transfer needs to be addressed for the LLB TA modification.

Main achievements of CSPEC

- Consolidated concepts and moving steadily to manufacturing phase
- Mitigated the risk of changing the lead engineer.
- Secured contracts with guides suppliers.
- Instruments hazards risks analysis almost complete.
- Understood clearly the review process of ESS.
- Generated a communication loop to all stake holders.

Thanks for your attention!
Questions?