NMX Update

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Instrument Lead Engineer NMX

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Summary

NMX Project structure

NMX Outline

NMX Technical components

NMX Cave

Project structure

Lead Scientist: Esko Oksanen, ESS
Second Scientist: Gergely Nagy, Wigner

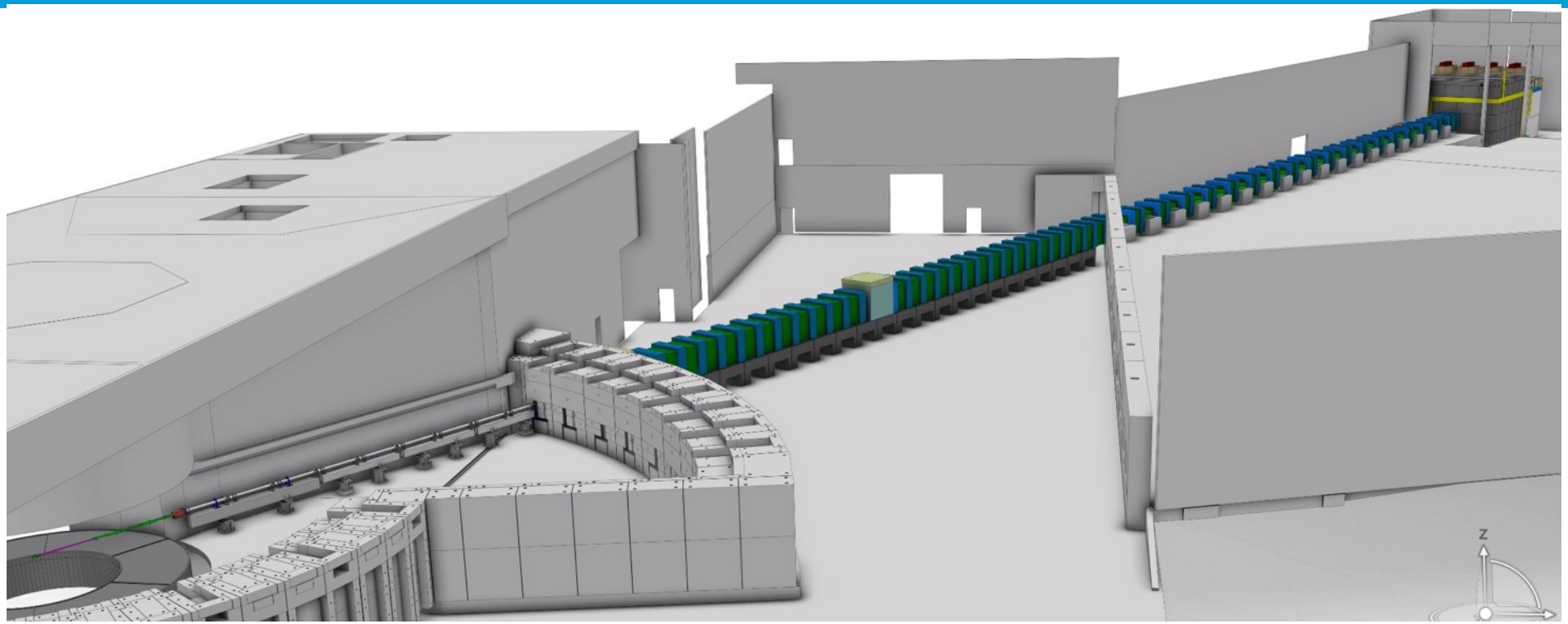
Lead Engineer: Giuseppe Aprigliano, ESS

Dorothea Pfeiffer	(ESS- Detector group/CERN)
Valentina Santoro	(ESS)
Hansdieter Schweiger	(ESS)
Damian Martin Rodriguez	(ESS)
Markus Olsson	(ESS-NCG)
Erik Nilsson	(ESS-NCG)
Stuart Birch	(ESS-PSS)
Laurence Page	(ESS-Vacuum Group)
Paul Barron	(ESS-MCA)
Thomas Holm Rod	(ESS-DMSC)
Jonathan Taylor	(ESS-DMSC)

Jean-Luc Ferrer	(IBS – GSY Group, FR)
Márton Markó	(Wigner Research Centre, HU)
Szabina Török	(Centre for Energy Research HU)
Petri Kursula	(University of Bergen, NO)
Ants Koel	(Tallinn University of Technology, EE)

Tallinn University of Technology

NMX Outline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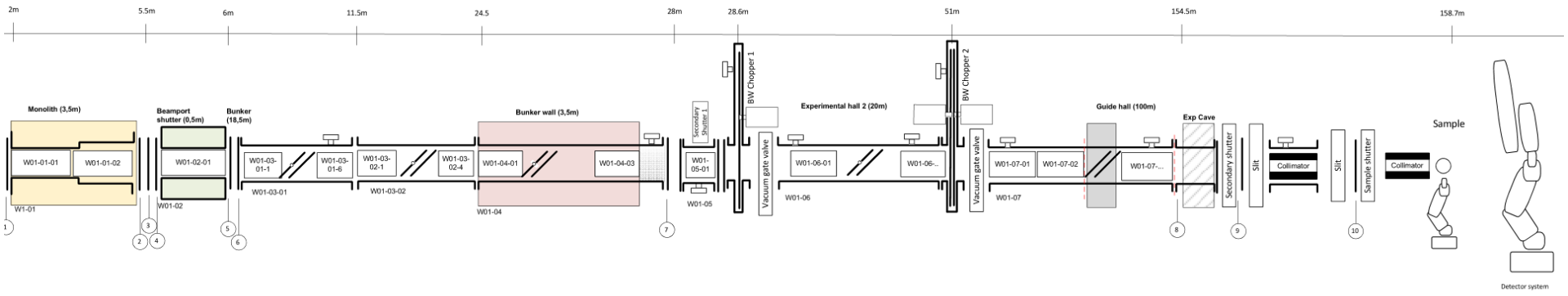
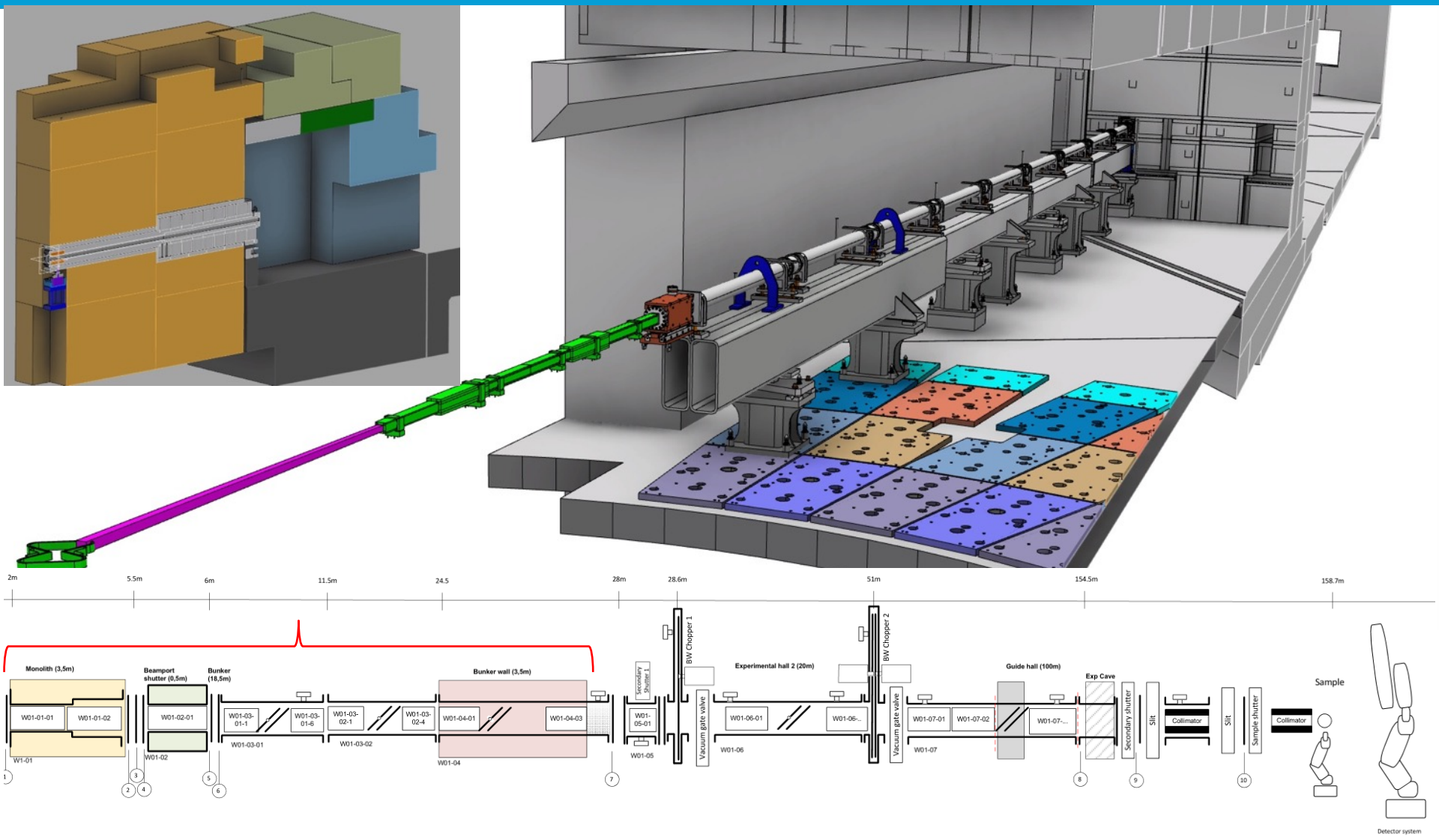
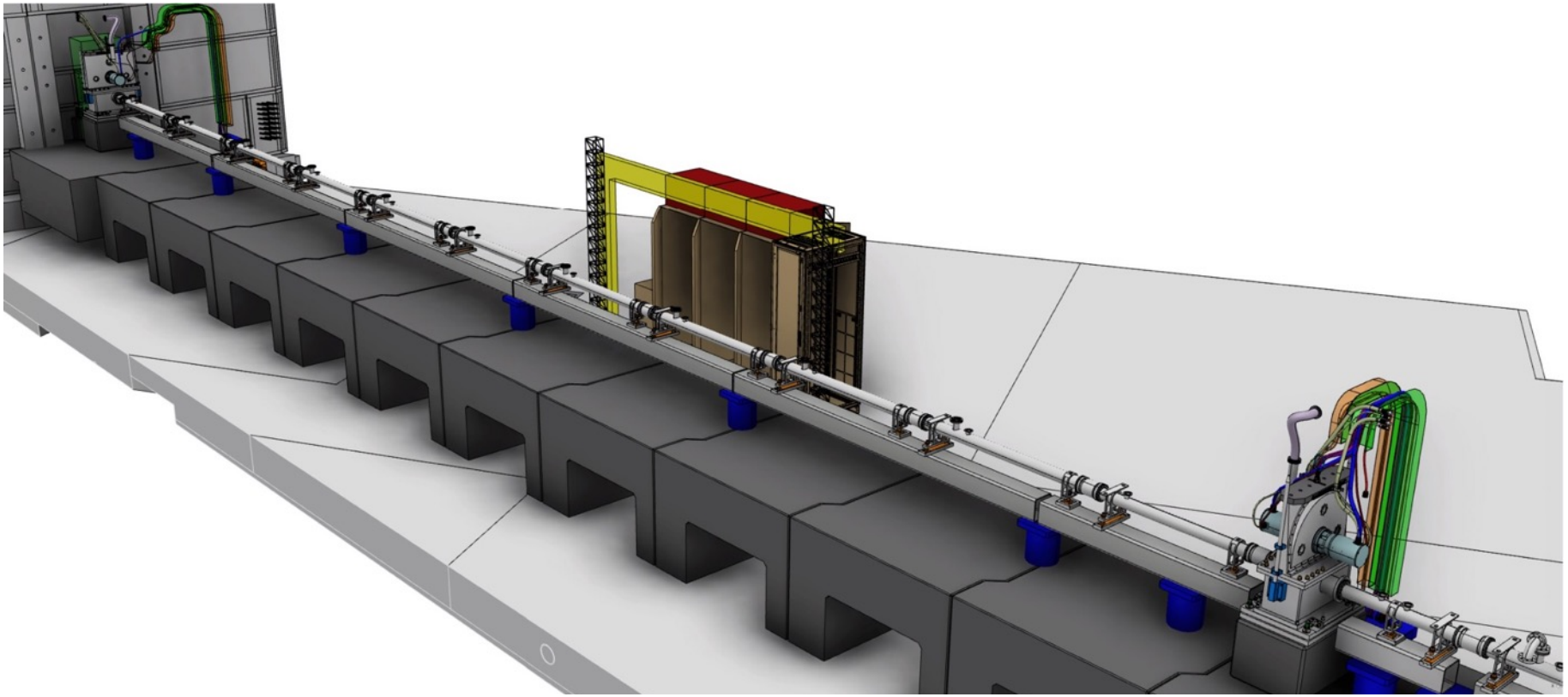
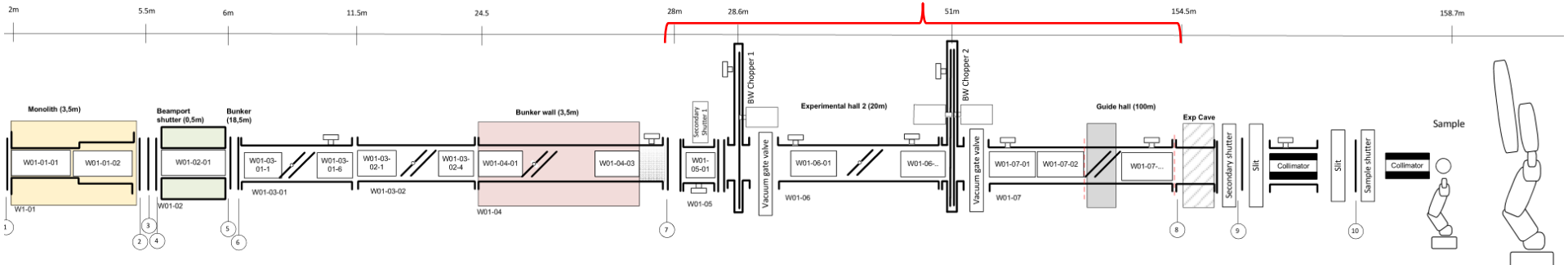

2m
5.5m
6m
11.5m
24.5
28m
28.6m
51m
154.5m
158.7m
Monolith (3,5m)
Beamport shutter (0,5m)
Bunker (18,5m)
Bunker wall (3,5m)
Experimental hall 2 (20m)
Guide hall (100m)
Exp Cave
W01-01-01
W01-01-02
W01-01
W01-02-01
W01-02
W01-03-01-1
W01-03-01-6
W01-03-01
W01-03-02-1
W01-03-02-4
W01-03-02
W01-04-01
W01-04-03
W01-04
W01-05-01
W01-05
Secondary Shutter 1
BW Chopper 1
Vacuum gate valve
W01-06-01
W01-06-...
W01-06
BW Chopper 2
Vacuum gate valve
W01-07-01
W01-07-02
W01-07-...
W01-07
Secondary shutter
Slit
Collimator
Slit
Sample shutter
Collimator
Sample
Detector system

NMX Outline (In bunker)

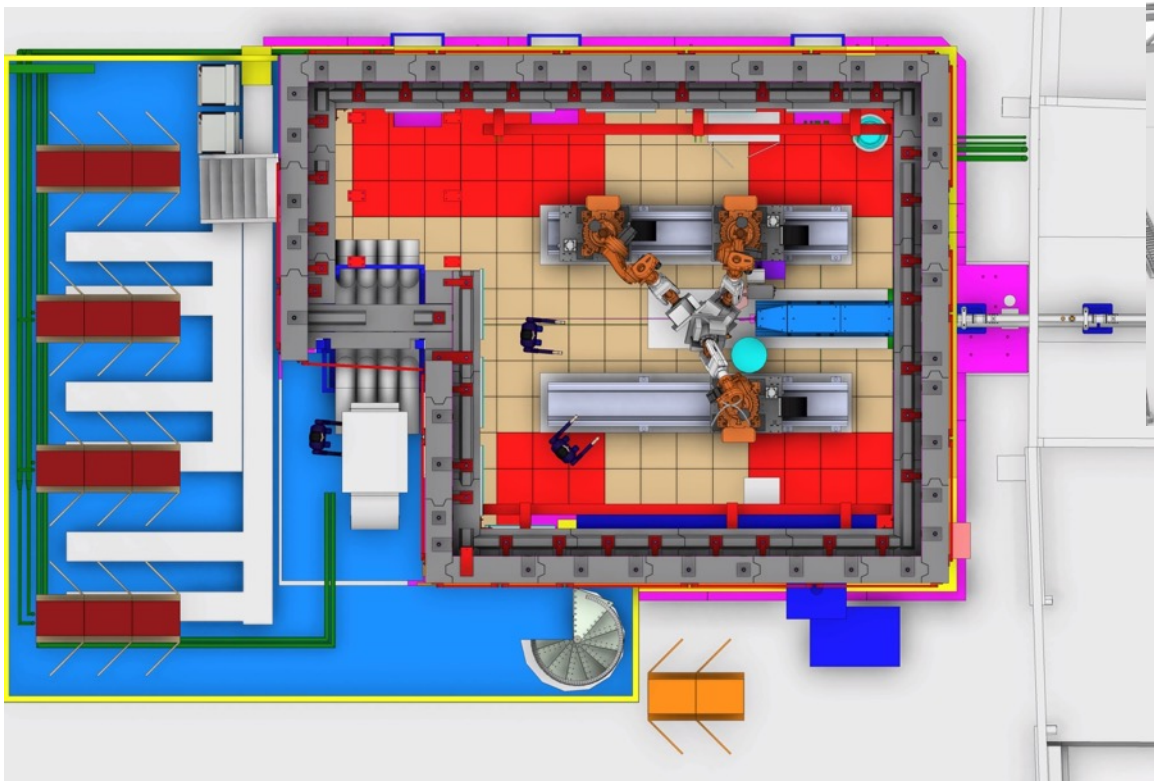


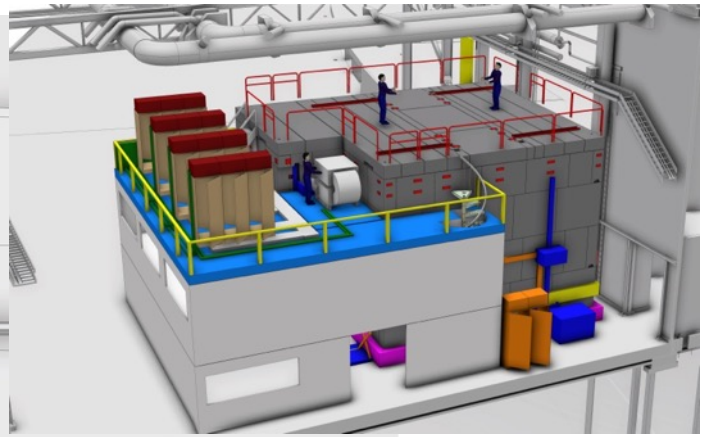
NMX Outline (Out of bunker)

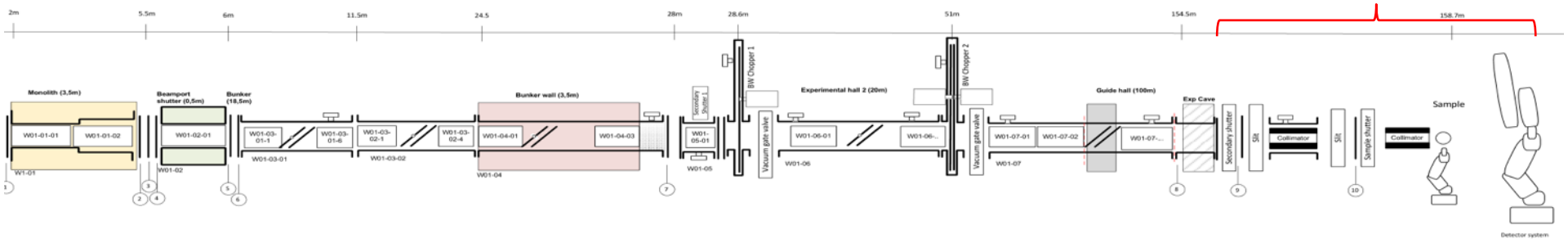




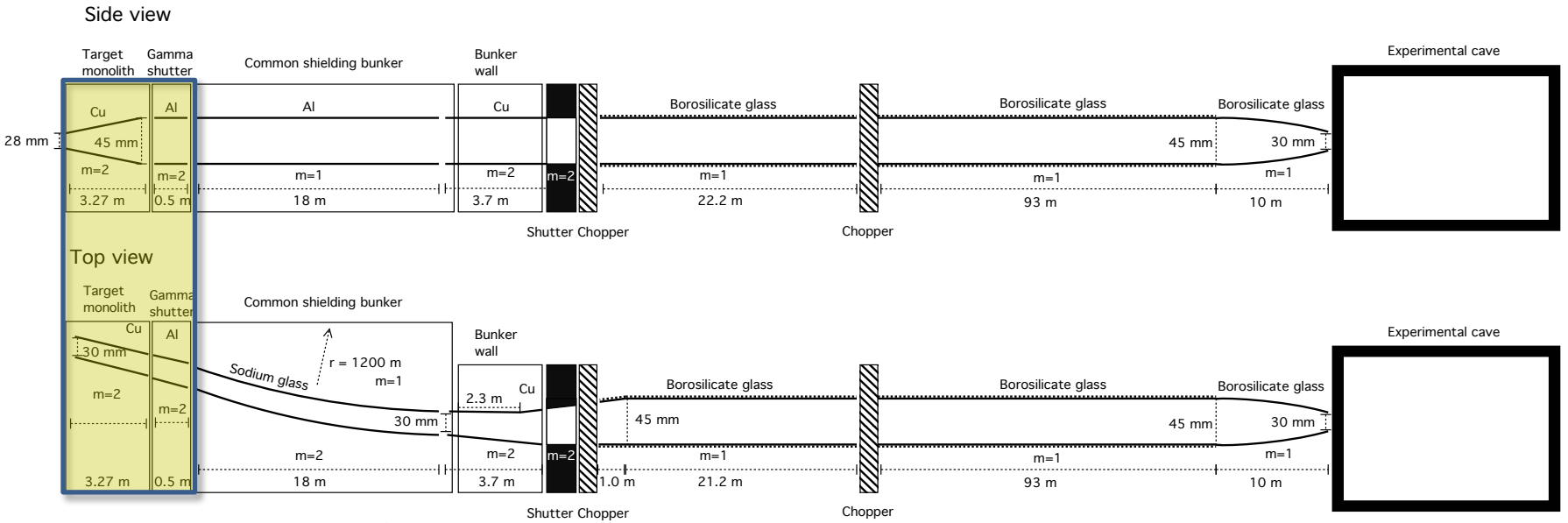
NMX Outline: EXP Cave and endstation

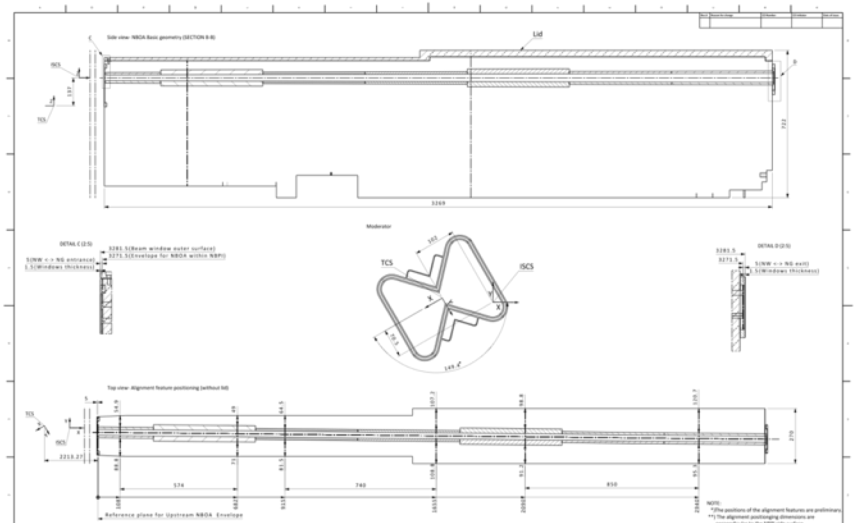






Neutron guides





NBOA and BBG

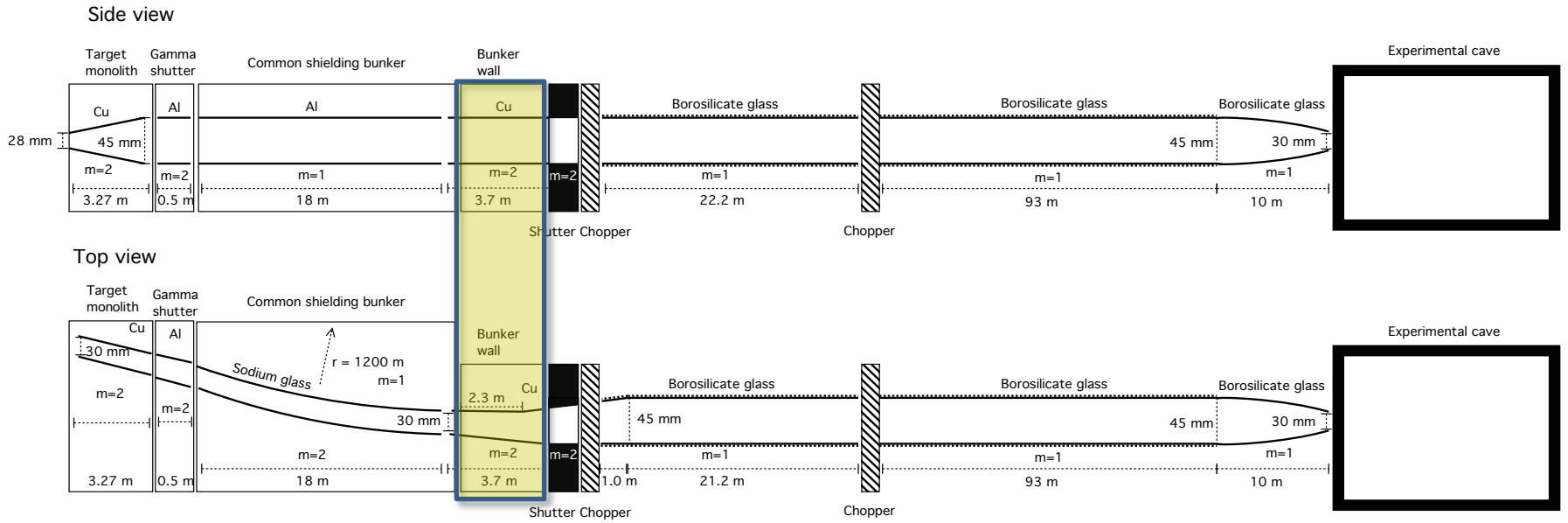
Supplier: S-DH

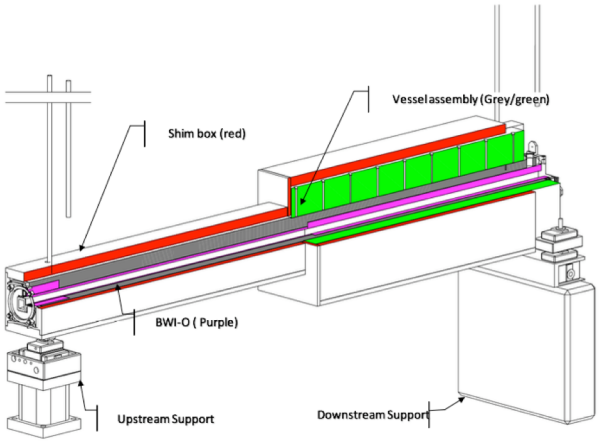
W1 NBOA special length but simple geometry

Special thanks to Hansdieter Schweiger

Gergely Nagy
Márton Markó

Neutron guides



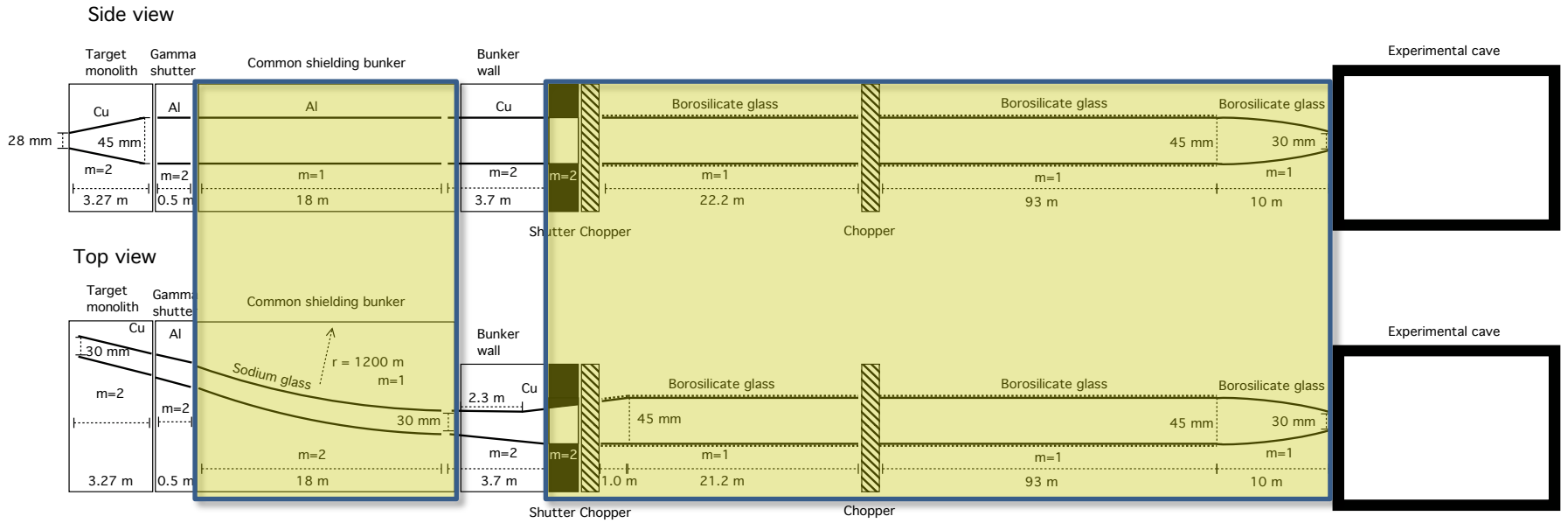


Open call for tender issued Feb20

Split procurement between optics and vessel

Gergely Nagy
Márton Markó

Neutron guides



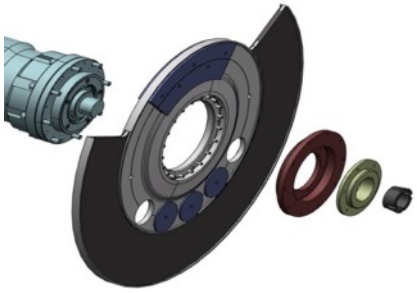
Contribution from Wigner,

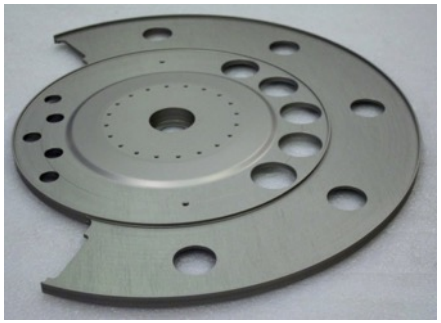
TA signed

Gergely Nagy
Márton Markó

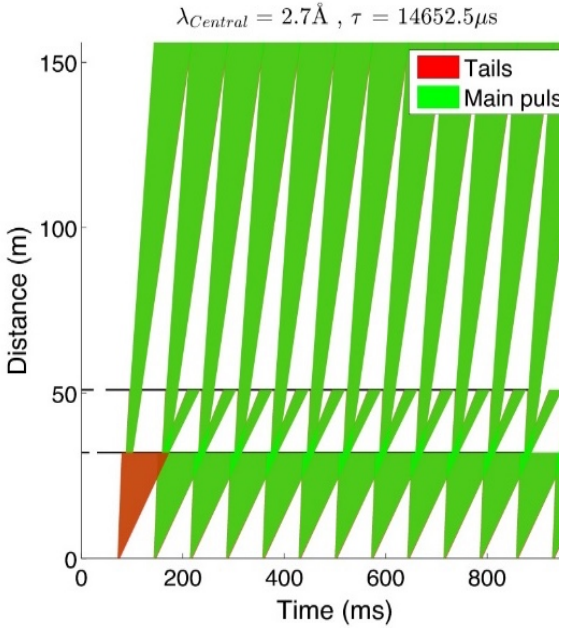
Wavelength Selection Choppers

- Disk diameter 700mm
- Rotating frequency 14 Hz
- B4C resin-epoxy coating.
- Single disk at 32m
- Double, co-rotating disk at 51m





Critical components delivered from Hungarian IK partner



Nikolaos Tsapatsaris (NCG)

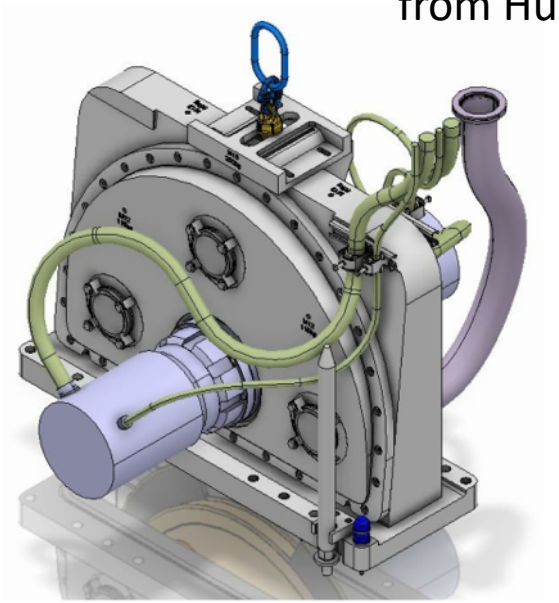
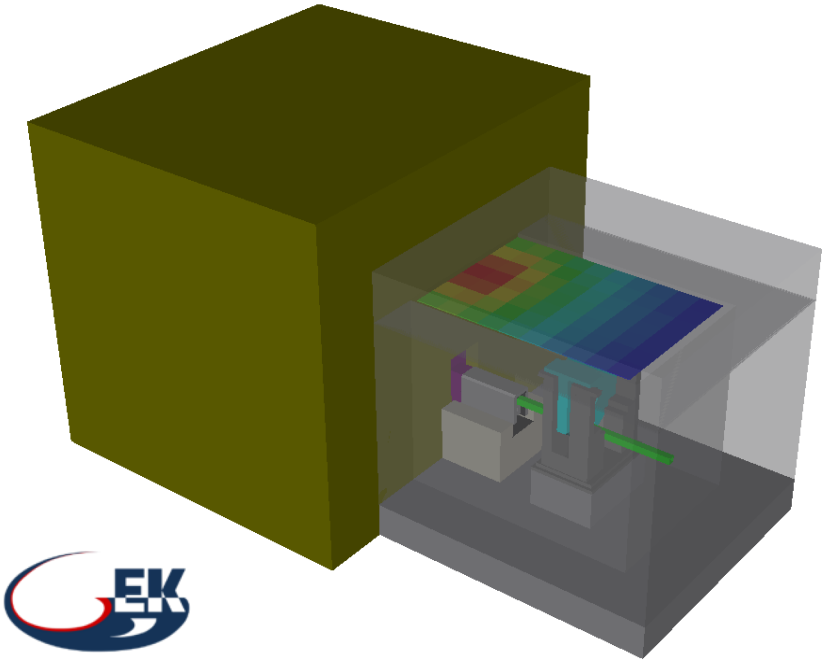


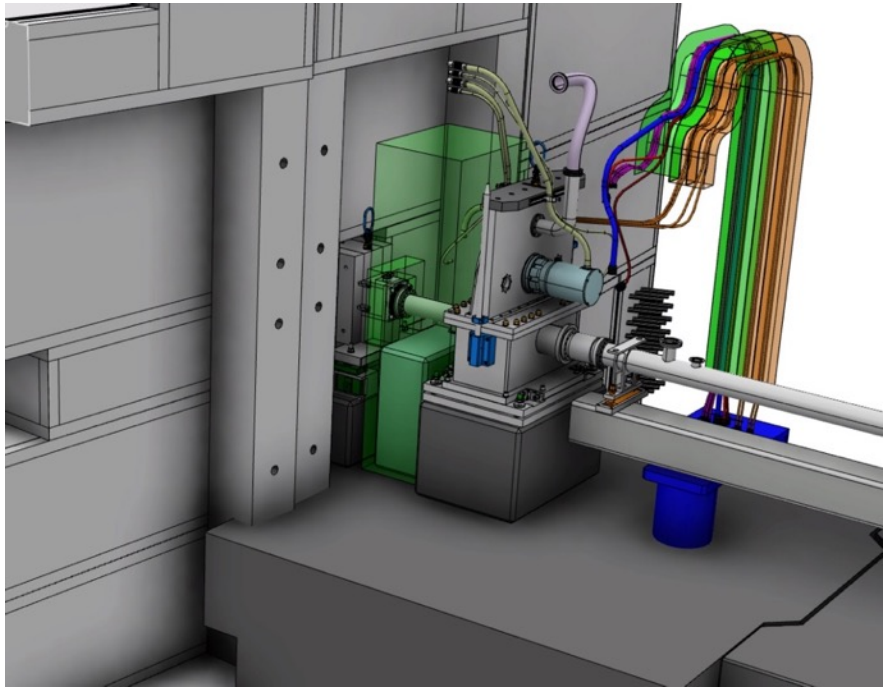
Figure 1 - Standard ESS chopper

Courtesy of: Erik Nilsson (NCG)

NMX joins the Common Chopper Project !

Shutter

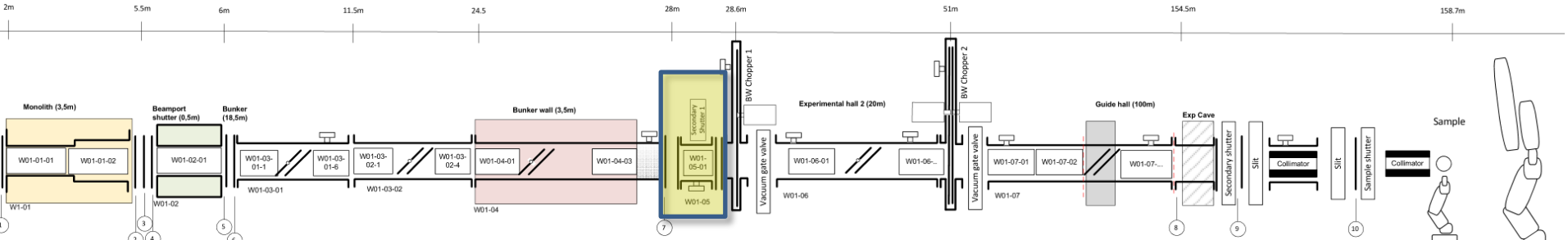




Courtesy S. Török

Simulations are ongoing

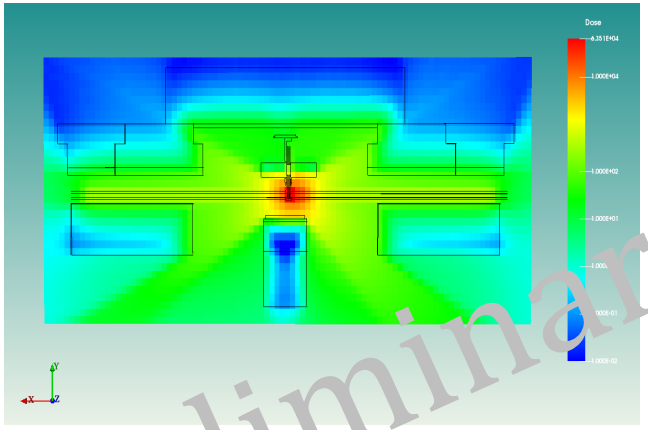
Mechanical design to start Q2 2020

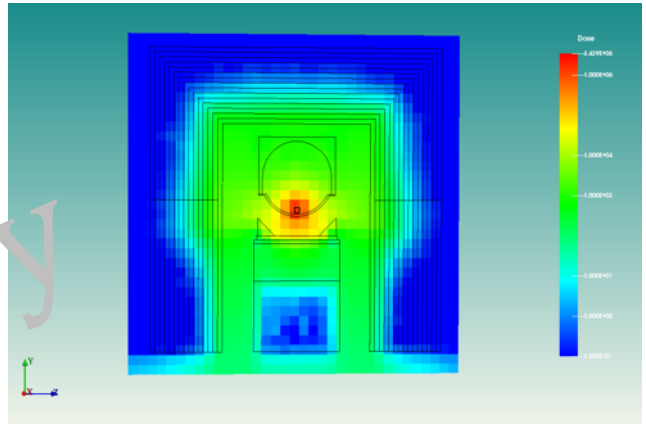


Guide shielding

Simulations performed by

Courtesy S. Török

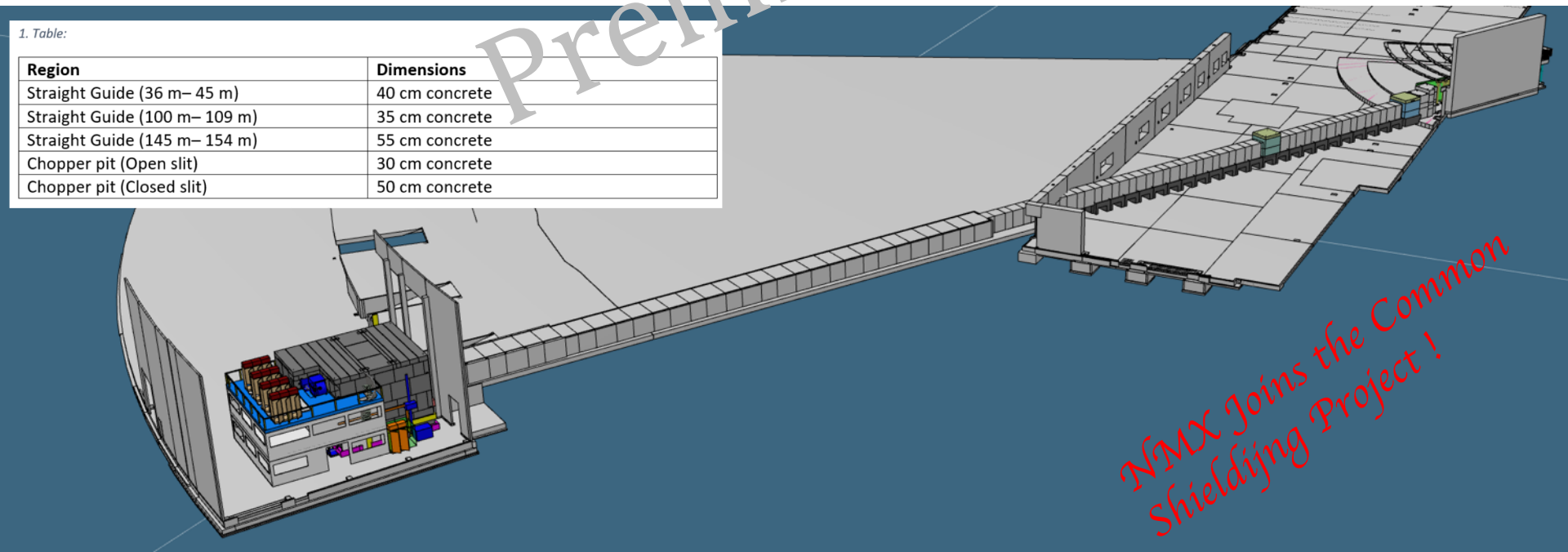




Preliminary

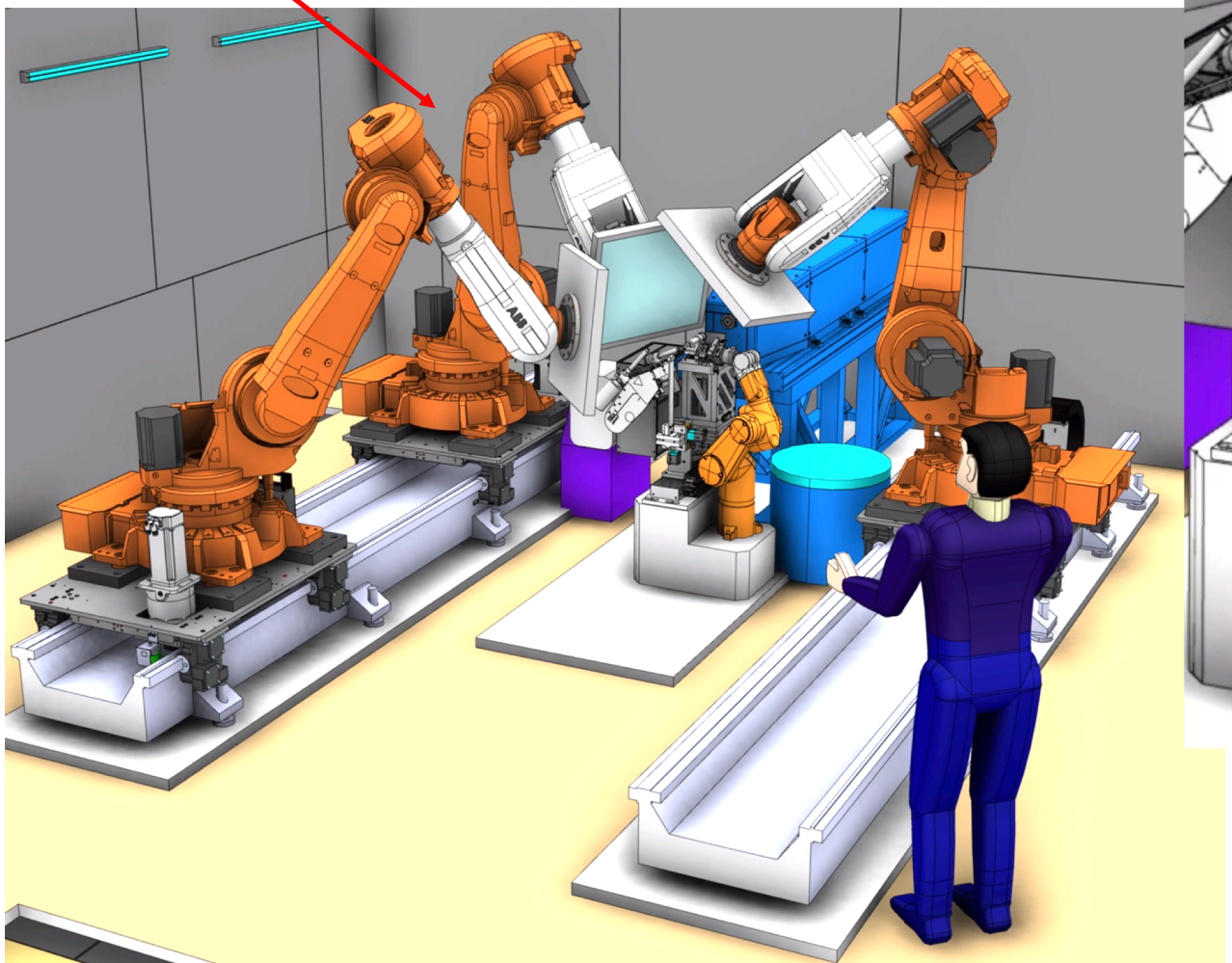
1. Table:

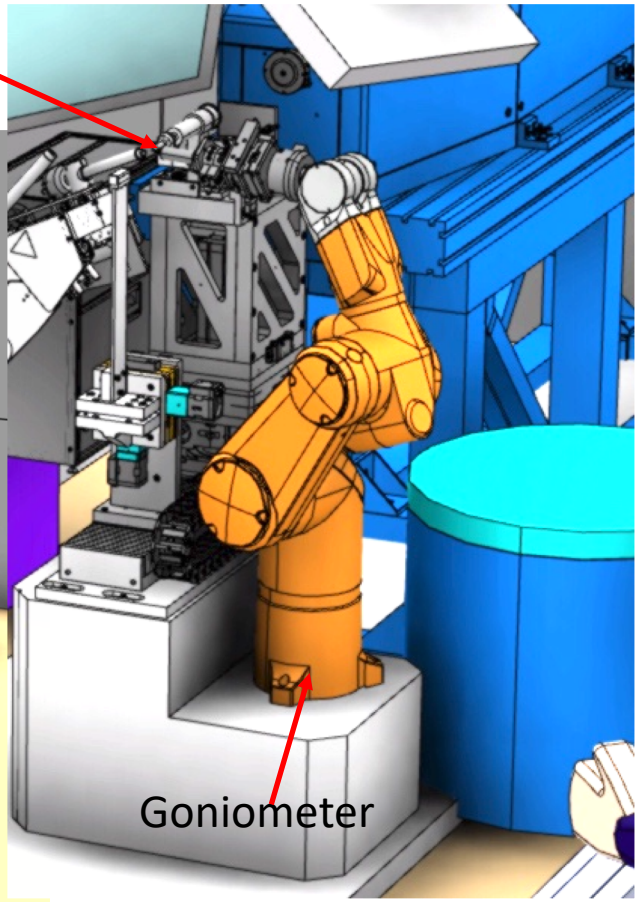
Region	Dimensions
Straight Guide (36 m– 45 m)	40 cm concrete
Straight Guide (100 m– 109 m)	35 cm concrete
Straight Guide (145 m– 154 m)	55 cm concrete
Chopper pit (Open slit)	30 cm concrete
Chopper pit (Closed slit)	50 cm concrete



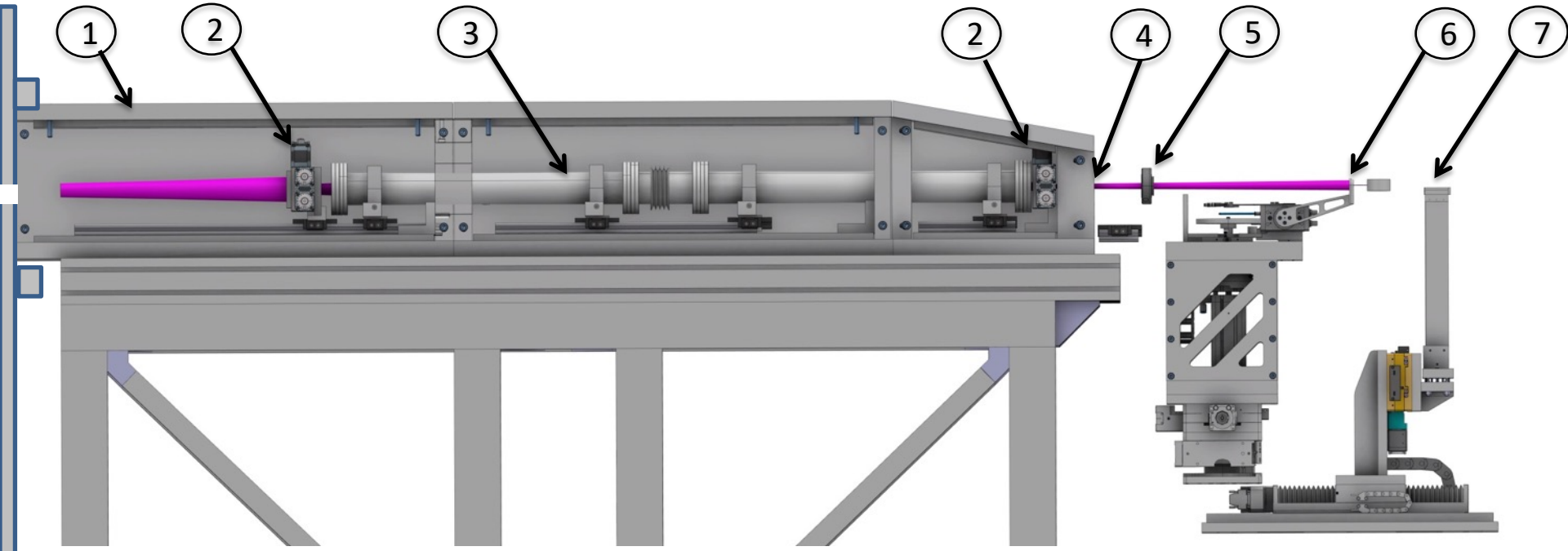
NMX Joins the Common Shieldijng Project !

Endstation





Endstation

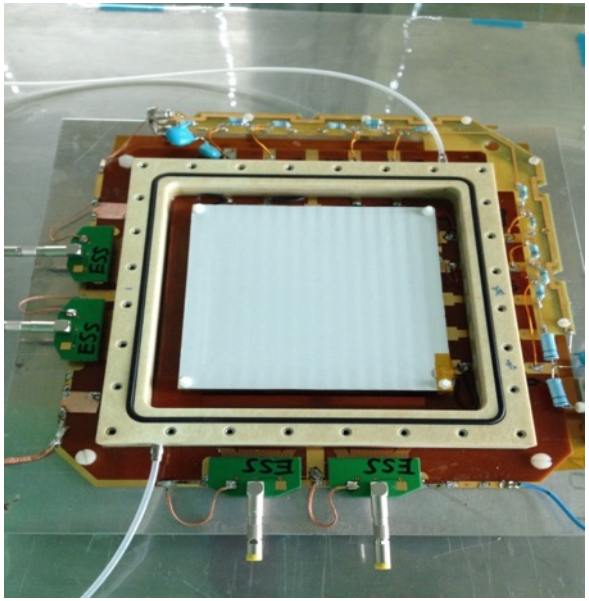


1 – Collimation System enclosure
2 – In air neutron slits
3 – Scraper tube
4 – Fixed aperture
5 – Sample exposure shutter
6 – Pinhole collimation system
7 – Non safety beamstop

Endstation Components: Detectors

Dorothea Pfeiffer (ESS/CERN),
Richard Hall Wilton(ESS)

IK contribution from Tallinn University of Technology,

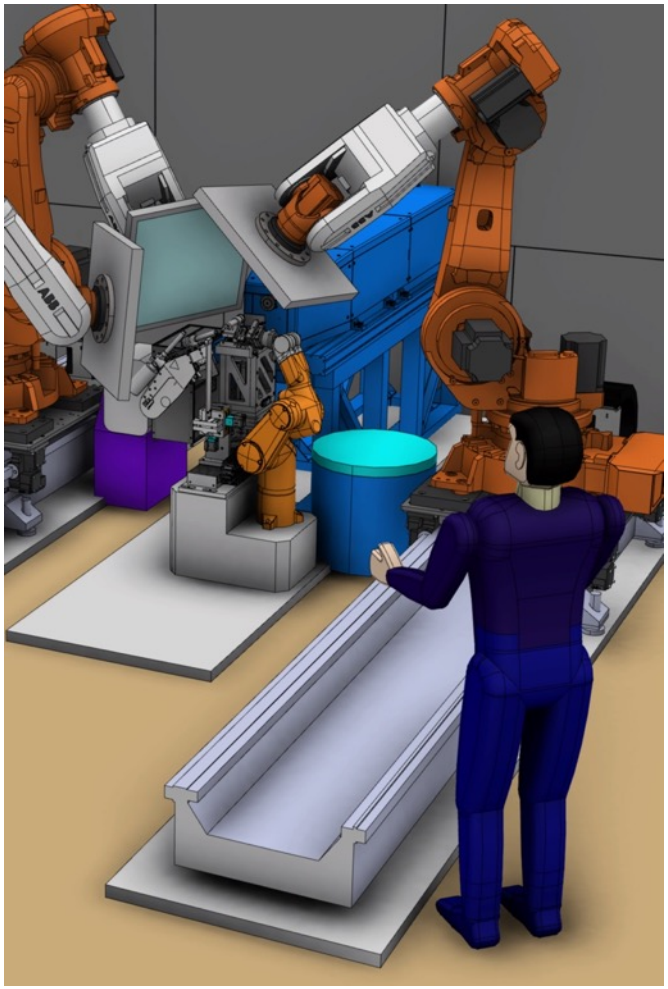


Triple GEM with Gd2O3 coated cathode

Three detectors of 500 mm x 500mm active surface.

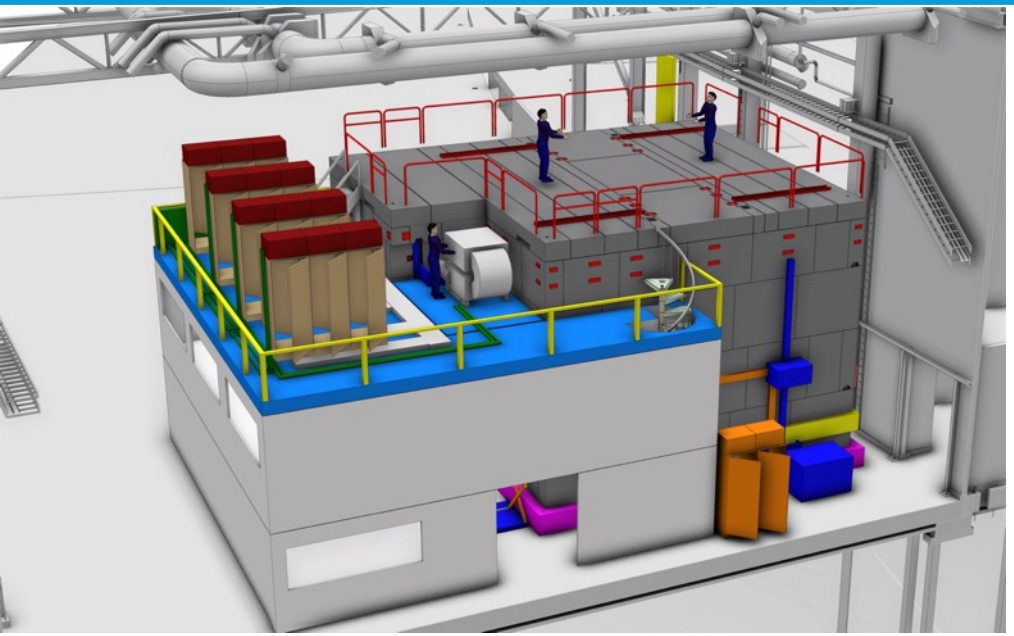
Light weight detector suitable for integration on robotic arm

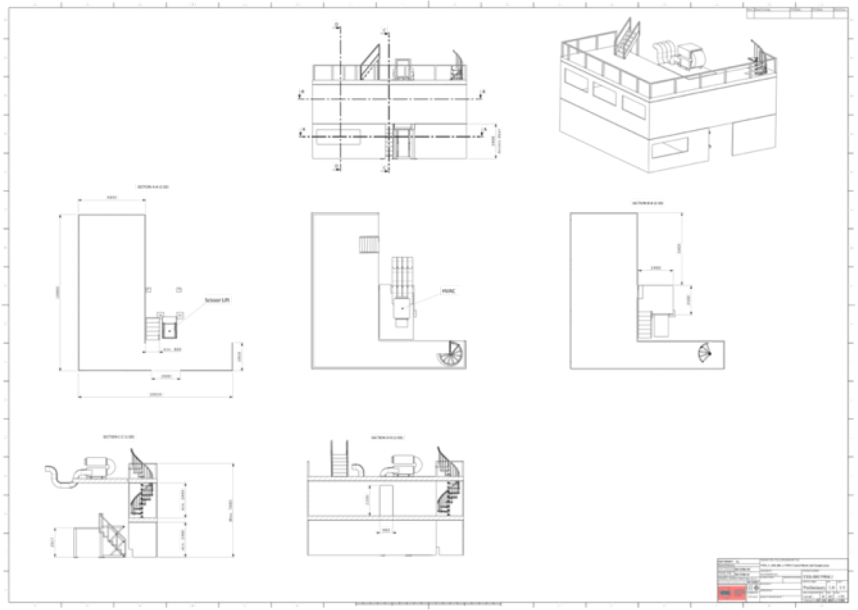
More detail in dedicated session



Courtesy of: Dorothea Pfeiffer

Main components: Infrastructure

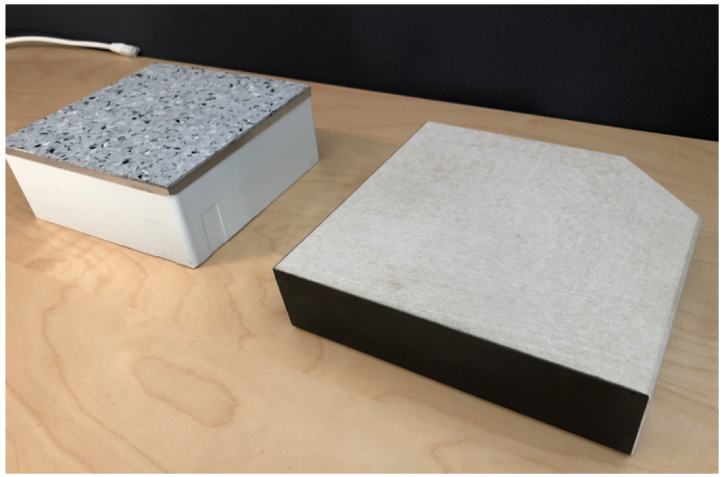




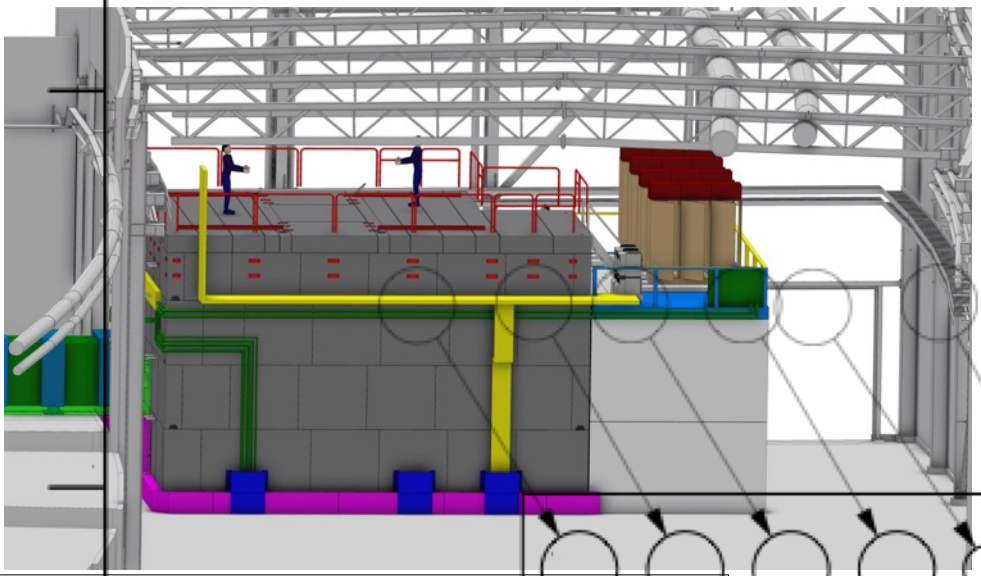
The control hutch is necessary to perform any further work on the infrastructure in E01 and to provide safe access to the cave roof.

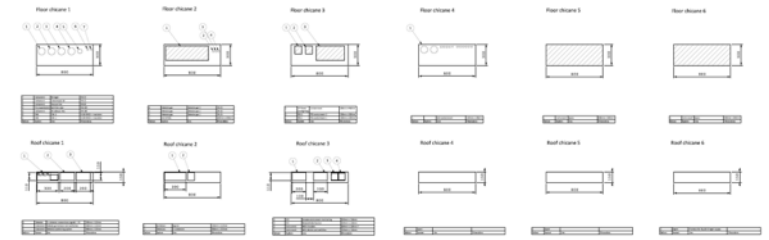
Specifications are in advanced state
Open call for tender planned for Q2 2020

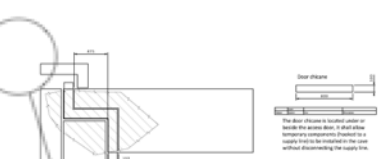
Difficult decisions ahead… What colour of cave walls?
What tiles for the cave raised floor?

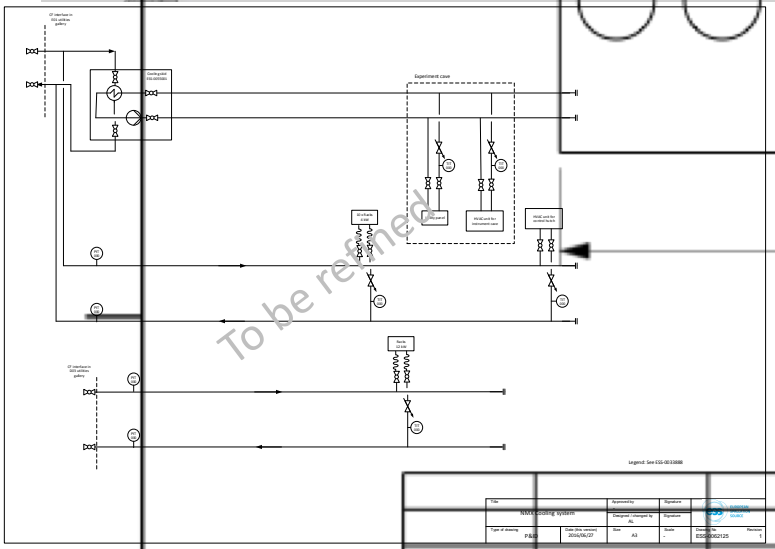


Main components: Infrastructure





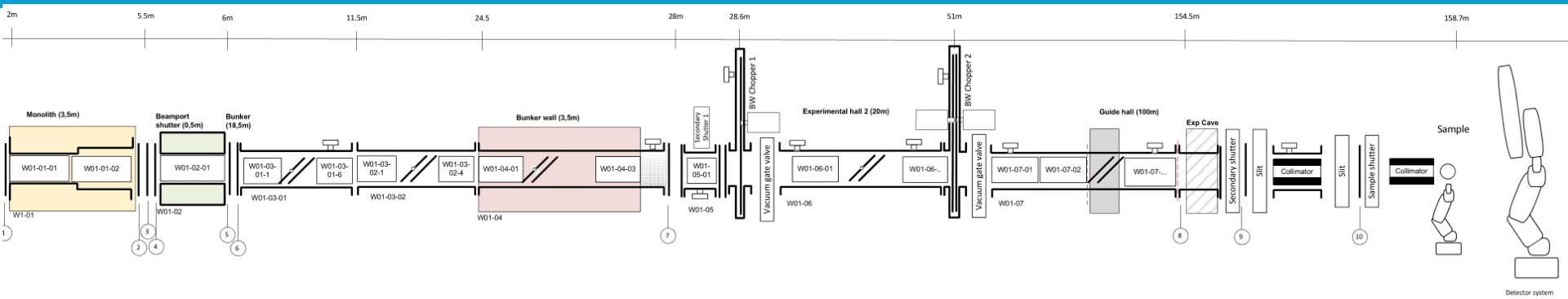




Starting to analysing envelopes for instrument media distribution in E01.

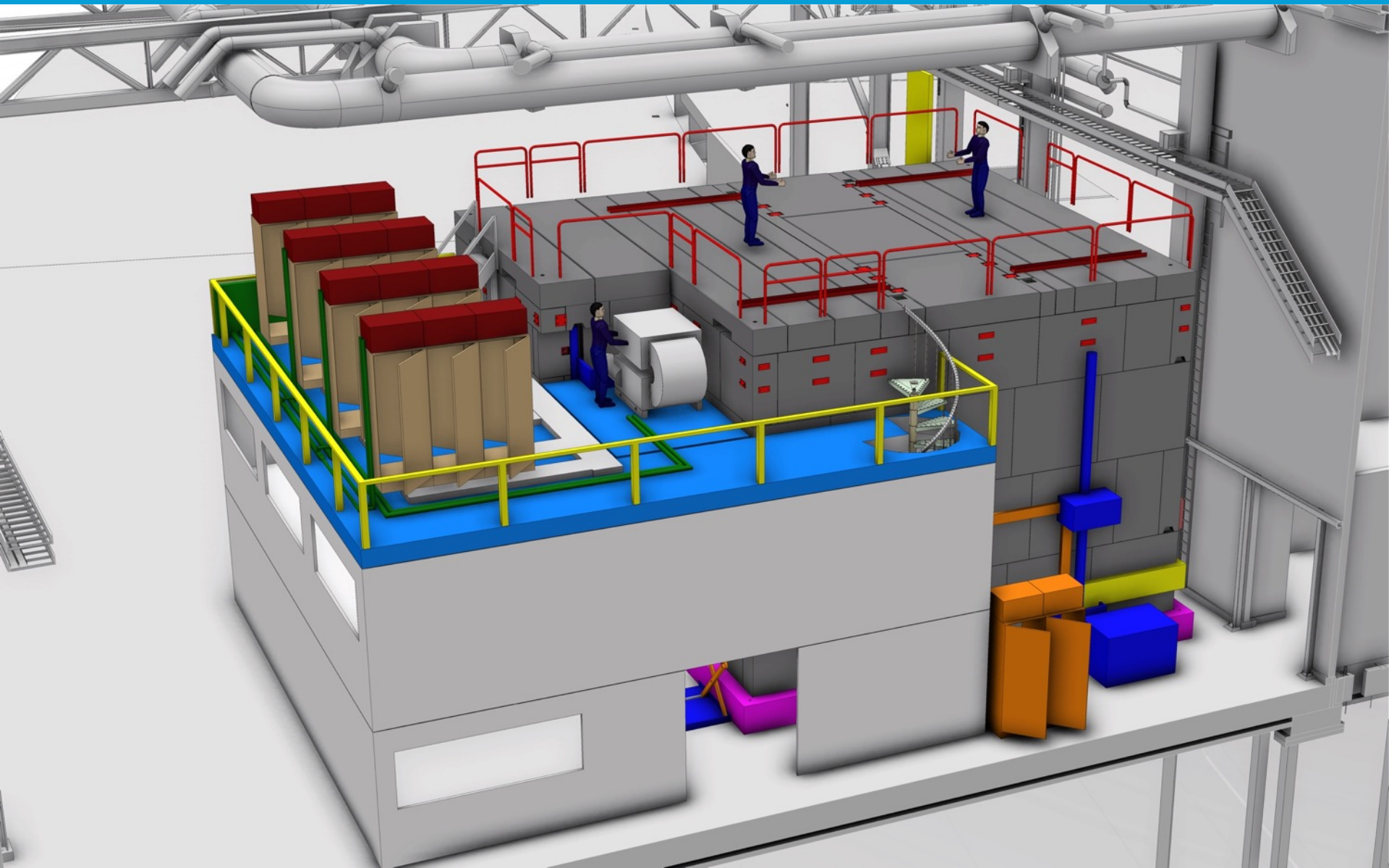
Next: Racks needs (Power and arrangement)

Status per component



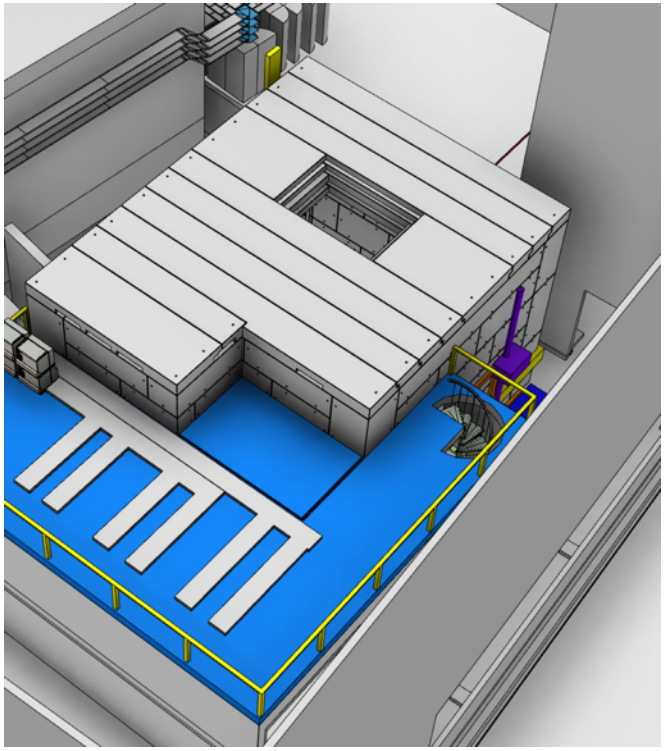
Component	Design	Procurement	Specs	CTV	OCT	KO	PDR	CDR	SAT	IRR	SAR
NBOA	EK/Wiegner	ESS	X	X	X	X	X	X	Q3 2020		
BBG	EK/Wiegner	ESS	X	X	X	X	X	X	Q3 2020		
In bunker	EK/Wiegner	EK/Wiegner	X						Q4 2021		
BWI	EK/Wiegner	EK/Wiegner	X	X	X				Q4 2020		
Out of Bunker	EK/Wiegner	EK/Wiegner	X						Q2 2022		
Chopper components	EK/Wiegner	EK/Wiegner	X						Under discussion		
Chopper 1	ESS	ESS	X	-	-	X			Under discussion		
Chopper 2	ESS	ESS	X	-	-	X			Under discussion		
Detectors	ESS	ESS/Tallin Univ.	X						Q4 2022		
Robotic systems	CEA	CEA	X	X					Q2 2022		
Shutter	ESS/EK/Wigner	ESS	X						Q4 2021		
Beam monitors	ESS	ESS							Under discussion		
Guide Shielding	ESS/EK	ESS	X	-	-				Under discussion		
Exp Cave	ESS/EK	ESS	X	X	X	X	X	X	-	X	Q2 2020
Control hutch	ESS	ESS	X						-		Q4 2020
Infrastructure E01	ESS	ESS							Q1 2021		
Collimation system	ESS	ESS							Q1 2022		
Cryostream / HC1	ESS	ESS							Q4 2022		
Beamstop	ESS	ESS							Q1 2022		
PSS	ESS	ESS							Under discussion		
Sample prep.	ESS	ESS							Q1 2022		

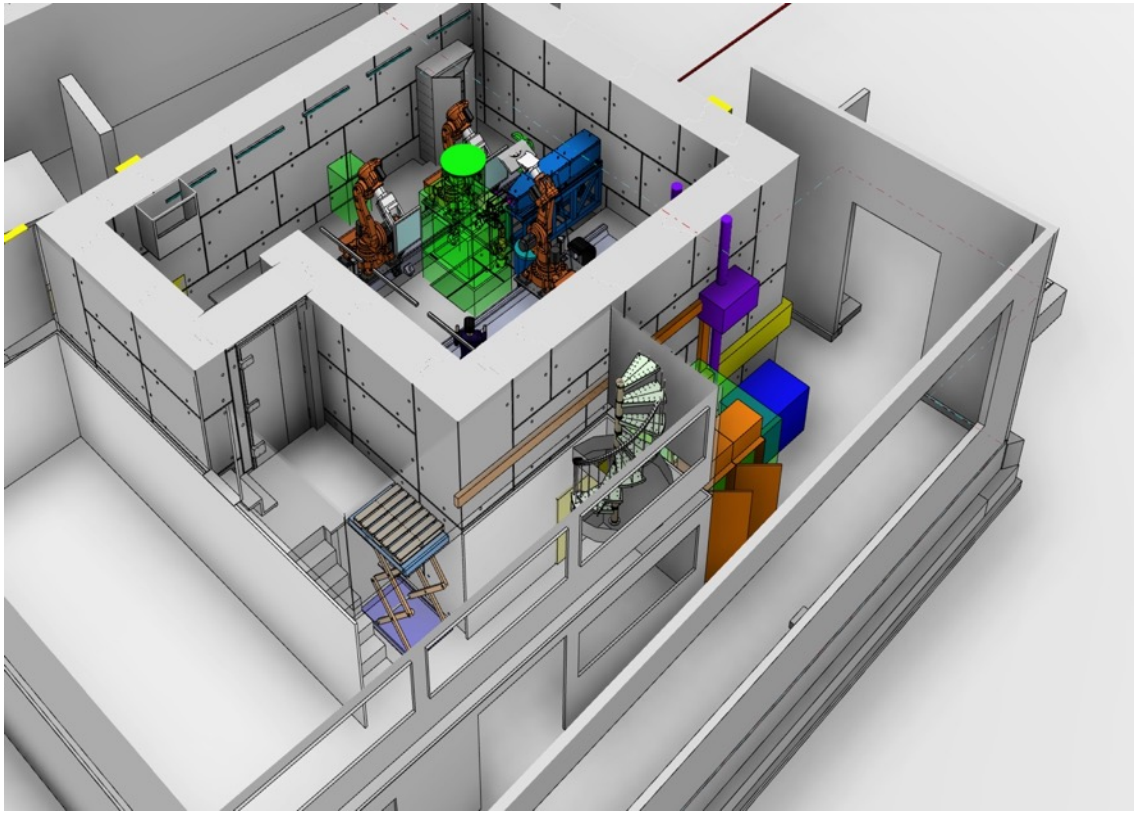
A closer look: The experimental cave



Accessibility

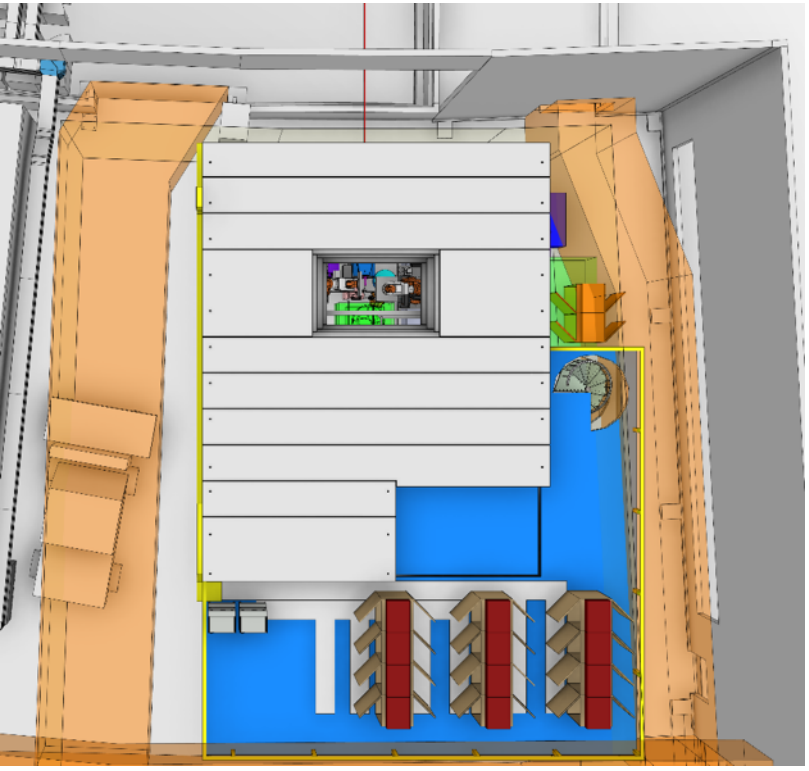
Personnel and goods
Access from control hutch.

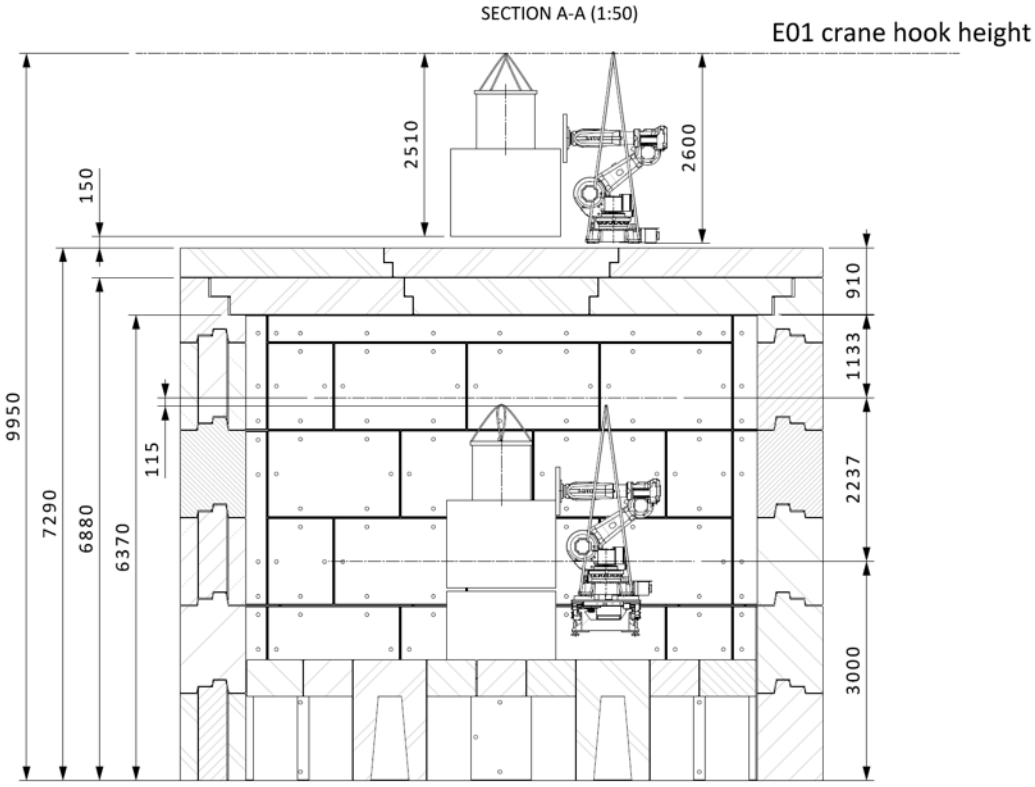




Optional opening on the roof to easily access sample position.

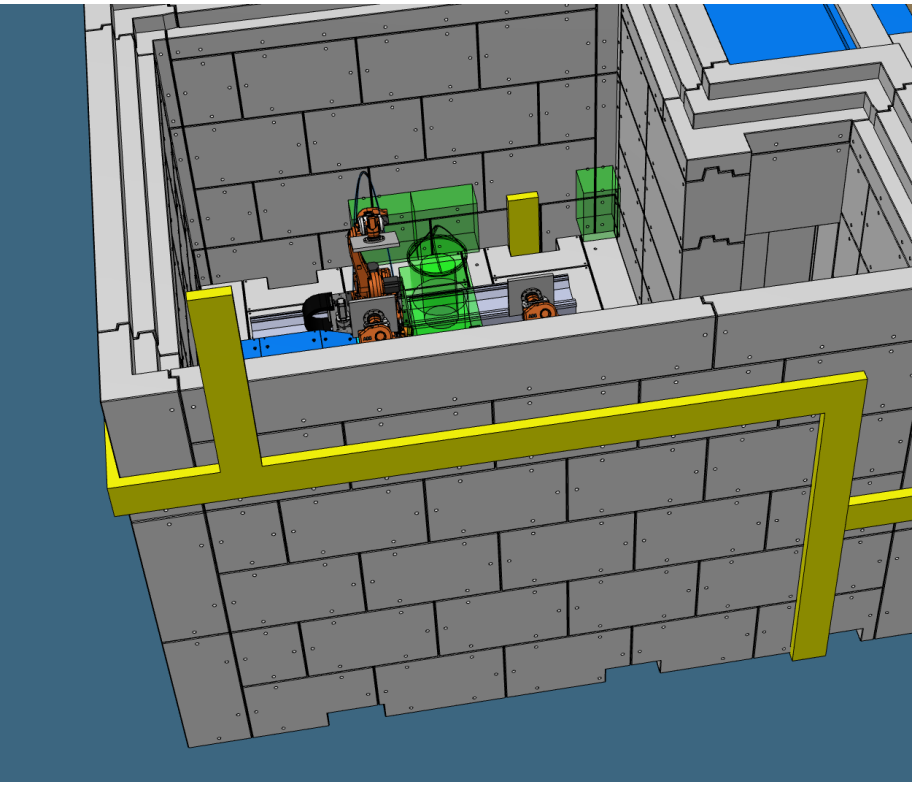
Accessibility

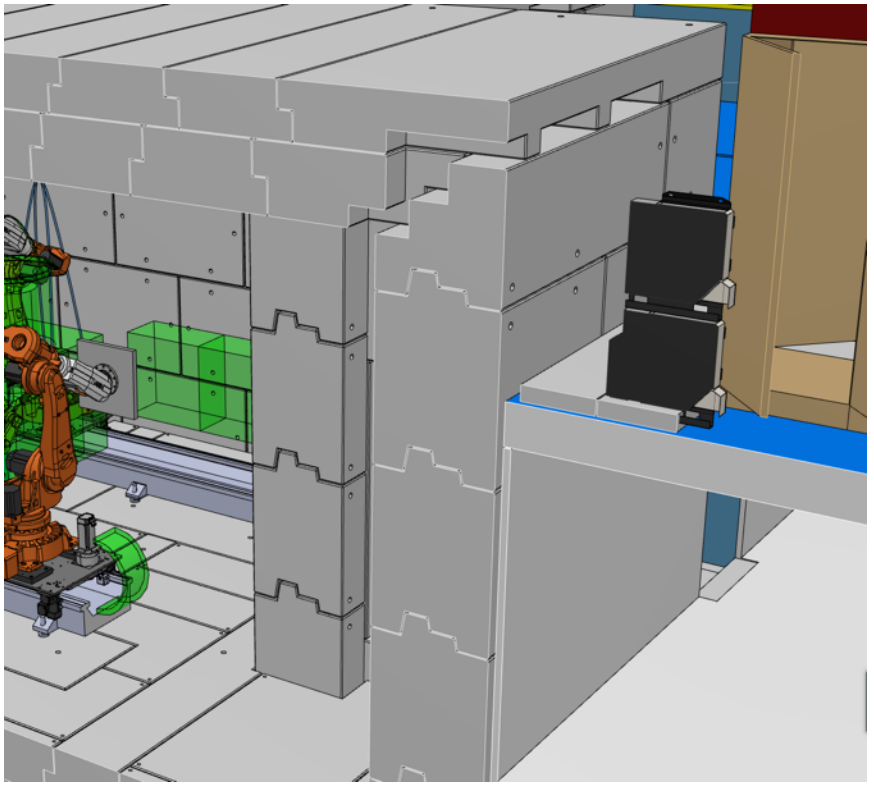




Roof in two layers to fulfill crane capacity limitation
Manhole is considered for accessing second sample position
Roof can be opened completely

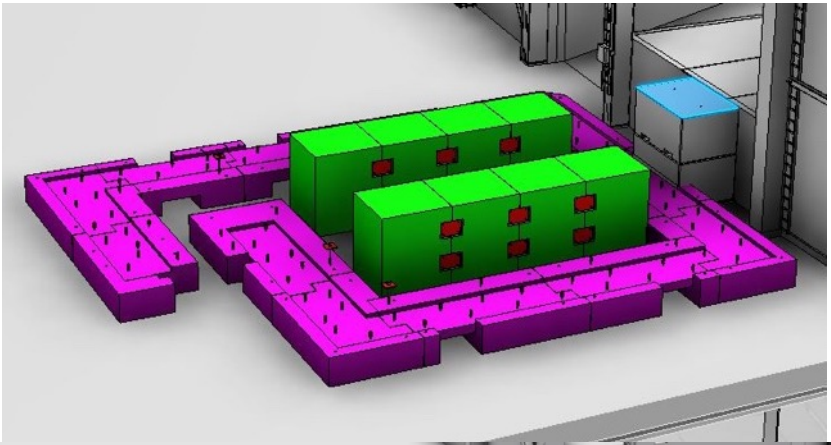
Penetrations through the walls and roof

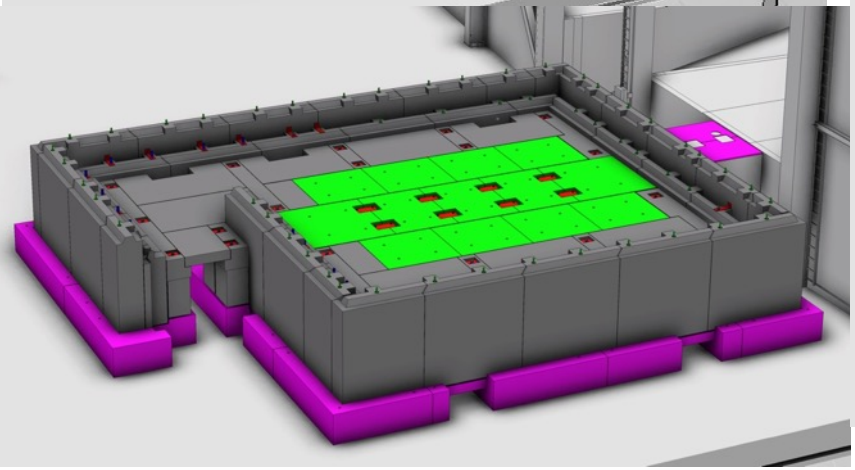


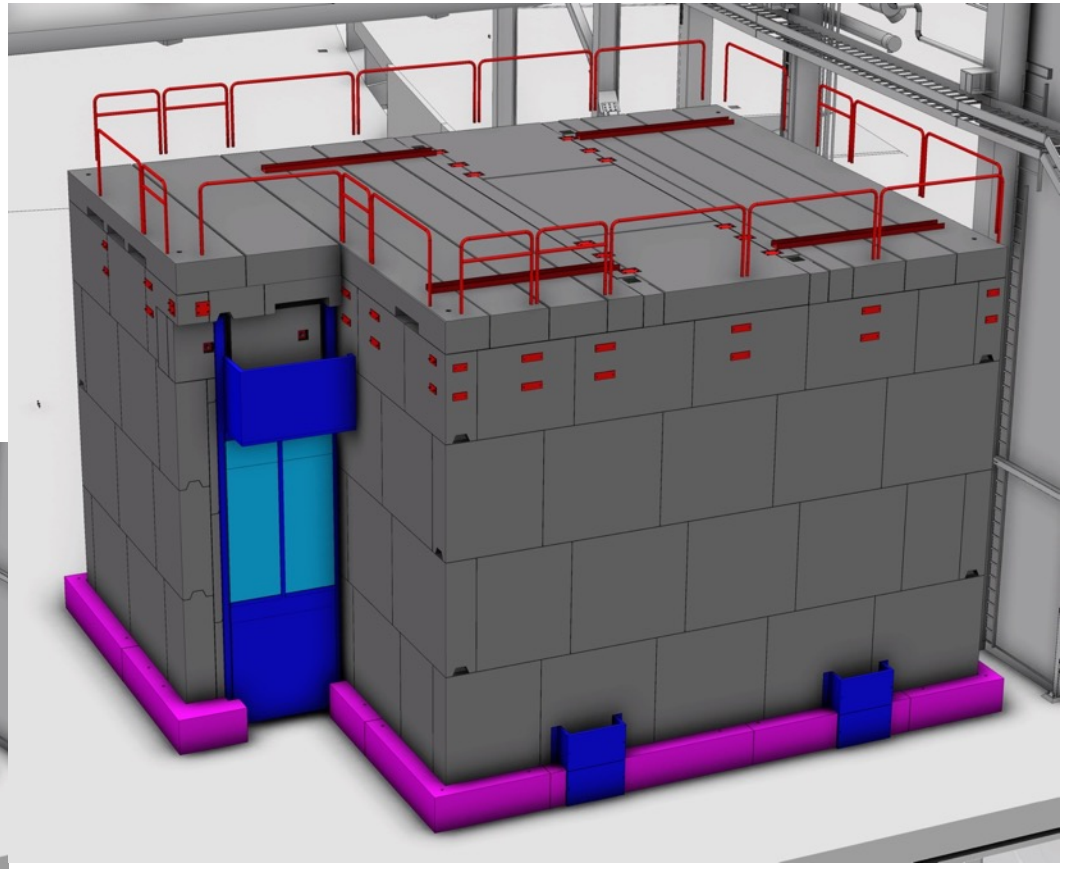


Penetrations in the concrete for media, general purpose power and signals

Final design







Limitations on floor loading led to cast in place solution for the foundation (dismountable)
Accidental scenarios, impose limitations to roof opening
Safety considerations implemented (Fall protection, documented dismounting sequences)

Construction process IPL involvement

EUROPEAN SPALLATION SOURCE

Preparatory work

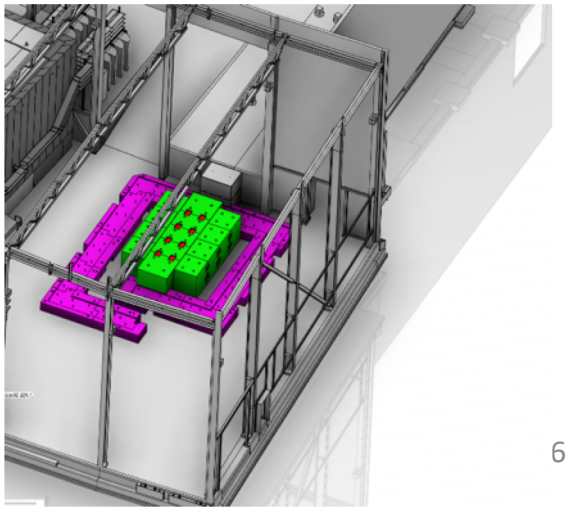
Created the Ib 201 (Cave foundation only)
Collected workers safety certificates (Hot works, first aid)
Collected RAMS and Performed TG4 IRR
Consultations with BAS-P and EH&S on general safety
Consultations with CF to agree on floor loading and grinding.
Consultations with rigging team on construction and operations
Issued Work order and Organized site induction courses
Restrict site plan

Setup of construction environment framework

BAS-U, area BAS-U and BAS-P
Prior notification to authorities
Construction H&S plan
Site plan organization

Recursive work

Issue work requests for each operation on EAM tool (SAM/Rigging/Unloading)
Timely procurement of services (Temp crane..)
Coordinate with logistics to ensure access to trucks
Regularly update the installation binder
Regular safety rounds



Lesson learnt: Organization

- Coordination with Bas-P, Bas-U, CF ,metrology and ESS rigging team, already before CDR, was paramount.
- After TG4, day to day coordination with BAS-U, rigging team, SEC, and metrology, part of this work falls on the IPL shoulders.
- IPL heavy workload setting up the Installation binder for the first time, coordinating timely logistics and work requests as needed (at least in the initial phase)
- After the first difficulties in setting up the work requests support from the ESS teams was excellent.
- We just passed IRR 2 (completion of cave erection), From now on, it will be a piece of cake….

The Installation binder (only the index though..)

Lesson learnt: Management of work area

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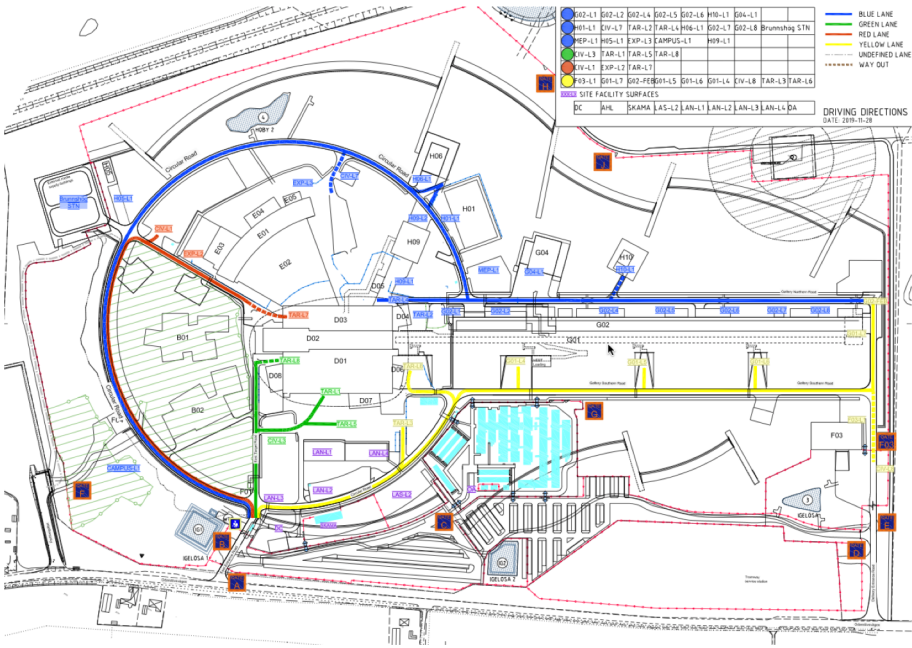
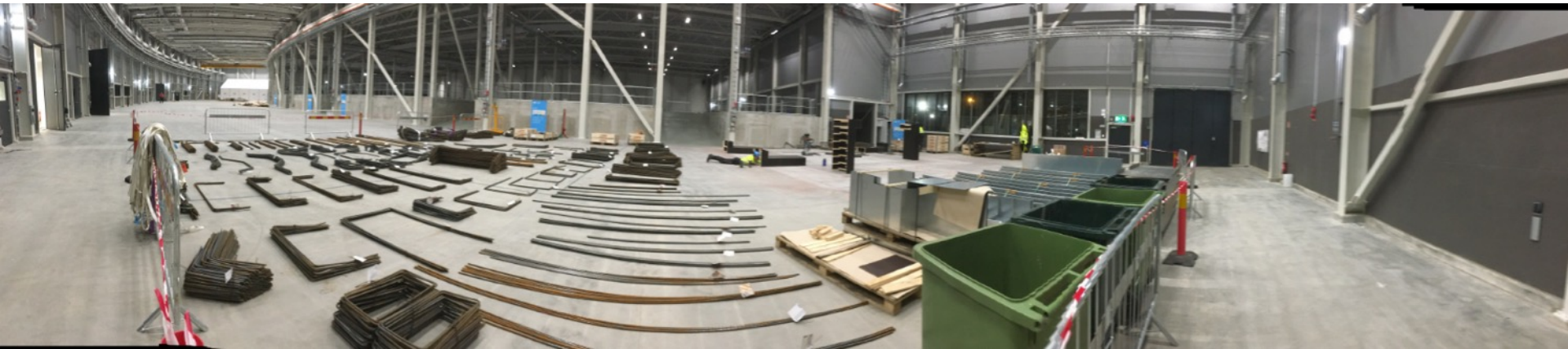
Issues solved on the spot:
Truck carrying rebars would not fit in the door: Reorganization of unloading method.

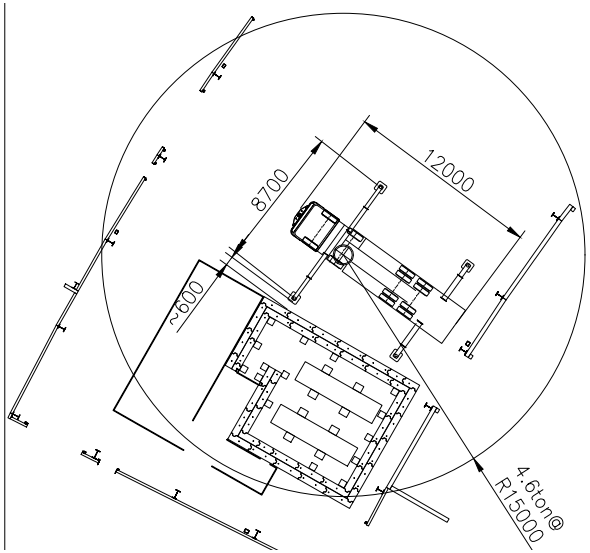
A ladder was not foreseen to release slings from a utility container, wasted time.

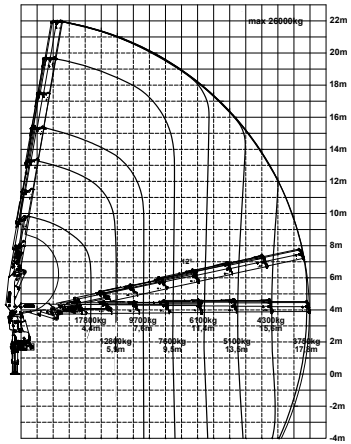
Space allocation conflict outside the E01 building, negotiations with area managers.



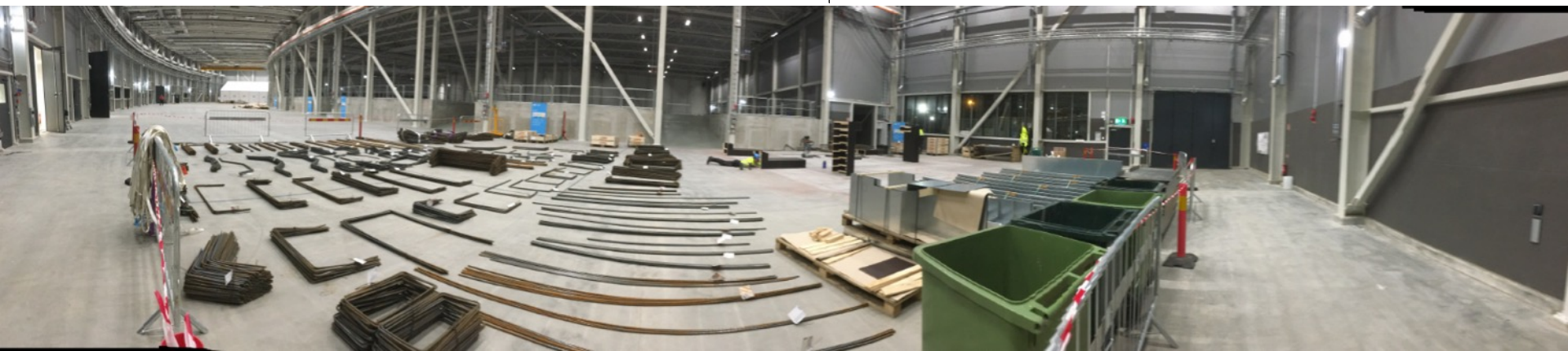


Lesson learnt: Management of work area

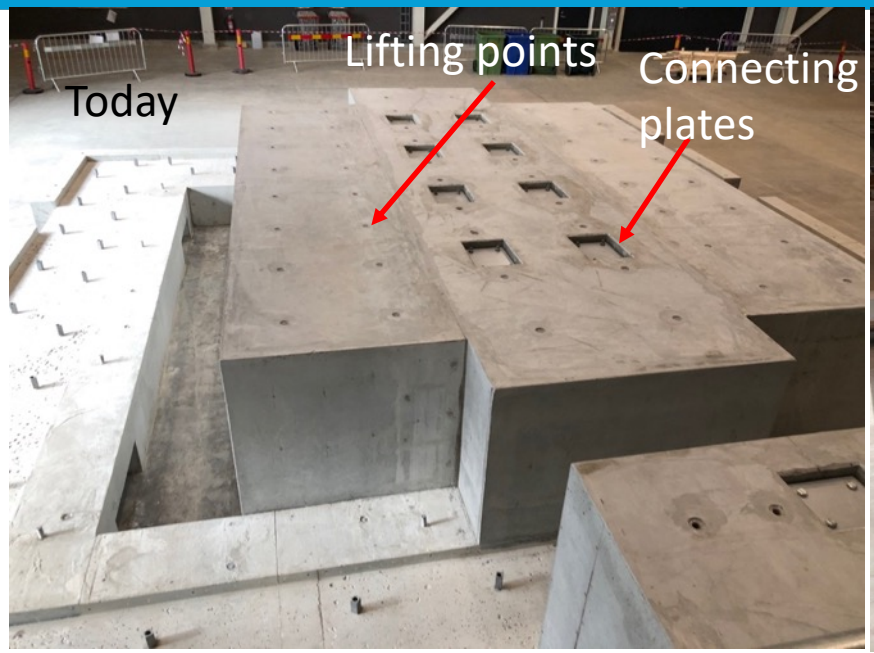


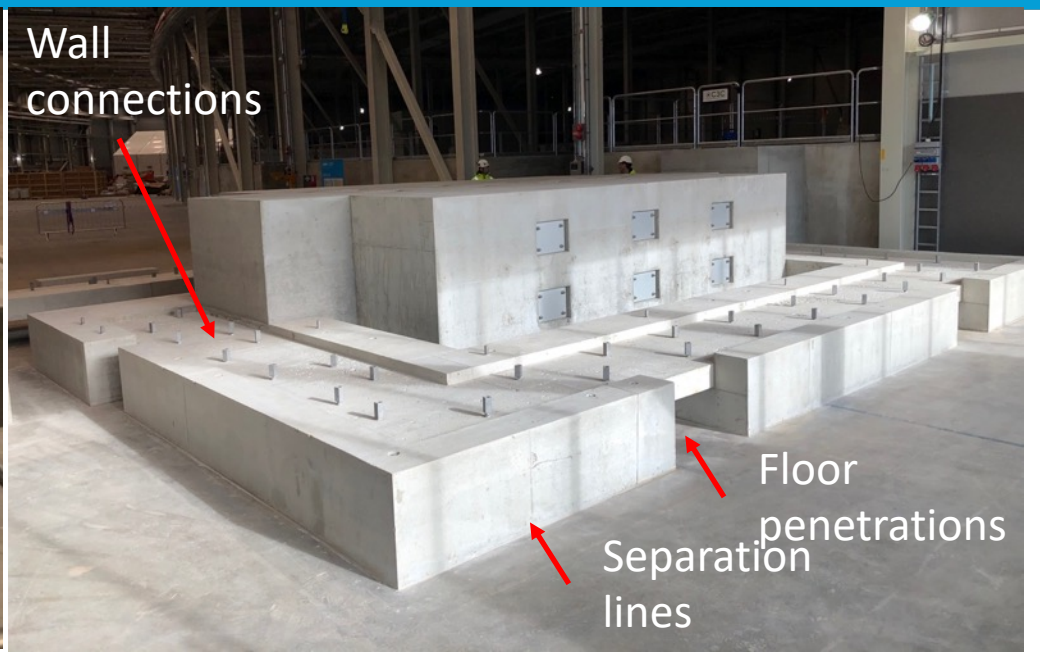


E01 crane coverage was not as expected, identified need for temporary crane.



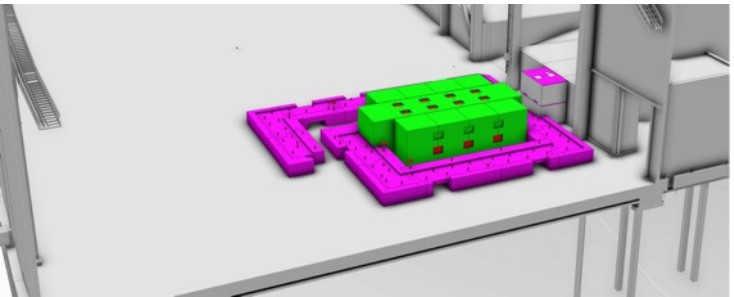
A closer look: The experimental cave



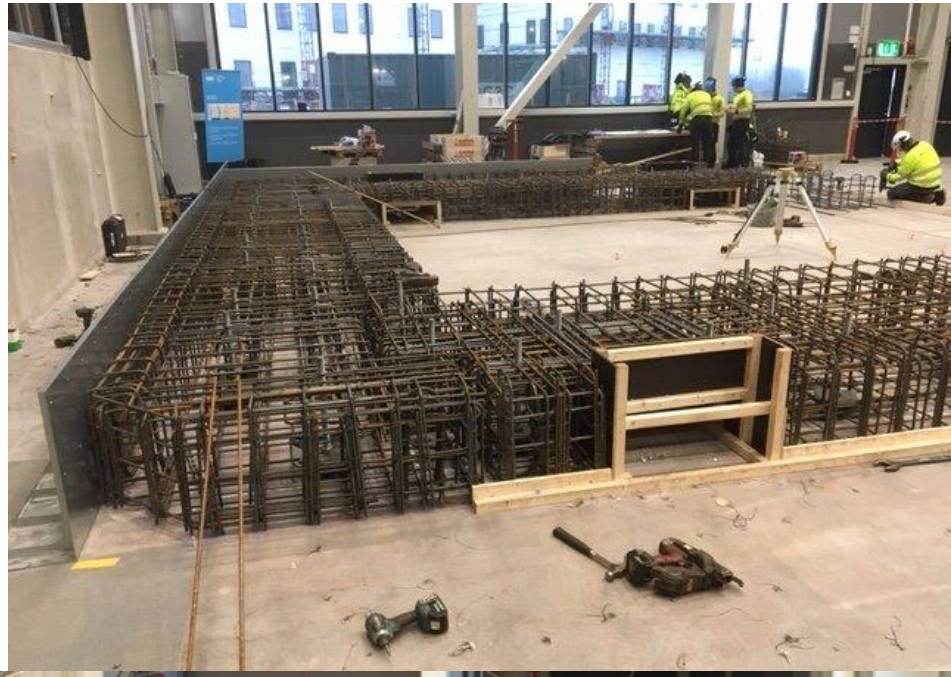


Cave foundation and internal plinths, all dismountable

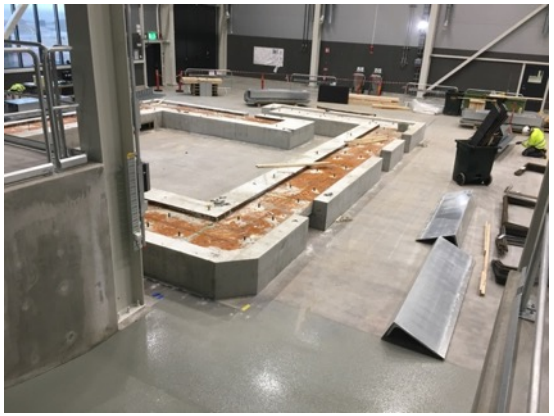
Detail design and manufacturing contract awarded to C3C Engineering AB: Started casting 19th Dec 2019

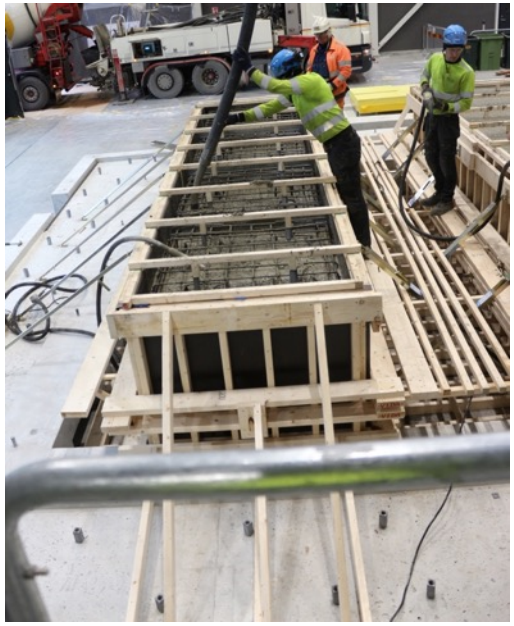


Some pictures

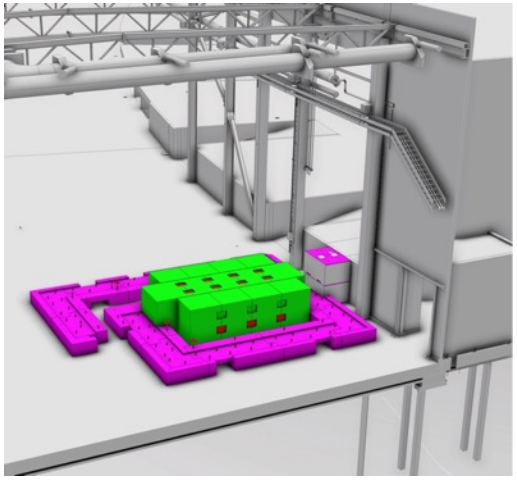


Some pictures

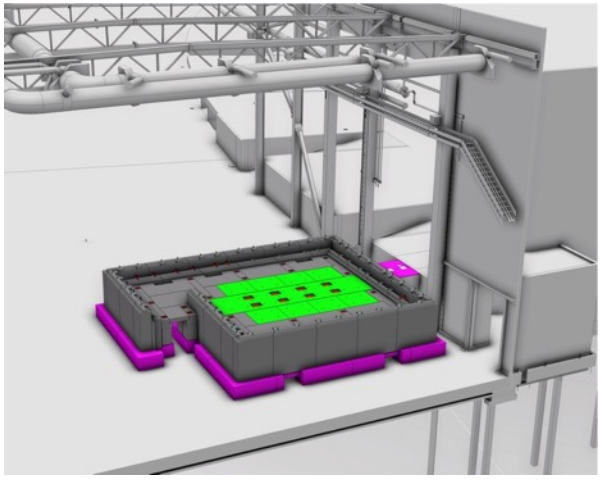




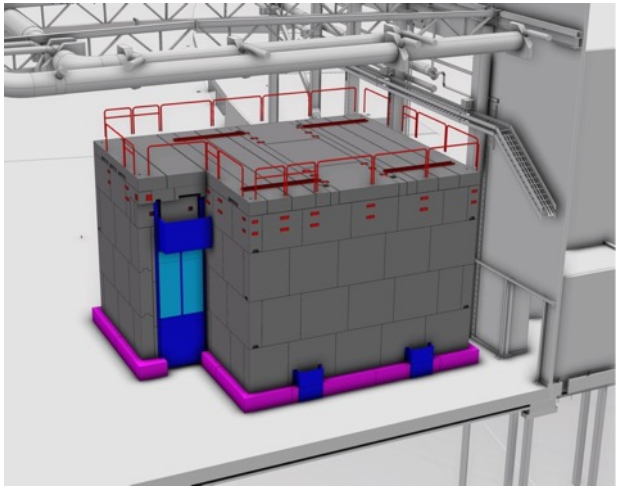
Looking forward



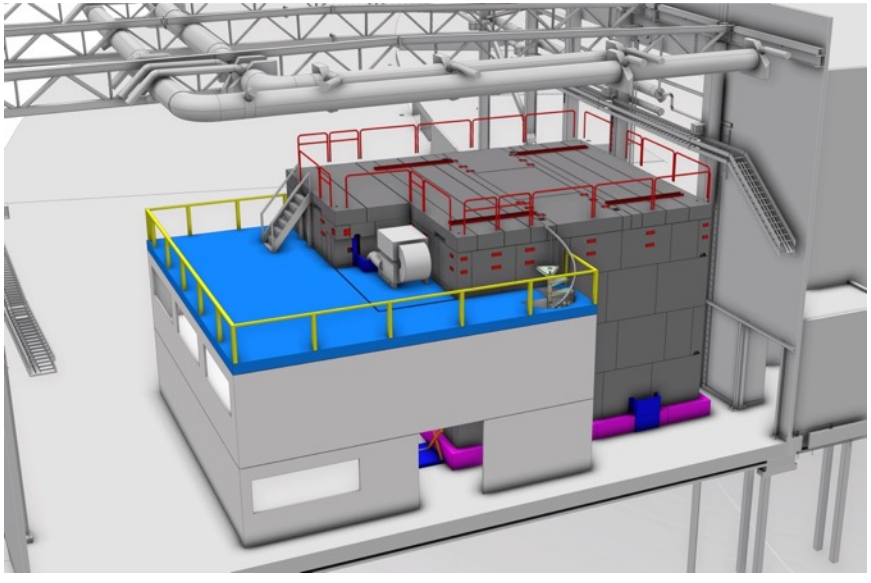
Today



March 20



May 20



Q4 2020

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Thanks to you

and to everybody who contributed.