



SAR-MEETING DREAM INSTRUMENT COMPONENTS OVERVIEW

26.03.2026 | P. HARBOTT, S. DESERT, F. PORCHER, A. FORNELL, P. BRANT CARVALHO



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DREAM

Team

Florence Porcher
Instrument Scientist (LLB/ESS)

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Project Engineer (FZJ)

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Lead Engineer (FZJ)

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Former Instrument Scientist FZJ
Now Head of Diffraction and
Imaging Group

Anna Fornell
Instrument Operations Engineer



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OUTLINE

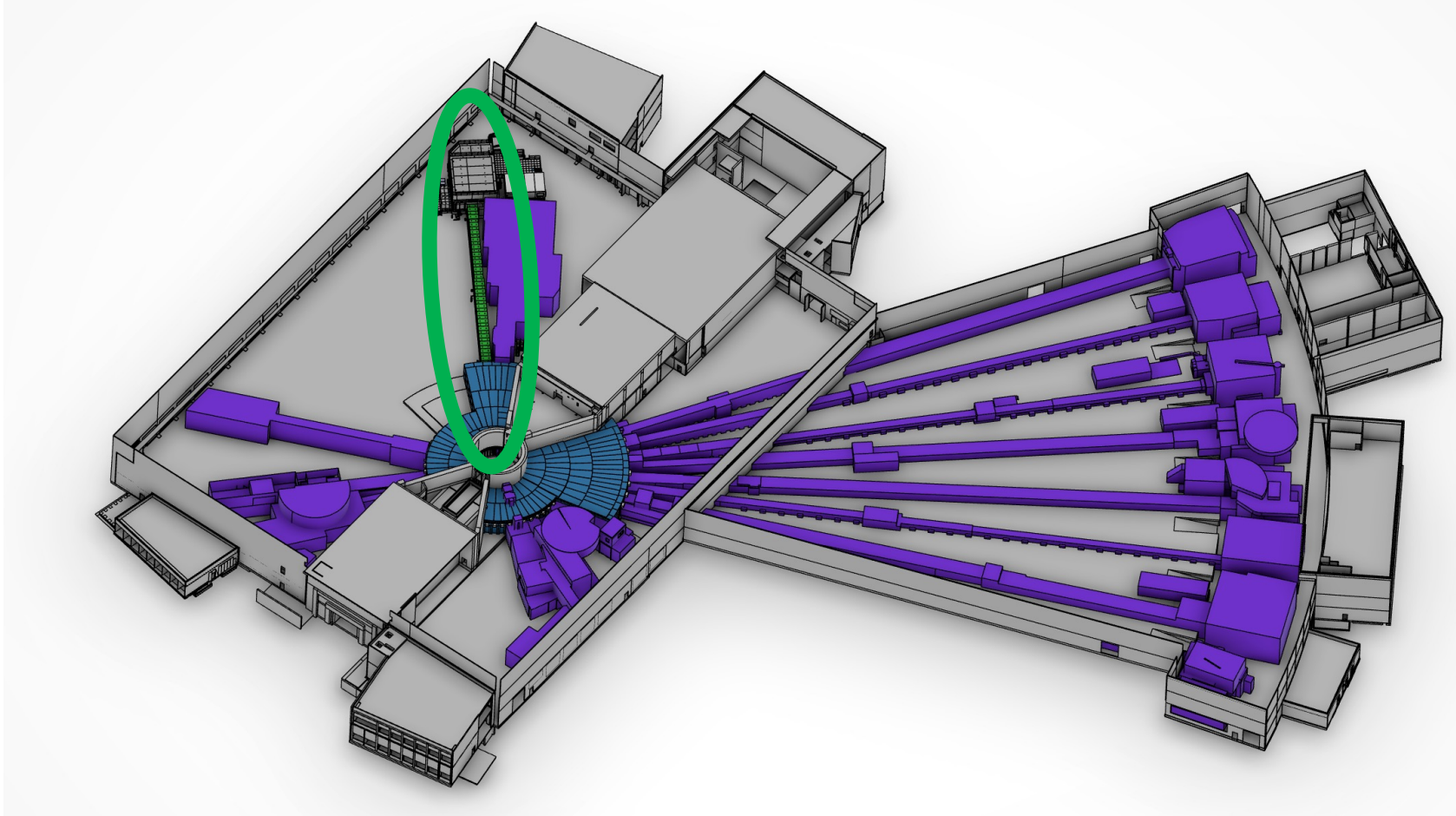
► Overview of DREAM-Layout

► FBS and LBS Structure

► Components Overview

OVERVIEW OF DREAM-LAYOUT

Location: S03 (South Sector), Instrument Hall D01



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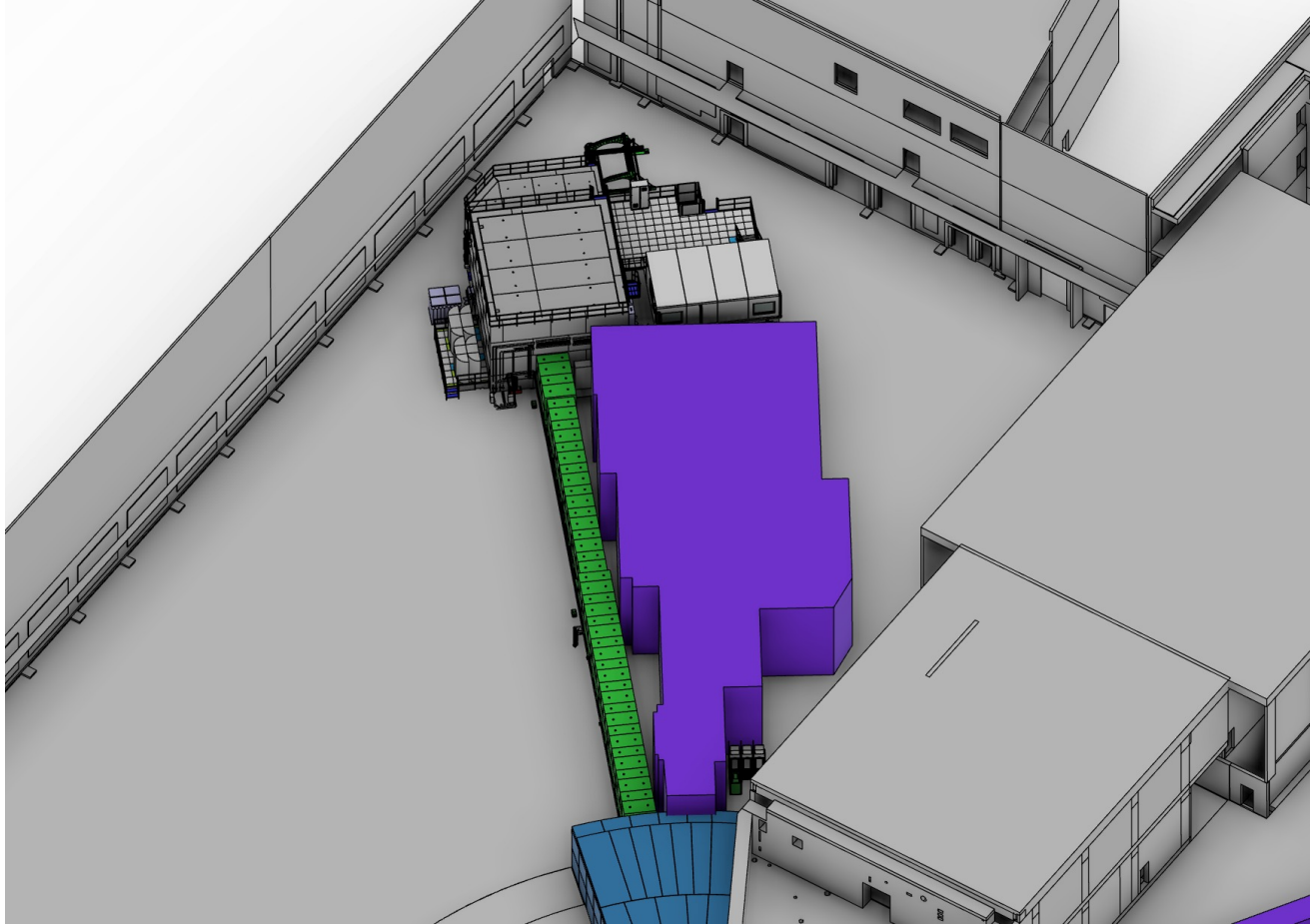
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OVERVIEW OF DREAM-LAYOUT

Location: S03 (South Sector), Instrument Hall D01



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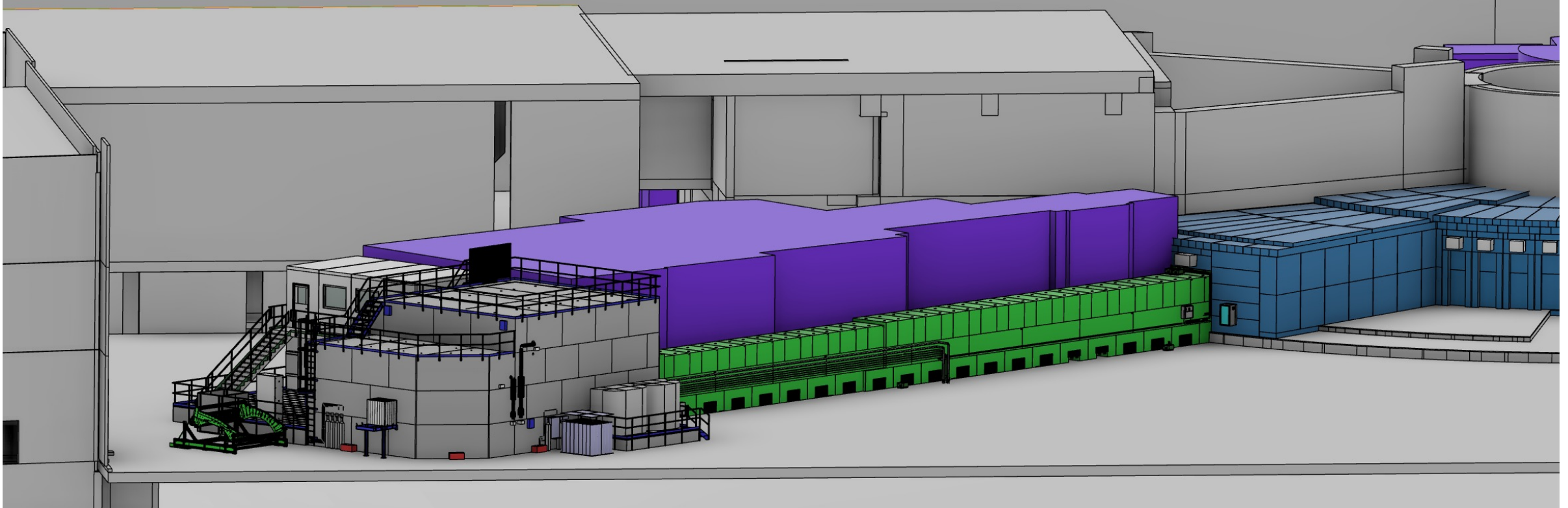
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OVERVIEW OF DREAM-LAYOUT

Location: S03 (South Sector), Instrument Hall D01



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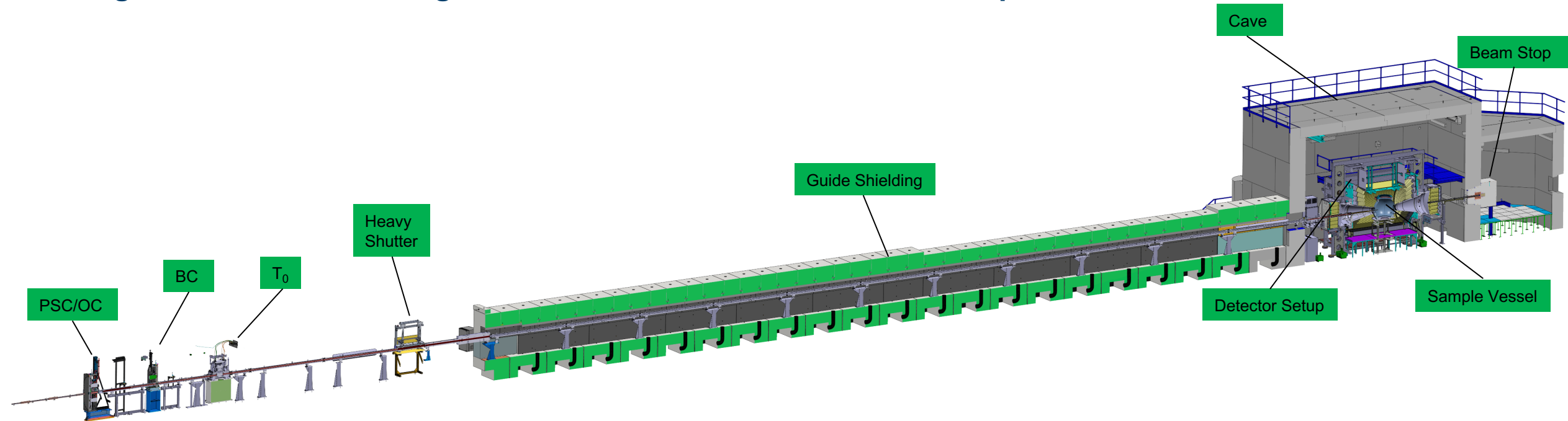


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OVERVIEW OF DREAM-LAYOUT

Location: S03 (South Sector), Instrument Hall D01

Straight beamline, 76 m long, direct view to thermal moderator, bi-spectral



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FBS AND LBS STRUCTURE



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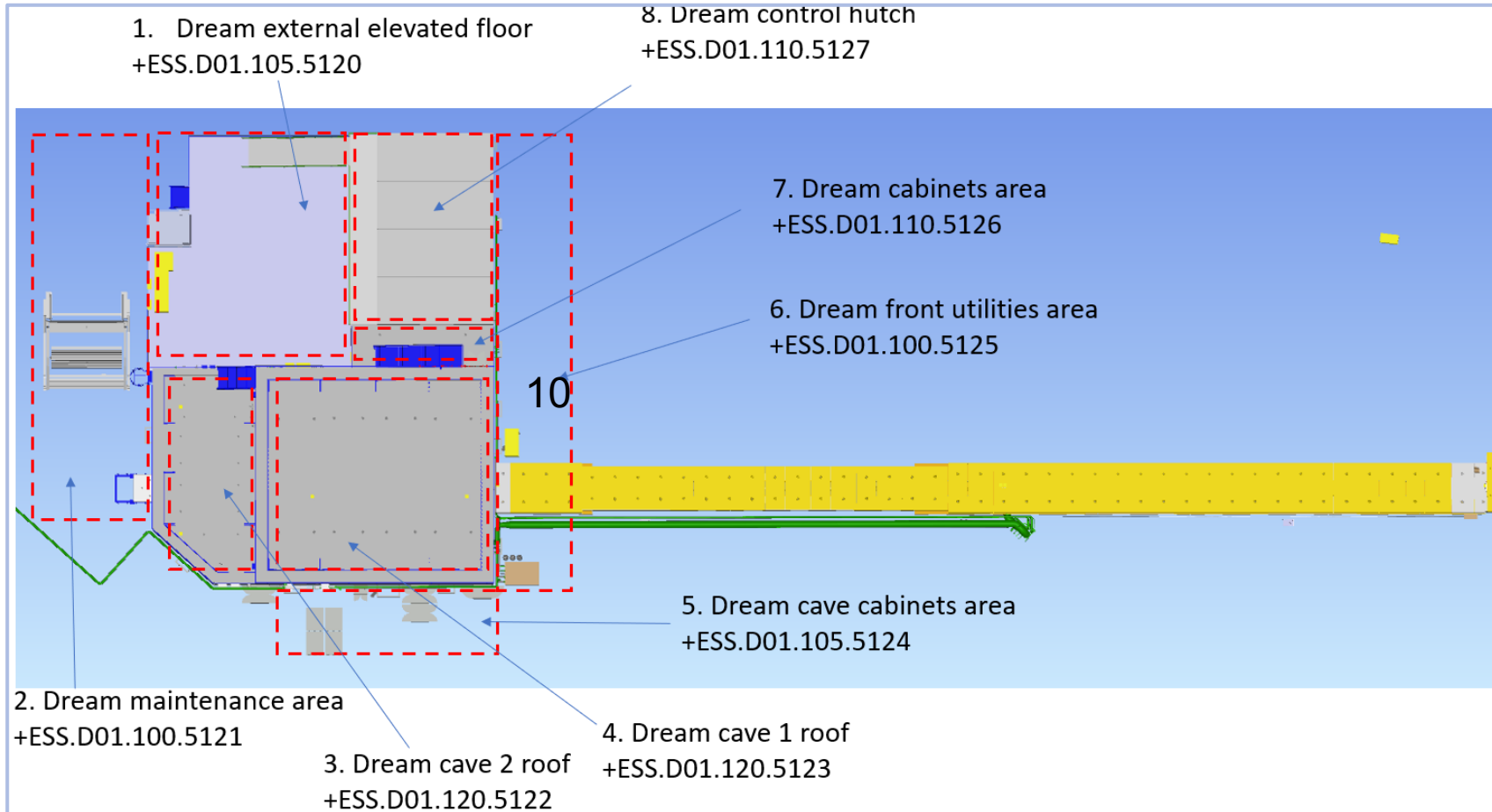
FBS AND LBS STRUCTURE

DREAM FBS: ESS-0094866

Level		DREAM FBS	Description
0	DREAM	=ESS.NSS.H01.DREAM	DREAM
1	A01	=ESS.NSS.H01.DREAM.A01	Beam Transport and Conditioning
1	A02	=ESS.NSS.H01.DREAM.A02	Sample Exposure System
1	A04	=ESS.NSS.H01.DREAM.A04	Support Systems
1	A05	=ESS.NSS.H01.DREAM.A05	Supply Systems
1	B01	=ESS.NSS.H01.DREAM.B01	Scattering Characterization System
1	F01	=ESS.NSS.H01.DREAM.F01	Personnel Safety System (DREAM PSS)
1	G01	=ESS.NSS.H01.DREAM.G01	DREAM Vacuum System
1	K01	=ESS.NSS.H01.DREAM.K01	Instrument Automation Control System
1	K02	=ESS.NSS.H01.DREAM.K02	Data Management & Experiment Control System
1	U01	=ESS.NSS.H01.DREAM.U01	Cave

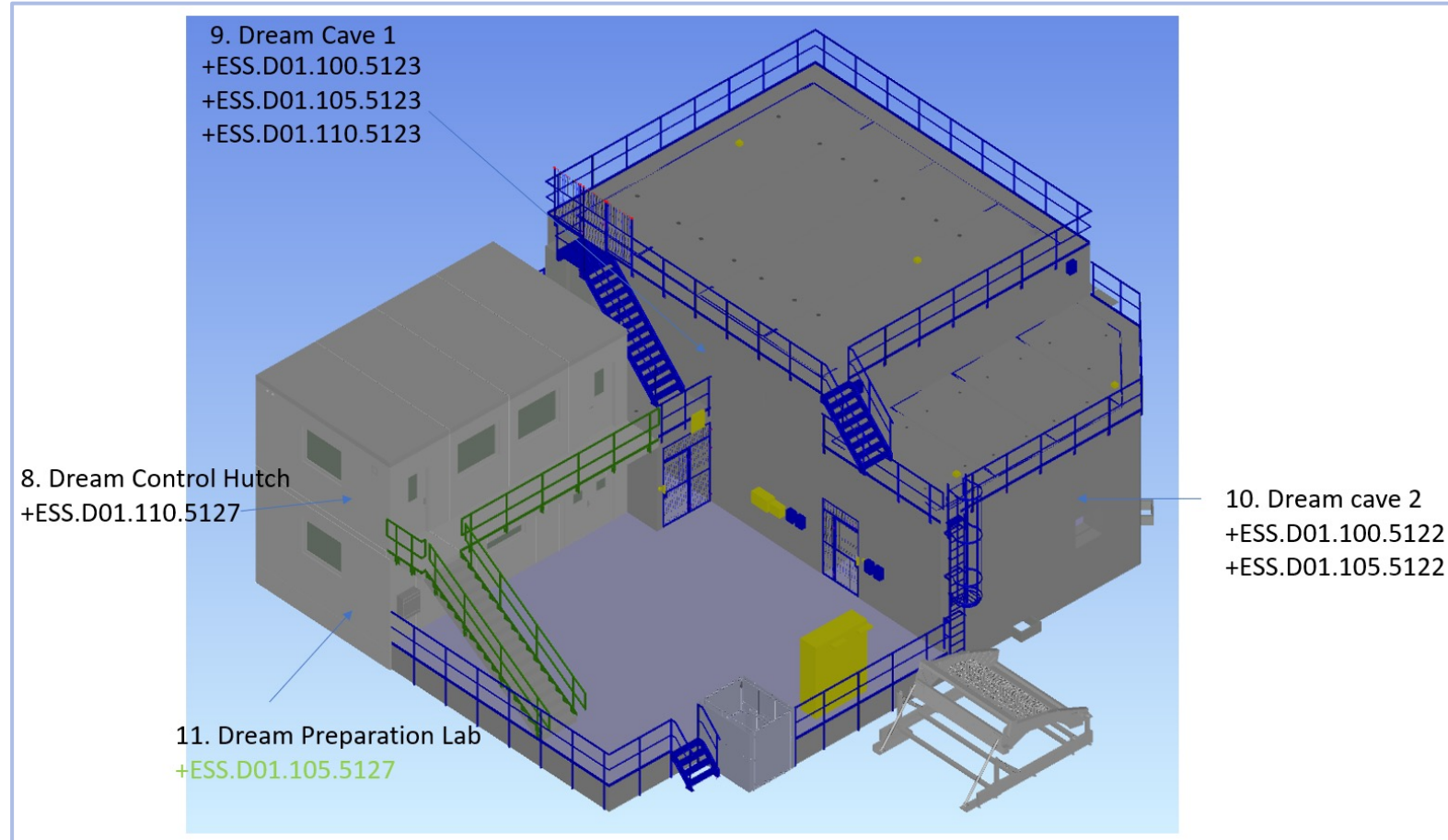
FBS AND LBS STRUCTURE

DREAM LBS: ESS-4013730



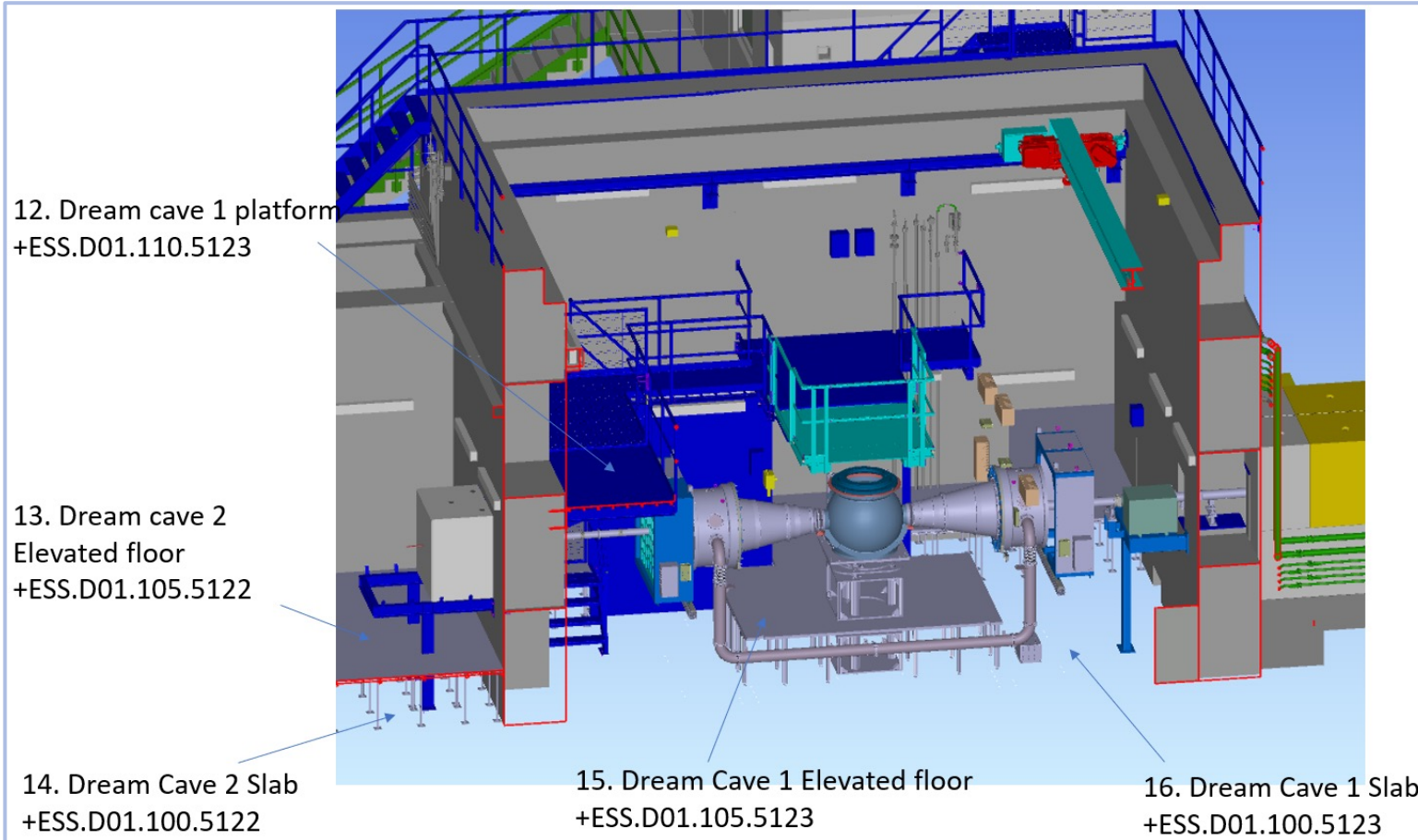
FBS AND LBS STRUCTURE

DREAM LBS: ESS-4013730



FBS AND LBS STRUCTURE

DREAM LBS: ESS-4013730



COMPONENTS OVERVIEW

Beam Transport and Conditioning (=ESS.NSS.H01.DREAM.A01)



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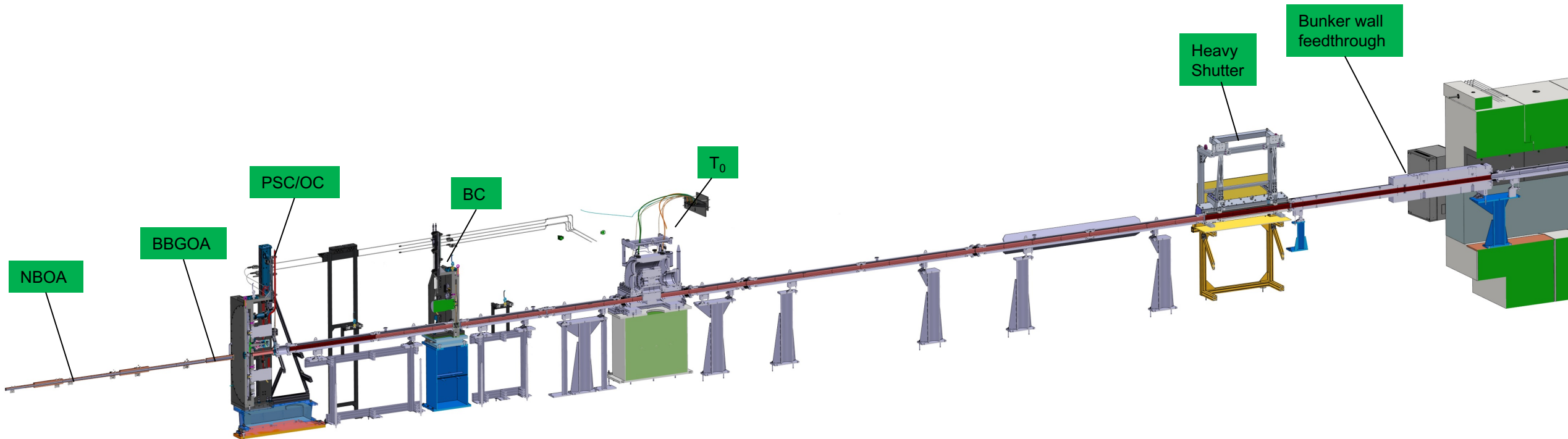
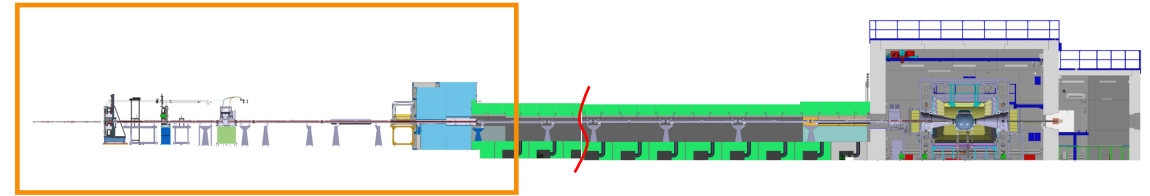
BEAM TRANSPORT AND CONDITIONING

=ESS.NSS.H01.DREAM.A01

=ESS.NSS.H01.DREAM.A01.W02.WH01	NBOA - Neutron Beam Optics Assembly
=ESS.NSS.H01.DREAM.A01.W02.WH02	BBGOA- Bridge Beam Guide Optics Assembly
=ESS.NSS.H01.DREAM.A01.R01	Neutron Chopper System
=ESS.NSS.H01.DREAM.A01.B01	Beam Validation
=ESS.NSS.H01.DREAM.A01.W01	Beam Delivery System
=ESS.NSS.H01.DREAM.A01.U01	In Bunker Mechanical support system
=ESS.NSS.H01.DREAM.A01.R03	Beam Cut off
=ESS.NSS.H01.DREAM.A01.F01	Shielding (Guide shielding and bunker wall insert)
=ESS.NSS.H01.DREAM.A01.R02	Beam Geometry Conditioning
=ESS.NSS.H01.DREAM.A01.R04	Beam Polarising System

BEAM TRANSPORT AND CONDITIONING

=ESS.NSS.H01.DREAM.A01 (in-bunker section)



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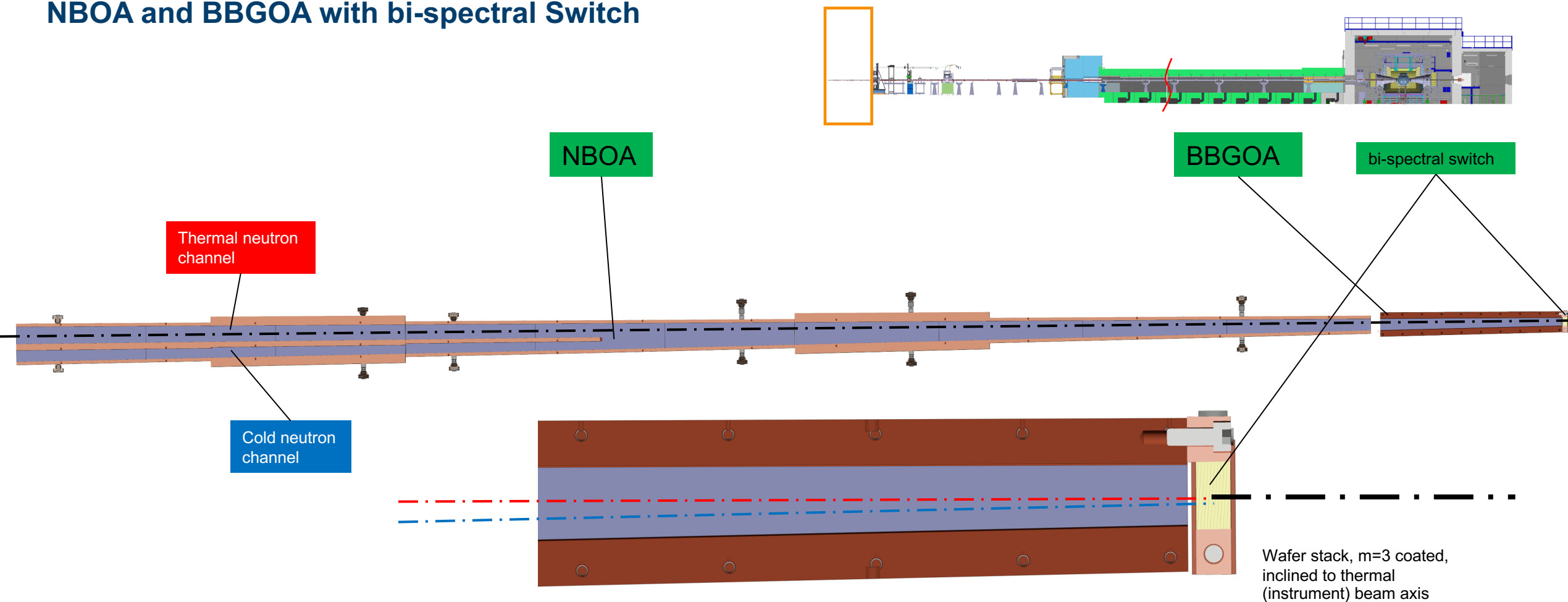
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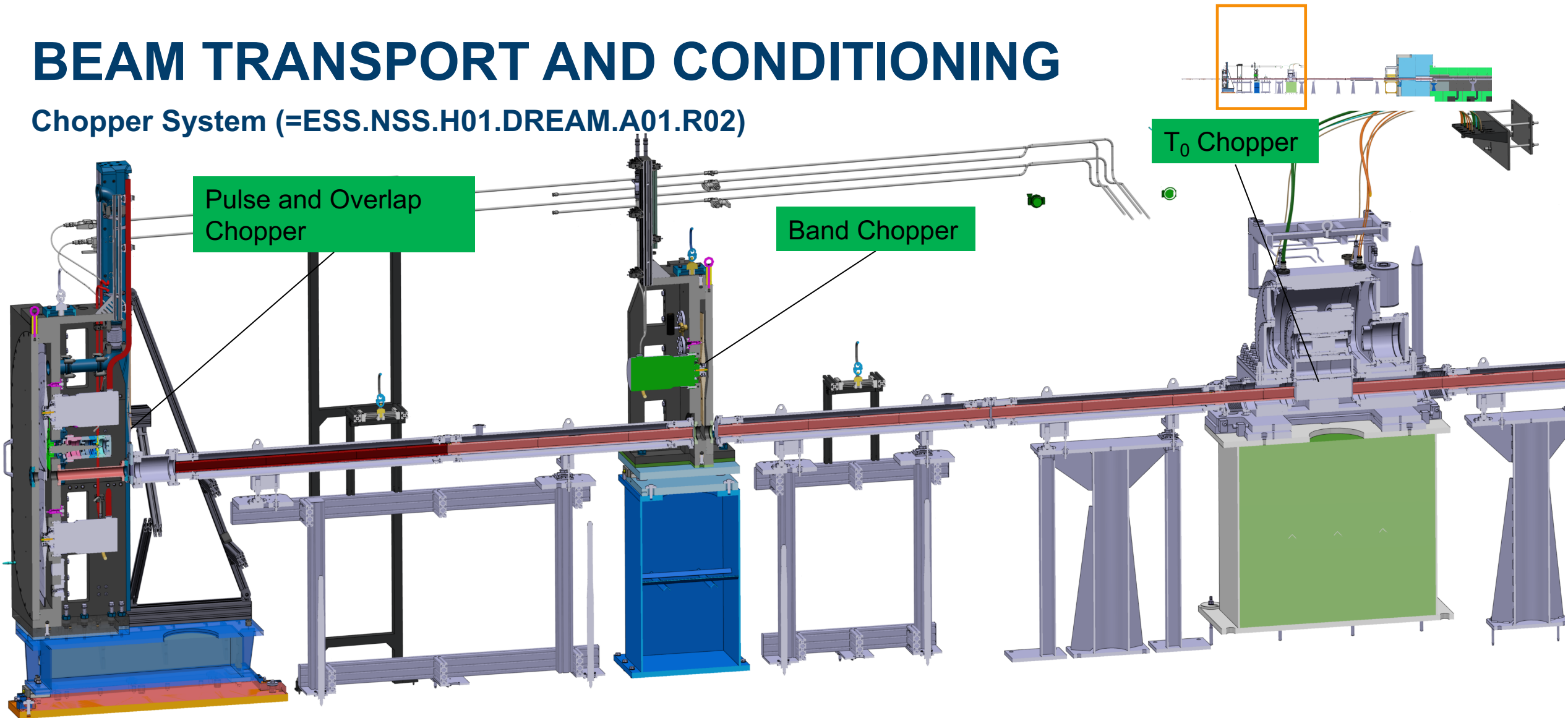
BEAM TRANSPORT AND CONDITIONING

NBOA and BBGOA with bi-spectral Switch



BEAM TRANSPORT AND CONDITIONING

Chopper System (=ESS.NSS.H01.DREAM.A01.R02)



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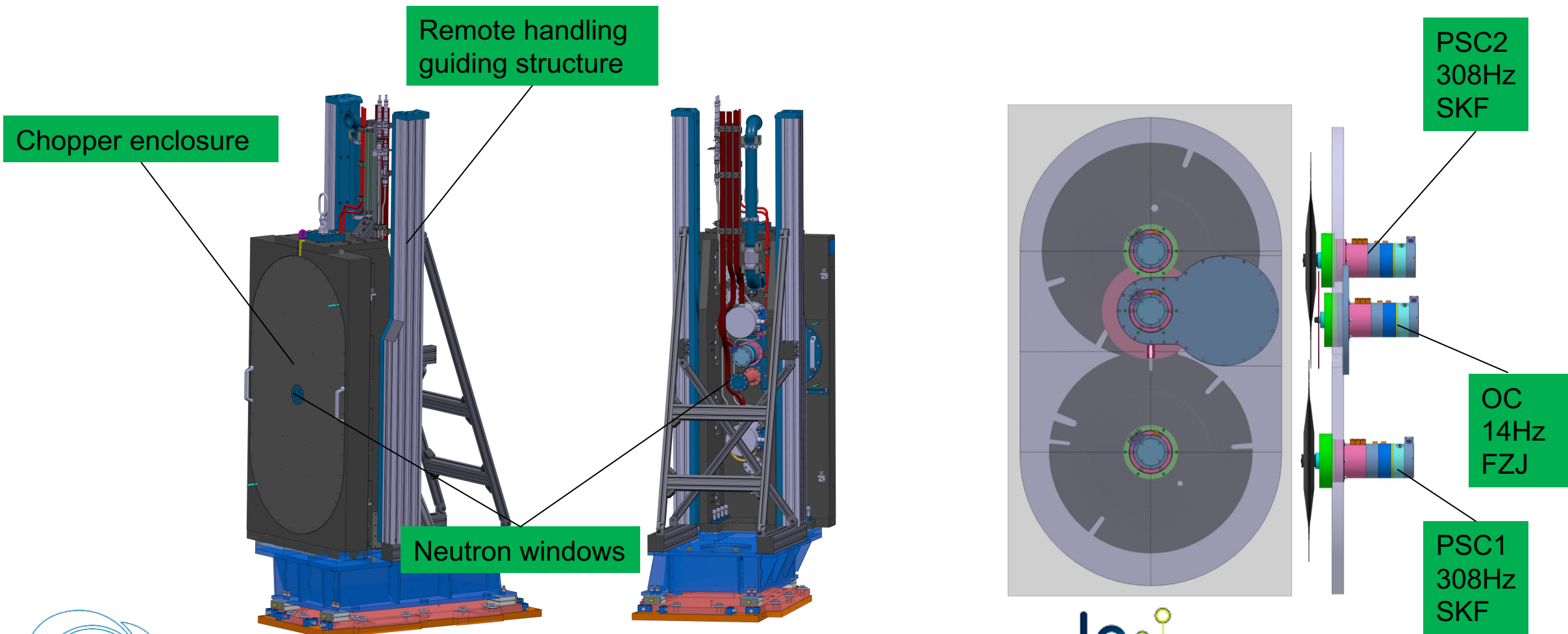
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BEAM TRANSPORT AND CONDITIONING

Pulse / Overlap Chopper System (FZJ)



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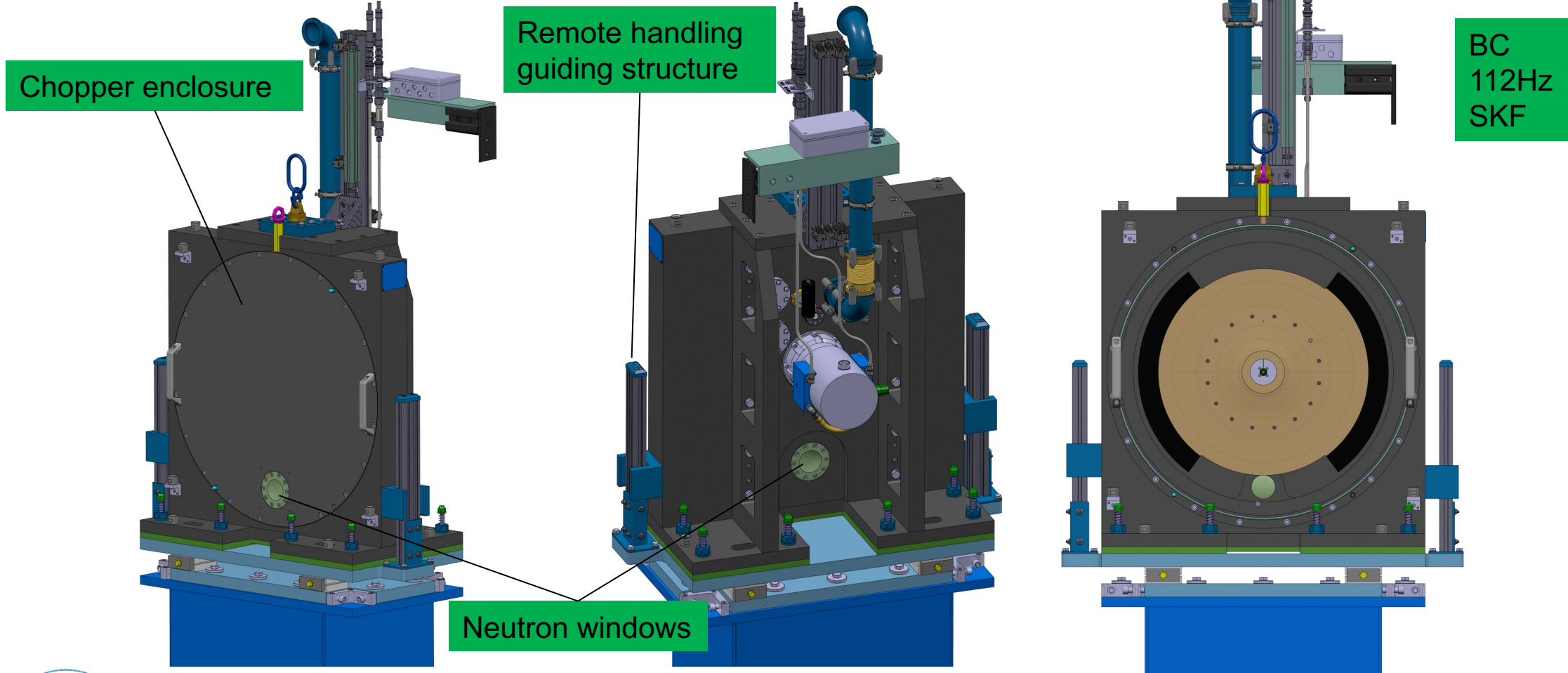
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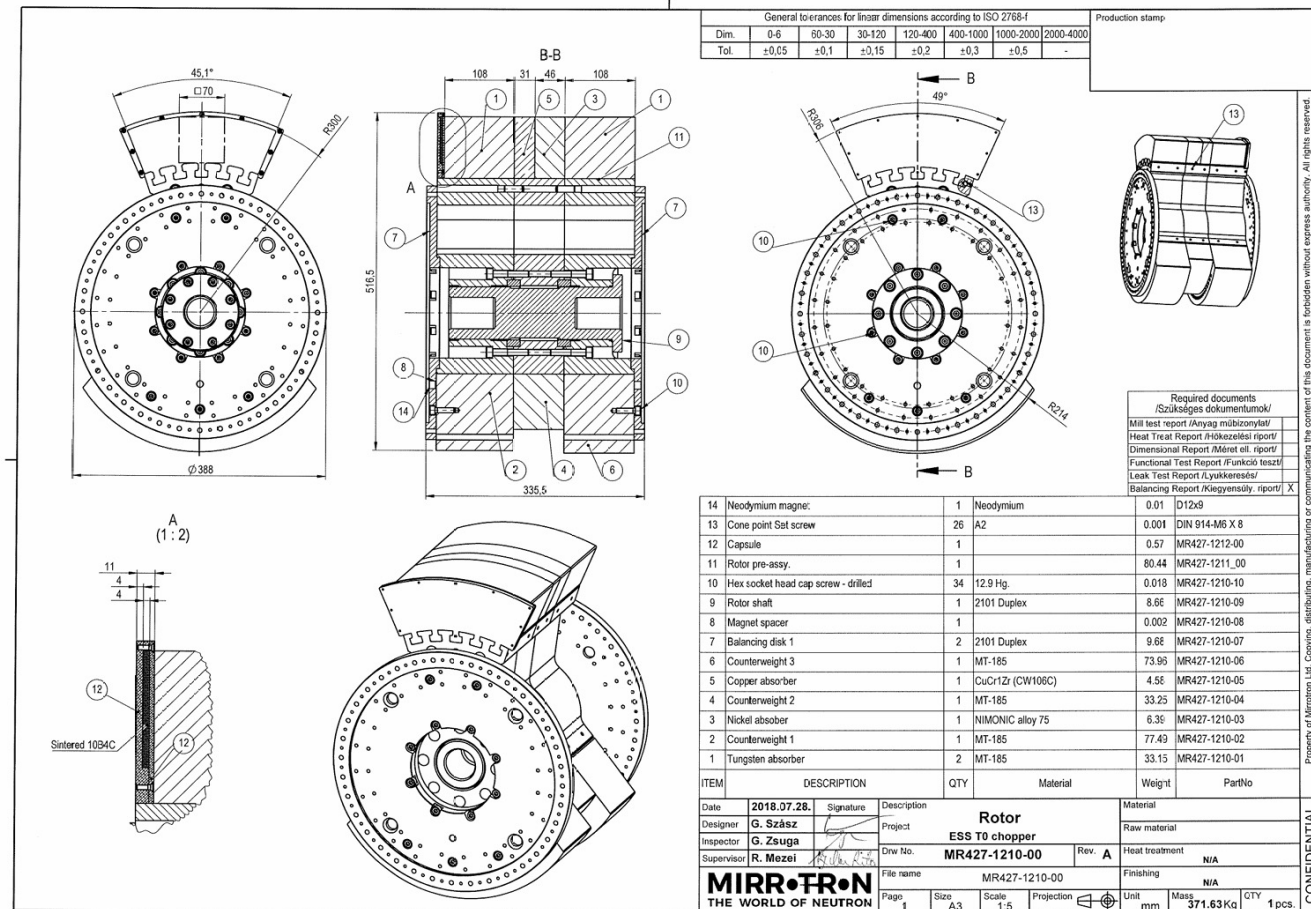
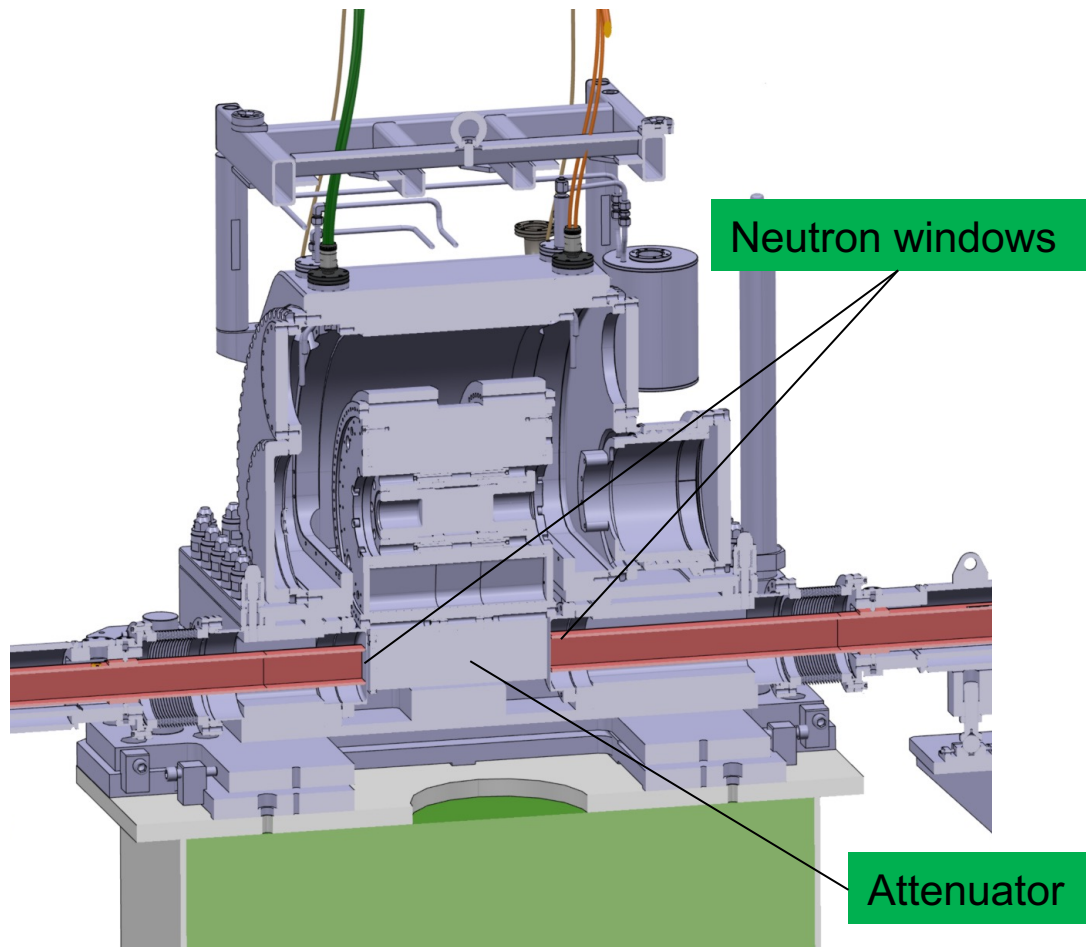
BEAM TRANSPORT AND CONDITIONING

Band Chopper System (FZJ)



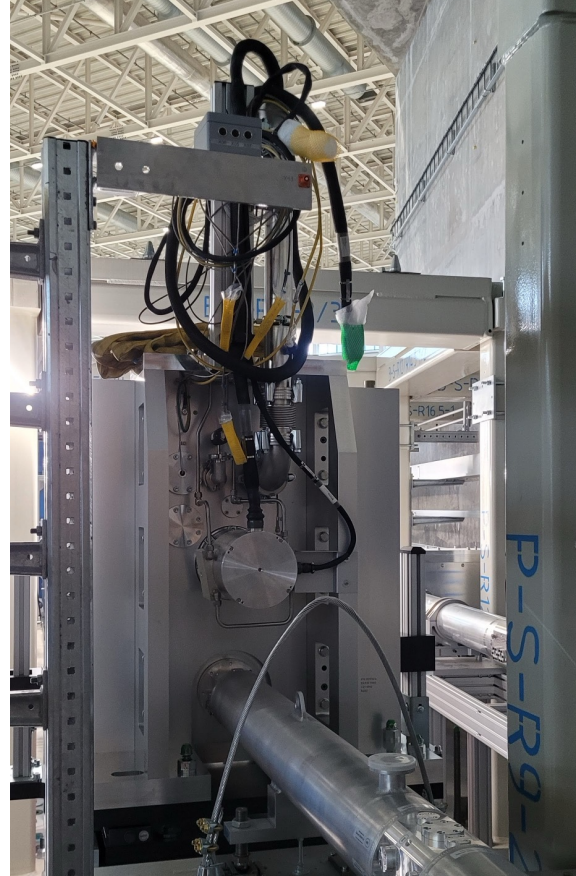
BEAM TRANSPORT AND CONDITIONING

T₀ Chopper (ESS / Mirrotron)



BEAM TRANSPORT AND CONDITIONING

Chopper installation



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BEAM TRANSPORT AND CONDITIONING

Chopper racks



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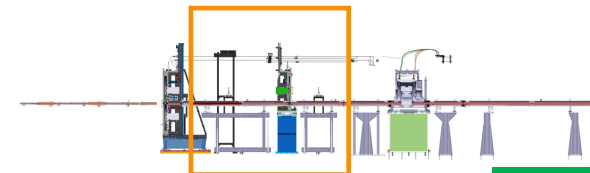
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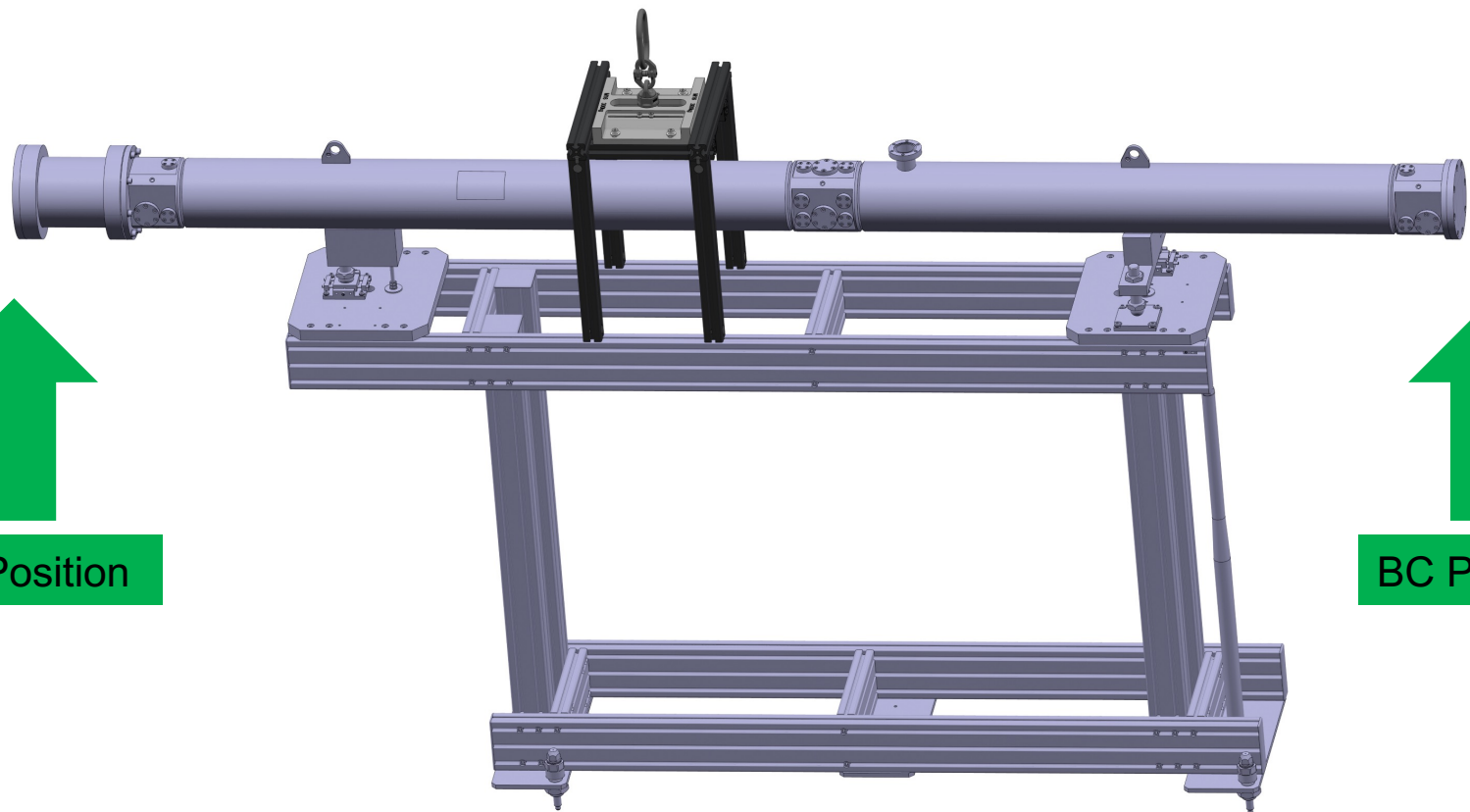
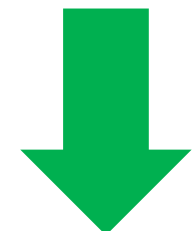
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BEAM TRANSPORT AND CONDITIONING

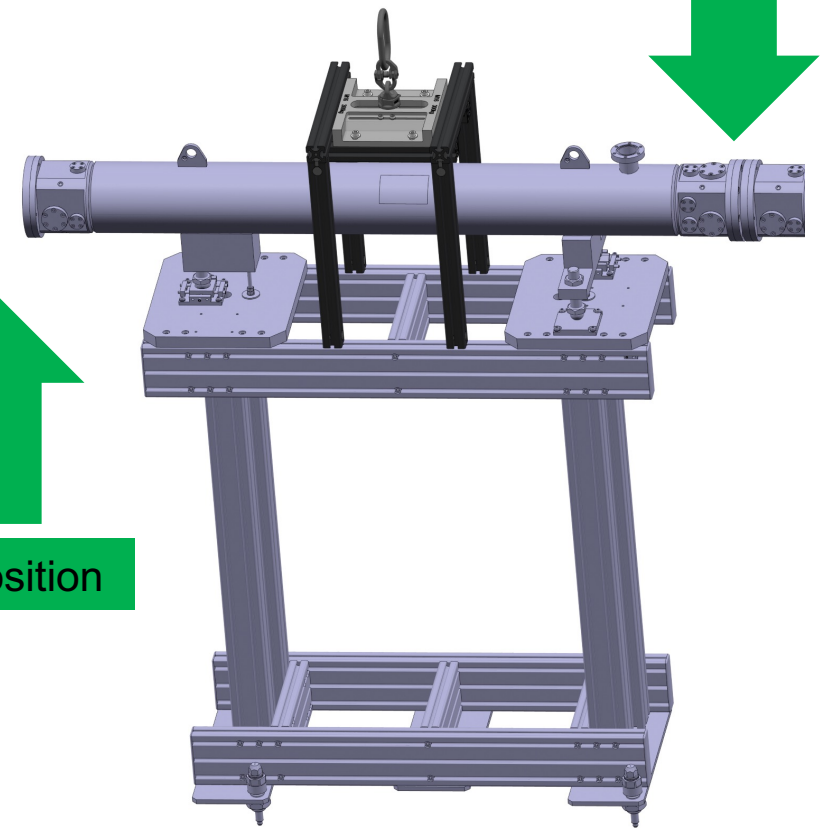
Remote handling guide supports



Window pair



PSC Position



BC Position



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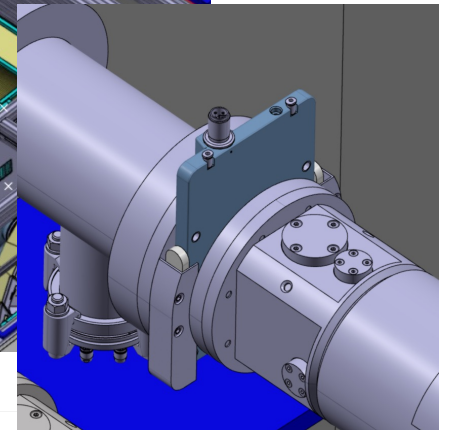
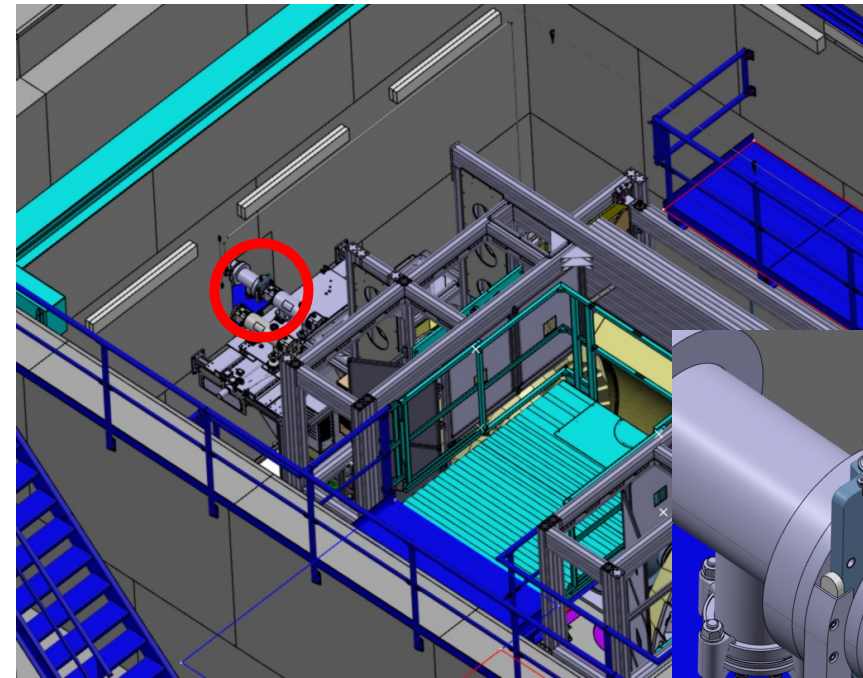
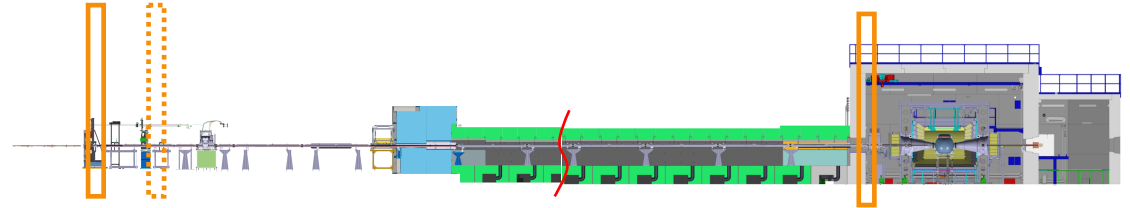
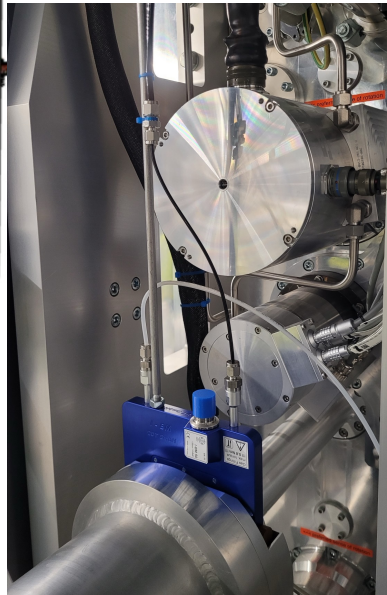
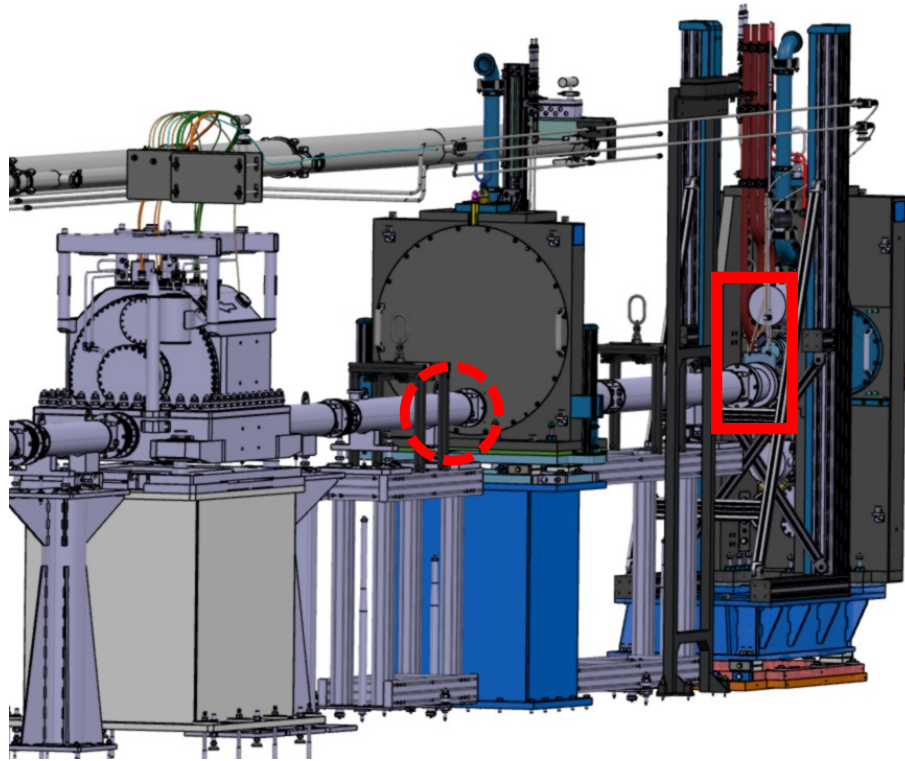
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BEAM TRANSPORT AND CONDITIONING

Beam validation (=ESS.NSS.H01.DREAM.A01.B01)



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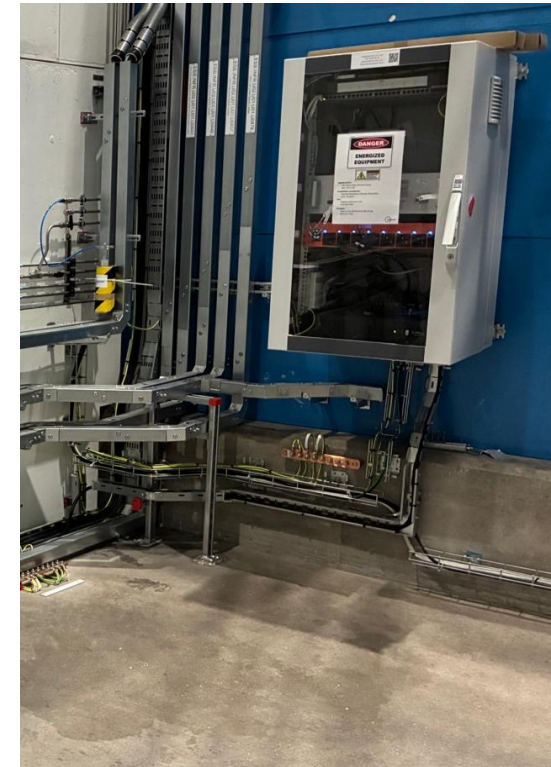
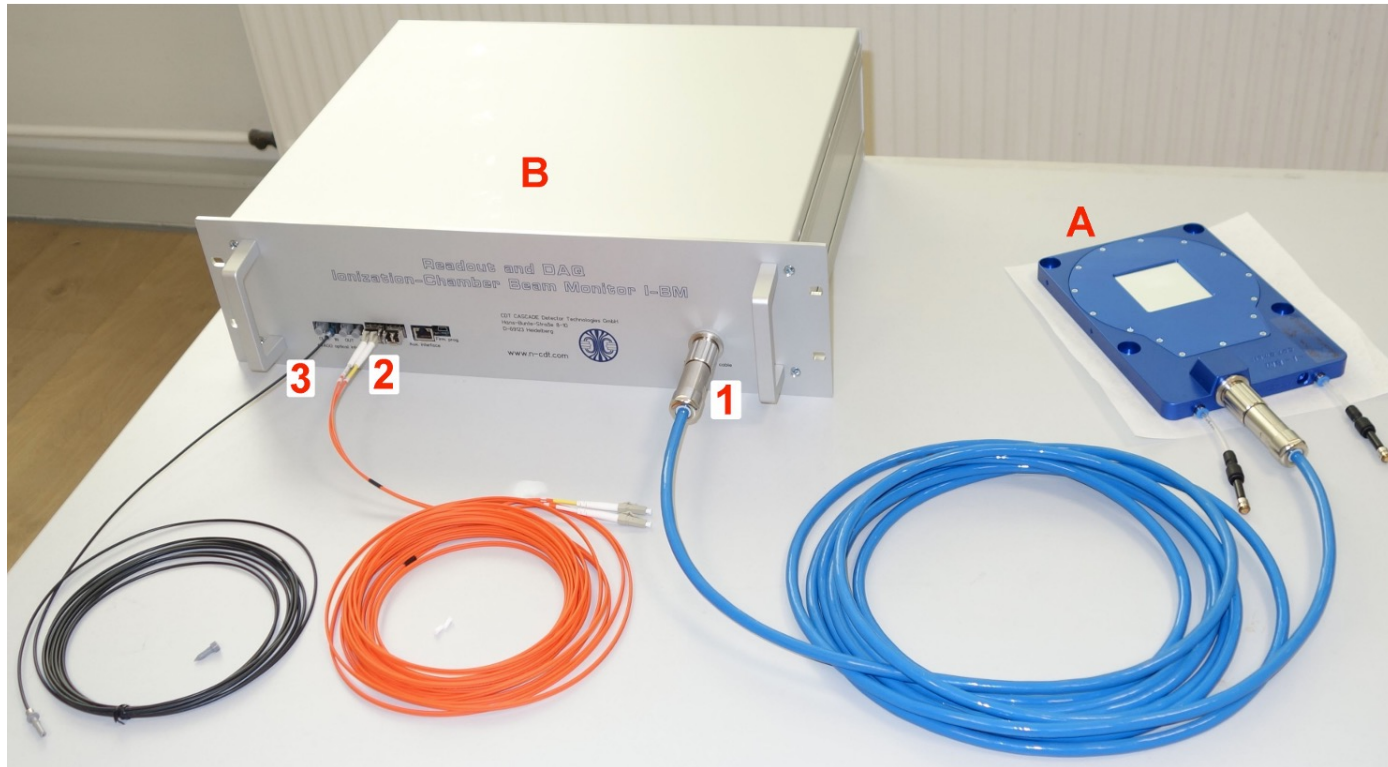
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BEAM TRANSPORT AND CONDITIONING

CDT I-BM Monitor System



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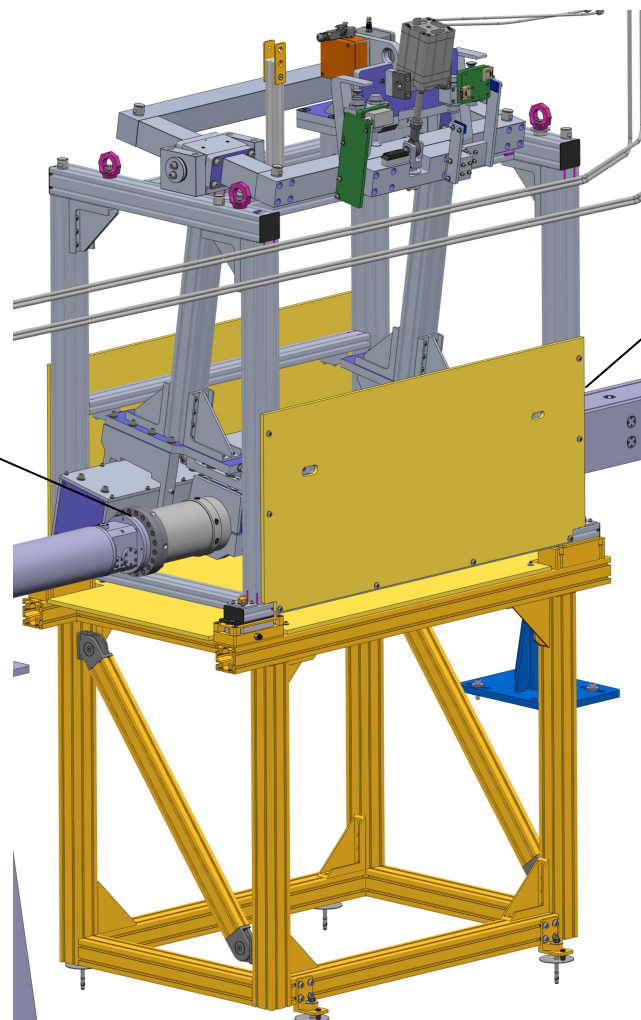


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BEAM TRANSPORT AND CONDITIONING

Heavy shutter (=ESS.NSS.H01.DREAM.A01.R03)

Window pair



Window pair

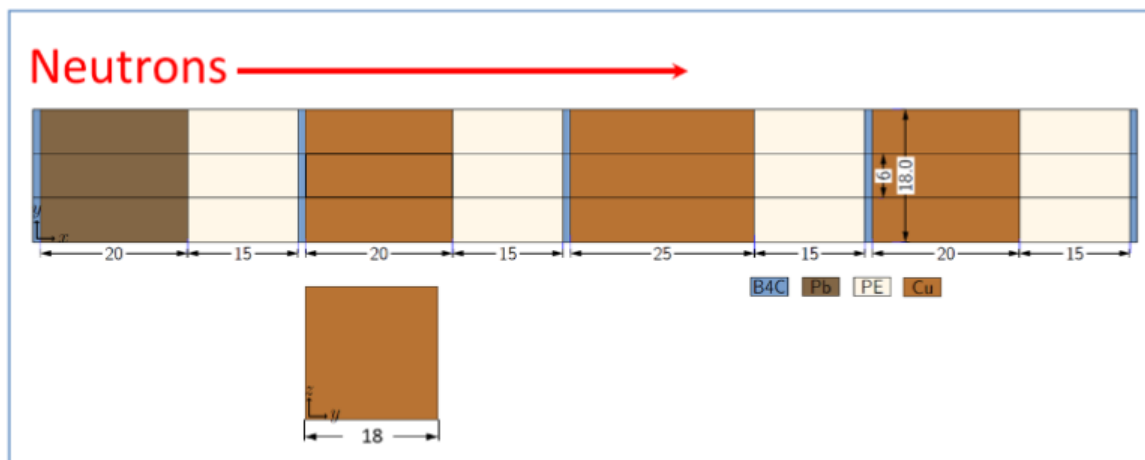
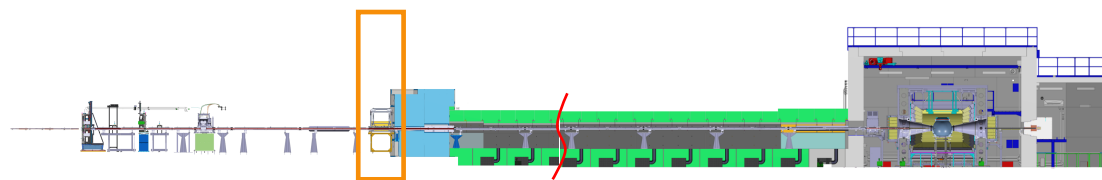
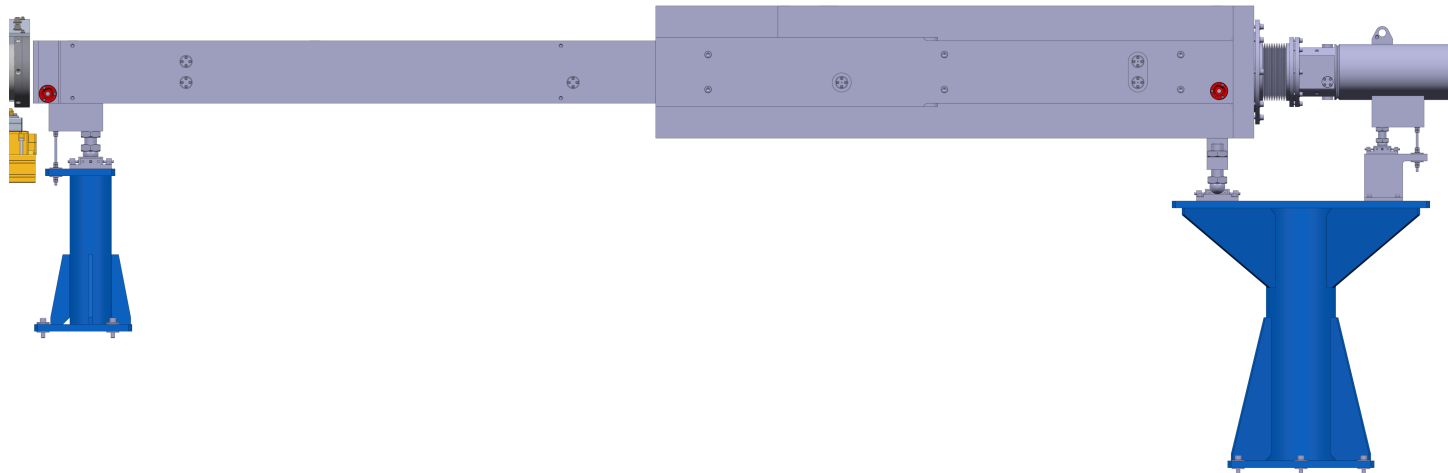
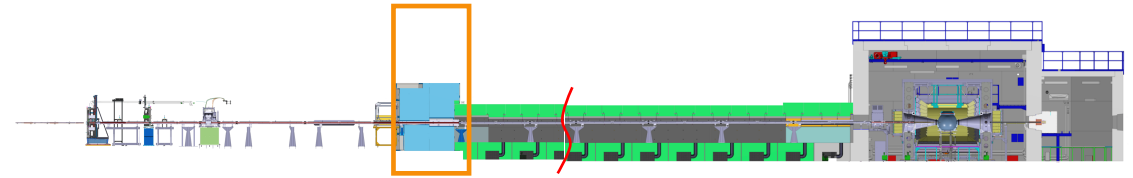


Figure 4: Composition and geometry of Shutter block (dimensions in cm)

BEAM TRANSPORT AND CONDITIONING

Bunker wall feedthrough



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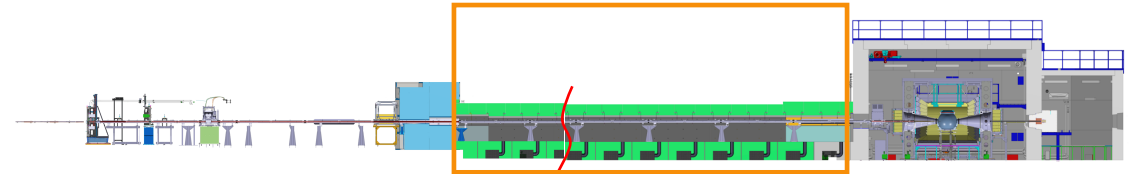
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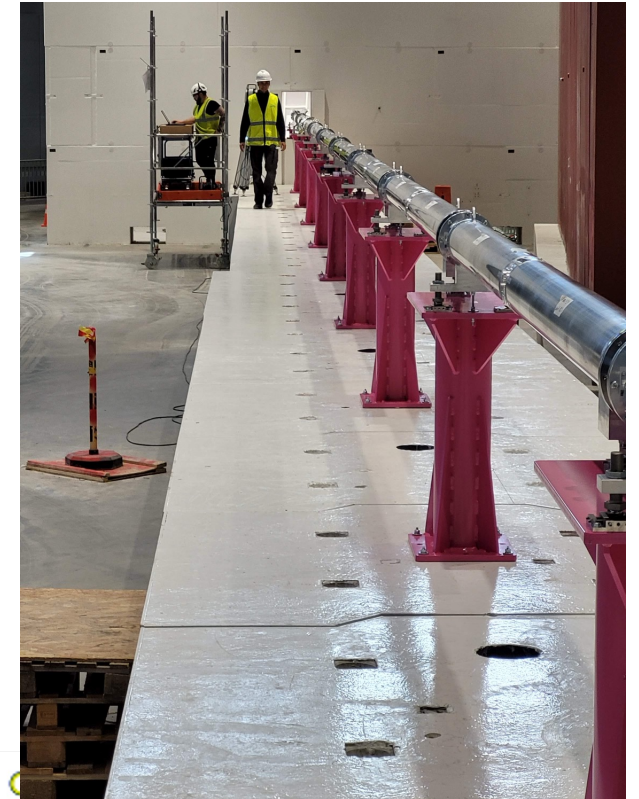
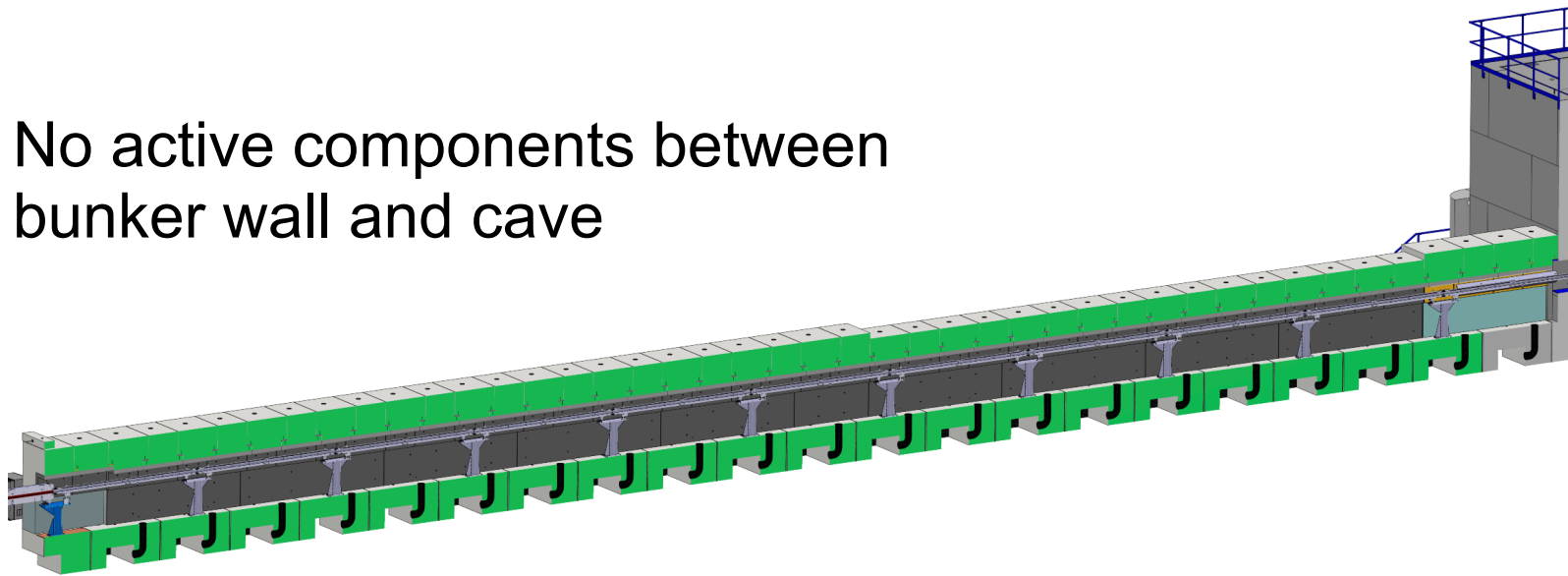
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BEAM TRANSPORT AND CONDITIONING

Guide outside of bunker



No active components between bunker wall and cave



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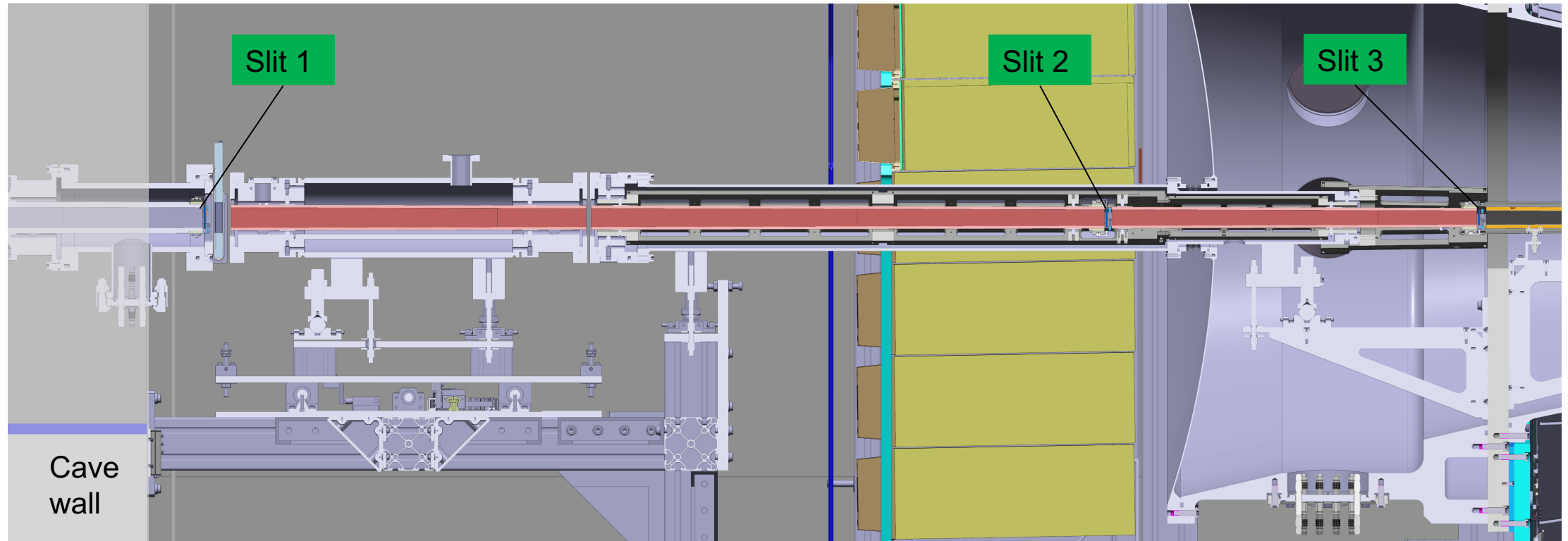
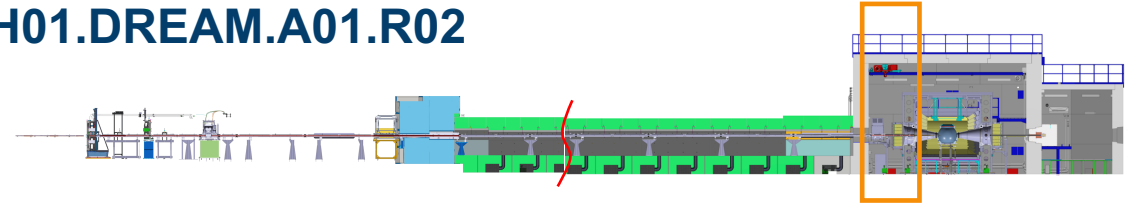


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BEAM TRANSPORT AND CONDITIONING

Slit system: Beam Geometry Conditioning, =ESS.NSS.H01.DREAM.A01.R02



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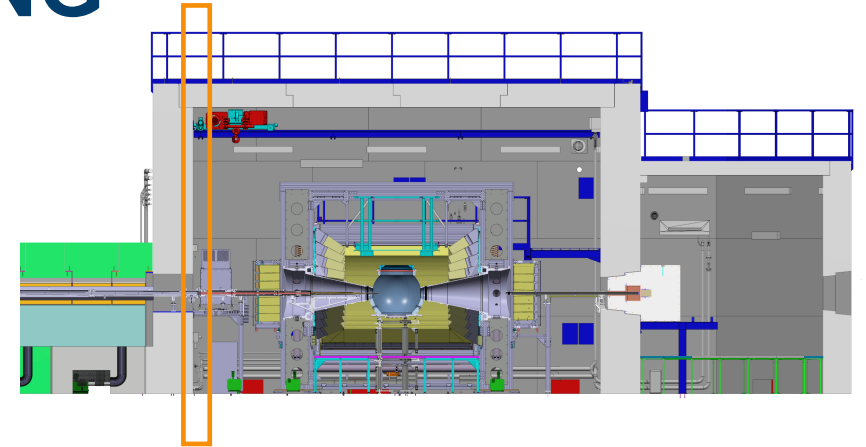
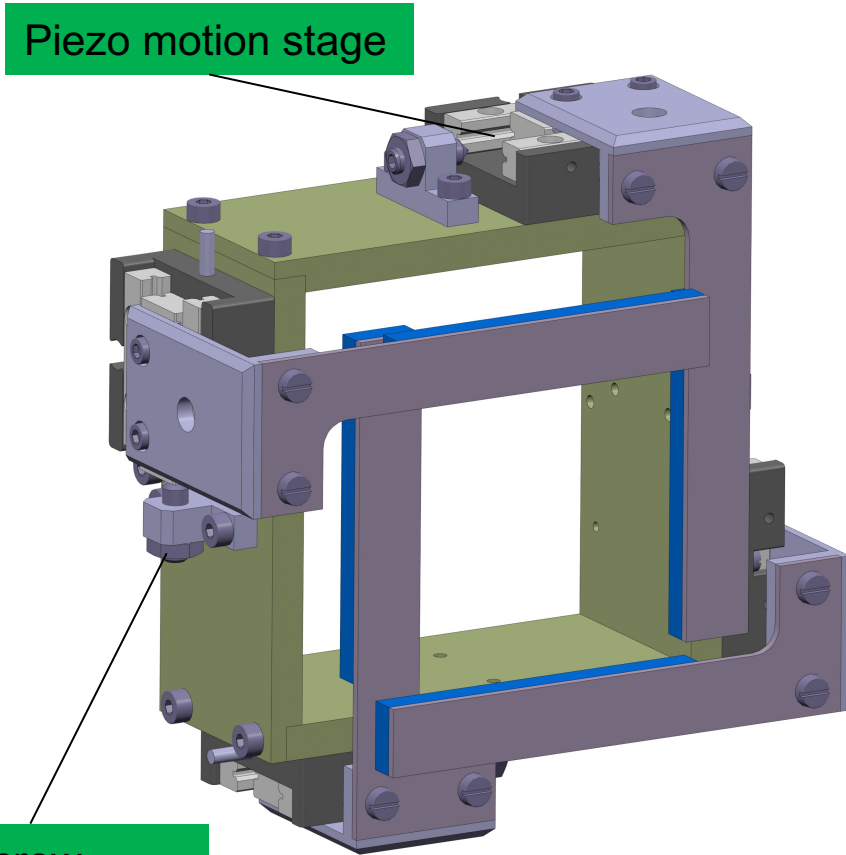
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BEAM TRANSPORT AND CONDITIONING

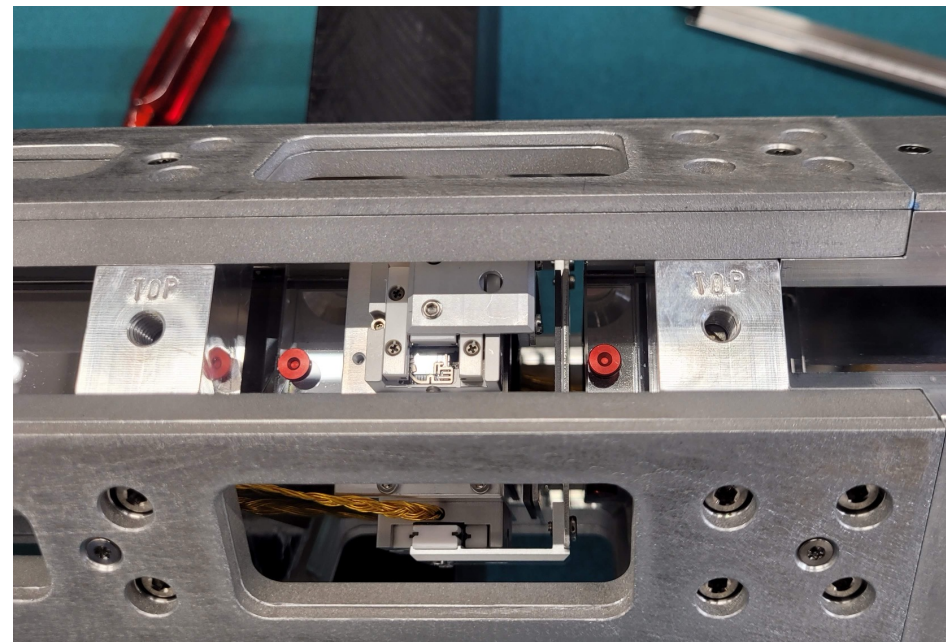
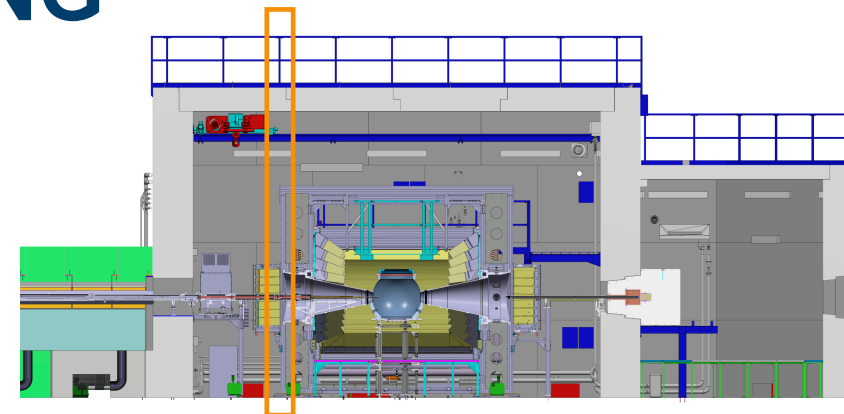
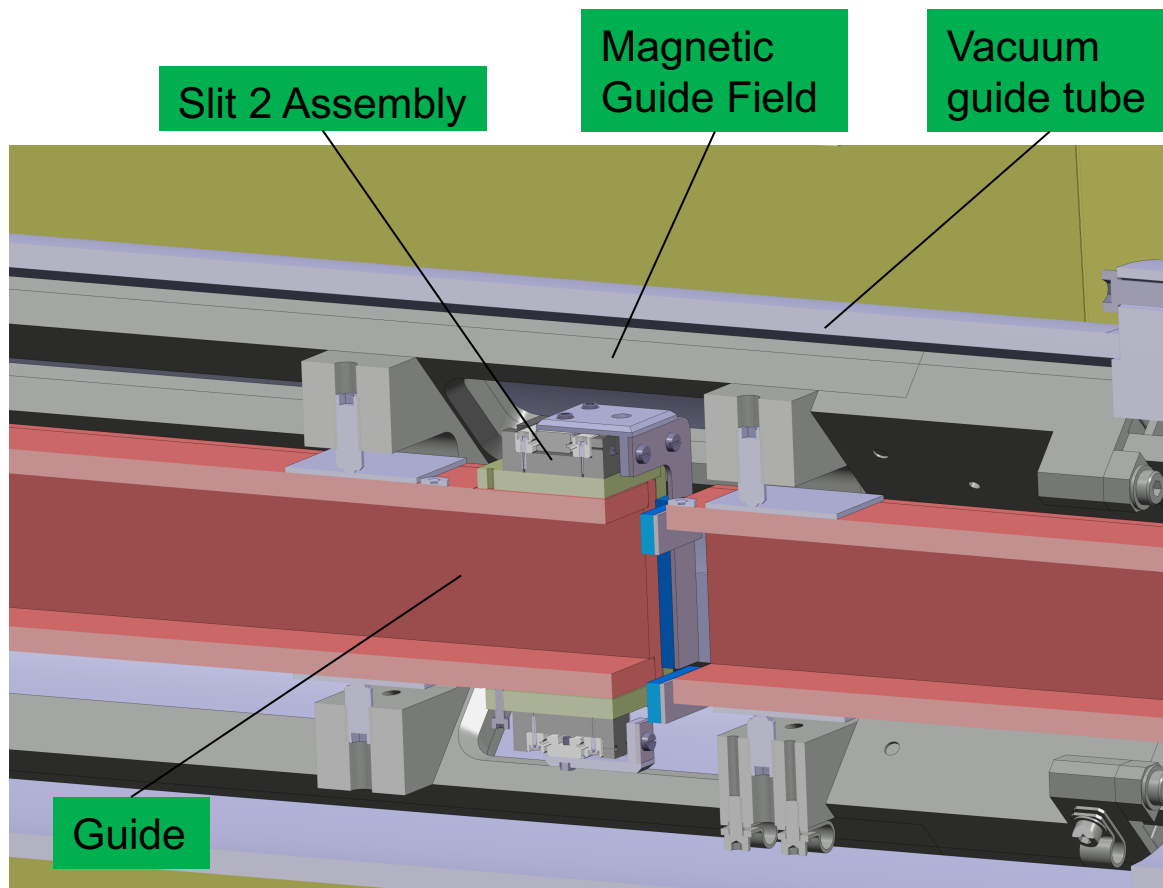
Slit 1 at beam entrance into cave



- Individual drives per slit blade
- Only two positions, fully open and partly closed
- Partly closed position controlled by stop screw
- Slit assembly clamped on glass guide

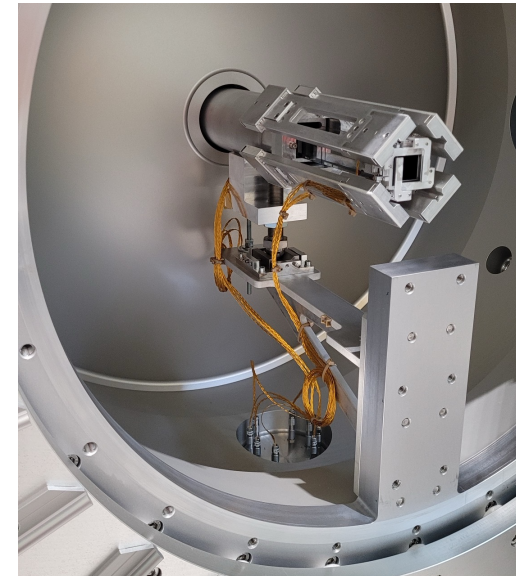
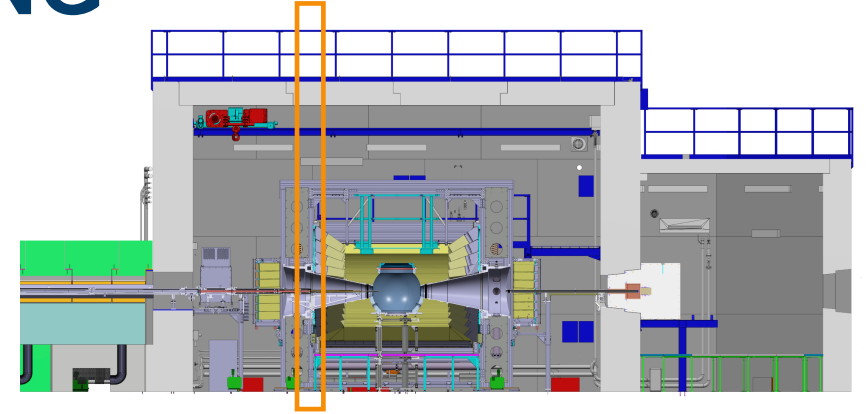
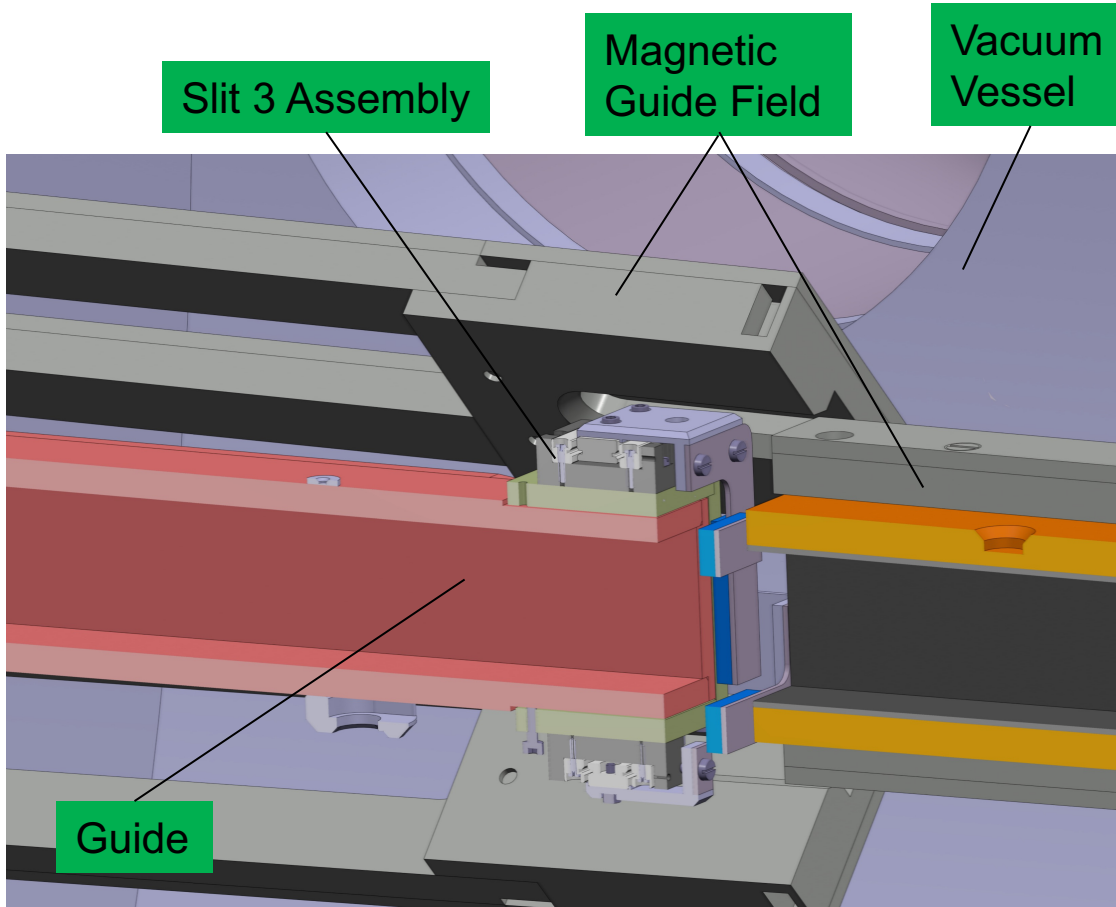
BEAM TRANSPORT AND CONDITIONING

Slit 2 „inside“ High Resolution Backward Detector



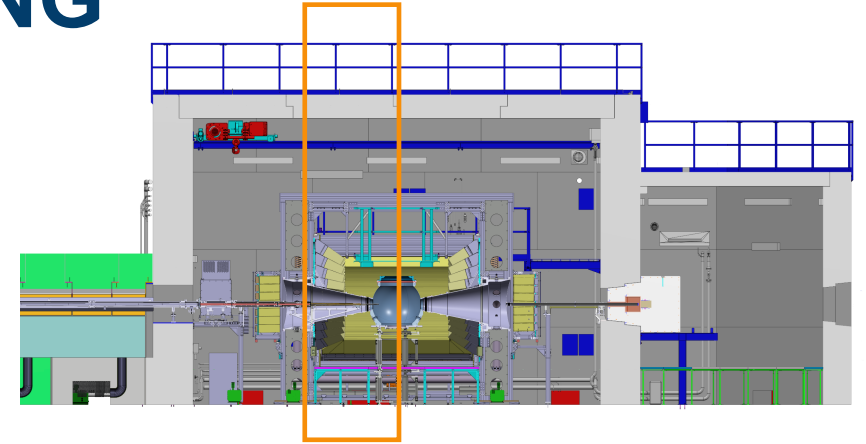
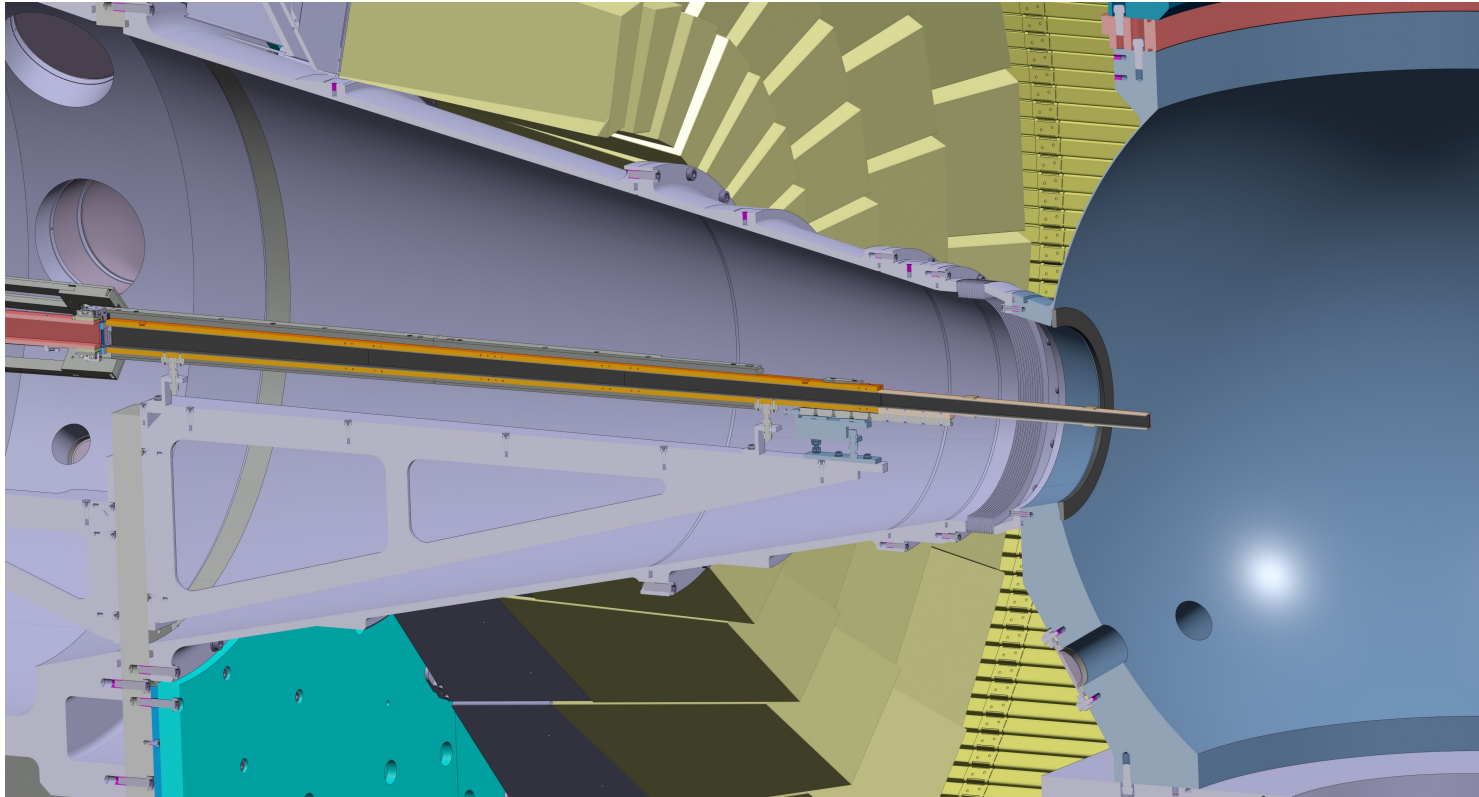
BEAM TRANSPORT AND CONDITIONING

Slit 3 End of reflecting guide



BEAM TRANSPORT AND CONDITIONING

Absorbing guide section



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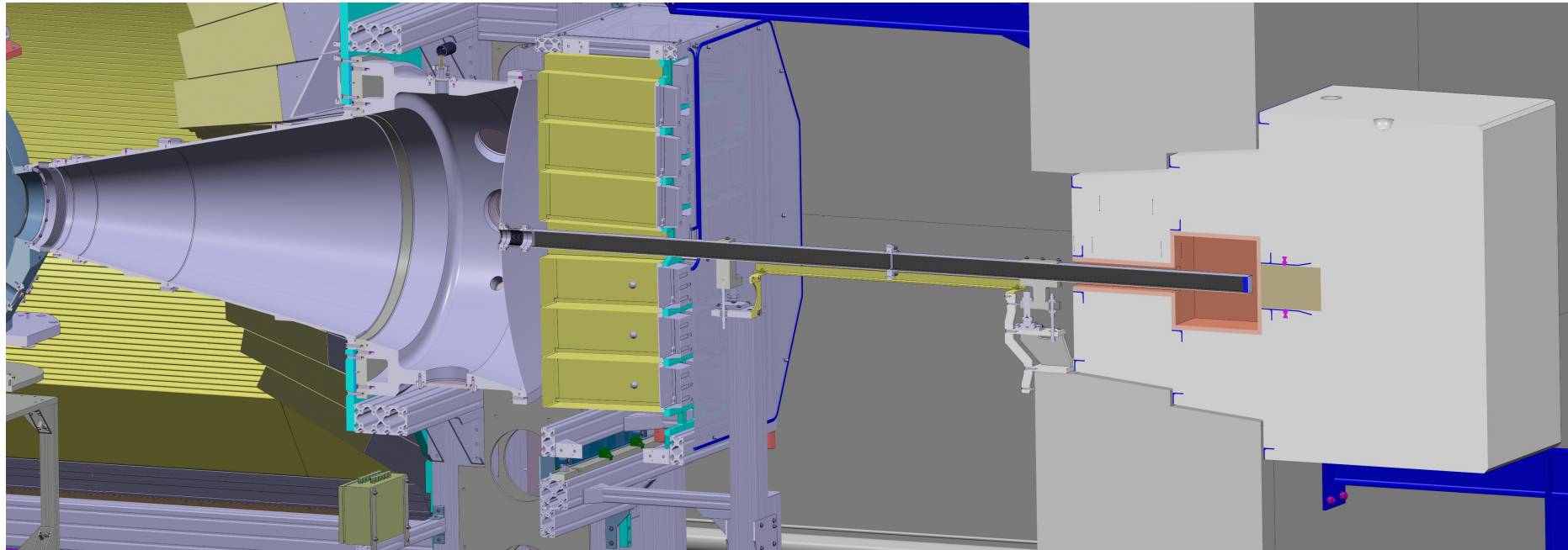
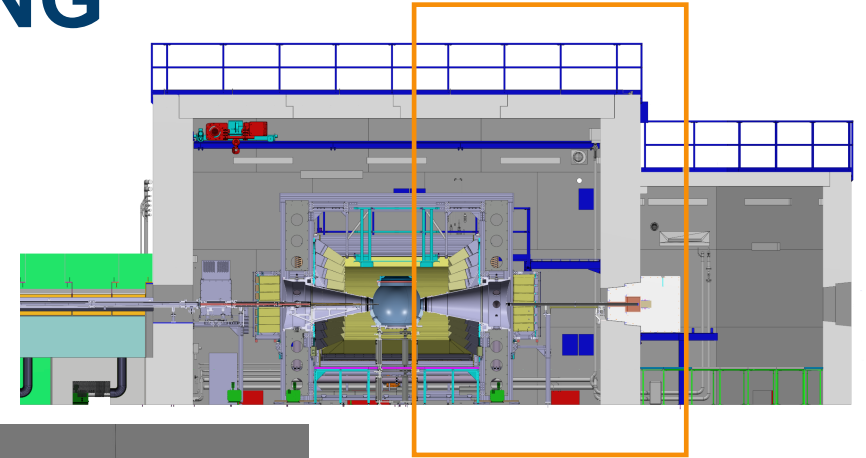
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BEAM TRANSPORT AND CONDITIONING

Beam dump section



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COMPONENTS OVERVIEW

Sample exposure system (=ESS.NSS.H01.DREAM.A02)



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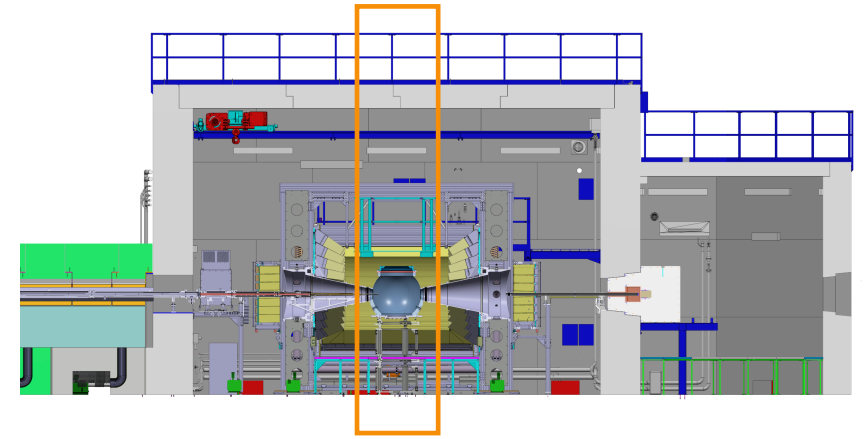
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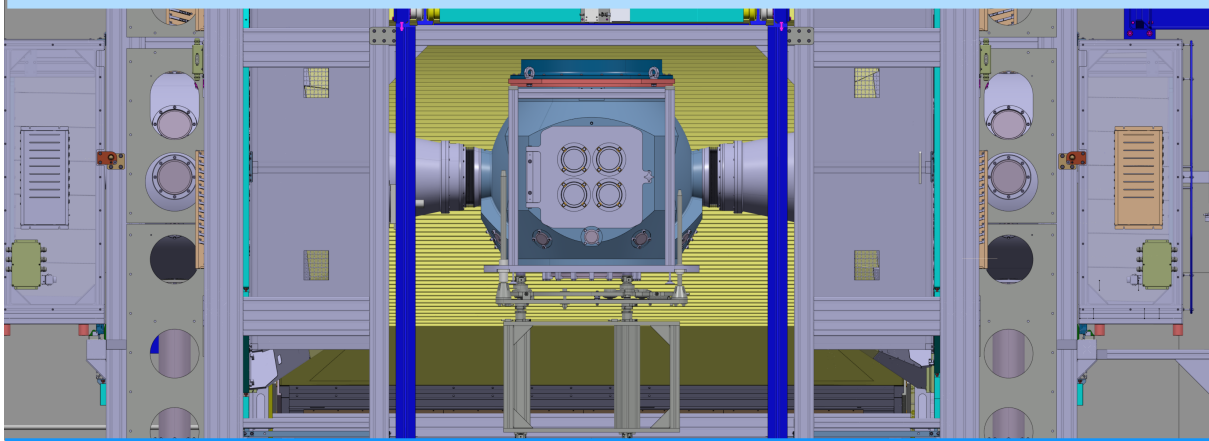
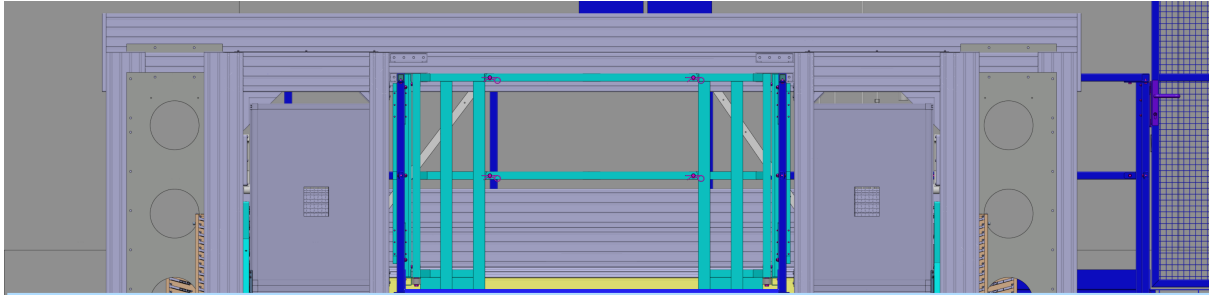


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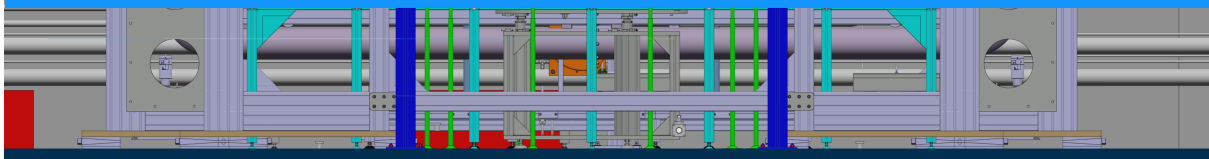
SAMPLE EXPOSURE SYSTEM



Platform (LBS +ESS.D01.110.5123)



Elevated Floor (LBS +ESS.D01.105.5123)

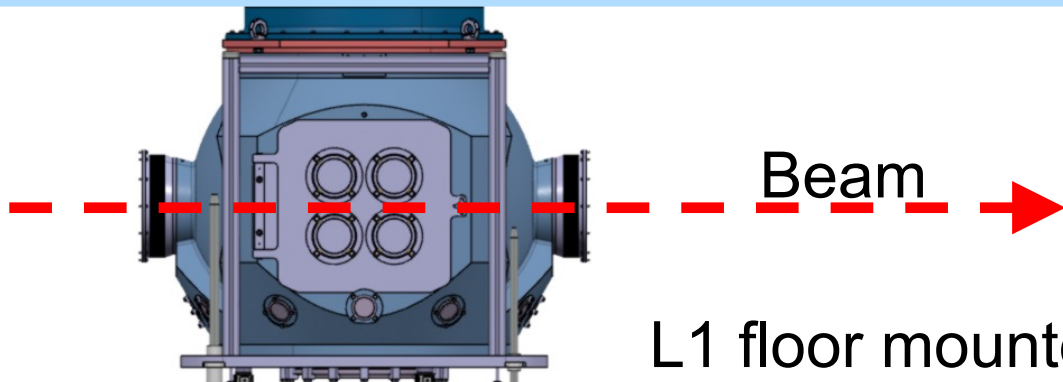
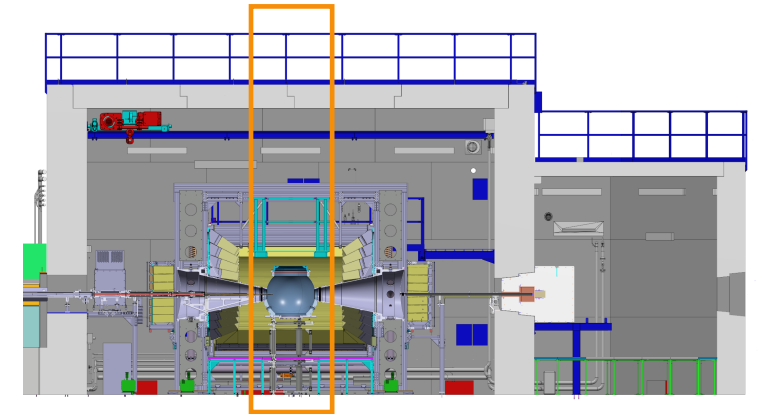


Slab (LBS +ESS.D01.100.5123)



SAMPLE EXPOSURE SYSTEM

L1 top mounted (L- (XL)-size SE)



L1 floor mounted (XL/L-size SE)

L0 floor mounted

Slab (LBS +ESS.D01.100.5123)

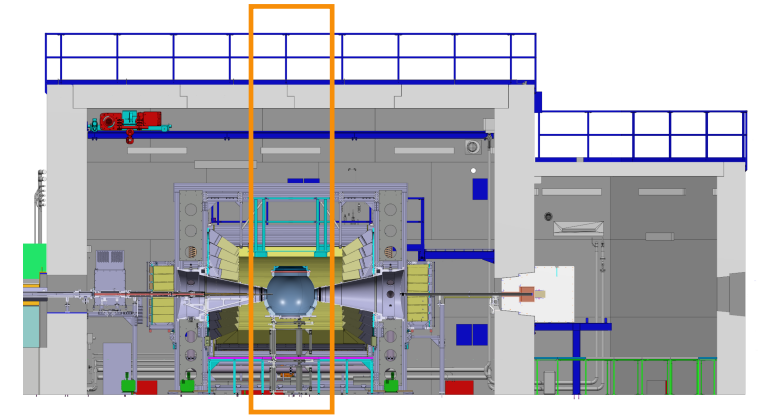
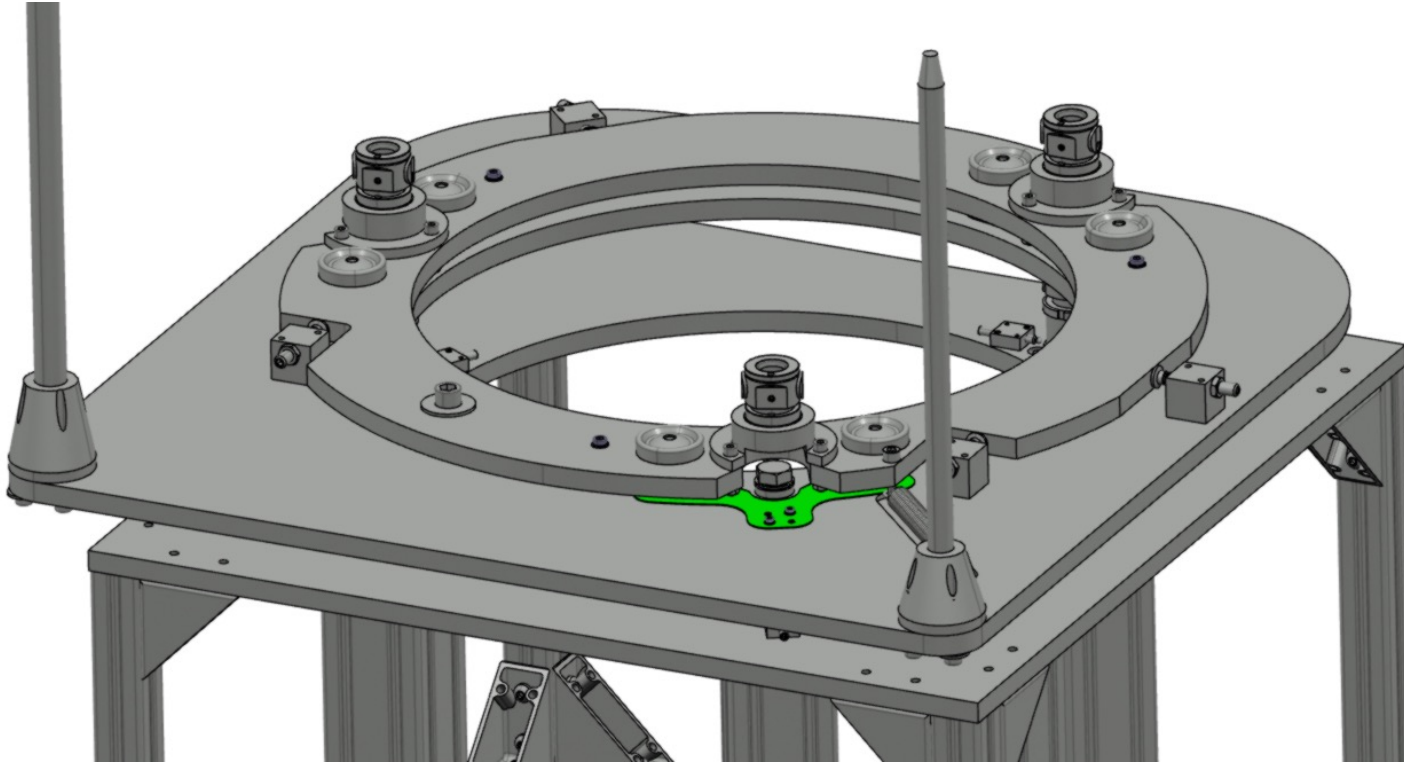
Validation Report
 Document Number ESS-0038078
 Project Name <<Project Name>>
 Date Dec 16, 2019
 Revision 2
 State Released

ESS Sample Environment Mechanical Interfaces for Instruments –
 Reference Document for WBS 13.6.X.2.3

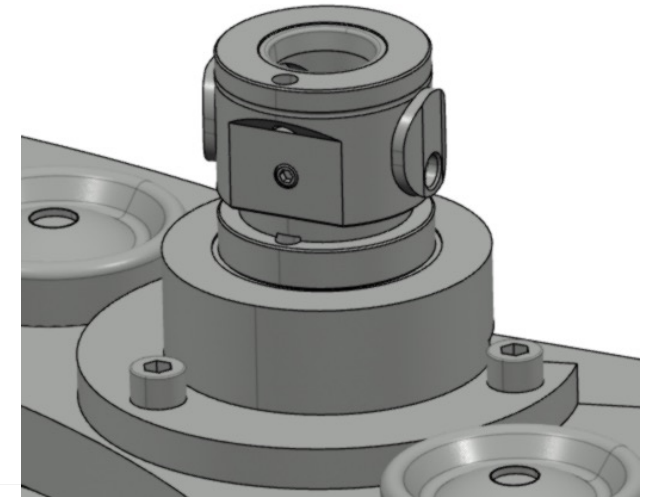
	Name	Affiliation
Authors	Anders Pettersson, Malcolm Guthrie, Borja Perez, David Hume	ESS
Reviewers	Zvonko Lasic, Liang Whitelegg	ESS
Approver	Arno Hassler, Arno	

SAMPLE EXPOSURE SYSTEM

Alignment features for all degrees of freedom

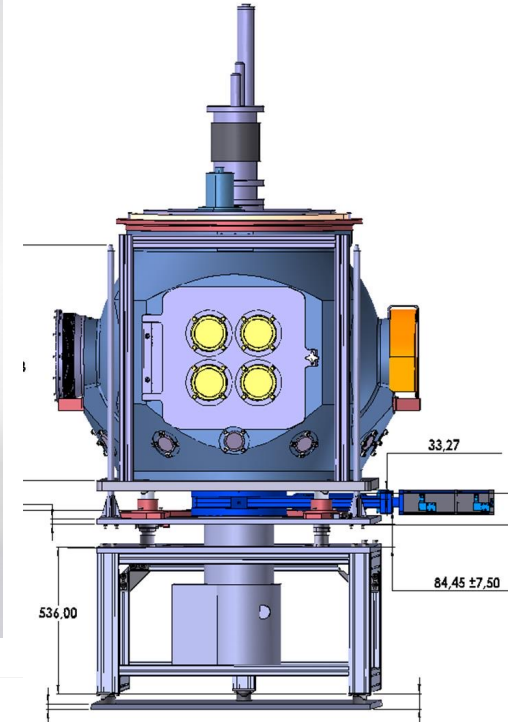
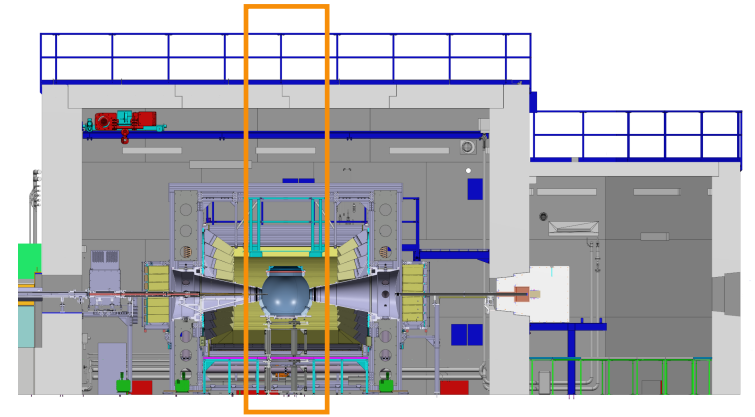


Kipp kinematic mounts



SAMPLE EXPOSURE SYSTEM

Sample Vessel (=ESS.NSS.H01.DREAM.A02.C01)



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COMPONENTS OVERVIEW

Support systems (=ESS.NSS.H01.DREAM.A04)



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SUPPORT SYSTEMS

ESS.NSS.H01.DREAM.A04

=ESS.NSS.H01.DREAM.A04.A01

Control Hutch

=ESS.NSS.H01.DREAM.A04.A02

Sample Preparation Facility

=ESS.NSS.H01.DREAM.A04.F01

Fire Protection

=ESS.NSS.H01.DREAM.A04.G01

Lift

=ESS.NSS.H01.DREAM.A04.GM01

Local Crane

=ESS.NSS.H01.DREAM.A04.P01

Remote Area Surveillance

SUPPORT SYSTEMS

Control Hutch

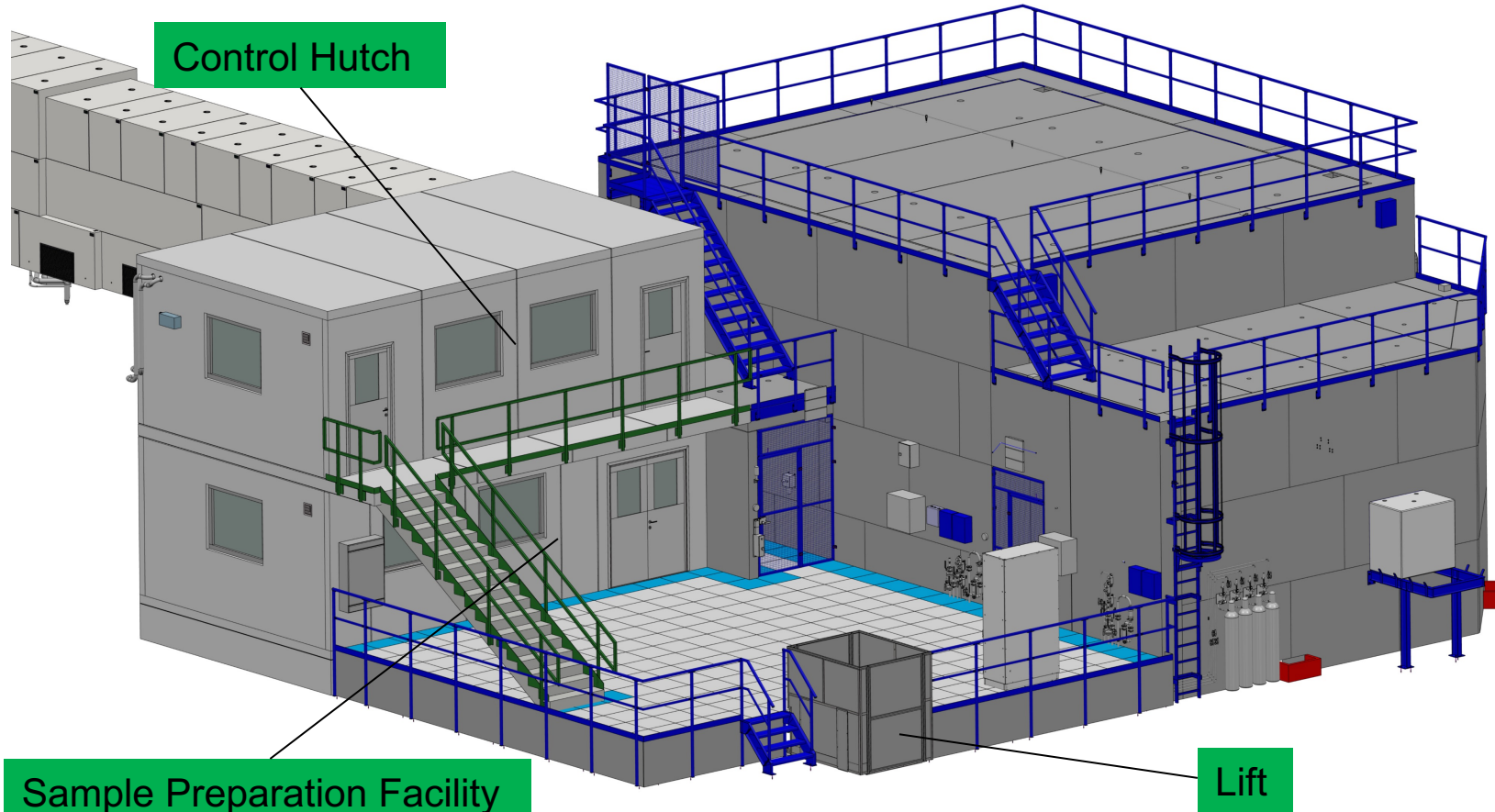
Sample Preparation Facility

Lift

(=ESS.NSS.H01.DREAM.A04.A01)

(=ESS.NSS.H01.DREAM.A04.A02)

(=ESS.NSS.H01.DREAM.A04.G01)



Sample Preparation Facility

Lift



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SUPPORT SYSTEMS

Local Crane (=ESS.NSS.H01.DREAM.A04.GM01)



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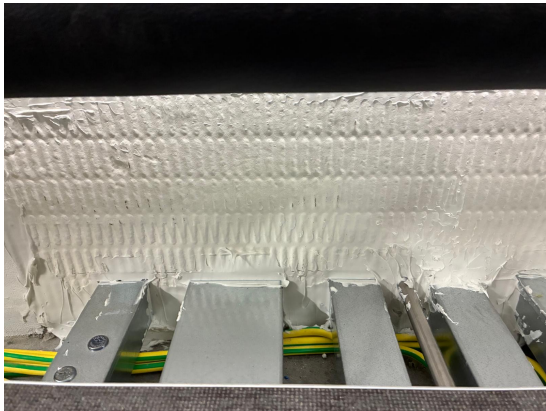


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SUPPORT SYSTEMS

Fire Protection (=ESS.NSS.H01.DREAM.A04.F01)

- No sprinkler but fire protection system inside cave
- Sprinkler system inside and around hutch and SE-lab



Document Type Decision
Document Number ESS-5538361
Date Jun 13, 2025
Revision 2
State Released
Confidentiality Level Internal
Page 1 (10)

DREAM INSTRUMENT CAVE FIRE SUPPRESSION ASSESSMENT



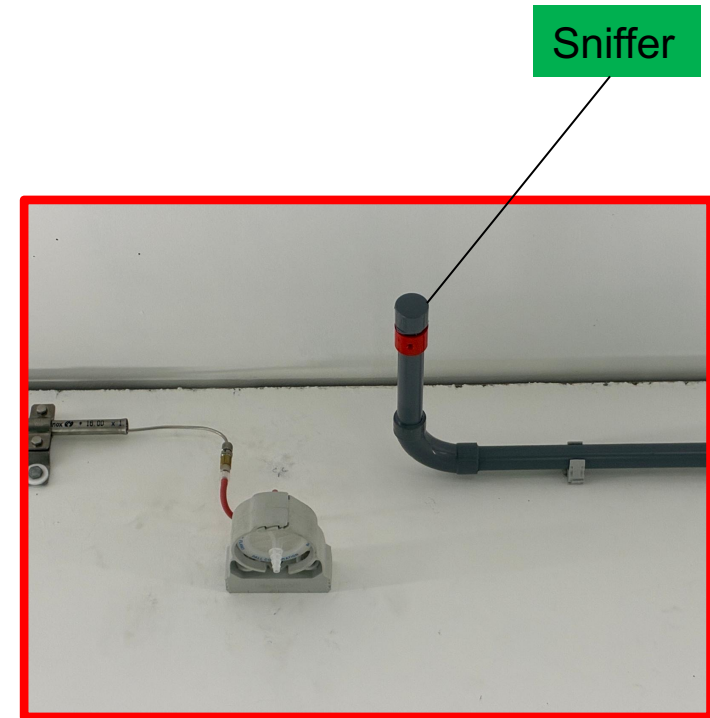
	Name	Role/Title
Owner	Florence Porcher	Instrument System owner
Reviewer	Fredrik Jorud	Senior Fire Safety Engineer
Approver	Ola Dahlborg	ESH&S Head of division
	Kevin Jones	Technical Division Director

UNCONTROLLED COPY, ESS-5538361, Rev. 1, Released, 2025-06-13, Internal, 1 file, page (1/10)
https://www.fz-juelich.de/ESS/ESS5538361_12130851108_40879_151617



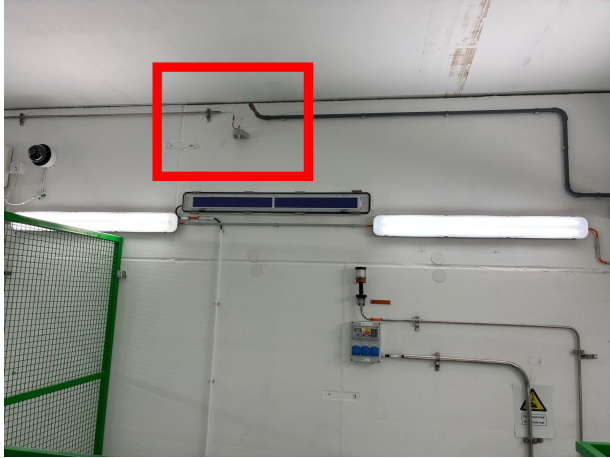
SUPPORT SYSTEMS

Fire Detection System



SUPPORT SYSTEMS

ODH monitor

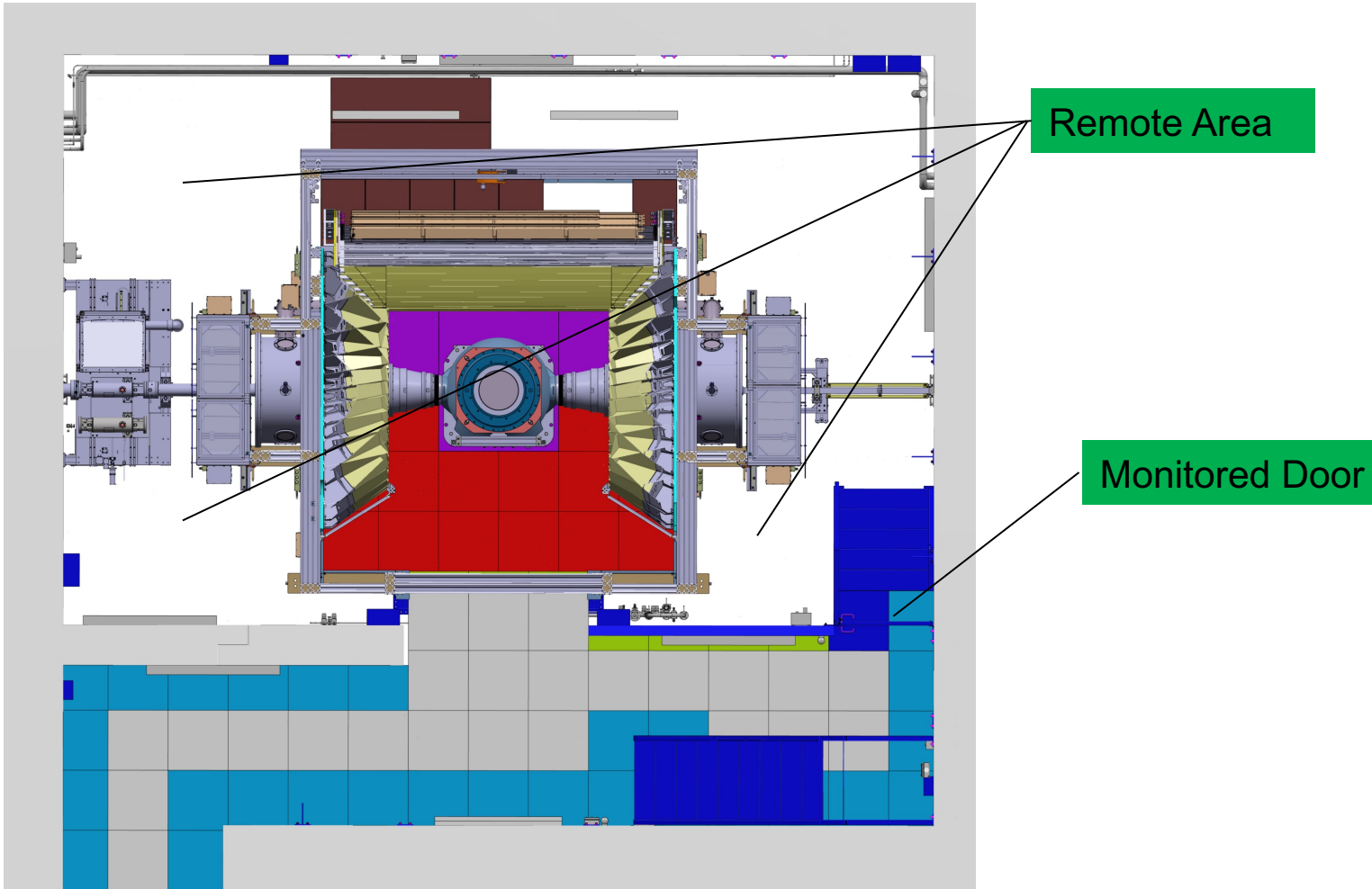


ODH-Sensor



SUPPORT SYSTEMS

Remote Area Surveillance (=ESS.NSS.H01.DREAM.A04.P01)



COMPONENTS OVERVIEW

Supply Systems (=ESS.NSS.H01.DREAM.A05)



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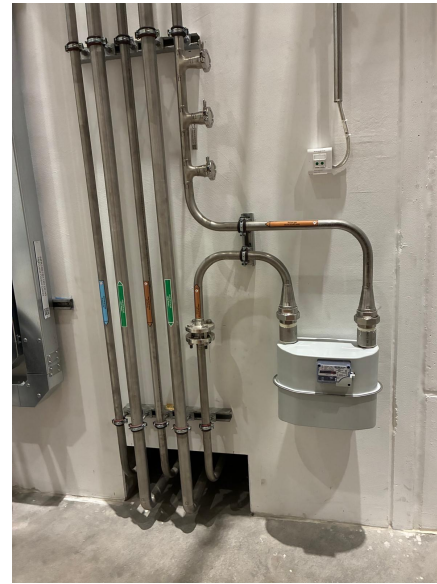
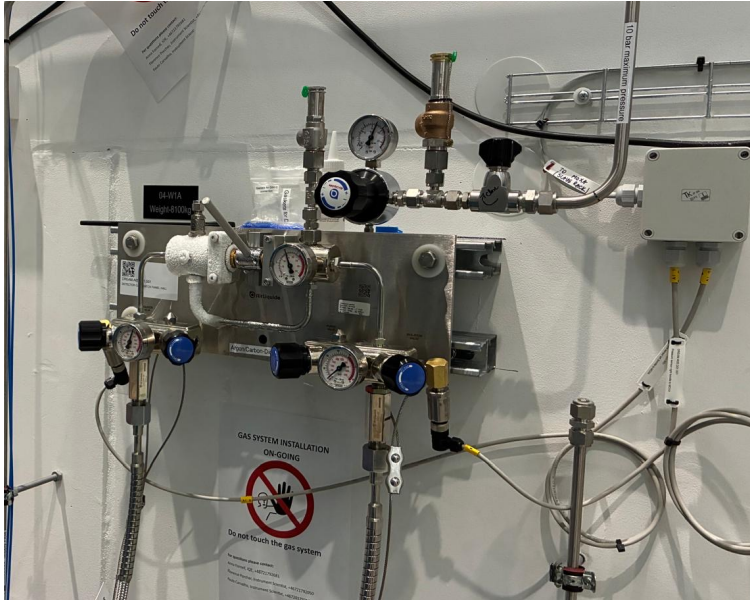
26.03.2026

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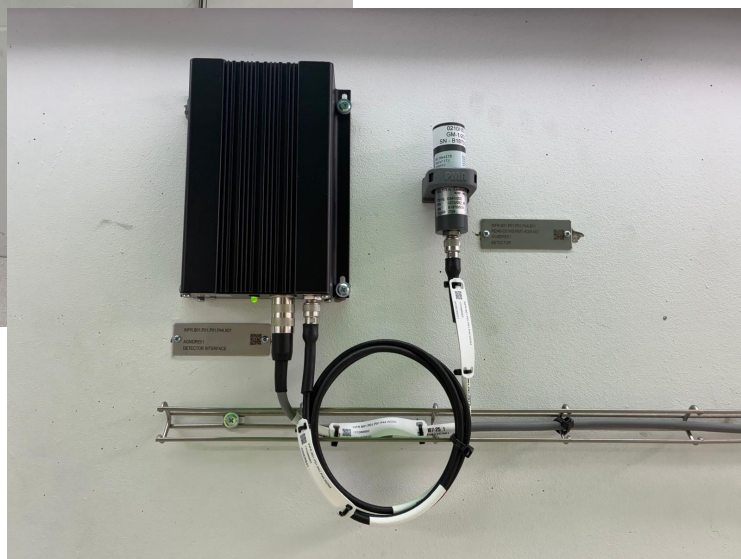


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SUPPLY SYSTEMS



REMS



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COMPONENTS OVERVIEW

Scattering Characterization System (=ESS.NSS.H01.DREAM.B01)



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SCATTERING CHARACTERIZATION SYSTEM

Neutron Detector System (=ESS.NSS.H01.DREAM.B01.B01)

=ESS.NSS.H01.DREAM.B01.B01.B01

High Resolution Backward Detector

=ESS.NSS.H01.DREAM.B01.B01.B02

Backward End Cap Detector

=ESS.NSS.H01.DREAM.B01.B01.B03

Mantle Detector

=ESS.NSS.H01.DREAM.B01.B01.B04

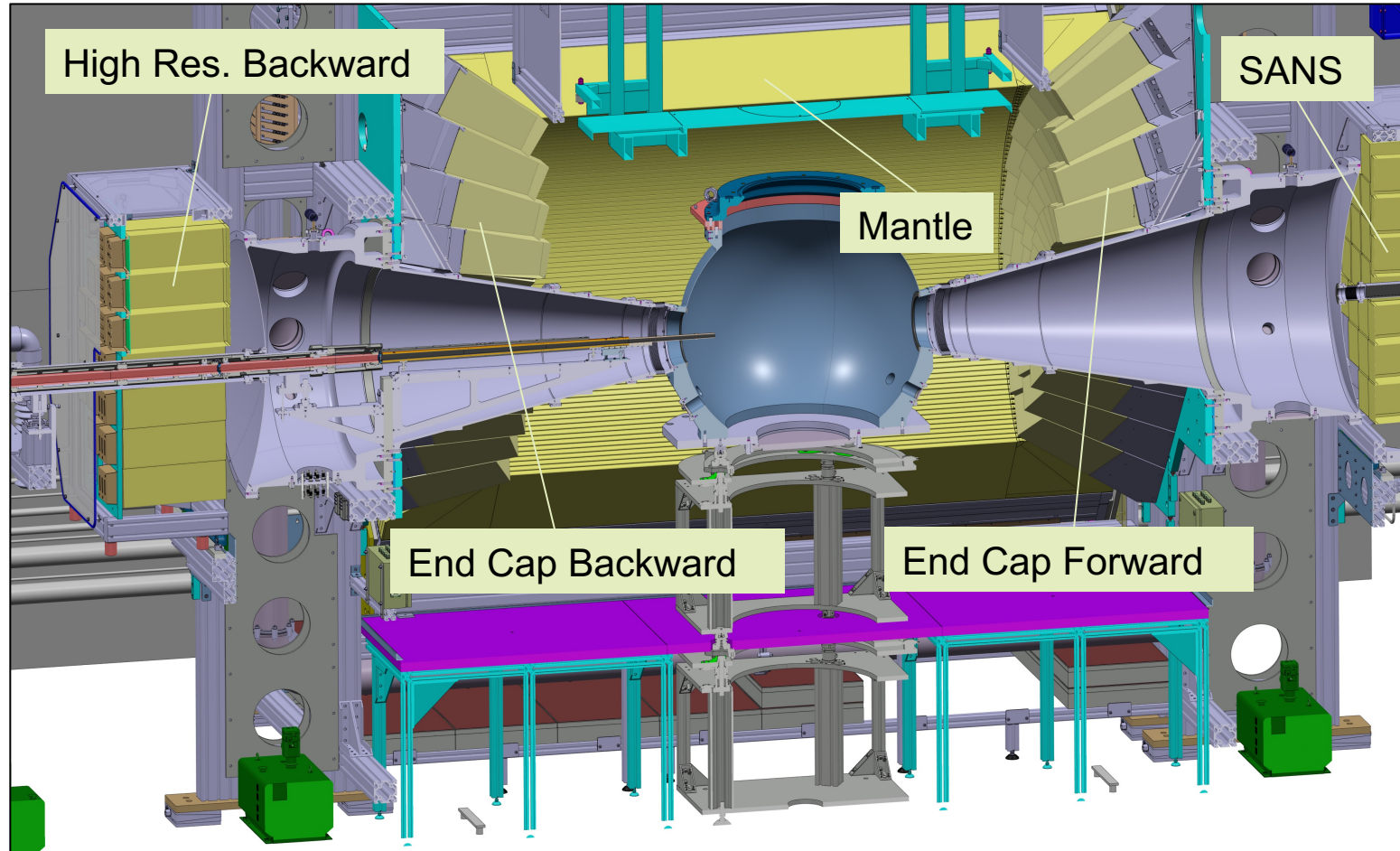
Forward End Cap Detector

=ESS.NSS.H01.DREAM.B01.B01.B05

SANS Detector (not in scope)

SCATTERING CHARACTERIZATION SYSTEM

Neutron Detector System (=ESS.NSS.H01.DREAM.B01.B01)



^{10}B Detectors from CDT

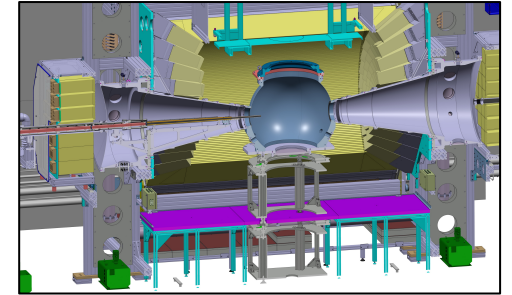
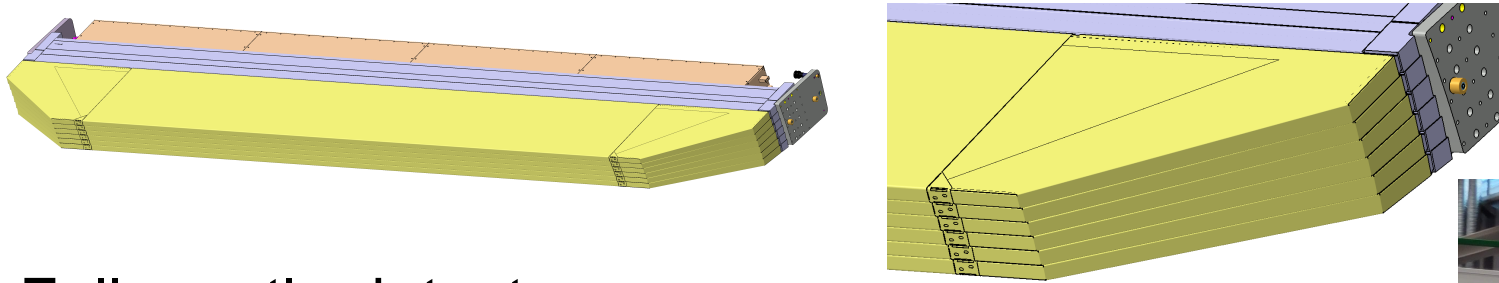
Adapted to instrument geometry

Evacuated scattering flight path to high resolution detectors

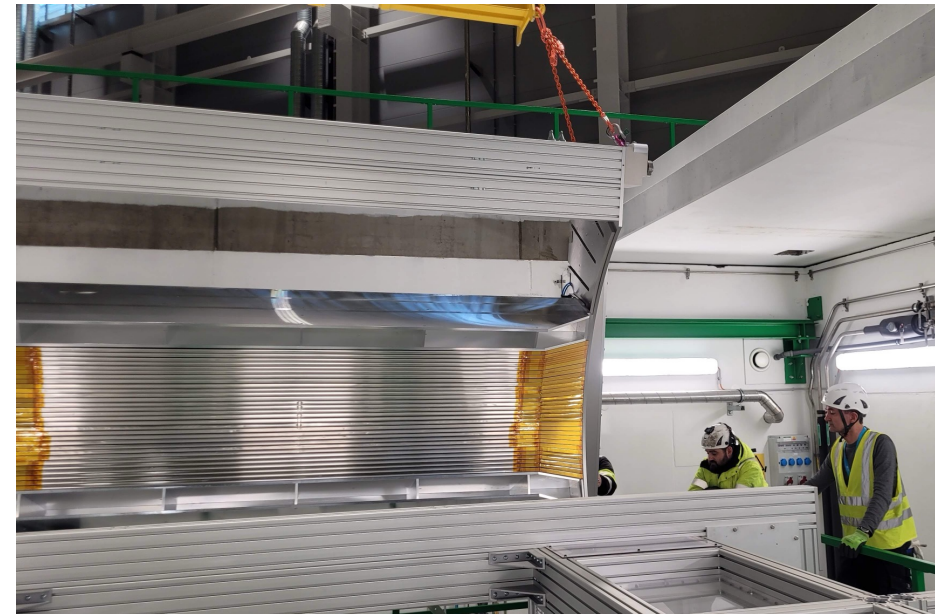
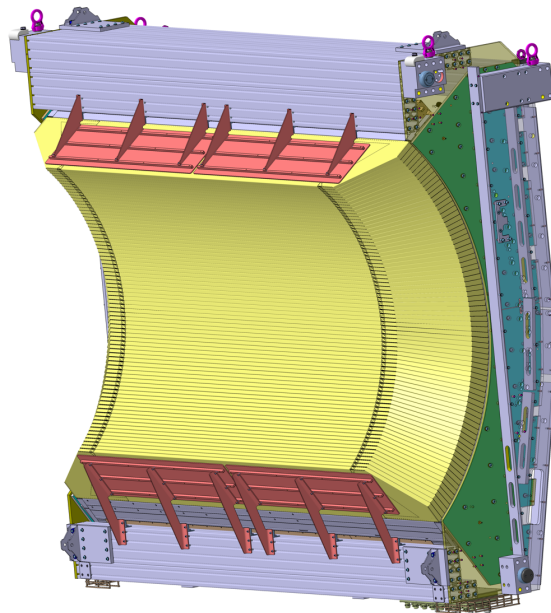
SCATTERING CHARACTERIZATION SYSTEM

Mantle Detector (=ESS.NSS.H01.DREAM.B01.B01.B03)

6 Segments -> 1 Mounting Unit (MU)



Full mantle detector:
13 MUs, 84°
Seamless filling



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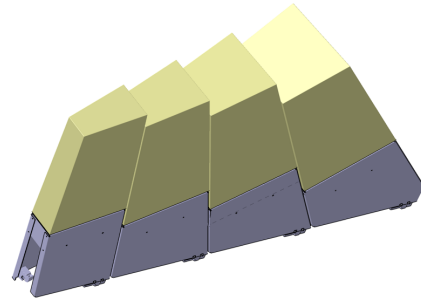


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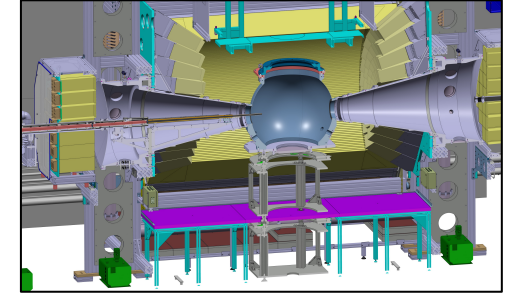
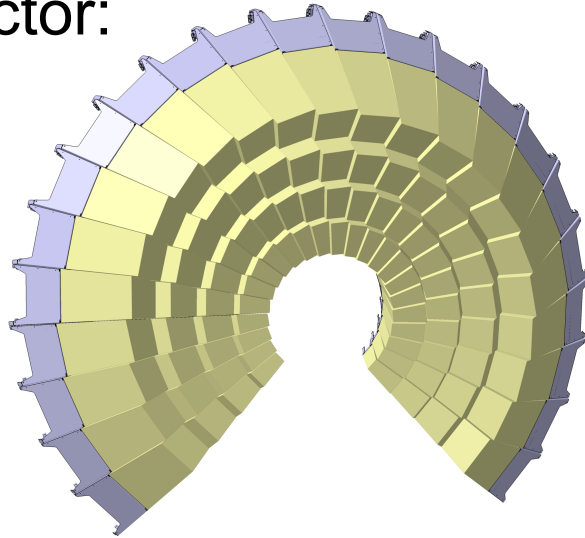
SCATTERING CHARACTERIZATION SYSTEM

End Cap Detectors (=ESS.NSS.H01.DREAM.B01.B01.B02 / B04)

4 individual SUMOs -> 12°-Segment
SUMOs delivered



Full end cap detector:
23 Segments



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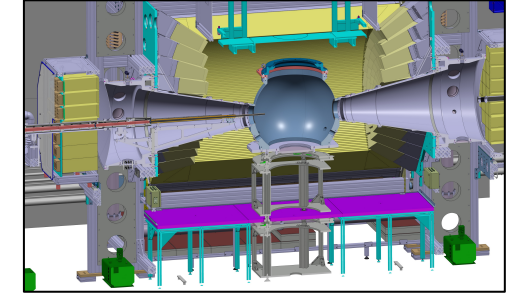
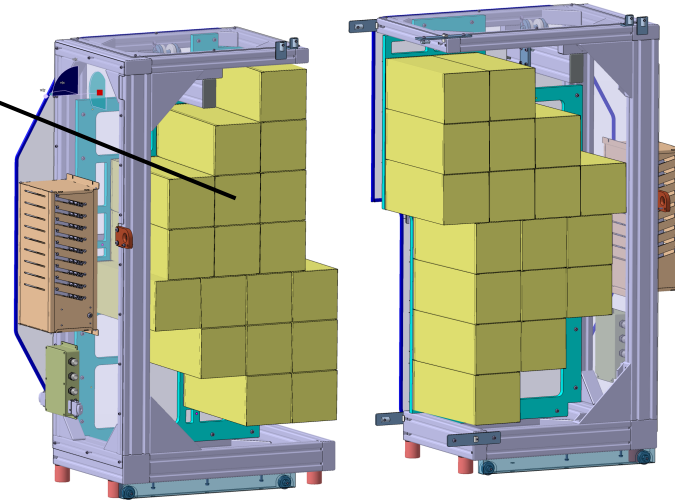


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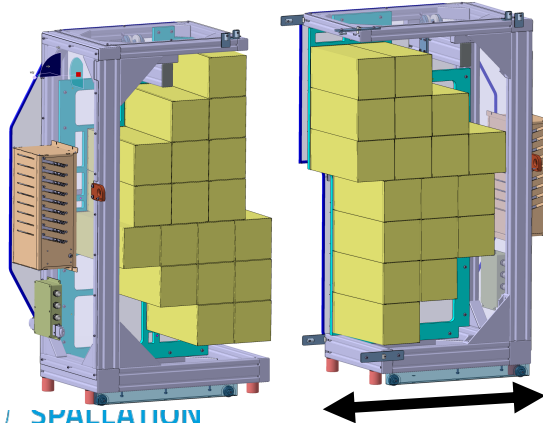
SCATTERING CHARACTERIZATION SYSTEM

High Resolution Detectors (=ESS.NSS.H01.DREAM.B01.B01.B01 / B05)

Identical „Cuboids“



Cuboids pre-mounted on frames by supplier



Guiding rail



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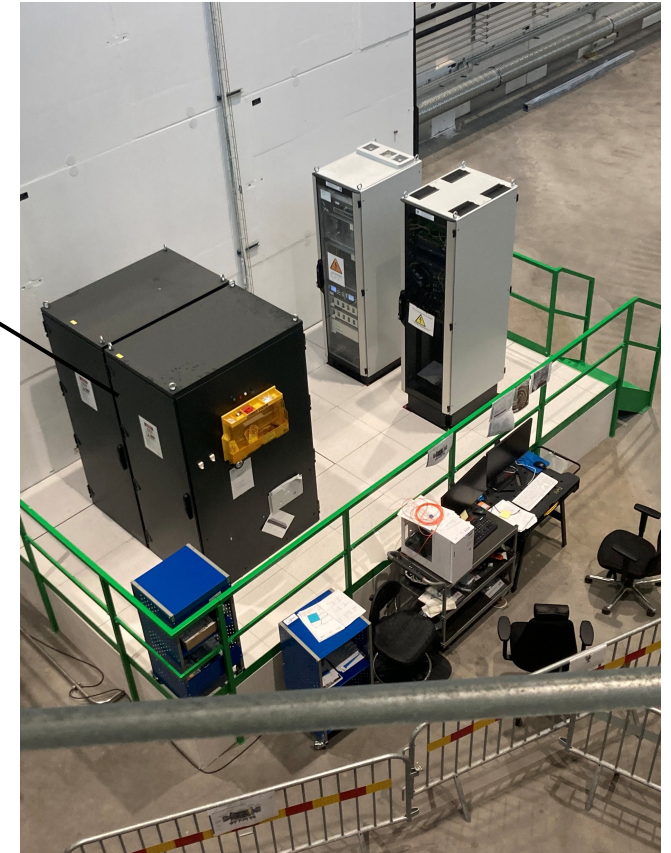


SCATTERING CHARACTERIZATION SYSTEM

Neutron Detector Electronics (=ESS.NSS.H01.DREAM.B01.C01)



Detector racks



COMPONENTS OVERVIEW

Personal Safety System (=ESS.NSS.H01.DREAM.F01)



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PERSONAL SAFETY SYSTEM (PSS)



COMPONENTS OVERVIEW

DREAM Vacuum System (=ESS.NSS.H01.DREAM.G01)



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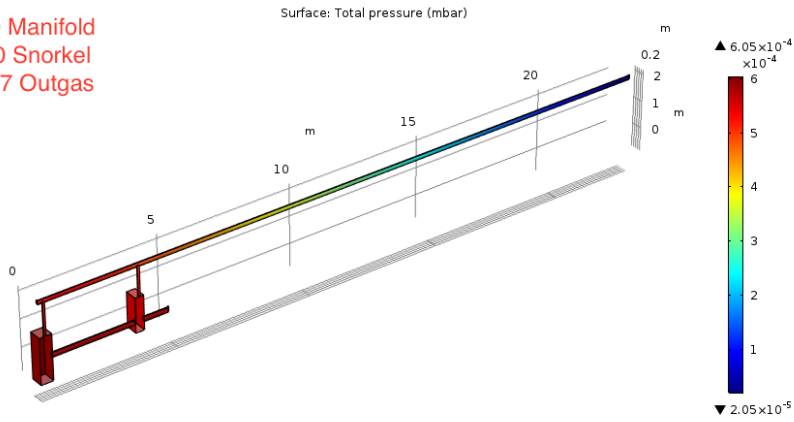


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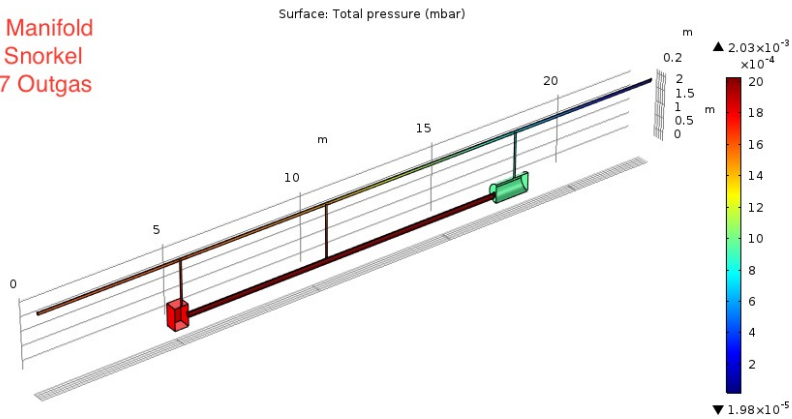
VACUUM SYSTEM

Early layout in bunker and cave

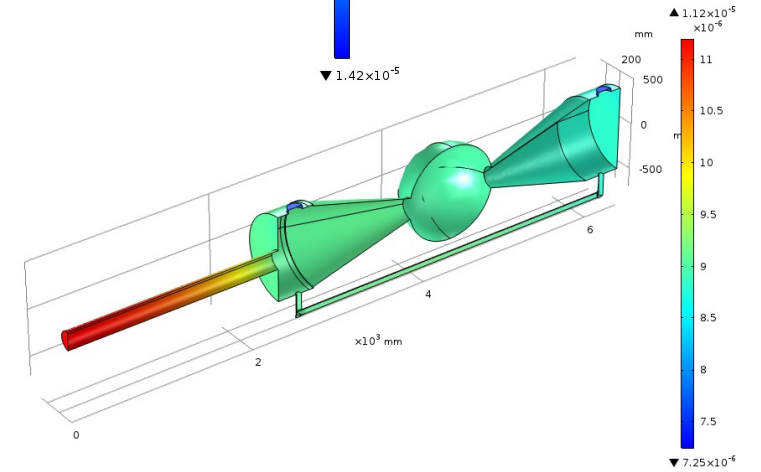
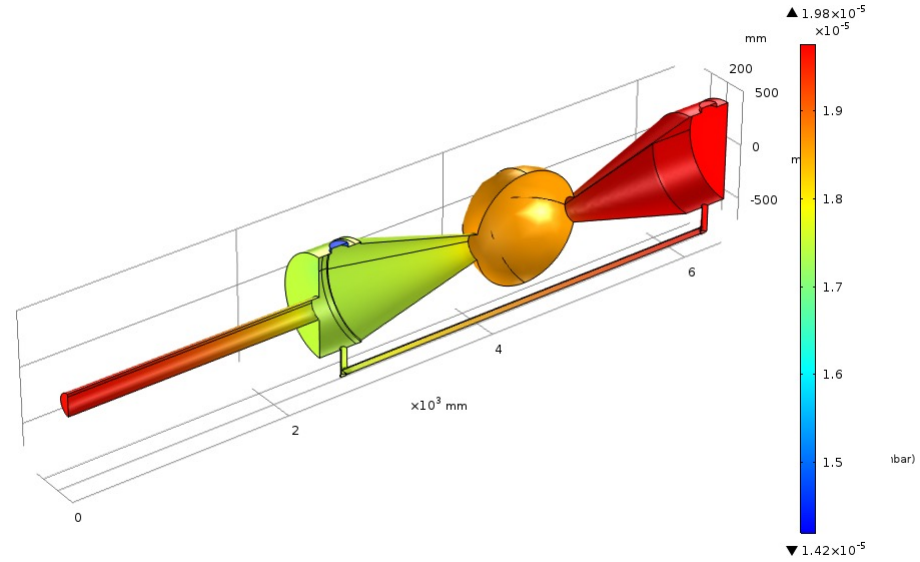
160 Manifold
100 Snorkel
1E-7 Outgas



100 Manifold
63 Snorkel
1E-7 Outgas



Surface: Total pressure (mbar)



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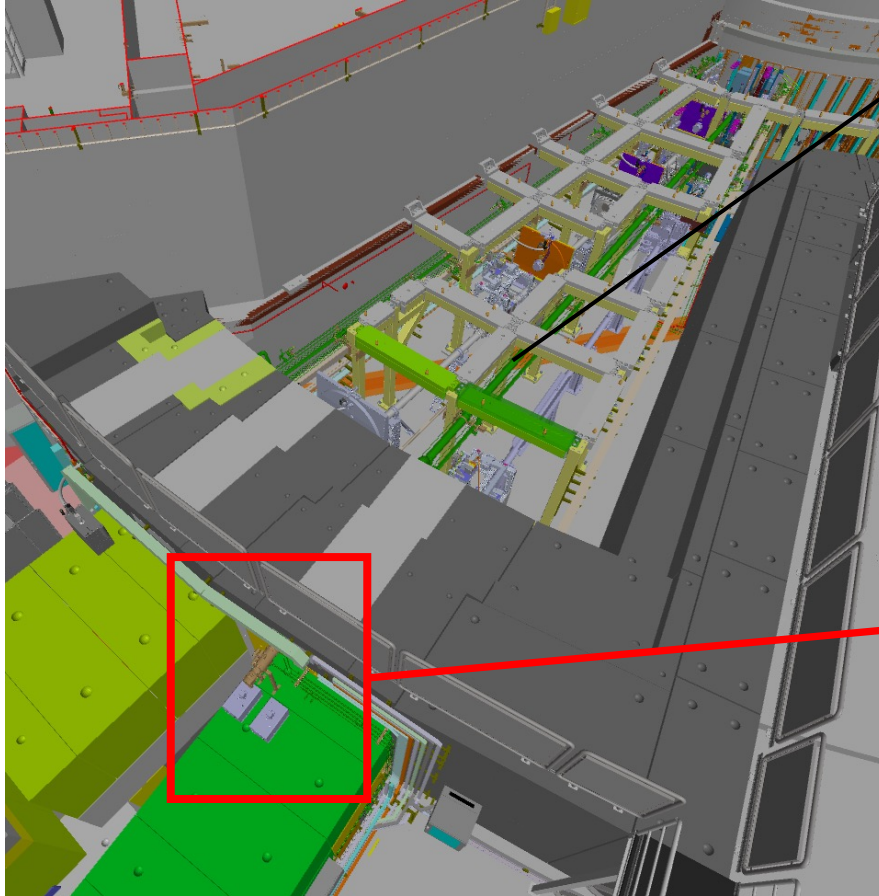
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VACUUM SYSTEM

In bunker



- Two vacuum manifolds:
1. For high speed disc choppers
 2. For T_0 -chopper and guides



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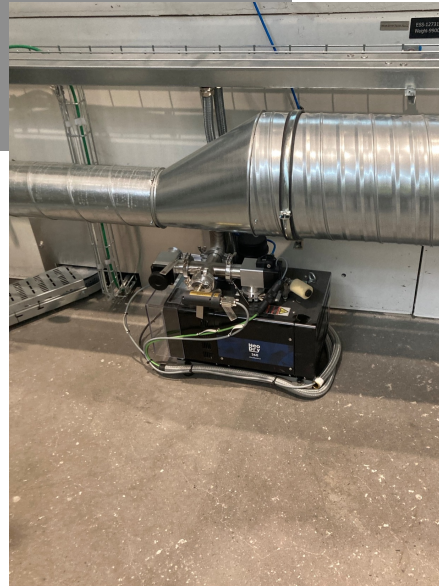
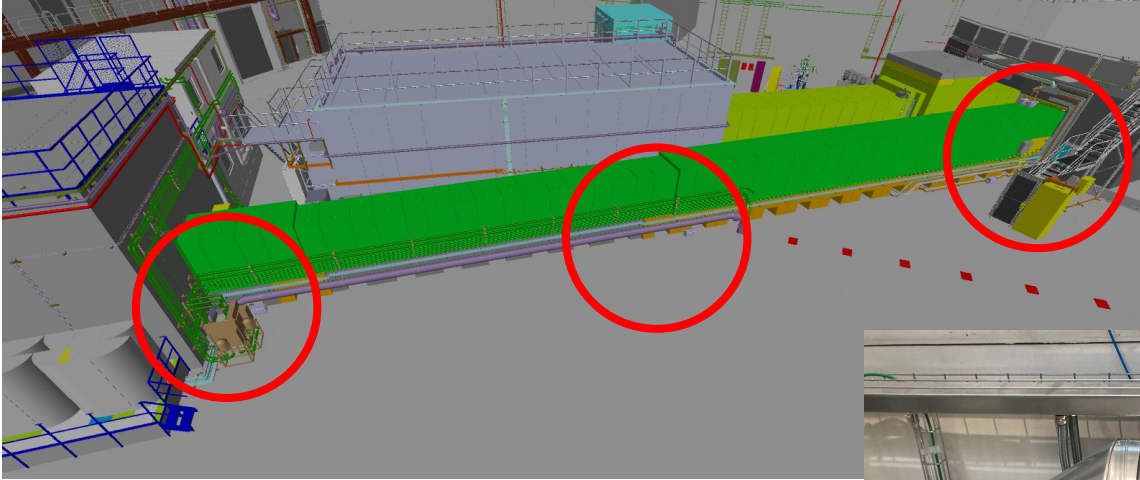


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VACUUM SYSTEM

Along the guide

Three pumps along the guide



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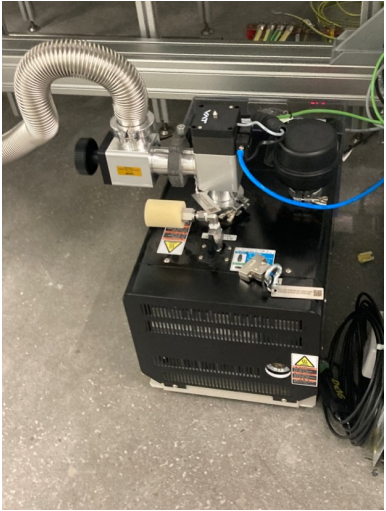
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VACUUM SYSTEM

In the Cave



Two pumps in the cave

Possible upgrade:

Turbo and cryo pump for sample vessel and scattering flight path (cryogenic vacuum)



COMPONENTS OVERVIEW

Instrument Automation Control system (=ESS.NSS.H01.DREAM.K01)



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INSTRUMENT AUTOMATION CONTROL SYSTEM

=ESS.NSS.H01.DREAM.K01

- =ESS.NSS.H01.DREAM.K01.K01 DREAM Motion Control 1 (In-Bunker)
- =ESS.NSS.H01.DREAM.K01.K02 DREAM Motion Control 2 (Collimation)
- =ESS.NSS.H01.DREAM.K01.K03 DREAM Motion Control 3 (Sample Area)

INSTRUMENT AUTOMATION CONTROL SYSTEM

DREAM Motion Control 1 (In-Bunker) (=ESS.NSS.H01.DREAM.K01.K01)

Shutter control rack in bunker rack area



Shutter pneumatic rack close to bunker



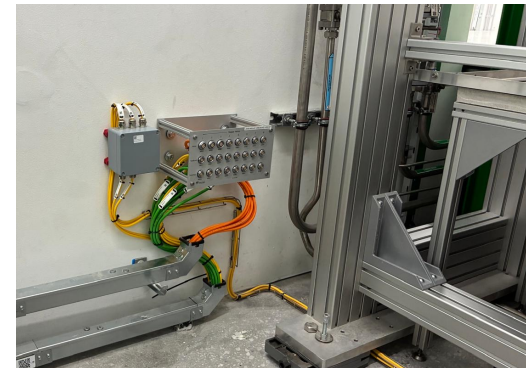
INSTRUMENT AUTOMATION CONTROL SYSTEM

DREAM Motion Control 2 and 3 (In-Cave) (=ESS.NSS.H01.DREAM.K01.K02 / K03)



Rack 2:
Piezo slit controllers,
polarizer guide changer

Rack 3:
Controls for optional
sample manipulation axes



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COMPONENTS OVERVIEW

Experimental Cave (=ESS.NSS.H01.DREAM.U01)



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EXPERIMENTAL CAVE

=ESS.NSS.H01.DREAM.U01

=ESS.NSS.H01.DREAM.U01.F01

Cave Shielding

=ESS.NSS.H01.DREAM.U01.G01

HVAC cave

=ESS.NSS.H01.DREAM.U01.ND01

Technical Floor Cave

=ESS.NSS.H01.DREAM.U01.ND02

Technical Floor Cabinets

=ESS.NSS.H01.DREAM.U01.ND03

Technical Floor DB

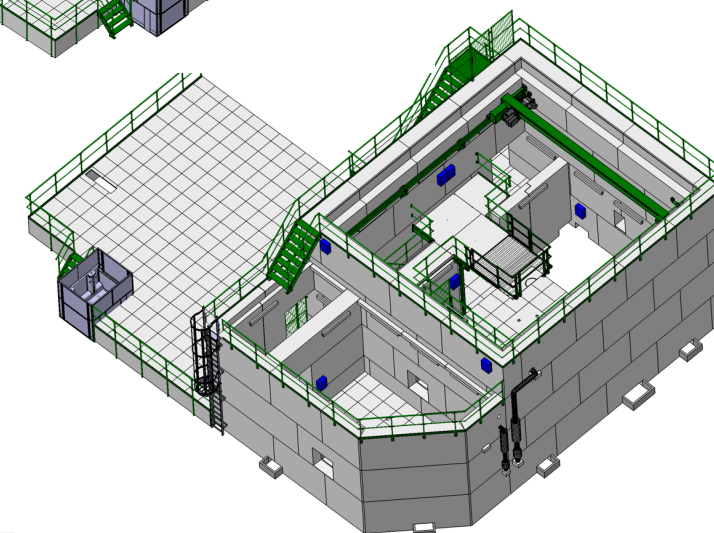
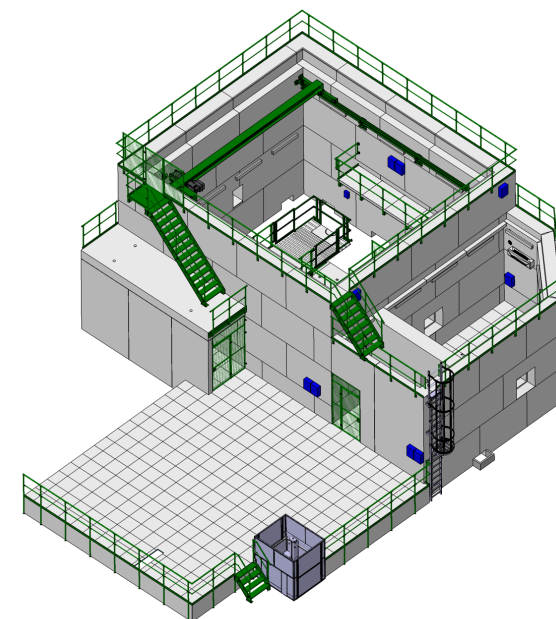
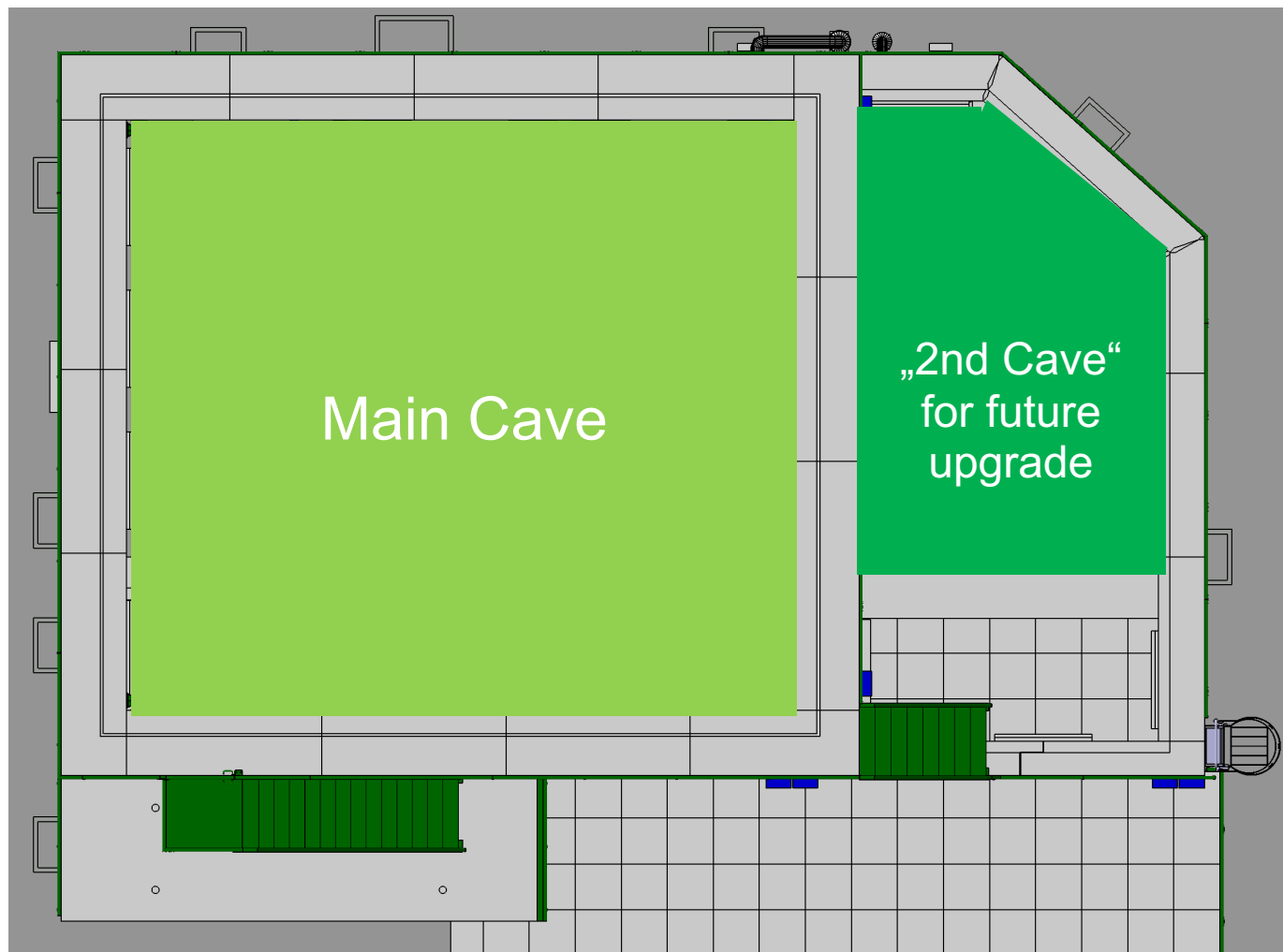
=ESS.NSS.H01.DREAM.U01.U01

Cave Structure

=ESS.NSS.H01.DREAM.U01.WS01

Sliding platform

EXPERIMENTAL CAVE



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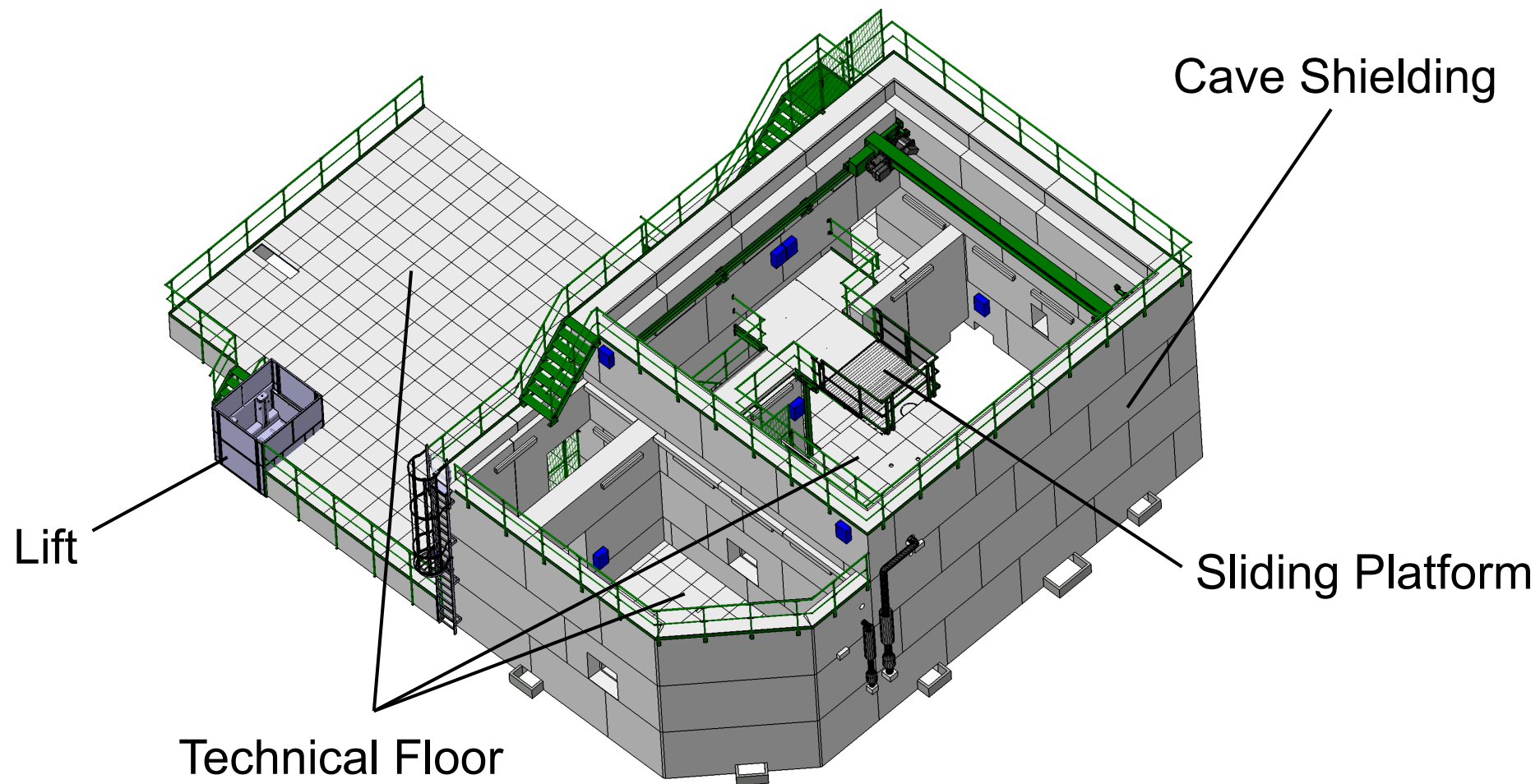
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EXPERIMENTAL CAVE



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EXPERIMENTAL CAVE

Cave Structure (=ESS.NSS.H01.DREAM.U01.U01)



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EXPERIMENTAL CAVE



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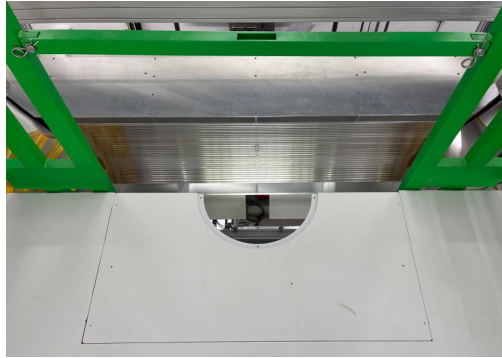
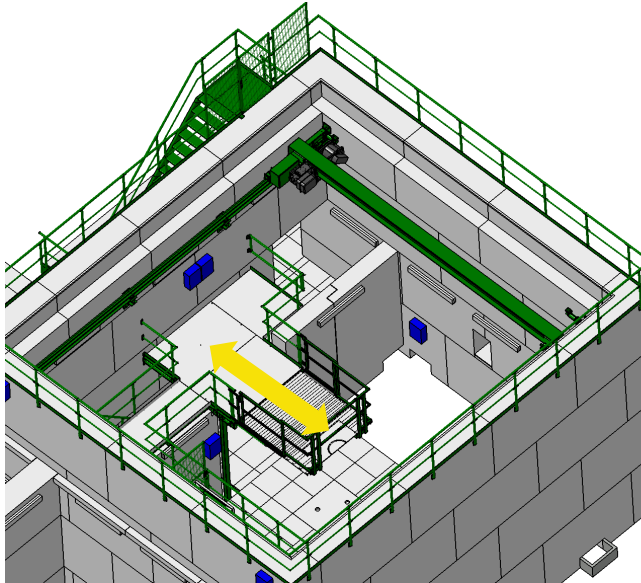
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EXPERIMENTAL CAVE

Sliding Platform (=ESS.NSS.H01.DREAM.U01.WS01)



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EXPERIMENTAL CAVE

Technical floors outside cave



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THANK YOU!



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