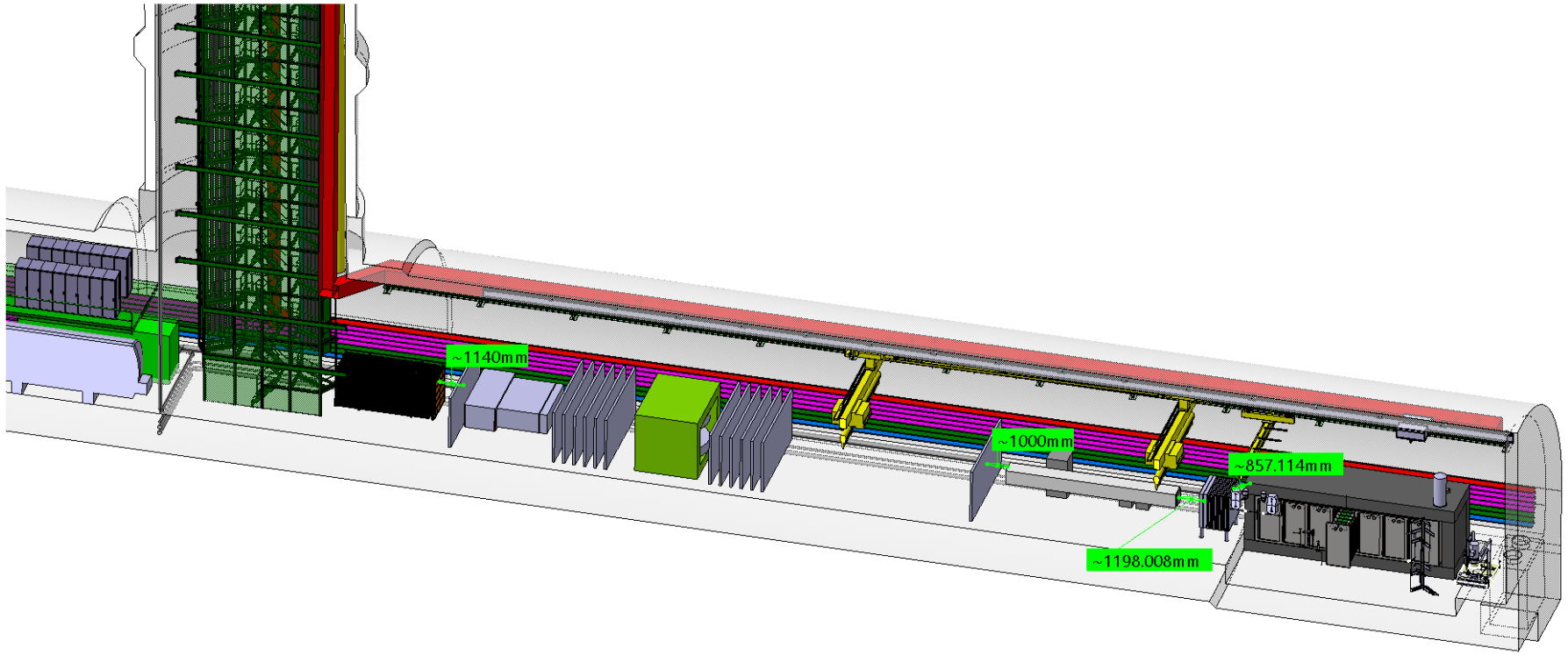
FPF progrès

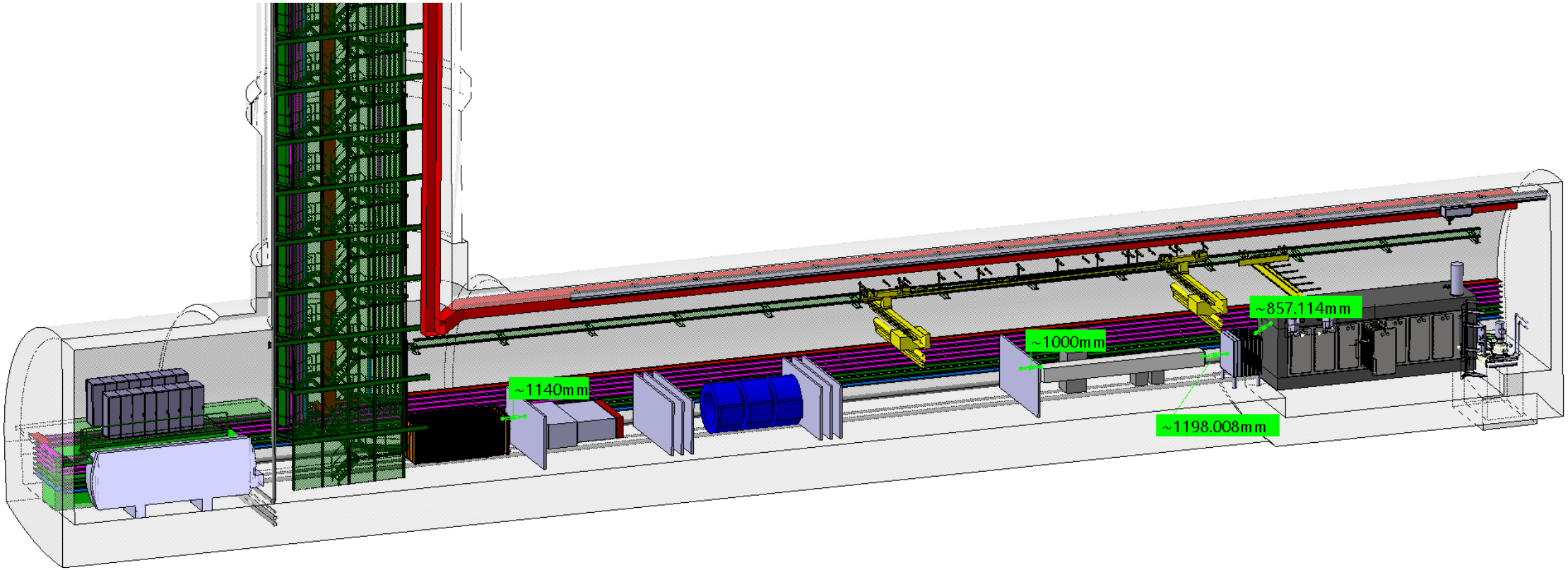
23/05/2024

Anastasiya Magazinik

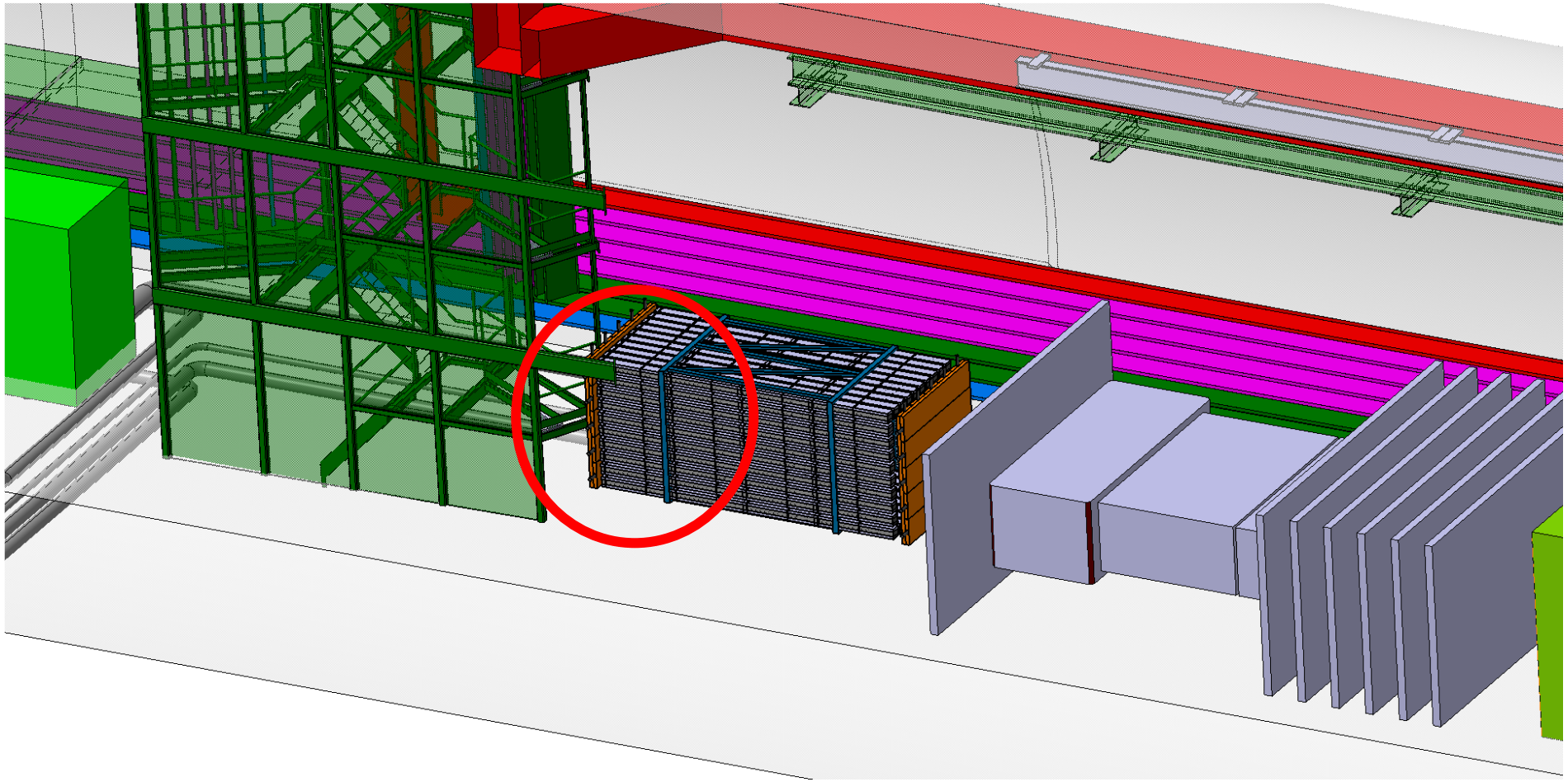
Distance between detectors



FASER2 with crystal-puller magnet

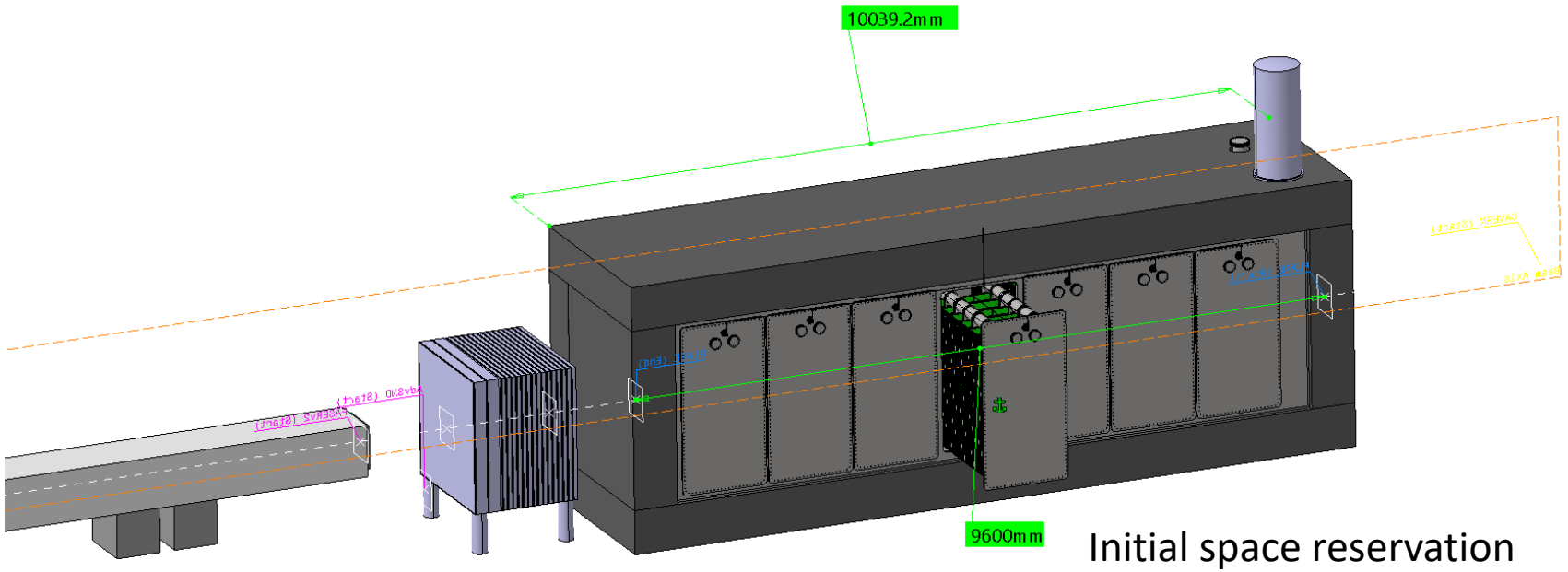


Clash → longer tunnel?



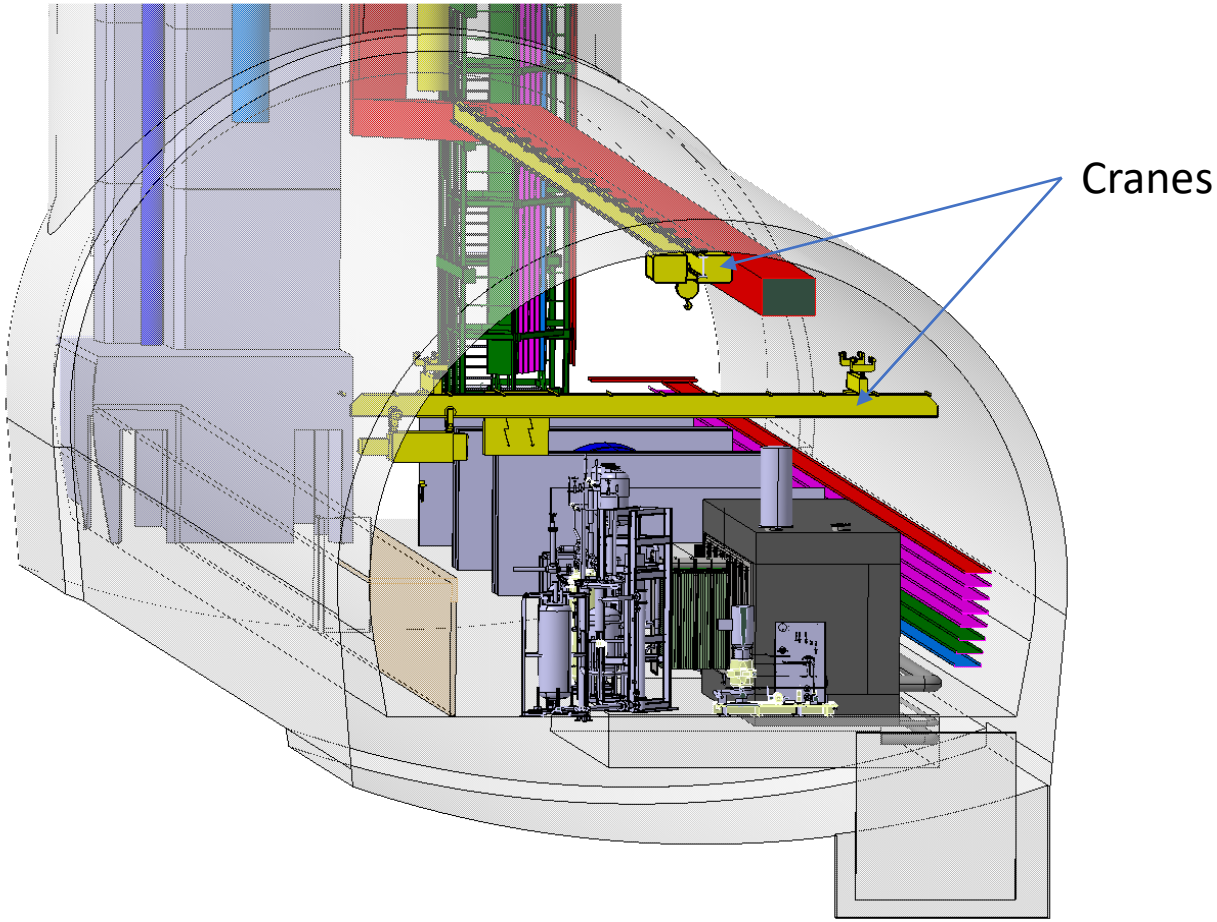
FLArE slightly longer

The latest model with horizontal installation

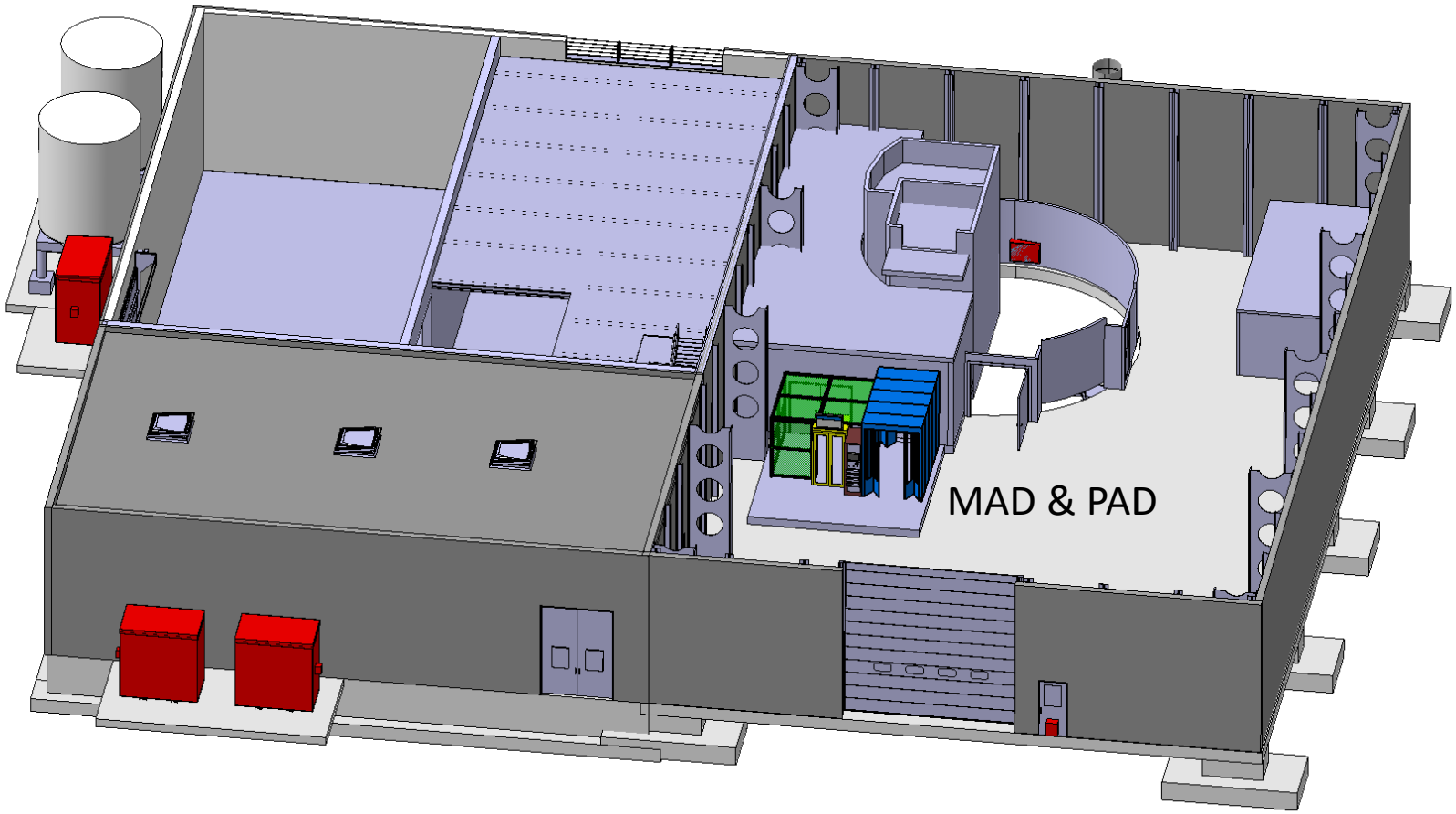


Initial space reservation

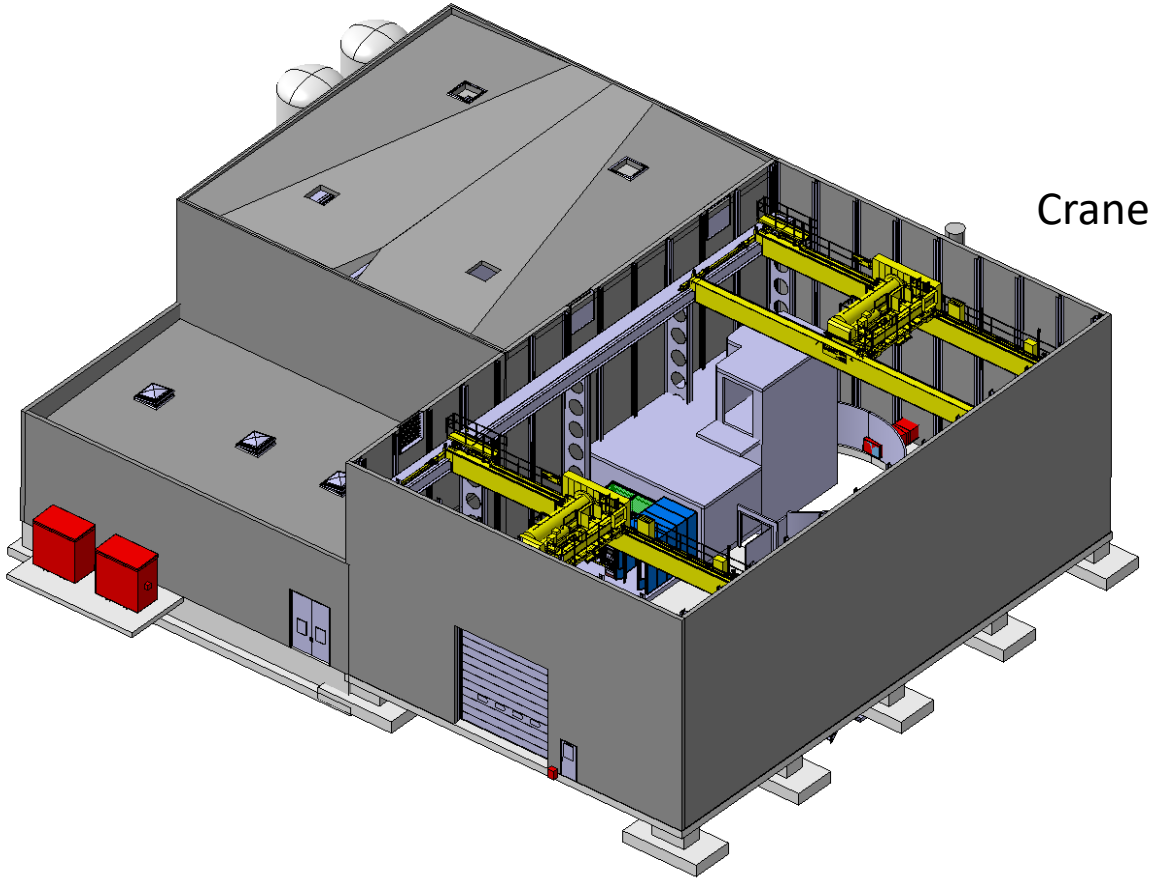
Cranes in the cavern



Surface building



Surface building

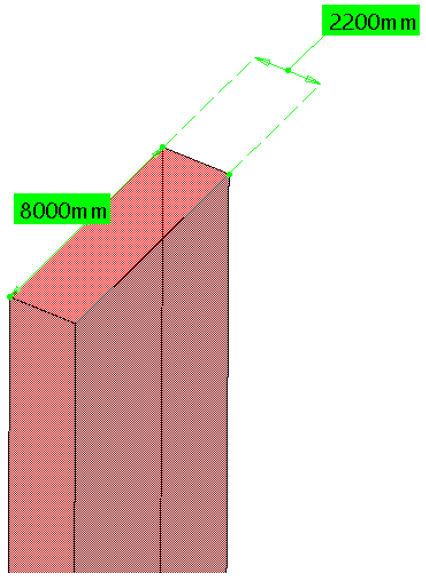


Crane integration in progress

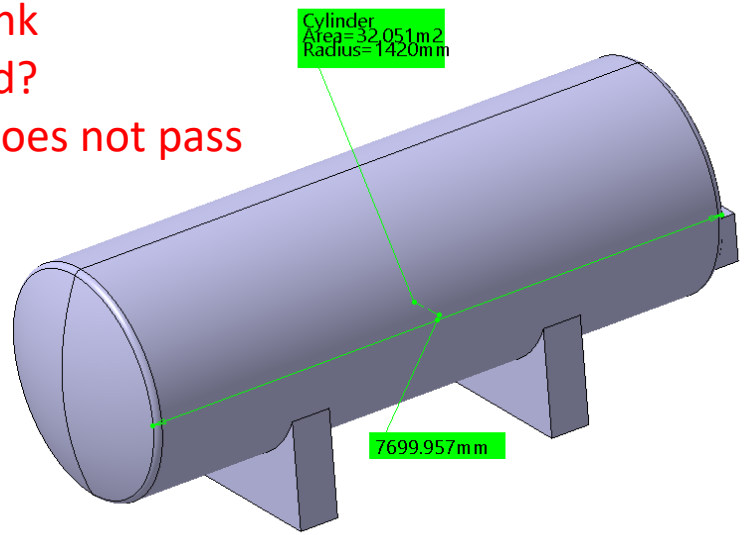
Old slides

Transport study from the first glance

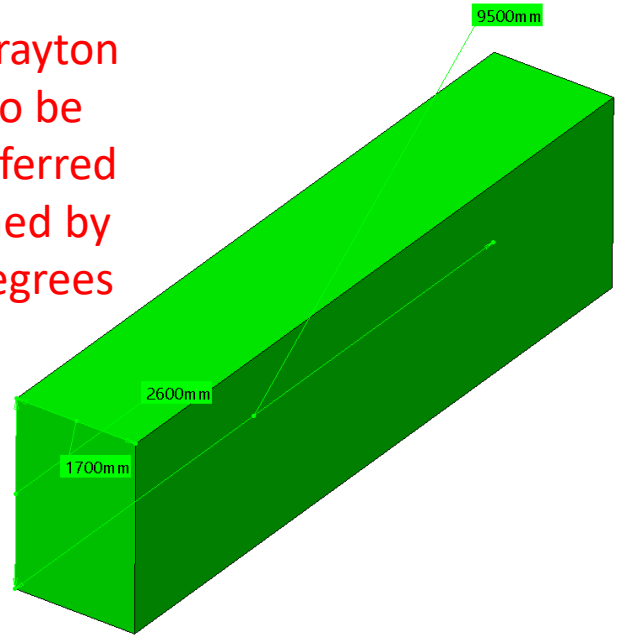
Transport volume



LAr storage tank
- Do we need?
- Diameter does not pass



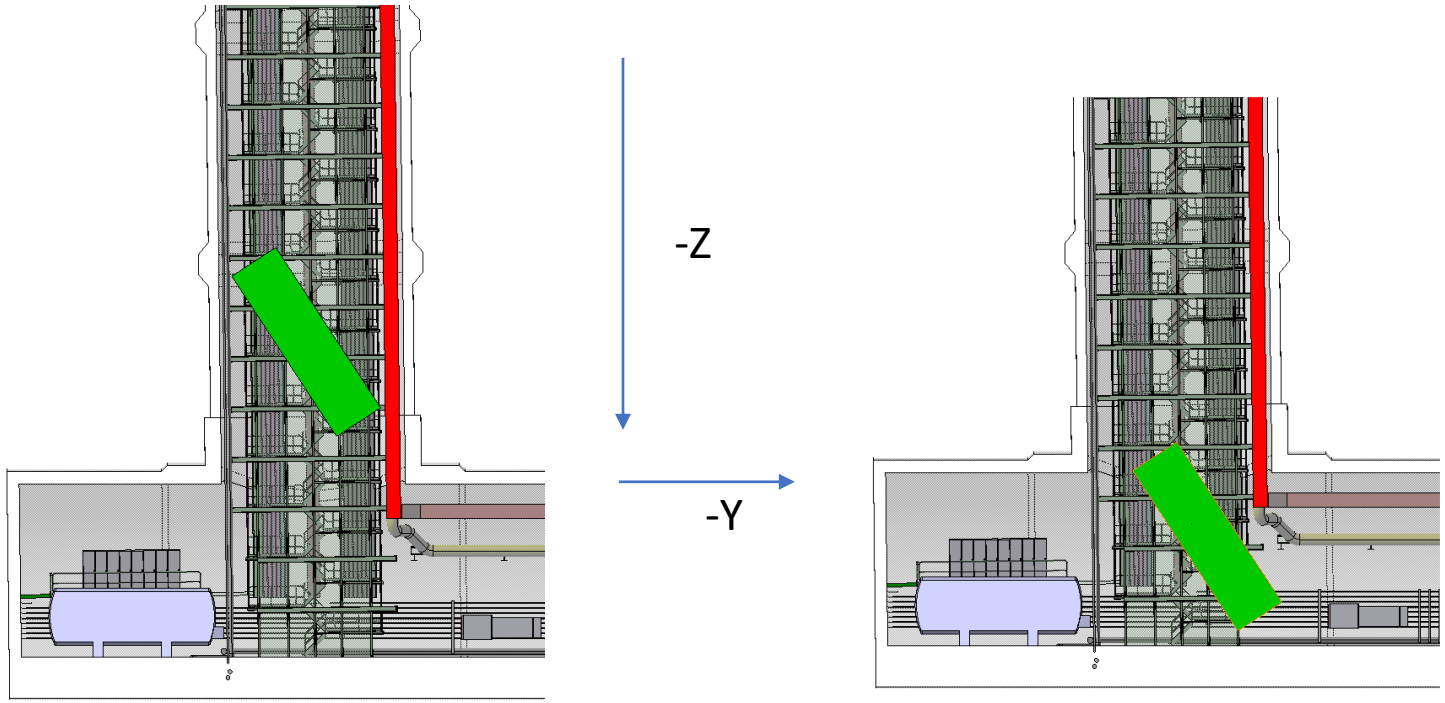
Turbo-Brayton
- Has to be transferred inclined by 60 degrees



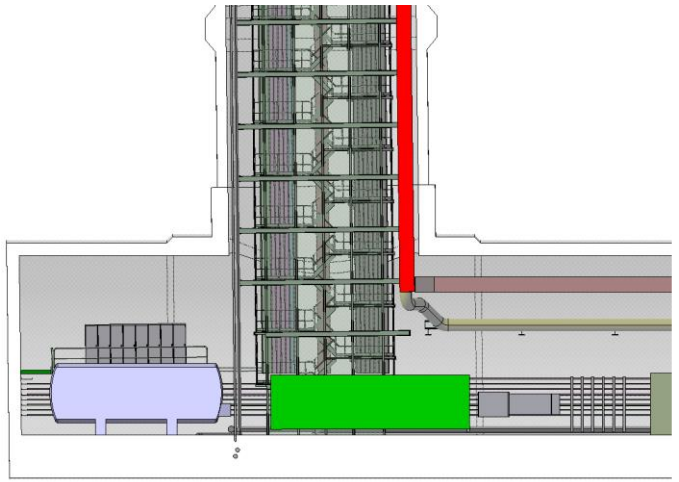
Critical pass from shaft to cavern

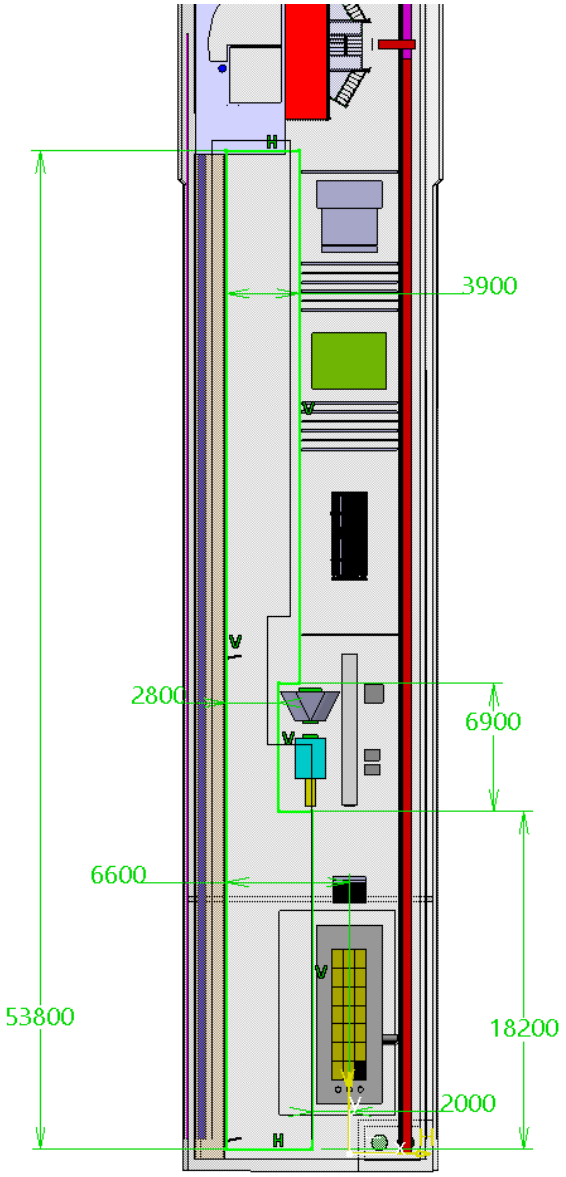
Turbo-Brayton

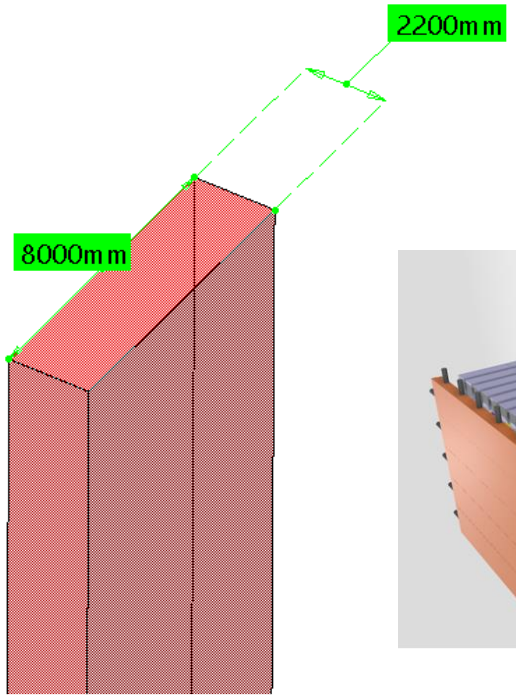
- Has to be transferred inclined by 60 degrees

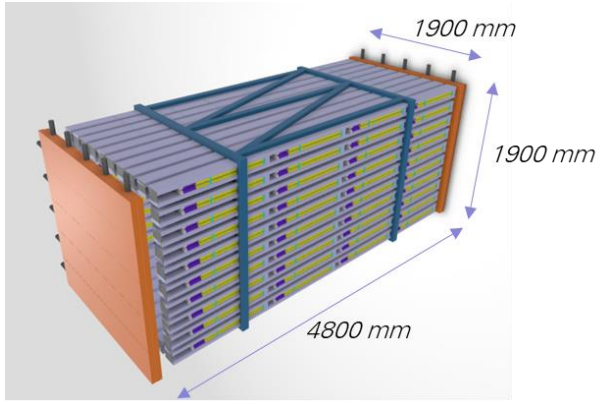


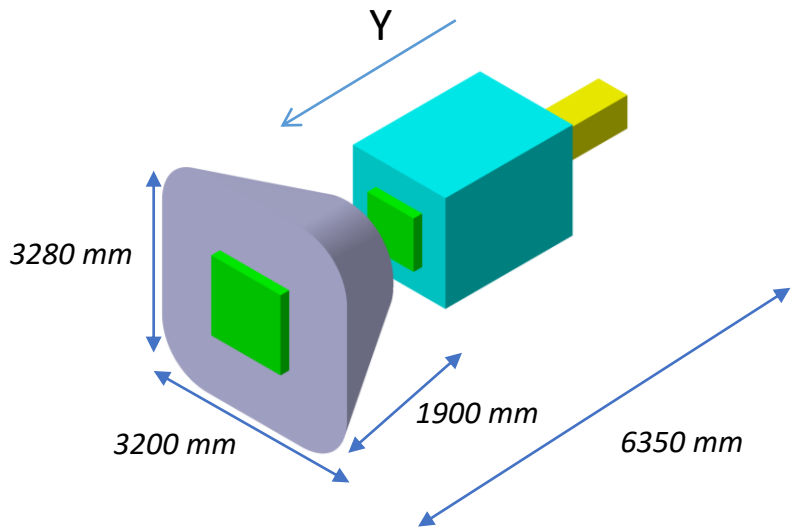
Combination of movements in + Z, - Y directions

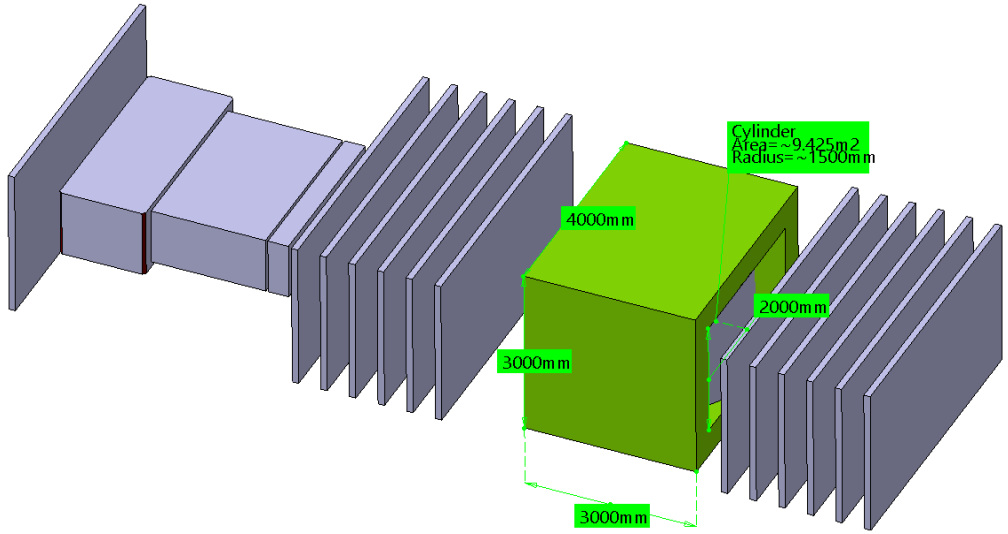


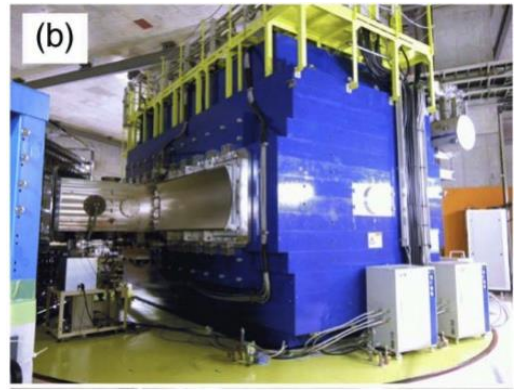

3900
2800
6900
6600
53800
18200
2000


2200mm
8000mm


1900 mm
1900 mm
4800 mm


Y
3280 mm
3200 mm
1900 mm
6350 mm


Cylinder
Area=~9.425m2
Radius=~1500mm
4000mm
2000mm
3000mm
3000mm


(b)

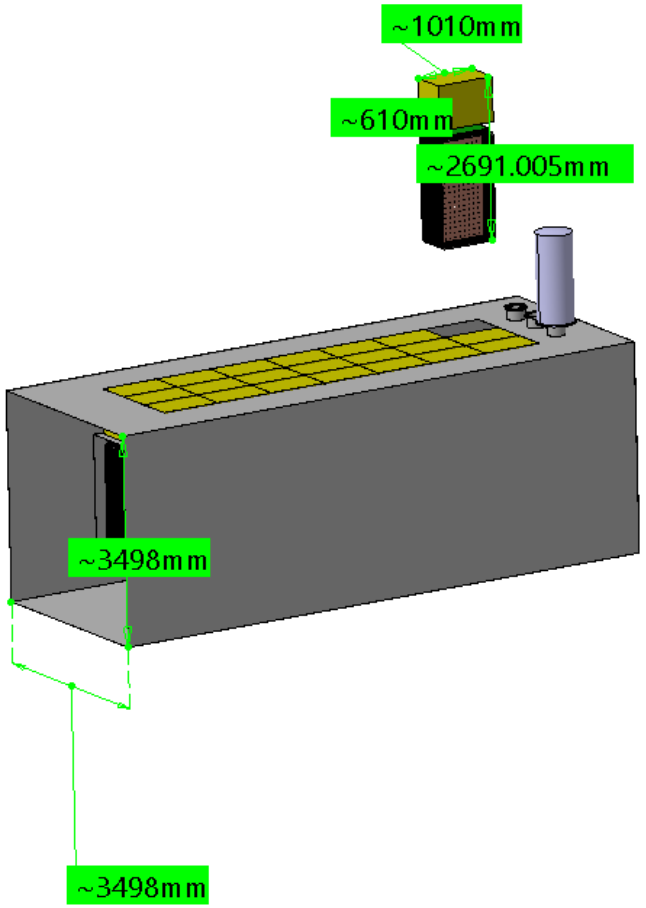
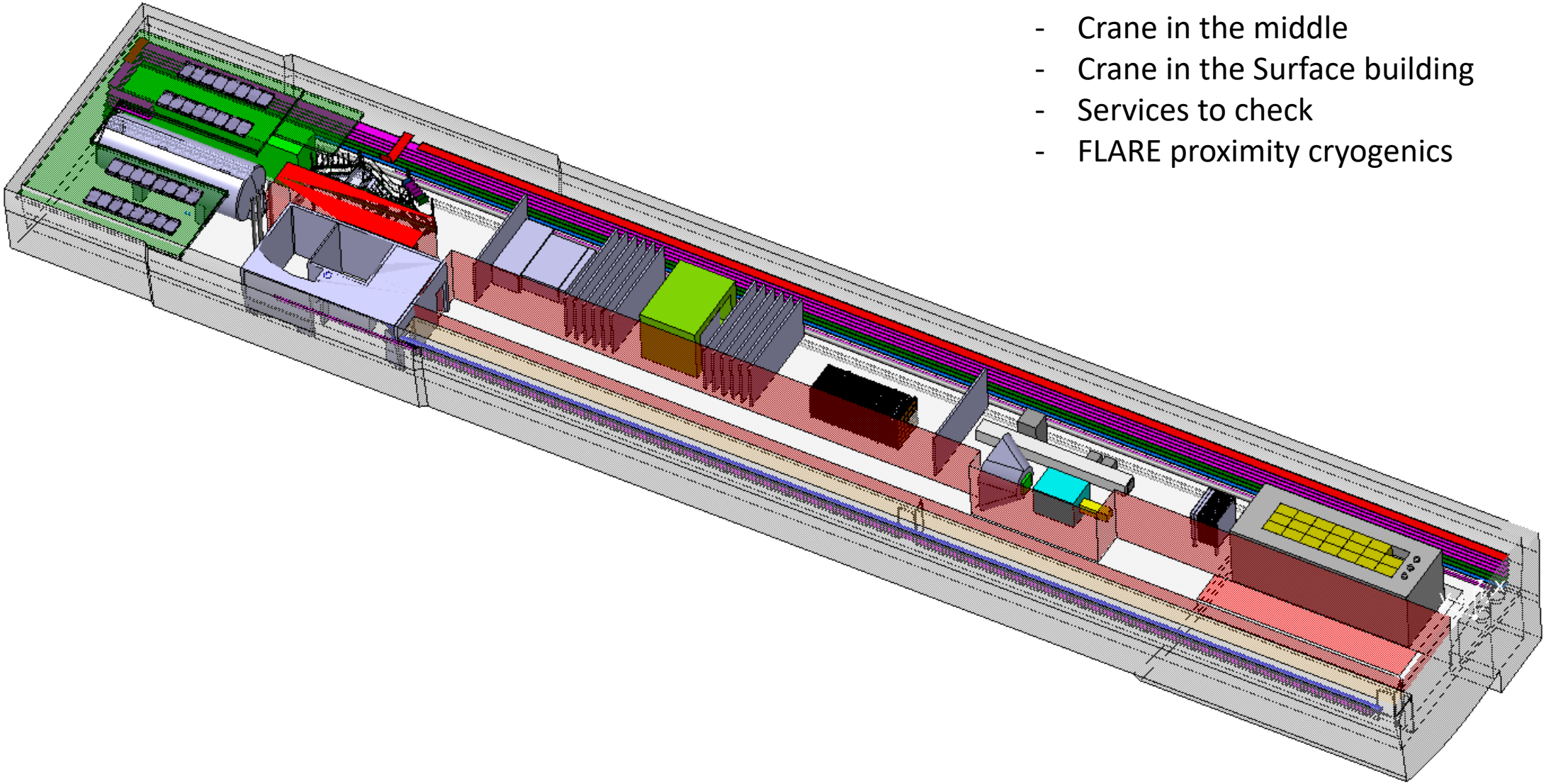
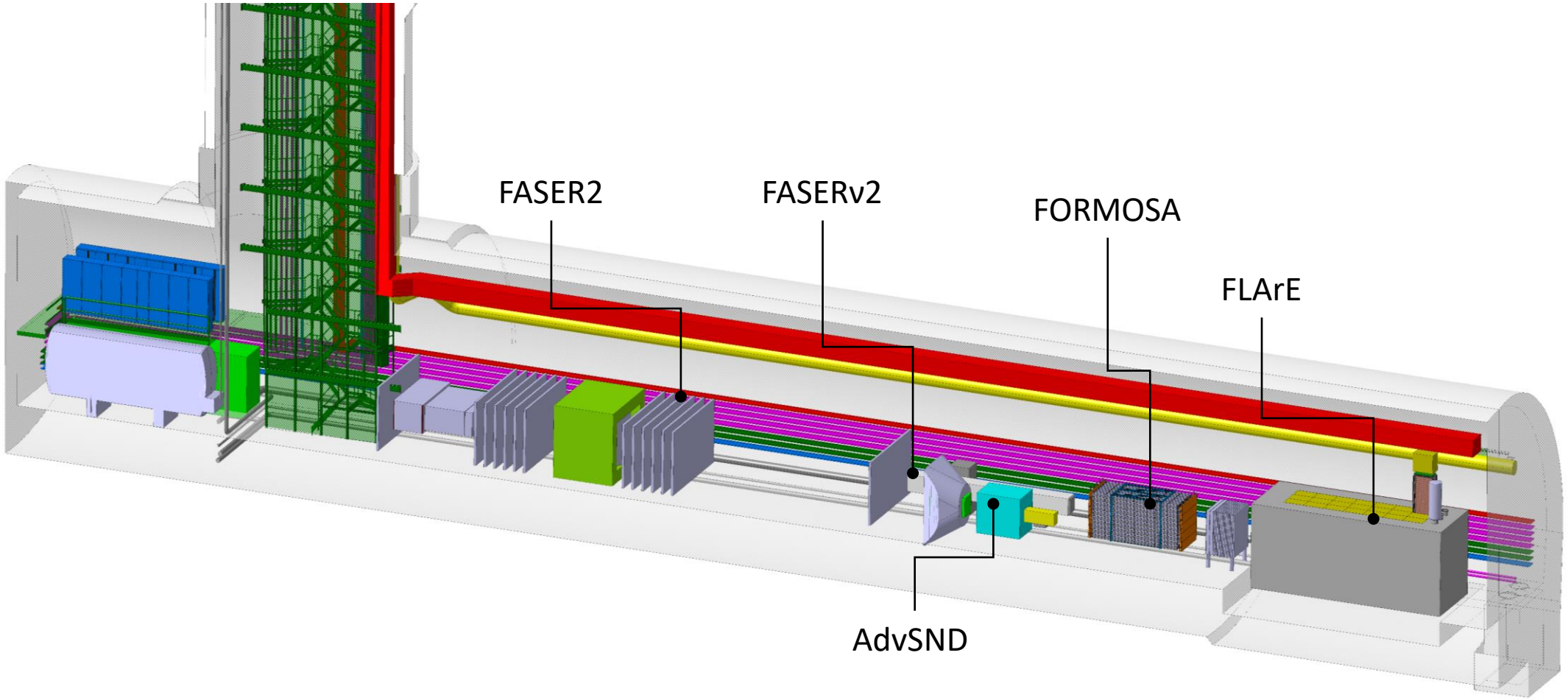


Table with components

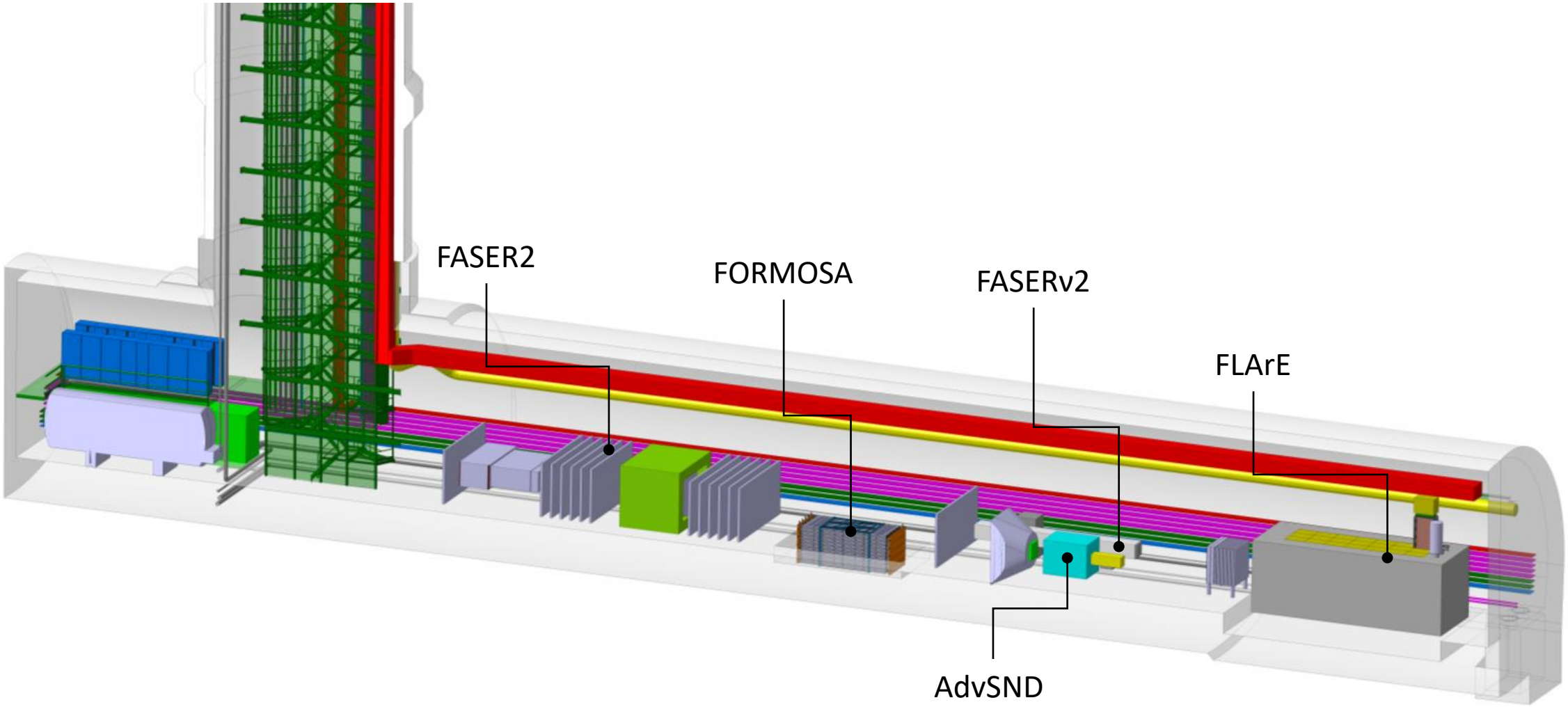


- Crane in the middle
- Crane in the Surface building
- Services to check
- FLARE proximity cryogenics

Configuration 1

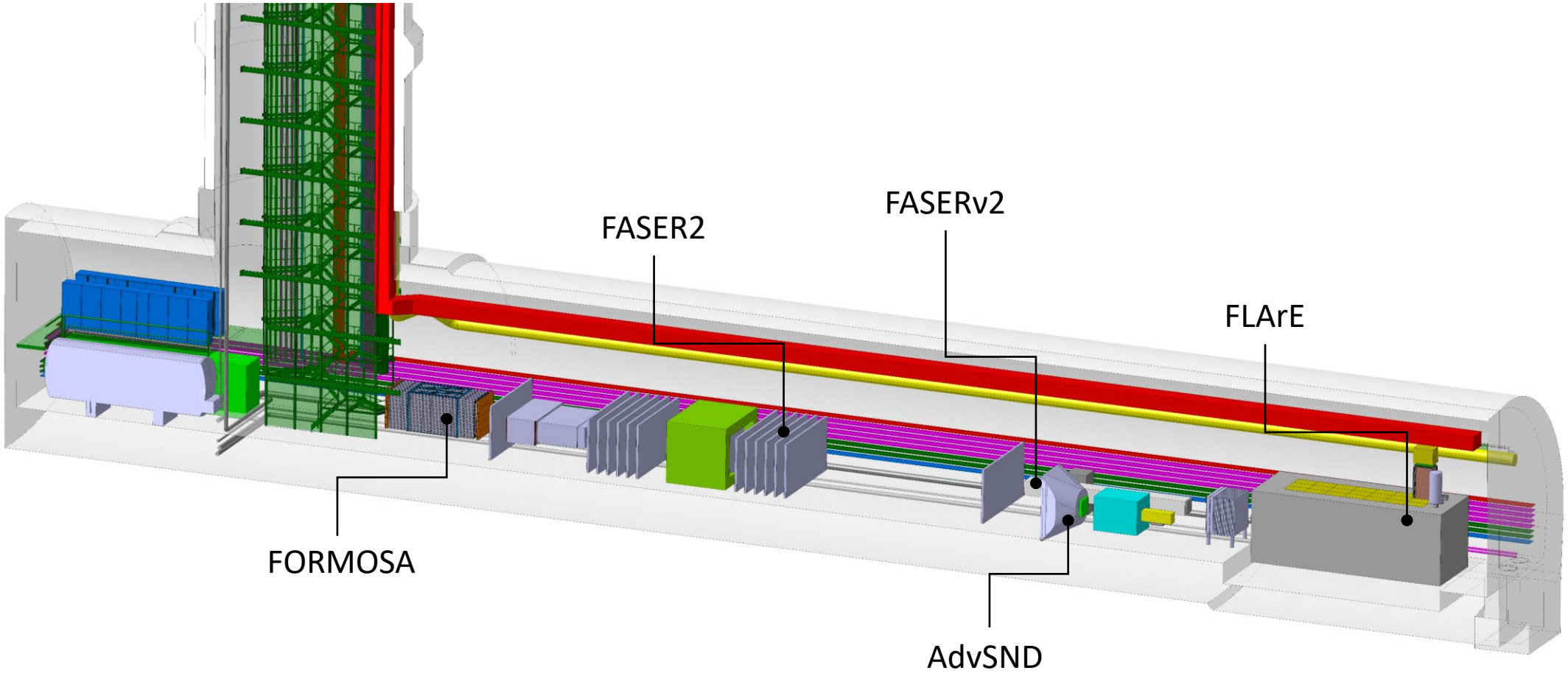


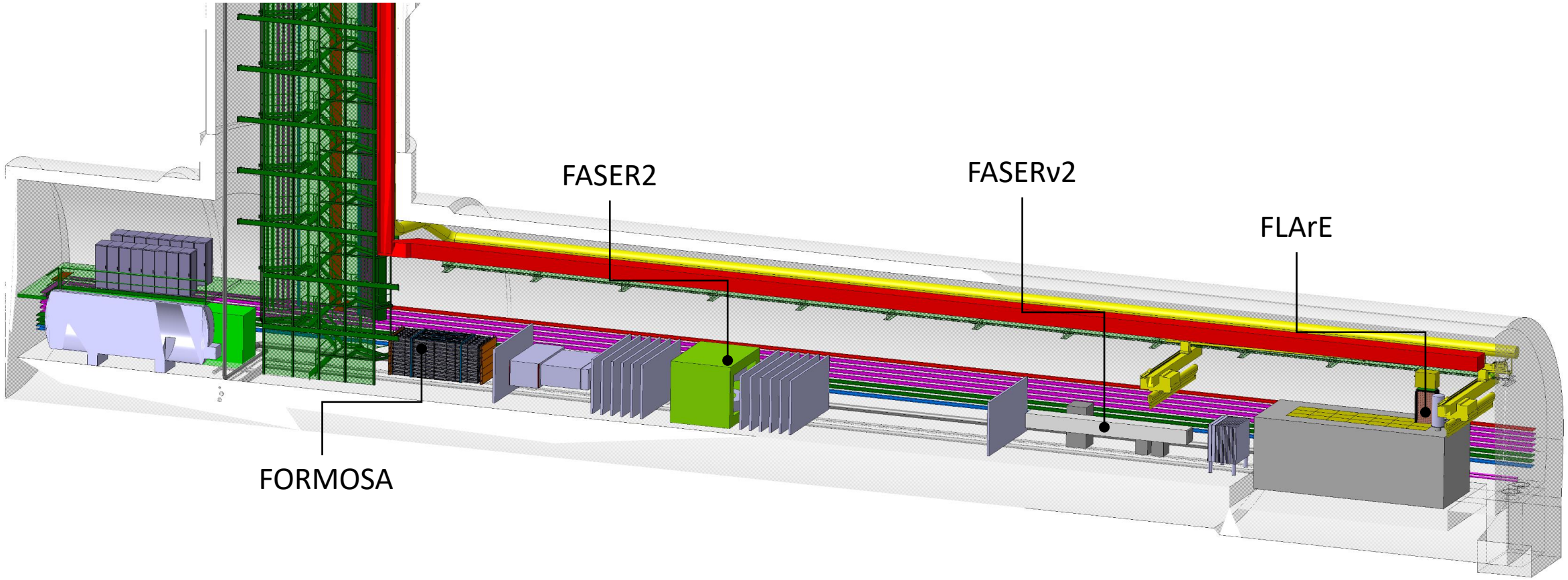
Configuration 2



Configuration 3 baseline

Remove ADV
FORMOSa-ok

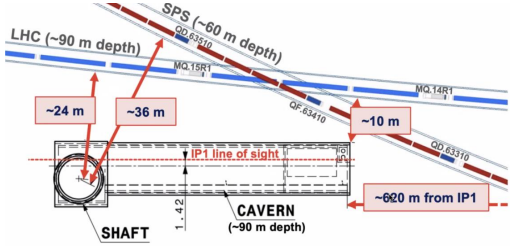


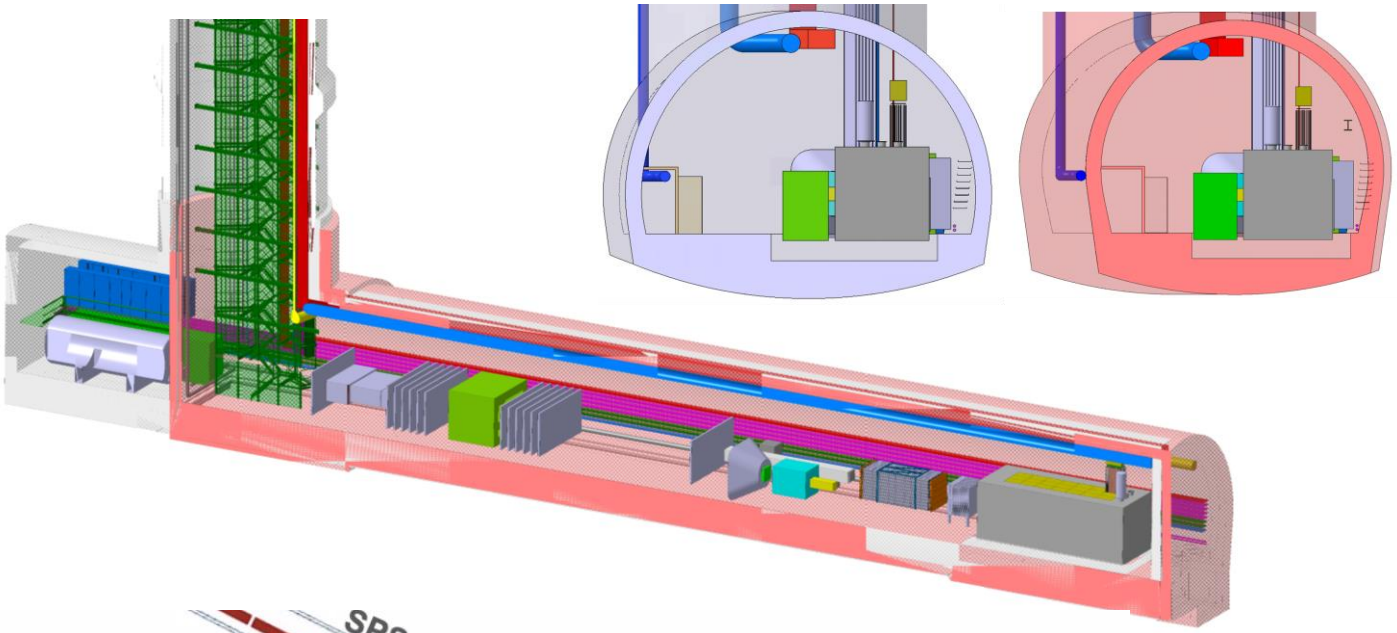

FASER2
FASERv2
FLArE
FORMOSA

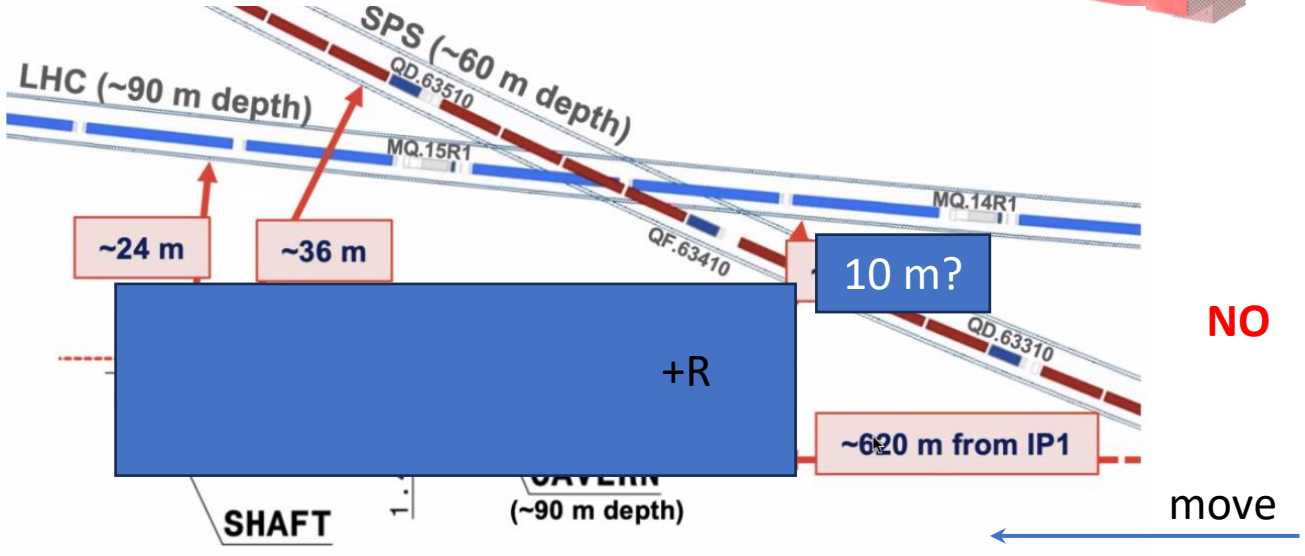
General layout (02.2024)

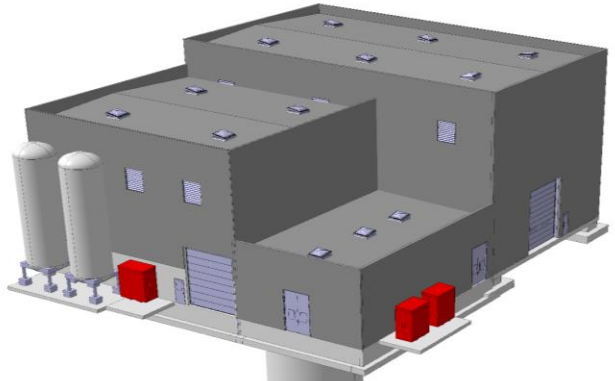
- A 10 m extension allows an additional space for the services (cryogenics, electrical)
- The services do not clash with the transport path
- The services are kept separately from the rest of the cavern
- A radius increase enlarges the transport path and give room for the services inside the cavern (cable trays, pipes etc.)
- A radius increase enlarges the crane movement rate

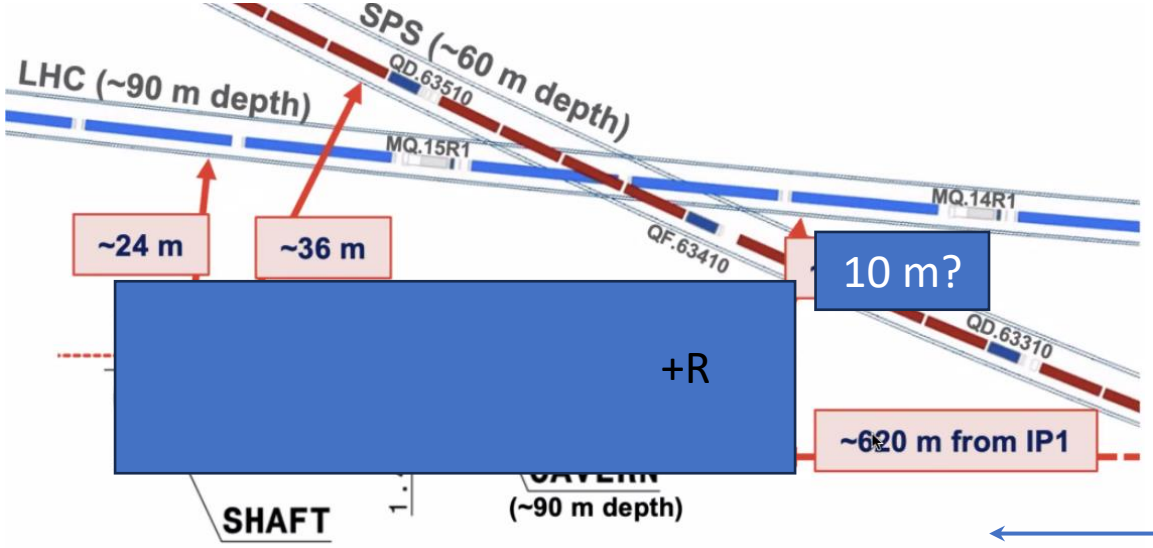
- *Need to understand effect for cavern placement (keeping minimum distance from LHC tunnel, and effect of LOS in cavern)*



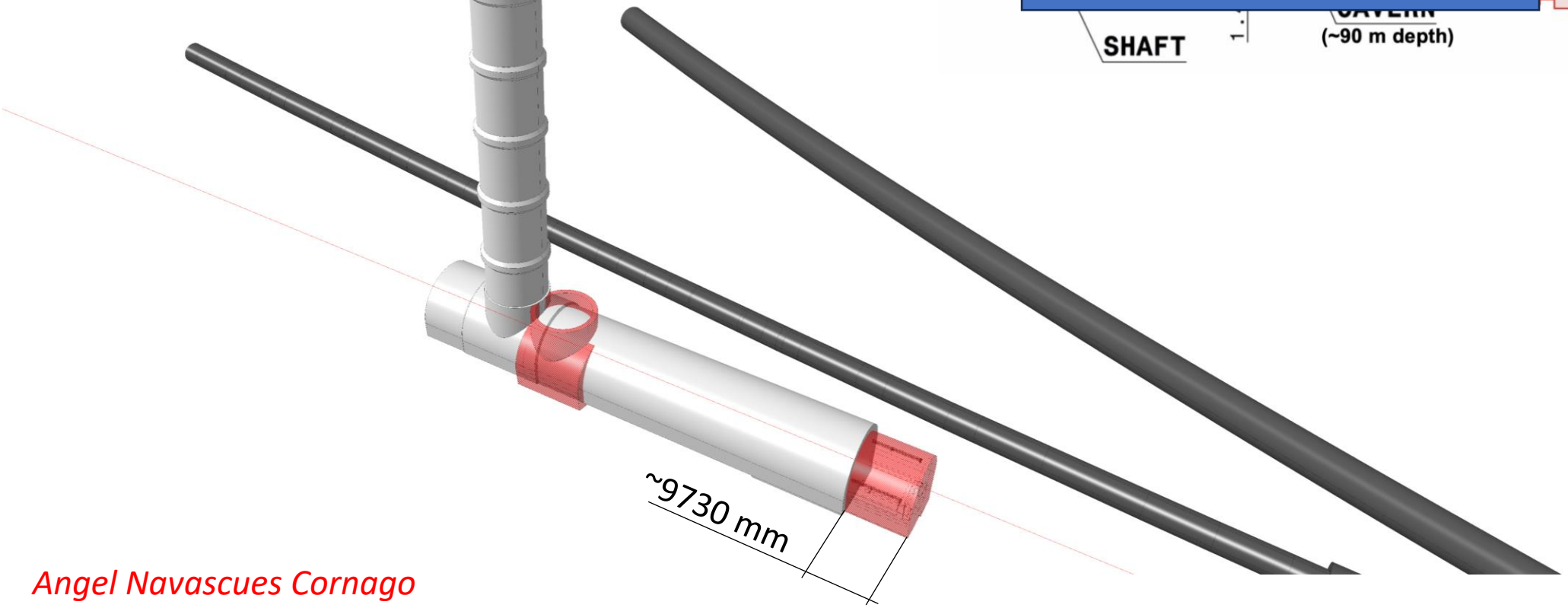




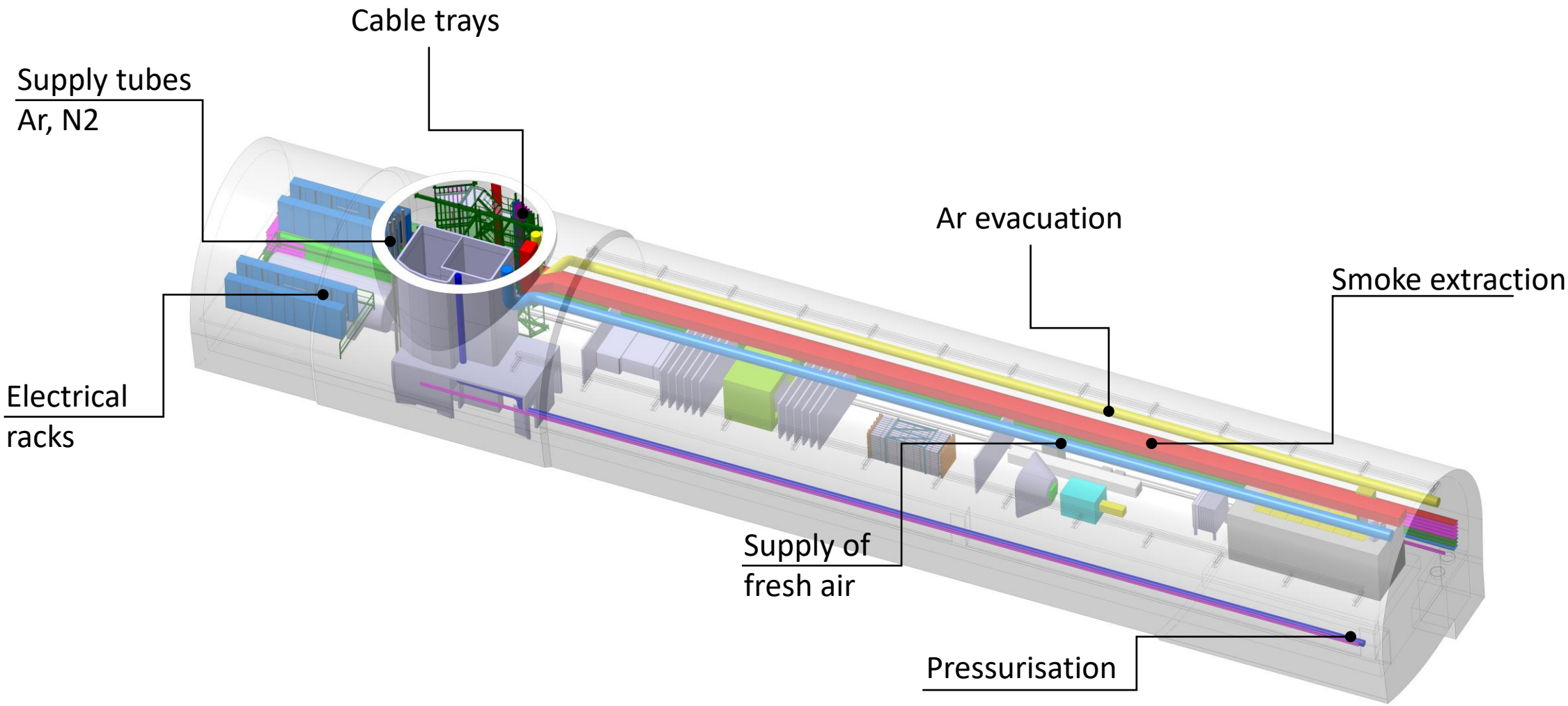




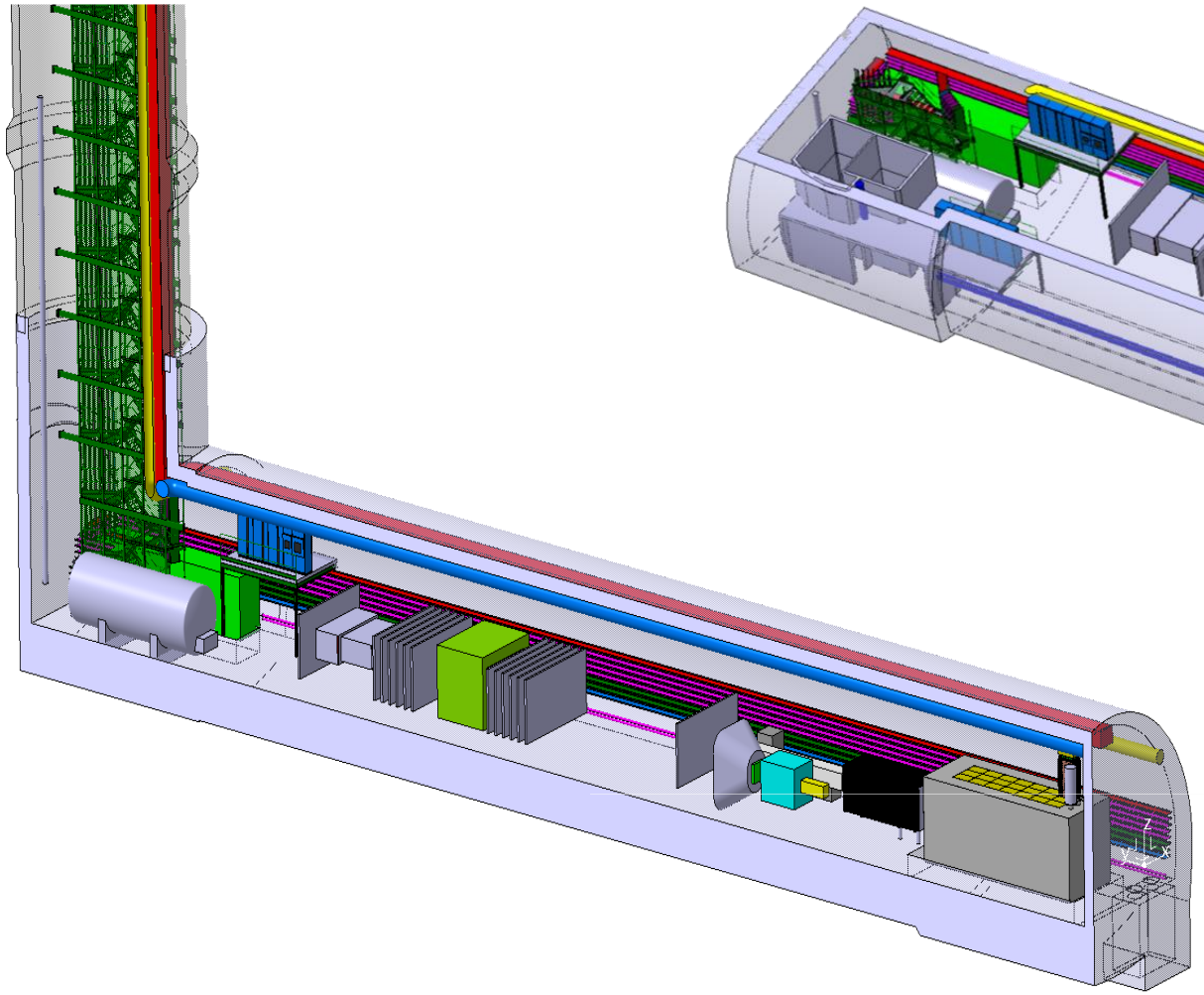
NO

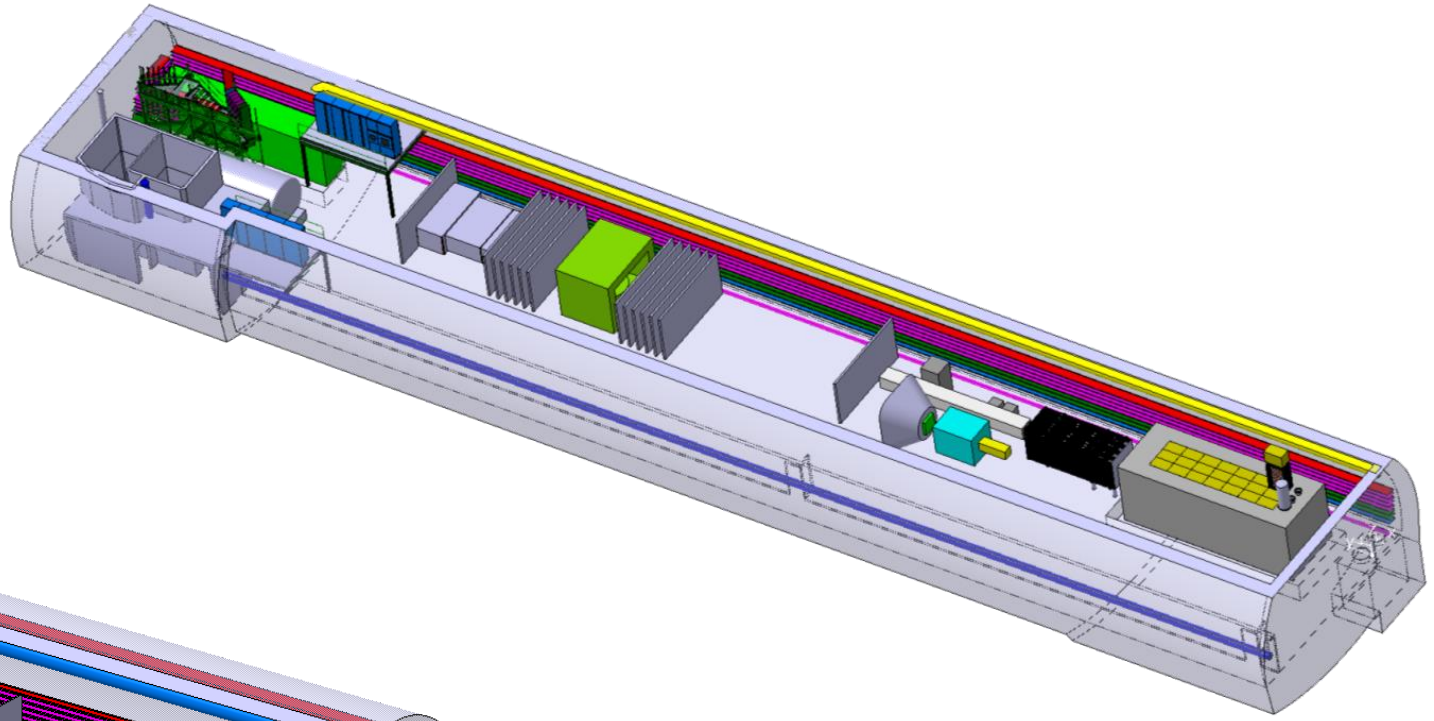


Angel Navascues Cornago


Cable trays
Supply tubes
Ar, N2
Ar evacuation
Smoke extraction
Electrical
racks
Supply of
fresh air
Pressurisation

14/02/2024





Requirements

- Additionally have LAr and N^2 lines down shaft:
  - GAr out 30 cm diameter
  - GAr in 10 cm (vacuum jacket included)
  - LN^2 20 cm (vacuum jacket included)
  - LAr 20 cm (vacuum jacket included)
  - Dewars on surface: $50m^3$ LAr, $10m^3$ N^2
- CV
  - Extraction de fumée (section rectangulaire) : 1000x700
  - Extraction d'argon : diamètre 600
  - Pressurisation : diamètre 400
  - Pulsion (supply) : diamètre 700
  - Extraction : diamètre 700

• Size constraints

Rough sketch of 20tn (active volume) LArTPC detector

Full size of cryostat:

Inner size: 2.1 x 2.1 x 8.2 m^3 (~50 ton LAr in total)

Outer size: 3.5 x 3.5 x 9.6 m^3

Handling requirements:

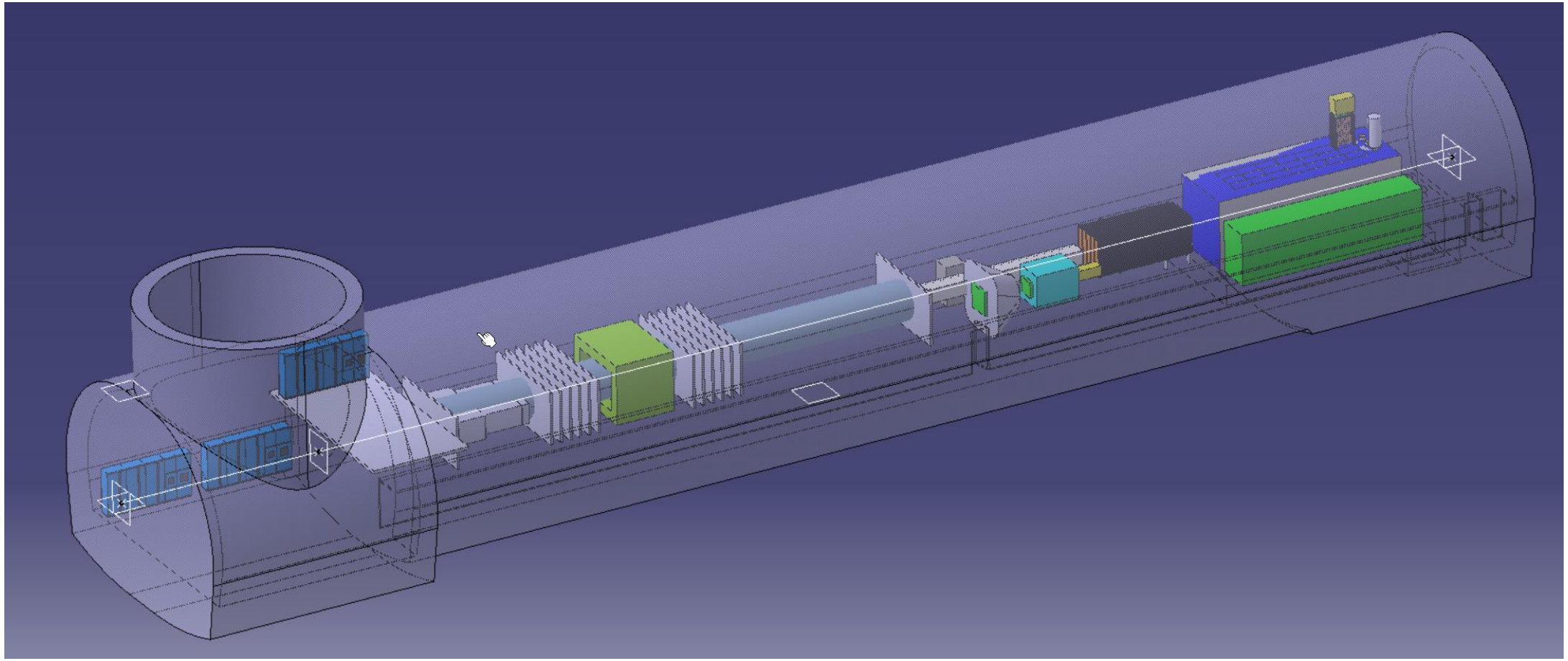
Cryostat would be assembled in the cavern, biggest pieces for transport to the cavern: 6m x1m x 0.5m

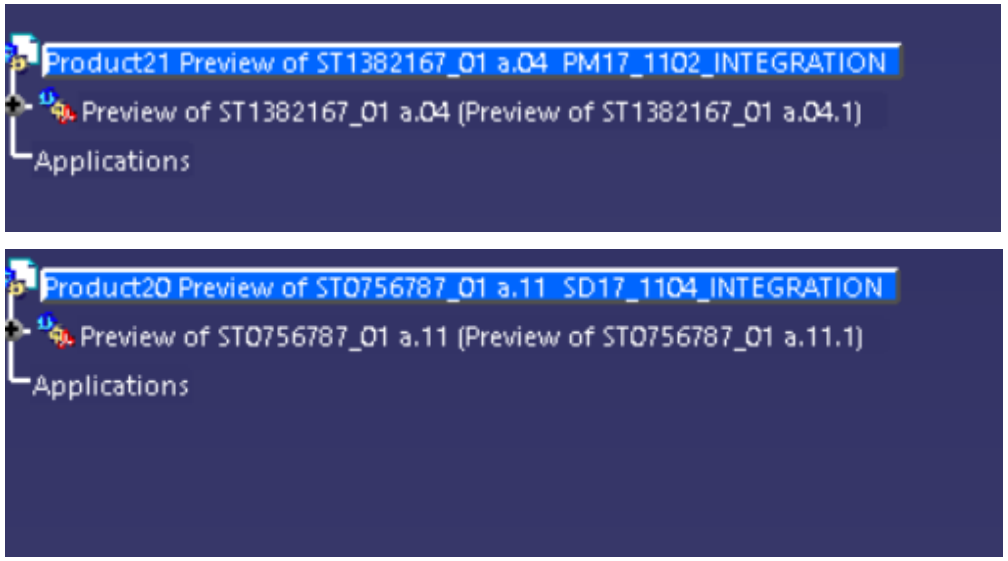
Cooling unit needs to be transported in 1 piece: 8mx 1.6mx 2.7m

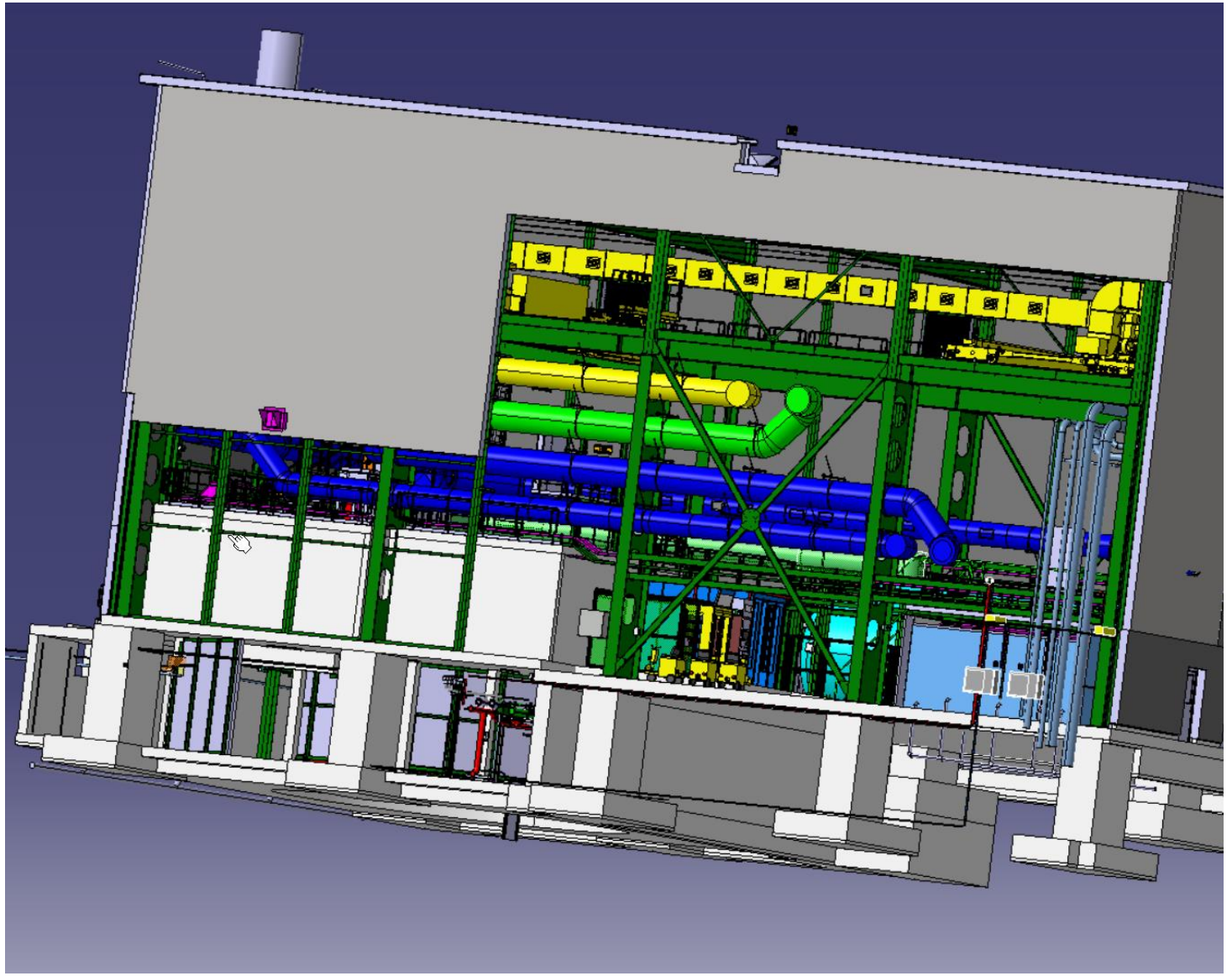
Can be lowered vertically and turned if needed (to save space in shaft)

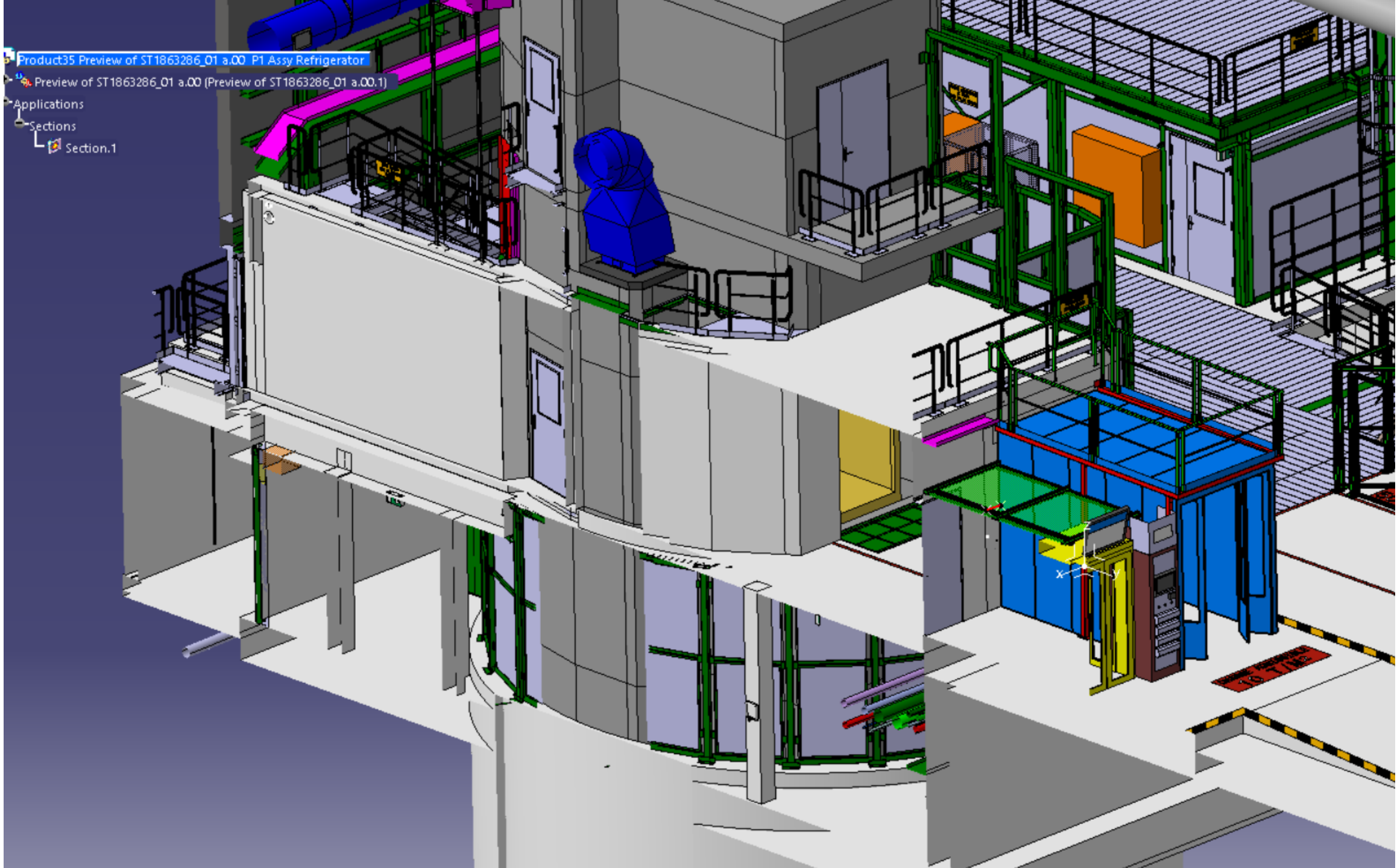
25tn crane should be OK

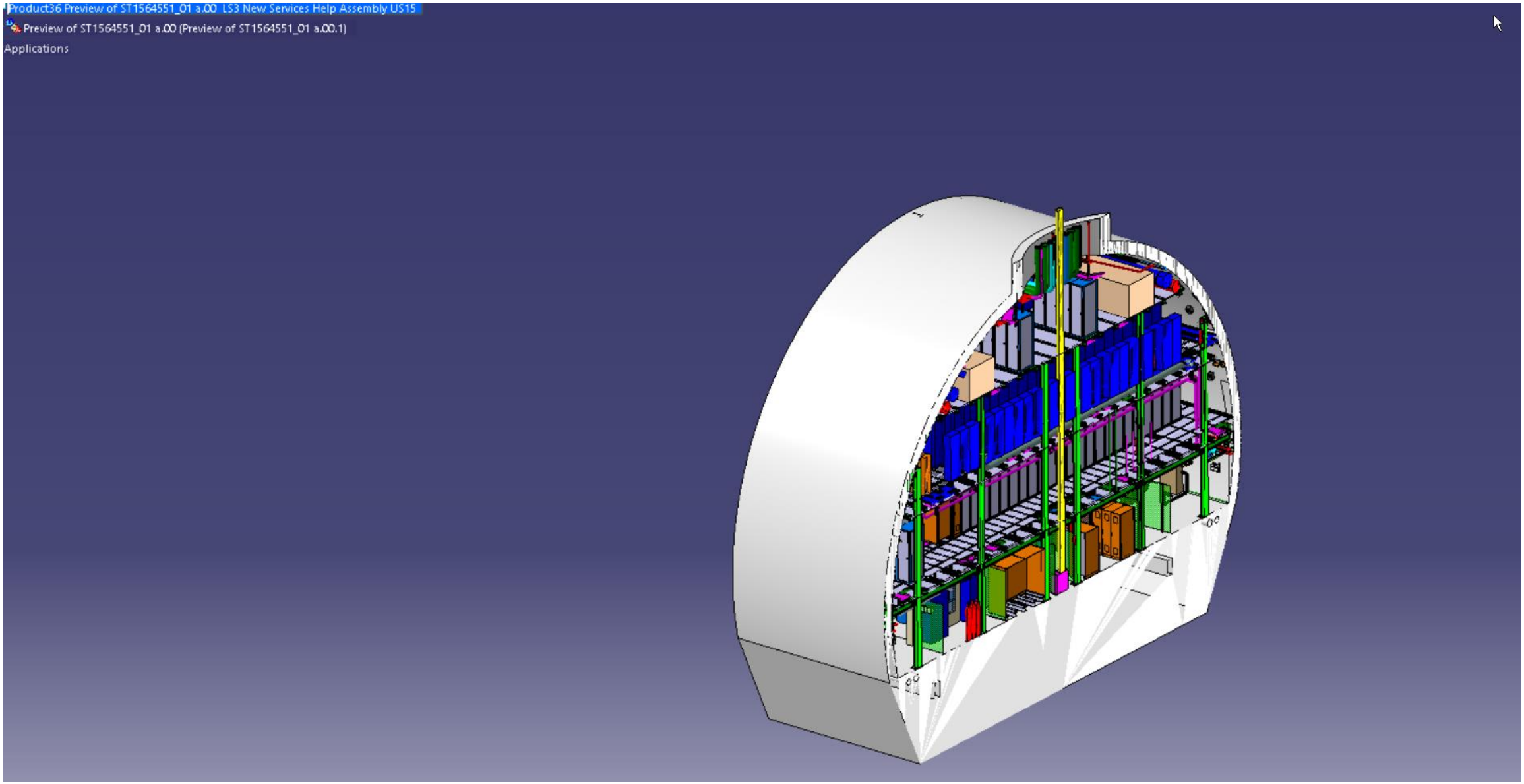
Need to be able to have a man lift on all sides of detector

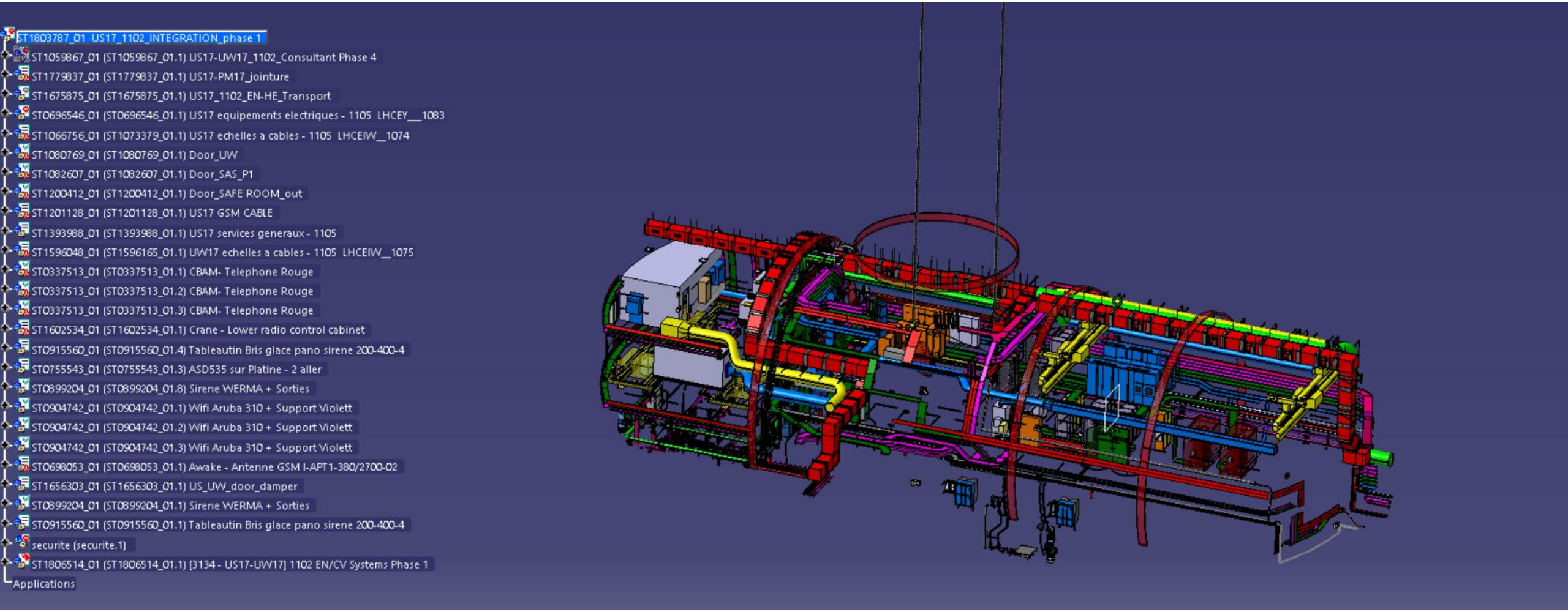



Product21 Preview of ST1382167_01 a.04_PM17_1102_INTEGRATION
Preview of ST1382167_01 a.04 (Preview of ST1382167_01 a.04.1)
Applications
Product20 Preview of ST0756787_01 a.11_SD17_1104_INTEGRATION
Preview of ST0756787_01 a.11 (Preview of ST0756787_01 a.11.1)
Applications



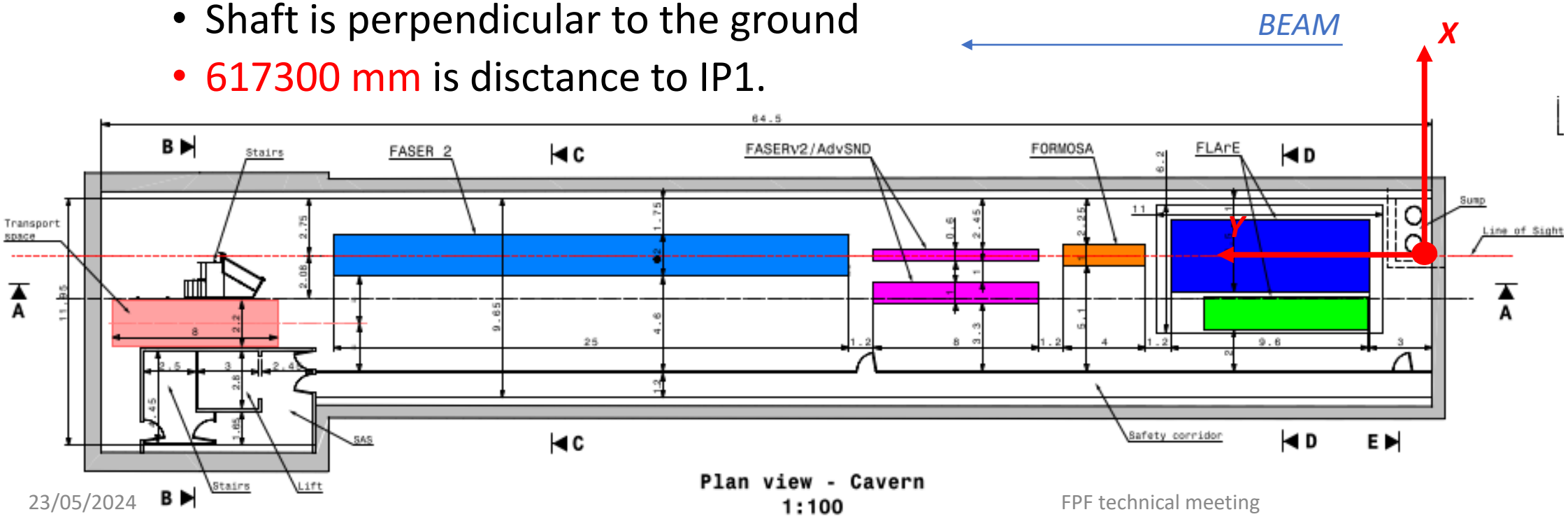

Product35 Preview of ST1863286_01 a.00 P1 Assy Refrigerator
Preview of ST1863286_01 a.00 (Preview of ST1863286_01 a.00.1)
Applications
Sections
Section.1


Product36 Preview of ST1564551_01 a.00 LS3 New Services Help Assembly US15
Preview of ST1564551_01 a.00 (Preview of ST1564551_01 a.00.1)
Applications


ST1803787_01 US17_1102_INTEGRATION_phase 1
ST1059867_01 (ST1059867_01.1) US17-UW17_1102_Consultant Phase 4
ST1779837_01 (ST1779837_01.1) US17-PM17_jointure
ST1675875_01 (ST1675875_01.1) US17_1102_EN-HE_Transport
ST0696546_01 (ST0696546_01.1) US17 equipements electriques - 1105 LHCEY__1083
ST1066756_01 (ST1073379_01.1) US17 echelles a cables - 1105 LHCEIW__1074
ST1080769_01 (ST1080769_01.1) Door_UW
ST1082607_01 (ST1082607_01.1) Door_SAS_P1
ST1200412_01 (ST1200412_01.1) Door_SAFE ROOM_out
ST1201128_01 (ST1201128_01.1) US17 GSM CABLE
ST1393988_01 (ST1393988_01.1) US17 services generaux - 1105
ST1596048_01 (ST1596165_01.1) UW17 echelles a cables - 1105 LHCEIW__1075
ST0337513_01 (ST0337513_01.1) CBAM- Telephone Rouge
ST0337513_01 (ST0337513_01.2) CBAM- Telephone Rouge
ST0337513_01 (ST0337513_01.3) CBAM- Telephone Rouge
ST1602534_01 (ST1602534_01.1) Crane - Lower radio control cabinet
ST0915560_01 (ST0915560_01.4) Tableautin Bris glace pano sirene 200-400-4
ST0755543_01 (ST0755543_01.3) ASD535 sur Platine - 2 aller
ST0899204_01 (ST0899204_01.8) Sirene WERMA + Sorties
ST0904742_01 (ST0904742_01.1) Wifi Aruba 310 + Support Violett
ST0904742_01 (ST0904742_01.2) Wifi Aruba 310 + Support Violett
ST0904742_01 (ST0904742_01.3) Wifi Aruba 310 + Support Violett
ST0698053_01 (ST0698053_01.1) Awake - Antenne GSM I-APT1-380/2700-02
ST1656303_01 (ST1656303_01.1) US_UW_door_damper
ST0899204_01 (ST0899204_01.1) Sirene WERMA + Sorties
ST0915560_01 (ST0915560_01.1) Tableautin Bris glace pano sirene 200-400-4
securite (securite.1)
ST1806514_01 (ST1806514_01.1) [3134 - US17-UW17] 1102 EN/CV Systems Phase 1
Applications

Coordinate system FPF

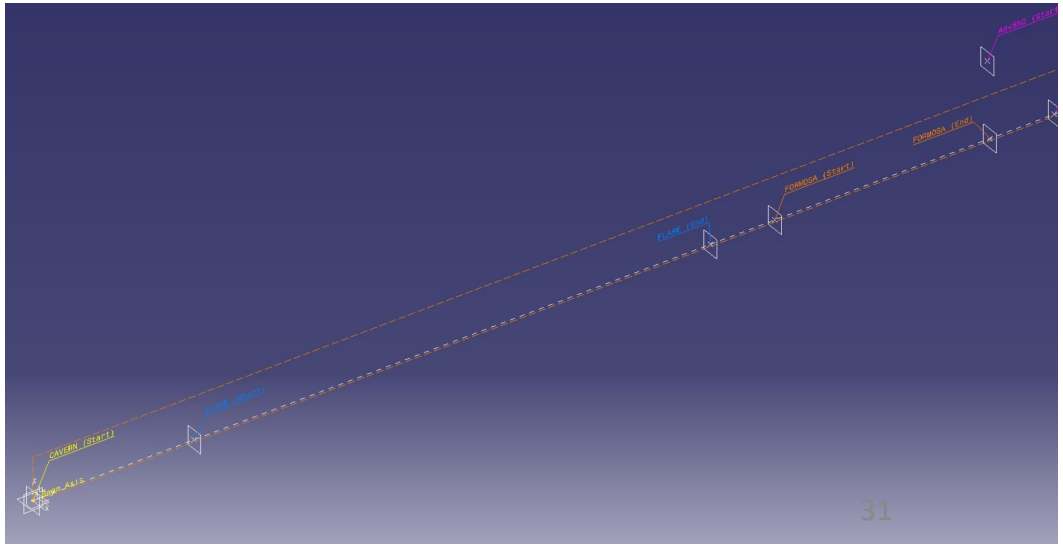
- Current configuration:
  - ‘Y’ is line of Sight
  - Tunnel floor is parallel to ‘Y’
  - Tunnel wall is perpendicular to ‘Y’
  - Shaft is perpendicular to the ground
  - 617300 mm is disctance to IP1.



Skeleton

Skeleton is a file with critical positions for the main components for the integration:

- Point is a start and end positions with respect to ‘0’;
- A new coordinate system will be created 1184, it is our ‘0’;

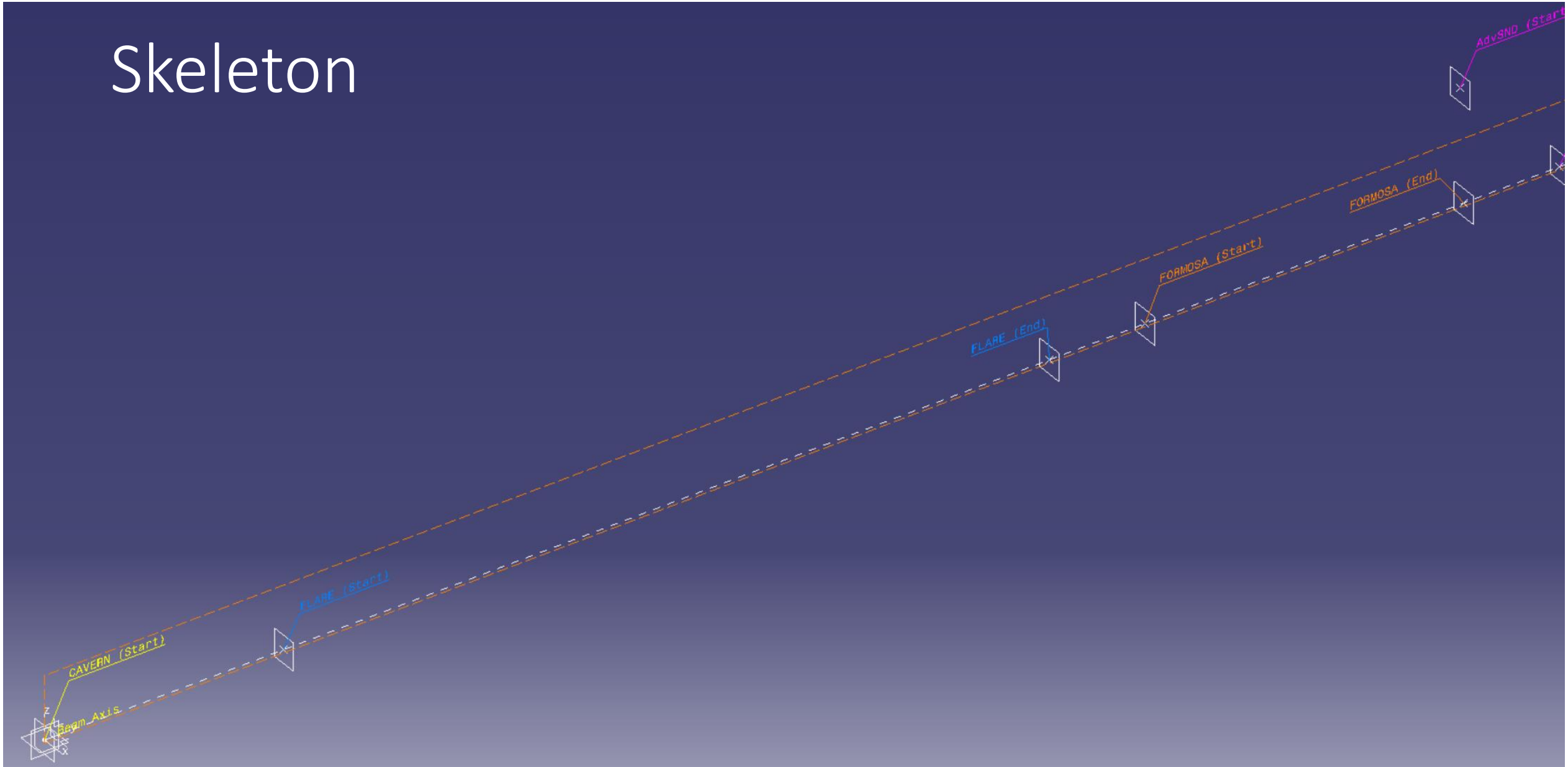


Exchange folder

- Regular Technical meetings: Technical Meetings · Indico (cern.ch)
- DETECTORS & skeleton
  - https://cernbox.cern.ch/s/byQMkFSNBPt9Bnm

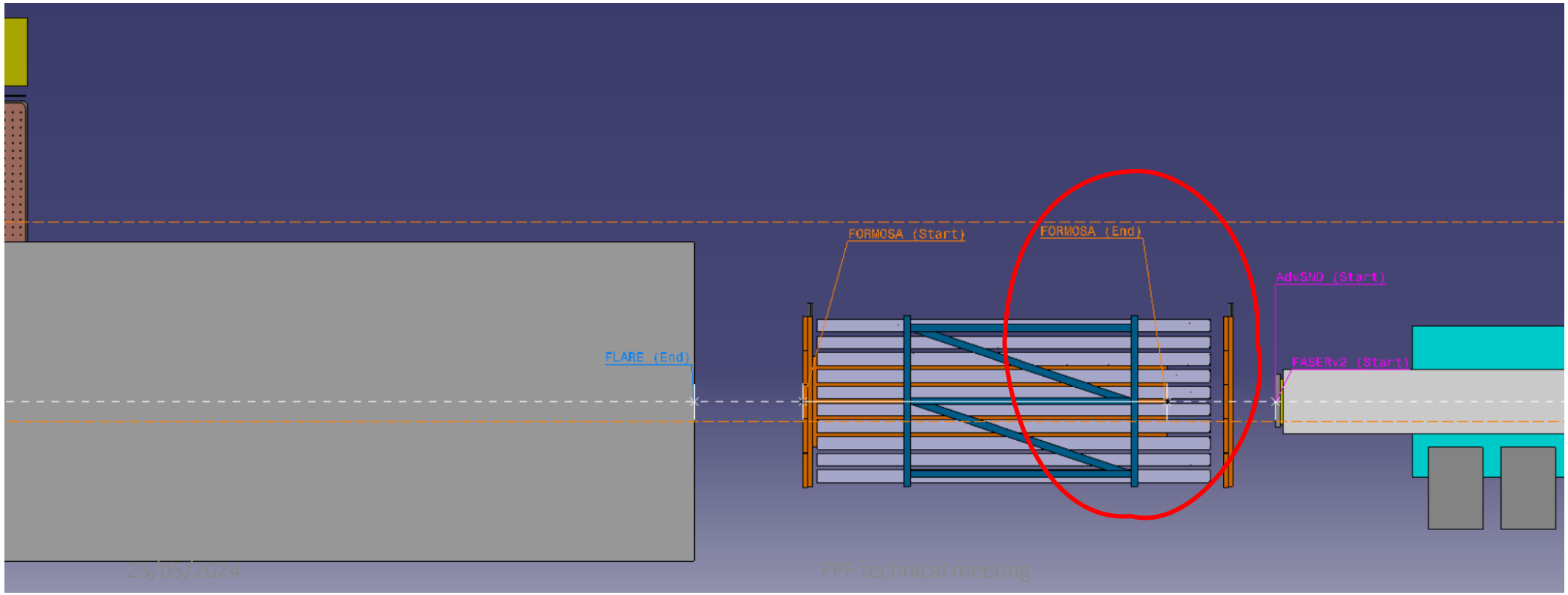
- Access to the full model via the new PLM platform
  - CERN Light account is required
  - https://plm.cern.ch/prod/?StartItem=ST_Document:11796331AD5D4FB2CEFEC36143D6E026

Skeleton


AdvSND (Start)
FORMOSA (End)
FORMOSA (Start)
FLARE (End)
FLARE (Start)
CAVERN (Start)
Beam Axis
Z
X

FORMOSA

1. The latest model according to Chris Hill.
2. Formosa is bigger than the initial envelop (next slide)
3. Clash with hadron/muon calorimeter (next slide)



FORMOSA

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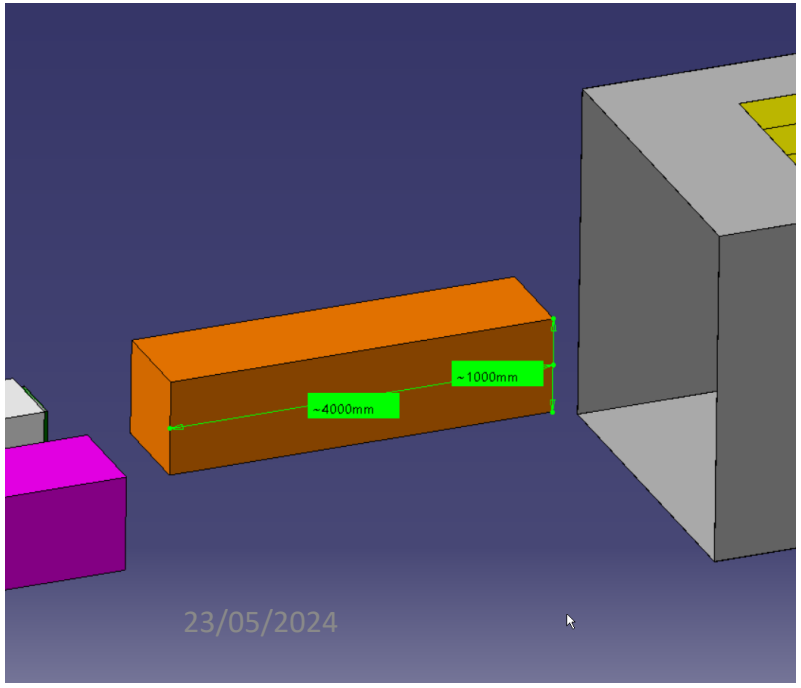
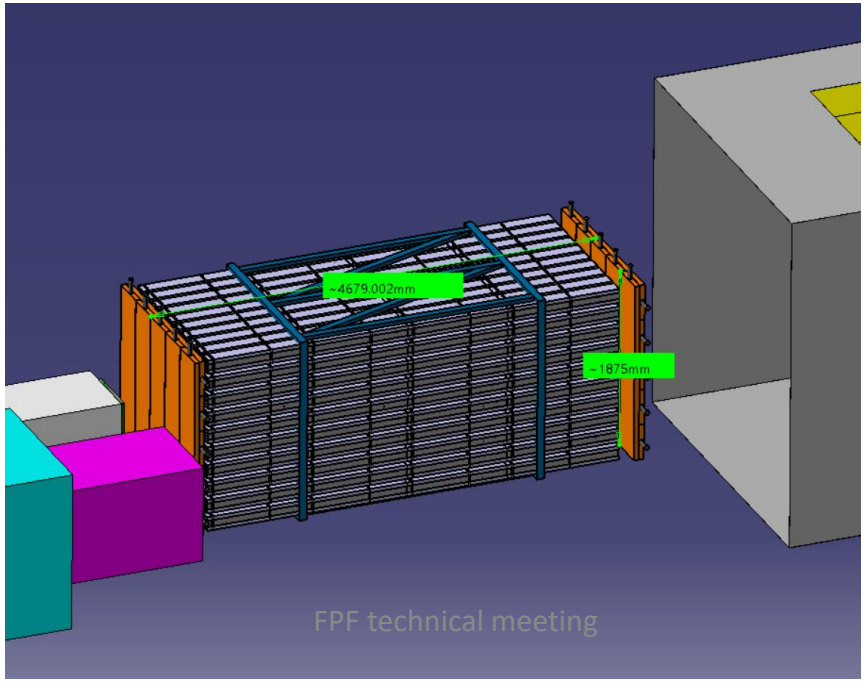
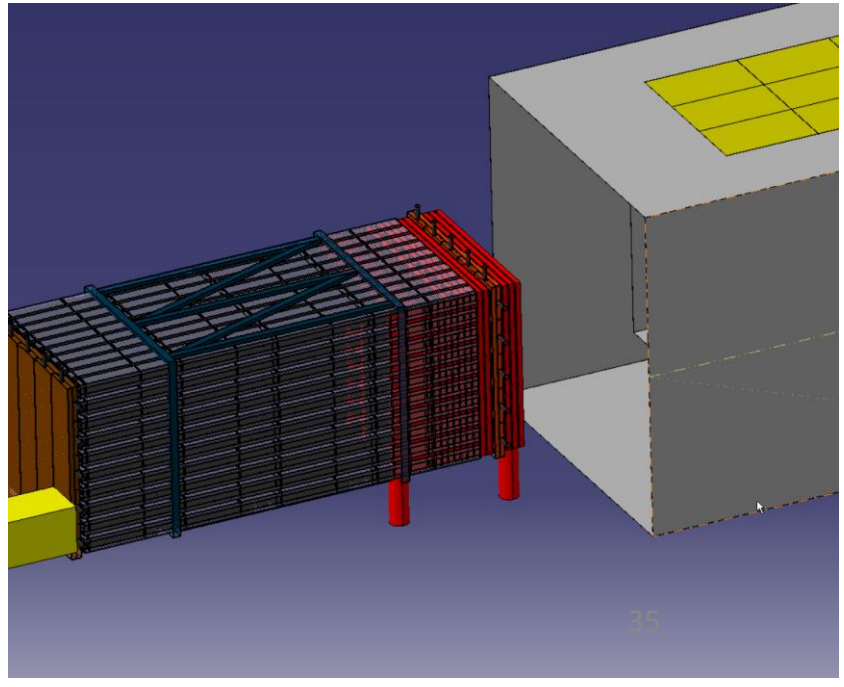
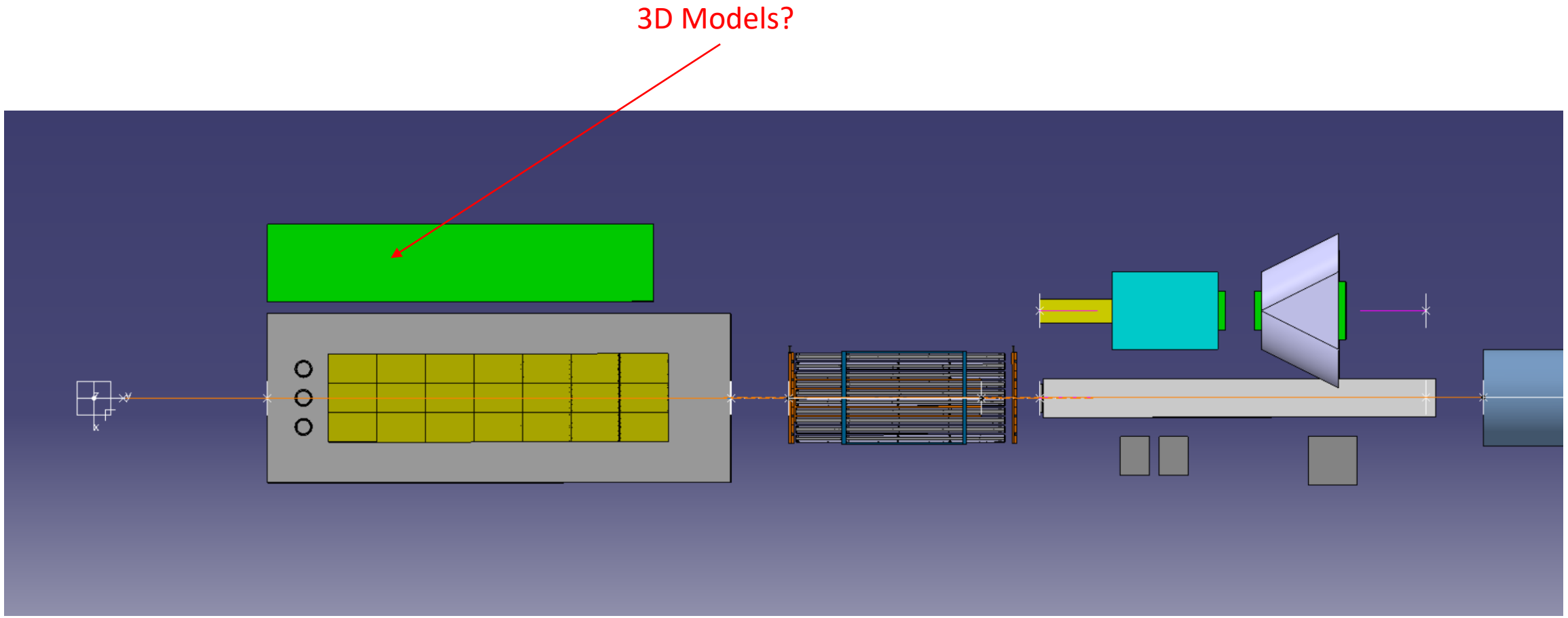






FLARE

1. Need to integrate the cryostat 3D model.

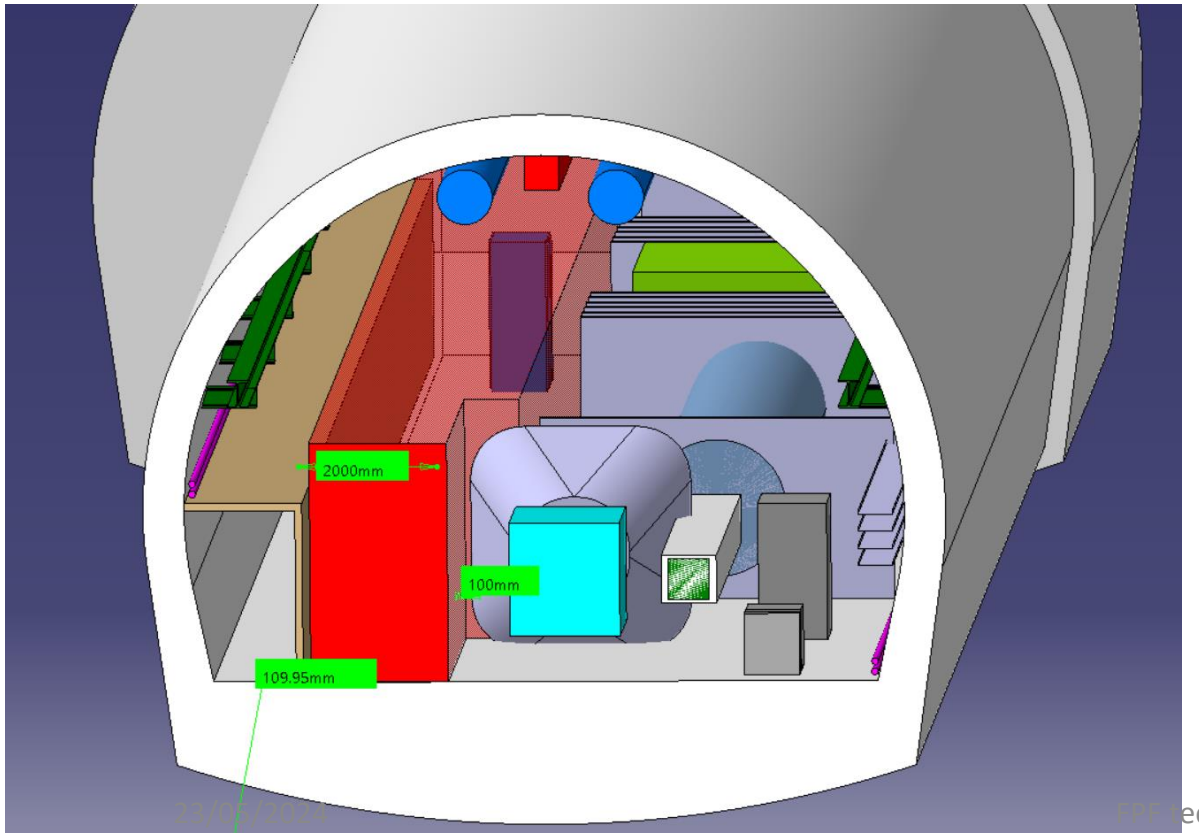


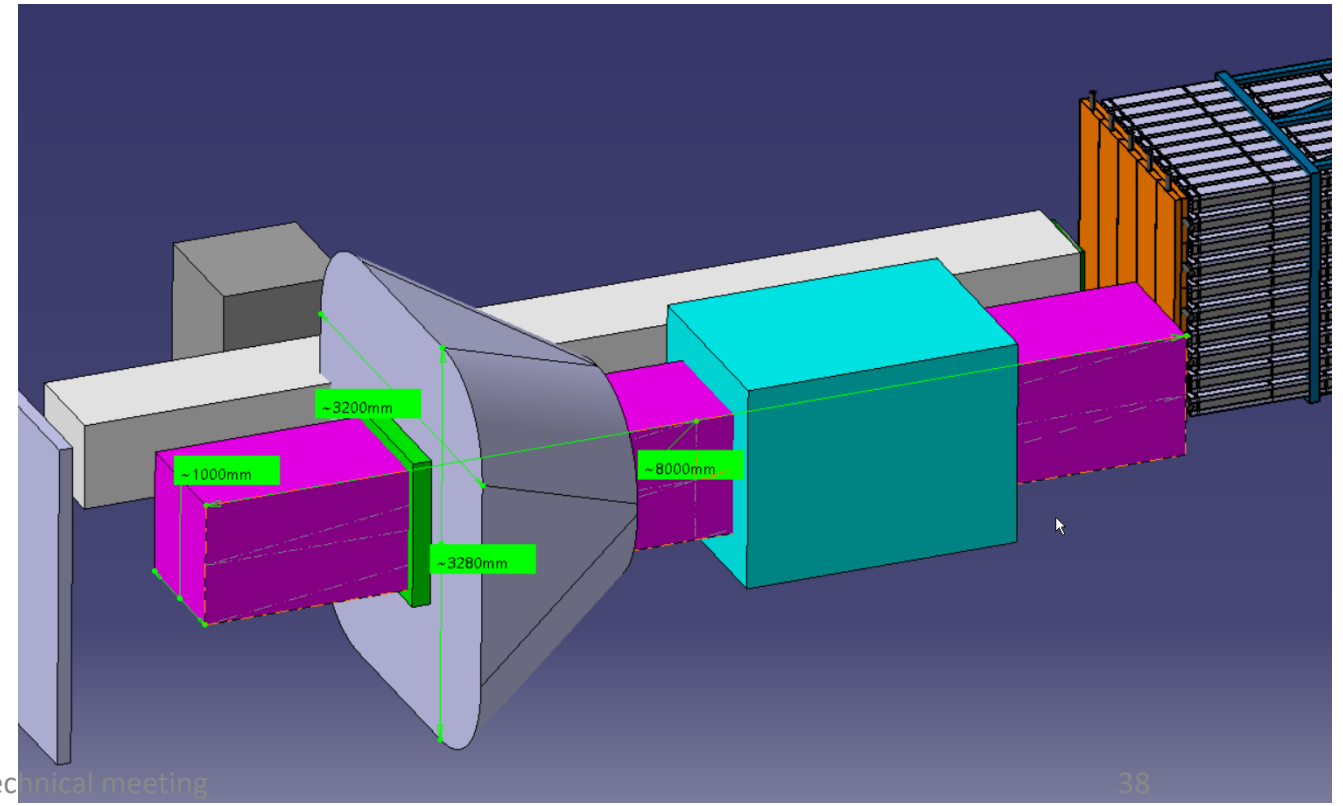
FLARE

- Turbo-Brayton cryo-freezers | Air Liquide Advanced Technologies
- Air Liquide presents the latest developments to its Turbo-Brayton cryogenic technology to the Go LNG project | Air Liquide Advanced Technologies

AdvSND & FASERnu2

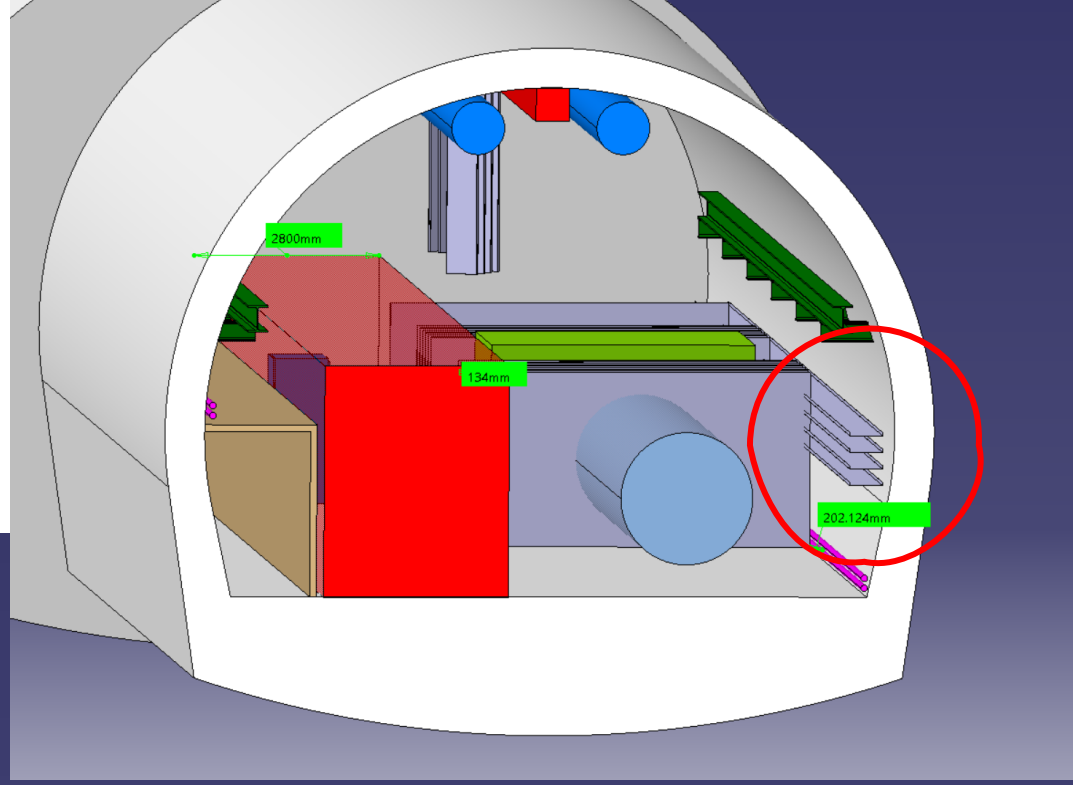
1. Bigger than the initial envelop.
2. Clash with FASERnu2 and the floor.
3. The transport path is 2 m.

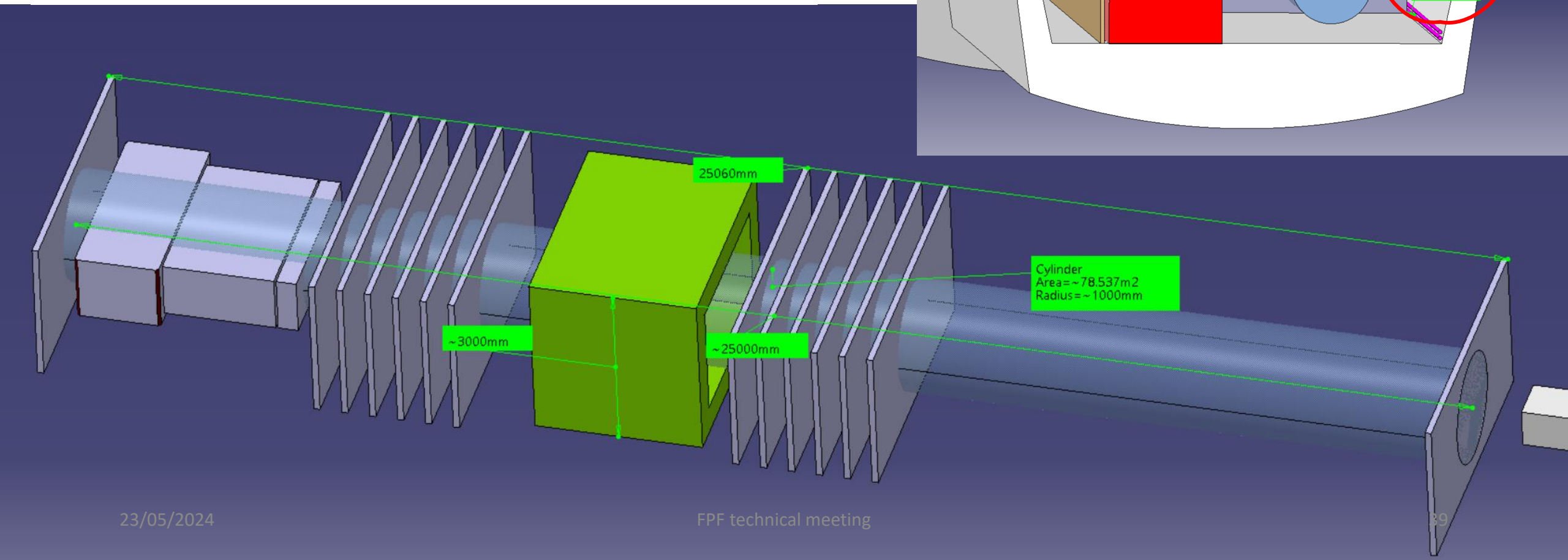




FASER2

1. Bigger than the initial envelop (next slide).
2. No space to the wall.
3. Transport path is 2.8 m.
4. No access to the cable trays and the water pipes (if needed?)

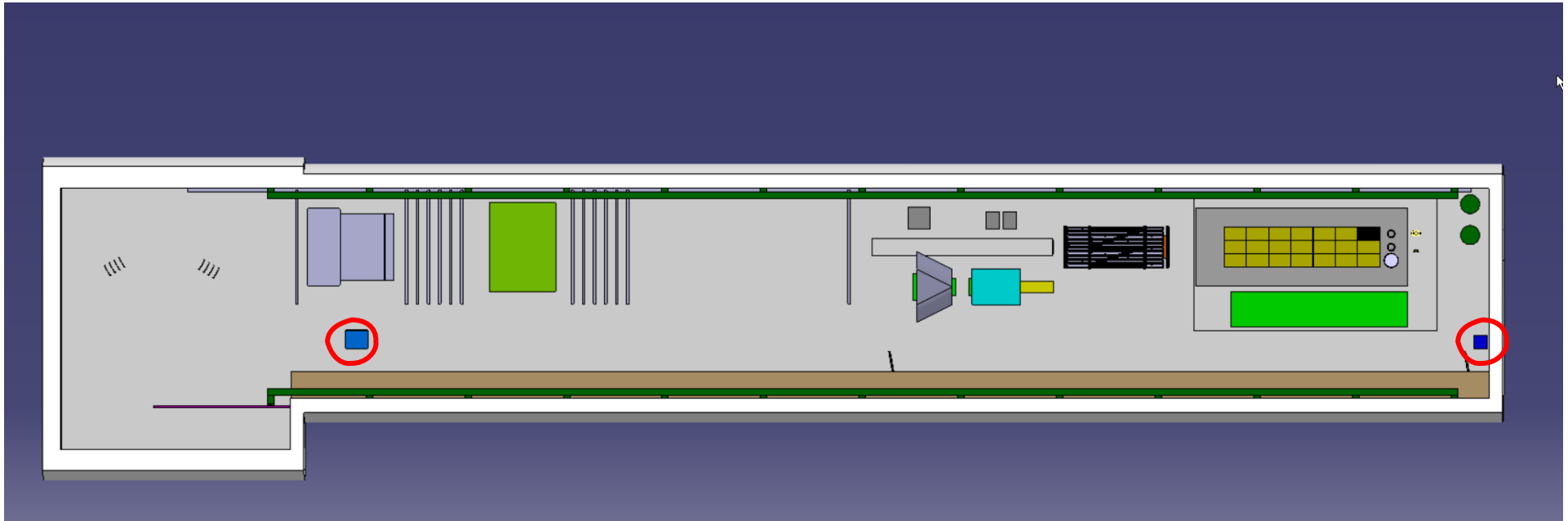




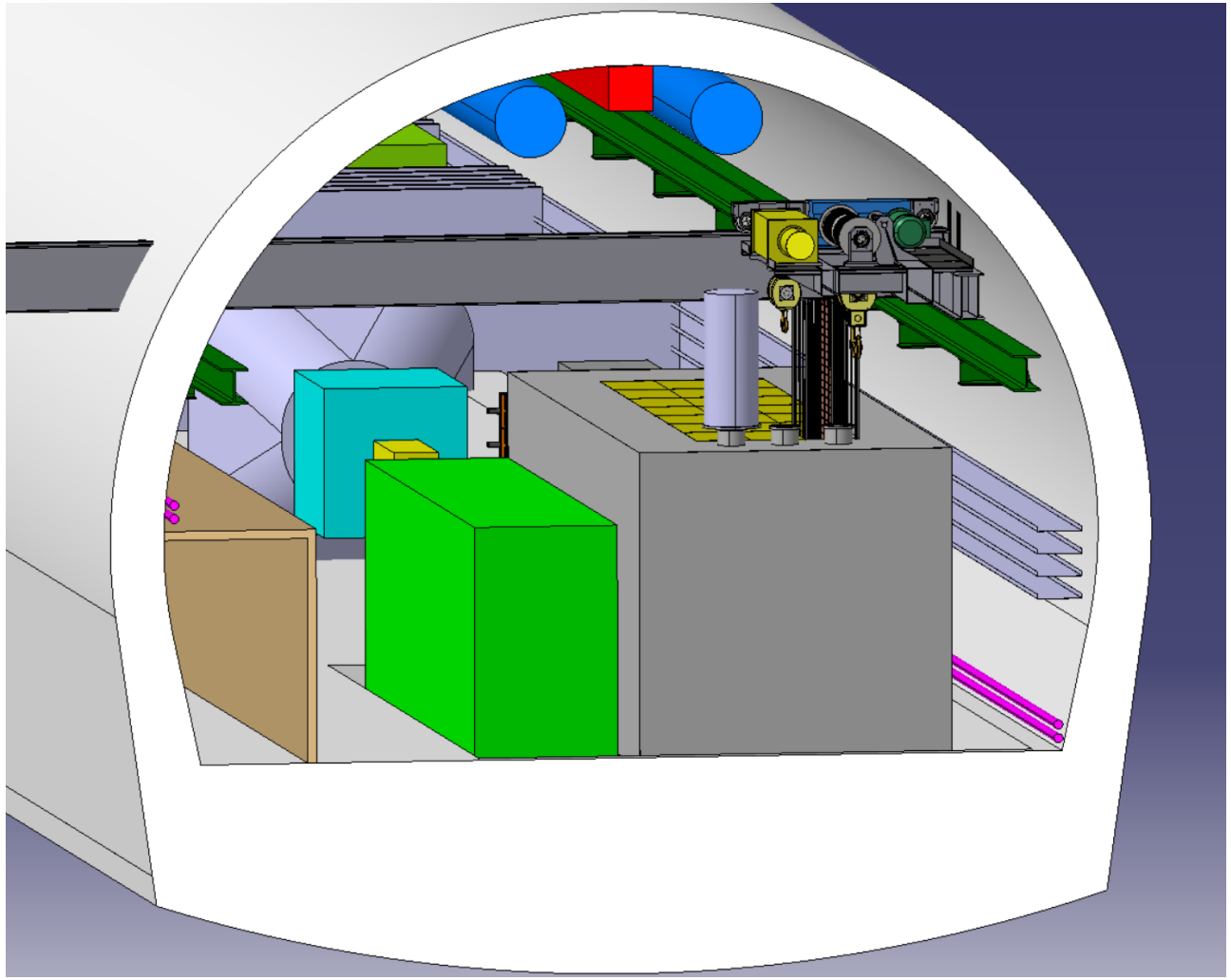
Critical aspects

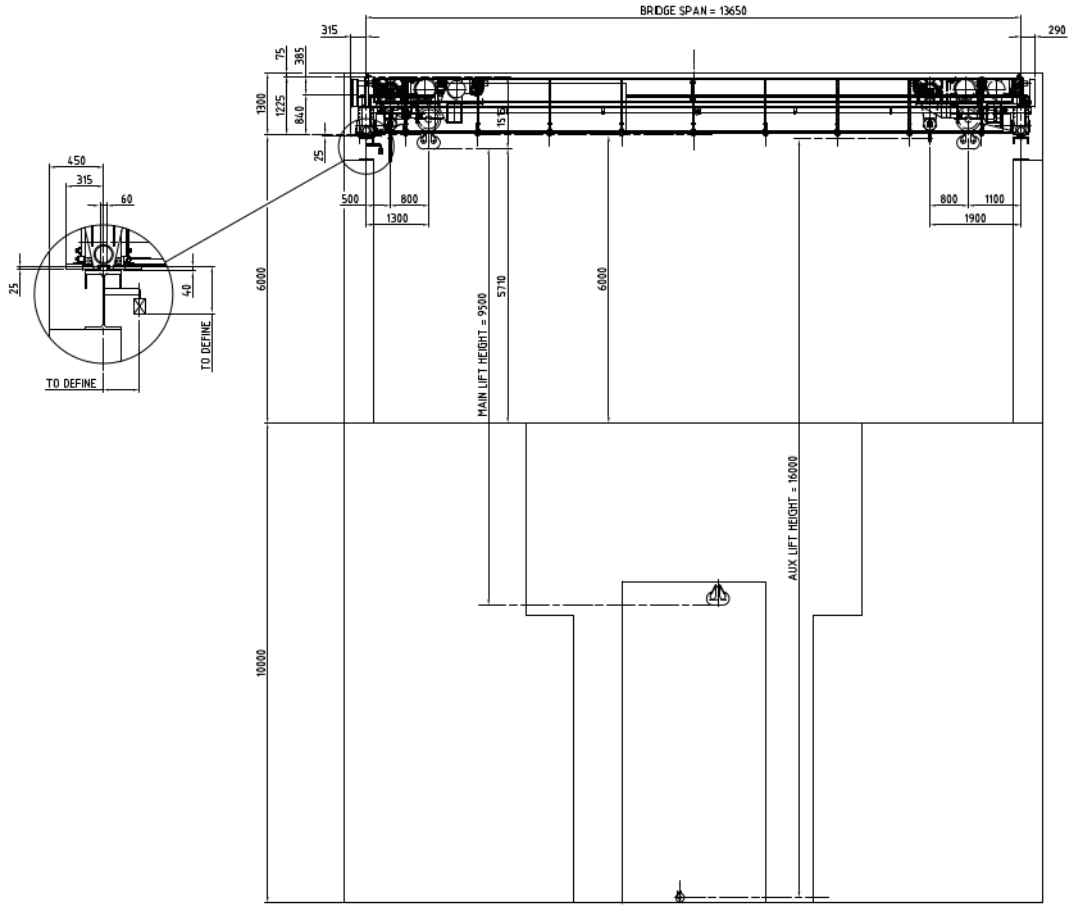
CABLE TRAYS and RACKS

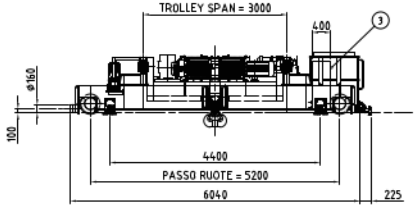
- For the racks need to check with RP (no space in the cavern)
- Can be on the surface building
- No place for the cable trays access (see the previous slide)

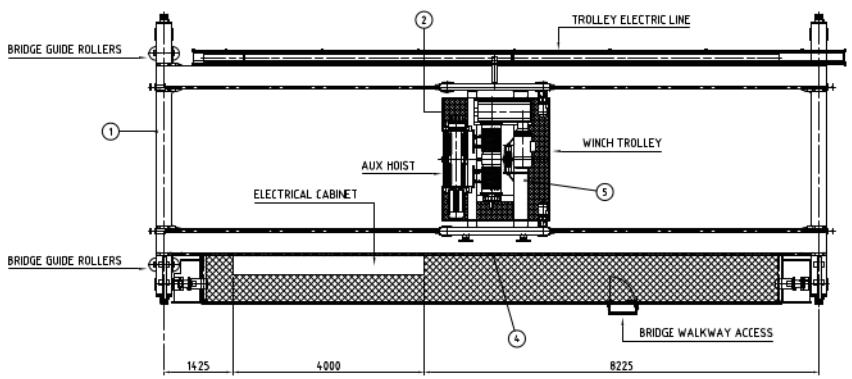


Transport

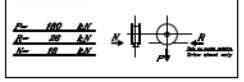








Static loads on crane wheels:



TECHNICAL CHARACTERISTICS	
MECHANISMS CLASS FEM-ISO	M4
STRUCTURE CLASS FEM-ISO	A4
INSTALLATION	COVERED
CRANE CAPACITY	kN 250 / 50
CAPACITY EACH WINCH TROLLEY	kN 250
BRIDGE SPAN	m 13.650
MAIN HOOK LIFTING	m 9.350
ROPE DIAMETER	mm 20
MAIN LIFTING SPEED	m/min 5-0.3 (INVERTER)
MAIN LIFTING POWER	kW 30
AUX LIFTING SPEED	m/min 6-0.6 (INVERTER)
AUX LIFTING POWER	kW 7.5
TROLLEY SPEED	m/min 10-0.5 (INVERTER)
TROLLEY POWER	kW 0.55 x 2
BRIDGE SPEED	m/min 35-1 (INVERTER)
BRIDGE POWER	kW 2.2 x 2
AMBIENT TEMPERATURE	°C +40 / -0
MAIN VOLTAGE	400V/50Hz
AUX VOLTAGE	110V/50Hz
CONTROL SYSTEM	RADIO REMOTE CONTROL
BRIDGE WHEELS	Nr 4 ø400mm
TROLLEY WHEELS	Nr 4 ø250mm

Pos	Qtà	Descrizione	Materiale	UNI/Marca	Disegno	Peso
5	1	TROLLEY LIFTING PLATES ASSEMBLY			APS105691R0	46
4	1	BEAM LIFTING PLATES ASSEMBLY			APS105690R0	92
3	1	ELECTRIC APPLIANCES ASSEMBLY			AAE105685R1	75
2	1	WINCH TROLLEY ASSEMBLY			ACA104439R0	4585
1	1	BRIDGE ASSEMBLY			AAG104458R2	11615

16350 — Peso kg — 4:1 — Tolerance generale

N°	Data	Modifica	Sigla
00	15/09/14	Modified access	MC
01	07/11/15	Added electric appliances/ lifting plates	MC

DOUBLE GIRDER BRIDGE CRANE ASSEMBLY
CAPACITY = 250/50 kN SPAN = 13.650 m

Bonfanti INTEGRATED HANDLING SOLUTIONS

Disegnato MB
Verificato
Approvato
Data 11/09/2015
Scala 1:50
Commessa 11003
Dis.N°AAG104468R2

Contacts

- RP – Angelo Infantino
- CV – Roberto Bozzi
- Transport HE – Roberto Rinaldesi
- FORMOSA – Chris Hill
- FLARE – Steven Linden & Connor
- FASER2 – Jamie
- FASERnu2
- AdvSND