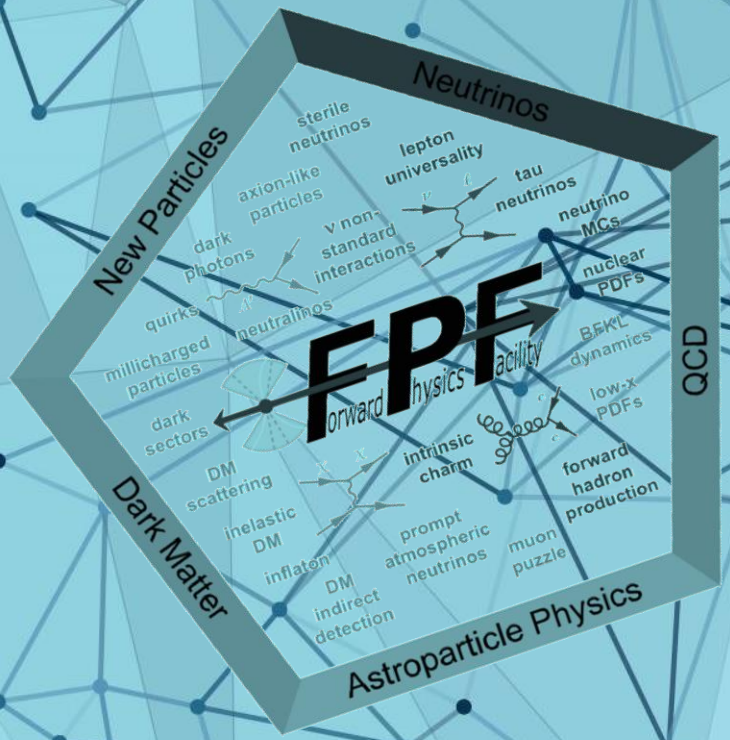
ENGINEERING DEPARTMENT

ACTEMIUM

Forward Physics Facility Integration

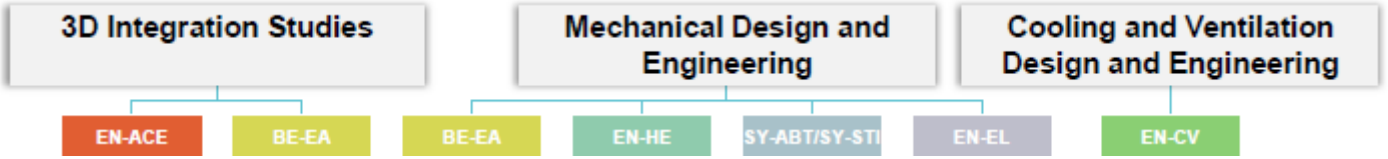
9th FPF Meeting



The presentation is the result of the joint work of many experts from CERN and collaborative institutes

Julien Prosic

March 5th, 2026

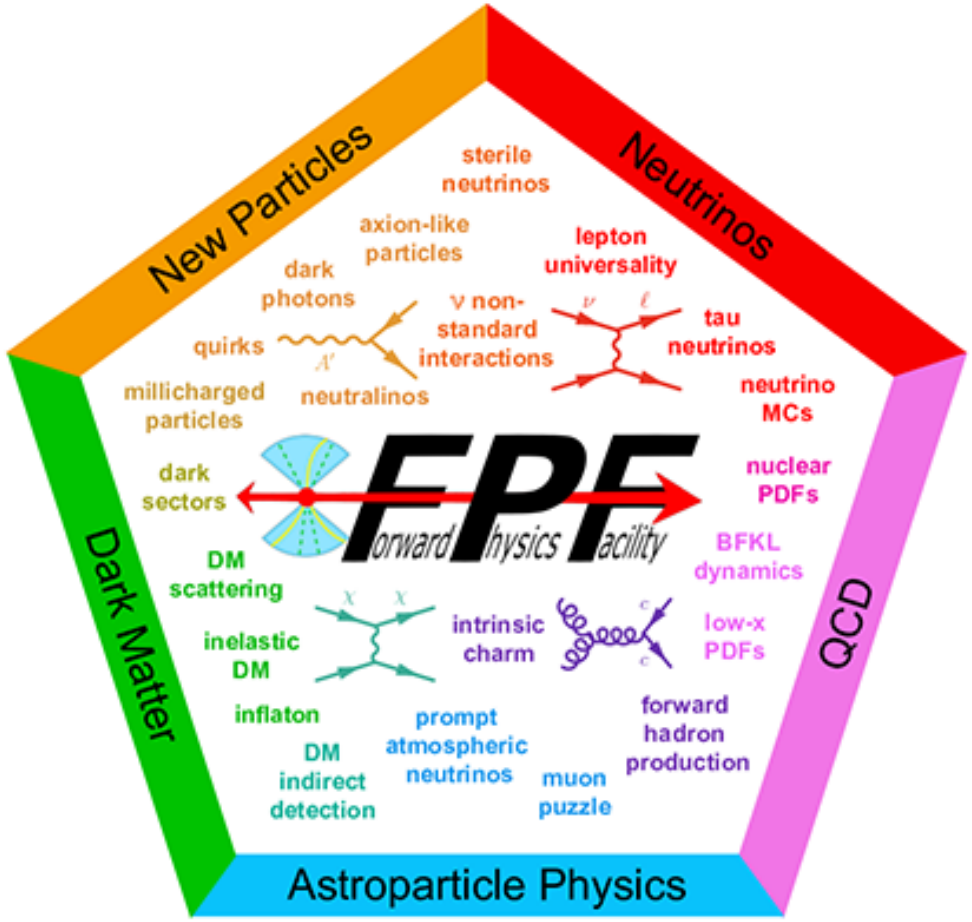


EN-ACE Integration design Office: Accelerator Coordination and Engineering

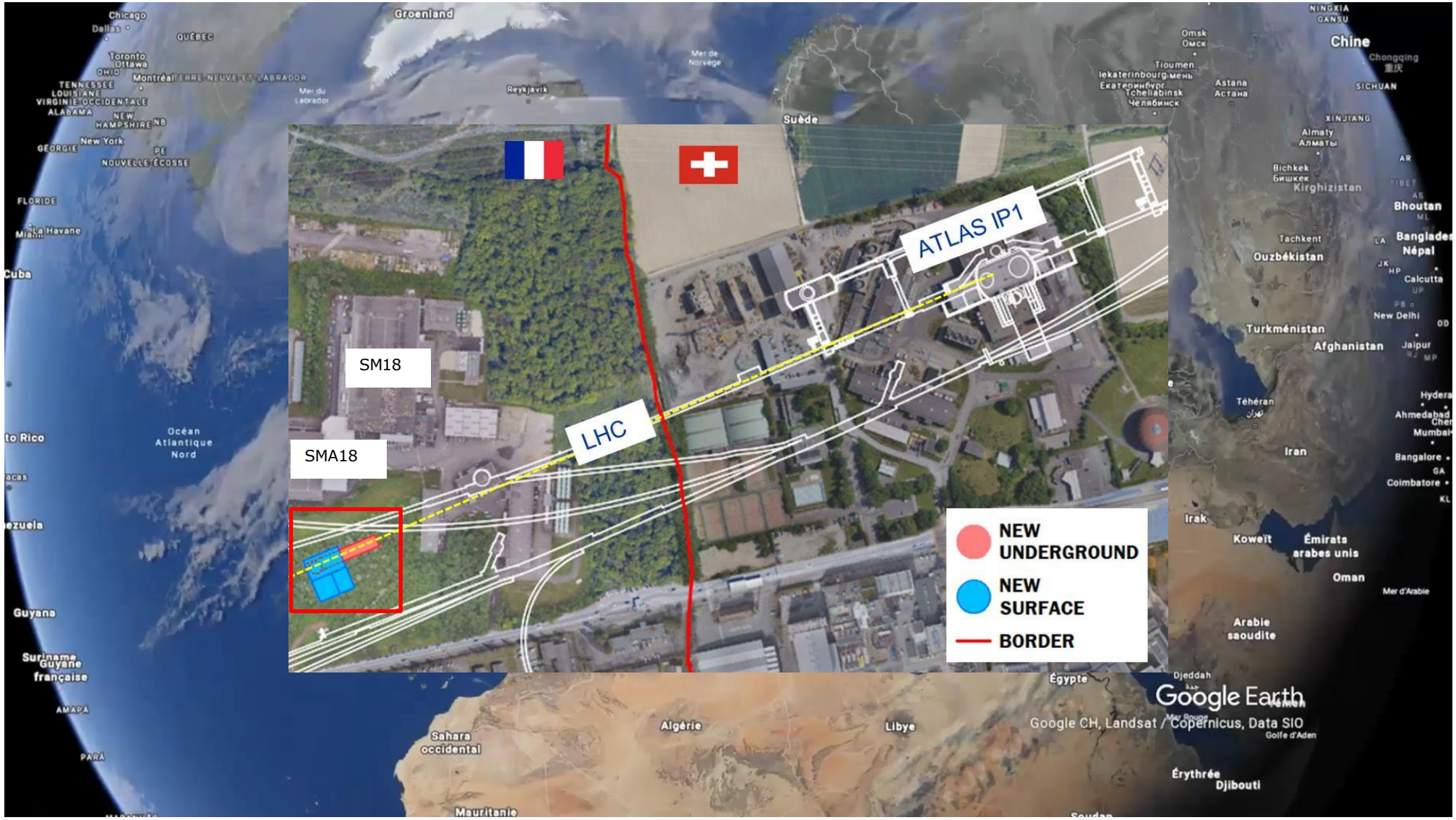
The 3D integration office for the accelerators is responsible for collecting, centralizing, and checking the 3D models provided by CERN design offices such as equipment owners, electrical, civil engineering, metallic structure, transport, handling, cooling, and ventilation services. This office manages 3D space and avoid any interferences before and during the installation phase.

Content

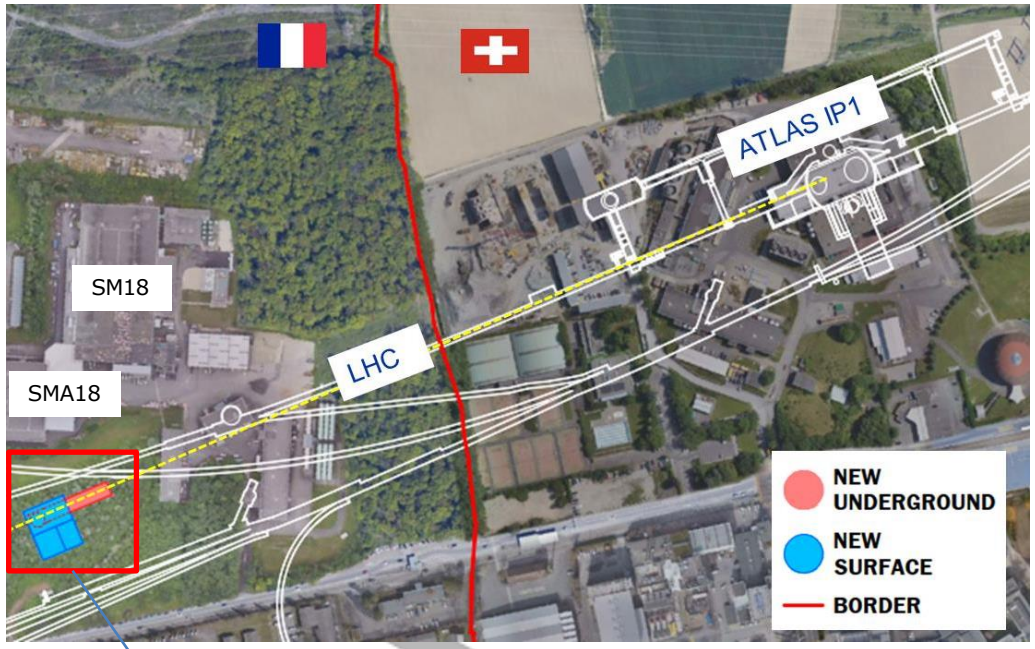
- Overview and global layout
- FPF experiments
- Integration of the services
- Safety items integration
- Collaboration with experiments experts
- Summary
- Next steps



Location


ATLAS IP1
LHC
SM18
SMA18
NEW UNDERGROUND
NEW SURFACE
BORDER
Google Earth
Google CH, Landsat / Copernicus, Data SIO

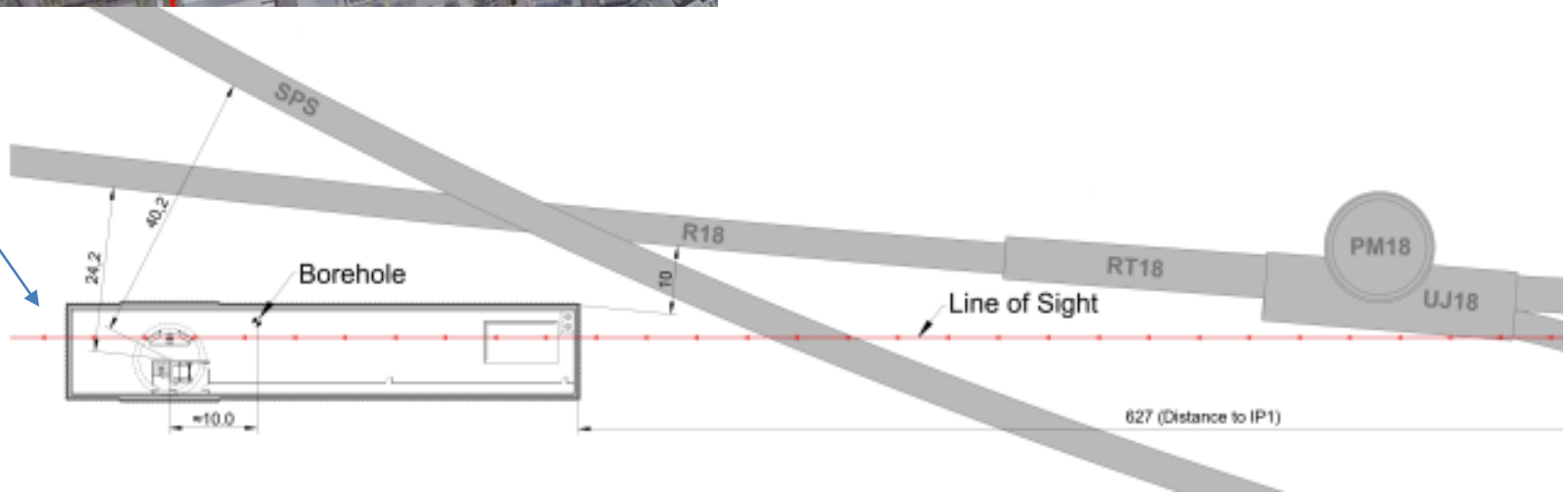
Overview



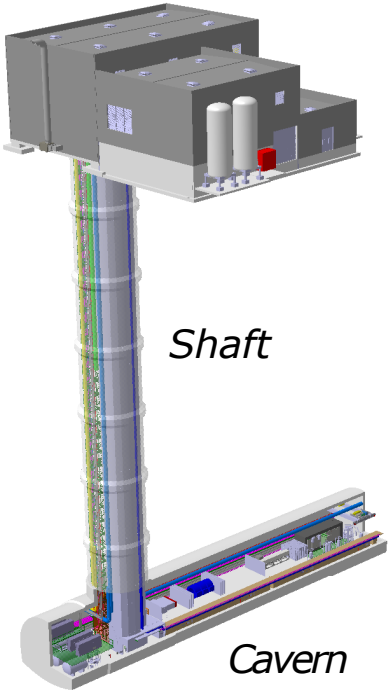
- FPF - Forward Physics Facility:

To build a new facility to test new physics

- Final location to respect constraints:
  - ✓ 627 m from ATLAS IP1 on the French side of CERN land
  - ✓ 90 m depth
  - ✓ 10 m away from the LHC tunnel



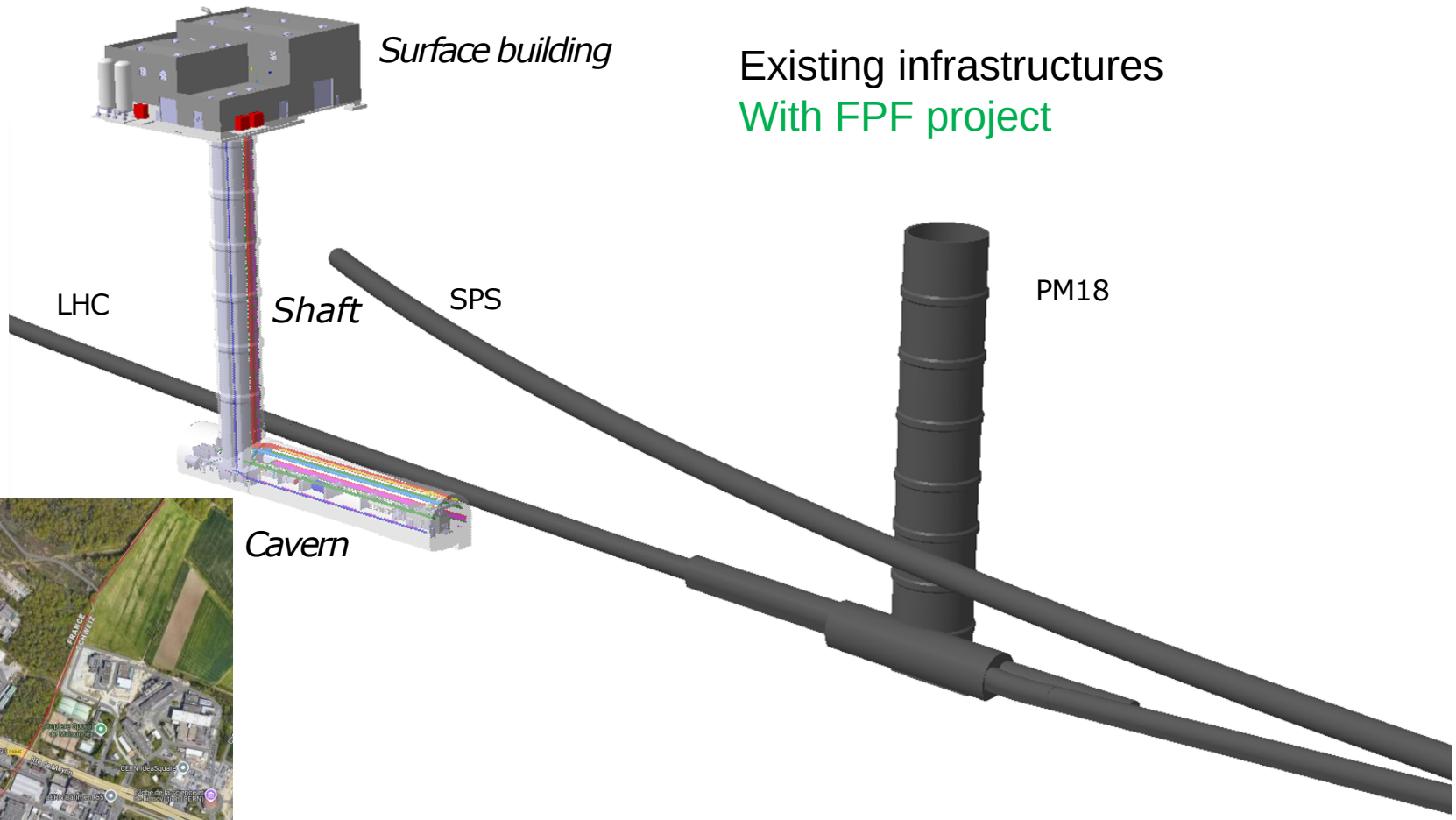
Surface building



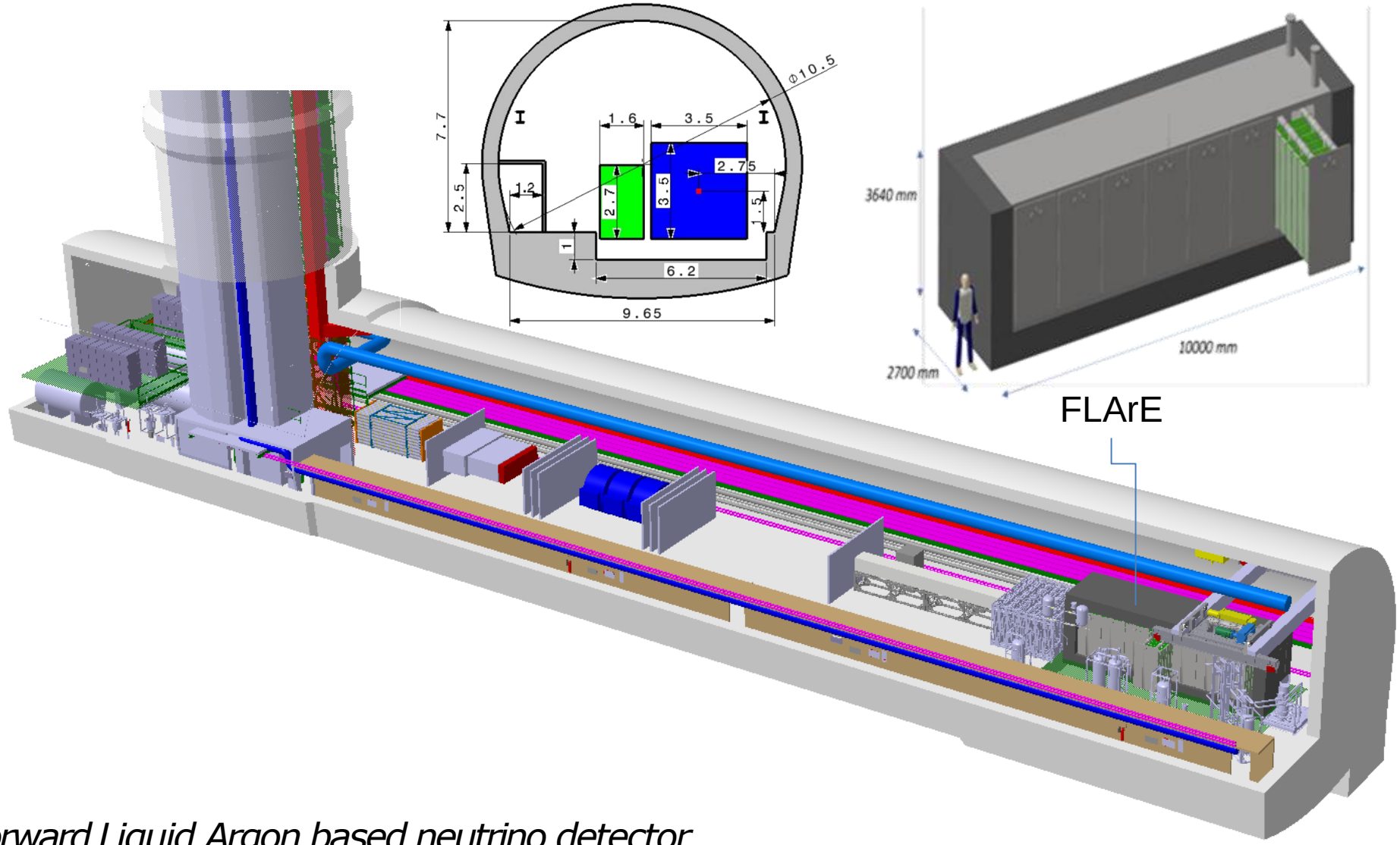
Shaft

Cavern

Overview

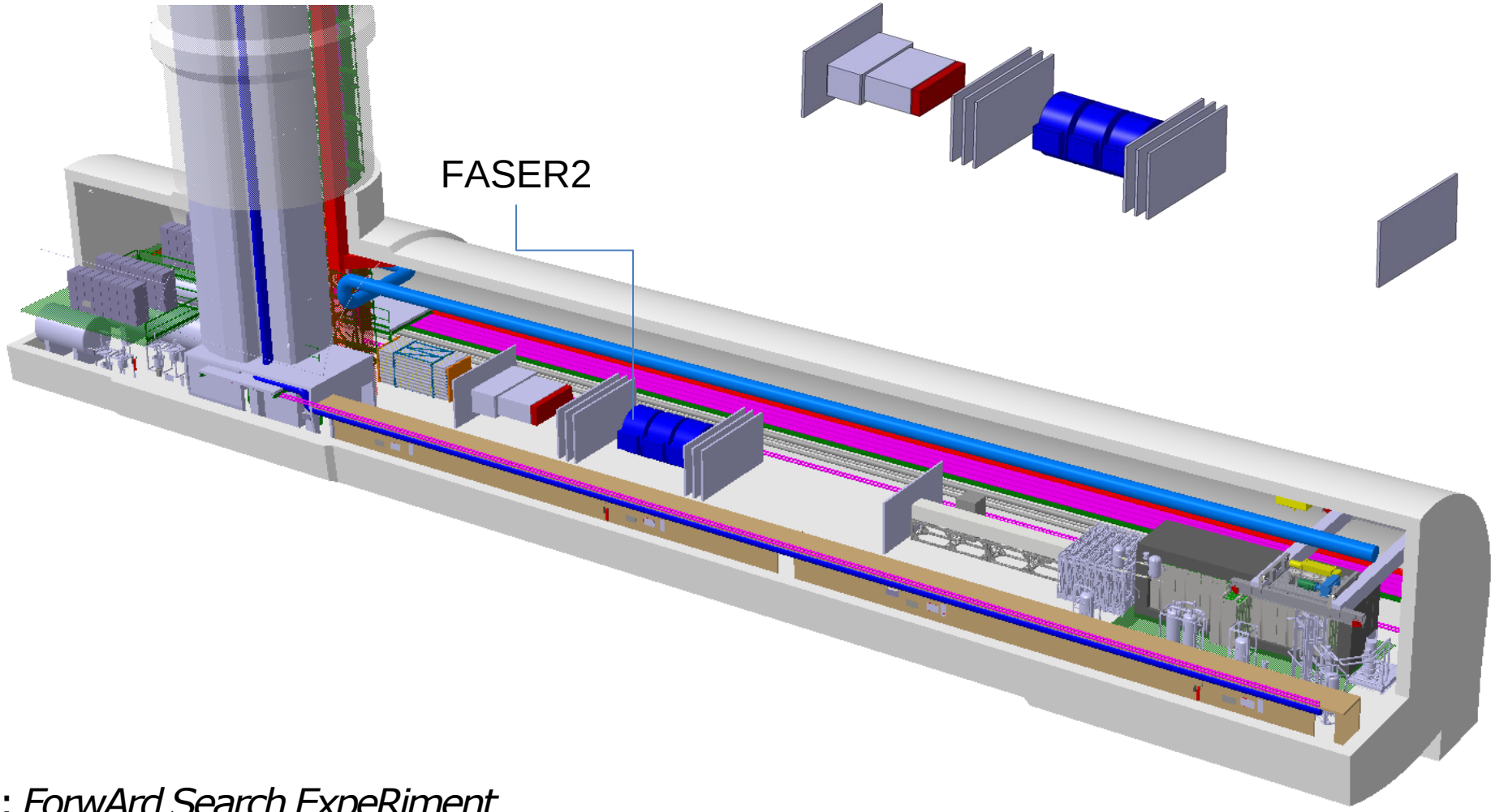

Surface building
Existing infrastructures
With FPF project
LHC
Shaft
SPS
PM18
Cavern

FPF Experiments



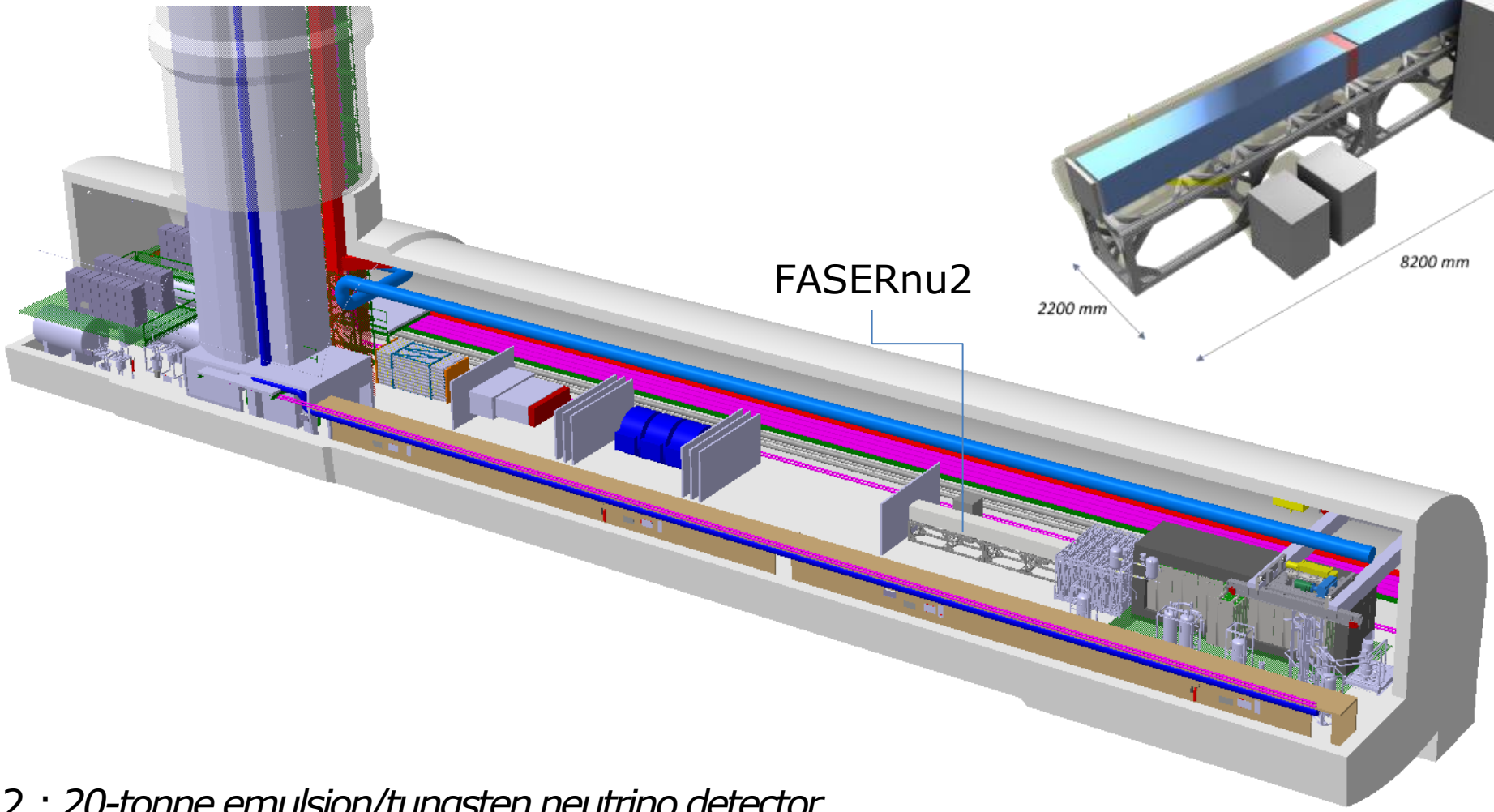
FLArE: *Forward Liquid Argon based neutrino detector*

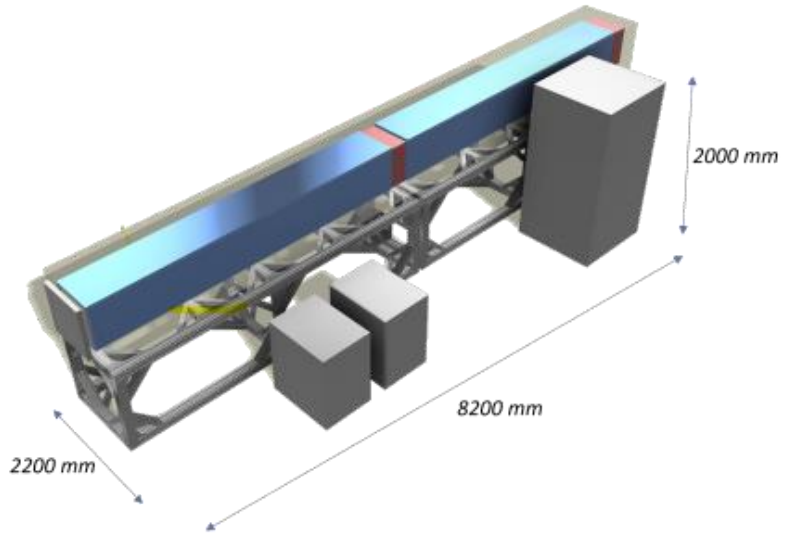
FPF Experiments



FASER2 : *ForwArd Search ExpeRiment*

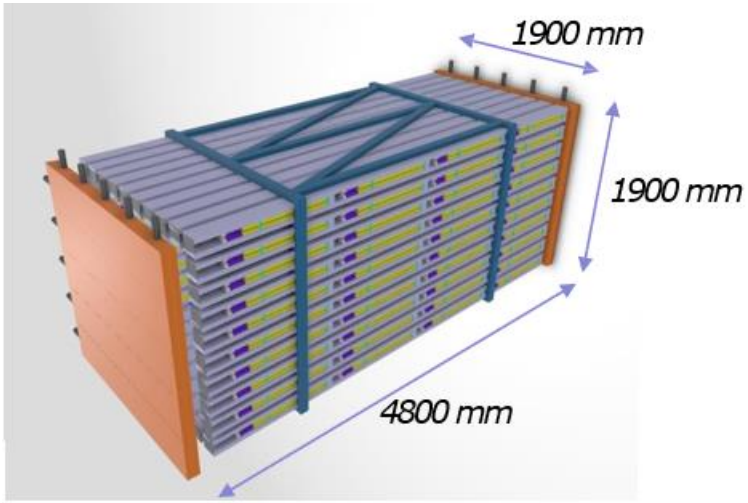
FPF Experiments

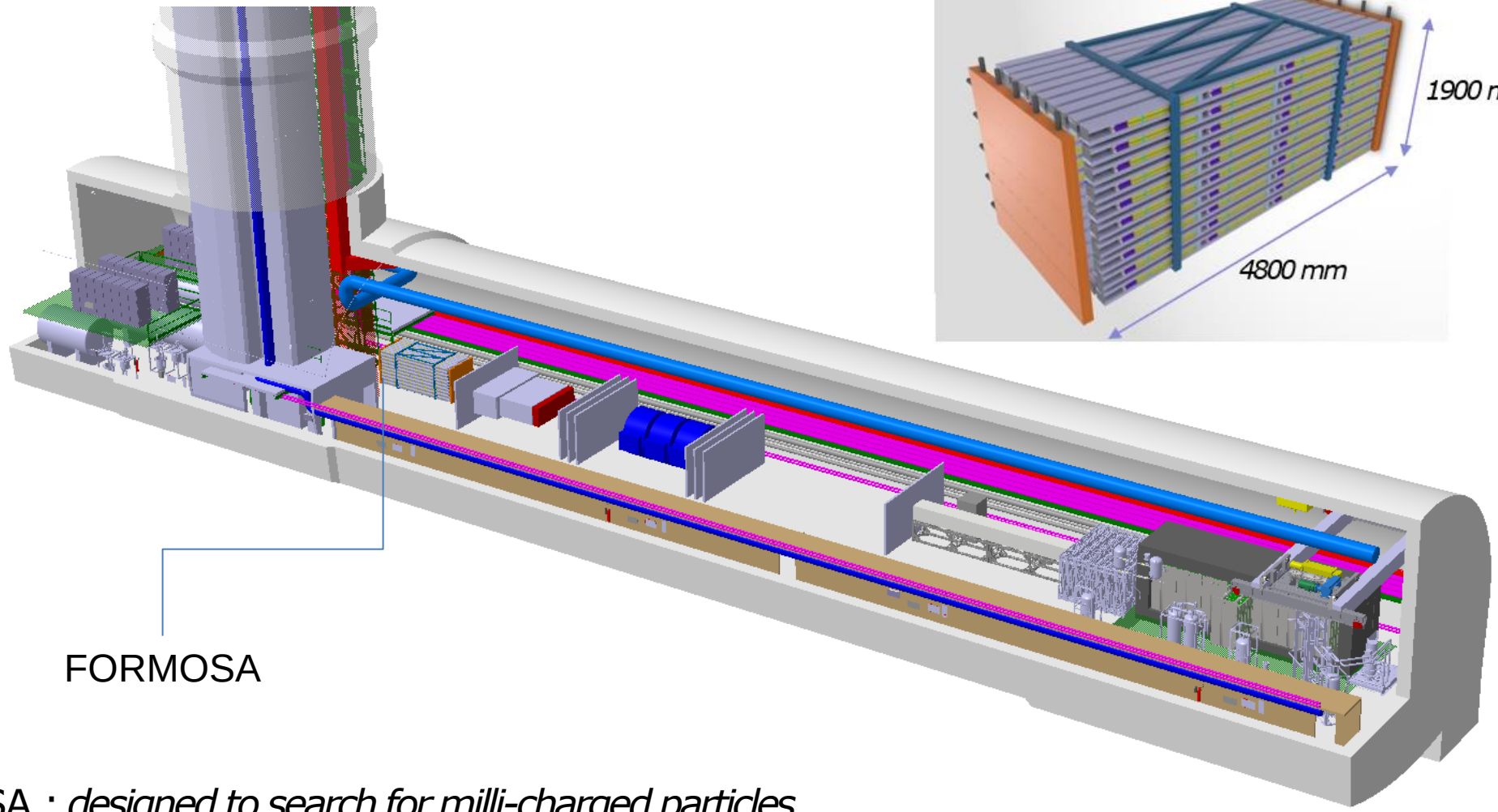




FASERnu2 : *20-tonne emulsion/tungsten neutrino detector*

FPF Experiments

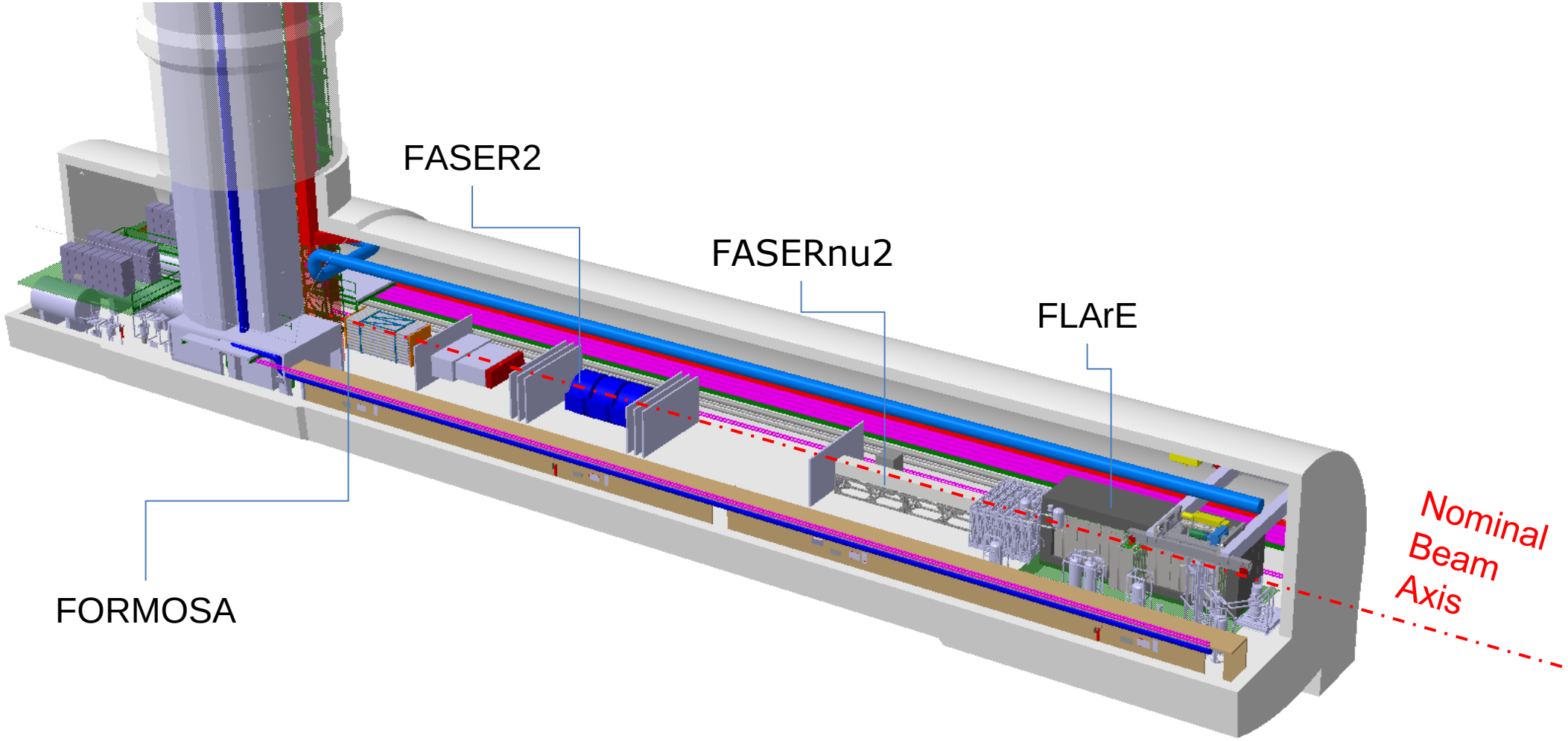




FORMOSA : *designed to search for milli-charged particles*

FPF Experiments

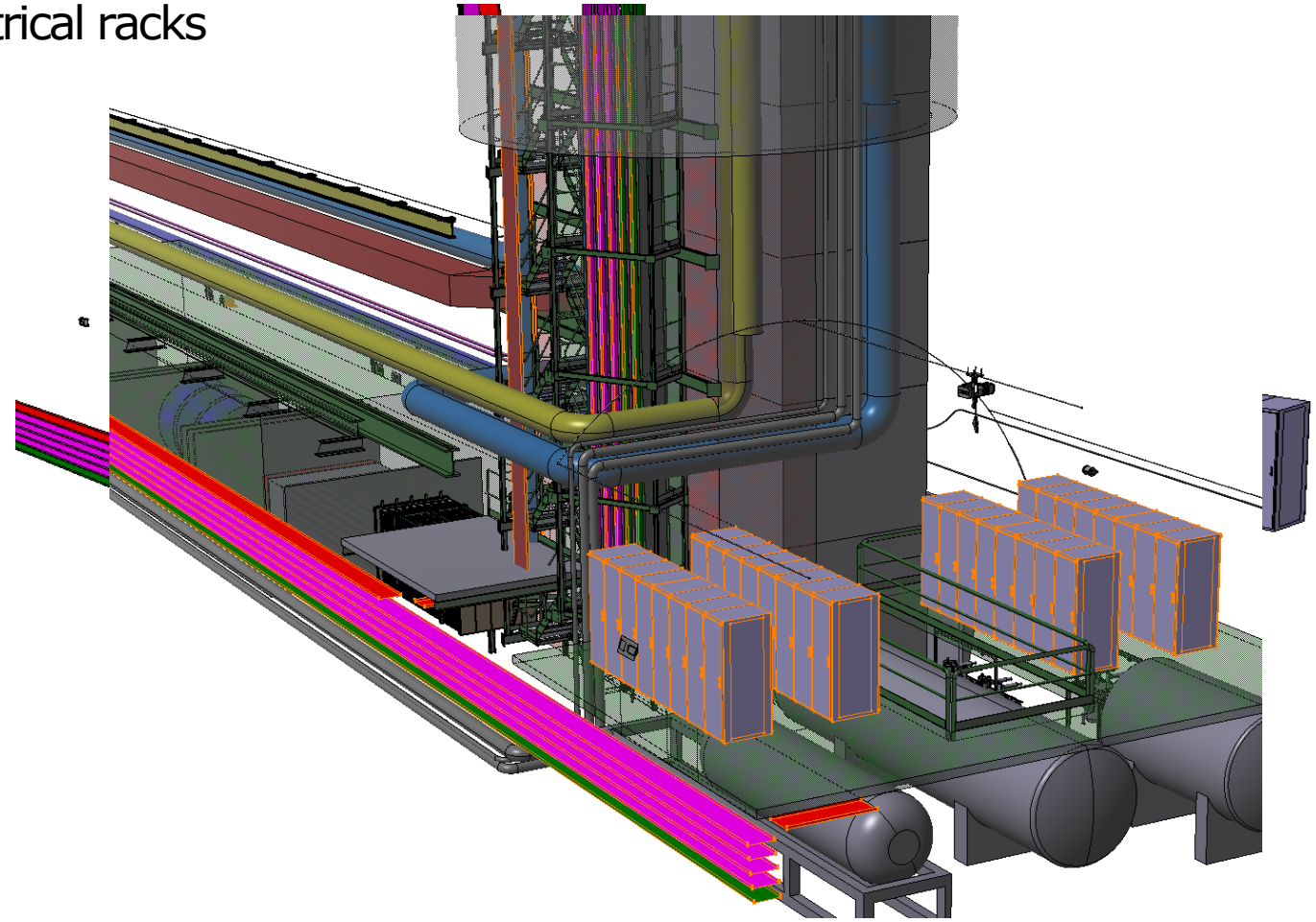
4 proposed FPF experiments, diverse detectors for a broad physics program

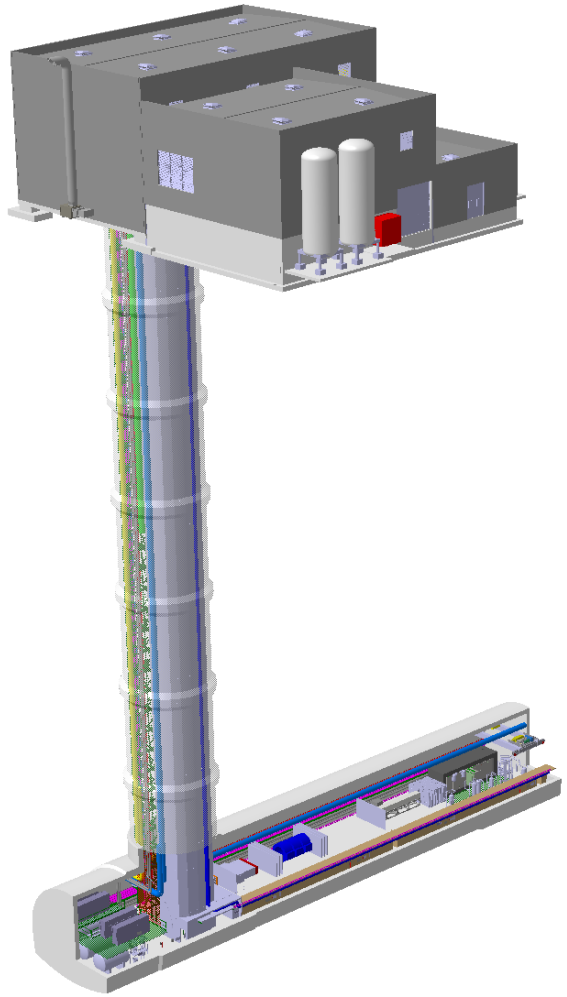


FPF services

Electrical services (EN-EL)

- Cable trays
- Electrical racks





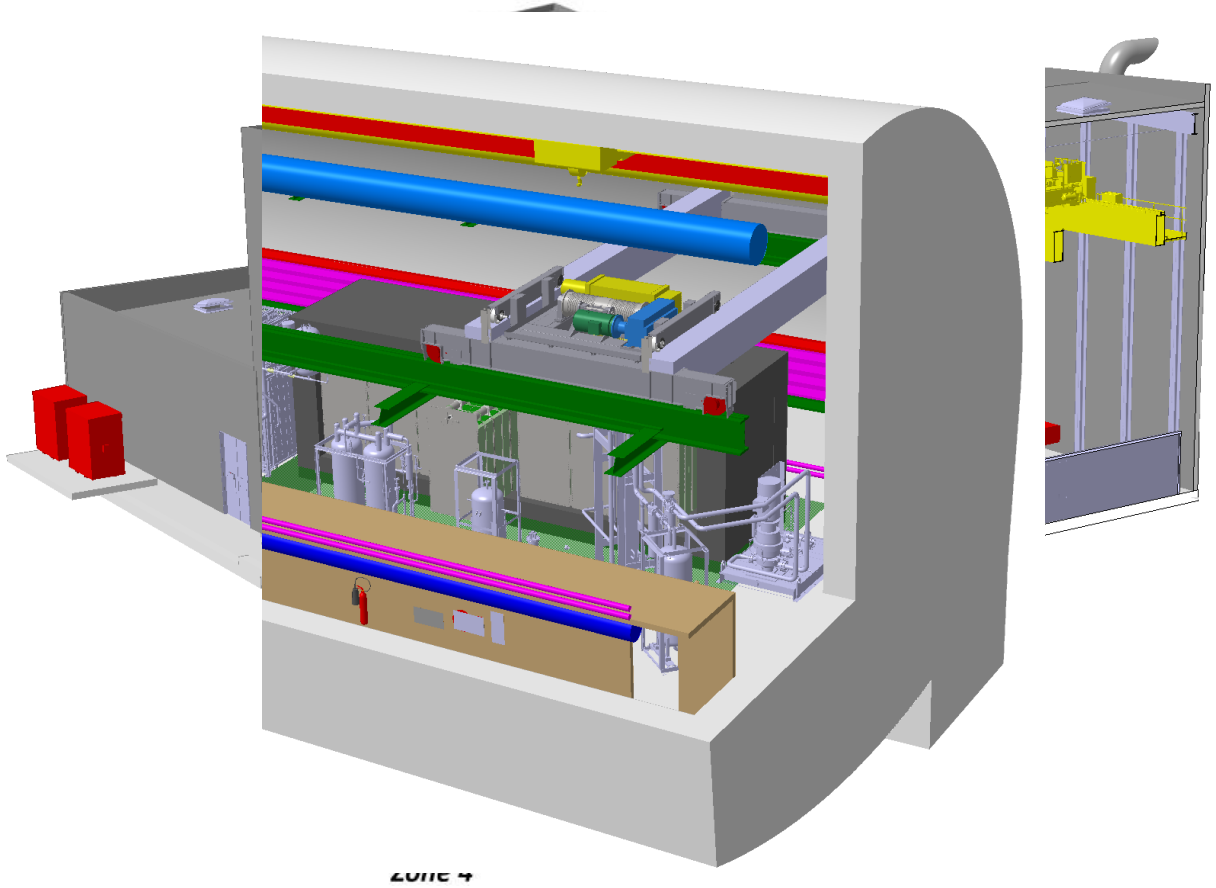
Design and cost optimization in progress

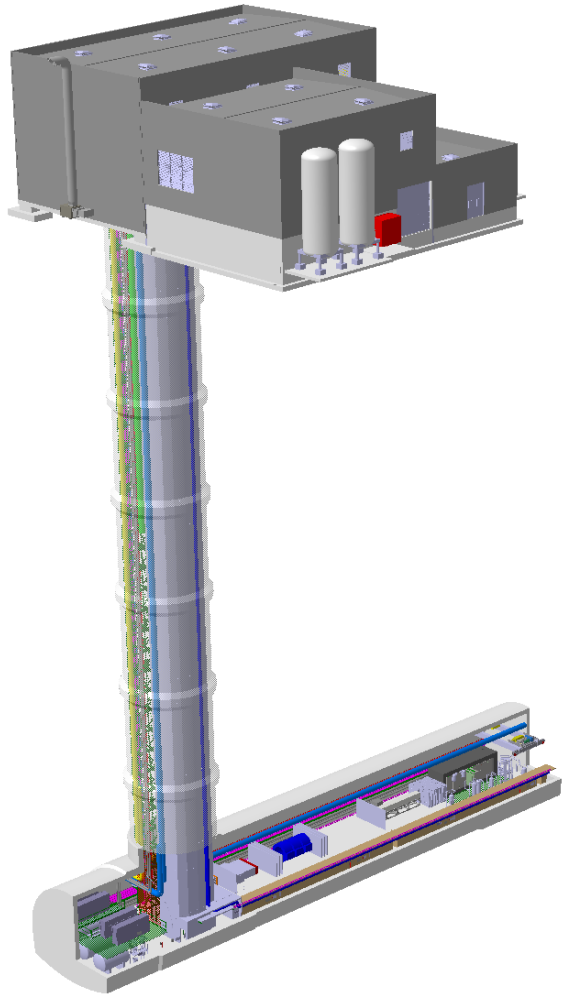
Note: *Input on number of cable trays and electrical racks needed from experiments.*

FPF services

Transport (EN-HE)

- Transport zones to be defined and shared
- Cranes in surface building and cavern





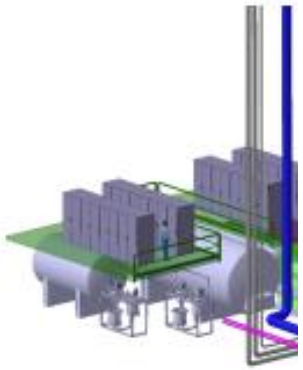
Design and cost optimization in progress

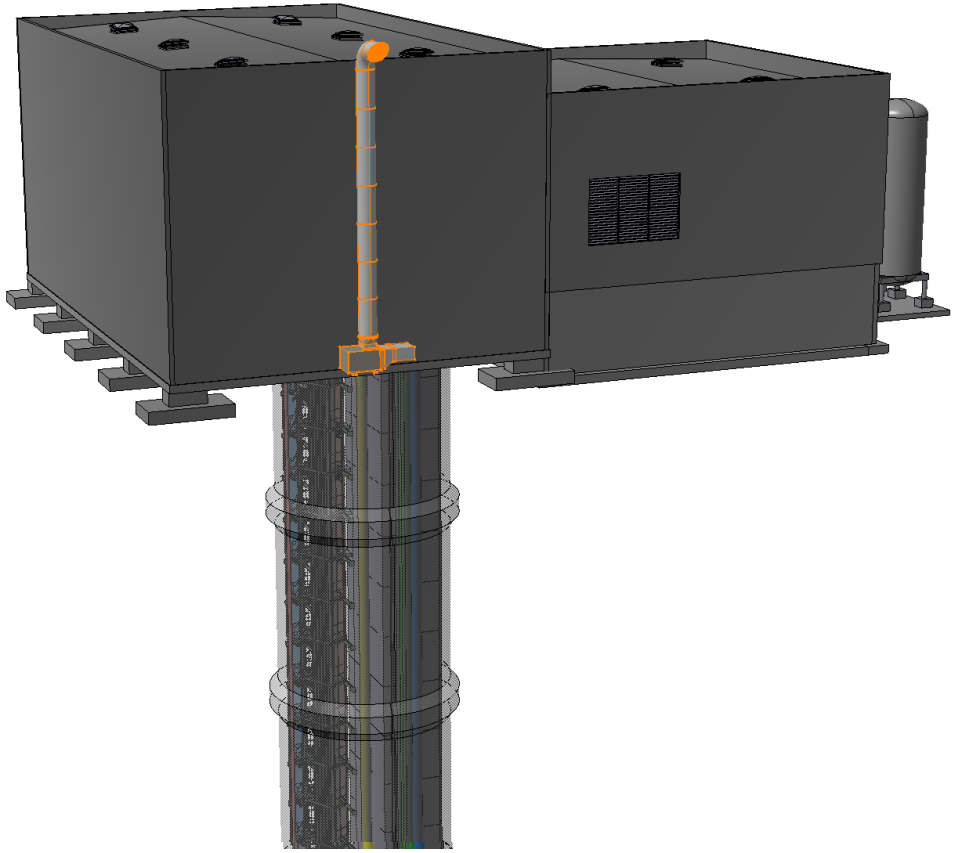
Note: *CERN-PBC-Notes-2024-004, https://cds.cern.ch/record/2904086*

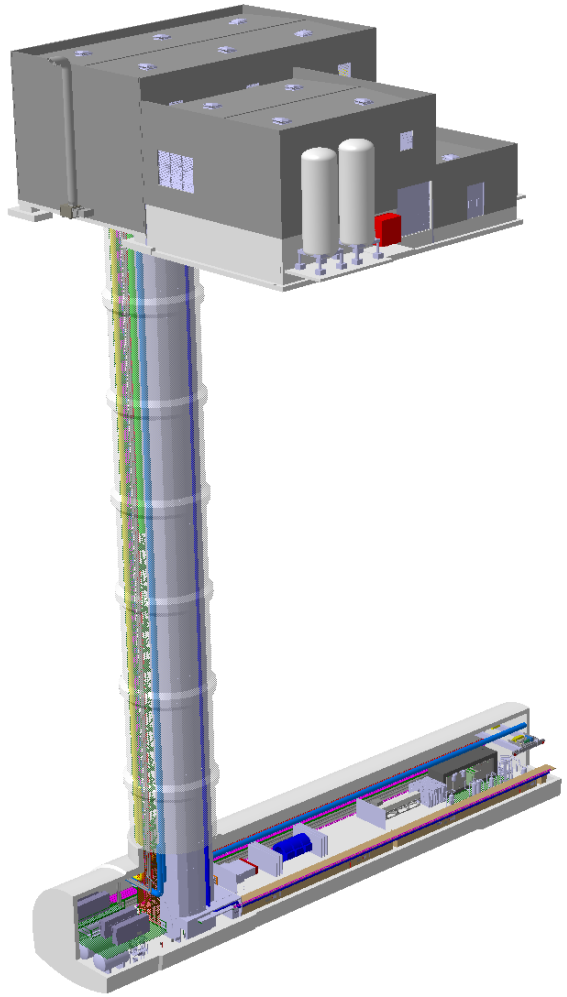
FPF services

Cooling/Ventilation (EN-CV)

- Smoke extraction
- Argon extraction
- Pressurisation
- Fresh air supply







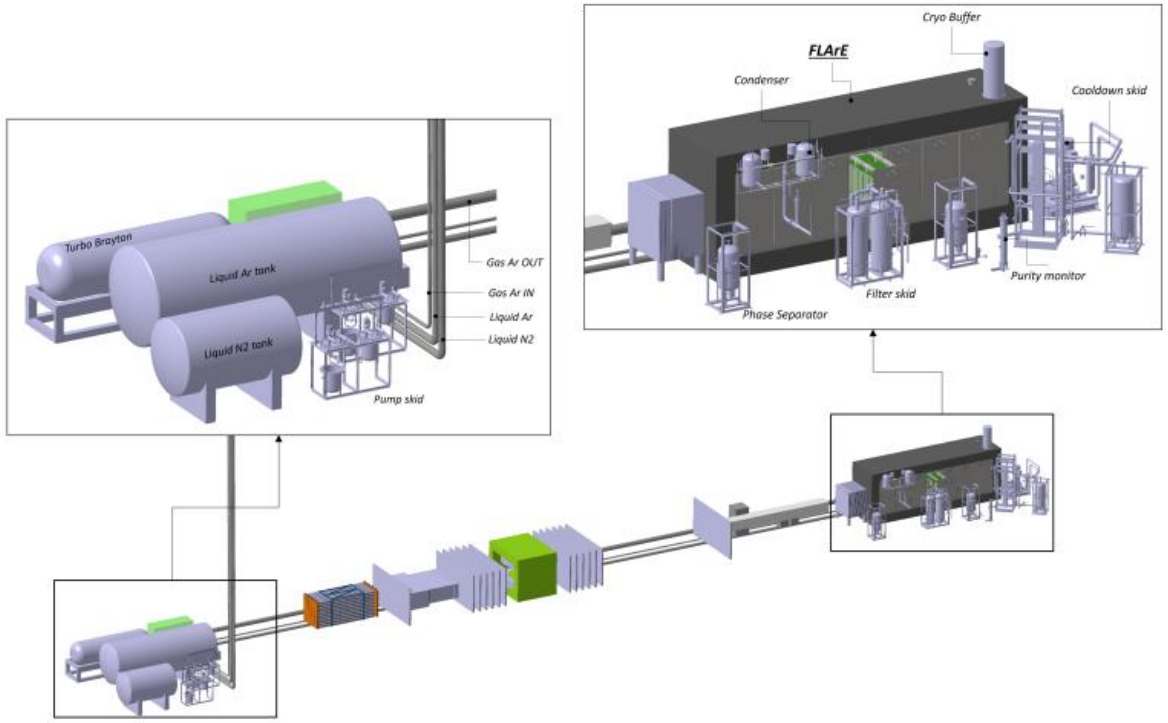
Design and cost optimization in progress

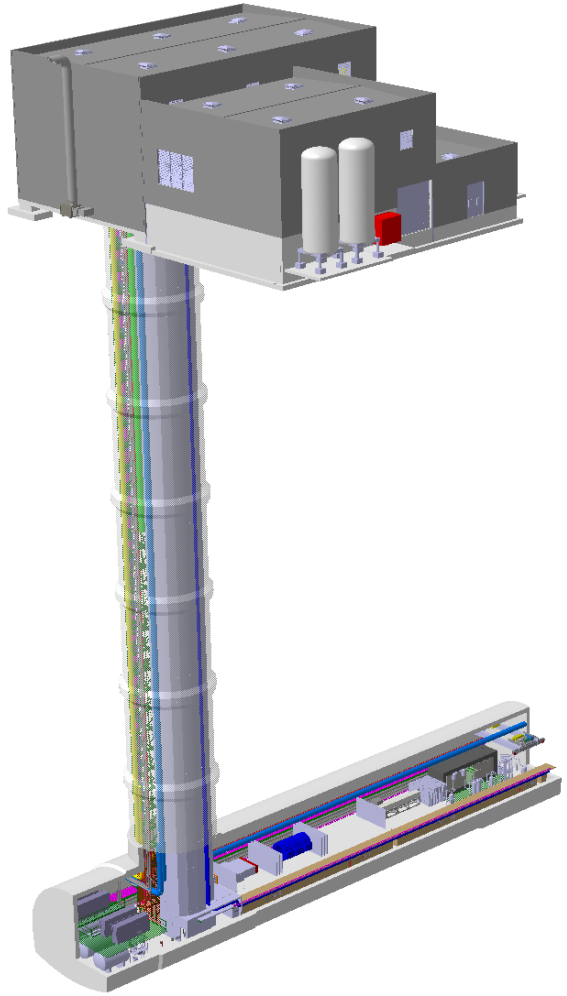
Note: *Conceptual design by EN-CV documented in: https://edms.cern.ch/document/2801032/1*

FPF services

Cryogenics

- Turbo-Brayton cooling unit
- Argon storage tank
- Piping for transporting cryogenic liquid from surface into cavern



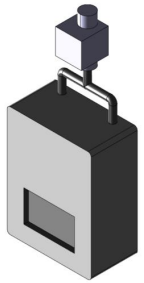


Design and cost optimization in progress

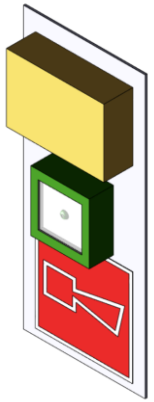
Note: *the cryogenics is needed for the FLArE detector*

Safety items integration

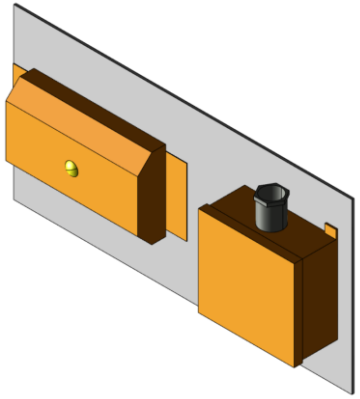
Surface Building:



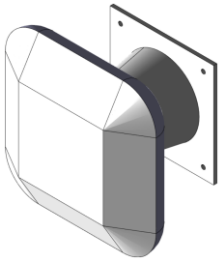
Fire detector



Evacuation panel

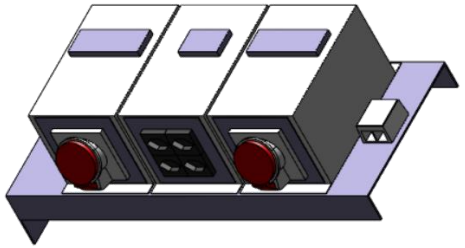


Anti Panic light

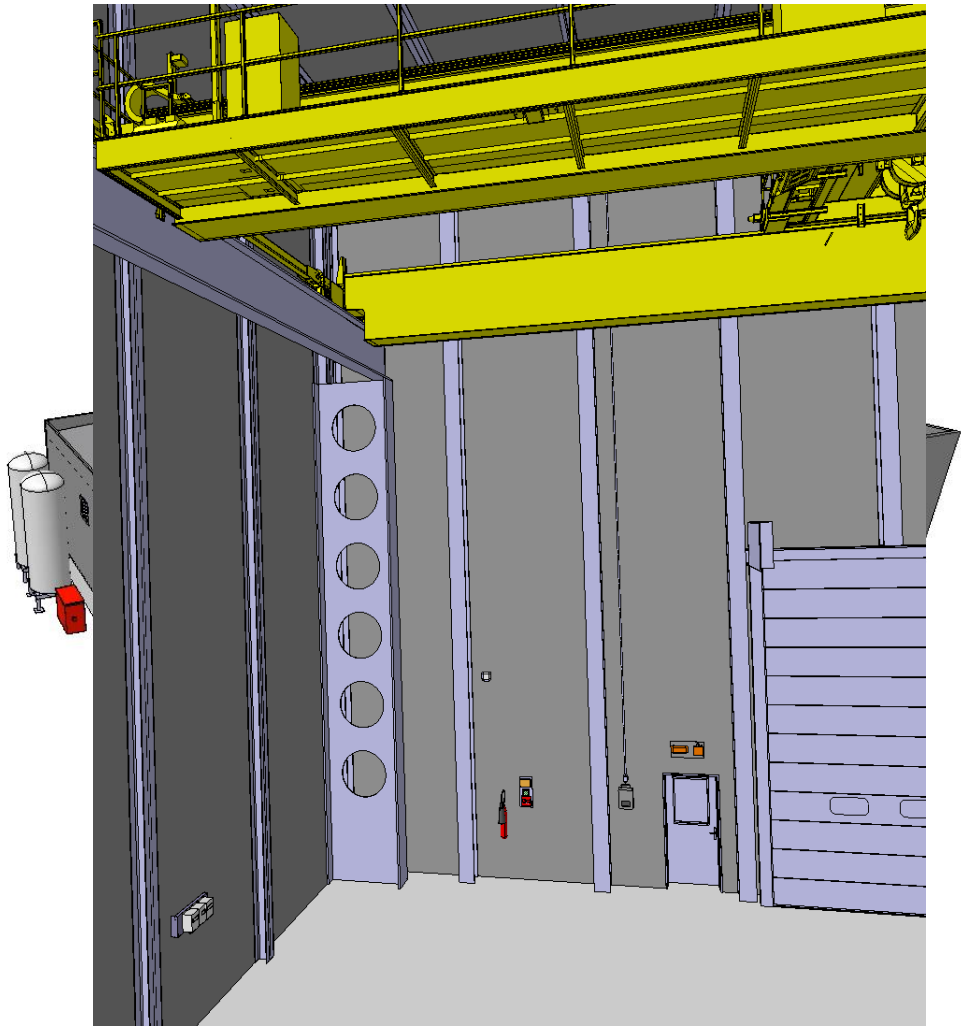


WIFI

Fire extinguisher



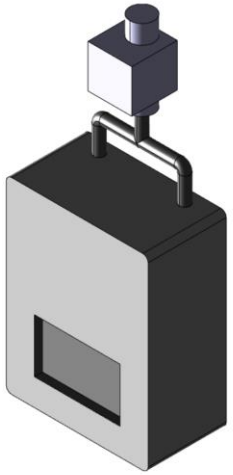
Electrical boxes

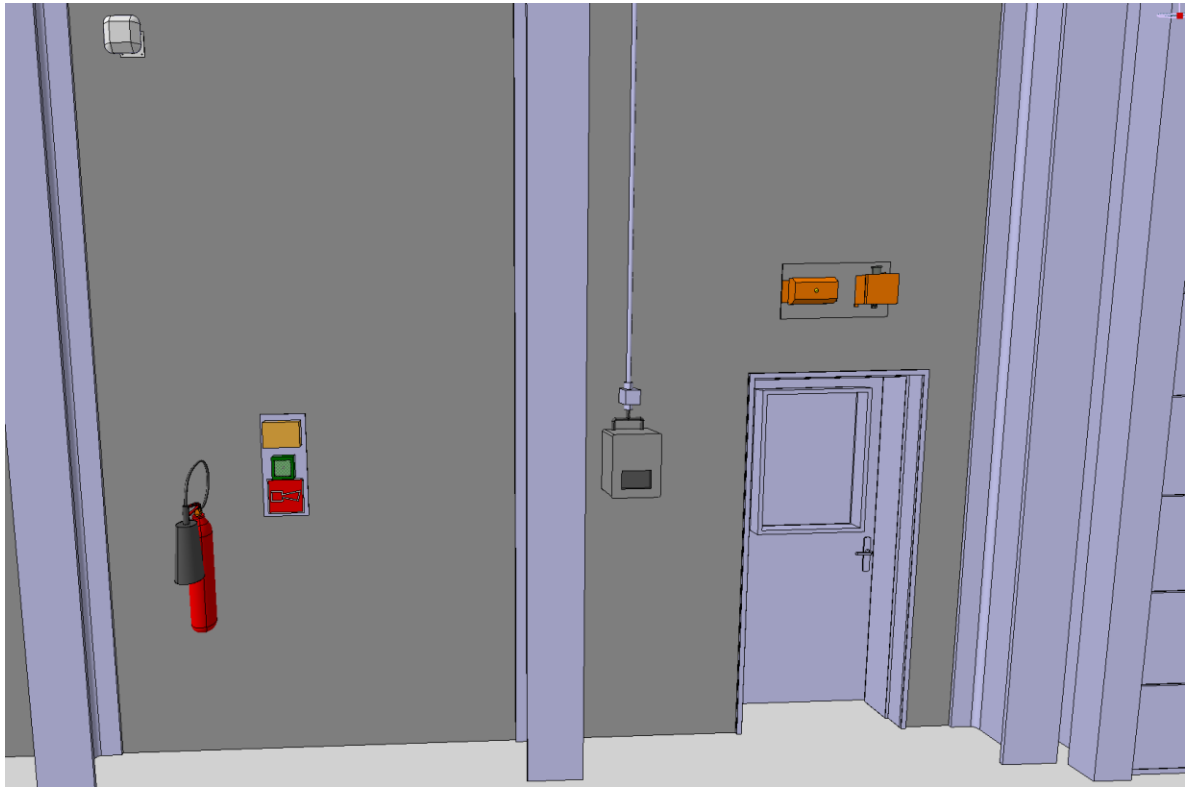


Safety items integration

Surface Building: fire detection in each room

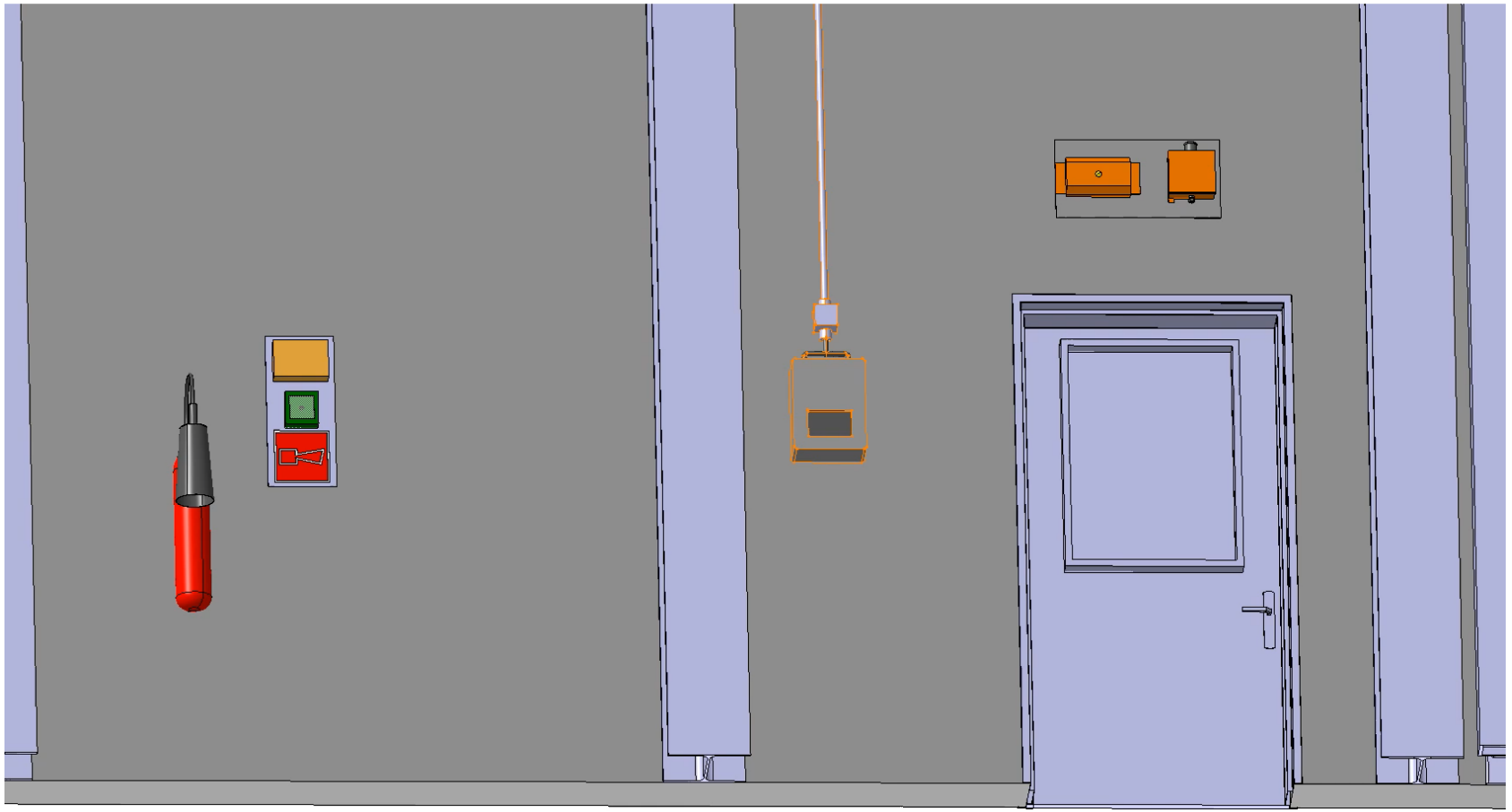
Fire detector





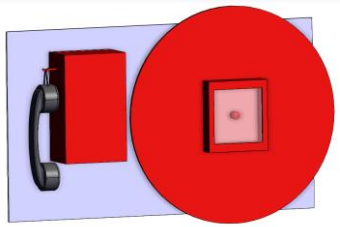
Safety items integration

Surface Building: fire detection in each room

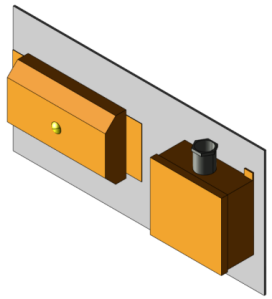


Safety items integration

Cavern: electricity connection, safety items

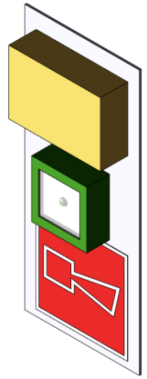


Emergency panel

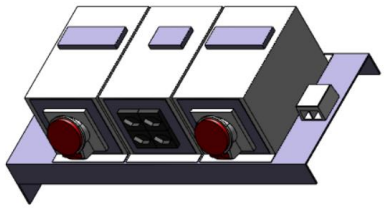


Anti Panic light

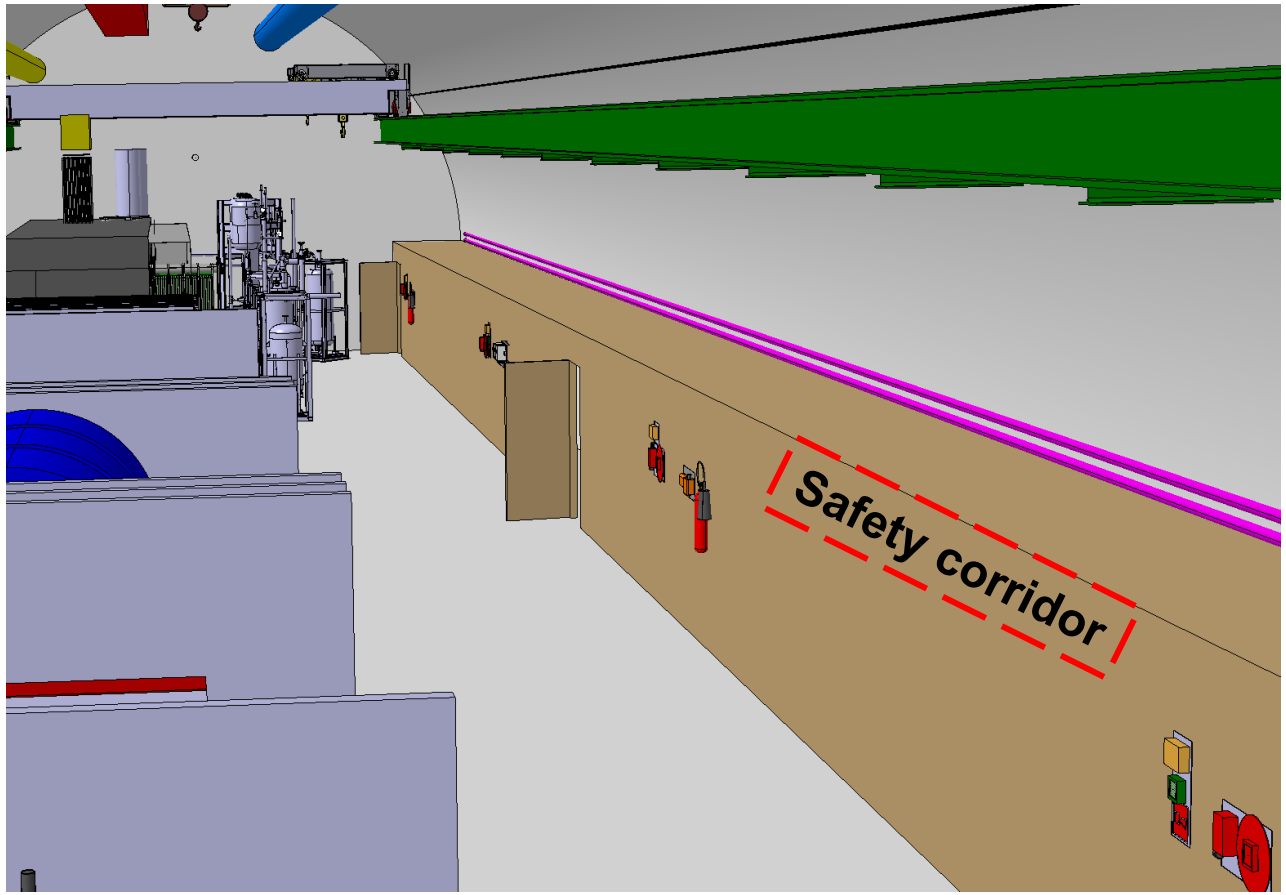
Fire extinguisher



Evacuation panel



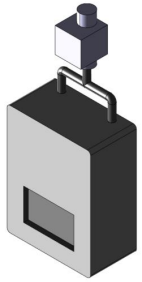
Electrical boxes



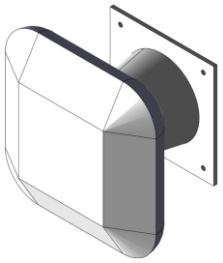
Safety items integration

Cavern: GSM cable, WIFI, fire detection

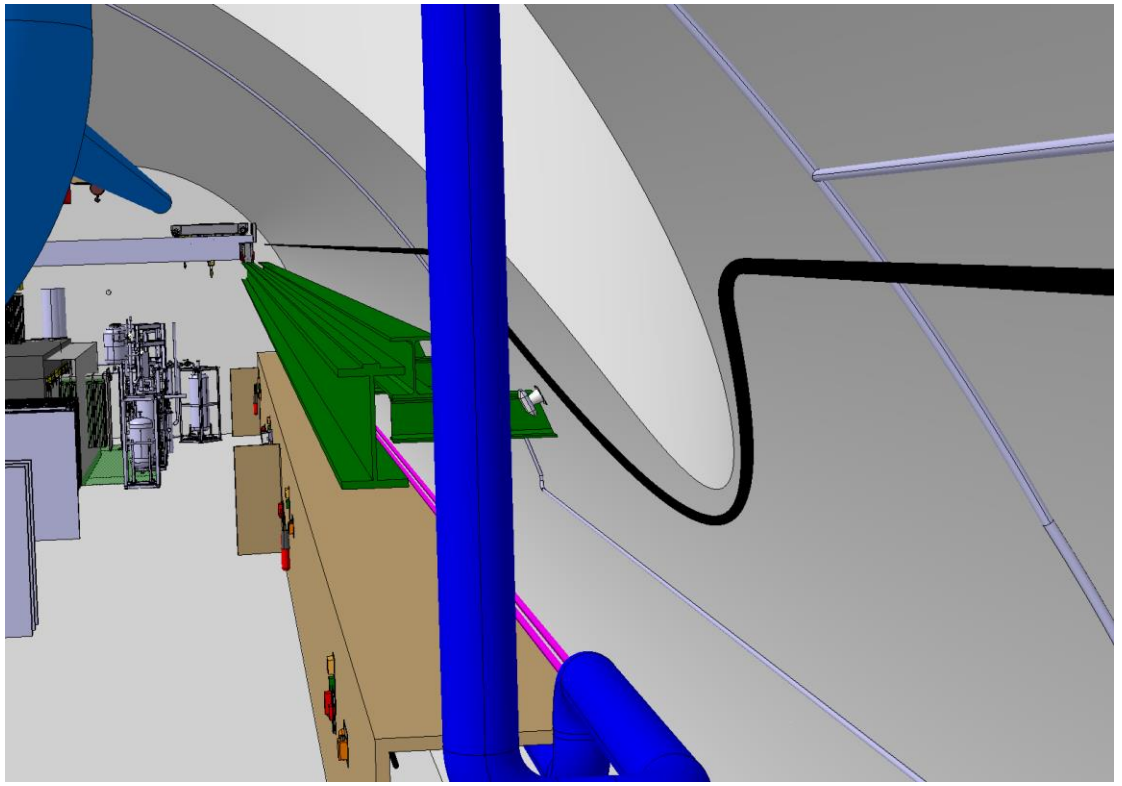
Speaker for alarm



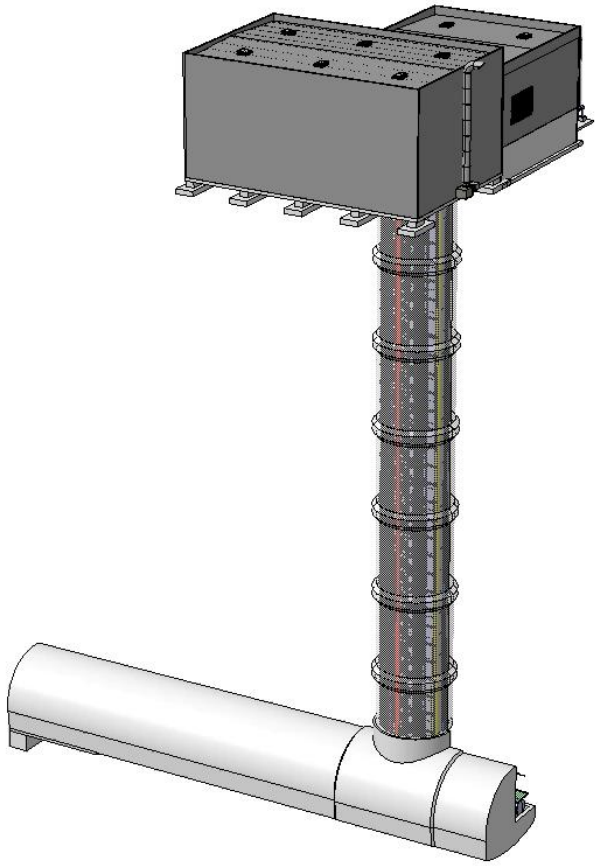
Fire detector



WIFI



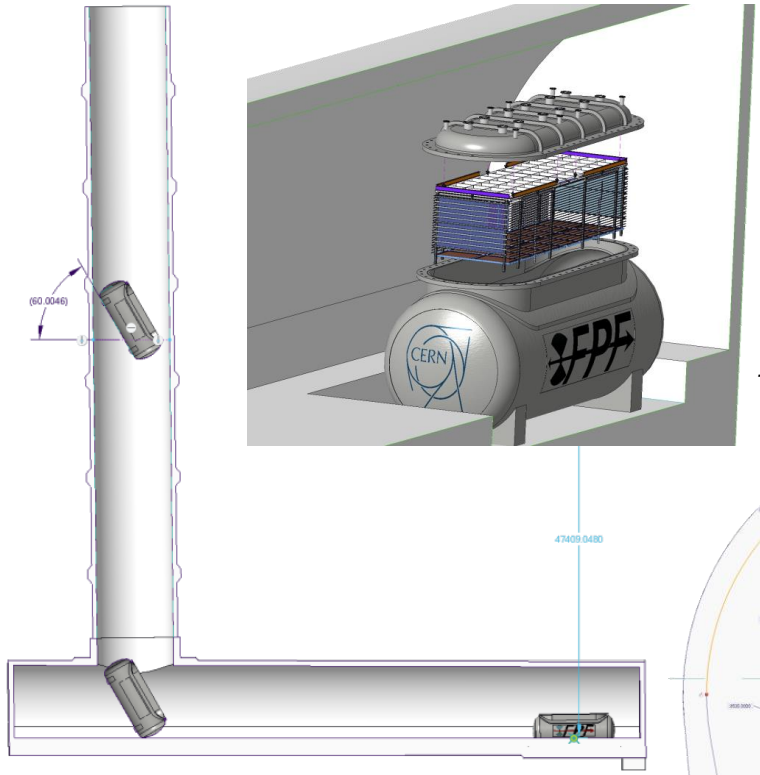
Integration



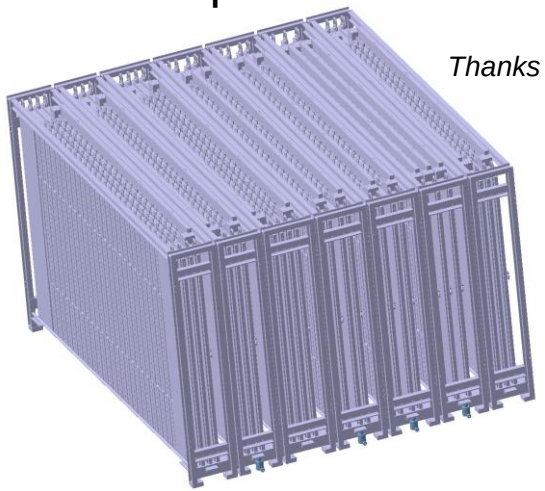
Collaboration with experts

In order to check the transport, the space available, the connection, updating the model…

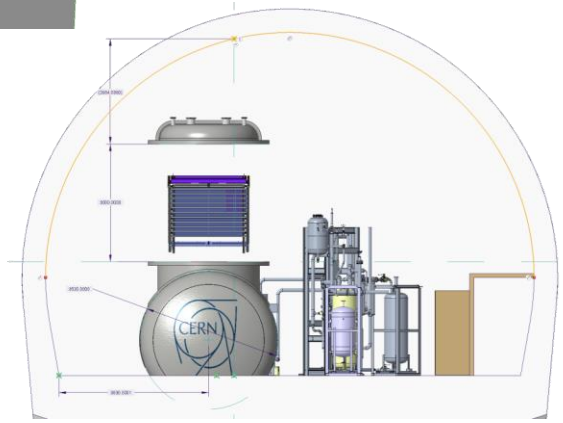
We exchange CAD files between CERN and experiment experts



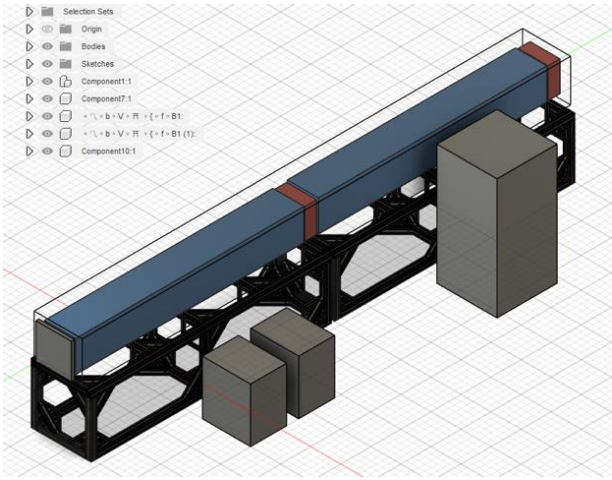
Thanks to C.Miraval



Thanks to K.Mavrokoridis



Thanks to A.Ariga



Summary

- FPF location is frozen
- The global civil CAD model is frozen
- The several services are integrated – optimization in progress
- Safety elements are integrated – need to be confirmed by CERN experts
- CAD models exchange is in progress with the experiments groups

Next steps

- Going further in the services design to be more detailed:

  need more detailed requirements from experiments

- Update the costing of the services

- Check the safety with CERN experts

- Continue the experiment CAD models integration (transport, volume, technical needs)

Thank you!

Literature

- FASER Collaboration, Abreu, H., Mansour, E. A., Antel, C., Ariga, A., Ariga, T., Bernlochner, F., Boeckh, T., Boyd, J., Brenner, L., Cadoux, F., Casper, D. W., Cavanagh, C., Chen, X., Coccaro, A., Crespo-Lopez, O., Debieux, S., D'Onofrio, M., Dougherty, L., … Zhang, G. (2022). *The FASER Detector*. http://arxiv.org/abs/2207.11427
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