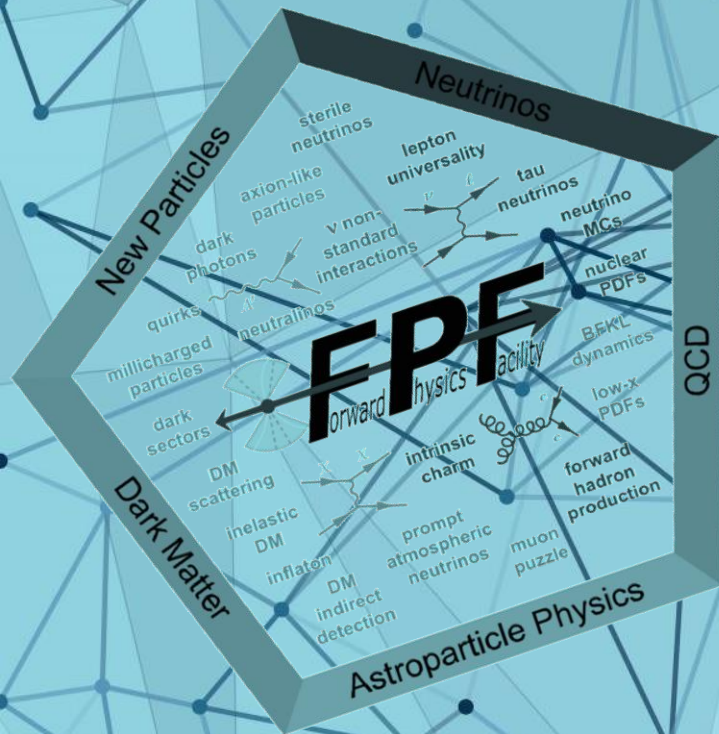


Forward Physics Facility Integration

8th FPF Meeting

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



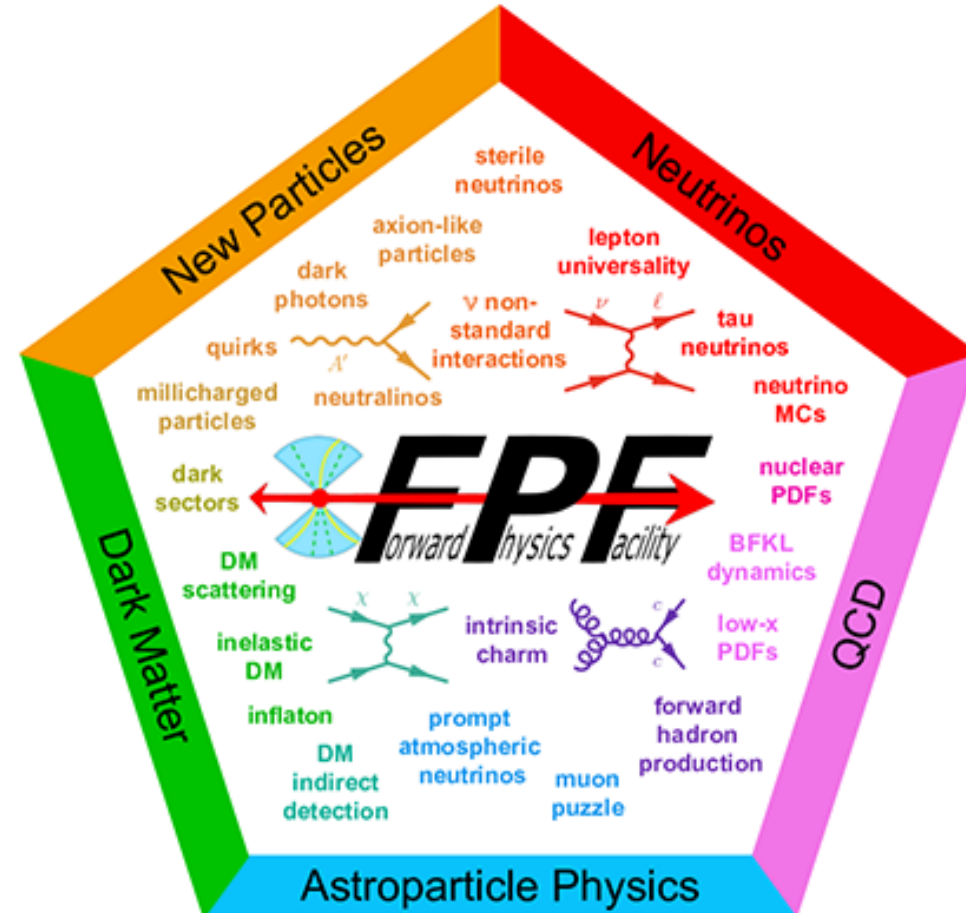
Julien Prosic
January 21st, 2025

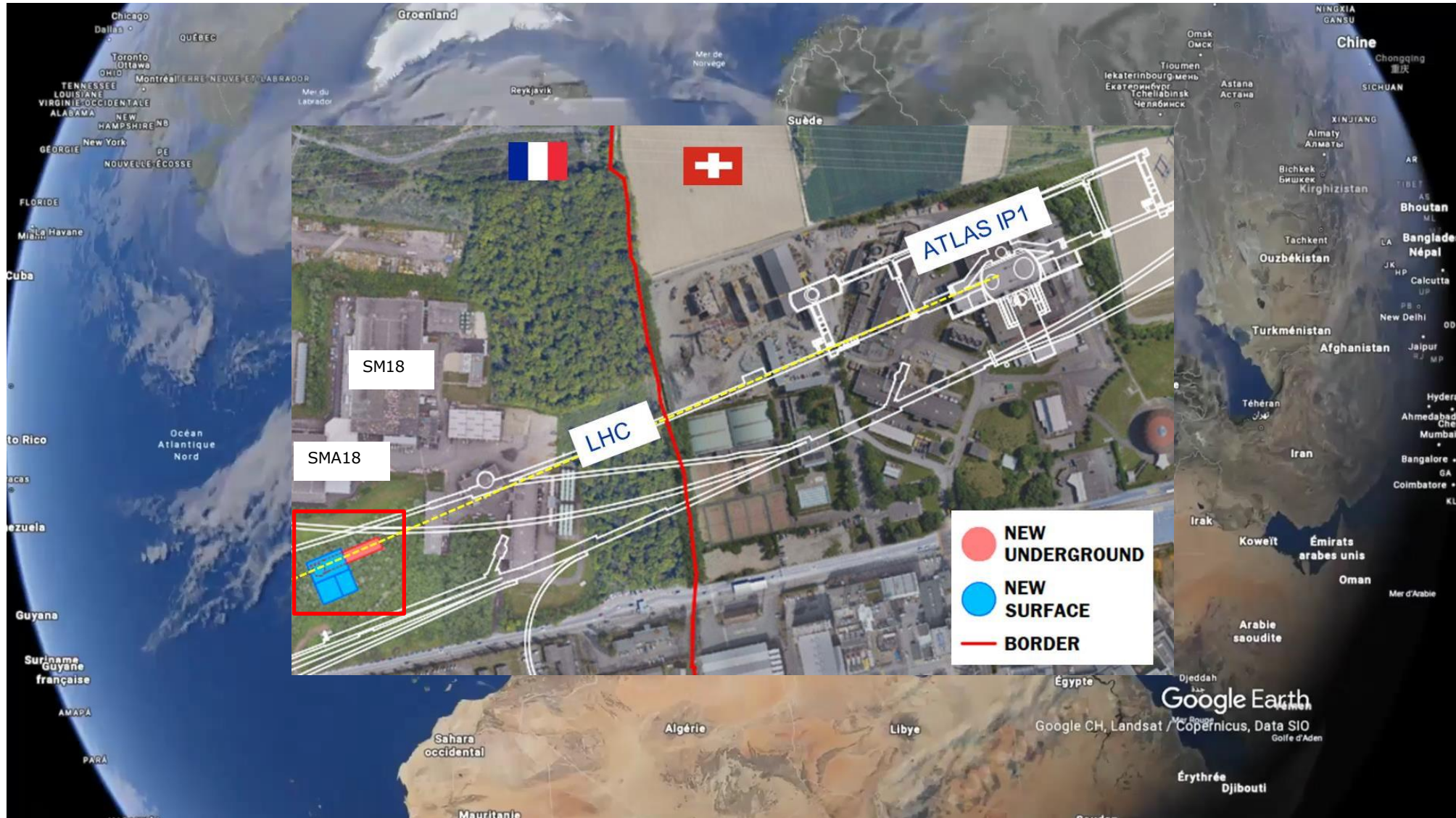


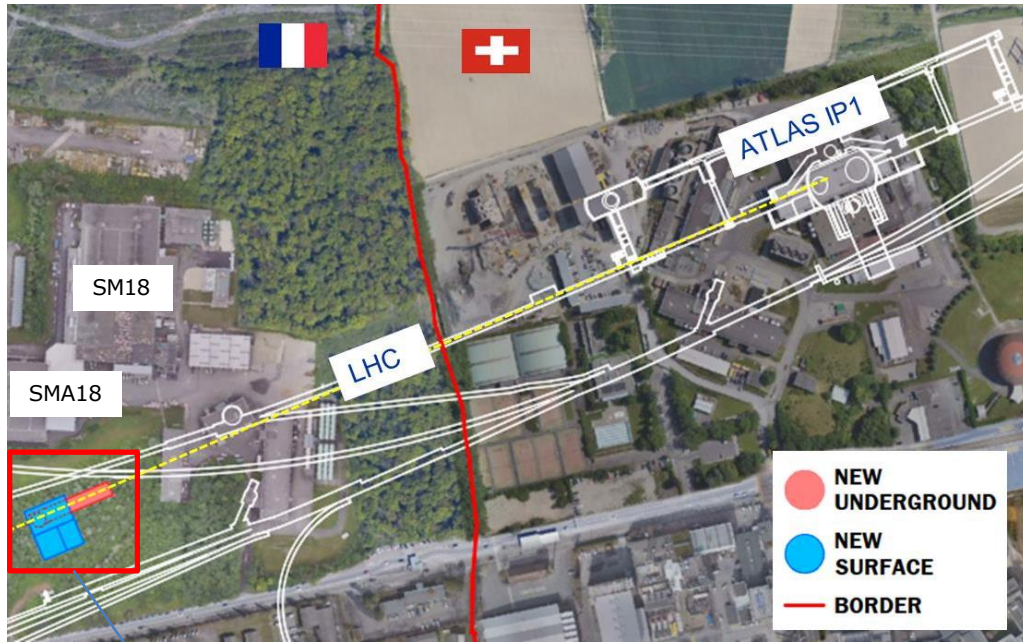
EN-ACE Integration design Office: Accelerator Coordination and Engineering

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.

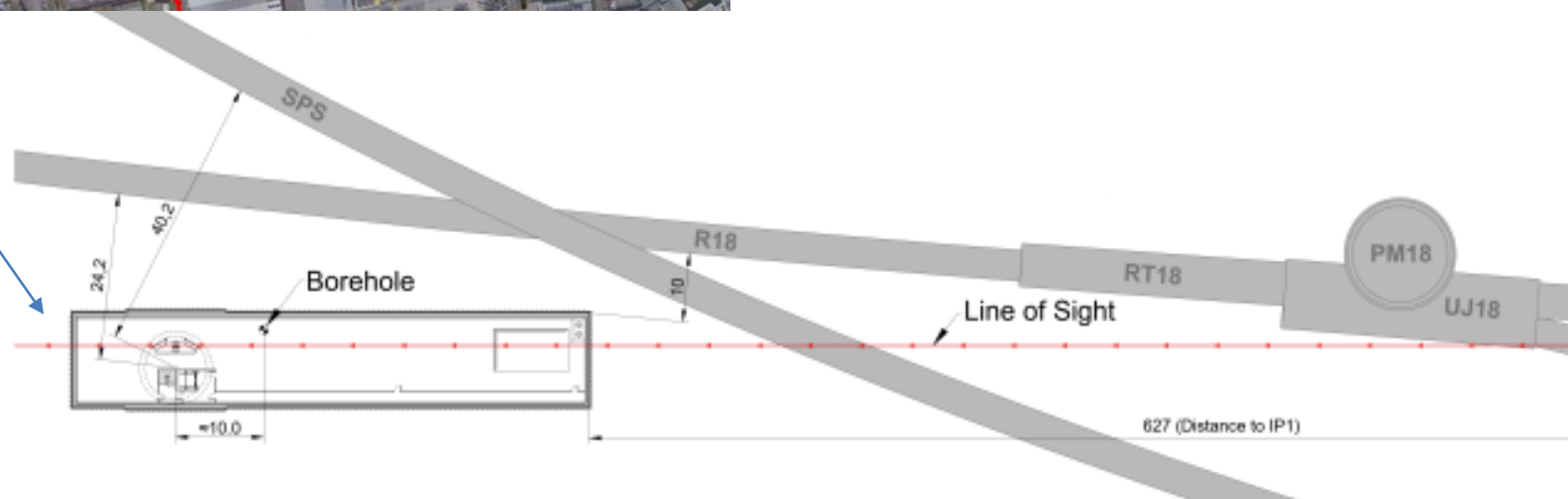
- Overview and global layout
- FPF experiments
- Integration of the services
- Safety items integration
- Collaboration with experiments experts
- Summary
- Next steps



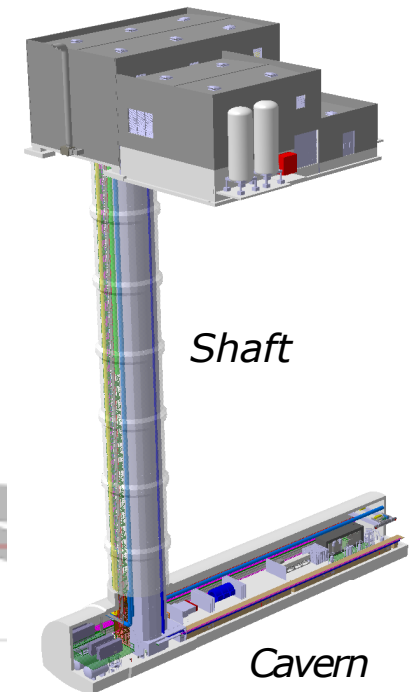


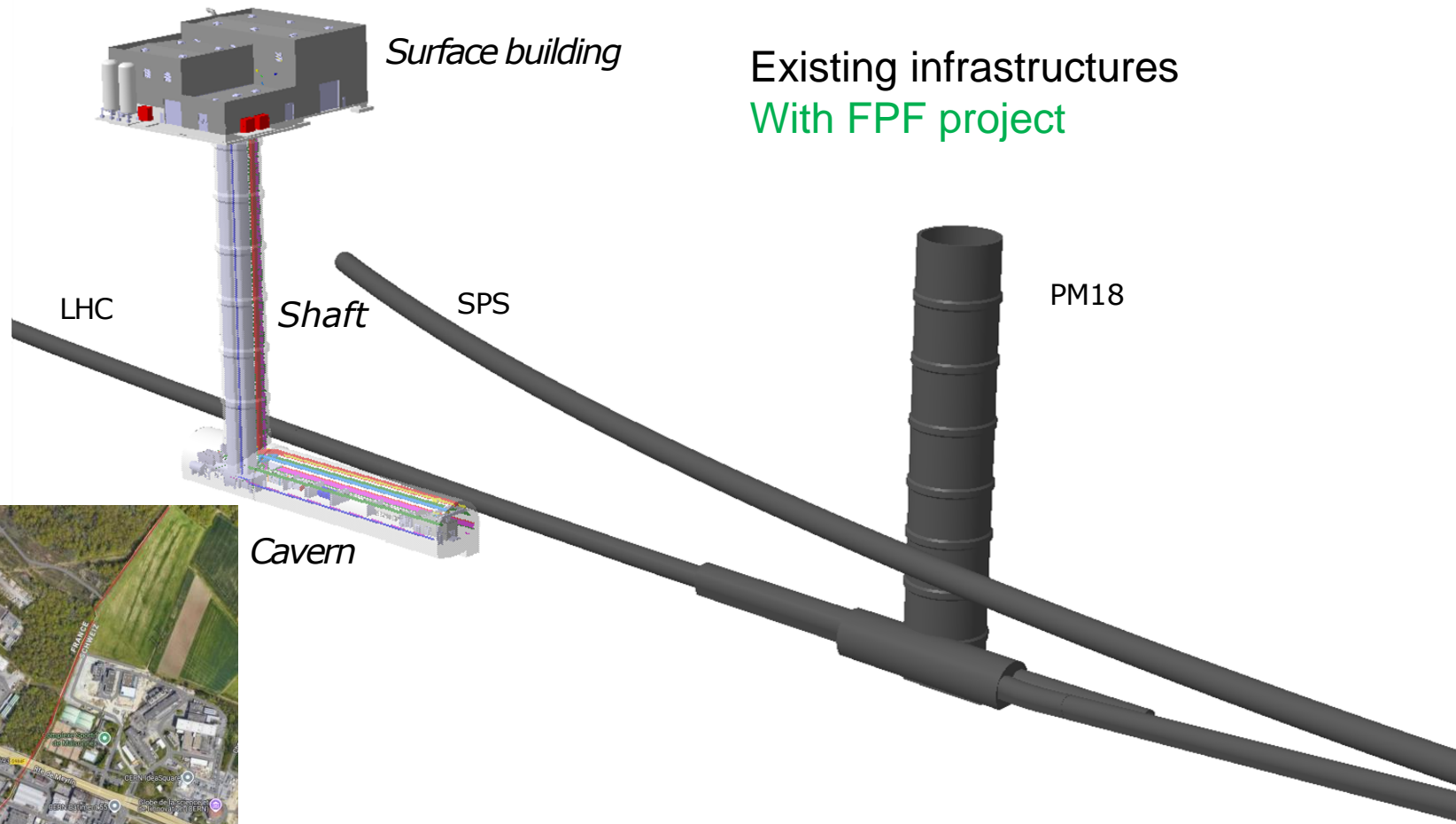


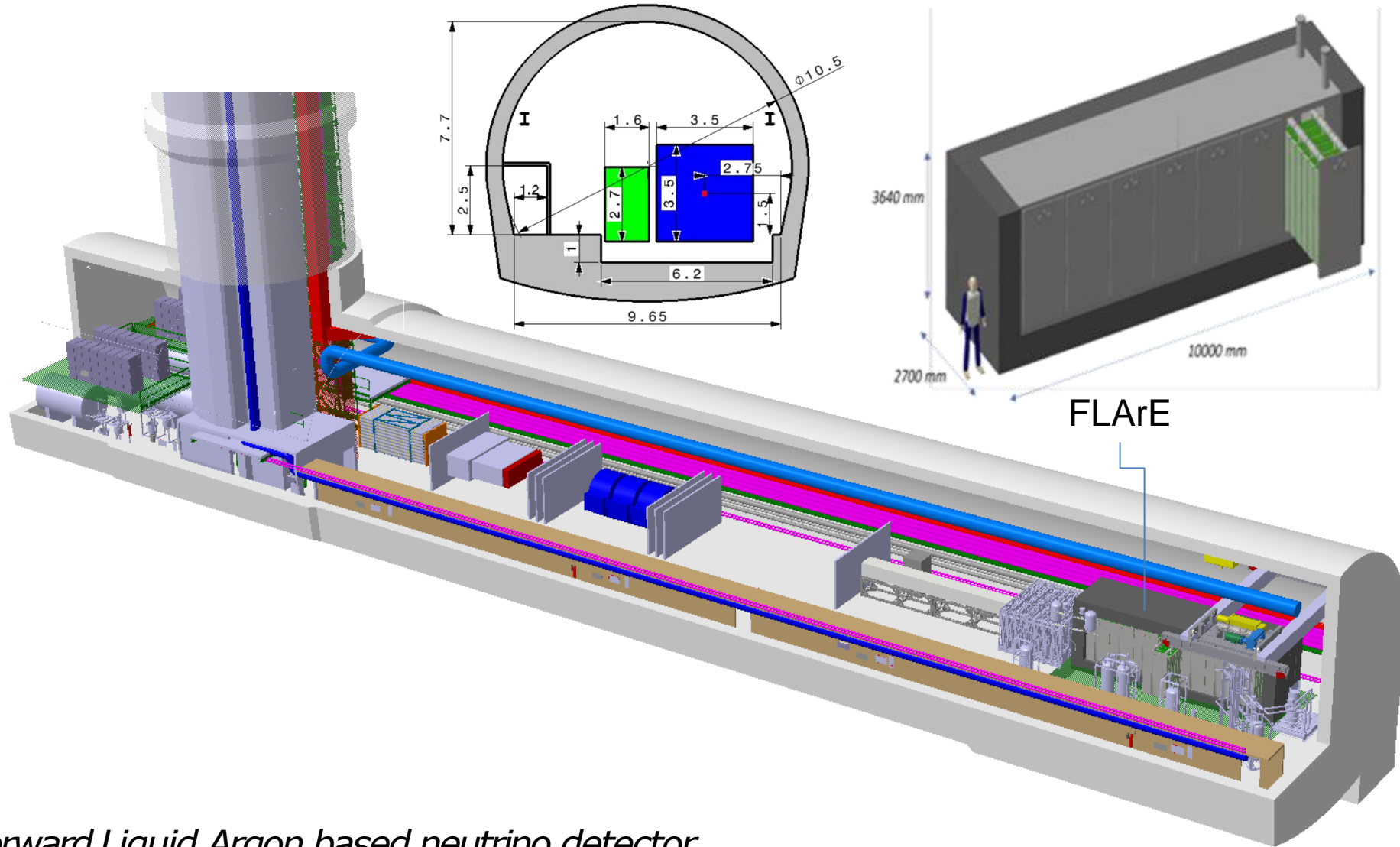
- FPF - Forward Physics Facility:
To build a new facility to test new physics
- Final location to respect constraints:
 - ✓ 627 m from ATLAS IP1 on the French side of CERN land
 - ✓ 90 m depth
 - ✓ 10 m away from the LHC tunnel



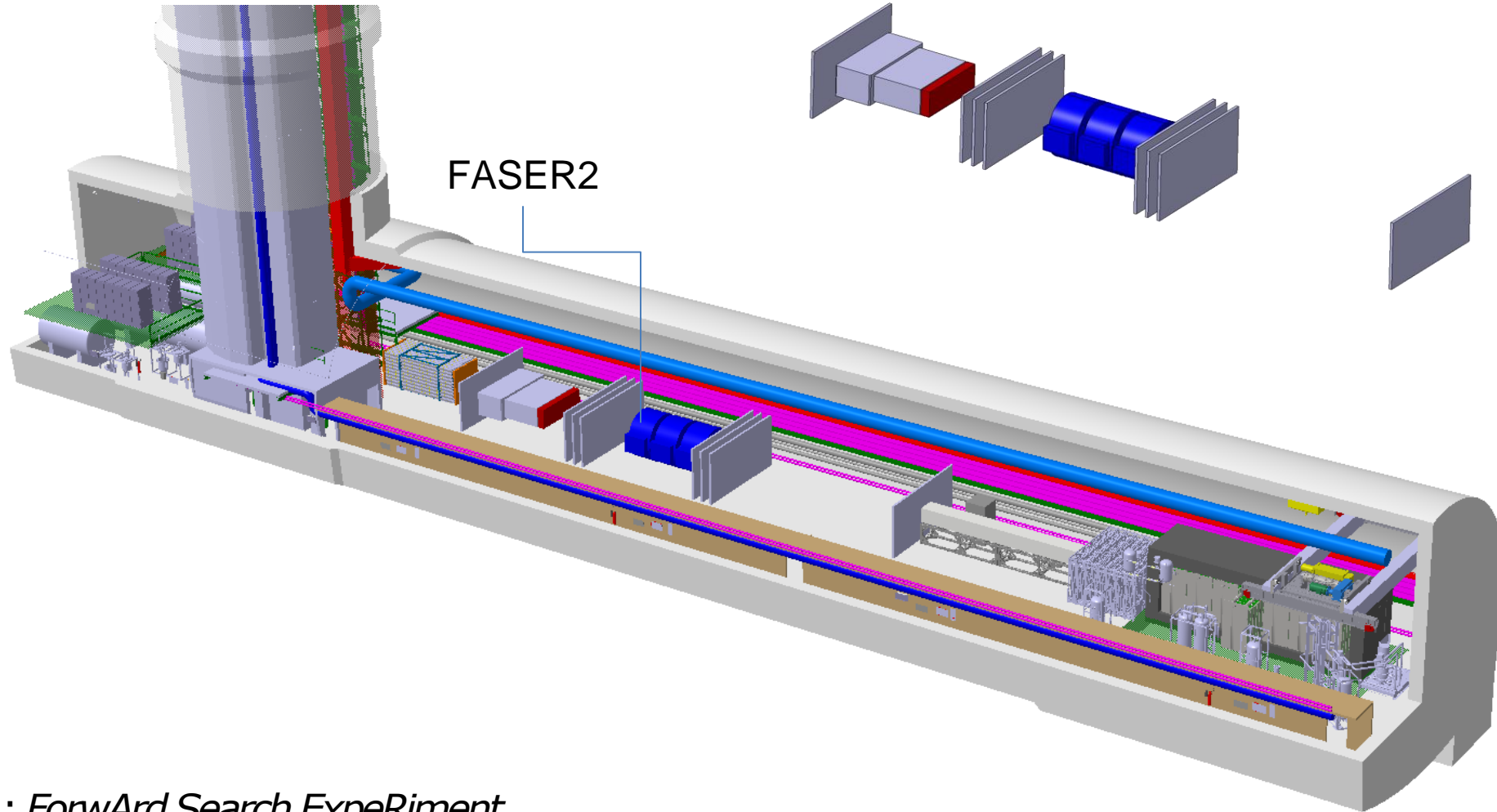
Surface building



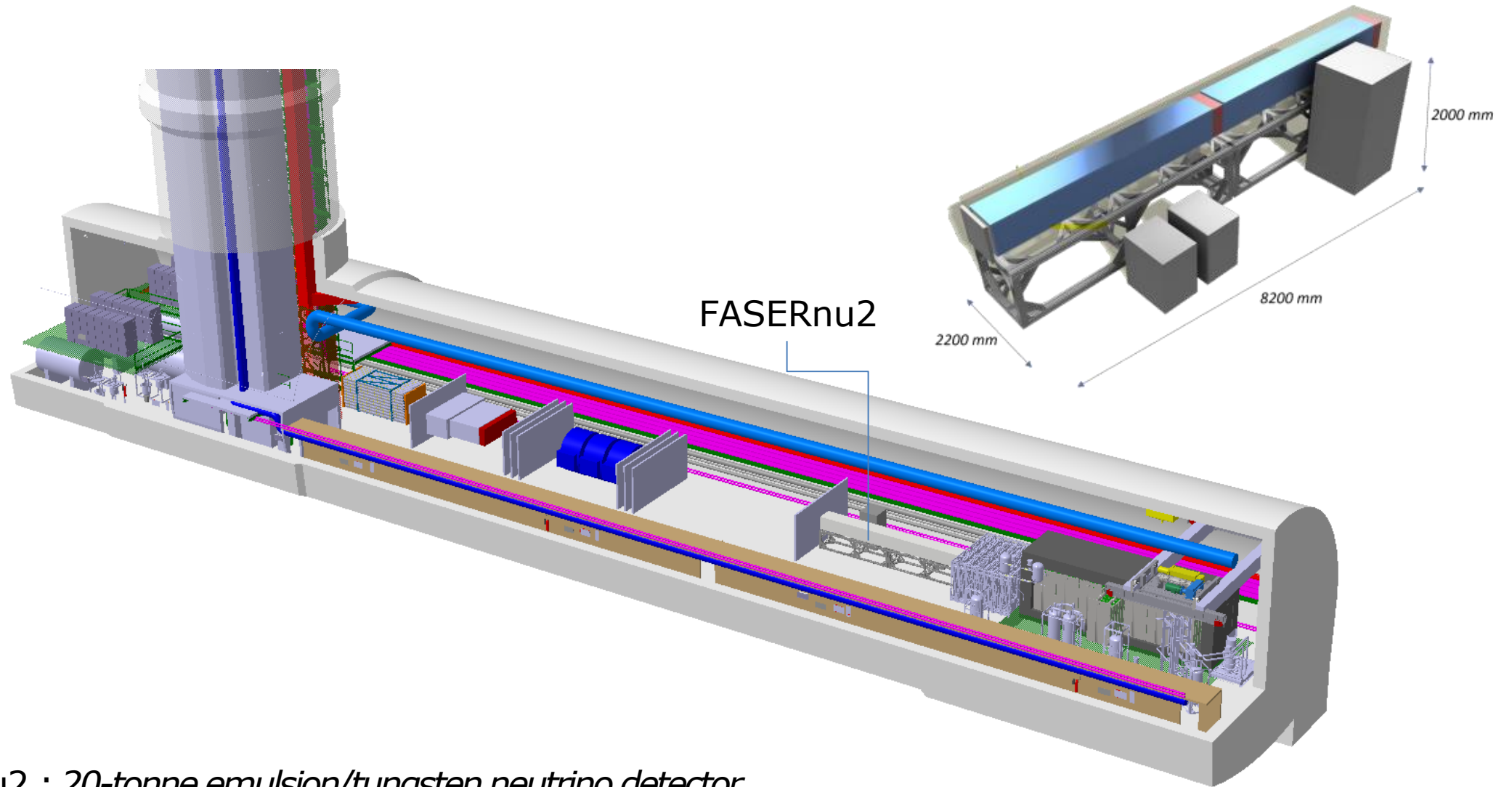




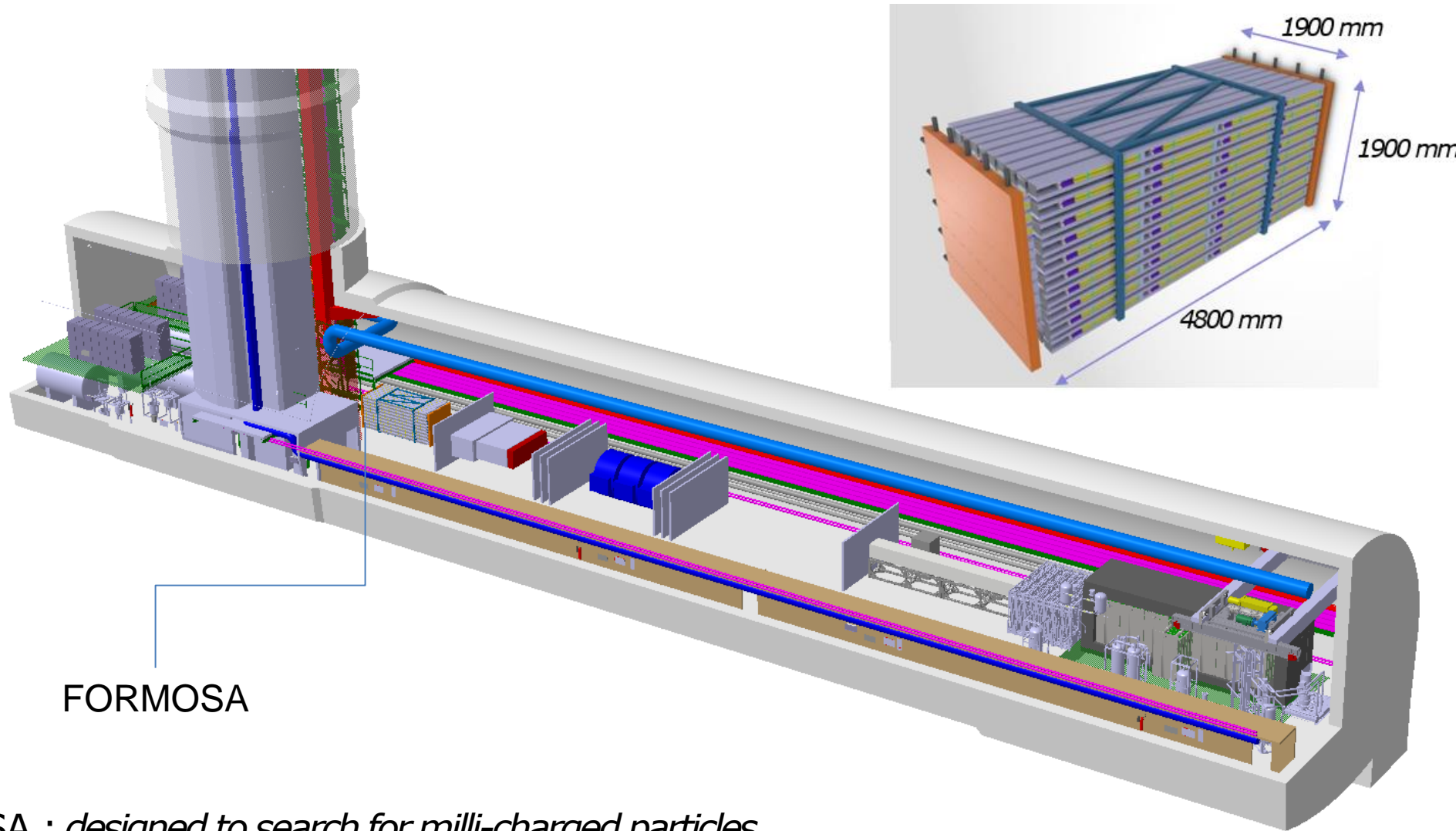
FLArE: Forward Liquid Argon based neutrino detector



FASER2 : *ForwArd Search ExpeRiment*

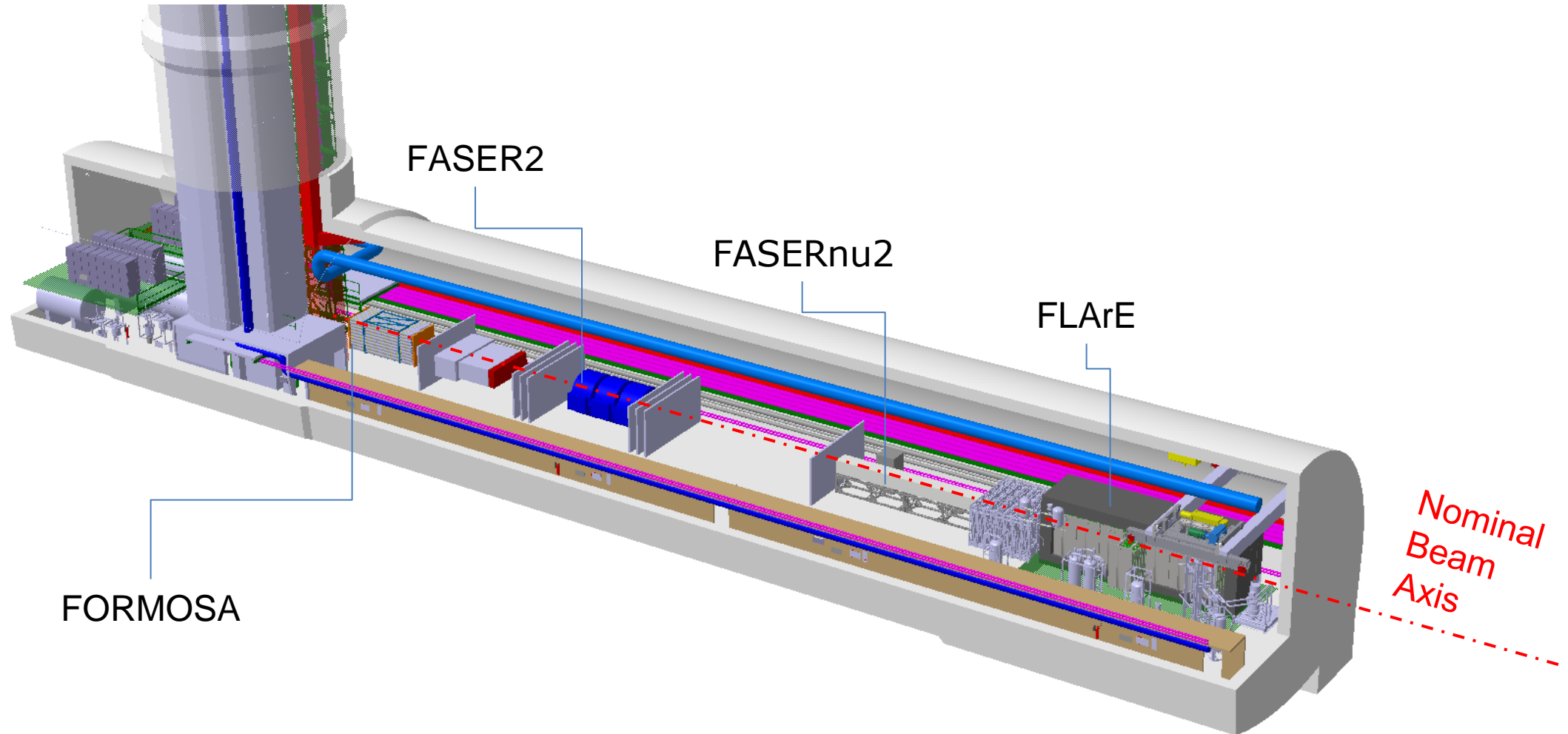


FASERnu2 : 20-tonne emulsion/tungsten neutrino detector



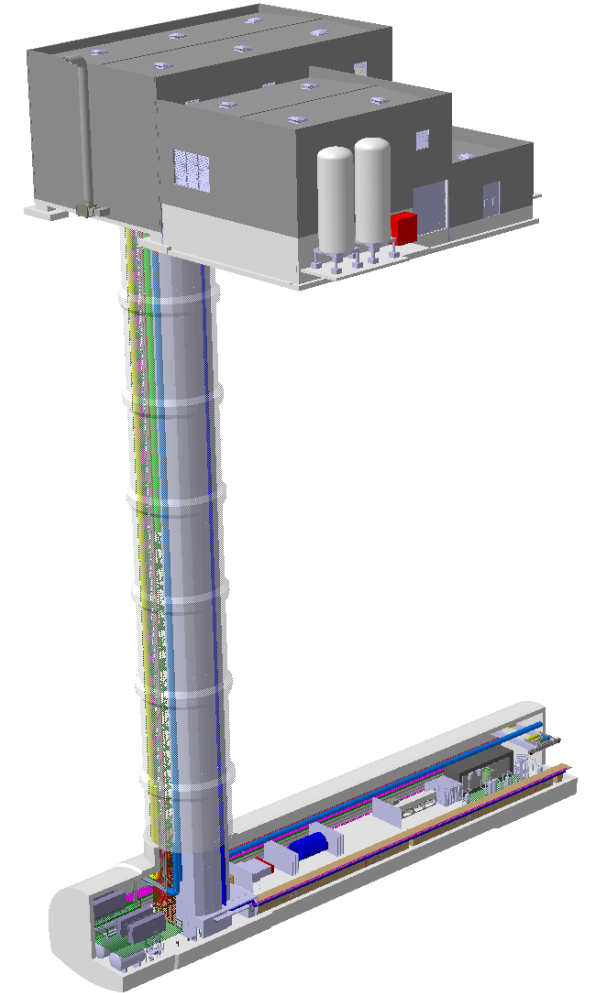
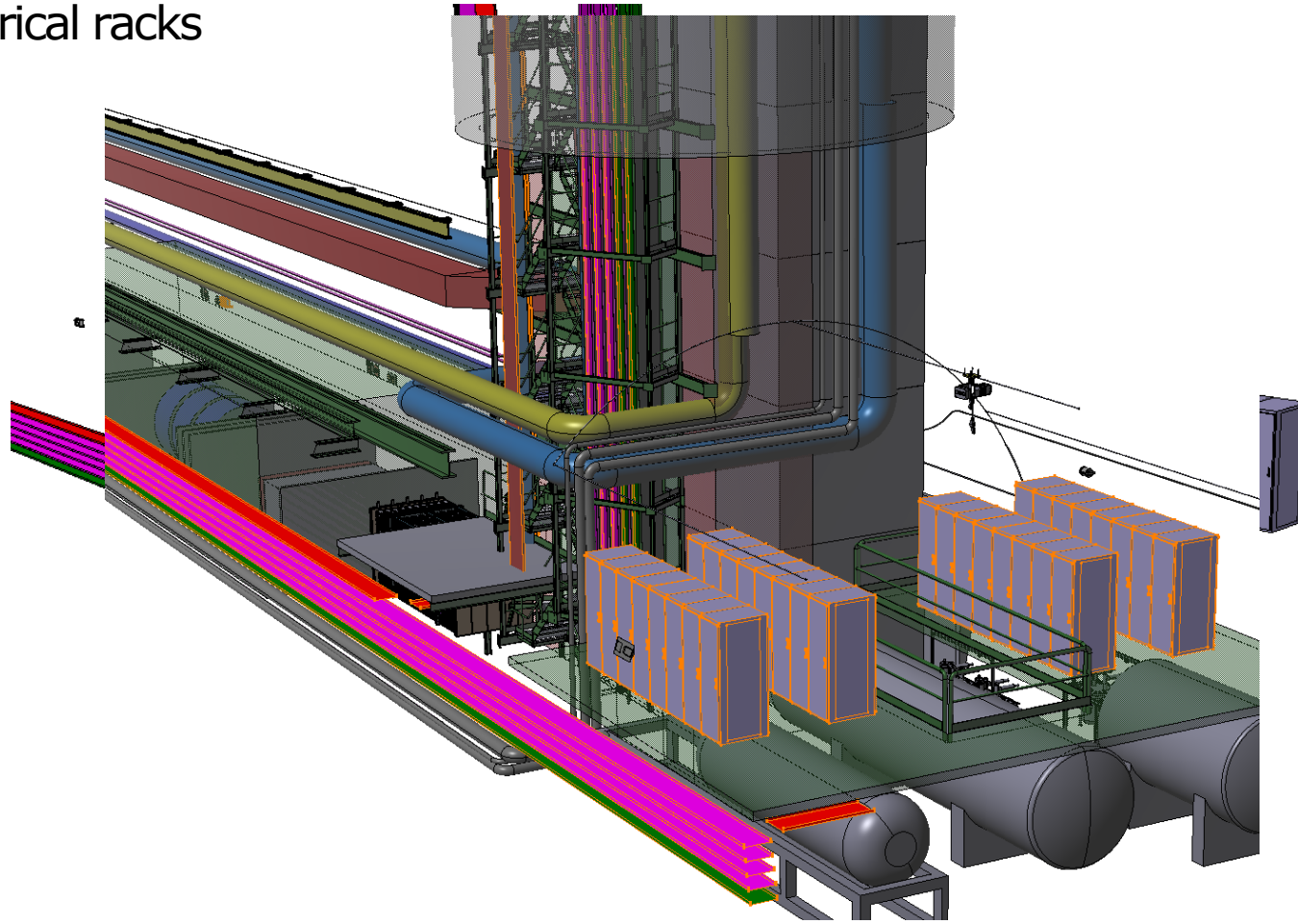
FORMOSA : *designed to search for milli-charged particles*

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



Electrical services (EN-EL)

- Cable trays
- Electrical racks

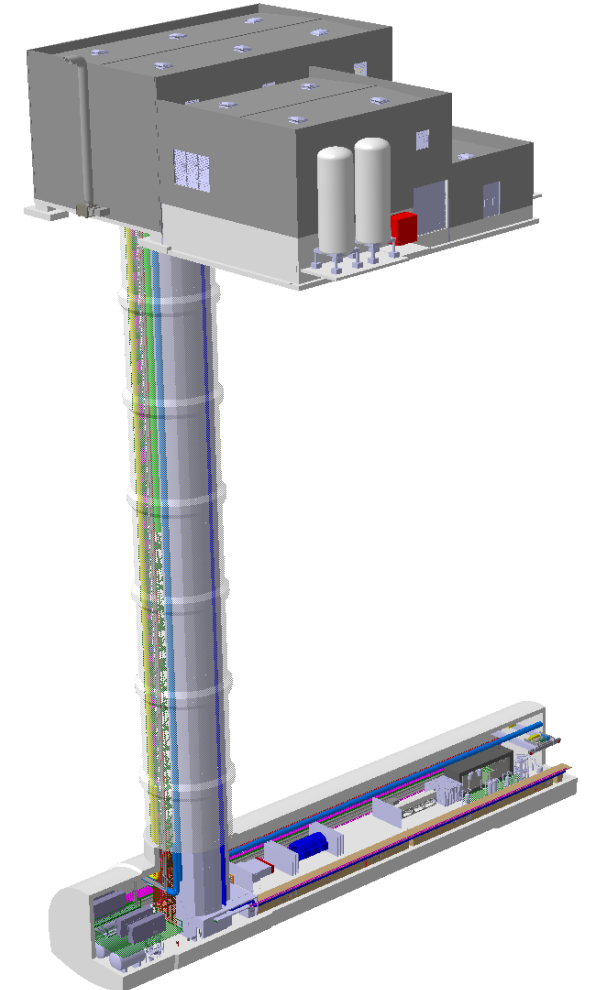
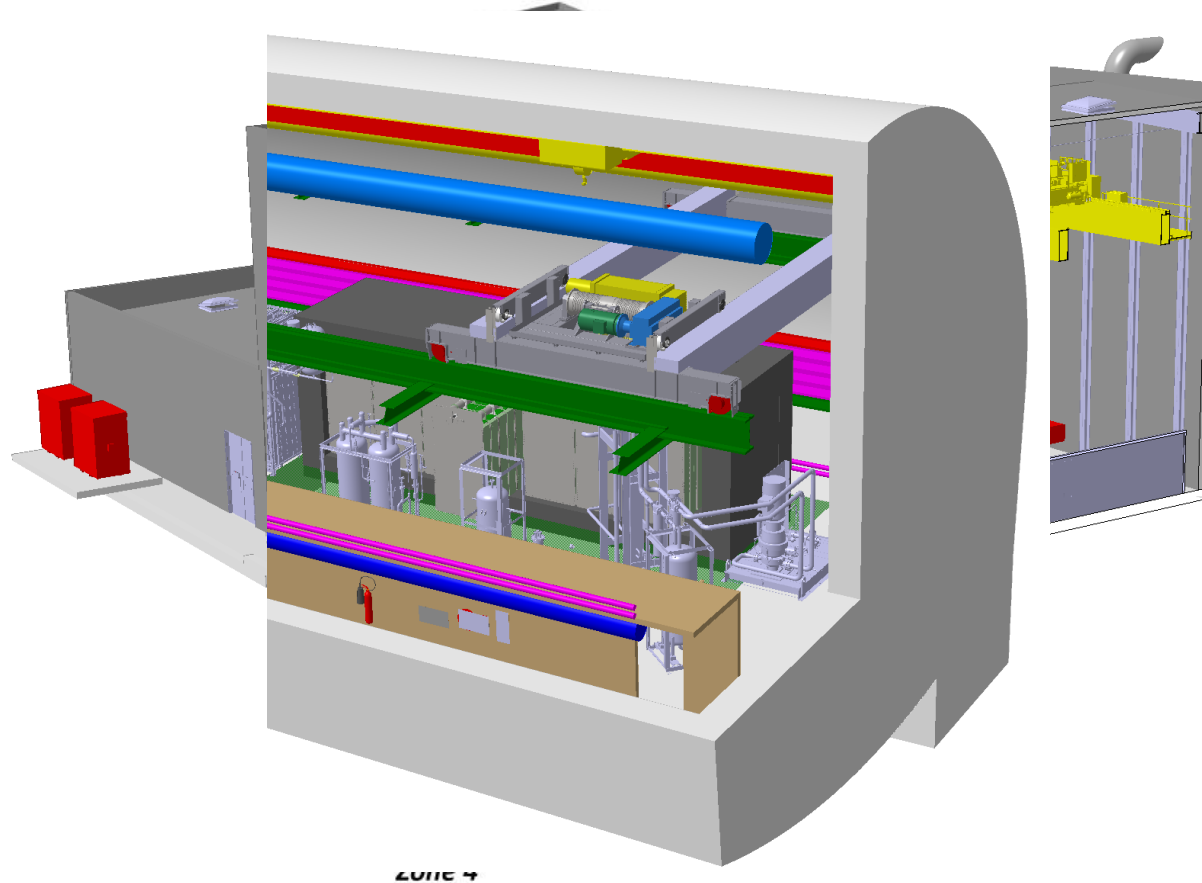


*Design and cost optimization
in progress*

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

Transport (EN-HE)

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

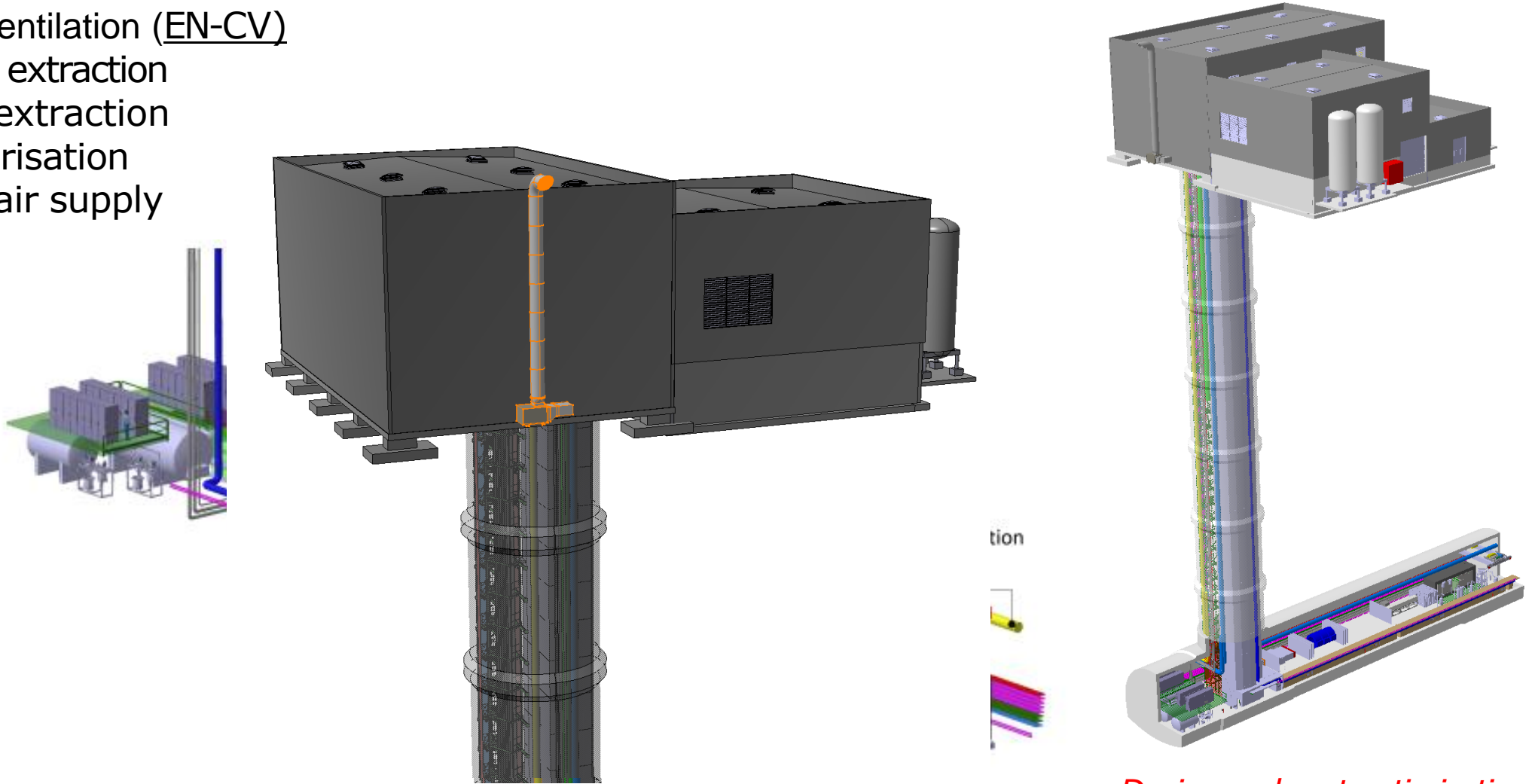


*Design and cost optimization
in progress*

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

Cooling/Ventilation (EN-CV)

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

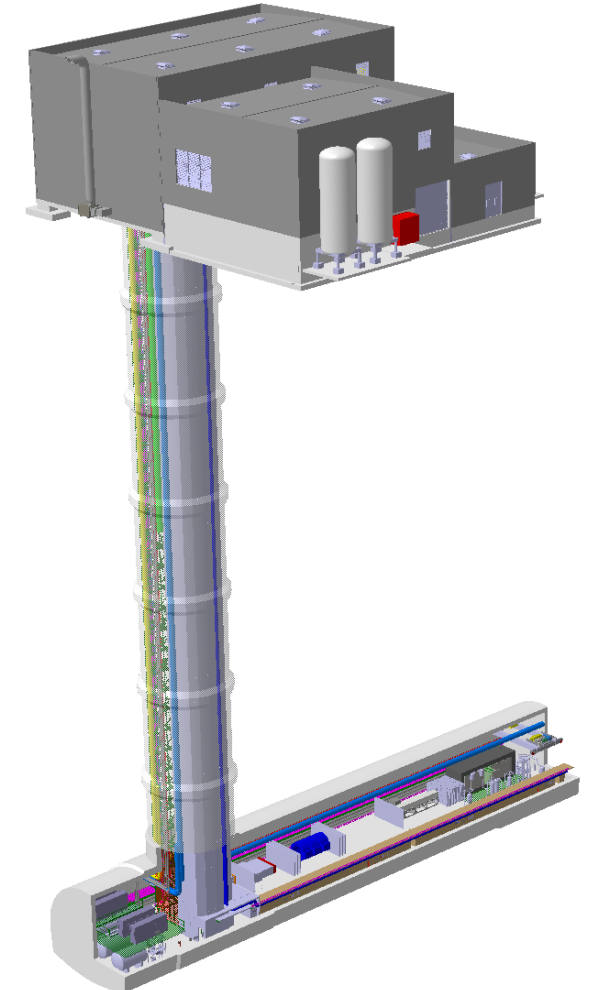
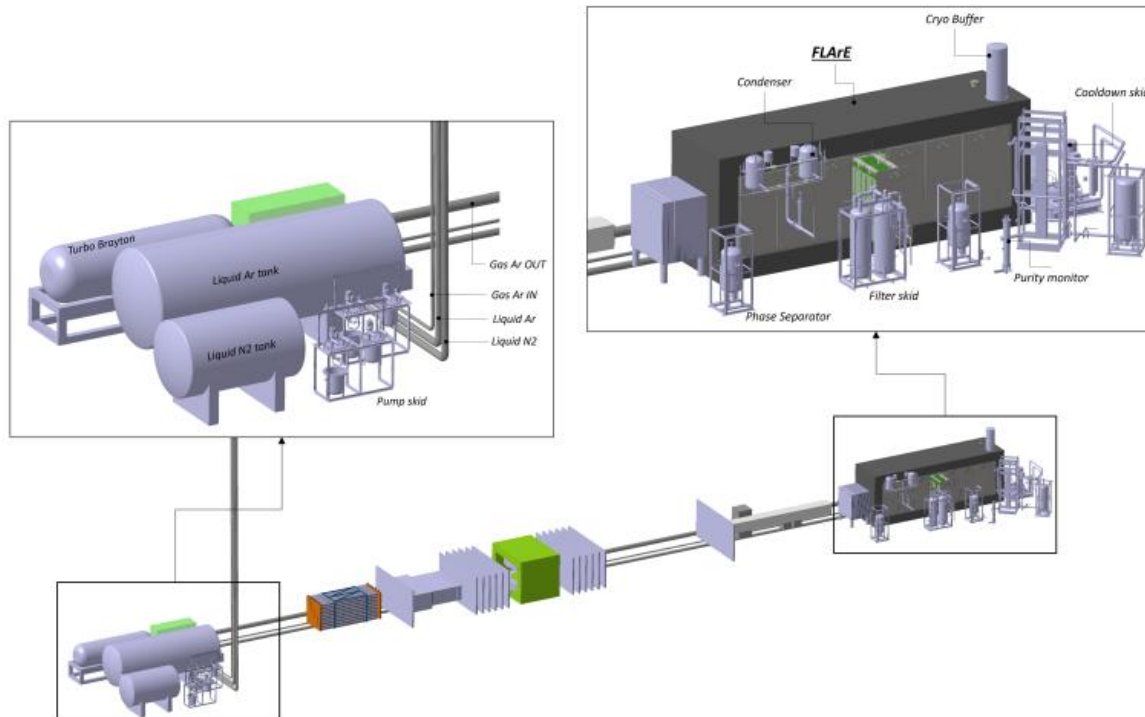


*Design and cost optimization
in progress*

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

Cryogenics

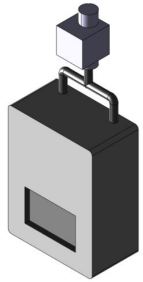
- Turbo-Brayton cooling unit
- Argon storage tank
- Piping for transporting cryogenic liquid from surface into cavern



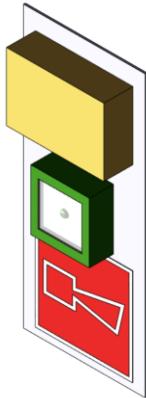
Design and cost optimization in progress

Note: the cryogenics is needed for the FLArE detector

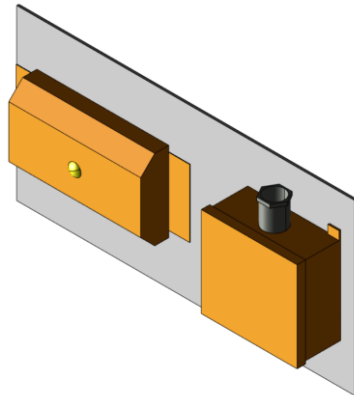
Surface Building:



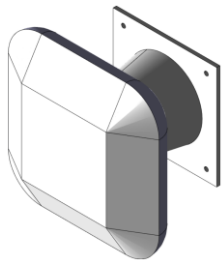
Fire detector



Evacuation panel



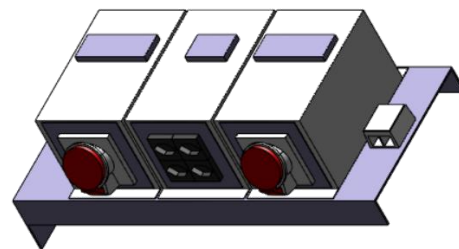
Anti Panic light



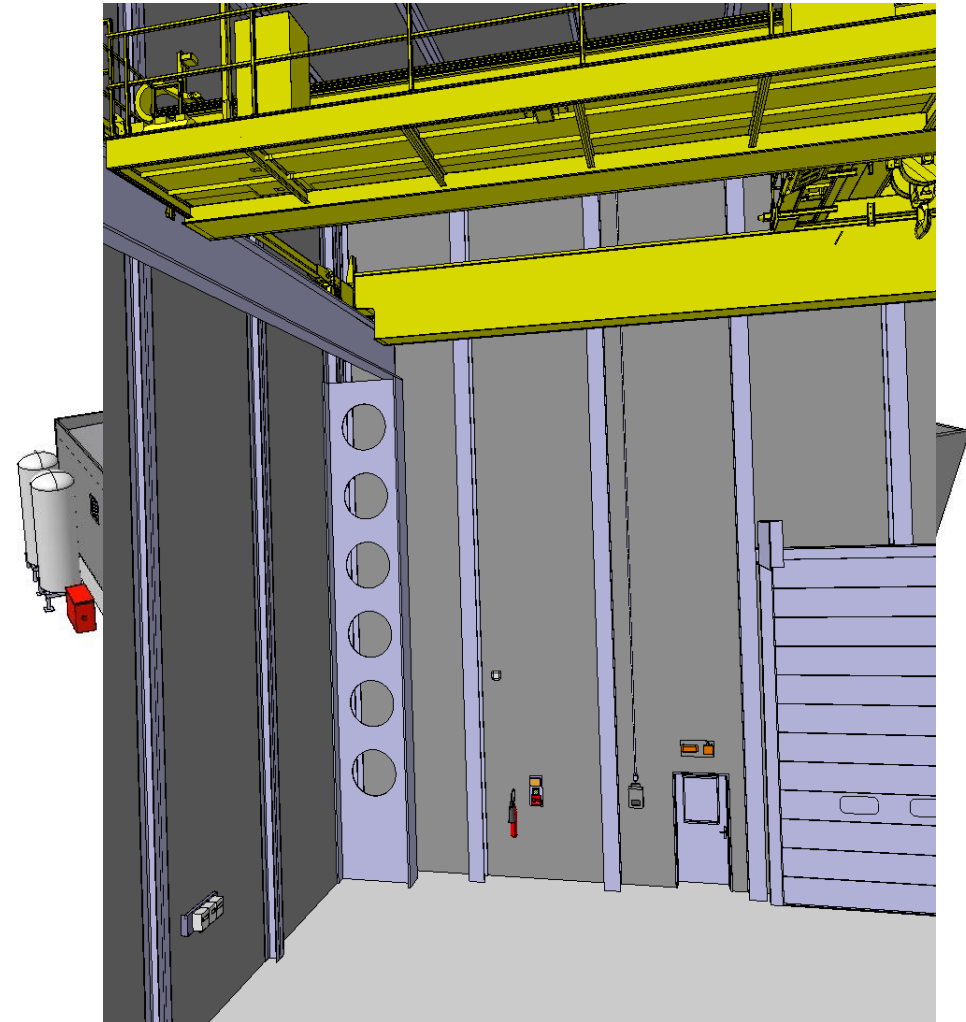
WiFi



Fire extinguisher

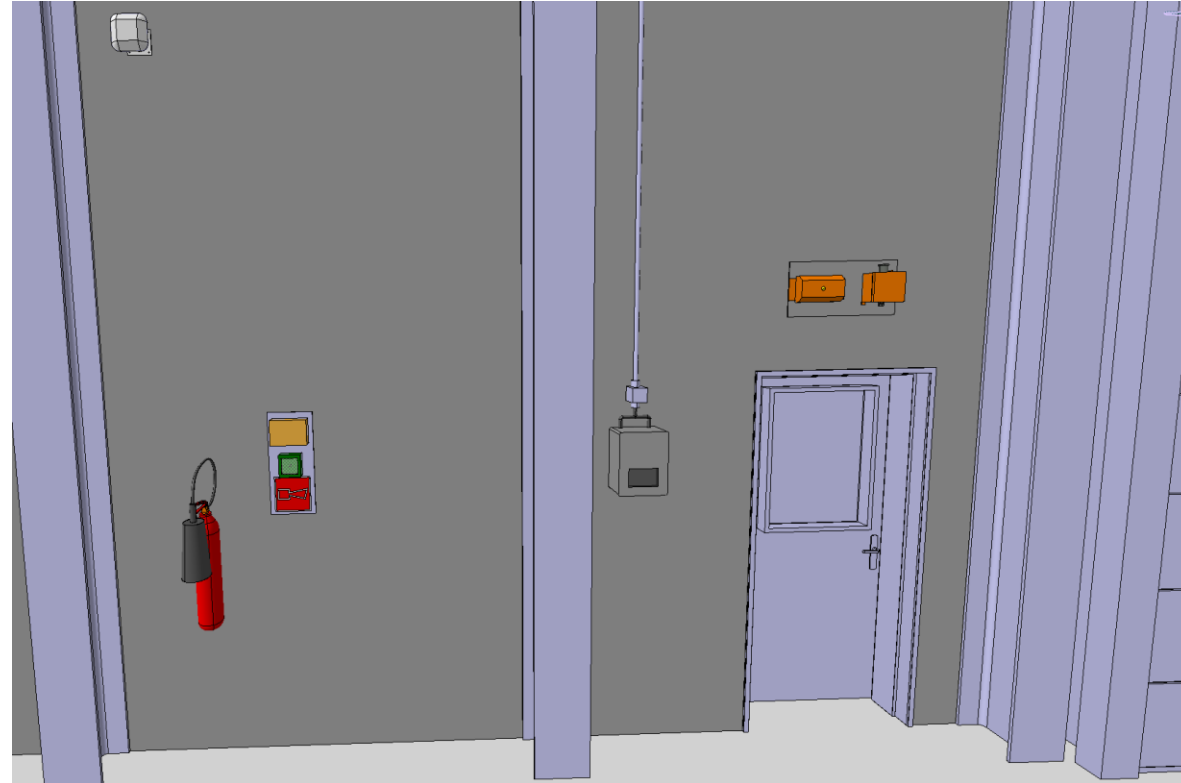
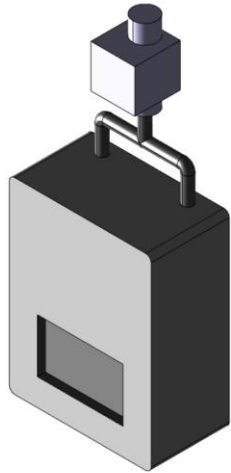


Electrical boxes

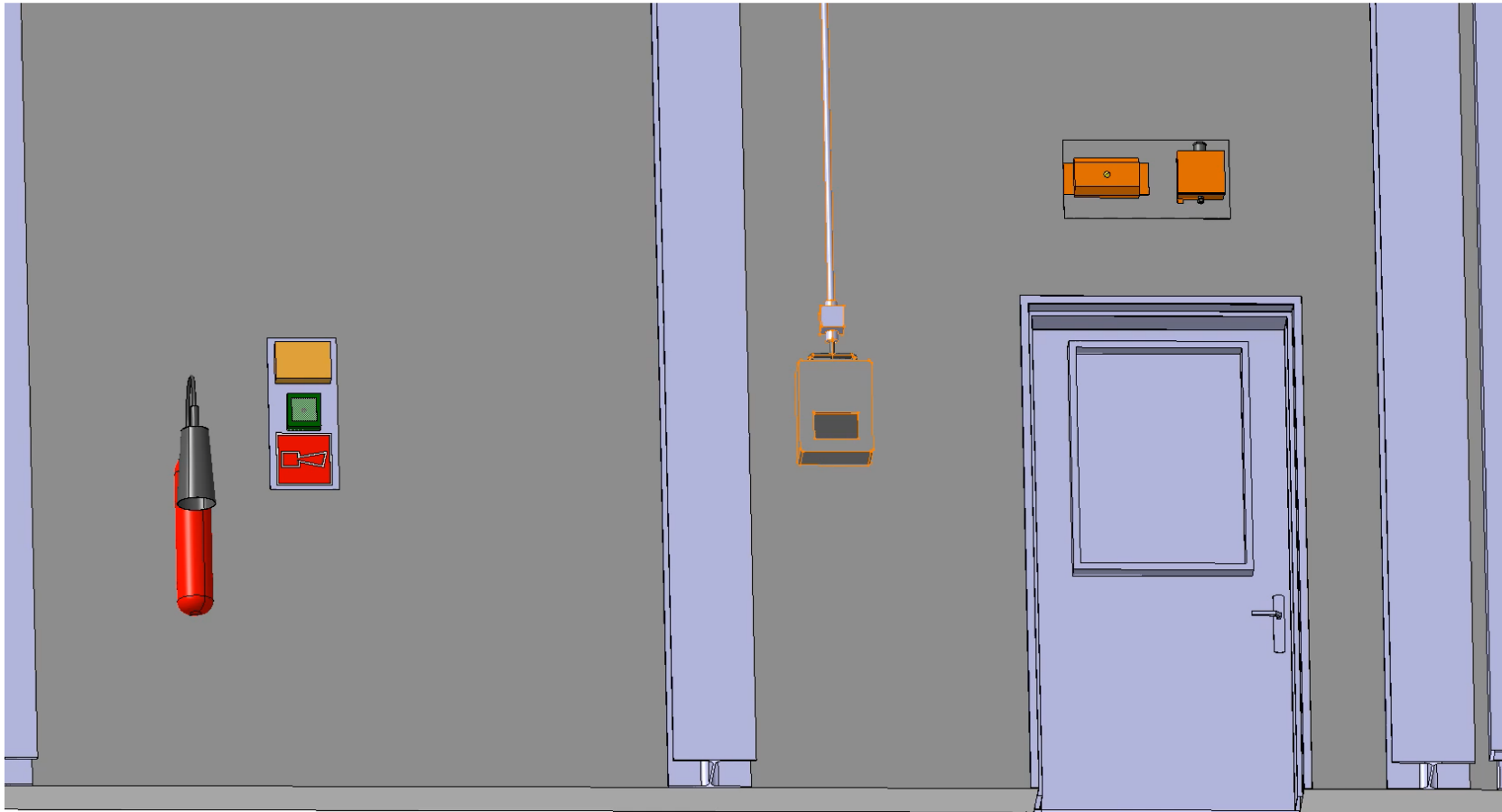


Surface Building: fire detection in each room

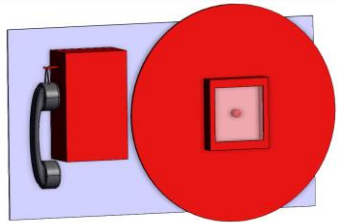
Fire detector



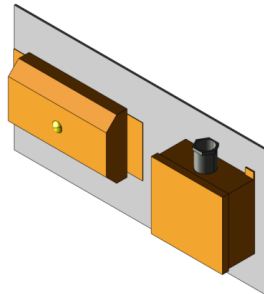
Surface Building: fire detection in each room



Cavern: electricity connection, safety items



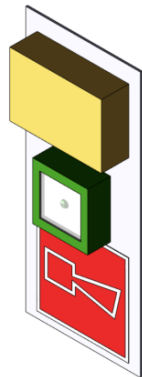
Emergency panel



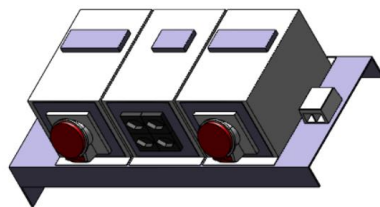
Anti Panic light



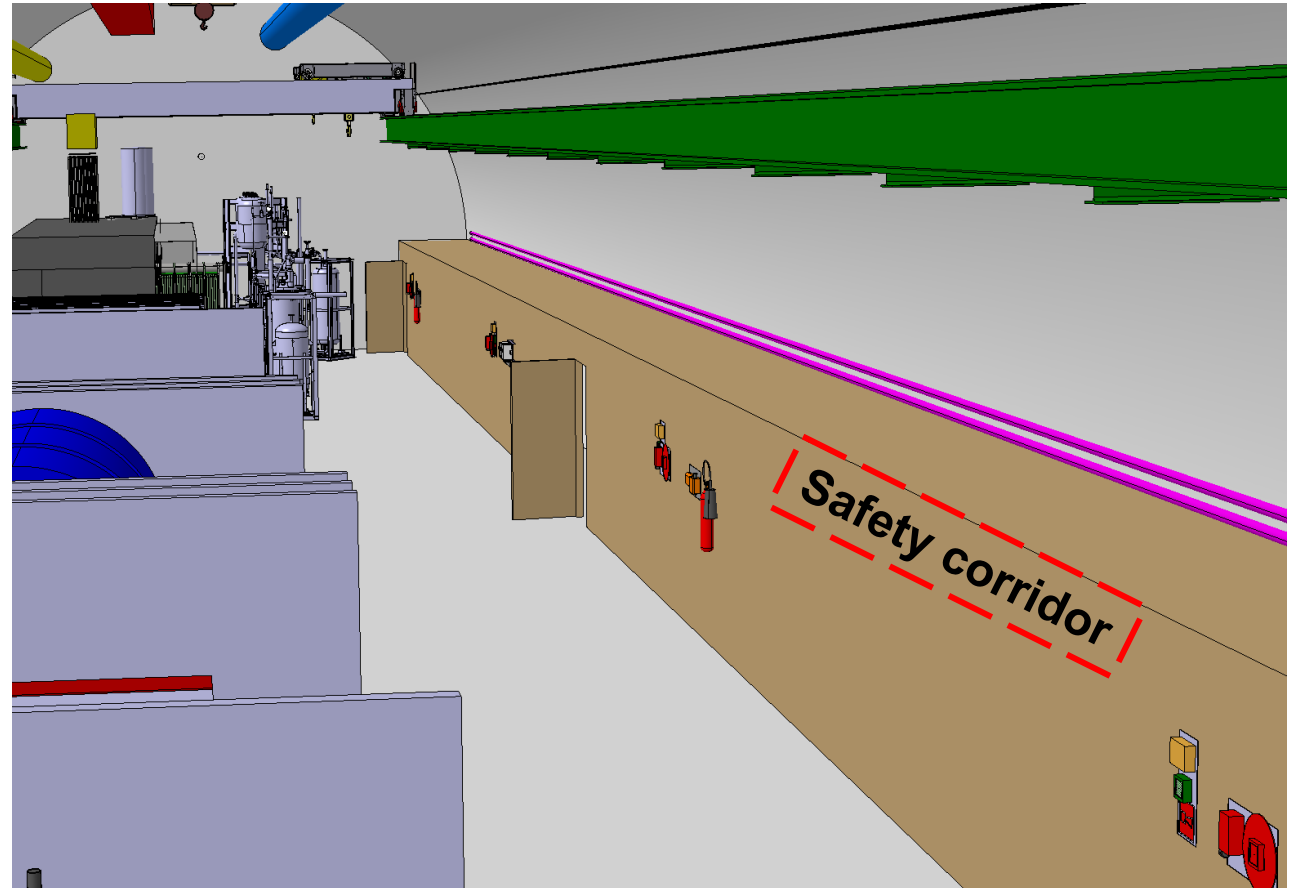
Fire extinguisher



Evacuation panel



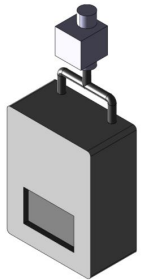
Electrical boxes



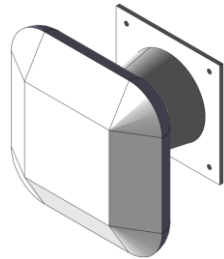
Cavern: GSM cable, WIFI, fire detection



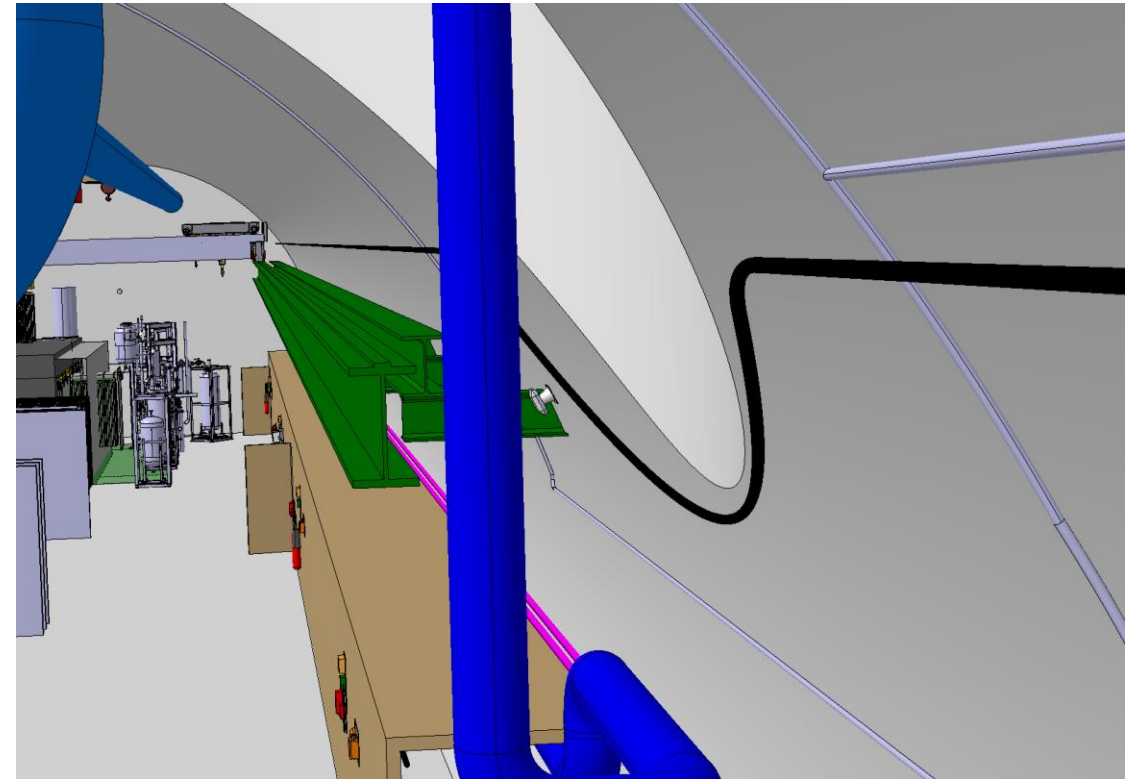
Speaker for alarm

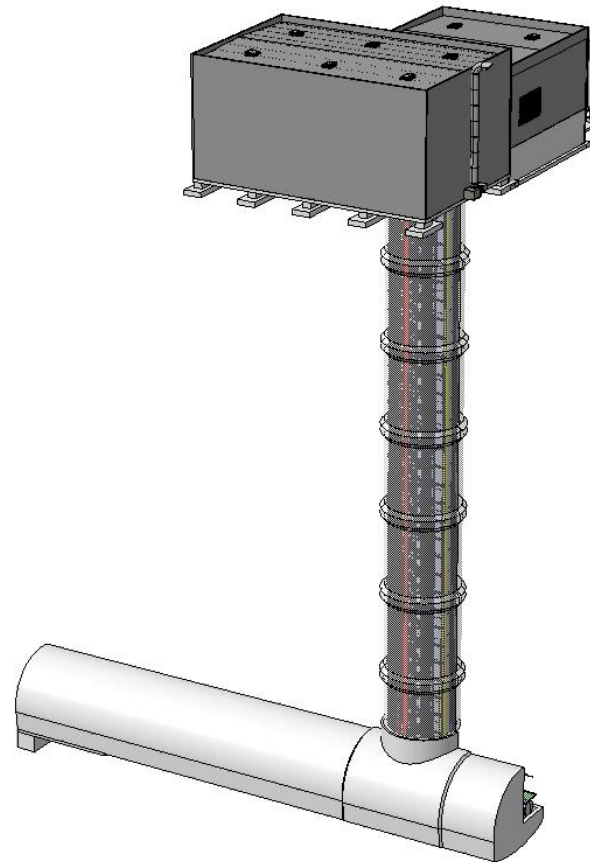


Fire detector



WIFI

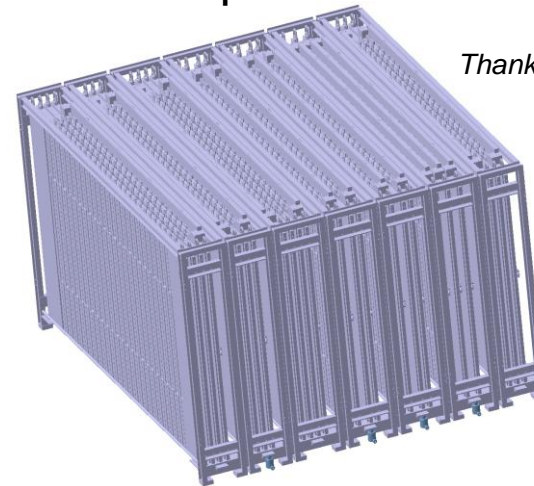




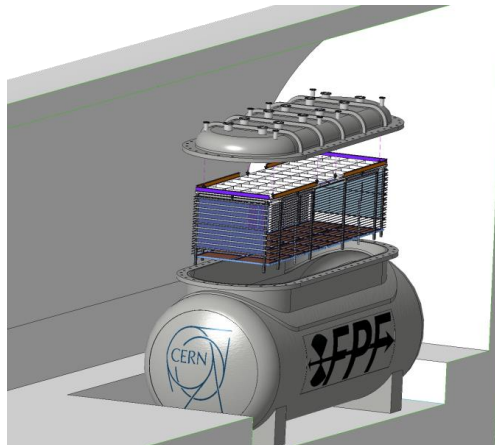
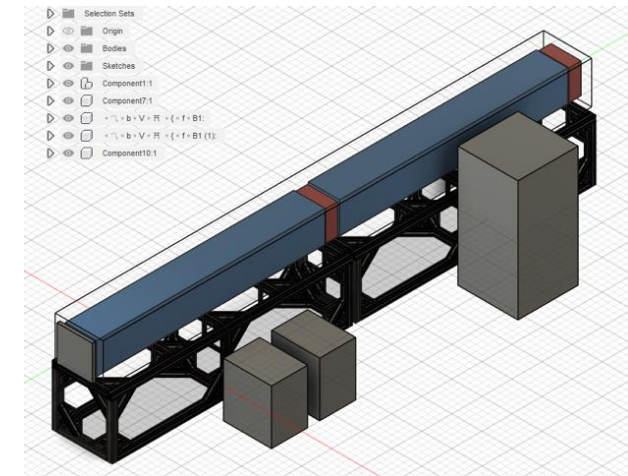
In order to check the transport, the space available, the connection, updating the model...

We exchange CAD files between CERN and experiment experts

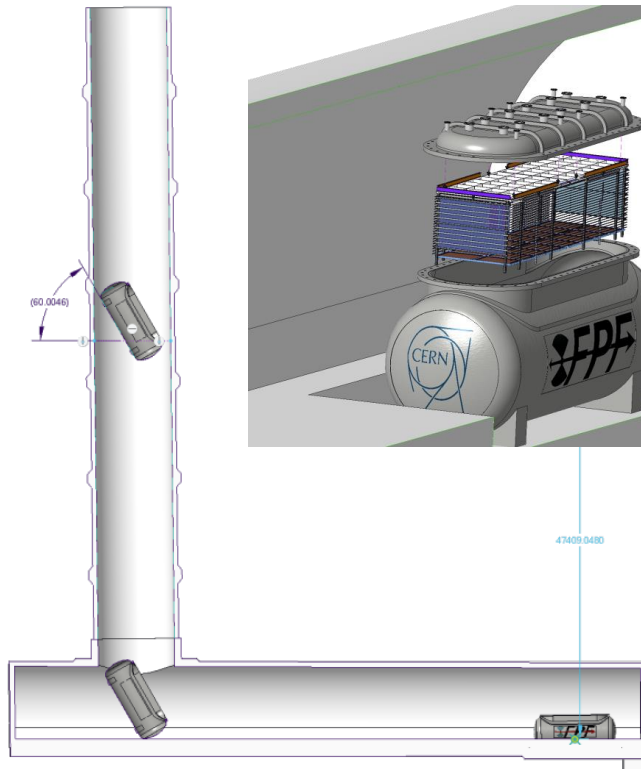
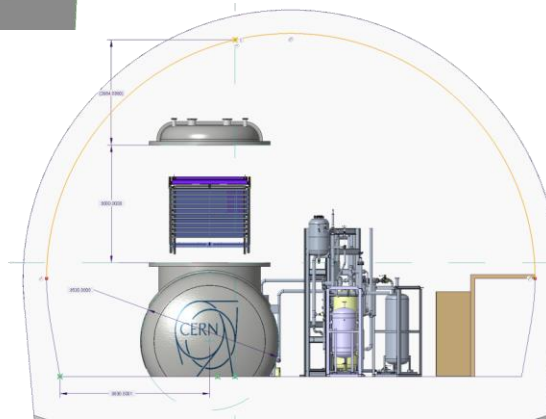
Thanks to C.Miraval



Thanks to A.Arigo



Thanks to K.Mavrokoridis



- 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

- 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!

- 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>
- Anchordoqui, L. A., Ariga, A., Ariga, T., Barr, A. J., Batell, B., Bian, J., Boyd, J., Citron, M., de Lellis, G., de Roeck, A., Crescenzo, A. di, Diwan, M. v, Feng, J. L., Hill, C. S., Kling, F., Linden, S., Mcfayden, J., Otono, H., Reno, M. H., ... Wu, W. (n.d.). *FORWARD PHYSICS FACILITY*.
- Andreini, M., Arduini, G., Balazs, K., Boyd, J., Bozzi, R., Cerutti, F., Corsanego, F., Corso, J., Elie, L., Infantino, A., Navascues Cornago, A., Osborne, J., Peon, G., & Sabaté Gilarte, M. (2023). *Update on the FPF Facility technical studies*.
- Abreu, H., Antel, C., Ariga, A., Ariga, T., Boyd, J., Cadoux, F., Casper, D. W., Chen, X., Coccaro, A., Dozen, C., Denton, P. B., Favre, Y., Feng, J. L., Ferrere, D., Galon, I., Gibson, S., Gonzalez-Sevilla, S., Hsu, S. C., Hu, Z., ... Zhang, G. (2020). Detecting and studying high-energy collider neutrinos with FASER at the LHC: FASER Collaboration. *European Physical Journal C*, 80(1). <https://doi.org/10.1140/epjc/s10052-020-7631-5>
- Collaboration, T. S. (2022). *SND@LHC: The Scattering and Neutrino Detector at the LHC*. <http://arxiv.org/abs/2210.02784>
- Ball, A., Brooke, J., Campagnari, C., de Roeck, A., Francis, B., Gastal, M., Golf, F., Goldstein, J., Haas, A., Hill, C. S., Izaguirre, E., Kaplan, B., Magill, G., Marsh, B., Miller, D., Prins, T., Shakeshaft, H., Stuart, D., Swiatlowski, M., & Yavin, I. (2016). *A Letter of Intent to Install a milli-charged Particle Detector at LHC P5*. <http://arxiv.org/abs/1607.04669>
- Presentations of CERN experts

- 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
- Regular Technical meetings: [Technical Meetings · Indico \(cern.ch\)](#)