

# LCD Engineering & Integration Detector Services Cavern Layout

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on behalf of the CERN LCD Engineering Group

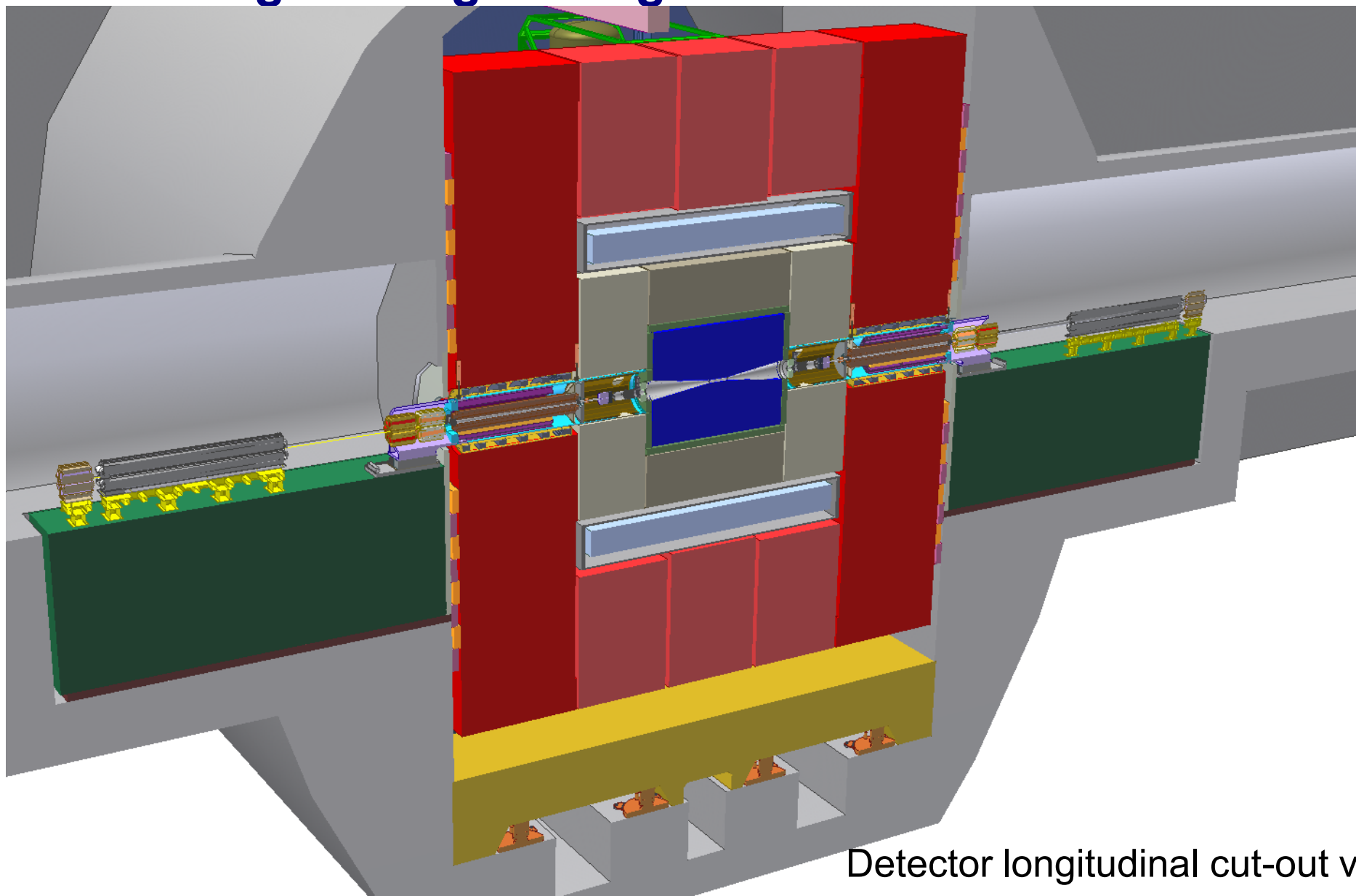
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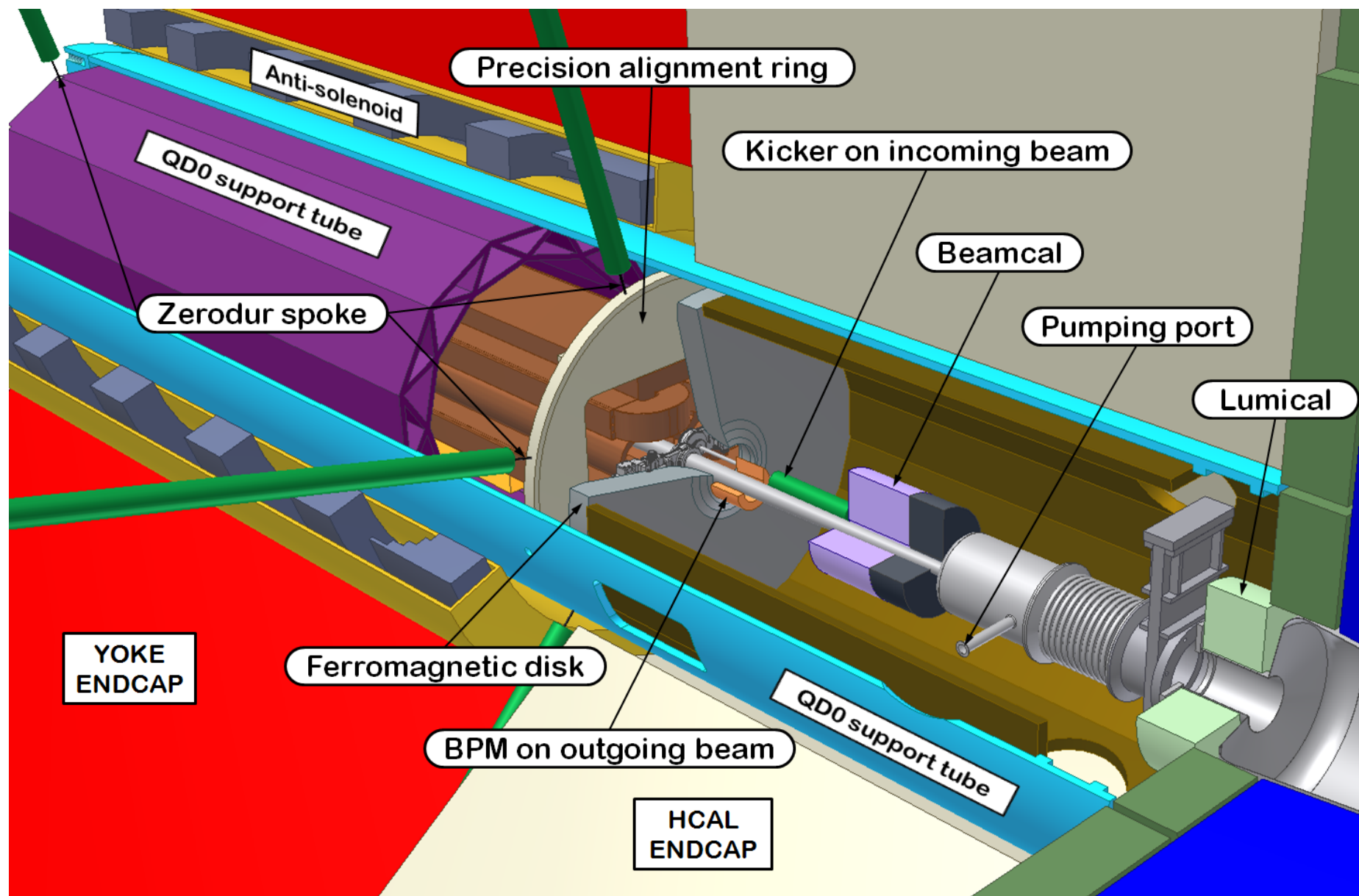


## Detector engineering & integration issues.



Detector longitudinal cut-out view

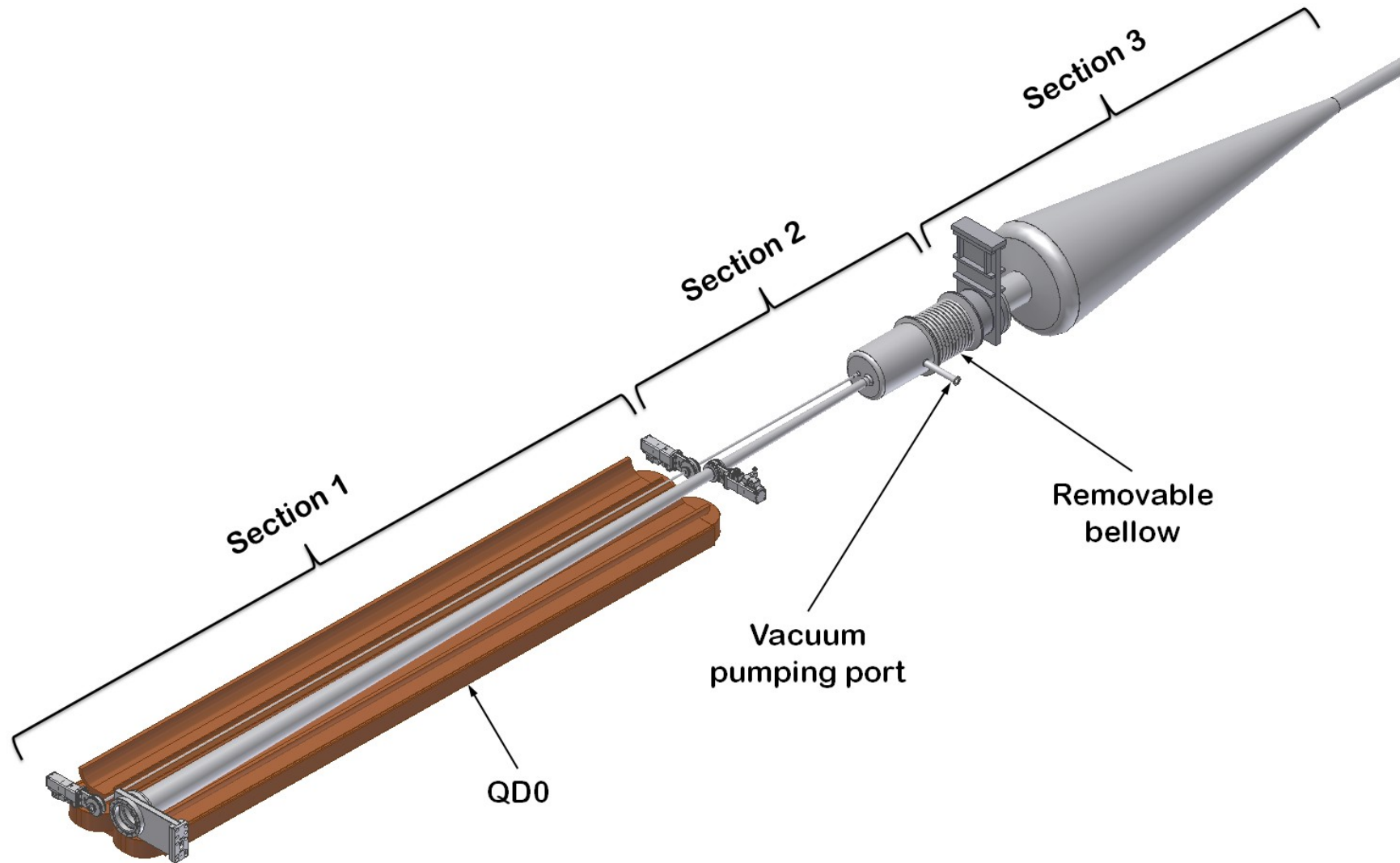
## Engineering & Integration of the Detector forward region.



## Progress on the forward region design.

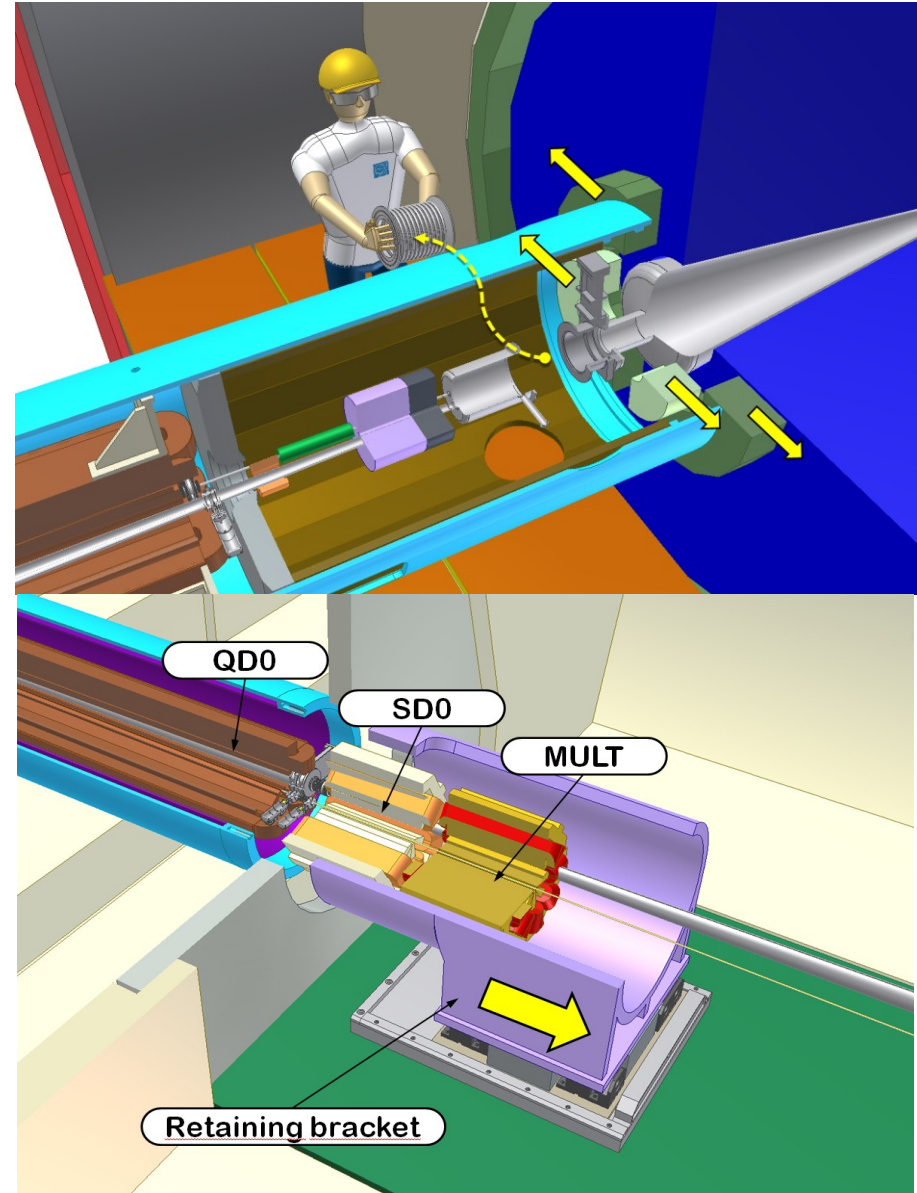
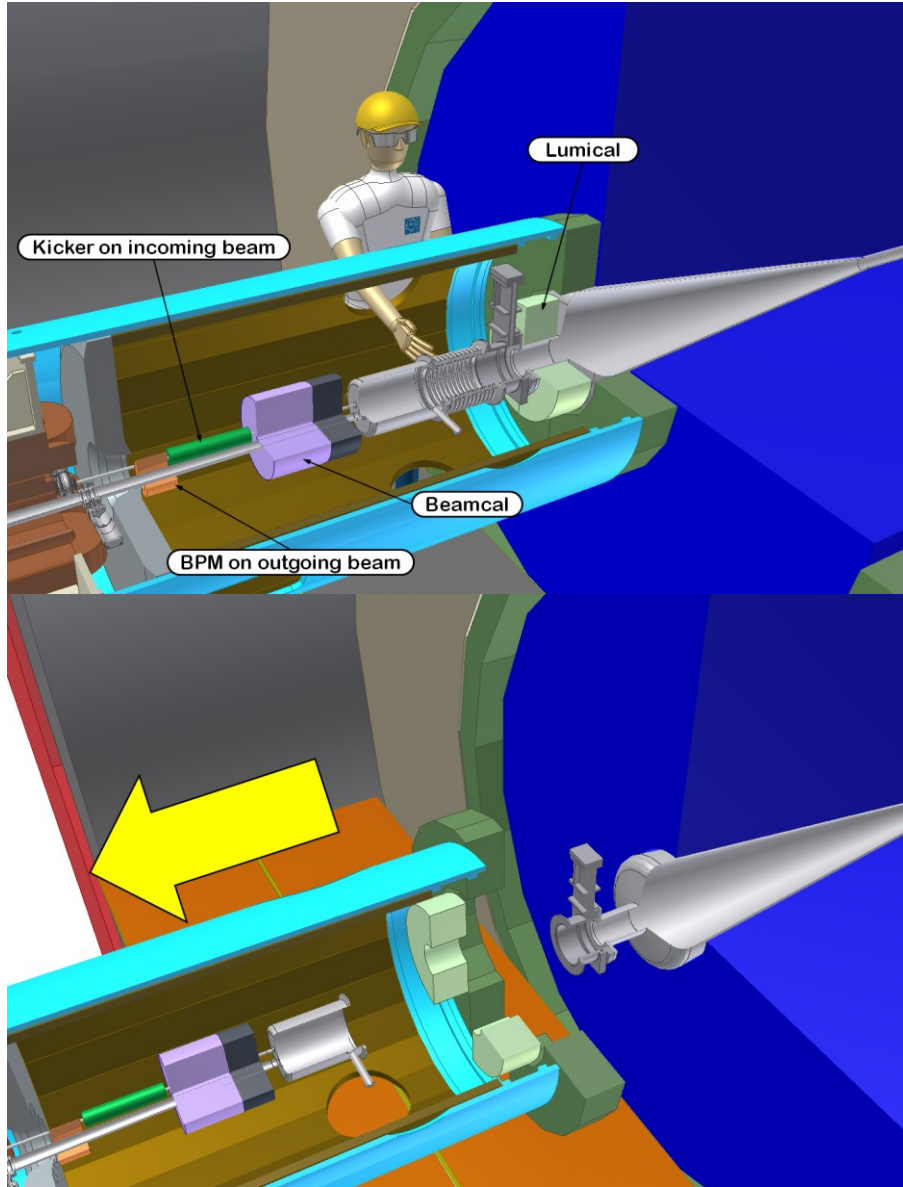
- Integration of the different forward detectors (Lumical, Beamcal)
- Integration of the beam feed-back components (BPM, Kicker)
- Integration of QD0, support tube and stabilization system
- Integration of the anti-solenoid & the ferromagnetic front-disk
- Integration of the optical link system for QD0+detector alignment
- Sectorization of the vacuum piping

## Beam-pipe sections.





## Maintenance scenario.



## Detector services.

Although the needs in terms of powering, cooling and gas-flushing have not yet been declared by sub-detectors, a minimal list of detector specific infrastructures has been set-up.

Considering that caverns ventilation, main power lines and primary cooling are services provided by the machine infrastructures Group, we have focused our attention to the following services:

- ✓ Sub-detector specific cooling, in the range between -20 and +20 deg C
- ✓ Low and high voltage power distribution to sub-detectors
- ✓ UPS to control PCs and sensible systems
- ✓ Compressed air for valve piloting closing to the detector
- ✓ Gas distribution for sub-detectors, including Nitrogen and dry-air flushing
- ✓ Detector slow-control and safety systems

To be noted that this list does not include the magnet services and the detector moving system, that are considered separately from sub-detector services.

## Detector services.

### Find the best location for the service skids.

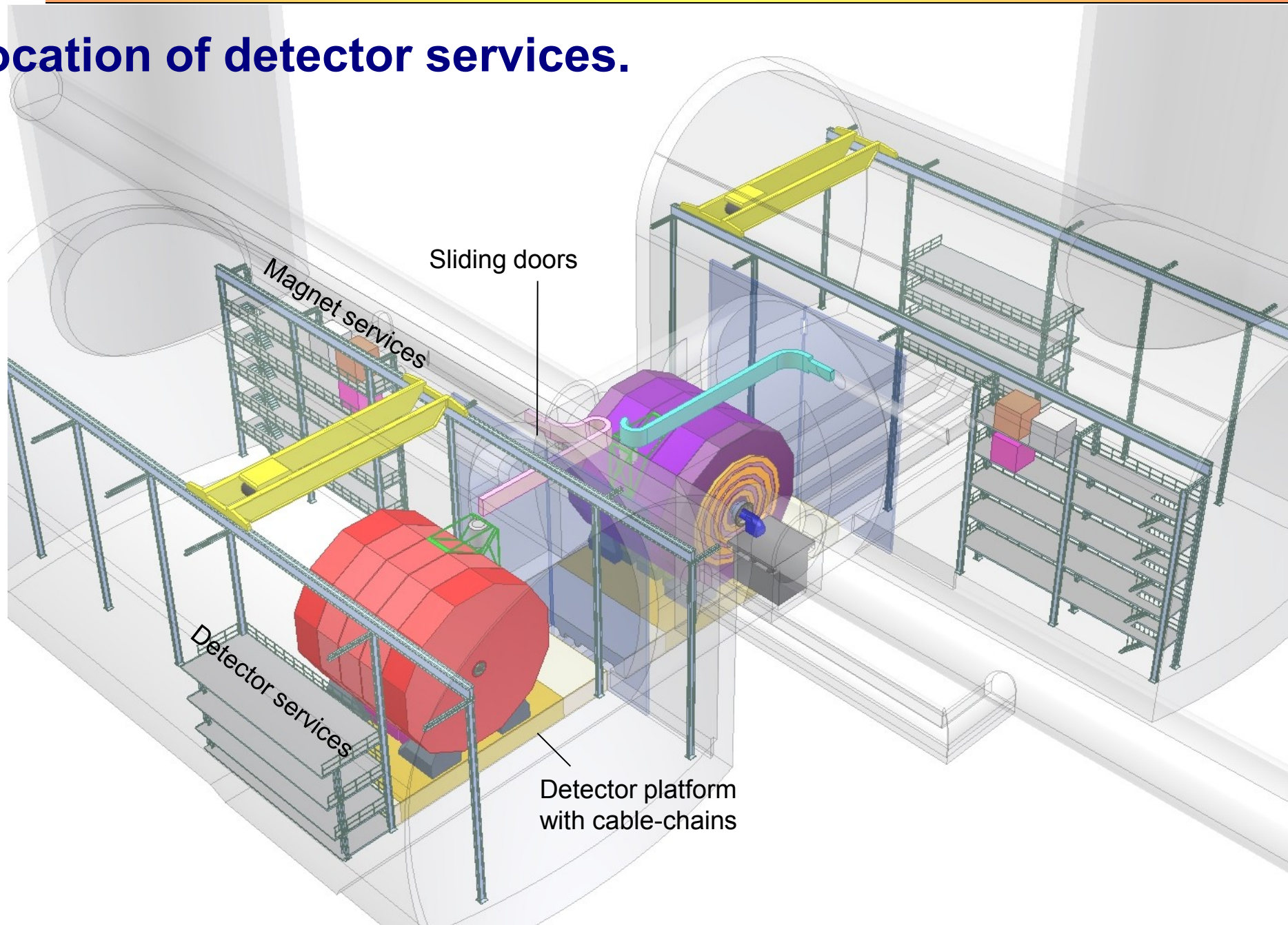
Considering the issues of accessibility for maintenance, presence of stray field from the detector magnet and in order to avoid producing vibrations close to the Interaction Region, the service skids have been located on the metallic scaffolds on the cavern wall opposite to the transfer tunnel.

### How to connect them to the detector platform.

The link to the detector platform is done via multiple cable-chains, running underneath the cavern floor, as done at CMS. Therefore the detector stays always cabled and connected to the service skids and the floor is free from obstacles that could prevent free movement of people or machines.

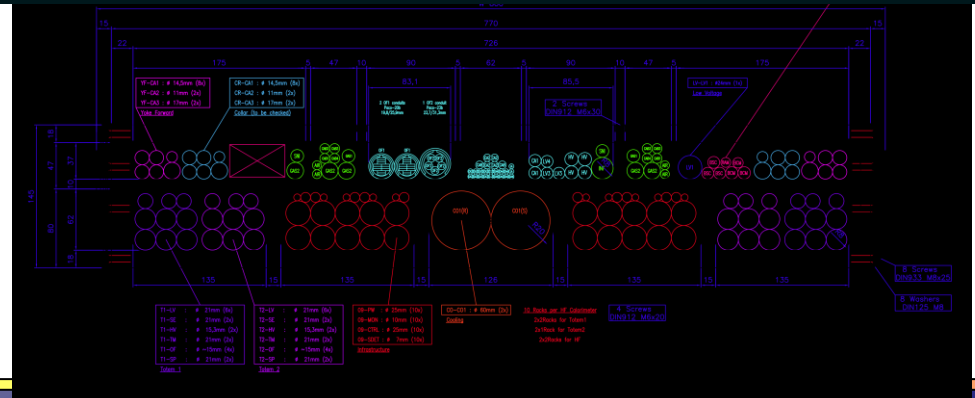
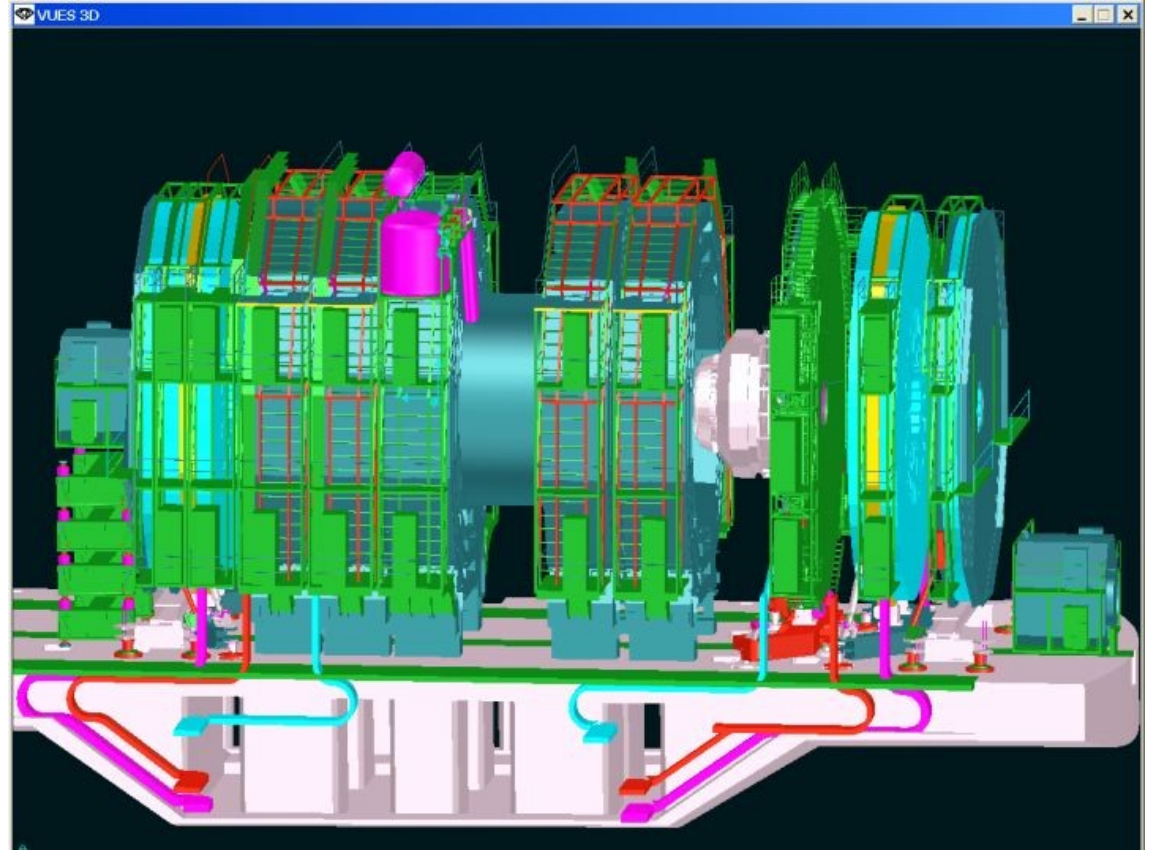


## Location of detector services.

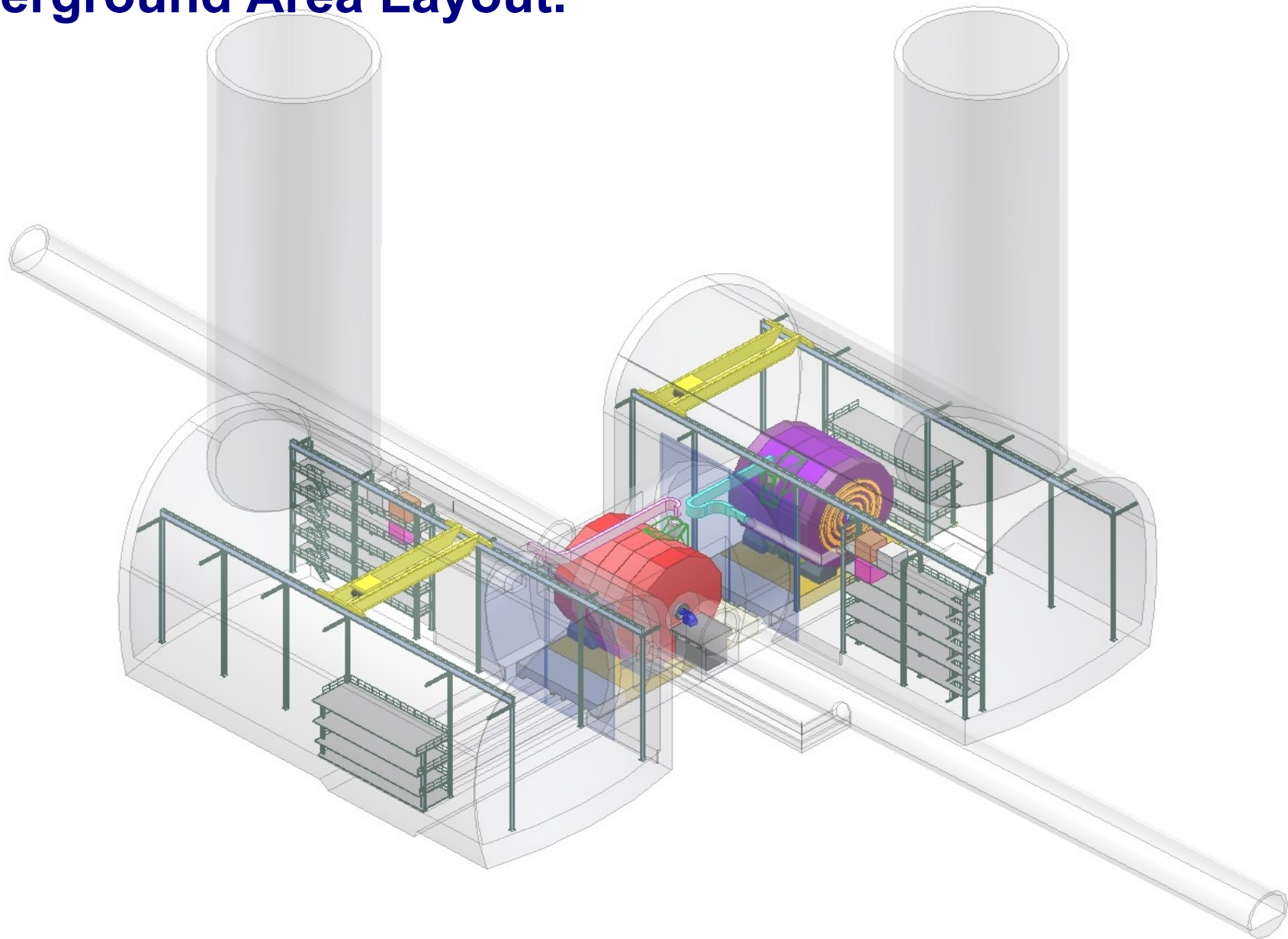




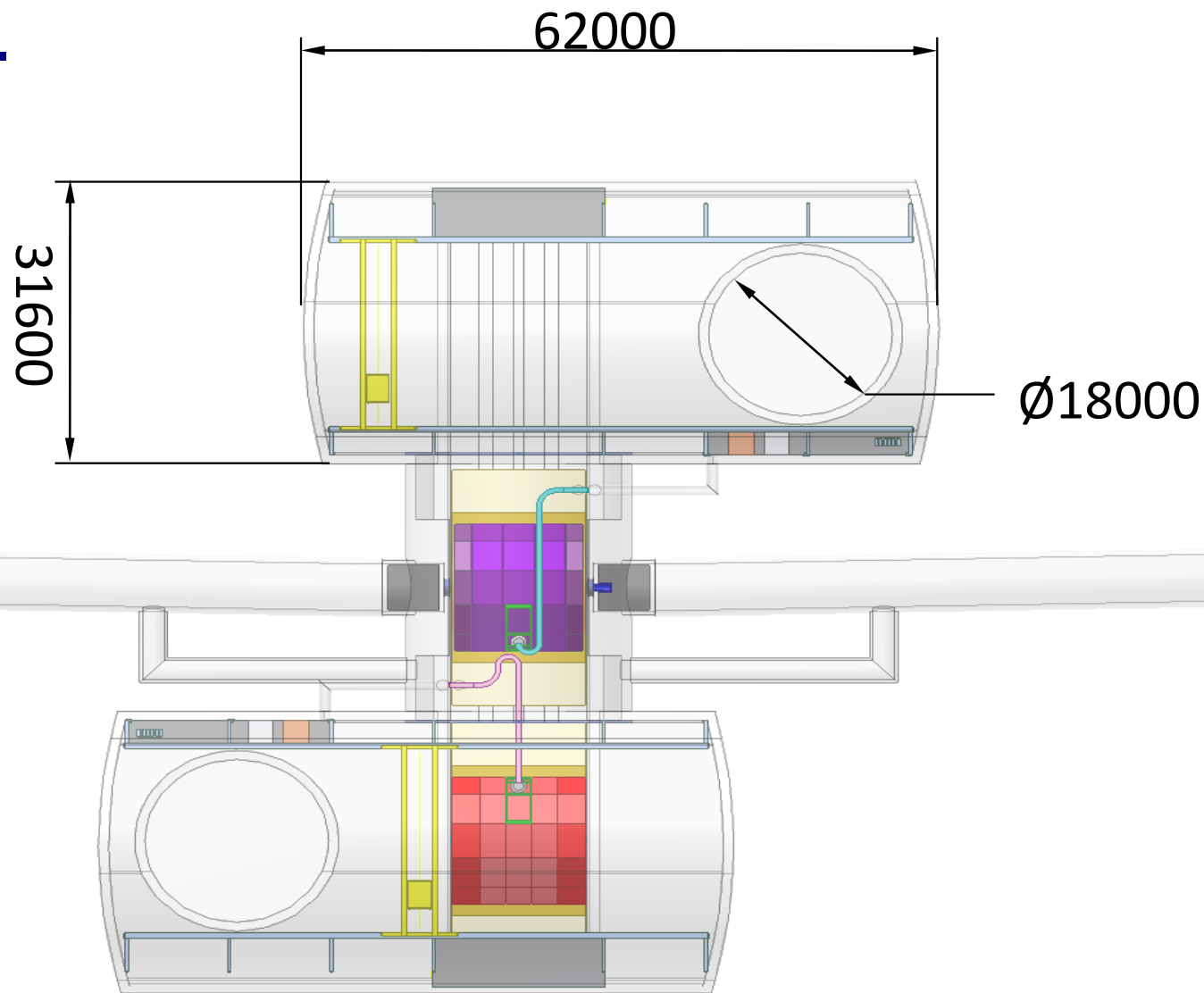
## Cable-chains for detector services (CMS example).



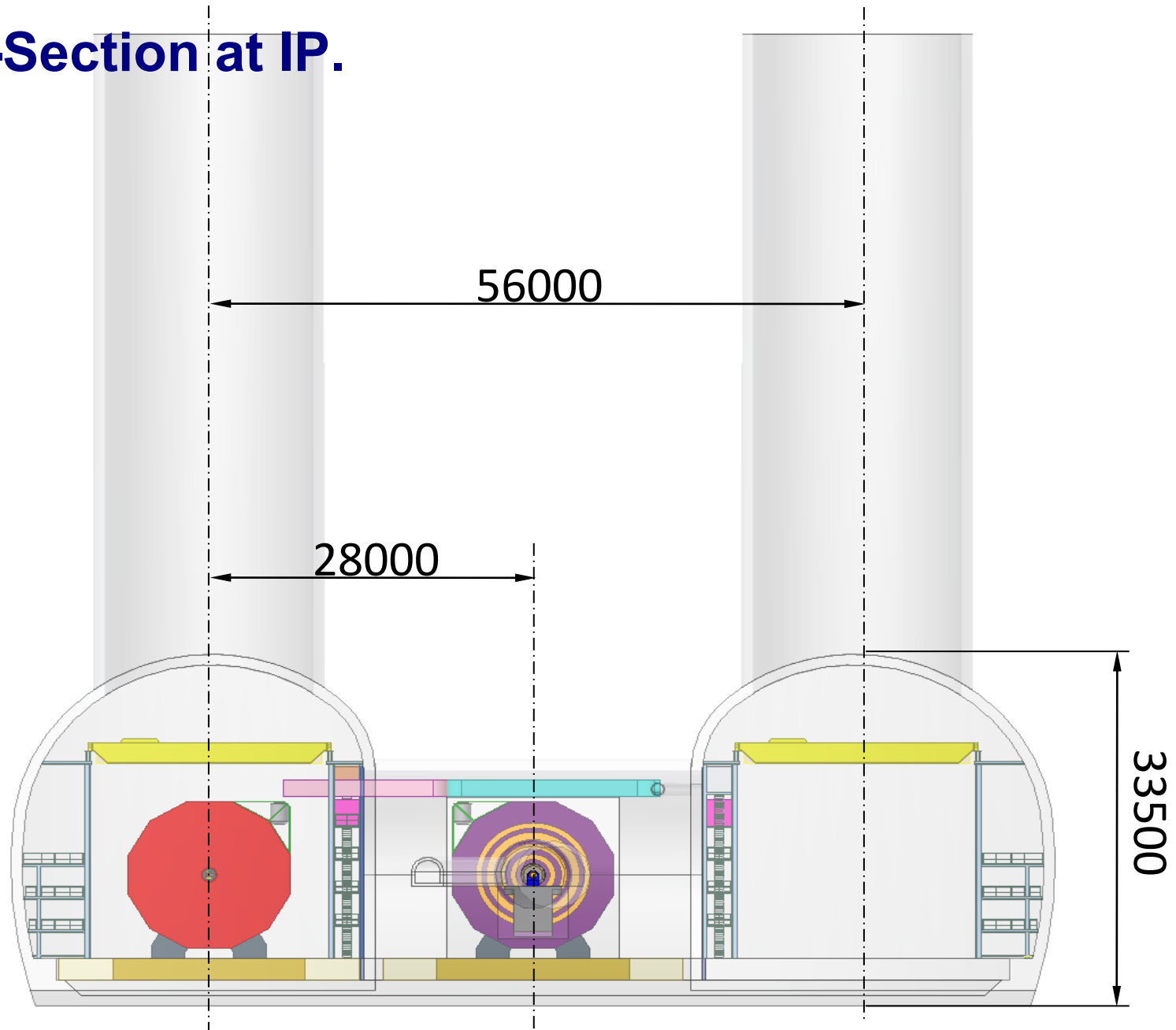
## Underground Area Layout.



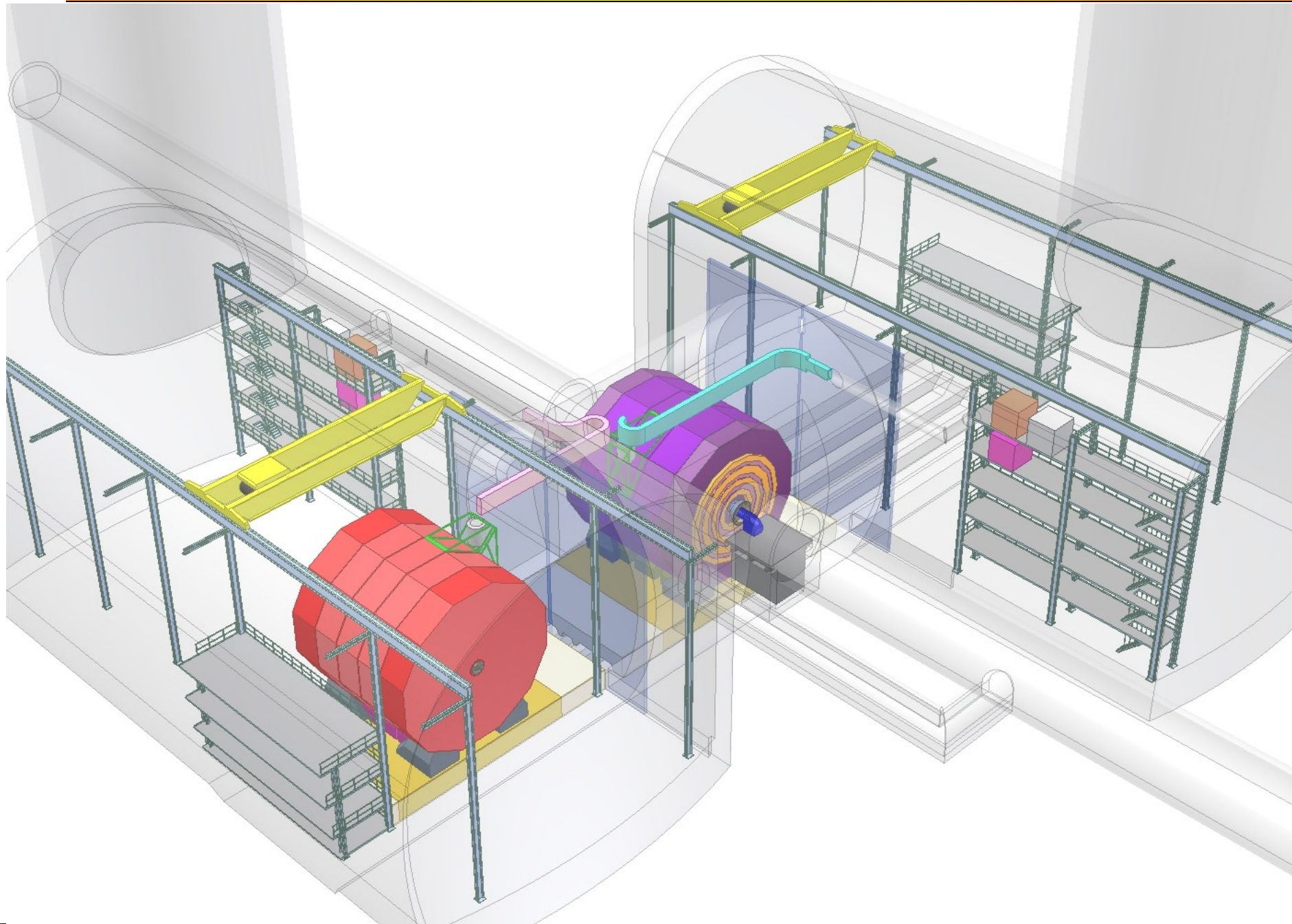
## UA Top View.

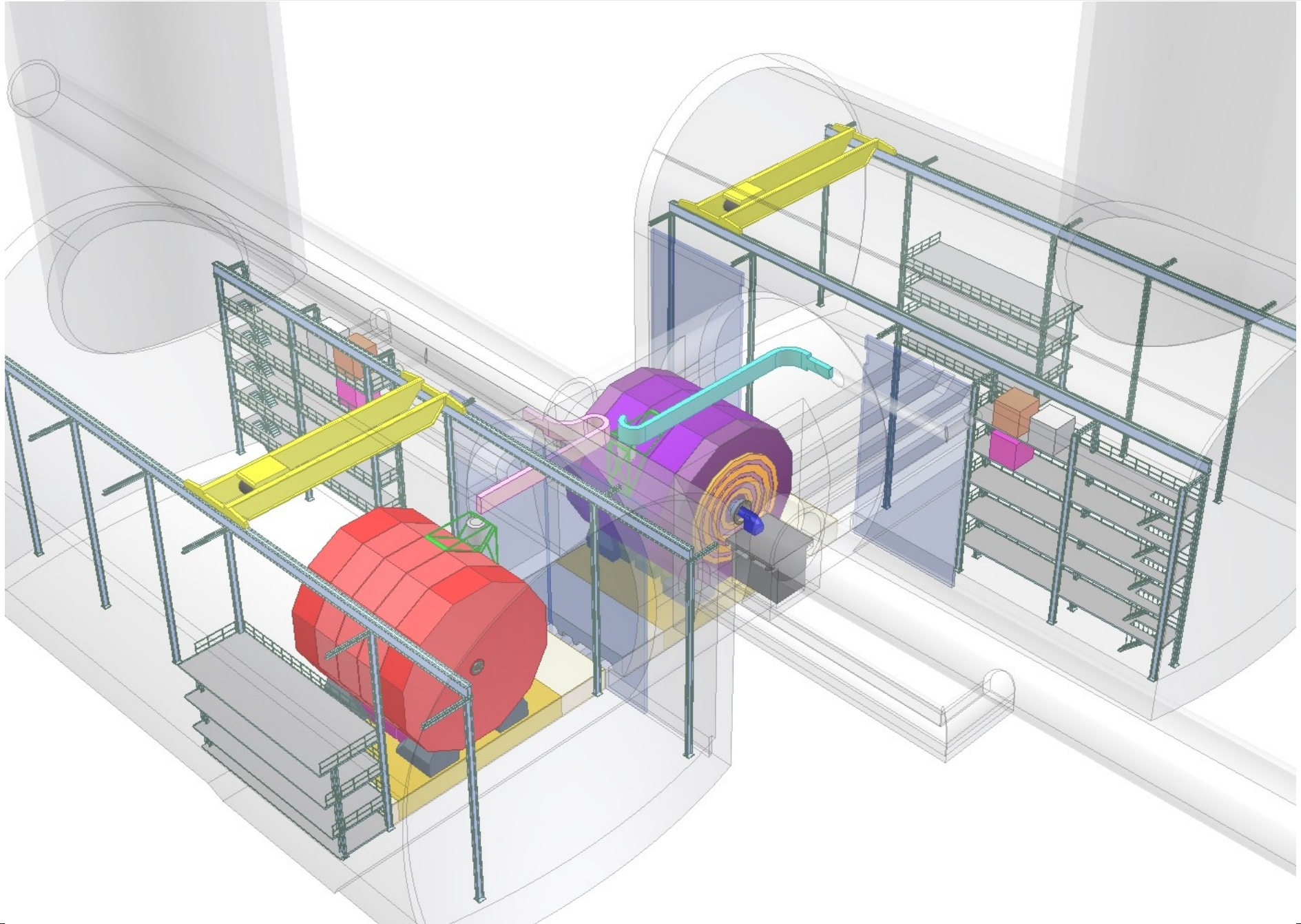


## UA Cross-Section at IP.

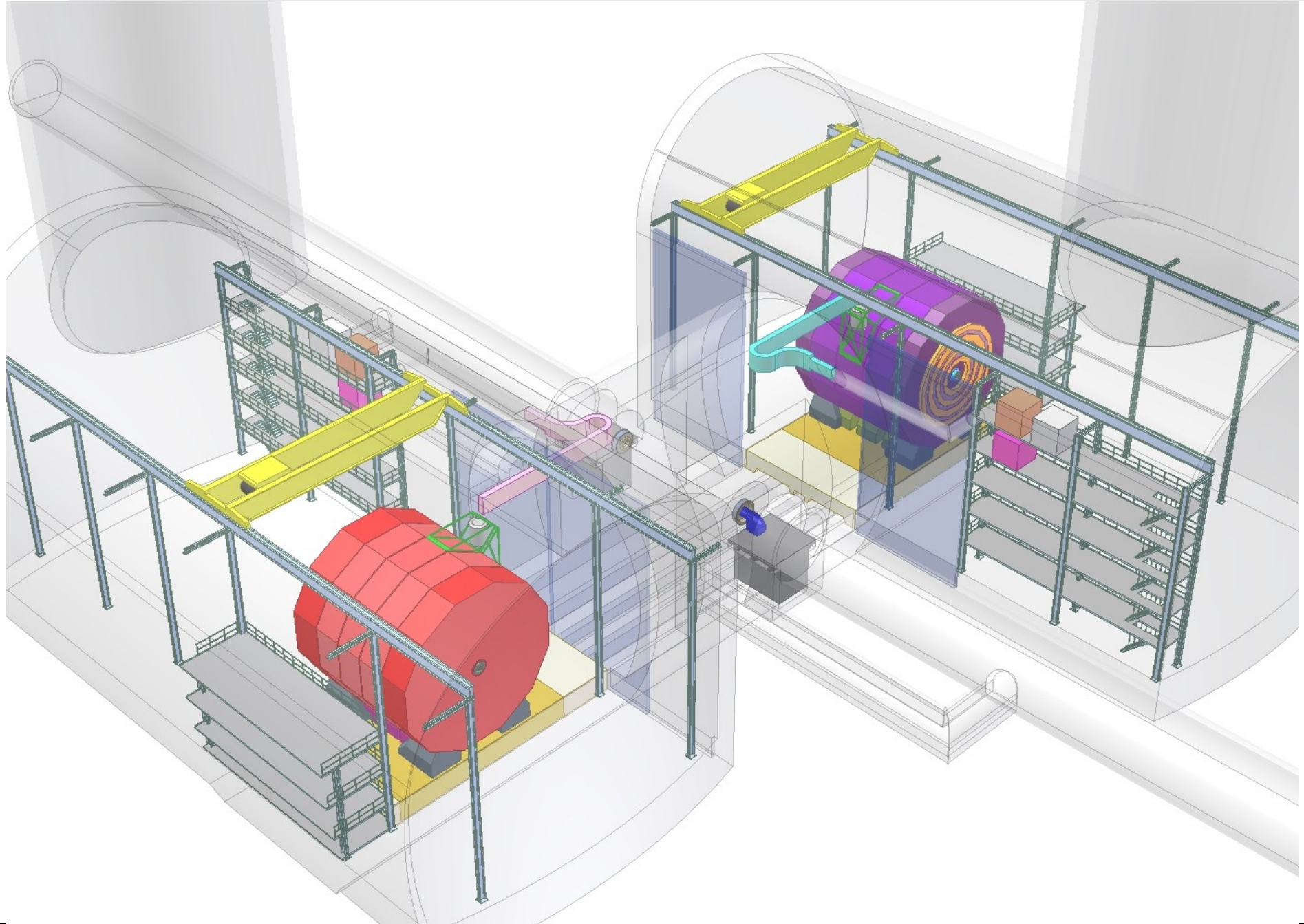


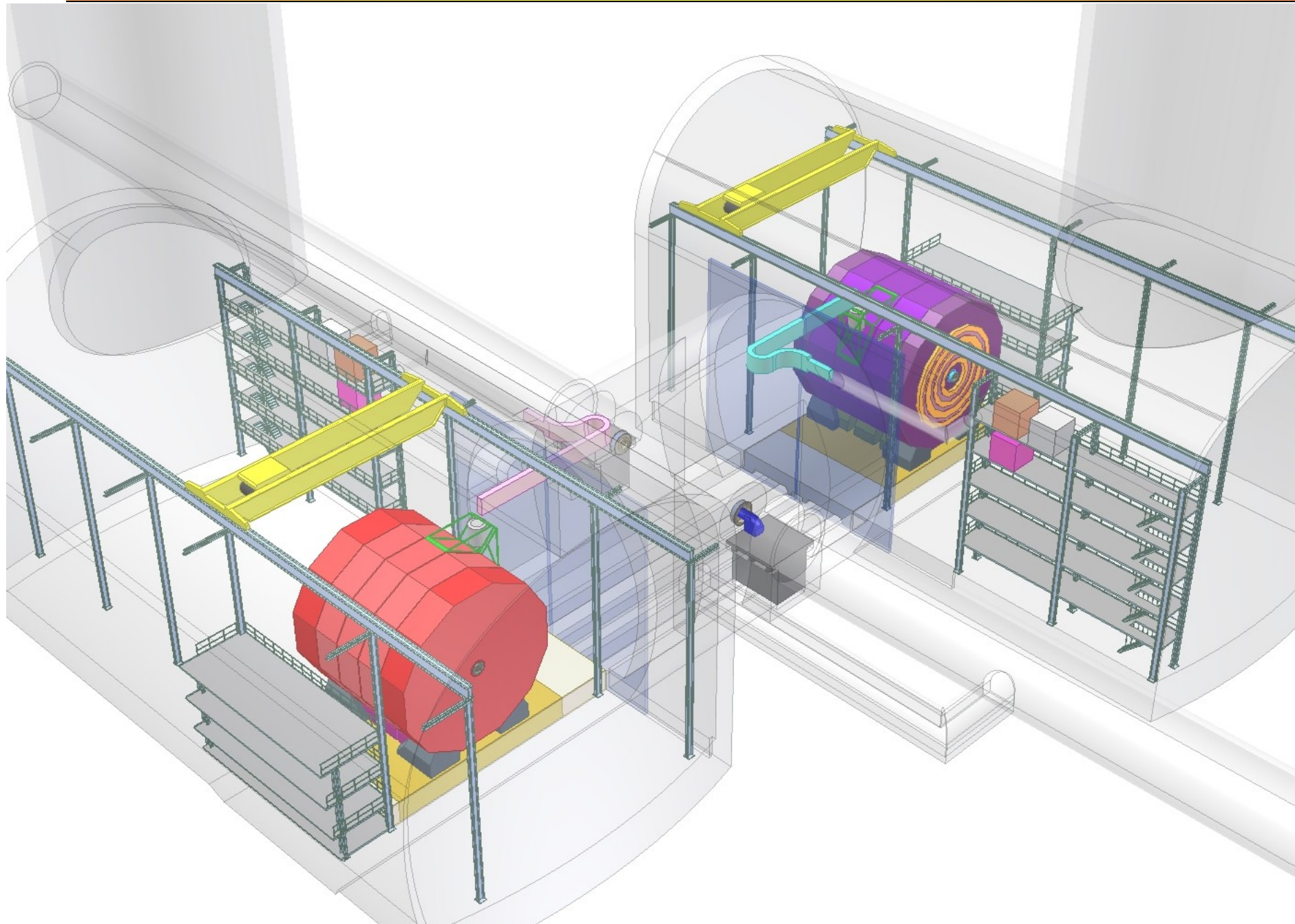




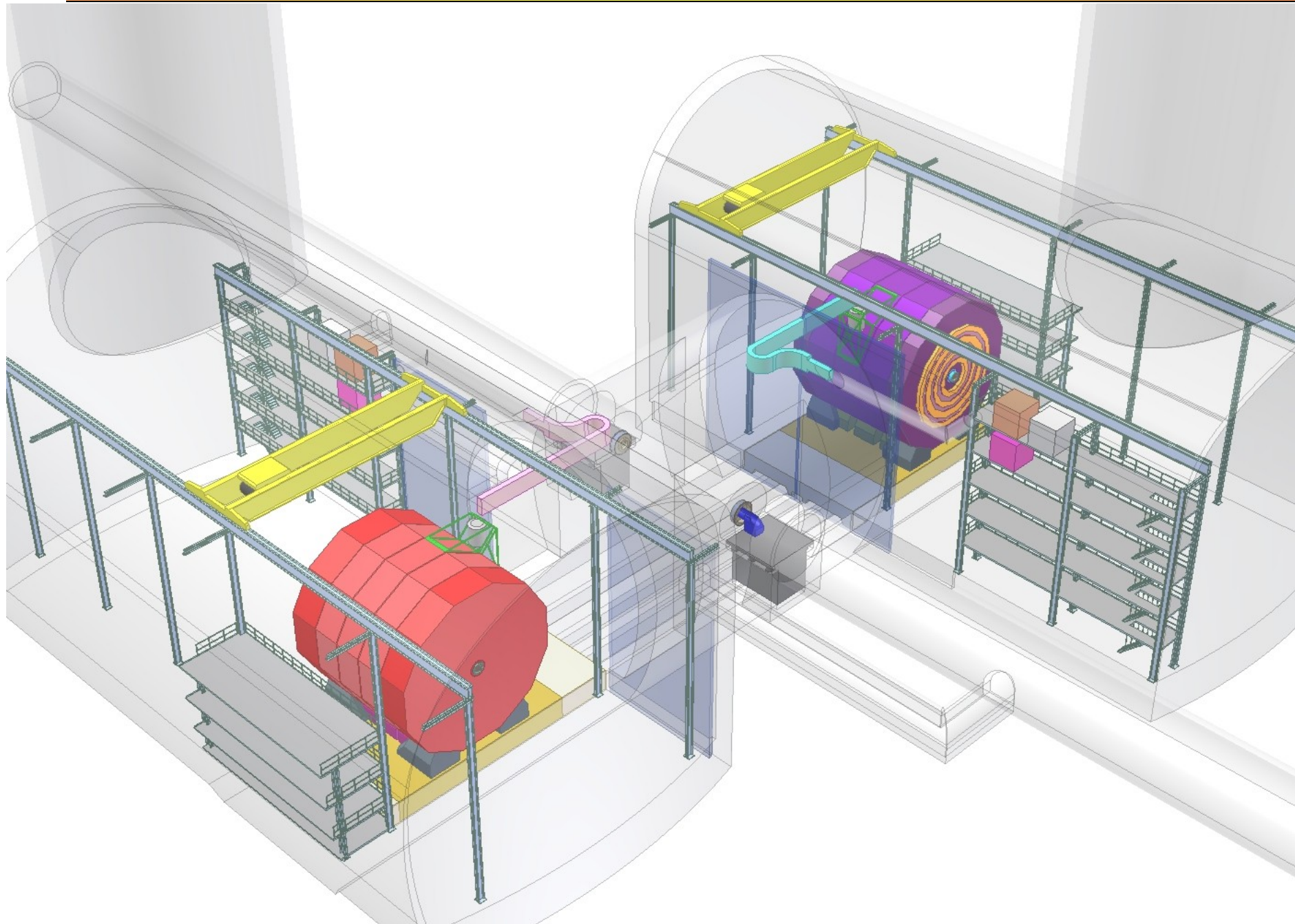




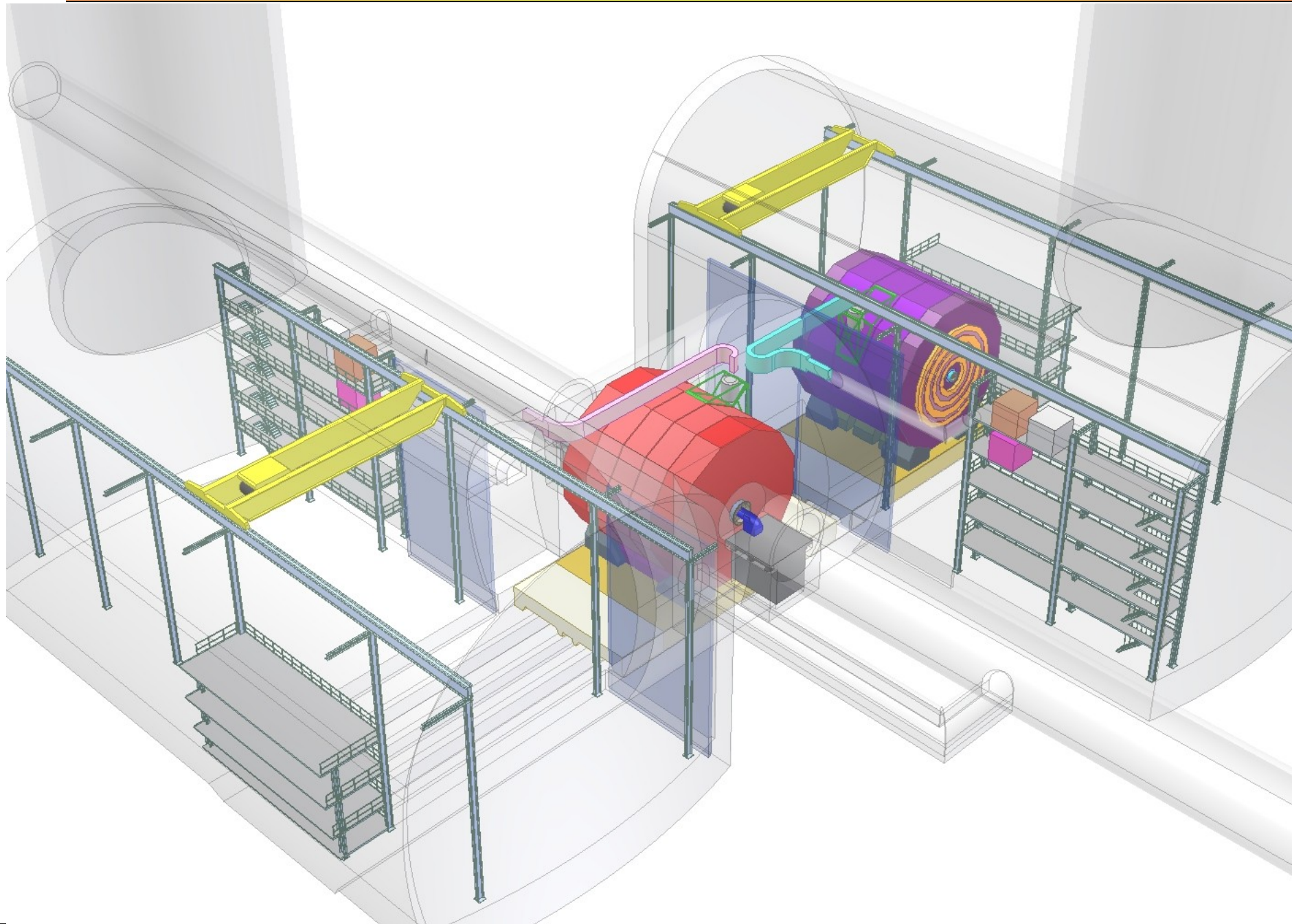


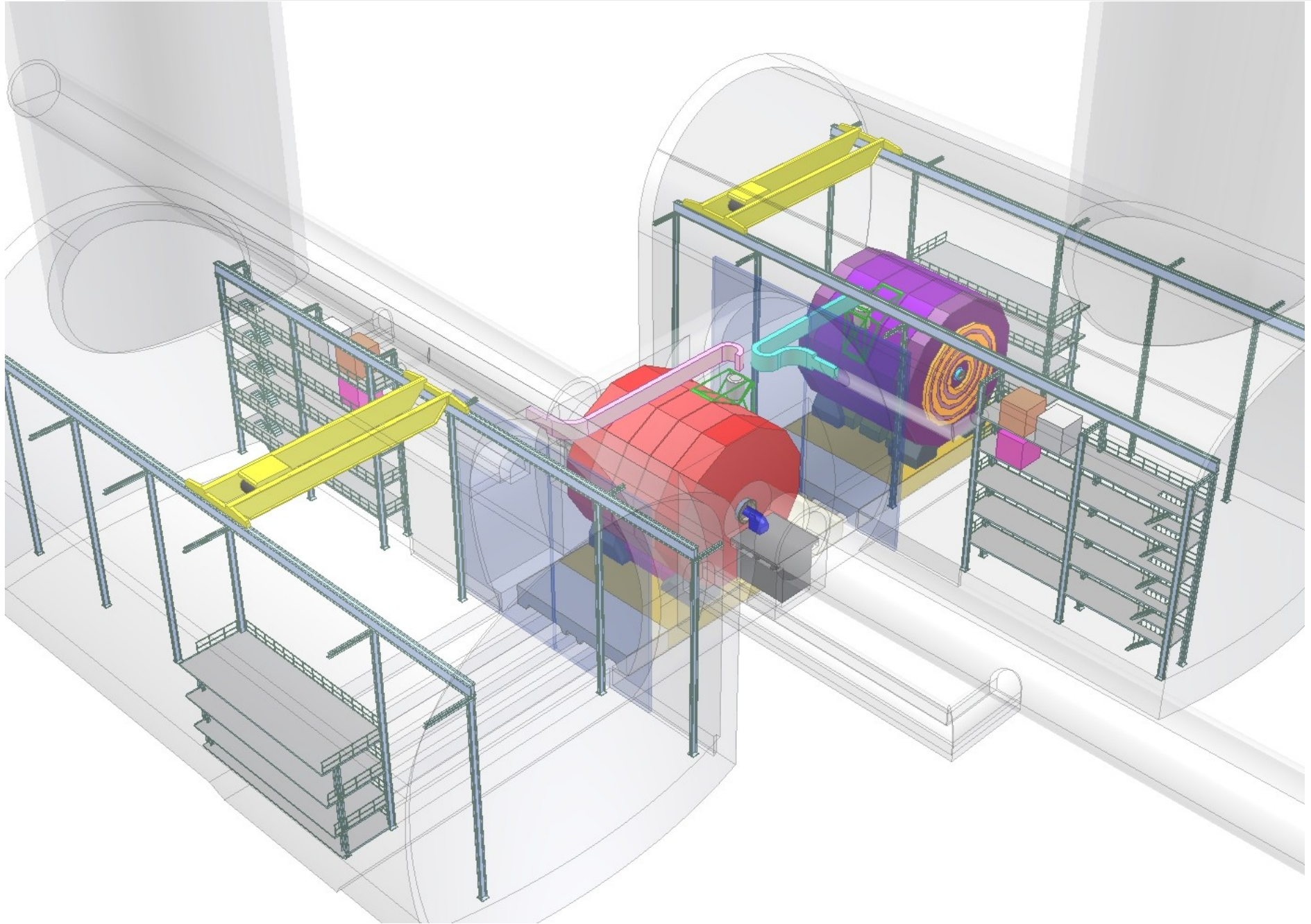














## Underground Area Ventilation.

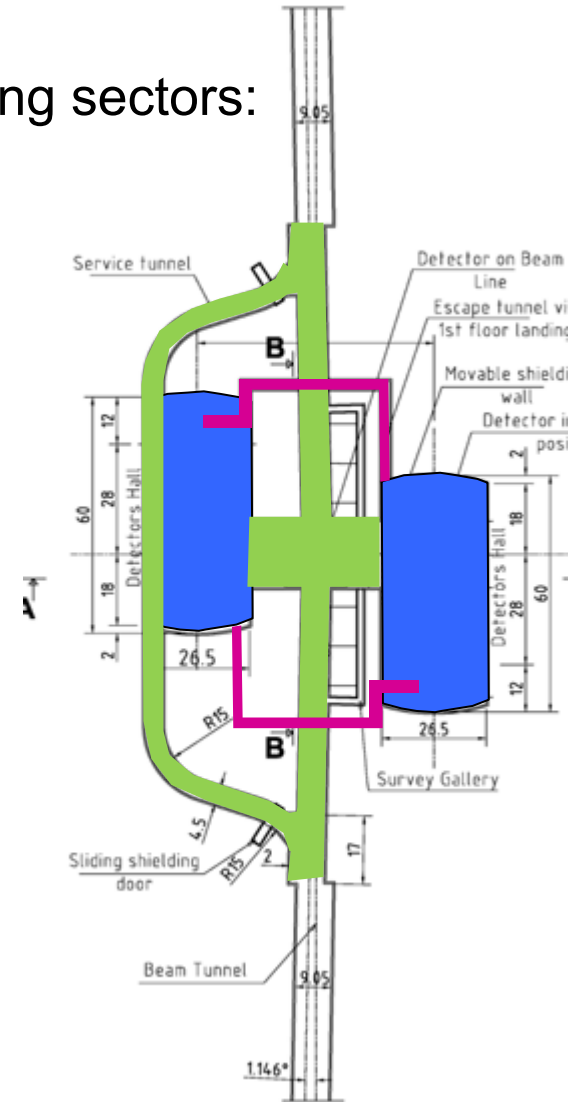
The functionalities assured by the ventilation are the following:

- Provide fresh air for personnel.
- Treat air according to needs: heating, conditioning, dehumidify.
- Evacuate thermal charges.
- Ensure dynamic confinement between machine and accessible areas where 100% air tightness cannot be achieved.
- Provide extraction capabilities.
- Filtering exhaust air before releasing into the environment.
- Purge of areas (after a fire).

## Ventilation sectors:

The underground area shall be divided in the following sectors:

- Cavern A (=)
- Cavern B (=)
- Bypass and interaction region (-)
- Emergency escape tunnel (+)
- Pressurised areas in shaft (+)



Courtesy M. Gastal, J. Osborne

## Detector Moving System.

- A study has recently started and a first proposal is presented by M. Herdzina.