SID Assembly Procedures

European and Japanes Site

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U.S. DEPARTMENT OF ENERGY
Office of Science

SLAC NATIONAL ACCELERATOR LABORATORY

Assembly procedures driven by SID design features

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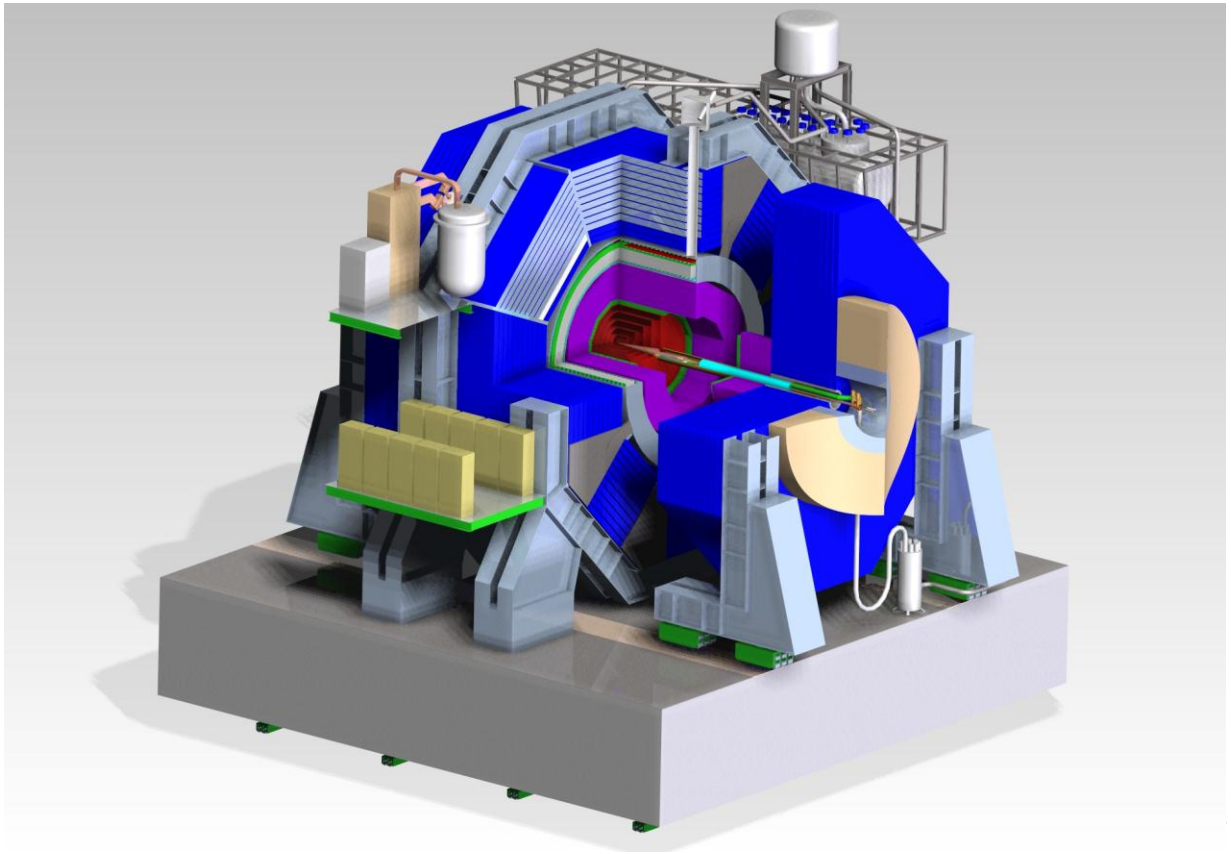
Compact design with 5 T Solenoid

Single Ring Barrel ~ 4’000 tons

Self Shielded: Stray Fields & Radiation

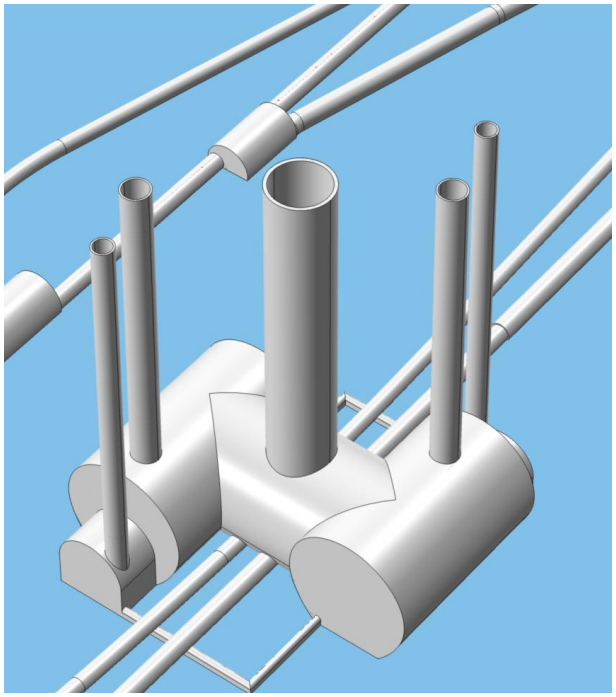
Short L* with QD0’s supported from the doors

Sub System	Tons
Barrel Ecal	60
Barrel Hcal	450
Coil	192
Barrel Iron	3287
Total Barrel	**3990**
Endcap Ecal	10
Endcap Hcal	38
Endcap Iron	2100
Pacman	100
Feet	60
BDS	5
Total Door (x1)	**2313**
Total SiD	**8615**

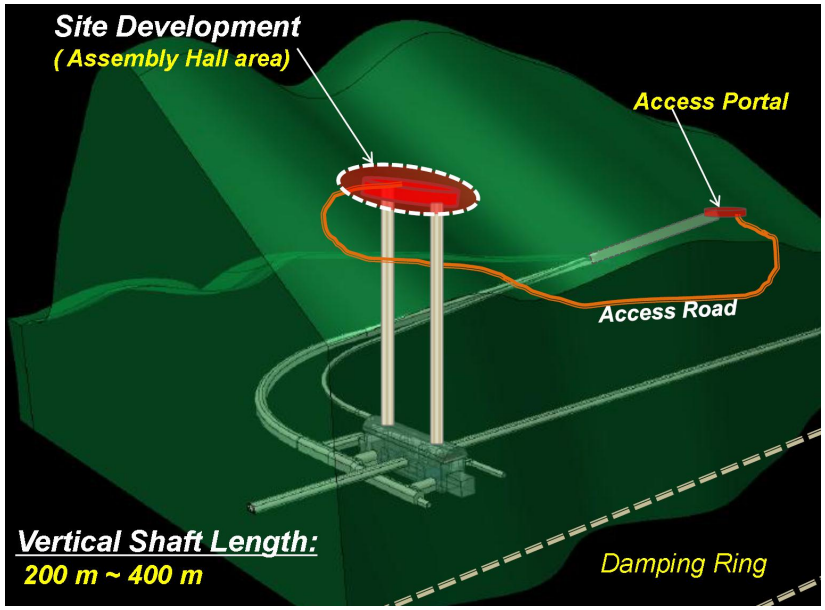


Assembly Procedures for different Sites

- The assembly procedure will be different for the two sites
- Both layouts must satisfy push-pull requirements
- The detector hall must be optimized for costs: benefits vs. features

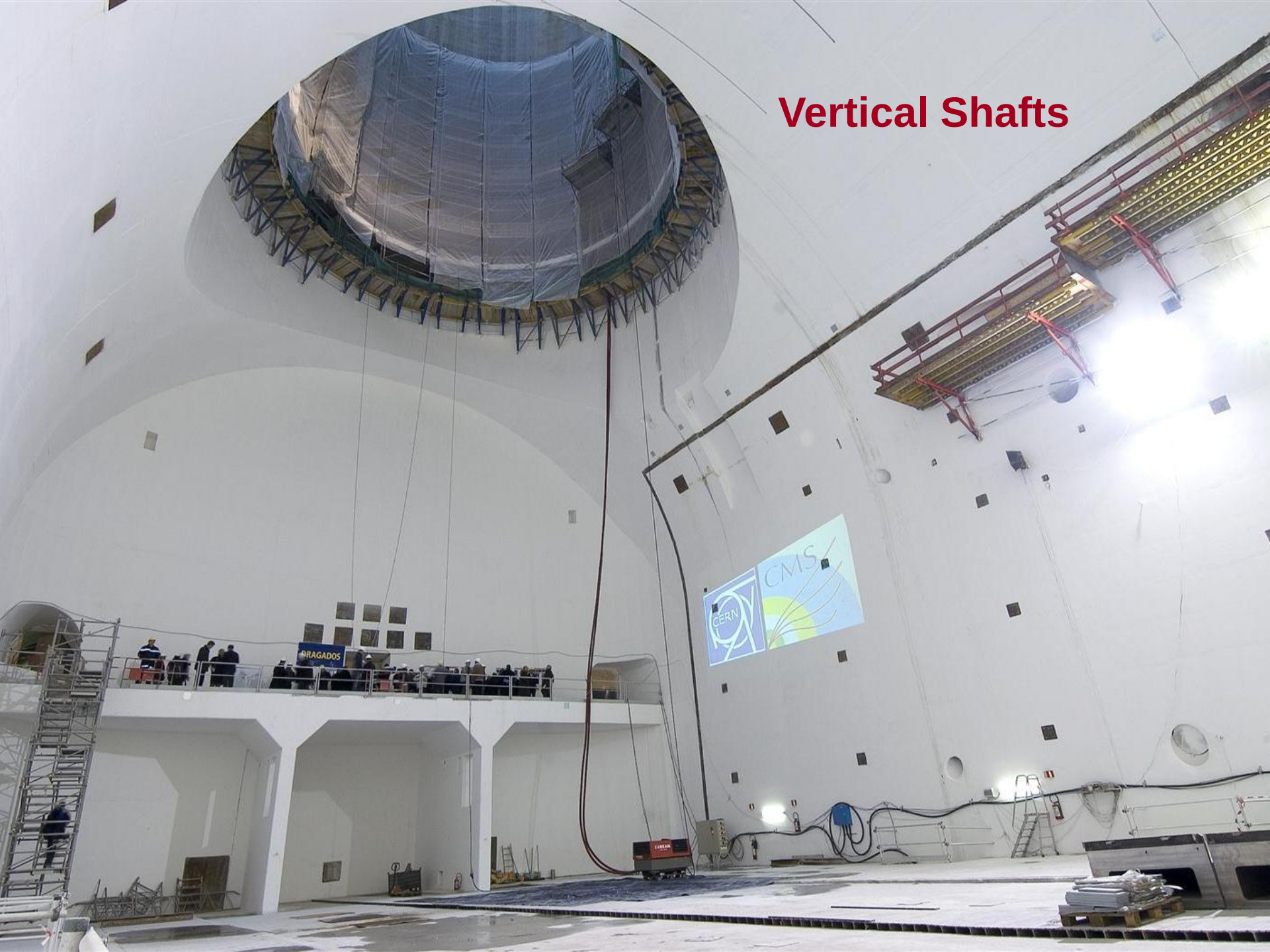


•Vertical shafts (Europe, Americas)



•Horizontal shafts (Japan)

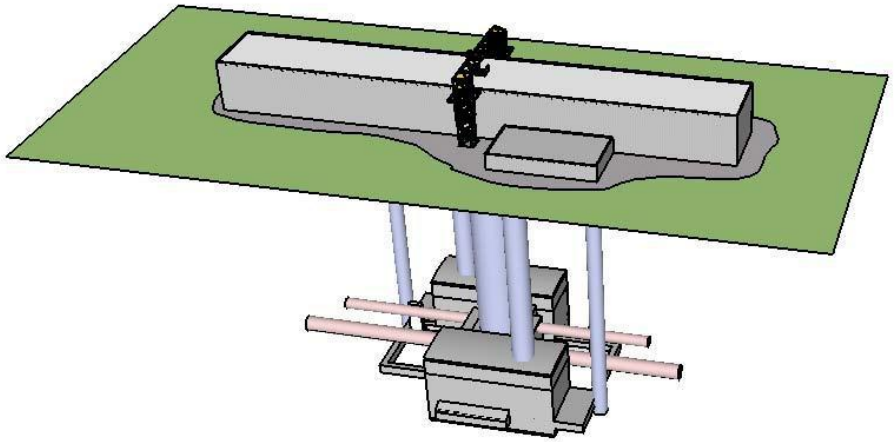
Vertical Shafts

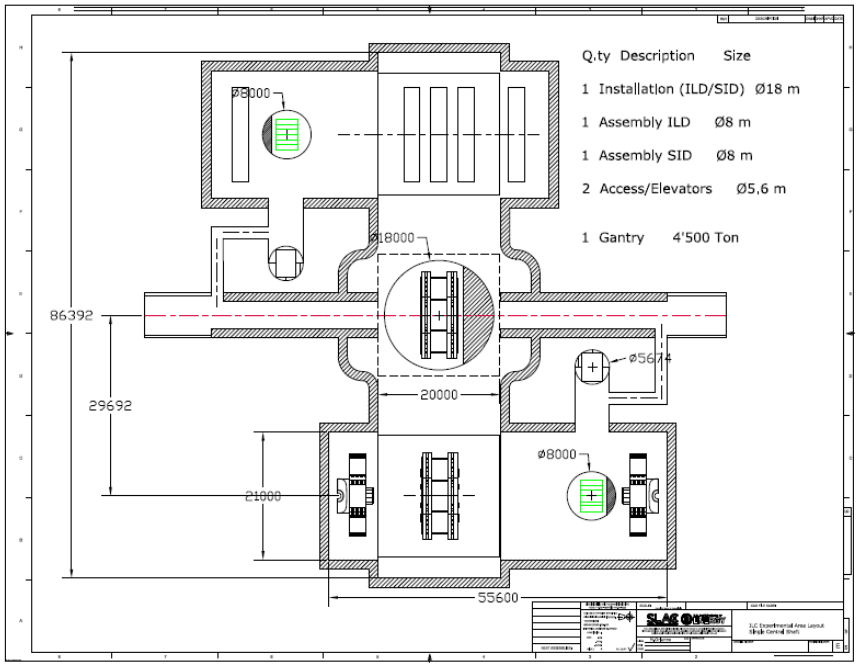


Detector Hall Design: Vertical Shaft

Five shafts Layout : single large shaft above the IP, two smaller shafts on the alcoves, two shafts for personnel access.

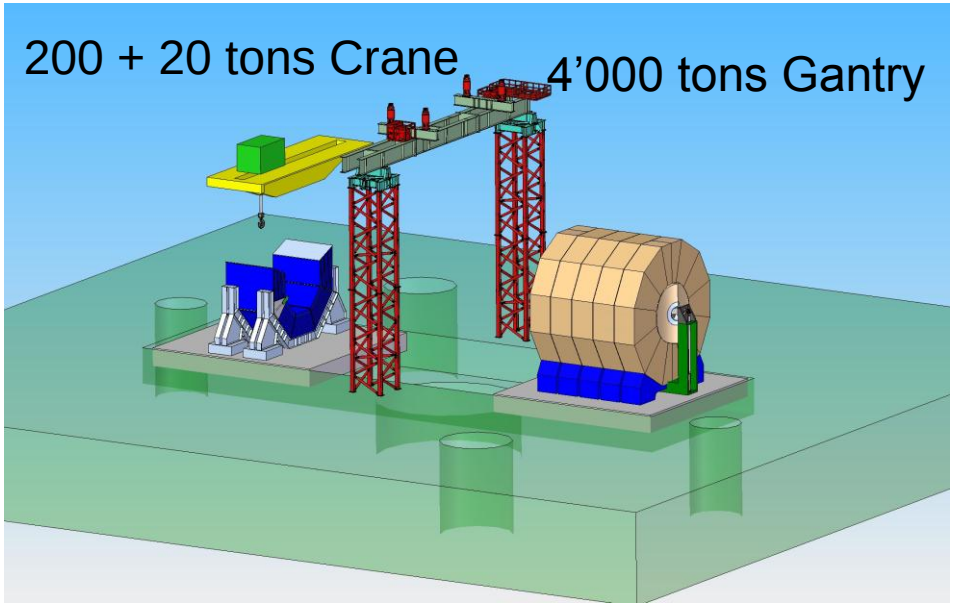
Cost optimization vs. features, like IP commissioning without detectors.

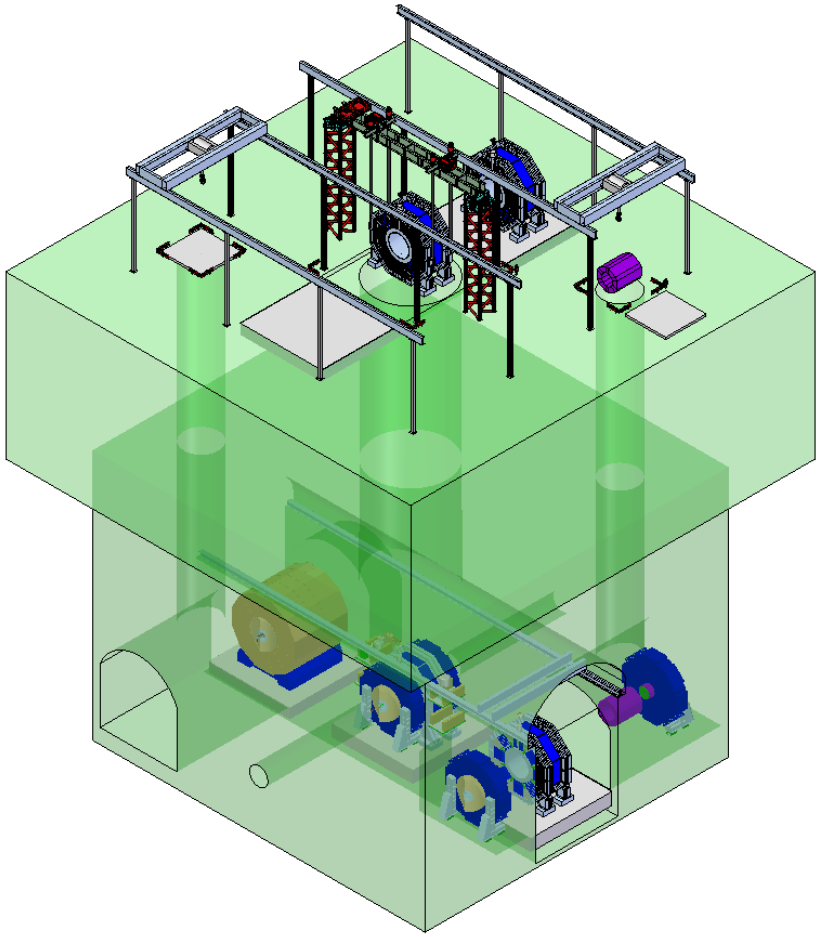




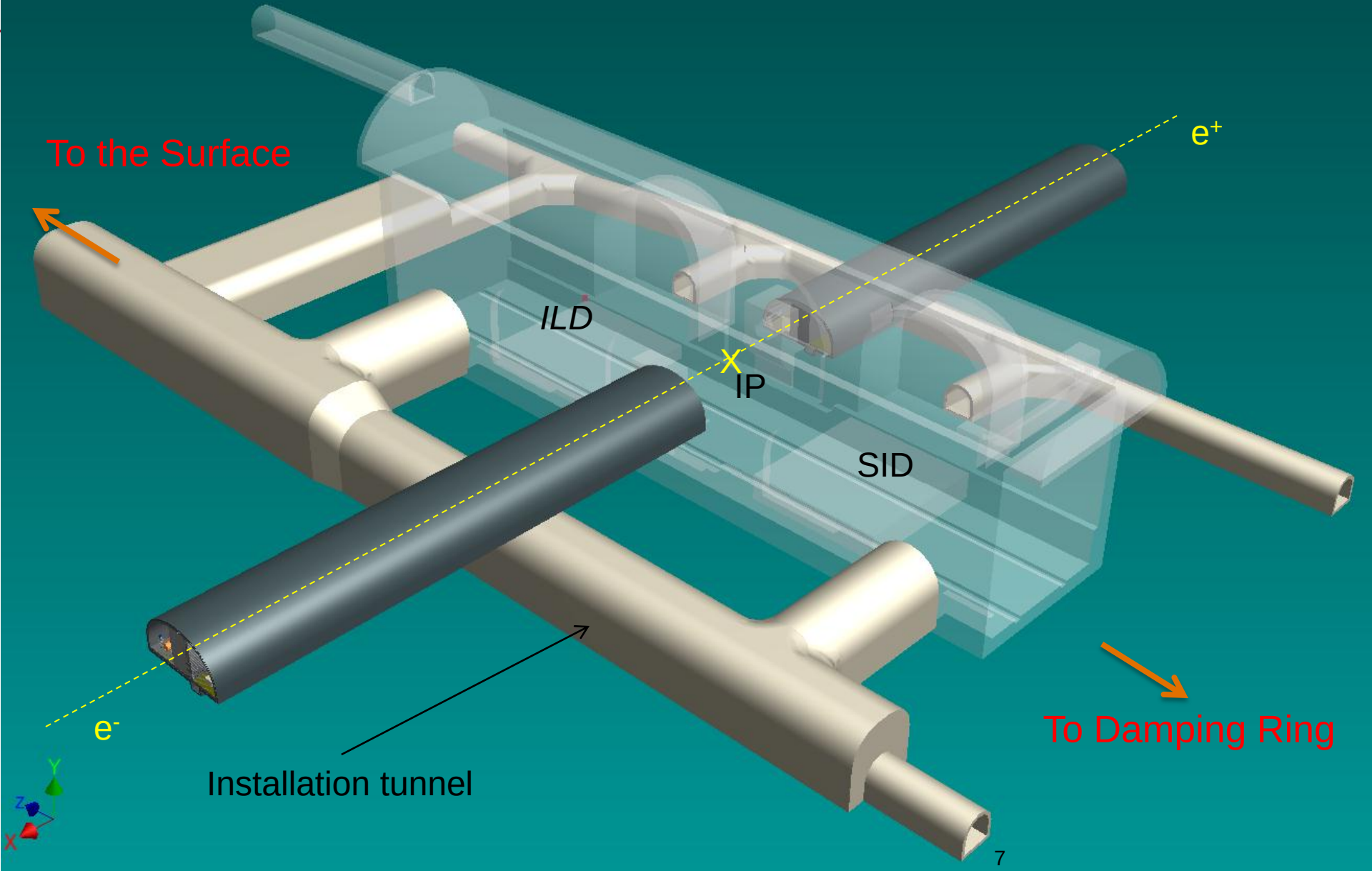
Surface assembly *a la* CMS

1. Assembly of Iron Doors+Barrel on surface
2. Commissioning of the magnet on surface
3. Very Large capacity gantry

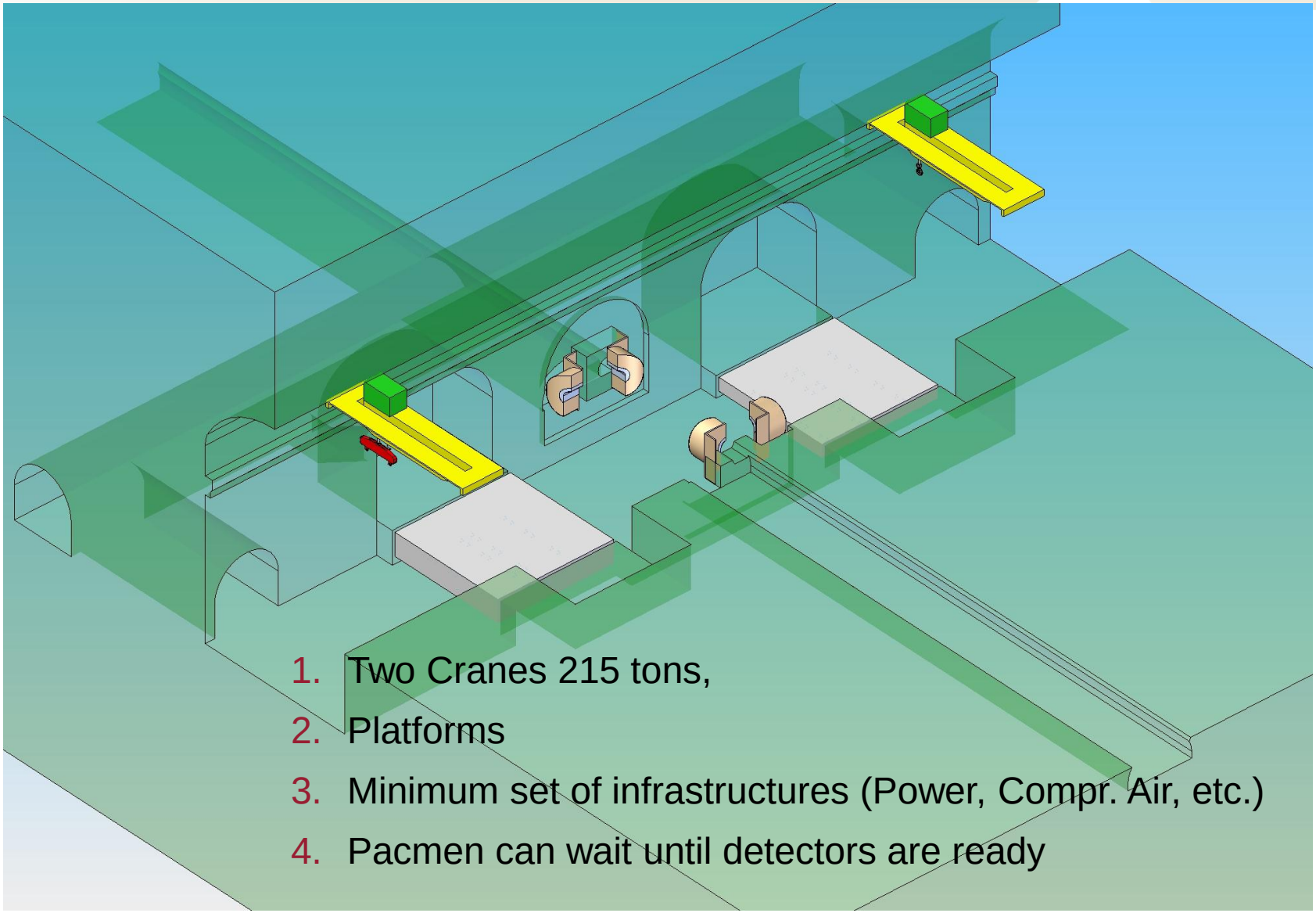




Detector Hall, Japanese Mountain Site

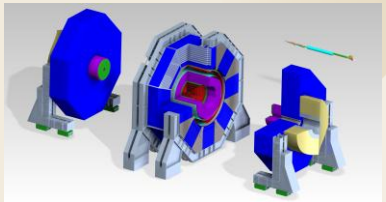


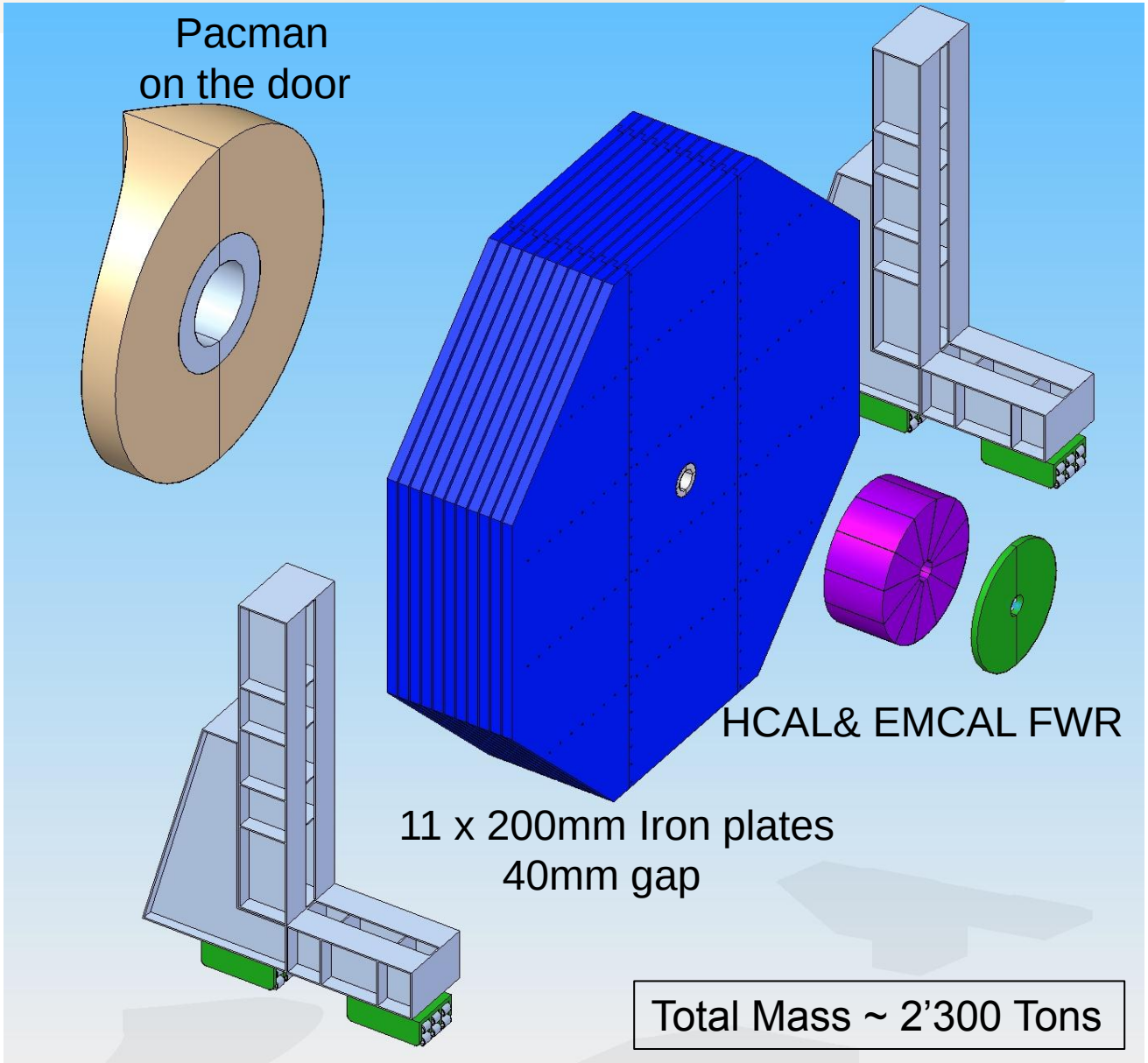
Site Delivery prior the start of the Detector Assembly



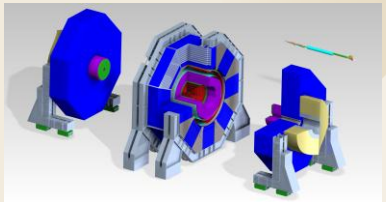
1. Two Cranes 215 tons,
2. Platforms
3. Minimum set of infrastructures (Power, Compr. Air, etc.)
4. Pacmen can wait until detectors are ready

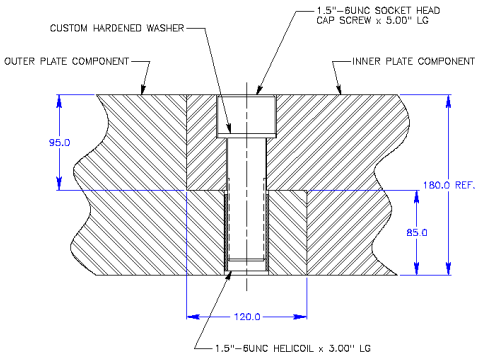
Door Assembly



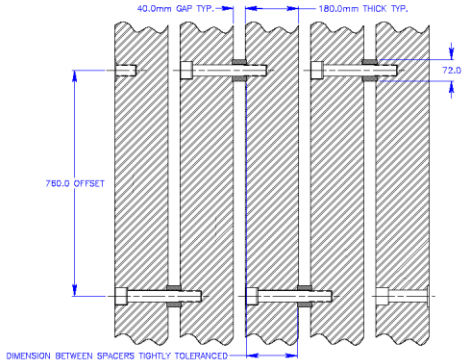


Door Design

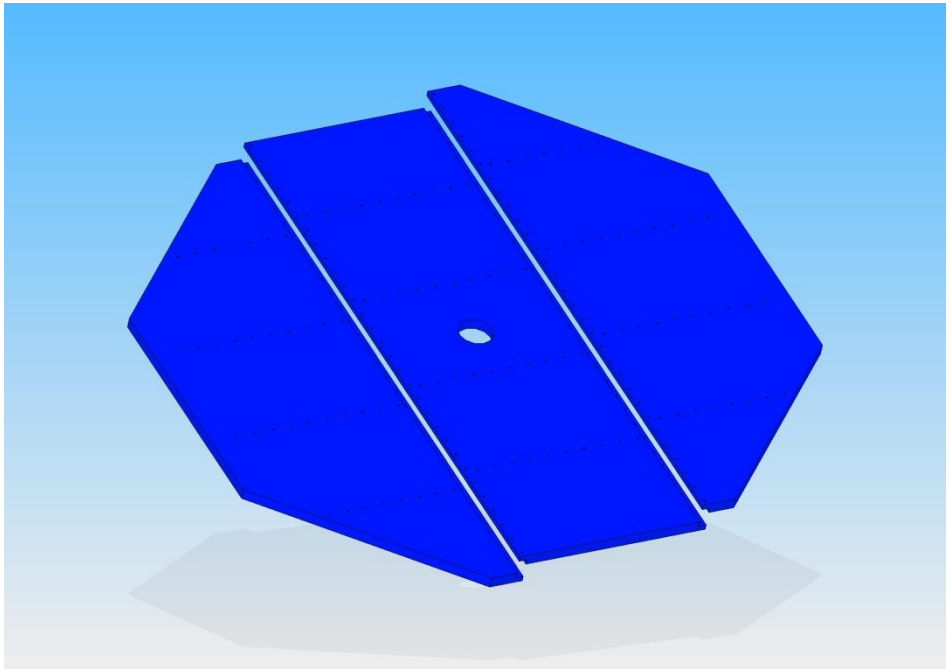


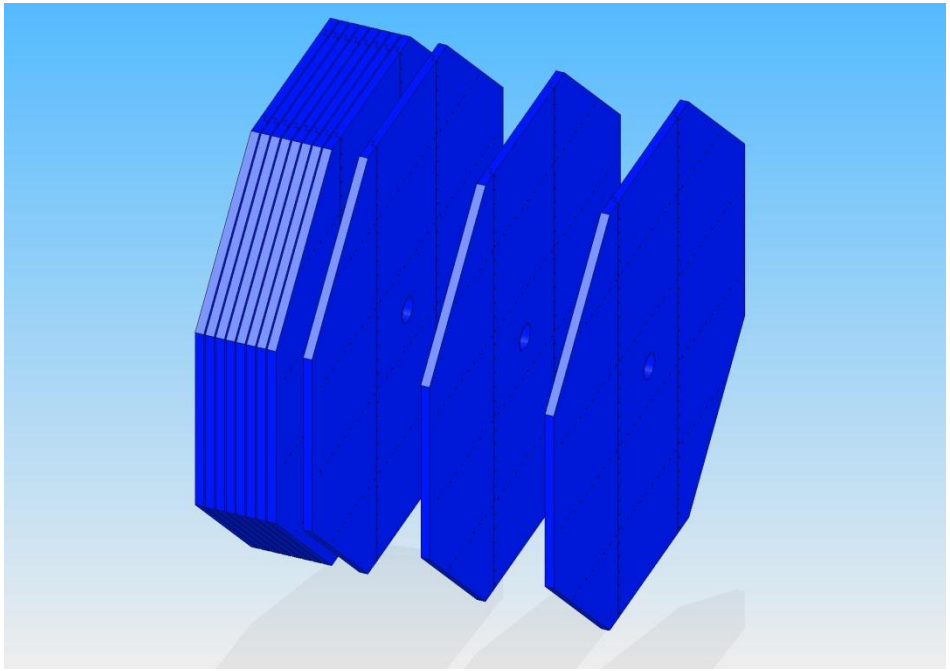


Intra-plate connections

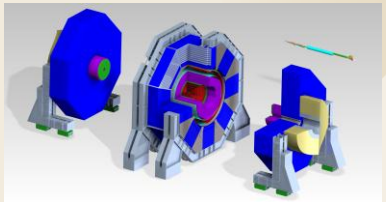


Spacer Offset





Door Assembly on the platform



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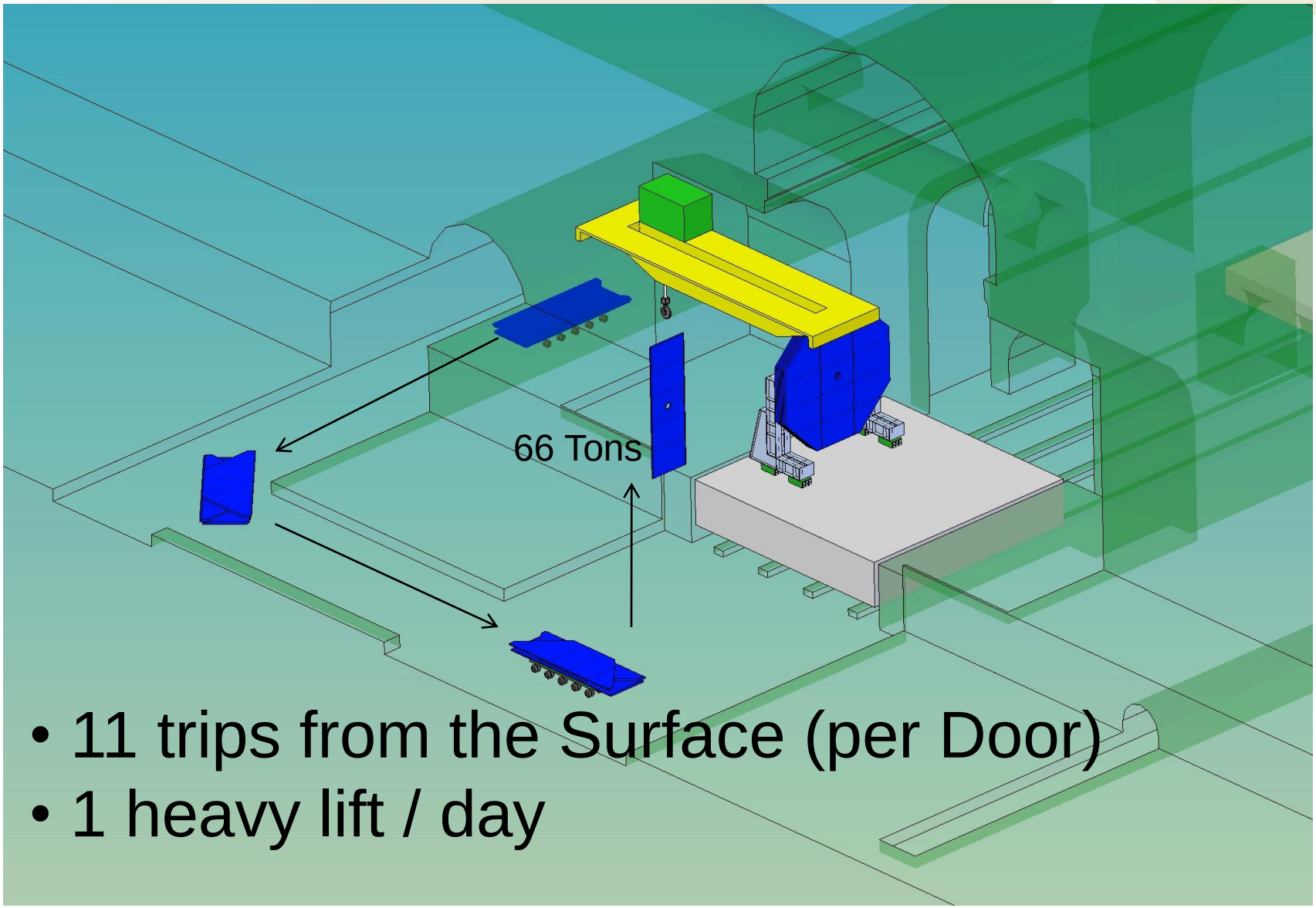
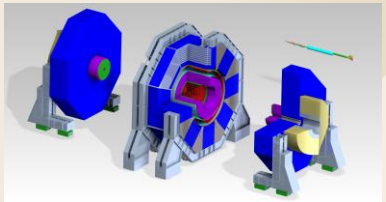


- 11 trips from the Surface (per Door)
- 1 heavy lift / day

Iron Barrel Yoke layout

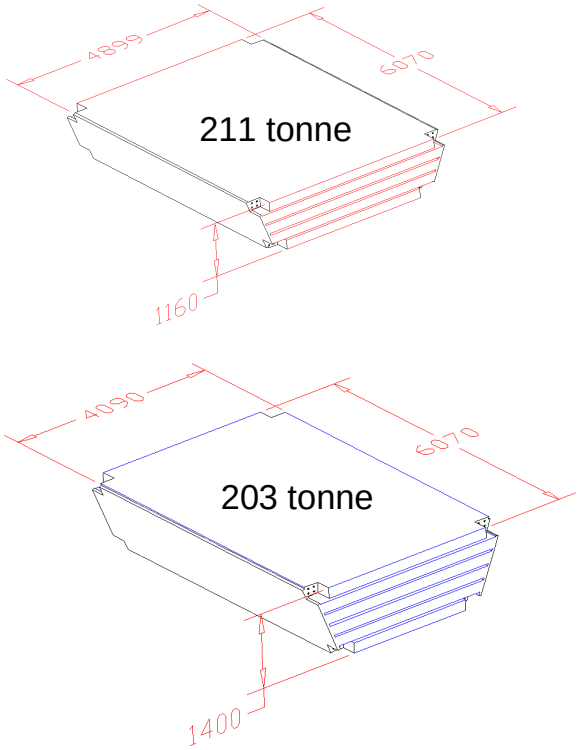


Bolted assembly, 144 plates 200 mm thick, 40mm gap

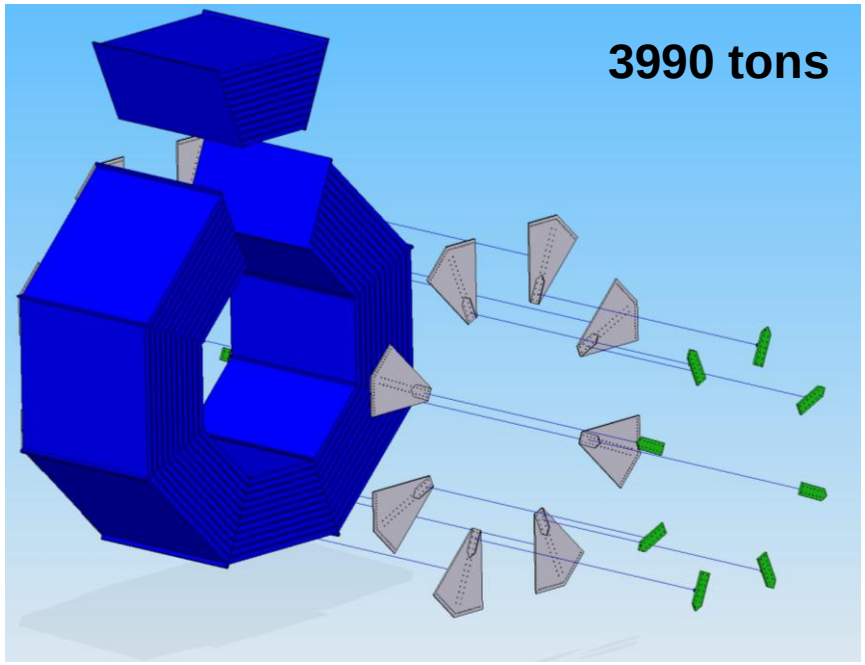
Opportunity to make blank assembly at the factory before shipping

Preliminary Contacts with Kawasaki Heavy Industries

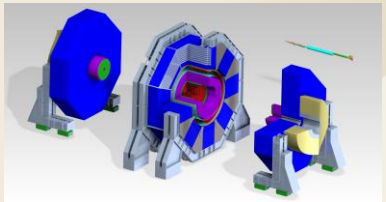
- Plate thickness tolerance for each: 0.1mm
- Plate flatness: 4mm (in a plate)
- Fabrication (assembling & welding) tolerance: 2mm
- Full trial assembly: capable (but need to study)



Max. Crane capacity 215 Tons



Barrel Assembly



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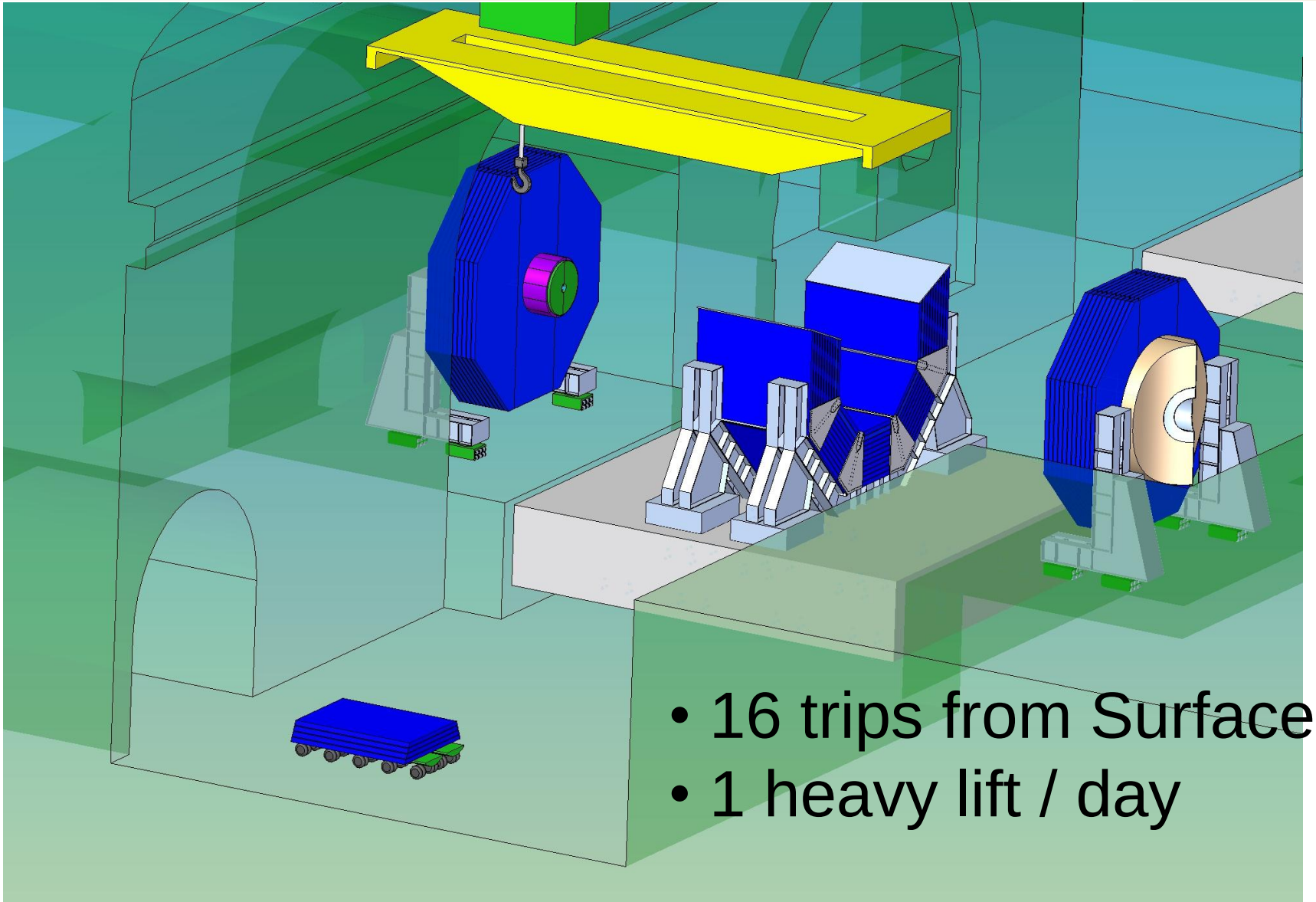
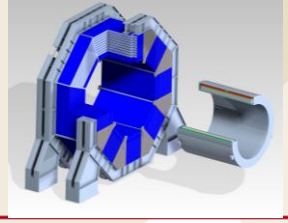


- 16 trips from Surface
- 1 heavy lift / day

Solenoid assembly



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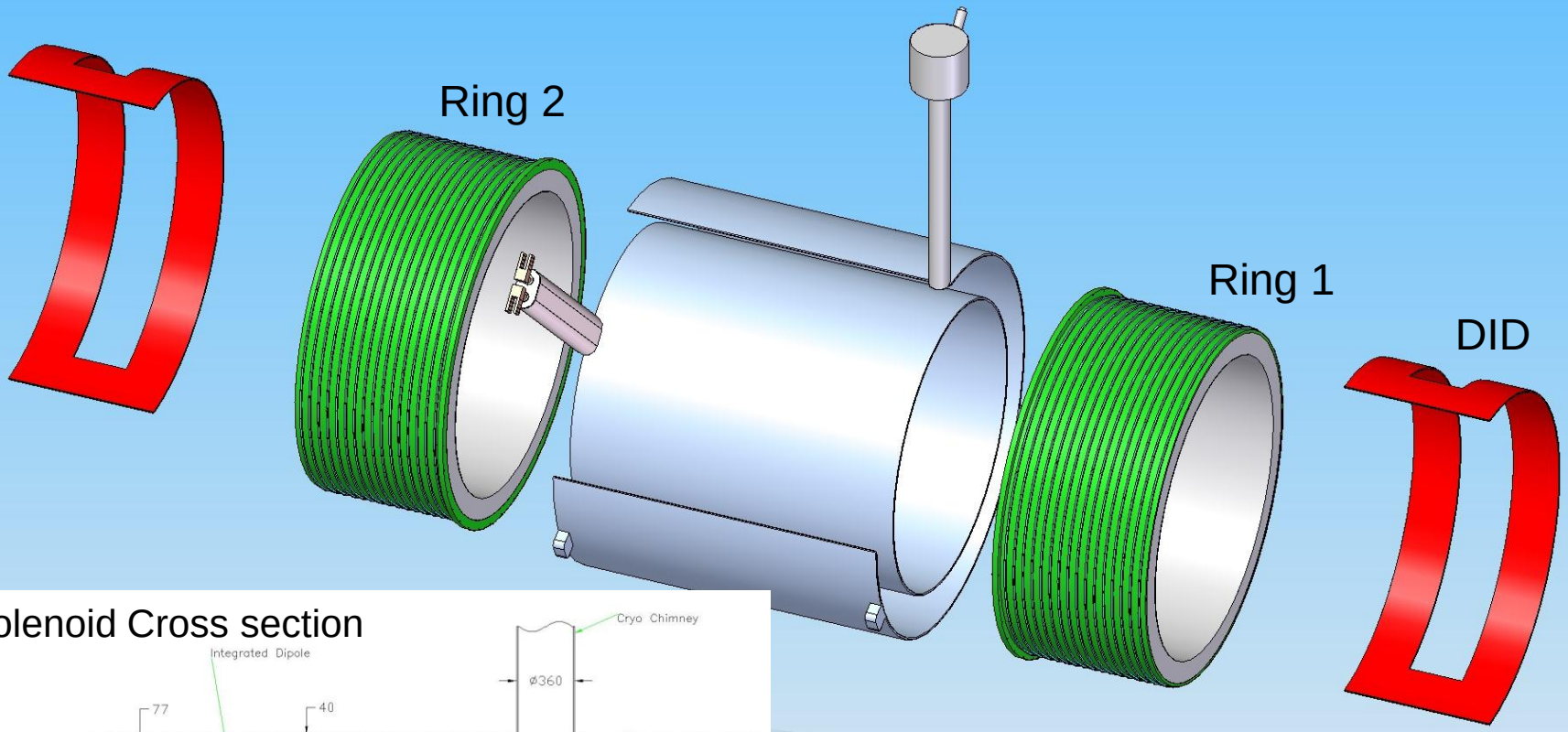
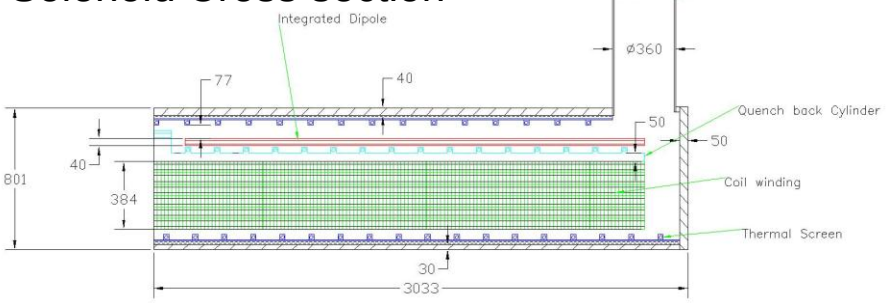
1. Assembly on Site (surface)
2. Test with low current

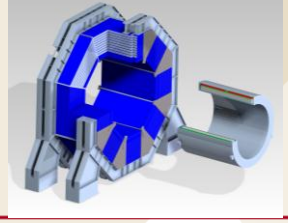


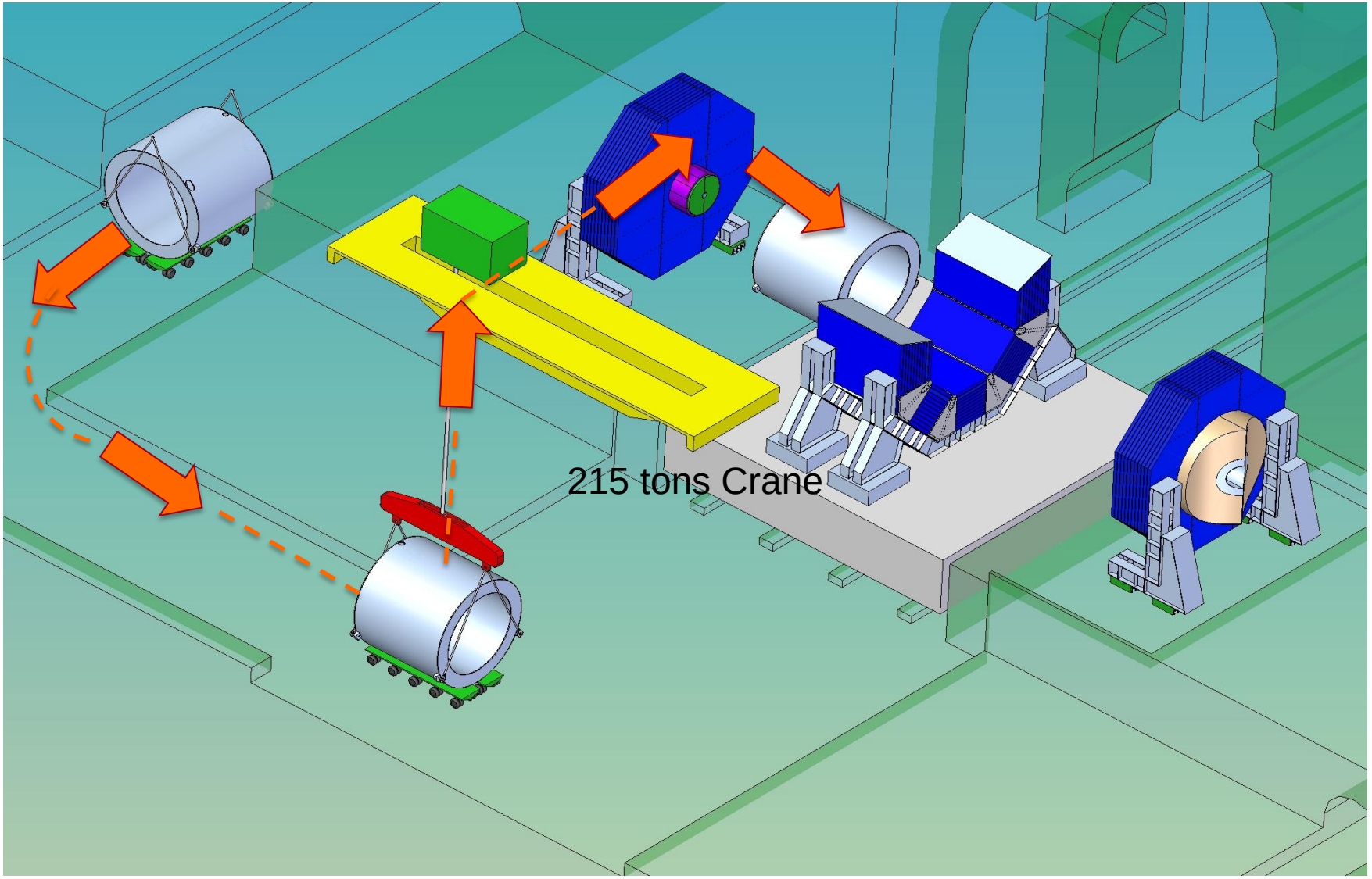
Solenoid Cross section



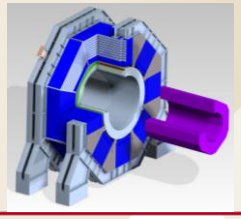
Total Mass = 180 Tons

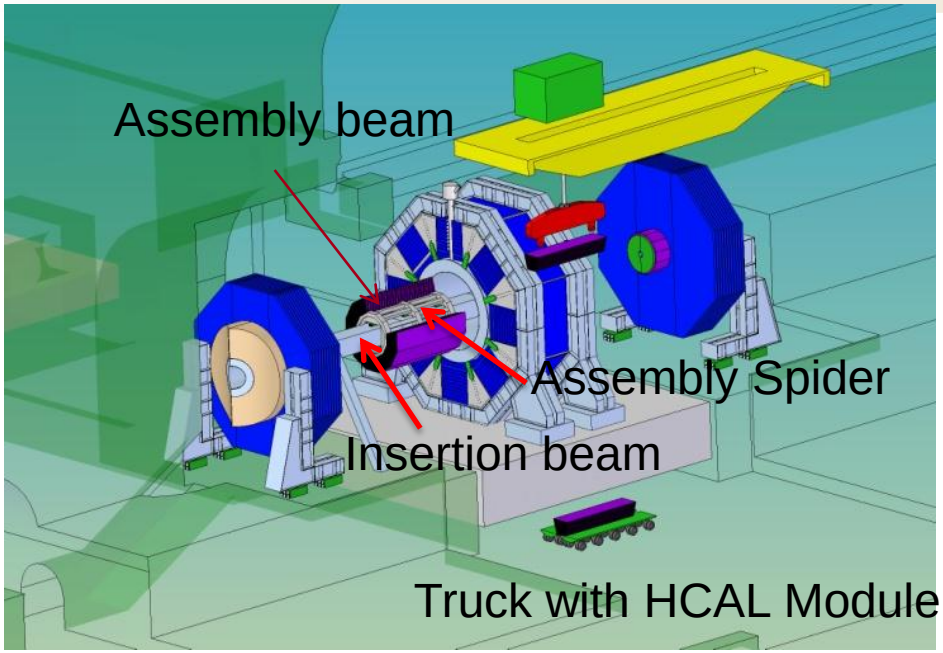
Solenoid Installation



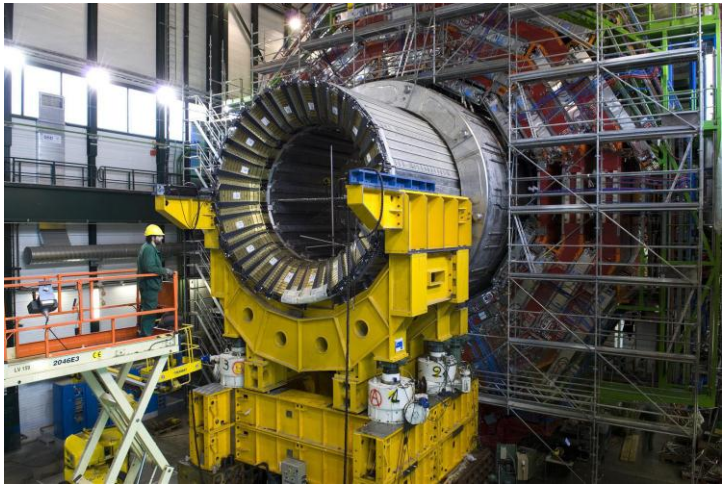


HCAL Barrel Assembly





SLD, Liquid Argon Calorimeter Assembly Beam (Option 1)

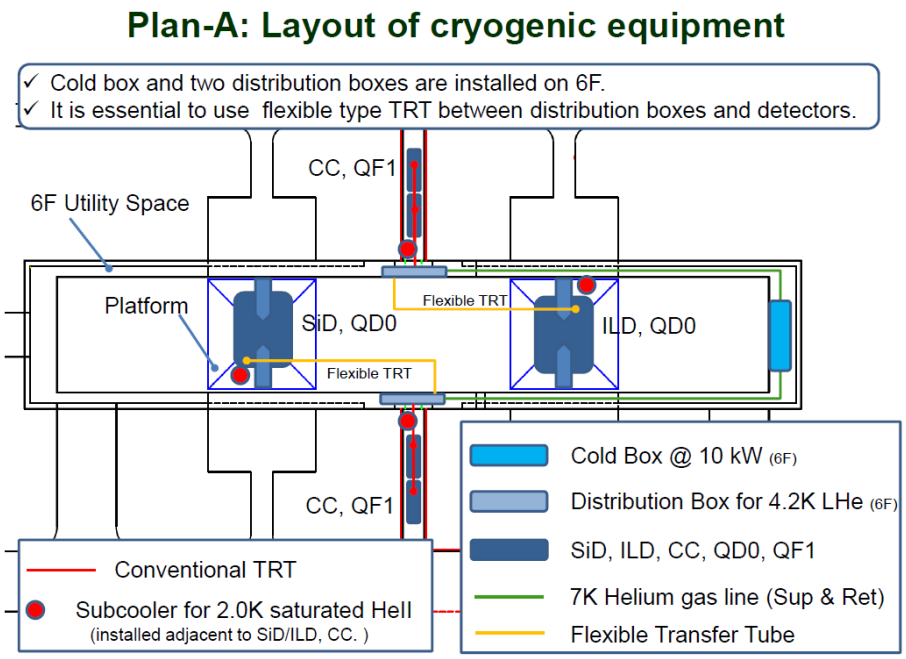


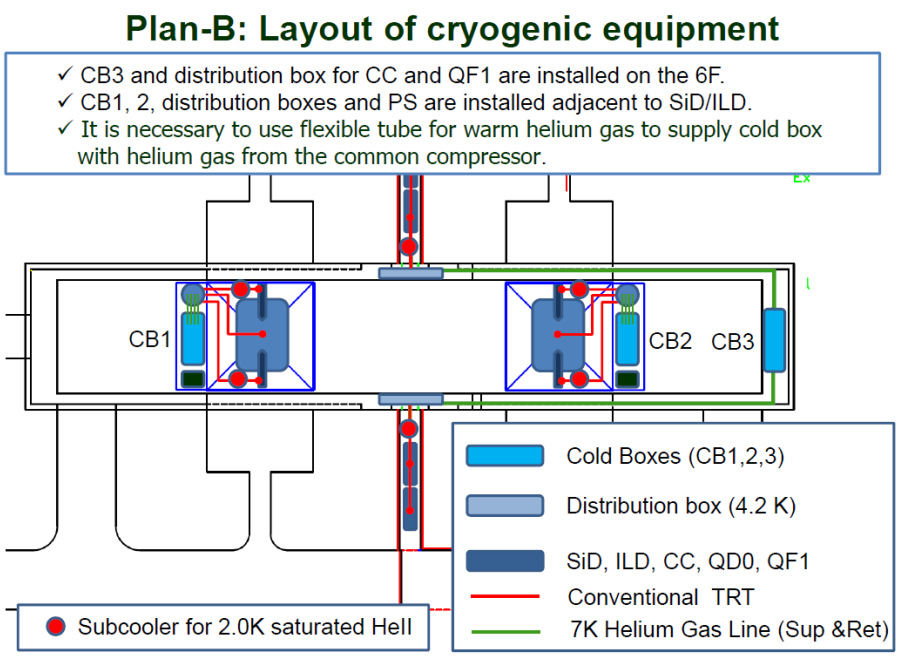
CMS HCAL barrel on the cradle (Option 2)

Cryogenic Layout : Two options

Plan A : Cold Boxes are stationary. Cold Transfer lines to each detector. Reliability for push-pull. Not off-the-shelf.

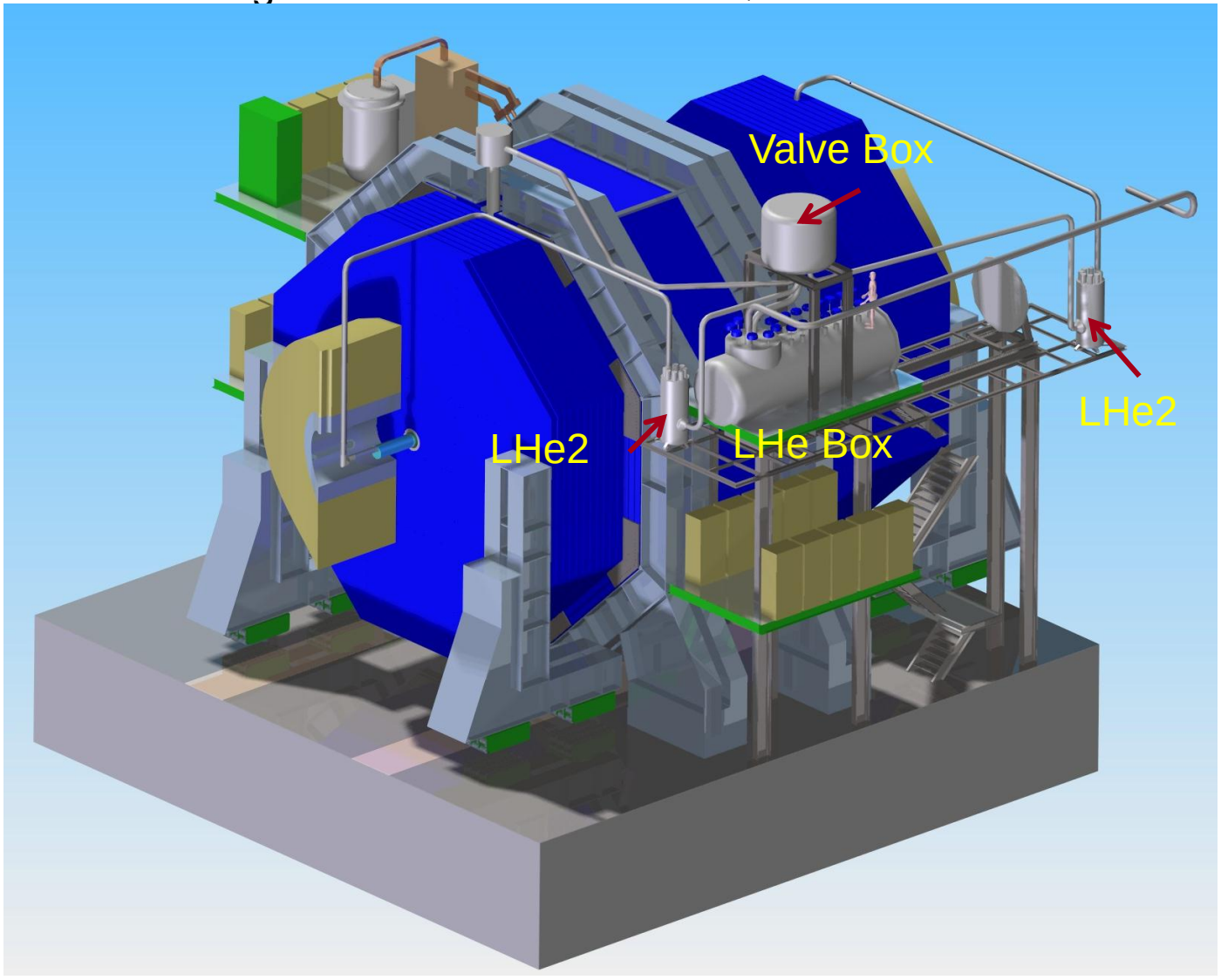
Plan B : Cold Boxes on the platform. Warm Transfer lines to each cold box. Vibrations, fringe field effects, space





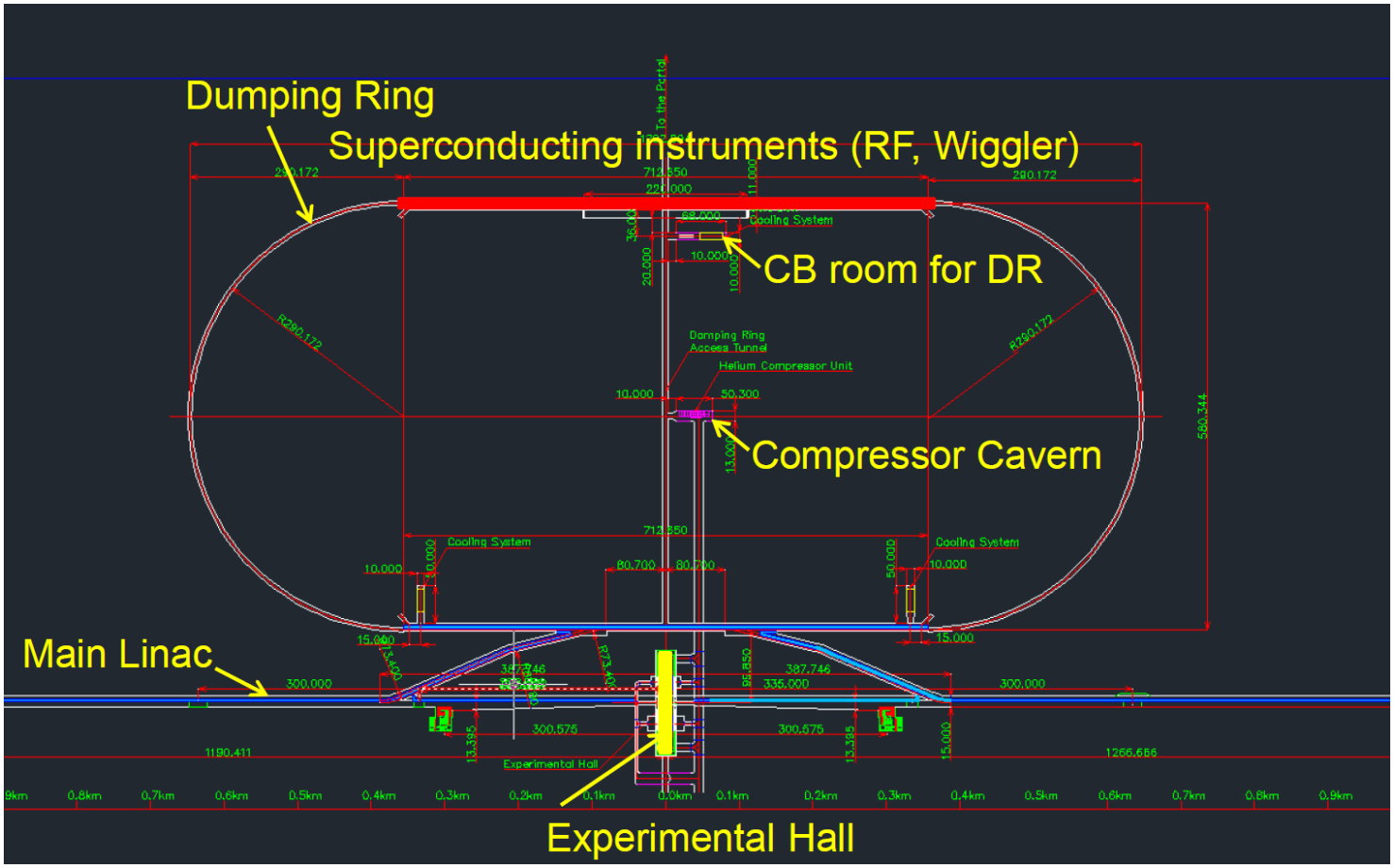
Integration of the Cryogenic plant on the platform

Main LHe refrigerator and LHe2 for the QD0's above level on metallic structure.



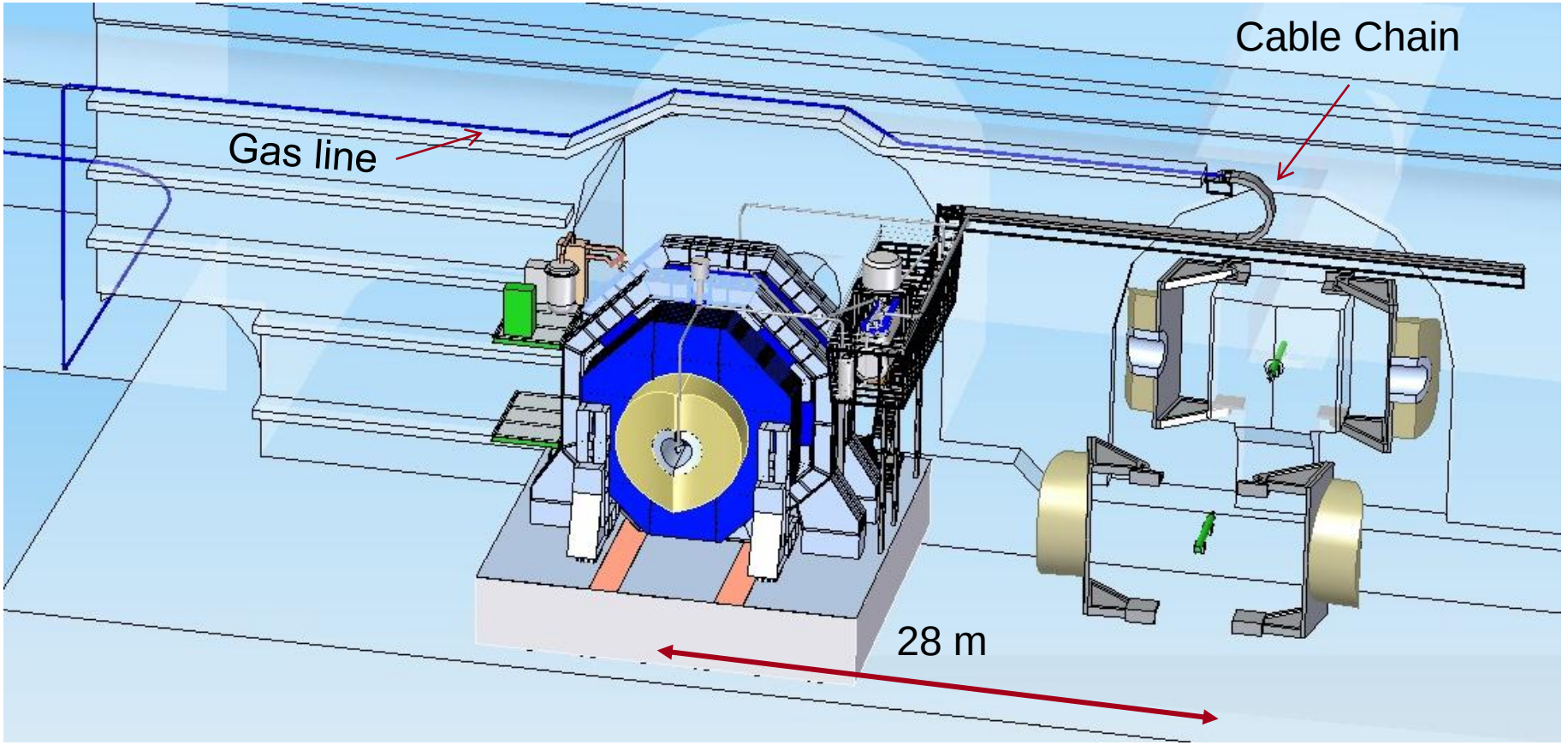
Compressor cavern

The compressor cavern for the Gas Helium is located at ~300 m form the detector hall



Flexible Line to the Compressor

The GHe line from the compressor is flexible, in a cable chain



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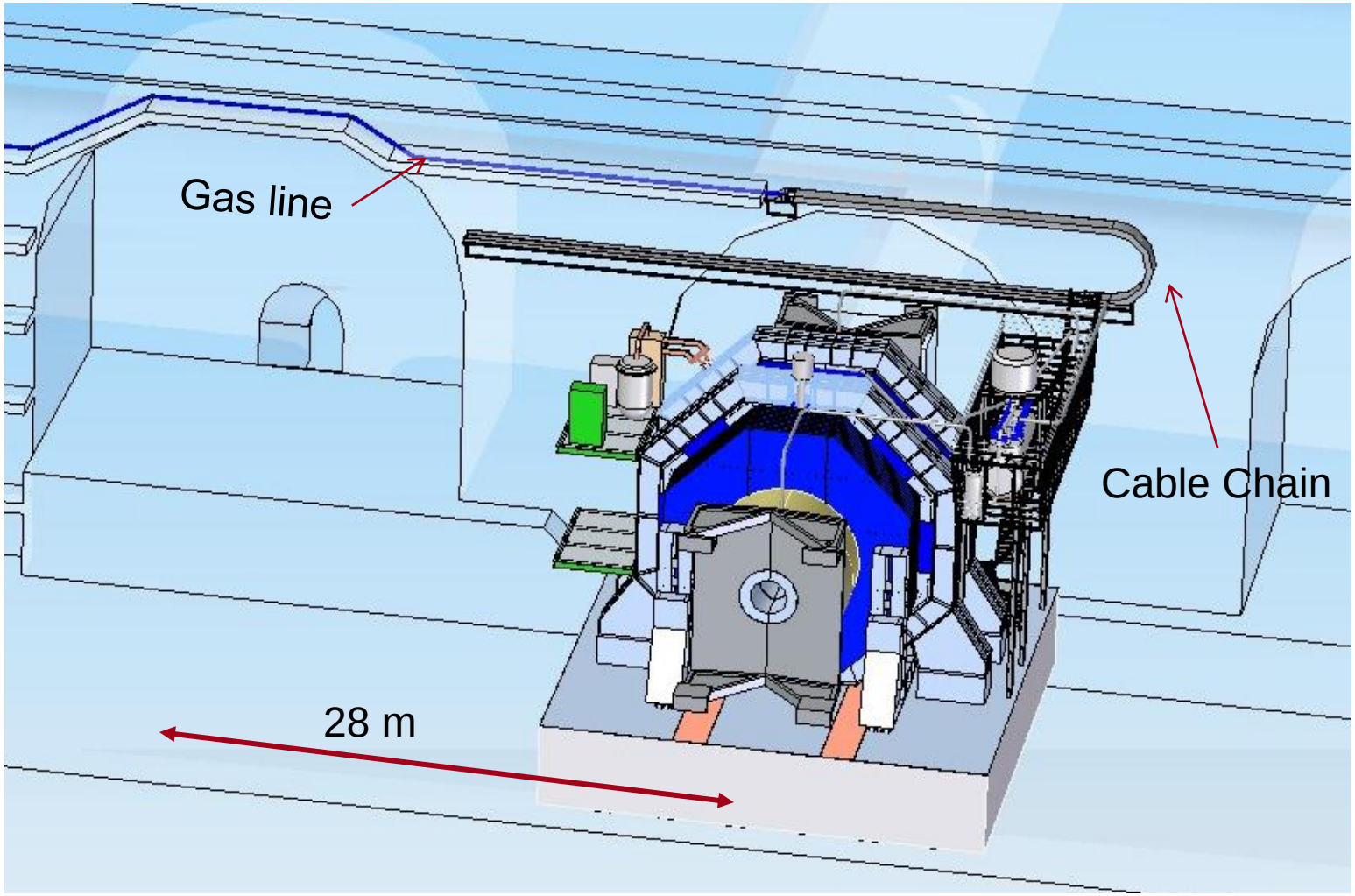

Cryogenic layout: SID and ILD

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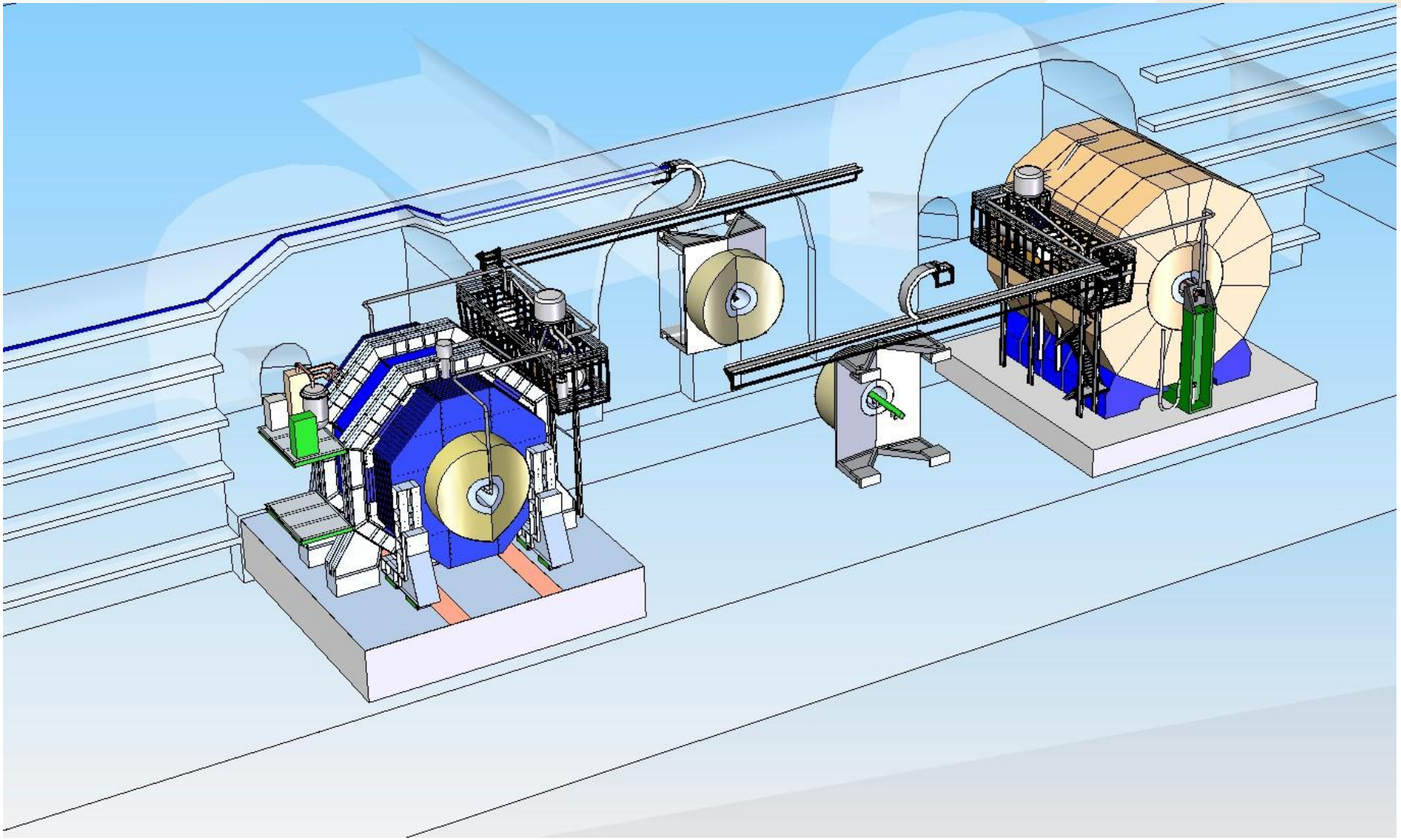
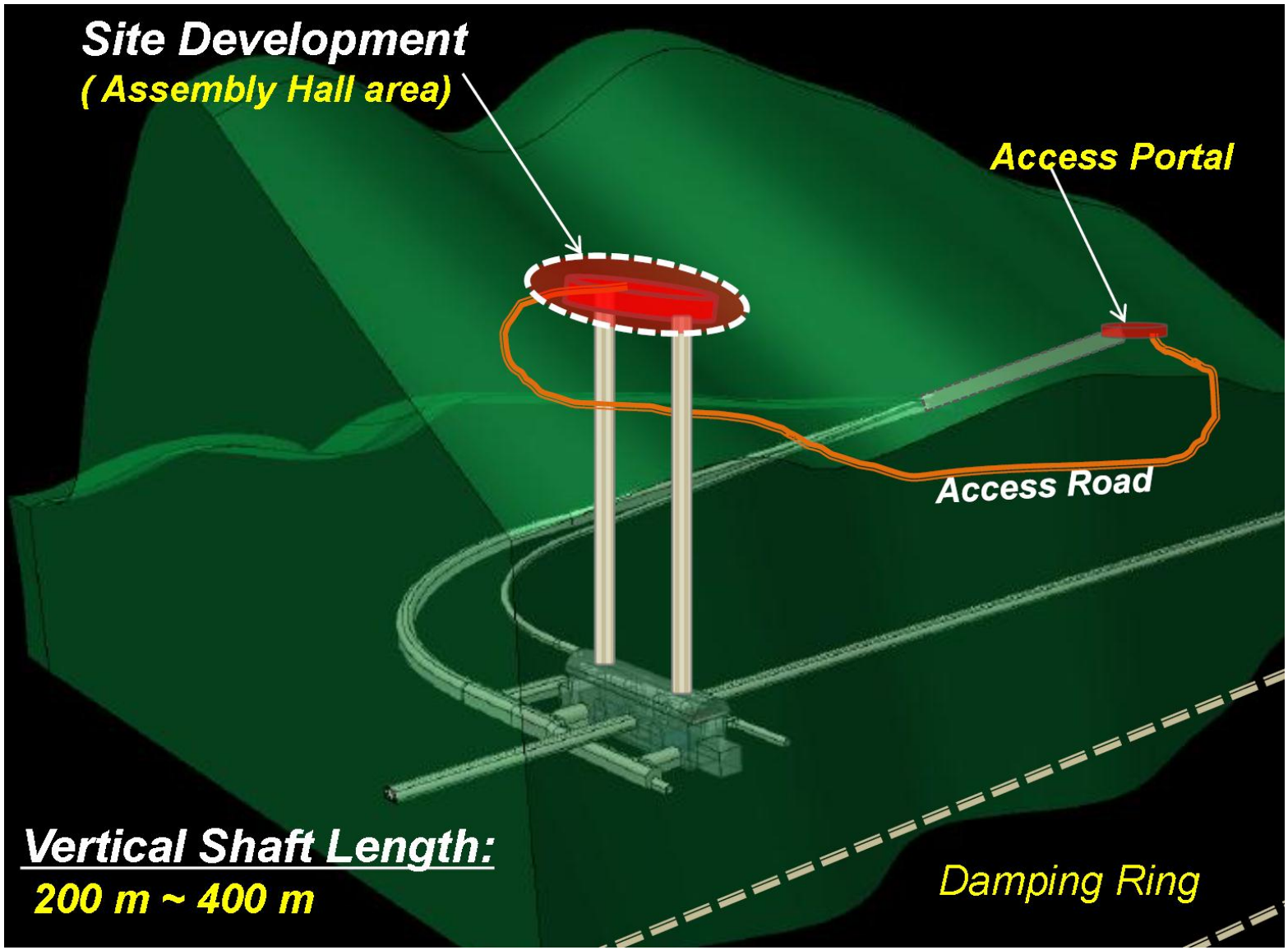


Access Portal Logistic



Summary

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We developed credible Assembly scenarios for both the Vertical and Horizontal access shafts.

The Japanese Mountain site with horizontal shafts is preferred by SID, being closer to the original assembly procedure considered for the design of the detector.

Still a margin to optimize further costs and procedures.

More work is needed to define the layout of the cryogenic distribution and services

The logistic and procedures of the Portal Site on surface for the preassembly of the detector need to be defined.