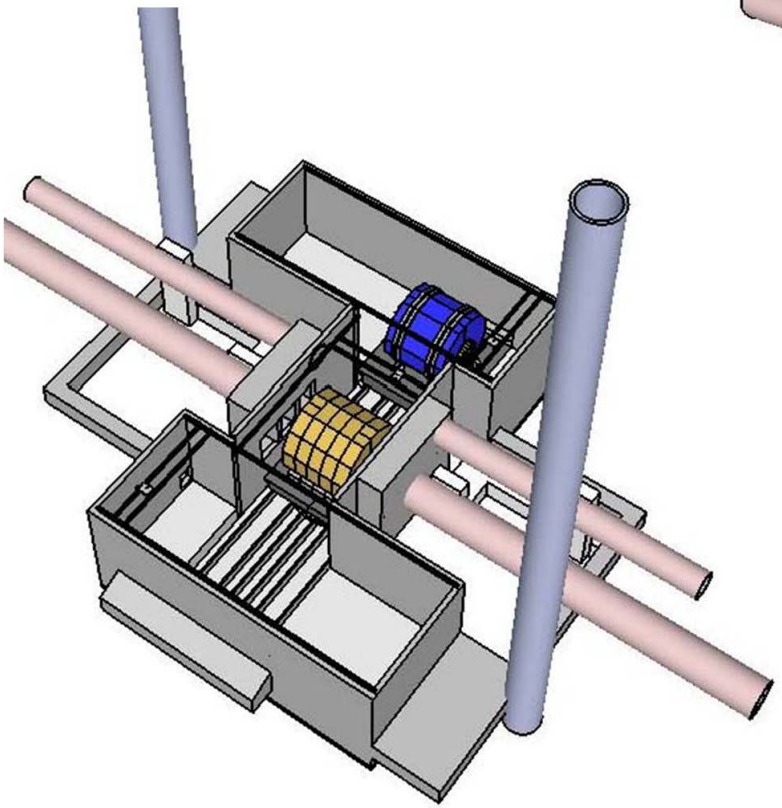
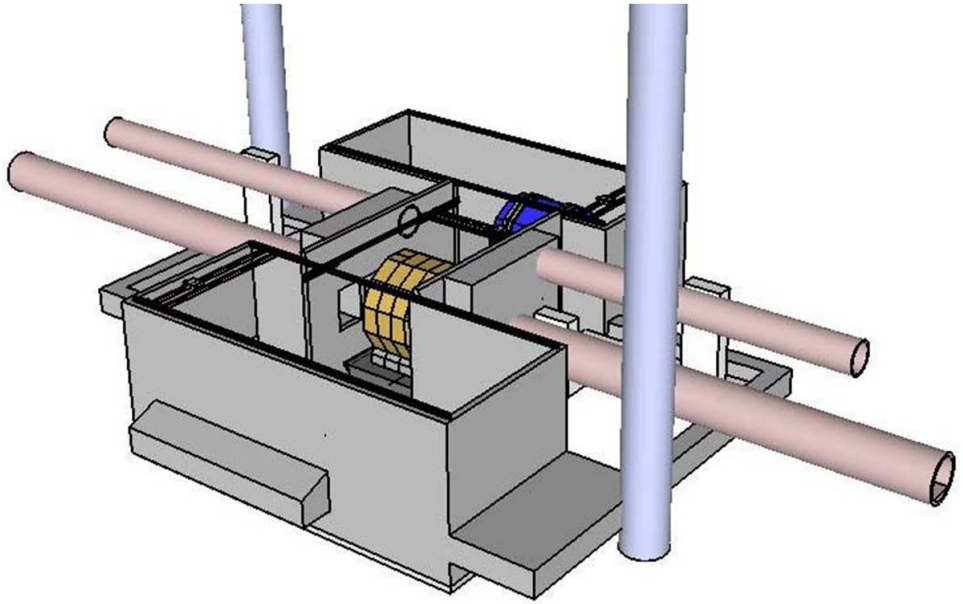
ILD in Mountain Site Hall

Karsten Buesser

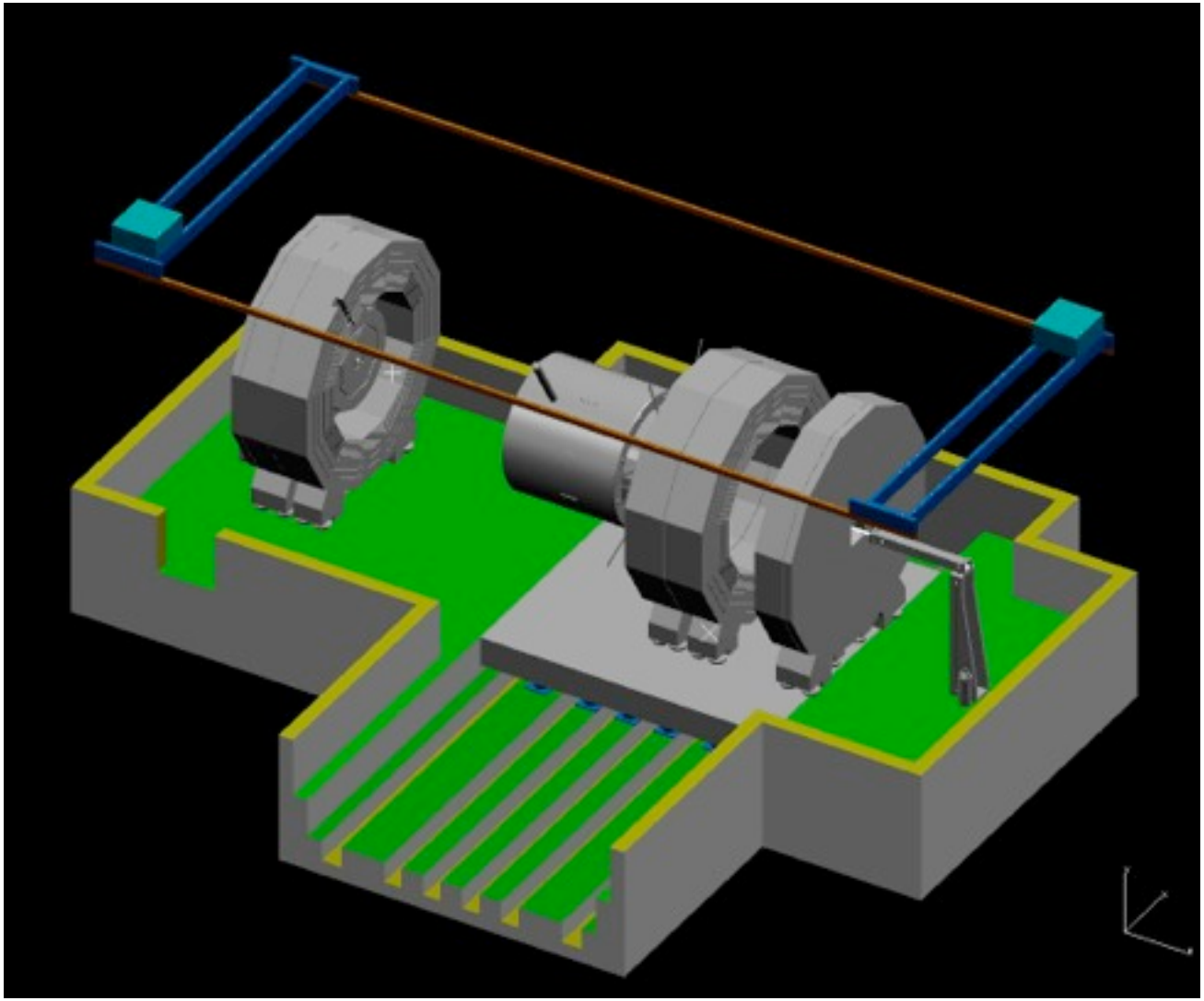
09.03.2012

MDI CTG Webex



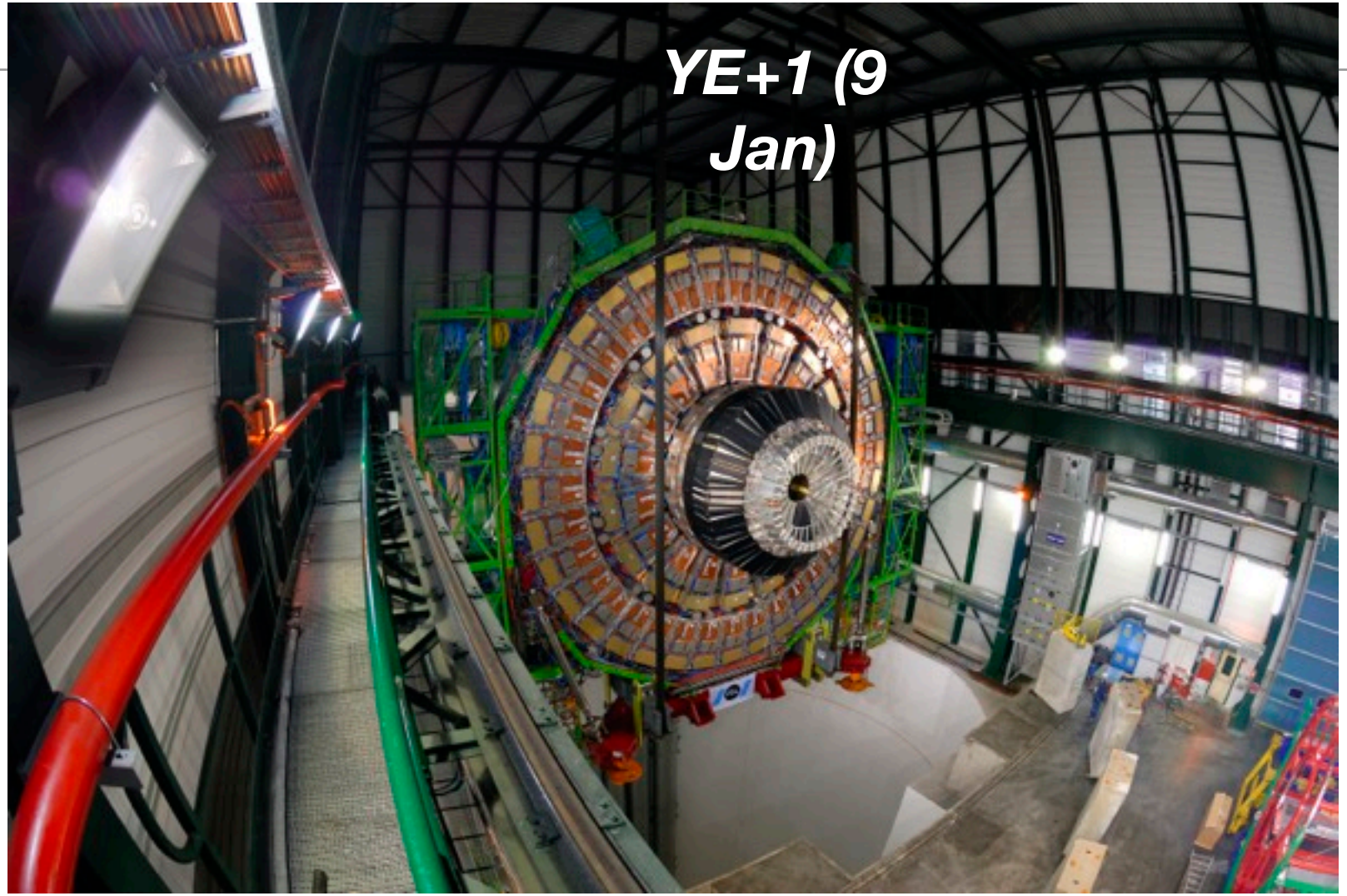


ILD in Maintenance Region (non-mountain site)



R. Volkenborn

CMS Assembly

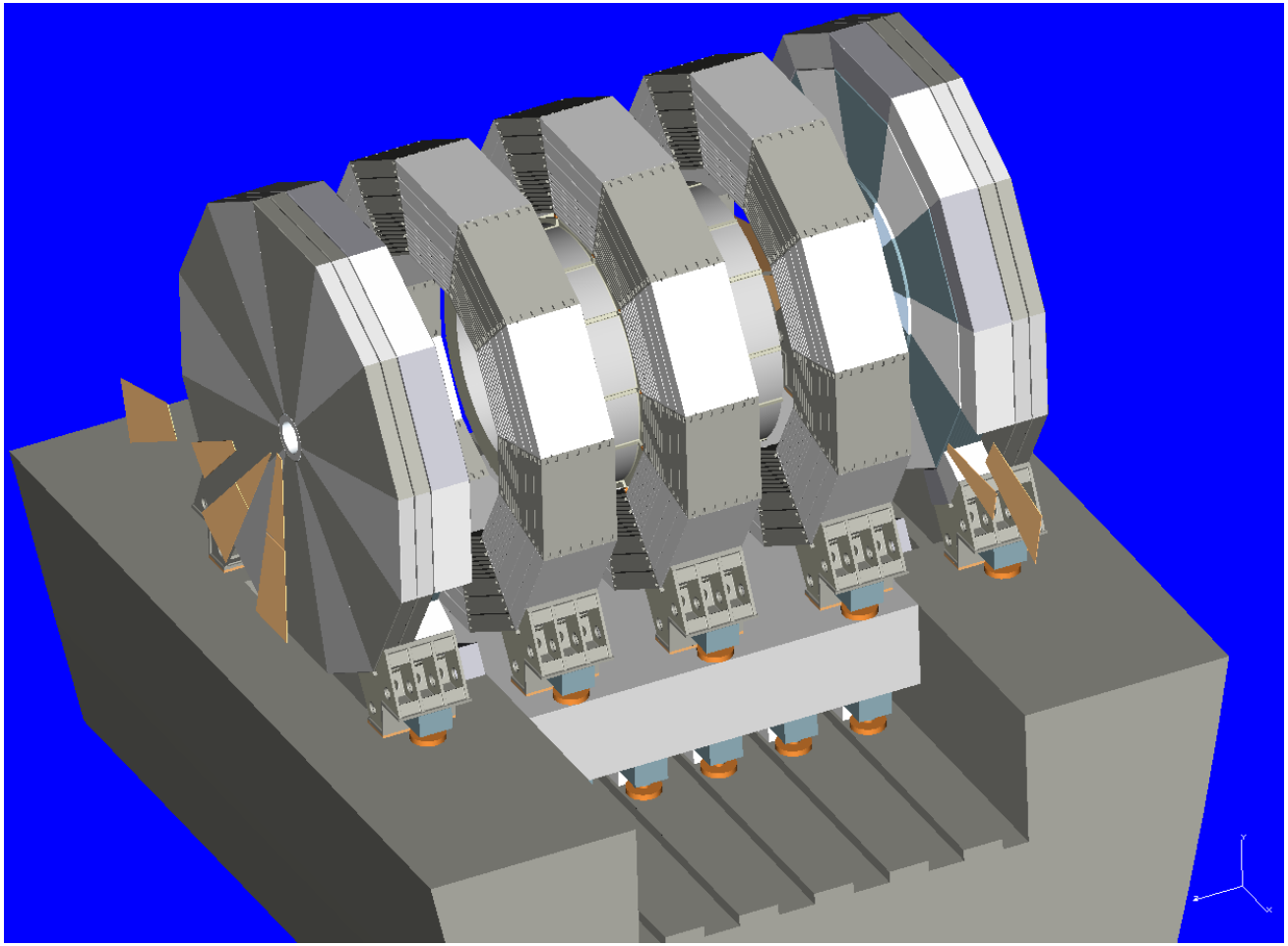


ILD Assembly

- CMS-type assembly for non-mountain sites:
  - Pre-assemble and test ILD components on surface as far as possible
  - Lower five yoke rings with pre-installed detector components
  - About one year of assembly underground
- Non-CMS-type assembly for mountian sites:
  - Part sizes are limited by access tunnel
  - Yoke rings need to be built underground
  - Sub-detectors mostly installed underground
  - Need more time (~3y) and more underground space

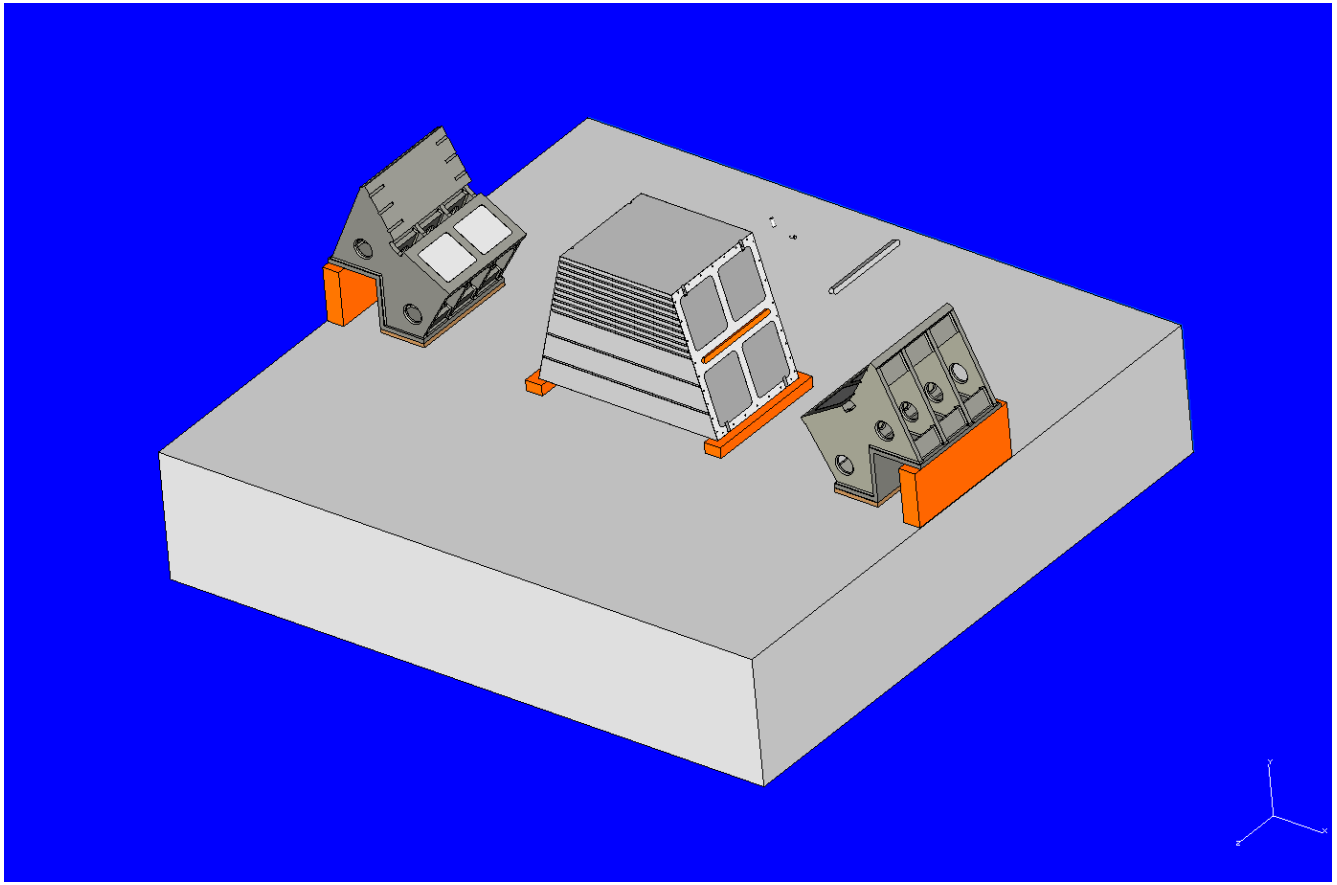
ILD Design

- Assumption: basic detector model will not change for mountain sites



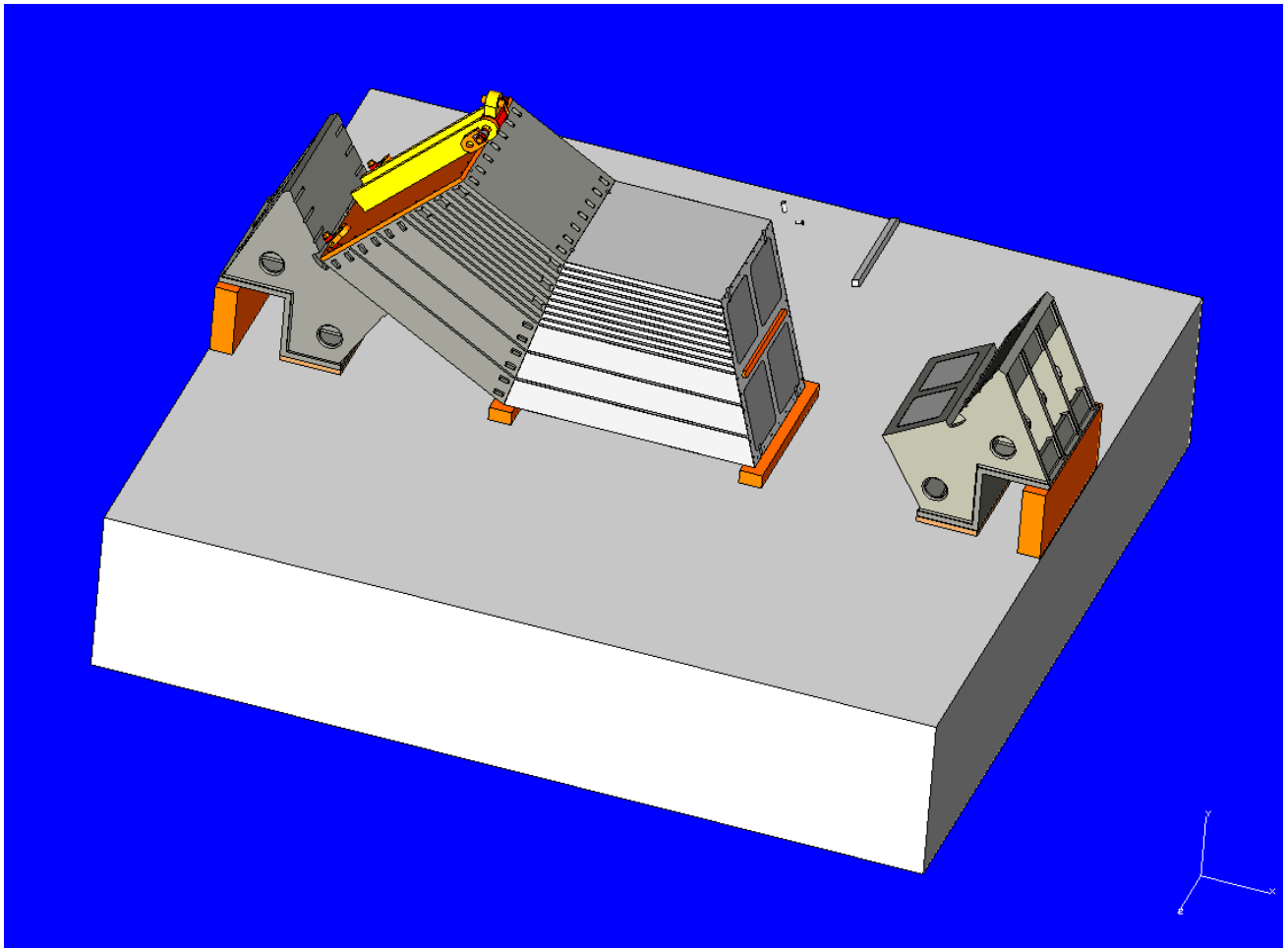
Yoke Assembly

- Start with central ring on platform
- Space needed for: tools, scaffolding, surveying equipment



Yoke Assembly

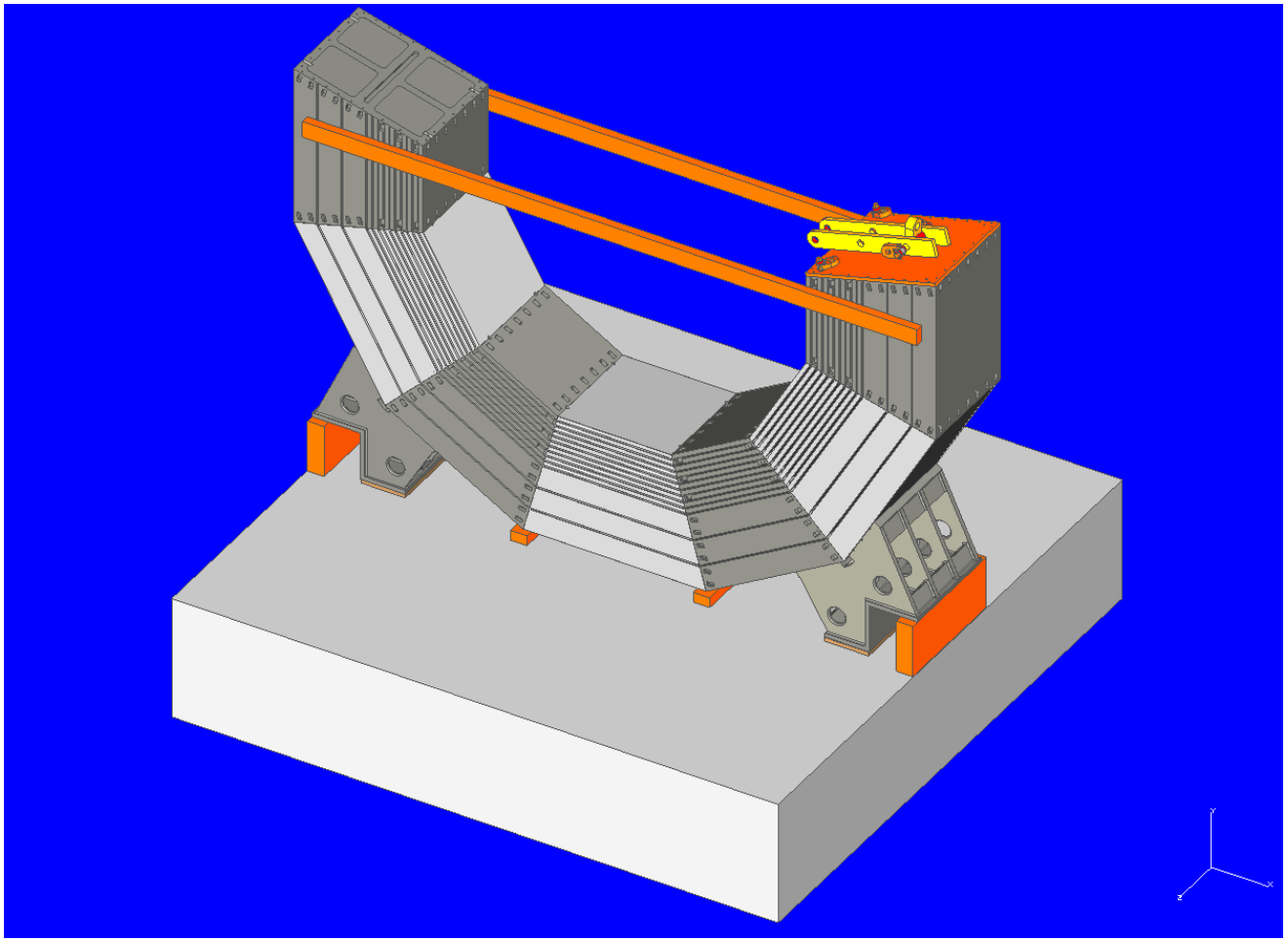
- 200t crane coverage needed



R. Stromhagen

Yoke Assembly

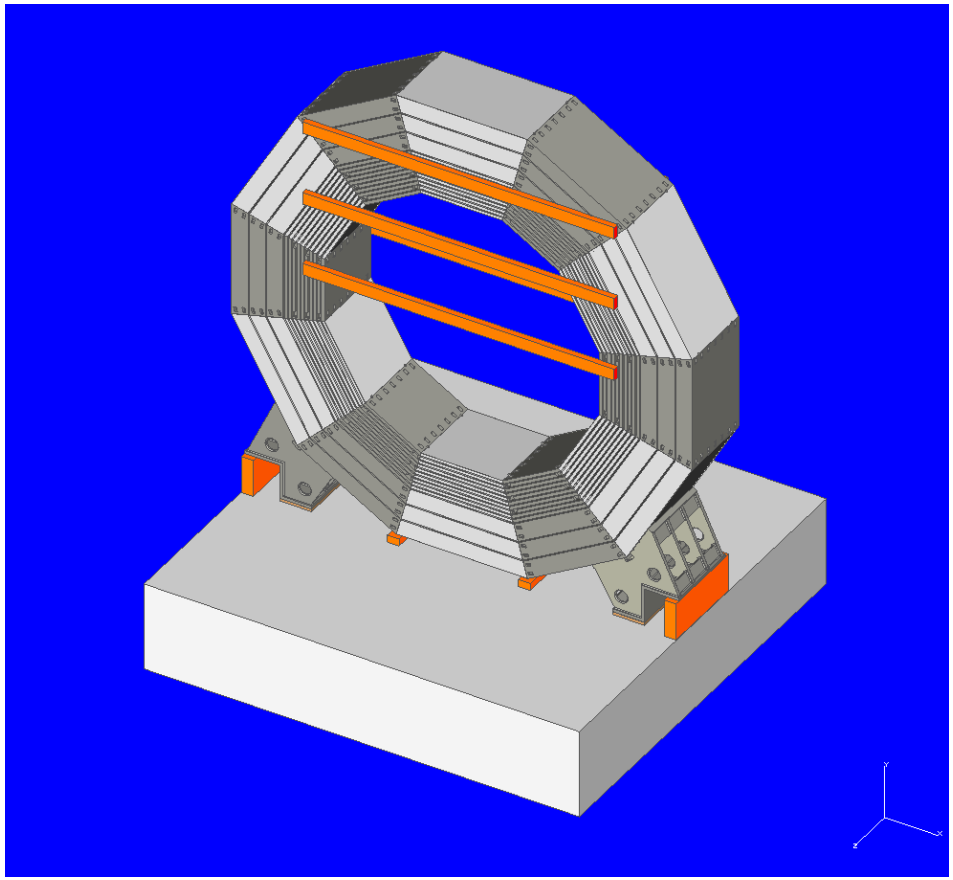
- Tooling needs still under study



R. Stromhagen

Yoke Assembly

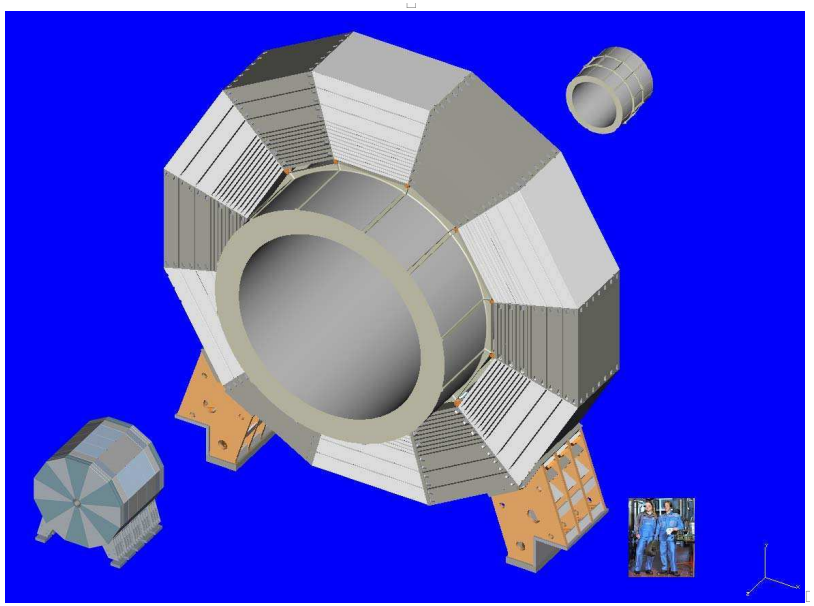
- Tolerances of the ring segments need to be better than 1 mm
- Laser surveying needed during full assembly
- Tools needed
  - 200t crane
  - chain hoists
  - taylored tools: beams etc.
  - hydraulics
  - surveyors
- Time estimate: 60 working days per ring



R. Stromhagen

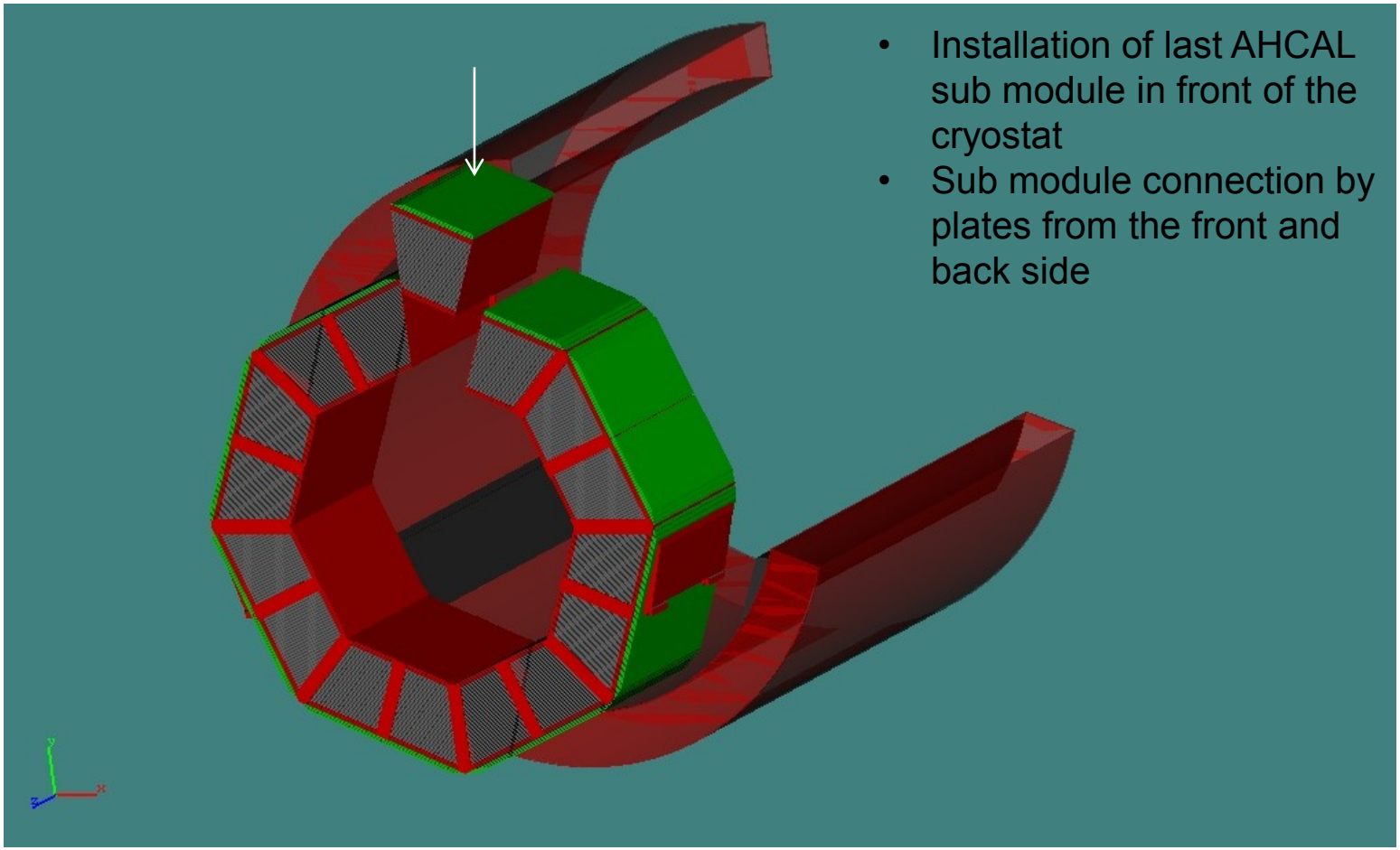
Coil Installation

- Coil can only be transported without its ancillaries (cold box, chimney)
- Functional test needs to be done underground after installation into central barrel yoke ring
  - very low fields, yoke will not be ready by then
  - test field mapping equipment
  - Takes ~4 months (incl. cool-down and warm-up)
- Final high field test when yoke is ready
  - incl. field map measurements



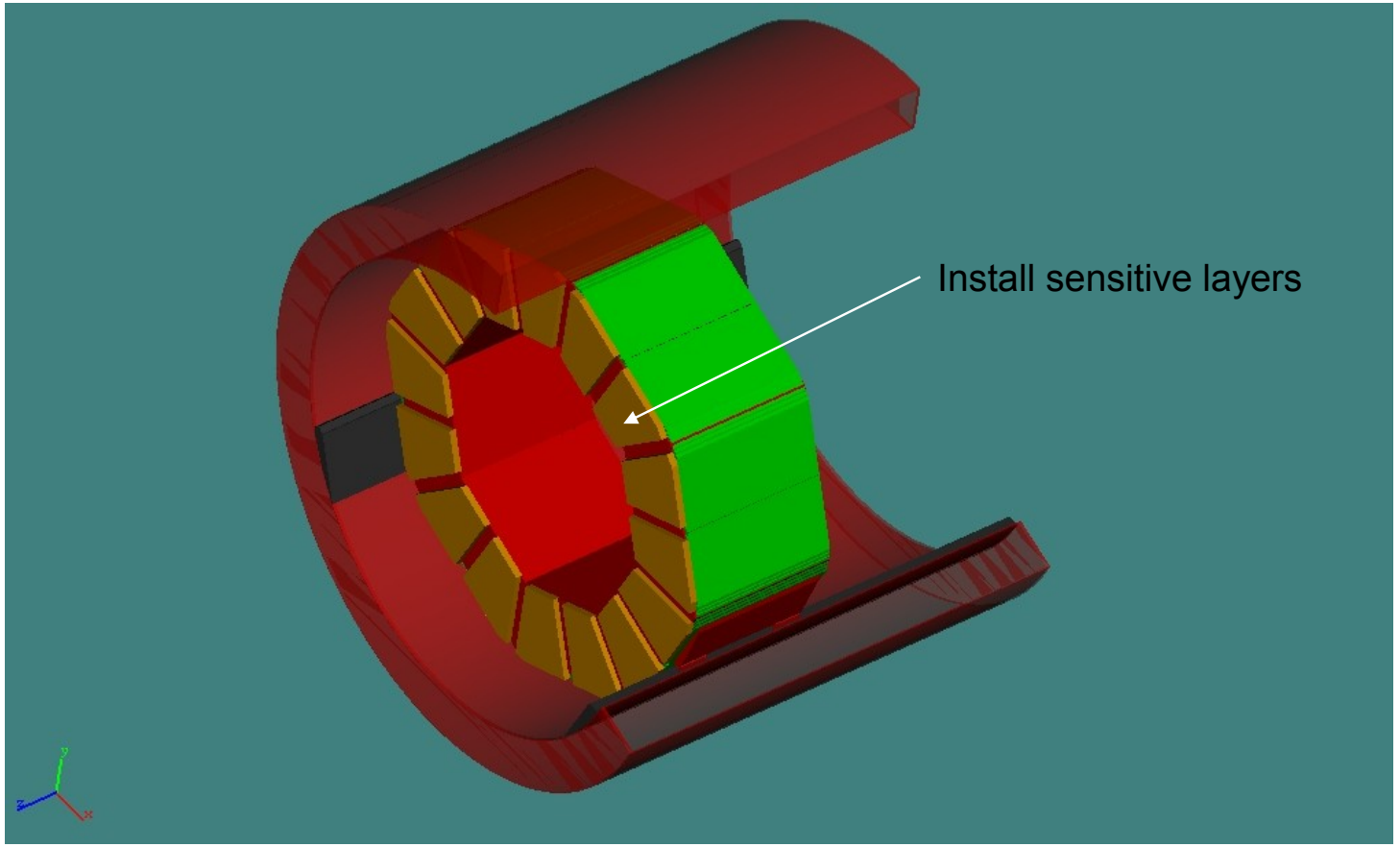
R. Stromhagen

AHCAL Installation

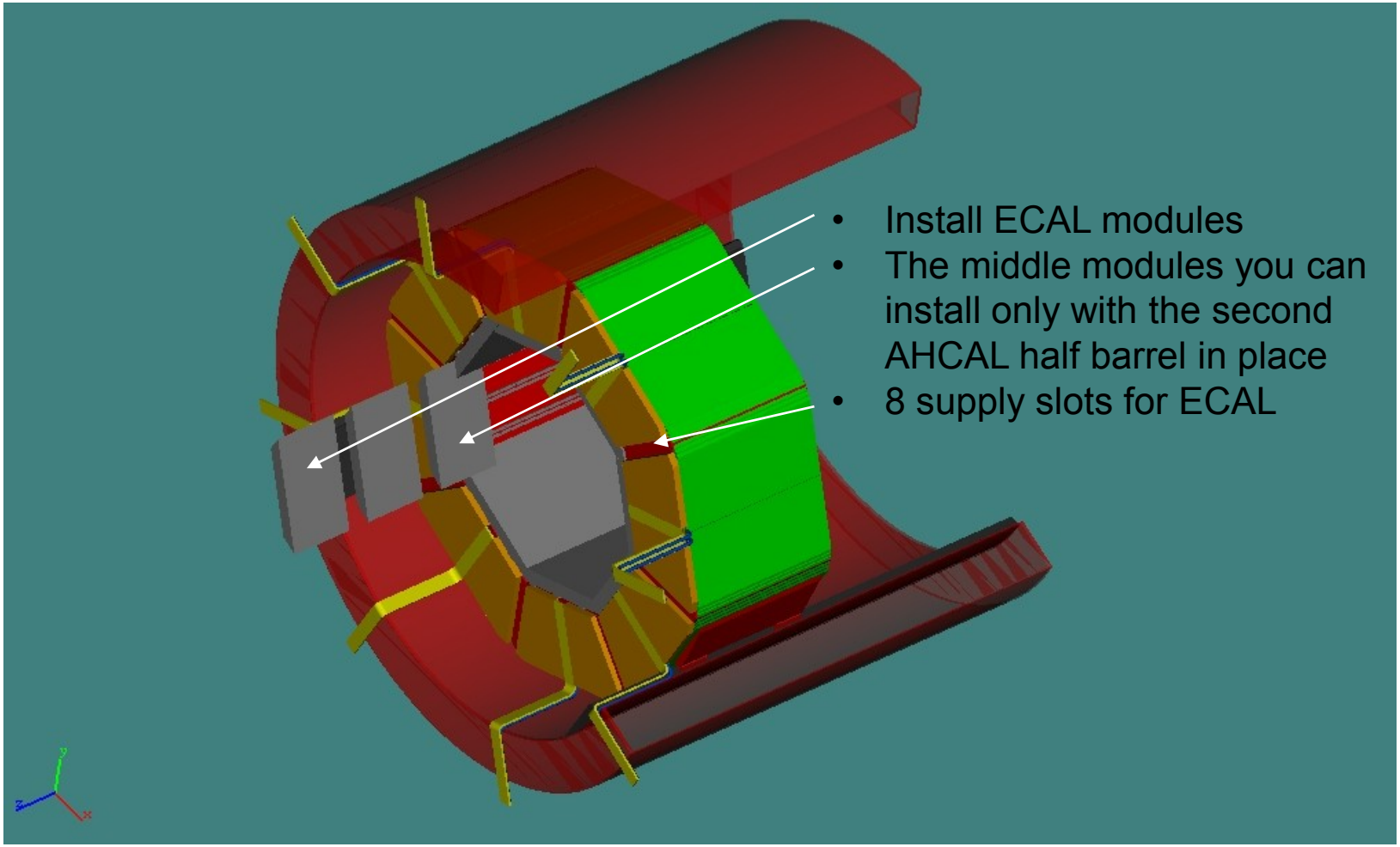


- Installation of last AHCAL sub module in front of the cryostat
- Sub module connection by plates from the front and back side

AHCAL Installation



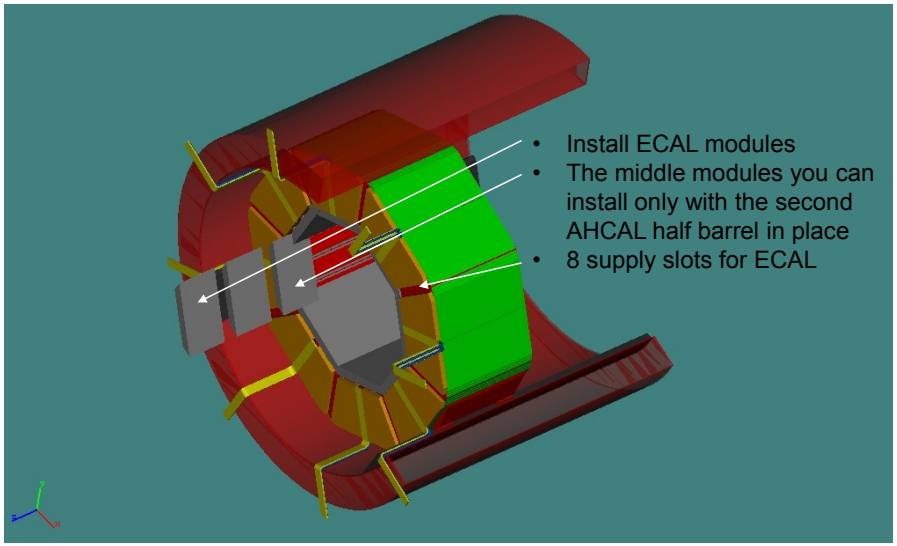
AHCAL/ECAL Installation



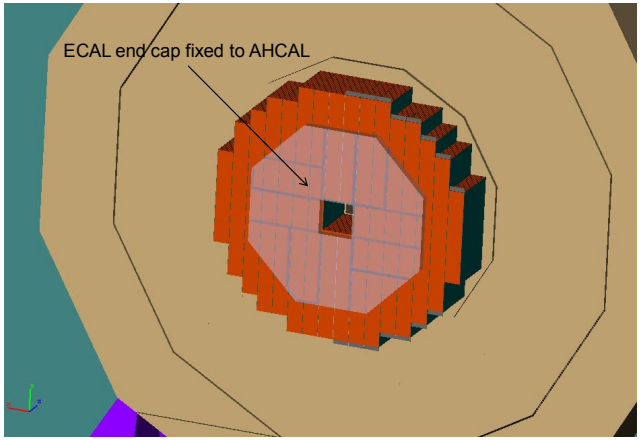
Calorimeter Installation

- Special tooling needed: support cradle, directly mounted to the coil
- Crane coverage
- Surveying equipment

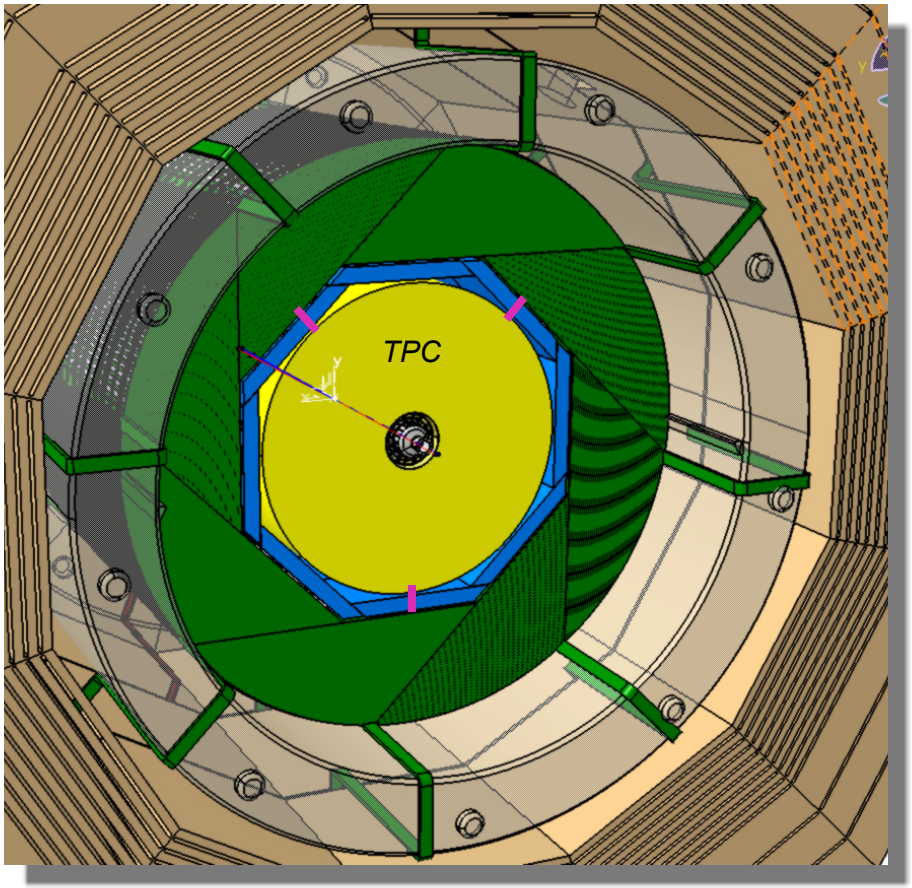
- Time estimate for AHCAL barrel:
  - 180 working days
- ECAL barrel:
  - probably less
- Endcaps: ?

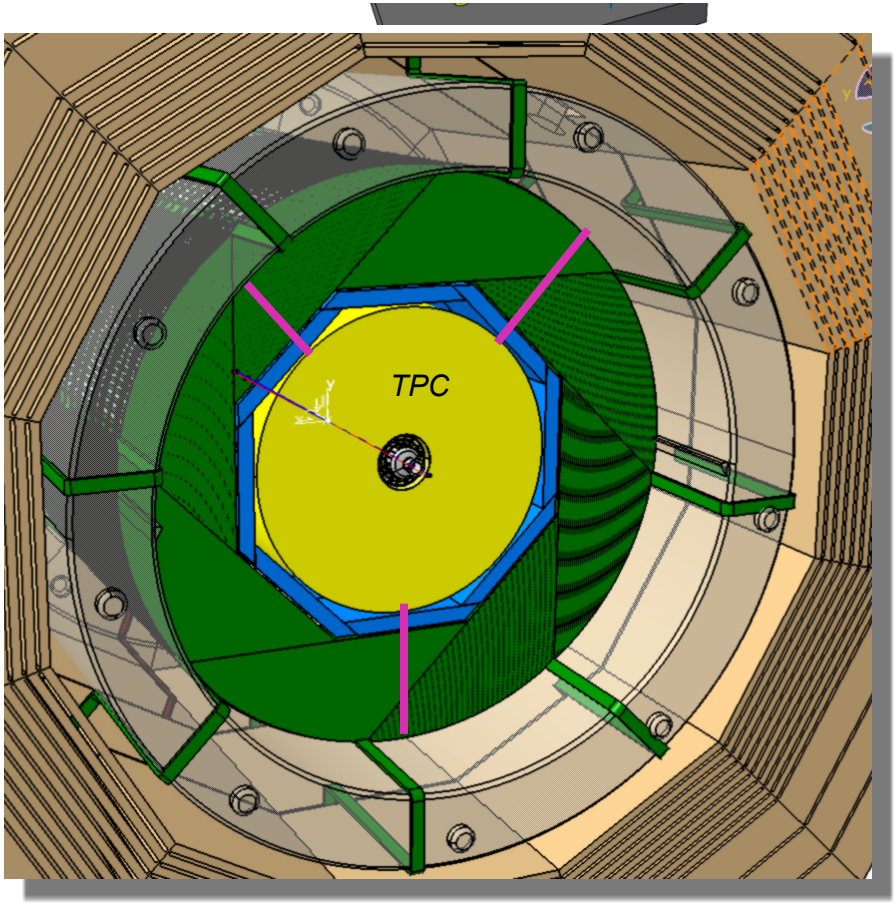


K. Gadow

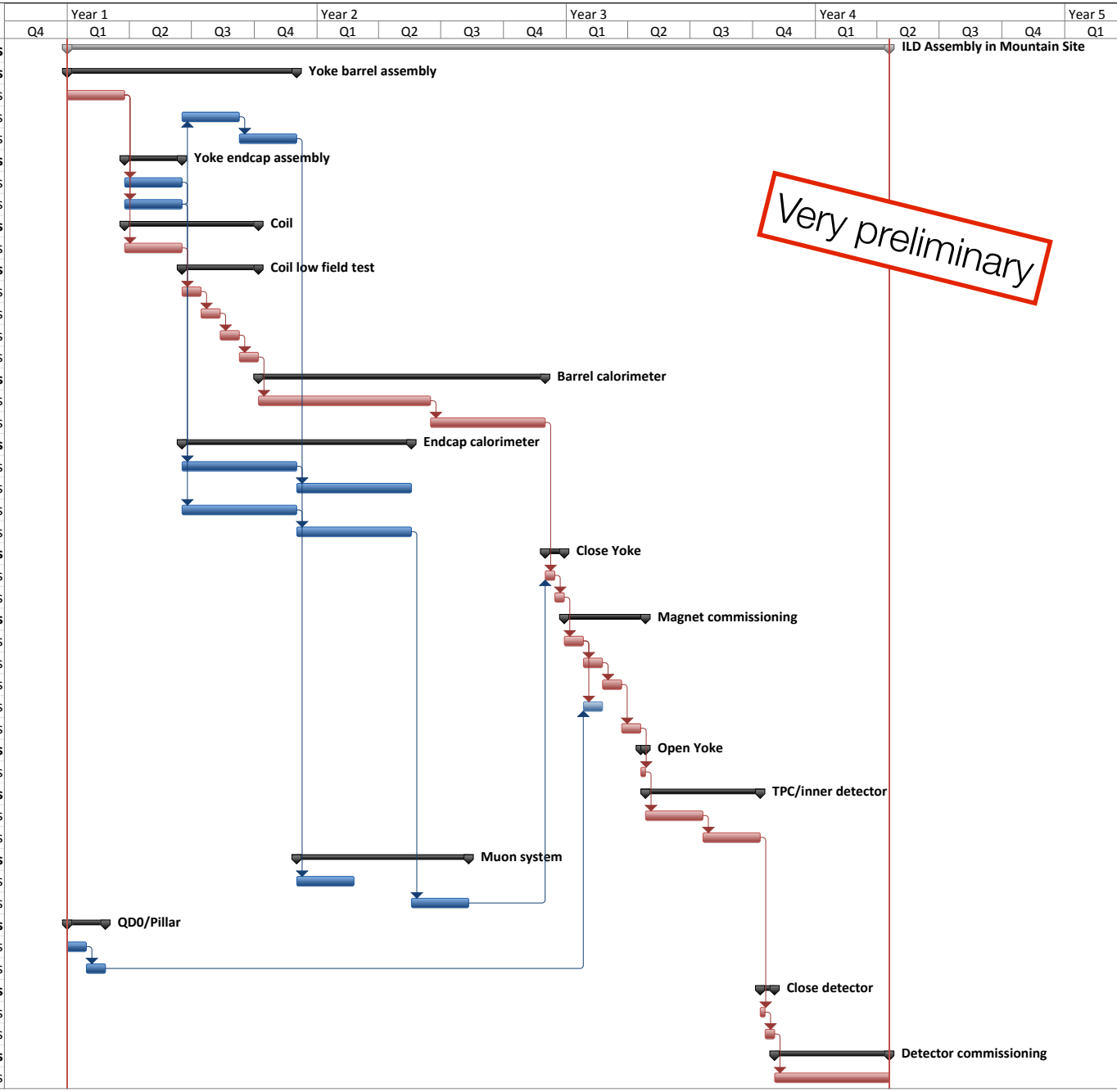


TPC Installation



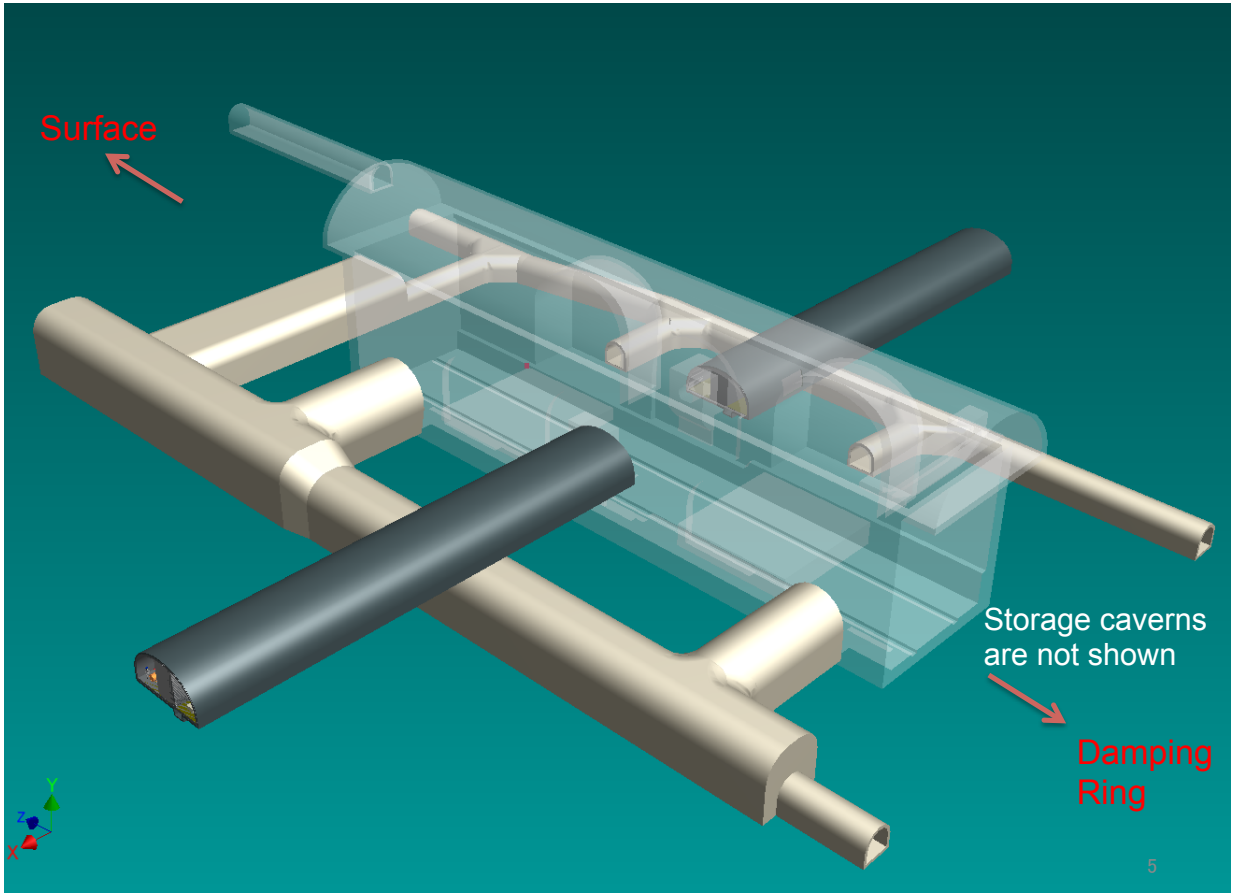


ID	Task Name	Duration
0	**ILD Assembly in Mountain Site**	**860 days**
1	**Yoke barrel assembly**	**240 days**
2	YB0	60 days
3	YB+z	60 days
4	YB-z	60 days
5	**Yoke endcap assembly**	**60 days**
6	YE+z	60 days
7	YE-z	60 days
8	**Coil**	**140 days**
9	Coil installation (incl. ancillaries)	60 days
10	**Coil low field test**	**80 days**
11	Cool down	20 days
12	Coil test	20 days
13	Field mapping test	20 days
14	Warm up	20 days
15	**Barrel calorimeter**	**300 days**
16	HCAL barrel assembly/cabling	180 days
17	ECAL barrel assembly/cabling	120 days
18	**Endcap calorimeter**	**240 days**
19	HCAL +z endcap assembly/cabling	120 days
20	ECAL +z endcap assembly/cabling	120 days
21	HCAL -z endcap assembly/cabling	120 days
22	ECAL -z endcap assembly/cabling	120 days
23	**Close Yoke**	**20 days**
24	Move YBs	10 days
25	Move YEs	10 days
26	**Magnet commissioning**	**85 days**
27	Cool down	20 days
28	High field tests	20 days
29	Field mapping	20 days
30	QD0 testing	20 days
31	Warm up	20 days
32	**Open Yoke**	**5 days**
33	Move YEs	5 days
34	**TPC/inner detector**	**120 days**
35	TPC insertion/cabling	60 days
36	Inner detector insertion/cabling	60 days
37	**Muon system**	**180 days**
38	Muon chamber barrel insertion/cabling	60 days
39	Muon chamber endcap insertion/cabling	60 days
40	**QD0/Pillar**	**40 days**
41	QD0 mounting	20 days
42	Forward calorimeters	20 days
43	**Close detector**	**15 days**
44	Close YEs	5 days
45	Install QD0/Pillars	10 days
46	**Detector commissioning**	**120 days**
47	Detector commissioning and testing	120 days



Japanese Hall Design (Status: 01/2012)

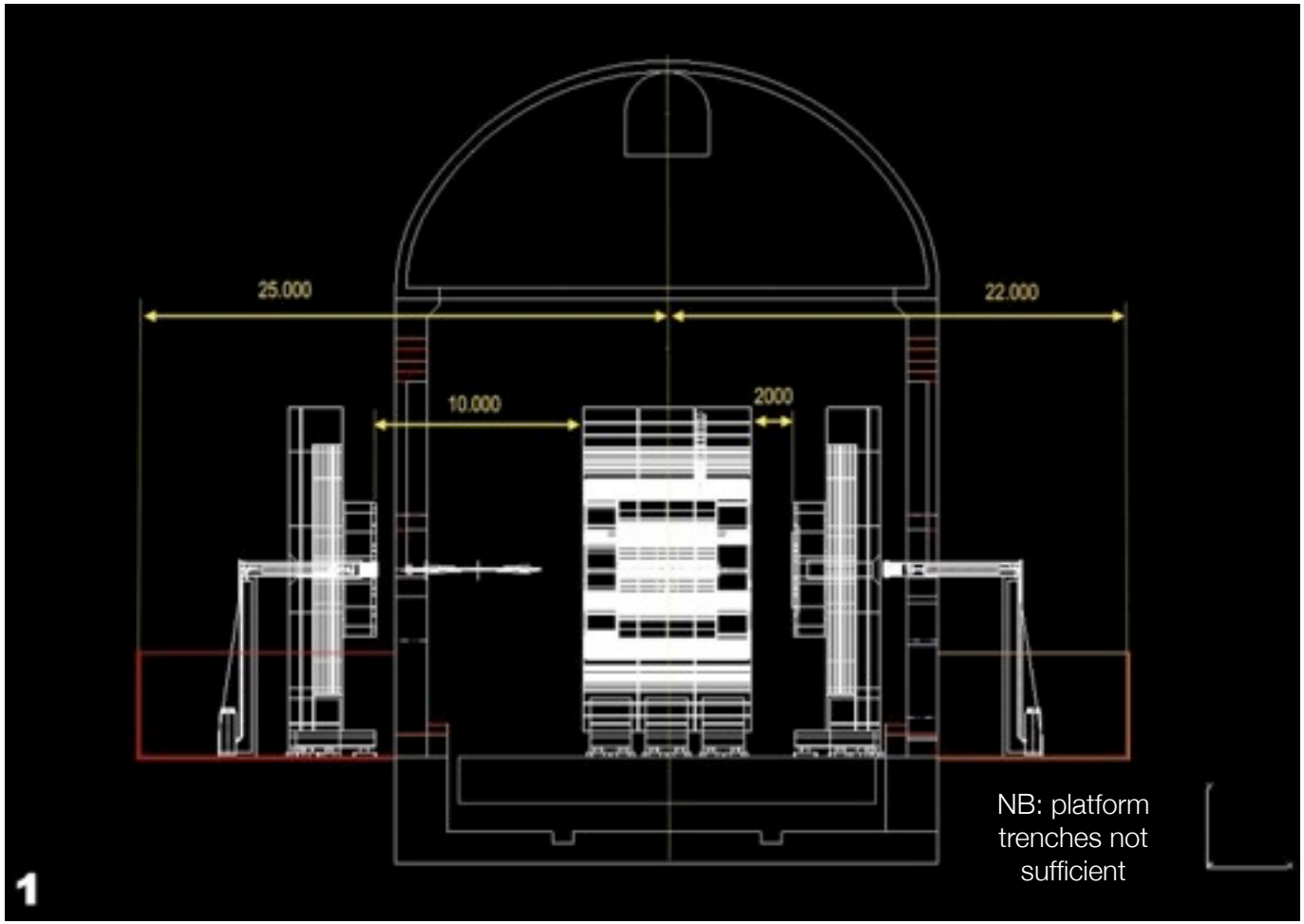
Y. Sugimoto



- Probably not enough space for detector assembly and regular maintenance

Maintenance Position (DESY Study)

- Changed hall model to enlarge alcoves in parking position (47m lateral space)

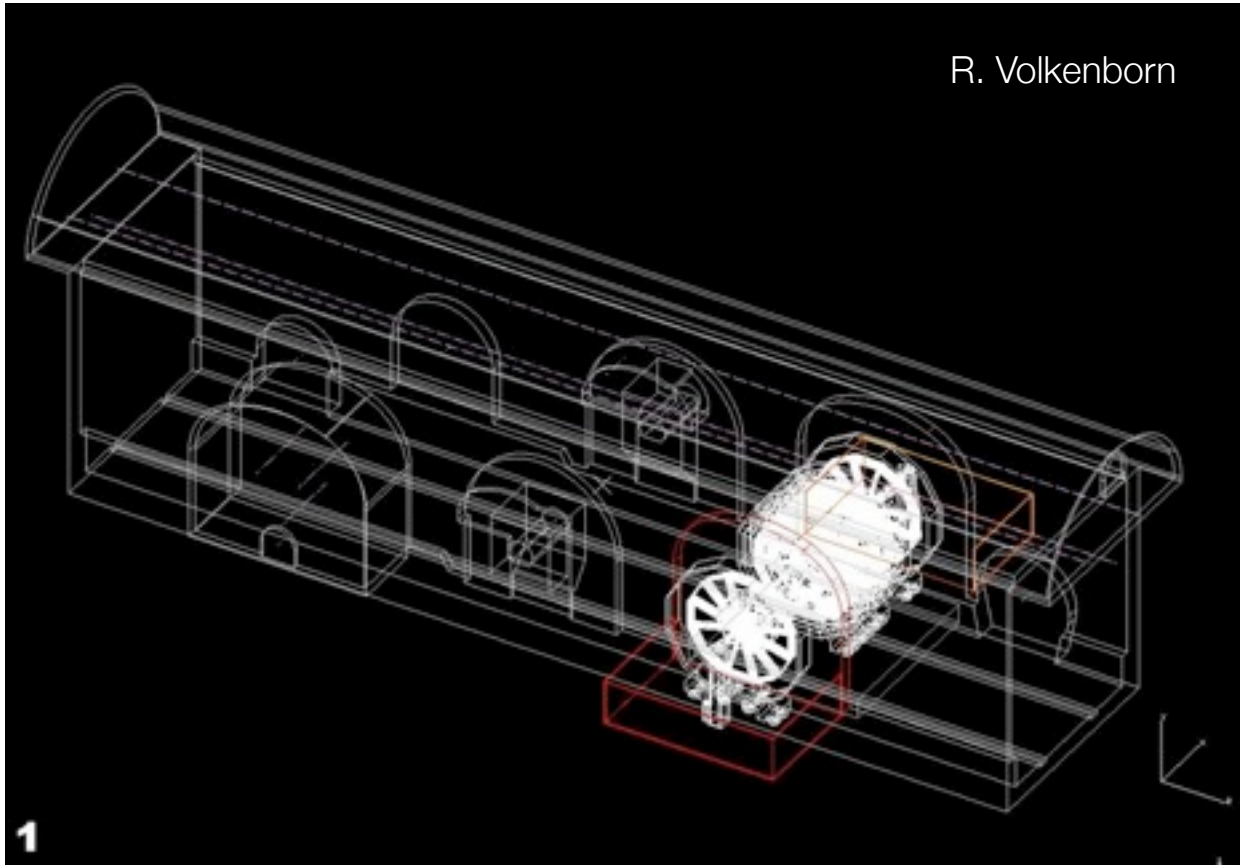


R. Volkenborn

Larger Parking Position (DESY Study)

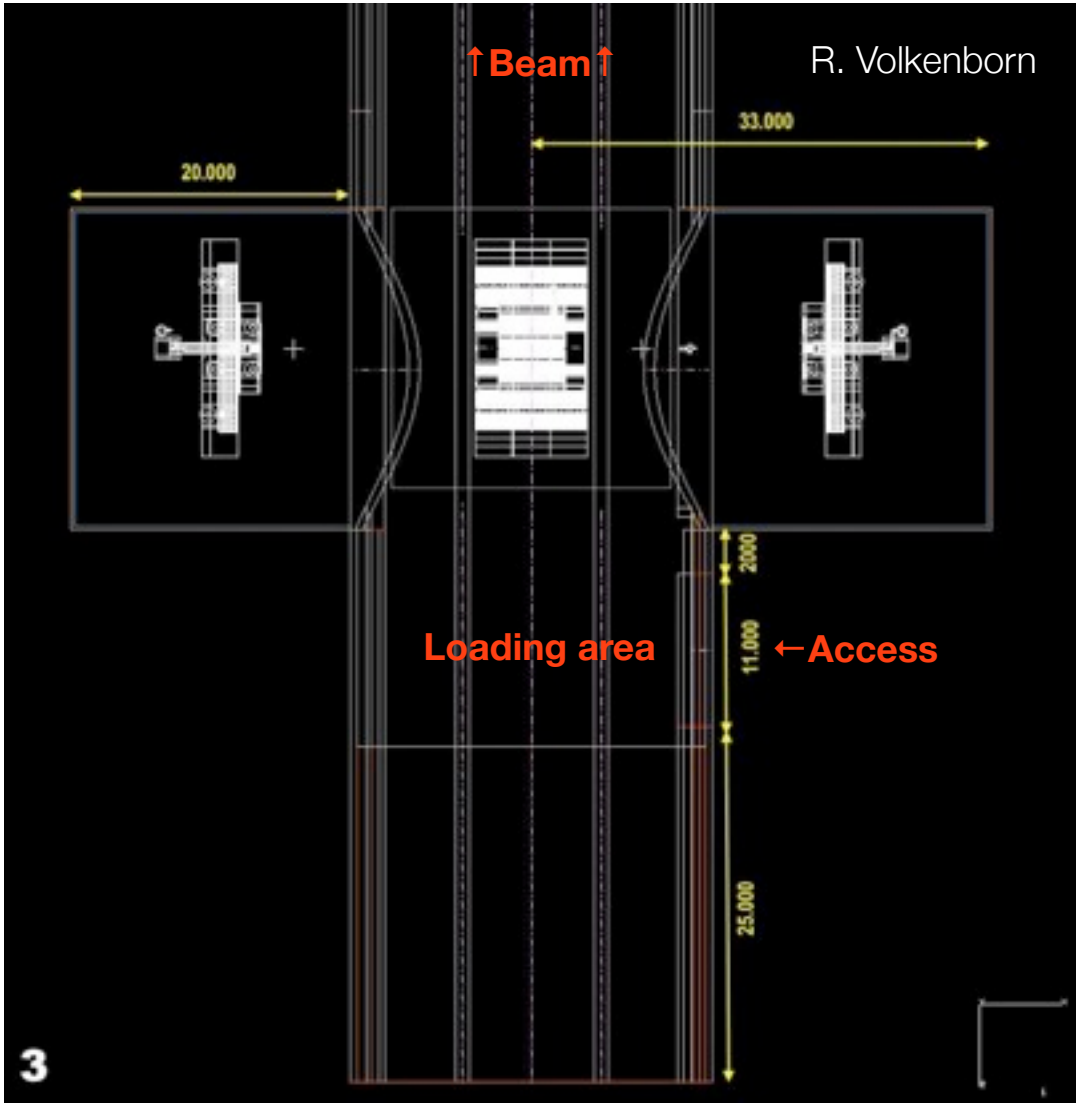
- Lateral space is needed to open the detector, remove QD0 magnets, inner detector, TPC

- Alternative: rotate the detector by 90 deg before opening
  - Almost impossible
  - need to disconnect cable chains and possibly cryo lines
  - warm-up the coil



Underground Construction Space (DESY Study)

- Three underground „construction sites“ are minimum
  - Alcoves need to be enlarged (53m lateral space)
  - Fourth might be needed for YB+/- barrel yoke rings, QD0 pillars, etc.
- Crane coverage: 200t in main hall, 100t in alcoves
- For comparison: CMS surface assembly hall : ~25m x ~90m
  - we need about the same - underground



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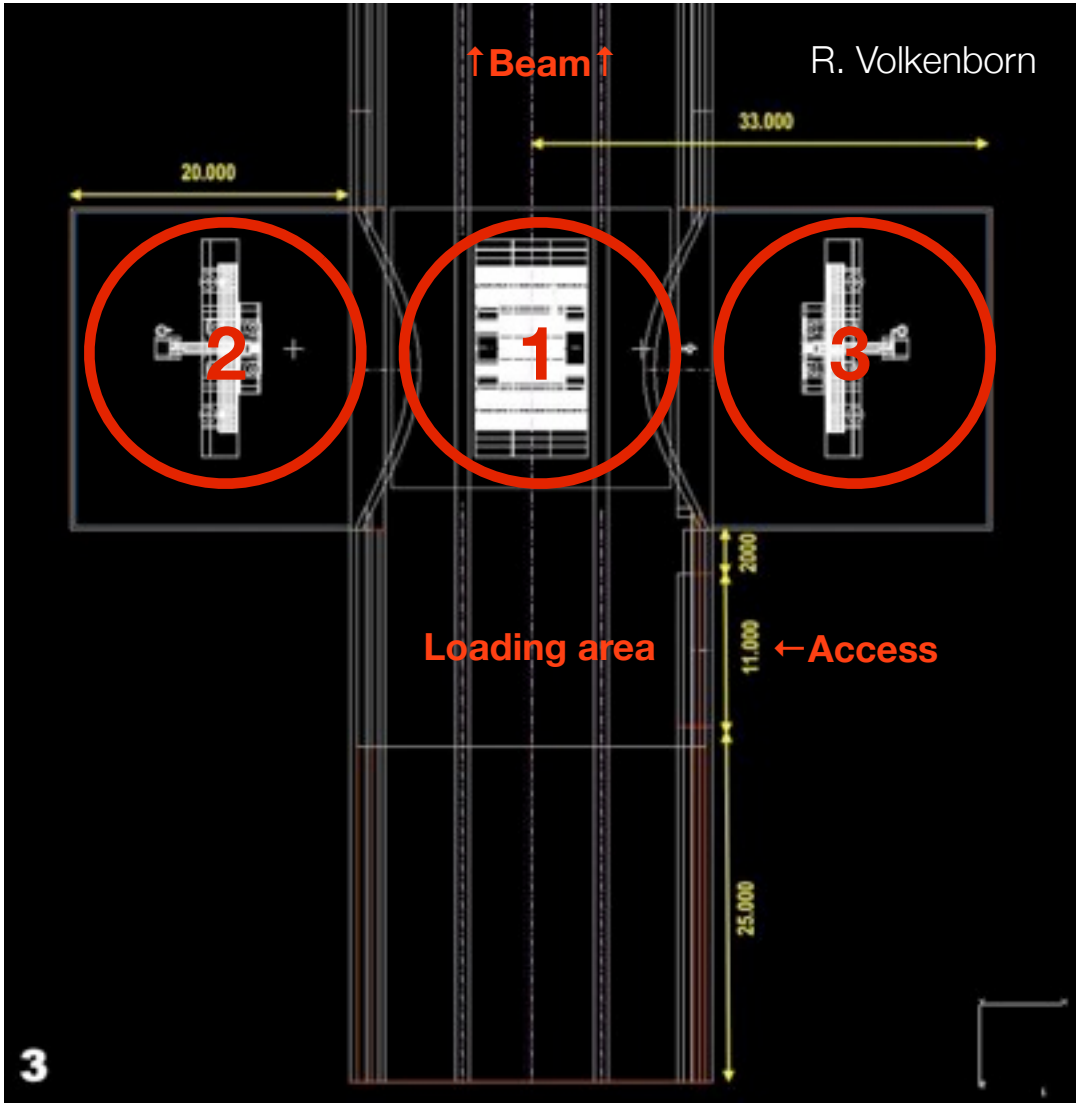

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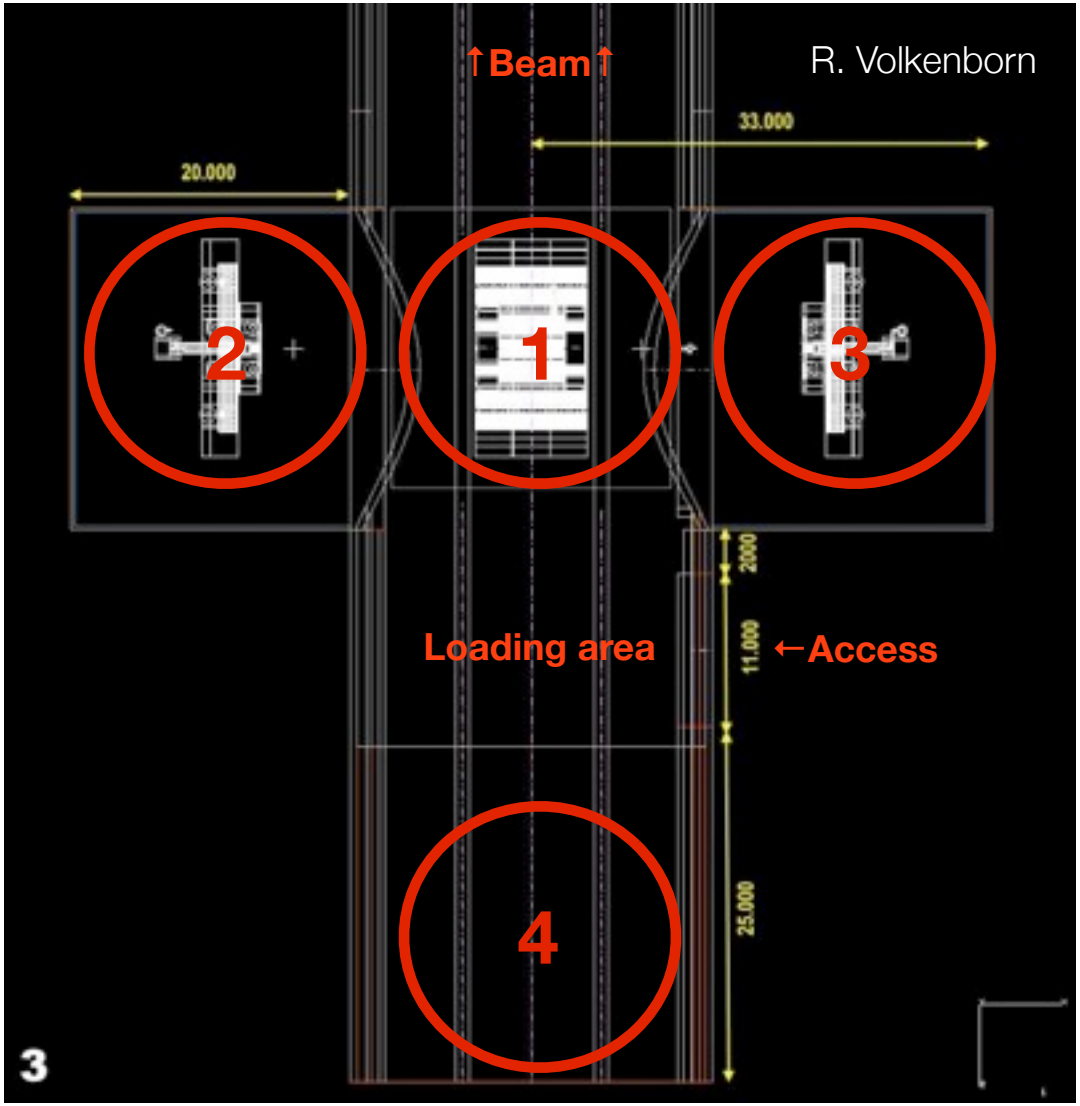
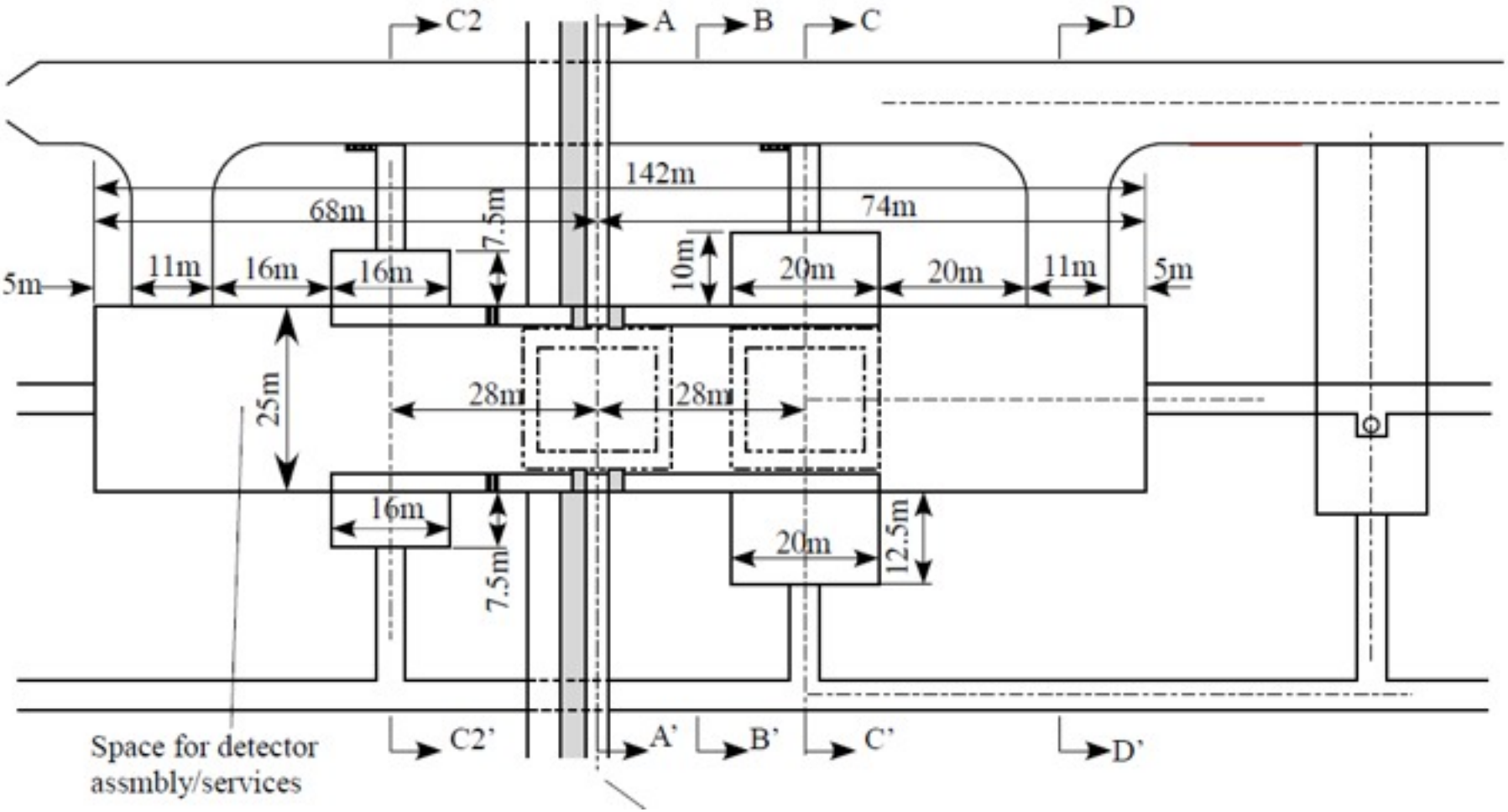


Japanese Hall Design Update (03/2012)

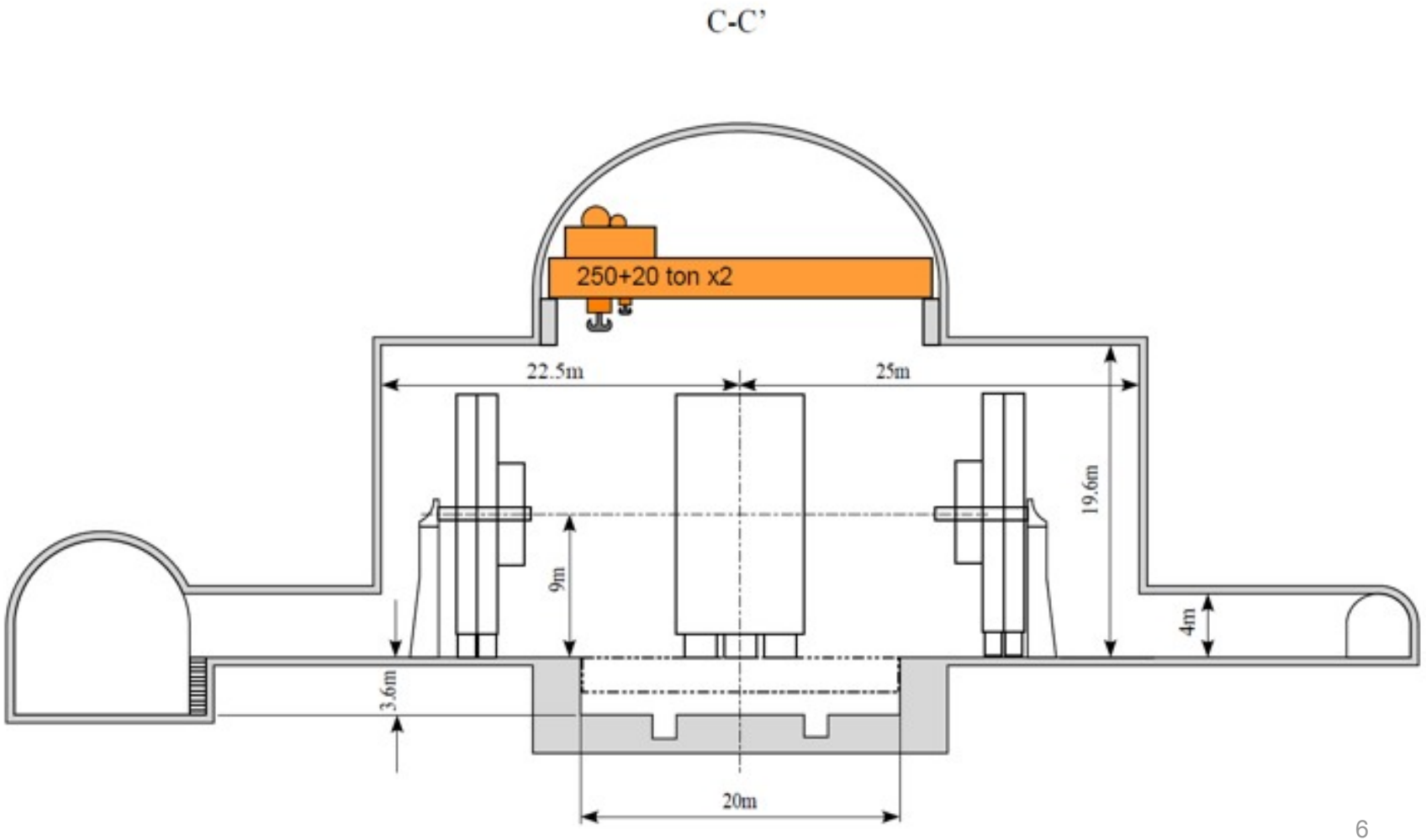
全体平面図:Plan view of EXP hall



Y. Sugimoto/ T. Tauchi

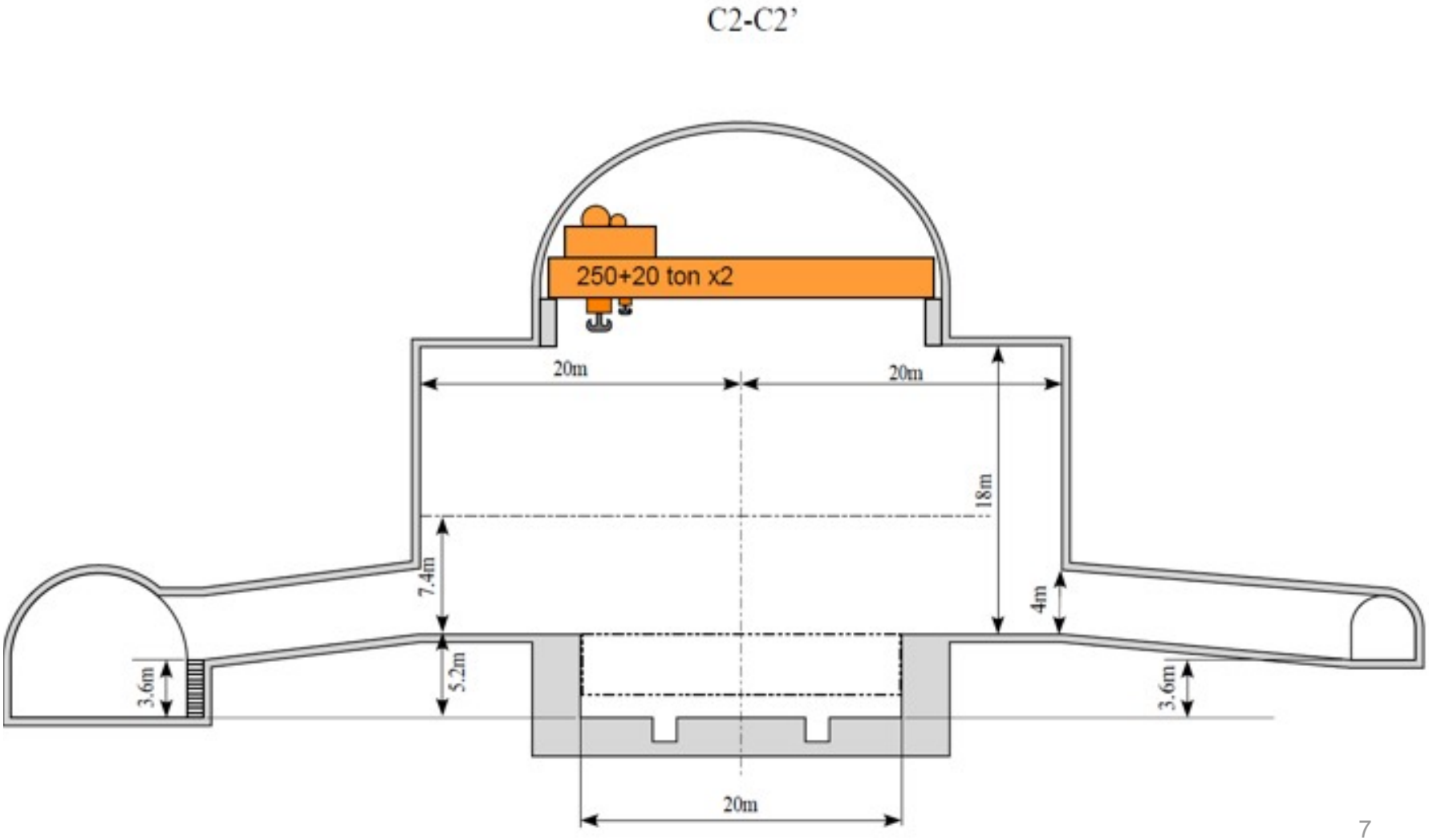
Japanese Hall Design Update (03/2012)

ガレージ部断面(ILD)： in ILD Garage



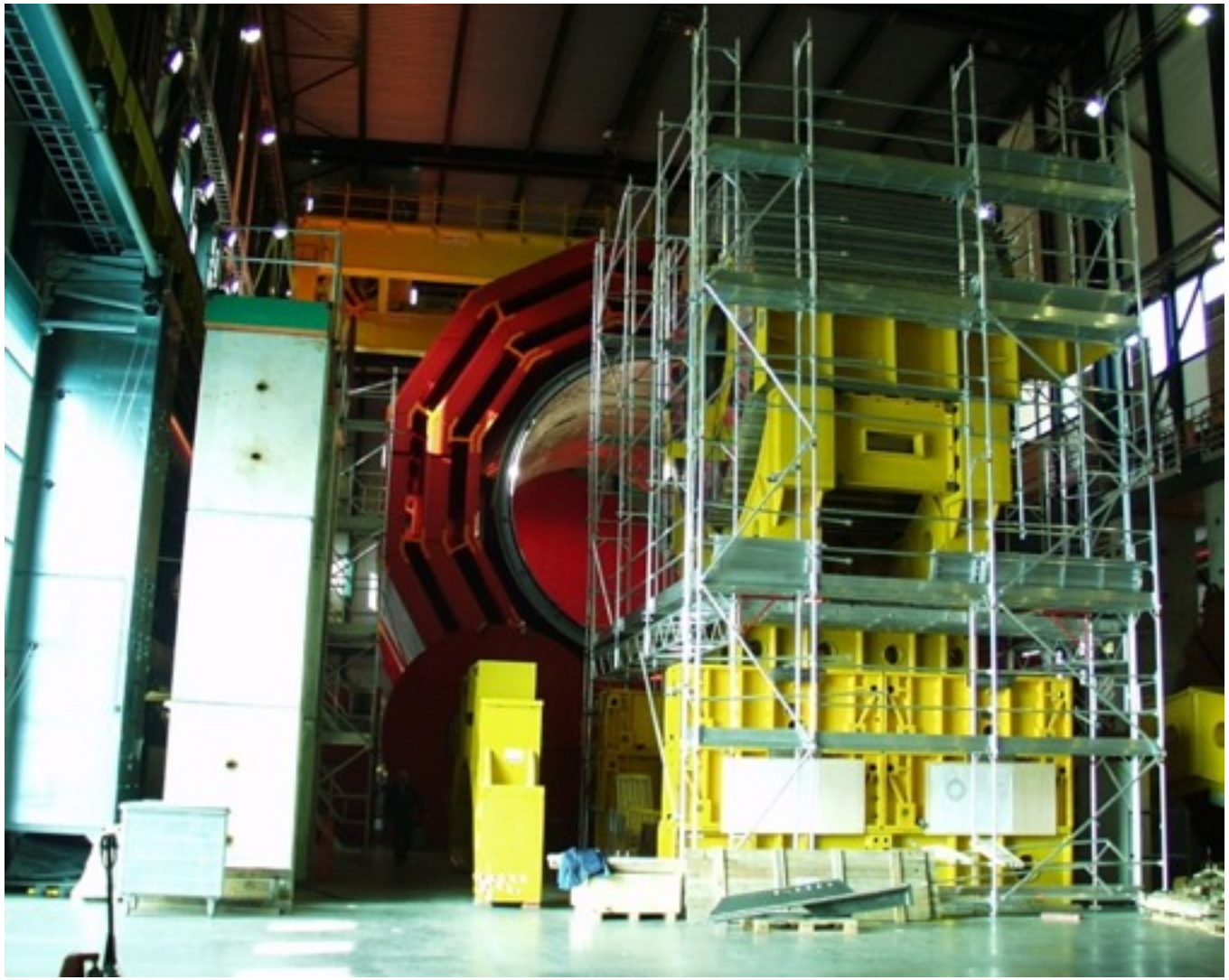
Japanese Hall Design Update (03/2012)

ガレージ部断面(SiD) : in SiD Garage



CMS Surface Assembly Hall

CMS Surface Assembly Hall



CMS Surface Assembly Hall

Conclusion

- First attempt to define an assembly sequence for ILD in the mountain sites
- 3y+ underground assembly time seems feasible
  - Requires optimised underground conditions
- Current hall design under study with enlarged alcoves and longer hall

- Need to optimise the whole system detector/machine/hall w.r.t. assembly time schedule and cost!
- Need to understand trade-offs: space vs time