

# ILD-0 overall dimensions

What's new since last meetings ?

*( 20-21/01/2009 CERN+ MDI/webex)*

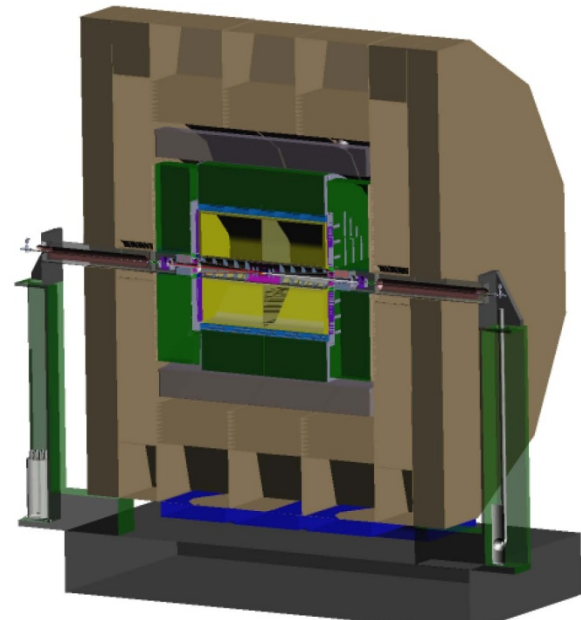
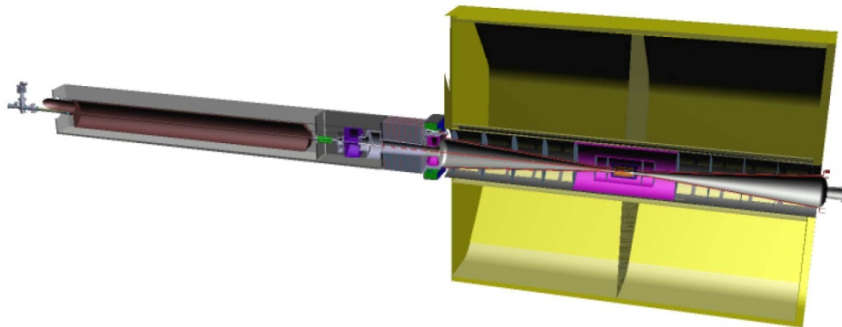
- ❖ Yoke
- ❖ Coil
- ❖ Beam pipe design
- ❖ Hall dimensions & Pillar design

➤ The dimensions of most of the subdetectors have been fixed, and may be found on the ildilc website :

<http://www.ilcild.org/groups/mdi/ILD0dimensions-weight130209.xls>

➤ Also an « uptodate » 3D pdf of ILD0 ( from M.Joré):

[http://www.ilcild.org/groups/mdi/private/ild-00/ILD0\\_02-09.pdf/view](http://www.ilcild.org/groups/mdi/private/ild-00/ILD0_02-09.pdf/view)



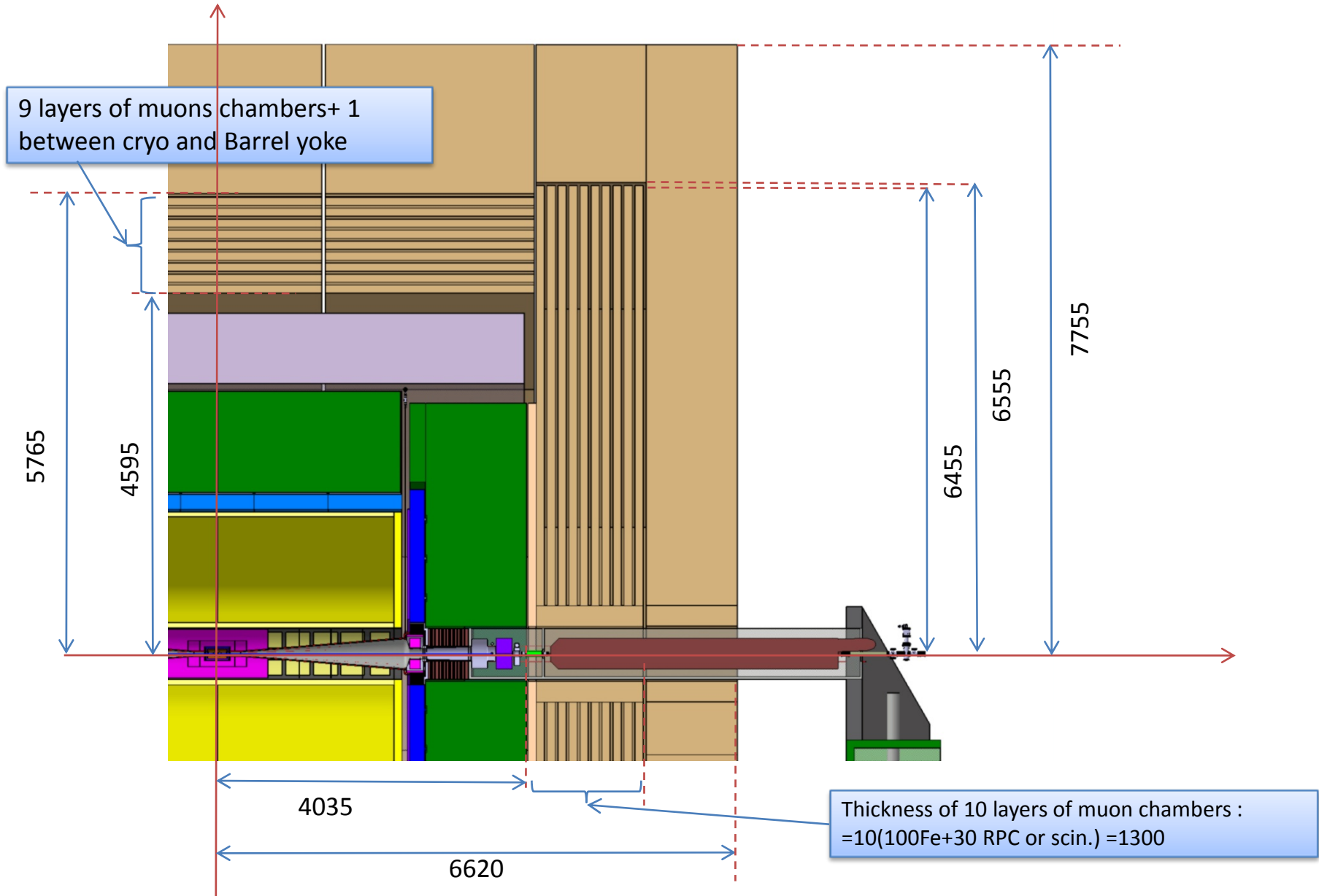
## Convergence between Saclay and Desy studies

	nominal 3,5T; max 4T; nominal 3.5 T; 2,4?GJ		
Barrel Y Rin	4595	Barrel yoke weigth = 6900 t	
Barrel Y Rout	7755	Endcap yoke= 3250 t	
Barrel 1/2 length	4035	Total yoke= 13400 t	
thick.	3160		
1st Yoke endcap front	4060	the 1st ring will contain the 10 muons chambers	
1st Yoke endcap back	5420		
1st Yoke endcap Rin	550		
1st Yoke endcap Rout	6555		
thick.	1360		
2nd Yoke endcap front	5460		
2nd Yoke endcap back	6620		
2nd Yoke endcap Rin	550		
2nd Yoke endcap Rout	7755		
thick.	1160		
Ring Yoke endcap front	4060		
Ring Yoke endcap back	5420		
Ring Yoke endcap Rin	6555		
Ring Yoke endcap Rout	7755	gap muon chambers	40
thick.		gap barrel rings	25
FSP front	3960	gap barrel endcap	50
FSP back	4060		
FSP Rin	550		
FSP Rout	3240		
thick.	100		

- Final thickness of yoke will depend on stray field ( last constraint is < 50G at 15m) and gap size effects...
- Shape of the endcaps still in discussion : Depends on construction methods, muons chambers insertions; and also on split/no split



# Yoke dimensions (2)

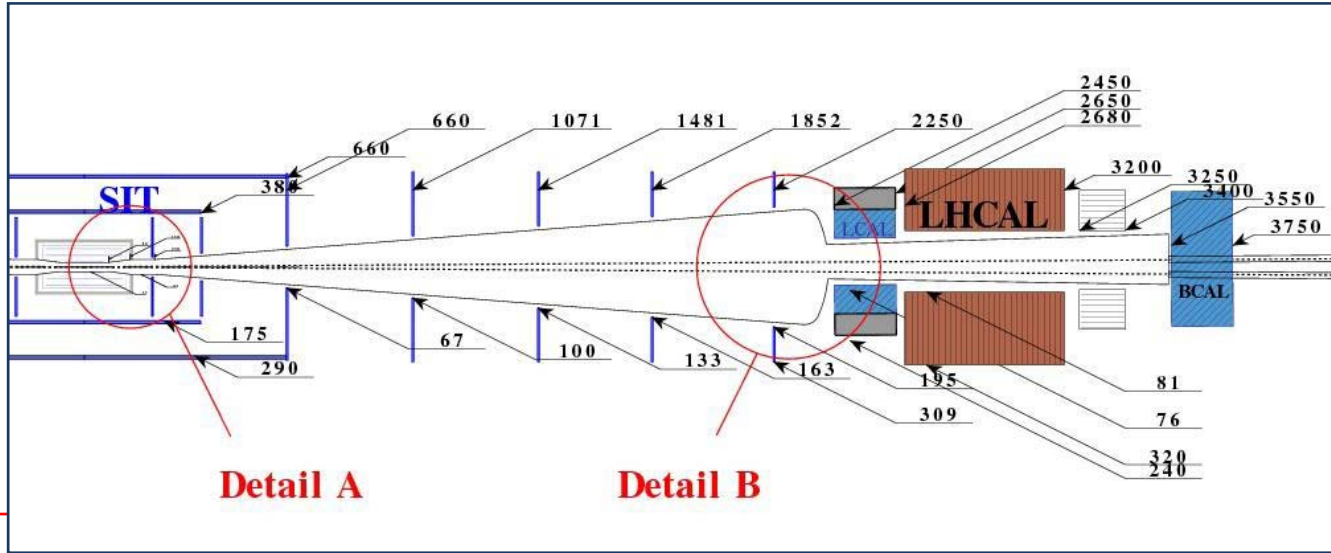


( see F.Kircher webex MDI 10/02/2009)

- Decision on 4 February to increase the coil thickness from 350 to 450 mm to cope with the stored energy of 2.7 GJ @ 4 T
- Terminology: coil = winding + mandrel
- Proposal:

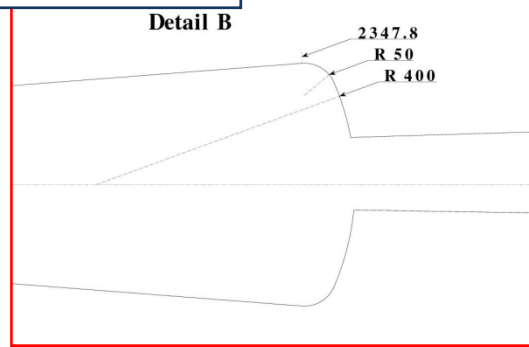
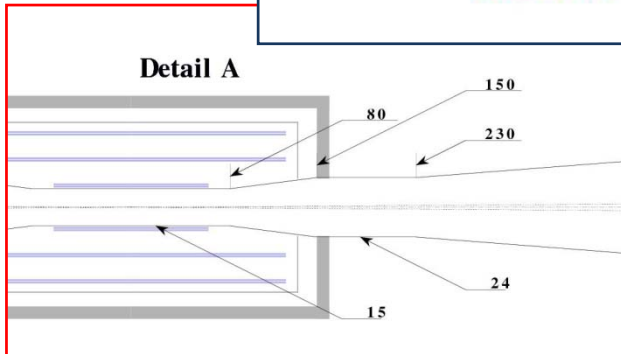
Parameter	Old design	New design
Total coil thickness (mm)	350	450
Winding thickness (mm)	300	385
Number of layers in winding	4	5
Mandrel thickness (mm)	50	65
Overall bare conductor dimensions (mm <sup>2</sup> )	73 * 22	75 * 28
Total number of turns	1240	1225

# Beam pipe



**Detail A**

**Detail B**



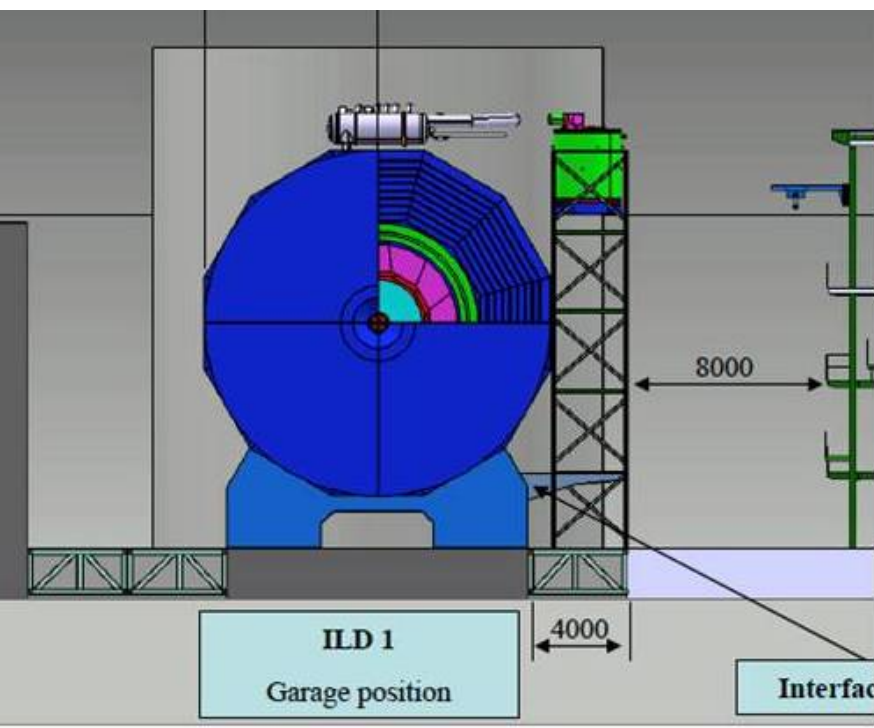
- Central cylinder: R= 15 L= 80
- First cone : R= 24 L= 150
- Second cylindre: R= 24 L = 230
- Large cone: R= 188.55 L = 2348.5
- Spherical cupola Centre= (2030, 0) R=400
- Fillet R= 50

*Note on the beam tube for ILD ( M. Anduze, H. Videau, M. Joré)*  
[http://www.ilcild.org/groups/mdi/Beam\\_tube\\_note.pdf](http://www.ilcild.org/groups/mdi/Beam_tube_note.pdf)

ILD Main dimensions		ILD 0	Weight	
TPC	Rin(sensitive/mechanical)	395(330)	P= 4T	
	Rout(sensitive/mechanical)	1743(1808)		
	Zmax ( endplate out )	2350		
Barrel CAL	ECAL	Rin / Rout	1843/ 2028	W/Si, 24 X0 P= 75 t
		Z max	2350	
	HCAL	Rin / Rout	2058 / 3410	SS/Scinti, or RPC, 5.3 l, max 48 layers barrel P= 626 t
		Z max	2350	
Endcaps CAL	ECAL	Zmin / Z max	2450 / 2635	P=2x15.5 t
	HCAL	Zmin / Z max	2650 / 3937	P= 2x264 t
Coil Cryostat	Rin / Rout		3440 / 4340	
	Z max		3905	
Yoke, barrel	Rin / Rout		4595/ 7755	P= 6900 t
	Z max		4035	
Yoke, endcaps overall	Rin / Rout		350 / 7755	P=2x3250t
	Z max		6620	

<http://www.ilcild.org/groups/mdi/ILD0dimensions-weight130209.xls>

Because of Push-pull considerations, hall size limitations, we should consider ILD overall dimensions as detector + services.



### Primary services

- Water chillers,
  - High to medium voltage power transformers
  - Diesel & UPS facility
  - He storage & compressor plants
  - Gas & compressed-air plants
- Plants usually on surface

### Secondary services

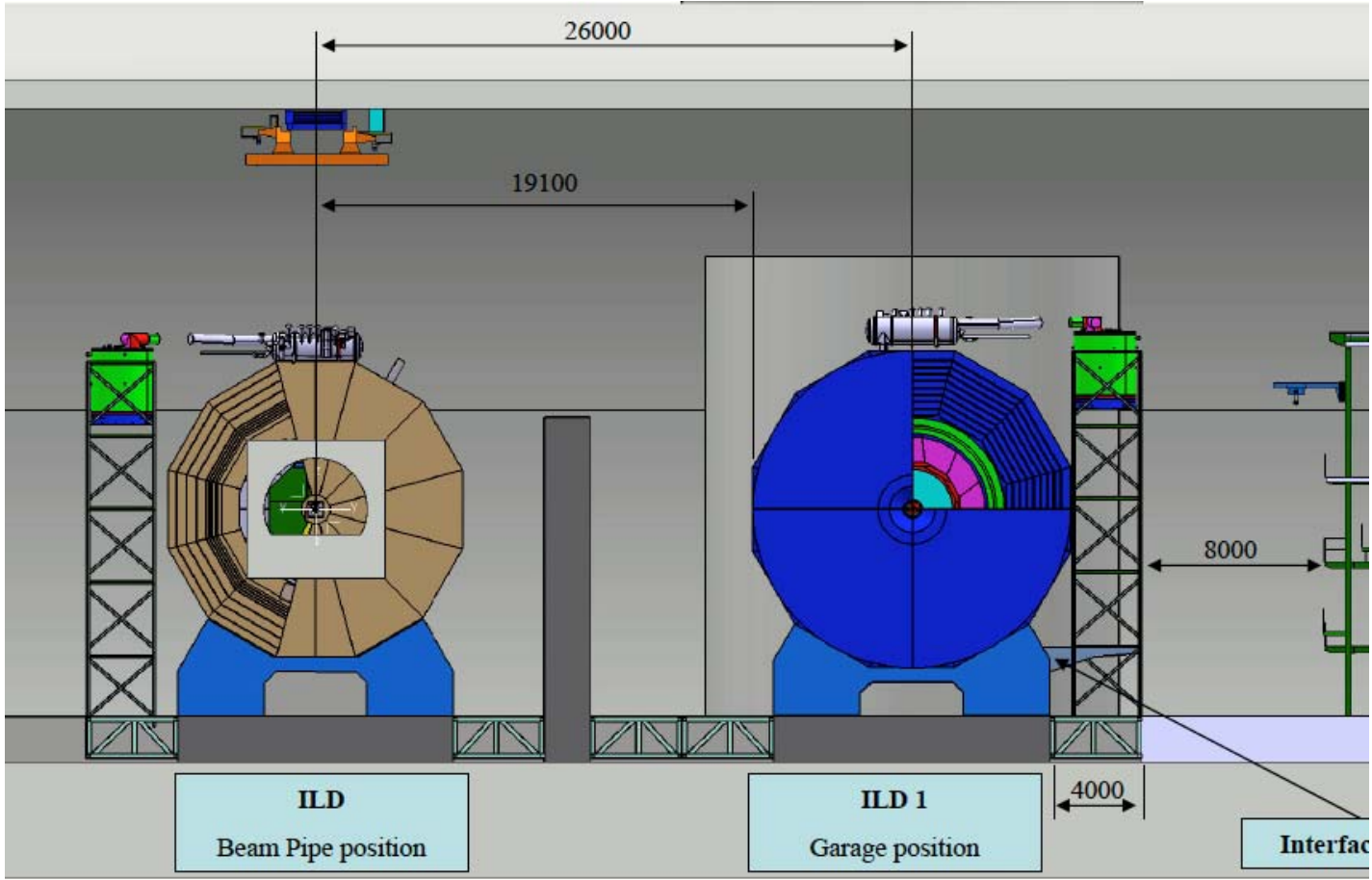
- Temperature-stable cooling water for sensitive detectors
  - Low Voltage/High Voltage supply for front-end electronics
  - Gas mixtures for drift-chambers
  - UPS power for valuable electronics
  - AC-DC power converters for superconducting coil(s)
  - Cryogenics & Vacuum services
- Need to be close to detector ( flexible lines <50m)

### On-board services

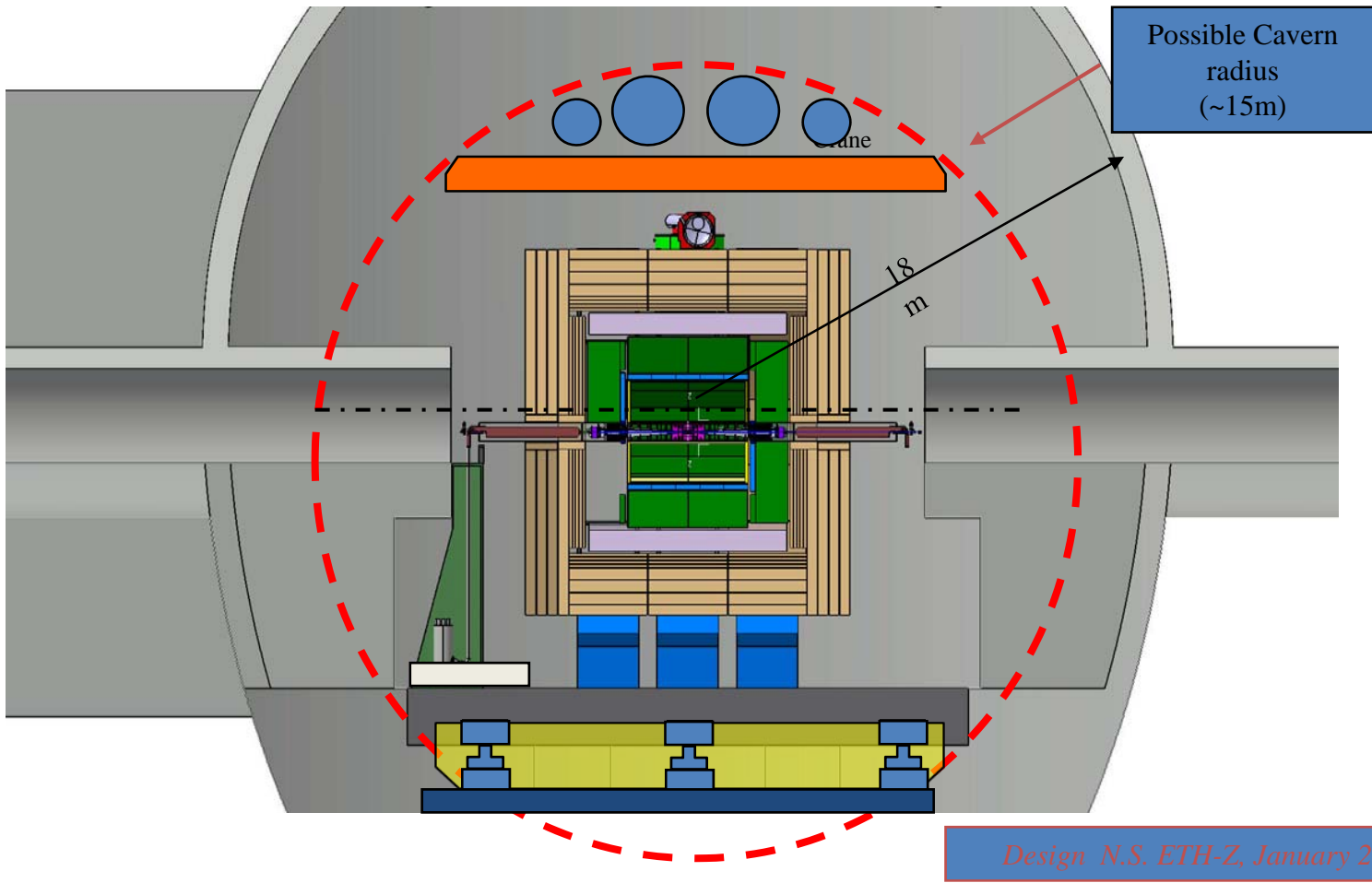
Some secondary services must be situated close to the detector as well, if the connection lines through the cable-chains is technically difficult or too expensive

From A. Gaddi , CMS-ILD Engineering Workshop 2009





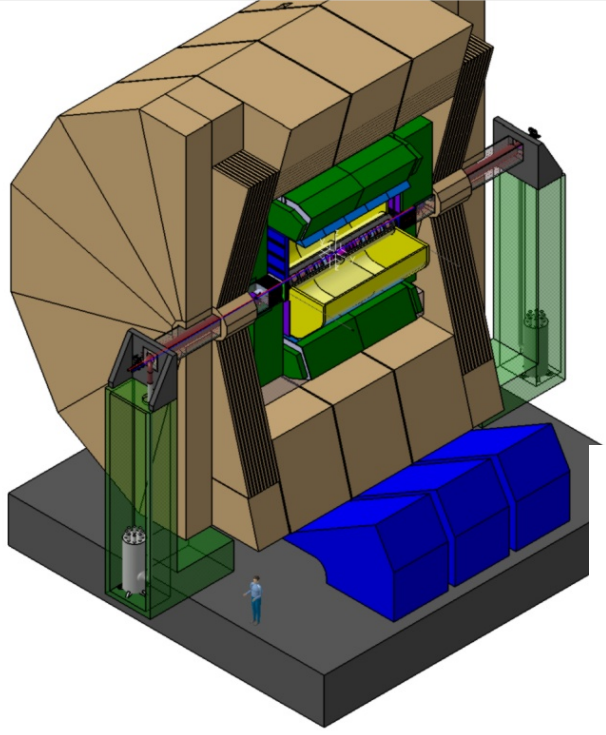
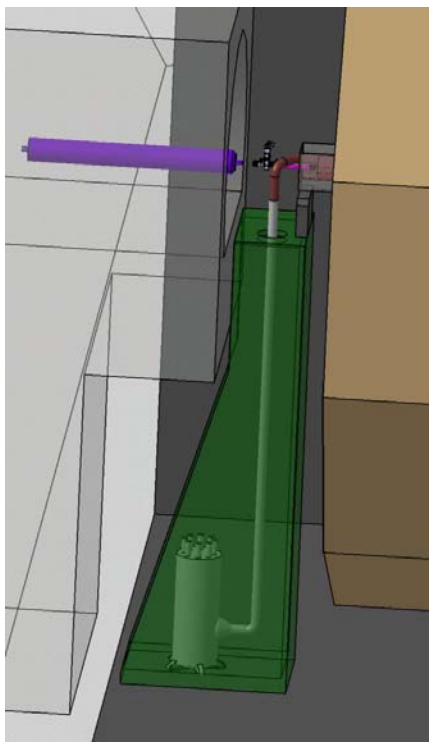
*From A.Hervé & N.Smiljkovic  
(1st draft, depends on stray field limits)*



A.Hervé, MDI/Integration Webex Meeting 04/02/09

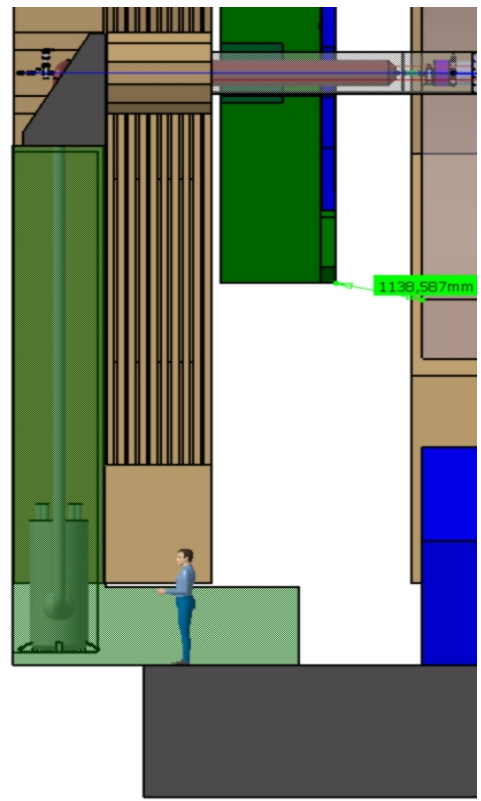
# Pillar structure

Old design

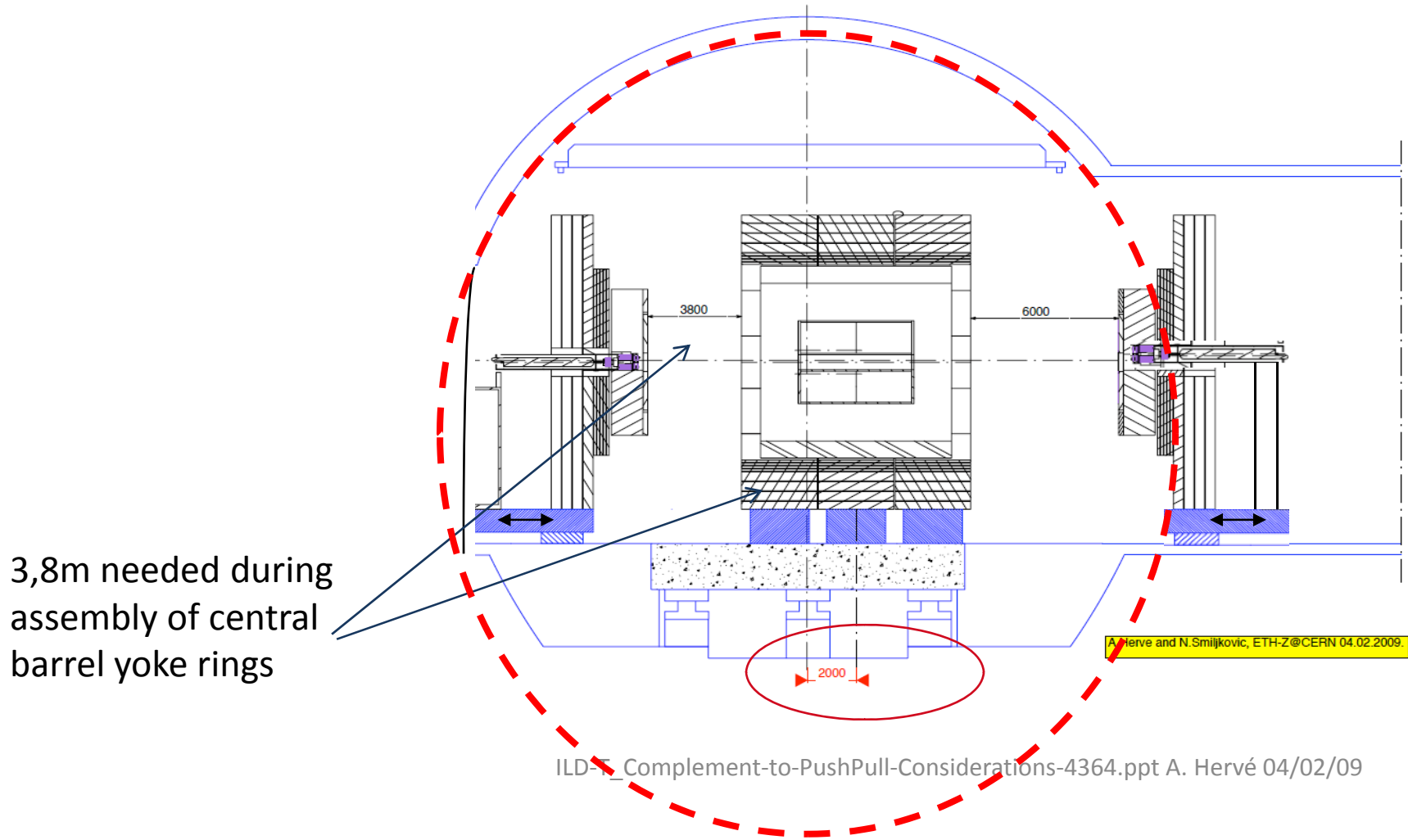


*To reduce the diameter of the hall and the size of the platform*

New design  
start @ 8m from IP



# Opening position in garage position with a sliding central barrel ( still feasible within 15 m of radius)



ILD-5\_Complement-to-PushPull-Considerations-4364.ppt A. Hervé 04/02/09