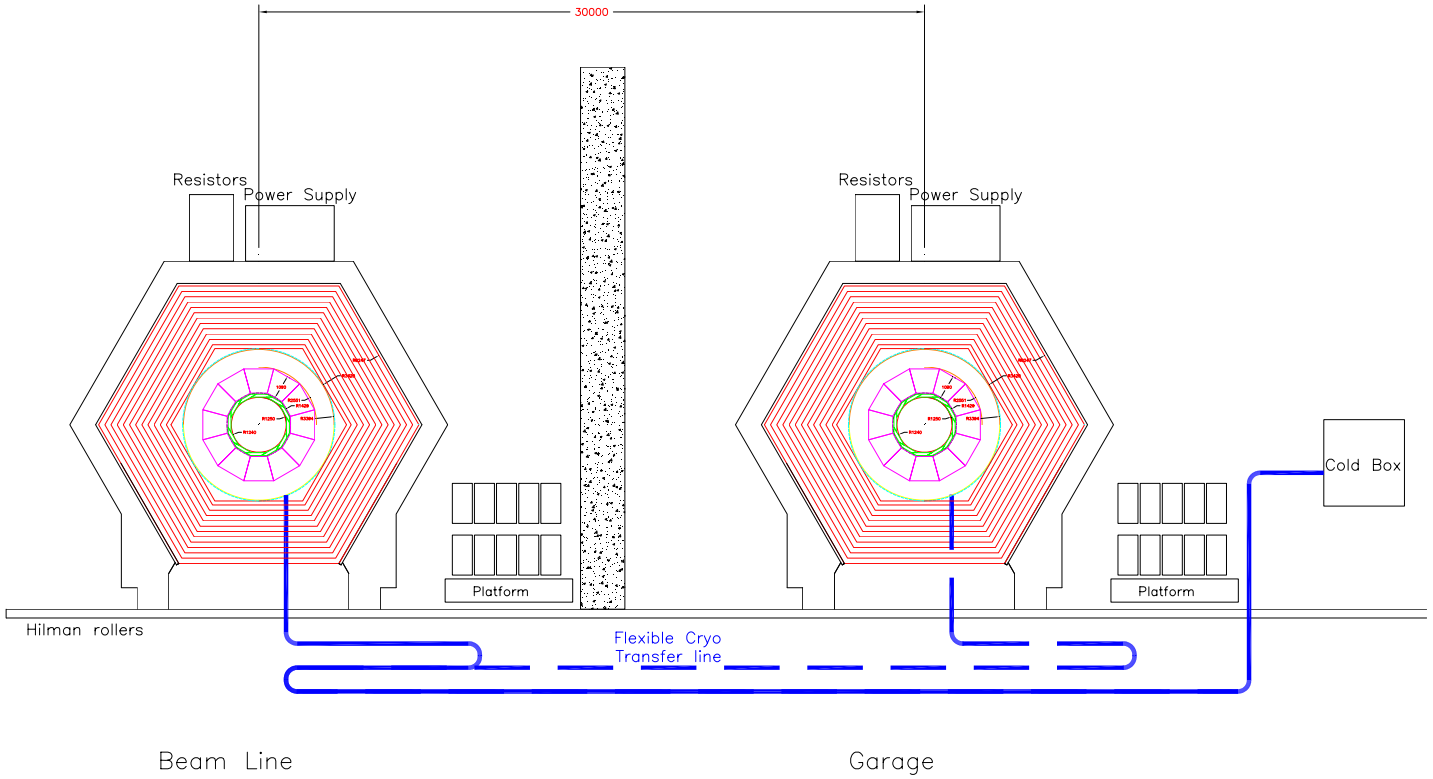
IR Hall Assumptions

1. Push-Pull and doors opening with Hilman Rollers
2. Racks and ancillaries on SiD or on a side platforms (location driven by the the fringe field)
3. Cold Box off detector (in the hall)
4. Flexible cryogenic transfer line (100mm OD) Solenoid-Cold box
5. He compressors remote



Surface Assembly Assumptions

1. Solenoid, Muon detectors and HCALs are installed and commissioned on surface
2. Surface-to-UX crane limited to 2500 tons : Yoke barrel split in two parts, horizontally
3. Semiconductor detectors (VXD, Tracker and ECAL) are pre-commissioned in clean labs and installed underground

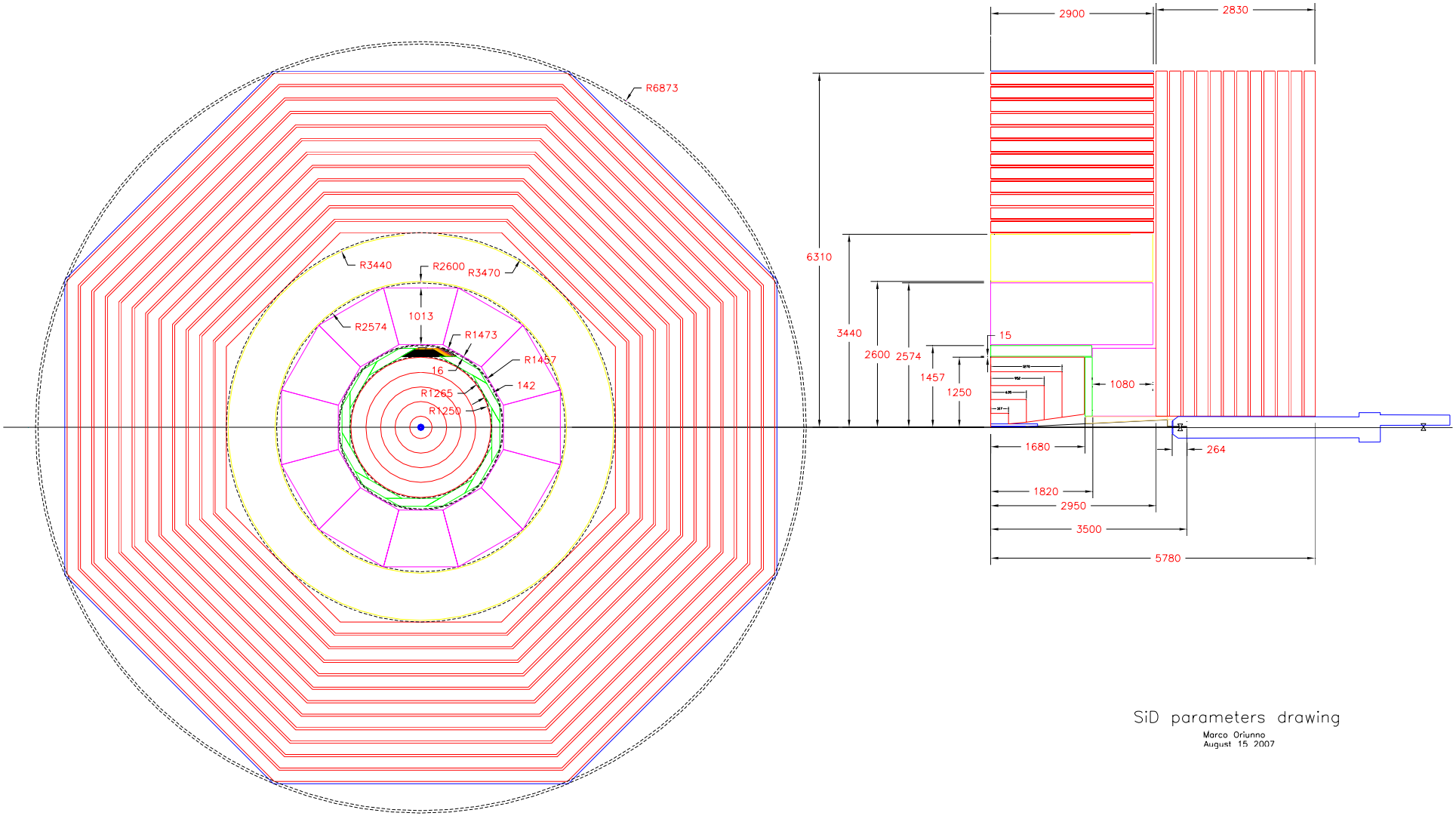
SiD weights table

Item	Tons
Tracker + VTX	3
Ecal Barrel	59
Hcal Barrel	367
Total Inner Detectors	**429**
Cold mass	104
Vacuum Tank	117
Yoke Barrel	3000
Muon detectors Barrel	50
Self Shielding Barrel	100
Infrastructure	50
Feet x 6	180
Barrel subtotal	**4459**

Item	Tons
Doors	
Ecal Fwd	10
Hcal Fwd	23
Yoke Forward	2315
Muon Forward	30
Feet x 2	60
Self Shielding Forward	50
BDS	5
Door subtotal	2493
Two Doors total	4986

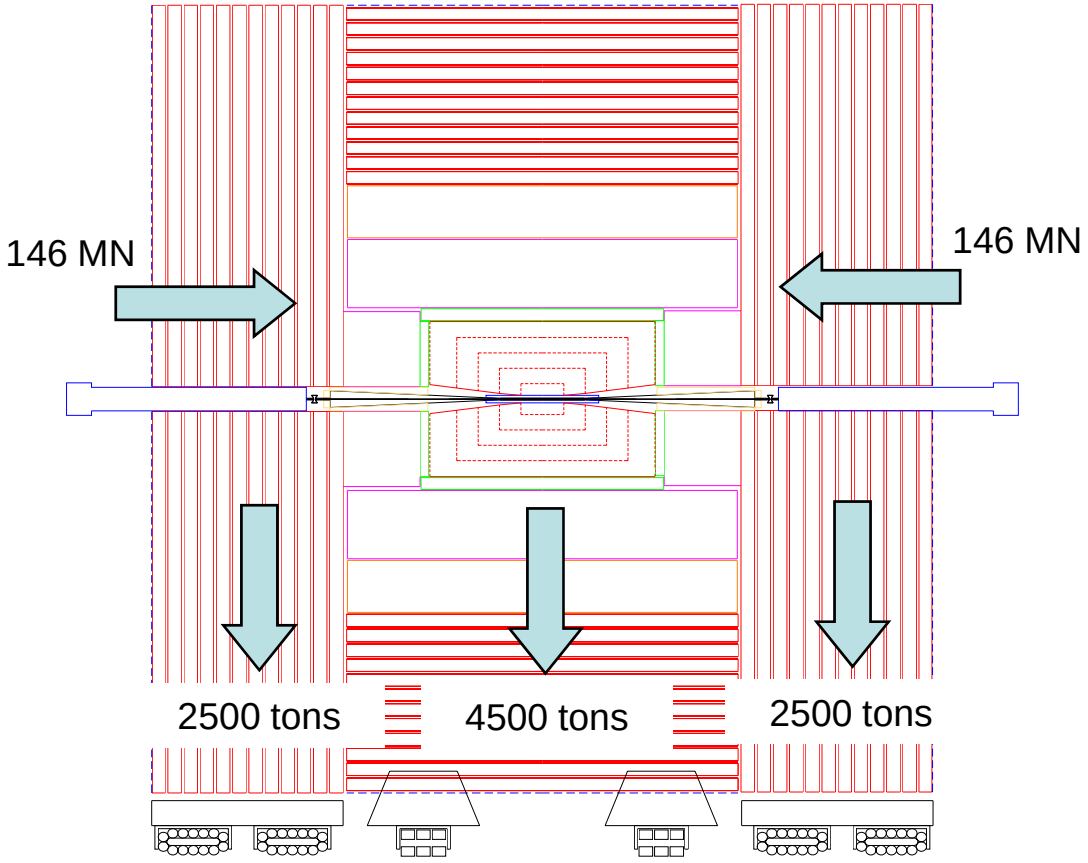
SiD Gran Total	**9445**

SiD parameters



Forces acting on the barrel

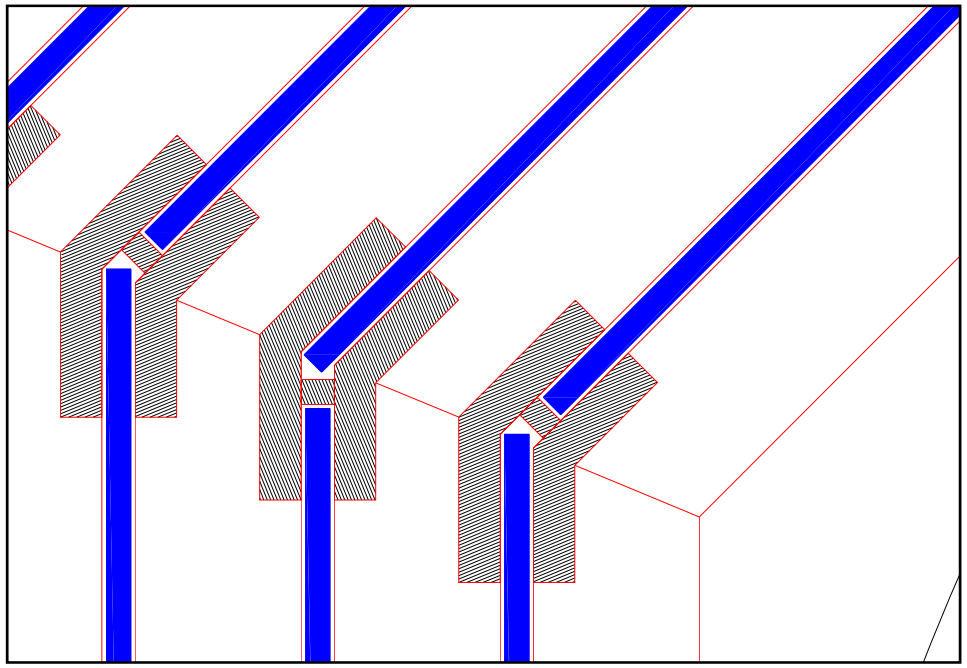
1. Compressive Magnetic forces of the doors (146 MN each)
2. Weight of the two doors carried by the barrel during the push-pull phase (2500 tons each)

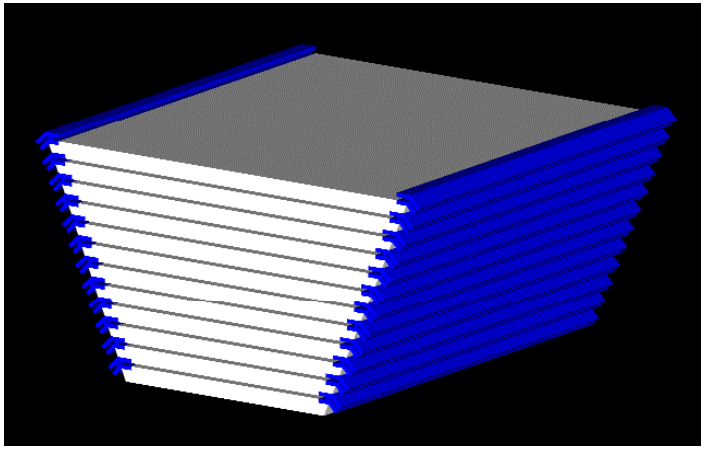


Yoke Barrel design

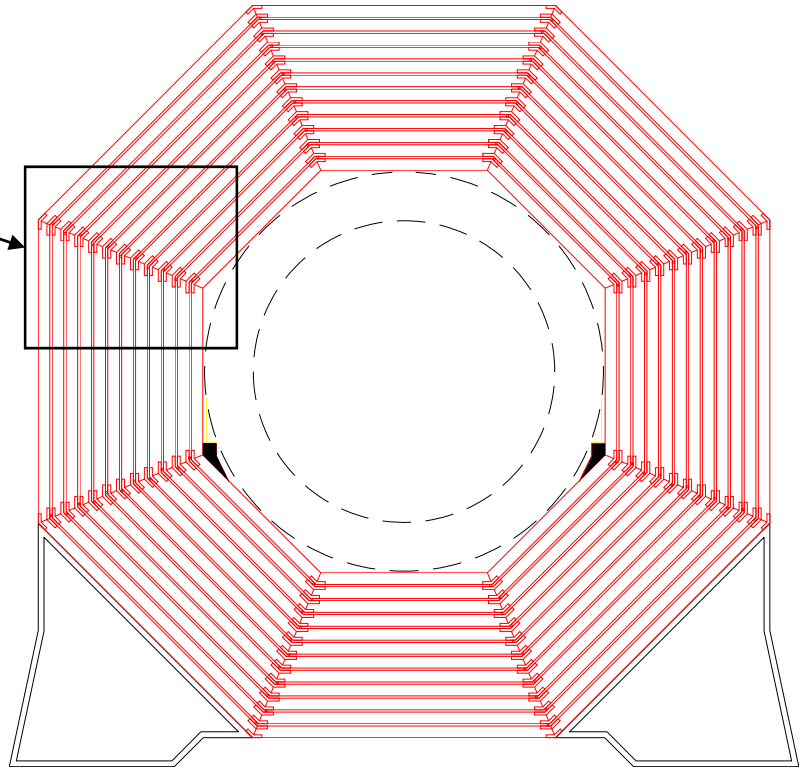
Requirements –> hold the whole SiD detector and slide on rollers

i.e., strenght + stability





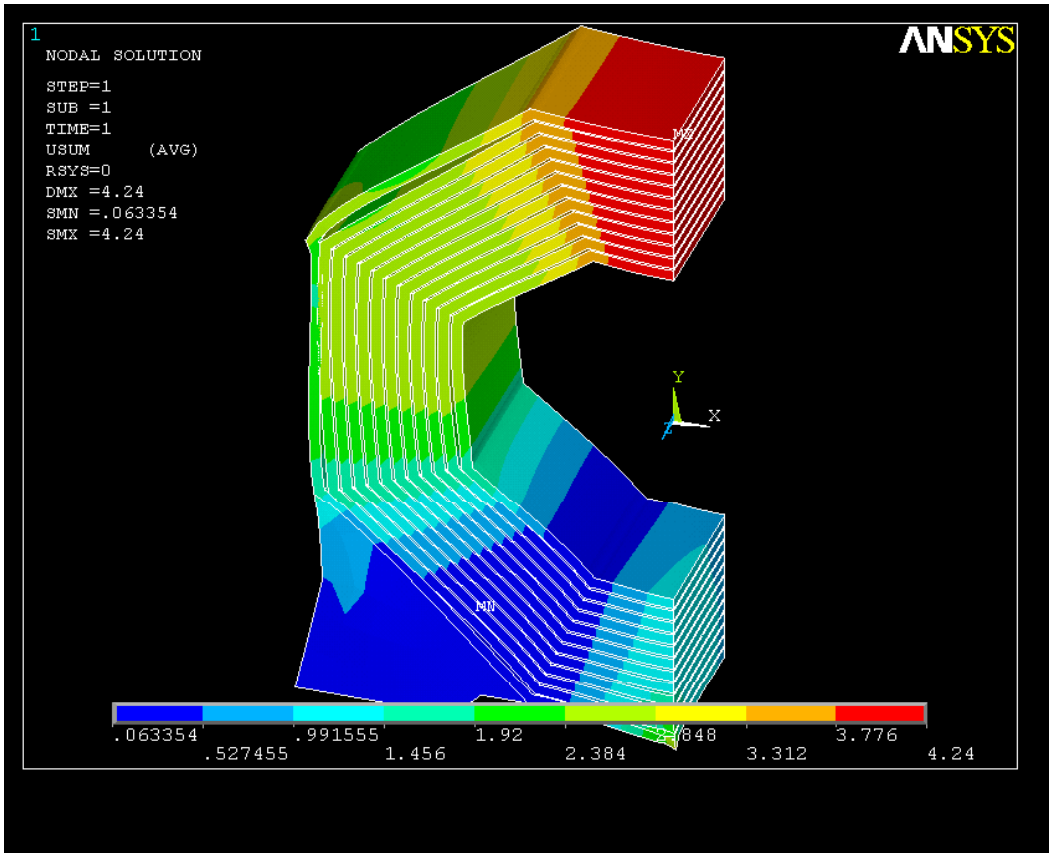
Self supporting skeleton stiffened by brackets



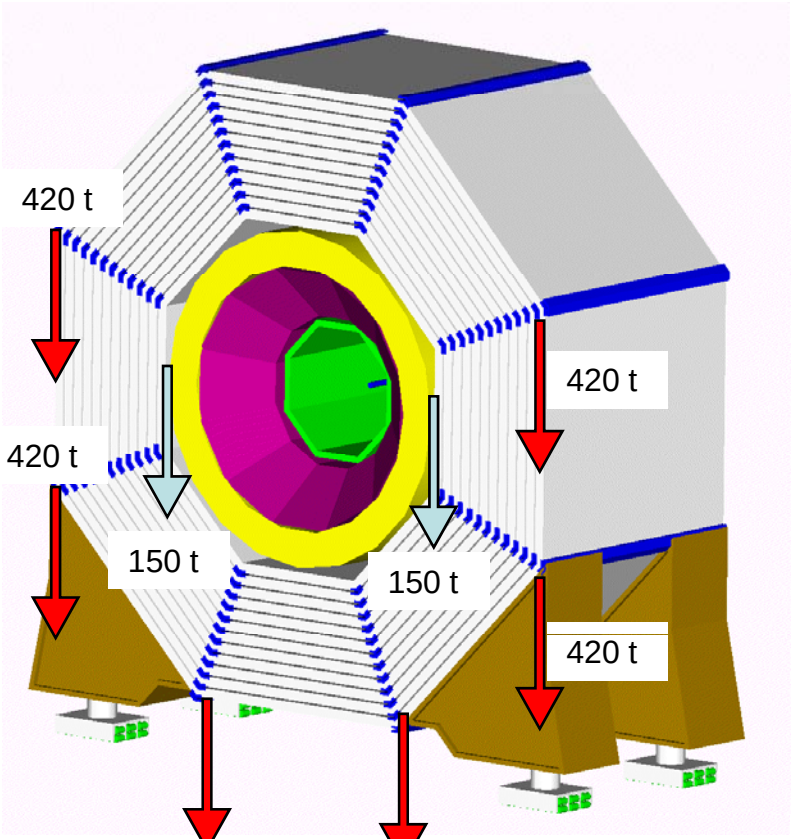
Yoke Barrel dimensioning

Cenetral detector Load 4 x 150 tons = 600 ton (Solenoid, Hcal, Ecal, Tkr)

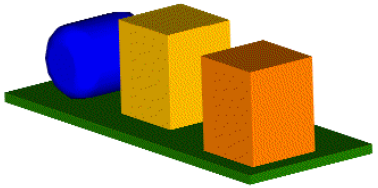
Doors 6 x 420 tons = 2520 tons (per side)



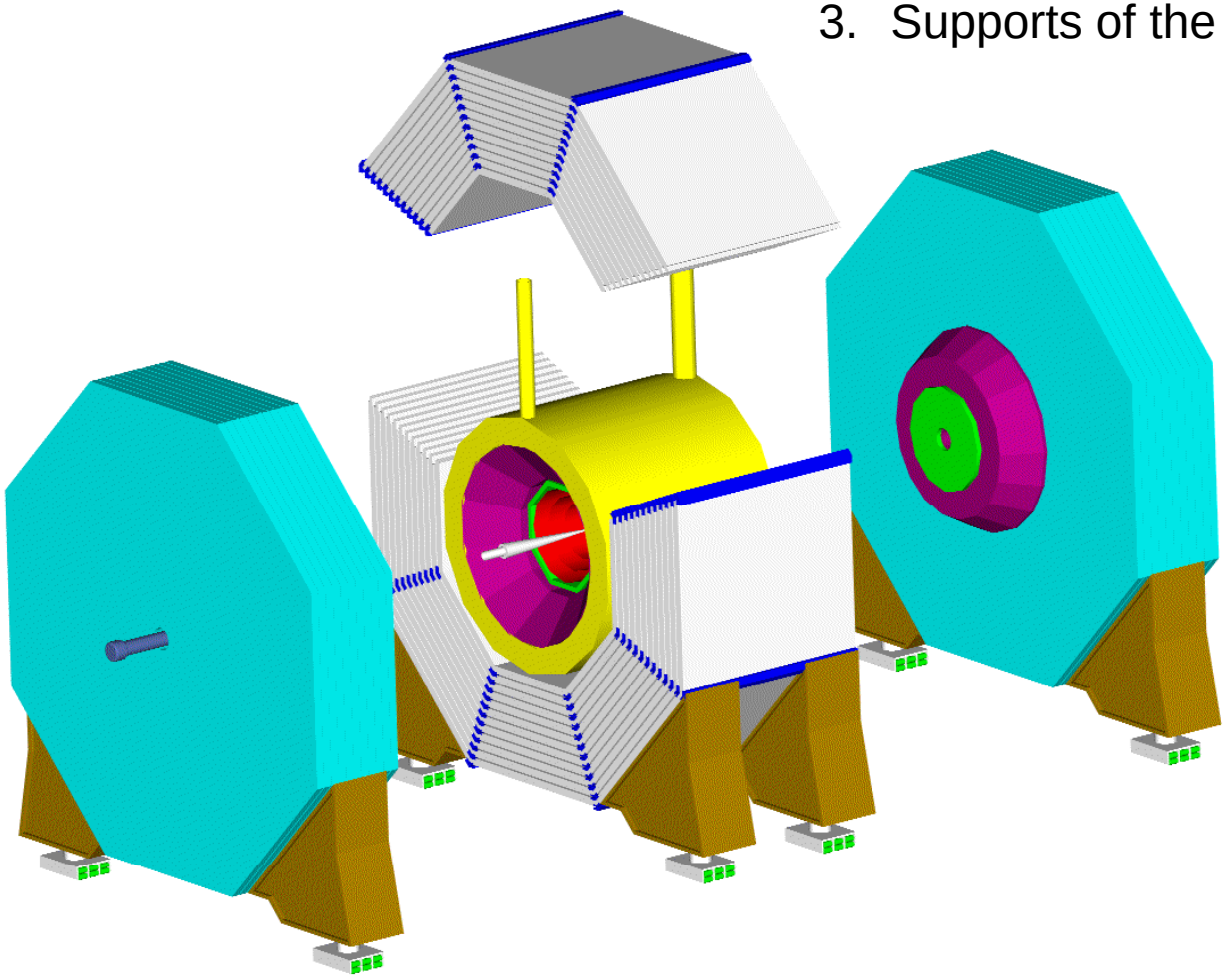
Max deformation ~ 4 mm at middle top



Additional features to be studied:



1. YB Horizontal splitting for the solenoid installation/extraction
2. Space for the chimney(s)
3. Supports of the doors



Support of the Magnet Cryostat

or….decoupling the iron deformation from the tracker

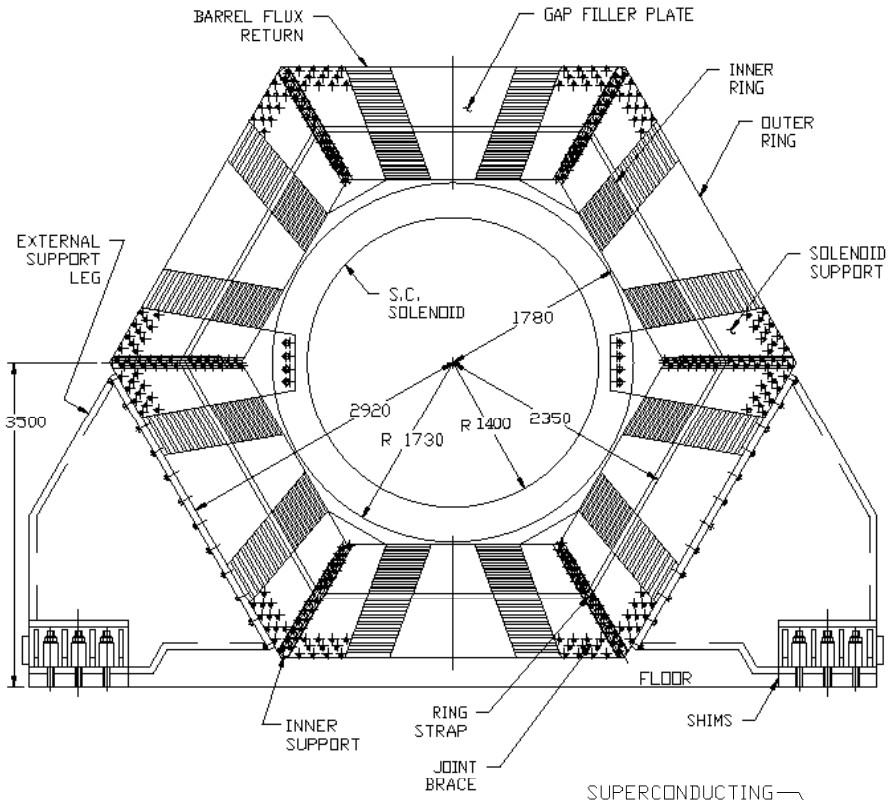
Shall be the cryostat kinematically mounted on the Iron Yoke ?

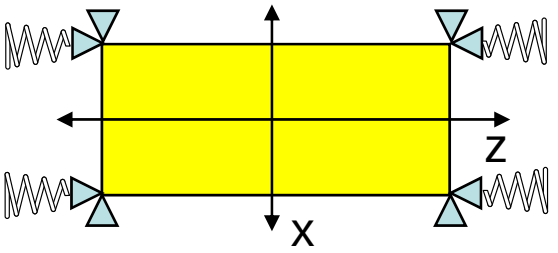
How much kinematics ?

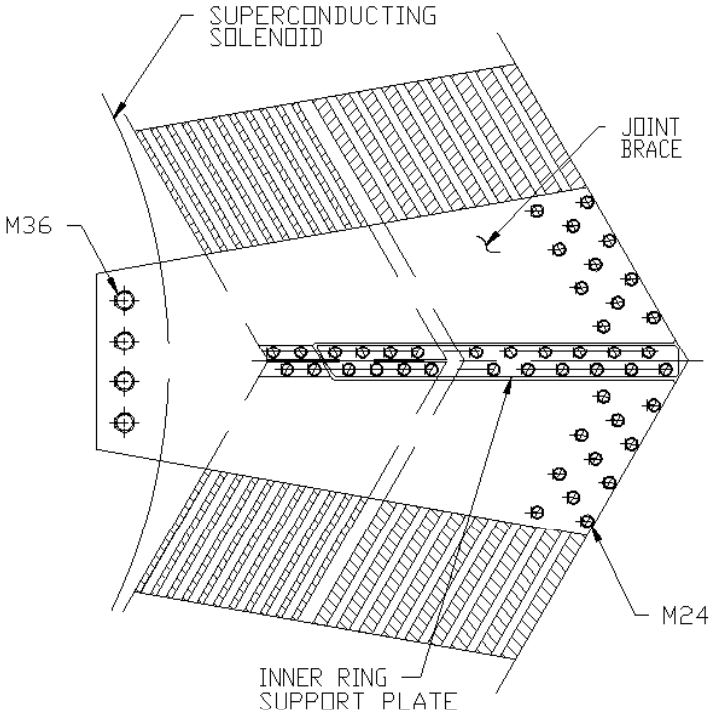
Would be enough to kinematical mount only the tracker ?

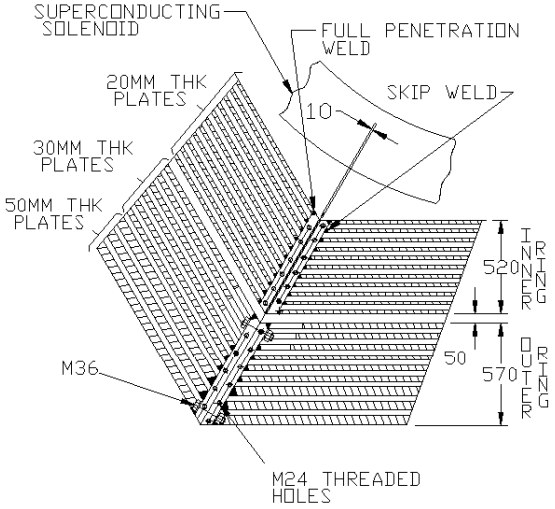
Three examples : BABAR, CMS and ATLAS

BABAR

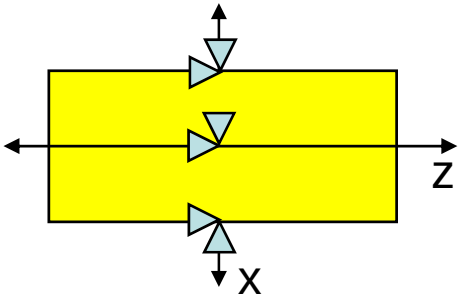

BARREL FLUX RETURN
GAP FILLER PLATE
INNER RING
OUTER RING
EXTERNAL SUPPORT LEG
SOLENOID SUPPORT
S.C. SOLENOID
1780
2920
R 1730
R 1400
2350
3500
FLOOR
INNER SUPPORT
RING STRAP
JOINT BRACE
SHIMS

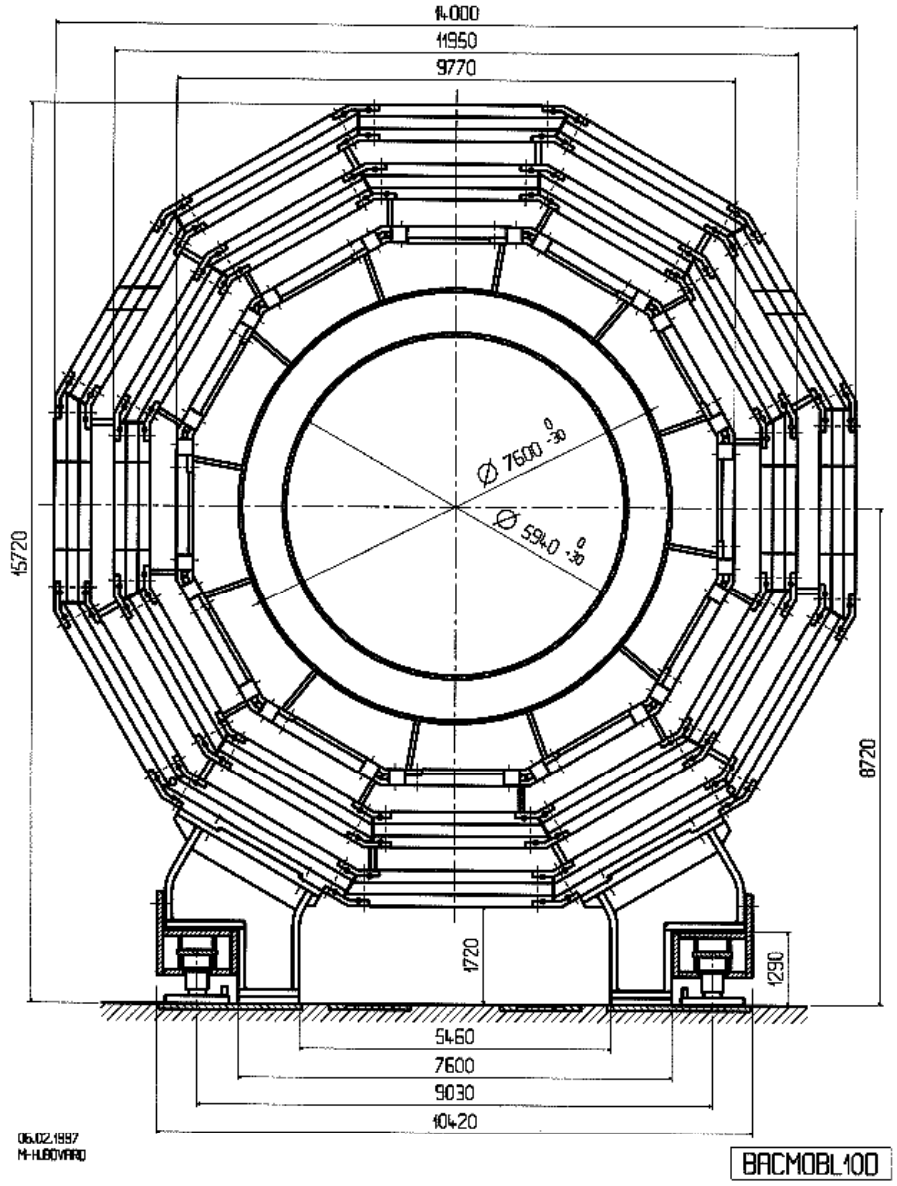

Z
X

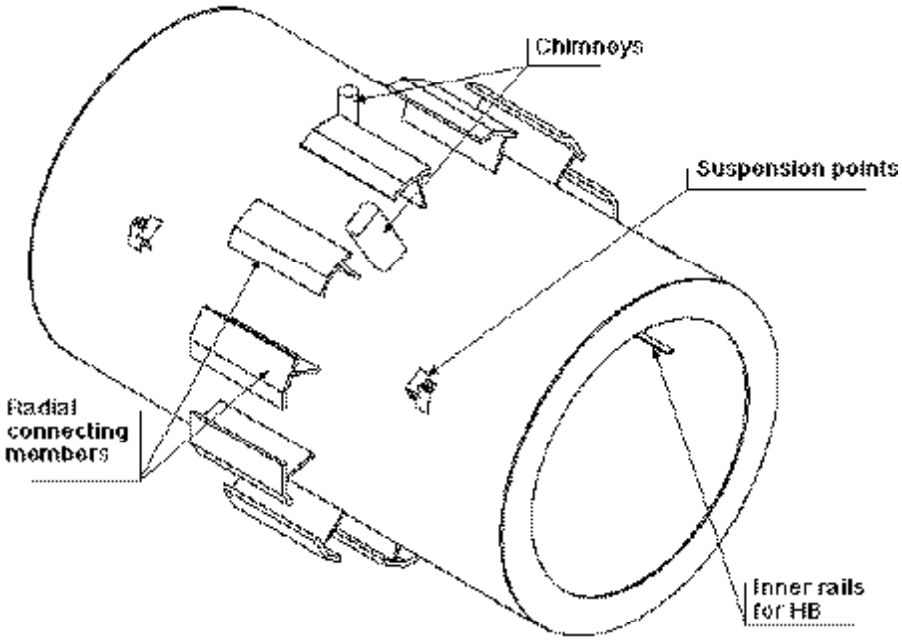

SUPERCONDUCTING SOLENOID
JOINT BRACE
M36
M24
INNER RING SUPPORT PLATE


SUPERCONDUCTING SOLENOID
FULL PENETRATION WELD
SKIP WELD
20MM THK PLATES
10
30MM THK PLATES
50MM THK PLATES
520
INNER RING
50
570
OUTER RING
M36
M24 THREADED HOLES

CMS


Z
X


14000
11950
9770
15720
8720
1720
1290
5460
7600
9030
10420
06.02.1997
M-HUBOYARD
BACMOBL100


Chimneys
Suspension points
Radial connecting members
Inner rails for HB

ATLAS

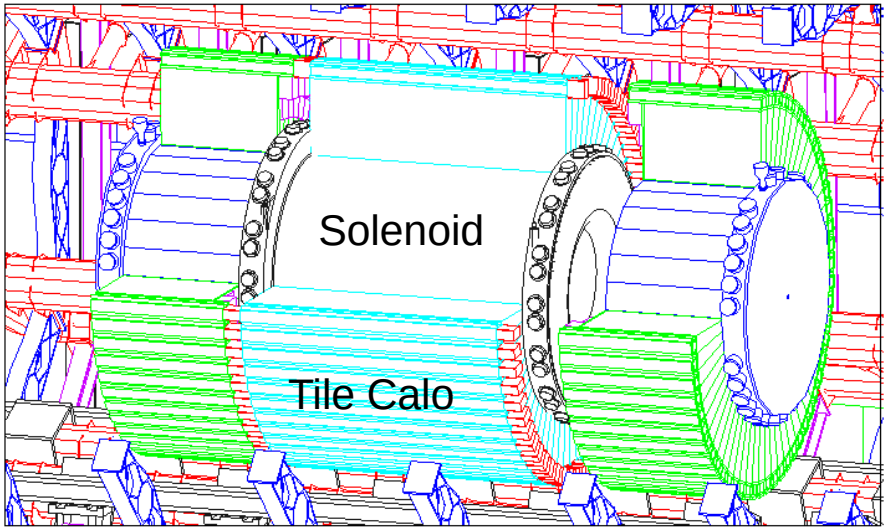
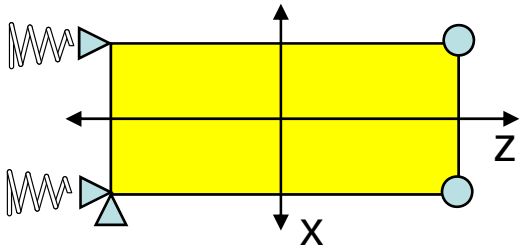
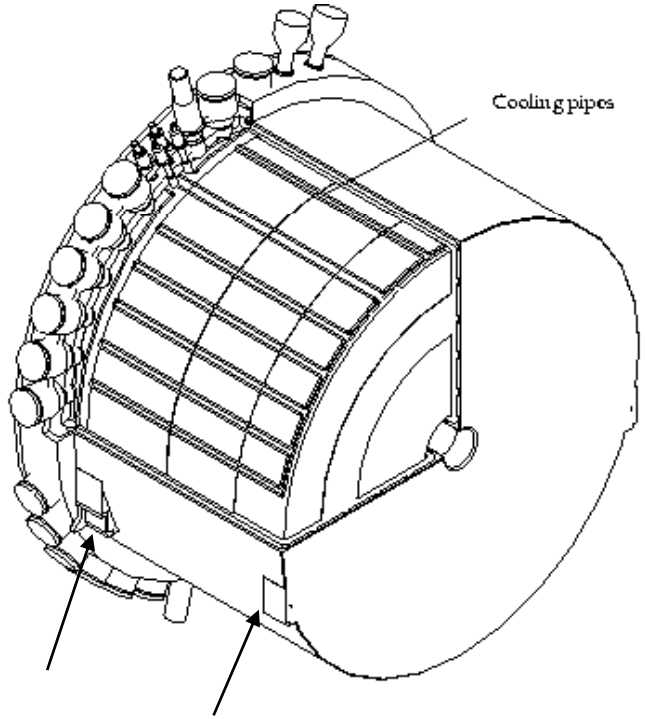


Figure 4-1 View of the calorimeter system in ATLAS. Visible are the three Tile Calorimeter assemblies -the central barrel and 2 extended barrels. Each assembly is built from 64 wedges (modules).





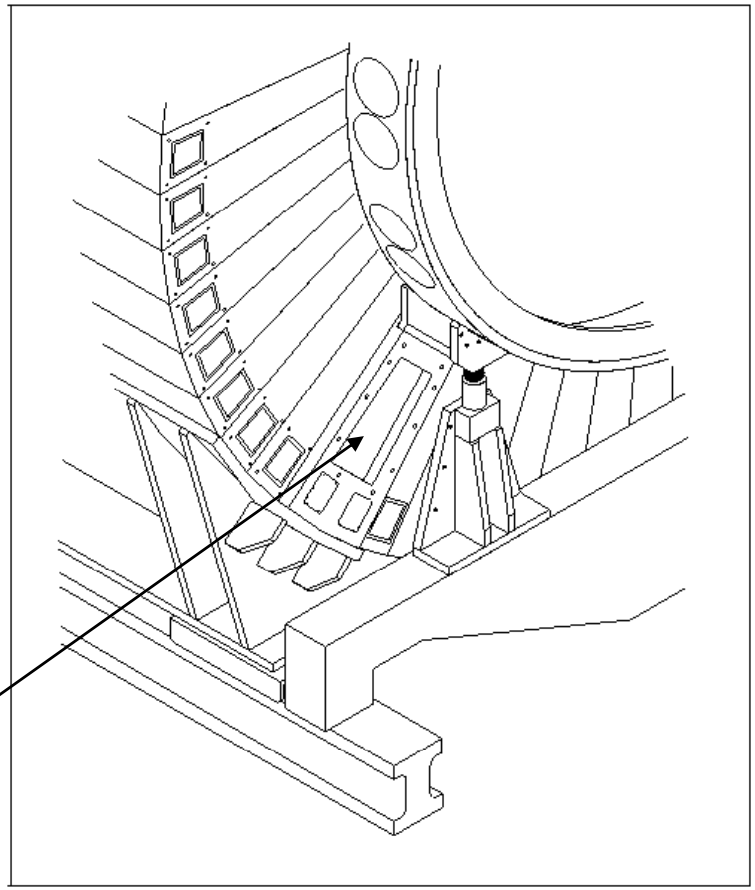
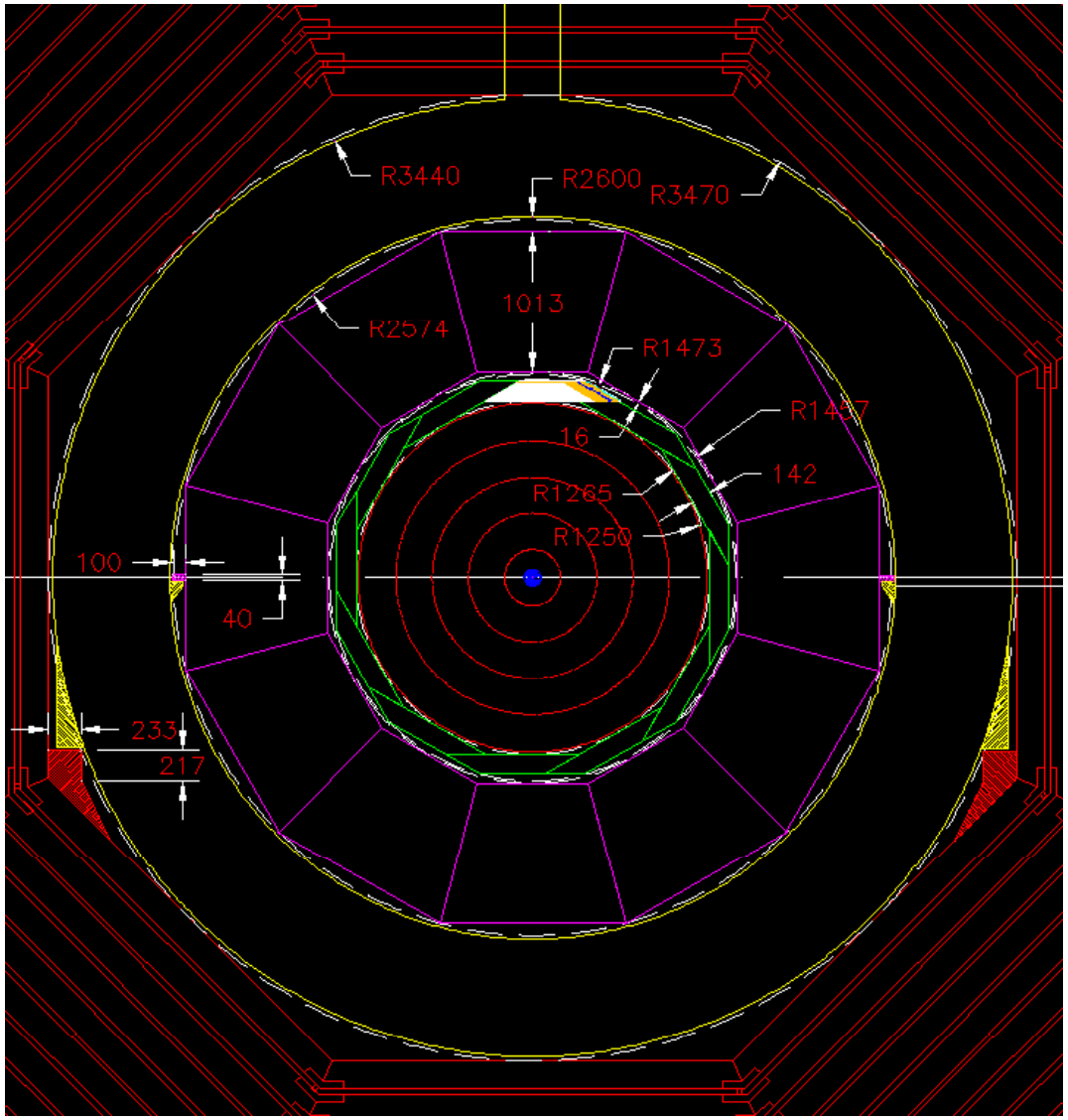
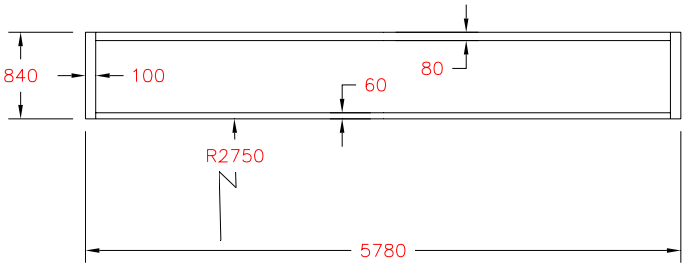


Figure 4-15 The cryostat is supported by the Tile calorimeter at both ends.

Support of the Solenoid on the SiD Iron Yoke



Gravity load is symmetric and deformations contained by the stiffness of the cryostat

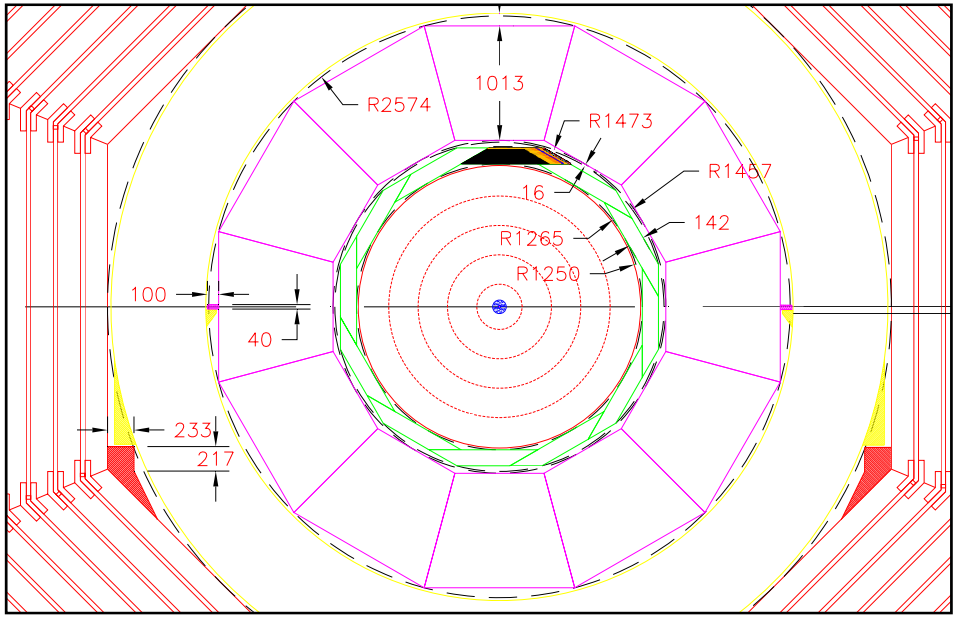


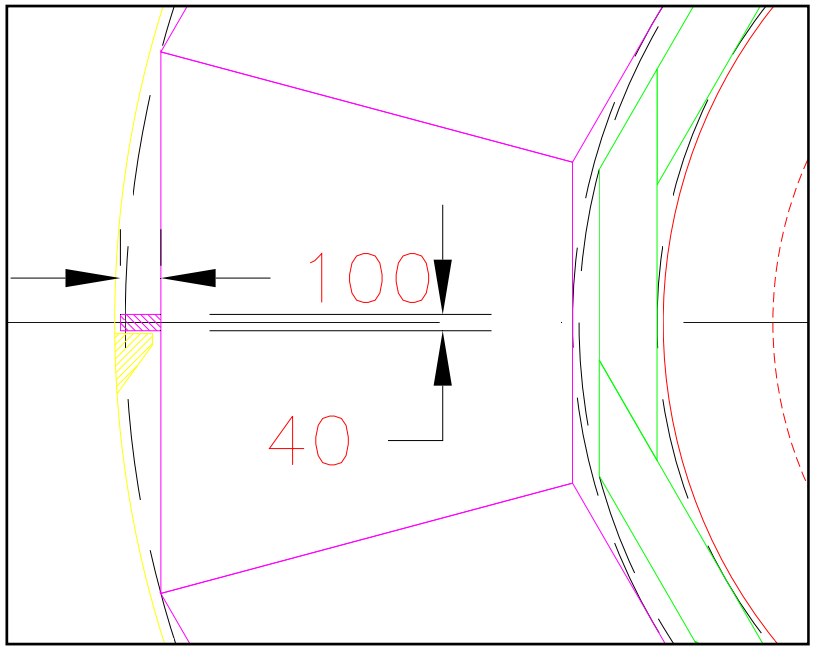
Forces and torques resulting from axial and radial offset, and from angular tilt of the coil

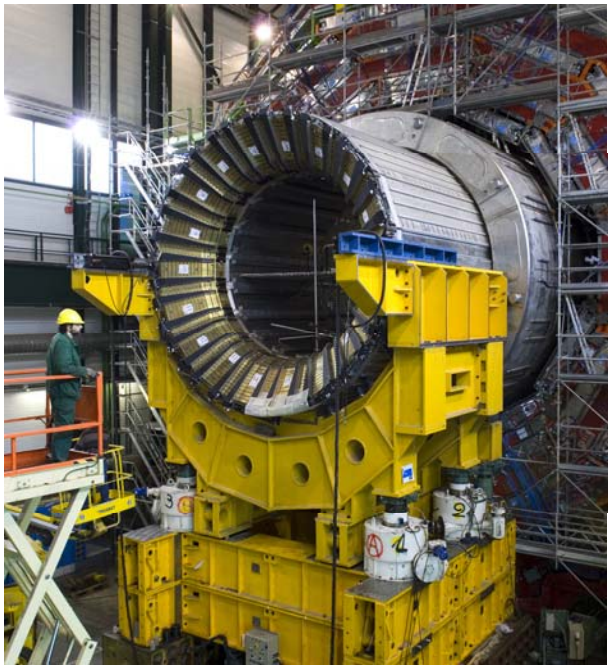
axial displacement (cm)	1	3	10
axial force (kN)	840	2540	8140
radial displacement (cm)	1	3	10
radial force (kN)	380	1130	3740
angular tilt (radian / minute)	1/620 ~ 5.5 '	3/620 ~ 16.5 '	10/620 ~ 55 '
torque (kN.m)	2730	8220	27240

(from CMS Solenoid 4T)

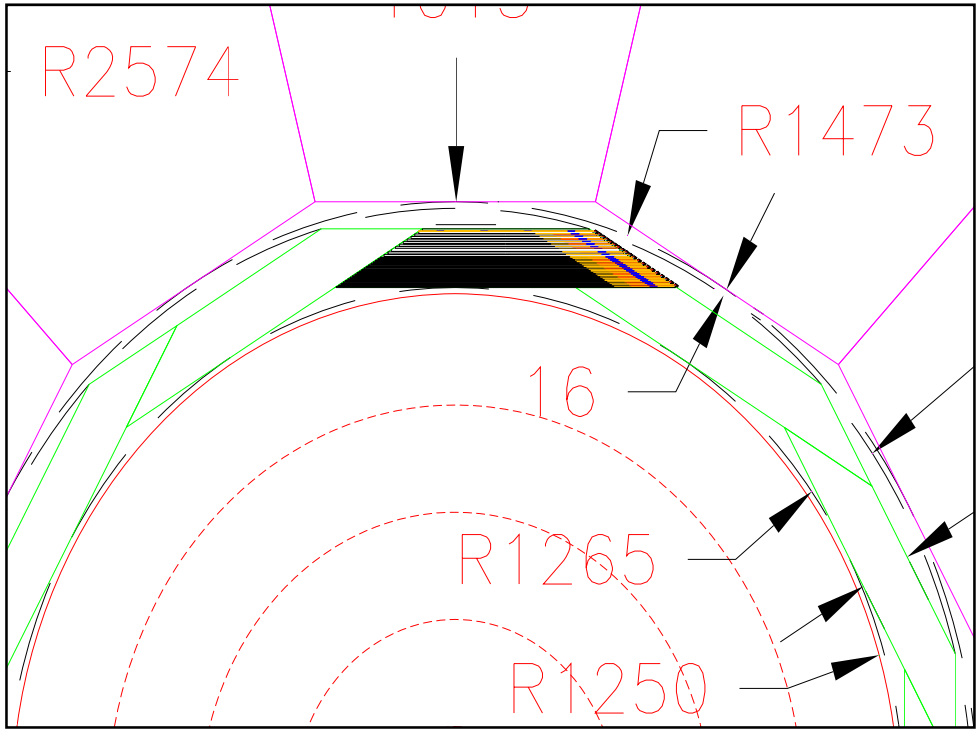
HCAL on the cryostat

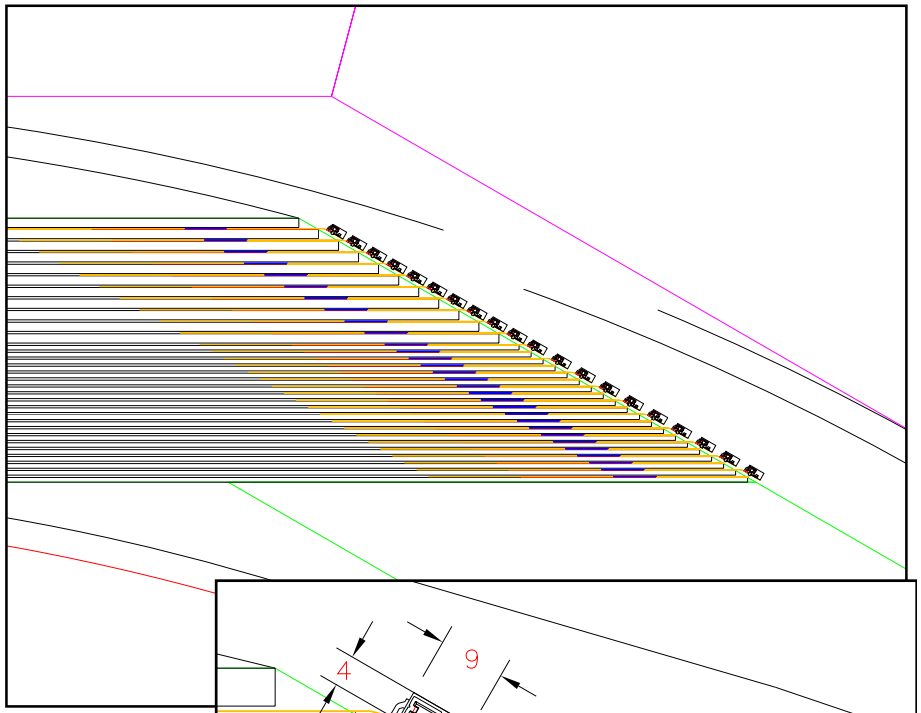


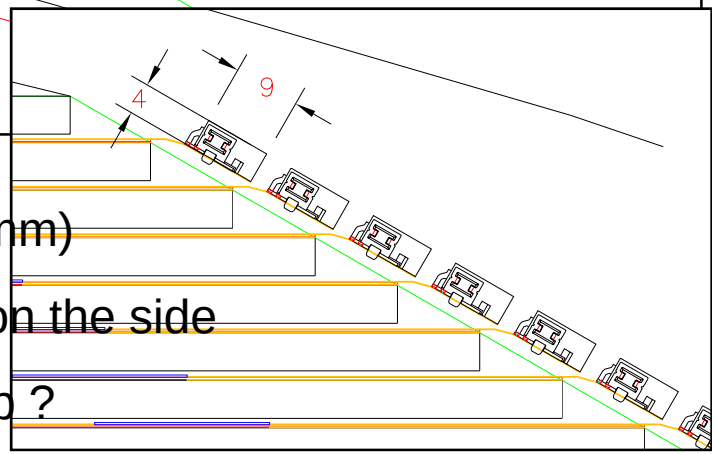




ECAL on the HB







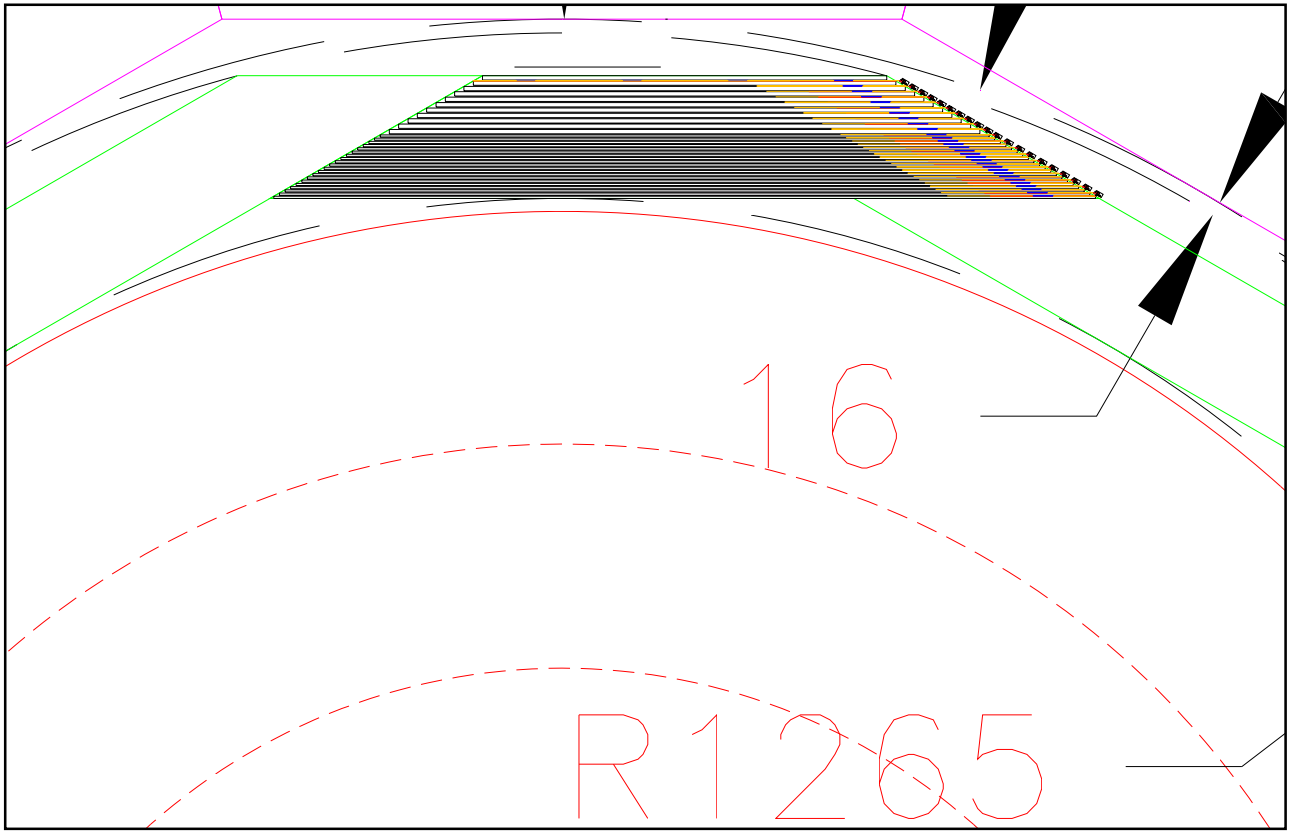
Ecal octants mounted on Hcal with rails (load 10 N/mm)

Gap ~70 mm to Hcal, for the routing of Ecal cables on the side

Physics arguments about the optimization of this gap ?

Design of Si/W Ecal in progress : kapton connectivity and cable concentrators in a very small space

Tracker/Ecal interfaces

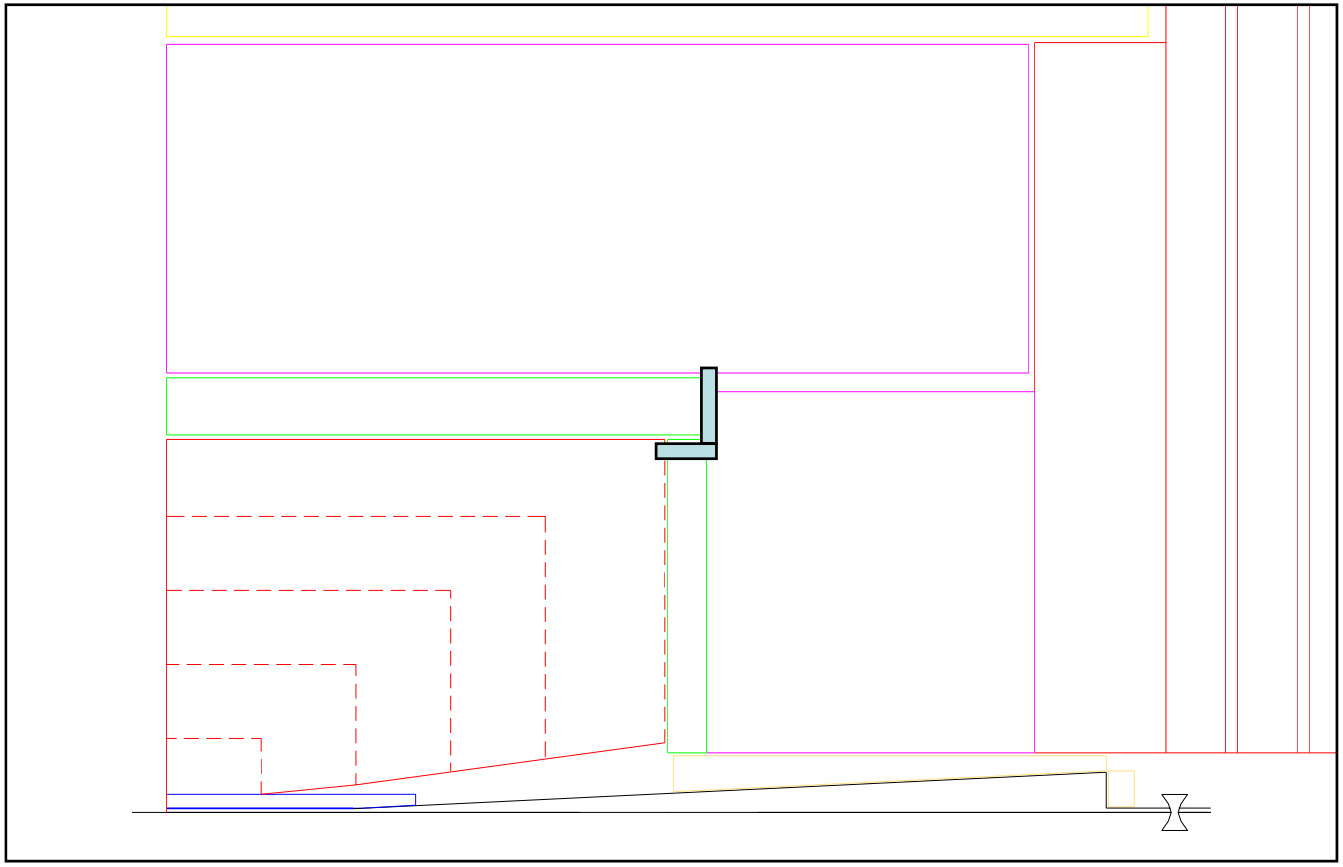


Do we need a tracker support envelopes ? Strcutural, thermal or enviromental…

Which are the temperature requirements ?

Gap between Tracker and Ecal the smallest, I guess.

Tracker support

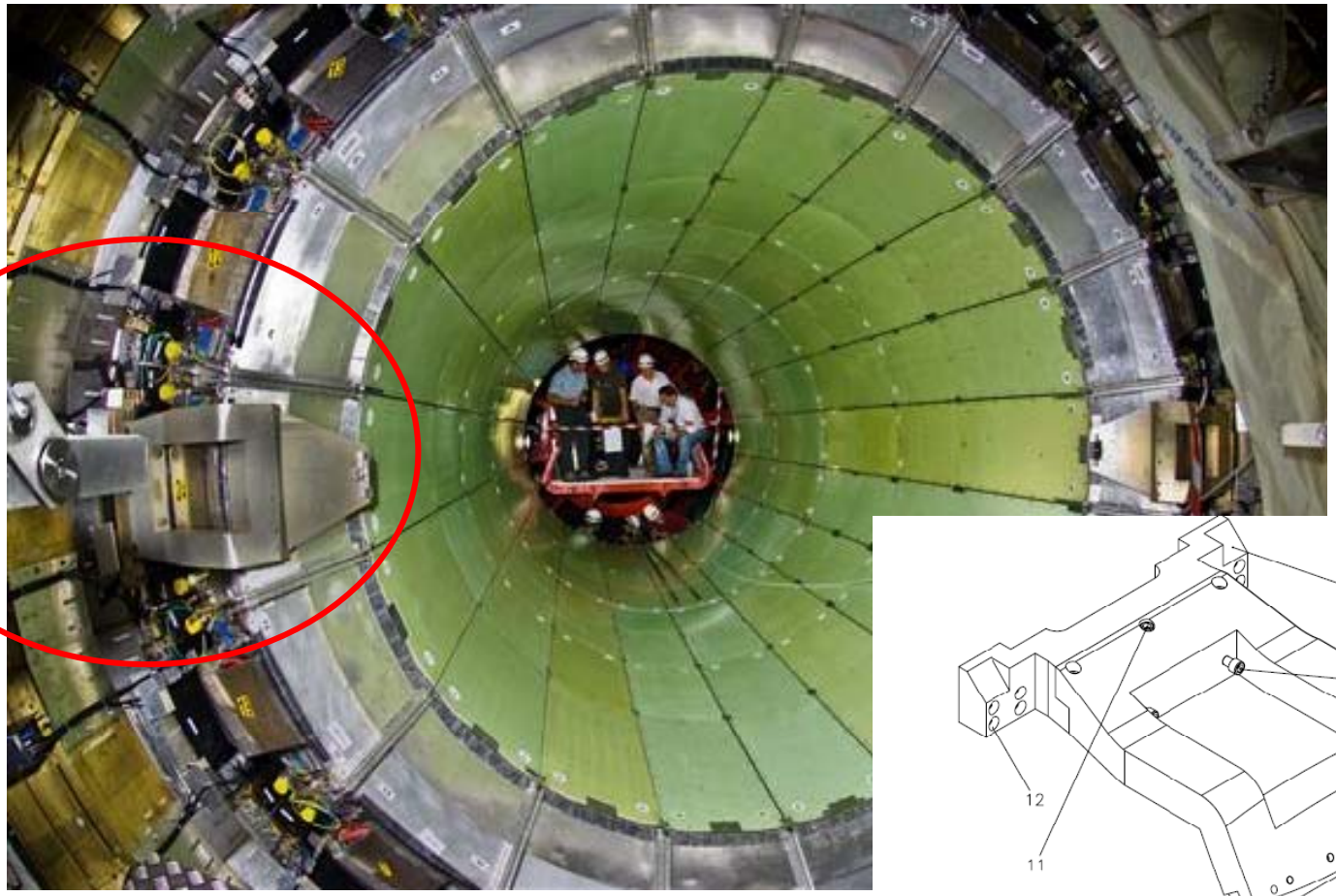


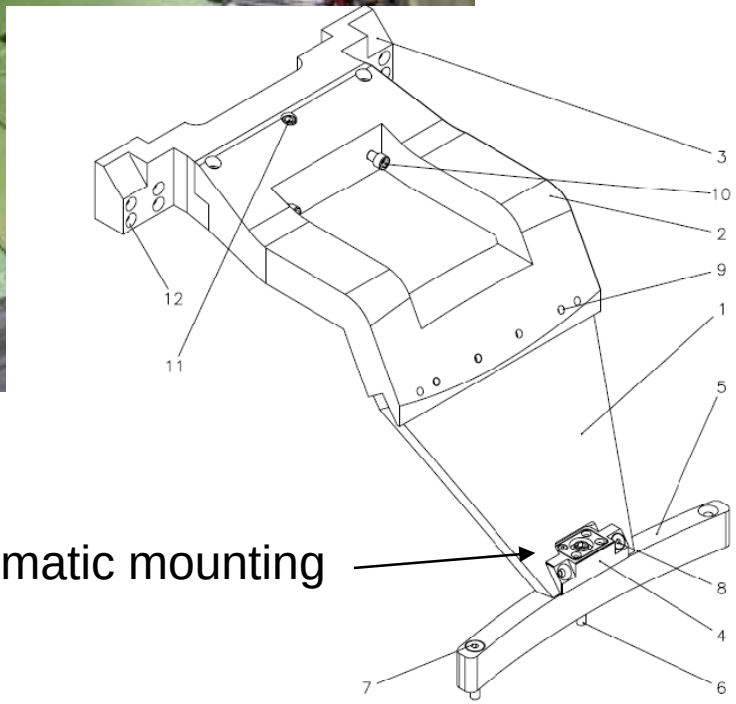
Compared to Ecal, Hcal offers more stable support points for the tracker

Ecal design and technology are peculiar and they should not be involved in the issue of the tracker supports

In the present SiD layout, one need a crack between endcap and barrel geometry to reach the Hcal from the Tracker

Tracker support





Kinematic mounting

Integration topics to be next addressed :

1. VXD integration and supports
2. Beamppipe supports
3. Forwrad region, i.e.e lumical, mask etc.
4. QD0 integration and supports on the doors