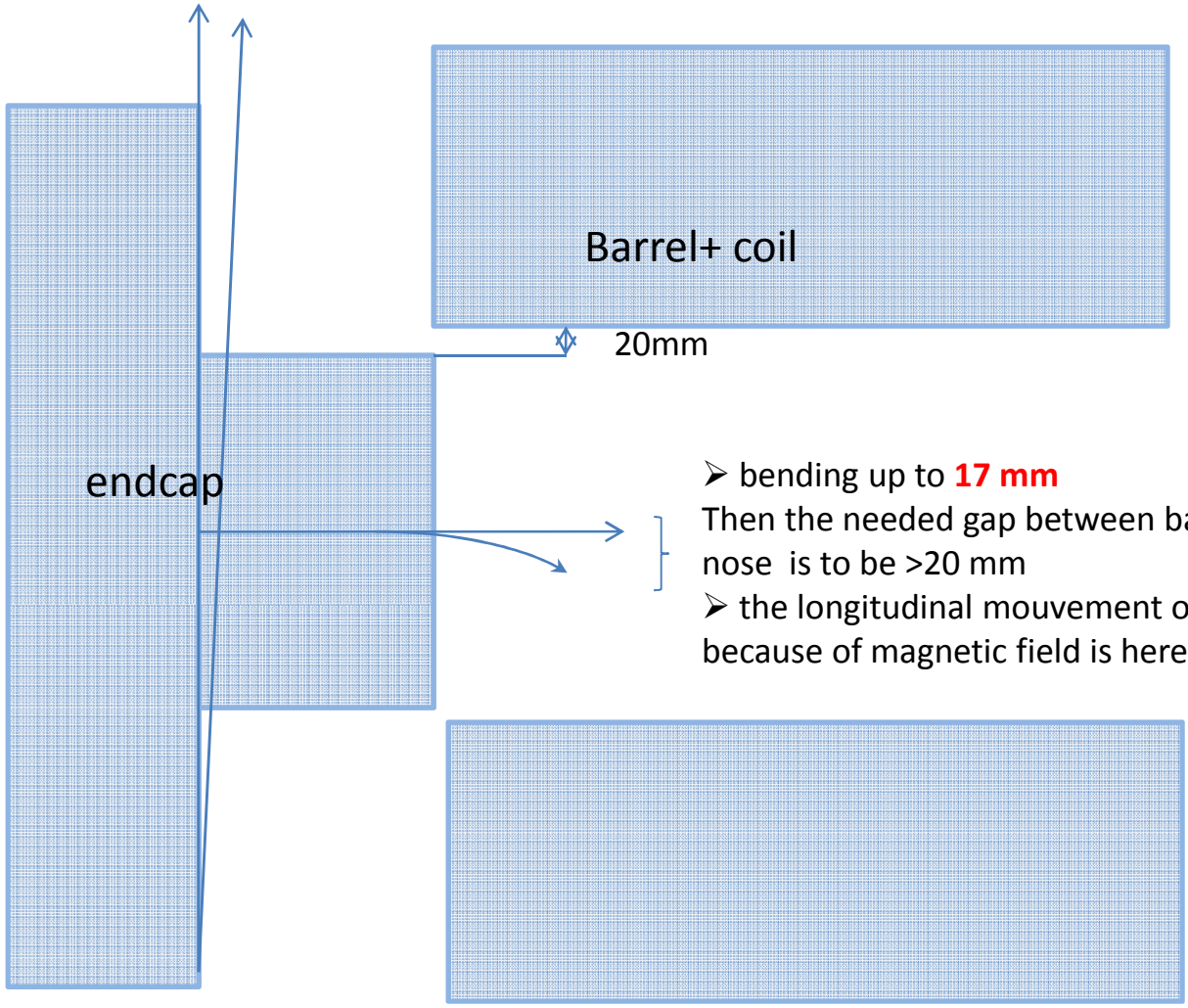
What's new at LAL-LLR (MDI issues)

M.Jore, C.Clerc

- Visit at CMS
- Forward detectors meeting at LLR
- Vacuum in Beam pipe, first LAL results

Visit at CMS (1) Endcap deformation



- bending up to **17 mm**

Then the needed gap between barrel and Calo nose is to be >20 mm

- the longitudinal mouvement of the nose because of magnetic field is here of **17** mm

✓Vertical deformation ≈**3 mrad** , i.e. 45 mm at 15 m

✓Possible lateral misalignement : **13 mm**

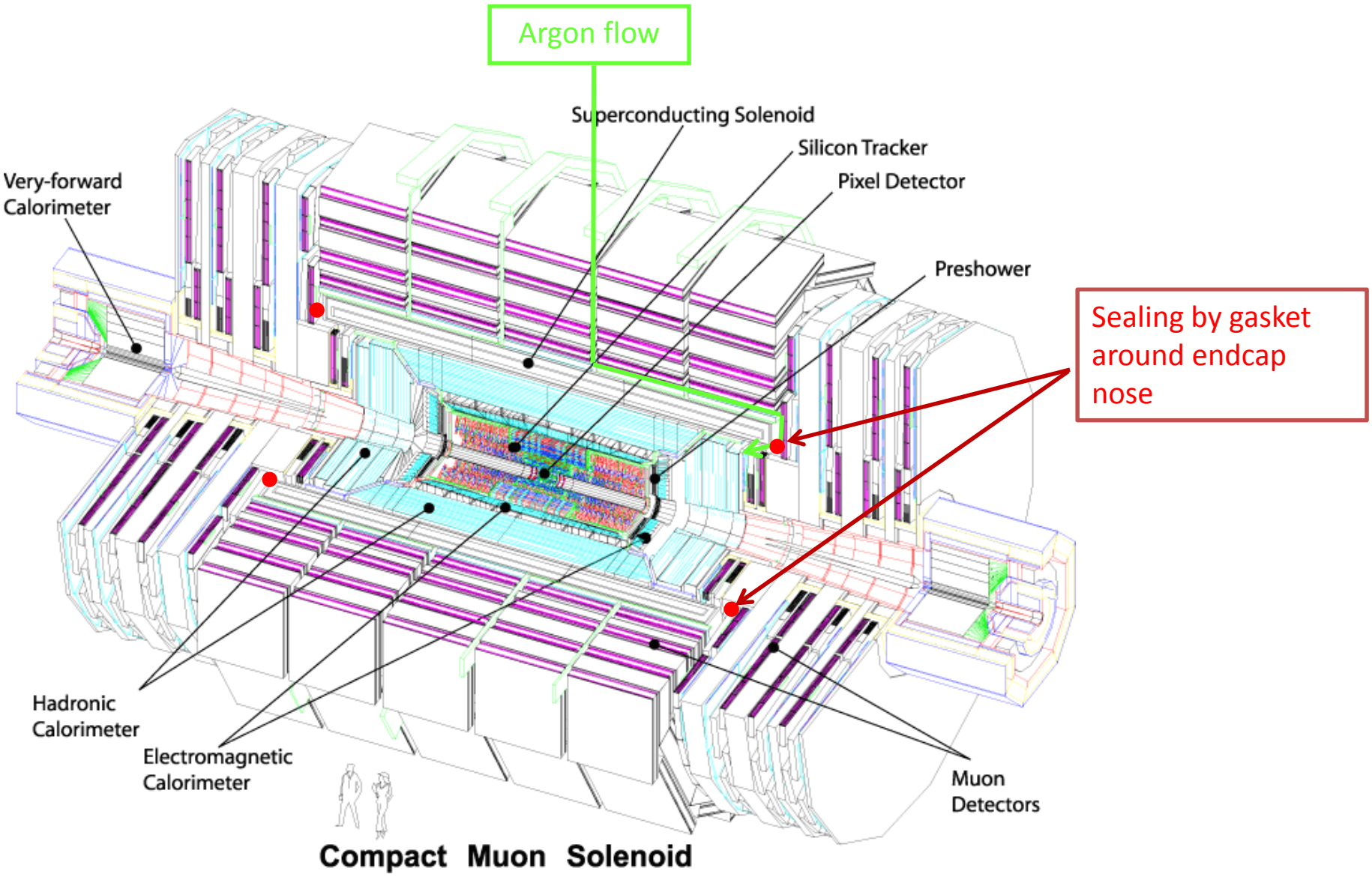
During the closing of endcaps , the position is controled by laser monitoring (4 points) / beam tube

Visit at CMS (2) airpads

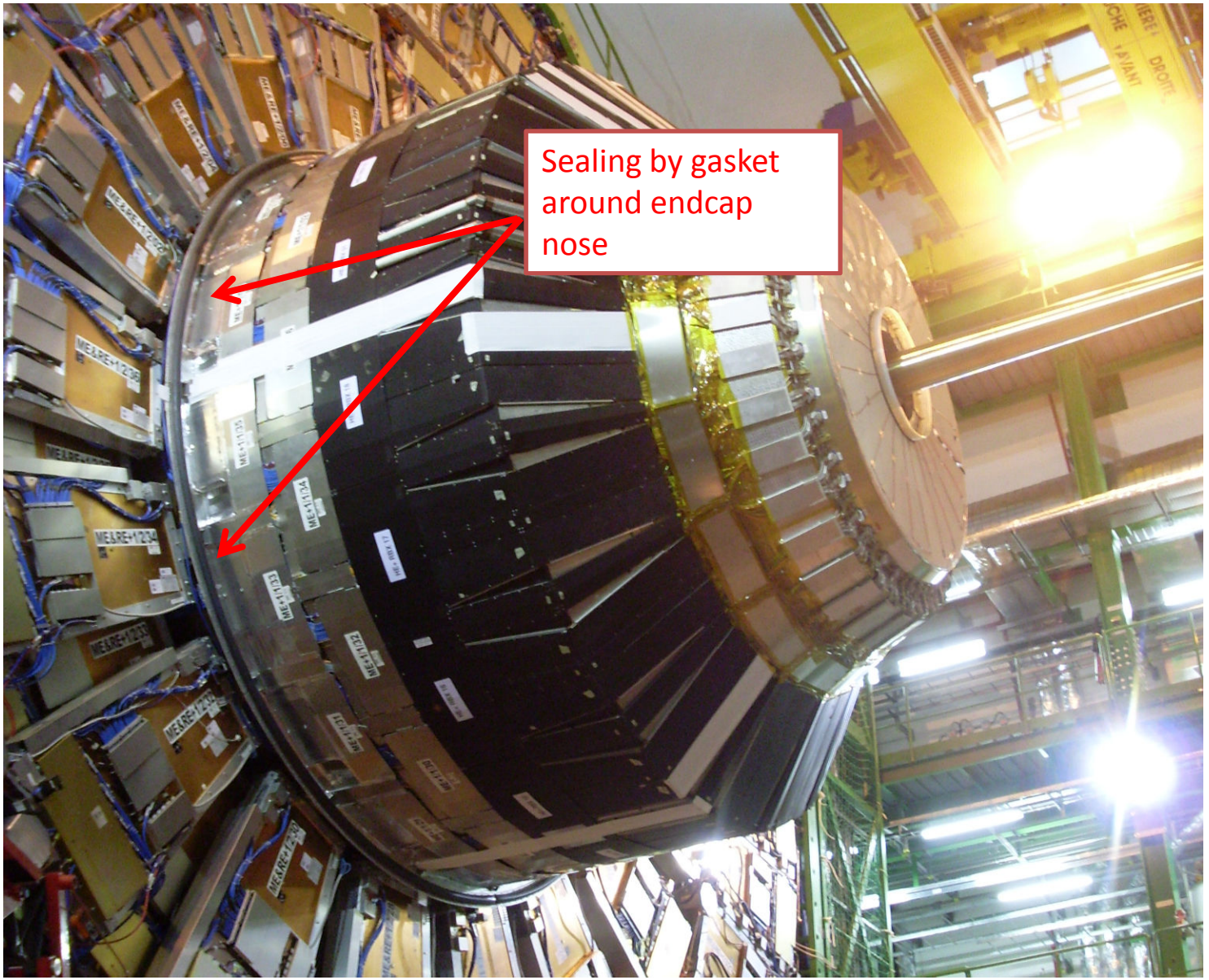
- The ground deformation may be of 5 mm at a scale of 2 m
- The airpads need compressed air supply of 150 bars (40 bars needed to come off)

- The moving speed is constant (no slowing down when close to contact)
- Time needed to close one side : 1, 5 days
- High pendular effect during lowering down in pit , so lowering times of each pieces : 12 h .

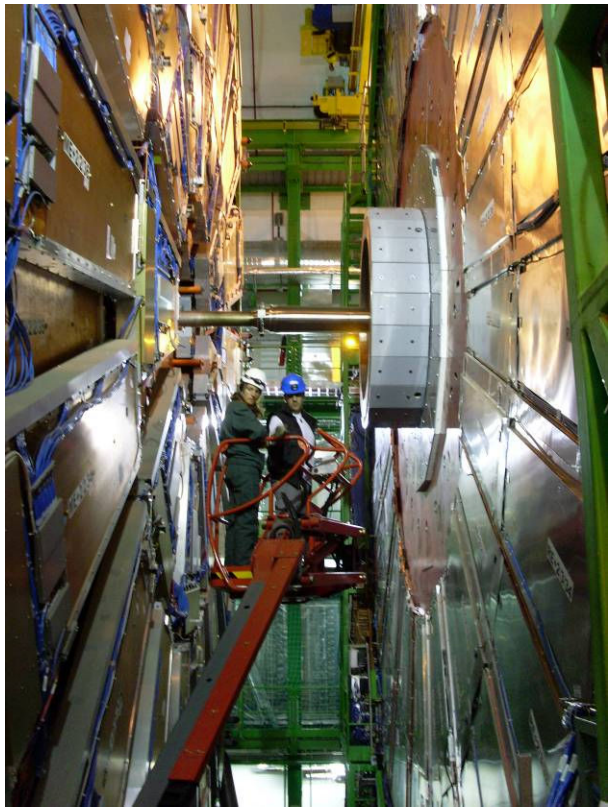
Visit at CMS (3) dry gas



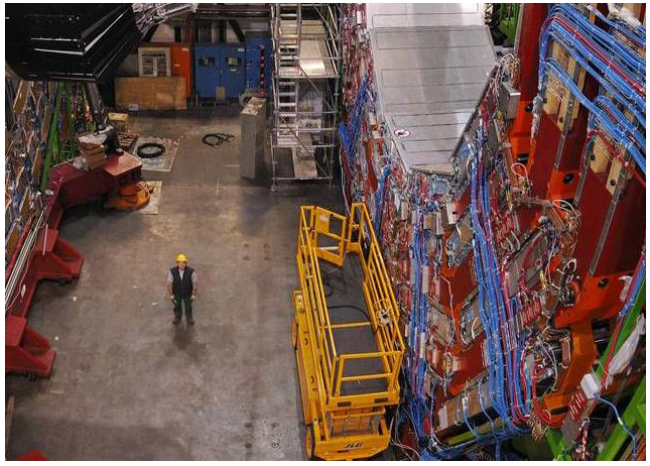
Visit at CMS (4) dry gas



Visit at CMS (5) tooling



- Small size cradle elevator (used for small interventions) :
  - Needed place between endcap and barrel : 1.6 m
  - The overall size on floor of engine is 1.3 m
- Crane truck (allowing heavier operation up to ≈full height) :
  - 1.5 m on floor, 2 m needed for motion



+ On surface :
Scaffolding
Fixed and moveable

Forward detectors meeting with S.Schuwalov, W.Wierba **(1) Lumical**

Modifications on Lumical :

• Reduction out the outside diameter from 250-260 down to 215-220 by the electronic inside the W sandwiches. Then a layer was W3.5+ Si 1.5= 5mm and becomes W3.5+ Si 1.5+ elec 1= 6mm.

•The consequence is the increase of the thickness of the Lumical 150mm →180mm, may be a problem regarding to the flange (its position can be moved outside of the detector).

•The Lumical will be fixed to the front plate of LHCal

Reduce also the W outside active region.

•Cooling: use W to draw the heat out of the detector to the edge. The total power dissipation of the Lumical should be in the range of 20-50W

Initial alignment requirement :

•1mm in xy

•10 mm in z (between the two lumical)

•1mm regarding to the beam pipe.

Position measurement requirement :

•1/2mm in xy

•60 µm in z (between the two lumical)

•4 µm inner radius. This could be guaranteed by construction and checked online by FSI system.

Alignment system possibilities :

•Laser beams in the beam pipe (4 windows of 2mm of diam per side at least)

•Introduction of a tube in the Fdet carbon support structure with vacuum

•Reference point on QD0, and thus what is the accuracy of Monalisa system (< 10µm?)

Space for cables coming from the inner part.

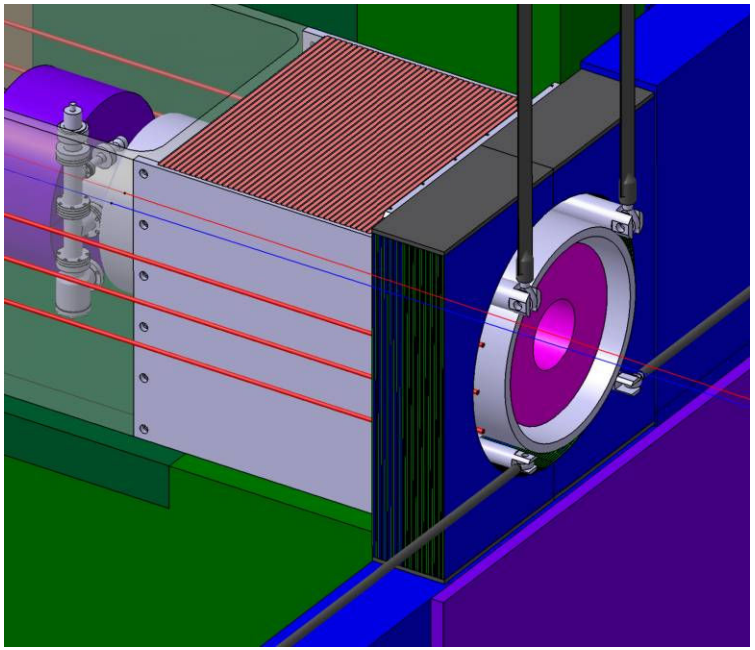
•The way out is now on the top and bottom of LHCal instead of its side.

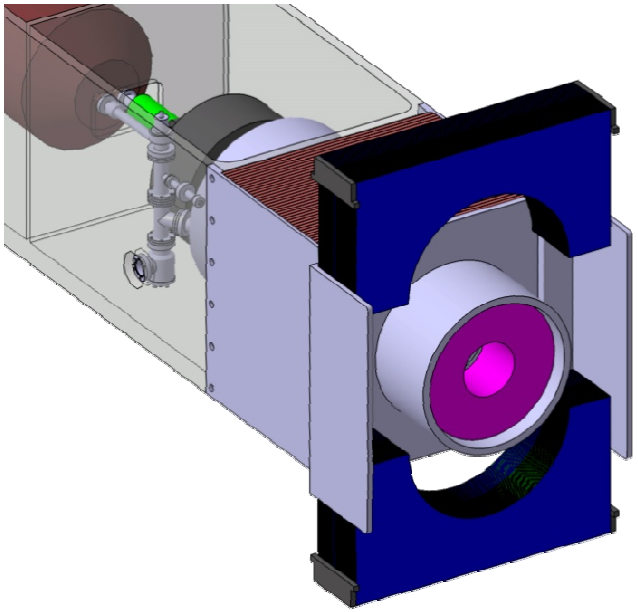
•The patch panel should be close to the vacuum pump, on the back side of the LHCal.

•The Ecalring and lumical opening (or mouting) procedures are changed. The Ecal ring will be split horizontally, and the Lumical vertically. Thus, consequences on the place of tension rods

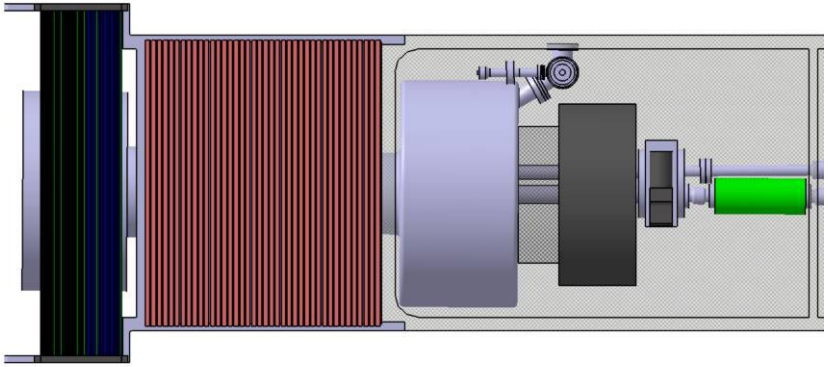
• Rout (active)=150; Rout total=200
•Need of **10 cm of graphite in front of the beamcal** with Rout=Rout active of Beamcal. so as in front part the graphite will be in close contact with the first layer, the total thickness of Beamcal+Graphite will be 170+80=250 mm
•If a pair monitor is foreseen, then the graphite thickness could be reduced to allow place for this pair monitor.
•The Gauge situated between pump and beamcal will have to be moved.
•The change from previous design is that the place where the single beam pipe is separated in two is now in the entrance plane of the graphite and no more of the Beamcal itself.
•The beamcal is supported from below with feet

•P=10 to 15 W so " a priori " no cooling needed but may be necessary for isolation of other subdetector.





Less dead material
Lower gap
Better cables paths
Stiffer support for tension rods



Vaccum in beam pipe(1)

Constraint on vacuum of 1 nT (10-9 mb) in central position (beampipe)

Vacuum
……. One analysis [6] of the effect of beam gas interactions on detector backgrounds set the required vacuum level at 1 nTorr in the 200m upstream of the IP and 10nTorr in the remainder of the BDS system. This paper did not attempt to specify the maximum permissible vacuum pressure in the 18m zone of the detector itself. It is assumed that each detector concept will investigate this limit and provide a technical means of providing it within the space constraints of their detector design…..(IR interface document)

*And datas from " Technical note for ILD beam pipe "*Y. Suetsugu.

Studies and simulations undergoing at LAL, to evaluate the incidence of the beam pipe shape in central position (cylindrical or conical).

First results are :

- No major differences regarding conductance, which is anyway limited by weak conductance in central part (i.e. inside VTX).
- No need to oversize the pump close to beamcal as long as vacuum limited by conductance
- More results, for next ILD-MDI meeting (Paris, january)