



How to dispose the services in ILD

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Recalling ancient studies like
“Note on the integration of the ILD detector”
by Catherine Clerc & Mathieu Joré March 2009
“ILD integration studies” by M. Joré January 2010
June 2011

...



The following drawings come from the DBD model or from the large model as recently defined.
Nevertheless the discussion applies as well to the small model.



Principle : The subdetectors need to get in their envelopes

- the power at different voltages
- the corresponding cooling
- the needed fluids (gas)
- the controls and commands

They have to get out

- the signals (digitized)
- the monitoring parameters

These have to flow between the other sub-detectors to the outside world once they are assembled but also when they are under test.

The detector parts have to be assembled, fastened but the detector may also have to be opened

The services have to comply with the assembling and opening procedures.

The design and the procedures have to comply with the needs of the services.



A plea



ILD should have solutions for the services as close as possible between the different sub-detectors,

to ensure that,

constituting transverse groups on services could be helpful in view of the scarce manpower

For example:

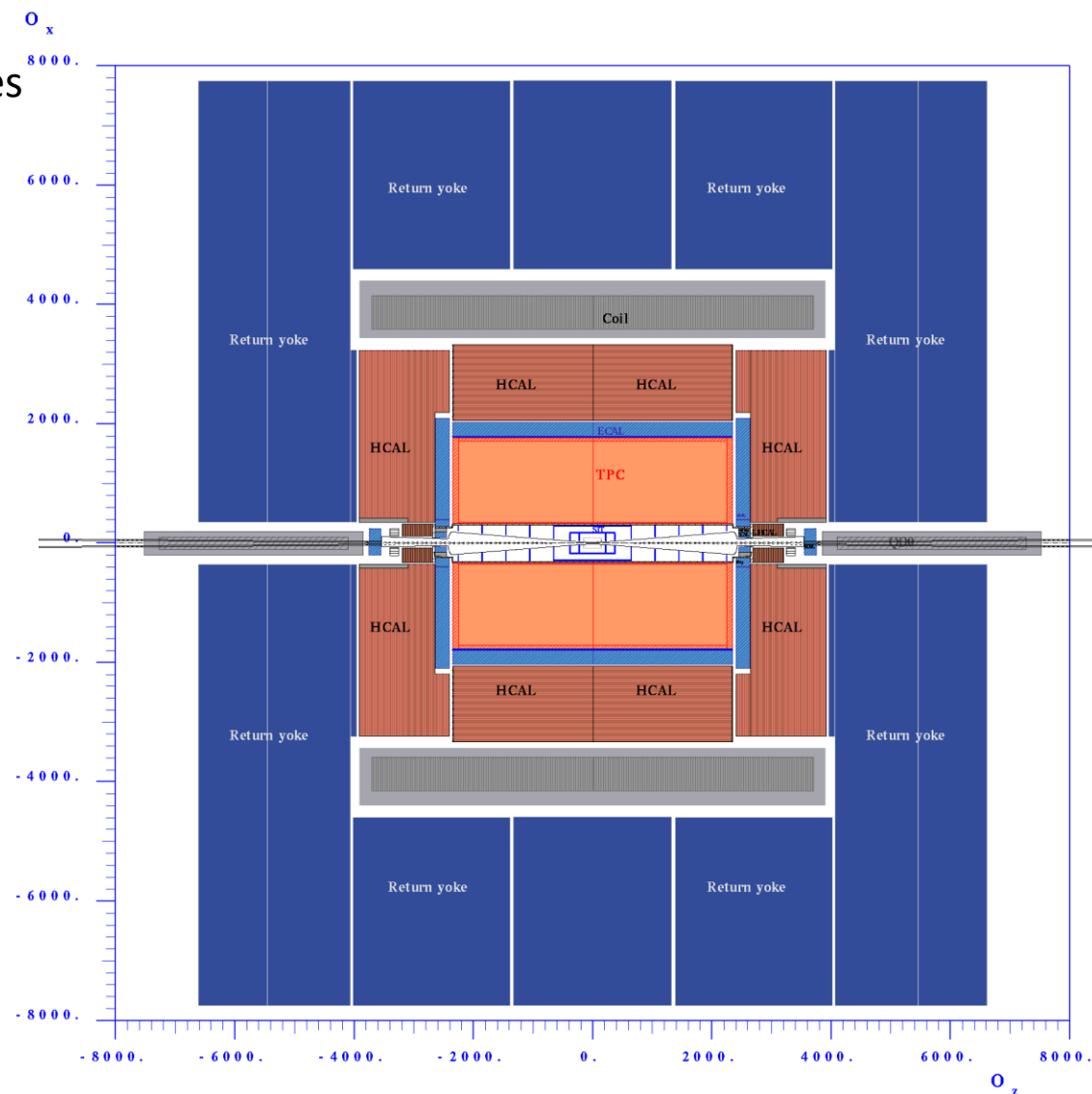
the cooling; it may have to be specific to the sub-detector but not everywhere
the low voltage power supplies may use DC-DC converters, do they have to be different
the data flow concentrators etc.



Paths

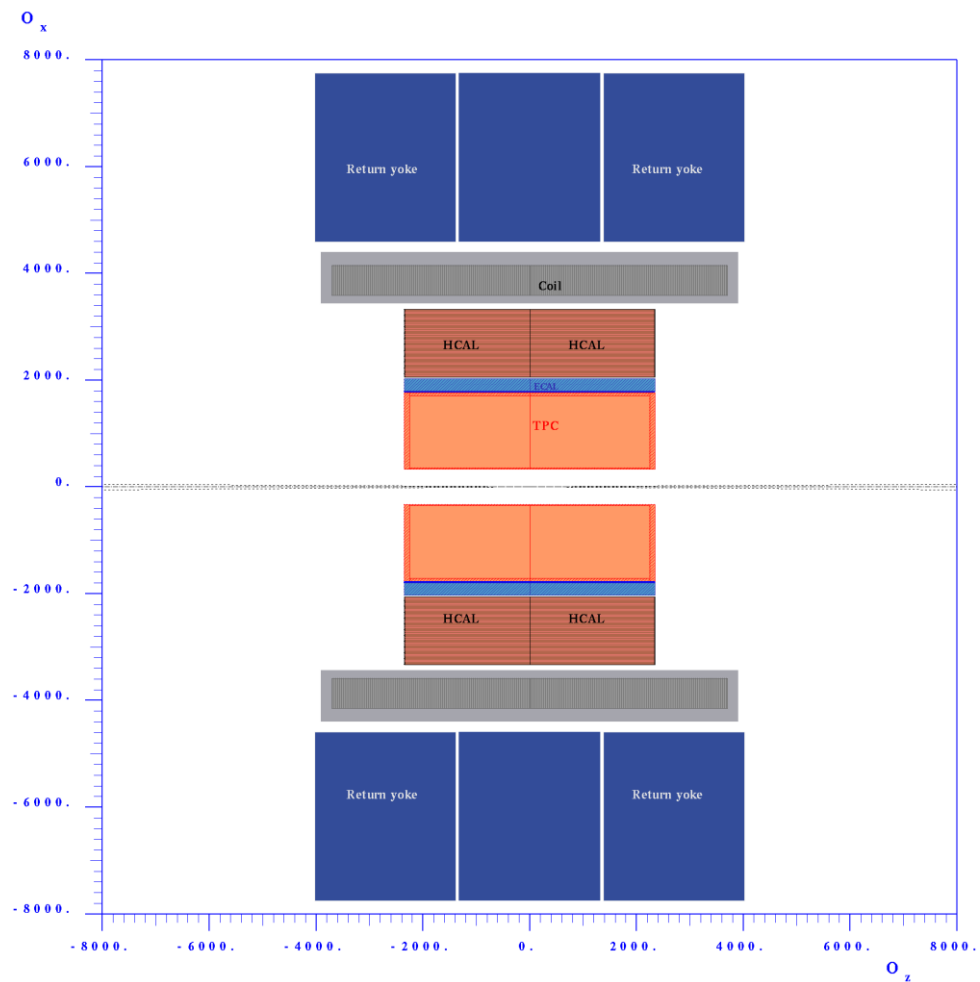
To sketch the path of services we need to recognise the big ensembles of the detector and the way they move: Barrel, end caps
But the barrel yoke itself is made of 3 rings
The forward calorimeters and magnets have two specific beams to support them
The detectors inside the TPC are embedded together with the beam pipe in a cylindrical structure.

The rules are then
that the barrel parts have services running out along the central ring on the barrel
The end cap parts have services along the end caps
The forward systems have services along the beams
The inner detectors may have services linked to the forward beams but more likely running with the barrel.

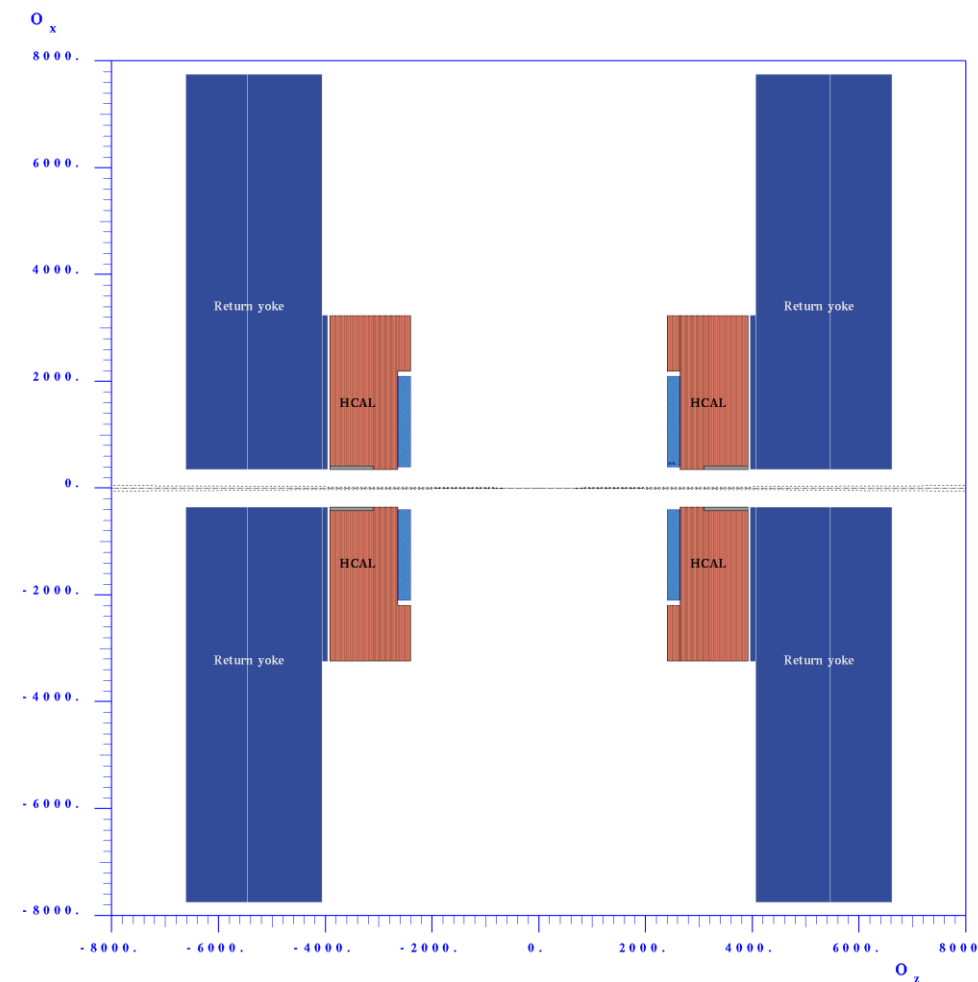




The barrel and the end caps



Barrel elements:
TPC, SET, Ecal, Hcal, Coil, Yoke



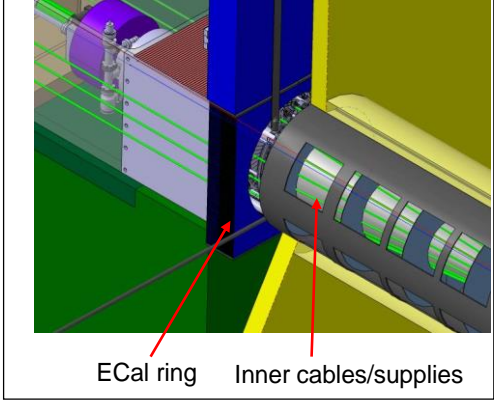
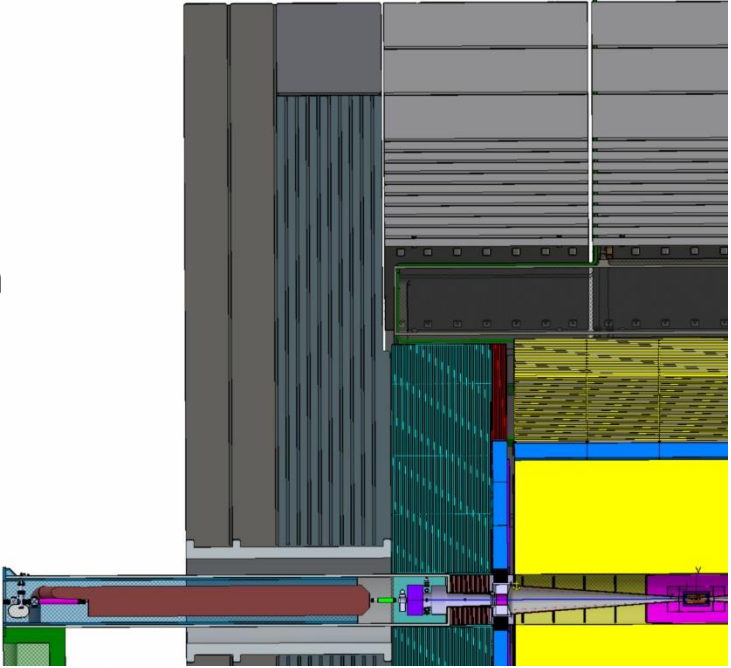
End cap elements:
Ecal, Hcal, Yoke



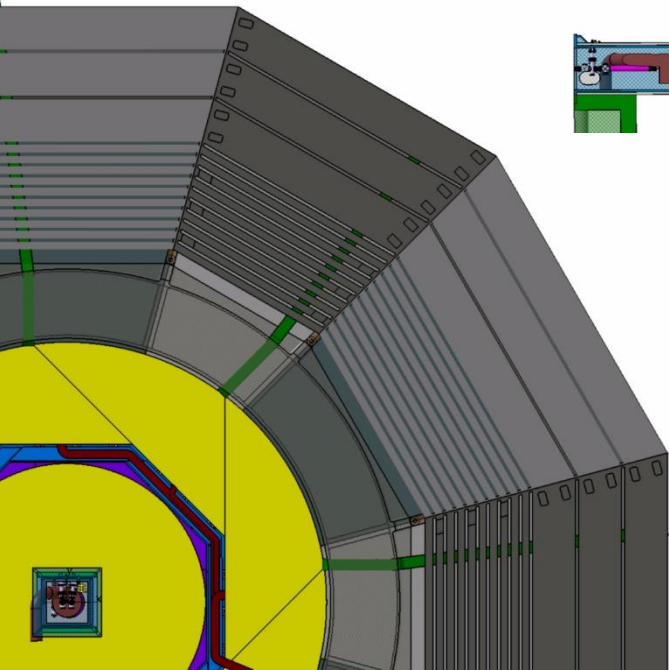
The barrel and the end caps



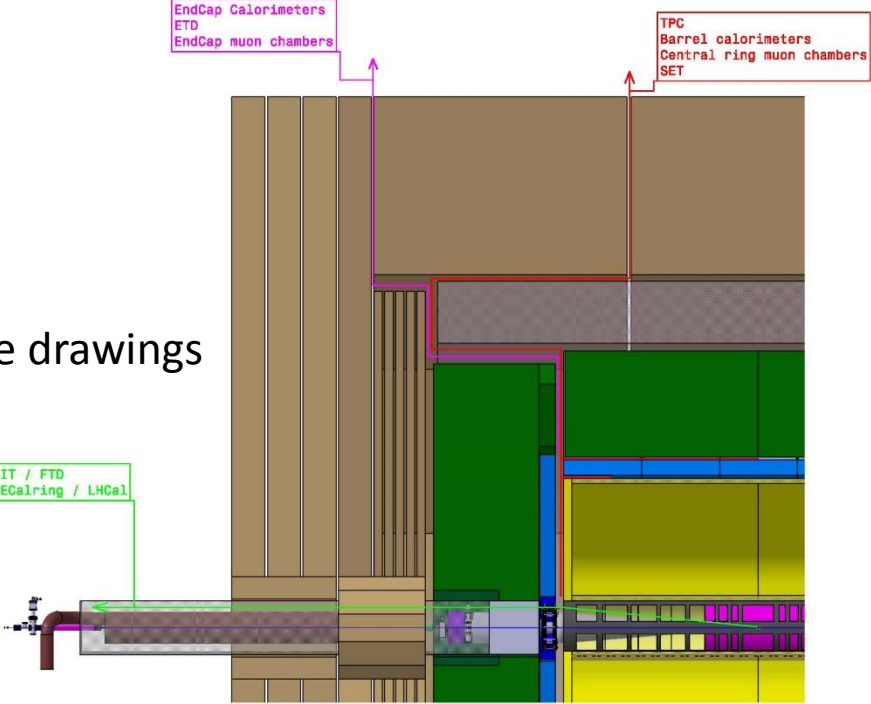
Recent drawings from the CAD model



ECal ring Inner cables/supplies



Obsolete drawings



EndCap Calorimeters
ETD
EndCap muon chambers

TPC
Barrel calorimeters
Central ring muon chambers
SET

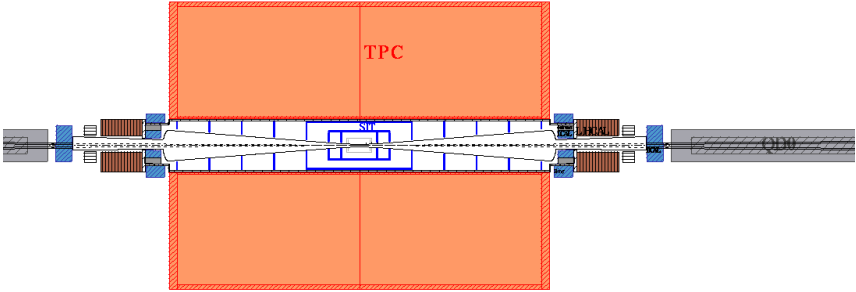
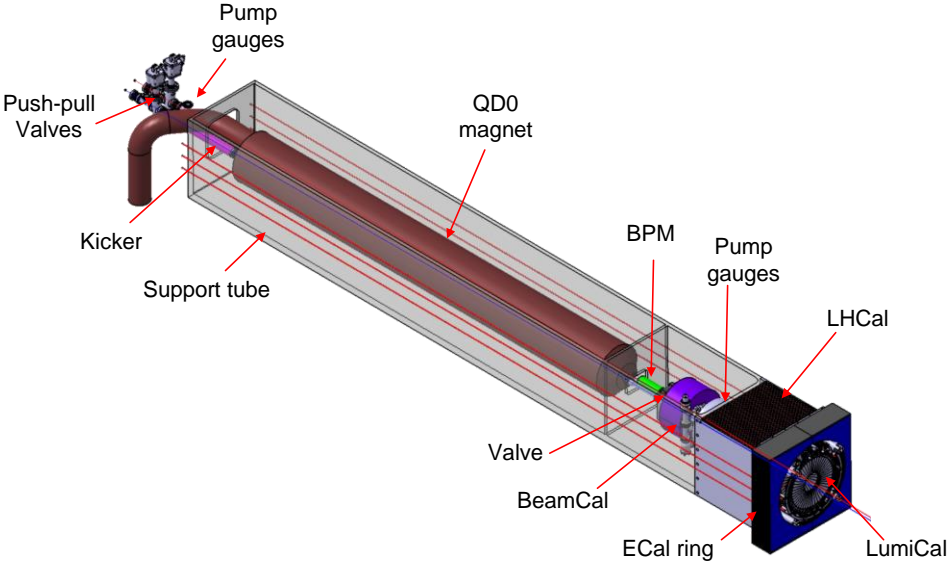
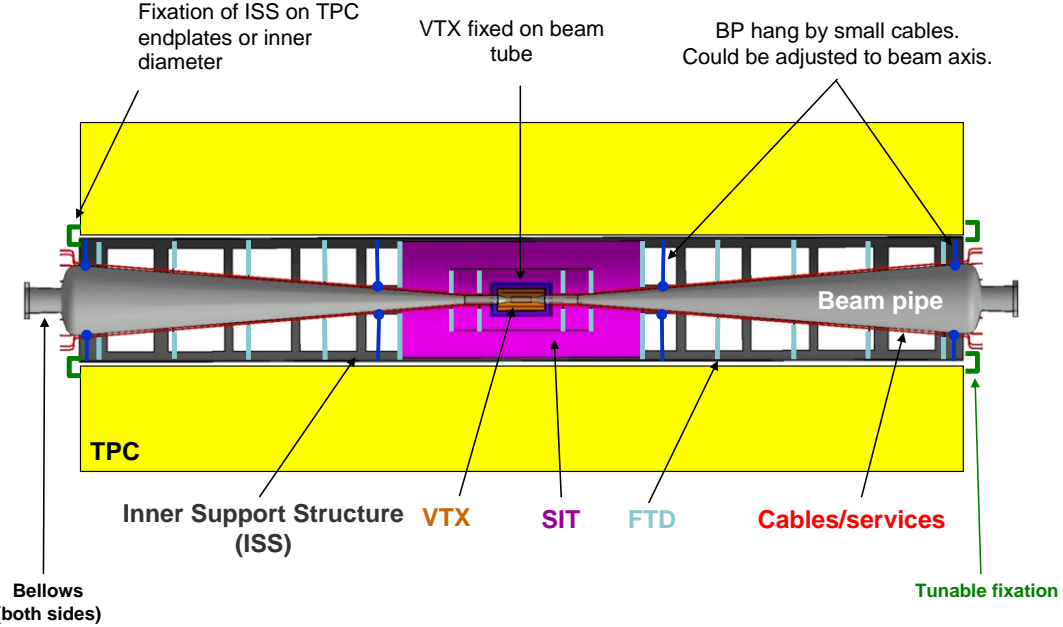
Vertex / SIT / FTD
LumiCal / ECalring / LHCal

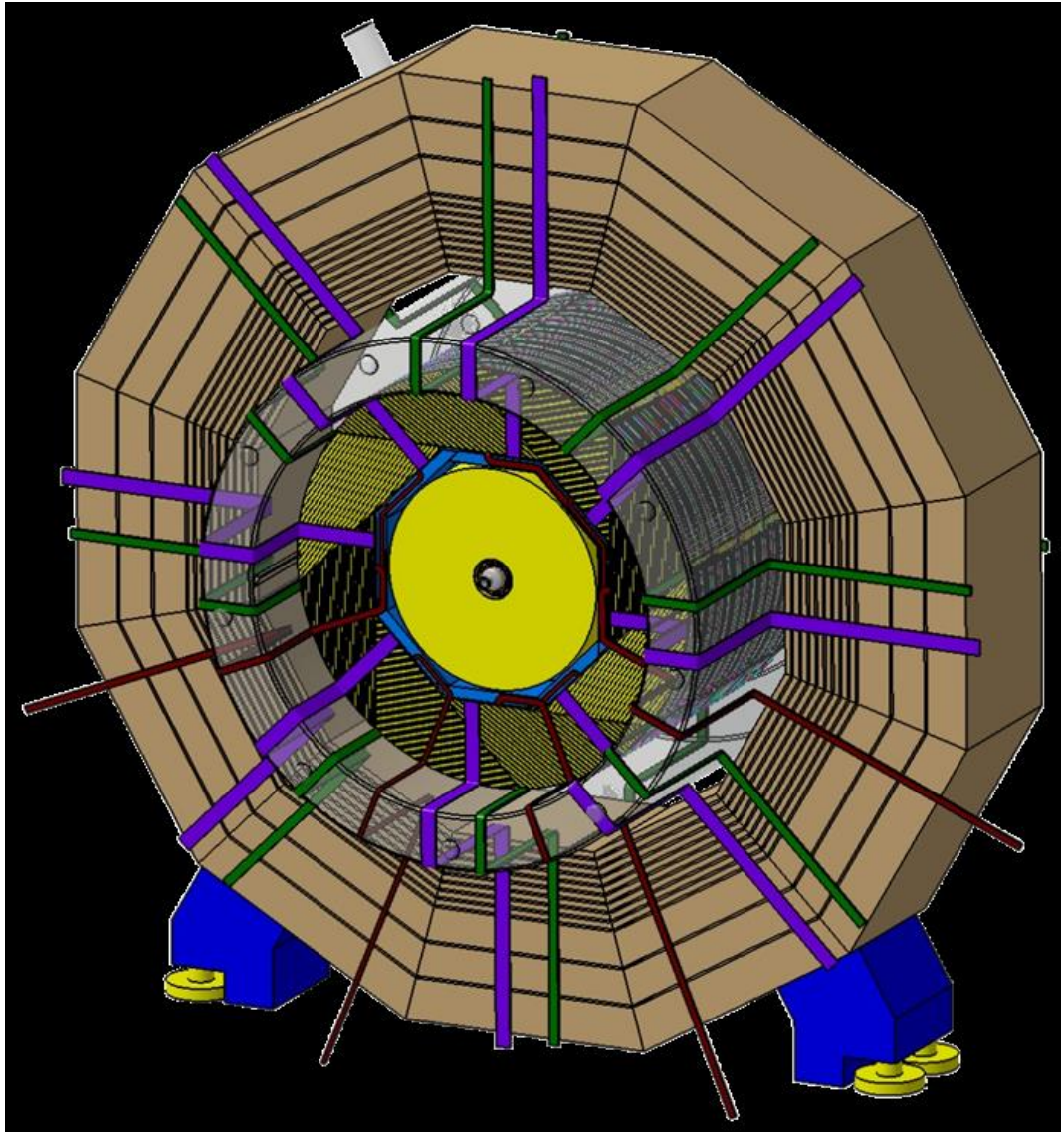


Inner and forward

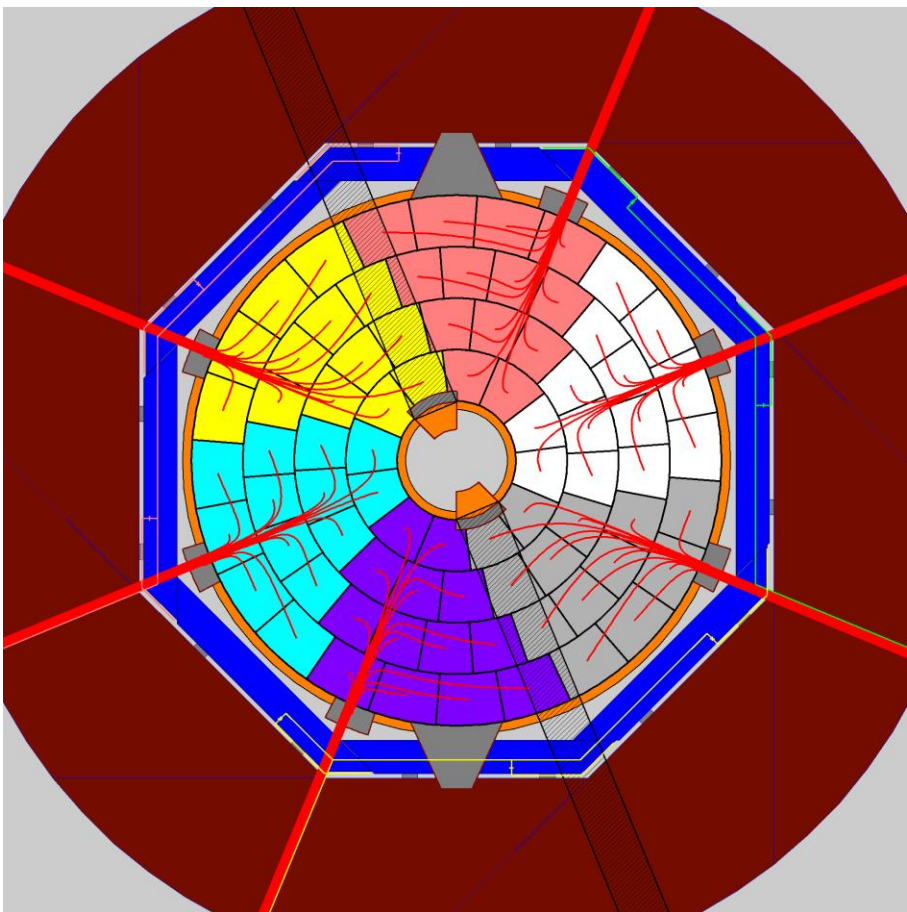


DBD's CAD drawings





Henri Videau Integration meeting, Orsay February 2018

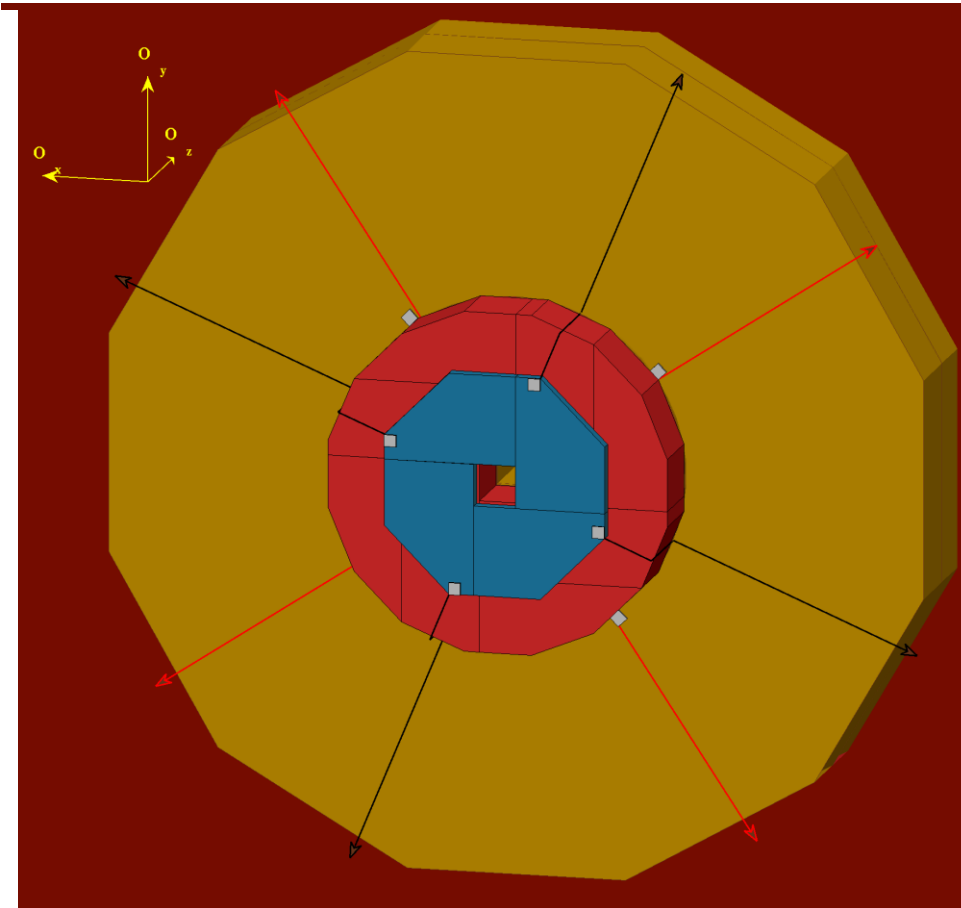
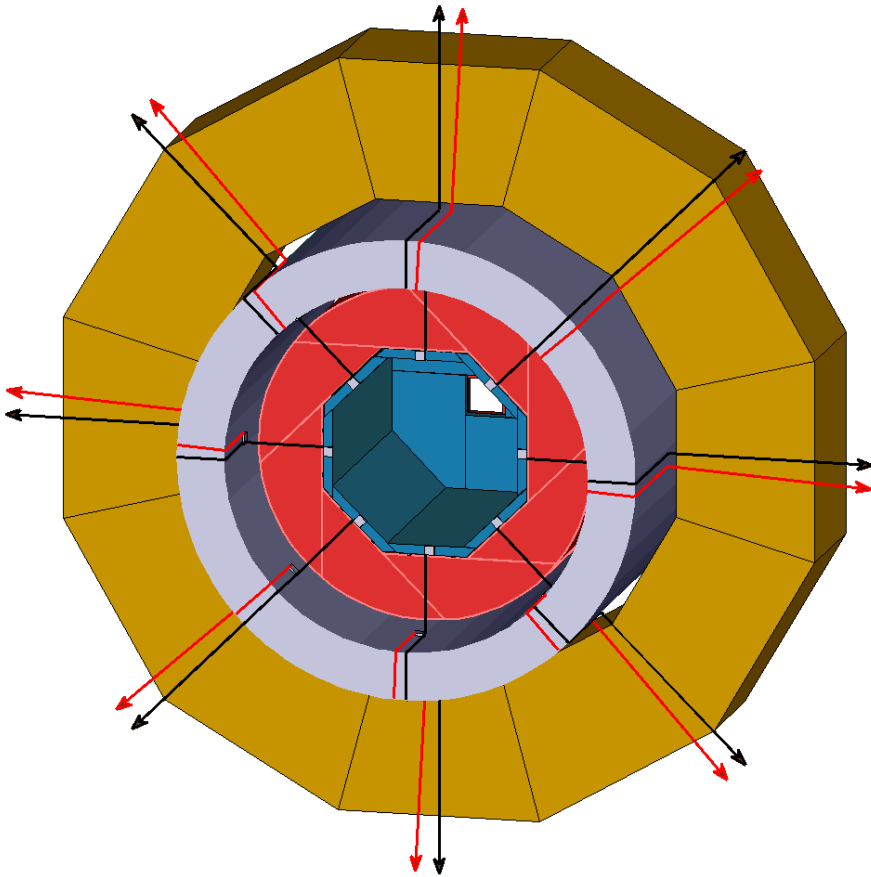
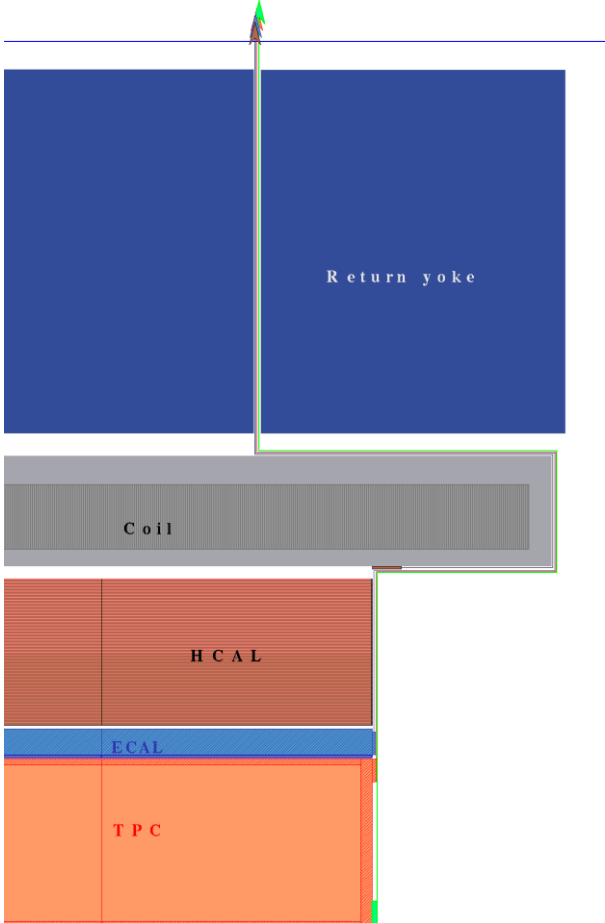


A possible sketch
for the Ecal barrel cooling
the other Ecal services are on the other face
for the TPC fastening
for the TPC services and patch panels



Then we have to recognise how to slice the services interposing “patch panels” to connect and disconnect

The patch panels define the border between the sub-detector and the common part of ILD



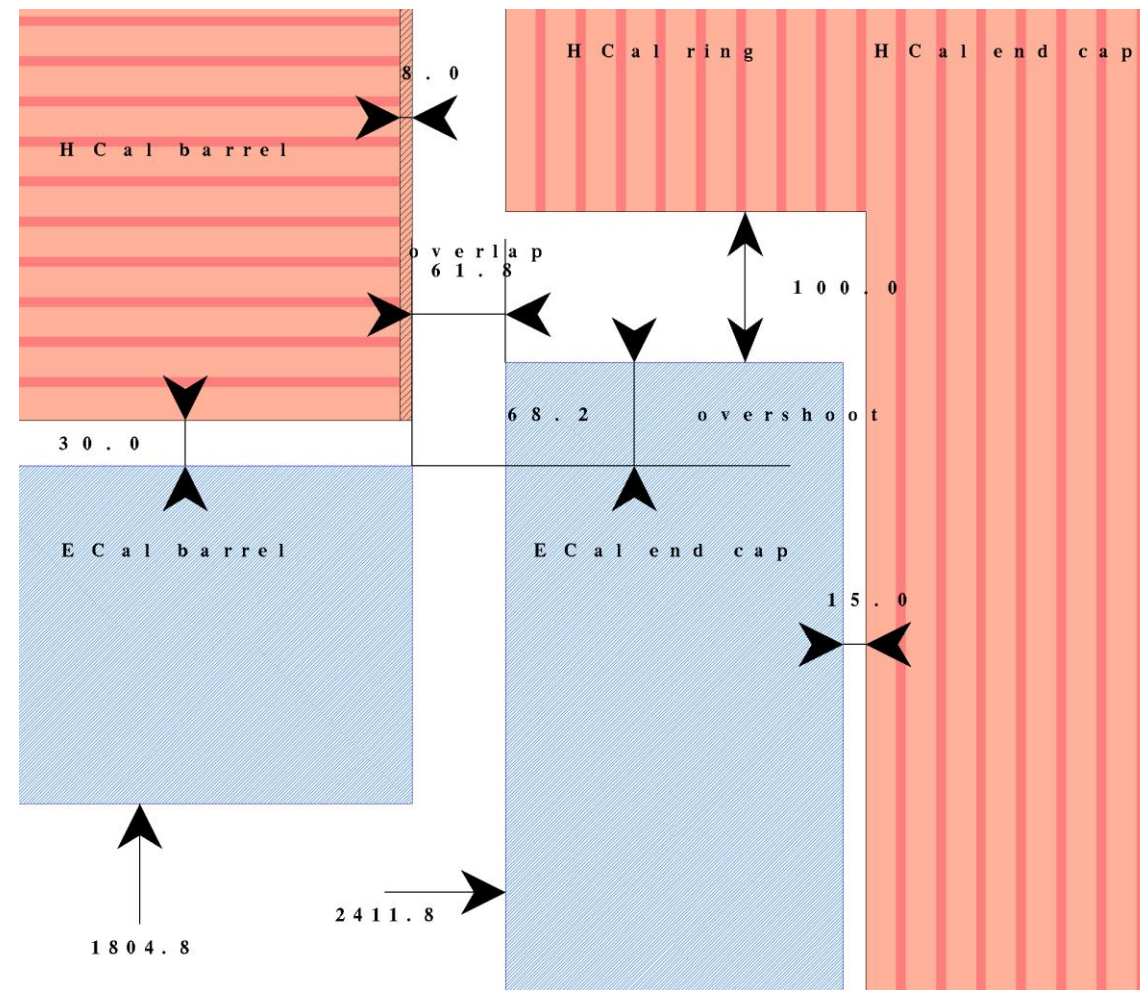


Space

Then to ensure that the services have the room to sneak out of the detector

Problem of the cryostat-FSP corner in the simulation model

Problem of the overlap region where the gap has been reduced from 100 to 62 mm with an overshoot larger than 30mm.





These images were to help starting a discussion on services and patch panels

They are likely to be inexact and not up to date.

The people in charge of integration in the sub-detectors should provide in the frame of their ICD the description of the services and the place they would like for their patch panels.

It is possible that the full design can not be done fully before the technological choices.

END