



Services in a “à la Videau” HCal structure

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April 27 2017



The historical motivation for such a structure
is this pretentious enough?

Handling the interfaces

Handling the services

Handling the safety

What about the end caps?

What do you gain, what do you pay for it?



The historical motivation for such a structure

The idea of this HCal structure is simply an extension of the ECal model

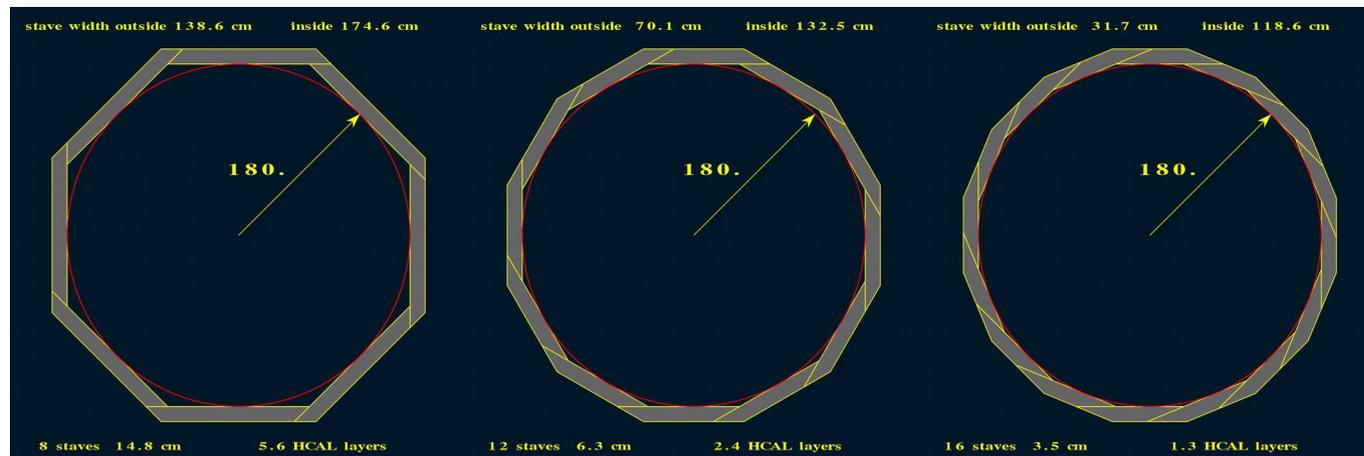
What structure offers the possibility to interface
a sampling detector to the world only by its rear?

The answer is easy, the sampling plates have to have one end
at the outer limit of the detector.

As soon as you break the rotational symmetry down to a polygonal one
with a reasonable number of sides, you can play the game.

You may start looking for the best symmetry, for physics, for mechanics:
you may want to be as close as possible to a circle (physicist)
but when the number of sides becomes too large you come into mechanical problems.

Technically the best for ECal would be 4 and for HCal too, but who dares?





If you start from the eightfold way you get our current ECal design (HV2) and the “à la Videau” HCal structure.

Then all the connections come to the rear of the HCal:
between the HCal and the coil cryostat
and they are out of the particle paths, not generating dead zones .
They do not interfere with the path of the other subdetector services and
the HCal barrel services will just run along the inner cryostat mandrel.

A subsequent feature is that the mechanical limitations of the sampling plates induce a wheel structure intrinsically very rigid if you do not mess it.

You got rid of the phi cracks, you may nevertheless get z cracks depending on the number of wheels. See Jean-Christophe's talk.

Once the wheels clamped together you have a HCal barrel as a very rigid block



For the barrel you interface only with the cryostat and with the ECal barrel

With the cryostat:

The HCal as a block is supported by two rails not far from 3 and 9 o'clock
Its deformation in the x direction is very limited
nevertheless one rail will enable a move in this direction. See JCI talks.

A special interface concerns the cooling. This can be brought in by pipes
nitrogen, ..
but the fact that the barrel iron structure conducts heat well means that only
the back side needs cooling
as the cryostat is a heat sink, a cooperative solution could be looked after
which could be drastically simple.

With the ECal:

this has been looked at in the task force. The small distortion of the structure
makes it well possible taking care about additional stresses on the ECal rails.



A space (~72mm) is left between HCal and cryostat mandrel which is free for bringing in and out power, gas, cables ...

This space can also be used for installing concentrators, converters.

All the cables and services go to patch panels on the external faces of the barrel.

In fact they can also be fixed to the cryostat in the large space between cryostat and HCal end caps which are reduced in radius.

The patch panels being attached to the barrel provides the possibility to use them not only when the HCal is installed but also when it is under test.

They do not interfere with services from other sub-detectors.

From the patch panels a reduced number of services run outside on the barrel services path.



Safety problems may arise from electronics and subsequently cooling

Remembering the first slides there is no wonder that the safety problems are strictly the same as for the ECal.

The cooling seeming OK, the main safety item is the probability for electronics, chips, converters, .. to die.

The problem is linked to the structure, not to the technology.

There are three levels of electronics: the VFE, the first level, E1
the first level of concentration/distribution E2
the second level of concentration/distribution, the final hub/patch panel level. E3



- E1 is buried in the detector sensitive cassettes, getting access is a major operation to be done outside the interaction region and needing to touch more than the sole HCal.

The solution is threefold,

- all the risky components have to be burnt in and thoroughly tested at assembly time
- redundancy has to be an integrated part of the design
- possibility to isolate (pass-by) faulty regions as small as possible

- E2 may be the most tricky

this is the part concentrated at the periphery of the HCal, outside the HCal but in a narrow place reachable only by sliding the barrel block out of the cryostat it is like for E1 a major operation which deals with the HCal

but also with the services of the sub-detectors located inside, ECal, TPC ..

The solution is similar to E1 considering that it concerns a reduced number of objects but that the impact of the death of one object is much more harmful.

The probability of a risk at this level is to be evaluated against the risks at the E1 level.

Basic redundancy is essential, like the possibility to access independently even and odd layers to ensure that no fully blind zone appears.



- E3 is an easier task

As patch panels E3 has to be in an easily accessible place.

The access may not be easy considering the opening possibilities on the beam line but this is not a major task.

A thorough risk analysis is to be done anyway
and all the processing has to be properly thought out

but we can not anyway build a detector like ILD without doing it.

Who would dare to be just sloppy because you have an easier access?
then you won't be sloppy and can afford well estimated risks.

or do you have just no confidence in what we all can do?

in what has already been done in other places.



What about the end caps? →

Clearly the difference between the two end-cap designs has less philosophical sources and consequences.

In particular it does not introduce at first sight very different safety approaches.

That does not mean that they do not require attention

The task force study should not stop at the barrel and there is no correlation between the barrel and end-caps solutions



What do you gain, what do you pay for it?

That has to be the elements for a conclusion of the task force study rather than my own conclusion.

even though I may have my own opinion

is there any place for esthetism?

LM



The end

or the start?