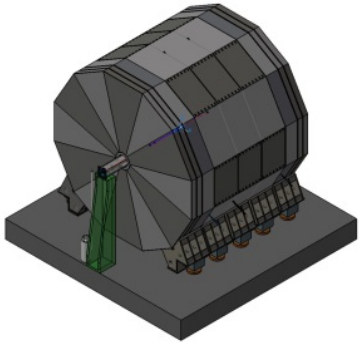
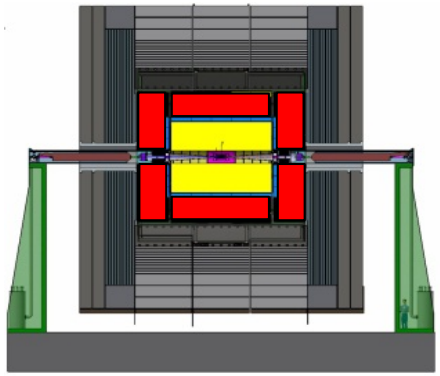
ILD – Integration status

Linear Collider days in Saclay

(27-29 November 2013)

ILD – Integration status





Outline

I. STATUS
II. MANAGEMENT INTERFACES
III. MECHANICAL STUDIES IN France
IV. NEXT STEPS
V. CONCLUSION

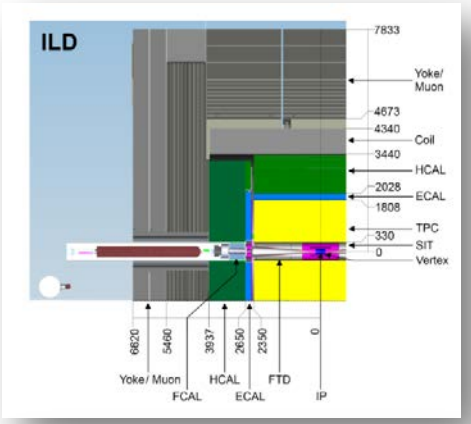
ILD – Integration status

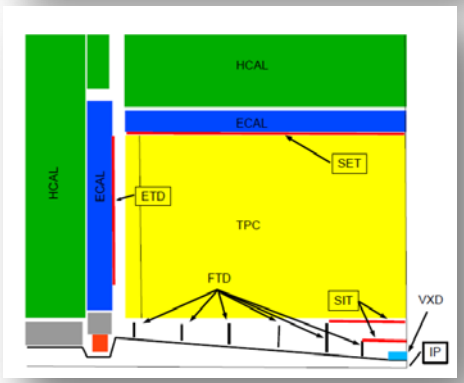
I. STATUS

- Each sub-detector has already defined its own :
  - Placeholder,
  - Sub detectors fixations
  - Câbles
  - Cooling or gaz
  - Integration tools
  - …

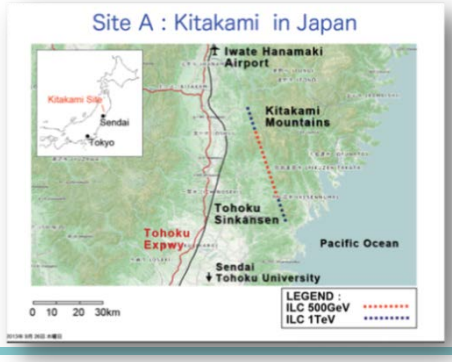
Remark:
Some detectors are in competition with a different technology.

Now, no site-specific issues have been taken into account.





- Now we have a proposal site in northern Japan



ILD – Integration status

II. MANAGEMENT INTERFACES

- Update of the integration contact list
- Creation of a mailing-list.

➢ Send a **template of Interface Control Document (**ICD)

-Sub-detectors (weight, dimensions,…)

-Services (cabling, cooling, gaz…)

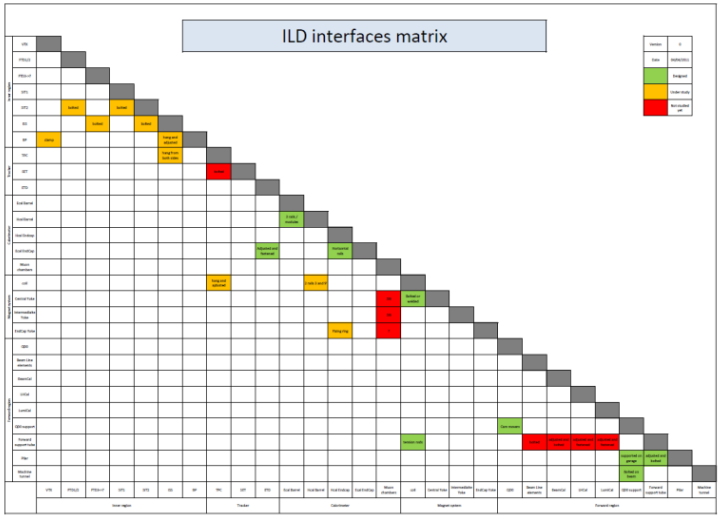
-Preliminary integration scenario

-Integration tools

-Maintenances

-…

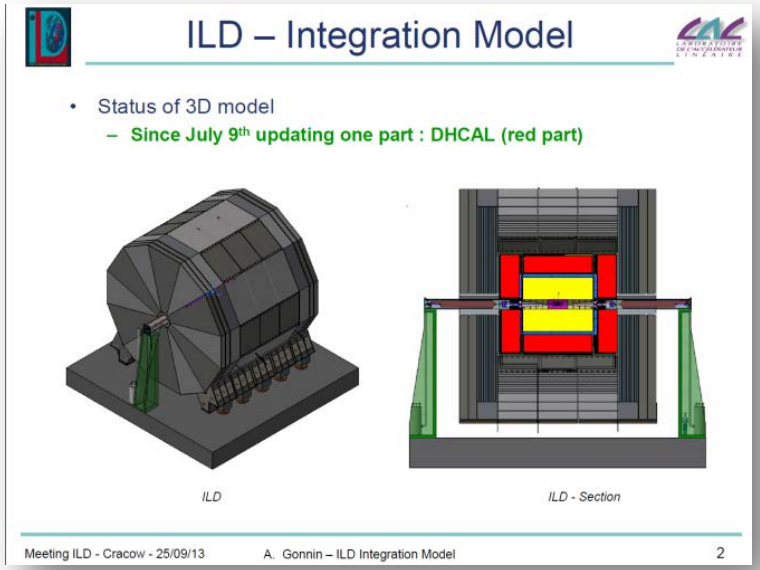
➢ **Interfaces matrix**

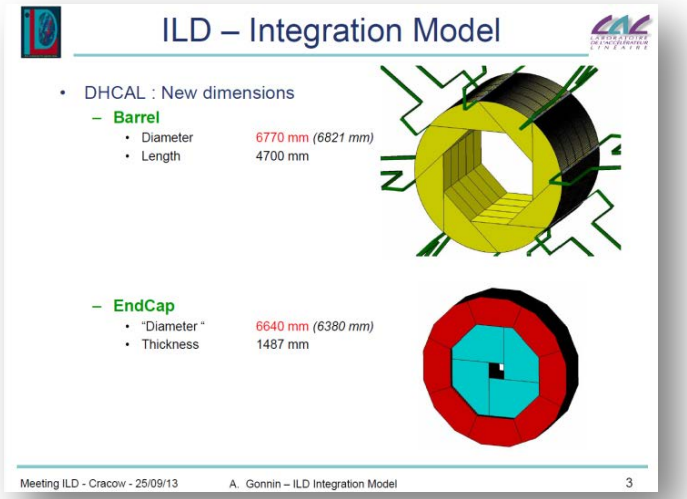


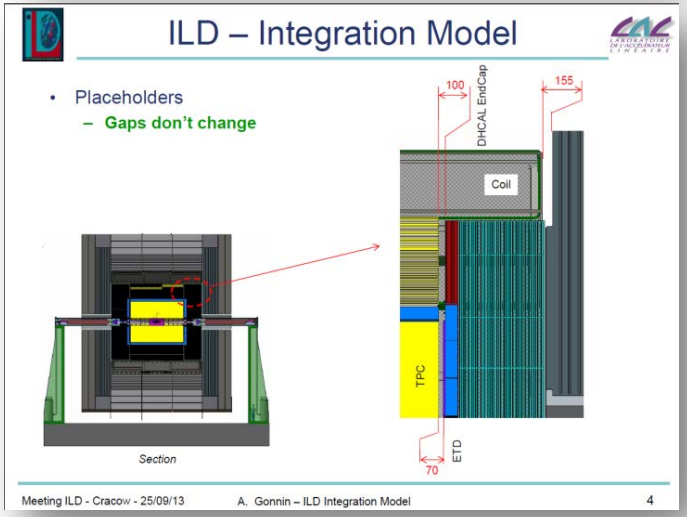
ILD – Integration status

- *At LAL,* collect all informations from collaborators (3D model, services placeholders..)

  Alexandre Gonnin try to keep the last version of CATIA 3D MODEL.





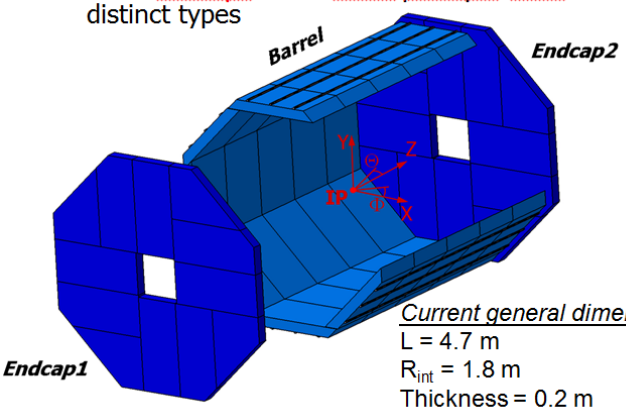


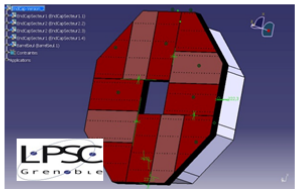
- Each responsible of sub-detector must send a Step file when they have upgrade their design.
- At LAL, checking if there is no conflict with the other parts
- Upload on EDMS DESY a Step file of the whole experiment
  -> Aura Rosca (DESY) aura.rosca@desy.de

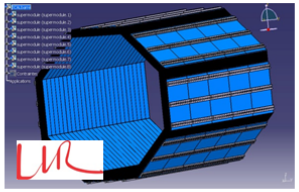
ILD – Integration status

III. MECHANICAL STUDIES IN FRANCE: ECAL BARREL

- The ECAL barrel consists of 40 identical trapezoidal modules of tungsten absorber plates (~80 t) interleaved with layers of Silicon detectors with very fine segmentation of the readout (5x5 mm²)
- ECAL endcaps : The same principle than barrel (~50 t) with 12 modules of 3 distinct types



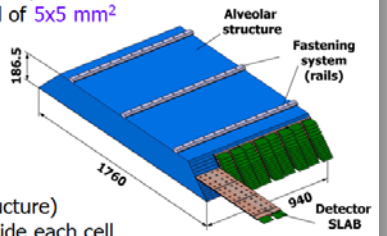




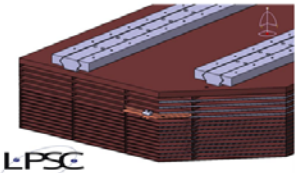
Current general dimensions :
L = 4.7 m
R_{int} = 1.8 m
Thickness = 0.2 m

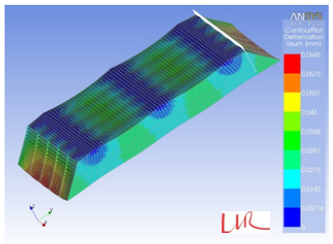
Main features of the ECAL

- Multilayer calorimeter Silicon/Tungsten as compact as possible (small Molière radius) with pixel of 5x5 mm²
- Sampling of W in depth according to the need of energy resolution : ~23 X_0
- Half of the tungsten plates is incorporated into a self-supporting alveolar composite structure (carbon) to avoid machining step and reduce dead zone
- Half of W plates in supports (H-shaped structure) called detector slab, which are then slid inside each cell
- fastening system ECAL/HCAL is included in the design (rails)




Alveolar Structure (Technological proto)

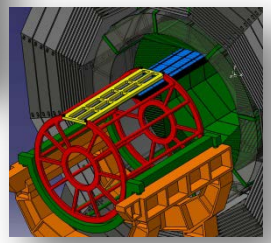

Endcap module design



- Mechanical Simulations

- Need to perform mechanical simulations with ANSYS to check all loads cases (0°, 45° and 90°)
- Need to continue destructive tests on materials and prototypes (typ. the thermal proto instrumented with bragg grattings) to implement correctly simulations and define all the margins of security of the model.

Marc Anduze Anduze@llr.in2p3.fr



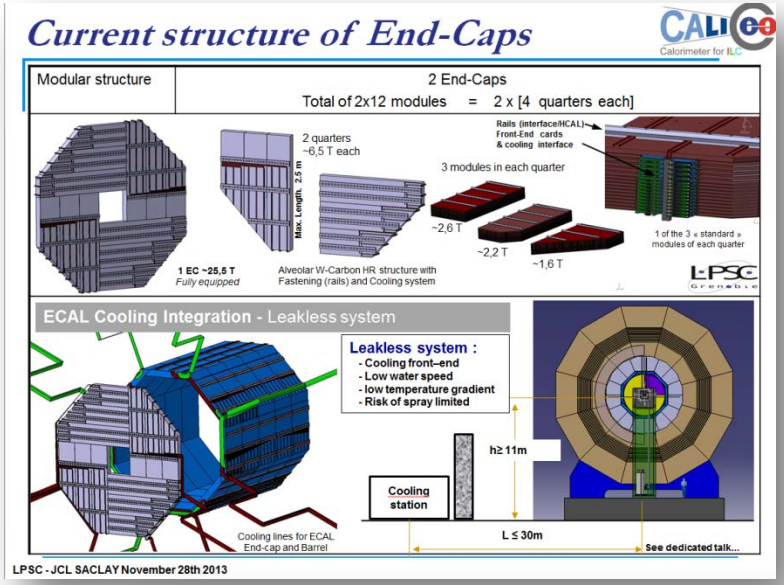
- Ecal design
- Services
- Integration tools
- Calculations
- Tests

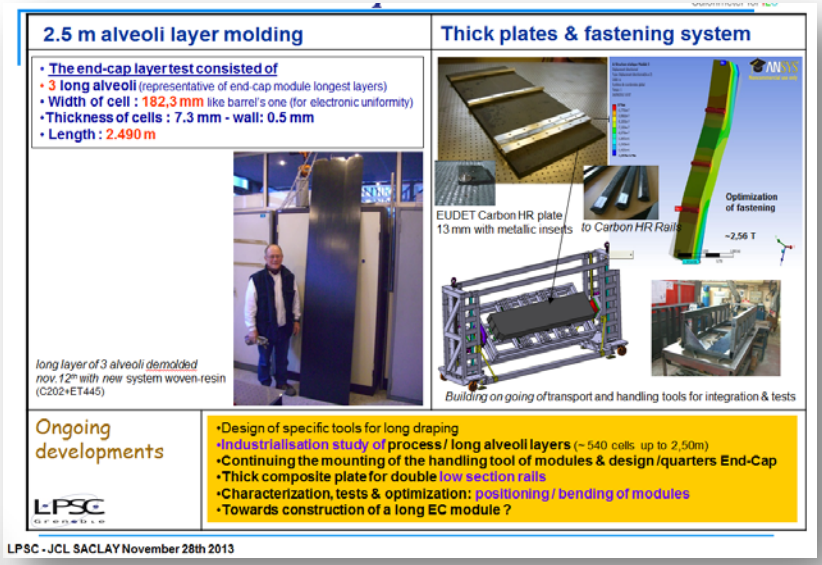
Check if overlap with 3D Catia model

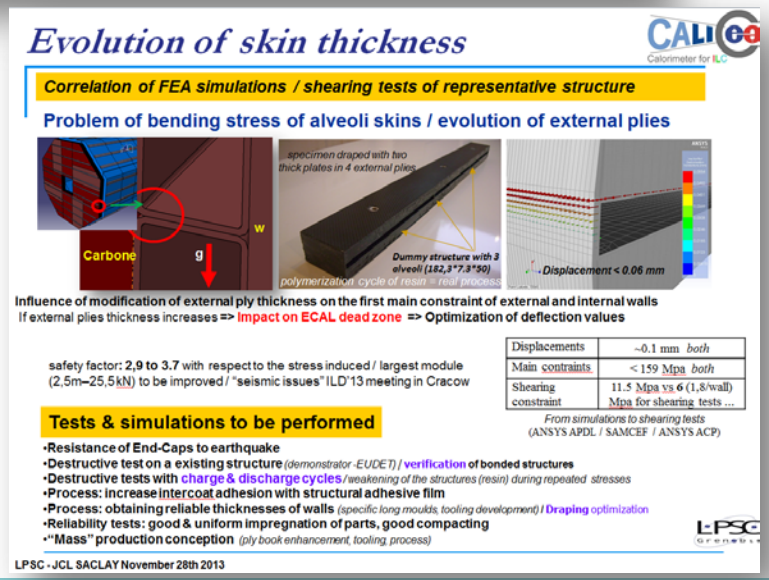
ILD – Integration status

III. MECHANICAL STUDIES IN FRANCE:

SIW ECAL ENDCAP







Denis GRONDIN - grondin@lpsc.in2p3.fr
Julien GIRAUD - giraud@lpsc.in2p3.fr

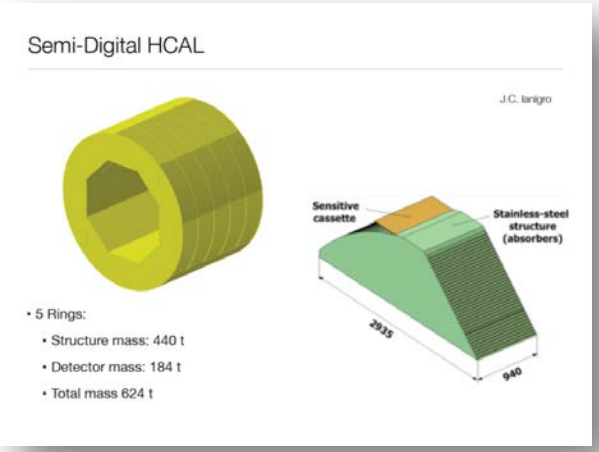
- Ecal endcap design
- Barrel & endcap cooling
- molding tools
- Calculations
- tests

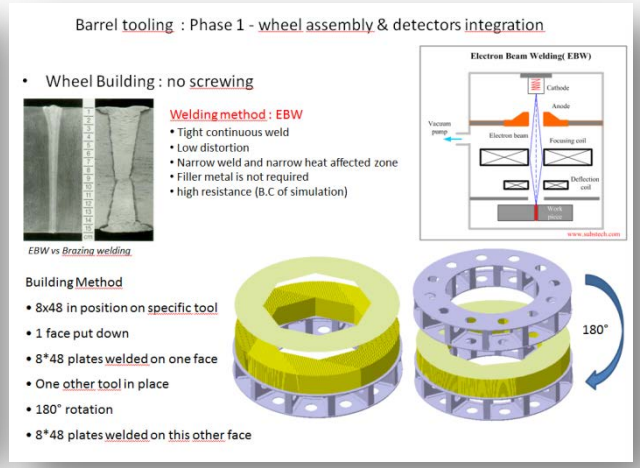
} Check if overlap with 3D Catia model

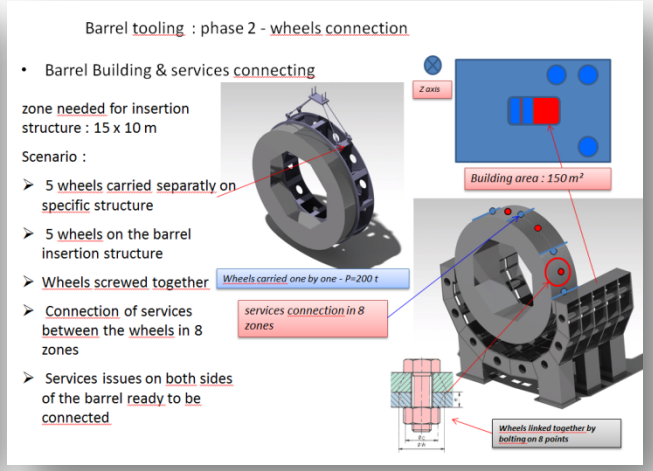
ILD – Integration status

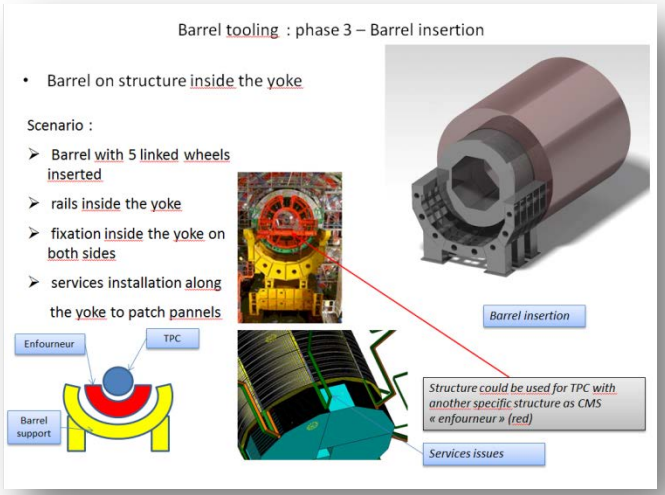
III. MECHANICAL STUDIES IN FRANCE:

Semi-Digital HCAL









Jean-Christophe Ianigro - ianigro@ipnl.in2p3.fr

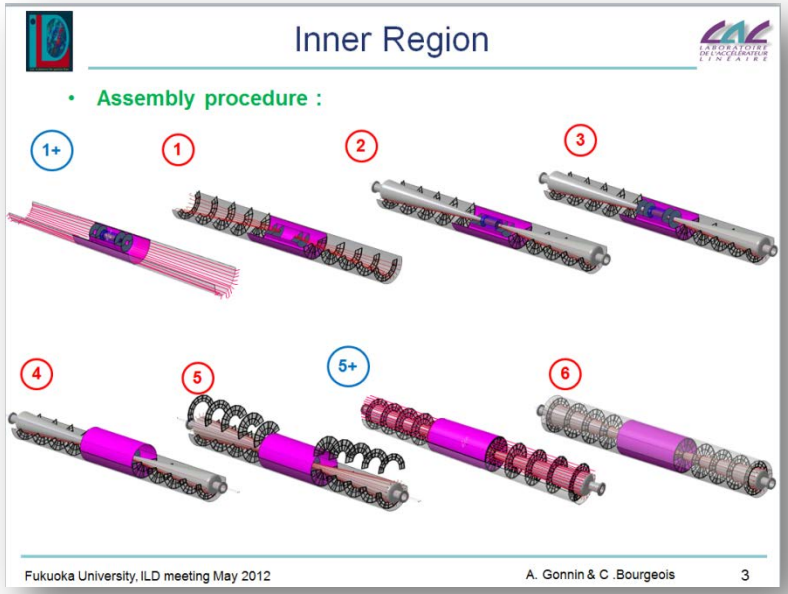
- Hcal design
- Services
- Assembly tools
- Insertion tools
- Calculations

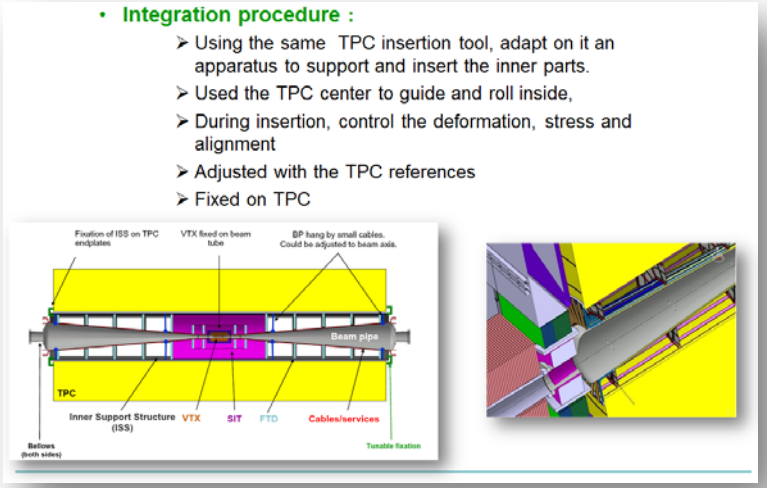
Check if overlap with 3D Catia model

ILD – Integration status

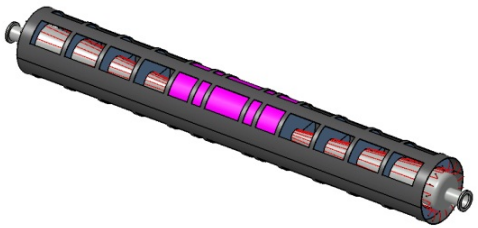
III. MECHANICAL STUDIES IN FRANCE:

Inner region & ILD interfaces





Christian Bourgeois - bourgeois@lal.in2p3.fr
Alexandre Gonnin – gonnin@lal.in2p3.fr



Inner region:

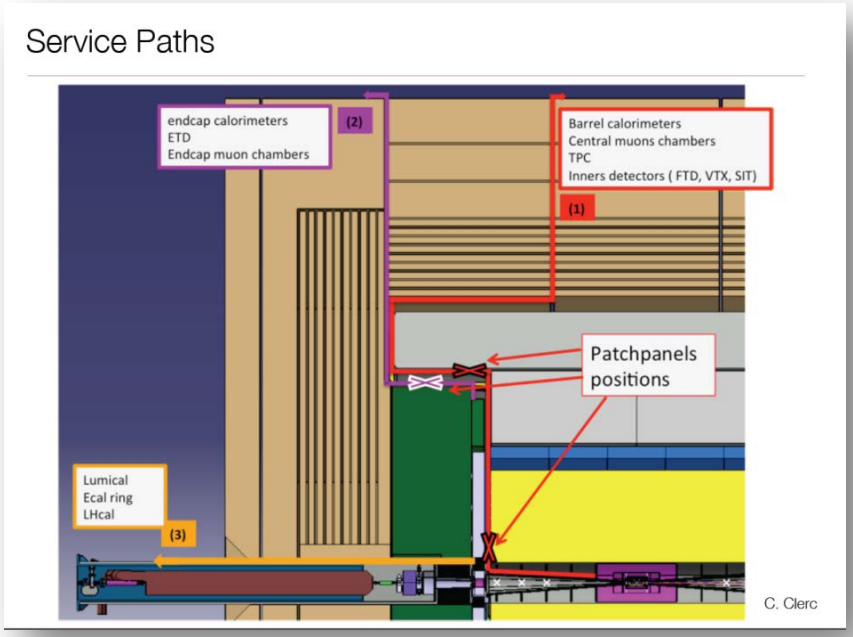
- Assembly scenario
- Alignement tools
- Fixations

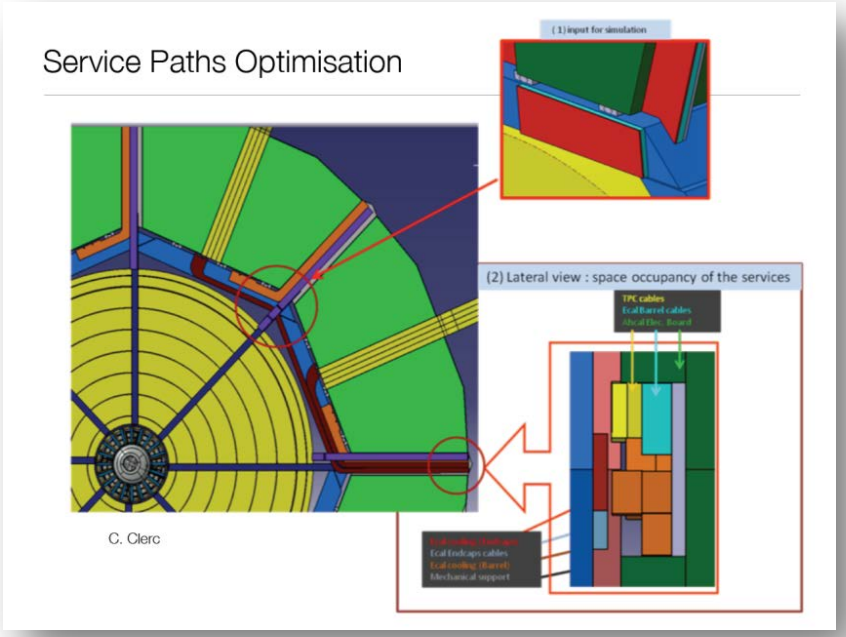
Management ILD interfaces

ILD – Integration status

III. MECHANICAL STUDIES IN FRANCE:

Services estimate





Catherine Clerc - clerc@poly.in2p3.fr

- Services studies
- patchpanels
- Placeholder estimate

ILD – Integration status

Other studies in France:

TPC studies

Paul Colas - paul.colas@cea.fr
David Attié - David.Attie@cea.fr
Pierre Manil - pierre.manil@cea.fr

Vertex studies

Marc Winter - mwinter@sbgpcs119.in2p3.fr

Electronic ECAL barrel integration

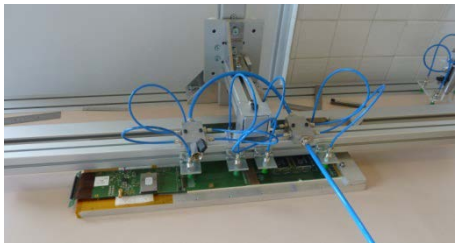
SLAB industrialisation:

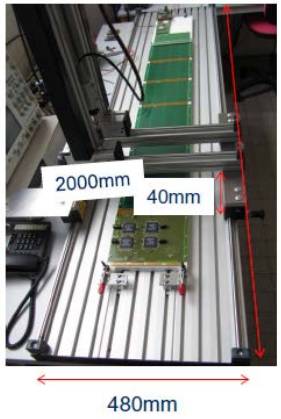
Patrick Cornebise - cornebis@lal.in2p3.fr

- Assembly tests (6 FEV8-3C + 1FEV8 + 1Adapt Diff)
- Measurements and stubs effects (FEV 8,…)
- Soldering bench studies

Julien Bonis - bonis@lal.in2p3.fr

- Slabs assembly procedure
- Assembly automation



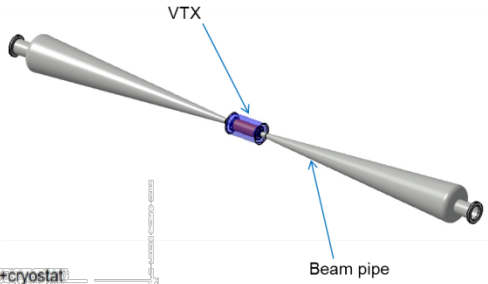


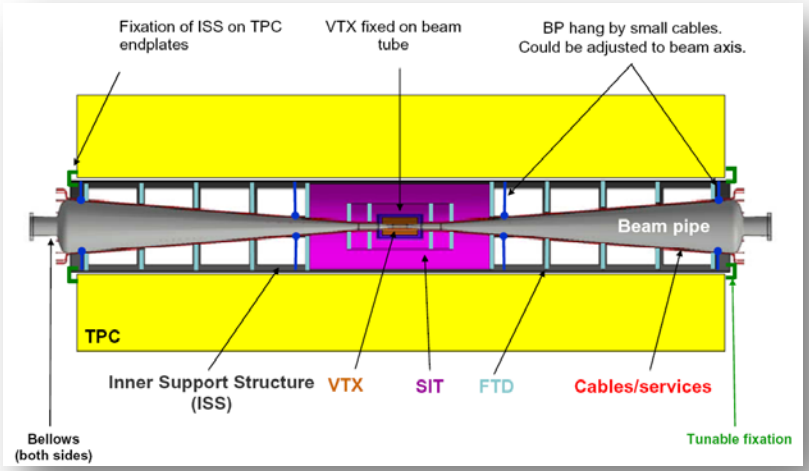
ILD – Integration status

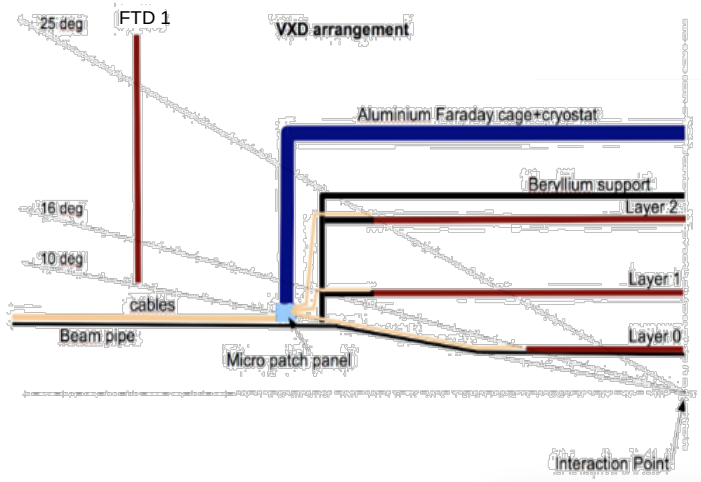
IV. NEXT STEPS

Need more investigation for:

- Inner system: vertex detector, silicon tracking

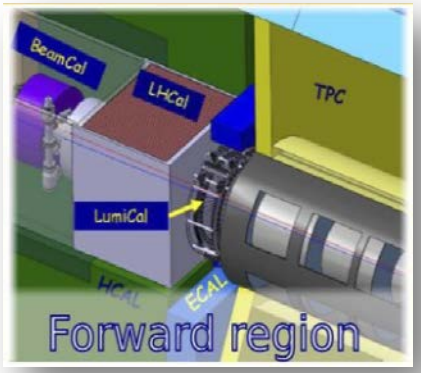






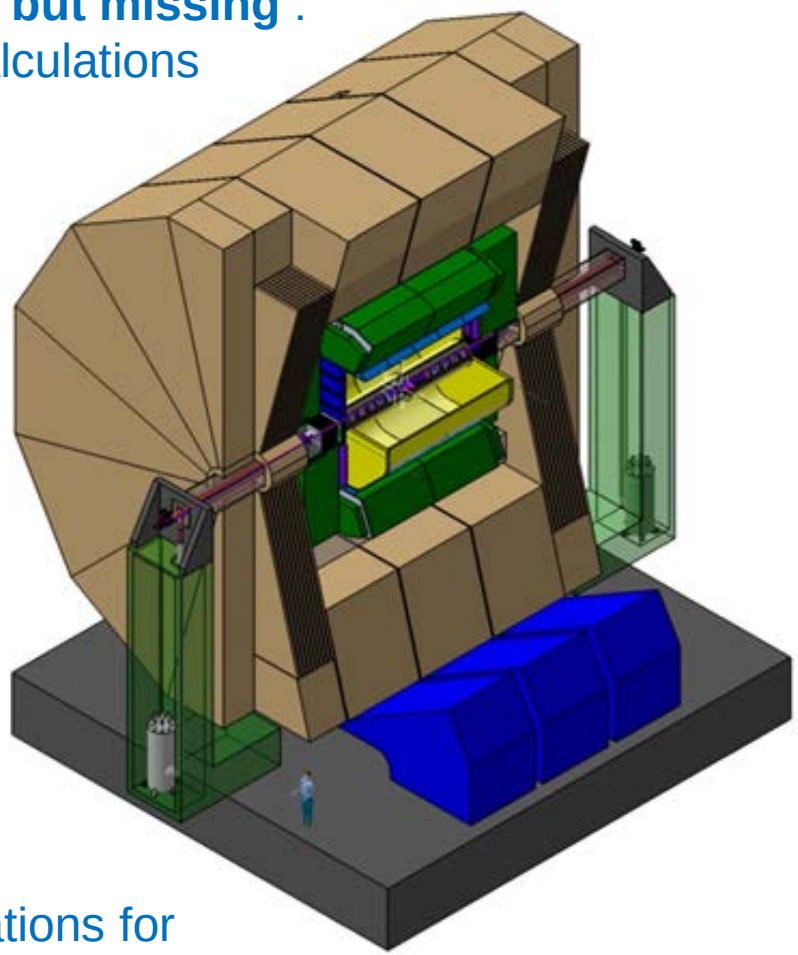
- Forward direction, LHCAL :

no information, no technological design



ILD – Integration status

On 3D model currently the gaps are respected, but missing :
- sub-detectors fixations, sized according to the calculations (+earthquake acceleration)
- most of the services.

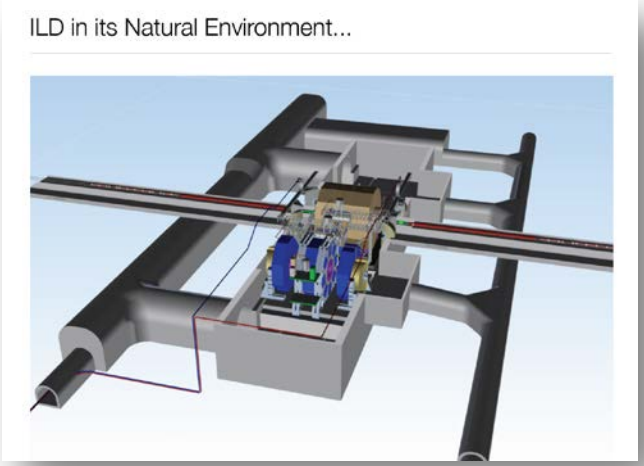


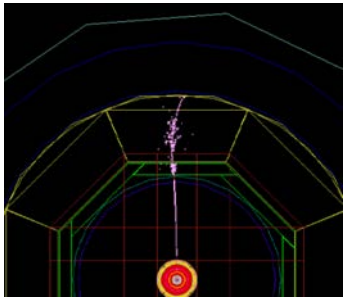
Need to study :
- An integration scenario : provide space and fixations for assembling tools
- An open scenario for maintenance
- Services, cables patch panel placeholders and fixations

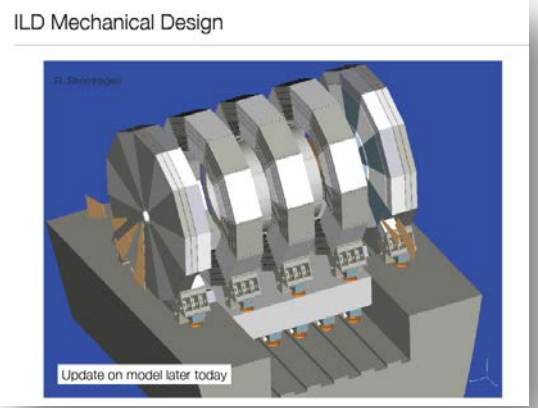
ILD – Integration status

Optimization:

- Improvements driven by the cost efficiency and physics
- Realize full scale prototypes
- More realistic designs of mechanics, cabling, cooling
- Internal integration of the ILD engineering model
- External integration with the machine and SiD
- Validate each sub-detectors dimensions with physical simulations







ILD – Integration status

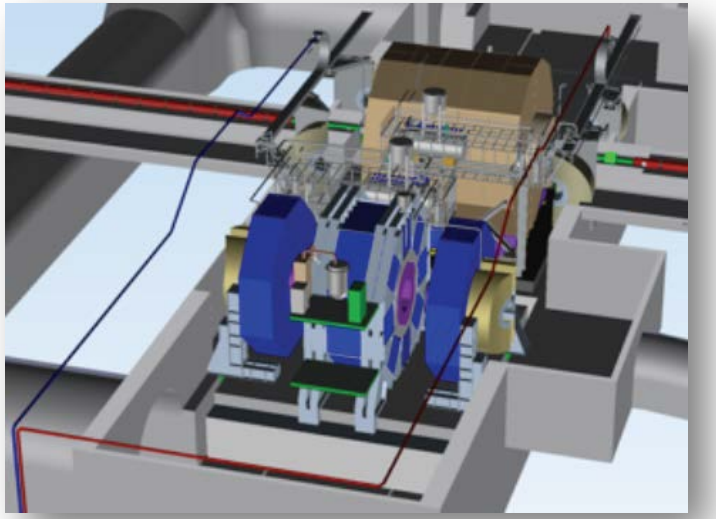
Need « project » organisation:

- At the last collaboration meeting in Krakovie, different propositions were showed
- Need to identify the leaders

In october, LLR organised a technical meeting with LAL, LPNHE, OMEGA, LPSC:

- Common goal
- Shedule for the future 2 years
- For exchange documents, used EDMS

➢ Next french technical meeting end of november.



ILD – Integration status

V. CONCLUSION

Many tasks must still be done…

untill the TDR.