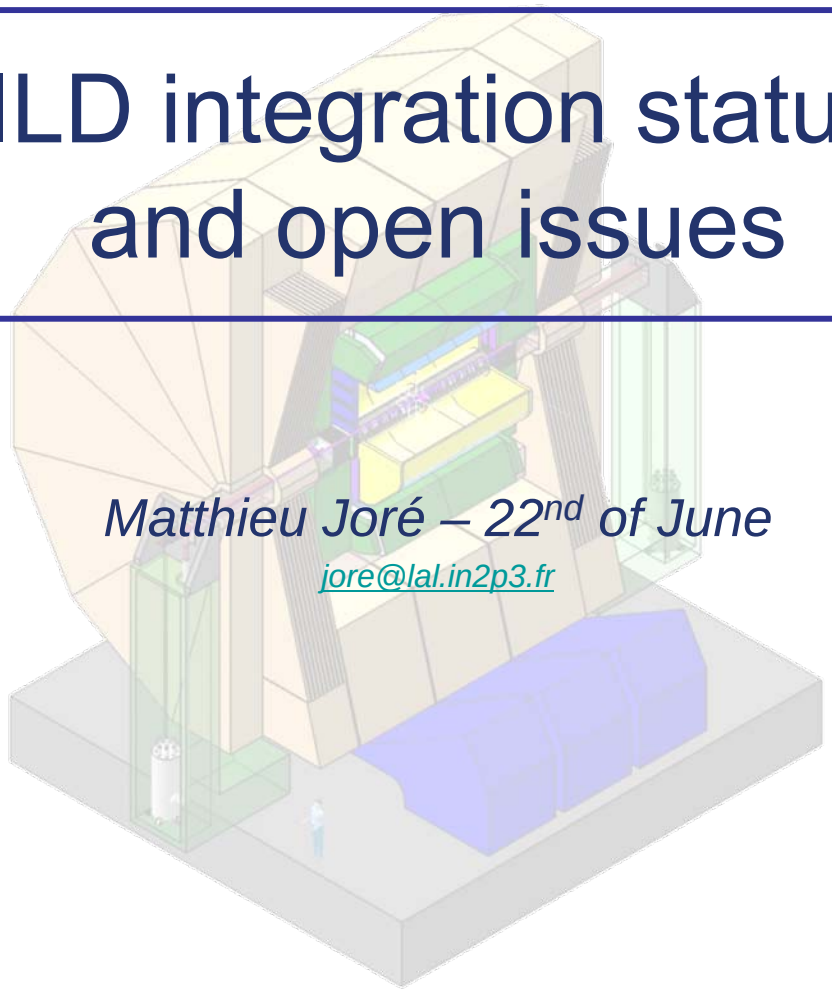
ILD integration status and open issues



Matthieu Joré – 22nd of June

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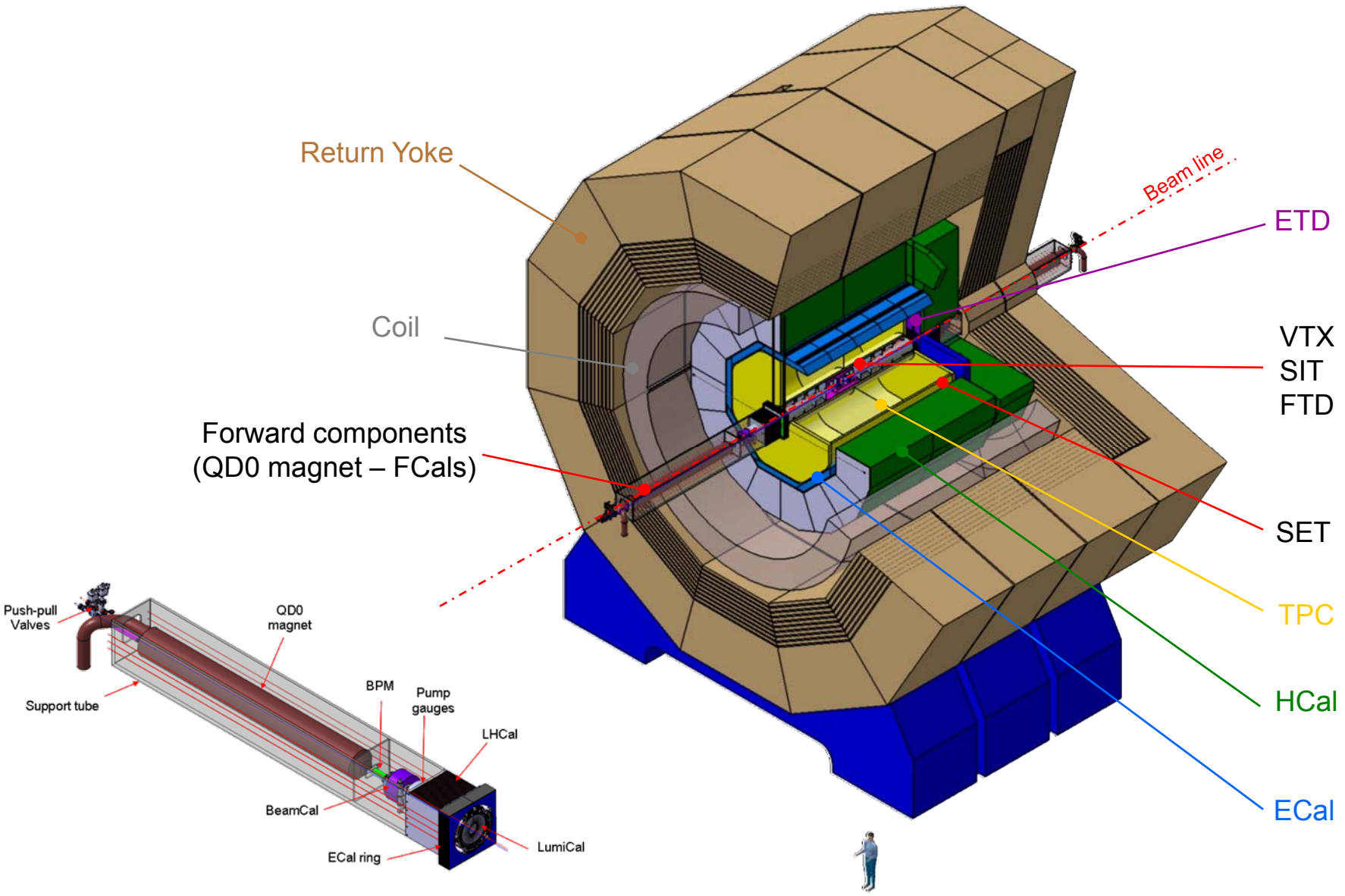
Outline

- Introduction
- Hadron calorimeters integration
  - **AHCal barrel**
  - **SDHCal barrel**
  - **EndCap**
- Inner region
  - **Status**
  - **Current assembly procedure**
  - **Some open issues**
- Conclusions

ILD overview

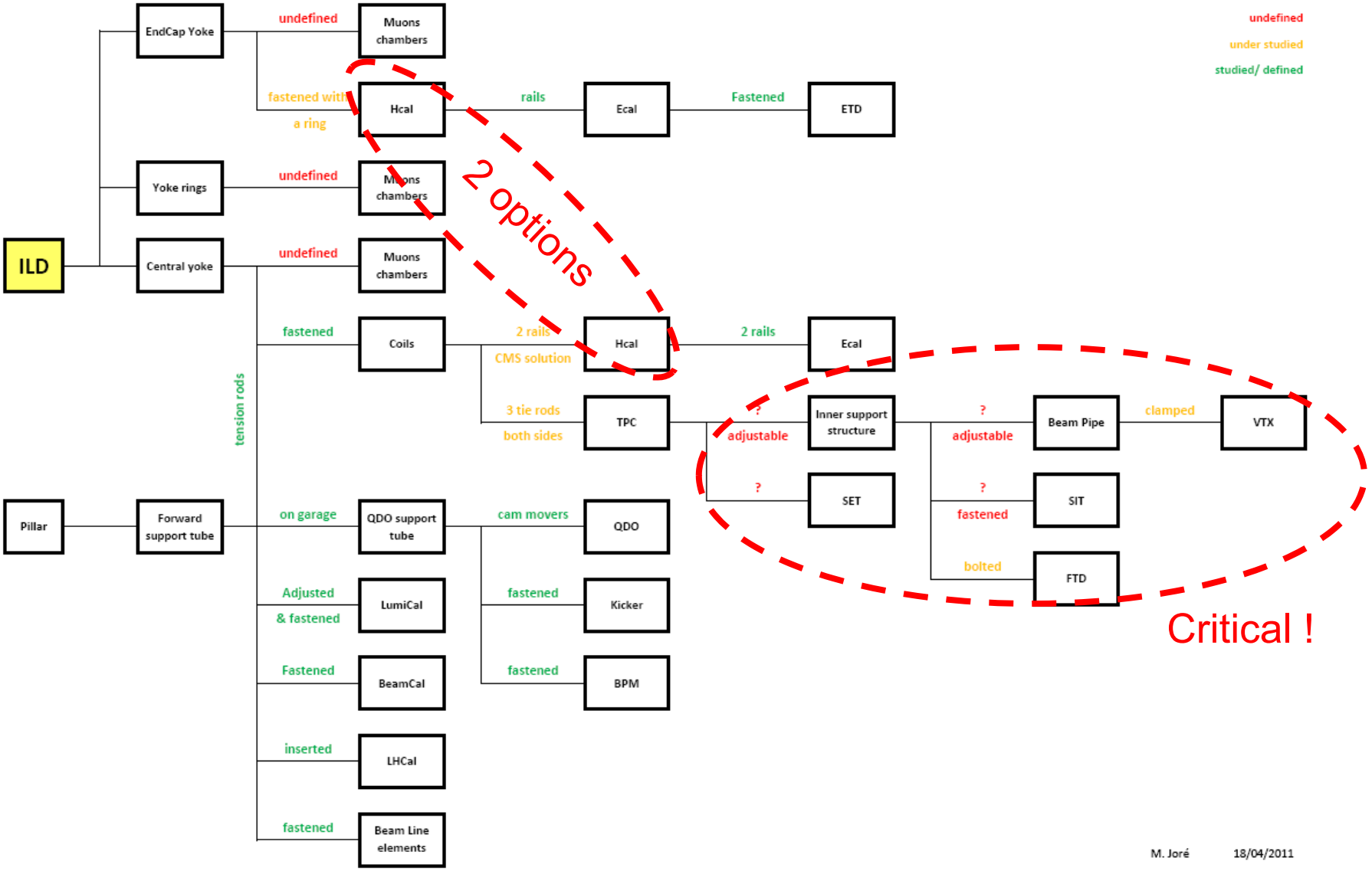


Goals for the integration studies

- For 2012 :
  - **Complete basic mechanical integration of the baseline design accounting for insensitive zones such as the beam holes, support structure, cables, gaps or inner detector material**
  - **Develop a realistic simulation model of the baseline design, including the identified faults and limitations**

- Goals for this ILD workshop :
  - **Define a software baseline for mass production**
    - Each sub detector must show that they could be integrated in ILD
  - **Estimate as much as possible the insensitive material**
    - Especially for the inner region !

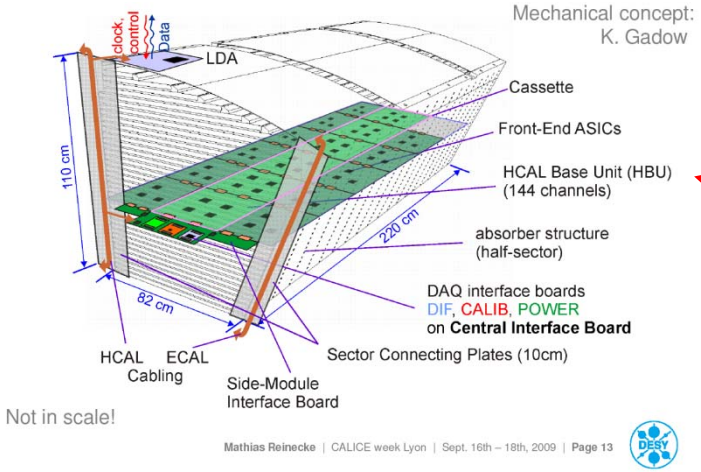
ILD Integration tree

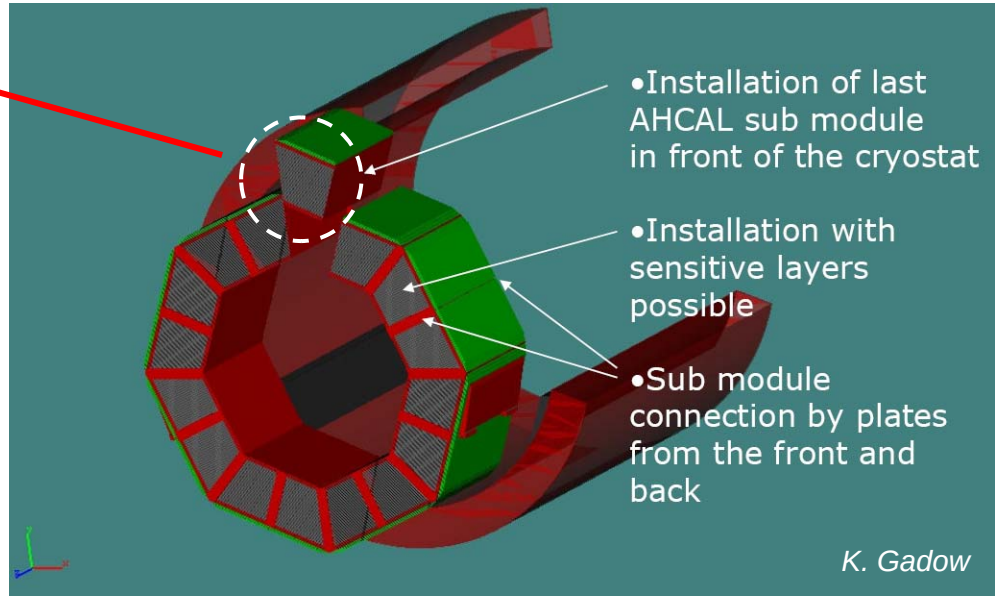


Hadron Calorimeters integration

AHCal Barrel

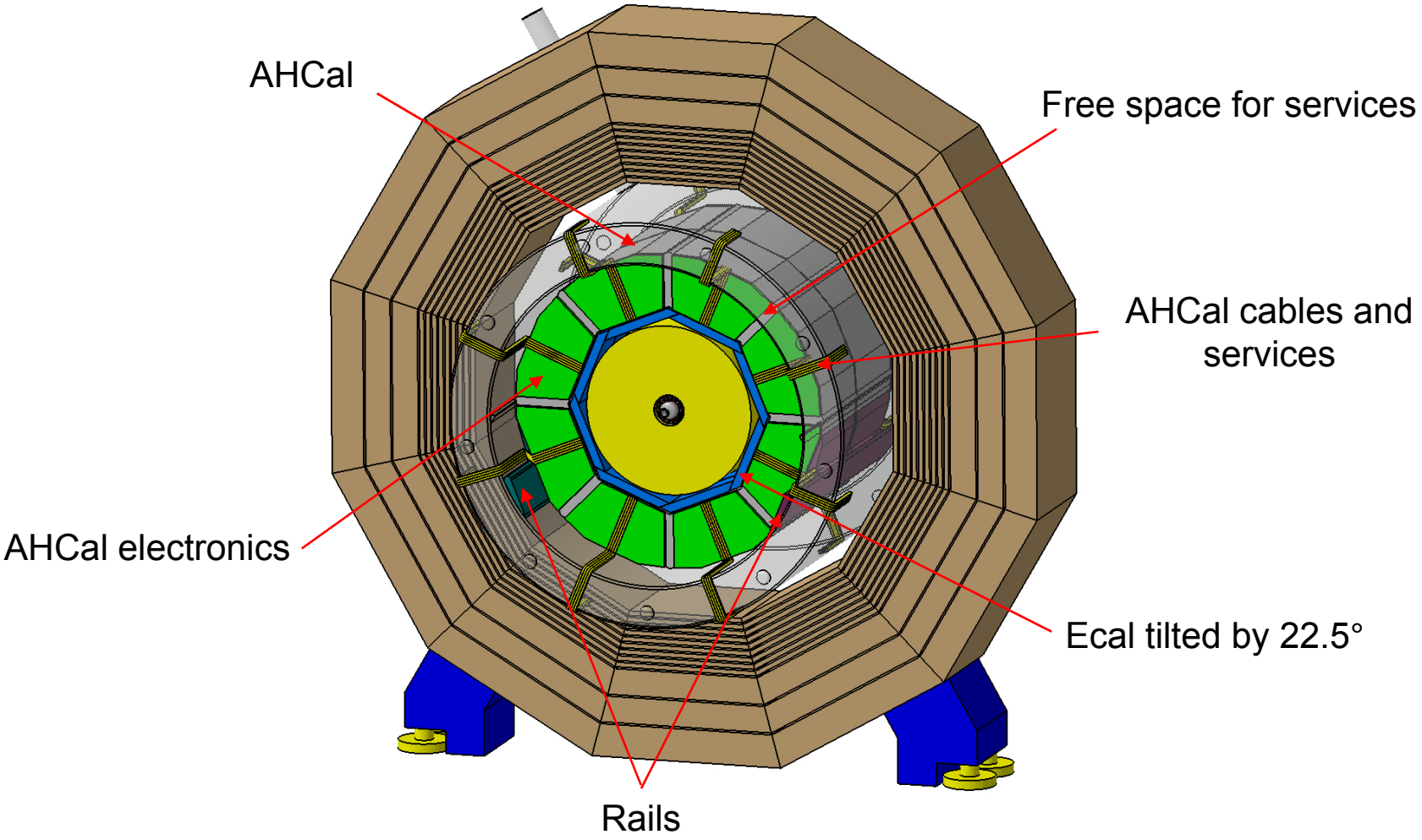
- Mechanical concept :
  - **Made of 2 rings**
  - **16 modules / rings**
  - **Module is made of bolted SS plates**
  - **Electronic card and tile inserted along the axis**
  - **Tilt of 22.5° for the rail integration**





AHCal barrel in ILD

- Recent updates have been done to integrate the model in ILD
  - **Dimensions now fit the requirements**



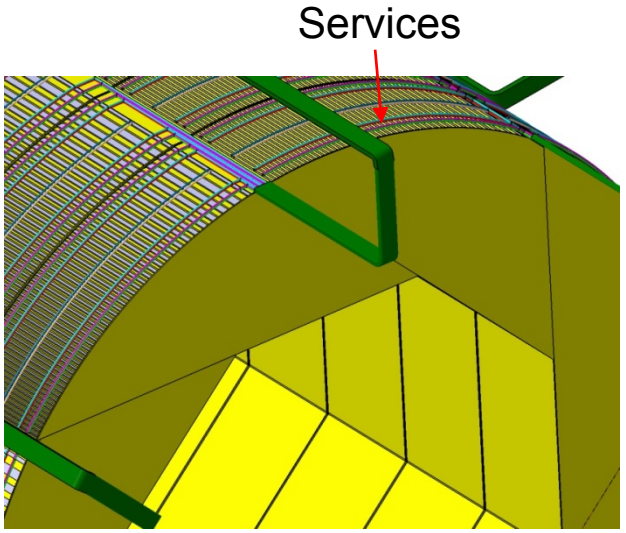
AHCal issues

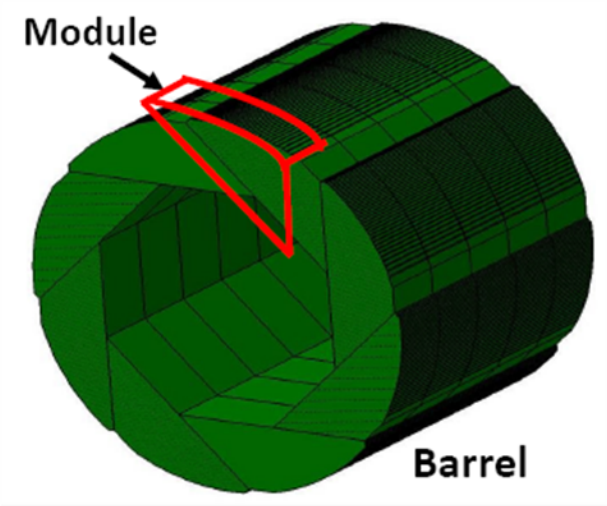
- AHCal barrel design :
  - **Crack at z=0**
    - Could have two different length for the rings
  - **Integration of the rails system with the cryostat**
    - Could be similar to CMS system

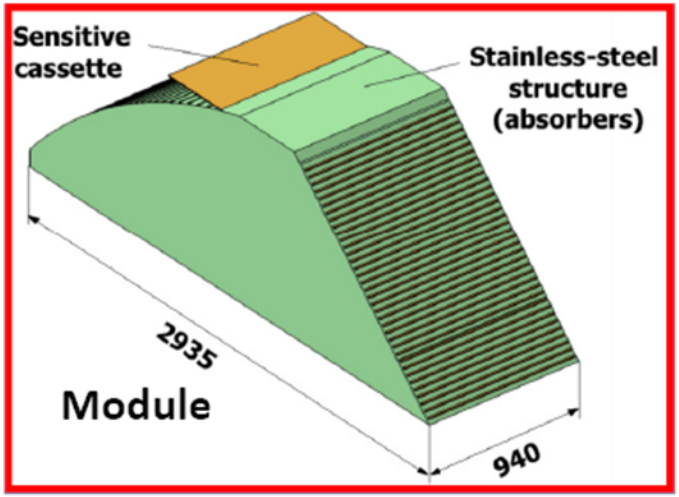
- Integration :
  - **Impact of the 22.5° tilt on the Ecal should be OK**
  - **New design of the Ecal Leakless system to be performed**

SDHCal barrel

- Mechanical concept (JC Ianigro):
  - **Made of 5 rings**
  - **Structure “a la Videau” with 8 modules**
  - **RPC are inserted radialy**
  - **Electronic and services between cryostat and ring**
    - Might allow to reduce the overlap dimension



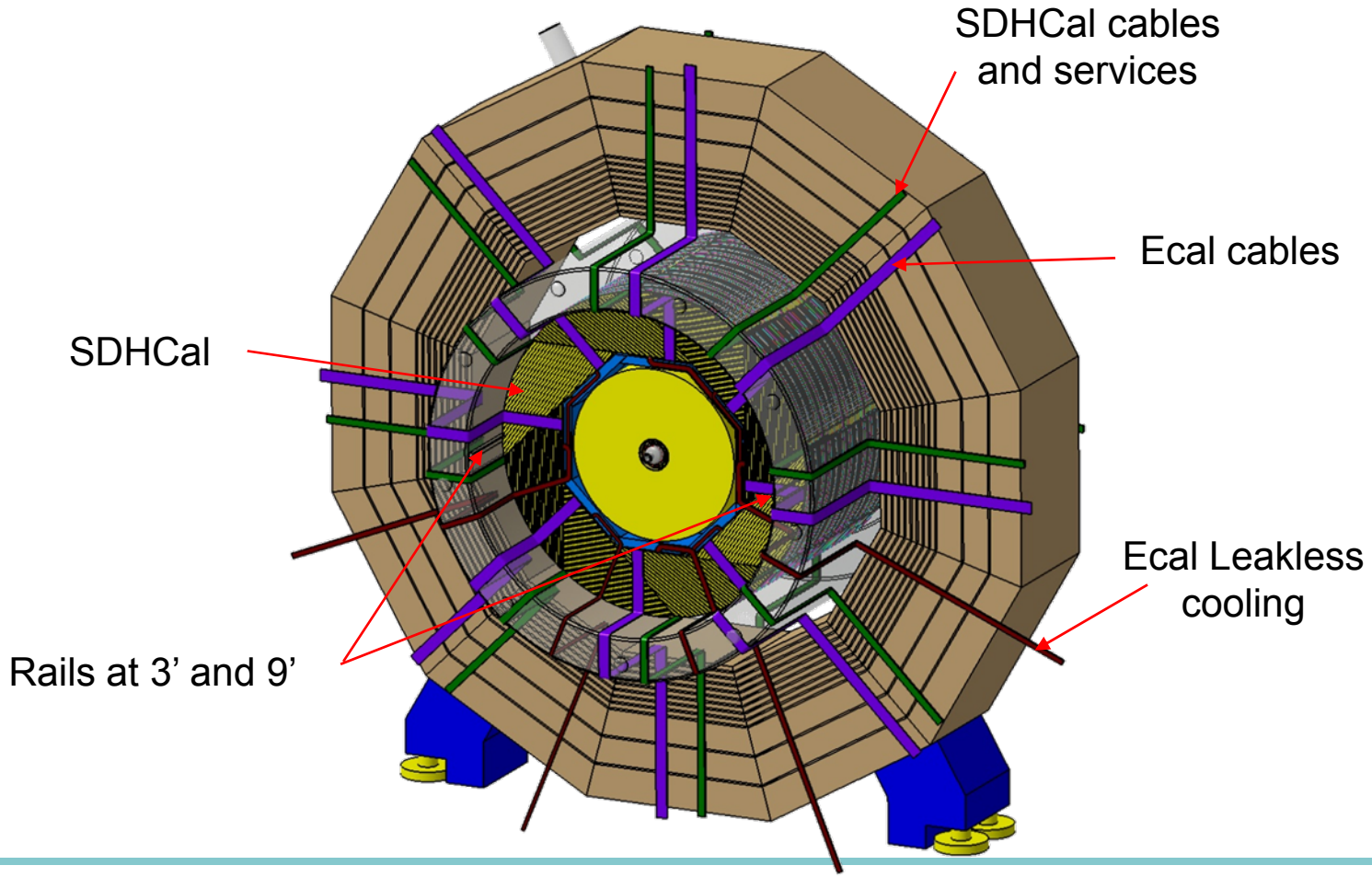




From MC Fouz at CALICE meeting 2011

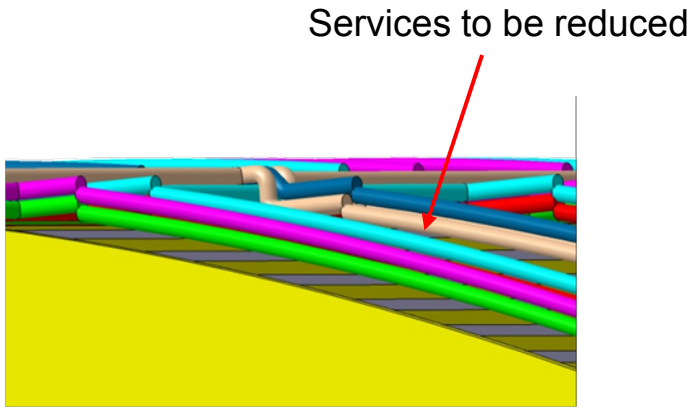
SDHCal in ILD and cables

- Now integrated into the ILD Cad model
- Detailed study on cabling will be done (C. Clerc)
  - **Reducing the overlap seems possible**



SDHCal issues

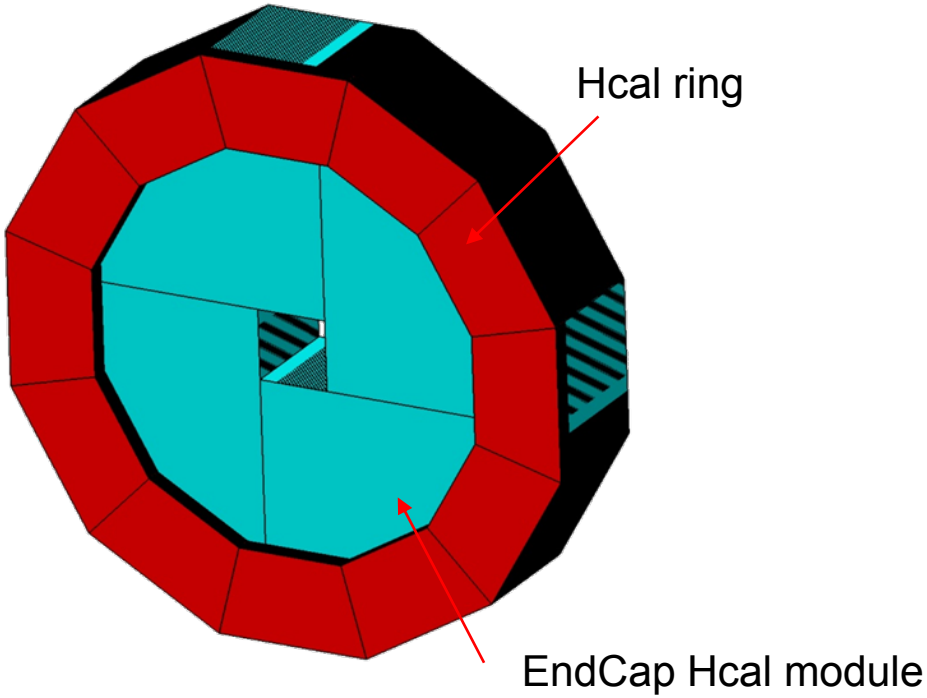
- Barrel :
  - **Dimensions should be revisited to allow some clearance with the cryostat**
    - Impact on the sensitive part
    - New design of the services
  - **Rails system should be studied**
    - Could be the same as the AHCal
    - Arround 50mm is needed



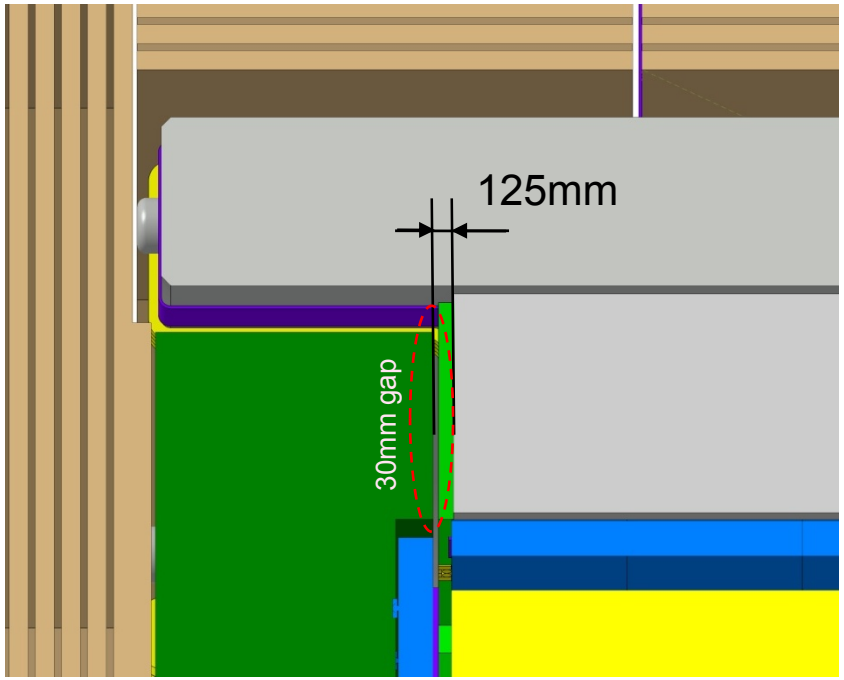
- Integration :
  - **Design of the Ecal leakless system**
  - **Estimation of the total amount of cables in order to optimise the overlap dimension**

EndCap

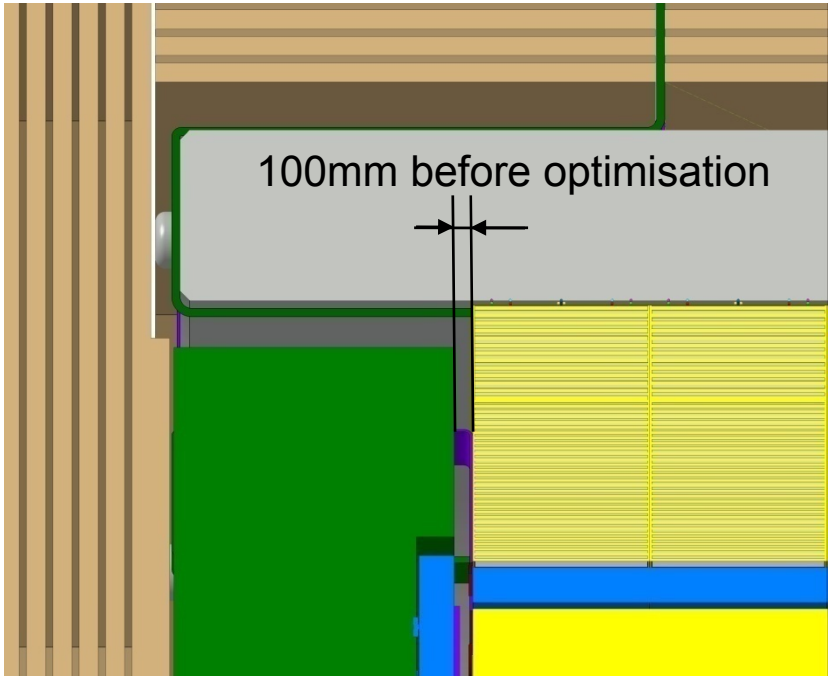
- First design of the EndCap Hcal proposed by Jean Christophe but fits to both concept (RPC or scintillator)
  - **Build in 4 module**
  - **Fixation to the yoke must be studied**
    - Must decouple yoke and HCal
  - **Mechanical behaviour must be understood**



Focus on the overlap region



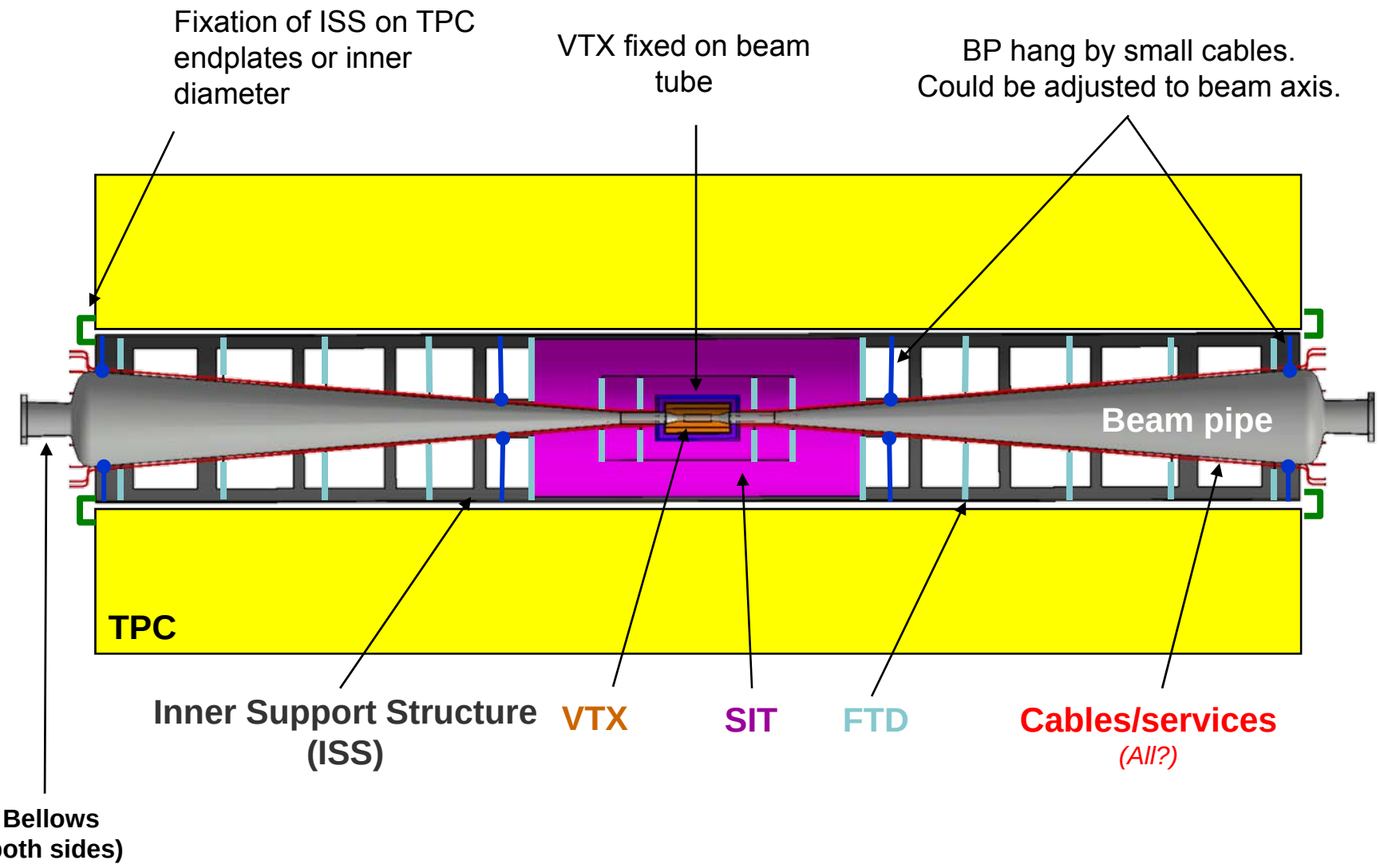
AHCal



SDHCal

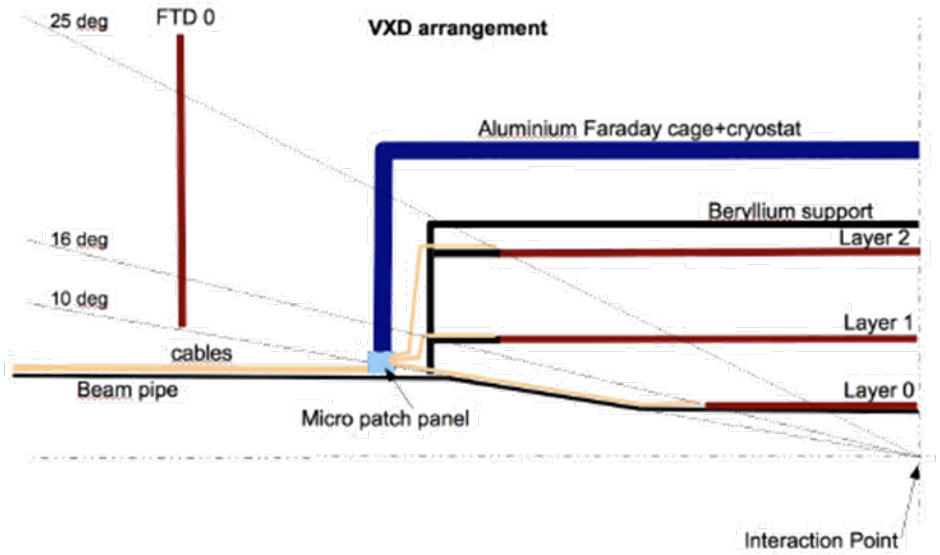
Inner region integration

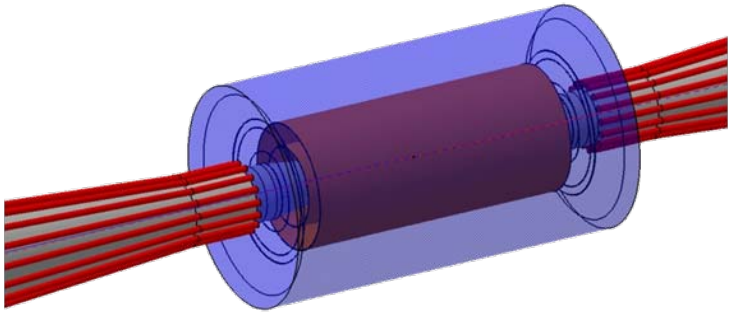
Inner region - reminder



Updates on Vertex

- Some progress has been made on VTX by J. Baudot and al.
  - **Estimation of mechanical material**
  - **First estimation of cables and power needs**
  - **Cooling depends on the technology :**
    - Air flow for CMOS
    - CO2 evaporation in pipes for CCD -> real cryostat

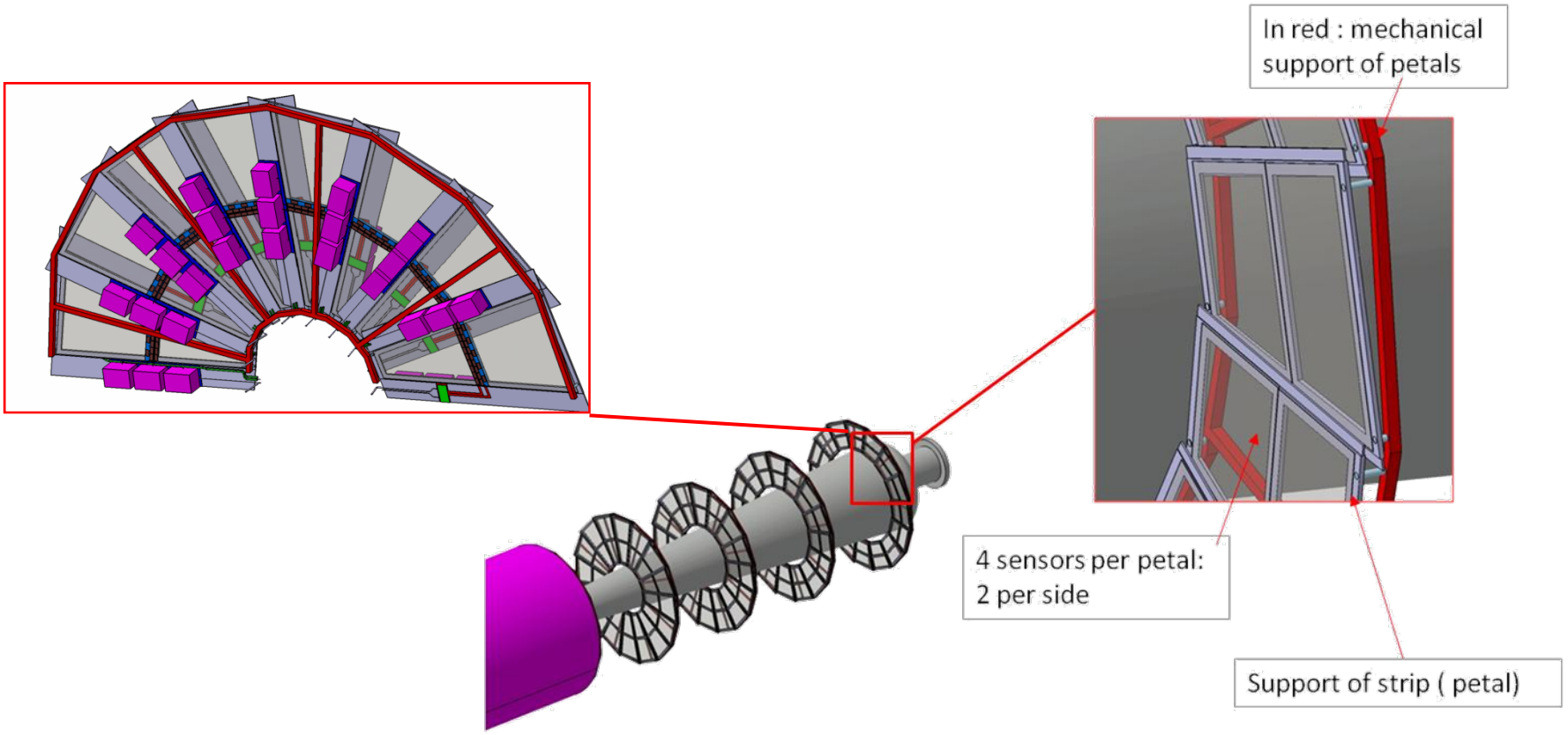




VTX in the ILD CAD model

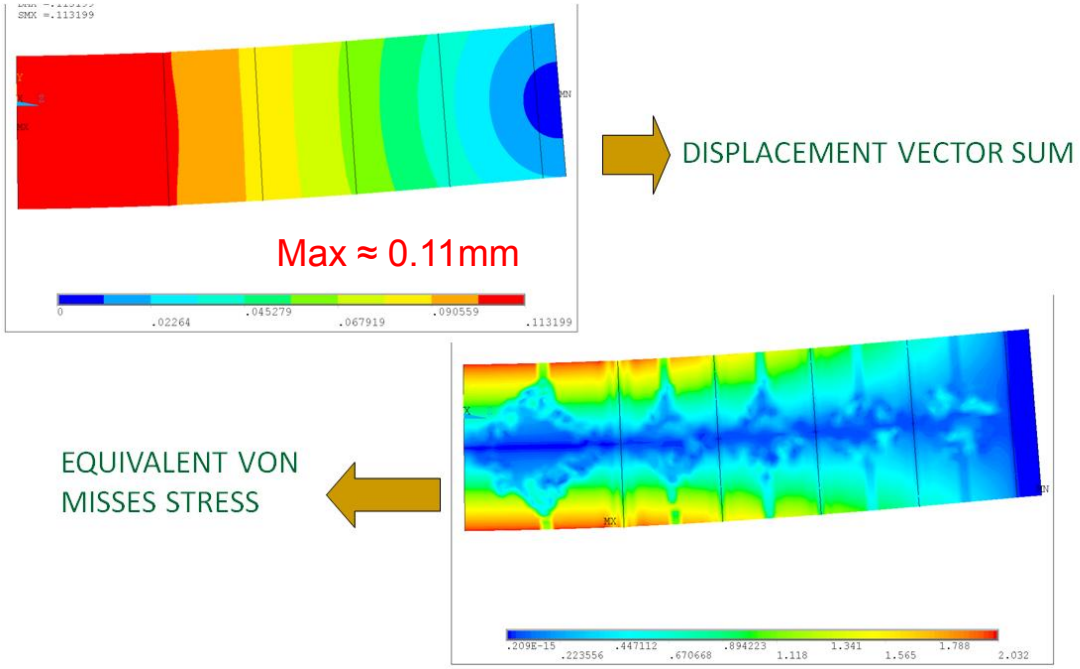
Updates on FTD 3->7

- On FTD3->7 by David Moya and al.
  - **Mechanical design of petals**
  - **Estimation of the cable amount and positions**
  - **Cooling must be studied (probably air cooling)**



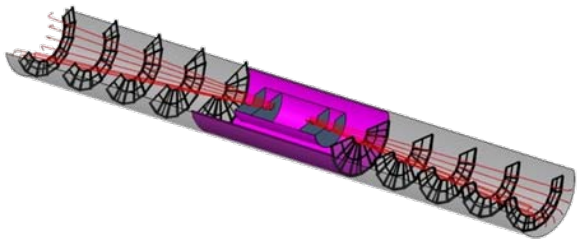
Inner supporting structure

- David also performed FEA calculations on the tube
- Results :
  - **Material used for the composite: MTM45/IM7**
  - **Cylinder eight Layers 1,04 mm thickness with 0º/90º/45º/-45º config.**
  - **Rings four Layers 0,52 mm thickness**



Current assembly procedure

1



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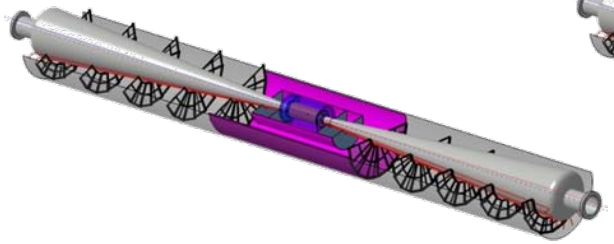

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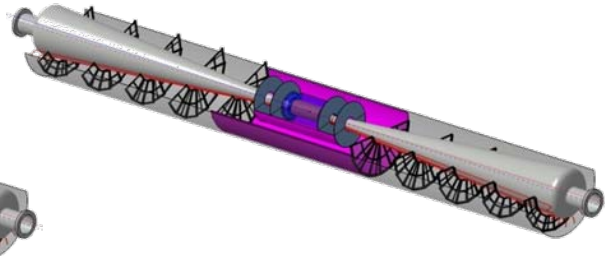

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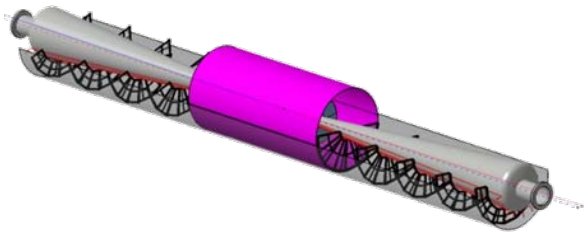

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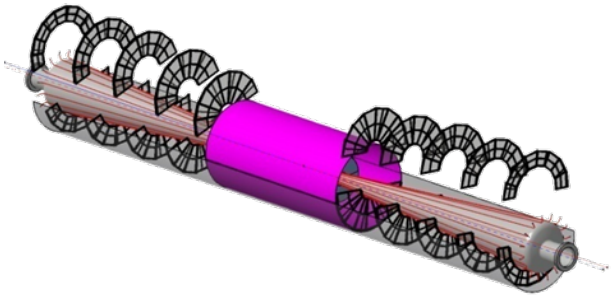

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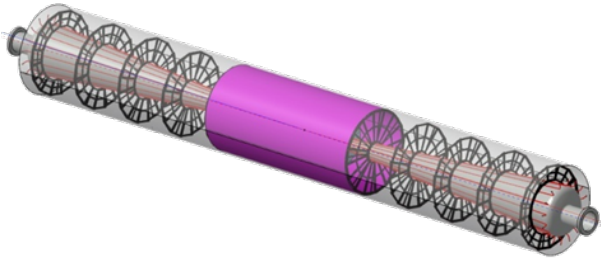


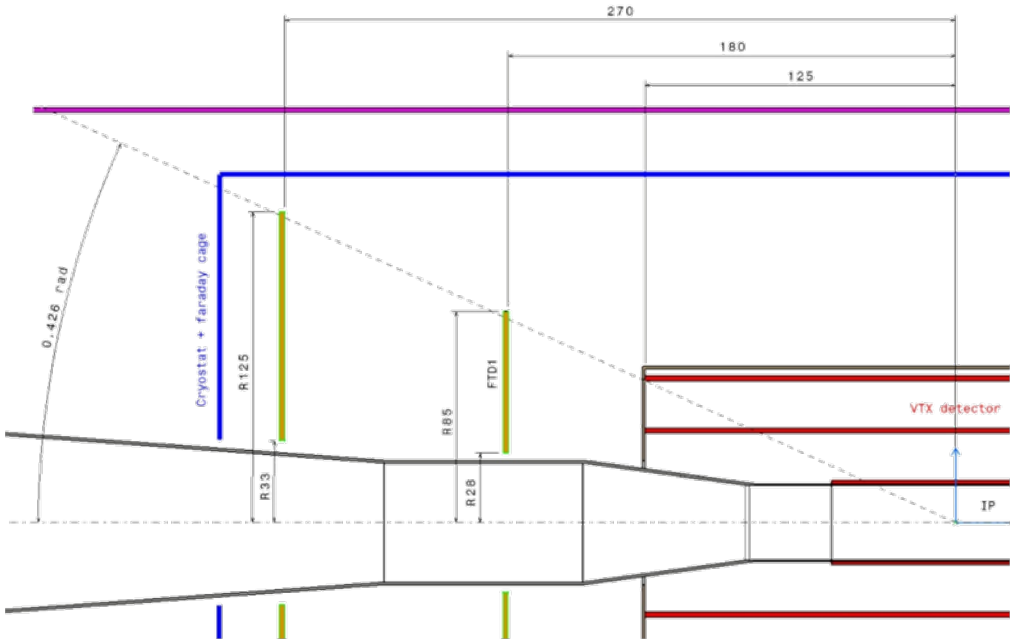
Some open issues

- SIT :
  - **Mechanical structure?**
  - **Cables amount and path ?**
  - **Cooling**
  - **No one identified at the moment**

- FTD1&2 cables and support?
- BP support : wires?
- Tooling
- Etc…

Discussions about FTD1&2 and VTX

- FTD1&2 use Pixel sensors
  - **Might need a cryostat and a faraday cage as the Vertex**
- Discussion ongoing to review their integration :
  - **Integrated in the same cryostat than the VTX**
  - **Position and dimensions would be modified**
  - **Integration procedure too**
  - **Any comments?**



Conclusions

- Hadron Calorimeters :
  - **Both concepts are now integrated in the ILD CAD model**
  - **Some remaining issues :**
    - Overlap region optimisation for the SDHCal (services integration)
    - Rail design on coil for both
    - EndCap design and fixation to the yoke

- Inner region
  - **Better understanding of the VTX and the FTD 3->7**
  - **Still missing informations on the SIT and FTD1&2 !**
  - **Some information could be implemented into the simulation**
    - Rough estimation of cables and route
    - CFRP supporting tube

- Still some remaining studies for DBD 2012 :
  - **TPC fixation**
  - **Inner Supporting tube fixation and tuning**
  - **Forward region, etc…**