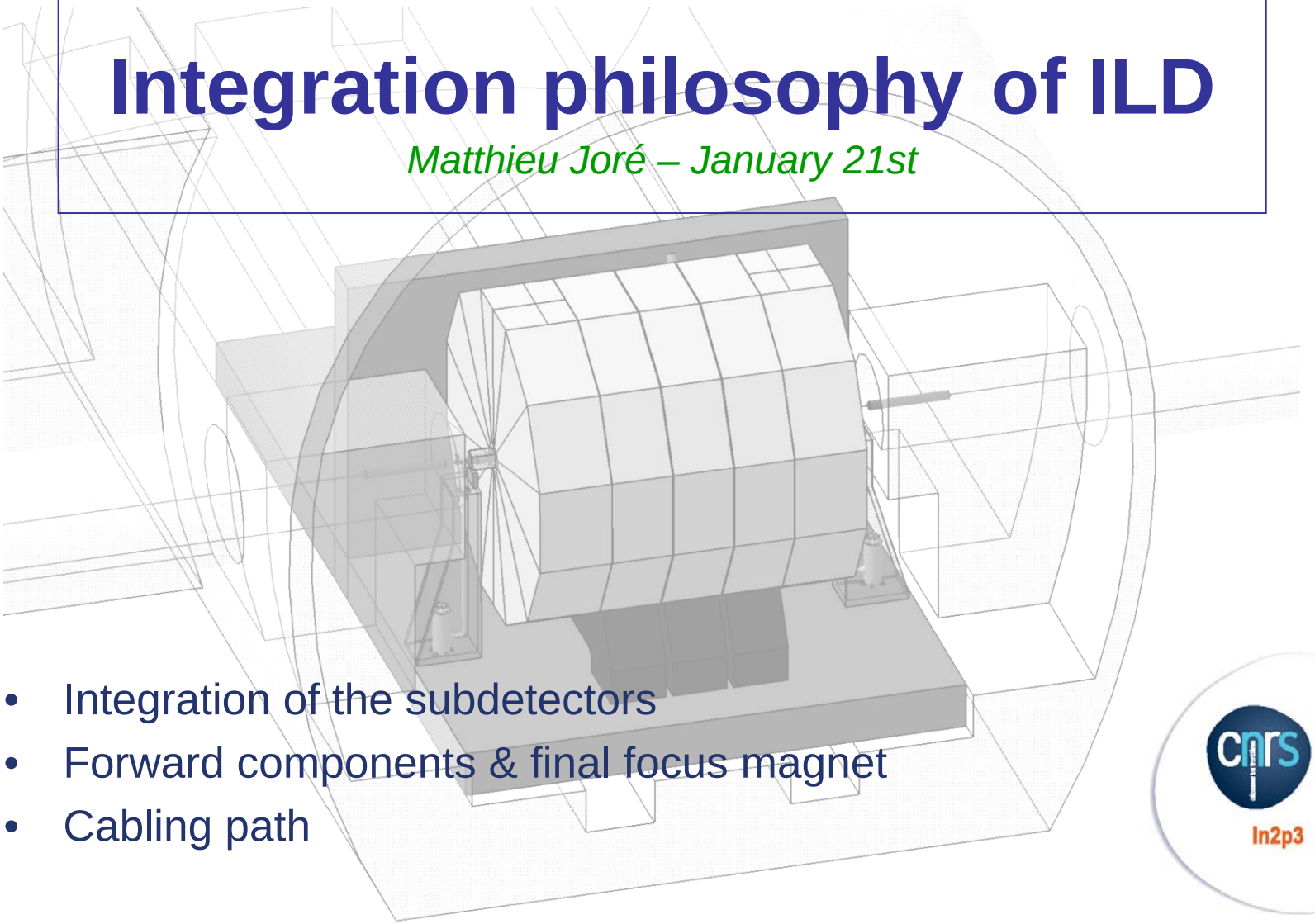
Integration philosophy of ILD

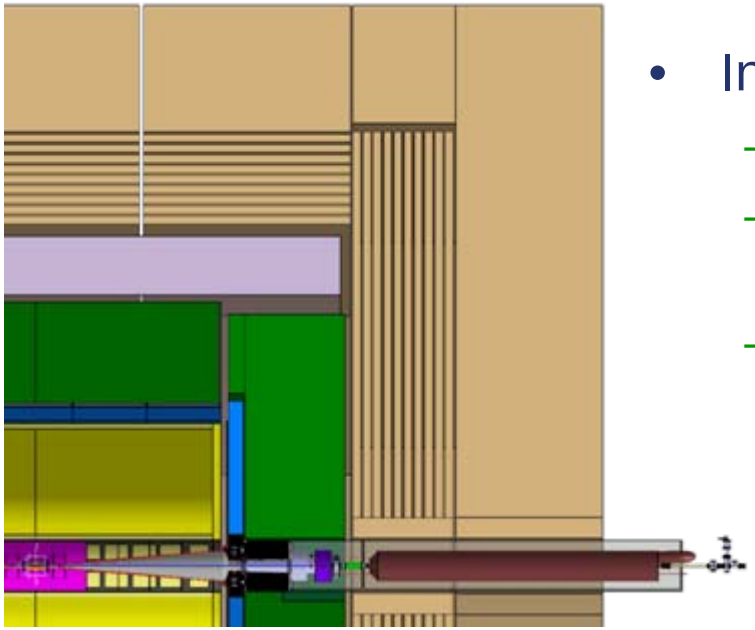
Matthieu Joré – January 21st



- Integration of the subdetectors
- Forward components & final focus magnet
- Cabling path

Introduction

- ILD Reference parameters (not final…)
  - **ECAL : Si/W**
  - **HCAL : AHCal with Scintillator/SS**
  - **8 folds for Calorimeters, 12 folds for return yoke**
  - **Vertex : 3 twin layers**
  - **Field : 3,5T (but still possible to operate at 4T)**
  - **TPC tracker**



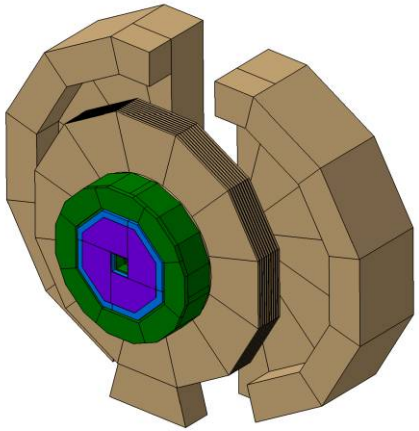
- Integration largely inspired from CMS design
  - **Assembly scenario (see Catherine's talk)**
  - **Compact detector (14mx14m – more than 14000t now)**
  - **Always try to have an easy maintenance scenario and integrate as compact as possible**

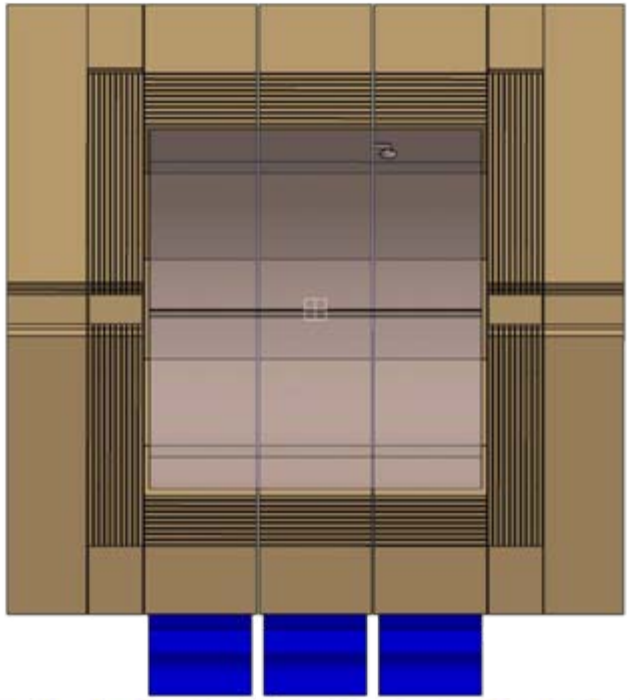
Yoke design

- Barrel yoke segmented in 3 pieces :
  - **Central supports , muon chambers, coil, barrel calos and TPC**
  - **2 others supports muon chambers**

- Doors segmented in 3 pieces :
  - **Front : 10 muon chambers layers + EC Calos**
  - **Back : split in 2 to maximise access both on/off beam**

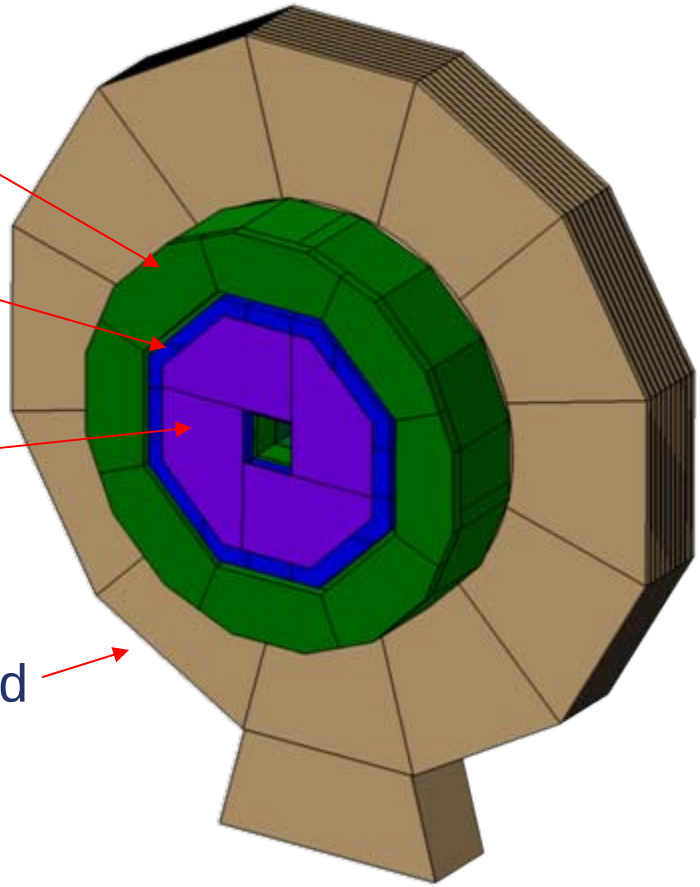
(see "ILD on Beam position" and Catherine's talk)

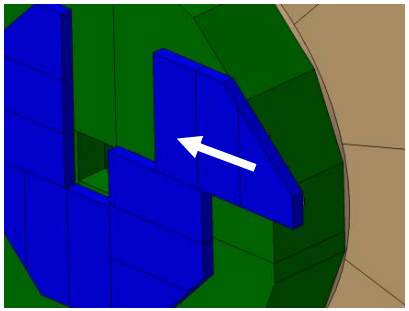




EndCap

- HCal
  - **attached to FSP**
  - **segmented in 4 modules**
  - **Rings screwed on HCal**
- ECal
  - **supported via rails to HCal**
  - **several configurations under study**
- ETD
  - **screwed on ECal (?)**
  - **segmented in 4 modules**
- Different muon chambers insertion method

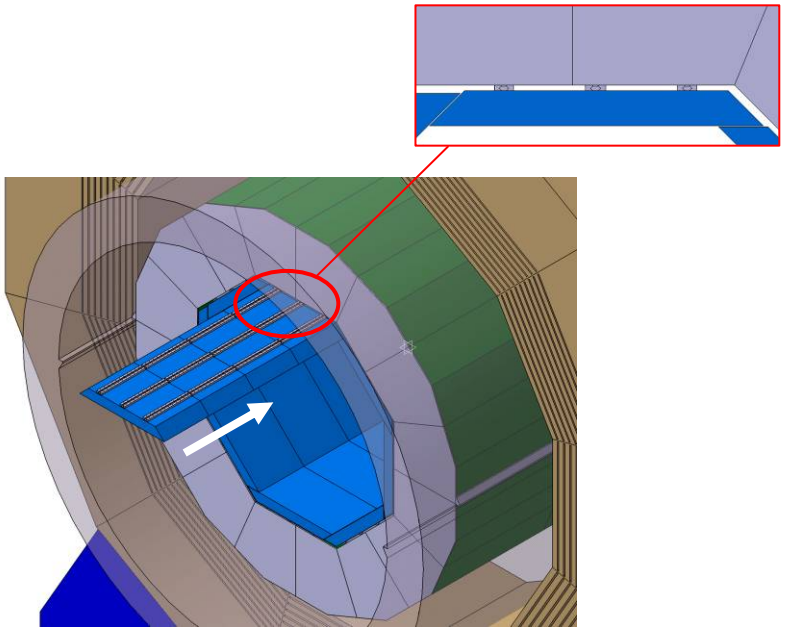


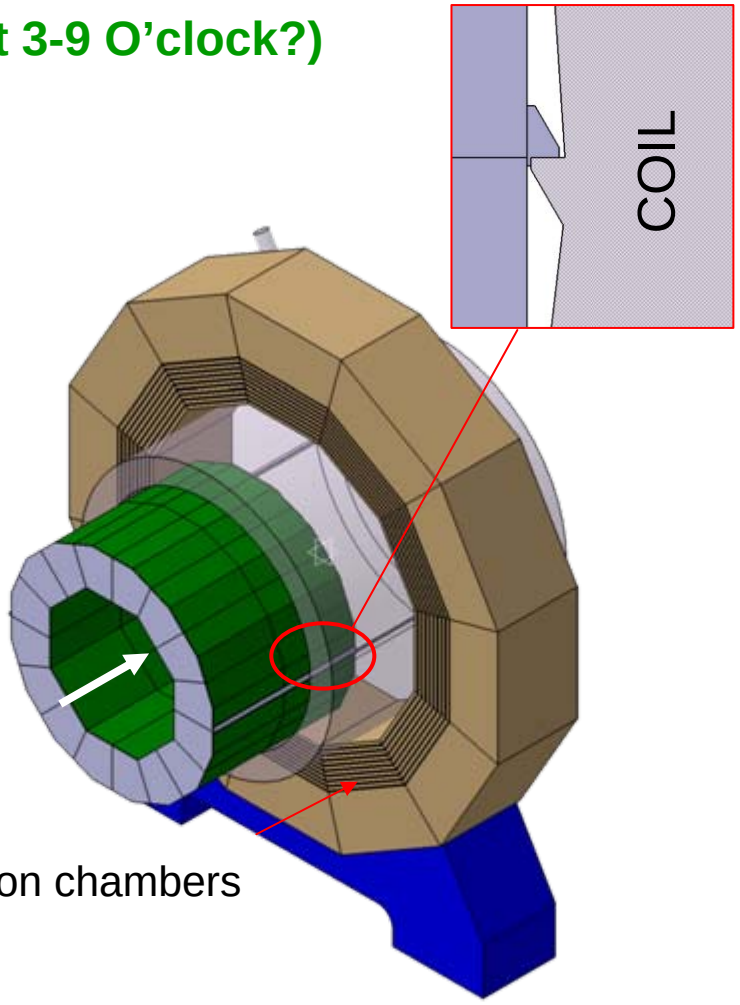


ECal insertion

Barrel calorimeters

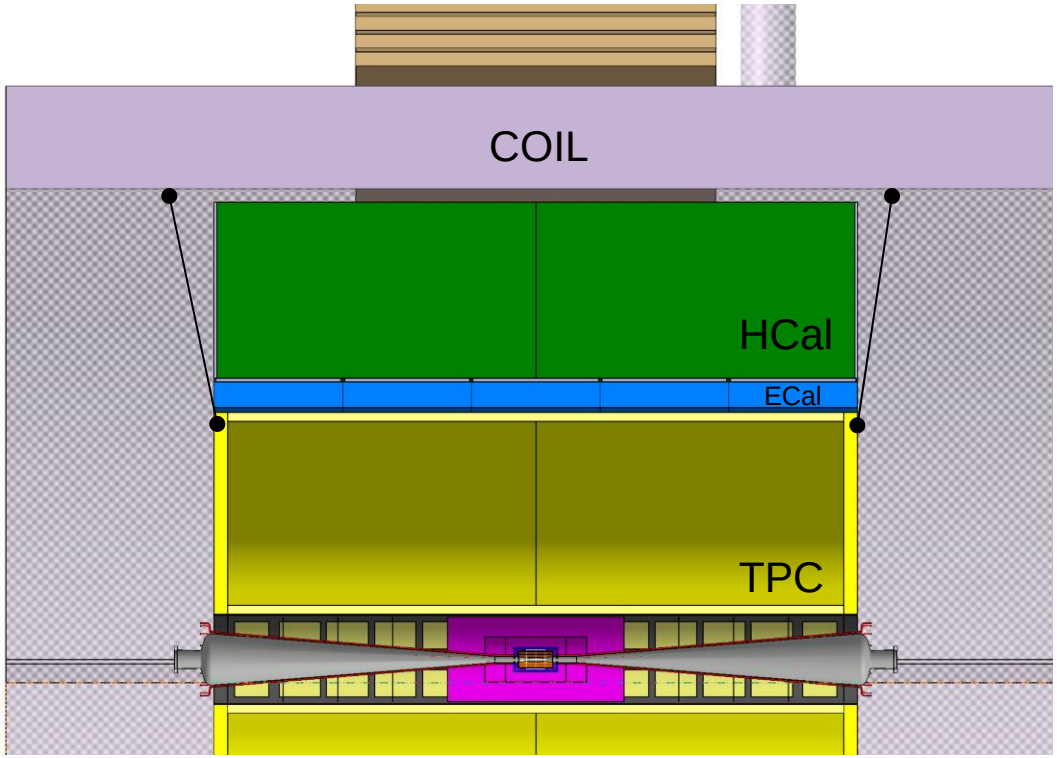
- HCal (chosen solution for LoI parameters) :
  - **Split in 2 rings**
  - **Supported by rails on coil cryostat (at 3-9 O'clock?)**
- ECal :
  - **Segmented in 8 staves of 5 modules**
  - **Slit with rails screwed on HCal**





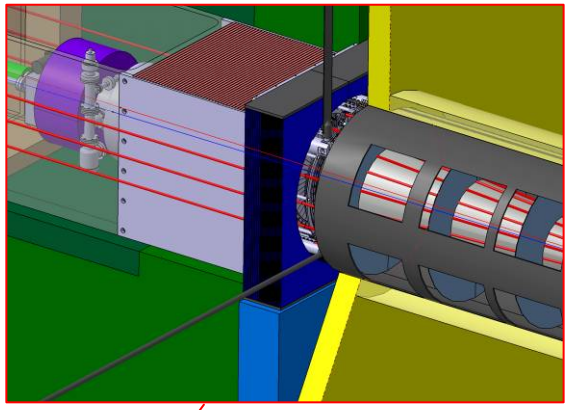
TPC and Inner detectors/BP

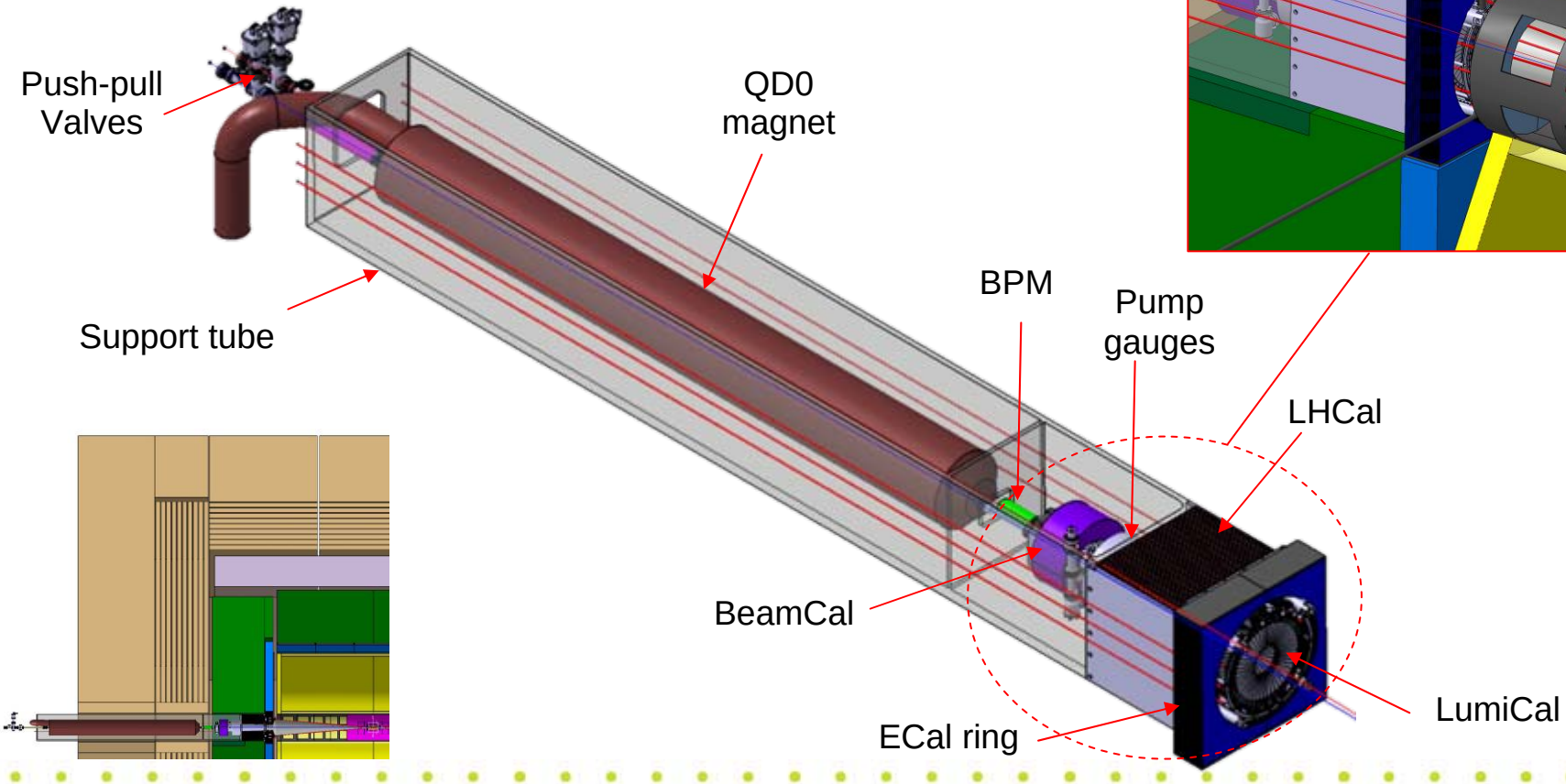
- TPC hanged from coil : solution need to be designed
- Inner detectors/beam pipe supported from TPC endplates or inner tube
  - **Allow to adjust beam pipe/vertex/FTS/SiT independently of the forward support tubes' position**



Forward components

- Support tube which supports all these components
  - **Forward Calos : LumiCal, ECal ring, LHCal, BeamCal**
  - **Vacuum components and beam diagnostics**
  - **Final focus magnet (big challenge!)**



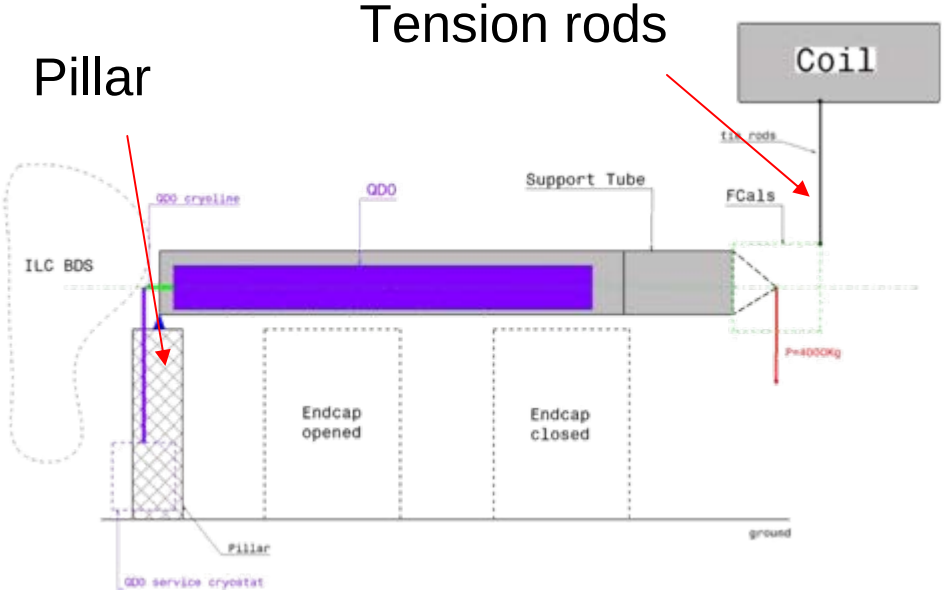


Support tube (1)

- High requirements on support tube
  - **Good vibration performance (QD0 stability)**
  - **Allowable amplitude**
    - Few mm in static load
    - About 50nm for ground motion (IR interface document)
  - **Alignment system is needed (in a mm range)**
  - **Good results from Yamaoka's calculations**

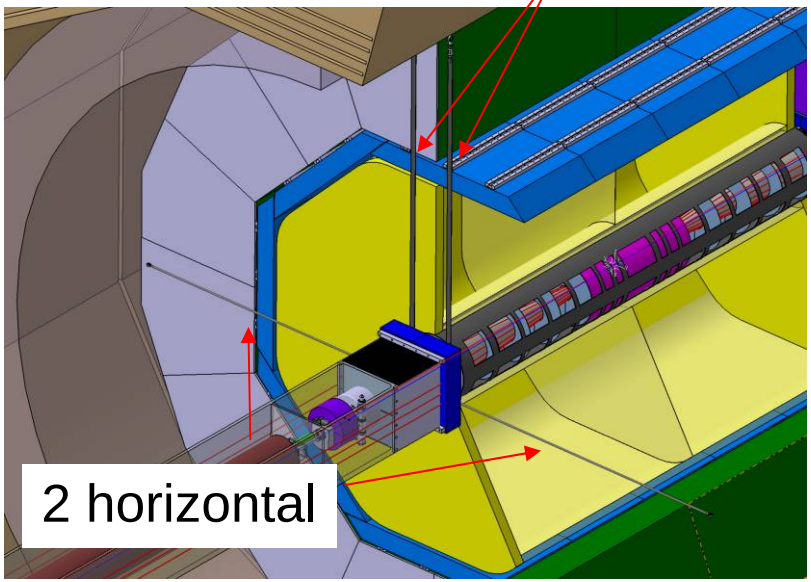
Tension rods

Pillar



Principle

2 vertical

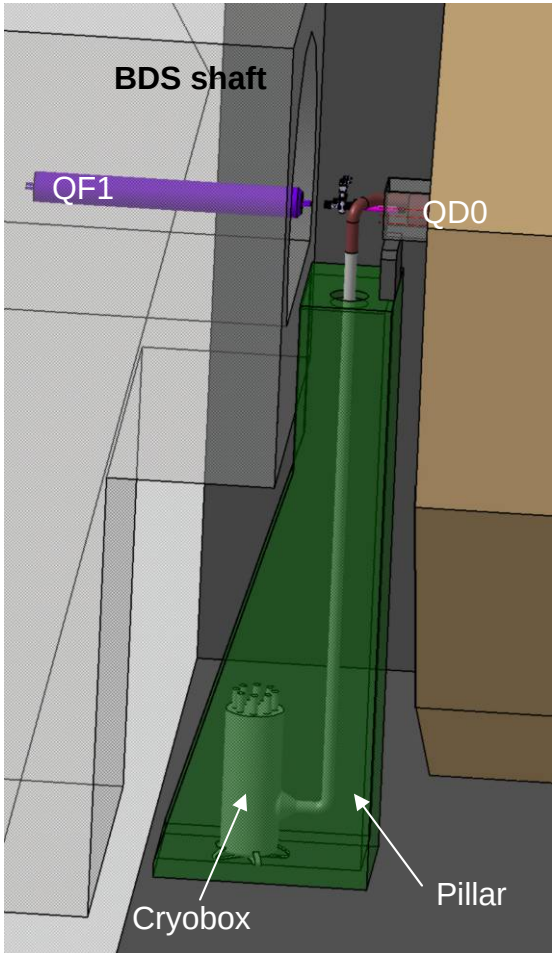


In ILD detector

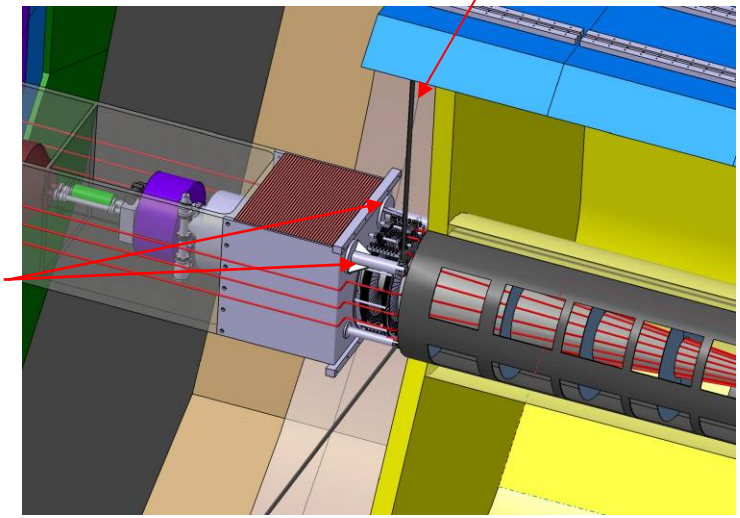
Support tube (2)

- Pillar has several roles:
  - **Support the tube (has to be designed)**
  - **Support the cryoline and the cryobox**
  - **A part of the pacman ?**
  - **Must be pulled out in garage position**
  - **Allow access to valves/pumps**

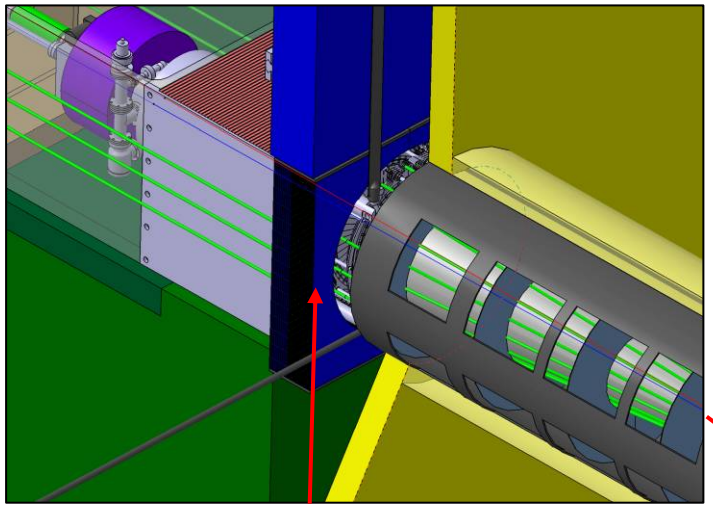
  (on/off beam position)



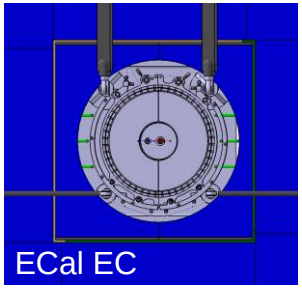
- Tensions rods

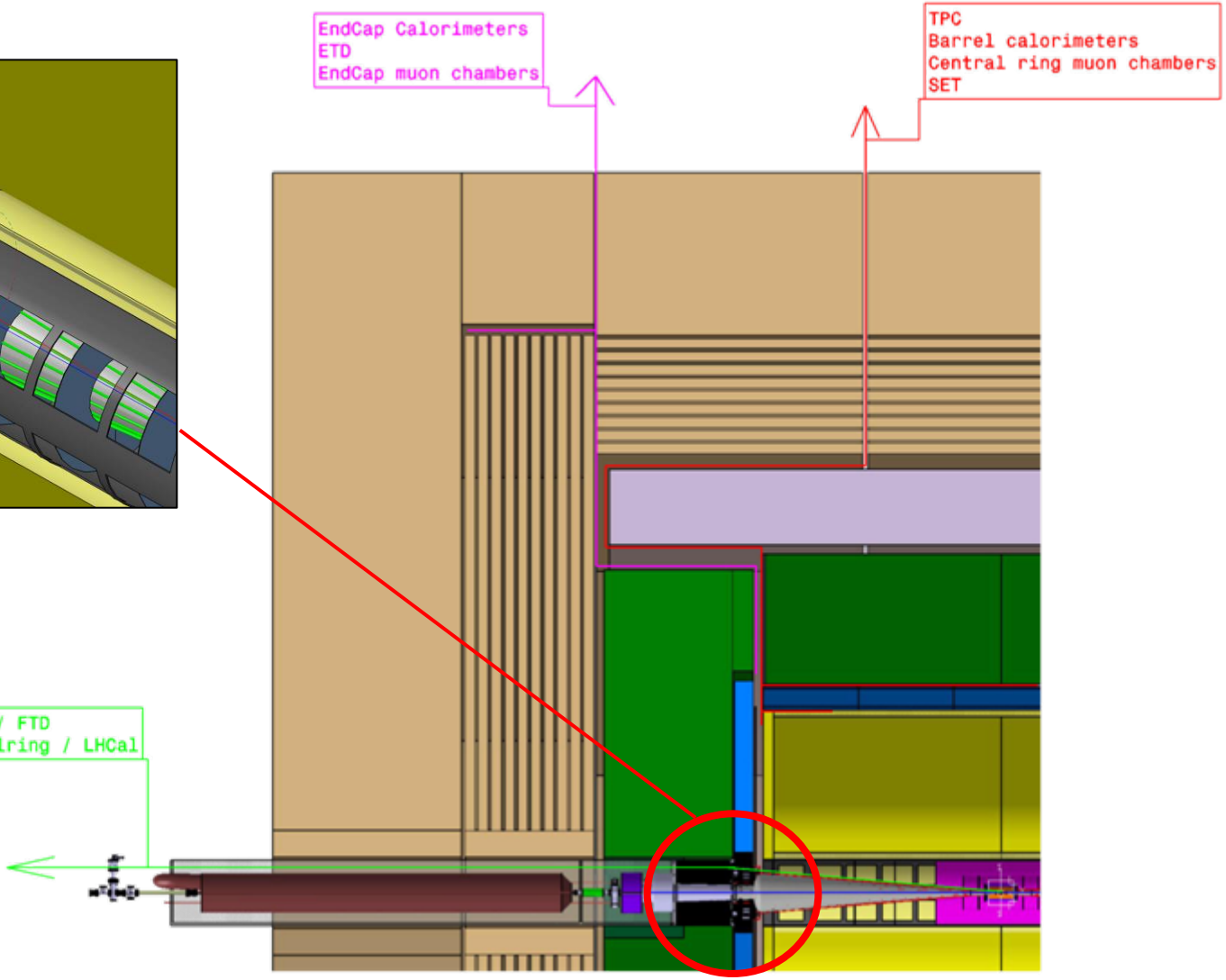


Cabling/services path



Inner cables/supplies
behind the ECal ring





Conclusions & Perspectives

- Quite well detailed design

- But still need effort to solve some remaining issues :
  - **under study :**
    - Cabling path : chimney or gap and influence on Stray Field
    - Support tube behavior
    - EndCap structure + yoke feet
    - Beam pipe shape
    - Vacuum
    - …
  - **need to be studied and designed (for the LoI?):**
    - Support system between pillar and tube
    - TPC mechanical support
    - Inner detectors integration and their support
    - …