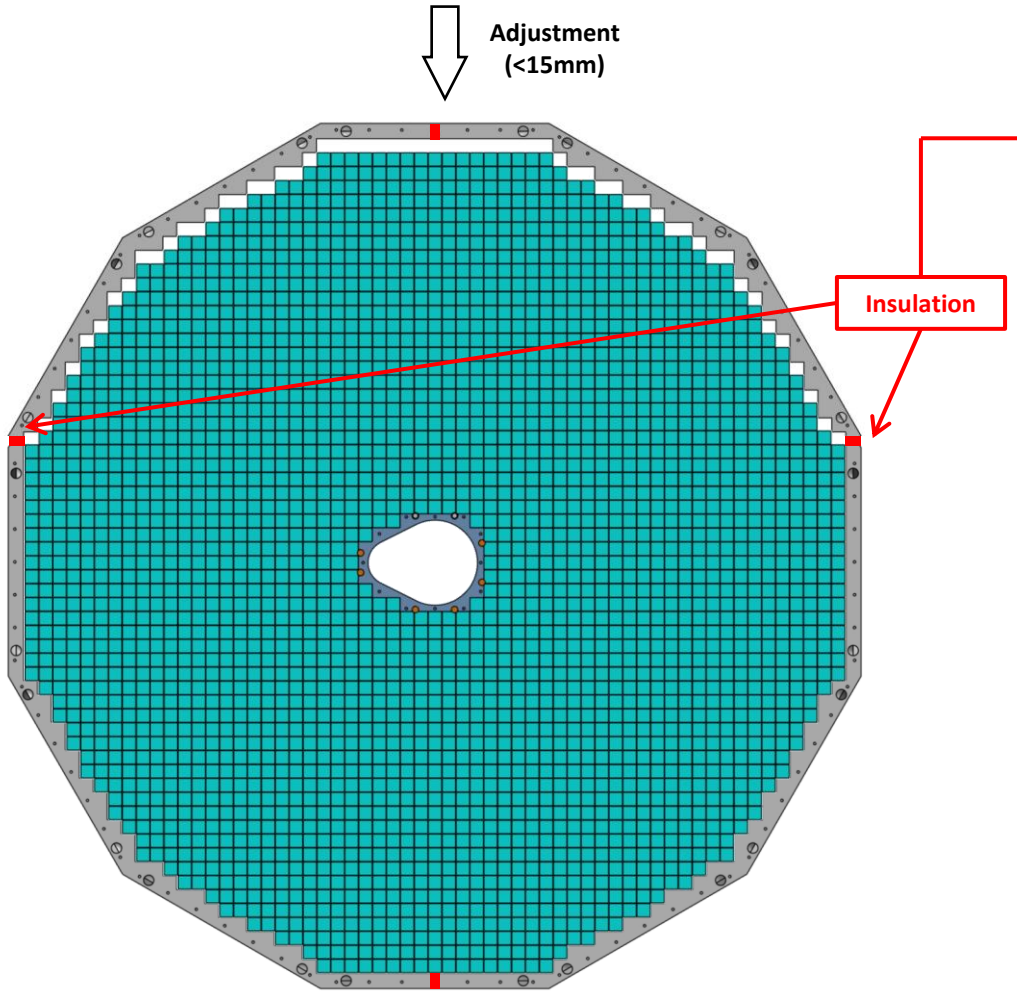
Backward Ecal / EEEMCal

Triple I Engineering Meeting Update (23/02/2026)

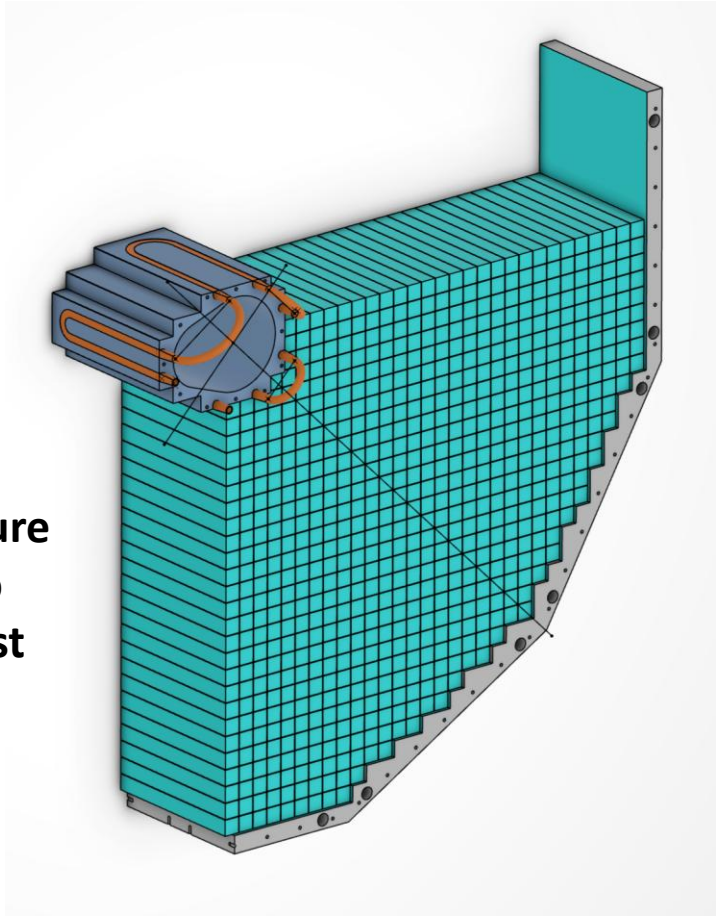
Julien Bettane

Prototype External structure – FSW

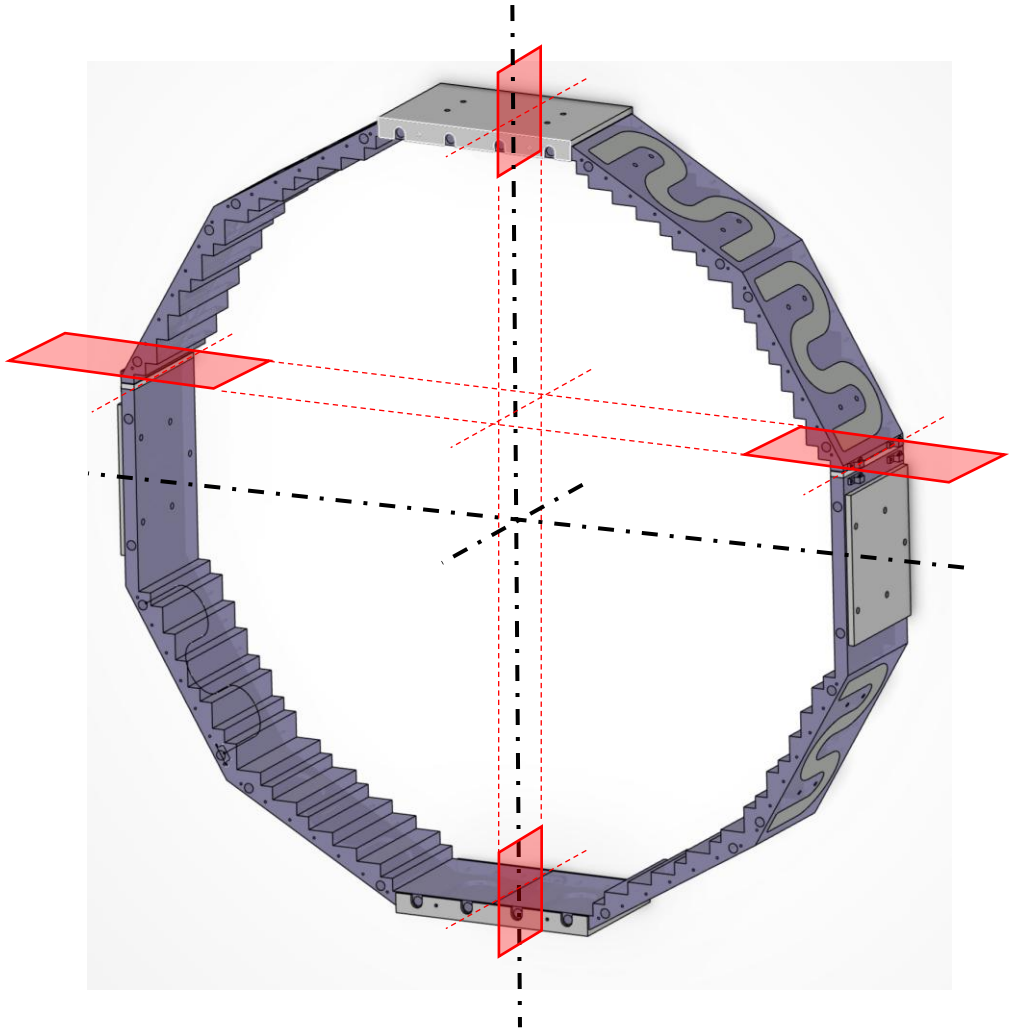


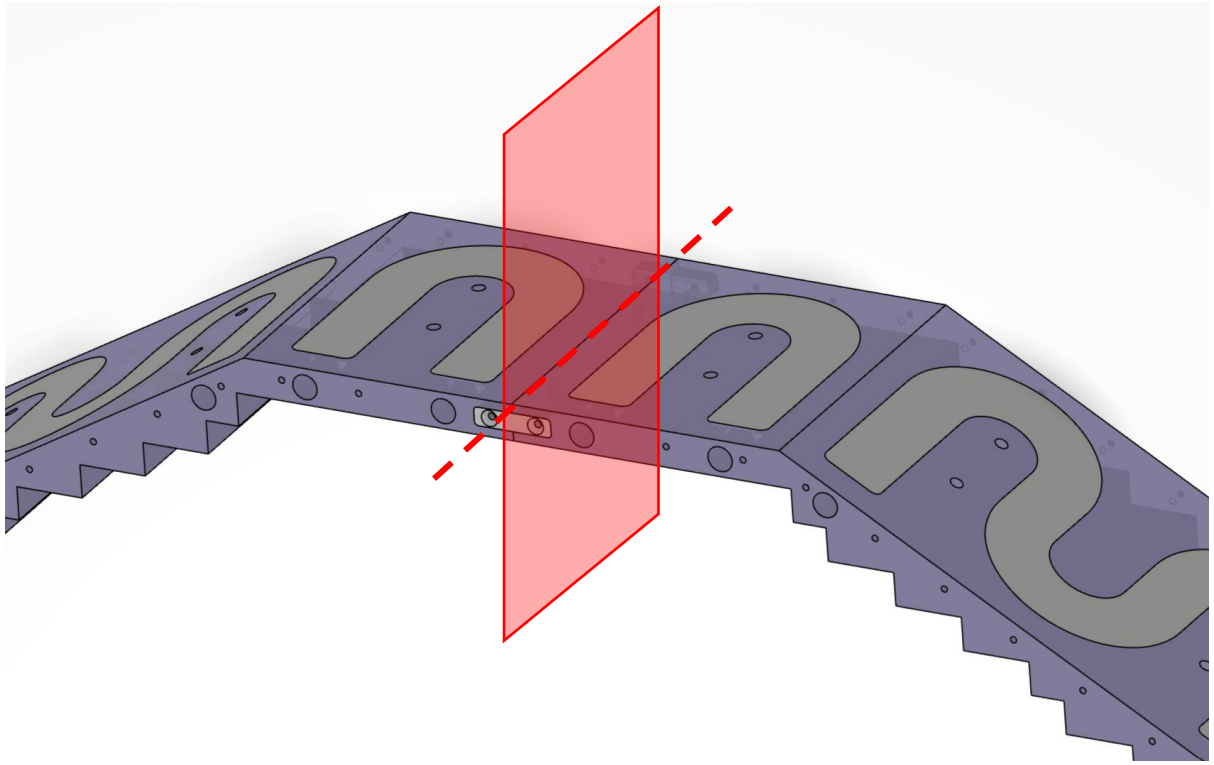
- External structure not machined in one block
  - *Better for the Eddy current*
  - *Better for the contact with crystals on the top (cooling)*
- Better for the adjustments

External structure in 4 blocks to reduce the cost



Prototype External structure – FSW





Mechanical structure with cover plate (5mm) on the top and the bottom

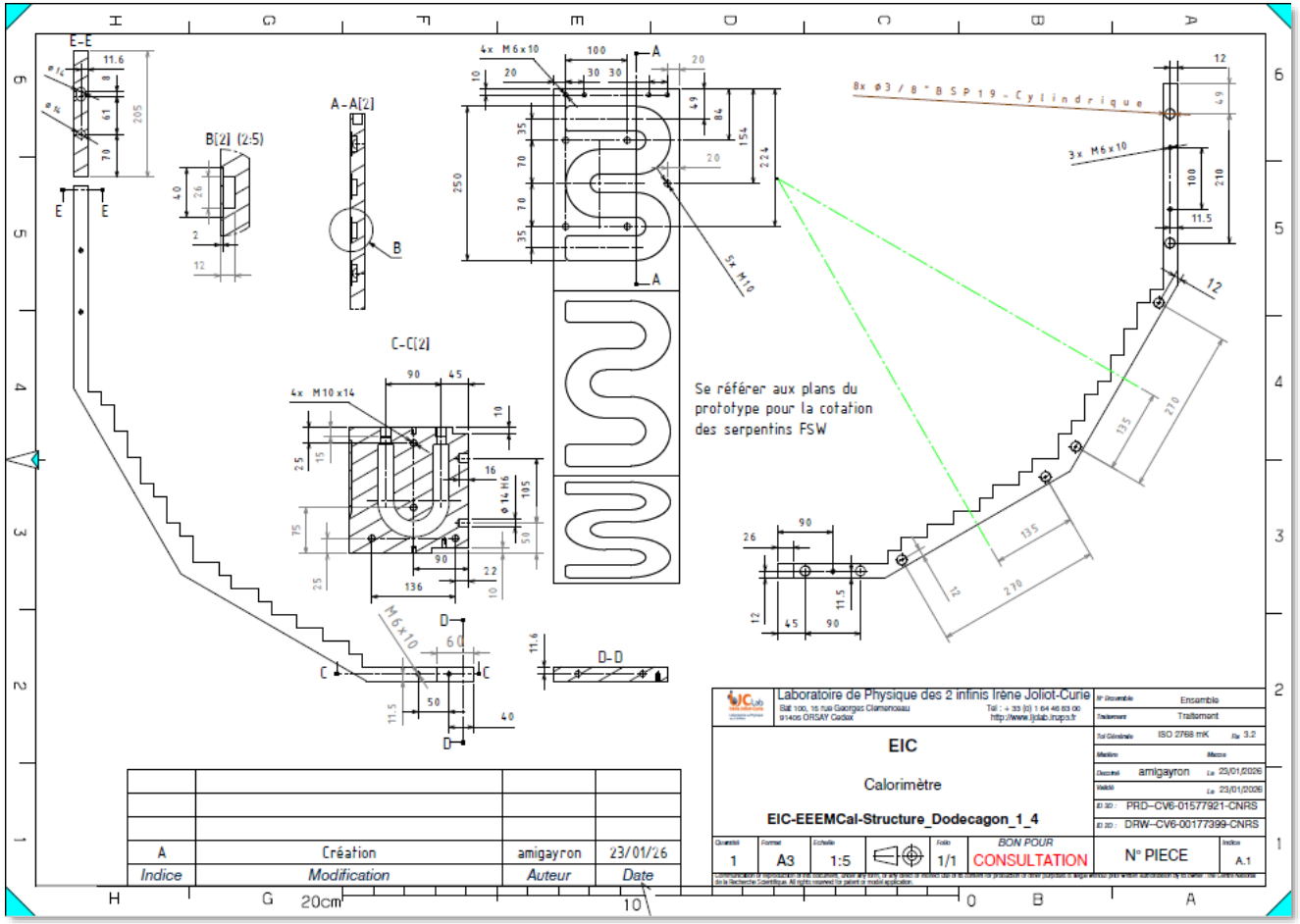
→ **FEA to be consolidated**

Prototype External structure – FSW

- ❑ Quote in progress
- ❑ 7 companies contacted

- ❑ **First step (prototype)**
  - ¼ machined
  - Check tolerances
  - Test stress
  - Check deflection

- ❑ **Second step**
  - The rest of the structure
  - Assembly & tests



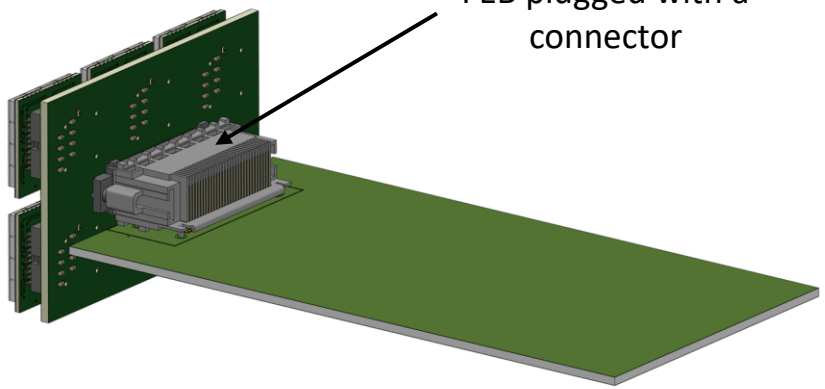
Electronics

Two options considered:

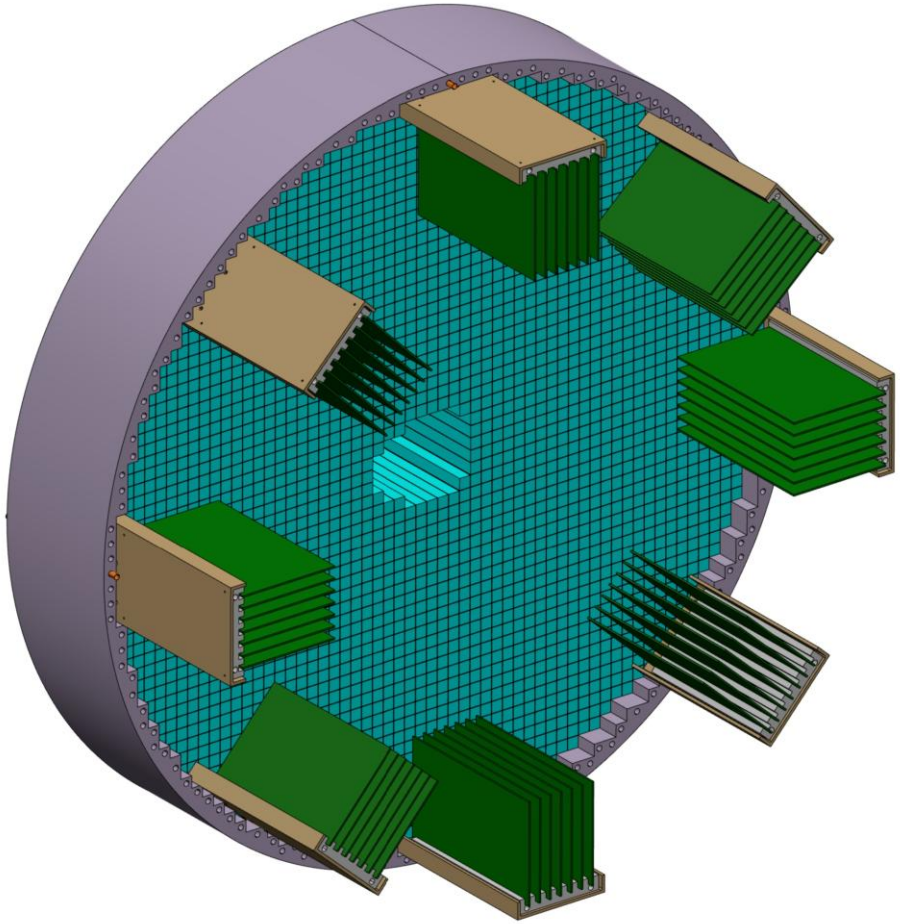
- **Baseline → discret electronic**
  - PCB + cables
  - All around the detector

- **Alternative → Asics**
  - 1) FEB directly plugged on the interposer fastened on the crystals (no cables)
  - 2) FEB linked with cables on the interposer, all aound the detector

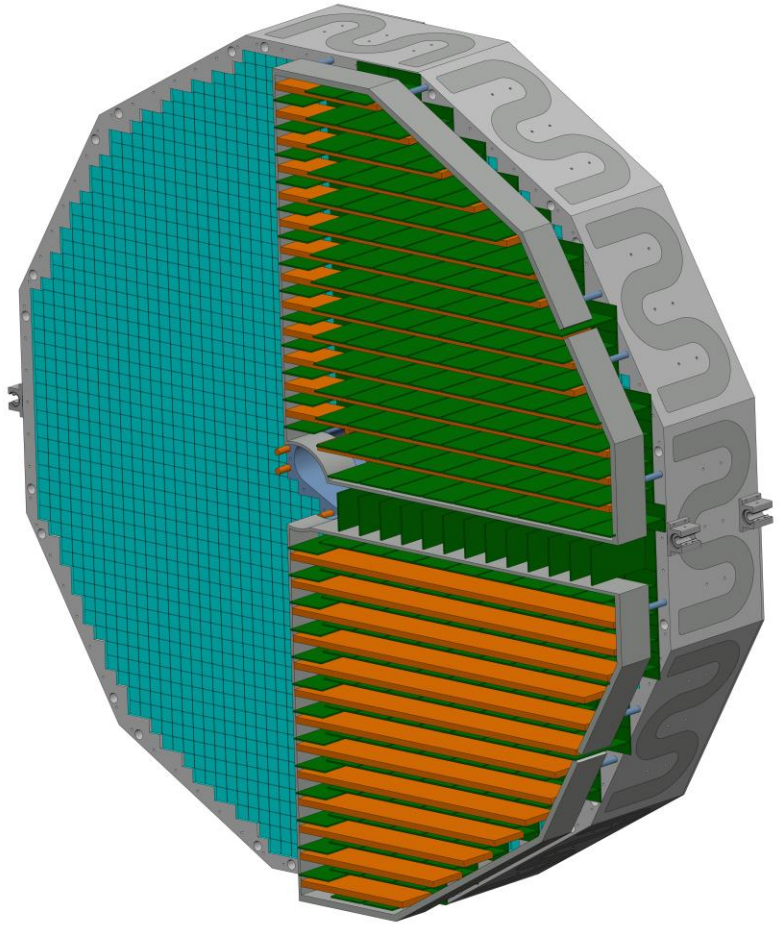
1 FEB for 6 crystals



Electronics – Cooling

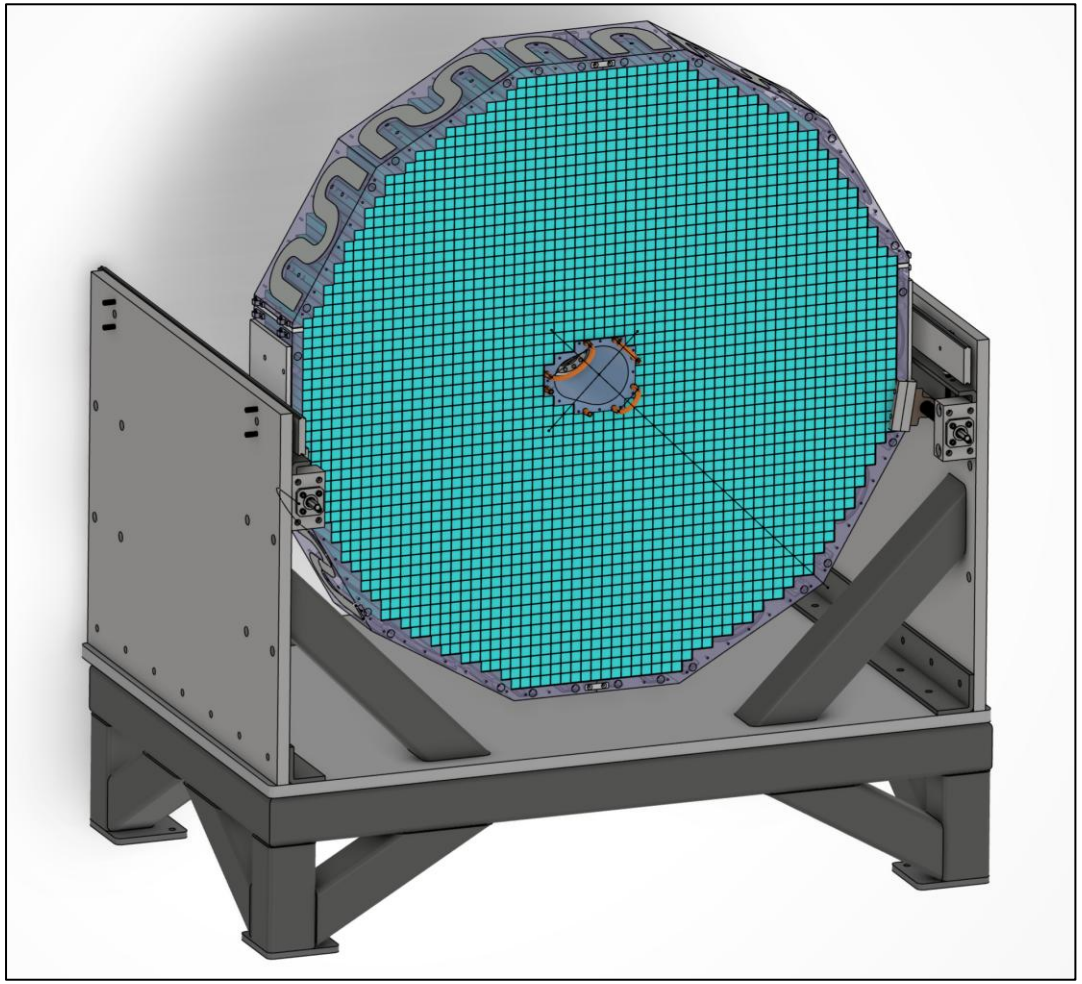


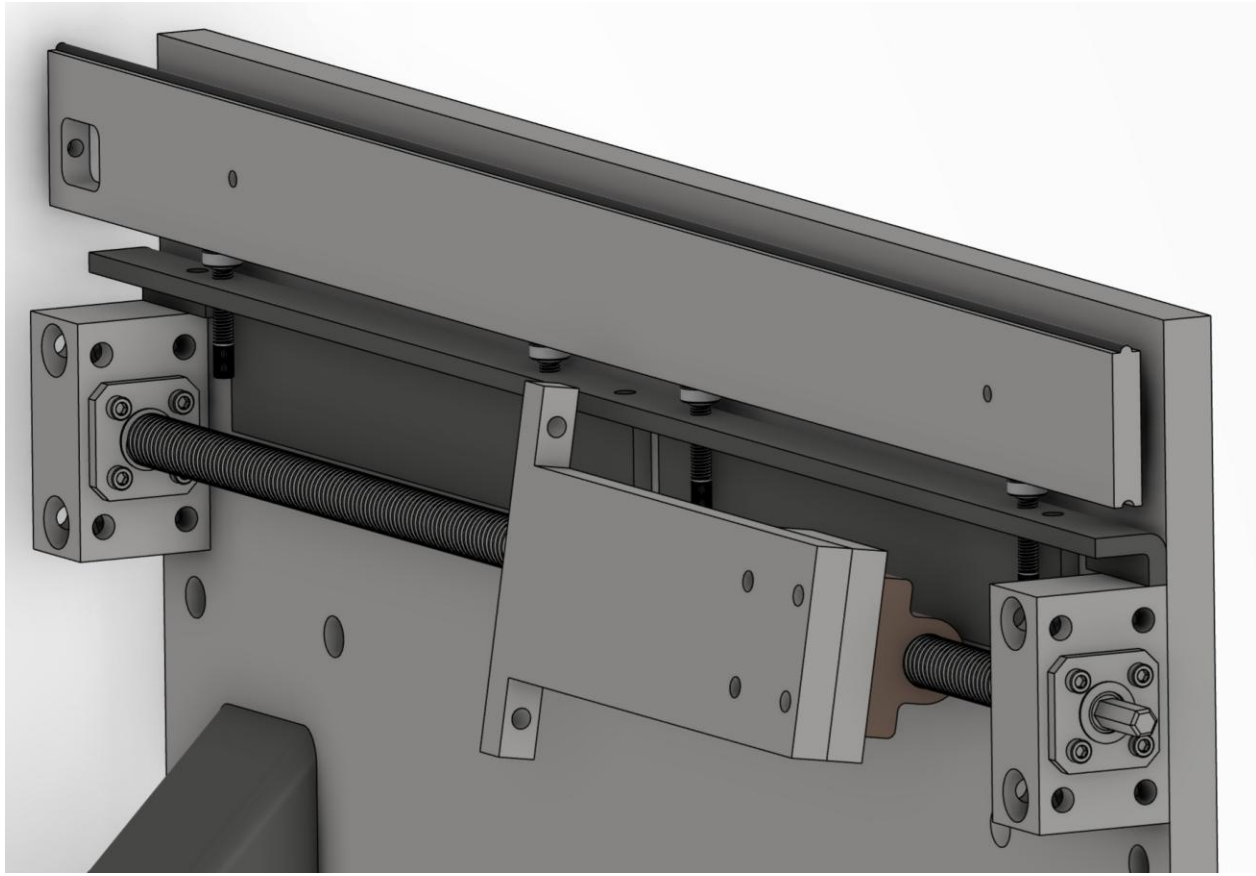
Baseline (discret)
With PCB on racks cooled



Alternative (Asics)
With FEB on cold plates

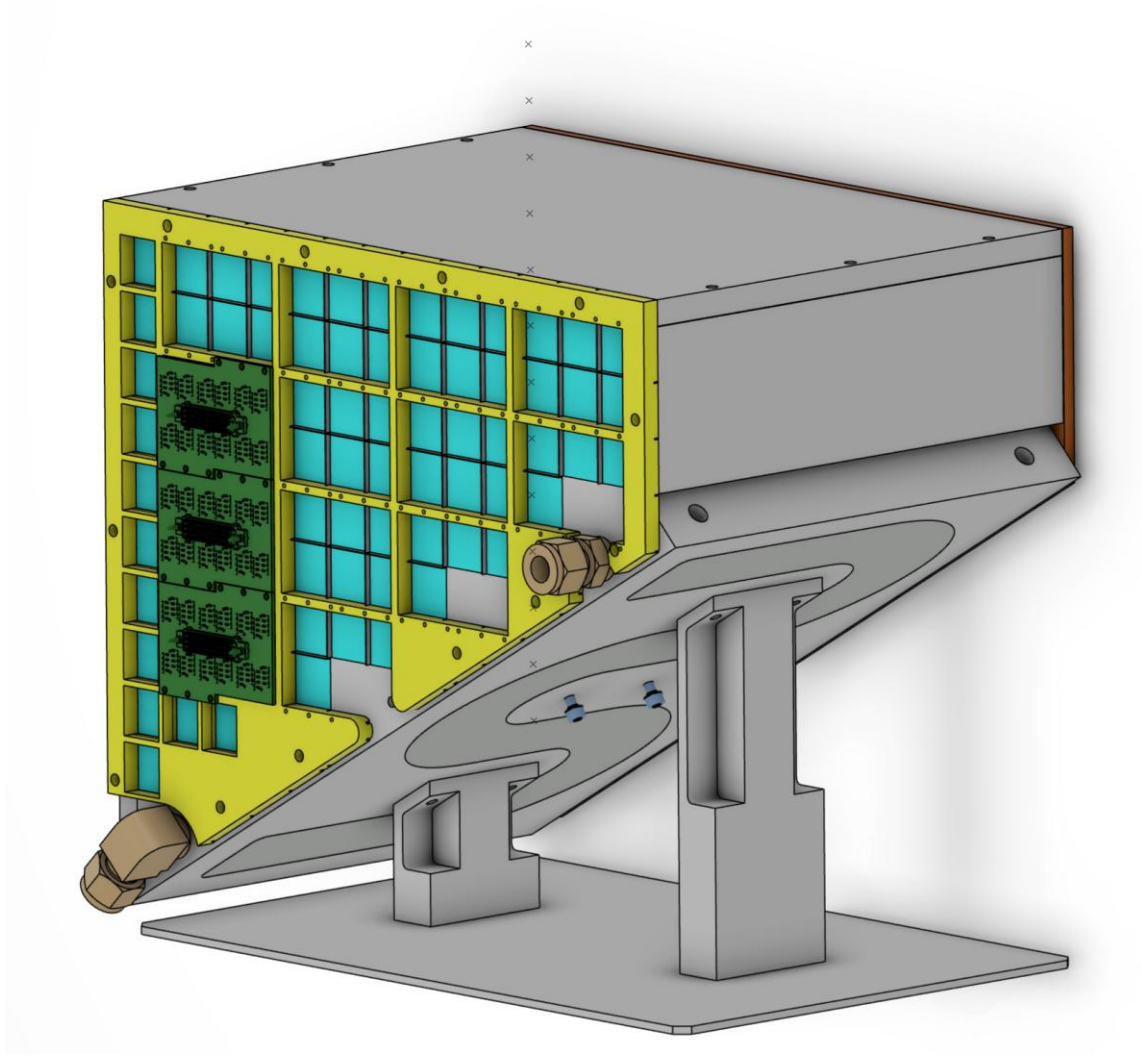
Tooling assembly

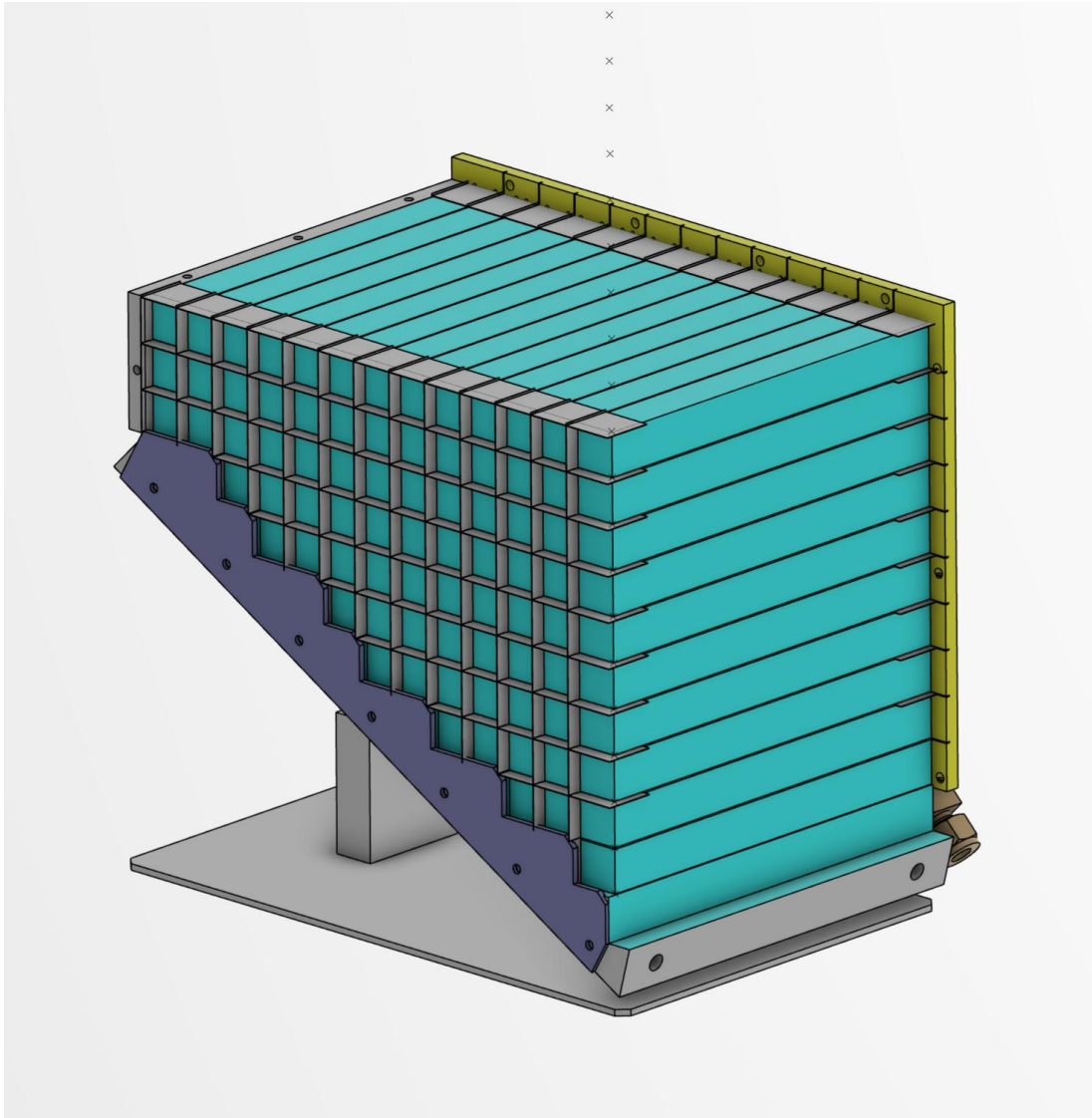




Design of the tooling in progress.
IJCLab is responsible for the design of the pushing insertion mechanism.

Prototype 1/12 (one twelfth)





Machining of the grid and plates in progress.
Design of the cooling in progress.

Review

Date: 26 / 29 may 2026
Documents completed: 4 / 8 may 2026
Topic: Mechanical Design, Assembly (the integration part is shown by Rahul/Roland/Dan ?)

Contents:

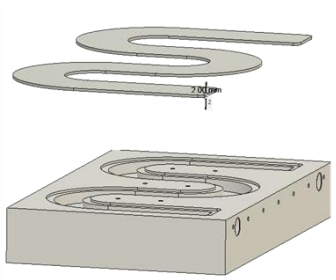
- ❑ **Overview**
  - Specifications
  - Clearances
- ❑ **Mechanical structures**
  - Internal structure (design, fabrication, cooling, FEA)
  - External structure (design, fabrication, cooling, FEA)
- ❑ **Cooling**
  - For the crystals (design, thermal studies)
  - For the discret electronics (design, thermal studies)
- ❑ **Fabrication & Procurement**
- ❑ **Assembly**
  - Step by step
  - Metrological checking & tests
- ❑ **Integration ?**
- ❑ **Risks analysis, Schedule**

Final Design and Safety Review of the ePIC Electron Endcap EM Calorimeter (EEEMCAL)

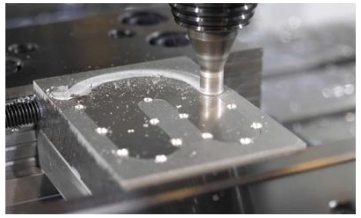
5. Have interfaces with other detector subsystems been appropriately defined and appraised? Are the plans for integration in the ePIC infrastructure appropriately developed to start construction?

BACKUP SLIDES

Prototype External structure – FSW

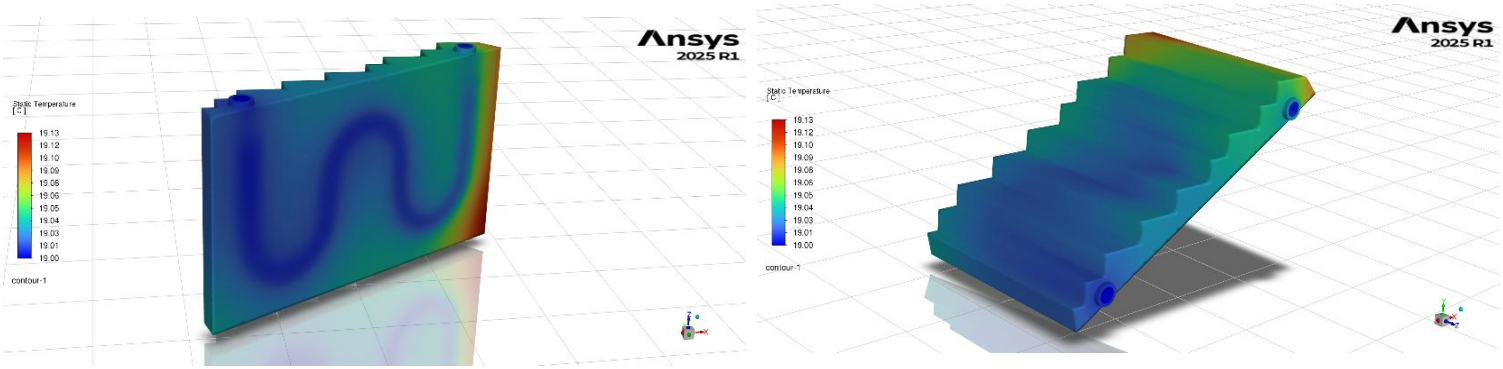


Raw bloc machined

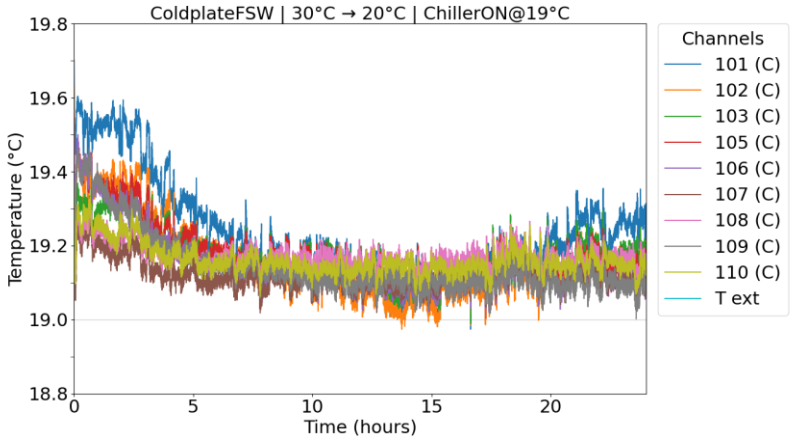


FSW

Dimensional inspection
→ OK (< 0,1 mm)



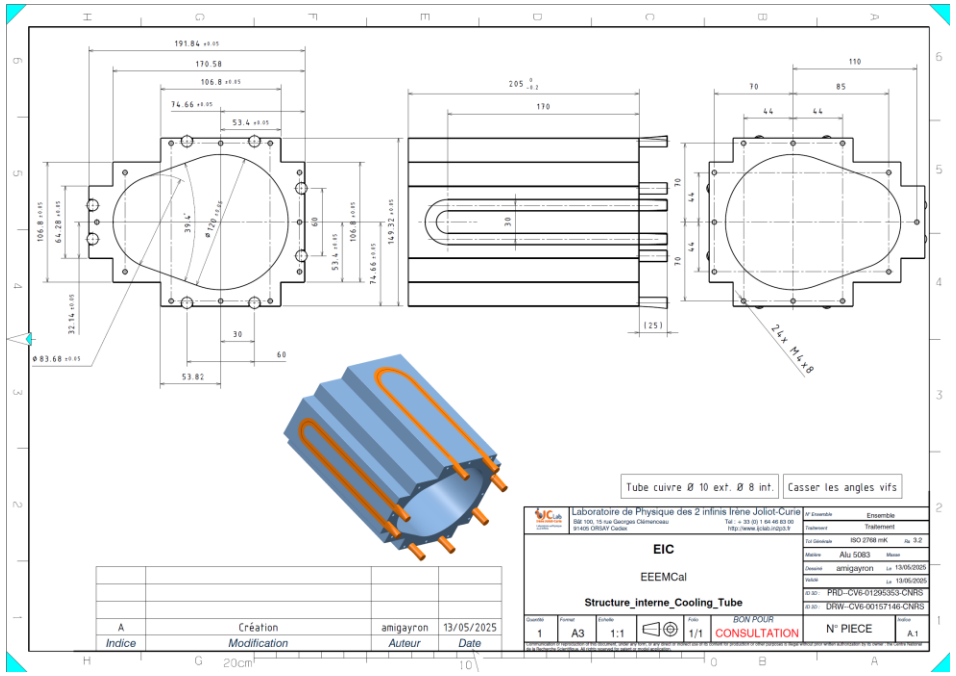
Fluent simulation (Water= 19°C / T ext = 23°C)

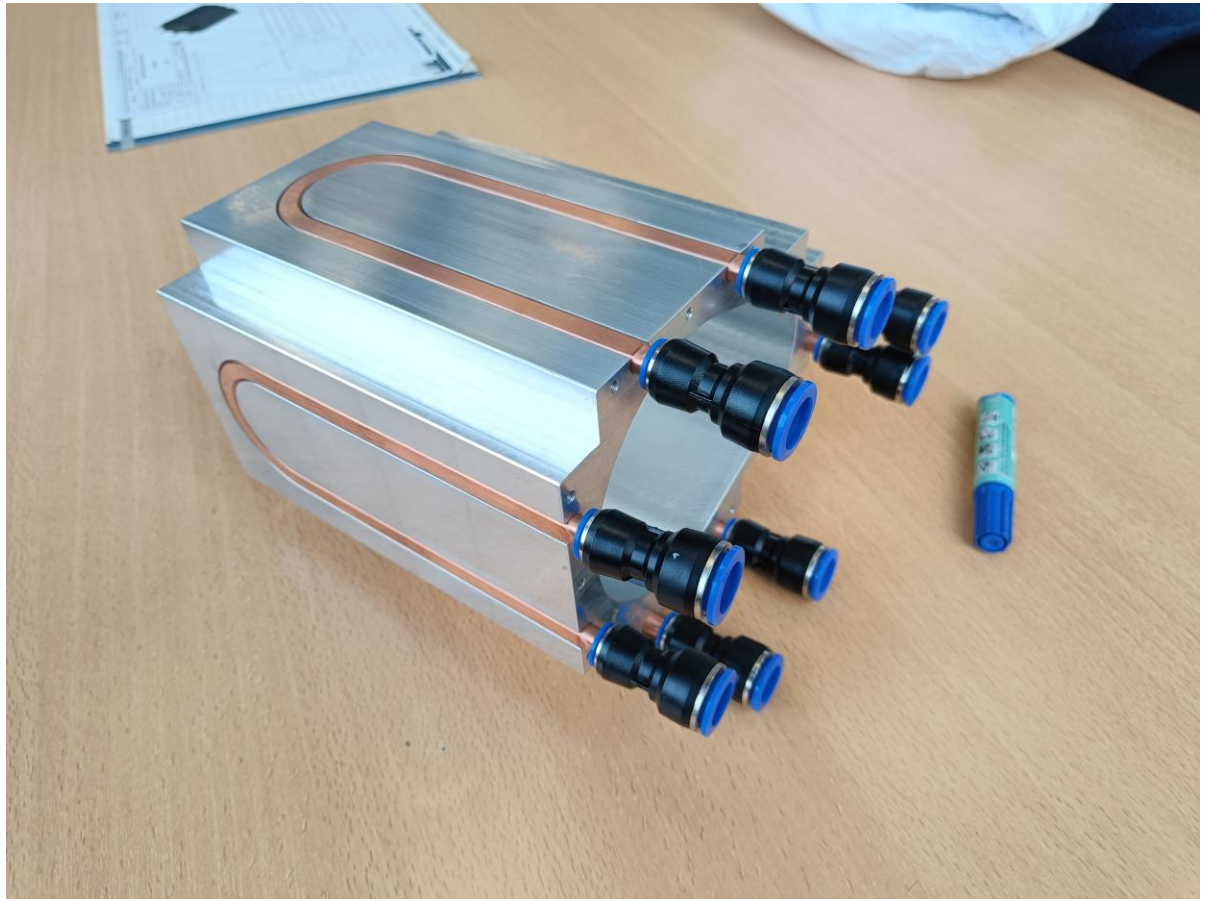


Thermal sensors on the cold plate

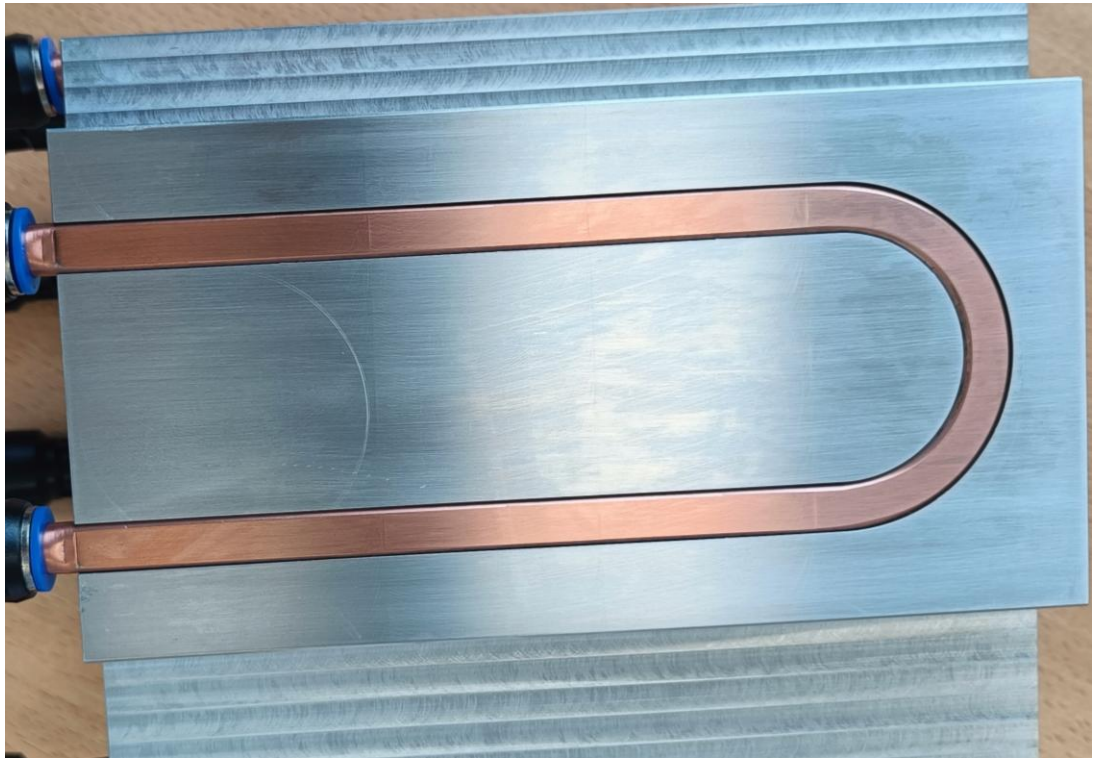
Prototype Internal structure – Copper tubes

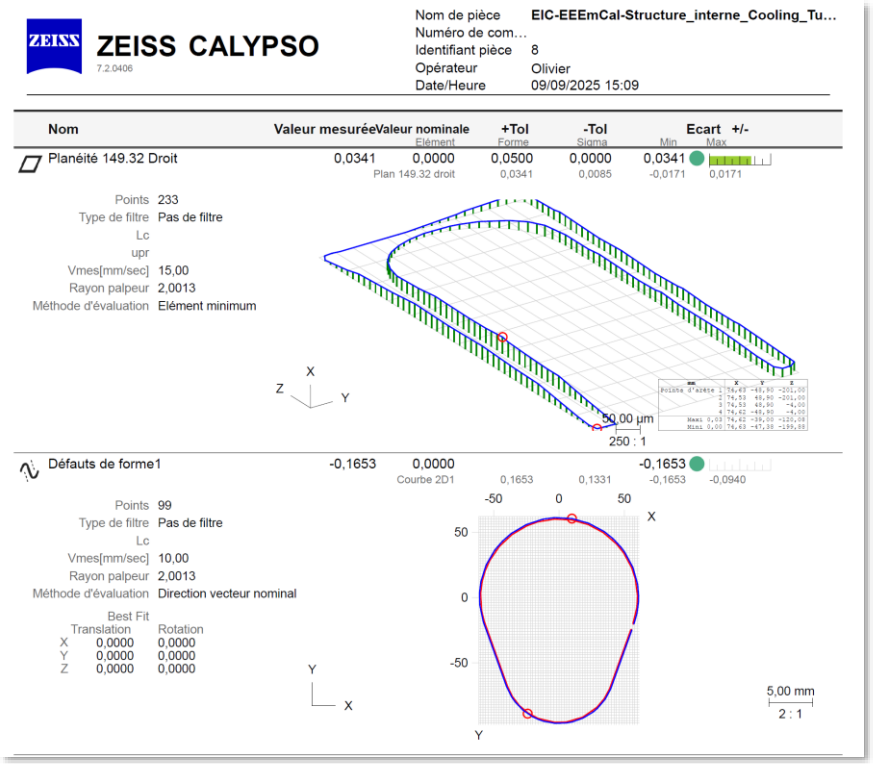
- Prototype with copper tubes
- Internal structure received
- Clearance with beam pipe = 11 mm
- Thermal tests ongoing





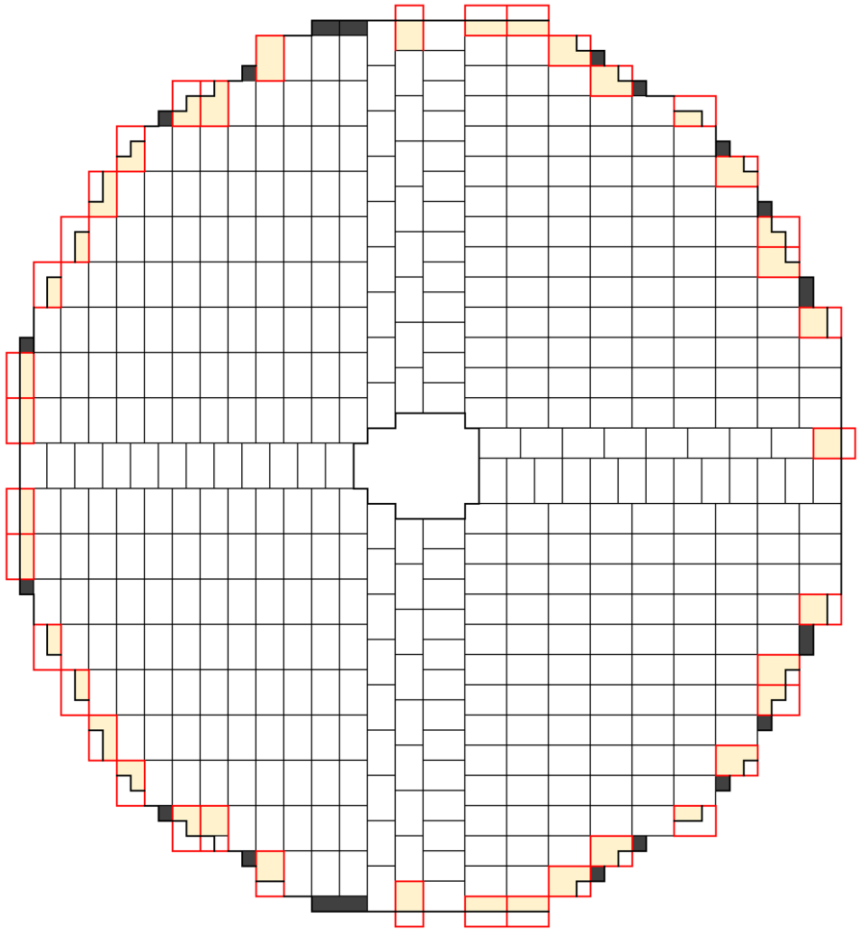
Prototype Internal structure – Copper tubes



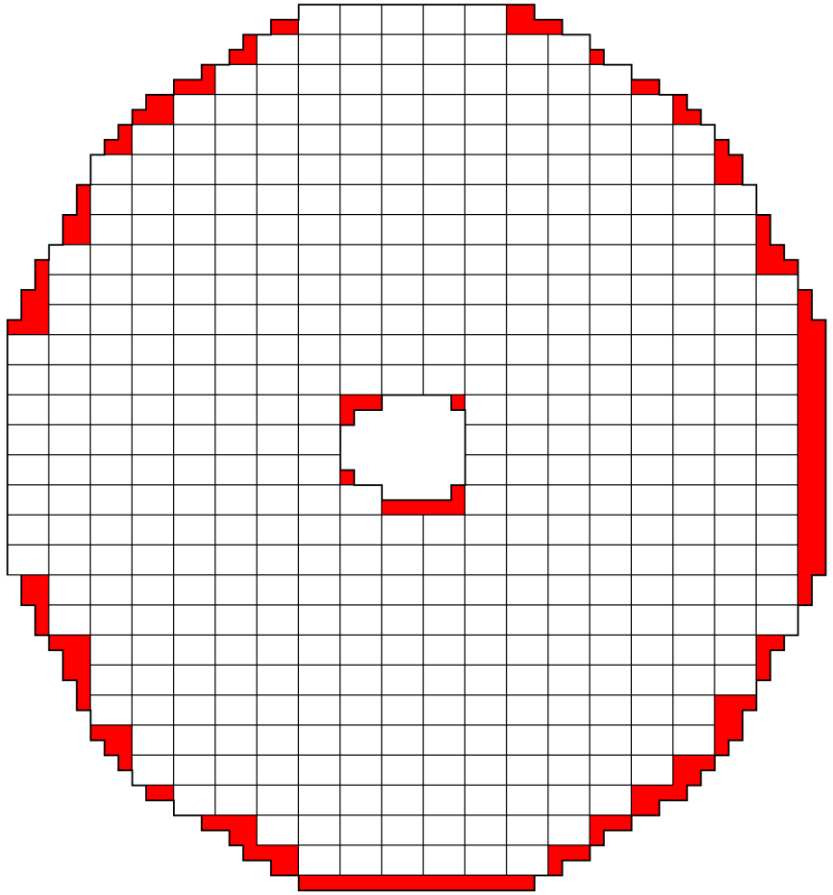


Dimensional inspection
→ OK (< 0,1 mm)

Design & Cooling for the FEB

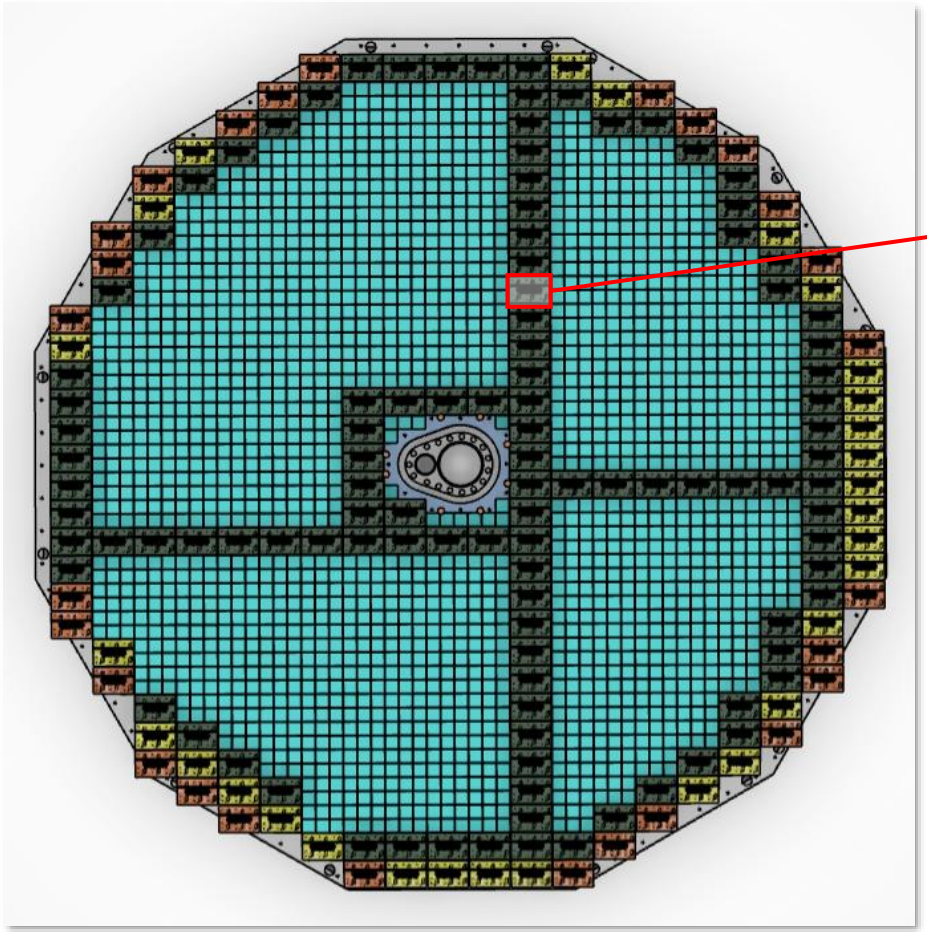


+	-
Good mapping	Hard to cool
Good fitting at the center	Bad fitting on the edge

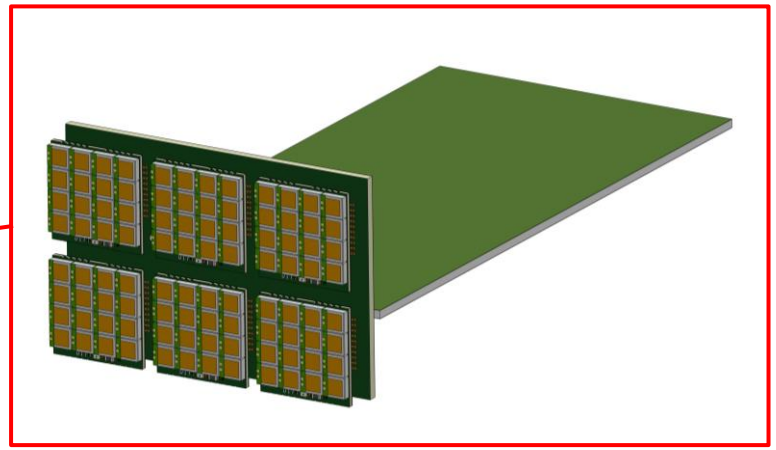


+	-
Easier to cool	Bad fitting at the center
	Bad fitting on the edge

Design & Cooling for the FEB



Clearance OK
Clearance OK – On structure
Clearance KO – Adjustment required

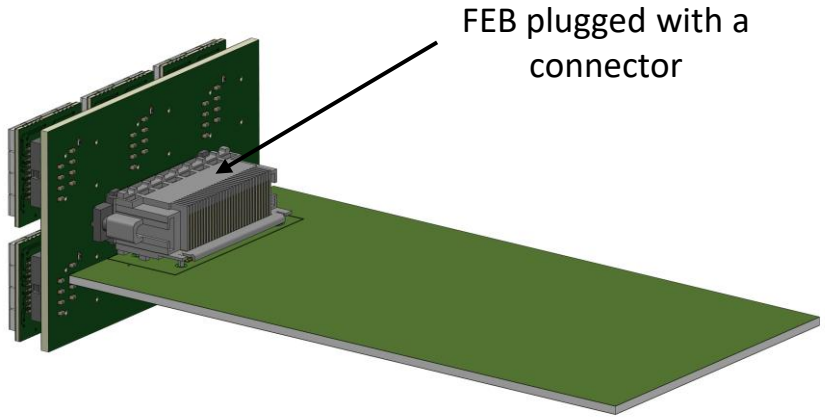
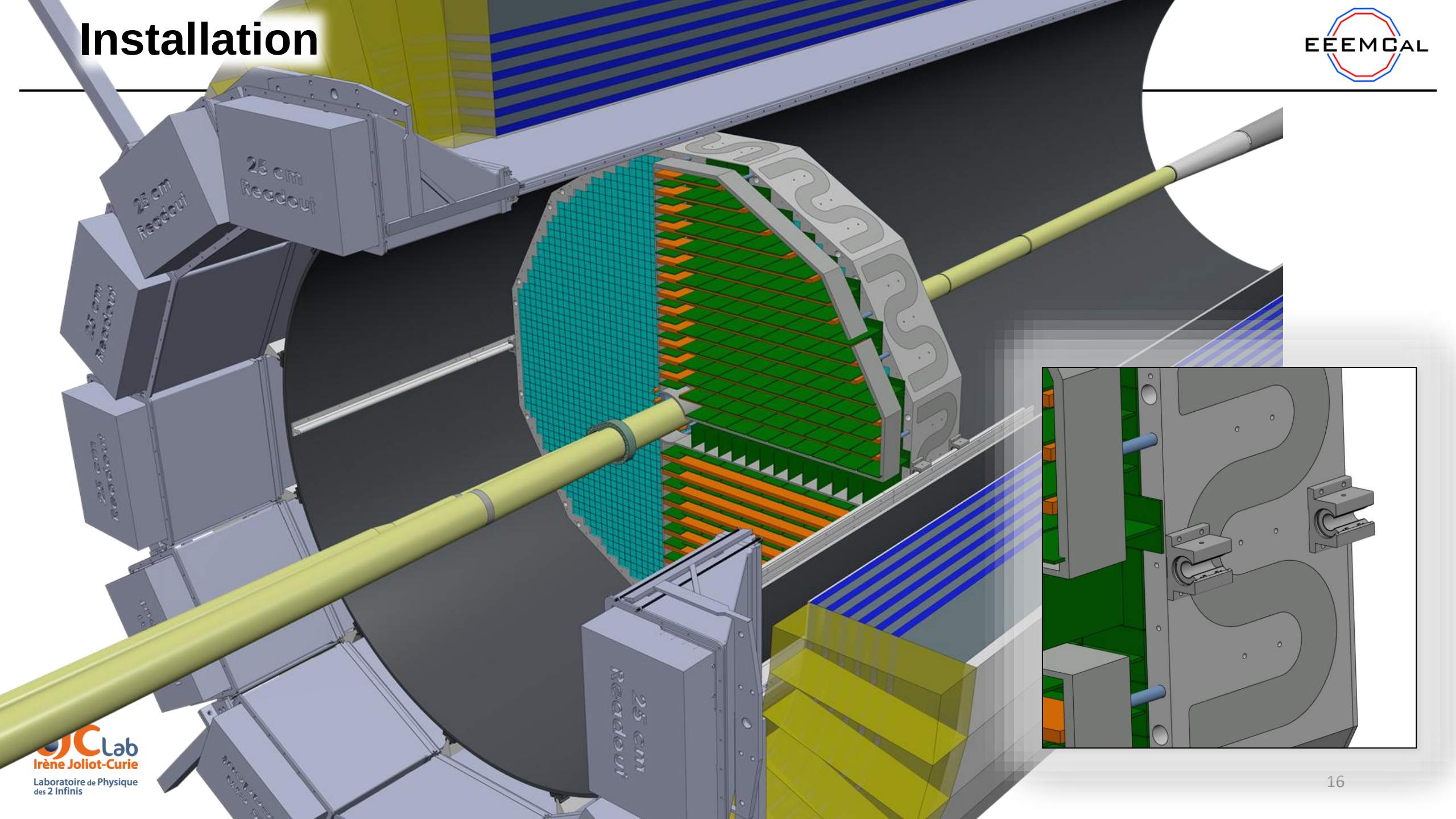


≈ 500 (Adapter + FEB)

→ Work in progress

Based on the optimum for the Asics
→ 1 lpGBT for 3 EICROC (OMEGA, IN2P3)

1 FEB for 6 crystals



Installation