# **Backward Ecal** / EEEMCal

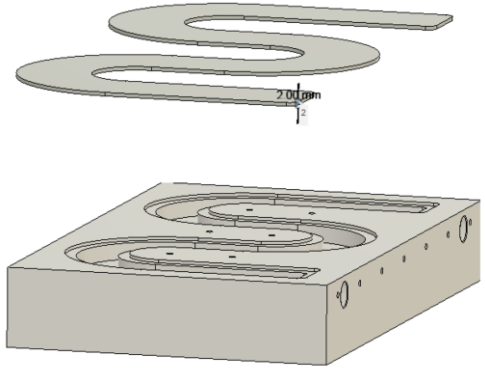
Triple I Engineering Meeting Update (30/06/2025)

**Julien Bettane**

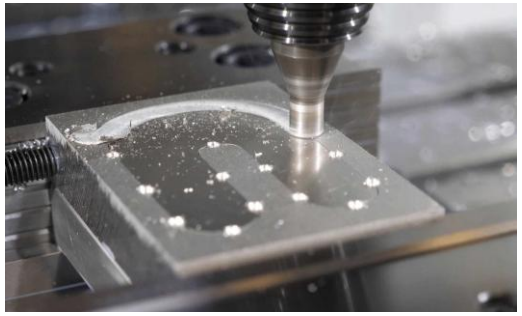


# Prototype External structure (1/12) – FSW

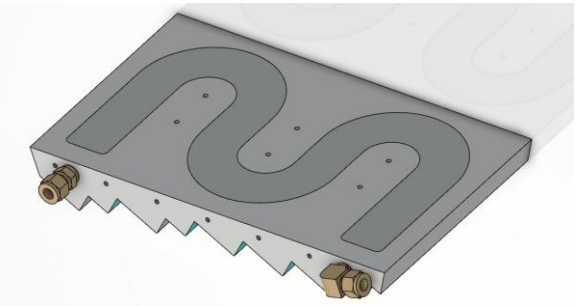
- Prototype to check the efficiency of the cooling
- **Test the Friction Stir Welding (FSW) technology**
- Good watertightness and good for the pressure
- Machining going to start this week
- Metrology checking required because of the deformation



*Raw bloc machined*



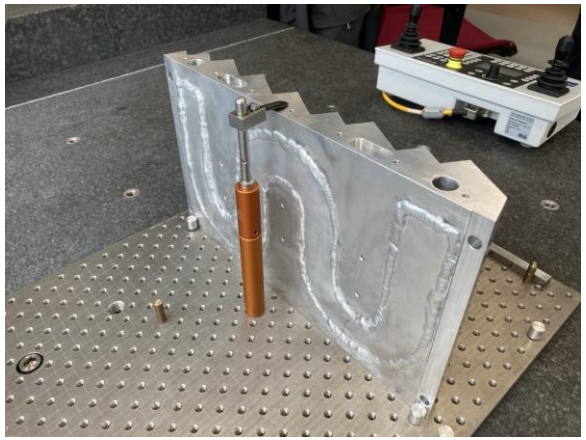
*FSW*



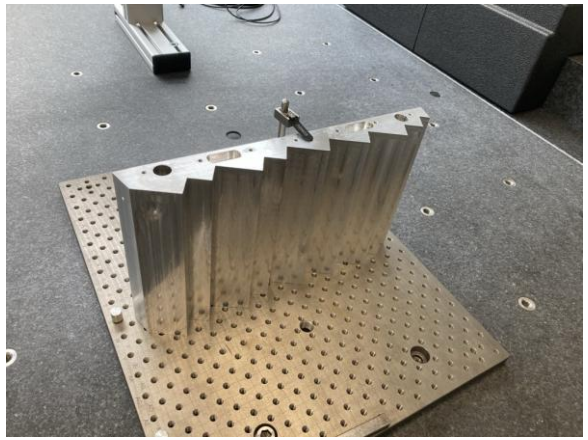
*Machining of the shape*

# Prototype External structure (1/12) – Welding

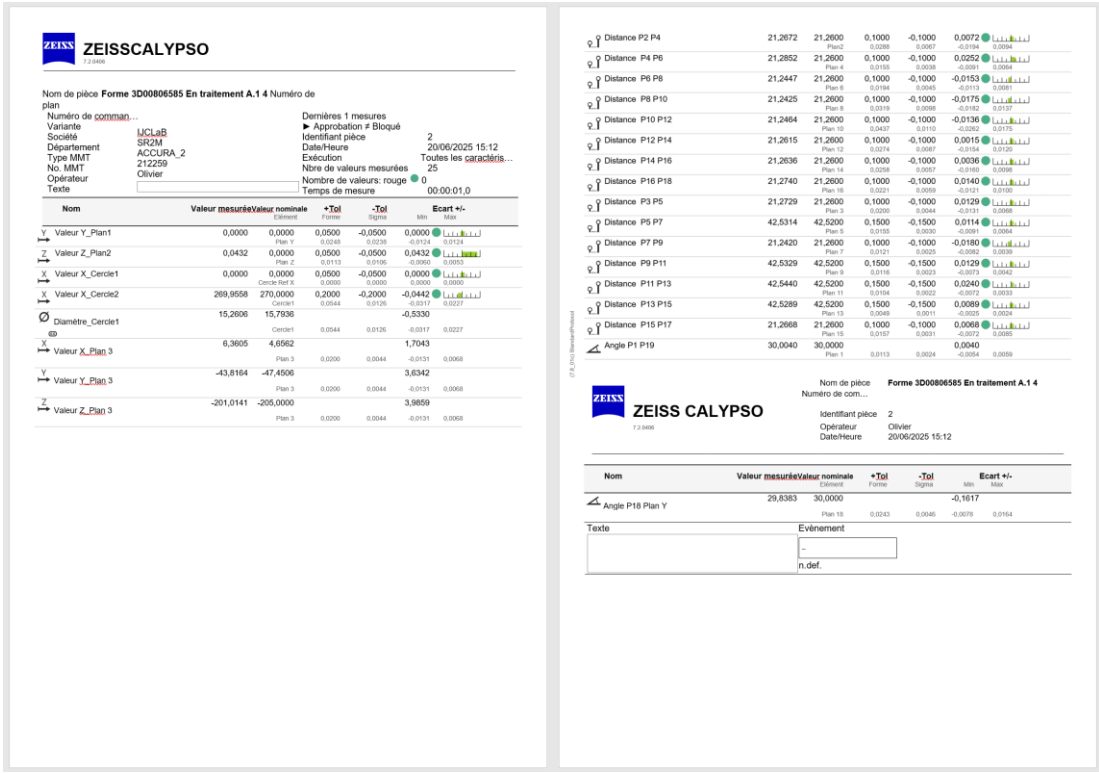
- Aluminum welding tests in progress → **NOT SO EASY !!**
- Machining tests of the shape in our mechanical workshop in order to practice



*Aluminum welding test*



*Practice for the machining of the shape*



ZEISSCALYPSO

Nom de pièce **Forme 3D00806585 En traitement A.1 4** Numéro de plan

| Nom | Valeur mesurée | Valeur nominale | +Tol | -Tol | Ecart +/- |
|---|---|---|---|---|---|
| Valeur Y_Plan1 | 0,0000 | 0,0000 | 0,0500 | -0,0500 | 0,0000 |
| Valeur Z_Plan2 | 0,0432 | 0,0000 | 0,0500 | -0,0500 | 0,0432 |
| Valeur X_Cercle1 | 0,0000 | 0,0000 | 0,0500 | -0,0500 | 0,0000 |
| Valeur X_Cercle2 | 269,9558 | 270,0000 | 0,2000 | -0,2000 | -0,0442 |
| Diamètre_Cercle1 | 15,2606 | 15,7936 | | | -0,5330 |
| Valeur X_Plan 3 | 6,3605 | 4,6562 | | | 1,7043 |
| Valeur Y_Plan 3 | -43,8164 | -47,4506 | | | 3,6342 |
| Valeur Z_Plan 3 | -201,0141 | -205,0000 | | | 3,9859 |

| | | | | | |
|---|---|---|---|---|---|
| Distance P2 P4 | 21,2672 | 21,2600 | 0,1000 | -0,1000 | 0,0072 |
| Distance P4 P6 | 21,2852 | 21,2600 | 0,1000 | -0,1000 | 0,0252 |
| Distance P6 P8 | 21,2447 | 21,2600 | 0,1000 | -0,1000 | -0,0153 |
| Distance P8 P10 | 21,2425 | 21,2600 | 0,1000 | -0,1000 | -0,0175 |
| Distance P10 P12 | 21,2464 | 21,2600 | 0,1000 | -0,1000 | -0,0136 |
| Distance P12 P14 | 21,2615 | 21,2600 | 0,1000 | -0,1000 | 0,0015 |
| Distance P14 P16 | 21,2636 | 21,2600 | 0,1000 | -0,1000 | 0,0036 |
| Distance P16 P18 | 21,2740 | 21,2600 | 0,1000 | -0,1000 | 0,0140 |
| Distance P3 P5 | 21,2729 | 21,2600 | 0,1000 | -0,1000 | 0,0129 |
| Distance P5 P7 | 42,5314 | 42,5200 | 0,1500 | -0,1500 | 0,0114 |
| Distance P7 P9 | 21,2420 | 21,2600 | 0,1000 | -0,1000 | -0,0180 |
| Distance P9 P11 | 42,5329 | 42,5200 | 0,1500 | -0,1500 | 0,0129 |
| Distance P11 P13 | 42,5440 | 42,5200 | 0,1500 | -0,1500 | 0,0240 |
| Distance P13 P15 | 42,5289 | 42,5200 | 0,1500 | -0,1500 | 0,0089 |
| Distance P15 P17 | 21,2668 | 21,2600 | 0,1000 | -0,1000 | 0,0068 |
| Angle P1 P19 | 30,0040 | 30,0000 | | | 0,0040 |

ZEISS CALYPSO

Nom de pièce **Forme 3D00806585 En traitement A.1 4**

Identifiant pièce 2

Opérateur Olivier

Date/Heure 20/06/2025 15:12

| Nom | Valeur mesurée | Valeur nominale | +Tol | -Tol | Ecart +/- |
|---|---|---|---|---|---|
| Angle P18 Plan Y | 29,8383 | 30,0000 | | | -0,1617 |

Texte

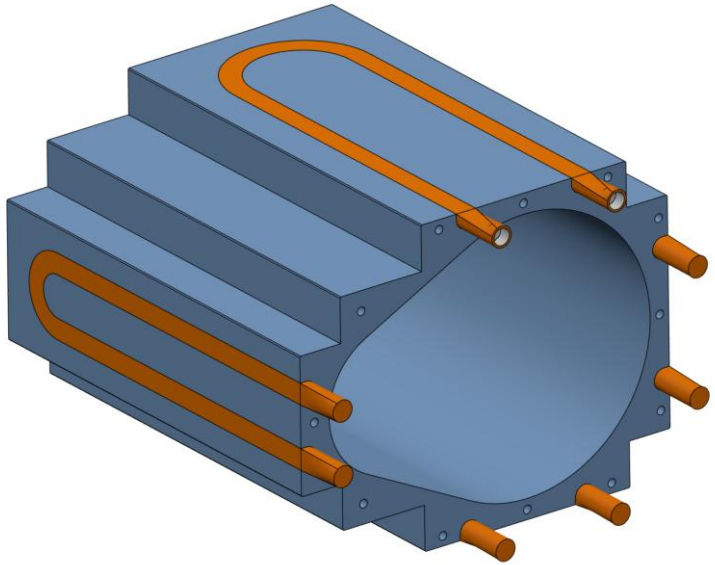
Evènement

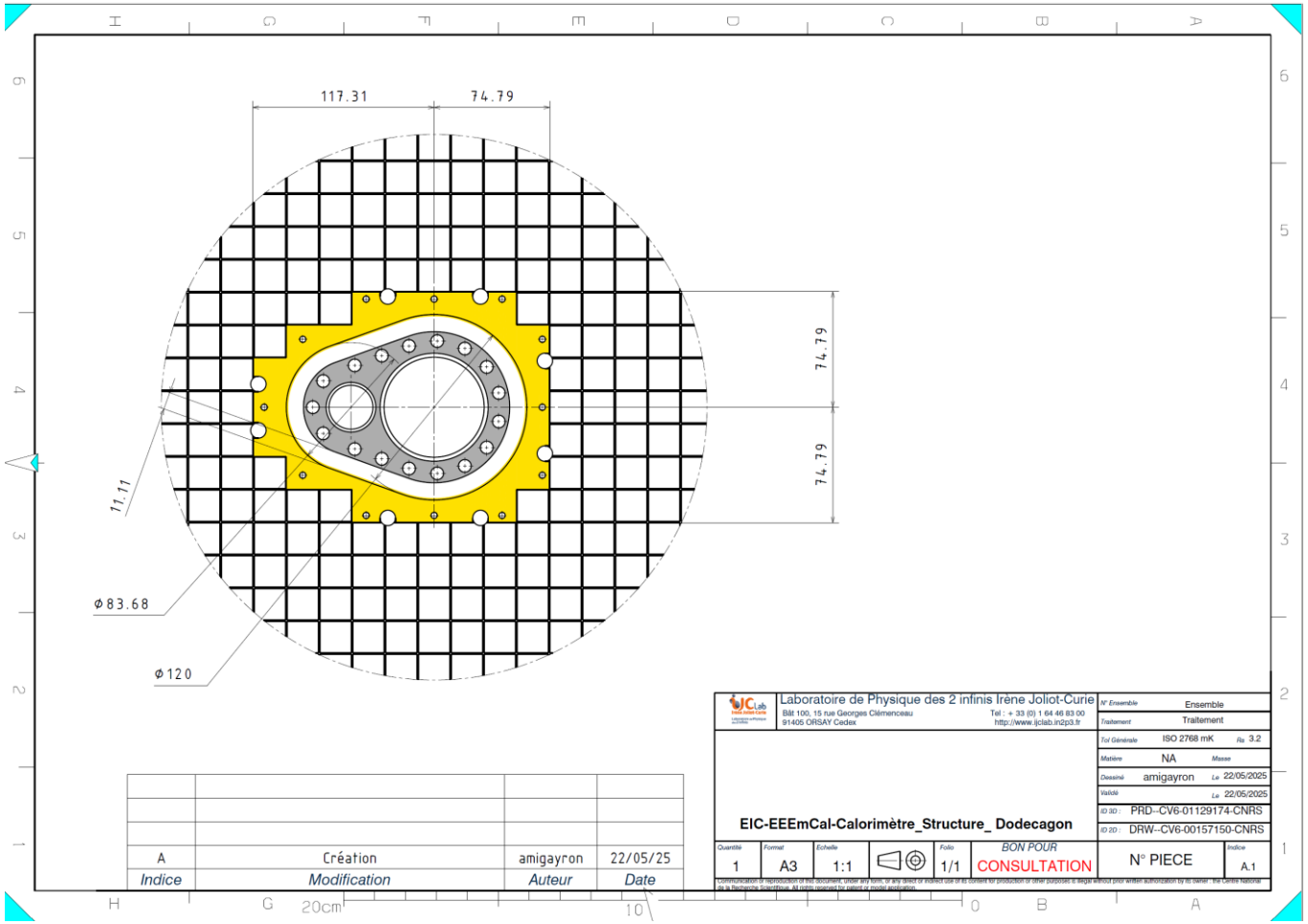
n.def.

*Metrology testing of the shape < 0,025 mm*

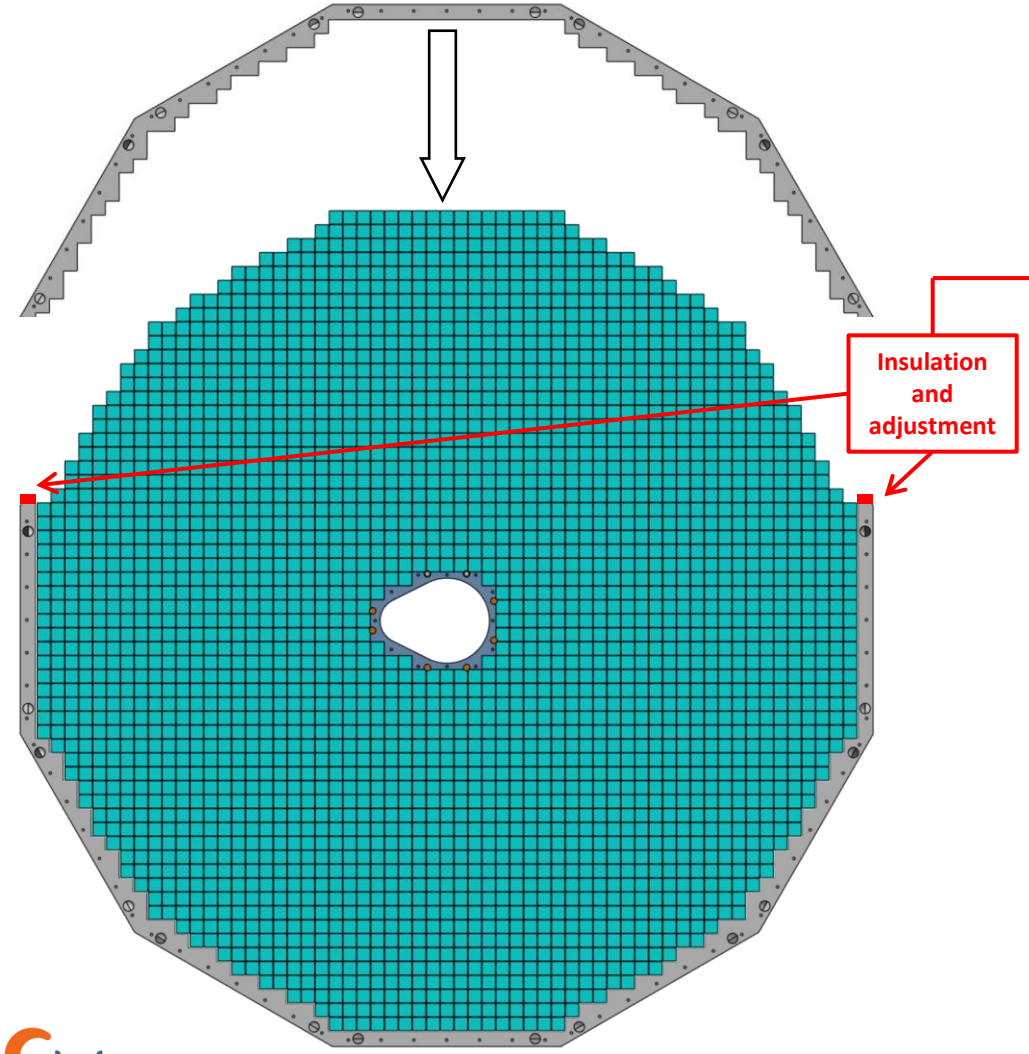
# Prototype Internal structure – Copper tubes

- Prototype with copper tubes
- Order placed last week
- Design stays the same even if the flange is reduced → Not possible to add crystals
- **Clearance = 11 mm**



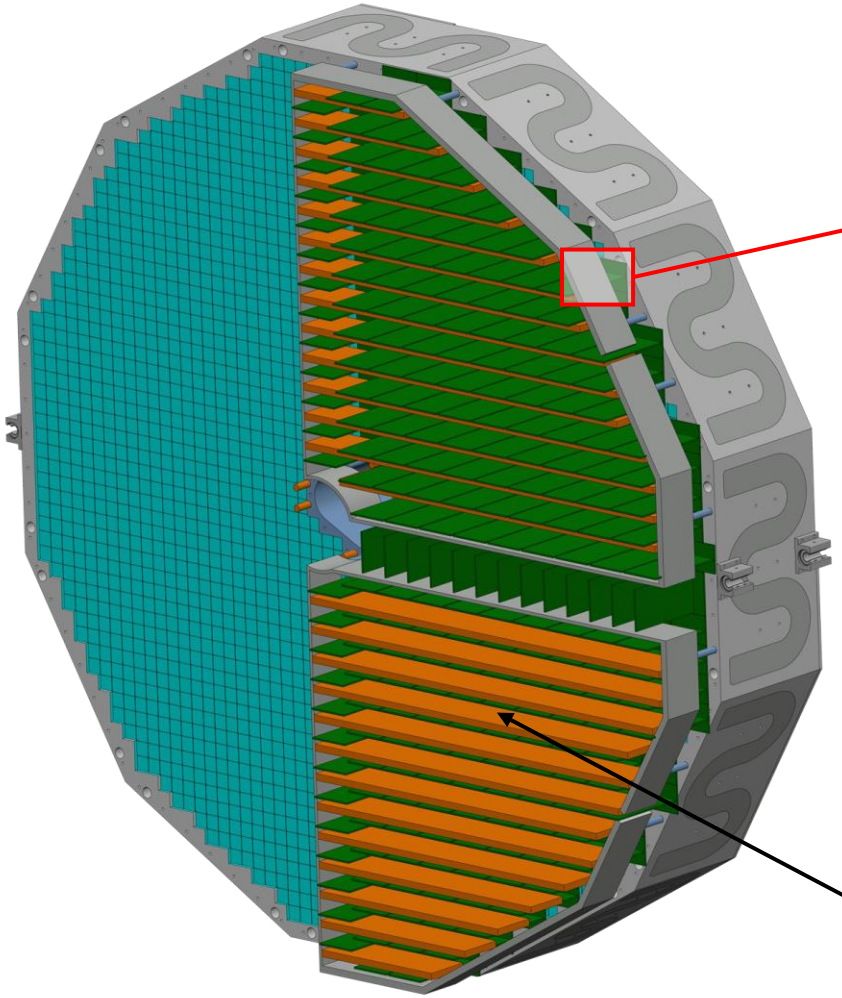


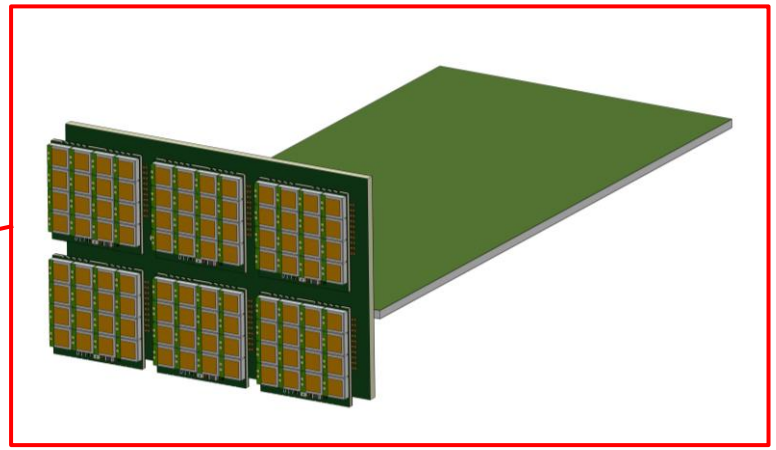
# Fabrication of the External structure




- ❑ External structure in one block at the beginning
- ❑ External structure in two parts at the end (after machining)
  - ➢ *Better for the Eddy current*
  - ➢ *Better for the contact with crystals on the top (cooling)*
- ❑ Good for the deflection & the stress
- ❑ Good for the tolerances and the positioning of the crystals

# Design & Cooling for the FEB





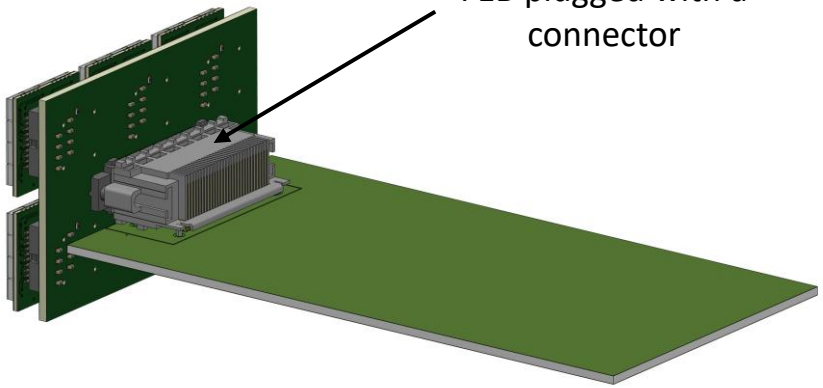
**≈ 500 (Adapter + FEB)**

**→ Work in progress**

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

Copper plates for the cooling and the mechanical support of the FEB

**1 FEB for 6 crystals**



FEB plugged with a connector

# Installation

- Two rails at 3 & 9 o'clock
- Validate the kinf of rails
- Mass= 2,5 tons
- Increase the surface to reduce local stress on the structure
- Two Guide bearing or Plain bearing per face
- Carbon tube removed ?