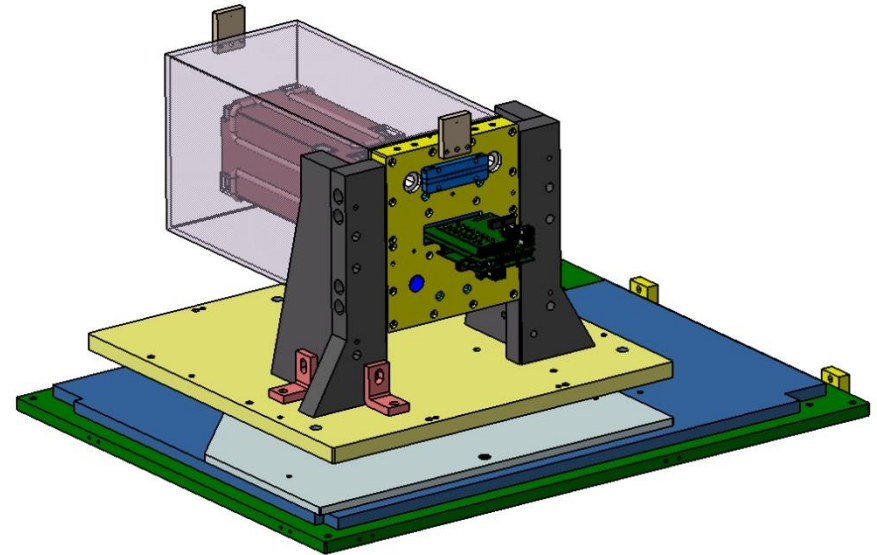
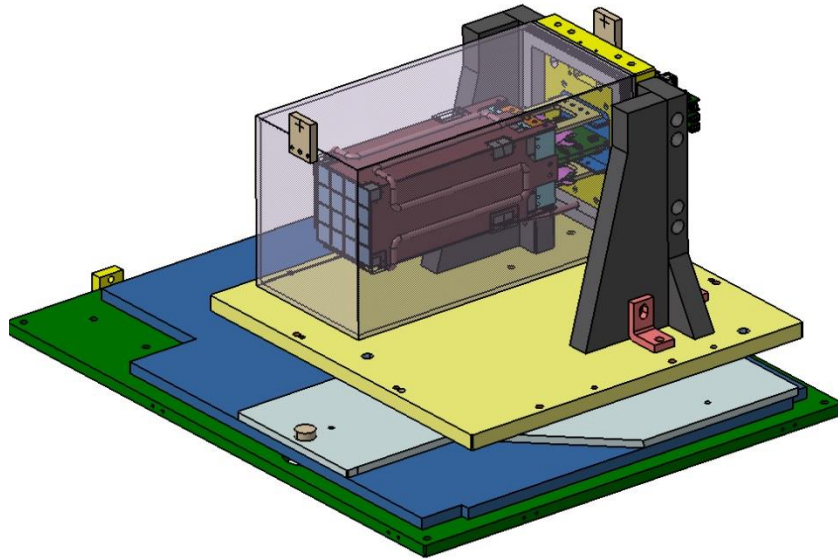


EMC BWEC Mechanics

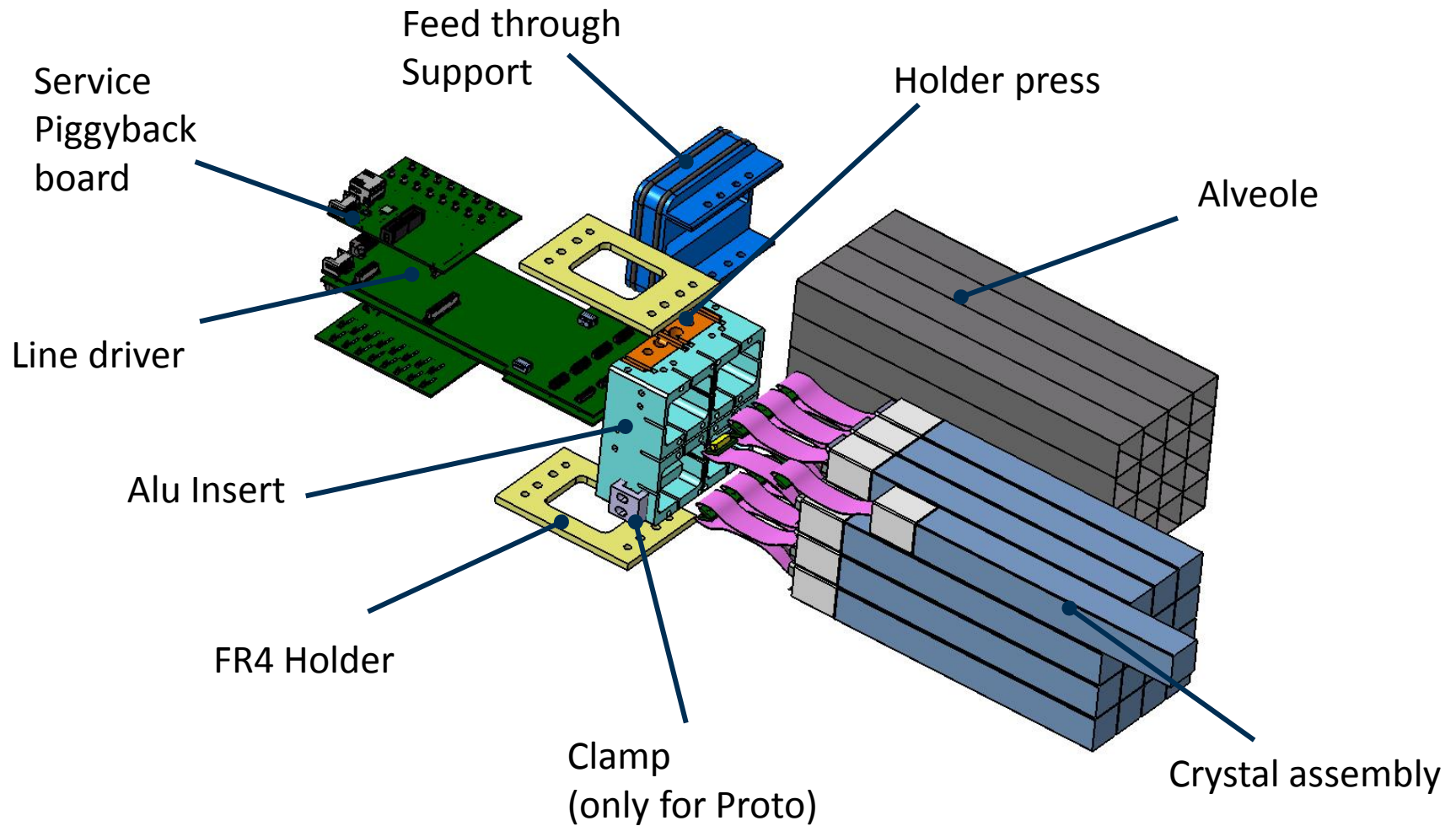
1. Proto16-2
2. Holders deflection tests
3. Cooling tests
4. Translation supporting system

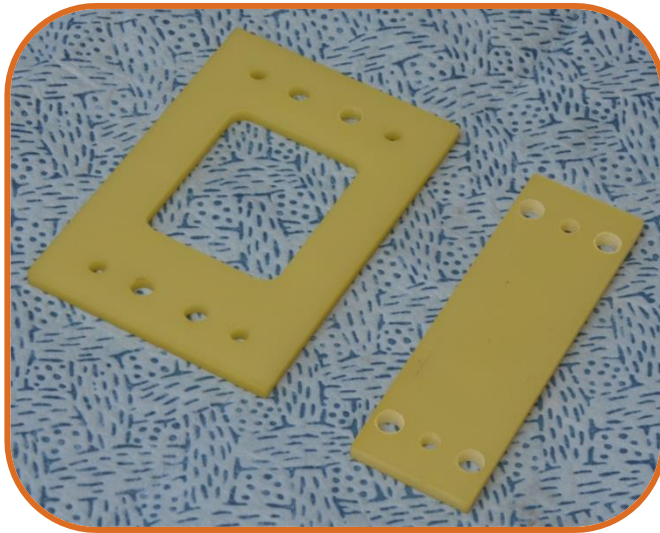
Proto16-2

- New 16 crystal prototype
- New cold-warm holding system
- New analogue line driver
- New design for capsule assembly



- Fine alignment system
- Rotation on the horizontal plane
- Beam reference alignment
- Prepared for cooling tests



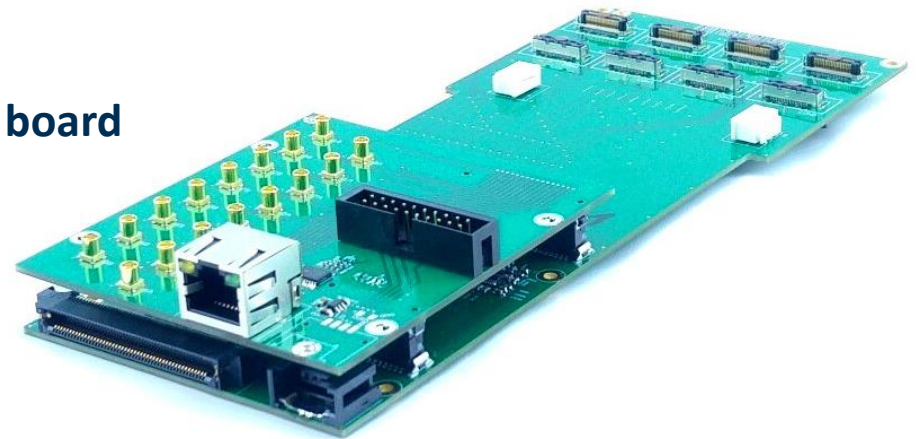


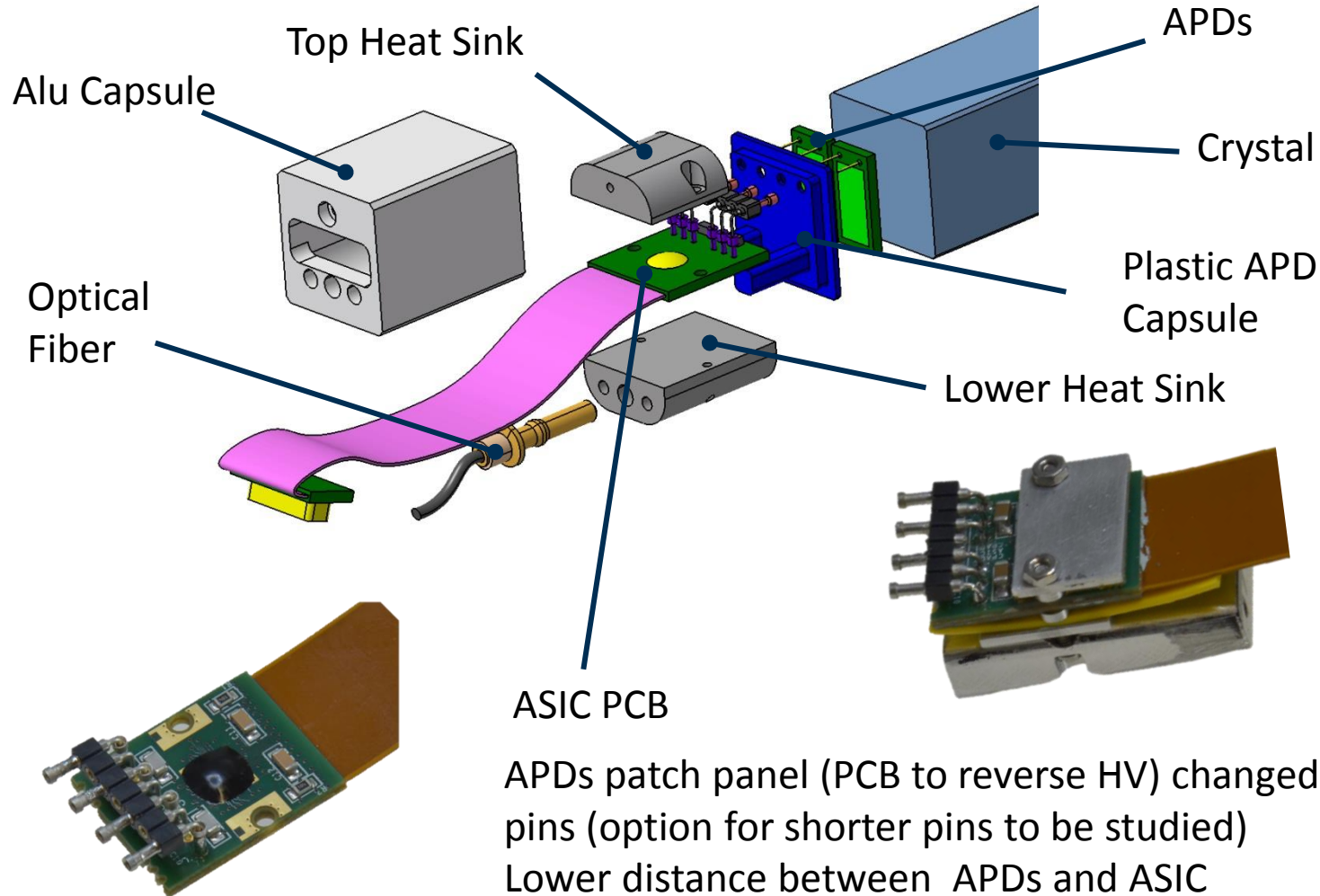
Glass reinforced plastic (GRP) holders - FR4

- Low thermal conductivity: 0.29 W/mK
- Medium/high strength TS = 320 Mpa E = 22 GPa
- Wide and narrow versions
(for Proto 16-2: two wide parts)
- Dowel pins for accurate positioning

Analogue line driver + Service Piggyback board

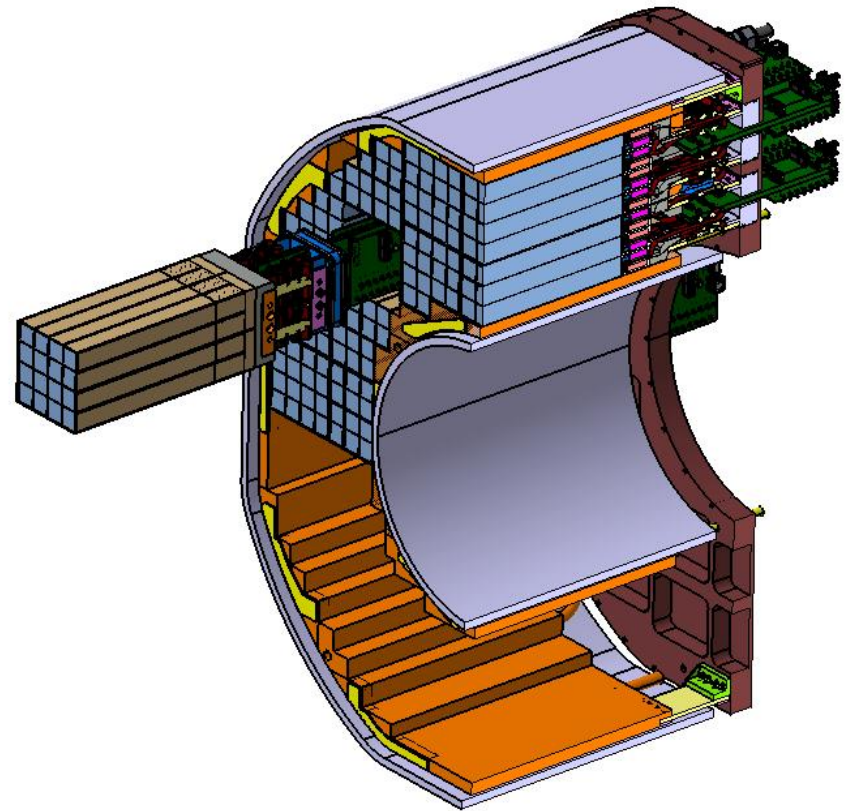
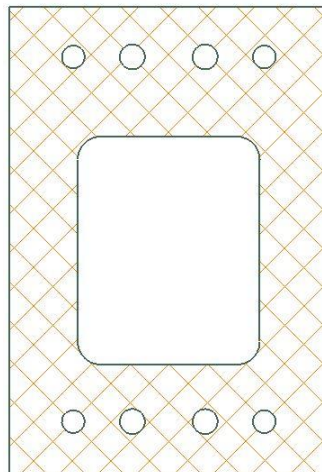
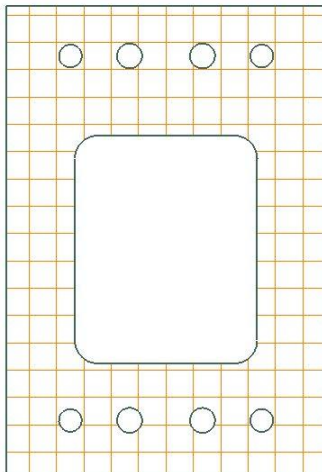
- Latest design
- Geometry adapted to current design
- Modular design (for Piggyback)
- 2 Temperature sensor connectors
- HFS 100 Cu signal cables

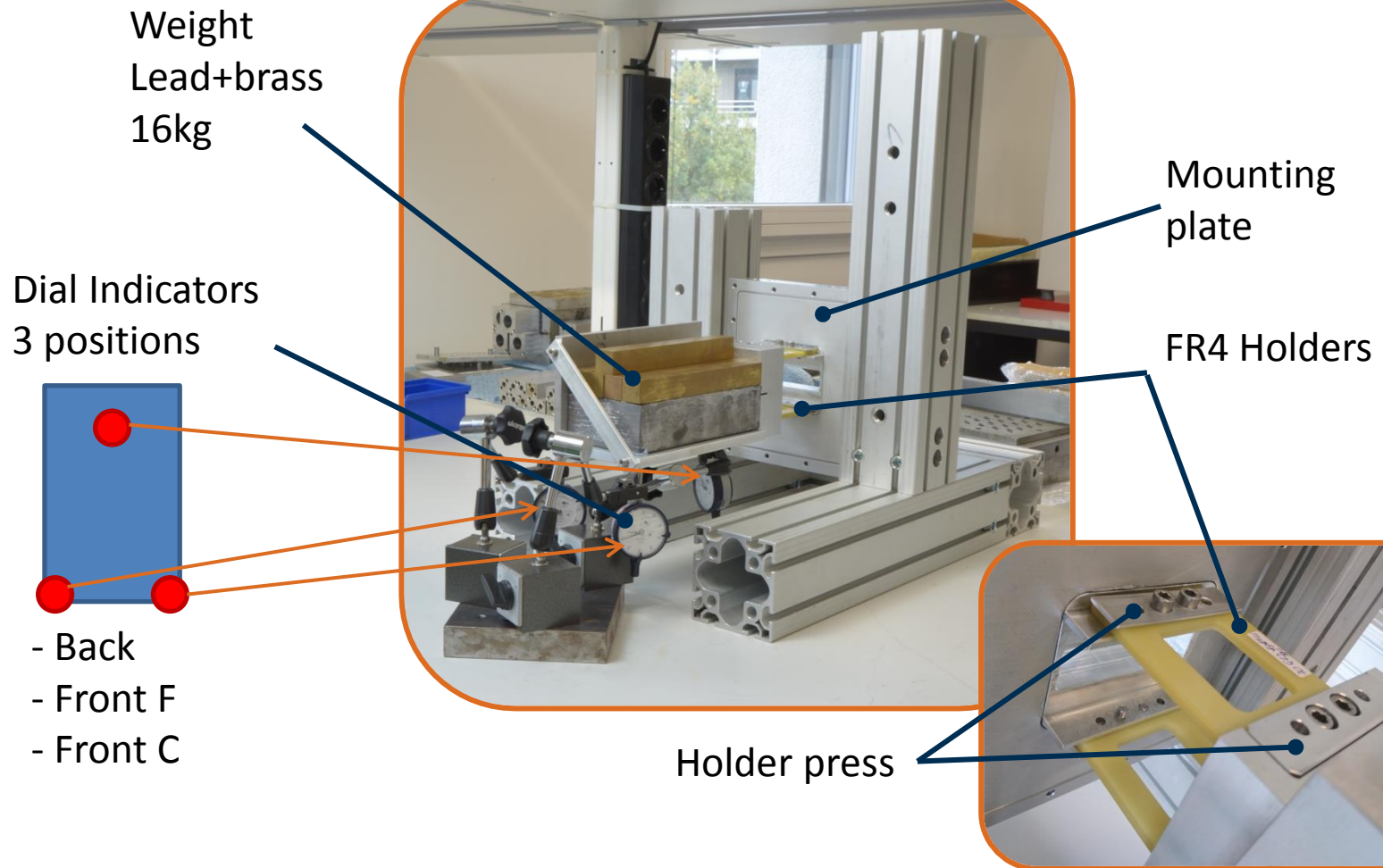




Holders deflection tests

- Subunits design to be easily exchangeable
- GRP holders in vertical or horizontal positions
- Two fibers layout:
 - $0/90^\circ$
 - $\pm 45^\circ$





Deflection summary

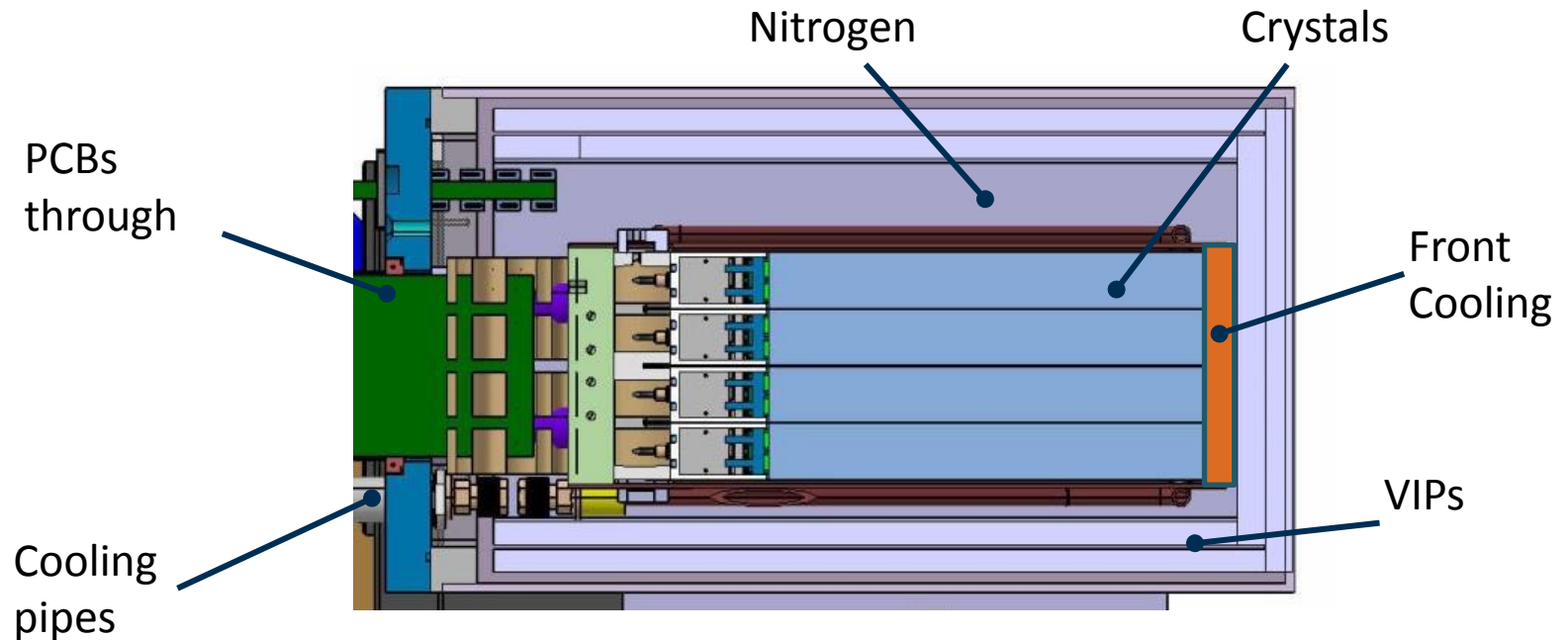
Position	Fiber Orientation	Back (μm)	Front F (μm)	Front C (μm)	„Deflection rank“
Horizontal	0/90	47	79	86	3rd
	+/-45	58	92	109	4th
Vertical	0/90	19	69	75	1st
	+/-45	22	76	81	2nd

As expected the results show us that the **vertical position** and the the **0/90 orientation** is **better**.

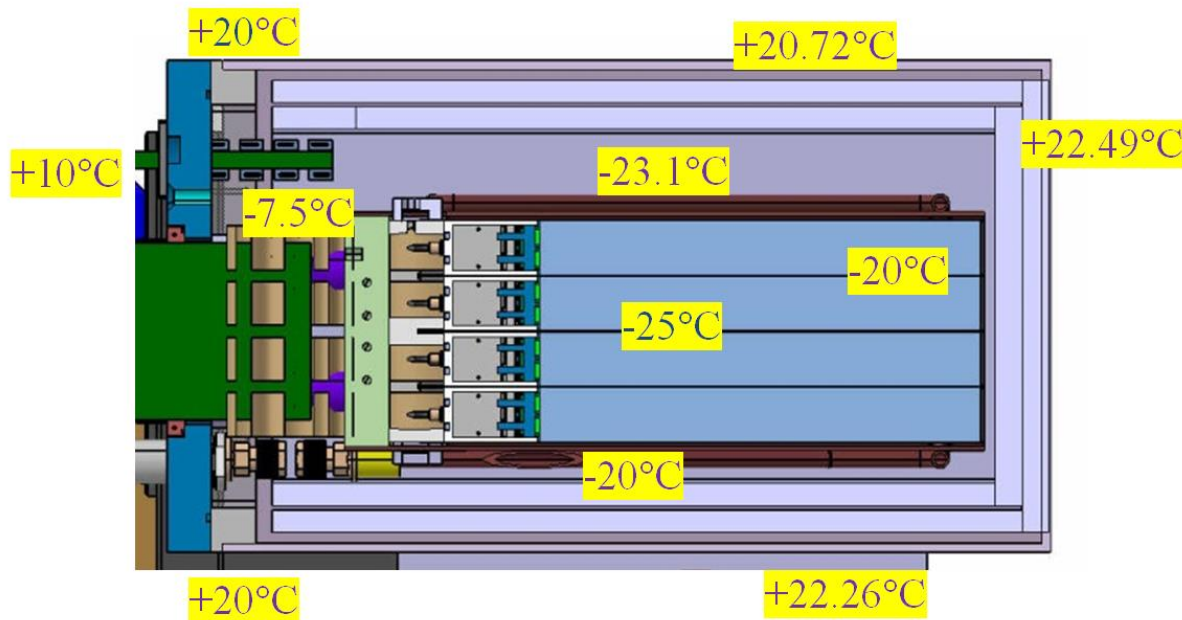
In the final BWEK arrangement **horizontal position** is **needed**, so the holders will be **connected** to transfer the shear.

Cooling tests

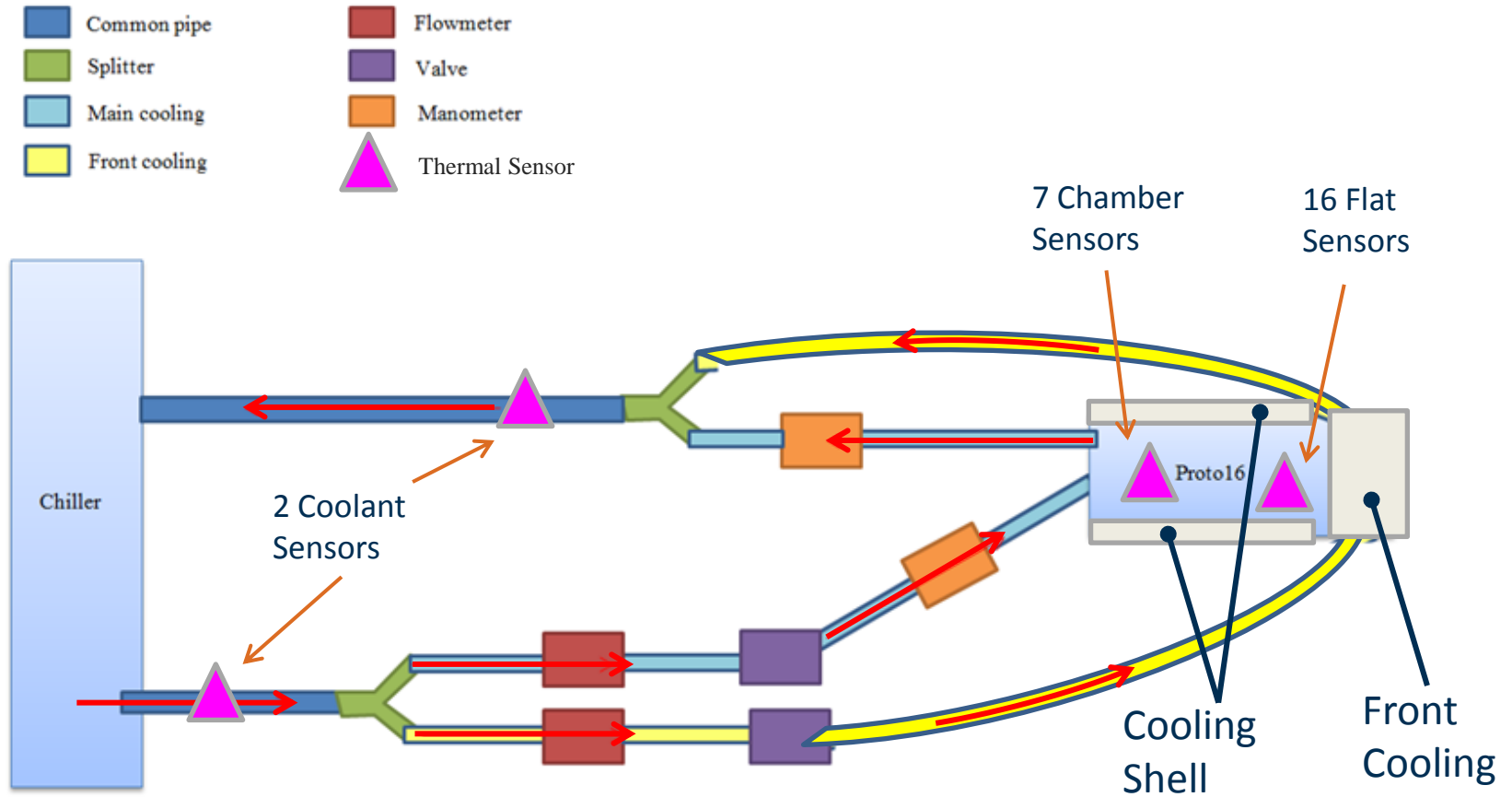
- Thermal tests to **validate** thermal and pressure drop calculations with the Proto16



Calculated temperature and pressure drop values

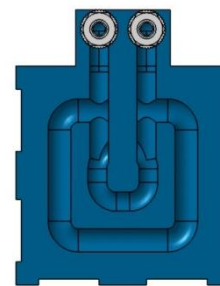
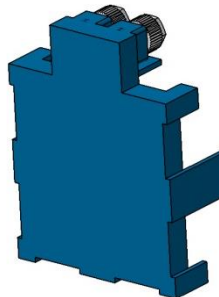
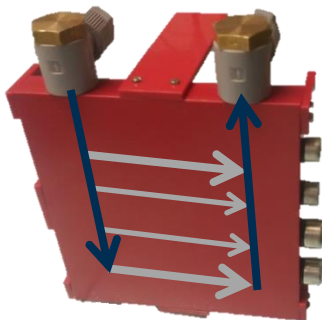
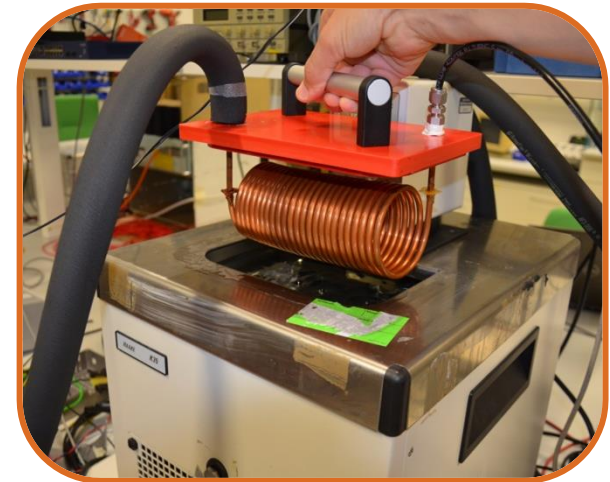


Flow (l/min)	Pressure drop (mbar)
1,0	212,92
2,0	431,71
3,0	647,56
5,0	1079,26



40 Measurements:

- **5 Front cooling shells** (Active Copper, Active Plastic Manufactured, Active Plastic 3D Printed, Passive Copper, Passive Aluminium Foil)
- **4 Flows values** (1,1 – 2,2 – 3,3 – 5,5)
- **2 Nitrogen temperatures** (Room temperature and -25°C)





Flowmeter (inside the insulation box)



Manometer



New set of VIPs (2x10 and 20mm)

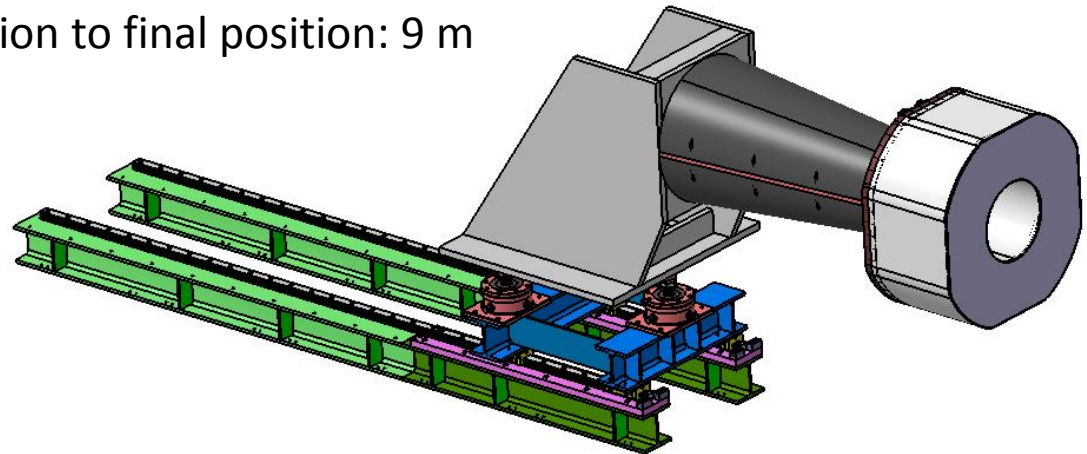


Rear side of the Proto

Translation supporting system

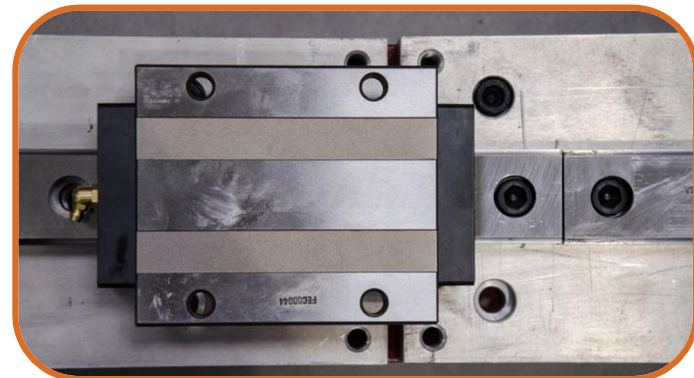
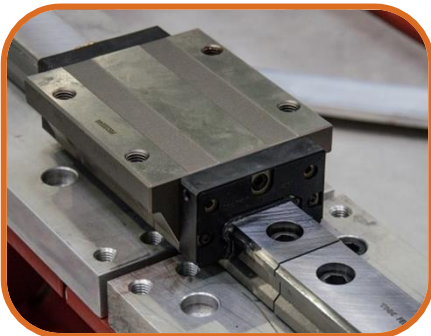
BWEC characteristics:

- **Tight clearance** with regard to the other detectors: 5 mm
- Heavy load to be inserted, detector + supports: **1000 kg**
- **Long path** from mounting position to final position: 9 m
- Rails divided in **two sections**



Tests:

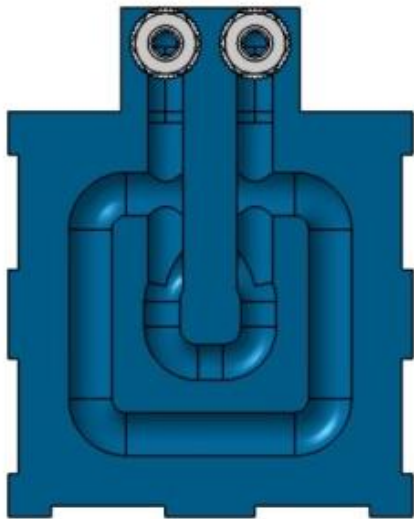
- Rails **alignment** and **position**, joining the two sections (rails play: **50 μm**)
- **Fine tuning** using alignment feet. Fine screw threads used
- **Deflection measurements** (in different sections)



Summary

- New upgraded 16 crystal prototype, construction has started
- Subunit holders tests validated
- Setup for cooling tests defined and under construction
- Linear system test built, tests to be done

Thank you



S. Ahmed
L. Capozza
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J. Jorge Rico
F. Maas
E. J. O. Noll
D. Rodríguez Piñeiro
S. Wolff