

IFIC – SiWECAL activities: gluing and more

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IFIC
INSTITUT DE FÍSICA
CORPUSCULAR

AITANA
MATTER AND TECHNOLOGY

 UNIVERSITAT
DE VALÈNCIA
 **CSIC**
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS



COB vs FEVs noise paper draft

- ▶ Draft since december...
 - Overleaf link (read only) <https://www.overleaf.com/read/gwkswbsgcckj>
- ▶ If you want edit rights, please let me know.
- ▶ Still missing few bites
 - Text and figures on COB design
 - Description of the production
 - Description of the process of chip bonding and encapsulation
 - Sensor gluing (? needed? Was it explained in previous papers?)
 - Few crosschecks of numbers (gains, etc)
 - Description of the injection system

- ▶ A. Irles
 - 50% CALICE, 50% ILD & pheno, 75% LUXE&ECAL-p, 50% preparing for position, 50% office work...
- ▶ Student starting this month (Melissa Almanza)
 - 100% LUXE and ECAL-p
- ▶ 20% mechanical engineer (César Blanch)
 - LUXE ECAL-p & ECAL-e: preparing tools for gluing R&D
- ▶ Postdoc... this was a failure. Our candidate dropped and went to industry.
 - Not clear if we will be able to maintain the budget.

- ▶ Not long-term positions for engineers/technicians associated to this project.

- ▶ Gluing R&D for CALICE is not in danger.
 - Large scale production is a different topic...

▶ Check slides discussed in LUXE ECAL-p meeting (in the indico).

▶ FEV2 metrology

▶ Quick gluing tests / samples for Alice/Alex

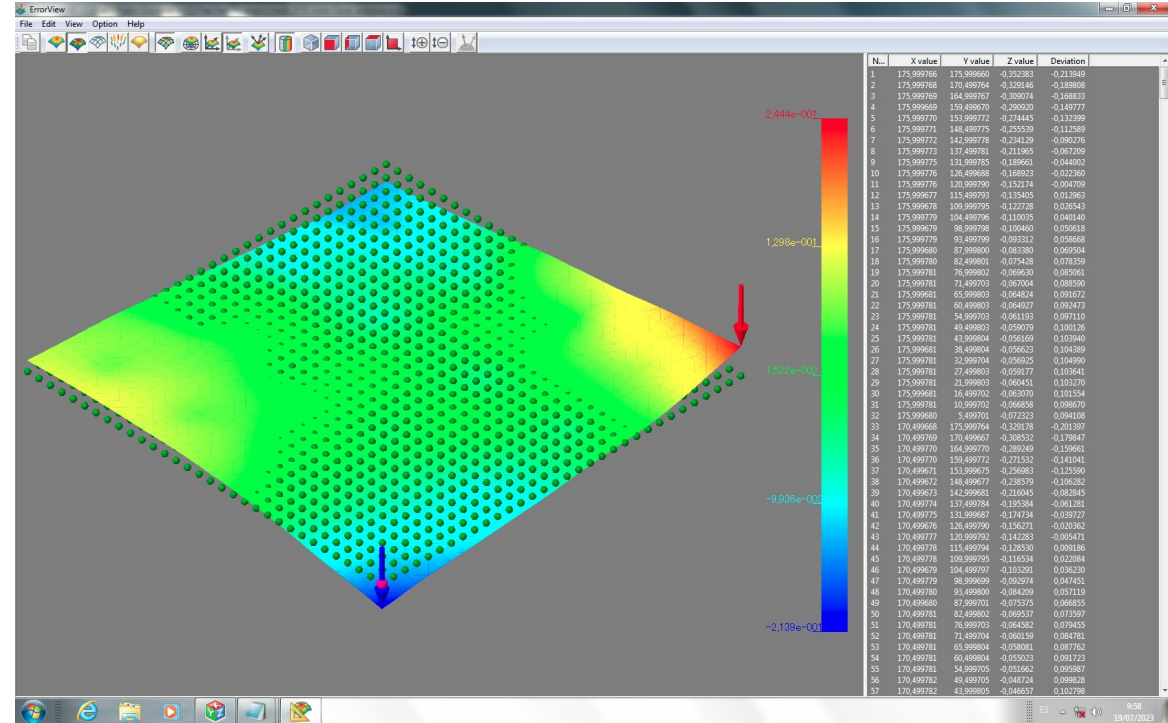
- Testing new and old glues

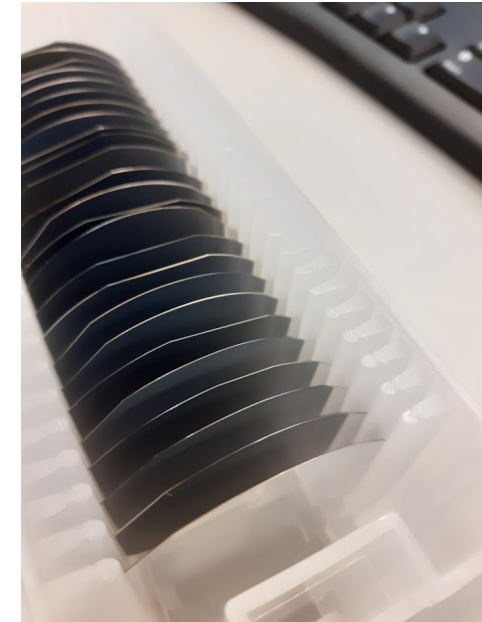
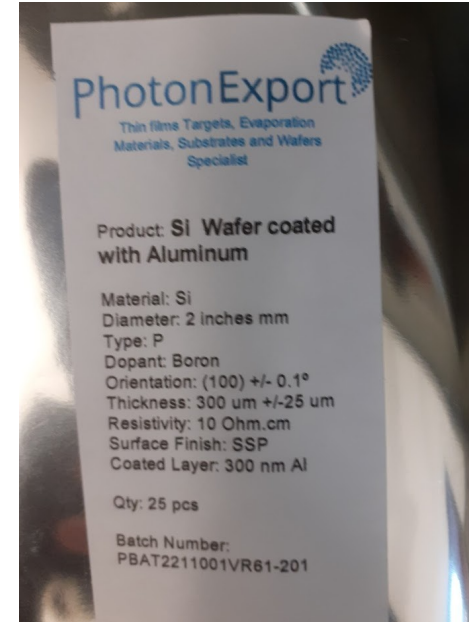
▶ R&D strength of the glue

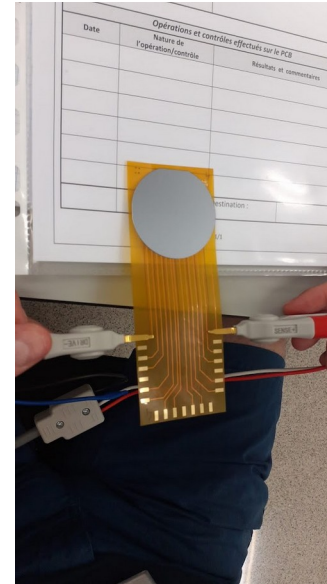
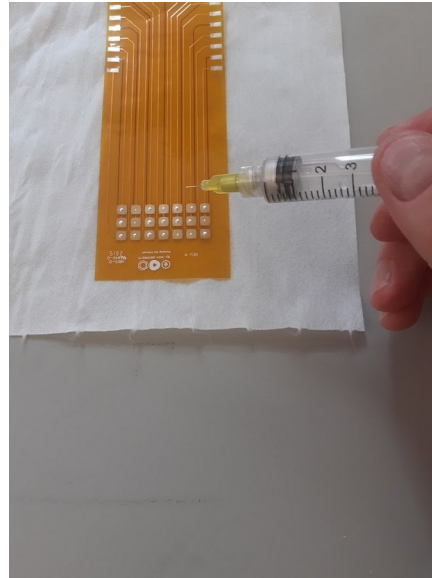
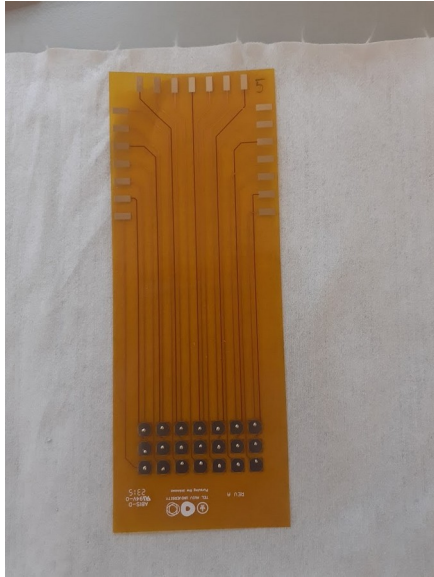
- Pull tests (Alice/Alex)
- Underfill (Alice/Alex)
- Double tape approach
- Other solutions
- Optimization of FEV2 assembly ?

▶ Wafer characterization

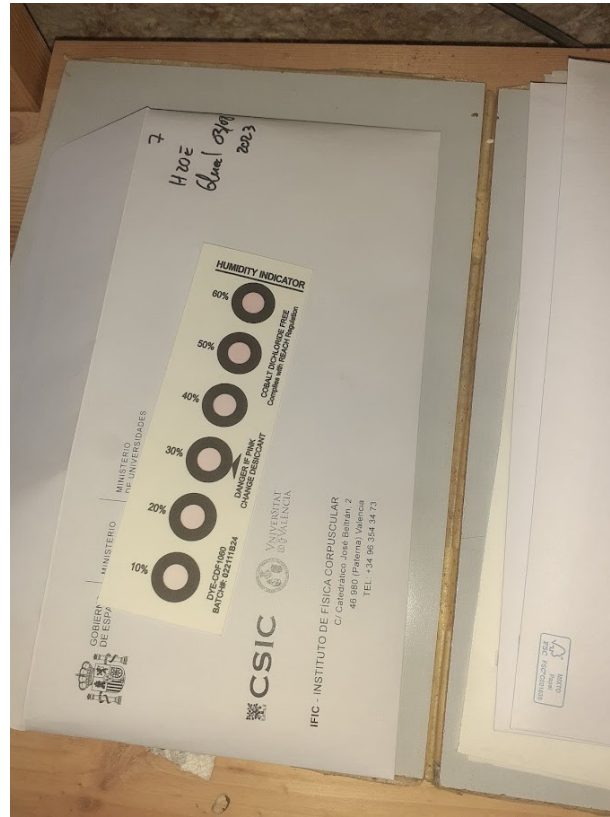
- ▶ In production. Few samples per lab.
 - IFIC has one (fully equipped and functional...)
 - Not tested at IFIC yet
- ▶ Metrology at IFIC doesn't show great results...
 - to be compared with metrologies before and after component soldering



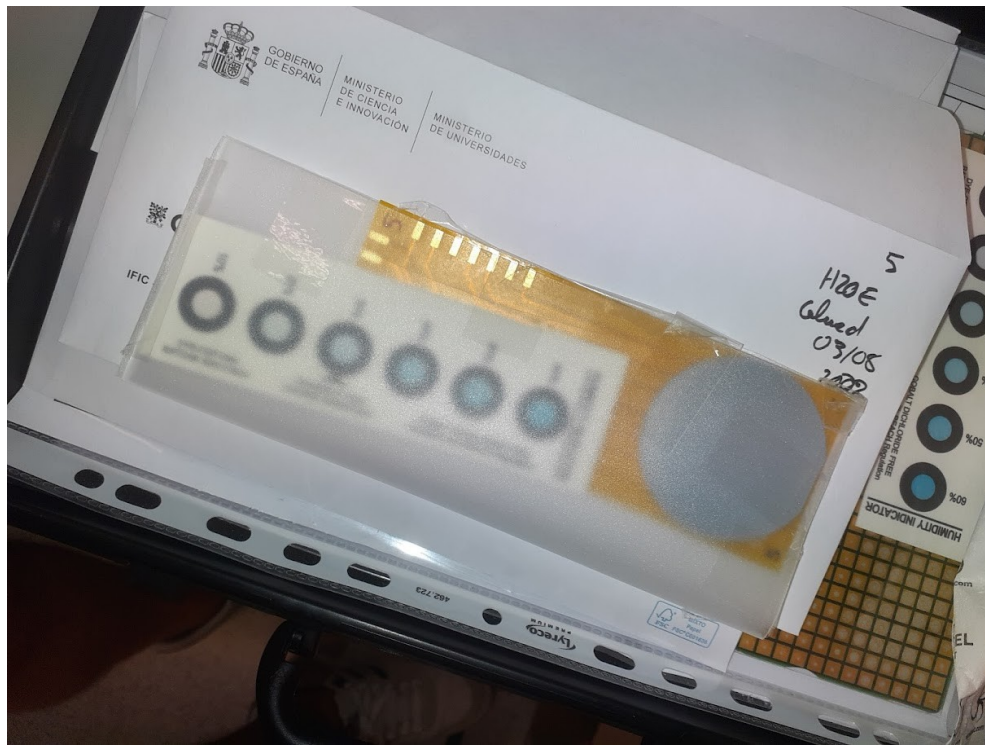
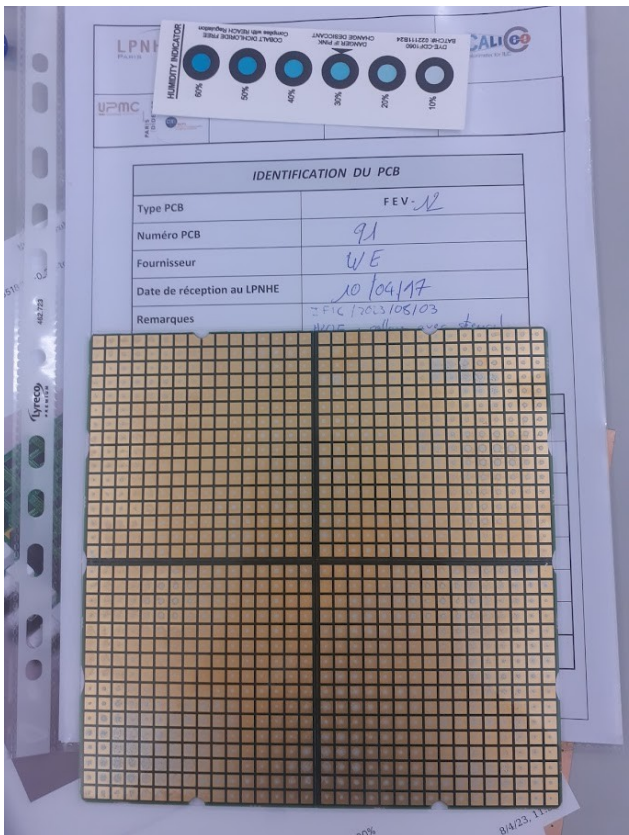




- ▶ New tests done in August 2023, using serynge with different glues (H20E, EJ4110)
- ▶ Measurement of resistivity being performed
- ▶ Different humidity storage conditions.
 - The lab (25degrees, ~20humidity) &
 - the workshop in my house - Palomar - (30 degrees... ~70-80% humidity)



August 2023 – two PCBs shipped to IJCLab IFIC



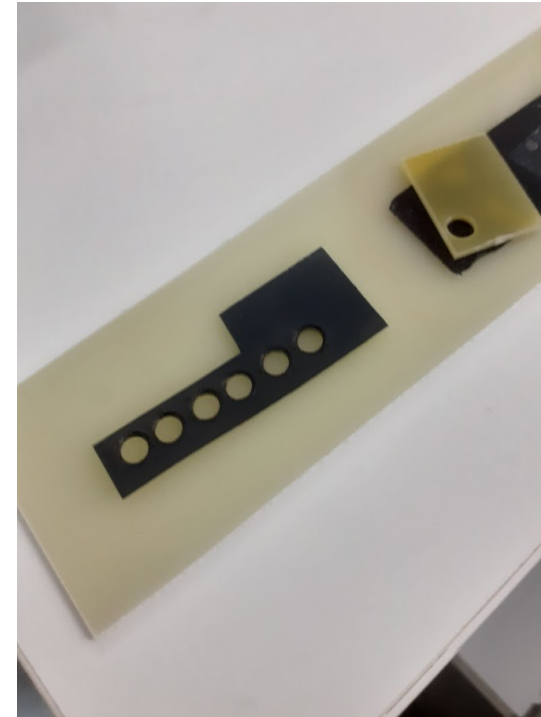
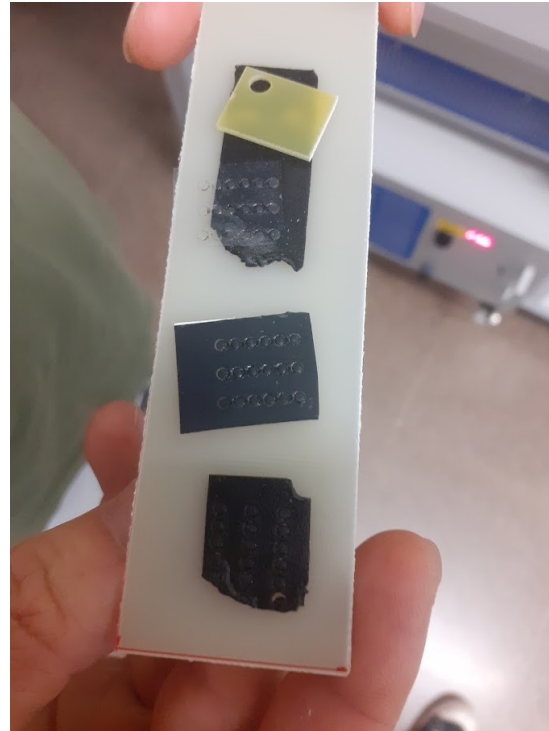
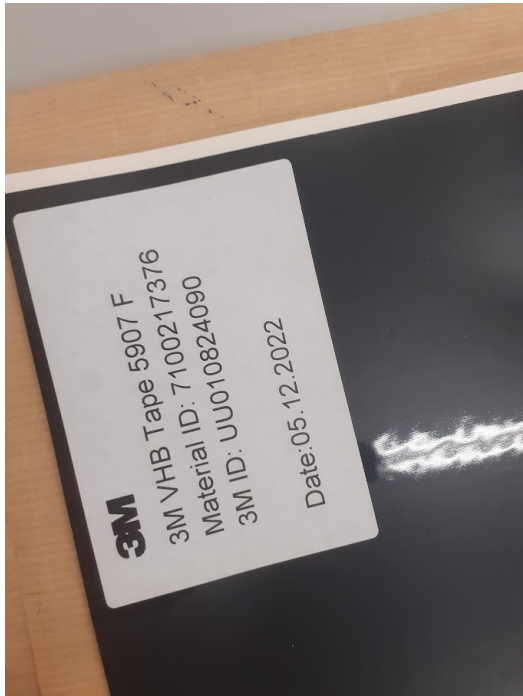
August 2023 – two PCBs shipped to IJCLab

- ▶ Curing at 80 degrees for half a day (15h)
- ▶ Full **procedure in the aspiration plate**
 -
- ▶ Deformation of the PCB visible after the process...
 - Not seen when doing tests in climatic chamber without wafers / aluminum plate
 - Previous tests were done in an oven and/or climatic chamber... better controlled environment
 - Curing oven will be available for us at IFIC.

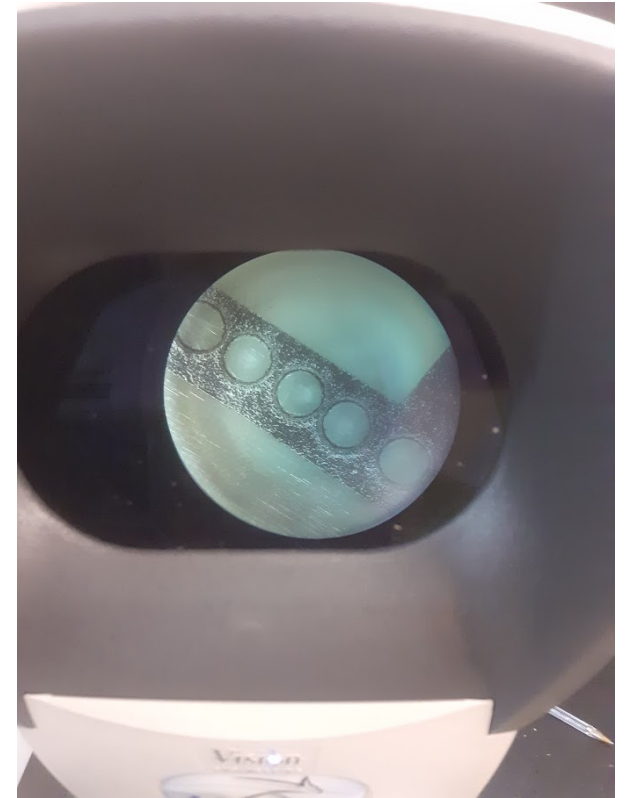


Testing the double tape approach

- ▶ Another approach is to use double tape
 - Dirk managed to get a sample of 150um which is perfectly okay for CALICE



Testing the double tape approach



Testing the double tape approach

- ▶ As we speak
 - Stencil design in process (with holes of 3mm diameter)
 - Production will, hopefully, happen before CALICE meeting

- ▶ Questions (for underfill too)
 - What are the electrical properties of these solutions ?

3M webinar on thin film glues

▶ <https://multimedia.3m.com/mws/media/4414400/3m-tapes-for-membrane-switch-brochure.pdf>

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Key Panel Graphics:
7 mils polycarbonate

Printed Shorting Pad:
5 mils heat stabilized polyester

Bottom Circuit: 5 mils heat stabilized polyester

3M™ Adhesive Transfer Tape 467MP: 2 mils acrylic adhesive

3M™ Membrane Switch Spacer 7946MP: 6 mils (2 mils frontside adhesive, 2 mils PET carrier, 2 mils backside adhesive)

3M™ Membrane Switch Spacer 9045MP: 5 mils (2 mils frontside adhesive, 1 mil PET carrier, 2 mils backside adhesive)

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► <https://multimedia.3m.com/mws/media/4414400/3m-tapes-for-membrane-switch-brochure.pdf>


3M™ Tapes for Metal and HSE Plastics

with 3M™ Acrylic Adhesive


Product Number	Description	Total Caliper (mils)	Construction		Caliper (mils)
7945MP	Excellent temperature, chemical and UV resistance. High shear strength withstands repeated stresses of switch actuation. Designed to separate switch circuitry until actuation. Both liners are printed.	5	Top Liner	58# PCK	
			Adhesive Type I	200MP	2
			Carrier	Polyester	1
			Adhesive Type II	200MP	2
			Bottom Liner	58# PCK	
			Top Liner	58# PCK	

3M webinar on thin film glues

3 Transmisión en directo




Biografía del conferenciante

 **Fernando Ballesteros**
Ingeniero de aplicaciones 3M Cintas y Adhesivos Industriales.
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Diapositivas

Procesos de conversión | Para optimizar los procesos

¿Qué es un convertidor?

Los convertidores añaden valor a las tecnologías adhesivas de 3M al crear piezas a medida del usuario final, que permiten obtener un proceso más ágil y un resultado óptimo




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Productos principales

- SP7202 – para sustratos HSE
- SP7555 – para sustratos LSE

Pegado de carátulas

Pegado de panel perforado en luminarias

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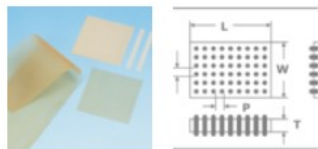




GB-Matrix type of Inter-Connector

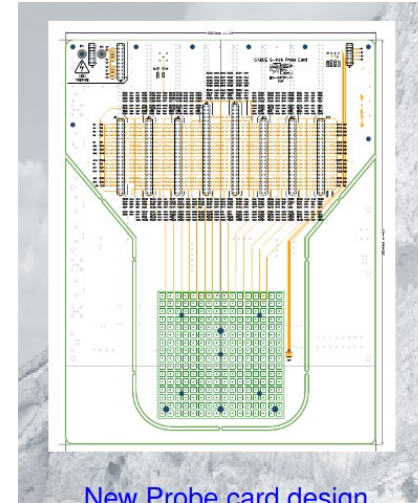
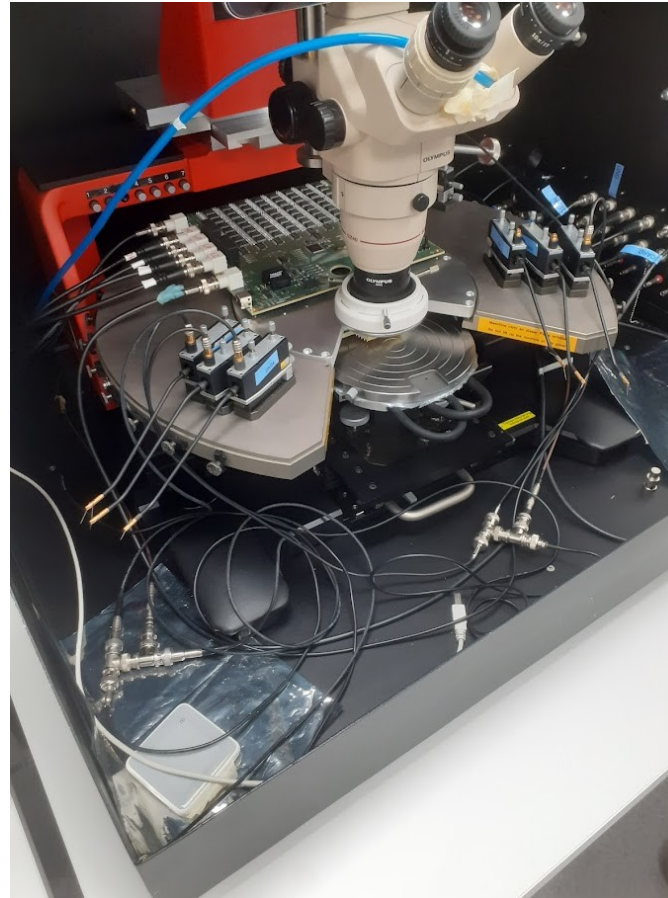


The GB-U-type of Inter-Connector is used for permanent board to board and component to board connections.



Wafer characterization

- ▶ We are getting a switch + probe card for testing sensors
 - Coordinated with ECAL-p / Tel Aviv sensor testing
 - Electronics designed by CERN
- ▶ Two parts:
 - Switch card → designed by CERN
 - Probe card → designed and produced by CERN (~5000CHF)
- ▶ The switch card is to be produced by us
 - I contacted a spanish company, ROMPAL.
 - Will produce 1 for me...



Meeting with Rompal

- ▶ I haveve shown them our FEV2
- ▶ They have an industrial process for PCB assembly with large and long oven that facilitate the optimization of the heating/soldering with different phases
- ▶ They could do a detailed study of deformation and damage of the PCB (and/or components) during the assembly
 - It requires to destroy one or two naked FEV2.
 - The result of the process could be a special oven program for our cards
- ▶ They could also equip our PCBs, after they have done the tests
 - Or before.

