Si-W ECAL overview

Technical prototype development

Daniel Jeans, LLR

for the SiW ECAL groups

3×15 cells

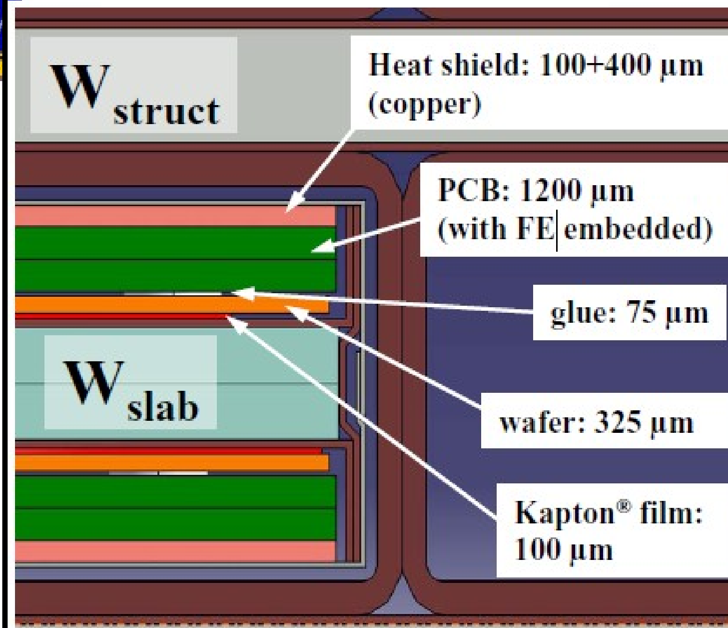
Technological prototype

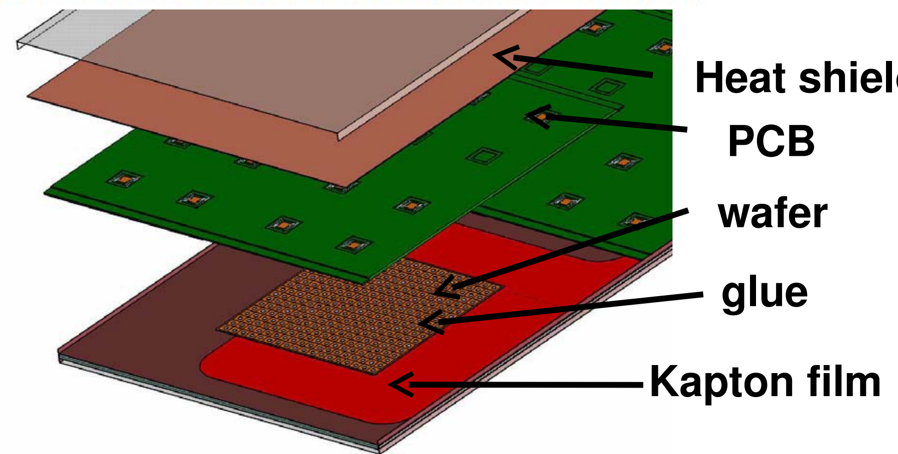
Short detector slabs (×14)

Long detector slab (1)

Complete Tower of 4 wafers = 18×18 cm²

Silicon module





- mechanics
- cooling studies (mechanics – Denis)
- silicon sensors (Remi)
- FE electronics (electronics – Nathalie)
- FE board
- DAQ (DAQ session - Franck/David)
- assembly (mechanics – Julien)
- testbeam planning

EUDET module – Assembly Mould

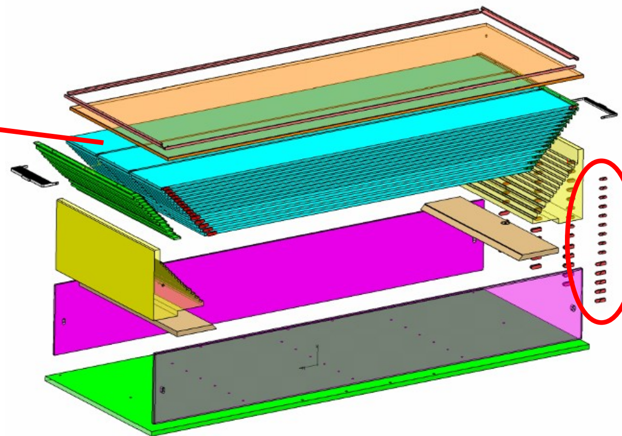
- ⇨ Reception of mould : *Sept 2010*
- ⇨ Validation & Thermal tests : *Oct 2010*
- ⇨ Alveolar structure : *Dec 2010*

Alveolar layer production :

9/15 structures are been moulded but the production is now stopped by problems with the autoclave

Dimensional inspection of 1st core received

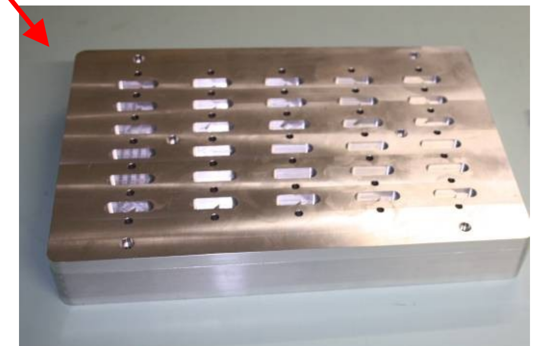
First integration tests with final core + joints



Joints production :

100/180 joints ready

Design and construction of 2 moulds according to lower and upper parts



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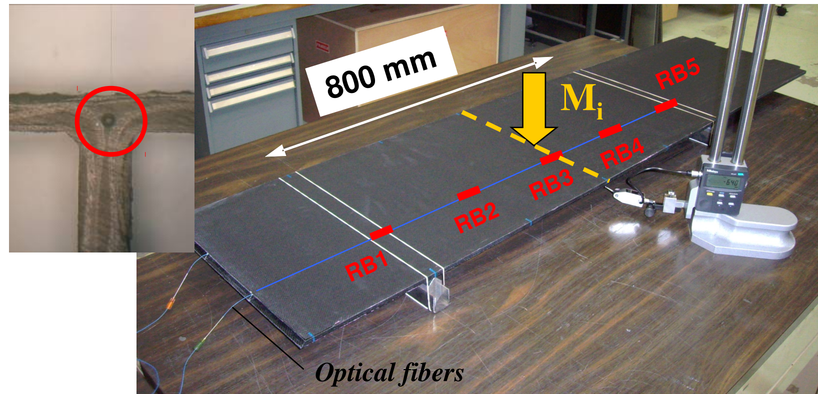
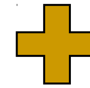
EUDET module – BG studies

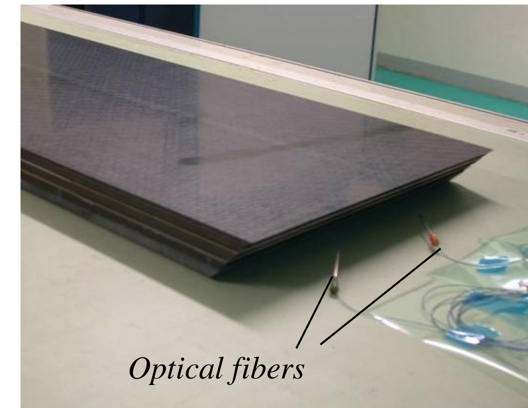
<u>Embedded sensors:</u>

Improve the simulation (SAMCEF) about the global mechanical behaviour of the module using tests with optical fibers with Bragg Gratings (BG) embedded in the composite

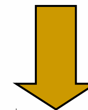


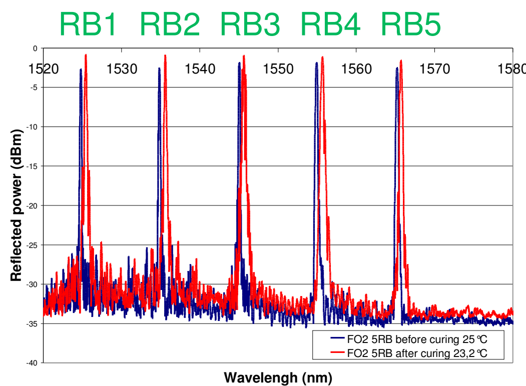
Bending 3pts tests to validate the principle on alveolar layer



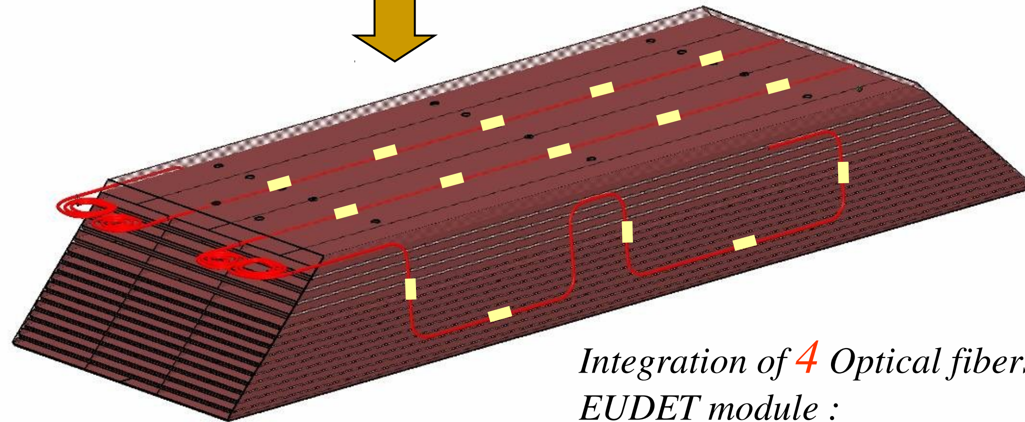


Preparation of similarly tests on demonstrator + destructive tests !!!





Response of each Bragg Grating



Integration of 4 Optical fibers into the EUDET module :
Correlation : Tests + Simulations

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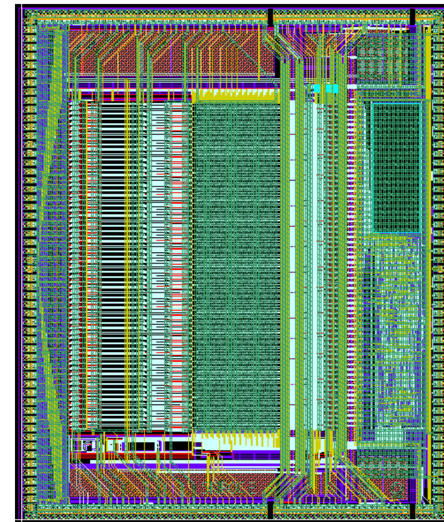
Mechanical schedule

- Eudet module :
  - Reception of complete Assembly mould — September 2010
  - The end of the alveolar layer production — October 2010
  - Thermal tests and Validation of the mould — October 2010
  - EUDET module structure — December 2010
  - Modifications of H mould — December 2010
  - 14 short H-shaped + 1 long structures — Jan/Feb 2011
  - Mechanical demonstrator tests (+destructive) — February 2011
  - TestBeam preparation (interfaces, tools…) — First half-year 2011

SKIROC2 current status

Stephane Callier/
Omega

- Thanks to our engineering run, we were expecting 1250 devices -> finally, we have more than 1650 samples! (naked dies)
  - Few samples are currently packaged in CQFP240 for complete characterization on test board
  - Others will be later tested on a probe station

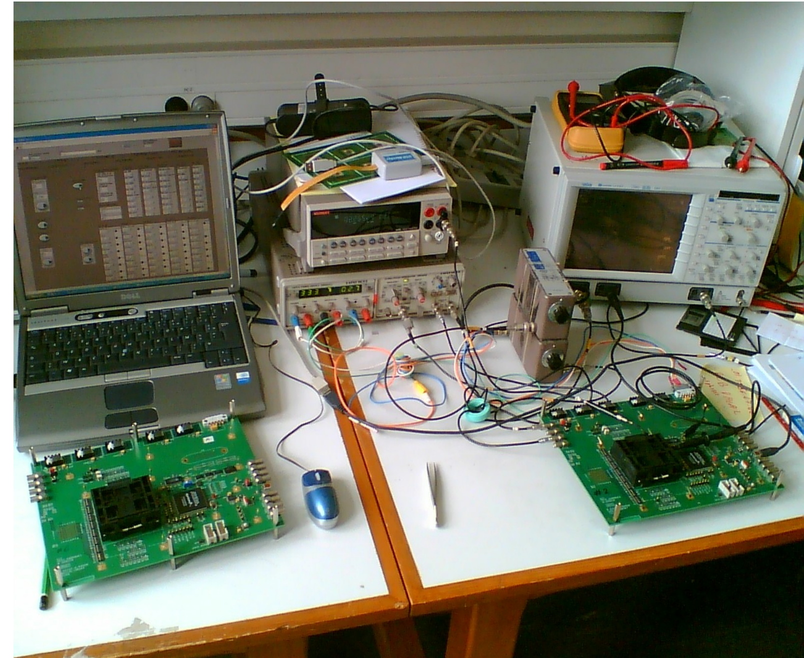


- We are currently waiting for:
  - 5 Chips (currently in bonding @ Systrel)
  - 4 PCBs (currently in cabling @ LAL)
  - The software & the firmware of this PCB (currently in development @ OMEGA)

SKIROC2 close future

Stephane Callier/
Omega

- Within next week(s?), we will be able to test the SKIROC2 chip
  - Based on our simulations and previous results and chips, we can already predict the performances and the possible issues of this chip



- After, we will have to develop a test bench with a probe station for testing all of the naked devices

- Finally, SKIROC2 will be integrated in FEV8 boards
  - 16 chips on each board to read out 1024 channels
  - Contact with CERN bonding lab

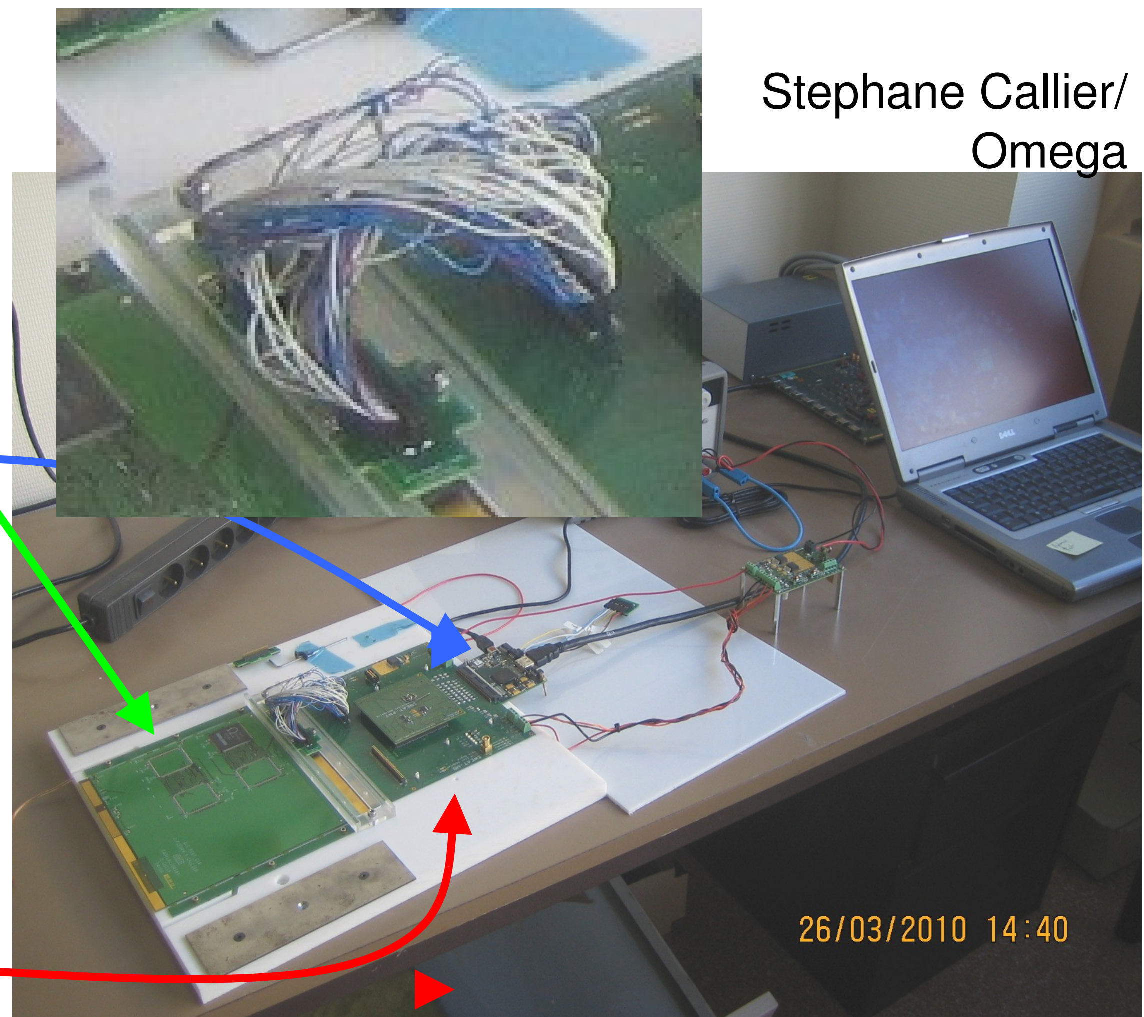
- 4 Test Boards : 2 @ OMEGA, 1 @ LLR, 1 @ SKKU

FEV7s

Stephane Callier/
Omega

- Test bench @ LLR using now FEV7-CIP

- The DIF is ready to communicate with the adapter board



- The adapter board (SWEAT) is now debugged (connectors are inverted and swapped with free wires... nice !)

- We are ready to provide a setup to the chip and analyze the results (october 2010)

FEV8

Stephane Callier/
Omega

- Upcoming FEV8 will use 16 SKIROC2 chips (unless critical issue on the device)
- Schematic is 95% complete : optimization of connectors assignement for terminations & digital signal returns to avoid need of an termination pcb
- 1024 channels on 180 mm x 180 mm board (4 si sensors)
- Pads for bonding and biasing guard rings should be included… Manufacturer are reluctant with that “new” constraint !
- Our Korean colleagues (Sung Kyun Kwan University) should take in charge half of the next FEV8 production

Planning

FEV7/SPIROC2/DAQ2

Cosmics → end 2010
Testbeam Q1-2 2011

FEV8/SKIROC2

Assembly of first short slab ~ Q3-4 2011
First tests towards end 2011

After this:
    test of long detector slab
    Filling of eudet structure

Conclusions

excellent progress in several critical pieces

- DAQ2
- SKIROC2

we look forward to having a working sensor->DAQ chain
in a few months

mechanical, cooling and integration aspects in good shape

FEVx

Stephane Callier/
Omega

- Korean people have designed a 5 chips version of the FEV7-COB based on LAL's PCB. They should manufacture it within next months, and later test it on a test bench.

- We need to have 3 test benchs : 1 @ LLR, 1 @ LAL & 1 @ SKKU

- Issue points still to be solved:
  - Enclosing of the chips on the FEV (resin, top cap…?)
  - Planarity of the FEV (mecanical stress could damage the very thin and fragile wafers)

- Still to remember (managed by UK calice groups):
  - Kapton for interconnexion between FEV & FEV, FEV & SWEAT (current flowing & voltage dropout)
  - Gluing of the wafer on the FEV