Update on EICROC0 testing effort at IJCLab

- **Measurements with ^{90}Sr β source**
  - First analysis based on digital (ADC & TDC) data — *Arzoo's talk*
- **Update on IR laser test bench development** — *Ana's talk*
- **Update on EICROC0 PCBs**
- **Update on firmware porting associated to ZCU106 FPGA board**
- **Update on next EICROC iterations** — **OMEGA team**
- **Discussion**

Dominique Marchand on behalf of
Olivier Brand-Foissac, Vincent Chaumat, Thomas Cornet, Mathurin Grossetête,
Beng-Yun Ky, Arzoo Sharma, Laurent Serin, Ana-Sofia Torrentó

06/16/2025 - EICROC0 meeting

Update on EICROC0 PCBs

- **8 PCBs partially cabled at IJCLab (finalization end of May)**
  - **5** at BNL
    - **3 to be kept at BNL for testing needs**
    - **2 to be shipped back to IJCLab after wire-bonding a flip chip (HPK sensor with metalization removed + EICROC0)** ***To be exploited with the IR Laser test bench (Summer '25)***
  - 3 at IJCLab for next EICROC0 iterations

Update on firmware development concerning updated FPGA board

AMD Zynq™ UltraScale+™ MPSoC ZCU106

Still under development

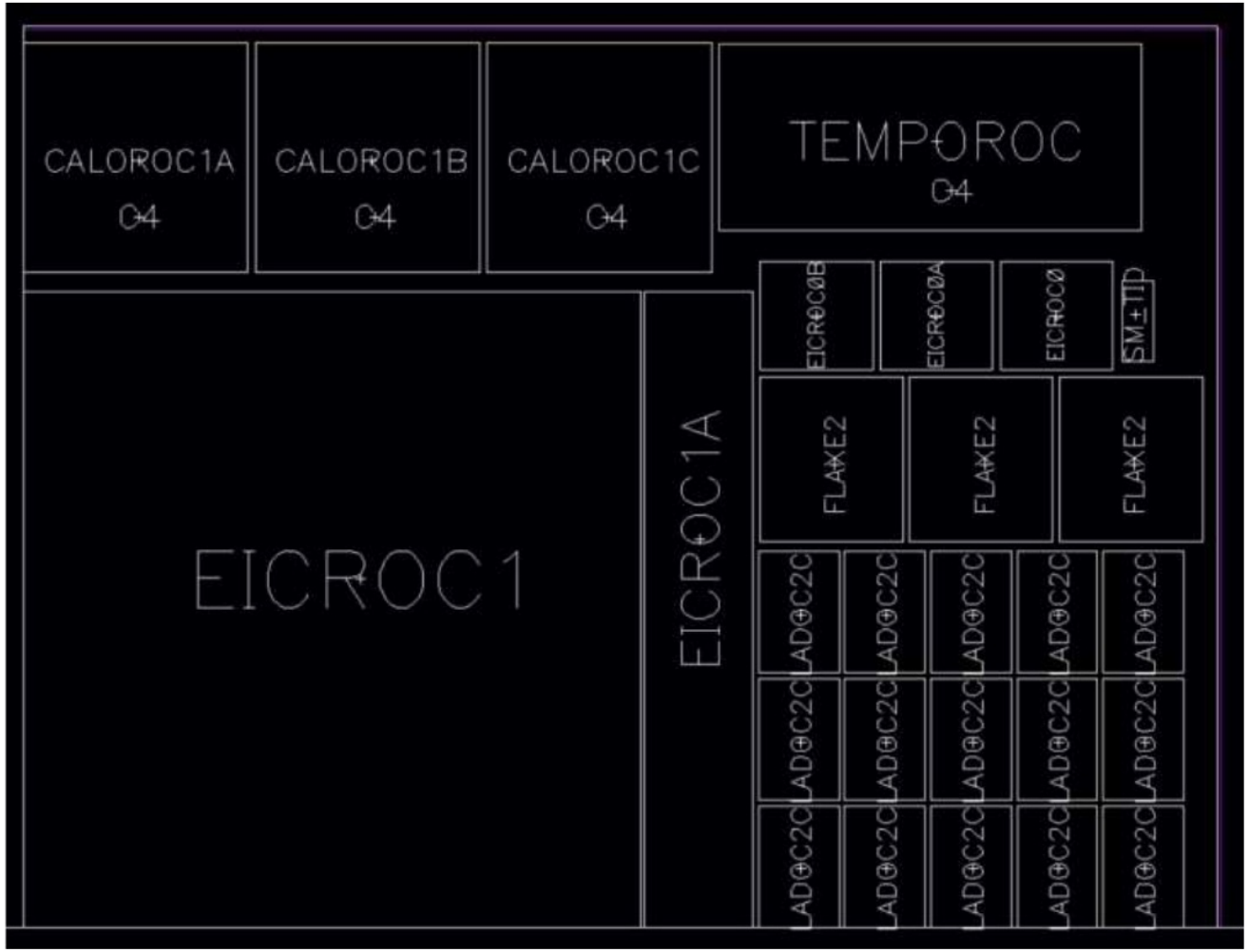
- Firmware porting **DONE**
- For **I2C full compatibility** reasons: requires replacement of some « pull-up » resistor values on the PCB
  - Optimized resistor values still to be determined: **work on progress** with a PCB holding an EICROC0 ASIC (only)
- Once sucessful resistor values determined, further tests will be performed at IJCLab before sharing with you the firmware/sofware suite.
  We'll keep you informed

EICROC reticle 2025

- TSMC now requires to fully populate the reticle
  - Cost ~300 k€

- For EIC we have
  - 1 EICROC1 32x32
  - 1 EICROC1A 4x32
  - 3 EICROC0/A/B 4x4
  - 3 CALOROC1A/B/C
  - ~70% of reticle area
  - EICROC1 is 40% of reticle area
  - gds files loaded end of may

- Still administrative issues delaying the start of fabrication



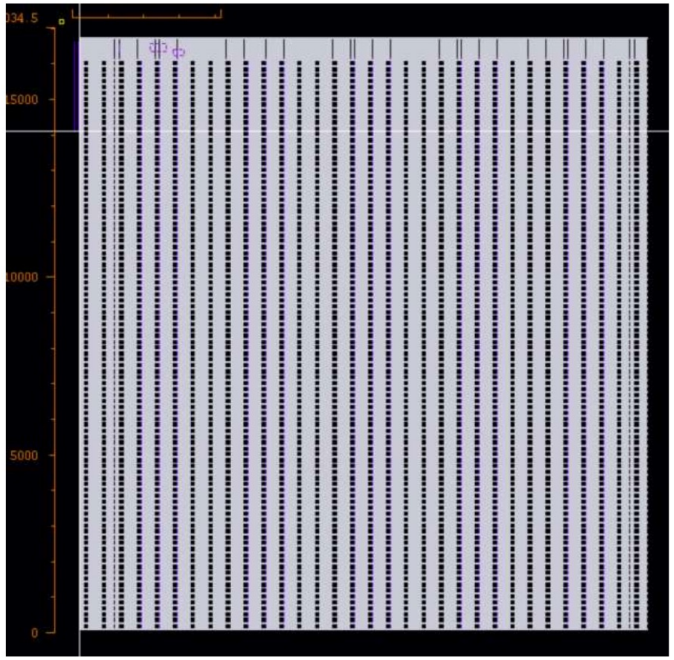
EICROC0 variants

- EICROC0A same as EICROC0 with more testability
  - Each pixel can be by-passed by SC (clock is then turned off)
  - Buffers in SC to allow extension to 4x32
  - Larger dynamic range in pulse injection

- EICROC0B
  - Same preamp/discri/TDC/integrator
  - ADC and driver replaced by peak sensing and Wilkinson ADC
  - Currently ADC path ~1 mW/ch becomes 200 uW/ch

- Will be fabricated with EICROC1 below

- 32x32 chip : final dimensions

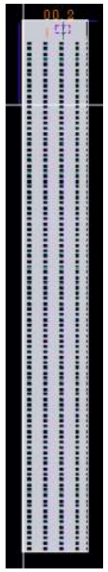


- Goal :
  - test full-scale chip analog performance (IR drops)
  - Allow final sensor characterization
  - Test interface with DAQ : fast commands and 320 Mb/s data output
  - Progress on module/front-end boards

- Caveats ;
  - Not (yet) zero-suppressed data
  - Still 2mW/ch
  - Still analog-on-top

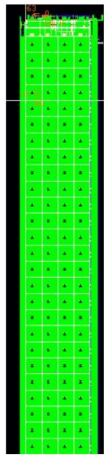
- Designed as 8 blocks of 4x32
  - Read out sequentially, like EICROC0
  - Pixel similar to EICROC0A
  - 8 CLPS outputs at 40 MHz
  - Clock tree for isochronous calib_pulse distribution

- Common balcony (End of column)
  - Biases and slow control
  - New : fast command decoder (clock, calib_pulse, enable_acquisition, start_readout)
  - Backup clock and cmd_pulse inputs available
  - New : 320 MHz serializer for 1 CLPS output



EICROC1A variant

- Full block of 4x32 of EICROC1 with old EICROC0 pinout
  - Same balcony as EICROC0A (same slow control parameters)
  - Same testboard and DAQ as EICROC0
  - Allows to test colums specific effects (IR drops)



Discussion

- **ePIC ASIC review meeting** (EICROC, CALOROC, CFDROC, SALSA, ALCOR): **June 2-3, 2025, Paris region**
  Gathered ASIC designer teams, Dave Abbott, Elke Aschenauer, Fernando Barbosa, Rolf Ent, Jeff Landgraf

https://indico.bnl.gov/event/28161/

Very fruitful discussions

- *Monday June 2nd and Tuesday morning at OMEGA*
- *Tuesday afternoon at CEA Saclay*

Jointly organized by OMEGA, LLR, IJCLab and CEA/Irfu

- **ePIC meeting** (July 14-19, 2025, JLab): we'll attend remotely

- **Seeking for a postdoctoral researcher working at IJCLab: characterization of pixelated AC-LGAD with EICROC & simulation activities (i.e. exclusive process including far-forward detectors)**
  (2,5 years, starting Oct. 2025)
  Arzoo's contract is extended until January 9th, 2026. [original end: July 9th, 2025]