CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE

IN2P3

UPMC PARIS UNIVERSITAS

LPNHE Laboratoire de physique nucléaire et des hautes énergies

SiTRA test beams at CERN: infrastructure developments and results

Annual EUDET meeting

NIKHEF

Alexandre CHARPY

General Overview

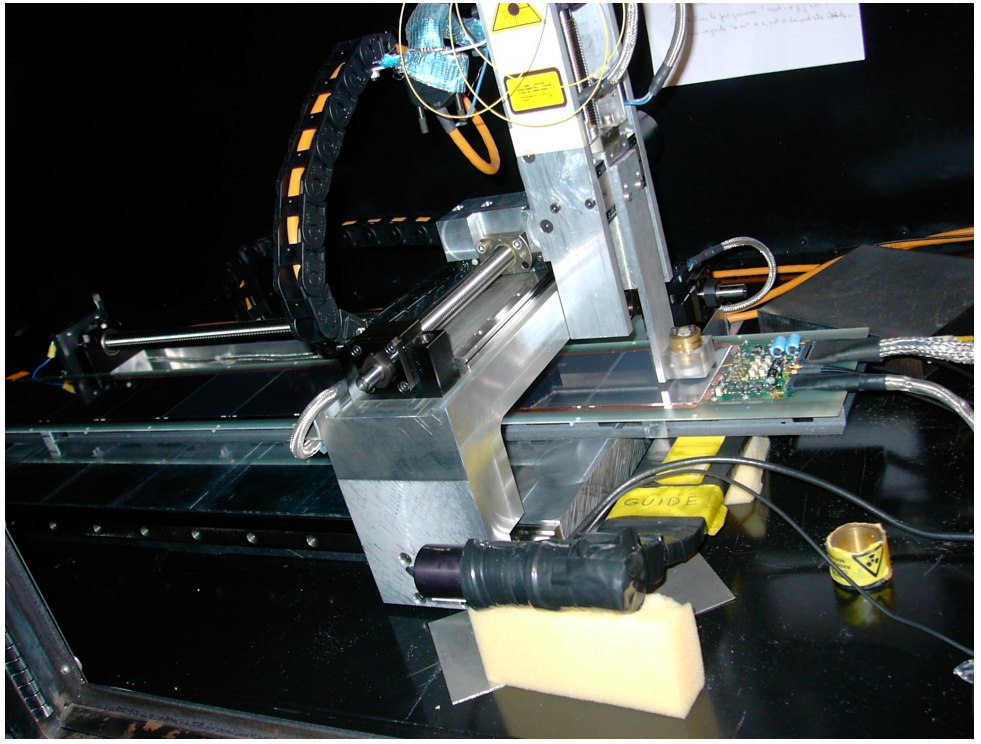
I. Status of the last test beam
- Overview
- Some results

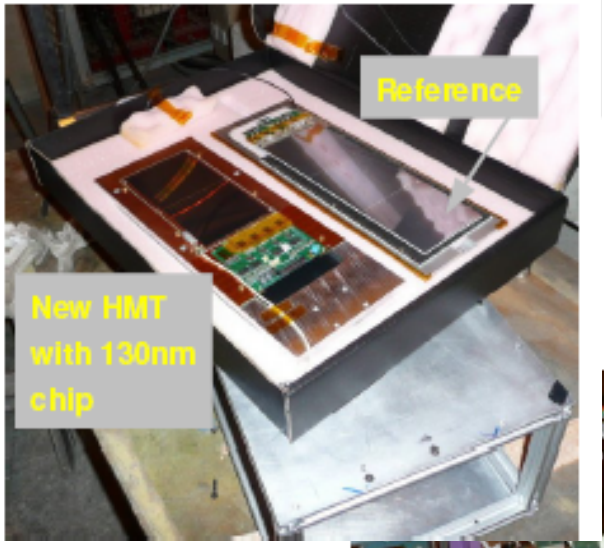
II. Project
- Test SiTr130-88 chip
- Alignment study

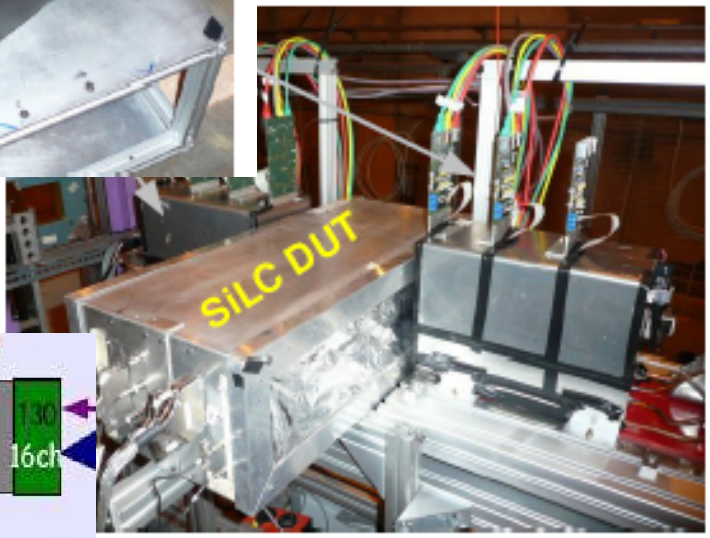
III. Mechanics
- Module conception
- Tools development
- Clean room
- Modules manufacturing

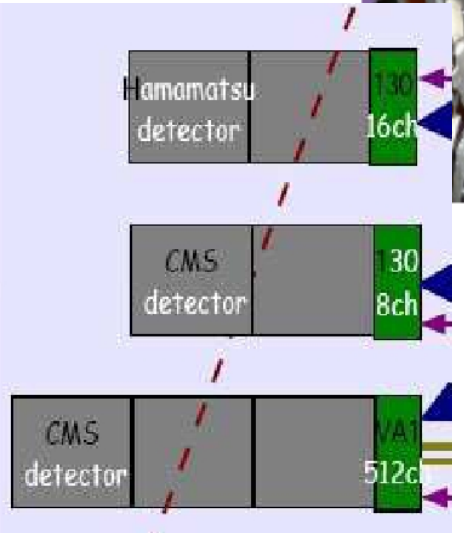
II. DAQ
- FEE electronics
- ALTERA 2
- Software development

Status of the 2007 beam-test and testbench with source @ Paris





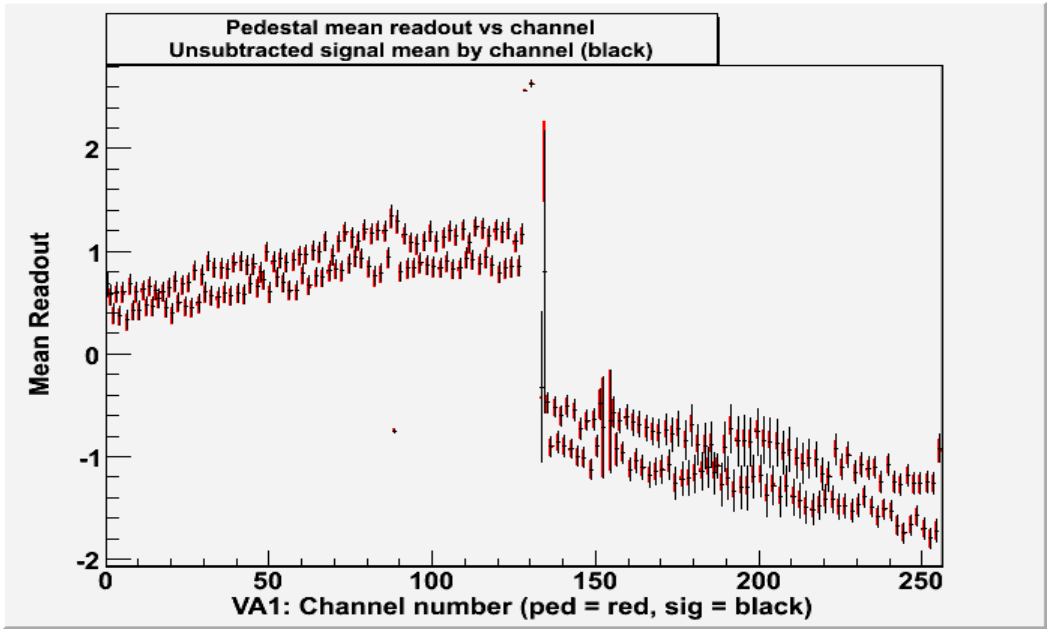


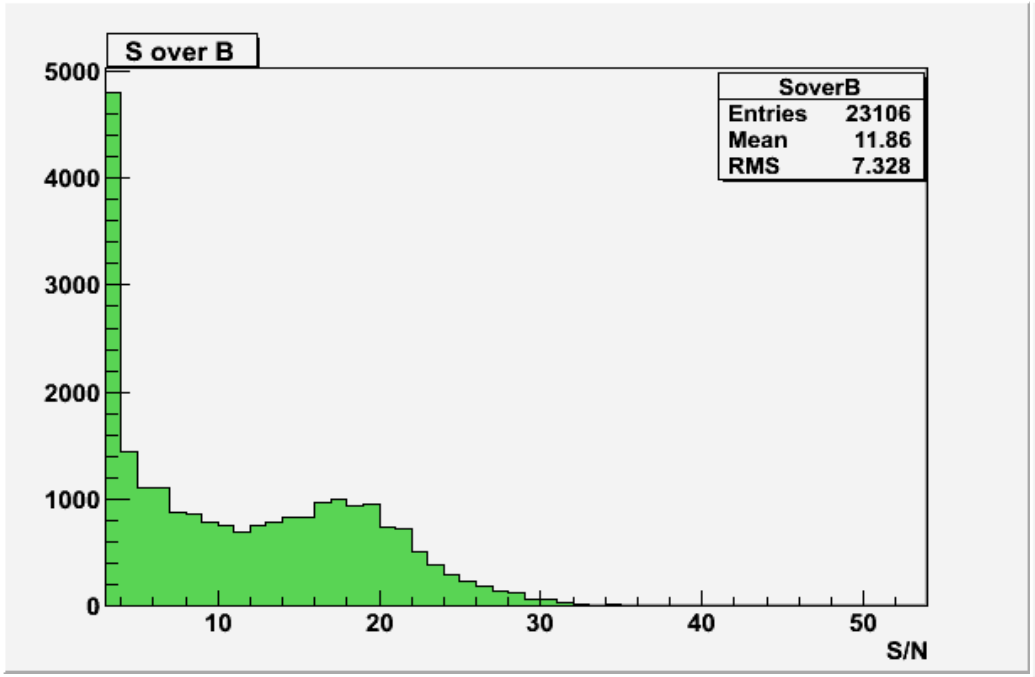


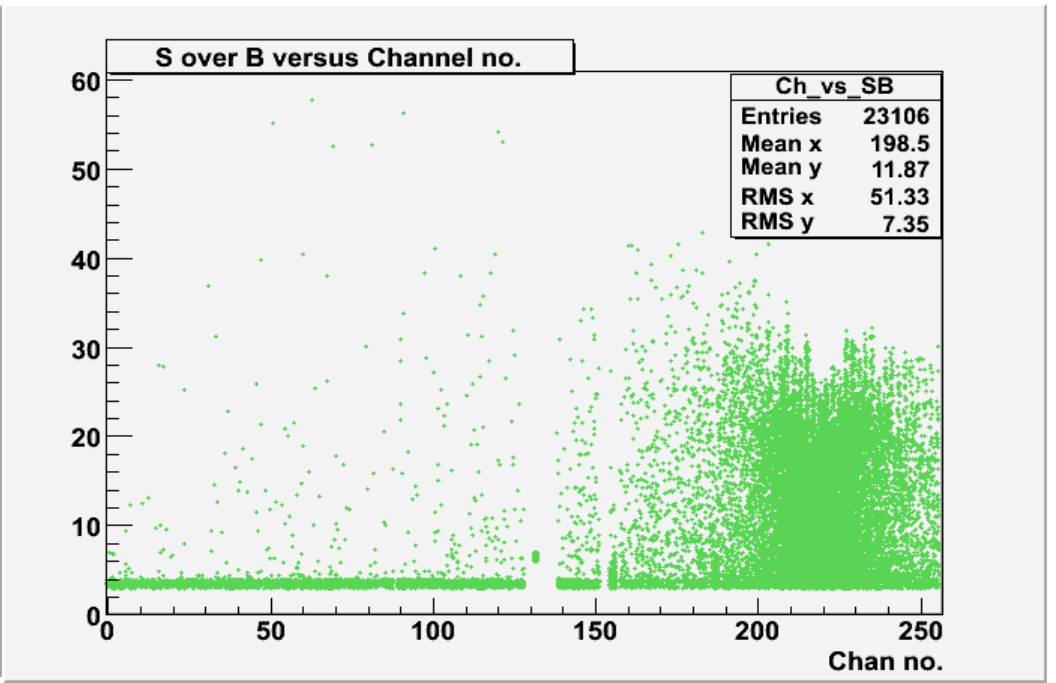
- Faraday cage @ Paris:
  - 3D table
  - PM + Scintillator for triggering
  - Infrared laser
  - Radioactive source Sr90

Status of the 2007 beam-test and testbench with source @ Paris

- Some results of VA1
  - Pedestal subtraction
  - Common noise study
  - Signal to Noise

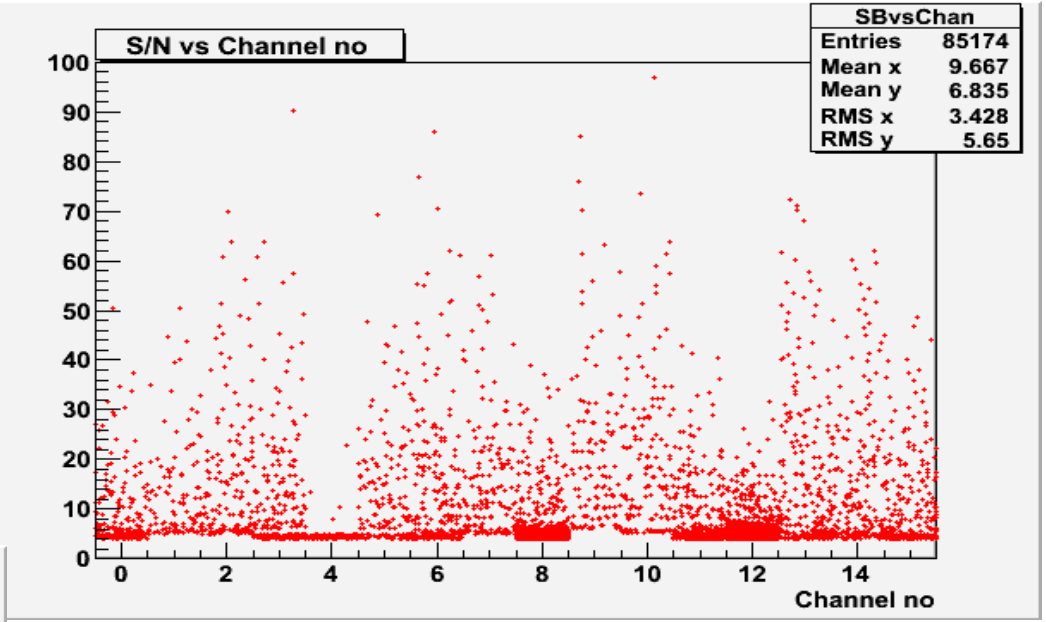


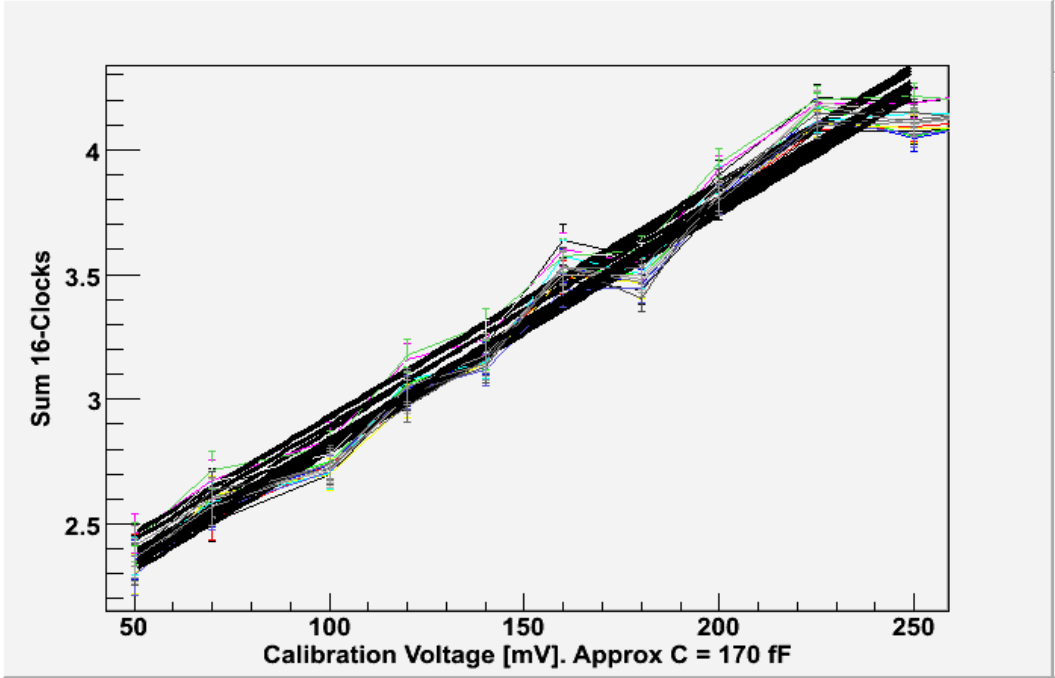


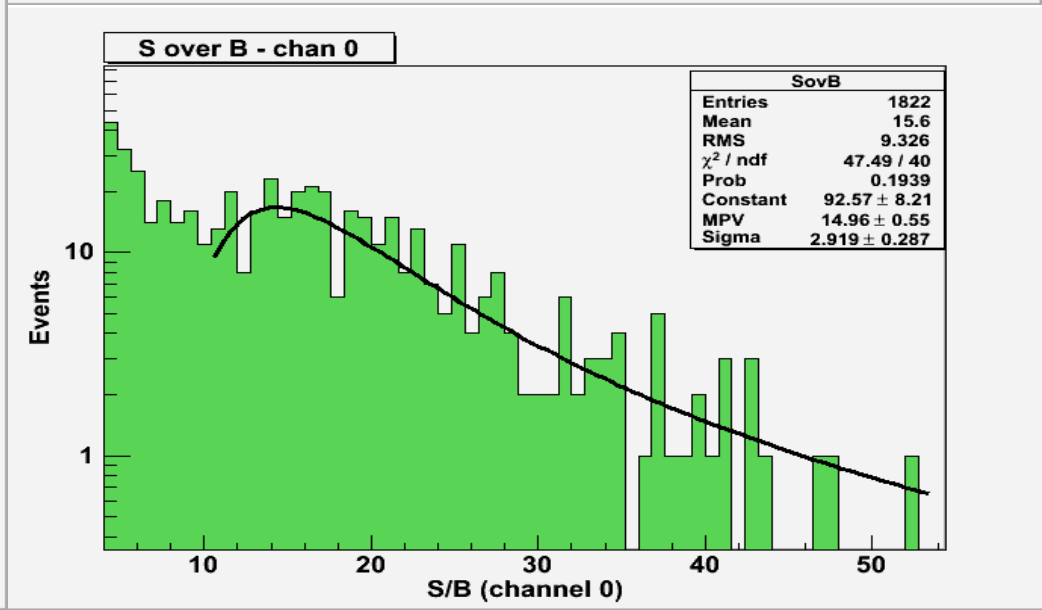


Status of the 2007 beam-test and testbench with source @ Paris

- Some results of SiTr130-4:
  - Pedestal study (vs channel, sample ...)
  - Signal to noise Vs Channel
  - Signal to noise
  - Linearity

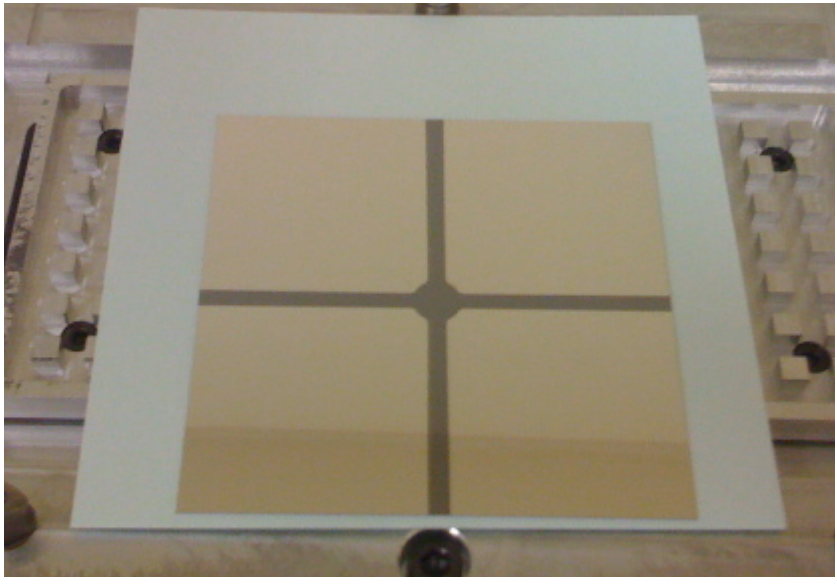






Project

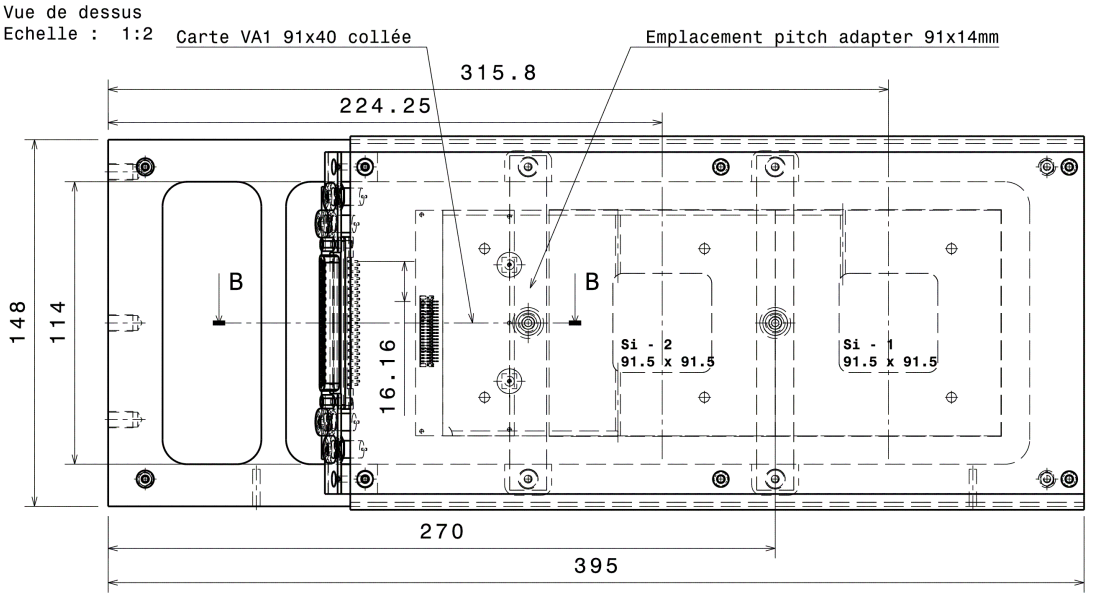
- Testing the SiTr130-88 chips
  - New HPK sensors performance characterization
  - Performance extraction of the new chip SiTr130-88 (more statistics)
  - Alignement system (M.Fernandez Garcia, I.Villa)
- Develop an environnement for modules manufacturing for EUDET collaboration (G.Badet, A.Charpy, G.Daubard, C.Evrard, P.Ghislain, D.Imbault, P.Repain)
  - parameters of HPK sensors: dimension, transparency
  - Front-end electronics
  - Development of toolbox
  - Clean room installation

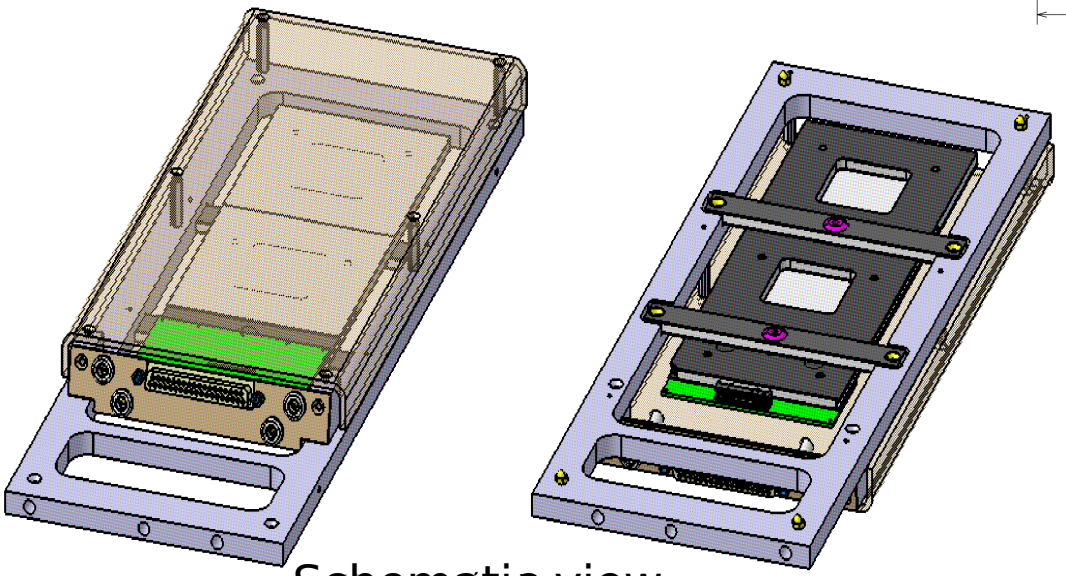


Mechanic development

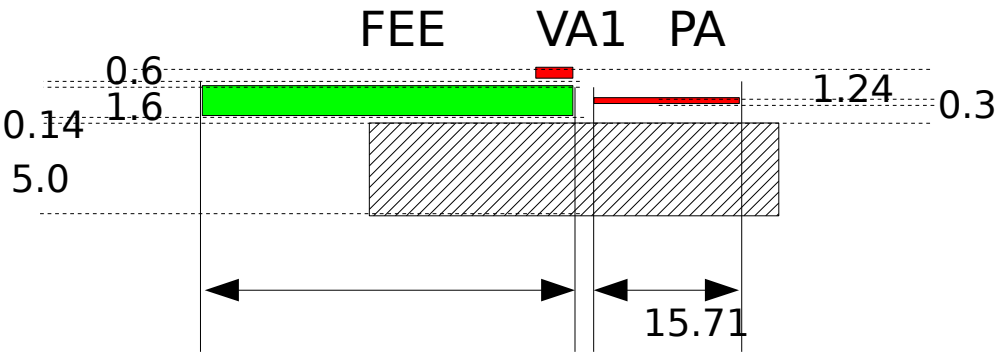
- *Module conception (LPNHE team)*

- *Modules with two sensors*
- *Different FEE (chip development)*
- *Bonding constraints (I.McGill)*
- *Faraday cage integration*
- *Alignment study*
- *Easy and secure handle*
- *Study for global structure*





Schematic view

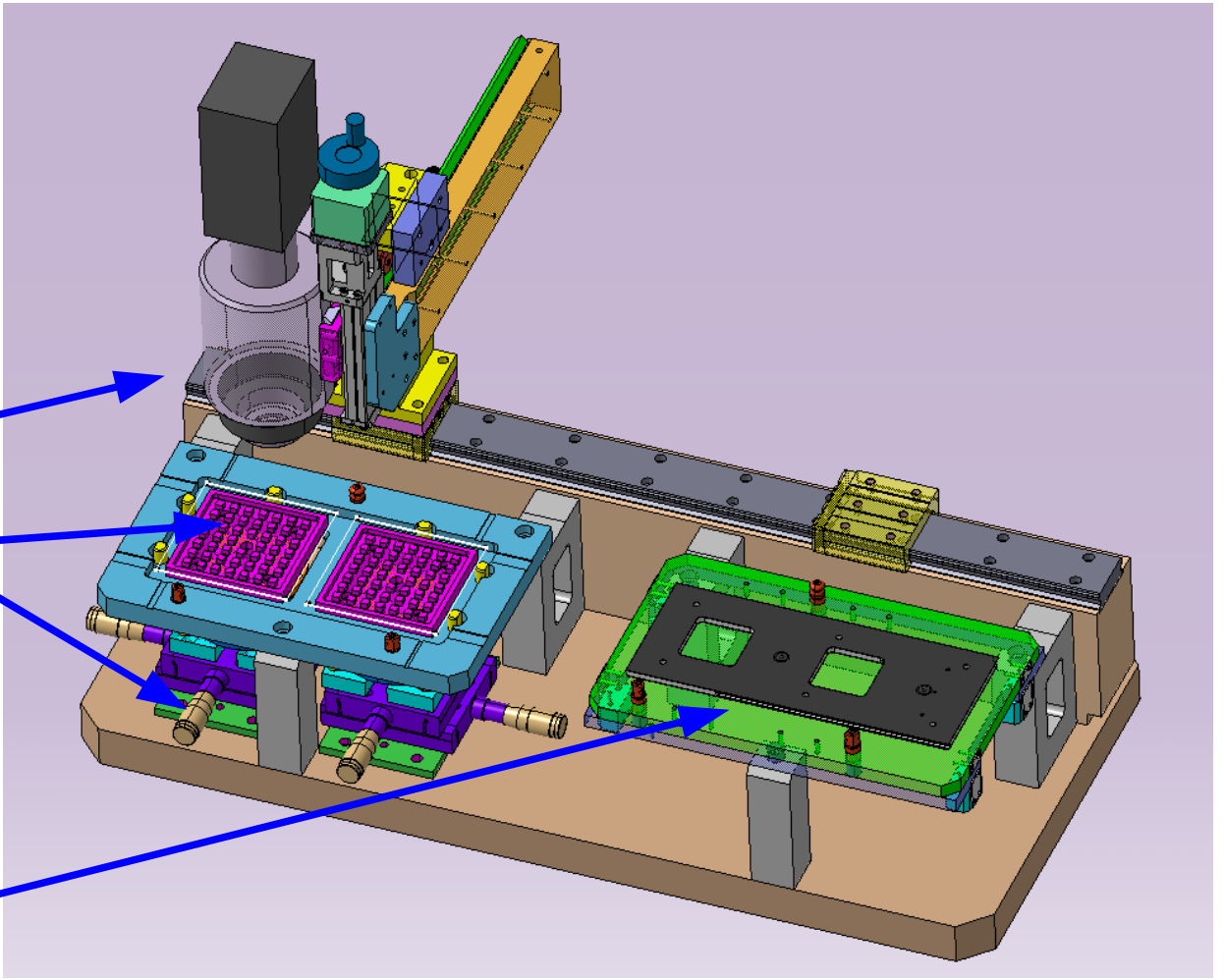


Mechanic development

- *Tools conception for "automated" manufacturing*

Precise alignment of the different parts of the modules:

· silicon strips
· pitch adapter connectivity
· FEE



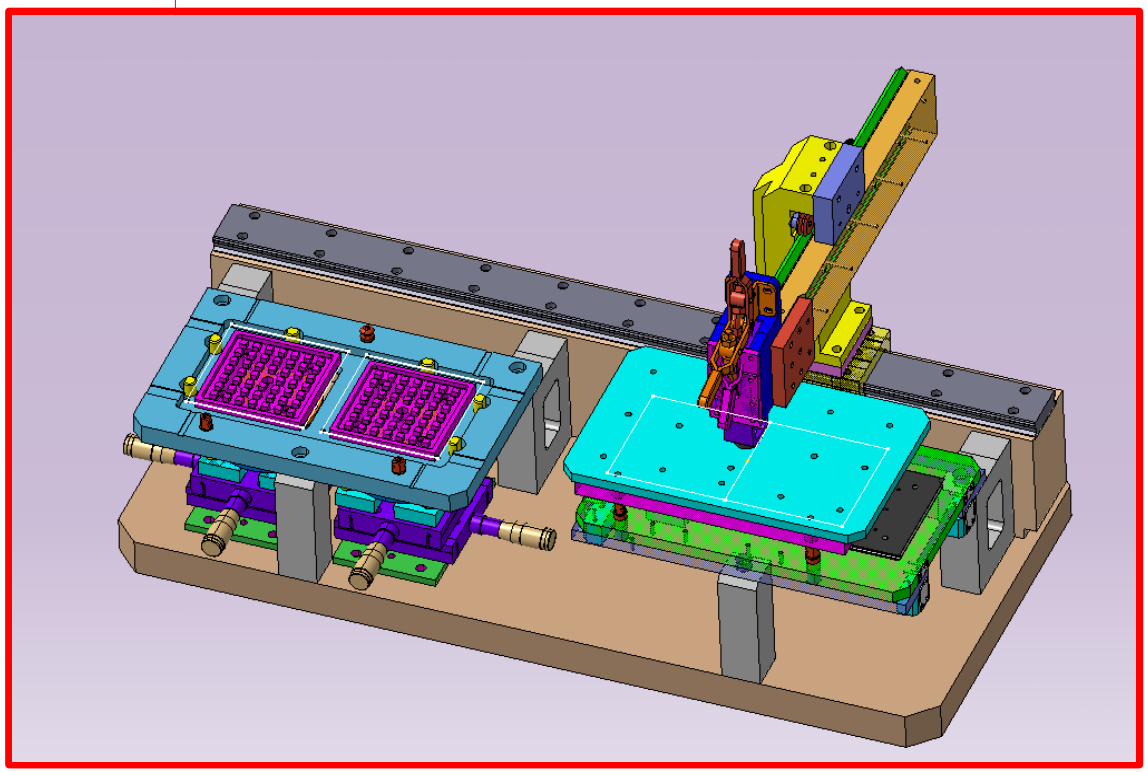
Perfect integration on the carbon fiber support during the gluing

Mechanic development

- *Tools conception for "automated" manufacturing*

• Keep alignement during the gluing process
• Perfect integration on the carbon fiber support during the gluing

Suction transfert tool

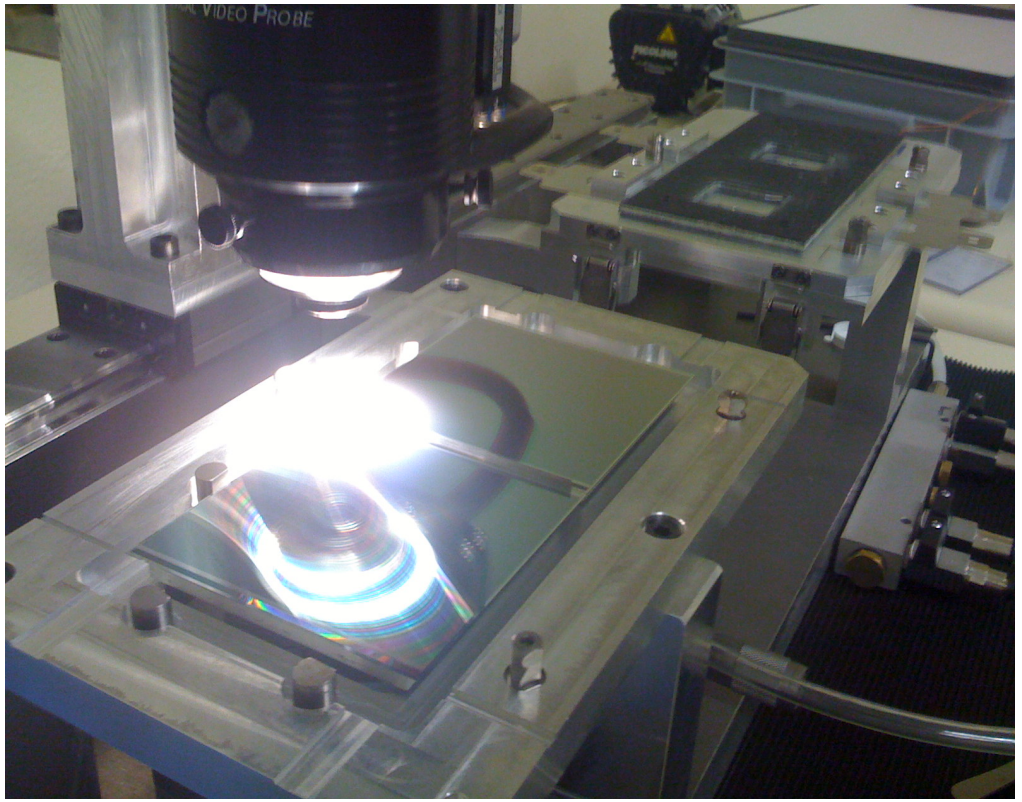


Gluing tool

Mechanic development

- *Work environement*

- *Definition of the procedure and the critical point during the assembly*
- *Installation of the cleanroom and the first module is done*



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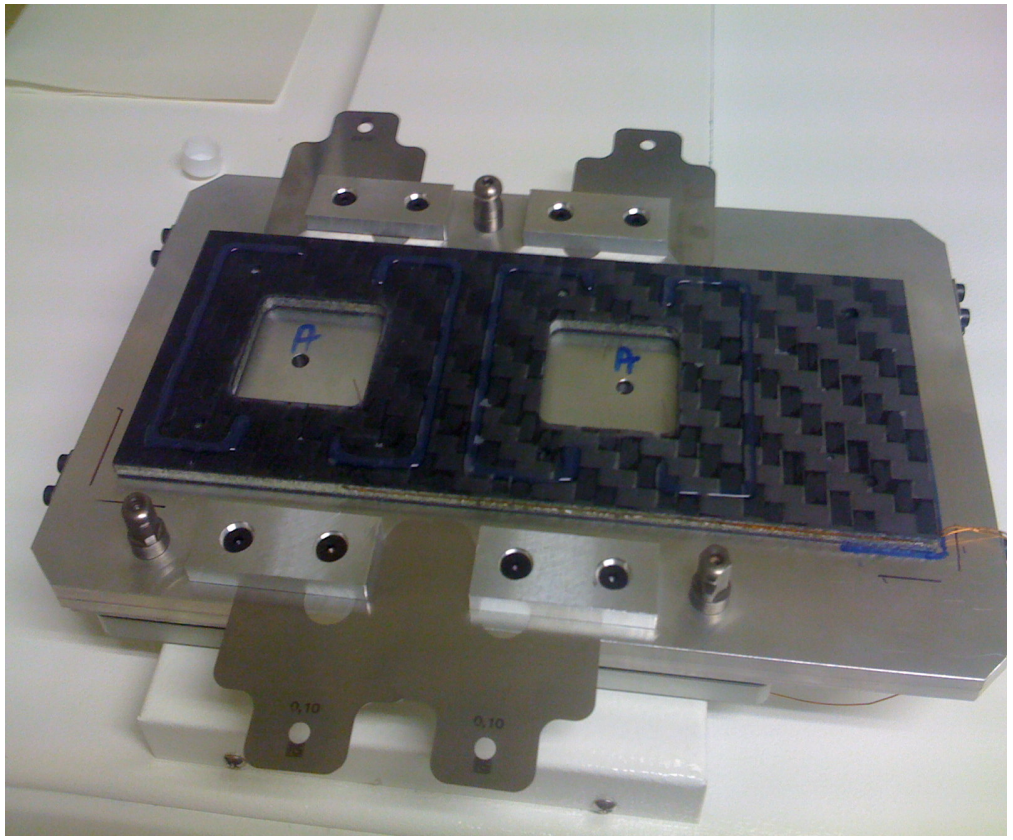

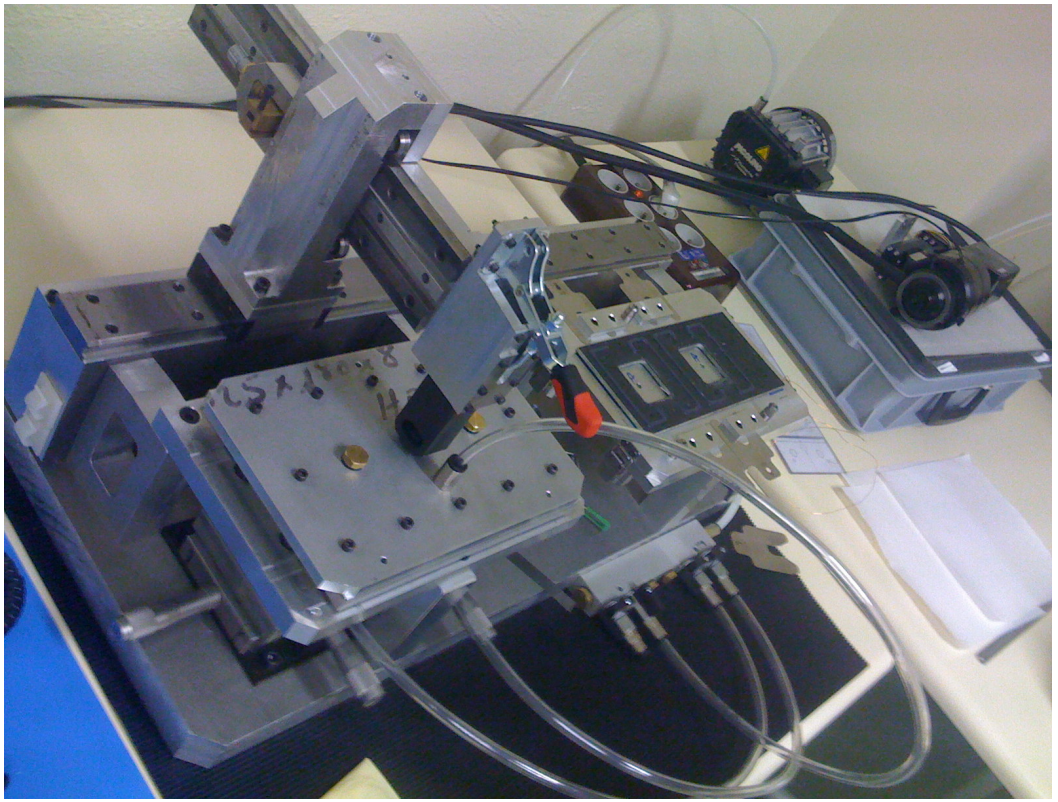

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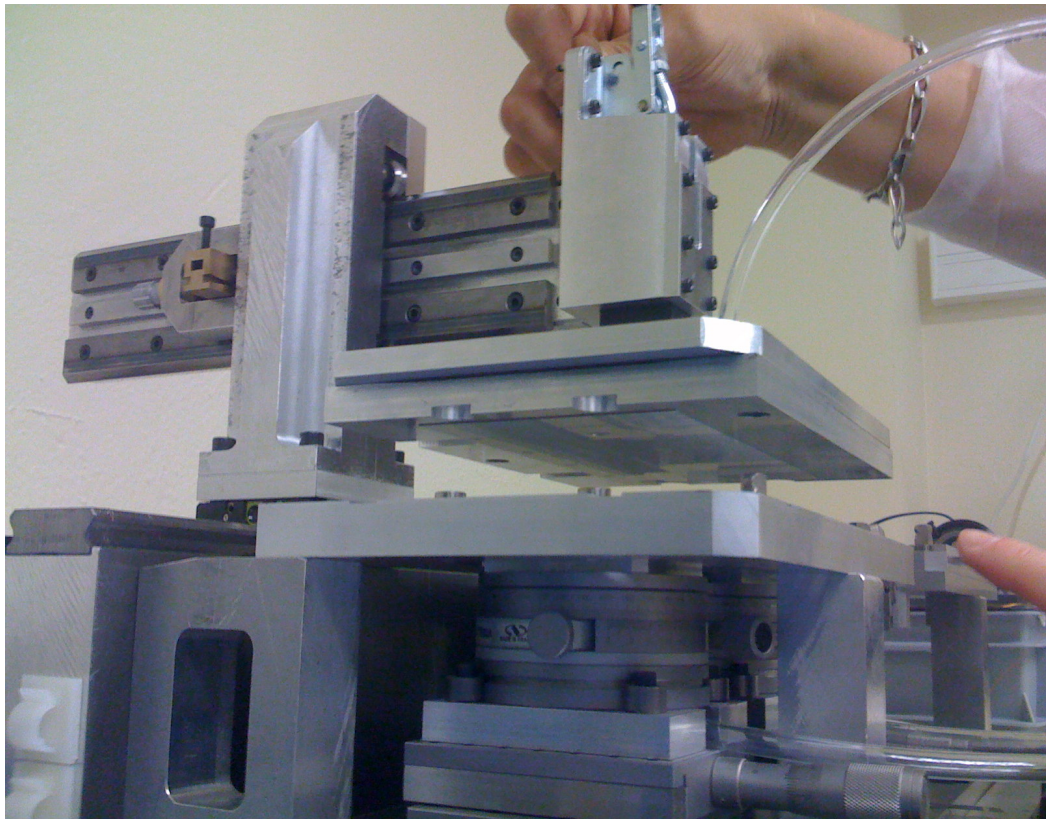

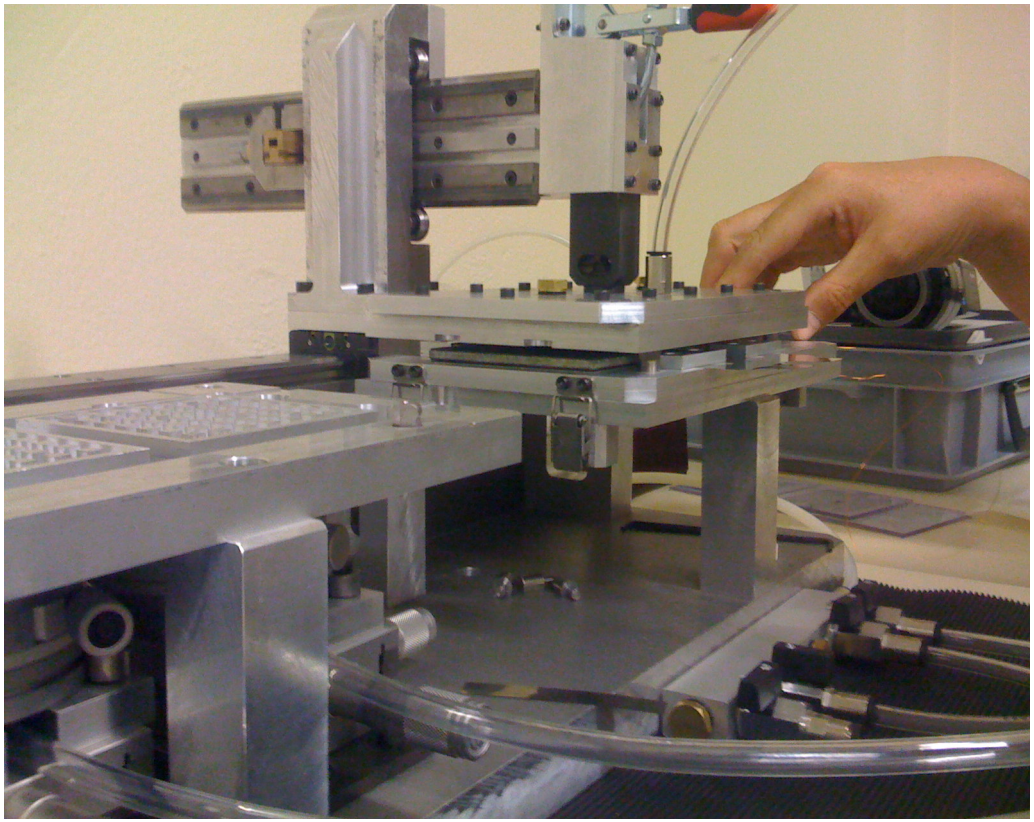

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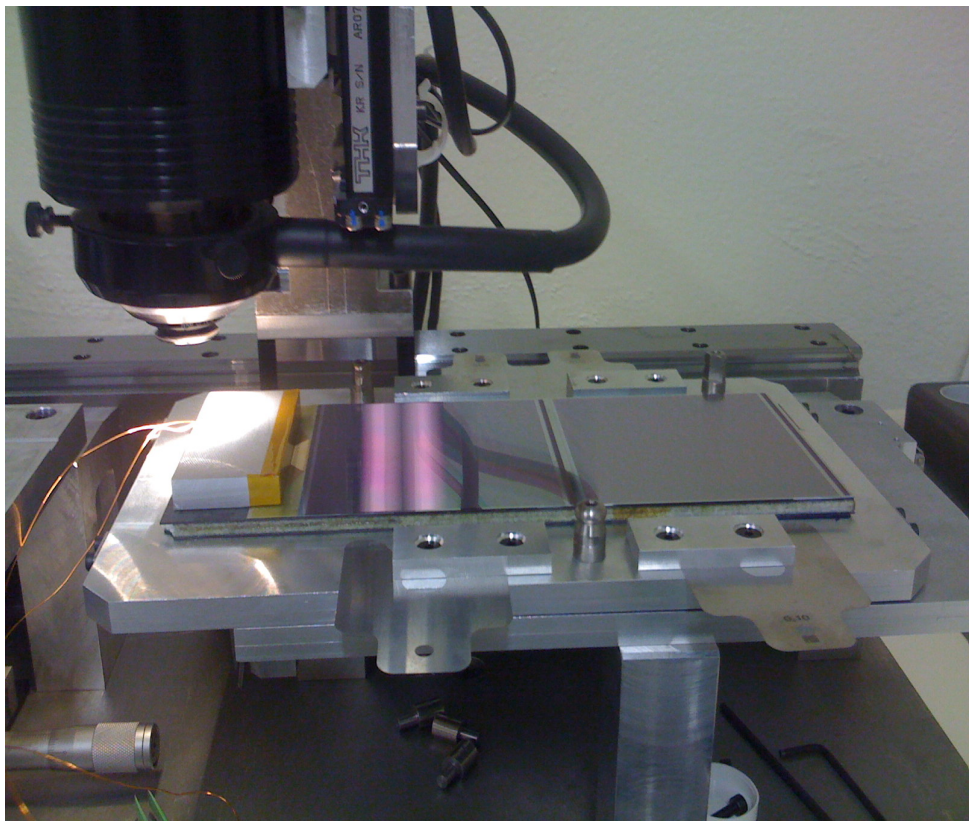
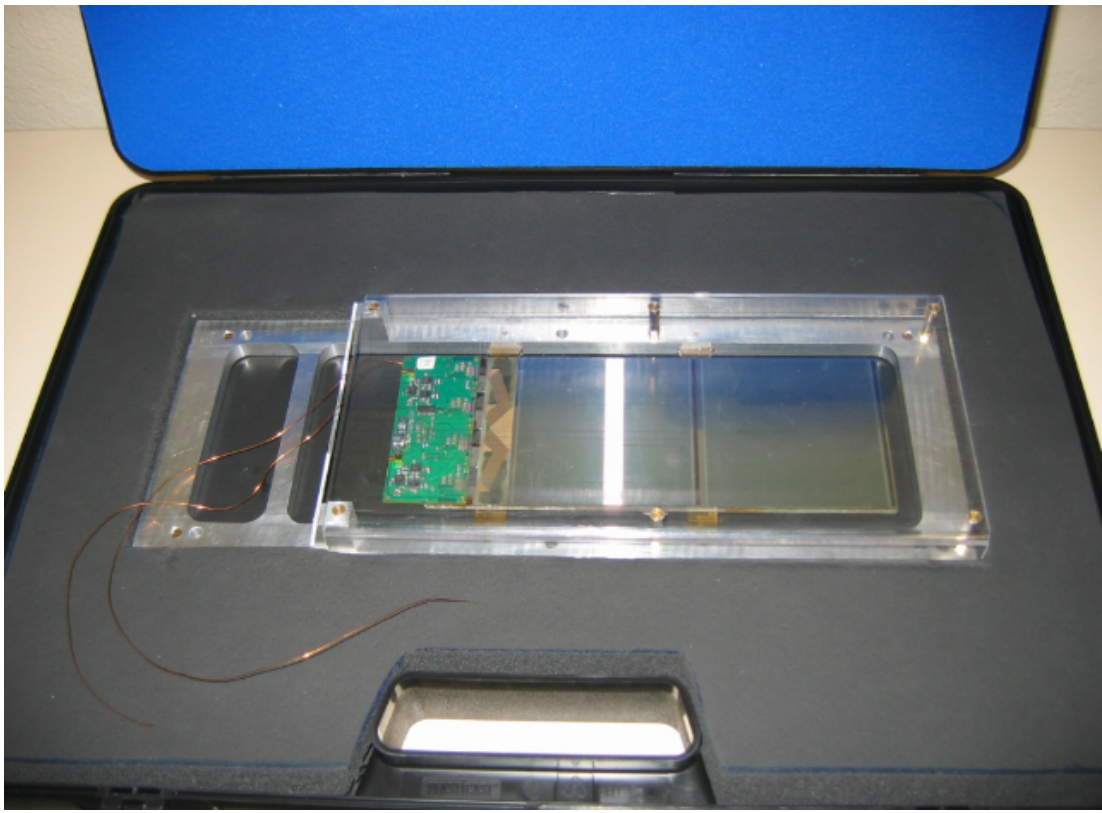
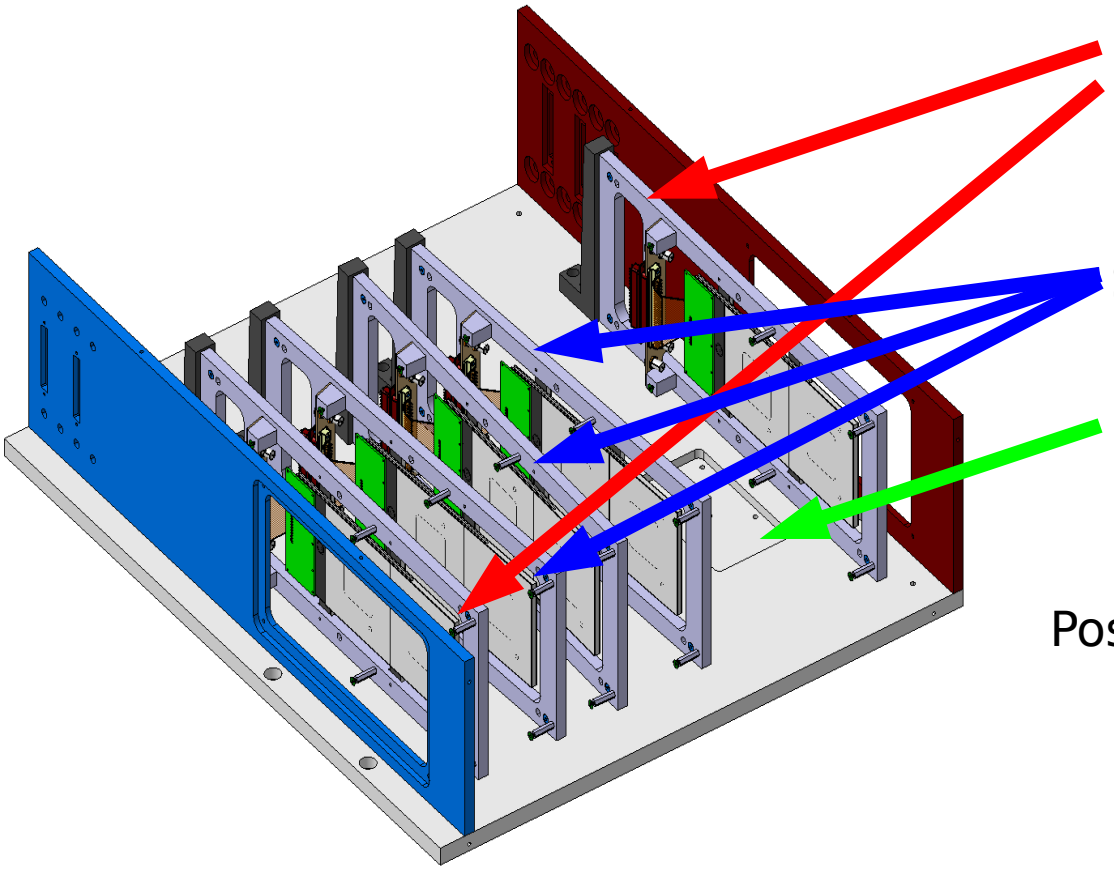




Mechanic development

- *Faraday cage (I.Villa and V.Saveliev)*

Example of configuration:



Two reference sensors equipped with the VA1' chip

Sensors equipped with SiTr130-88 chip

Collimator for alignment study

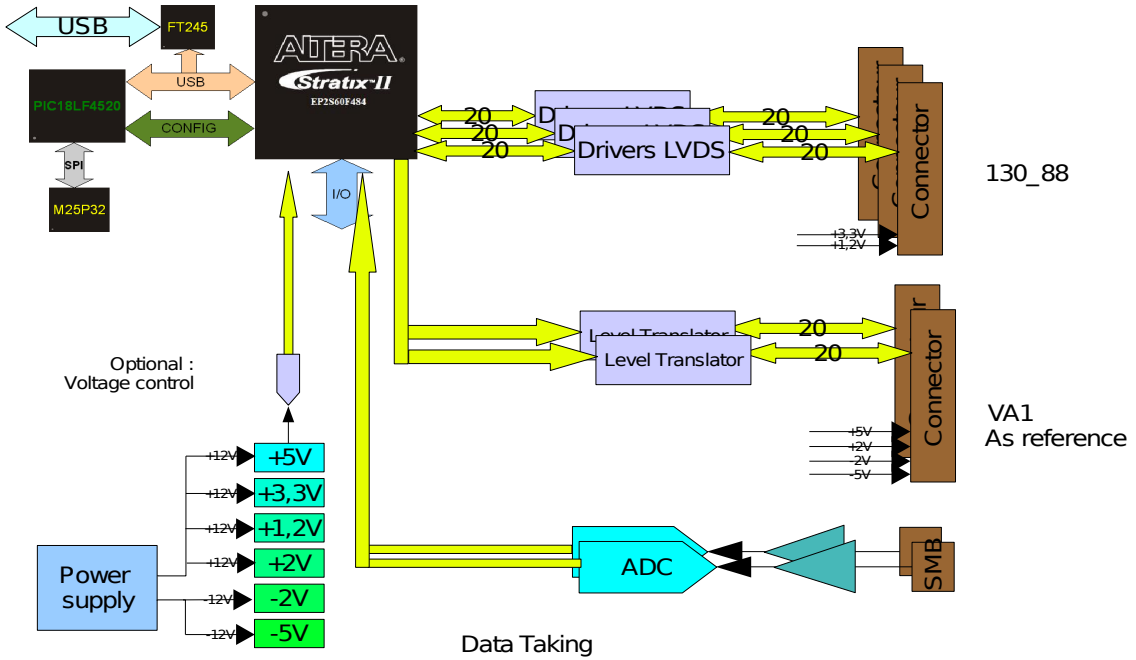
Possibility to do a “standalone” tracking + EUDET tracking

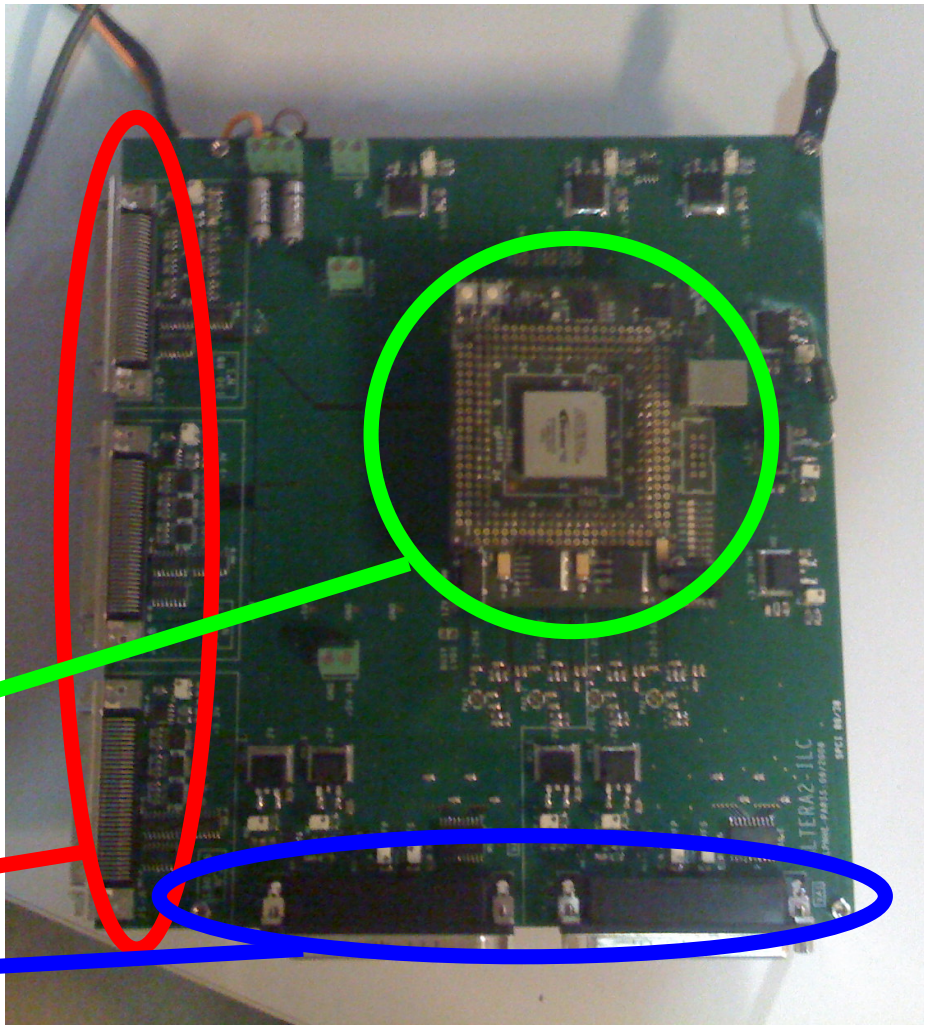
Data Acquisition System

- Flexible system: work with VA1 chip, SiTr130-88 (A.Comerma, H.PHAM, R.Sefri), and future
- Idea: develop a DAQ, can work in EUDET environnement or on standalone for local test
- Easy upgradable system → FPGA board with USB output/input
- Real tool box to automatize the different study: pedestal, calibration, alignment etc ....

Data Acquisition System

- *Hardware parts*





FPGA board with USB connexion (A.Comerma) – VHDL code to manage (M.Dhellot, A.Charpy):

- *SiTr-130 and FEE acquisition for tracking*
- *VA1 acquisition for reference tracking*

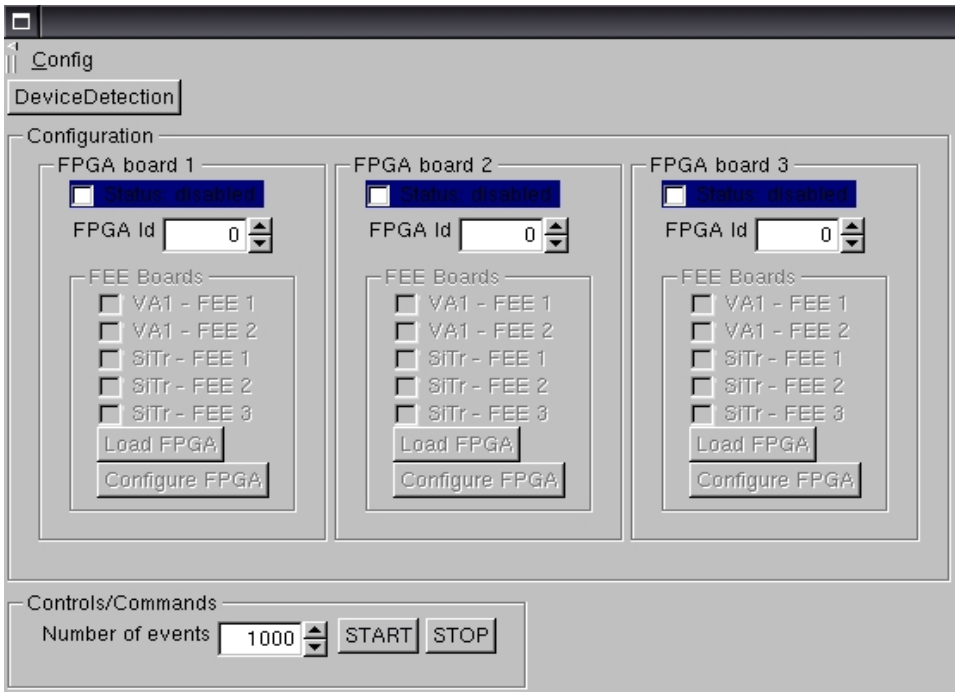
Data Acquisition System

- Software parts

- Slow control is managed by Labview code (J.F.Huppert)

- DAQ system is written in C++ and using the Root framework (C.Ciobanu, A.Charpy):

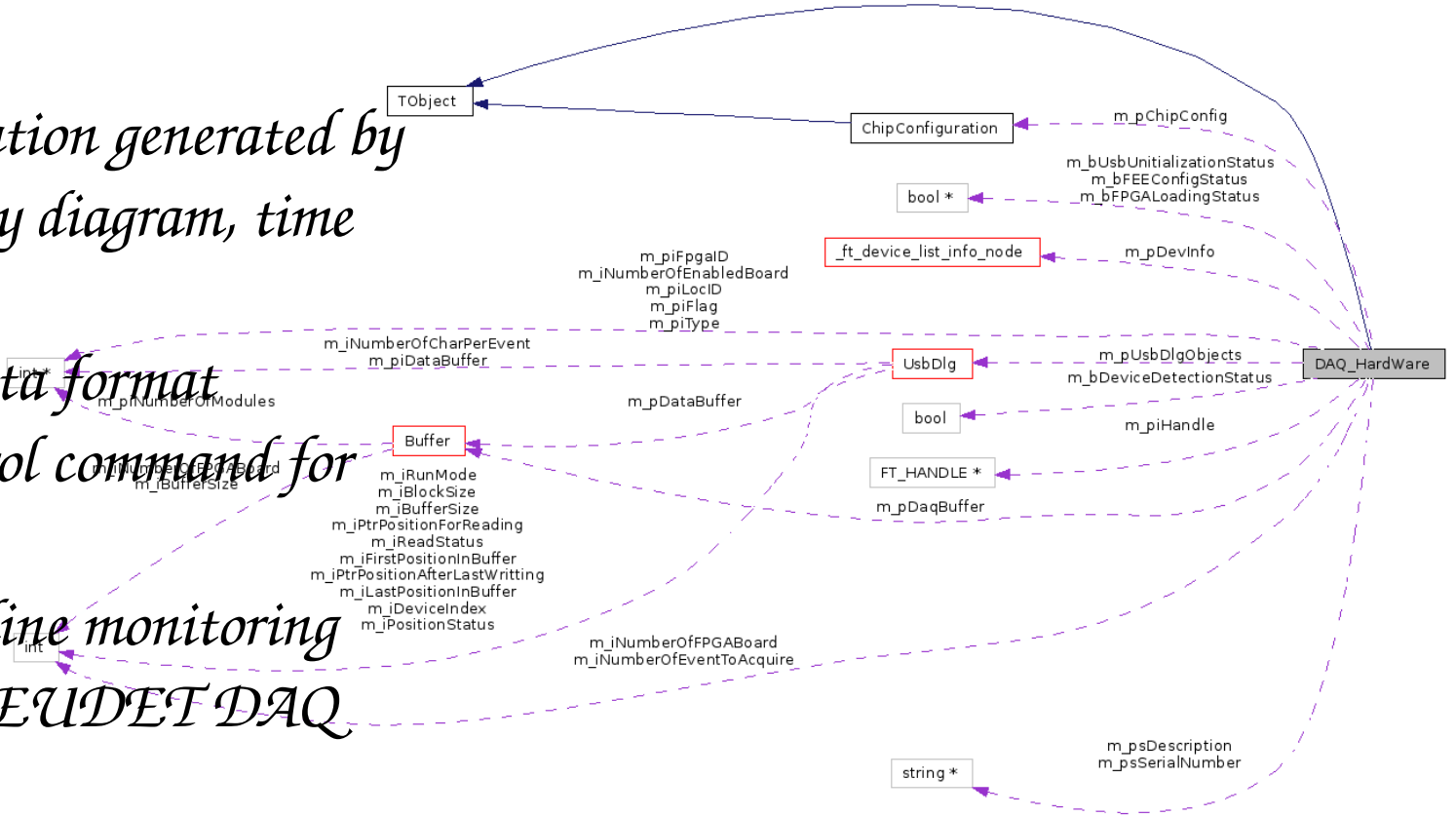
  - Set the DAQ system and chip configurations
  - Written the raw data
  - Possibility of on-line monitoring
  - Send the data to EUDET DAQ system if needed



Data Acquisition System

- Software parts

- DAQ system is written in C++ and using the Root framework (C.Ciobanu, A.Charpy):
  - XML Documentation generated by Doxygen (Activity diagram, time diagram)
  - Universal raw data format
  - Unified the control command for the DAQ system
  - Possibility of on-line monitoring
  - Send the data to EUDET DAQ system if needed



Summary

- *Mechanical status*
  - *Tools are ready to produce the module sensors*
  - *Availability for EUDET collaboration → Need to know new specification for tool customization or if changes is needed*
- *DAQ status*
  - *VHDL and C++ code is under development (will be ready for the next testbeam)*
  - *Next step: SiTr130 management*
- *Next tasks*
  - *Validation of the DAQ system*
  - *Behaviour study of the electronics and sensors with local tests*
  - *Characterization of the new SiTr130-88 chips → beam test @ DESY in March 2009*
- *Status is available on the following link:*

  http://lpnhe-lc.in2p3.fr/internal/Status.html

Thanks