

Transnational activities tests in May and November 2010

EUDET Meeting

September 29, 2010,

Alexandre Charpy

On behalf of the LPNHE-LC team



Goal



Develop equipments & infrastructure for silicon sub-detector R&D (ILD, etc...):

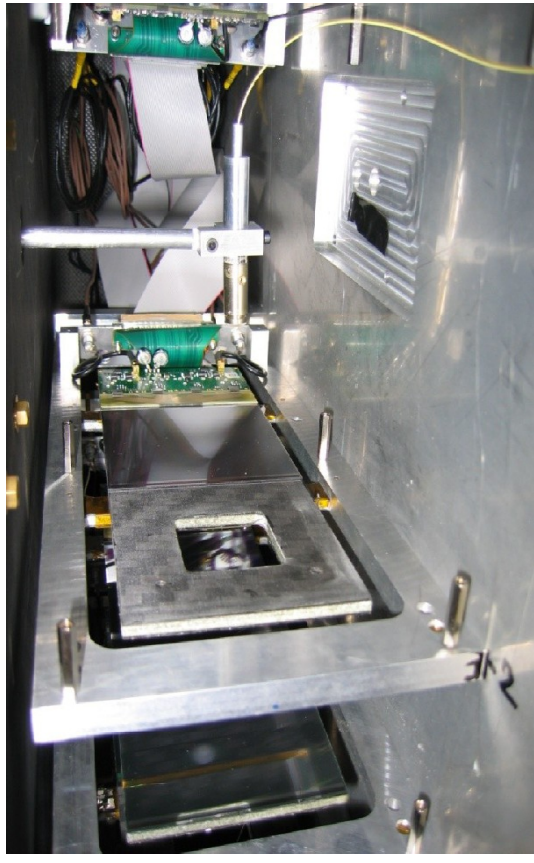
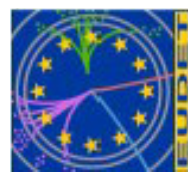
- silicon sensor: characterization and performances of new technology
- Front End Electronic (FEE): test the submicronic chip
- Data Acquisition system (DAQ)
- mechanical integration cooling, alignment, mechanical prototypes for testing elementary-module concepts, support structure.

Essential Work for the Detector Baseline Design in 2012.

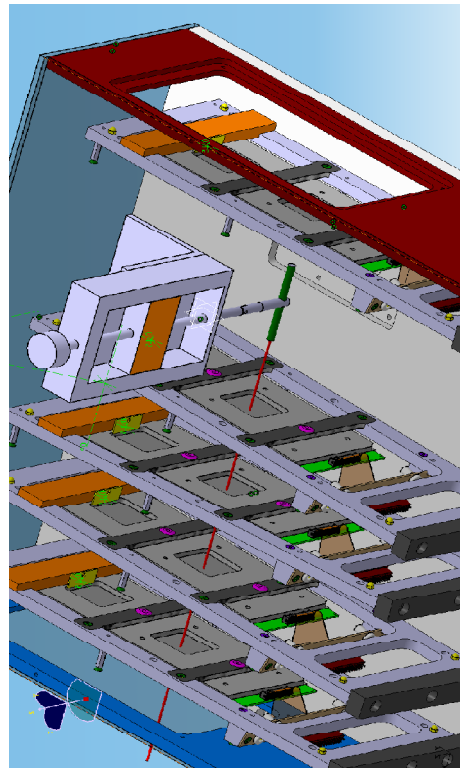


Standalone Test Beam System

LPNHE – mechanical structure



- Tests transparent silicon sensors with an embedded laser
- Tests all kind of sensors types (new strip technology, new pixel devices)
- Tests of new Front-End Electronics (FEE) → SiTr130-32&128
- Combined tests with other sub-detector prototypes => new such infrastructure are developed and adapted to those tests



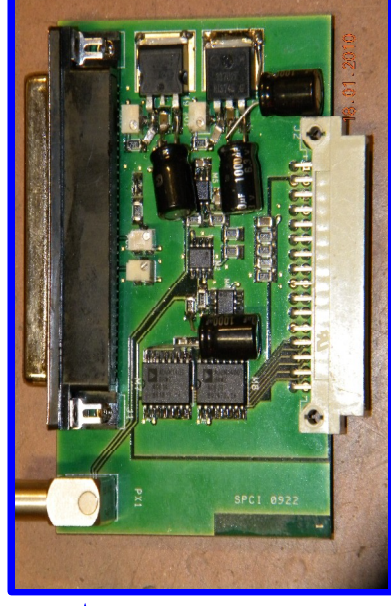
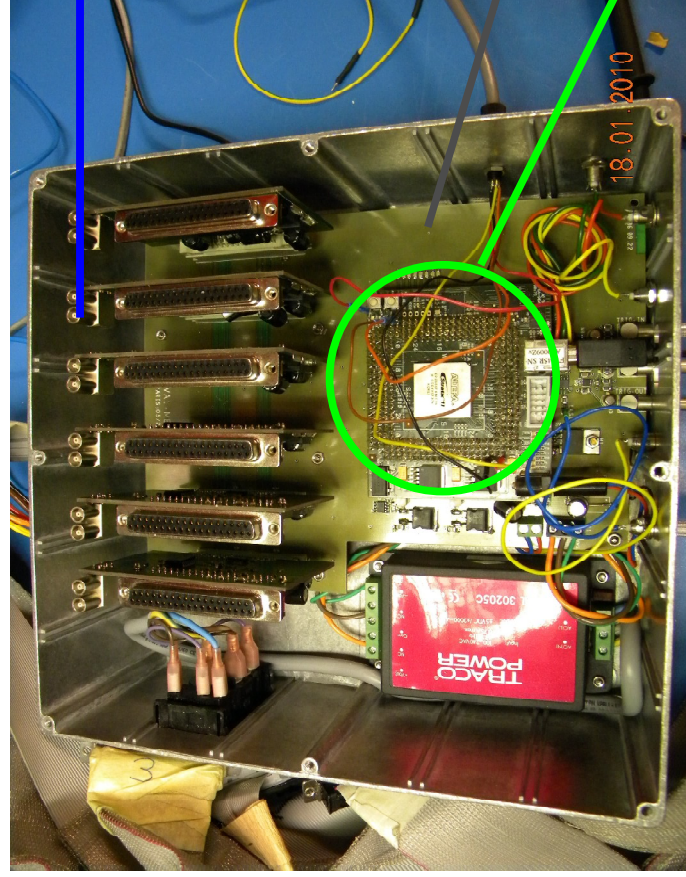


Standalone Test Beam System

LPNHE - DAQ - Hardware



- Modular and scalable DAQ Hardware ToolKit
(EUDET deliverable)
- Actually adapted for VA1' chip (reference) and SiTr-130 prototypes



2 input channels
ADC 16bits x2

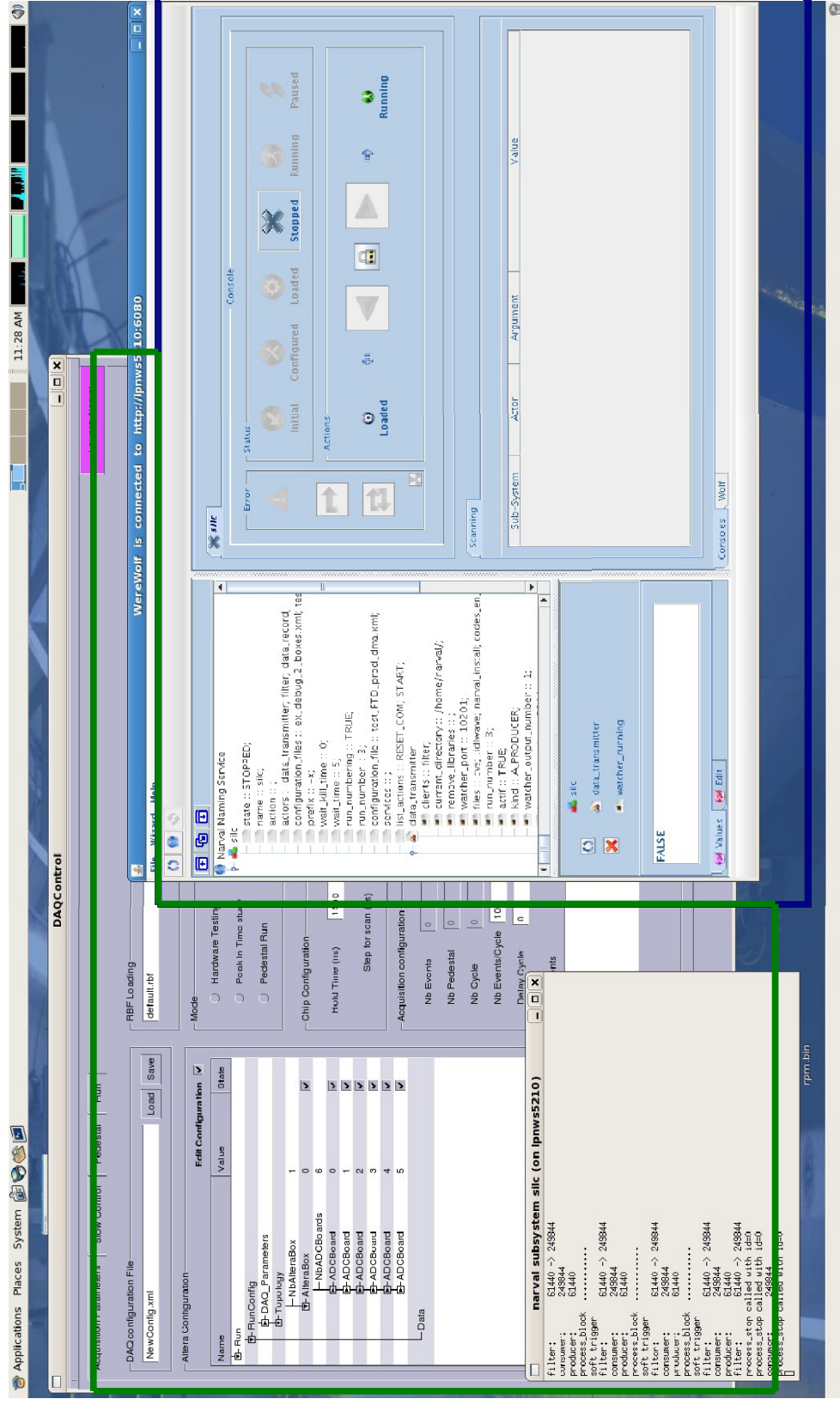
Mother Board: 6 daughter board,
trigger NIMTTL, laser control,
embedded power supply

USB/FPGA board



Standalone Test Beam System

LPNHE - DAQ - Software



•Narnal Control

•Configuration and online:

- QTRoot → developed @ LPNHE for SiLC
- DAQ Configuration, Basic Analysis, Online



Standalone Test Beam System

LPNHE - DAQ - Software

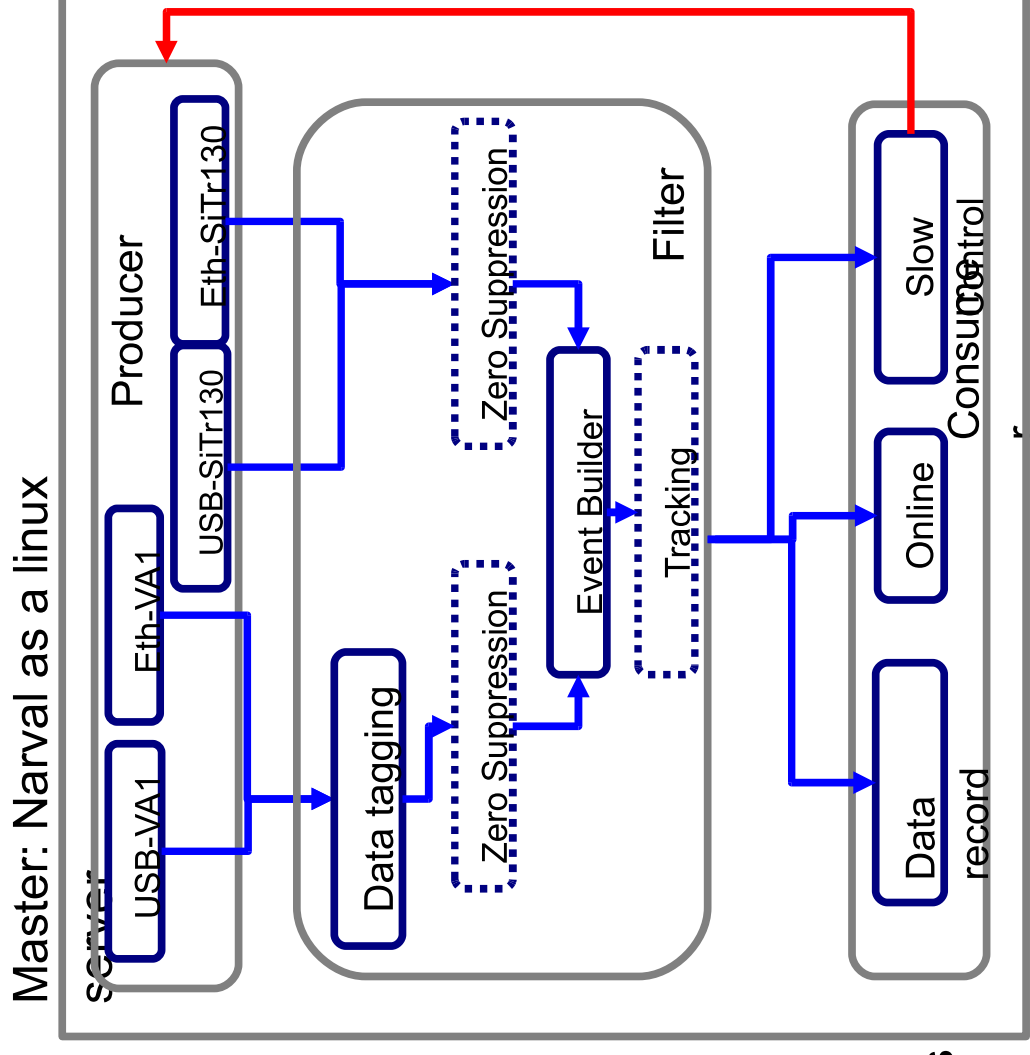


Narval:

- Distributed DAQ written in ADA language
- Divide the acquisition into activities called actors (ADA)
- Activities are divided by tasks (C++/ADA)
- Framework manage the data management
- High flexibility with very simple scripts
- Easy deployment throw the debian/ubuntu official package

• Three basic actors:

- Producers ,Filters, Consumers
- Dedicated libraries for the tasks

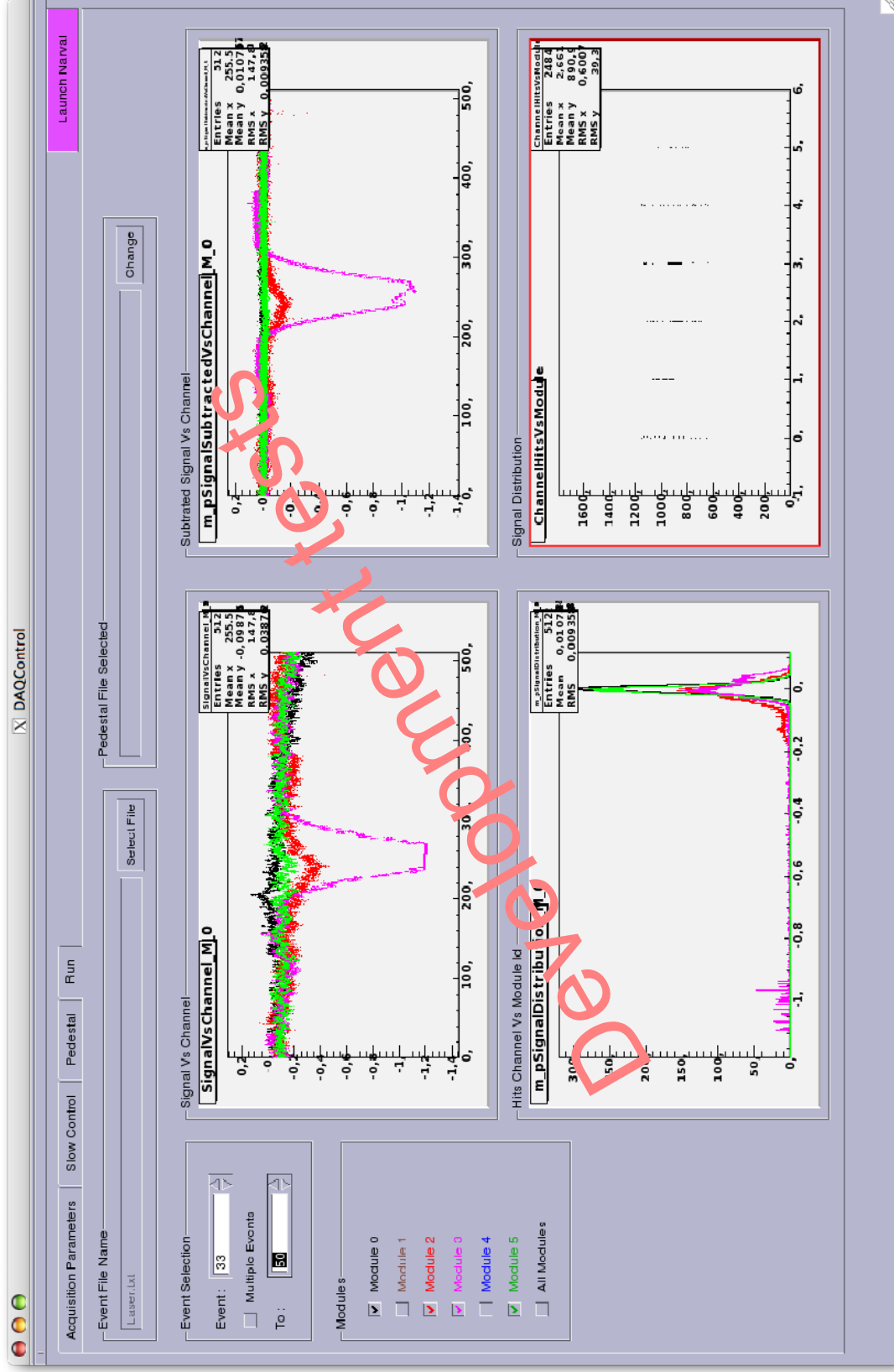




Standalone Test Beam System

LPNHE - DAQ - Software

Demo



Module 4
Module 3
Module 2
Module 1



Beam test of May 2010

Transnational

INFN Torino - LPNHE - IFCA

Test beam at CERN-SPS H6, with 120 GeV proton beam

A. Charpy (LPNHE), M. Fernandez (IFCA), G. Alampi (Torino), J. David (LPNHE), M. Dhellot (LPNHE), P. Ghislain (LPNHE), A. Savoy-Navarro (LPNHE), D. Gamba (Torino), F. Kapusta (LPNHE), G. Cotto (Torino), P. Mereu (Torino), W. da Silva (LPNHE)



Beam Test – May 2010

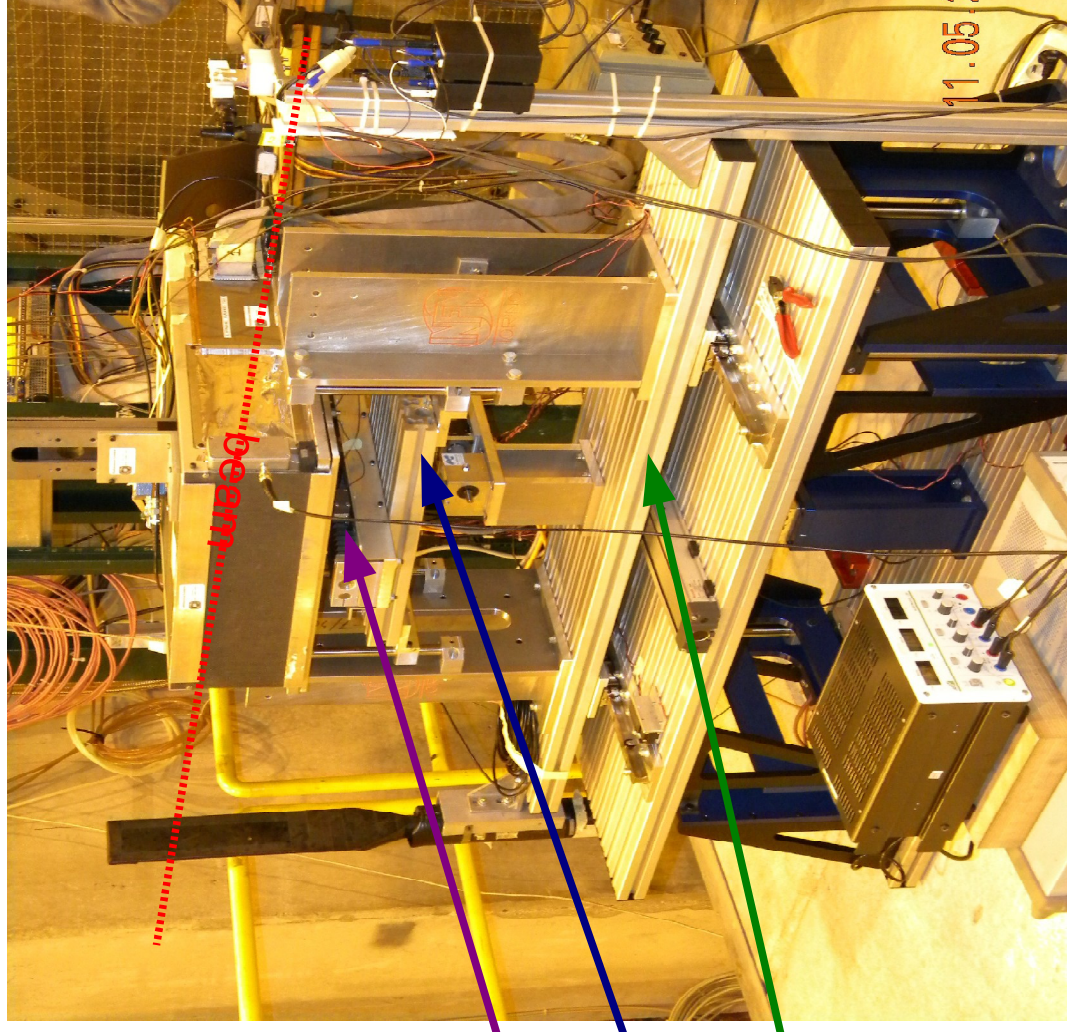


First & successful tests in May 2010 at SPS-CERN (alignment sensors).

Starting point of new silicon sensors technology campaign (for november)

Through **transnational EUDET**:

- user: INFN Torino
- Motorized XYZ alignment table
 - 4 linear +1 rotation;
 - 1 rotation (0.01 degree)
 - 2 movements for Faraday cage (0.1mm);
 - 2 movements for positioning test bench (0.1mm);
 - Control & monitoring via LabView





Beam Test – May 2010

Silicon sensors prototype



- Starting point: knowledge of HEPHY Vienna and Karlsruhe IEKP gained in the CMS experiment
- New silicon sensor conception => strip with 50 μm pitch and 12.5 μm width
- Hamamatsu HPK manufacturing => 91.5x91.5 mm², 320 μm thickness



Surface treatment of silicon wafers

- Alignment System throw an infrared laser
- ~ 20% transmittance

Study the impact of the treatment on the silicon sensor performance



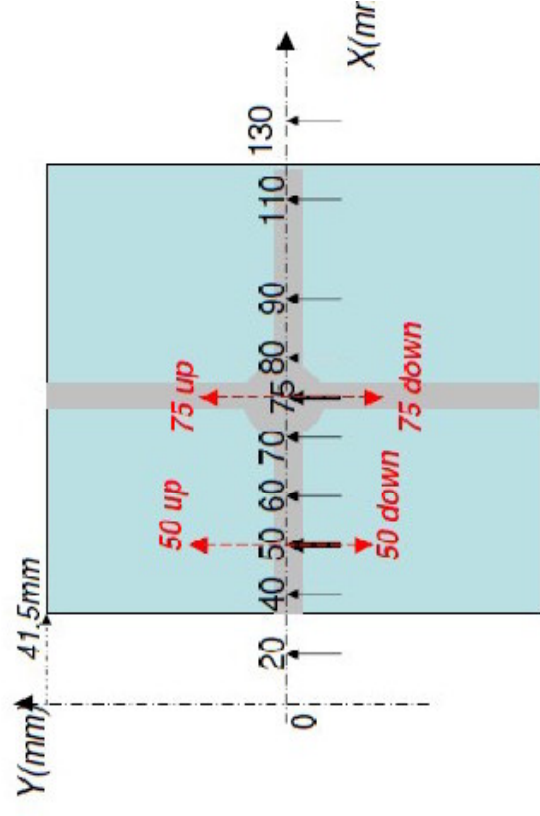
Beam Test configuration



- Silicon Module equipped with 4 VA1' => 512 active channels
- 5 modules
 - 2 classic modules 183*91.5mm² (reference for tracking)
 - 3 transparent modules: 91.5*91.5 mm²

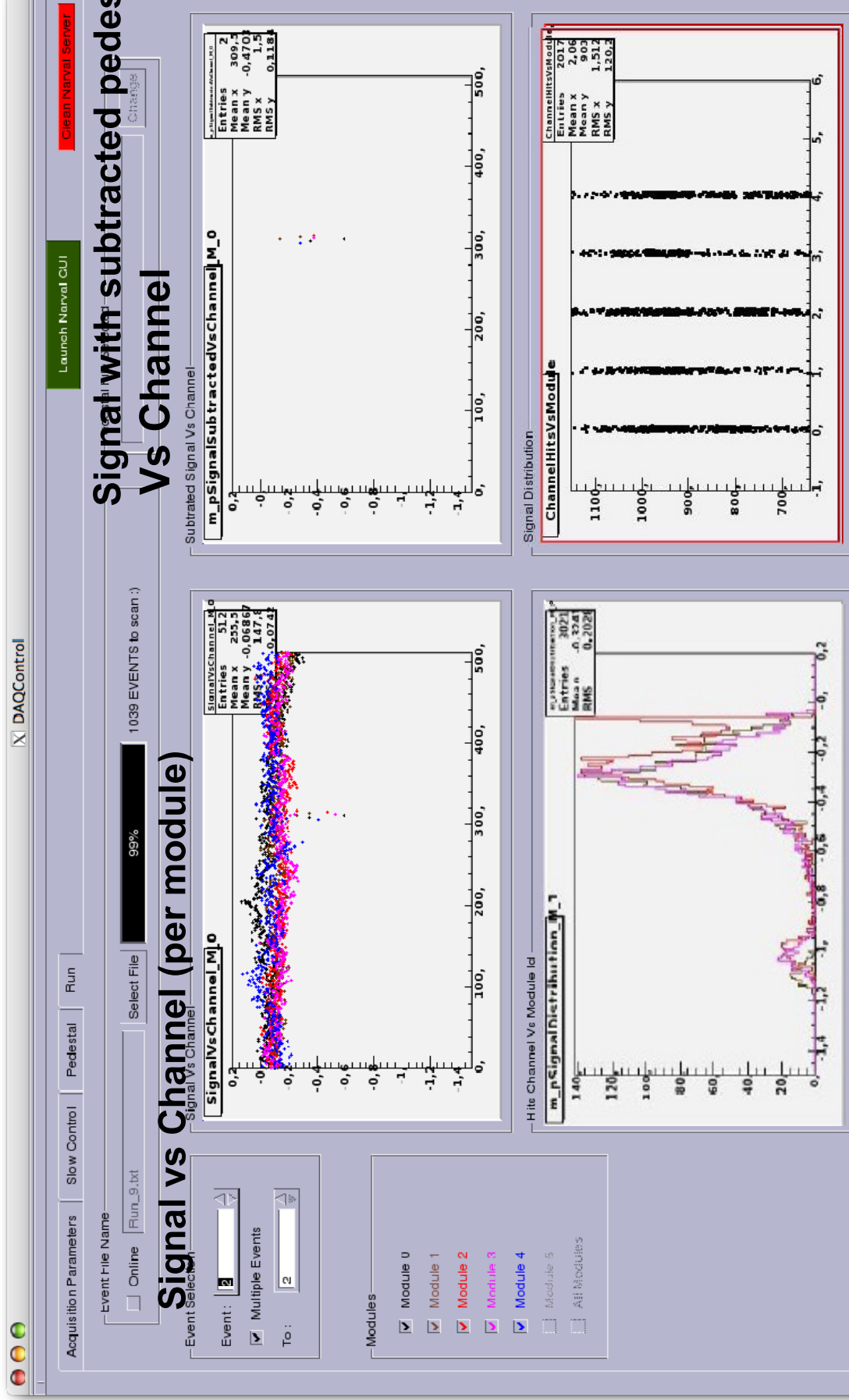


Main goal: scan different area of the “transparent” sensors
→ extract signal to noise according the area
→ tracking





Online Monitoring Cumulated events



Signal with 4σ subtraction

Channel hit Vs Module



Beam Test – May 2010

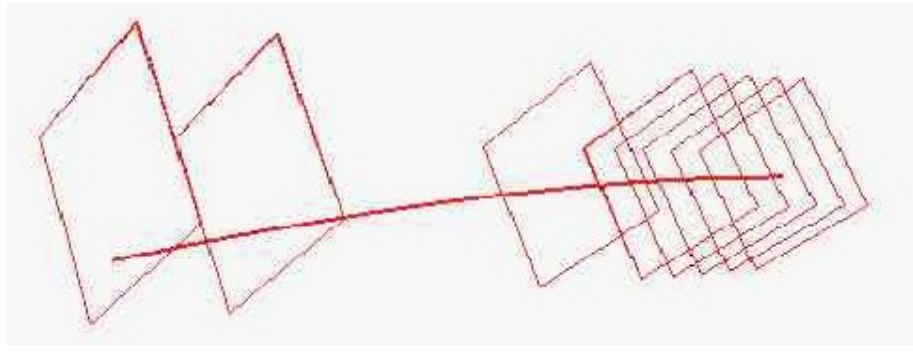
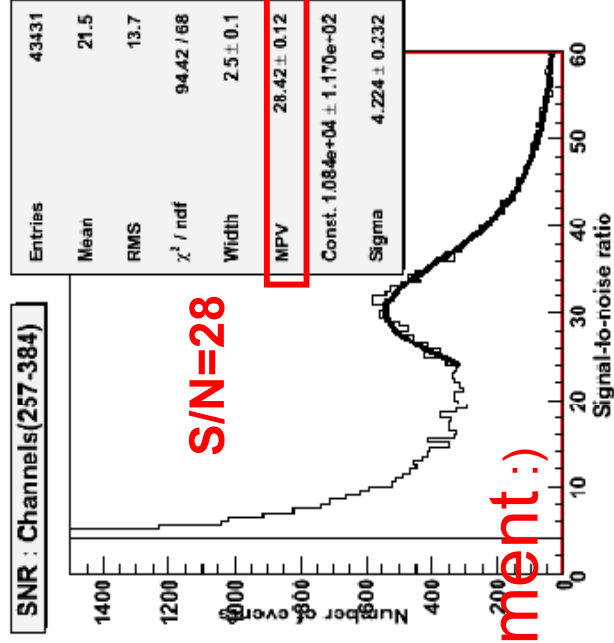
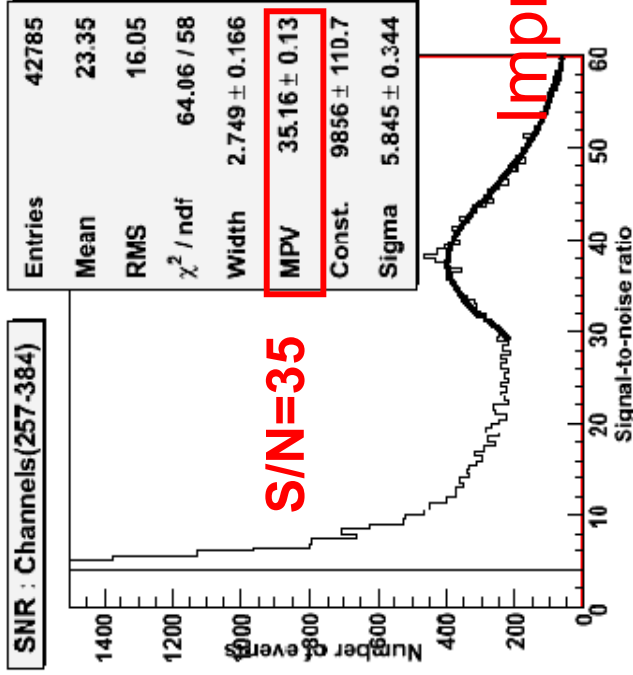
Data Analysis



run		jour	heure	Moteur 1	Moteur 2	Moteur 3	Moteur 4	nb evts	plot	file size	pc
Run 1.txt		Thu 13 May 10	19:36	55	102	55	60	5088	Run1Plot.jpg	195M	
Run 2.txt		Thu 13 May 10	21:17	55	102	50	60	2004	Run2Plot.jpg	89M	
Run 3.txt		Thu 13 May 10	22:04	55	102	45	60	annulé		99M	
Run 4.txt		Thu 13 May 10	22:17	55	102	40	60			108M	
Run 5.txt		Thu 13 May 10	22:52	55	102	40	60				
Run 6.txt		Thu 13 May 10	23:45	55	135	40	60			55M	
Run 6.txt		Thu 13 May 10	?	55	135	variable	60			62M	
Run 7.txt		Thu 13 May 10	?	55	135	70	60		Run7Plot.jpg	38M	
Run 8.txt		Thu 13 May 10	?	55	135	70	60	60000 (?)		1400M	
Run 9.txt		Fri 14 May 10	08:46	55	135	70	80	1039		38M	
Run 10.txt		Fri 14 May 10	09:10	55	135	70	100	1034		38M	
Run 11.txt		Fri 14 May 10	09:25	55	135	70	120	1047	Run11Plot.jpg	38M	
Run 12.txt		Fri 14 May 10	09:44	55	135	70	130	1025	Run12Plot.jpg	45M	
Run 13.txt		Fri 14 May 10	10:04	55	135	70	20	961	Run13Plot.jpg	42M	

Logbook data taken in May 2010

Performing by W. Da Silva:
- sensors characteristic ... done
- tracking with GenFit
in developement



Beam test of November 2010 Project



New sensors prototype

SPS-CERN in November 2010





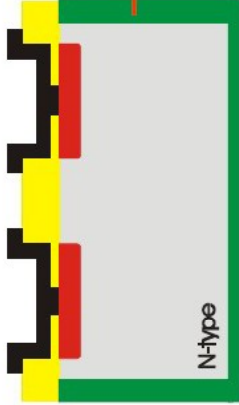
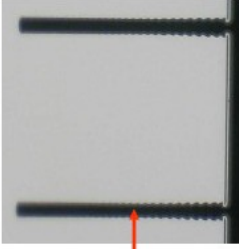
Università degli Studi
di Trento

G.-F. Dalla Beta

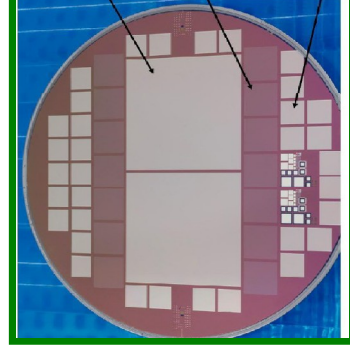
SiLC Meeting, Paris, January 26, 2010



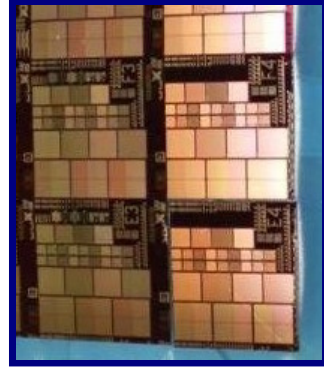
Next steps (2): Planar detectors with active edge

- Trench etching steps investigated on test wafers
- TCAD simulations for breakdown prediction
- Layout complete (p-on-n, mainly strips)



- SOI technology developed by VTT
- Active edge, 50 μm pitch, 6" wafer
- DC and FOXFET



Avalanche Pixel Sensor
(APS) pour trajectomètre
(OSU)
V.Saveliev

*Test of new Double Sided Strip
Detector (DSST).
We will share this T.B system with
KEK colleagues at CERN & KEK*

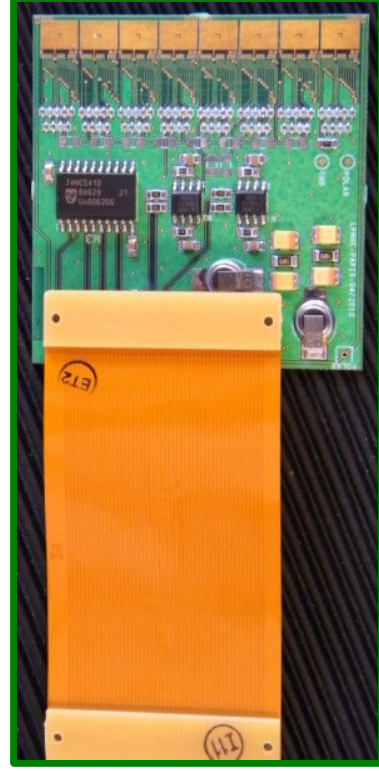


Infra-structure

SPS-CERN in November 2010



- Support structures: ready for the new VTT and IRST active edge sensor prototypes
- To be ready for the November test beam at SPS-CERN.
- New HPK DSSD sensors to be also tested at SPS.



New VA1' Front End Electronic (FEE) cards support: 8 VA1' chip of 128 channels (1024 strips)
- 2 FEE = one full silicon module (until 2048 channels)

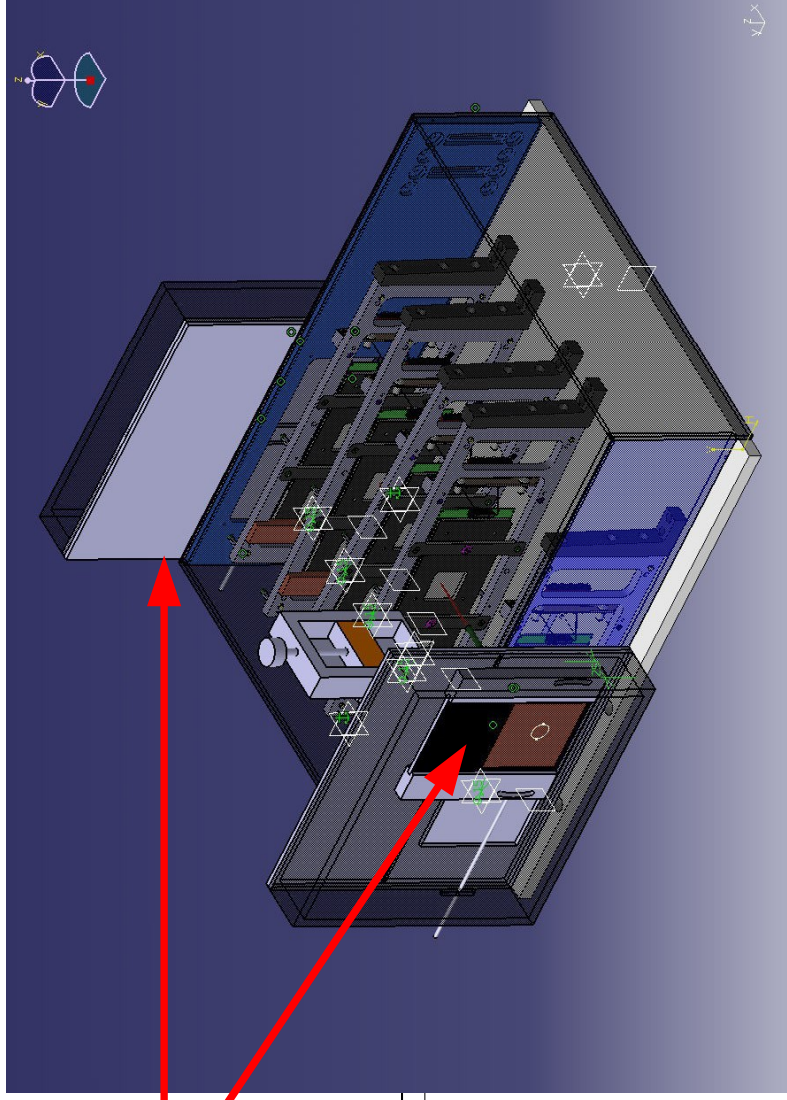
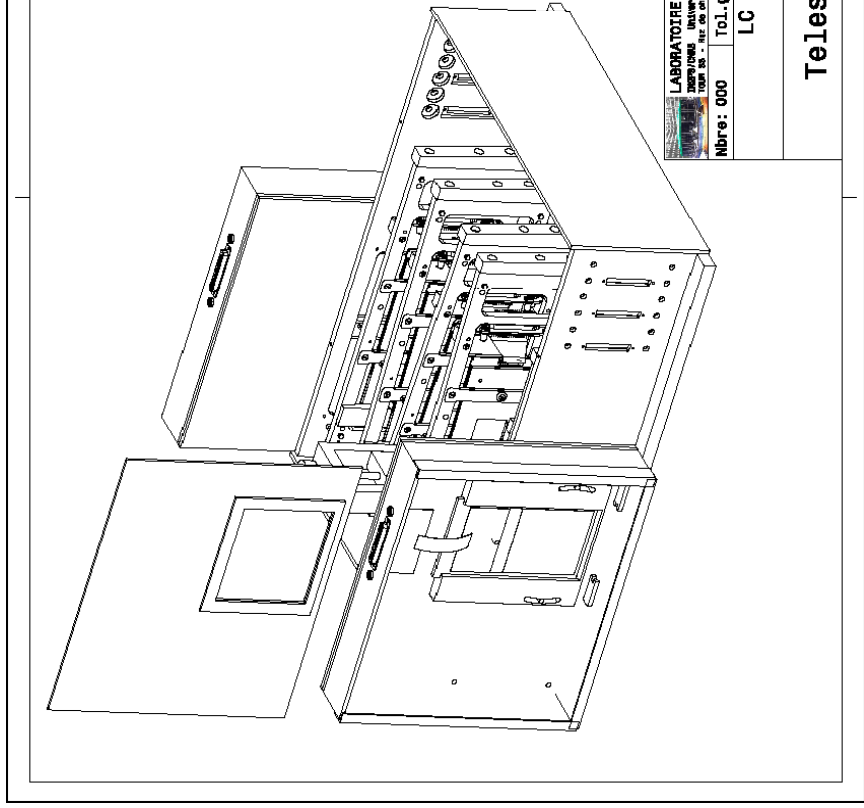


Infra-structure

SPS-CERN in November



Modification of the silicon module
 => XY strip in both part of the
 faraday cage
 P. Ghislain



Improving the silicon tracking system
 with the 2 XY reference module

- improve the silicon sensors studies
- test the performance of the tracking (XY, stereo angle etc ...)

LABORATOIRE DE PHYSIQUE NUCLEAIRE ET DES HAUTES ENERGIES 200701000 UNIVERSITE PARIS VI ET VII TOUR 5B - 1er DE CHATELAIN - 6, PLACE Jussieu - 75251 PARIS CEDEX 05 http://www-lpnp.jussieu.fr/		Ref: 01 44 37 46 98 Nbre: 000 Tol-gén: js12 / Ra 3.2 Matière: ----	
Ech. 1/3 Auteur: P. GHISLAIN Vérif: ---- Date: 01/08/2010		Ref: ---- Vérif: ---- Date: 01/08/2010	
LC 1/3 A3H		1/3 A3H	
Telescope		1/3 A3H	

Let's go for November

Thanks for your interest

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