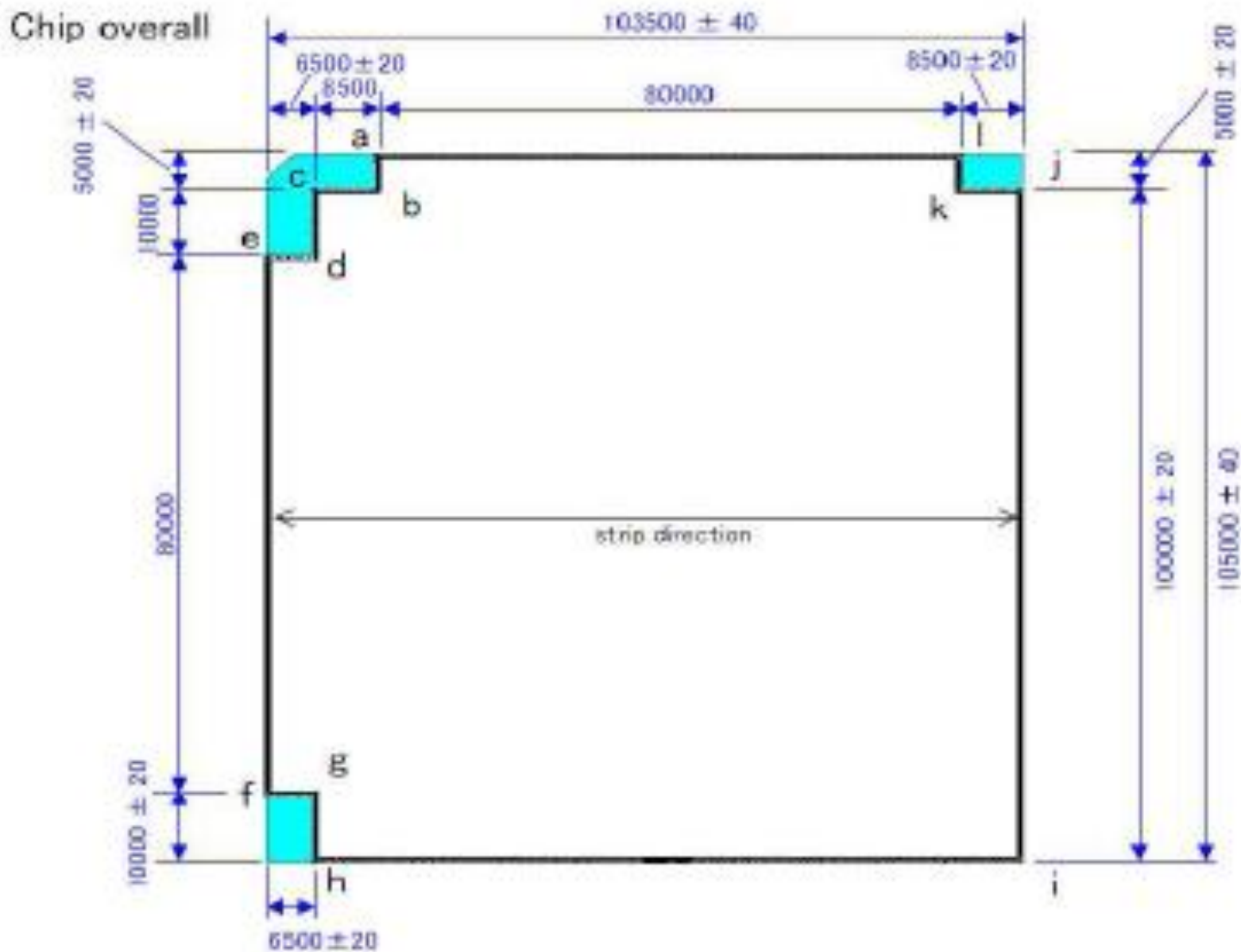# INFN, silicon tracker status

F. De Persio, F. Meddi, G.M. Urciuoli, F. Noto
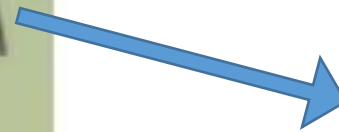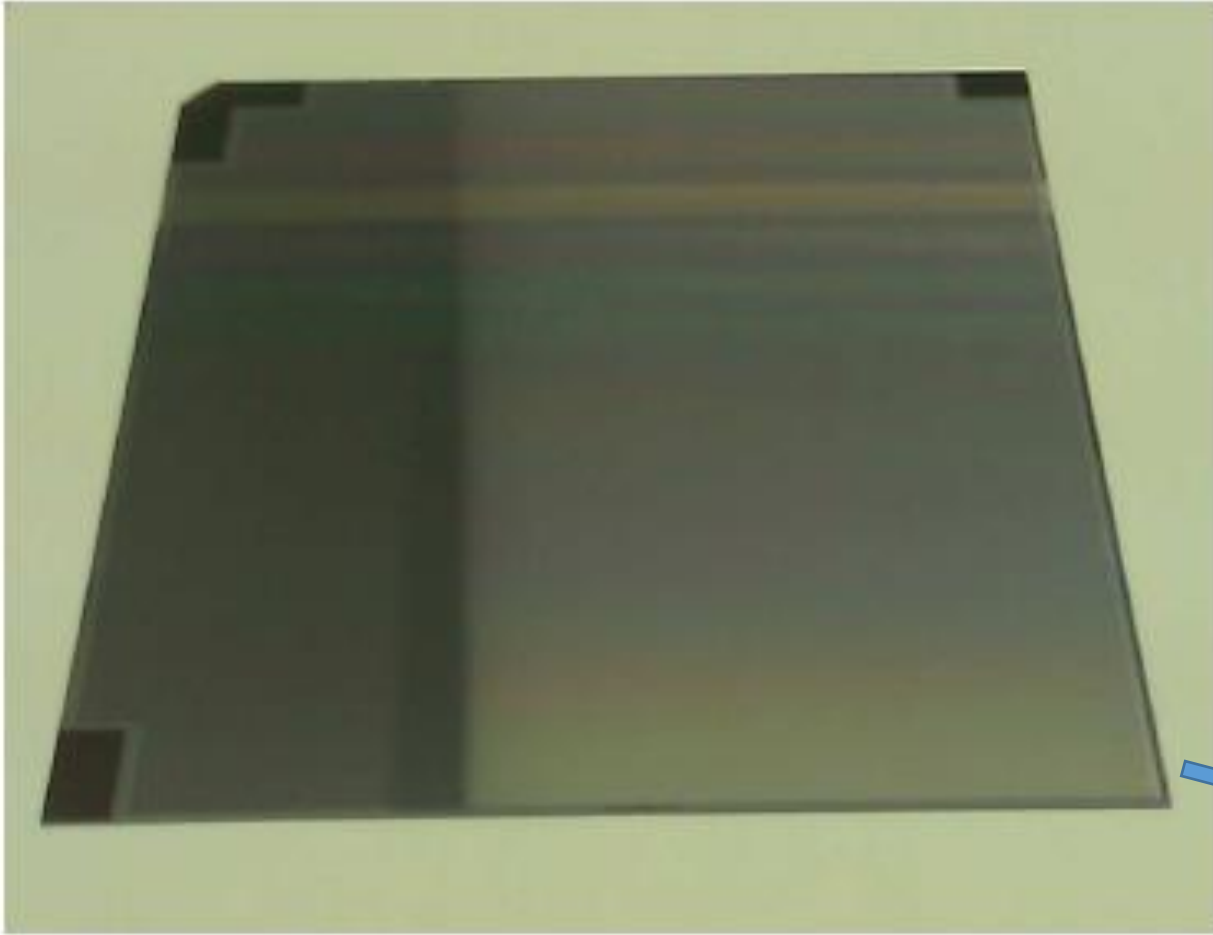
(INFN)

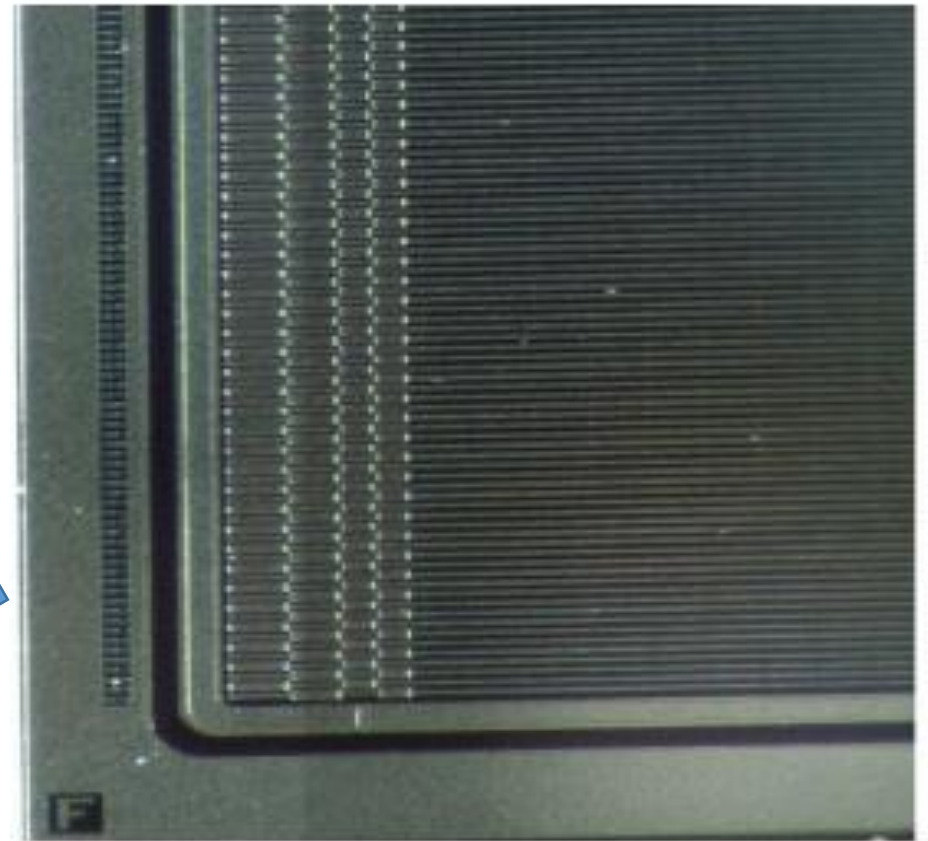# Silicon microstrip detector design

number of strips : 2070
strip length : 78500 (No. 1-100)
strip length : 95500 (No. 101-300)
(No. 1871-2070)
strip length : 102000 (No. 301-1870)
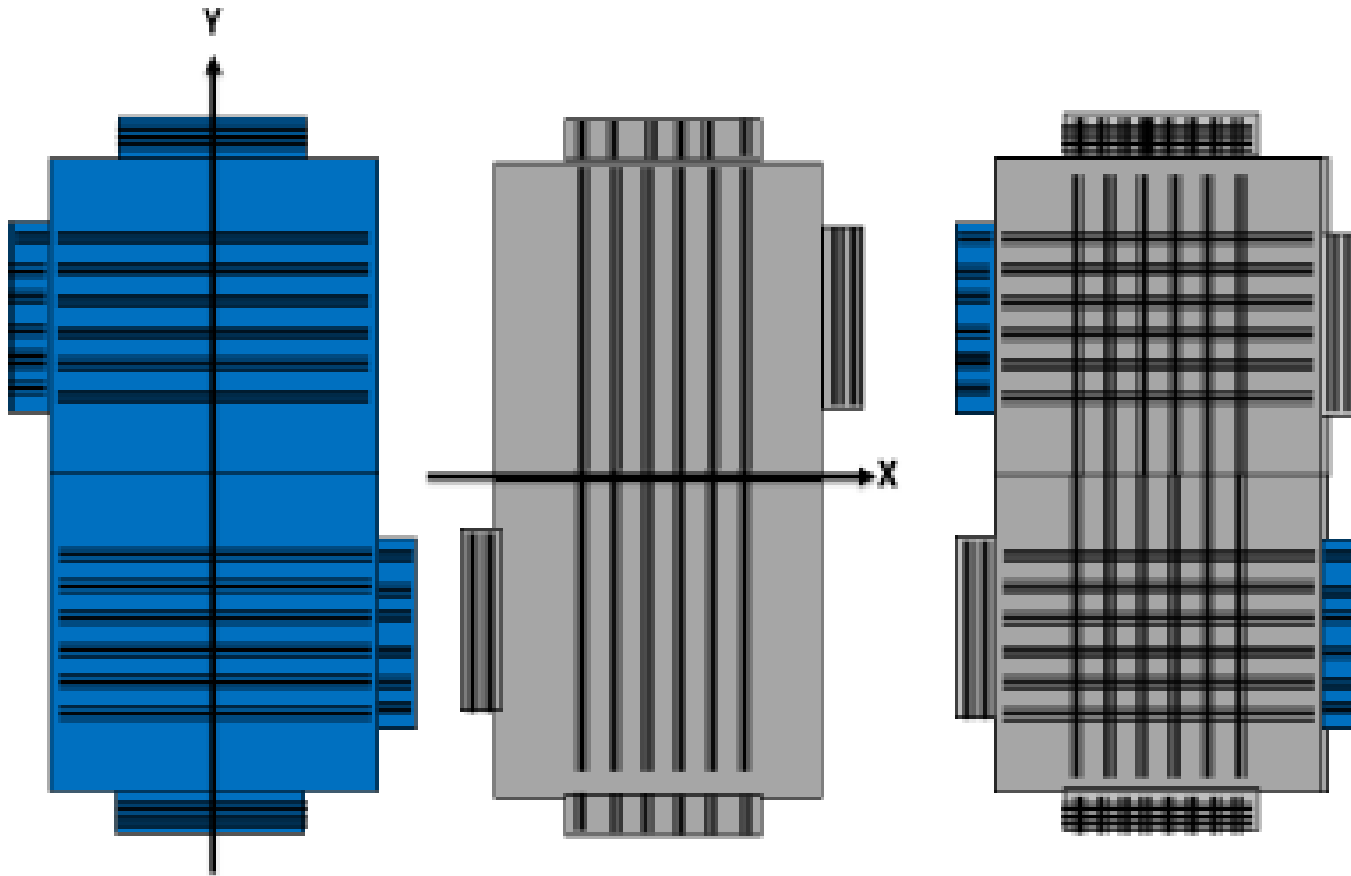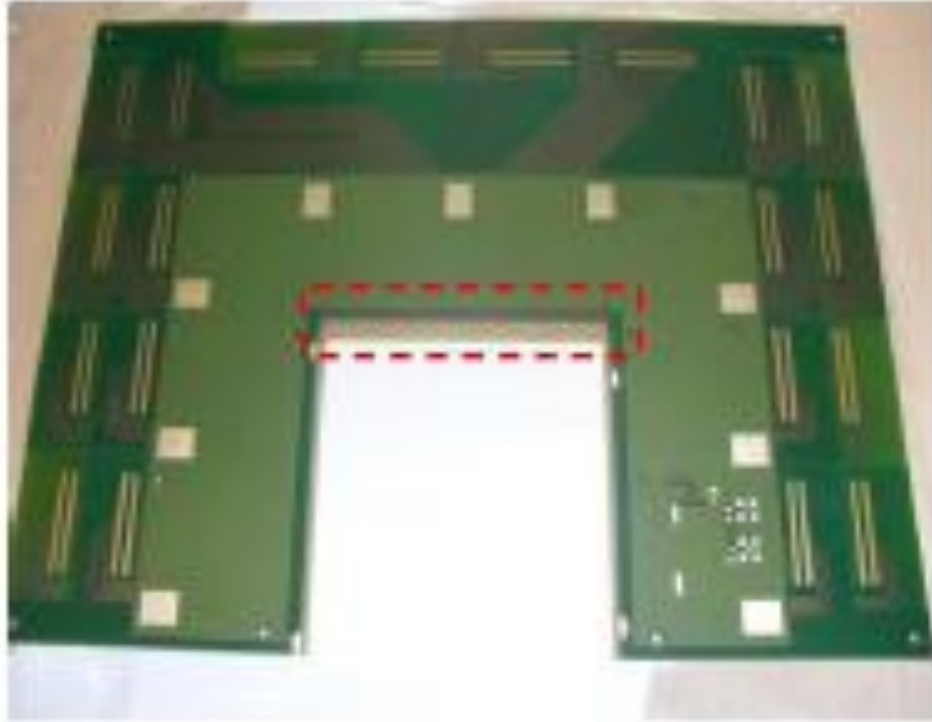
Silicon microstrip detector

Zoom
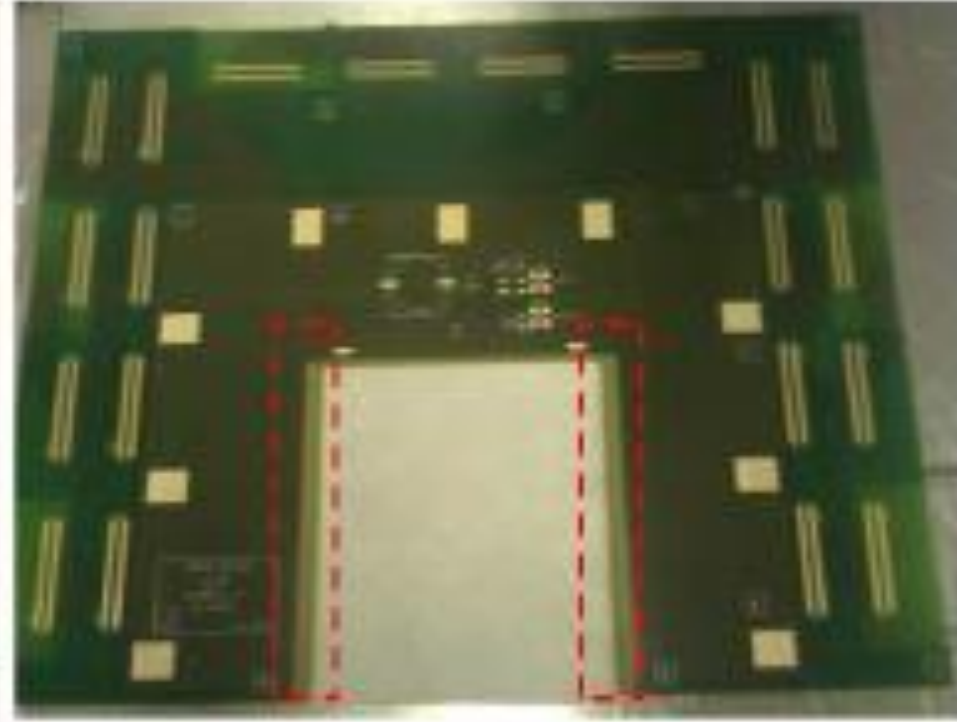
The SBS silicon tracker X and Y planes

Four identical silicon microstrip detectors build up the SBS silicon tracker X and Y planes. Each plane is build up by two silicon microstrip detectors properly rotated and constituting each half a plane.

Two different kind of PCBs for the X and Y half planes respectively.
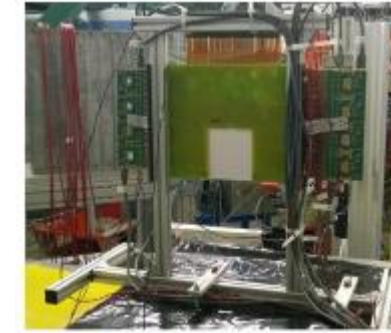

Half X Plane PCB

Half Y Plane PCB

UP to the end of 2017

- Production and test of a **prototype** of half a plane X.

- **Software analysis strategy developed**: **all** the **6** values related to the **latencies** corresponding to the great part of the silicon microstrip detector signal generated by a MIP are summed up: MPDs can read values corresponding to not more than 6 contiguos latencies).
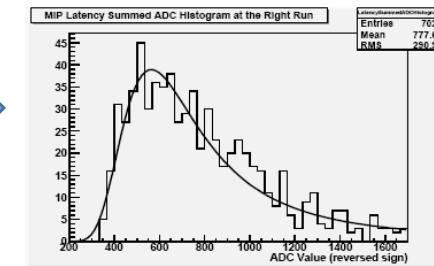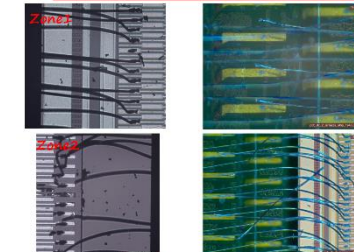

- **Satisfactory results** from the point of view of the protoype signal generation and collection and of the Signal to Noise Ratio
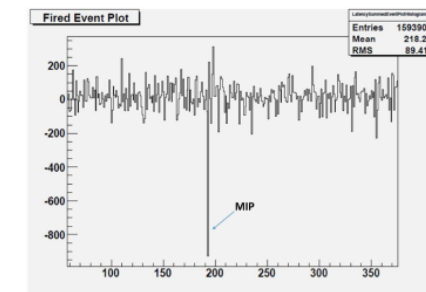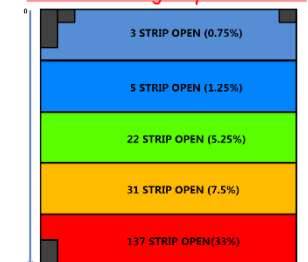

- **Mayor problem experienced**: excessive wire-bonding breakings after transportation for relatively short distances.
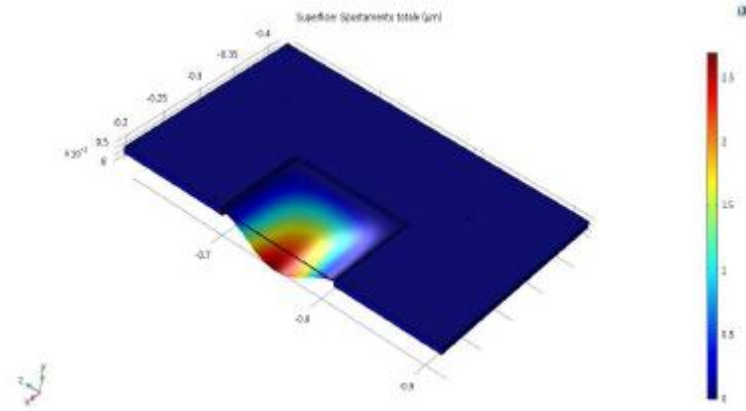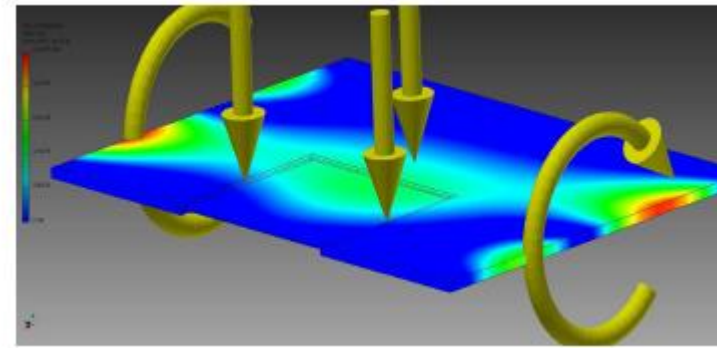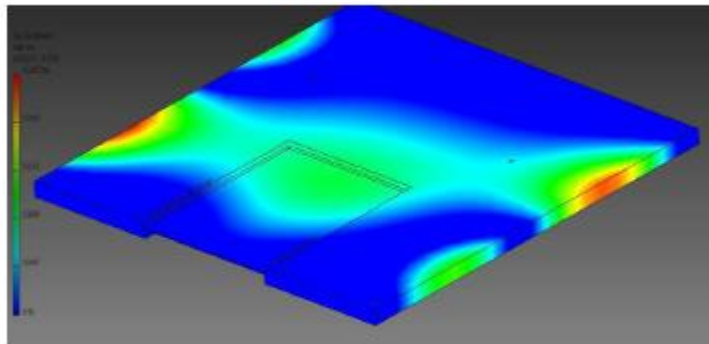
Investigation about the causes of wirebonding breakings

Computer simulations of **detector + PCB assembly deformations during wirebondings**

Computer simulations of **detector + PCB assembly deformations caused by handlings**.
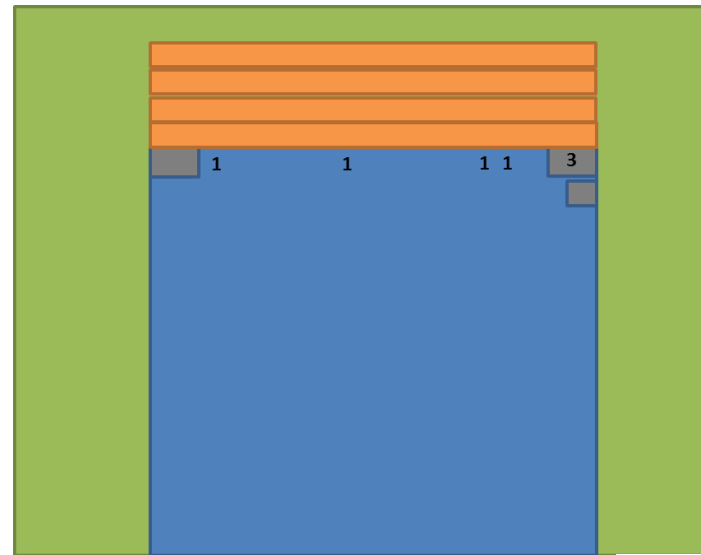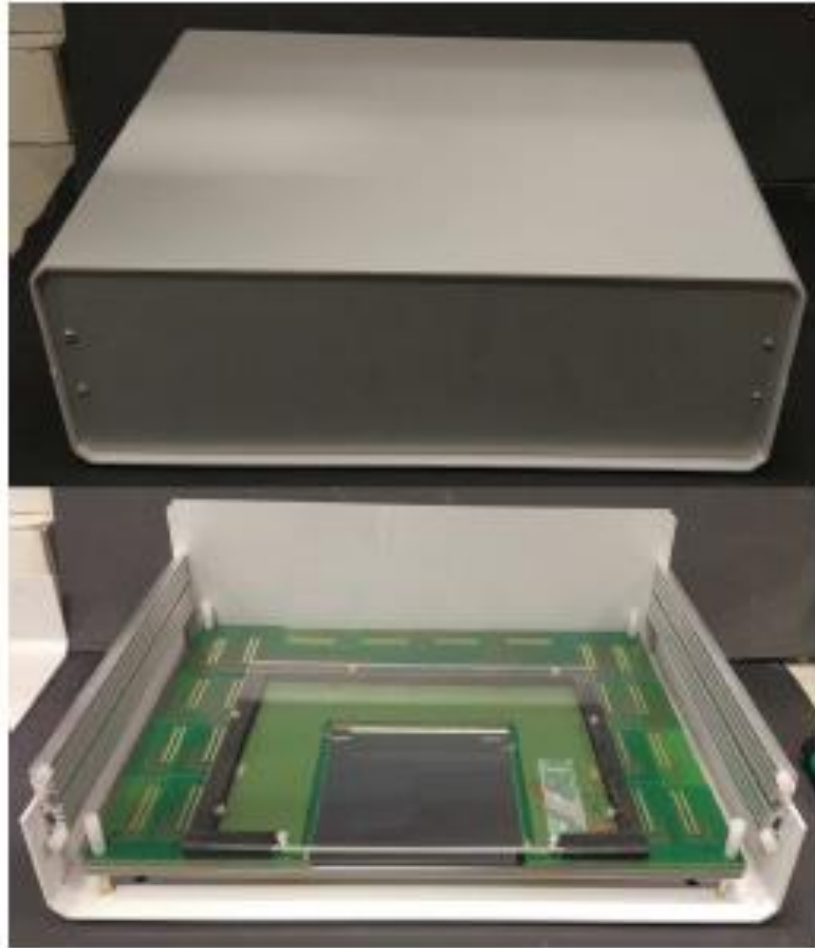

Cumulative effects of wirebondings and handlings.

No effects of bad handling and/or wirebonding stresses on our PCB + detector assemblies resulted by computer simulations.
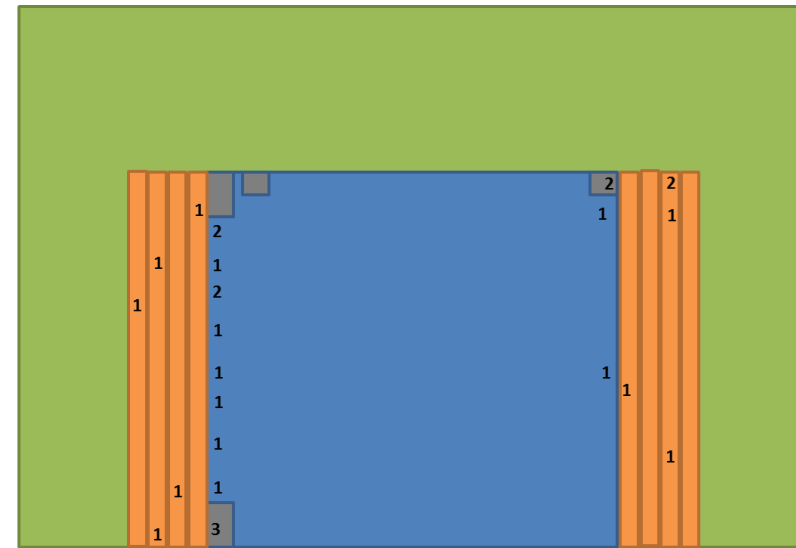
... Only the transport sysytem to be blamed for that.

New Transport system succesfully tested for transportation from Bari to Rome (≈ 430 km)

Broken wirebondings: (out of 5500)
patch = 3
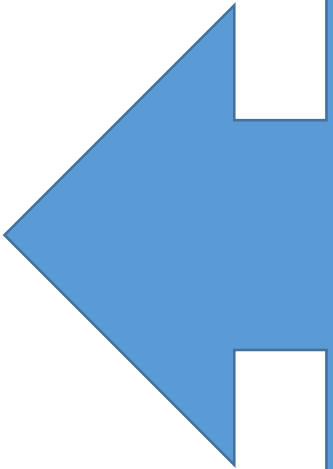Silicon = 4
PCB = 0

X Plane Detector

Broken wirebondings: (out of 5500)
patch = 3
Silicon = 4
PCB = 0

Y Plane Detector

Test Robustness of Packing and Shipping
of one wire bonded dummy silicon detector sent to JLAB and returned to Rome, **via airplane**

Just arrived!! To be checked soon by Probe Station visual inspection

Silicon microstrip detector production started at INFN-Bari with an **automatic bonding machine** Devoltec 6400, G4 type:
one half plane **X** with a standard PCB design, and
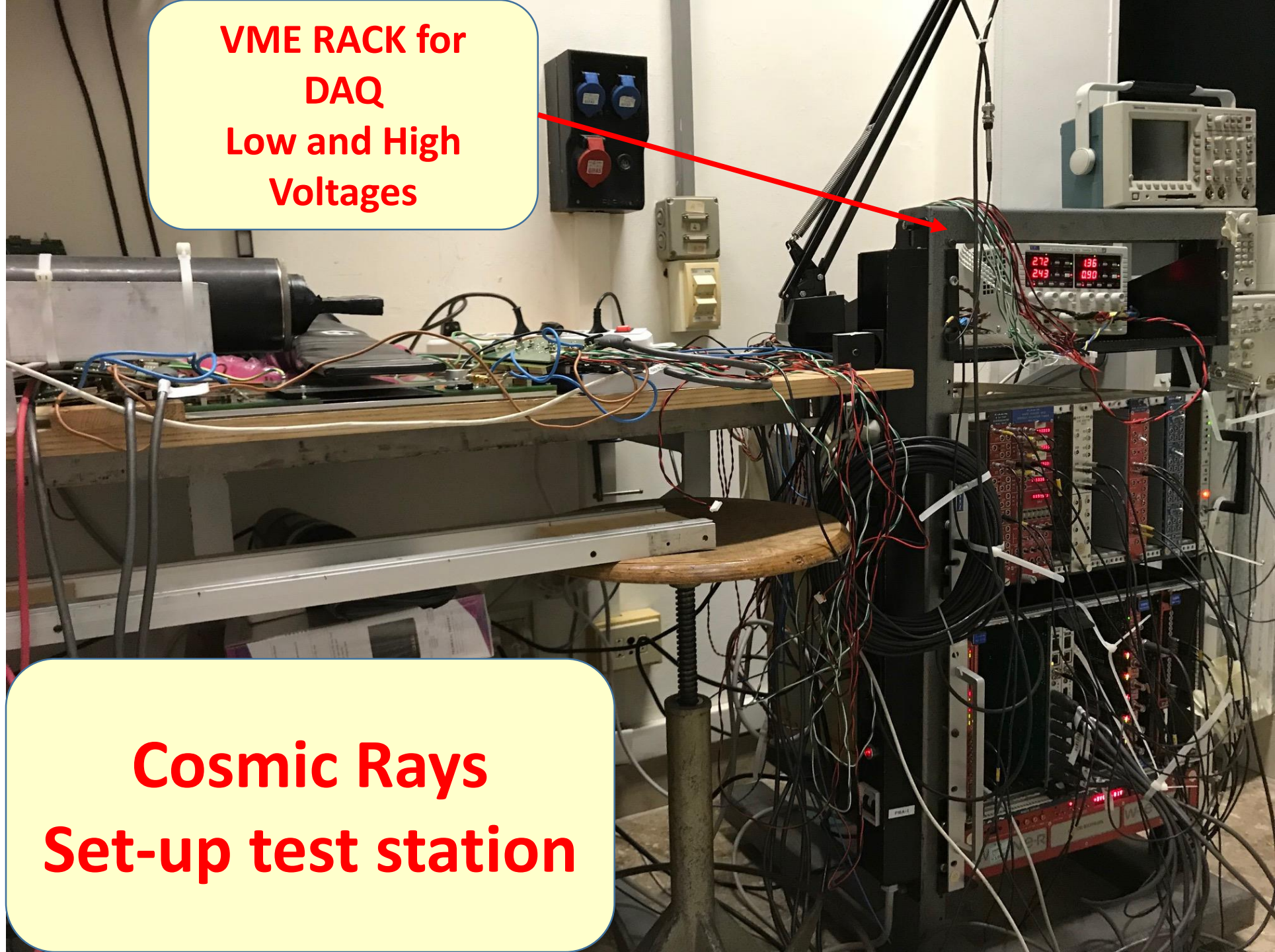**one** half plane **Y** with a reduced GND plane PCB **already produced**
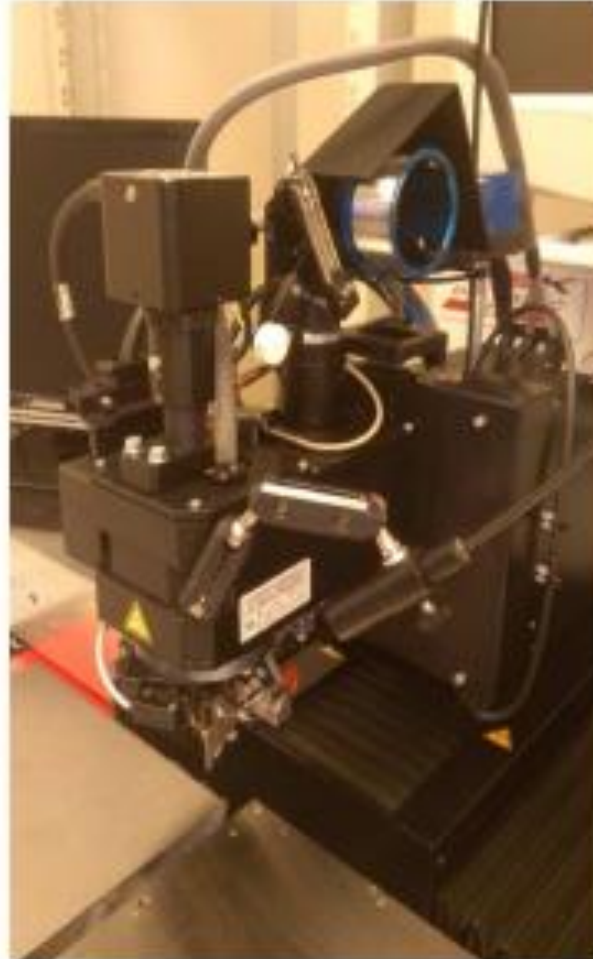
Cosmic Rays Set-up test station: work is in progress

Production: SID-X plane

μ
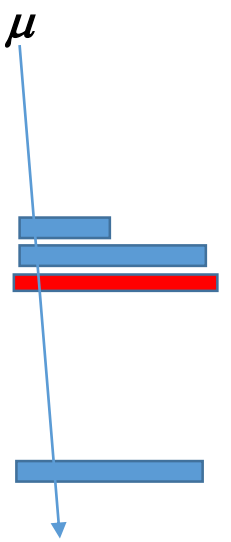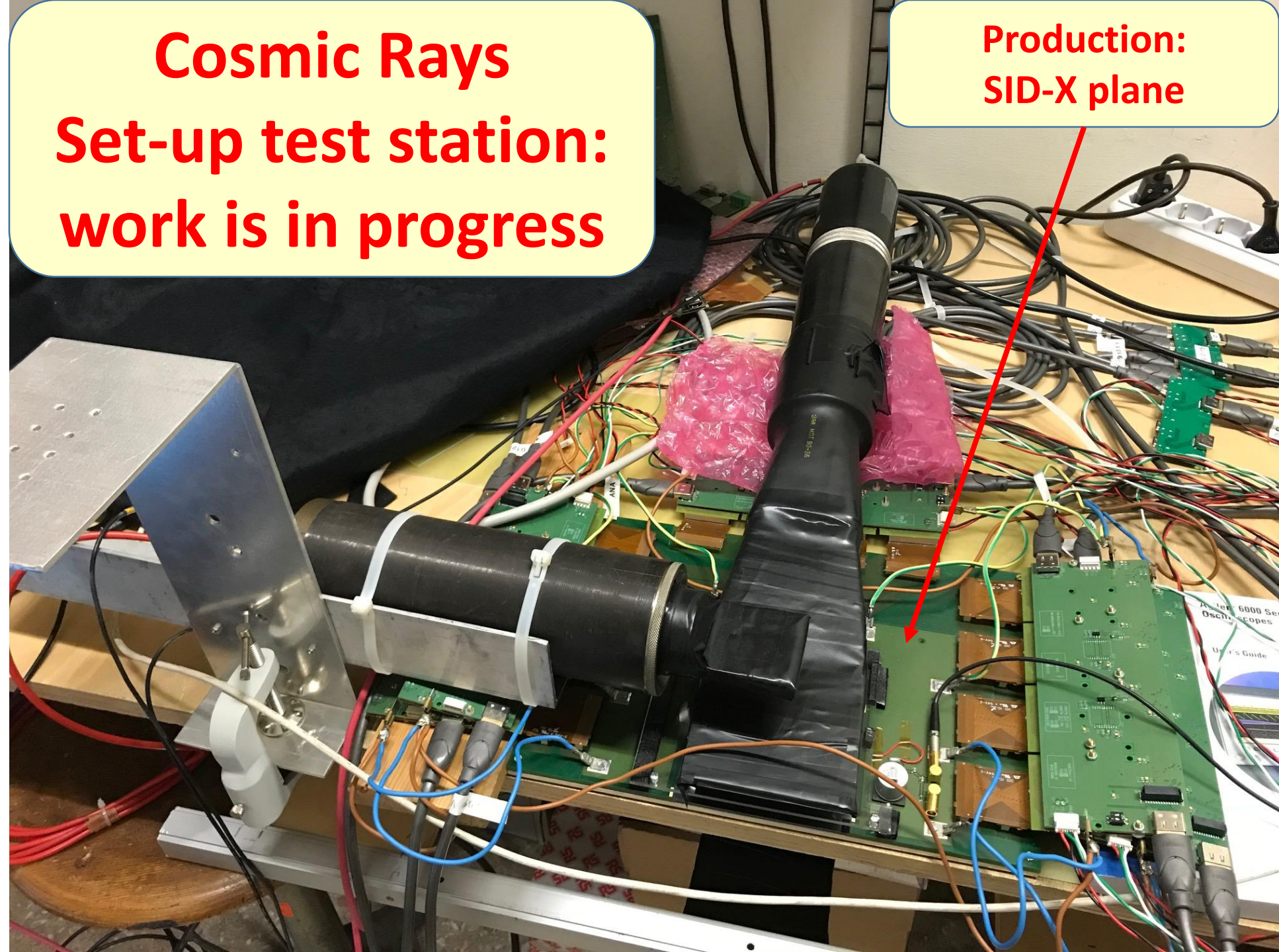
VME RACK for
DAQ
Low and High
Voltages

Cosmic Rays
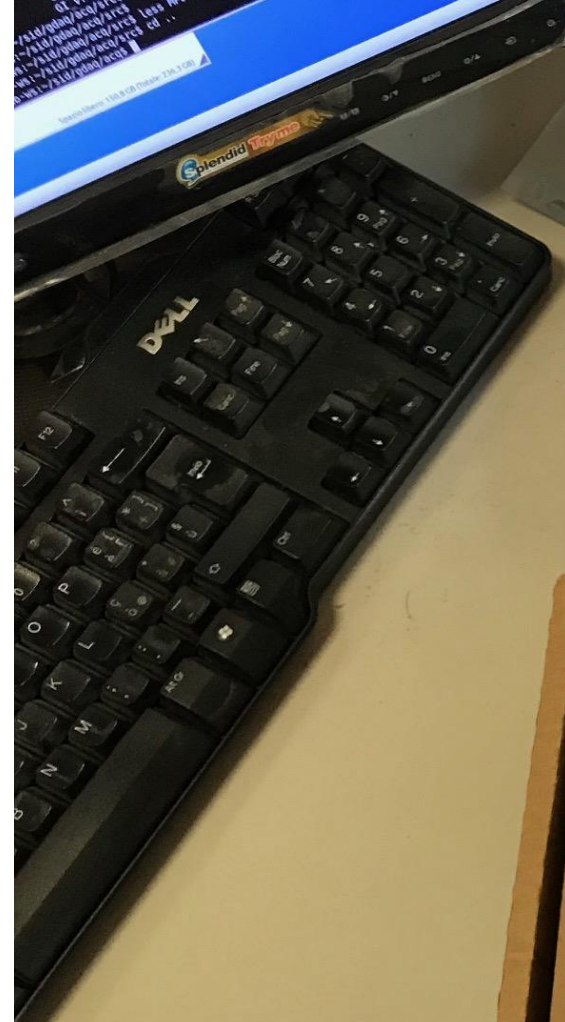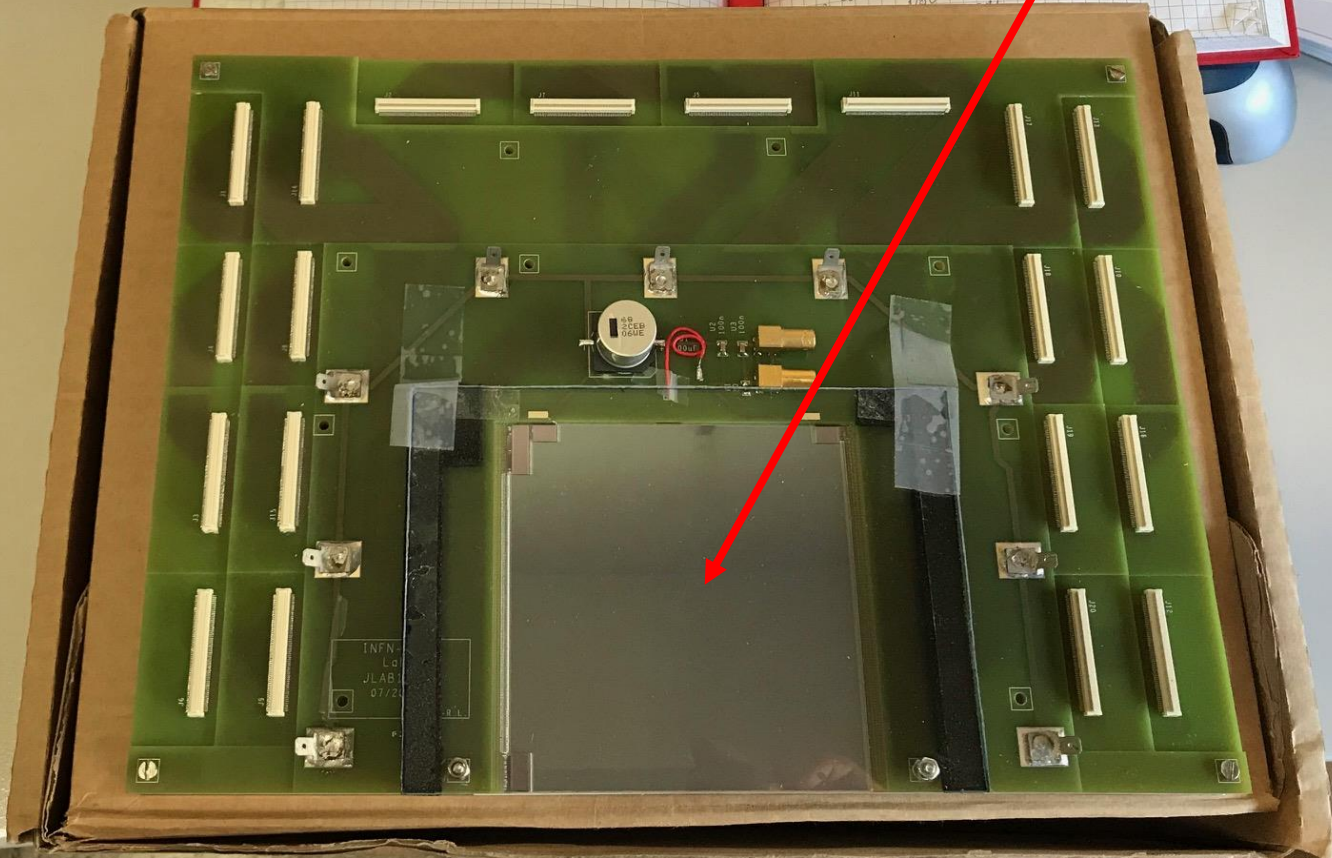Set-up test station

Production:
SID-Y plane
already tested

New analysis algorithm

- For each cosmic ray run, the average of each single strip ADC counts and the relative standard deviation are calculated.

- A MIP is considered «crossing» a strip when, for the event concerned, the ADC relative value exceeds the average of a predetermined number of standard deviations.

Prototype signal good results confirmed

Highest Raw Latency Summed MIP ADC Histogram at the Right Run

df	50.26 / 37
p0	155.8 ± 10.8
p1	931.3 ± 16.2
p2	143.4 ± 8.5
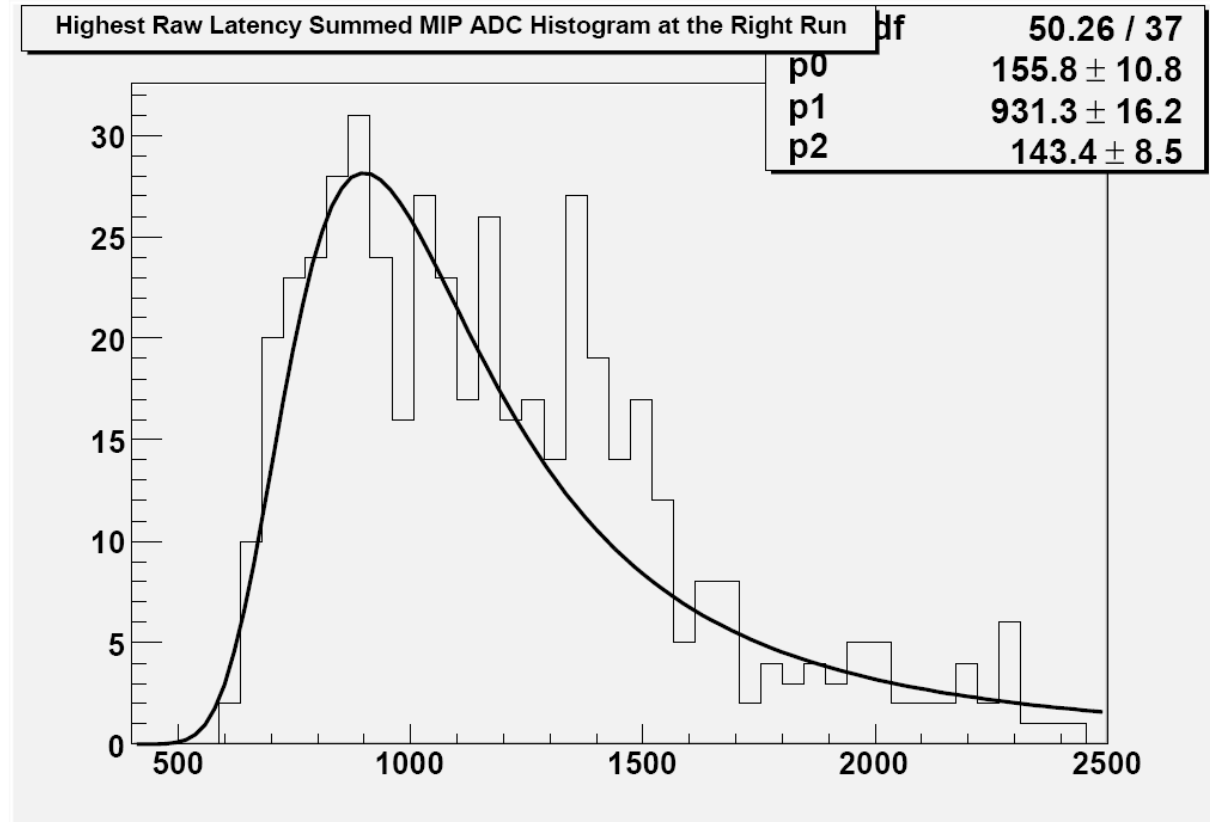
MIP distribution along the detector

Hole generated by geometric causes
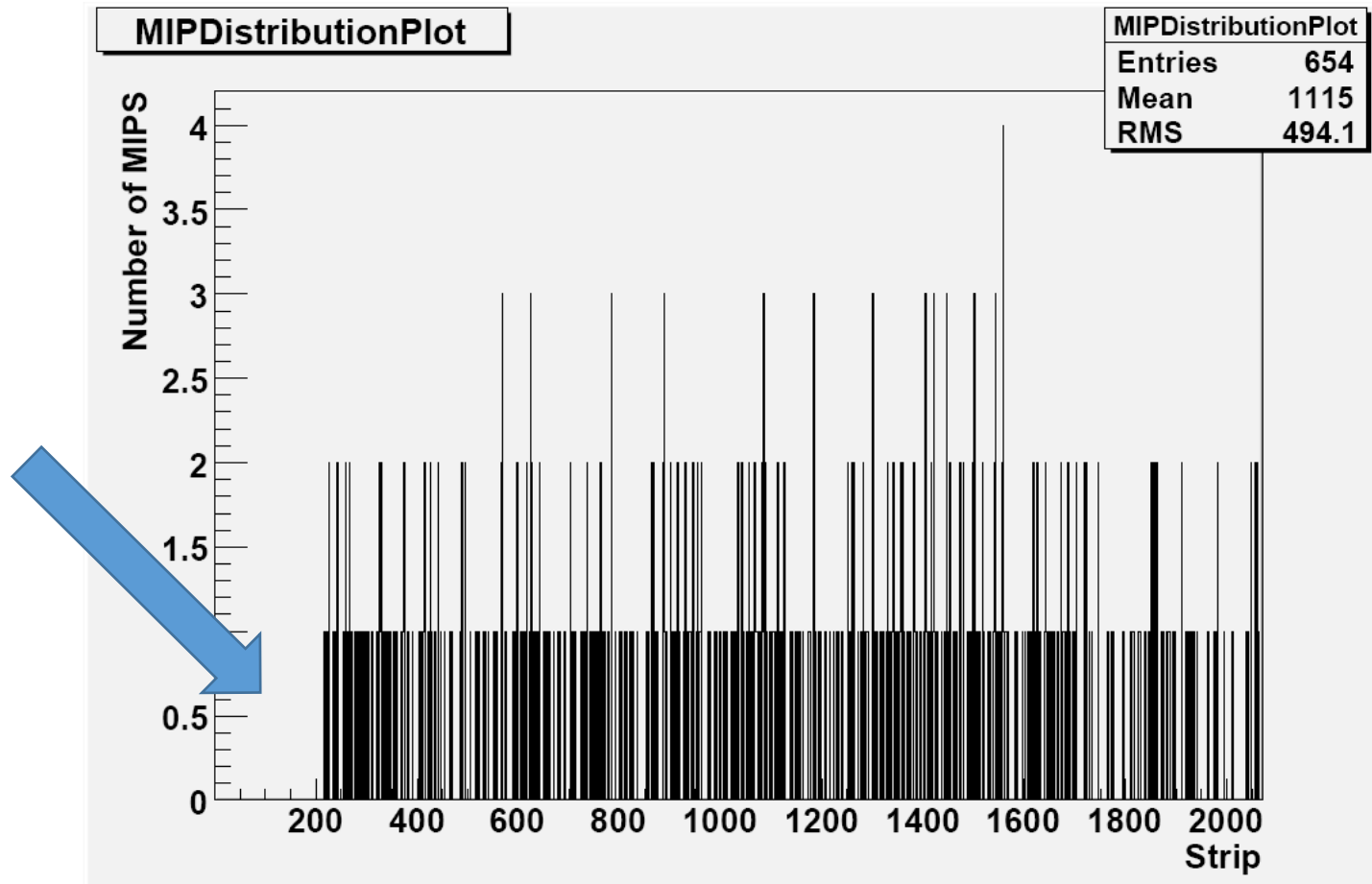
Conclusions

- One half X plane (bonded to a standard PCB) and one half Y plane (bonded to a reduced GND plane PCB) constructed.

- X half plane showed good results.

- Y half plane produced results slightly worse ($\approx$ 10% smaller S/N).

- One more half plane X and two more half planes Y are being constructing at INFN-BARI and will be delivered soon to Rome (to be qualified) and then shipped to Jlab.

- Contaact with the Jlab engineering staff needed to coordinate Silcon planes installation.