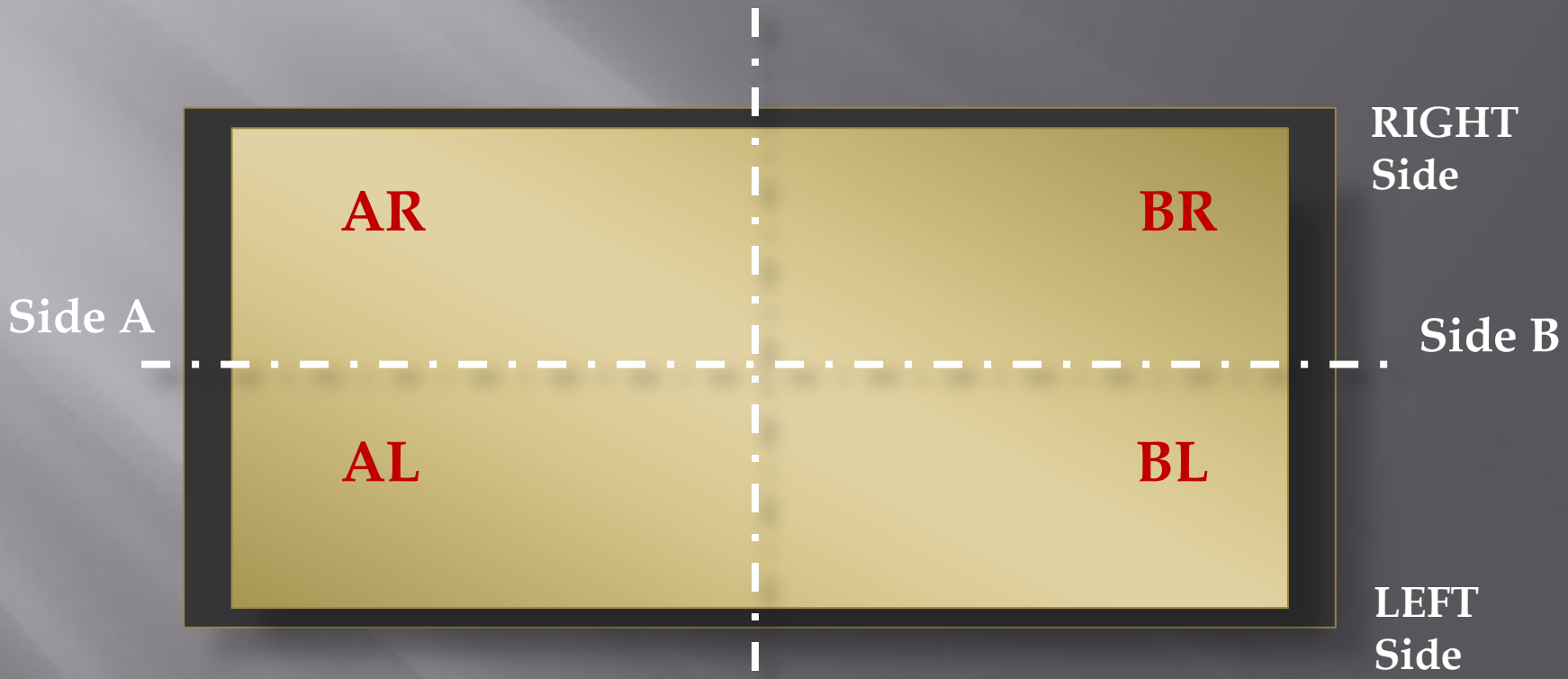
Construction of and first experience with a 2.2 x 1 m2 micromegas chamber

Givi Sekhniaidze
On behalf of the Micromegas community

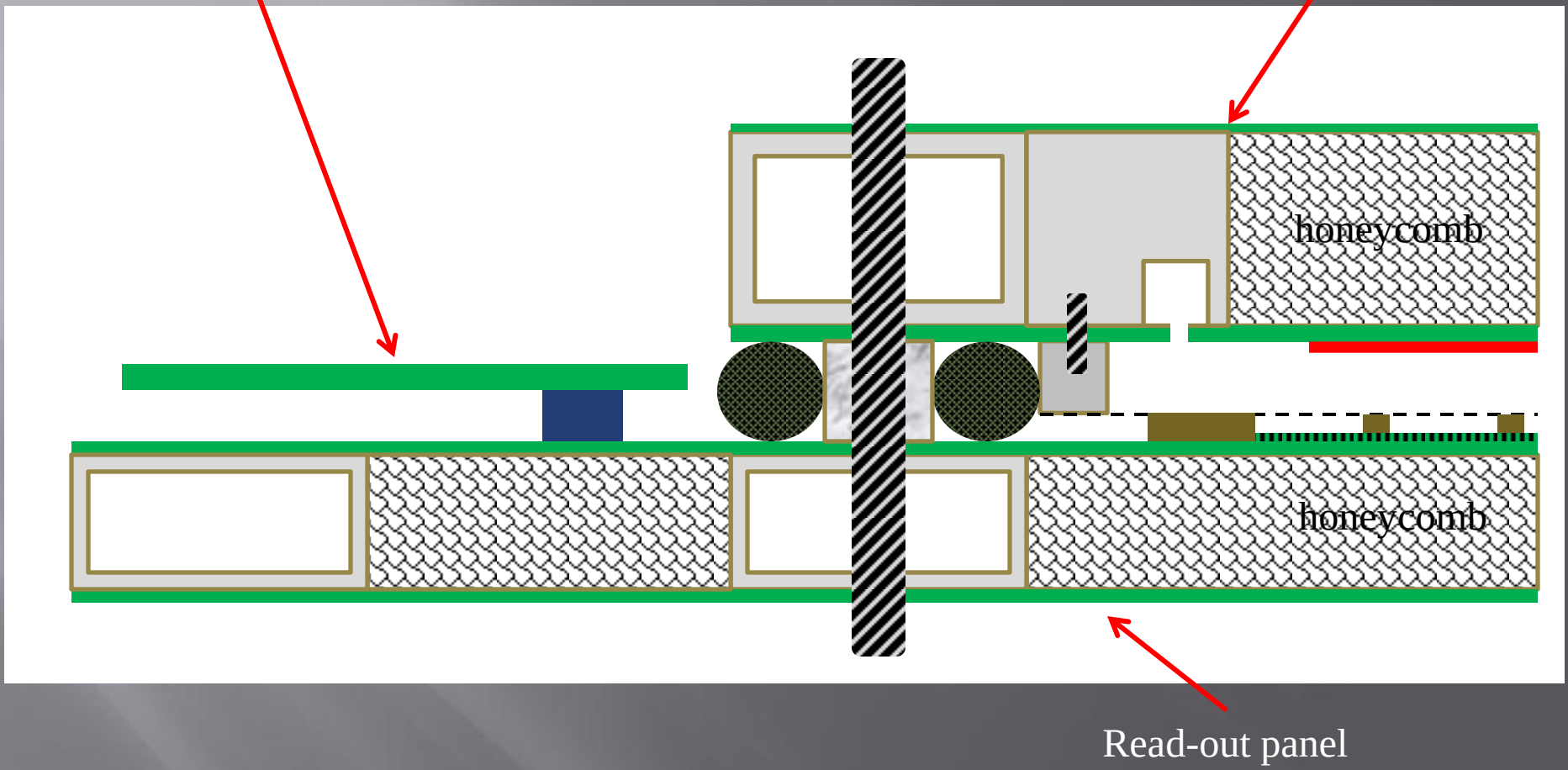
Overview

- Mechanical Issues
- Electrical Issues
- Preliminary results on chamber response from cosmic

L2 - Naming convension

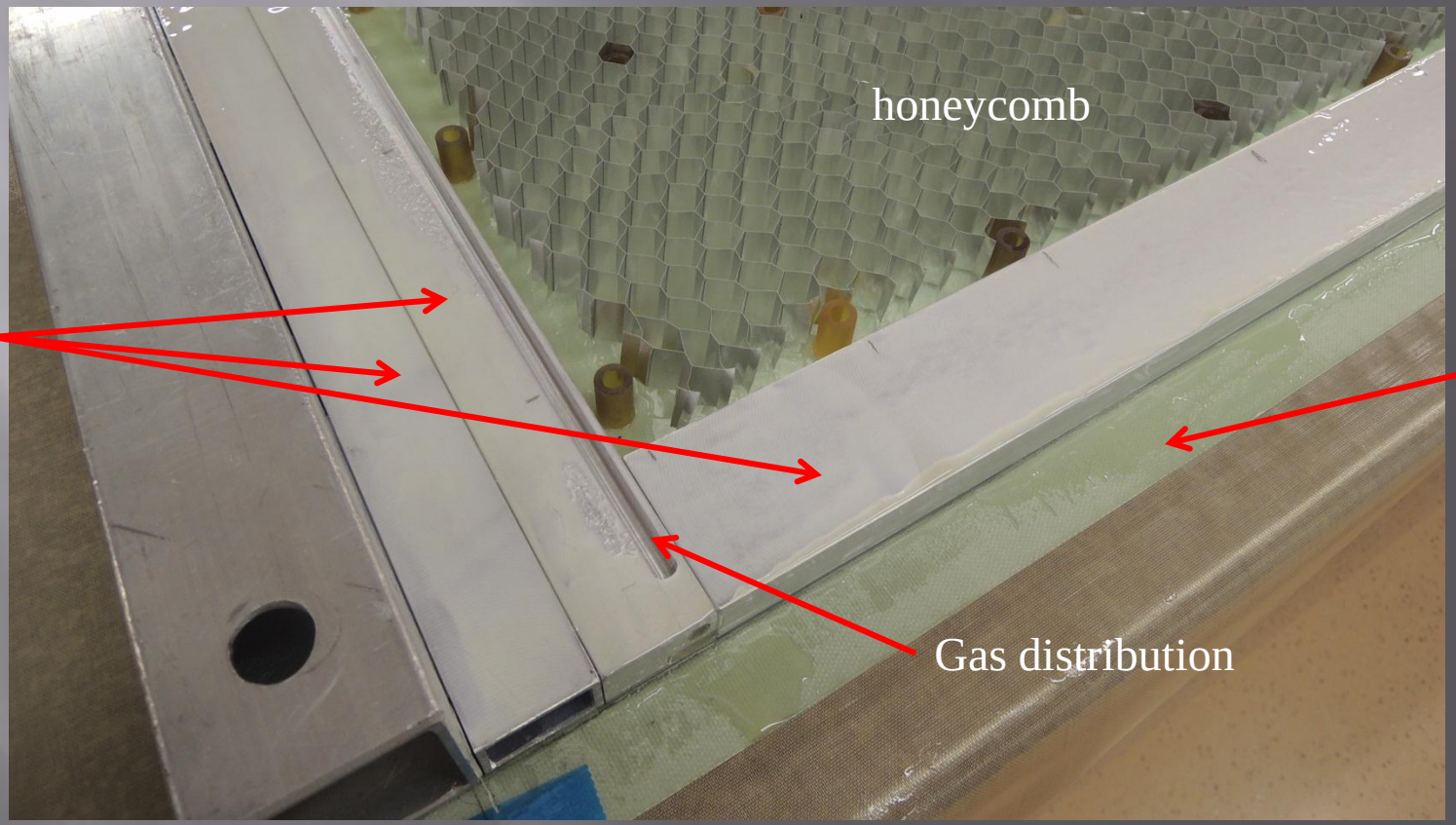


L2 – Sketch-up



Mechanical issues – Drift panel (1)

- 0.5 mm thick FR4 skin
- 15 mm thick Aluminum honeycomb
- External Aluminum frames



Mechanical issues – Drift panel (2)

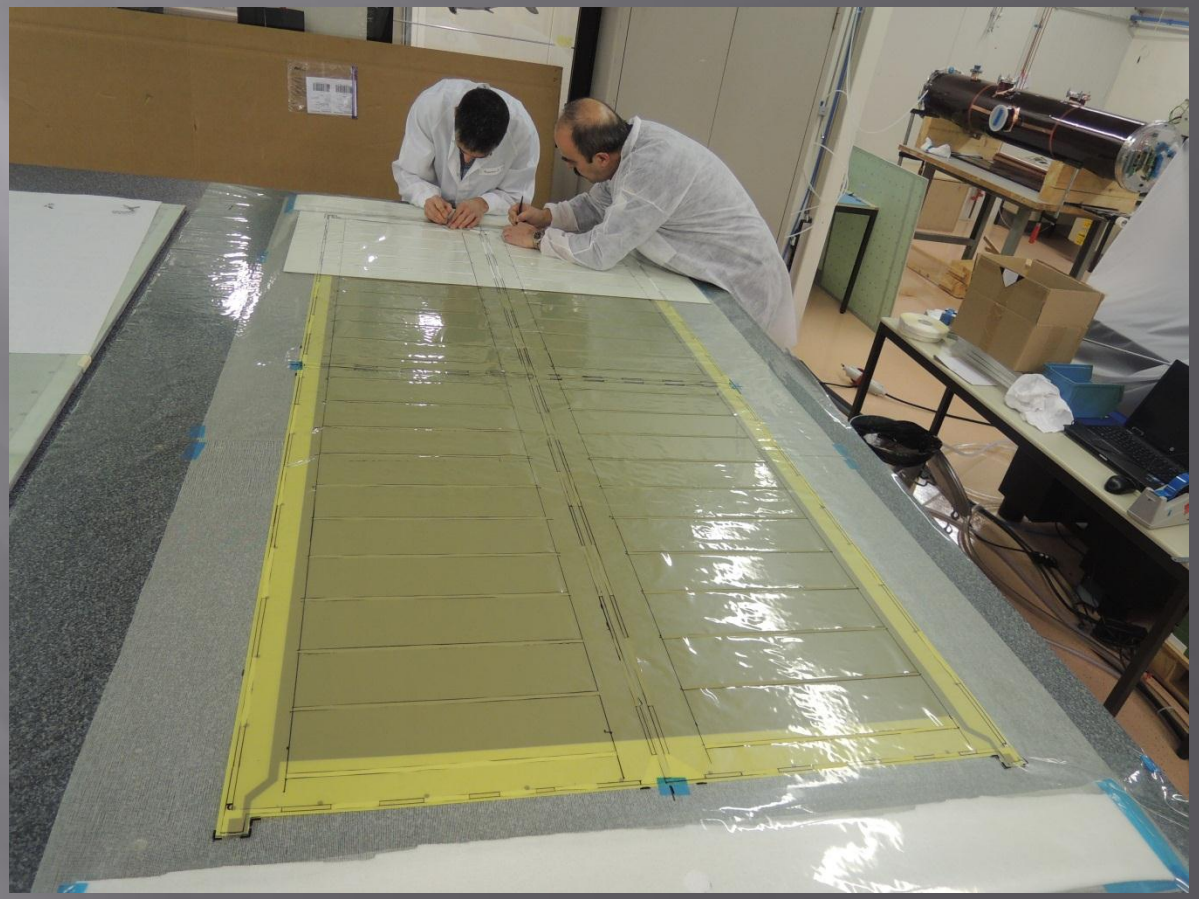
Panel was closed with 0.5 mm thick FR4 skin

Mechanical issues – Drift panel (3)

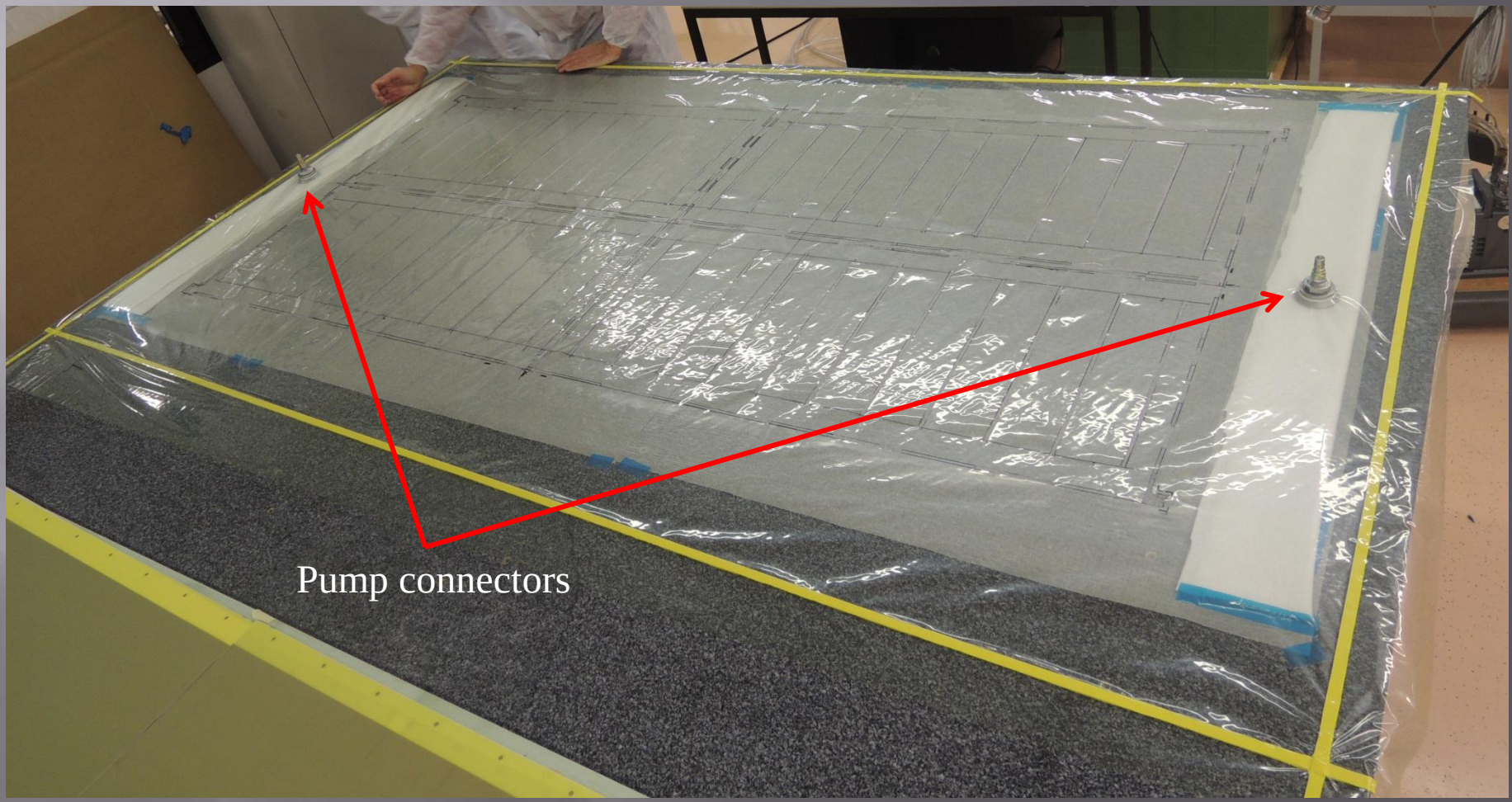
Flatness of the panels were measured with the laser interferometer

Mechanical issues – vacuum system (1)

- Thin net on the table
- Vacuum plastic foil on it
- “Sucking windows”

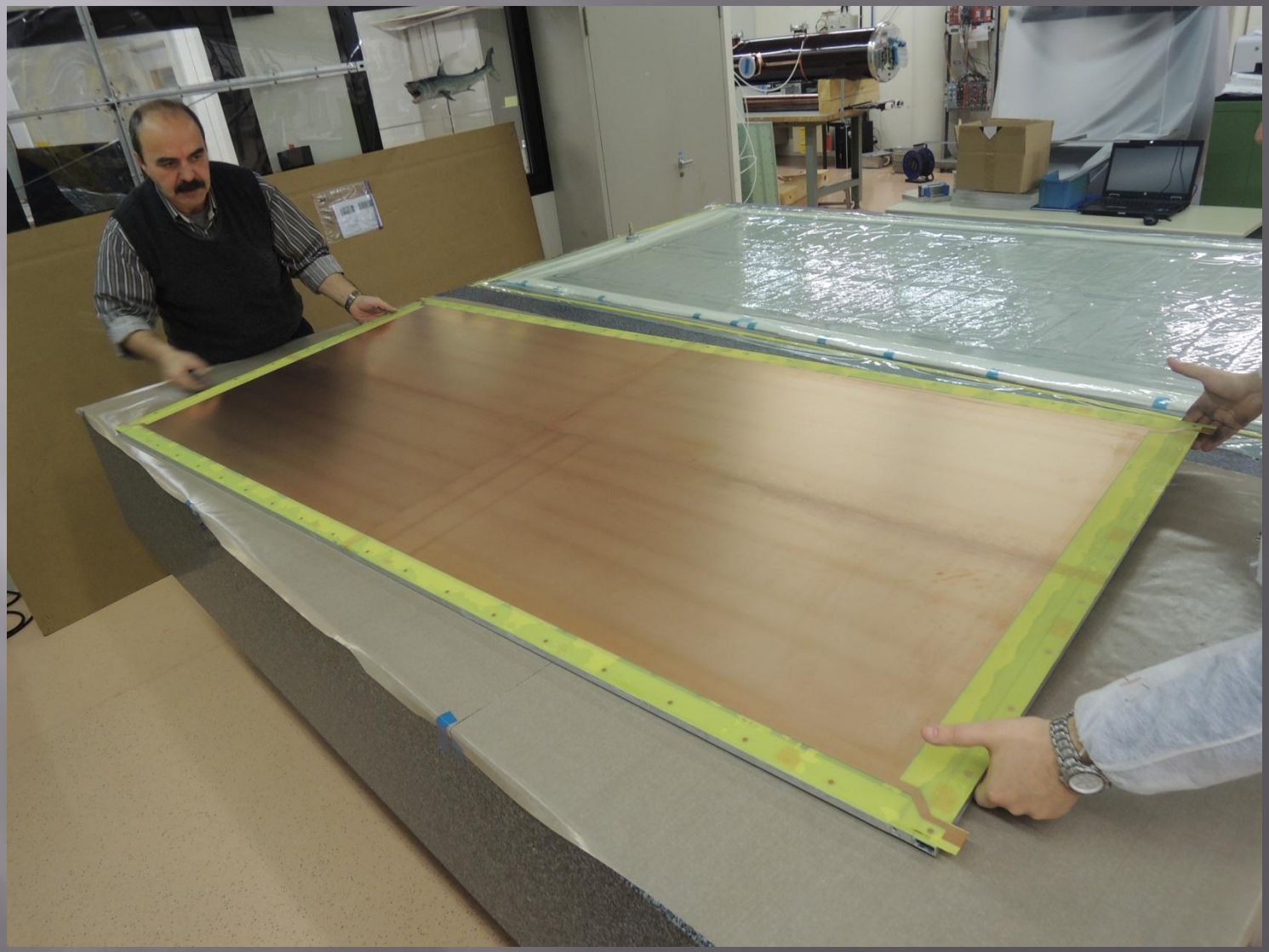


Mechanical issues – vacuum system (2)



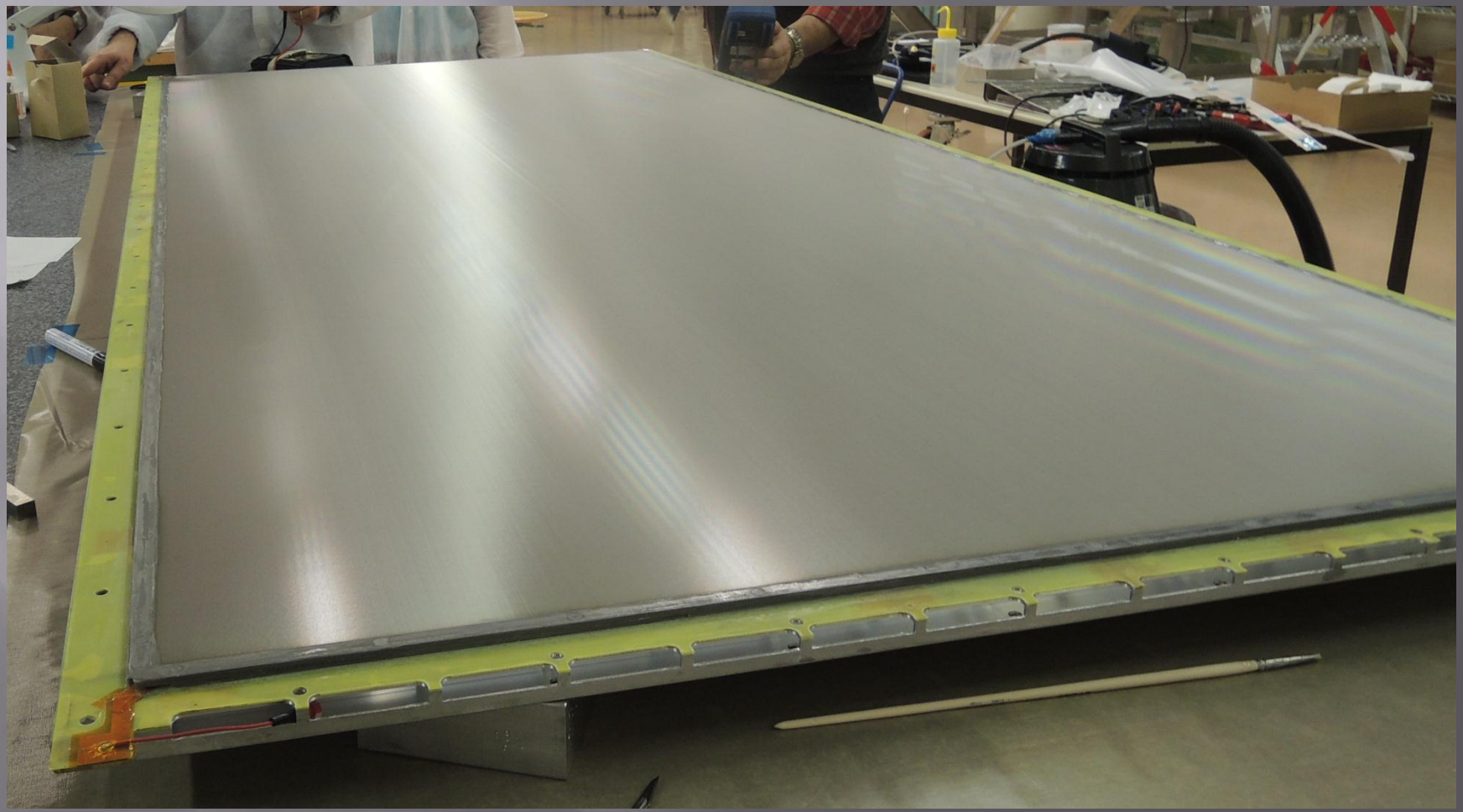
Mechanical issues – vacuum system (3)

Mechanical issues – Drift panel



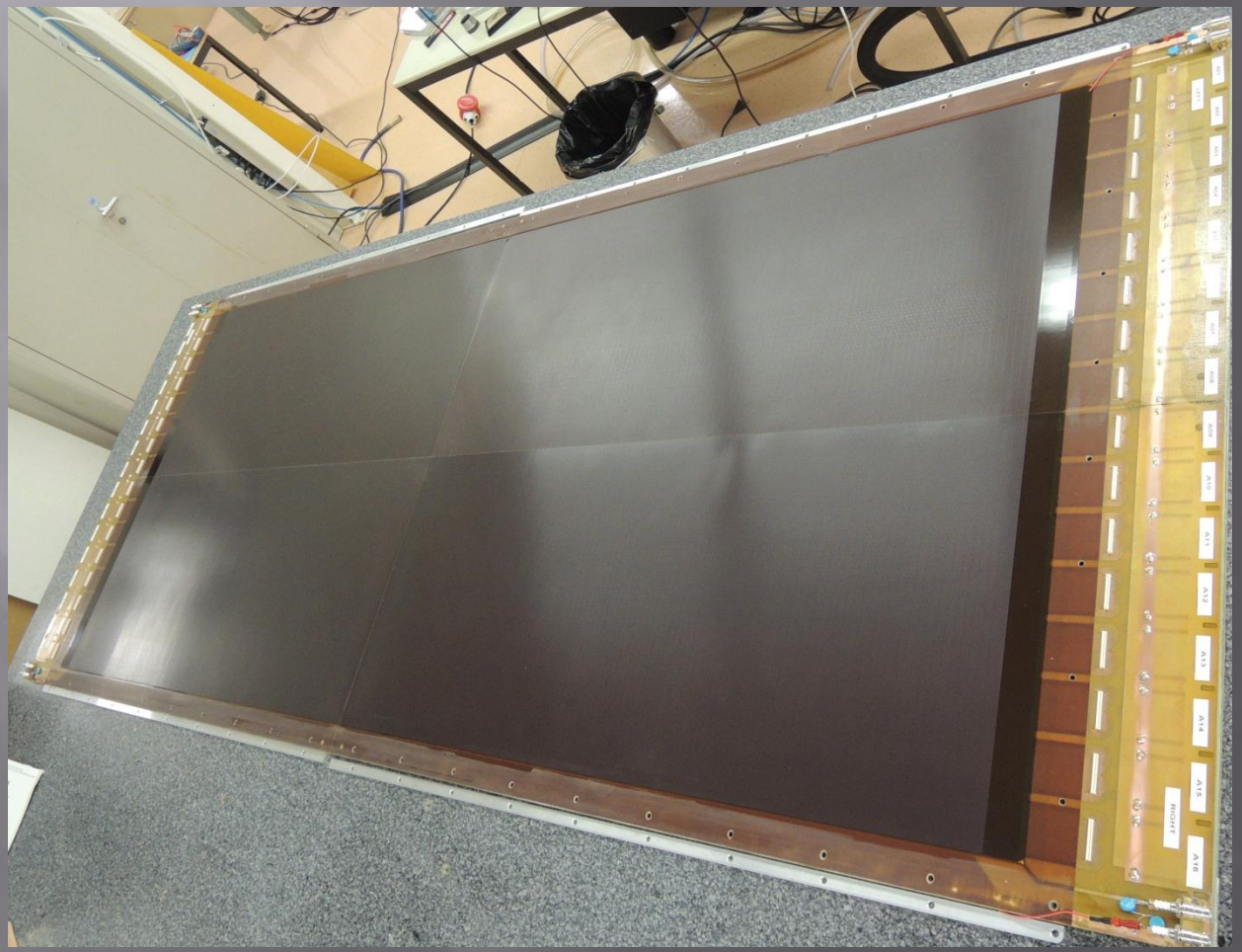
Mechanical issues – Drift panel

- 5 mm thick Aluminum frame mounted on the panel
- Mesh stretched and glued on the frame

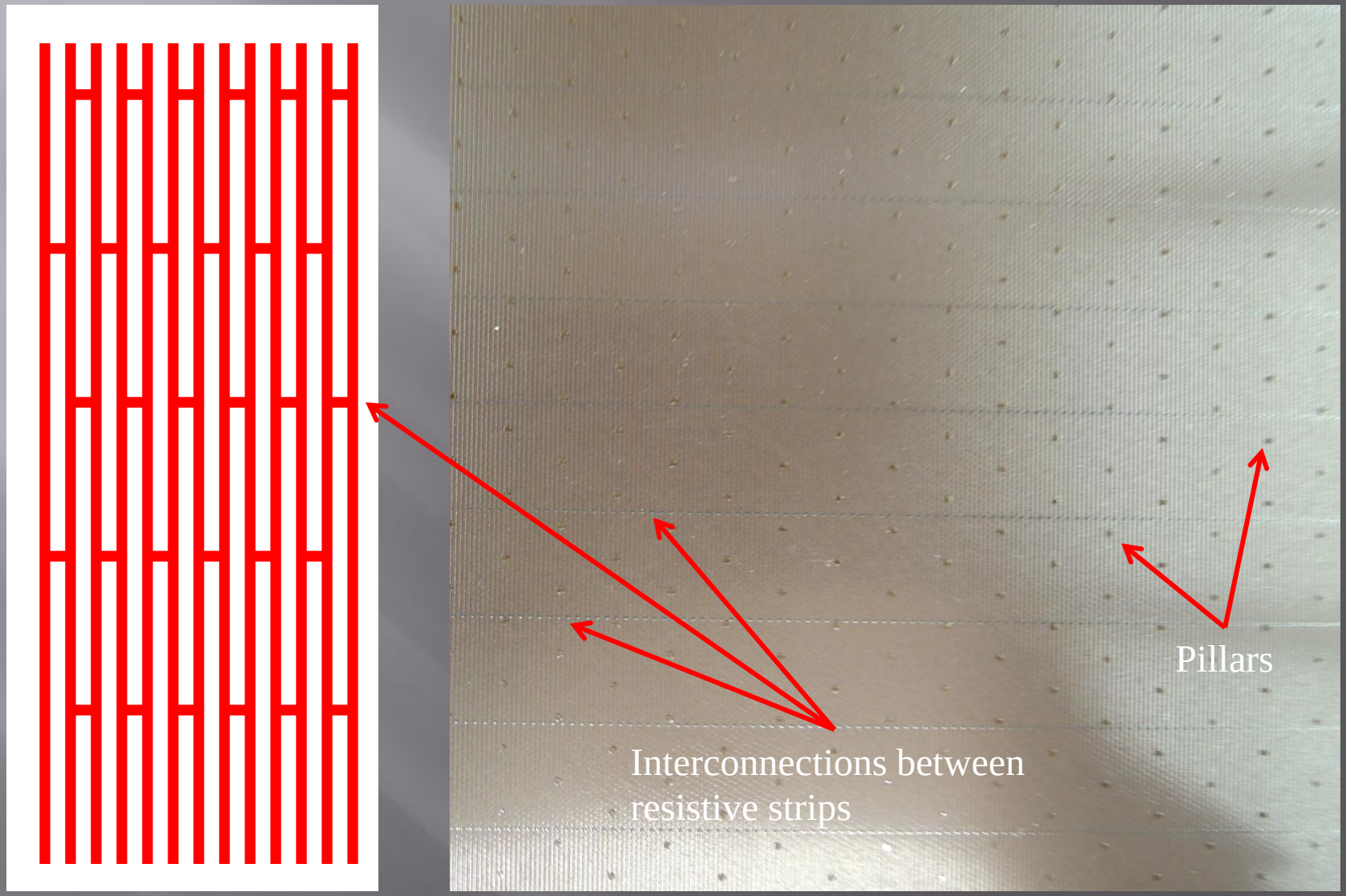


Mechanical issues – Read-out panel

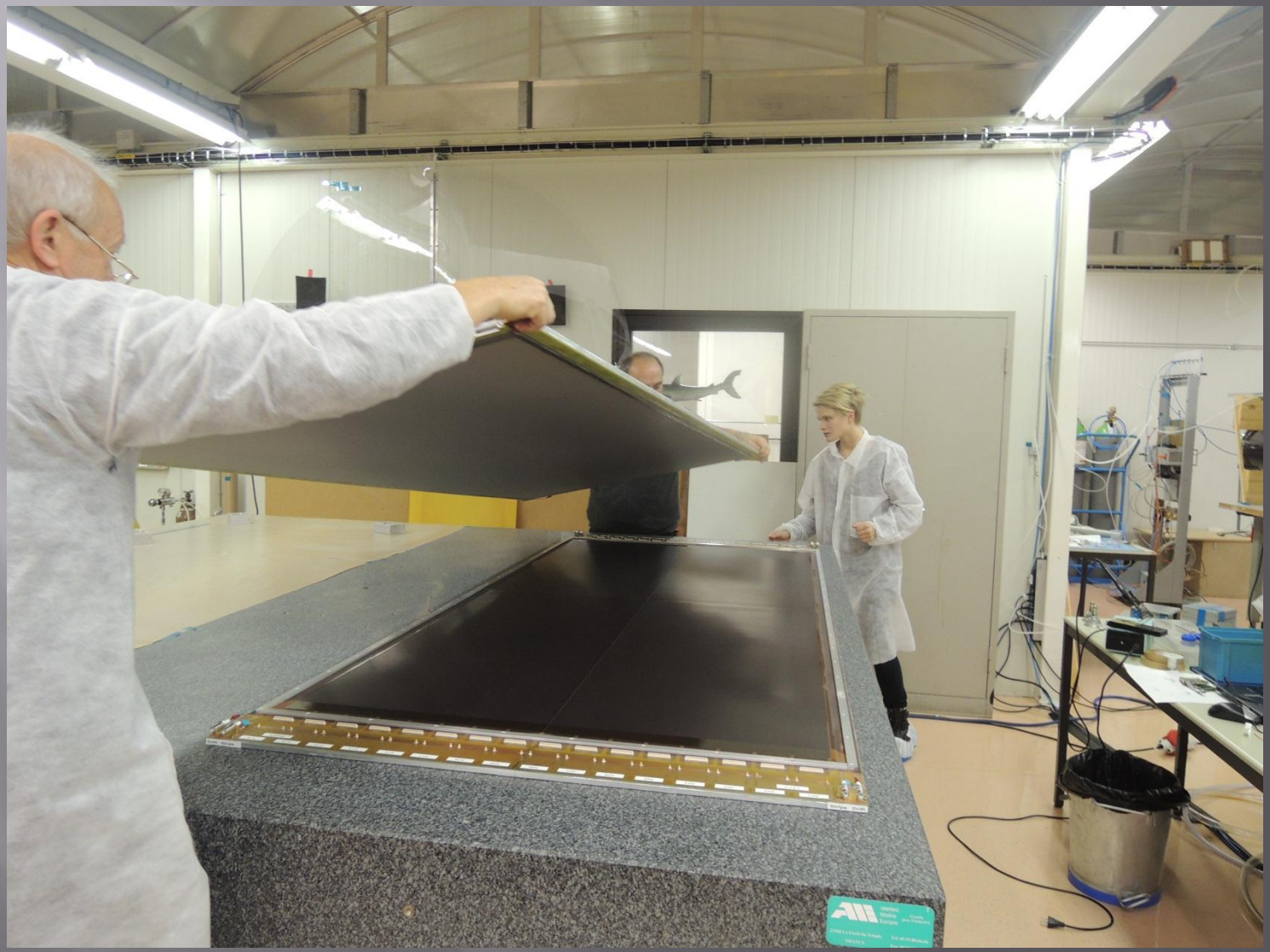
- 0.5 mm thick FR4 skins
- 10 mm thick Aluminum honeycomb
- External Aluminum frames



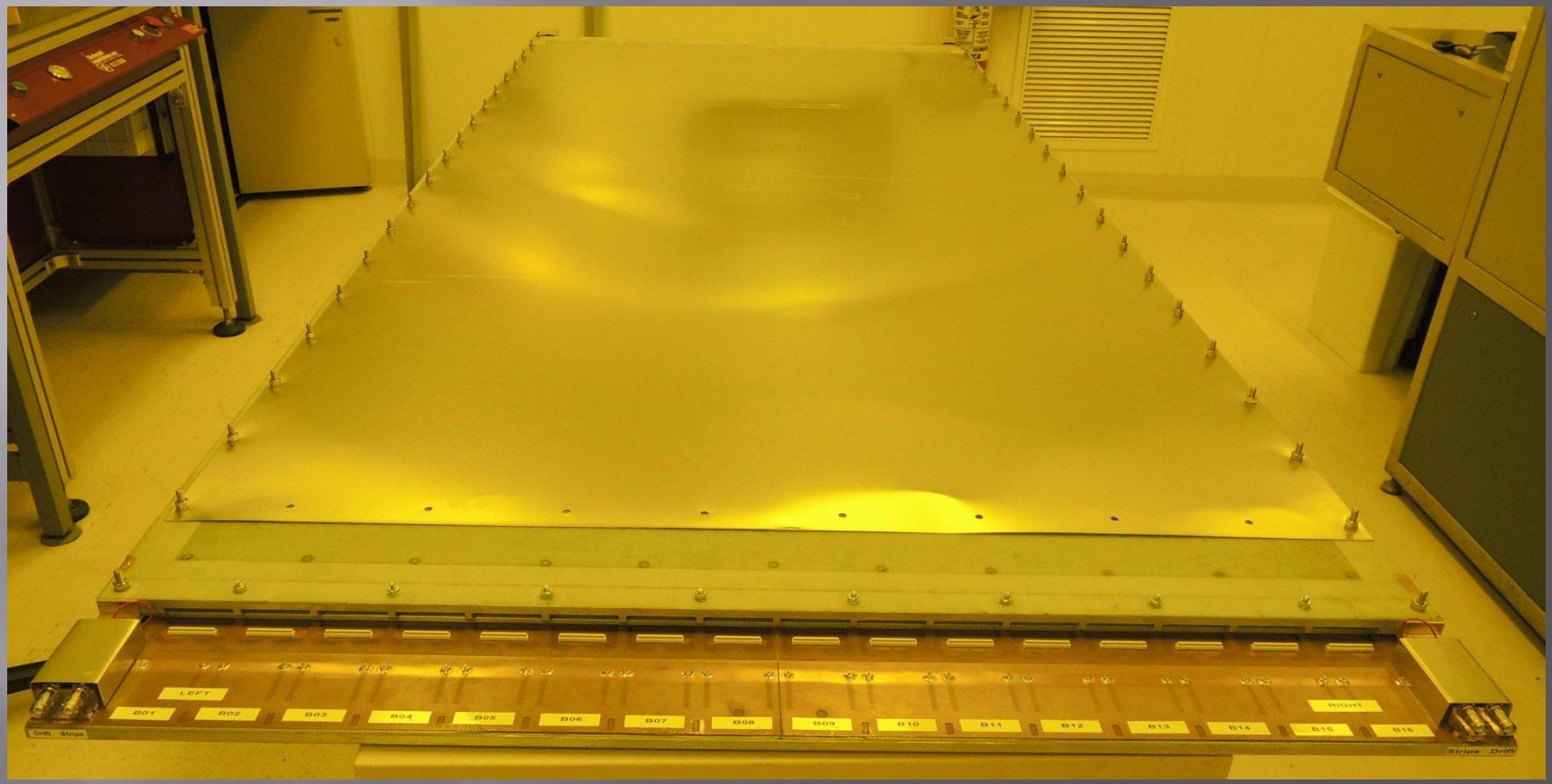
Mechanical issues – Read-out panel



Mechanical issues – chamber assembling



L2 Micromegas chamber



Electrical issues

- After some cleaning/refurbishing effort all four read-out parts are working well

- One read-out board, AL (side A, left), had a problem:
  - Short between a resistive strip and read out strip below
    - The read out strip was identified and disconnected from connector, problem disappeared

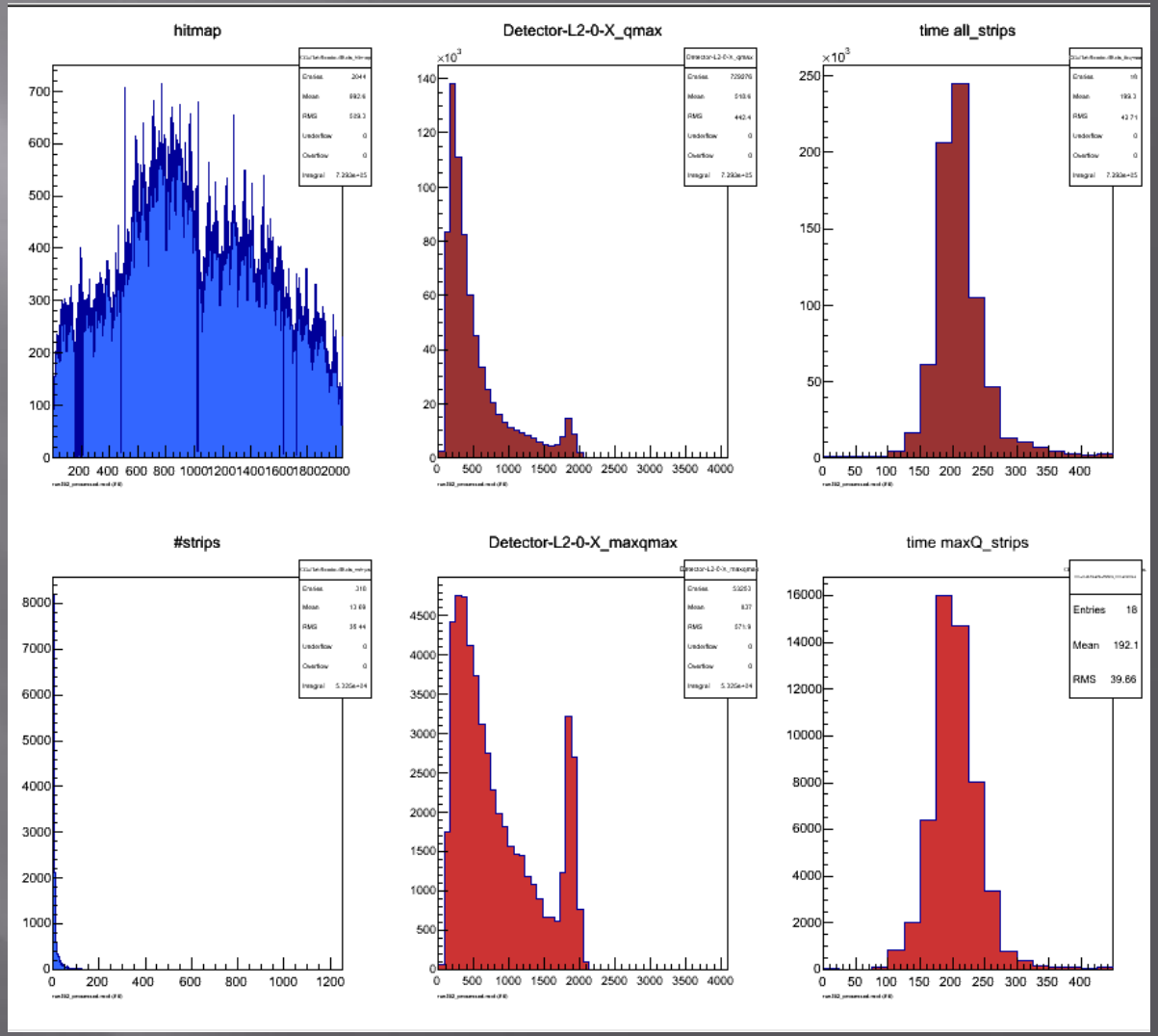
- Initially there was a big current on the drift electrode and it was identified as a leak on the surface of the O-ring
  - HV input connection was insulated with kapton tape, problem disappeared

- Typical current between resistive strips and mesh 0 -20 nA

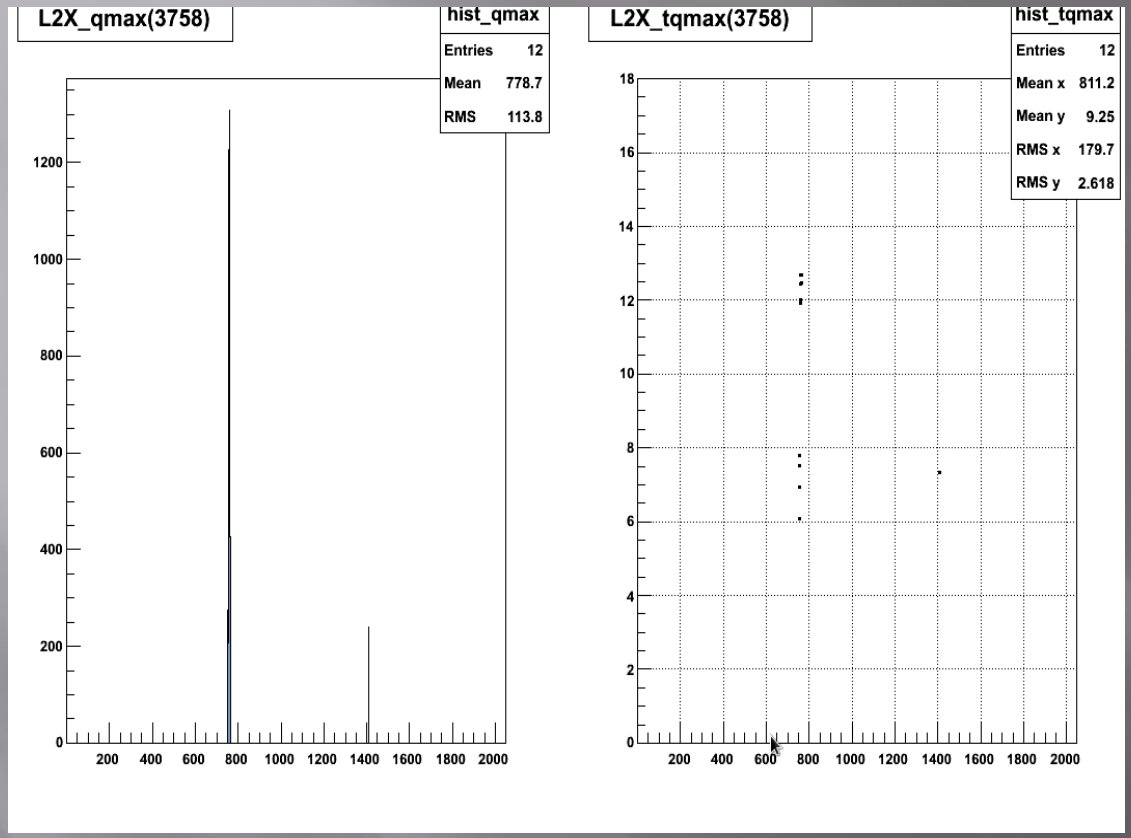
- HV up to 580 V the sparks are not observed

Very preliminary results (1)

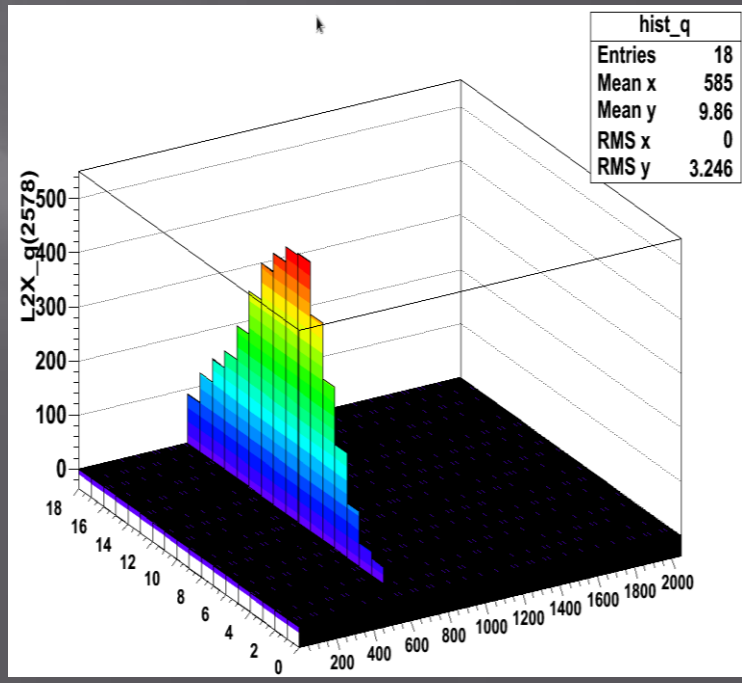
Summary plots from event browser



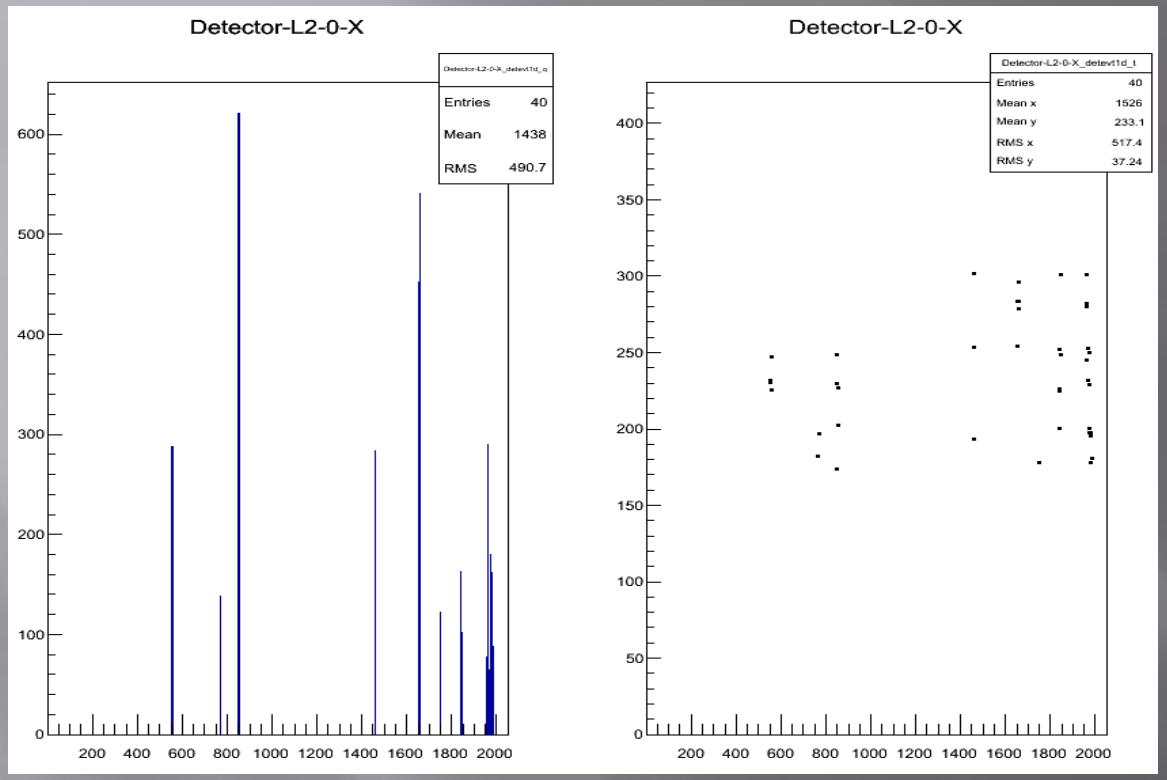
Very preliminary results (2)



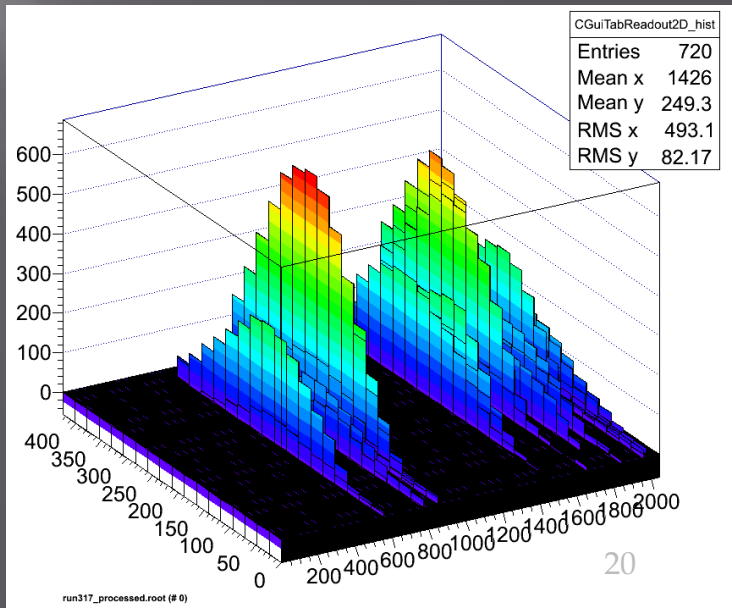
Single event detected by L2



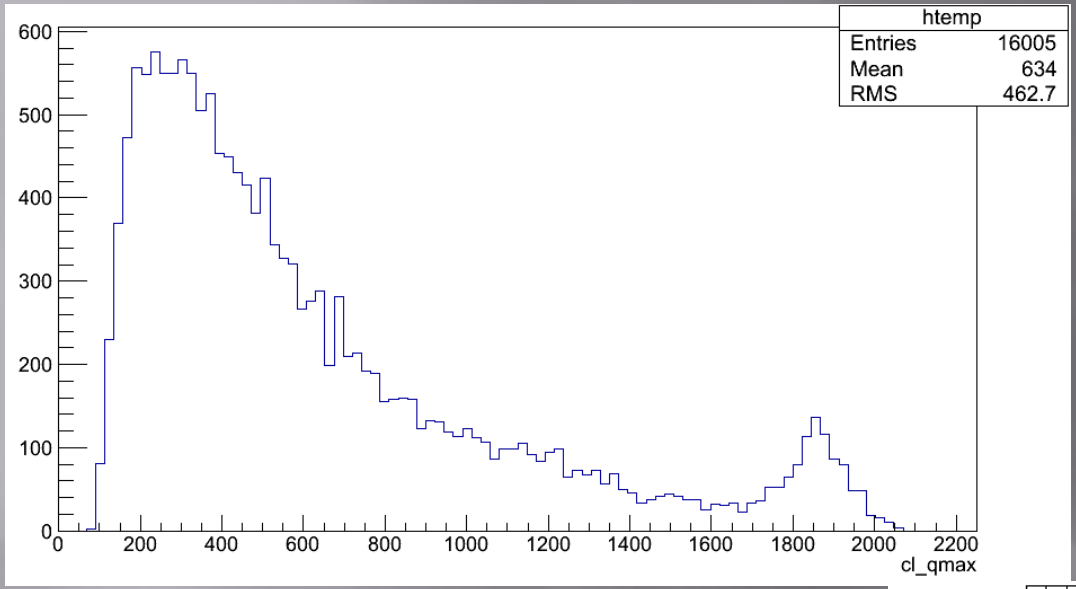
Very preliminary results (3)



Cosmic shower detected by L2

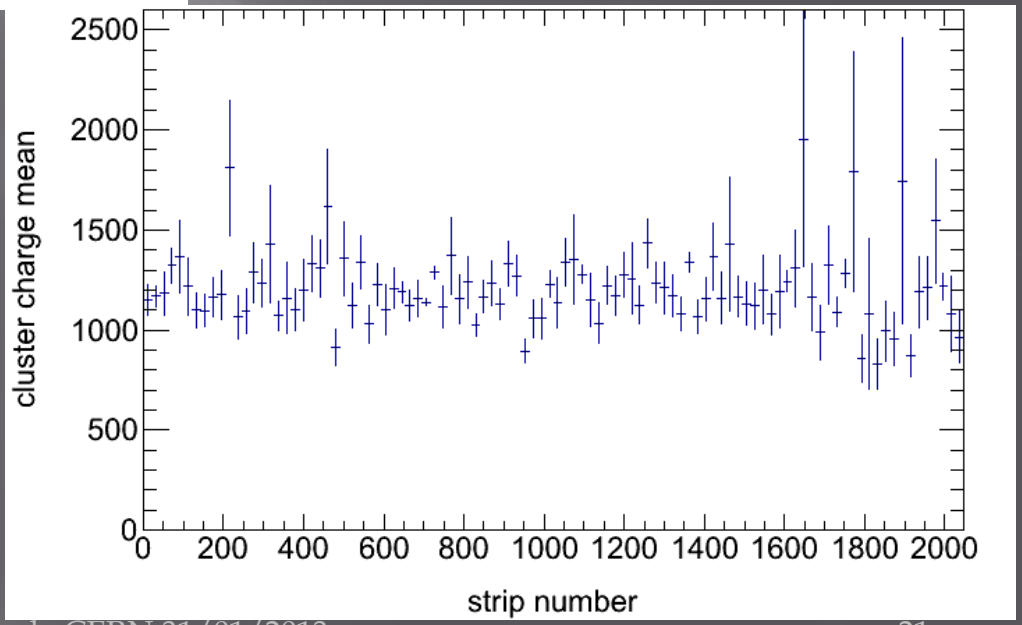


Very preliminary results (4)



Charge distribution

Chamber uniformity



Summary

- 2,2 x 1 m2 Micromegas chamber has been build and working well

- Few mechanical details to be changed for the second chamber:
  - Other (lighter) material instead of the honeycomb
  - Improve the vacuum system for he better performance (Mylar foil? Smaller and more “sucking windows”?)
  - Change the gas distribution system to avoid the leak
  - Expand photo resistive layer on the read-out board

- Shortcuts between the resistive strips seems promising
  - Variable distance between of interconnections?

Etc., etc., …