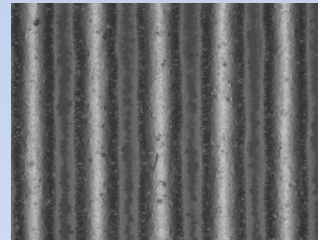
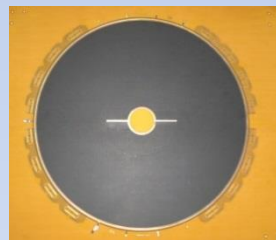
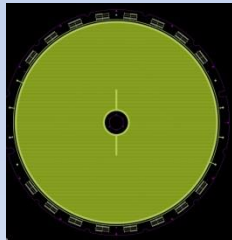


New results from CLAS12 forward resistive Micromegas produced by CIREA/ELVIA and CERN



Gabriel CHARLES

Collaboration with ELVIA

Geometry of the detector and first measurements

Tests with a cosmic bench

Conclusions

Conclusion slide by D. Neyret for the previous RD51 mini-week

Conclusions and perspectives



Large size CIREA prototype

- *Production without problem*
- *2 prototypes delivered, one prepared and tested with beam*
- *Normal behavior during data taking: no leak current, no discharge*

First results on performances

- *Performances of strips look good: efficiency, residuals*
- *Important problem with pixels, very low efficiency near vias*
- *Detector to be opened soon to investigate this problem*
- *Discussion with CIREA next week to find a solution*

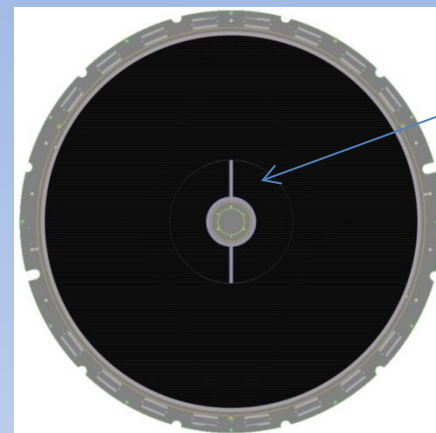
Next steps with CIREA

- *Complete analysis*
- *Large resistive prototype for CLAS12 (resistive strips) to be delivered next week*
- *Production of small prototypes (TF10, 6x10cm²) with buried resistors in progress, expected in February*
- *Large size non-simplified prototype to be launched in February, including solution on vias*
- *Large size resistive prototype launched afterward*

Specifications :

- active area : 430 mm diameter disk with a 50 mm diameter hole at the center
- PCB thickness less than 100 μm and glued on ROHACELL
- 500 μm pitch, with 100 μm between two strips
- resistive strips *à la Joerg*

Gerber view

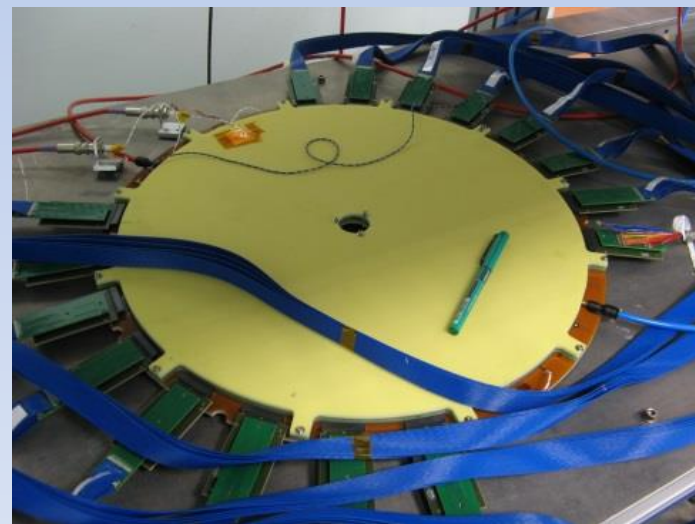


Central zone



Prototype by CIREA

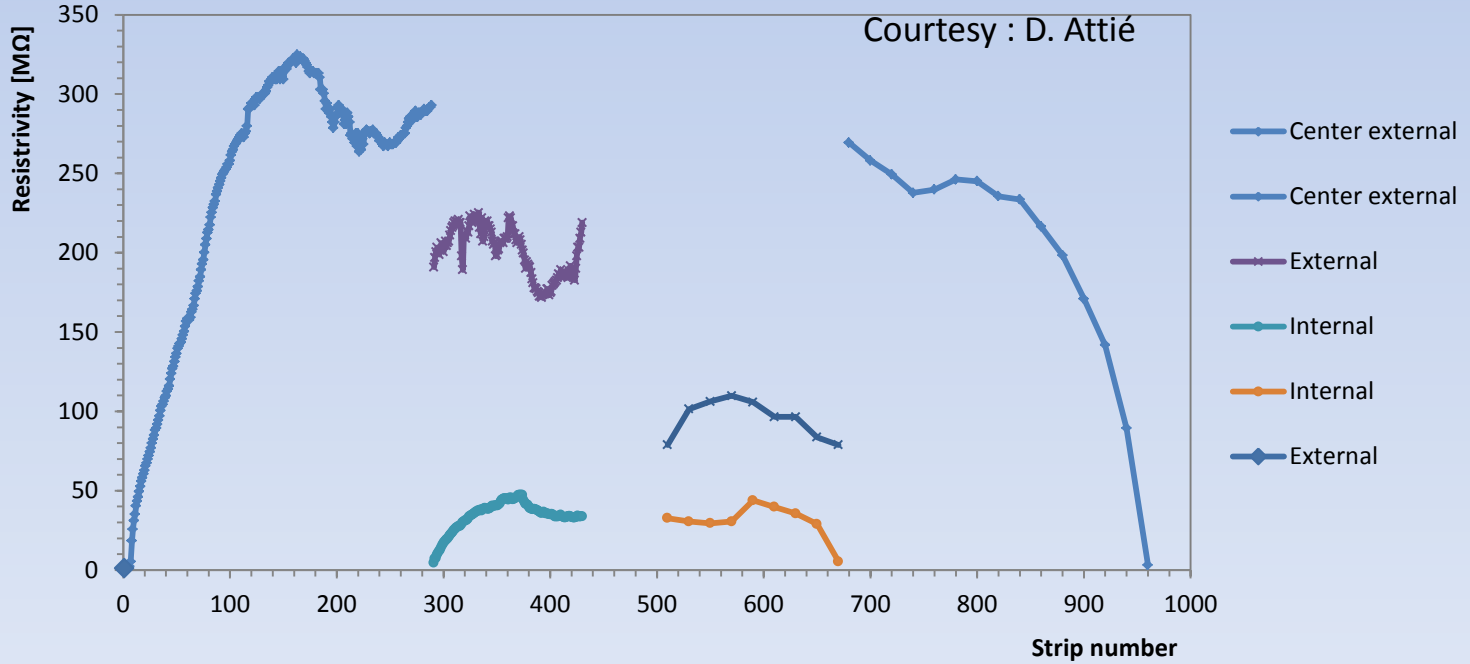
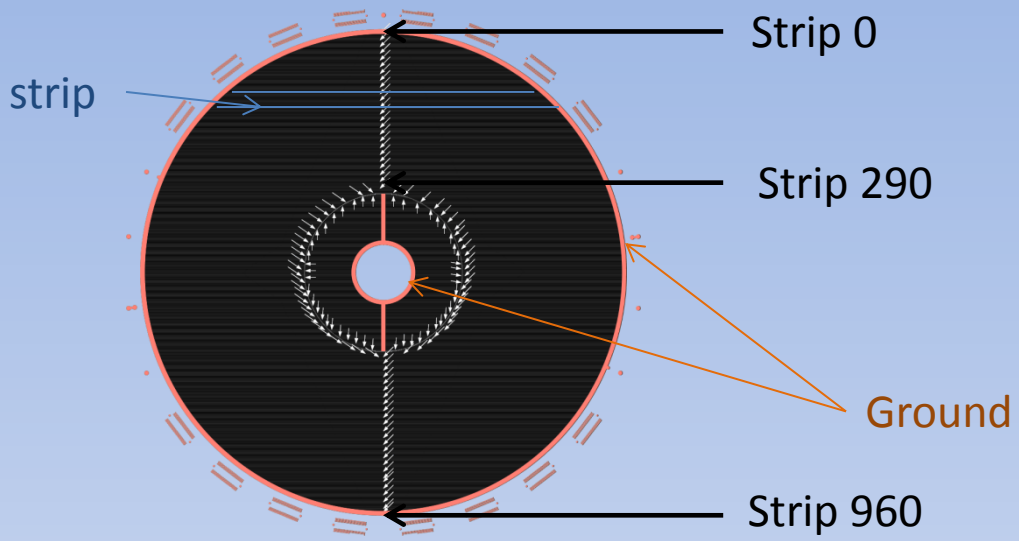
Two prototypes tested



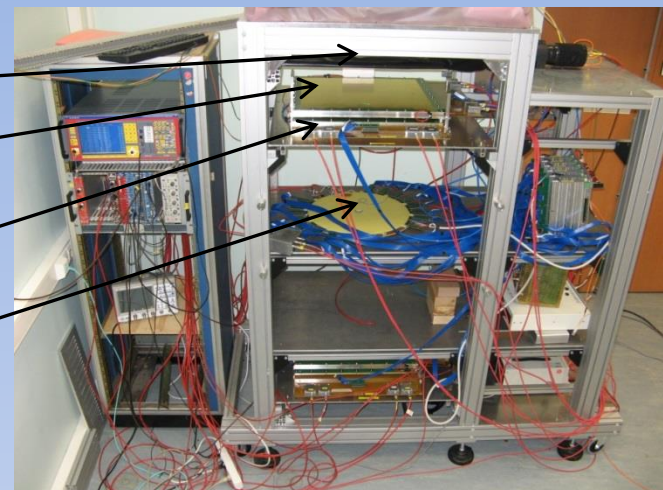
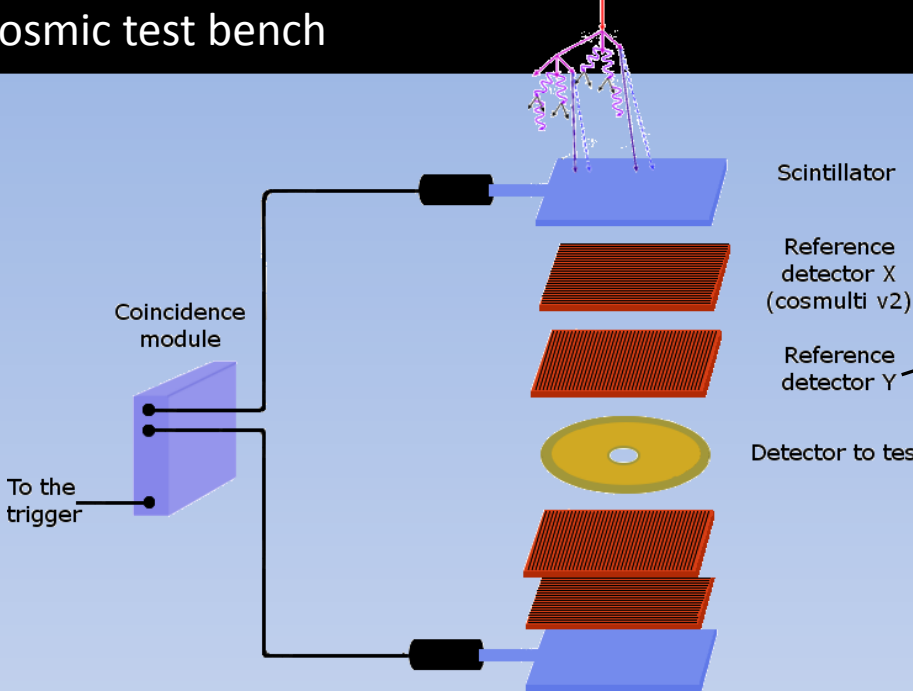
Prototype by CERN

Strip resistivity for the CERN prototype

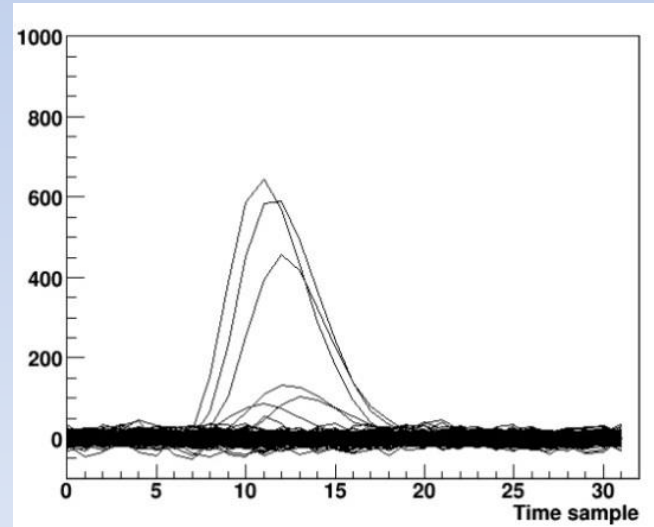
The resistivity was measured in more than 400 points on a non-bulked PCB

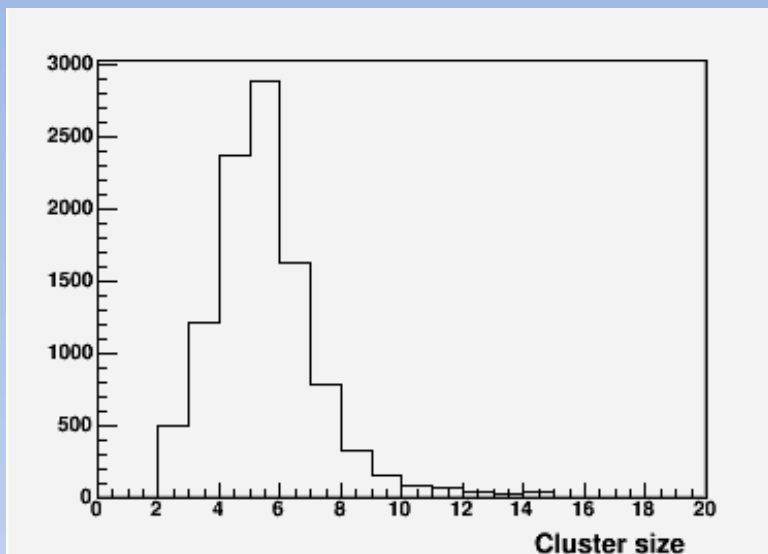


Cosmic test bench

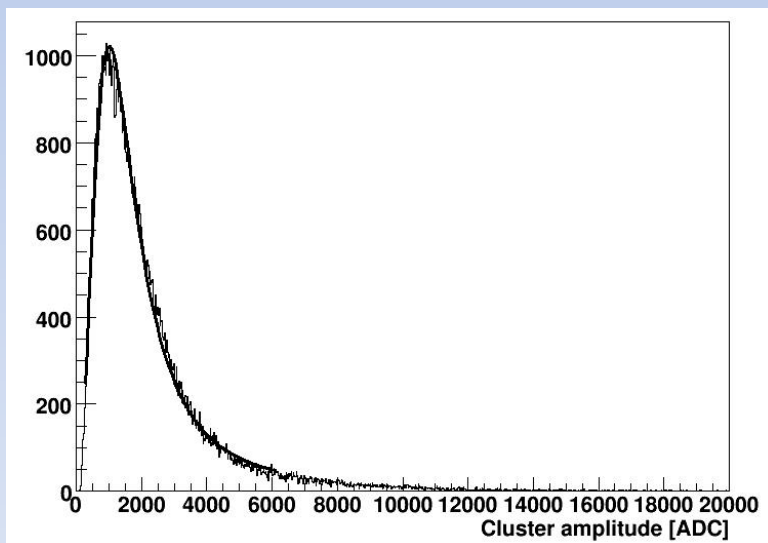


- The two forward prototypes have been tested
- For both, more than 500,000 triggers have been recorded
- For each trigger, when a cluster is reconstructed in all the reference detectors, the track is interpolated to the prototype
- The position interpolated is then compared to the cluster reconstructed in the detector under test

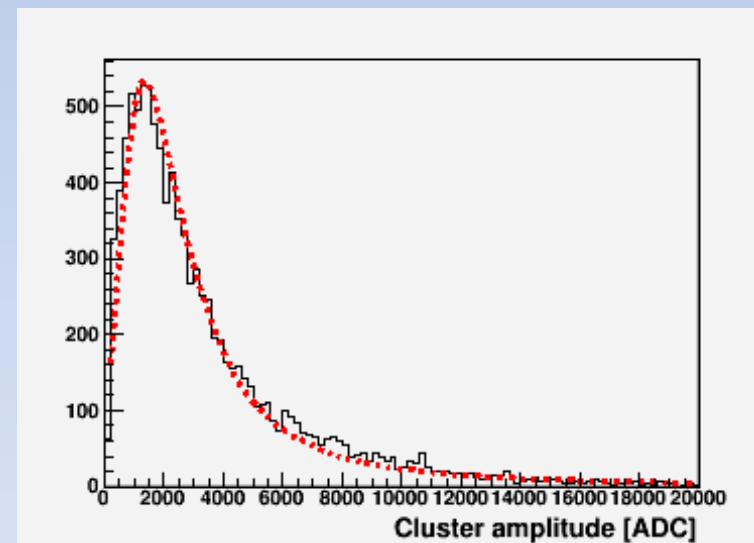




- No leakage current after one day
- Excellent S/N ratio
- Other variables consistent with standard Micromegas

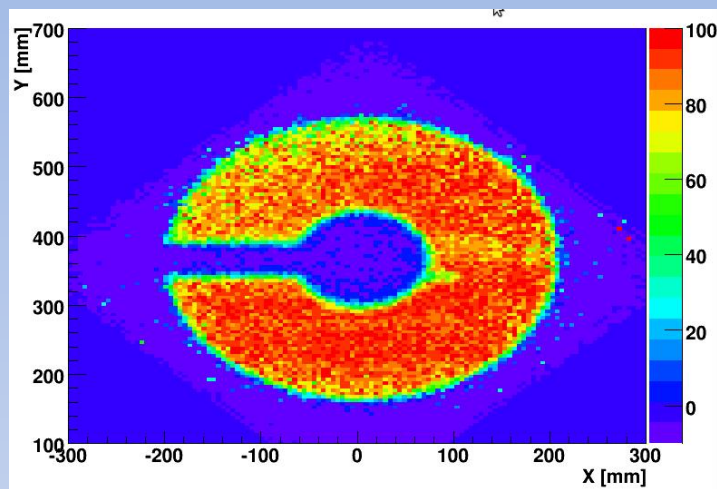


$\langle S/N \rangle \sim 140$ at $V_{\text{mesh}} = 450$ V



$\langle S/N \rangle \sim 150$ at $V_{\text{mesh}} = 460$ V

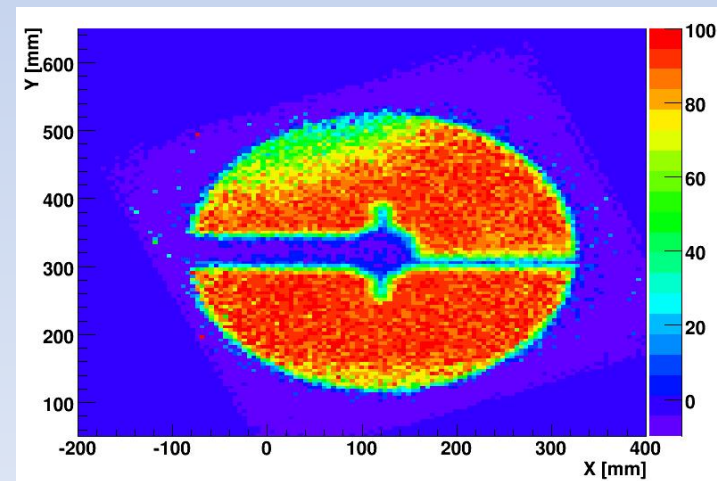
Prototype by ELVIA



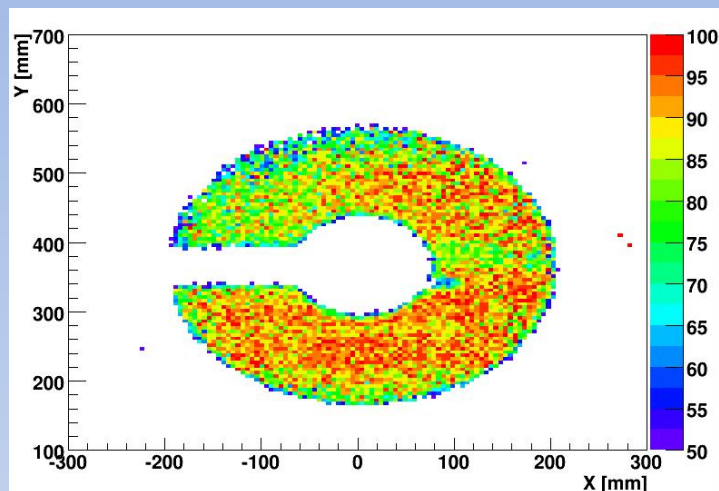
- Central zone not connected (forget hole in the drift)
- Lower efficiency on the top left part of the detector

Prototype by CERN

- Excellent efficiency on almost all the detector
- Low efficiency on the top left part of the detector



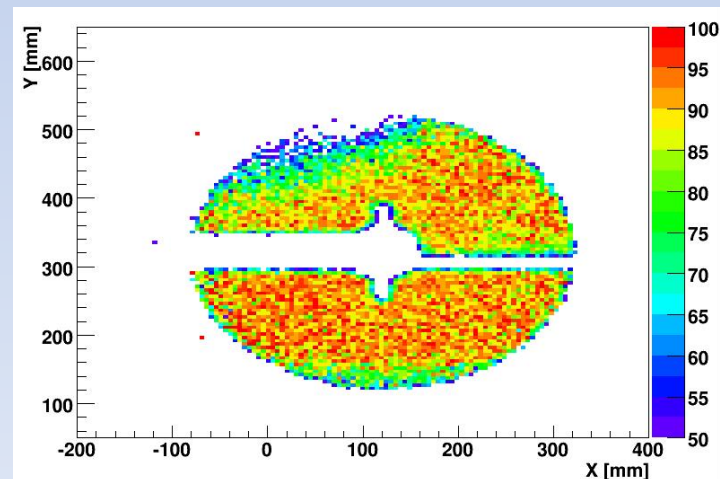
Prototype by ELVIA



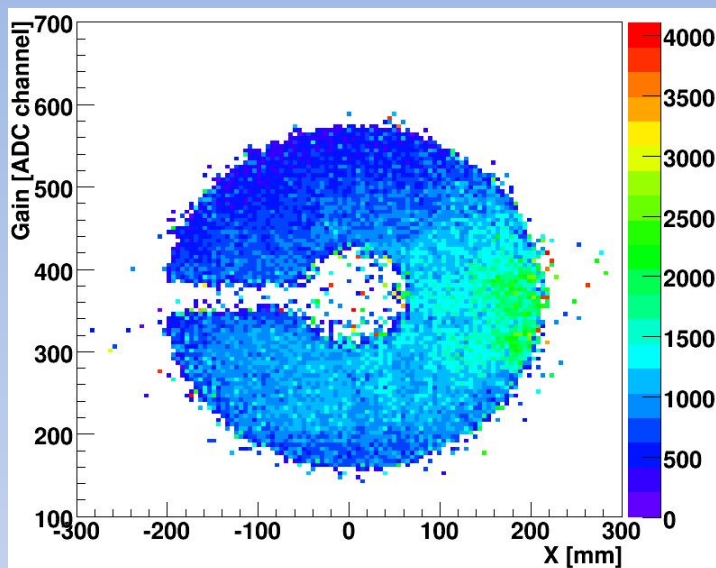
- Central zone not connected (forget hole in the drift)
- Lower efficiency on the top left part of the detector
- Efficiency around 90%

Prototype by CERN

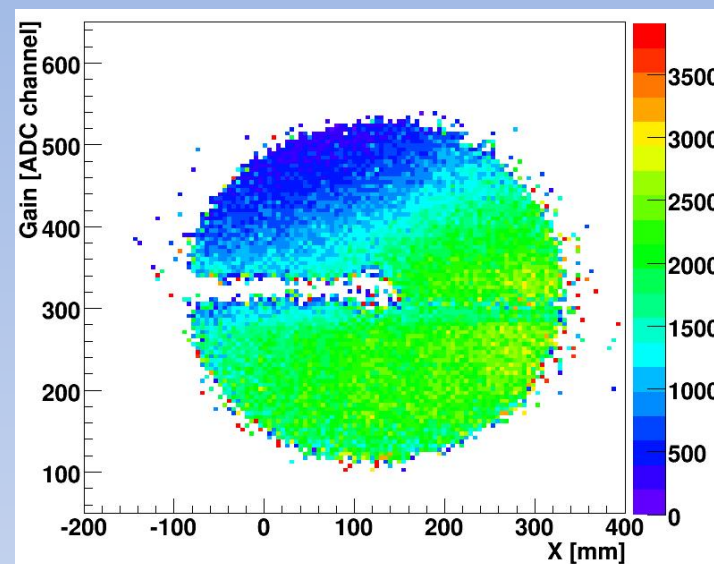
- Excellent efficiency on almost all the detector
- Low efficiency on the top left part of the detector
- Efficiency better than 90% almost everywhere



ELVIA



CERN



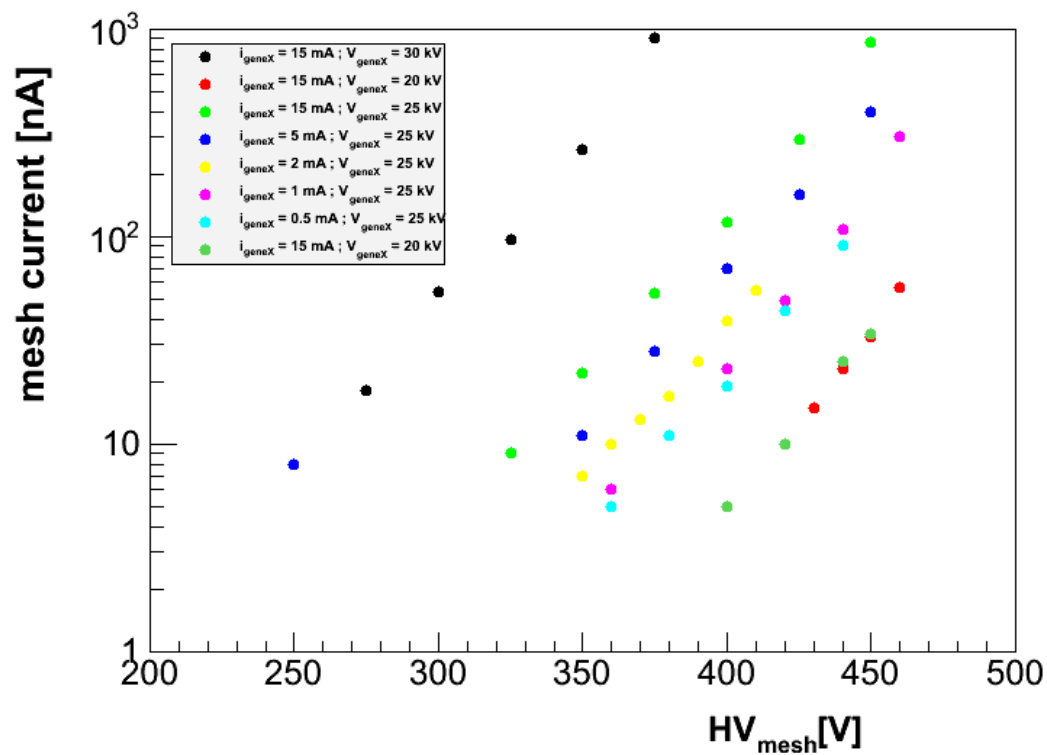
Same
fields for
both
detectors



Amplification gaps are different.

- The two detectors have lower gain both at the same position
- Just a coincidence ? A gas leak ? Switch gas entrance and exit to check
- About gas circulation : the design will be soon finalized, simulations by finite elements are ongoing

Courtesy : C. Lahonde-Hamdoun and S. Procureur



Preliminary conclusion : there is no saturation at 1 MHz per cm².

Large size resistive MM by CIREA

- Production without problem
- Prototype tested in cosmic bench and under X rays
- Normal behavior under cosmic rays : no leakage current

First results on performances

- Very good efficiency
- No sign of saturation yet with X-rays
- Next CLAS12 resistive may have lower resistivity

Next steps with ELVIA

- Test of forward prototypes of resistive MM made by serigraphy by ELVIA
- Test of small ($6 \times 10 \text{ cm}^2$ active area) prototypes with buried resistors for COMPASS
- Large size ($40 \times 40 \text{ cm}^2$) non-simplified prototype for COMPASS

500 μm

