# PICMIC status

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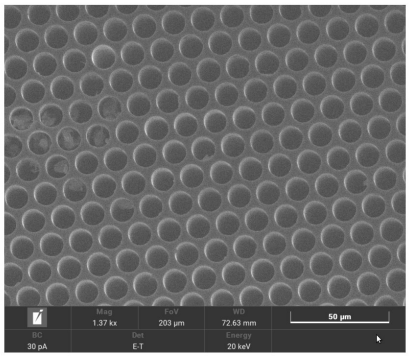
# Detection concept

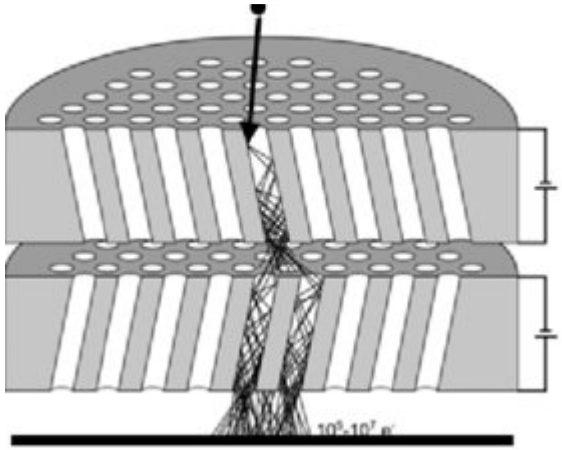
The electron avalanche produced in the MCPs is detected by :

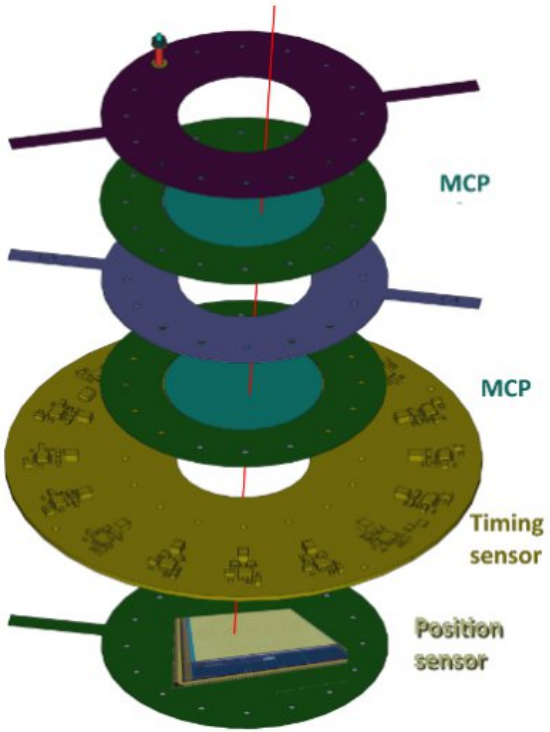
- a transparent grid that is connected on its periphery to timing sensors

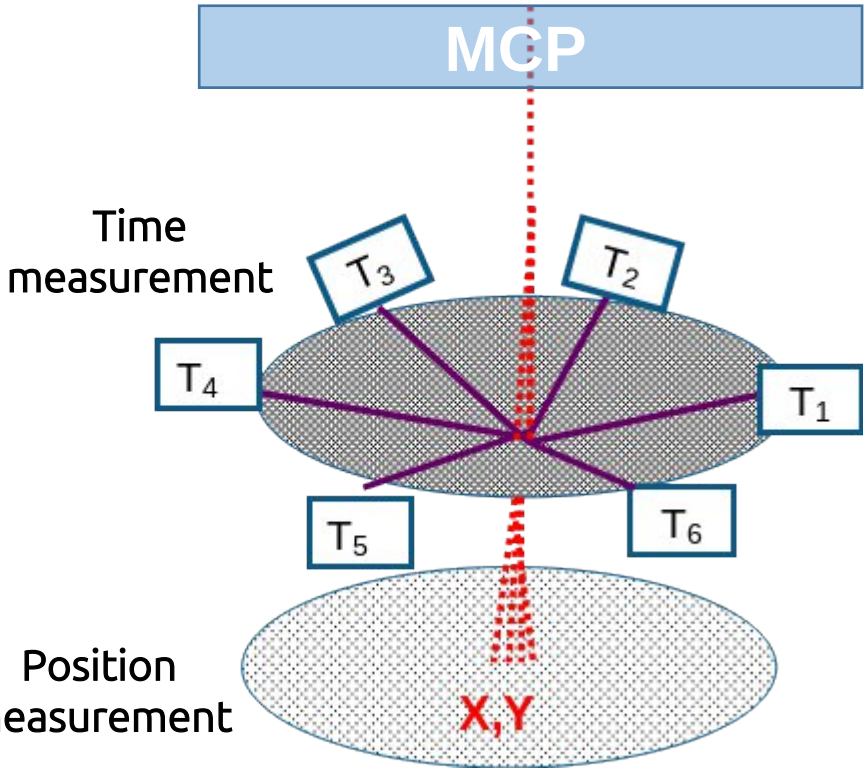
- a detection matrix with micrometer pixels (the PICMIC chip)



12 µm holes





# PICMIC-0 chip

- Grid of 5µm hexagonal pixels
- The pixels are interconnected into strips of 3 directions :
  - 0°
  - 60°
  - 120°
- 2556 strips (852 for each direction)
- Active area dimensions :7.4X6.4 $mm^2$

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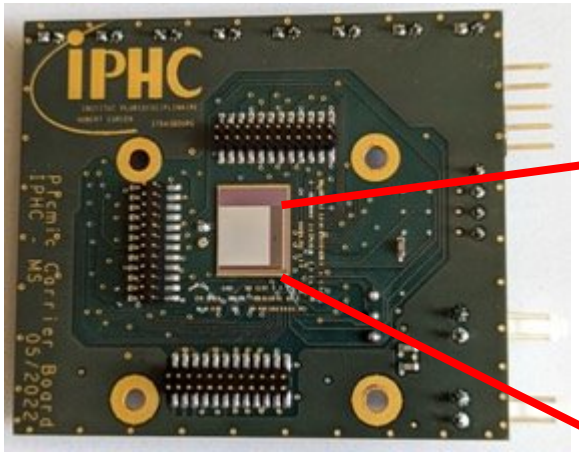
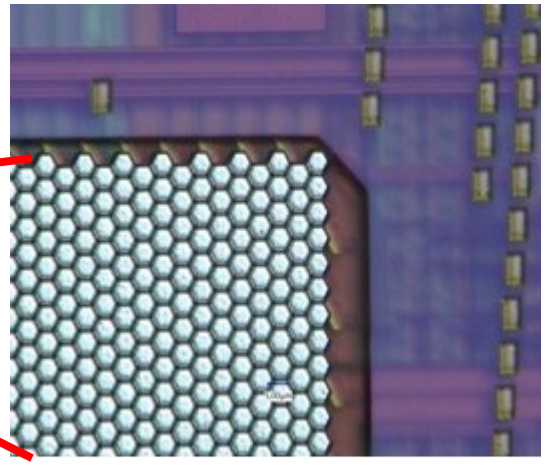
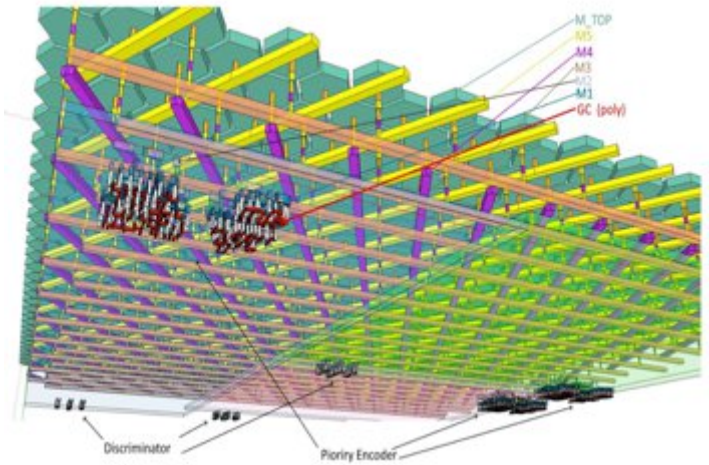
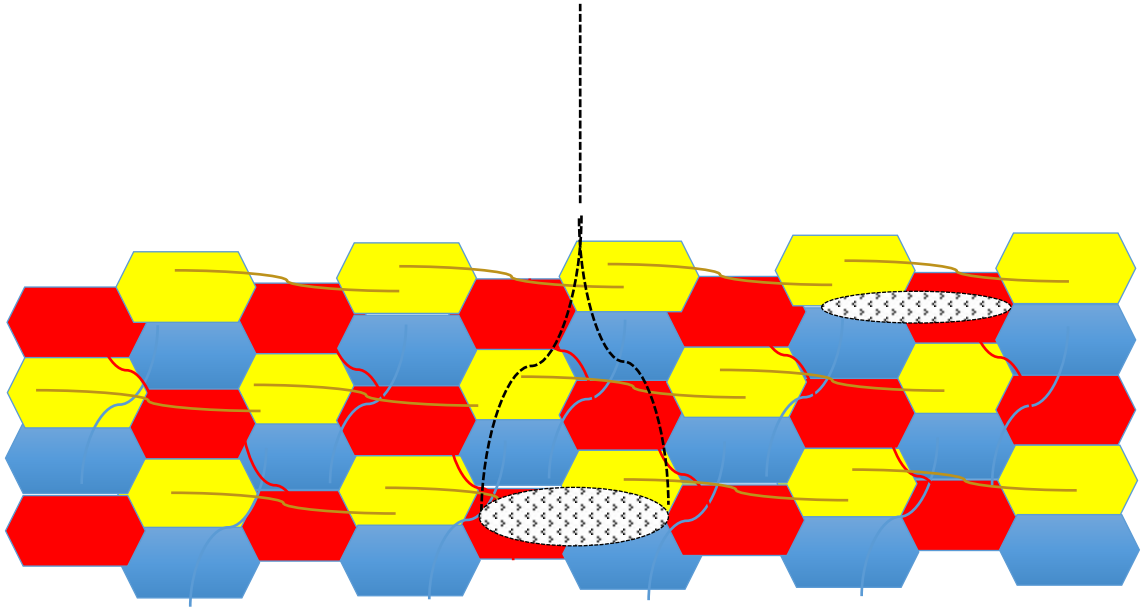
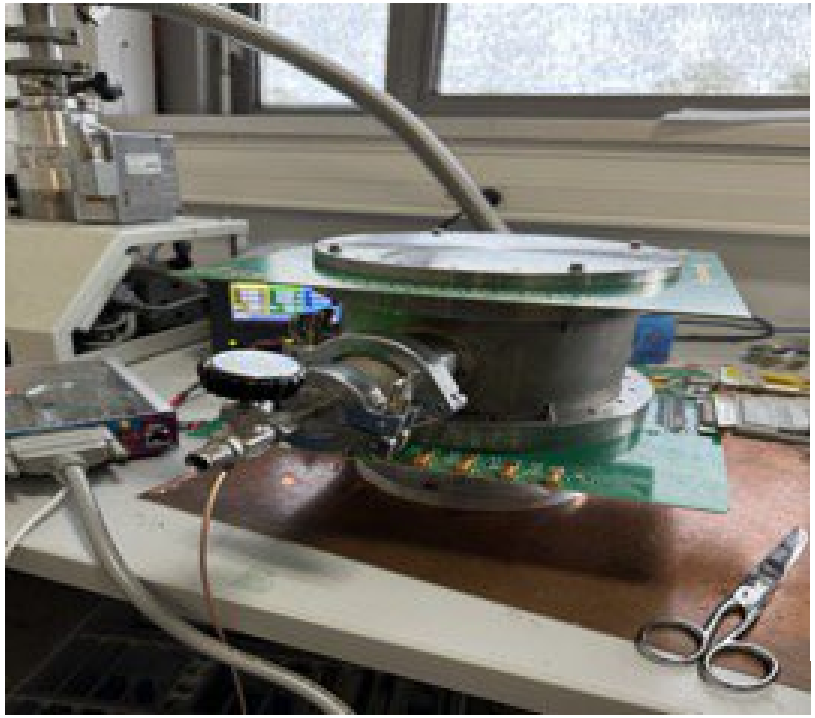


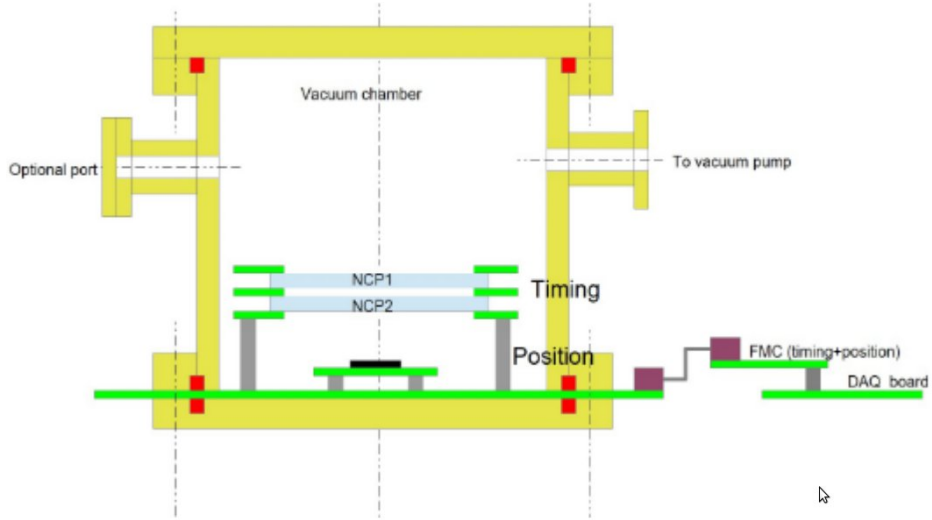



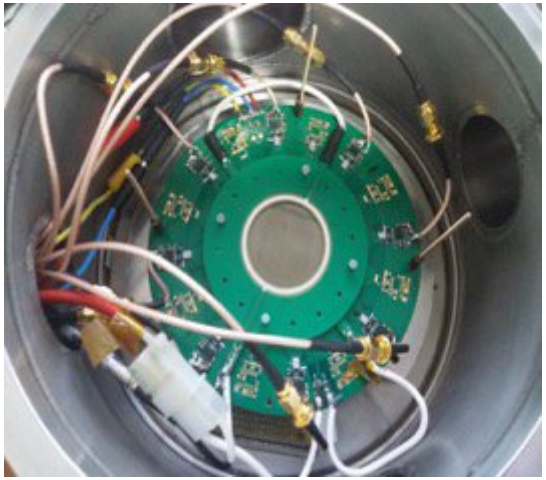


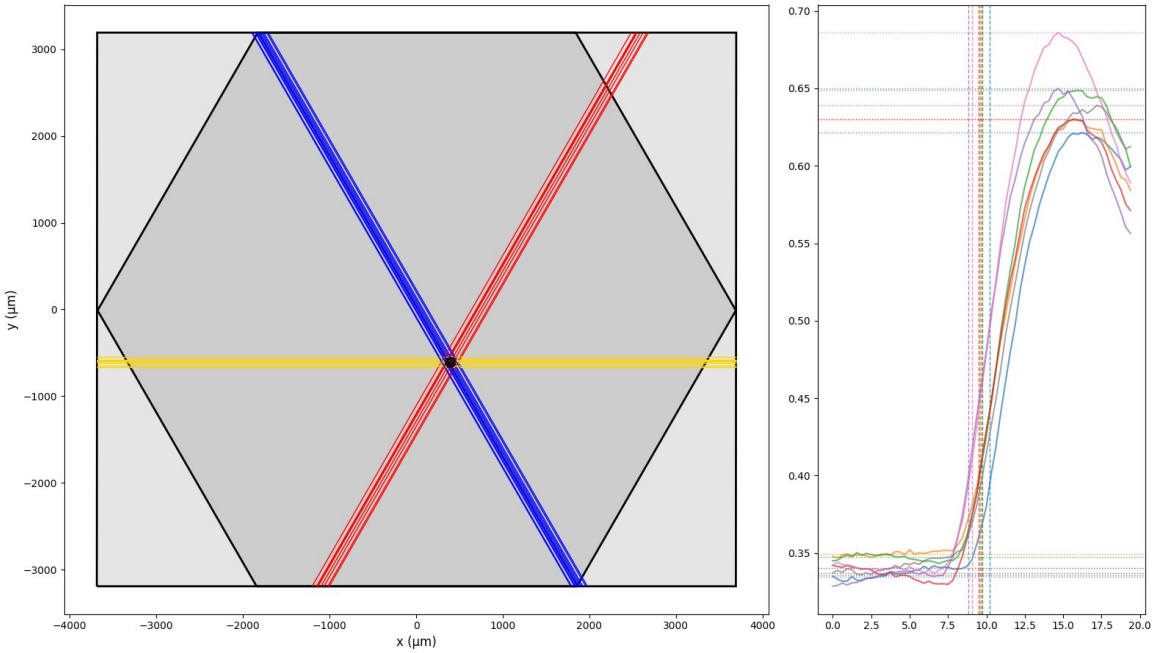
# Setup

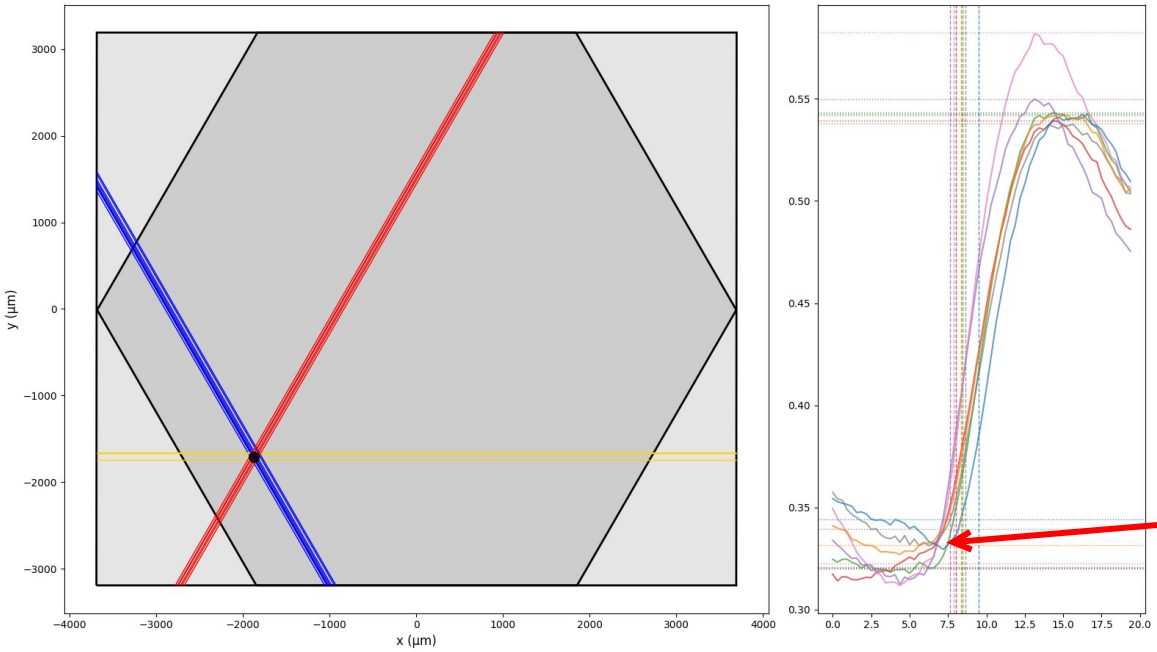



Vacuum chamber
Optional port
To vacuum pump
NCP1
NCP2
Timing
Position
FMC (timing+position)
DAQ board

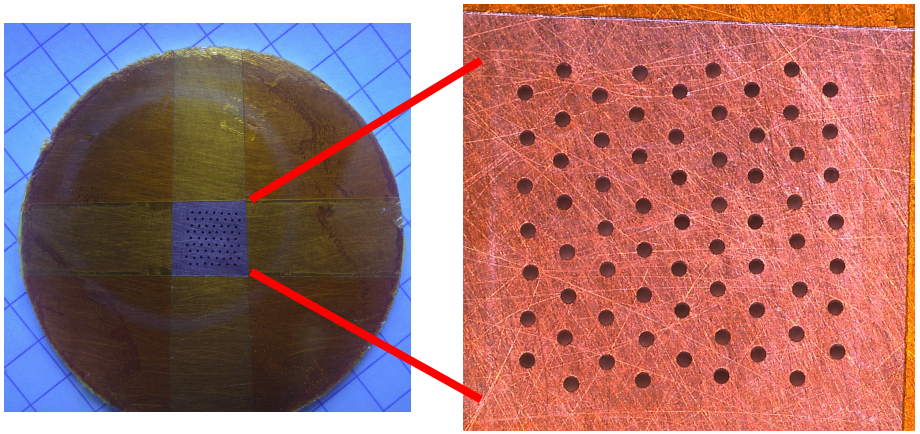


# Event display

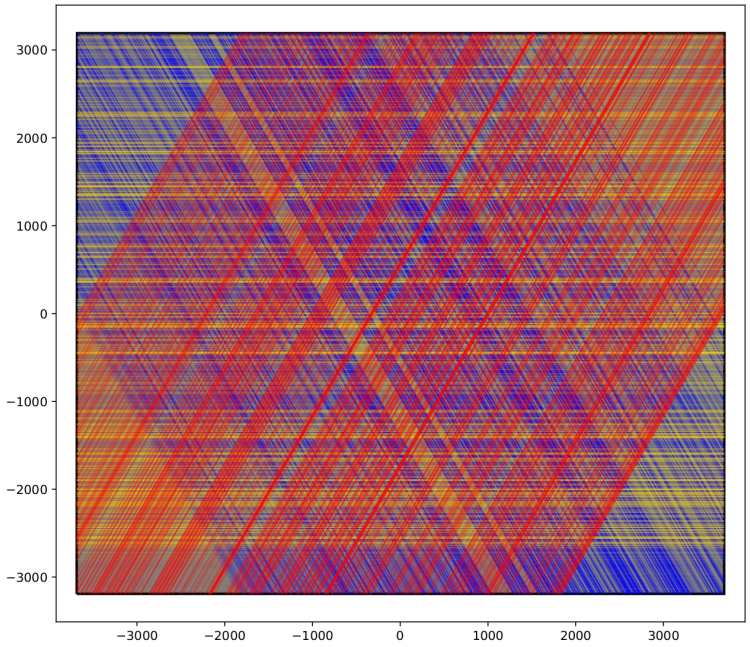


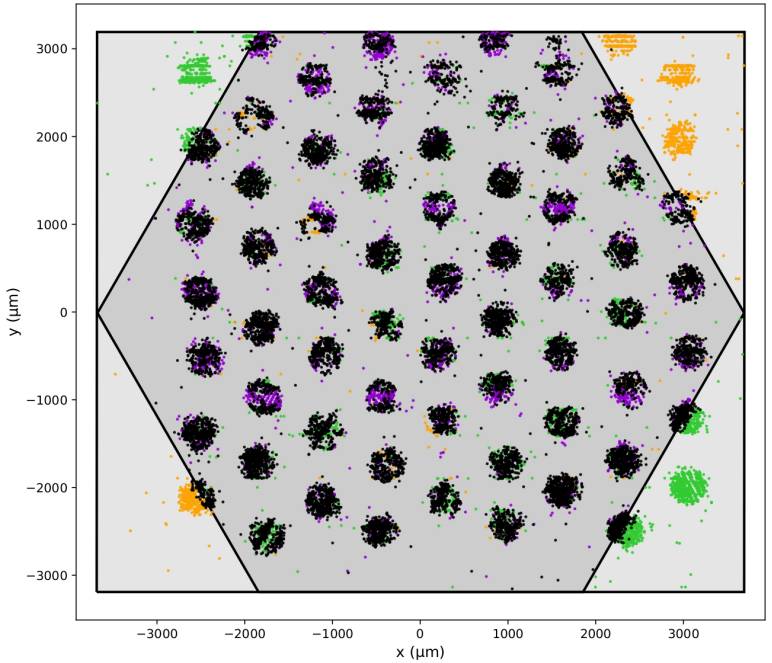

- Bad baseline due to perturbations from the clock of the PICMIC chip
  - can impact time measurement

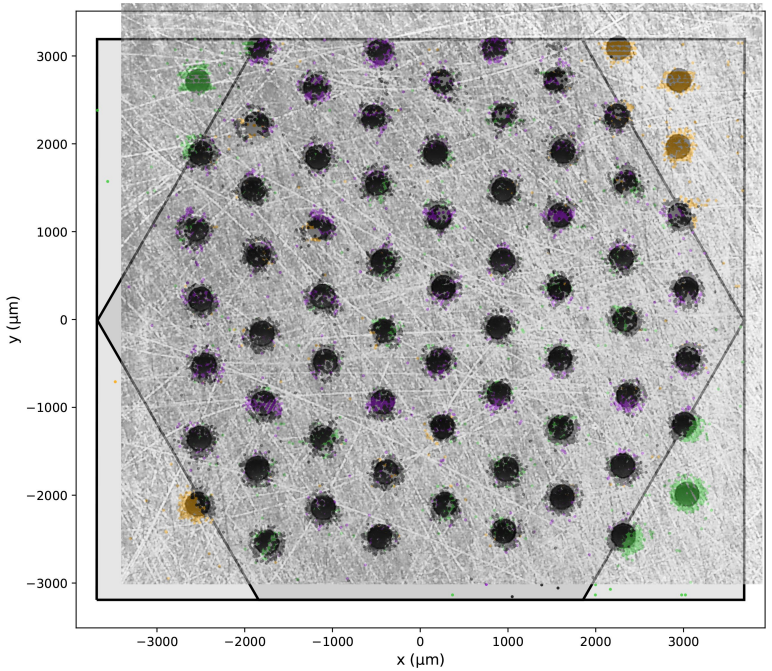


- Grid of 300 µm holes
- Pitch 800 µm



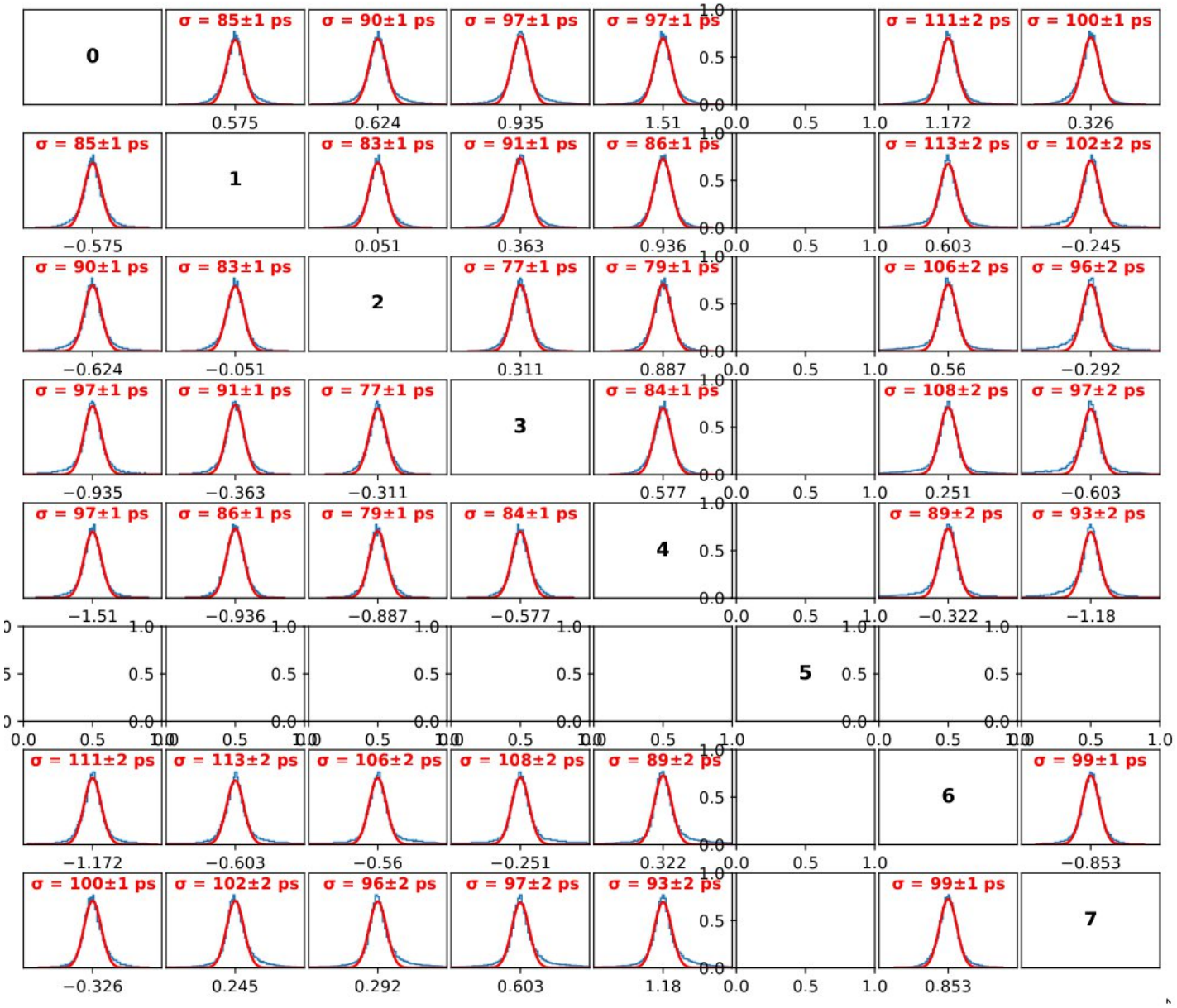

- Some channels are not responding properly due to calibration problems



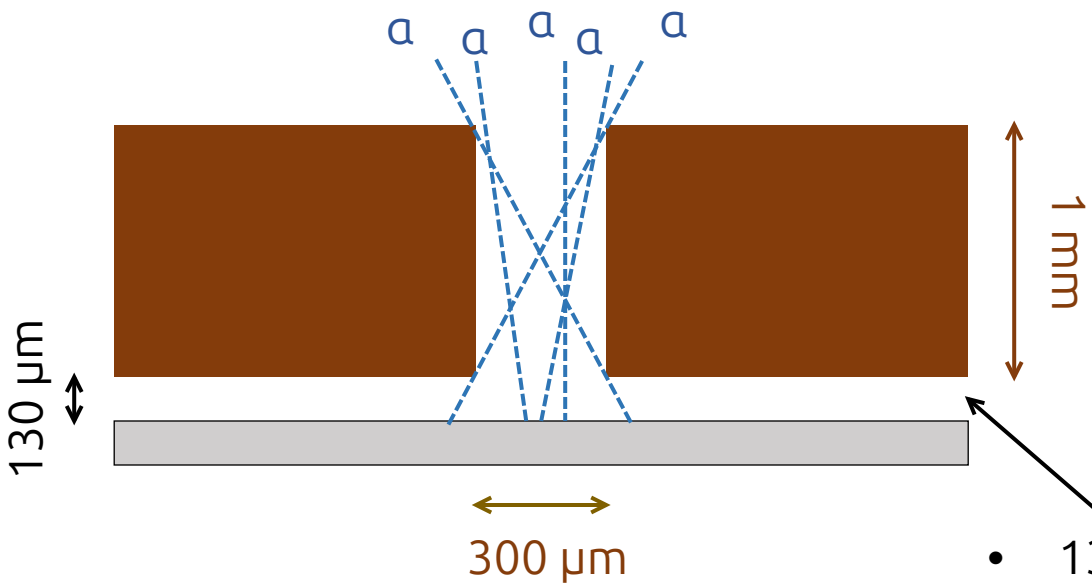



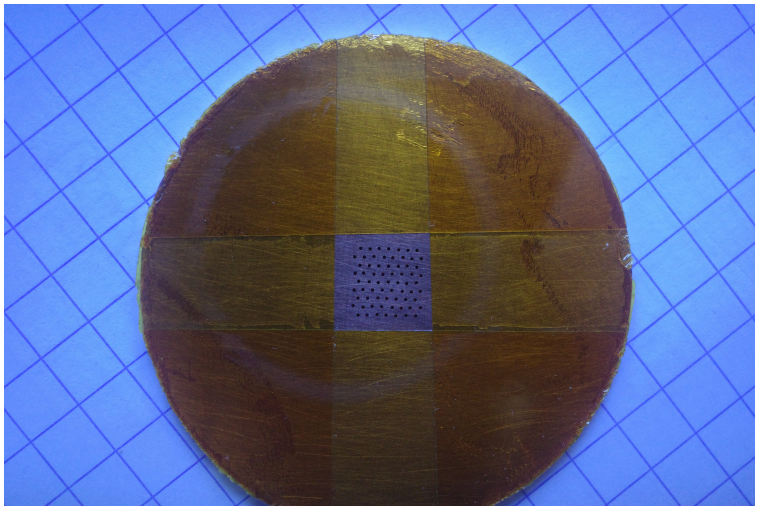
# Time resolution

- $T_i$ - $T_j$ time difference ~ 90ps
- Combining 8 channels we can obtain ~30ps time resolution



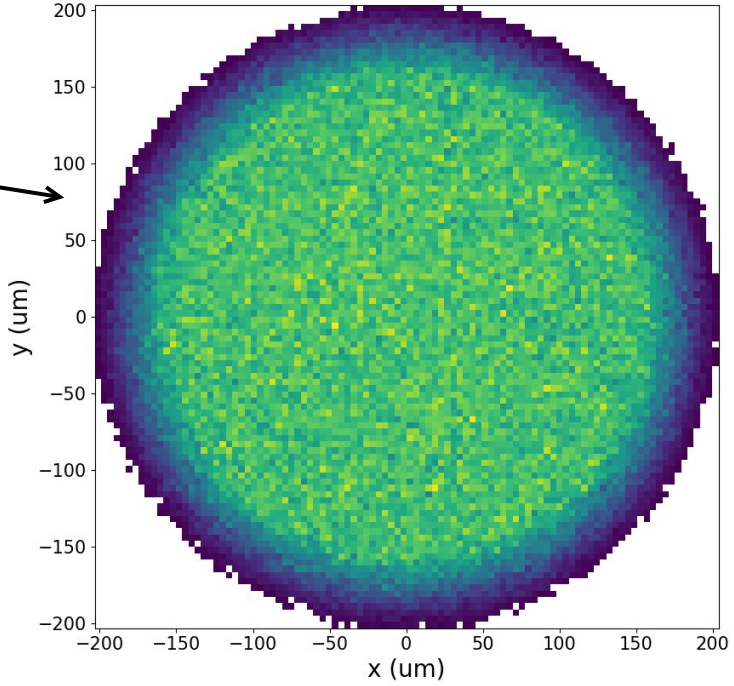
# Spatial resolution



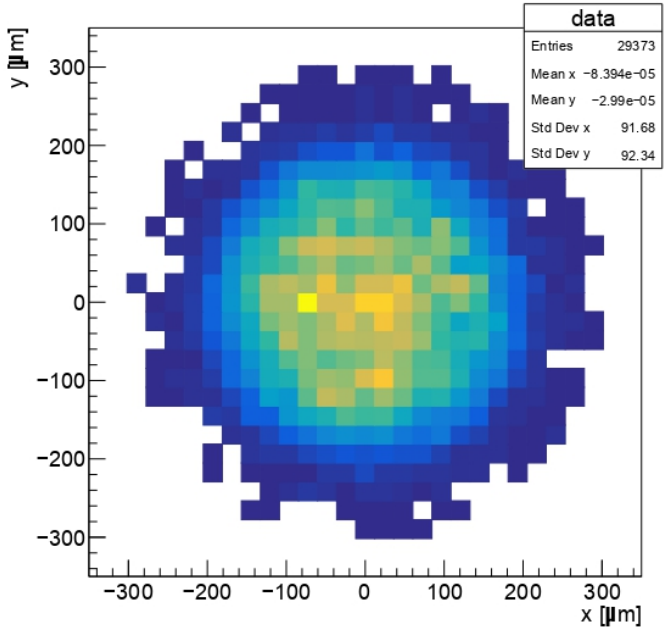



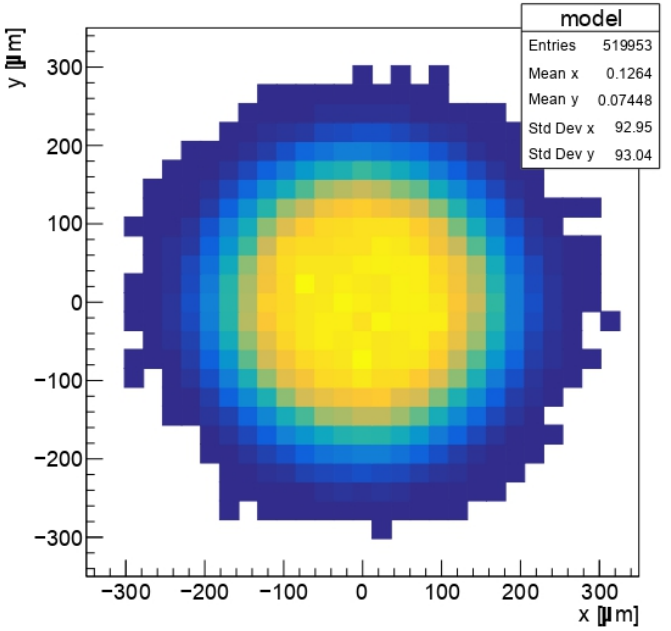
- 130 µm spacing due to kapton layer

- **Model** :
  - Simulate a detector with a perfect precision
  - Then convolute this response by a gaussian of stddev **σ**
    => find the **σ** that best fits the data

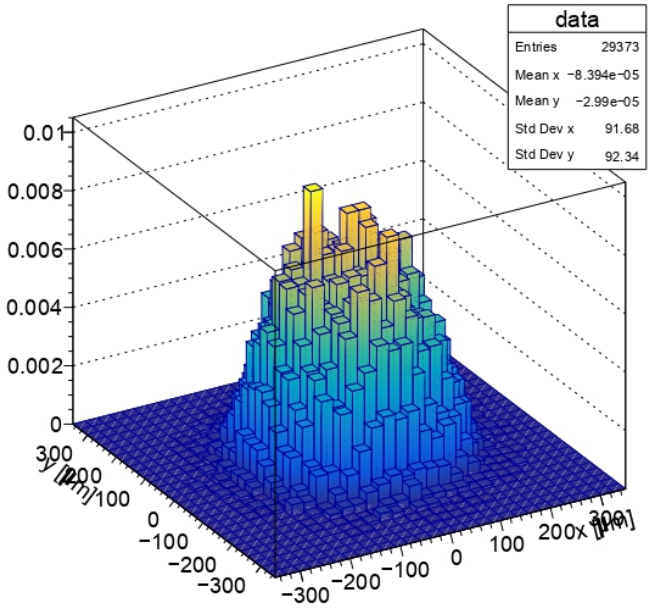


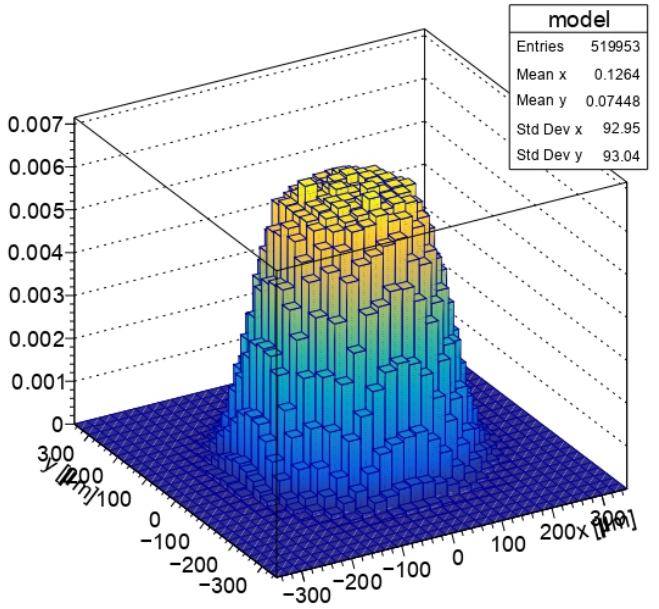
# Spatial resolution




- Best fitting model :
  - σ = 44.7 µm



# Summary

- Current performances :
  - Time resolution ~ 30ps
  - Spatial resolution ~ 45 µm

- Oncoming :
  - Test the spatial resolution of the detector with a scanning electron microscope at ILM (very focused electron beam)