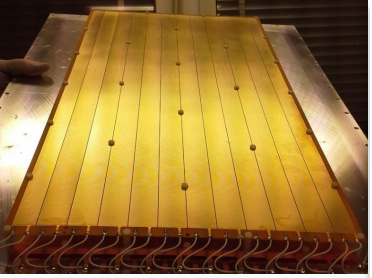

THGEM-based PD test beam

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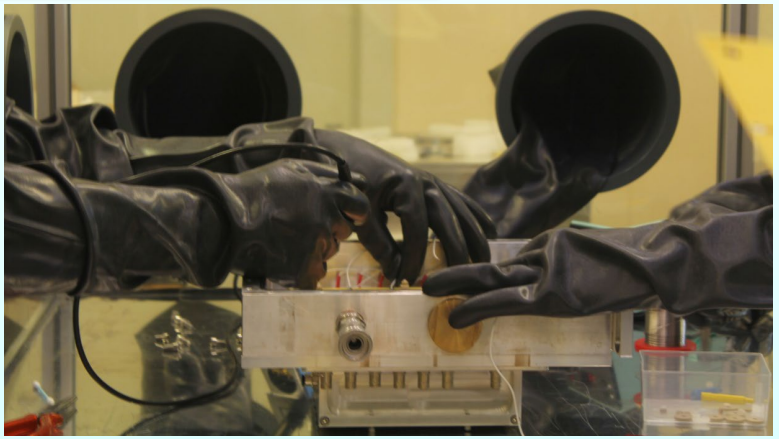
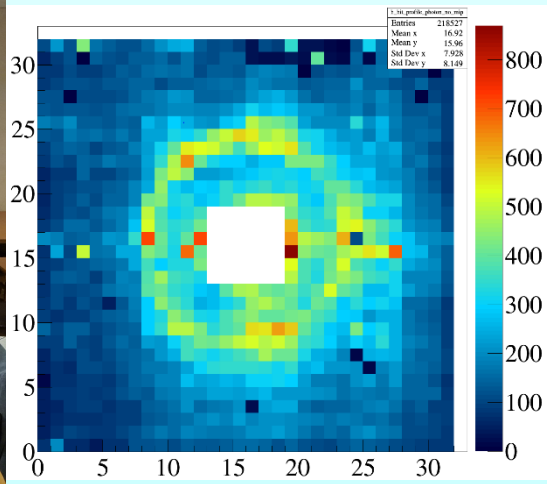
The Test Beam Setup

The Hybrid PD prototypes

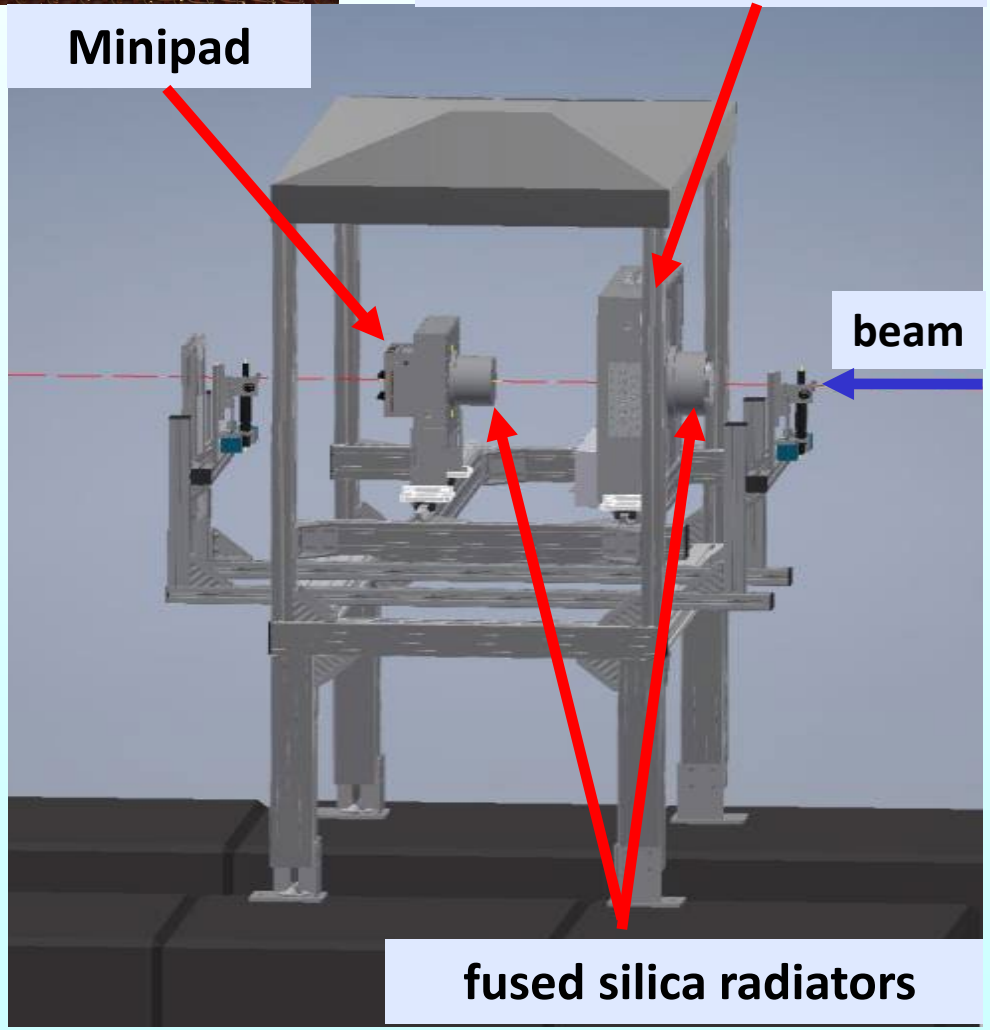
The data taking

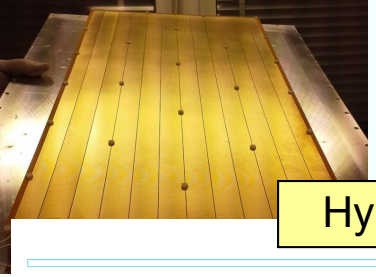
online results





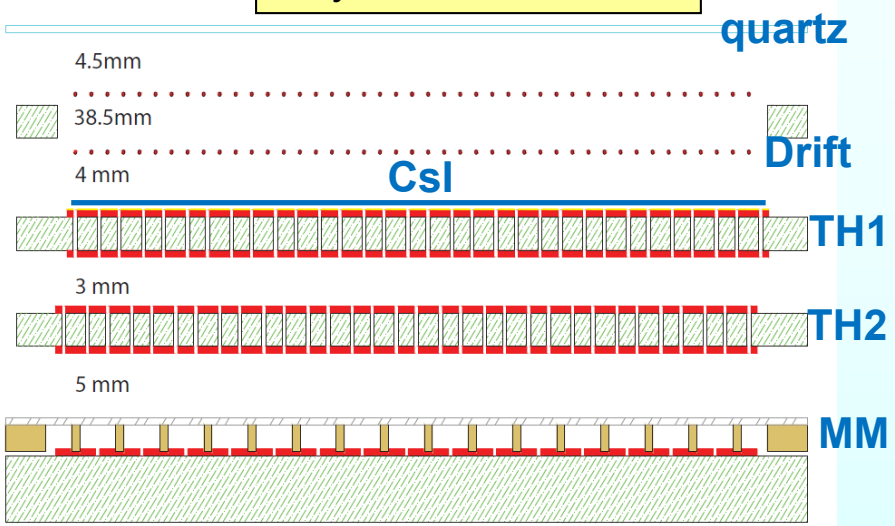
Test Beam Setup



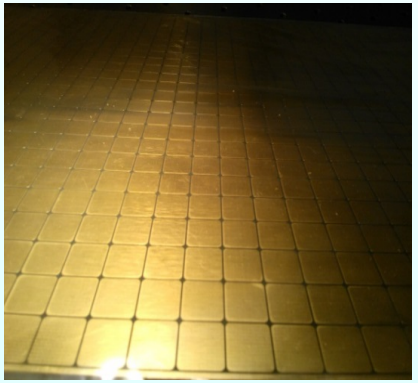


hybrid THGEM+Micromegas PD

Hybrid PD scheme



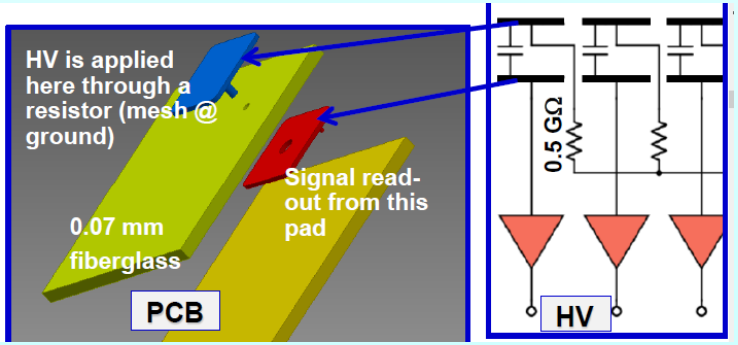
Active area = 300x300 mm^2



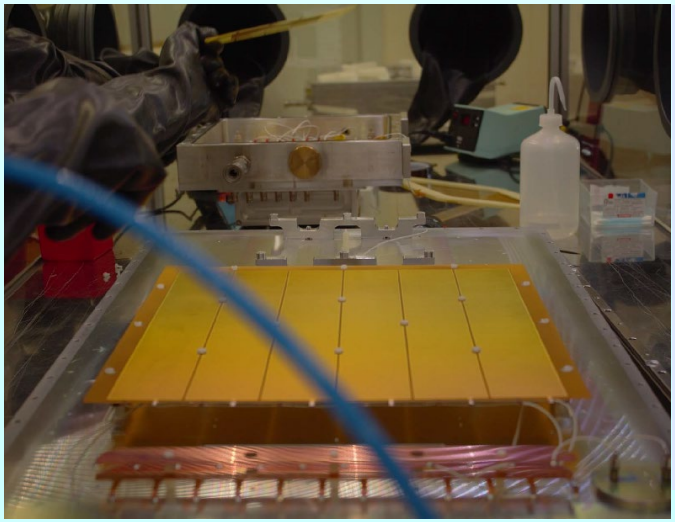
12 mm X 12 mm pads

THGEM parameters:
Thickness = 0.4 mm
Hole diameter = 0.4 mm
Pitch = 0.4 mm
No rim

Standard Bulk Micromegas produced at CERN



Capacitive coupling → APV25 → SRS



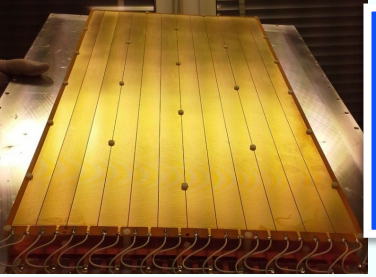
35 micron Cu

6 sectors

Drilling by ELTOS

Polishing in Trieste

Au coating at CERN



The minipad prototype

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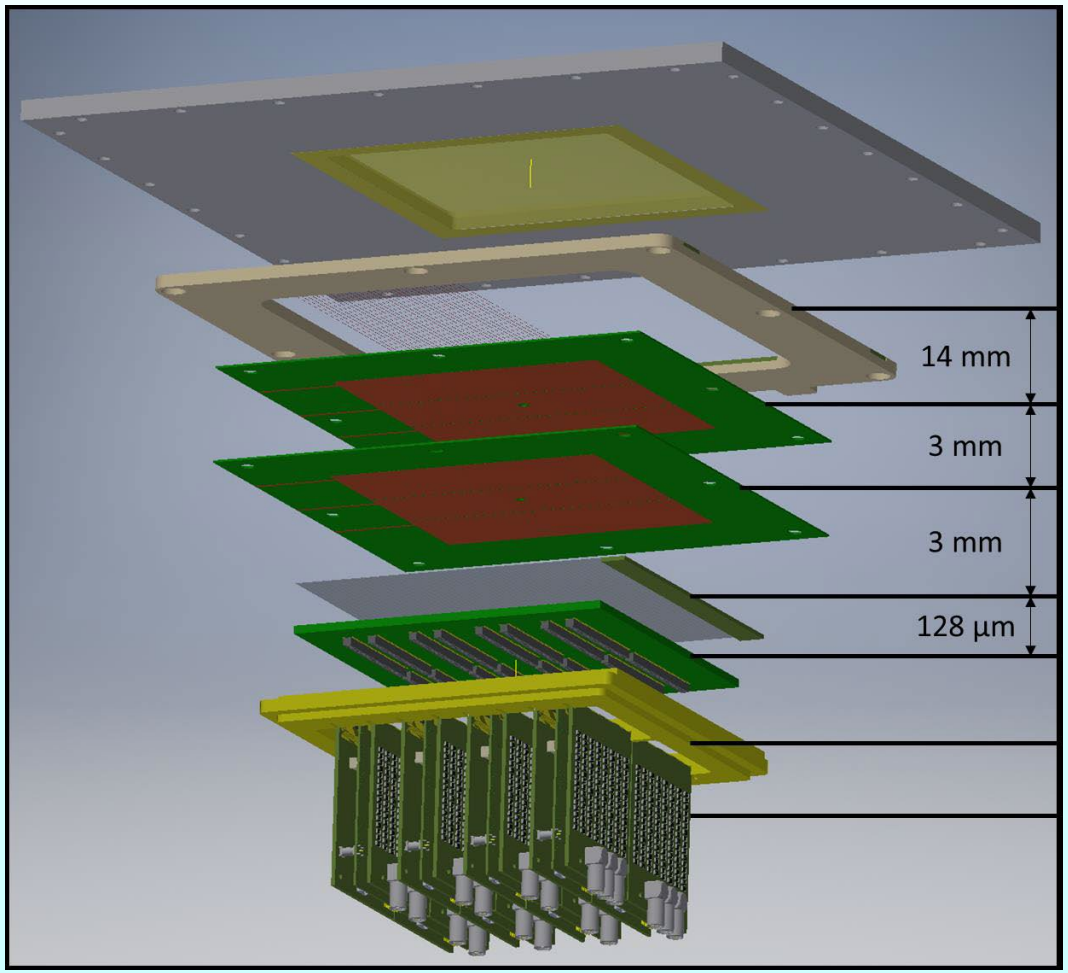
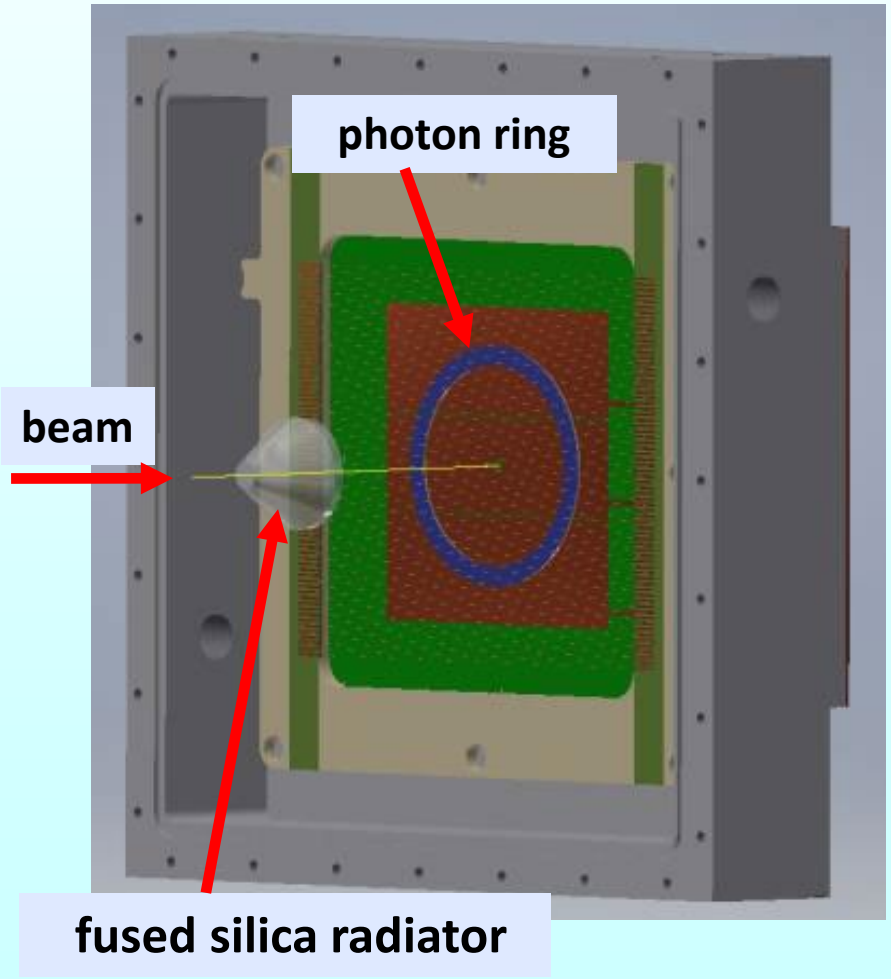
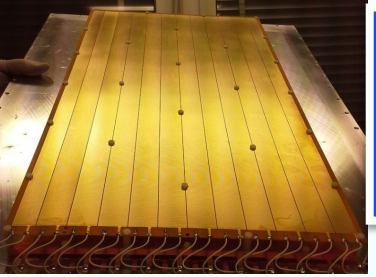
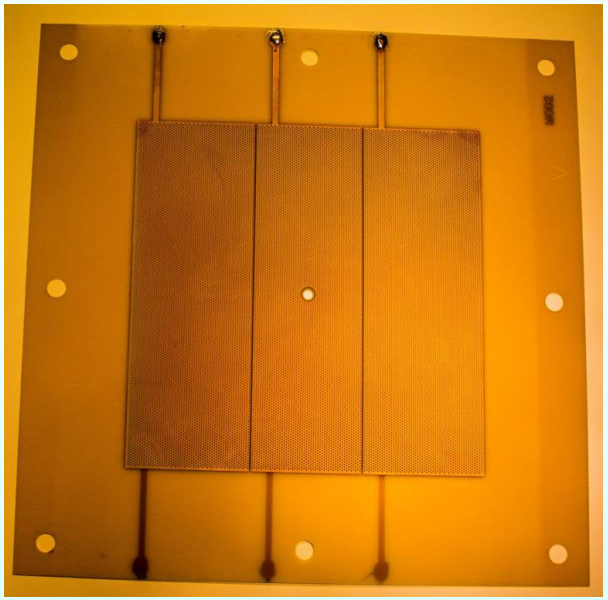
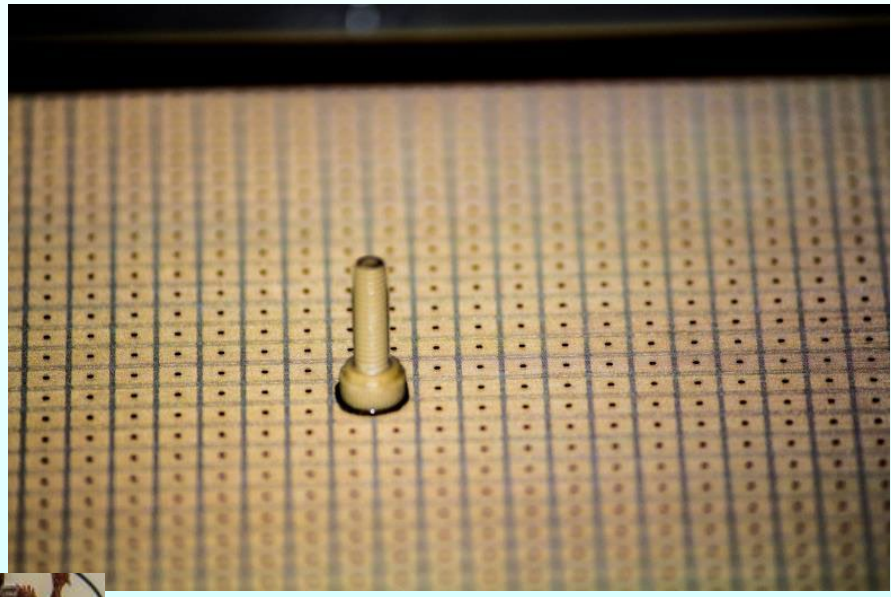


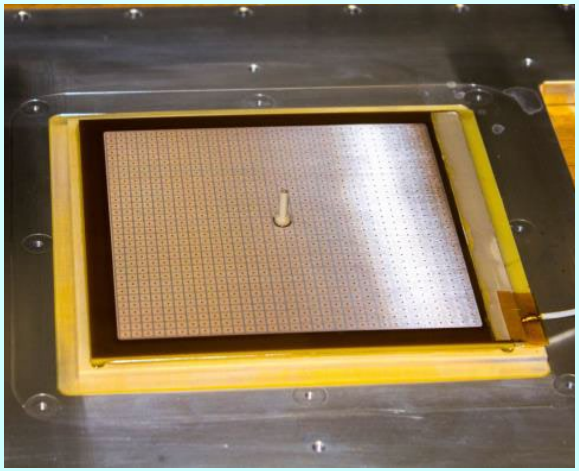


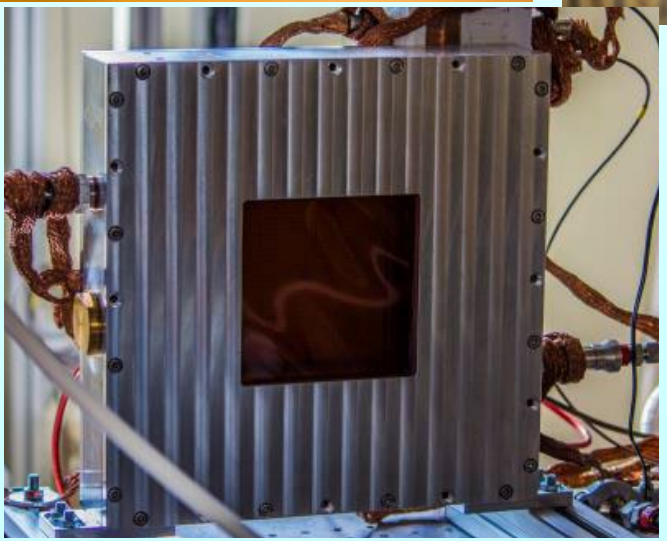
The minipad prototype

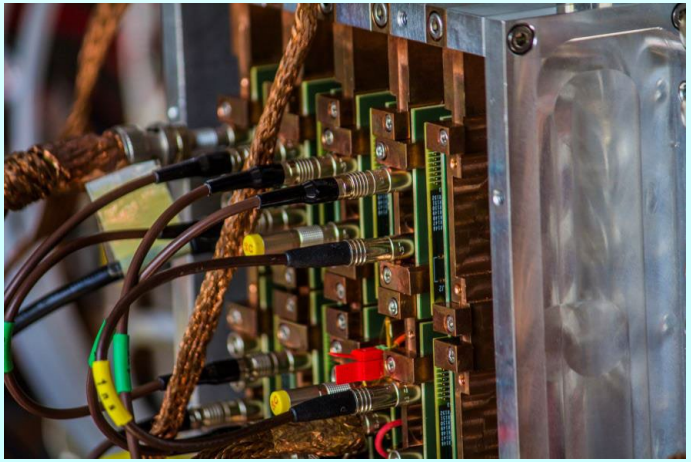


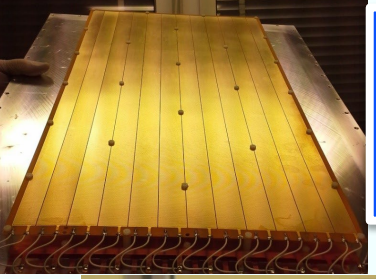












The minipad prototype

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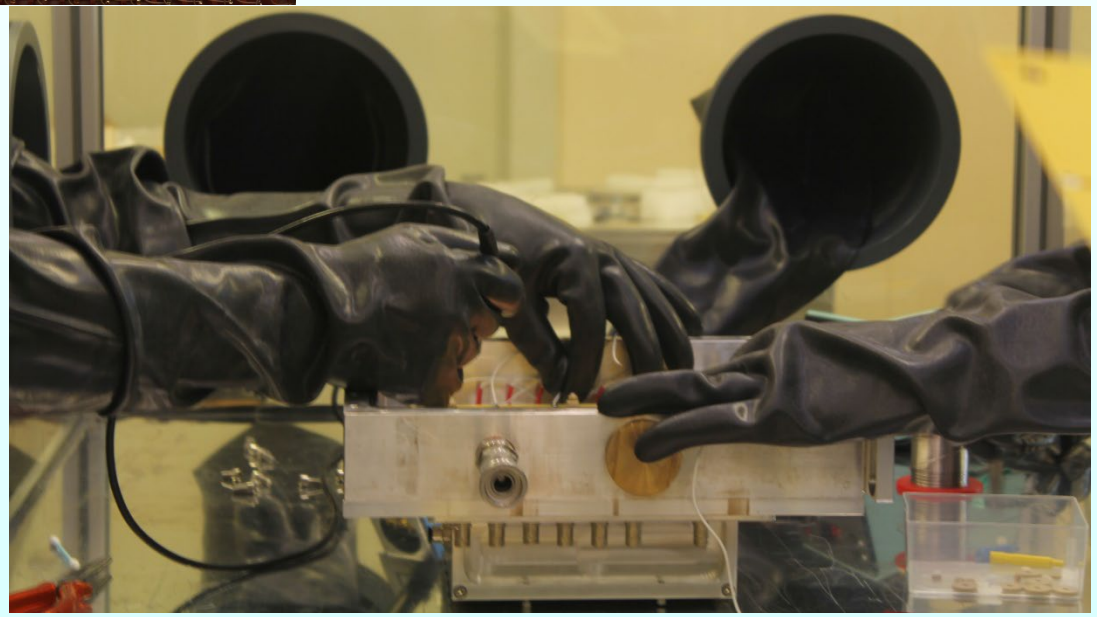
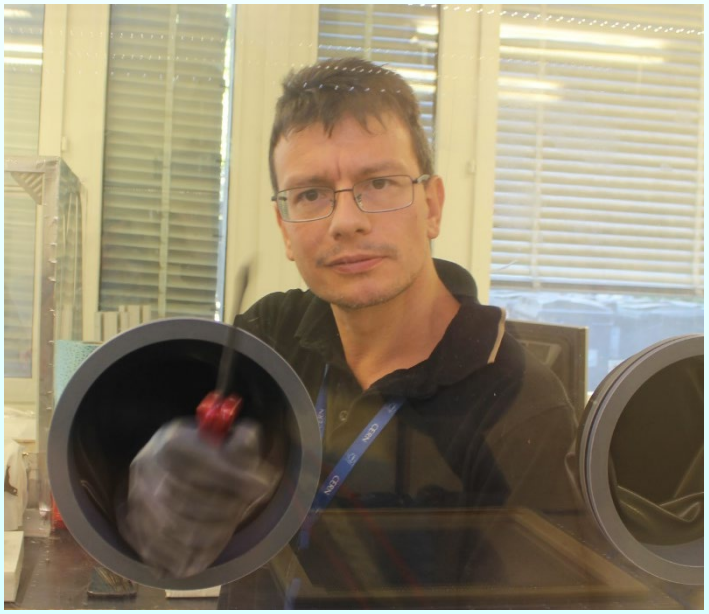
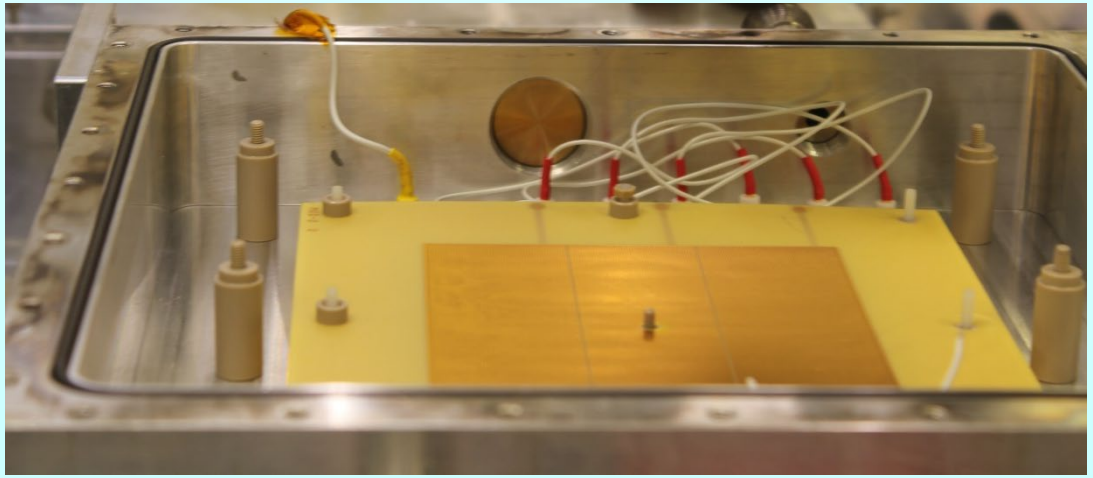
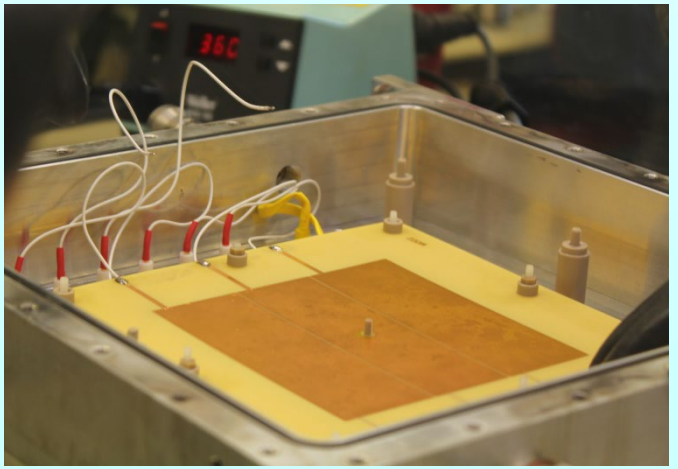
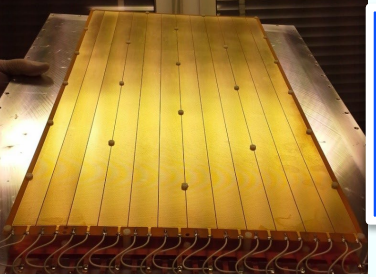




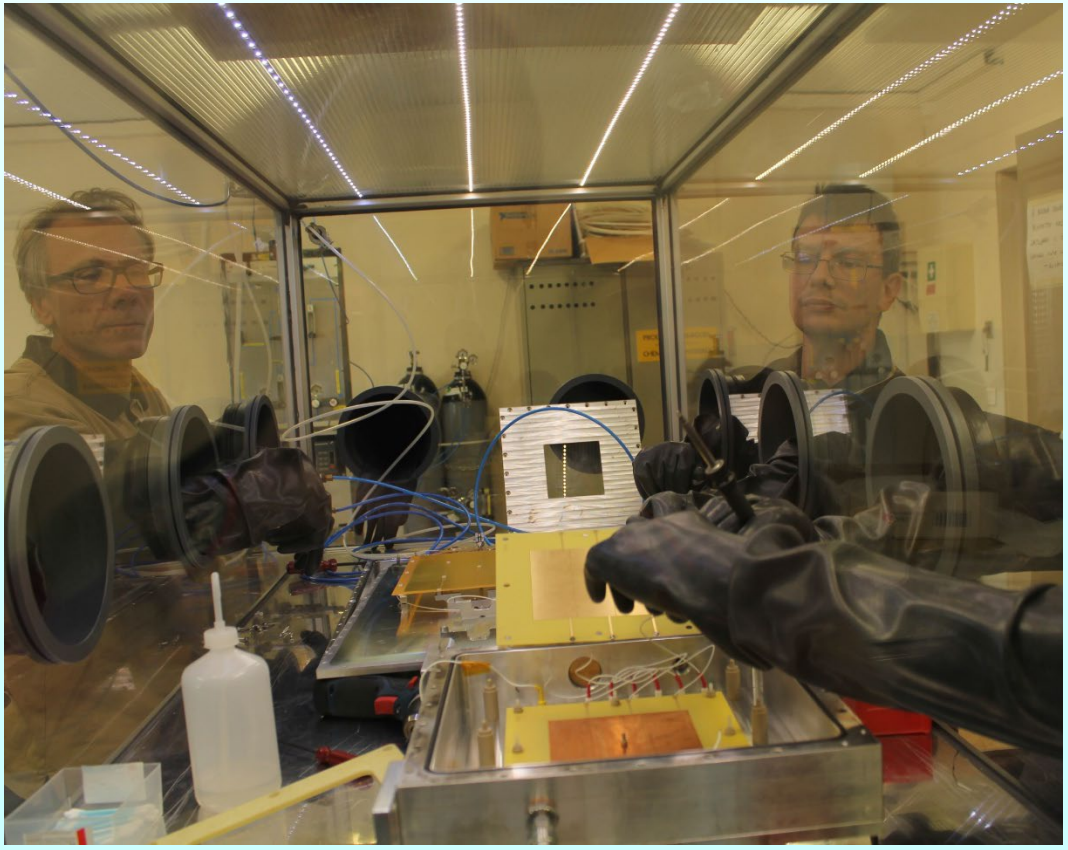


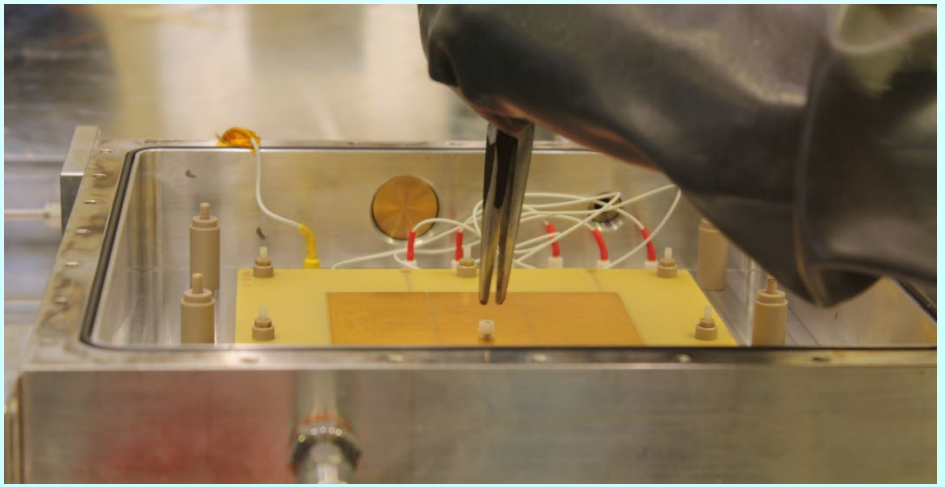


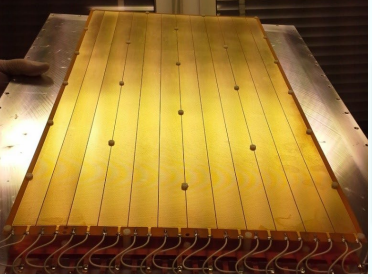


The minipad prototype

Istituto Nazionale di Fisica Nucleare







The 300 x 300 prototype

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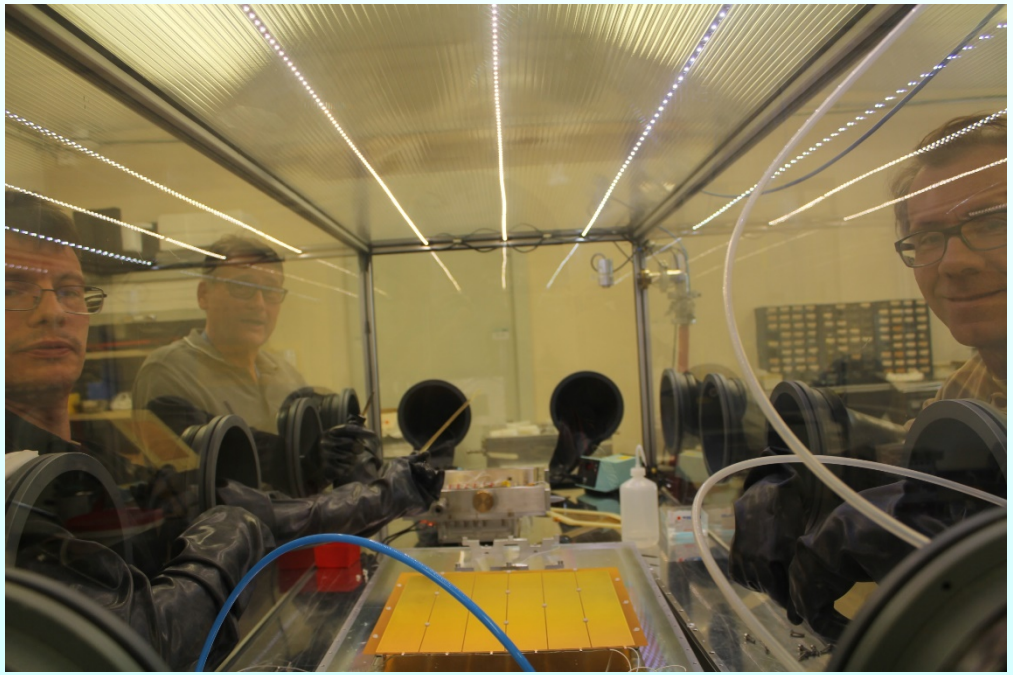
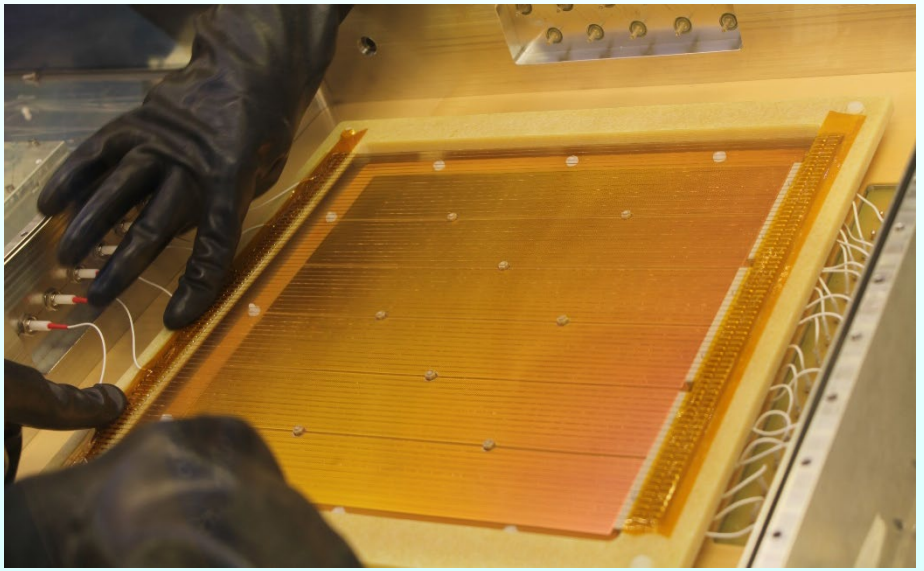
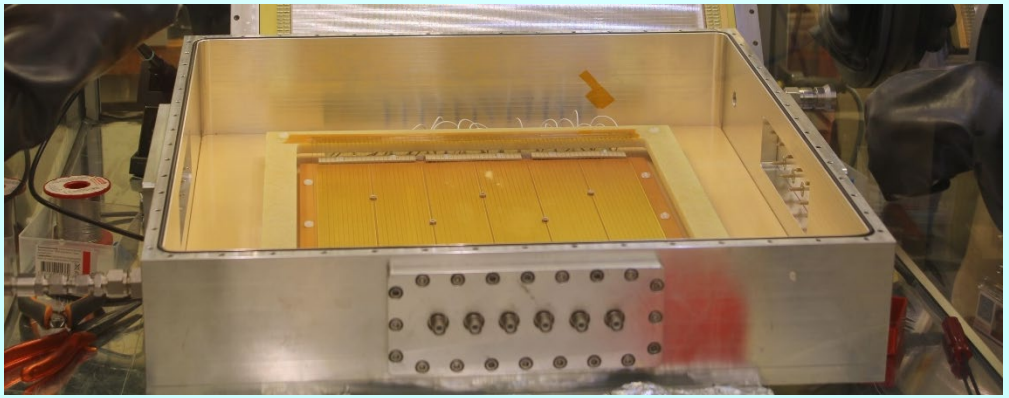
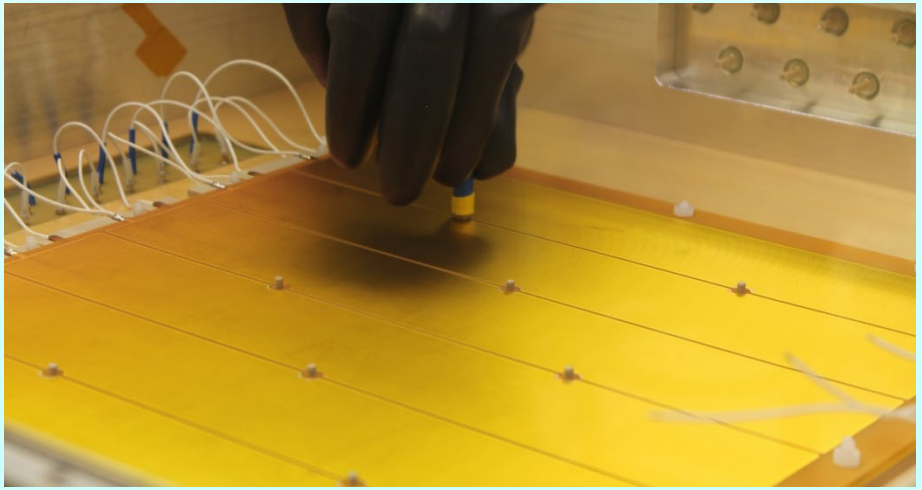
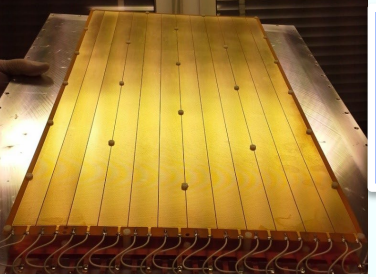


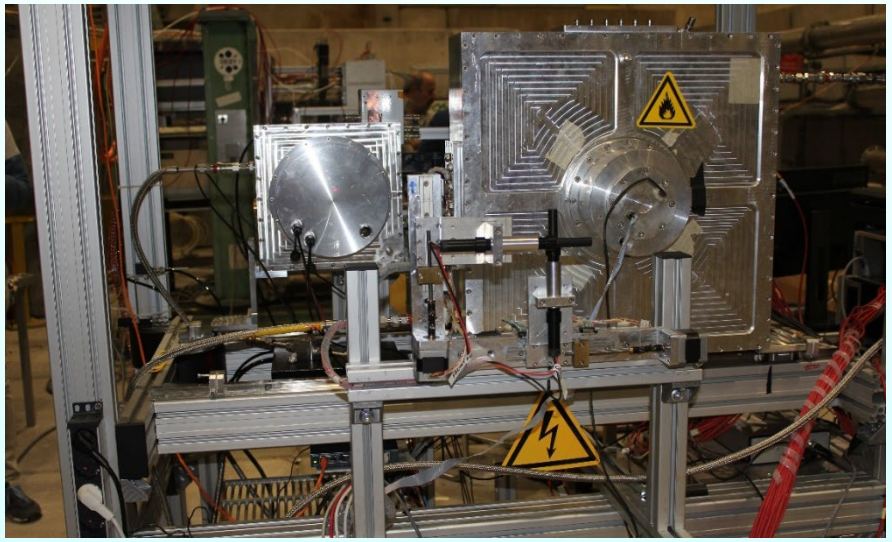


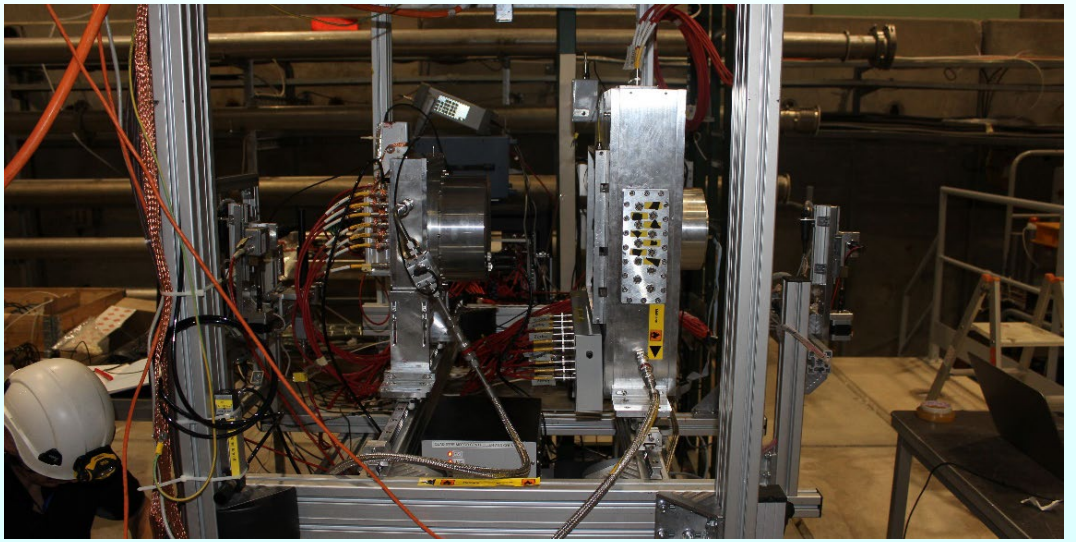


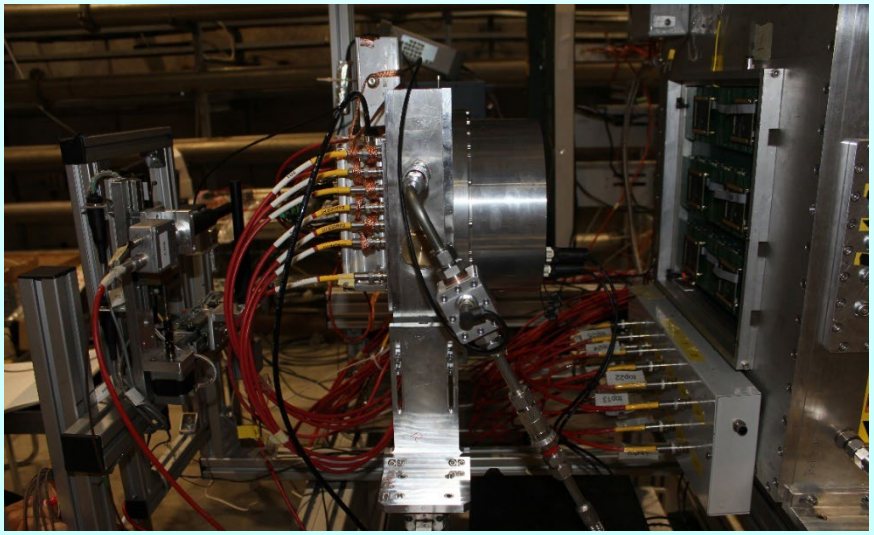


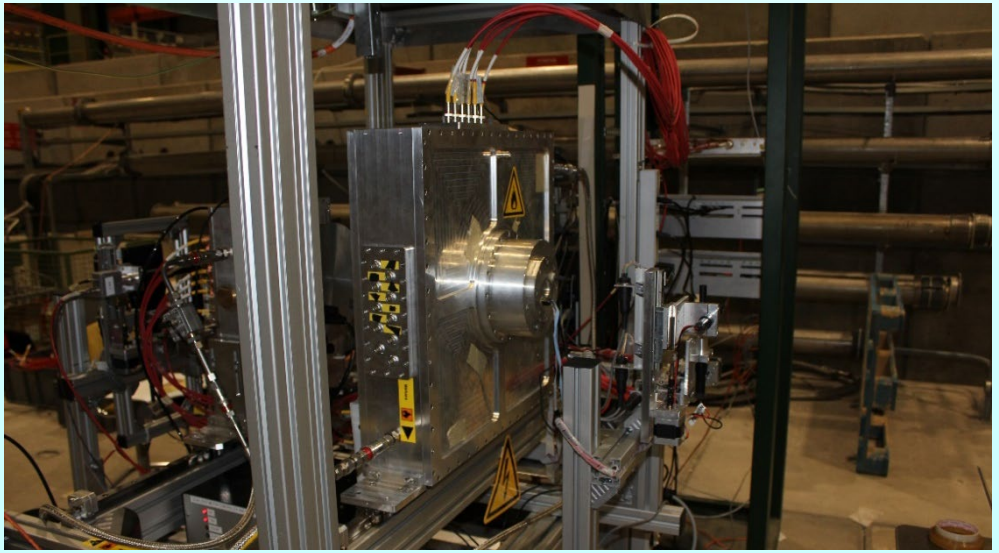
The setup

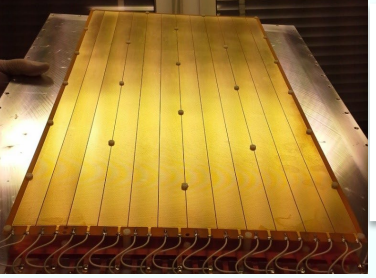












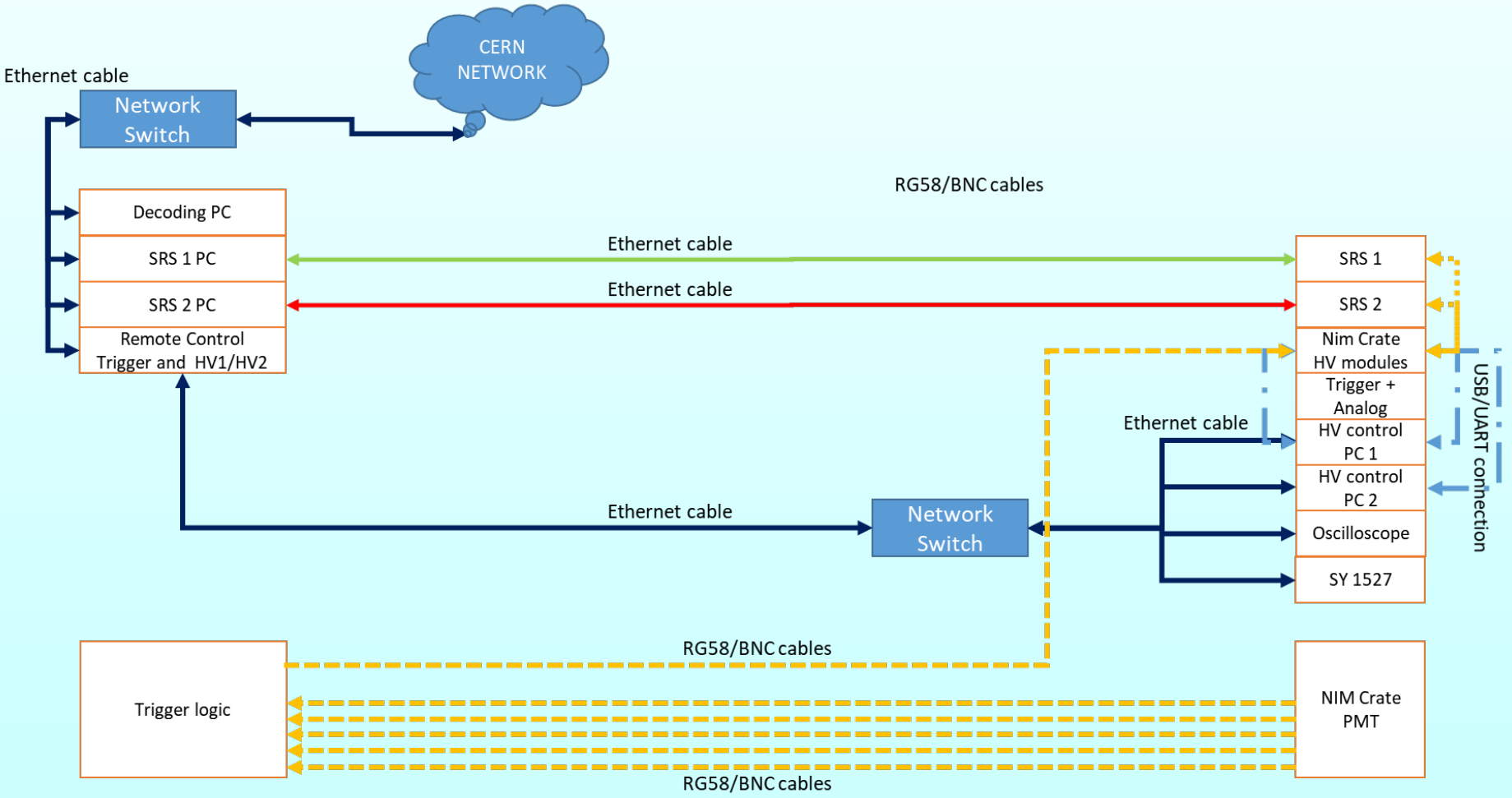
Crates, DAQ and control

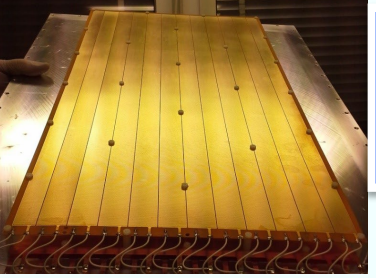
Istituto Nazionale di Fisica Nucleare

CTRL room

Communication setup configuration

Experimental Area





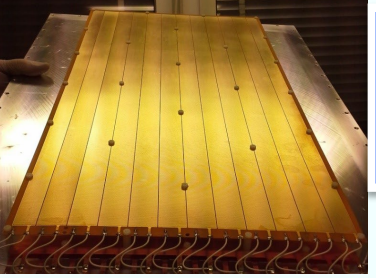
Timeline

Istituto Nazionale di Fisica Nucleare

Support structure and services installation: Oct. 16-17
Alignment and gas distribution: Oct. 18
Trigger preparation (parasitic): Oct. 19-22
Fused silica radiators mounting: Oct. 22
Photon Detectors installation: Oct. 23

Trigger setting: Oct. 24-25
Tuning and calibration with analog readout: Oct. 25-27
SRS problems (fixed by Eraldo) Oct. 28
Data taking with Ar/CH4 50/50 Oct. 28-30
Gas changed to pure CH4: Oct. 30 → No beam until end of test beam period

Extra time in parasitic mode for data taking with pure CH4:
CH4 data with Minipad detector: Nov. 1 – 3
CH4 data with 300 x 300: Nov. 4-5
Dismounting of the setup: Nov. 7



Data

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Analogue readout scans:

- THGEM1, THGEM2 and MM Voltage bias, Drift scans

SRS readout data:

- **latency scan**
- **drift scans (for different THGEM1 ΔV)**
- **Voltage bias scans (for THGEM1, THGEM2 and MM)**
- **Light interceptor scans**

- **Long runs in nominal conditions with interceptor open and closed**

Data for both Ar/CH4 50/50 and pure CH4.

Data for both Minipad and 300 x 300.

Most of the data are still to be analyzed.

APV Signals

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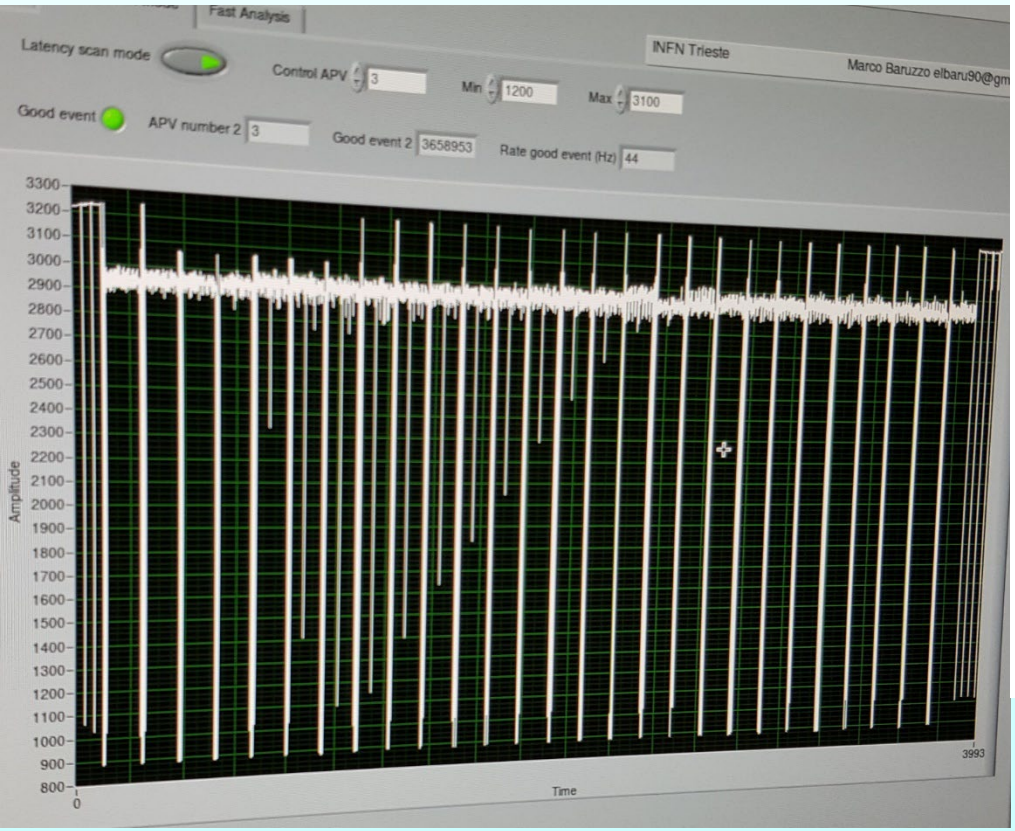
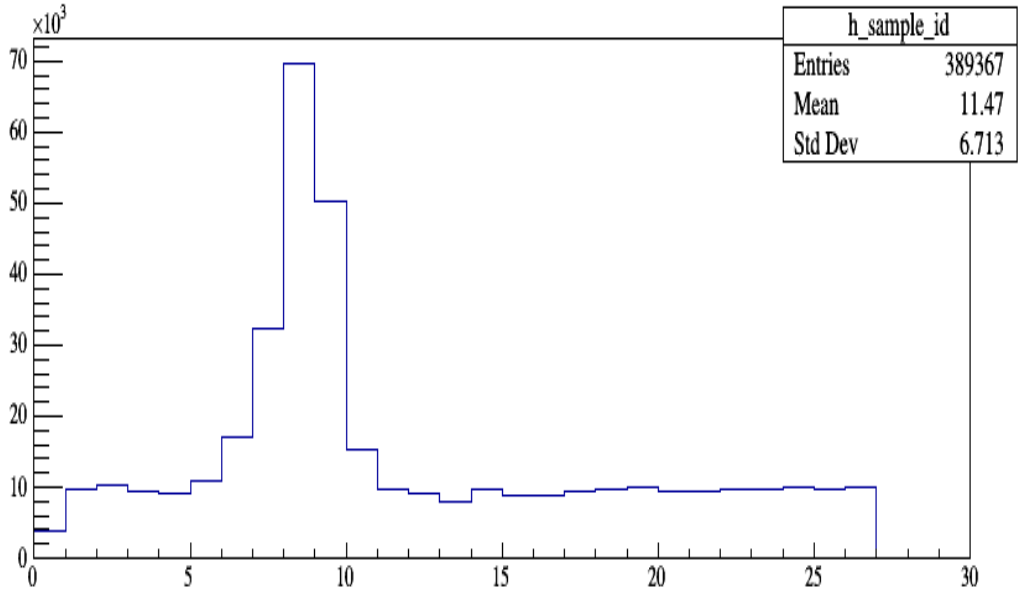
Typical gain: ~ 30 k

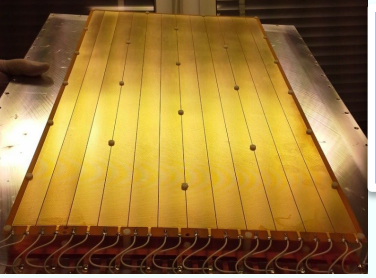
Typical acquisition rate: ~300 events/spill



Latency scan

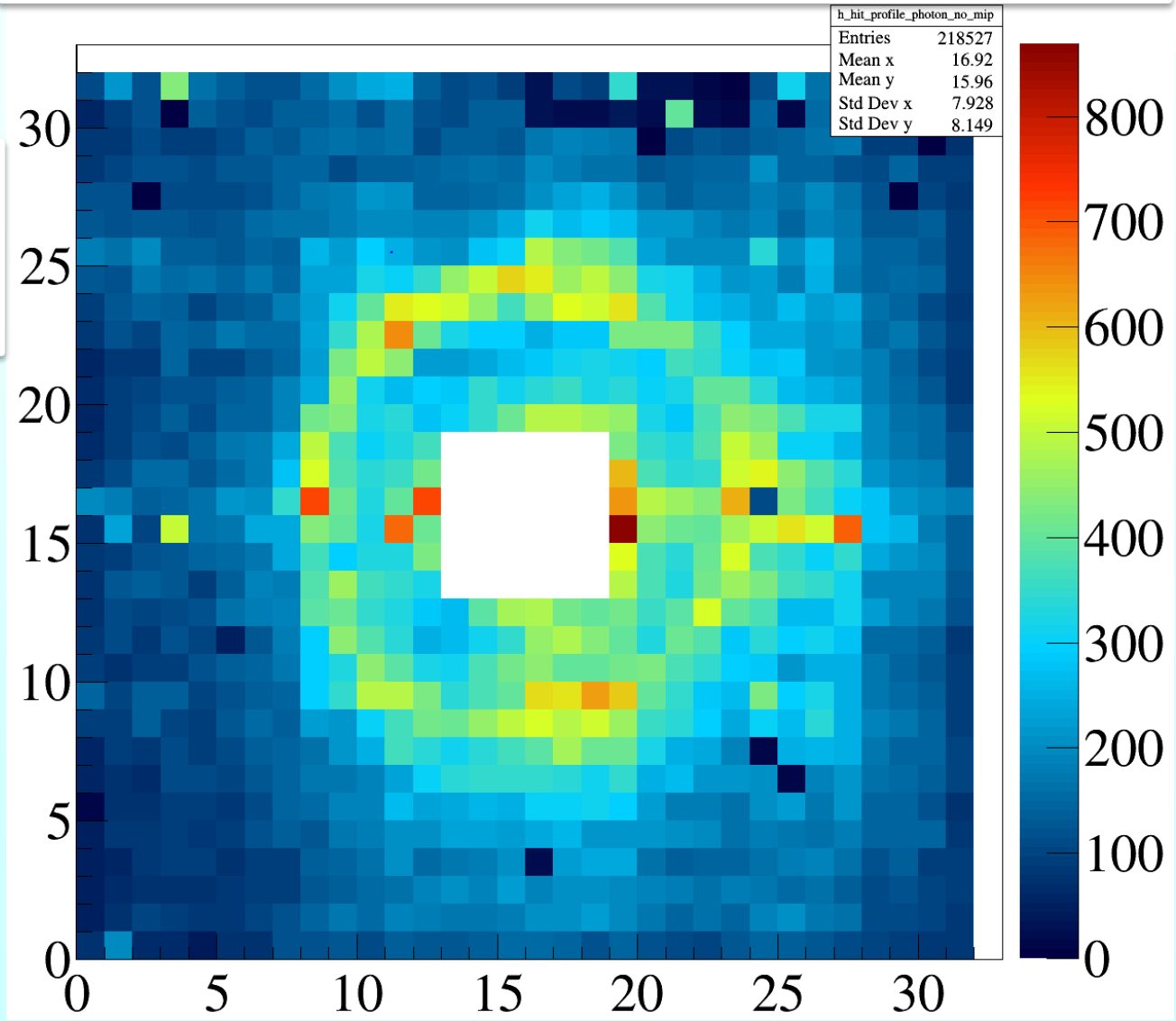


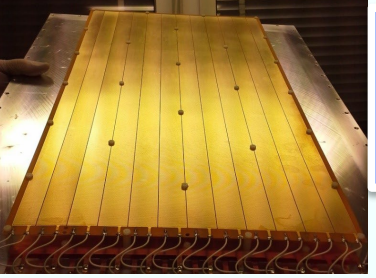
time (25 ns steps)



Piled up rings

Ar/CH4 50/50

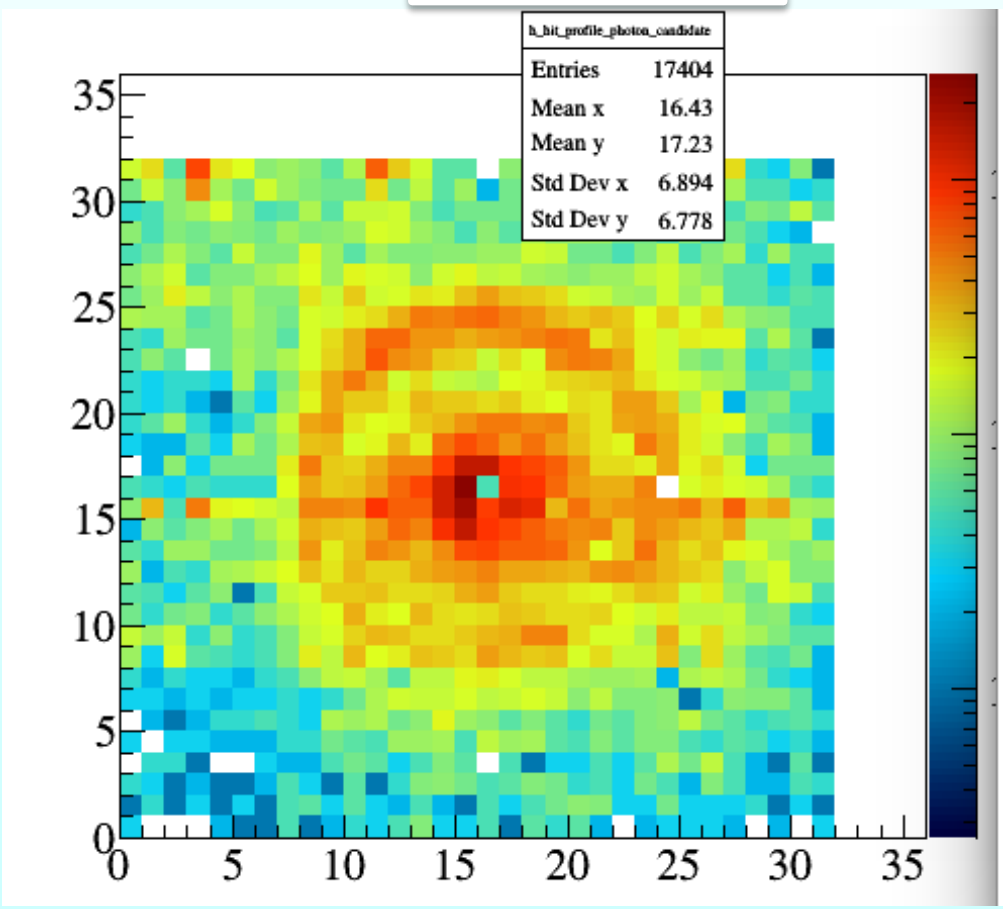


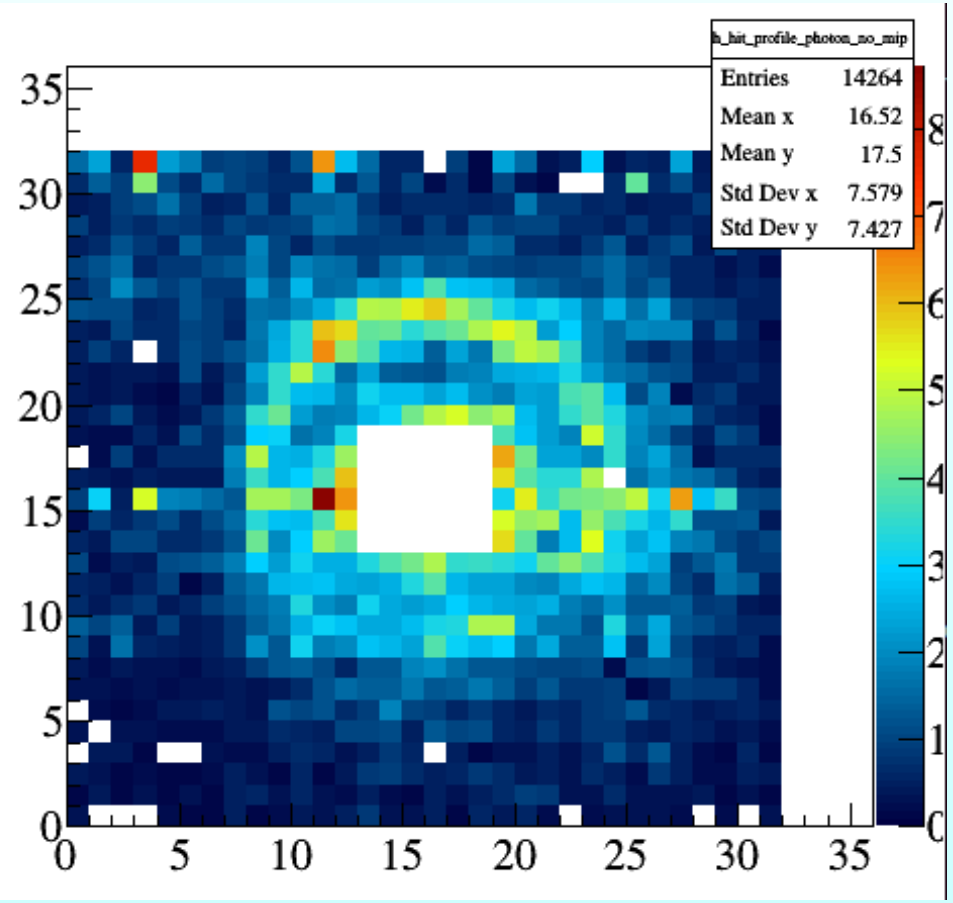


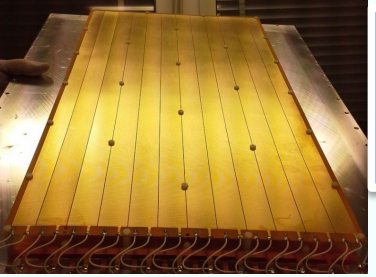
Piled up rings

Istituto Nazionale di Fisica Nucleare

CH4

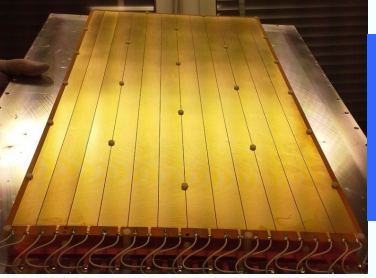






The team

Istituto Nazionale di Fisica Nucleare



Conclusions

Istituto Nazionale di Fisica Nucleare

New modular Hybrid THGEM + MM PD with minipads (3 mm x 3 mm) tested with beam for the first time.

Stable response (~30k gain), almost no APV setting loss.

Photon rings (piled up events) clearly seen

Prototype "validated" at first order.

Comparison between Ar/CH4 50/50 and pure CH4 in beam for the first time

Frequent APV setting loss for large gain with 300 x 300 Hybrid PD

Big thanks to Yorgos and Nikos
and enormous thanks to Eraldo