Pad MicroMegas & μRWELL characterization for MPGD based HCAL

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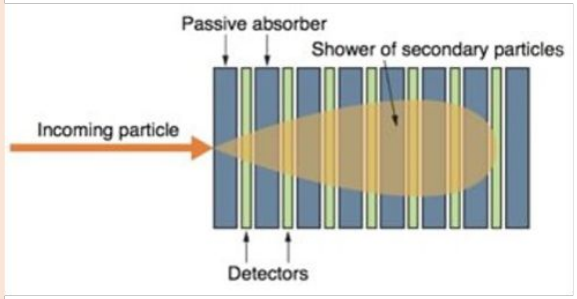
Why MPGD based HCAL?

Proposal of a sampling calorimeter with **Micro-Pattern Gas Detector** as active layer

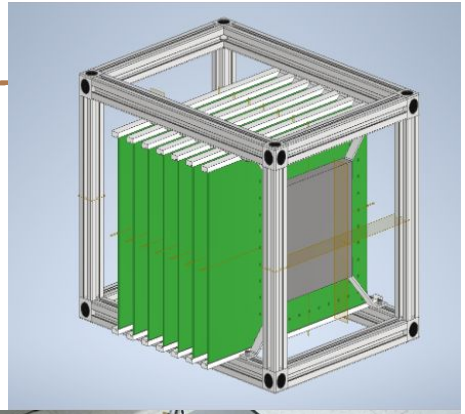
Advantages

- Radiation hardness
- High rate capability (MHz/cm^2)
- Suitable for fine granularity
- Good space ($> 50\mu m$) and time resolution ($5 - 10\ ns$)
- Good response uniformity (~10%)
- Relatively cheap for large area instrumentation



µRWell and resistive **Micromegas** best MPGD options for reducing discharge effects

Why MPGD based HCAL?

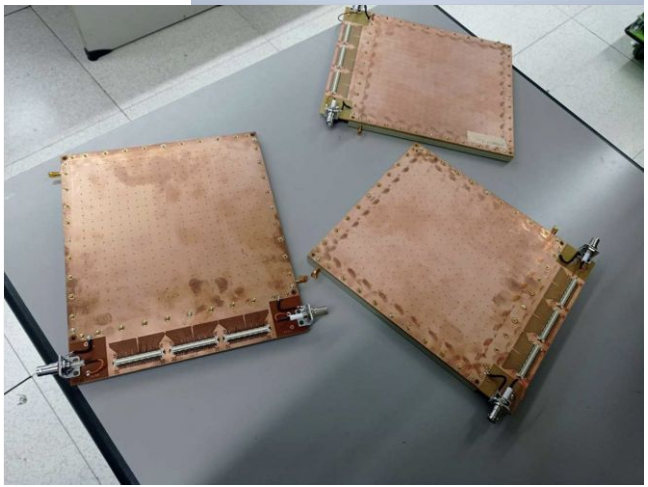


Proof of concept: HCal prototype made of 8 MPGD based active layers and 8 absorbers ($2\lambda_N$)

MPGD detectors:

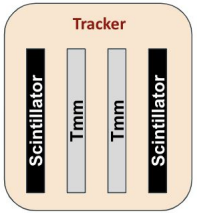
- build 7 µRWELL & 4 MicroMegas thanks to CERN MPT workshop and INFN:
  - 20x20 cm2 of active area
  - 1 cm2 pixel ⟶ 384 pixels
  - common readout board for both technologies

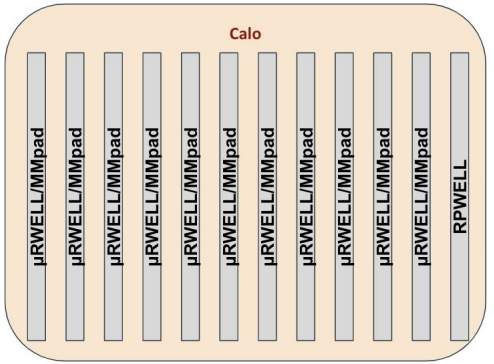
- preliminary tests (HV stability, gain measurements, measurements under X-ray or with Fe55) performed at the various institutes (Bari, Frascati, Naples, Rome3, Weizmann)



Test beam

- **Goals of the test beam:**
  - measure efficiency,
    cluster size, spatial resolution, time resolution,
    gain uniformity.
  - best 8 detectors will be used for the HCal prototype





- **Test beam setup:**
  - 2 supporting structures (48x52x100cm3):
    - one for the tracker system made of 2 scintillators plus 2 Tmm
    - one for the 11 µRWELL+MicroMegas chambers (plus one RPWELL)
  - DAQ based on SRS+APVs:
    - not yet able to work with different FECs at least using CTF (under debugging; next week we will be at 154 and any help will be appreciated)
  - Gas needed: Ar:CO2 (93:5:2) or (93:7), Ar:CO2:CF4 (45:15:40) order already in place (thanks Eraldo for taking care)
  - Desy table for the calo structure for performing a full scan of the detectors (not yet requested)
  - HV, logic unit already ordered and taken from the pool but we would need a rack