

Status of the Front Tracker GEM

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SBS Collaboration Meeting

INFN – Catania, Genova, Bari and Rome/Sanità

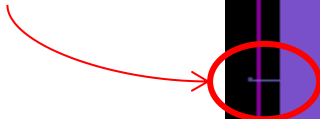
New GEM foil revision

Gas system and humidity level

New Front-End cards with Panasonic 133pins (CERN Standard)

New GEM foil revision

Pad for capacitor to ground



- ❑ Resistor pads moved 2 mm out of the GEM frame.
- ❑ Larger HV paths
- ❑ New pads for soldering grounding capacitors to readout plane

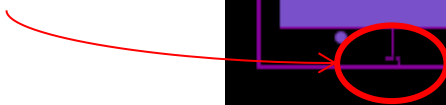
Pros:

- Access GEM sector HV directly for «cleaning» protocol proposed by Rui
- Capacitors to grounds **may** improve noise

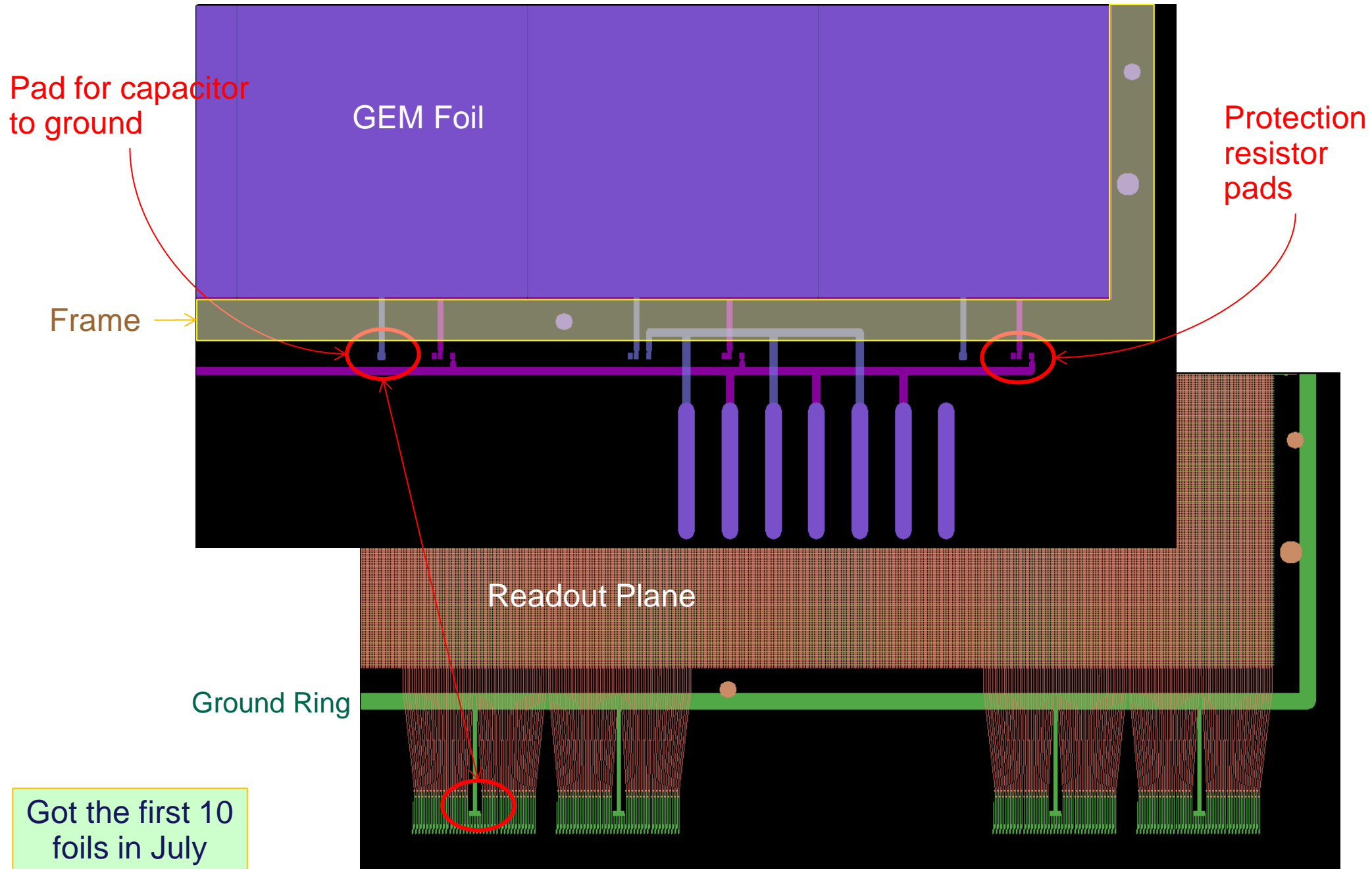
Cons:

- Resistors are no longer protected by the frames
- Assembling more complex

Protection resistor pads



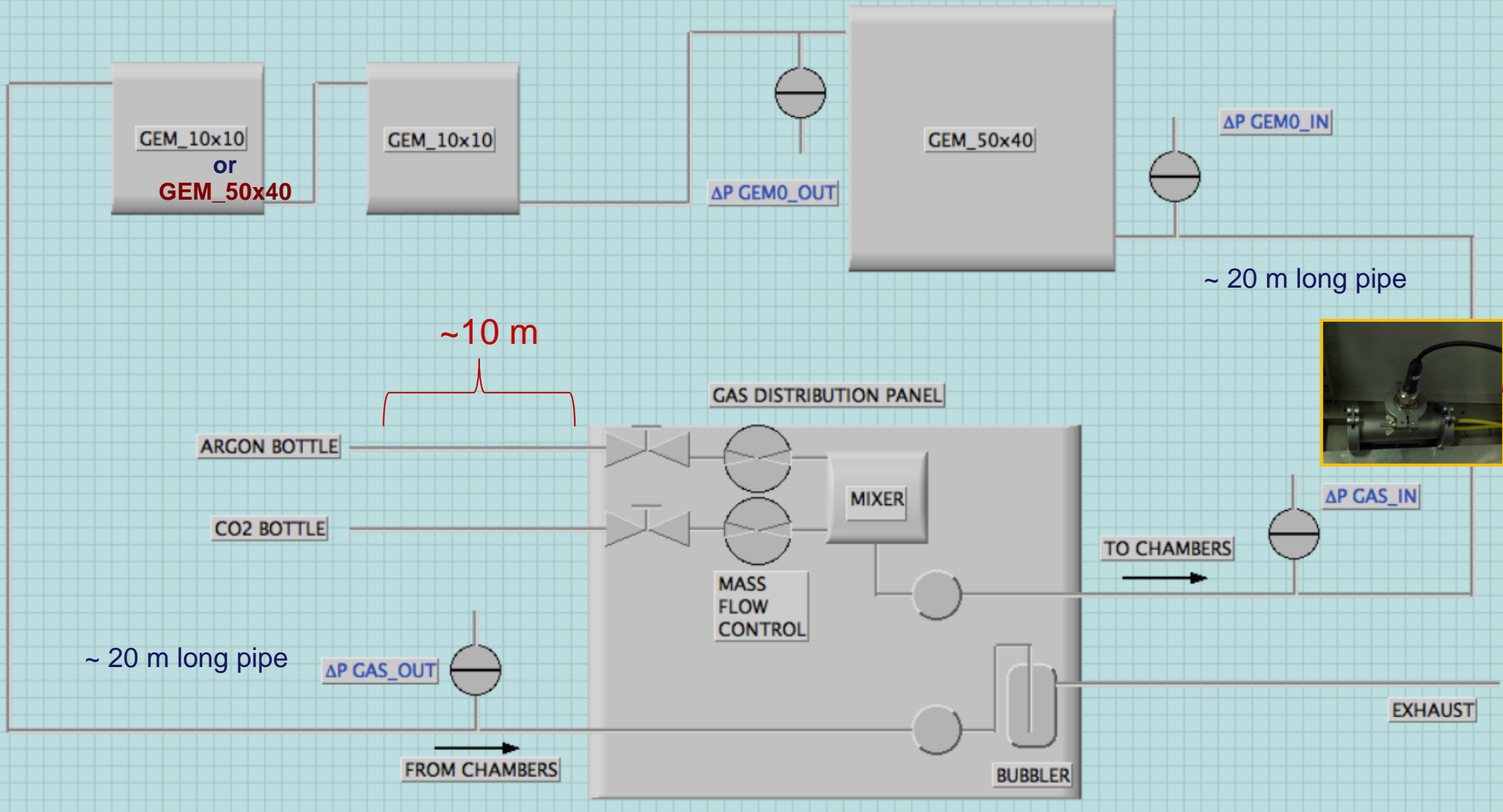
New GEM foil revision / detail



Gas System in Rome w/Humidity Sensor

Series operation

DESY TESTBEAM LAYOUT



Humidity in the gas line

Try to understand the gain drop in DESY test.

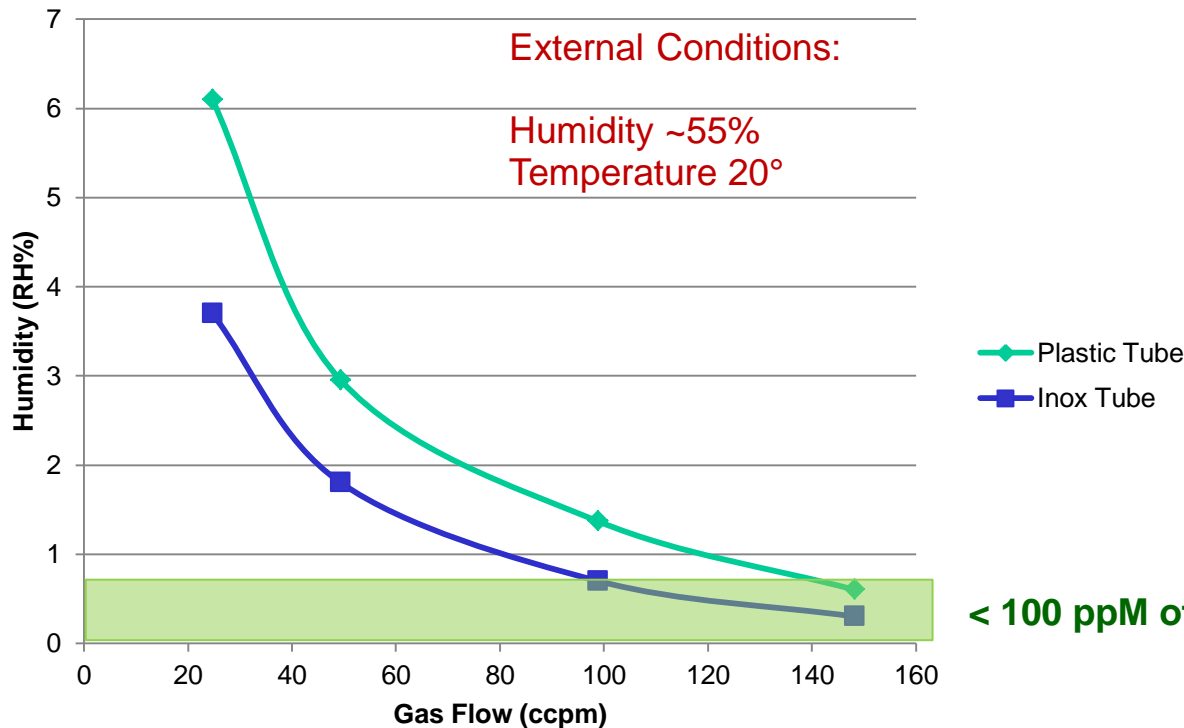
Humidity in gas line may play some role

Polyester pipes are permeable to water

→ replaced 10 m with inox pipes

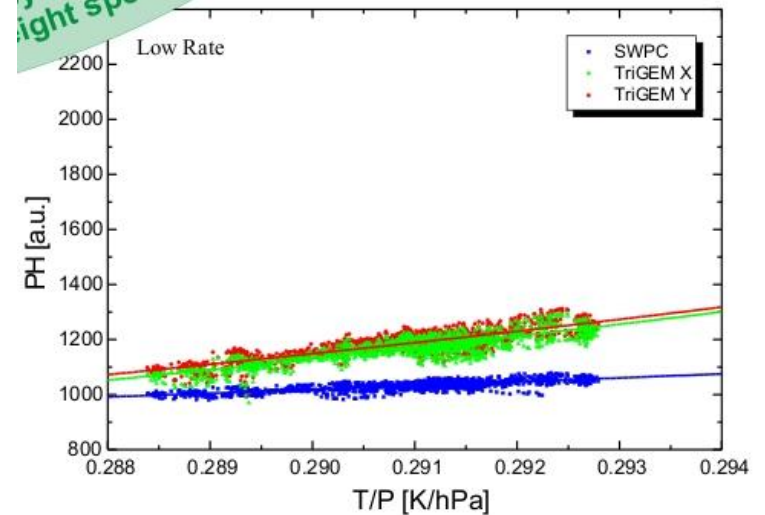
In literature <100 ppM H₂O seems to be acceptable for stable operation (and negligible spark rate)

Increase flux and/or add hydrosorb/oxysorbe cartridges before chambers inlet



S. Kappler et al. / 2001 - CERN

High resolution analysis of the light spectra!



Fit of exponential model for each line:

$$G = A \cdot e^{-B \cdot \frac{T}{P}}$$

G: Eff. Gain T: Temp. P: Press. A, B: Fit parameters

IEKP, Karlsruhe University (Germany)



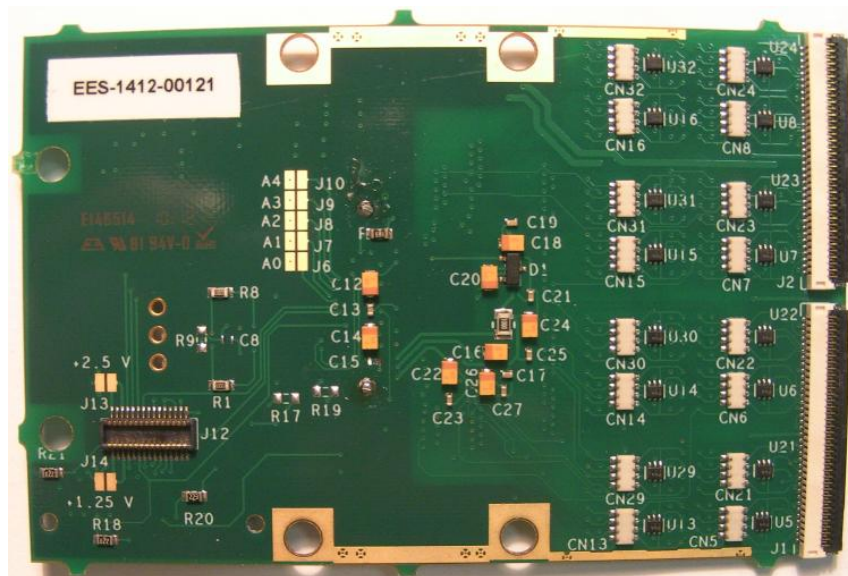
New APV Card with Panasonic 133pins connector

We now have two versions of the APV cards:

- 2xZIF connectors
- Panasonic 133 pins «CERN Standard connector (few mm longer)

All other components identical
Both versions will be maintained

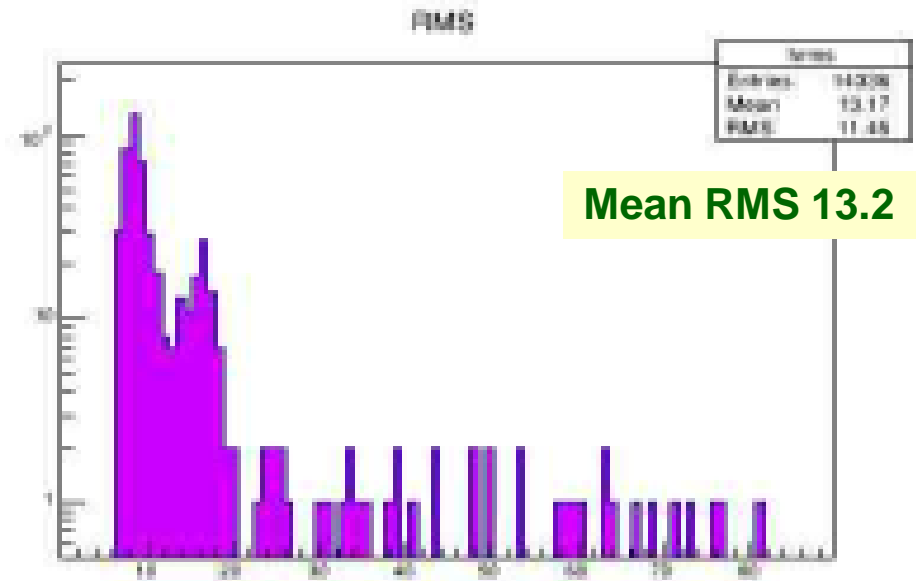
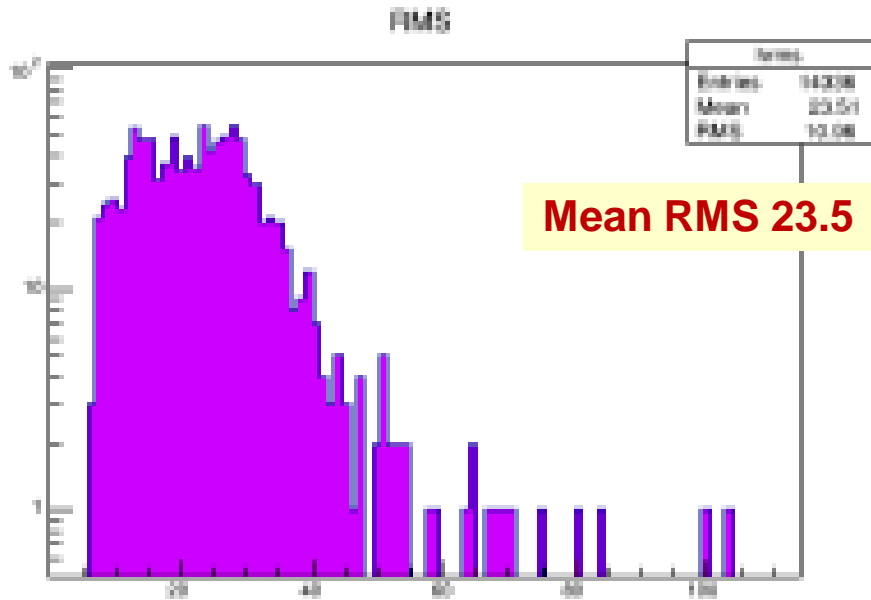
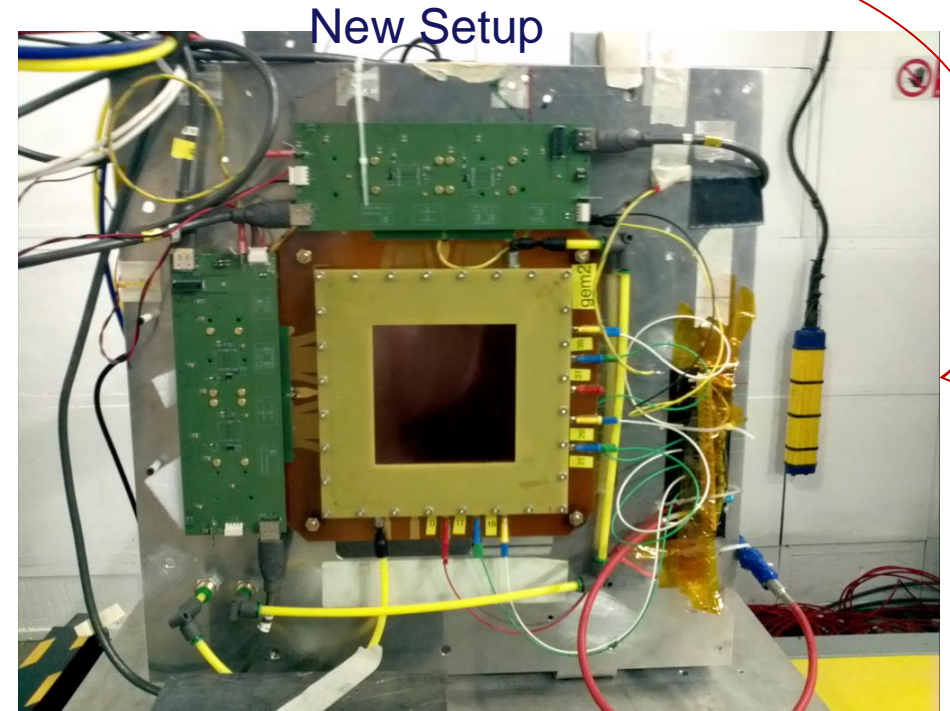
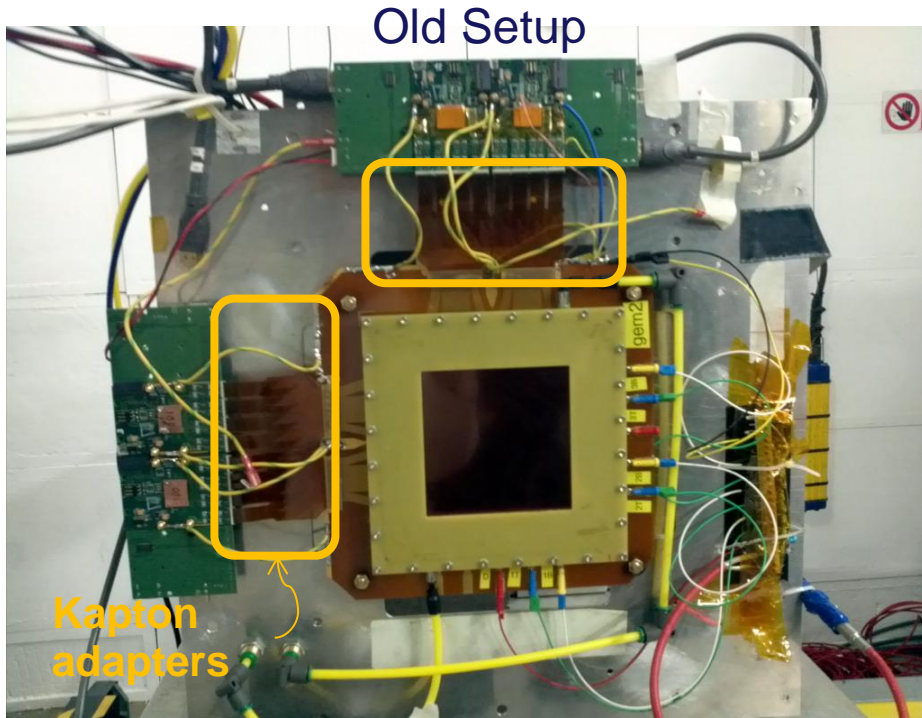
ZIF Connector version



«Standard» Panasonic. NEW!



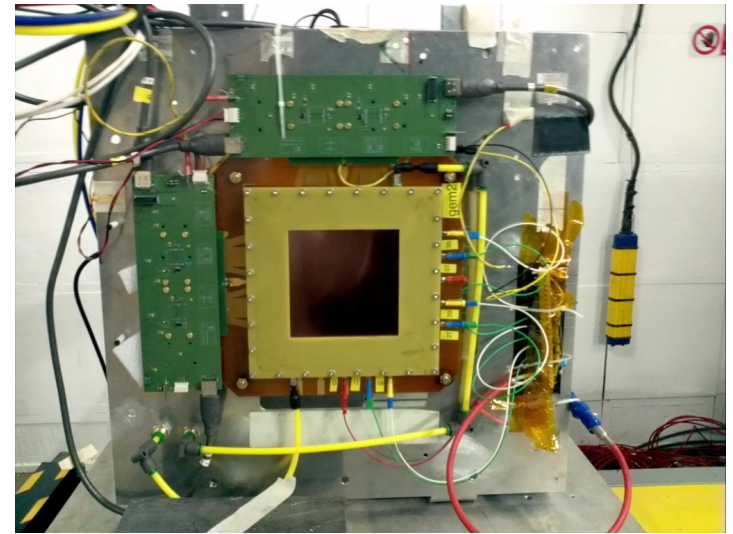
Performance of Panasonic 133pins card



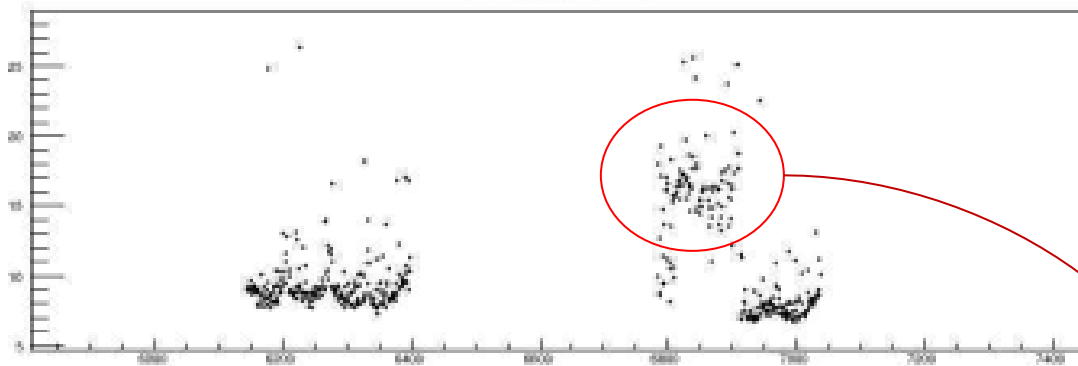
Performance of Panasonic 133pins card / Details

Confirmed large noise introduced by the kapton adapters used to match «standard» panasonic equipped GEM modules with ZIF connector of our APV cards

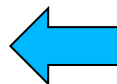
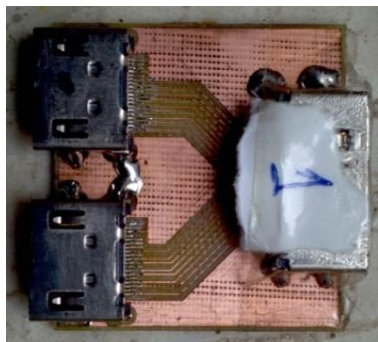
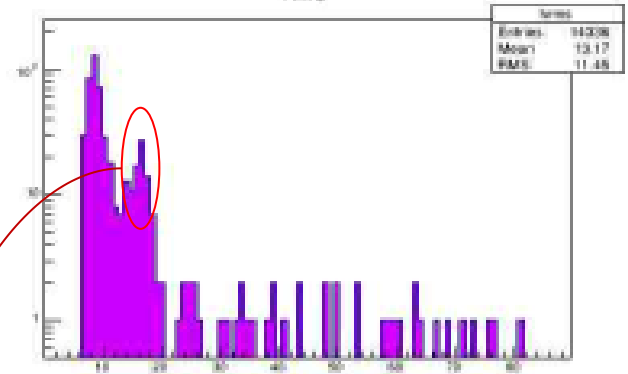
Effective Noise level at ~ 10 ADC unit !
Consistent to the noise level measured on large chamber in DESY test and Lab



FMS of Pedestal vs bunch



FMS



Defect in one channel of the home made HDMI-A-to-B adapter (used to match old and new MPD versions – not required in the future)

Comparison to SRS measurements in Feb/2013

Noise measurements on chamber

All connected (51, 54 always disconnected, 62 SRS)

51 0 8.36366 3.15819
 52 0 21.4899 5.41732
 53 0 22.0336 4.68268
 54 0 7.47843 3.10985
 62 0 13.9927 4.54739

SRS disconnected

51 0 8.40966 3.15261
 52 0 18.9219 4.8044
 53 0 17.6065 5.3753
 54 0 7.53835 3.14959
 62 0 6.93804 1.25661

One INFN card disconnected

51 0 8.35581 3.15129
 52 0 30.5165 11.6532
 53 0 11.735 6.7953
 54 0 7.44862 3.1477
 62 0 13.5801 3.29789

All INFN cards disconnected (SRS connected to chamber)

51 0 8.52771 3.38525
 52 0 9.97818 4.19041
 53 0 11.9473 7.0925
 54 0 7.52595 3.27819
 62 0 17.2399 4.84427

As before, muxgain=4

51 0 12.2671 4.97137
 52 0 33.6612 9.04412
 53 0 34.8818 8.63826
 54 0 10.6839 4.76459
 62 0 19.7942 6.01776

When connected to chamber:
 INFN: 21-22 ADC unit
 SRS: 13-14 ADC unit

When disconnected:
 INFN: 7-8 (no adapter)
 INFN: 11-12 (with adapter)
 SRS: 7

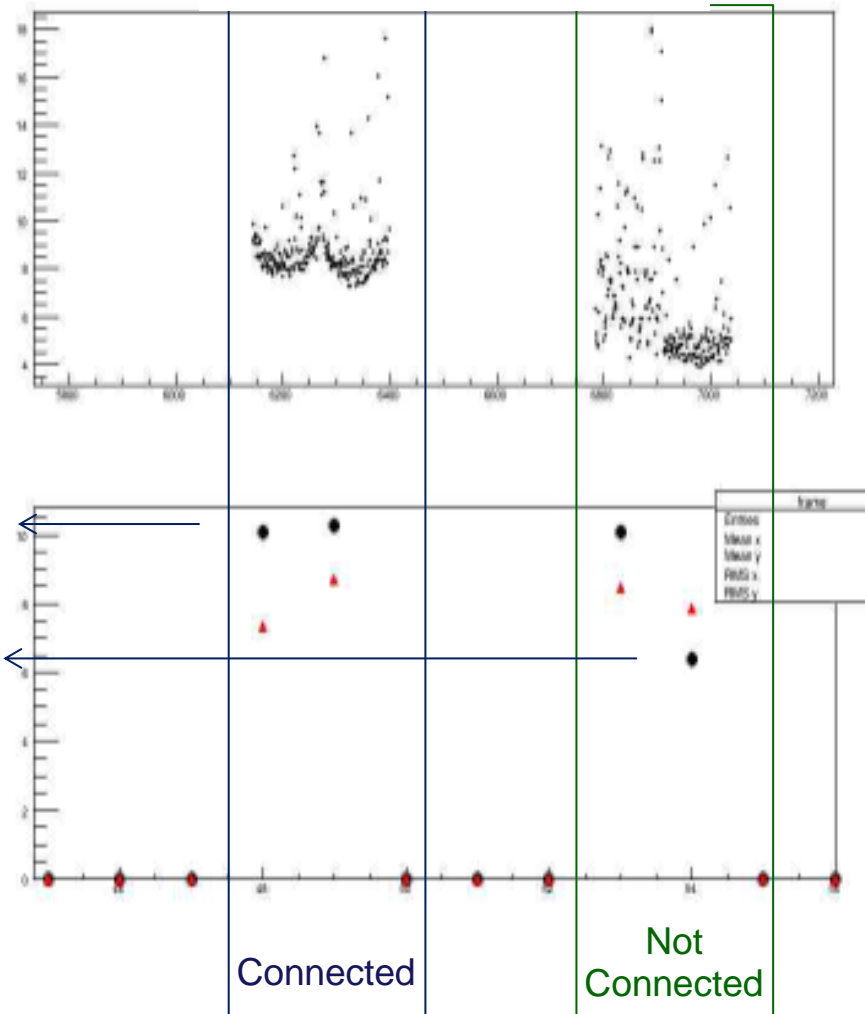
(muxgain=1, adc.gain=5)

10-11

7

Slide presented in Feb/2013

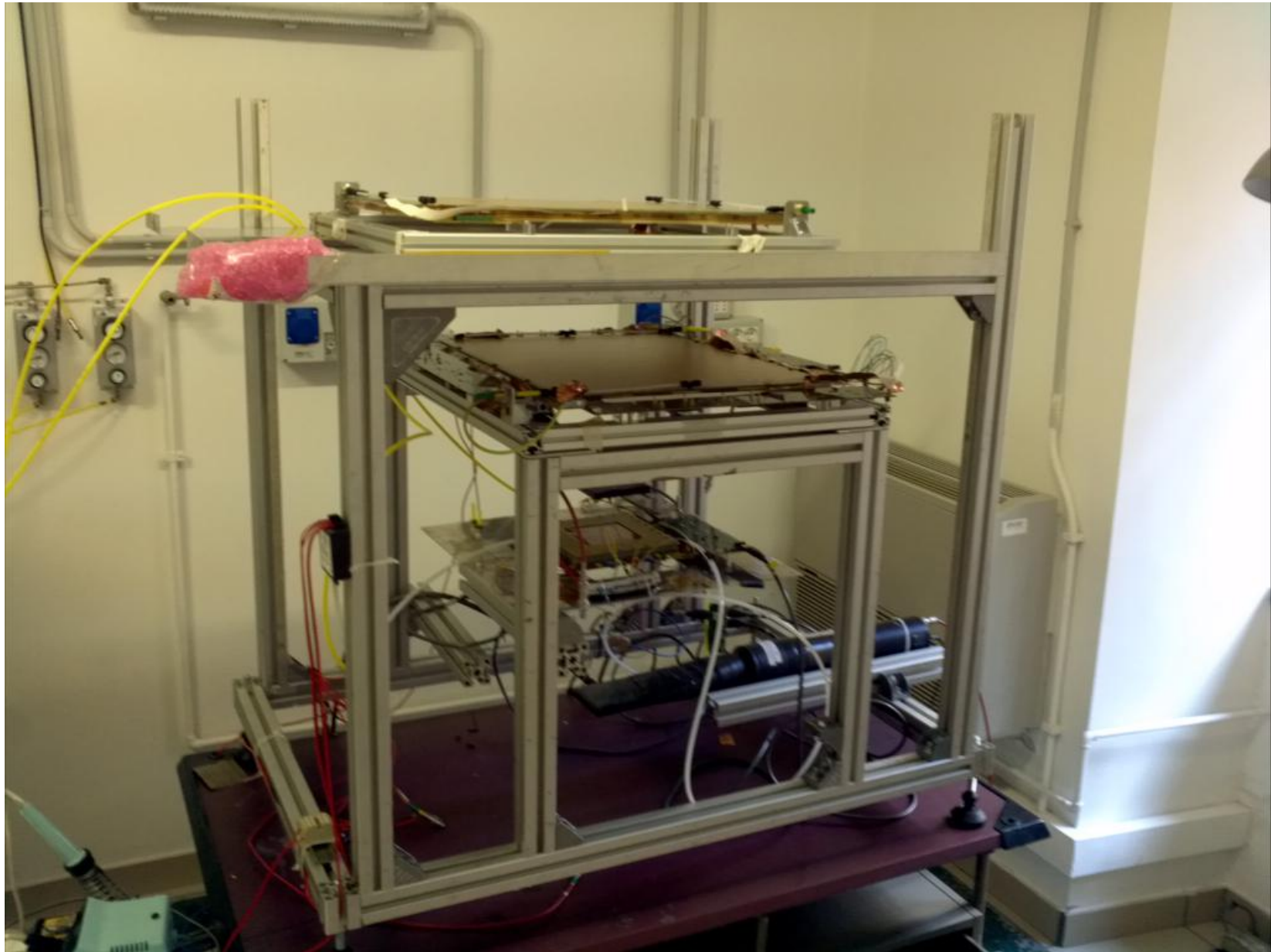
Pedestal RMS (noise)



New Panasonic 133 pin cards

Noise at the same level of SRS cards!

Characterization Stand in Rome



Current Status

1. Material:
 1. 3 large modules assembled (2 preliminary tested, 1 has a shorted sector)
 2. Procured and available:
 1. All PERMAGLAS frames procured and available
 2. Almost all drifts foils procured and available
 3. 10 readout foils + 3 honeycomb planes
 4. 10 GEM foils new revision, additional 20 coming soon
 3. Ordered:
 1. Outer frame prototype (support 3 modules + electronics + gas pipes ...)
2. Electronics: 2 front/end card versions identical performances; MPD v4 final (under production), firmware under development (external RAM tested)
3. Gas system main functionalities, test and improvement for H₂O and O₂ monitor and control
4. HV system ... Optimization to be done, spark detection (?)
5. DAQ Software ... stable versions/development
6. Analysis Tools ... Under development
7. Characterization stand ... in progress
8. DESY Analysis ... slow progress