

Front Tracker Status

E. Cisbani / RM / R

SBS Weekly Meeting

2015 Mar 15

BA=Bari
CT=Catania
GE=Genova
LE=Lecce
RM=Roma-ISS

E=Engineer
P=PhD Student
R=Researcher
S=Student
T=Technician

E. Bellini / CT / R
S. Colilli / RM / T
A. Del Dotto / RM / P
C. Fanelli / RM / P
F. Giuliani / RM / T
A. Grimaldi / CT / T
F. Librizzi / CT / R+T
M. Lucentini / RM / T
G. Mini / GE / T
P. Musico / GE / E
R. Perrino / BA+LE / R
L. Re / CT / S
F. Santavenere / RM / T
D. Sciliberto / CT / T
C. Sutura / CT / R

(all part time involvement)

Delta from previous report

Module assembling

- Pressure compensation chamber added to 6 modules; 2 gas and HV tested; required more time than planned due to very practical issues

Chamber integration

- First carbon fiber external frame arrived; work in progress to finalize integration tools and procedure

Electronics

- Flexible(-Rigid) backplane arrived and tested successfully
- Active HDMI repeater arrived, preliminary test «unsatisfying»
- First schematic of 12 cards backplane (for UVa)

Gas circulation in GEM modules

Measure gas module impedance as:

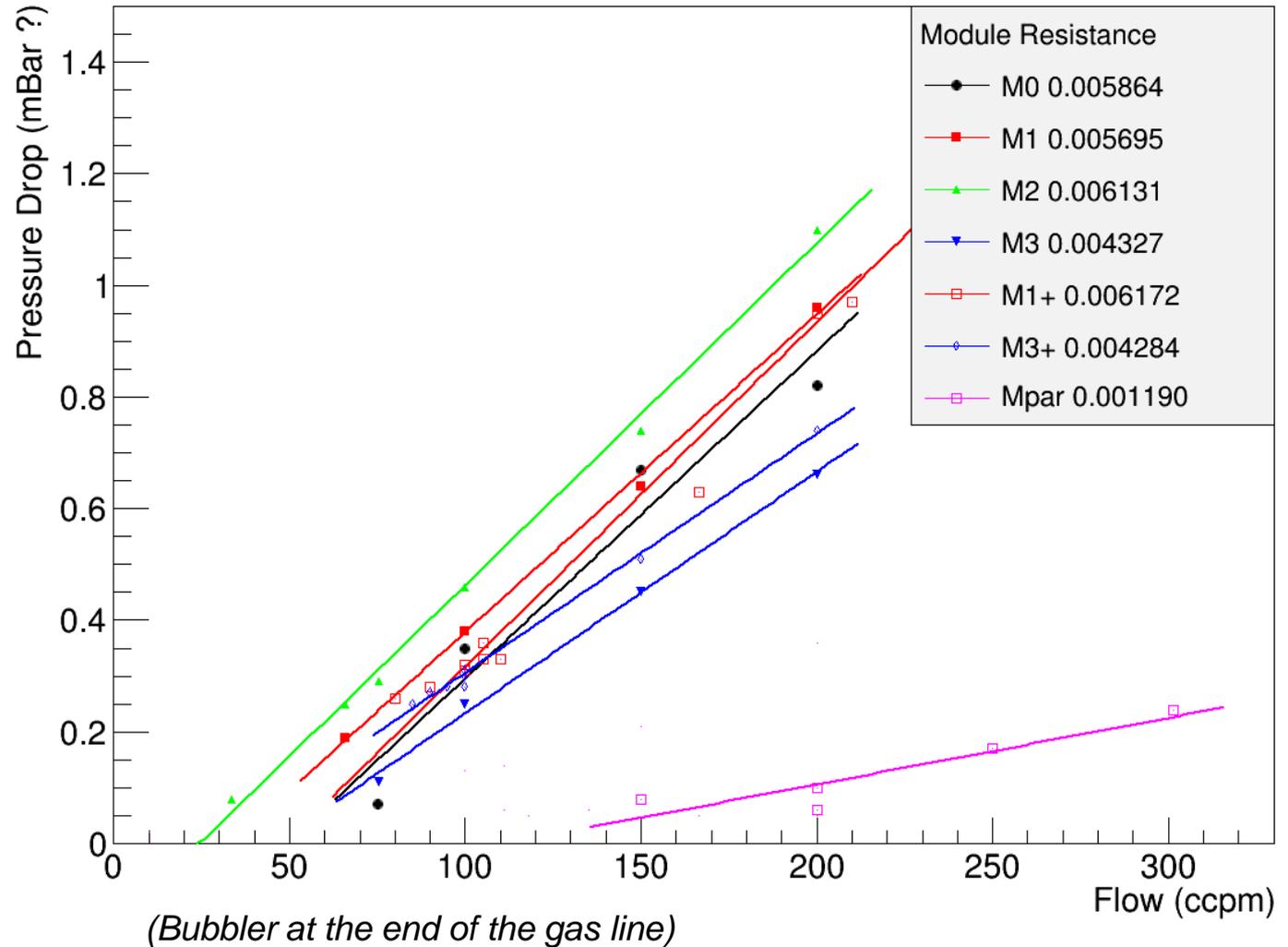
In-Out Pressure Drop/Flux

M1+ and M3+ are M1 and M3 after assembling of compensation chamber

Max Impedance variation between modules $\pm 22\%$

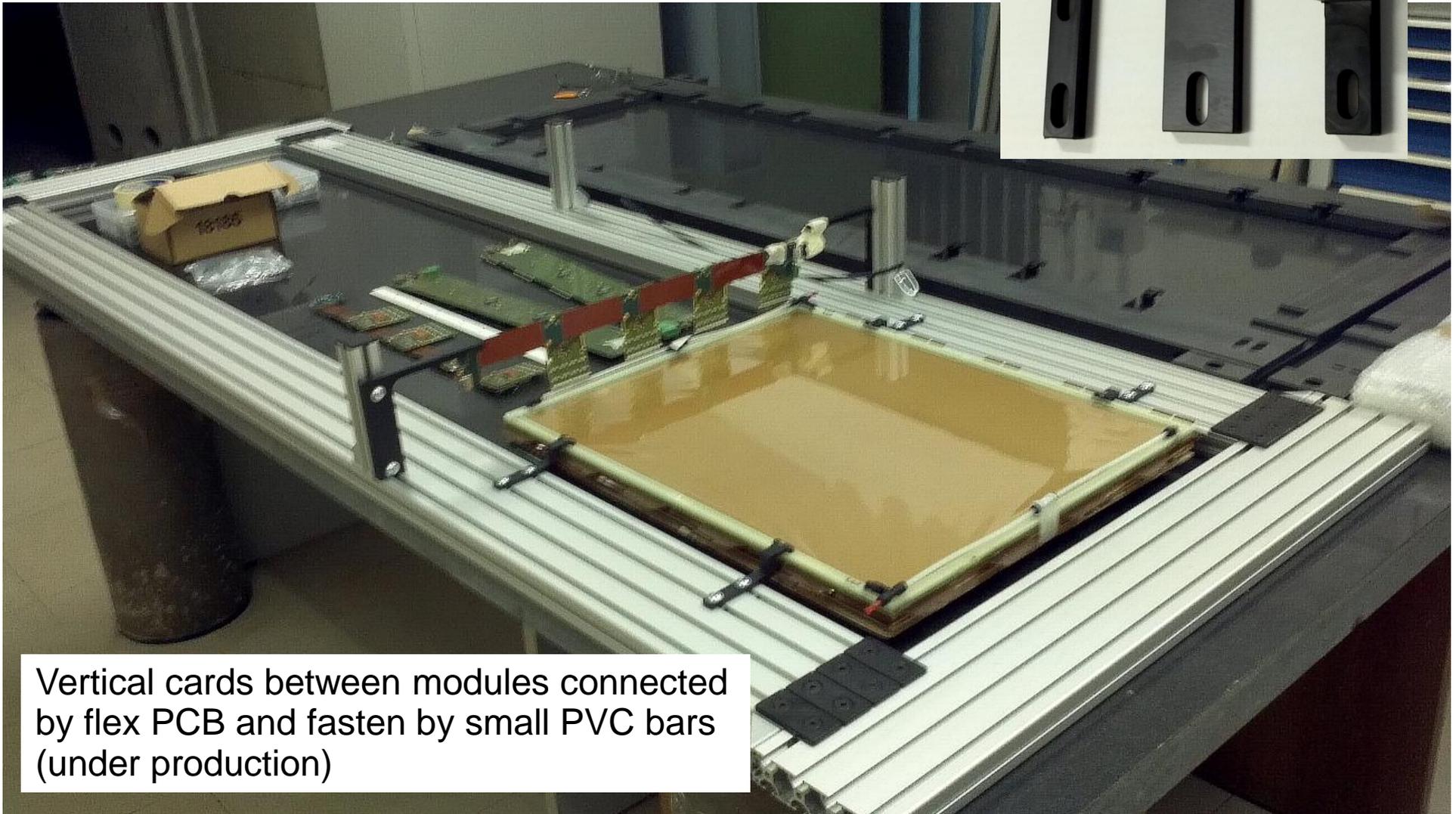
Impedance variation before/after comp. Chamber $< 10\%$

Pressure Drop vs N2 Gas Flow



GEM chamber integration

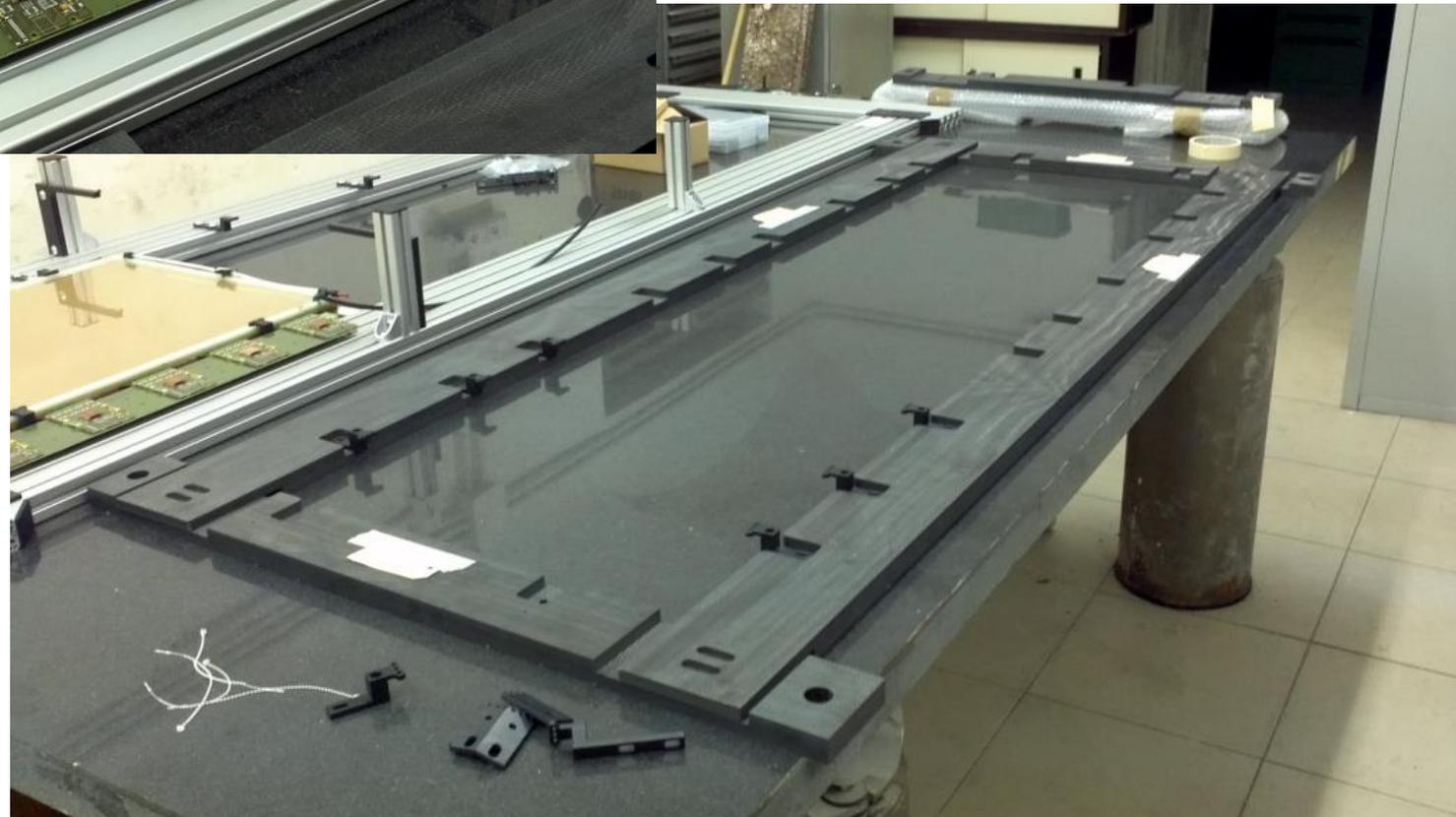
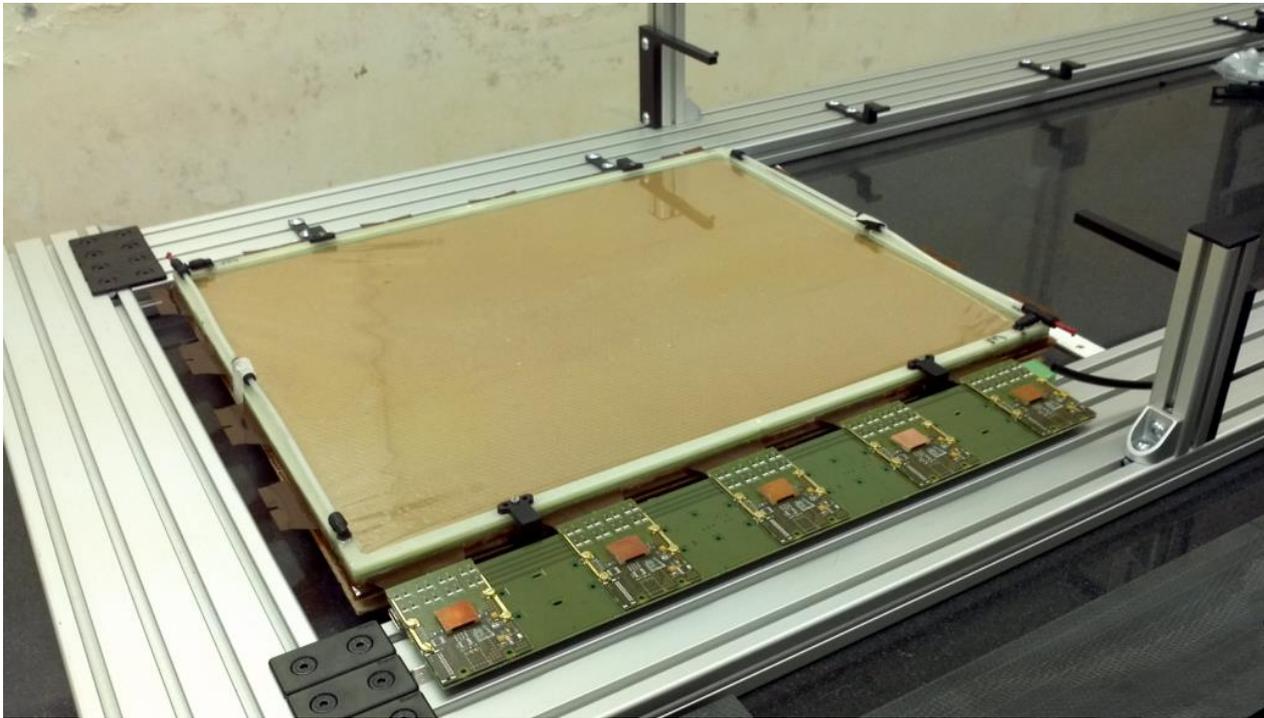
Two external frame versions available (aluminum and carbon fiber); GEM modules are fasten by small PVC arms (right picture)



Vertical cards between modules connected by flex PCB and fasten by small PVC bars (under production)

GEM chamber integration

Electronics and ancillary components (gas pipes, LV, HV cables ...)
Sit on the external frame bars

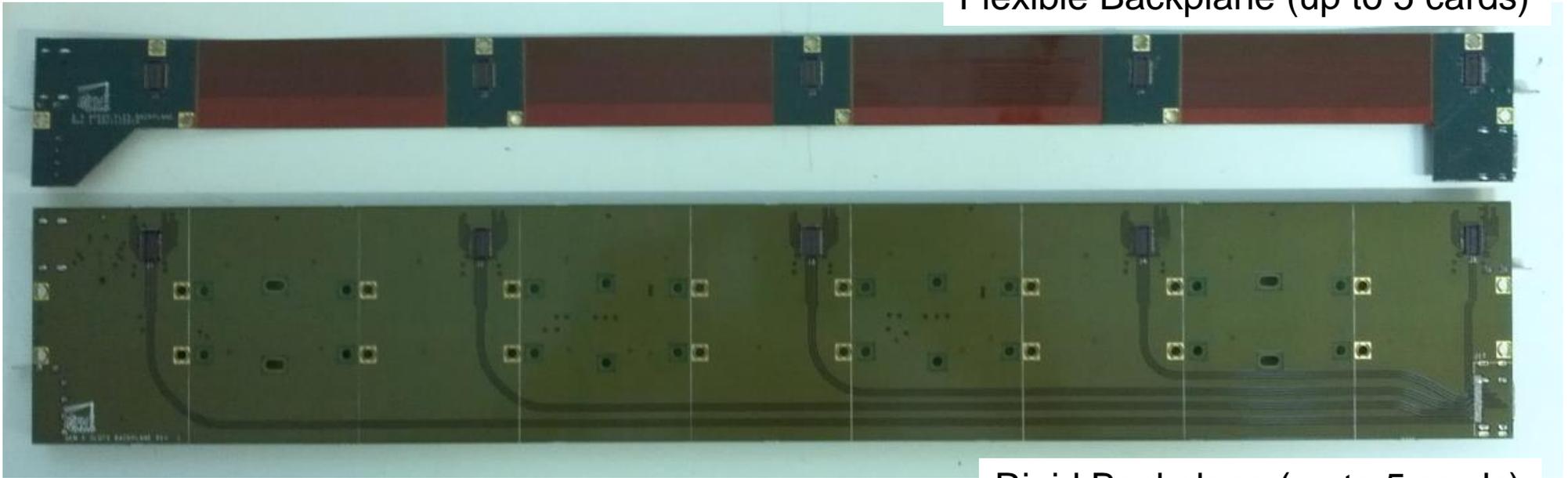


Both frames are made of 4 independent bars

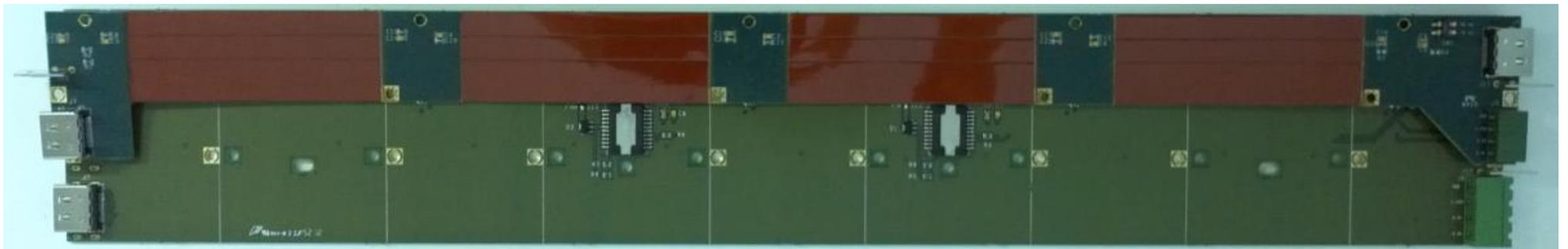
Electronics / Flexible backplane

- Reduced material budget: 31 g vs 150 g of the rigid backplane)
- 10 prototypes produced
- Successfully tested
- Voltage regulators not in the flexible backplane (as in rigid version)

Flexible Backplane (up to 5 cards)



Rigid Backplane (up to 5 cards)



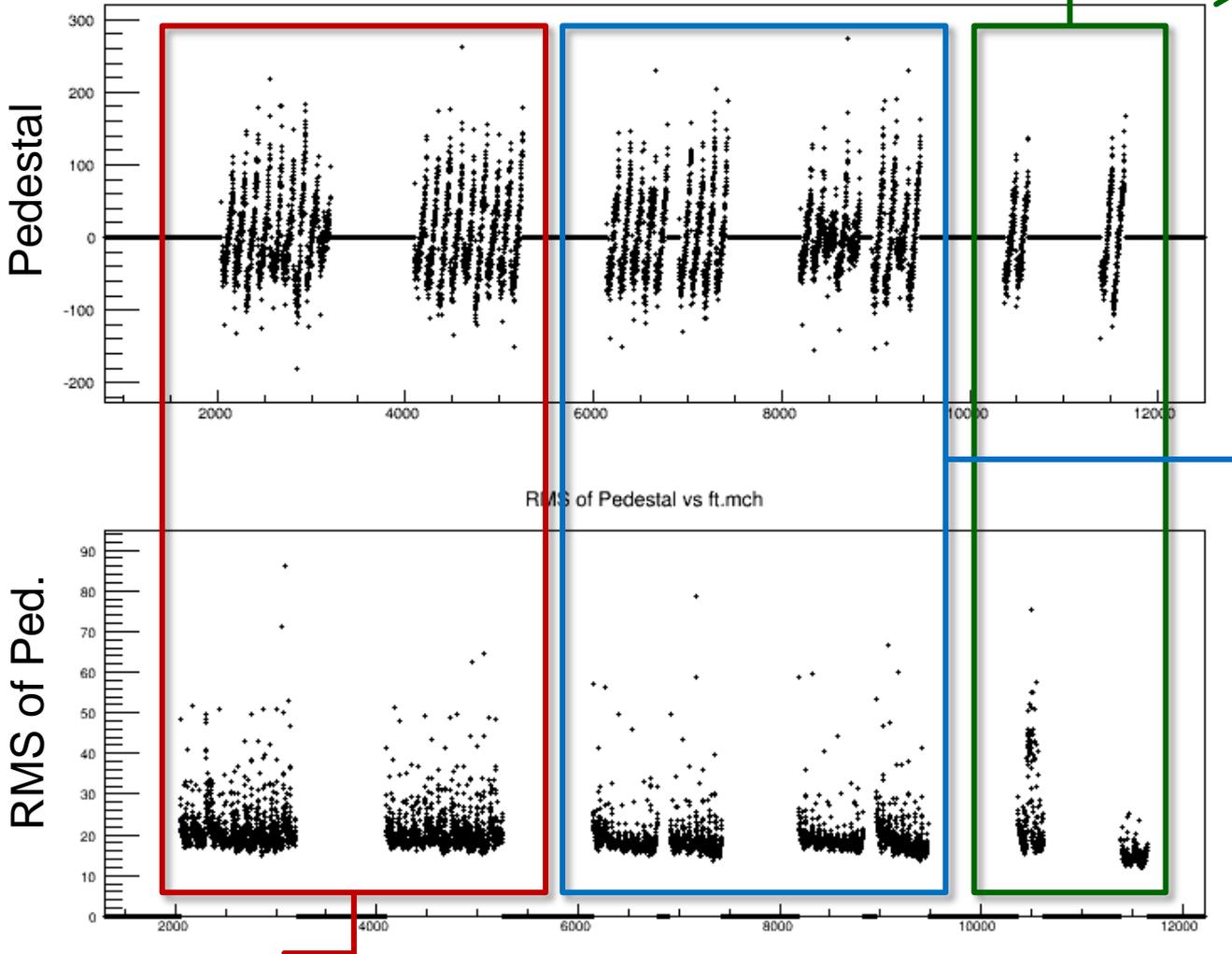
Flexible Backplane Performance

Pedestal vs ft.mch (/data/d0/out/1409_qatest/qa_0643.dat_apv.root)

4xbackplane/UVa like cards
on 10x10 GEM module

Flex backplane noise
slightly better than rigid
(same dynamics)

Flex 5xbackplane + cards
on 40x50 module

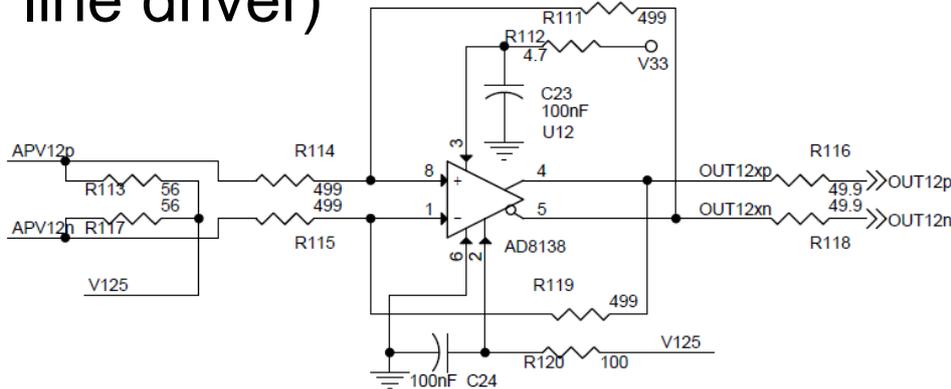


Rigid 5xbackplane +
cards on 40x50 module



HDMI cabling

Low noise differential amplifier (gain=1
⇒ line driver)



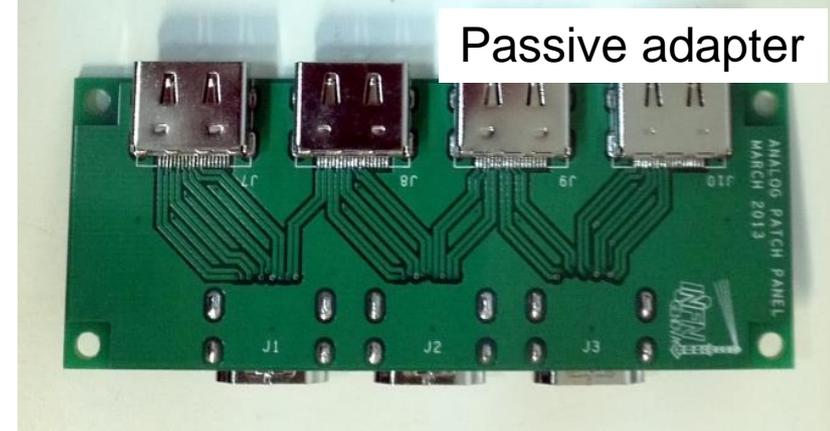
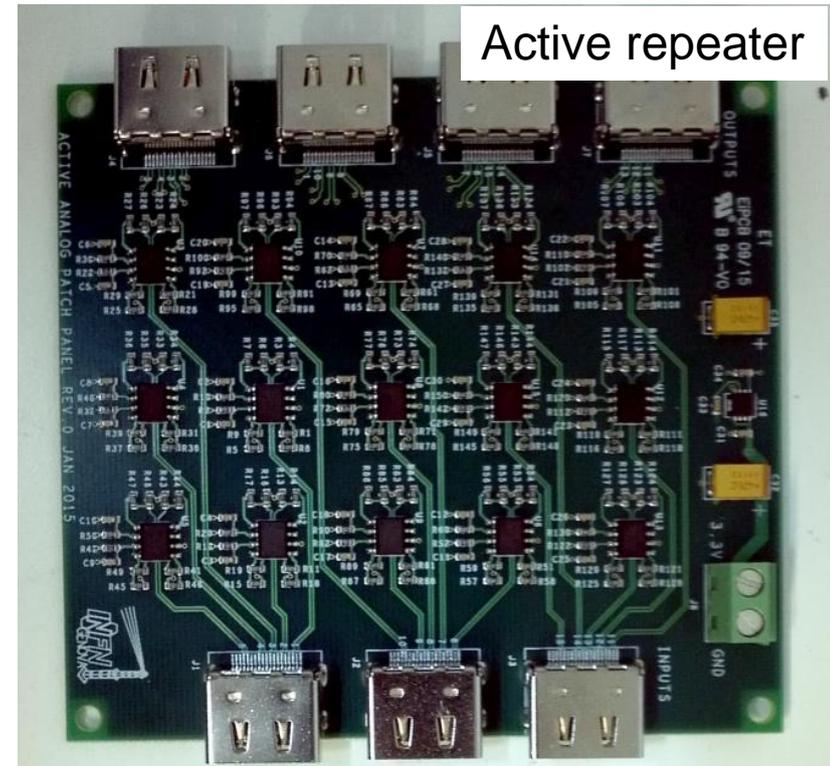
Acquisition Paths:

Digital signals:

MPD ▶ HDMI Cables ▶
Backplanes ▶ APV Cards

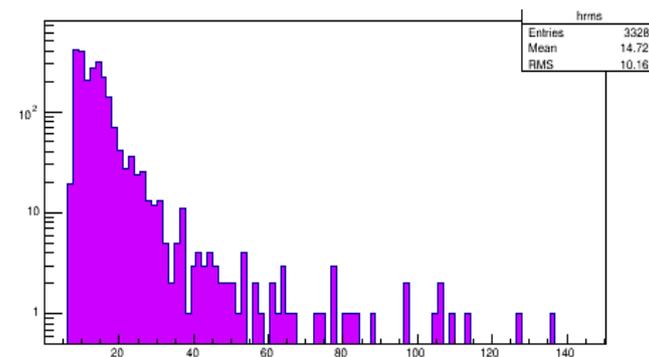
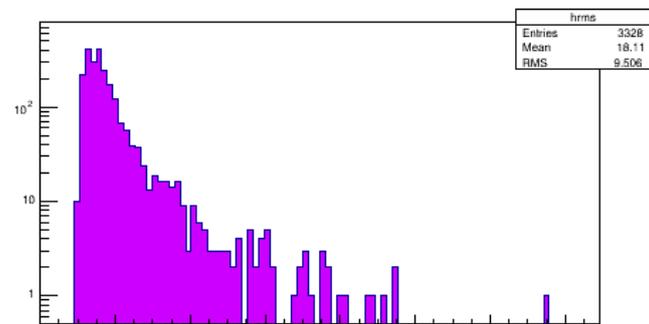
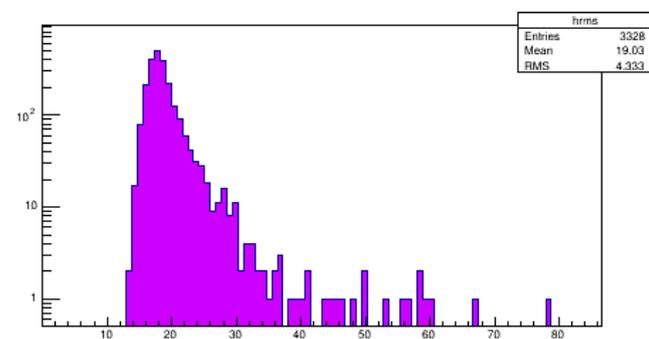
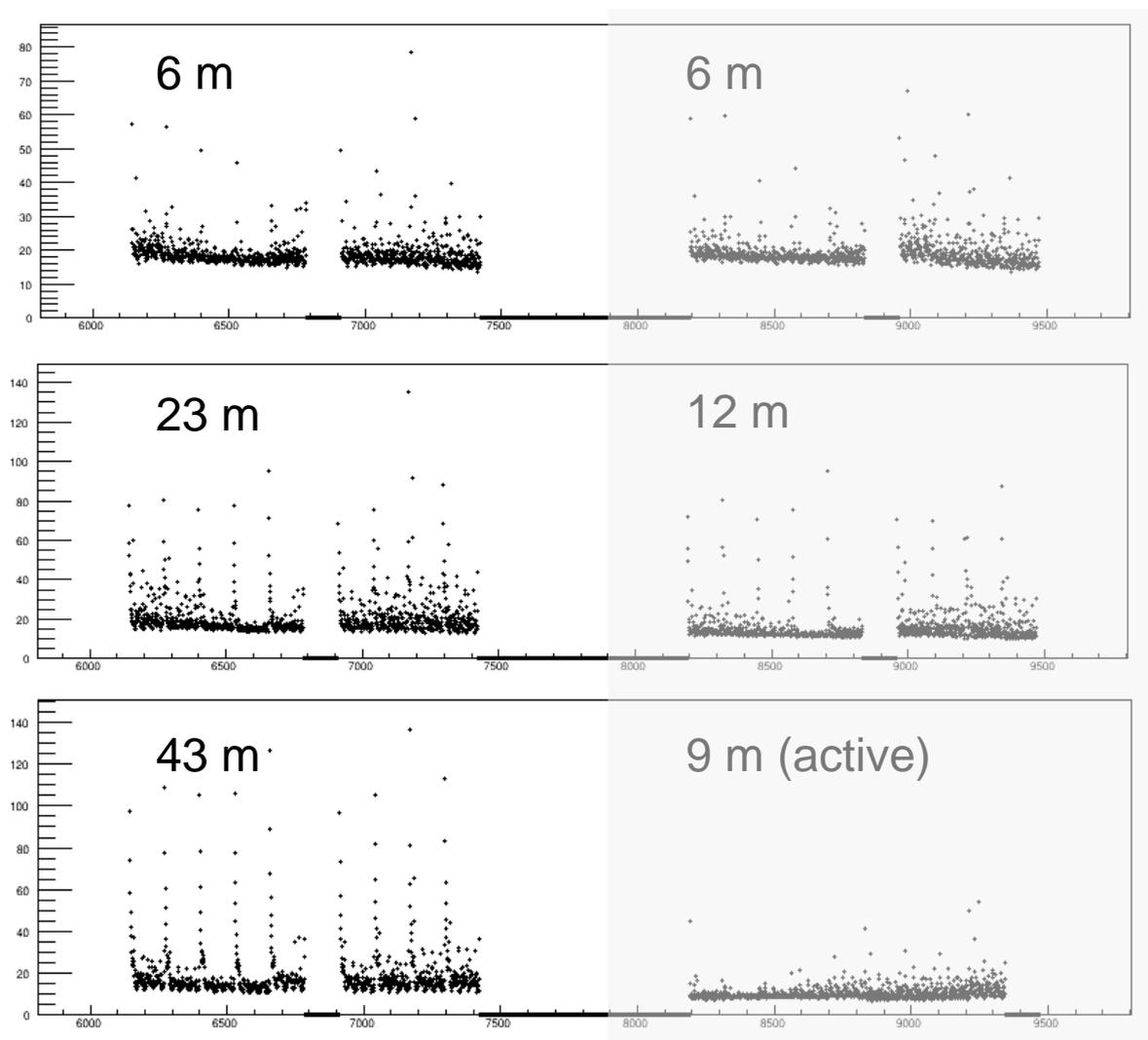
Analog signals:

APV Cards ▶ Backplane ▶ 3m
HDMI ▶ **HDMI Adapter** ▶ «long»
HDMI Cables ▶ MPD



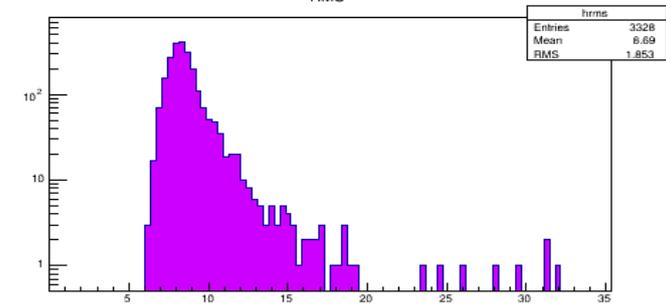
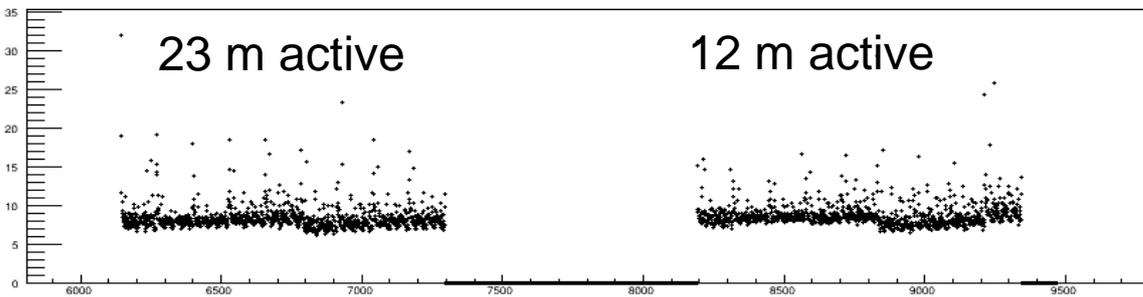
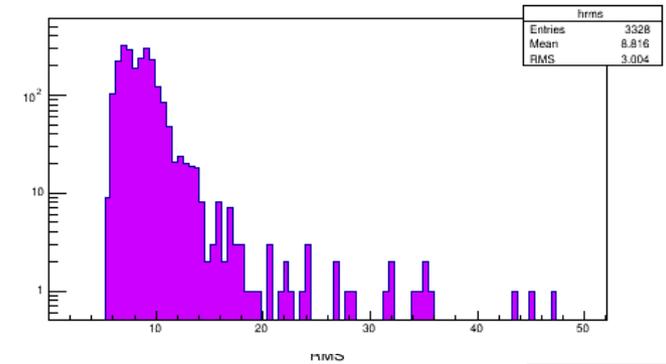
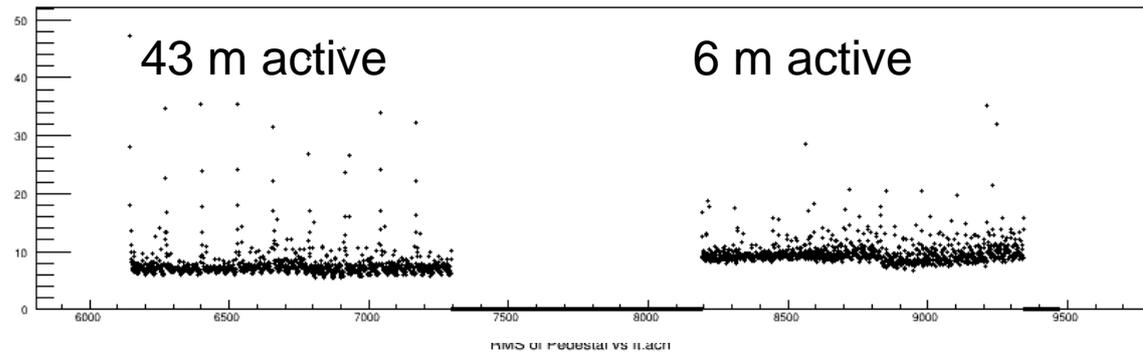
HDMI long cable noise

Pedestal RMS



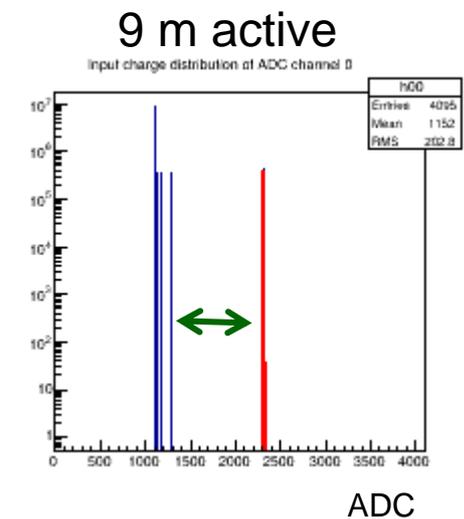
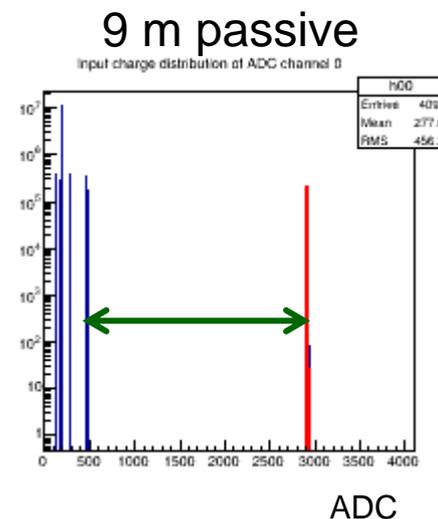
- ⇒ «peak» noise with periodic pattern (position independent from cable length!)
- ⇒ «peak» noise increases with cable length
- ⇒ noise baseline decreases with cable length (due to cable attenuation)

HDMI long cable with active repeater



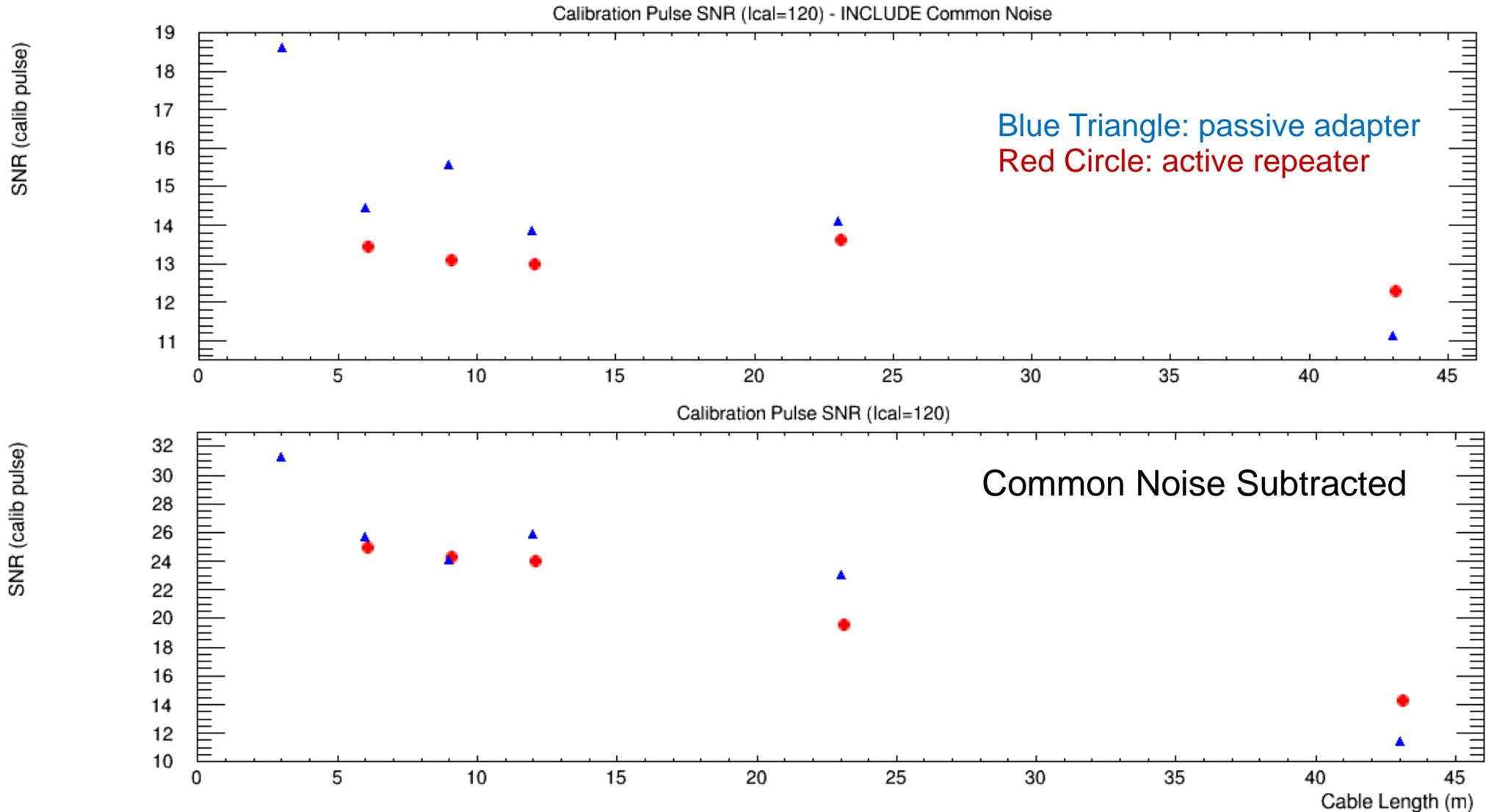
«peak» noise with periodic pattern still present, but attenuated

signal is however attenuated (smaller dynamic range!, see green lines in right plots)



SNR vs Cable Length

Use internal APV calibration pulse to estimate relative SNR



Active repeater and passive adapter show similar SNR within errors

Production/Test Summary

	Produced or Assembled	Tested or under test	NOT Accepted	Comment
GEM foils	51	36	7	2 can be probably recovered
Readout+Honeycomb	15 + 18	8	1	bad gluing, probably still usable
GEM Module	8 / 16	4		pressure compensation chamber on 6 chambers, now under test
External Carbon Frame	1 / 6	1		Just arrived
Front End Electronics	345 / 345	100	3 + 44*	* Under re-working (fix bonding) seems to work
VME Modules	28 / 28	16	3	minor bug, maybe related to DAQ configuration procedure
Backplane (rigid)	80 / 80	28		
Backplane flex-rigid	10 (proto)	7		Under test
Patch Panel (passive adapters)	50 / 50	20		First delivery presented several bugs in connector soldering, returned to company and fixed
Active repeater	2 (proto)	2		Under test