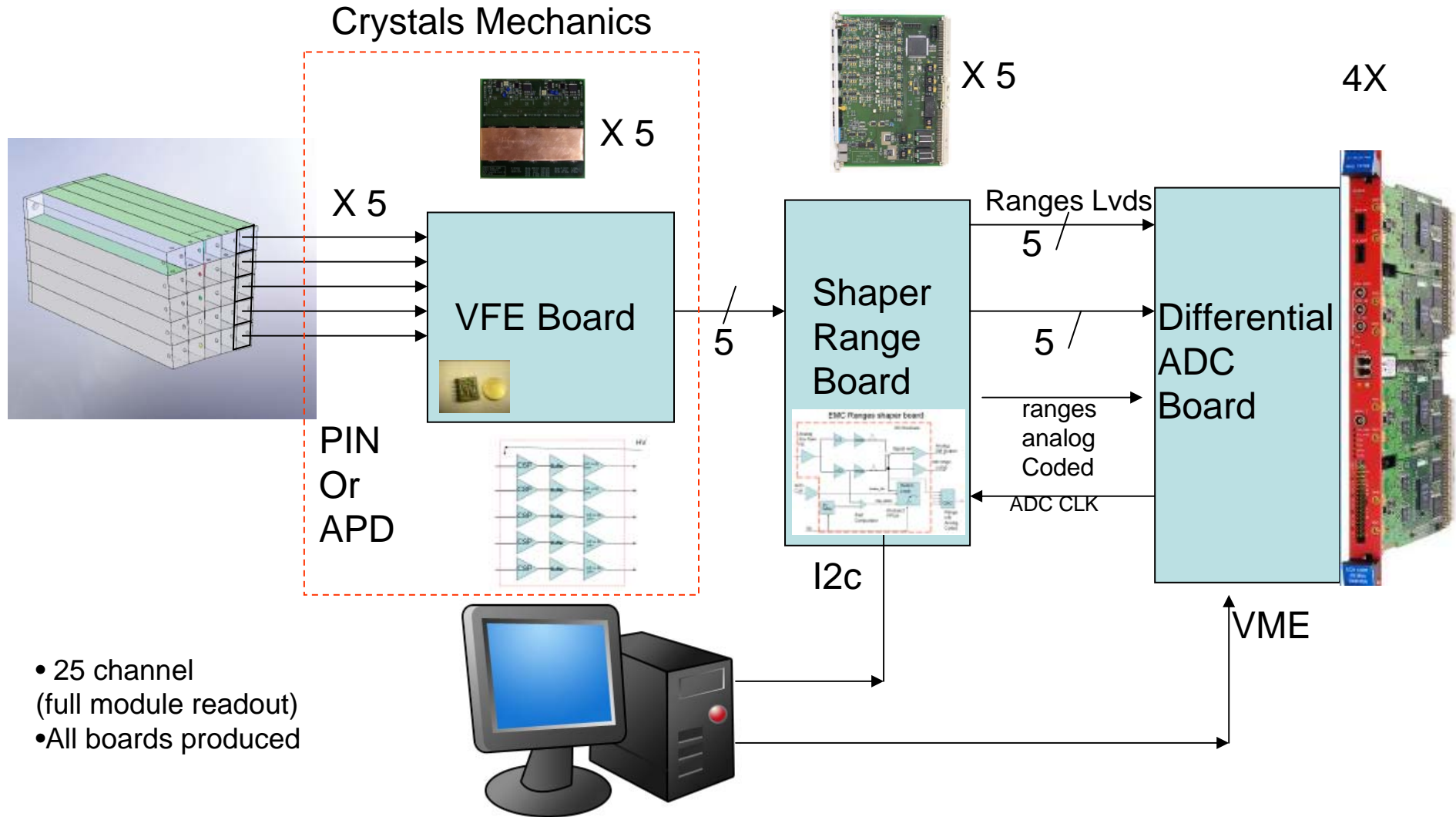# EMC Electronics Update after the 2° BTF test beam

Valerio Bocci
INFN Roma

EMC Electronics: INFN Roma,INFN Perugia
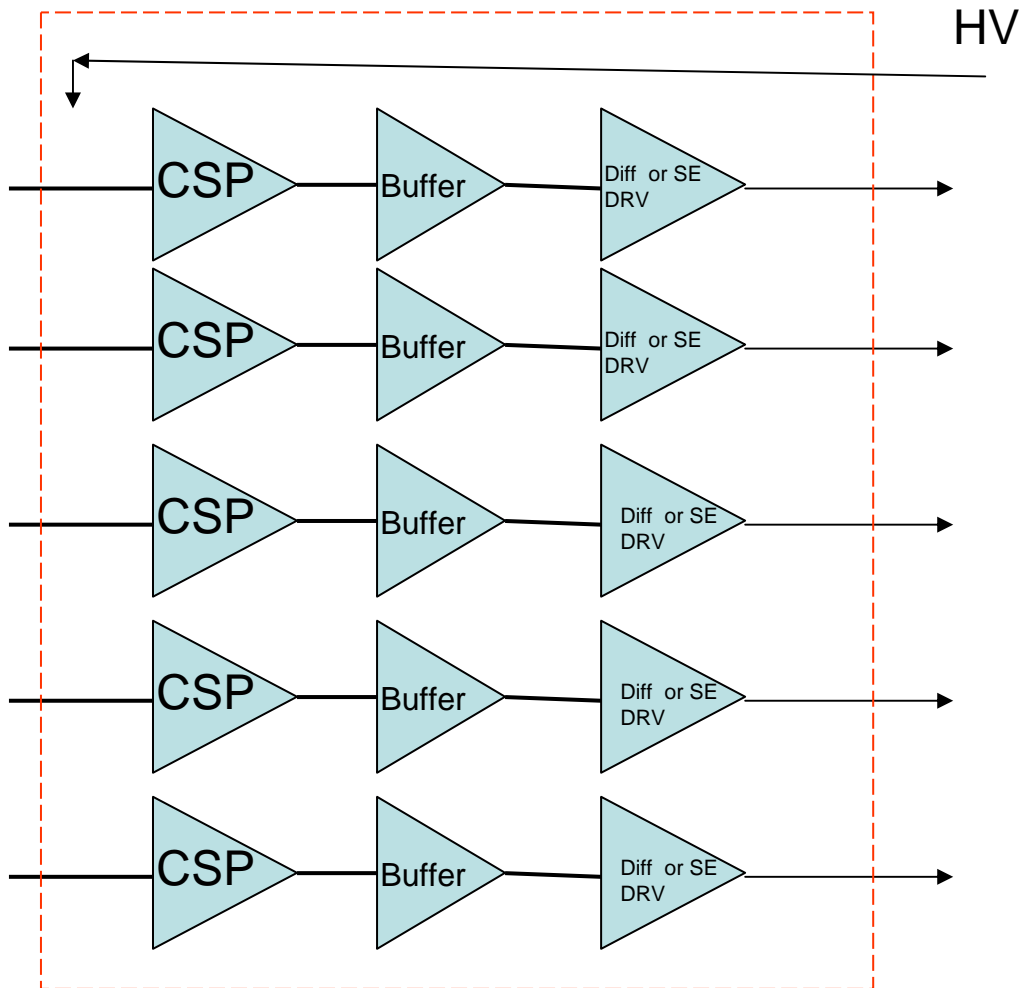
25 crystals tower readout electronics

Crystals Mechanics

X 5

X 5

4X

X 5

Ranges Lvds

X 5

VFE Board

5

PIN Or APD

Shaper Range Board

5

5

Differential ADC Board

ranges analog Coded

ADC CLK

I2c

VME

• 25 channel (full module readout)
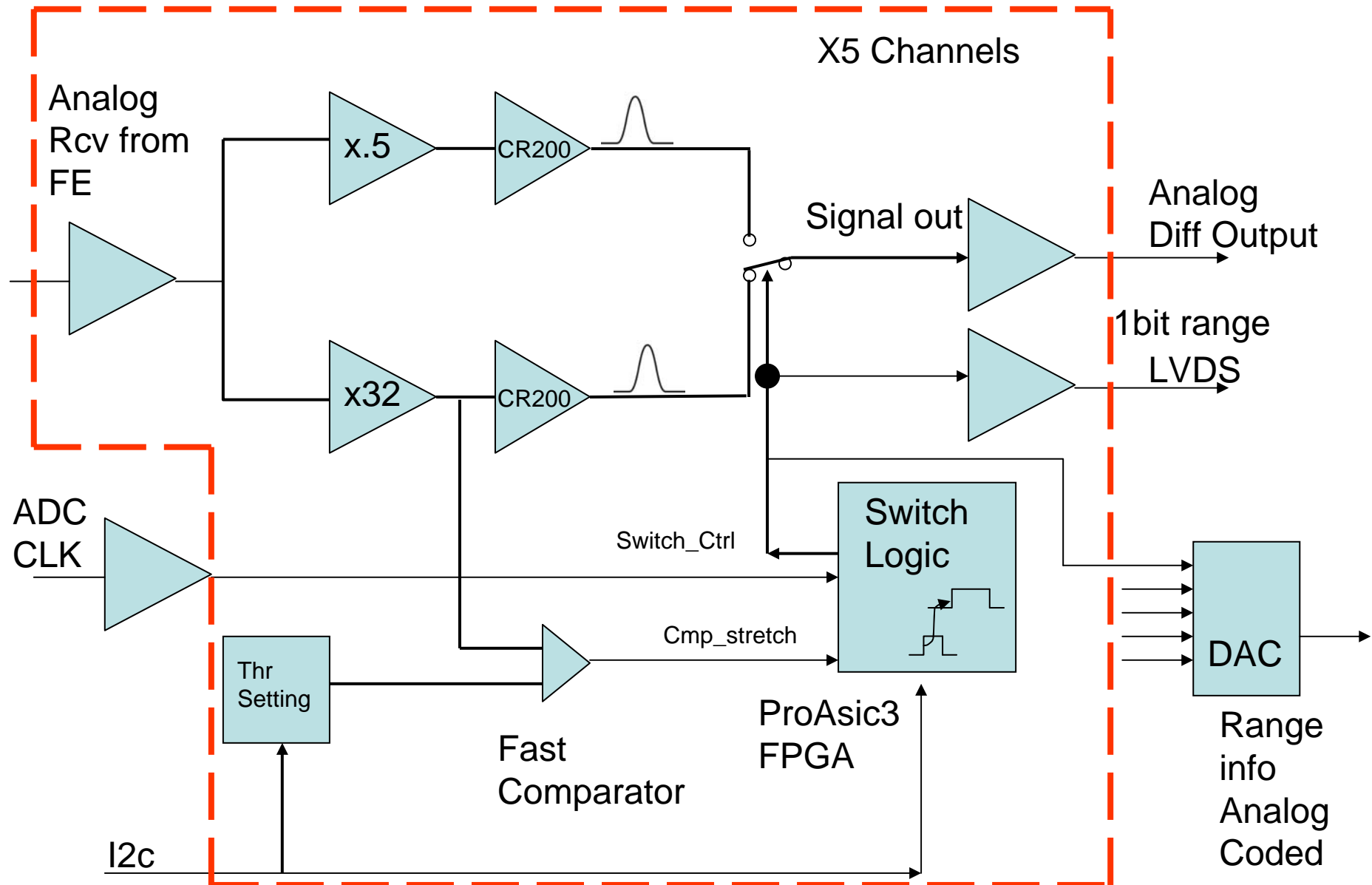•All boards produced

Very Front End Board

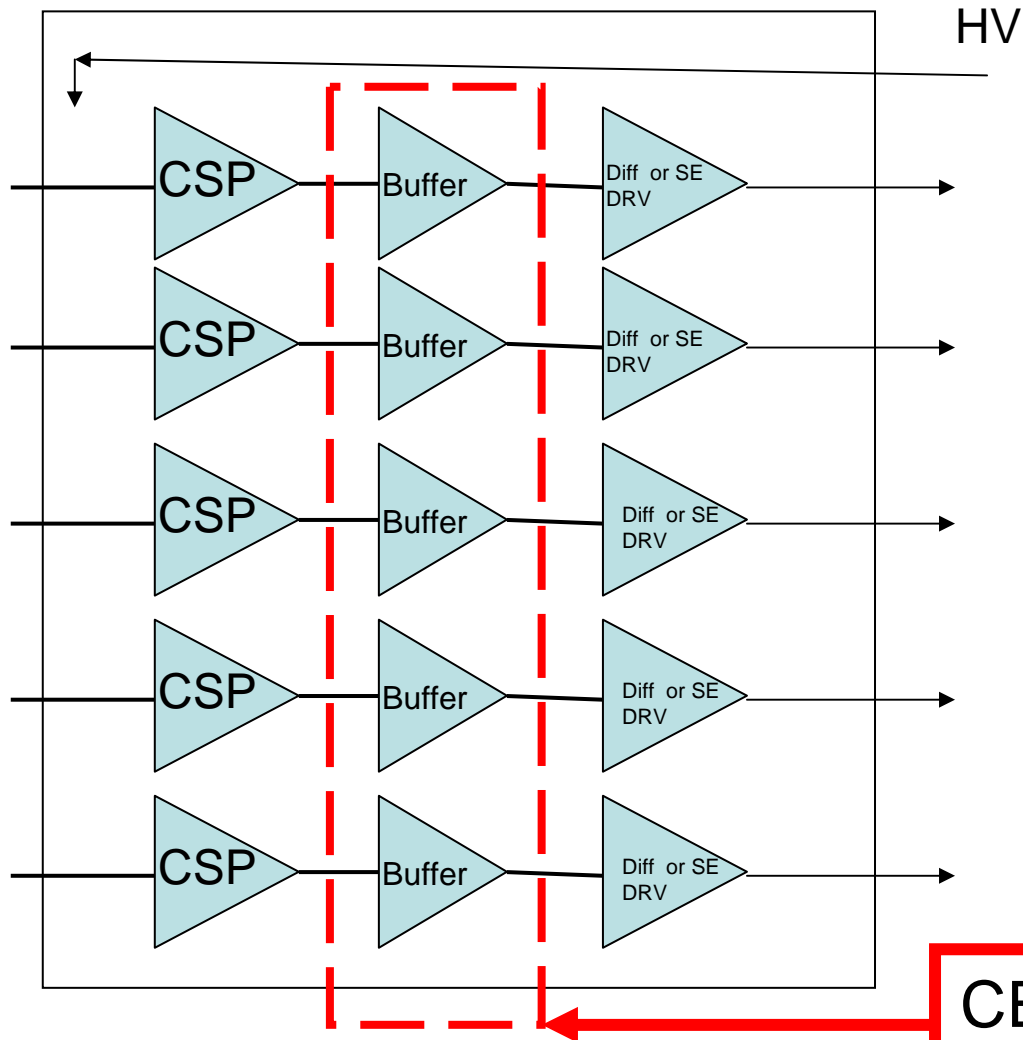
- EMC VFE Board
- 5 CSP Channels
- Enable to mount:
  Cremat,
  Hamamatsu,
  Home Made CSP
- HV distribution
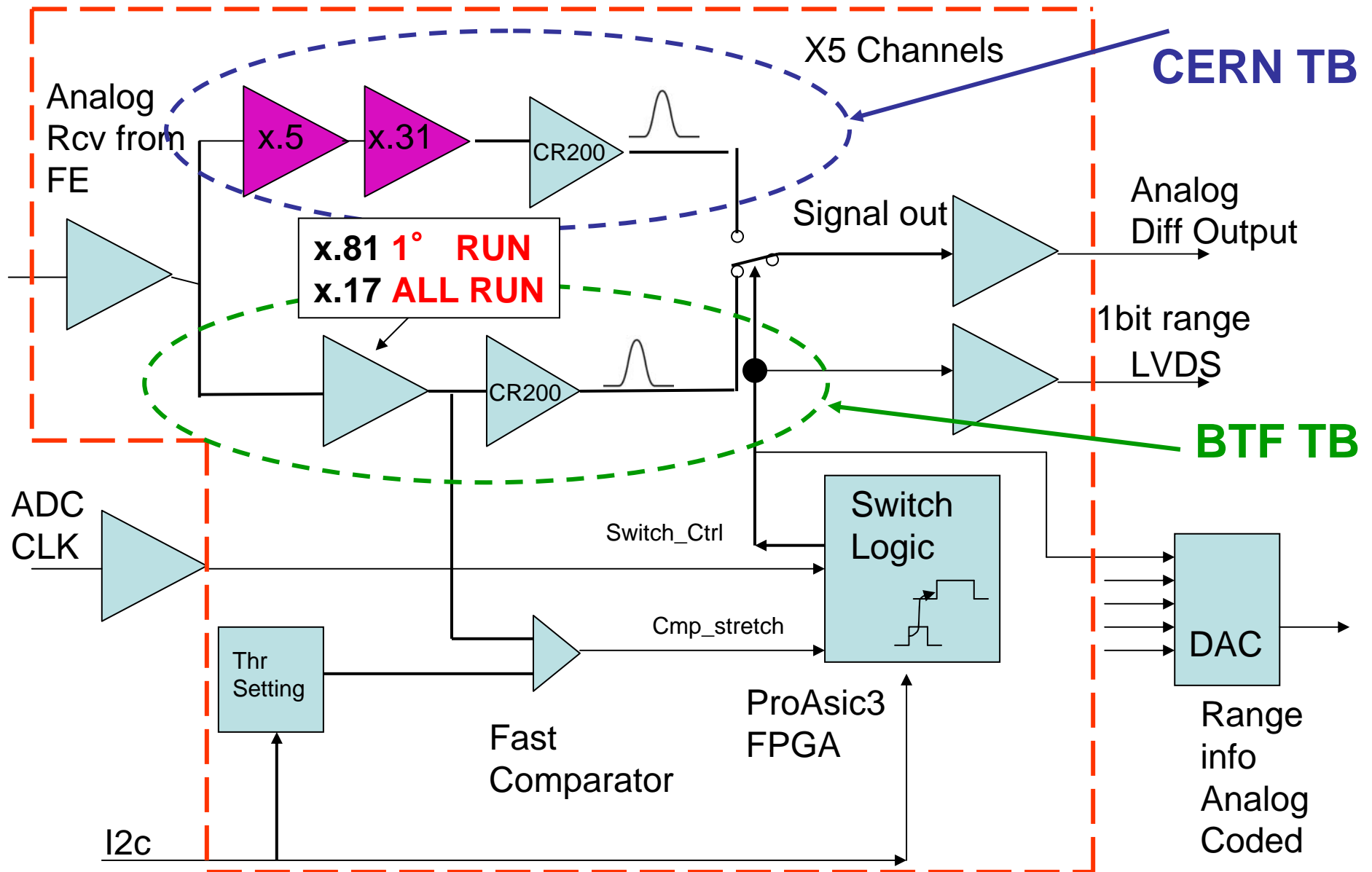
EMC Ranges shaper board

X5 Channels

Analog Rcv from FE

x.5 CR200

x32 CR200

Signal out

Analog Diff Output

1bit range LVDS

ADC CLK

Switch_Ctrl

Switch Logic

Thr Setting

Cmp_stretch

Fast Comparator

ProAsic3 FPGA

DAC

Range info Analog Coded

I2c

La Biodola SuperB Workshop May 28 June 2, 2011

Valerio Bocci

Very Front End Board settings for APDs Channels

HV

CSP → Buffer → Diff or SE DRV →
CSP → Buffer → Diff or SE DRV →
CSP → Buffer → Diff or SE DRV →
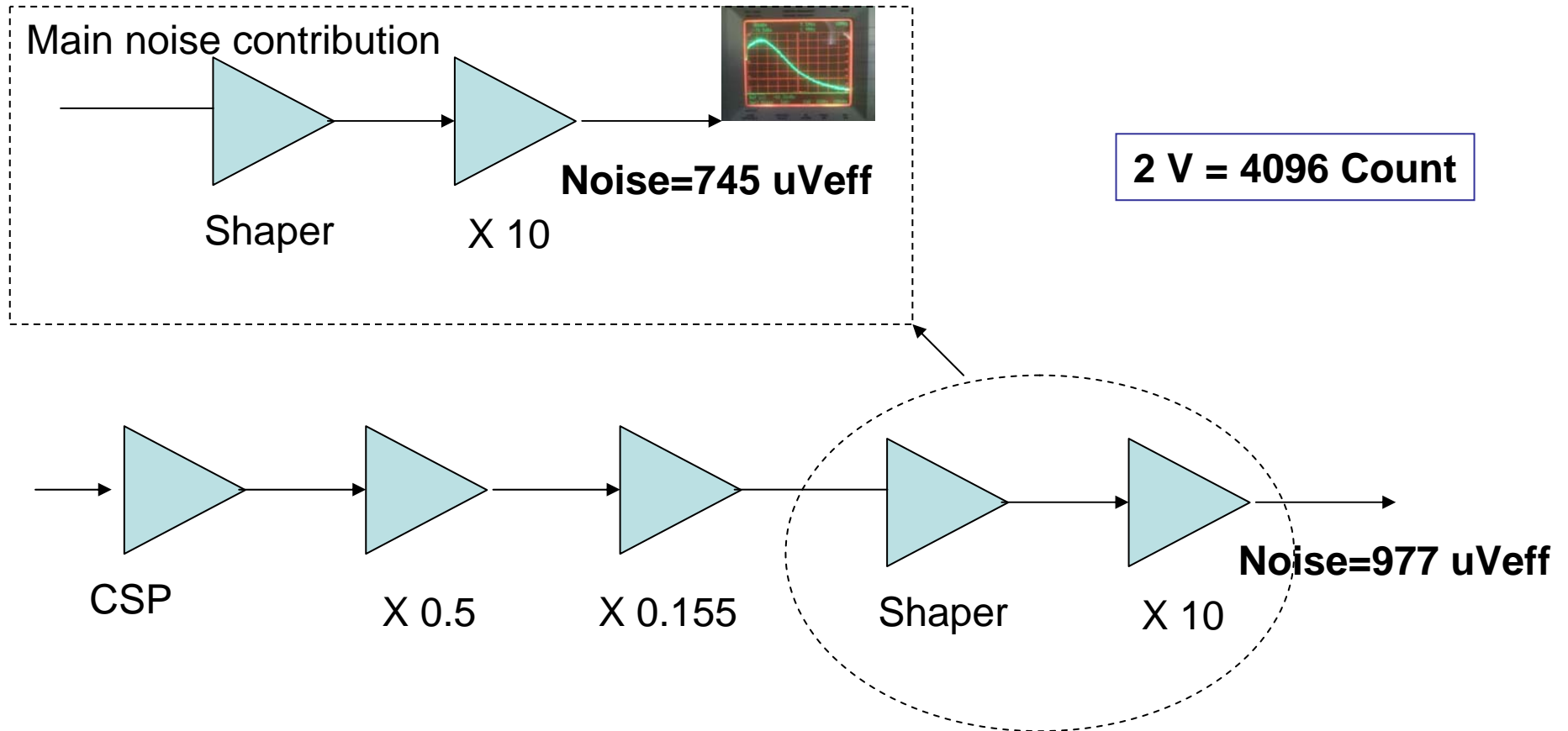CSP → Buffer → Diff or SE DRV →
CSP → Buffer → Diff or SE DRV →

CERN configuration gain: 0.5
BTF2 configuration gain:1

EMC Ranges shaper board test beam settings
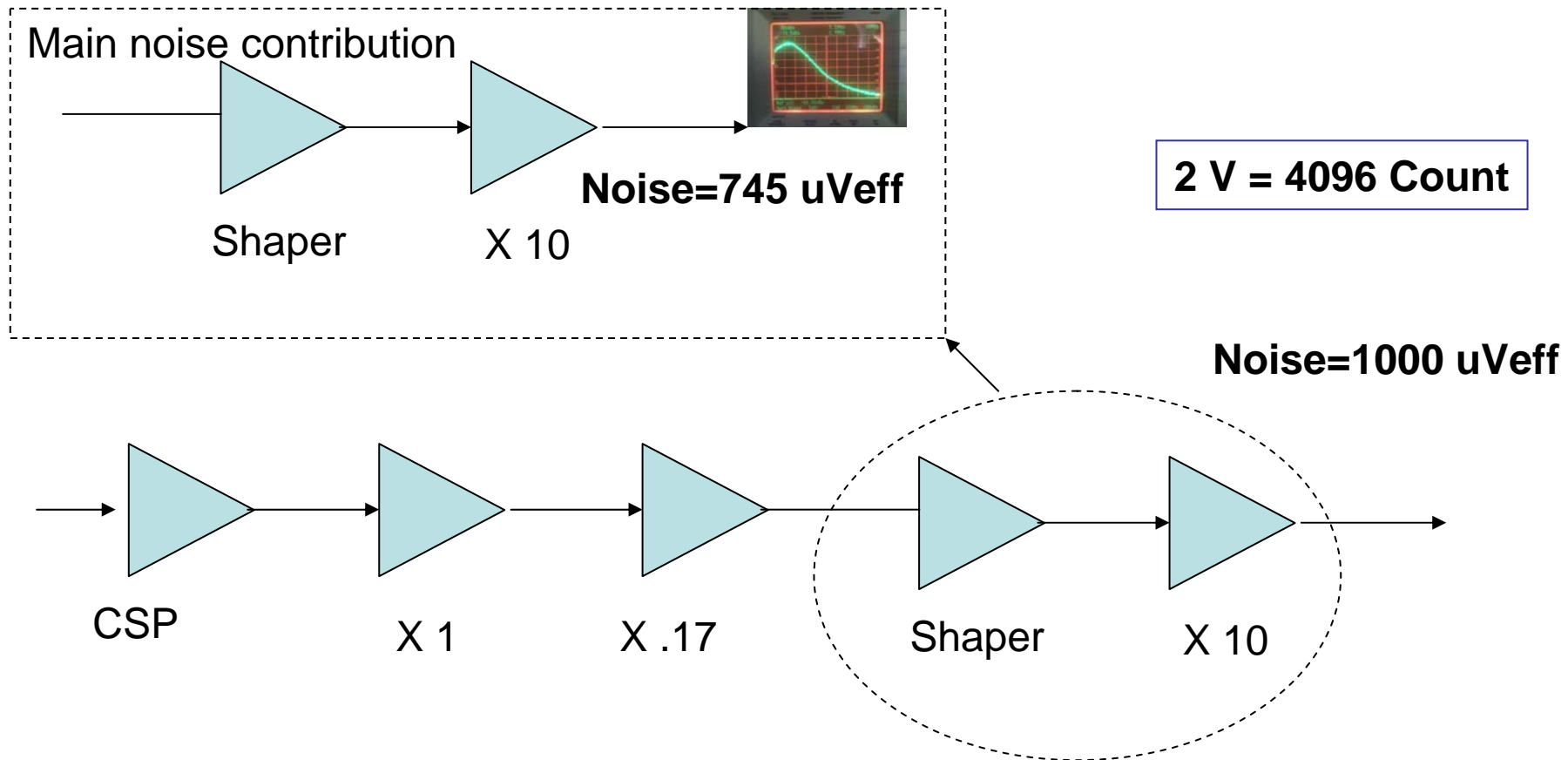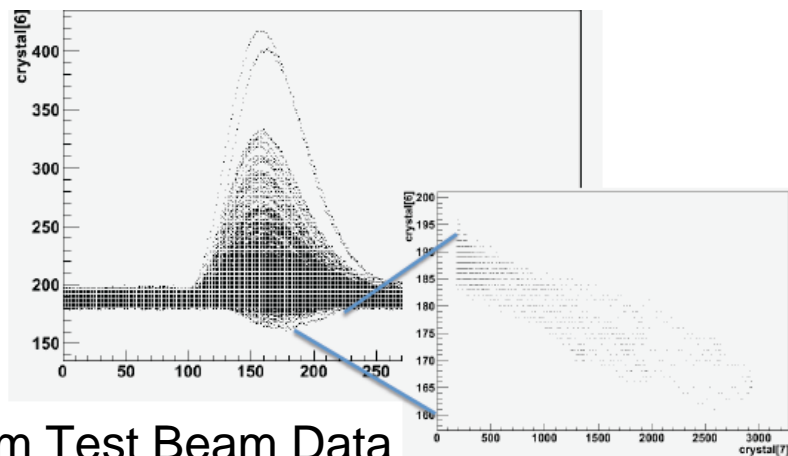
CERN Test Beam Amplification Chain

Main noise contribution

Shaper

X 10

Noise=745 uVeff

2 V = 4096 Count

CSP

X 0.5

X 0.155

Shaper

X 10

Noise=977 uVeff

BTF 2° Test Beam Before MAY 9, 5 PM

Main noise contribution

Shaper   X 10

Noise=745 uVeff

2 V = 4096 Count

Noise=2444 uVeff

CSP   X 1   X .81   Shaper   X 10
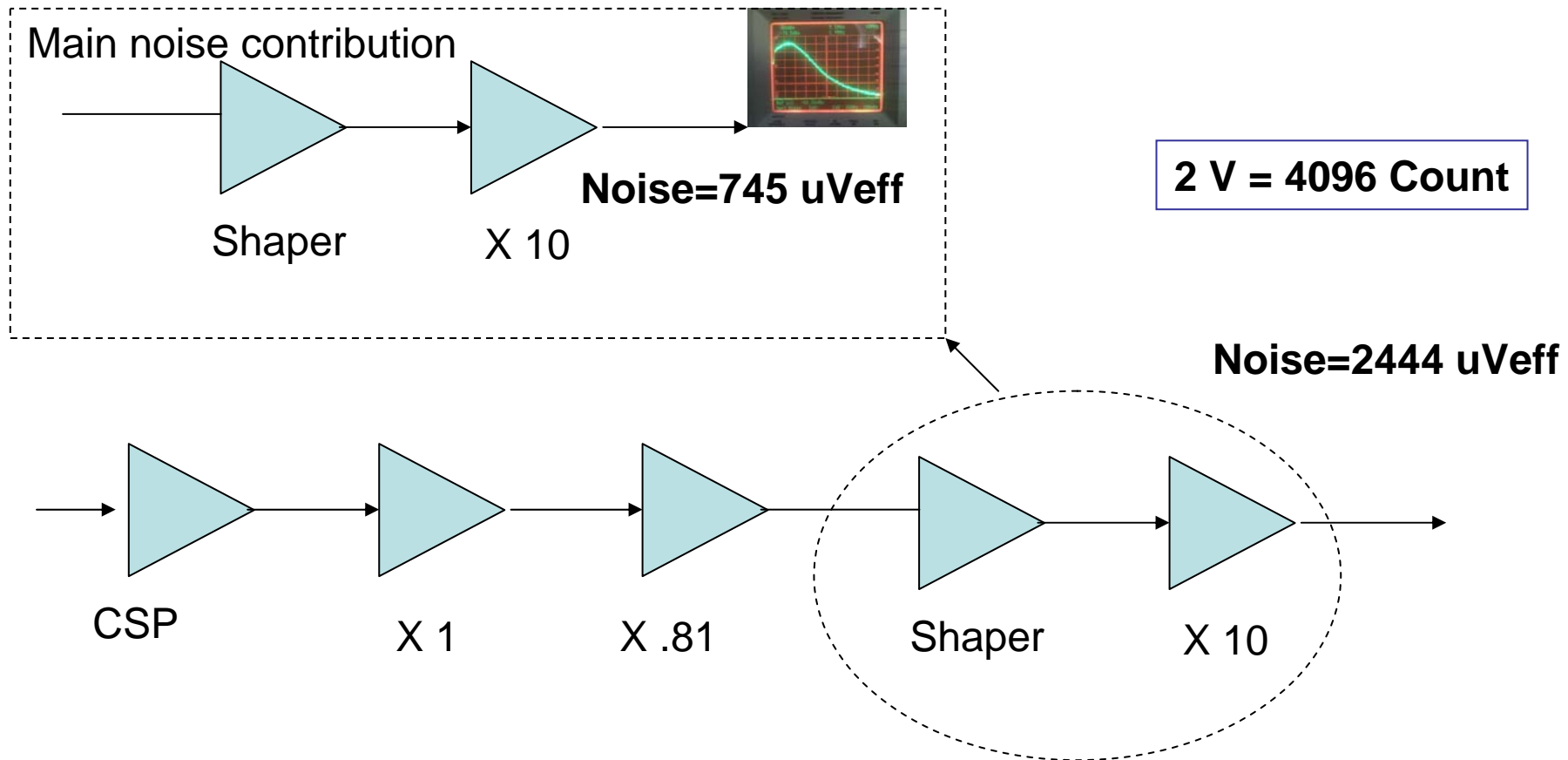
BTF 2° Test Beam After MAY 9, 5 PM

Main noise contribution

Shaper   X 10   **Noise=745 uVeff**

2 V = 4096 Count

Noise=1000 uVeff
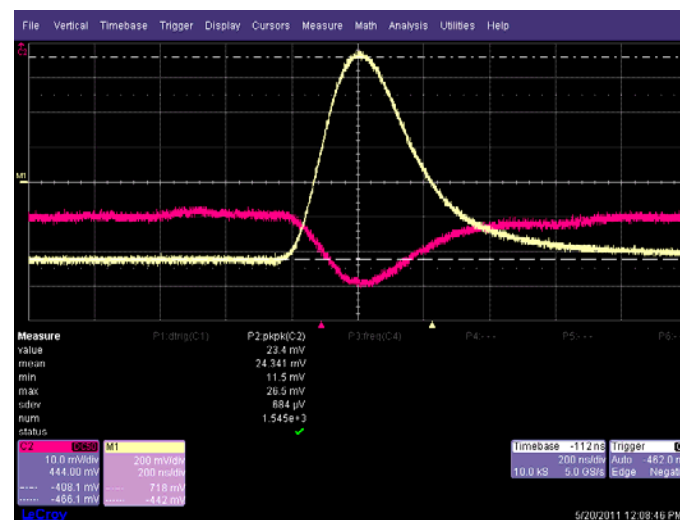
CSP   X 1   X .17   Shaper   X 10

Problems found during the test beam

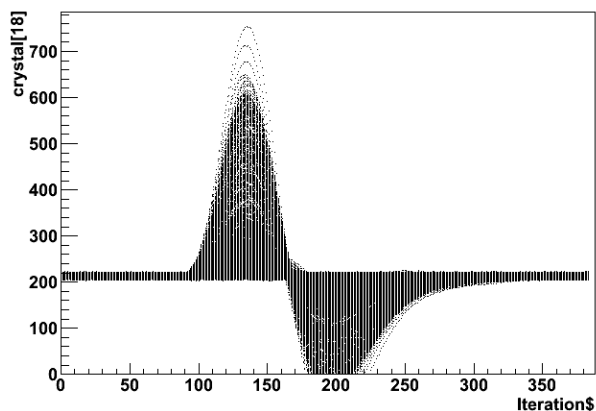Discovery of Xtalk Ch_{N-1} vs Ch_N

From Test Beam Data

Replicated in LABE

Similarly (7,8), (8,9), (2,3), (3,4),(20,21)

Just a couple of fake cables from VFE to Range shaper

Xtalk Matrix measuraments

(A.Papi L.Recchia)

2.2%	2.0%	1.7%	1.7%
2.2%	2.0%	2.0%	2.0%
1.2%	1.2%	1.1%	1.0%
0.5%	0.5%	0.5%	0.5%
2.2%	2.0%	2.4%	1.7%

← Ch0

Ch24 →
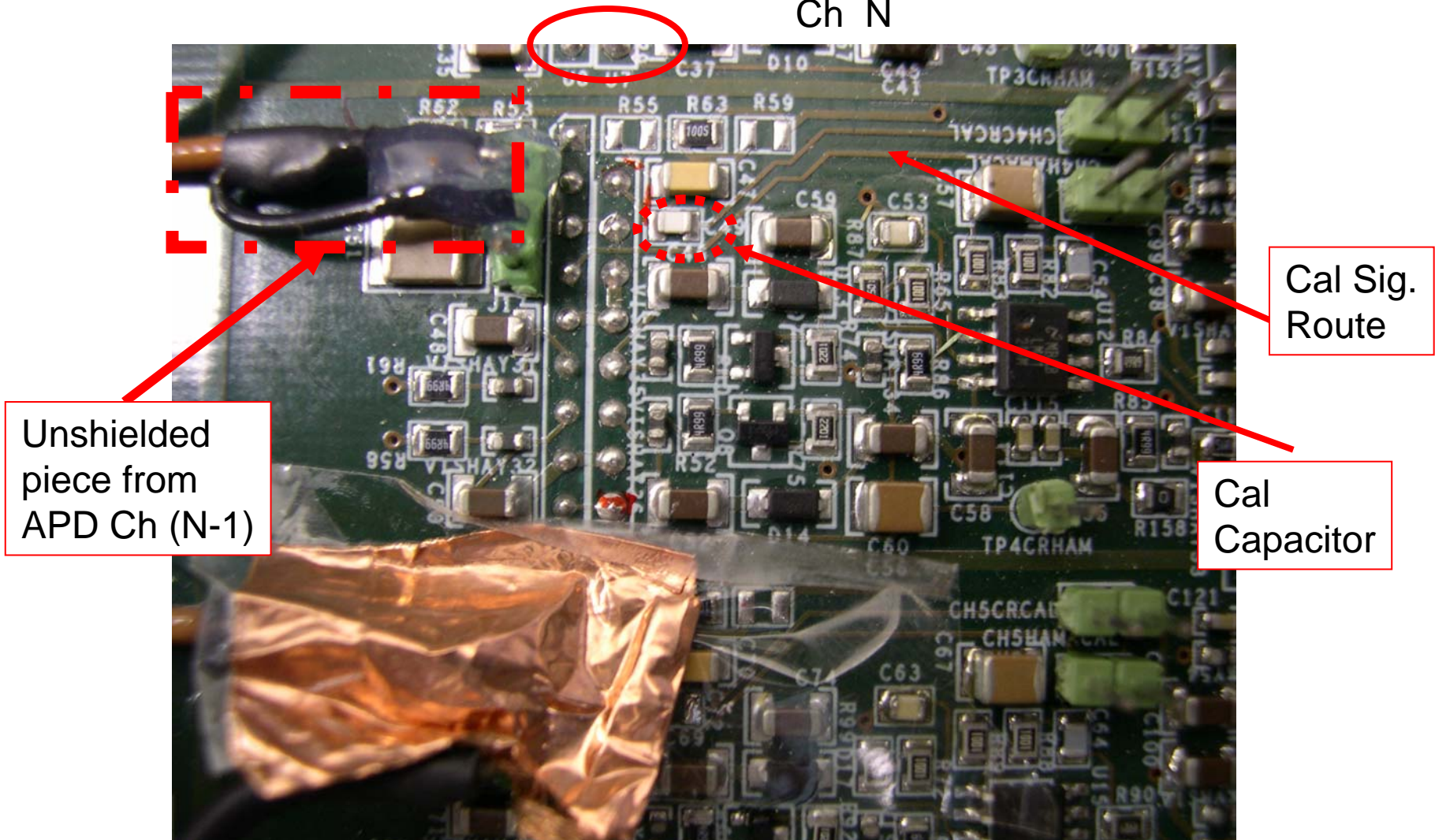
Ch3= Ch3(real) + 2.2% of Ch4

Very Front End Board

(PCB layout D. Ruggieri, A.Papi)

- EMC VFE Board
- 4 Layers
- 5 CSP Channels
- Enable to mount:
  Cremat,Hamamatsu,Home Made CSP
- HV distribution
- Mounted on crystals
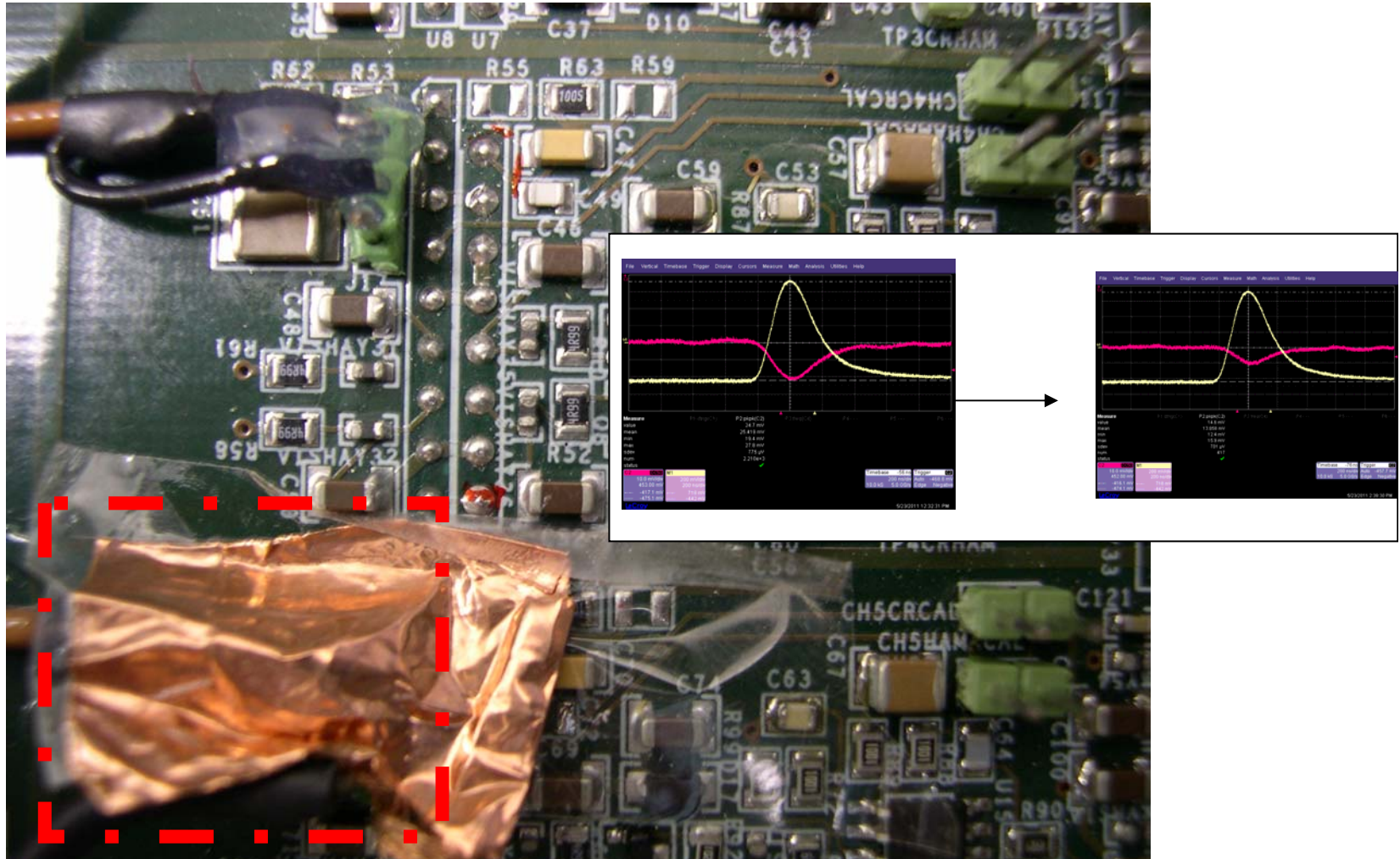- Interface with EMC range Board

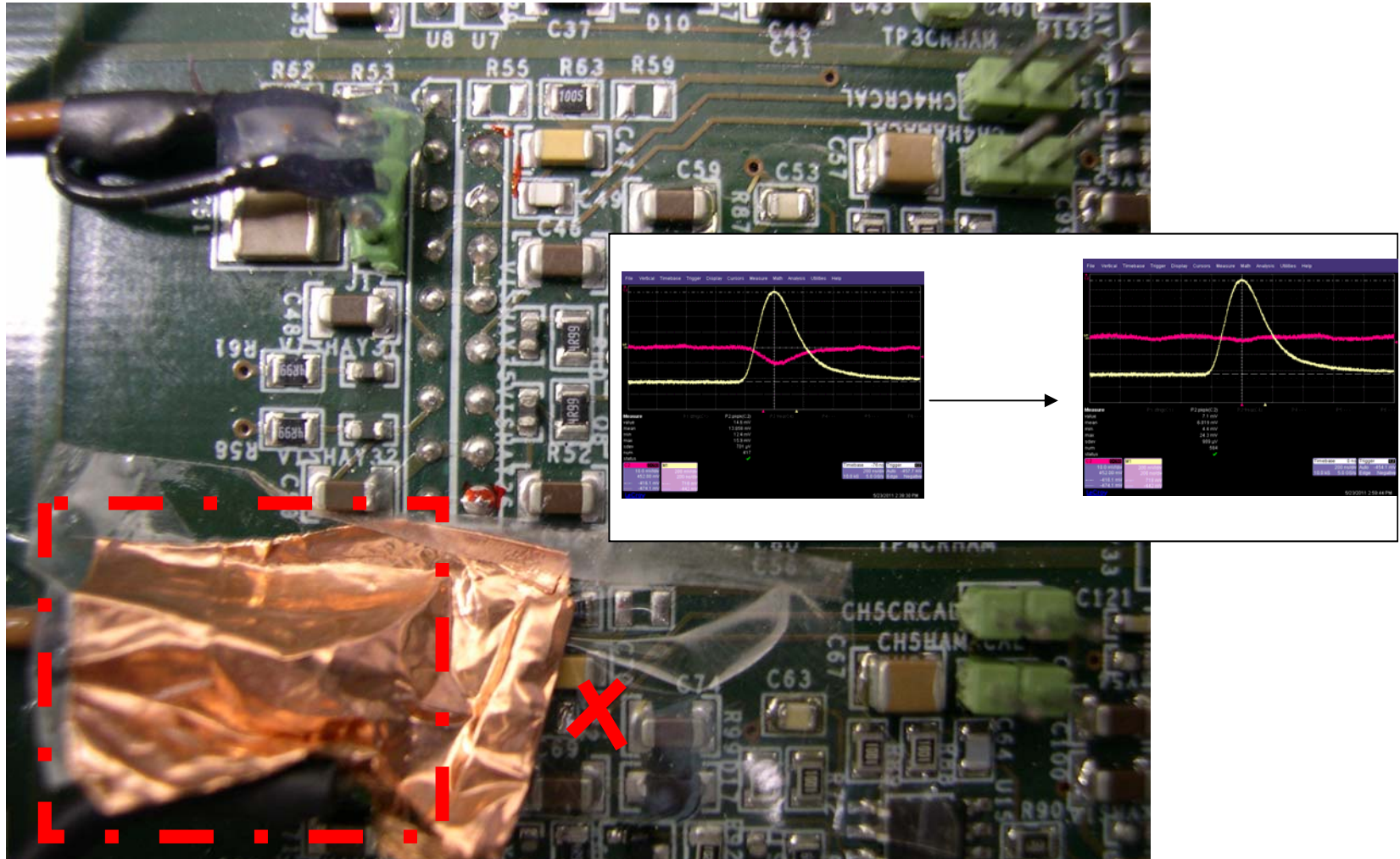# VFE Board Xtalk Source and target

Output from Ch N

Cal Sig. Route

Cal Capacitor

Unshielded piece from APD Ch (N-1)
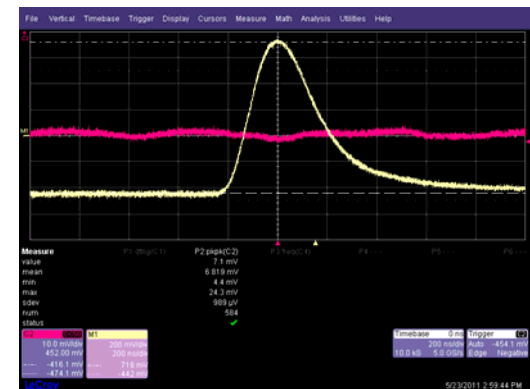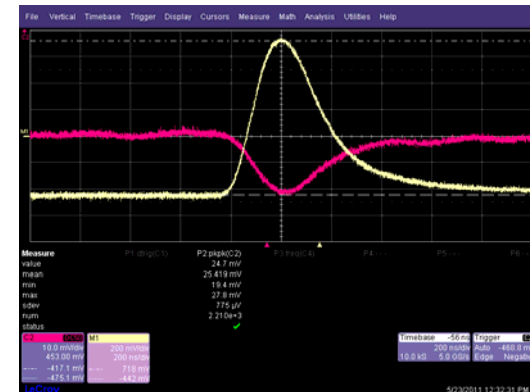
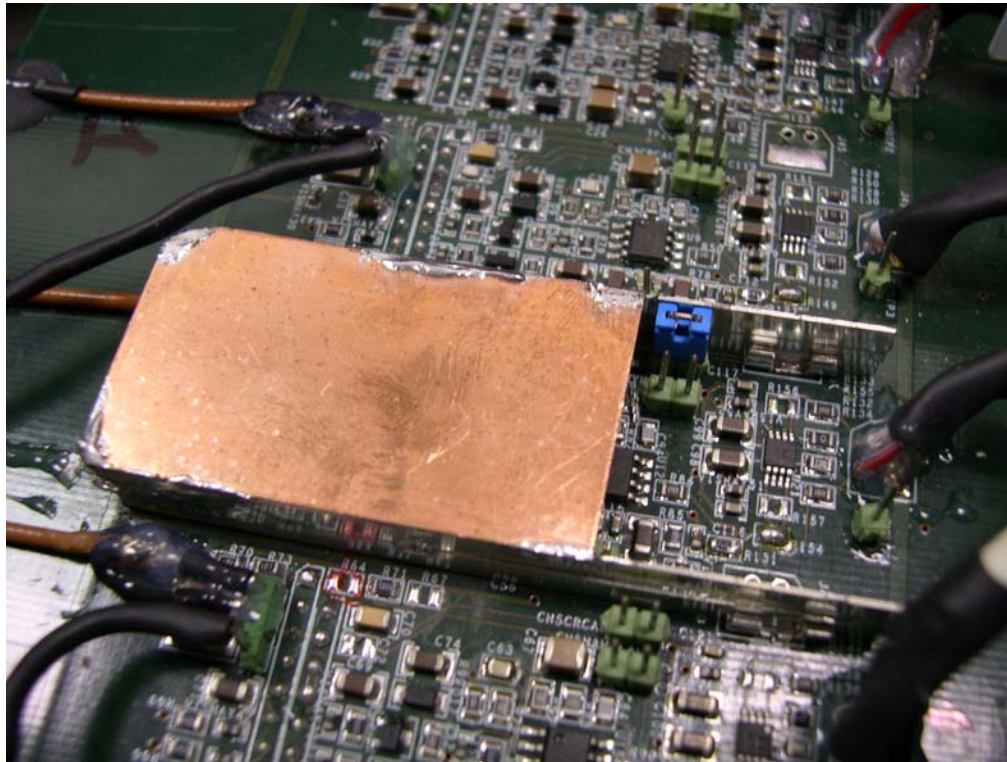# VFE Board Xtalk Source and target

VFE Board Xtalk Source and target

Final Xtalk solution
(by Luigi Recchia)

Conclusions

- We replicate the results from the CERN test beam

- The Better conditions of the Environment permits to discover second order effects not cleary visible during test CERN

- Now we know how to cure the xtalk problem and how to discover fake cables.

- The system is good in the High range and low range scale we have to investigate how to manage overlapping regions.