

PIERRE  
AUGER  
OBSERVATORY

# Commissioning dell'elettronica

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# Introduction

- UUB vs UB
- Installation and transition
- New detectors (SSD, SPMT, RD and AMIGA)
- New Functionalities (Triggers, ...)

# UUB vs UB

- ADC

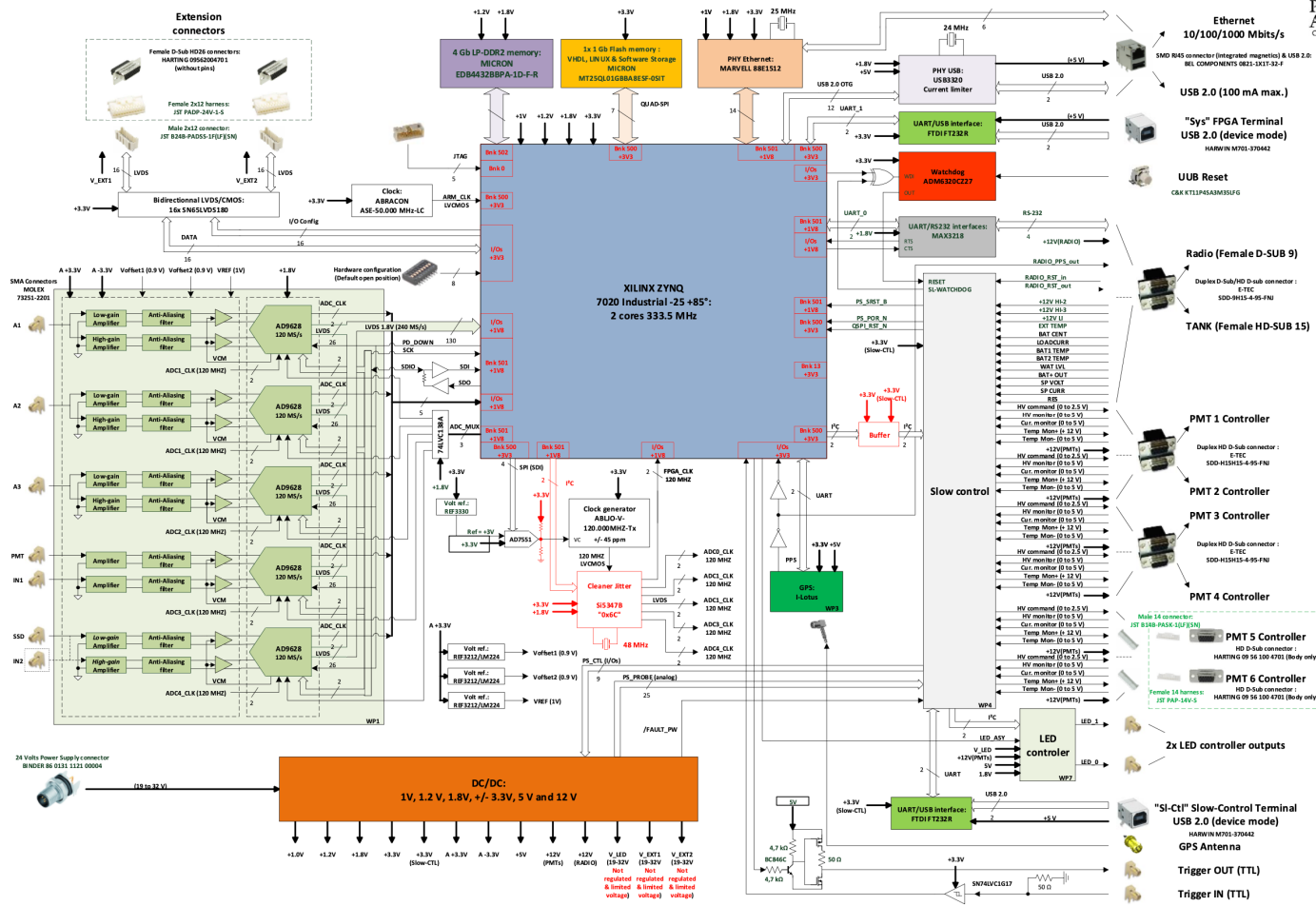
- 120 MHz, 12 bits
- Time bin 8.3 ns  $2.4 \sigma$
- 0-2V in 4096 counts
- Baseline 200 ADC counts
- Noise:
  - $\text{RMS}_{\text{HG}}$  2.0 ADC counts
  - $\text{RMS}_{\text{LG}}$  0.5 ADC counts
- HG/LG in phase (same input)

- ADC

- 40 MHz, 10 bits
- Time bin 25 ns  $7.2 \sigma$
- 0-2V in 1024 counts
- Baseline 50 ADC counts
- Noise:
  - $\text{RMS}_{\text{HG}}$  1 ADC count
  - $\text{RMS}_{\text{LG}}$  0.5 ADC counts
- HG/LG not in phase (anode/diode) cross calib needed

# UUB

## Version 3 baseline schematic



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# UUB vs UB

Detectors:

3x2 LPMT

1 SPMT

1x2 SSD

1 RD

1 AMIGA

Detectors:

3x2 LPMT

# Installazione nel campo

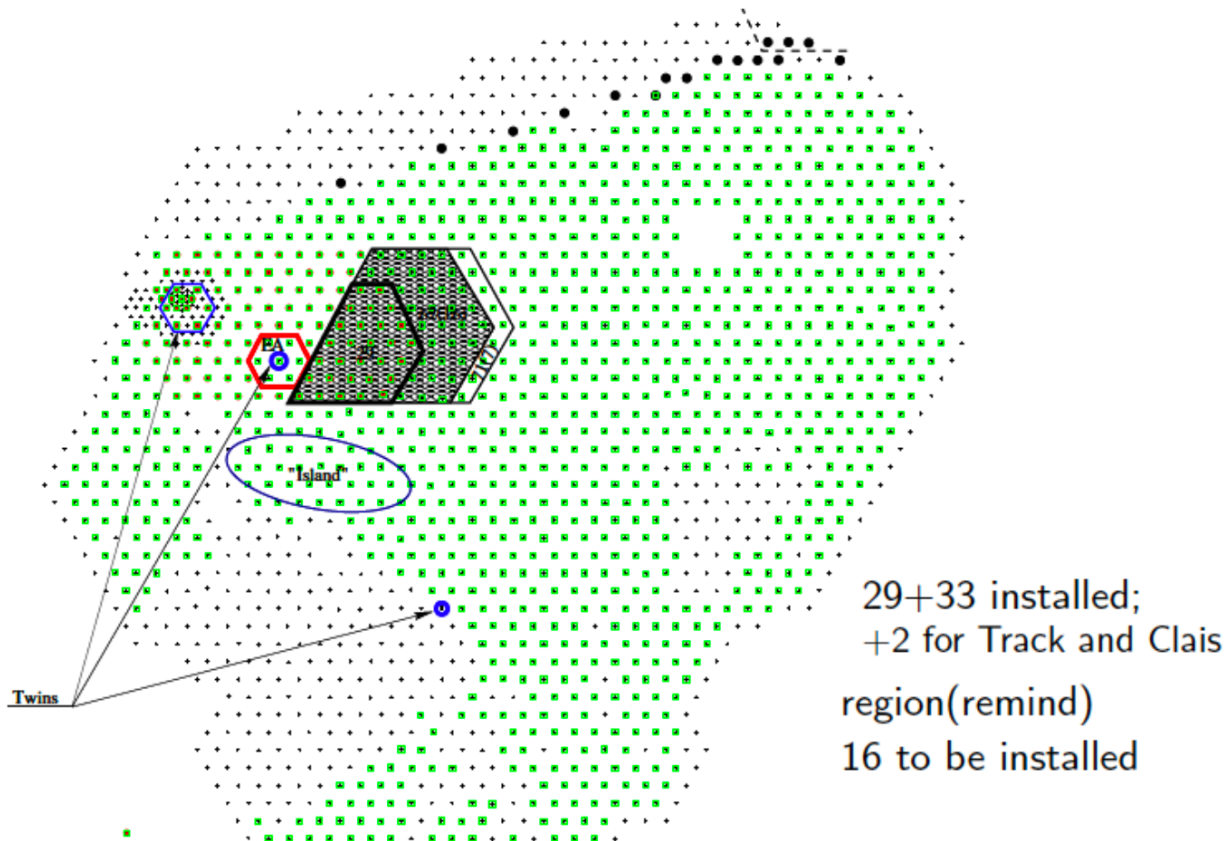


Figure 1: Map of the current pre-production array.

# Installazione

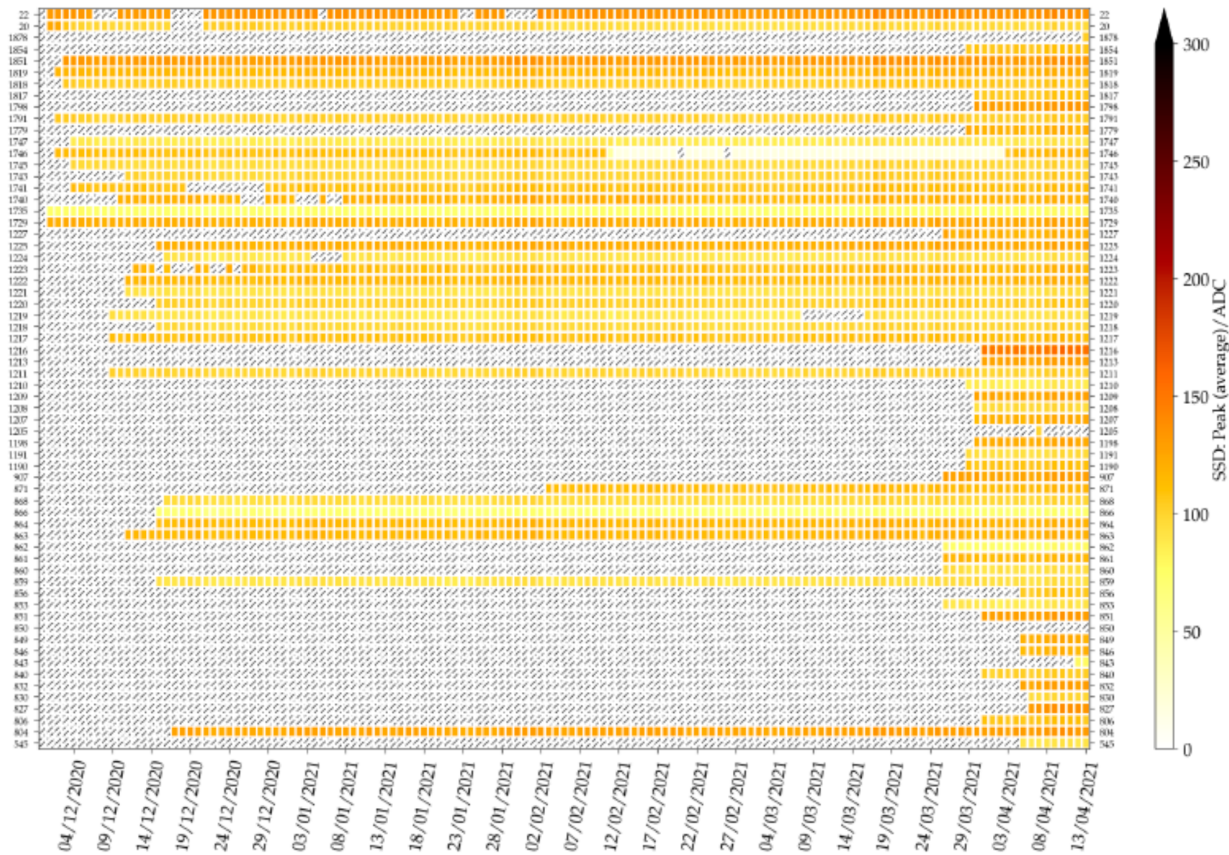


Figure 8: SSD muon peak for all stations.

# Installazione

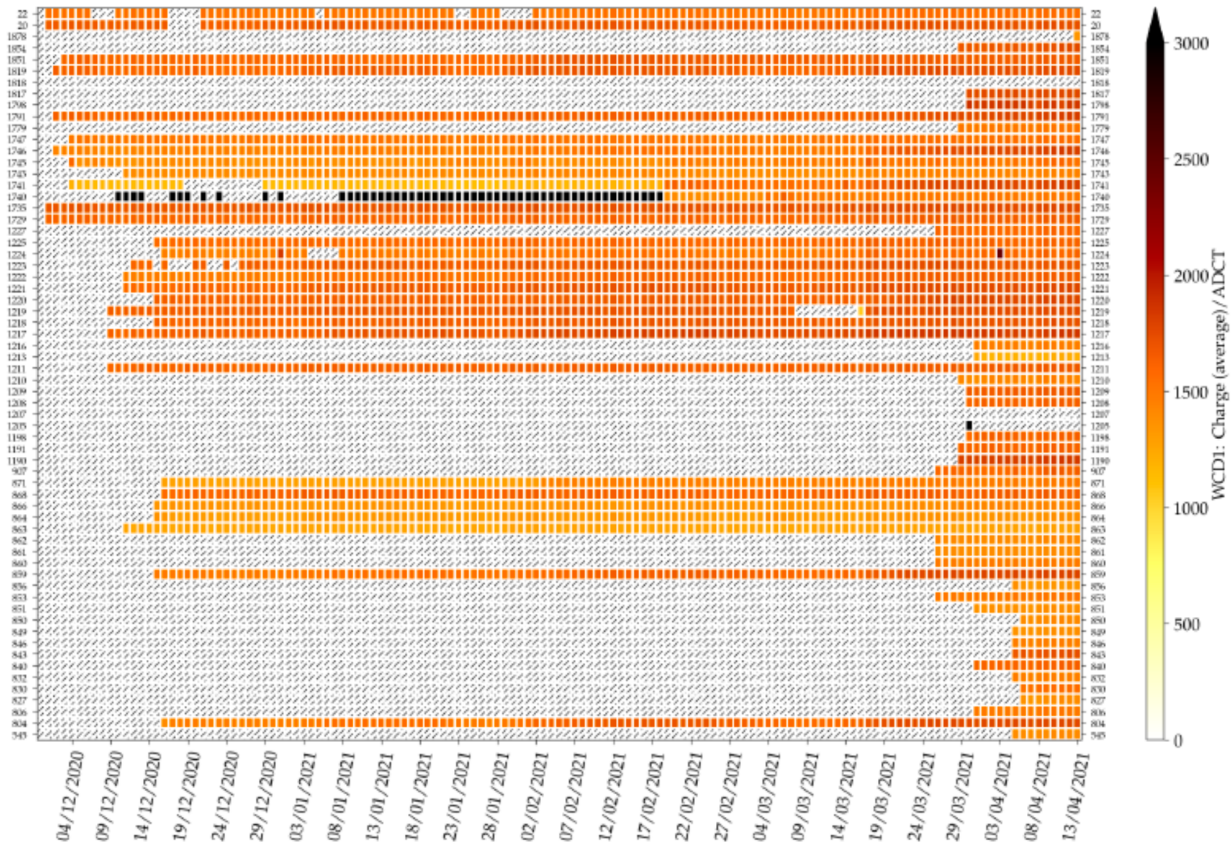
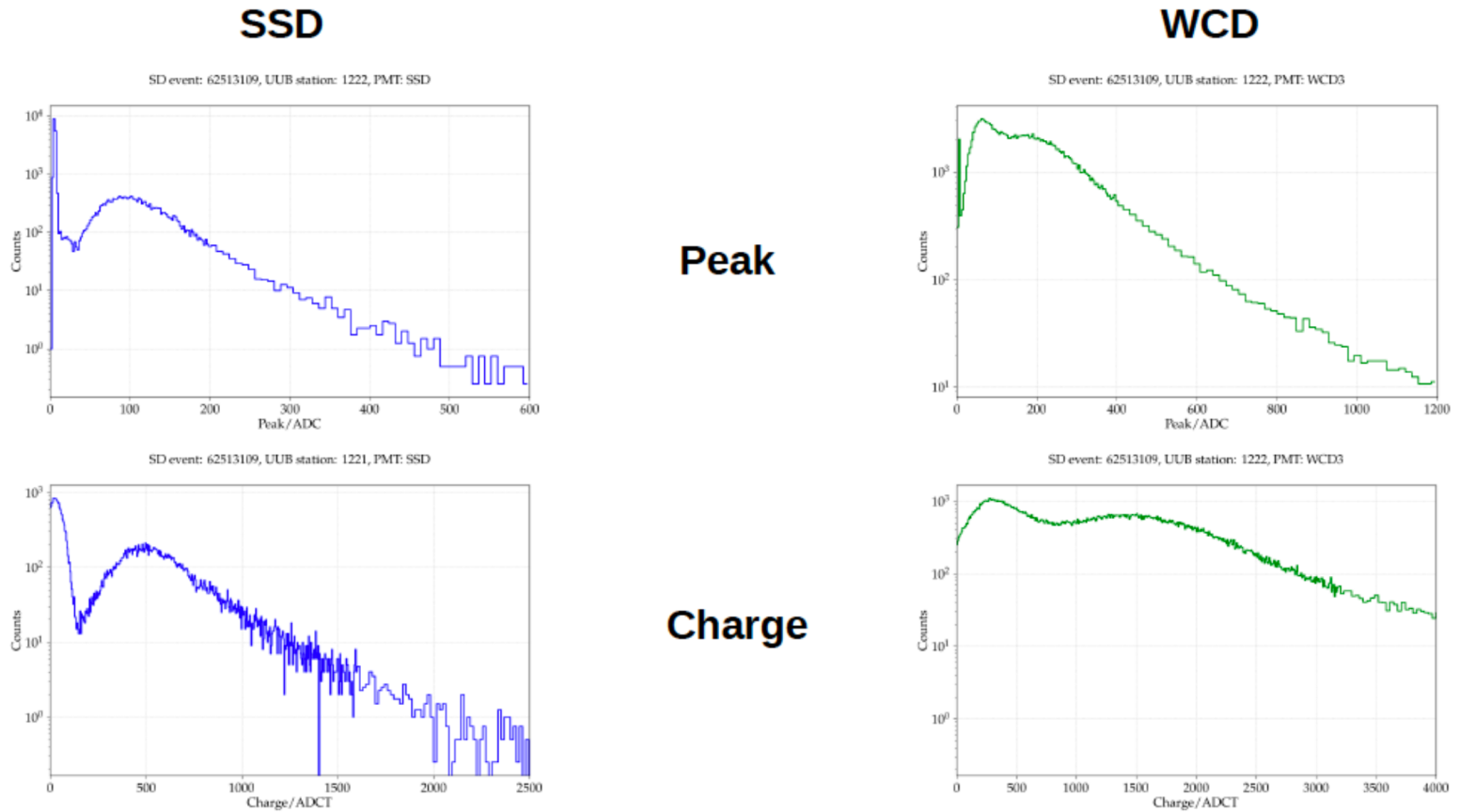


Figure 10: WCD muon charge histograms for LPMT 1.



# Installazione

Examples of charge and peak histograms are shown below.



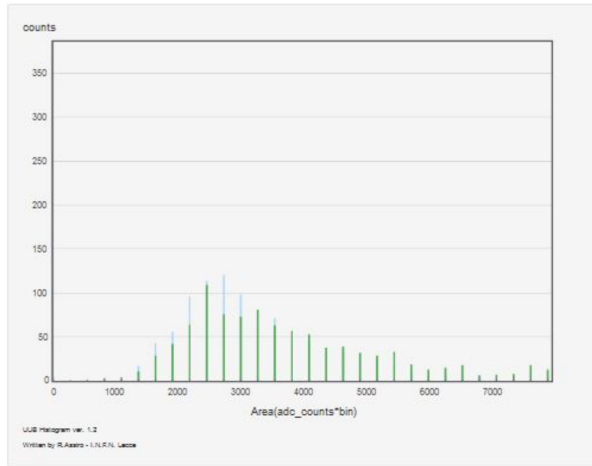
*Figure 7: SSD and WCD peak and charge histograms for station 1222.*

# Installazione

- **SSD test**
- Developed a tool to quick test SSD
  - Web page
  - ADC Data from fpga: Baseline, Peak and AREA
  - Moda, Mean and RMS
- MIP detection. Both self and external trigger

# Test before instalation

CH 1 Low CH 2 High CH 3 Low CH 4 High CH 5 Low CH 6 High CH 7 Low CH 8 Low CH 9 Low CH 10 High Toggle All ch Reset Zoom



Histogram data

Number of Events:

Mode:

Channel	Mean	RMS
low0	127.01	98.00578482637298
high0	3730.133	2328.493169258181
low1	155.203	99.91521301083221
high1	4389.926	2771.21978784144
low2	14.095	9.88738849785591
high2	47.861	69.5142839925725
low3	0.242	1.46745902838888
low3	20.914	14.73877725963171
low4	1.448	3.89041077522886
high4	15.612	24.4009314578309

## SSD TEST

**Select:**  
Channels  
Trigger  
Number of Events  
Display

**Display:**  
Area distribution  
Peak Distribution  
Baseline

For each: Moda, Mean and RMS

ZOOM

Trigger

Mode:

Source:

Level:  Counts

Axys range

Min:  X axis

Max:  Y axis

COINCIDENCE PANEL

# Installazione

- Definire un protocollo
- Verificare stato dei detectors
- Rivedere procedure per setting HV dei detectors e calibrazione
  - Utilizzo SSD in trigger?

# Nuovi detector

- Lavoro da fare per DAQ e Analisi
- DAQ
  - Calibrazioni (fpga, CPU)
  - UIO, interrupts (Diverso da UB)
  - Gestione RD e AMIGA?
- Analisi
  - Utilizzo dei nuovi detector

# Nuove funzionalità

- Triggers
  - Ora tutto riferito a UB (40 MHz)
  - Soglie? Ora simili a UB. Minor rumore -> soglie più basse e combinazioni temporali...
  - Utilizzo SSD? RD?
  - Nuovi trigger?
- Nuove comunicazioni?

# Conclusioni

- Fase nuova
- Bisogno di forze nuove ma con esperienza
  - RTD?
  - Nuove posizioni...
  - Coordinamento tra esperti dei rivelatori, elettronica e fisica