

# MAROC Test Status Report

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# Overview

H8500+MAROC showed excellent discrimination power at SPE level and an adequate radiation tolerance for the CLAS environment.

Timing performances and background noise under investigation

Sub-ns timestamp resolution

New Setup\* (with NINO chip)

Measure leading edge time and time over thr

Feed Maroc with Laser+MAPMTs or Test Pulse

MAPMTs selection,

Characterization with dark

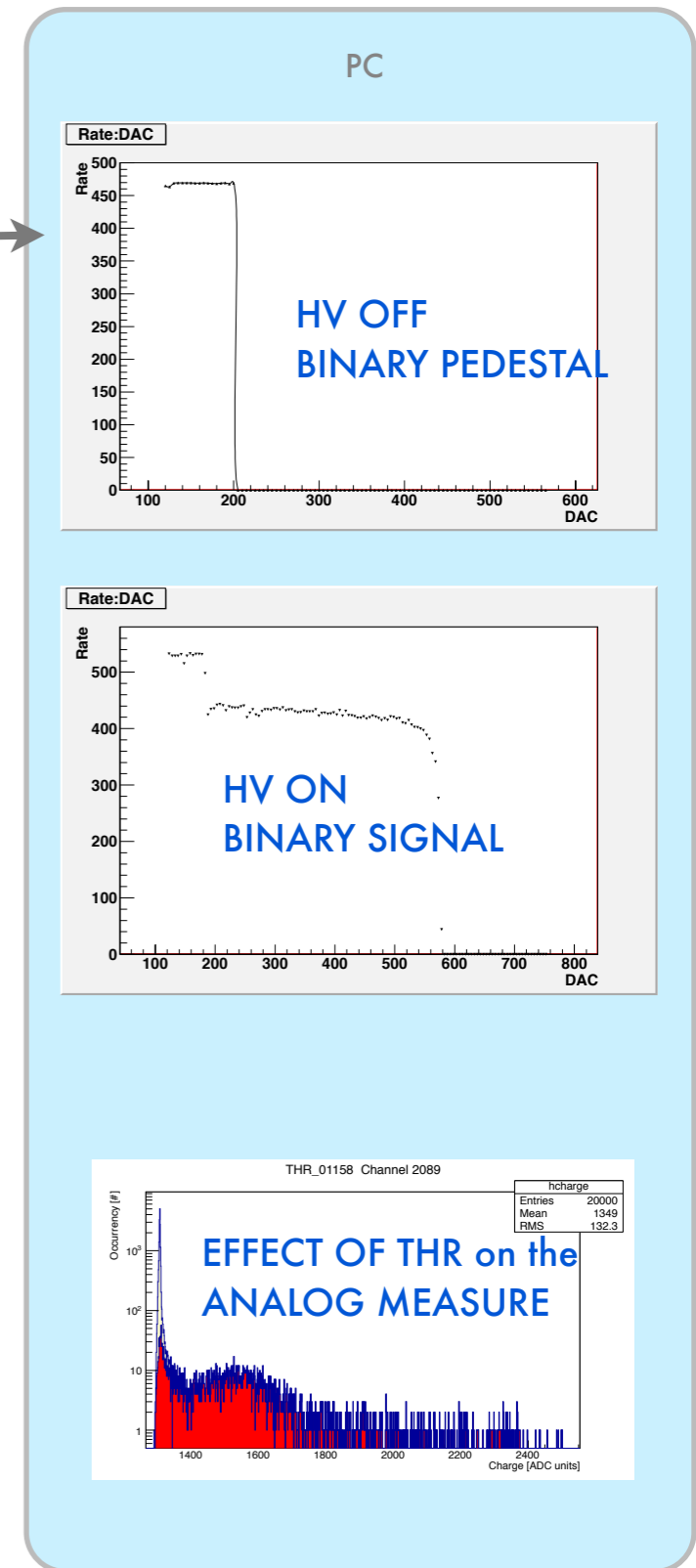
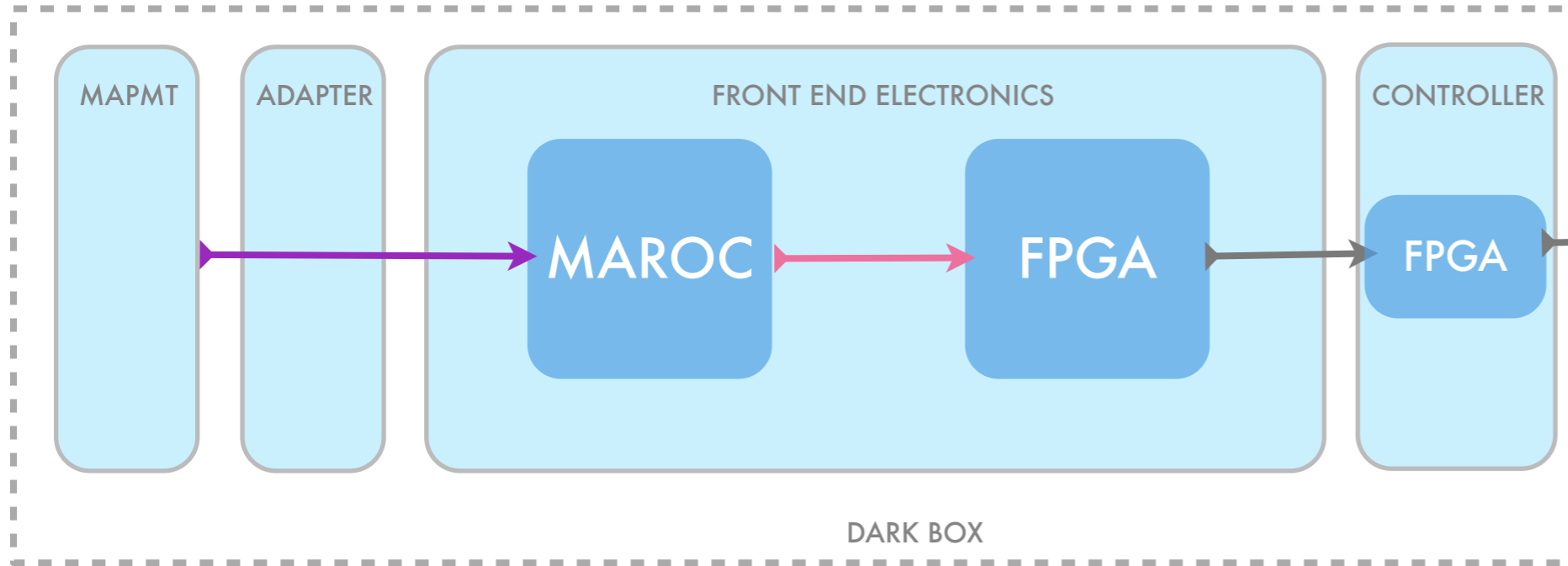
Usual Setup (Self trigger)

Data on 4 MAPMT lost



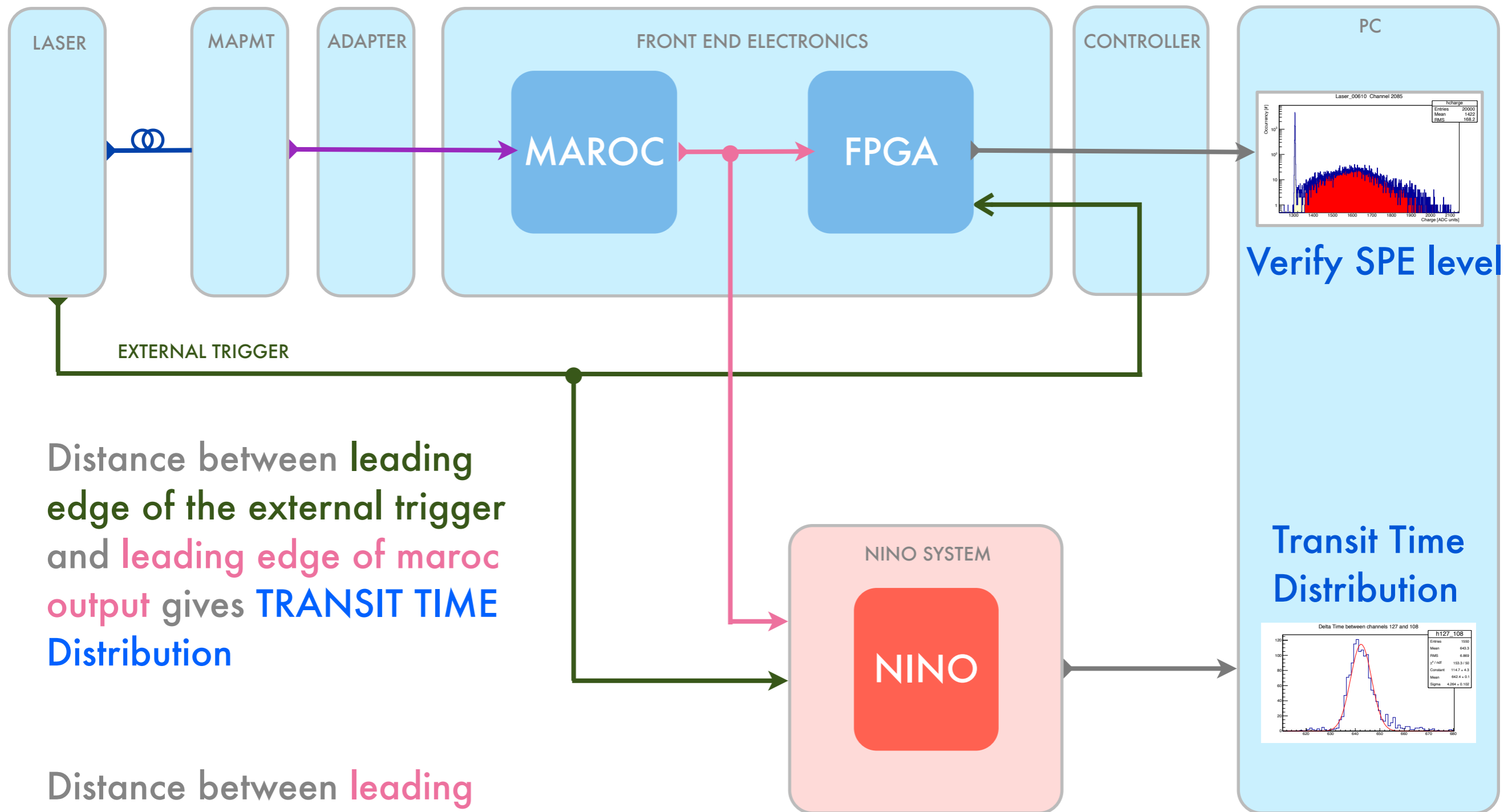
\* configuration with on hand electronics not optimal for very precise measurements.

# Standard Setup: Dark measurements, Pixel equalization



	Status	Plan
Dark	<ul style="list-style-type: none"> <li>● Setup ready.</li> <li>● Lost data about 4 MAPMT.</li> <li>● Estimated daq time: around 1 MAPMT/hour</li> </ul>	Compare H8500 and H12700 <ul style="list-style-type: none"> <li>● Rate/pixel</li> <li>● Uniformity</li> <li>● THR dependance of ADC spectrum</li> </ul>
Calibration	<ul style="list-style-type: none"> <li>● BTF test in July 2013 manual calibration attempt.</li> <li>● Need for automatic calibration protocol.</li> </ul>	<ul style="list-style-type: none"> <li>● Study equalization capabilities of MAROC preamp section.</li> <li>● Implement software routine for extracting gain maps for uniformity improvements.</li> </ul>

# New NINO setup (scheme)



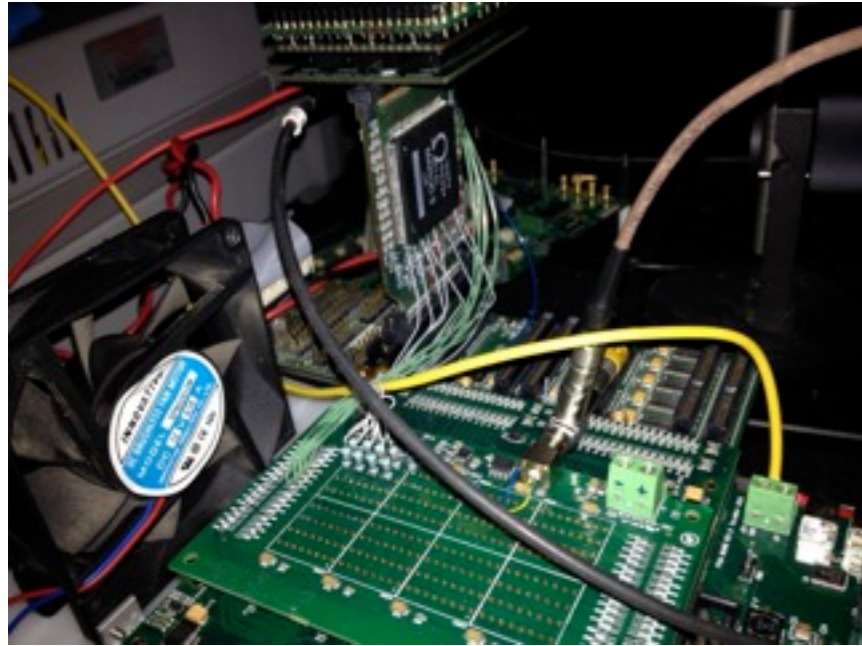
Distance between leading edge of the external trigger and leading edge of maroc output gives **TRANSIT TIME Distribution**

Distance between leading and trailing edge of maroc output gives **DURATION**

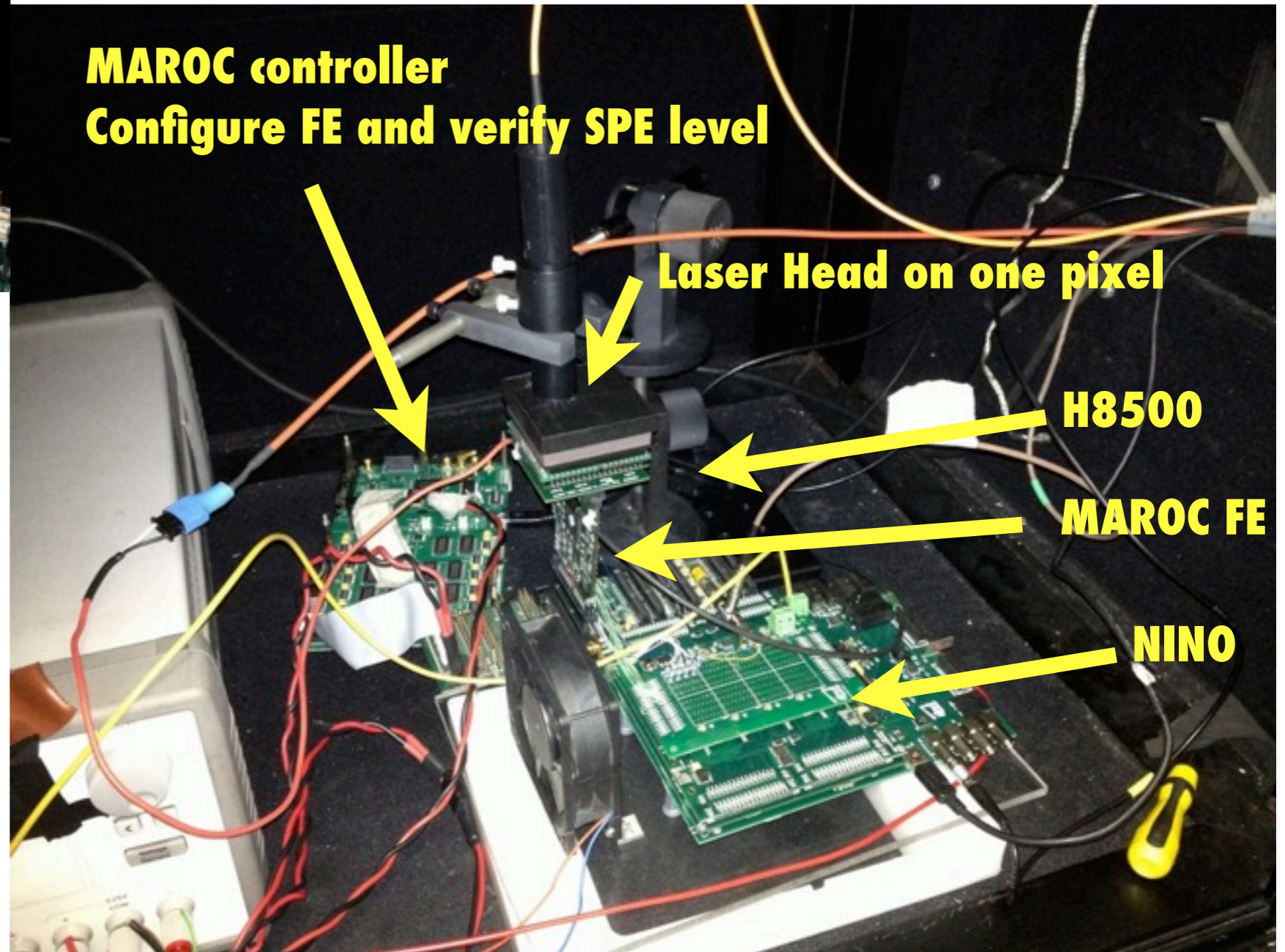
NINO: precise timestamp (TDC) of signal edges

# New NINO setup (picture)

The SETUP at ISS



Connection  
between MAROC  
and NINO  
8 binary output  
8 sum channels



**MAROC controller**  
Configure FE and verify SPE level

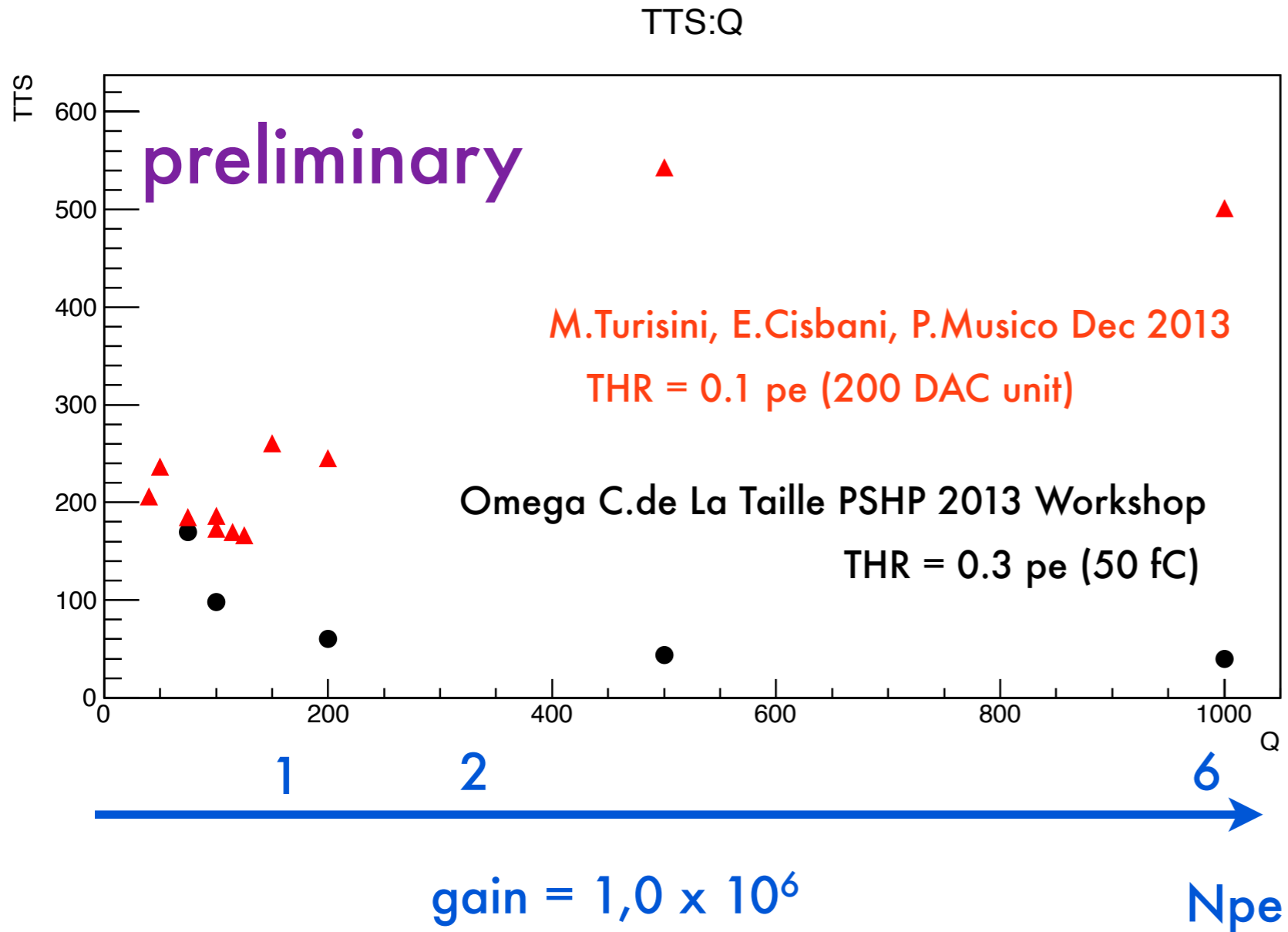
**Laser Head on one pixel**

**H8500**

**MAROC FE**

**NINO**

# MAROC Timing Resolution



Charge injector  
in place of  
LASER + MAPMT

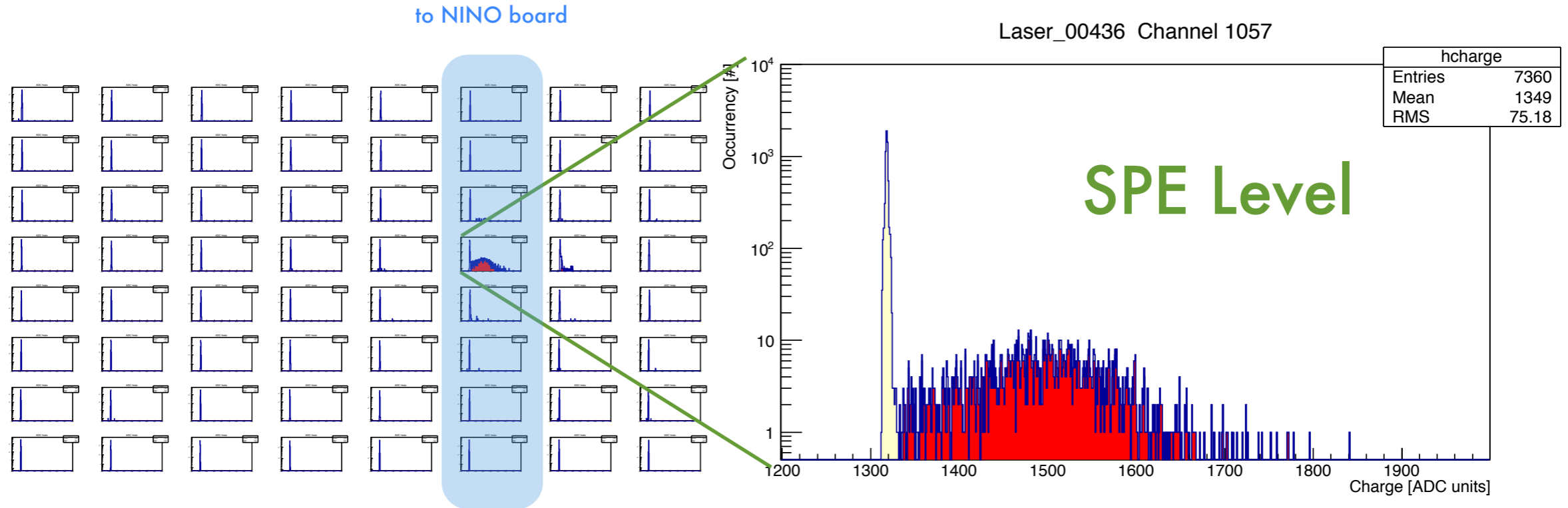
## Status:

1. Twice the jitter at SPE
2. Wrong trend with Q
3. Small compared with H8500

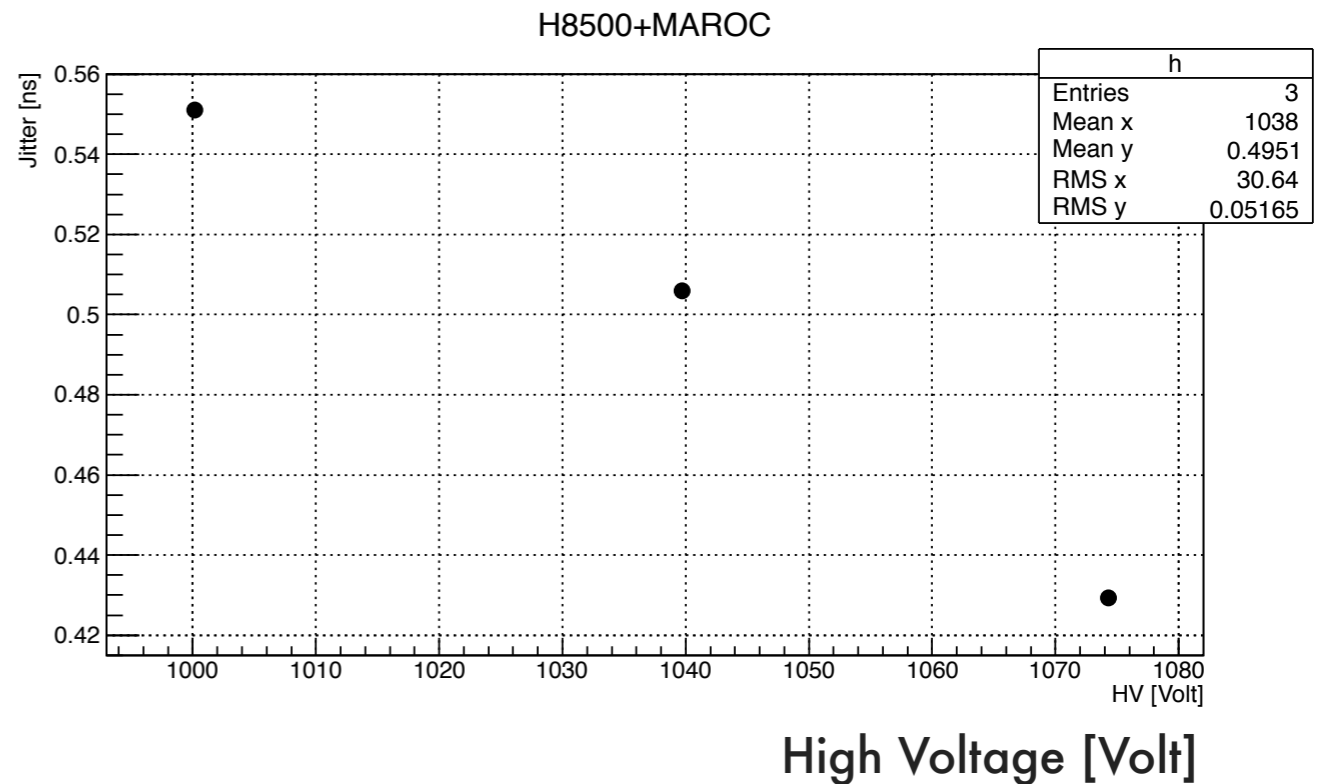
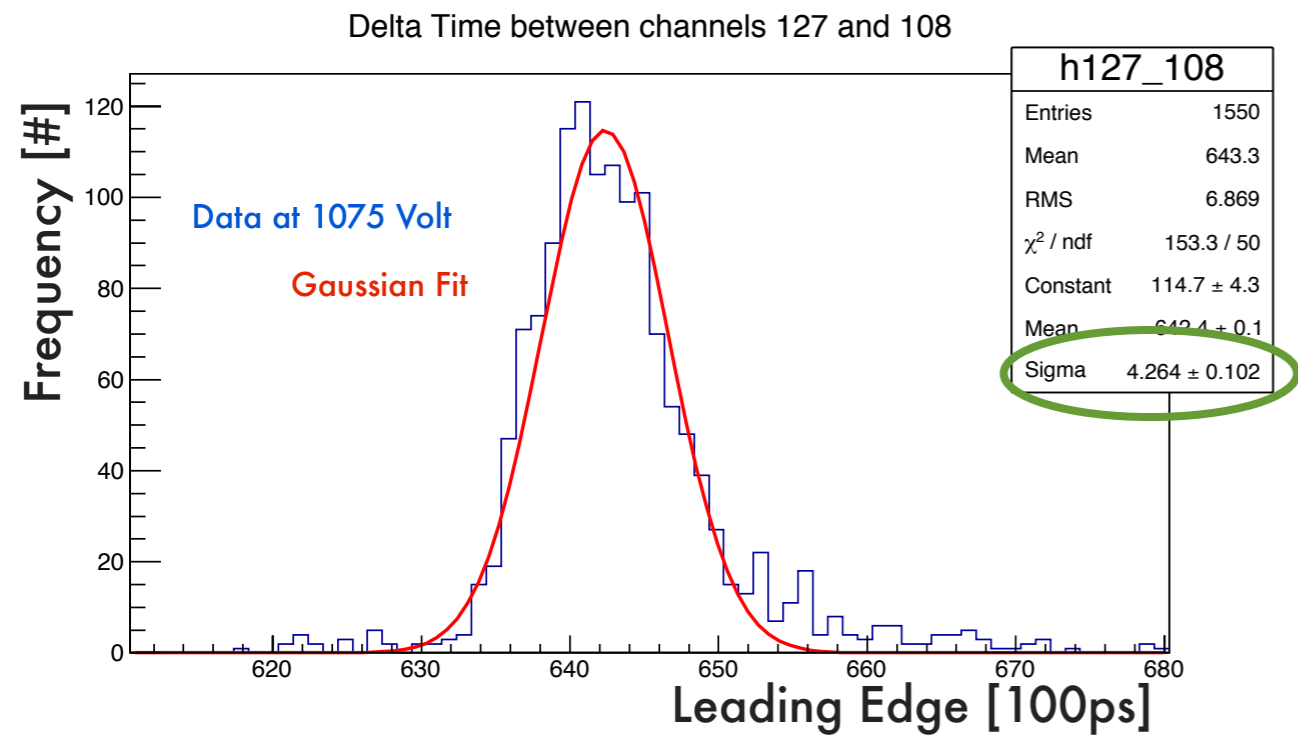
## Plan:

1. Calibrate THR (DAC-fC Mapping)
2. Try to improve MAROC-NINO coupling
3. Repeat charge scan

# H8500+MAROC Timing Resolution



**Leading edge 500 ps jitter Measured**



# Outlook

- Readout tests are almost complete.
- Sub-ns resolution achievable with MAROC+ H8500
- January 2014 (optimize measurement):
  - ◆ Laser+H8500+MAROC+NINO
    - ❖ THR scan (optimization),
    - ❖ HV scan,
    - ❖ Try different Channels,
    - ❖ Try Time Over Threshold measurements.
  - ◆ Charge injector to estimate MAPMT contribution
  - ◆ Try to feed MAROC with SiPM
- February 2014 (systematic study)
  - ◆ Thermal noise.



**End**

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