

MAROC3 Update

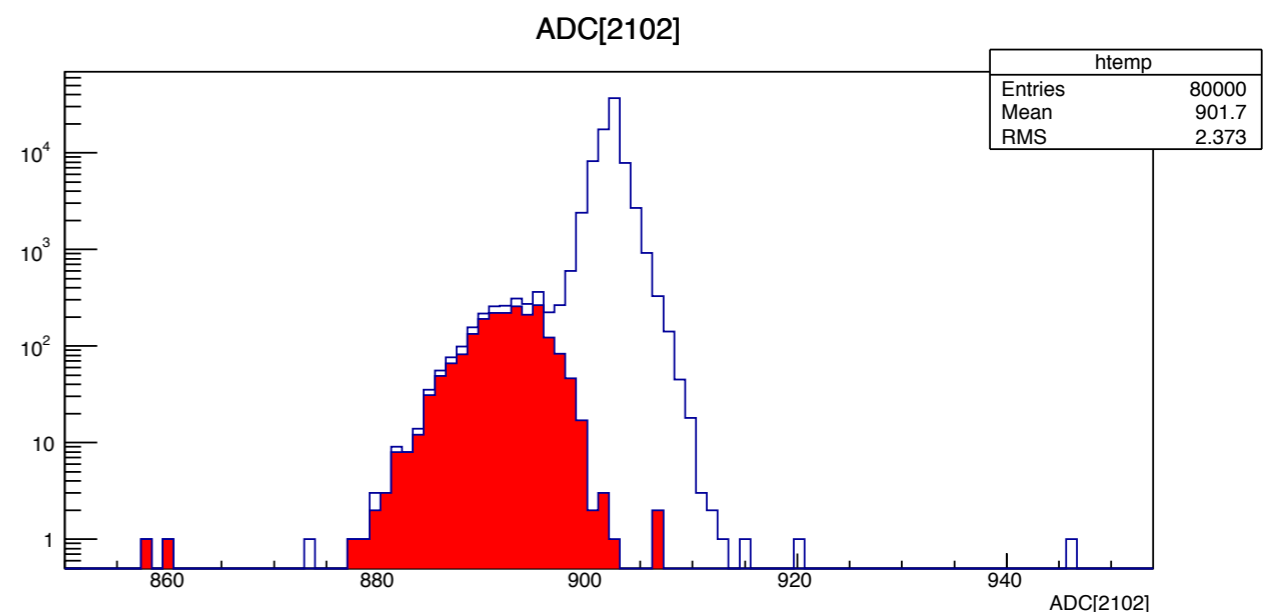
Turisini Matteo

CLAS12 RICH R&D, 2013 April 19th, ISS

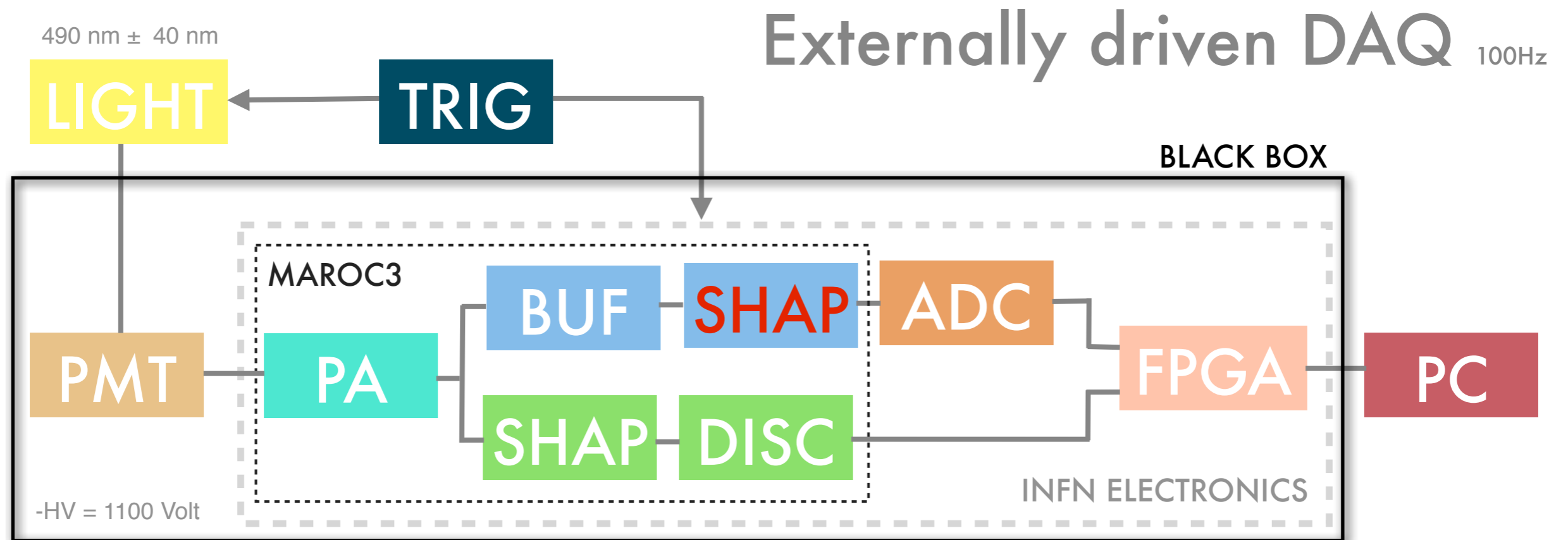
This week

- Setup at ISS installed successfully
- Shaping studies
- Strategy:
 - Optimize response at spe using adc informations
 - Investigate digital response as alternative to charge measurement

Thermal spe response,
over threshold events in red (digital output)
2013 January, UTFSM (Chile).



Setup Block Scheme

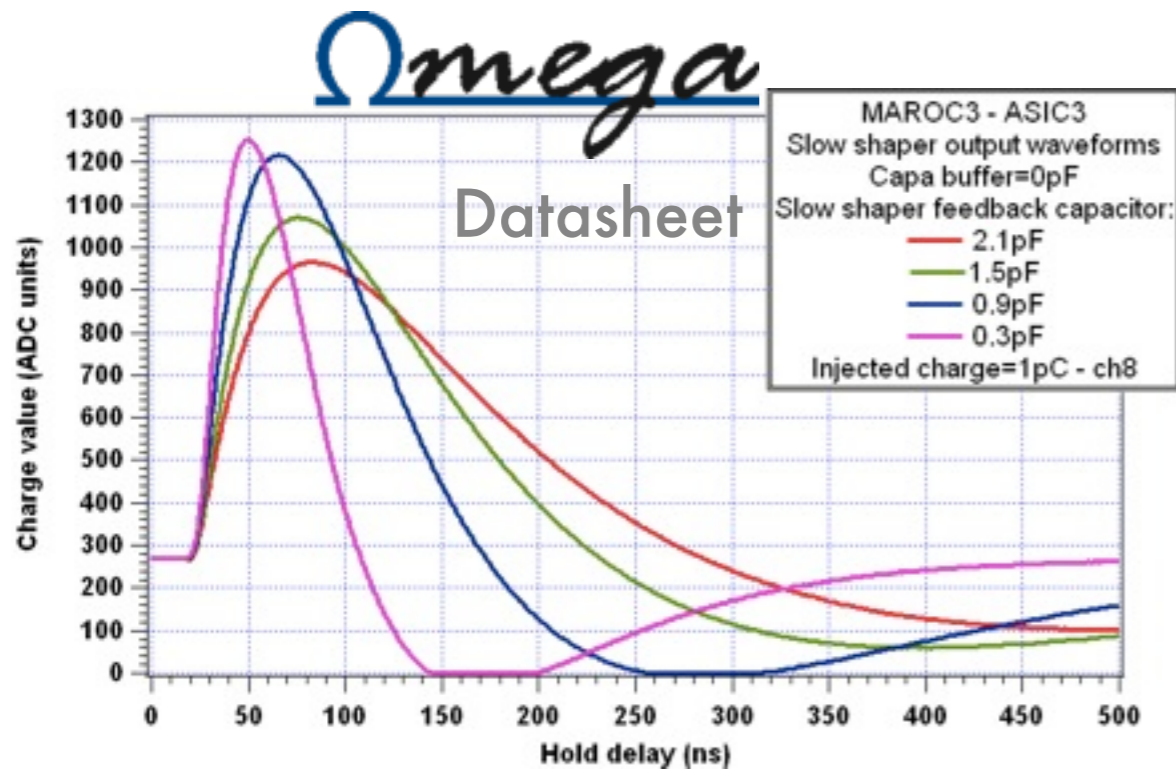


1. Waveform reconstructed sampling charge output with different delays
2. Injected charge unknown but fixed (many photons)

Source of noise:

- low statistics (2000evts)
- delay estimation
- injected charge fluctuations

Playing with Capacitors



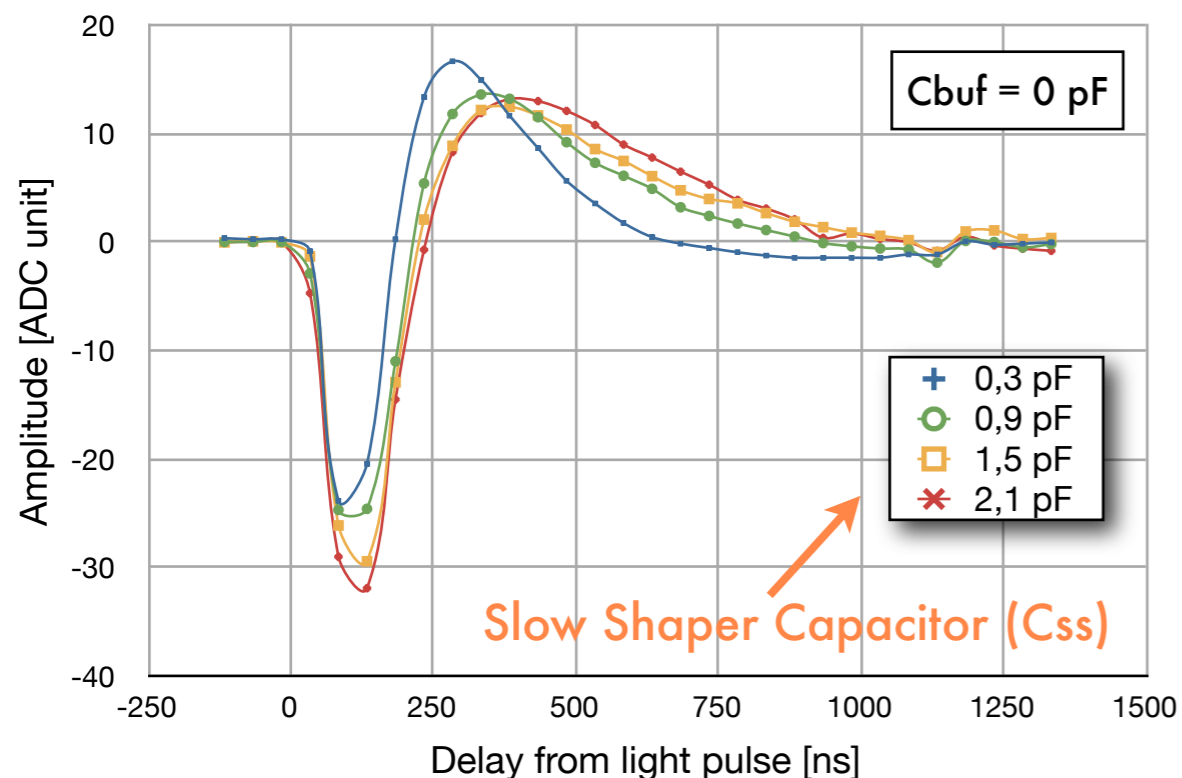
Analog output studied as a function of different tunable capacitors on the slow shaper

C_{ss} varies from 0,3 pF to 2,1 pF

and C_{buf} varies 0 pF to 3,75 pF

$7 \times 16 = 112$ different configurations,

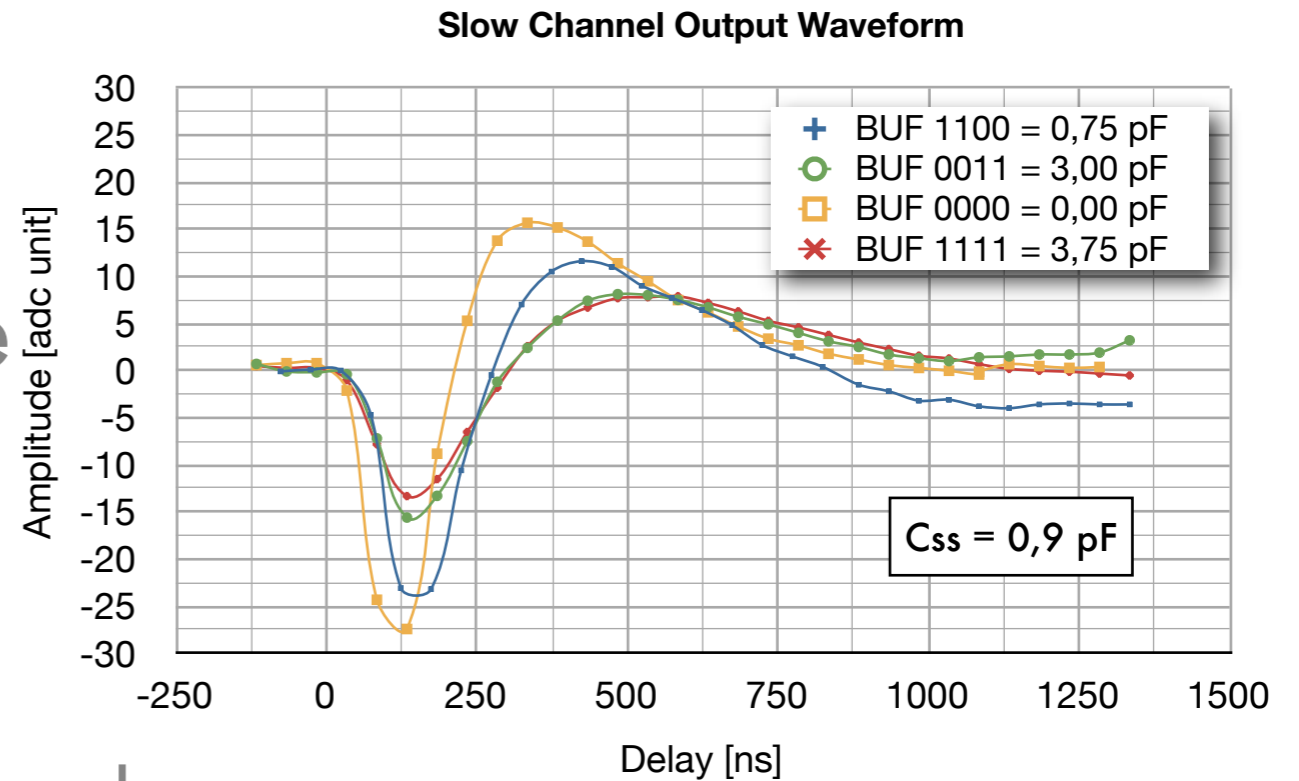
Slow shaper output waveform



1. Broader than datasheets
2. Bipolar but different
3. Peaking Time linear with C_{ss}

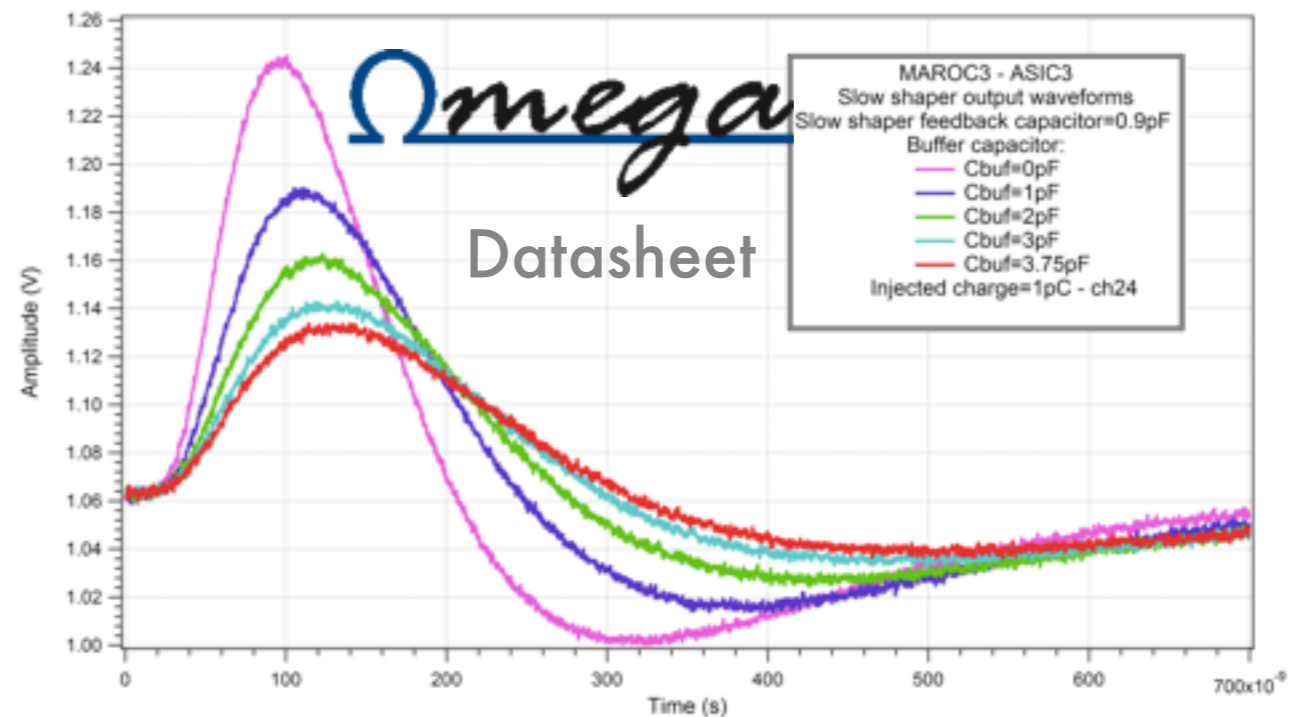
RC Buffer Capacitance

- 1.Active high logic
- 2.Cbuf = 0 pF is better at spe



Amplitude: one order of magnitude difference!
12 mV vs 180 mV

Peaking Time: factor 3 difference!



Consideration on Injected Charge

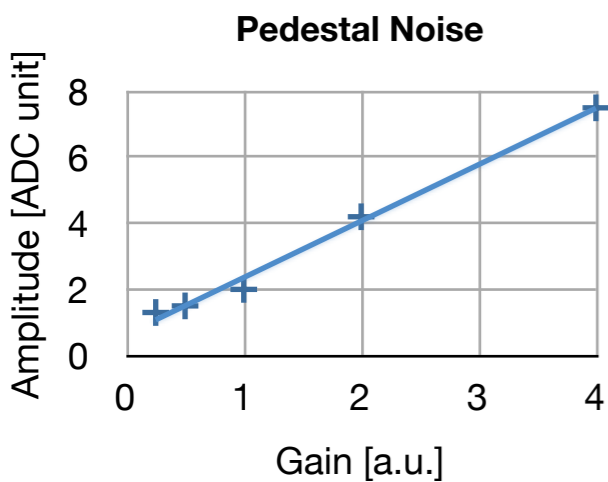
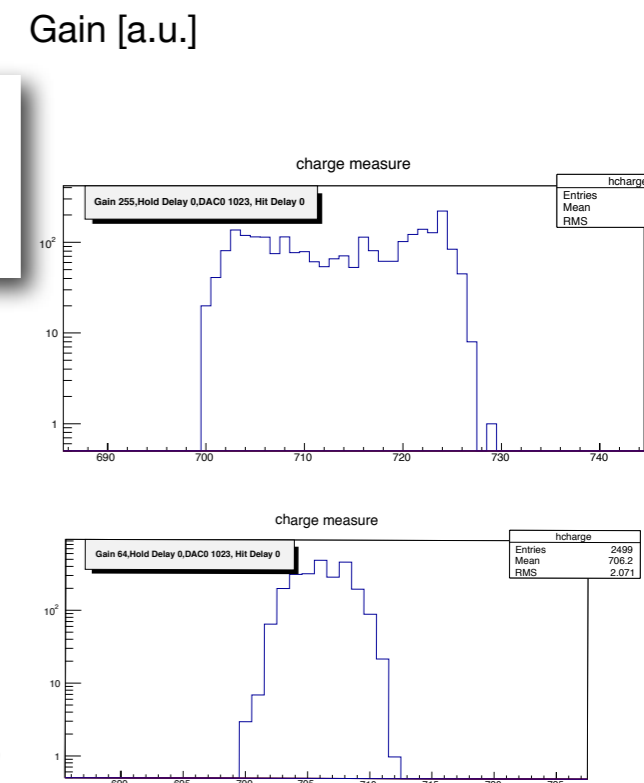
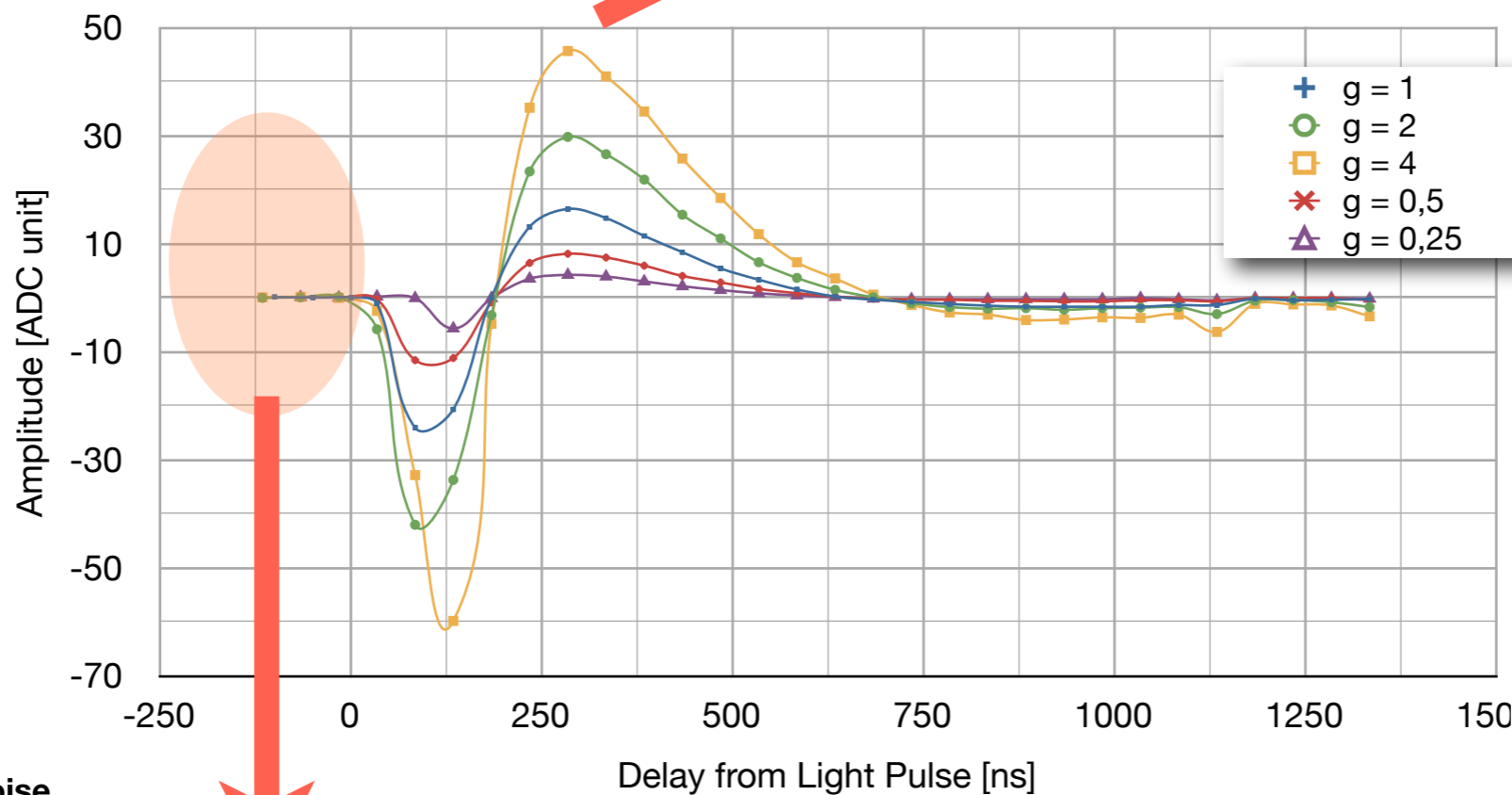
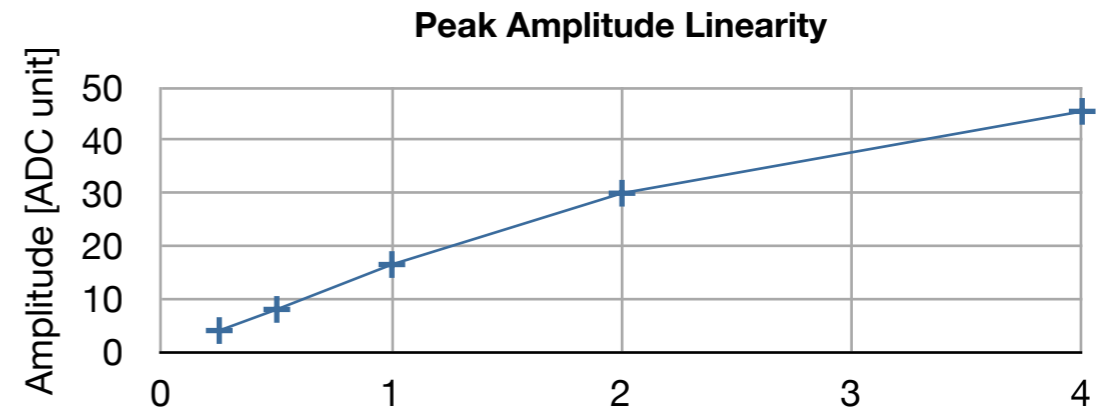
French guys inject directly 1pC (100mV on 10pF)
simulating 1 pe at $6,25 \times 10^6$.
or 5pe at $1,25 \times 10^6$ (typ. gain)

At ISS measured Dy12 Pulse Amplitudes 5mV
with a FWHM of 3 ns gives 0,15 pC on 50 Ohm)
Too small to be spe at typ gain!

Our injected charge is smaller of a factor 6
⇒ Check PMT Gain

PreAmplifier (PA)

Peak Amplitude shows a nice linearity up to gain = 2



Noise is linear with PA gain and Common to all the channels

Conclusions

- Setup at ISS is ready
- Charge meas. configuration span confirmed MAROC3 is working good
- Shaping differences could depends on biasing
- Amplitude differences depends on injected charge (Check PMT Gain)
- Noise at PA gain greater than 1 to be understood
- Next step: spe condition, investigate digital.