# SPIROC2 measurements

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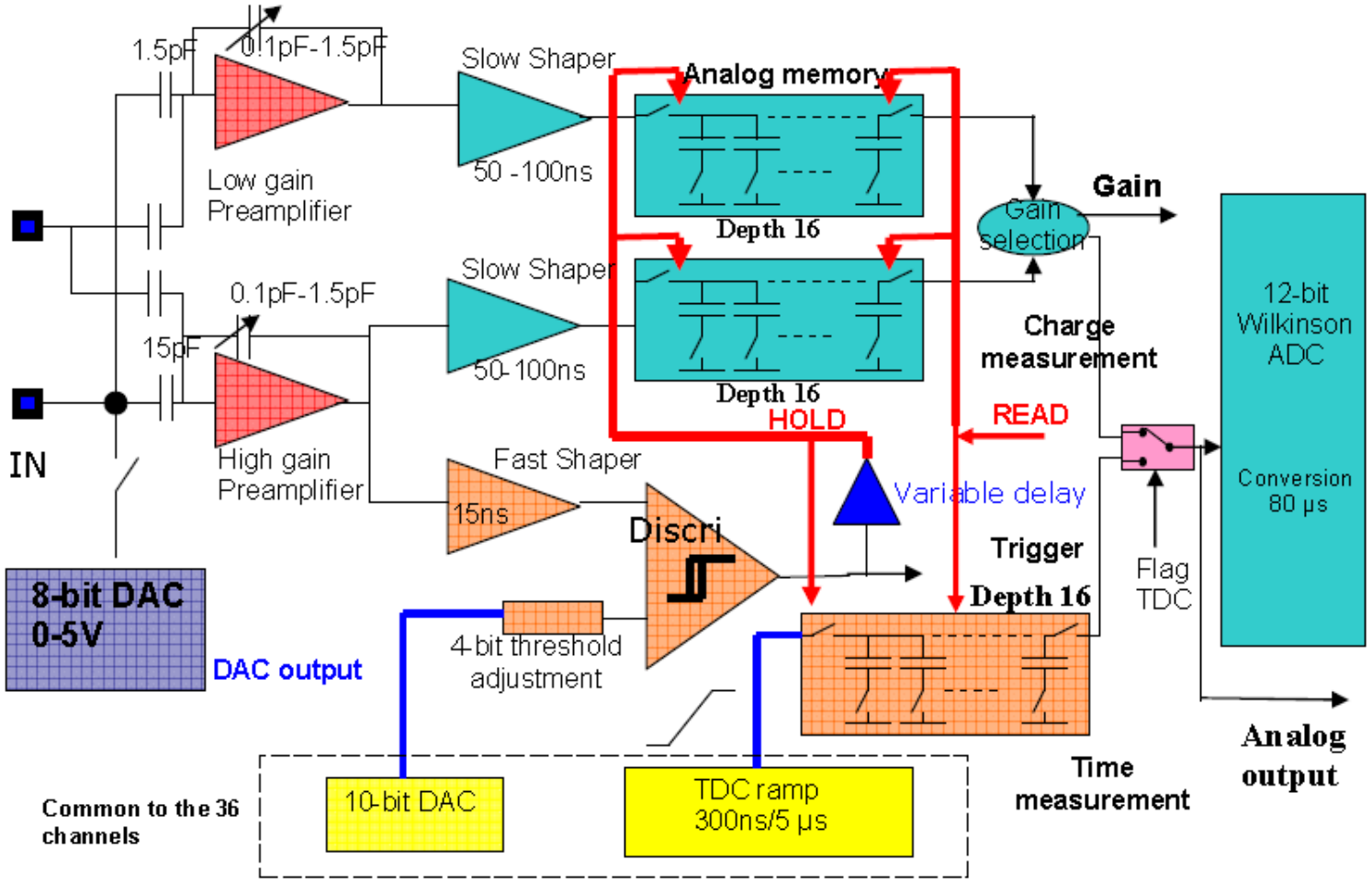
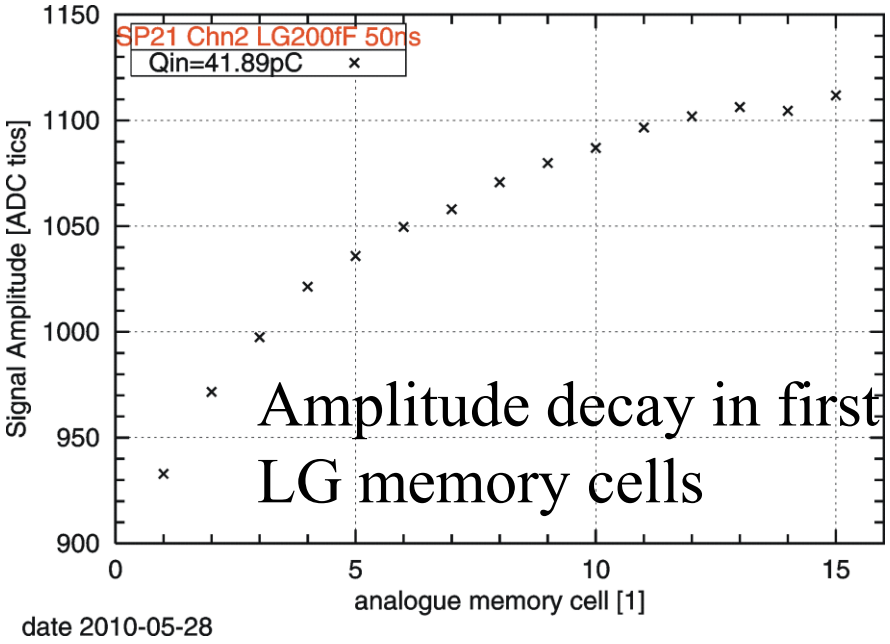
# SPIROC 2B (Analog HCAL)

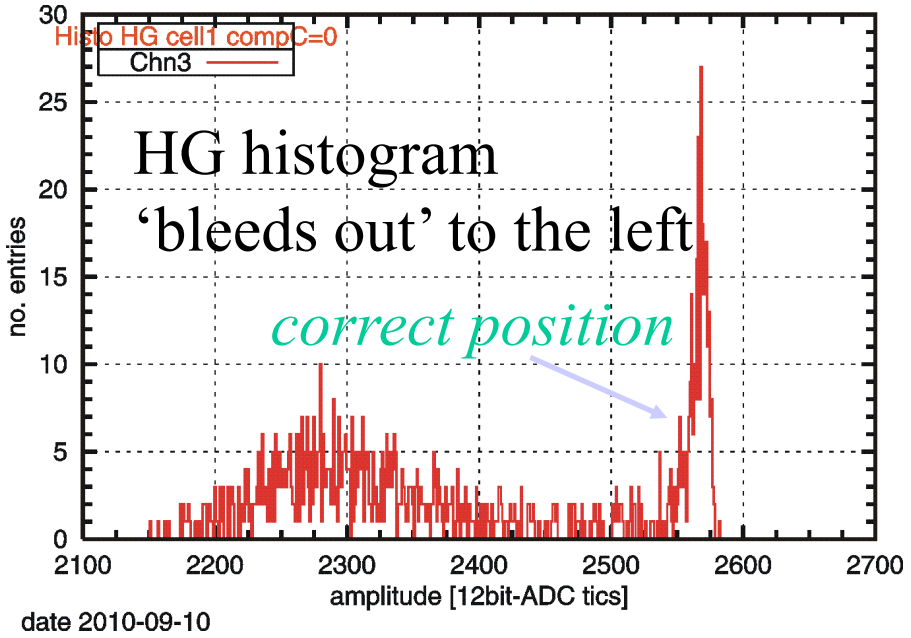
- Bi-gain (autogain)
- Analogue Memory depth : up to 16 events can be stored (columns)
- 2 × 36 channels (Charges/Times)



# Cell dependant amplitude

## Try to understand this problem seen in DESY



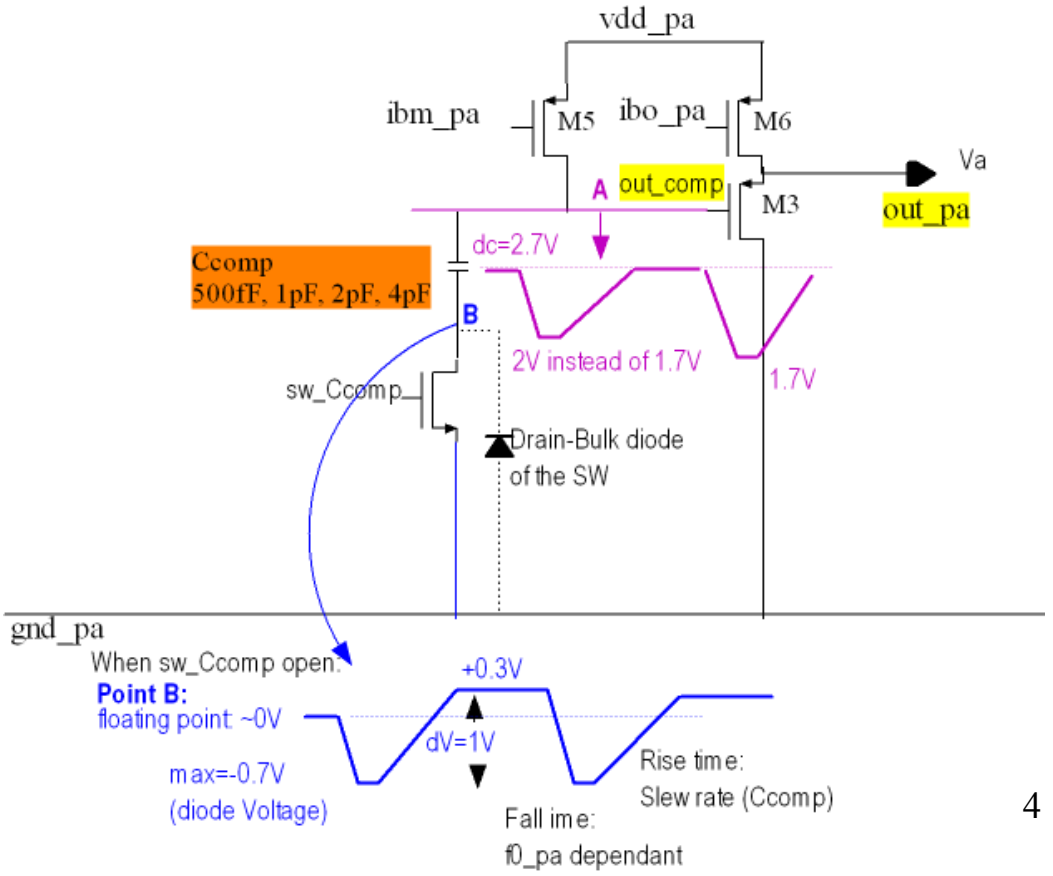




- **Effect depends on**
  - **Amplitude of the input signal**
  - **input signal shape**
  - **rate**
  - **Cured when PA comp. caps**

HG PA=100fF, LG PA=200fF
50 ns shaping, ext. Hold/Trig.
hold-time=95ns (LG), 130ns (HG)
Charge Injection with 5ns risetime.
No PA compCs

# Rate pb: understood

- Due to the switches of the Compensation capacitors when they are OFF
- SW OFF  but  Drain  Substrate diode which prevents the voltage to go down to voltages lower than -700 mV
- ALL the Ccomp must be set ON to avoid this effect



# Trigger efficiency

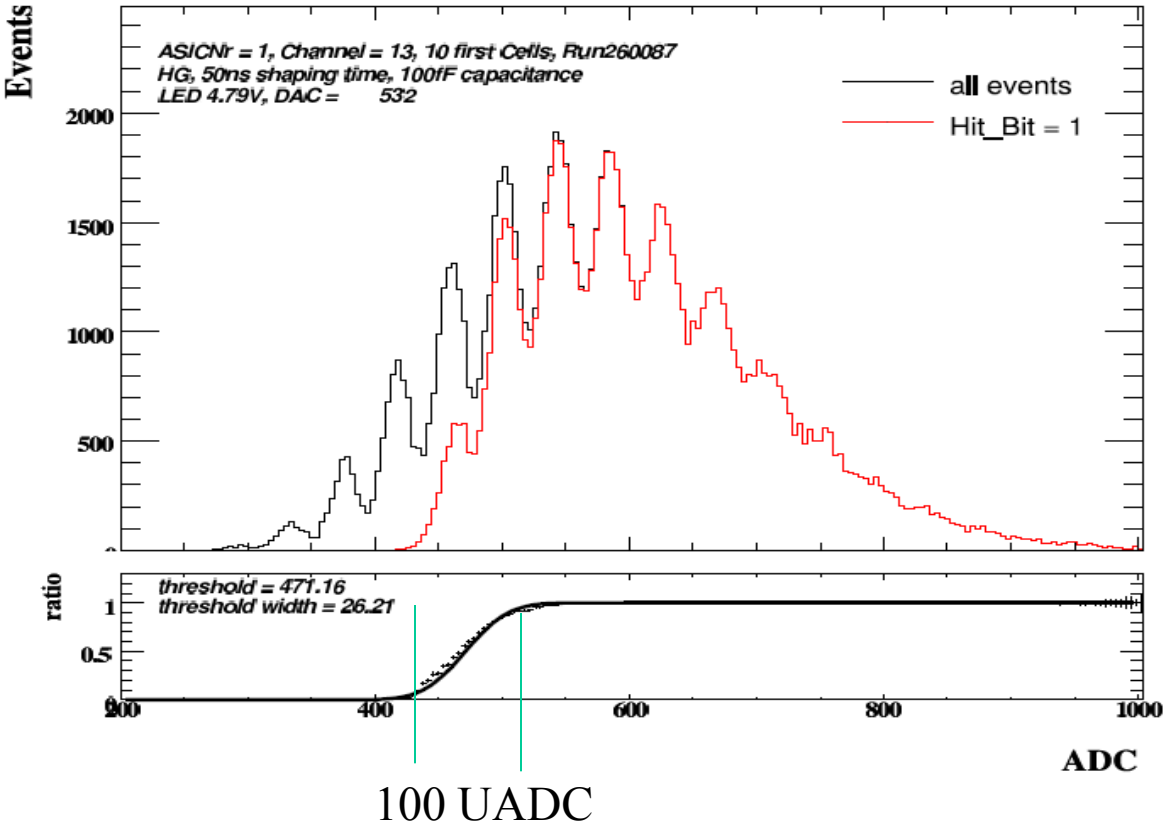
**DESY measurement:**

HG, LED 4.79V, DAC=532

ALL events in black

Hit bit in red

slope=100 UADC




➔ Try to reproduce the same measurement in Orsay

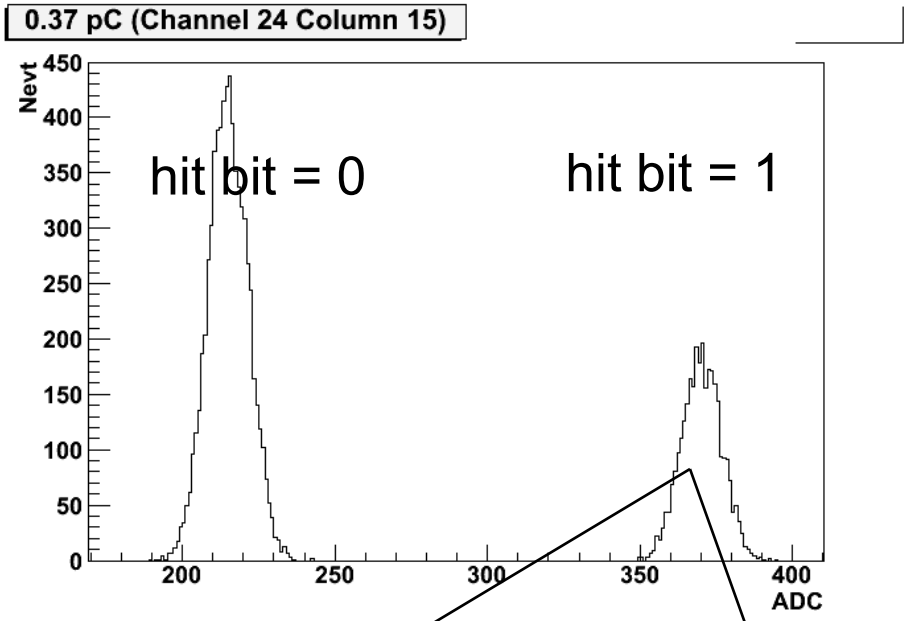
**Injected charge from 0.25pC to 0.5 pC – step = 10 fC**

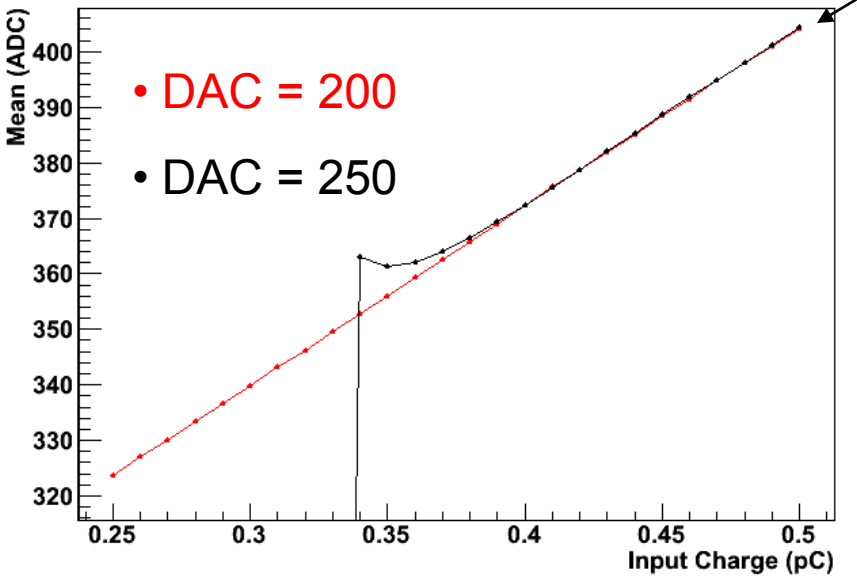
2 data samples:

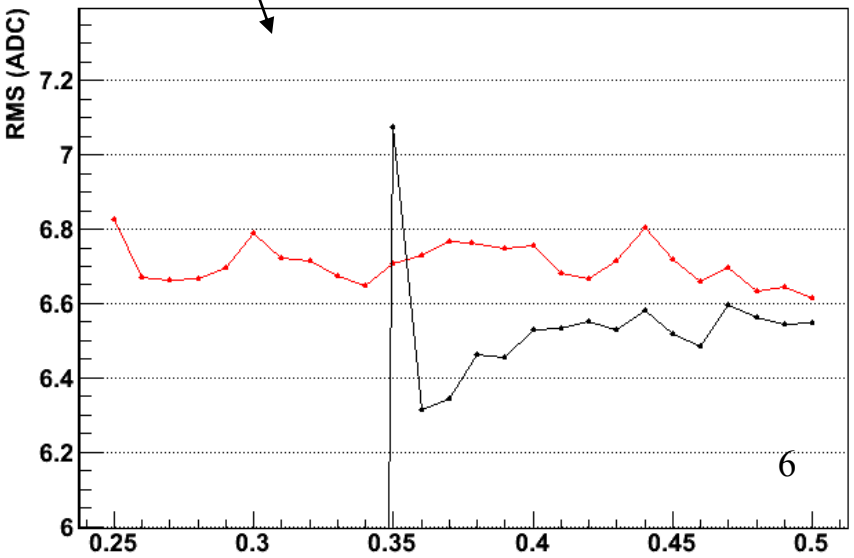
**1 UADC=250 µV**

- DAC value = 200 (all events triggered) → reference sample
- DAC value = 250 → studied trigger threshold

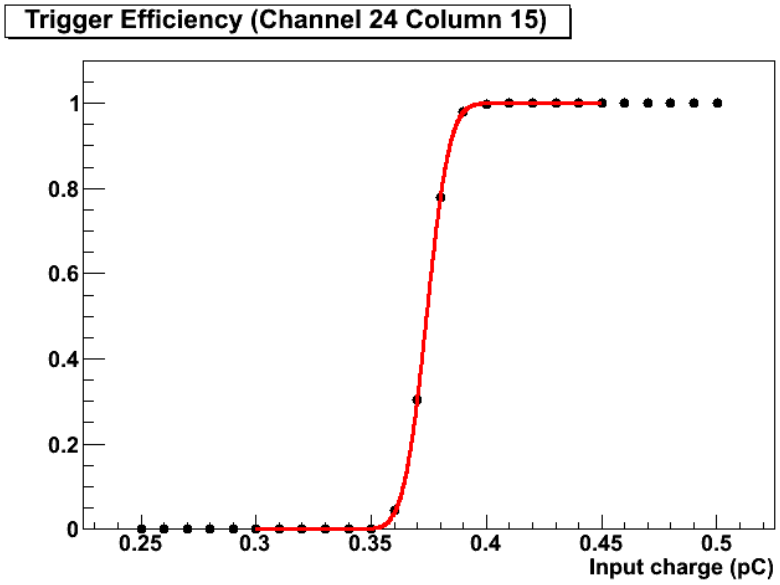
# Trigger efficiency



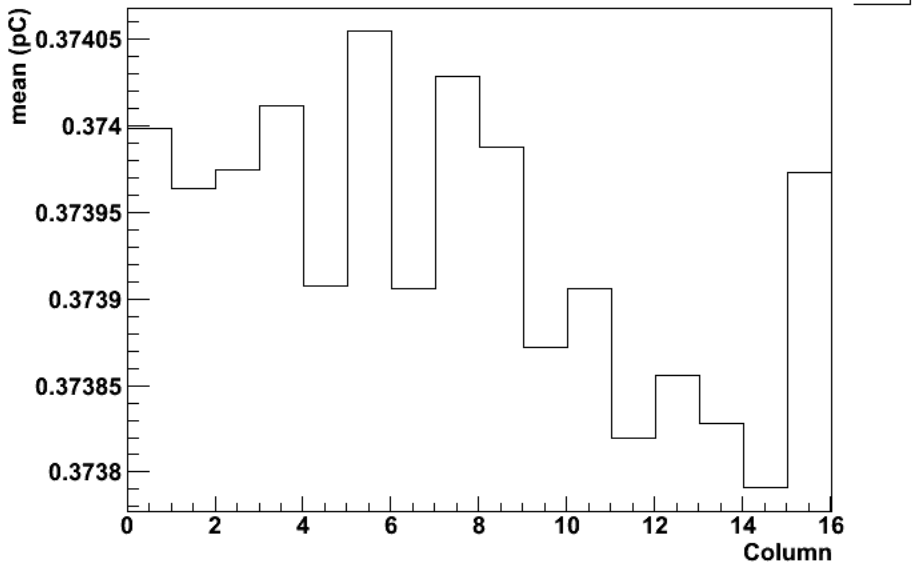



# Trigger efficiency in function of the injected charge

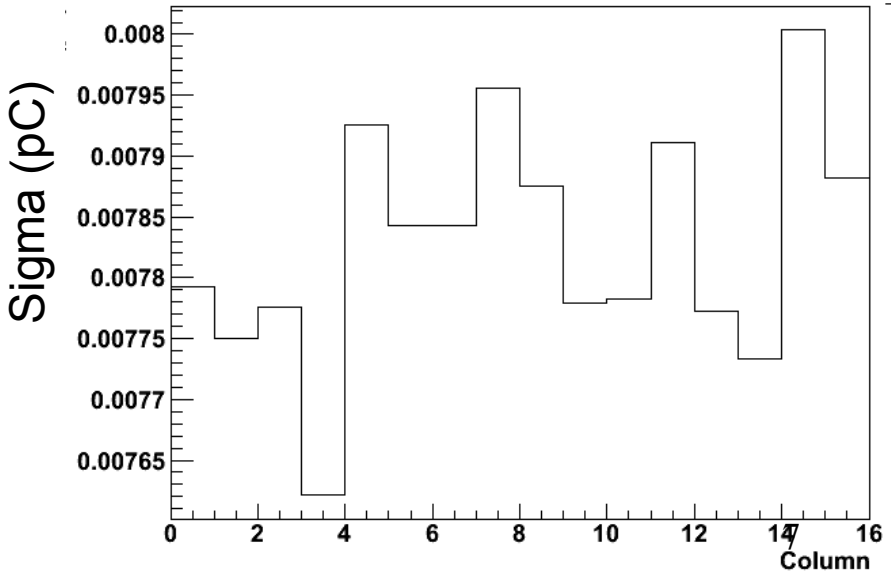



$$f = \frac{1}{2} \cdot \left[ 1 + Erf\left( \frac{x - \mu}{\sigma \cdot \sqrt{2}} \right) \right]$$

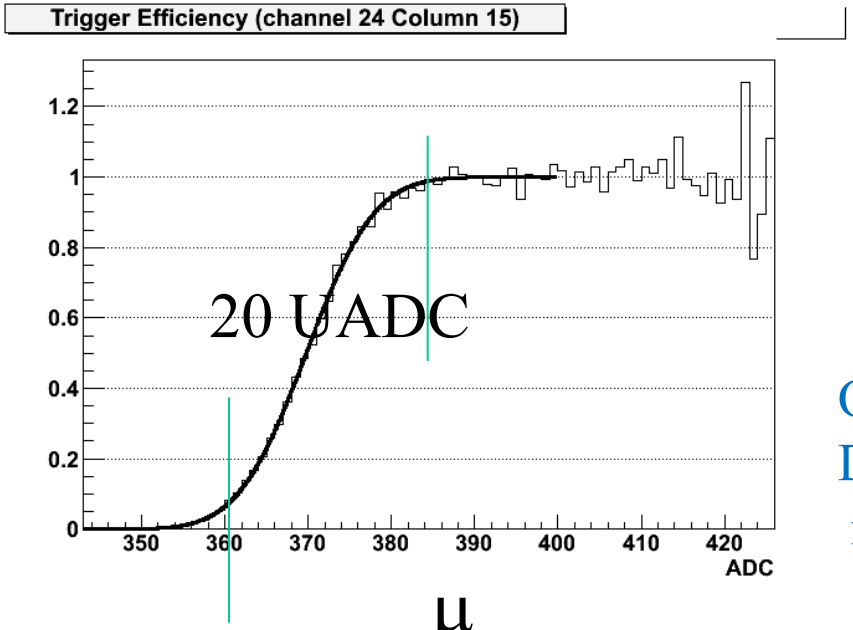
$\mu$




$\sigma$



# Trigger efficiency in function of the converted value



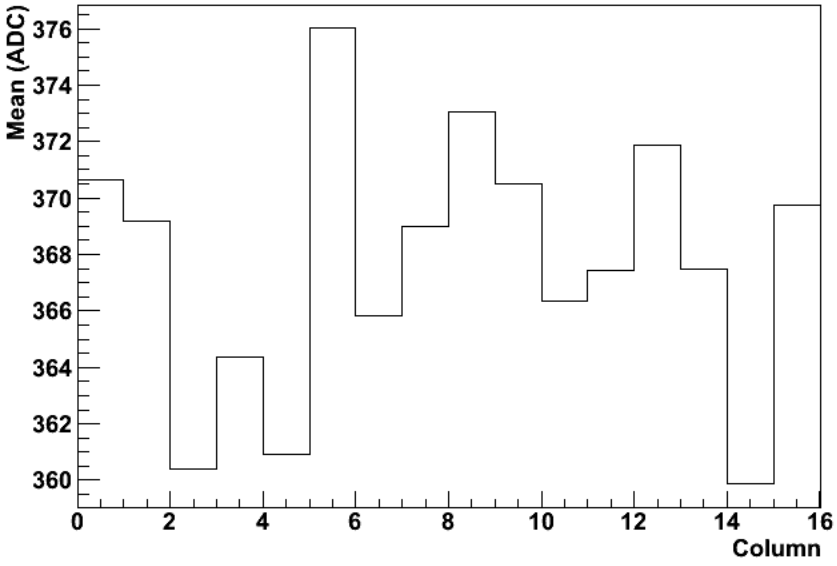

$$f = \frac{1}{2} \cdot \left[ 1 + Erf\left( \frac{x - \mu}{\sigma \cdot \sqrt{2}} \right) \right]$$

ORSAY: 20 UDAC

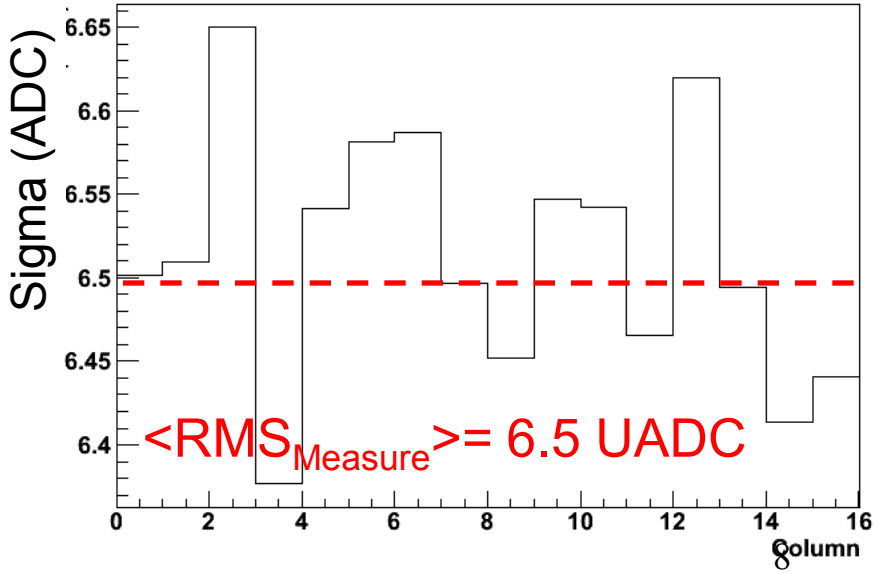
DESY: 100 UADC

measurements with SiPm ➔ Noisier.

μ




σ






Next step: stability of the efficiency in function of the DAC threshold

# SKIROC2

(Stéphane's slides)

Stéphane CALLIER, Christophe DE LA TAILLE, Frédéric DULUCQ,
Gisèle MARTIN-CHASSARD, Nathalie SEGUIN-MOREAU

# SKIROC2 overview

**S***ilikon*

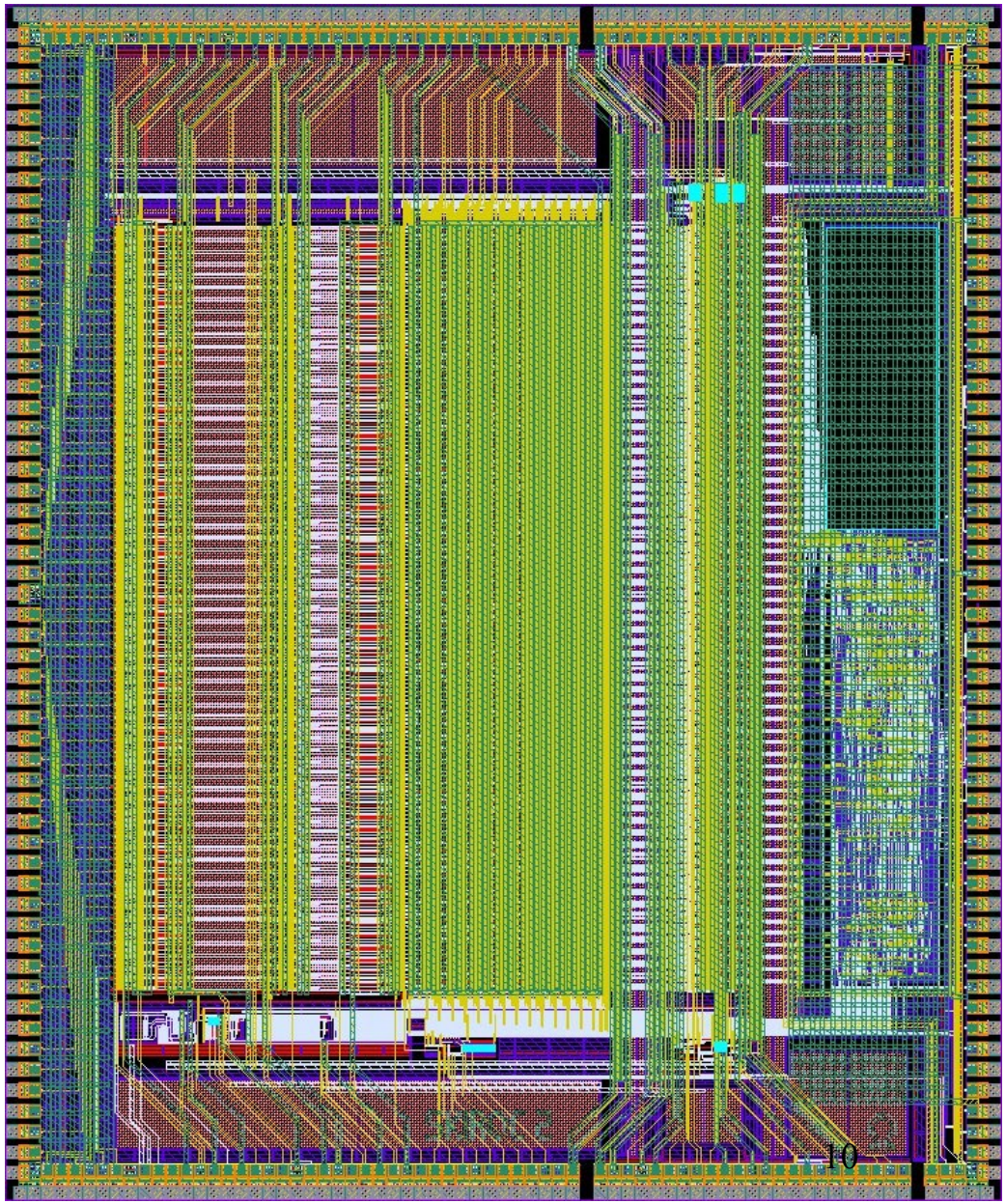
**K***alorimeter*

**I***ntegrated*

**R***ead*

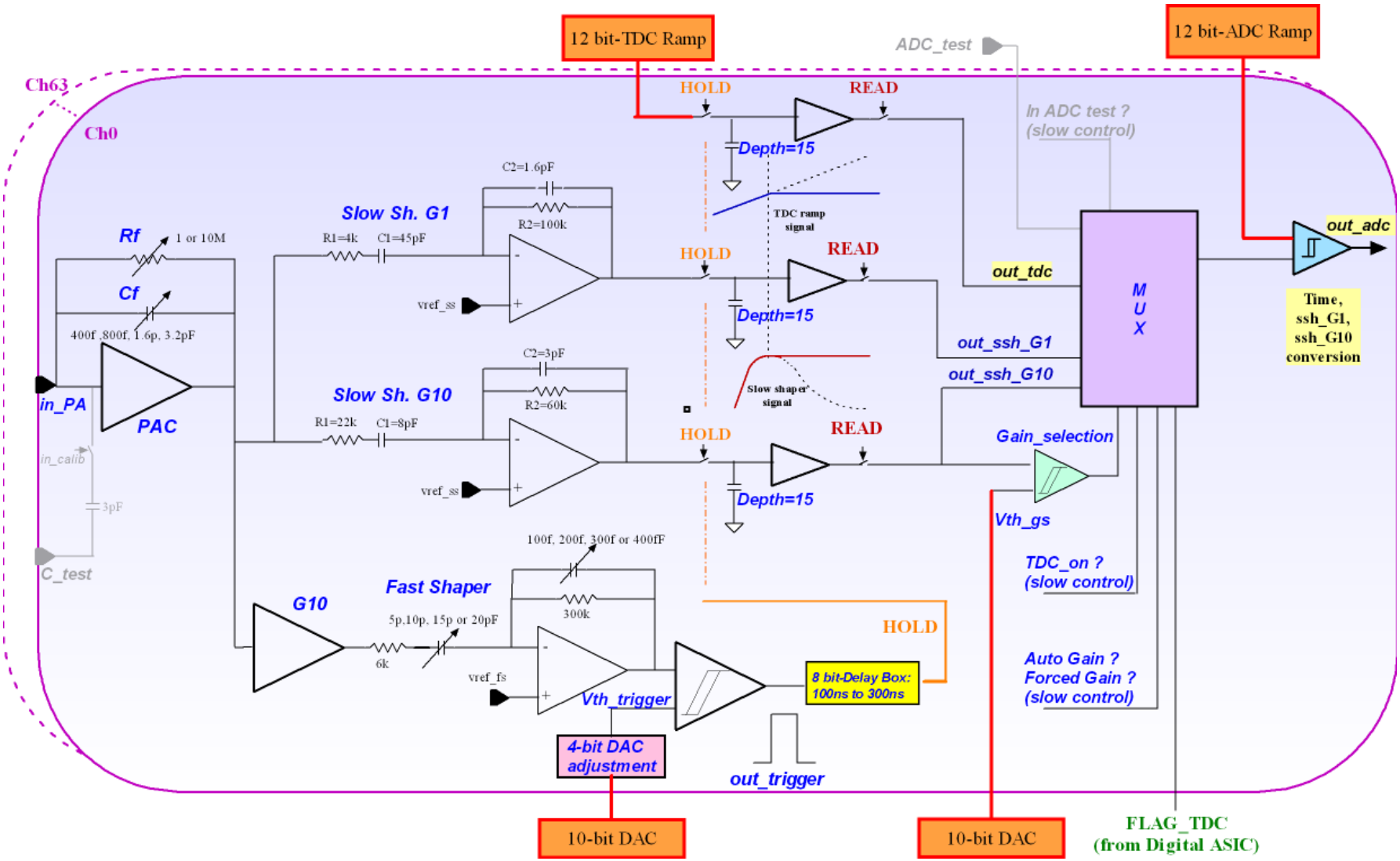
**O***ut*

**C***hip*



- 64 Channels
- Bi-gain (autogain)
- Dynamic Range : from ½ MIP up to 2500 MIP (4fC / MIP)
  - With C*detector* = 20pF
- Analogue Memory depth : up to 15 events can be stored

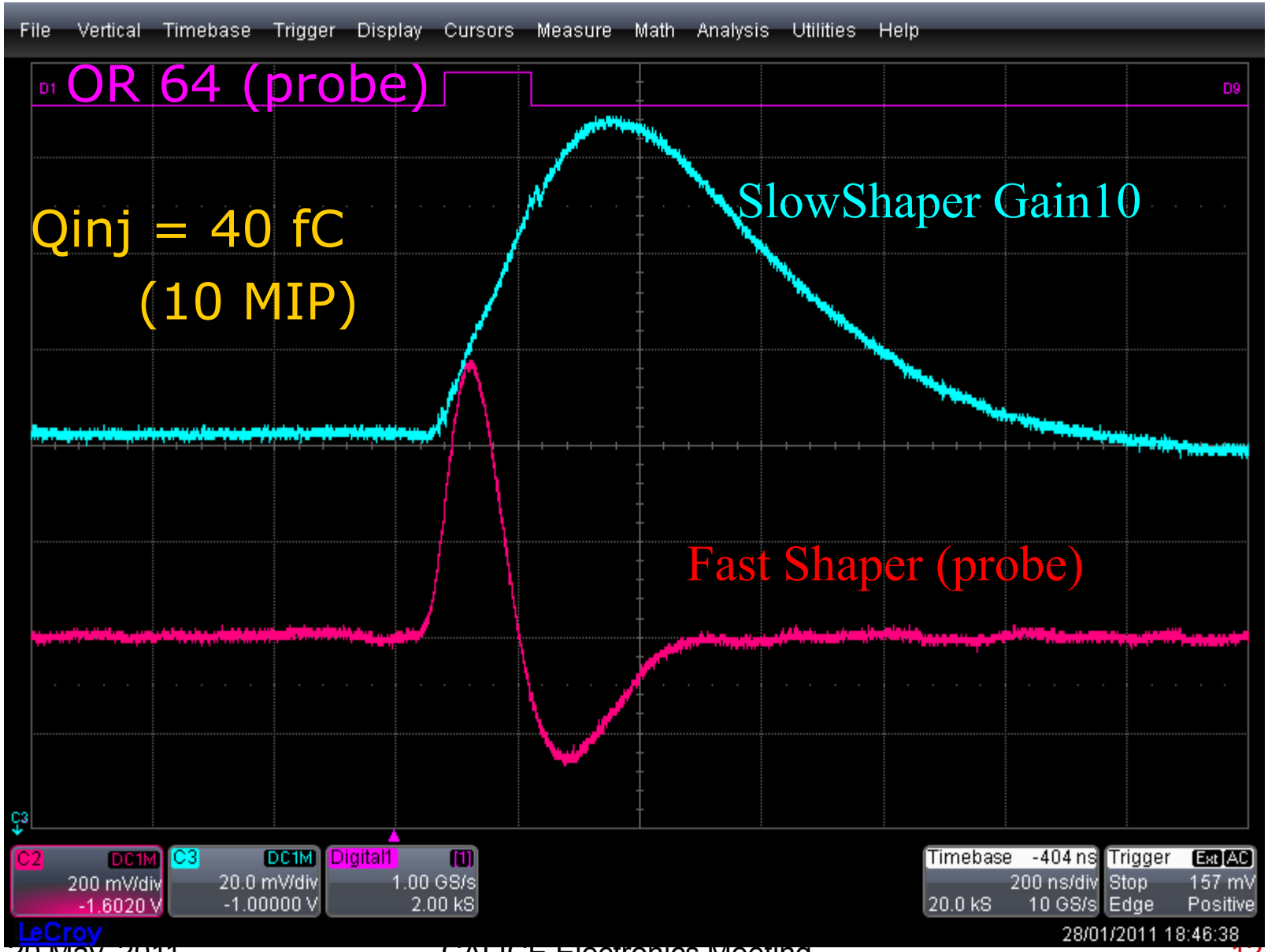
# SKIROC2 Analogue core



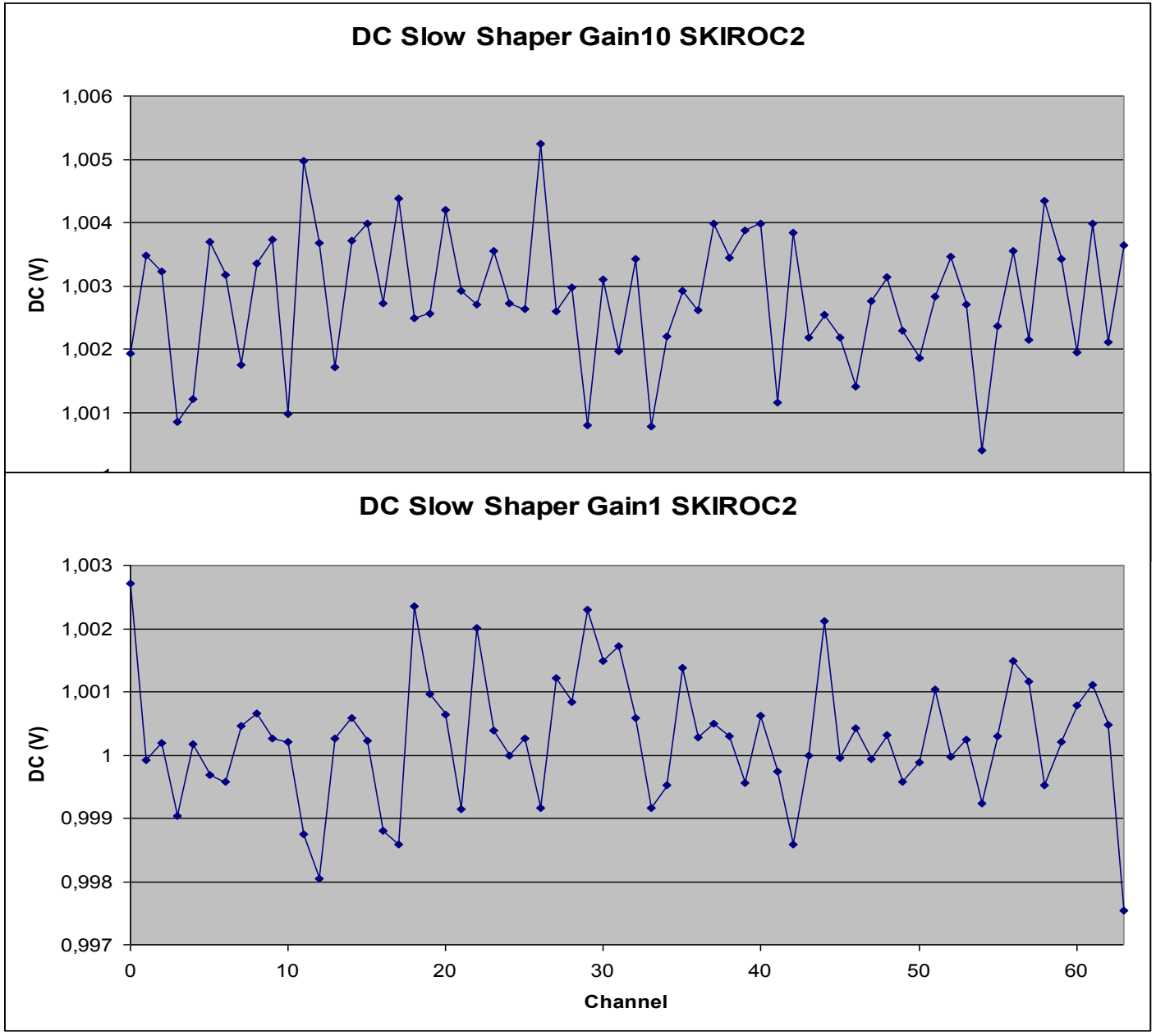

10-bit DAC for discriminator threshold

–With improved 4-bit adjustment on each channel

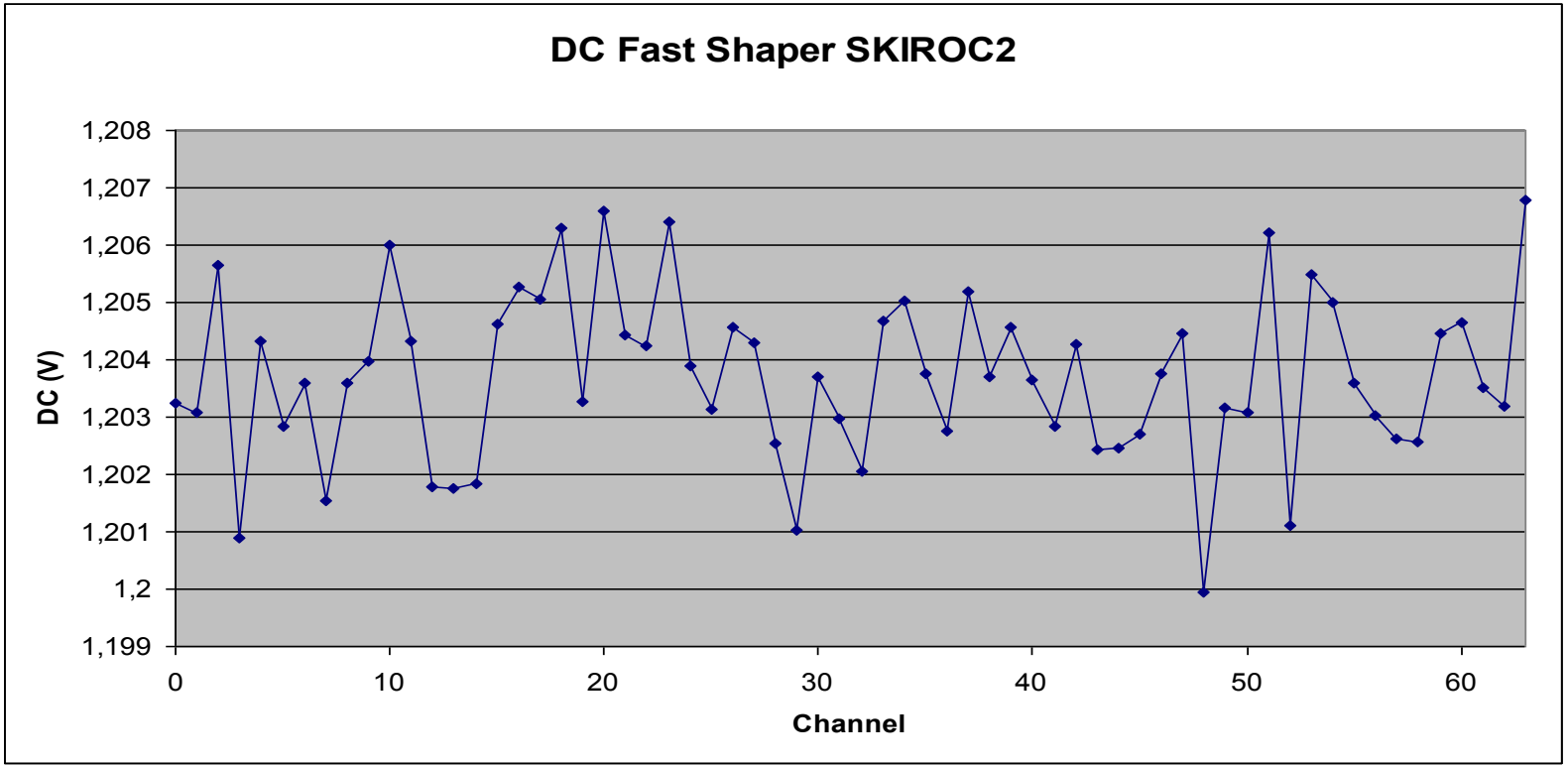
# SKIROC2 Analogue Measurements



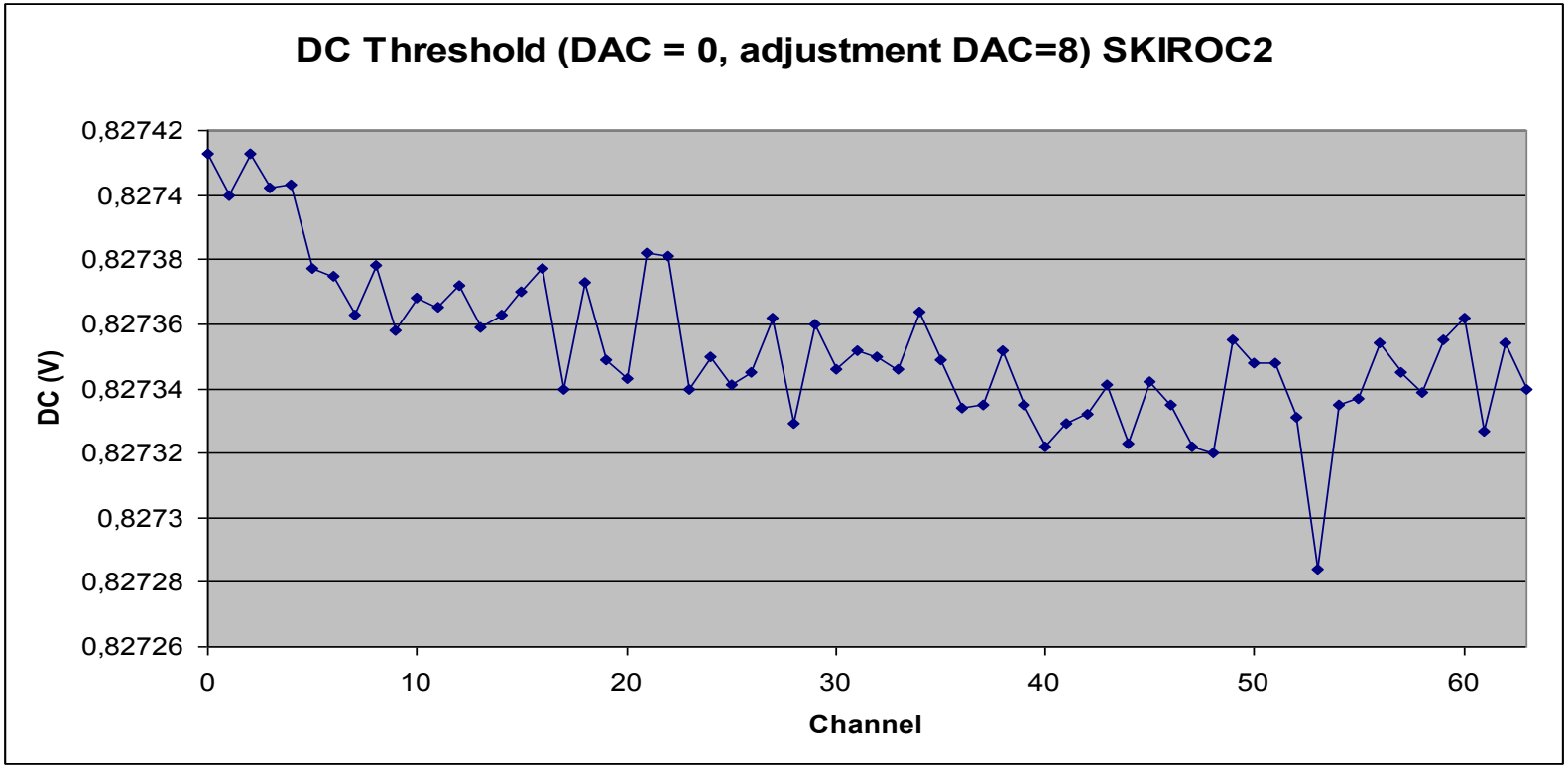
# DC Slow Shaper



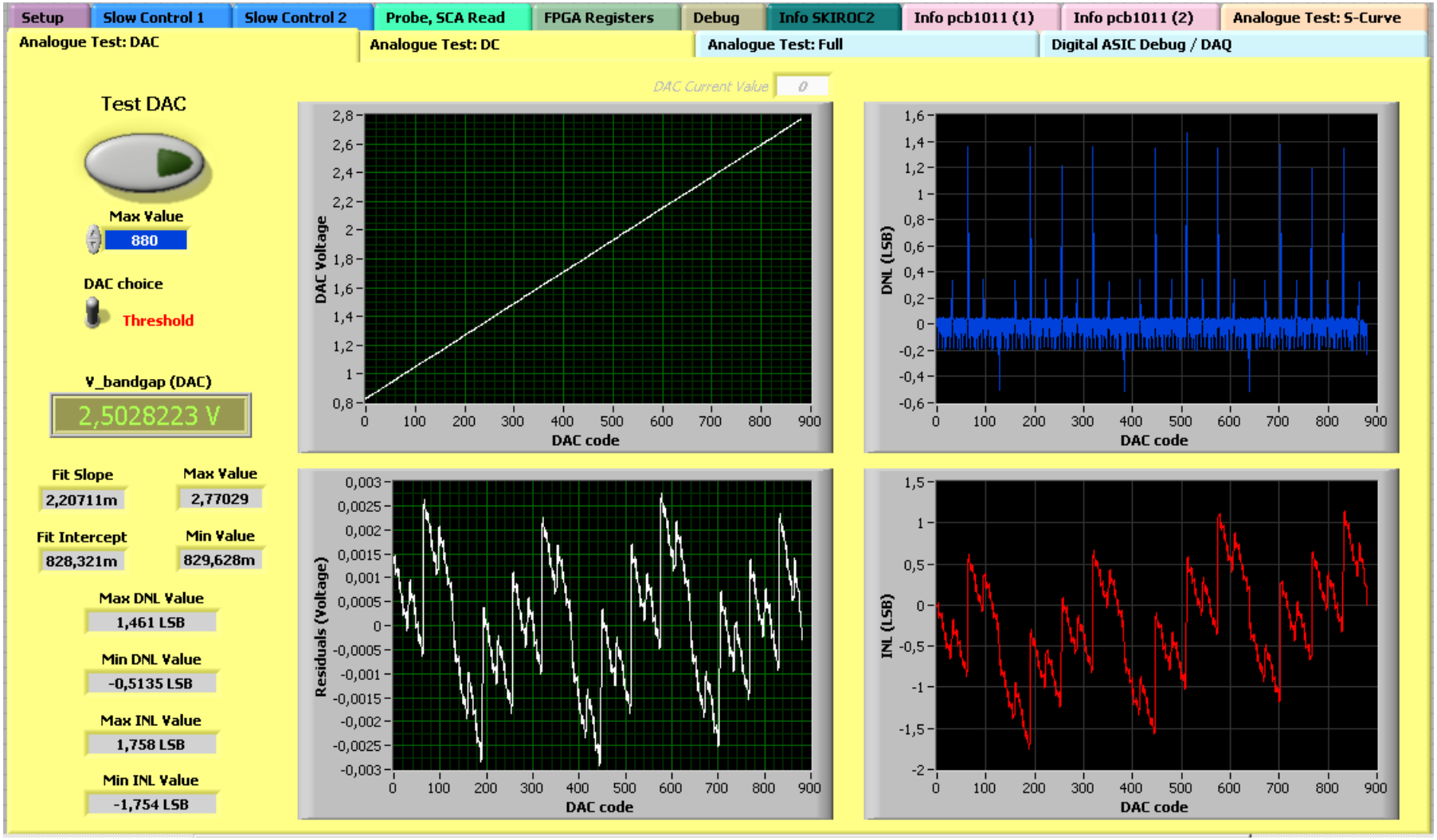
# DC Fast Shaper



# DC Threshold



# DAC Threshold



# SKIROC2 Summary

- First measurements seems to be compliant with simulations

- Next steps (next tests) :
  - Analogue linearity of : PA, SS1, SS10, FS, ADC
  - S-curves (Trigger efficiency)
  - Digital data to analyze (using ADC)
    - Pedestal + Charge injected
    - TDC characterization
  - Bandgap, Power Pulsing, 4-bit DACs and others …

- 4 Test Boards :
  - 2 @ OMEGA / LAL
  - 1 @ LLR
  - 1 @ SKKU