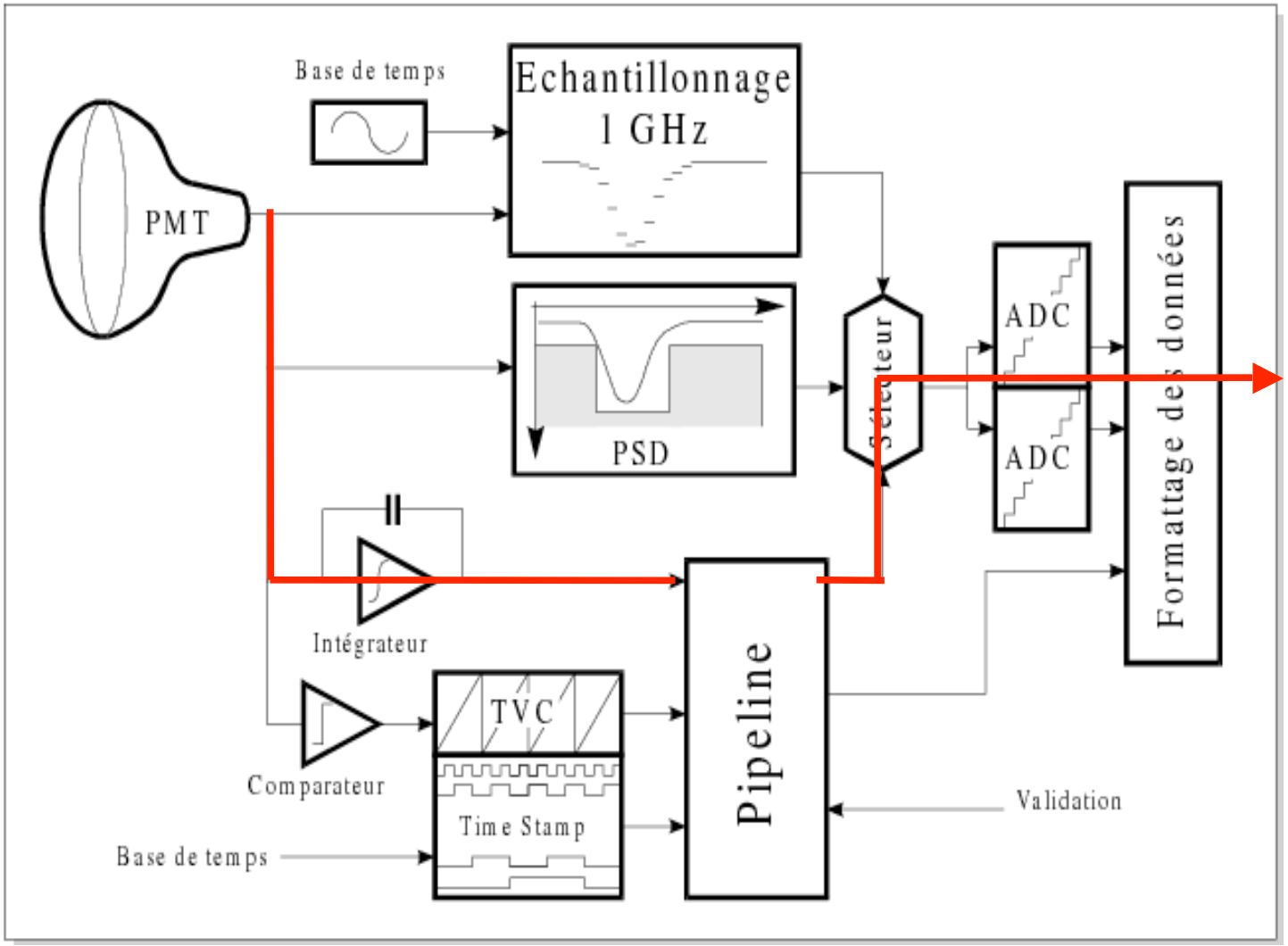
ARS Calibration – latest news

- Latest Calibration
- DNL correction
- ARS DAC tunning tests
- HV change?

Reminder



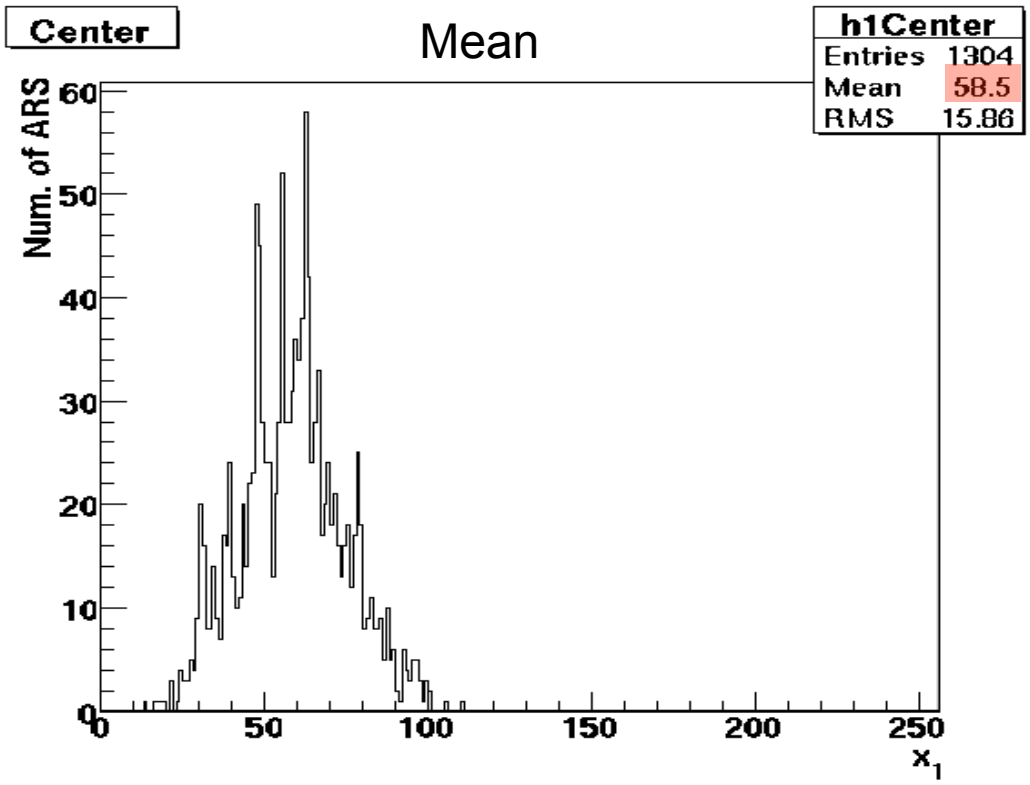
AVC counts => # of p.e.

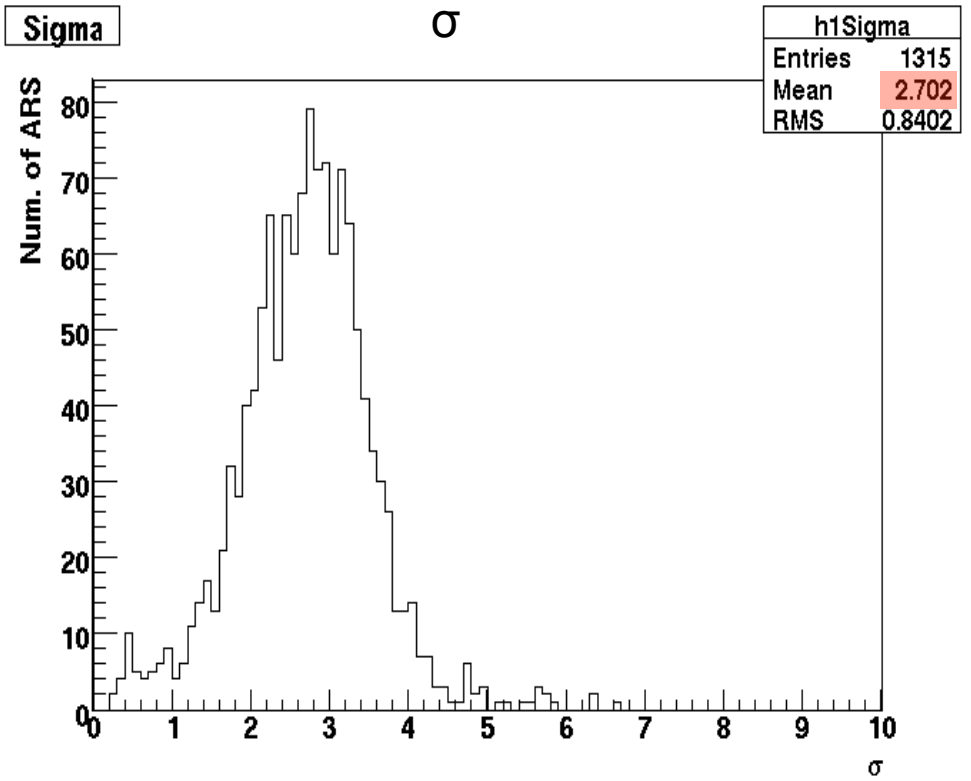
New 1pe Calibration Set

- Soft v3r4
  - installed at La Seyne
  - with possibility of including DNL correction*
- Run 38470 – 13/01/2008 1pe and XT correction only**
- In the DataBase versionid 17275311:
- Previous from 04/11/2008
- TS=0 check to monitor the thresholds

* Reweighting method
**No Ope because « breaks » everything

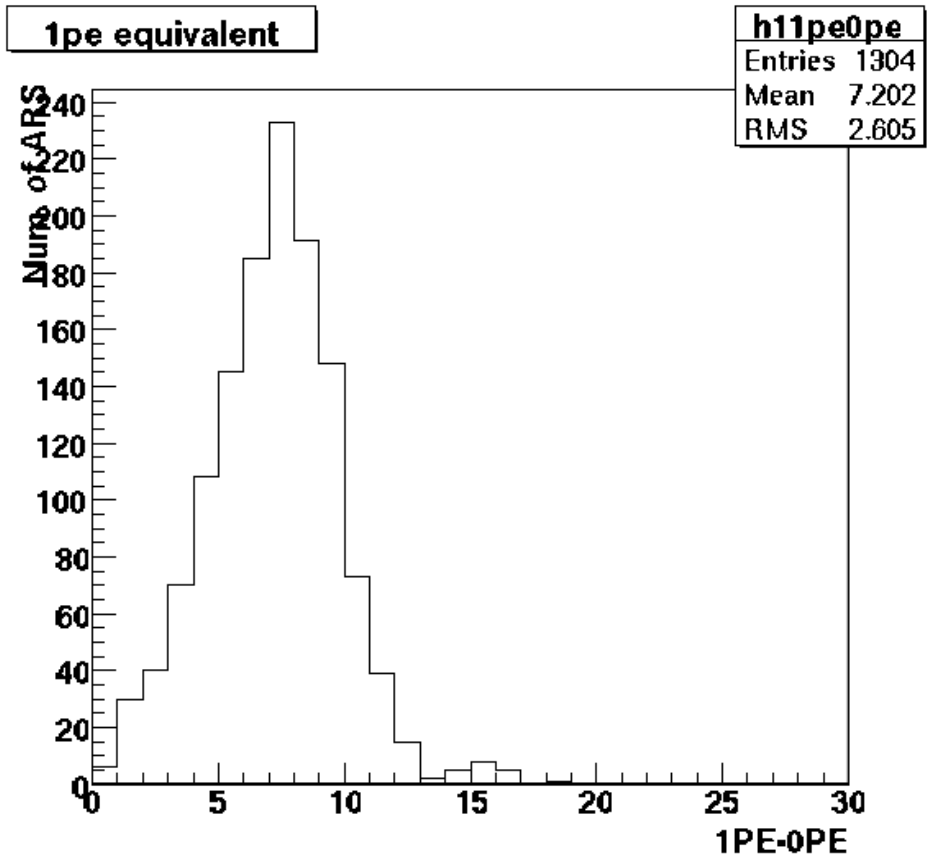
1pe

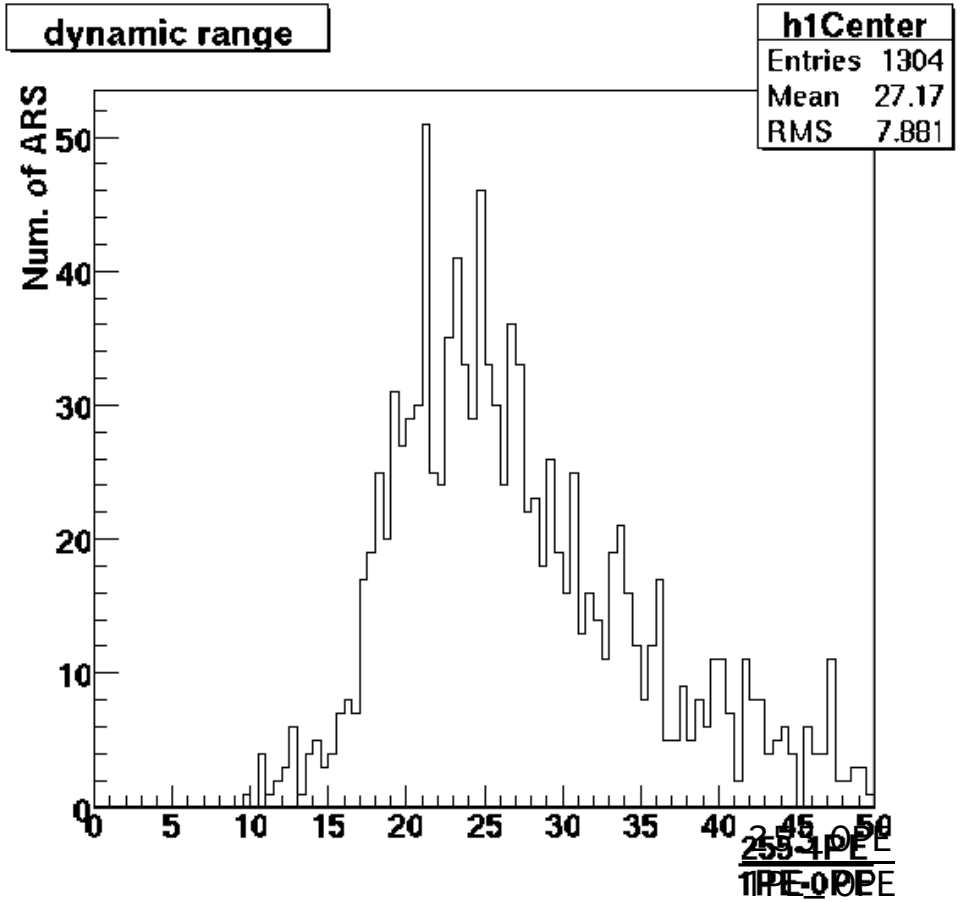




Big dispersion. We want to get a more uniform picture.

Dynamic range





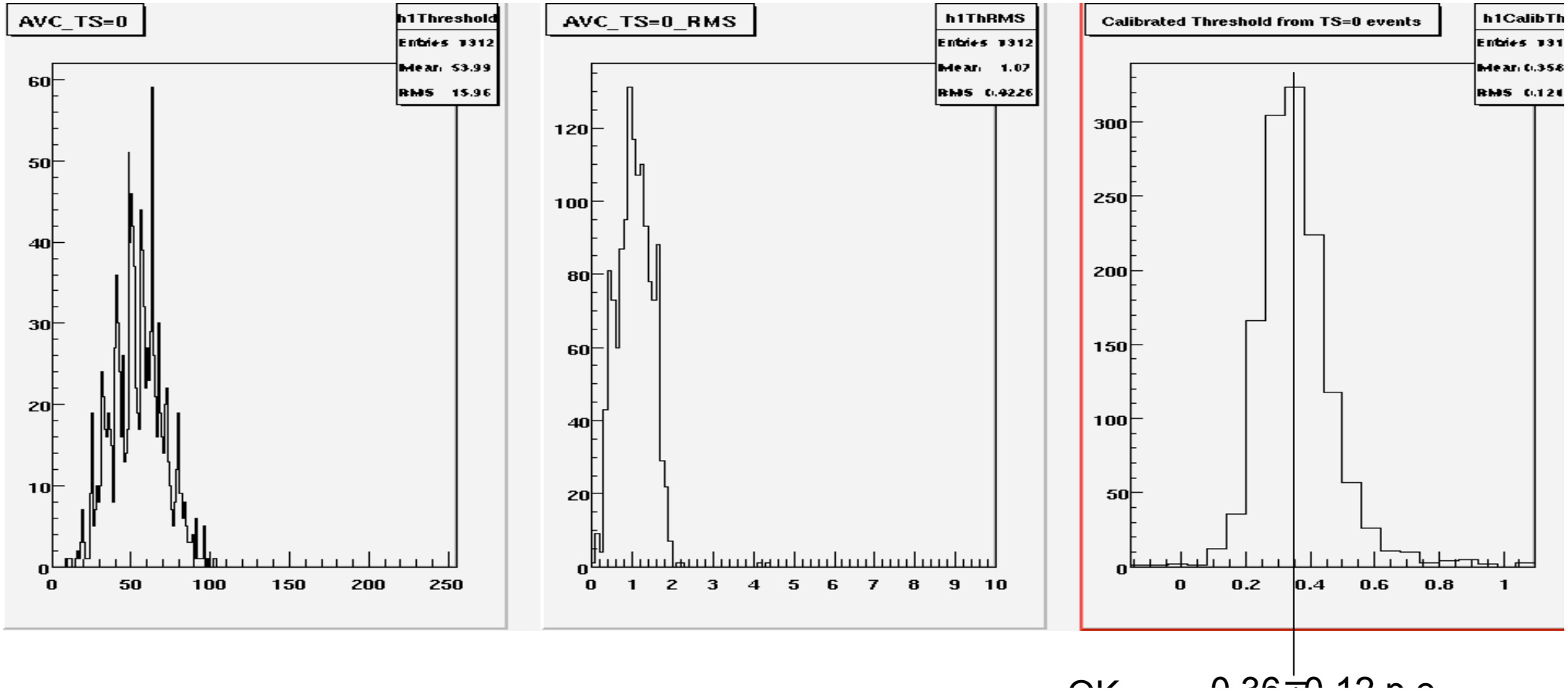
Originally 1pe-0pe =10 Change due to gain drop

Goal : get back to original situation (Adapt HV or electronics setting)

get a more homogeneous response

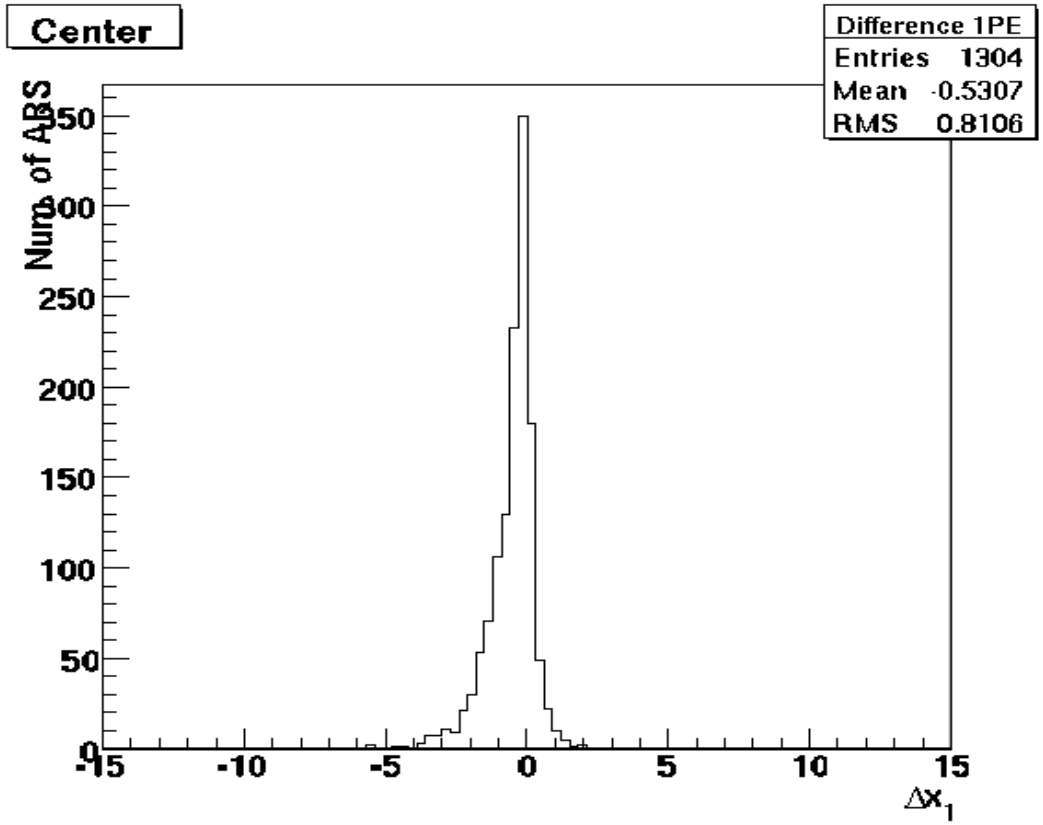
Check threshold with TS=0 events

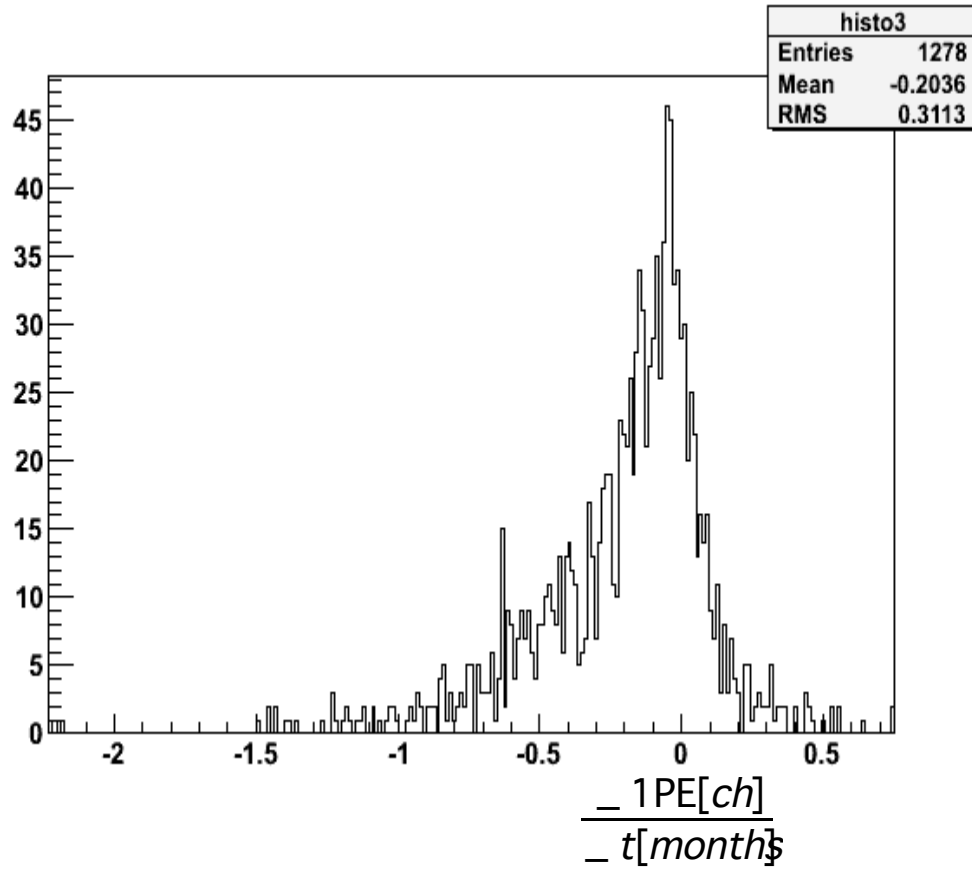
Run 38460: setup "Line 1-12 TS=0 trigger threshold (noise corr.) SCAN"



Gain drop

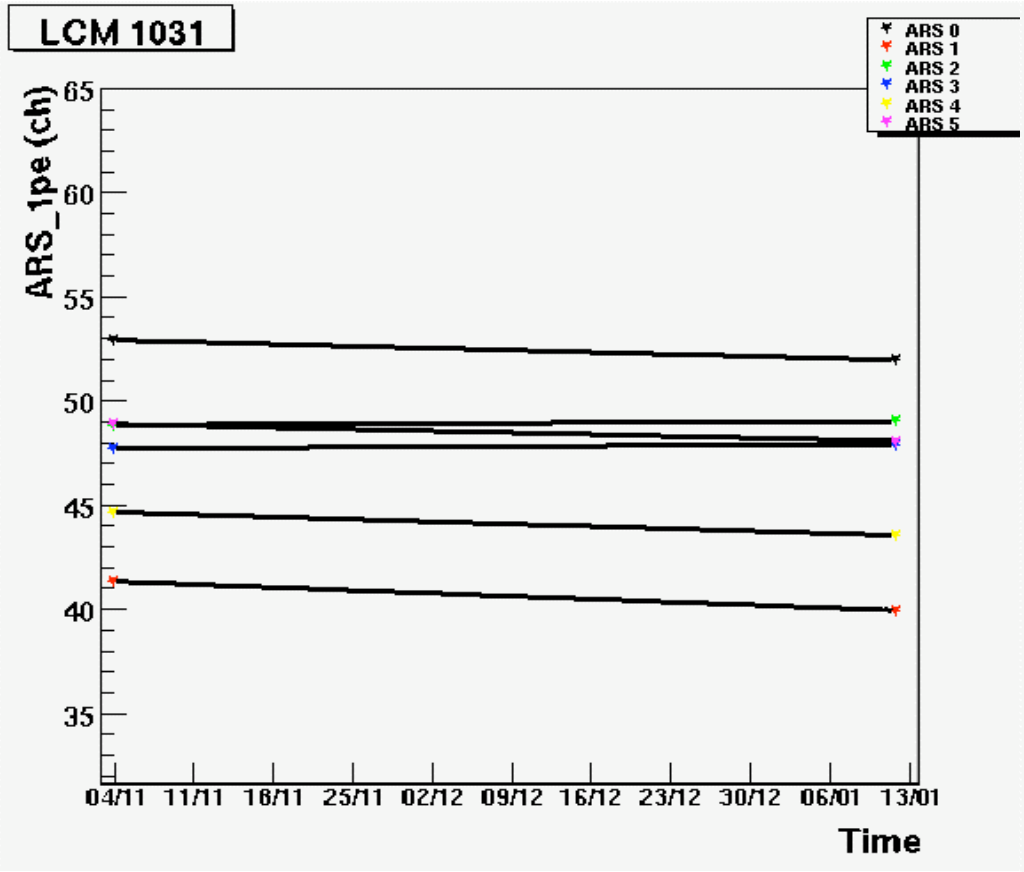
0.53 Ch. in 2.5 months

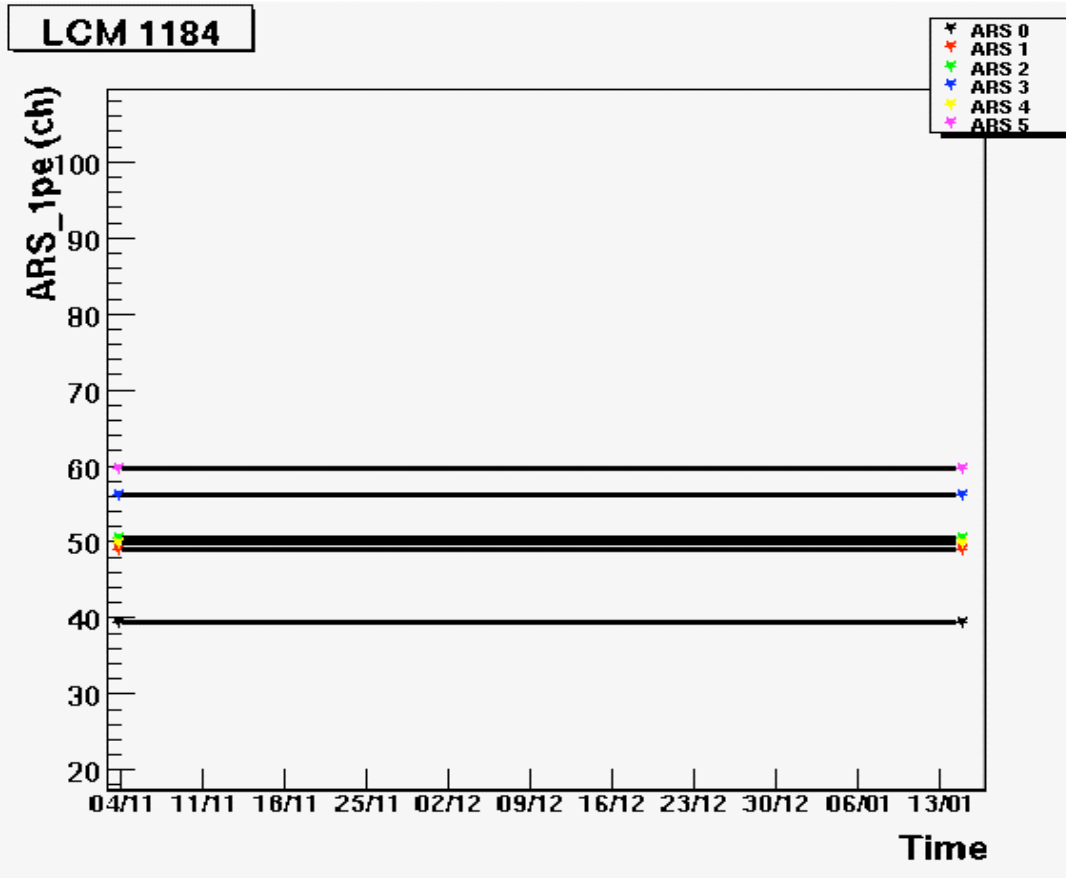




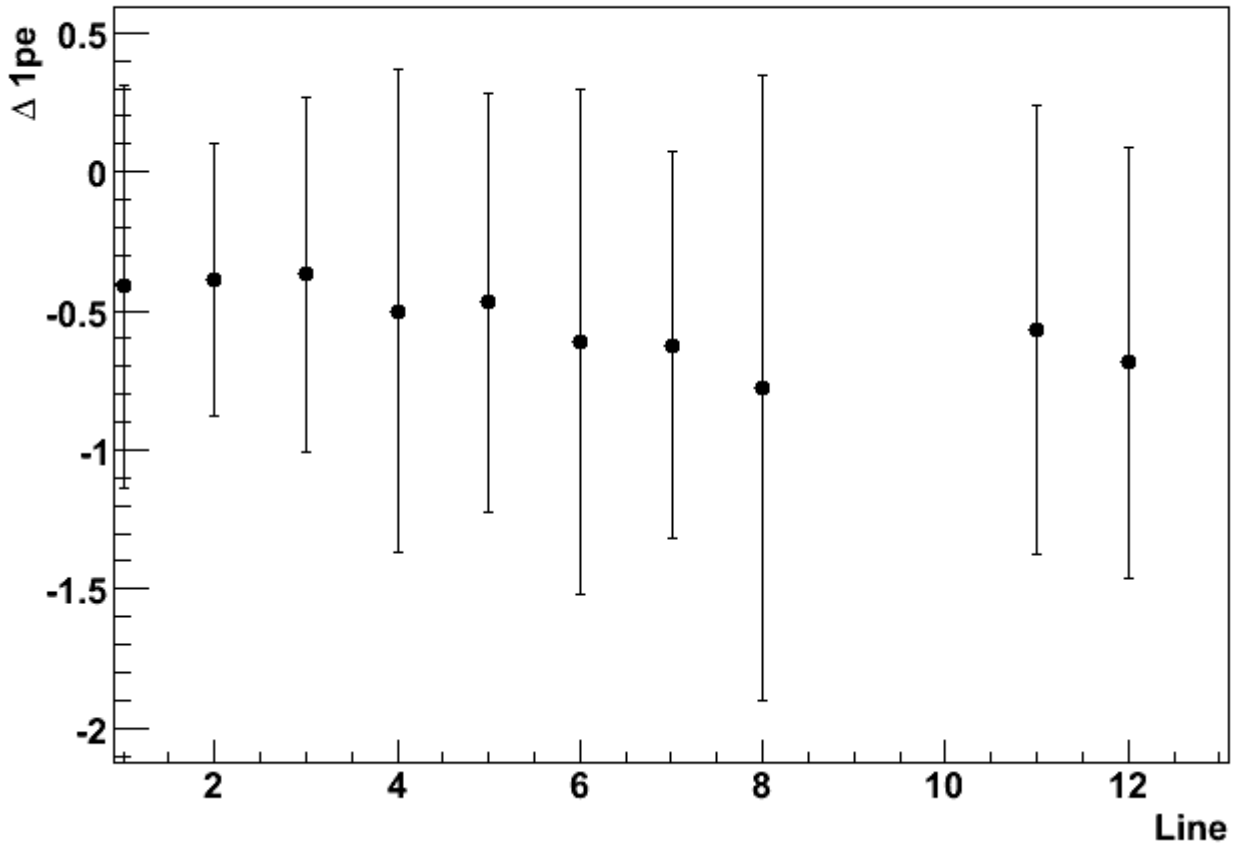
Gain drop examples

inhomogenous





Gain drop v.s. line



Nota: error bars are not statistical but the mean σ of the fitted 1pe distributions

Mean: -0.23Ch./Mth x2.5 months

DNL correction

Correction=Reweighting see:

Antoine presentation in Rome

or http://apc.univ-paris7.fr/MediaWiki/Utilisateur=ANTARES

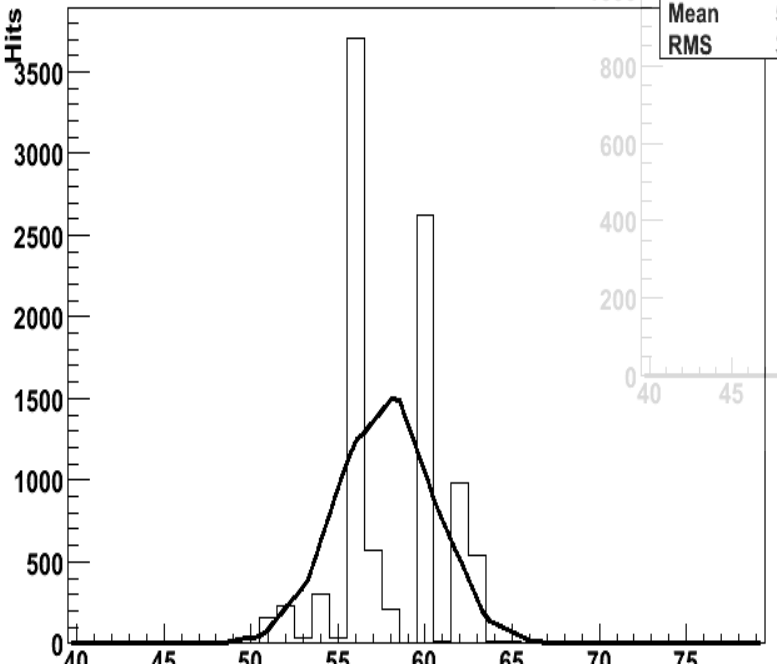
$$Ae^{-\alpha(x-x_0)} + Be^{\frac{-(x-x_1)}{2\sigma^2}}$$

NO

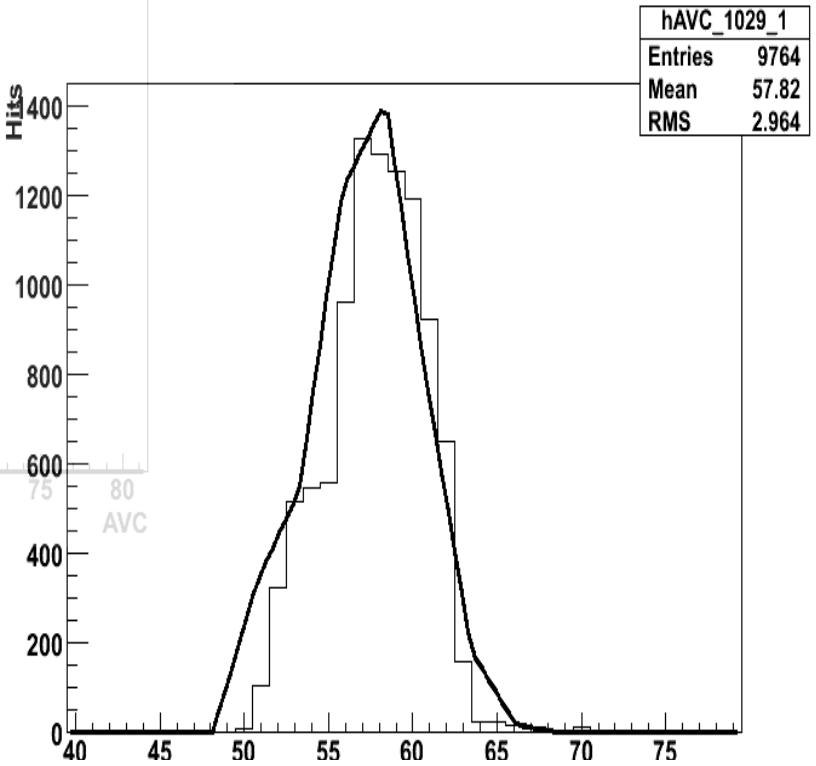
YES

Corr1= Correction + no DC fit

No correction



Corr2= Correction + DC fit



DNL correction

Correction=Reweighting see:

Antoine presentation in Rome

or http://apc.univ-paris7.fr/MediaWiki/Utilisateur=ANTARES

$$Ae^{-\alpha(x-x_0)} + Be^{\frac{-(x-x_1)}{2\sigma^2}}$$

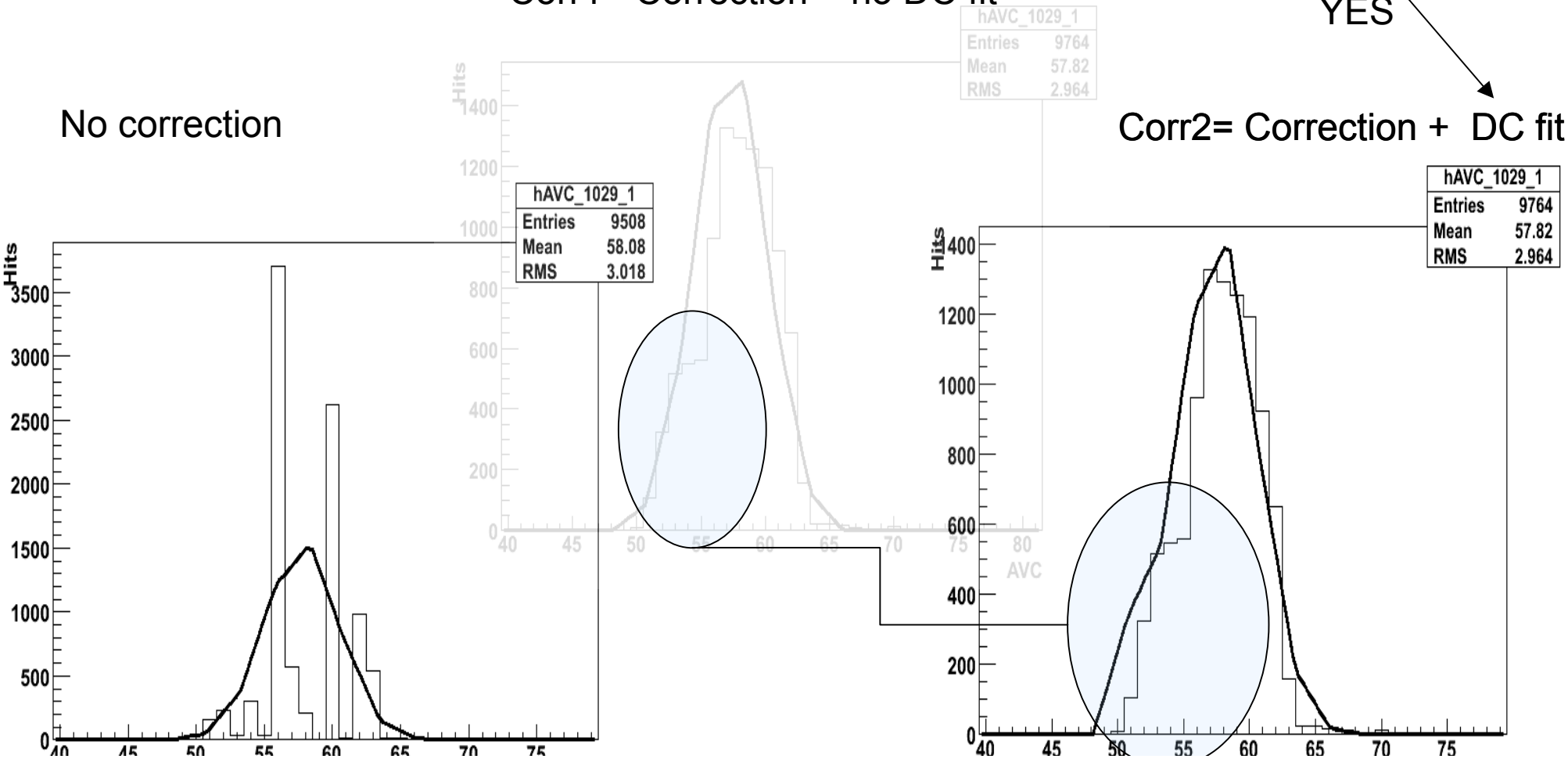
NO

YES

Corr1= Correction + no DC fit

No correction

Corr2= Correction + DC fit



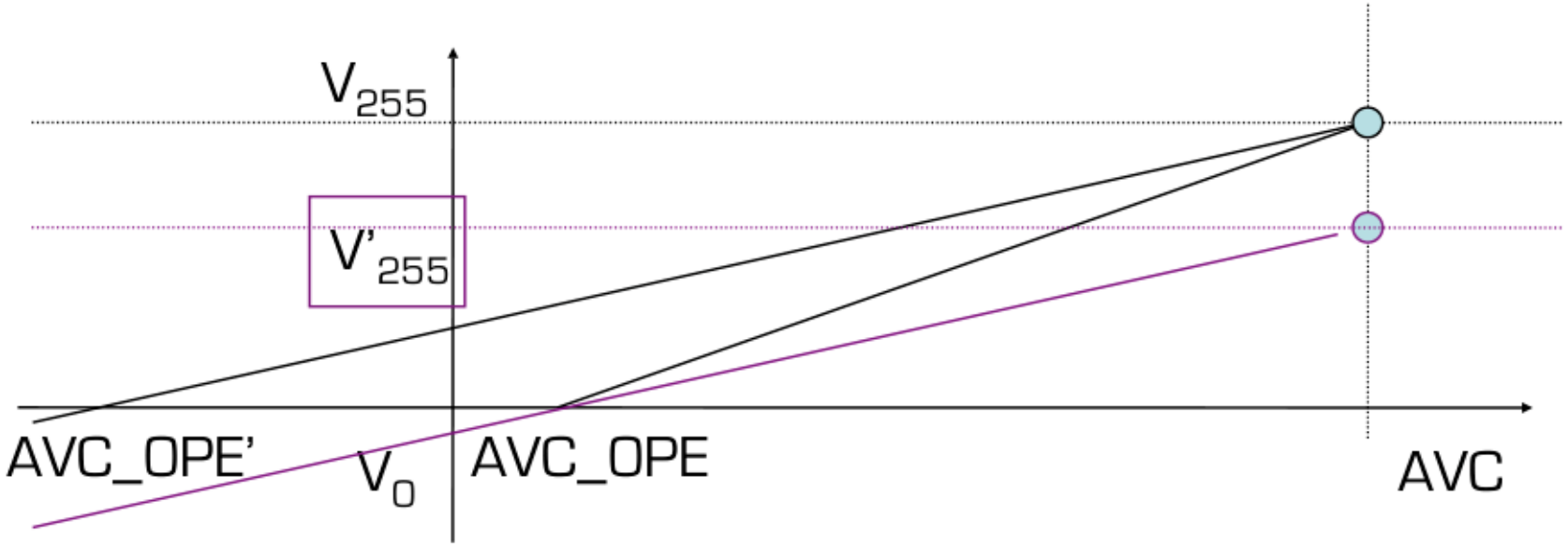
DAC tunning

- Why?:

  Get a uniform detector

  0pe=30 & 1pe-0pe=10

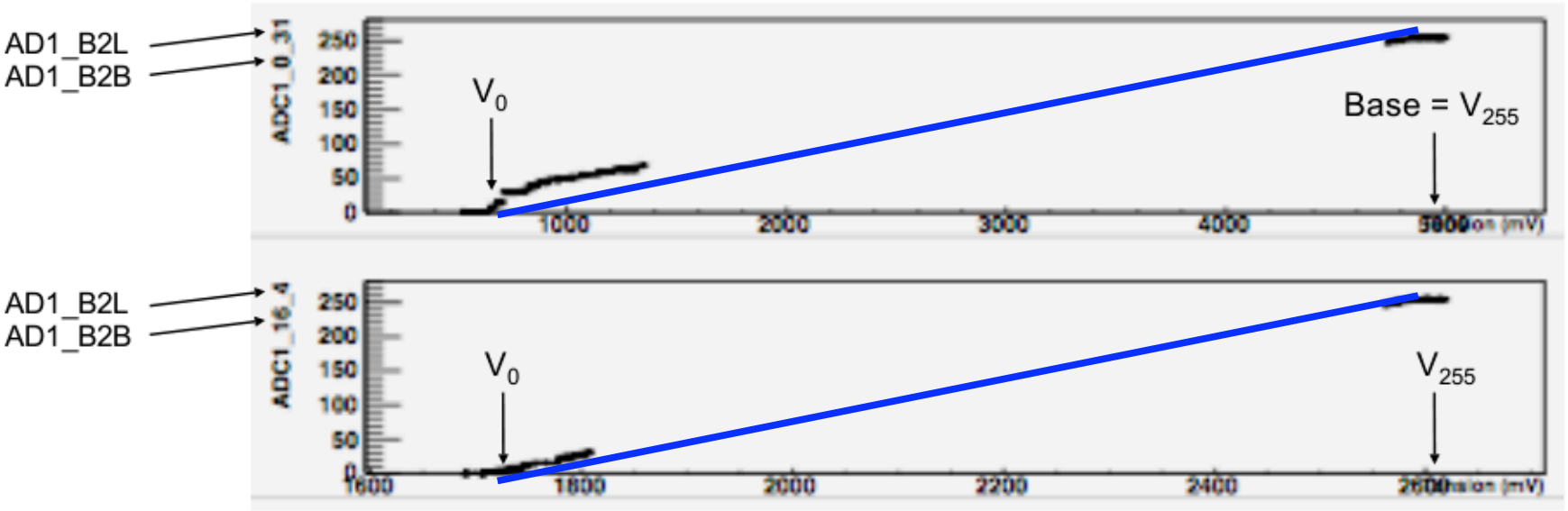
- Play with Tranfer Function of ARS



- Was not working as expected

Reminder definition TF

ADC transfer functions (Elec-2005-005) for base (AD1_B2B) and slope (AD1_B2L)



V_{255} ≡ lowest V for which AVC=255

V_0 ≡ First V≠0 signal AVC=0pe

$$V_{bin} = \text{Base} - \text{LSB (255-bin)}$$

$$\text{Base} = \alpha_b \times \text{AD1\_B2B} + \beta_b$$

-133.7 mV/bit 4849 mV

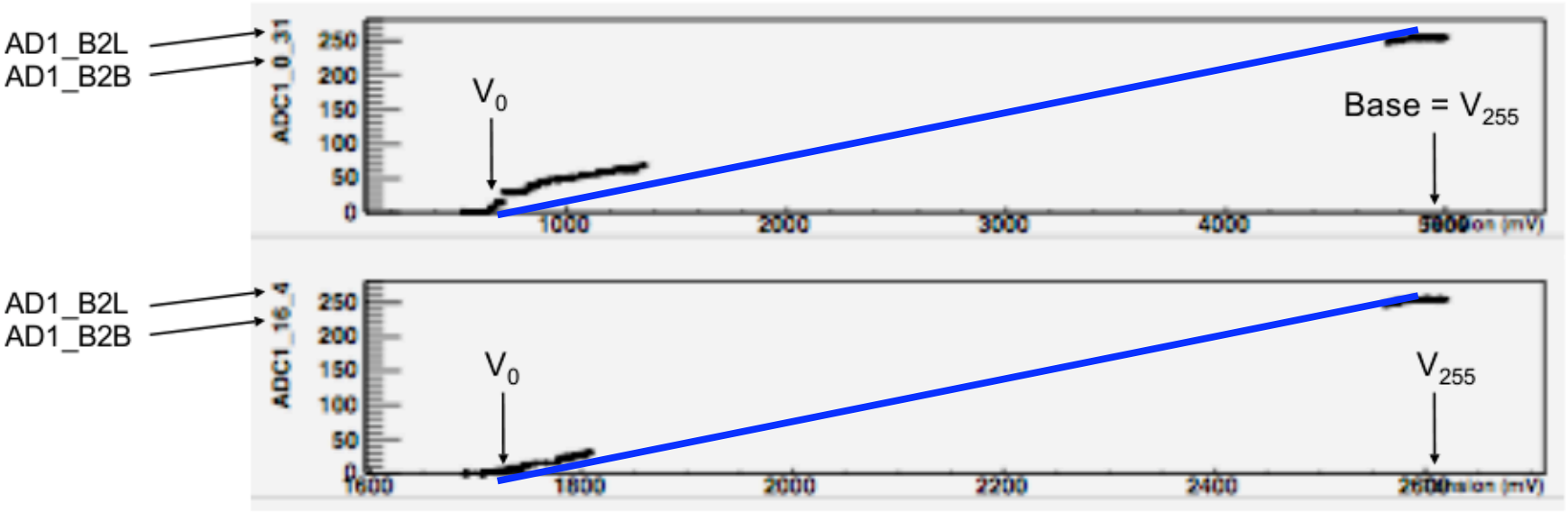
$$\text{LSB} = \alpha_l \times \text{AD1\_B2L} + \beta_l$$

0.486 mV/bit 1.45 mV

Today: AD1 B2L=11 & AD1 B2B=17

Reminder definition TFTests with LB (base=cst)

ADC transfer functions (Elec-2005-005) for base (AD1_B2B) and slope (AD1_B2L)



V_{255} ≡ lowest V for which AVC=255

V_0 ≡ First V≠0 signal AVC=0pe

V_{bin} = Base - LSB (255-bin)

Base = α_b x AD1_B2B + β_b

-133.7 mV/bit 4849 mV

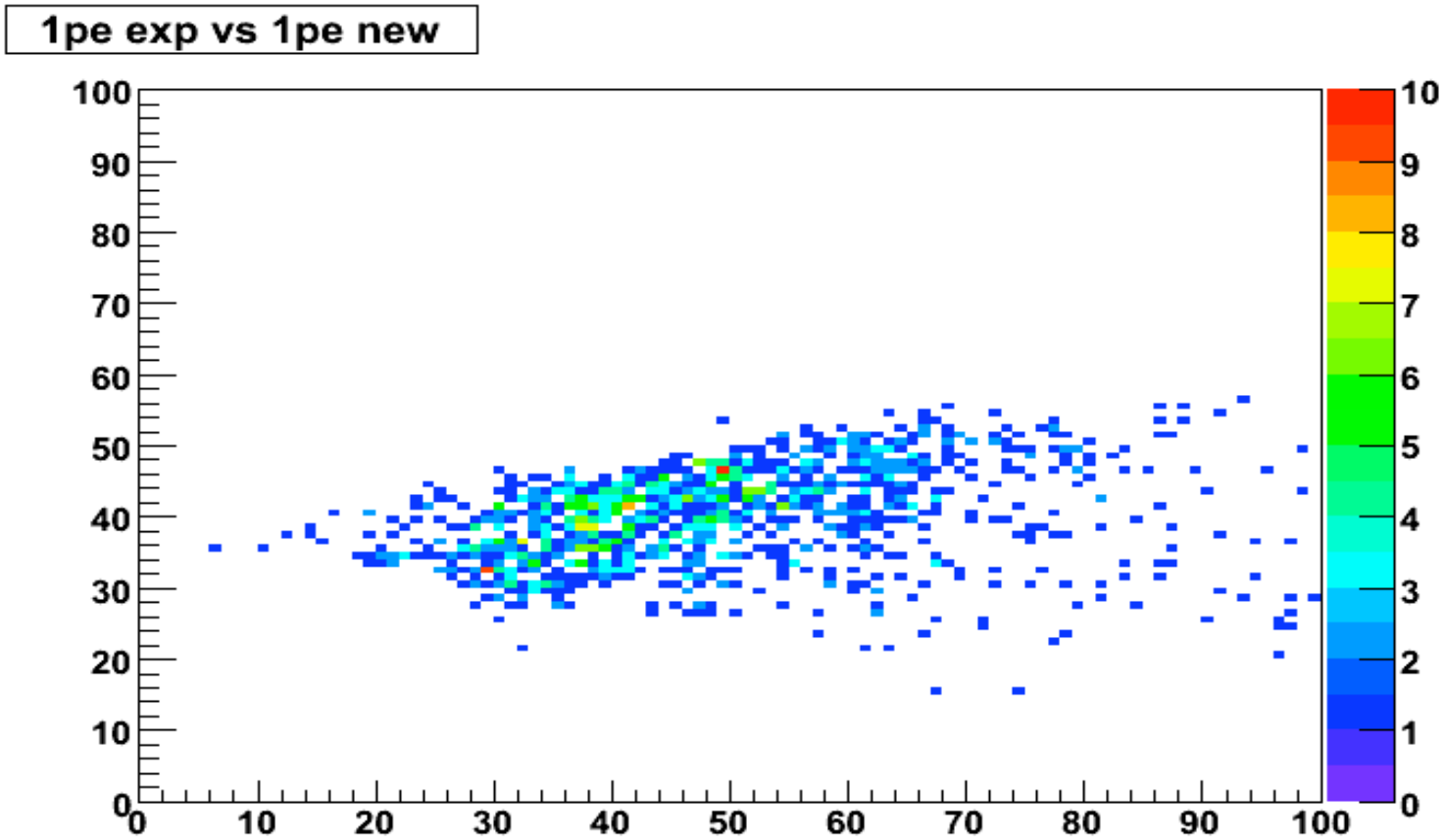
LSB = α_l x AD1_B2L + β_l

0.486 mV/bit 1.45 mV

Today: AD1 B2L=11 & AD1 B2B=17

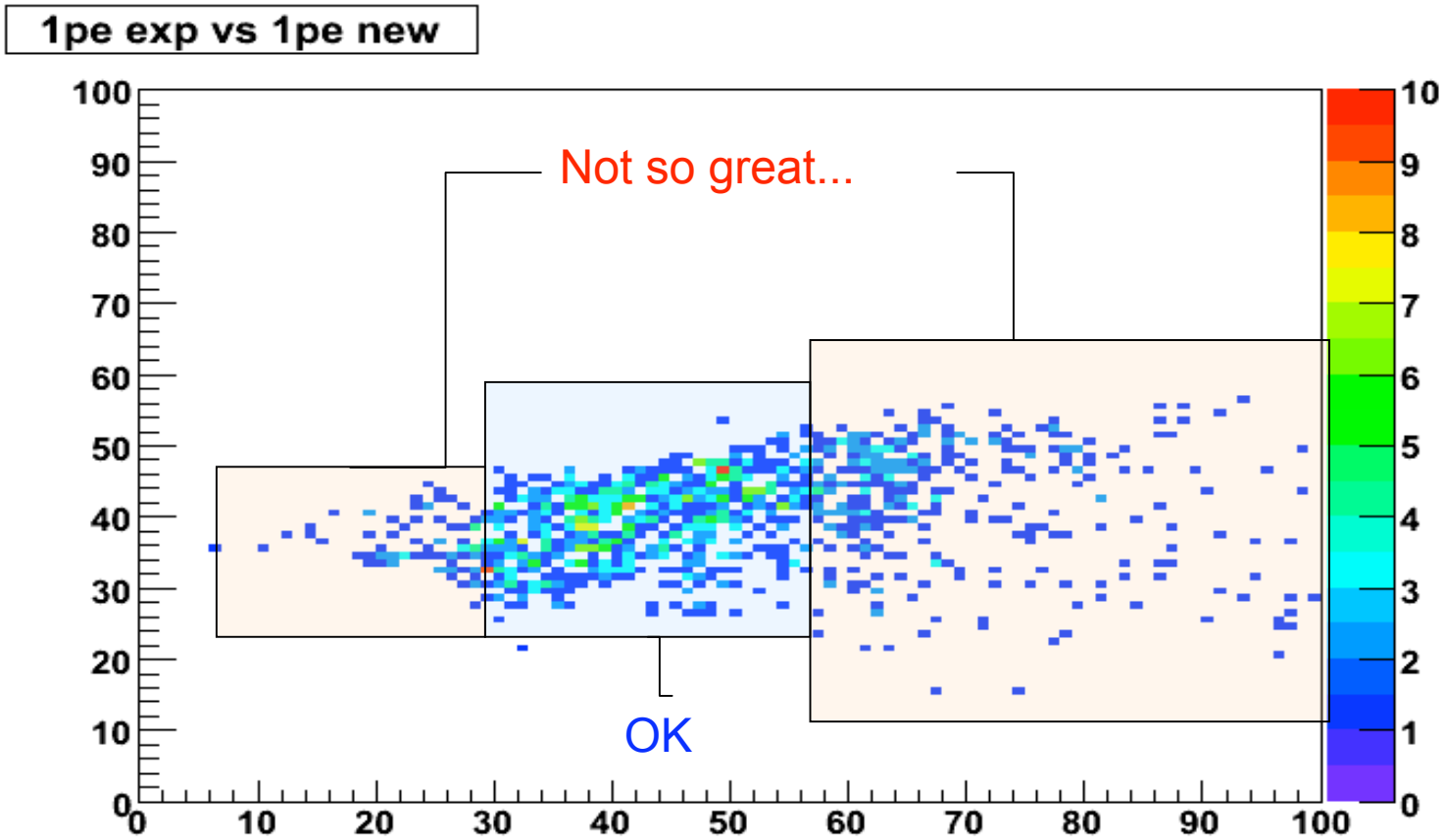
Tunnings for 1pe=40 and 0pe=30

1) ad1_b2l (LSB) so that 1pe-0pe=10
2) ad1_b2b (base) so that 0pe=30

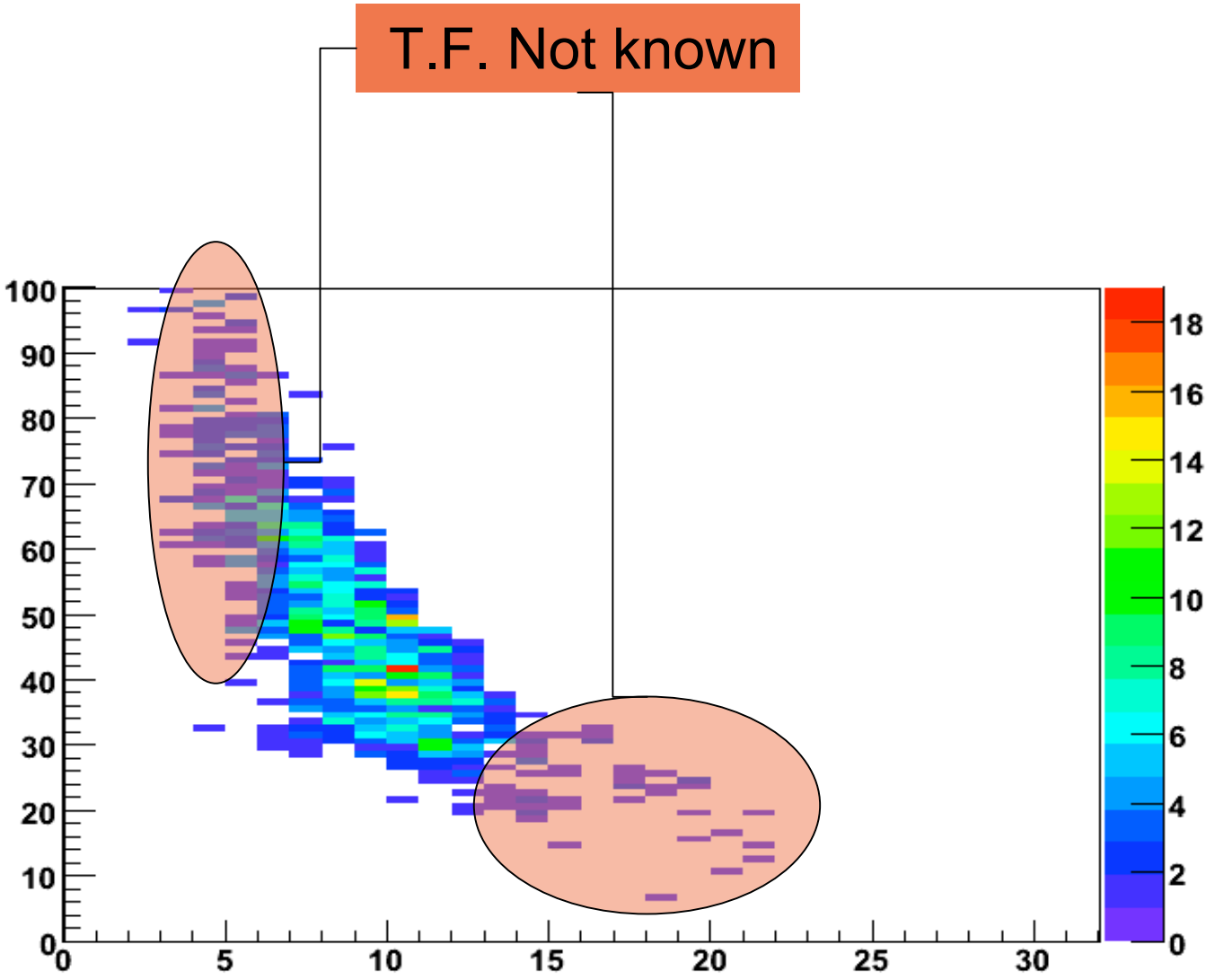


Tunnings for 1pe=40 and 0pe=30

1) ad1b2l (LSB) so that 1pe-0pe=10
2) ad1b2b (base) so that 0pe=30 (base known)

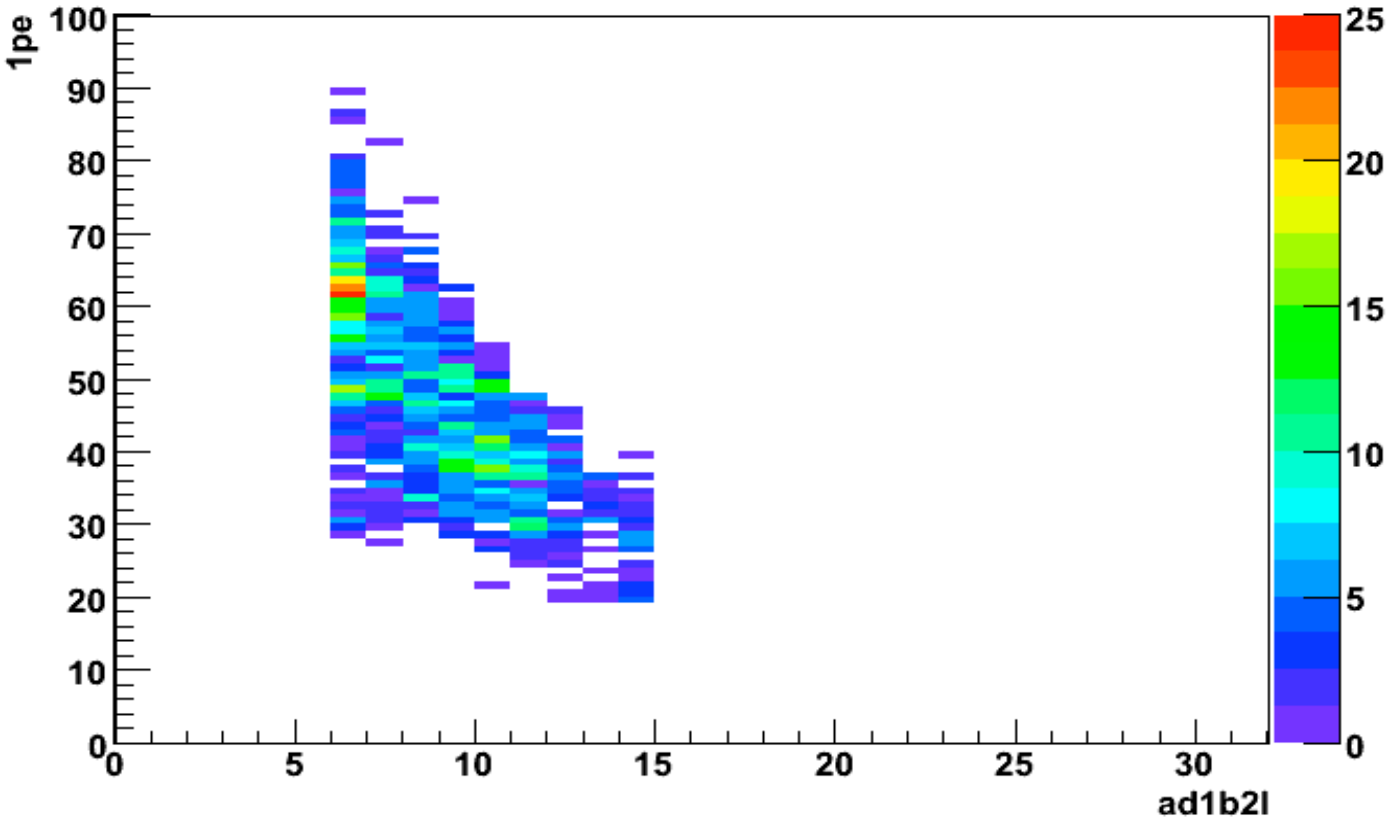


1pe v.s. DAC setting (lsb)



1pe v.s. DAC setting (lsb)

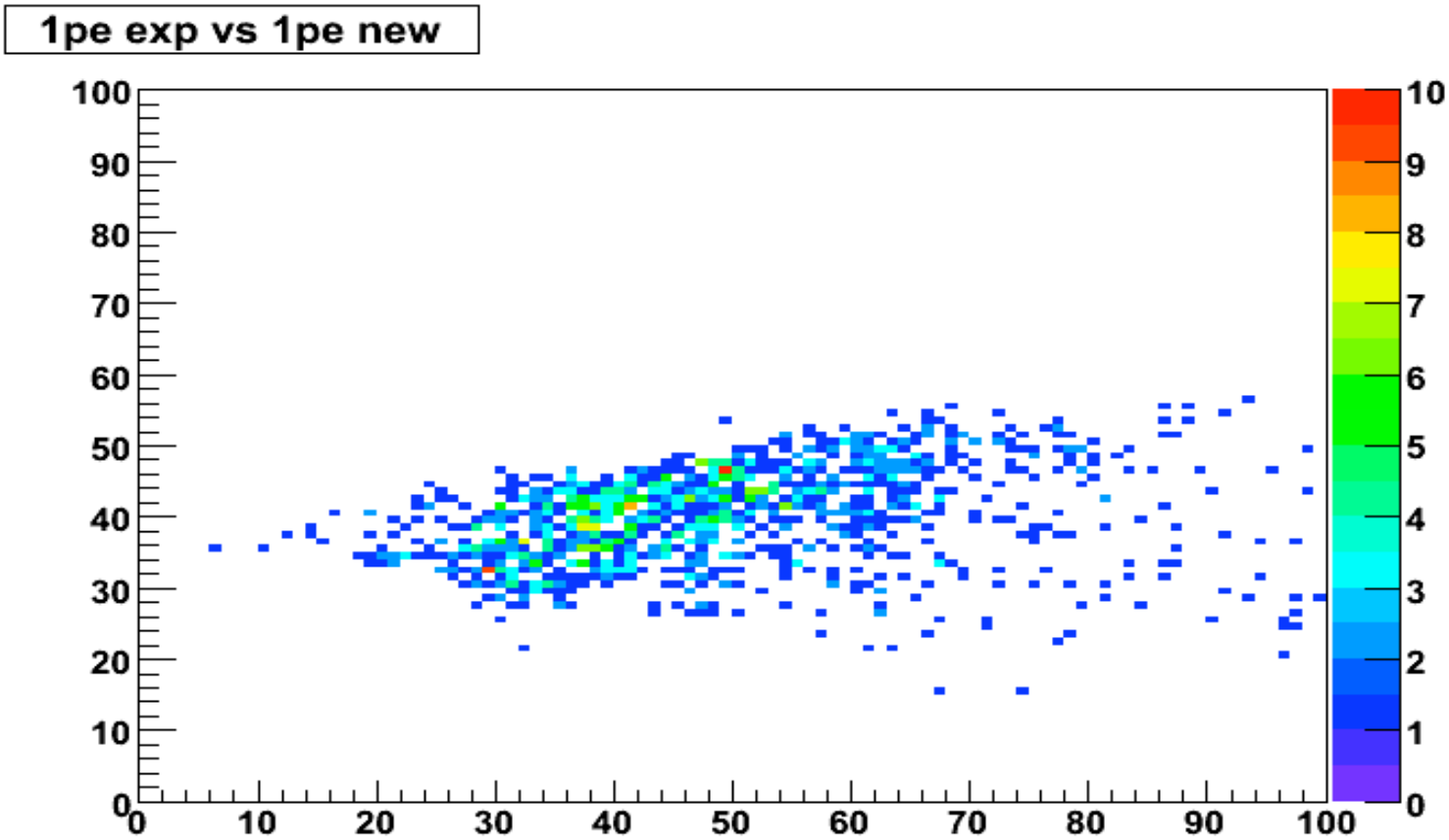
ad1_b2l<7=>6 & ad1_b2l>14 =>15



Tunnings for 1pe=40 and 0pe=30

Before

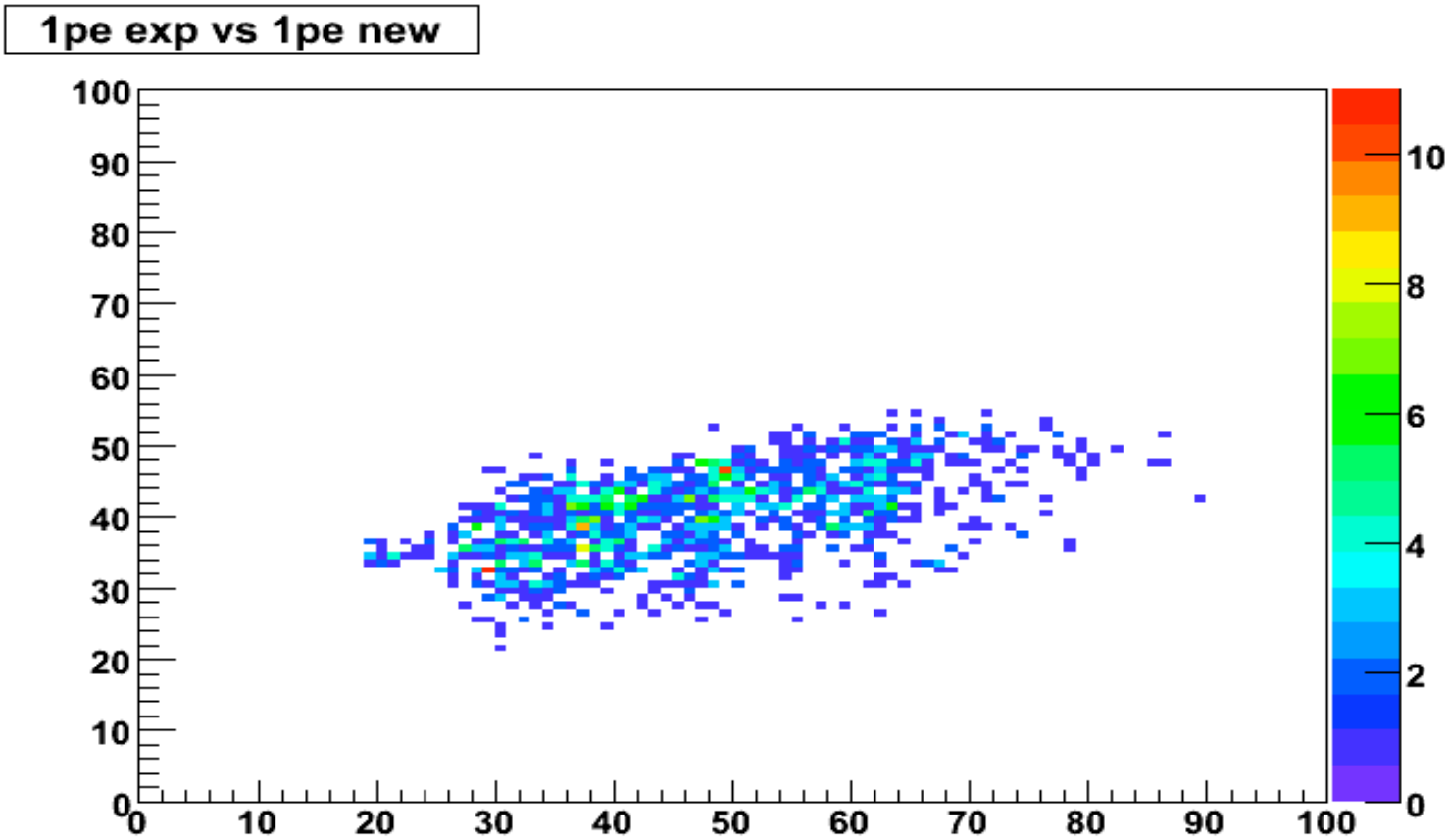
ad1_b2l<7=>6 & ad1_b2l>14 =>15



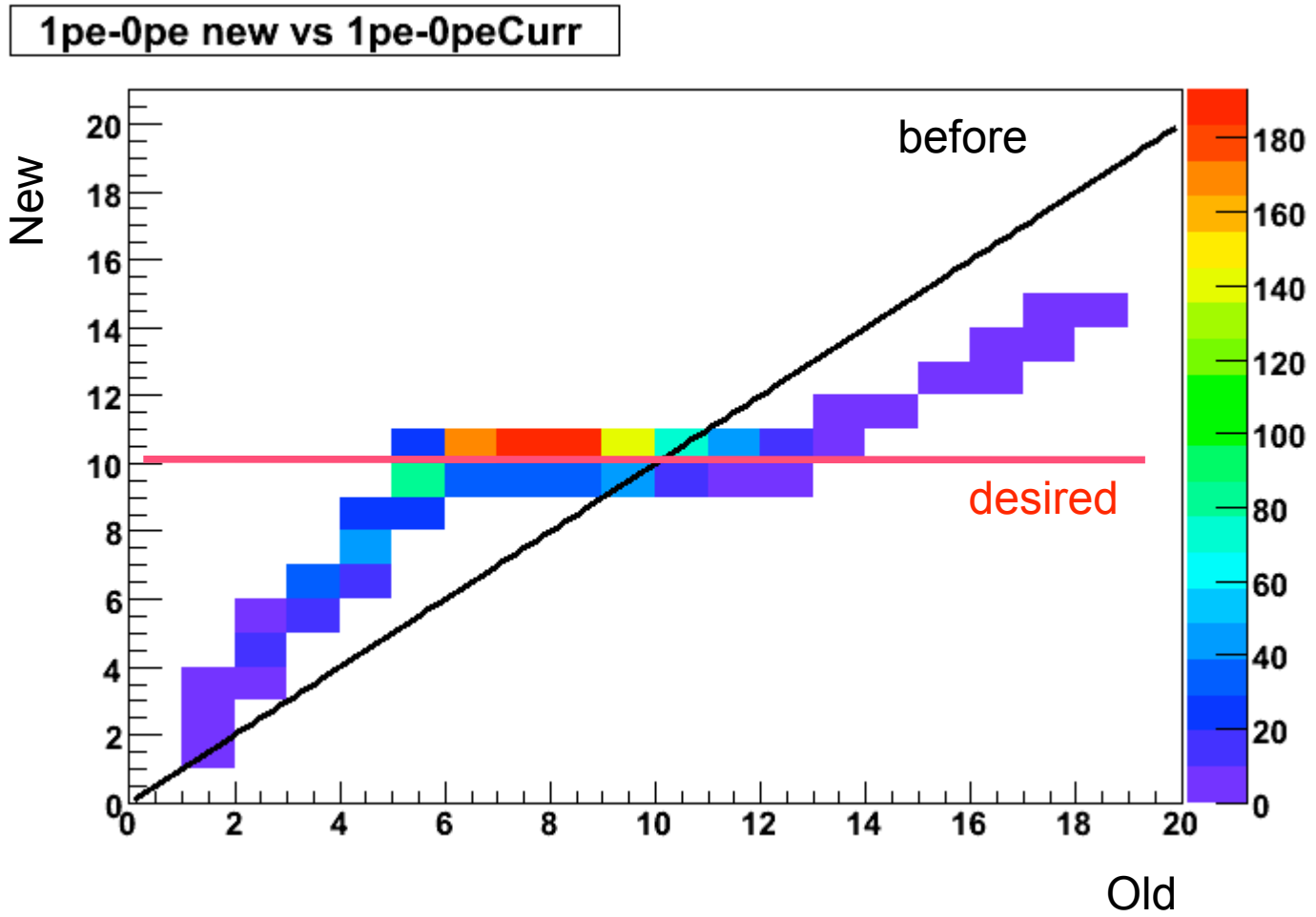
Tunnings for 1pe=40 and 0pe=30

After

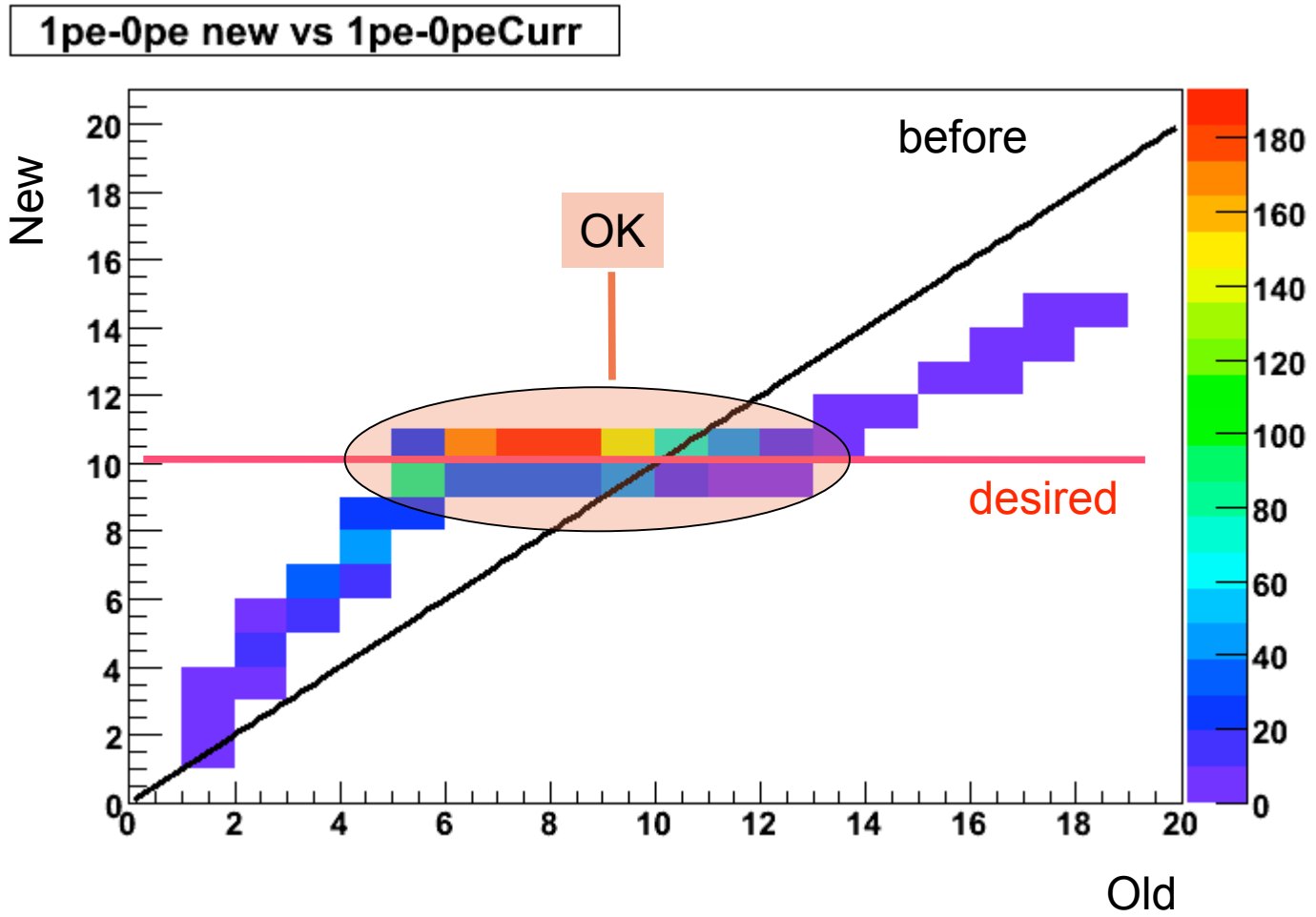
ad1_b2l<7=>6 & ad1_b2l>14 =>15



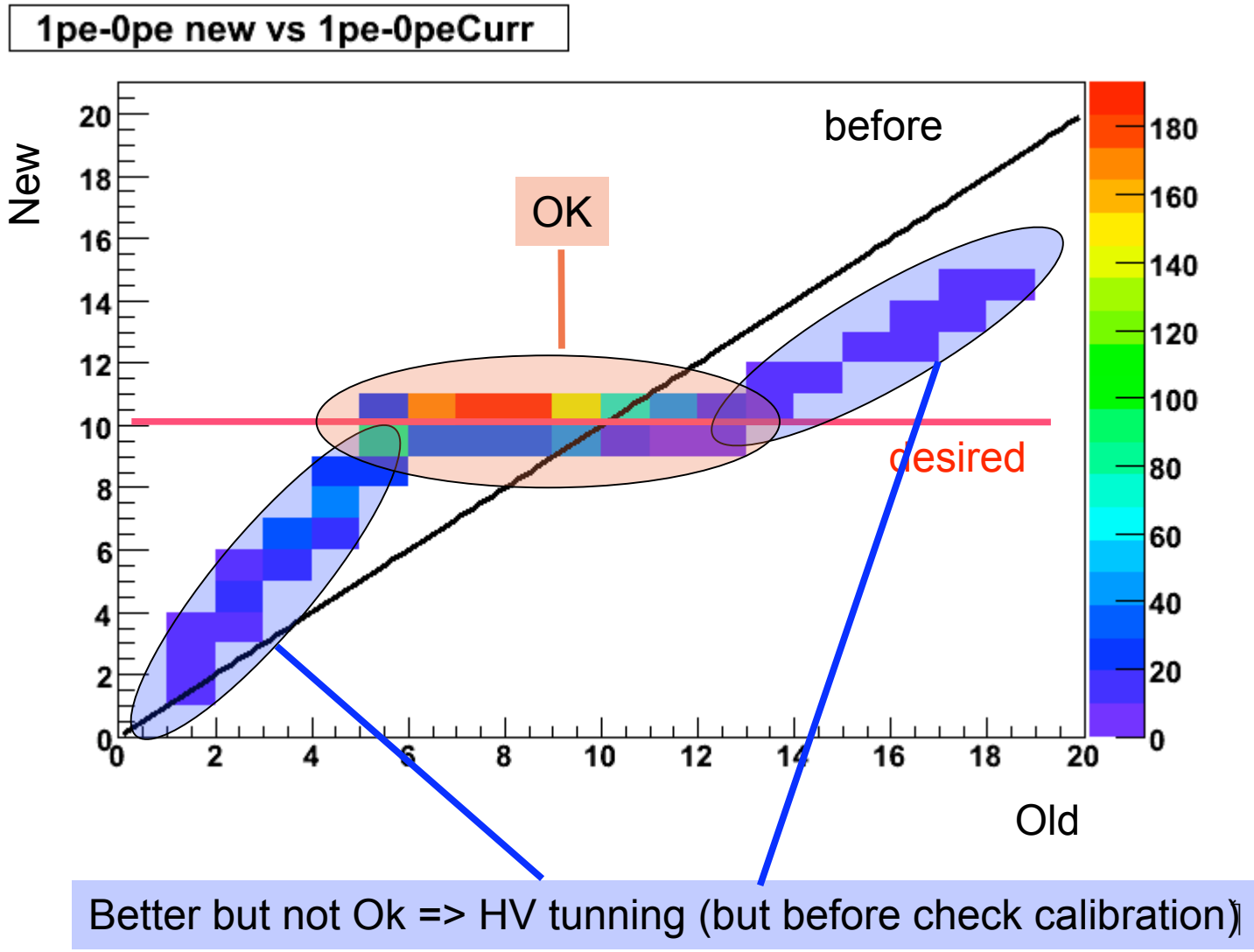
DAC: Summary/Conclusion



DAC: Summary/Conclusion



DAC: Summary/Conclusion



Better but not Ok => HV tunning (but before check calibration)

HV Tunning Study

J.-P. Schuller CEA-Saclay

Alternative/Complementary approach to homogenize the detector:

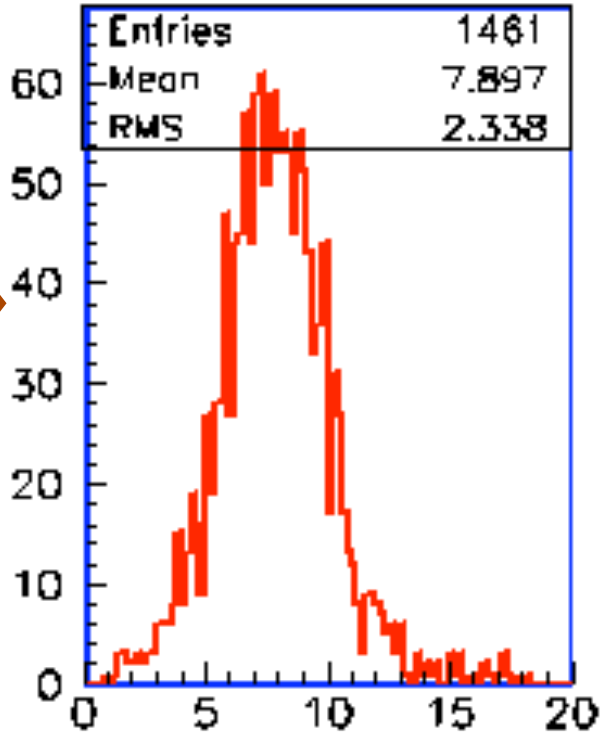
Play with PMT HV => Change Gain => Move 1PE-0PE

New attempt to render more uniform the channels response

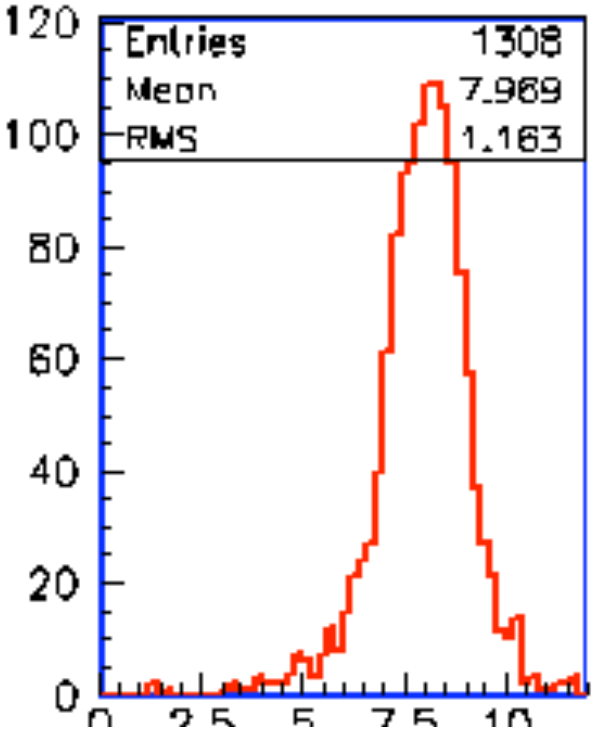
What is different with respect to November 2008 ?

- New set of pedestals centred around 30
- Target value for 1pe: 8 ADC channels (instead of 10)

1pe (≡ slope) distribution with standard HV's



1pe (≡ slope) distribution with modified HV's

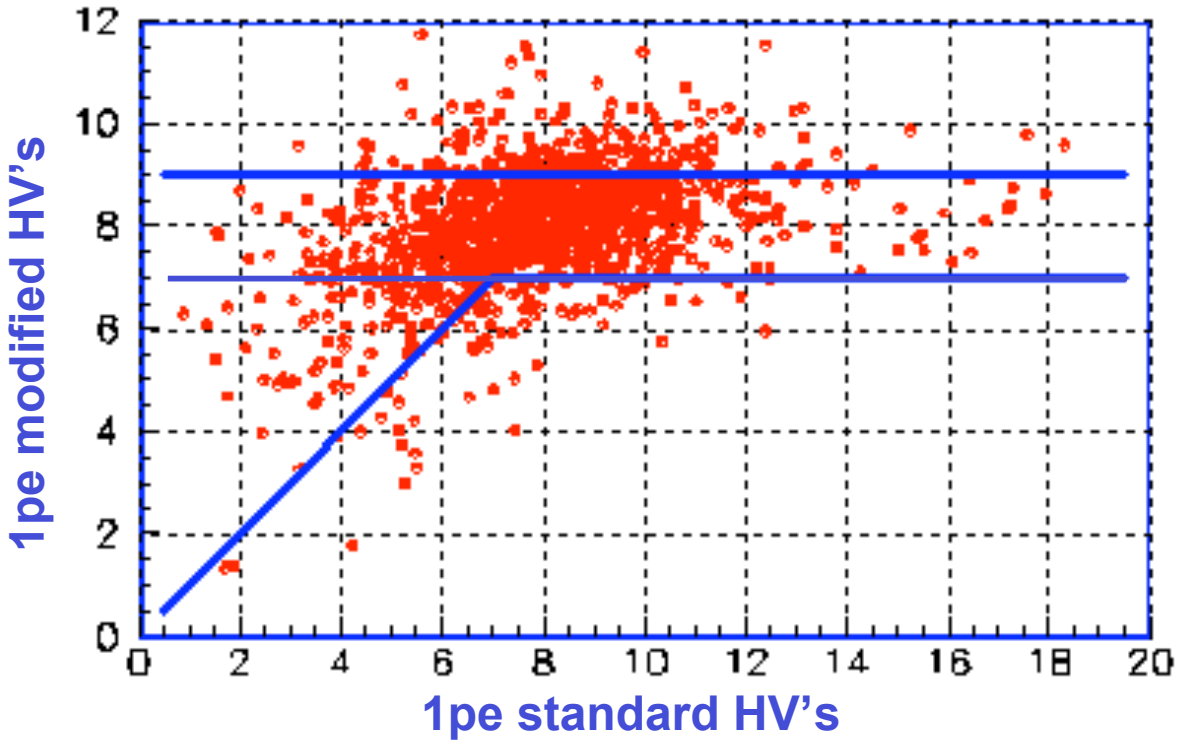


- Average value ~ stable
- rms divided by ~ 2

(was already near 8 !!)

Less entries in 2nd plot: loss of L10 in the interval…

Corrected slopes after 2nd iteration



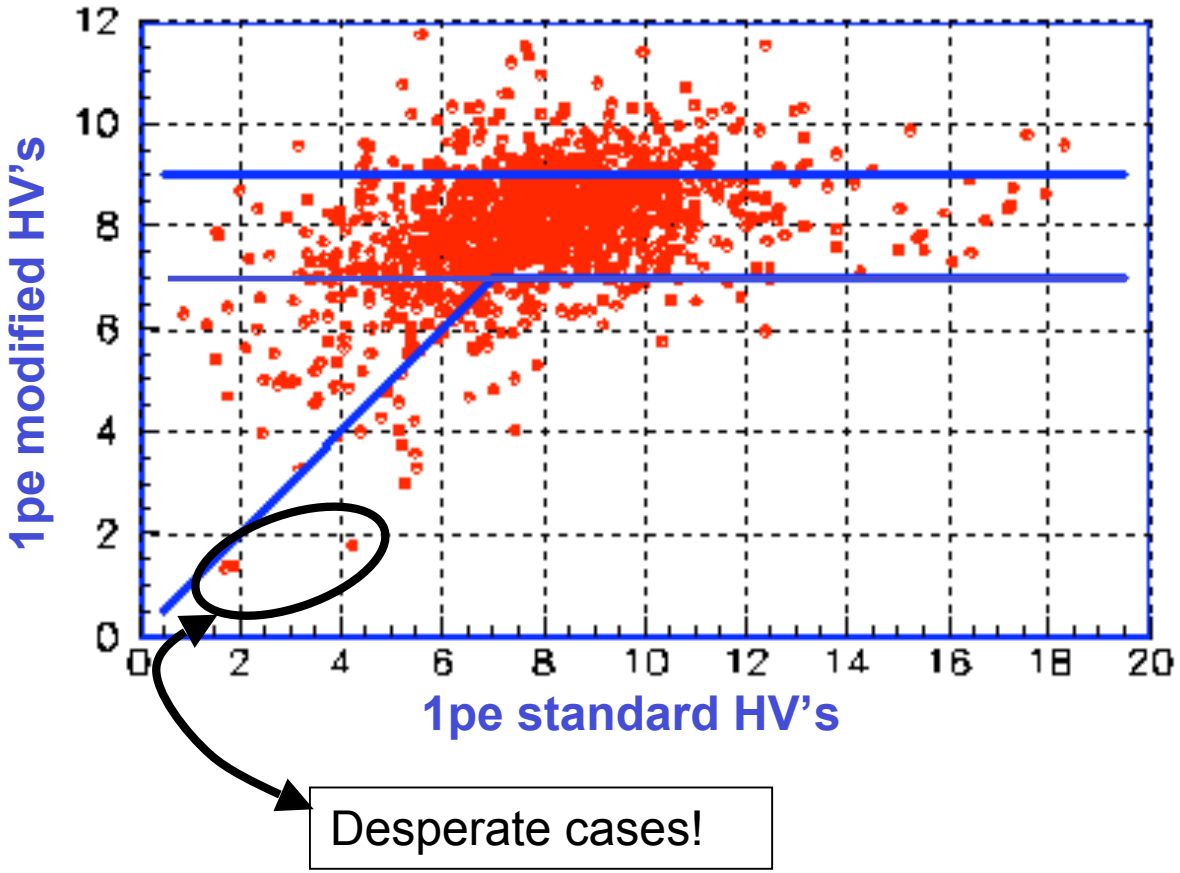
Target value: 8

➔ 8 ± 1 is OK

Reminder:

Due to DNL, uncertainty on slope is ± 2

Corrected slopes after 2nd iteration



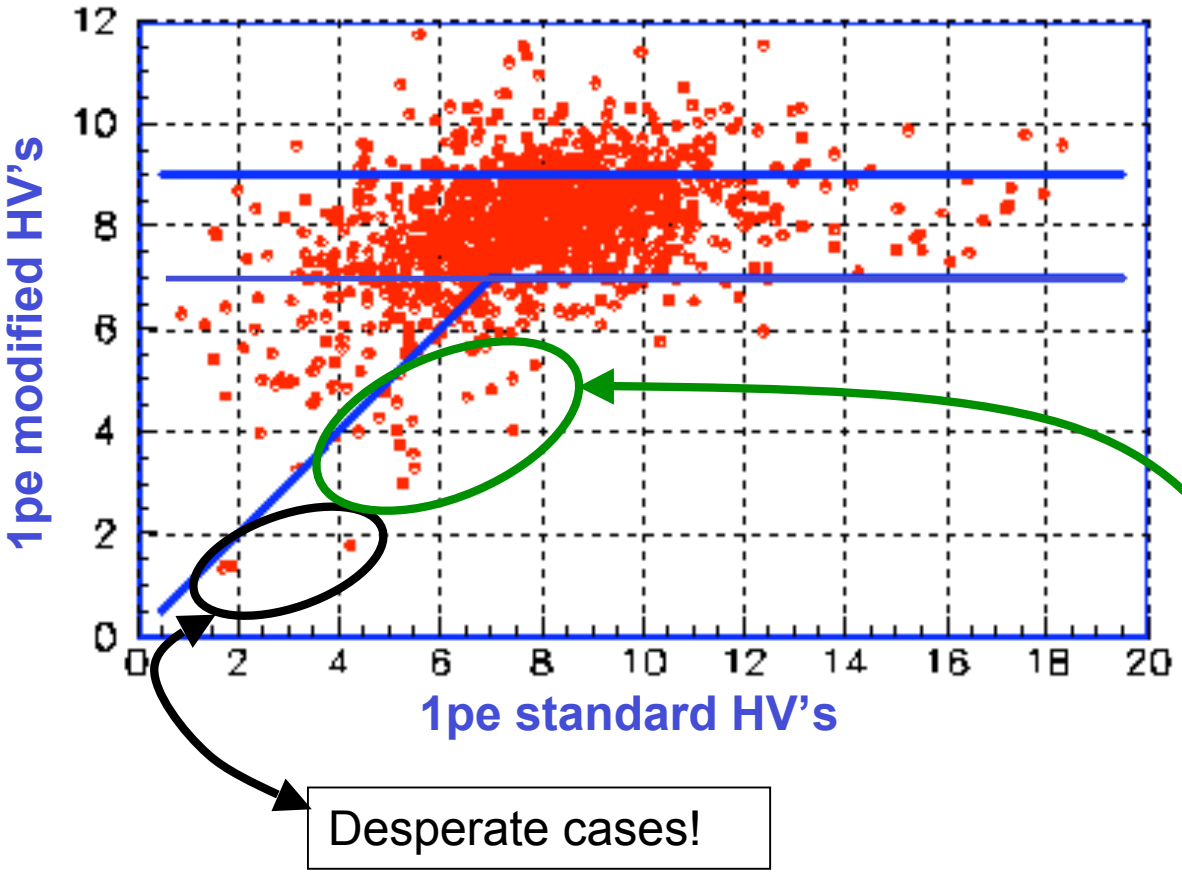
Target value: 8

➔ 8 ± 1 is OK

Reminder:

Due to DNL, uncertainty on slope is ± 2

Corrected slopes after 2nd iteration



Target value: 8

➔ 8 ± 1 is OK

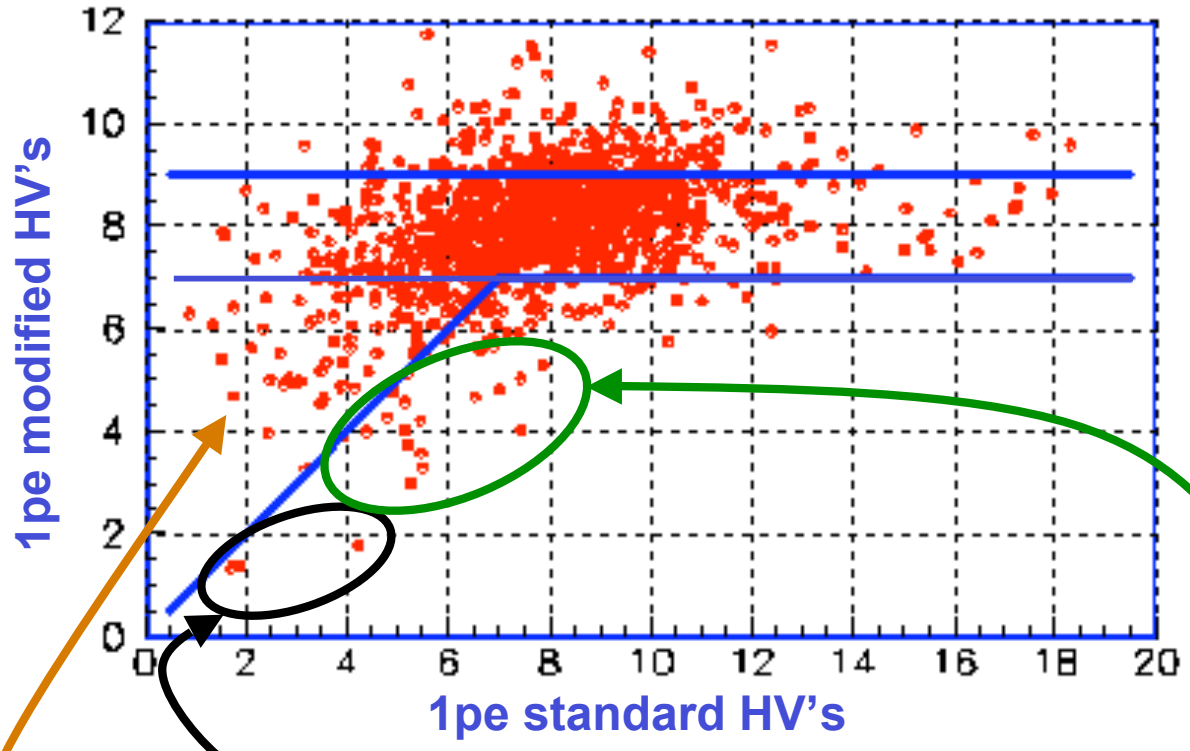
Reminder:

Due to DNL, uncertainty on slope is ± 2

Degraded!!
Thresholds pb??

Desperate cases!

Corrected slopes after 2nd iteration



Target value: 8

➔ 8 ± 1 is OK

Reminder:

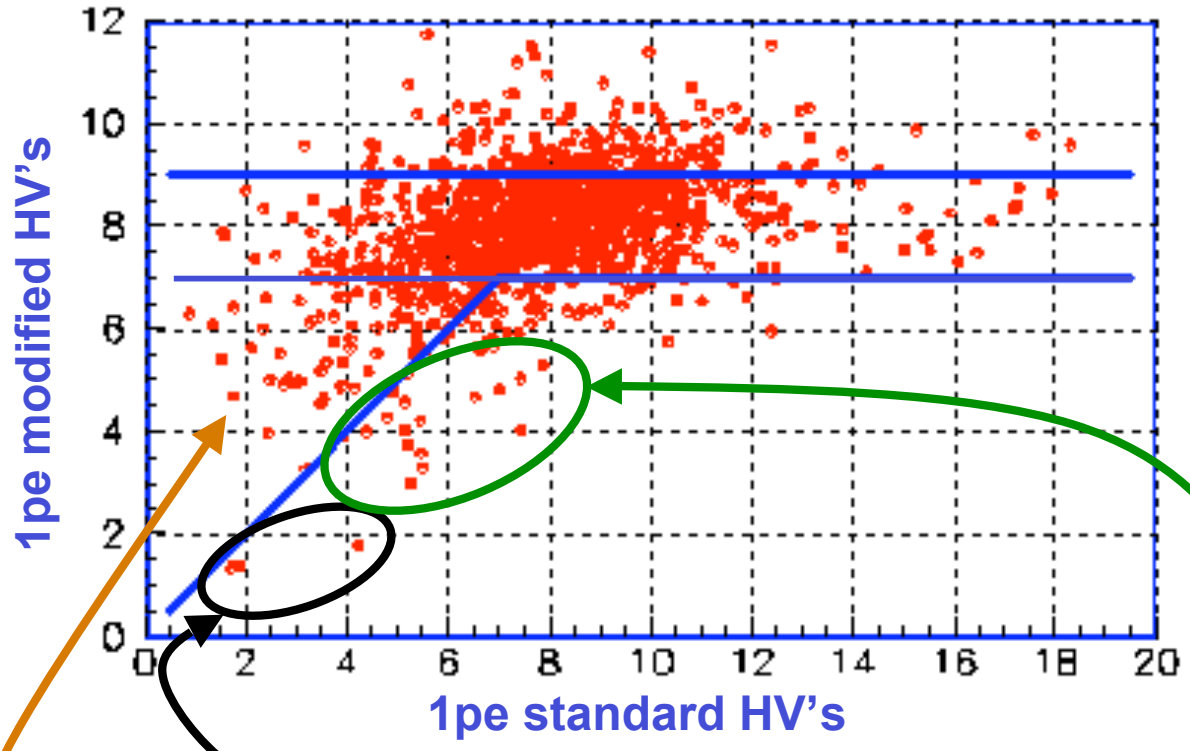
Due to DNL, uncertainty on slope is ± 2

Degraded!!
Thresholds pb??

Desperate cases!

Improved!
But not enough…

Corrected slopes after 2nd iteration



Target value: 8

➔ 8 ± 1 is OK

Reminder:

Due to DNL, uncertainty on slope is ± 2

Degraded!!
Thresholds pb??

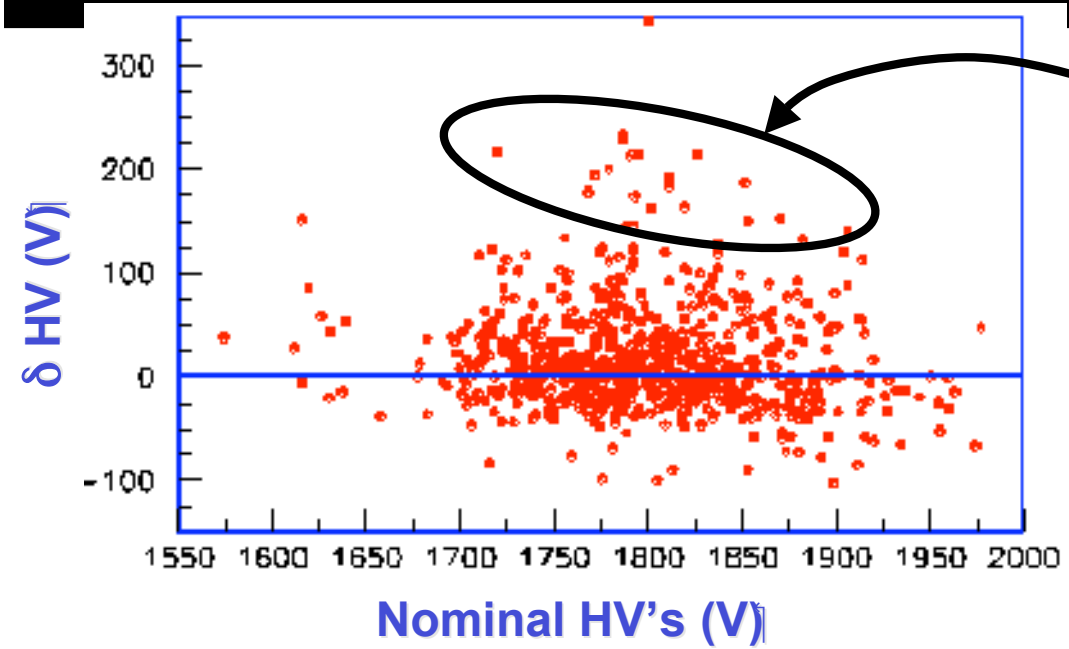
Desperate cases!

Improved!
But not enough…

A 3rd iteration can be useful.

- **Better to perform it after a re-tuning of TRIG0_TH**
- **Ideally after we found a way to get rid of the DNL!**

Applied corrections to HV's

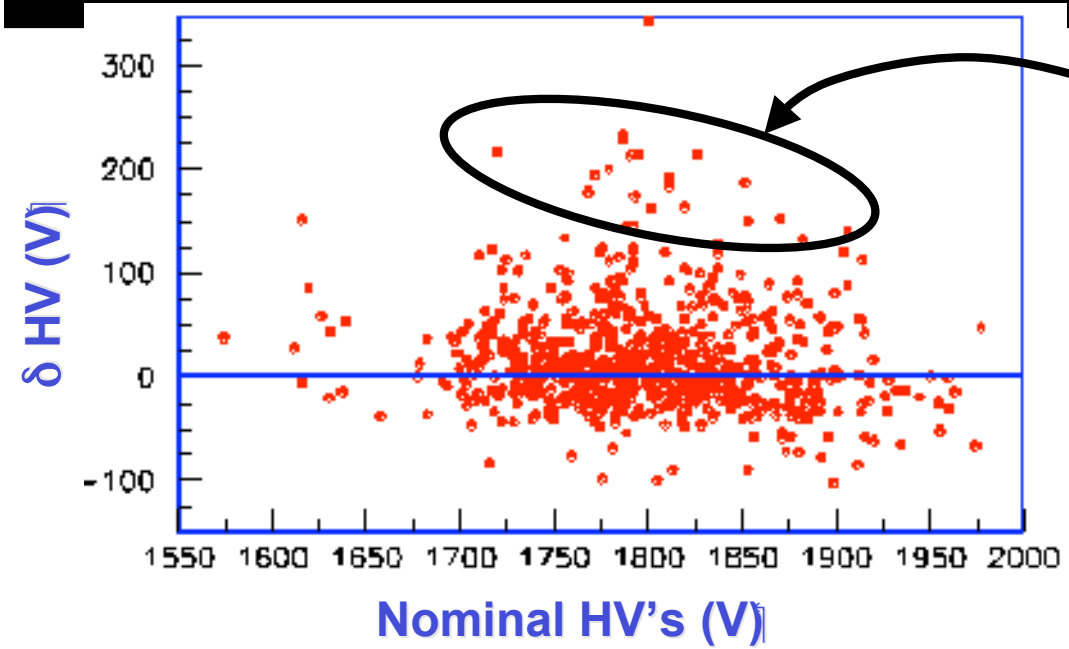


For these channels, the operation can not be repeated every year…

The HV is limited to 2400 V !

In average: + 18 V

Applied corrections to HV's

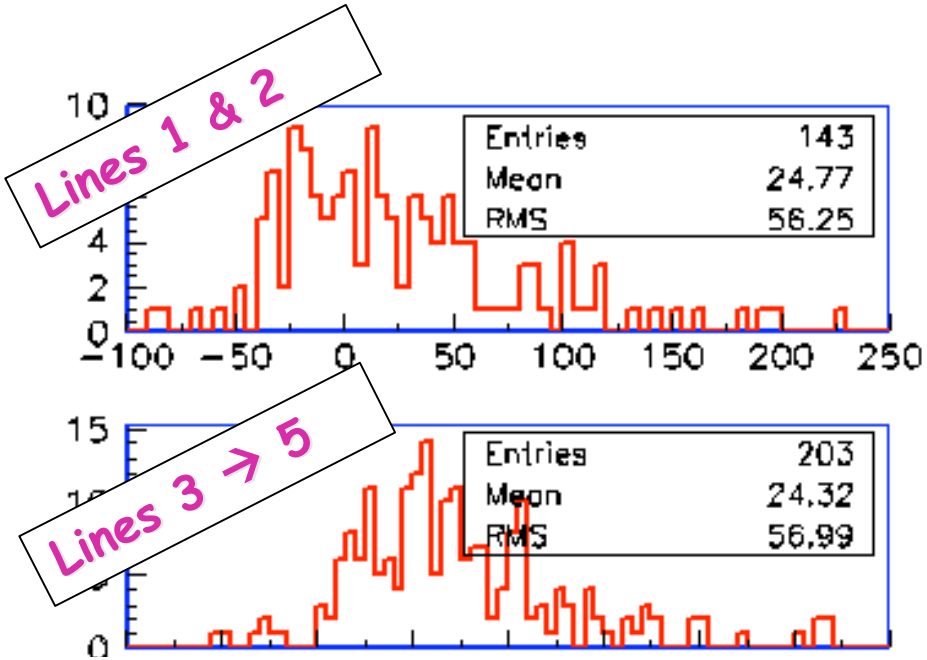


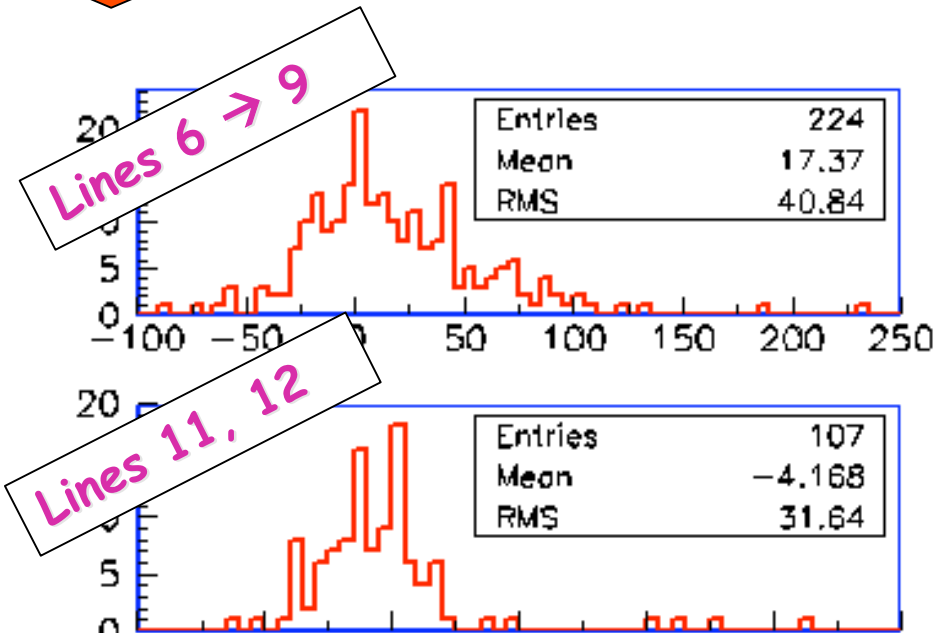
For these channels, the operation can not be repeated every year…

The HV is limited to 2400 V !

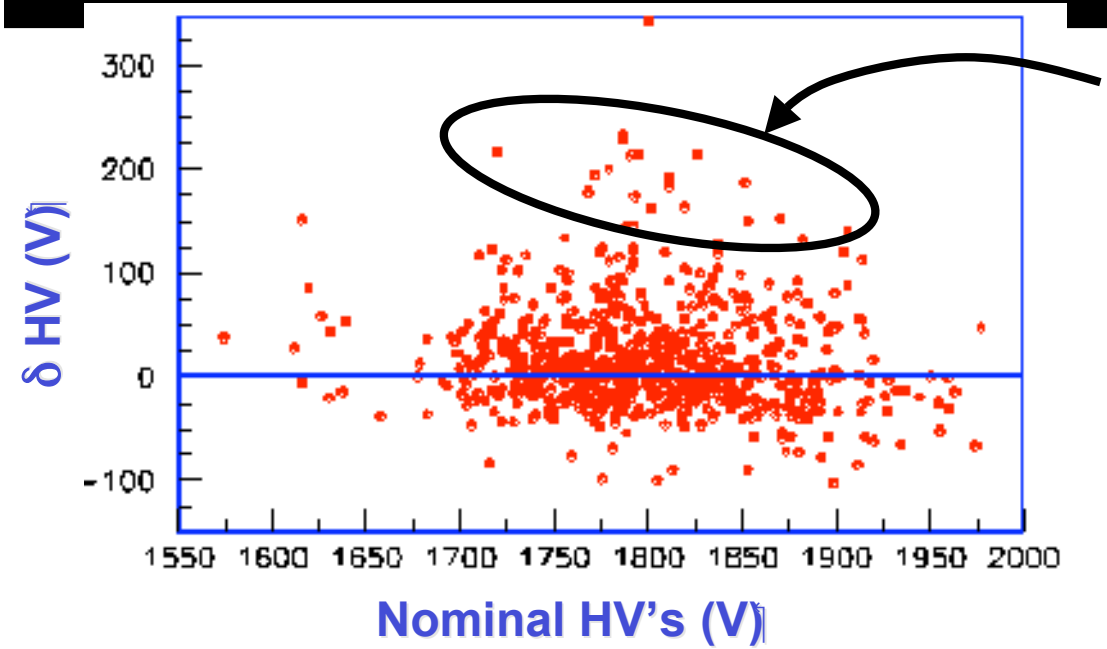
In average: + 18 V

Interesting to group lines by family according to their connection date …





Applied corrections to HV's



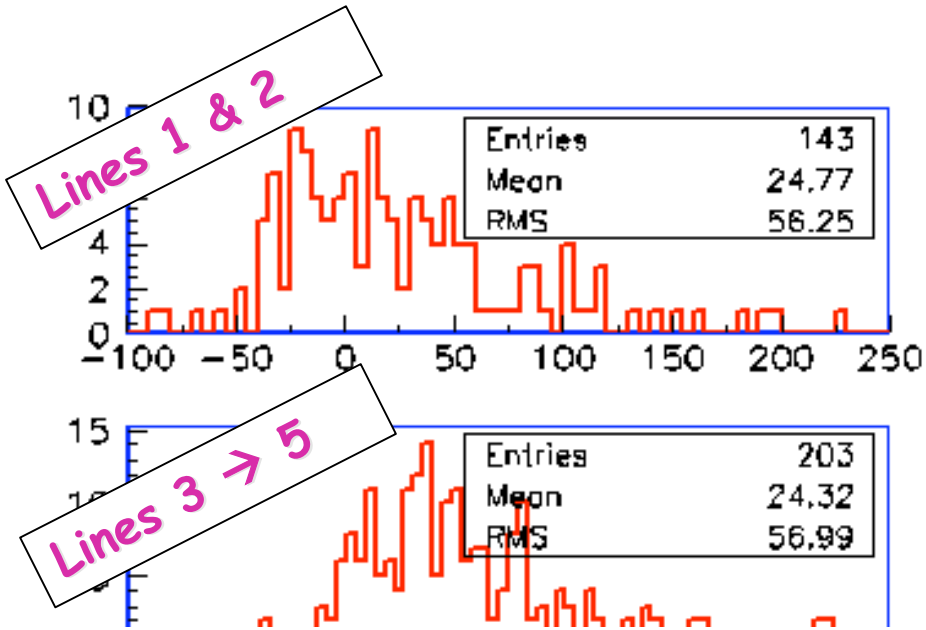
For these channels, the operation can not be repeated every year…

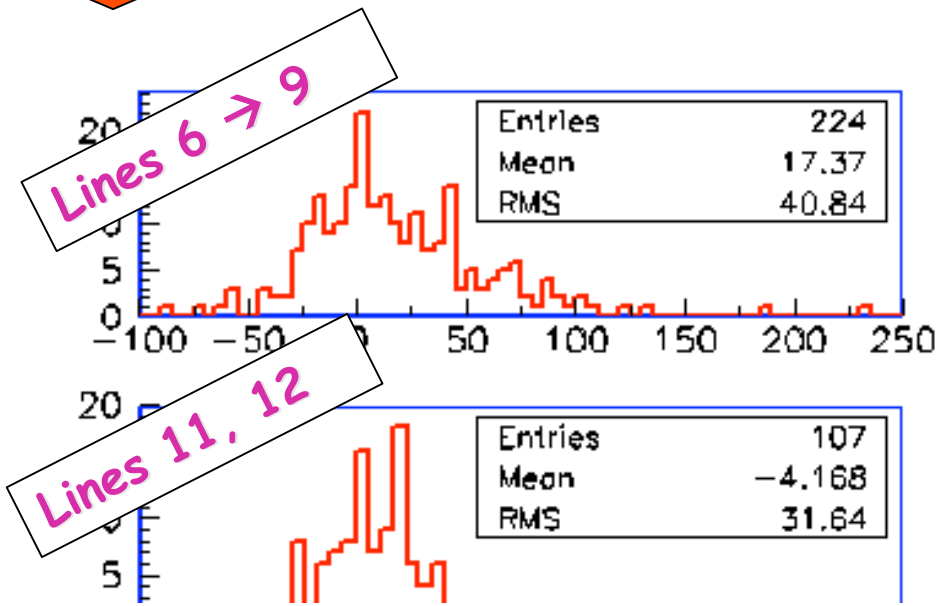
The HV is limited to 2400 V !

In average: + 18 V

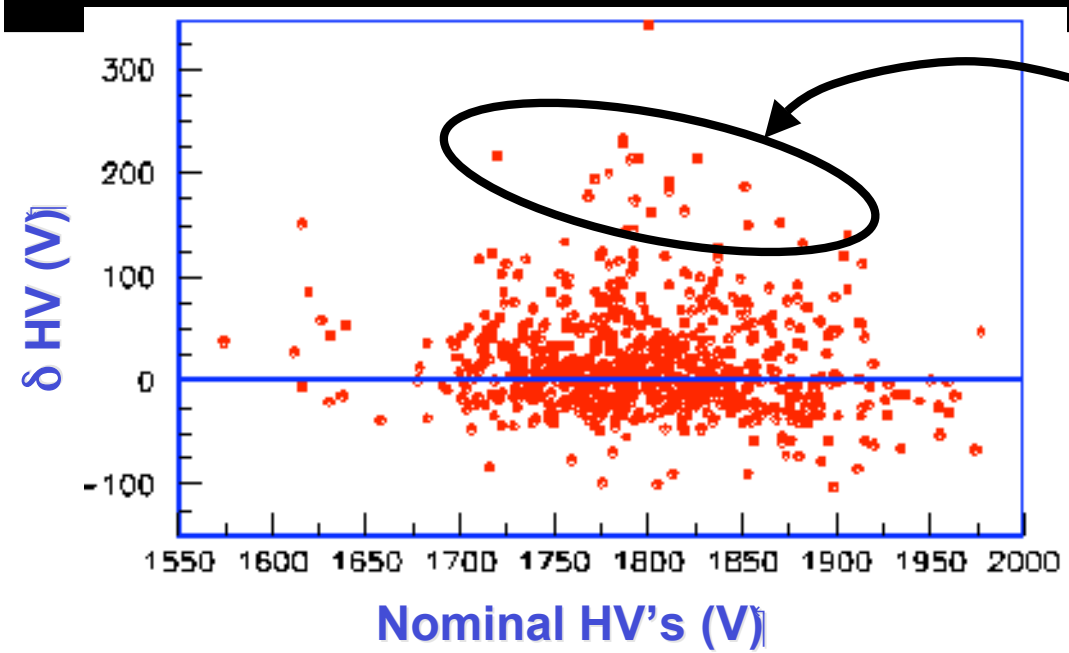
Interesting to group lines by family according to their connection date …

Stabilised ???





Applied corrections to HV's

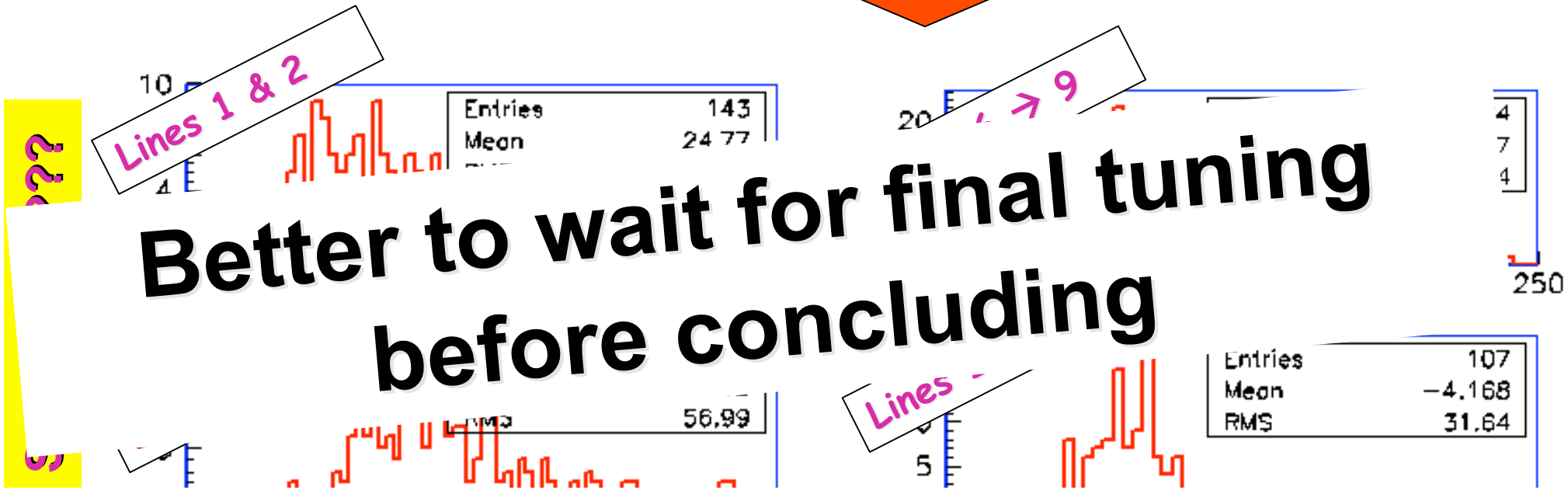


For these channels, the operation can not be repeated every year…

The HV is limited to 2400 V !

In average: + 18 V

Interesting to group lines by family according to their connection date …



Better to wait for final tuning before concluding

Future action

1) Infer new trig0_th value to follow HV setting
2) Re-calilbration p.e. peak
3) Fine adjustment of trig0_th (TS=0 + rate)

=> RECOMPUTE EVERY CALIBRATION CONSTANTS
Time (t0 + tvc), charge, thresholds

We have started to implement 1)….

We will report on this at the first ANR report.