TEST BEAM RESULTS

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Outline

Tests:

- Software clipping
- Noise without “T”
- Tests of discrete component (COTS)
  - Noise
  - Plateau

Software clipping

Software clipping

- How do I do it?
  - From the Oscilloscope I have 2 types of curves:
    - With hardware clipping
    - Without clipping

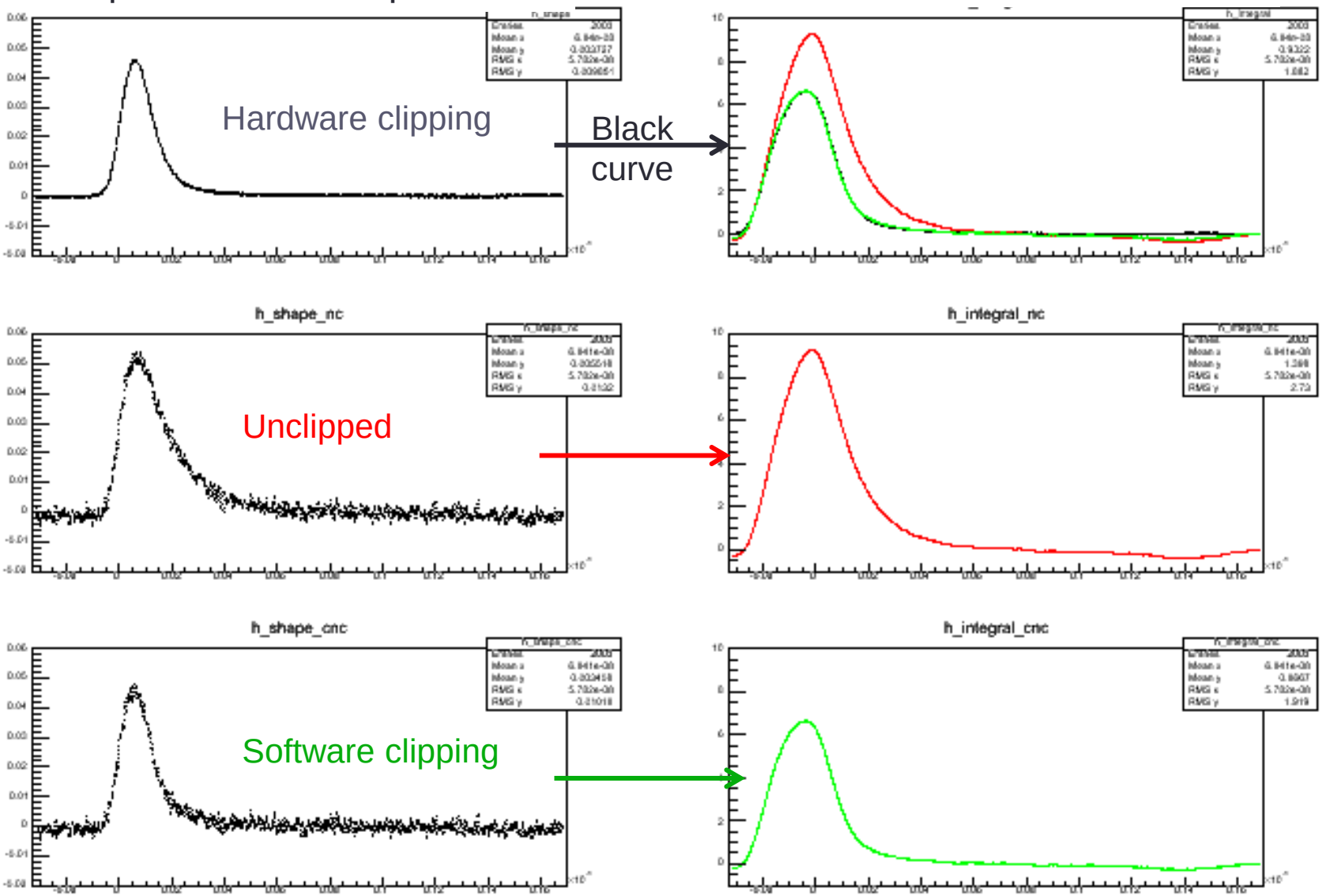
  - Make clipping on unclipped shape by software
    - Clipping is done by the function:

$$v_1(t_0) = \boldsymbol{A} \cdot (v_0(t_0) - \boldsymbol{B} \cdot v_0(t_0 - \boldsymbol{t_d}))$$

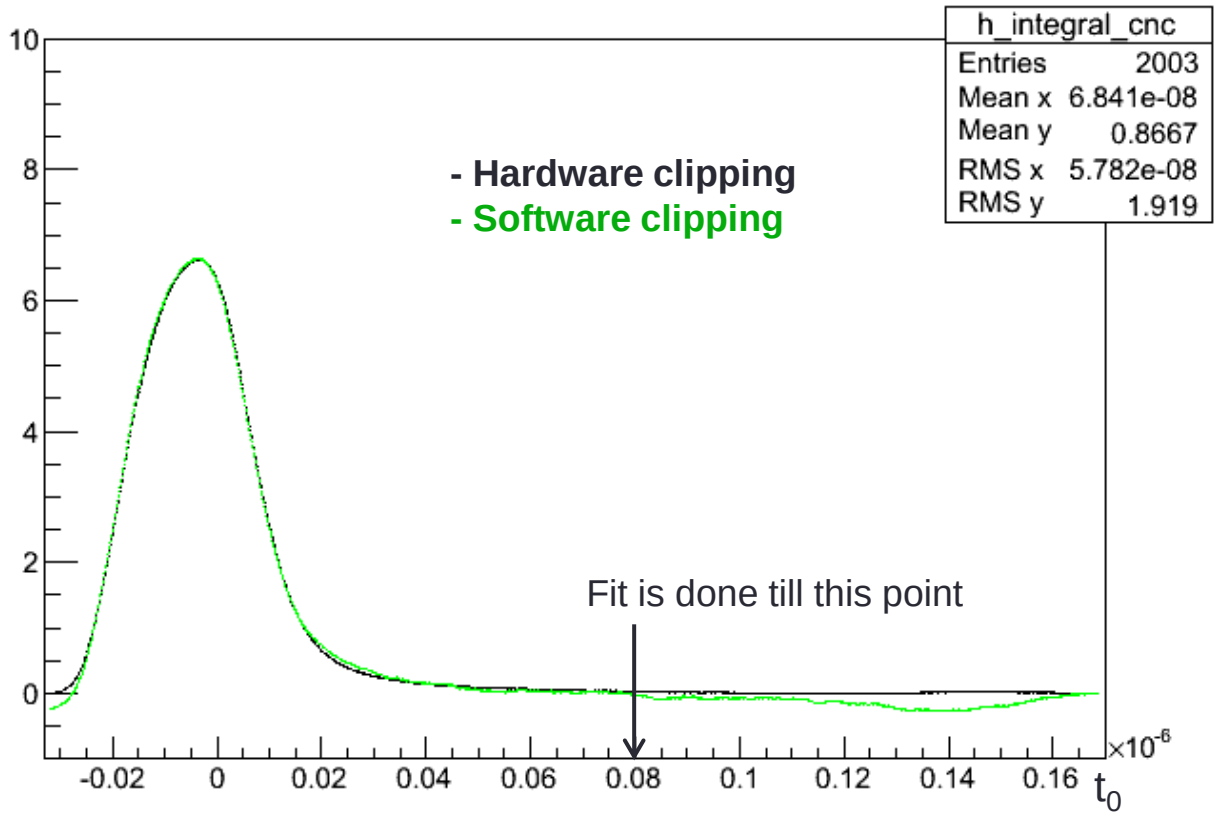
      where A, B and t_d – parameters of clipping
    - Make clipping by ourselves
    - Fit to “hardware” clipped distributions with this function →find parameters

Shapes from the scope

Result of integration



Zoom on the fit



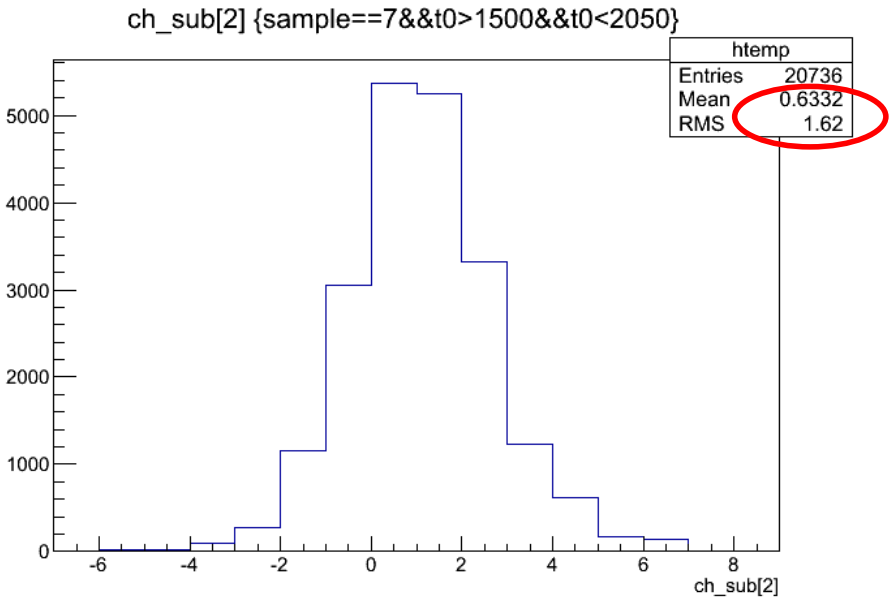
$$v_1(t_0) = \boldsymbol{A} \cdot (v_0(t_0) - \boldsymbol{B} \cdot v_0(t_0 - \boldsymbol{t_d}))$$

Var	Value	Error
t_d	1.034e-08	4.5e-10
A	9.113e-01	8.4e-03
B	3.191e-01	2.5e-03

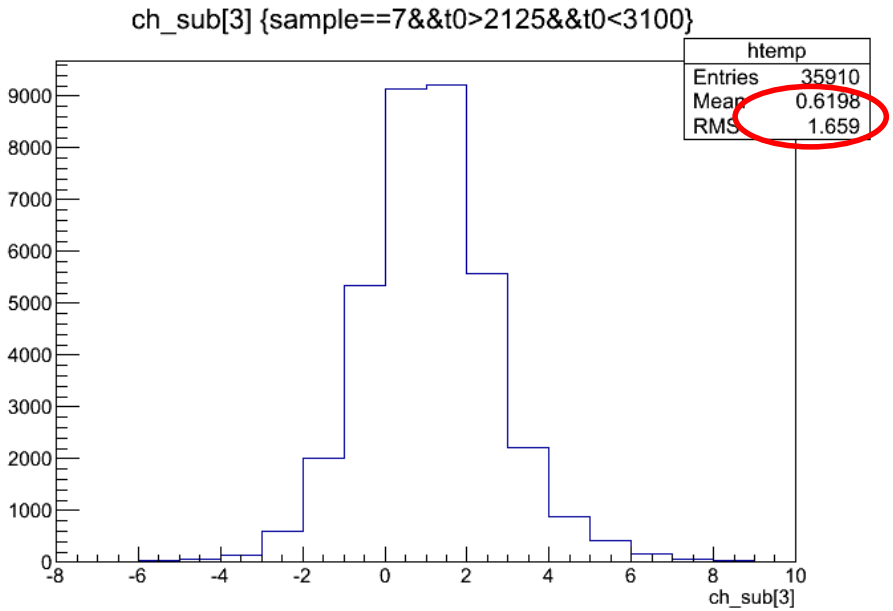
Noise without T

Run 558, noise only(**with T**) pattern==2 subtracted

Ch_sub[2]



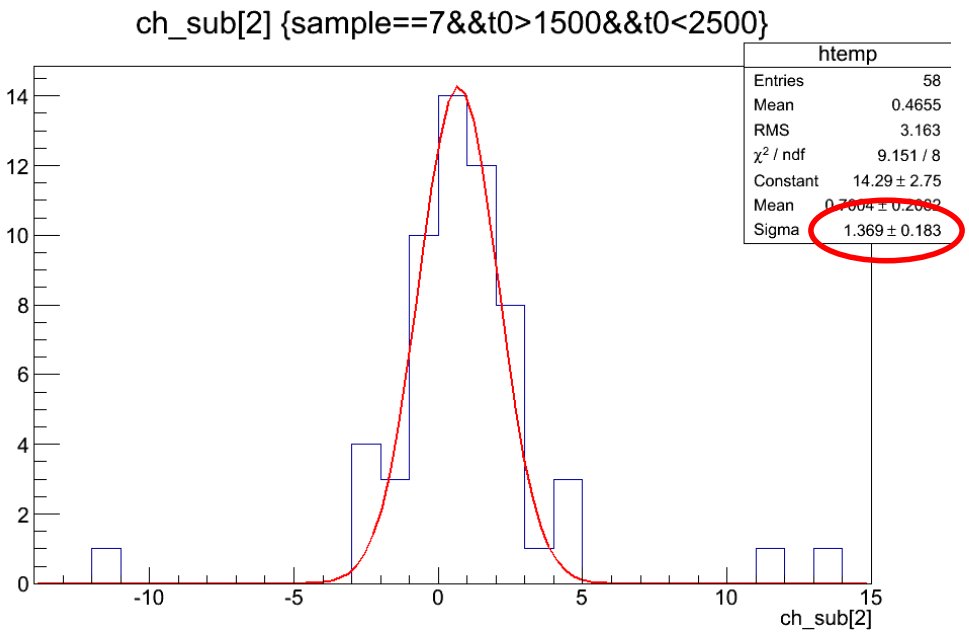
Ch_sub[3]



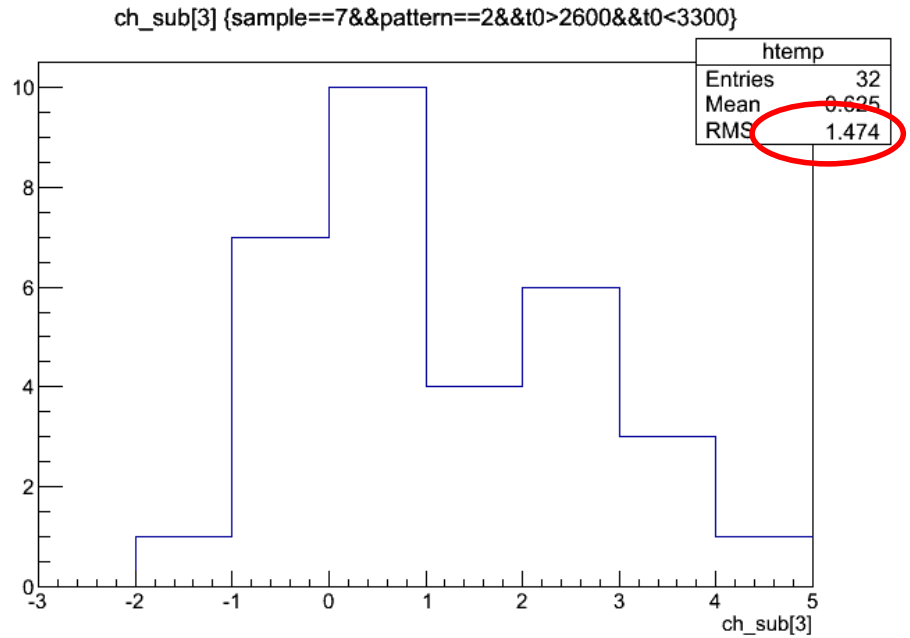
Centered at 0 with positive shift →OK

Run 575, noise only(**without T**) pattern==2 subtracted

Ch_sub[2]



Ch_sub[3]



Centered at 0 with positive shift →OK

NB: RMS $_{ASIC}$ ~ 1.6 after subtraction

Tests of the COTS

Pedestal

Pedestal subtraction

- How do I do it?
  - For channels 1 and 3, area of interest it is
    ch1 is with signal
    ch3: only noise
    in the sample 7
  - Pedestal= min(ch[1]_sample5, ch[1]_sample6), values of adc is positive
  - Event-by-event:
    - ch_sub[1]=(ch[1] – pedestal)
  - Same for ch[3]

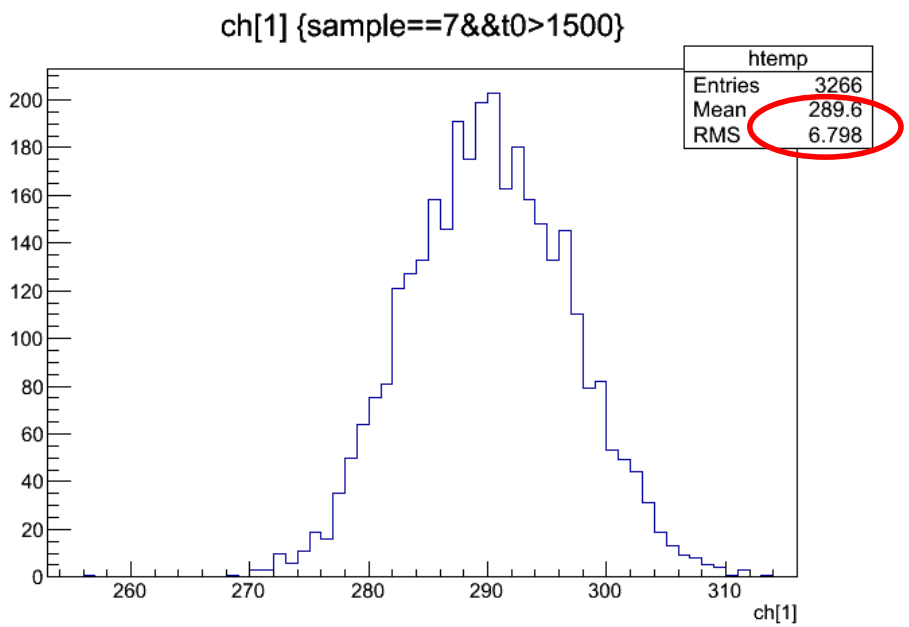
Noise

Run 585+586, noise only pattern==2

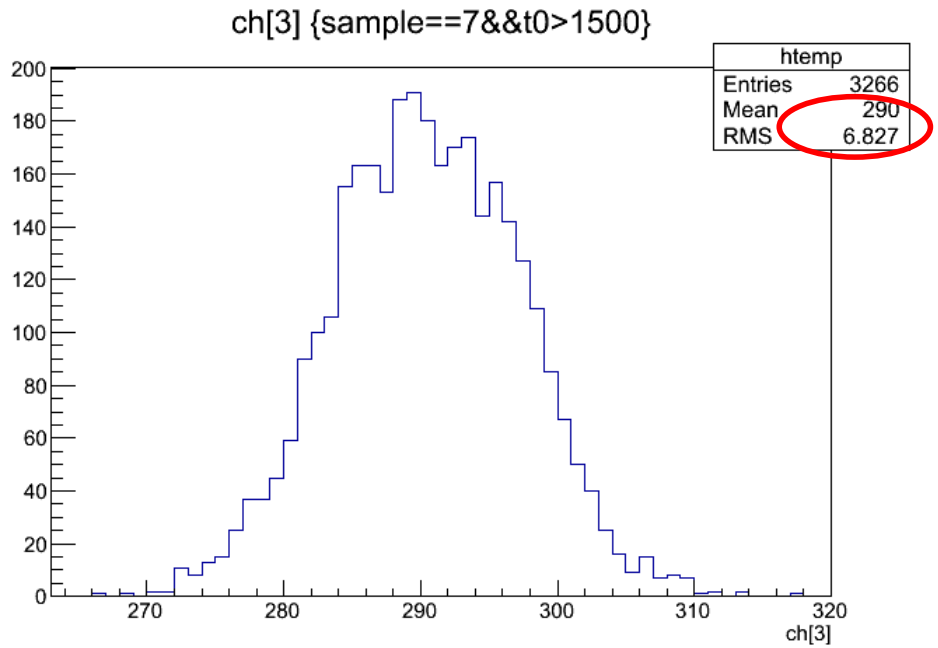
Not subtracted

COTS

Ch[1]



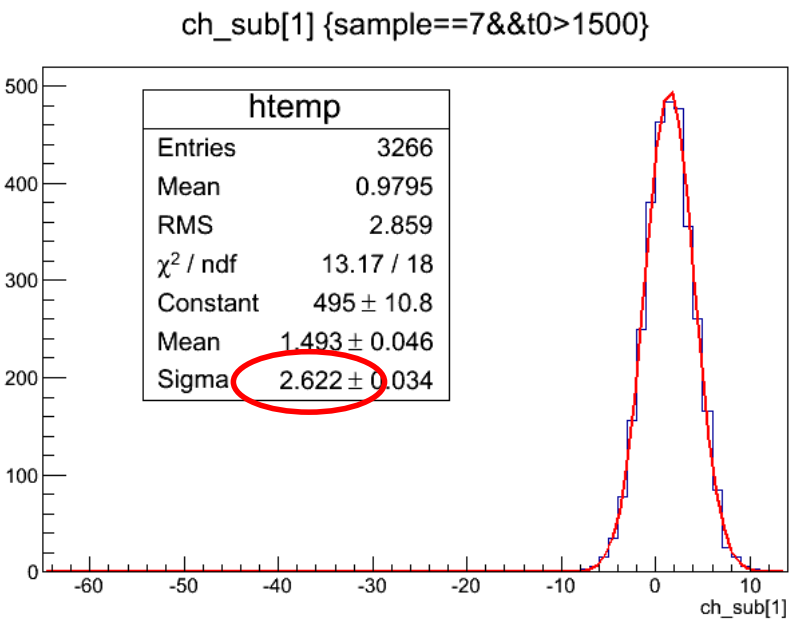
Ch[3]



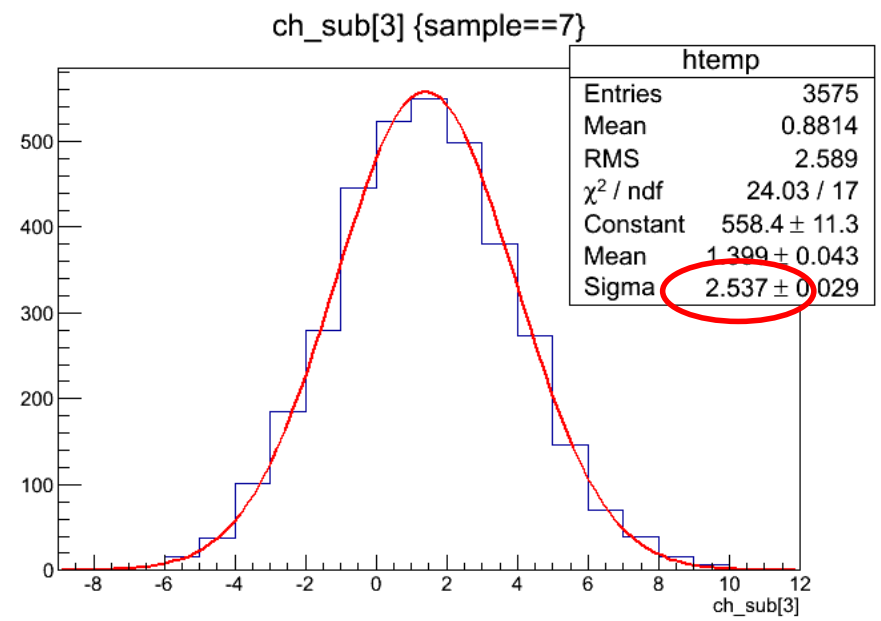
Run 585+586, noise only pattern==2 subtracted

COTS

Ch_sub[1]



Ch_sub[3]



Centered at 0 with positive shift →OK

NB: RMS $_{ASIC}$ ~ 1.6 after subtraction

Plateau test

How to do

- $ADC(FE)_{ped\ subtracted}$ vs t_0 : 2D plot
- Fit with something
  - Here it is "*pol2*"
- From the ADC peak value
  make step on t_0 **±1 ns** (40 tdc), **±2ns**
  → check plateau, give result in %

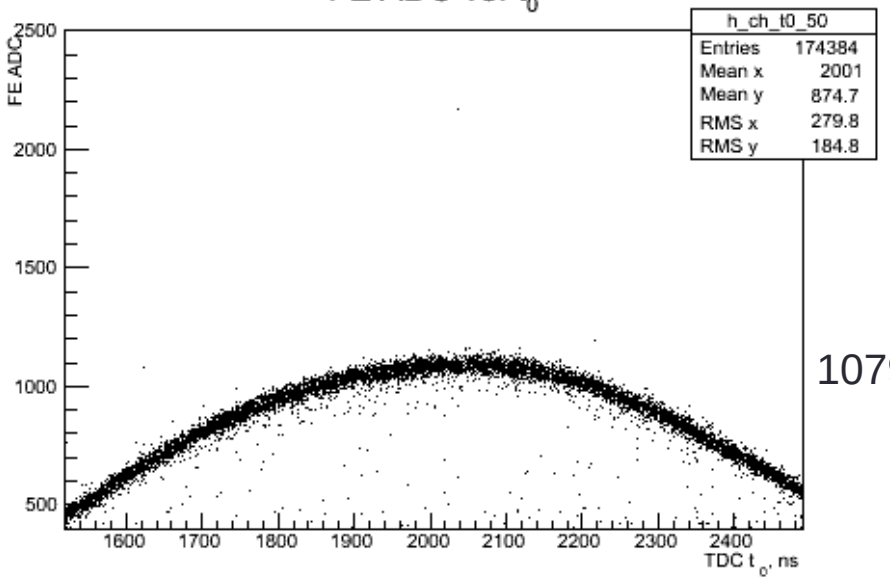
E=50GeV,

#events = 33k

Channel 2

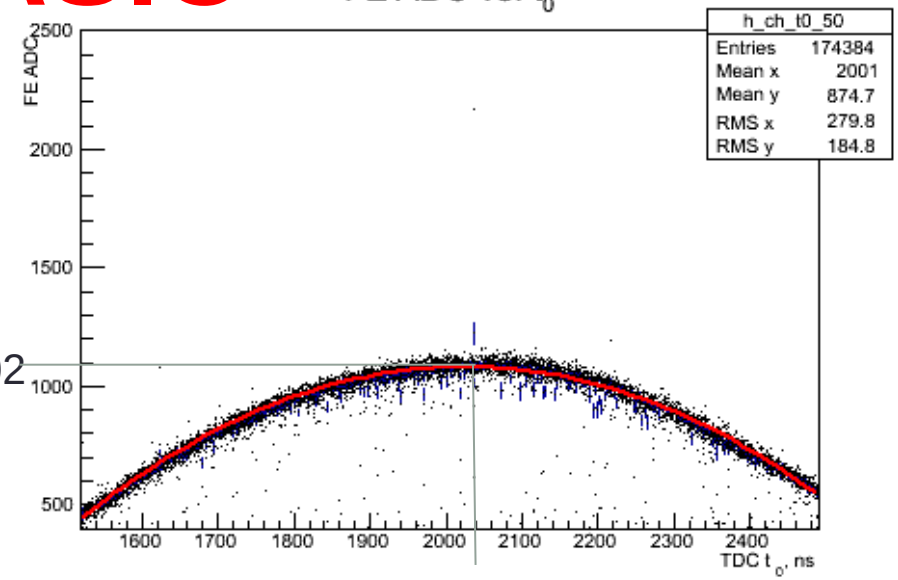
ASIC

FE ADC vs. t_0



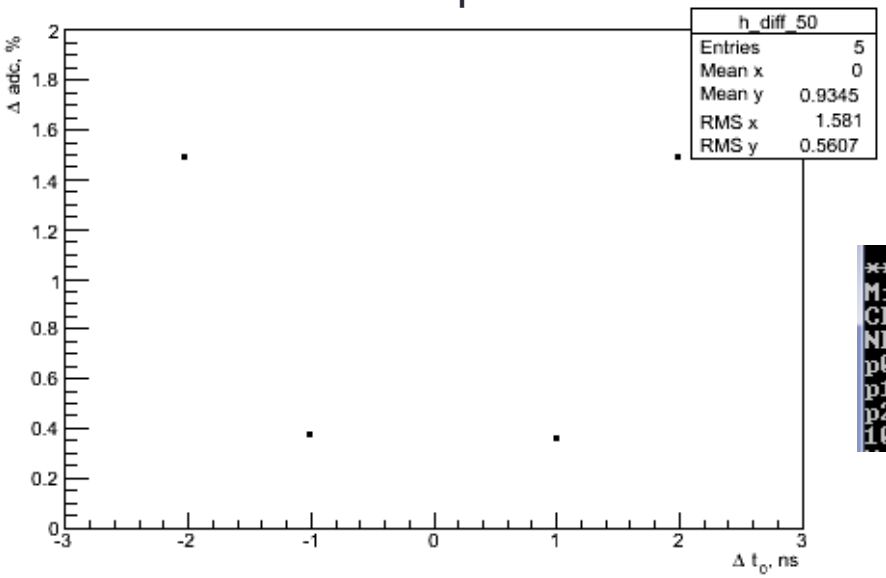
1079.02

FE ADC vs. t_0



t_0 = 2026.44

Test of plateau

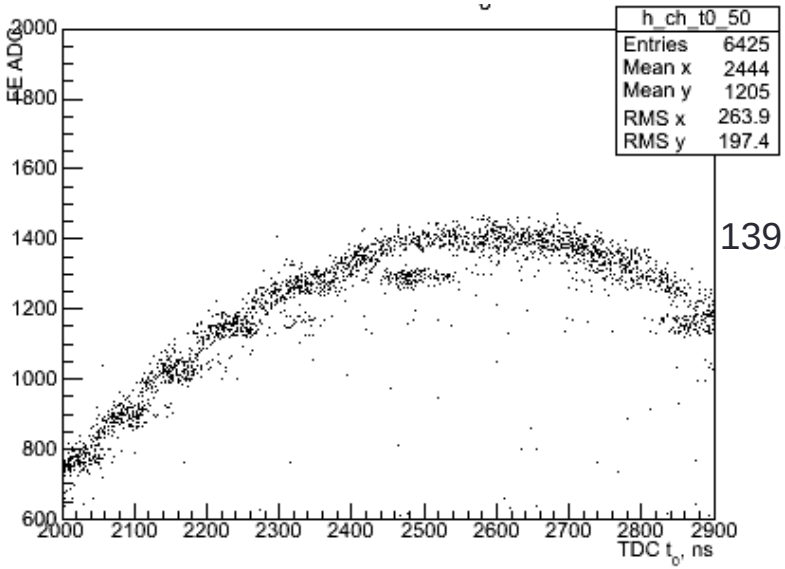



```
*********************************************
Minimizer is Linear
Chi2                      =      26107.6
NDf                       =          966
p0                        =     -9273.21    +/-    3.8259
p1                        =      10.2171    +/-    0.00387187
p2                        =  -0.00252092    +/-    9.62246e-007
1079.02 2026.44
```

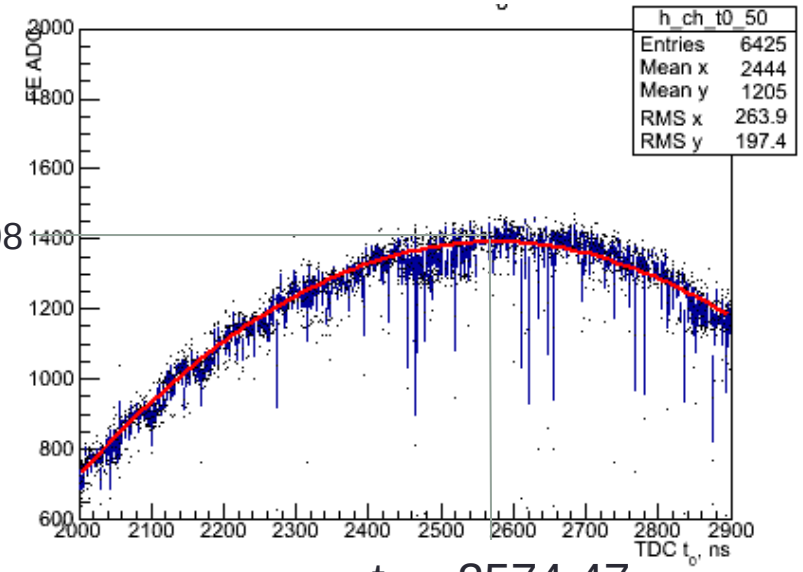
E=50GeV,
#events = 10k

Channel 1

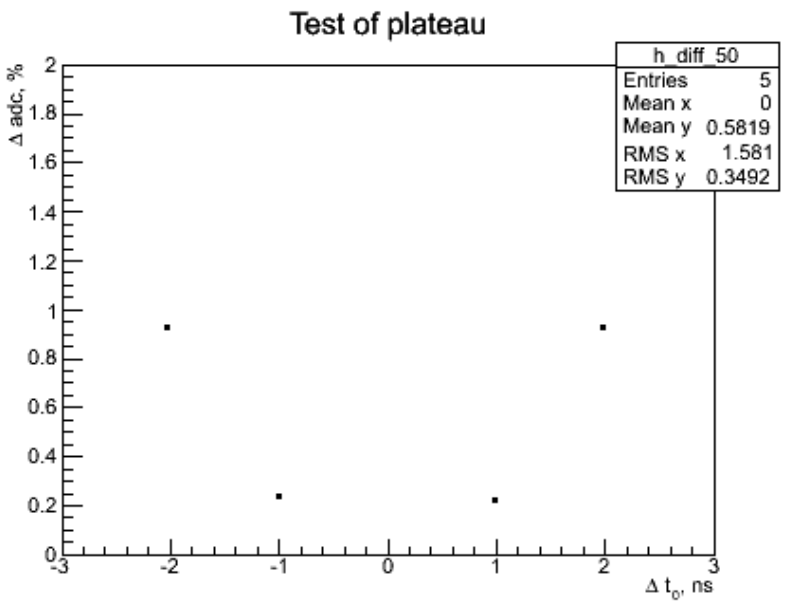
COTS



1391.08



t_0 = 2574.47




```
*********************************************
Minimizer is Linear
Chi2                      =      22548.5
NDf                       =          701
p0                        =     -12022.5   +/-   12.6215
p1                        =      10.4205   +/-   0.0104929
p2                        =  -0.00202384   +/-   2.14672e-006
1391.08 2574.47
```

Conclusions

- Software clipping
  - Works fine → problem is not here
- Noise without “T”
  - Better than with “T” → expected noise from the “T”
- Tests of discrete component (COTS)

Noise	**worse than ASIC**
Plateau	**~ 1% in ± 2ns**

Tests to do?