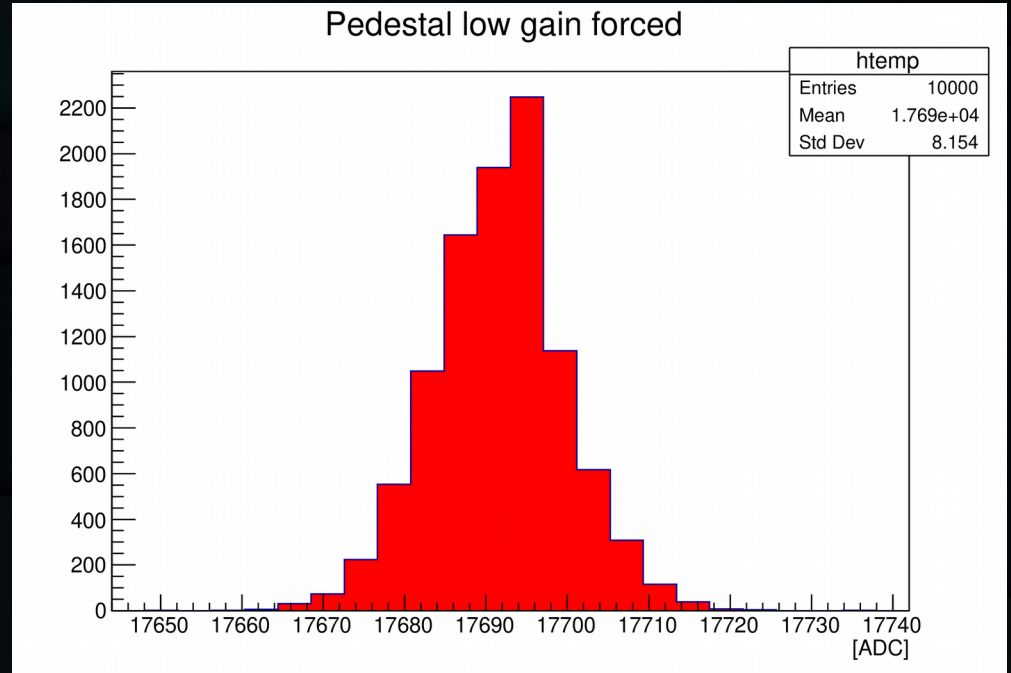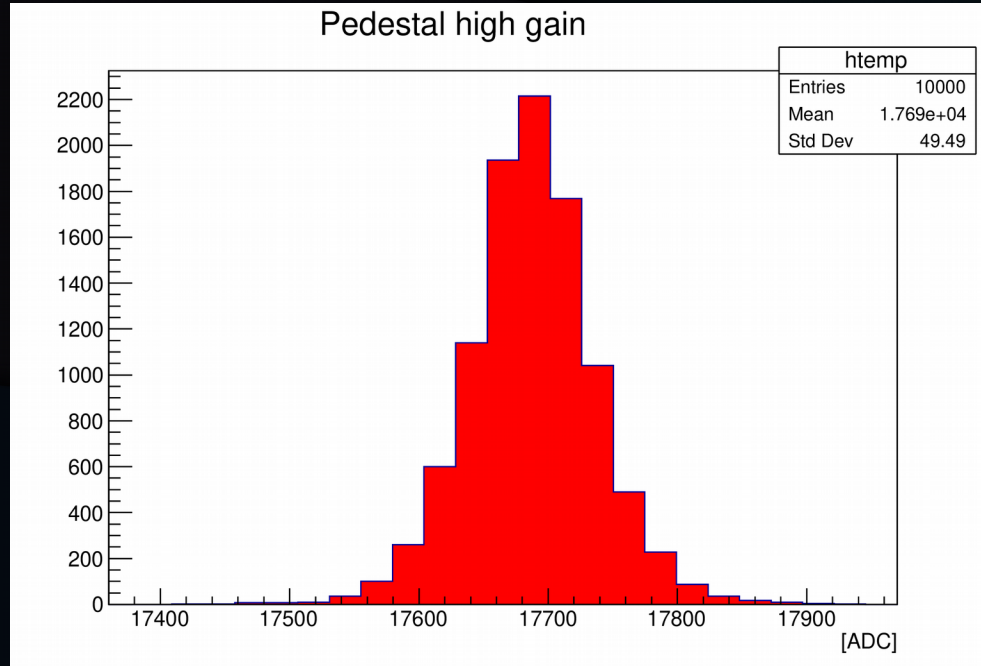# Check noise in low gain

- Our understanding (before LABEC test):
  - The noise of events acquired with low gain can be measured by acquiring pedestals when the low gain is forced.
  - The noise acquired with free low gain is similar to the one measured with forced low gain.

- LABEC test:
  - The distribution of events acquired with free low gain is wider than the one acquired with forced low gain.
  - LABEC data are affected by several strange behaviors.

- We decided to replicate a large signal by using LED in lab., where the system is stable.
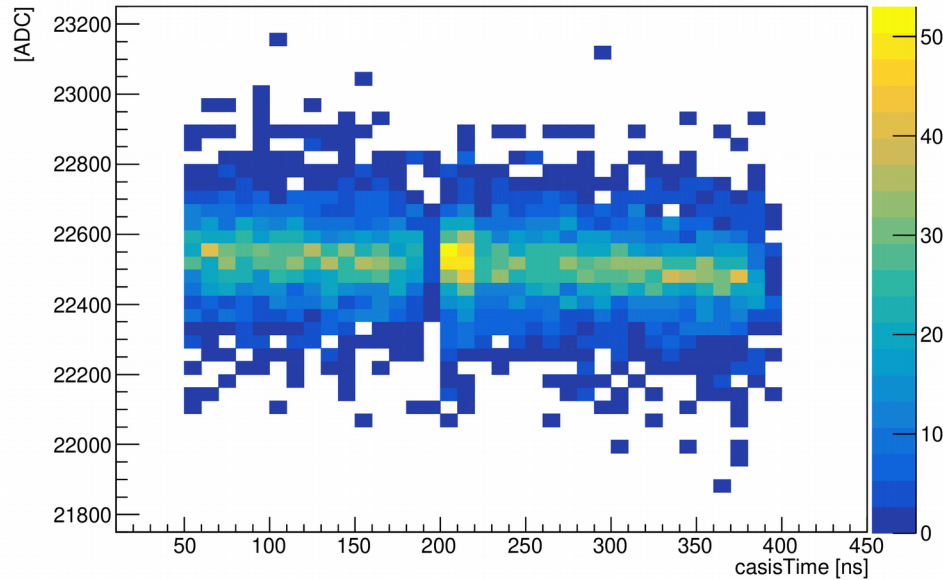
Noise in low gain: pedestal

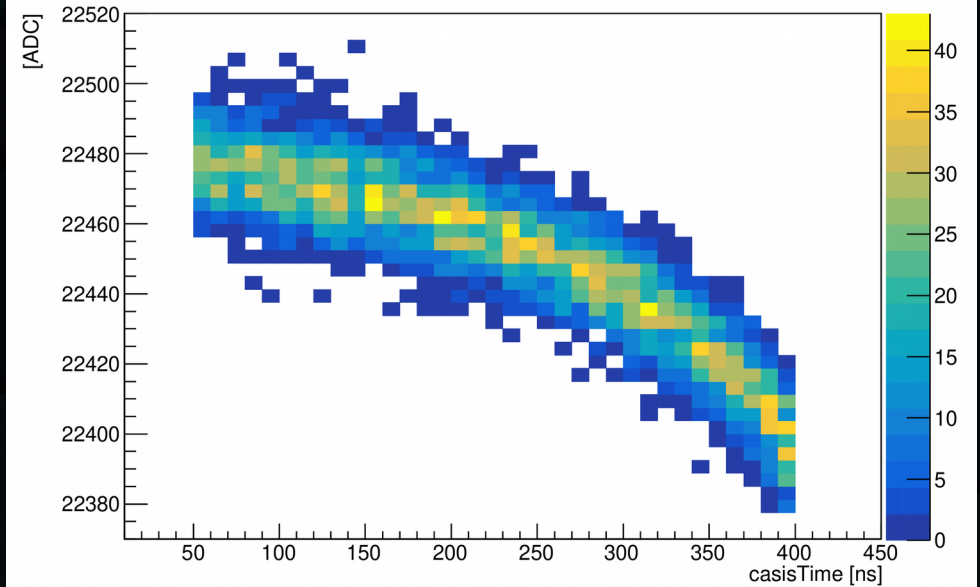- Using kapton cable connected to a LPD: pedestal.

Noise in low gain: LED

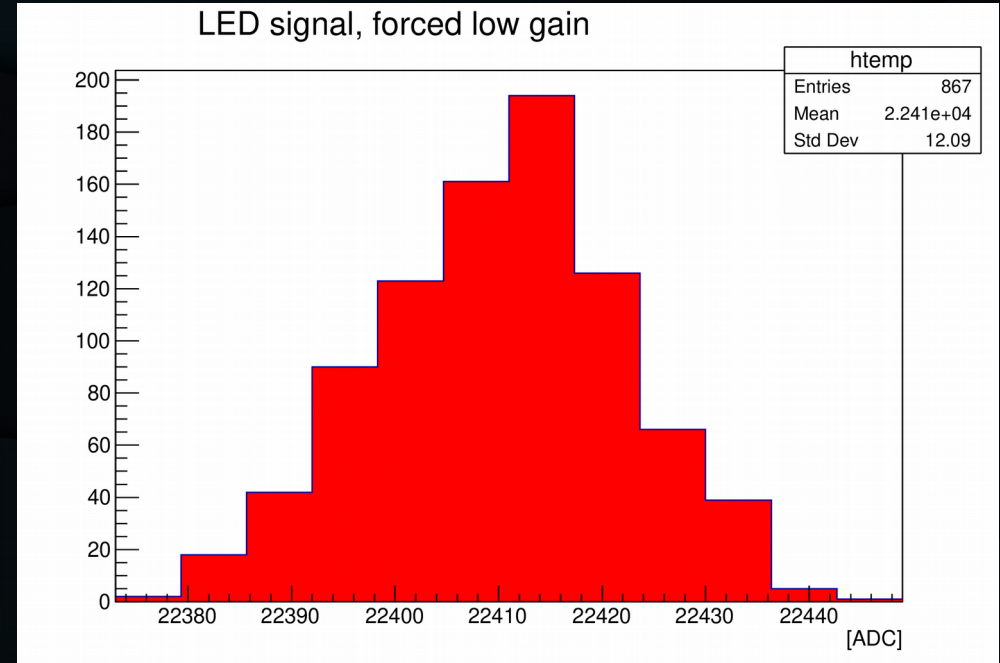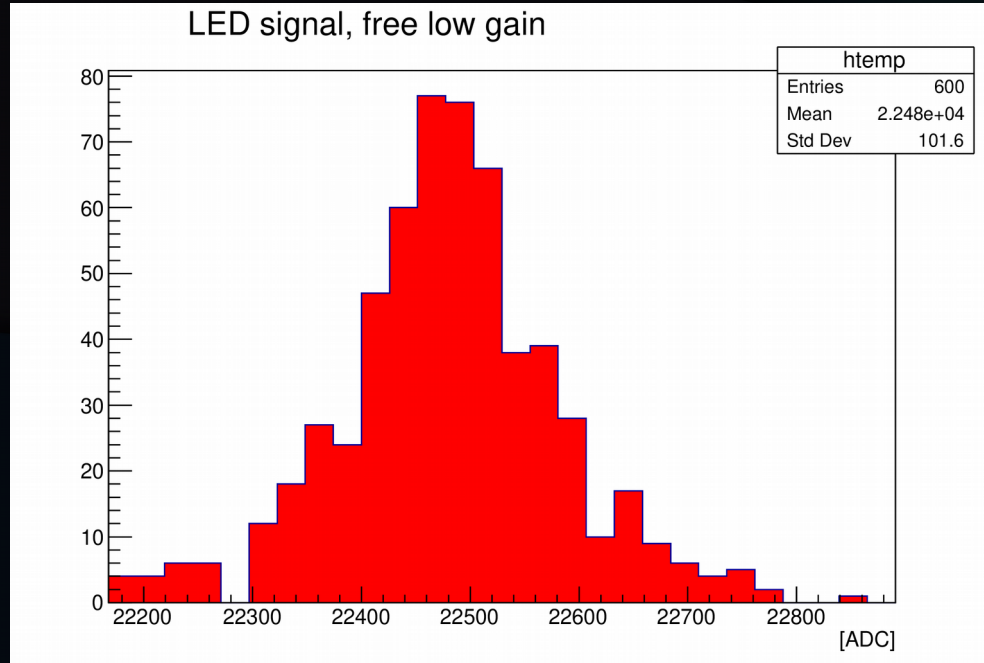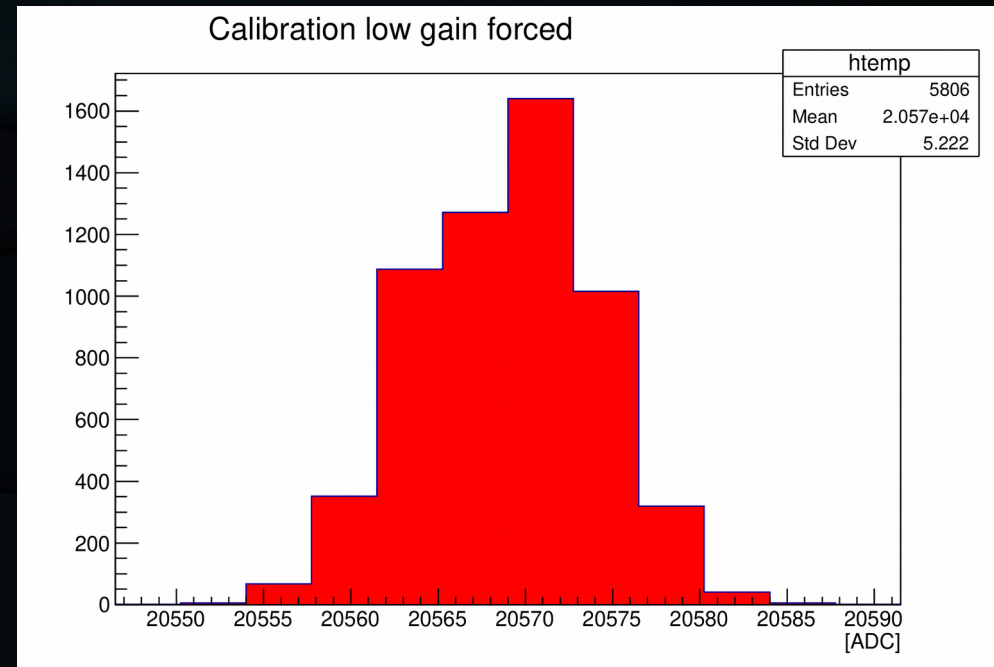- Injecting light with LED (2 us, 5 V): signal vs casisTime
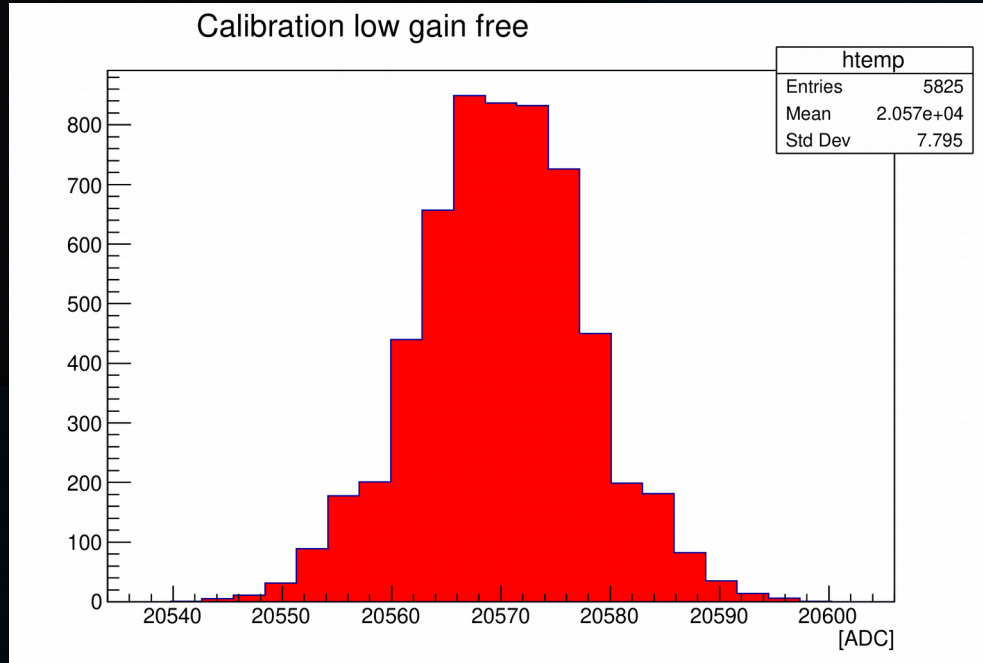
Noise in low gain: LED

- It seems that the noise is very small when low gain is forced, while is larger if low gain is free
- Selecting a small casisTime window:

LED signal, free low gain

htemp	
Entries	600
Mean	2.248e+04
Std Dev	101.6

LED signal, forced low gain

htemp	
Entries	867
Mean	2.241e+04
Std Dev	12.09

Noise in low gain: using calibration

- Channels are not connected to cables.

Noise in low gain: summary

- The noise of free low gain events is bigger than forced low gain events: is it due to the self-switching circuit which injects noise on the CDS input?

- This feature is not confirmed with calibration procedure.
  - Do it strongly depends on cables?

- Noise in free LG is ~ 100 ADC, bigger than the noise in HG: how can we measure the free low gain noise? It is needed for:
  - MC simulation: digitization
  - S/N ratio for events which are slightly above LG threshold.