SiPM dark rate study update
Calorimetry meeting

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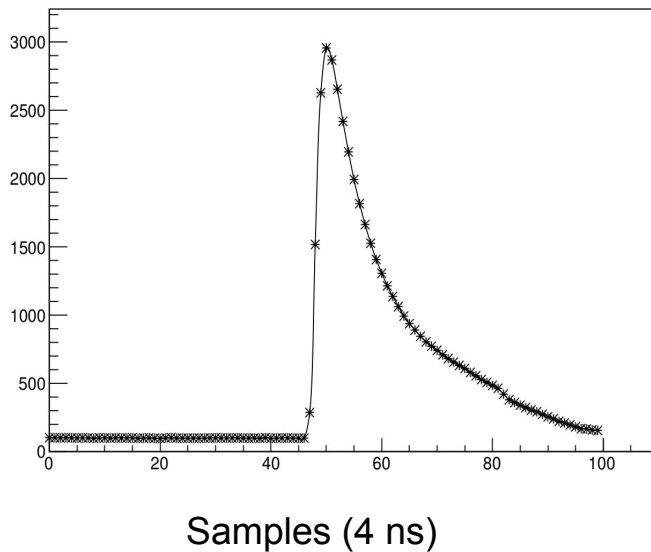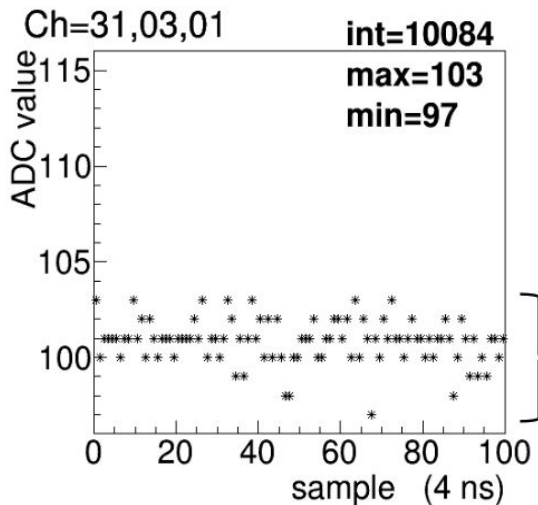
Dark count rate

- Study dark rate of SiPMs with the help pedestal RMS of fADC
- Higher relative RMS corresponds to more damage
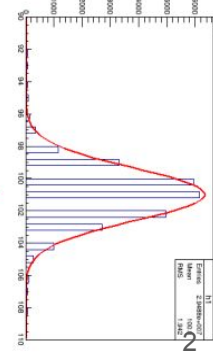- Studied at different bias voltage and temperature

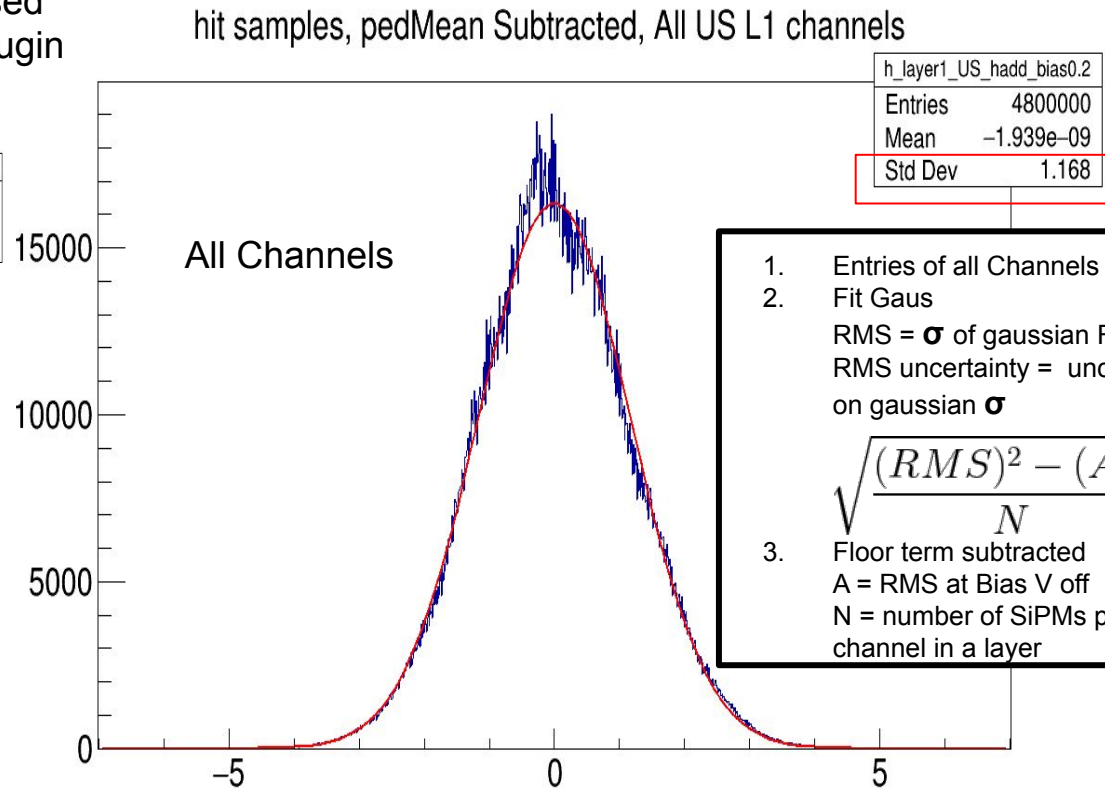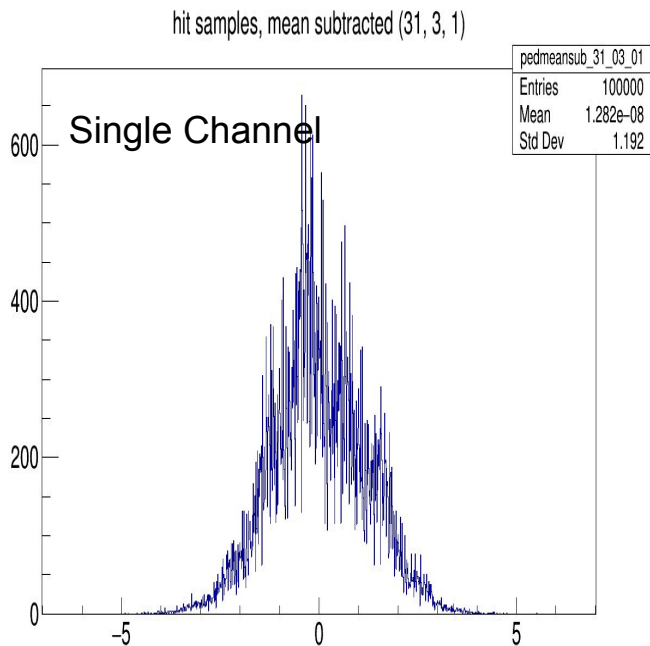**Signal Waveform**

Waveform (without signal)

Ch=31,03,01   int=10084
                max=103
                min=97

Get RMS of
samples in readout
window

Samples (4 ns)

2

Data collection/ Procedure

- Quadrant 3 LEDs being pulsed (1000 triggers) with standard 6.25 V setting,
- Different temperatures (18C, 10C, 5C)
- Different bias voltages (V=off, 0.0, 0.2 …… 2.0)
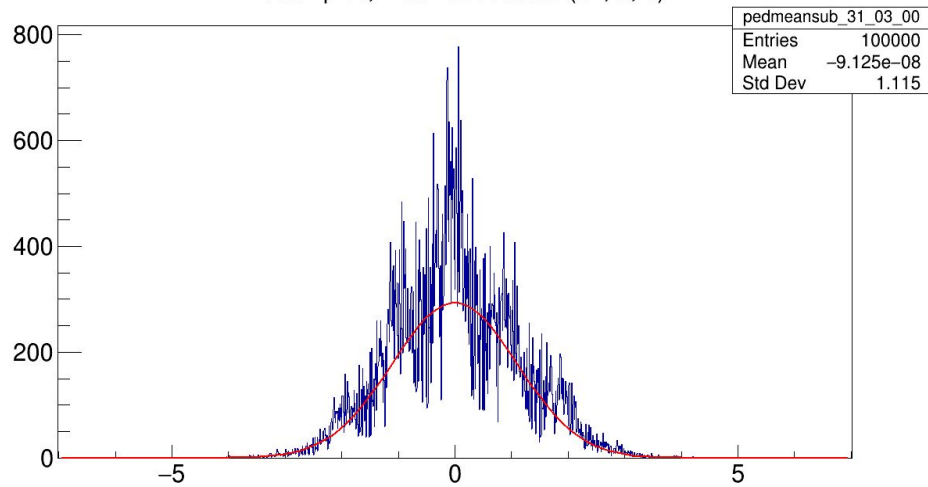- Quadrant 1 channels analysed
- FADC_mode10_pedestal plugin

hit samples, pedMean Subtracted, All US L1 channels

h_layer1_US_hadd_bias0.2	
Entries	4800000
Mean	−1.939e−09
Std Dev	1.168

hit samples, mean subtracted (31, 3, 1)

Single Channel

pedmeansub_31_03_01	
Entries	100000
Mean	1.282e−08
Std Dev	1.192

All Channels

1. Entries of all Channels
2. Fit Gaus
   RMS = **σ** of gaussian Fit
   RMS uncertainty = uncertainty on gaussian **σ**

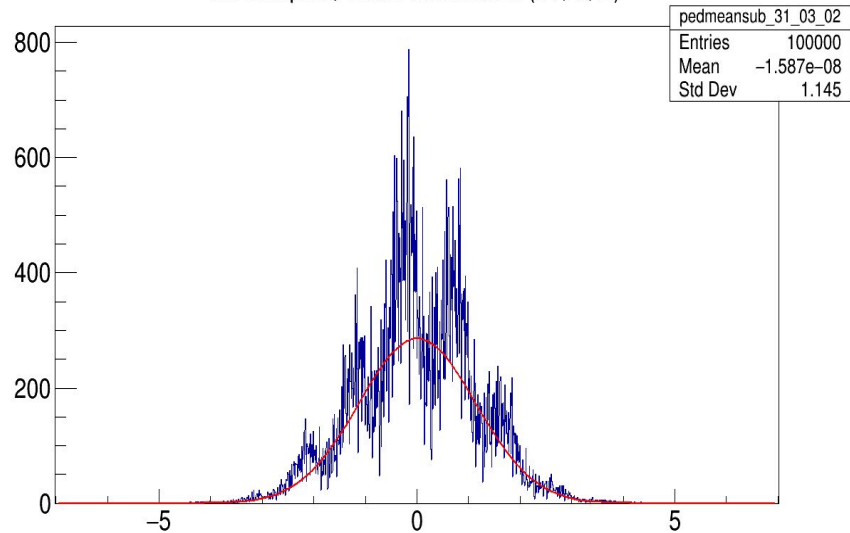$$\sqrt{\frac{(RMS)^2 - (A)^2}{N}}$$

3. Floor term subtracted
   A = RMS at Bias V off
   N = number of SiPMs per channel in a layer
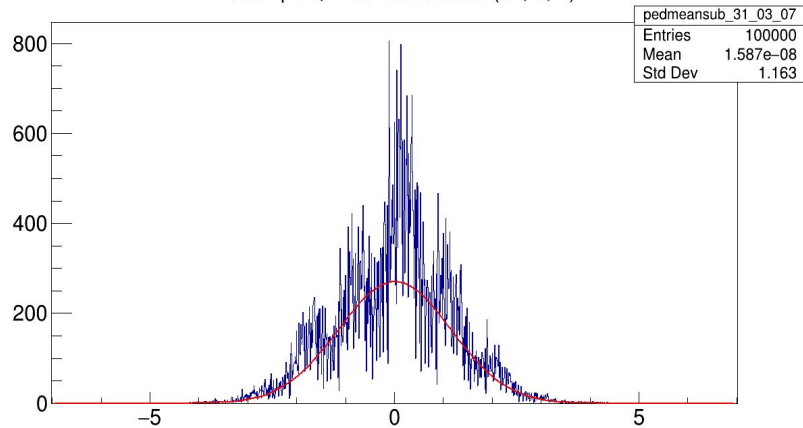

3

Single channel distributions

4
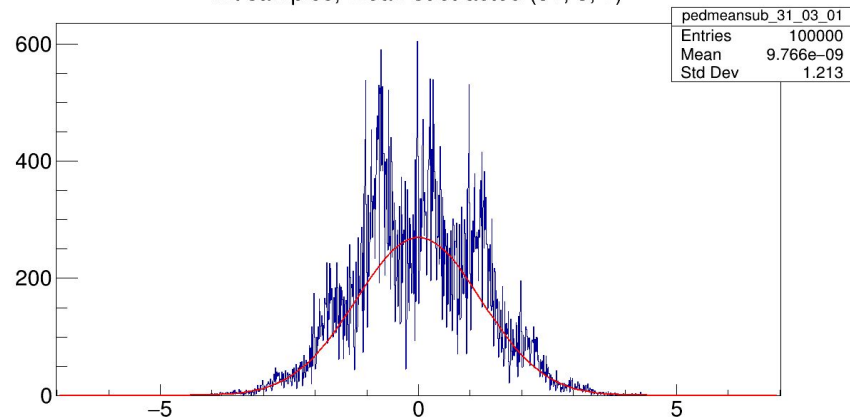
Upstream Pedestal RMS, Layer 1 10C
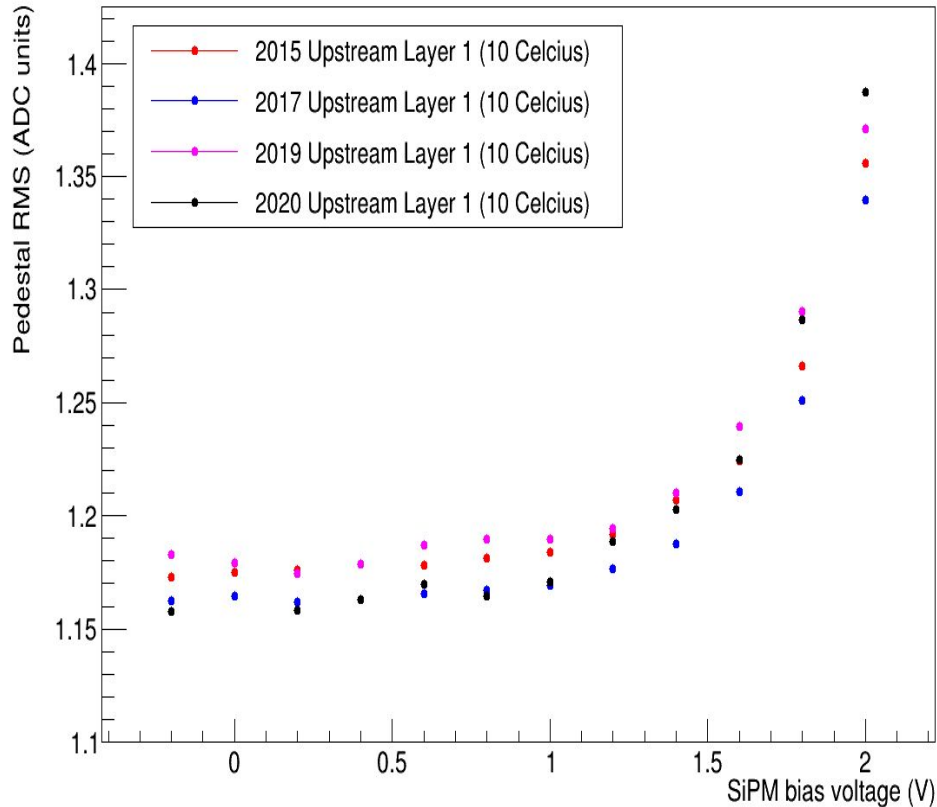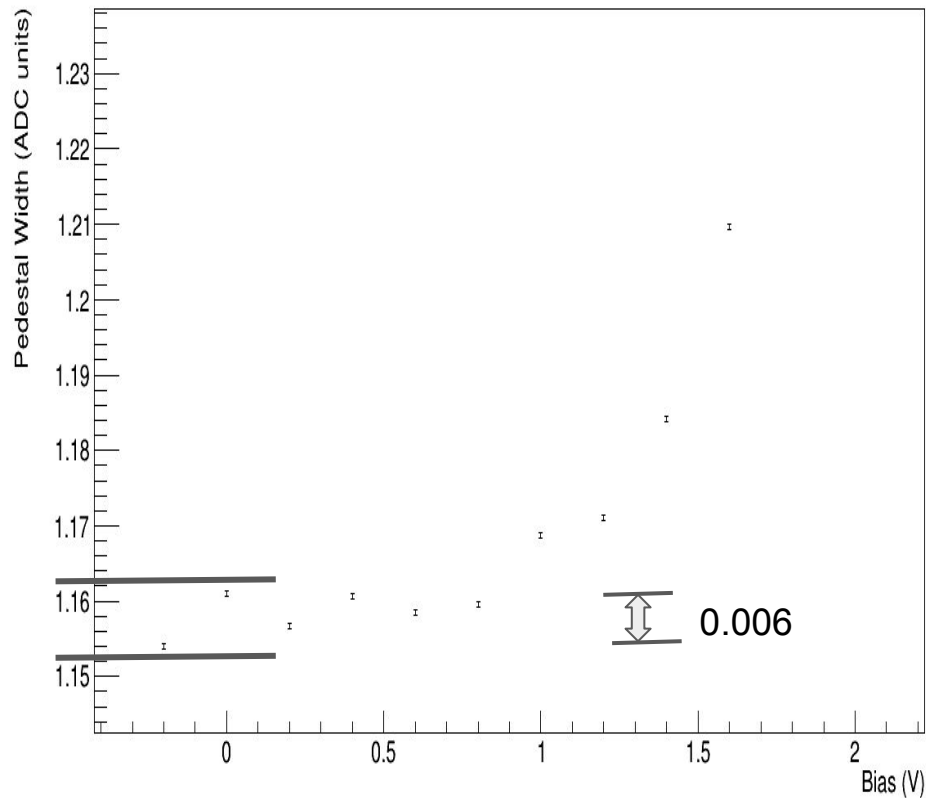
2020 10C   Layer 1 Upstream

Fluctuations ~ 0.006

V=off term fluctuates with time !

Layer 1 Upstream

Layer 1 Upstream
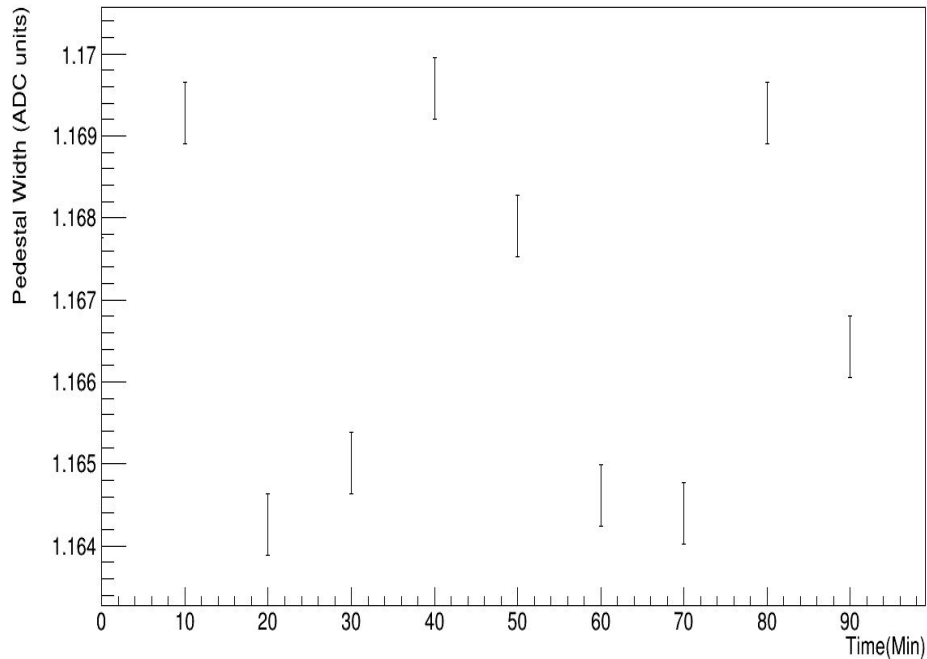
V=off term vs time (5 C & 10 min)
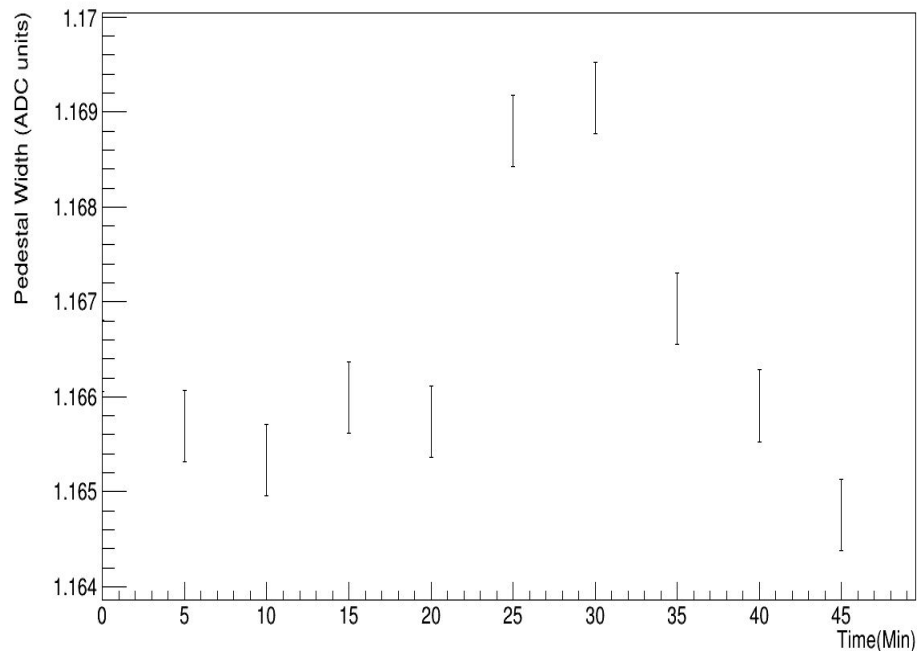
V=off term vs time (5 C & 5 min)

Fluctuations ~ 0.006

Conclusions:

- V=off term is not constant (fluctuates with time)
- Study it in detail with more runs