

BCAL-LED Update
Calorimetry meeting Nov 14 2019

New LED runs taken by Jon
(Oct 2019)

Varun Neelamana
University of Regina

- Every Run in Mod 10 i.e. Raw data mode.(Mod 9 + additional window raw data)
Which gives pulse waveform for each event.
- Each LED pulser - 1000 pulses; Runs shown below
 - Upstream LED pulsed
70131 || 6 V || U
70132 || 6.25 V || U
70133 || 6.5 V || U
70134 || 6.75 V || U
70135 || 7 V || U
 - Downstream LED pulsed
70136 || 6 V || D
70137 || 6.25 V || D
70138 || 6.5 V || D
70139 || 6.75 V || D
70140 || 7 V || D
- Plotted Histograms of ADC pulse peaks for each Run number (specific voltage).
- In total for 1536 channels around 1.5 million events

Up Channel Pulse peak hist

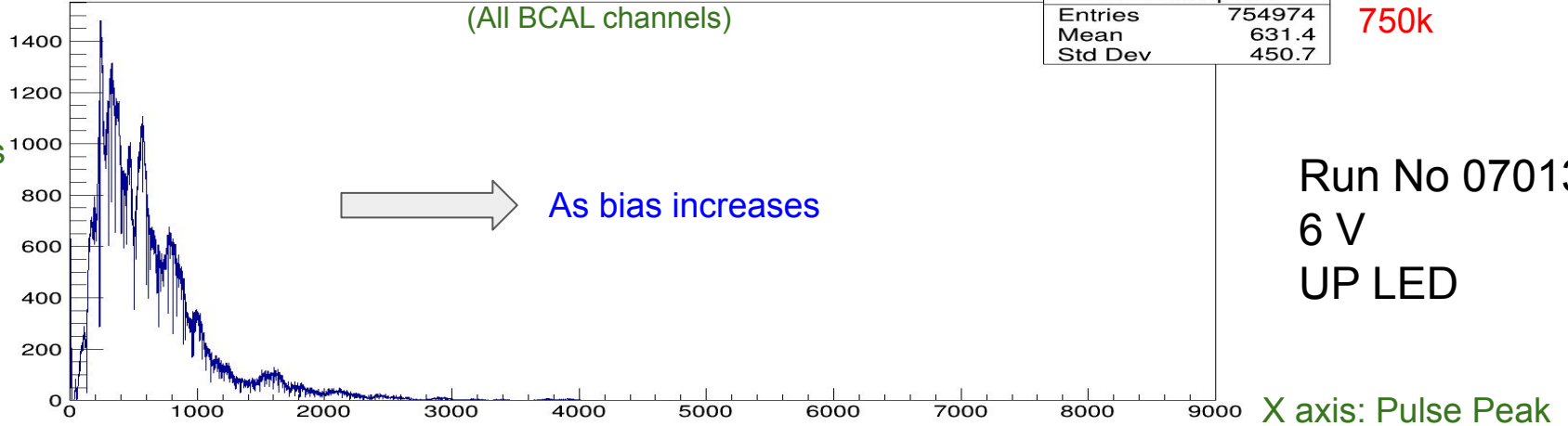
(All BCAL channels)

UP Pulse peak	
Entries	754974
Mean	631.4
Std Dev	450.7

750k

Run No 070131
6 V
UP LED

Counts



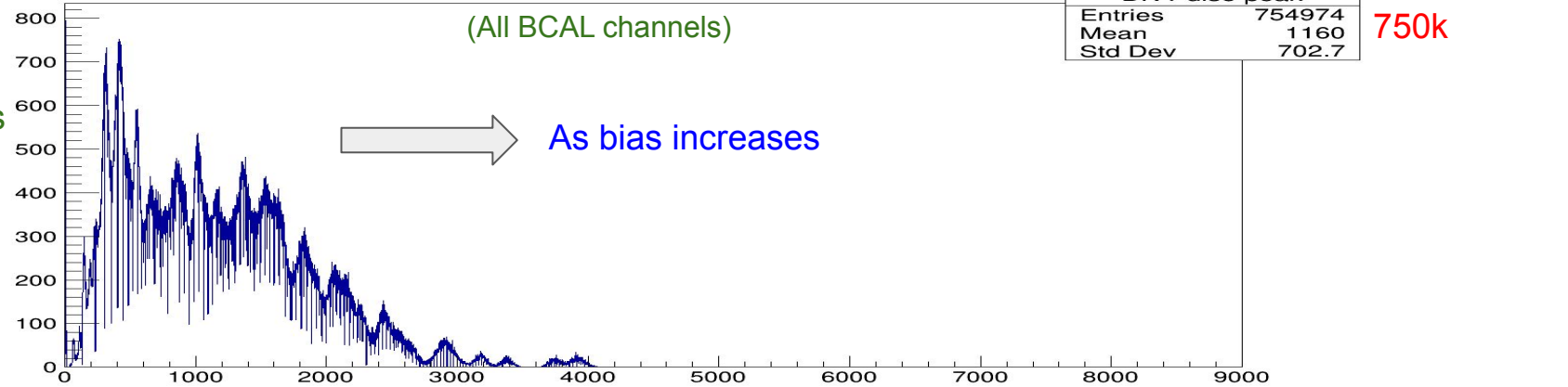
DN Channel Pulse peak hist

(All BCAL channels)

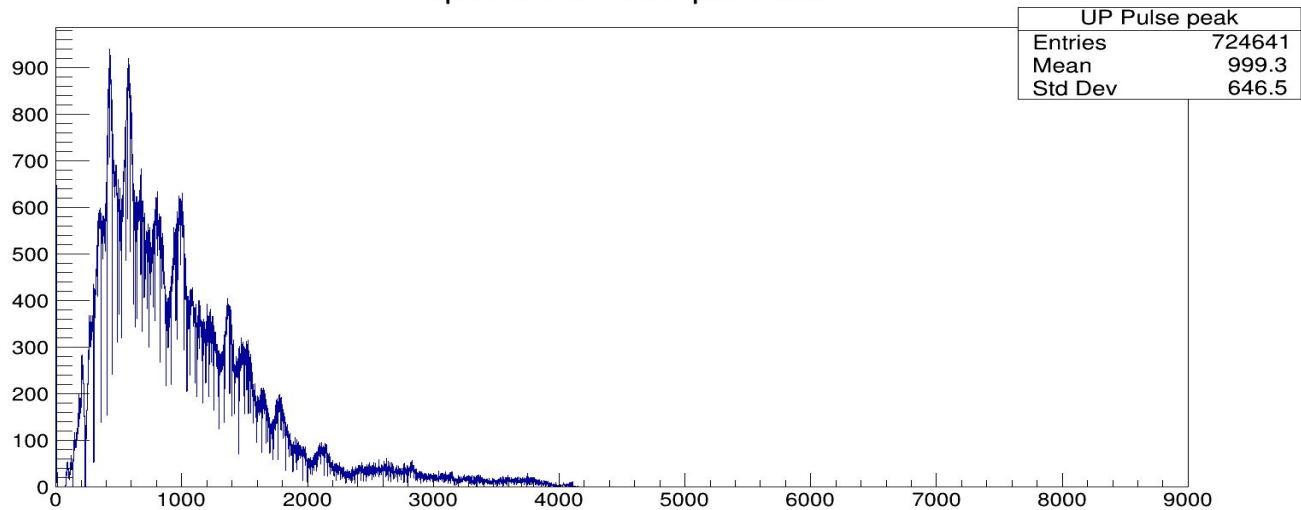
DN Pulse peak	
Entries	754974
Mean	1160
Std Dev	702.7

750k

Counts



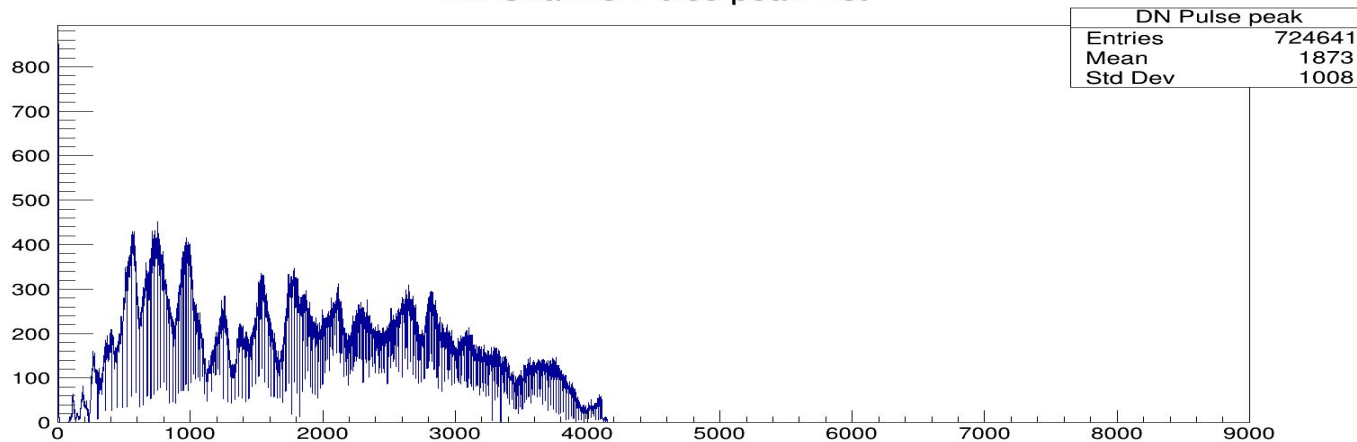
Up Channel Pulse peak hist



720k

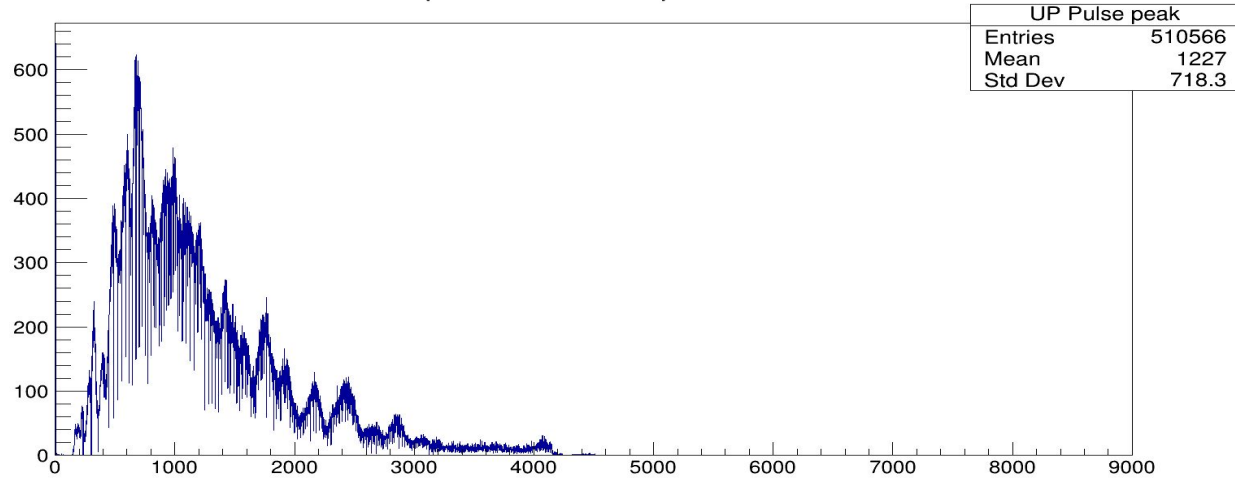
Run Run No 070132
6.25 V
UP LED

DN Channel Pulse peak hist



720k

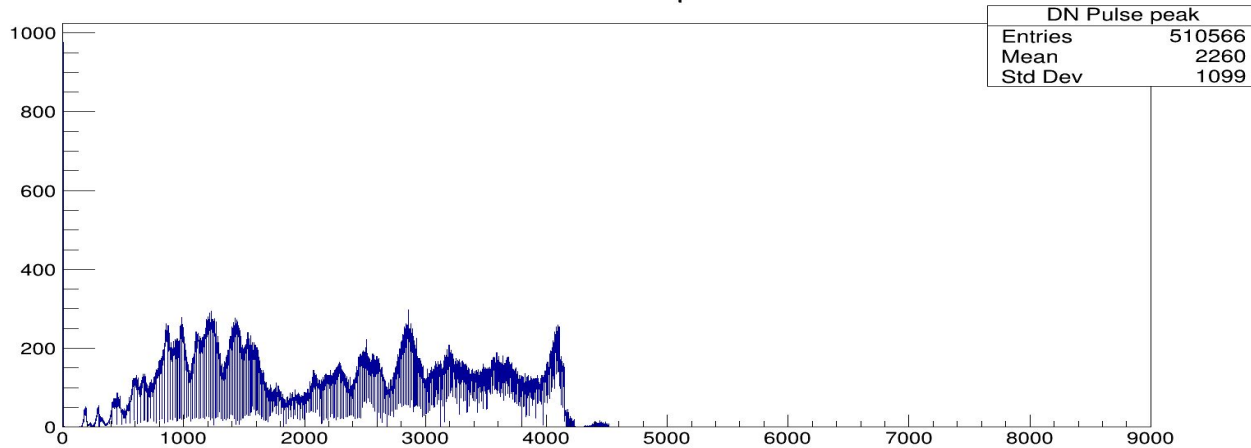
Up Channel Pulse peak hist



510k

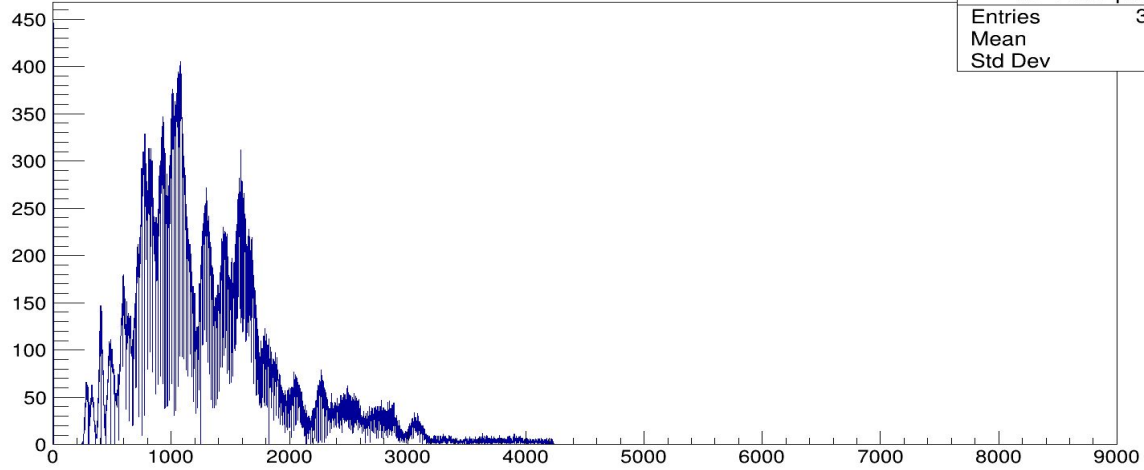
Run No 070133
6.5 V
UP LED

DN Channel Pulse peak hist



510k

Up Channel Pulse peak hist

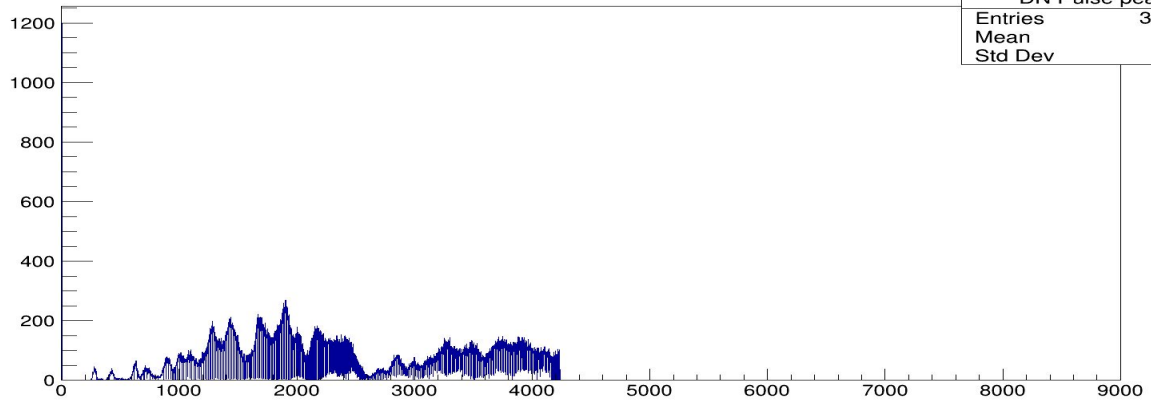


UP Pulse peak	
Entries	311652
Mean	1318
Std Dev	628.6

311k

Run No 070134
6.75 V
UP LED

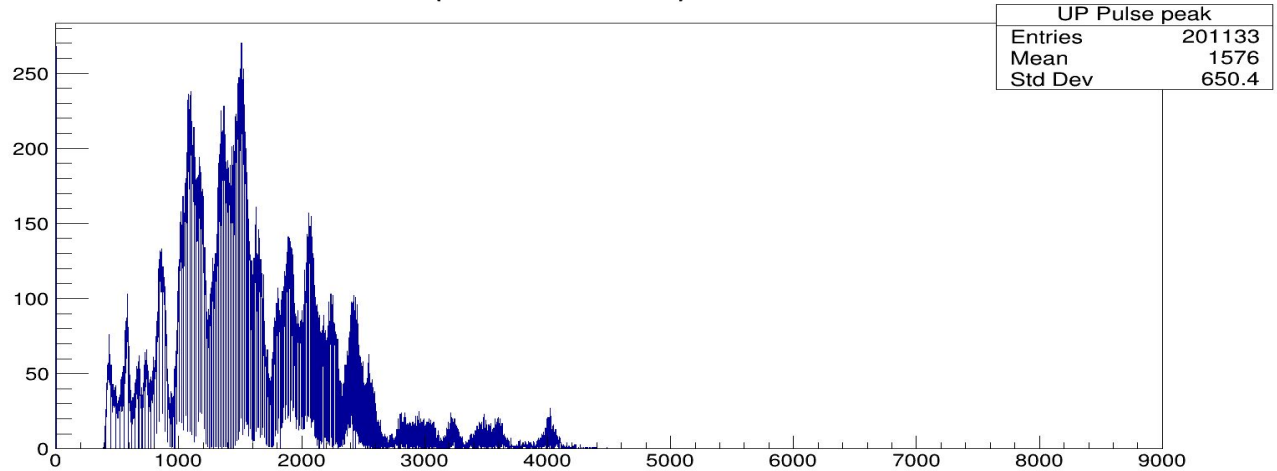
DN Channel Pulse peak hist



DN Pulse peak	
Entries	311652
Mean	2395
Std Dev	1030

311k

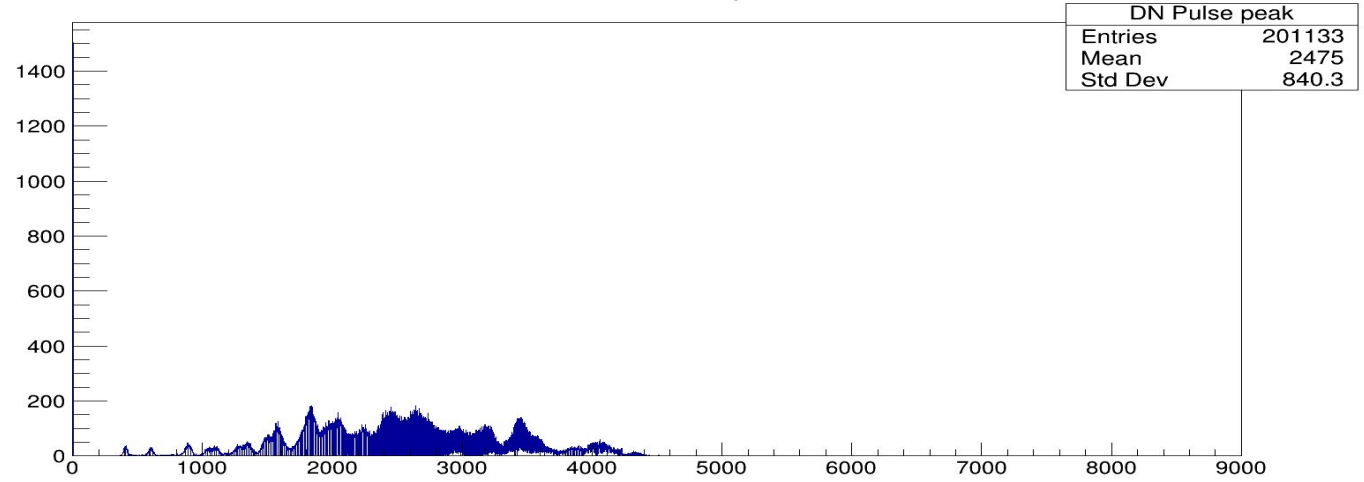
Up Channel Pulse peak hist



201k

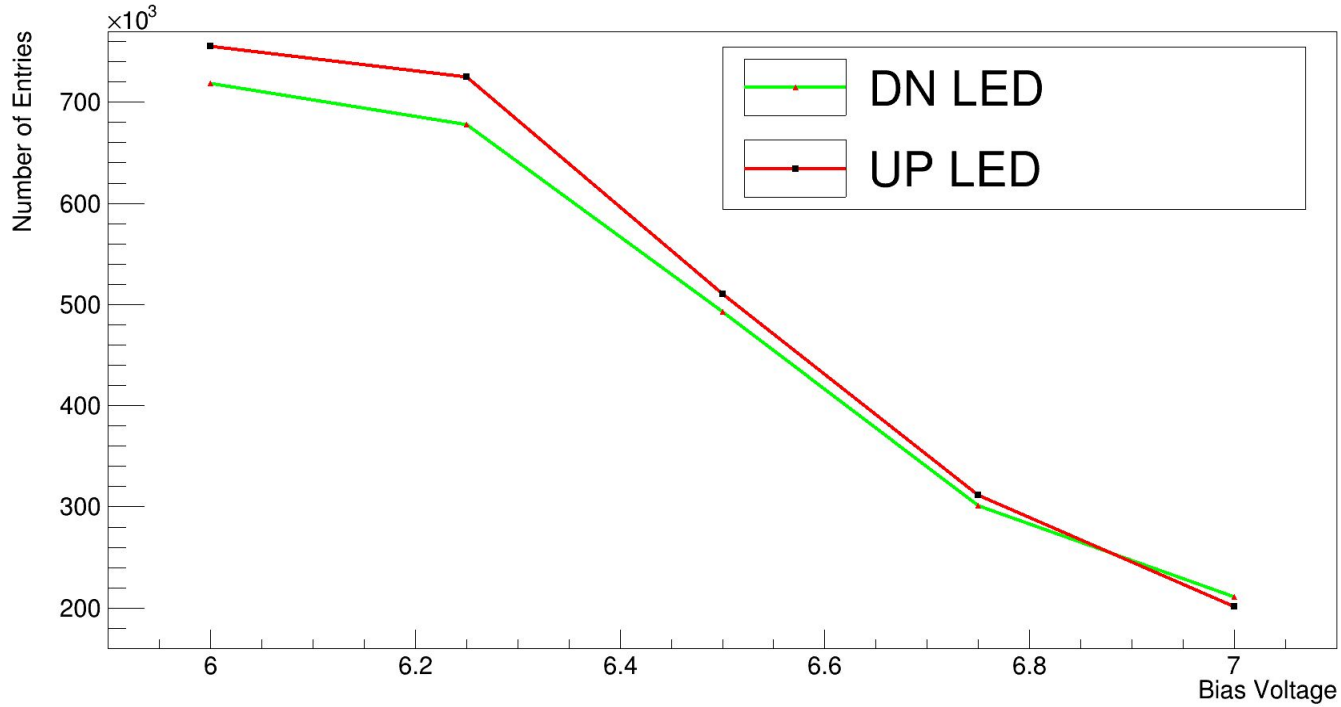
Run No 070135
7 V
UP LED

DN Channel Pulse peak hist



201k

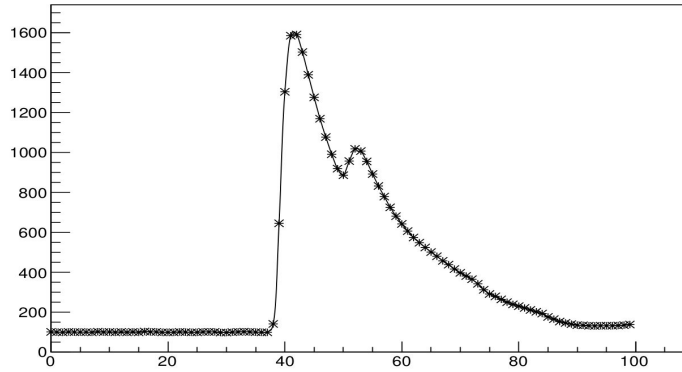
Bias Voltage vs Number of Entries



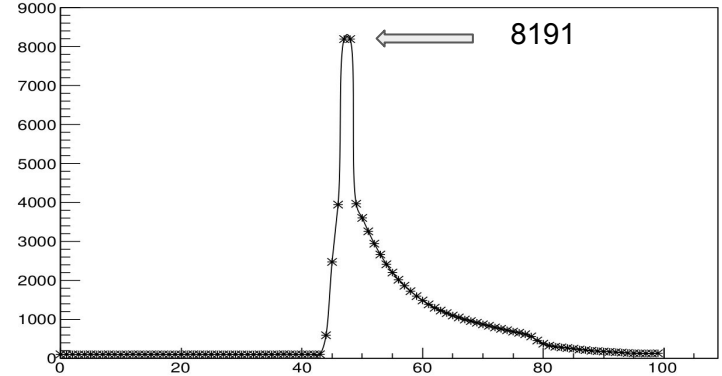
Entries missing (Checking saturation)

- ADC pulse waveform -window raw data (samples) for a channel & single event
- In the runs with increased bias plots with saturation were observed
- Missing entries (could be due to saturation)

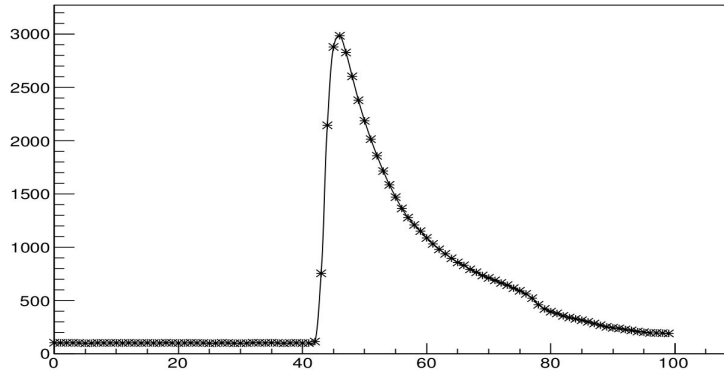
Y axis
Pulse
Peak



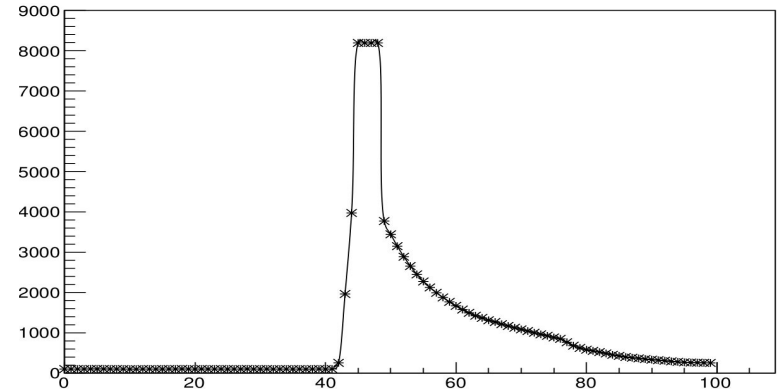
CH NO 365 - 6V -DN LED



CH NO 365 - 6.25 V - DN LED

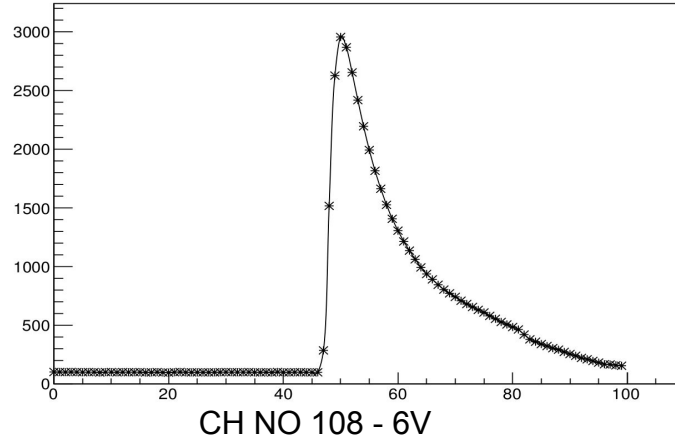


CH NO 622 - 6V -DN LED

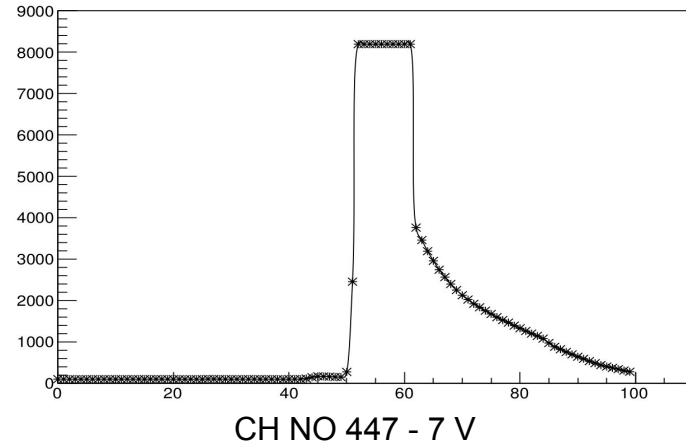
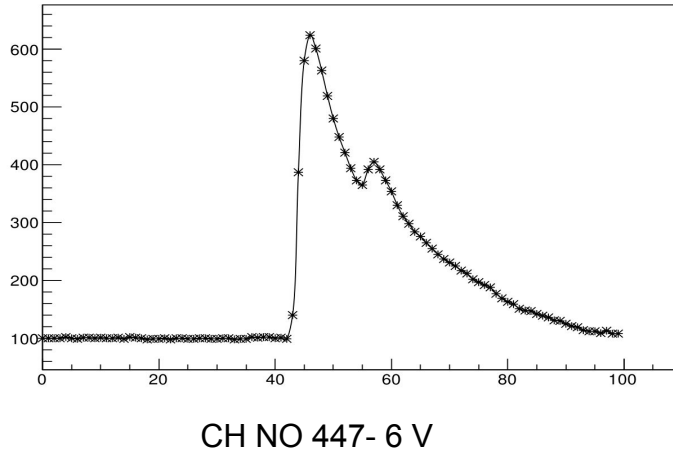
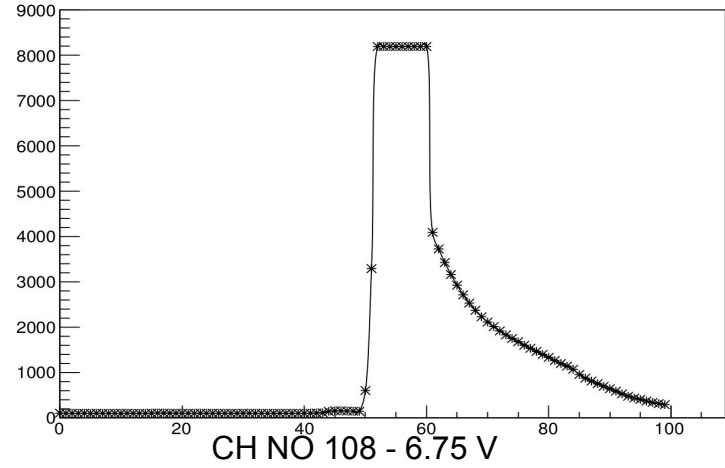


CH NO 622 - 6.25 V- DN LED

- Few more plots for comparison
- Investigate with more channels (more statistics)



Y axis
Pulse
Peak



Conclusion:

- The bias voltage 6.25 seems ok (further discussion can be done)
- Further investigating the saturation and its correlation with the missing events
- Thinking to check cross talk
- The newest version of BCAL-LED monitoring code has been uploaded to Github (Foda)

Downstream LED Pulser	UP channel No. of Pulse peaks	DN channel No. of Pulse peaks
Run No 070136 - 6 V	718839	718839
Run No 070137 - 6.25 V	677894	677894
Run No 070138 - 6.5 V	492938	492938
Run No 070139 - 6.75 V	301425	301425
Run No 070140 - 7 V	210719	210719

Upstream LED Pulser	UP channel No. of Pulse peaks	DN channel No. of Pulse peaks
Run No 070136 - 6 V	754974	754974
Run No 070137 - 6.25 V	724641	724641
Run No 070138 - 6.5 V	510566	510566
Run No 070139 - 6.75 V	311652	311652
Run No 070140 - 7 V	201133	201133