

A quick study of pulse shapes.

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Lund, March 7-8 2013.

A pulse was generated by putting a wire across the inputs of the PCA16, directly on the FEC, without using the kapton cable. A pulse generator was used to generate the pulse. The amplitude of the pulse could be varied. A pulse is by capacitive coupling generated on the input of the amplifier. The output from the PCA16 was looked at with a scope and data was read from the ALTRO. The output pulse shapes was found to be very stable and did not vary much from pulse to pulse. In this study we varied also the decay time of the PCA16, using the two different settings of 500 and 1500 in units of the DAC used to set the decay time. The shaping time was fixed to 120ns, and the gain to 12mV/fC.

Below are figures with different pulse amplitudes and decay time settings. From these we draw the

Conclusions

We can not reconstruct the behavior of long pulses as seen at the test beam, using the same PCA16 settings as at the test beam and by using a test pulse. What is seen is that a large pulse may give a tail but which is not as flat or as long as in the test beam data for pulses of amplitudes well within the ADC scale.

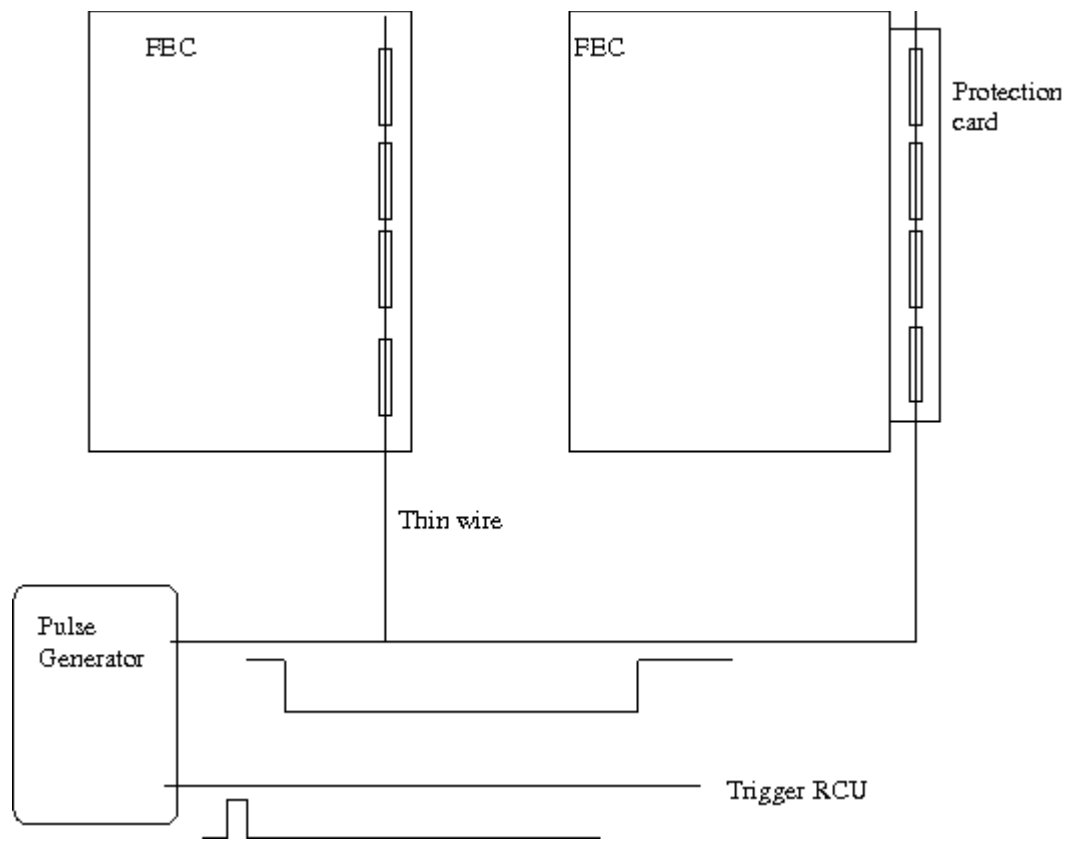
Increasing the the decay time cause a longer tail, and for some channels a flat plateau. The tail can last for at least 400 time samples at the largest pulse height generated, this amplitude saturates the PCA16. At the beam we have never taken data with more than 300 samples. We should take a test run with 1000 time samples to see the tail behavior at the test beam.

There is no large pulse to pulse variation of the output within a channel. There are some differences between channels, but this can be caused by that all channels do not have identical input pulses.

The induced pulse at the test setup may be different from the beam generated signal, and may perhaps explain the different behavior.

Might be that a tail cancellation algorithm can remove the tail. Since the SALTRO is based on the PCA16 chip, and if the tail is considered a problem, may it be interesting to do such a study.

The same tests was done with a protection card inserted. Note that the results can not be identical and compared in detail, since the wire inducing the pulse is impossible to attach in an identical way. This investigation show that the protection card do not have a large effect on the pulse, though minor effects can not be excluded.



Rough drawing of test pulse setup.

A pulse as digitized with zero suppression by the ALTRO. **Pulse generator amplitude is 2V**, decay time set to 500, ADC threshold 3. On the X-axis is the time bin, on Y-axis the ADC values. At the test beam long pulses are seen for a pulse of this amplitude.

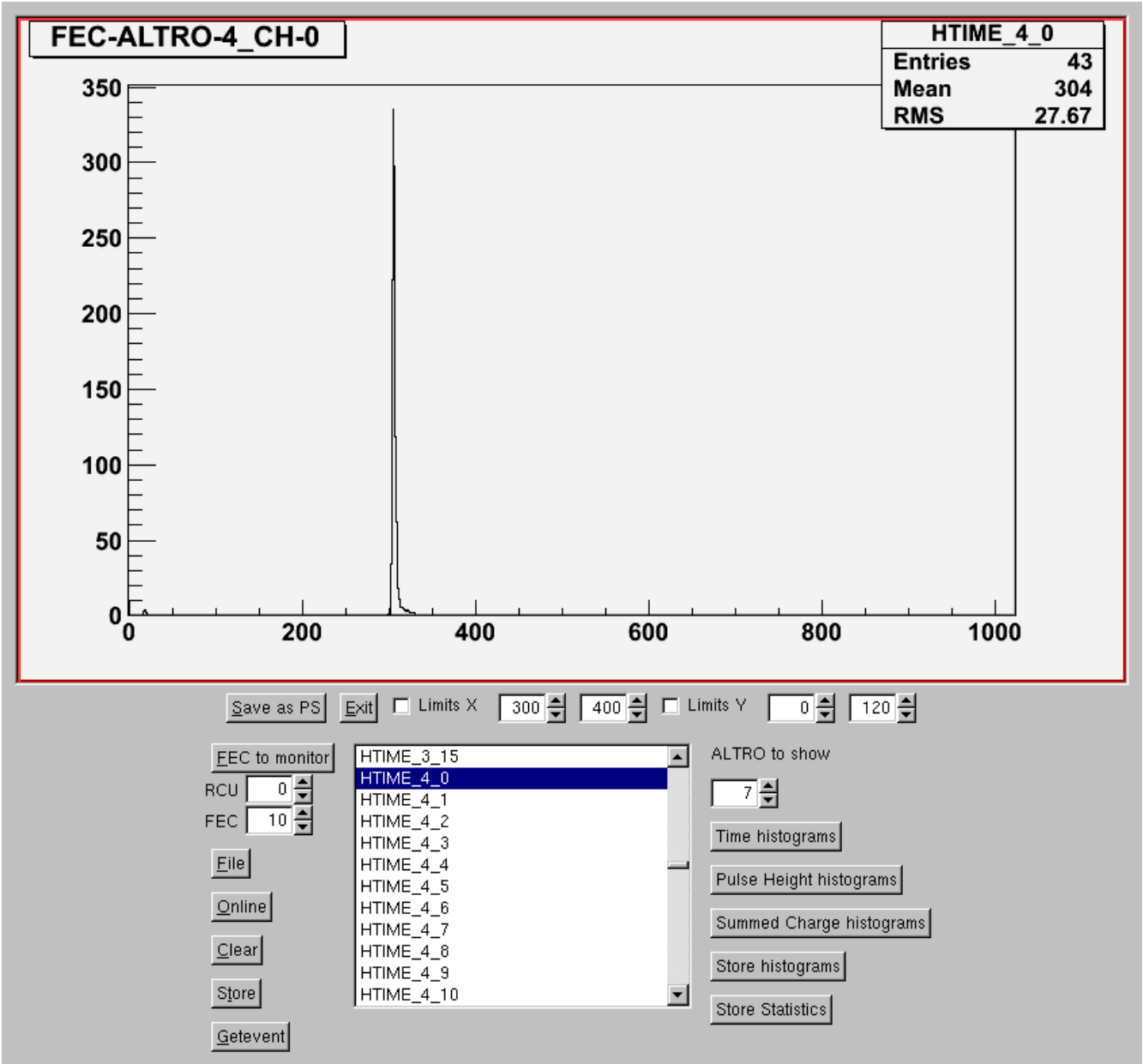


Figure 1

The length of each cluster was histogrammed. The figure show the cluster length for the ALTRO chip 4 channel 0 after zero suppression. As is seen is the length always less than 50 time samples.
(Pulse amplitude is 2V, decay time set to 500, ADC threshold 3)

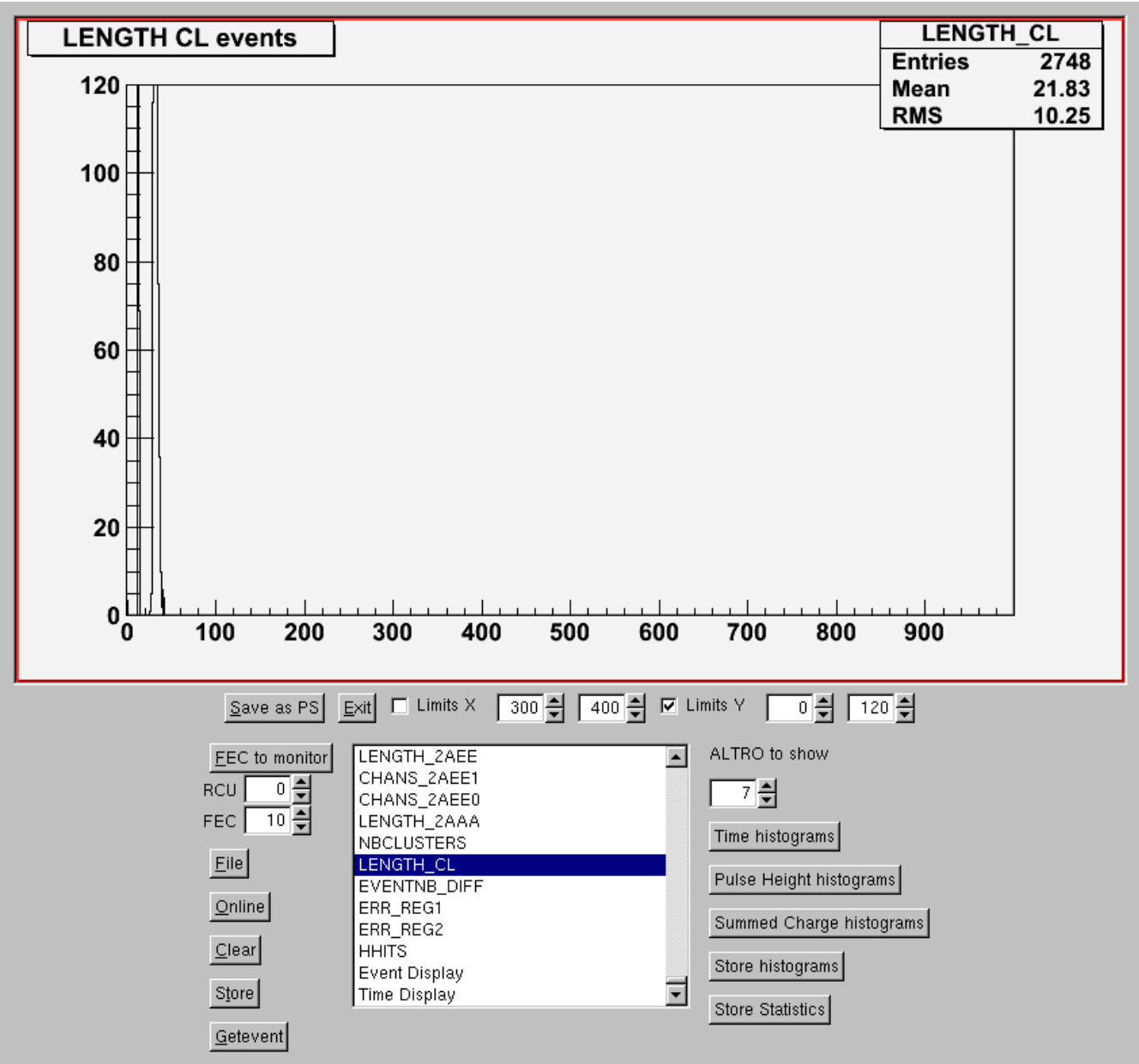


Figure 2

There is no sign of long pulses for these settings. This figure is a detail of the figure 1.

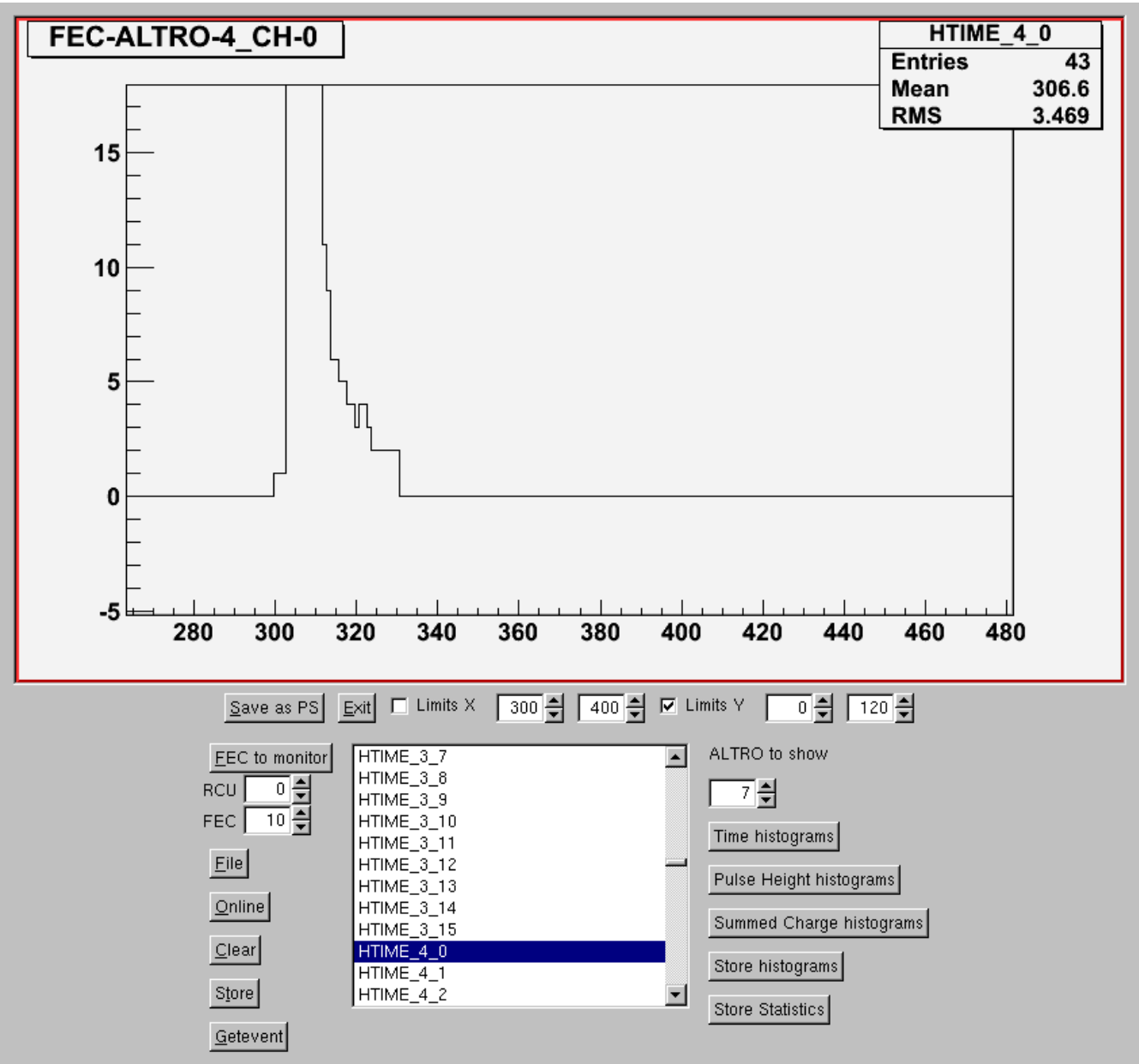


Figure 3

The pulse amplitude from the generator was increased to 10V (maximum possible with the pulse generator used). This pulse overflows the PCA16 and the ADC scale. In this case a longer falling tail appears. But no sign of a plateau.

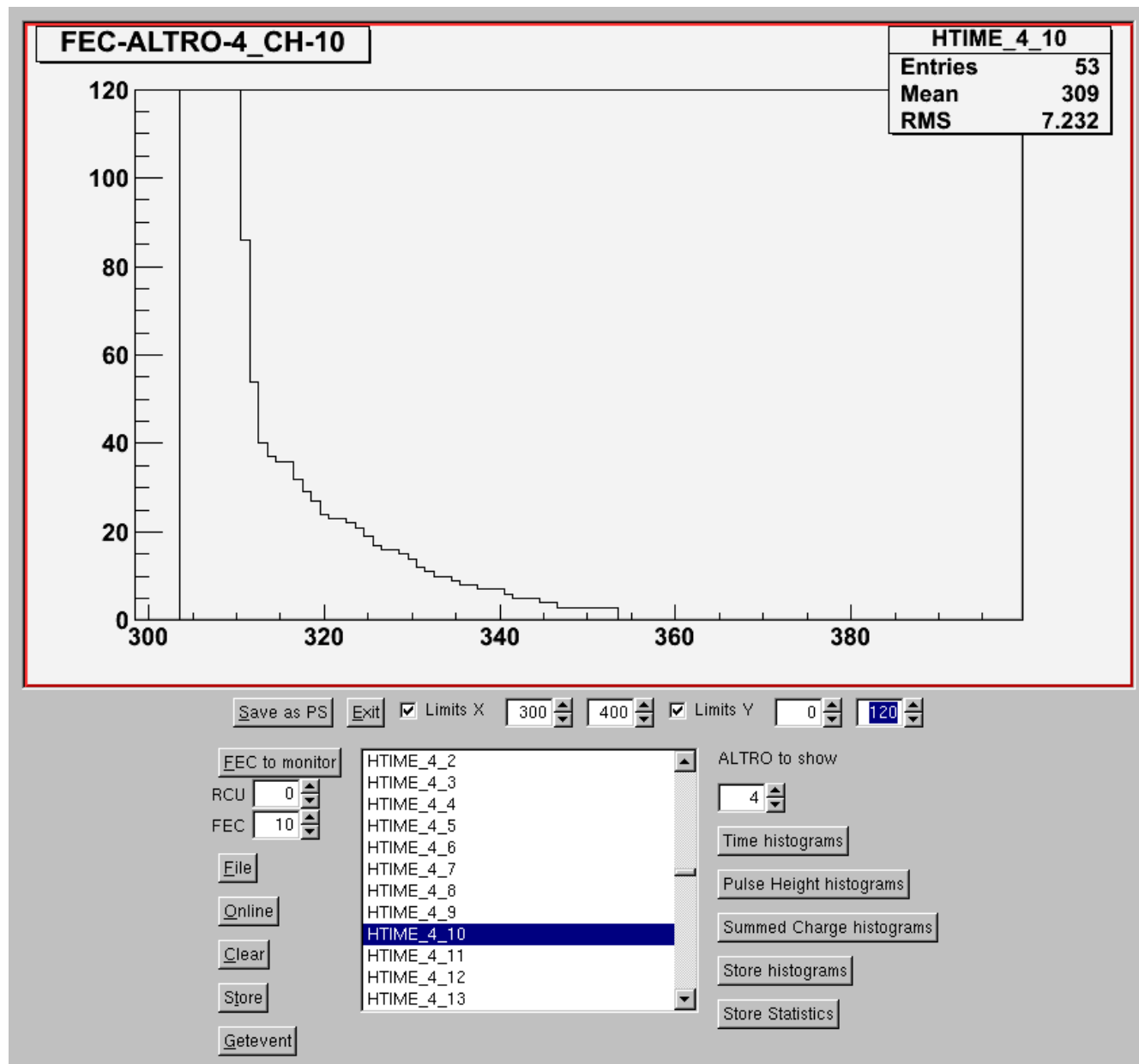


Figure 4

The cluster length of the ALTRO chip 4 channel 0 after zero suppression.
 As is seen is the length always less than 100 time samples.
 (Pulse amplitude is 10V, decay time set to 500, ADC threshold 3)

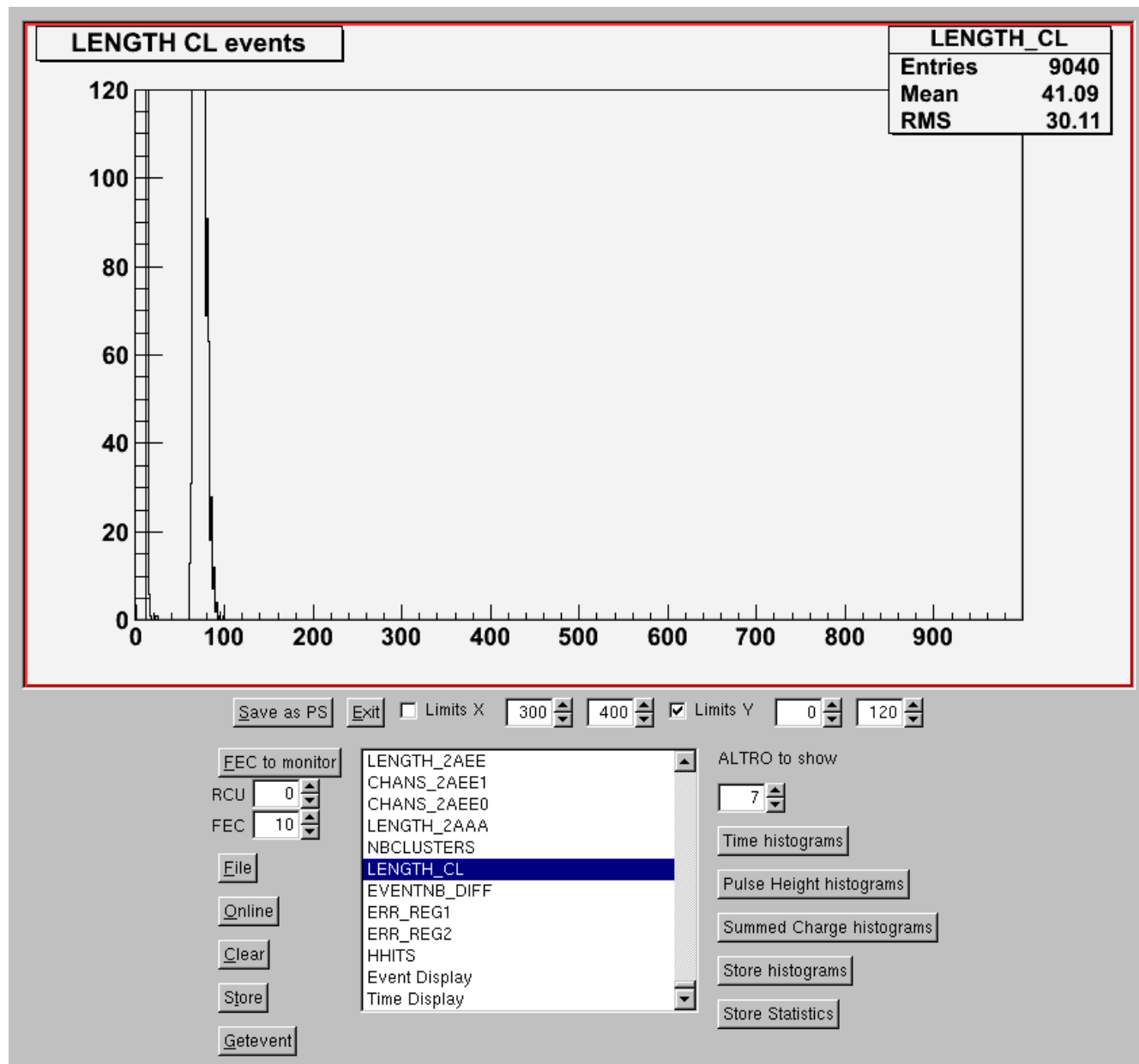


Figure 5

Other settings of the pulse generator amplitude shows a gradual change with the amplitude between these two extremes of the length of the cluster from the ALTRO and the height of the tail. Both the ADC output and the scope output from the PCA16 show the same result within what can be seen on the scope and ADC scale.

The decay time setting was changed to 1500. Pulse generator amplitude is here 2V.
The tail becomes longer compared with same pulse at decay time 500. Note that this figure is without zero suppression to give the baseline behavior.

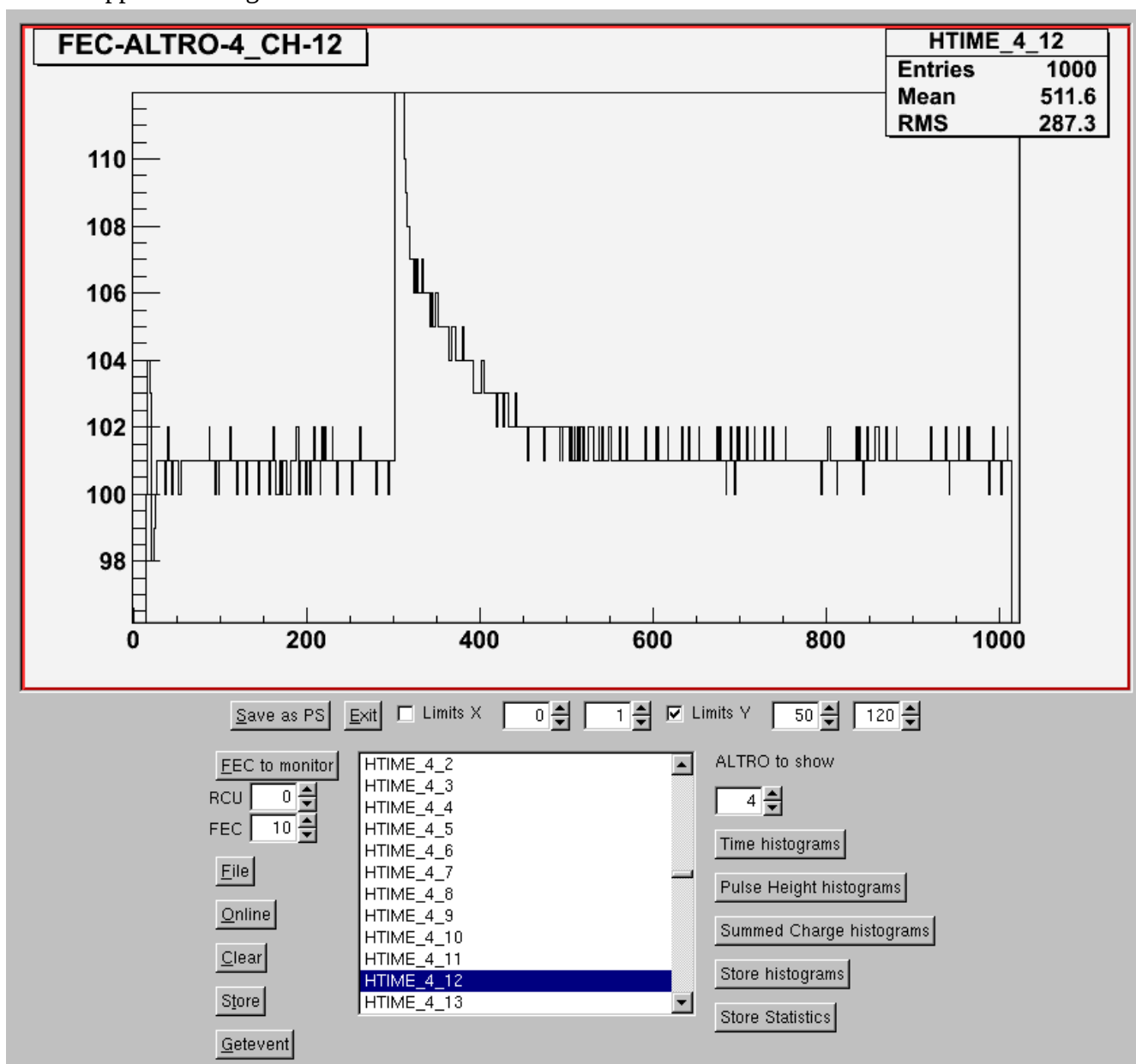


Figure 6

Decay time 1500. The amplitude is set 10V, which saturates the PCA16, a long tail and a more or less flat shoulder appears. Note that this figure is without zero suppression to give the baseline behavior.

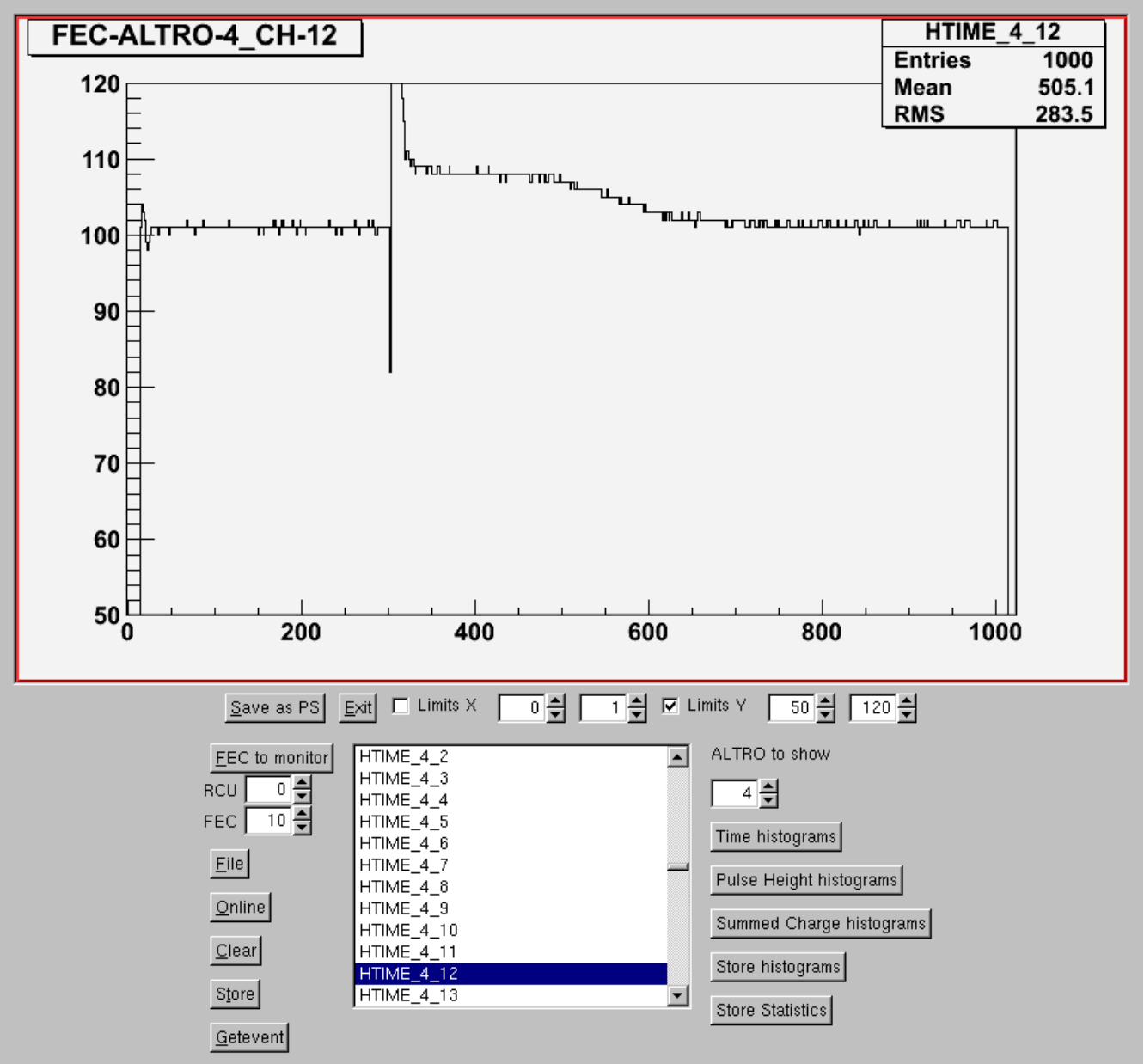


Figure 7

Decay time 1500. The amplitude is set 10V, which saturates the PCA16, a long tail and a more or less flat shoulder appears. This figure is with zero suppression. Note that this is another channel than in the previous figure, illustrating differences between channels.

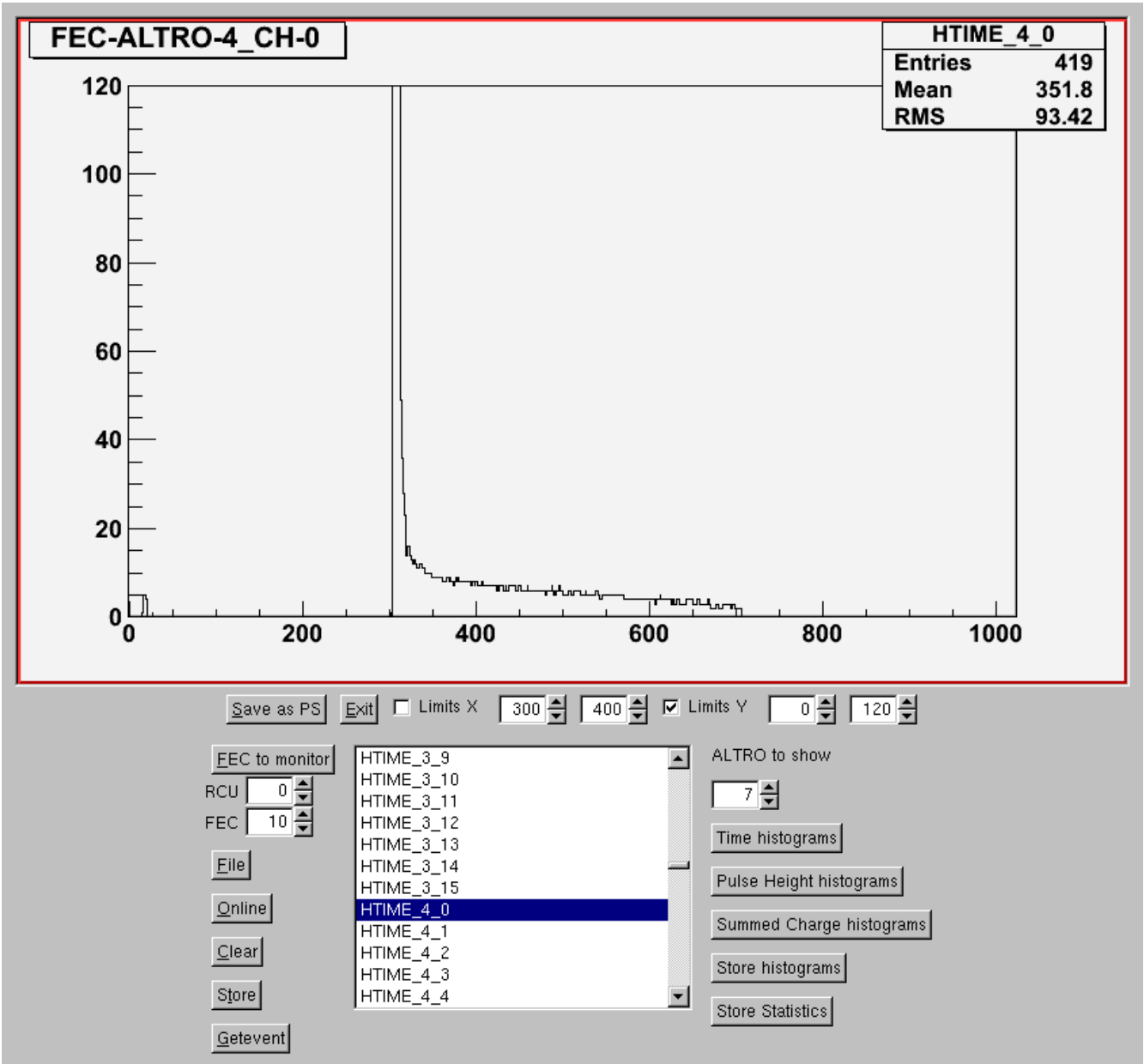


Figure 8

The cluster length of the ALTRO chip 4 channel 0 after zero suppression.
As is seen is the length rather long, around 400 time samples.
(Pulse amplitude is 10V, decay time set to 1500, ADC threshold 3)

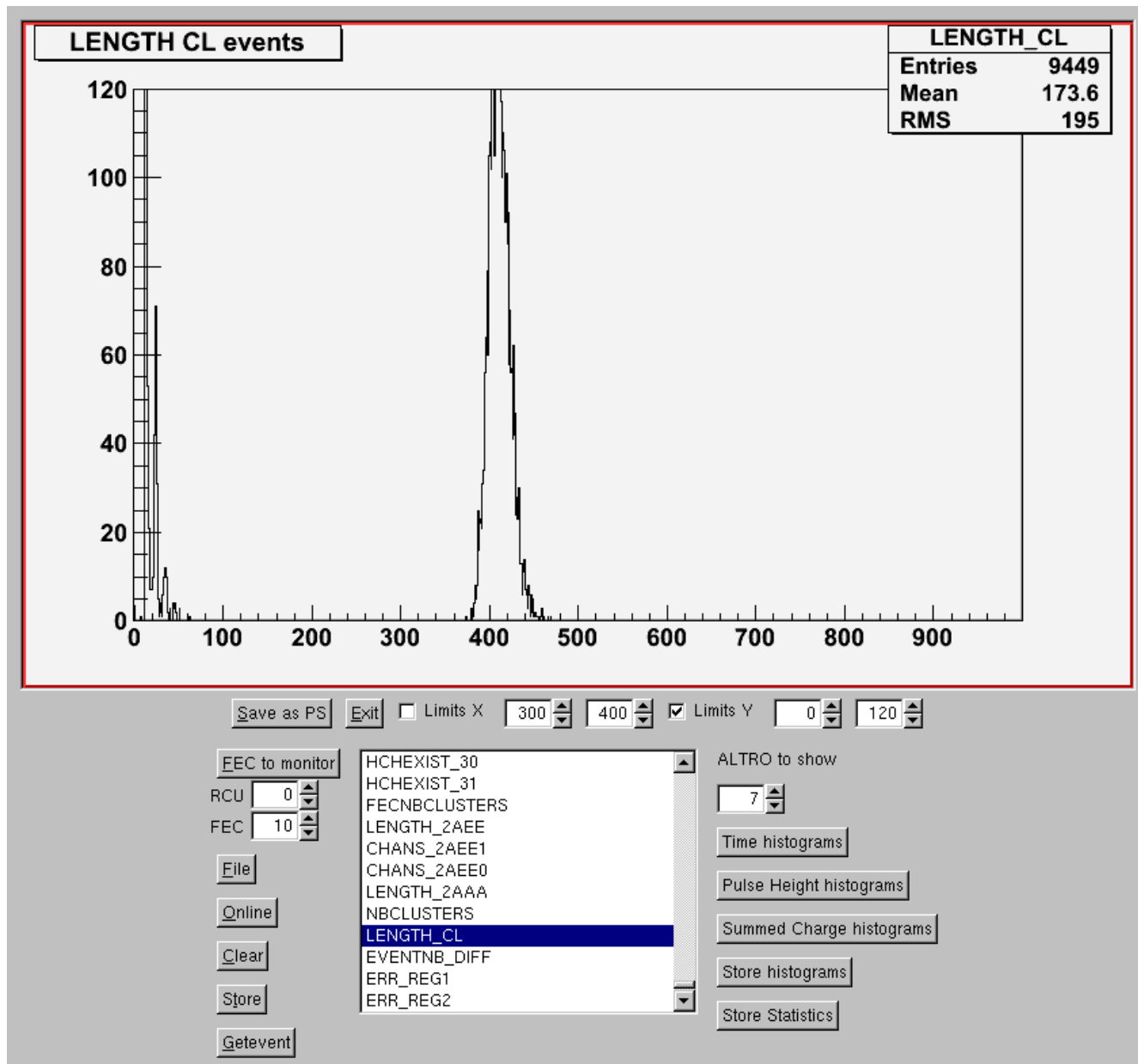


Figure 9

The same tests was done with a protection card inserted. Note that the results can not be identical and compared in detail, since the wire inducing the pulse is impossible to attach in an identical way. This will of course change the amplitude/shape of the induced pulse, and one can not do a detailed comparison. The overall behavior is seen to be the same. The figure show the cluster length for a pulse of 10V from the pulse generator, and decay time 1500. This investigation show that the protection card do not have a large effect on the pulse, though minor effects can not be excluded. This requires a much more detailed study than this.

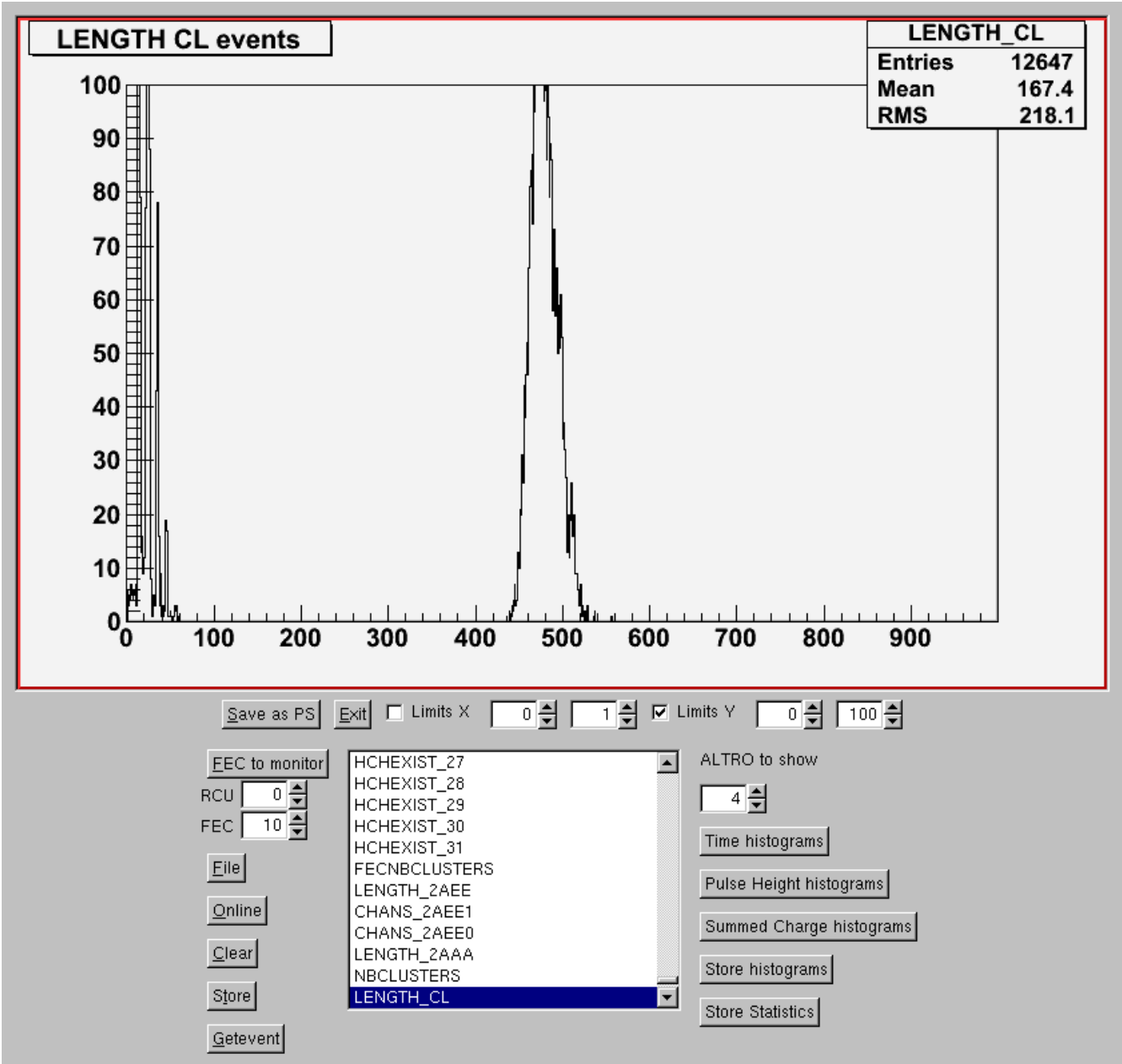


Figure 10