Pulser test

With this test we want to understand how the gain changes during the calibrations and if this is a trustable process. First we need to determine the gain

Gain Determination of our Pre-Amp

In the lab

1. Connect LVDS cable of our pre-amp to the first FEBEX card
2. Connect, with a LEMO the pulser, to the pulser input of our pre-amp
3. Connect BUS 0 in the MRC-1 (master connecter) to our entry in the pre-amp
4. Change modes in the Pulser to Local mode (Go to Main Menu → Option 6)

In the PC

1. Connect to FEBEX PC
2. pb5 get 1 all (this shows what are the parameters that we can change)
3. go2Febex
4. ssh lipc-4
5. /mbsrun/febex/lipc-4
6. resa
7. make clean
8. make
9. mbs
10. @startup
11. connect rfio 192.168.2.12:1290 -diskserver
12. sho acq (this must show some events)
13. open file name=/d/d01-1/agkr/*CALIFA/CALIFA_Ring9/Tomas_DATA/cosmic_test/lmdFiles/220613_run* -rfio size=1000 -auto first=1
14. close file

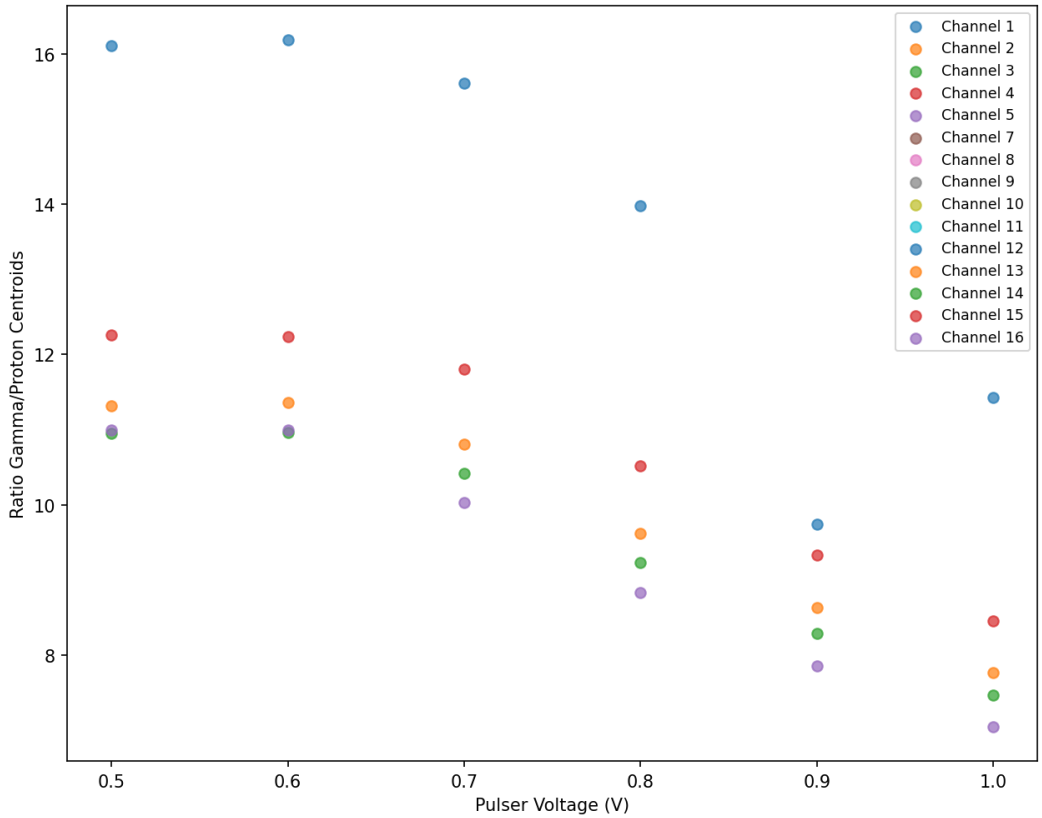
Check events

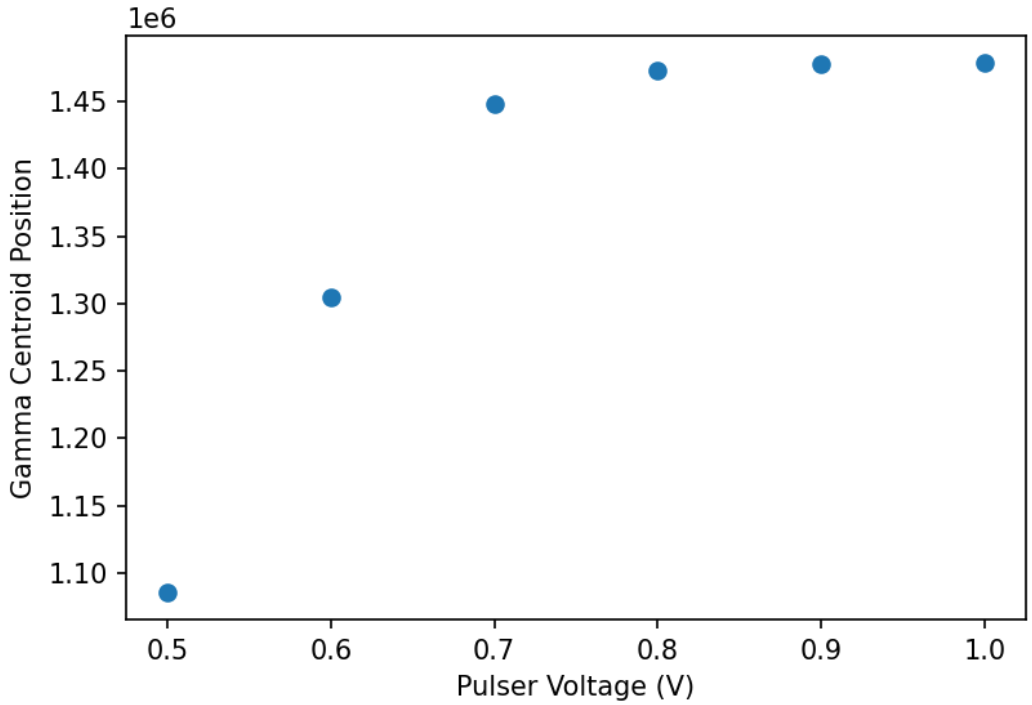
1. tomas
2. cd cosmic_test/
3. . unpack.sh 220705

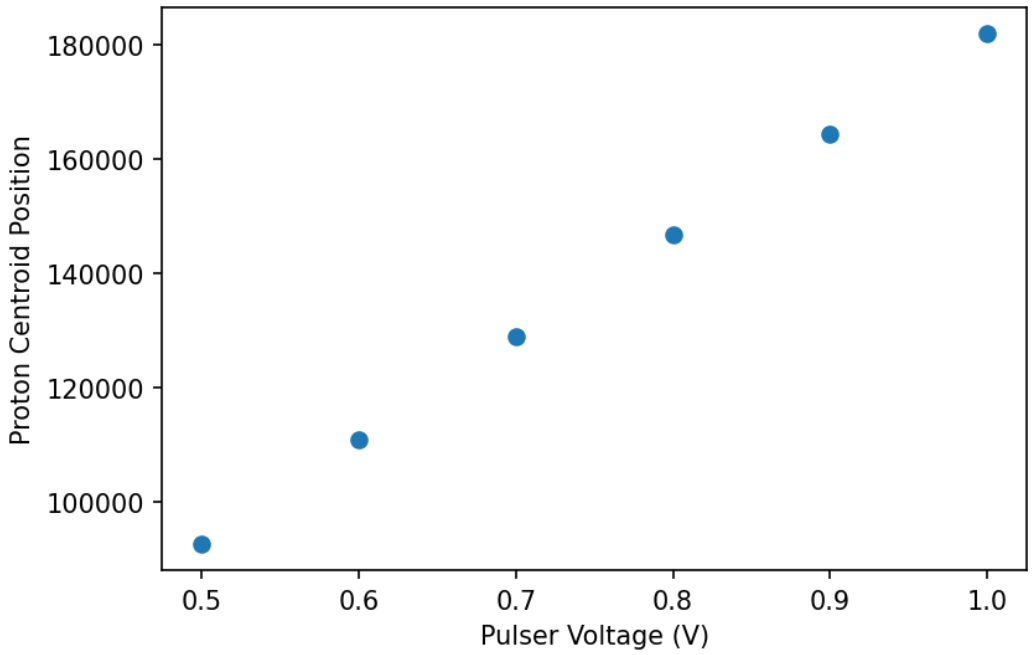
4. AnalysisxTree→StartViewer() (to check the structure of events)
5. AnalysisxTree→Draw("I_CsI[0]")

Other ways of Drawing: https://root.cern.ch/root/htmldoc/guides/users-guide/Trees.html#simple-analysis-using-ttreedraw

Results of 1st test




1e6
1.45
1.40
1.35
1.30
1.25
1.20
1.15
1.10
Gamma Centroid Position
0.5
0.6
0.7
0.8
0.9
1.0
Pulser Voltage (V)


180000
160000
140000
120000
100000
Proton Centroid Position
0.5
0.6
0.7
0.8
0.9
1.0
Pulser Voltage (V)

This results shows that for the gamma centroids, after the 0.7 voltage we have saturation. This is already expected, since that for a certain voltage this would go out the gamma range.

Nevertheless, in the first graph we see that even for the 0.5 and 0.6 values, the ratio for different channels, changes a lot, it would induce 9% errors in the calibration.

Also, some of the proton channels have 0 counts and I don't know why...

There is also the need to re-do the test with the rise time and decay time similar to the CsI(Tl) response of the crystals.
Reference: https://arxiv.org/pdf/1103.6105.pdf

Table. 2 Summary of waveform parameters.

Crystals	CsI(Na)		CsI(Tl)		NaI(Tl)		CsI	
Source	γ	α	γ	α	γ	α	γ	α
Rise time (ns)	40	5	50	35	20	10	5	5
Decay time (ns)	670	17_{fast}	1080	670	250	170	22	15
		490_{slow}						

New test

- Pulse from 0.1 to 1 V, in intervals of 0.1V
- Change the rise time and decay time to the same as CsI(Tl) in the pulser