Team members

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Student : Carl RETHMEIER

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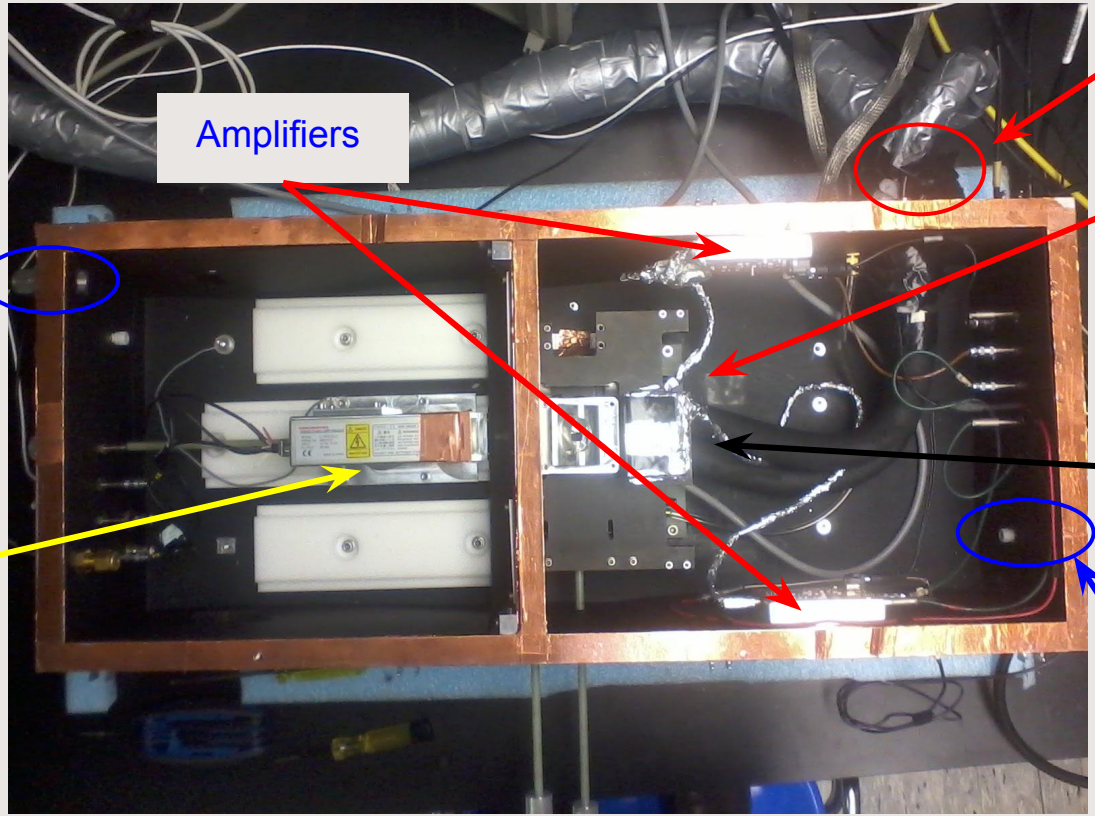
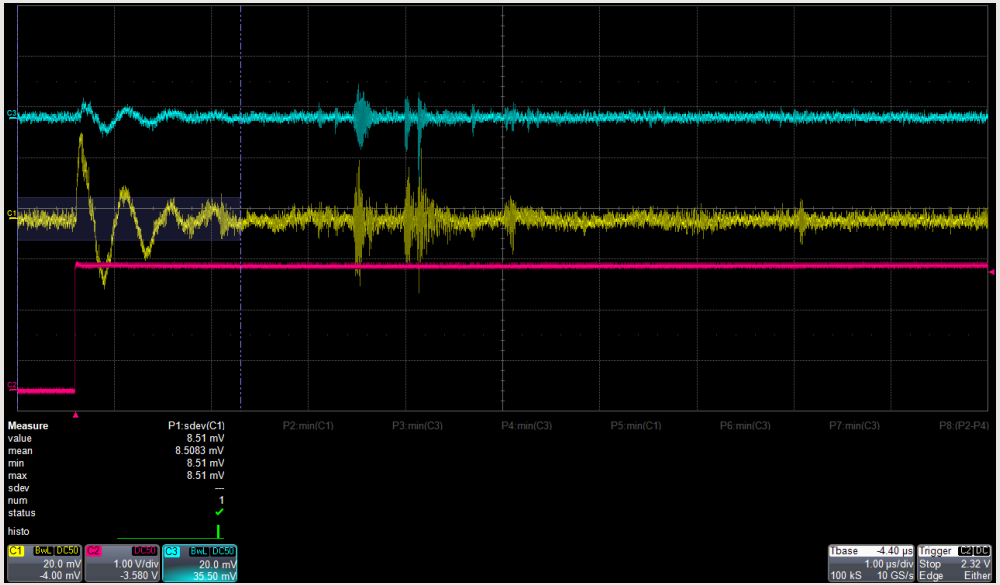
How does the setup work ?



Reduce electronic noise to have better results

Too much electronic noise on the signal observed on the oscilloscope :

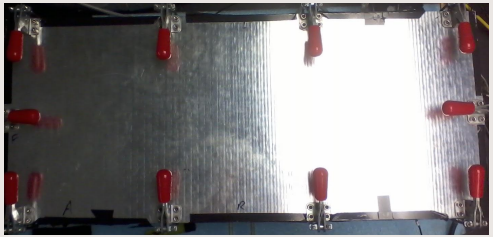


★ Sol. 1. : Could improve the code - WaveFormProcess -

★ Sol. 2. : Improve the setup

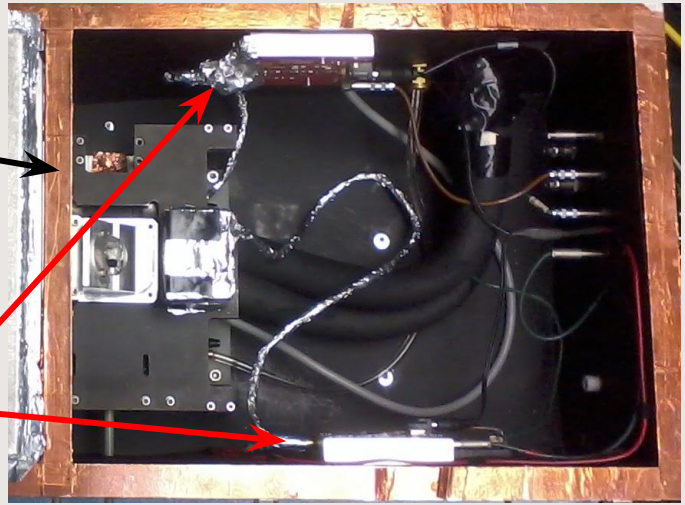
Sources of electronic noise

- Ground loops and no ground point
- When the F.L. is on it creates radio waves whose frequencies are between 400 MHz and 1.2 GHz
- Radio waves propagate through the air and are transmitted to any piece of conductive metal
  - The lid of the box conduct electric field and disturb the amplifiers >> the signal is disturbed
  - Each detector receives these radio waves >> the signal is disturbed
  - The metal divider act as a transmitter and the connectors of the signal wire act as antenna >> the signal is disturbed



The lid of the box

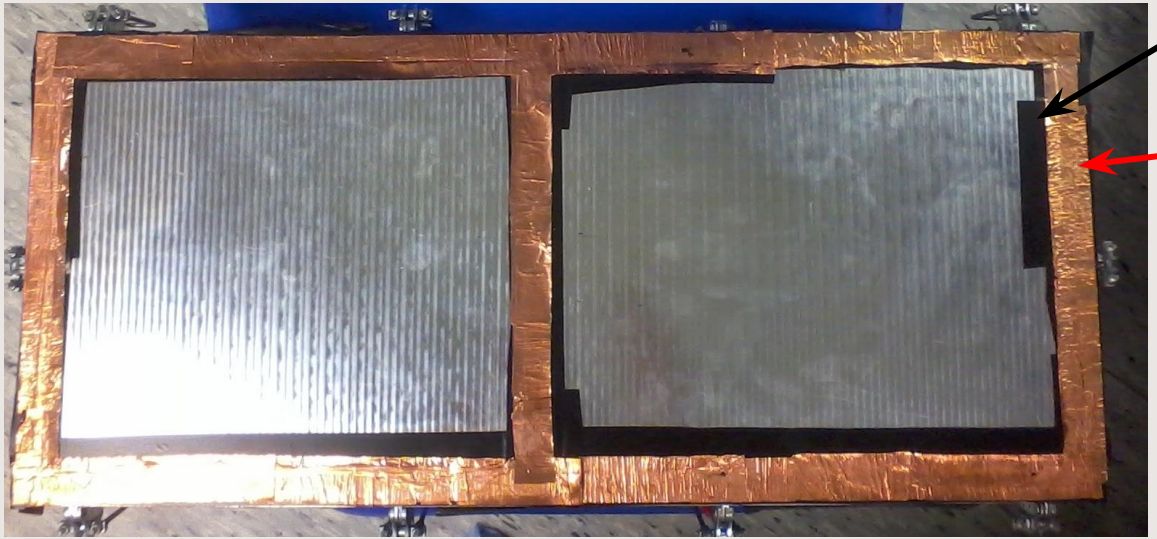
metal divider



Connectors to the amplifiers

Three main solutions to improve the setup

- Create a ground point : help for trigger.
- Isolate the lid from the box.



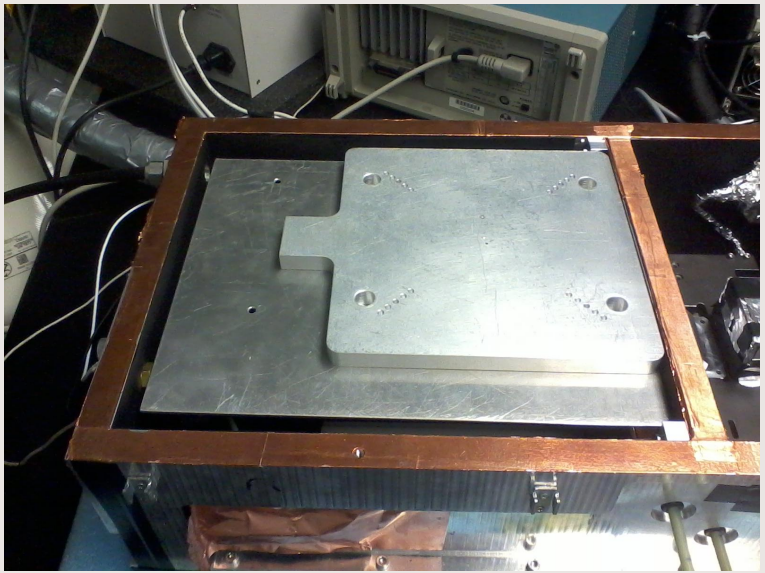
Csq :

- The electric field from the flash lamp is guided by copper

- No more electric field above the amplifiers

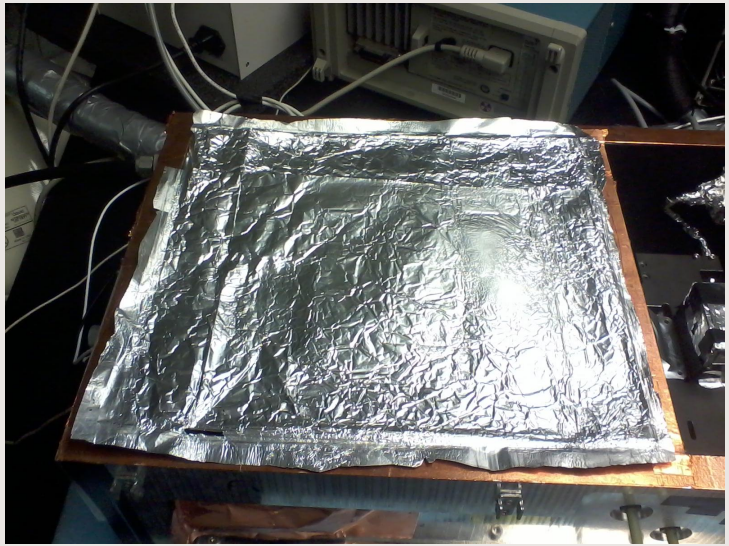
Three main solutions to improve the setup

➢ Isolate the flash lamp : *Faraday cage*.



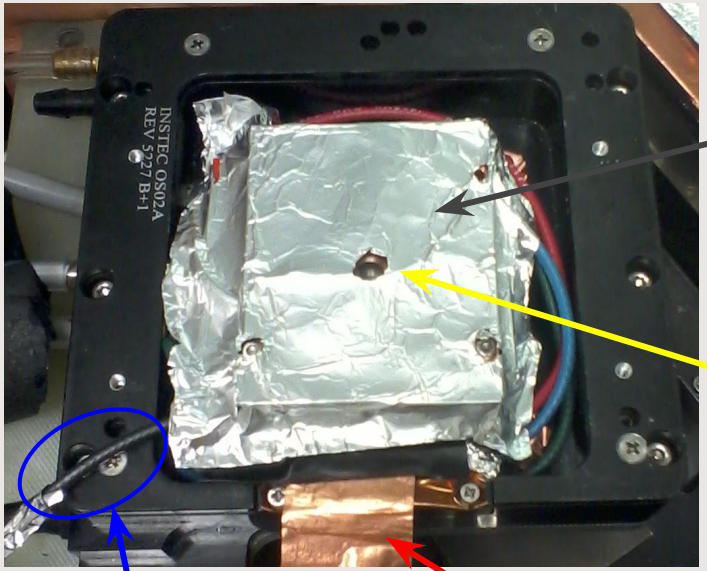
The centimeter thick piece of metal absorb radio waves from the F.L.

A aluminum foil, connected to the pieces of metal, conduct electric field to the copper tape and so to the ground.



Three main solutions to improve the setup

➢ Isolate the detectors from the radio waves of the F.L. : *Faraday cage*.



Aluminum foil

Hole for the light

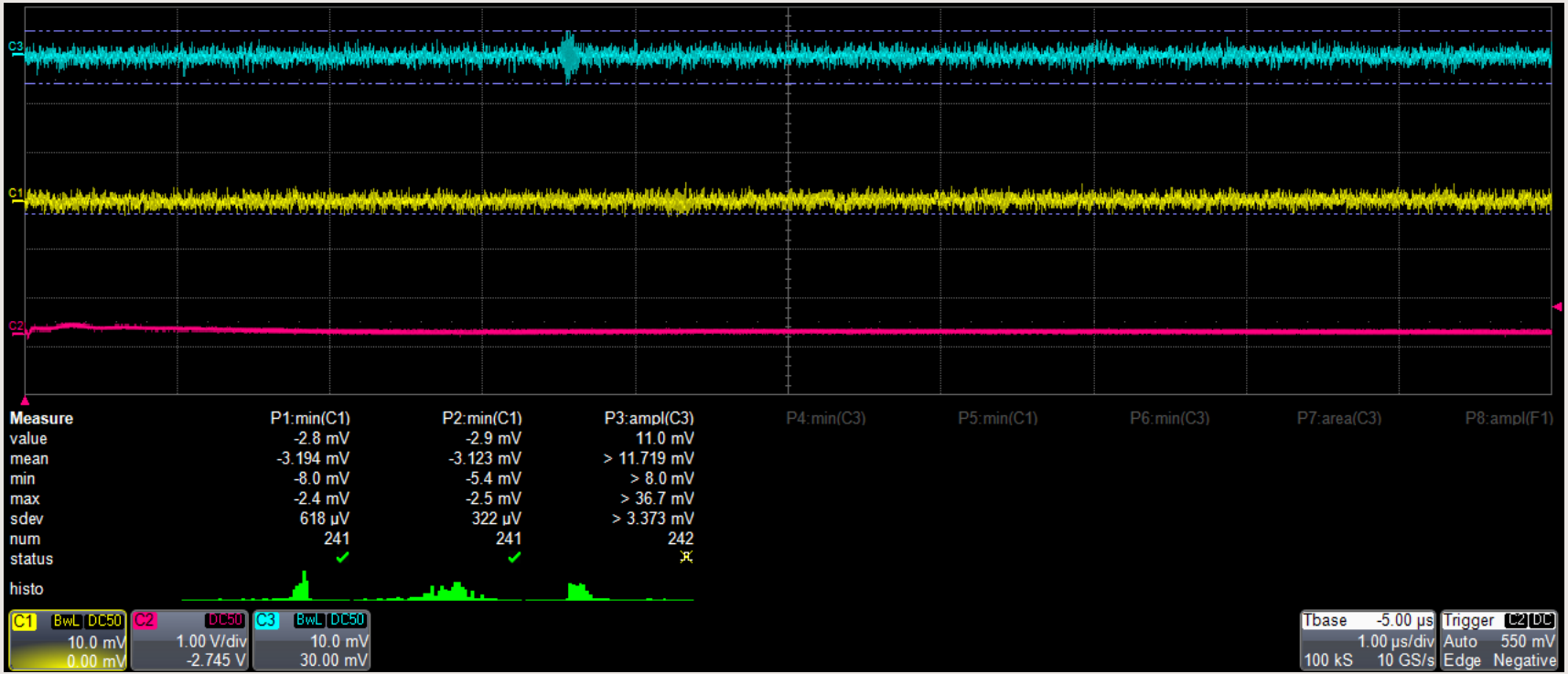
Signal

Copper to ground (inside)

Signal

Copper to ground

Both signals get better



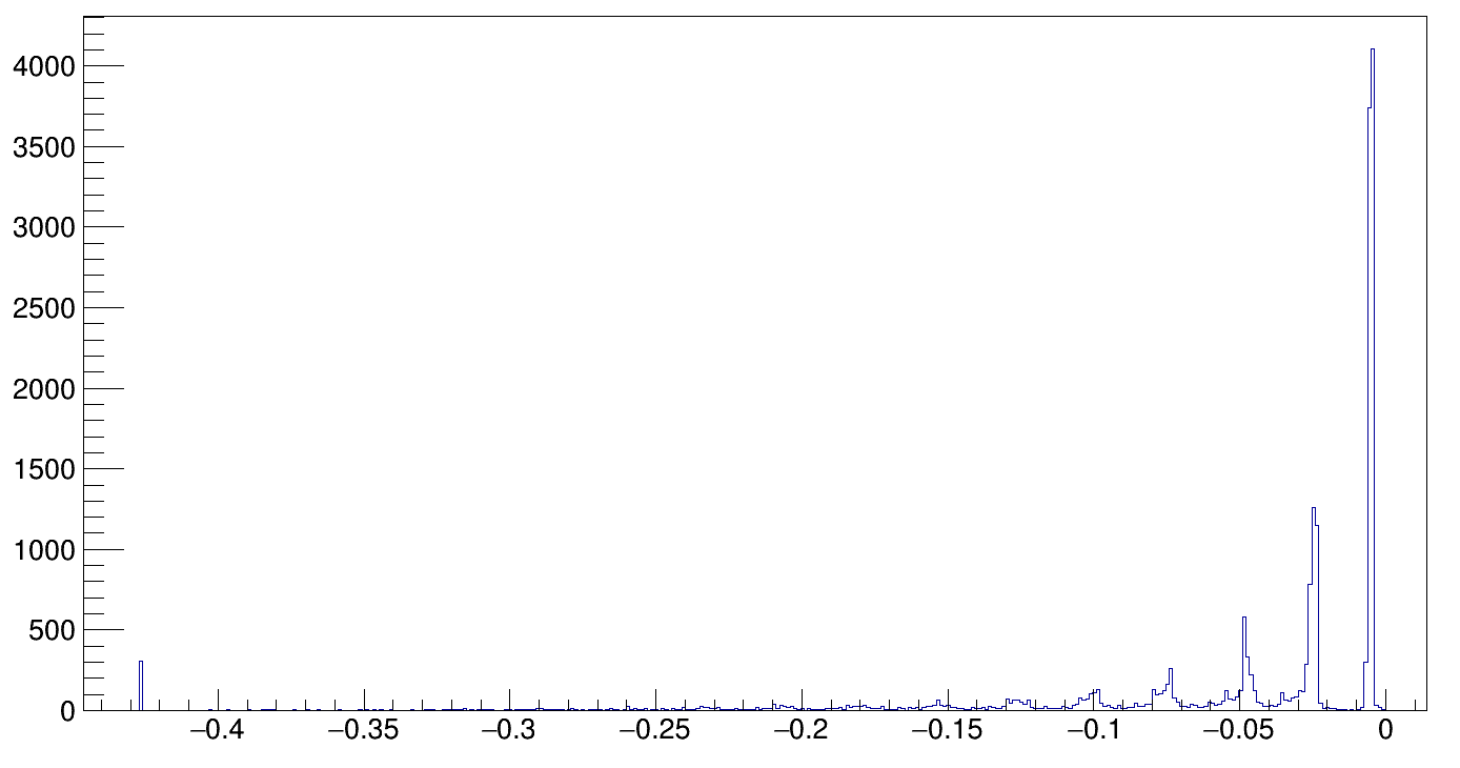
Analysis

- Use number of waveforms without a pulse to calculate probabilities
- Analysis of histogram from scope.
  - Histogram plots minimum amplitude (for negative pulses)
  - Events in peak closest to 0 taken as number of zeros
- Development of peak finder (and learning how already developed software works).
  - Boxcar smoothing over 600 bins
  - 3.5 baseline sigma threshold for pulse
  - Pulse checked using width and charge
  - Count number of zeros and apply Poisson

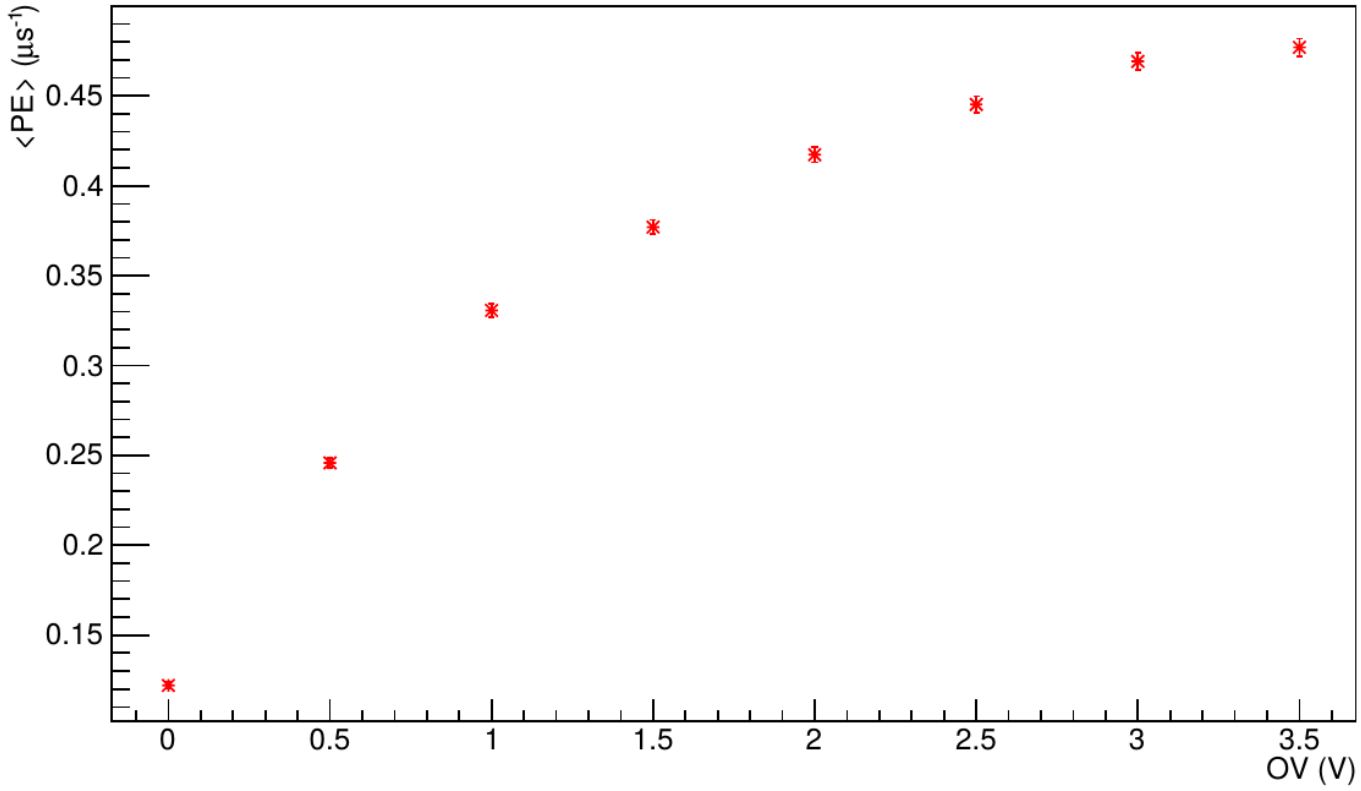
Analysis

- <PE>
  - Ready
- Dark Noise
  - Ready
- Crosstalk
  - Developing
- Afterpulse
  - Will integrate waveform after initial dark noise pulse

Histogram


4000
3500
3000
2500
2000
1500
1000
500
0
−0.4
−0.35
−0.3
−0.25
−0.2
−0.15
−0.1
−0.05
0

<PE>



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