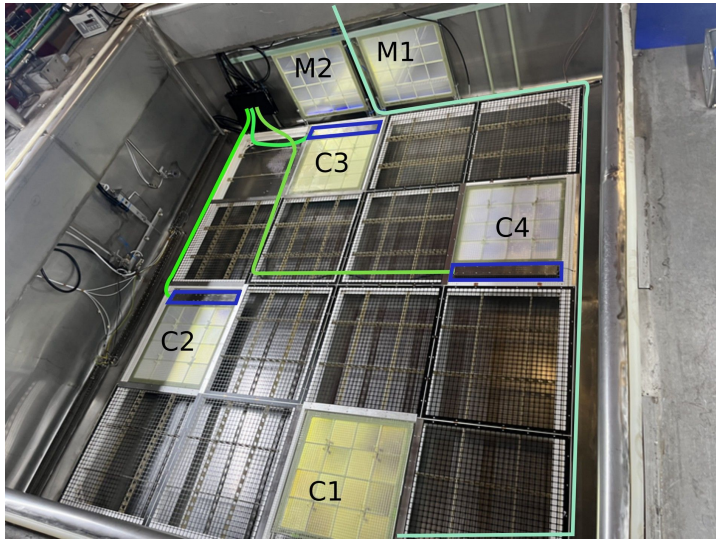
Linearity analysis for cathode modules
April 2024 data taking

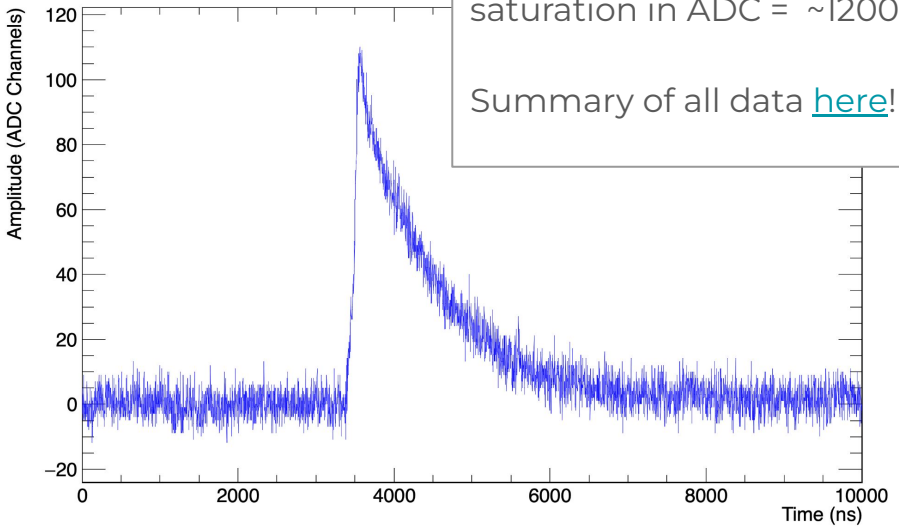
Matteo Galli

03/05/2024

Dataset

- **CAEN digitizer** + **Koheron** warm receiver
- LED of **365nm**, scan of LED voltage until saturation for each channel:
- Cathode modules: C1, C2, C3, C4 (module configurations here)
- LED scan from **3.2V** to **21.0V**
- Integration window: (3300 - 6000) ns





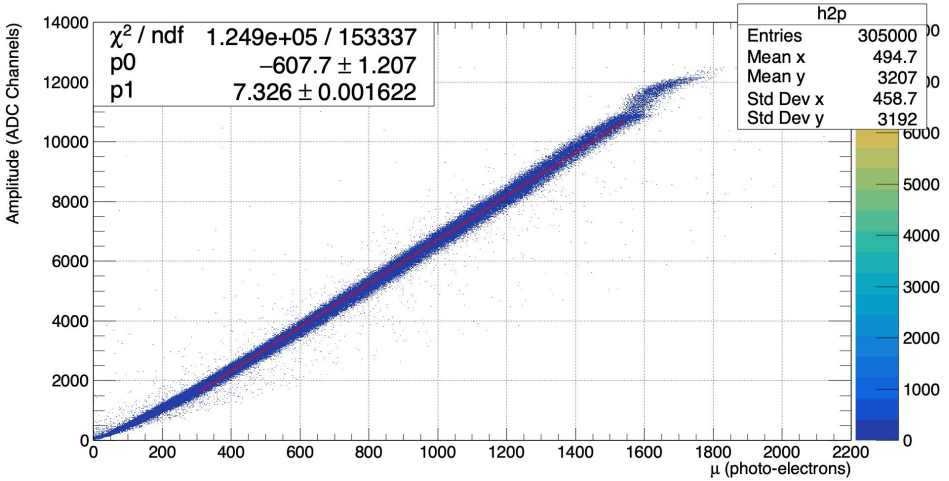
Koheron saturates at ~ 1.5V

1 ADC = 0.122 mV

saturation in ADC = ~12000

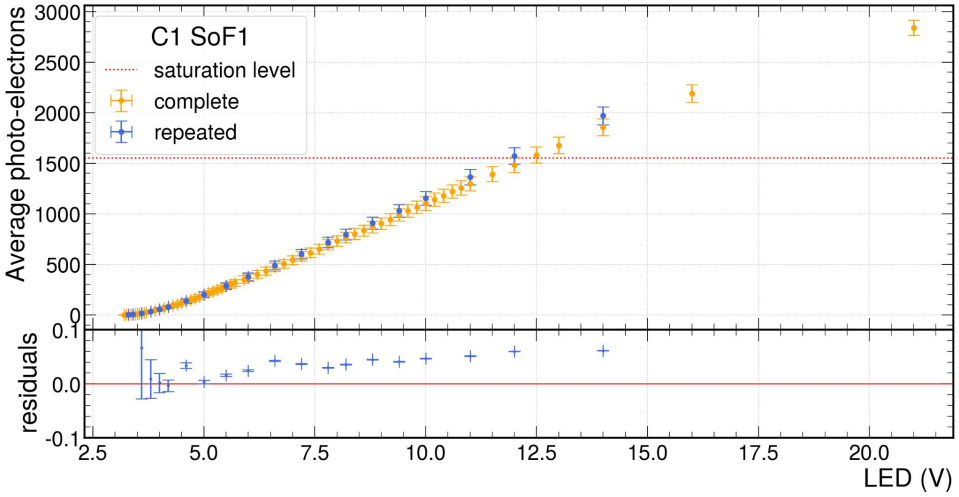
Summary of all data here!

Linearity - C1 SoF 1

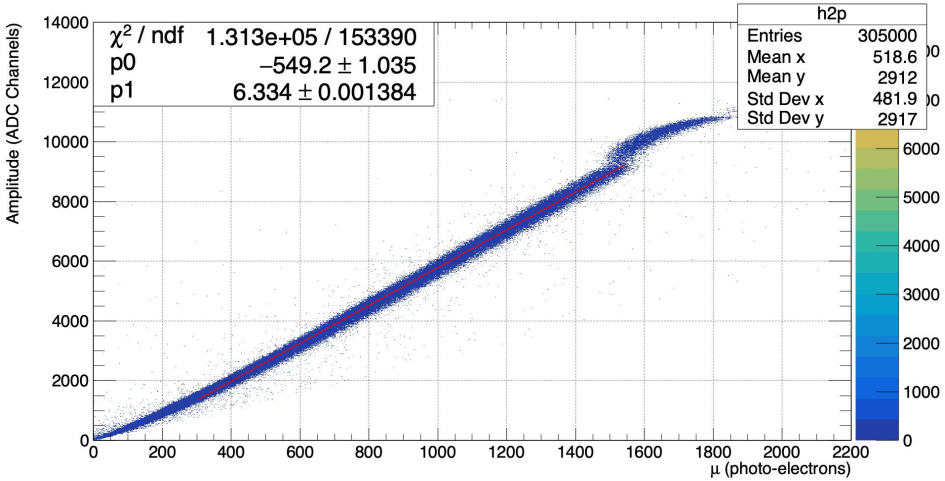


- SPE: 6.7 ADC
- max amplitude: ~11000 ADC
- dynamic range: ~1550 PE
- fit: (300 - 1550) PE

- “repeated” data: few points took the same day
- Reach saturation with LED @ 12V

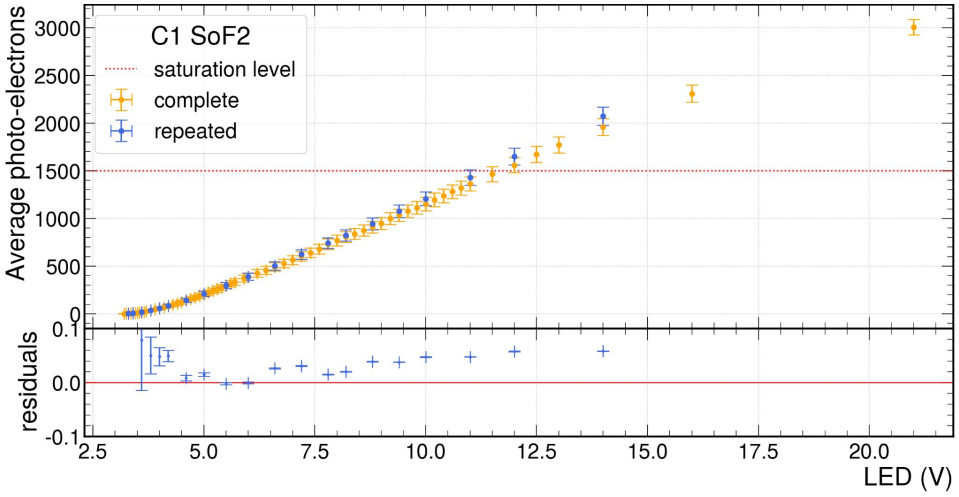


Linearity - C1 SoF 2

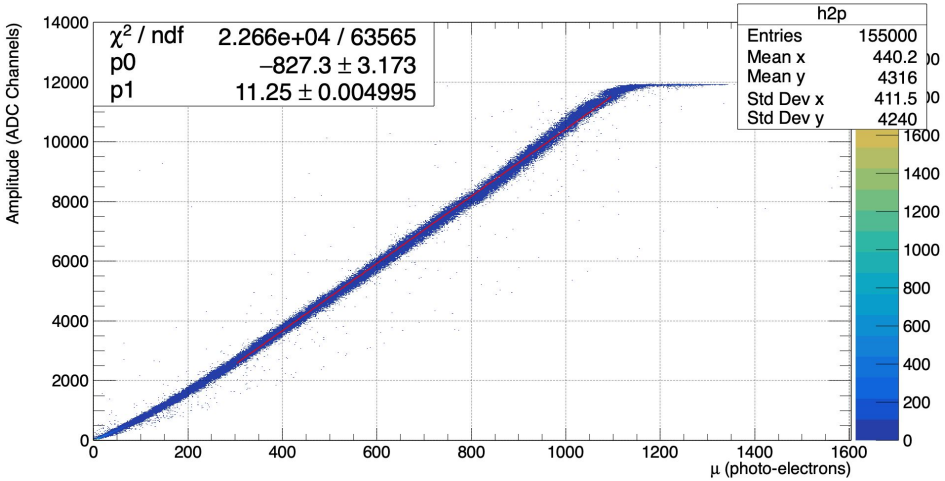


- SPE: 6.1 ADC
- max amplitude: ~9000 ADC
- dynamic range: ~1500 PE
- fit: (300 - 1550) PE

- “repeated” data: few points took the same day
- Reach saturation with LED @ 11.5V

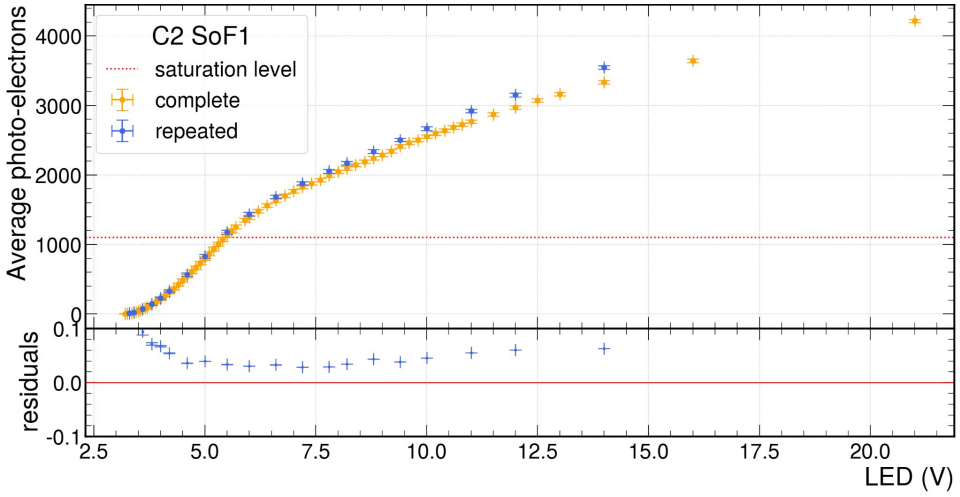


Linearity - C2 SoF 1

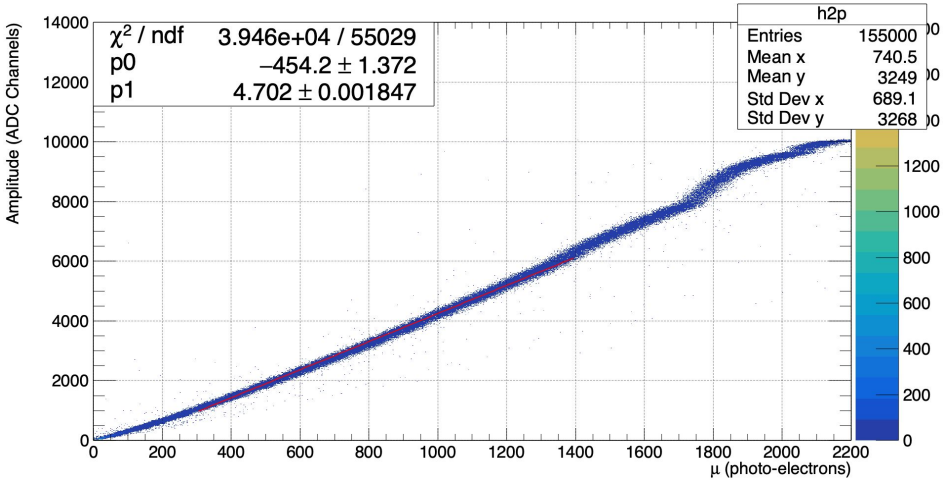


- SPE: 6.1 ADC
- max amplitude: ~11000 ADC
- dynamic range: ~1100 PE
- fit: (300 - 1100) PE

- “repeated” data: few points took the same day
- Reach saturation with LED @ 5.4V

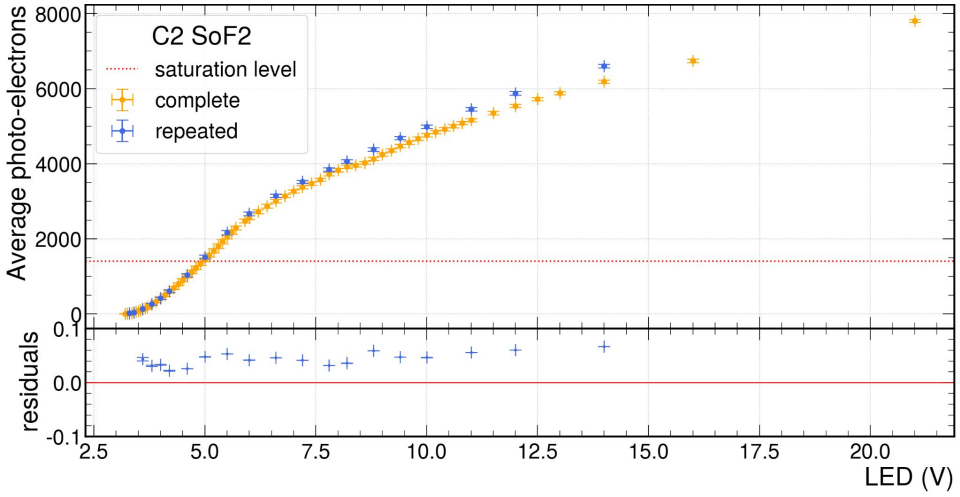


Linearity - C2 SoF 2

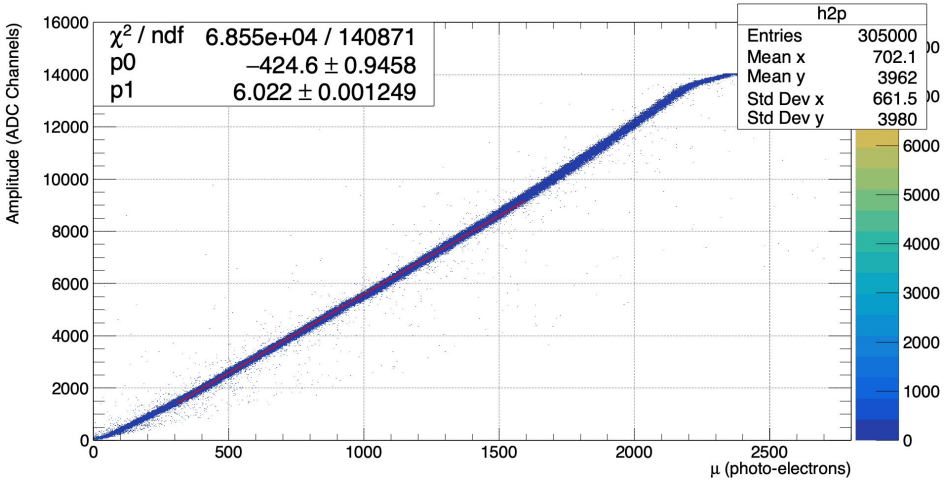


- SPE: 5 ADC
- max amplitude: ~6000 ADC
- dynamic range: ~1400 PE
- fit: (300 - 1400) PE

- “repeated” data: few points took the same day
- Reach saturation with LED @ 5V

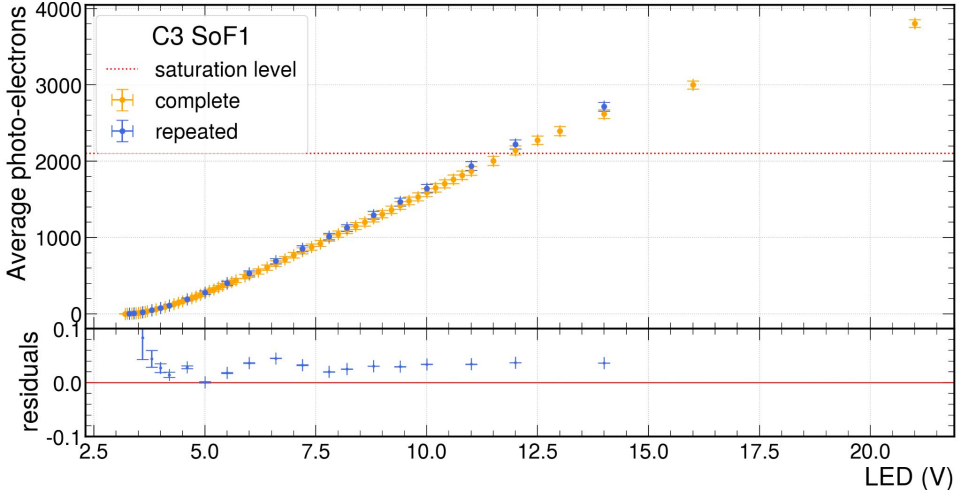


Linearity - C3 SoF 1

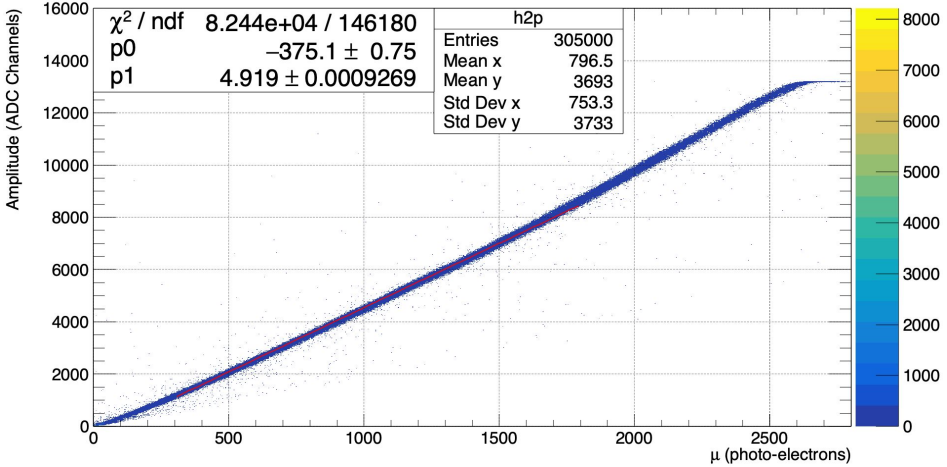


- SPE: 6.1 ADC
- max amplitude: ~9000 ADC
- dynamic range: ~1600 PE
- fit: (300 - 1600) PE

- “repeated” data: few points took the same day
- Reach saturation with LED @ 11.5V

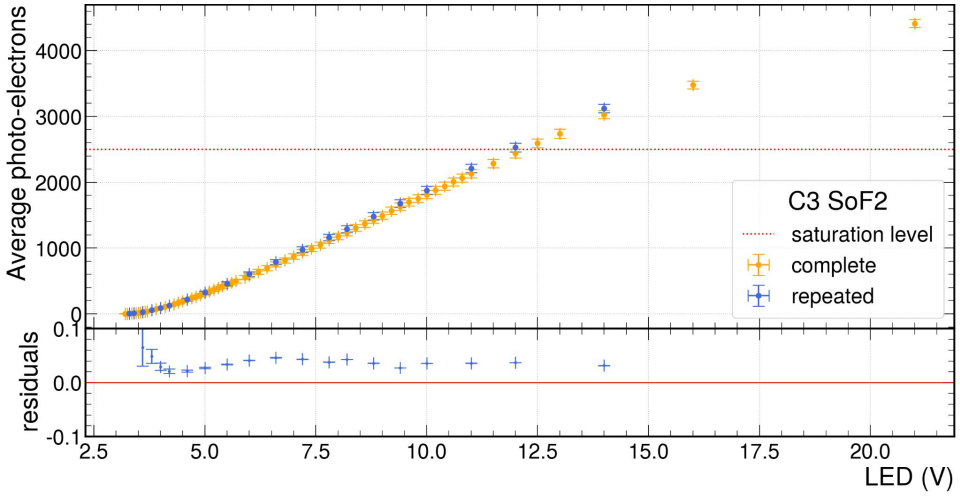


Linearity - C3 SoF 2

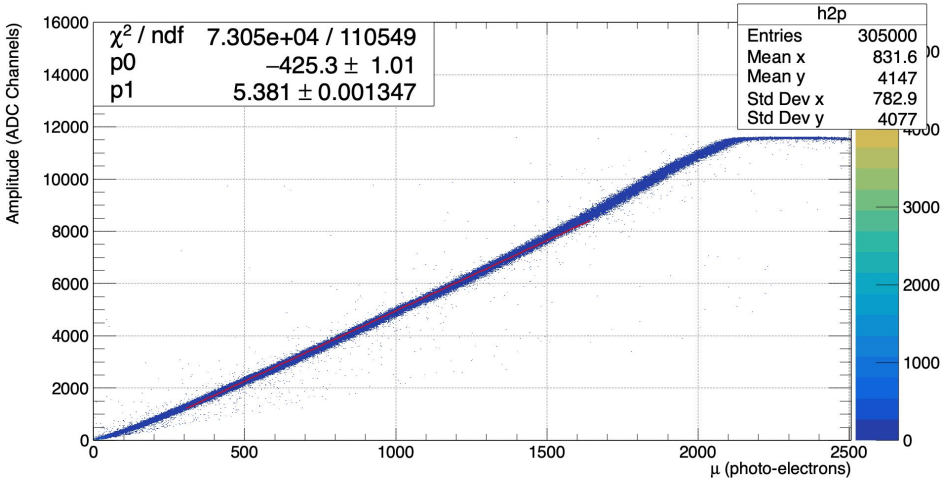


- SPE: 5.5 ADC
- max amplitude: ~8000 ADC
- dynamic range: ~1700 PE
- fit: (300 - 1800) PE

- “repeated” data: few points took the same day
- Reach saturation with LED @ 11.5V

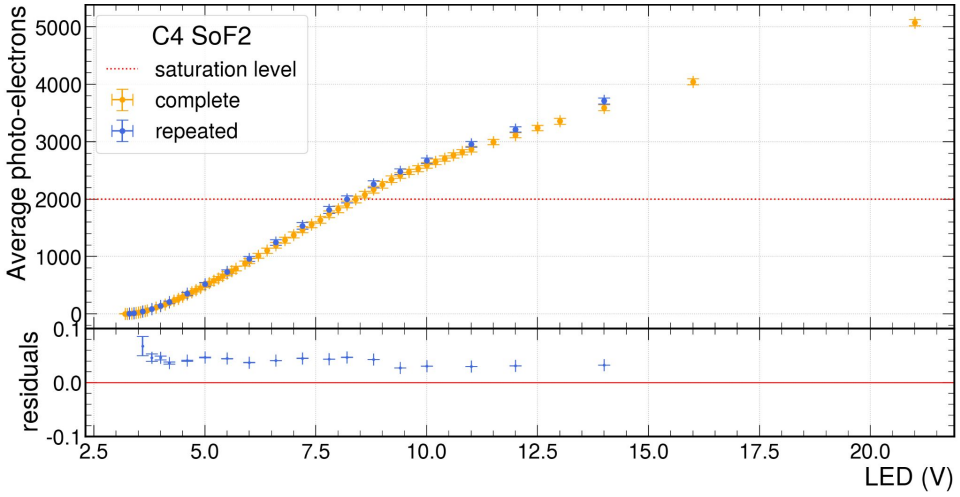


Linearity - C4 SoF 2

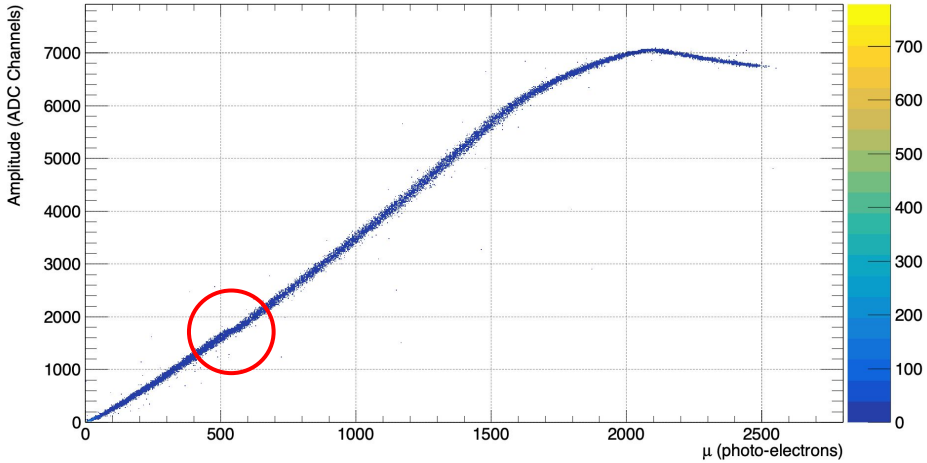


- SPE: 6.1 ADC
- max amplitude: ~8000 ADC
- dynamic range: ~1600 PE
- fit: (300 - 1700) PE

- “repeated” data: few points took the same day
- Reach saturation with LED @ 8V

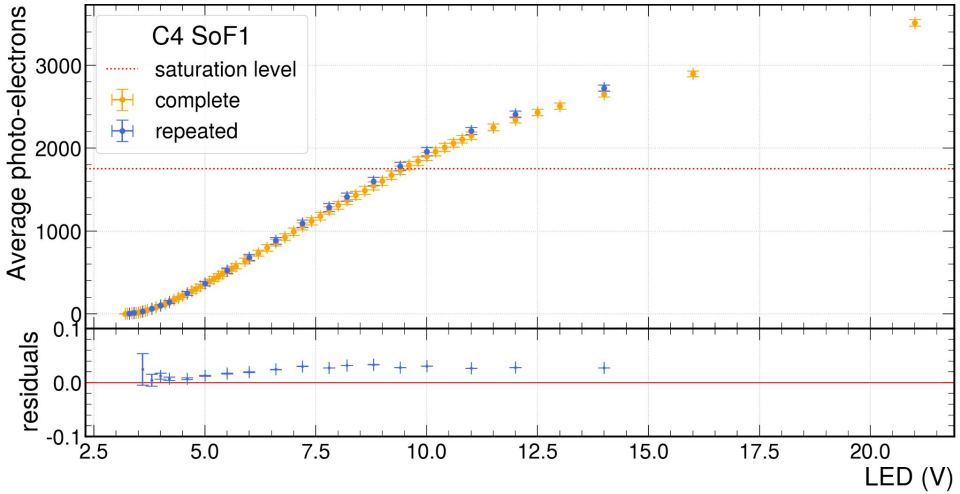


Linearity - C4 SoF 1

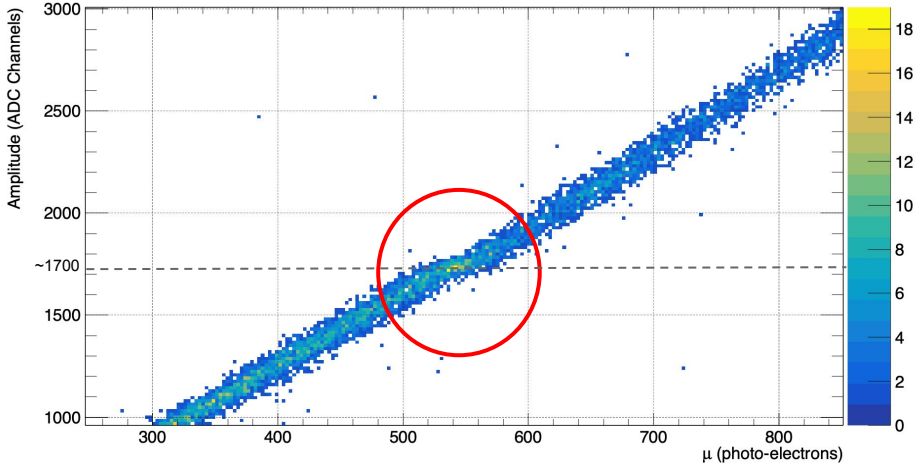


- SPE: 4.3 ADC
- Strange behaviour around 500 PE

- “repeated” data: few points took the same day
- Reach saturation with LED @ 9V

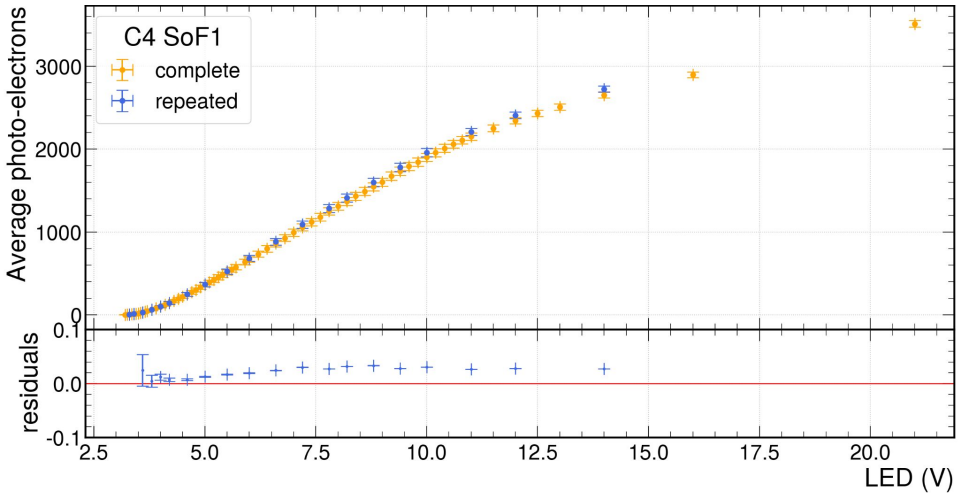


Linearity - C4 SoF 1



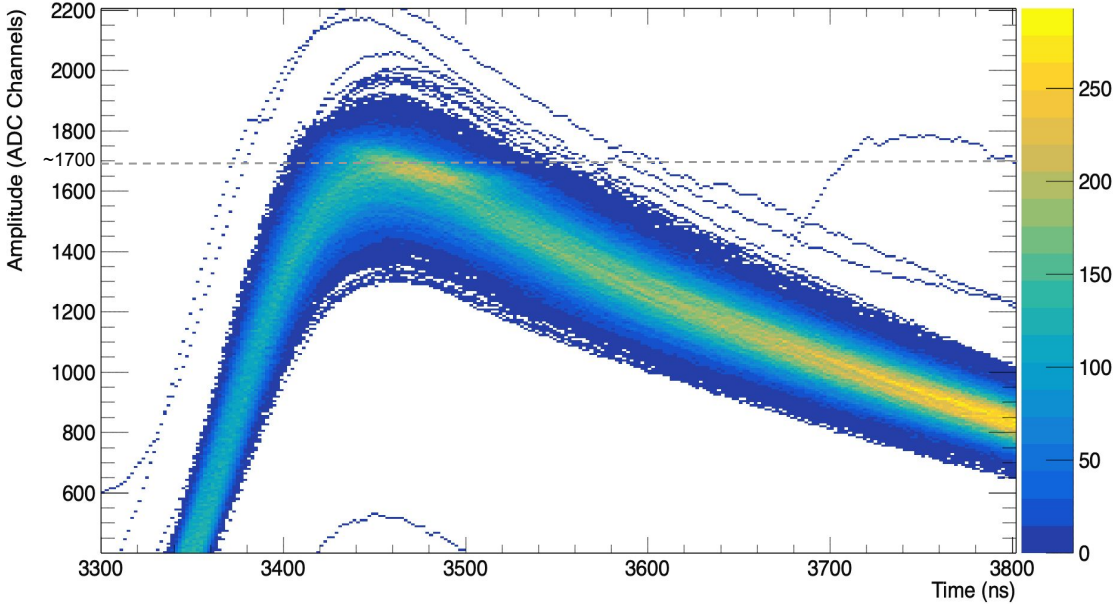
- SPE: 4.3 ADC
- Strange behaviour around 500 PE

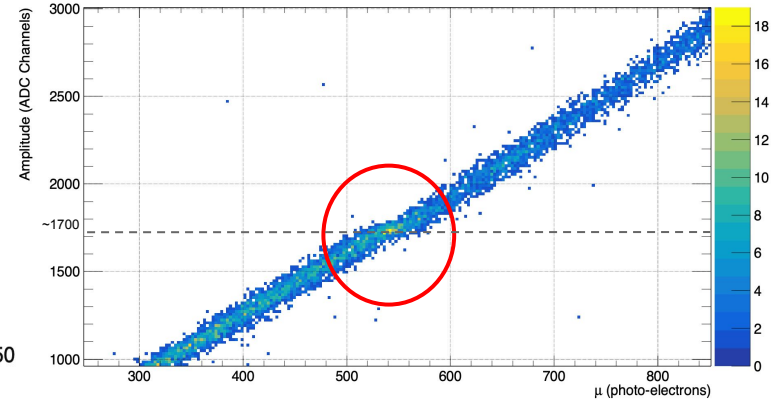
- “repeated” data: few points took the same day
- Reach saturation with LED @ 9V



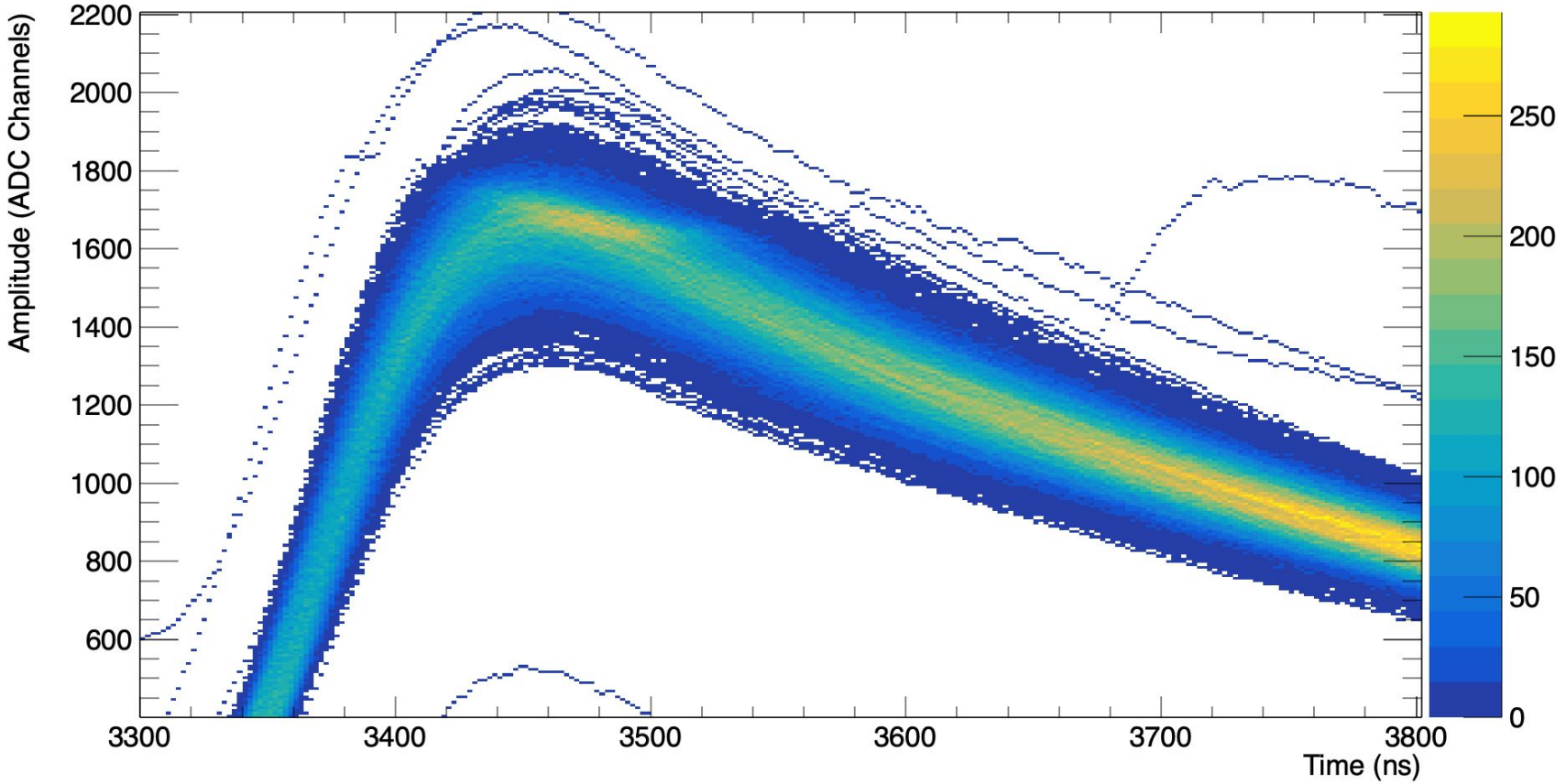
Linearity - C4 SoF 1

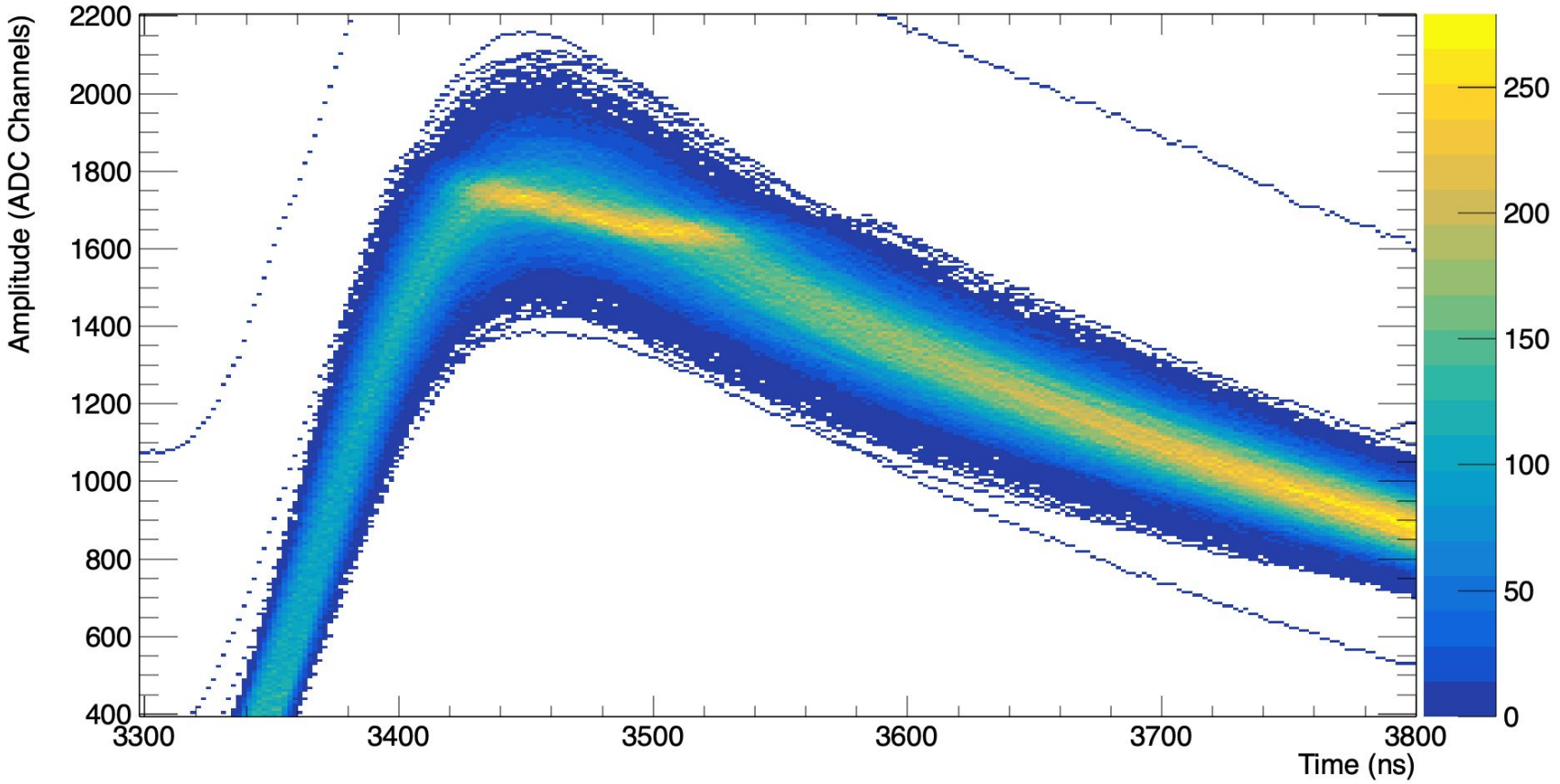
waveform deformation





Backup slides


Amplitude (ADC Channels)
2200
2000
1800
1600
1400
1200
1000
800
600
3300
3400
3500
3600
3700
3800
Time (ns)
250
200
150
100
50
0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Time (ns)
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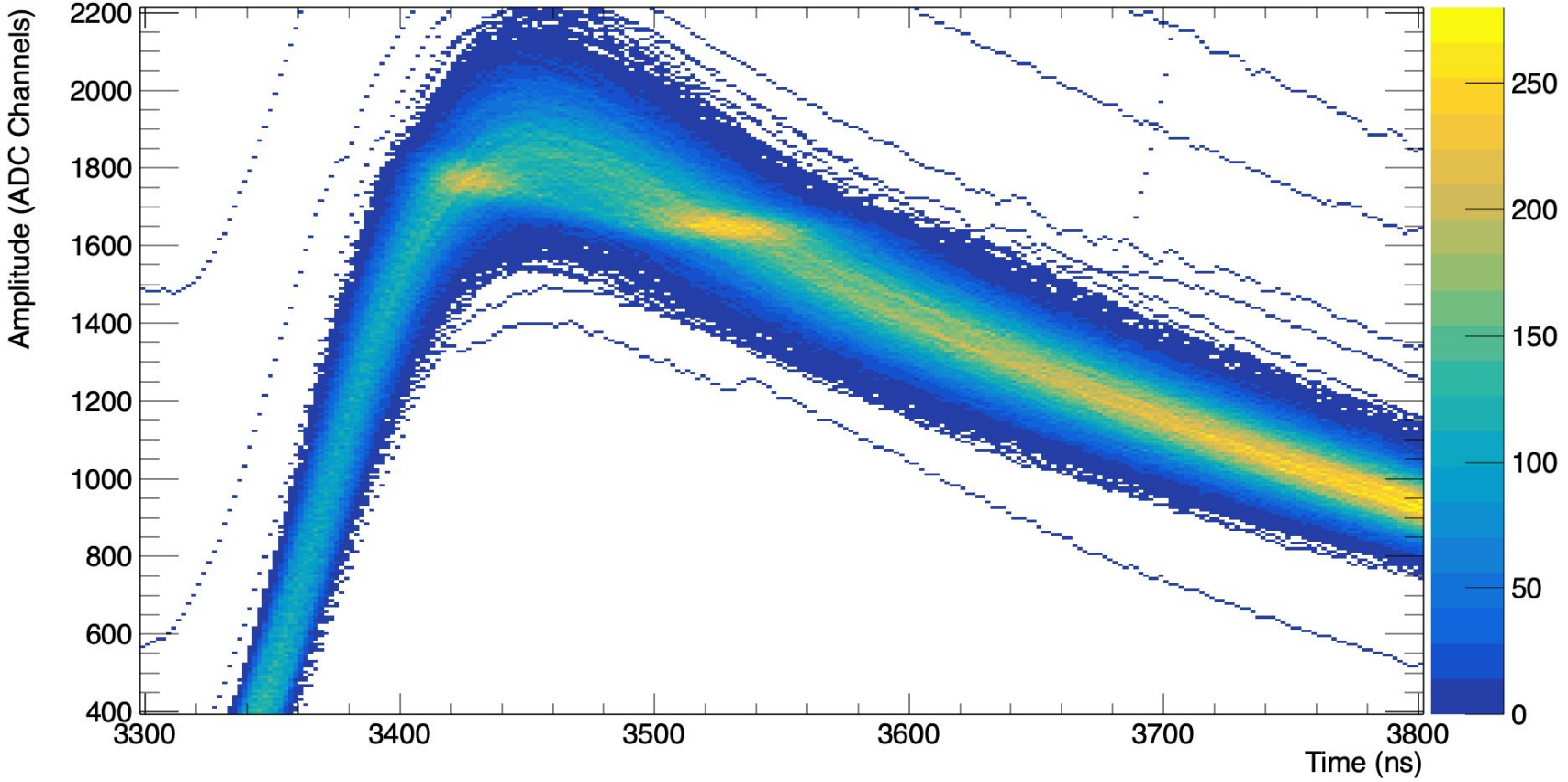
0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