

TPOL Hardware Update



Data to be shown in this presentation

- Hot checkout 2022
- Batch 5-8 2020

Numbering schemes

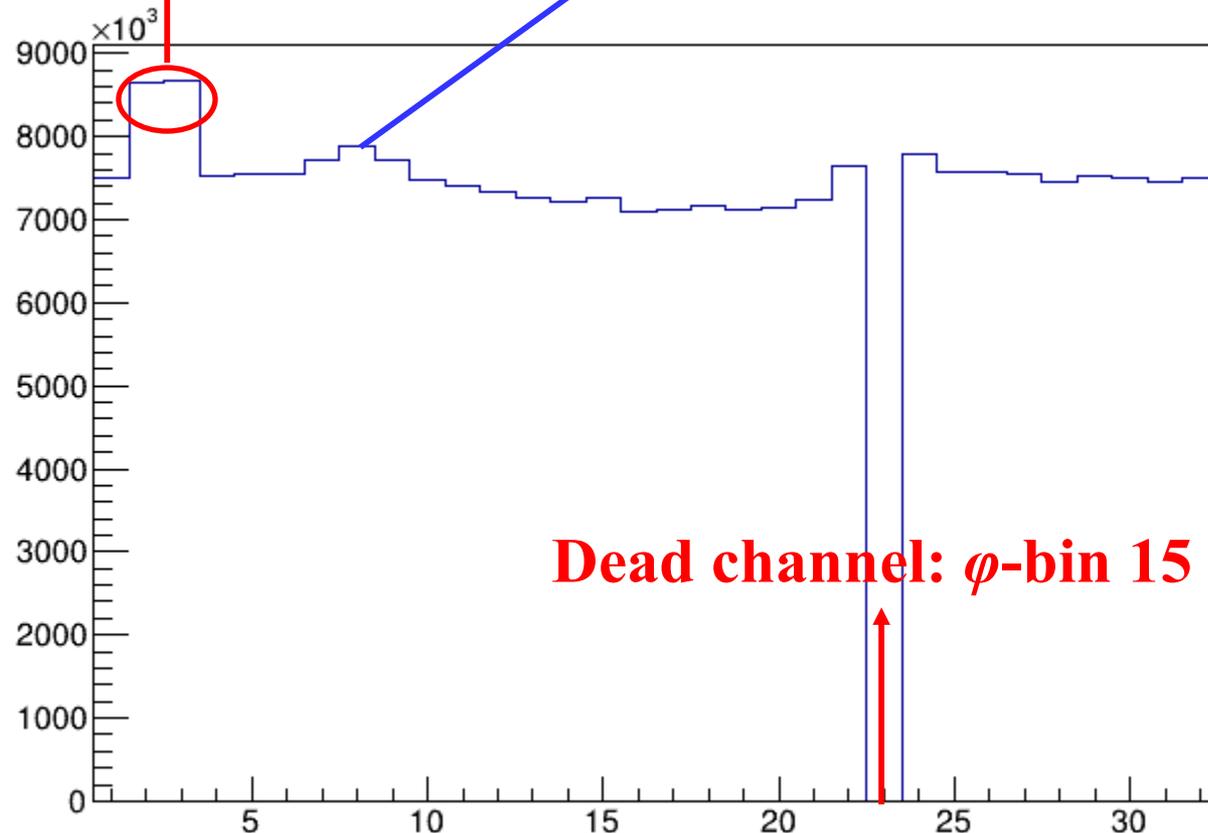
- TPOL-cable number
- Sector number (from Manufacturer)
- φ -bin number (32 bins from 0° to 360°)
- fADC slot, channel

Will include φ -bin number for all channels of interest

Channels of interest

Hot channels: φ -bin 26, 27

Noisy channel: φ -bin 8



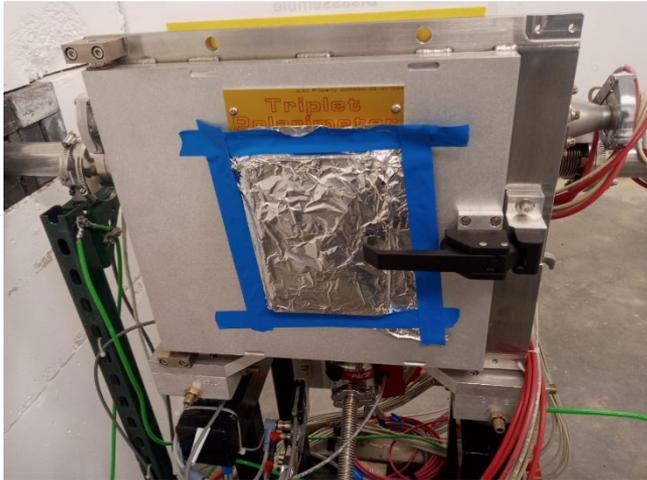
NOTE: In prior analysis of 2020 data,
 φ –bins 14-16, and 26-27 were removed

Presentation

- Noisy channel and window repair
- Dead channels
- Hot channel
- Noisy channel
- Other issues

TPOL window cover

Front view

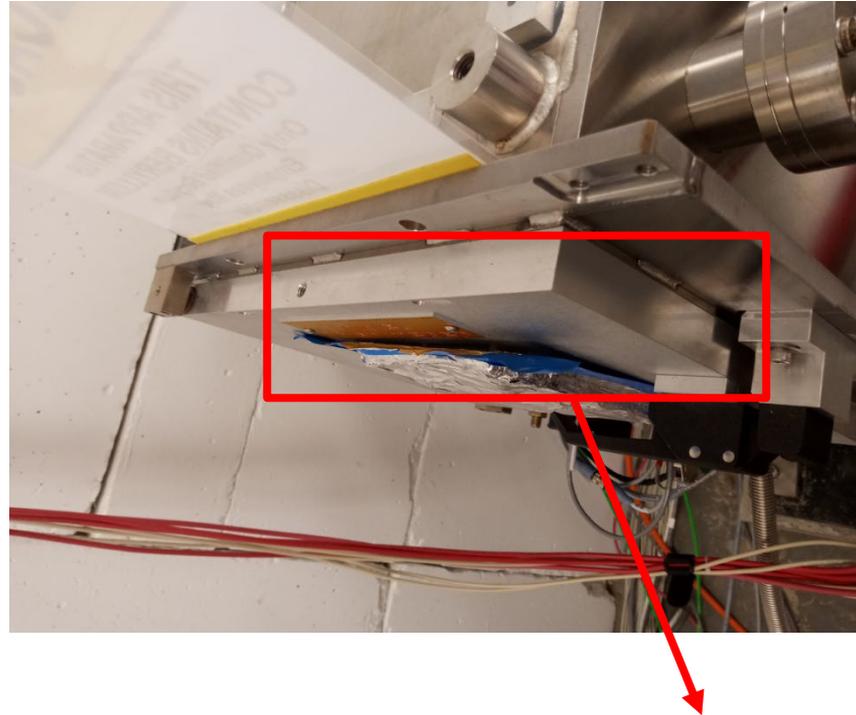


TPOL window cover

Front view



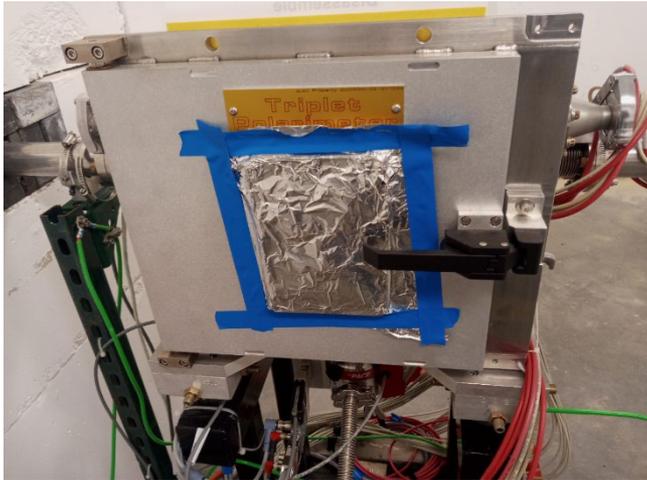
Side view



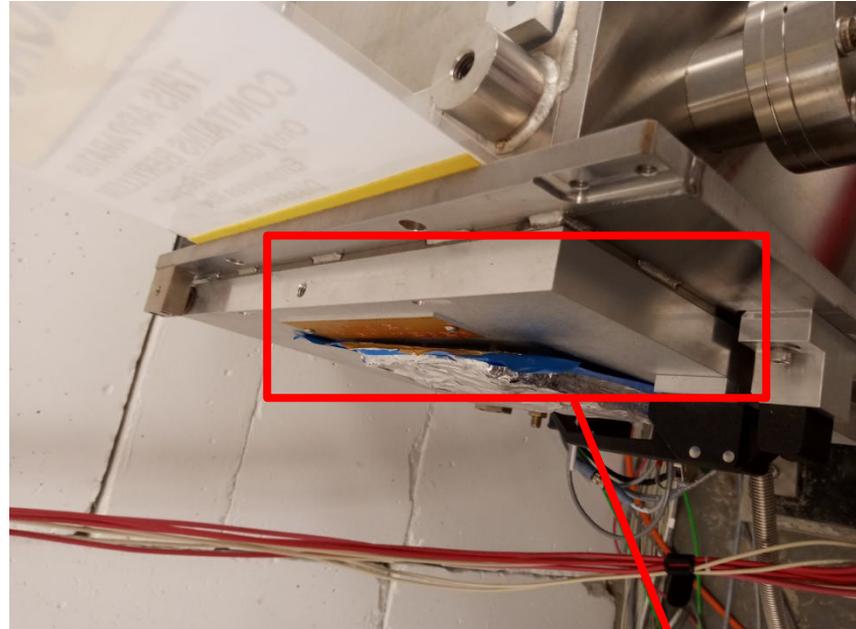
**Tape lifted off surface
of vacuum chamber**

TPOL window cover

Front view



Side view



**Tape lifted off surface
of vacuum chamber**



Tear in aluminium

TPOL window cover repaired



Layer 1

TPOL window cover repaired

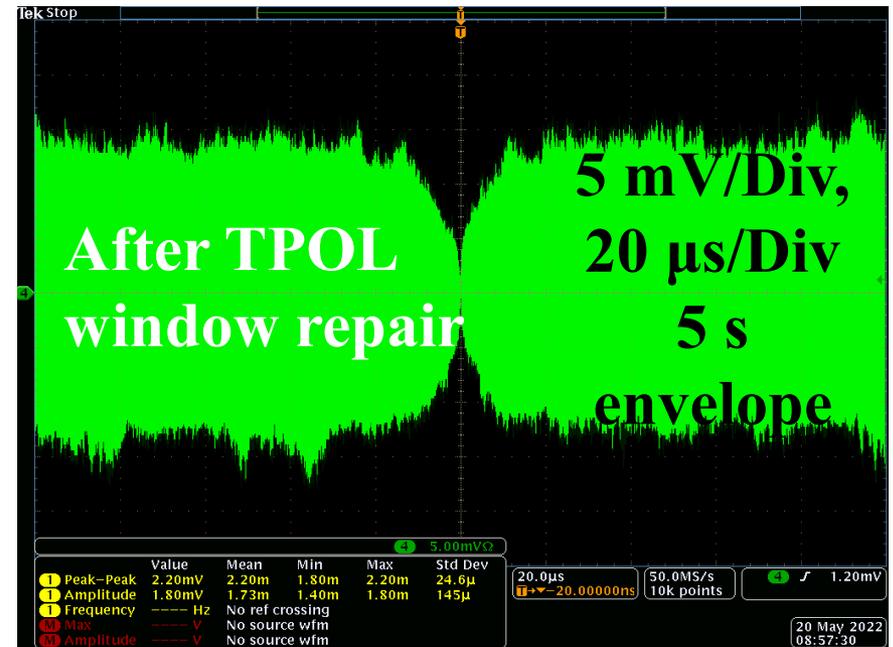


Layer 1



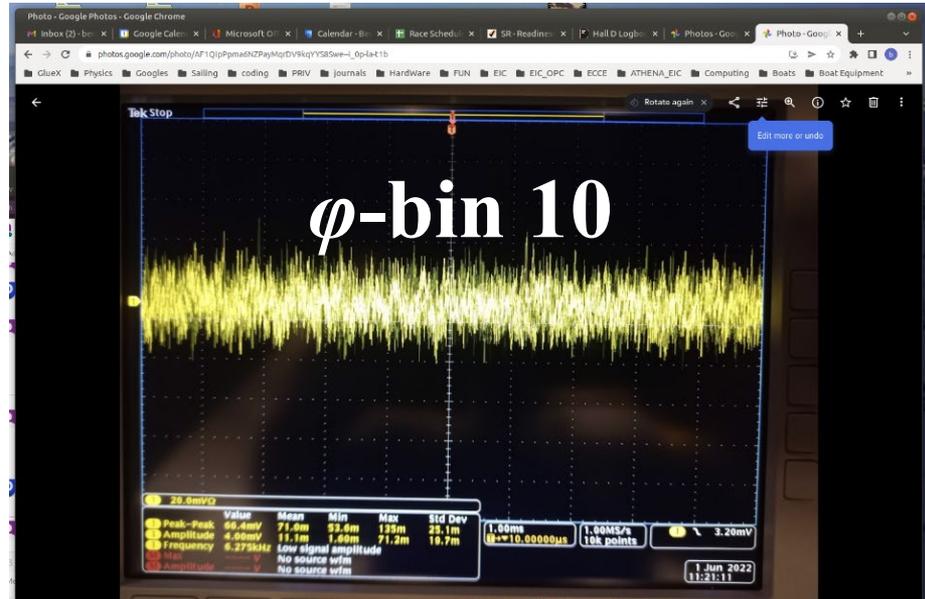
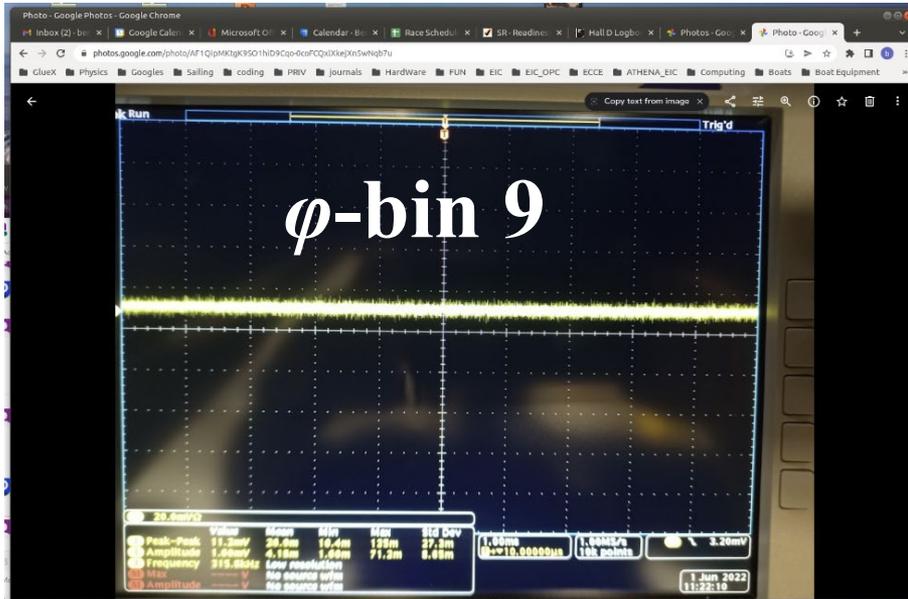
Layer 2

Noisy channel (ϕ -bin 8)



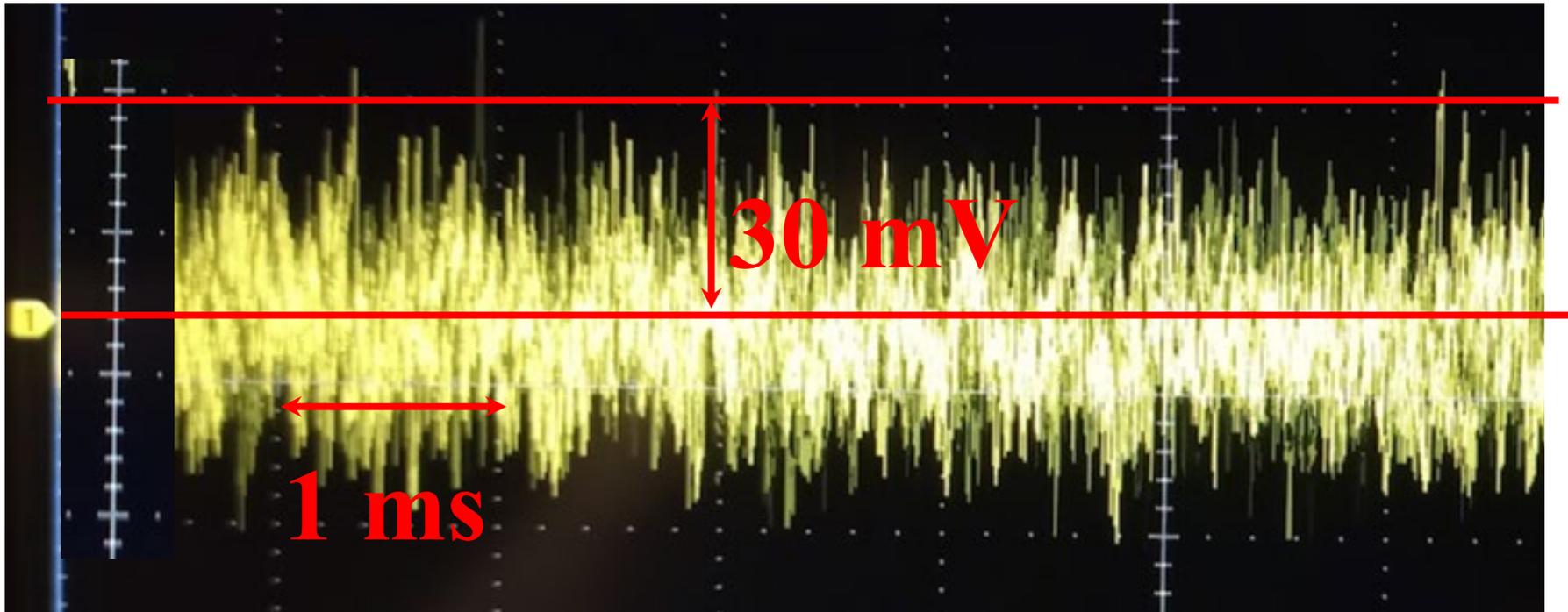
- Window repair fixed some of the noise in the channel, but channel still too noisy 😞

Comparison



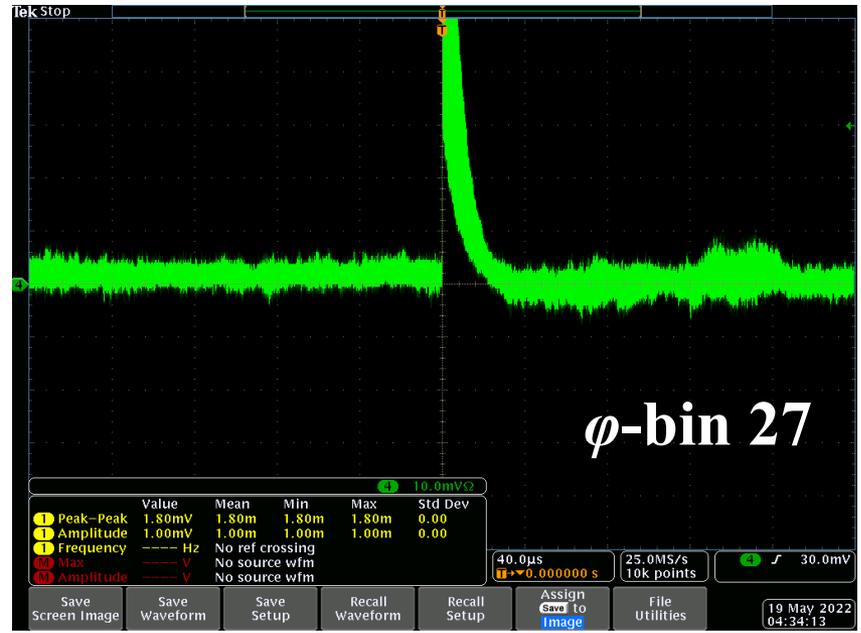
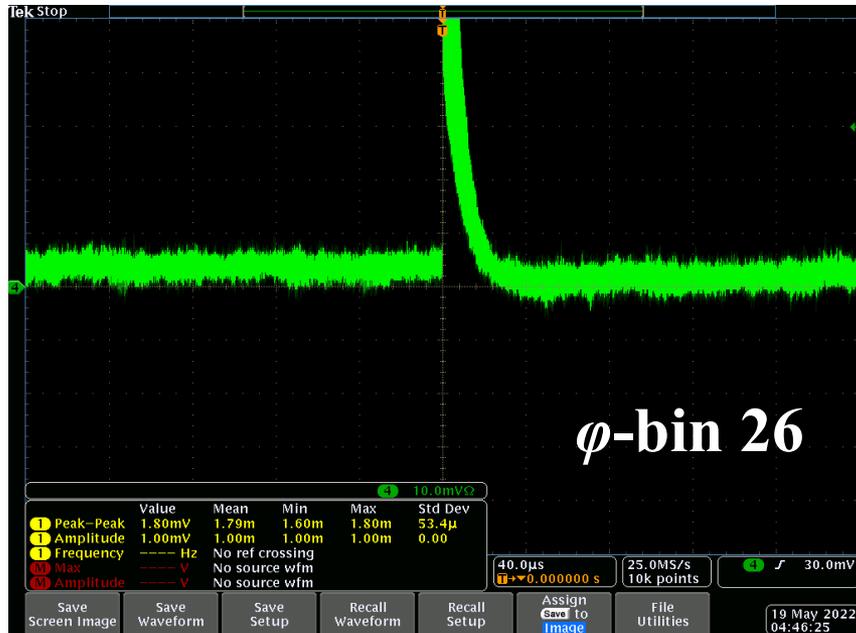
- Several days after I took the o-scope pictures shown on previous slide, Beni took some screen shots
- ϕ -bin 9 looks normal
- ϕ -bin 10 looks super noisy ☹️

φ -bin 8 close up



- fADC threshold set to 60 channels above baseline
- 60 channels is about 30 mV
- Spikes above threshold at about kHz rate.

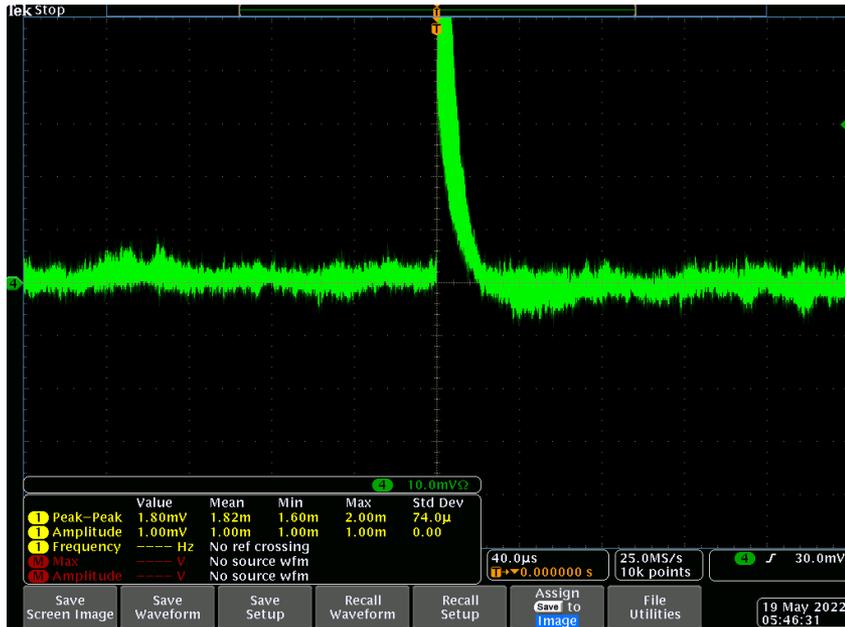
Hot channels (o-scope)



- 30 mV trigger
- 10 mV/Div
- 40 μ s/Div
- 10 minute envelope

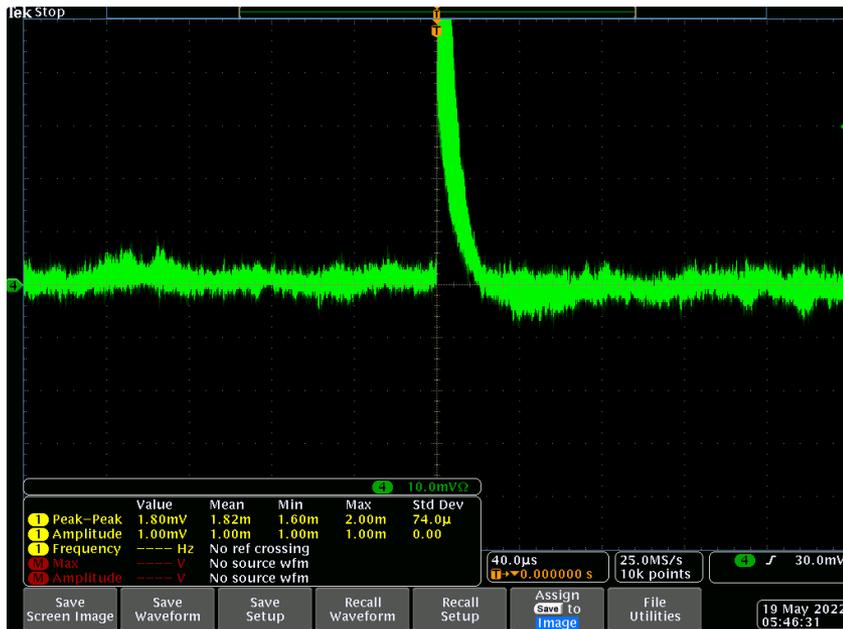
Looks normal

Dead channel (o-scope)



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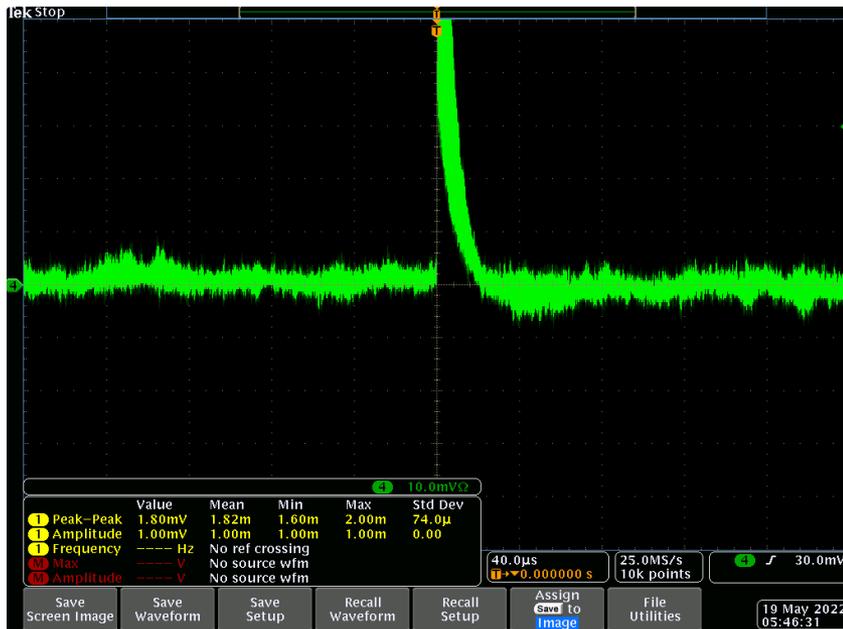
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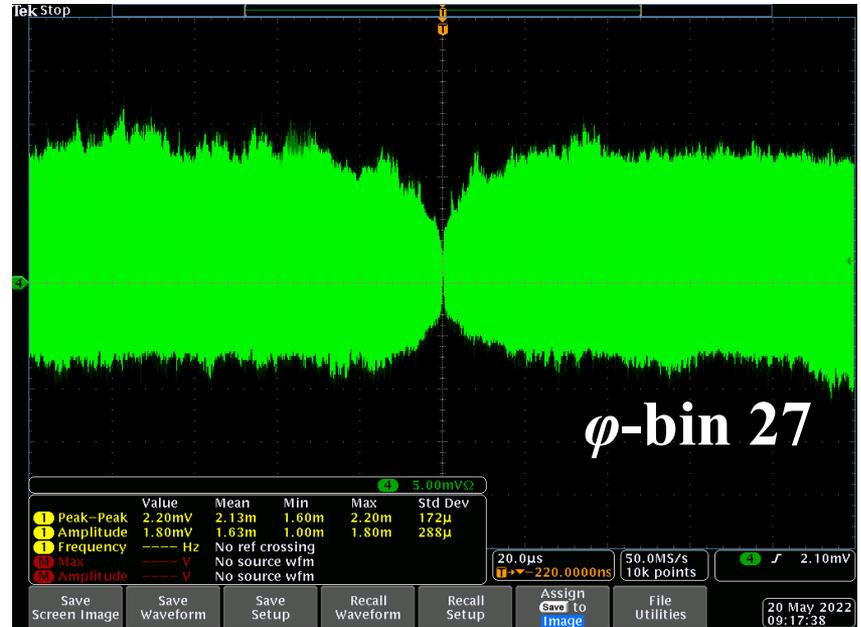
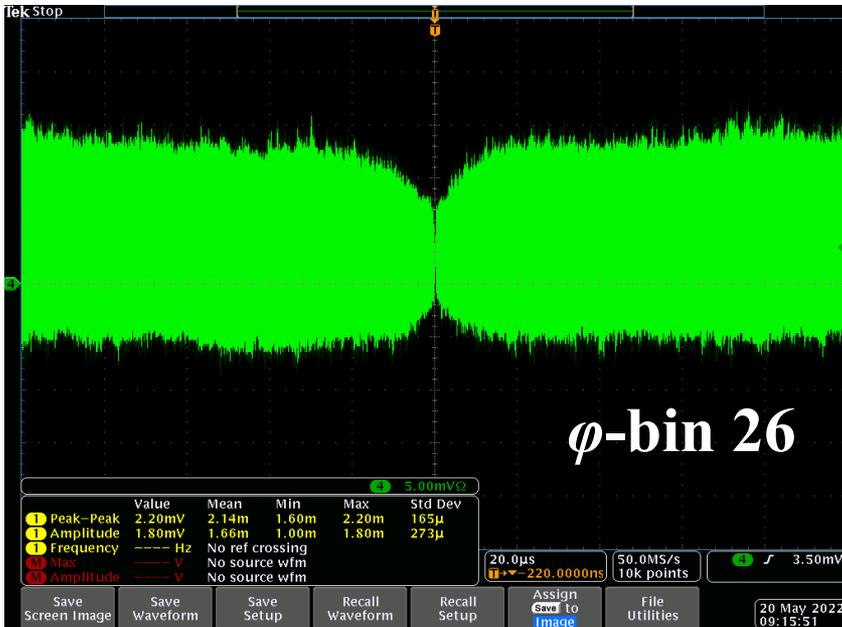
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- Just in case the intermittent problem is associated with the fADC: I moves the dead channel (and neighbors) from slot 13, channels 0-2 to slot 13, channels 8-10.

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Hot channels (o-scope)



- Low trigger
- 5 mV/Div
- 20 μ s/Div
- 5 second envelope

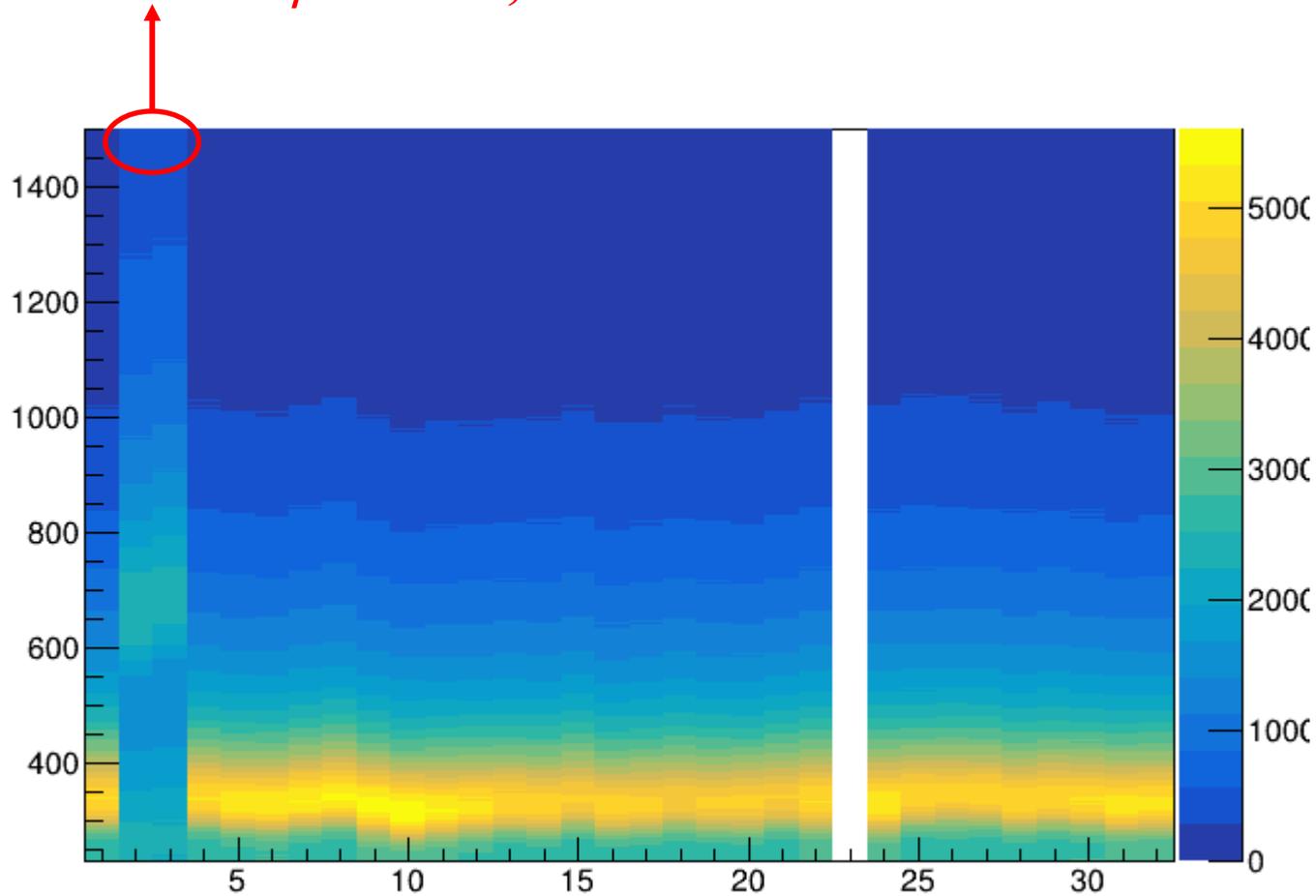
Looks normal

Hot channels

- o-scope shots looked OK
- Looked back at the data

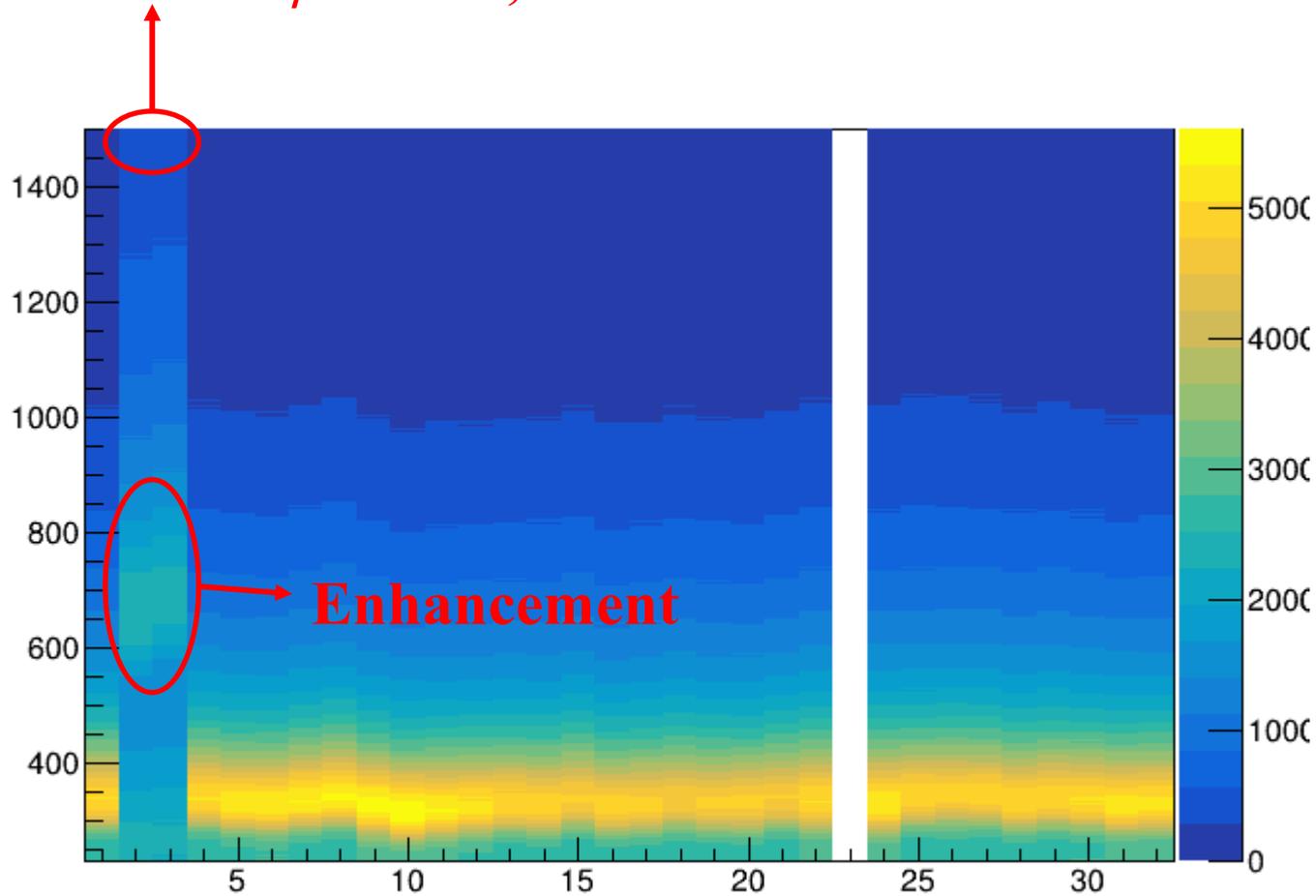
Hot channels

Hot channels: φ -bin 26, 27



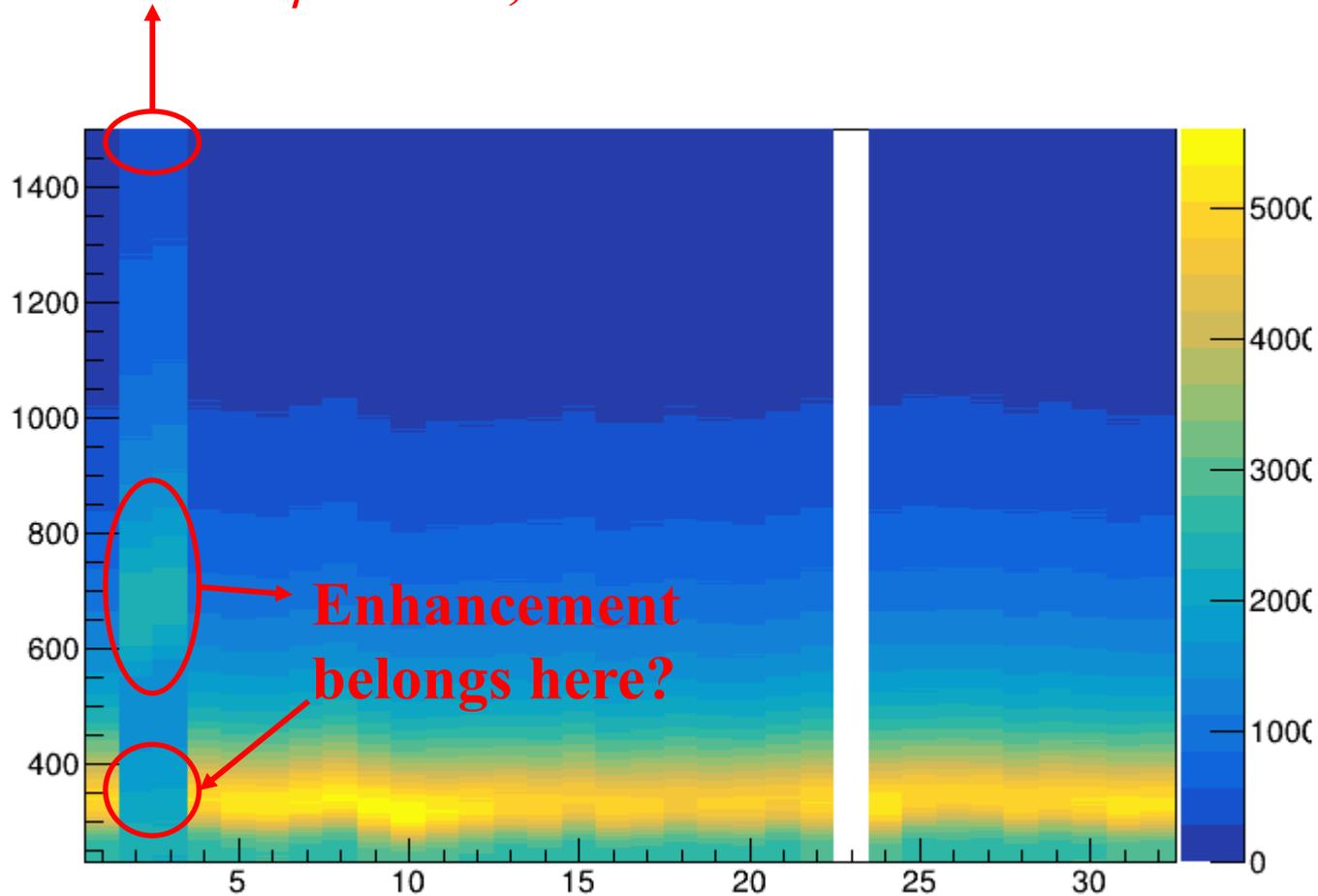
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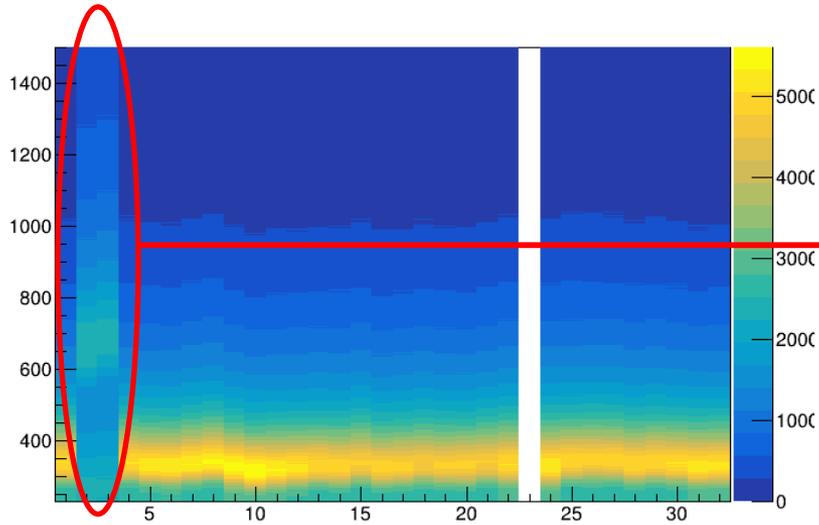


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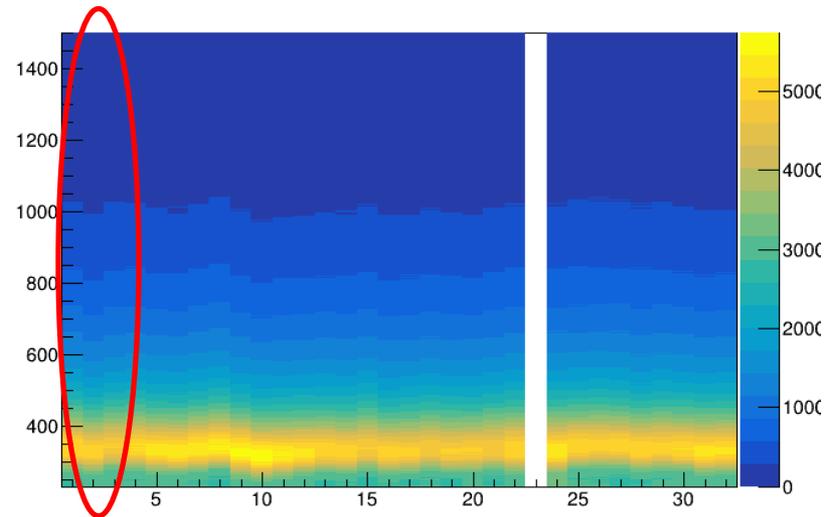
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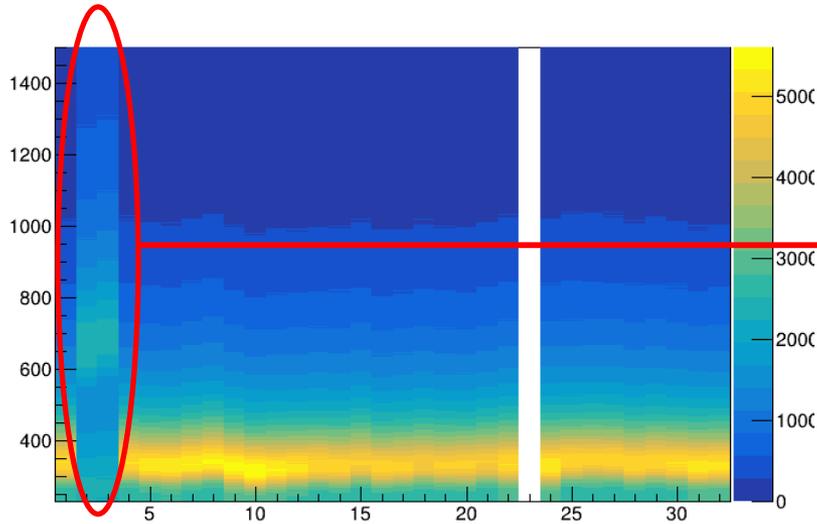
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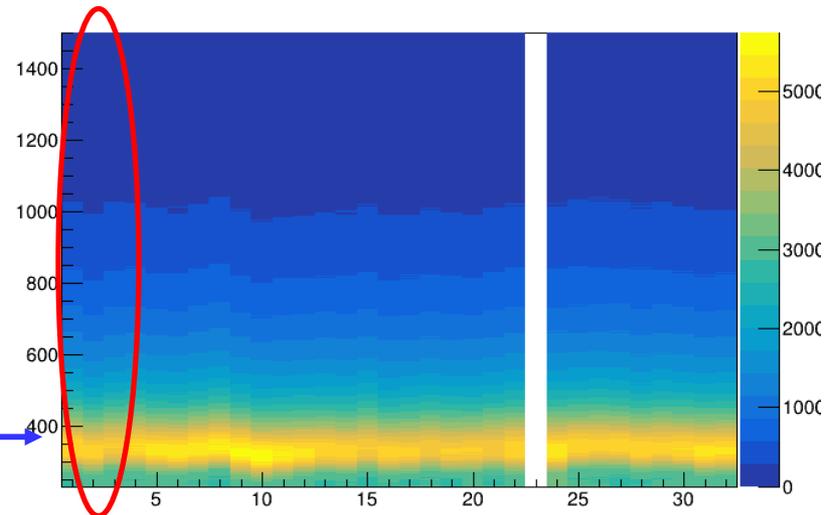
Divide fADC channels by 2



Hot channels

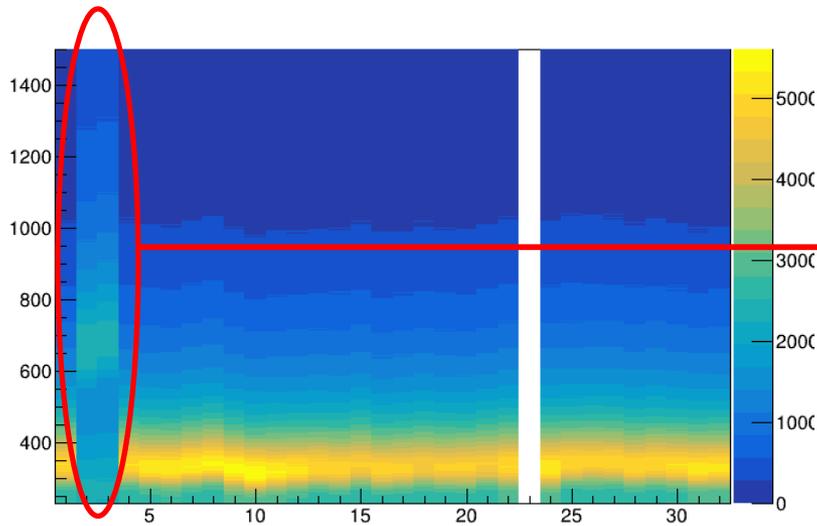


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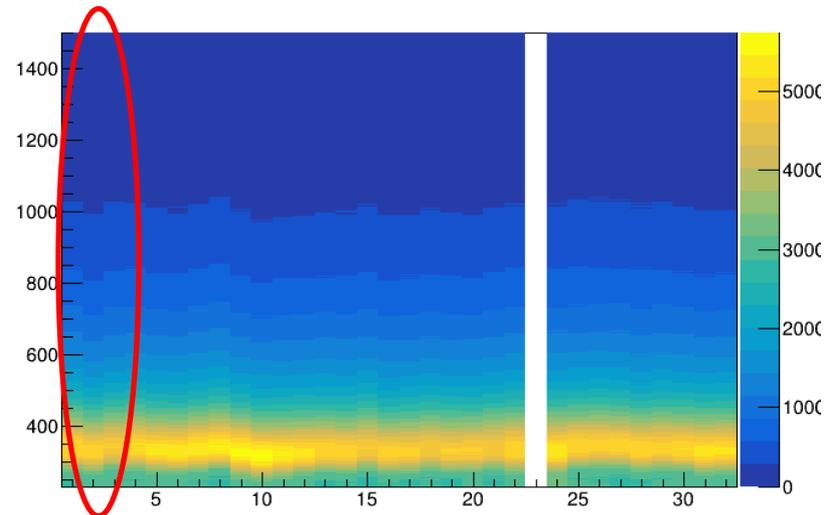


- Calibration: Should realign energy deposition

Hot channels



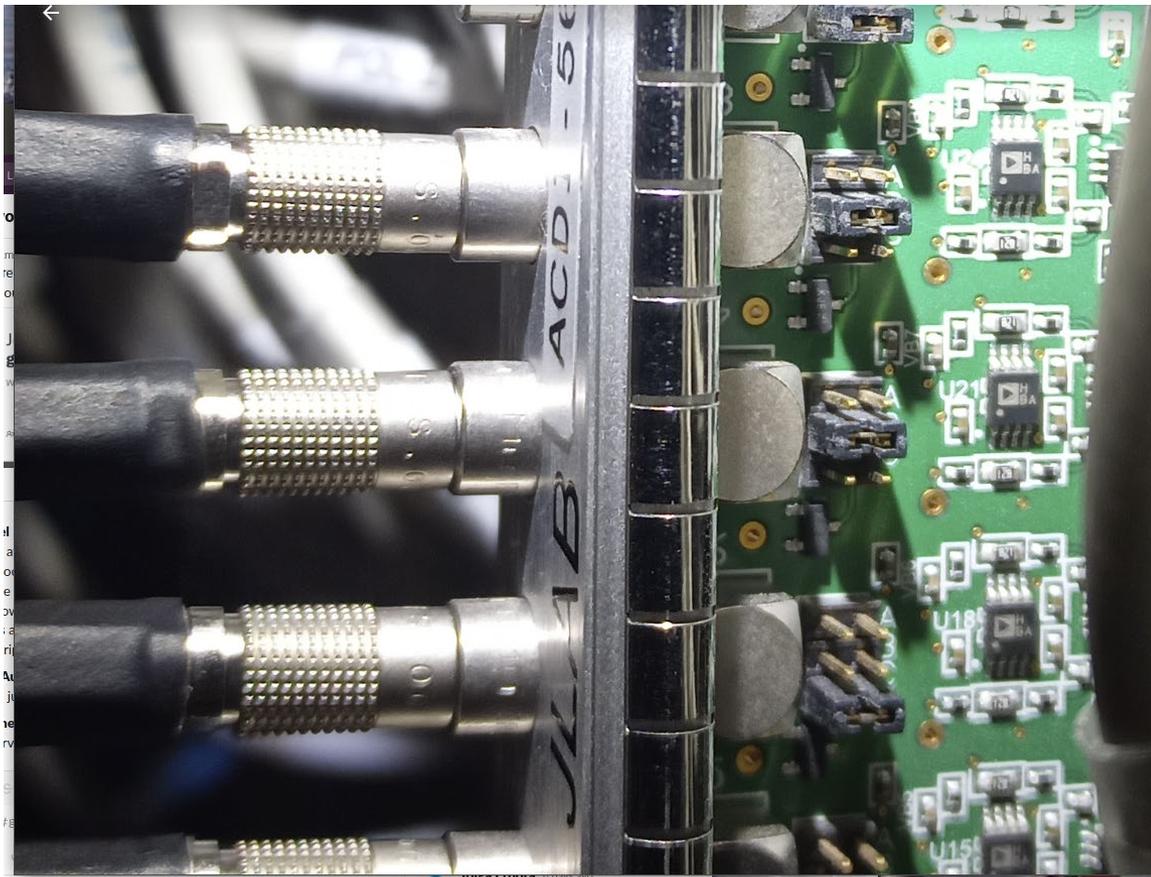
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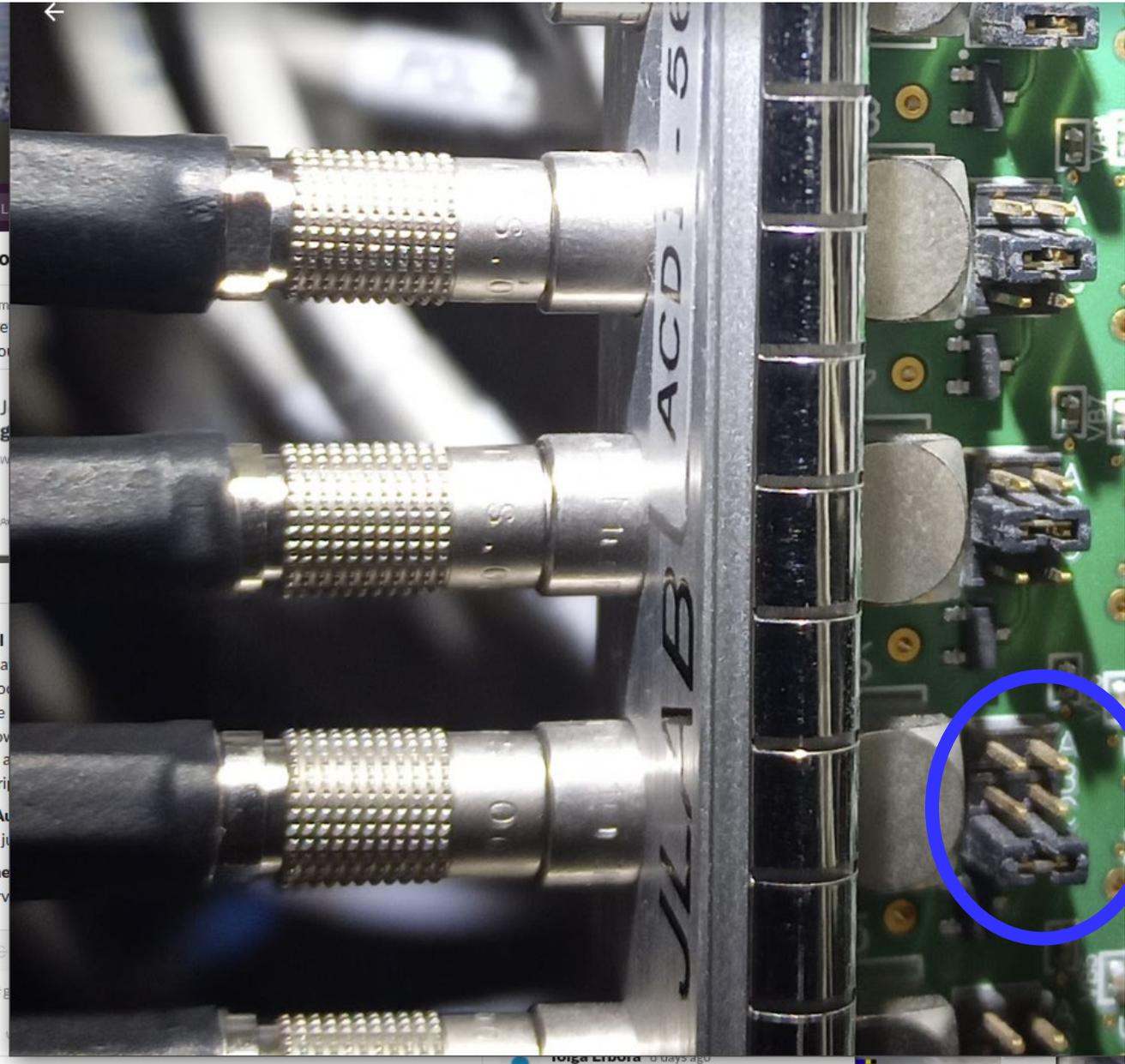
**Told Beni about
strange behavior and
he figured out what
was wrong (next slides)**

fADC voltage range

Beni pulled fADC module and found the channels associated with the hot ϕ -bins 26 and 27 had the wrong jumper settings for the voltage range and fixed the issue for future data ☺

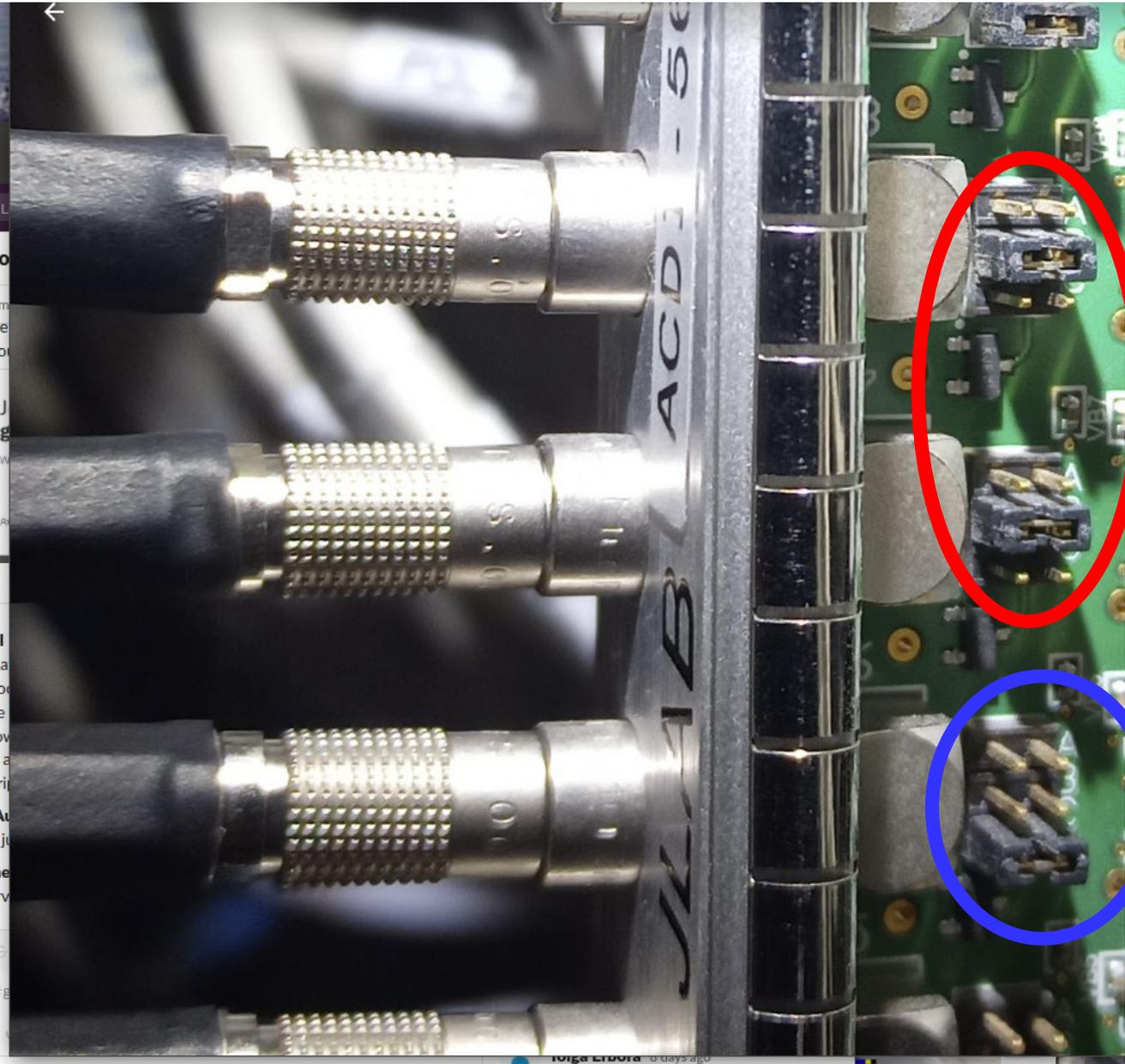


fADC voltage range



**Correct
setting**

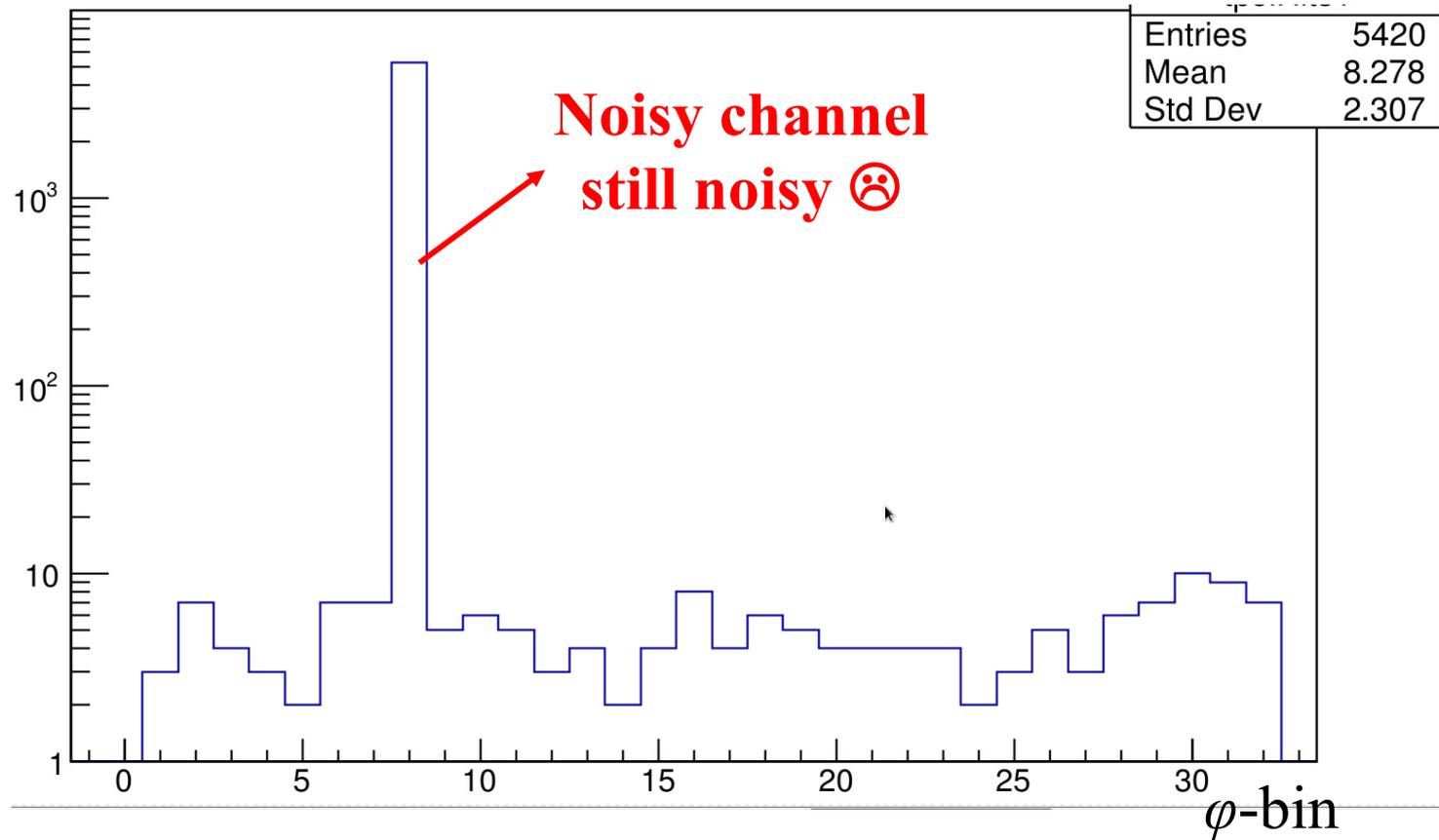
fADC voltage range



Incorrect setting

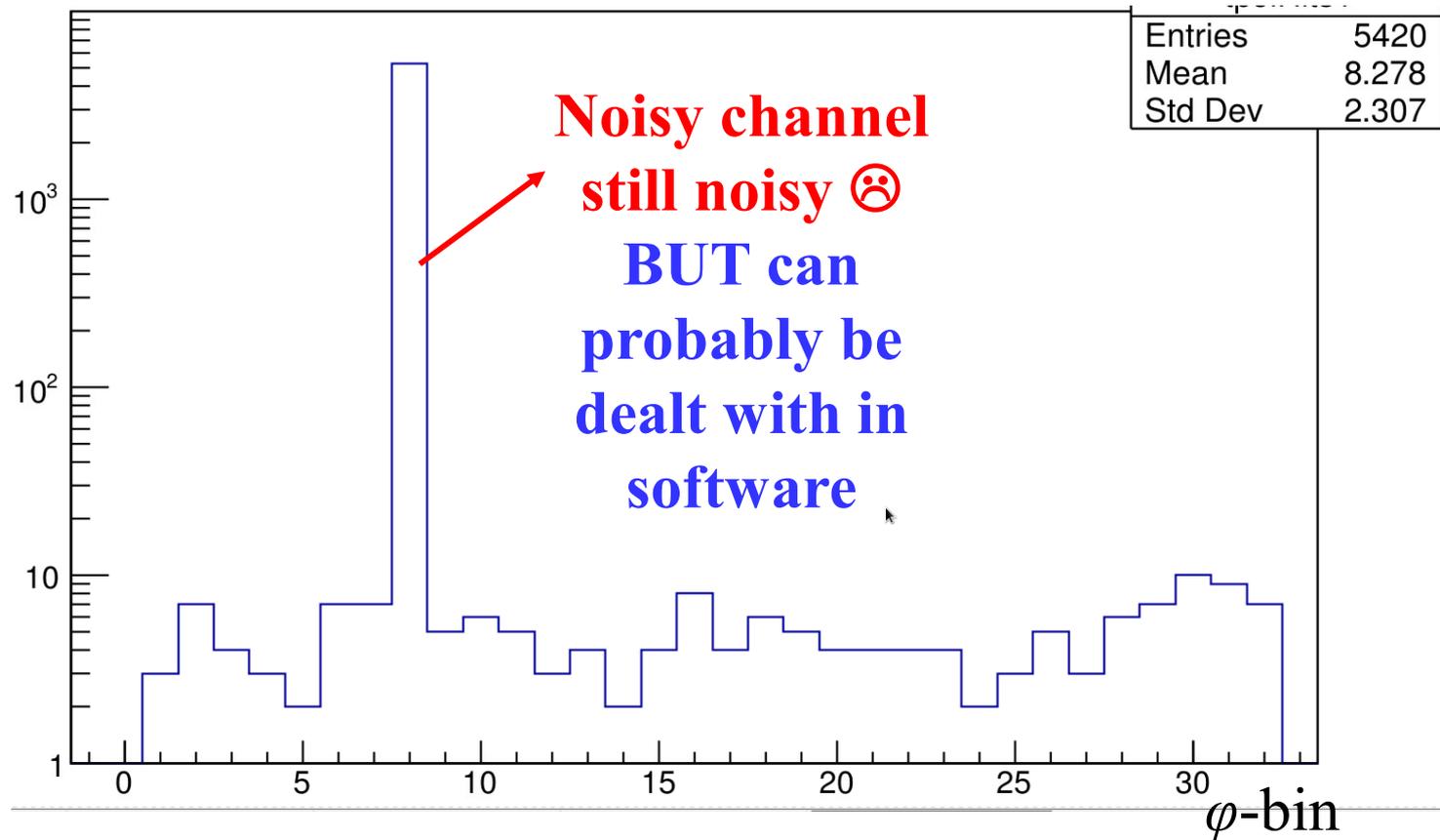
Correct setting

Cosmics



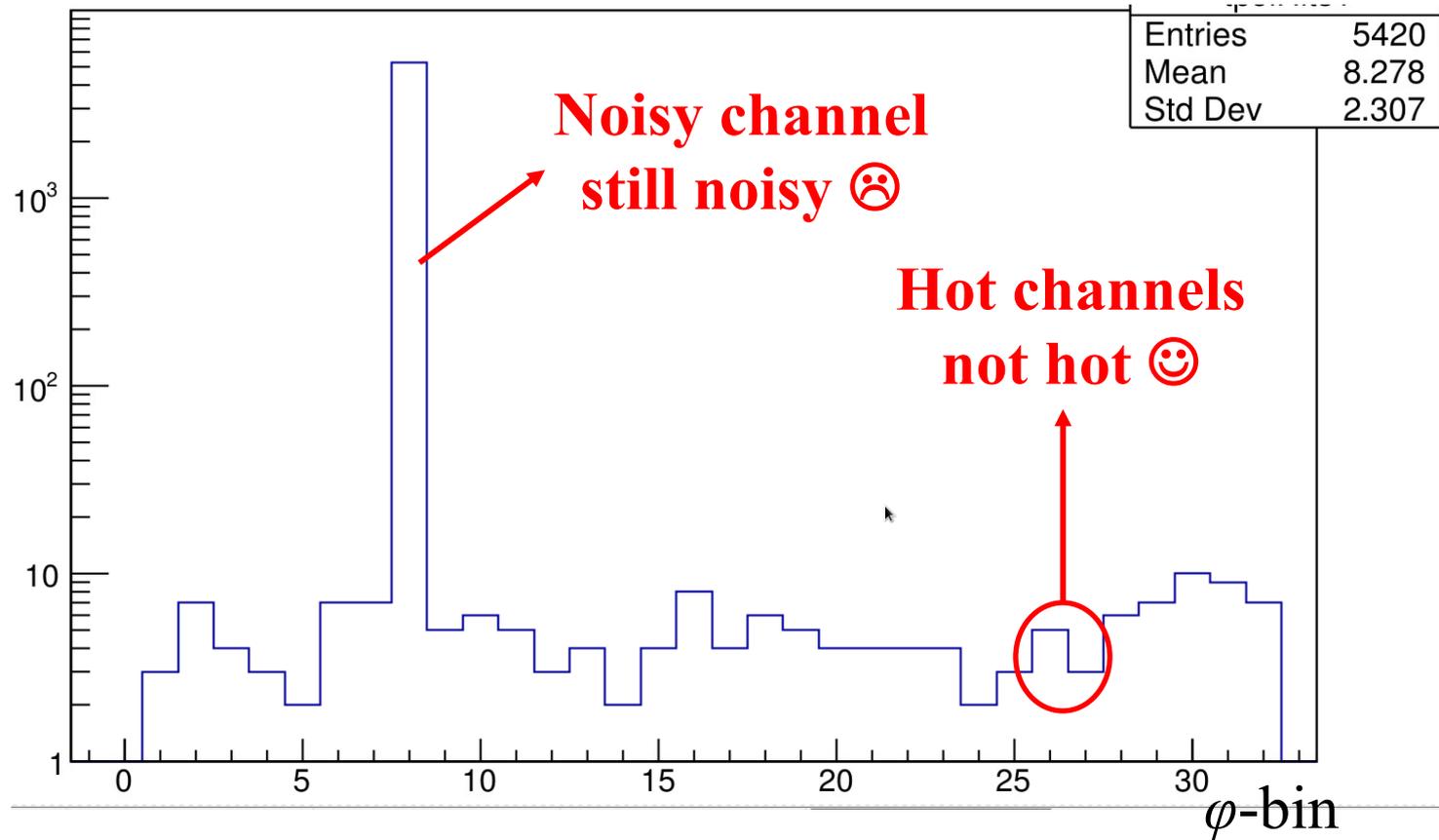
- Beni analyzed cosmic data
- Required 90 fADC counts above baseline (~ 240 keV energy deposit)

Cosmics



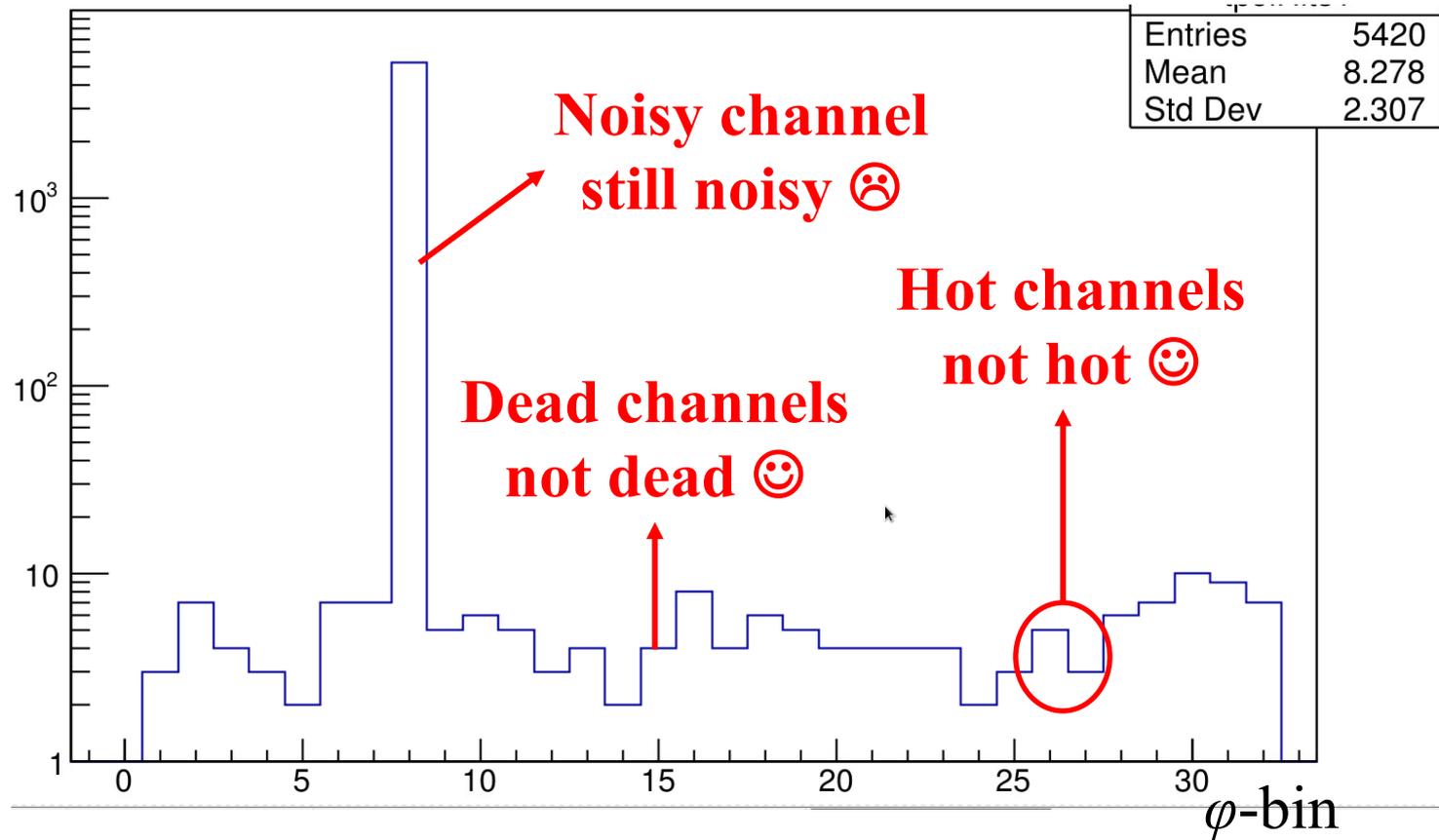
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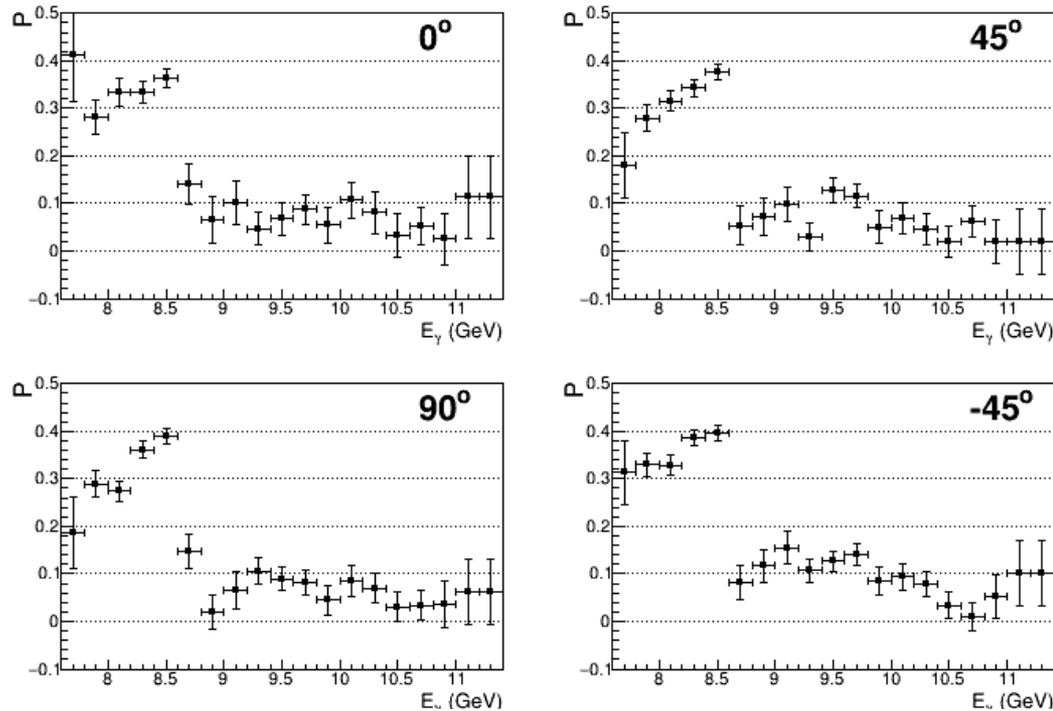
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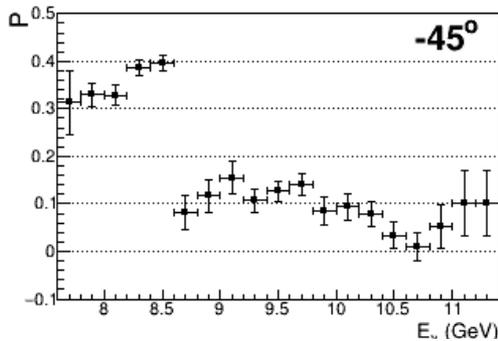
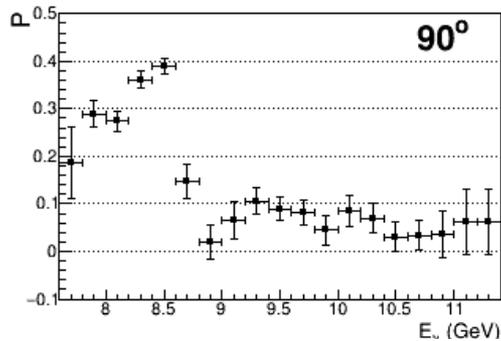
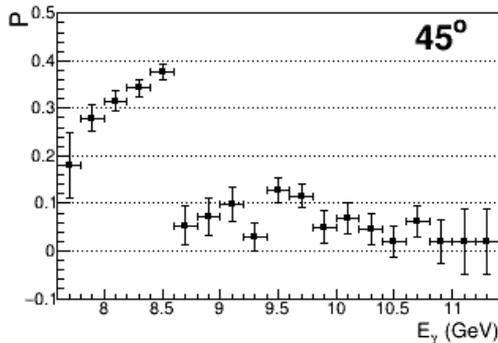
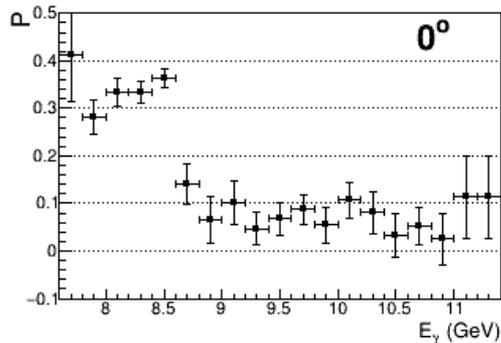
Preliminary polarization for batch 5-8 using recovered channels



Polarization values for E_γ between 8.0 and 8.6 GeV

| Beam orientation | Polarization |
|------------------|--------------------|
| 0 degrees: | 0.3460 +/- 0.0137 |
| 45 degrees: | 0.3476 +/- 0.0108 |
| 90 degrees: | -0.3498 +/- 0.0106 |
| 135 degrees: | -0.3746 +/- 0.0100 |

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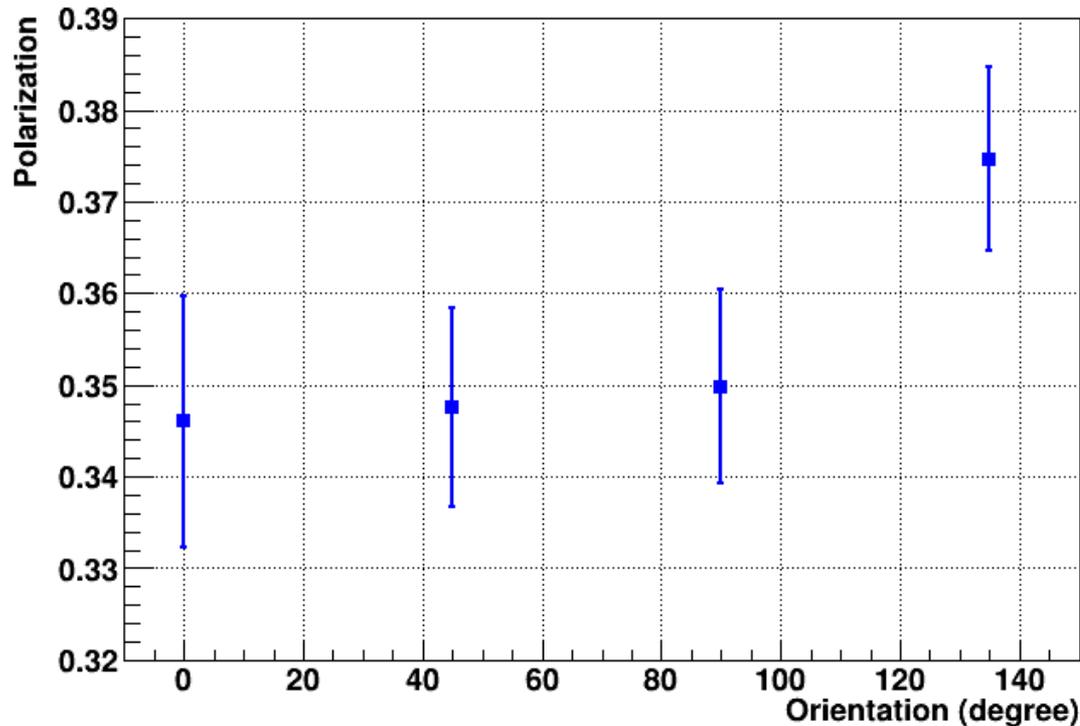


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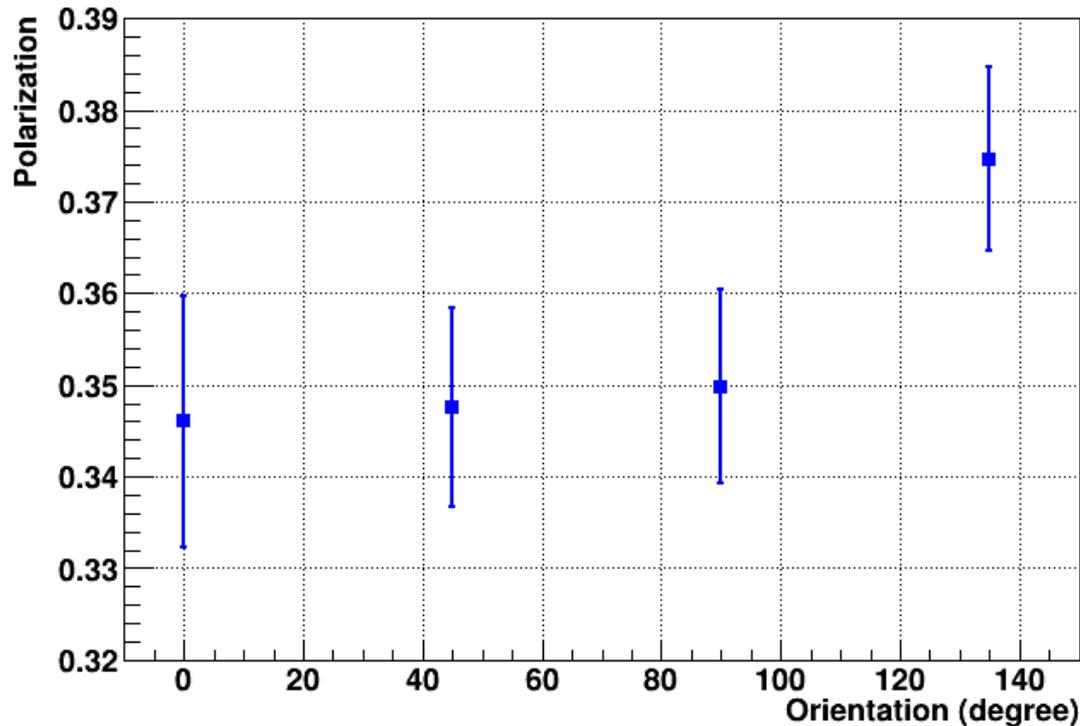


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- 135 orientation is still higher than the rest
- Will recalibrate energy deposition

Title

