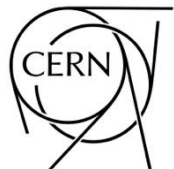


# LumiBelle2: March 2026 Access Overview

Pablo Mooney

CERN, Geneva, Switzerland

The University of Manchester, UK



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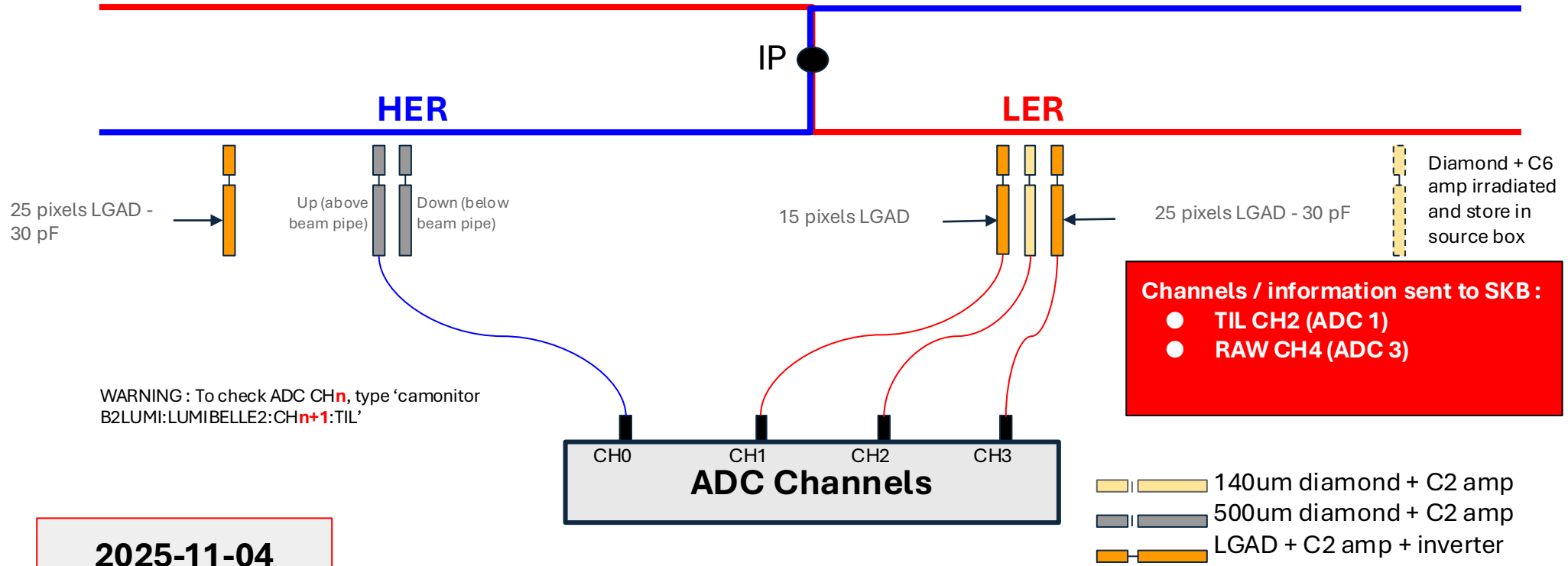
# TIL Configuration

TIL 4 – TIL

TIL 5 – COUNT

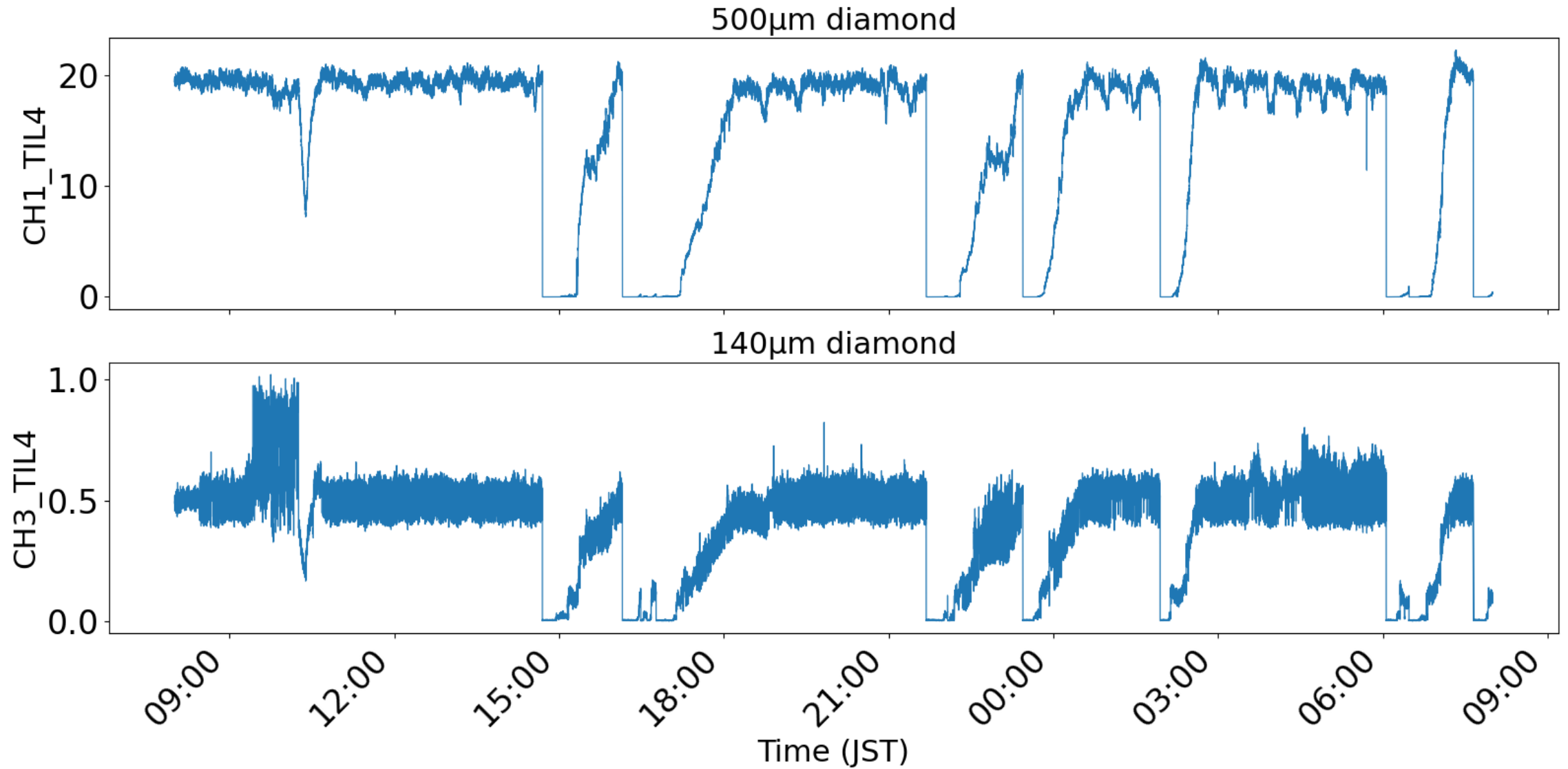
TIL 6 – RAWSUM

# System Setup 2025-11-04

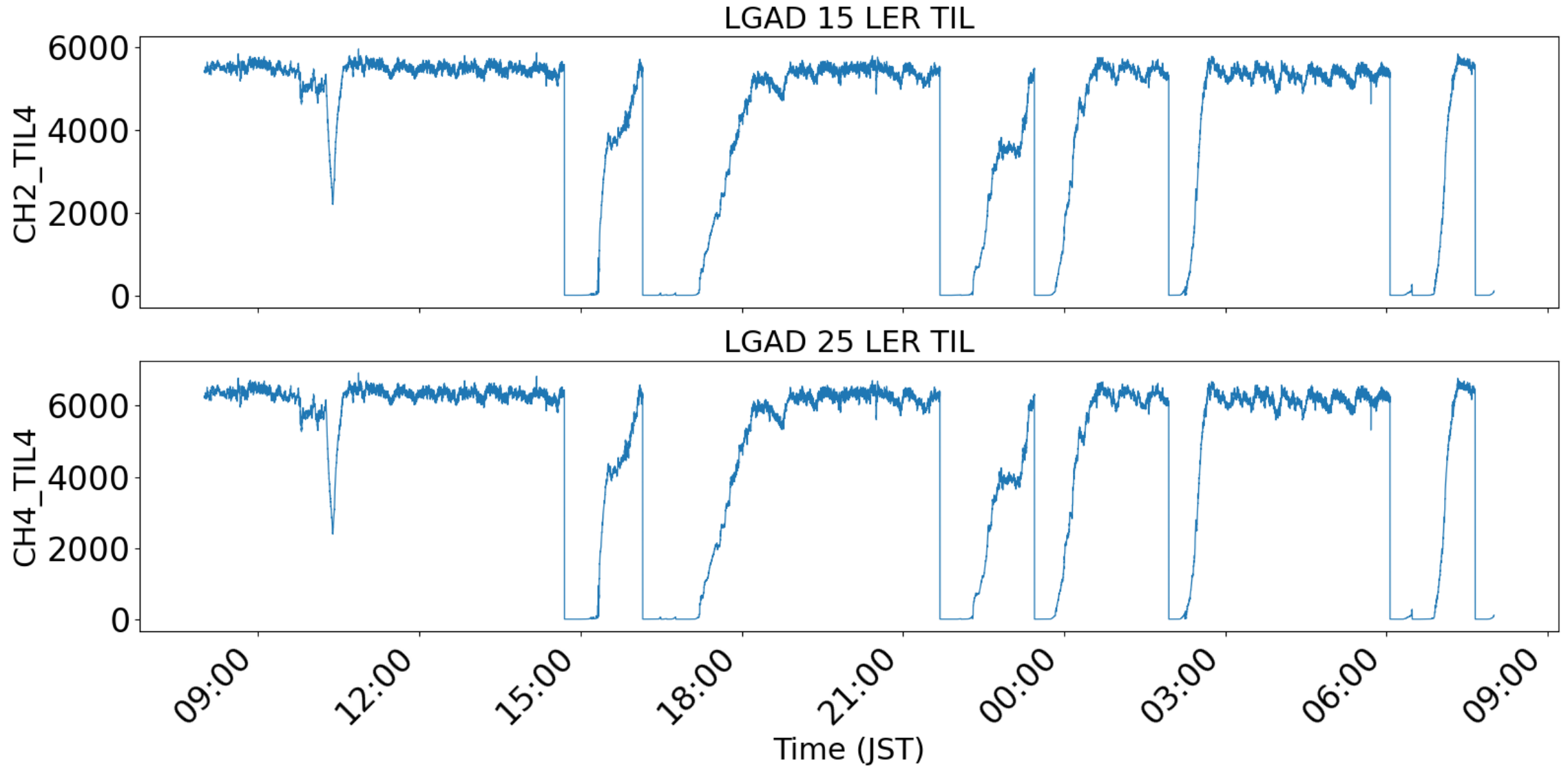


2025-11-04

# CH1 & CH3 TIL4 2025-12-14



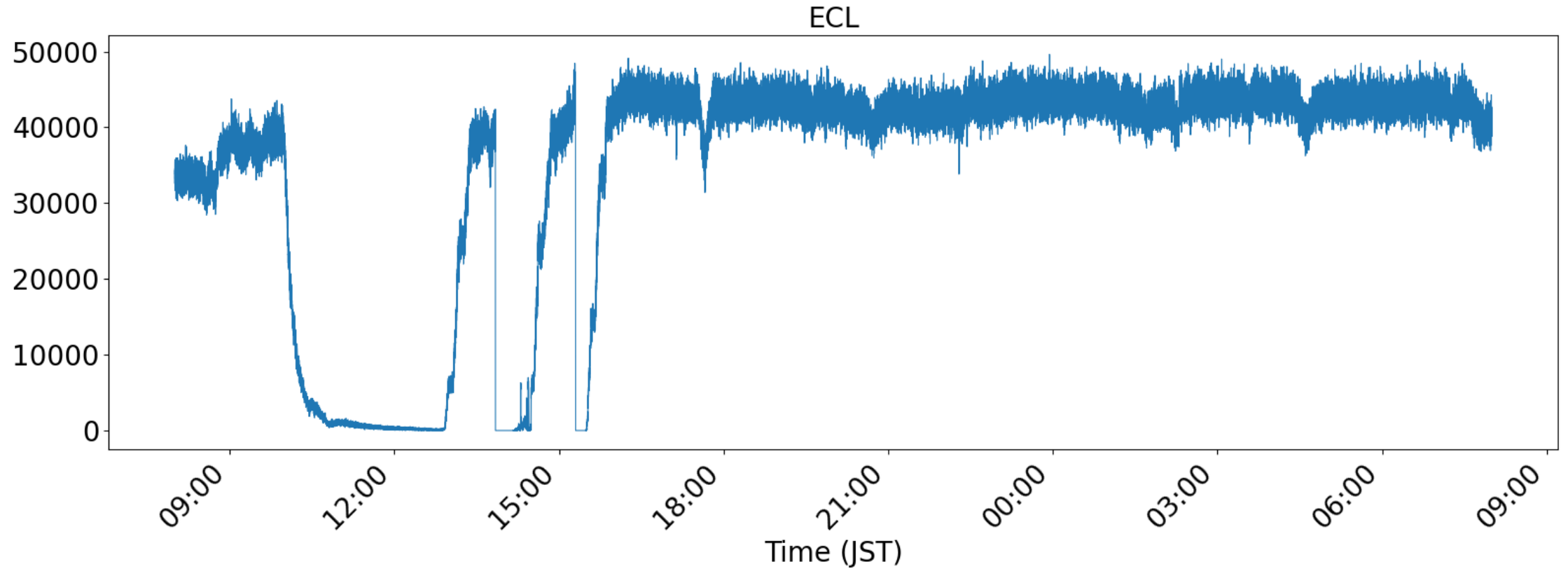
# CH2 & CH4 TIL4 2025-12-14



# 2026 Configuration

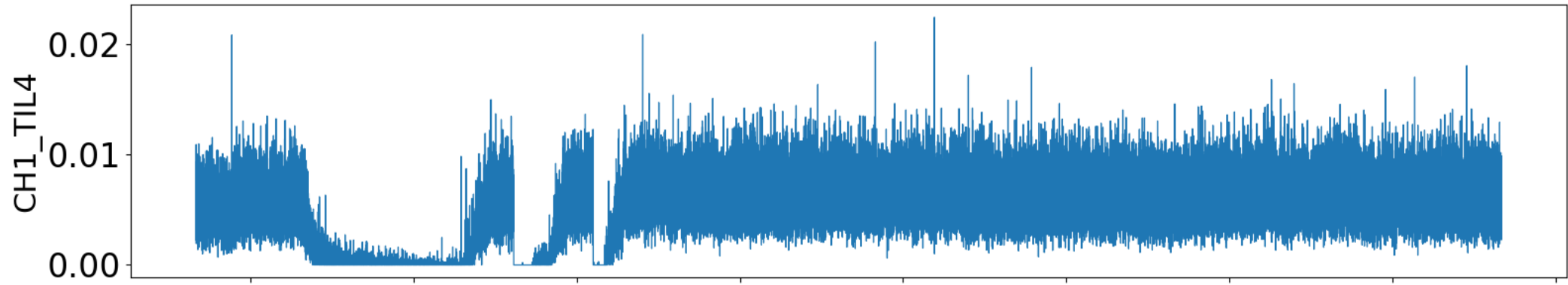
Detector	ADC e-hut	Channel
LGAD 25 HER	ADC 0	CH1
LGAD 15 LER	ADC 1	CH2
CVD Diamond	ADC 2	CH3
LGAD 25 LER	ADC 3	CH4

# 2026 ECL 2026-03-25

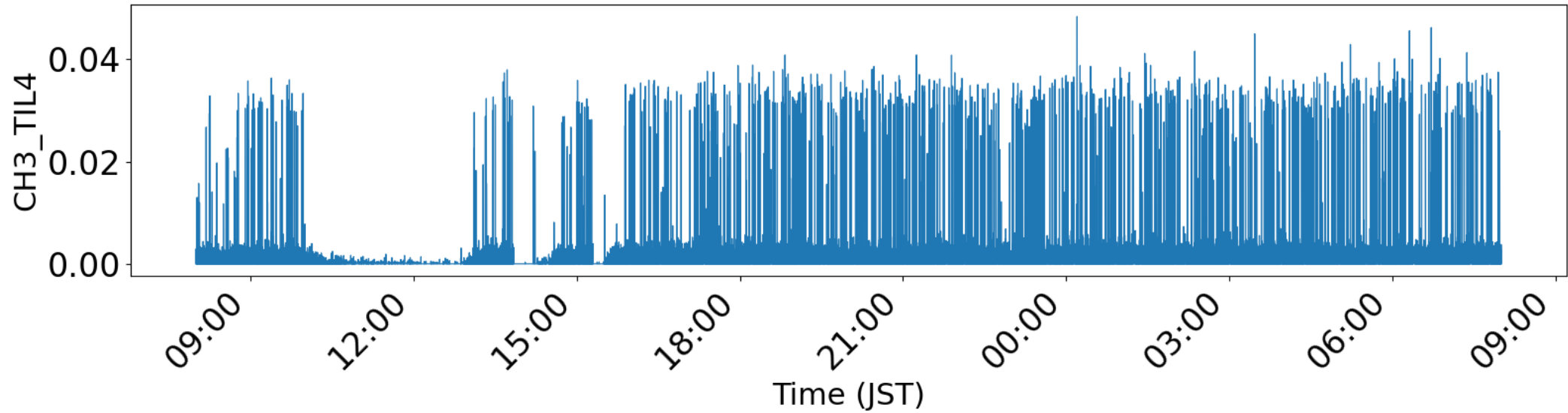


# CH1 & CH3 TIL4 2026-03-25

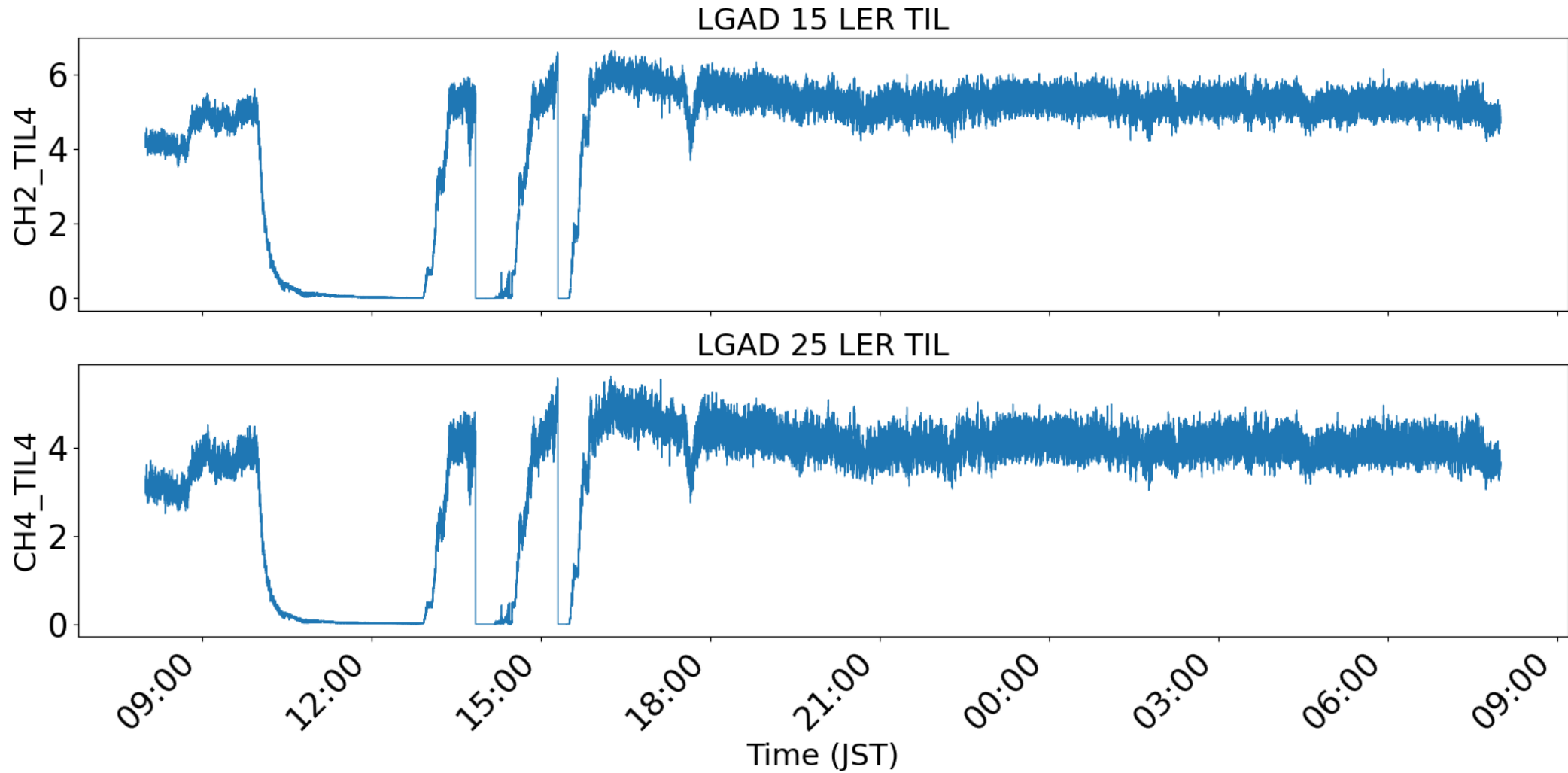
OLD LGAD 25 HER



CVD Diamond



# CH2 & CH4 TIL4 2026-03-25



# Stable windows

- Windows taken using ECL data
- 120 second windows

Simplified version of Anass' code used for now (thank you Anass!)

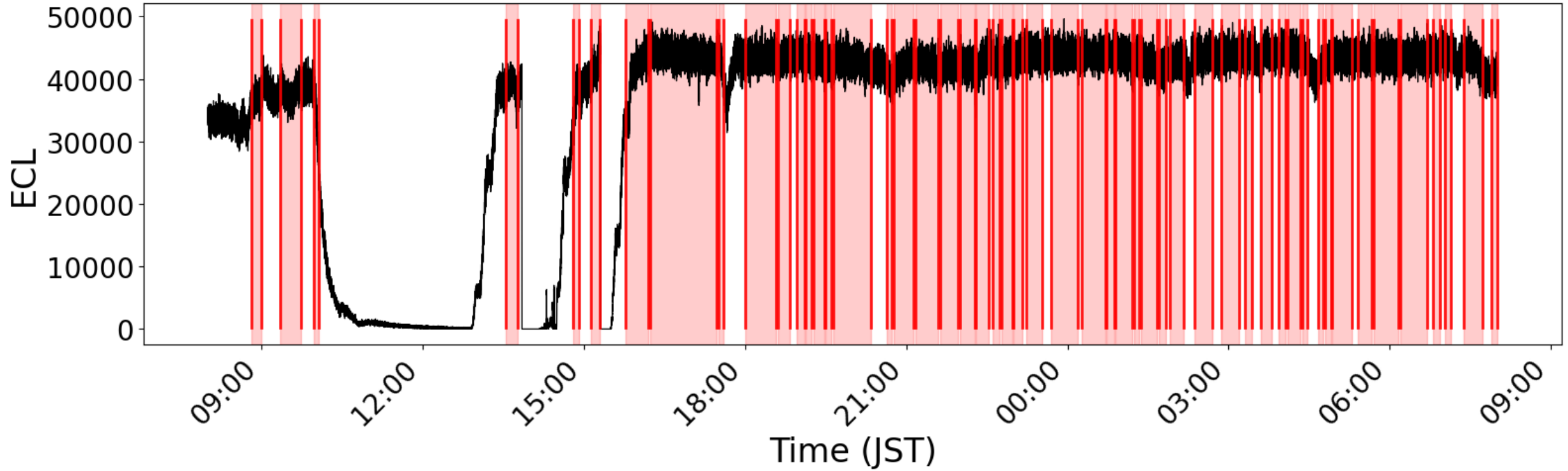
Computed using

- RSD -> low noise
- Slope -> minimal drift
- Gradient -> small fluctuations

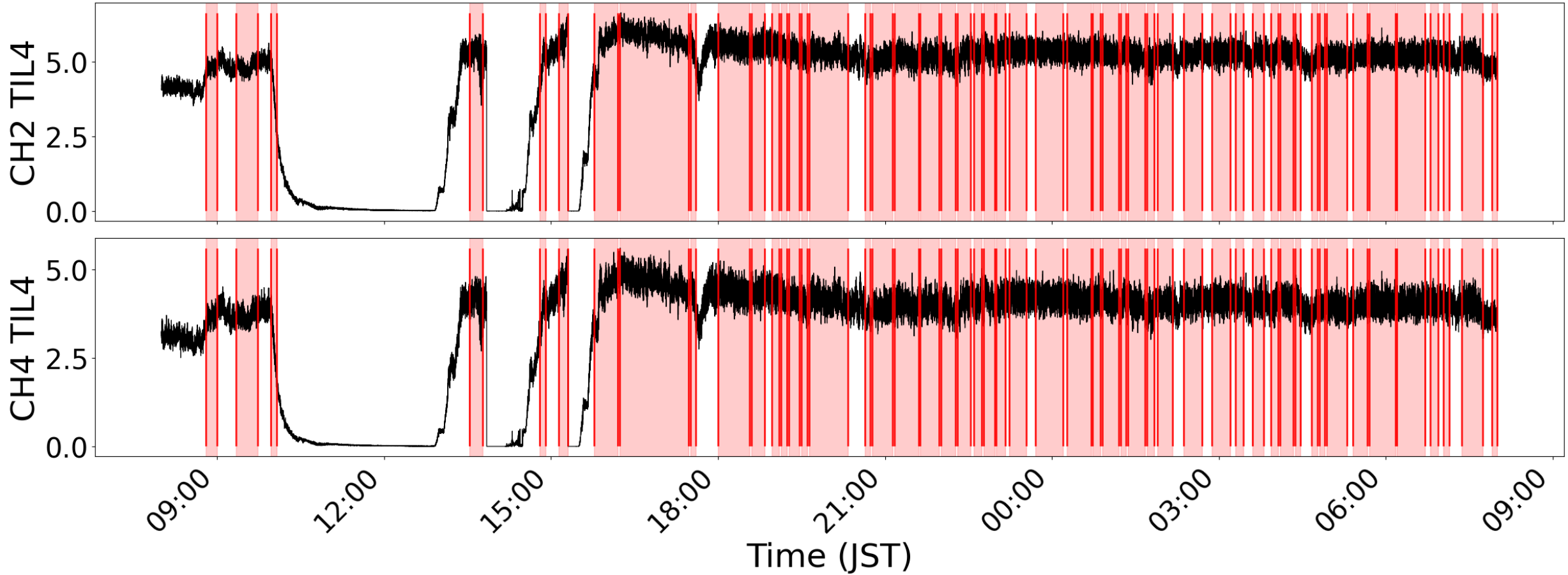
Keep windows that satisfy this and merge adjacent ones

Data analysis taken from the windows (none stable data discarded)

# Stable windows ECL 2026



# Stable windows ECL mapped onto CH2 & CH4 TIL4



# Data from all stable windows in 2025 and 2026

2025 Stable Window Data			
ECL Mean			30971.35
Channel	TIL	Mean	Mean/ECL
CH2 LGAD 15 LER	TIL4 - TIL	~5000	1.7-01
CH4 LGAD 25 LER	TIL4 - TIL	~6000	2.0e-01

2026 (before TMUX) Stable Window Data			
ECL Mean			41260.33
Channel	TIL	Mean	Mean/ECL
CH2 LGAD 15 LER	TIL4 - TIL	~5	1.260667e-04
CH4 LGAD 25 LER	TIL4 - TIL	~4	9.528064e-05

# Section 2: Next Steps

# Potential Solutions

## Threshold

- The threshold settings from 2025 and 2026

## Out of phase

- Sampling out of phase from the peak
- Phase scan to get optimised phase

# Threshold settings

2025 Threshold				
Channel	Threshold		RAW	
CH0	9.8 mV	20 ADC	1.0 mV	2 ADC
CH1	9.8 mV	20 ADC	0.0 mV	0 ADC
CH2	11.7 mV	24 ADC	2.9 mV	6 ADC
CH3	9.8 mV	20 ADC	4.9 mV	10 ADC

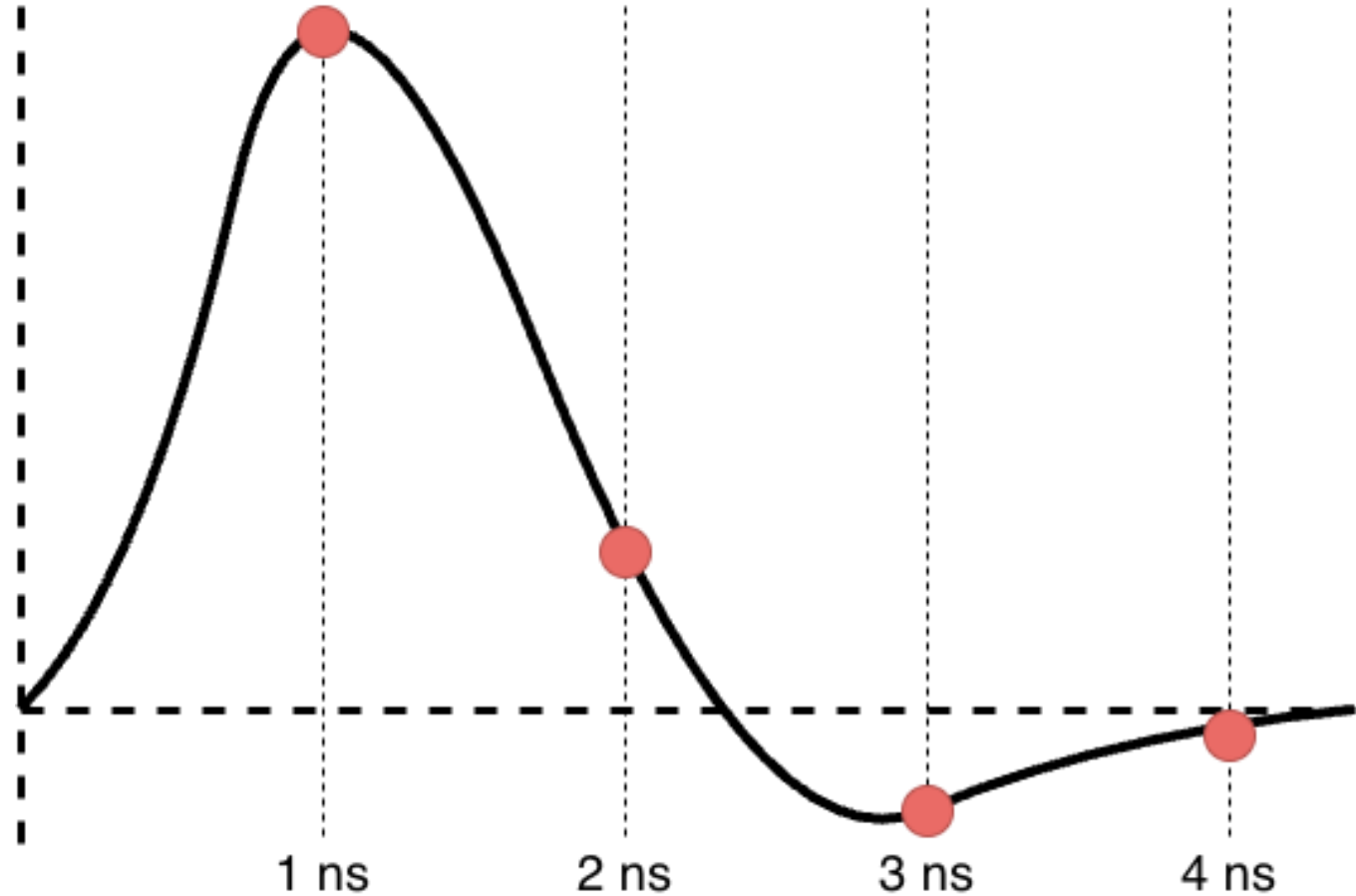
2026 Thresholds – After March Access				
Channel	Threshold		RAW	
CH0	10 mV	20 ADC	10 mV	20 ADC
CH1	20 mV	40 ADC	10 mV	20 ADC
CH2	15 mV	30 ADC	10 mV	20 ADC
CH3	20 mV	40 ADC	10 mV	20 ADC

# Threshold Adjustment

- TMUX installed
- We can now connect remotely and adjust the thresholds

# Optimising phase

- Sampling occurs every 1 ns
- Signal  $\sim 4$  ns
- Possible sampling away from the peak
- We can scan the optimum phase to sample the peak of the signal
- Step 3.5 in Operation Guidelines

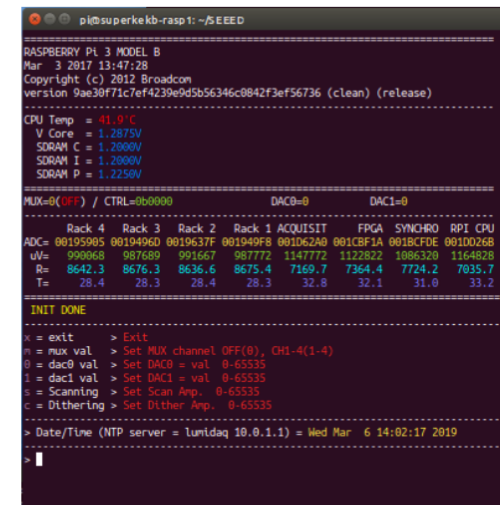


# Operation Guidelines

- Process to complete the scan
- Possibility of doing this remotely without restarting the whole system?

- 3.5. Open **ssh** to **RASPBERRY PI 3** in **SYNCHRONIZATION** crate, from which we monitor the **ADC status and temperature**. It also enables to **set the optimized Phase (also phase scan to get the optimized phase)** for the signals to be sampled at their peak. (□ please note that phase scan is normally not needed and should not be done in normal operation)

```
cd ~/daq_phase2/RPI3
gnome-terminal --title="RASPBERRY PI 3" --command="ssh pi@10.0.1.51"
--geometry 80x35+50+430
# password mangold
# then in the newly open terminal :
cd SEED
sudo ./mux_dac
```



```
pi@superkeb-rasp1:~/SEED
RASPBERRY PI 3 MODEL B
Mar  3 2017 13:47:28
Copyright (c) 2012 Broadcom
version 9ae30f71c7ef4239e9d5b56346c0842f3ef56736 (clean) (release)
-----
CPU Temp = 41.81C
V Core = 1.2875V
SDRAM C = 1.2000V
SDRAM I = 1.2000V
SDRAM P = 1.2250V
-----
MUX=0(OFF) / CTRL=060000 DAC0=0 DAC1=0
-----
Rack 4 Rack 3 Rack 2 Rack 1 ACQUISIT FPGA SYNCHRO RPI CPU
ADC= 00195005 00194960 0019637F 001949F8 001062A0 001CBF1A 0018CFDE 00100268
uV= 990068 987689 991667 987772 1147772 1122822 1086320 1164828
R= 8642.3 8676.3 8636.6 8675.4 7169.7 7364.4 7724.2 7035.7
T= 28.4 28.3 28.4 28.3 32.8 32.1 31.0 33.2
-----
INIT DONE
-----
k = exit > Exit
n = mux val > Set MUX channel OFF(0), CH1-4(1-4)
p = dac0 val > Set DAC0 = val 0-65535
l = dac1 val > Set DAC1 = val 0-65535
s = Scanning > Set Scan Amp. 0-65535
d = Dithering > Set Dither Amp. 0-65535
-----
> Date/Time (NTP server = lumidaq 10.0.1.1) = Wed Mar  6 14:02:17 2019
>
```

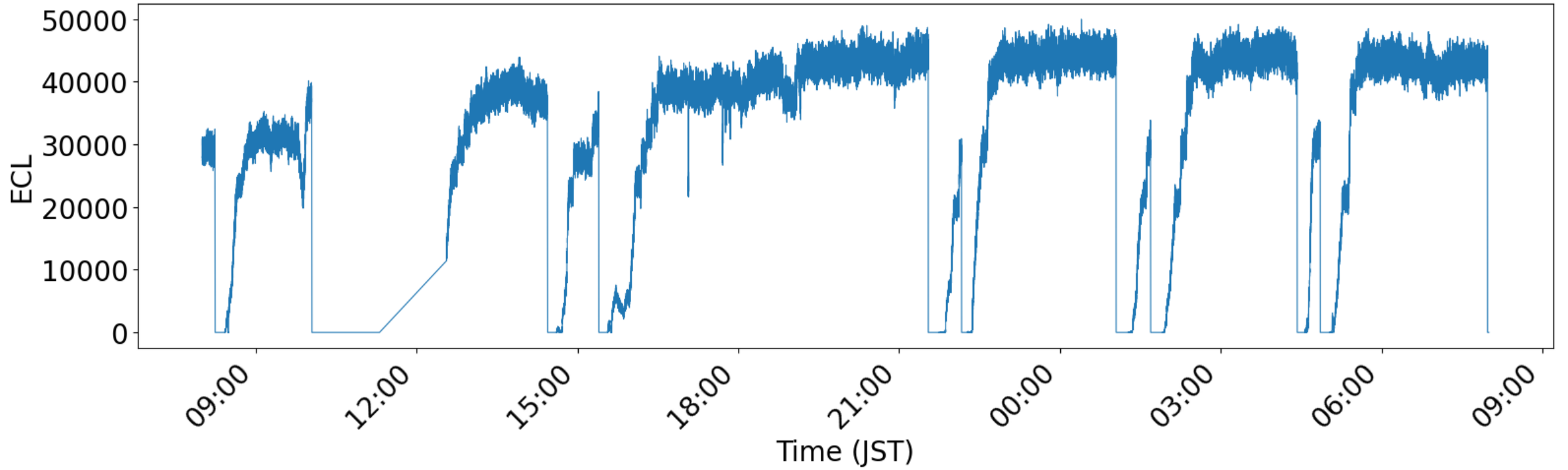
#Here, you can scan the **optimum phase** to sample at the peak of the signal,  
#for Scan: s->type the start phase (0-65535)->type the stop phase (65535)->type the step->type the time interval->start  
#Set the optimum phase, here it uses the DAC0, then type 0->type the phase you want  
(□ please note that phase scan is normally not needed and should not be done in normal operation)

# Phase Scan

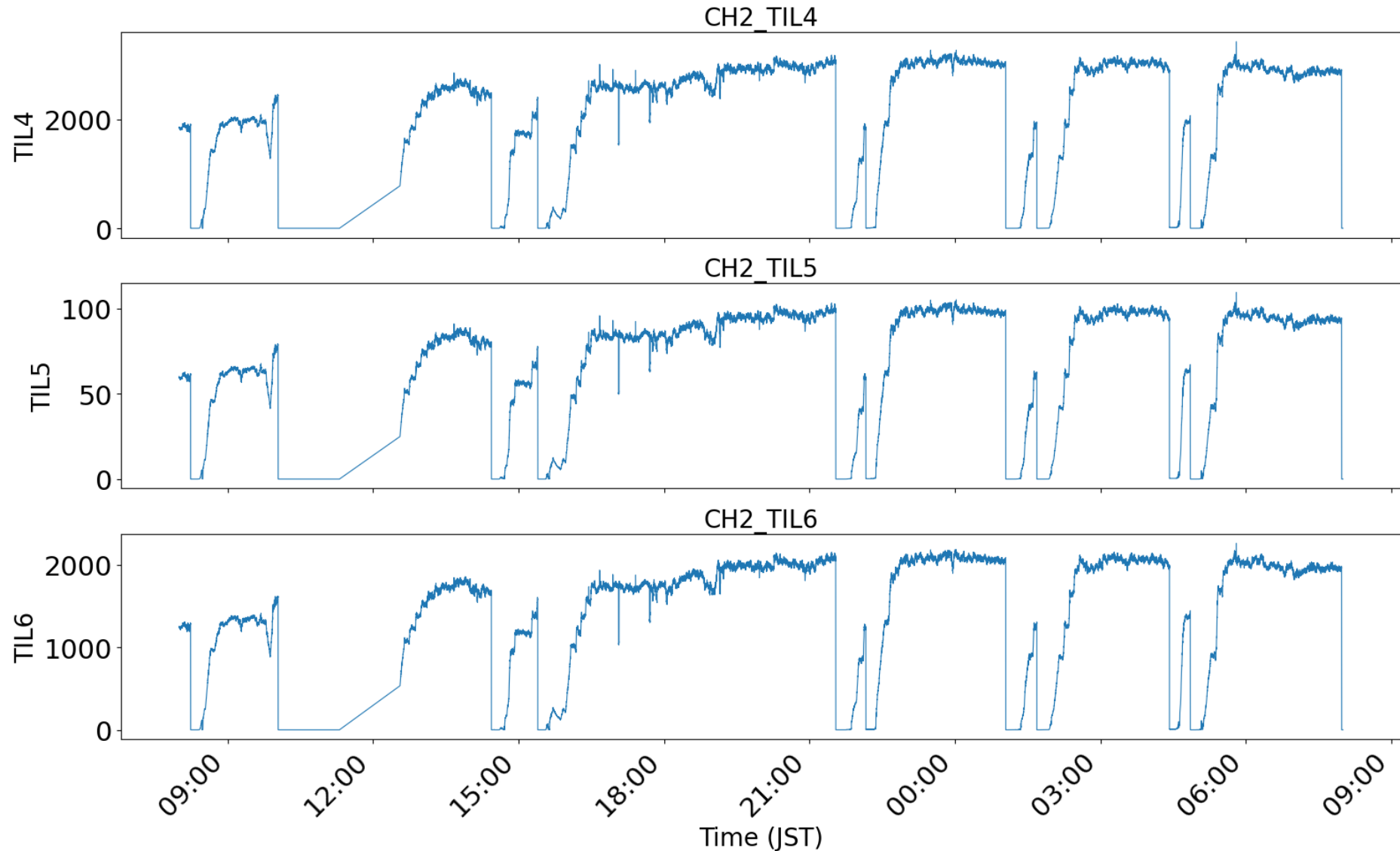
- Use a combination of wires (1-4ns)
- Use a trombone
- The idea is to be able to tune the sampling with the CAMONITOR reading to get the peak
- Cannot do this during shutdown

# Section 3: Post TMUX Data

# ECL – 2026-04-22

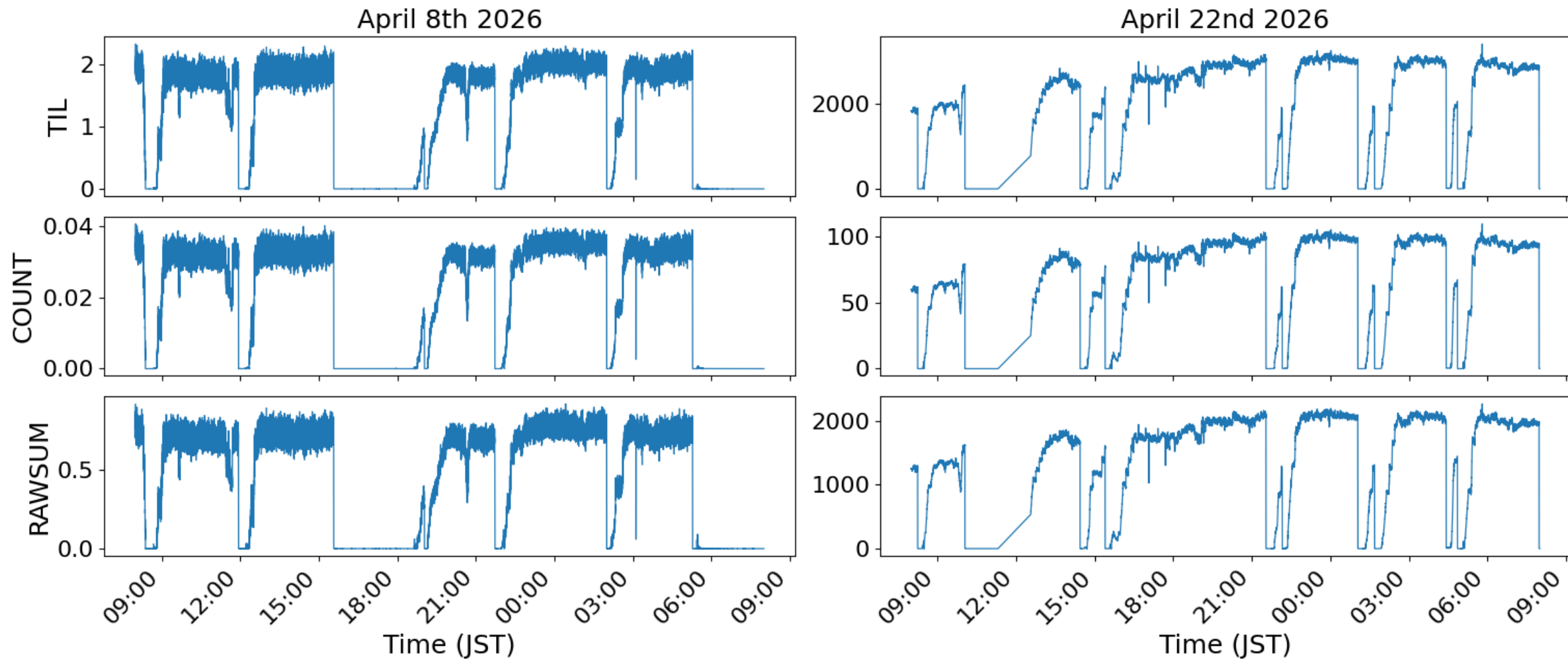


# simple\_all\_PV\_1Hz\_2026-04-22-08-00-00



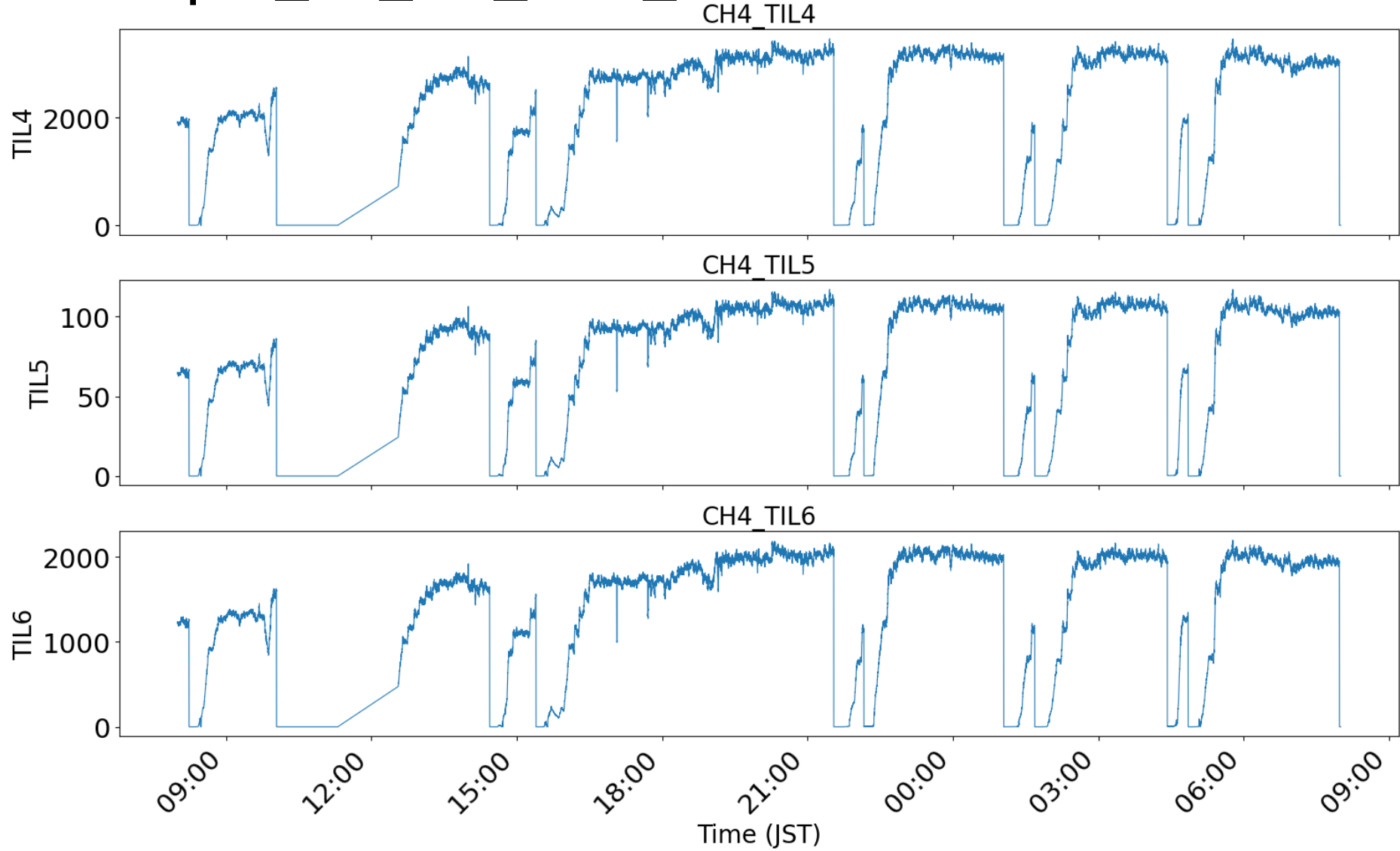
# 2026-04-08 v 2026-04-22

LGAD 15 LER - CH2



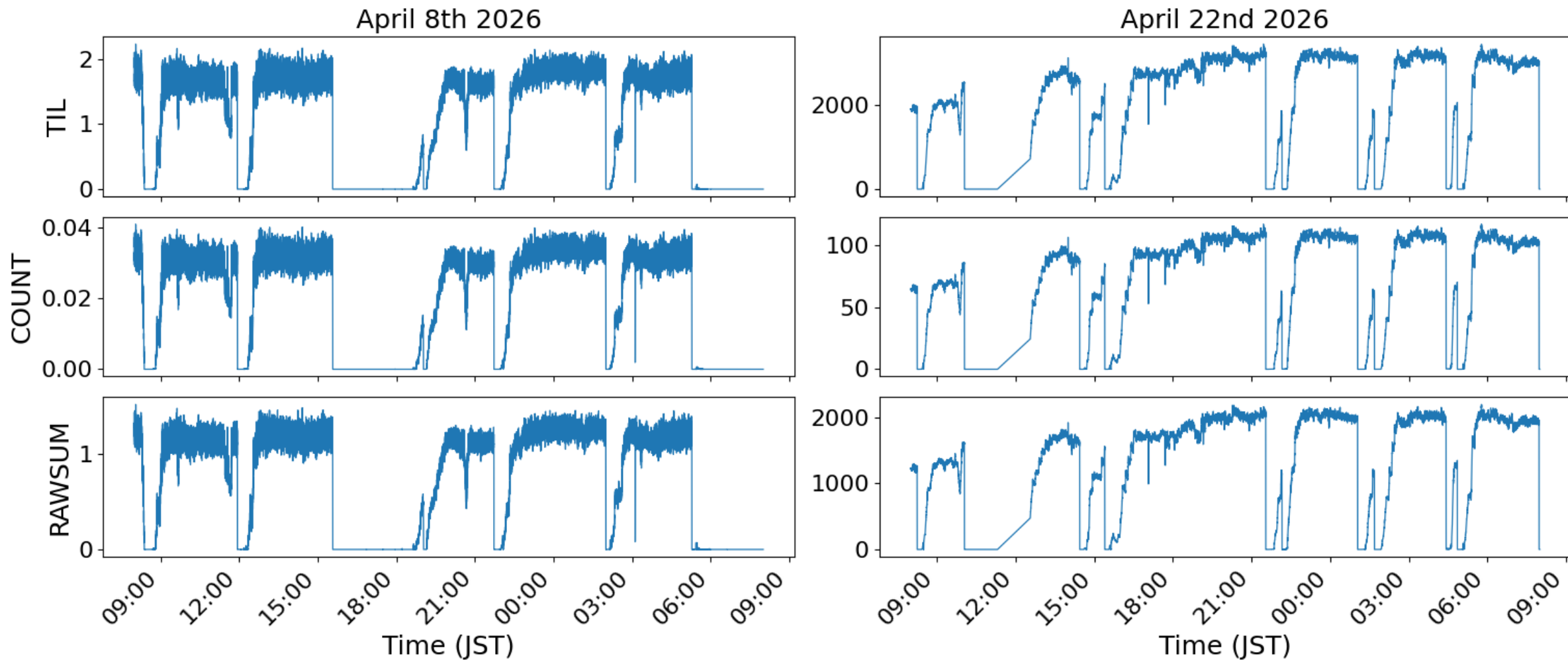
# LGAD 25 LER

simple\_all\_PV\_1Hz\_2026-04-22-08-00-00



# 2026-04-08 v 2026-04-22

LGAD 25 LER - CH4



# Comparison Table – after TMUX

2026-04-08 Stable Window Data			
ECL Mean			39000
Channel	TIL	Mean	Mean/ECL
CH2 LGAD 15 LER	TIL4 - TIL	~2	5e-05
CH4 LGAD 25 LER	TIL4 - TIL	~2	4.5e-05

2026-04-22 Stable Window Data			
ECL Mean			42000
Channel	TIL	Mean	Mean/ECL
CH2 LGAD 15 LER	TIL4 - TIL	~3000	7e-02
CH4 LGAD 25 LER	TIL4 - TIL	~3000	7e-02

# Comparison Table with 2025

2025 Stable Window Data			
ECL Mean			31000
Channel	TIL	Mean	Mean/ECL
CH2 LGAD 15 LER	TIL4 - TIL	~5000	2e-01
CH4 LGAD 25 LER	TIL4 - TIL	~6000	2e-01

2026-04-22 Stable Window Data			
ECL Mean			42000
Channel	TIL	Mean	Mean/ECL
CH2 LGAD 15 LER	TIL4 - TIL	~3000	7e-02
CH4 LGAD 25 LER	TIL4 - TIL	~3000	7e-02