LumiBelle2: March 2026 Access Overview

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TIL 4 – TIL

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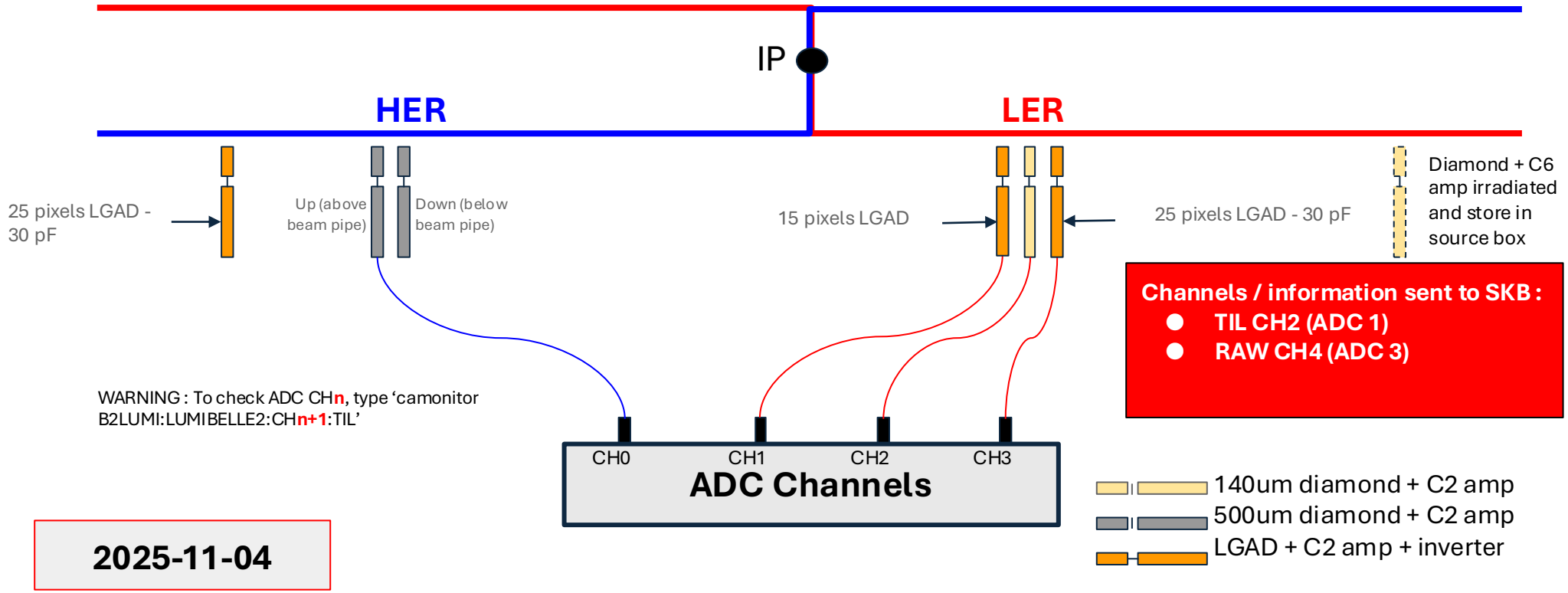
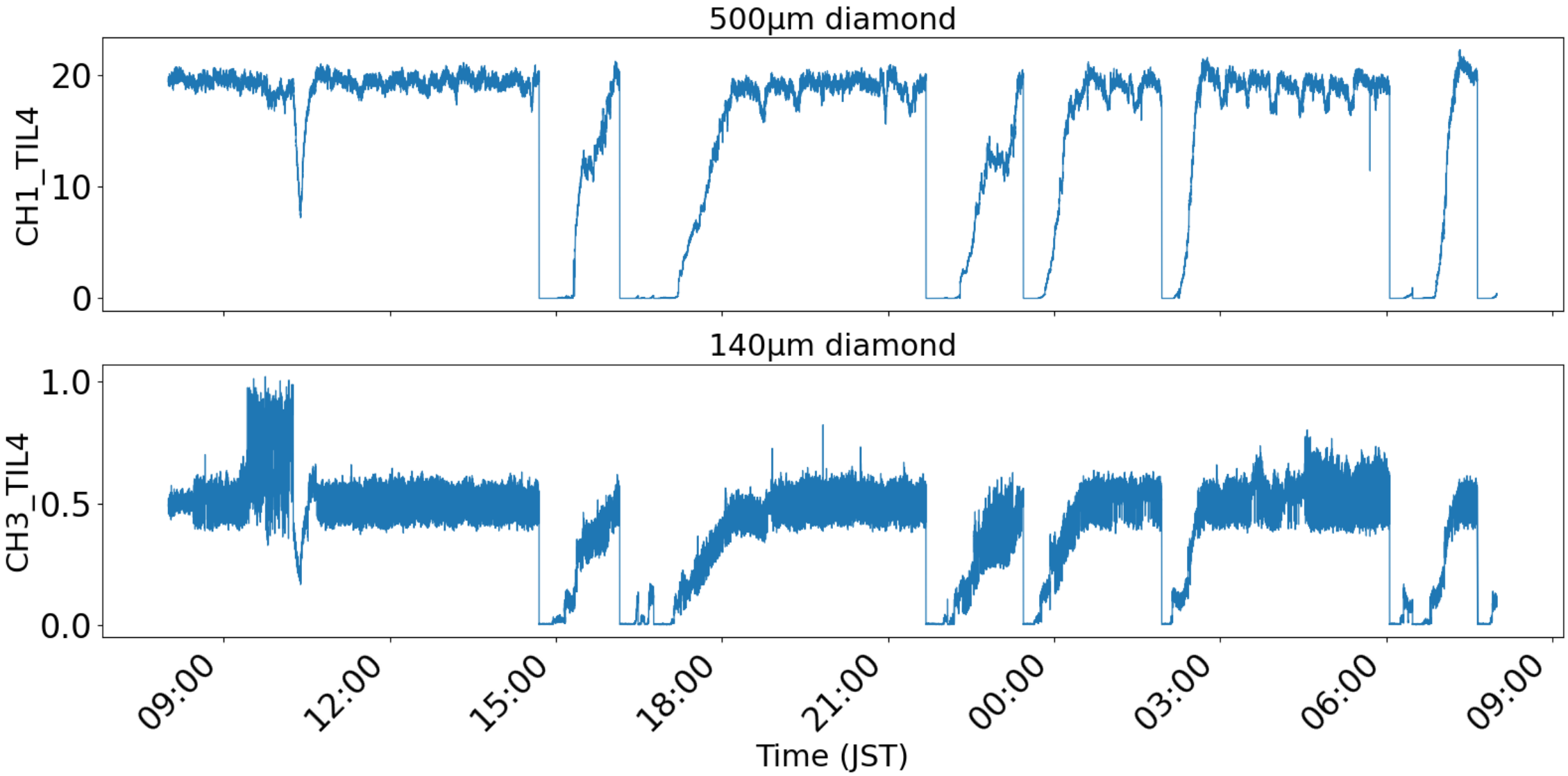
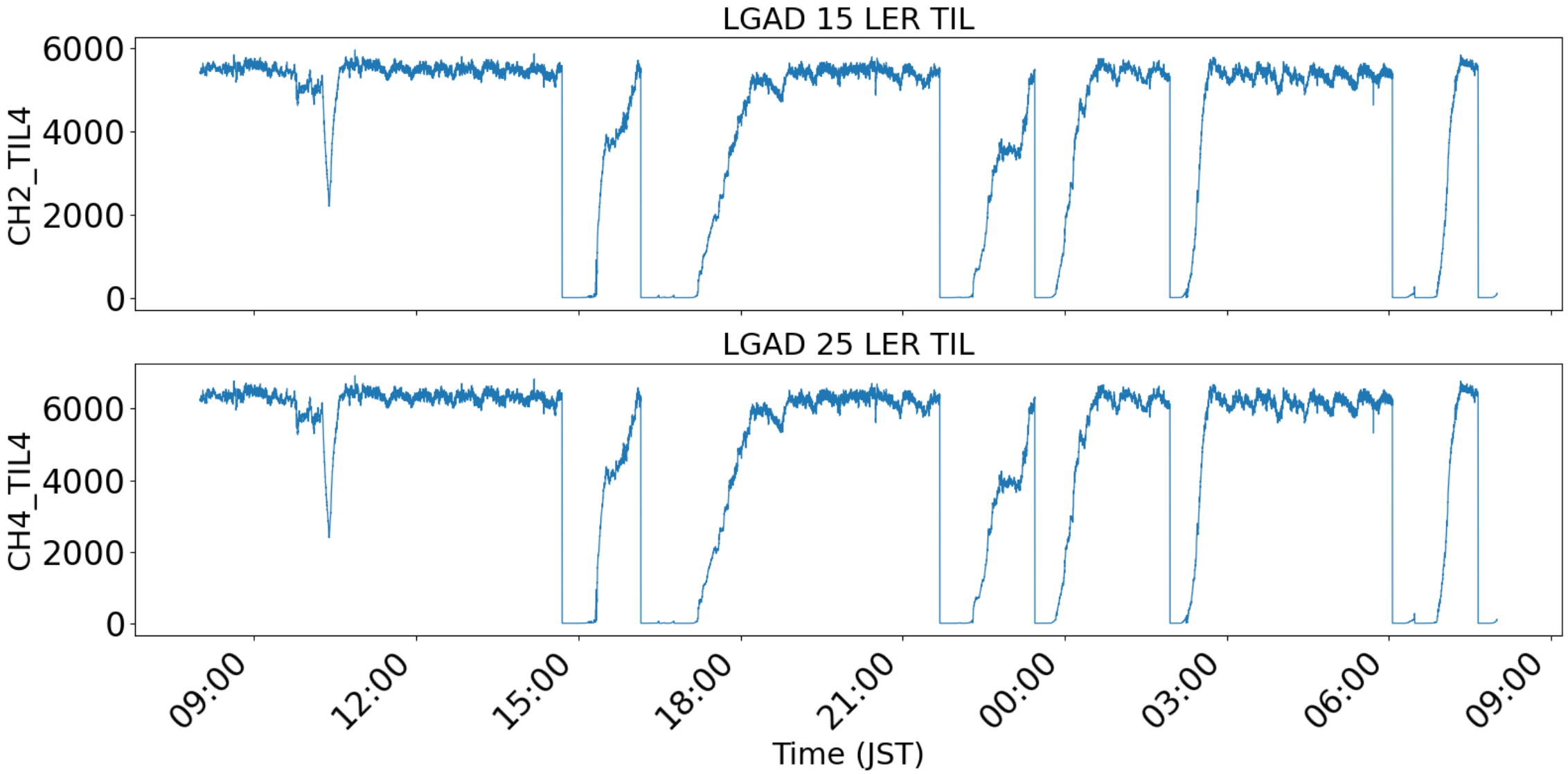
System Setup 2025-11-04



CH1 & CH3 TIL4 2025-12-14



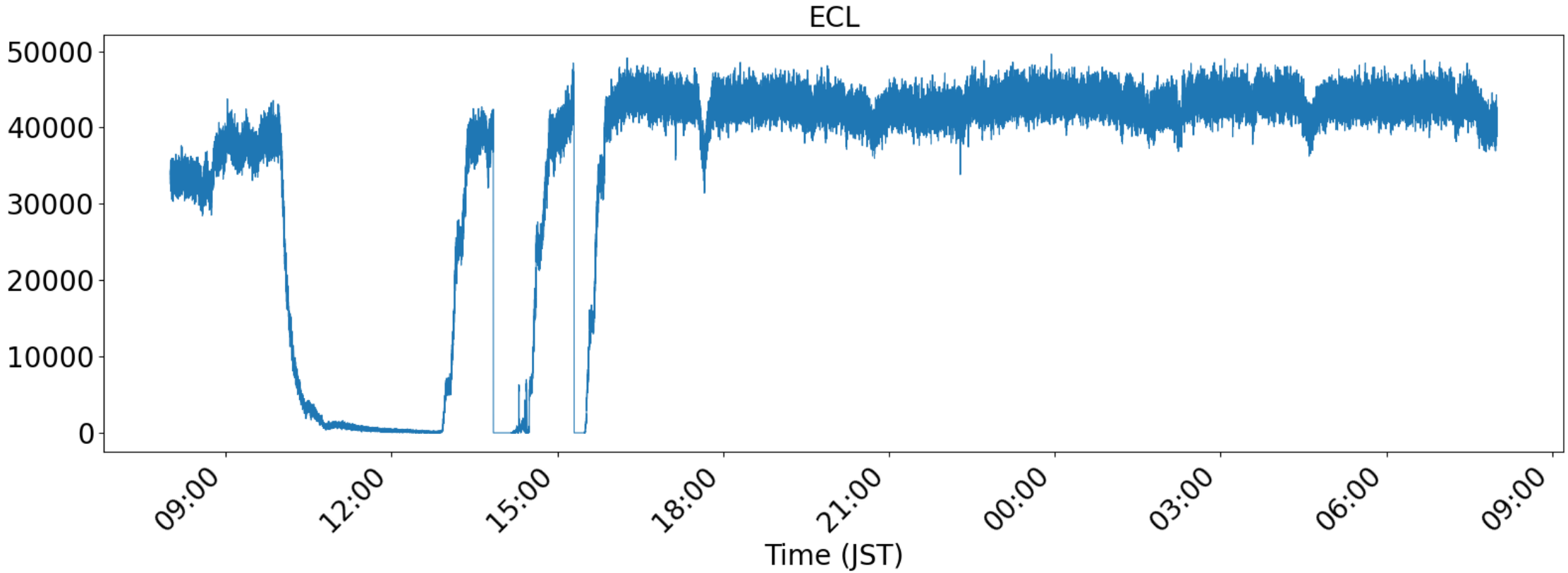
CH2 & CH4 TIL4 2025-12-14



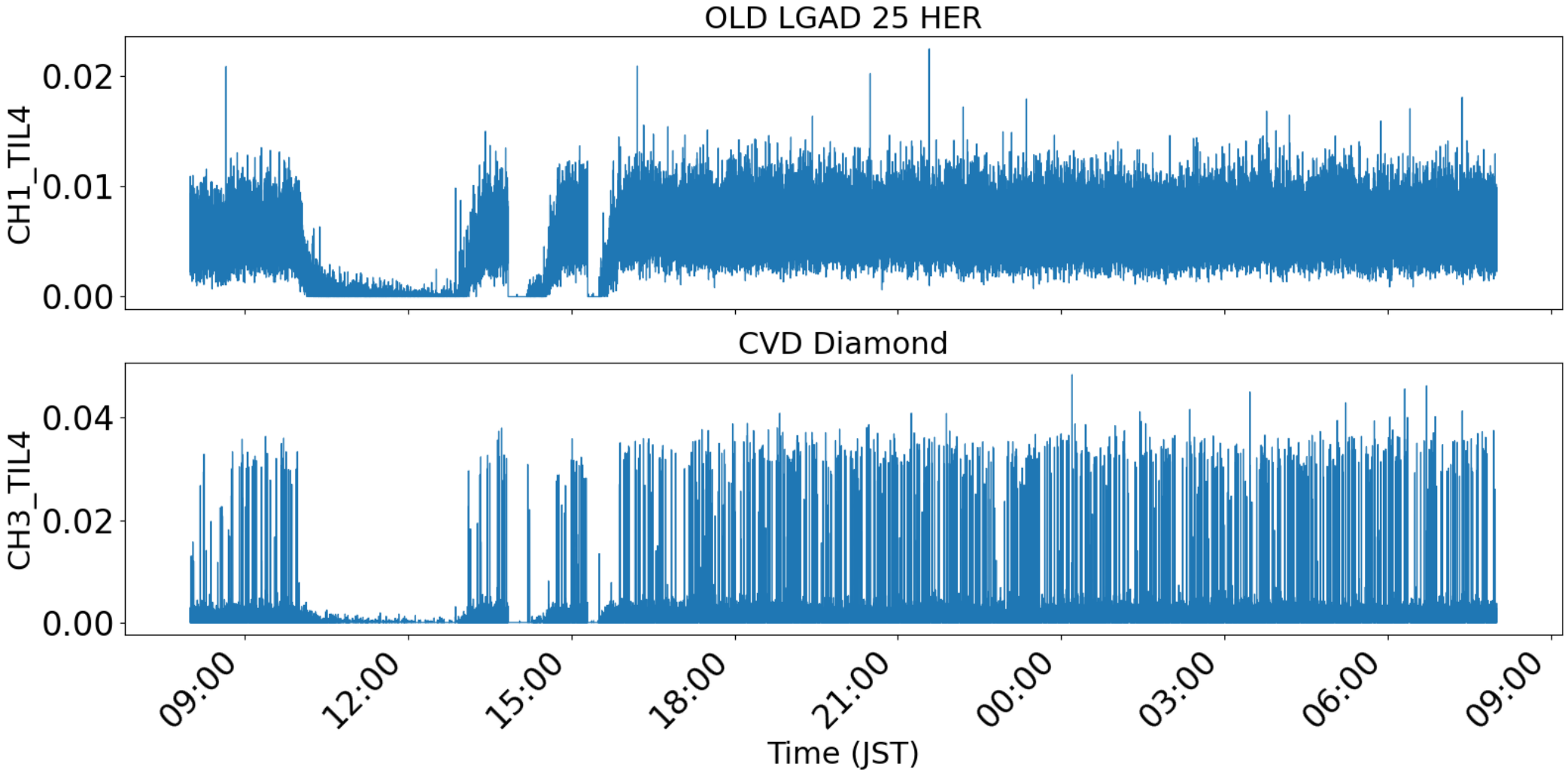
2026 Configuration

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

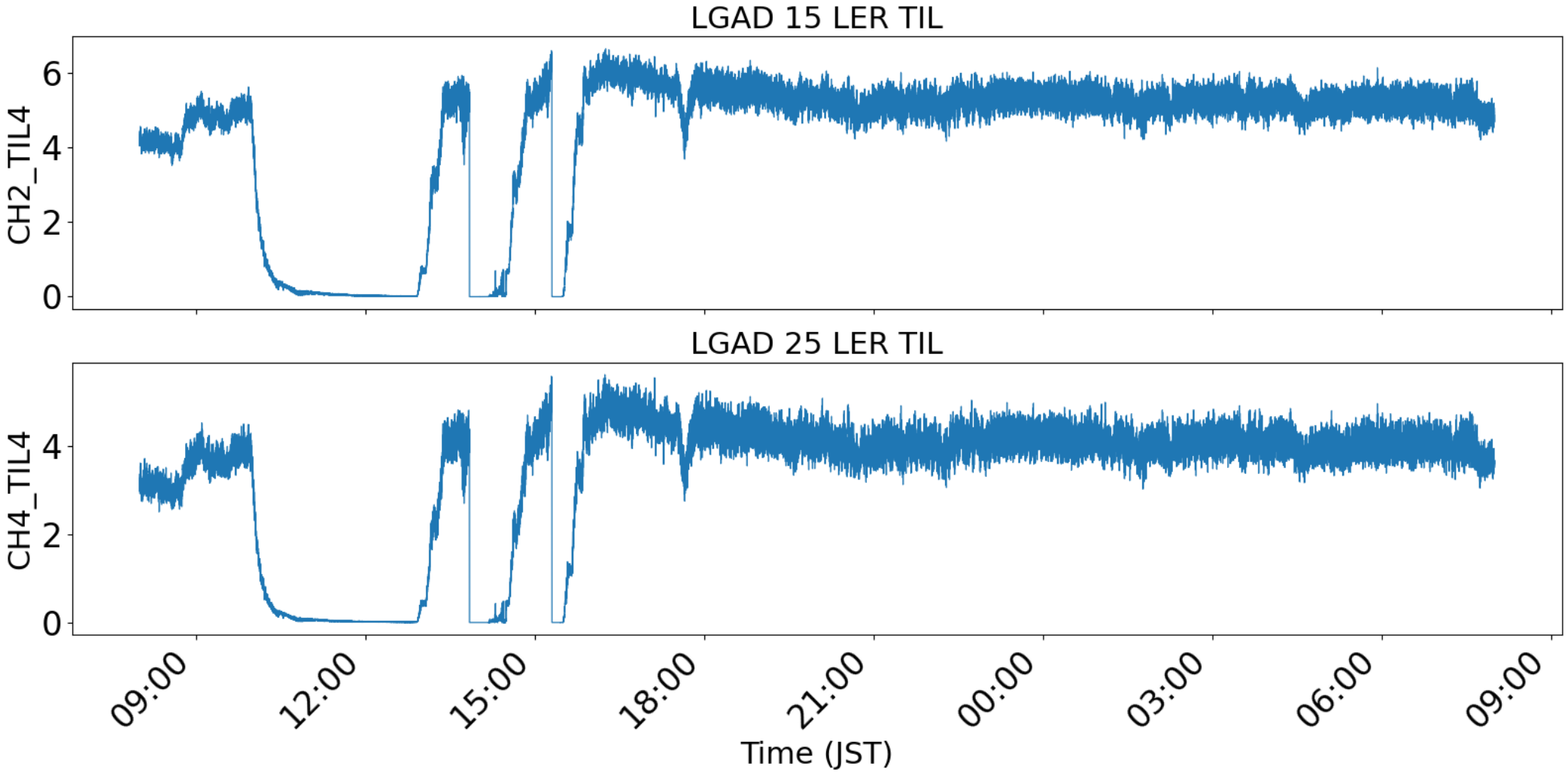
2026 ECL 2026-03-25



CH1 & CH3 TIL4 2026-03-25



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!)

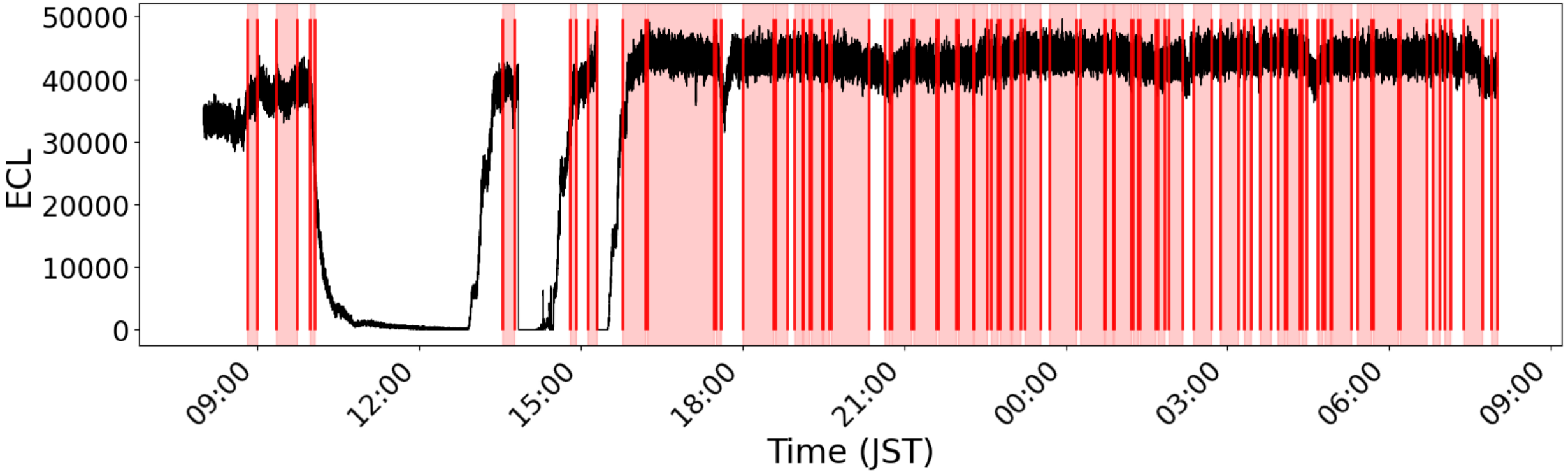
Computed using

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

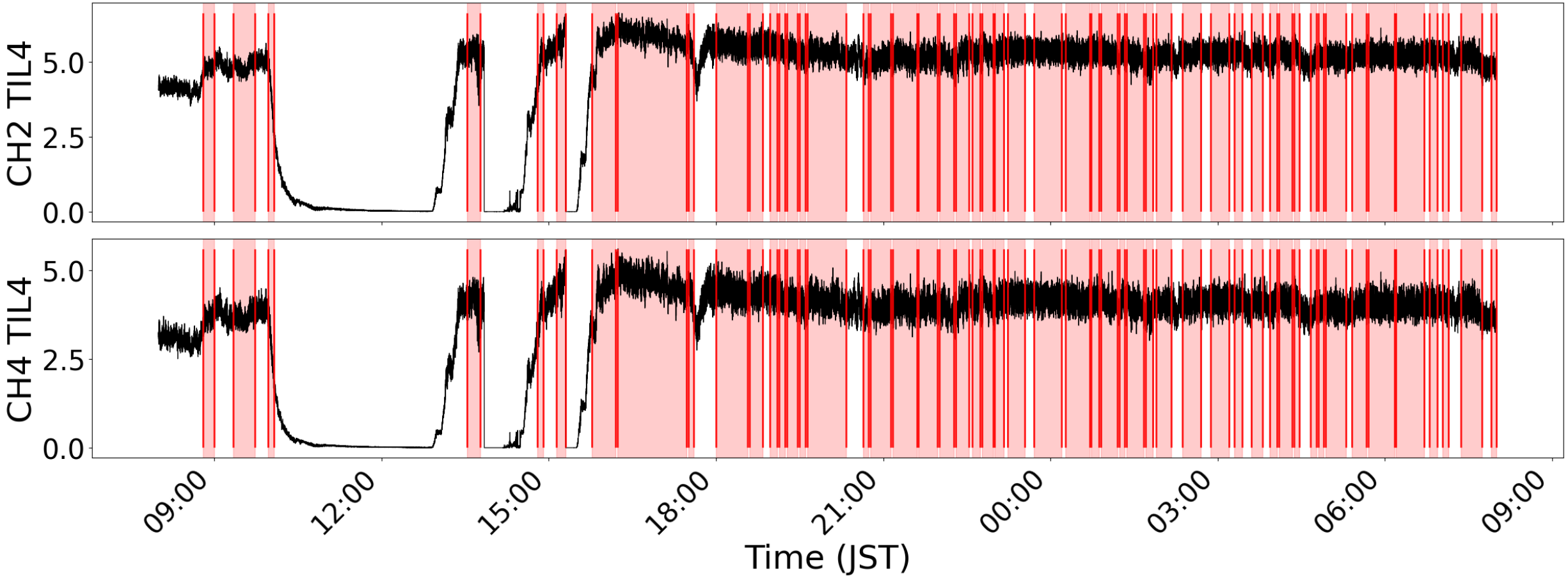
Keep windows that satisfy this and merge adjacent ones

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

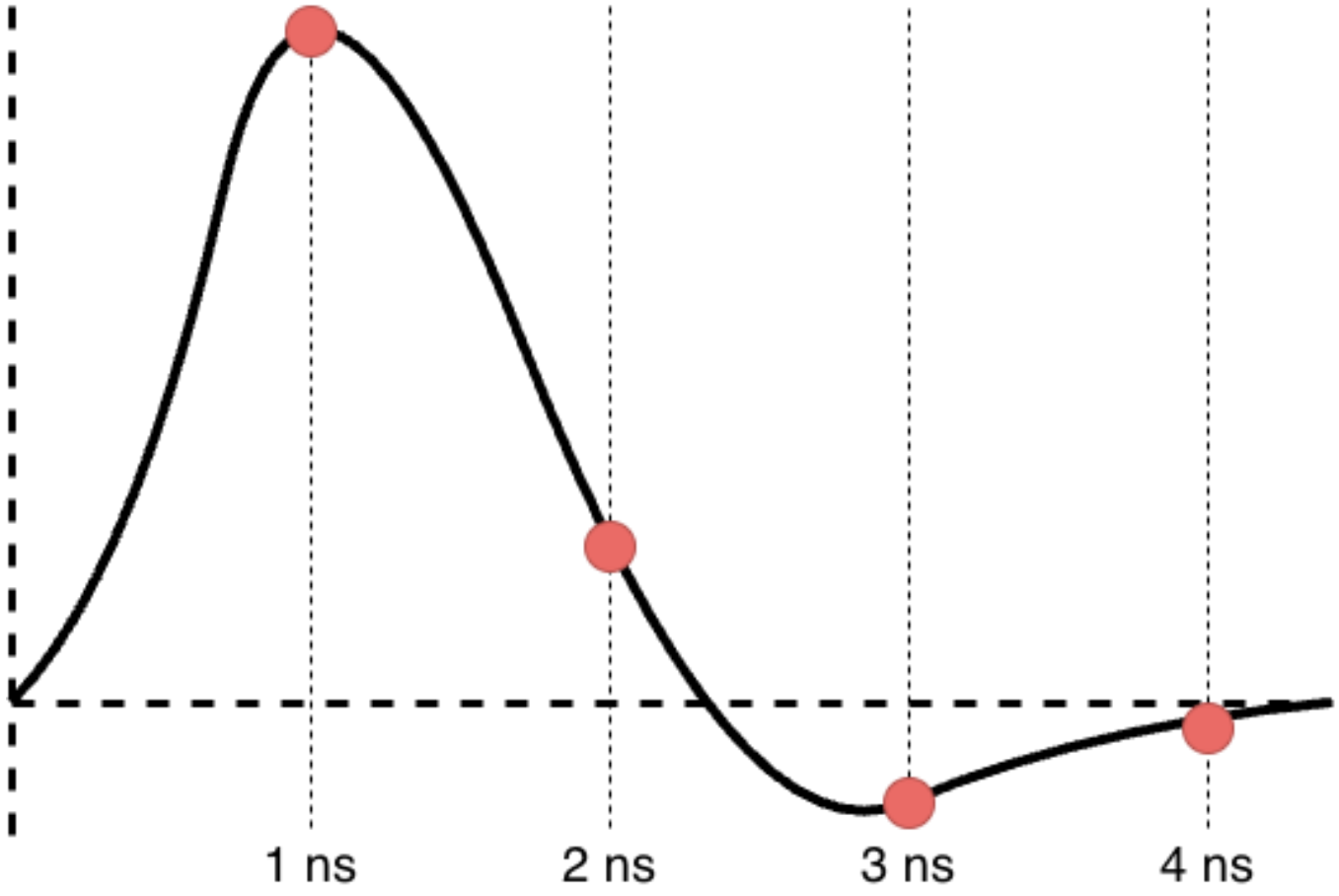
2026 Thresholds – After March Access				
Channel	**Threshold**		**RAW**	
CH0	10 mV	20 ADC	10 mV	20 ADC
CH1	20 mV	40 ADC	10 mV	20 ADC
CH2	15 mV	30 ADC	10 mV	20 ADC
CH3	20 mV	40 ADC	10 mV	20 ADC

Threshold Adjustment

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

Optimising phase

- Sampling occurs every 1ns
- Signal ~4ns
- 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

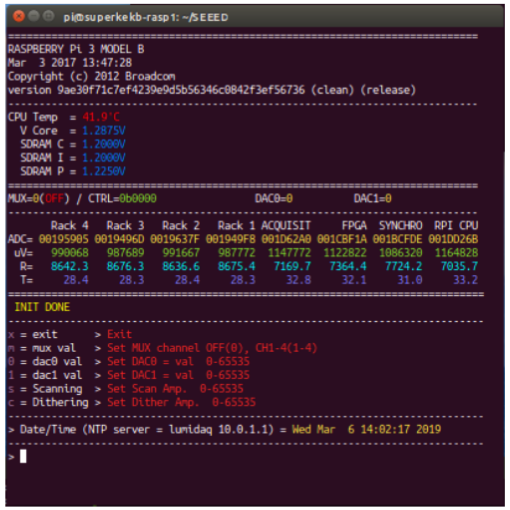


Operation Guidelines

- 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 marigold
# then in the newly open terminal :
cd SEEED
sudo ./mux_dac
```



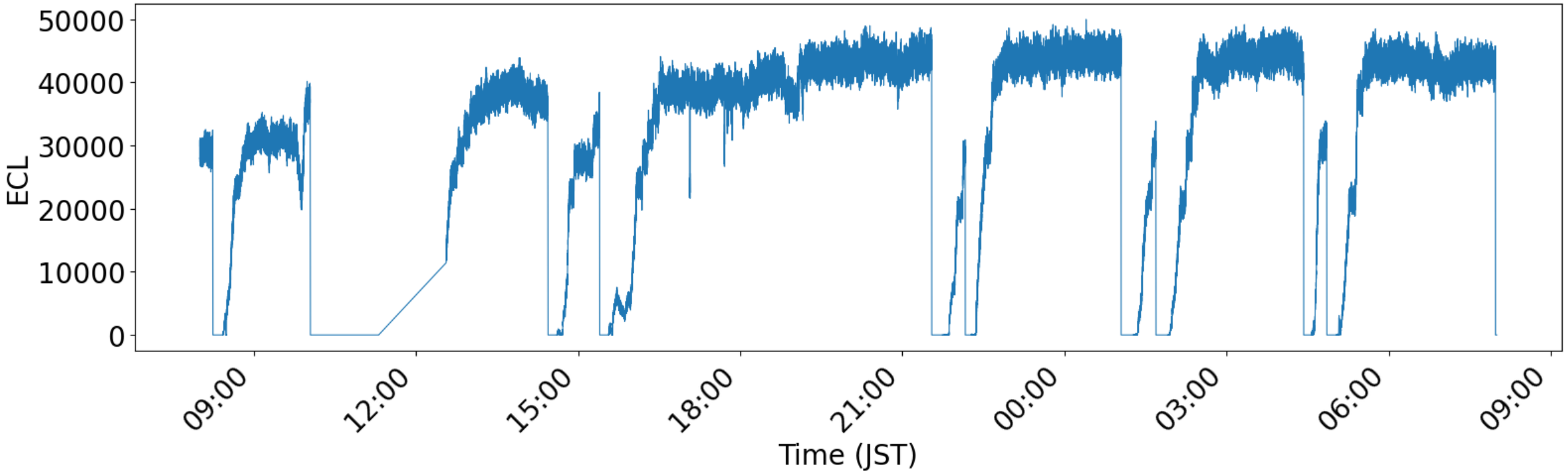

```
#Here, you can scan the optimum phase to sample at the peak of the signal,
#for Scan: s->type the start phase (0-65535)->type the stop phase
(65535)->type the step->type the time interval->start
#Set the optimum phase, here it uses the DAC0, then type 0->type the phase
you want
( please note that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

Phase Scan

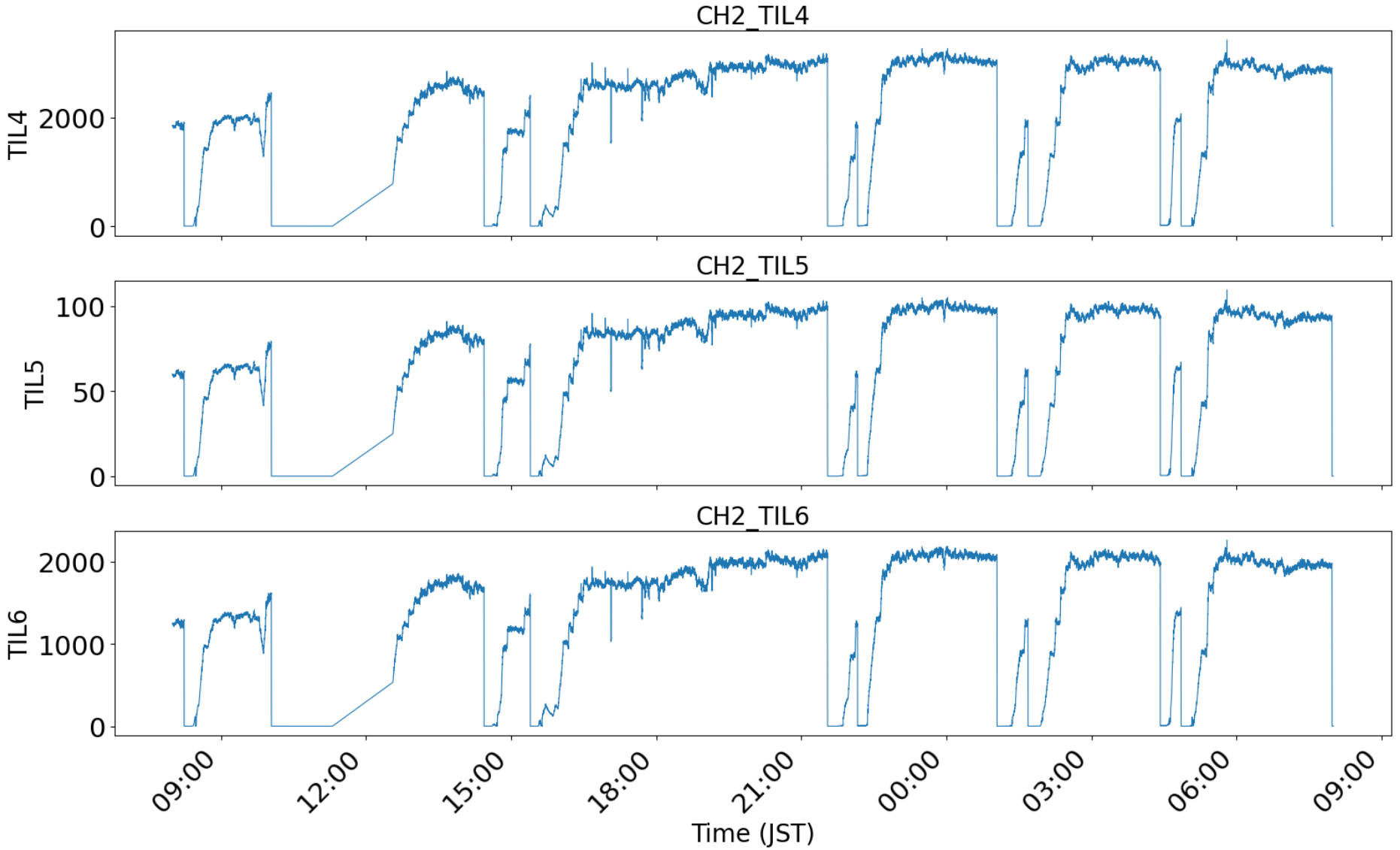
- Use a combination of wires (1-4ns)
- Use a trombone
- The idea is to be able to tune the sampling with the CAMONITOR reading to get the peak
- Cannot do this during shutdown

Section 3: Post TMUX Data

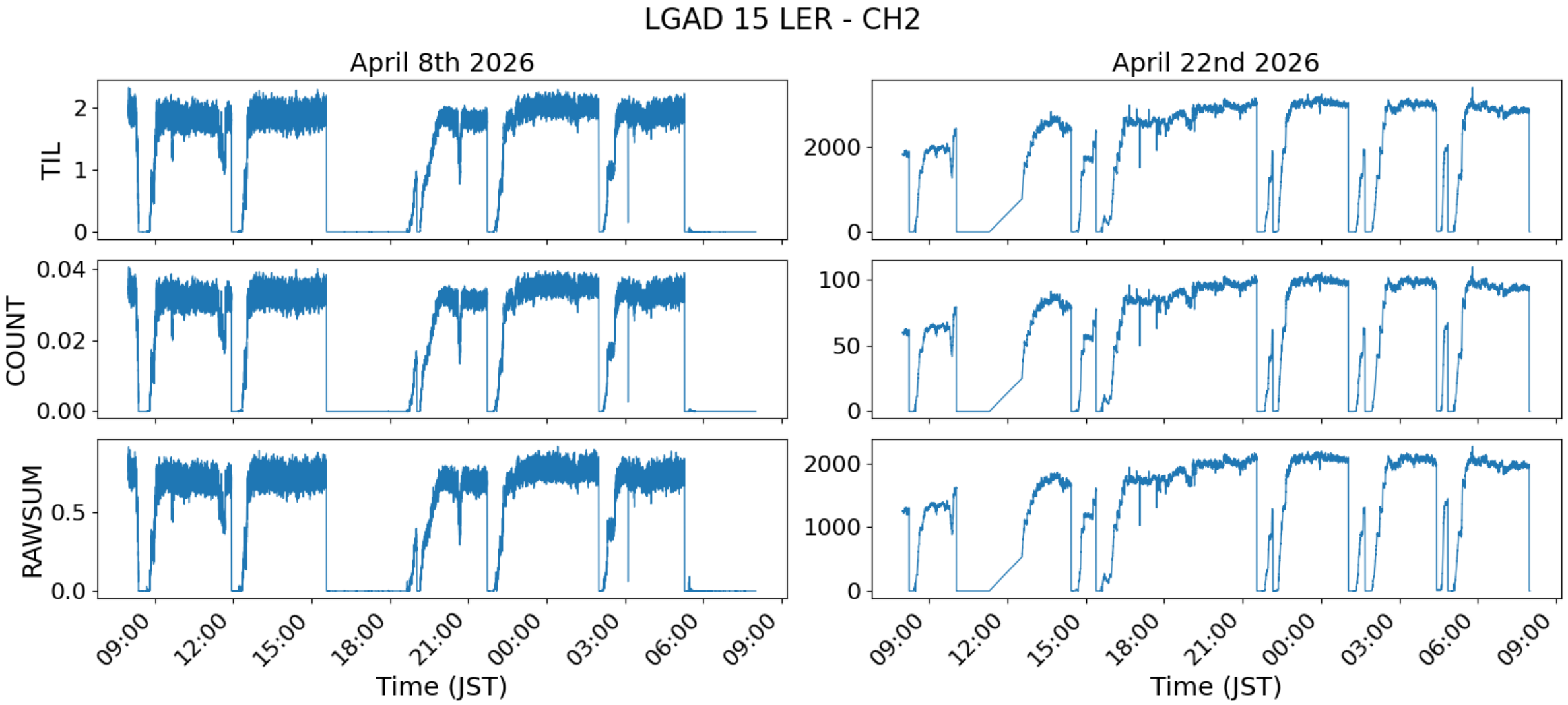
ECL – 2026-04-22



simple_all_PV_1Hz_2026-04-22-08-00-00

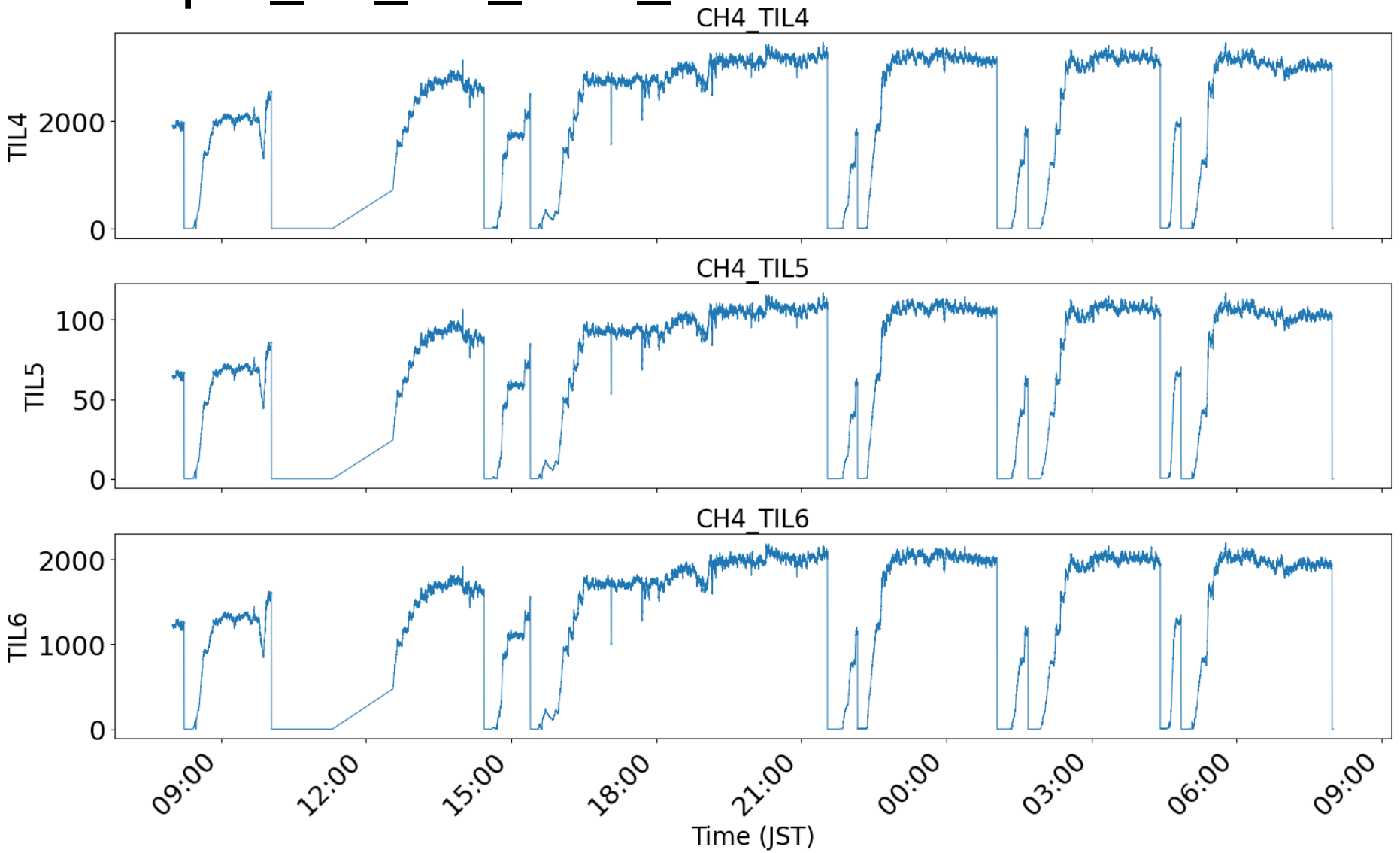


2026-04-08 v 2026-04-22

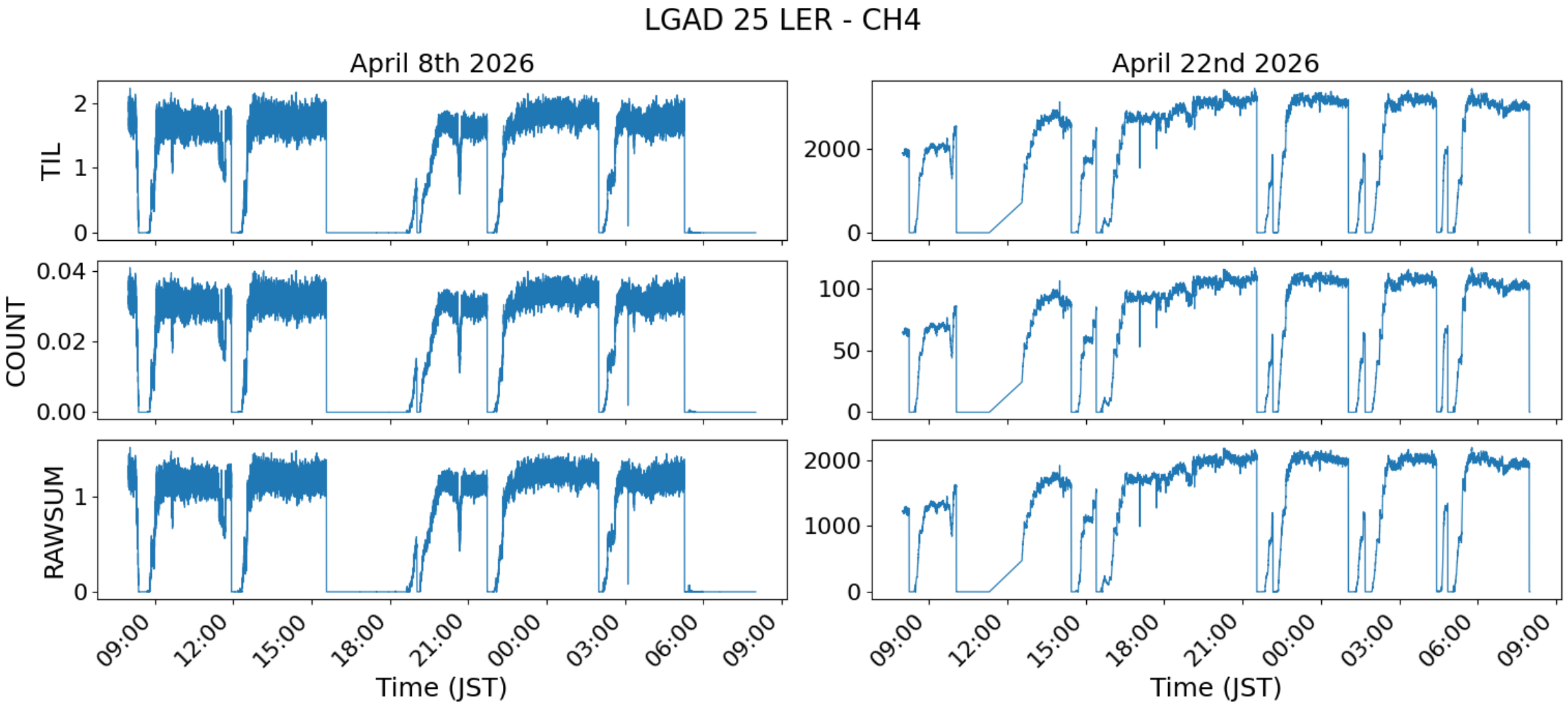


LGAD 25 LER

simple_all_PV_1Hz_2026-04-22-08-00-00



2026-04-08 v 2026-04-22



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