

NEVER DROP A HIT

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Software-Design Concept

- Never Drop a Hit:** If the data is too huge, stop the system with error. **NO SILENT FAIL**
- Multi Detectors and Computers:** HPGe, PMT, Si, and many detector types are required. Using several computers via network.
- User Friendly:** No Physicist wants to learn a complicated setting system. Status visible at a glance, from any web browser.
- Record All Run Information:** All settings have to be stored automatically. Writing the log book at midnight is the hard work :)

Never Drop a Hit

- DELILA has no data-dropping mechanism. For example, the backpressure of ZeroMQ to stop data transfer.
- When the data stream is too huge, DELILA uses all computer memory and stops with an error by itself.
- The Monitor component drops data sometimes. For example, when many channels need heavy processing (PSD vs ADC for 40 channels at high rate).

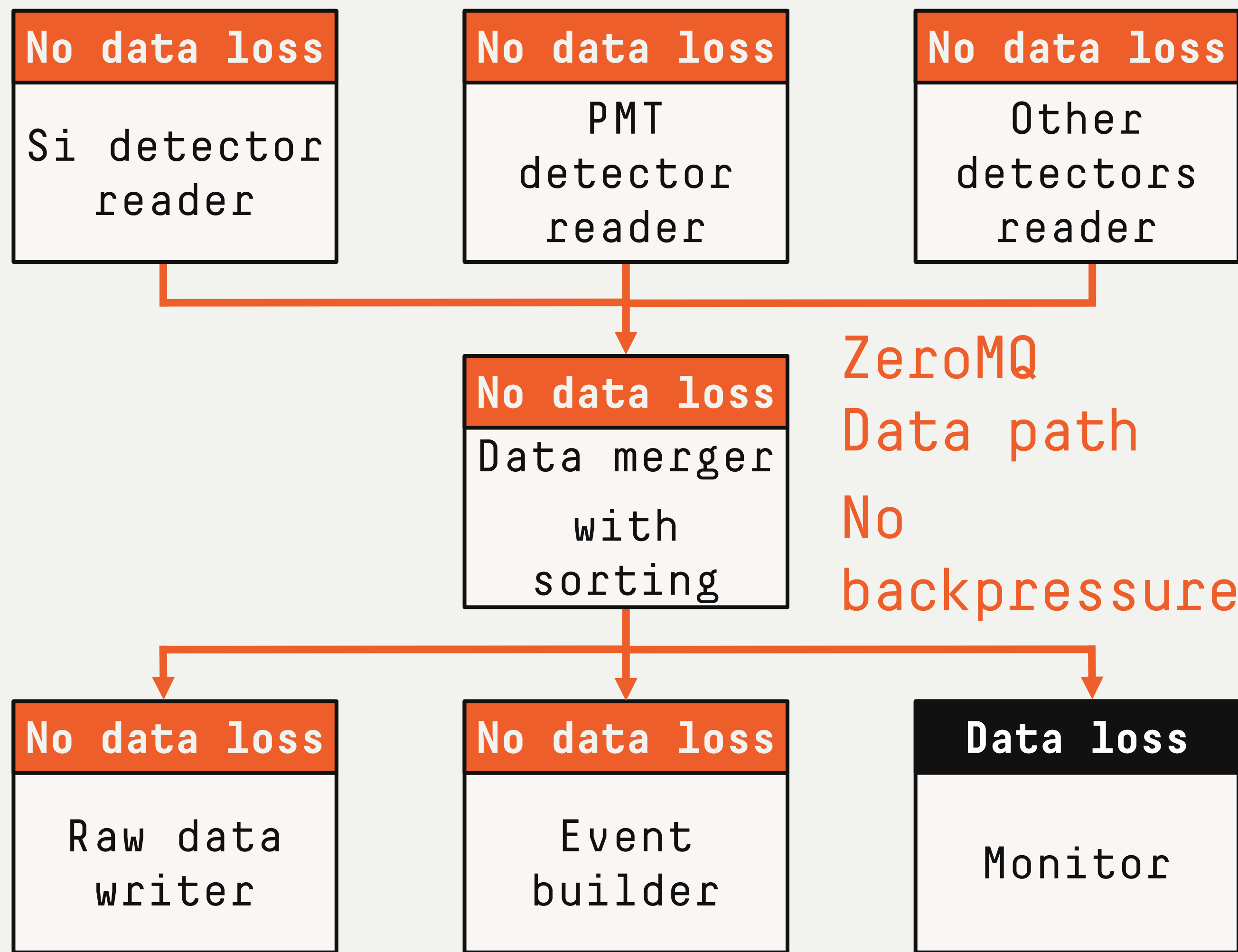
Nothing perfect - But solutions

- Digitizer drops (front end) ➔ counted and shown, never hidden
- When memory full ➔ stop and write all data to the file
- When disk full ➔ Real trouble! watched by watchdog script

5.28 MHz
event rate for
13 hours

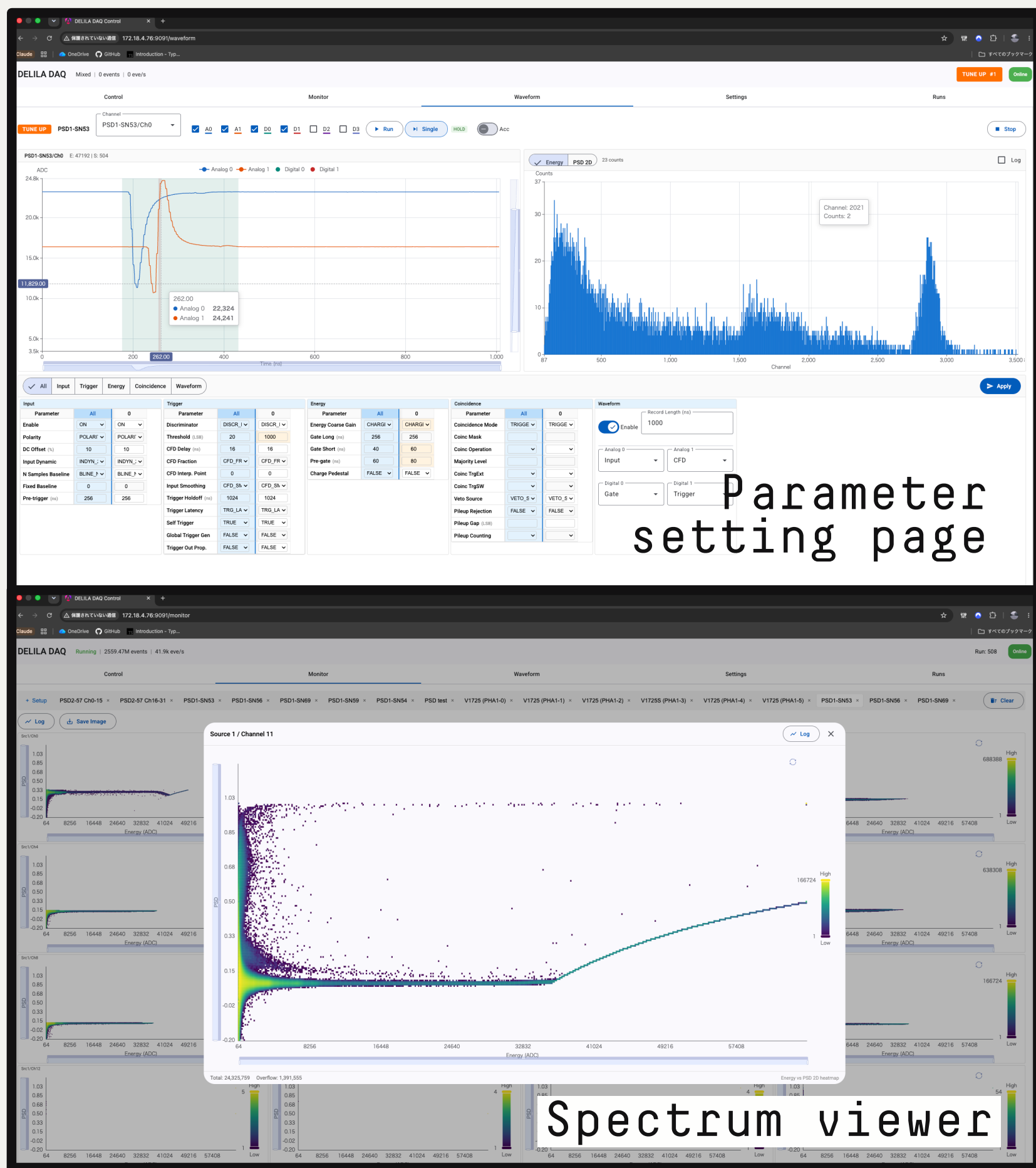
0
heartbeat loss
during 3-day run

Multi Detectors and Computers



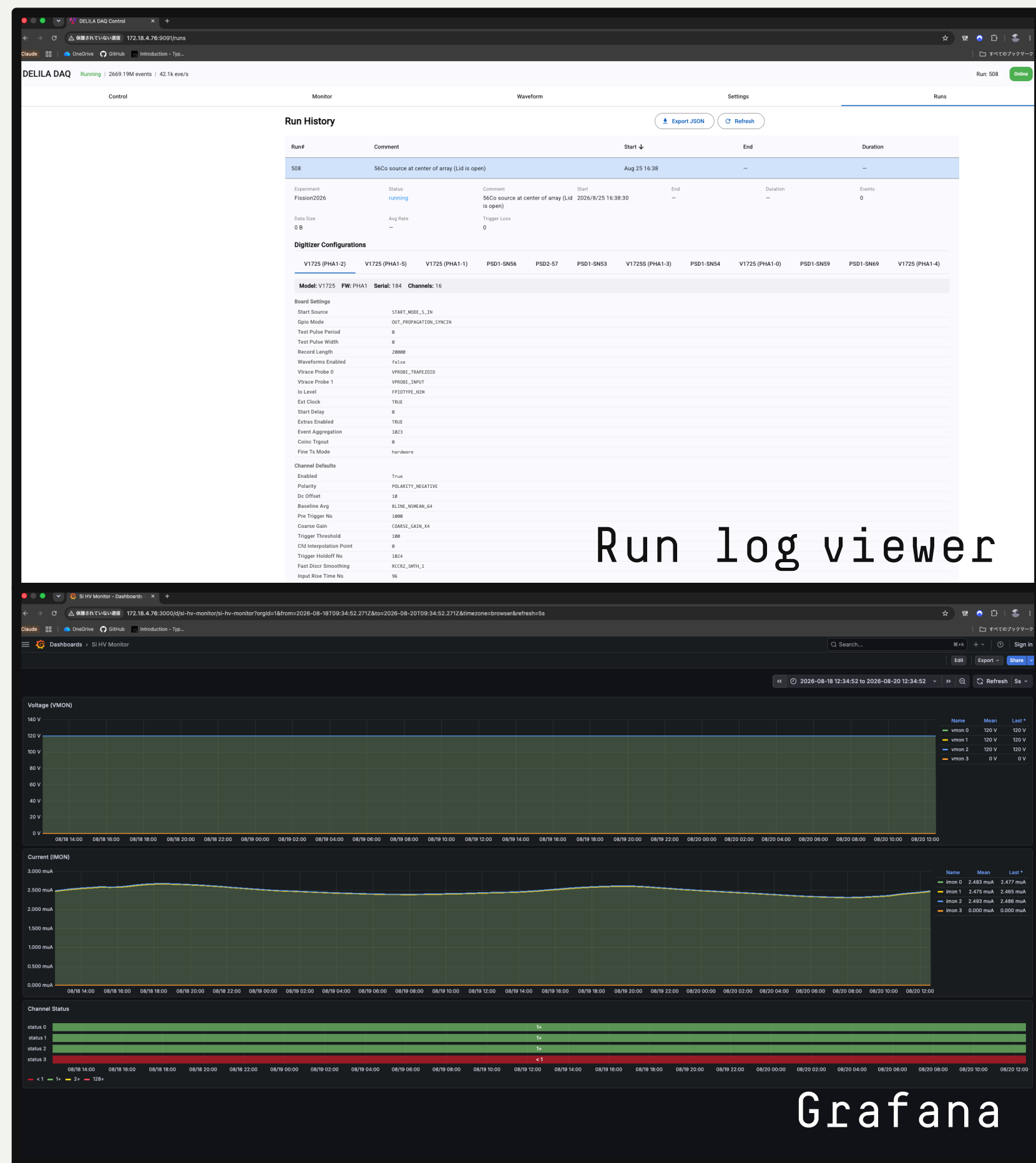
- All Components are built in Rust and C++.
- Components can communicate with each other over computers.
- Raw data format is self describing binary format.
- Event builder is fully C++. Because the output format is ROOT and Rust version of ROOT data writing has no compression option.

User Friendly



- Tune parameters and see the spectrum and waveform on your browser
- Basic plots are supported, energy distribution, PSD vs ADC, and experiment specific plots can be added
- Installation is also easy. Only the CAEN library, ROOT, and Rust toolchain are required

Record All Run Information



- Run information is stored in MongoDB and shown in log part
- All settings of digitizers, lost-trigger count
- Counting rate and power supply information are stored in InfluxDB. Gas pressures, environment information will be supported soon
- Grafana for visualization

Record of the system

5 years
since the first
experiment

28
publications
using DELILA

Predecessor version
{Full C++}:
IEEE Trans. Nucl.
Sci. 72(12), 2025



This work
{Rust and C++}:
github.com/ELI-NP/
delila-rs

