Digital Board Reader

presentation meeting

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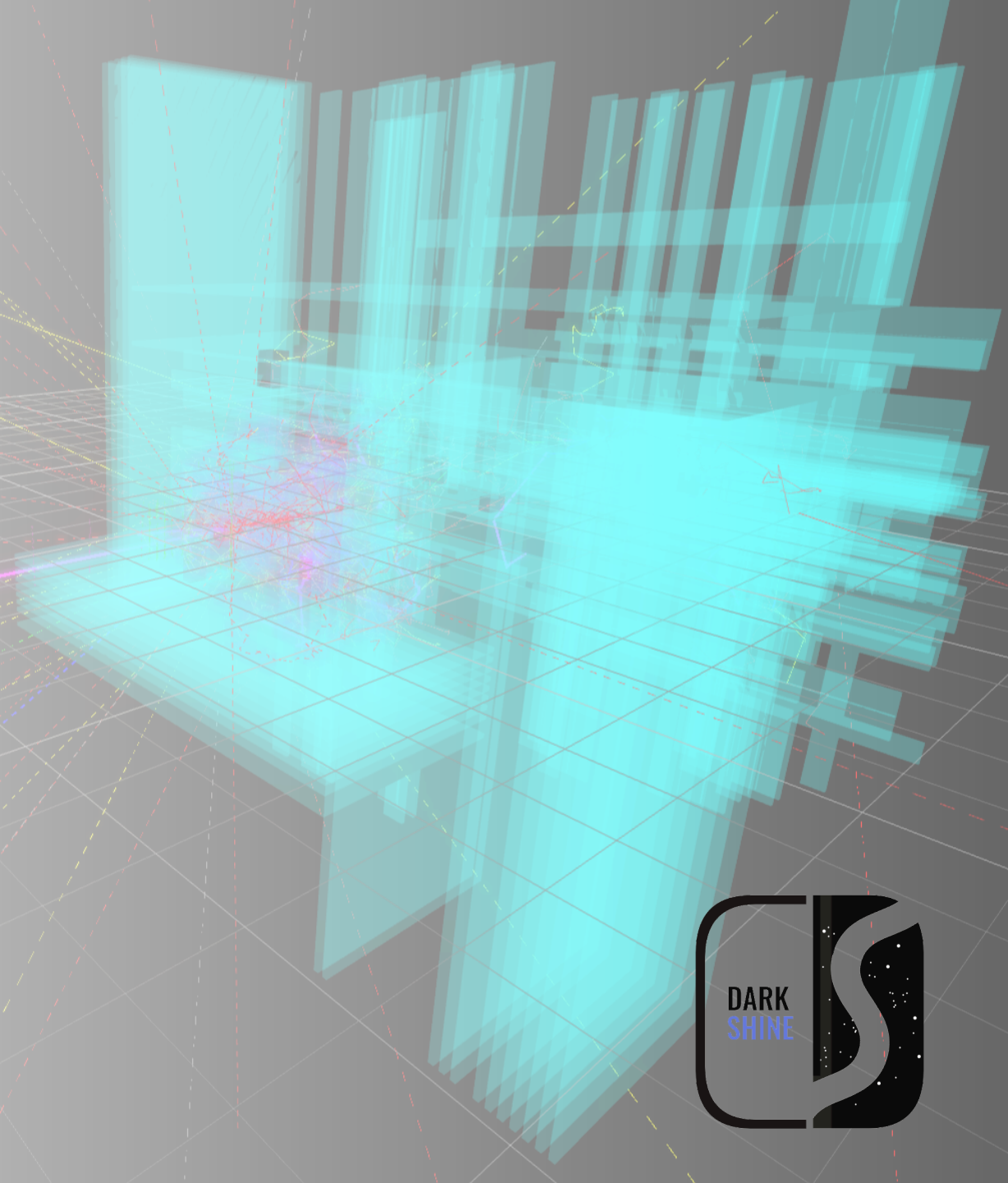

[1] TDLI

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Outline

1. Digital Board Reader Intro
2. Known bugs in digital board firmware

Digital Board Reader Intro

Digital Board Binary file reading, waveform plotting, root file output.

Binary file processsing:

- **Flexible** data header/data recognition
- Fast header **id finding**: jump to any event id < 1 s
- File **corruption tolerance**

Quick Plot:

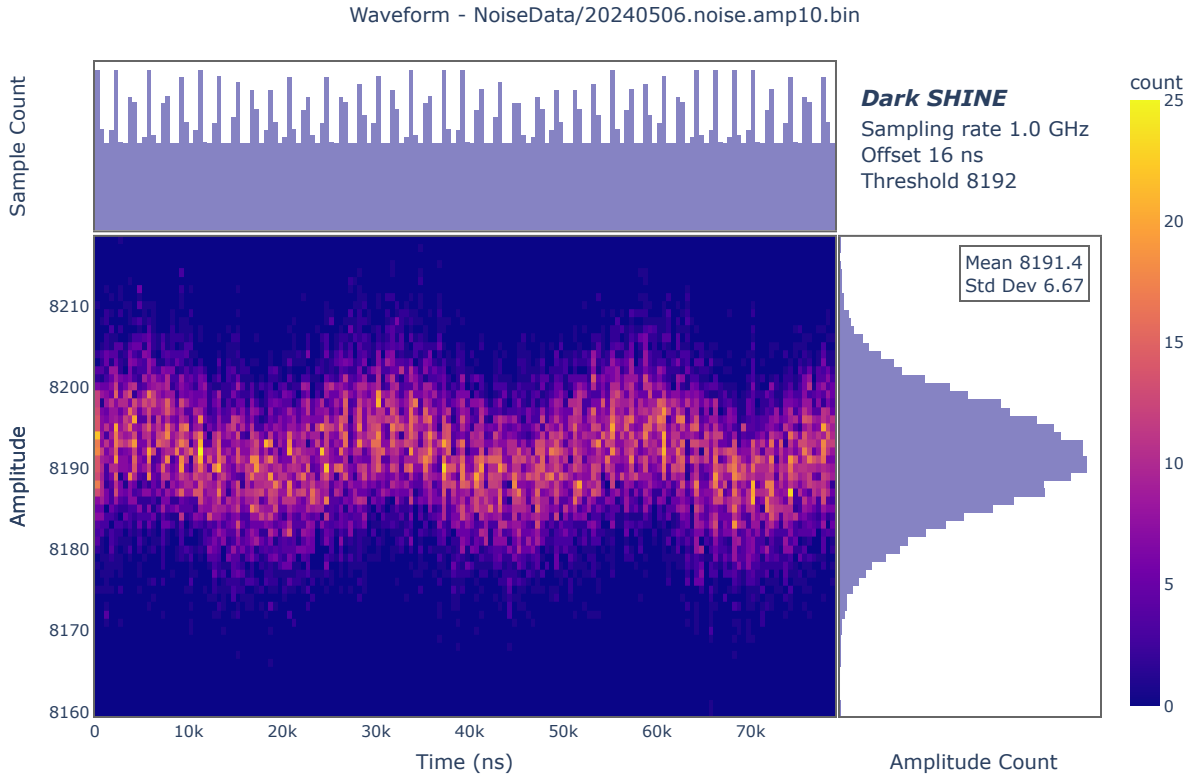
- Waveforms plot
- Frequency analysis
- Single event baseline, deonising(optional)

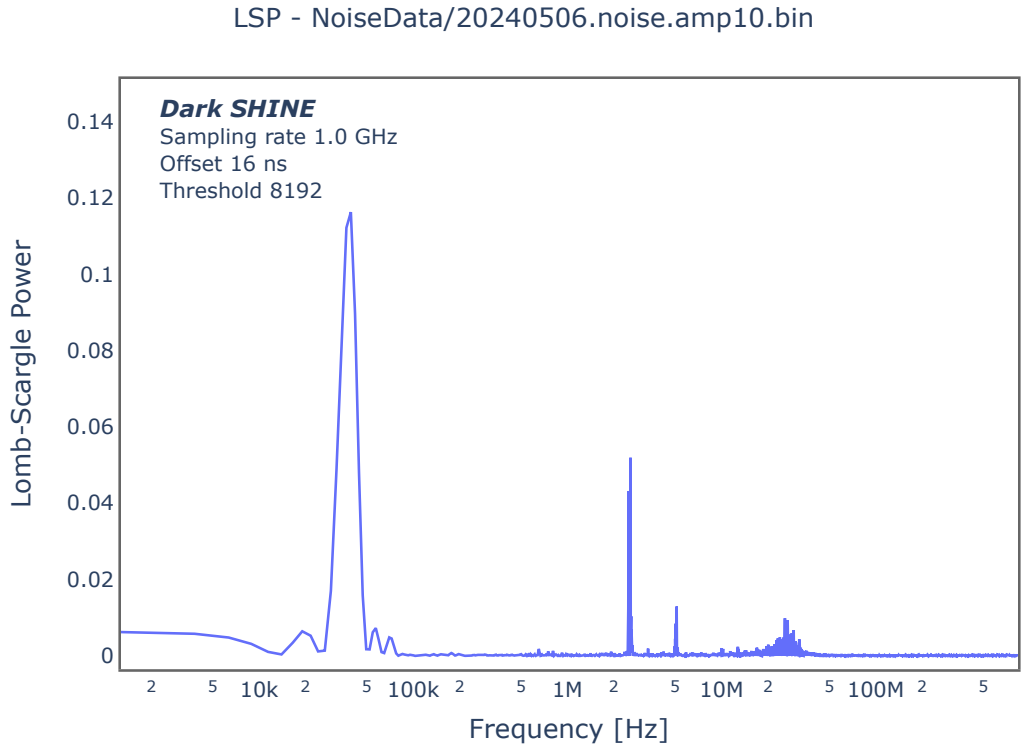
Root file output

- Event info (mean, std, max, mean, integration, id, timestamp, data length, channel n etc.) in root file. No raw data stored.

Digital Board Reader Intro

Frequency analysis: Use Lomb-Scargle periodogram for unevenly sampled data.

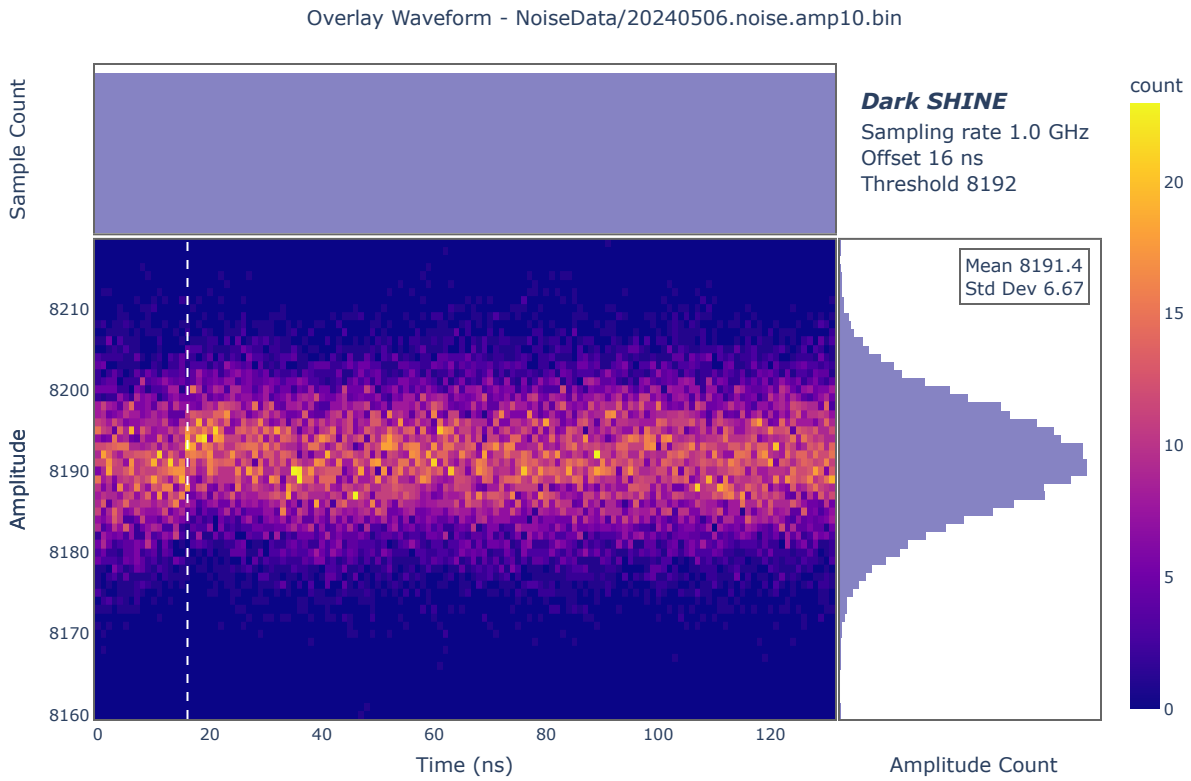


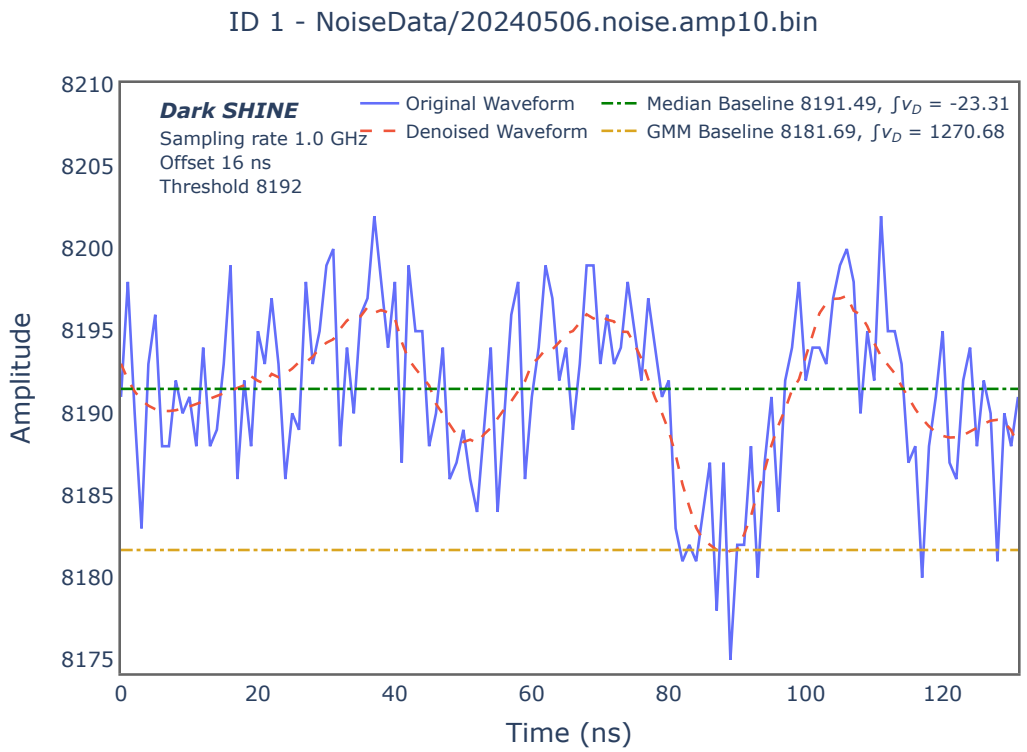


Digital Board Reader Intro

Baseline finding, denoising

Denoising algorithm: Savitzky–Golay filter is more effective at **preserving high frequency signal** components but less successful at rejecting noise.





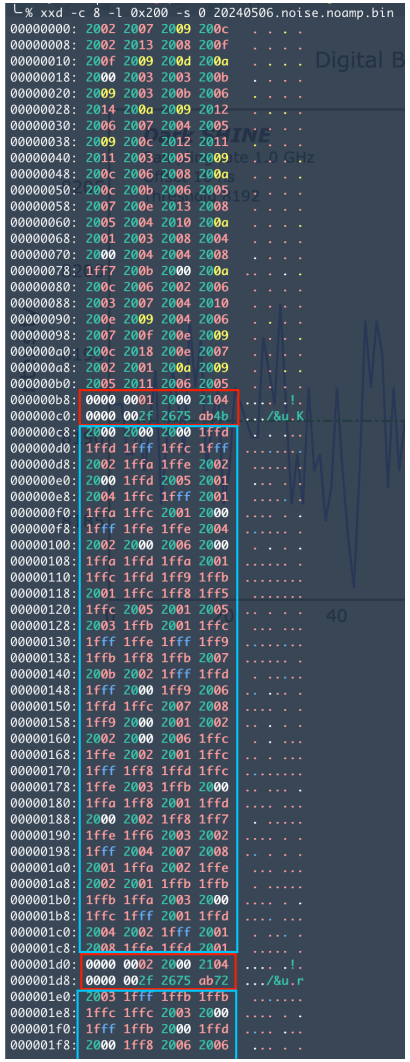
Known bugs in digital board firmware

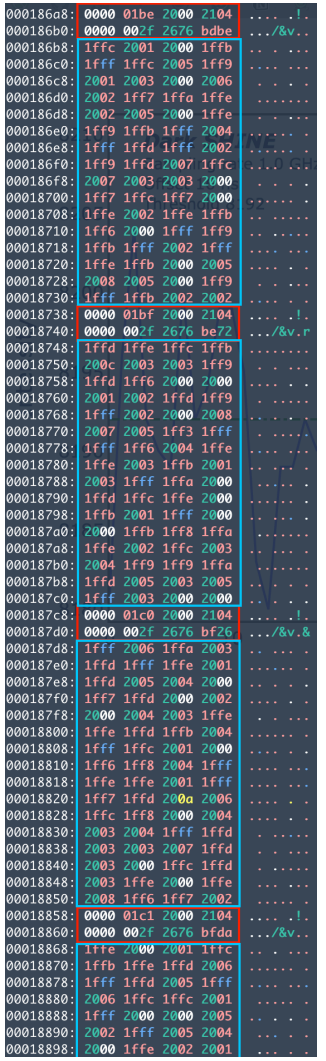
Major bug 1: Data packet incomplete

Across different noise samples:

Header id	Expected Data size	Actual Data size
id < 264	264 Bytes	264 Bytes
id >= 264	264 Bytes	128 Bytes

Minor bug: header 1 not starting from 0B

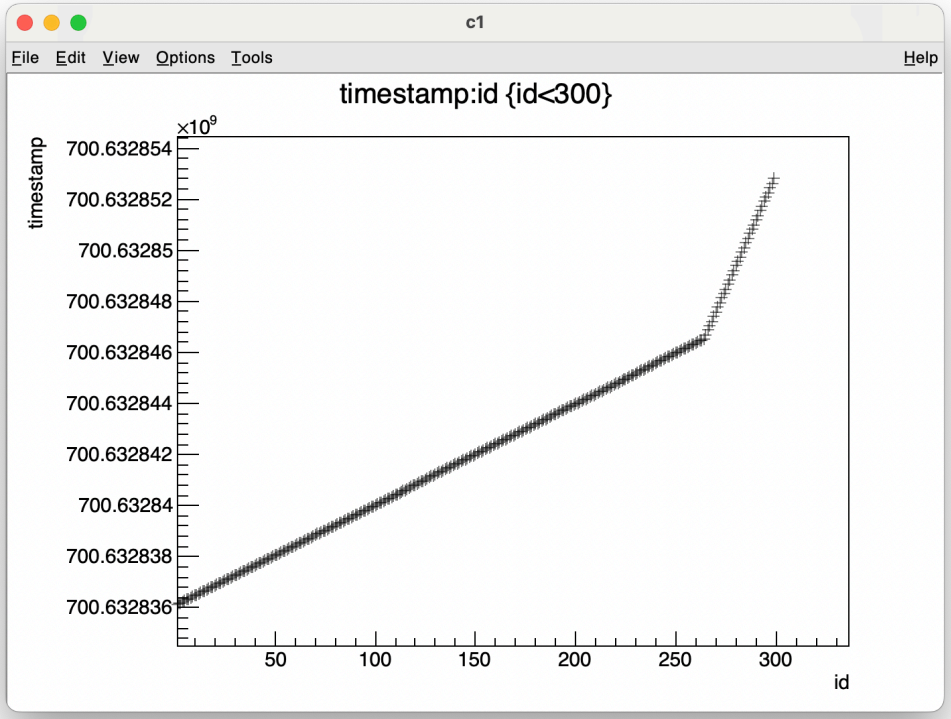


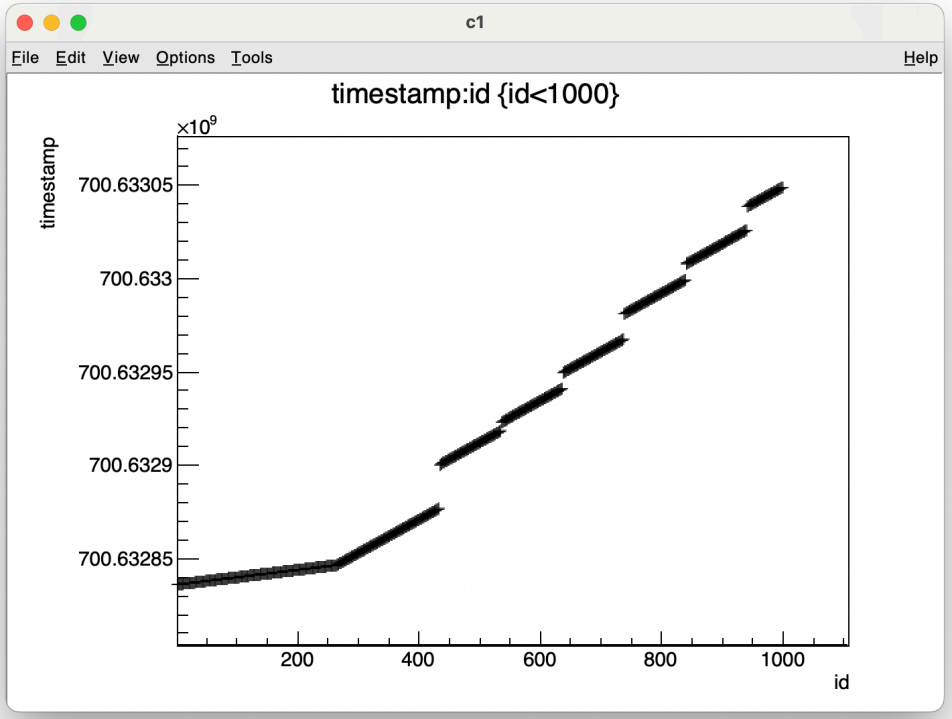


Known bugs in digital board firmware

Major bug 2: Wired timestamp behavior

In nosise sampeling, with threashold and other parameter not changed, the trigger rate changes. And some time gap bettwen higer id.





Thanks

GitHub Repo