DATE: EXAMPLE

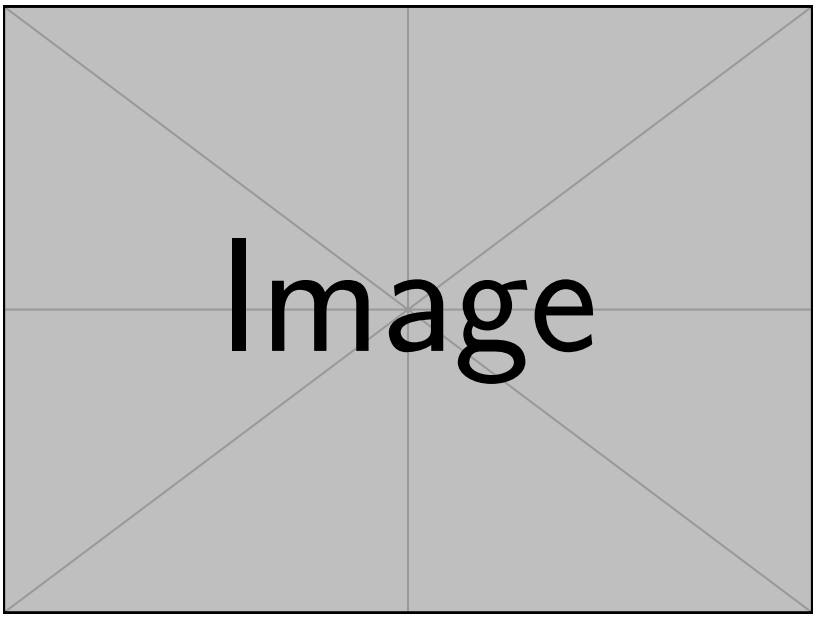

FIGURE 1: Example image for templating

DATE: 02.04

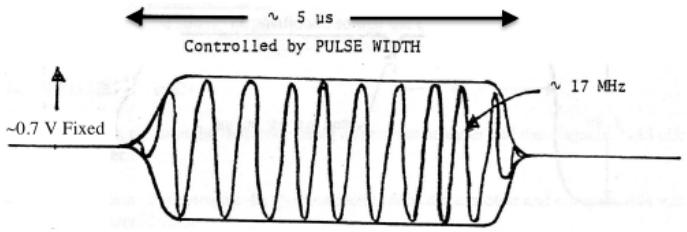

Figure 2. Conceptual sketch of r.f. pulses at the PROBE HEAD.

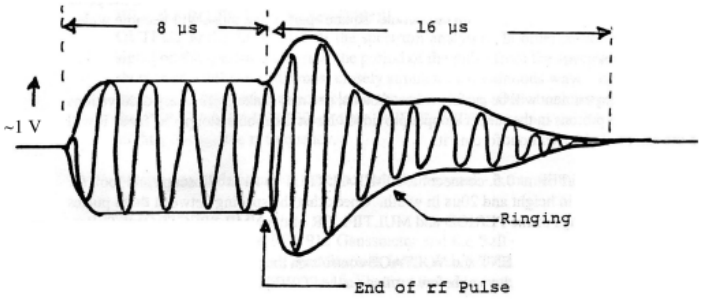

FIGURE **02.04A.1**: Sketch of r.f. pulse from [1] as a test if my printing format works as expected. The bottom figure shows r.f. pulses at the LF-HF OUTPUT for RC FILTER set to HF.

DATE: 02.07

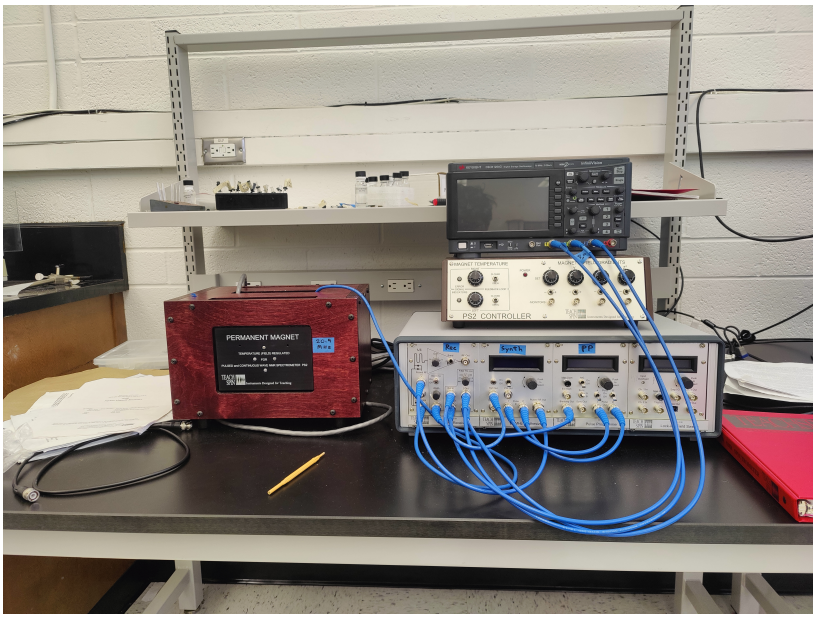

FIGURE **02.07A.2**: Initial experimental setup for NMR.

DATE: 02.11

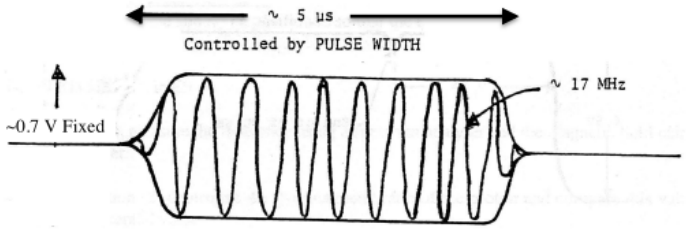

FIGURE **02.11A.3**: Conceptual sketch of r.f. pulses at the PROBE HEAD from the lab manual [1].

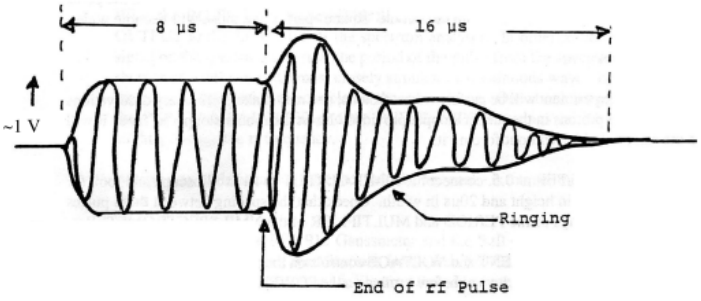

FIGURE **02.11A.4**: r.f. pulses at the LF-HF Output for RC Filter set to HF from the lab manual [1].

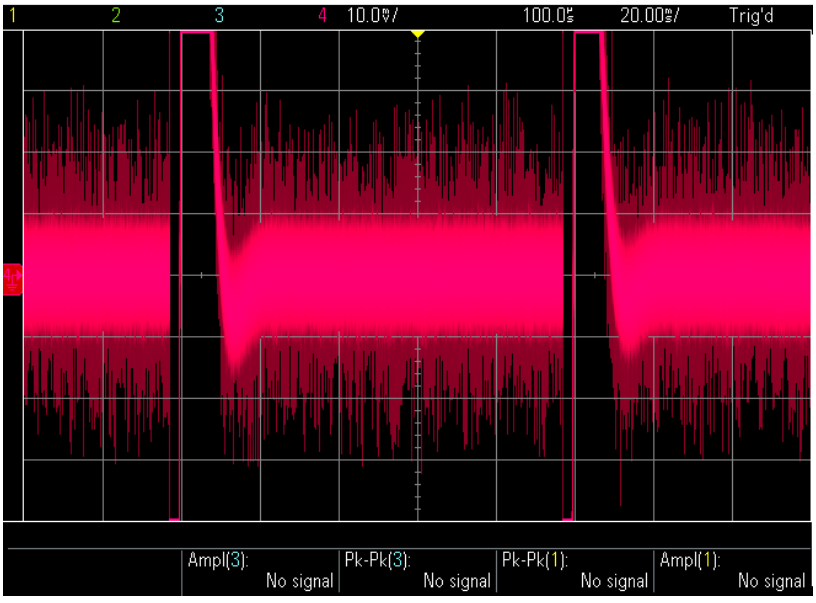

FIGURE **02.11D.1**: Initial Reading from Osciilloscope. Notice Peaks

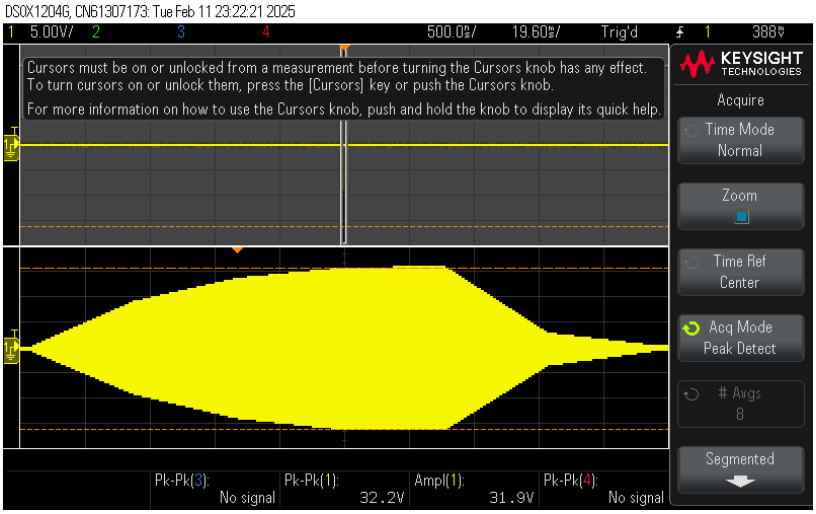

FIGURE **02.11D.2**: Scope readings using zoom mode. Clearly we can see the packet.

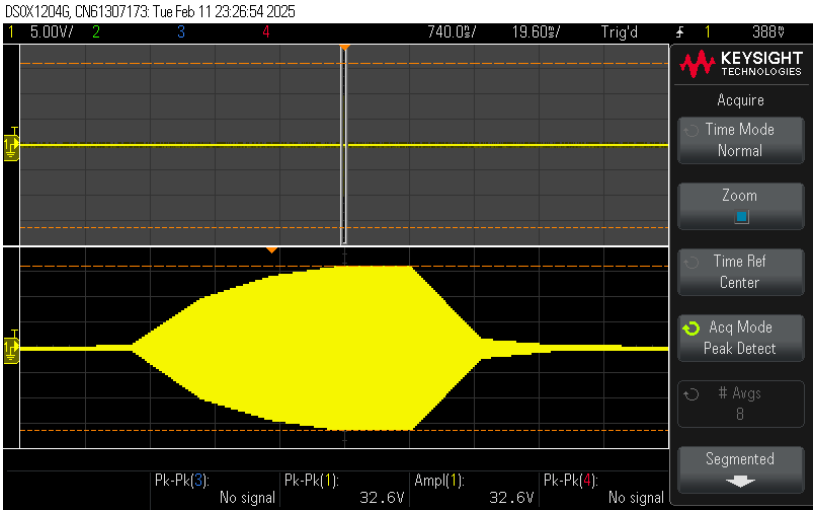

FIGURE **02.11D.3**: Another scope reading using zoom mode. Maximum voltage observed $V_{pp} = 31.5 \pm 0.5\,\mathrm{V}$

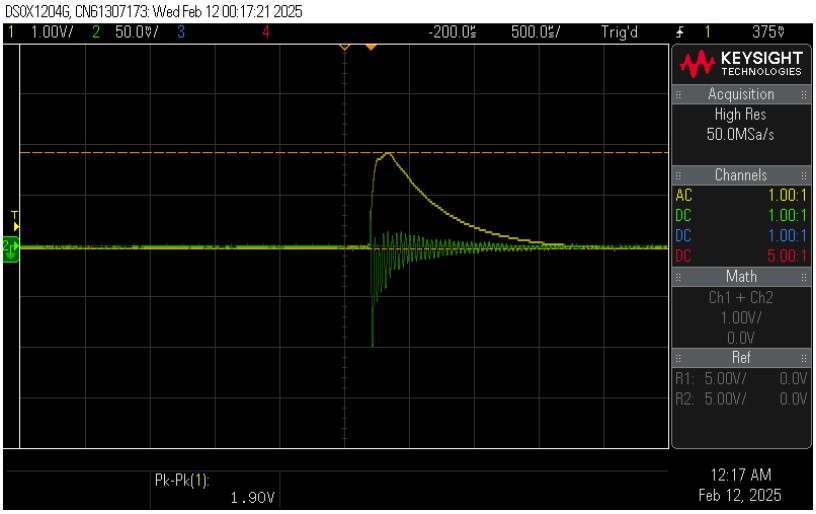

FIGURE **02.11E.1**: FID Signal (Channel One) from Osciilloscope with Difference Signal From Q Output (Channgel Two)

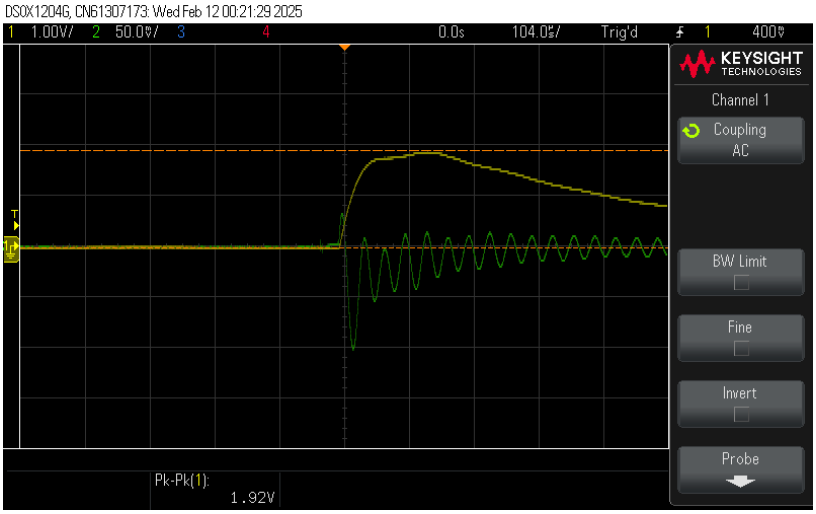

FIGURE **02.11E.2**: Zoomed in version of the previous figure.

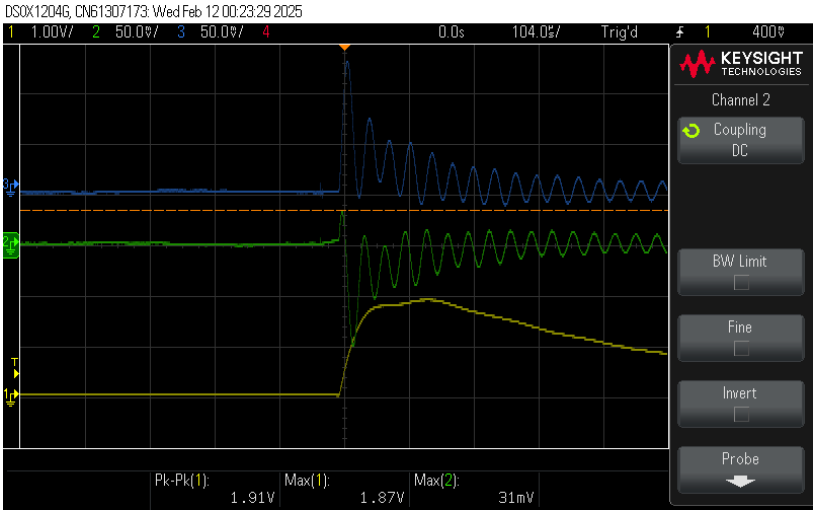

FIGURE **02.11E.3**: FID Signal (Channel One) from Osciilloscope with Difference Signal From Q Output (Channgel Two) and Difference Signal from I Output (Channel Three)

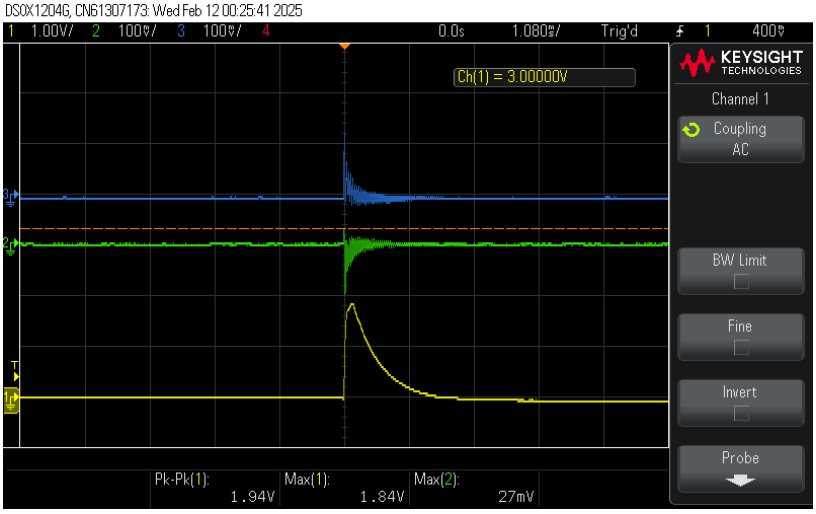

FIGURE **02.11E.4**: Zoomed in version of the previous figure.

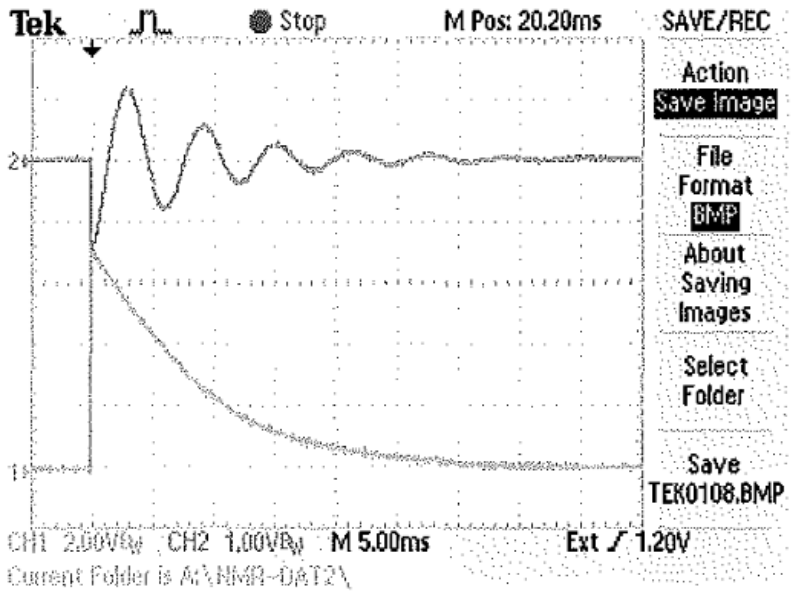

FIGURE **02.11F.1**: Expected FID and Difference signals from the Teach Spin Cw Laboratory Manual [2] (p. III-7)

DATE: 02.14

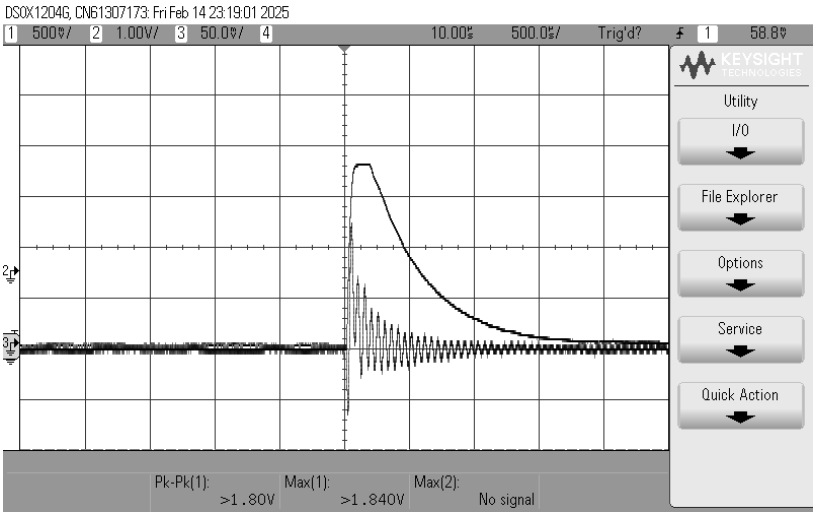

FIGURE **02.14A.1**: New Data Obtained from scope for heavy mineral oil. We can clearly see a more distinct pulse width forming as is expected from Fig. 02.11F.1 and from the 'spin echo' section of the lab manual [1].

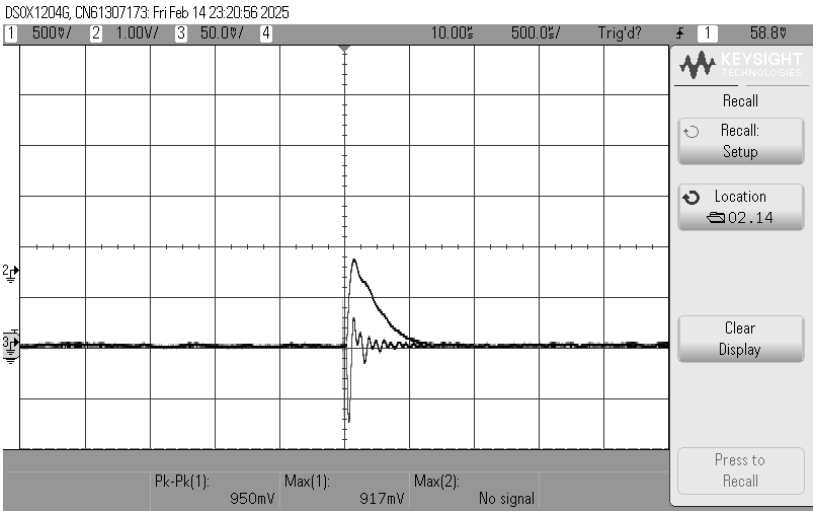

FIGURE **02.14B.1**: Peak obtained when measuring light mineral oil. Clearly, as compared to Fig. 02.14A.1, there peak is signifianly smaller.

DATE: 02.25

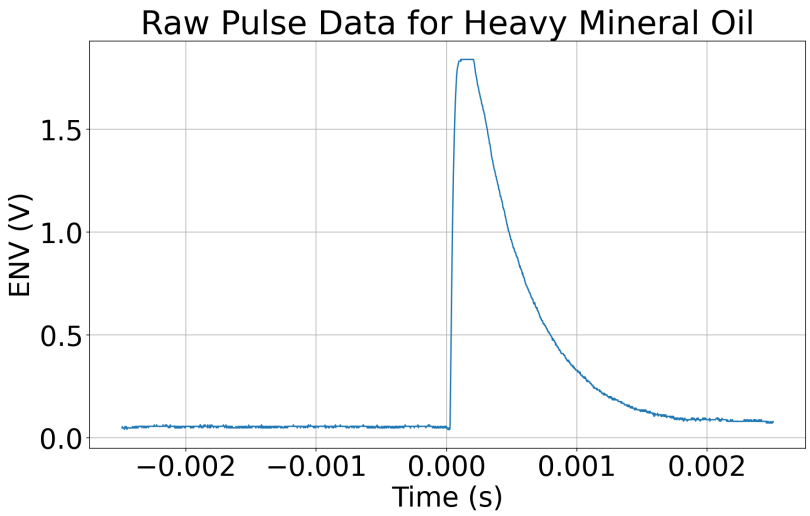

FIGURE **02.25B.2**: Raw Pulse data obtained from the Osciilloscope. We will casterate this dataset to fit the tail of the exponential.

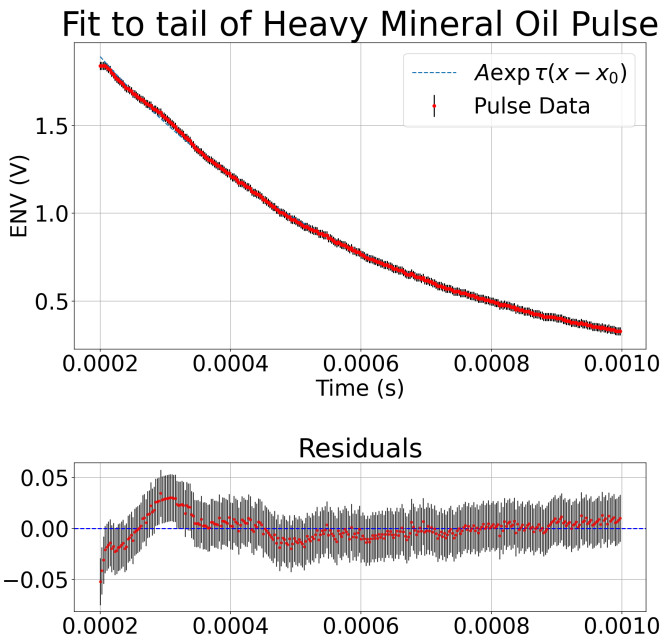

FIGURE **02.25B.3**: Obtained fit using the equation in the graph. Obtained parameters are as follows, $A = 2.0 \pm 70000$ $\tau = -2233 \pm 4$, and $x_0 = 0.0002 \pm 16$ with a $\chi^2_{\text{red}} = 0.2$.

DATE: 02.28

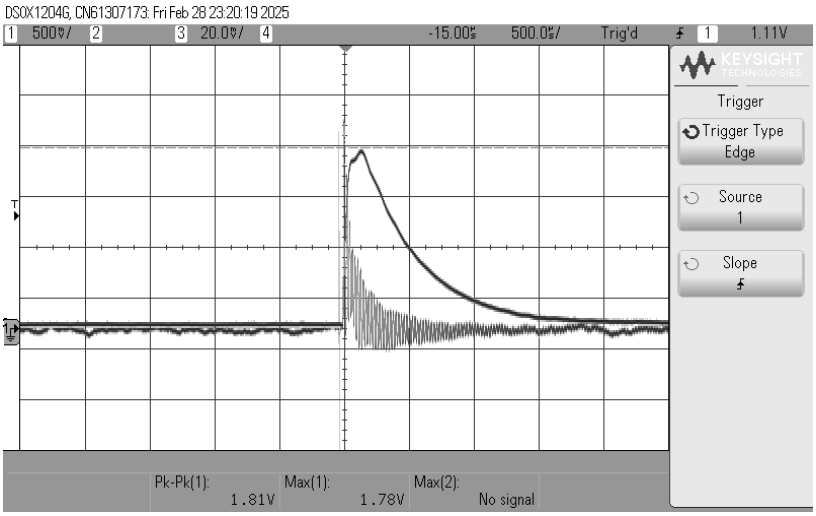

FIGURE **02.28A.1**: Differerent signal than previous measurements observed. Need to retune and adjust parameters.

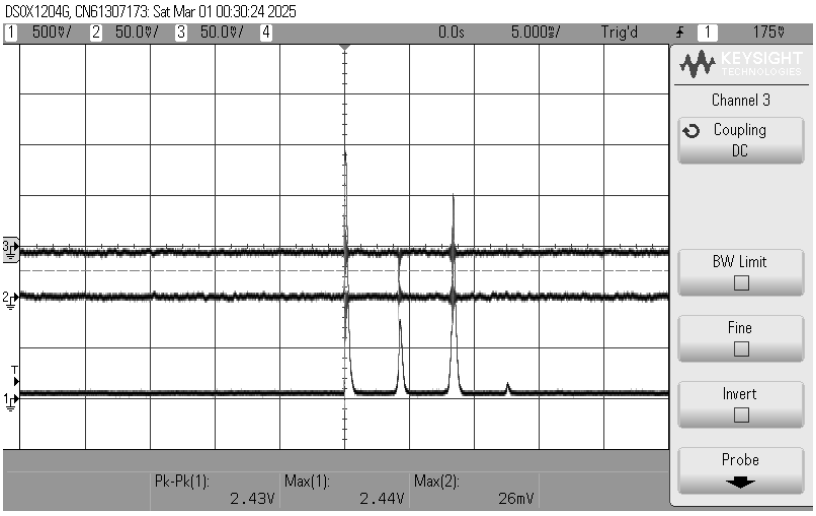

FIGURE **02.28B.1**: Possible Spin Echo observed. First peak is from a $\frac{\pi}{2}$-pulse, second peak is a π-pulse. The third peak may be the observation of a spin echo.

DATE: 03.03

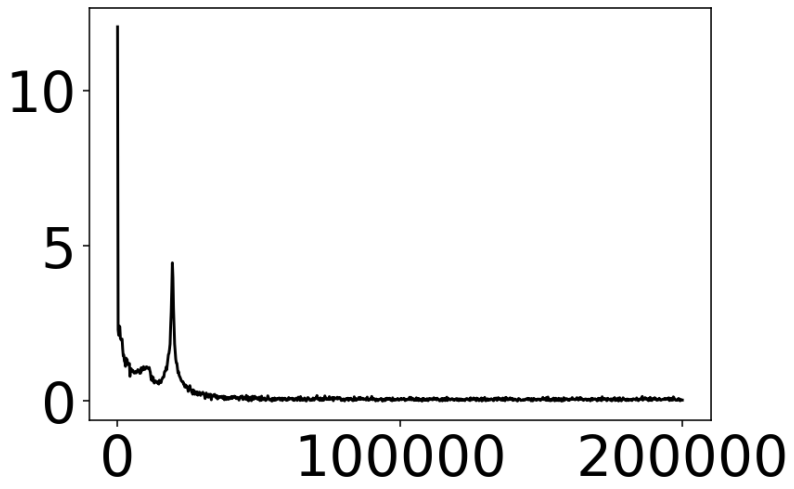

FIGURE **03.03A.1**: Data obtained from taking the fourier transform of the I signal data. Notice the existance of two distinct peaks. One being the mean and the other being the resonance frequency.

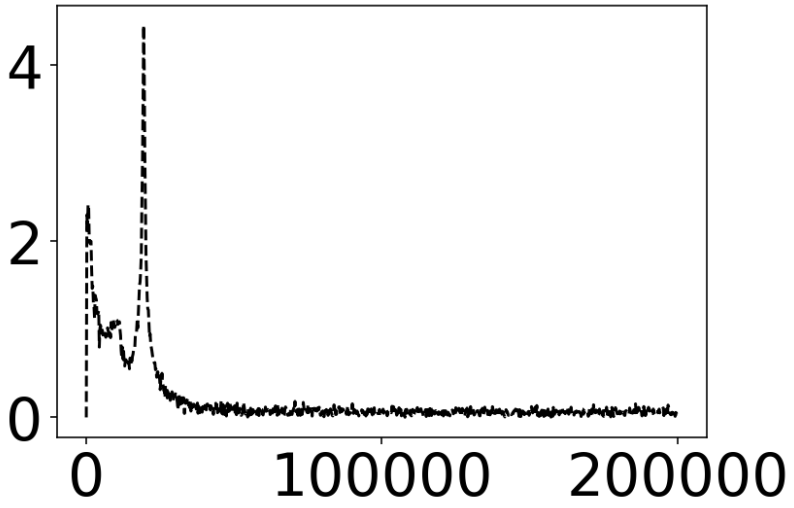

FIGURE **03.03A.2**: Mean removed fourier transform.

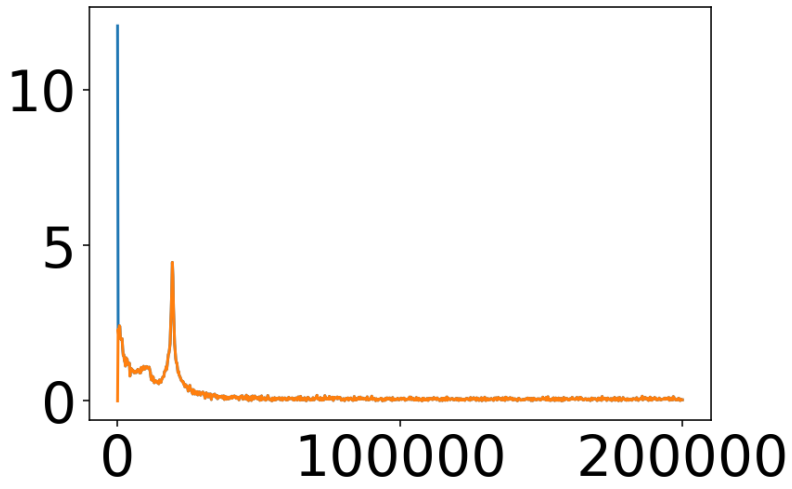

FIGURE **03.03A.3**: Mean removed fourier transform (new).

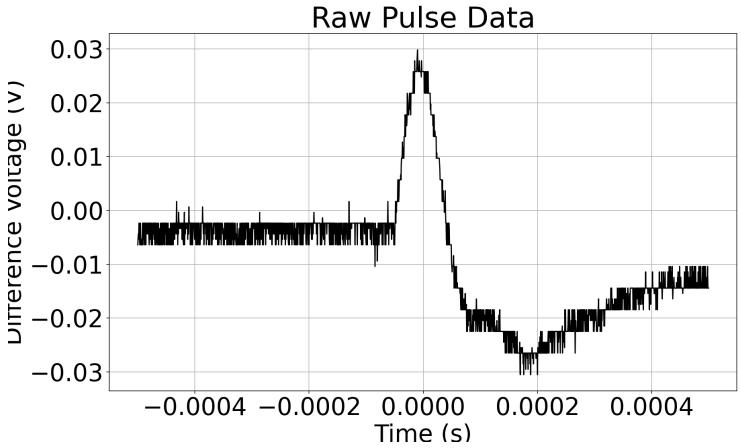

FIGURE **03.03B.1**: Resultant I-signal observed after tuning using fourier transofmr method suggested by SKS.

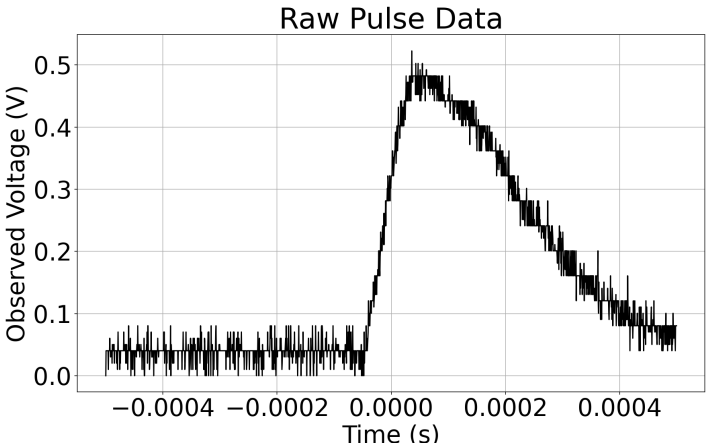

FIGURE **03.03B.2**: Corresponding signal.

DATE: 03.04

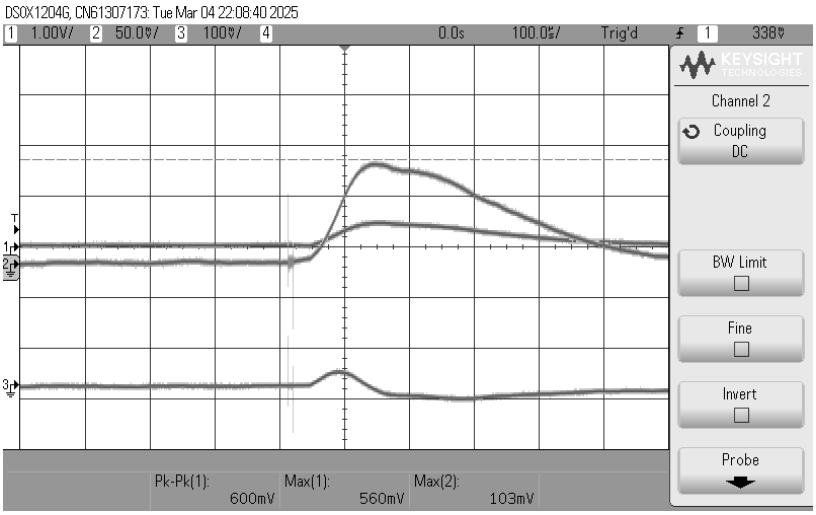

FIGURE **03.04A.1**: Result of a π pulse with pulse length $\ell_\pi = 6.94\,\mu$s.

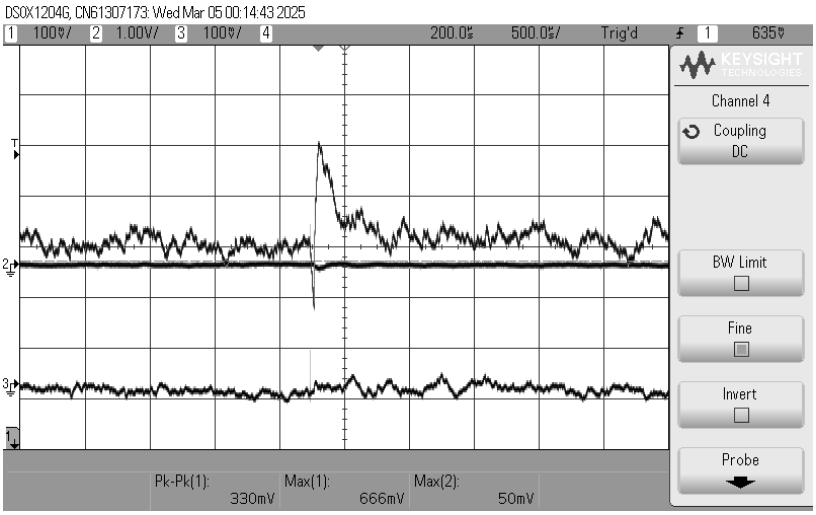

FIGURE **03.04B.1**: Relavent output with new pulse length parameters.

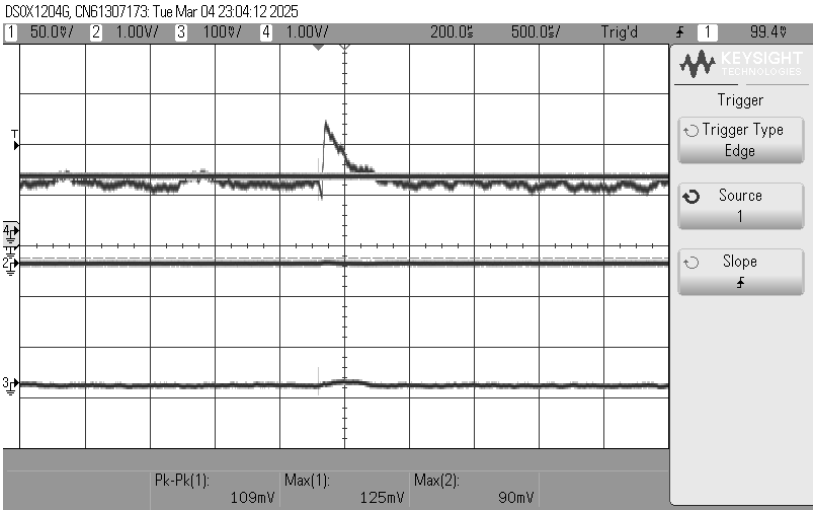

FIGURE **03.04D.1**: Output signal from distilled water sample. Notice that the signal strength is quite low and very noisy.

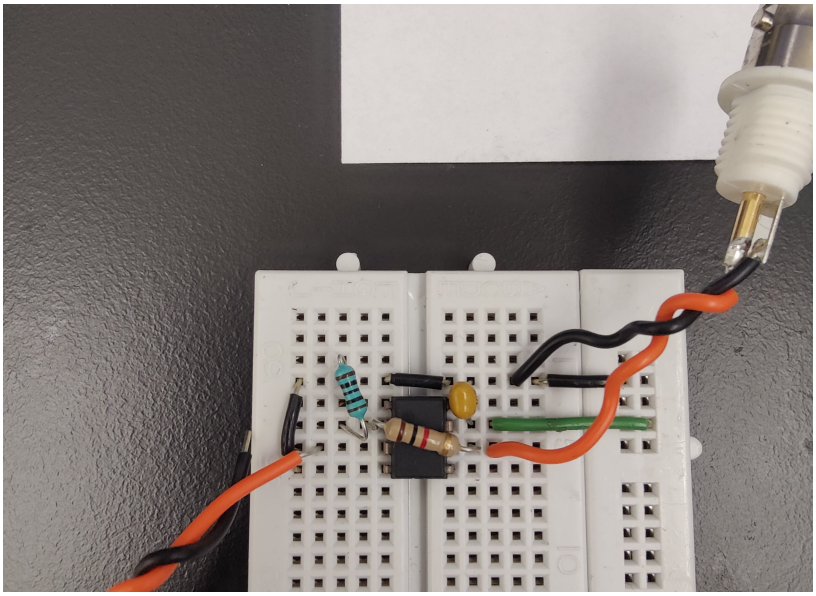

FIGURE **03.04F.1**: Breadboard of non-inverting op-amp.

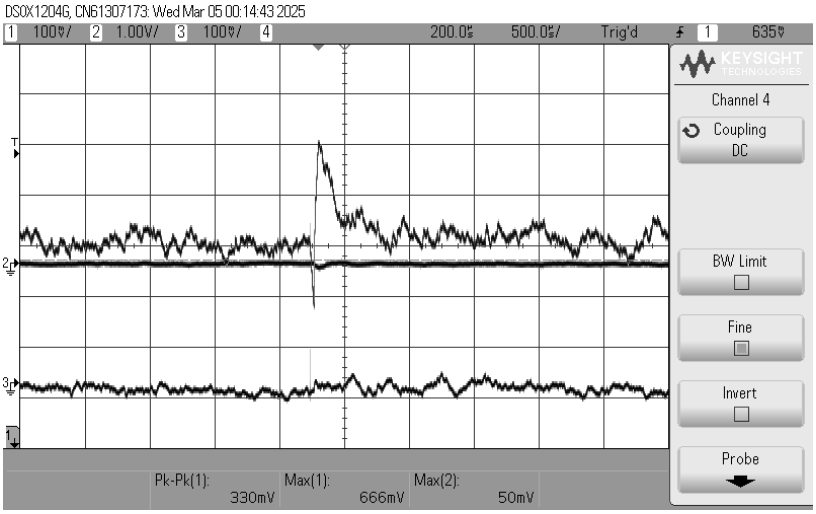

FIGURE **03.04G.1**: Noisy small signal observed.

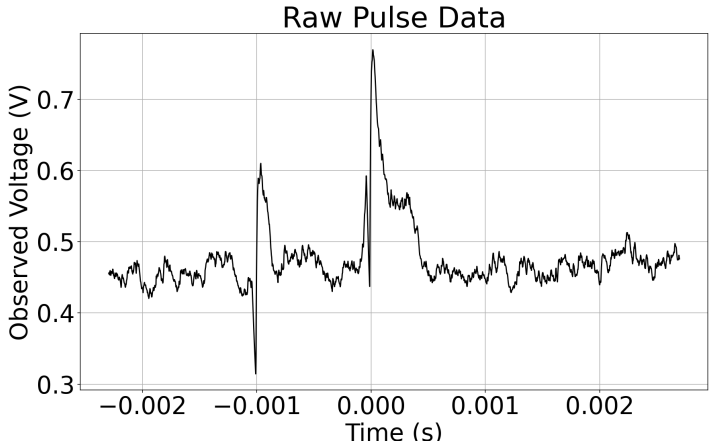

FIGURE **03.04G.2**: Observation for Distilled Water.

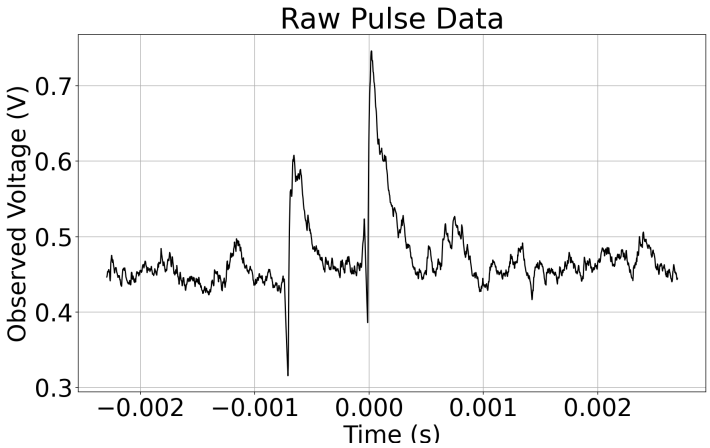

FIGURE **03.04G.3**: Observation for Distilled Water.

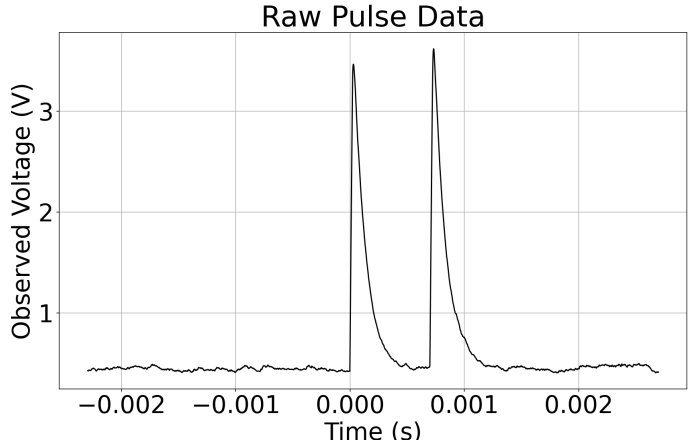

FIGURE **03.04G.4**: Observation for Distilled Water.

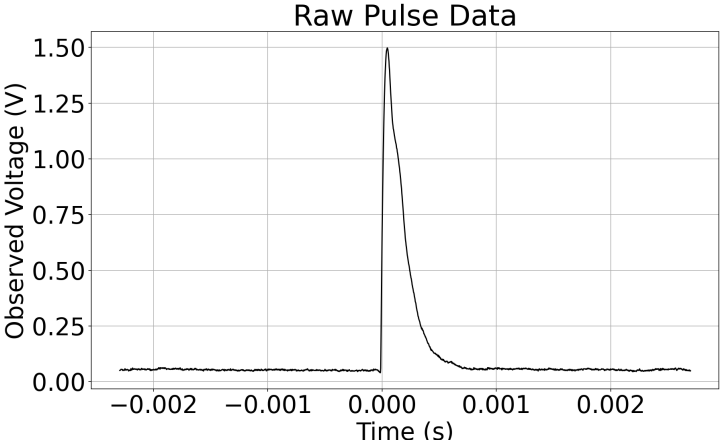

FIGURE **03.04H.1**: Observation for Light Mineral Oil.

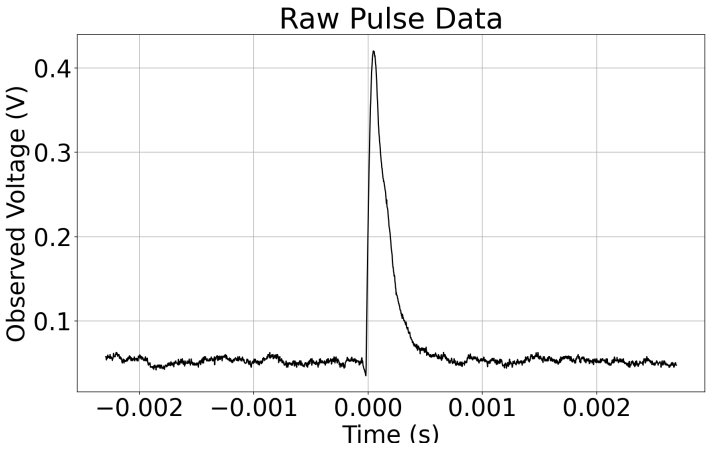

FIGURE **03.04H.2**: Observation for Light Mineral Oil.

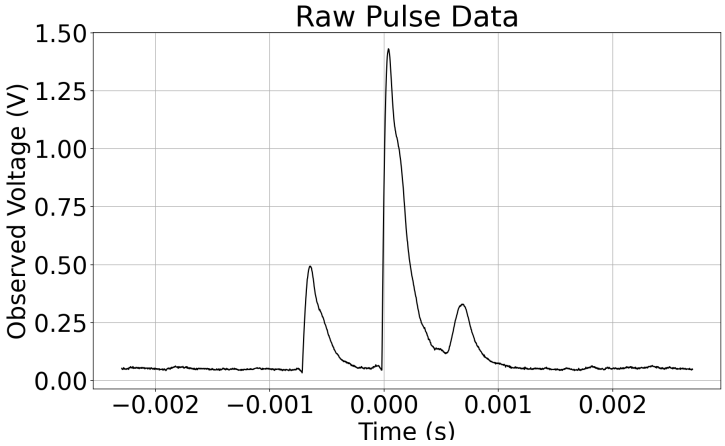

FIGURE **03.04H.3**: Observation for Light Mineral Oil.

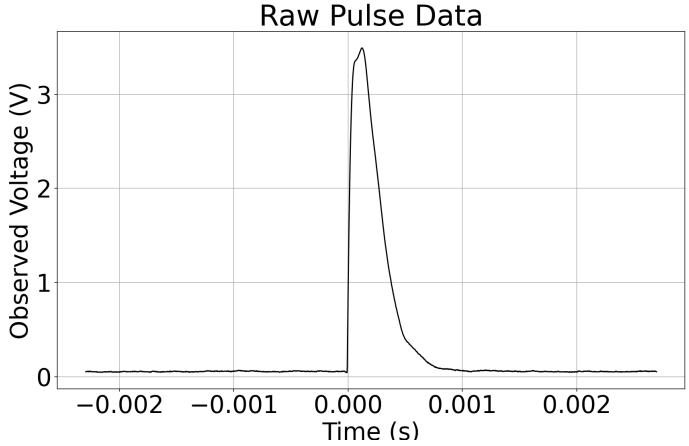

FIGURE **03.04I.1**: Observation for Heavy Mineral Oil.

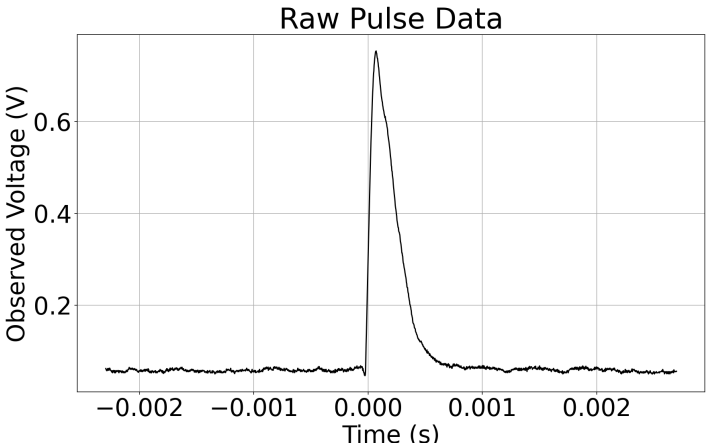

FIGURE **03.04I.2**: Observation for Heavy Mineral Oil.

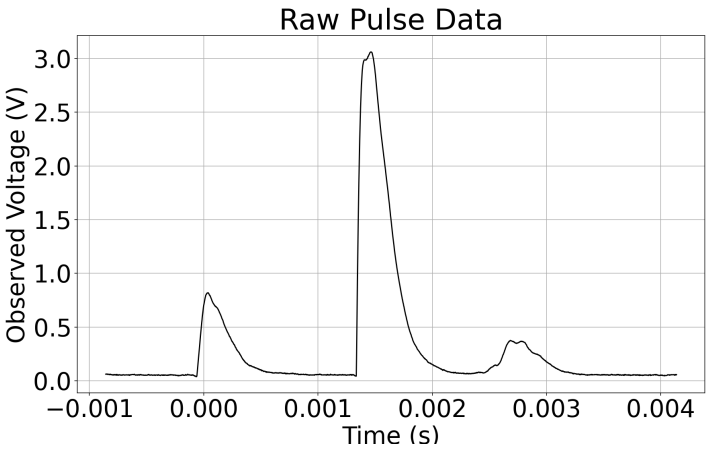

FIGURE **03.04I.3**: Observation for Heavy Mineral Oil.

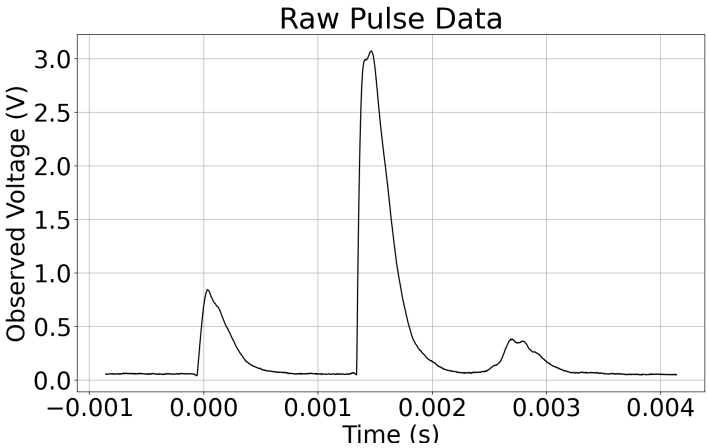

FIGURE **03.04J.1**: Playing around with pulses to see if we can implement a unitary gate. This is more just exploration with no expectation of results.

DATE: 03.05

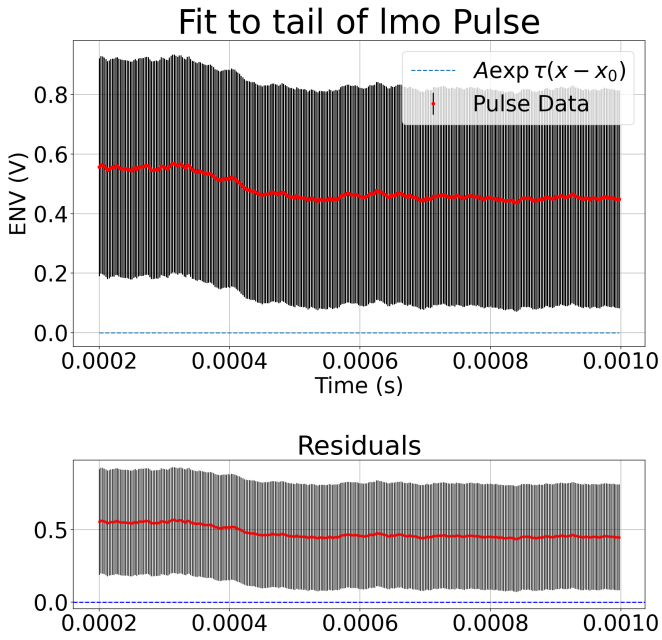

FIGURE **03.05A.1**: $A = 125.02730736861422 \pm inf$, $\tau = -159.21440895422927 \pm inf$, $x_0 = -0.711144259571313 \pm inf$ $\chi^2_{\text{red}} = 2.0$

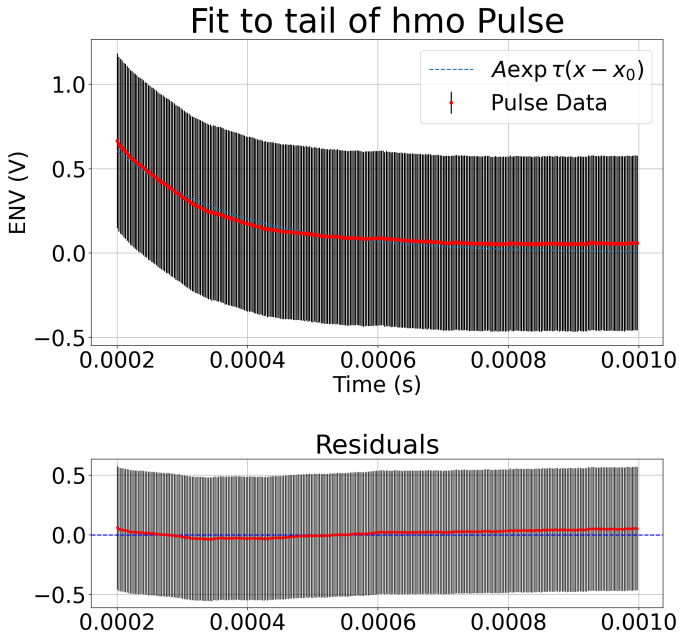

FIGURE **03.05B.1**: $A = 0.0 \pm 9000.0$, $\tau = -5456.4 \pm 90.0$, $x_0 = 0.0 \pm 200.0$, $\chi^2_{\text{red}} = 0.003$

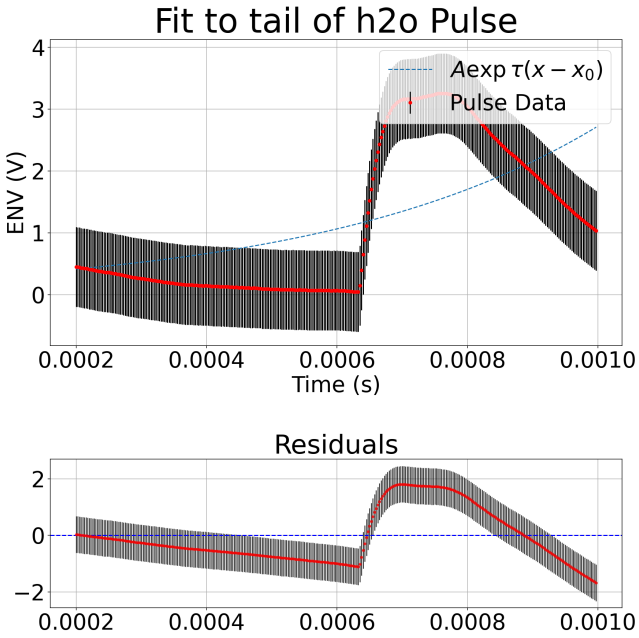

FIGURE **03.05C.1**: $A = 0.650974392642326 \pm 1436422.7844434683$, $\tau = 2345.446650108936 \pm 224.61004122688507$, $x_0 = 0.0003897026532702442 \pm 937.2177888340759$, $\chi^2_{\text{red}} = 2.0$

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