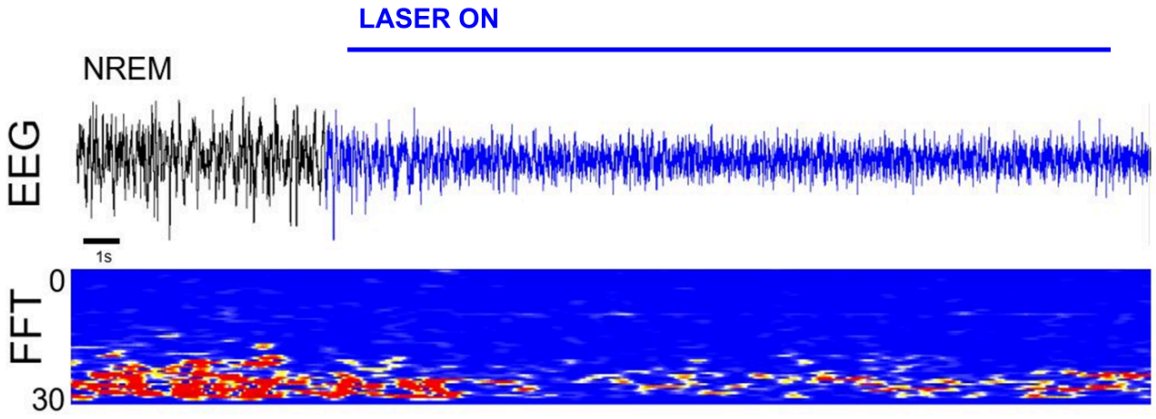
Assignment 1.2: Creating a Data Frame

Due Date: September 22nd, 2025

The goal of this mini-assignment is to take the functions you created in the previous assignment and apply them across multiple mice and multiple trials. Instead of calculating theta power for a single trial, you will now loop through all episodes in the dataset and organize the results systematically.

For this portion of the assignment, you turned on the laser every time the animal was in NREM sleep, where theta is not a dominant frequency. You want to see whether you can induce theta experimentally by activating SUML glutamate neurons and shift the power from delta-rich waves (representative of NREM sleep) to theta-rich waves (representative of REM sleep). You are comparing these laser-induced trials to theta power during REM sleep to see how similar it is.



In your Excel sheet, you have raw EEG data for both Baseline and Laser ON trials. If you open the file, you will see that they are labeled accordingly. For example, "Laser1" refers to Laser trial 1, while "Baseline2" refers to Baseline REM sleep trial 2.

Baseline1	Baseline2	Baseline3	Baseline4	Baseline5	Laser1	Laser2	Laser3	Laser4	Laser5
0.0023	0.00133	0.00081	0.0017	0.00123	-0.00094	-0.00167	0.00243	0.00015	-0.00206
0.00249	0.00128	0.00082	0.0011	0.0012	-0.00176	-0.00126	0.00243	-0.00012	-0.00183
0.00277	0.00128	0.0001	0.00021	0.0005	-0.00164	-0.00107	0.00201	-0.00041	-0.00199
0.00219	0.00171	0.00054	-0.00024	0.00028	-0.00097	-0.0014	0.00183	-0.00008	-0.002
0.00243	0.00165	0.00036	-0.00056	0.00071	-0.00106	-0.00143	0.00182	0.00037	-0.00176
0.00168	0.00139	0.00008	-0.00072	0.00045	-0.00051	-0.00158	0.00129	0.00046	-0.00165
0.0018	0.00079	0.00014	-0.00033	0.00032	0.00018	-0.00159	0.00133	-0.00011	-0.00165

As an output, you should create **clean, analysis-ready DataFrames** that store similar to the example below:

mouseID	theta_baseline	theta_laser
35_wt	52.48	58.83
41_wt	49.31	67.90
43_wt	53.24	63.84
54_ko	57.62	57.65
60_ko	48.83	62.71

These organized tables will serve as the foundation for later steps in the final assignment, where you will carry out statistical comparisons (baseline vs laser) and produce graphs to visualize your findings.

1) Load "Assignment_SUML_DATA.xlsx" into your Jupyter Hub:

- Inspect your data with .head() function and list the sheet names. *What does the data represent? What does each column and row mean?*

2) Extract EEG signals for each baseline and laser on columns for each mouse

4) Calculate theta power (sum of power in 4 - 8 Hz range) for each trial using the function you wrote for Assignment 1.1 (**return % theta power** not raw theta power).

5) Summarize results into a clean DataFrame.

- Calculate % theta power for each trial
- Computer average % theta power across all trials for each mouse and each condition (Baseline vs Laser On)
- Save your results into a DataFrame with the following columns: mouseID and condition (Baseline vs. Laser ON) with appropriate averages of % theta power. *(You can refer to the example DataFrame above)*

6) Interpret your results: Do you see a clear difference? Does your laser manipulation decrease or increase theta power?