**Optrode User Guide:**

Physical Setup:

* Ensure all of the devices are turned on (Green Laser, Blue Laser, both Shutters, Photodiode) and the devices that need to be are connected to the laptop (Spectrometer, Power meter, DAQ card).
* Ensure the correct light filters are in place for the particular laser that is going to be used (Green Laser – Orange filters, Blue Laser – Yellow Filters).

To run the program, execute the "Optrode\_Version7.py" file. To do this in the linux OS:

* Open a terminal.
* Change to the directory that contains the program - "cd PhysicsLabPythonCodes/Optrode/".
* Execute the program - "python Optrode\_Version7.py".

When performing tests:

* Specify the desired parameters, select the “Setup” option and once this is complete, select the “Start” option.
* If something goes wrong with the test and you wish to repeat the test, select the “Re-run” option when the test is finished.
* If you wish to proceed with the next test, select the “Change” option, change the desired parameters, select the “Setup” option and once the test is setup, select the “Start” option.

Performing tests with samples:

* First test with the fibre connected to the Power meter to get a background reading.
* Next test with the fibre dipped in a sample.
* Generally, take all measurements with one laser before moving on to another laser. Start with the lowest concentration sample and work your way up to the most concentrated, testing both the continuous and multi-integration paradigms. Generally, repeat this loop of samples multiple times.
* When changing samples, it is necessary to clean the fibre. Do this by dipping the fibre in water and cleaning the tip, then dipping it in isopropanol and again cleaning the tip.

Potential Complications:

* Generally, when the Power meter is first used after it has been plugged in, the computer needs permission to access the Power meter - To resolve this, enter the Sudo password (the same password that is used to log into the laptop).
* After the initial tests with the Power meter, unplug the Power meter and restart the program.
* Errors when reading the DAQ card - To resolve, simple exit the program and execute it again.

Output:

This program gives three plots of output, these are the Photodiode Readings, the Photodiode and Spectrometer Latencies, and the Power meter, Readings and latencies. Additionally, the program will always output the Spectrometer Readings.

This data is saved in an HDF5 file under the title specified in the program’s GUI. The components of this file are:

* Photodiode:
* Readings (as a matrix where each column represents a different spectrum and each row in that column represents the intensity at a certain wavelength).
* Time each reading was taken at.
* Power meter (If it is connected):
* Readings (as an array).
* Time each reading was taken at.
* Spectrometer:
* Readings (as an array).
* Time each reading was taken at.
* Wavelength range for each spectrum.

**Optrode Analysis Guide:**

To run the program:

* Open a terminal.
* Change to the directory that contains the program - "cd PhysicsLabPythonCodes/Optrode/".
* Execute the program - "python Optrode\_Analysis.py".

Doing the Analysis:

* Specify how many samples you want to compare.
* Select the name of the output file.
* Select the samples – Hold the “Ctrl” button to select all the files together.
* Select the background sample – This should be one of the Power meter readings.
* Click the “Start” option.