Power Sweep Procedure

Purpose: The power sweep is an automated data collection which gives us the input and output powers of a given sample in the UCNP microscope with sweeping powers (low to high).

The setup of this experiment is ideally a completely aligned and optimized configuration of the microscope with the following specifications (see alignment procedures if needed):

- the chopper active at 500 Hz and reference signal fed into Lock-in detector port: *Ref In*
- The FW photodetector connected to the Lock-in detector: *Input Signal A.*
- The FW photodetector in AC low mode
- A sample slide should be positioned in focus on the translation stage below the CT1.
- The WIDER objective lens should be installed into the CT1.
- Lock-in in voltage mode *(A)* for input settings
- The RIO should be set to **28 mW** pump power at 1550 nm wavelength
- While the detector is ON the lights should be **OFF**
- Irises should both be open for at minimum the first sweep
- Dark noise should be recorded first sweep***

1. Make sure the Lock-in detector is on and has had time to warm up and is set up according to the above instructions. With the Rio Laser pump disabled, and chopper running, record the dark noise of the Lock-in. Using the VOA, attenuate the signal to slightly above this noise floor using a power meter and record this value (note: *the*

power sweep will start at a lower power so what we are setting is always the max power of that power sweep.

1. Remove the power meter and pull down the light shielding curtain over the system, securing the sides with clips. Use the computer (potato) to open: Anaconda–>spy-env3→ Jupyter notebook →Desktop and then open the file : **SR830_powersweep.ipynb.** Once loaded, change the following values in the appropriate module of the code:
    a. Max input power (mW) : the value recorded on the power meter after attenuation
    b. Exported file name: specified with the sample name and max input power

2. Make sure the FW detector is on and the lights are off. Adjust the Lock-in sensitivity to a step or two above an overloaded state (marked by red lights on overload indication). Make sure not to move the RIO control software position after opening. Run the code block with the max power specified. MUST NOT TOUCH THE COMPUTER WHILE CODE IS RUNNING. RIO POWERS ARE MANUALLY BEING CHANGED WITHIN THE CODE. After code is finished running, run the plotting modules to check the data, and run the module to save the collected data.

1. Attenuate using the VOA to the next power up from the first one you selected using the chart below of target Max powers to power sweep (these will be stitched together during analysis):

Max Powers to Power sweep:
1 uW
2.5 uW
10 uW
50 uW

150 uW
300 uW
1 mW
5 mW
10 mW
15 mW

- Once the log plot of the most current shows indication of rolling over/ saturation, you do not need to power sweep any higher powers

5. Repeat step three, keeping in mind that you may need to start attenuating with the irises to keep the Lock-in Detector below the overload threshold for higher powers.