Horiba iHR550 Spectrometer QuickInstallation and Operation Guide

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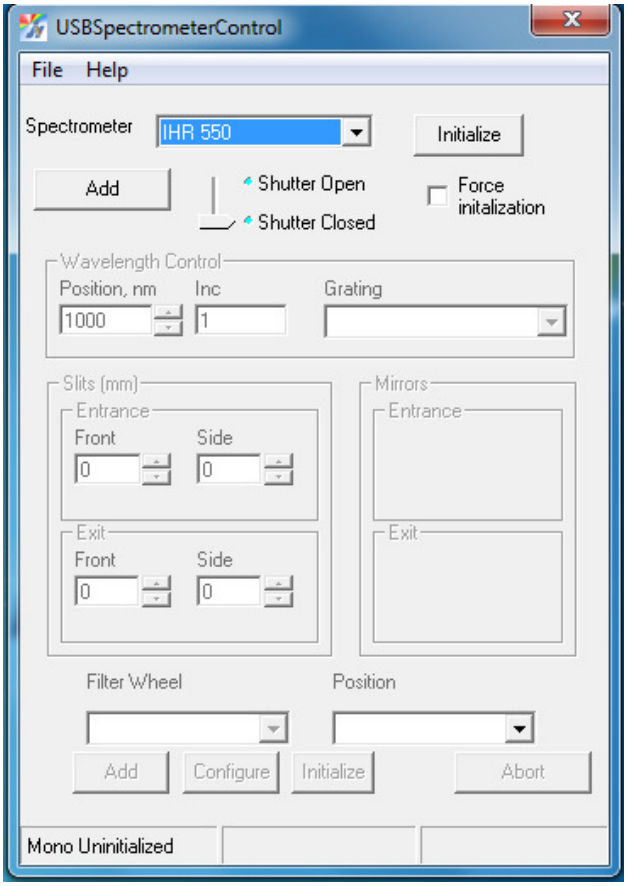
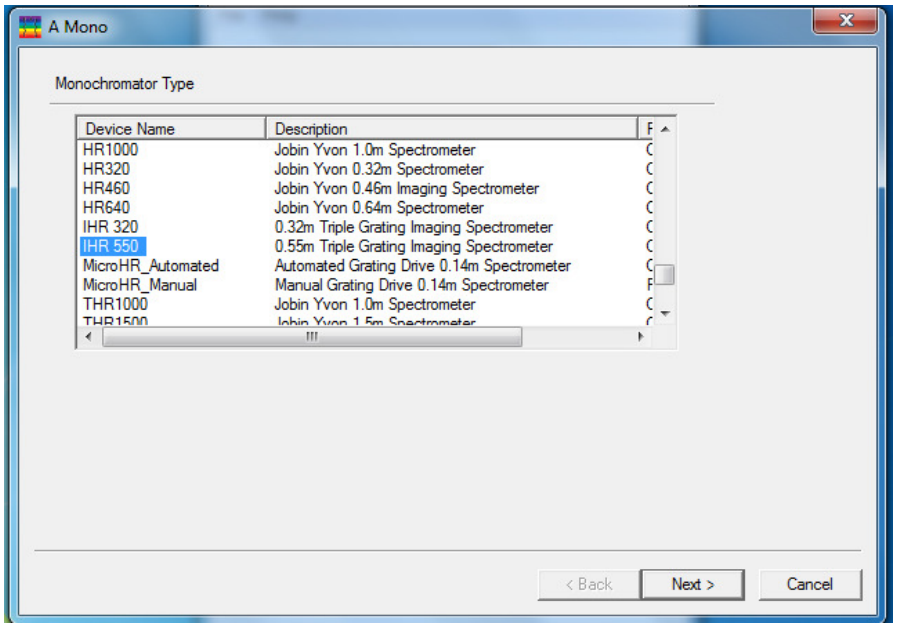
The Horiba iHR550 is an imaging spectrometer that can be used both as a spectrograph and as a monochromator. This is a short guide to installing its software tools and operating the spectrometer to get a simple wavelength spectrum measurement.

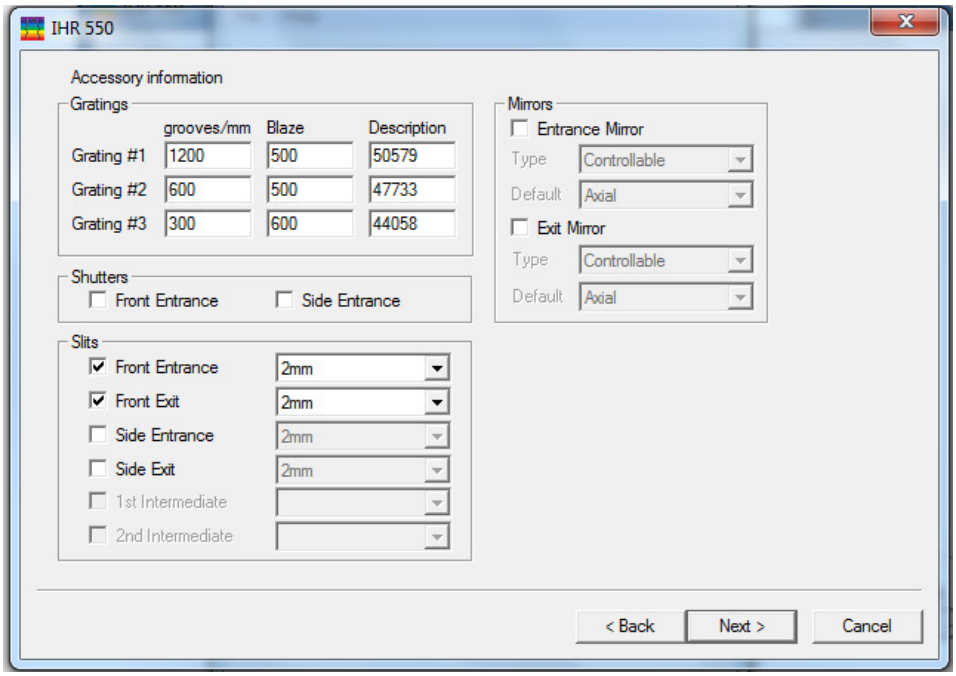
- Install the pre-requisite software. First should be the USB-spectrometer utilities. This initializes the spectrometer and controls only the spectrometer, not any attached detectors (such as the Syncerity CCD camera) or external mirrors and appendages. In the case of this particular setup, the spectrometer can be initialized and only the front entrance slit and Grating turret (that rotates the gratings) can be controlled. Once the utilities are installed, open the '**USBSpectrometerControl**' program.



- If the spectrometer has been preconfigured and installed, then just plug in all power cables, turn the spectrometer, CCD and Shutter Control Unit (SCU) on, and press the ‘Initialize button.
- If the spectrometer is being configured for the first time, click the ‘Add’ button and select the iHR550 option (the 550 refers to its 55cm focal length) and click ‘Next.’



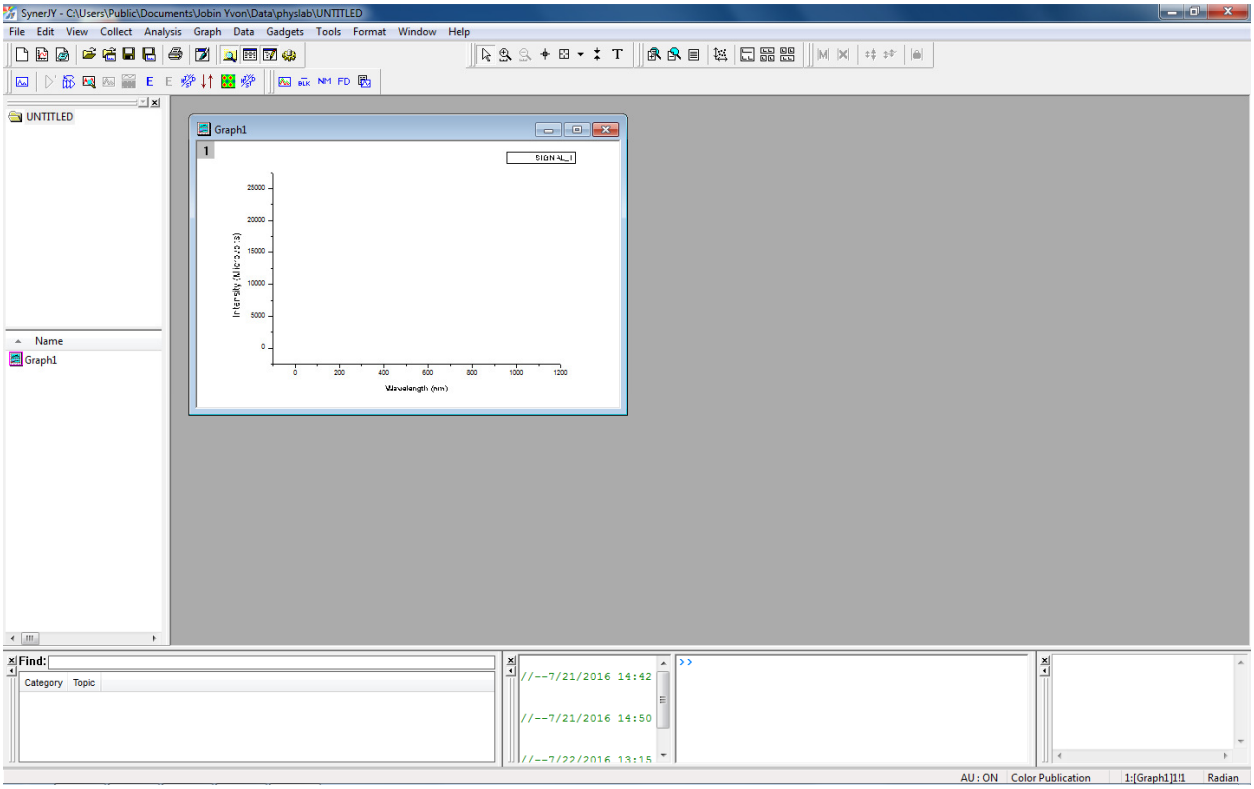
- Proceed through the options until you get to the spectrometer’s details window; enter the relevant details (found on the back of the spectrometer or in the official operation manual



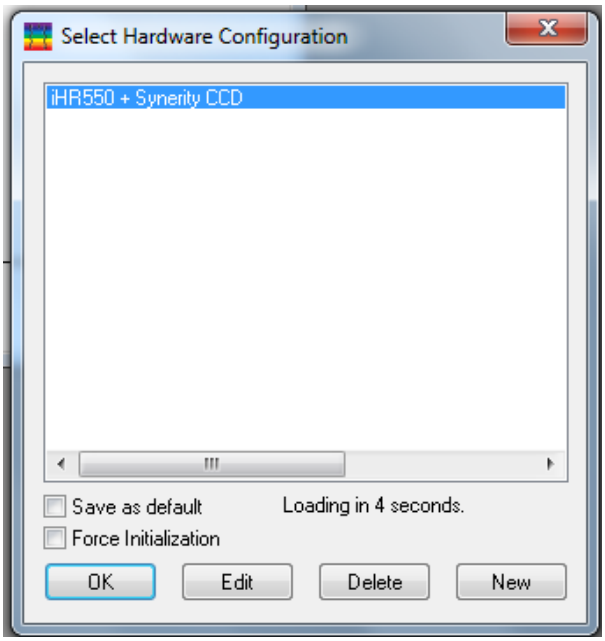
- Finish adding the spectrometer and proceed to the installation of **SynerJY**. The USBSpectrometerControl should be run before SynerJY for the initialization and control of the monochromator.

SYNERJY is the overall spectrometer system's control software. It interfaces, synchronizes and operates the spectrometer along with associated detectors (in this case, the Syncerity).

- Open SynerJY. It will only launch and work if the USB hardware key (a DRM USB provided alongside the spectrometer) is plugged into the computer.

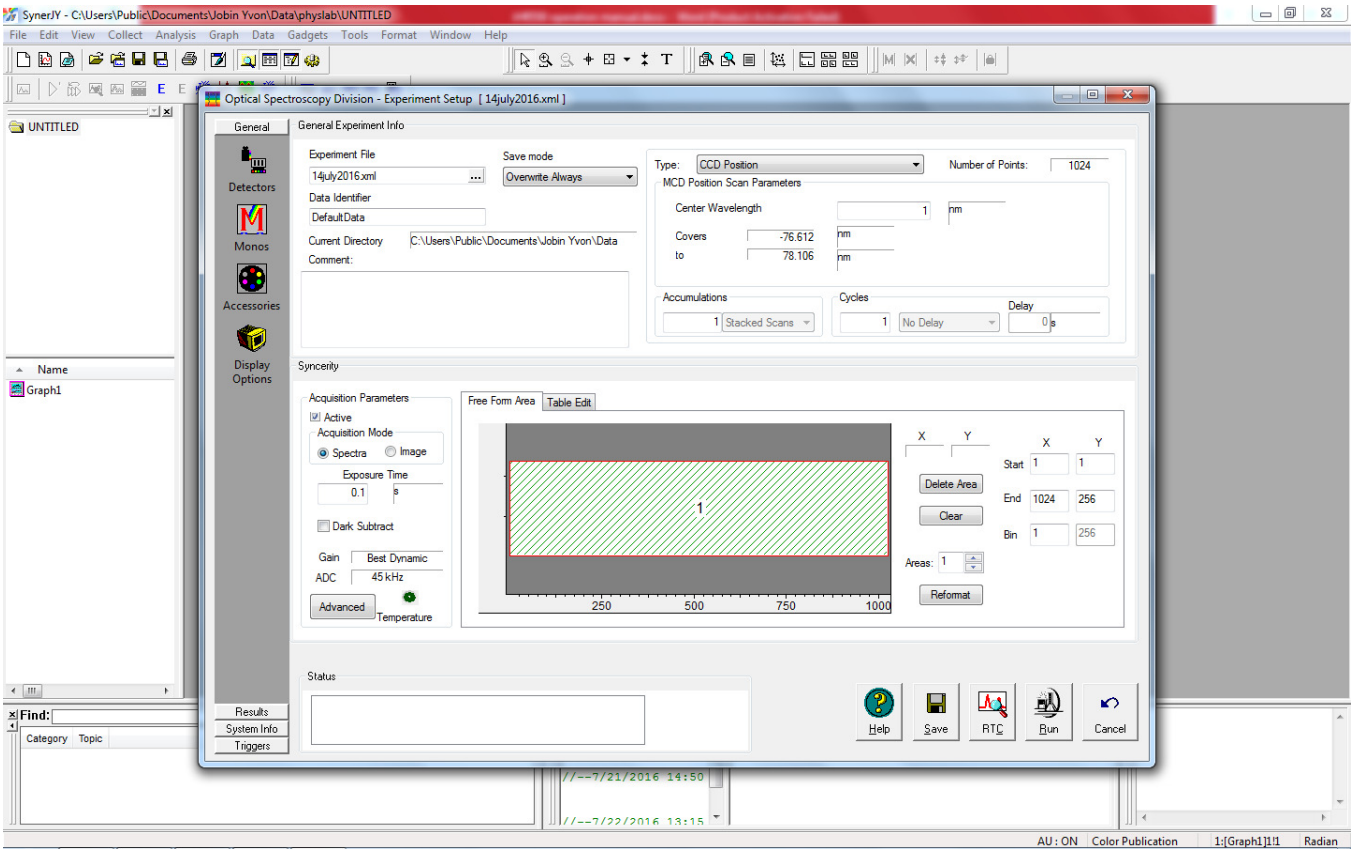


- Click Collect→System Reinitialization→System Reinitialization.



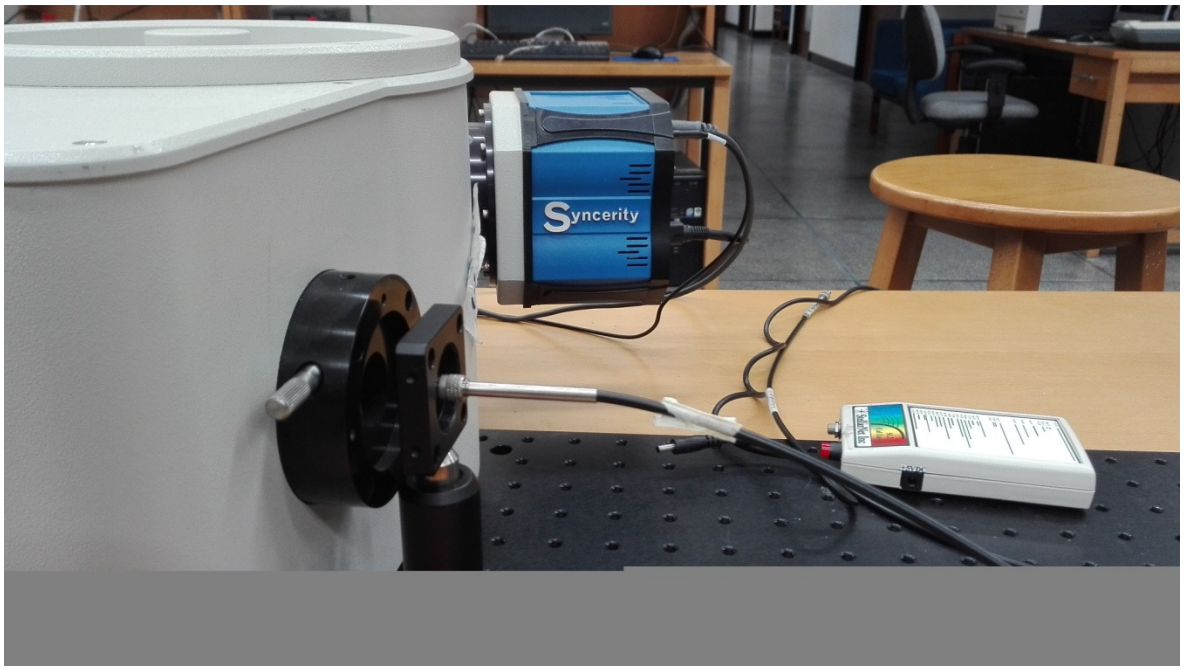
- Select the configuration; the iHR550+Syncerity in this case or just wait for it to do it itself.

- The New Experiment window will open up.

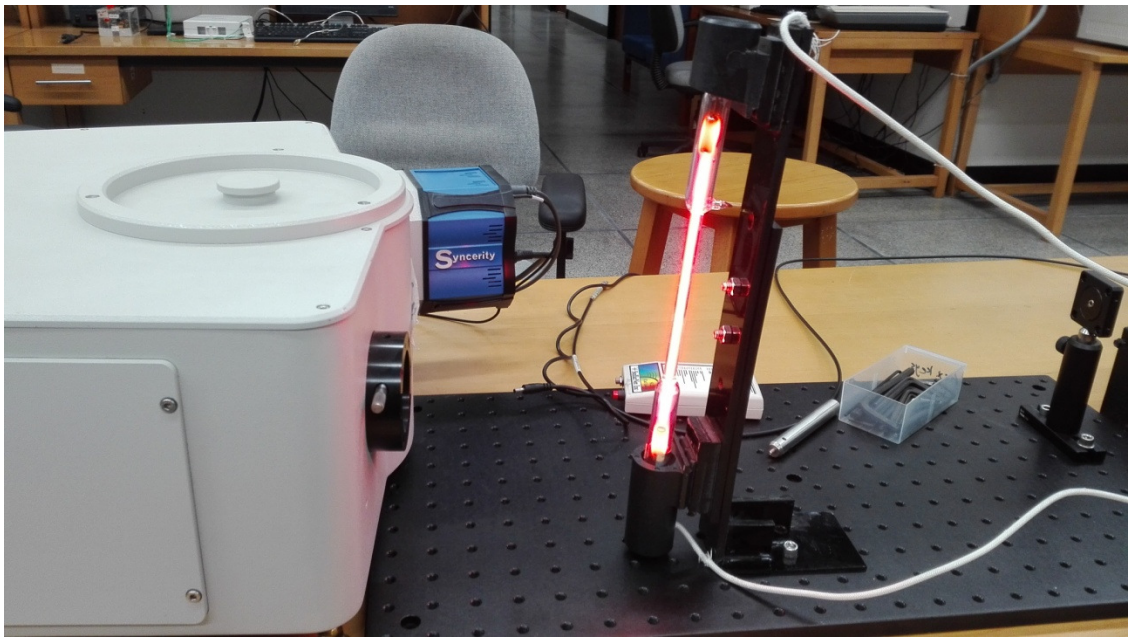


- On the left will be tabs with options to configure different aspects of experiments, perform computations on signals, chain experiments together, etc. In the ‘General’ tab, The ‘Detector’ tab should be open. Make sure the ‘Active’ option is selected, select spectra, and set the details as required. In the ‘Mono’ tab, some options for the monochromator will be provided. BEFORE clicking run, go back to the USBSpectrometerControl software (it should be running alongside SynerJY as it always slightly better control of the spectrometer; it’s slightly more responsive) and set the entrance slit width, set the entrance slit shutter to be OPEN, and select the grating to be used. The shutter should open with a ‘clicking’ sound. If it does not do that via software, flip the switch on the Sdrive-500 Shutter control unit device. This is very important for the entrance shutter must be open for any light to be collected by the spectrometer. This shutter is different from the one on the exit slit’s detector, the Syncerity in this case.
- The spectrometer’s slit height should then be selected. This only has 3 options; closed, 1mm and 15mm. The steel rod at the side of the slit opens and closes the plastic convering that adjusts the slit height. Push it until it stops to close it, pull it to open the slit. Slit height and width should ideally be small to reject as much stray light as possible.
- The slit width is controllable down to very small degrees and should be optimized according to the experiment to ensure good detection and throughput of the system.

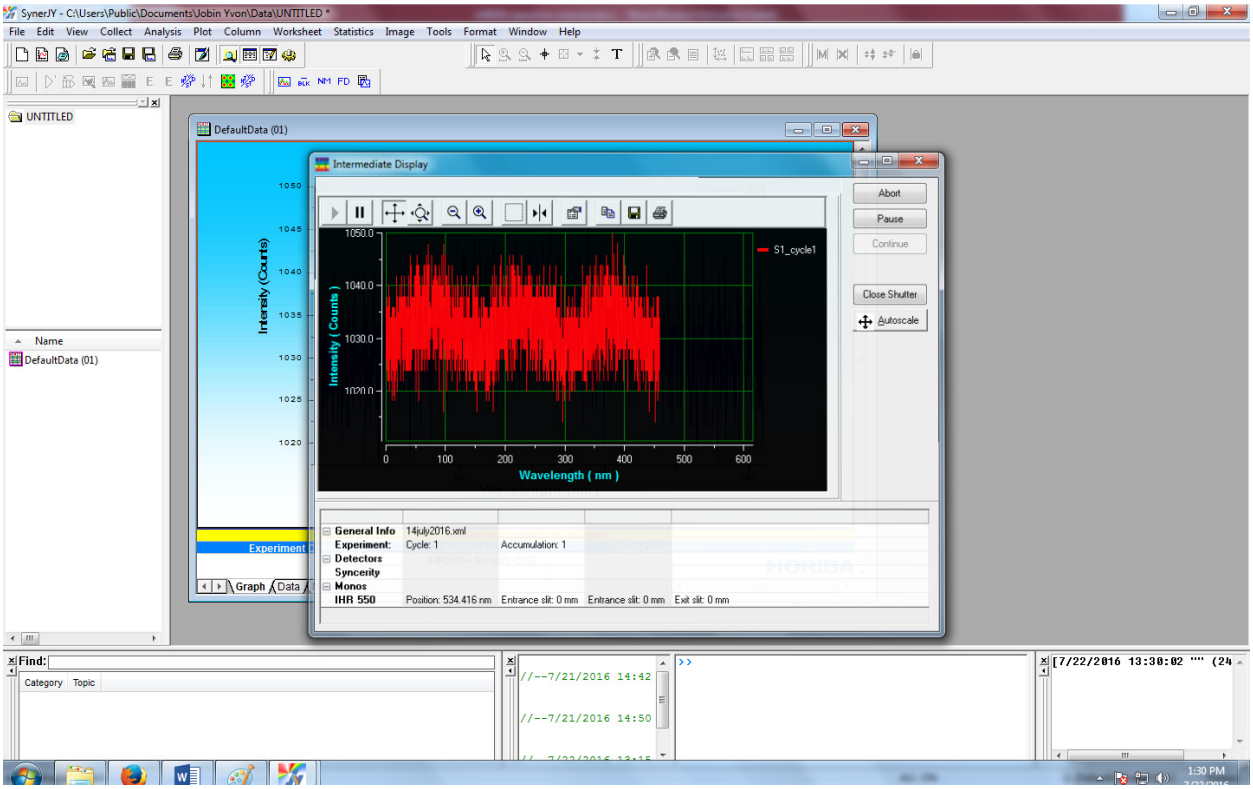
- Experiment comments are important to identify and distinguish between data sets. These are also in the experiment setup window.
- Make sure your hardware is setup. Below are examples of simple arraignments where a Stellarnet SL2 calibration lamp and an Electrotechnic neon spectrum tube were set up before the entrance slit of the spectrometer. The SL2 lamp's output is extremely faint which is why it was placed very close to the monochromator's slit. Optimizing this distance is important for the detector can saturate and give inaccurate results if the input intensity is too great. Stray light is also to be avoided thus overhead lights should be turned off.



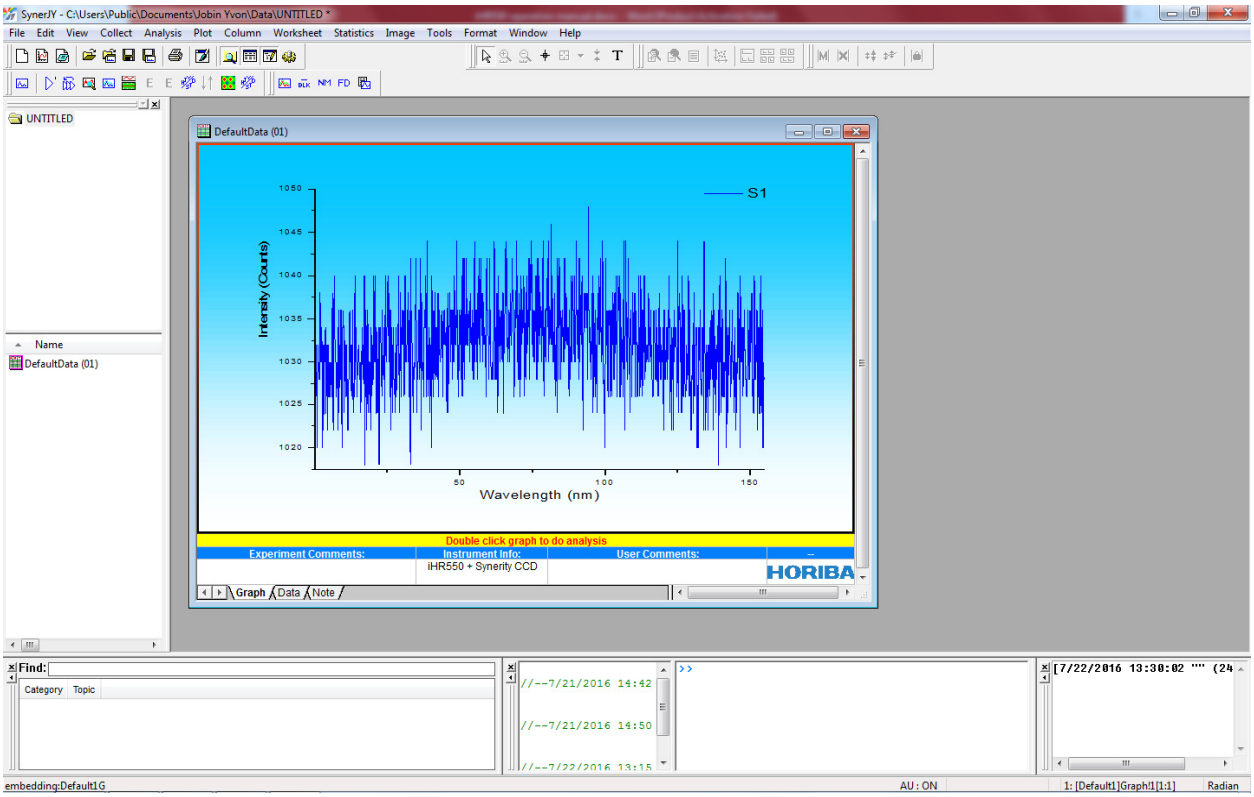
- The neon spectrum tube was placed at distances ranging from 35-50cm from the entrance slit. The slit itself was made very narrow and short to avoid saturation of the detector.



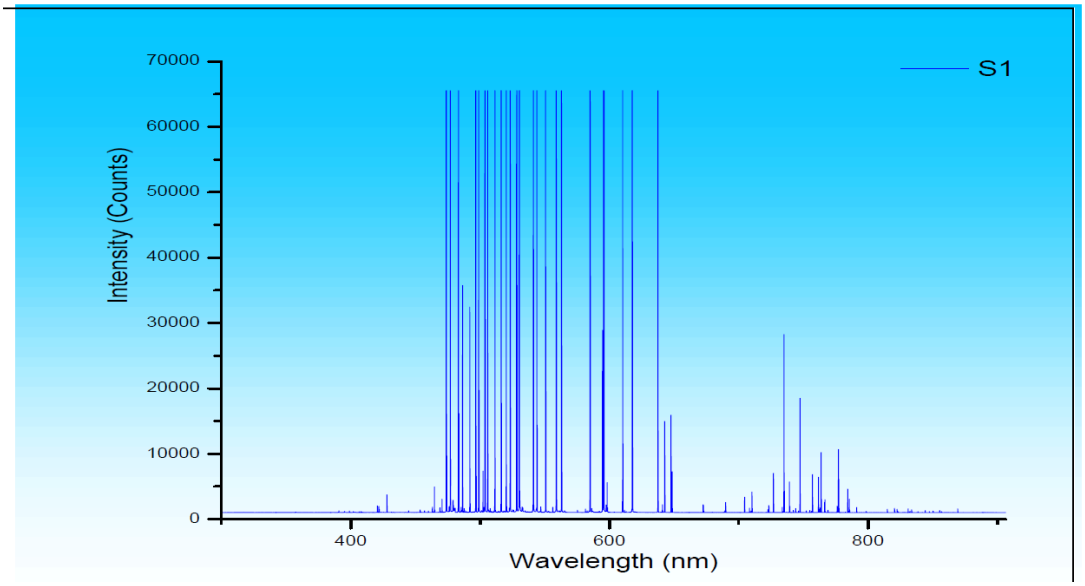
- Once all the setting are configured, simply click the ‘Run’ button. The spectrometer will then take measurements.



- Shown is a ‘dark’ reading where the entrance slit is closed.

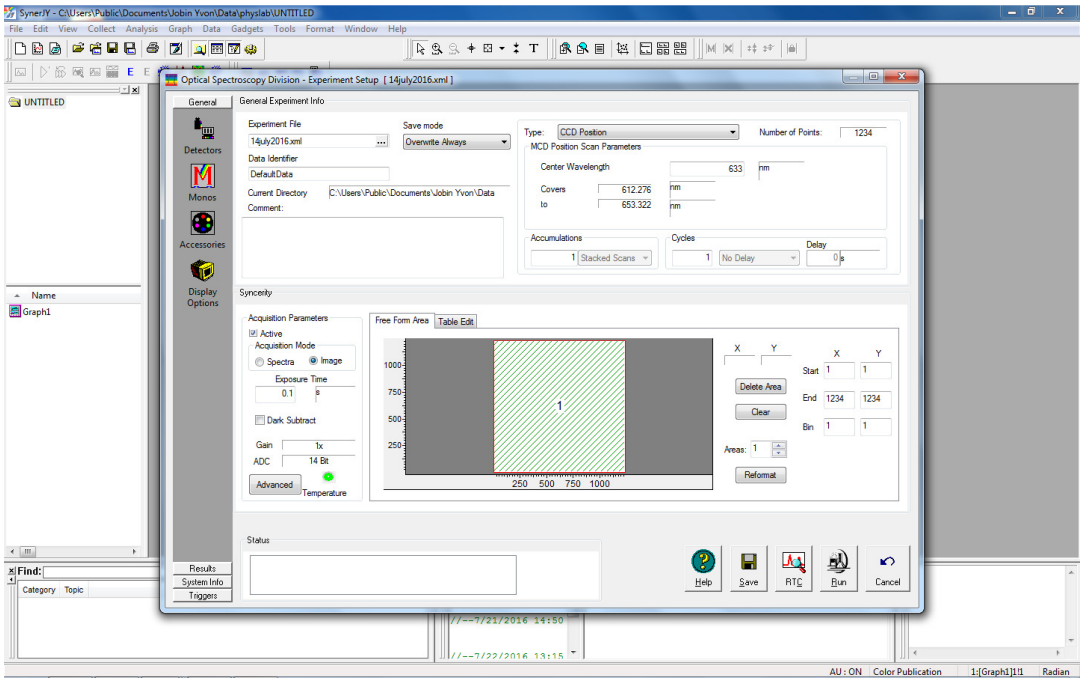


- The collected data contains a spectrum graph, raw data points and experiment notes that can be used for later reference.
- Shown now is a spectrum measurement with the electromechanical shutter, entrance and exit slits all open at specific dimensions; the setup is the neon spectrum tube described above with a grating with a groove density of 1200gr/mm;

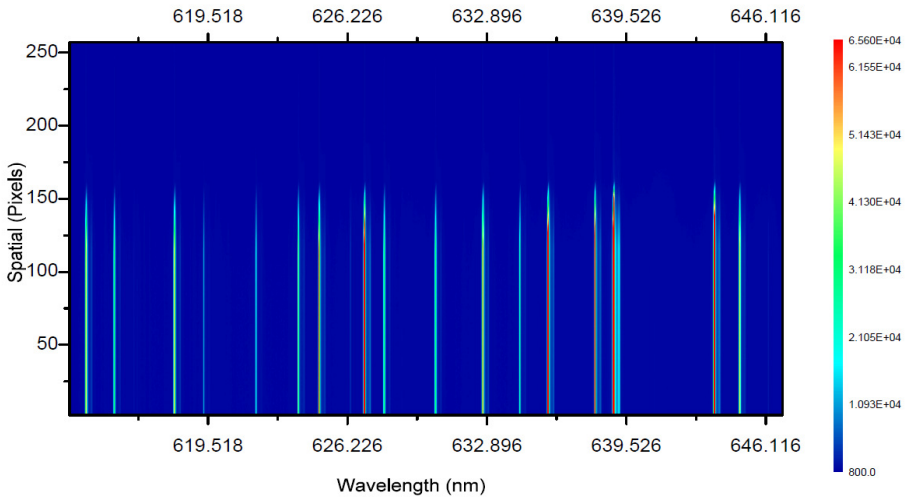


- If this data is to be exported, then go to the File→export option; it contains multiple exporting options including NI (National Instruments) TDM/TDMS files and Multipage PDFs.

- If instead of a spectrum a spectral image is required, then simply select ‘Image’ instead of ‘spectrum in the Experiment setup window. This will only work for a specific narrow band around a center wavelength. The width of the band can be varied slightly by changing the grating used (in the ‘Monos’ tab that allows you to modify monochromator settings), but not too much.



- The result of such an acquisition is shown below; the setup was of a neon spectrum tube, exactly the same as the one described above.



- The interpretation of the spectral image is simple, the CCD takes an exact image (or ‘picture’) of the grating-seperated light falling on it. The horizontal pixels correspond to wavelengths and the ‘colour’ corresponds to the number of photons detected by the camera.