Theory:

We can use ordinary lamp to measure the relationship between the wavelength of incoming light and the channel number inside the software we are using with the help of grating with known passing wavelength. The grating shall only let light with a certain wavelength pass.

Method:

Material: Mirror, Positive lens, SPE, gratings with known passing wavelength, iodine cell, NeHe laser.

Process:

Step 1. Calibration CCD

We put a mirror in front of the SPE to reflex the light into it. Then we put a positive lens between the mirror and the SPE to gather the light. Now we start the software and check if there is a reading of anything. After we have gotten a reading we pause the software and put a grating just in front of the SPE so we can measure a new result. We adjust the ExpT which is the exposure time so we get a visible and sharp peak. We change the software to Peak Mode and take the value of the peak we find. When we find two peaks we record both. And we record also the wavelength corresponds to the peak which we already know. For the second peak if there is one we use the wavelength times 2. We measure four times channel number with four different gratings. And we get totally 7 relation between wavelength and channel numbers. We plot the result and get a linear relationship. And we calculate the first-degree polynomial to fit the relationship. The polynomial is needed later for measurement.

Step 2. Laser spectroscopy

First we try to make the room as dark as possible. Then we start a HeNe laser and let it shoot through a container that contains iodine. We put a lens between SPE and the excited iodine cell and put a white paper at where the SPE stand. We move around the lens until we get a sharp picture of the laser on the paper. Then we remove the paper there and put a paper in front of iodine cell to block the light from laser. Then we change the software so it measures one time and then set that as background base. Then we change the software back to continue measuring and remove all papers and measure the laser by SPE. We get a graph with a lot of peaks and we record all of the channel numbers associate with ordinal number of the peaks. These are all the statistics we need. Now the experiment part is done.