1 Running Matlab

To run Matlab on one of the optics lab computers, open a terminal and type

ssh -l username physics.ubc.ca

at the command prompt. The username should be the same one that was used to log onto the optics lab computer. When asked if you wish to continue, type **yes** followed by your physics account password. At the prompt type **matlab**.

2 Extracting Data from Image Files

The image files that you take should be properly renamed so that they are easier to work with within the MATLAB environment. Ensure that the Matlab file *DiffractionData.m*[1] has been copied to your home directory. This should also be the directory where your image files have been saved.

The matlab function DiffractionData has been written to load a given image file, and extract the intensity data along a user defined horizontal line. The dimensions of the image files are 480x640 pixels. The usage is

DiffractionData('Imagefile.jpeg' , 'Outputfile.txt' , Horizontal line number);

where **Outputfile.txt** is a comma deliminated text file with the pixel number and the corresponding intensity value from 0 to 255, and **Horizontal line number** is a value from 1 to 480 corresponding to the desired horizontal scan line.

The difficulty is knowing which horizontal line should be used. We can fairly easily isolate it using the image of the Poisson spot, and as long as the relative position of the laser and camera has not changed then this value should be valid for all of the images taken.

While in Matlab, open the Poisson spot image by using the command

image = rgb2gray(imread('Imagefile.jpeg'));

where **Imagefile.jpeg** should be replaced by the name of the Poisson spot image you have taken.

Now that the image is loaded into Matlab, let's view it using the command

imshow(image);

Since the image has been loaded into Matlab as an array, we can define which elements of the image to show. By changing the command used above to

imshow(image(200:400,1:640));

[1] There will be a link on the website for the *DiffractionData.m* file.

we can show the entire horizontal scope of the image, but only from pixels 200 to 400 in the vertical direction. By narrowing and altering the range of the vertical pixels it should be possible to obtain a good idea of which horizontal line intersects the center of the poisson spot.

Once the proper scan line has been determined, it should be a simple matter of loading each image into the DiffractionData function. Be careful to give each image a unique output filename as they are rewritten during each call to the function.