Tutorial 6 - Fraunhofer diffraction

In the following exercise you will investigate how different experimental parameters affect the Fraunhofer diffraction pattern arising from a single slit. The findings will help you gather some of the common features of diffraction.

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Task 1 - Placing the screen in the far-field.

You can choose the wavelength of light to be 532 nm for beginning your code. Based on this value, calculate where you should be placing the screen to observe the far field diffraction pattern. You can assume the diagonal size of your aperture to be 5 microns.

What happens to this distance if you change the aperture size?

What happens if you change the wavelength?

If you can, plot the variation of the distance to the screen as a function of the aperture diagonal size and the wavelength (separately!).

Task 2 - The one-dimensional diffraction pattern for a slit

Using the value of the screen location from above, plot the one-dimensional diffraction pattern that will arise from a slit source. (Hint - in this case you have only one co-ordinate to consider).

Ensure that you can observe at least five orders of diffraction on either side of the maxima.

Task 3 - Dependence on wavelength

Repeat the above task, but now plot for different wavelengths. Plot all curves on the same graph. What do you observe?

Task 4 - Dependence on aperture size

Repeat the above task, but now for different aperture size. Plot all curves on the same graph. What do you observe?