

**EXPERIMENTAL GOAL**

Your goal in this laboratory is to measure the spacing between the slits of a diffraction grating and the grooves of a compact disc.

**PROCEDURAL COMMENTS**

In the previous laboratory session, we used the interference pattern produced by a double slit to measure the wavelength of a helium neon laser. In this laboratory, we are going to use the interference pattern produced by a diffraction grating and a compact disc to measure the spacing between the grating's slits and the CDs' grooves respectively.

A diffraction grating is similar to a double slit except that it has many evenly spaced slits instead of just a pair of slits. Therefore, a collimated laser beam impinging on a diffraction grating can also produce an interference pattern. Based on the derivations in Sections Q2.4 and Q2.6, derive an equation for the angles at which light exiting from every slit will interfere constructively to produce "principal" interference maxima. Use this equation to experimentally determine the spacing between the slits of the grating. Use 633.0 nm for the wavelength of the helium neon laser. (Note: the conventional unit used to express slit spacing of a grating is # of slits/mm.)

A CD consists of a series of evenly spaced grooves and ridges and these grooves and ridges can essentially act as a diffraction grating. However, unlike the diffraction grating you used, the CD does not transmit light. Try to figure out how you can set up an interference pattern with a CD and measure its groove-spacing.

**GRADING**

1. (4 pts) Skeptic: Explain the equation used to calculate the angular maxima for the interference pattern
2. (2 pts) Procedure Person: How did you come up with the setup to measure the groove spacing for the CD.
2. (4 pts) Procedure Person: What was your final slit / groove spacings (in units of #/mm)? How did you calculate the uncertainty?
3. (4 pts) Recorder: [go over lab book, give points for sketch of experimental layout, orderly presentation, uncertainty calculations
4. (4 pts) All: accuracy of results: (600 +/- 15) grooves/mm for grating, 580 to 640 (+/- 15 or so) grooves/mm for CD
5. (2 pts) Recorder: what would happen to the interference pattern if you increase the width of the grooves on a CD