Name(s)	Project Number
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Project Title

Calculating the Double Slit Experiment

Abstract

Objectives/Goals

I wanted to recreate and mathematically calculate the Double Slit Experiment to prove that it worked and to help understand how it worked.

Methods/Materials

First, I calculated the spacing of the interference maxima of the pattern using a ratio, and a specific trigonometric function ￼that I interpreted from many initial equations to calculate the intensity of light throughout the entire pattern. Next, I calculated it using four slits instead of two, assuming that a four-slit pattern was just a superposition of two double slit patterns, and changed the equation to being the sum of two of the intensity equations ￼to apply to the situation. I set up the double slit experiment with a red laser shining through a Cornell slit film with set distances, and recorded the data to see if it matched my calculations. I repeated the process with a green laser, and then both using four slits.

Results

The green laser maxima were 7.5 mm apart in the double slit and 22 mm apart in the four slit experiment. The red laser maxima were 12 mm apart in the double slit and 16 mm apart in the four slit. All of these values were confirmed by real-life measurements and calculations.

Conclusions/Discussion

The data for four slits at first did not match up, but I divided the spacing between the slits by 2. This follows because the only slits that affect the spacing of the interference pattern are the two outermost slits, being that the amount of wavelengths of light between the edges of the source and the screen are what determines the spacing of the pattern. The maxima of the green laser were more spaced out than the maxima of the red laser. This can be explained by the fact that the red laser is a longer wavelength than the green laser, and that there is an inverse relationship between the wavelength and the spacing of the pattern.

Summary Statement

I calculated the intensity of light throughout the pattern created by a double slit and four slit experiment, and compared it to real-life measurements.

Help Received

Consulted with Dr. Lynn Cominsky and Steve Anderson at Sonoma State University, and Greg Huffman, an engineer.