CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY

Name(s)
Maya A. Basu

Project Number
J1803

Project Title
Predicting the Interference Pattern from a Double and Triple Slit Experiment with Geometry

Abstract

Objectives/Goals
My objective is to confirm or refute equations I have derived predicting the interference pattern from double and triple slit experiments.

Methods/Materials
I wrote a program in Google Spreadsheets which graphed the interference pattern for two and three slits over varying experimental parameters. I built a clear Acrylic water wave table, and shone a light through the table. The light projected the wave patterns as shadows below. I created waves using a solenoid oscillating with two and three pointed attachments I designed and 3D printed. The solenoid was controlled by an Arduino through a relay, and powered by a DC power supply. The Arduino ran a program I wrote, allowing me to control the wave frequency. I measured the least and greatest distances between the innermost interference areas 5 cm from the point of emanation over various frequencies, to compare with my predictions.

Results
I compared my predictions with the measurements from the wave table for both the double and triple slit setup over various frequencies. 75% of the data points matched the prediction, and 100% of the data points were within the margin of error introduced through the measurement process.

Conclusions/Discussion
I set up my experiment to disprove my equations, which predict the interference patterns of double and triple slit experiments over varying experimental parameters. In contrast, the data I took supports my hypothesis by showing that my equations accurately predict the interference patterns resulting from double and triple slit setups.

Summary Statement
I derived equations using analytic geometry and trigonometry that predicted the interference patterns resulting from double and triple slit setups, and validated them with data taken from my physical experiments.

Help Received
My dad showed me how to use Google Spreadsheets as a programming environment.