Abstract:

Young's double slit experiment tested the wave-like properties of light, and later other quantum particles, proving that light is a wave. By shining a light through two slits, the waves would interfere causing a pattern on a screen they were projected onto. This proves that light can be interpreted as a wave, because particles would've created an exact replica of whatever they were shone through. I decided to recreate and mathematically calculate the experiment to prove that it worked and to help understand how it worked. First, I calculated the pattern using a ratio $n\lambda/d = x/L$, and a specific trigonometric function $y=\cos^2((\frac{\pi}{\lambda}\cdot d\cdot\frac{x}{L}))$. 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 $y=\cos^2((\frac{\pi}{\lambda}\cdot\frac{c}{2}\cdot\frac{x}{L}))+\cos^2((\frac{\pi}{\lambda}\cdot\frac{2c}{2}\cdot\frac{x}{L}))$ 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. My calculations confirmed the real-life examples that I set up during the experiment.