



**CALIFORNIA STATE SCIENCE FAIR  
2004 PROJECT SUMMARY**

<b>Name(s)</b> <b>Bryce W. Cronkite-Ratcliff</b>	<b>Project Number</b> <b>J1510</b>
<b>Project Title</b> <b>Enlightenment: A Study of the Wavelike Properties of Light</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective was to examine and demonstrate the wavelike properties of light.</p> <p><b>Methods/Materials</b> I performed several different experiments in which the wavelength effects of light are evident to the naked eye, even though the wavelength is very short. Two of these experiments are classics that are historically significant in the development and acceptance of the wave theory of light. Lasers of two different wavelengths were used in addition to a number of rulers, ball bearings, computer-generated slits, and other conventional items. The experiments were performed over very long path length so that the patterns were large enough to be easily observed and photographed. Measurements were made both directly and using photographs. Analysis of the results was performed using Microsoft Excel.</p> <p><b>Results</b> I observed interference patterns from two different classical experiments : the Young's Slit experiment and the Poisson's Spot experiment. In the Young's Slit experiment I used slits generated on a computer printer to demonstrate that the projected interference pattern behaved as predicted. I changed parameters such as the distance between the slits, the distance between the detection screen and the slits, and the color of the light source. For the Poisson's Spot experiment I used ball bearings mounted to glass slides to create interference patterns from laser sources. Again I varied parameters such as ball diameter, laser color, and the distance from the bearing to the detection screen. I then used a steel ruler as a reflection-diffraction grating to obtain accurate measurements of the light from my two lasers of different colors (red and green). Lastly, I used my knowledge of interference and the wavelength of my light sources to measure miniscule distances including groove spacing on a CD and DVD and the width of a human hair.</p> <p><b>Conclusions/Discussion</b> The nature of light is a question that sparked centuries of debate among the world's greatest scientific minds. I demonstrated that light did in fact exhibit wavelike properties, and I made a number of specific measurements of light interference phenomena. Finally, I not only took loads of beautiful pictures, but also had a great deal of fun with this project.</p>	
<b>Summary Statement</b> My project is an exploration of the wavelike properties of light.	
<b>Help Received</b> Father served as my mentor; Mother helped mount project.	