



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

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Project Title How Does Temperature Affect the Optimal Performance of Fiber Optics?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Our science fair project will be conducting an experiment dealing with the transmission of light through fiber optic cables. This project will be titled "The Effect of Temperature On The Optimal Performance of Fiber Optics". The purpose of this experiment is to find out how temperature changes the optimal performance at which light travels through the optical fiber. According to our research we learned that water shouldn't be exposed to the end of the fiber, that the fiber must be enclosed in a UV stabilized material, and that fibers work best in temperatures near 80 C up to 200 C, yet they don't show loss of efficiency at temperatures as low as -40 Celsius. We hypothesize that the fiber optics will work best at around room temperature and temperatures around 80-150 degrees Celsius.</p> <p>Methods/Materials To do this project, get fiber optics, a light source, and a photo detector. When finished with setting up these instruments, first darken the room(minimal light presence)and by using a flashlight, position the light so it transmits light into one end of the cable and stick the other end into the photo detector's detector.(Caution: Do not damage instruments, and do not play around with them too much because you can get electrically shocked.) Once you've done that, switch the measured data to nW on the photo detector and wait until it reads 3.08 nW. When it reads that number, turn on the light source and keep it on until the detector gives you a reading. Once you've learned how to do that, do your trials and record them down. Then change the environment of the fiber optic by adding ice or boiling water to change the temperature. Again, do the same thing while having the new environment introduced to the cable. Record your answers and come up with a conclusion.</p> <p>Results Our results were that the hotter temperatures got faster light transmission. We tested the cable at temperatures of 0-100 degrees Celsius and the cable that was introduced to 100 Celsius, worked the best. The average results were approximately 5.94 nW, 6.8 nW, 7.64 nW, 8.89 nW, and 11.11 nW.</p> <p>Conclusions/Discussion Our prediction was proven by the results of our experiment. Thus, our prediction is supported by our data. For example, when the fiber optics were exposed to a temperature of 0 degrees Celsius, the average of the optimal performances was 5.943333333 nW. However, at 100 degrees Celsius, the average was 11.11333333 nW.</p>	
Summary Statement We are trying to prove how varying temperatures effect the optimal performance of light. measured with nanowatts.	
Help Received Dr. X gave us a photo detector; Mr. R gave us fiber optic cables	