CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
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Project Number
S1814

Project Title
Chromatic Chaos: Measuring the Velocity and Energy of a Monochromatic Light

Abstract

Objectives/Goals
Through which media does a green monochromatic light (laser of 450nm) travel the fastest? I am attempting to measure the speed and energy of light as it travels through a medium using Snell's law and equations for energy conversion.

Methods/Materials
Thing glass contained (2cm max.), laser (450nm), protractor, solar cell, 4 primary (+ green) dyes, Multi-meter. Simply place the container with dyed water perpendicular to the laser. Then measure ten angles and project the laser through the material, noting the initial and refracted angle, as well as the voltage output on the Multi-meter. Use Snell's law to compute velocity.

Results
Basically, a green laser was definitely the fastest through a green medium (independent of the control or clear medium), and maintained the greatest energy through this medium as well. Green contained the fastest velocity (215,255,928.4 meters per second) and energy (0.19 volts and 3.04E-20 Joules) of any trial due to its relatable wavelength to that of the original laser.

Conclusions/Discussion
This projects helps understand how light travels, and what exactly impedes its travel. Light travels constantly at the speed of c, but is merely "slowed down" due to the time it takes to be absorbed by the bonds in the dye, propelling electrons to higher energy levels, then being re-emitted as another beam with less energy. Green media retained the most energy and velocity because the light was transmitted rather than absorbed, increasing time and losing energy

Summary Statement
My project is to measure how contrasting and relating wavelengths interact and modify the speed and energy of a monochromatic light

Help Received
I completed the experimenting on my own, but received help to understand Physics topics from Mr. Schoor, teacher at Villa Park