



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

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Project Title Measuring Optical Disc Storage Capacity	
<p style="text-align: center;">Abstract</p> <p>Objectives The objective of our project was to understand the relationship between the wave nature of light and storage data capacity by examining optical media using lasers.</p> <p>Methods Our methods rely on measuring the angle between diffraction points and using that angle and the known wavelength of the laser to determine the distance between the rows of pits on CDs and DVDs. We designed a styrofoam rig to hold a laser steady at a fixed distance from the discs which were positioned under the laser. We then mapped the diffraction points on a protractor template and recorded their degrees of diffraction. We tested each disc using both a red and blue laser. After data collection, we calculated the distance between the rows of pits on each of the discs. We then took the average for each disc for both the red and blue laser readings to compare results.</p> <p>Results We found that DVDs have less distance between the rows of pits than CDs. A DVD had an average distance between pits of approximately 723nm and a CD had an average distance of approximately 1451nm.</p> <p>Conclusions We concluded that because there was less distance between the rows of pits on the DVD than the CD, the DVD has greater storage capacity. This finding is consistent with our hypothesis that DVDs would have a higher storage capacity than CDs because the pits on DVDs are created by a laser with a narrower wavelength than that used to create a CD.</p> <p>Data storage is in high demand as more and more digital data is created. Optical data storage has been limited by the physical size of the disc and the width of the light beam. Scientists are trying to increase optical data storage on optical media either by using discs made of materials other than plastic such as glass or crystal or using light beam techniques to try to create smaller pits on the plastic discs. Our experiment helps other to understand how the sizes of wavelengths are associated with data storage capacity. By applying what we have learned, others can expand on that knowledge to figure out how to increase optical data storage capacity.</p>	
Summary Statement We measured the data on optical discs using red and blue lasers.	
Help Received A relative explained how DVDs and CDs are created by lasers.	