



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Scott K. Hempy	Project Number S1608
Project Title The Effect of Altitude on the Detection of Cosmic Rays in a Cloud Chamber	
Abstract Objectives/Goals The purpose of my project was to determine whether I could detect significant differences in the quantity of cosmic rays at three different altitudes by using a diffusion cloud chamber. Methods/Materials I built a cloud chamber using a glass aquarium turned upside down. It was placed on a sheet of anodized aluminum which was resting on dry ice. The atmosphere inside the aquarium was supersaturated with felt soaked isopropyl alcohol and cooled by the dry ice. As cosmic rays move through the aquarium ionizing the atoms, condensation occurs and falls to the floor of the device. By drawing two grids on the cardboard floor and counting the condensation trails which dropped in each of the 2 inch x 2 inch grids, for 3-four minute intervals, I recorded the number of rays detected. I chose to test my apparatus at 2000 feet elevation, sea level and underground. Each of these locations would be tested and counted by two people simultaneously counting two different grids, and on three different occasions to ensure legitimate results. Results My tests showed that my hypothesis was correct: Higher quantities of cosmic rays were detected at the highest location. At 2000 feet elevation, occurrence rates per minute were 45, 34.2 and 39 on my three attempts. The sea level location had rates per minute of 36.1, 23.7 and 21.7, while underground had rates of 12.3, 19.6 and 34.8. I found the results were very consistent within each of the 3 four minute intervals on a given day. The differences between testing days I suspect are due to the transporting of the chamber. Conclusions/Discussion My tests showed that my hypothesis was correct: Higher quantities of cosmic rays were detected at the highest location. At 2000 feet elevation, occurrence rates per minute were 45, 34.2 and 39 on my three attempts. The sea level location had rates per minute of 36.1, 23.7 and 21.7, while underground had rates of 12.3, 19.6 and 34.8. I found the results were very consistent within each of the 3 four minute intervals on a given day. The differences between testing days I suspect are due to the transporting of the chamber.	
Summary Statement The purpose of my project was to determine whether I could detect significant differences in the quantity of cosmic rays at three different altitudes by using a diffusion cloud chamber.	
Help Received My mother was the second counter alongside myself counting the cosmic rays.	