



# CALIFORNIA STATE SCIENCE FAIR 2014 PROJECT SUMMARY

<b>Name(s)</b> <b>Zoe Zawol</b>	<b>Project Number</b>  34729
<b>Project Title</b> <b>Is the Cosmic Ray Flux Greater at Higher Altitudes Than at Lower Altitudes?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My objective was to determine if the cosmic ray flux is greater at higher altitudes than at lower altitudes. My hypothesis was yes; I reasoned that at higher altitudes cosmic ray particles have a smaller chance of interacting with atmospheric molecules than they do at the increasingly denser atmosphere at lower altitudes. Therefore, the cosmic ray flux should be greater at higher altitudes than at lower altitudes.</p> <p><b>Methods/Materials</b> To perform my experiment, I built a cloud chamber to detect cosmic rays. I lined a small aquarium (chamber) with felt strips soaked in 99% pure isopropyl alcohol. I sealed the chamber with a metal plate, inverted it, and placed it metal plate down on top of crushed dry ice. A supercooled alcohol vapor cloud developed within the chamber. Ionized cosmic rays passing through the vapor caused visible condensation trails.</p> <p>I tested my cloud chamber at different altitudes, video recording the trails. As a control, I placed the cloud chamber in an aluminum foil wrapped box, which I thought might block the cosmic rays. The videos revealed too many cosmic ray trails to accurately count, so I marked all but a small portion of the video screen proportional to a section of the cloud chamber. I counted the trails in that portion and calculated the cosmic ray flux per cubic centimeter per minute for each altitude.</p> <p><b>Results</b> My results showed that at higher altitudes, the cosmic ray flux is greater than at lower altitudes. I reasoned that this is because the increasing density of the atmosphere provides more opportunities for cosmic rays to interact with other particles as they descend, resulting in fewer cosmic rays reaching the lower altitudes. I also found evidence that variations in the solar wind may affect the cosmic ray flux.</p> <p><b>Conclusions/Discussion</b> My conclusion is that the cosmic ray flux is indeed greater at higher altitudes than at lower altitudes.</p>	
<b>Summary Statement</b> The central focus of my project was to determine whether the cosmic ray flux is greater at less dense higher altitudes above earth than at increasingly denser lower altitudes.	
<b>Help Received</b> Dad helped me buy materials, drove me to the various altitudes to conduct my experiments, and talked with me about my ideas.	