CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
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Project Number
J1312

Project Title
Cosmic Shielding

Abstract

Objectives/Goals
My objective was to learn how well different materials block cosmic rays. My hypothesis is that the denser the material, the more cosmic rays it will block. Based on that, aluminum will block the most, followed by PVC plastic, then plywood.

Methods/Materials
MATERIALS: glass aquarium, isopropyl alcohol, wool felt, duct tape, aluminum sheeting, 1/8 inch thick plywood, 1/8 inch thick PVC, dry ice, cardboard box, metal sheet
SET UP: 1) Create covers out of wood, plastic, and aluminum to go over the detector. 2) Put dry ice in cardboard box. 3) Attach felt inside top of aquarium and soak with alcohol. 4) Attach metal sheet to open side of aquarium and seal with tape. 5) Place aquarium metal side down, on top of the dry ice. 6) Wait for cloud to form in chamber.
EXPERIMENT: 1) Place detector on a flat indoor surface. 2) Shine light into detector. 3) Set up camera to film entire inside of the detector. 4) Film for 1 minute and use video to count number of cosmic rays, writing the number on a record sheet. 5) Place aluminum cover around detector and repeat step 4. 6) Place wood cover around detector and repeat step 4. 7) Place plastic cover around detector and repeat step 4

Results
Cosmic rays per trial:
Aluminum: 1 - 32, 2 - 24, 3- 25, 4 - 37, 5 - 33, Total - 151, Avg - 30.2
Wood: 1 - 28, 2 - 26, 3- 23, 4 - 25, 5 - 22, Total - 121, Avg - 24.2
Plastic: 1 - 32, 2 - 24, 3- 30, 4 - 31, 5 - 28, Total - 145, Avg - 29
No Shield: 1 - 46, 2 - 31, 3- 17, 4 - 27, 5 - 26, Total - 147, Avg - 29.4

Conclusions/Discussion
The wood material blocked the most cosmic rays and the other two blocked almost none. This tells me that my hypothesis was wrong. I believe that the materials were not able to block the particles very well, but the wood was slightly thicker so the results showed a bigger change. Cosmic rays come from large space events which are not always consistent, so that may have played a part in the variations between each trial. My counting may have been inconsistent. I learned next time I should have a more consistent counting method and cosmic rays are hard to stop. I learned a lot of things about cosmic rays. I believe scientists working on future manned deep space missions could use these results in future research, because in deep space cosmic rays come in much greater numbers and can act as a form of harmful radiation. They could use this research to help figure out how to block the rays.

Summary Statement
My project is about finding out how well different materials block cosmic rays.

Help Received
My father helped handle dry ice, cut the metal sheeting, add silicone sealant for a few holes, and process videos of time trials. My grandfather built the shields after I gave him the dimensions and the materials.