California Science Center

CALIFORNIA STATE SCIENCE FAIR
2001 PROJECT SUMMARY

Your Name (List all student names if multiple authors.)
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J1404

Project Title (Limit: 120 characters. Those beyond 120 will be ignored. See pg. 9)
Particle Presence: The Presence of Subatomic Radioactive Particles

Division
X **Junior (6-8)** _ **Senior (9-12)**

Preferred Category (See page 5 for descriptions.)
14 - Physics & Astronomy

Abstract (Include Objective, Methods, Results, Conclusion. See samples on page 14.)
Use no attachments. Only text inside these boxes will be used for category assignment or given to your judges.

Objective: Our team project#s goal was to successfully build a Wilson Diffusion Cloud Chamber to view condensation trails left by subatomic particles. A secondary goal was to observe and compare the trails left by the particles from a source with a known mode of decay to a source with an unknown mode of decay, to determine the unknown mode of decay.
Materials and Methods: The Cloud Chamber consists of a series of containers: one composed of Styrofoam, and another of Acrylic plastic. Placed between these two containers is a fabricated junction of a copper pipe and a copper plate. A combination of ethyl alcohol and dry ice created the testing environment. To produce subatomic particles, different radioactive isotopes were used and placed inside of the chamber. The resulting observations were digitally captured on a camcorder for analysis.
Results: From the different sources tested, our results varied. The known sources that were used were ineffective and possibly stable. A test involved rubbing a raw silk cloth against the container to produce particles, which were long and thick. A Van de Graaf Generator was used for a third test, which produced the same results as the cloth. A fourth source was used, from an ionizing chamber of a smoke detector. This source produced short condensation trails that were thin. A fifth test used Polonium-210, a definite alpha mode of decay. The trails were short and thin. A sixth test dealt with Strontium-90, which is a definite beta particle for which no trails were observed.
Conclusion: The trails from the second and third tests were caused by electrostatic particles, also known as Cosmic rays. From the fifth test, we observed Alpha particle trails, so when we examined our test results from the smoke detector source, we compared the trails to that of the Po-210, and concluded that the mode of decay was alpha. After an extensive study, it was made fact that the source was Am-241 and it emitted Alpha and Gamma rays; however, we only saw trails by the Alpha particles. As for the Sr-90, it is thought that a Cloud Chamber becomes inactive after about an hour of testing. Therefore, we were unable to conclude using this source. In summary, our goals were completed from the test data we were able to identify various modes of decay.

Summary Statement (In one sentence, state what your project is about.)
This project deals with Alpha and Beta particles, which, when passing through alcohol vapor, leave a condensation trail which is evidence of a Particle's Presence to study.

Help Received in Doing Project (e.g. Mother helped type report; Neighbor helped wire board; Used lab equipment at university X under the supervision of Dr. Y; Participant in NSF Young Scholars Program) See Display Regulation #8 on page 4.
Father and Mother helped with materials, grammtical errors in report, and transportation; Father helped with summary; teacher stayed late many-a-night to supervise the completion of the project; mentor helped with background information; friends and family gave encouragement.