



California Science Center
CALIFORNIA STATE SCIENCE FAIR
2001 PROJECT SUMMARY

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

Eryn A Denney

Science Fair Use Only

J1406

Project Title (Limit: 120 characters. Those beyond 120 will be ignored. See pg. 9)

Where Alphas Go, Betas Fear to Tread: Analysis of Alpha Particle Tracks

Division

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: My goal in this project was to find the energy of alpha particles through observation of their tracks as seen in a cloud chamber.

Materials and Methods: To find the energy of the alpha particles, I first built a diffusion cloud chamber. The current chamber is the third I have built in the course of this experiment. The sponges in the top of the chamber are saturated with Methyl alcohol and pellet dry ice is placed underneath. An alpha source of Polonium-210 was placed inside. Once the bottom temperature reached approx. -30 degrees C, tracks began to form in the layer of sensitivity. The tracks were then photographed with a digital camera and enhanced on a computer with a graphics package. Once printed out, I measured the tracks with a ruler included in the photograph and recorded the results. 75 tracks in some 40 photographs were used as data. The median track length was calculated and the particle energy determined using a graph from W.A.Bethe.

Results: The median track length was 20 cm. Based on the work of Bethe, alpha particles having this as range would have an energy of 3.5 MeV.

Discussion: The proven energy of alpha particles emitted by Polonium-210 is 5.5 MeV. My results are considerably lower than this. There are two likely reasons for this. First, if the particle's path is upward, the track would be shorter than the range of the particle because it would leave the layer of sensitivity. Second, I cannot be sure of the exact location of the point on the source needle where the particle is emitted. So while the energy of alpha particles can be determined from their track length, the chamber used must be capable of showing tracks for their entire range. I'm still thinking about how to do that.

Summary Statement (In one sentence, state what your project is about.)

My project is to determine the energy of alpha particles from their track length.

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.