

Los Alamos High School
Physics
Alpha, Beta, Muon

The goal of my project this year is to examine the paths of common subatomic particles. More specifically, I hope to construct a computer model that is capable of identifying particle type (e.g. alpha particle or muon) based on particle trajectory. This model might eventually be used to determine the relative frequency of different kinds of particles in our local atmosphere or to analyze the particles in emissions of various radioactive substances.

I will use a homemade cloud chamber to collect data for this project. The chamber already functions; my first step will be to improve its cooling system and experiment with videotaping the particle tracks that I see. I may also place a radioactive source in the chamber and film its emissions. Once I have obtained good footage, I plan to run an edge-detection algorithm (such as the Canny edge detector) on select frames to make them easier to process. My first major milestone will be successfully encoding the data in a fashion suitable for tagging. It will then be ready for analysis by the main body of code. I will begin with “training” the computer to identify the various particles by manually tagging each image. However, I do foresee some difficulties with transitioning from manual tagging to computer tagging; that will be my central focus between now and April.

The bulk of the code for this project will be written in Java, since I have some experience with edge detection in that language already. I will use R for statistical analyses of the final results as well.

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