



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Deirdre M. Fuller	Project Number J1509
Project Title In Search of Cosmic Rays	
Abstract Objectives/Goals The objective of my project is to discover which direction most cosmic ray muons come from, either directly above or from horizontally. Methods/Materials To determine which direction muons come from, I first had to build a device to detect them. So I built a cosmic ray telescope consisting of a scintillator panel, a photomultiplier tube, a preamplifier, a shaping amplifier, and an oscilloscope. When a muon passes through the scintillator panel it gives off a bit of light which travels to the photomultiplier tube where it is converted to an electric signal. That signal passes through the preamplifier and shaping amplifier and finally to the oscilloscope where it can be viewed as a blip on the screen. To figure out which direction the muons were coming from, I took measurements of the number of muons per second, first when the scintillator panel was flat(receiving only muons from above), then when it was vertical(receiving only muons from horizontally). Results After taking all my measurements, I noticed that the number of muons per second coming from above was considerably larger than that of muons coming from horizontally. Therefore most muons, and subsequently most cosmic rays, come from above. Conclusions/Discussion Cosmic rays themselves are massive particles that come from space. When they hit our atmosphere they break off into three different kinds of particles, the easiest of those to detect is the muon. My results certainly supported my hypothesis that most muons will come from directly above.	
Summary Statement The purpose of my project is discover which direction cosmic rays come from.	
Help Received My father, Dr. George M. Fuller, and Dr. Jim Mattison supervised my use of the equipment in the USCD physics lab.	