

# CR1

# Preliminary Research Plan

## Pion 3

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# Purpose:

**The purpose** of the cosmic ray project is to study cosmic rays and answer our own proposed questions about them, by testing them in real life. Our question for the project that we would like to test is; does the temperature affect the rate that cosmic rays come down. Our hypothesis for the question is that we are guessing the cosmic rays rate will be higher, while the temperature is higher. We figure this because while the temperature is higher, particles move faster, hopefully implying that the rate will be higher as the temperature is higher.

## **Research**

As we all know, ninety percent of all cosmic rays that enter the atmosphere originate from protons. These protons hit air particles in the atmosphere, and decay into either pions or kaons, while other pieces of the atoms scatter around the atmosphere. The pions and kaons, quite shortly after, decay into mesons, which after another quite short period of time decay into muons. The muons are what we typically refer to as cosmic rays, as they are usually the particles that are detected by the device we are using and in Geiger counters nowhere near an Earth-based radioactive object. As mentioned before, we want to know if the temperature of an area affects the rate at which the rays get here, in other words: does the cold slow them down, and the heat speed them up?

# Experimental Design

## Steps:

- First, we need to make sure the equipment has power and is working
- Then we need to set up all the equipment needed
- Gather data
- Check every day at the beginning of class to make sure every thing is working

## Equipment:

- The Detector
- Temperature probe
- Laptop
- Cables

## Variables:

- Temperature
- Direction from sun (are we facing the sun or facing away from the sun)

## Controls:

- Location

# Analysis

**PART 1:** We think that the hotter it is, the fewer cosmic rays will get through. This is because the atoms will be hyperactive and the particles will be stopped by them. This will be verified by taking the temperature of the outside and recording the amount of cosmic rays.

**PART 2:** We found that that the average data was between 9000 and 10,000 hits per 2 hours. It is because of this, that our hypothesis is proven \_\_\_\_\_. The data shows that the number of hits is \_\_\_\_\_ during the night. This mean that as the temperature went down the number of hits went

## **Deliverables**

Our team will make a report in order to share our findings with other people world wide. Our data will show all of the data we have acquired and we will turn it into a graph in order to show the results easier. We are hopefully making a poster for the eLab Portal to help spread our results. We believe that all of these items will have been able to show if we had a successful experiment or what went wrong.

# Personnel

Team Make-up – Michael Colyer-Rose- Responsible for research and resources

Jason Dorrell- Responsible for deliverables and experiment design

Christian Fernandez- Responsible for title page and purpose

Taylor Throop- Responsible for Analysis and Personnel

Task Assignments - – Michael Colyer-Rose- Responsible for research and resources

Jason Dorrell- Responsible for deliverables and experiment design

Christian Fernandez- Responsible for title page and purpose

Taylor Throop- Responsible for Analysis and Personnel

Consultant/Advisor – Mr. Kliewer, teacher

## Resources

- **Budget:** We don't have a budget. We're freeloading on this entire experiment.
- **Building Resources:** The availability of the room is rather limited. We can only receive data at our actual class time; any other time is a little more difficult. We have until October 16, 2009 to collect the necessary data and publish it on an online poster. For ventilation, we are in an enclosed place, not outside, so more than likely, we're not getting as much data as we should. Except for the paperwork, we don't really store any of the equipment. We are leaving it out until the day we are not experimenting anymore. The shop space is devoted to one small part of the room where the detector collects data, day and night. The tools we are using for the experiment are the detector itself, a laptop, any other computer we can use, and a temperature probe.
- **Timeline:** The work we have to do is as follows: we have to update the logbook almost everyday to gain a better understanding of what it is we're doing, make a report summarizing just that, and ultimately make a poster to publish online. On Friday, October ninth, this report should be turned in for grading. Each of us is in charge of doing a quarter of this, with mine being this section and research, Christian with the title page and purpose, Taylor with analysis and personnel, and Jason with the rest.

Jason Dorrell	Experiment Design & Deliverables
Michael Colyer-Rose	Research & Resources
Taylor Throop	Analysis & Personnel
Christian Fernandez	Title Page & Purpose

- **Milestones:**
  - Preliminary: Take pre-test; enter in beginning logbook entries; and the preliminary version of this report. All of this is from the previous week.
  - Final: Collect Data, enter remaining logbook entries, and write the final version of this report (this one). All of this is due October 9, 2009.
  - Publication: Gather the information to create an online poster and take the post-test. All of this due on October 16, 2009.