# CALIFORNIA SCIENCE & ENGINEERING FAIR
# 2018 PROJECT SUMMARY

**Name(s)**

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**Project Number**

38030

**Project Title**

## Determining if Concrete Is a Liable Screen against Galactic Cosmic Radiation

**Abstract**

**Objectives/Goals**

The objective of this experiment is to create a detector, and measure and differentiate natural secondary cosmic particles above and below concrete with steel reinforcement.

**Methods/Materials**

Plastic rectangular fish tank, black felt, black card stock, 11 gauge steel, styrofoam cooler, block of dry ice, heating pad, video recorder, molding clay, categorize and count each type of secondary particle detected above and below concrete.

**Results**

Once the particle detector had reached its max efficiency, nine total 30 second trials were recorded above concrete. This same process was used again below concrete with steel. The secondary particles detected were categorized into comparable charts, with a section pertaining to one of the four possible outcomes from the chamber: electron/positron, alpha particle, muon, and unidentifiable. With concrete acting as a shield, almost all secondary particles were able to be screened. While almost all particles were screened, muons remained present. These accounted for more than 70% of below concrete occurrences.

**Conclusions/Discussion**

Being under six inches of concrete with reinforced steel in comparison to being above greatly reduces secondary particles. Although muons proved to be able to penetrate extremely well when compared to other highly interactive secondary rays under concrete. Therefore, occupants below six inches of concrete with steel reinforcement are still vulnerable to muons. This result is a step towards reducing and even stopping the negative effects of cosmic rays on certain types of highly sensitive technology and protection for astronauts against high energy particles in space.

**Summary Statement**

After measuring and categorizing the secondary particles created by galactic cosmic rays with and without shielding, I found muons were not as susceptible when screening secondary particles.

**Help Received**

I built the particle detector myself and researched all information on my own. I received a brief overview of how a cosmic ray works from a PHD student at Stanford University, which led me to continue further research of my own. I received help from a parent obtaining all the necessary materials, handling the dry