



**CALIFORNIA STATE SCIENCE FAIR  
2013 PROJECT SUMMARY**

<b>Name(s)</b> <b>John H. Park</b>	<b>Project Number</b> <b>J1899</b>
<b>Project Title</b> <b>How Do Different Various Voltages Affect the Deflection Rate of Charged Particles at a Constant Current?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My project was designed to determine how a modulated voltage supply at a constant low current would affect the rate of deflection of charged particles by an electromagnet. The theoretical aspect of this phenomenon is described in the Lorentz equation. After reviewing those equations, I am lead to believe that higher voltages will increase the deflection rate.</p> <p><b>Methods/Materials</b> My project calls for at least; one variable power supply, one detection device (Geiger, scintillator, or electroscope), one alpha radiation source, and one electromagnet. Other equipment is necessary, such as banana plugs, alligator clips, a multimeter, and other basic electrical equipment, but is commonly available and therefore not named. At its most basic, the experiment is an alpha radiation source pointed at an electromagnetic field with the source facing the detection device. All the devices will be unchanged and consistent except for the voltage going through the electromagnet to ensure that only the voltage is being tested.</p> <p><b>Results</b> My data shows that the variance fields between the various voltages were negligible and were within the right of human error with attaining data through an optical spinthariscopes. Therefore, I must conclude that the effect of an electromagnet at variable low voltages at a constant low current does not have a strong enough magnetic flux field to deflect alpha particles with an energy of 5.91 MeV's.</p> <p><b>Conclusions/Discussion</b> Although my shield apparatus failed to deflect the alpha particles, I believe my experiment has tested many components that will be useful in future experiments. This project has also helped me determine improvements to my experiment that may yield better results in the future, such as a vacuum chamber. In the next couple of years, I hope to be able to design and build a prototype shield device for potential use as a spacecraft radiation shield.</p>	
<b>Summary Statement</b> My project was designed to test how a low voltage electromagnetic field would affect the rate of deflection of charged particles, such as alpha radiation.	
<b>Help Received</b> This project was conducted by my self and the experiment itself was conducted at my residence without assistance from any qualified persons.	