



CALIFORNIA STATE SCIENCE FAIR 2012 PROJECT SUMMARY

Name(s) Isfar Munir; Jamison Sloan	Project Number S1810
Project Title The Effect of a Magnetic Field on the Plasma Arc of a Tesla Coil	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this project was to measure the degree to which a magnet deflects the plasma arc generated by a Tesla Coil (if any deflection occurred at all). It was hypothesized that the magnets would have an effect on the arc, and that north and south poles would produce no significant change over each other. In addition, 2 magnets put together to form a rod was compared to 5 magnets put together to form a rod, with the hypothesis predicting that there would be no difference between the two.</p> <p>Methods/Materials A Tesla coil was constructed by hand for this project; a high voltage transformer, a capacitor rated for high voltages, tungsten rods (for the spark gap), an aluminum toroid, and copper wire were all used to construct the Tesla coil. The Tesla coil was powered through a standard wall outlet. A steel rod was screwed into a wooden base. A steel hex nut was screwed onto the rod and the magnets were balanced on top of the nut (facing vertically). 2 neodymium magnets were put together for two sets of trials, 5 magnets were put together for another two tests (north and south poles were both tested), and a control data set was taken without any magnets at all. For each trial, a camera atop a wooden horse was used to take a picture for each trial. These pictures were put into Microsoft Paint, where (after scaling) a gridline was used to measure the maximum point away from the rod the arc reached.</p> <p>Results Statistical tests were run on the data sets to determine if the magnets had a significant effect on the path of the arc from the Tesla coil. F-Tests were run to determine variances between data sets, and for every F-Test a T-Test was also run. All data sets had equal variances (per the F-Test run on that set). Thus, all T-tests which were run assumed equal variances. The T-tests indicated that the magnets had no significant effect on the arc coming from the Tesla coil.</p> <p>Conclusions/Discussion This project refuted our hypothesis that the magnets would have an effect on the plasma arc of a Tesla Coil. This conclusion can be reached by looking at any statistical test conducted during the experiment. Future experimentation will focus on using stronger magnets and multiple magnets positioned in different locations to exert a deflection on the plasma arcs. This is a path not taken previously, and with luck the experiment can uncover the effects magnets have on high voltage electricity discharges.</p>	
Summary Statement This project was designed to determine the effect of a magnetic on the path travelled by an arc coming from a Tesla Coil.	
Help Received Physics teacher assisted in determining the strength of the magnets; Our friends Isaac and Stephen assisted in the statistical analysis; our friend Karel assisted in winding the secondary coil	