



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) William Shen	Project Number J1029
Project Title Most Effective Coilgun	
<p style="text-align: center;">Abstract</p> <p>Objectives The objective of this study was to test the effects of a number of changes in a coilgun s electrical system and the projectile on the distance traveled by the projectile.</p> <p>Methods Projectile, measuring tape, capacitors, magnet wire, ferromagnetic projectile, camera. Started with a standard coilgun design as control parameters. Changed different parts of the electrical circuit and measured the distance traveled by the projectile. A hypothesis about the most effective setup for the circuit was formed using data from the previous experiments and tested. Continued testing after hypothesis was disproved.</p> <p>Results Tested the effects of changing the number of capacitors, the projectile mass (same material), the position of the projectile, and the number of turns in the wire of the coil, as well as the effect of multiple variables together. Found that more capacitors and projectile positions farther from the center of the coil launched a projectile farther. Projectile mass was found to have no significant effect. The number of turns in the coil had no clear cut relation with the distance traveled by the projectile; rather, a certain amount of turns was the most effective.</p> <p>Conclusions For the farthest firing coilgun, a design would use as many capacitors as possible and have the projectile far from the center of the coil. The number of turns would have to be optimized for the other components to accelerate the projectile the most because of changed interactions when many variables are modified at once.</p>	
Summary Statement I measured the effects of different variables on the distance traveled by the projectile and found the most effective combination.	
Help Received Basic coilgun design based on the Mark 2 design from the website Barry's Coilgun Designs. Received help on construction and theory of the coilgun from my father.	