



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) David Legg; Britny Patterson	Project Number S0914
Project Title Coil Conundrum	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This project aims to investigate the relationship between projectile mass and projectile kinetic energy after firing in small-scale coil guns.</p> <p>Methods/Materials A single-stage coil gun was assembled, and a device to measure projectile velocity was constructed using two pairs of LED's and photo-dependent resistors. Four projectiles of different masses were made by cutting different lengths of a steel rod, and each was fired ten times through the device. The velocities were electronically recorded, and their respective kinetic energies were calculated. Finally, a two-tailed student's t test was used to determine statistical significance of the data.</p> <p>Results The data indicate that projectile mass has no statistically significant effect on the kinetic energy imparted. However, random error may be masking underlying trends in the data.</p> <p>Conclusions/Discussion This implies that scale of a coil gun should be based on other factors. Another benefit of this project was the practical knowledge gained in controlling the discharge of capacitors and in the capabilities of the system. This insight was important when continuing to Phase II, a multiple-stage coil gun, fired precisely by an electronic microcontroller. Also, random error present in this experiment was further minimized in Phase II.</p>	
Summary Statement This project attempted to optimize the mass of a coil gun's steel projectile.	
Help Received Partner participated in entire project. Father helped with some soldering and woodwork.	