



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Xochitl Morales	Project Number J0915
Project Title The Gauss Rifle: A Magnetic Linear Accelerator and Kinetic Energy	
Abstract Objectives/Goals The objective of this experiment is to determine how the number of magnets in a magnetic linear accelerator will affect the kinetic energy of the projectile. Methods/Materials In my project, I used a ruler with a cylindrical groove in the middle, ten steel ball bearings, four neodymium magnets, a meter stick, masking tape, Scotch tape, and a calculator. Results My results showed no specific pattern in the kinetic energies. First, the kinetic energy nearly tripled. Then, when the rifle with two magnets was compared to the the rifle with three magnets, the kinetic energy was extremely close to doubling. However, when compared to the results with four magnets, the projectile of the rifle with four magnets' kinetic engergy only increased by about 53%;. Conclusions/Discussion The results of the experiments allowed me to conclude that my hypothesis was, indeed, incorrect. My data suggests that the kinetic energy will add up linearly, but the speed will not. Instead, the speed seems to increase by a smaller amount each time a magnet is added. At one point in the project, I noticed an anomaly associated with the neodymium magnets; some had a stronger electromagnetic pull. This unexpected happening would be a relevant and interesting topic for future research and may be the reason for the unexpected results.	
Summary Statement The objective of this experiment is to determine how the number of magnets in a magnetic linear accelerator will affect the kinetic energy of the projectile.	
Help Received Mrs. Rios helped spot where the projectile landed; Mr. Nail provided neodymium magnets and steel ball bearings; Father helped revise Abstract and Background Research.	