



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Robert I. Karz	Project Number J1621
Project Title The Power of Sound: How Sound Influences Kinetic Energy	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of my project is to see if sound waves can affect kinetic energy, as demonstrated on a Gauss rifle. I believe that when the frequency of a set of sound waves is increased, it will make the projectile from the Gauss rifle travel further at a linear rate.</p> <p>Methods/Materials The Gauss rifle is composed of a wood plank, aluminum ramp, neodymium magnets, and steel ball bearings contained in a sound-dampening chamber consisted of foam. AC powered cone speakers in the chamber are aimed at the rifle, receiving selected frequencies from the frequency generator on my laptop computer. A trigger ball in a potential energy state is queued at the top of the ramp. After a frequency is selected, the ball is launched, placing it into a kinetic energy state. It is then accelerated through the Gauss rifle by magnetic energy and launched out the front of the rifle, landing into the sand-filled measurement tray. The 15 frequencies (1-15 KHz) and three baselines were each repeated four times.</p> <p>Results From the different frequencies tested, I found that the higher the frequency, the shorter the distance the projectile traveled. Further, there was a slight linear decrease in distance as the frequency increased.</p> <p>Conclusions/Discussion My experiment did in fact show that sound waves can affect kinetic energy as demonstrated by the varying distances of travel by a Gauss rifles projectile. Though, I achieved my objective, by affecting kinetic energy with sound, my results did not support my hypothesis. As the frequency increased, the distance of travel did not increase. Instead, it decreased, thus disproving my hypothesis. These results suggest that sound waves could be used to deflect solid objects, such as altering the trajectory of a Kinetic Energy missile, or redirecting an automobile away from a highway railing, if it is about to crash into it.</p>	
Summary Statement This project is about affecting kinetic energy with varied sound frequencies, demonstrated by aiming sound waves at a projectile launched from a Gauss rifle.	
Help Received My father helped with the power tools to cut materials and to load the Gauss rifle. My mother helped edit information and fix grammatical errors. My teachers helped by giving me a structured format and outlines as guides. Special thanks to family and friends for their encouragement.	