



**CALIFORNIA STATE SCIENCE FAIR  
2005 PROJECT SUMMARY**

<b>Name(s)</b> <b>Ernesto Botello</b>	<b>Project Number</b> <b>J1599</b>
<b>Project Title</b> <b>The Gauss Rifle</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> I continued in this project because I felt that I had more to learn in this subject and that my project had not yet been able to reach to its full potential. In my research, I discovered the many laws that when using magnetic acceleration you are altering the forces that are attracting one magnet to an object. The reversal is used in switching plates and gears in most machines because the heavy equipment can only be moved using a powerful enough shift of energy to move the gears in action so that the mechanic within the machine are kept moving. I also learned about how transportation vehicles are going to the next level with GPS inside.</p> <p><b>Methods/Materials</b> The materials I used in my project were two wooden meter sticks, tape, five neodymium rare earth magnets (cube in shape 1 ½ cm x 1 ½ cm), eleven nickel plated steel ball bearings around the same height as the magnets or larger, a sharp pair of scissors, and a wooden board. The procedures I took were to attach the five magnets to the wooden rulers with the tape about twelve centimeters apart from each other. Tape the rulers so the magnets do not become attracted to themselves easily. To the right of each magnet, I placed two steel ball bearings. I fired the device by setting the eleventh ball bearing in front of the leftmost magnet and the energy would pass through the magnets launching the ball at a very high speed, so fast your eyes can't even see it.</p> <p><b>Results</b> When angled in an upward position the speed gradually decreased because the force of gravity was acting against it. When angled in a downward position the speed increased gradually as the force of gravity added on to the acceleration from the device. Since I used two sizes of ball bearings the speed also changed when I changed the sizes or combined them.</p> <p><b>Conclusions/Discussion</b> In conclusion I found that when angling the device in an upward position the device went slower because of the force of gravity which I did not take into consideration was going to act against it. I also found that when you angle the device in a downward position the force of gravity acts with the device which makes the device go faster. When using the larger sizes balls the device goes slower because of the mass. When using the smaller balls the device goes faster and is because of less mass.</p>	
<b>Summary Statement</b> My project is simply a device that launches steel ball bearings at very high speeds with neodymium magnets.	
<b>Help Received</b> None	