CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
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Project Number
J0822

Project Title
The Linear Accelerator

Abstract

Objectives/Goals

1. Problem Statement: Can magnets be used to increase the momentum of a steel ball?

2. Hypothesis: If magnets are introduced to a kinetic energy sequence with steel ball bearings hitting each other, then the momentum of the steel ball bearings on the magnetic track will be twice the speed of the last ball on the non-magnetic track.

Methods/Materials

3. Materials:
14 5/8 inch steel ball bearings 4 1/2 x 1/2 x 1/2 neodymium magnets
2 tracks with 1/2 inch routed groove 4 1/8 inch steel nuts
Epoxy glue 1 1/2 inch wodden dowel

4. Procedure:
1. Set up linear accelerator with magnets
2. Release 5/8 inch steel ball bearing down ramp of accelerator
3. Film last ball over a twelve inch track as it leaves the accelerator
4. Calculate speed of ball by converting inches traveled/frames of video @ 30 frames/second to inches per second
5. Perform ten trials of steps one through four
6. Repeat steps one through five for linear accelerator

Results

5. Results: The last ball of the linear accelerator reached speeds up to 90 inches per second, while the last ball on the non-magnetic track reached speeds up to 11 inches per second.

Conclusions/Discussion

Magnetic linear accelerators are a more efficient way to move mass than non-magnetic linear accelerators.

The large linear accelerator uses electromagnets instead of real magnets. They use these huge machines to then speed subatomic particles to incredible speeds and crash them into each other. (Wikipedia, 2007) Scientists do this to observe the effects of the subatomic collisions and to gain insight as to larger scale collisions in space. Scientists can then get an idea of how the universe was formed.

Summary Statement

This experiment tests the use of magnets to accerlerate steel balls.

Help Received

Dad helped with the use of power tools to construct the accelerator. mom helped edit the written report.