Kohler McInnis
Junior Division Physics

Maglev Trains: Are they Cool or Are They Hot? A Study of the Effect of Temperature on Maglev Trains

This project was chosen because of an interest in maglev trains and in helping to search for possible alternatives and/or the reduction of the reliance on fossil fuels for transportation. Maglev trains levitate because the magnetic pole of the track is the same pole as the magnets on the train, therefore creating a magnetic field, repelling each other and creating a lift and reducing friction for the train. This project tested the effect of temperature on the strength of the magnetic field. The hypothesis was that heated magnets would create the strongest magnetic field. For this project, a two-inch train car and a two-foot long track were built out of particle board and button magnets. The magnetic car was placed in the freezer for two hours. I then ran the car down the track multiple times, adding a quarter with each run. The number of quarters were counted until the train was no longer levitating. The next test was at room temperature, repeating the process. Next, I heated the car to 200 degrees and ran the test again. I found that the colder the magnets were, the stronger the magnetic field. The cooled magnets held 10 quarters. The train at room temperature held eight quarters and the heated train held only six quarters. The conclusion is that the cooled magnets create a stronger magnetic field than the heated magnets. Upon reading about how the Japanese super-cool their maglev trains because of this, I now understand why.