



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) William H. Baldwin	Project Number J0903
Project Title The Superconducting MagLev Train	
Objectives/Goals To build a working model of a small scale superconducting magLev train that provides sufficient data to calculate whether or not building a full scale superconducting MagLev train is possible, and if so what would the specifications be.	
Abstract	
Methods/Materials Experimental procedure: 1. Build the train. 2. Lay the magnets on the track in a three magnet thick oval where the outer rows of magnets are inversely polarized to the middle row of magnets. 3. Build the mechanical motor and size it correctly on the track in order to propel the train when levitating. 4. Choose which height you would like the train to be cooled at (2mm-14mm) place train on shim and cool...wait.....and we have lift off! 5. Measure heights, weights, speeds, and times. 6. Calculations Materials - A 35#65#16mm High Grade, Melt Textured Yttrium Barium Copper Oxide Bulk Superconductor. -400 .5#.5#.125" N42 Grade Neodymium Magnets.(Magnetized through Thickness) -A .25" thick cold-rolled Steel sheet. -Liquid Nitrogen. -Polystyrene Plastic sheeting.	
Results The levitation height was able to be varied from 2mm-14mm due to the enhanced flux pinning effects of the superconductor. However, the levitation gets much weaker the higher the levitation. The average speed through the acceleration-gates was 3.38k/h. While the average speed through the speed-gates was 4.81Km/h.	
Conclusions/Discussion Over all, the experiment did turn out how I had anticipated. The Small scale superconducting maglev train did provide accurate data, and I actually determined that running full scale superconducting trains would not be a feasible replacement for traditional trains due to the extreme build up of cost and weight.	
Summary Statement To build a completely functional small scale Superconducting MagLev Train and use its performance aspects to determine whether or not full scale Superconducting Trains would be a feasible replacement for traditional locomotives.	
Help Received My parents helped me purchase the necessary materials, along with supervising me with the liquid nitrogen.	