



**CALIFORNIA STATE SCIENCE FAIR  
2011 PROJECT SUMMARY**

<b>Name(s)</b> <b>Thomas M. Arrizza</b>	<b>Project Number</b> <b>J0902</b>
<b>Project Title</b> <b>High Voltage Discharges: Investigating Effects of Wire Structures</b>	
<b>Abstract</b> <b>Objectives/Goals</b> About a year ago, I became fascinated with the idea of a Tesla coil. In September I built a Tesla coil. I observed that the sparks farther away from the Tesla coil seemed to be longer. I decided to research and find out why. I believed the differences might be caused by the electric field surrounding the Tesla coil. If this was so, the spark lengths would change length based upon the distance the discharge point was to the Tesla coil. I made this my hypothesis. <b>Methods/Materials</b> To test my hypothesis, I constructed structures from copper tubing. I performed approximately 60 tests and recorded and measured a total of 20 samples. For these experiments, I tested the shorter wire heights against the longer wire heights in configurations I constructed to compare the sparks emitted. I named my first wire structure the #Daisy Flower#. The second structure I made I called the #Ladder#. The third structure I tested was a wire with adjustable heights. I placed each of the configurations on the toroid of the Tesla coil and took several photographs of each result. I then measured the length of the sparks indirectly by measuring the lengths on the photographs I took. <b>Results</b> I found that my first two configurations, when tested, seemed to support my hypothesis, the sparks emitted were ten times longer at the farthest wires (at the greatest vertical heights). The separate wire heights experiment did not show the same result. I was puzzled by this, so I researched to find answers. <b>Conclusions/Discussion</b> I found that the sparks travel as far away from the Tesla coil as they need to complete a circuit with ground. Even though my hypothesis was not supported, my findings may be helpful in research regarding harvesting directed lightning for power.	
<b>Summary Statement</b> This project studies the effect of copper wire shapes that I made on high voltage, low current electrical discharges from a Tesla Coil	
<b>Help Received</b> Father supervised project; Teacher helped guide project in correct direction	