



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

|   |                                       |
|---|---------------------------------------|
| <b>Name(s)</b><br><b>Luke R. Wilhelm</b>  | <b>Project Number</b><br><b>J0222</b> |
| <b>Project Title</b><br><b>Danger High Voltage: Especially When Cold</b>  |                                       |
| <p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b><br/>The objective of this experiment is to see how the voltage output of a solar cell is affected by different temperatures.</p> <p><b>Methods/Materials</b><br/>Materials: solar cell, multimeter, lamp, hairdryer, ice packs, wooden board, box, wire clips.<br/>Methods: shining light over solar cells, use ice packs and hairdryer to influence temperature, record voltage, record different temperatures.</p> <p><b>Results</b><br/>When the solar cell is colder, the voltage output is higher. Using a circuit consisting of the solar cell under the light and the 2,000 ohm resistor, the hottest average temperature of 66.4 degrees Celsius produced the lowest voltage output of 4.1 volts. The lowest average temperature of 12.7 degrees Celsius, produced the highest average voltage output of 4.6 volts.</p> <p><b>Conclusions/Discussion</b><br/>The results from this experiment support the hypothesis, which was that the solar cell's voltage output would decrease as the temperature rises. This is because of the quasiparticles, called phonons, which move around the solar cell faster in higher temperatures. This movement blocks the flow of electrons, which then in turn decreases the voltage output.</p> |                                       |
| <b>Summary Statement</b><br>This project is about testing to see how different temperatures affect the voltage output of a solar cell.  |                                       |
| <b>Help Received</b><br>My parents helped me construct the testing apparatus I used to conduct my experiment.   |                                       |