



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Rosemary J. Chapman	Project Number J1801
Project Title The "Eggsact" Speed of Light	
Abstract Objectives/Goals The objective of this project is to measure the speed of light using the hot spots created by the interference of microwaves in a microwave oven, on different foods. Methods/Materials The rotating mechanism was removed from a microwave oven to produce hot spots that caused uneven cooking. After heating different foods, a metric ruler was used to measure the distance between the centers of the hot spots. This distance represents half of the wavelength of a microwave produced by the oven. The frequency of the microwaves produced by the oven was given on the oven's label. Results The speed of the microwaves was calculated by multiplying the average wavelength determined from the hot spots of each food and the frequency of the microwave oven. Since microwaves and visible light are both electromagnetic waves, they have the same speed. When using egg whites, the speed of light was calculated to be 304,000,000 m/s, which was a 1.33% error when compared to the actual speed of light, 300,000,000 m/s. Egg yolks yielded a 3.0% error, marshmallows a 3.6% error and sour punch straws a 4.6% error. Conclusions/Discussion By removing the rotating platter in a microwave oven, hot spots were produced which are the antinodes that form when the microwaves reflect off the walls of the oven and interfere with each other, producing standing waves. The distance between the hot spots did not depend on the type of food tested, but the egg whites gave the best results because their hot spots had a more defined center making it easier to measure the distance between them.	
Summary Statement This project is about measuring the speed of light using the microwaves generated by a microwave oven.	
Help Received My mom supervised my experimental procedure and explained some of the concepts of electromagnetic waves.	