# CALIFORNIA STATE SCIENCE FAIR
## 2004 PROJECT SUMMARY

**Name(s)**
Skye Aaron

**Project Number**
**J1501**

**Project Title**
## Measuring the Speed of Light: To Jupiter and Beyond

**Abstract**

**Objectives/Goals**
Measure the distance to Jupiter in order to measure the speed of light.

-

**Methods/Materials**
I used parallax to find the distance to Jupiter at opposition, and then derived equations to calculate this distance at other times. I observed and recorded the times of numerous Io eclipses, and used these to find a time lag. By coupling the distance changes and the time lag, I calculated the speed of light. I used the telescope that I built as part of my project from last year, CalSky star maps and viewing predictions, a stopwatch, a clock, and recording materials (pen, paper, etc.).

-

**Results**
Distance to Jupiter at opposition: 4.2 AU (4.4 AU actual)
Changes in Distance: 0.0486 AU (0.0482 AU actual)
Speed of Light: 383,000 km/sec (299,729 km/sec actual)

-

**Conclusions/Discussion**
My parallax measurements yielded a result with about 5% error. However, errors in my estimated change of distance were smaller (about 1%). While these distances were fairly accurate, my overall speed of light estimate was very sensitive to small timing errors. The result was too high, almost 30% faster than the accepted value, and could easily have been off by much more.

My procedure presents a valid approach, but is not necessarily the most practical method; extreme accuracy in observations is required to get good results. However, taking into consideration my homemade telescope and the needed precision, my project produced a surprisingly close estimate.

-

**Summary Statement**
I measured the distance to Jupiter and timed Io's eclipses to estimate the speed of light.

**Help Received**
Father checked calculations and drove me to observation sites; Friend suggested project idea; Mother helped with display board