CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

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Project Number

S1903

Project Title

A Photometric Study of Eclipsing Binary Stars: A Methodology for Classification

Abstract

Objectives/Goals

This project was a study of two W Ursae Majoris eclipsing binary star systems, AB Andromedae and ER Orionis. The study sought to describe the stars based on various classification schemes and to verify classifications found in the literature.

Methods/Materials

Operating a telescope in New Mexico, observations of these two systems were made and measured by photometry software. Lightcurves were created from these observations and modeling software was used to fit models to the observational data. From these models, certain parameters of the binary star systems were determined and compared with those found by other research.

Results

It was found that inferences made from observations by the author were mostly in agreement with known parameters and classifications. AB Andromedae and ER Orionis are systems where the stars are in contact and therefore fill or even overflow their Roche lobes. The stars' spectral classes range from G to F, which are stars with temperatures ranging from about 5000 to 7500 Kelvin.

Conclusions/Discussion

It was verified that AB Andromedae and ER Orionis are W Ursae Majoris eclipsing binary star systems. This project was successful in understanding the morphologies of these two systems and will continue to gather data for other stars. This project developed an efficient way to classify eclipsing binary stars demonstrating the value of amateur astronomical data.

Summary Statement

This project developed a methodology for the classification of eclipsing binary stars.

Help Received

Help received from Raja Guhathakurta, Professor of Astronomy at UCSC.