



ANALYZING ASTEROIDS



Using Light Curves to Determine Rotation Period and Shape of Asteroids

Hannah Olson
holson@umd.edu

Science, Discovery, and the Universe
Majors: Applied Mathematics and Astronomy

Introduction

An asteroid is a small, rocky object in our solar system that orbits the sun. Asteroids are typically found in the asteroid belt, which is located between Mars and Jupiter. There are over 500,000 known asteroids in our solar system. For a large majority of these asteroids, no physical characteristics about the asteroid, except orbital period, are known. The goal of this research project is to measure both the rotation period and shape of the asteroid 9529 Protopapa by mapping the asteroid's light curve, which is how the asteroid changes in brightness over time.

Analysis

Jacob Shpeice and I went to the observatory and attempted to gather our data for the asteroid over a period of several nights. However, despite our efforts we were unable to gather any usable data. Our goal was to use the program MPO Canopus to analyze the data that we collected, and produce a light curve for the asteroid, which we would then use to determine the asteroid's rotation period.

Conclusions

This research project taught me a lot about observational astronomy. Sometimes, astronomers are not able to gather the data that they need, because of the same problems that Jacob and I encountered during our project. If I could do this project over again, I would start in the fall, when the weather in Maryland tends to be more conducive for an observational astronomy research project.

Equipment

All of the data that was used for this research project was collected at the University of Maryland's observatory using the 7" astrophysics telescope located there. The telescope has an aperture of 7 in and a focal length of 1600 mm. The CCD attached to the telescope is 1472 x 2184 pixels. We used the program MaxIm DL 5 to capture our images.

Problems

We encountered many problems and setbacks throughout this research project. One of the biggest problems that we faced was the weather. Since this was an observational astronomy project, we could only gather data on nights when the sky was clear, or nights with a very thin cloud cover. We also could not gather data when the moon was full or near full, because it can be so bright that it washes out the relatively dim asteroid. In addition to these problems, there were also some technical issues with the equipment that we were using, the telescope and the computer used to control it, that prevented us from gathering any data on some nights.

Acknowledgements

I would like to thank the following people for all of their help and support throughout my capstone project:

- Jacob Shpeice, my research partner
- Elizabeth Warner, my mentor