CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY

Name(s)

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Project Number

S1817

Project Title

Determination of the Orbital Elements of Near-Earth Asteroid 1999 LO28 Using the Method of Gauss

Abstract

Objectives/Goals

The objective of the research was to generate the orbital elements of the asteroid 1999 LO28 in order to better study its orbit and assess its potential threat for planetary collision.

Methods/Materials

Images of the asteroid were taken on 5 separate nighttime observation runs. The images were then reduced and aligned using CCDSoft Version 5. Images were then used to generate initial vectors of the asteroid from the Method of Gauss using a Python program. Once these vectors were determined, they were used to determine the orbital elements of 1999 LO28 in a Python program. I developed both programs.

Results

I compared the orbital elements that were determined for this near-Earth asteroid with the predicted corresponding values by the Jet Propulsion Lab (JPL). Five out of the six orbital elements were within one-thousandth of the JPL value.

Conclusions/Discussion

I determined how these calculated orbital elements would change over time, and it was found that the 1999 LO28 asteroid would never collide with the Earth, but will collide with the Sun in about 200 million years. The orbital elements I calculated were new information that had never been collected previously. This was then published in the recent Minor Planet Center report (MPC), which provides information used by space organizations such as NASA and SpaceX to program spacecraft to efficiently travel through space without collisions with asteroids like this.

Summary Statement

I determined the orbit of a near-Earth asteroid and assessed its potential threat to planetary collisions.

Help Received

I was able to use telescopes to collect data from the Frank Etscorn Observatory in Socorro, New Mexico. I gained access to these facilities through my research advisor, Dr. Adam Rengstorf, at the New Mexico Institute of Technology and Mining.