

**SIERRA COLLEGE OBSERVATIONAL ASTRONOMY
LABORATORY EXERCISE**

NUMBER III.Ja. TITLE: PLUTO AND CHARON (INTRODUCTION)

DATE- **PRINT NAME/S AND INITIAL BELOW:** **GROUP**

DAY-

LOCATION

OBJECTIVE:

Be able to:

Graph data, visually fit the data with lines.

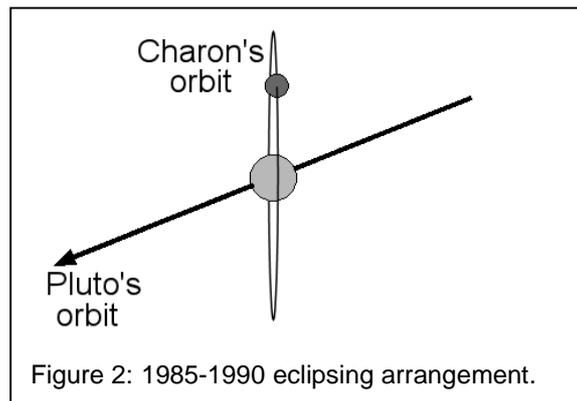
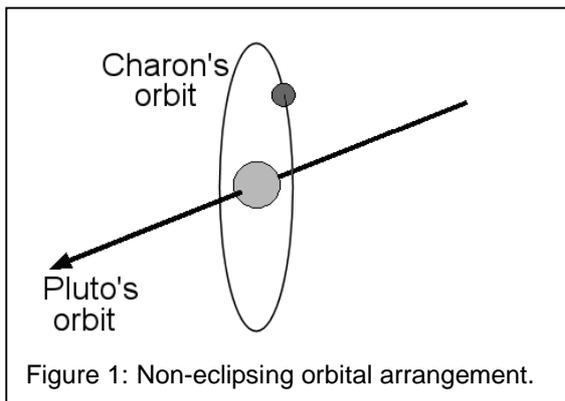
Interpret a light curve, infer orbital events, calculate orbital time intervals.

Calculate the sizes of Pluto and Charon, and the mass of the Pluto system.

DESCRIPTON:

The dwarf planet Pluto is a contender for being the largest object in the Kuiper Belt. It is orbited by at least four satellites, the largest being named Charon.

Charon and Pluto are gravitationally locked with each other—both take 6.39 days to rotate, and Charon takes 6.39 days to orbit Pluto. Meanwhile, the entire system takes a full 248 years to orbit the Sun! Shortly after Charon was discovered in 1978, astronomers calculated that a rare event was about to occur—as Charon travelled around Pluto, its orbit would be perfectly aligned with the Earth. This meant that from 1985 to 1990, Charon and Pluto would (as viewed from the Earth) enter into a cycle of eclipsing each other!

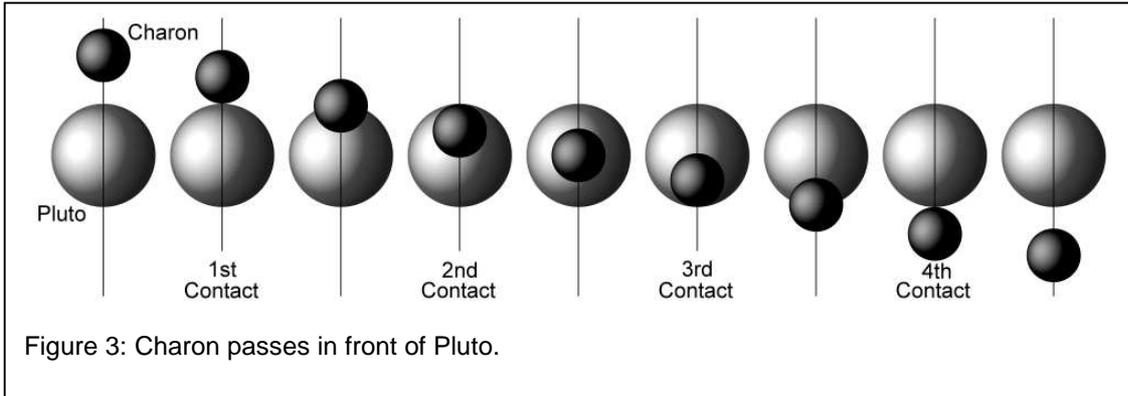


These eclipse events (called occultations) are not just interesting—they can be used to learn the sizes of Pluto, Charon, and even the masses of the Pluto-Charon system. Determining these parameters will be the goal of this lab.

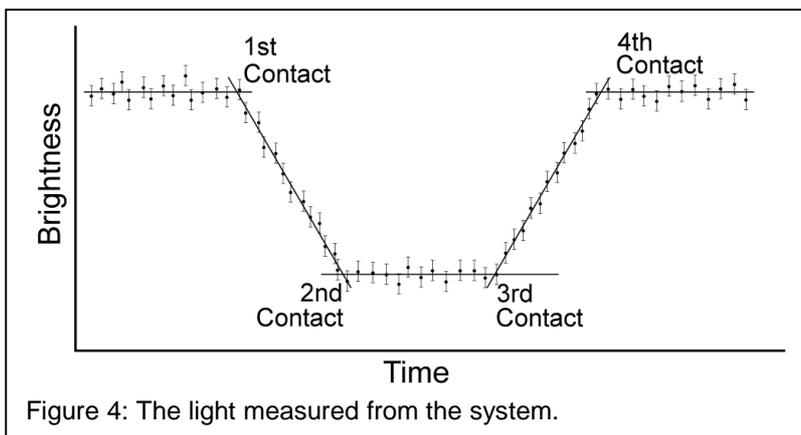
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Understanding occultations

Suppose you were studying the Pluto system during an occultation. Even if you could not see Pluto and Charon as separate objects, what would you expect to observe as Charon moves across the face of Pluto? (As you read, refer to Figures 3 and 4.)



- 1) Charon approaches Pluto (from our viewpoint). The instant that the leading edge of Charon reaches Pluto is called "1st contact."
- 2) As Charon moves in front of Pluto, the Pluto-Charon system grows fainter. The moment the trailing edge of Charon reaches Pluto is called "2nd contact."
- 3) The system's brightness remains constant, but dimmed. The moment Charon's leading edge reaches the edge of Pluto is called "3rd contact."
- 4) The system's brightness rises, as Pluto emerges from behind Charon. The system reaches the original brightness at the moment of "4th contact."



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