



# LEARN - Can Asteroids Have Rings Like Saturn?

## **Learning Objective:**

Learn that rings are not exclusive to planets and discover how they can be detected in smaller bodies like asteroids.

## **Overview:**

The progress in astronomical technology and observation techniques has played a significant role in understanding the uniqueness of rings surrounding the giants planets in our solar system.

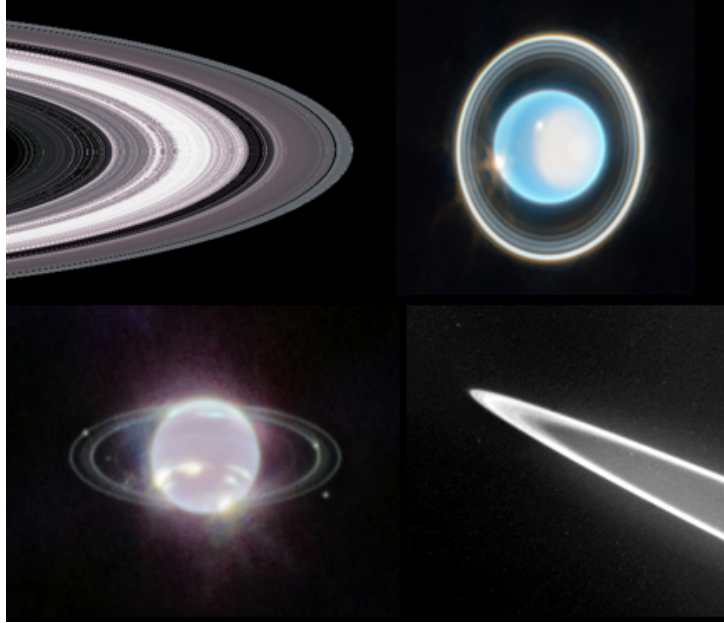
## **Specifics:**

Saturn stands as the primary celestial body known for its distinctive rings, marking a significant milestone in astronomical history. These iconic rings were first observed in the 17th century, making Saturn the pioneering discovery of ringed planets.

It was not until a considerably later period that Saturn's exclusive status was challenged. In 1977, NASA's Kuiper Airborne Observatory made a significant finding by detecting a similar structure around Uranus during a stellar occultation event. Few years later, one of the Voyager probes gave additional confirmation of this discovery.

During the Voyager missions, new findings were made concerning the ringed nature of Uranus. Jupiter and Neptune were also found to have rings, expanding the list of ringed celestial bodies. This group of giant planets had the privilege of being the only ones with rings for a considerable period.

However, in the 2010s, with the aid of remarkable progressions in optical instruments and improved detection methods, we were able to uncover rings encircling other celestial bodies as well. These newfound rings extend from distant exoplanets to smaller bodies within our own solar system.



In 2014, a discovery caught the attention of the astronomy world: two rings encircling (10199) Chariklo, a Centaur asteroid, were officially unveiled. Centaur asteroids are a unique class of celestial bodies residing between the orbits of Jupiter and Neptune. Chariklo is considered as the largest representative of its kind, with an estimated diameter of around 300 km.

The inner ring is situated 391 kilometres from Chariklo's centre and it stretches a width of 7 kilometres. Whereas the outer ring is positioned at a distance of 405 kilometres away from the centre, and has a width of 3 kilometres. These celestial features were named Oiapoque and Chuí, as a tribute to the northern and southern borders of Brazil (one of the collaborating scientists originated from this South American country).

The current theory among astronomers on the origins of these rings suggests that they most likely emerged from the aftermath of collisions between Chariklo and other celestial bodies, leading to the dispersion of debris.



The following year, a potential ring system was announced around (2060) Chiron, the first discovered Centaur object, but conclusive results were still missing.

### **How rings are usually detected**

Due to their small size, both Chariklo and Chiron, present a challenge in terms of direct observation. However, the identification of rings on objects of such size can be achieved with a technique known as stellar occultation. This method, initially used to disprove Saturn's exclusive ring status in the 1970s, has recently brought to light the presence of ring systems around dwarf planets such as Haumea and Quaoar.

The process involves an alignment wherein a particular asteroid passes directly in front of a distant star, as observed from Earth's perspective. Observers should meticulously time the duration of this celestial rendezvous. These precious seconds provide essential data for calculating the object's dimensions, shape, and the presence of any accompanying structures, such as rings.



**You can learn more about this subject by visiting these websites:**

[LEARN – Do asteroids have moons?](#)

[Steve Preston Asteroid Occultation Predictions](#)

[OccultWatcher - International Occultation Timing Association](#)