

Saturn's Rings

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The Mystery of the Rings

In 1610, Galileo pointed the newly invented telescope at Saturn and noticed strange shapes on both sides of the planet. Galileo thought the shapes were two moons, one on each side of the planet. The “moons” seemed to play “hide-and-seek” with him, appearing and disappearing over several years of observations.

Many other astronomers studied Saturn's strange and changing appearance for several decades without finding a good explanation. Dutch astronomer Christiaan Huygens solved the mystery in the 1650s. In his book, Huygens described Saturn as being “surrounded by a thin flat ring.” Although Huygens' explanation of Saturn's famous rings was not entirely correct, it forms the foundation for today's theories of the ring system.

After hundreds of years, astronomers are still studying Saturn, the sixth planet from the Sun, and its signature rings. Other planets have rings, but they are so faint that we cannot easily see them. Saturn's rings stand out because they are very bright and contain lots of icy material that reflects sunlight.

Saturn and its ring system have been visited over the past 30 years by several spacecraft, including Pioneer 11 and Voyagers 1 and 2. Spacecraft, however, cannot land on the ringed planet. Saturn, like Jupiter, is a gas giant and does not have a solid surface. Since its launch in 1990, the Earth-orbiting Hubble Space Telescope also has been probing the planet.

Observations by Hubble, other spacecraft, and many ground-based telescopes have yielded valuable information about Saturn and its famous rings. The planet's ring system is composed of about 10,000 rings, called ringlets. The ring system is about 175,000 miles (280,000 kilometers) across, yet only about half a mile (1 kilometer) thick. These measurements may seem large, but the rings orbit a huge planet. The rings, when compared with Saturn's size, are flatter than a piece of paper. The rings' thinness and the way they are tilted toward Earth are why Galileo saw — and even Hubble sees today — the rings disappear at times. When viewed edge-on, the rings are almost invisible.

The rings are not composed of solid sheets of material. Astronomers believe they are made of pieces of dusty water ice, which range in size from dust grains to boulders. These particles gently collide with each other as they orbit Saturn.

The greatest mysteries about Saturn's rings are how they formed, how long they will last, and why they are there at all. NASA's Cassini spacecraft, now orbiting Saturn, is providing a stunning close-up look at the planet and its rings, complementing Hubble's far view. The mysteries that began with Galileo will continue for future generations of astronomers.

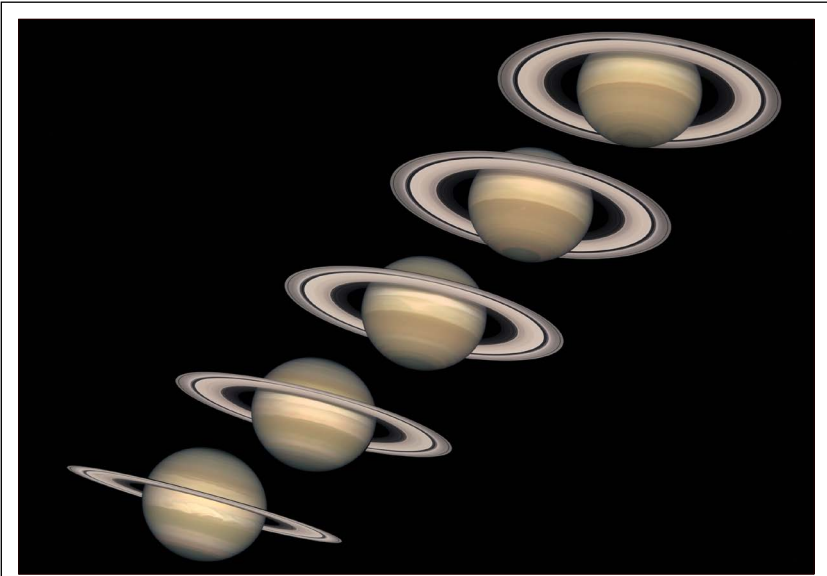
Credits: NASA and The Hubble Heritage Team (AURA/STScI).

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A Change of Seasons on Saturn

The Hubble Space Telescope captured these images of Saturn over a four-year period. The images show the planet's rings at different angles, from edge-on to nearly face-on. Saturn is tilted, so our view of the rings changes as the planet travels around the Sun. Earth is similarly tilted. These slight tilts produce seasons on both planets.

Credit for Hubble images: NASA and The Hubble Heritage Team (AURA/STScI).

VOCABULARY

Gas giant: A large planet that has no solid surface because it is composed almost entirely of hydrogen and helium.

FAST FACTS

Location: Saturn is the sixth planet from the Sun and the second largest.

Diameter: 74,900 miles (120,000 kilometers).

You can get images and other information about the Hubble Space Telescope on the World Wide Web. Visit <http://hubblesite.org> and follow the links.

