



THE STAR ★ WITNESS



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Special Feature

Closing in on Saturn's Rings

By NASA's Amazing Space reporters
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HUNDREDS OF YEARS before telescopes were invented, ancient sky watchers were gazing into the night sky to view Saturn, which shines more brightly than most of the stars in the sky. But it was not until Galileo pointed his telescope at Saturn in 1610 that those famous "hula-hoop" rings were seen.

Although Galileo saw the rings, he did not know what they were. He thought the rings were two moons, one on each side of the planet. These "moons" seemed to play "hide-and-seek" with him, appearing and disappearing over several years of observations.

Dutch astronomer Christiaan Huygens solved the mystery in the 1650s. In his book, Huygens described Saturn as being "surrounded by a thin flat ring." The discovery of Saturn's mysterious ring system led to a rush of observations of the planet during Huygens' time.

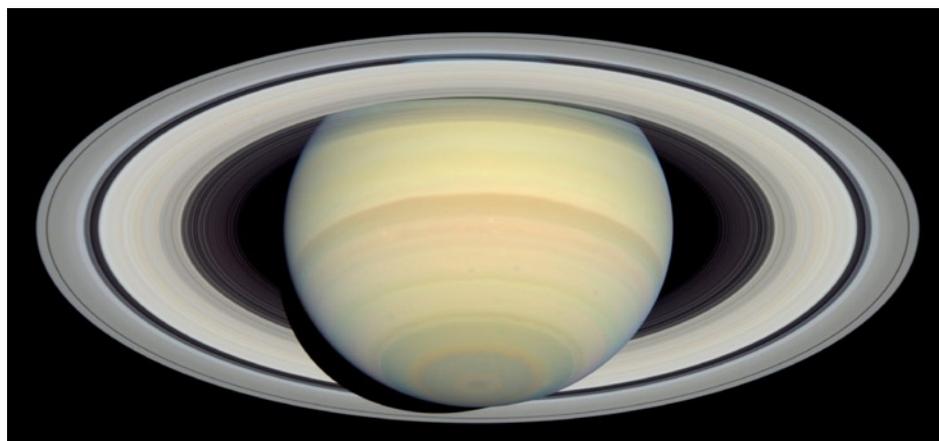


IMAGE: NASA, ESA, and E. Karkoschka (U. of Ariz.)

Hubble's view of Saturn's ringed world (See page 2 for larger image.)

Saturn's unique rings

Today, astronomers are still studying Saturn, the sixth planet from the Sun, in an attempt to understand the planet and its ring system. After hundreds of years of Saturn-watching, there is still much information that astronomers do not know about the planet 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 material. Their brightness is due to their makeup. The rings are made of icy material that reflects sunlight, just as ice does on Earth.

A popular destination spot

Saturn and its ring system are so special that three spacecraft have visited the planet over the past 30 years to take some close-up views. None of the spacecraft, however, has landed on the ringed planet. Saturn, like Jupiter, is a gas giant and does not have a solid surface.

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Hubble's view of Saturn's ringed world

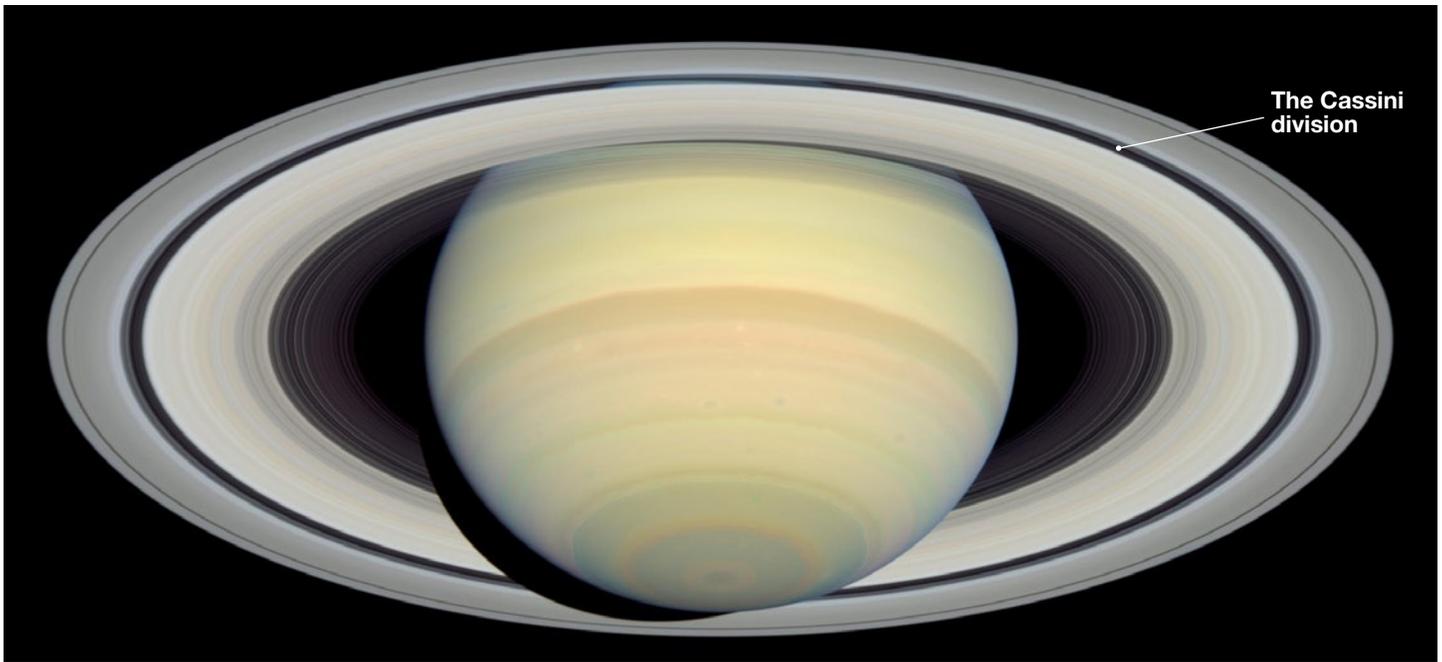


IMAGE: NASA, ESA, and E. Karkoschka (U. of Ariz.)

The Hubble Space Telescope was more than 1 billion miles away from Saturn when it snapped this image. The dark band in the ring system is actually a large gap between the rings called the Cassini division. The gap was discovered in 1675 by Italian astronomer Jean-Dominique Cassini, for whom the Cassini spacecraft is named. The colors in the Hubble view are what you would see if you could travel to the planet. The bright icy particles that make up the rings make them appear white.

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The first spacecraft to fly by Saturn was Pioneer 11 in the late 1970s (see photo at right). In the early 1980s, Voyager 1 and 2 flew by the ringed planet. Even the Earth-orbiting Hubble Space Telescope has been “eyeing” the planet, snapping several spectacular pictures since its launch in 1990 (see photo, above).

Finding the keys to the rings

Observations from Hubble, the three spacecraft, and many ground-based telescopes have yielded valuable information about Saturn and its famous rings. The planet's ring system is made up of about 10,000 rings, called ringlets. The ring system is about 175,000 miles (280,000 km) across, yet only about half a mile

(1 km) thick. These measurements may seem very large, but remember, the rings orbit a huge planet. So, compared with Saturn's size, the rings appear paper-thin.

The rings are not made up of solid sheets of material. Astronomers believe the rings 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 go around Saturn. The rings orbit Saturn just as our Moon goes around Earth. If our Moon broke apart, the pieces would form a ring around our planet. The collisions between the ring particles are what make the ring system so thin.

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1979: A first portrait from Pioneer 11



IMAGE: NASA-Ames Research Center

Pioneer 11 was the first spacecraft to fly to Saturn. This image of Saturn's rings was taken on Sept. 1, 1979 from a distance of 941,000 km (584,710 miles).

Views from the Cassini spacecraft, in orbit around Saturn



IMAGE: NASA, JPL, Space Science Institute

Above: Thousands of ringlets

This Cassini image shows some of the thousands of distinct ringlets that make up the ring system. The Cassini division is clearly visible.

Left: Cassini sees through the rings

In this image, Saturn's rings make a sheer veil through which we can see the planet. The rings cast dark shadows on the planet. The tiny white speck on the curve of Saturn is actually Prometheus, one of Saturn's moons.

In each picture, Cassini was so close to Saturn that it could not take a picture of the entire planet.

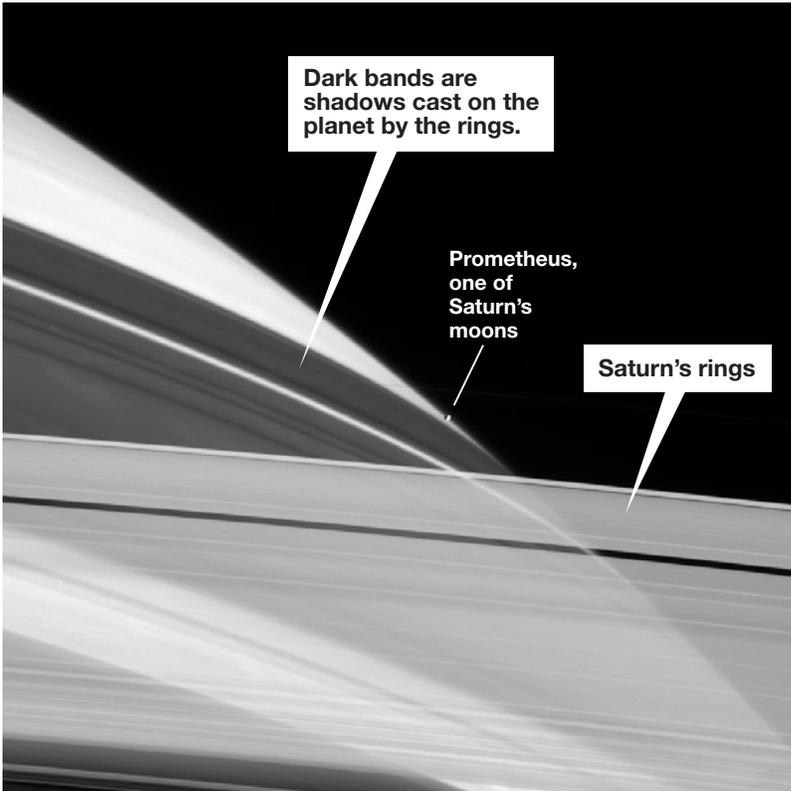


IMAGE: NASA, JPL, Space Science Institute

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And now ... ringside seats

Although astronomers have spent about 400 years looking at Saturn, they do not know everything about its ring system. Now a new spacecraft designed to study Saturn, its moons, and its complex ring system has settled into orbit around the planet. Named Cassini, for the Italian astronomer who studied the planet in the late 1600s, the spacecraft spent nearly seven years traveling to Saturn.

On July 1, 2004, the seasoned traveler finally arrived. The spacecraft flew through the faint, wispy outer rings and settled into orbit around the second largest planet in the solar system. It will spend four years studying the planet and taking photos, such as those above. Scientists hope Cassini will help explain how and when Saturn's rings were formed, why there are gaps between the rings, and even why Saturn has such a spectacular ring system. ★

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