Ghostly spokes in Saturn's rings spotted by Cassini

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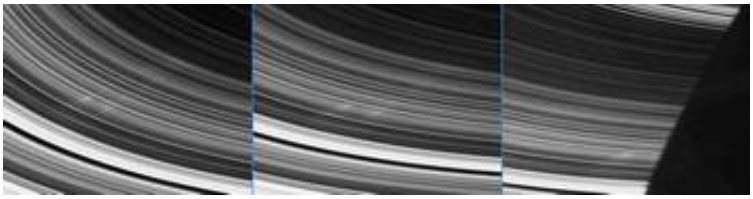

Delighted scientists on the Cassini imaging team will be breaking out the champagne in celebration of the first Cassini sighting of spokes, the ghostly radial markings discovered in Saturn's rings by NASA's Voyager spacecraft 25 years ago.

A sequence of images taken on the unilluminated side of the rings has captured a few faint, narrow spokes in the outer B ring, about 3,500 kilometers long and about 100 kilometers wide (2,200 miles by 60 miles). The images show the spokes as they march into the shadow of the planet on the rings due to their orbital motion.

Dr. Carolyn Porco, Cassini imaging team leader at the Space Science Institute in Boulder, Colo., and one of the first individuals to study spokes in Voyager images, was attending the Division of Planetary Sciences meeting in Cambridge, England, when she was informed of the discovery by her staff members. "This is really a joy, and very

unexpected," she said. "It takes me back to my early days on the Voyager mission."

The new Cassini images can be seen at: ciclops.org, saturn.jpl.nasa.gov and www.nasa.gov/cassini.

According to the latest ideas, the visibility of spokes is believed to depend on the elevation of the Sun above the rings, the less sunlight, the more visible the spokes. For this reason, scientists weren't expecting to see spokes until later in the mission when the sun angle is low.

"We had convinced ourselves that conditions wouldn't be right for seeing spokes on the lit side of the rings until about 2007," Porco said. "But this finding seems to be telling us that conditions on the dark side of the rings are almost as good right now for seeing spokes."

In Voyager images from 25 years ago, these narrow wedge-shaped features typically extended 10,000 to 20,000 kilometers (6,200 to 12,400 miles) radially outward across Saturn's B ring. When seen at low phase angles, spokes appeared dark; when seen at high phase angles, they appeared bright. This behavior indicated they were comprised of very small icy particles, about the size of the wavelength of light. Since Voyager days, spokes had been seen in images taken by NASA's Hubble Space Telescope. The new Cassini images were taken at very high solar phase angles, where small particles can brighten substantially, making them more visible.

Porco's analysis of spokes in the early 1980s found that these narrow arrangements of small particles came and went with a period equal to that of the powerful bursts of radio waves, called Saturn Kilometric Radiation (SKR), discovered by Voyager and coming from Saturn's magnetic field. This association indicated that spokes were a phenomenon involving electromagnetic effects and partly connected to

Saturn's magnetic field.

Of intense interest will be a Cassini determination of the periodicity in the appearance of spokes. This will require monitoring spoke activity from a variety of geometries over several years. "Cassini has found that the SKR period has changed since Voyager, which though hard to believe, may mean that the rotation of Saturn's interior has changed," said Porco. "That would be a finding of enormous consequence, so, we'll be looking very closely to see if the frequency of spoke activity has changed too."

There is no commonly accepted theory for the creation of spokes. Some ideas suggest that spokes result from meteoroid impacts onto the rings; others suggest that they are created by instability in the magnetosphere near the rings.

Whatever the cause, imaging team members will study the new spoke images and maintain their vigil for additional spoke sightings. Viewing conditions on the dayside are expected to improve toward the end of Cassini's nominal four-year mission, as Saturn continues in its nearly 30-year orbit and the Sun's angle above the rings continues to drop.

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. The Jet Propulsion Laboratory (JPL), a division of the California Institute of Technology in Pasadena, manages the Cassini-Huygens mission for NASA's Science Mission Directorate, Washington. The Cassini orbiter and its two onboard cameras were designed, developed and assembled at JPL. The imaging team consists of scientists from the U.S., England, France, and Germany. The imaging operations center and team leader (Dr. C. Porco) are based at the Space Science Institute in Boulder, Colo.

Source: Space Science Institute