New Observations Show Dynamic Particle Clumps In Saturn's A Ring (Forwarded)

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- *From*: Andrew Yee <ayee@xxxxxxxxxxxxxxxxxxxxx>
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Office of News Services
University of Colorado−Boulder
Boulder, Colorado

Contact:
Larry Esposito, (303) 492−5990
Joshua Colwell, (303) 492−6805
Jim Scott (303) 492−3114

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New Observations Show Dynamic Particle Clumps In Saturn's A Ring

New observations from the Cassini spacecraft now at Saturn indicate the particles comprising one of its most prominent rings are trapped in ever−changing clusters of debris that are regularly torn apart and reassembled by gravitational forces from the planet.

According to University of Colorado at Boulder Professor Larry Esposito of the Laboratory for Atmospheric and Space Physics, particle clusters in the outermost main ring, the A ring, range from the size of sedans to moving vans and are far too small to be photographed by the spacecraft cameras. The size and behavior of the clusters were deduced by a research team observing the flickering starlight as the ring passed in front of several stars in a process known as stellar occultation, he said.

This is the first time scientists have been able to measure the size, orientation and spacing of these particle clumps in Saturn's rings, he said. Esposito is the science team leader for the Ultra Violet Imaging Spectrograph, or UVIS, a $12.5 million instrument designed and built at CU−Boulder that is riding on Cassini.

CU-Boulder planetary scientist Joshua Colwell, UVIS science team member, said researchers believe Saturn's ring particles are made up of ice, dust and rock, and range in size from dust grains to mountains. The new observations of the particle clusters indicate the A ring is primarily empty space.

"The spacing between the clumps as determined by UVIS data is greater than the widths of the clumps themselves," Colwell said. "If we could get close enough to the rings, these clumps would appear as short, flattened strands of spiral arms with very few particles between them."

Colwell participated in a press briefing on new Cassini-Huygens observations at the 37th Annual Meeting of the Division for Planetary Sciences meeting held Sept. 4 to Sept. 9 in Cambridge, England.

Bound to each other by their own gravity, the clumps are periodically torn apart by the gravitational tides of Saturn, said Colwell. He likened the process to a handful of marbles placed in orbit around a beach ball. The marbles closest to the ball would orbit more quickly and drift from the pack before reorganizing themselves into new, orbiting clumps.

The individual clusters were largest near the middle of the ring and became smaller toward the edges of the ring, the team reported. The cluster cores range in size from two meters to 13 meters, or 7 feet to 43 feet. There are no indications yet that similar clumps exist in Saturn's other rings, confirming predictions made by the team from computer simulations.

The UVIS team also detected a tenuous atmosphere on Saturn's tiny moon Enceladus made of water vapor, said Esposito. The researchers detected no free-floating hydrogen or oxygen atoms, implying the water was recently released -- perhaps from a local fissure near the moon's south pole -- and was escaping from its surface. Enceladus is only about 310 miles, or 500 kilometers, in diameter.

When combined with Cassini images and results from other spectrometers onboard the spacecraft, the new Enceladus observations indicate water and grains of ice are being spewed from the moon's surface much in the manner of gaseous jets that have been observed erupting on the surface of comets, Esposito said. "The rate of water released is sufficient to provide the neutral oxygen discovered by UVIS around Saturn last year and to re-supply Saturn's E ring."

In July, the UVIS team released new images from the mission depicting emissions near Saturn's poles that resemble Earth's northern lights. The image can be viewed at:
http://www.colorado.edu/news/releases/2005/290.html

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. The Jet Propulsion Laboratory, a division of the California Institute of Technology in

Pasadena, manages the Cassini–Huygens mission for NASA's Science Mission Directorate in Washington, D.C.

The Cassini orbiter was designed, developed and assembled at JPL. The ultraviolet imaging spectrograph was built, and the team is based, at the University of Colorado at Boulder.

For more information about the Cassini–Huygens mission visit
http://saturn.jpl.nasa.gov
The ultraviolet imaging spectrograph team home page is at
http://lasp.colorado.edu/cassini

Note to Editors: Contents embargoed until 3:45 a.m. EDT on Monday, Sept 5. A graphic of the ring clusters is available at

http://saturn.jpl.nasa.gov/multimedia/images/image-details.cfm?imageID=1707
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