Cassini makes simultaneous measurements of Saturn's nightside aurora and electric current system

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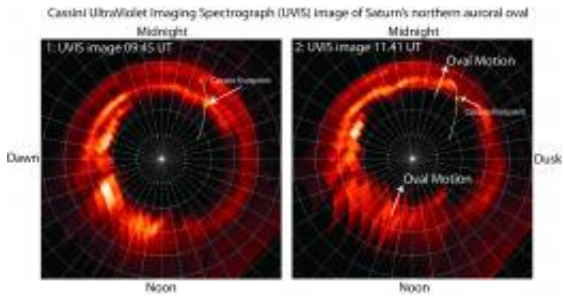

Two images of Saturn's northern auroral oval, made with the Ultraviolet Imaging Spectrometer (UVIS) instrument. The second image, made two hours after the first, shows the motion of the oval as the planet rotates. Credit: NASA / ESA and the Cassini UVIS team

(PhysOrg.com) -- Since the NASA / ESA Cassini-Huygens spacecraft arrived at Saturn in 2004, astronomers and space scientists have been able to study the ringed planet and its moons in great detail. Now, for the first time, a team of planetary scientists have made simultaneous measurements of Saturn's nightside aurora, magnetic field, and associated charged particles. Together the fields and particle data provide information on the electric currents flowing that produce the emissions. Team leader Dr Emma Bunce of the University of Leicester will present the new work at the National Astronomy Meeting in Manchester on 27 March 2012.

Generally, images of the aurora (equivalent to the terrestrial 'northern lights') provide valuable information about the electromagnetic connection between the solar wind, the planet's magnetic field (magnetosphere) and its upper atmosphere. Variations in the aurora then provide information on changes in the associated magnetosphere. But viewing the aurora (best done at a large distance) at the same time as measuring the magnetic field and charged particles at high latitudes (where the aurora is found, best done close to the planet) is hard

In 2009, Cassini made a crossing of the magnetic field tubes that connect to the aurora on the night side of Saturn. Because of the position of the spacecraft, Dr Bunce and her team were able to obtain ultraviolet images of the aurora (which manifests itself as a complete oval around each pole of the planet) at the same time.

This is the first time it has been possible to make a direct comparison between Cassini images of the nightside aurora and the magnetic field and particle measurements made by the spacecraft. And because of the geometry of the orbit at Cassini, it took about 11 hours to pass through the high-latitude region or about the same time it takes Saturn to make one rotation.

This meant that the team were able to watch the auroral oval move as the planet turned. As Saturn and its magnetosphere rotated, the auroral oval was tilted back and forth across the spacecraft with a speed that is consistent with a planetary rotation effect:

Dr Bunce comments: "With these observations we can see the simultaneous motion of the electric current systems connecting the magnetosphere to the atmosphere, producing the aurora. Ultimately these observations bring us a step closer to understanding the complexities of Saturn's magnetosphere and its ever elusive rotation period".

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