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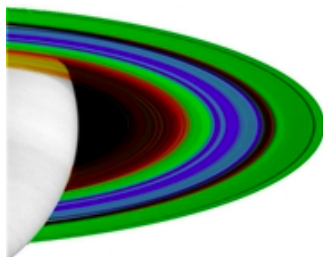
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'U' space engineers set sights on Saturn



(Photo courtesy of NASA)

Cassini-Huygens mission arrives at ringed planet after seven-year flight

By Kingson Man, For the Daily
October 05, 2004

Chances are Prof. Sushil Atreya is anticipating Christmas more than you are. He already knows what he wants: a couple of dust particles, some gas samples, and, if he has been really good, some hydrocarbon-chain molecules. The only catch is that

these substances are some 600 million miles away from Earth.

On Dec. 25, the Cassini orbiter will release its Huygens probe for a freefall descent into Titan, the largest of Saturn's moons. Then, on board the probe, a crucial component designed by Atreya, a professor in the University's Department of Atmospheric, Oceanic and Space Sciences, will begin collecting data.

The Cassini-Huygens mission was launched seven years ago — the result of a collaborative effort between NASA and its European equivalent, the European Space Agency, composed of 17 different nations.

After more than two billion miles of interplanetary travel and accelerated by the gravities of Venus, Earth and Jupiter, the Cassini orbiter shot through a precise gap in Saturn's rings and finally sidled into orbit around the planet in July.

Several scientists in AOSS played leading roles in the design and construction of instruments included on the Cassini orbiter and Huygens probe.

Prof. Tamas Gombosi, chair of the department, said, "(The University) has the greatest university involvement in Cassini." Over 20 members of AOSS play leadership roles such as principal investigators, co-investigators and team leaders of various projects within the mission.

An interdisciplinary scientist in magnetosphere and plasma physics, Gombosi will study Saturn's ionosphere, a large magnetic region around the planet composed of charged particles. He hopes that studying this region will lead to a greater understanding of Earth's own magnetic fields.

AOSS Prof. Andrew Nagy will use radioscientific methods to determine the composition of Titan and Saturn's atmospheres. Radio waves beamed back at Earth will pass through Saturn's atmosphere and be altered in a measurable way, which gives the chemical signature of the compounds present, Nagy said. This may help explain the presence of five to 10 times more water in Saturn's ionosphere than previously expected.

Atreya will have to wait a few more months for the instrument of his expertise, the gas chromatograph mass spectrometer to come online. It is part of the Huygens probe that will be released onto Titan on Christmas Day. During its three weeks of descent onto the surface of the moon, it will sample gaseous and solid particles in Titan's atmosphere.

The thick atmosphere and the presence of "pre-biotic" carbon molecules on the natural satellite make it especially interesting to scientists. "Titan has all the constituents of life that primordial Earth had," Atreya said.

The extreme cold of Titan's surface, however, makes it unlikely to harbor life. Even the

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instruments themselves need thermal blankets and a radioactive heat source to stay operational in the harsh -300 degree Fahrenheit environment. It also provides shielding from potentially disastrous impacts with micrometeorites.

The payoffs of exploration in such a forbidding environment are promising, Atreya said. Saturn's rings of gaseous and solid material are analogous in structure to the early solar system and may shed light on the processes of collisions and coalescing that form planets.

Marking the beginning of NASA's "faster, better, cheaper" mission philosophy, Cassini-Huygens still cost a substantial \$3 billion. In addition, the orbiter is larger than previous solar system explorers — its fuel source alone is more massive than the Galileo and Voyager spacecrafts combined.

Besides driving technological change, "there are always several ways to justify costs," said Gombosi, who goes on to cite the figure that "for every \$1 NASA spends, the national economy benefits \$10." The University did not contribute money to the mission, though — "only brainpower."

Currently, Cassini-Huygens has completed only the first of its 76 planned orbits around Saturn. The orbiter has so far met with early success: During its flyby of Jupiter, other members of the AOSS participated in taking measurements of Jupiter.

The release of the Huygens probe into Titan will be the orbiter's next great challenge, Atreya said. But he still keeps it simple. At the end of the day, he said, he's just "trying to drop things onto a planet."

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