Uranus has rings too

Jayant Narlikar & Thanu Padmanabhan

Since time immemorial Saturn had been enjoying the privilege of being unique amongst all planets: it boasted of spectacular rings around it. The rings may have been examples of a failed satellite. That is, a satellite that did not form. Why? One possible reason could be that the strong tidal forces exerted by a planet would have disrupted any tendency of matter around it to form into a satellite. So the dust continued to circle the planet without forming into a ball-like satellite.

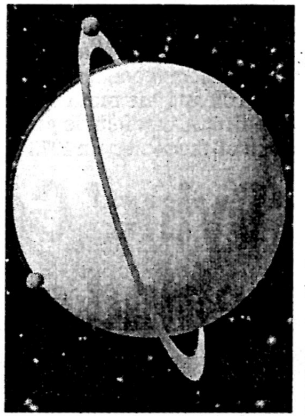
The monopoly of Saturn vis-s-vis rings, however, was broken on March 10, 1977; and that too quite unexpectedly. Another planet of our solar system, Uranus was found to have rings. 'Unexpectedly', because astronomers were observing Uranus for a different reason altogether when they were rewarded by the evidence that the planet has rings. Amongst the teams of astronomers who made the discovery was one from the Indian Institute of Astrophysics, Bangalore, led by Professor J.C. Bhattacharyya.

What these astronomers were looking for was a phenomenon called occultation. That is, an event, when you see a planet cross the line of sight of a more distant object like a star. On March 10, 1977 there was to be an occultation of the star SAO 158687. The number refers to the star catalogue prepared by the Smithsonian Astrophysical Observatory. In an occultation event, when the blocking planet comes in the way, the star cannot be seen. It reappears when the blocking disc moves out of the way.

What Bhattacharyya and his colleagues observed was rather unusual. Forty minutes before the actual event, the intensity of the star dropped slightly, by about five percent. This lasted for nine seconds. There were more such drops lasting about a second each. The actual occultation lasted about 25 minutes, following which there was another sequence of similar partial blocking of light from the star symmetric to what had happened before.

Why this partial blocking of light? Astronomers correctly guessed that the reason was that there were rings around the planet which did the trick. Unlike the planet itself, its rings are translucent and can block the light of the star partially, depending on their thickness. By noting the durations and timing of partial blocking, Bhattacharyya and his colleagues could formulate a picture of Uranus's ring structure. The occulting material in the ring seemed stretched to a width of around 7000 km., some 10% more than the radius of the Earth.

Other teams looking at the same phenomena included the astronomers in the Kuiper Airborne Observatory (which was working from a jet aircraft!) and from the Perth Observatory in Australia.



Clearly ring structure could be further clarified by observing more occultations of stars. Thus Uranus was finally acknowledged as the second planet to possess rings.

Later the other giant planets Jupiter and Neptune joined the club. Thus we can say that all the big outer planets of our solar system have rings.

Astrophysician Jayant Narlikar and Thanu Padmanabhan, theoretical physicist, will contribute to **DNA**'s *special series through 2009, designated the International Year of Astronomy.*



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