

CASSINI-HUYGENS

Pan

Named after the Greek god of shepherds, the small Saturn moon Pan orbits in the middle of the prominent Encke Gap in Saturn's A ring, the outermost of the main rings of the planet. Its presence was predicted on the basis of Voyager observations of wavy patterns at the gap's edges, consistent with the gravitational effect of an unseen, embedded moon. Unresolved images of Pan were finally found in the Voyager 2 archive after a careful search by American planetary scientist Mark Showalter in 1990, almost a decade after the Saturn flyby.

These two images of Pan were taken on 7 March 2017, when the Cassini spacecraft passed within 25,000 km of the moon. With a mean radius of 14 km, Pan has a very peculiar shape, with a prominent equatorial ridge giving it the bizarre appearance of a giant 'ravioli' or 'flying saucer'. Nearby ring moons, particularly Atlas but also Daphnis, have somewhat similar shapes. Pan's density has been estimated to be $0.43 \pm 0.15 \text{ g cm}^{-3}$, low for such an icy object, which means that the speed necessary to escape its surface will also be low. Therefore, when the moon has an impact from a ring particle, ejecta can escape Pan's gravitational field with relative ease.

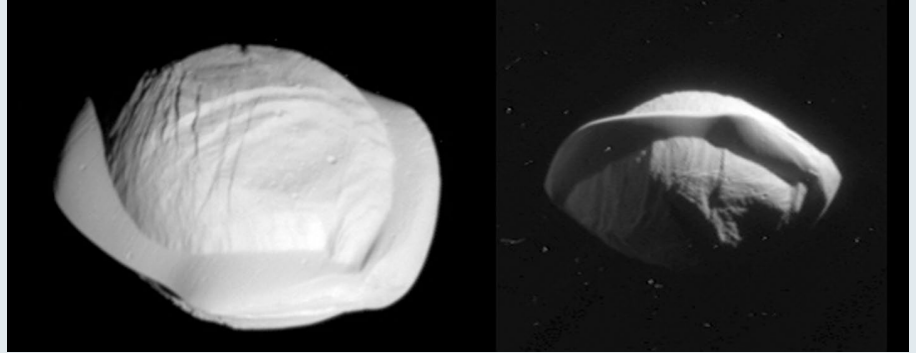


Image credit: NASA/JPL-Caltech/Space Science Institute

However, since the ring particles are nearly co-planar and the moon's spin axis is perpendicular to the ring plane, such material is then likely to be swept up by the moon and preferentially re-accreted in the orbital plane to form the distinctive equatorial ridge.

The existence of several rings or partial rings within the Encke Gap supports the idea that the process is ongoing. Current models suggest that Pan originally accreted into the more rounded central part visible in the images, created the

gap for itself by shepherding the ring material on each side, and then grew its characteristic appendage.

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