

A new moon-induced structure

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Abstract

Embedded moons are known to create an observable propeller-shaped structure in the surrounding ring which consists of a gap and kinematic wake. In the cases of Pan and Daphnis, the moons are sufficiently massive to open a circumferential gap - the Encke and Keeler gap, respectively. New results, however, reveal the existence of a previously unknown moon-associated structure found at the Encke and Keeler gap edges.

By analyzing Cassini Ultraviolet Spectrometer (UVIS) High Speed Photometer (HSP) and Voyager 2 Photopolarimeter (PPS) occultations we found a few kilometer wide gaps located within a few kilometers of the ring edges. These transparent regions feature sharp edges and have so far been found exclusively downstream of the respective embedded moon. Gap characteristics for features found near the inner and outer Encke gap edges are consistent with each other. Two occultations with special observing geometries, one tracking and one double-star, allow to investigate spatial and temporal morphology of these gaps. Our preliminary results suggest that these structures are individual gaps with an aspect ratio of about 1:5 and may thus be about 10km long.

Their existence offers another avenue in searching for embedded objects although our preliminary search did not produce examples apart from those reported here for Pan and Daphnis.

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