

Cassini observations of the outer edge of Saturn's A ring

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Abstract

The outer part of Saturn's A ring between the Keeler Gap at a radius of 136,505km and the edge of the A ring at 136,770km has several resonant features, including the 33:32, 34:33 and 35:34 resonances with Prometheus. The strong 7:6 resonance with Janus can have a dominating effect on the edge of the A ring [1] especially during the four-year intervals when the Janus-Epimetheus orbital configuration places the Janus resonance close to the ring's edge [2].

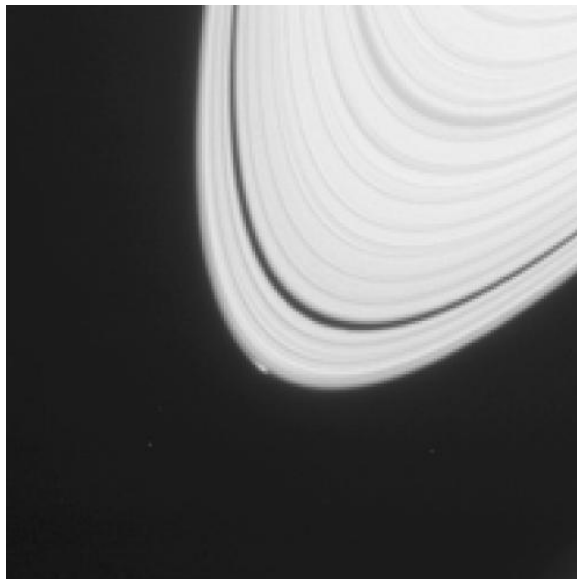


Figure 1: Object "Peggy" – a disturbance visible at the outer edge of Saturn's A ring. This is part of a Cassini ISS narrow angle camera image taken on 2013 April 15. (PIA18078. Image Credit: NASA/JPL-Caltech/Space Science Institute)

Observations of this region by the Imaging Science Subsystem (ISS) instrument onboard the Cassini spacecraft throughout the 17y duration of the mission have revealed how the various resonances affect the ring structure. In particular, the large (~13km) amplitude, radial distortions produced by the 7:6 inner Lindblad resonance with Janus dominate the A ring's

structure beyond the Prometheus 35:34 inner Lindblad resonance at 136,732km.

The discovery and subsequent tracking of a feature (nicknamed "Peggy"; see Fig.1) orbiting close (within ~10km) to the A ring edge led to a more detailed examination of this entire region, especially towards the end of the mission when some of the highest resolution images were obtained. This has revealed that the semi-major axis of "Peggy" appears to have undergone a stochastic evolution of +/-5km between 2013 and 2017, probably as a result of encounters with other objects. Furthermore, the object itself appears to be embedded in a wider (+/-5°) region of material, possibly debris from a collision.

This talk will use ISS images and knowledge of resonant dynamics to characterize and review our understanding of this dynamically fascinating region.

Acknowledgements

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References

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