

11.3 Jovian Planet Rings

Our goals for learning:

- What are Saturn's rings like?
- How do other jovian ring systems compare to Saturn's?
- Why do the jovian planets have rings?

What are Saturn's rings like?




What are Saturn's rings like?

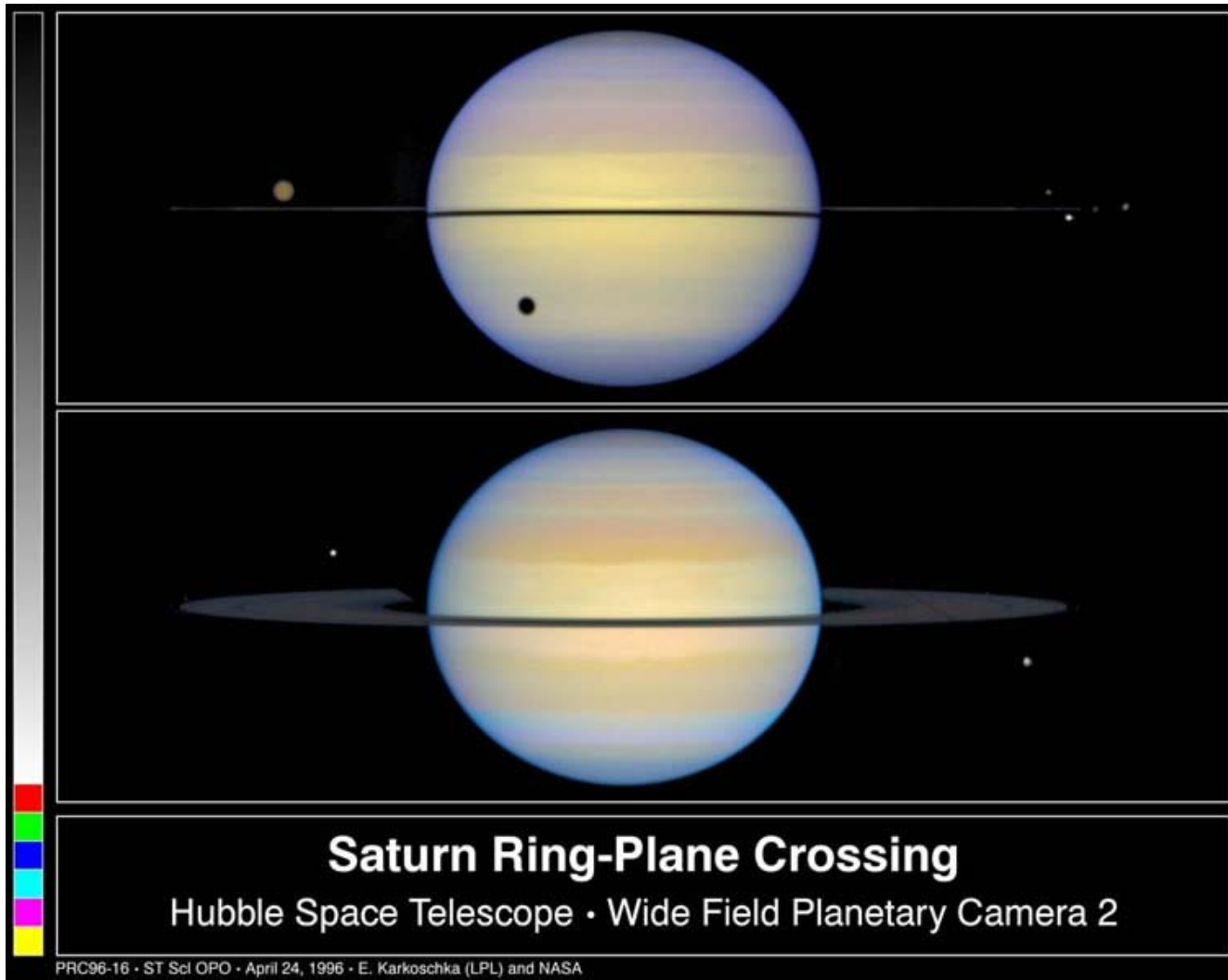
- They are made up of numerous, tiny individual particles
- They orbit over Saturn's equator
- They are very thin

Earth-based view

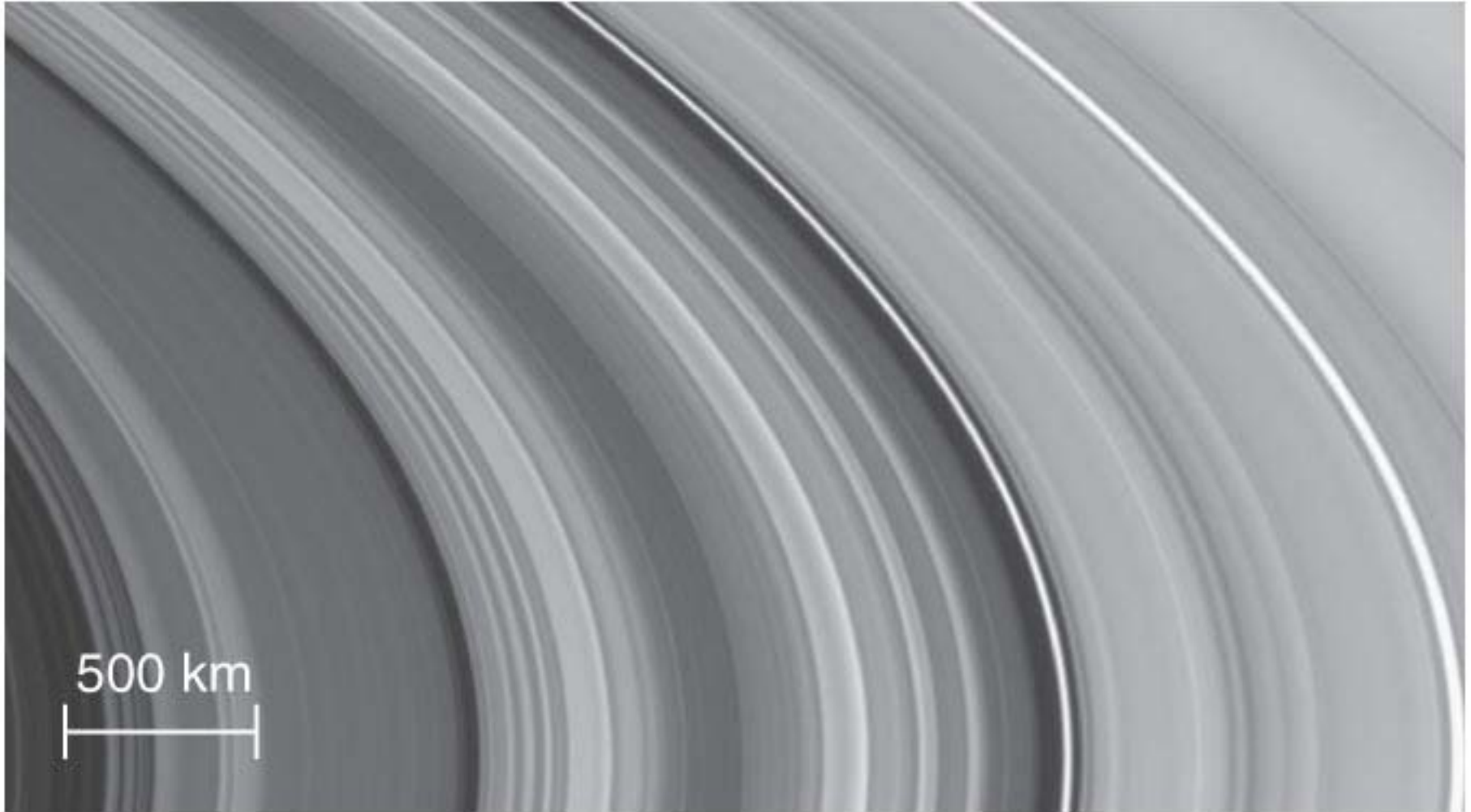


Interactive Figure 

Hubble Space Telescope's view



Spacecraft view of ring gaps

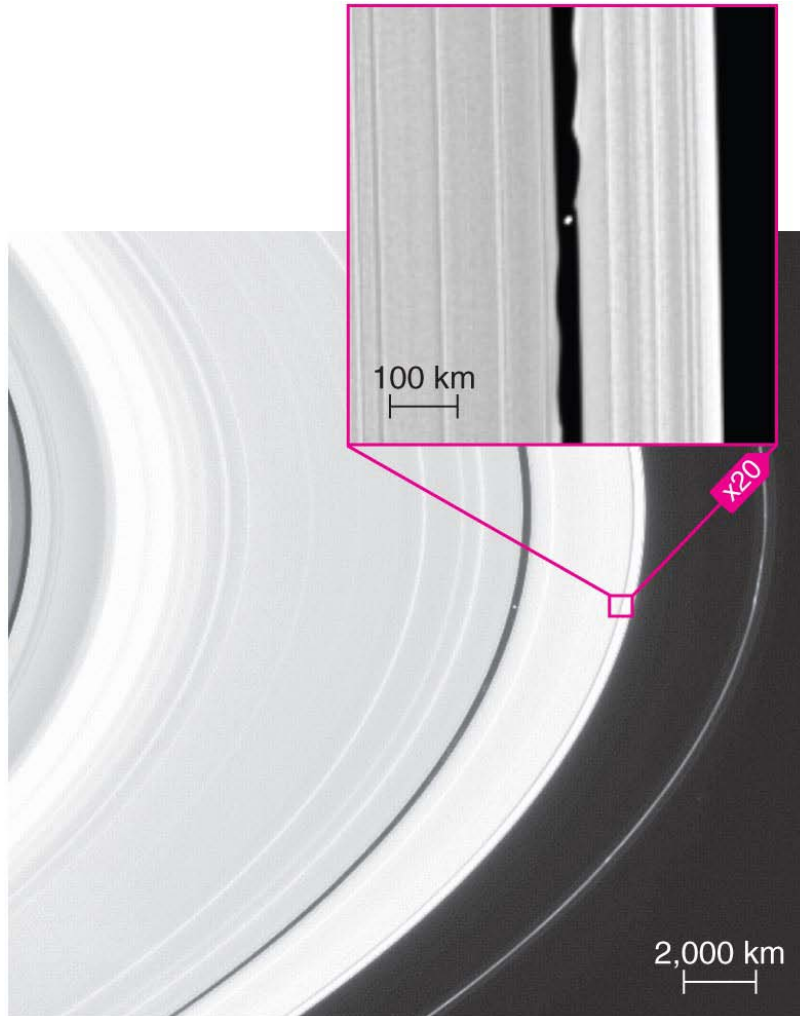


Artist's conception of close-up

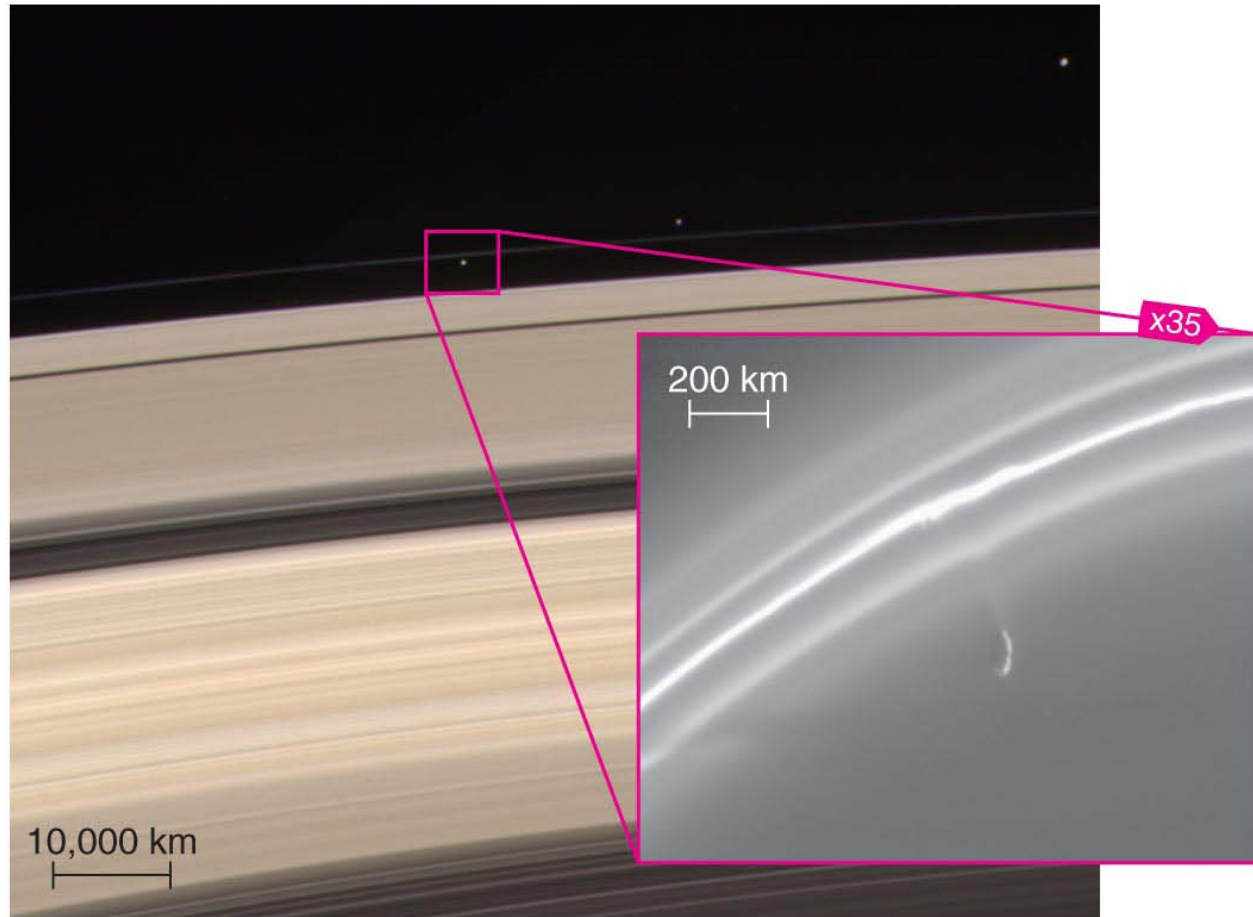


Gap Moons

- Some small moons create gaps within rings

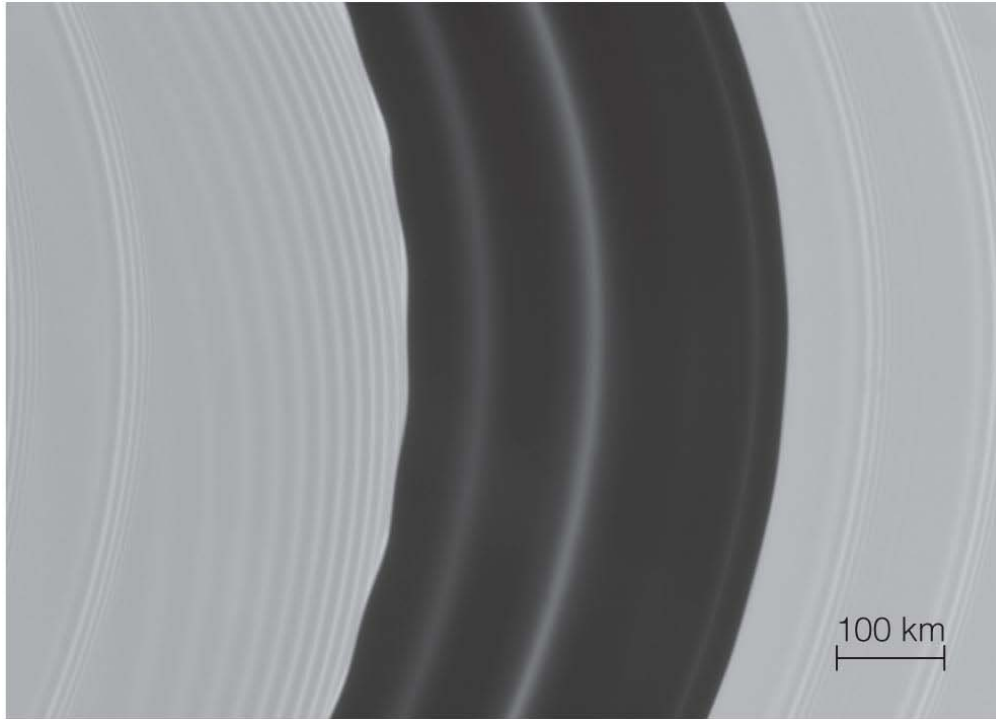


Shepherd Moons



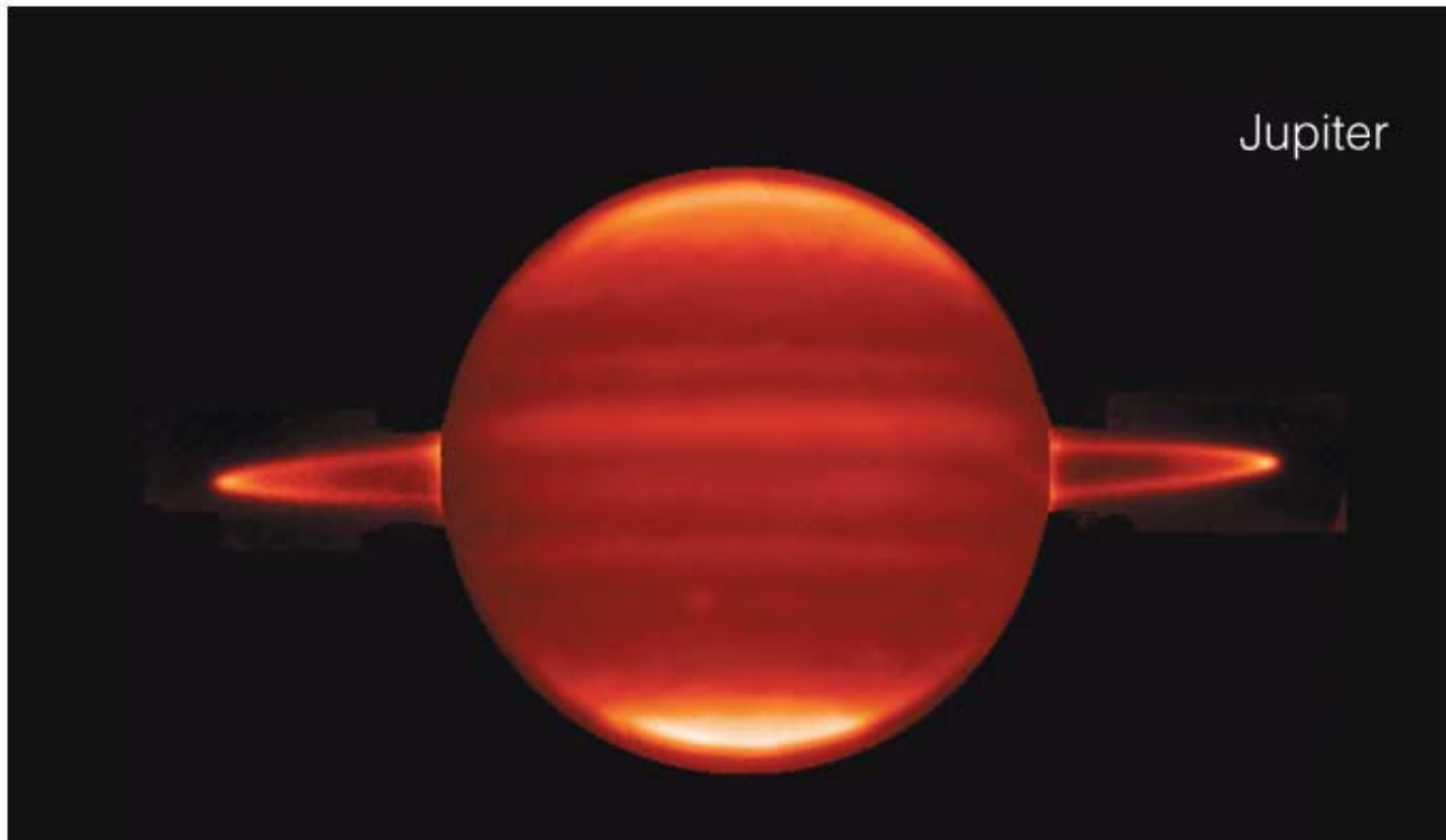
- Pair of small moons can force particles into a narrow ring

Resonance Gaps

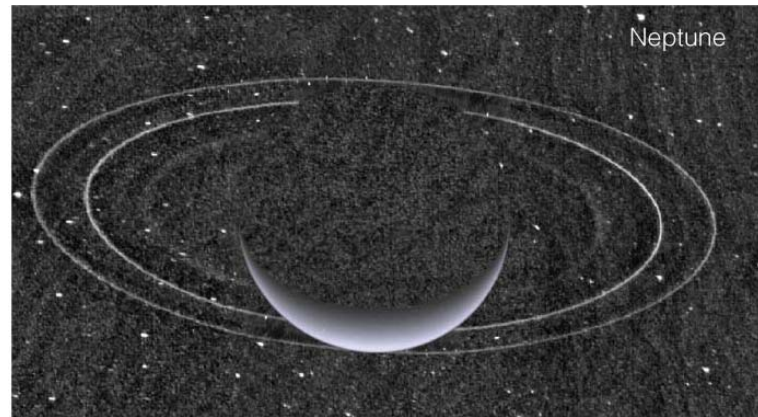
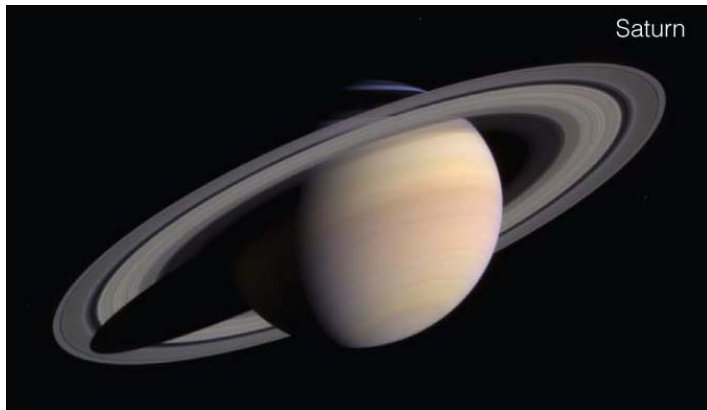
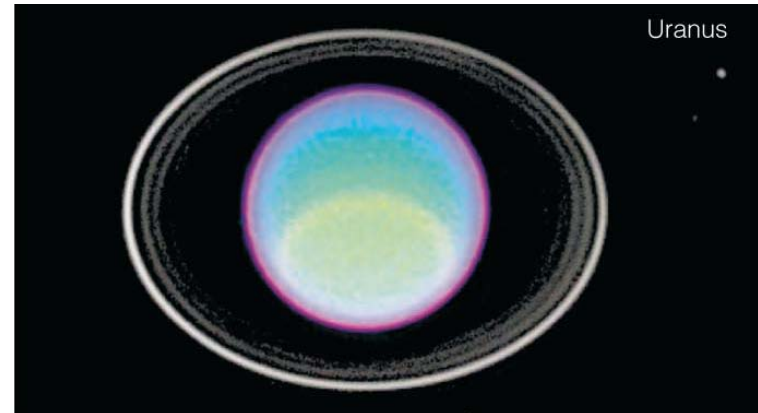
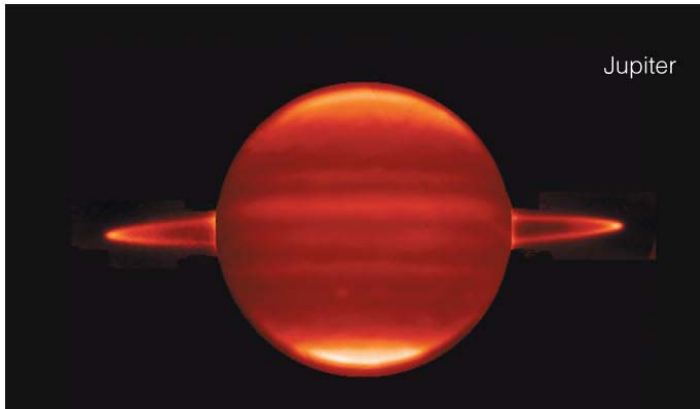


- Orbital resonance with a larger moon can also produce a gap

How do other jovian ring systems compare to Saturn's?

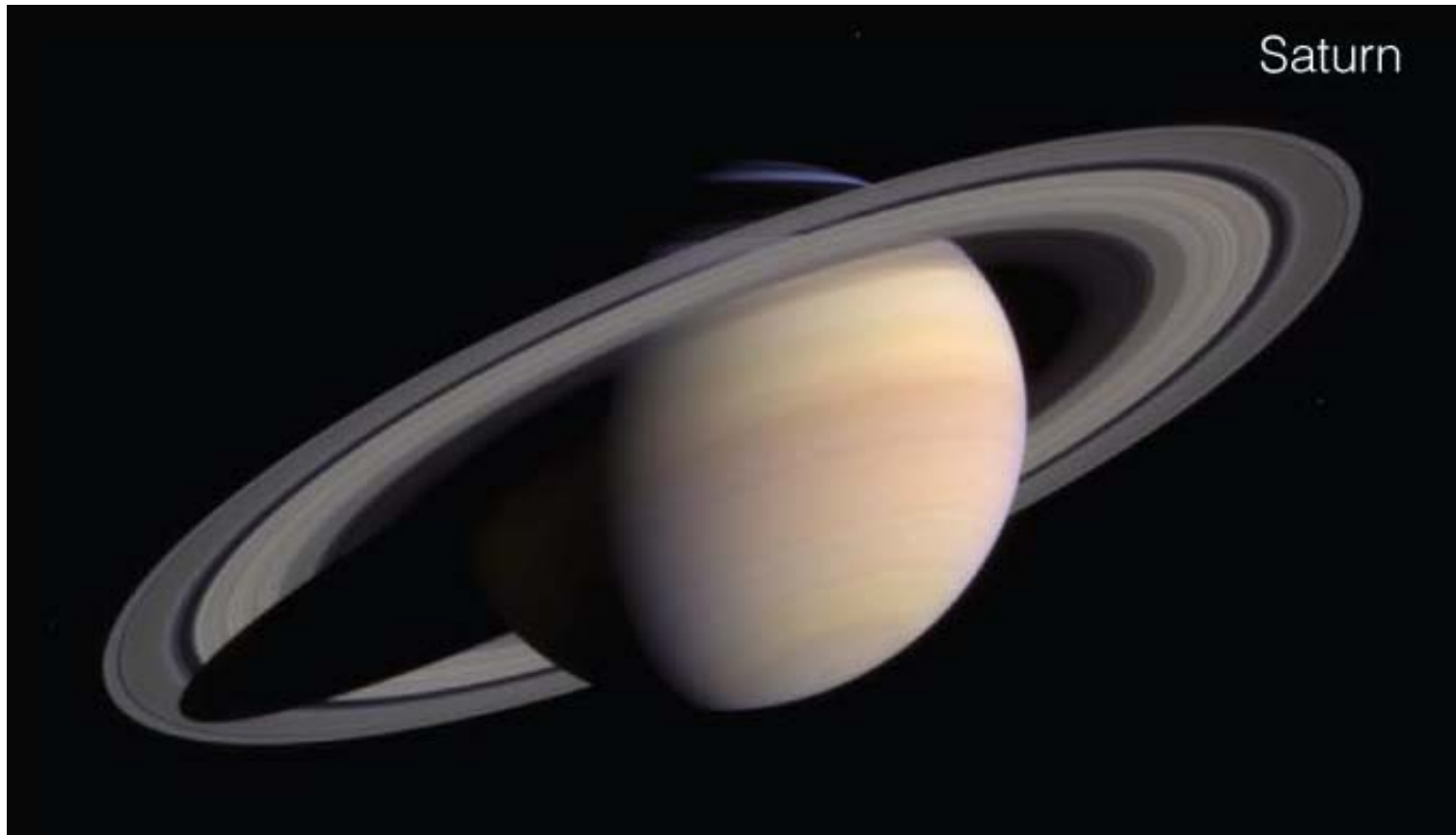


Jovian Ring Systems



- All four jovian planets have ring systems
- Others have smaller, darker ring particles than Saturn

Why do the jovian planets have rings?



Why do the jovian planets have rings?

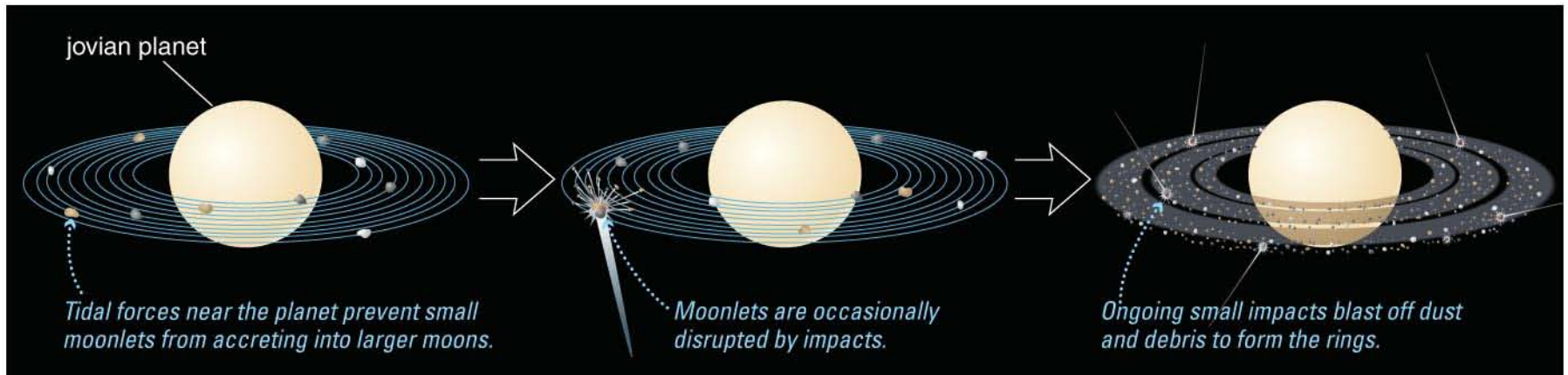
- They formed from dust created in impacts on moons orbiting those planets

How do we know that?

How do we know?

- Rings aren't leftover from planet formation because the particles are too small to have survived this long.
- There must be a continuous replacement of tiny particles.
- The most likely source is impacts with the jovian moons.

Ring Formation



- Jovian planets all have rings because they possess many small moons close-in
- Impacts on these moons are random
- Saturn's incredible rings may be an "accident" of our time

What have we learned?

- What are Saturn's rings like?
 - Made up of countless individual ice particles
 - Extremely thin with many gaps
- How do other jovian ring systems compare to Saturn's?
 - Much fainter ring systems with smaller, darker, less numerous particles
- Why do the jovian planets have rings?
 - Ring particles are probably debris from moons