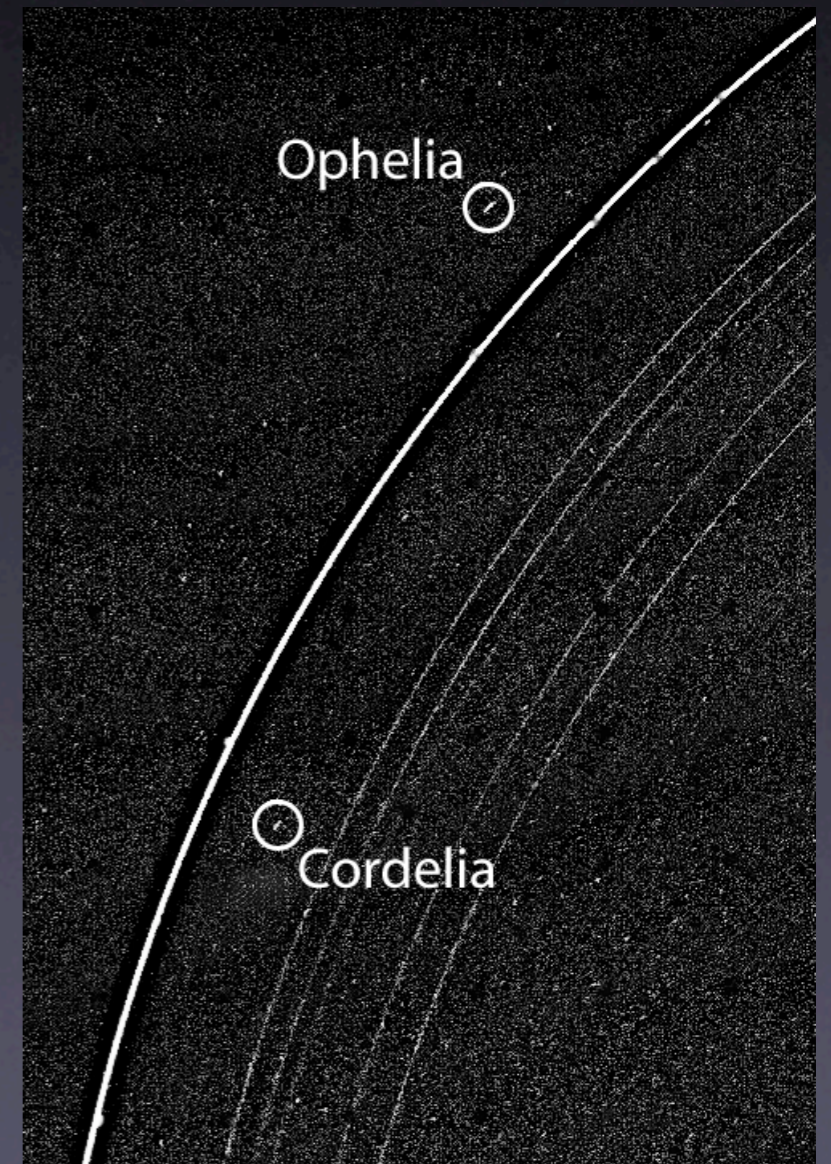


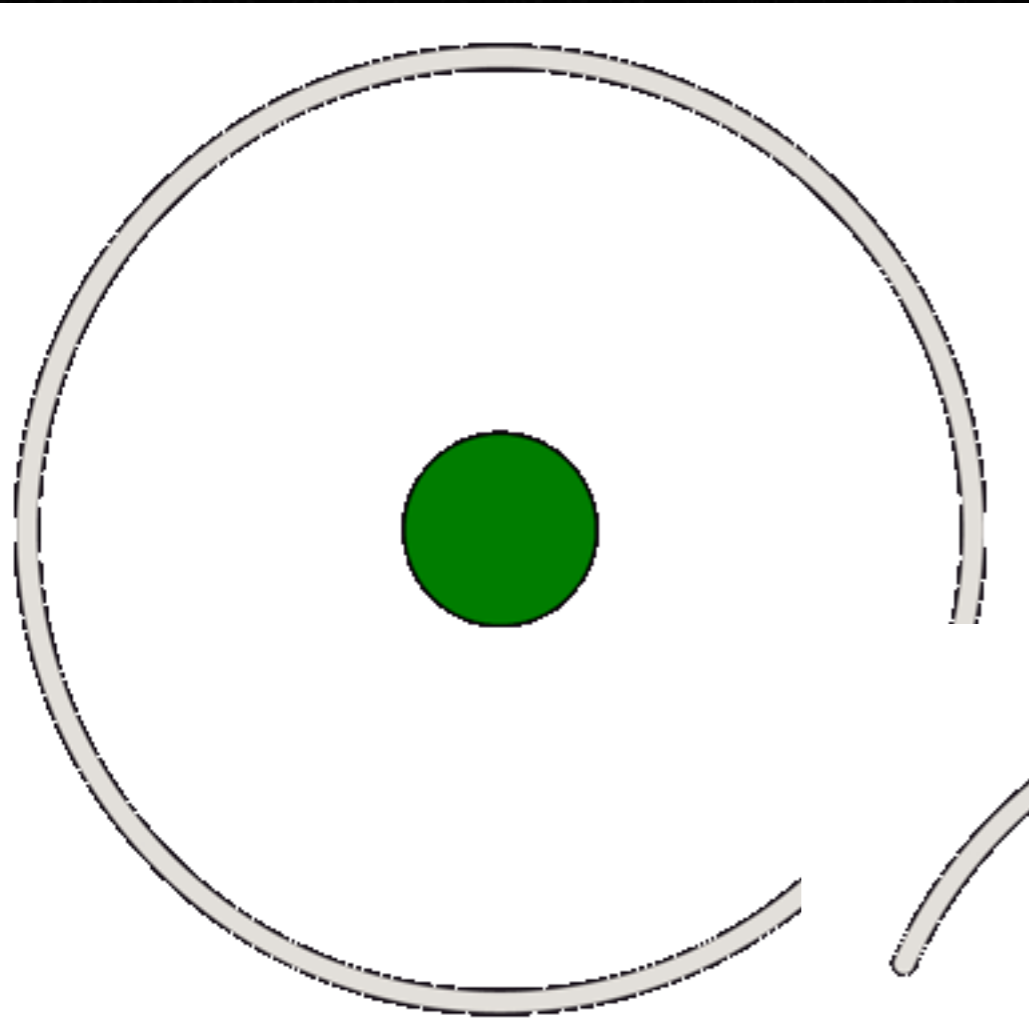
The Uranian Ring System: Meet the Dynamicist's Nightmare



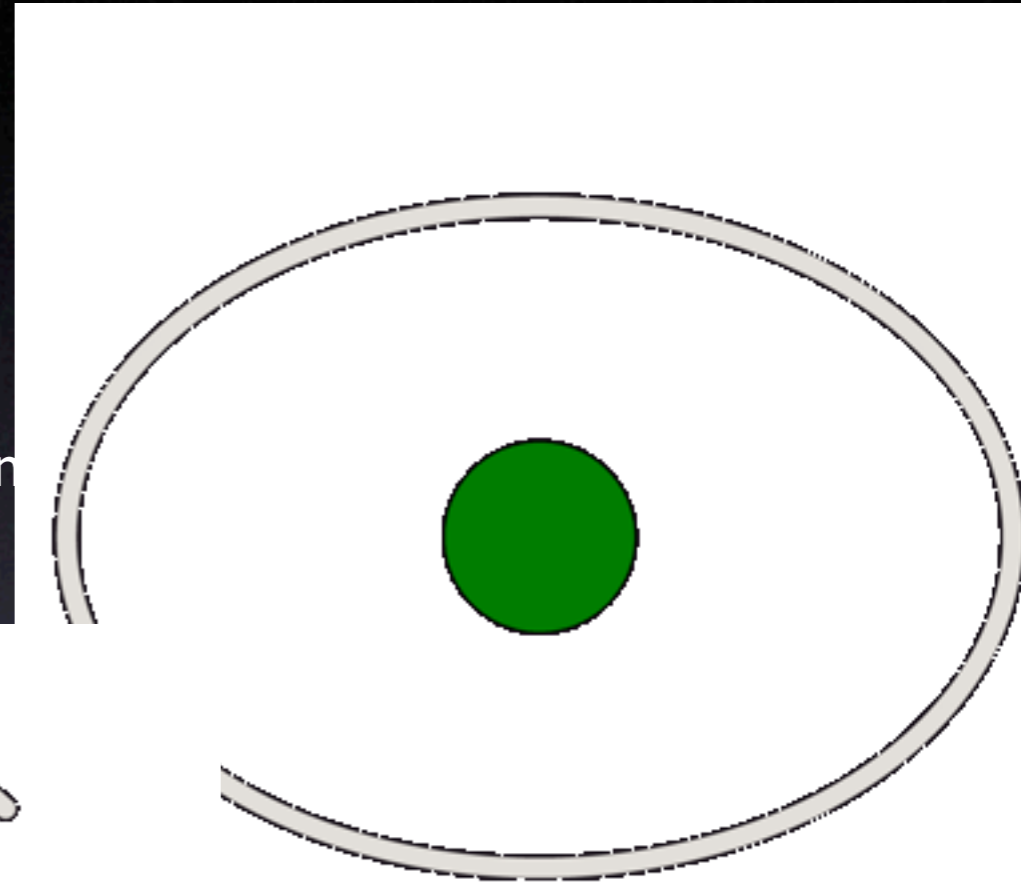
- Ten narrow rings, all but one of high density.
- Only three of 20 ring edges have known “shepherds” or other confinement.
- Most “missing” shepherds must be just below Voyager’s 10-km detection threshold.
- Ring confinement is *the* major unsolved problem for the Uranian ring system.
- Note: NH2 could easily detect sub-km moons in a flyby.



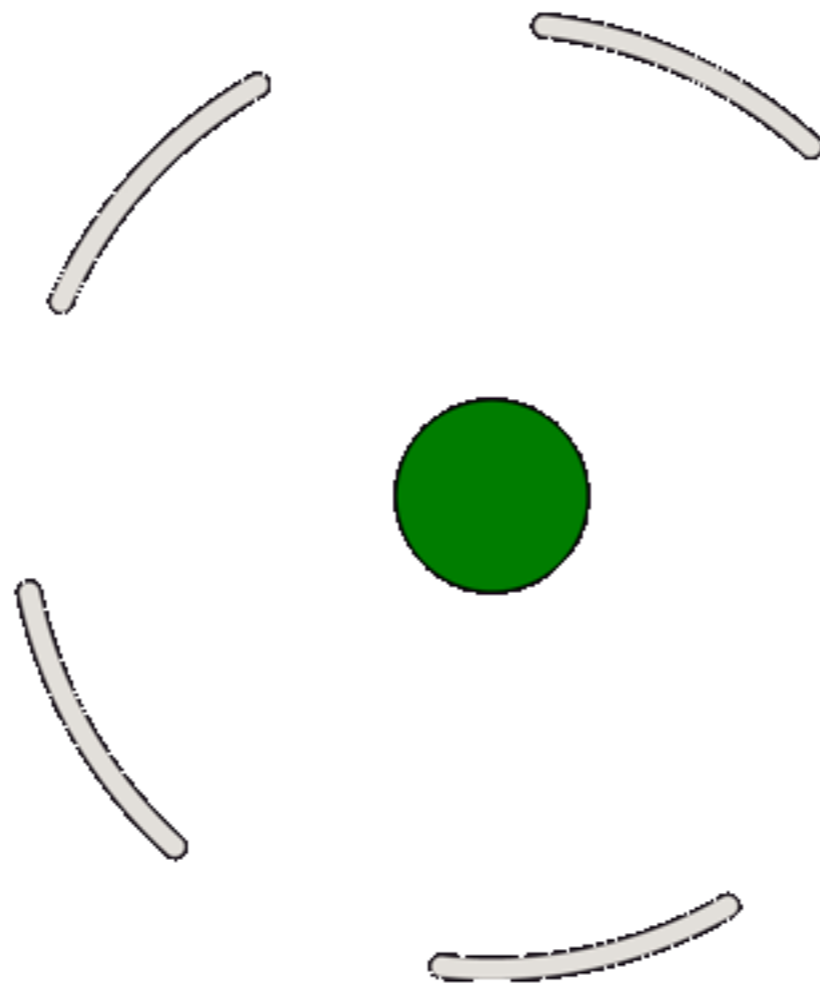
Several rings have modes and patterns not seen elsewhere in the Solar System



λ Ring
 $m = 5$ brightness pattern
 36° arcs



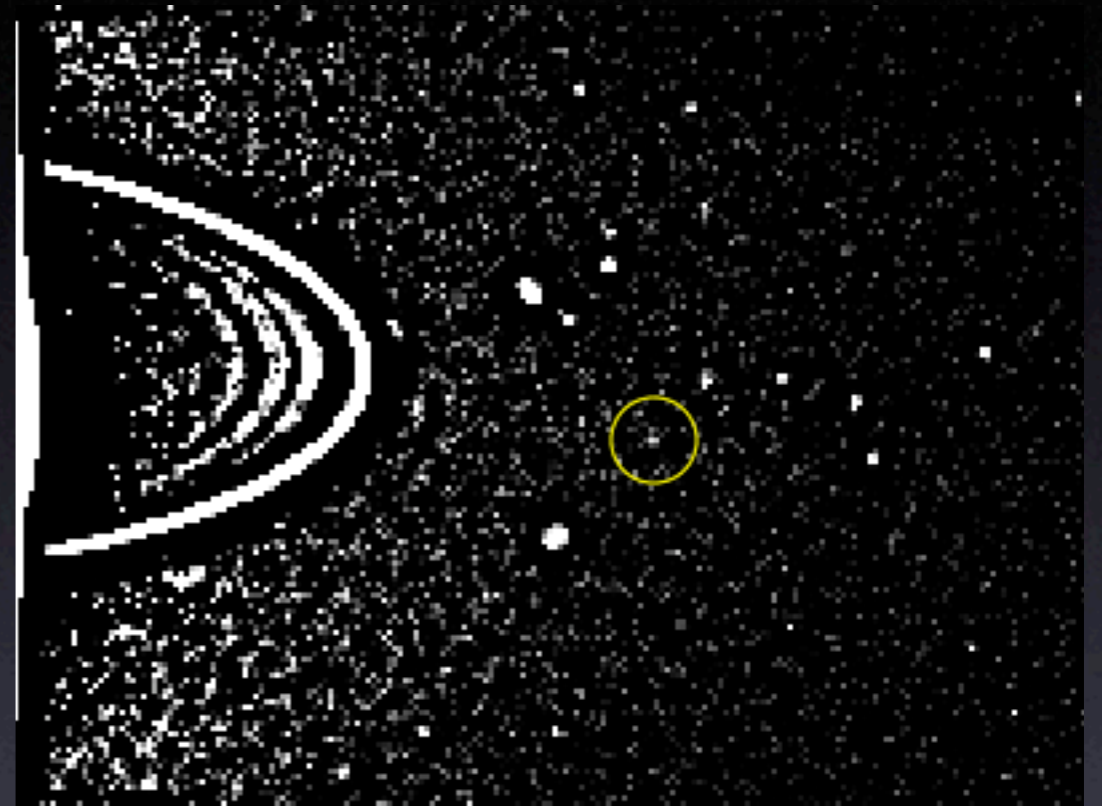
δ Ring
 $m = 2$ shape pattern
(planet-centered ellipse)



γ Ring
 $m = 0$ shape pattern
“breathing” mode

The Uranian Inner Satellite System

- Until Cassini, Uranus had more known *regular* satellites (18) than any other planet.
- A densely-packed swarm of 9 inner moons is gravitationally unstable on time scales of 10^6 to 10^8 years.



Newly-discovered moon S/2003 U2 follows an orbit perilously close to that of Belinda.



Theme A:

Origin and Evolution of Satellite Systems

- *Requires* closer scrutiny of the Uranus and Neptune systems, about which we know comparatively little.
- *Requires* examination of ring systems in concert with moons.
- *Cannot* be addressed by a spacecraft orbiting a moon of Jupiter or Saturn.
... because one moon is not a system!