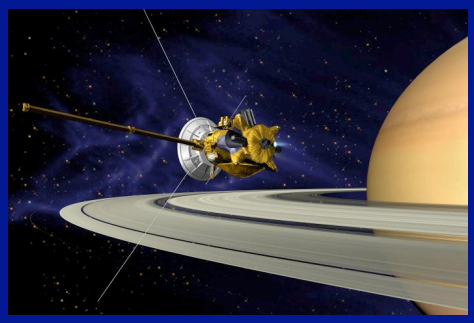
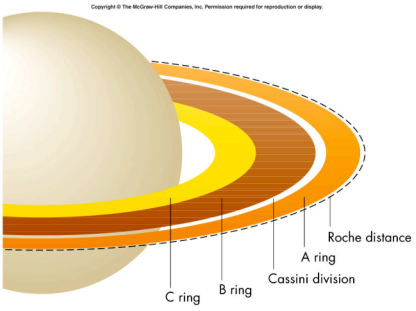
The Rings of Saturn…final remarks

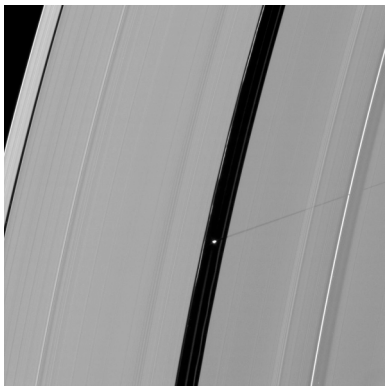


The size and structure of Saturn's ring



The ring extends out to about 2.4 Saturnian radii,
And is composed of 3 main rings and a prominent gap

The Cassini spacecraft has revealed incredible and beautiful detail in the rings

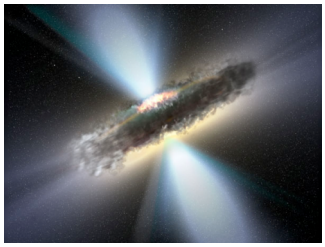


The existence of Saturn's ring due to "tidal disruption"

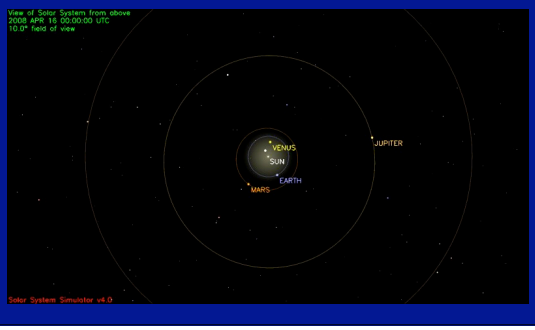
- Tidal "stresses" due to a difference of the gravitational force on the front and rear side of a moon near a planet.
- If a moon gets closer to a planet than about 2.4 planetary radii, the tidal stresses pull the moon apart
- In case of Saturn, a moon probably moved within the "tidal disruption radius" and was torn to rubble.

Saturn's ring is a nearby example (and the first discovered) of a very broad class of astronomical phenomenon called an **accretion disk**

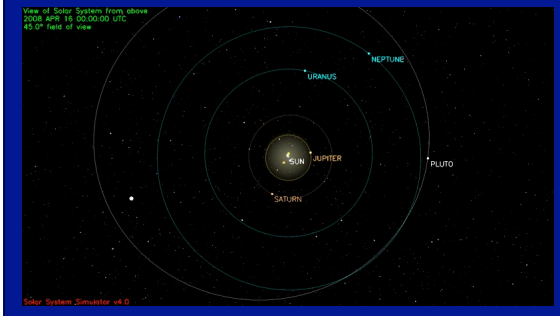
Accretion disks surround large black holes, and in a sense the disk of the Milky Way galaxy is one



Way Out … exploration of the outer solar system



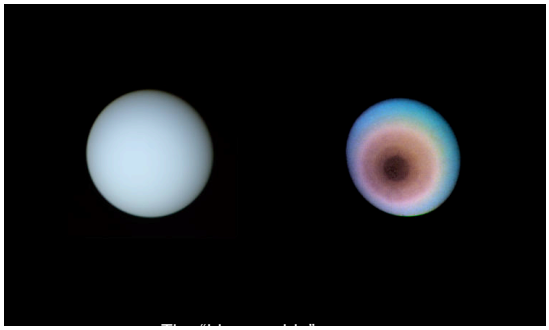
Further out from the Sun…new planets



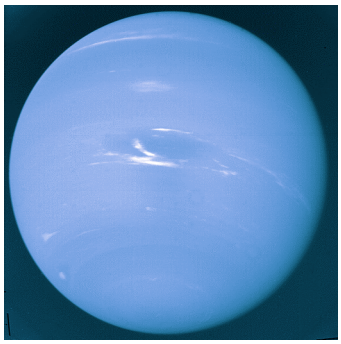
The basic facts on the planets Uranus and Neptune

- Semimajor axes: 19.19 au (U) and 30.06 (N)
- Orbital periods: 84.01 years (U) and 164.8 years (N)
- Diameters: 4.0XEarth (U) and 3.9XEarth (N)
- Masses: 14.5XEarth (U) and 17.1XEarth (N)

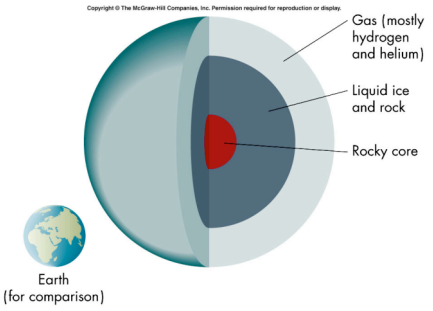
Uranus as seen from Voyager 2



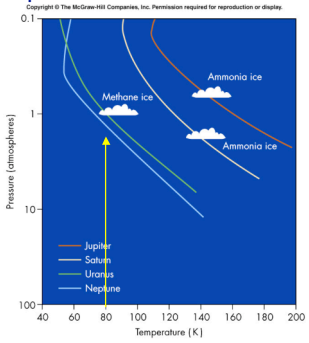
Neptune as seen by Voyager 2



The basic facts on Uranus and Neptune



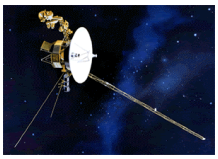
Atmospheric structure of Uranus and Neptune: it's cold out there



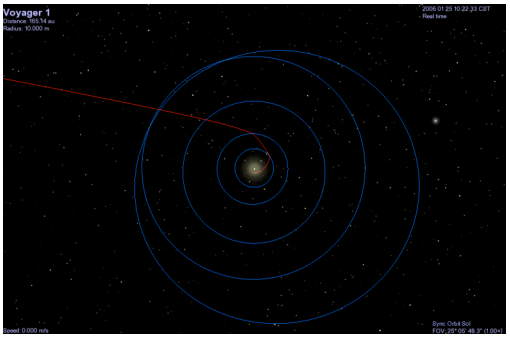
Uranus and Neptune appear to be in yet a new class of planets. Much different than the terrestrial planets, but not like Jupiter and Saturn either. There is much variety in the major planets

In 1989, Voyager 2 left Neptune and went deeper into space. It is still in communication with us

The limits of the solar system

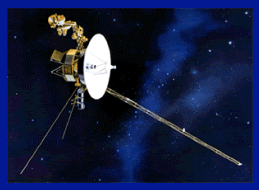


The Odyssey of the Voyager spacecraft

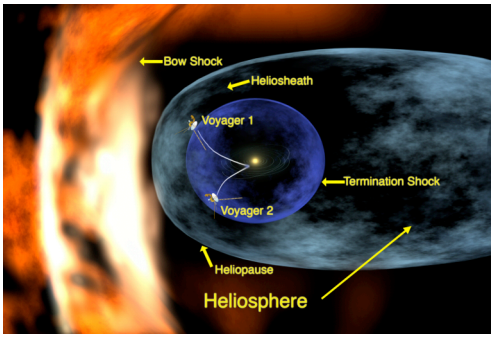


Locations of the Voyager

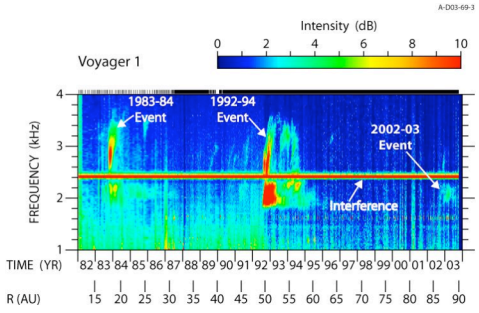
- Voyager 1: 105.9 au from Sun (March 2008) = 9.82 billion miles = 14 light hours
- Voyager 2: 85.5 au



The Heliospheric boundary: between the solar wind and the interstellar medium



The University of Iowa radio instruments on Voyager 1 and 2 "picked up" the termination shock years before we got there



Radio emission from deep space

Voyager spacecraft radio receiver