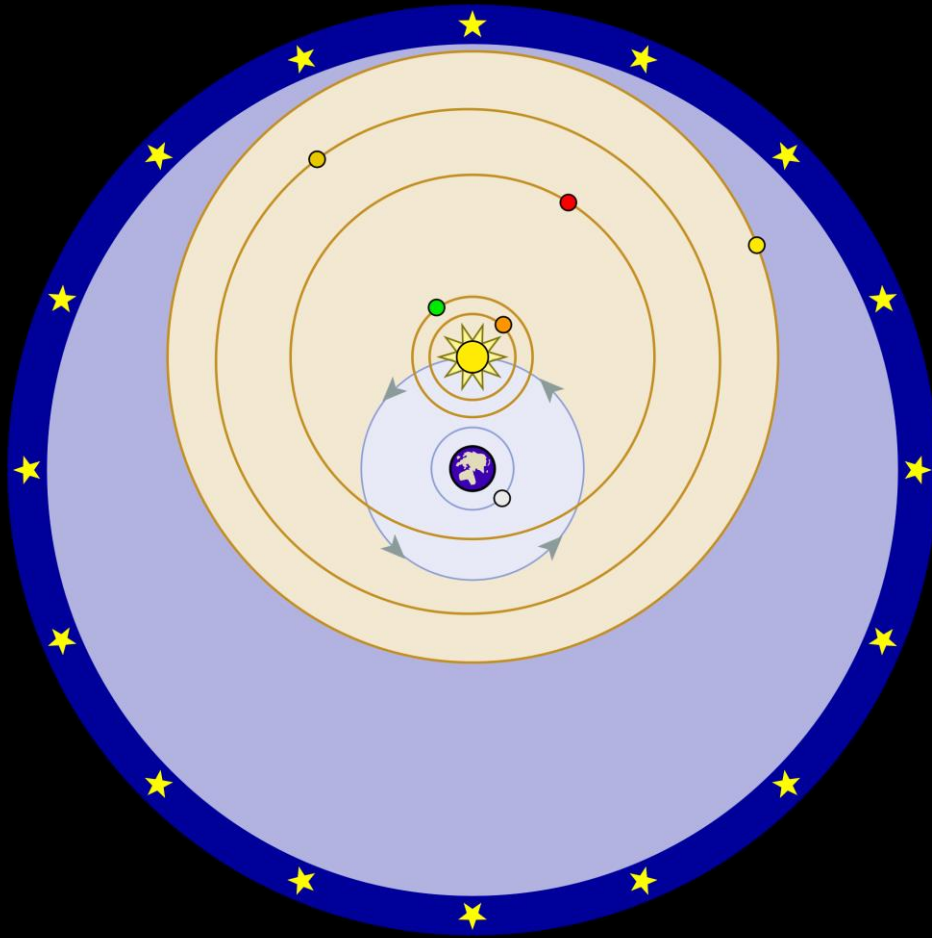


The Human Endeavor in Space



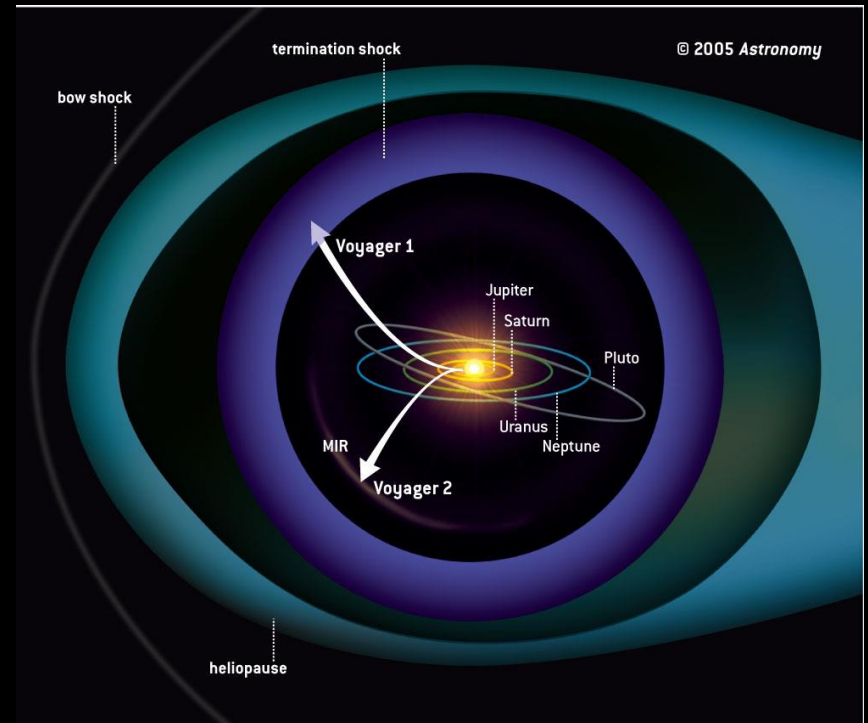
The Solar System



- Has been studied since the beginning of history
- Making observations of visible light
- 20th century – moved past the Earth's atmosphere allowing for more diverse and advanced observations
 - Radio waves
 - Close up views from probes

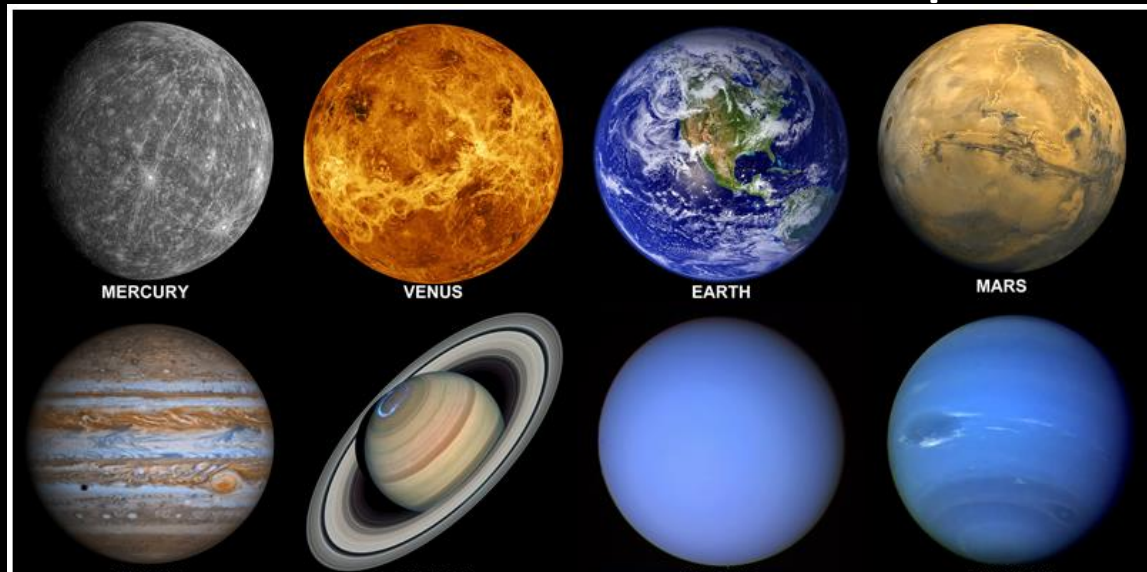
The Solar System

- Sun (average star)
- Heliosphere (particles and magnetic field emanating from sun)
- Objects orbiting the Sun



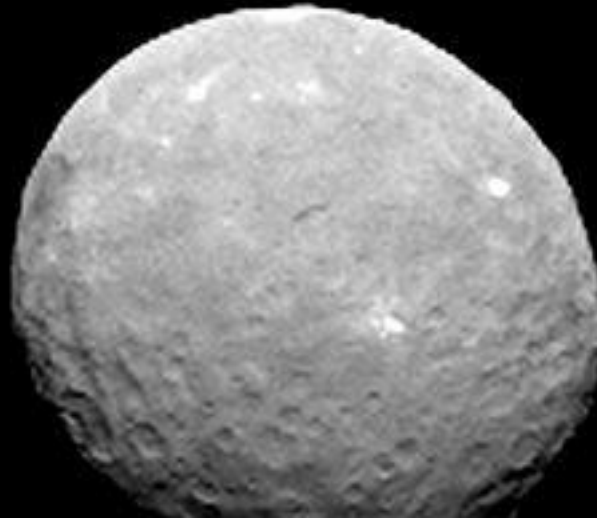
Objects that orbit the Sun

- The first 6 planets were known since ancient times (though the Earth was not considered a planet until 1543)
- Uranus and Neptune were only discovered with the invention of the telescope



Asteroid or Planet???

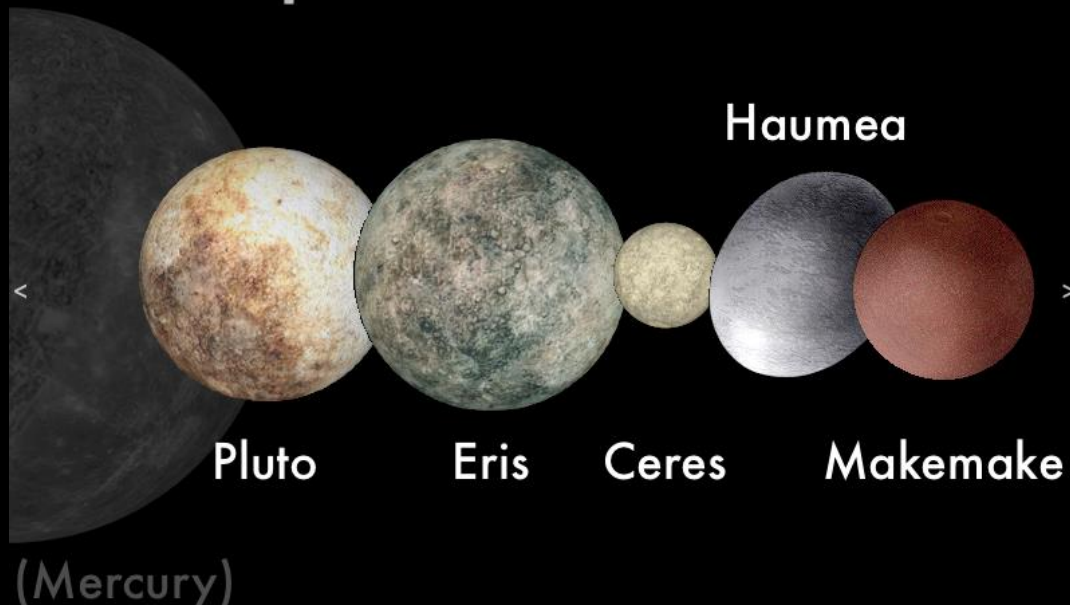
- In 1801, an object orbiting the Sun between Mars and Jupiter (Ceres) was declared a planet, but when many more such objects were discovered the classification of asteroid became appropriate.



Asteroid or Planet?

- In 1930 the same thing happened with Pluto.
- Pluto and Ceres have been redefined as dwarf planets
- Haumea, Makemake, and Eris are the other dwarf planets that join Pluto in the Kuiper belt beyond Neptune

Dwarf planets



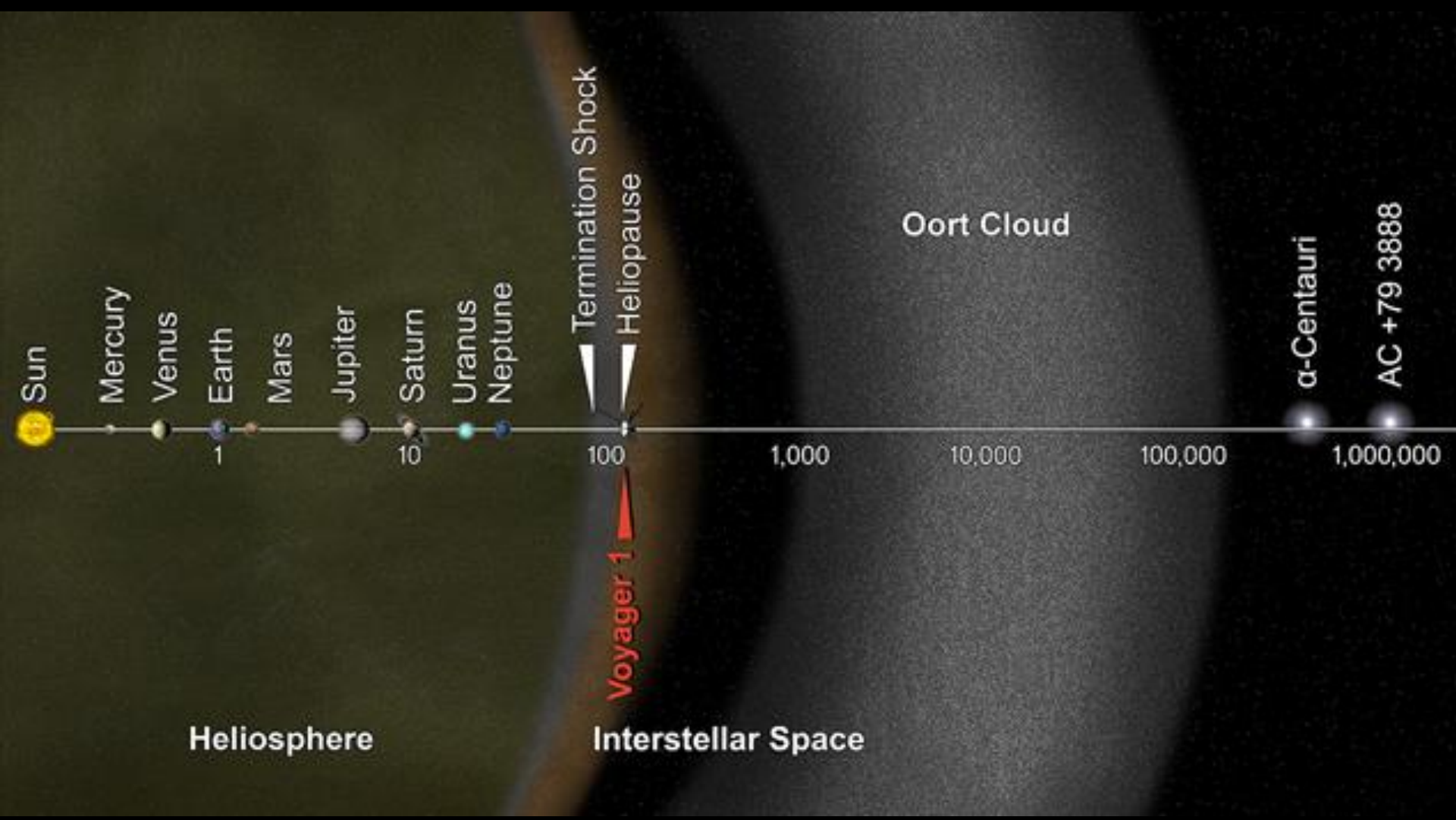
Oort Cloud

- Sedna (smaller than Pluto) has an extremely elongated orbit around the Sun. Might be the first known member of the Oort cloud.
- Oort cloud is a hypothesized reservoir of comet nuclei located a light year from the Sun.
- Comets might enter the inner solar system when disturbed from the Oort cloud.



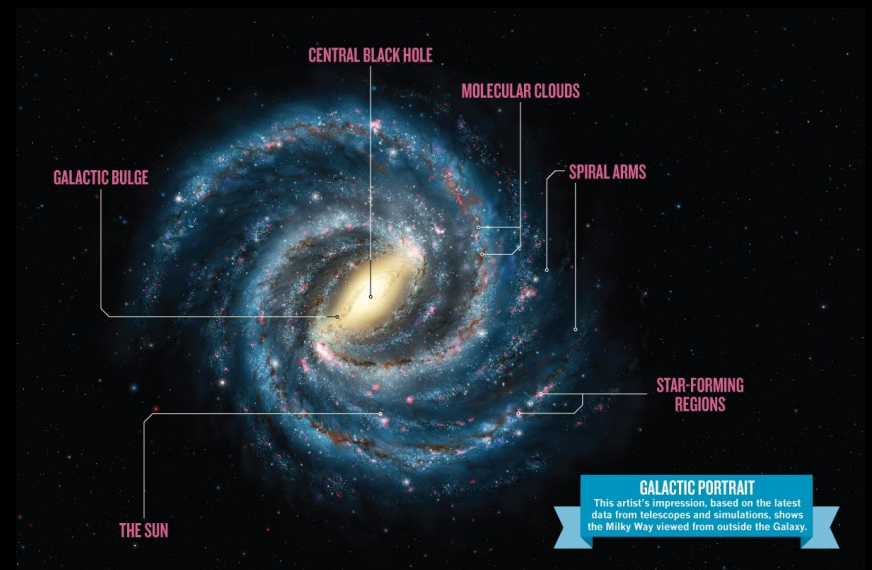
Cosmic Perspective

- Interstellar space – space between stars within the galaxy
- Sun's nearest stellar neighbour is Proxima Centauri, 4.2 light years away.
- As of 2013, astronomers have detected 809 planets orbiting other stars.



Cosmic Perspective

- Our solar system, along with all the stars you can see on a clear night, reside in the Orion arm of our galaxy – the Milky Way
- Orbit around a supermassive black hole in the center of the Milky Way about 26, 000 light years away, once every 250 million years.

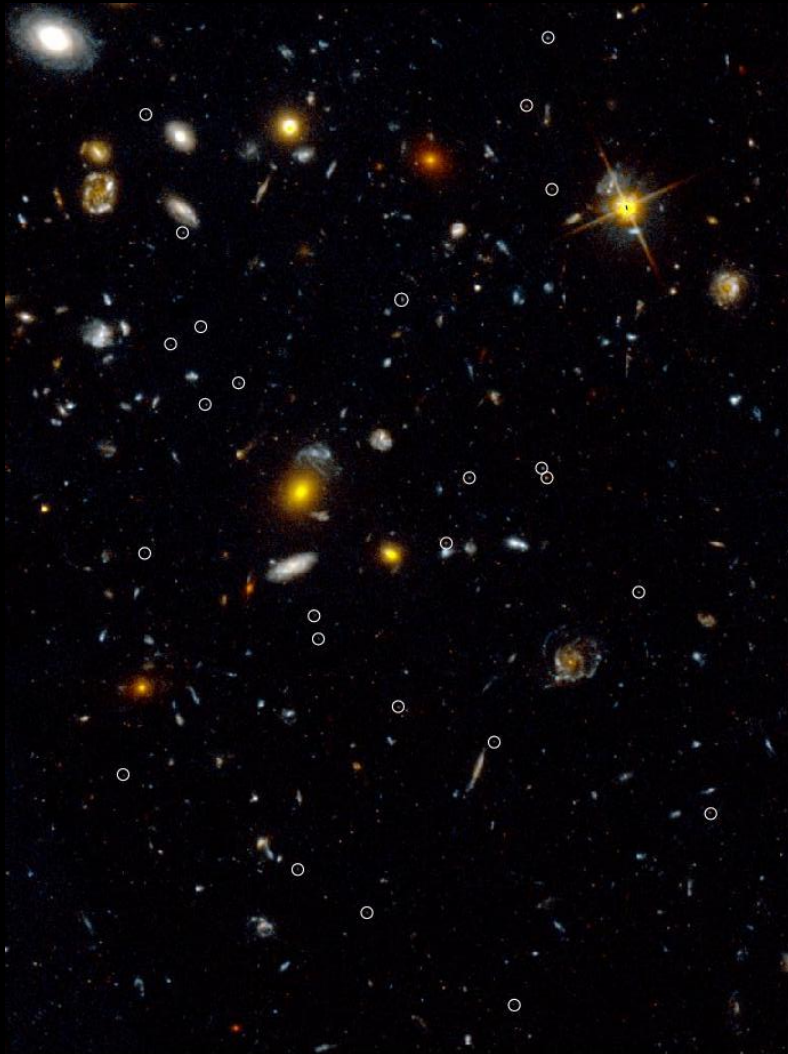


Milky Way

- Includes 200 billion stars, clouds of gas and dust, enormous quantities of dark matter.
- Two small galaxies orbit the Milky Way and can be seen from the southern hemisphere – Large Magellanic Cloud, Small Magellanic Cloud



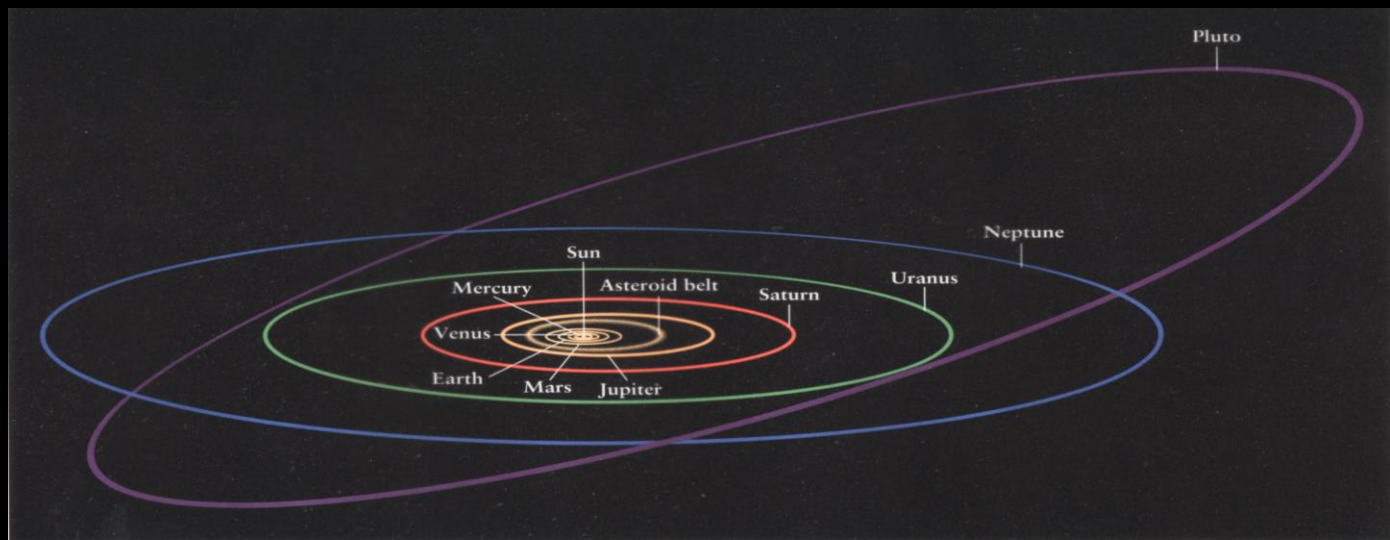
Cosmic Perspective



- Intergalactic space – space between galaxies (there are billions of known galaxies)
- Most galaxies are receding from each other
- Ignoring the motion of the Milky Way, our solar system is moving at 100,000 km/h

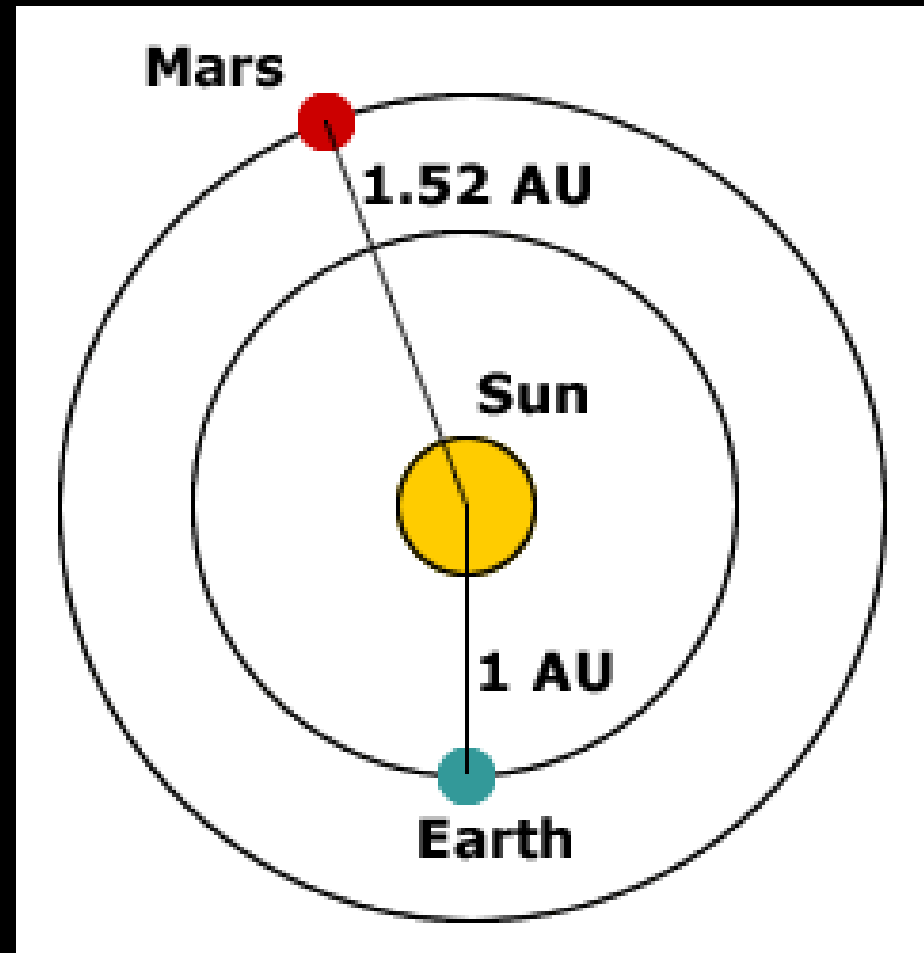
Our Solar System

- The Sun and planets each rotate on their axes
- The planets, their moons, and asteroids all revolve around the Sun in the same direction the Sun rotates, and in the same plane called the ecliptic.



Distances within the Solar System

- Astronomical Unit – the distance between the Earth and Sun (150,000,000 km)



Temperatures in the Solar System

- <http://solarsystem.nasa.gov/basics/Ktable.html>