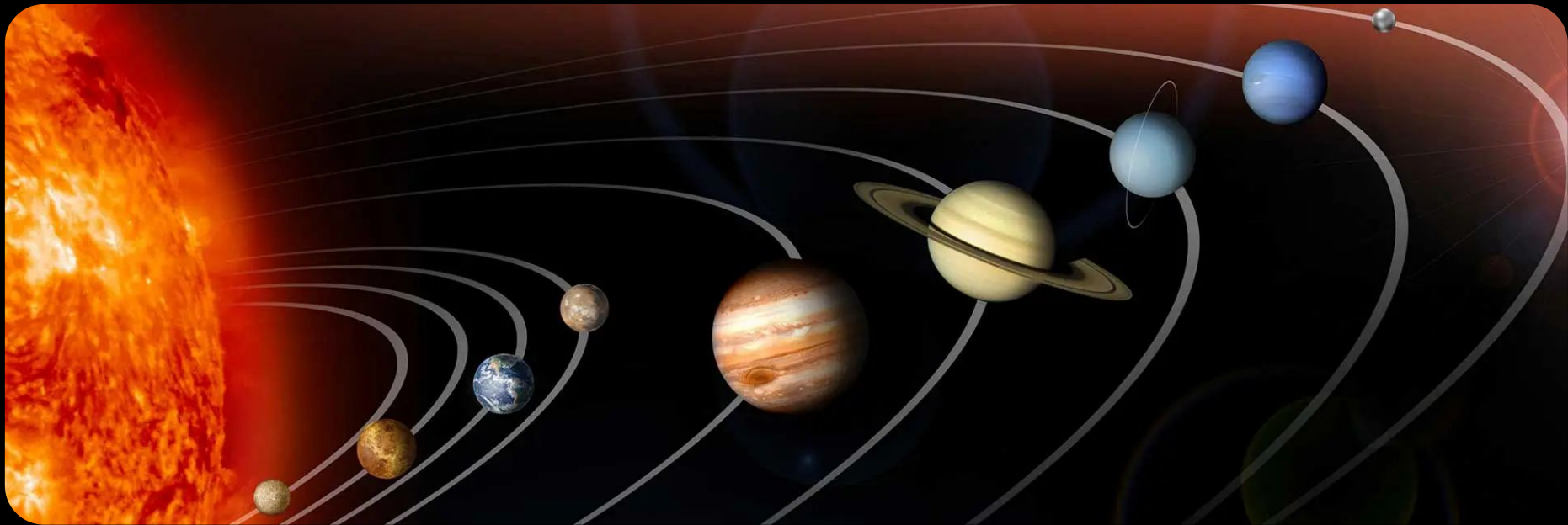


# Lesson 3: The Solar System



**How did the solar system evolve?**

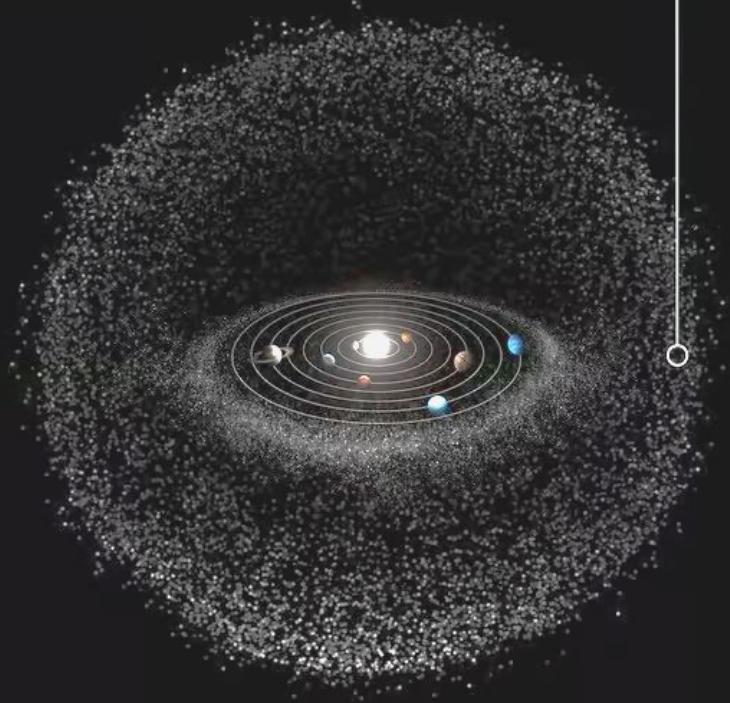
## Kuiper Belt

Distance from Sun: 30–50 AU

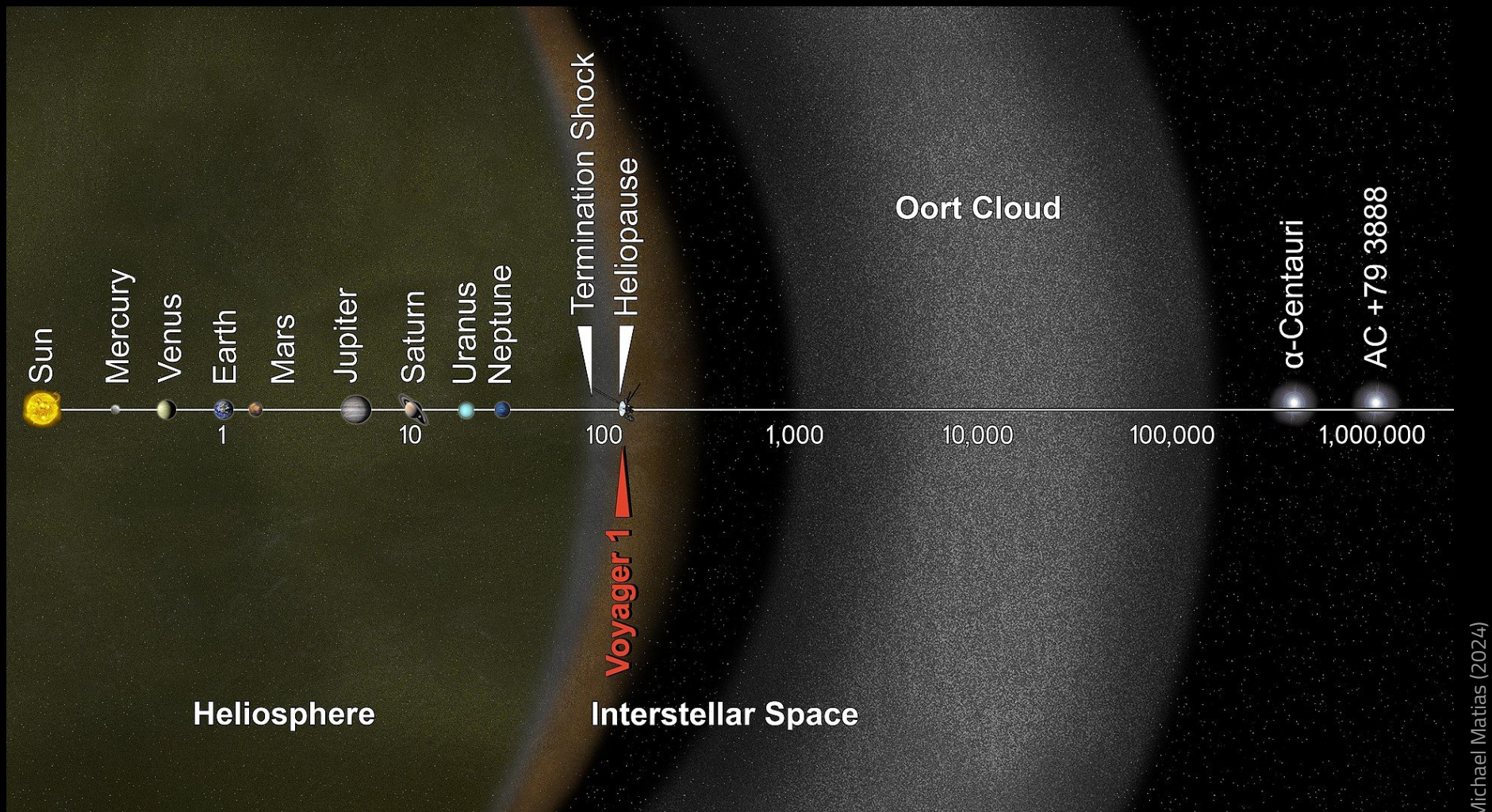


## Oort Cloud

Distance from Sun: 2000–200 000 AU







**sun**  
(865,000 mi  
1,392,000 km)

**Venus**  
(7,500 mi  
12,100 km)

**Mars**  
(4,200 mi  
6,800 km)

**Mercury**  
(3,000 mi  
4,900 km)

**Earth**  
(7,938 mi  
12,760 km)

**Jupiter**  
(89,000 mi  
143,000 km)

**Saturn**  
(74,900 mi  
120,600 km)

**Neptune**  
(31,000 mi  
50,000 km)

**Uranus**  
(32,000 mi  
51,000 km)

Sizes given are the approximate diameter of each body.

Terrestrial planets  
(inner planets)

Gas Giants  
(outer planets)

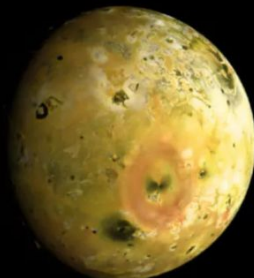


# Solar System Major Moons

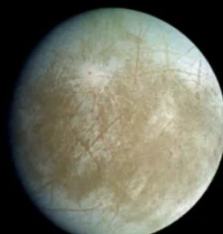
The Solar System contains 18 or 19 natural satellites of planets that are large enough for self-gravity to make them round. (Why the uncertain number? Neptune's moon Proteus is on the edge.) Two of them are larger than Mercury; seven are larger than Pluto and Eris. If they were not orbiting planets, many of these worlds would be called "planets," and scientists who study them are called "planetary scientists."

Images from Galileo (Jupiter's moons), Cassini (Saturn's moons), Voyager 2 (Uranus and Neptune's moons). Data from NASA/JPL, processed by Ted Stryk, Gordan Ugarkovic, Emily Lakdawalla, and Jason Perry. Earth's Moon photo by Gari Arrillaga. Montage by Emily Lakdawalla. The Planetary Society, [blog@planetary.org](mailto:blog@planetary.org).

## Jupiter...



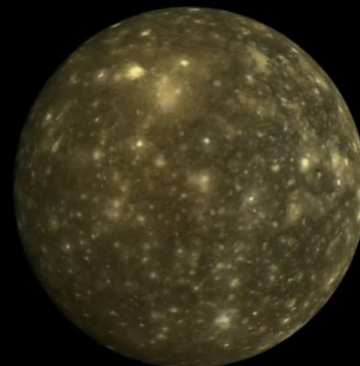
Io



Europa



Ganymede



Callisto



Titan

## Saturn...



Mimas



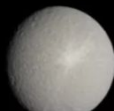
Enceladus



Tethys



Dione



Rhea

## Uranus...



Miranda



Ariel



Umbriel



Titania



Oberon

## Neptune...



Proteus

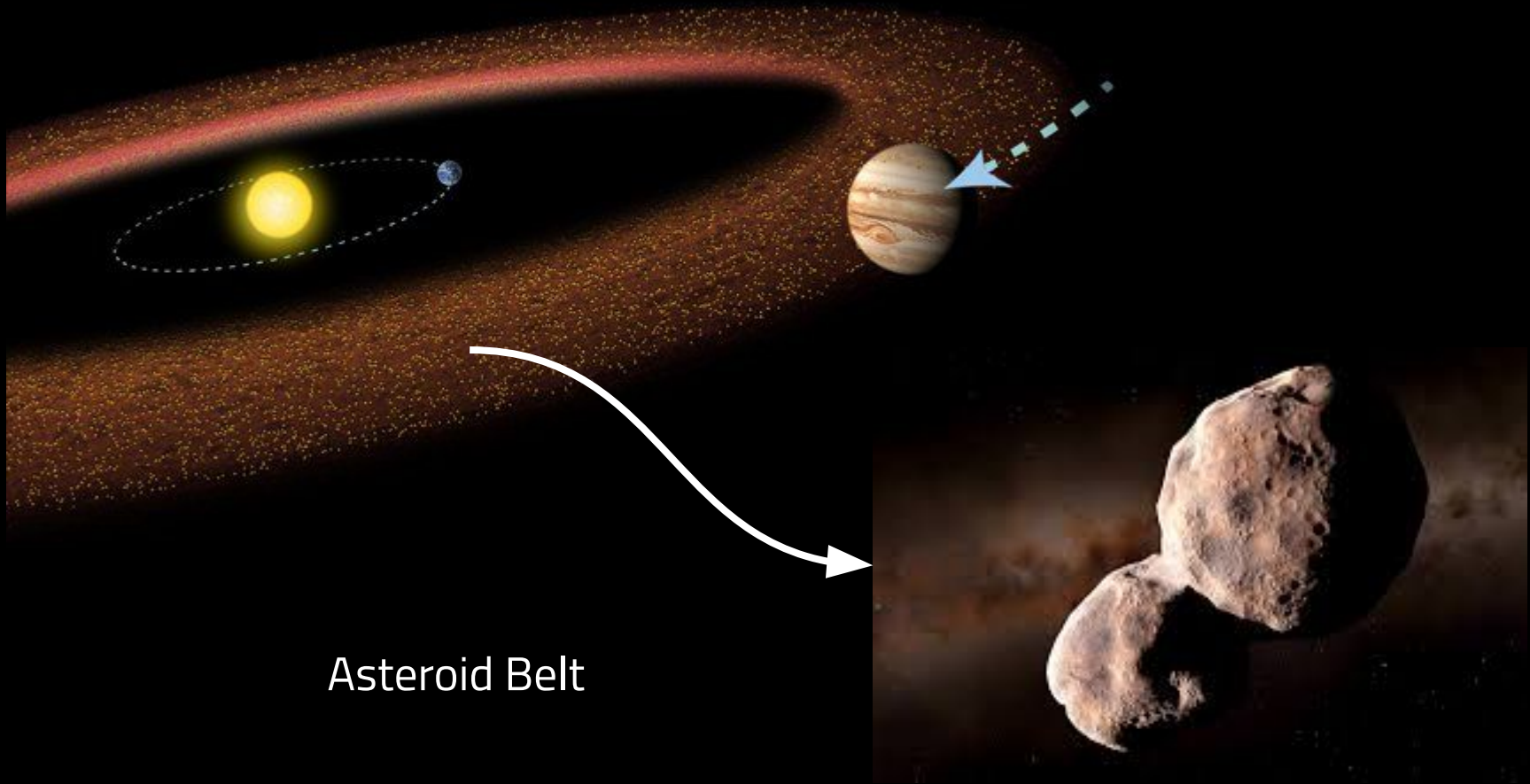


Triton

## Earth...



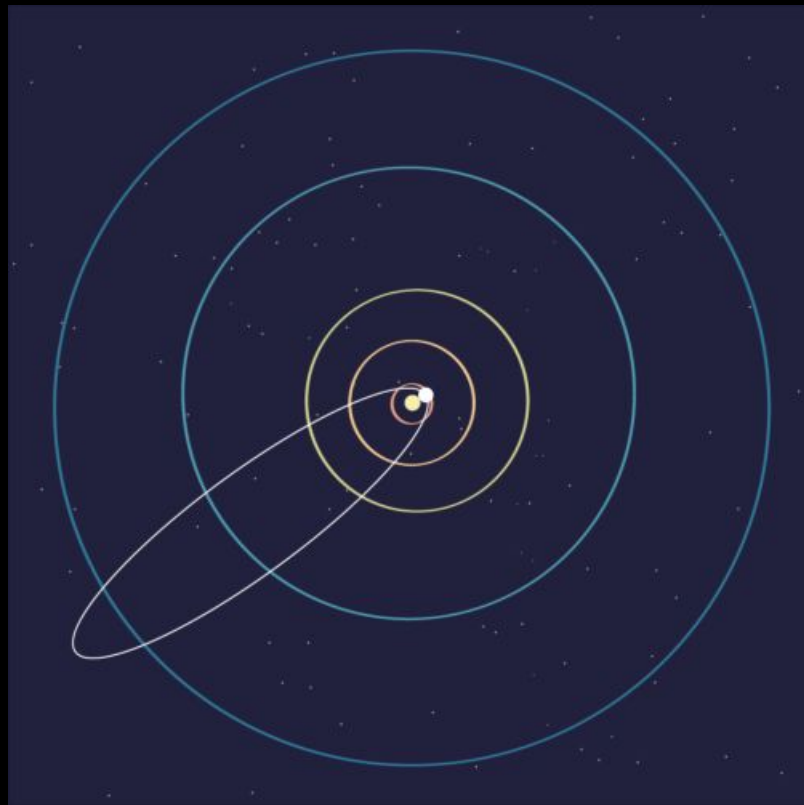
The Moon



Asteroid Belt



Comets





## Dwarf Planets

**CERES**



**PLUTO**



**ERIS**



**MAKEMAKE**

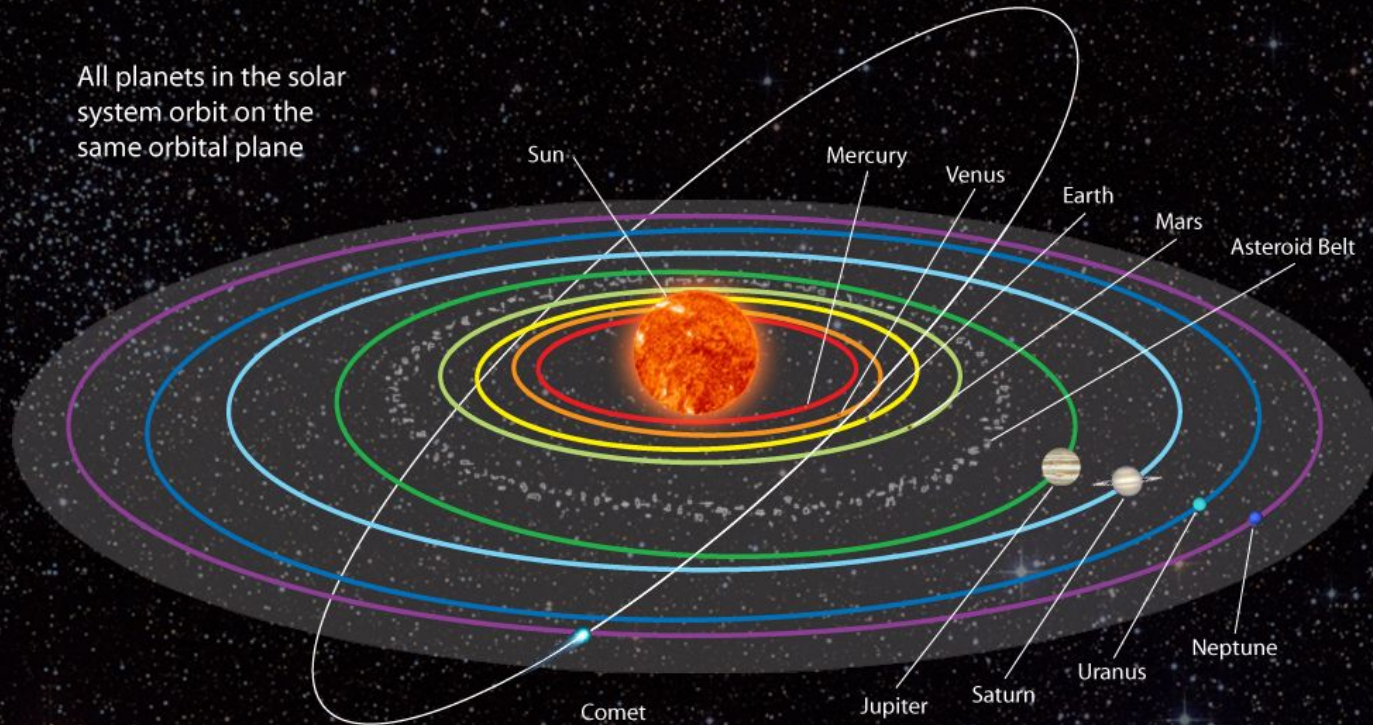


**HAUMEA**

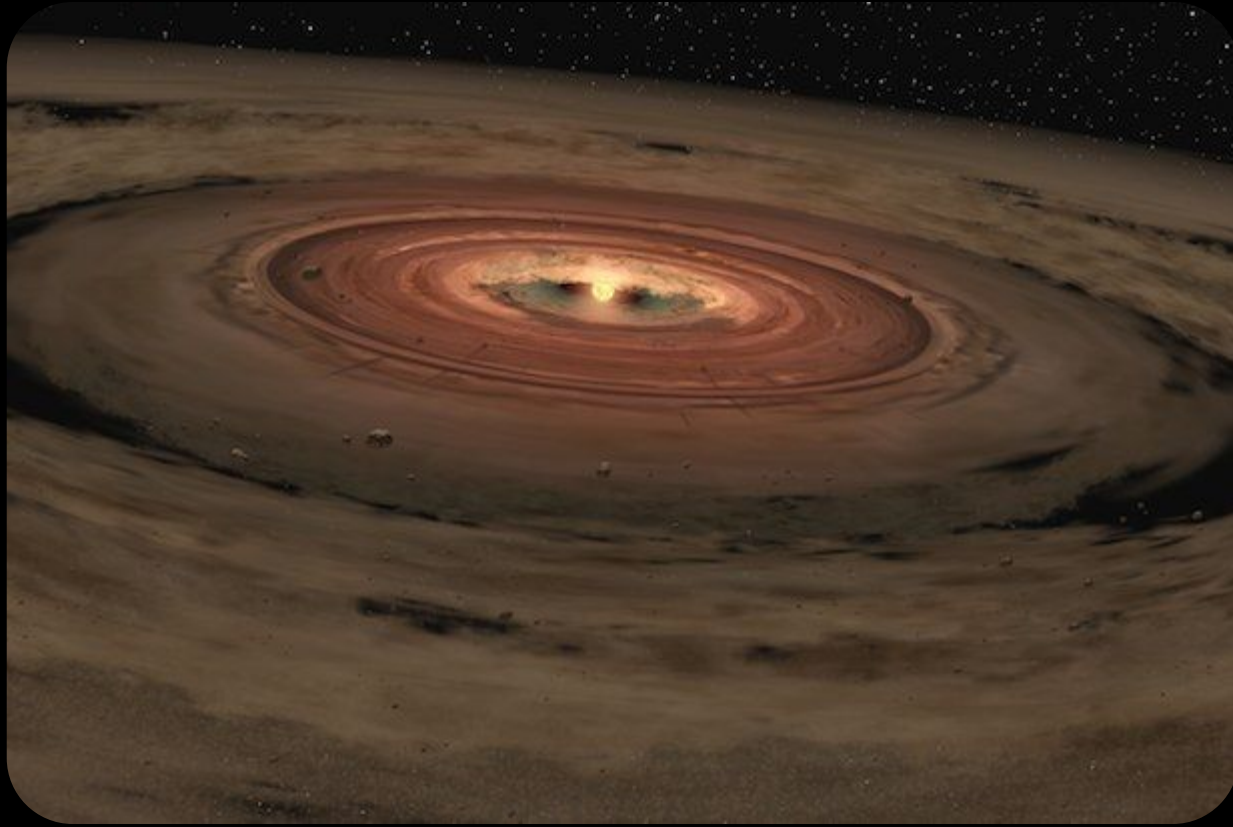


# Orbital Plane

All planets in the solar system orbit on the same orbital plane



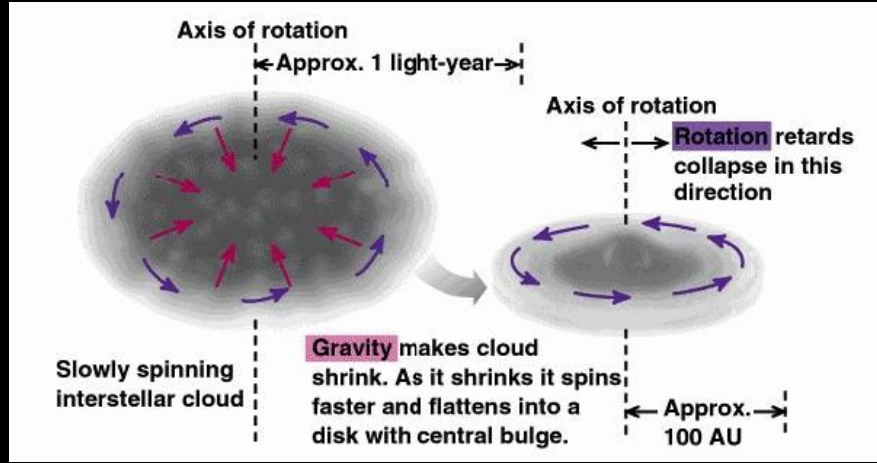
\* Many comets exist outside the orbital plane



**How are planetary systems formed?**

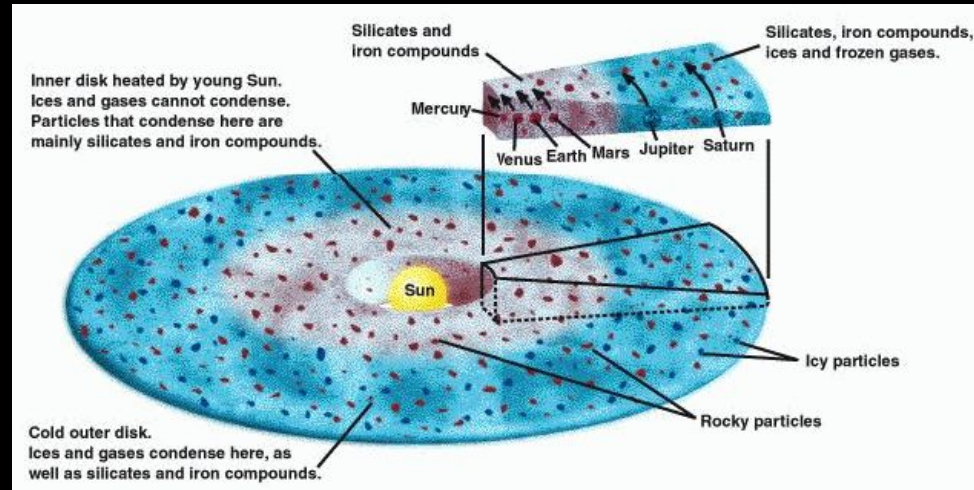


# Formation of Solar Systems: Nebular Theory



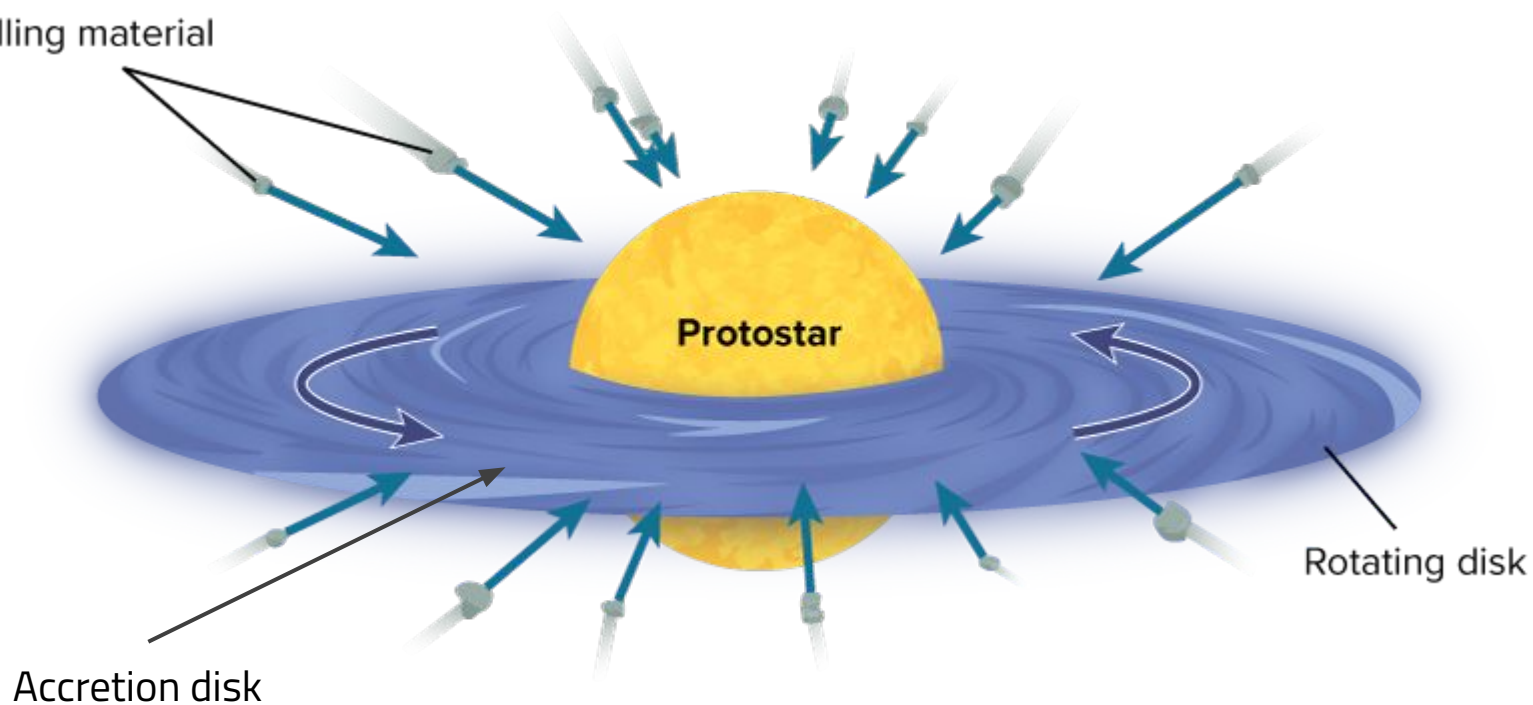
Cloud collapse

## Formation of Protoplanetary disk





Infalling material

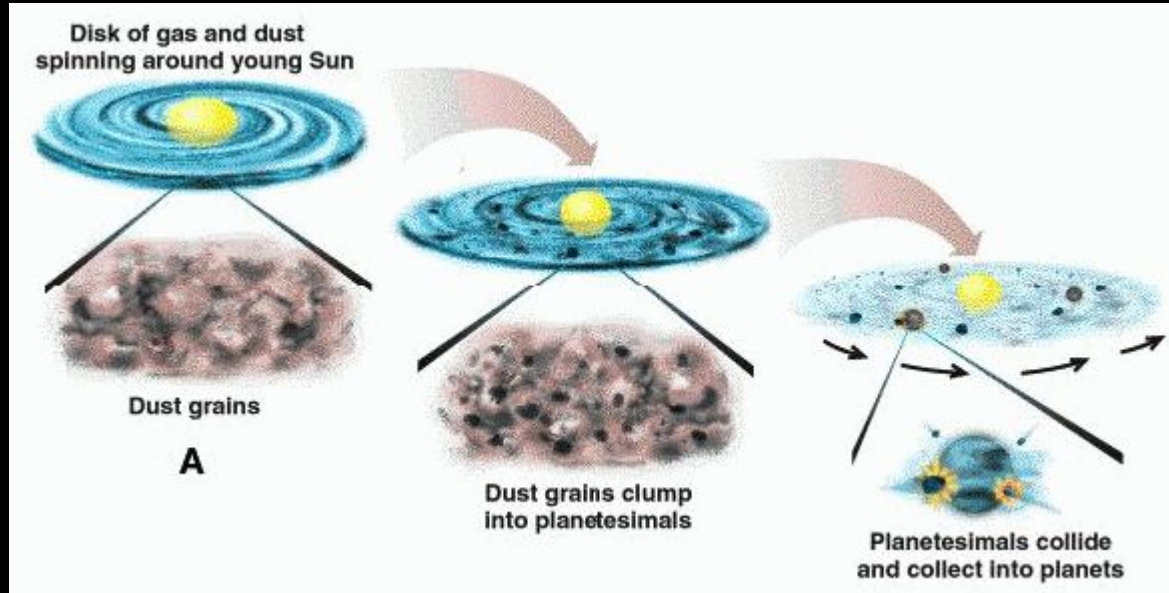


Protostar

Rotating disk

Accretion disk

# Formation of Solar Systems: Nebular Theory



Growth of Planets