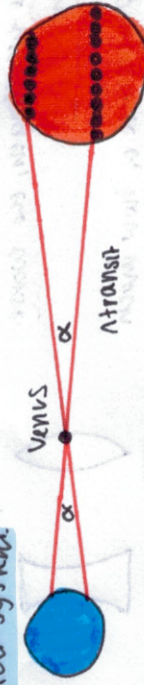


Meteoroids - particles of dust and larger rock and mix of stone/ice/metal that orbit the Sun

- when it enters the Earth's atmosphere, air resistance converts kinetic energy into thermal energy causing the particles to incandescence. the resulting streak of light is a meteor

- meteor shower named after the radiant is when individual meteors appear to diverge from a radiant lies in

In 1677, Edmond Halley wanted to determine the absolute distance between planets and size of Solar system.



- observed paths of Venus in transit would be different with varying latitudes
- if latitude distance between two locations known, simple triangulation can calculate Earth - Venus distance and therefore Earth - Sun distance
- it was calculated 2.57. within its modern day value

Exploring the Solar System

$$1 \text{ AU} = 1.5 \times 10^8 \text{ km}$$

Dwarf planets - sufficient mass to be spherical but lack the gravitational force to clear their orbits of debris

Small Solar System Objects:

- Asteroid - small, irregular, rocky (d. < 1000 km)
- Meteoroid - smaller (d. $\approx 10 \text{ m}$)
- Comets - mixtures of compacted dust, rock and ice

most found in the asteroid/main belt

Comets:



- dust tail** - broader, curved, produced by solar radiation pressure pushing particles out of comet's nucleus
- ion tail** - long, straight, mostly blue consisting of ions that have been excited by particles in solar wind and emit light by fluorescence when de-excite
- grains of dust following independent solar orbits

→ **Short-period comets** - periods of < 200y
most stay within the solar system originate from Kuiper Belt elliptical solar orbits a subset has period of < 20y

→ **Long-period comets** - periods of > 200y
originate from Oort cloud unpredictable orbits some orbits highly inclined to plane of the solar system some orbit opposite way to planets hyperbolic orbits

Heliosphere - outermost atmospheric layer of the Sun

Planet	diameter/1000km	mass/Earth mass	T/°C	atmosphere	rings?	moons
Mercury	4.9	0.055	170	none	x	0
Venus	12.1	0.82	470	dense CO ₂	x	0
Earth	12.8	1.00	15	H ₂ , O ₂ & H ₂ O	x	1
Mars	6.9	0.11	-50	thin CO ₂	x	2
Jupiter	143	318	-150	H ₂ & He	✓	> 60
Saturn	121	95	-180	H ₂ & He	✓	> 60
Uranus	51	45	-210	H ₂ & He	✓	> 25
Neptune	50	17	-220	H ₂ & He	✓	> 12

Theory for origin of water on Earth:

1. Comets and SSSOs collided with the surface, bringing water
2. Water originally trapped in hydrated minerals may have been released on Earth