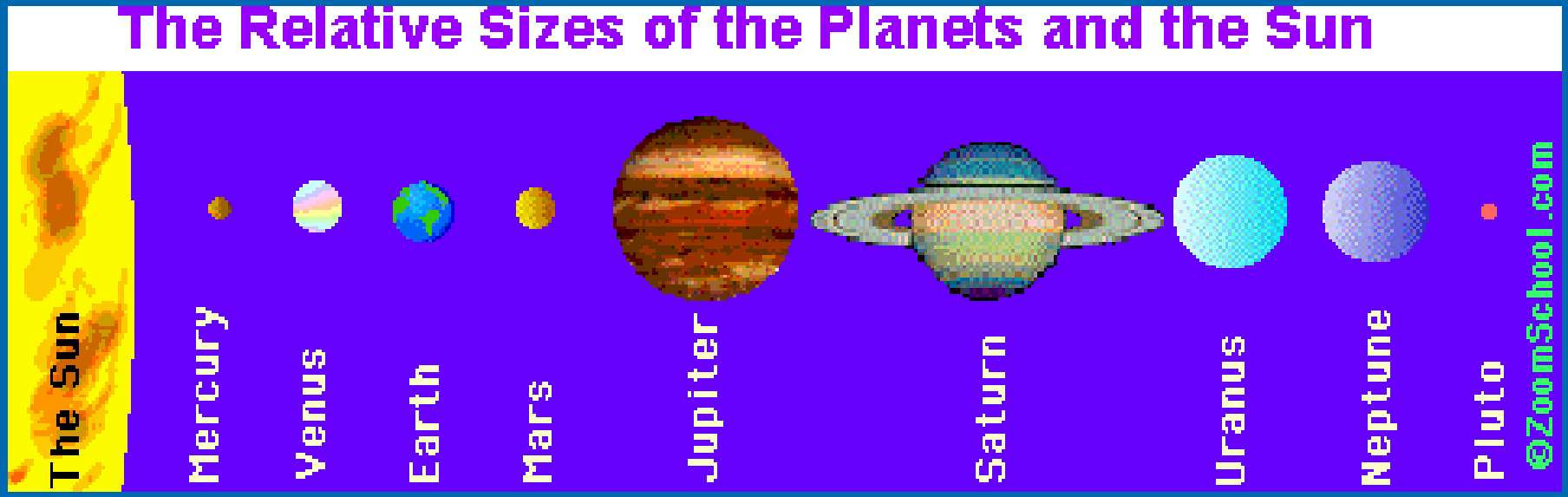
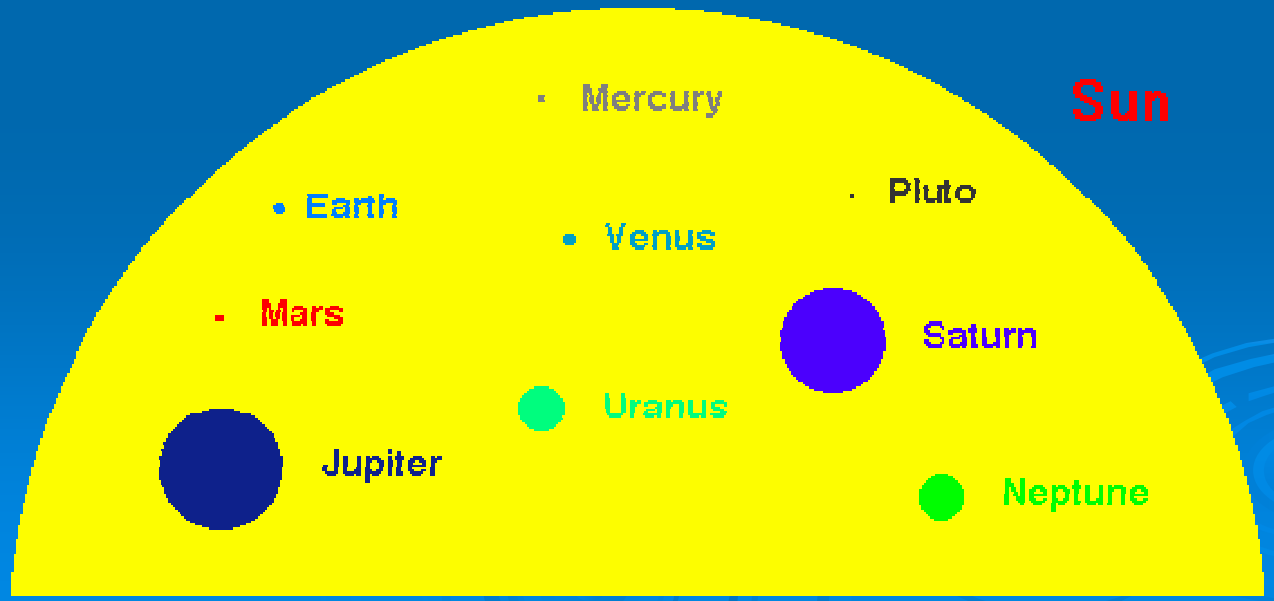
Chapter 23

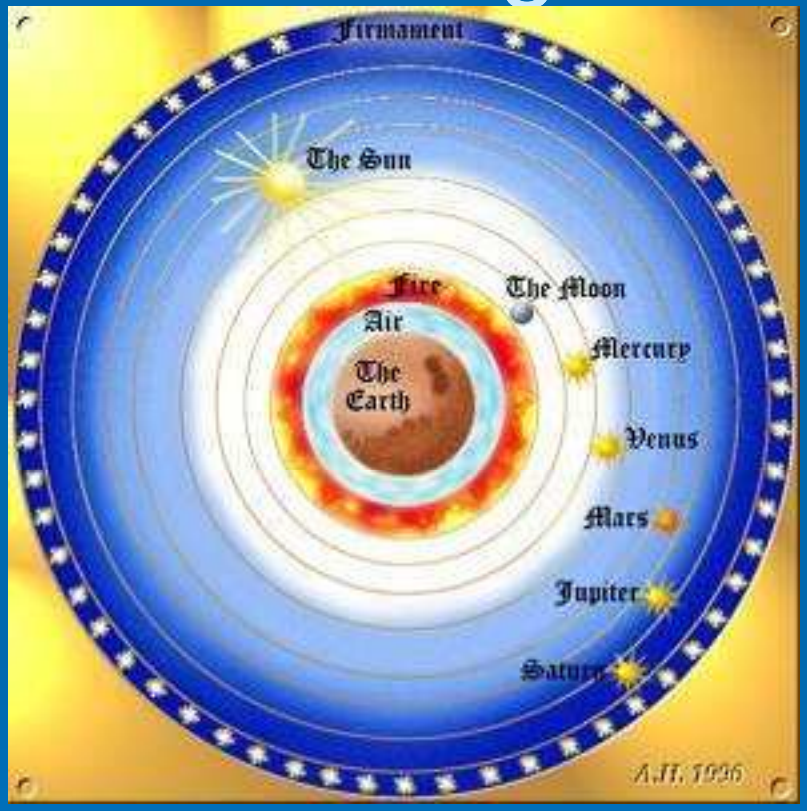
Our Solar System

Our Solar System



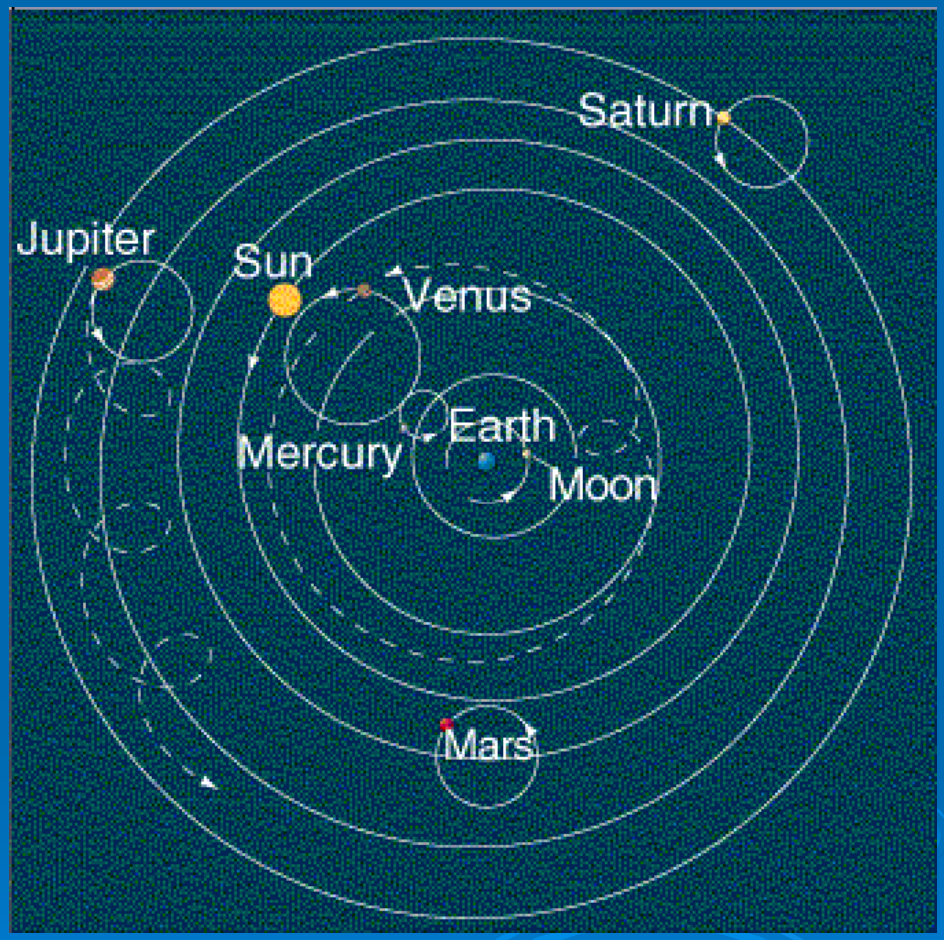


Historical Astronomy – Wandering Stars



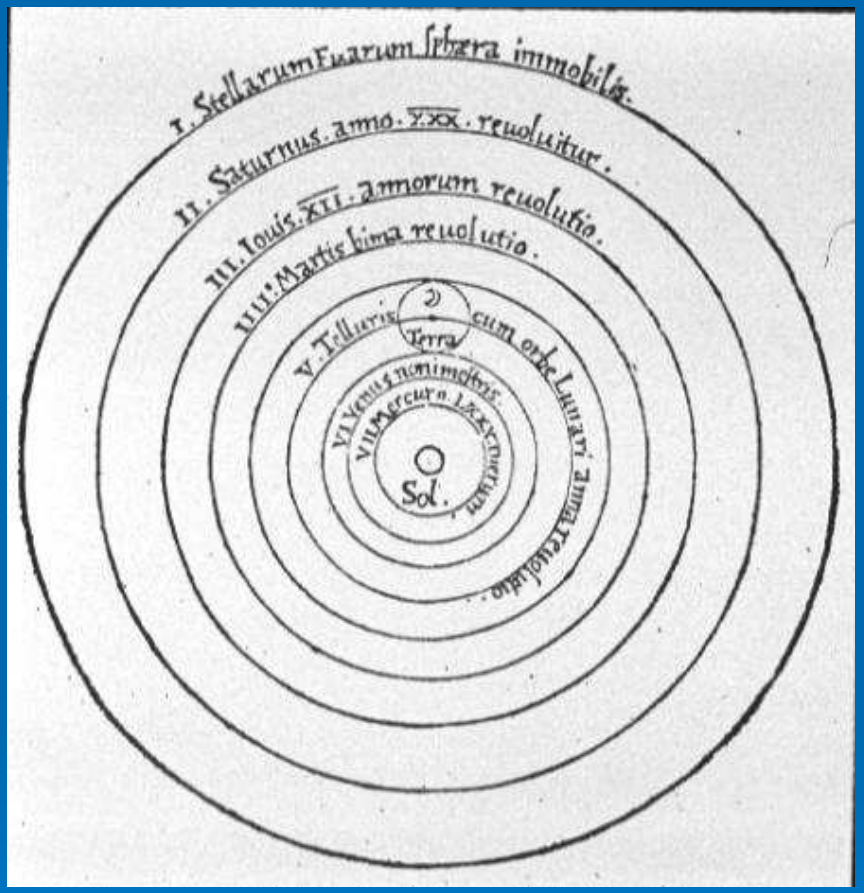
- Greeks watched the stars move across the sky and noticed five “stars” that wandered around and did not follow the paths of the normal stars. They called them Wander Stars “planets”.
- “**Wandering Stars**” were: Mercury, Venus, Mars, Jupiter and Saturn

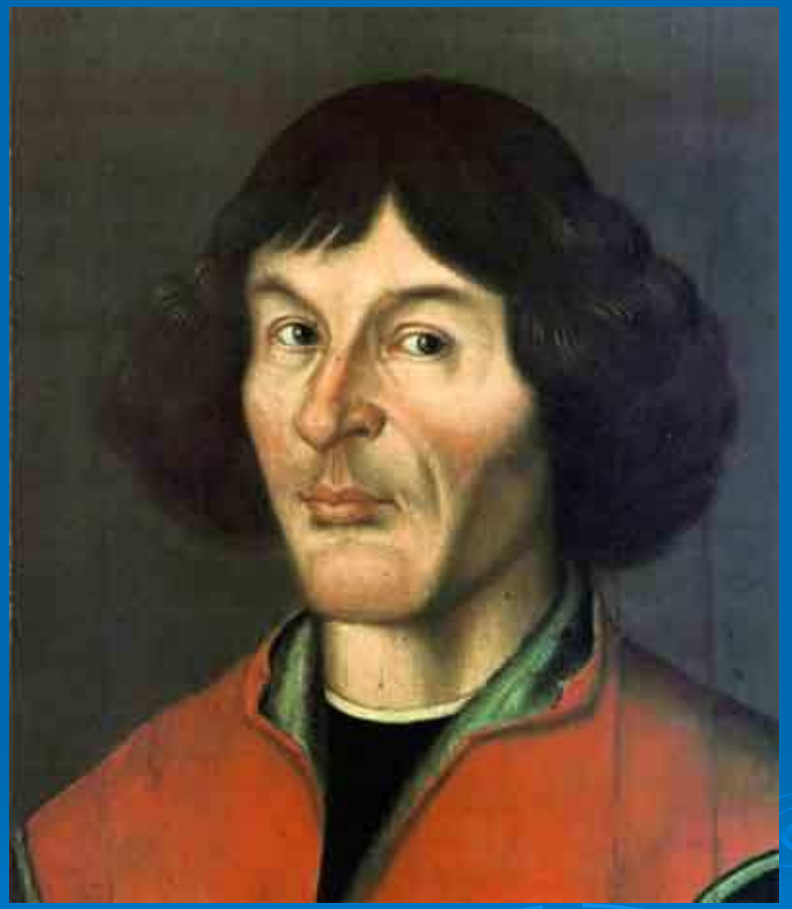
Historical Astronomy -Ptolemy



- Ptolemy – geocentric, believed Earth was the middle of the whole universe

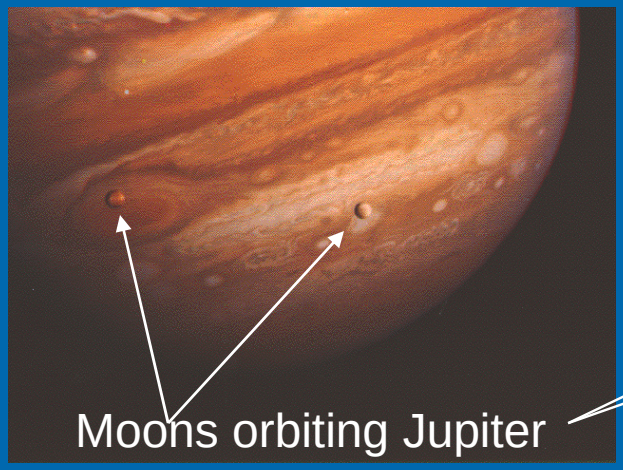
Historical Astronomy - Copernicus

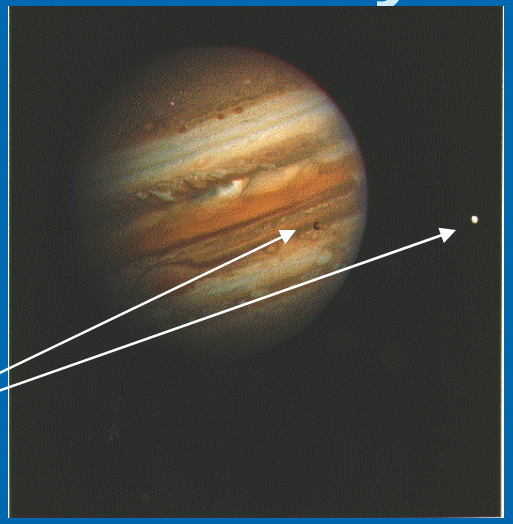


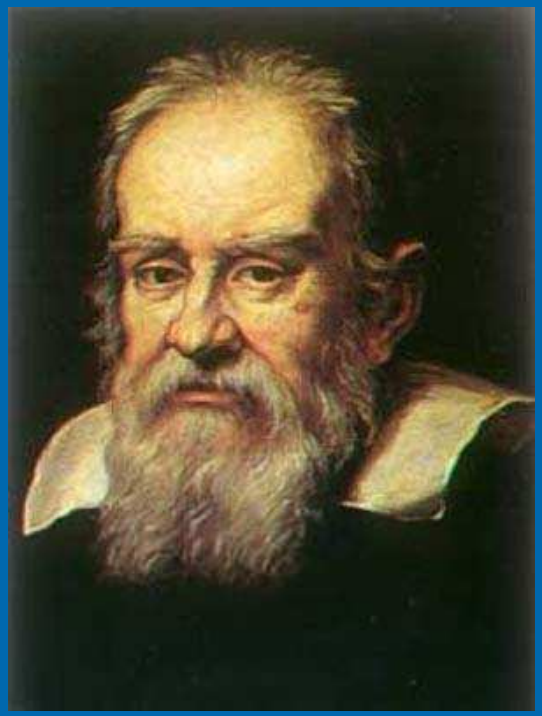


- Copernicus: Polish Astronomer believed:
  Heliocentric – Sun centered Solar System

Historical Astronomy - Galileo

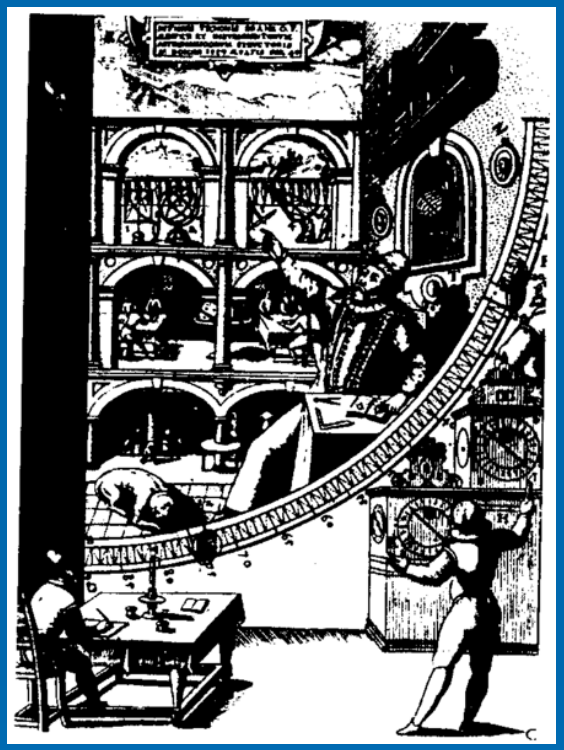






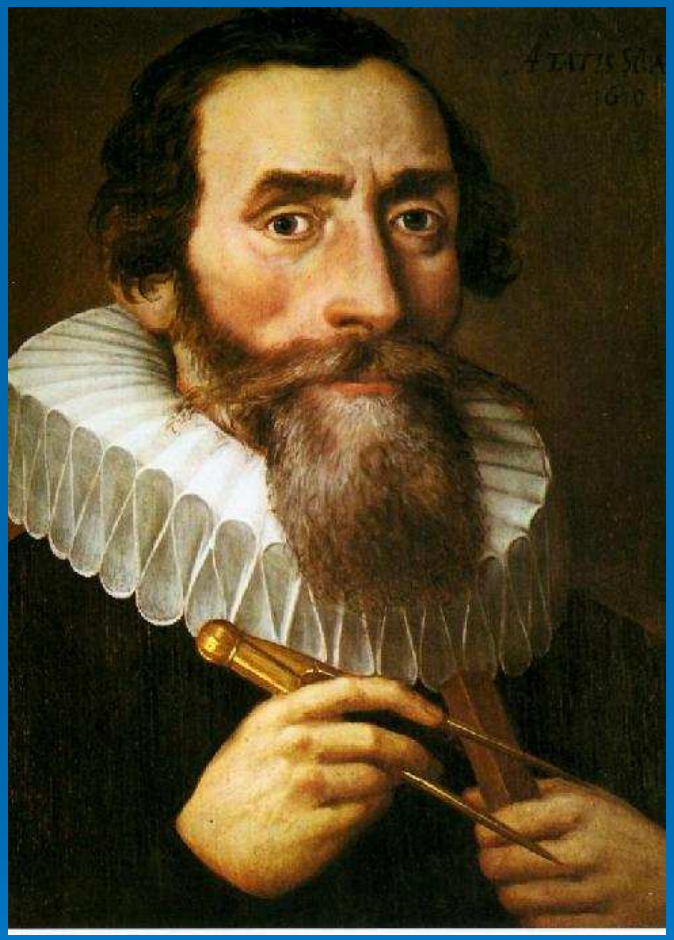
- Galileo: confirms Copernicus heliocentric belief
  - With telescope, he saw moons around Jupiter & Venus going through phases

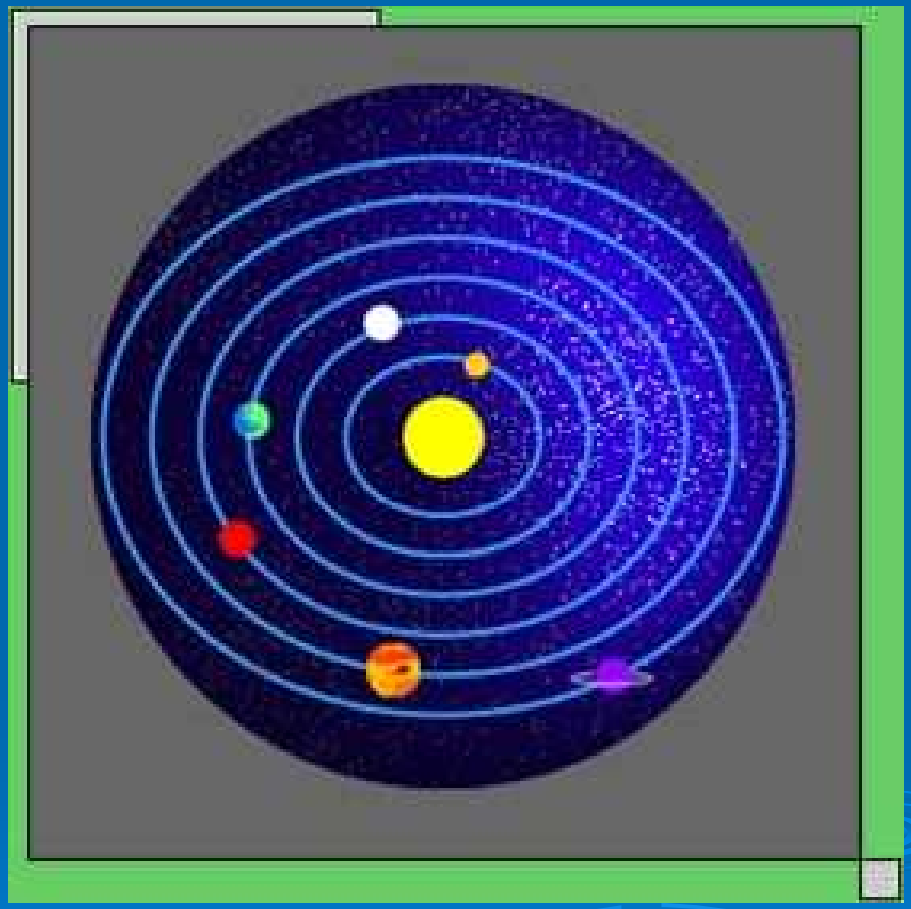
Historical Astronomy - Brahe



- **Brahe**, an astronomer, made very precise measurements of the location of the planets for over twenty years. Couldn't make exact predictions because he used circular orbits.
- Needed the help of Kepler to get it right.

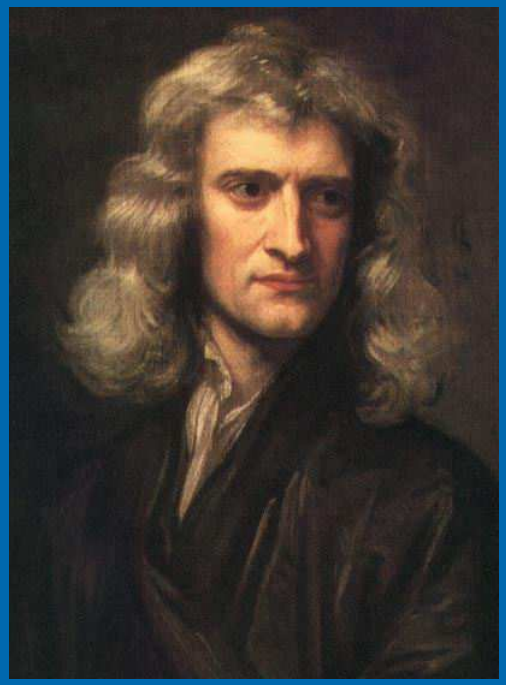
Historical Astronomy - Kepler

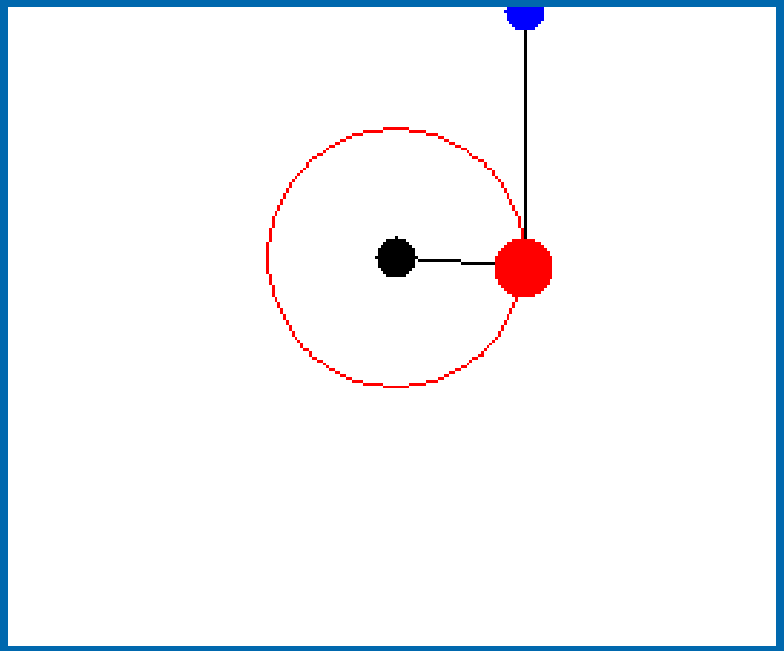




- **Kepler**, a mathematician, used Brahe numbers and determined that the orbits of the planets were elliptical not perfect circles.

Historical Astronomy - Newton





- **Newton** – determines that planets stay in orbit because of Inertia and Gravity
  - a. **Inertia** – an object at rest stays at rest, an object in motion stays in a straight line motion, until acted on by an outside force.
  - b. **Gravity** – the attraction of two objects. The strength of gravity depends on the masses each object possess.

“Historical Summary”

- Greeks watched the stars move across the sky and noticed five “stars” that wandered around and did not follow the paths of the normal stars.
- “Wandering Stars” were: Mercury, Venus, Mars, Jupiter and Saturn
- Ptolemy believed: Geocentric - Earth centered Solar system
- Copernicus: Polish Astronomer believed: Heliocentric – Sun centered Solar System
- Galileo: confirms Copernicus belief
  - With telescope, he saw moons around Jupiter & Venus going through phases
- Brahe, an astronomer, made very precise measurements of the location of the planets for over twenty years.
- Kepler, a mathematician, used Brahe numbers and determined that the orbits of the planets were elliptical not perfect circles.
- Newton – determines that planets stay in orbit because of Inertia and Gravity
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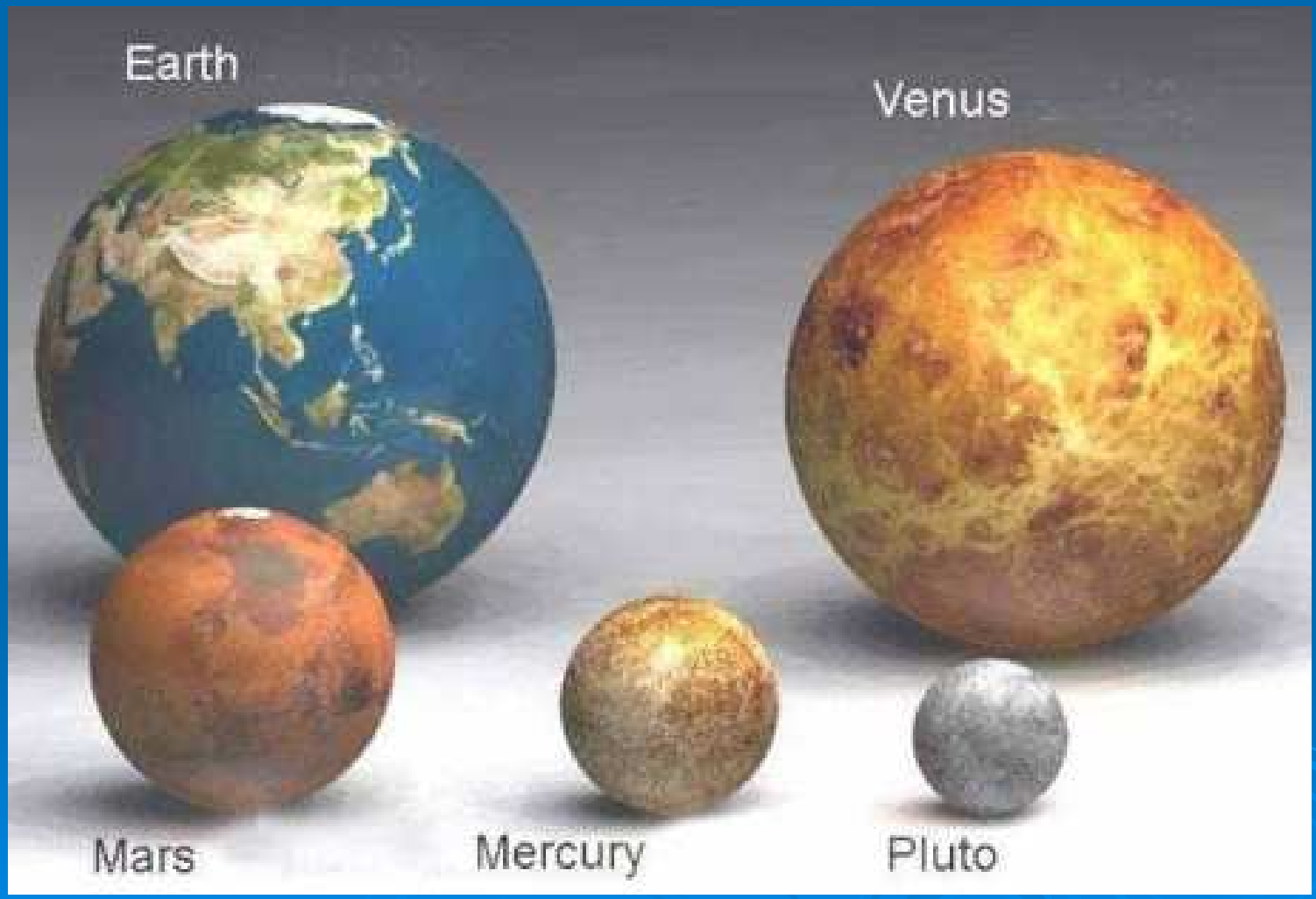
  - Gravity – the attraction of two objects. The strength of gravity depends on the masses each object possess.

Need-to-Know Planets

- The Inner Planets-The Terrestrial Planets:
- Mercury, Venus, Earth and Mars
  - Mercury: Closest to the sun, about the size of our moon, fastest revolution, daytime temp 427 C & night temp –170 C
  - Venus: Earth's "twin" and one of the hottest surfaces, thickest atmosphere of terrestrial Planets, very slow rotation (243 Earth days) & retrograde rotation, Called the "Morning & the Evening Star"
  - Earth: Intelligent life, liquid water
  - Mars: The "Red" planet, live TV from the surface, largest volcano in solar system: Olympus Mons
  - Asteroid Belt: In orbit where a planet should be, range in size from 1000 km (1/3 the size of our moon) to dust size

Inner Planets + Pluto



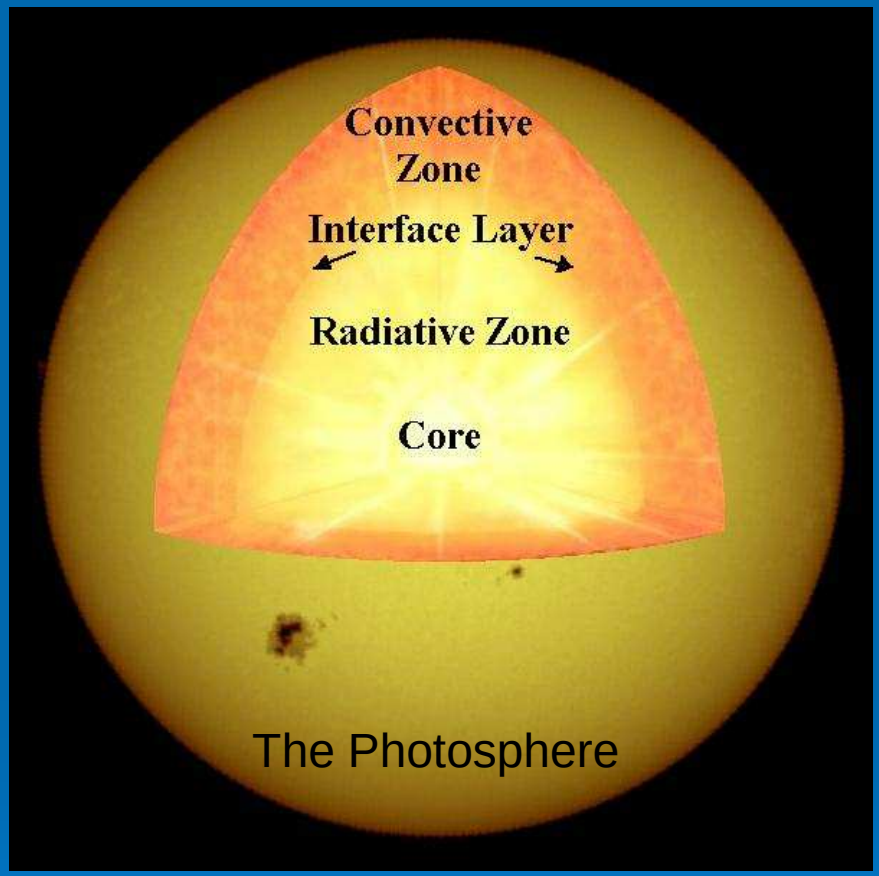
“Need-to-Know” Planets

- The Outer Planets-Pluto & The Gas Giants (Jovian Giants):
- Jupiter, Saturn, Uranus, & Neptune
  - Jupiter: Largest of the Jovian Giants, large Red Dot is a massive storm, we viewed breakup of comet crash onto its surface.
  - Saturn: Rings are horizontal, fastest rotation causes poles to be flatten and equator to bulge, least dense- it would float in water
  - Uranus: Super heated ocean of water 8,000 km thick, Blue planet w/ atmosphere featureless &11,000 km thick. Axis is tilted almost 90 degrees.
  - Neptune: Its orbit was used to calculate the position and existence of Pluto, 5 vertical rings, Blue planet w/ atmosphere with visible changing clouds. Its largest moon is Triton which has retrograde revolution.
  - Pluto: Last known planet discovered in 1930, only terrestrial planet in outer planets, “Twin” planets w/ large moon Charon. It has officially been declassified and is no longer a “planet”.

“Need-to-Know” Satellites

- Mariner 2 – 1962, first probe of Venus
- Mariner 4 - 1965, first probe of Mars
- Mariner 7- 1969, explored Mars, sent back aerial photos of surface
- Mariner 9 – 1971, Explored Mars, sent back photos of two Martian moons
- Mariner 10- 1974, three passes of Mercury
- Viking 1 – 1975 – first spacecraft to land on Mars
- Viking 2 – 1975 , landed on and explored Mars
- Pioneer 10- 1983, First man-made object to leave our solar system, explore outer planets
- Pioneer 11 – explored outer planets
- Voyager 1- explored outer planets
- Voyager 2 – explored outer planets
- Magellan – orbit around Venus
- Pathfinder-1997- Landed on Mars, released microwave-sized remote controlled rover called “Sojouner”

Our Sun …. its layers



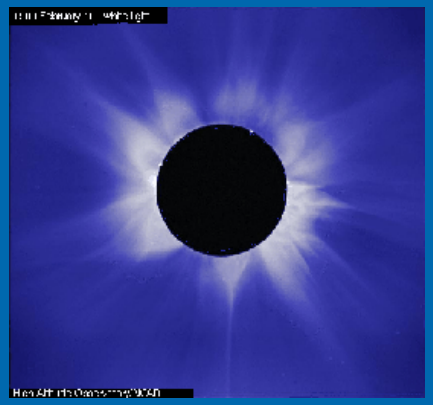
Photosphere - the surface of the sun, also known as the first atmospheric layer. It is what we see when we look at the sun

Core: over half of entire mass of sun is found here. Fusion takes place @ > 15 million degrees C. Hydrogen atoms fuse into Helium

Radiation Zone- energy transferred from core out of the interior of the sun, reaches temperatures of 100,000 degrees C

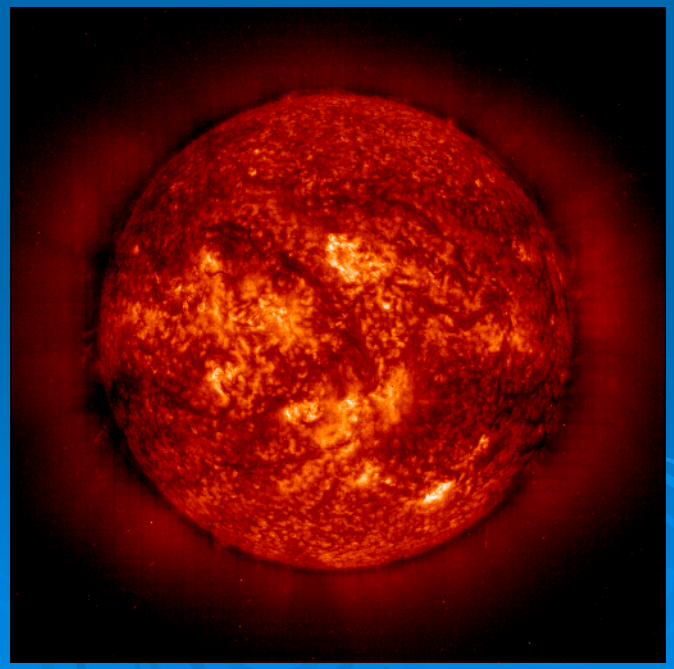
Convection Zone - Currents boil as the energy from the interior is transferred to the surface of the sun, temps drop to 6,000 degrees C

The Chromosphere & Corona

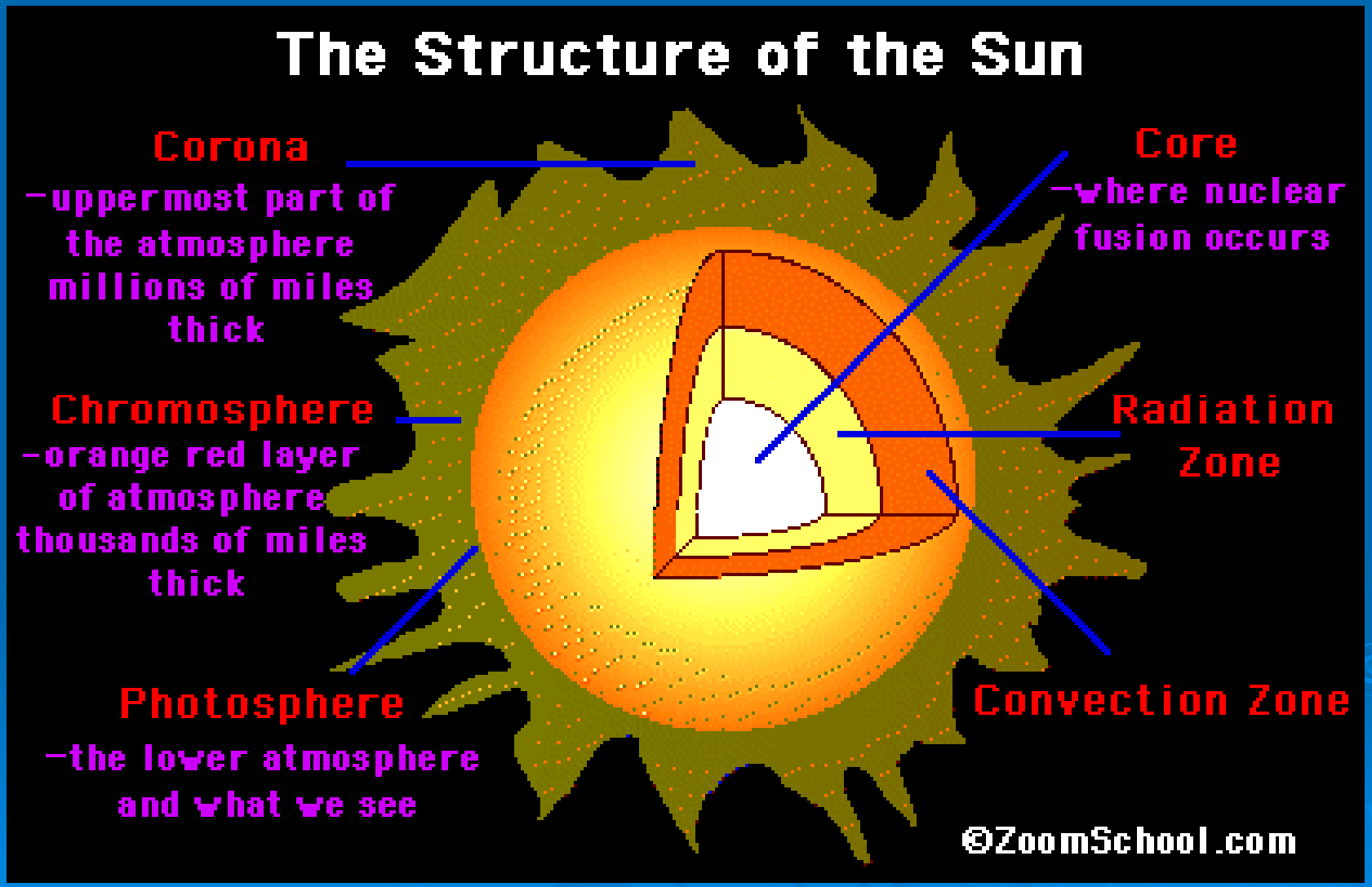


Corona – the “white halo” is the outer layer of the sun’s atmosphere, seen during total eclipses or w/ special filters on telescopes.

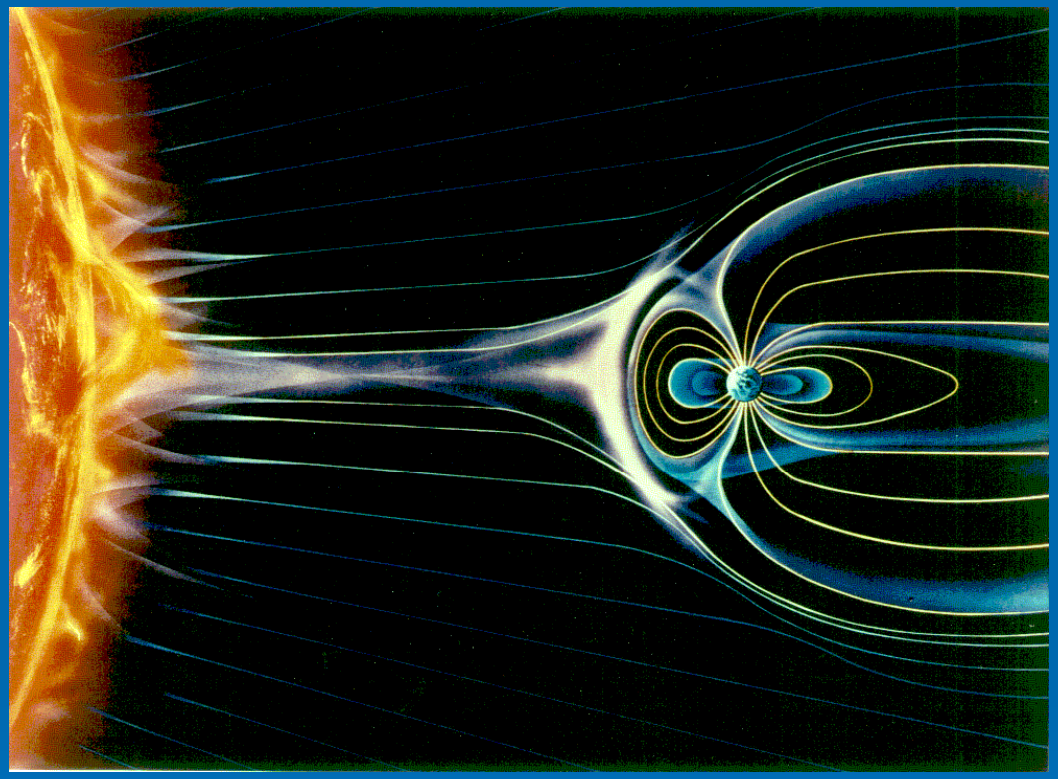
Chromosphere - the middle layer of the sun atmosphere, seen as a reddish glow at the beginning and end of a solar eclipse

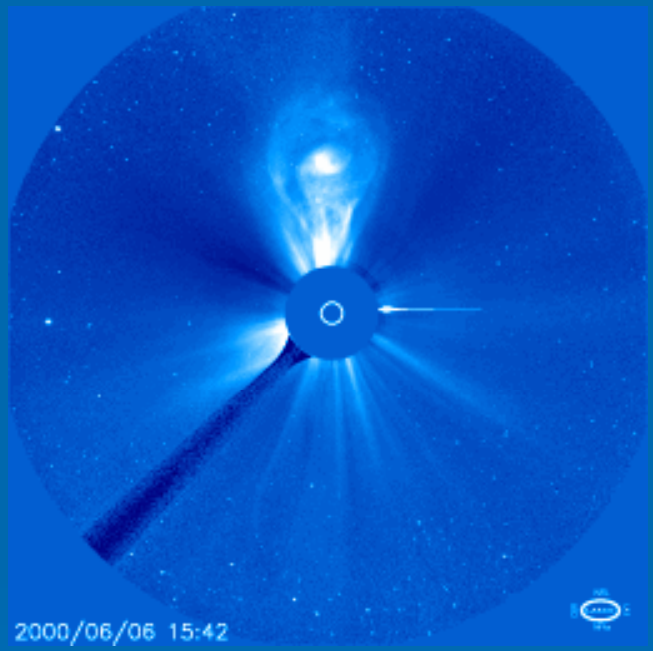


Structure of the Sun



Solar Wind



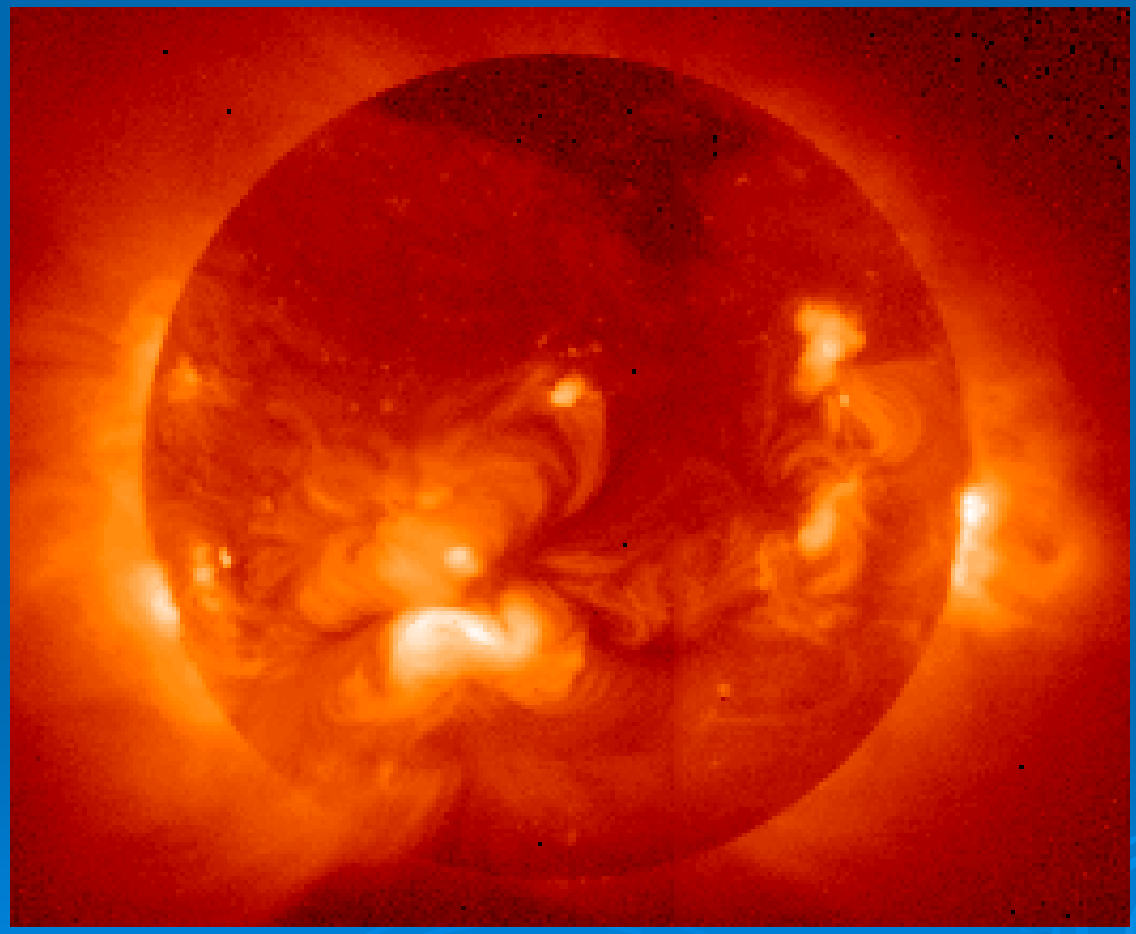


Solar Wind -The **solar wind** is a stream of charged particles—a plasma—that are ejected from the upper atmosphere of the sun It consists mostly of electrons and protons

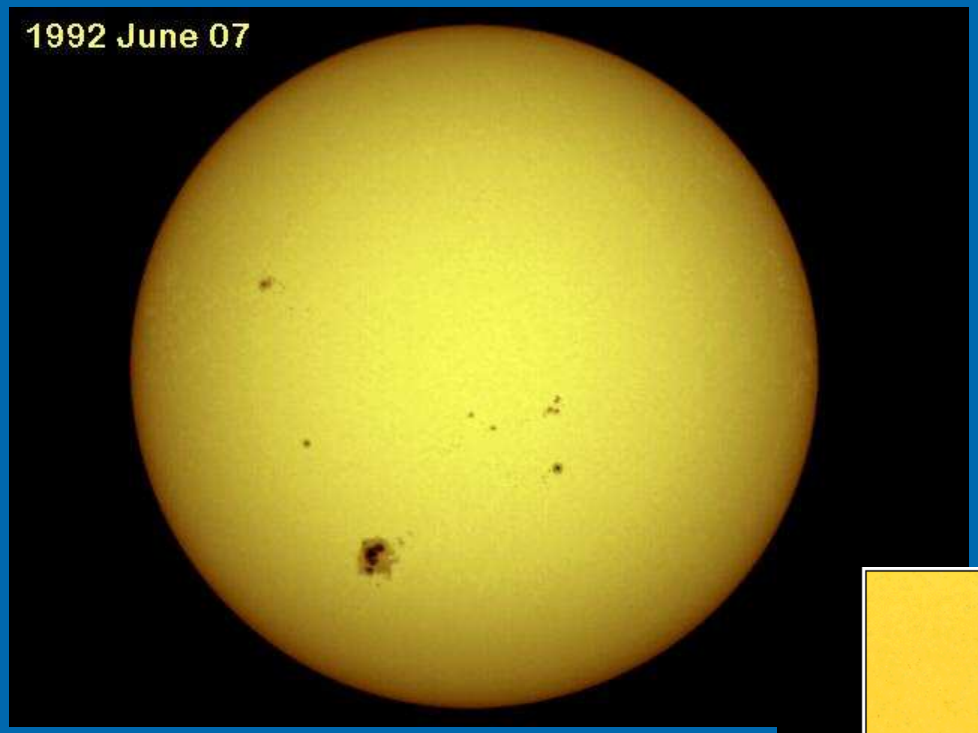
Aurora borealis…
…. The Northern Lights

Aurora australis…
…. The Southern Lights

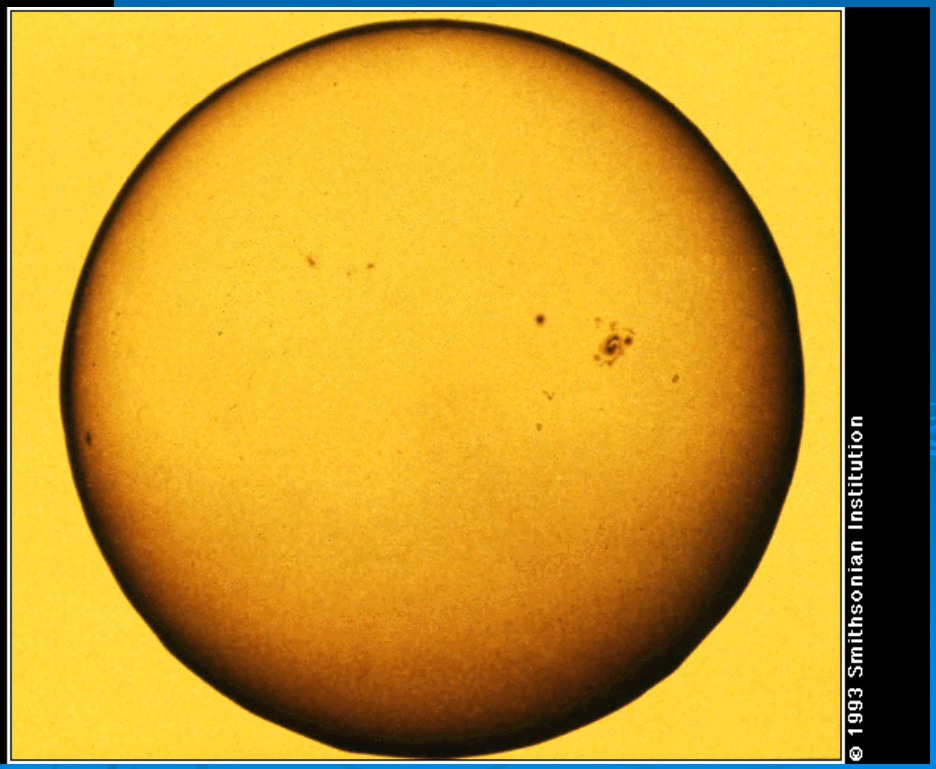
Dynamic surface of the Sun



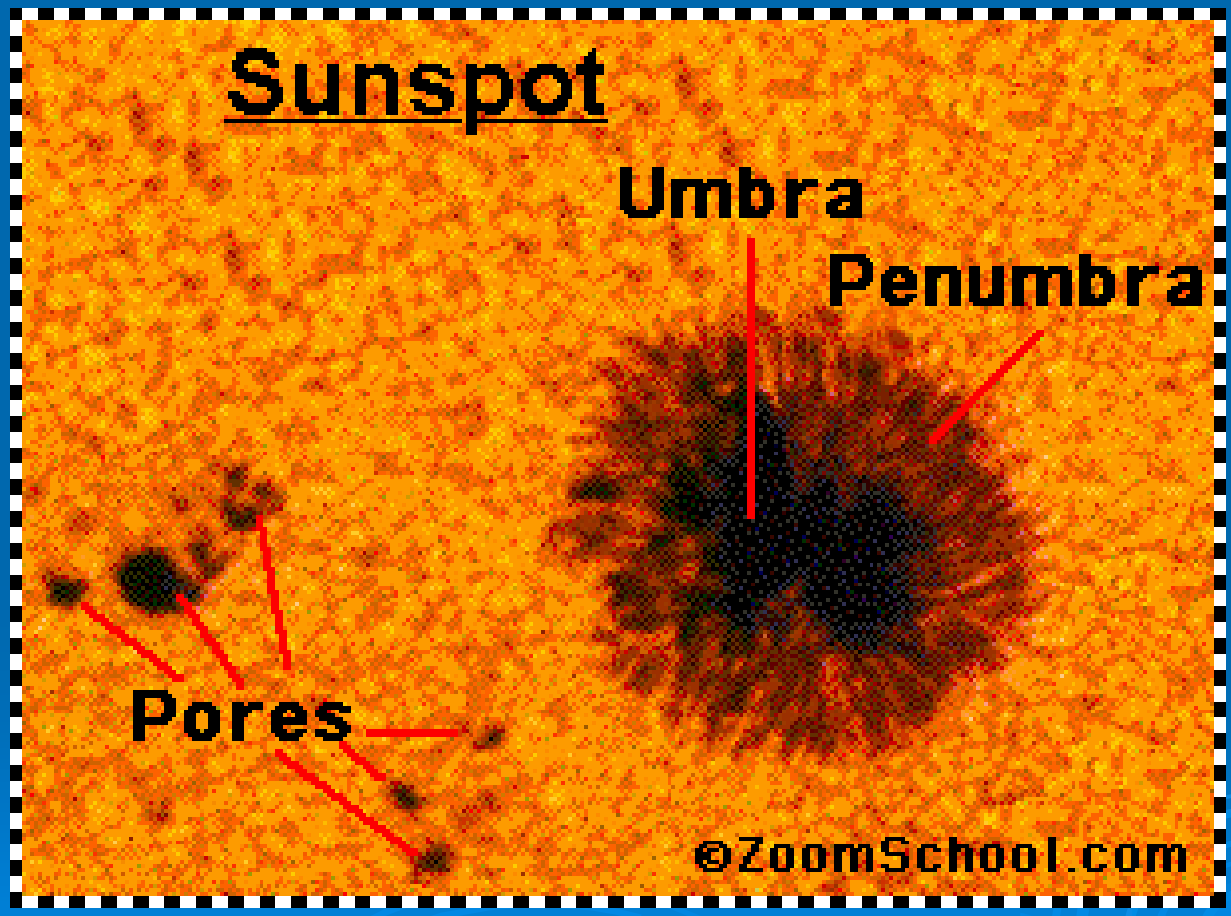
The Photosphere and Sunspots



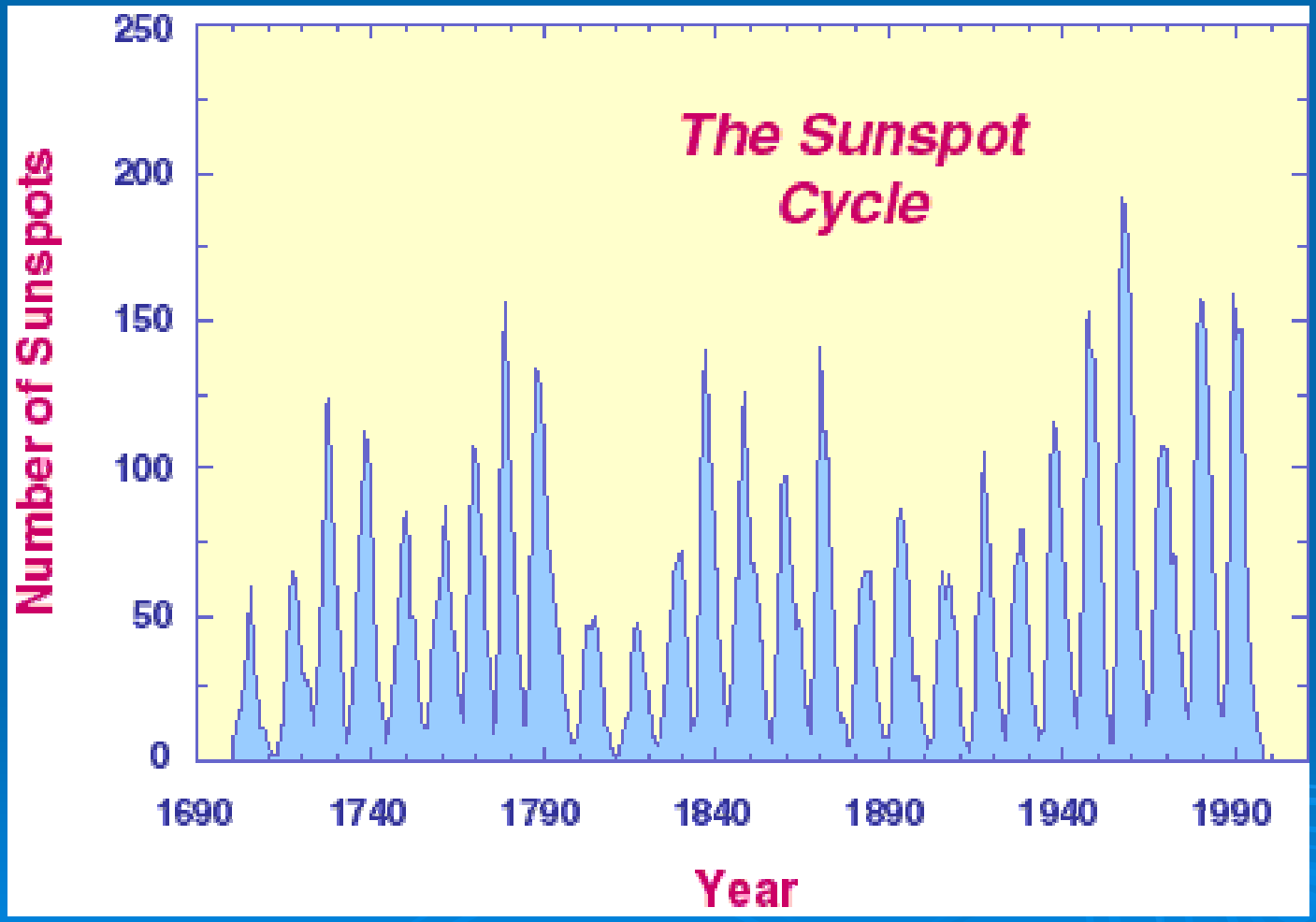
Sunspots - A **sunspot** is a region on the Sun's surface (photosphere) that is marked by a lower temperature than its surroundings and has intense magnetic activity.



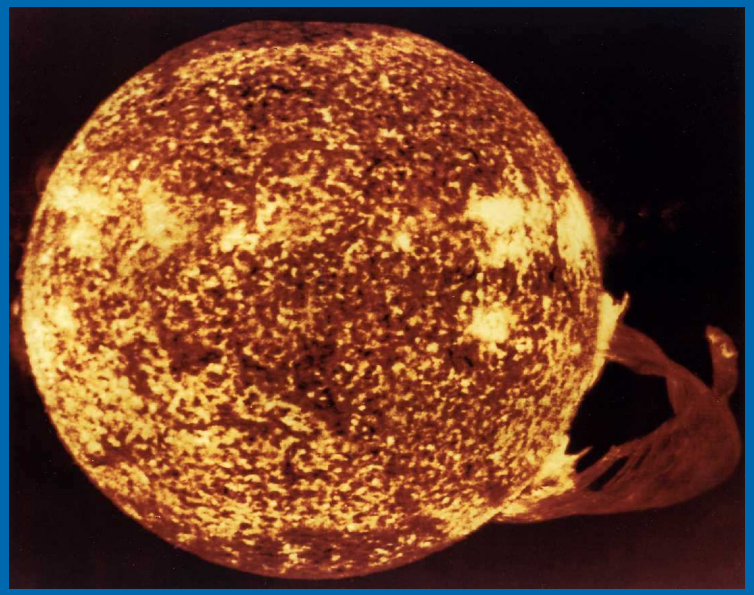
Sunspots…
Umbra and Penumbra

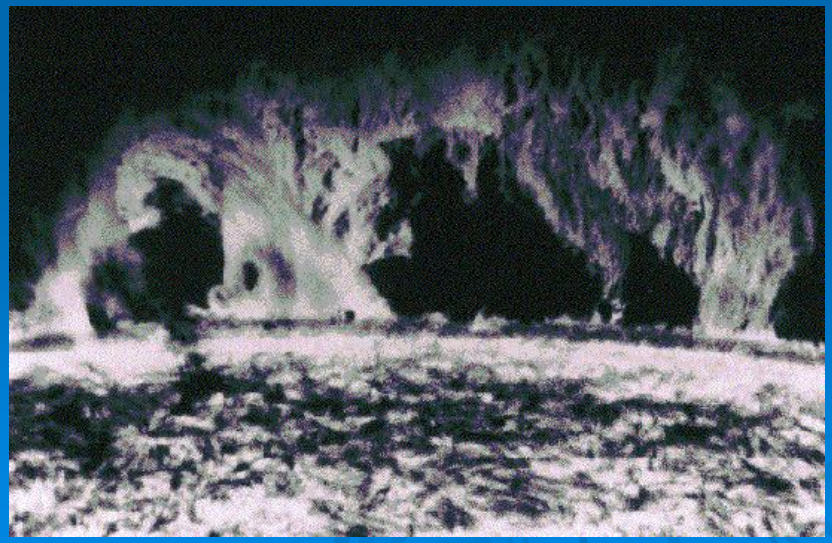


Sunspot Cycle (about 11 year cycle)



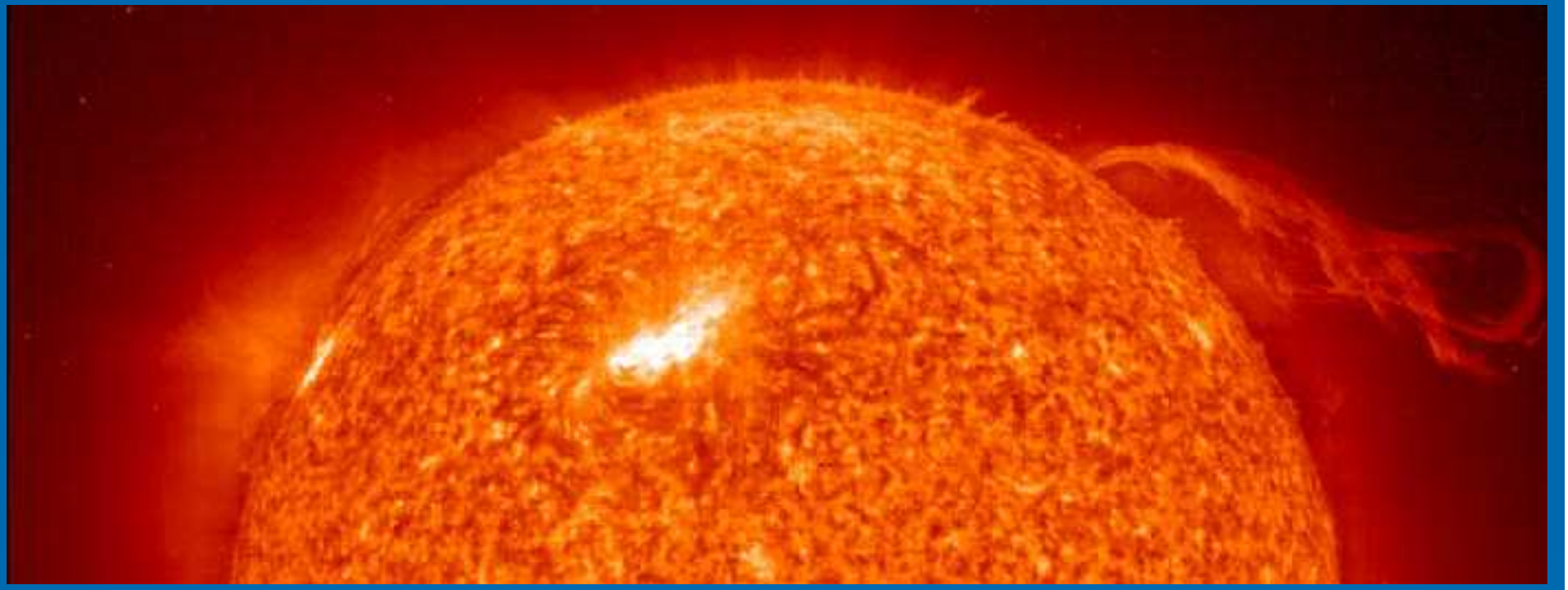
Features… Solar Prominence





Solar Prominence - a massive loop of plasma lifting off the surface of the sun. Prominences can loop hundreds of thousands of miles into space. Prominences are held above the Sun's surface by strong magnetic fields and can last for many months.

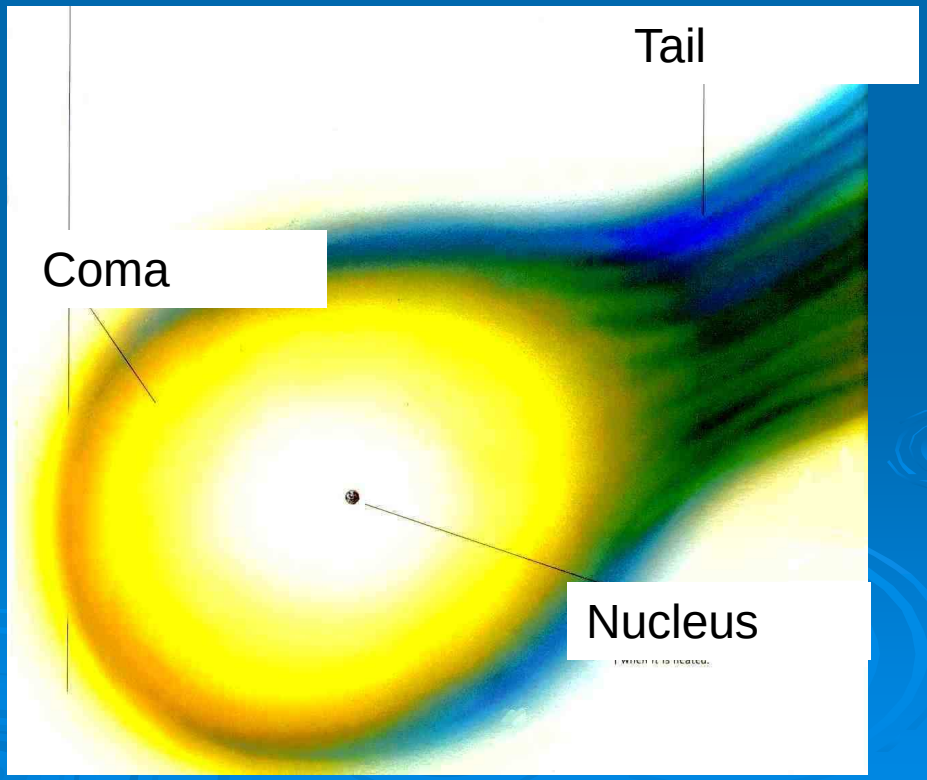
Solar Flare



Solar Flare - A solar flare is a magnetic storm on the Sun which appears to be a very bright spot and a gaseous surface eruption. Solar flares release huge amounts of high-energy particles and gases and are tremendously hot (from 3.6 million to 24 million ℉). They are ejected thousands of miles from the surface of the Sun.

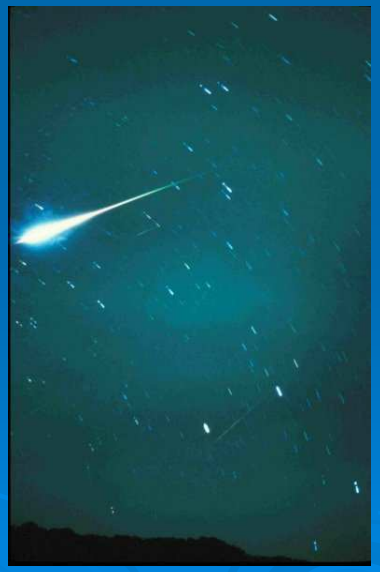
Comets

- Chunks of ice and dust that orbit the sun in extremely long narrow orbits
- Parts include Nucleus, Coma and the tail



Meteoroid, Meteor, Meteorite

- **Meteoroid**: rock/ice in space, usually from comets or asteroids
- **Meteor**: rock/ice that enters Earth's atmosphere, producing "shooting stars"
- **Meteorite**: rock that makes it through the atmosphere and lands onto the Earth's surface.



That’s All Folks !!

TTFN !!