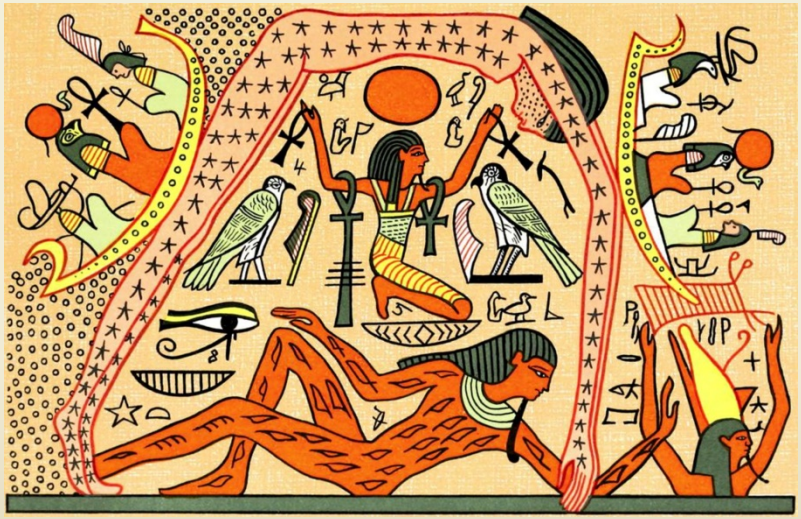
Ancient astronomy

- Astronomy was in an advance state in the Babylonian and Egyptian civilization. They identified celestial objects with gods and spirits, with various powers and purposes attributed to them.



Universe according to Ancient Egyptians (from the Greenfield Papyrus, ca. 1025 BC)

- The ancient astronomers used astronomy to track time and cycles, for agricultural purposes, as well as adding astrology to their sophisticated observations.

Greek astronomy

Scuola di Atene
di
Raffaello Sanzio

- The Ancient Greek philosophers refined astronomy, dragging it from being an observational science, with an element of prediction, into a full-blown theoretical science.
- They attempted to build a model of the universe that could account for the observations. They considered many different solutions for the various astronomical problems they came across.

Key figures and achievements in Greek astronomy

Thales (c624-546BC)

Introduced idea of rational (physical) reasoning to explain the nature instead of supernatural forces

Anaximander (c 610-546BC)

Suggested that the earth floats in space, the idea of the celestial sphere.

Pythagoras (560-480BC)

Suggested that the Earth was spherical

Aristarchus (310-230BC)

Measured sizes and distances to moon and Sun
First one to suggest that the Earth goes around the Sun.

Eratosthenes (276-196BC)

Measured the size of the Earth

Apollonius (240-190BC)

Introduced epicycles to explain retrograde motion

Ptolemy (100-170AD)

Refined the geocentric model of the universe that lasted 1400 years.
Wrote *Almagest.*

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Plato (428-348BC)

Suggested that the heavens were perfect so heavenly bodies must be spherical in shape and move in perfect circles.

Eudoxus (400-348BC)

Introduced nested spheres to explain retrograde motion of planets

Aristotle (384-322BC)

Gave observational evidence for spherical earth.
Refined the geocentric universe and justified it with his view of the nature of matter and motion

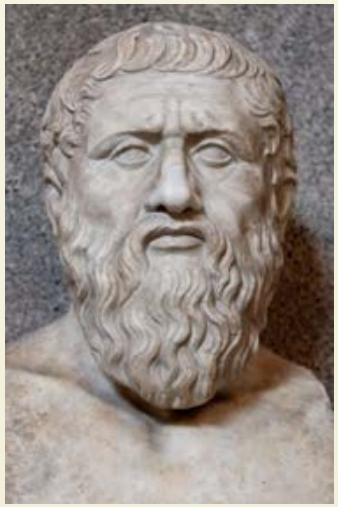
Hipparchus(190-120BC)

Discovered precession
Introduced the magnitude system for star brightness
Measured the parallax of Moon
Improved epicycle model

Plato

Ancient Greek writer, philosopher

(427 – 347 BCE)



- Plato was the founder of the school ‘Academy’ in Athens.
- According to him Universe (sky) was constructed with geometric simplicity and perfection.

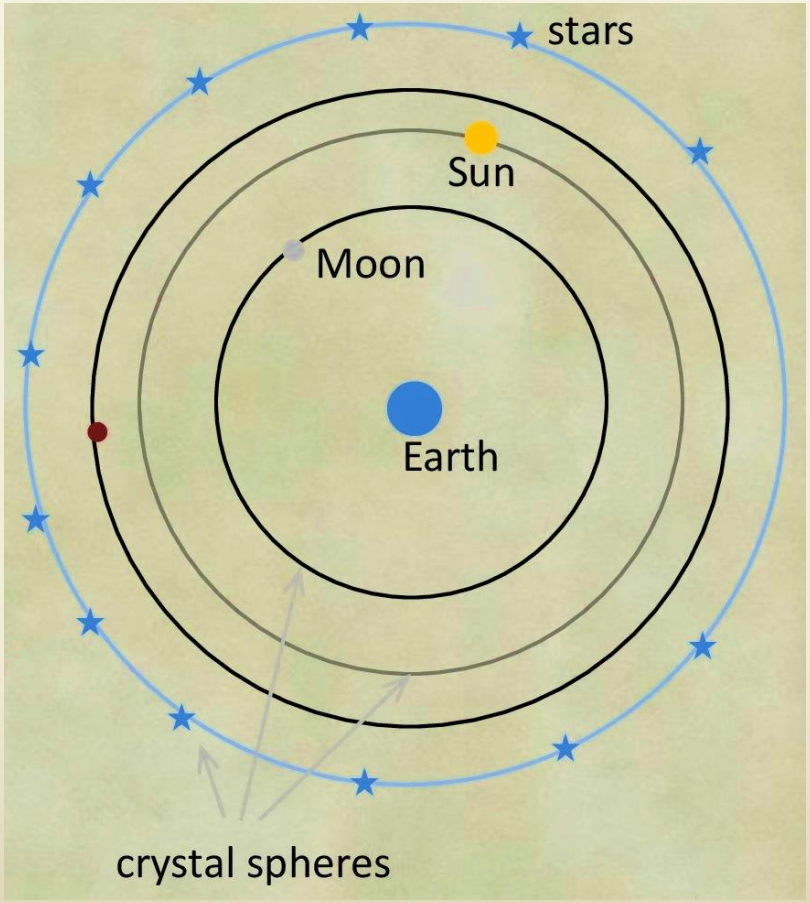
–The Earth and all celestial objects had to be spherical

–They moved in circular orbits at uniform speeds

•Influence of those ideas lasted over two millennia

Plato believed that

- Spherical Earth was at the center (Geocentric model).
- Celestial objects were located on nested, concentric crystal spheres that were rotating around the Earth at different rates.



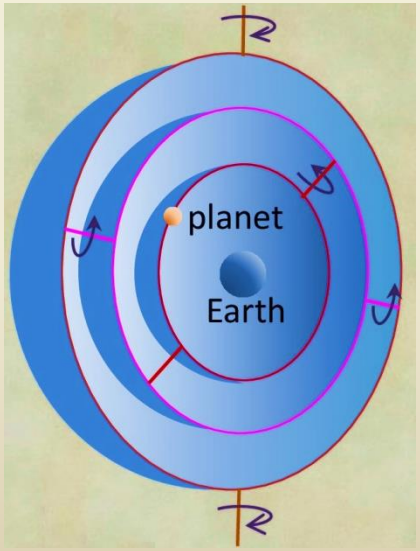
Obviously this did not explain the complicated retrograde motions of planets. Plato left it as an exercise for his students to solve.

Eudoxus of Cnidus

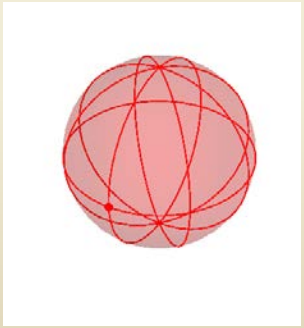
Ancient Greek astronomer, scholar, mathematician, and student of Plato

(408 – 355 BCE)

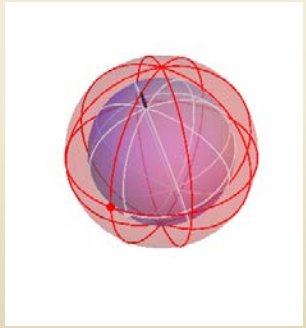
- He was the first person to devise a model that could explain the retrograde motion of the planets in the sky.
- According to Eudoxus, each planet was located on a crystal sphere, but that sphere was not directly spinning about the Earth.



- He used concentric spheres in such a way that a planet attached to one of the spheres could be made to travel around the common center, making periodic retrograde motions. This is often called the ***"homocentric" model*** of planetary motion.
- Eudoxus model with a total of 27 spheres predicted the observable positions of the planets to the observational accuracy of the time.

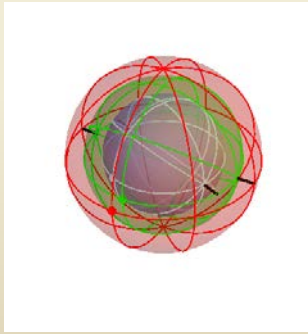


Star 1 sphere



Sun and Moon
3 spheres

Planet 4 spheres



retrograde motion

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