

# Classical Astronomy

## The Mediterranean Cultures & The Middle Millennium

**Geography:** Mediterranean = “Middle Earth”

**Sociology & Politics:** Tribes & City-States

**Time:** c. 600 BCE to c. 400 CE

Bronze/Iron Age and the Trojan War: ~ 700 BCE

European Dark Ages: ~ 415 CE to ~1400 CE

**Philosophy:** A “Rational” Universe

**Tools:** Observations, Measurement, Mathematics

Logic & Symbolic Logic: Arithmetic, Geometry, Trigonometry

**Physics:** The Classical Elements & Light

# Classical Astronomy: Some Pioneers

**Pythagoras** (582-507 BCE): The Pythagorean Theorem  
The Sphericity of Bodies  
 $a^2 + b^2 = c^2$   
Moonlight & Reflection - The Phases  
Crystalline Spheres

**Philolaus** (c.480-c.405 BCE): A Moving Earth?

**Anaxagoras** (499-428 BCE): Lunar Phases & Eclipses  
Other Earths? Other Civilizations?

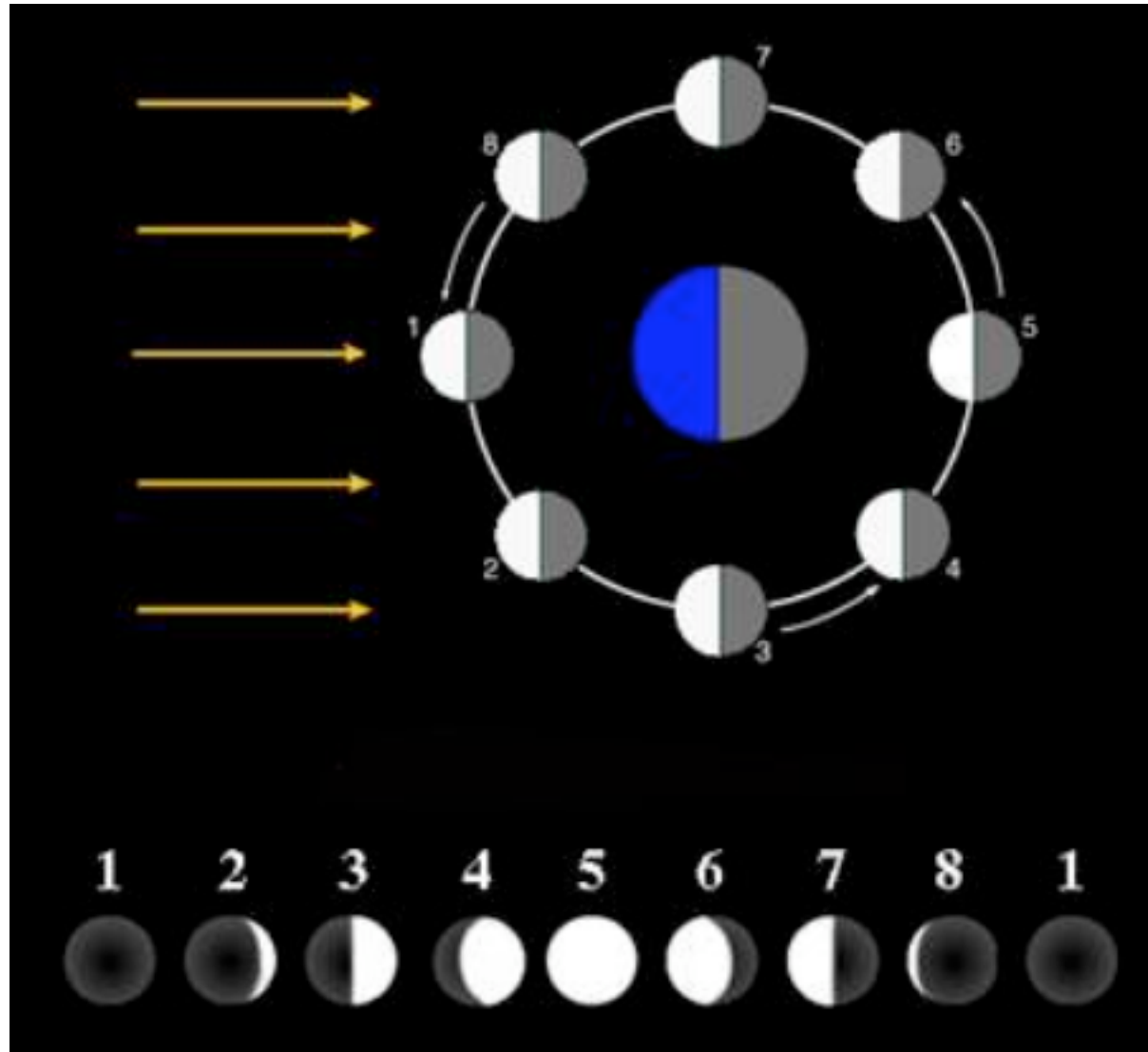
**Democritus** (c.460 BCE- ? ): The Milky Way as Stars  
Atomism

**Euclid** (c.330-c.275 BCE): Geometry & Number Theory  
Textbook: "The Elements"

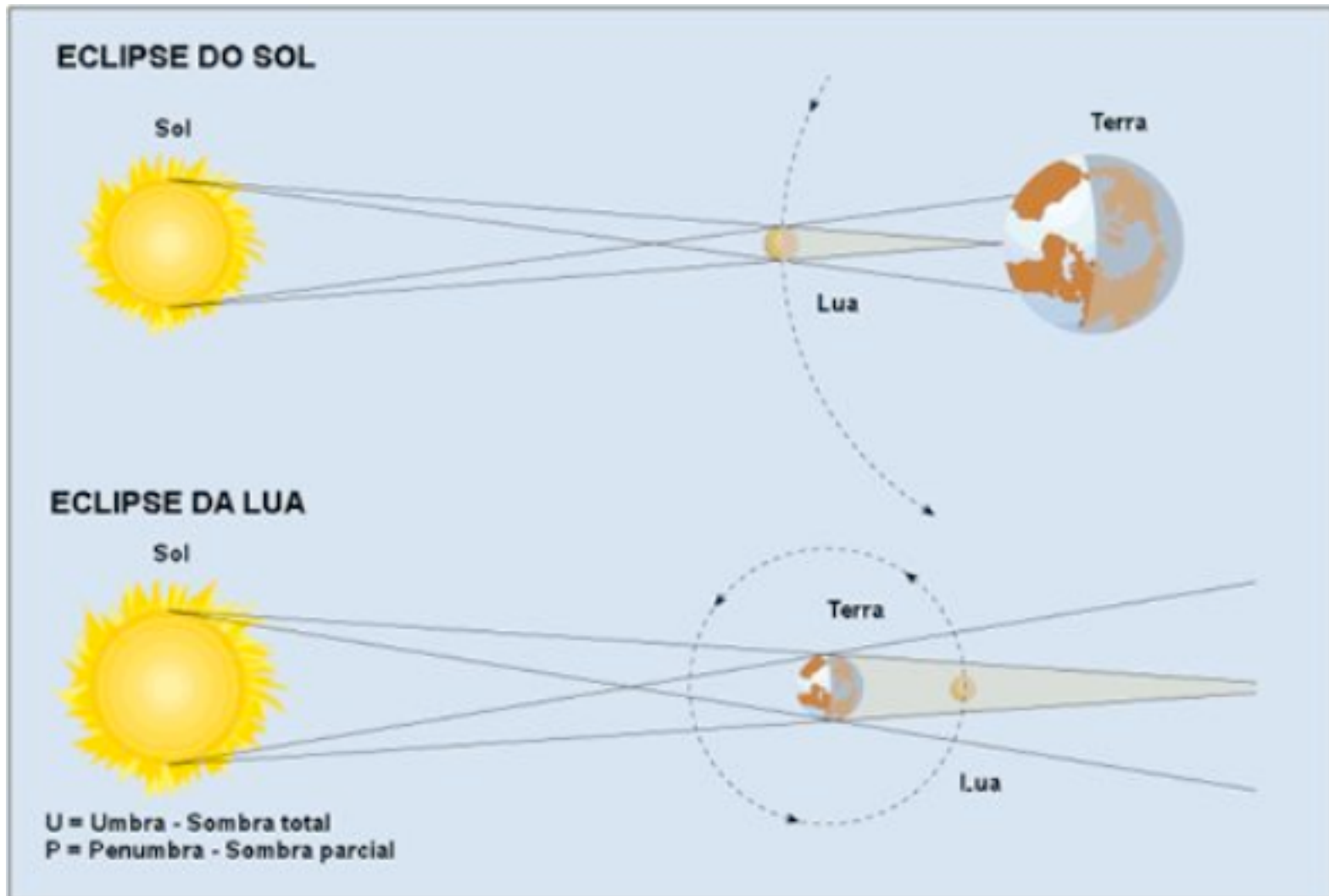
## **Aristotle (384-322 BCE): Aristotelian Physics and Philosophy**

- **Angular Sizes of the Sun and Moon. Proximity of the Moon**
  - Constancy of Distances & Near-Circular Motions
  - Solar Eclipses
- **Lunar Phases; Lunar & Solar Eclipses**
  - Light and Shadow  
*cf.* Pythagoras and Anaxagoras
- **The Sphericity of the Earth**
  - Visibility & Elevation, The Sky & Latitude, ...
  - Lunar Eclipses (Time & Longitude; The Earth's Shadow)
- **The Immobility of the Earth (WHOOOPS!)**
  - Arguments from “Aristotelian” Physics: Falling Objects
  - The absence of a Stellar Parallax

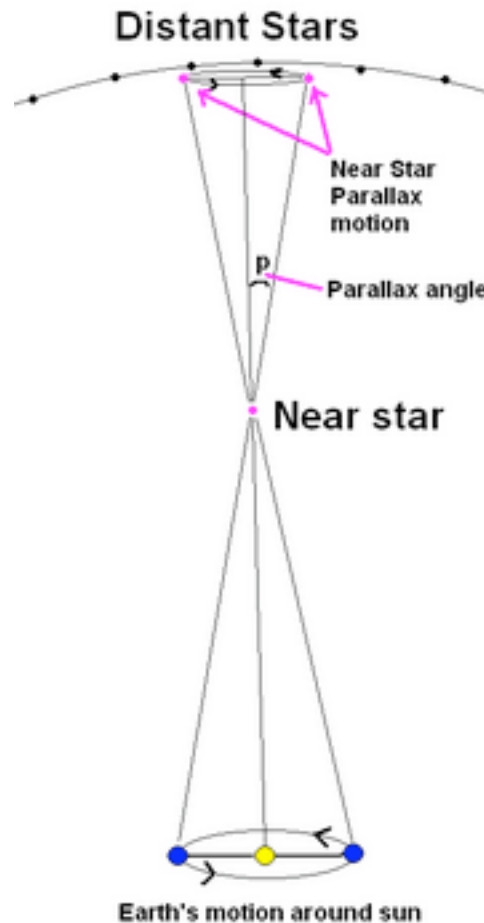
# Phases of the Moon



# Lunar and Solar Eclipses



## The Problem of the Stellar Parallax (300 BCE to 1836!)



***Note that the parallax angle,  $p$ , is inversely proportional to the distance! Large distances imply small angles.***

***Aside: The Aristotelian Influence from 350 BCE to 2008 CE.***

# The Aristotelian Universe

(c. 300 BCE)

- **Geocentric & Geostatic** (Note that the Scale is Unknown)
- **Geostatic:** All Motions are “Westward” and “Diurnal” ( $P \sim 1$  day)

