The Two Sphere Universe:
Inner sphere: Earth is stationary in the center
Outer sphere fixed stars rotates around the Earth once a day

Planets “wander” in between these two spheres.
GEOCENTRIC, TRADITIONAL UNIVERSE:
Ptolemaic view of the universe: geocentric, circular orbits
Dante’s Universe

Hell is in the center of the Earth

Purgatory is a mountain in the Atlantic
EPICYCLES: needed to explain observation of planets’ motion
Looping orbits of planets as they turn on epicycles
Nicholas Copernicus

On the Revolutions of the Heavenly Spheres

1543

Copernicus died the year his book was published and was never charged with heresy. Text was very mathematical not easy to understand.
Copernican system
COPERNICUS: HELIOCENTRIC UNIVERSE
Opposition to heliocentrism:
1) common sense (sun rises, sun sets)

2) Scripture:
   condemned by Protestants & Catholics alike
   (Old Testament:
    Joshua makes the sun stands still)

3) classical authority of Ptolemy, ancient Greek
   astronomy

4) threatens entire Christian cosmology
   (world view), sense of order
TYCHO BRAHE’S COMPROMISE MODEL

earth central, moon and sun revolve around the Earth but all the other planets revolve around sun
Tycho Brahe's compromise system
Galileo Galilei (1564-1642) portrait by Justus Sustermans
Galileo, *Sidereus Nuncius*, 1610
(The Starry Messenger)
Latin treatise announcing his discoveries with telescope
DIALOGO
DI
GALILEO GALILEI LINCEO
MATEMATICO SOPRAORDINARIO
DELLO STUDIO DI PISA.
E Filosofo, e Matematico primario del
SERENISSIMO
GR. DVCA DI TOSCANA.
Doune ne i congressi di quattro giornate si discorre
sopra i due
MASSIMI SISTEMI DEL MONDO
TOLEMAICO, E COPERNICANO;
Proponendo indeterminatamente le ragioni Filosofiche, e Naturali
tanto per l'una, quanto per l'altra parte.
CON PRI
VILEGI.
IN FIORENA, Per Gio: Batista Landini MDCXXXII.
CON LICENZA DEI SUPERIORI.

Galileo Dialogue on the Two Chief World Systems  1632
Galileo Galilei (1584-1642)
astronomy: popularizer of Copernican system
invention of telescope: qualitatively new data:
    sees new stars, moons of Jupiter

1632 Dialogue on Two Chief World Systems:
    attack on Ptolemy & Aristotle;
defender of Ptolemaic system is named “Simplicius”
    public, vernacular defense of heliocentrism
    charged with Copernican heresy

1633 trial by Roman Inquisition,
    required to recant his errors publicly, denying heliocentrism
    and the movement of the Earth
    says sotto voce, "Eppure si muove" ("But it does move");
    house arrest in Florence
1633 Galileo’s Trial before the Roman Inquisition on charges of Copernicanism

Painting by Joseph-Nicolas Robert-Fleury. *Galileo before the Holy Office, 1847*