

Where did We Come From?

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Pre-modern Cosmology

Define 'modern'

Mesopotamian cosmological thought

↳ 16th century BCE

7th Century BCE Greece ⇒ Homer & Hesiod still describing flat disc

6th Century ⇒ shift in thought

↳ round Earth speculation

↳ Pythagoras & Parmenides

2nd/3rd century BCE ⇒ Greeks interested in round Earth model

↳ measurement efforts

↳ Eratosthenes of Cyrene ⇒ Geocentric Model

Planets

Heliocentric Model

- 'Central fire', 6th century BCE, Philolaus & Hicetus

- Sun as star ⇒ first proposed by Anaxagoras ~450 BCE

↳ 3rd century BCE Aristarchus of Samos

↳ earth & planets revolving around central object

Copernican Revolution 1500s

↳ No one center, earth is center only for moon, center of universe near Sun, most distant stars are very far & stationary

Tycho Brahe

observational flaws in Ptolemaic model

Kepler

laws of planetary motion

Newton

Principia in 1687 ⇒ theory of gravity ⇒ end of geocentricity ⇒ Helio centricity

Early History of the telescope

- first telescope, Netherlands 1608
 - rapid improvements by Galileo \Rightarrow 3x, 4x, 23x magnification
 - by 1700s huge telescopes being built
- Jupiter's Moons
sunspots
Venus phases
moon craters

The expanding Universe

- Relativity
 - Cepheid variables
 - Hubble's distance measurements
- } Building blocks \Rightarrow Lemaitre 1927
Hubble 1929

Steady State vs Big Bang Universe

Big Bang \rightarrow origin @ $t=0$
Steady state \rightarrow constant density

CMB \Rightarrow observational evidence for Big Bang

\rightarrow Alpher & Herman (1948)
Zel'dovitch & Dicke (1960s)

\rightarrow Penzias & Wilson (1964)

Inflation

3 paradoxes: horizon, monopole, flatness

\rightarrow Guth, late 70s - early 80s

Observational efforts \Rightarrow B-modes

Accelerating Universe (1990s)

Type Ia supernovae \Rightarrow standard candle
 \rightarrow redshift \Rightarrow speed