

Apparent to Actual Motions

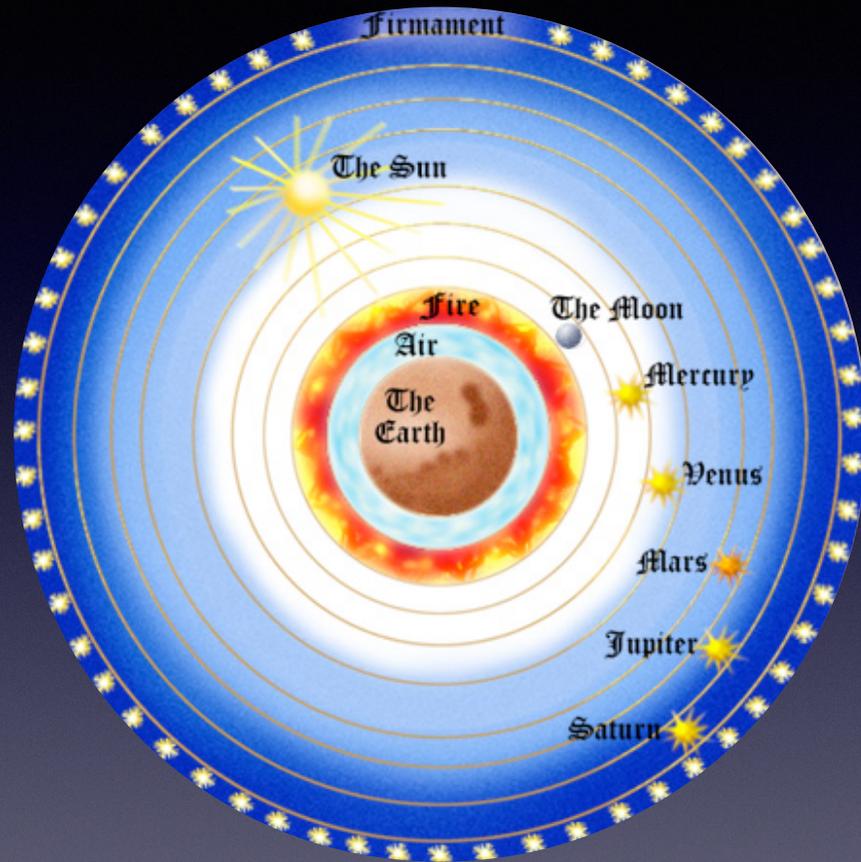
How do celestial objects appear to move across the sky
and how do they actually move across the sky?



Early Astronomy

Apparent Motions

- Geocentric Universe - idea that Earth was at the center of the solar system
 - Also called the Ptolemaic System
 - Stars all rotate around the Earth on a single large sphere at $15^\circ/\text{hour}$
 - Planets travel on smaller spheres around their own larger sphere in epicycles



Geocentric Universe

Apparent Motions

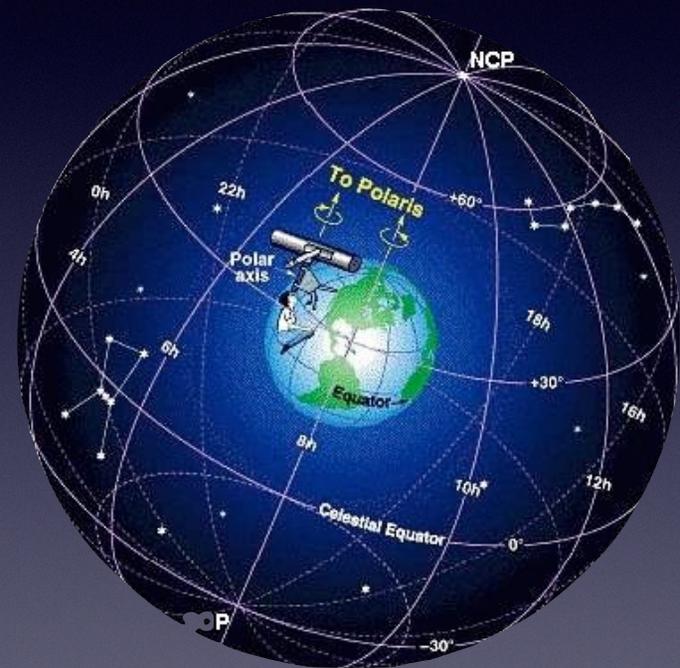
- Problems with the Geocentric Model:
 - Locations of the planets could not accurately be predicted
 - Changes in the apparent diameter of the Moon and Sun could not be explained

Apparent Motions

- Apparent Motion - the way in which celestial objects appear to move across the sky

Apparent Motions

- Celestial Sphere - the visible portion of the sky that celestial objects appear to travel on
- Celestial Object - any of the natural objects that can be seen in the sky



Apparent Motions

- Horizon - the edge of the visible portion of the celestial sphere
- Zenith - highest point on the celestial sphere which is directly over the observer

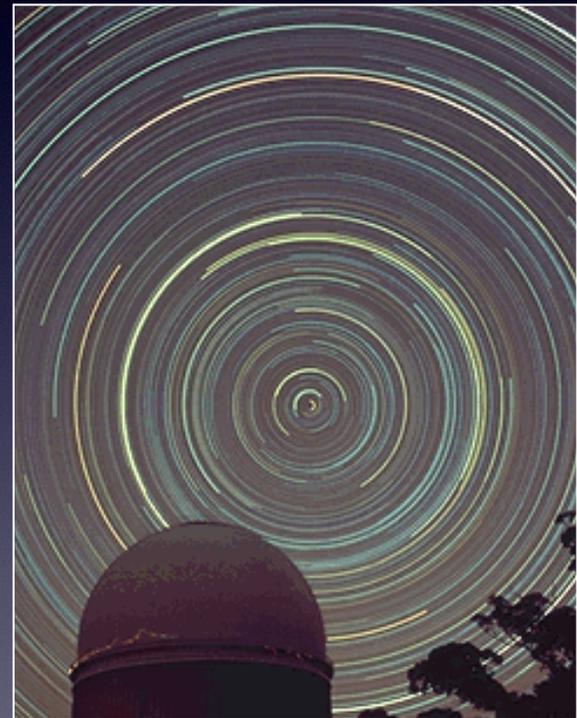


Apparent Motions

- All objects [except Polaris] appear to move across the celestial sphere from east to west at $15^\circ/\text{hour}$ or $360^\circ/24$ hours

Apparent Motions

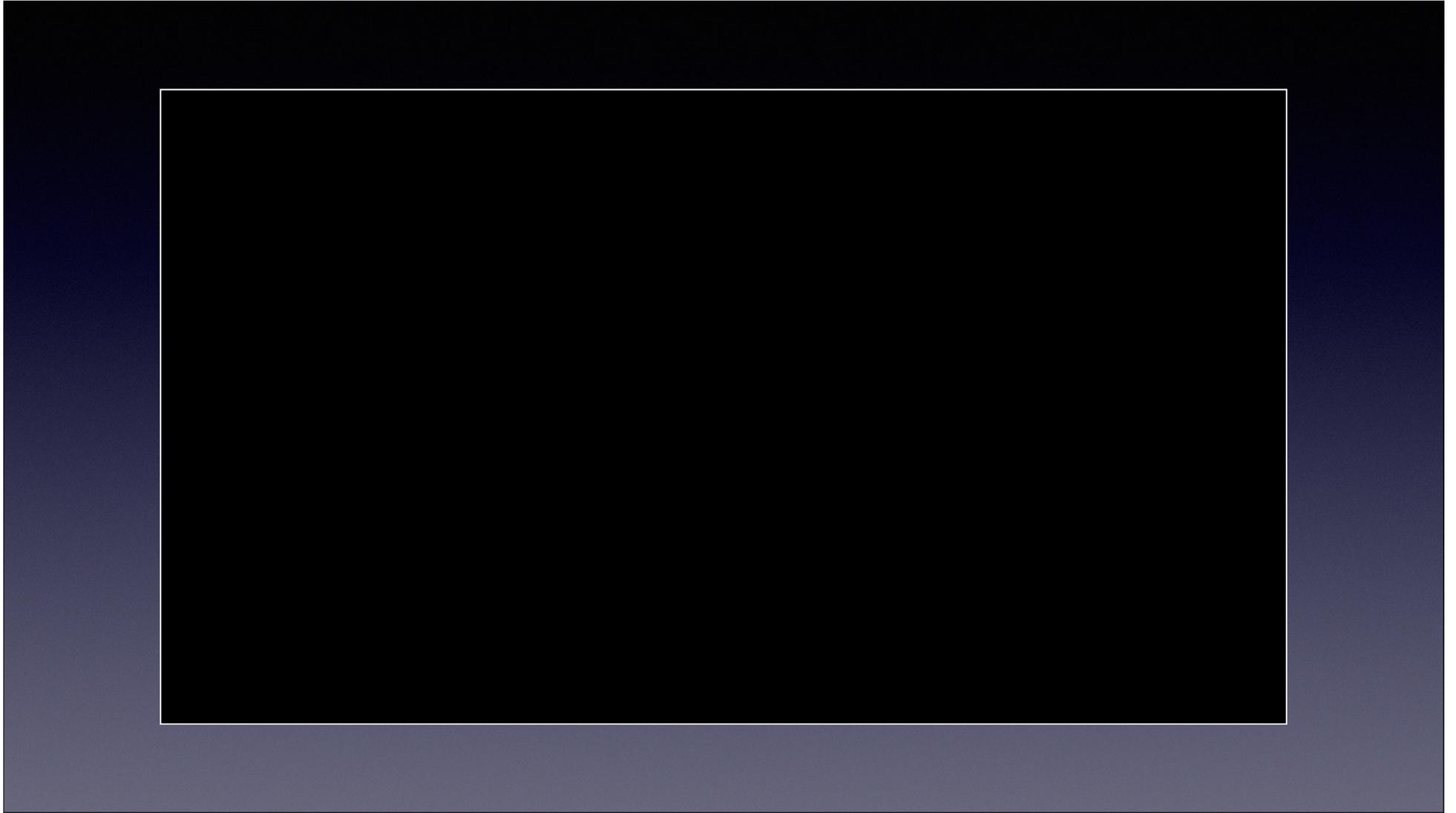
- Star Trails - long exposure photos of stars as they appear to move across the sky
- Circumpolar Stars - stars that move around a polar star
- Polar Star - star directly above the North or South Pole



Apparent Motions

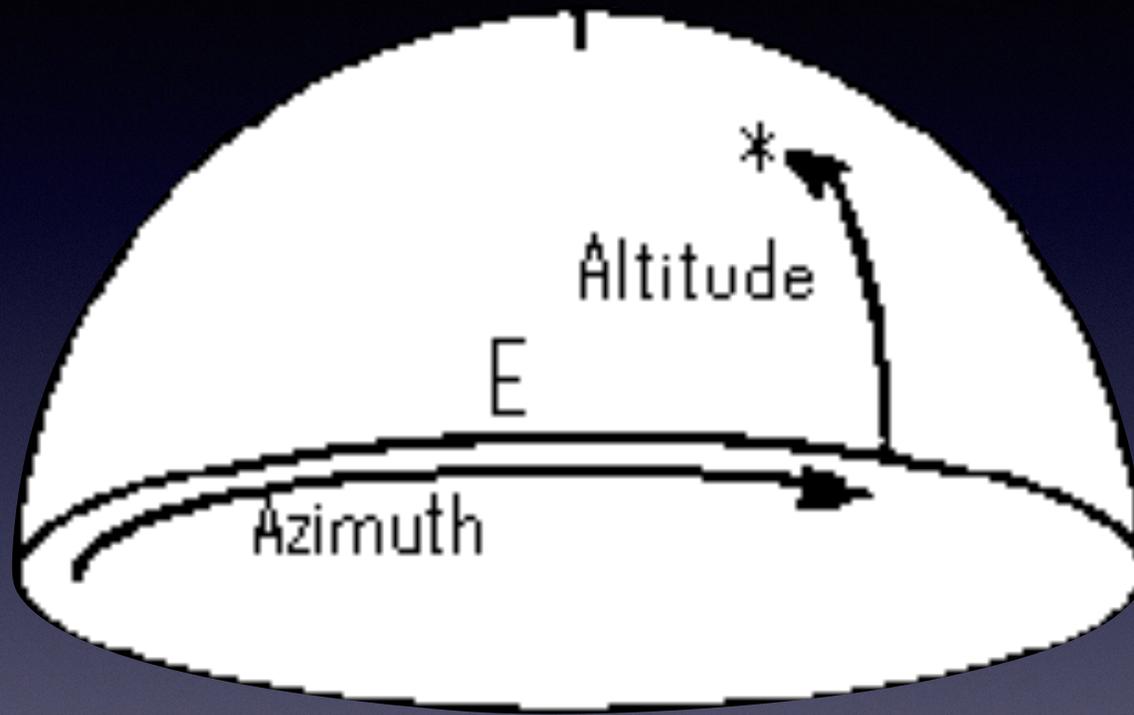






Apparent Motions

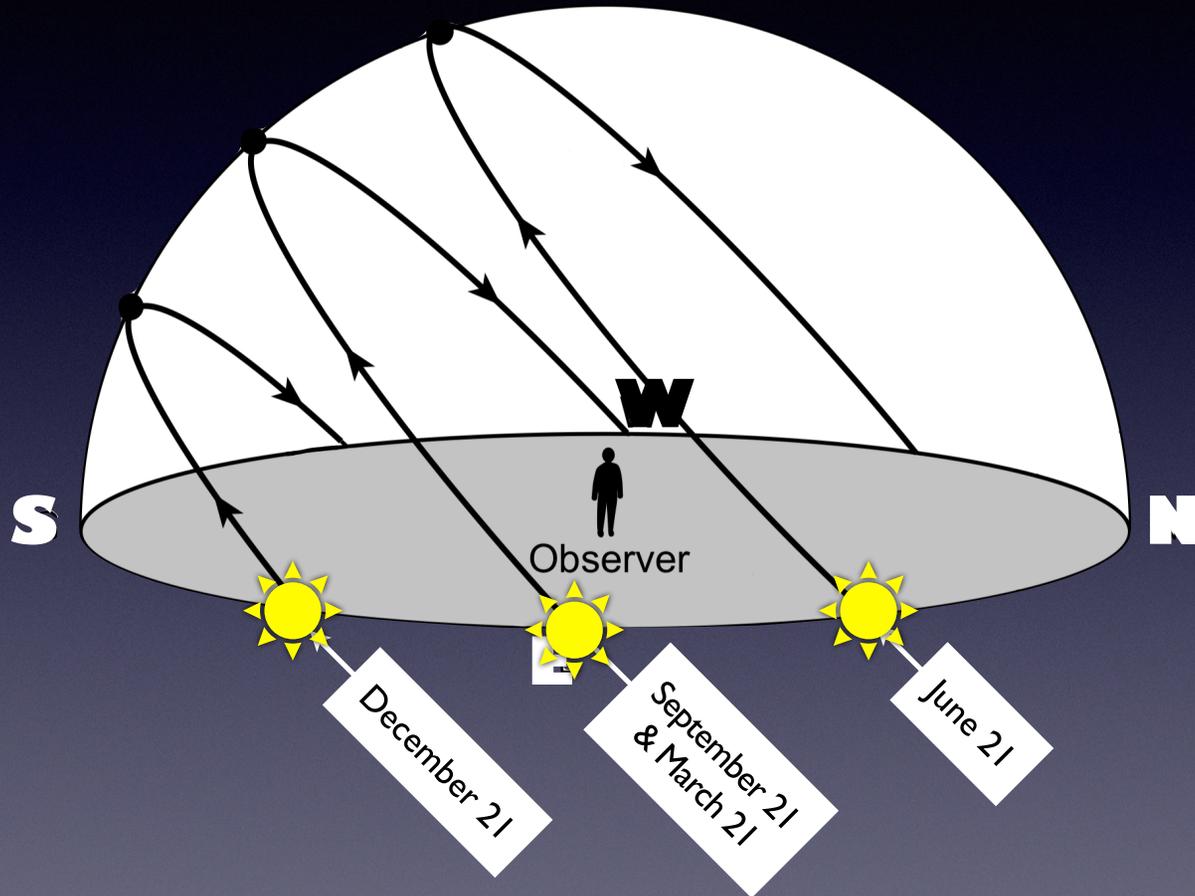
- Locating positions on the celestial sphere:
 - Altitude - angular distance above the horizon [0° to 90°]
 - Azimuth - angular distance along the horizon measured from due north [0° to 360°]



Altitude and Azimuth

Apparent Motions

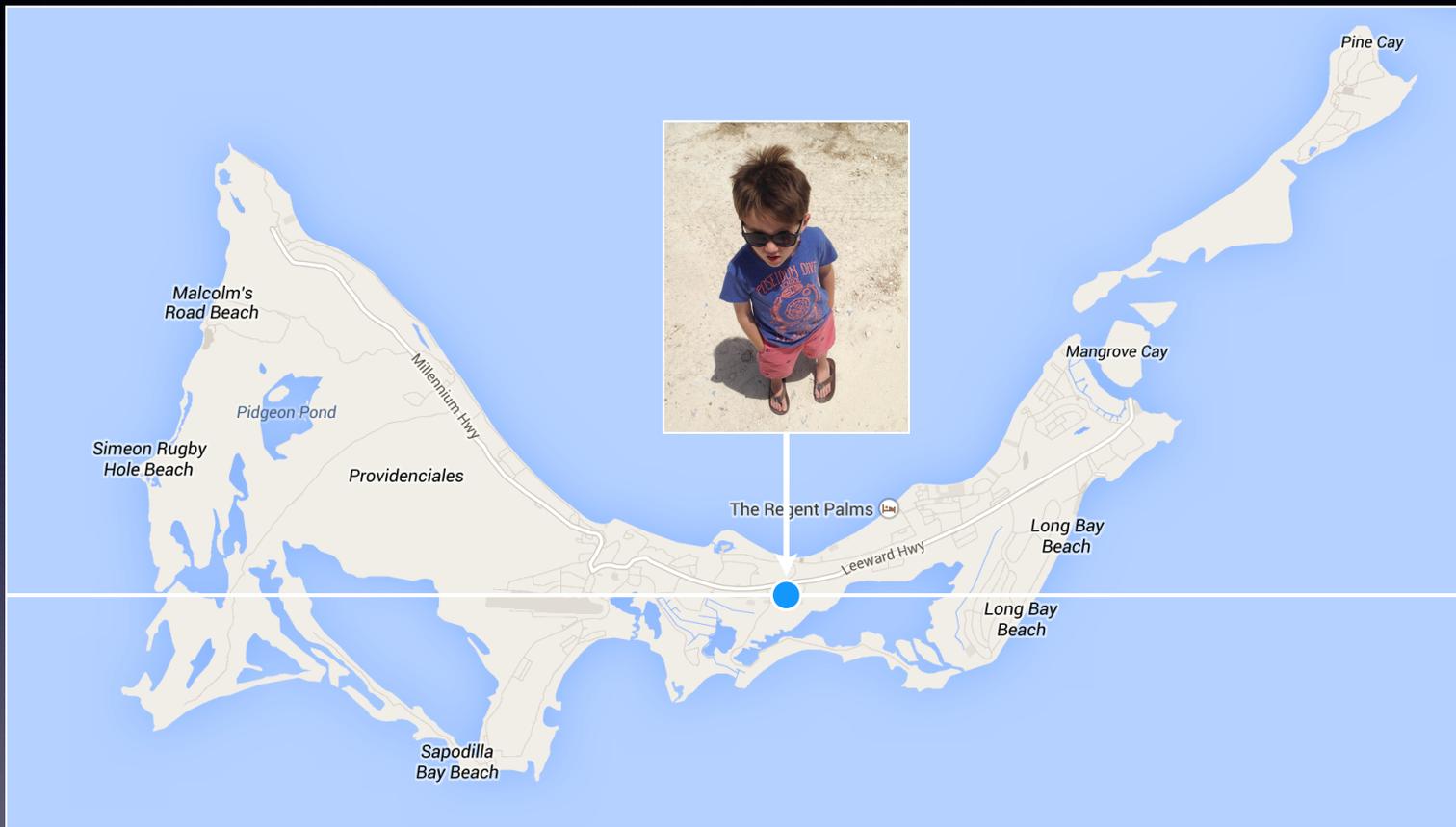
- The Sun's path changes throughout the seasons
 - The greater the Sun's path the increased amount of daylight hours an area receives
 - The shorter the Sun's path the decreased amount of daylight hours an area received



Apparent Motions

- What's Charlie's approximate latitude if this photo was taken at noon on June 21?





22° N

22° N

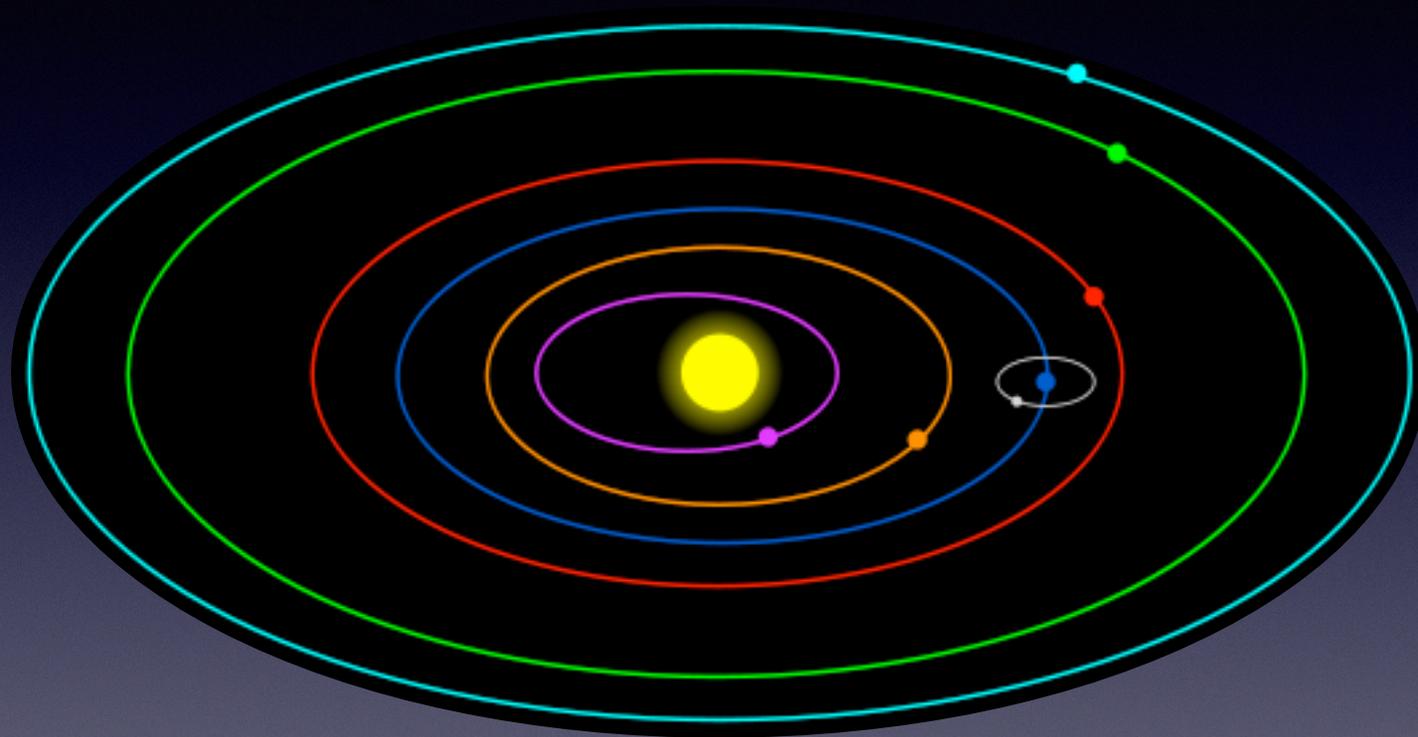


Nicolaus Copernicus
1473 - 1543

Copernicus

Actual Motions

- Heliocentric Model - current model of the solar system where the Sun is at the center
 - Also called the Copernican Model
 - Planet revolve around the Sun in circular paths



Heliocentric Model Universe