Our Place in the Universe

History of Astronomy

Mitzi Adams, M.S.
NASA/MSFC
Session 1, 28 January, 2016
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Our Place in the Universe
Session 1: History of Astronomy

We often ask ourselves
  Who am I?
  Why am I here?
  How did I get here?
Let's go back to the beginning of history.

This session includes a very broad overview of a couple of the major ideas of astronomy, along with demonstrations of Earth's motions that
-- give rise to the seasons,
-- show us the "faces" of Venus (and the Moon)
-- result in retrograde motion of the outer planets
**Hypatia:** "And in those days there appeared in Alexandria a female philosopher, a pagan named Hypatia, and she was devoted at all times to magic, astrolabes, and instruments of music..." (died: 415 CE)

**Claudius Ptolemy:** Famous for geocentric view of the universe, author of the Almagest. c. 150 CE
Major Ideas

Copernicus (1543) -- Kepler & Brahe (c. 1615): Developed heliocentric view of the universe. What happened c. 1608?
Annie Cannon, Henrietta Leavitt, Georges Lemaître, Edwin Hubble: The Big Bang view of the universe that says, the universe (space and time) began from a “singularity”. Initially, the universe was extremely hot and dense, but it has gradually cooled as it has expanded over 13.8 billion years. c. 1927 CE
Terms

Olber's Paradox -- Newton - The universe is static and infinite with a random scattering of stars.

The paradox - If the universe is infinite with a random scattering of stars, then everywhere we look we must see a star. The sky should be as bright as day!

Occam's Razor -- The most simple explanation is often the correct one.

Kepler's Laws --

Einstein

Cosmological Principle -- Universe is homogeneous - every region is the same as every other region, i.e. it doesn’t matter where we make measurements from.

Universe is isotropic - universe looks the same in every direction, i.e. no one region has significantly more matter than any other.
Terms

Opposition -- For Mars every 26 months
(1 Martian year)

Retrograde Motion
Terms

Conjunction and Opposition

- Outer Planet
- Orbit of Earth
- Inner Planet
- Maximum Eastward Elongation
- Inferior Conjunction
- Superior Conjunction
- Conjunction
- Opposition
- Maximum Westward Elongation
Coordinate Systems -- The Geocentric Universe
Coordinate Systems -- The Geocentric Universe

- **North celestial pole**
- **Polaris**
- **CASSIOPEIA**
- **LYRA**
- **Virgo**
- **GEMINI**
- **ORION**
- **SAGITTARIUS**
- **SOUTHERN CROSS**
- **Celestial sphere**
- **Apparent rotation of the celestial sphere**

**Right Ascension**

**Declination**

- **RA = 0 meridian or prime meridian**
- **Celestial equator**
- **Observer's ground plane**
- **Zenith**
- **Nadir**
- **Horizon**
- **Direction of rotation of the celestial vault**
- **To the Pole Star**
As Earth moves around the Sun, the Sun appears “in front” of the constellations of the ecliptic (Zodiac)
Let's Demonstrate What We Mean
But Wait! The ecliptic passes through Ophiuchus!!
Your “Real” Sign

Capricorn - Jan 20 to Feb 16
Aquarius - Feb 16 to Mar 11
Pisces - Mar 11 to Apr 18
Aries - Apr 18 to May 13
Taurus - May 13 to Jun 21
Gemini - Jun 21 to Jul 20
Cancer - Jul 20 to Aug 10
Leo - Aug 10 to Sep 16
Virgo - Sep 16 to Oct 30
Libra - Oct 30 to Nov 23
Scorpius - Nov 23 to Nov 29
Ophiuchus - Nov 29 to Dec 17
Sagittarius - Dec 17 to Jan 20
Phases of Venus

Statis Kalyvas - VT-2004 programme