

| Questions/Main Ideas | Notes |
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| <p>When and how did our universe began?</p> | <p>Overview Scientific Cosmology</p> <ul style="list-style-type: none"> - Time & space created 14 billion yrs ago – Big Bang - Started hot/small . . . expanding/cooling ever since - The smaller the volume w/ same #of particles ⇒ temp ↑ - So hot in beginning, nothing complex existed only protons, neutrons and electrons. EX. Hot room - Over time galaxies emerged (due to gravity) & stars, then planets |
| <p>What is our Cosmos made of?</p> | <p>Composition of the Cosmos</p> <ul style="list-style-type: none"> - 5% normal matter - from the Periodic Table - 25% dark matter - - 70% dark energy – making universes expand quickly |
| <p>How long ago was the earth and sun formed?</p> <p>How long ago did semi-modern human beings appear?</p> | <p>Time</p> <ul style="list-style-type: none"> - Earth/Sun formed 5 billion yrs ago - Dinosaurs – 150 million yrs ago - Semi-modern human – 2 million yrs ago - EX. If 14 billion yrs = 1 year All human history = 13 seconds Shakespeare alive 1 second ago |
| <p>Where does most information about astronomy come from?</p> <p>How fast does light travel?</p> <p>How many times can an object go around the earth at this speed?</p> <p>How long does it take for light to travel from the sun to the earth?</p> <p>How long does it take for light to travel from the moon to the earth?</p> | <p>Looking back in time - - - finite speed, galaxy is BIG</p> <ul style="list-style-type: none"> - Astronomers get most info from LIGHT - Light travels @ 300,000 km/sec (86,000 m/s) EX. @ this speed, an object goes around earth 8x in 1 sec. - EX. Light = messenger Light takes 8 mins to get to earth from the sun We see moon as it was one second ago - EX. If God turned all lights off, then back on: <ul style="list-style-type: none"> • 8 mins - sun • 10 min – Venus (light from sun to V. back 2 earth) • ~1 hr – Jupiter (light from sun to J. back 2 earth) • 25 yrs – a star . . . another sun • 1000's of years – Milky Way comes into view • 2.5 million yrs – Andromeda galaxy, closest galaxy to us - We see things as they were in the past |
| <p>Summary:</p> <p>Time and space were created 14 billion years ago. It all started small and hot and it continues to expand and cool. The universe is composed of normal matter, dark matter, and dark energy. Humans have been in the universe for an extremely short amount of time. Astronomers learn about the universe mainly through light. Light travels at 300,000 km/sec. When we look at the stars, we look at the way they were years and years ago.</p> | |

Class Notes

Topic: *Introduction to Cosmology*

Speaker: James Bullock, Ph.D

http://ocw.uci.edu/lectures/physics_20b_cosmology_lec_1_introduction_to_cosmology.html (26:05 - 44:26)

Listening and Note-taking Practice 1

Class: Physics 20B. Cosmology

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| <p>What is a <u>light-year</u>?</p> <p>How far away is the nearest bright star? Nearest star? Nearest galaxy?</p> | <p>Light-year: a measure of <u>distance</u></p> <p>DEF: distance light travels in a yr. 10 trillion km (9.53×10^{12} km)</p> <p>Nearest bright star: 8 light yrs away</p> <p>Nearest star: 4 lght yrs away</p> <p>Nearest galaxy: 2.5 million lght yrs away</p> |
| <p>How are galaxies changing?</p> | <p>Galaxies that are far away look very different than galaxies that are closer.</p> <p>Far away galaxies are older (b/c light take time to travel)</p> <p>⇒ galaxies evolve and change ovr time</p> <ul style="list-style-type: none">- Galaxies are becoming bigger and more ordered |
| <p>Summary:</p> <p>A light year is a measurement of distance. It measures how far light travels in one year. Galaxies are changing with time. They are becoming bigger and more ordered.</p> | |