Science 8
Lab Activity

Our Expanding Universe

EQ: How do we know about objects in the universe?

Targeted Skills

Information Literacy

- Collect Information
  - models
- Evaluate information
  - draw conclusions, make inferences and connections

Developing Skills

Information Literacy

- Organize and manipulate information
  - Venn diagrams

Enduring Understandings

The structure and function of the universe is a result of the interrelationships among its components.

Concepts Important to Know and Understand

energy transfer

Broad Brush Knowledge

origins of the universe, Doppler, electromagnetic spectrum

Core Objectives

2. Represent the natural world, using models and identify their limitations
4. Recognize, analyze, review, and critique contributions of scientists.
6. Describe characteristics of the universe, such as stars and galaxies using visual tools such as graphs, maps, and charts.

Purpose: To compare various models of universal formation.

Expert Information: Since the beginning of time, people have tried to explain how the universe was formed. Nicolaus Copernicus, who influenced scientists such as Galileo, Kepler, and Hubble, conducted some of the first studies of the origin of the universe.

Scientists at first, thought that the Universe was static and its appearance has never changed. This model is called the **Steady State Theory**. In this theory, galaxies are not moving away from each other, but new stars are being made from energy in the center of galaxies. The new stars spiral out from the center. The galaxy reabsorbs the energy given off by stars throughout their life cycles. The energy is then reused to produce new stars.

In 1926 Georges Lemaitre proposed that the Universe was not static, but instead expanding outwards in all directions. If the Universe is expanding in all directions, it was proposed that the Universe then must have been all in one location. Lemaitre theorized that 10-15 billion years ago, everything in the Universe was located in a single point. This single point exploded outwards in every direction forming everything we can see. This theory was called the **Big Bang Theory**.

In the 1960's scientists discovered that the universe is filled with radiation that is the left-over heat from the Big Bang. This Cosmic Microwave Background radiation (CMB) has made the Big Bang the most accepted theory.

With scientists feeling secure with the Big Bang theory for the formation of the Universe, they then set out to find out how the universe will end. Scientist in the 1980' and 1990's thought that the end of the Universe would all depend on the amount of mass in the Universe. If the Universe had a smaller amount of mass, the amount of gravitational force it could produce would not be enough to stop the expansion of the Universe, and it would expand forever.

If the universe had enough mass, gravity would stop the expansion of the Universe, and then cause everything to contract back to a single point in a **Big Crunch**. The universe was then thought to expand back out and create a cycle of expansion and contractions. This theory was called the **Oscillating-Universe Theory**.

Venn Diagram, 3 Circles

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