

Dark Matter

I. Physical Characteristics

1. Define the term dark matter.

Dark Matter - non-visible, non-electromagnetic radiation that affects the gravity of objects in the universe

2. Dark matter can be detected with telescopes.

Circle One : True False

(* Not reactant to light)

3. Most of the universe's mass is composed of dark matter.

Circle One : True False

4. Define the term dark energy.

Dark Energy - unknown form of energy that affects the universe on the largest scales

5. List the percentages of components of the universe.

Visible Matter : 4 %

Dark Matter : 23 %

Dark Energy : 73 %

← Similar to % of water on Earth
(What if we knew nothing about water and still interact with it?)

II. Evidence That Dark Matter Exists

1. List four effects of dark matter that indicate its existence.

1. Rotation of galaxies

2. Velocity of dispersing galaxies

3. High amount of galaxy cluster matter

4. Cosmic background radiation

↑ (Radiation left over after the Big Bang)

2. Describe the Big Bang Theory.

- Theory that describes how the universe expanded from an initial state of high density + temperature. (13.82 billion yrs. ago)
- (All matter contained in a single point)
- (Universe still expanding → due to dark energy)

3. List what occurred during the expansion of the universe after the Big Bang.

- 1 second : Hydrogen nuclei formed
- 380,000 years : First electrons formed
- 1 million years : Cosmic background radiation released
- 100 million years : Dark ages
- 400 million years : First stars formed (Supernovas + black holes form)
- 1 billion years : Protogalaxy mergers (galaxies start forming)
- 12-14 billion years : Modern galaxies in existence

III. The Fate Of The Universe

1. Black holes absorb dark matter.

Circle One :

True

False

2. Describe the possible fates of the universe.

1. Expansion

- * Most likely * → Possibility #1 : Expands forever (not enough gravity)
- Possibility #2 : Expansion gradually slows down

2. Contraction

"Big Crunch" - gravity overcomes expansion

Cyclic?