



Dark Matter

Why in News?

Recently, researchers have created a **detailed map of the invisible [dark matter](#) that makes up 85% of the universe.**

What do the Findings Suggest?

- The new findings **align with the standard model of [cosmology](#) based on [Einstein's theory of gravity](#).**
- The researchers used the **Atacama Cosmology Telescope (ACT)** to map dark matter **using light from the early universe**, known as the **cosmic microwave background (CMB) radiation.**
- They used the CMB radiation to map dark matter by observing **how it interacts with the gravity of massive objects like [galaxy clusters](#) and lumps** of dark matter.
 - The **[gravitational field](#)** generated by these objects **bends and distorts the light** that passes through them, which **helps in detecting dark matter.**

What is Dark Matter?

- **About:**
 - Dark matter is a **hypothetical form of matter** that is believed to exist in the universe but is **invisible and does not interact with light.**
 - **Importance of Dark Matter:**
 - Dark matter is essential to **explaining the observed structure of the universe.**
 - It helps to **account for the distribution of matter in galaxies and the cosmic web.** Understanding dark matter is important for developing a **complete understanding of the universe and its evolution.**
 - **Dark Energy:**
 - It is a type of energy that is thought to be responsible for the **accelerating expansion of the universe.**
 - It is a form of energy that fills the entire universe and exerts a **negative pressure**, pushing galaxies and other matter away from each other.
 - Dark energy is estimated to make up about **68% of the total energy content of the universe.**
 - **Evidence Related to Dark Matter:**
 - There is strong **indirect evidence**, as reflected in various levels like **distance scales:**
 - For example, as **we move from the centre of the galaxy to its periphery**, there is a **significant disparity between the observed plot of star speeds and their estimated figure.**
 - This implies that the galaxy has a significant amount of dark matter.
 - **Other Distance Scale Evidence:**
 - There are **Bullet clusters of galaxies** that are formed through the **merging of two galaxies**, as per scientists **their merger could only be explained through the presence of some dark matter.**
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UPSC Civil Services Examination Previous Year Question (PYQ)

Q. In the context of modern scientific research, consider the following statements about 'IceCube', a particle detector located at South Pole, which was recently in the news: (2015)

1. It is the world's largest neutrino detector, encompassing a cubic kilometre of ice.
2. It is a powerful telescope to search for dark matter.
3. It is buried deep in the ice.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Ans: (d)

Source: DTE

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