



Study Suggests Dark Matter Existed Pre-Big Bang

Description

Scientists have a new idea about dark matter. They think it may have started before the Big Bang. Many people believe the Big Bang was the start of everything: matter, dark matter, space, and energy.

After the Big Bang, the universe grew very quickly. This quick growth is called cosmic inflation. Some scientists think this inflation might have happened before the Big Bang. Researchers at the University of Texas at Austin believe that dark matter was formed during this time.

They created a model called warm inflation via freeze-in, or WIFI. In this model, small particles create dark matter while the universe is warm. Katherine Freese, a scientist from UT Austin, says their model is unique because dark matter can be made during inflation.

Scientists think the universe was once a very tiny point. During the early moments, dark matter might have formed from radiation and particles working together.

This idea is not proven yet. Future studies, like those of the cosmic microwave background, may help test this idea. The research was published in *Physical Review Letters*.

Vocabulary List:

1. **Inflation** /ɪnˈfleɪʃən/ (noun): An increase in the size or extent of something often referring to the rapid expansion of the universe after the Big Bang.
2. **Radiation** /ˌreɪ.diˈeɪ.ʃən/ (noun): Energy that is emitted in the form of waves or particles which may interact with matter.
3. **Model** /ˈmɒdəl/ (noun): A simplified representation used to explain or predict phenomena such as the formation of dark matter.
4. **Cosmic** /ˈkɒz.mɪk/ (adjective): Relating to the universe particularly in reference to its large scale and structure.
5. **Researchers** /rɪˈsɜːr.tʃərs/ (noun): Individuals who conduct systematic investigations to establish facts or reach new conclusions.
6. **Proven** /ˈpruː.vən/ (adjective): Demonstrated to be true or valid through evidence or argument.

Comprehension Questions



Multiple Choice

1. According to scientists, when do they think dark matter may have started?
Option: During the Big Bang
Option: After the Big Bang
Option: Before the Big Bang
Option: At the same time as the Big Bang

2. What is the term used to describe the quick growth of the universe after the Big Bang?
Option: Cosmic expansion
Option: Universal expansion
Option: Cosmic inflation
Option: Galactic expansion

3. What is the name of the model created by researchers at the University of Texas at Austin to explain the formation of dark matter during inflation?
Option: Inflation-driven creation
Option: Heat-driven matter formation
Option: Warm inflation via freeze-in (WIFI)
Option: Expansionary dark matter process

4. What do scientists believe dark matter might have formed from during the early moments of the universe?
Option: Dark energy
Option: Radiation and particles
Option: Cosmic dust
Option: Solar flares

5. Which publication did the research on dark matter get published in?
Option: Scientific American
Option: Nature Communications
Option: Physical Review Letters
Option: Journal of Cosmology

6. What do some scientists think might have happened before the Big Bang?
Option: Formation of stars
Option: Creation of galaxies
Option: Cosmic inflation



Option: Dark matter explosion

True-False

7. The quick growth of the universe after the Big Bang is known as cosmic deflation.
8. Katherine Freese is a scientist from UT Austin who developed the dark matter model called WIFI.
9. According to the text, dark matter could only have formed after the Big Bang.
10. The idea that dark matter might have originated before the Big Bang has been universally accepted by all scientists.
11. The research about dark matter suggests that it can only be created in cold environments.
12. Future studies involving the cosmic microwave background could potentially validate or disprove the new idea about dark matter.

Gap-Fill

13. The quick growth of the universe after the Big Bang is known as cosmic _____.
14. Dark matter might have formed from radiation and particles during the early moments of the _____.
15. Researchers at the University of Texas at Austin created a model called warm inflation via _____, or WIFI.
16. Future studies, such as those related to the cosmic microwave background, may help _____ the new idea about dark matter.
17. Some scientists believe that cosmic inflation might have occurred before the Big _____.
18. According to the text, the research on dark matter was published in _____ Review



Letters.

Answer

Multiple Choice: 1. Before the Big Bang 2. Cosmic inflation 3. Warm inflation via freeze-in (WIFI) 4. Radiation and particles 5. Physical Review Letters

True-False: 7. False 8. True 9. False 10. False 11. False 12. True

Gap-Fill: 13. inflation 14. universe 15. freeze-in 16. test 17. Bang 18. Physical

Vocabulary quizzes

Multiple Choice (Select the Correct answer for each question.)

1. What are authorities doing when they are examining a situation to uncover the truth?

Option: Deciding

Option: Investigating

Option: Building

Option: Repairing

2. A person who commits a crime is known as a:

Option: Doctor

Option: Teacher

Option: Criminal

Option: Engineer

3. What do we call a sudden serious and unexpected event requiring immediate action?

Option: Close

Option: Normal

Option: Emergency

Option: Excitement

4. Who are the individuals dedicated to investigating and discovering new information?

Option: Teachers

Option: Cooks

Option: Researchers

Option: Drivers

5. What is the raised level surface providing the foundation for people or things?

Option: Platform



- Option: Tunnel
- Option: Bridge
- Option: Cave

6. What is the increase in prices of goods and services over time?

- Option: Deflation
- Option: Equalization
- Option: Inflation
- Option: Isolation

7. Which term describes something that is of great worth or importance?

- Option: Worthless
- Option: Beautiful
- Option: Valuable
- Option: Harmful

8. What is the emission of energy as electromagnetic waves or as moving subatomic particles?

- Option: Silence
- Option: Meltdown
- Option: Radiation
- Option: Darkness

9. What term describes something that has been shown to be true or valid?

- Option: Gathered
- Option: Bought
- Option: Proven
- Option: Earned

10. What word describes the act of giving support confidence or hope?

- Option: Saddened
- Option: Discouraged
- Option: Encouraged
- Option: Waited

Gap-Fill (Fill in the blanks with the correct word from the vocabulary list.)

11. A _____ prohibits or forbids certain actions items or behaviors.

12. In times of need we often _____ on our friends for support.

13. The _____ of the ancient artifact amazed the archaeologists.



14. The pilot _____ the aircraft during the flight.
15. The politician gave an inspiring _____ to the crowd.
16. The weather forecast issued severe _____ for an approaching storm.
17. The doctor _____ the diagnosis after further tests.
18. His attitude _____ after facing numerous challenges.
19. She provided unwavering _____ to her friend during tough times.
20. The old map led them to a hidden pirate _____ on the island.

Matching Sentences (Match each definition to the correct word from the vocabulary list.)

21. A person's unique personality and characteristics that distinguish them from others.
22. The teacher effectively the lesson to the students.
23. Professionals with advanced knowledge and skills in a particular field.
24. Official organizations or individuals with the power to enforce laws or rules.
25. They a hidden cave deep in the forest during their expedition.
26. The laboratory results the presence of a rare substance in the sample.
27. Being exposed to high levels of radiation poses a serious to health.
28. She is a role for young aspiring dancers in the community.
29. The astronomers studied the phenomena occurring in outer space.
30. Constructive can help individuals improve and grow.

Answer

Multiple Choice: 1. Investigating 2. Criminal 3. Emergency 4. Researchers 5. Platform 6. Inflation 7. Valuable 8. Radiation 9. Proven 10. Encouraged

Gap-Fill: 11. Ban 12. Depend 13. Discovery 14. Controls 15. Speech 16. Warnings 17. Confirmed 18. Hardened



19. Support 20. Treasure

Matching sentence: 1. Identity 2. Communicated 3. Experts 4. Authorities 5. Discovered 6. Confirmed 7. Danger 8. Model 9. Cosmic 10. Criticism

CATEGORY

1. Sci/Tech - LEVEL1

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