



Stunning Picture Einstein Didn't Believe Possible – But It Is!

Description

One of the earliest confirmed predictions of general relativity is the gravitational deflection of starlight. The phenomenon was first observed in 1919 during a total solar eclipse. Due to stars' point-like appearance, this effect manifests as an apparent displacement of stars near the eclipse. However, this gravitational lensing occurs more broadly. When a distant galaxy is obstructed by a closer one, some of the distant light bends around the closer galaxy, distorting our view of the remote stars.

This lensing effect can also amplify the brightness of the distant galaxy, allowing us to observe some of the most remote stars in the Universe. Additionally, one of the most striking outcomes of gravitational lensing is the creation of an Einstein Ring. This occurs when a far-off galaxy is perfectly aligned behind a closer galaxy, resulting in the distortion of its light into a circular shape.

Although Einstein acknowledged this effect in 1936, he believed direct observation was impossible. Nevertheless, modern telescopes have proven him wrong. Recent advancements, like the James Webb Space Telescope (JWST), have unveiled numerous Einstein rings, showcasing the beauty of cosmic alignment.

An exquisite example captured by the JWST depicts an elliptical foreground galaxy, part of the SMACS J0028.2-7537 cluster, distorting the colors of a distant spiral galaxy akin to the Milky Way into a near-perfect ring. This breathtaking image highlights the significance of our unique perspective in revealing such cosmic wonders.

These astronomical marvels exemplify how beauty is not solely subjective but is also contingent on the observer's position in the vastness of space. For more captivating images like this, visit the JWST Image of the Month website.

Vocabulary List:

1. **Deflection** /dɪ'flekʃən/ (noun): The act of causing something to change direction.
2. **Lensing** /'lɛn.zɪŋ/ (noun): The effect of light bending around a massive object.
3. **Amplify** /'æmplɪfaɪ/ (verb): To increase the volume or strength of a signal.
4. **Distortion** /dɪs'tɔ:ʃən/ (noun): The action of twisting or altering something out of its true or natural state.
5. **Akin** /ə'kɪn/ (adjective): Of similar character or quality.
6. **Marvel** /'mɑ:rvəl/ (noun): A wonderful or astonishing person or thing.



Comprehension Questions

Multiple Choice

1. In which year was the phenomenon of gravitational deflection of starlight first observed?
Option: 1919
Option: 1936
Option: 1945
Option: 1962
2. What is one of the outcomes of gravitational lensing where a far-off galaxy is aligned behind a closer galaxy?
Option: Einstein Ring
Option: Hubble Ring
Option: Newton Ring
Option: Galileo Ring
3. Who believed direct observation of gravitational lensing was impossible in 1936?
Option: Einstein
Option: Galileo
Option: Hubble
Option: Kepler
4. Which telescope is mentioned in the article that has unveiled numerous Einstein rings?
Option: James Webb Space Telescope (JWST)
Option: Hubble Space Telescope
Option: Kepler Space Telescope
Option: Spitzer Space Telescope
5. What phenomenon can amplify the brightness of a distant galaxy due to gravitational lensing?
Option: Gravitational Amplification
Option: Brightness Enhancement
Option: Light Intensification
Option: Luminosity Boost
6. What effect distorts the colors of a distant spiral galaxy into a near-perfect ring?



- Option: Gravitational Lensing
- Option: Cosmic Convergence
- Option: Astronomical Refraction
- Option: Spectral Distortion

True-False

7. The gravitational deflection of starlight was first observed in 1936.
8. An Einstein Ring occurs when a close galaxy is directly in front of a far-off galaxy.
9. Einstein believed direct observation of gravitational lensing was possible in 1936.
10. The JWST has not unveiled any Einstein rings according to the article.
11. Gravitational lensing has no impact on the brightness of distant galaxies.
12. The example captured by the JWST involves a distant galaxy distorting colors of a foreground galaxy.

Gap-Fill

13. The gravitational deflection of starlight phenomenon was first observed during a total solar eclipse in _____.
14. Einstein acknowledged the gravitational lensing effect in _____.
15. The area where distant light bends around a closer galaxy distorting our view of remote stars is known as gravitational _____.
16. An exquisite example captured by the JWST depicts an elliptical foreground galaxy part of the SMACS J0028.2-7537 cluster distorting the colors of a distant spiral galaxy akin to the Milky Way into a near-perfect _____.
17. According to the article, gravitational lensing can amplify the brightness of distant galaxies, allowing us



to observe some of the most remote _____ in the Universe.

18. The creation of an Einstein Ring occurs when a far-off galaxy is perfectly _____
behind a closer galaxy.

Answer

Multiple Choice: 1. 1919 2. Einstein Ring 3. Einstein 4. James Webb Space Telescope (JWST) 5. Gravitational Amplification 6. Gravitational Lensing

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

Gap-Fill: 13. 1919 14. 1936 15. lensing 16. ring 17. stars 18. aligned

Vocabulary quizzes

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

1. What are the elusive particles that are difficult to detect?

- Option: Neutrinos
- Option: Microalgae
- Option: Biosignatures
- Option: Anomalies

2. Which term refers to small organisms like bacteria or archaea?

- Option: Microbial
- Option: Complexities
- Option: Marvel
- Option: Deflection

3. What describes a planet capable of supporting life?

- Option: Habitable
- Option: Groundbreaking
- Option: Catastrophic
- Option: Nuanced

4. Which term means expressing something clearly and effectively?

- Option: Articulates
- Option: Permeated
- Option: Amplify



Option: Akin

5. What term is used to describe the change in direction of light or particles?

- Option: Deflection
- Option: Tantalizing
- Option: Adept
- Option: Accelerated

6. Which term refers to irregular or unexpected observations?

- Option: Anomalies
- Option: Phenomenon
- Option: Revolutionize
- Option: Irreversibility

7. What term describes changes in the original shape or form?

- Option: Distortion
- Option: Catastrophic
- Option: Accelerated
- Option: Marveled

8. Which term denotes something involving or causing great damage or suffering?

- Option: Catastrophic
- Option: Unprecedented
- Option: Perplexed
- Option: Groundbreaking

9. Which term means to bring about a great change or innovation?

- Option: Revolutionize
- Option: Accelerated
- Option: Marvel
- Option: Nuanced

10. What term is used to describe an increase in speed or rate?

- Option: Accelerated
- Option: Tantalizing
- Option: Biosignatures
- Option: Microalgae

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

11. The ancient artifact had an _____ design that puzzled researchers.



12. The team achieved an _____ level of success in their experiment.
13. The complex puzzle left the players feeling _____ and frustrated.
14. Using a microphone can _____ your voice so that it reaches a larger audience.
15. The project's success was hindered by the many _____ involved in its implementation.
16. The decision to demolish the historic building was met with concern over its _____.
17. She was incredibly _____ at playing the piano often impressing her audience.
18. The author's writing style was very _____ weaving subtle meanings throughout the text.
19. The smell of freshly baked cookies was _____ making everyone eager for a taste.
20. The intricate artwork was a true _____ demonstrating the artist's exceptional skill.

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

21. The discovery of a new treatment was _____ and promised to revolutionize the medical field.
22. The natural light display in the sky was a breathtaking _____ captivating all who witnessed it.
23. The cryptic message left by the criminal was _____ and difficult to decipher.
24. The scent of fresh flowers _____ the room creating a pleasant atmosphere.
25. Scientists searched for _____ in the soil to determine the presence of microbial life.
26. The study focused on the potential benefits of _____ for a sustainable food source.
27. The car _____ down the straight road reaching top speed in seconds.
28. The earthquake had a _____ impact on the region causing widespread destruction.
29. The irreversible decision to cut down the ancient trees led to an outcry from environmentalists.



30. The mirror caused a in the light creating an interesting optical illusion.

Answer

Multiple Choice: 1. Neutrinos 2. Microbial 3. Habitable 4. Articulates 5. Deflection 6. Anomalies 7. Distortion 8. Catastrophic 9. Revolutionize 10. Accelerated

Gap-Fill: 11. enigmatic 12. unprecedented 13. perplexed 14. amplify 15. complexities 16. irreversibility 17. adept 18. nuanced 19. tantalizing 20. marvel

Matching sentence: 1. groundbreaking 2. phenomenon 3. enigmatic 4. permeated 5. biosignatures 6. microalgae 7. accelerated 8. catastrophic 9. irreversibility 10. deflection

CATEGORY

1. Health - LEVEL5

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