



First Measurement of Universe's Most Violent Wind

Description

Scientists have measured the speed of hot gas from M82, a galaxy that forms stars much faster than the Milky Way. The gas moves at over 3 million kilometres per hour, which could push gas into space and create an outflow stretching thousands of light-years.

This discovery comes from the XRISM spacecraft, a mission by JAXA and NASA. Its sensitive instrument detected X-ray emissions from heated iron at M82's centre. The findings, published in *Nature*, help answer a long-standing question about what drives the outflow visible from this galaxy.

M82 and similar galaxies are interesting to scientists because they burn through their gas rapidly. This creates strong winds and massive gas flows that change the galaxy and its surroundings. Understanding these winds is important for learning how galaxies evolve and how stars are formed.

The researchers used the Doppler effect, which is the change in sound pitch when a source moves. They found that iron is moving outward in many directions, revealing a wind velocity over 3 million kilometres per hour. The gas temperature was about 25 million degrees Celsius, creating strong outward pressure.

While the new data supports previous theories about shockwaves causing winds, it also raises questions. M82 seems to release enough material to form seven solar masses of stars each year, but four of those are unaccounted for. Scientists must now find where these missing masses go.

Vocabulary List:

1. **outflow** //ˈaʊtflɒʊ// (noun): movement of gas or liquid away from something
2. **emissions** //ɪˈmɪʃənz// (noun): gases or energy sent out from something
3. **velocity** //vəˈlæsəti// (noun): how fast something moves in a direction
4. **pressure** //ˈpreʃər// (noun): a force that pushes on something
5. **shockwaves** //ˈʃɒkweɪvz// (noun): strong waves of energy through air or matter
6. **unaccounted** //ˌʌnəˈkaʊntɪd// (adjective): not explained or not shown in records

Comprehension Questions

Multiple Choice



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1. What is the speed of hot gas from M82?
Option: 1 million kilometres per hour
Option: 2 million kilometres per hour
Option: 3 million kilometres per hour
Option: 4 million kilometres per hour
 2. Which two space agencies are involved in the XRISM spacecraft mission?
Option: NASA and ESA
Option: NASA and JAXA
Option: JAXA and ESA
Option: NASA and Roscosmos
 3. In which journal were the findings about M82 published?
Option: Science
Option: Nature
Option: Astrophysical Journal
Option: Monthly Notices of the Royal Astronomical Society
 4. What temperature was the gas at M82 approximately?
Option: 15 million degrees Celsius
Option: 20 million degrees Celsius
Option: 25 million degrees Celsius
Option: 30 million degrees Celsius
 5. How many solar masses of stars does M82 seem to release each year?
Option: Five
Option: Six
Option: Seven
Option: Eight
 6. What phenomenon did the researchers use to study the movement of iron in M82?
Option: Redshift
Option: Blue shift
Option: Doppler effect
Option: Gravitational lensing

True-False



7. The gas from M82 moves slower than the speed of sound.
8. The heated iron emissions were detected at the center of M82.
9. M82 releases exactly seven solar masses of stars each year.
10. Understanding the winds from M82 is unimportant for understanding galaxy evolution.
11. The gas temperature at M82 is about 25 million degrees Celsius.
12. Shockwaves causing winds are a new theory regarding M82.

Gap-Fill

13. The gas from M82 moves at over _____ kilometres per hour.
14. The mission by JAXA and NASA is called _____.
15. The findings about M82 help answer questions about what drives _____ visible from this galaxy.
16. The temperature of the gas was about _____ million degrees Celsius.
17. M82 seems to release enough material to form seven solar _____ of stars each year.
18. Scientists are trying to find where the _____ masses go in M82.

Answer

Multiple Choice: 1. 3 million kilometres per hour 2. NASA and JAXA 3. Nature 4. 25 million degrees Celsius
5. Seven 6. Doppler effect

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

Gap-Fill: 13. 3 million 14. XRISM 15. the outflow 16. 25 17. masses 18. missing

Vocabulary quizzes



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

1. What is a core sample mainly used for in geological studies?
Option: To measure temperature
Option: To analyze sediment layers
Option: To assess wildlife
Option: To determine weather patterns
2. Which type of vehicle can complete tasks without human intervention?
Option: Manual
Option: Semi-autonomous
Option: Autonomous
Option: Unmanned
3. What is the primary function of propulsion systems in vehicles?
Option: To aid in steering
Option: To provide navigational support
Option: To generate movement
Option: To enhance passenger comfort
4. Which of the following is a primary component in nuclear power generation?
Option: Turbine
Option: Reactor
Option: Boiler
Option: Generator
5. What typically accumulates at the bottom of lakes and oceans?
Option: Sand
Option: Sediment
Option: Fish
Option: Plants
6. What is measured in pascals in fluid dynamics?
Option: Temperature
Option: Velocity
Option: Pressure
Option: Density
7. What is a common issue observed in ice sheets due to climate change?
Option: Thickening
Option: Stability
Option: Thinning



Option: Cooling

8. Which of the following describes the speed of an object in a specific direction?

Option: Acceleration

Option: Velocity

Option: Distance

Option: Momentum

9. What do vehicles emit that contributes to air pollution?

Option: Odors

Option: Emissions

Option: Noise

Option: Vibrations

10. What type of materials are often used in medical treatments and energy generation?

Option: Thermal

Option: Electrical

Option: Chemical

Option: Radioactive

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

11. In physics, _____ is described as the force applied per unit area.

12. An _____ vehicle can operate independently without human intervention.

13. A sediment _____ provides valuable information about the geological history of an area.

14. Modern ships rely heavily on GPS for accurate _____.

15. The layers of _____ in the riverbed can indicate the ecological changes over time.

16. The _____ of polar ice caps is a significant concern for scientists studying climate change.

17. Reducing carbon _____ is essential for improving air quality.

18. The nuclear _____ is a critical component for generating electricity in power plants.



19. Earthquakes can produce _____ that travel through the ground.
20. A _____ of species can be found in diverse ecosystems across the globe.

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

21. The construction project was halted upon discovering exposed bedrock beneath the site.
22. Engineers assess the stability of structures to ensure safety during earthquakes.
23. The outflow from the river increased significantly during the rainy season.
24. There were several unaccounted expenses in the financial report that needed clarification.
25. The software returned to its default settings after the error occurred.
26. The difficulty of the test surprised many students who were unprepared.
27. The project had a limited budget, restricting its scope and ambitions.
28. Sailors use stars to navigate their way across the open ocean.
29. Plasma is often referred to as the fourth state of matter, distinct from solids, liquids, and gases.
30. The satellites maintained their orbital paths around the Earth for years.

Answer

Multiple Choice: 1. To analyze sediment layers 2. Autonomous 3. To generate movement 4. Reactor 5. Sediment 6. Pressure 7. Thinning 8. Velocity 9. Emissions 10. Radioactive

Gap-Fill: 11. pressure 12. autonomous 13. core 14. navigation 15. sediment 16. thinning 17. emissions 18. reactor 19. shockwaves 20. variety

Matching sentence: 1. bedrock 2. stability 3. outflow 4. unaccounted 5. default 6. difficulty 7. limited 8. navigate 9. plasma 10. orbital

CATEGORY

1. Sci/Tech - LEVEL3

POST TAG

1. ESL learning



2. esl news
3. Level 3
4. most violent wind
5. reading comprehension
6. universe

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