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

Comprehension Questions

Multiple Choice

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

CATEGORY

1. Sci/Tech - LEVEL3

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