NASA-JAXA's XRISM Telescope Clocks Hot Wind of Galaxy M82

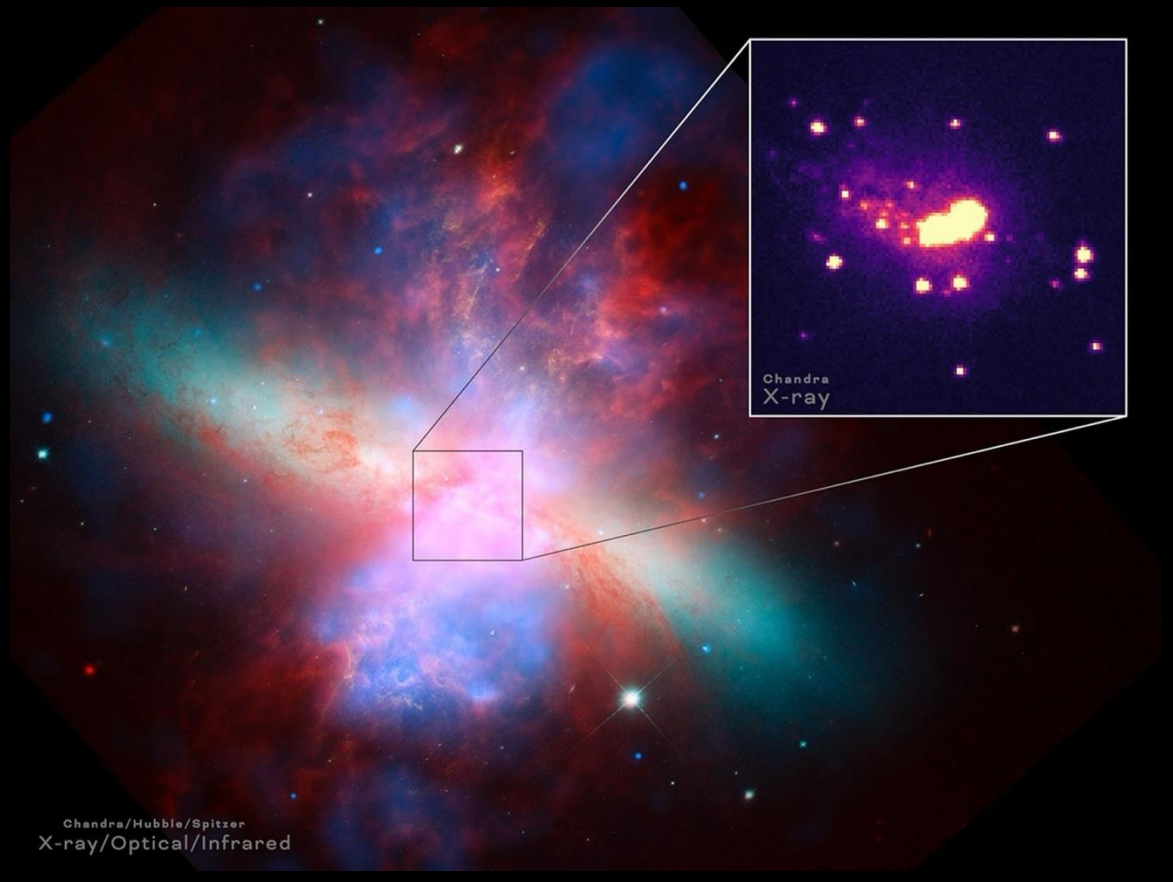
For the first time, astronomers have directly measured the speed of superheated gas billowing from a cauldron of stellar activity at the heart of M82, a nearby galaxy undergoing an extraordinary burst of star formation.

The material is moving more than 2 million miles (over 3 million kilometers) per hour and appears to be the primary force driving a cooler, well-studied, galaxy-scale wind.

Researchers made the calculations using data from the Resolve instrument aboard the XRISM spacecraft.

Scientists particularly wanted to understand the role of cosmic rays in galactic winds. These high-speed charged particles are found throughout the cosmos and are accelerated by some of the same events scientists think produce gusts like those in M82. There was a possibility they were a main source of outward pressure on the galaxy's gas.

XRISM observations helped the research team determine that the hot central wind is a little faster than expected. Combined with the high temperatures in the core of the galaxy, it's powerful enough to produce the larger cool wind without cosmic rays, although they may still be contributing.



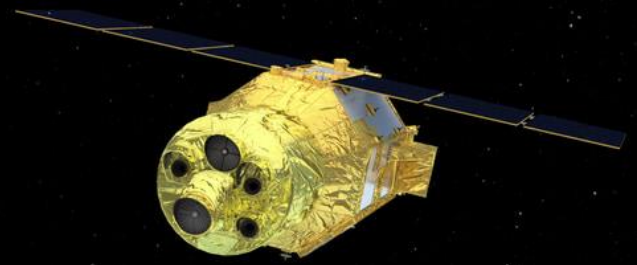
The cool wind of galaxy M82 drives gas and dust up to 40,000 light-years from its core, as shown here using data from NASA's Chandra, Hubble, and Spitzer missions. The inset shows a Chandra view of the galaxy's central region.

Credit: NASA's Goddard Space Flight Center; X-ray: NASA/CXC/JHU/D.Strickland; Optical: NASA/ESA/STScI/AURA/The Hubble Heritage Team; Infrared: NASA/JPL-Caltech/Univ. of AZ/C. Engelbracht; XRISM Collaboration et al. 2026

NASA news article: https://science.nasa.gov/missions/xrism/nasa-jaxas-xrism-telescope-clocks-hot-wind-of-galaxy-m82/
Nature paper: https://www.nature.com/articles/s41586-026-10231-1

More About XRISM

- Technology developed for XRISM could improve nuclear safeguards. The mission's instruments require extremely high spectral resolution, which can be used to detect isotopes of different kinds of radioactive nuclear materials, like uranium. This ability could be incorporated into screening instruments. The same technology could improve trace contamination analysis.
- New and improved instruments for X-ray missions drive industry partners to make improvements in superconducting materials that could be used in quantum computing.



Artist's concept of the XRISM spacecraft. Credit: NASA's Goddard Space Flight Center Conceptual Image Lab