

# Discovery of an ancient spiral galaxy dubbed the 'monster' of the universe

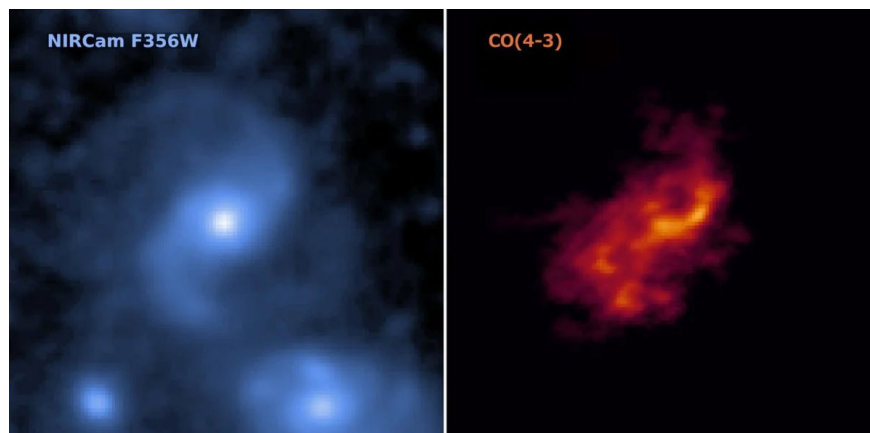
Ancient spiral galaxy discovered, dubbed the monster of the universeA giant barred spiral galaxy estimated to be 11.1 billion years old has been discovered.

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A giant barred spiral galaxy estimated to be 11.1 billion years old has been discovered, revealing previously unknown star formation and gas dynamics. The new discovery could reshape our understanding of the evolution of galaxies like the Milky Way.

Astronomers have observed a massive, active spiral galaxy from the early universe, providing new insight into how galaxies like the Milky Way formed. The ancient galaxy has a bright central bar – a structure seen in many modern spiral galaxies – and its discovery is helping scientists better understand how these cosmic giants evolved.

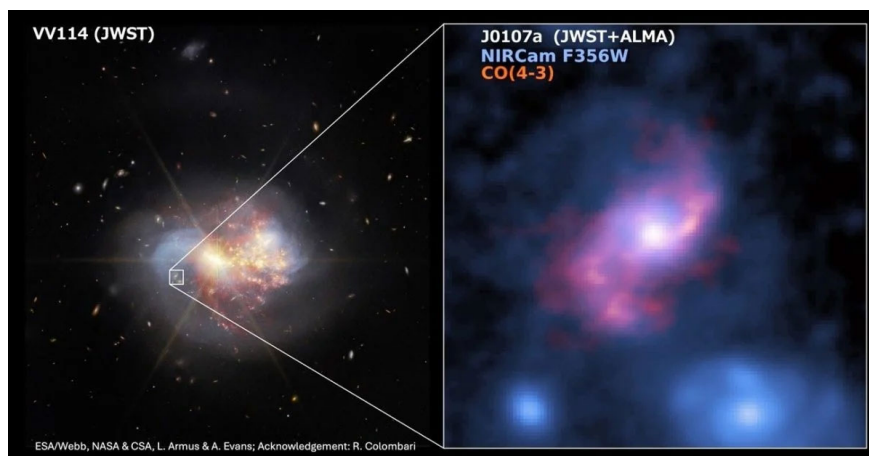
Some spiral galaxies, including the Milky Way, have a bar running straight through their centers. This bar acts as a funnel for gas to flow into the core, where it fuels new star formation. However, two big questions remain: Why do only about half of spiral galaxies have bars? And what role do these structures play in galaxy evolution?



**The "monster" from the early universe**

To answer these questions, a research team led by Dr. Shuo Huang (National Astronomical Observatory of Japan and Nagoya University) used the ALMA radio telescope. They focused on the galaxy J0107a in the constellation Cetus, which existed 11.1 billion years ago. J0107a is known by scientists as a "monster galaxy" - a type of galaxy that grows extremely fast due to its extraordinary rate of star formation.

Previously, detailed studies of such distant galaxies were nearly impossible. But thanks to the sharp observations of the world's most advanced James Webb Space Telescope (JWST), astronomers can now clearly see the spiral structures and central bars in these ancient galaxies. J0107a stands out as the oldest and most massive barred spiral galaxy ever observed, making it an ideal "time capsule" for studying the formation of majestic galactic structures in the early universe.



The team found that in J0107a, the distribution and motion of gas in the central bar is similar to modern galaxies. However, compared to modern galaxies:

1. The gas density is many times higher
2. Faster air flow speeds, reaching several hundred km/s

The team believes that the massive gas flow toward the center will trigger intense star formation, which in turn will drive the evolution of the 'monster galaxy.' This is the first time these features have been observed experimentally, and they were not predicted by theoretical models or simulations.

*"We expect that the detailed information on gas distribution and motion obtained from this observation will provide important clues not only to the origin of galaxy diversity, but also to the formation and evolution of the more common barred spiral galaxies," said Dr Huang.*

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