

# Vivid portrait of interacting galaxies marks Webb's second anniversary

July 12 2024

---



This "penguin party" is loud. The distorted spiral galaxy at center, the Penguin, and the compact elliptical galaxy at left, the Egg, are locked in an active embrace. A new near- and mid-infrared image from the James Webb Space Telescope, taken to mark its second year of science, shows that their interaction is marked by a faint upside-down U-shaped blue glow. Credit: NASA, ESA, CSA, STScI

A duo of interacting galaxies commemorates the second science anniversary of NASA's James Webb Space Telescope, which takes constant observations, including images and highly detailed data known as spectra. Its operations have led to a "parade" of discoveries by astronomers around the world.

"Since President Biden and Vice President Harris unveiled the first image from the James Webb Space Telescope two years ago, Webb has continued to unlock the mysteries of the universe," said NASA Administrator Bill Nelson. "With remarkable images from the corners of the cosmos, going back nearly to the beginning of time, Webb's capabilities are shedding new light on our celestial surroundings and inspiring future generations of scientists, astronomers, and explorers."

"In just two years, Webb has transformed our view of the universe, enabling the kind of world-class science that drove NASA to make this mission a reality," said Mark Clampin, director of the Astrophysics Division at NASA Headquarters in Washington.

"Webb is providing insights into longstanding mysteries about the early universe and ushering in a new era of studying [distant worlds](#), while returning images that inspire people around the world and posing exciting new questions to answer. It has never been more possible to explore every facet of the universe."

The telescope's specialization in capturing [infrared light](#)—which is beyond what our own eyes can detect—shows these galaxies, collectively known as Arp 142, locked in a slow cosmic dance. Webb's observations, which combine near- and mid-infrared light from Webb's NIRCam (Near-Infrared Camera) and MIRI (Mid-Infrared Instrument), respectively, clearly show that they are joined by a haze represented in blue that is a mix of stars and gas, a result of their mingling.

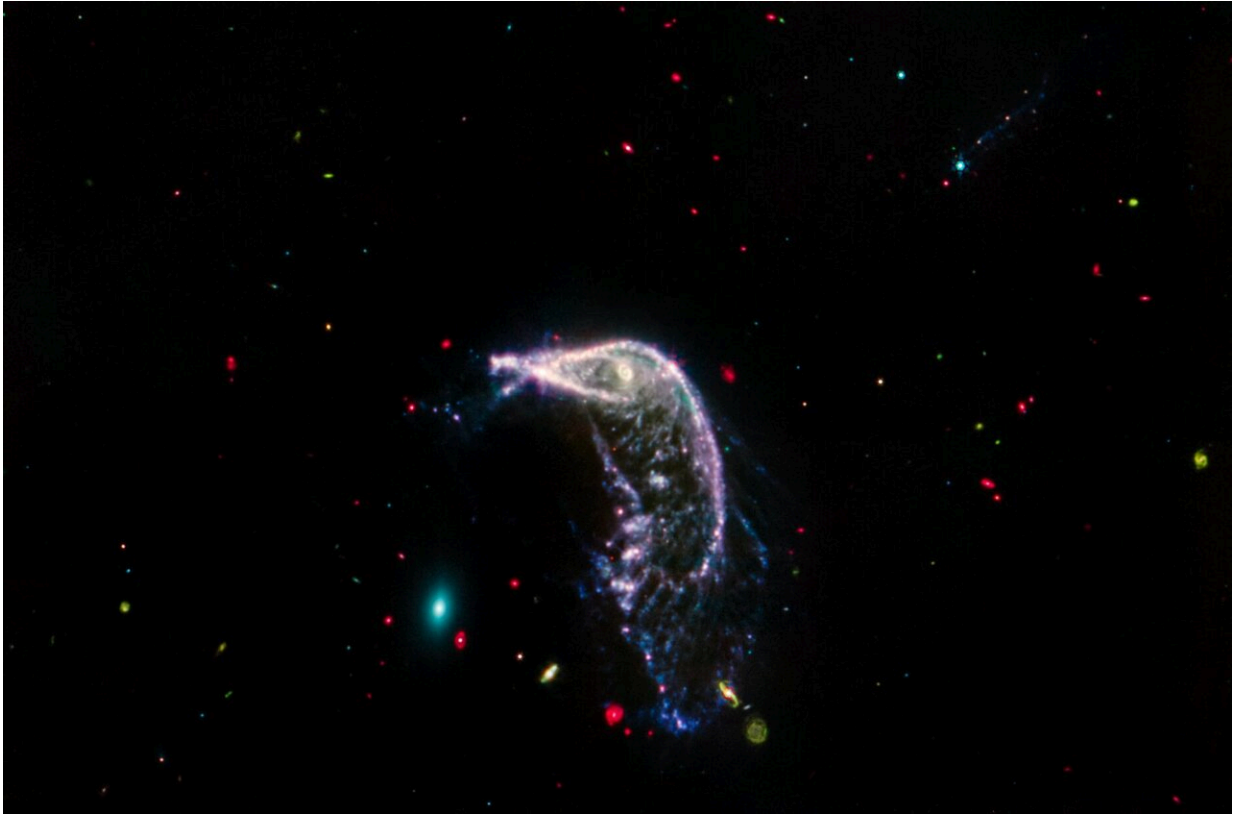
Their ongoing interaction was set in motion between 25 and 75 million years ago, when the Penguin (individually cataloged as NGC 2936) and the Egg (NGC 2937) completed their first pass. They will go on to shimmy and sway, completing several additional loops before merging into a single galaxy hundreds of millions of years from now.

Before their first approach, the Penguin held the shape of a spiral. Today, its galactic center gleams like an eye, its unwound arms now shaping a beak, head, backbone, and fanned-out tail.

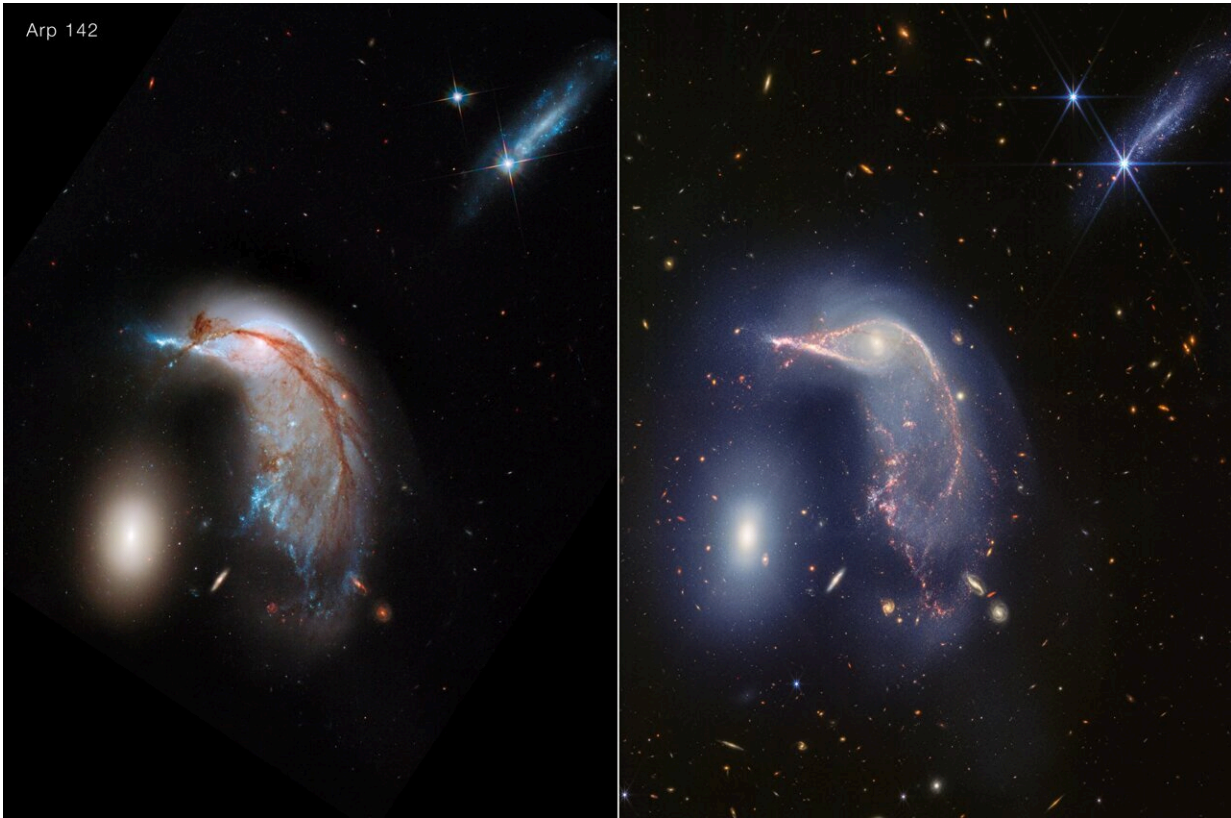
Like all spiral galaxies, the Penguin is still very rich in gas and dust. The galaxies' "dance" gravitationally pulled on the Penguin's thinner areas of gas and dust, causing them to crash in waves and form stars. Look for those areas in two places: what looks like a fish in its "beak" and the "feathers" in its "tail."

Surrounding these newer stars is smoke-like material that includes carbon-containing molecules, known as [polycyclic aromatic hydrocarbons](#), which Webb is exceptional at detecting. Dust, seen as fainter, deeper orange arcs also swoops from its beak to tail feathers.

In contrast, the Egg's compact shape remains largely unchanged. As an [elliptical galaxy](#), it is filled with aging stars, and has a lot less gas and dust that can be pulled away to form new stars. If both were spiral galaxies, each would end the first "twist" with new star formation and twirling curls, known as tidal tails.



Webb's mid-infrared view of interacting galaxies Arp 142 seems to sing in primary colors. The background of space is like a yawning darkness speckled with bright, multi-colored beads. Credit: NASA, ESA, CSA, STScI



Two penguins, two eggs—two very different color schemes. Credit: NASA, ESA, CSA, STScI

Another reason for the Egg's undisturbed appearance: These galaxies have approximately the same mass or heft, which is why the smaller-looking elliptical wasn't consumed or distorted by the Penguin.

It is estimated that the Penguin and the Egg are about 100,000 light-years apart—quite close in astronomical terms. For context, the Milky Way galaxy and our nearest neighbor, the Andromeda Galaxy, are about 2.5 million light-years apart. They too will interact, but not for about 4 billion years.

Now, look to the top right to spot a galaxy that is not at this party. This

edge-on galaxy, cataloged PGC 1237172, is 100 million light-years closer to Earth. It's also quite young, teeming with new, blue stars.

Want one more party trick? Switch to Webb's mid-infrared-only image to see PGC 1237172 practically disappear. Mid-infrared light largely captures cooler, older stars and an incredible amount of dust. Since the galaxy's stellar population is so young, it "vanishes" in mid-infrared light.

Also take a moment to scan the background. Webb's image is overflowing with distant galaxies. Some take spiral and oval shapes, like those threaded throughout the Penguin's "tail feathers," while others scattered throughout are shapeless dots. This is a testament to the sensitivity and resolution of the telescope's infrared instruments. (Compare Webb's view to the 2018 observation that combines infrared light from NASA's retired Spitzer Space Telescope and near-infrared and visible light from NASA's Hubble Space Telescope.)

Even though these observations only took a few hours, Webb revealed far more distant, redder, and dustier galaxies than previous telescopes—one more reason to expect Webb to continue to expand our understanding of everything in the universe.

Provided by Space Telescope Science Institute

Citation: Vivid portrait of interacting galaxies marks Webb's second anniversary (2024, July 12) retrieved 11 October 2024 from <https://phys.org/news/2024-07-vivid-portrait-interacting-galaxies-webb.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.