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A NEW TELESCOPE IS REWRITING THE STORY OF SPACE AND TIME

Are we alone in the universe?

How does the universe work?

How did we get here?

The James Webb Space Telescope is an ambitious scientific endeavor to answer these questions. This new telescope builds on the legacy of previous space-based telescopes to push the boundaries of human knowledge even further, to the formation of the first galaxies and the horizons of other worlds.

When the universe was young, more than 13 and a half billion years ago, no stars shone in the abyss. Astronomers call this era the dark ages, a time when the cosmos was filled with hydrogen and helium gas, the raw material for all the worlds to come.

A mysterious substance known as dark matter existed too. As things expanded and cooled, some of the dark matter consolidated in immense orbs, driving the gas to their cores. The rising gravitational pressure within these halos, as astronomers named them, forced hydrogen atoms to fuse into helium, igniting the primordial universe's first stars.

Scientists have been filling in the universe's origin story for decades, but in the past year, the largest and most advanced space telescope ever built has rewritten the first chapters.

Ancient galaxies discovered by the **James Webb** Space Telescope are brighter, more numerous, and more active than anticipated, revealing a frenetic opening to the saga of space and time. The telescope "James Webb" cannot see the first stars, though, as they weren't bright enough to detect individually.



Launched on Christmas morning in 2021, the space telescope is now positioned nearly a million miles from Earth. Its primary mirror captures the light of ancient galaxies, which has been traveling through space for more than 13 billion years, revealing the galaxies as they were in the distant past.

Astronomers expected to find some of these infant galaxies with this telescope. They didn't expect to find so many—or that the discoveries could shake their understanding of galactic history.

The deepest galaxy survey of the universe ever undertaken kicked off in September 2022, when an international collaboration began using telescope James Webb to observe patches of sky for dozens of hours at a time.

The scientists, from professors to graduate students, were preoccupied with the mosaic on their laptops: hundreds of images freshly captured by the telescope and stitched together. The picture, shared with the team only days before, contained tens of thousands of galaxies and other celestial objects.

In its first year of science operations, the James Webb Space Telescope exceeded astronomers' expectations and wowed the world with stunning imagery.