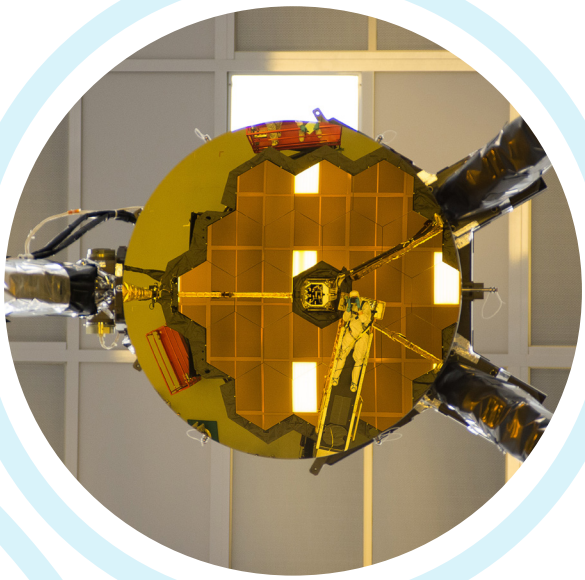
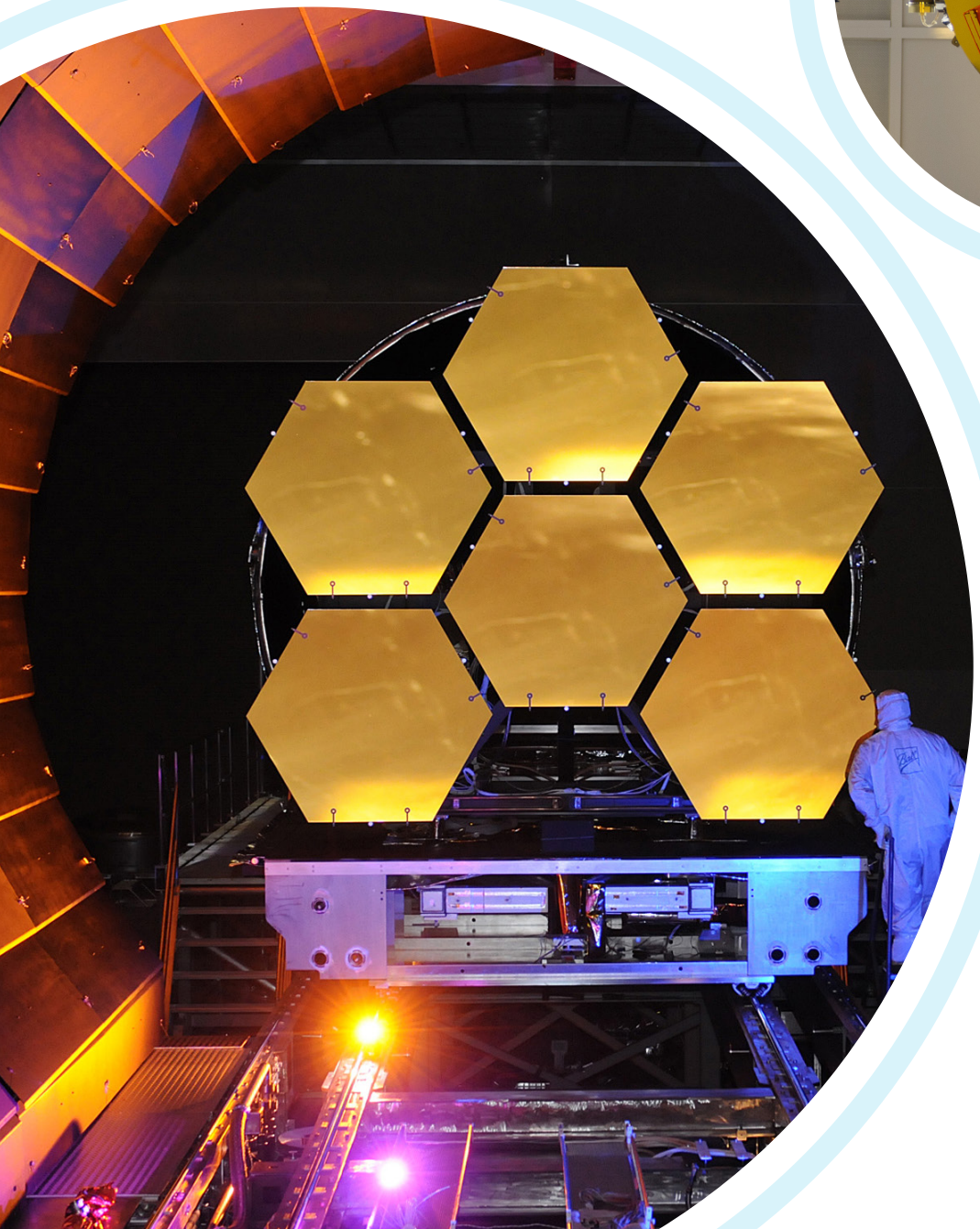
JWST

James Webb Space Telescope

Are we alone? How did we get here? The James Webb Space Telescope will play an important role in answering our most fundamental questions. As NASA's next premier observatory, the Webb telescope will study emissions from objects formed when the universe was just beginning.





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Overview

Serving as the premier observatory of the next decade, NASA's Webb telescope will revolutionize our understanding of the cosmos as it studies every phase of our universe's history, from the first luminous glows after the Big Bang to the evolution of our own solar system.

As the world's largest infrared telescope, Webb will offer unprecedented resolution and sensitivity from long-wavelength visible light, near-infrared and mid-infrared. It will detect objects up to 400 times more faint than can be observed by current ground- and space-based telescopes. Webb has four scientific goals:

- Search for the first light after the Big Bang
- Determine how galaxies evolved
- Observe the birth of stars and protoplanetary systems
- Investigate the properties of planetary systems and the origins of life

Our Role

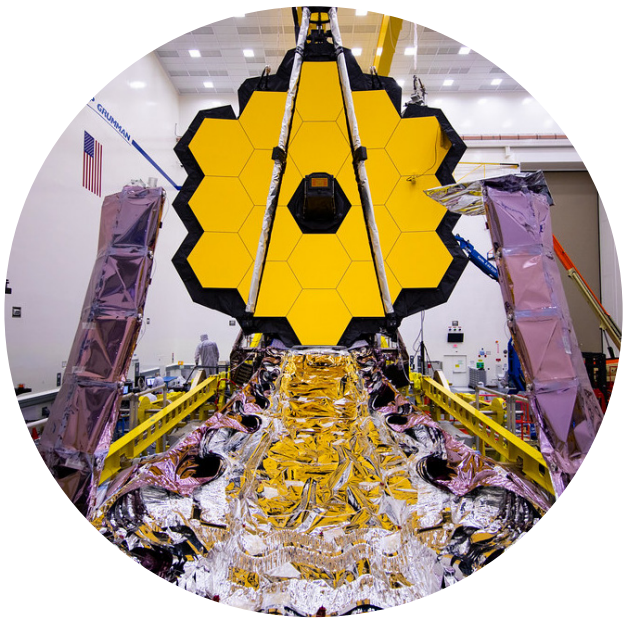
Our extensive space hardware experience on all four of NASA's Great Observatories made Ball the best choice for leading the development, design and manufacture of Webb's entire optics system, including the primary, secondary, tertiary and fine-steering mirrors. We are currently supporting integration and test on these systems. Ball is a principal subcontractor to Northrop Grumman Space Systems, the prime contractor for this mission.

Webb's magic is in the Ball-built mirrors. Its primary mirror is composed of 18 beryllium mirror segments working together as one mirror. Using a process called Wavefront Sensing and Control, our advanced software will calculate the optimum position of each of the mirrors. To accurately align the telescope, each primary mirror segment has seven Ball-built cryogenic actuators (tiny, mechanical motors) with both coarse- and fine-positioning capability to enable Webb's high-quality, sharp images.

We enable Webb to discover objects from the dawn of the universe with the largest, most innovative, deployable and adaptive mirror system ever developed.

Quick Facts

- Webb's primary mirror is comprised of 18 hexagonal mirror segments, each 1.3 meters (4.3 feet) in diameter
- Each mirror segment weighs about 20 kg (46 lbs.)
- The primary mirror's total diameter is 6.5 m (21 feet 4 in.)
- The primary mirror's gold coating is highly reflective over all the wavelengths the telescope will see, from visible to mid-infrared
- Because Webb is an infrared telescope, the mirrors and actuators must function at temperatures as low as -400^0 F (33K)
- Webb is the largest mirror and the first segmented telescope ever flown in space
- Webb is the first mirror to deploy in space. The efficient folding scheme allows the primary mirror to fit into an Ariane launch vehicle



James Webb Space Telescope secondary mirror struts (Credit: NASA)

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