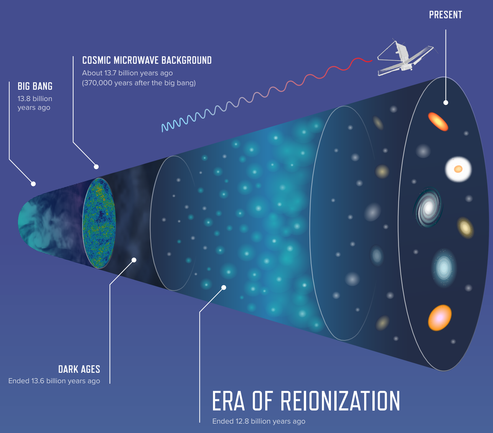
Cosmic Reionization

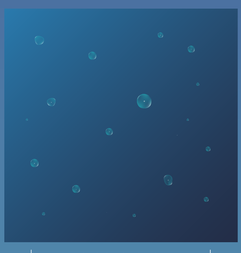
EXPLORING THE EARLY UNIVERSE

Our view of the universe wasn't always so clear. More than 13 billion years ago, neutral gas made the universe opaque to some types of light. Over hundreds of millions of years, the universe became transparent as its gas particles became charged or ionized. What caused the gas to change? The James Webb Space Telescope will peer deep into space to gather more information about objects in this period, known as the Era of Reionization, to help us understand this major transition in the history of the universe.

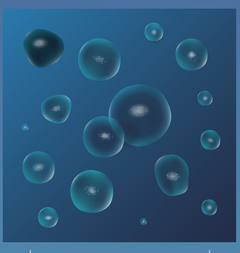


WHAT WE DO KNOW

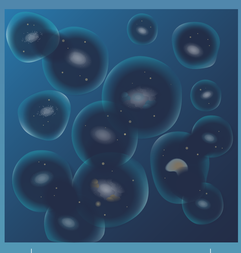
After the first stars formed, the universe was still cast in a gaseous fog, but as stars and young galaxies continued to evolve and produce more energetic light, they began to change the gas around them—converting it from neutral to ionized gas. Eventually, they transformed the space, making it possible to observe these early galaxies.



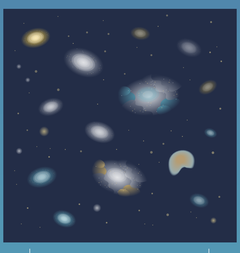
Stars begin forming, heating gas



Stars assemble into galaxies



Galaxies become more massive



Clear universe, end of reionization

OODLES OF NEW DATA

How did stars and galaxies change over time? Webb's infrared observations will help us create the first detailed snapshot of galaxies in the early universe—as well as provide much more information than ever possible before. With this new data, researchers will begin to analyze individual objects to understand how the surrounding gas changed from neutral to ionized, creating the transparent universe we see today.

Deliver a More Detailed Snapshot

Classify Individual Galaxies

Gauge the Energy Output of Luminous Objects

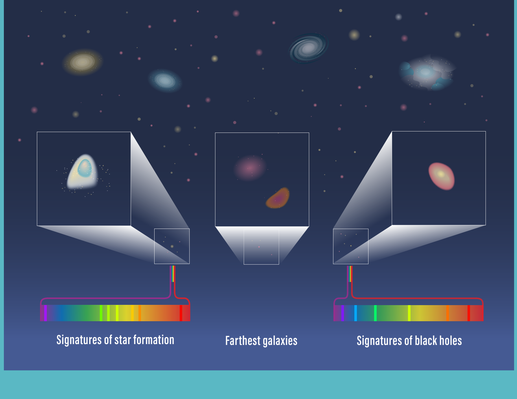
Measure Star Formation in Galaxies

Learn How Metal-rich Early Galaxies Were

Find Evidence of Early Black Holes

LOOKING BACK IN TIME

Webb will dig deeper into the universe's history than any other telescope—showing us galaxies as they began assembling more than 13 billion years ago. Only Webb has the sensitivity and resolution to deliver higher resolution images and unique, colorful spectra in infrared light (depicted below as rainbows) that will help us learn about the conditions in the Era of Reionization.



Signatures of star formation

Farthest galaxies

Signatures of black holes