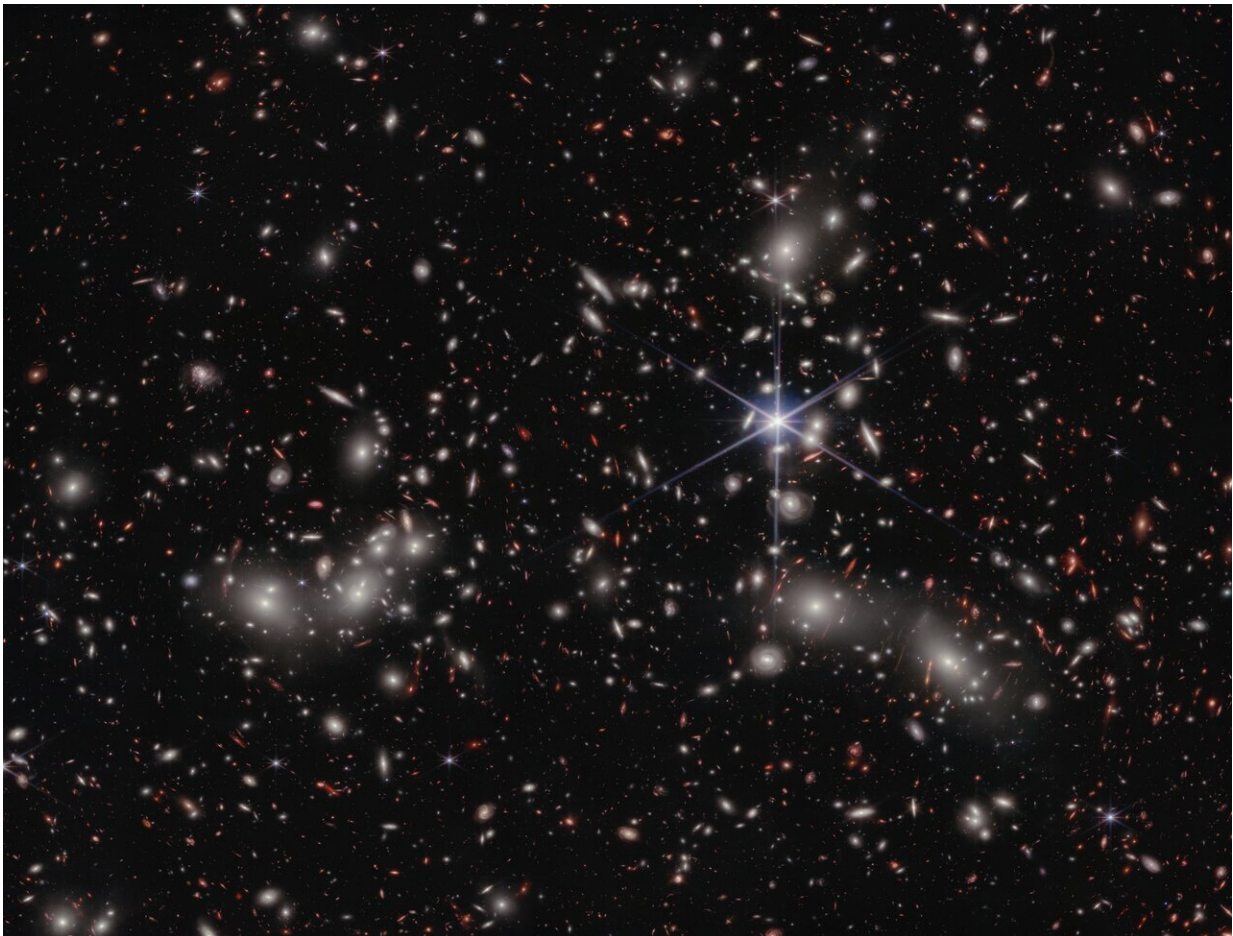


James Webb Space Telescope uncovers new details in Pandora's Cluster

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Credit: NASA

Astronomers have revealed the latest deep-field image from the

NASA/ESA/CSA James Webb Space Telescope, featuring never-before-seen details in a region of space known as Pandora's Cluster (Abell 2744). Webb's view displays three clusters of galaxies—already massive—coming together to form a megacuster.

The combined mass of the galaxy clusters creates a powerful gravitational lens, a natural magnification effect of gravity, allowing much more distant galaxies in the [early universe](#) to be observed by using the cluster like a magnifying glass.

Only Pandora's central core has previously been studied in detail by the NASA/ESA Hubble Space Telescope. By combining Webb's powerful infrared instruments with a broad mosaic view of the region's multiple areas of lensing, [astronomers](#) aimed to achieve a balance of breadth and depth that will open up a new frontier in the study of cosmology and galaxy evolution.

Astronomers studied the region as part of the Ultradeep NIRSpec and NIRCам Observations before the Epoch of Reionization (UNCOVER) program. The new view of Pandora's Cluster stitches four Webb snapshots together into one panoramic image, displaying roughly 50 000 sources of near-infrared light.

In addition to magnification, [gravitational lensing](#) distorts the appearance of distant galaxies, so they look very different from those in the foreground. The galaxy cluster "lens" is so massive that it warps the fabric of space itself, enough for light from distant galaxies that passes through that warped space to also take on a warped appearance.

In the lensing core to the lower right in the Webb image, which has never been imaged by Hubble, Webb revealed hundreds of distant lensed galaxies that appear like faint arced lines in the image.

The UNCOVER team used Webb's Near-Infrared Camera (NIRCam) to capture the cluster with exposures lasting 4–6 hours, for a total of about 30 hours of observing time. The next step is to meticulously go through the [imaging data](#) and select galaxies for follow-up observation with the Near-Infrared Spectrograph (NIRSpec), which will provide precise [distance measurements](#), along with other detailed information about the lensed [galaxies](#)' compositions, providing new insights into the early era of galaxy assembly and evolution.

The UNCOVER team expects to make these NIRSpec observations in the summer of 2023.

In the meantime, all of the NIRCam photometric data have been publicly released so that other astronomers can become familiar with them and plan their own scientific studies with Webb's rich datasets.

The [imaging mosaics and catalogue](#) of sources on Pandora's Cluster (Abell 2744) provided by the UNCOVER team combine publicly available Hubble data with Webb photometry from three early observation programs: JWST-GO-2561, JWST-DD-ERS-1324, and JWST-DD-2756.

Provided by NASA

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