**Astronomers reveal new details about dark matter’s influence on Universe**

**Strictly embargoed until 4pm GMT on Monday 26 January 2026 - Nature Astronomy embargo**

**-With pictures-**

Scientists have created the highest resolution map of the dark matter that threads through the Universe – showing its influence on the formation of stars, galaxies and planets.

The research, including astronomers from Durham University, UK, tells us more about how this invisible substance helped pull ordinary matter into galaxies like our Milky Way and planets like Earth.

The findings, using new data from NASA’s James Webb Space Telescope (Webb), are published in the journal Nature Astronomy.

The study was jointly led by Durham University, NASA’s Jet Propulsion Laboratory (JPL), and the École Polytechnique Fédéral de Lausanne (EPFL), Switzerland.

The new map confirms previous research and provides new details about the relationship between dark matter and the normal matter from which we – and everything we can touch or see – are made.

When the Universe began, dark matter and normal matter were probably sparsely distributed.

Scientists think dark matter clumped together first and then pulled in normal matter, creating regions where stars and galaxies began to form.

In this way, dark matter determined the large-scale distribution of galaxies we see in the Universe today.

By prompting galaxy and star formation to begin earlier than they would have otherwise, dark matter also played a role in creating the conditions for planets to eventually form. Without it we might not have the elements in our galaxy that allowed life to appear.

Research co-lead author Dr Gavin Leroy, in the Institute for Computational Cosmology, Department of Physics, Durham University, said: “By revealing dark matter with unprecedented precision, our map shows how an invisible component of the Universe has structured visible matter to the point of enabling the emergence of galaxies, stars, and ultimately life itself.

"This map reveals the invisible but essential role of dark matter, the true architect of the Universe, which gradually organises the structures we observe through our telescopes.”

Dark matter does not emit, reflect, absorb, or block light, and it passes through regular matter like a ghost.

However, it does interact with the rest of the Universe through gravity, something the new map shows with a new level of clarity.

Evidence for this interaction lies in the degree of overlap between maps of dark matter and normal matter.

According to the research, Webb’s observations confirm that this close alignment cannot be a coincidence. Instead, the astronomers say it is due to dark matter’s gravity pulling normal matter towards it throughout cosmic history.

Research co-author Professor Richard Massey, in the Institute for Computational Cosmology, Department of Physics, Durham University, said: “Wherever you find normal matter in the Universe today, you also find dark matter.

“Billions of dark matter particles pass through your body every second. There’s no harm, they don’t notice us and just keep going.

“But the whole swirling cloud of dark matter around the Milky Way has enough gravity to hold our entire galaxy together. Without dark matter, the Milky Way would spin itself apart.”

The area covered by the new map is a section of sky about 2.5 times larger than the full Moon, in the constellation Sextans.

Webb peered at this region for a total of about 255 hours and identified nearly 800,000 galaxies, with many detected for the first time.

The scientific team then looked for dark matter by observing how its mass curves space itself, which in turn bends the light traveling to Earth from distant galaxies – as if the light of those galaxies has passed through a warped windowpane.

The map contains about 10 times more galaxies than maps of the area made by ground-based observatories and twice as many as the Hubble Space Telescope.

It reveals new clumps of dark matter and captures a higher-resolution view of the areas previously seen by Hubble.

Research co-lead author Dr Diana Scognamiglio, of NASA’s Jet Propulsion Laboratory, said: “This is the largest dark matter map we’ve made with Webb, and it’s twice as sharp as any dark matter map made by other observatories.

“Previously, we were looking at a blurry picture of dark matter. Now we’re seeing the invisible scaffolding of the Universe in stunning detail, thanks to Webb’s incredible resolution.”

To refine measurements of the distance to many galaxies for the map, the team used Webb’s Mid-Infrared Instrument (MIRI).

Durham University’s Centre for Extragalactic Astronomy was involved in the development of MIRI, which was designed and managed through launch by JPL.

The wavelengths detected by MIRI make it adept at detecting galaxies obscured by cosmic dust clouds.

The team next plans to map dark matter throughout the entire Universe, using the European Space Agency’s (ESA) Euclid telescope and NASA’s upcoming Nancy Grace Roman Space Telescope.

They will learn more about dark matter’s fundamental properties and how dark matter might have changed over cosmic history.

However, that patch of sky studied in this latest research will be the reference on which all future mapping will be fine-tuned and compared.

**Media Information**

**Interviews**

Research co-lead author Dr Gavin Leroy, in the Institute for Computational Cosmology, Department of Physics, Durham University, is available for interview on Thursday 22 January, Friday 23 January up to 3pm. Dr Leroy can be contacted on [gavin.leroy@durham.ac.uk](mailto:gavin.leroy@durham.ac.uk).

Research co-author Professor Richard Massey, in the Institute for Computational Cosmology, Department of Physics, Durham University, is available for interview on Thursday 22 January and Friday 23 January (all day) and Monday 26 January (PM) on [r.j.massey@durham.ac.uk](mailto:r.j.massey@durham.ac.uk).

Alternatively, please contact Durham University’s Communications Office on [communications.team@durham.ac.uk](mailto:communications.team@durham.ac.uk).

**Pictures available**

The following images are available to download via this link: <https://bit.ly/4qwKLOY>

* Comparison vGL.jpg: The Dark Matter distribution in the COSMOS field observed by the Hubble Space Telescope (left) and by James Webb Space Telescope (right). Credit: Dr Gavin Leroy/Professor Richard Massey/COSMOS-Webb collaboration.
* Comparison+contours vGL.jpg: This map shows the Dark Matter distribution in the COSMOS field observed by the Hubble Space Telescope (left) and by James Webb Space Telescope (right). Dark Matter distribution in the COSMOS field. The overlaid contours mark regions of equal dark-matter density, highlighting where this invisible matter is most strongly concentrated. Credit: Dr Gavin Leroy/Professor Richard Massey/COSMOS-Webb collaboration.
* JWST mass\_map\_pos.jpg: Using data from the James Webb Space Telescope, astronomers have produced one of the most detailed maps to date of dark matter. By measuring how gravity from unseen matter bends the light of background galaxies, the map shows how dark matter acts as the hidden framework on which visible galaxies are built. Credit: Dr Gavin Leroy/Professor Richard Massey/COSMOS-Webb collaboration.
* HST+JWST mass\_map\_pos.jpg: Using data from the James Webb Space Telescope, astronomers have produced one of the most detailed maps to date of dark matter. By measuring how gravity from unseen matter bends the light of background galaxies, the map shows how dark matter acts as the hidden framework on which visible galaxies are built. Here the Dark matter map from the JWST telescope is framed inside the original HST map from 2007. Credit: Dr Gavin Leroy/Professor Richard Massey/COSMOS-Webb collaboration.
* contour\_map.jpg: Using data from the James Webb Space Telescope, astronomers have produced one of the most detailed maps to date of dark matter. By measuring how gravity from unseen matter bends the light of background galaxies, the map shows how dark matter acts as the hidden framework on which visible galaxies are built. The overlaid contours mark regions of equal dark-matter density, highlighting where this invisible matter is most strongly concentrated. Credit: Dr Gavin Leroy/COSMOS-Webb collaboration.
* press\_release\_HST.jpg: In 2007, astronomers produced the first detailed map of the hidden dark matter of the COSMOS field. By measuring how gravity from unseen matter bends the light of background galaxies, the map shows how dark matter is distributed and acts as the hidden framework on which visible galaxies are built. Credit: NASA, ESA and R Massey (California Institute of Technology).
* James Web Space Telescope: JWST in space near Earth. Credit NASA/dima\_zel.
* The Hubble Space Telescope hovers at the boundary of Earth and space in this picture. Hubble drifts 353 miles (569 km) above the Earth's surface, where it can avoid the atmosphere and clearly see objects in space. Credit NASA.

Alternatively, please contact Durham University’s Communications Office on [communications.team@durham.ac.uk](mailto:communications.team@durham.ac.uk).

**Source information**

An ultra-high-resolution map of (dark) matter, Diana Scognamiglio, Gavin Leroy, David Harvey, et al, is published in Nature Astronomy, DOI 10.1038/s41550-025-02763-9.

A copy of this paper, embargoed until 4pm GMT on Monday 26 January 2026,is available from Durham University’s Communications Office on [communications.team@durham.ac.uk](mailto:communications.team@durham.ac.uk).

The paper will appear at the following web link after the embargo of 4pm GMT on Monday 26 January 2026: [https://www.nature.com/articles/s41550-025-02763-9](https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Furldefense.us%2Fv3%2F__https%3A%2F%2Fwww.nature.com%2Farticles%2Fs41550-025-02763-9__%3B!!PvBDto6Hs4WbVuu7!L8ukL9Bqv12cB_UwmzqubJNbtCGnvCNica7RRSoruy7C2toMZvVsGqadwiGx7BznpbsFGxiRcJTCiWJgiCJheXw%24&data=05%7C02%7Cleighton.kitson%40durham.ac.uk%7C9952fb65e5924b6d116708de52d78888%7C7250d88b4b684529be44d59a2d8a6f94%7C0%7C0%7C639039282858805617%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMiIsIkFOIjoiTWFpbCIsIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=o58QYL8s58o4lYc8uDumqPFePhLlk7fNdgqwx%2BqVRq0%3D&reserved=0)

**More about Webb and MIRI**

The James Webb Space Telescope is solving mysteries in our solar system, looking beyond to distant worlds around other stars, and probing the mysterious structures and origins of our universe and our place in it. Webb is an international program led by NASA with its partners, ESA (European Space Agency) and CSA (Canadian Space Agency). To learn more about Webb, visit [**https://science.nasa.gov/webb**](https://science.nasa.gov/webb)

**About Durham University**

Durham University is a globally outstanding centre of teaching and research based in historic Durham City in the UK.

We are a collegiate university committed to inspiring our people to do outstanding things at Durham and in the world.

We conduct research that improves lives globally and we are ranked as a world top 100 university with an international reputation in research and education (QS World University Rankings 2026).

We are a member of the Russell Group of leading research-intensive UK universities, The Times and Sunday Times UK University of the Year 2026, and ranked in the top five in all three major UK university rankings (The Times and The Sunday Times Good University Guide, the Guardian University Guide, and the Complete University Guide).

For more information about Durham University visit: [www.durham.ac.uk/about/](https://www.durham.ac.uk/about/)

**END OF MEDIA RELEASE – issued by Durham University Communications Office**