Euclid UK Press Release

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UK astronomers help Euclid capture our sharpest ever panoramas of the Universe



Euclid's view of Abell 3128, a cluster of hundreds of galaxies around 800 million light-years away. Credit: ESA/Euclid/Euclid Consortium/NASA. Image processing by J.-C. Cuillandre, E. Bertin and the Science Ground Segment.

Teams of scientists and engineers across the UK involved in the European Space Agency's Euclid mission have used breakthrough techniques to reveal the first large pieces of its map of the Universe, unprecedented for their unique combination of incredible detail and remarkable area.

This latest data release, known as DR1-Foundation, covers an area of sky as big as 9500 full Moons from just one year of observing. Some 900 million galaxies are now seen with phenomenal clarity thanks to cutting-edge UK research.

Euclid is transforming our understanding of the Universe. A flurry of discoveries is announced today (Thurs 12 November) that includes the combined efforts of astronomers, the public, and AI, contributing to our largest ever catalogue of gravitational lenses. Studying these objects, the apparent warping of distant galaxies, is one of the clues that will unlock the mysteries of dark matter and dark energy, shedding light on our place in the Universe.

In collaborating with partners around the world, British technology and expertise is enabling groundbreaking discoveries with Euclid using state-of-the-art algorithms and cameras, thanks to £54 million of investment from the UK Space Agency in the mission.

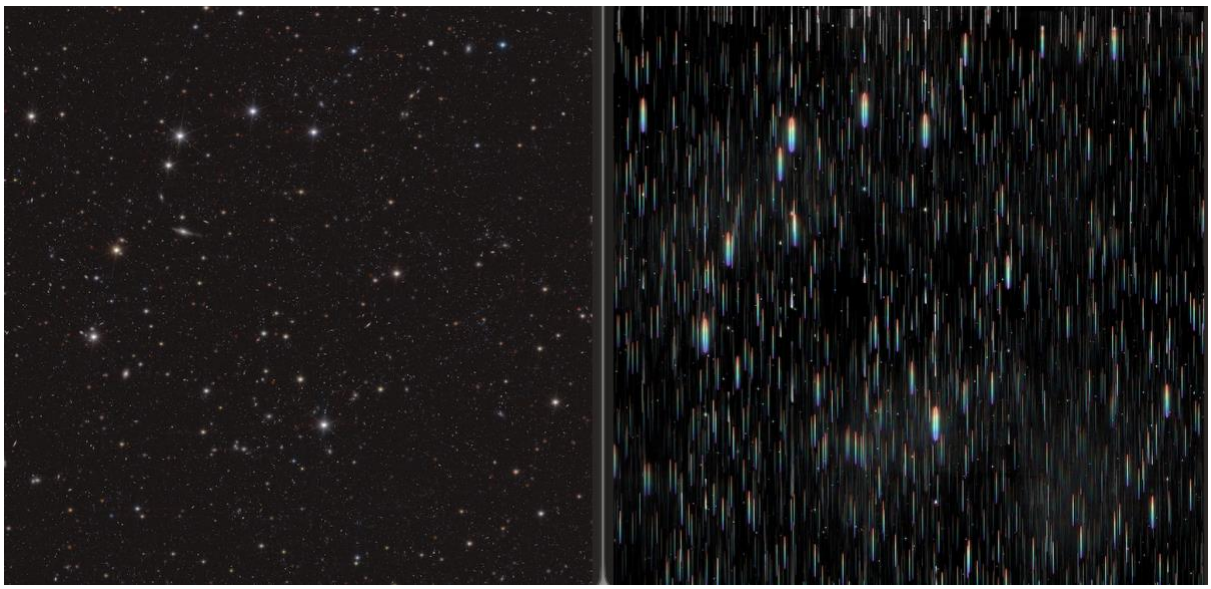
Launched in July 2023, the Euclid space telescope is on a mission to map one third of the sky in exquisite detail. This is made possible by an onboard visible instrument (VIS), with its design and build led by University College London's Mullard Space Science Laboratory (MSSL).

A team of seven UK universities, led by the University of Edinburgh, is also designing brand new analysis pipelines to push forward groundbreaking science within the large datasets VIS produces. Known as the UK Science Ground Segment, they work behind the scenes to account for the effects of radiation on the detectors and understand the telescope's optics to measure the properties of galaxies with incredible precision.

Remarkably, this latest release is still just a small part of what will become Euclid's complete cosmic atlas. Even so, it is 1.7 million gigabytes in size, equivalent to a mixtape that would take 2,000 years to listen to.

Professor Andy Taylor of the University of Edinburgh, who leads the UK Science Ground Segment for the mission, says "These huge, ultra-high-definition images from Euclid are a gamechanger for astronomy. Euclid is proving itself to be a 'Super-Hubble Space Telescope', with the same high resolution but over large areas of the sky, taking just days to see more of the cosmos than Hubble has ever seen in its decades of operation.

"It is an exciting time for astronomy as we turn these amazing images into a 3D map of the Universe, creating a laboratory to probe dark matter and dark energy."



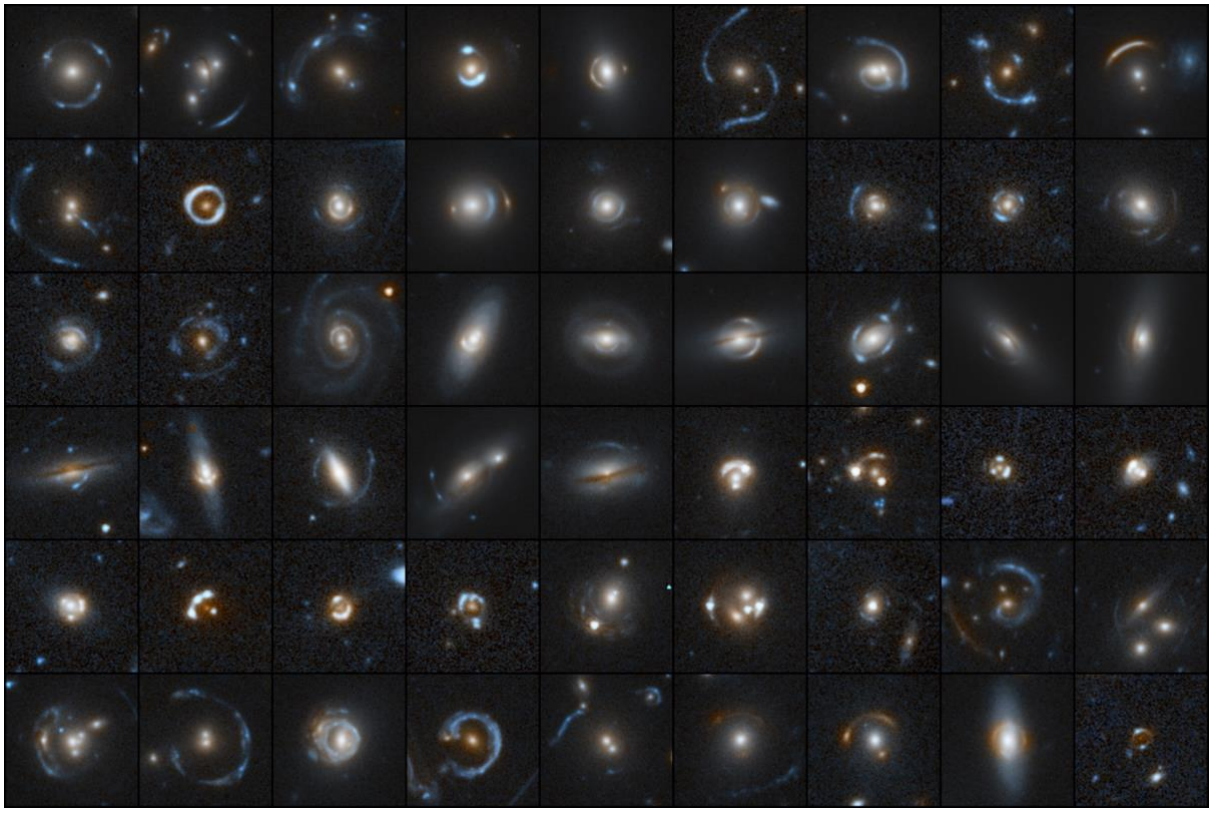
The image on the left shows a patch of sky filled with stars and other cosmic objects. On the right, these objects are transformed into stretched rainbows of light through the process of spectroscopy. Credit: ESA/Euclid/Euclid Consortium/NASA, image processing by B. Granett

As well as capturing beautiful, panoramic images, Euclid can also split up light like a rainbow, in a technique known as spectroscopy. UK-led research and techniques have contributed to the detailed spectra of more than 160 million sources in this release.

Beyond the standard one-dimensional spectra, a new method led by Louis Gabarra at the University of Oxford unlocks a new capability of Euclid's near-infrared spectrometer, NISP. Using slitless spectroscopic observations and new software, known as 'GELSA', partially developed thanks to a UK Research and Innovation (UKRI) grant, it produces spatially resolved emission-line maps of galaxies. This breakthrough allows scientists to understand how and where stars form within galaxies over cosmic time.

Spectra also give us the distances to galaxies and allow us to investigate their chemical composition and measure their redshifts, enabling Euclid to produce what will become the most detailed 3D map of the Universe to date.

Within this unfurling map are illusions of spacetime, known as strong gravitational lenses, where light rays from background galaxies travelling on a path toward us bend due to the presence of heavy objects such as galaxy clusters.



A collage of 54 strong gravitational lenses seen in Euclid's latest release. Each lens is tiny on the sky, about the size of a one-pence coin seen from 150 metres away, requiring the exceptional resolution of Euclid to resolve and breakthrough methods to discover in haystack of data. Credit: ESA/Euclid/Euclid Consortium/NASA, image processing by N. Lines and T. Li

Thanks to a UK-led effort with teams based at Portsmouth, Newcastle, and Oxford, Euclid is revolutionising the number of these we can find, with more than 15,000 catalogued in this dataset alone. These objects are now abundant clues for scientists to understand the

mysteries of the influences we can't see directly but dictate how the Universe formed and how it ultimately ends – dark matter and dark energy.

Dr James Nightingale, an astronomer at Newcastle University, developed the software used to analyse Euclid's 15,000 strong gravitational lenses. He said, "When I began studying strong lensing in 2012, I had just 50 lenses to work with. Now, with Euclid, we need to analyse that many every hour just to keep up.

"By doing this for thousands of galaxies we can begin to answer much bigger questions: how do galaxies grow, where is their matter, and what does this tell us about the Universe as a whole?"

"Over 10 years ago, we forecast that Euclid would revolutionise the field of strong lens discovery. That day is finally here." says Natalie Lines, PhD student at the University of Portsmouth, who was recently awarded the 2026 Jocelyn Bell Burnell medal by the Institute of Physics for her work on observational cosmology.

Contributing to the strong gravitational lens classifications have been members of the public, thanks to a citizen science project hosted on the Zooniverse platform – Space Warps.

"These spectacular discoveries were only possible thanks to the powerful combination of machine learning classifiers and the incredible contributions of thousands of citizen scientists. These volunteers made over 4 million classifications and their efforts were truly humbling - the incredible strong lens systems we have found are a testament to the huge team effort which has gone into identifying them." said Philip Holloway, Research Fellow at the University of Portsmouth.

Recently featuring at events including the Royal Society's Summer Science Exhibition and New Scientist Live, UK teams are spotlighting the varied career opportunities and further ways for communities and schools to get involved in an international mission such as Euclid.

"Euclid's dataset isn't just for scientists, it's for all of us. Each jigsaw piece that gets added to this remarkable cosmic atlas tells us more about humanity's place in the Universe." says James Fawcett-Newell at the University of Edinburgh, UK Public Engagement Lead for the Euclid mission.

Attention will soon turn to how the countless objects catalogued by Euclid can reveal more about the dark matter and dark energy that make up 95% of the Universe, in a way that ground-based telescopes alone cannot. The first cosmology results are expected in 2027.

For further information and for interviews, contact:

James Fawcett-Newell, Euclid UK Public Engagement Lead

Email - james.fawcett@roe.ac.uk