https://www.hermanus.astronomy@gmail.com

"The Southern Cross"

The Hermanus Astronomy Centre Monthly Newsletter

April 2025

MONTHLY MEETINGS

*(These meetings are scheduled for the **Third Tuesday** of each month except December)*

Our last meeting was held on **Tuesday 18th March** at **Onrus Manor** and on Zoom. The presentation was by **Dr JJ van Zyl**, senior lecturer at Stellenbosch University, titled *"**Unlocking the Secrets of the Universe with Cosmic Rays: From Nuclear Security to Dark Matter!**"*.

We were treated to a relaxing but highly educational presentation on cosmic particles. Did you know that we are being attacked by muons at the rate of about one every second? And JJ showed us his "toy" detector to prove it! But don't take my word for it, rather watch the recording of the presentation and subsequent discussion from the floor. Herewith the link:

https://www.youtube.com/watch?v=z6w-TN_8Mww

The next meeting is scheduled for **Tuesday 15th April**.

Dr Christiaan Hettlage, an astrophysicist with the **South African Astronomical Observatory (SAAO)** and former chairman of the **Cape Centre**, is known for making complex astronomy accessible, engaging and fun. When he's not studying the universe, he's probably sharing his passion with curious minds like yours.

His presentation:

"Black Holes: The Dark Mysteries of the Universe Unveiled".

Black holes—the universe's most enigmatic monsters—lurk in the darkness of space and warp reality itself. But how do we *know* they exist? And what happens if you fall into one?

We anticipate a thrilling exploration of these cosmic giants, where Einstein's mind-bending *Theory of Relativity* meets real-world astronomy. Discover:

- The science behind black holes—no PhD required!
- The surprising link between spacetime and spaghetti (yes, really!)
- How astronomers captured the first-ever image of our galaxy's supermassive black hole
- The violent collisions of black holes—detected from billions of light-years away!

The venue is **Onrus Manor clubhouse**, the time **18.00 (6 p.m.)**. This will be a hybrid meeting with accessibility on Zoom.

SPECIAL INTEREST GROUP ACTIVITIES

Cosmology

These meetings are scheduled for the **First Tuesday** of each month except January.

On Tuesday 4th March we watched and discussed the second half of THE ENTIRE HISTORY OF THE UNIVERSE, episode 26: *"How did the Universe Begin?"*.

The video link:

https://www.youtube.com/watch?v=3Illx0WkCxU&list=PLROBLlvnR7BEF9b1NOvRf_zhboibmywJb&index=26&t=26s&pp=iAQB

The discussion link: https://youtu.be/2k4SithdnFY

The **April** meeting, scheduled for **Tuesday 1st**, will be episode 27: *"What is Hidden in the Darkness at the Beginning of Time?"*

For further information regarding the Cosmology group, contact Derek Duckitt – derek.duckitt@gmail.com

Study Group

Scheduled for the **Last Tuesday** of each month except December.

Our last meeting, scheduled for 25th February, was postponed (mainly due to loadshedding).

On **Tuesday 11th March**, we watched **Brian Greene** discussing *"What Creates Time?"* with **Julian Barbour.**

Our next meeting is scheduled for **Tuesday 25th April** and is the second part of the above.

For further information regarding the Study Group, contact Peter Harvey petermh@hermanus.co.za

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Observing

On Friday March 29, we, four HAC members with about 20 members of the Hermanus Hikers club, gathered for a stargazing evening off Rotary Way. Very good conditions and enthusiastic participation made for a most enjoyable event. Many thanks to Pierre for facilitating.

Optimal dates for **April 2024**:

SUGGESTED EVENING OBSERVATION WINDOWS

(Lunar observations notwithstanding)

Date	*Moon*		*Dusk end*
April 19	*Rises*	**22h38 (70%)**	**19h39**
to **April 30**	*Sets*	**19h48 (6%)**	**19h28**

Skynotes Moon feature ***Endymion Crater***.

Skynotes Object of the month: ***eta Carinae Nebula***

Moonwatch Within a few days either side of the **First Quarter** (April 5th)

The Sun The Sun and Auroral Activity:

Meteors The presence of the Moon make observation prospects for the **γ Normids** look poor for the maximum date, April 22nd at 03h30. However, the π Puppids look more promising on 23rd at a reasonable evening observation time. But the hourly rate is very low. For more details, see the April *Skynotes*.

Comets From **Tim Cooper**

CAMNotes2025 No.2, April to June, is not yet available. You will be informed as soon as it is posted.

https://assa.saao.ac.za/wp-content/uploads/sites/23/2024/12/ASSA-CAMnotes-2025-Number-1.pdf

MNASSA

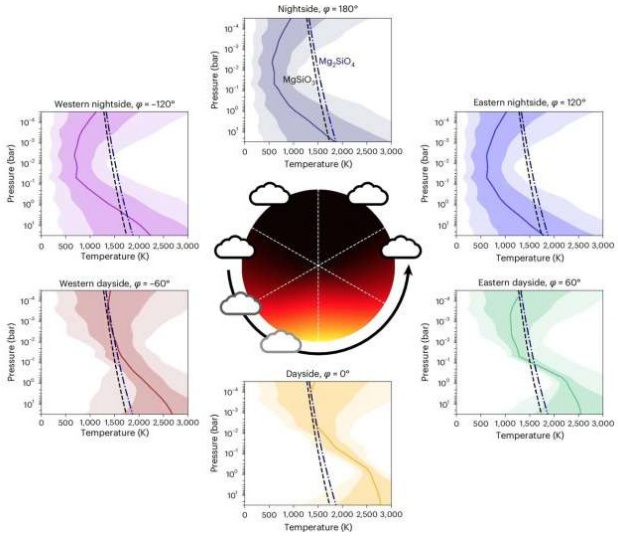
The Monthly Notes of the Astronomical Society of Southern Africa is available on

http://www.mnassa.org.za/

ASTRONOMY NEWS: March 2025 overleaf…

(Compiled by Pieter Kotzé)

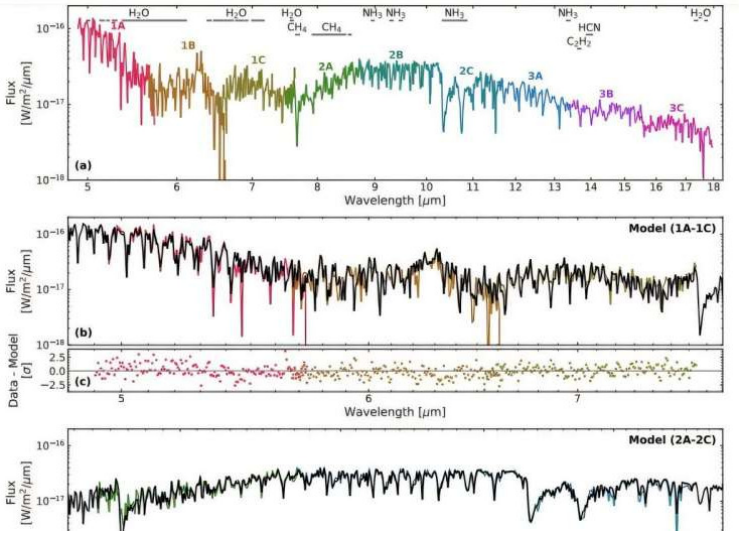
JWST uncovers rare ultra-hot Neptune LTT 9779 b's exotic atmosphere



Longitudinal transition of LTT 9779 b from cloudy to cloud free. Credit: Nature Astronomy (2025). DOI: 10.1038/s41550-025-02488-9

A team of international researchers including Dr. Jake Taylor from the Department of Physics at the University of Oxford, has used the James Webb Space Telescope (JWST) to explore the exotic atmosphere of LTT 9779 b, a rare "ultra-hot Neptune." The study offers new insights into the extreme weather patterns and atmospheric properties of this fascinating exoplanet, LTT 9779 b, that resides in the so-called hot Neptune desert, a category of planets where exceptionally few are known to exist. While giant planets orbiting very close to their host stars—often called hot Jupiters—are commonly detected using current exoplanet-finding methods, ultra-hot Neptunes like LTT 9779 b remain remarkably rare.https://phys.org/news/2025-02-jwst-uncovers-rare-ultra-hot.html

Hydrogen cyanide and acetylene detected in a brown dwarf atmosphere for the first time

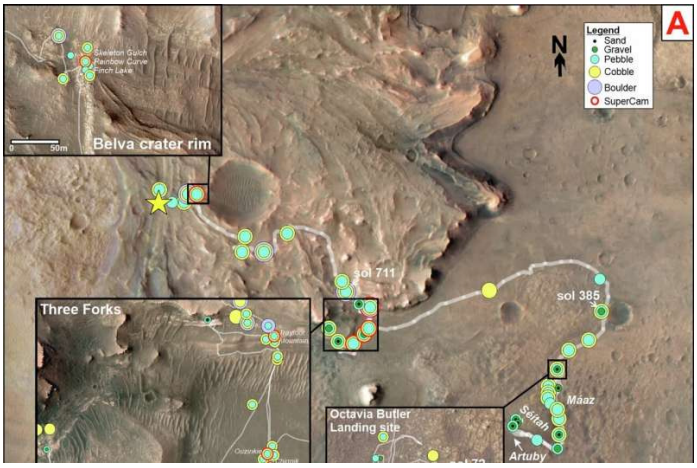


The MIRI/MRS spectrum of WISE-0458, and the best-fit model. Credit: arXiv (2025). DOI: 10.48550/arxiv.2502.13610

Using the James Webb Space Telescope (JWST), an international team of astronomers has explored the atmosphere of a nearby brown dwarf binary designated WISE J045853.90+643451.9. As a result, they detected hydrogen cyanide and acetylene in the atmosphere of this binary, marking the first time these two species have been identified in the atmosphere of a brown dwarf. Brown dwarfs are intermediate objects between planets and stars. Astronomers generally agree that they are substellar objects occupying the mass range between 13 and 80 Jupiter masses. One subclass of brown dwarfs (with effective temperatures between 500 and 1,500 K) is known as T-dwarfs, and represents the coolest and least luminous substellar objects so far detected. Located just 30.1 light years away, WISE J045853.90+643451.9 (or WISE-0458) is a binary composed of two T-dwarfs of spectral type T8.5 and T9, with effective temperatures of 600 and 500 K, respectively.

https://phys.org/news/2025-02-hydrogen-cyanide-acetylene-brown-dwarf.html

Unburied treasure: Rover researchers find unexpected minerals on Mars that hint at possibility of ancient life

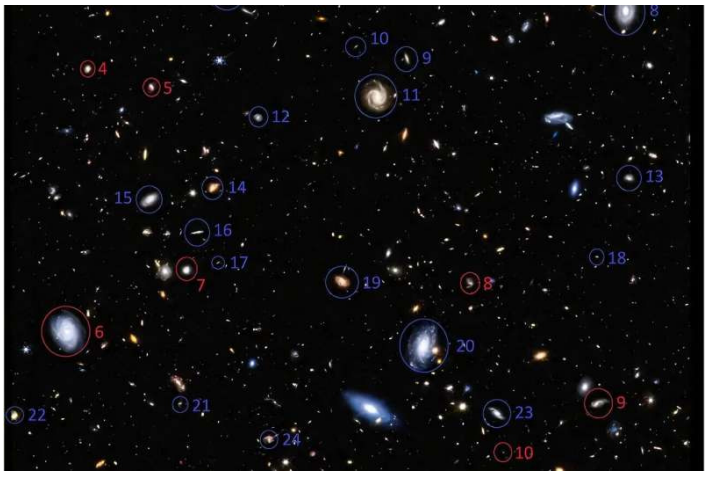


Rover traverse and light-toned float rocks detection. Credit: *Communications Earth & Environment* (2024). DOI: 10.1038/s43247-024-01837-2

Sometimes scientists must dig and work and sweat to make scientific discoveries. And sometimes a robot rolls over a rock that turns out to be a revelation. That's what happened when Mars exploration expert Roger Wiens, professor of Earth, atmospheric, and planetary sciences in the College of Science at Purdue University, had NASA's Perseverance rover shoot its laser at some oddly pale rocks lying on the Martian surface—and discovered that they are composed of unusually high aluminium associated with the mineral kaolinite. That was interesting on its own, but what made the discovery fascinating is that this mineral typically forms only in very warm and wet environments. The discovery, published by Wiens and his team in *Communications Earth & Environment*, suggests that Mars may have been warmer, wetter and weirder than scientists suspected.

https://phys.org/news/2025-03-unburied-treasure-rover-unexpected-minerals.html

Puzzling observation by JWST: Galaxies in the deep universe rotate in the same direction

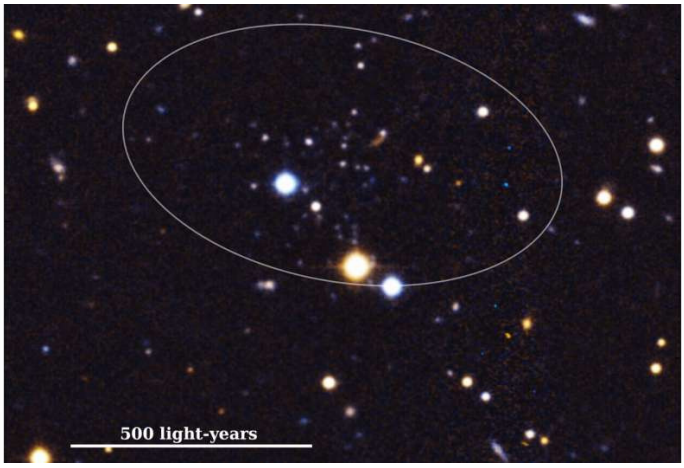


Spiral galaxies imaged by JWST that rotate in the same direction relative to the Milky Way (red) and in the opposite direction relative to the Milky Way (blue). The number of galaxies rotating in the opposite direction relative to the Milky Way as observed from Earth is far higher. Credit: Monthly Notices of the Royal Astronomical Society (2025). DOI: 10.1093/mnras/staf292

In just over three years since its launch, NASA's James Webb Space Telescope (JWST) has generated significant and unprecedented insights into the far reaches of space, and a new study by a Kansas State University researcher provides one of the simplest and most puzzling observations of the deep universe yet. In images of the deep universe taken by the James Webb Space Telescope Advanced Deep Extragalactic Survey, the vast majority of the galaxies rotate in the same direction, according to research by Lior Shamir, associate professor of computer science at the Carl R. Ice College of Engineering. About two thirds of the galaxies rotate clockwise, while just about a third of the galaxies rotate counter clockwise.

https://phys.org/news/2025-03-puzzling-jwst-galaxies-deep-universe.html

Small, faint and 'unexpected in a lot of different ways': Dwarf galaxy discovery forces rethink of cosmic evolution



Researchers led by astronomers at the University of Michigan have discovered the smallest and dimmest galaxy to date that's orbiting the Andromeda system, the Milky Way's nearest major galactic neighbour. The newfound galaxy, Andromeda XXXV, is seen within the white ellipse. Credit: CFHT/MegaCam/PAndAS (Principal investigator: Alan McConnachie; Image processing: Marcos Arias)

A discovery made by a team led by researchers at the University of Michigan tugs at the seams of some key cosmic lessons we thought we had learned from our own galaxy. This new knowledge comes from the outskirts of Andromeda, the Milky Way's nearest major galactic neighbour, where astronomers have found the system's smallest and dimmest satellite galaxy to date. This dwarf galaxy, named Andromeda XXXV and located roughly 3 million light-years away, is forcing astronomers to rethink how galaxies evolve in different cosmic environments and survive different epochs of the universe. Although the discovery bears more questions than answers, that's what happens when you're investigating the universe, said Marcos Arias, the lead author of the report in *The Astrophysical Journal Letters* that details the discovery.

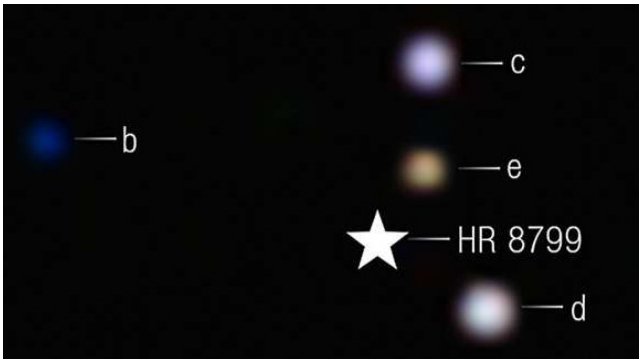
https://phys.org/news/2025-03-small-faint-unexpected-lot-ways.html

Four tiny planets are orbiting one of our nearest stars

Astronomers have revealed new evidence that not just one, but four tiny planets are circling around Barnard's Star, the second-nearest star system to Earth. The four planets, each only about 20 to 30% the mass of Earth, are so close to their home star that they zip around the entire star in a matter of days. That probably means they are too hot to be habitable, but the find is a new benchmark for discovering smaller planets around nearby stars. The resulting paper is published in *The Astrophysical Journal Letters*. "It's a really exciting find—Barnard's Star is our cosmic neighbour, and yet we know so little about it," said Ritvik Basant, Ph.D student at the University of Chicago and first author on the study. "It's signalling a breakthrough with the precision of these new instruments from previous generations." Barnard's Star is a type called an M dwarf star, which we now know is extremely numerous in the universe. Scientists, therefore, would like to know more about what kinds of planets they host.The finding adds weight to a November study by a team using a different telescope, which had found strong evidence for one planet around Barnard's Star and hints at others.

https://phys.org/news/2025-03-tiny-planets-orbiting-nearest-stars.html

Webb telescope directly observes exoplanet CO_2 for first time



The clearest look in the infrared yet at the iconic multi-planet system HR 8799. Colours are applied to filters from Webb's NIRCam (Near-Infrared Camera). A star symbol marks the location of the host star HR 8799, whose light has been blocked by the coronagraph. In this image, the colour blue is assigned to 4.1 micron light, green to 4.3 micron light, and red to the 4.6 micron light. Credit: NASA, ESA, CSA, STScI, W. Balmer (JHU), L. Pueyo (STScI), M. Perrin (STScI)

The James Webb Space Telescope has directly observed the key chemical of carbon dioxide in planets outside of our solar system for the first time, scientists announced Monday. The gas giants are not capable of hosting extraterrestrial life, but do offer clues in a lingering mystery about how distant planets form, according to a study in *The Astrophysical Journal*. The HR 8799 system, 130 light years from Earth, is only 30 million years old—just a baby compared to our solar system's 4.6 billion years. A U.S.-led team of researchers used Webb to directly detect carbon dioxide in the atmosphere of all four of the system's known planets, according to the study.

https://phys.org/news/2025-03-webb-telescope-exoplanet.html

https://phys.org/news/2025-03-jwst-captures-images-carbon-dioxide.html

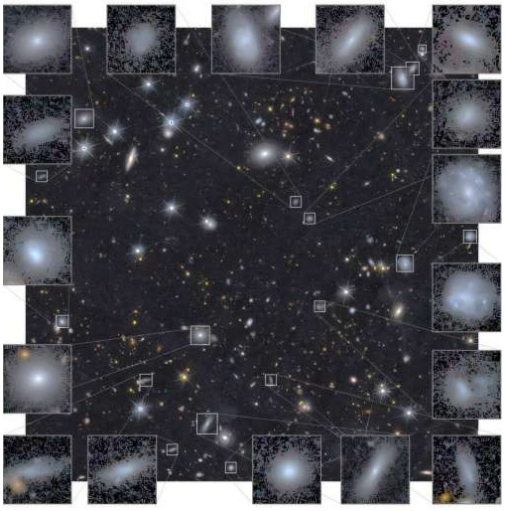
'Beyond what we'd hoped': SKA-Low's first glimpse of the universe

The first image from an early working version of the SKA Observatory's SKA-Low telescope, which is currently under construction on Wajarri Yamaji Country in Western Australia. Credit: SKAO

The first image from the international SKA Observatory's telescope in Australia, SKA-Low, has been released today—a significant milestone in its quest to reveal an unparalleled view of our universe. It is the first image from an early working version of the SKA-Low telescope, using just 1,000 of the planned 131,000 antennas, and an exciting indication of the scientific revelations that will be possible with the world's most powerful radio observatory. SKA-Low is one of two telescopes under construction by the SKA Observatory (SKAO), co-hosted in Australia and South Africa on behalf of its member states and the global community. The image shows an area of sky of about 25 square degrees—equivalent to approximately 100 full moons. In it we see around 85 of the brightest known galaxies in that region, all of which contain supermassive black holes. When complete, the same area of sky will reveal much more—scientists calculate the telescope will be sensitive enough to eventually show more than 600,000 galaxies in the same frame.

https://phys.org/news/2025-03-ska-glimpse-universe.html

Astronomers discover 2,674 dwarf galaxies using Euclid telescope

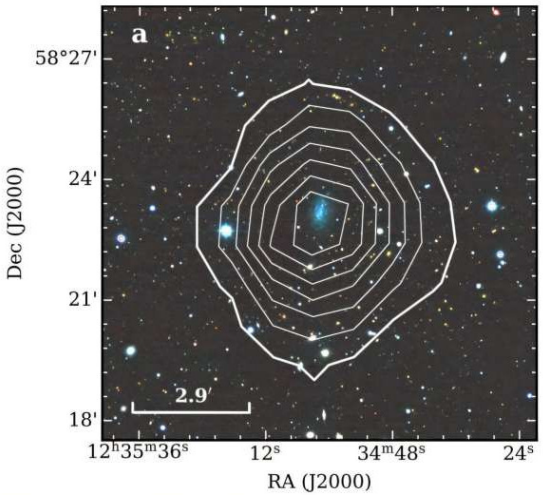


Some of the dwarf galaxies discovered in the Euclid images. Credit: arXiv (2025). DOI: 10.48550/arxiv.2503.15335

ESA's Euclid space telescope has been providing valuable data from the depths of space for almost two years. With its help, the largest and most accurate 3D map of the universe to date is to be created, with billions of stars and galaxies. The data from Euclid is analyzed by the international Euclid consortium, which also includes the research teams of Francine Marleau and Tim Schrabback at the University of Innsbruck. From 25 Euclid images, astronomer Marleau and her team at the Department of Astro- and Particle Physics at the University of Innsbruck have now discovered a total of 2,674 dwarf galaxies and created a catalogue of dwarf galaxy candidates. Using a semi-automatic method, the scientists have identified candidates and analyzed and described them in detail.

https://phys.org/news/2025-03-astronomers-dwarf-galaxies-euclid-telescope.html

FAST detects new ultra-faint dwarf galaxy



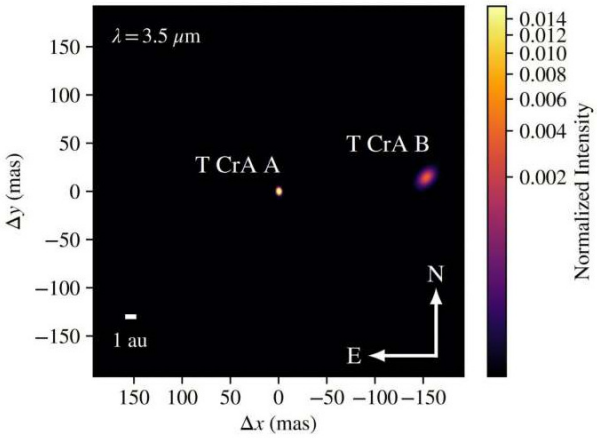
H I column-density map of KK153 from the FAST observation shown in white contours overlaid on the DESI-RGB (g, r, z) image in colour scale. Credit: arXiv (2025). DOI: 10.48550/arxiv.2503.08999

Using the Five-hundred-meter Aperture Spherical radio Telescope (FAST), Chinese astronomers have detected a new ultra-faint dwarf galaxy, which turned out to be gas-rich. The finding was reported in a research paper published March 12 on the preprint server *arXiv*. The so-called ultra-faint dwarf galaxies (UFDs) are the least luminous, most dark matter–dominated, and least chemically evolved galaxies known.

Therefore, they are perceived by astronomers as the best candidate fossils from the universe at its early stages. A team of astronomers led by Jin-Long Xu of the Chinese Academy of Sciences (CAS) is carrying out a FAST extragalactic H I (neutral atomic hydrogen) survey (FASHI). One of the objectives of this survey is to search for dark and weak galaxies. Now, they report the finding of a new UFD as part of this project.

https://phys.org/news/2025-03-fast-ultra-faint-dwarf-galaxy.html

Observations detect a companion star to T Coronae Australis

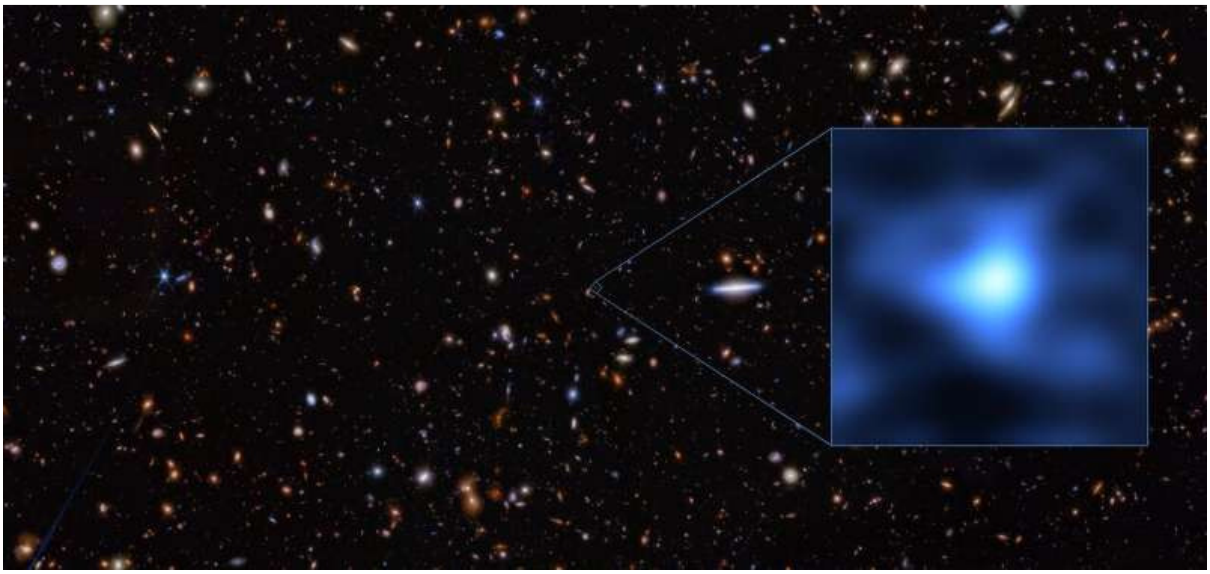


Best-fit model image corresponding to the fit to the three complete L-band data sets. The companion is clearly visible at 153 mas separation toward the west direction. Credit: arXiv (2025). DOI: 10.48550/arxiv.2503.08523

Using the Very Large Telescope Interferometer (VLTI), an international team of astronomers has observed a young Herbig Ae-type star known as T Coronae Australis. As a result, they found that the star has a companion separated by about 23 AU from it. The discovery was reported March 11 on the *arXiv* preprint server. Herbig Ae/Be stars (HAeBe) represent a class of early-type intermediate-mass pre-main sequence (PMS) stars still embedded in gas–dust envelopes and not yet fusing hydrogen to helium. They are between two and ten times more massive than the sun and have spectral types A, B, and in a few cases F.T Coronae Australis (or T CrA for short) is a Herbig Ae-type star of spectral type F0 in the Coronet Cluster of the Corona Australis star-forming region, at a distance of about 500 light years. The star resides in a complex circumstellar environment, which includes a circumstellar disk, accretion streamers, jets and outflows.

https://phys.org/news/2025-03-companion-star-coronae-australis.html

Oxygen discovered in most distant known galaxy



The precise location in the night sky of the galaxy JADES-GS-z14-0, an extremely tiny dot in the Fornax constellation. Credit: ALMA (ESO/NAOJ/NRAO)/S. Carniani et al./S. Schouws et al/JWST: NASA, ESA, CSA, STScI, Brant Robertson (UC Santa Cruz), Ben Johnson (CfA), Sandro Tacchella (Cambridge), Phill Cargile (CfA)

Two different teams of astronomers have detected oxygen in the most distant known galaxy, JADES-GS-z14-0. The discovery, reported in two separate studies, was made possible thanks to the Atacama Large Millimeter/submillimeter Array (ALMA), in which the European Southern Observatory (ESO) is a partner. This record-breaking detection is making astronomers rethink how quickly galaxies formed in the early universe. Discovered last year, JADES-GS-z14-0 is the most distant confirmed galaxy ever found: it is so far away, its light took 13.4 billion years to reach us, meaning we see it as it was when the universe was less than 300 million years old, about 2% of its present age. The new oxygen detection with ALMA, a telescope array in Chile's Atacama Desert, suggests the galaxy is much more chemically mature than expected.

https://phys.org/news/2025-03-oxygen-distant-galaxy.html

NASA's Curiosity Rover Detects Largest Organic Molecules Found on Mars

NASA's Curiosity rover drilled into this rock target, "Cumberland," during the 279th Martian day, or sol, of the rover's work on Mars (May 19, 2013) and collected a powdered sample of material from the rock's interior. Curiosity used the Mars Hand Lens Imager camera on the rover's arm to capture this view of the hole in Cumberland on the same sol as the hole was drilled. The diameter of the hole is about 0.6 inches. The depth of the hole is about 2.6 inches.

Researchers analyzing pulverized rock onboard NASA's Curiosity rover have found the largest organic compounds on the Red Planet to date. The finding, published Monday in the Proceedings of the National Academy of Sciences, suggests prebiotic chemistry may have advanced further on Mars than previously observed. Scientists probed an existing rock sample inside Curiosity's Sample Analysis at

Mars (SAM) mini-lab and found the molecules decane, undecane, and dodecane. These compounds, which are made up of 10, 11, and 12 carbons, respectively, are thought to be the fragments of fatty acids that were preserved in the sample. Fatty acids are among the organic molecules that on Earth are chemical building blocks of life. Living things produce fatty acids to help form cell membranes and perform various other functions. But fatty acids also can be made without life, through chemical reactions triggered by various geological processes, including the interaction of water with minerals in hydrothermal vents. Perhaps most important, scientists determined that Yellowknife Bay was indeed the site of an ancient lake, providing an environment that could concentrate organic molecules and preserve them in fine-grained sedimentary rock called mudstone."There is evidence that liquid water existed in Gale Crater for millions of years and probably much longer, which means there was enough time for life-forming chemistry to happen in these crater-lake environments on Mars," said Daniel Glavin, senior scientist for sample return at NASA's Goddard Space Flight Center in Greenbelt, Maryland, and a study co-author.

https://www.spacedaily.com/reports/NASAs_Curiosity_Rover_Detects_Largest_Organic_Molecules_Found_on_Mars_999.html

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COMMITTEE MEMBERS

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