"The Southern Cross"

The Hermanus Astronomy Centre Newsletter

FEBRUARY 2024

Please note that all our regular meetings are scheduled for **TUESDAYS,** commencing at **18.00 (6 pm)** unless otherwise advised. The day and date may change from time to time according to the current Hermanus load shedding status and/or according to venue availability for a physical meeting; such changes will be notified via e-mail and on our website.

MONTHLY MEETINGS

Monthly Meetings are held on the **Third Tuesday** of each month.

No Monthly Meeting was held in December.

Our last meeting was held on **January 16th**. **Jenny Morris** of the Hermanus Astronomy Centre presented ***"The Southern Cross, the story of an Earthly Wobble and a Starry Icon".***

Jenny outlined for us the history of the discovery of the Southern Cross, the smallest of the 88 official constellations. The northern and southern hemispheres of the world have been treated at different times over the millennia to the sight of this constellation, its visibility owing to the precession of the earth's rotational axis, namely the "Earthly Wobble" as Jenny puts it. Attracted to its astrological and apparent Christian symbolism and latterly as a navigational aid in the southern hemisphere (there being no convenient Polaris), this constellation has received much attention.

Herewith the YouTube link for a revisit or in case you missed it:

https://www.youtube.com/watch?v=tIZ7C4hMrG8

The next Monthly Meeting is the HAC's Annual General Meeting, scheduled for **Tuesday February 20th 2024** and will be in person at **the Catholic Church Hall**. Your physical attendance will be greatly appreciated. However, a virtual link will be circulated prior to the AGM should you be unable to travel. We shall be commencing at **18.00** (**6 pm**).

A short presentation will follow the meeting. Details will be circulated closer to the time.

SPECIAL INTEREST GROUP ACTIVITIES

Cosmology

These meetings are scheduled for the **First Tuesday** of each month, commencing at **18.00 (6 pm)** with no meeting in January.

On **Tuesday December 5th**, in episode 15 of "THE ENTIRE HISTORY OF THE UNIVERSE", we watched– ***"What Was The First Black Hole?"***

In case you missed it, herewith the link -

https://www.youtube.com/watch?v=SedW4SdXNHU&list=PLROBLlvnR7BEF9b1NOvRf_zhboibmywJb&index=14

The next episode (*not* the penultimate, see below) of the "THE ENTIRE HISTORY OF THE UNIVERSE" series is number 16 ***"Where Are All The Hidden Dimensions?"*** - scheduled for **Tuesday February 6th.**

The quest for understanding hidden dimensions has been a journey through the annals of physics, from ancient speculations to modern-day revelations. Delve into the enigmatic world where atoms shape our reality and black holes lurk in the depths of space, unveiling the mysteries of existence itself.

In a tale spanning centuries, from Democritus to Einstein, explore how foundational concepts like atoms and black holes emerged from the depths of human imagination to become pillars of scientific truth. Witness the forgotten brilliance of visionaries like Theodor Kaluza, who dared to conceive of dimensions beyond our perception, laying the groundwork for a revolution yet to come.

Join the intrigue as physicists Michael Green and John Schwarz defy convention amidst the thunderous storms of Aspen, unravelling the esoteric threads of string theory to unveil the tantalizing possibility of extra dimensions. Explore the intricate geometries of Calabi-Yau manifolds, hidden realms where the fabric of spacetime bends and twists, offering glimpses into the underlying structure of the universe.

As the quest unfolds, contemplate the profound implications of dimensions too small to see yet too vast to ignore, challenging our very understanding of reality. Amidst the cacophony of scientific discourse, one question echoes through the ages: Where are all the hidden dimensions? Embark on a journey of discovery, where the boundaries of perception blur and the fabric of reality unravels before your eyes.

The series now continues for another 16 episodes. We'll update you with more detail when we have it.

For further information, please contact Derek Duckitt: derek.duckitt@gmail.com.

Astrophotography

This SIG is no longer scheduled but can be arranged as requested by group members.

For further information, contact Deon Krige: krige.deon44@outlook.com and please keep an eye on our website calendar and our e-mail notices and invites.

Study Group

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

On **Tuesday January 30th**, we watched and discussed ***Who were the Proto-Indo-Europeans?***

We enjoyed an information packed account of the movements and the cultural evolution of the current inhabitants of Europe and the Near East since the dawn of civilisation.

The video link: https://www.youtube.com/watch?v=j_mj64nrmnM&t=262s

The post-video discussion link: https://studio.youtube.com/video/e9-ZXXW6huA/edit

The next **Study Group** meeting is scheduled for **Tuesday February 27th**. Topic details to follow.

For further information regarding Study Group, please contact Peter Harvey

petermh@hermanus.co.za

Observing

This section includes recommended dates for **Stargazing**, **Moonwatch**, **Meteors**, **Solar observation** and whatever else deserves a close look.

For quick reference:

Optimal dates for **FEBRUARY 2024**:

Stargazing – evening observation window **February 1st to 12th** (please see February *Skynotes* page 2 for more detail).

Moonwatch – a few days either side of the **First Quarter** (February 17th) (please see February *Skynotes* page 2 for more detail).

No centre Stargazing or Moonwatch activities are planned at the moment. They do tend to be arranged at short notice for weather considerations. Please watch our activities calendar on the website – https://www.hermanusastronomy.co.za/

Eclipses – None observable from southern Africa.

The Sun - **The Sun and Auroral Activity**: Daily solar activity and predictions for auroral activity can be found at the following website:

https://www.spaceweatherlive.com/en/solar-activity.html

Meteors - Peaking on Friday February 9th, the **alpha Centaurids** are visible from 22h00 to 03h30 on Saturday morning. Although the moon will not be a problem, the hourly rate of 5 will not provide much entertainment.

The **gamma Normids** will commence on Sunday February 25th but will peak on March 14th. Again, a not very intense shower.

For the dedicated meteor enthusiast, please see page 5 in the February *Skynotes*.

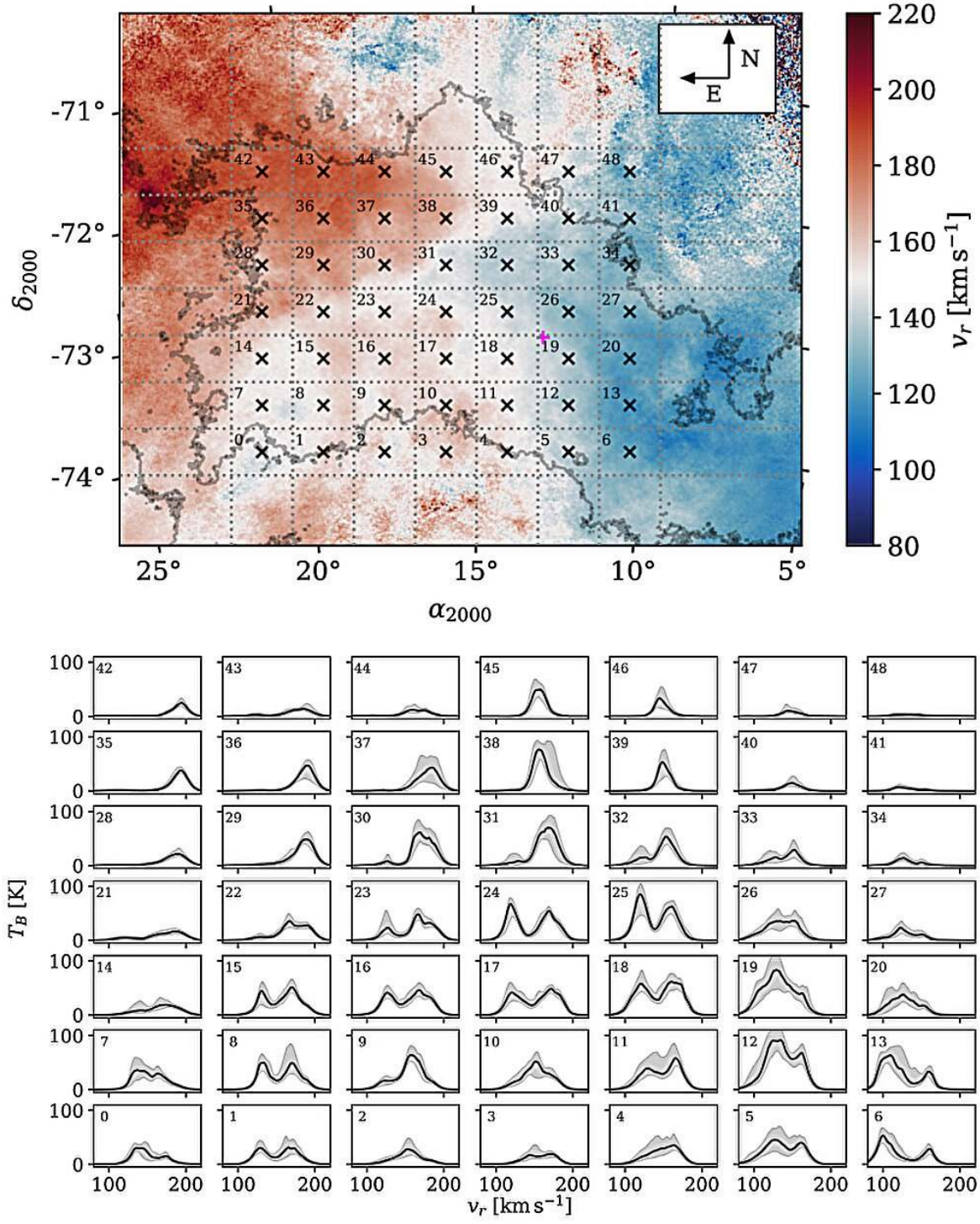
Future Trips

No outings are planned at present.

ASTRONOMY NEWS: JANUARY 2024

(Compiled By Pieter Kotzé)

New study shows Small Magellanic Cloud is actually two smaller galaxies



Top: Intensity-weighted mean velocity map of the SMC from Pingel et al (2022). The single contour indicates an Hi column density of 15×10^{20} cm^{-2}. The center of the SMC used in this work (defined based on the stellar populations observed by Gaia Zivick et al, 2021) is marked with a magenta cross. Spatial bins are overlaid and identified with numbers. Bottom: The average Hi brightness

temperature spectra (T_b (v_r)) profiles from spatial bins marked at left (black). Each panel includes shaded gray envelopes denoting the 16th through 84th percentile of the T_b (v_r) within each spatial bin. We observe that the radial velocity structureof Hi emission features multiple, distinct velocity peaks (and typically two, dominant components). Credit: arXiv (2023). DOI: 10.48550/arxiv.2312.07750

A large international team of astronomers and astrophysicists has found evidence showing that the Small Magellanic Cloud is not a single galaxy—it is actually two, one behind the other. The group has written a paper describing their work and posted it to the *arXiv* preprint server.

https://phys.org/news/2023-12-small-magellanic-cloud-smaller-galaxies.html

LST-1 discovers the most distant active galactic nucleus at very high energies

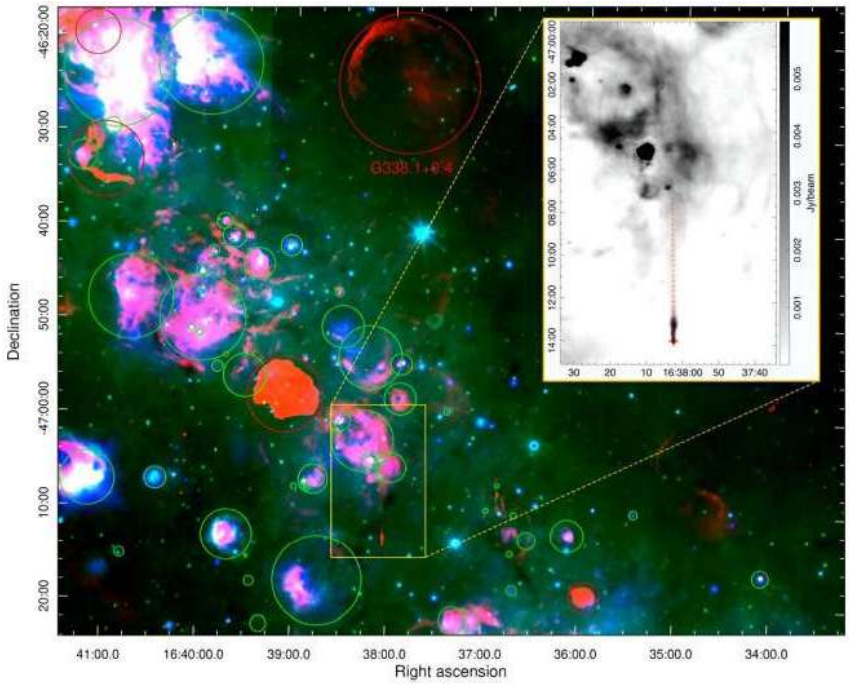
LST-1 during observations at CTAO-North, La Palma, Spain. Credit: CTAO gGmbH (CC BY-NC-ND 2.0)

On 15 December, the Large-Sized Telescope (LST) Collaboration announced through an Astronomer's Telegram (ATel) the detection of the source OP 313 at very high energies with the LST-1. Although OP 313 was known at lower energies, it had never been detected above 100 GeV, making this the LST-1's first scientific discovery. With these results, OP 313 becomes the most distant active galactic nuclei (AGN) ever detected by a Cherenkov telescope, further showcasing the LST prototype's exceptional performance while it is being commissioned on the CTAO-North site on the island of La Palma, Spain.

https://phys.org/news/2023-12-lst-distant-galactic-nucleus-high.html

Astronomers detect new pulsar wind nebula and its associated pulsar

https://phys.org/news/2023-12-astronomers-pulsar-nebula.html#google_vignette

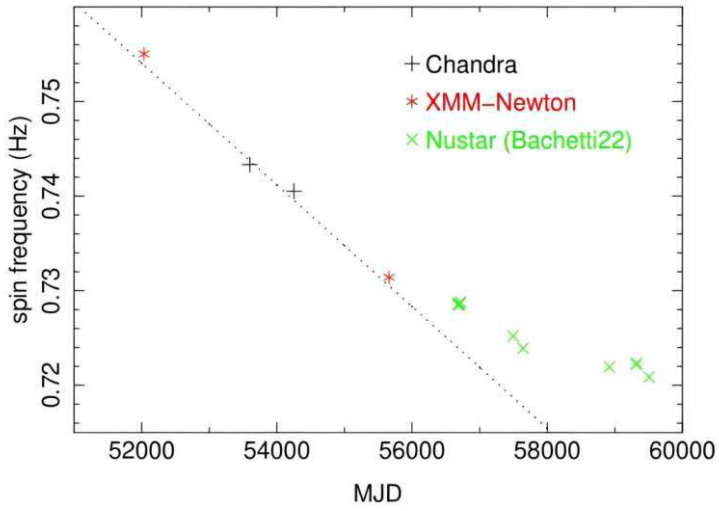


Composite image of the Galactic plane region and Potoroo, with the red layer showing the ASKAP total intensity image at 1368 MHz, and the green and blue layers representing WISE infrared images at 12 μm and 22 μm respectively.

Known Galactic SNRs are indicated by red circles (Green, 2019, 2022), while known Galactic HII regions are marked by green circles (Anderson et al., 2014). The box highlights the section of deep interest. The inset is the ASKAP zoomed-in image showing Potoroo where a red cross marks the position of the X-ray source, while a red dashed line is Potoroo's axis of symmetry, which corresponds to the tail length studied in this paper. Credit: *arXiv* (2023). DOI: 10.48550/arxiv.2312.06961

Astronomers from the Western Sydney University in Australia and elsewhere report the detection of a new pulsar wind nebula and a pulsar that powers it. The discovery, presented in a on the pre-print server *arXiv*, was made using the Australian Square Kilometre Array Pathfinder (ASKAP), as well as MeerKAT and Parkes radio telescopes.

Researchers investigate pulsations of the ultra-luminous X-ray pulsar M82 X-2



Spin history of M82 X-2 since 2001. Credit: arXiv (2023). DOI: 10.48550/arXiv.2312.16770

Using NASA's Chandra spacecraft and ESA's XMM-Newton satellite, Chinese astronomers have inspected the pulsations of an ultra-luminous X-ray pulsar known as M82 X-2. Results of the study indicate that the pulsar showcases a long-term spin-down trend. The study was detailed in a paper published on the pre-print server *arXiv*. Ultra-luminous X-ray sources (ULXs) are point sources in the sky that are so bright in X-rays that each emits more radiation than 1 million

suns emit at all wavelengths. Although they are less luminous than active galactic nuclei, they are more consistently luminous than any known stellar process. https://phys.org/news/2024-01-pulsations-ultra-luminous-ray-pulsar.html#google_vignette

NASA telescopes start the year with a double bang

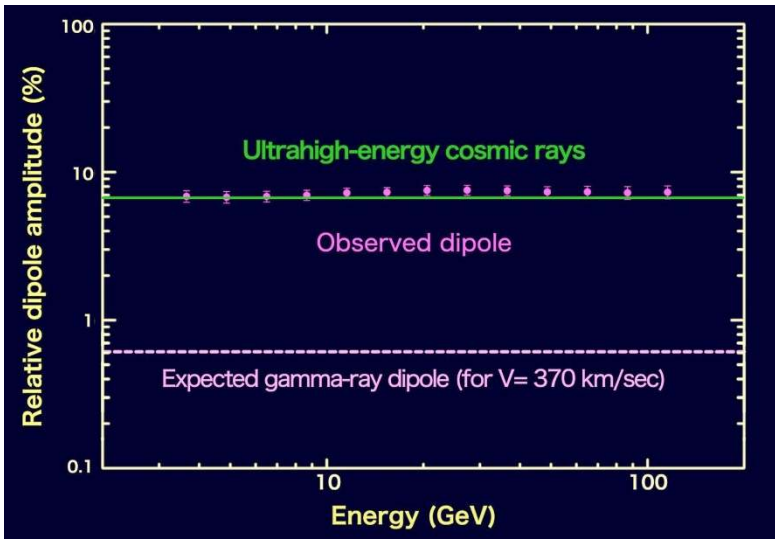
Credit: NASA

A colourful, festive image shows different types of light containing the remains of not one, but at least two exploded stars. This supernova remnant is known as 30 Doradus B (30 Dor B for short) and is part of a larger region of space where stars have been continuously forming for the past 8 to 10 million years. It is a complex landscape of dark clouds of gas, young stars, high-energy shocks, and superheated gas, located 160,000 light-years away from Earth in the Large Magellanic Cloud, a small satellite galaxy of the Milky Way. The new image of 30 Dor B was made by combining X-ray data from NASA's Chandra X-ray Observatory (purple), optical data from the Blanco 4-meter telescope in Chile (orange and cyan), and infrared data from NASA's Spitzer Space Telescope (red). Optical data from NASA's Hubble Space Telescope was also added in black and white to highlight sharp features in the image. https://phys.org/news/2024-01-nasa-telescopes-year.html

Fermi Gamma-ray Space Telescope detects surprise gamma-ray feature beyond our galaxy

Astronomers analyzing 13 years of data from NASA's Fermi Gamma-ray Space Telescope have found an unexpected and as yet unexplained feature outside of our galaxy."It is a completely serendipitous discovery," said Alexander Kashlinsky, a cosmologist at the University of Maryland and NASA's Goddard Space Flight Center in Greenbelt, who presented the research at the 243rd meeting of the American Astronomical Society in New Orleans. "We found a much stronger signal, and in a different part of the sky, than the one we were looking for." Intriguingly, the gamma-ray signal is found in a similar direction and with a nearly identical magnitude as another unexplained feature, one produced by some of the most energetic cosmic particles ever detected. The team was searching for a gamma-ray feature related to the CMB (cosmic microwave background), the oldest light in the universe. Scientists say the CMB originated when the hot, expanding universe had cooled enough to form the first atoms, an event that released a burst of light that, for the first time, could permeate the cosmos. Stretched by the subsequent expansion of space over the past 13 billion

years, this light was first detected in the form of faint microwaves all over the sky in 1965.In the 1970s, astronomers realized that the CMB had a so-called dipole structure, which was later measured at high precision by NASA's COBE (Cosmic Background Explorer) mission. The CMB is about 0.12% hotter, with more microwaves than average, toward the constellation Leo, and colder by the same amount, with fewer microwaves than average, in the opposite direction.



Both the gamma-ray and the cosmic ray dipoles have strikingly similar magnitudes – about 7% more gamma rays or particles than average coming from one direction and correspondingly smaller amounts arriving from the opposite direction. Credit: NASA's Goddard Space Flight Centre

https://phys.org/news/2024-01-fermi-gamma-ray-space-telescope.html

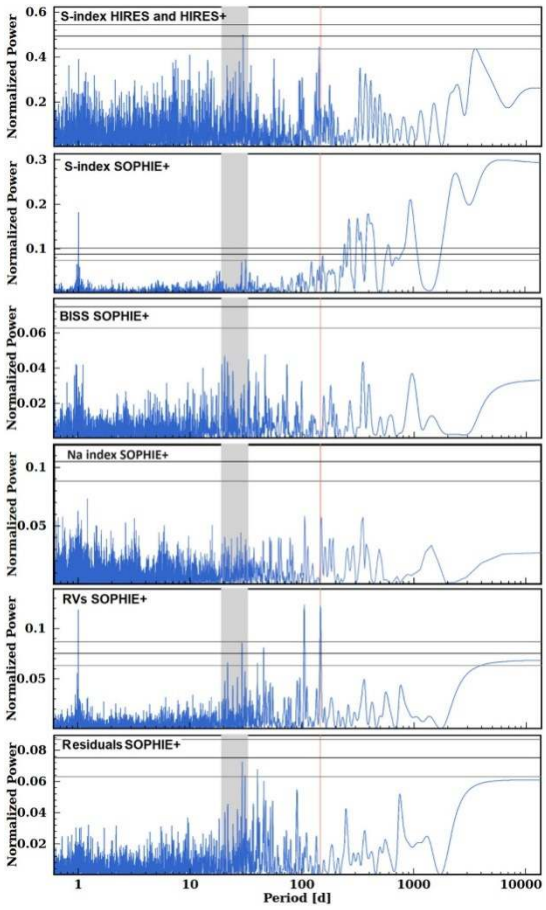
https://www.spacedaily.com/reports/NASAs_Fermi_Detects_Surprise_Gamma_Ray_Feature_Beyond_Our_Galaxy_999.html

Astronomers Discover Unexpected Structures In Youngest Planetary Disks Ever Seen

ALMA image showing the protoplanetary disc surrounding the young star HL Tauri. (ESO/ALMA)

How long does planet formation take? Maybe not as long as we thought, according to new research. Observations with the Atacama Large Millimetre/submillimetre Array (ALMA) show that planet formation around young stars may begin much earlier than scientists thought. These new results were presented at the American Astronomical Society's 243rd Meeting. Cheng-Han Hsieh, a Ph.D. candidate at Yale, presented the new observations. "ALMA's early observations of young protoplanetary disks have revealed many beautiful rings and gaps, possible formation sites of planets," he said. "I wondered when these rings and gaps started to appear in the disks." Hsieh is referring to the well-known ALMA images of protoplanetary disks that have been making news for a few years now. These images show the protoplanetary disks around young stars with gaps that scientists think are where planets are forming. https://www.sciencealert.com/astronomers-discover-unexpected-structures-in-youngest-planetary-disks-ever-seen

Astronomers make rare exoplanet discovery, and a giant leap in detecting Earth-like bodies



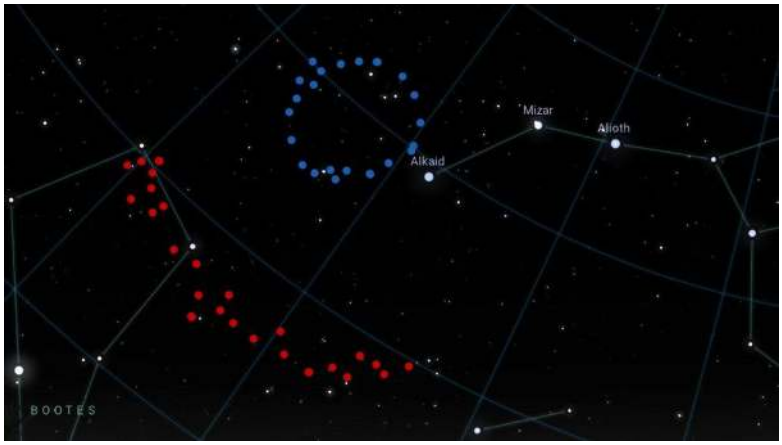
Periodogram of RVs and activity indicators of HD 88986. From top to bottom: HIRES and HIRES+ S-index, SOPHIE+ S-index, bisector, RVs, and residuals of RVs after Keplerian fit on the 146.1 d. Credit: Astronomy & Astrophysics (2023). DOI: 10.1051/0004-6361/202347897

Astronomers have made the rare discovery of a small, cold exoplanet and its massive outer companion—shedding light on the formation of planets like Earth.

The findings include a planet with radius and mass between that of the Earth and Neptune, with a potential orbit around its host star of 146 days. The star system also contains an outer, large companion, 100 times the mass of Jupiter. This is a rare discovery, with exoplanets smaller and lighter than Neptune and Uranus being notoriously hard to detect, with only a few being identified to this day. Such rare systems are particularly interesting to better understand planetary formation and evolution; they are thought to be a key step for the detection of Earth-like planets around stars. The new planetary system is discovered around the star HD88986. This star has a similar temperature to the sun with a slightly larger radius.

https://phys.org/news/2024-01-astronomers-rare-exoplanet-discovery-giant.html

Huge ring of galaxies challenges thinking on cosmos

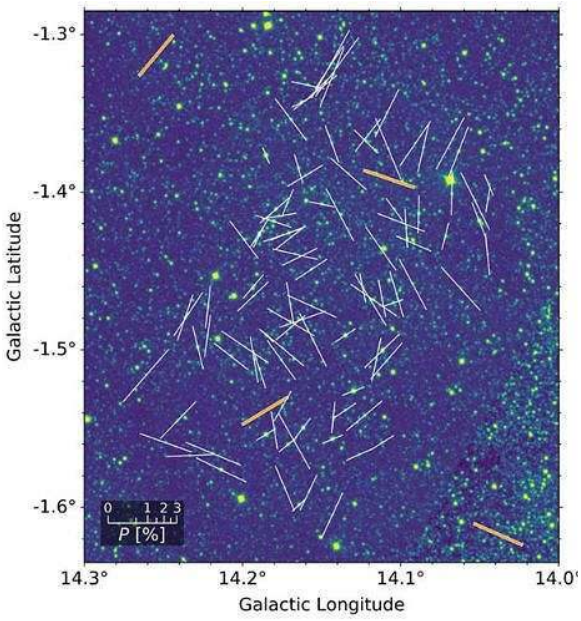


An artist's impression highlighting the positions of the Big Ring (in blue) and Giant Arc (shown in red) in the sky.

Scientists at the University of Central Lancashire have discovered a gigantic, ring-shaped structure in space. It is 1.3bn light-years in diameter and appears to be roughly 15 times the size of the Moon in the night sky as seen from Earth. Named the Big Ring by the astronomers, it is made up of galaxies and galaxy clusters. They say that it is so big it challenges our understanding of the universe. It cannot be seen with the naked eye. It is really distant and identifying all the

galaxies that make up the bigger structure has taken a lot of time and computing power. Such large structures should not exist according to one of the guiding principles of astronomy, called the cosmological principle. This states that all matter is spread smoothly across the Universe. Although stars, planets and galaxies are huge clumps of matter in our eyes, in the context of the size of the universe they are insignificant - and the theory is that much bigger patches of matter should not form. https://www.uclan.ac.uk/news/big-ring-in-the-sky

Our surprising magnetic galaxy

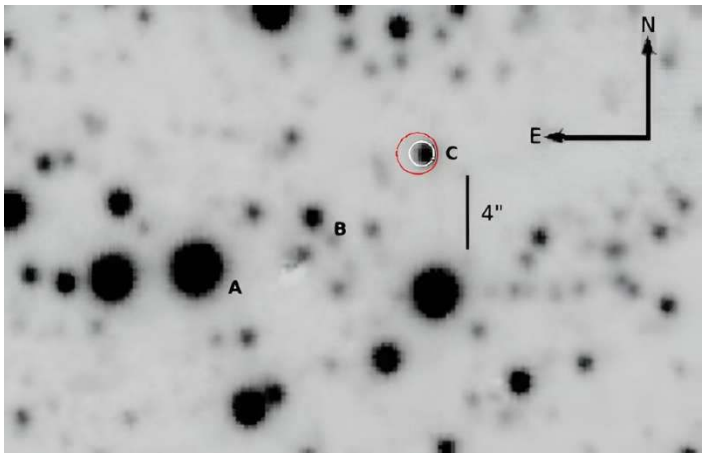


The white lines superimposed on this image of the Sagittarius arm of the Milky Way show the polarization, or orientation, of light. This correlates with the orientation of local magnetic field lines. Combined, this information builds a detailed map of the magnetic field in that arm of the galaxy.

A team of astronomers including those from the University of Tokyo created the first-ever map of magnetic field structures within a spiral arm of our Milky Way galaxy. Previous studies on galactic magnetic fields only gave a very general picture, but the new study reveals that magnetic fields in the spiral arms of our galaxy break away from this general picture significantly and are tilted away from the galactic average by a high degree. The findings suggest magnetic fields strongly impact star-forming regions which means they played a part in the creation of our own solar system.

https://www.spacedaily.com/reports/Our_surprising_magnetic_galaxy_999.html

Astronomers discover new Be/X-ray binary system

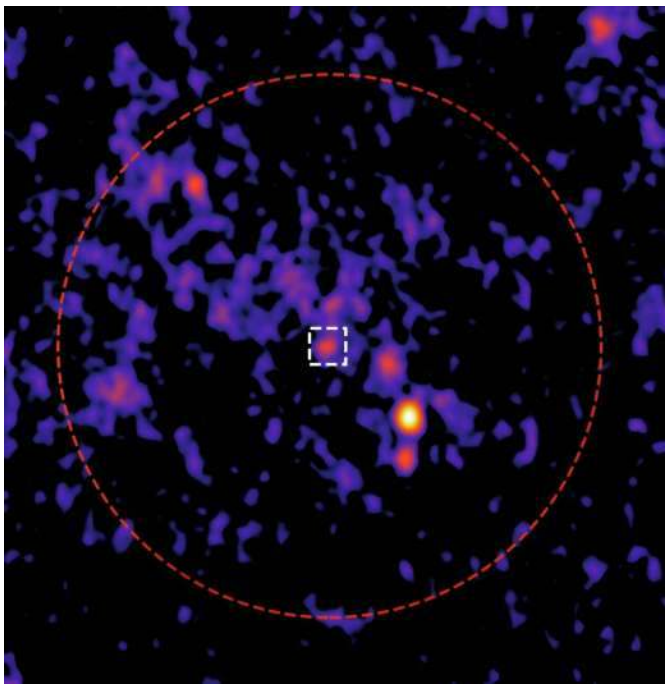


UKIDSS J-band finding chart for 4XMM J182531.5–144036. The red circle is centred on the XMM-Newton detected position, with a radius of 1" equal to the positional error. The white circle is centred on the Chandra detected position and has a radius of 0.6" equal to its positional error. Credit: arXiv (2024). DOI: 10.48550/arxiv.2401.02468

Astronomers from the Open University in Milton Keynes, UK and elsewhere report the detection of a new Be/X-ray binary. The newfound system, designated 4XMM J182531.5–144036, exhibits persistent X-ray emission. The finding was detailed in a paper published January 4 on the pre-print server *arXiv*. X-ray binaries are composed of a normal star or a white dwarf transferring mass onto a compact neutron star or a black hole. Based on the mass of the companion star, astronomers divide them into low-mass X-ray binaries (LMXBs) and high-

mass X-ray binaries (HMXBs). Be/X-ray binaries (Be/XRBs) are the largest subgroup of HMXBs. These systems consist of Be stars and, usually, neutron stars, including pulsars. Observations have found that most of these systems showcase weak persistent X-ray emission that is interrupted by outbursts lasting several weeks. https://phys.org/news/2024-01-astronomers-bex-ray-binary.html#google_vignette

Astronomers produce most sensitive radio image ever of ancient star cluster



The team identified a new radio source (white square) in the centre of the cluster (red circle) Credit: Paduano et al.

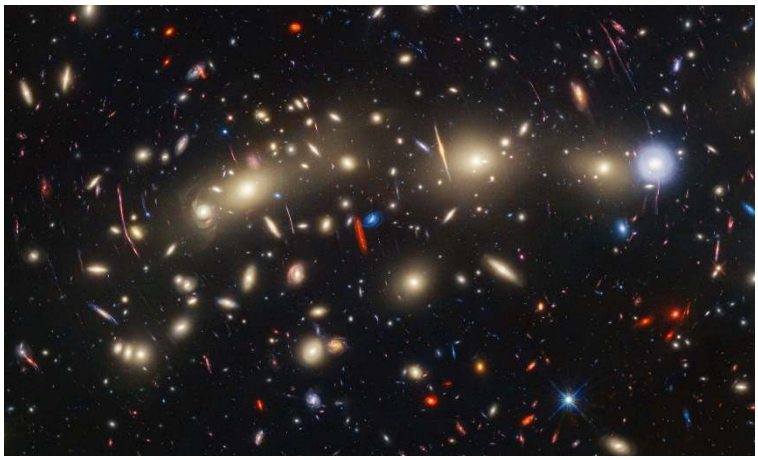
A global team of astronomers have created the most sensitive radio image ever of a globular cluster, an ancient ball of tightly packed stars.

The image is of the second brightest globular cluster in the night sky—known as 47 Tucanae—and was produced by a team led by the Curtin University node of the International Center for Radio Astronomy Research (ICRAR) in Western Australia.

The scientists also detected a previously undiscovered radio signal from the center of the cluster. The research was published in *The Astrophysical Journal*.

Astronomer Dr. Arash Bahramian, from ICRAR's Curtin University node, says star clusters are an ancient relic of the early universe. https://phys.org/news/2024-01-astronomers-sensitive-radio-image-ancient.html

Gigantic Galaxy Clusters Found Just Before They're Awash in Star Formation



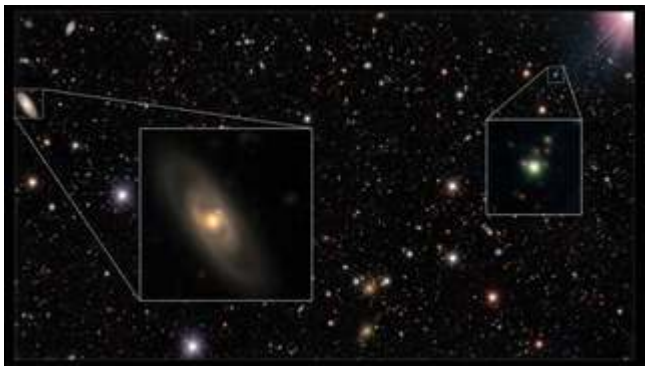
This panchromatic view of galaxy cluster MACS0416 was created by combining infrared observations from the NASA/ESA/CSA James Webb Space Telescope with visible-light data from the NASA/ESA Hubble Space Telescope. Credit: NASA/ESA/CSA/STScI

One of the central factors in the evolution of galaxies is the rate at which stars form. Some galaxies are in a period of active star formation, while others have very little new stars. Very broadly, it's thought that younger galaxies enter a period of rapid star formation before levelling off to become a mature galaxy. But a new study finds some interesting things about just when and why stars form. The study

looked at a type of galactic cluster known as Brightest Cluster Galaxies (BCGs), which are the largest and brightest galaxy clusters we can see. In this case, the team identified the 95 brightest clusters as seen from the South Pole Telescope (SPT). These galaxies are at redshifts ranging from z = 0.3 to z = 1.7, which spans the period of the Universe from 3.5 to 10 billion years ago. That's a good chunk of cosmic time, so you would think the data would show how star formation changed over time. At a high rate when galaxies were young and there was plenty of gas and dust around, then at a low rate after much of that raw material had been consumed. But what the team found was that within these clusters star formation was remarkably consistent across billions of years. They also found the key to when star formation occurs: entropy. https://www.universetoday.com/165248/gigantic-galaxy-clusters-found-just-before-theyre-awash-in-star-formation/

Decade-long Dark Energy Survey offers new insights into the expansion of the universe

The most recent results from a survey of over 1,500 supernovas calls the standard model of

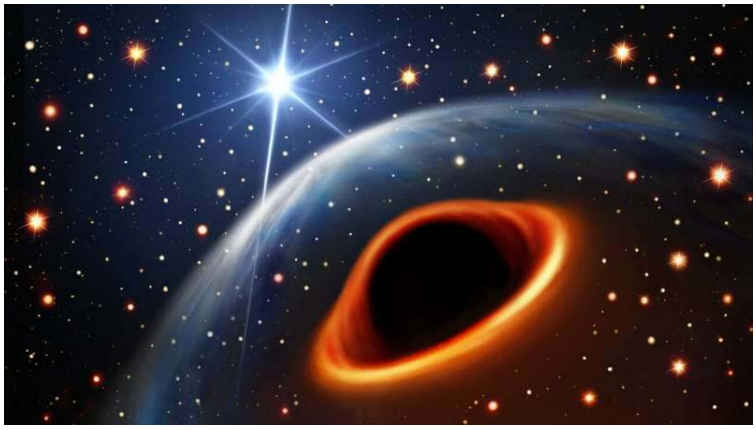


One of the supernovas discovered in the Dark Energy Survey (left) compared to distant quasar (right)(Image credit: DES Collaboration/NOIRLab/NSF/AURA/M. Zamani)

A survey of over 1,500 supernovas conducted by the Dark Energy Camera has placed strong constraints on the accelerating expansion of the universe. The results suggest that the mysterious force that drives this cosmic acceleration, dark energy, may change over time, varying in density, which calls the standard model of cosmology into question. The results were delivered by the largest sample of supernovas ever harvested by a single instrument as part of the Dark Energy Survey. Supernovas were integral to the discovery in the late 1990s that not only is the universe expanding, but it is also doing so at an accelerating rate. https://www.space.com/supernova-survey-suggests-dark-energy-may-change-over-time

Lightest black hole or heaviest neutron star? MeerKAT uncovers a mysterious object in Milky Way

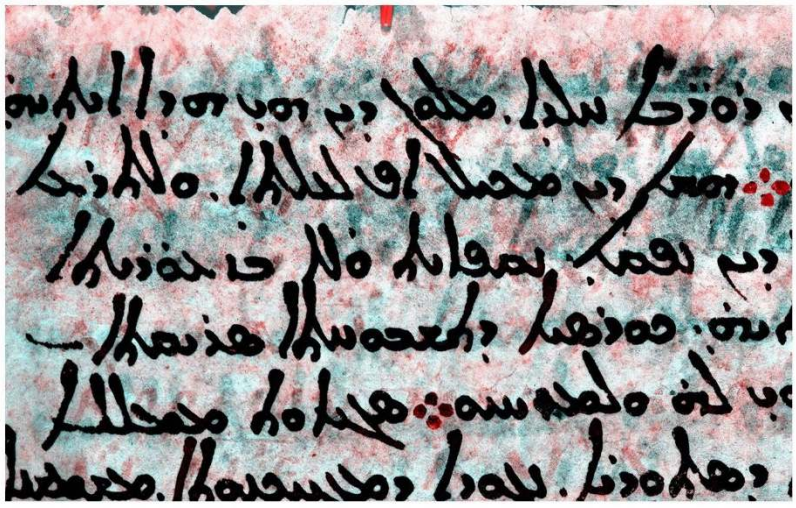
An international team of astronomers have found a new and unknown object in the Milky Way that is heavier than the heaviest neutron stars known and yet simultaneously lighter than the lightest black holes known. Using the MeerKAT Radio Telescope, astronomers from a number of institutions including The University of Manchester and the Max Planck Institute for Radio Astronomy in Germany found an object in orbit around a rapidly spinning millisecond pulsar located around 40,000 light years away in a dense group of stars known as a globular cluster. Using the clock-like ticks from the millisecond pulsar they showed that the massive object lies in the so-called black hole mass gap. It could be the first discovery of the much-coveted radio pulsar—black hole binary; a stellar pairing that could allow new tests of Einstein's general relativity and open doors to the study of black holes.



An artist's impression of the system assuming that the massive companion star is a black hole. The brightest background star is its orbital companion, the radio pulsar PSR J0514-4002E. The two stars are separated by 8 million km and circle each other every seven days. Credit: Daniëlle Futselaar (artsource.nl)

https://phys.org/news/2024-01-lightest-black-hole-heaviest-neutron.html

Ancient Star Catalogue of Greek Astronomer Hipparchus Discovered



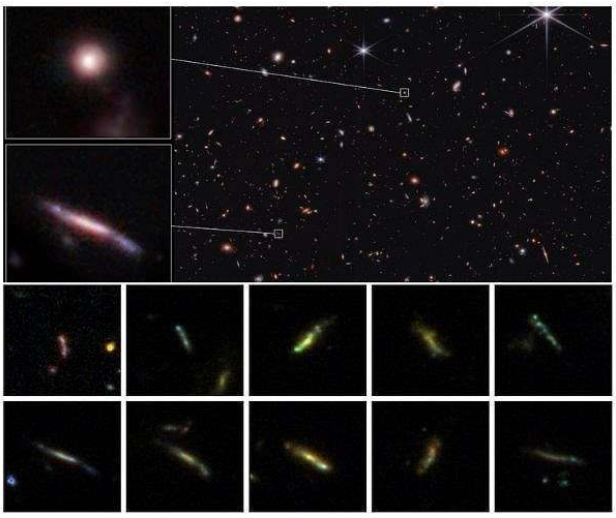
Fragments of Hipparchus' Star Catalog were uncovered by researchers using multispectral imaging. Credit: Museum of the Bible Collection

Researchers have discovered fragments of the Star Catalog authored by the ancient Greek astronomer Hipparchus. It was composed in the second century BC and is the first known comprehensive star catalog in the Western world. The fragments of Hipparchus' Star Catalog were discovered on a medieval palimpsest manuscript. The star catalog itself had been erased so that the pages could be reused for later medieval work. Until the fragments were recently discovered, the Star Catalog was known only through the writings of Claudius Ptolemy, another ancient astronomer who composed his own star catalog about four centuries after Hipparchus.

The fragments were uncovered by researchers from the CNRS, Sorbonne Université, and Tyndale House (affiliated with the University of Cambridge). The researchers were able to detect the erased fragments by using multispectral imaging followed by a process of decipherment and interpretation.

https://greekreporter.com/2024/01/21/ancient-star-catalogue-of-greek-astronomer-hipparchus-discovered/

New research shows that most early galaxies looked like breadsticks rather than pizza pies or dough balls



Sample shapes of distant galaxies identified by the James Webb Space Telescope's Cosmic Evolution Early Release Science (CEERS) survey. [(Credit: NASA, ESA, CSA, STScI, Steve Finkelstein (UT Austin), Micaela Bagley (UT Austin), Rebecca Larson (UT Austin)] (lower panel) Images of what researchers believe are elongated, ellipsoid (i.e. breadstick-shaped) galaxies, captured with the James Webb Space Telescope. The word "believe" reflects the fact that some of the galaxies may be disk (i.e pizza pie) shaped galaxies seen from the side. (Credit: Viraj Pandya et al.)

Researchers analyzing images from NASA's James Webb Space Telescope have found that galaxies in the early universe are often flat and elongated, like surfboards and pool noodles - and are rarely round, like volleyballs or frisbees. "Roughly 50 to 80% of the galaxies we studied appear to be flattened in two dimensions," explained lead author Viraj Pandya, a NASA Hubble Fellow at Columbia University in New York. "Galaxies that look like pool noodles or surfboards seem to be very common in the early universe, which is surprising, since they are uncommon nearby." The team focused on a vast field of near-infrared images delivered by Webb, known as the Cosmic Evolution Early Release Science (CEERS) Survey, plucking out galaxies that are estimated to exist when the universe was 600 million to 6 billion years old. While most distant galaxies look like surfboards and pool noodles, others are shaped like frisbees and volleyballs. The "volleyballs," or sphere-shaped galaxies, appear the most compact type on the cosmic "ocean" and were also the least frequently identified. The frisbees were found to be as large as the surfboard- and pool noodle-shaped galaxies along the "horizon," but become more common closer to "shore" in the nearby universe.

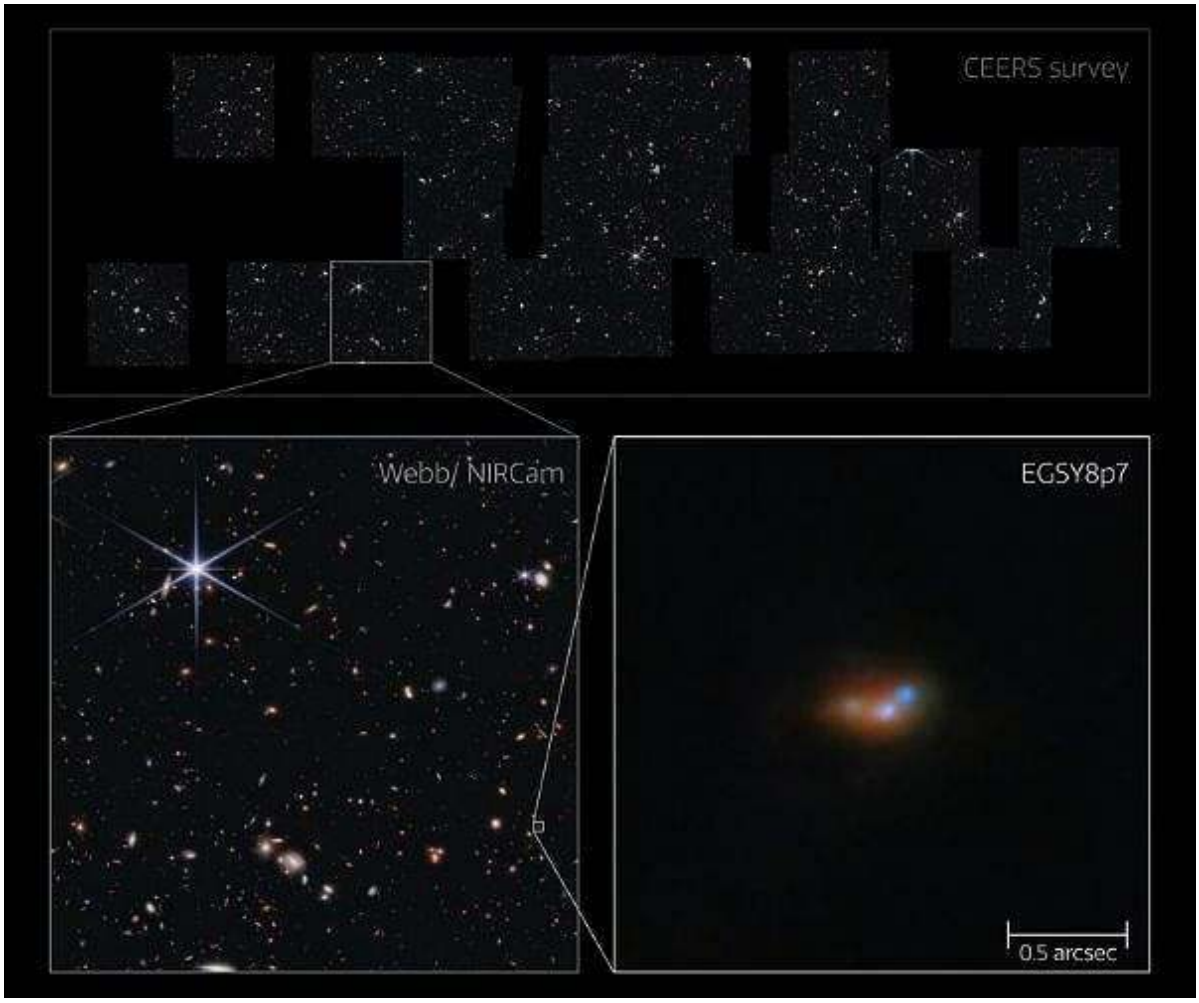
https://www.spacedaily.com/reports/New_research_shows_that_most_early_galaxies_looked_like_breadsticks_rather_than_pizza_pies_or_dough_balls_999.html

Webb reveals that galaxy mergers are the solution to early Universe mystery

One of the key missions of the NASA/ESA/CSA James Webb Space Telescope is to probe the early Universe. Now, the unmatched resolution and sensitivity of Webb's NIRCam instrument have revealed, for the first time, what lies in the local environment of galaxies in the very early Universe. This has solved one of the most puzzling mysteries in astronomy - why astronomers detect light from hydrogen atoms which should have been entirely blocked by the pristine gas that formed after the Big-Bang.

These new Webb observations have found small, faint objects surrounding the very galaxies that show the 'inexplicable' hydrogen emission. In conjunction with state-of-the-art

simulations of galaxies in the early Universe, the observations have shown that the chaotic merging of these neighbouring galaxies is the source of this hydrogen emission.



A graphic with three images. The top image, labelled "CEERS survey", shows many square images of stars and galaxies, stitched together according to their locations in the sky. One square is highlighted, and a cutout on the bottom left shows it enlarged, labelled "Webb/ NIRCam". A tiny spot is shown zoomed-in to the right, labelled "EGSY8p7" with a scale marker of "0.5 arcsec". Here it can be seen that the spot is three neighbouring galaxies, appearing as coloured blobs with bright, distinct cores.

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