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

"The Southern Cross"

The Hermanus Astronomy Centre's Monthly Newsletter

December 2025

MONTHLY MEETINGS

At **Onrus Manor**, on **Tuesday November 18th**, we enjoyed a virtual delivery by **Tim Cooper** with an update on the ***Global Meteor Network***.

Extracted from Pierre De Villiers' introduction to Tim Cooper's presentation:

"Tim is probably one of the most experienced, authoritative and most respected members of ASSA. If you look in the Sky Guide at the page which shows awards and officials, you'll see the name TP Cooper popping up all over. He's a past president of ASSA and an honorary member with a long service award.

"In 2018, he was awarded the Overbeek Medal, which is the highest award that ASSA can give for observational work. And he did make a brief mention of tracking meteorites coming down in Botswana. On receiving the Overbeek medal, he gave an absolutely fascinating talk. I must still twist Tim's arm to give our Centre a repeat of that detective story.

"There's no one more authoritative to talk about meteors in South Africa."

The link: https://www.youtube.com/watch?v=WWL3ji_7aAM

With no monthly meeting planned for December, our next is on Tuesday January 20th. The topic will be advised in due course.

SPECIAL INTEREST GROUP ACTIVITIES

Cosmology

On **November 4th**, we watched and discussed episode 34 of the Entire History of the Universe: *"The Illusion of Time - When Actually Are You?"*
The YouTube link: https://www.youtube.com/watch?v=ZSmNii0uOmw

The discussion link: https://www.youtube.com/watch?v=8tMLHE5H9R8

In our **December** meeting, scheduled for **Tuesday 2nd**, episode 35, *"What is The Biggest Thing in the Universe?",* is coming up.

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

Study Group

In our meeting on **Tuesday November 25th**, we watched two videos concerning new peer-reviewed evidence of the possibility of Non-Human Intelligence.

The first was presented by **Sabine Hossenfelder**, discussing the peer-reviewed report of **Dr Beatriz Villaroel**:

https://youtu.be/waPXFfvwvsg?si=NrmuMTzK1d0POW7K

The second, presented by **Ross Coulthart**, *News Nation* Special Correspondent, summarised the research of Dr Villaroel: the video link: https://www.youtube.com/watch?v=0BnZMeFtoAM

The group discussion link: https://youtu.be/T3Kz-G3Bo4E

The topic for our next meeting, scheduled for **Tuesday December 25th**, will be advised in due course. For further information regarding the Study Group, contact Peter Harvey petermh@hermanus.co.za

Astrophotography

AURORA BOREALIS

image by

Pieter Kotzé on cellphone

I am currently at the University Of Oulu, having just returned from a visit to the arctic circle in Lapland where I had the opportunity to see auroras for the first time.

Observing

No suitable evenings were available during October.

Optimal dates for **December 2025**:

SUGGESTED EVENING OBSERVATION WINDOWS
(Lunar observations notwithstanding)

Date		*Moon*	*Dusk end*
December 7	**Rise**	**22h45 (94%)**	**21h31**
to December 22	**Set**	**22h03 (4%)**	**21h41**

ASSA

From Tim Cooper

The link to the latest Comet, Asteroid and Meteor Section:

https://assa.saao.ac.za/wp-content/uploads/sites/23/2025/09/ASSA-CAMnotes-2025-Number-4.pdf

MNASSA

The Monthly Notes of the Astronomical Society of Southern Africa are available on:

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

Astronomy News November 2025 *continued overleaf…*

Compiled by Pieter Kotzé

NOVEMBER ASTRONOMY PICTURE

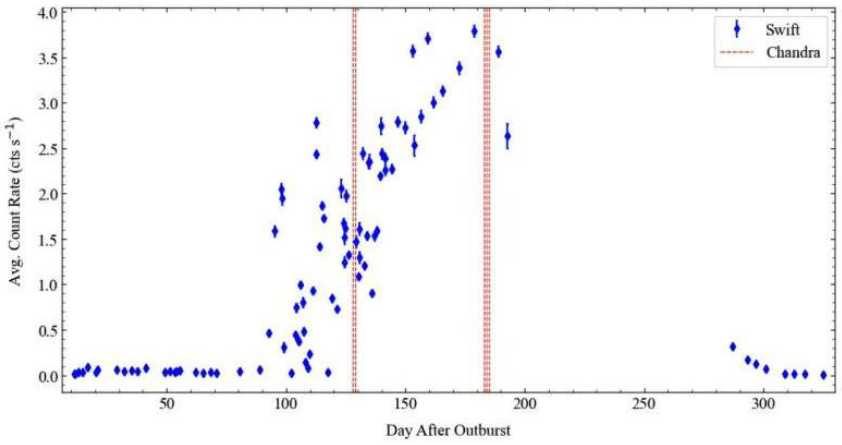
NGC 6960: The Witch's Broom Nebula

Image Credit & Copyright: Brian Meyers

Explanation: Ten thousand years ago, before the dawn of recorded human history, a new light would suddenly have appeared in the night sky and faded after a few weeks. Today we know this light was from a supernova, or exploding star, and record the expanding debris cloud as the Veil Nebula, a supernova remnant. This sharp telescopic view is centred on a western segment of the Veil Nebula catalogued as NGC 6960 but less formally known as the Witch's Broom Nebula. Blasted out in the cataclysmic explosion, an interstellar shock wave plows through space sweeping up and exciting interstellar material. Imaged with narrow band filters, the glowing filaments are like long ripples in a sheet seen almost edge on, remarkably well separated into atomic hydrogen (red) and oxygen (blue-green) gas. The complete supernova remnant lies about 1400 light-years away towards the constellation Cygnus. This Witch's Broom actually spans about 35 light-years. The bright star in the frame is 52 Cygni, visible with the unaided eye from a dark location but unrelated to the ancient supernova remnant.

Nova Scorpii 2023 shows months-long X-ray variability after stellar outburst

Using NASA's Swift spacecraft, an international team of astronomers have performed X-ray observations of a classical nova named Nova Scorpii 2023. A nova is a star experiencing a sudden increase in brightness and slowly returning to its original state, a process that could last many months. Such an outburst, which emits radiation across all wavelengths, is the result of the accretion process in a close binary system containing a white dwarf and its non-degenerate stellar companion. Nova Scorpii 2023, also known as V1716 Sco, was detected when it erupted on April 20, 2023 at magnitude 8.0. Follow-up observations of this outburst spectroscopically confirmed it as a classical (Fe II) nova. Since its outburst, Nova Scorpii 2023 has been monitored regularly with Swift, which detected X-ray emission from this source.



Light curve of Nova Scorpii 2023 over 300 days of Swift observations in the 0.3–10 keV range. The epochs of the Chandra exposures are denoted with dashed red lines. Credit: arXiv (2025). DOI: 10.48550/arxiv.2510.19102

The study found that the super soft X-ray source (SSS) phase of Nova Scorpii 2023 started a little after three months after the onset of the optical eruption and lasted between three and six additional months. The collected data indicate that the SSS flux was variable, both aperiodically and periodically. For instance, between late July and September 2023 there was large irregular variability over timescales of days. This aperiodic variability persisted but decreased in amplitude in October 2023.Therefore, based on these findings, the astronomers assume that they caught Nova Scorpii 2023 in February 2024 at the very beginning of cooling-off and the total SSS phase duration is likely to have been close to half a year. This suggests a constant bolometric luminosity phase of total duration close to nine months, which is typical for a white dwarf with a mass of about 1.2 solar masses.

https://phys.org/news/2025-10-astronomers-nova-scorpii-rays.html

A new, expansive view of the Milky Way reveals our galaxy in unprecedented radio colour

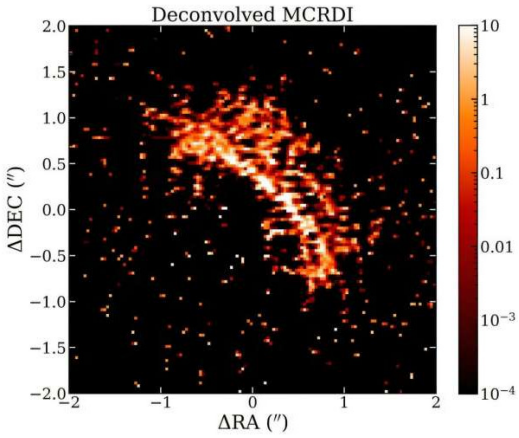
Astronomers from the International Centre of Radio Astronomy Research (ICRAR) have created the largest low-frequency radio colour image of the Milky Way ever assembled. This spectacular new image captures the Southern Hemisphere view of our Milky Way galaxy, revealing it across a wide range of radio wavelengths, the colours of radio light.It provides astronomers with new ways to explore the birth, evolution, and death of stars in our galaxy. Silvia Mantovanini, a Ph.D. student at the Curtin University node of ICRAR, dedicated 18 months and over 40,000 hours to construct the image by using the supercomputers at the Pawsey Supercomputing Research Centre to process and compile the data from two extensive surveys. This significant improvement in resolution, sensitivity and sky coverage allows for a more detailed and comprehensive study of the Milky Way, providing astronomers with a wealth of new data and insights.

The GLEAM-X view of the Milky Way, as seen from the southern hemisphere, in radio colour. Credit: Silvia Mantovanini

"This vibrant image delivers an unparalleled perspective of our galaxy at low radio frequencies," Mantovanini said. "It provides valuable insights into the evolution of stars, including their formation in various regions of the galaxy, how they interact with other celestial objects, and ultimately their demise."

https://phys.org/news/2025-10-expansive-view-milky-reveals-galaxy.html

JWST observations discover large debris disk around nearby M dwarf

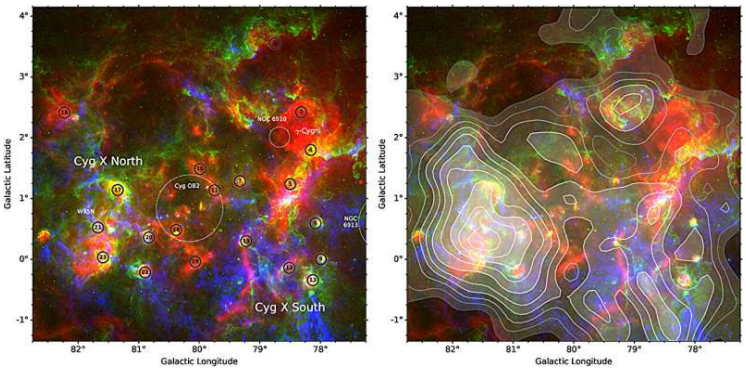


De-convolved image of the TWA 20 debris disk in the F200W filter obtained by running a deconvolution routine on the MCRDI result. The image is rotated North up. Credit: arXiv (2025). DOI: 10.48550/arxiv.2510.20216

An international team of astronomers have employed the James Webb Space Telescope (JWST) to observe a nearby M-dwarf star known as TWA 20. As a result, they detected a large debris disk around this star. Debris disks are collections of small bodies around stars, including asteroids, Kuiper belt objects, comets, and also micron-sized debris dust. Detection of new debris disks and their investigation could help us better understand the evolution of planetary systems, the composition of dust, comets, and planetesimals outside our solar system.TWA 20 is a faint M dwarf of spectral type M3, located some 261.5 light years away from Earth. It is a young star with an estimated age of about 10 million years and its effective temperature is 3,560 K.https://phys.org/news/2025-10-jwst-large-debris-disk-nearby.html

Astronomers expose CO-dark molecular gas, previously invisible to telescopes

An international team of astronomers has created the first-ever large-scale maps of a mysterious form of matter, known as CO-dark molecular gas, in one of our Milky Way's most active star-forming neighbourhoods, Cygnus X. Their findings, using the Green Bank Telescope (GBT), are providing crucial new clues about how stars formed in the Milky Way. For decades, scientists have known that most new stars are born inside clouds of cold molecular hydrogen gas. Much of this molecular hydrogen is invisible to most telescopes—it doesn't give off light that can easily be detected.

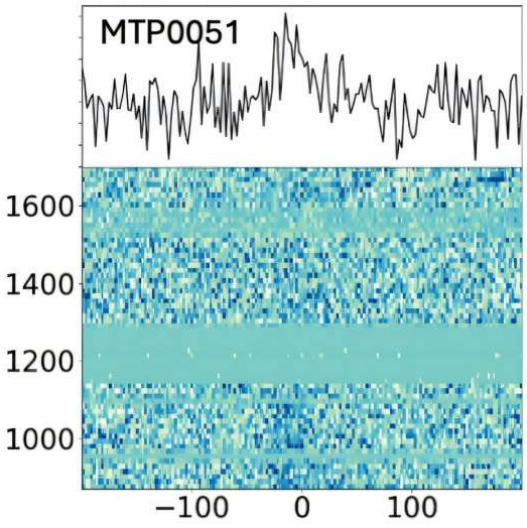


Red, green, and blue compilation in the Cygnus X region covering the footprint that was surveyed. Credit: The Astrophysical Journal (2025). DOI: 10.3847/1538-4357/adfa17

Traditionally, astronomers have hunted for these clouds by looking for carbon monoxide (CO), a molecule that acts like a flashing sign for star-building regions. However, it turns out there's a lot of star-forming gas that doesn't "light up" in CO. This dark, hidden material (called CO-dark molecular gas) has been one of astronomy's biggest blind spots. Now, for the first time, astronomers have mapped this hidden gas over a huge swath of sky—more than 100 times the area covered by the full moon—by observing the radio spectral lines from atoms recombining, known as Carbon Radio Recombination Lines (CRRLs). The team's map covers the bustling Cygnus X region, a cosmic metropolis about 5,000 light-years away, that's overflowing with newborn stars.

https://phys.org/news/2025-10-astronomers-expose-dark-molecular-gas.html

MeerKAT detects 30 new radio transient pulsars



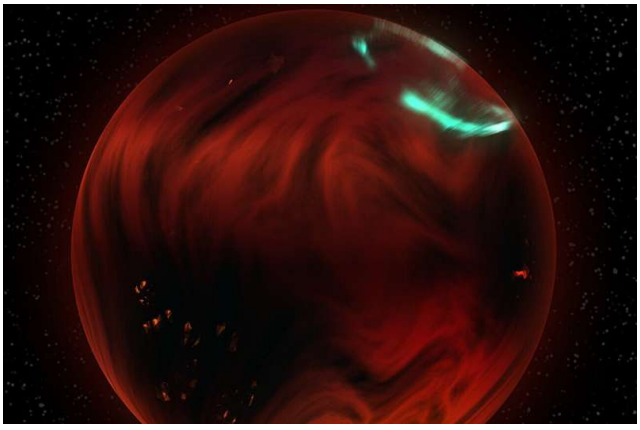
Discovery pulse of one of the 30 Galactic MeerTRAP sources. Panel shows the dynamic spectrum (bottom) and frequency-averaged pulse profile (top) from the filterbank data dedispersed to the best dispersion measure. Credit: arXiv (2025). DOI: 10.48550/arxiv.2510.17723

Using the MeerKAT telescope, an international team of astronomers have detected 30 new radio transient pulsars as part of the Meer(more) TRAnsients and Pulsars (MeerTRAP) project. Fast radio transients are short-duration radio signals of astrophysical origin. Contrary to the fast radio transients of extragalactic origin, which are known as fast radio bursts (FRBs), galactic fast radio transients are assumed to mostly originate from highly magnetized and rotating neutron stars. This includes pulsars, magnetars, and also rotating radio transients (RRATs).One of the programs dedicated to performing commensal, time-domain searches for fast transients is MeerTRAP. Thanks to the wide field of view and high sensitivity of MeerKAT, this search project has discovered a few dozen galactic radio transients. Now, a group of astronomers led by Jun Tian of the University of Manchester, UK, reports the finding of another batch of galactic radio transient pulsars. The transients were identified in real-time via a single pulse search.

https://phys.org/news/2025-10-meerkat-radio-transient-pulsars.html

Nearby brown dwarf's 'weather' mapped in unprecedented detail

Researchers at McGill University and collaborating institutions have mapped the atmospheric features of a planetary-mass brown dwarf, a type of space object that is neither a star nor a planet, existing in a category in-between. This particular brown dwarf's mass, however, is just at the threshold between being a Jupiter-like planet and a brown dwarf. It has thus also been called a free-floating, or rogue, planet, not bound to a star.

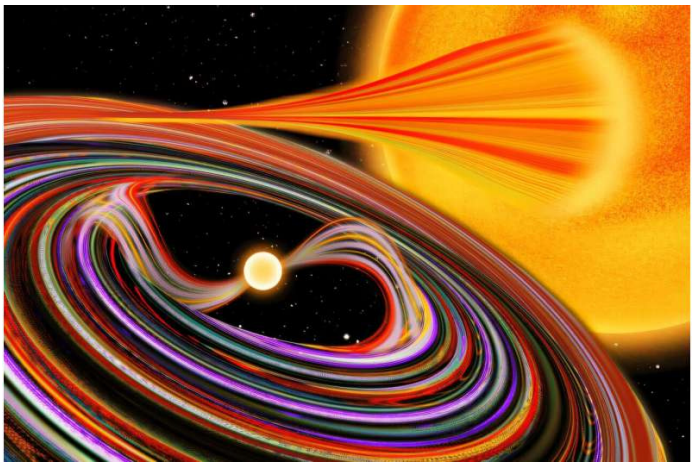


Credit: Anastasiia Nahurna.

Using the James Webb Space Telescope (JWST), the team captured subtle changes in light from SIMP 0136, revealing complex, evolving weather patterns across its surface. The work is published in *The Astrophysical Journal*."Despite the fact that right now we cannot directly image habitable planets around other stars, we can develop methods of learning about the meteorology and atmospheric composition on very similar worlds," said Roman Akhmetshyn, a McGill MSc student in physics and the study's lead author. SIMP 0136 sits about 20 light-years away in the direction of the constellation Pisces. With a mass about 13 times that of Jupiter, it's too small to sustain the nuclear fusion that powers stars, but too large to be considered an ordinary planet. It probably formed like a star before cooling and dimming over hundreds of millions of years. SIMP 0136 is a free-floating planet, drifting alone through space, and its isolated environment makes it an ideal laboratory for studying the atmospheres of gas giants without interference from starlight.

https://phys.org/news/2025-11-nearby-brown-dwarf-weather-unprecedented.html

Scientists get a first look at the innermost region of a white dwarf system

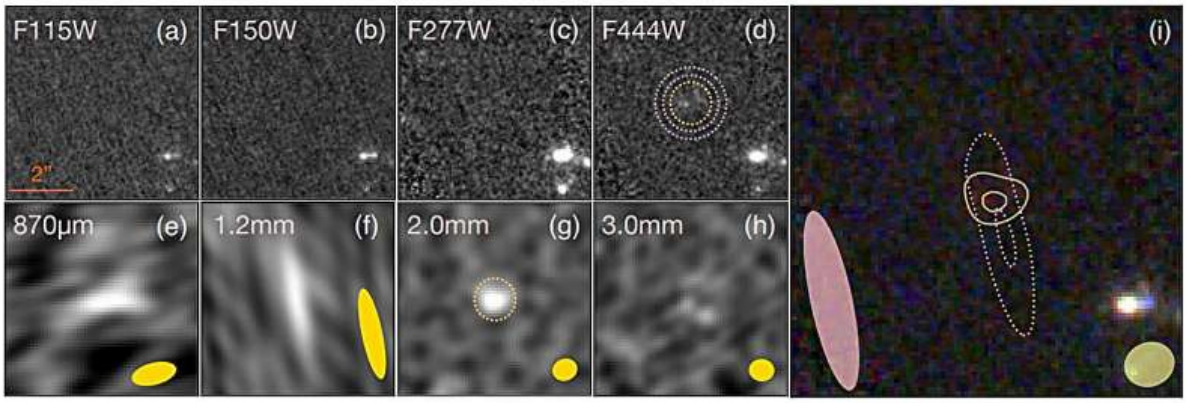


A smaller white dwarf star (left) pulls material from a larger star into a swirling accretion disk. The pair is called an "intermediate polar," and MIT astronomers used powerful telescopes to measure the system's X-ray polarization for the first time, revealing key features at the centre of its hottest, most extreme regions. Credit: Jose-Luis Olivares, MIT

Some 200 light years from Earth, the core of a dead star is circling a larger star in a macabre cosmic dance. The dead star is a type of white dwarf that exerts a powerful magnetic field as it pulls material from the larger star into a swirling, accreting disk. The spiralling pair is what's known as an "intermediate polar"—a type of star system that gives off a complex pattern of intense radiation, including X-rays, as gas from the larger star falls onto the other one. Now, MIT astronomers have used an X-ray telescope in space to identify key features in the system's innermost region—an extremely energetic environment that has been inaccessible to most telescopes until now. In an open-access study published in the *Astrophysical Journal*, the team reports using NASA's Imaging X-ray Polarimetry Explorer (IXPE) to observe the intermediate polar, known as EX Hydrae. The team found a surprisingly high degree of X-ray polarization, which describes the direction of an X-ray wave's electric field, as well as an unexpected direction of polarization in the X-rays coming from EX Hydrae. From these measurements, the researchers traced the X-rays back to their source in the system's innermost region, close to the surface of the white dwarf. What's more, they determined that the system's X-rays were emitted from a column of white-hot material that the white dwarf was pulling in from its companion star. They estimate that this column is about 2,000 miles high—about half the radius of the white dwarf itself and much taller than what physicists had predicted for such a system. They also determined that the X-rays are reflected off the white dwarf's surface before scattering into space—an effect that physicists suspected but hadn't confirmed until now.

https://phys.org/news/2025-11-scientists-innermost-region-white-dwarf.html

Dusty star-forming galaxy at high redshift discovered



Near-infrared to millimetre images of 6"×6" size centred on AC-2168. Credit: arXiv (2025). DOI: 10.48550/arxiv.2511.08672

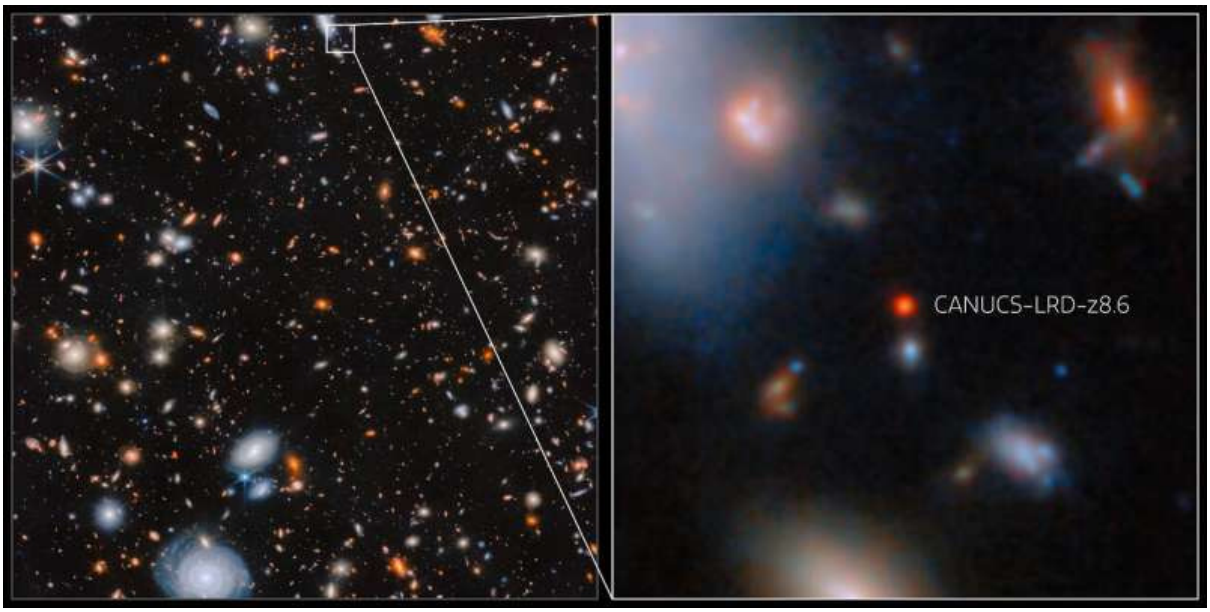
An international team of astronomers reports the discovery of a new dusty star-forming galaxy at high redshift. The newfound galaxy, designated AC-2168, was detected using the Atacama Large Millimeter/submillimeter Array (ALMA) and the Northern Extended Millimeter Array (NOEMA). The finding was detailed in a paper published Nov. 11 on the pre-print server *arXiv*. The so-called dusty

star-forming galaxies (DSFGs) are highly obscured galaxies undergoing a period of intense star formation, with star-formation rates reaching even 1,000 solar masses per year. They represent the most intense starbursts in the universe and are crucial to improving our understanding of galaxy formation and evolution. However, although many DSFGs are known, their nuclear structure, which can be essential to better understand the evolution of these galaxies, is still not fully explored. Hence, finding new DSFGs and investigating them in detail could shed more light on this matter.Recently, a group of astronomers led by Longji Bing of the University of Sussex, UK, inspected a part of the sky from the Cosmic Evolution Survey (COSMOS). By analyzing the COSMOS field with ALMA, they serendipitously identified a new DSFG at a redshift of approximately 6.63. The detection was confirmed by NOEMA observations.

https://phys.org/news/2025-11-dusty-star-galaxy-high-redshift.html

Webb witnesses a feasting supermassive black hole in the early universe

Researchers using the NASA/ESA/CSA James Webb Space Telescope have confirmed an actively growing supermassive black hole within a galaxy just 570 million years after the Big Bang. Part of a class of small, very distant galaxies that have mystified astronomers, CANUCS-LRD-z8.6 represents a vital piece of this puzzle that challenges existing theories about the formation of galaxies and black holes in the early universe. The discovery connects early black holes with the luminous quasars we observe today.



Credit: European Space Agency

Over its first three years, Webb's surveys of the early universe have turned up an increasing number of small, extremely distant, and strikingly red objects. These so-called Little Red Dots (LRDs) remain a tantalizing mystery to astronomers, despite their unexpected abundance. The discovery in CANUCS-LRD-z8.6, made possible by Webb's exceptional capabilities, has assisted in this hunt for answers. Webb's Near-Infrared Spectrograph (NIRSpec) enabled researchers to observe the faint light from this distant galaxy and detect key spectral features that point to the presence of an accreting black hole.

https://phys.org/news/2025-11-webb-witnesses-feasting-supermassive-black.html

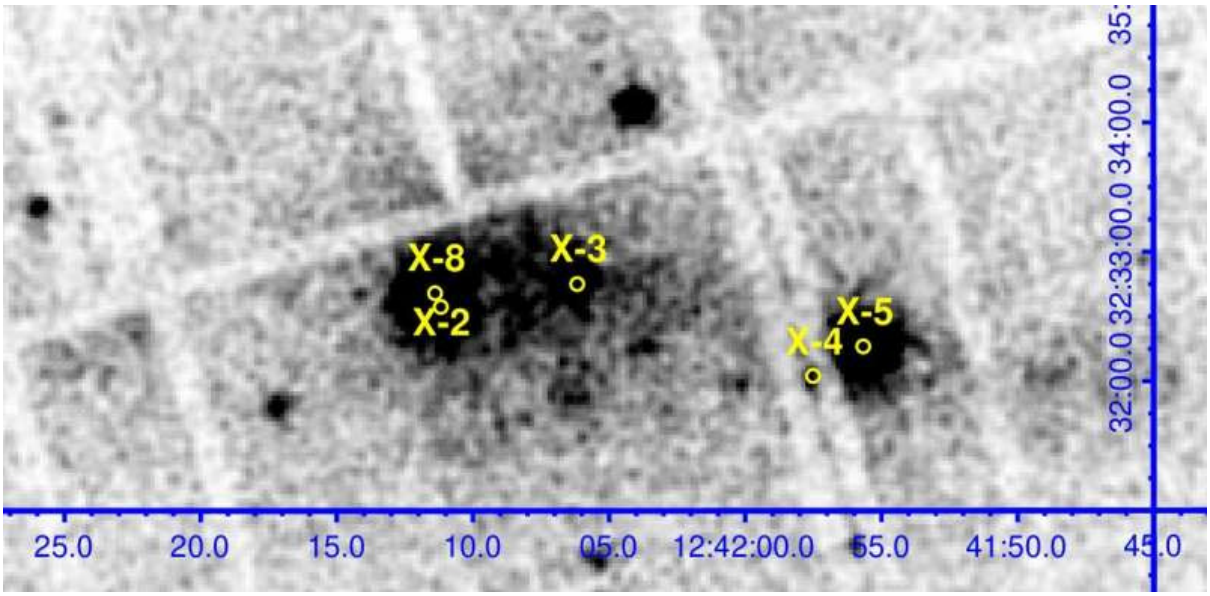
Pleiades star cluster revealed as just one part of a vast stellar family

Credit: Unsplash/CC0 Public Domain

Astronomers at the University of North Carolina at Chapel Hill have discovered that the famous Pleiades star cluster, the "Seven Sisters", is just the bright tip of a much larger stellar family. The research paper appears in *The Astrophysical Journal*. By combining data from NASA's Transiting Exoplanet Survey Satellite (TESS) and the European Space Agency's Gaia space telescope, the team uncovered thousands of hidden siblings spread across the sky, a sprawling structure they call the Greater Pleiades Complex. The discovery shows the Pleiades is 20 times larger than previously thought. Most stars, including our own sun, are born in groups. Over time, these stellar siblings drift apart, making it difficult to trace their origins. Using stellar spin rates as a "cosmic clock," young stars spin quickly, while older stars rotate more slowly. The UNC-Chapel Hill team identified long-lost members of the Pleiades scattered across the sky. By combining rotation measurements from NASA's TESS with precise position and motion data from ESA's Gaia, the researchers redefined the Pleiades not as a small star cluster but as the dense heart of a vast, dissolving stellar association."This study changes how we see the Pleiades—not just seven bright stars, but thousands of long-lost siblings scattered across the whole sky," said Andrew Boyle, lead author and graduate student in physics and astronomy at UNC-Chapel Hill. The findings have broad implications. The Pleiades is not only an astrophysical benchmark for young stars and exoplanets but also a cultural touchstone featured worldwide in the Old Testament and Talmud, celebrated as Matariki in New Zealand, and even represented by the logo of Subaru in Japan.

https://phys.org/news/2025-11-pleiades-star-cluster-revealed-vast.html

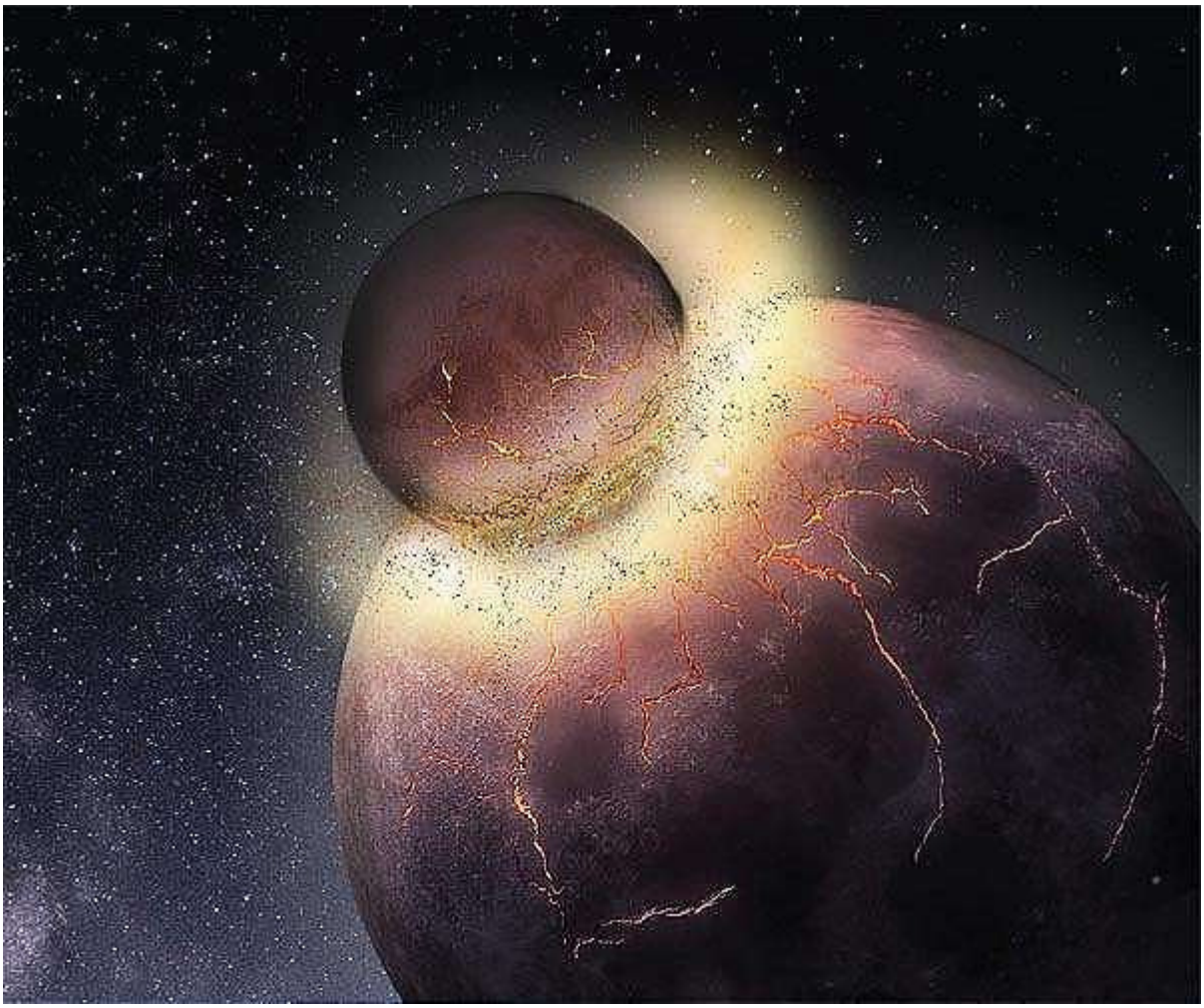
Astronomers discover new pulsating ultraluminous X-ray source



Combined XMM-Newton EPIC image of NGC 4631 in the 0.3–10 keV band from the July 2025 observation. The locations of known ULXs and the new ULX X–8 are marked. Credit: arXiv (2025). DOI: 10.48550/arxiv.2511.04282

Using ESA's XMM-Newton satellite, European astronomers have observed ultraluminous X-ray sources (ULXs) in the galaxy NGC 4631. As a result, they detected a new pulsating ULX, which received the designation X-8. The research is published November 6 on the *arXiv* preprint server.ULXs are point sources in the sky that are so bright in X-rays that each emits more radiation than a million suns emit at all wavelengths. They are less luminous than active galactic nuclei, but more consistently luminous than any known stellar process. Although numerous studies of ULXs have been conducted, the basic nature of these sources still remains unknown. Some persistent ULXs exhibit pulsations and therefore are categorized as ultraluminous X-ray pulsars (ULXPs). Discovering and studying objects of this type could be crucial for advancing our understanding of accretion physics—for instance, mechanisms that enable the sustained X-ray luminosities of ULXs which exceed the Eddington limit.NGC 4631, dubbed the Whale galaxy, is a late-type starburst galaxy at a distance of some 24.45 million light years, known to host at least seven ULXs. https://phys.org/news/2025-11-astronomers-pulsating-ultraluminous-ray-source.html

Lunar impactor Theia originated near Earth and Sun analysis reveals



A new study published in Science has traced the origin of Theia, the body that collided with Earth around 4.5 billion years ago and triggered the creation of the Moon. Led by the Max Planck Institute for Solar System Research and University of Chicago, the research utilizes ratios of metal isotopes to uncover Theia's place of origin and composition. The collision with Theia dramatically altered Earth's size, composition and orbit, marking the birth of the Moon. Although Theia was destroyed in the event, its chemical and isotopic traces remain in the present-day compositions of Earth and Moon. Isotope ratios for iron, chromium, calcium, titanium and zirconium, measured in terrestrial rocks as well as Apollo-returned lunar samples, are key to understanding planetary origins. Iron isotopic ratios in both Earth and Moon rocks proved indistinguishable. This supports previous data for other elements, yet

leaves open multiple collision models: the Moon may be composed mainly of Theia's material, of proto-Earth mantle, or a blend of both. The researchers reconstructed likely scenarios in planetary "reverse engineering," simulating which sizes and compositions for Theia and early Earth would produce the observed isotope matches.These findings suggest that both Earth and Theia shared close formation locales, with the lunar impactor's unique isotopic recipe corroborating its birth in the inner Solar System rather than the outer reaches. The scenario not only clarifies Moon formation but also offers a window into the Solar System's dynamic early environment.

https://www.spacedaily.com/reports/Lunar_impactor_Theia_originated_near_Earth_and_Sun_analysis_reveals_999.html

Committee Members

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Pierre de Villiers	(Vice-chairman, Speaker Selector, Projects and Outreach)	082 854 2277
Elaine Sykes	(Treasurer)	083 286 2683
Peter Harvey	(Secretary, Membership, "Skynotes", "Southern Cross", Study Group SIG co-ordinator, Observing co-ordinator)	081 212 9481 petermh@hermanus.co.za
Mick Fynn	(Educational outreach)	082 443 0848

Non-committee members with portfolio:

Deon Krige	Astro-photography (SIG coordinator)
Pieter Kotzé	"Southern Cross" (Astronomy News, Speaker Selector)