



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

“The Southern Cross”

The Hermanus Astronomy Centre Monthly Newsletter

November 2025

MONTHLY MEETINGS

In our **October** meeting on **Tuesday 21st**, we heard **Pieter Kotzé’s** update on the **James Webb Telescope**.

This 6,5 metre telescope was launched as a joint project between NASA, ESA and the Canadian Space Agency to investigate, inter alia, how the first stars, galaxies and ultimately planetary systems formed and progressed to enable the development of organic life and our own existence.

The YouTube link:

<https://www.youtube.com/watch?v=hKKaP7qAn7Q>

We meet again at **Onrus Manor** on **Tuesday November 18th** for a virtual delivery by **Tim Cooper** with an update on the **Global Meteor Network**. This will be shared on Zoom for those who cannot attend physically.

SPECIAL INTEREST GROUP ACTIVITIES

Cosmology

On **October 7th**, we watched and discussed sections 4 to 6 of episode 32 of THE ENTIRE HISTORY OF THE UNIVERSE series, “*What Is (Almost) Everything Made Of?*”

The video link:

https://www.youtube.com/watch?v=UYW11KNVI90&list=PLROBL1vnR7BEF9b1NOvRf_zhboibmywJb&index=32&t=457s&pp=iAQB

The Discussion link:

This link is not currently available and will be shared when received.

In our November meeting, scheduled for Tuesday 4th, we continue with episode 33 of the Entire History of the Universe, “*What is the Most Powerful Thing in the Universe?*”

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

Study Group

In our meeting on Tuesday October 28th, we watched “AI: How can We Control an Alien Intelligence?”

The video link: <https://www.youtube.com/watch?v=0BnZMeFtoAM>

The discussion link:

<https://youtu.be/T3Kz-G3Bo4E> <https://youtu.be/T3Kz-G3Bo4E>

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

Observing

No suitable evenings were available during October.

Optimal dates for **November 2025**:

SUGGESTED EVENING OBSERVATION WINDOWS

(Lunar observations notwithstanding)

<i>Date</i>		<i>Moon</i>	<i>Dusk end</i>
November 6	Rise	20h50 (98%)	20h51
to November 22	Set	22h43 (8%)	21h13

Skynotes contents:

The Moon: **The Lunar Crater Radio Telescope**

Object of the month: **M31 the Andromeda Galaxy**

ASSA

From Tim Cooper

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

<https://assa.saa.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/>

OUTREACH

WELCOME BACK TO OUR STAR, THE SUN!

The **Sun** humbly returned from the north and back into the southern hemisphere during the 22nd September equinox. This Sun is the energy source of all life on earth and controller of all the planets. Hermanus is chosen as the ideal site to measure this space weather and the magnetism that affects so much of Earth's magnetic field.



*Painting parade,
Monday 22nd September*

A decade ago, pupils of Lukhanyo school in Zwelihle were the students who painted the planets from the 0,9 metre Sun standing by the amphitheatre and the children's playground, ranging eastwards along the cliff path. The municipality supported the initiative to create the Solar System scale model to achieve two major goals:

1. The perception of the vast distances between planets
2. and of the emptiness of space.

Between professional artists, the astronomers and pupils and teachers, they scaled the planets and distances, placing them along the cliff path ending up with Pluto, the size of a pea, at Grotto Beach!

But over the decade there has been wear and tear, abuse and vandalism.

Guess who came forward to assist and encourage the Lukhanyo school children to do the painting? None other than our Mayor, Archie Klaas! He addressed the headmaster, Mr Morris Tshabalala, key members of his staff, the head girl and science club students and told them the important role they played as ambassadors of the cliff path solar model. Students from many

schools come to learn about the sun and the planets. Even students who were on the project a decade ago, such as Indiphile Madletyana, are appointed as the Hermanus ambassadors to the global Astronomy NASA conference at the CTICC whilst studying at University.

It's a great responsibility to continue this interest through the schools science groups, such as Zwelihle Astronomy, as space becomes more and more important in science, geography and human population trends.

Archie donned his overalls and started the painting of the sun and Mr Morris Tshabalala was soon on the ball with yellow and orange paint with the students following suit; orange the colour of the sun and yellow depicting coronal flares, sunspots and other features.

An hour later the job was done and Lukhanyo thanked the mayor for his participation and encouragement. They told him about the other projects they do with Hermanus Astronomy like observing through telescopes from Gearings Point, painting analemmatic sundials, the Global Meteor Network (GMN), SANSA visits and meetings, etc.

The Mayor closed by assuring them he'd love to join them painting their sundial too. He was impressed that these were funded by private donations.



*Archie the Mayor and Morris the Lukhanyo
headmaster hard at work painting the Sun*

Compiled by Pieter Kotzé

OCTOBER ASTRONOMY PICTURE



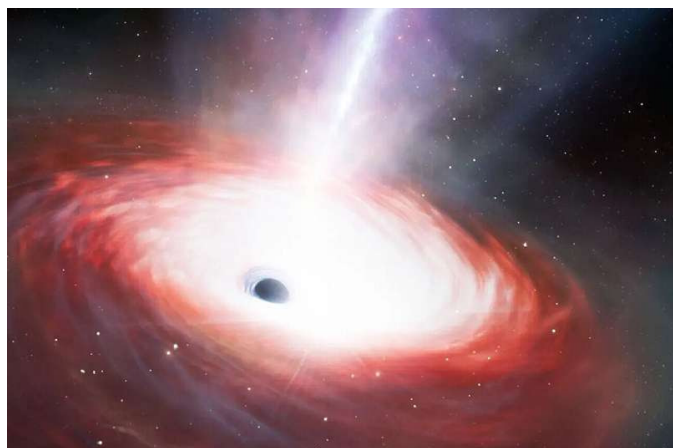
Credit: X-ray: (Chandra) NASA/CXC/U. Manitoba/C. Treyturi, (XMM-Newton) ESA/C. Treyturi; Optical: (Pan-STARRS) NOIRLab/MDM/Dartmouth/R. Fesen; Infrared: (WISE) NASA/JPL/Caltech/; Image Processing: Univ. of Manitoba/Gilles Ferrand and Jayanne English

The Hunt for the Hidden Supernova

It's hard to hide a [stellar explosion](#) for centuries, but that's apparently what happened. In the 12th century CE, between August 4 and August 6, 1181, a star in what we now call the [constellation of Cassiopeia](#) exploded. This "guest star" was one of only a [handful of dramatic celestial brightenings](#) to be recorded by humans before the invention of the telescope, and is recorded in separate texts by contemporary Chinese and Japanese skywatchers. The explosion was visible for about half a year, then faded away to obscurity. Since that time, astronomers have struggled to find the glowing remnant of the material ejected in the explosion. An extended radio object called [3c58](#) was thought to be the

remnant of the 1181 explosion at one point, since it contained a [neutron star pulsar](#). But the pulsar was spinning too fast to have been produced in 1181, leading many to continue the search. In 2013, an astronomer noticed a circular infrared source in Cassiopeia in observations obtained by NASA's [Wide-Field Infrared Survey Explorer](#) (or WISE for short). Follow-up X-ray observations with [XMM-Newton](#) showed that this extended source was also an extended X-ray source, indicating that the source was associated with a powerful, high-energy event, while high spatial resolution observations by the [Chandra X-ray Observatory](#) revealed the presence of a point-source of X-rays near the centre of the nebula. This central source was found to be the hottest known object in the sky, with a temperature of almost 200,000°C, with a stellar wind blowing into space at 16,000 km/s (equivalent to 35 million miles per hour), one of the fastest stellar winds ever seen. Although the nebula is faint in optical light, it does show radial structure in the visible produced by knots of heated material. Astronomers believe that this nebula is the real remnant of the 1181 event. This explosion is believed to be a peculiar supernova triggered by the collision of two [white dwarf stars](#), which somehow left behind a weird, massive, hot white dwarf at the centre of the remnant.

Supermassive black hole spews gas at record speeds, upending mass estimates



Artist's impression of a rapidly feeding black hole that is emitting powerful gas outflows. Credit: NOIRLab/NSF/AURA/J. da Silva/M. Zamani

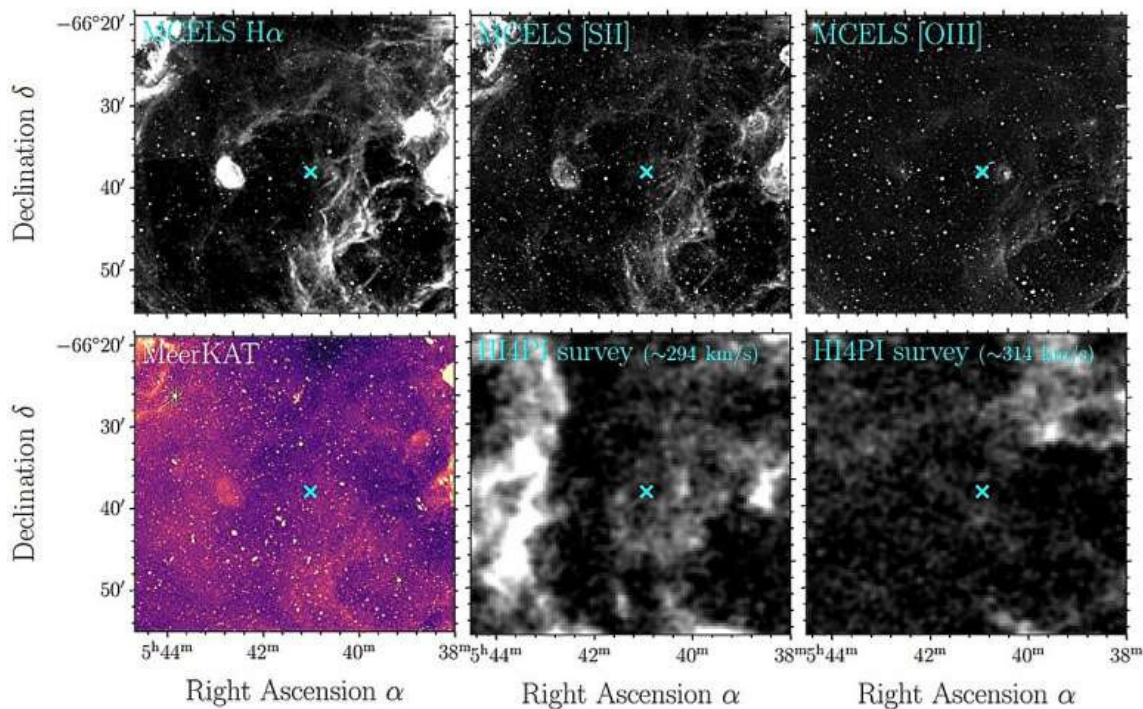
One of the most powerful black holes in the universe is belching out gas at speeds of up to 10,000 kilometres per second, making its estimated mass more than 10 times lower than first thought. The monster black hole, known as SMSS J052915.80-435152.0 (or simply J0529), was first [discovered in 2024](#) by Associate Professor Christian Wolf and his team at The Australian National University (ANU). Using brand-new powerful

optical equipment at the European Southern Observatory in Chile, they have now been able to magnify the black hole's light and get a closer look at the gas swirling around it. "Despite the quasar's extreme luminosity, the black hole at its heart was found to have a mass equal to 'only' around one billion suns," Associate Professor Wolf said. "Instead of rapidly rotating as previously presumed, this black hole is belching up the gas it's feeding on. The gas is being blown away by the ferocious density of light—this is the brightest object in the universe we know of."

<https://phys.org/news/2025-09-supermassive-black-hole-spews-gas.html>

Rare nova super-remnant discovered in the Large Magellanic Cloud

Astronomers report the discovery of a rare nova super-remnant surrounding the recurrent nova LMCN 1971-08a in the Large Magellanic Cloud (LMC). This is the first nova super-remnant identified in the LMC. The findings are detailed in a paper [published](#) September 17 on the *arXiv* preprint server. Nova super-remnants (NSRs) are greatly extended shell-like structures significantly larger than singular eruption nova shells. They grow by repeated nova eruptions sweeping the surrounding material away from a nova into a dense outer shell. However, although NSRs are predicted to form around all novae, to date only four such structures have been identified, and three of them in our galaxy.



Approximate 40×40 arcminutes field of view showing the nova super-remnant around LMCN 1971-08a seen across different surveys and wavebands. The location of the nova is indicated with the cyan cross in each panel. Credit: arXiv (2025). DOI: 10.48550/arxiv.2509.14368

Now, a team of astronomers led by Michael W. Healy-Kalesh, of the Friedrich-Alexander University of Erlangen-Nuremberg in Germany, reports the detection of the fifth nova super-remnant. By analyzing the data from various astronomical surveys and from the MeerKAT radio telescope, they identified the first such structure in the LMC.

<https://phys.org/news/2025-09-rare-nova-super-remnant-large.html>

Observations explore a rare type Iax supernova



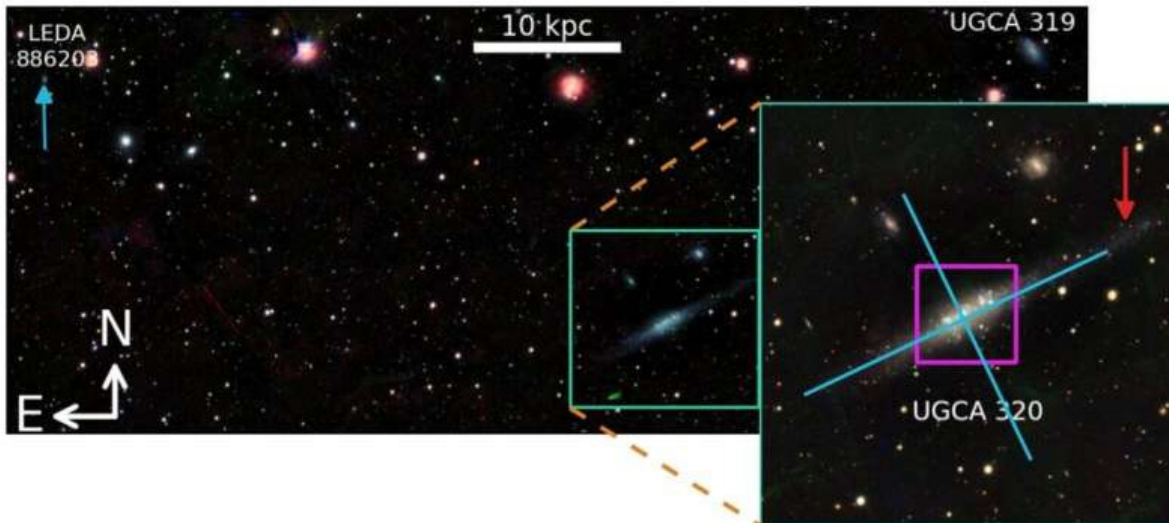
SN 2022xlp hosted by NGC 3938. This picture was taken with the BRC80 telescope in the Baja Astronomical Observatory of the University of Szeged. Credit: University of Szeged.

An international team of astronomers has conducted detailed multicolour photometric and spectroscopic observations of SN 2022xlp—a type Iax supernova. Results of the observational campaign could shed more light on the nature of this rare subclass of supernovae. Type Ia supernovae (SN Ia) are generally found in binary systems in which one of the stars is a white dwarf (WD). Stellar explosions of this type are important for astronomers, as they can offer essential clues into the evolution of stars and galaxies.

Type Iax SNe represent a very rare subtype of SN Ia, which leaves behind a remnant star, rather than completely dispersing the WD. In general, they are similar to type Ia SNe, but have a lower ejection velocity and lower luminosity. SN 2022xlp is a supernova discovered in 2022, which exploded in the galaxy NGC 3938, located some 72.2 million light years away. Based on the first spectrum obtained of SN 2022xlp, the supernova was classified as a type Iax SN.

<https://phys.org/news/2025-09-explore-rare-iax-supernova.html>

Multi-band observations explore nearby dwarf irregular galaxy UGCA 320

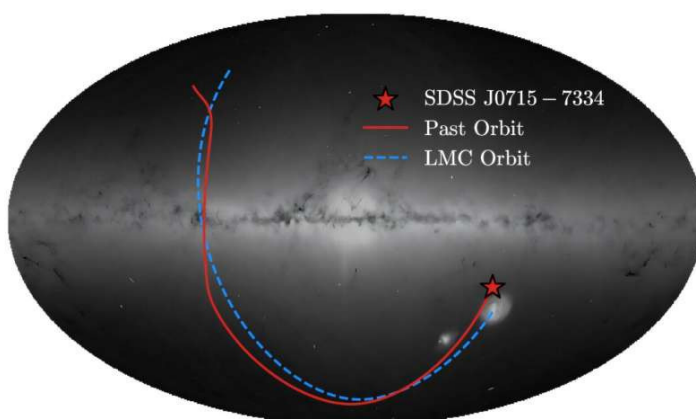


A Pan-STARRS grizy composite image of the field of UGCA 320. The background image is $78 \text{ kpc} \times 31 \text{ kpc}$, North is up and East is left. UGCA 320 is the prominent, elongated galaxy in the background image, highlighted in the green box. The two neighbours, LEDA 886203 and UGCA 319 are labeled and can be seen in the top-left (top of the blue arrow) and top-right portions of the background image, respectively. The foreground image (bigger green box) is a zoom-in view of the immediate neighborhood of UGCA 320 with the VLT/MUSE field-of-view (purple box) and SALT long-slit positions (skyblue lines) overlaid. A faint, asymmetric stellar extension is visible along the major axes of UGCA 320, in the north-west direction, marked with the red arrow. Credit: arXiv (2025). DOI: 10.48550/arxiv.2509.20359

Astronomers from South Africa have conducted multi-band observations of a nearby dwarf irregular galaxy known as UGCA 320. Results of the observational campaign, recently [published](#) on the arXiv preprint server, yield important insights into the nature of this galaxy. Located some 19.7 million light years away in the constellation Virgo, UGCA 320, also known as DDO 161 or HIPASS J1303-17b, is a gas-rich, optically blue, dwarf irregular galaxy that belongs to a nearby, relatively isolated group of dwarf [galaxies](#). The galaxy has a [stellar mass](#) of around 93 million [solar masses](#), a systematic velocity of approximately 740 km/s, and its star-formation rate (SFR) is estimated to be less than 0.02 solar masses per year. Given that still very little is known about the nature and properties of UGCA 320, a team of astronomers led by Adebisola B. Alabi of the North-West University in South Africa decided to take a closer look at this galaxy, focusing mainly on its stellar populations and ionized gas. For this purpose, they employed the Hubble Space Telescope (HST), the Southern African Large Telescope (SALT) and the Very Large Telescope (VLT).

<https://phys.org/news/2025-10-multi-band-explore-nearby-dwarf.html>

Astronomers discover the most 'pristine' star in the known universe



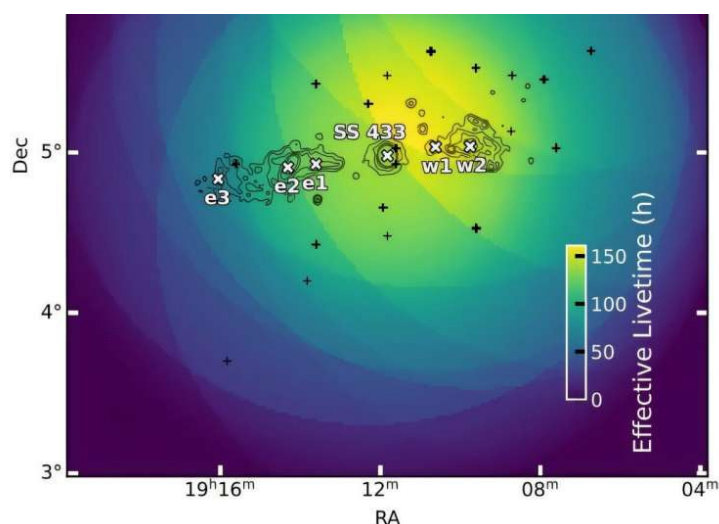
Kinematic properties. The past orbit of J0715 – 7334 and the LMC in Galactic coordinates on-sky, overlaid on the distribution of all stars observed by Gaia.

Not all stars are created equally. Astronomers believe that the first stars to form after the Big Bang were mostly made of only hydrogen and helium with trace amounts of lithium, as the heavier elements formed later on by nuclear

fusion inside the stars. When these stars went supernova, heavier elements spread throughout space and formed more stars. Each successive generation contained more heavy elements, and these elements also became successively heavier. While most stars still contain mostly hydrogen and helium, they now contain many [heavy elements](#) as well, especially as they get older. These elements show up in spectrographic data when astronomers gather light from these [distant stars](#). Stars are considered "pristine" when the data shows a lack of heavy elements—meaning they are likely very rare, older stars from earlier generations. And now, a group of astronomers, led by Alexander Ji from the University of Chicago, believe they have found the most pristine star on record. The group has [documented](#) their findings on the *arXiv* preprint server. The star, referred to as SDSS J0715-7334, is a red giant purported to have the lowest metallicity—or heavy element content—ever found. The team's detailed spectral and [chemical analysis](#) shows that SDSS J0715-7334 has a total metallicity "Z" of less than 7.8×10^{-7} . This is compared to the next lowest metallicity star currently known, a star located in the Milky Way with a total metallicity of around 1.4×10^{-6} .

<https://phys.org/news/2025-10-astronomers-pristine-star-universe.html>

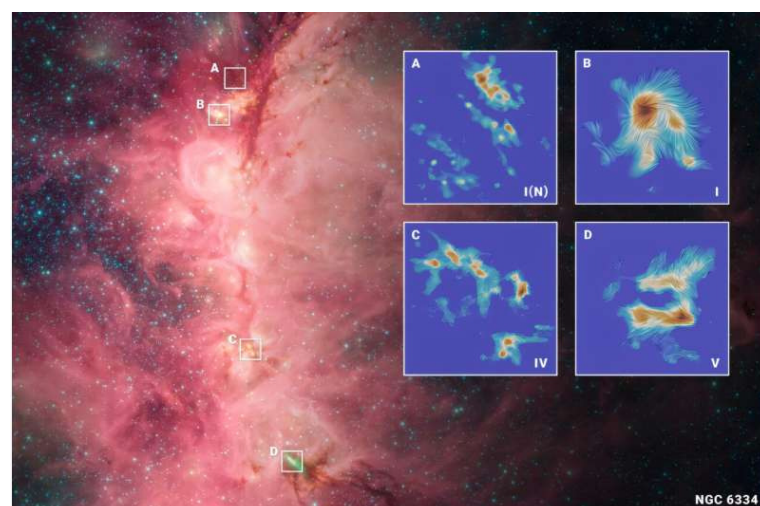
VERITAS observations explore a unique micro-quasar



SS 433 region acceptance corrected livetime map: Computed by dividing the exposure map by the VERITAS on axis effective area evaluated at an energy of 1 TeV. The map is overlaid by black X-ray contours. The VERITAS observation pointings are indicated by black markers and SS 433, the eastern and western jet emission regions are indicated by white crosses. Credit: arXiv (2025). DOI: 10.48550/arxiv.2509.21063

Using the Very Energetic Radiation Imaging Telescope Array System (VERITAS), German astronomers have observed a unique micro-quasar known as SS

433. Quasars, or quasi-stellar objects (QSOs), are [active galactic nuclei](#) (AGN) in the centres of active galaxies, exhibiting very high luminosity. Micro-quasars are their smaller versions—[binary systems](#) in which a compact object (such as a black hole or neutron star) draws matter from its companion star. Studies suggest that both quasars and micro-quasars are powered by spinning supermassive [black holes](#) (SMBHs). SS 433 was discovered in 1978 in the centre of the supernova remnant W50 as the first micro-quasar. It is a massive X-ray binary system at an advanced stage of evolution, located some 18,000 light years away. <https://phys.org/news/2025-10-veritas-explore-unique-microquasar.html>



Cosmic tug-of-war: Gravity reshapes magnetic fields in star clusters

This image from NASA's Spitzer Space Telescope shows a star formation region in molecular cloud NGC 6334, also known as the Cat's Paw Nebula. The colours correspond with emission at 3.6 microns (blue), 4.5 microns (green), and 8 microns (red). This cloud is actively forming massive stars, and is located in the constellation Scorpius, between

4,200 to 5,500 light-years from Earth. ALMA data overlaid on the image shows details of four specific areas that were observed (NGC6334I, NGC6334I(N), NGC6334IV and NGC6334V), revealing invisible forces of magnetism and gravity as they wrestle and shape the formation of stars deep within the giant molecular cloud. The colour scale in the ALMA images represents the intensity of the dust emission at 1.3mm and the drapery lines represent the orientation of the magnetic field. Credit: Credit for composite image: background, NASA/JPL-Caltech; overlay: ESO/NAOJ/NSF NRAO; image created by NSF/AUI/NSF NRAO/M. Weiss.

Astronomers have captured the clearest picture yet of how massive stars are born, revealing a dramatic interplay between gravity and magnetic fields in some of our galaxy's most dynamic star forming regions. A team led by Dr. Qizhou Zhang from the Centre for Astrophysics | Harvard & Smithsonian used the Atacama Large Millimeter/submillimeter Array (ALMA) to conduct the largest and most detailed survey to date of magnetic fields in 17 regions where clusters of massive stars are forming. These observations, reaching down to just a few thousand astronomical units (about 10 times the distance from the sun to Pluto) offer the first statistical insight into how the invisible forces of magnetism and gravity wrestle and shape the formation of stars deep within [giant molecular clouds](#). Star formation requires gas in space to be squeezed to densities more than ten trillion times greater than what's typically found in interstellar clouds. But this epic collapse isn't driven by gravity alone—magnetic fields and turbulence both push back, resisting the pull. For decades, astronomers have debated which force dominates as gas clouds shrink and stars ignite.

<https://phys.org/news/2025-10-cosmic-war-gravity-reshapes-magnetic.html>

With new analysis, Apollo samples brought to Earth in 1972 reveal exotic sulfur hidden in Moon's mantle

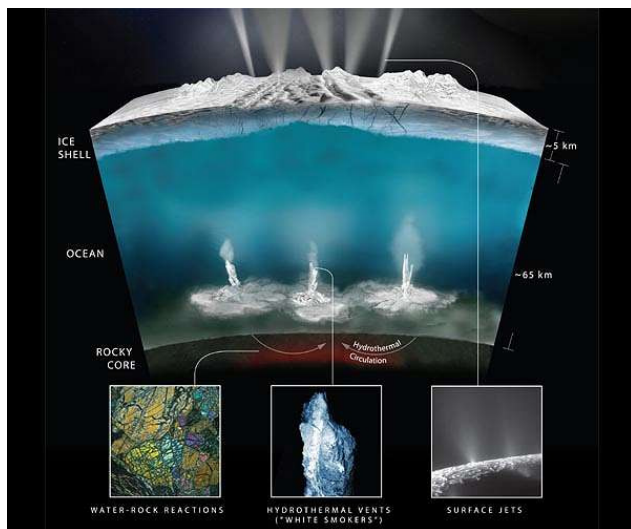


When astronauts returned from NASA's final Apollo Moon mission in 1972, some of the samples they collected were sealed and carefully stored away in the hope that future researchers using advanced equipment might analyze them and make new discoveries. Now, a research team led by a Brown University professor has done just that. In a study published in JGR: Planets, researchers report a sulfidic surprise in rock samples taken from the Moon's Taurus Littrow region during Apollo 17. The analysis shows that volcanic

material in the sample contains sulfur compounds that are highly depleted of sulfur-33 (or ^{33}S), one of four radioactively stable sulfur isotopes. In the case of the Moon and Earth, researchers have shown broad similarities in the two bodies' oxygen isotopes. It has long been assumed that sulfur isotopes would tell a similar story, according to James Dottin, an assistant professor of Earth, environmental and planetary sciences at Brown who led the new study.

https://www.spacedaily.com/reports/With_new_analysis_Apollo_samples_brought_to_Earth_in_1972_reveal_exotic_sulfur_hidden_in_Moon's_mantle_999.html

Cassini proves complex chemistry in Enceladus ocean

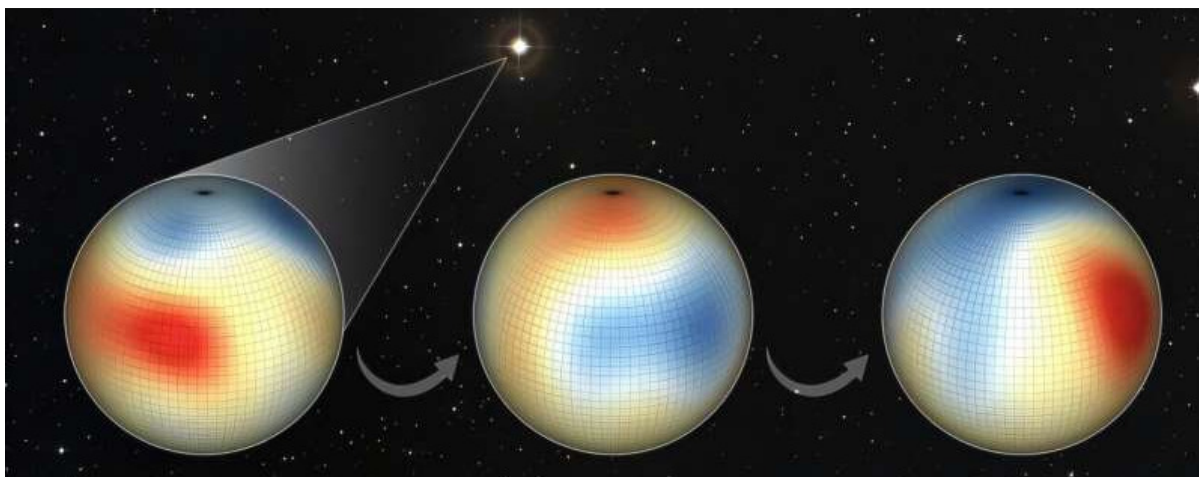


Scientists digging through data collected by the Cassini spacecraft have found new complex organic molecules spewing from Saturn's moon Enceladus. This is a clear sign that complex chemical reactions are taking place within its underground ocean. Some of these reactions could be part of chains that lead to even more complex, potentially biologically relevant molecules. Published in *Nature Astronomy*, this discovery further strengthens the case for a dedicated European Space Agency (ESA) mission to orbit and land on Enceladus. In 2005, Cassini found the first evidence that Enceladus has a hidden ocean beneath its icy surface. Jets of water burst from cracks close to the moon's south pole, shooting ice grains into space. Smaller than

grains of sand, some of the tiny pieces of ice fall back onto the moon's surface, whilst others escape and form a ring around Saturn that traces Enceladus's orbit. Lead author Nozair Khawaja explains what we already knew: "Cassini was detecting samples from Enceladus all the time as it flew through Saturn's E ring. We had already found many organic molecules in these ice grains, including precursors for amino acids. The ice grains in the ring can be hundreds of years old. As they have aged, they may have been 'weathered' and therefore altered by intense space radiation. Scientists wanted to investigate fresh grains ejected much more recently to get a better idea of what exactly is going on in Enceladus's ocean.

https://www.spacedaily.com/reports/Cassini_proves_complex_chemistry_in_Enceladus_ocean_999.html

Young sunlike star reveals rapid two-year magnetic cycle



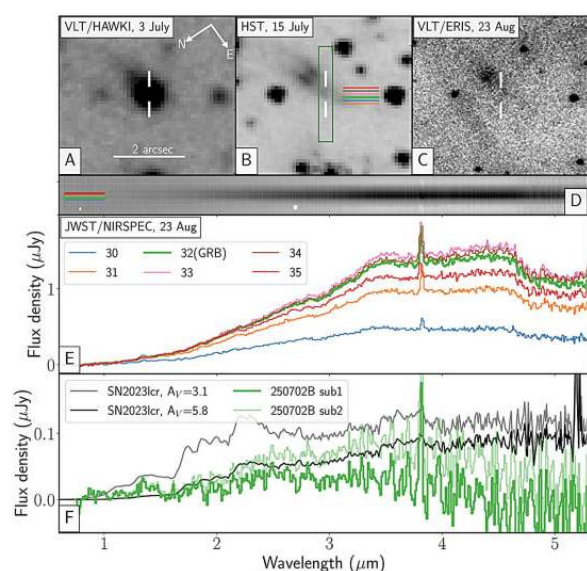
Credit: AIP/J. Alvarado-Gómez - STScI/NASA

Scientists at the Leibniz Institute for Astrophysics Potsdam (AIP) have uncovered the intricate magnetic heartbeat of a distant star remarkably similar to our own sun—but much younger and more active. This study, part of the "Far Beyond the Sun" campaign, follows nearly three years of ultra-precise observations and sheds new light on how stars like our sun generate their magnetic fields—and how these fields evolve over time. The results appear in the article "Far Beyond the Sun III: The Magnetic Cycle of ι Horologii" on the *arXiv* preprint server. The star at the heart of this research is *Iota Horologii* (nicknamed " ι Hor," in the constellation Horologium, the pendulum clock at the southern sky), located roughly 56 [light years](#) from Earth. At about 600 million years old—far younger than our

4.6 billion-year-old sun— ι Hor spins faster and displays far more vigorous magnetic activity than the sun. One of the most remarkable findings is that ι Hor completes a full magnetic cycle—equivalent to the sun's 22-year cycle—in just above two years (about 773 days). Over this period, the star's magnetic north and south poles reverse, only to switch back again, creating a rhythmic magnetic heartbeat far faster than our sun. <https://phys.org/news/2025-10-young-sunlike-star-reveals-rapid.html>

Follow-up observations by Webb confirm GRB 250702B is most energetic cosmic explosion ever recorded

Considering the immense size of the universe, it's no surprise that space still holds plenty of secrets for us. Recently, astronomers believe they stumbled upon a kind of cosmic blast never seen before, and it's challenging what we thought we knew about how stars die. In a paper [available](#) on the arXiv preprint server, scientists report the longest gamma-ray burst (GRB) ever recorded. This unique event was spotted by NASA's Fermi telescope on July 2, 2025, and is called GRB 250702B. GRB events are incredibly bright and can briefly outshine entire [galaxies](#).



Spatially resolved properties of the GRB 250702B host galaxy, and supernova limits. Credit: arXiv (2025). DOI: 10.48550/arxiv.2509.22778

However, GRB 250702B kept flaring up for a full day. Normal cosmic explosions only happen once—you can't explode a star twice. The team used the powerful James Webb Space Telescope to work out the distance, and by incorporating this measurement into energy calculations, they found it was the most energetic cosmic explosion ever recorded. Since most long gamma-ray bursts are accompanied by a massive supernova, the astronomers looked for one nearby. However, they couldn't find a bright supernova, although a fainter one may be hidden by the host galaxy's dust. The study authors speculate that GRB 250702B was caused by either a very unusual

form of a collapsing star or a black hole destroying a small star. Another surprising finding was that the host galaxy is extremely large and incredibly dusty. Usually, GRBs occur in small, young star-forming galaxies. This could mean the environment was important in creating the unusual GRB, as the astronomers point out in their paper. <https://phys.org/news/2025-10-webb-grb-250702b-energetic-cosmic.html>

<https://phys.org/news/2025-10-gamma-ray-black-hole-engulfed.html>

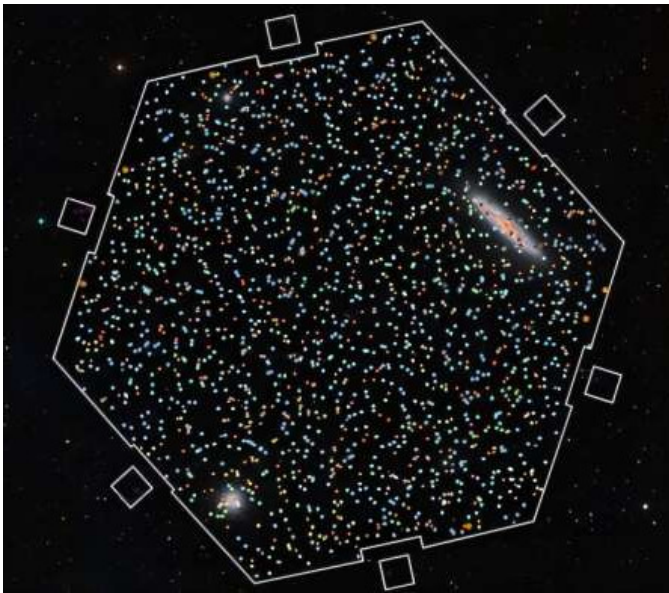
Ancient Heavy Water Found in Planet-Forming Disk Reveals Solar Origins of Earth's Oceans

Astronomers have detected "heavy water" in a planet-forming disk for the first time, uncovering compelling evidence that much of the water in our Solar System predates the Sun itself. The discovery provides new insight into how ancient interstellar ice survived the violent birth of stars and planetary systems. Using the Atacama Large Millimeter/submillimeter Array (ALMA), researchers identified doubly deuterated water (D₂O) in the disk surrounding V883 Orionis, a young Sun-like star. The presence of this rare isotopic form of water shows that the water in the disk - and the comets and planets that may one day emerge from it - originated long before the star's formation. The finding strengthens the view that the water found in comets, and perhaps in Earth's oceans, is inherited rather

than newly created. This interstellar water, older than the Sun, underscores the deep continuity between the formation of stars and the origins of life-supporting environments.

[https://www.spacedaily.com/reports/Ancient Heavy Water Found in Planet Forming Disk Reveals Solar Origins of Earth's Oceans 999.html](https://www.spacedaily.com/reports/Ancient%20Heavy%20Water%20Found%20in%20Planet%20Forming%20Disk%20Reveals%20Solar%20Origins%20of%20Earth's%20Oceans_999.html)

New telescope opens window to southern sky



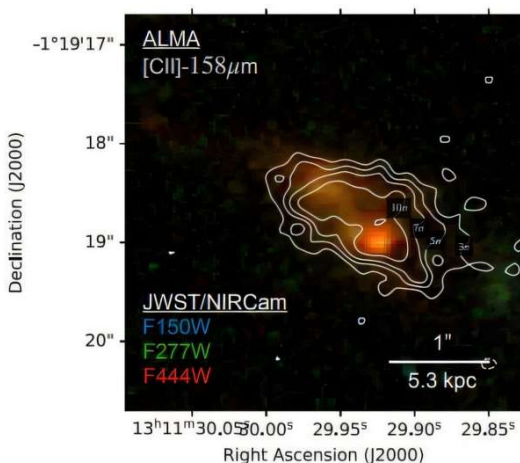
4MOST first-light field-of-view. Credit: AIP/Background: Harshwardhan Pathak/Telescope Live

A powerful new telescope has captured its first glimpse of the cosmos, and could transform our understanding of how stars, galaxies and black holes evolve. The 4MOST (4-meter Multi-Object Spectroscopic Telescope), mounted on the European Southern Observatory's VISTA telescope in Chile, achieved its 'first light' on 18 October 2025: a milestone marking the start of its scientific mission. Unlike a typical telescope that takes pictures of the sky, 4MOST records spectra—the detailed colours of light from [celestial objects](#)—revealing their temperature, motion and chemical makeup. Using 2,436 optical fibres, each thinner

than a human hair, the telescope can study thousands of stars and galaxies at once, splitting their light into 18,000 distinct colour components. When fully operational, 4MOST will scan the entire southern sky every few minutes, building a catalog of tens of millions of objects. The data it gathers will help answer fundamental questions about how the Milky Way formed, how galaxies grow, and the mysterious forces of dark matter and dark energy shaping the universe.

<https://phys.org/news/2025-10-telescope-window-southern-sky.html>

Distant galaxy A1689-zD1 found to have unusually low dust-to-gas ratio



False-colour JWST/NIRCam RGB image cutout (blue: F150W; green: F277W; red: F444W), overlaid with [C II]-158μm emission contours showing 3, 5, 7, 10σ (white solid lines). A scalebar is shown in the image plane. Credit: arXiv (2025). DOI: 10.48550/arxiv.2510.07936

Using the James Webb Space Telescope (JWST) and the Atacama Large Millimeter/sub-millimeter Array (ALMA), an international team of astronomers has carried out comprehensive multiwavelength observations of a distant massive galaxy known as A1689-zD1. A1689-zD1 is a bright highly-lensed massive galaxy at a redshift of approximately 7.13. It has a diameter of about 3,000 light years and its stellar mass is estimated to be some 2.6 billion [solar masses](#). The study found that although A1689-zD1 has a substantial dust mass, its dust-to-gas (DTG) and dust-to-metal (DTM) mass ratios are remarkably low—at a level of 0.00051 and 0.061, respectively. The astronomers note that this is due to the high metallicity of A1689-zD1 and its substantial gas mass, which was calculated to be 28 billion solar masses.

<https://phys.org/news/2025-10-distant-galaxy-a1689-zd1-unusually.html>

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