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

# "The Southern Cross"

The Hermanus Astronomy Centre Monthly Newsletter

# October 2024

## *MONTHLY MEETING*

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

Our last Monthly meeting was held virtually on Zoom on **Tuesday September 17th**. This was presented by **Prof Ilani Loubser** (North-West University) - ***"Monsters of the Universe: The Build-up of the Most Massive Galaxies"***.

Astonishing facts and figures were presented by Professor Ilani Loubser (North-West University) on the formation, growth and evolution of giant galaxies with supermassive black holes at their centres, involving cannibalism and resulting in clustering. The worldwide teams use telescopes, both optical and spectral, including SALT and MeerKAT, to examine and research these phenomena.

For a review of the presentation (and for those who missed it) herewith the link:

https://www.youtube.com/watch?v=7rypFV_12H8&ab_channel=DerekDuckitt

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Scheduled for **Tuesday October 15th**, our next meeting will be at **Onrus Manor** and virtually on **Zoom**.

Presented by **Dr Pierre Cilliers** (formerly with SANSA, Hermanus), his topic is ***"Solar Radio Bursts".*** SRBs are powerful, explosive events on the Sun that can disrupt radio communications and astronomy. But these bursts are more than just a nuisance. They offer a unique window into the Sun's turbulent atmosphere and the underlying processes that drive solar eruptions.

Join Dr. Pierre Cilliers as he delves into the fascinating world of SRBs. Discover how scientists use these radio emissions to study solar flares, Coronal Mass Ejections (CMEs) and other dynamic phenomena.

**Don't miss this opportunity to gain insights into the Sun's explosive behavior!** As a former Professor of Electronic Engineering and a dedicated research physicist, Dr. Cilliers has been at the forefront of cutting-edge research in space weather. His contributions to the development of the SANDIMS data portal and his leadership in the field of Geomagnetically Induced Currents (GICs) have been instrumental in safeguarding critical infrastructure.

## *SPECIAL INTEREST GROUP ACTIVITIES*

### *Cosmology*

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

On **Tuesday September 3rd**, in the series "THE ENTIRE HISTORY OF THE UNIVERSE", we watched episode 23: ***"Have We Really Found the Theory of Everything?"*** The YouTube video link:

https://www.youtube.com/watch?v=ae36scLdCsE&list=PLROBLlvnR7BEF9b1NOvRf_zhboibmywJb&index=22&t=15s&pp=iAQB

Episode number 24 of the same series is scheduled for **Tuesday October 1st**, ***"How does Light Actually Work?"*** The YouTube video link:

https://www.youtube.com/watch?v=E4CsY5B3BoI&list=PLROBLlvnR7BEF9b1NOvRf_zhboibmywJb&index=23&t=160s&pp=iAQB

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### *Study Group*

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

The meeting scheduled for September 24th was postponed and will meet on **October 29th**, the topic, ***"Does the Brain create Self?"*** - further details will be circulated via e-mail and on our website in due course.

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

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### *Observing*

This section includes recommended dates for observation of **astronomical phenomena** and whatever else deserves a close look.

Optimal dates for **October 2024**:

**SUGGESTED EVENING OBSERVATION WINDOW**
*(Lunar observations notwithstanding)*

| *Date* | | *Moon* | *Dusk End* |
|---|---|---|---|
| **September 22** | *Rises* | **22h56 (71%)** | **20h04** |
| to **October 4** | *Sets* | **20h30 (4%)** | **20h15** |
| **October 21** | *Rises* | **22h59 (80%)** | **20h32** |
| to **November 3** | *Sets* | **22h14 (5%)** | **20h48** |

**Moonwatch** a few days either side of the **First Quarter** (Thursday 10).

**Eclipses** None observable from southern Africa in October 2024.

**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

**The Solar System** - Sadly**,** in just six months time, our magnificent and most photogenic planet **Saturn** will "lose" his rings, but only for about 7 years. More on Saturn in the **October Skynotes**.

**Meteors** **Orionids** - please see *Skynotes* page 5 and the *2024 Sky Guide* p. 86 for more details.

**Comets** From **Tim Cooper -** CAMNotes 2024 No.4 is online:

https://assa.saao.ac.za/wp-content/uploads/sites/23/2024/09/ASSA-CAMnotes-2024-Number-4.pdf

**IAU SUMMARY by P Kotzé:**

**XXXII IAU General Assembly**


The XXXII IAU General Assembly took place in Cape Town from 6 till 16 August. This was the first time this event was held in Africa and was therefore of significant historical importance. A total of 2648 participants (2045 in person and 603 virtual) from 107 countries, with 647 of these students (500 in person and 147 virtual) attended the meeting. 911 Grants were awarded with significant African participation achieved. There were 211 science sessions (including plenaries) and 16 poster sessions (all hybrid) plus many social and side events.

I attended the meeting and delivered a poster presentation titled '*Rieger periodicity variation of solar Mg II spectral emission during various solar cycles*' in the IAUS 390 symposium: A Multi-Point view of the Sun: Advances in Solar Observations and in Space Weather Understanding.

The following symposia and focus meetings took place during the conference.

## Symposia

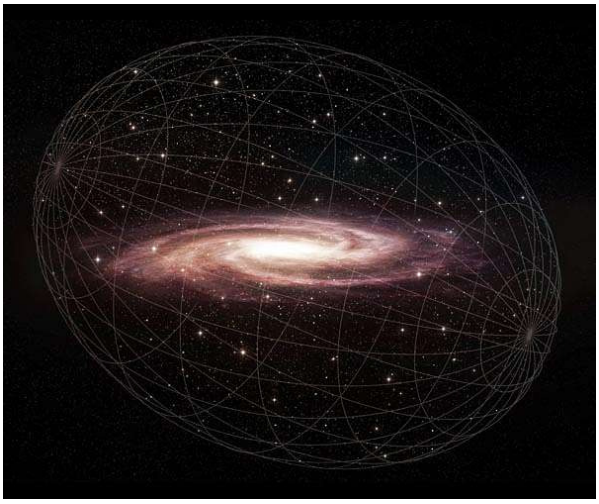
IAUS 389 Gravitational Wave Astrophysics
IAUS 390 A Multi-Point view of the Sun: Advances in Solar Observations and in Space Weather Understanding
IAUS 391 The first chapters of our cosmic history with JWST
IAUS 392 Neutral hydrogen in and around galaxies in the SKA era
IAUS 393 Planetary Science and Exoplanets in the Era of James Webb Space Telescope
IAUS 394 All-inclusive AGN

## Focus Meetings

FM 1 Harnessing ground-based optical telescopes: an opportunity for emerging astronomy in Africa
FM 2 A Coherent View of Atomic and Molecular Gas from Infrared to Radio Wavelengths
FM 3 Follow-up observations of small bodies in the Solar System in the era of large discovery surveys
FM 4 Bridging the final stages of massive stars to supernovae and transients
FM 5 The future of radio astronomy in an increasingly crowded spectrum
FM 6 History of Astronomy in South Africa: The Late Modern Period
FM 7 New Horizons at the interface between Computational Astrophysics and Big Data
FM 8 Advances and Challenges in Understanding the Solar and Stellar Dynamos
FM 9 Measures of luminous and dark matter in galaxies across time
FM 10 Teaching capacity of remote observing facilities for the Universities and High Schools
FM 11 Multi-wavelength Astrometry
FM 12 The High-Energy Gamma-ray Universe: Results and perspectives with wide-field ground-based facilities

**(Compiled By Pieter Kotzé)**

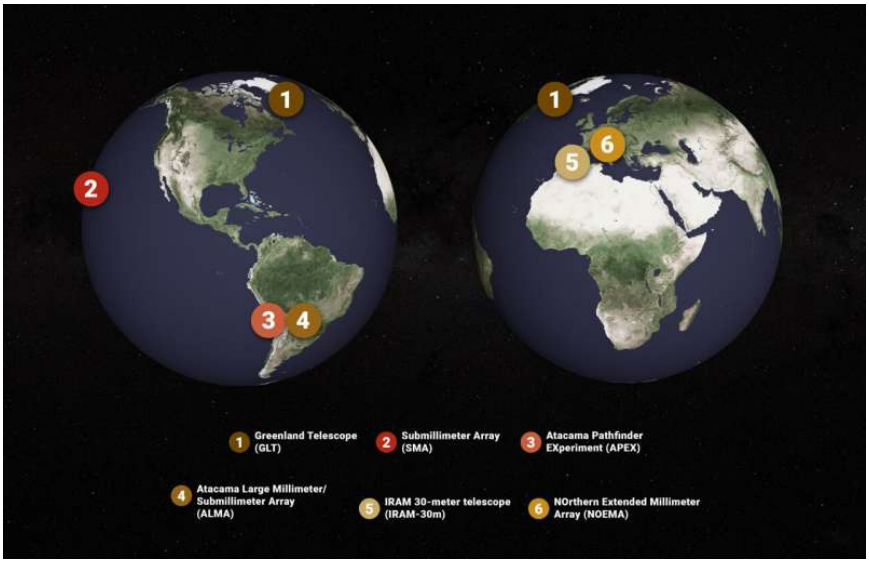
**Ancient binary star system found travelling from Milky Way's Outer Halo**



A team of researchers has identified a rare binary star system, estimated to be around 10 billion years old, that has travelled from the remote regions of the Milky Way's halo to our local stellar neighbourhood. The international team, including experts from the University of Hertfordshire, the UK, Spain, and China, made the discovery while examining stars near Earth. They identified a pair of stars-gravitationally bound together-consisting of a white dwarf and an ultracool subdwarf. The pair is believed to have originated from the Milky Way's halo, a distant and sparsely populated region surrounding the galaxy. The white dwarf, named VVV1256-62A, is about half the mass of our Sun and has cooled over billions of years, placing it near the bottom of the white dwarf cooling sequence. White dwarfs form at the end of a star's life cycle, cooling and reddening over time as they lack the nuclear fusion that powers other stars.

https://www.spacedaily.com/reports/Ancient_binary_star_system_found_traveling_from_Milky_Ways_Outer_Halo_999.html

**Event Horizon Telescope makes highest-resolution black hole detections from Earth**



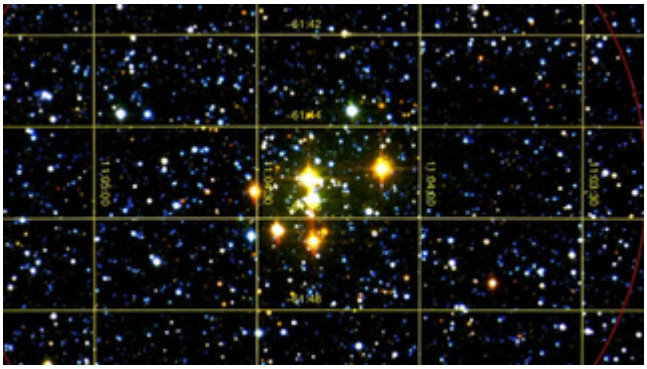

*The Event Horizon Telescope (EHT) Collaboration has made the first very long baseline interferometry (VLBI) detections at 345 GHz from the surface of Earth. The new experiment used two small subarrays of the EHT—made up of ALMA and the Atacama Pathfinder EXperiment (APEX) in Chile, the IRAM 30-meter telescope in Spain, the NOrthern Extended Millimeter Array (NOEMA) in France, the Submillimeter Array (SMA) on Mauna Kea in Hawai'i, and the Greenland Telescope—to make measurements with resolution as fine as 19 microarcseconds. Credit: CfA/SAO, Mel Weiss*

The Event Horizon Telescope (EHT) Collaboration has conducted test observations achieving the highest resolution ever obtained from the surface of the Earth, by detecting light from the centres of distant galaxies at a frequency of around 345 GHz. When combined with existing images of supermassive black holes at the hearts of M87 and Sgr A at the lower frequency of 230 GHz, these new results will not only make black hole photographs 50% crisper but also produce multi-color views of the region immediately outside the boundary of these cosmic beasts.

https://phys.org/news/2024-08-event-horizon-telescope-highest-resolution.html

**Rare Milky Way star cluster is packed with red supergiants 1 million times brighter than the sun**

"Clusters rich in red supergiants are very rare and tend to be very far away, but they play a crucial role in understanding key aspects in the evolution of massive stars."

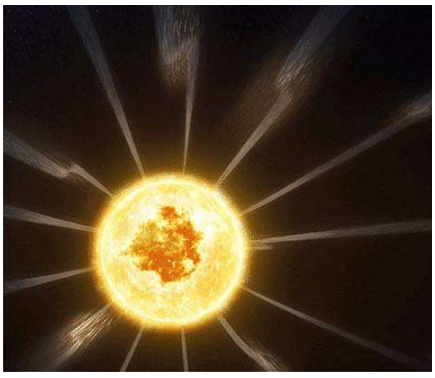


*Here be monsters! The supergiant rich cluster Barbá 2. (Image credit: Apellániz et al., 2024.)*

In the past, map makers often placed monsters on their maps to mark unexplored regions and potentially dangerous regions. A famous example is the 'Theatrum Orbis Terrarum' map, created in 1570, which features sea serpents and other sea monsters. Fast forward to today , and an unexplored Milky Way star cluster suggests that astronomers should adopt this tradition, too. The cluster is known as Barbá 2 and is found just 24,000 light-years or so away from Earth. An investigation using the star-surveying Gaia space telescope revealed that the Barbá 2 is packed with red supergiant stars, stars that can be hundreds of times wider than the sun and up to 1,000,000 times as luminous as the sun."There are many open clusters in the galaxy. However, not all open clusters have the same level of interest to astronomers," Ignacio Negueruela, a researcher at the Universidad de Alicante who was part of the team behind the discovery of supergiants in Barbá 2, told Space.com. "Clusters rich in red supergiants are very rare and tend to be very far away, but they play a crucial role in understanding key aspects in the evolution of massive stars."

https://www.space.com/milky-way-supermassive-stars-open-cluster

**Solar Orbiter Identifies Magnetic Mechanism Behind Solar Wind Acceleration**



ESA's Solar Orbiter spacecraft has delivered vital data that sheds light on the longstanding mystery of the energy source responsible for heating and accelerating the solar wind. In collaboration with NASA's Parker Solar Probe, the Solar Orbiter has unveiled that significant fluctuations in the Sun's magnetic field are the driving force behind this process. The solar wind, a continuous flow of charged particles from the Sun's atmosphere (corona), extends beyond Earth, interacting with our atmosphere to produce the auroras. The 'fast' solar wind travels at speeds exceeding 500 km/s (1.8 million km/h). Initially, the wind exits the Sun's corona at slower speeds, suggesting an unknown mechanism accelerates it as it travels further from the Sun. While it naturally cools as it expands into space, the cooling rate is slower than anticipated, indicating an additional energy input.The key question - what provides the energy to accelerate and heat the fastest solar wind - has been answered through data from Solar Orbiter and Parker Solar Probe. These instruments have confirmed that large-scale oscillations in the Sun's magnetic field, known as Alfven waves, are responsible for this energy transfer.

https://www.spacedaily.com/reports/Solar_Orbiter_Identifies_Magnetic_Mechanism_Behind_Solar_Wind_Acceleration_999.html

**Early galaxies weren't mystifyingly massive after all, James Webb Space Telescope finds**

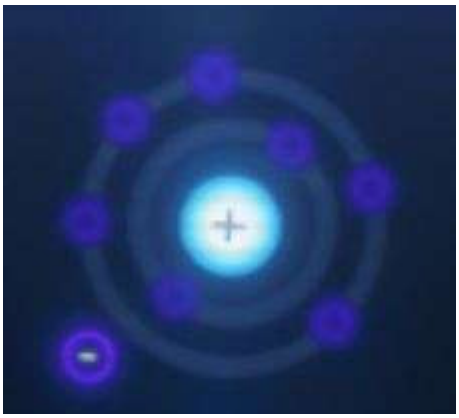
*This image shows a small portion of the field observed by NASA's James Webb Space Telescope's NIRCam*

*(Near-Infrared Camera) for the Cosmic Evolution Early Release Science (CEERS) survey. It is filled with galaxies. The light from some of them has travelled for over 13 billion years to reach the telescope. (Image credit: NASA, ESA, CSA, Steve Finkelstein (UT Austin))*

Black holes may be behind why the newborn universe appeared to possess more huge galaxies than scientists could explain, a new study finds. Astronomers made this discovery with the help of NASA's James Webb Space Telescope (JWST), the largest and most powerful off-Earth observatory to date. Launched in December 2021, the $10 billion JWST specializes in detecting infrared light, just like thermal vision goggles. Scientists are using JWST to investigate the early cosmos. However, "we are still seeing more galaxies than predicted, although none of them are so massive that they 'break' the universe," study lead author Katherine Chworowsky, a graduate student at the University of Texas at Austin, said in the press release. One possible reason that JWST sees about twice as many massive early galaxies as expected from the standard model is that stars formed more quickly in the early universe than they do today. "Maybe in the early universe, galaxies were better at turning gas into stars,"

https://www.space.com/black-holes-early-universe-massive-galaxies-james-webb

**NASA Discovers a Long-Sought Global Electric Field on Earth**



*A weak electric field in the upper atmosphere may loft charged particles into space.*

Using observations from a NASA suborbital rocket, an international team of scientists has, for the first time, successfully measured a planet-wide electric field thought to be as fundamental to Earth as its gravity and magnetic fields. Known as the ambipolar electric field, scientists first hypothesized over 60 years ago that it drove how our planet's atmosphere can escape above Earth's North and South Poles. Measurements from the rocket, NASA's Endurance mission, have confirmed the existence of the ambipolar field and quantified its strength, revealing its role in driving atmospheric escape and shaping our ionosphere - a layer of the upper atmosphere - more broadly. Understanding the complex movements and evolution of our planet's atmosphere provides clues not only to the history of Earth but also gives us insight into the mysteries of other planets and determining which ones might be hospitable to life.

https://www.spacedaily.com/reports/NASA_Discovers_a_Long_Sought_Global_Electric_Field_on_Earth_999.html

**New Horizons Offers Precise Measurements of Cosmic Light in the Universe**

Astronomers have achieved a significant milestone in understanding the darkness of deep space, thanks to NASA's New Horizons spacecraft. This mission has enabled the most accurate and direct measurements to date of the total amount of light generated by the universe. After more than 18 years in space and nine years following its historic encounter with Pluto, New Horizons is now over 5.4 billion miles (7.3 billion kilometres) away from Earth. In this remote region of the solar system, the spacecraft is far enough from the Sun to observe the darkest skies available, offering a unique perspective to measure the overall brightness of the universe. The results show that the great majority of visible light we receive from the universe was generated in galaxies. Importantly, there is no evidence for significant levels of light produced by sources not presently known to astronomers.

https://www.spacedaily.com/reports/New_Horizons_Offers_Precise_Measurements_of_Cosmic_Light_in_the_Universe_999.html

**Plasma Bubble Confirmed as Source of Persistent Emission in Fast Radio Burst FRB20201124A**

Fast Radio Bursts (FRBs) have emerged as one of the most intriguing puzzles in modern astrophysics. These brief but intense bursts of radio waves release an enormous amount of energy in just a few milliseconds, placing them among the most energetic phenomena in the cosmos. Discovered just over a decade ago, FRBs primarily originate from extragalactic sources, yet their precise origins remain unclear. Significant global efforts are underway to unravel the mechanisms behind these enigmatic events. In rare instances, the rapid bursts characteristic of FRBs coincide with persistent radio emissions. A recent study led by the Italian National Institute for Astrophysics (INAF) has detected the faintest persistent radio emission ever associated with an FRB. The focus of this research is FRB20201124A, first identified in 2020, situated approximately 1.3 billion light-years from Earth. The study is a collaborative effort involving INAF, the Universities of Bologna, Trieste, and Calabria in Italy, as well as international partners from research institutions in China, the United States, Spain, and Germany.

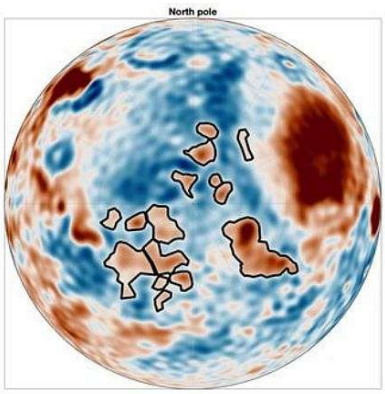
https://www.spacedaily.com/reports/Plasma_Bubble_Confirmed_as_Source_of_Persistent_Emission_in_Fast_Radio_Burst_FRB20201124A_999.html

**Iron winds detected on ultra-hot exoplanet WASP-76 b**

An international group of astronomers, including researchers from the University of Geneva (UNIGE) and the PlanetS National Centre of Competence in Research, has uncovered the presence of iron winds in the atmosphere of the ultra-hot Jupiter, WASP-76 b. This planet, with temperatures soaring beyond 2000 degrees Celsius, has been a focal point for scientists as they explore the extreme atmospheric conditions found on such worlds. A discovery earlier this year revealed the presence of a "rainbow" in the planet's atmosphere, and now the detection of iron winds on the day side of the planet adds more layers to its complex climatic dynamics. These findings have been published in 'Astronomy and Astrophysics'.WASP-76 b, first discovered in 2013, has been extensively studied due to its many extreme atmospheric features. Previous research, including studies from the UNIGE team, identified phenomena such as iron rain on its night side, barium in its upper atmosphere, and the appearance of a "rainbow" where its day and night sides meet.

https://www.spacedaily.com/reports/Iron_winds_detected_on_ultra_hot_exoplanet_WASP_76_b_999.html

**Gravity study of Mars reveals hidden structures and activity beneath Olympus Mons**



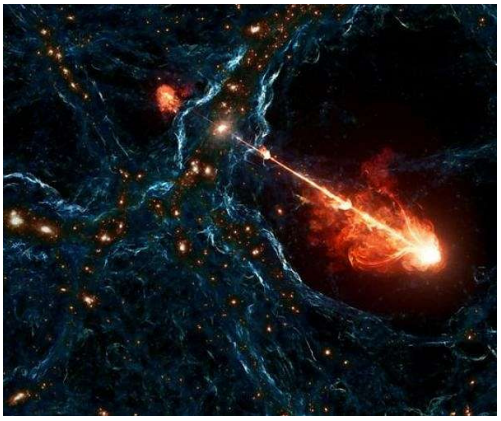

Recent gravity data from Mars have revealed dense, large-scale features hidden beneath the sediment of a once-extant ocean. The findings, which combine models and data from multiple Mars missions, also suggest that active processes within the planet's mantle could be driving the growth of Olympus Mons, the largest volcano in the Solar System. These insights were presented at the Europlanet Science

Congress (EPSC) in Berlin by Bart Root from the Delft University of Technology (TU Delft).

While Mars has long been known to harbour hidden structures, such as ice deposits, the newly discovered features beneath the northern polar plains remain enigmatic. A thick, smooth sediment layer - believed to have settled on an ancient seabed - conceals them. "These dense structures could be volcanic in origin or compacted material from ancient impacts. We've identified around 20 features of various sizes surrounding the northern polar cap, including one with a striking resemblance to a dog," said Dr. Root. "There's no surface trace of these structures, but through gravity data, we can catch a tantalizing glimpse of Mars' northern hemisphere's older history."

https://www.spacedaily.com/reports/Gravity_study_of_Mars_reveals_hidden_structures_and_activity_beneath_Olympus_Mons_999.html

**Gargantuan black hole jets are biggest seen yet**



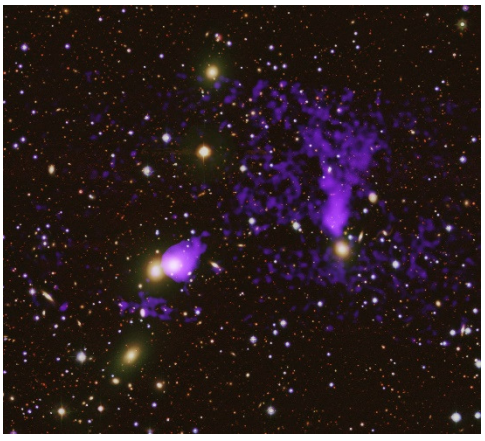
*An artist's illustration of the longest black hole jet system ever observed. Nicknamed Porphyrion after a mythological Greek giant, these jets span roughly 7 megaparsecs, or 23 million light-years. That is equivalent to lining up 140 Milky Way galaxies back-to-back.*

Astronomers have spotted the biggest pair of black hole jets ever seen, spanning 23 million light-years in total length. That's equivalent to lining up 140 Milky Way galaxies back to back. "This pair is not just the size of a solar system, or a Milky Way; we are talking about 140 Milky Way diameters in total," says Martijn Oei, a Caltech postdoctoral scholar and lead author of a new Nature paper reporting the findings. "The Milky Way would be a little dot in these two giant eruptions."

The jet megastructure, nicknamed Porphyrion after a giant in Greek mythology, dates to a time when our universe was 6.3 billion years old, or less than half its present age of 13.8 billion years. These fierce outflows - with a total power output equivalent to trillions of suns - shoot out from above and below a supermassive black hole at the heart of a remote galaxy. Prior to Porphyrion's discovery, the largest confirmed jet system was Alcyoneus, also named after a giant in Greek mythology. Alcyoneus, which was discovered in 2022 by the same team that found Porphyrion, spans the equivalent of around 100 Milky Ways. For comparison, the well-known Centaurus A jets, the closest major jet system to Earth, spans 10 Milky Ways.

https://www.spacedaily.com/reports/Gargantuan_black_hole_jets_are_biggest_seen_yet_999.html

**NASA's Chandra Finds Galaxy Cluster That Crosses the Streams**



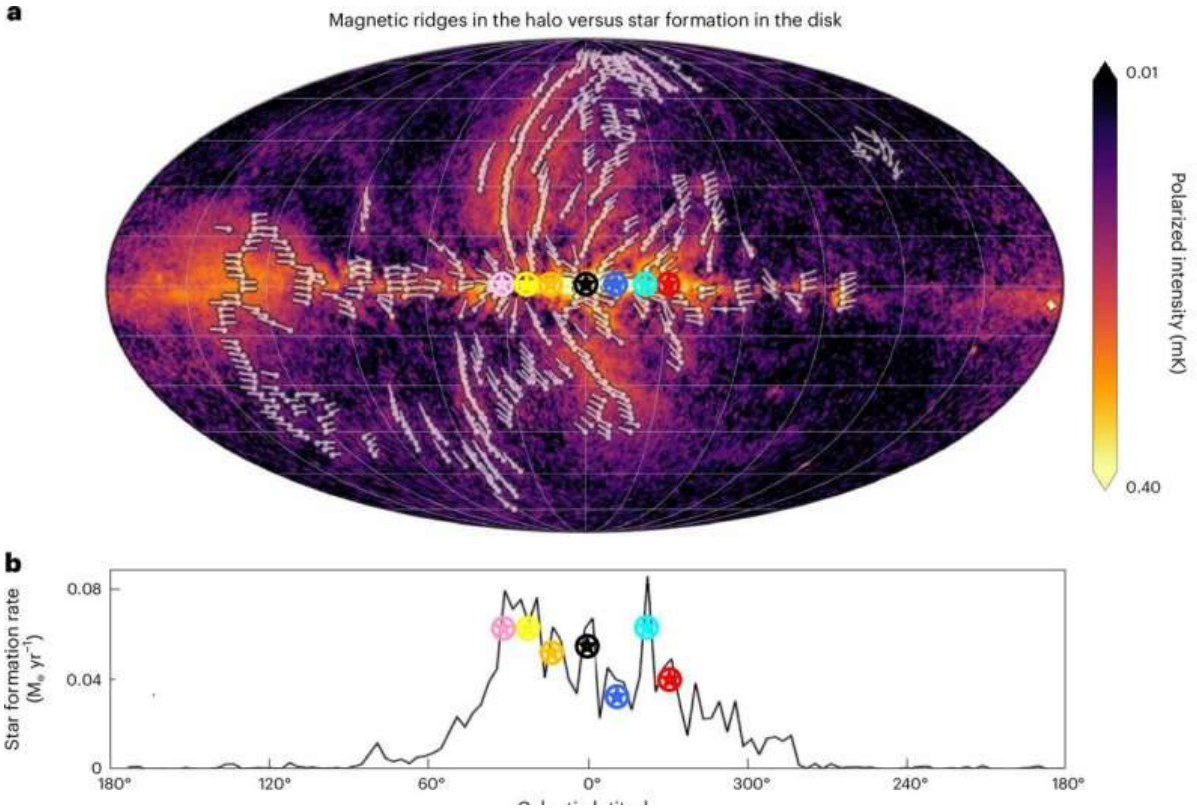
*X-ray: NASA/CXC/Xiamen Univ./C. Ge; Optical: DESI collaboration; Image Processing: NASA/CXC/SAO/N. Wolk*

Astronomers using NASA's Chandra X-ray Observatory have found a galaxy cluster has two streams of superheated gas crossing one another. This result shows that crossing the streams may lead to the creation of new structure. Researchers have discovered an enormous, comet-like tail of hot gas — spanning over 1.6 million light-years long — trailing behind a galaxy within the galaxy cluster called Zwicky 8338 (Z8338 for short). This tail, spawned as the galaxy had some of its gas stripped off by the hot gas it is hurtling through, has split into two streams. This is the second

pair of tails trailing behind a galaxy in this system. Previously, astronomers discovered a shorter pair of tails from a different galaxy near this latest one. This newer and longer set of tails was only seen because of a deeper observation with Chandra that revealed the fainter X-rays.

X-rays.https://www.nasa.gov/image-article/nasas-chandra-finds-galaxy-cluster-that-crosses-the-streams/

**A magnetic halo in the Milky Way: New discoveries about galactic outflows**

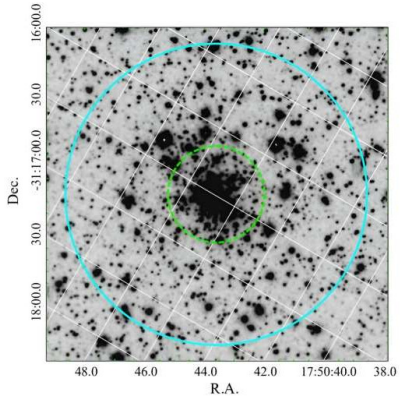



*Energy sources of the Galactic outflows. Credit: Nature Astronomy (2024). DOI: 10.1038/s41550-024-02362-0*

A new study led by the National Institute for Astrophysics (INAF), and with contributions from Radboud University's Marijke Haverkorn, has unveiled significant insights into the Milky Way: a magnetized galactic halo. This discovery challenges previous models of our galaxy's structure and evolution. Researchers have identified several magnetized structures extending far above and below the galactic plane (reaching heights of more than 16,000 light-years or 150 quadrillion kilometres), revealing one of the origins of the so-called eROSITA Bubbles, which are large-scale powered by intense outflows of gas and energy that are also being generated by the explosive death of stars in supernovae.

https://phys.org/news/2024-09-magnetic-halo-milky-discoveries-galactic.html

**New millisecond pulsar discovered**




*Ks-band image of Terzan 6. Credit: Gao et al., 2024.*

Using the Green Bank Telescope (GBT), astronomers have observed a globular cluster known as Terzan 6. They detected a new millisecond pulsar that is likely associated with this cluster. The finding was reported in a research paper published September 17 on the pre-print server *arXiv*.

Pulsars are highly magnetized, rotating neutron stars emitting a beam of electromagnetic radiation. The most rapidly rotating pulsars, with rotation periods below 30 milliseconds, are known as millisecond pulsars (MSPs). Astronomers assume that they are formed in binary systems when the initially more massive component turns into a neutron star that is then spun up due to accretion of matter from the secondary star.

https://phys.org/news/2024-09-millisecond-pulsar.html

**Telescope captures the most detailed infrared map ever of our Milky Way**

*This collage highlights a small selection of regions of the Milky Way imaged as part of the most detailed infrared map ever of our galaxy. Here we see, from left to right and top to bottom: NGC 3576, NGC 6357, Messier 17, NGC 6188, Messier 22 and NGC 3603. All of them are clouds of gas and dust where stars are forming, except Messier 22, which is a very dense group of old stars. The images were captured with ESO's Visible and Infrared Survey Telescope for Astronomy (VISTA) and its infrared camera VIRCAM.*

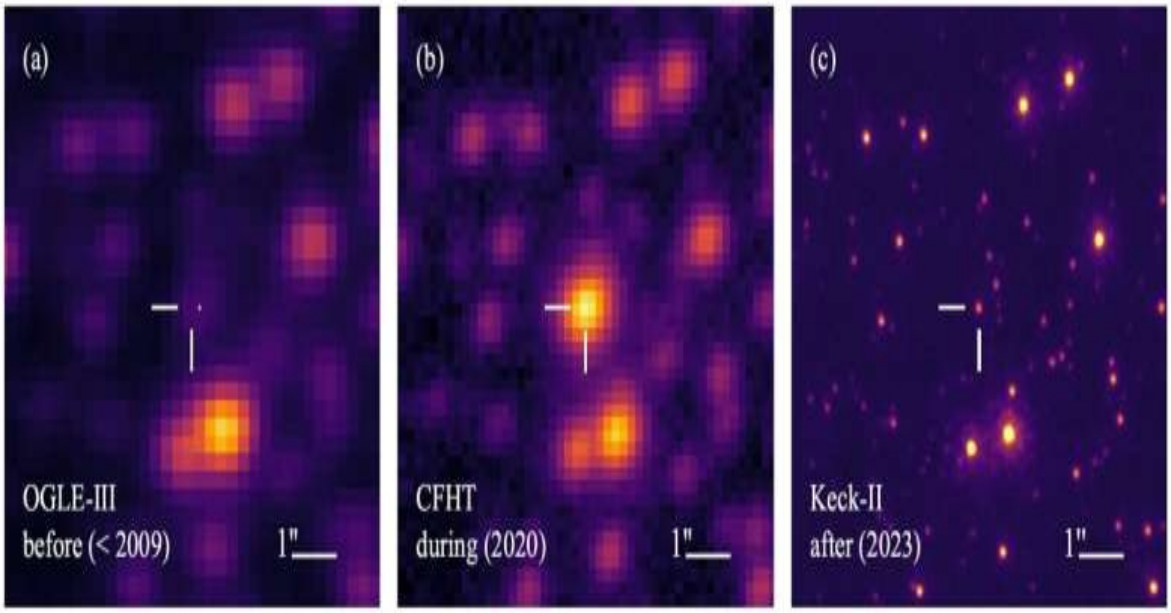
The gigantic map to which these images belong contains 1.5 billion objects. The data were gathered over the course of 13 years as part of the VISTA Variables in the Vía Láctea (VVV) survey and its companion project, the VVV eXtended survey (VVVX). Credit: ESO/VVVX survey. Astronomers have published a gigantic infrared map of the Milky Way containing more than 1.5 billion objects—the most detailed one ever made. Using the European Southern Observatory's VISTA telescope, the team monitored the central regions of our galaxy over more than 13 years. At 500 terabytes of data, this is the largest observational project ever carried out with an ESO telescope. This record-breaking map comprises 200 000 images taken by ESO's VISTA—the Visible and Infrared Survey Telescope for Astronomy. Located at ESO's Paranal Observatory in Chile, the telescope's main purpose is to map large areas of the sky. The team used VISTA's infrared camera VIRCAM, which can peer through the dust and gas that permeates our galaxy. It is therefore able to see the radiation from the Milky Way's most hidden places, opening a unique window onto our galactic surroundings.

https://phys.org/news/2024-09-telescope-captures-infrared-milky.html

**Existence of an Earth-like planet around a dead sun offers hope for our planet's ultimate survival**

This distant planetary system, identified by University of California, Berkeley, astronomers after observations with the Keck 10-meter telescope in Hawaii, looks very similar to expectations for the sun-Earth system: It consists of a white dwarf about half the mass of the sun and an Earth-size companion in an orbit twice as large as Earth's today.

That is likely to be Earth's fate. The sun will eventually inflate like a balloon larger than Earth's orbit today, engulfing Mercury and Venus in the process. As the star expands to become a red giant, its decreasing mass will force planets to migrate to more distant orbits, offering Earth a slim opportunity to survive farther from the sun.




*Images of the area of the microlensing event, indicated by perpendicular white lines, years before the event (a), shortly after peak magnification of the background star in 2020 (b) and in 2023 after its disappearance (c).*

The planetary system with a white dwarf, an Earth-like planet and a brown dwarf cannot be seen; the point of light in (c) is from the background source star that is no longer magnified. Credit: OGLE, CFHT, Keck Observatory. The discovery of an Earth-like planet 4,000 light years away in the Milky Way galaxy provides a preview of one possible fate for our planet billions of years in the future, when the sun has turned into a white dwarf, and a blasted and frozen Earth has migrated beyond the orbit of Mars.

https://phys.org/news/2024-09-earth-planet-dead-sun-ultimate.html

https://www.spacedaily.com/reports/This_rocky_planet_around_a_white_dwarf_resembles_Earth_8_billion_years_from_now_999.html

**Observations confirm that early-universe quasar neighbourhoods are densely populated with companion galaxies**

Observations using the Department of Energy-fabricated Dark Energy Camera (DECam) on the U.S. National Science Foundation Víctor M. Blanco 4-meter Telescope confirm astronomers' expectation that early-universe quasars formed in regions of space densely populated with smaller companion galaxies. DECam's exceptionally wide field of view and special filters played a crucial role in reaching this conclusion, and the observations reveal why previous studies seeking to characterize the density of early-universe quasar neighbourhoods have yielded conflicting results. Credit: NOIRLab/NSF/AURA/M. Garlick/J. da Silva (Spaceengine)/M. Zamani

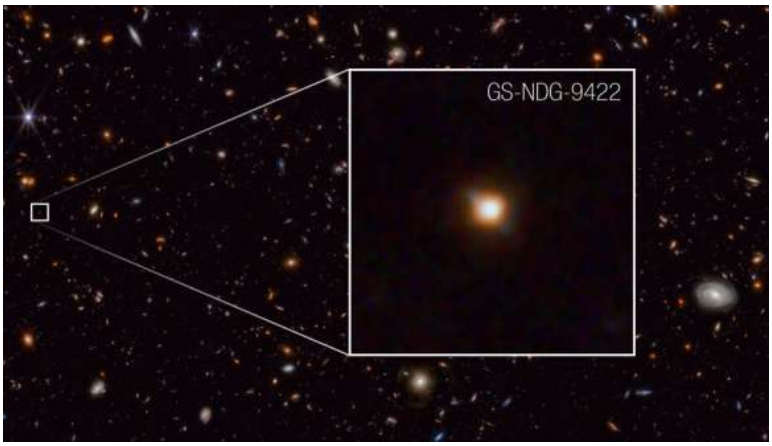
Quasars are the most luminous objects in the universe and are powered by material accreting onto supermassive black holes at the centres of galaxies.

Studies have shown that early-universe quasars have black holes so massive that they must have been swallowing gas at very high rates, leading most astronomers to believe that these quasars formed in some of the densest environments in the universe

where gas was most available. However, observational measurements seeking to confirm this conclusion have thus far yielded conflicting results.

https://phys.org/news/2024-09-early-universe-quasar-neighborhoods-densely.html

**Webb discovers 'weird' galaxy with gas outshining its stars**




The newly-discovered GS-NDG-9422 galaxy appears as a faint blur in this James Webb Space Telescope NIRCam (Near-Infrared Camera) image. It could help astronomers better understand galaxy evolution in the early Universe. Credit: NASA, ESA, CSA, STScI, Alex Cameron (Oxford)

The discovery of a "weird" and unprecedented galaxy in the early universe could "help us understand how the cosmic story began," astronomers say.GS-NDG-9422 (9422) was found approximately one billion years after the Big Bang and stood out because it has an odd, never-before-seen light signature—indicating that its gas is outshining its stars.The "totally new phenomena" is significant, researchers say, because it could be the missing-link phase of galactic evolution between the universe's first stars and familiar, well-established galaxies.

https://phys.org/news/2024-09-webb-weird-galaxy-gas-outshining.html

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