



“The Southern Cross”

The Hermanus Astronomy Centre Newsletter

JULY 2024

Please note that all our regular meetings are scheduled for **TUESDAYS**, commencing at 18.00 (6 pm) unless otherwise advised. The day and date may change; such changes will be notified via e-mail and on our website.

MONTHLY MEETING

These meetings are scheduled for the **Third Tuesday** of each month except December. We commence at **18.00** (6 pm).

Our last Monthly meeting was held at Onrus Manor on **Tuesday June 18th**. **Dr David Buckley** presented, in person at **Onrus Manor**, “*Things that go Bump in the Night: Observing Transients*”.

As those unfortunate would-be zoom attendees are too fully aware, we lost the Zoom link after about 10 minutes into David’s presentation. After much dedication to restoring the link by Derek, it was decided to abandon the Zoom as we had to get on with the meeting. And, of course, that meant no YouTube recording either! May we offer our sincere apologies to all inconvenienced.

Fortunately, Dr David Buckley has been kind enough to supply us the link to his superb presentation, herewith:

<https://cloudcape.saa.ac.za/index.php/s/4V1BRzIMQdRyKx3>

Our next meeting is scheduled for **Tuesday July 16th**: “*White Dwarf & Telescope Upgrade*” will be presented by **Dr Stephen Potter** of SAAO. This will be virtual on Zoom. Links will be sent to all members and associates.

SPECIAL INTEREST GROUP ACTIVITIES

Cosmology

These meetings are scheduled for the **First Tuesday** of each month except January. We commence at **18.00** (6 pm).

On **Tuesday June 4th**, in the series “THE ENTIRE HISTORY OF THE UNIVERSE”, we watched episode 20: “*Why does the Universe Look Like this?*”.

https://www.youtube.com/watch?v=iDqQ9ggTWmg&list=PLROBLlvnR7BEF9b1NOvRf_zhboibmywJb&index=20&t=17s&pp=iAQB

Episode number 21 is scheduled for **July 2nd**, “*What Are The Hidden Rules Of The Universe?*”

Astrophotography

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

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

Study Group

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

On June 25th, we watched and discussed “*The Walls of Tiwanaku*” part 1.

Herewith the download link for the discussion audio file:

<https://www.dropbox.com/scl/fi/w31a28b6dcqzrs8r6oguc/audio1713437554.m4a?rlkey=1fwitth40hxq8u4v40o2hcqt6&dl=0>

The next Study Group is scheduled to meet on **Tuesday July 30th**, the topic “*The Walls of Tiwanaku*” part 2.

Derek provides a link to a video by the US geologist, **Myron Cook**, about a naturally formed wall structure: https://www.youtube.com/watch?v=MEcE2MaCgso&ab_channel=MyronCook

We could also discuss the Myron Cook video (above) in the hope that some people may have watched it.

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

Observing

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

Optimal dates for **JULY 2024**:

SUGGESTED EVENING OBSERVATION WINDOW

(Lunar observations notwithstanding)

<i>Date</i>	<i>Moon</i>		<i>Dusk end</i>
27th June	<i>Rises</i>	23h45 (61%)	19h12
to 8th July	<i>Sets</i>	20h16 (4%)	19h17
26th July	<i>Rises</i>	23h53 (72%)	19h26
to 6th August	<i>Sets</i>	20h04 (4%)	19h32

Moonwatch a few days either side of the **First Quarter** (Wednesday July 14th)

Eclipses None observable from southern Africa.

The Sun **The Sun and Auroral Activity:** Daily solar activity and predictions for auroral activity can be found at the following website: <https://www.spaceweatherlive.com/en/solar-activity.html>

Meteors - **Piscis Austrinids, Southern δ Aquariids, α Capricornids.** Please see *Skynotes* page 5 and the *2024 Sky Guide* p. 86. for more details.

Comet <https://www.marthastewart.com/rare-green-comet-12p-pons-brooks-8610933>

Observing Weather permitting, we shall be gathering at **Gearing's Point** on **Monday July 1st** from **18.00** (6 p.m.).

Please keep an eye on our activities calendar on the website –

<https://www.hermanusastronomy.co.za/>

Future Trips

Please see the Outreach section below.

Outreach

HERMANUS SCIENCE AND TECHNOLOGY CLUB: The following Excursions are *provisionally* planned:

Palmiet Hydro-electric Power Station – Wednesday July 10th,

Caledon Middelvlei Wind Turbine facility – Wednesday July 17th and 24th,

Iziko Planetarium as guests of the IAU General Assembly on **Saturday 10th August.**

Although these activities are primarily arranged for scholars, HAC members are welcome but please inform Peter on petermh@hermanus.co.za if you would like to join us.

The above dates are provisional and confirmations will be advised as appropriate. Again, please refer to our website for updates.

Scientists Find Slowest-Spinning Radio Neutron Star

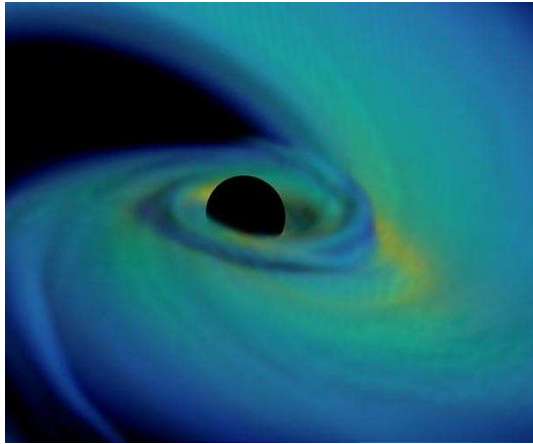


illustration only

Scientists have detected what they believe to be a neutron star spinning at an unprecedentedly slow rate - slower than any of the more than 3 000 radio-emitting neutron stars measured to date. Neutron stars, the dense remnants of a dead star, typically rotate at extremely high speeds, taking just seconds or even less to fully spin on their axis. However, the newly discovered neutron star, identified by an international team of astronomers, emits radio signals at an interval of 54 minutes.

The team was led by Dr. Manisha Caleb at the University of Sydney and Dr. Emil Lenc at CSIRO, Australia's national science agency, and includes scientists at The University of Manchester and the University of Oxford. The results, published in the journal *Nature Astronomy*, provide new insights into the life cycles of stellar objects.

https://www.spacedaily.com/reports/Scientists_Find_Slowest_Spinning_Radio_Neutron_Star_999.html

Newly Discovered Planet Retains Atmosphere Despite Star's Intense Radiation



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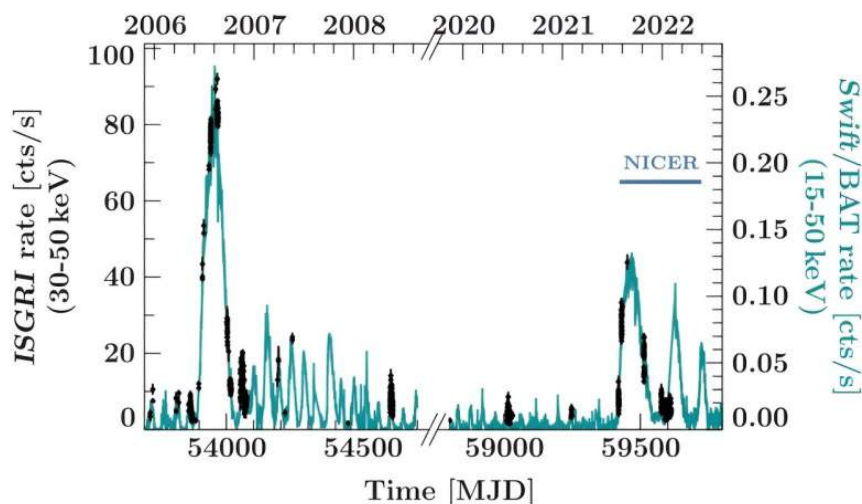
A rare exoplanet near its host star has retained a puffy atmosphere, defying expectations of being stripped down to bare rock due to the star's intense radiation. This discovery is challenging current theories about planetary evolution in extreme environments. Nicknamed "Phoenix," the newly discovered planet shows the vast diversity of solar systems and the complexity of planetary evolution, especially at the end of stars' lives. "This planet isn't evolving the way we thought it would; it appears to have a much bigger, less dense atmosphere than we expected for these systems," said Sam Grunblatt, a Johns Hopkins University astrophysicist who led

the research.

https://www.spacedaily.com/reports/Newly_Discovered_Planet_Retains_Atmosphere_Despite_Stars_Intense_Radiation_999.html

Astronomers observe giant outburst of a distant X-ray binary

Using the Neutron Star Interior Composition Explorer (NICER) onboard the International Space Station, astronomers have observed a distant X-ray binary known as EXO 2030+375. The observational campaign allowed them to explore a giant outburst that occurred in this system

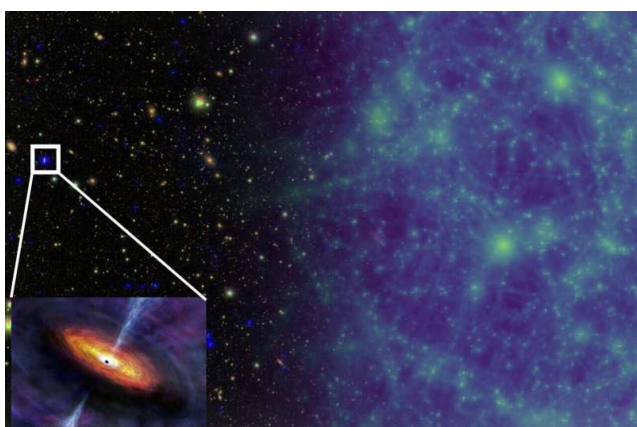


Long-term light curve of EXO 2030+375 in the 30–50 keV band as seen with INTEGRAL-ISGRI in black and the Swift-BAT light curve in teal. Credit: *Thalhammer et al., 2024.*

the largest subgroup of HMXBs. These systems consist of Be stars and, usually, [neutron stars](#), including pulsars. Observations have found that most of these systems showcase weak persistent X-ray emission that is interrupted by outbursts lasting several weeks. At a distance of about 7 800 light years, EXO 2030+375 is a Be/XRB consisting of a magnetized neutron star and a B0 Ve companion. The system has an [orbital period](#) of 46 days and the neutron star exhibits X-ray pulsations with a period of approximately 43 seconds.

<https://phys.org/news/2024-06-astronomers-giant-outburst-distant-ray.html>

Combined X-ray surveys and supercomputer simulations track 12 billion years of cosmic black-hole growth



Researchers have provided the best modelling to date of the growth of the supermassive black holes found in the centres of galaxies by combining X-ray observations from the most powerful X-ray facilities ever launched into space with supercomputer simulations of the build-up of galaxies over cosmic history. On the left is an image combining X-ray (blue) and optical (red, green, and blue) observations and on the right is simulated gas column density from cosmological simulations using IllustrisTNG. The observed X-ray emission is mainly from accreting supermassive black holes, as depicted in the artist's illustration (inset). The length of the short-side

of the figure covers the same apparent size as the full Moon in the sky. Credit: F. Zou (Penn State) et al.; Observations: The XMM-SERVS Collaboration; Simulations: The TNG Collaboration; Illustration: NahksTrEhnl (Penn State)

By combining forefront X-ray observations with state-of-the-art supercomputer simulations of the build-up of galaxies over cosmic history, researchers have provided the best modelling to date of the growth of the supermassive black holes found in the centres of galaxies. Using this hybrid approach, a research team led by Penn State astronomers has derived a complete picture of black-hole growth over 12 billion years, from the universe's infancy at around 1.8 billion years old to now at 13.8 billion years old.

<https://phys.org/news/2024-06-combined-ray-surveys-supercomputer-simulations.html>

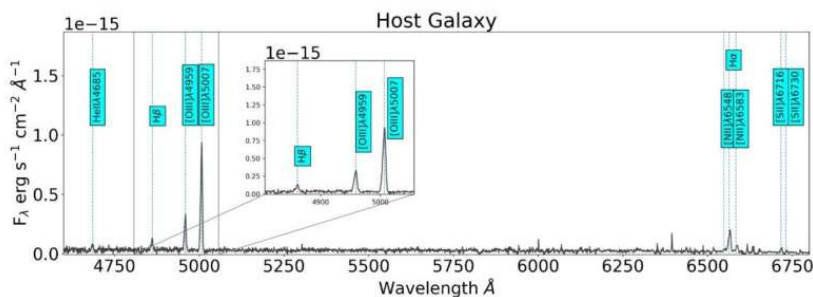
Scientists spot more Milky Way-like galaxies in early universe, advancing our understanding of how galaxies were formed



Some of the spiral galaxies studied by the researchers in the study. Credit: Vicki Kuhn

University of Missouri scientists are peering into the past and uncovering new clues about the early universe. Since light takes a long time to travel through space, they are now able to see how galaxies looked billions of years ago. In a new study, the Mizzou researchers have discovered that spiral galaxies were more common in the [early universe](#) than previously thought. The work [appears](#) in *The Astrophysical Journal Letters*. "Scientists formerly believed most spiral galaxies developed around 6 to 7 billion years after the universe formed," said Yicheng Guo, an associate professor in Mizzou's Department of Physics and Astronomy and co-author on the study. "However, our study shows spiral galaxies were already prevalent as early as 2 billion years afterward. This means galaxy formation happened more rapidly than we previously thought." <https://phys.org/news/2024-06-scientists-milky-galaxies-early-universe.html>

New rare 'green bean' galaxy discovered



Low resolution optical APO KOSMOS spectrum for the core of RGB1 extracted from a 8.8" wide aperture. Credit: Sanderson et al., 2024.

made with the Karl G. Jansky Very Large Array (VLA), was presented in a research paper [published](#) May 29 on the preprint server *arXiv*. The so-called "green beans" are very rare active galaxies glowing green under the intense radiation from the region around a central black hole. To date, only 17 such [galaxies](#) have been identified by the Sloan Digital Sky Survey (SDSS). Astronomers suppose that their rare occurrence is due to the fact that these sources may be experiencing a short-lived phase in their evolution. <https://phys.org/news/2024-06-rare-green-bean-galaxy.html>

Origins of fast radio bursts examined using polarized light



illustration only

What scientists previously thought about where Fast Radio Bursts (FRBs) come from is just the tip of the iceberg, according to new research led by astronomers at the University of Toronto. The mysteries of the millisecond-long cosmic explosions are unfolding with a new way of analyzing data from the Canadian Hydrogen Intensity Mapping Experiment (CHIME). Published today in *The Astrophysical Journal*, the

study details the properties of polarized light from 128 non-repeating FRBs - those from sources that have only produced a single burst to date. It finds that they appear to come from galaxies like our own Milky Way with modest densities and modest magnetic fields. Previous studies of FRBs have focused on much smaller samples of hyperactive repeating sources that, in contrast, appear to originate in dense, extremely magnetized environments. Only about 3 per cent of known FRBs repeat, coming from a source that has produced multiple bursts since being found. Most radio telescopes can only see small points in the sky, making it easier to focus on repeating FRBs with known positions. CHIME can survey an extremely large area of the sky to detect both repeating and non-repeating FRBs.

https://www.spacedaily.com/reports/Origins_of_fast_radio_bursts_examined_using_polarized_light_999.html

Water frost discovered on Mars' tallest volcanoes



illustration only

Water frost has been detected on Mars' colossal volcanoes, marking the first observation of this phenomenon on the largest mountains in the Solar System. The international team, led by the University of Bern, utilized high-resolution colour images from the Bernese Mars camera, CaSSIS, onboard the European Space Agency's ExoMars Trace Gas Orbiter. Understanding water distribution and transport is critical for future Mars missions and potential human

exploration.

"ExoMars" is a European Space Agency (ESA) program conducting active research into life on Mars for the first time since the 1970s. On board the ExoMars Trace Gas Orbiter (TGO) is the Colour and Stereo Surface Imaging System (CaSSIS), developed by an international team led by Professor Nicolas Thomas from the University of Bern's Physics Institute. CaSSIS has been capturing high-resolution colour images of Mars' surface since April 2018.

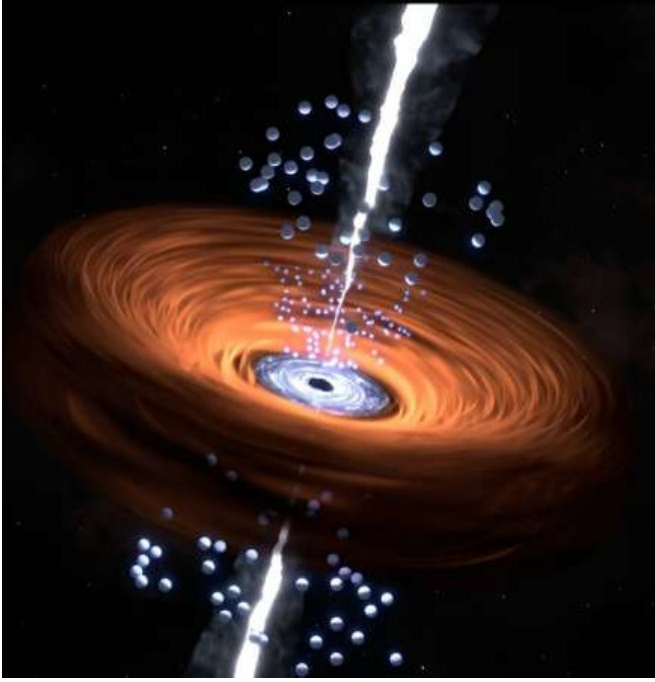
https://www.spacedaily.com/reports/Water_Frost_Discovered_on_Mars_Tallest_Volcanoes_999.html

Black hole observed 'awakening' for the first time

Astronomers have been able to observe a supermassive black hole waking up and setting the heart of its host galaxy alight for the first time. The galaxy 300 million light years from Earth in the Virgo constellation had been quiet for decades until late 2019, when it suddenly began to shine brighter than ever before. The centre of the galaxy -- where a supermassive black hole is believed to be squatting -- since then has been radiating a variety of rays. "This behaviour is unprecedented," Paula Sanchez Saez, an European Southern Observatory astronomer and first author of a new study in the journal *Astronomy & Astrophysics*, said in a statement.

https://www.spacedaily.com/reports/Black_hole_observed_awakening_for_the_first_time_999.html

A black hole of inexplicable mass: JWST observations reveal a mature quasar at cosmic dawn



Artist's impression of the bright core region of a quasar, an active galaxy. The supermassive black hole in the centre is surrounded by a bright disk of gas and dust. The dust component further out can obscure the view of the interior and shines predominantly in the mid-infrared range, light that can be analyzed by the James Webb Space Telescope. A bundled, high-energy particle beam protrudes into space from the immediate vicinity of the black hole perpendicular to the disk. Credit: T. Müller / MPIA

The James Webb Space Telescope observed a galaxy in a particularly young stage of the universe. Looking back into the past, it became clear that the light from the galaxy called J1120+0641 took almost as long to reach Earth as the universe has taken to develop to the present day. It is inexplicable how the black hole at its centre could have weighed over a billion solar masses back then, as independent measurements have shown. The findings are [published](#) in the journal *Nature*

Astronomy.

Recent observations of the material in close vicinity to the black hole were supposed to reveal a particularly efficient feeding mechanism, but they found nothing particular. This result is all the more extraordinary: it could mean that astrophysicists understand less about the development of galaxies than they thought. And yet they are by no means disappointing.

<https://phys.org/news/2024-06-black-hole-inexplicable-mass-jwst.html>

The unexpected behaviour of pulsing stars could help us measure the universe

Studying pulsing Cepheid stars offers a cosmic yardstick by which to measure the universe.



The star RS Puppis is one of the most luminous Cepheid variable stars, exhibiting a six-week cycle of changing brightness. (Image credit: NASA, ESA, Hubble Heritage Team (STScI/AURA)-Hubble/Europe Collaboration)

New research offers the most precise measurements yet of pulsating Cepheid stars, which may hold clues about the immense size and scale of our universe. Cepheids are a type of [variable star](#) that brighten and dim within a short period of time, exhibiting specific [luminosity](#) patterns. However, while this rhythmic behavior allows

astronomers to calculate distances across [space](#) based on changes, or pulses, in the stars' brightnesses, it can also make the stars challenging to observe in general. Using advanced spectrography observations collected between 2010 and 2022 from the Swiss Euler telescope in Chile and the Flemish Mercator [telescope](#) on La Palma in Spain, researchers with the Velocities of Cepheids (VELOCE) project studied hundreds of Cepheids with great precision and consistency. "Understanding the nature and physics of Cepheids is important because they tell us about how stars evolve in general, and because we rely on them for [determining distances](#) and the expansion rate of [the Universe](#)," Richard I. Anderson, an astrophysicist and lead author of the study from the Swiss Federal Institute of Technology Lausanne (EPFL), said in [a statement](#) announcing the new study. <https://www.space.com/unexpected-behavior-pulsing-stars-study-universe>

'The early universe is nothing like we expected': James Webb telescope reveals 'new understanding' of how galaxies formed at cosmic dawn



The Cosmic Gems is one of the most highly magnified objects in space, thanks to a phenomenon called gravitational lensing. (Image credit: ESA/Webb, NASA & CSA, L. Bradley (STScI), A. Adamo (Stockholm University) and the Cosmic Spring collaboration)

The [James Webb Space Telescope \(JWST\)](#) has discovered what could be the earliest star clusters in the universe. JWST spotted the five proto-globular clusters — swarms of millions of stars bound together by gravity — inside the Cosmic Gems arc, a galaxy that formed just 460 million years after the [Big Bang](#). The Cosmic Gems arc gets its name from its appearance: When seen from our [solar system](#), the star-studded galaxy looks like a hair-thin crescent due to the powerful gravitational influence of a foreground galaxy, which magnifies and distorts the distant galaxy's appearance

<https://www.livescience.com/space/cosmology/the-early-universe-is-nothing-like-we-expected-james-webb-telescope-reveals-new-understanding-of-how-galaxies-formed-at-cosmic-dawn>

Sprites from space! Astronaut photographs rare red lightning phenomenon from ISS



A rare red sprite captured from the International Space Station posted on X (formerly Twitter) on June 20, 2024, showing an event earlier in the year. The image was taken off the coast of South Africa. (Image credit: Matthew Dominick/NASA/X)

An astronaut captured an elusive glimpse of red lightning from space. [NASA](#) astronaut Matthew Dominick imaged the rare [red sprite phenomenon](#) from the [International Space Station](#) earlier in the year, which may build on earlier studies of the lightning type on the orbiting complex. "Super lucky a few weeks ago when shooting a timelapse of a lightning storm off the coast of South Africa. One of the frames in the timelapse had a red sprite," NASA astronaut Dominick [wrote on X](#), formerly Twitter, on Thursday (June 20).

<https://www.space.com/iss-red-lightning-sprite-thunderstorm-image>

COMMITTEE MEMBERS

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