# "The Southern Cross"

The Hermanus Astronomy Centre Newsletter

## JULY 2023

### *MONTHLY MEETINGS*

Our **June** meeting was held on **Monday 19th July**.

**Kos Coronaios** presented

***"BACK TO BASICS, My Astronomy Journey and Astrophotography using a Tripod"***

Many (most?) of us who love staring and pondering the night sky above us, particularly in the southern hemisphere, will have pondered on the wish to record these heavenly sights. Then we discover that the cost of the hardware (suitable telescopes, trackers, camera adaptors, the list goes on) will smite such a heavy blow to our financial resources that we turn sadly away, forced to admire with envy the fine images of the dedicated or better endowed. Kos to the rescue! This presentation illustrated the possibility of capturing surprising results with just a camera and tripod and a belief in ourselves.

Please take a look at the You Tube video - https://www.youtube.com/watch?v=RZXnLbl-aH8 .

"Ah," I hear your cry, "but what about the software, so expensive and complicated." Surprisingly, a lot of it is free. And the complications can be ironed out by joining the group of enthusiasts of the **Astrophotography Special Interest Group** (see below) lead by **Deon Krige**.

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Our next meeting, scheduled for **17th July**, ***The Violent Universe: Gamma-Ray Astronomy and South Africa's and Namibia's Role,*** will be presented by **Prof Markus Böttcher** of North-West University, Potchefstroom.

This talk will highlight South African and Namibian involvement in the rapidly evolving field of gamma-ray astronomy, which is probing the most violent phenomena in the Universe. We will start with an introduction to multi-wavelength astronomy across the electromagnetic spectrum, from radio waves via visible light to gamma-rays. The two main methods to observe gamma-rays (radiation carrying billions of times the energy of visible light) from space and from the ground will be explained and the various classes of astronomical sources emitting gamma-rays (such as pulsars, supernova remnants and active galactic nuclei) will briefly be discussed.

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## *SPECIAL INTEREST GROUP ACTIVITIES*

### *Cosmology*

(the **1st Monday** of each month)

This is a series of 17 videos entitled "COSMOLOGY, THE HISTORY OF THE UNIVERSE".

At the meeting on **13th June**, we watched episode 9 – ***Where did Dark Matter and Dark Energy Come From?***

https://www.youtube.com/watch?v=fX_1pM64uUk&list=PLROBLlvnR7BEF9b1NOvRf_zhboibmywJb&index=9 - about 45 minutes.

The next Cosmology meeting is scheduled for **Monday July 3rd**, "COSMOLOGY, THE HISTORY OF THE UNIVERSE", a 17 part series, episode 10 – ***Why is Gravity so Weak?***

The most powerful explosion created by mankind was the Russian test of a nuclear bomb at the equivalent of 15 megatons of TNT. We have observed a hyper nova of 10 billion billion times this strength. Yet this resulted from the force of gravity! Is gravity so weak? Join us as we learn about this "weakest" of the four forces.

Two examples of the many comments from people who are well qualified to comment:

*"This is one of the best written and presented science programmes ever made."*

*"An absolutely stellar production, as usual. Wonderfully written and perfectly narrated. I'm so grateful for this channel - the absolute best on YouTube."*

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

### *Astrophotography*

This SIG is scheduled for the **2nd Monday** of each month as requested by group members.

If you were unfortunate enough to have missed Kos Coronaios' presentation on Monday 19th (see above), please check the You Tube video: https://www.youtube.com/watch?v=RZXnLbl-aH8 .

Depending on responses, we shall be holding an Astrophotography SIG virtual meeting on **July 10th** to discuss this video.

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

### *Study Group*

Currently scheduled for the **last Monday** of each month.

Our last meeting, scheduled for June 26th, was cancelled. This special interest group is under revision in both content and timing. Members will be receiving updates shortly.

For further information, please contact Peter Harvey: petermh@hermanus.co.za

### *Stargazing / Moongazing*

Wednesday July 26th

A Moongazing session is being planned for the **First quarter Moon** on ~~**Thursday July 27th**~~, most probably at **Gearing's Point**. You may care to diarize this date. *Weather dependent, of course!*

### *Future Trips*

No outings are planned at present.

### *Website*

Please check our website calendar for HAC scheduled events: https://www.hermanusastronomy.co.za

## *ATTENDANCE at MEETINGS*

A steady decline in attendance figures at our meetings prompted the committee to investigate. A questionnaire was circulated to our membership to gather your thoughts and to decide upon appropriate actions to correct this trend.

The committee has noted your wishes which will be used to guide changes regarding such issues as live meetings (as opposed to virtual), topic content, venues, timing and event notification. Also noted was a clarion call for stargazing and observation workshops. Members will be informed in due course.

**Monthly Meeting** dates, *currently* scheduled for the **3rd Monday** of every month, are under review and, rest assured, members will be advised timeously. The above meeting date, **July 17th**, is unlikely to change.

No meeting is normally planned for December unless otherwise advised.

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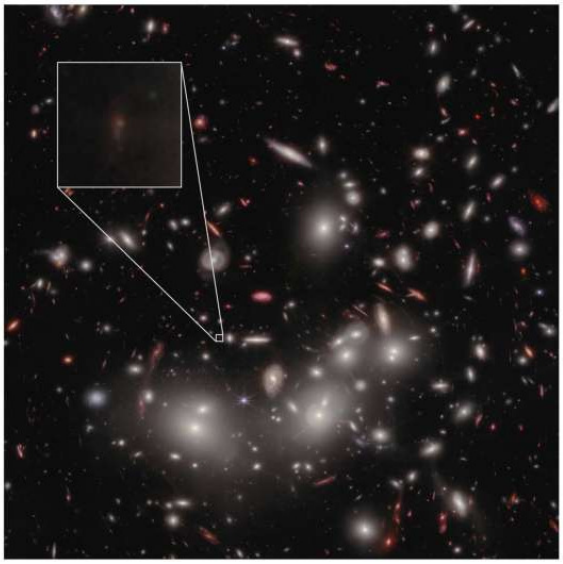
## *ASTRONOMY NEWS for JULY 2023*

**(compiled by Pieter Kotzé)**

**Astrophysicists confirm the faintest galaxy ever seen in the early universe**

An international research team led by UCLA astrophysicists has confirmed the existence of the faintest galaxy ever seen in the early universe. The galaxy, called JD1, is one of the most distant identified to date, and it is typical of the kinds of galaxies that burned through the fog of hydrogen atoms left over from the Big Bang, letting light shine through the universe and shaping it into what exists today.

The discovery was made using NASA's James Webb Space Telescope, and the findings are published in the journal *Nature*.



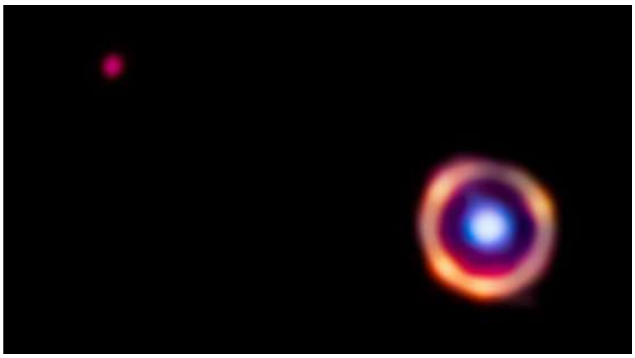
*A projected image of the galaxy JD1 (inset), which is located behind a bright cluster galaxy called Abell2744. Credit: Guido Roberts-Borsani/UCLA); original images: NASA, ESA, CSA, Swinburne University of Technology, University of Pittsburgh, STScI*

The first billion years of the universe's life were a crucial period in its evolution. After the Big Bang, approximately 13.8 billion years ago, the universe expanded and cooled sufficiently for hydrogen atoms to form. Hydrogen atoms absorb ultraviolet photons from young stars; however, until the birth of the first stars and galaxies, the universe became dark and entered a period known as the cosmic dark ages.

https://phys.org/news/2023-06-astrophysicists-faintest-galaxy-early-universe.html

**Webb Space Telescope detects universe's most distant complex organic molecules**

Astronomers using the Webb telescope discovered evidence of complex organic molecules in a galaxy more than 12 billion light-years away. The galaxy lines up almost perfectly with a second galaxy only 3 billion light-years away from our perspective on Earth.

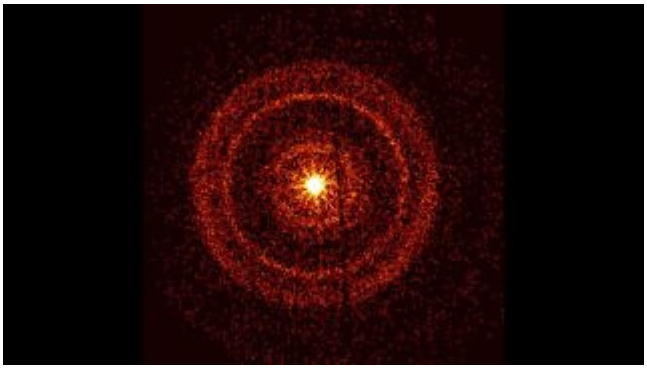


*In this false-colour Webb image, the foreground galaxy is shown in blue, while the background galaxy is red. The organic molecules are highlighted in orange. Credit: J. Spilker / S. Doyle, NASA, ESA, CSA*

Researchers have detected complex organic molecules in a galaxy more than 12 billion light-years away from Earth—the most distant galaxy in which these molecules are now known to exist. Thanks to the capabilities of the recently launched James Webb Space Telescope and careful analyses from the research team, a new study lends critical insight into the complex chemical interactions that occur in the first galaxies in the early universe. Spectroscopic data from the JWST suggest that the obscured interstellar gas in SPT0418-47 is enriched in heavy elements, indicating that generations of stars have already lived and died. The specific compound the researchers detected is a type of molecule called polycyclic aromatic hydrocarbon, or PAH. On Earth, these molecules can be found in the exhaust produced by combustion engines or forest fires. Being comprised of carbon chains, these organic molecules are considered the basic building blocks for the earliest forms of life, the researchers said.

https://phys.org/news/2023-06-webb-space-telescope-universe-distant.html

**Brightest gamma-ray burst ever seen, the largest known explosion since Big Bang, has a unique jet structure unlike any other**



*The brightest gamma ray burst ever seen is forcing astronomers to rethink their theories.(Image credit: NASA/Swift/A. Beardmore (University of Leicester))*

Scientists may finally know what made the largest explosion in the universe ever seen by humankind so powerful.Astronomers have discovered that the brightest gamma-ray burst (GRB) ever seen had a unique jet structure and was dragging an unusually large amount of stellar material along with it. This might explain the extreme properties of the burst, believed to have been launched when a massive star located around 2.4 billion light-years from Earth in the direction of the constellation Sagitta underwent total gravitational collapse to birth a black hole, as well as why its afterglow persisted for so long.Further examination of the powerful GRB has revealed that it is unique for its structure as well as its brightness. The GRB was surprisingly wide. So wide, in fact, that astronomers were initially unable to see its edges.

https://www.space.com/boat-gamma-ray-burst-unique-structure

https://www.spacedaily.com/reports/What_made_the_brightest_cosmic_explosion_of_all_time_so_exceptional_999.html

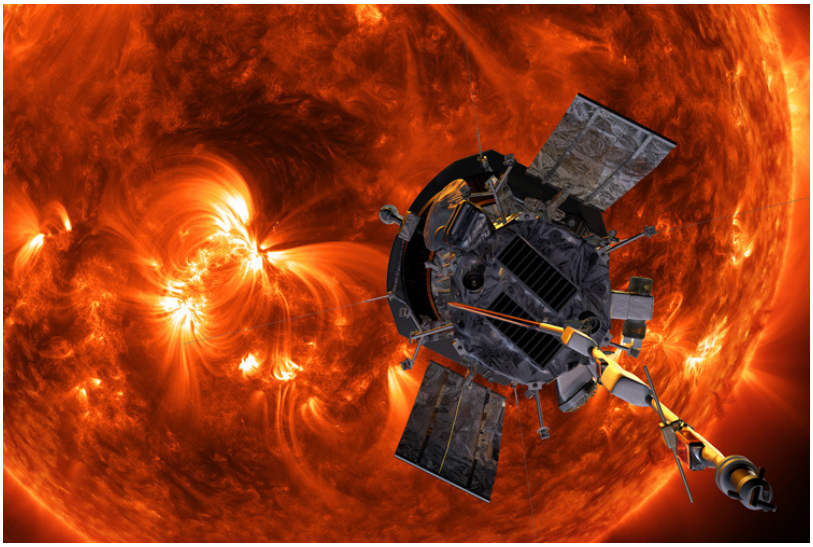
**Breaking the Cosmic Silence: First Detection of Radio Waves From Type Ia Supernova**

*Artist's rendition of SN 2020eyj, a white dwarf star that went supernova after pulling material from a helium companion star. Credit: Adam Makarenko/W. M. Keck Observatory*

**An unusual Type Ia supernova has been discovered by Stockholm University astronomers. For the first time, it was detected in radio waves and showed strong helium emissions. The supernova was triggered by a white dwarf star that pulled helium-rich material from a companion star. This novel finding adds to our understanding of Type Ia supernovae, which are pivotal for measuring the universe's expansion.**A team of astronomers led by Stockholm University has discovered an unusual Type Ia supernova – or thermonuclear supernova – called SN 2020eyj. Not only did they make the first detection of such a supernova in radio waves, follow-up observations from W. M. Keck Observatory on Maunakea, Hawai'i Island also showed strong emission lines of helium.

https://scitechdaily.com/breaking-the-cosmic-silence-first-detection-of-radio-waves-from-type-ia-supernova/

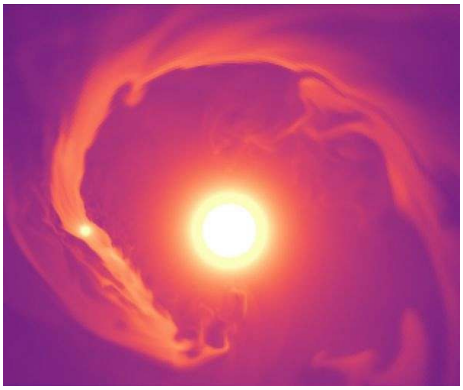
**Parker Solar Probe flies into the fast solar wind and finds its source**



*Artist's concept of the Parker Solar Probe spacecraft approaching the sun. Launched in 2018, the probe is increasing our ability to forecast major space-weather events that impact life on Earth. (Image credit: NASA)*

NASA's Parker Solar Probe has flown close enough to the sun to detect the fine structure of the solar wind close to where it is generated at the sun's surface, revealing details that are lost as the wind exits the corona as a uniform blast of charged particles.It's like seeing jets of water emanating from a showerhead through the blast of water hitting you in the face.In a paper to be published this week in the journal *Nature*, a team of scientists led by Stuart D. Bale, a professor of physics at the University of California, Berkeley, and James Drake of the University of Maryland-College Park, report that the Parker Solar Probe has detected streams of high-energy particles that match the supergranulation flows within coronal holes, which suggests that these are the regions where the so-called "fast" solar wind originates.

https://news.berkeley.edu/2023/06/07/parker-solar-probe-flies-into-the-fast-solar-wind-and-finds-its-source/



**Astronomers observe giant tails of helium escaping Jupiter-like planet**

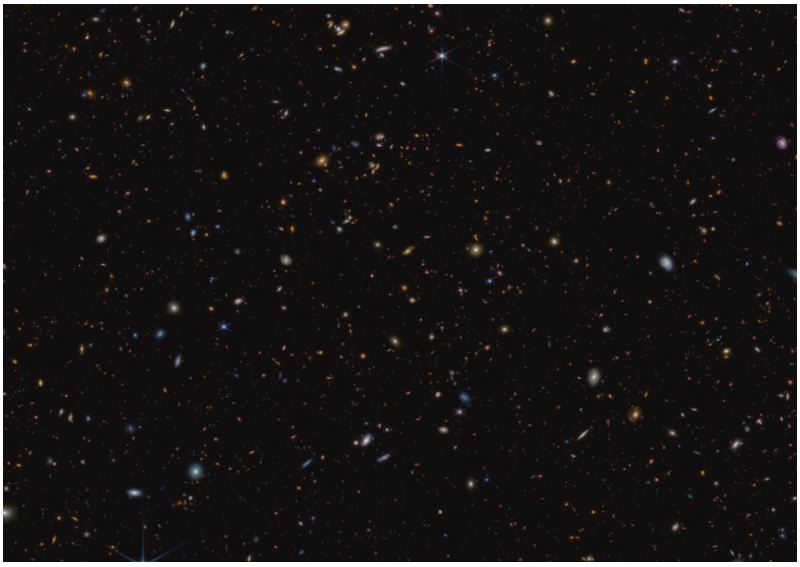
*Simulated view of the planet HAT-P-32b orbiting its parent star, HAT-P-32A. The planet is nearly twice the size of Jupiter and losing its atmosphere through dramatic tails of helium unfurling before and behind it as it travels through space. These tails are more than 50 times the length of the planet's radius. Credit: M. MacLeod (Harvard-Smithsonian Center for Astrophysics) and A. Oklopcic (Anton Pannekoek Institute for Astronomy, University of Amsterdam).*

A team of astronomers has used observations from the Hobby-Eberly Telescope (HET) at The University of Texas at Austin's McDonald Observatory to discover some of the longest tails of gas yet observed escaping a planet.The planet, HAT-P-32b, is nearly twice the size of Jupiter and losing its atmosphere through dramatic jets of helium unfurling before and behind it as it travels through space. These tails are more than 50 times the length of the planet's radius. The discovery is published in the journal Science Advances.

Tails of escaping material around planets can be the result of a collision freeing a trail of dust and debris. Or, they can be caused by the heat of a nearby star energizing and blowing a planet's atmosphere into space. However, tails as long as HAT-P-32b's are truly remarkable.

https://www.spacedaily.com/reports/Astronomers_observe_giant_tails_of_helium_escaping_Jupiter_like_planet_999.html

**James Webb Space Telescope discovers 717 ancient galaxies that flooded the universe with 1st light**



*This infrared image from NASA's James Webb Space Telescope (JWST) shows a portion of an area of the sky known as GOODS-South. More than 45,000 galaxies are visible here. (Image credit: NASA, ESA, CSA, Brant Robertson (UC Santa Cruz), Ben Johnson (CfA), Sandro Tacchella (Cambridge), Marcia Rieke (University of Arizona), Daniel Eisenstein (CfA))*

The James Webb Telescope (JWST or Webb) has unveiled hundreds of ancient galaxies that could be among the first members of the universe — a leap from only a handful that were previously known to exist at the time.As early as 600 million years after the Big Bang, these very young galaxies flaunted complex structures and clusters of star formation, a new study reports. The study is part of an international collaboration called the JWST Advanced Deep Extragalactic Survey (JADES), which gathered a month's worth of observations from two tiny patches in the sky: One in the Ursa Minor constellation and another in the direction of the Fornax cluster. Within this region were over 700 newly discovered young galaxies that reveal how the cosmos looked like in its earliest phase.

https://www.space.com/james-webb-space-telescope-galaxies-early-universe-first-light

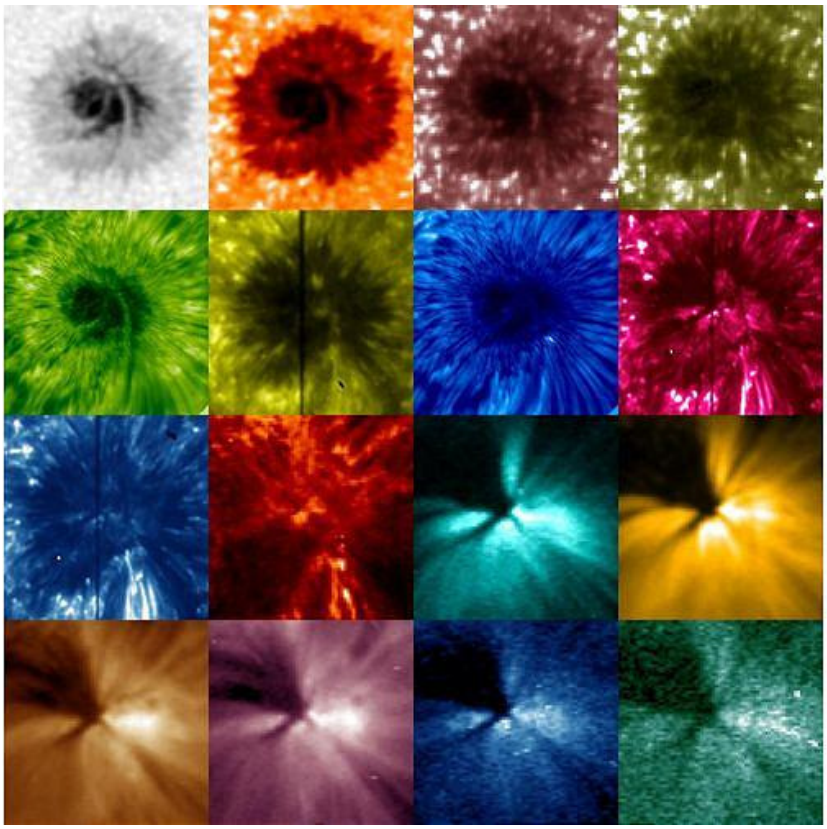
**A chaotic star is inching toward a violent death as astronomers watch in real-time**

*The luminous, hot star Wolf-Rayet 124 (WR 124) as seen by the James Webb Space Telescope.(Image credit: NASA, ESA, CSA, STScI, Webb ERO Production Team)*

Every star ages, but astronomers rarely get to watch it happen in real time. Now, they've gotten a front-row seat to the aging of an unusually chaotic star — and found that it's headed toward a spectacularly violent death. The star, located in the nearby Triangulum galaxy (also known as Messier 33), is in the middle of a transition into a class of highly unstable stars called Wolf-Rayet stars. New observations show that the star has begun beaming a new signal that was not seen when the star was first spotted in 2018. The new signal was detected in the peaks and valleys of the star's spectra, the wavelengths of the electromagnetic radiation it emits, and shows that the star is churning either carbon or iron deep within it through nuclear fusion. The new signal also indicates that the massive star, easily 25 times the sun's mass, has inched closer to its eventual fate of exploding into a spectacular supernova.

https://www.space.com/chaotic-star-wolf-rayet-supernova

**Sun's coldest region stores secret to heating million-degree corona, study finds**



Nearly five thousand kilometers above the Sun's surface lies a century-old question for solar physicists - how are temperatures in the star's upper atmosphere, or corona, hundreds of times hotter than temperatures at the Sun's visible surface?

An international team of scientists has a new answer to the question - commonly referred to as the Sun's coronal heating problem - with new observational data obtained with the 1.6-meter Goode Solar Telescope (GST) at Big Bear Solar Observatory (BBSO), operated by NJIT's Center for Solar Terrestrial Research (CSTR).

In a study published in Nature Astronomy, researchers have unveiled the discovery of intense wave energy from a relatively cool, dark and strongly magnetized plasma region on the Sun, capable of traversing the solar atmosphere and maintaining temperatures of a million degrees Kelvin inside the corona.

https://www.spacedaily.com/reports/Suns_coldest_region_stores_secret_to_heating_million_degree_corona_study_finds_999.html

**James Webb pierces the cold heart of the Chameleon**

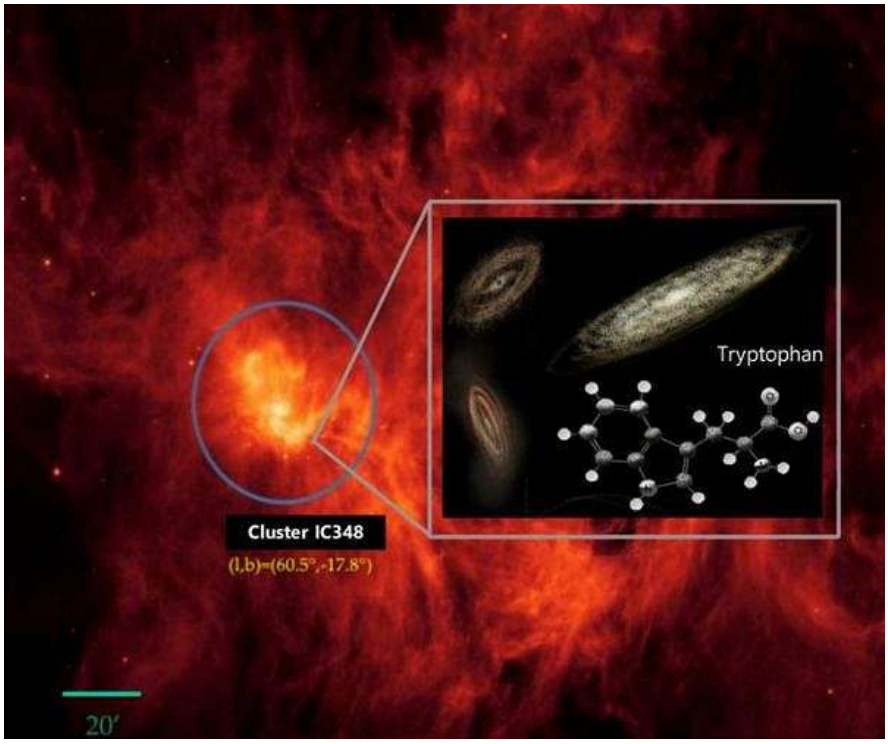
By observing distant stars through a star-forming cloud of gas and dust, Webb is helping astronomers map out the complex chemicals that could form life.

*NASA, ESA, CSA, and M. Zamani (ESA/Webb); Science: F. Sun (Steward Observatory), Z. Smith (Open University), and the Ice Age ERS Team.*

This gorgeous new image from the James Webb Space Telescope (JWST) features the molecular cloud Chameleon I, one of the nearest star-forming regions to Earth, located just 626 light-years away. At upper left is a young protostar called Ced 110 IRS 4, whose light illuminates the dense, bluish cloud at the infrared wavelengths Webb observes. Just visible through the cloud at center are several small, pointlike background stars, mostly obscured by the cold material. But these stars are the cornerstone of a new study, which used JWST to decode the chemical composition of ices within Chameleon I. In the case of Chameleon I, researchers identified ices inside the cloud such as water, carbonyl sulfide, ammonia, methane, and methanol. Researchers also found hints of even more complex molecules, such as ethanol. Webb's new view of the Chameleon is the most comprehensive look at ices within such a dense molecular cloud to date. The observations are providing astronomers with important information about the particular molecules that are available to form new planets — and any life that might eventually evolve on them.

https://www.astronomy.com/science/james-webb-pierces-the-cold-heart-of-the-chameleon/

**Evidence of the amino acid tryptophan found in space**




High amounts of tryptophan were detected in the Perseus Molecular Complex, specifically in the IC348 star system, a star-forming region that lies 1000 light years away from Earth - relatively close in astronomical terms. The region is generally invisible to the naked eye, but shines brightly when viewed in infrared wavelengths.Tryptophan is one of the 20 amino acids essential for the formation of key proteins for life on Earth, and produces one of the richest pattern of spectral lines in the infrared. It was therefore an obvious candidate to be explored using the extensive spectroscopic database of the Spitzer satellite, a space-based infrared telescope.

*Tryptophan has been detected in space. Jorge Rebolo-Iglesias. Background image: NASA/Spitzer Space Telescope*

https://www.spacedaily.com/reports/Evidence_of_the_amino_acid_tryptophan_found_in_space_999.html

## COMMITTEE MEMBERS

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| Peter Harvey | (Secretary, "Skynotes", "Southern Cross", Study Group SIG coordinator) | 081 212 9481<br>petermh@hermanus.co.za |
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| | | |
|---|---|---|
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