

"The Southern Cross"



HERMANUS ASTRONOMY CENTRE NEWSLETTER

JUNE 2022

Monthly Meeting

(the third Monday of each month)

16th May: Dr Jenny Morris of the Hermanus Astronomy Centre presented "*Here Comes the Sun*", subtitled "A brief history of the location of the centre of the Universe".

In a most enlightening talk, Jenny guided us through the historical belief systems and psychology of humanity rather than focusing on events. From the dawn of humankind, philosophy has been dominated by mythological and spiritual beliefs that gods had created the universe with man, and therefore his planet, the Earth, at the centre of everything. Over the millennia, beliefs have evolved from the flat-earth and the geocentric towards more scientific analyses, placing the Sun and then the Milky Way Galaxy at the centre. Jenny highlighted the fact that, even with modern scientific evidence, the scientific community still chose to resist Einstein's general relativity for 45 years.

You can view Jenny's presentation on YouTube <https://www.youtube.com/watch?v=T-AdPuDVCWA>

Next meeting on 20th June: Martin Snow presents "The Ups and Downs of the Solar Cycle". Further information will be sent before the event.

2022 meeting dates: For your diaries - The monthly meetings of 2022 are scheduled as follows: 20 June, 18 July, 15 August, 19 September, 17 October and 21 November. Unless otherwise advised, all our meetings are virtual using Zoom, commencing 18.30.

Special Interest Group activities

Cosmology

(the first Monday of each month)

May: This meeting was cancelled as 2nd May was a holiday.

This month: 6th June, topic to be advised.

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

Astrophotography

(the second Monday of each month)

Our meeting, scheduled for **Monday 9th May**, was cancelled as we had no requests for a topic. Instead, we scheduled a Moongazing outreach.

This month: 13th June, the choice of topic will be in accordance with members' wishes.

For further information, please contact Deon Krige: krige.deon44@outlook.com

Study Group

(the last Monday of each month)

30th May: we watched a video, **Sabine Hossenfelder's "Is Nuclear Power Green?"** (23 mins)

followed by "**Grid Scale Energy Storage 30x cheaper than Lithium-ion! How do they do that?**" (14 minutes)

27th June, the topic will be advised in due course.

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

Stargazing

Please note that currently all our meetings are virtual, held on Zoom. Zoom meetings are scheduled to commence at 18.30 unless otherwise advised. Invites will be circulated to members closer to the time. Eskom may, of course, require changes to these plans.

The exception to this is, of course, Stargazing, the one activity actually benefitting from loadshedding! No Stargazing is currently planned but we shall let you know as soon as a suitable evening is scheduled.

Other activities

Educational outreach: Mick Fynn, assisted by others including HAC members, has been leading weekly tours of the solar system model on the Cliff Path commencing every Thursday at 11.00 at the **Tourism Centre** (Old Railway Station). Tourism staff are keen to market and publicise this new addition to Hermanus attractions.

Future Trips

No outings are being planned at present.

GEARING'S POINT ASTRONOMY EDUCATION DISPLAY (GPAED)

The HAC has identified all relevant sub-contractors required for the execution of the Gearings Point Astronomy Education Display and paid the deposits where needed.

The first step was to submit the 20 draft educational information tablets to an experienced Science Editor to convert them into reader-friendly and attractive format. This process will be finalised by mid-June.

The second step is the local graphic design of the tablets, which should be complete by the end of June.

Step three is the chemical etching of the information onto 3mm SS slabs, which is deeper and more durable than laser-engraving on engineered granite. Deadline completion for this stage is end August.

The local pre-casting of the mounting slabs has the same deadline, as has the builder for casting the reinforced foundations onto which the mounting slabs will be affixed.

Installation in situ should be completed during September.

The project team of Pierre, Deon and Derek have forfeited the luxury of boredom for the next 6 months.

ASTRONOMY NEWS(Compiled by Pieter Kotzé)

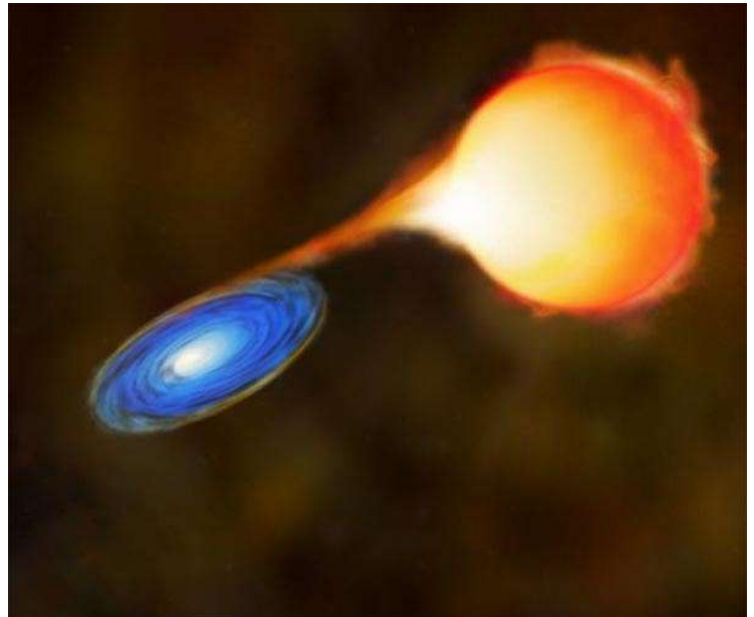
Breaking news from the dawn of the universe

Astrophysicists at the Niels Bohr Institute, University of Copenhagen, and the Technical University of Denmark, have identified a distant object with properties that lie in-between those of a galaxy and those of a so-called quasar. The object can be seen as the ancestor of a supermassive black hole, and it was born relatively soon after the Big Bang. Simulations had indicated that such objects would exist, but this is the first actual finding. The newly found object - named GNz7q by the team - was born 750 million years after the Big Bang which is generally accepted as the beginning of the universe as we know it. Since the Big Bang occurred about 13.8 billion years ago, GNz7q origins in an epoch known as "Cosmic Dawn".

https://www.spacedaily.com/reports/Breaking_news_from_the_dawn_of_the_universe_999.html

Giant stars undergo dramatic weight loss program

Astronomers at the University of Sydney have found a slimmer type of red giant star for the first time. These stars have undergone dramatic weight loss, possibly due to the presence a greedy neighbour. Published in Nature Astronomy, the discovery is an important step forward to understanding the life of stars in the Milky Way - our closest stellar neighbours. There are millions of 'red giant' stars found in our galaxy. These cool and luminous objects are what our Sun will become in four billion years. For some time, astronomers have predicted the existence of slimmer red giants. After finding a smattering of them, the University of Sydney team can finally confirm their existence.



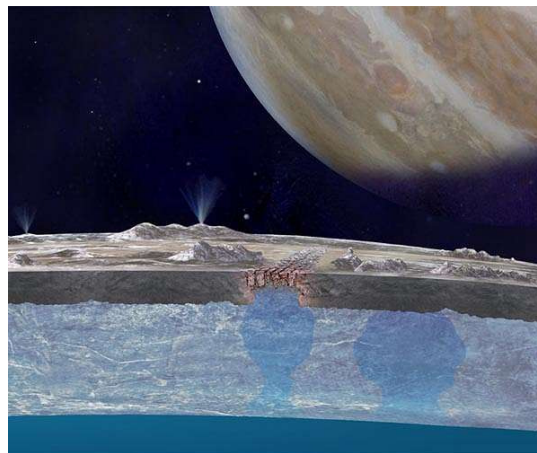
In the binary named Mira, a red giant star transfers mass to a white dwarf.

https://www.spacedaily.com/reports/Giant_stars_undergo_dramatic_weight_loss_program_999.html

Water on Jupiter's moon closer to surface than thought: study

Ridges that criss-cross the icy surface of Jupiter's moon Europa indicate there are shallow pockets of water beneath, boosting hopes in the search for extra-terrestrial life.

Europa has long been a candidate for finding life in our solar system due to its vast ocean, which is widely thought to contain liquid water -- a key ingredient for life. There is a problem: the ocean is predicted to be buried 25-30 kilometres



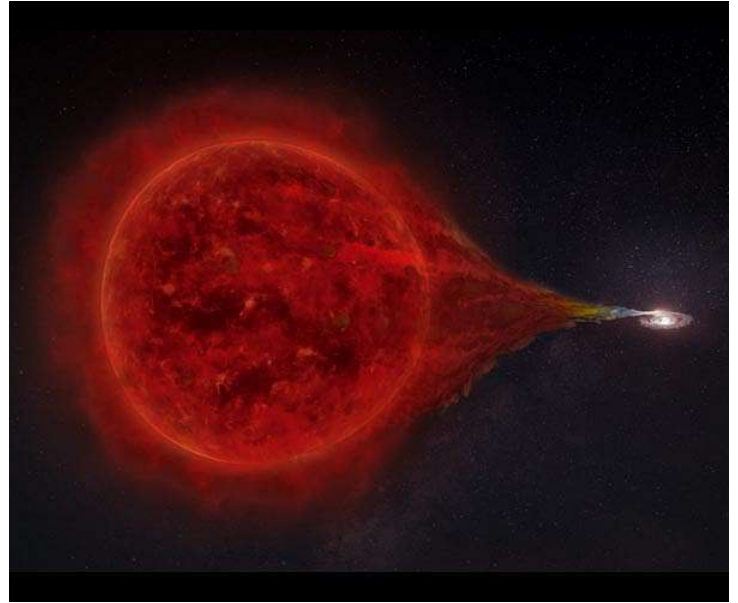
(15-17 miles) beneath the moon's icy shell. However water could be closer to the surface than previously thought, according to new research published in the journal Nature Communications. The finding came partly by chance, when geophysicists studying an ice sheet in Greenland watched a presentation about Europa and spotted a feature they recognised.

https://www.spacedaily.com/reports/Water_on_Jupiters_moon_closer_to_surface_than_thought_study_999.html

MAGIC telescopes observe nova explosion

Light on, light off - this is how one could describe the behaviour of the nova, which goes by the name RS Ophiuchi (RS Oph). Every 15 years or so, a dramatic explosion occurs in the constellation of the Serpent Bearer. Birthplaces of a nova are systems in which two very different stars live in a parasitic relationship: A white dwarf, a small, burned-out and tremendously dense star - a teaspoon of its matter weighs about 1 ton - orbits a red giant, an old star that will soon burn up. The dying giant star feeds the white dwarf with matter shedding its outer hydrogen layer as the gas flows onto the nearby white dwarf.

This flow of matter continues, until the white dwarf over(h)eats itself. The temperature and pressure in the newly gained stellar shells become too large and are flung away in a gigantic thermonuclear explosion. The dwarf star remains intact and the cycle begins again - until the spectacle repeats itself.



Artwork of the binary star system RS Ophiuchi: Matter flows from the red giant onto the white dwarf. The newly added stellar envelopes explode in a bright nova about every 15 years.

[https://www.spacedaily.com/reports/MAGIC telescopes observe nova explosion 999.html](https://www.spacedaily.com/reports/MAGIC_telescopes_observe_nova_explosion_999.html)

Astronomers find freaky stars covered in helium burning ashes



Artist's impression of the merging of two white dwarf stars (Image by Nicole Reindl,

A German team of astronomers
from the Universities of

University of Potsdam)

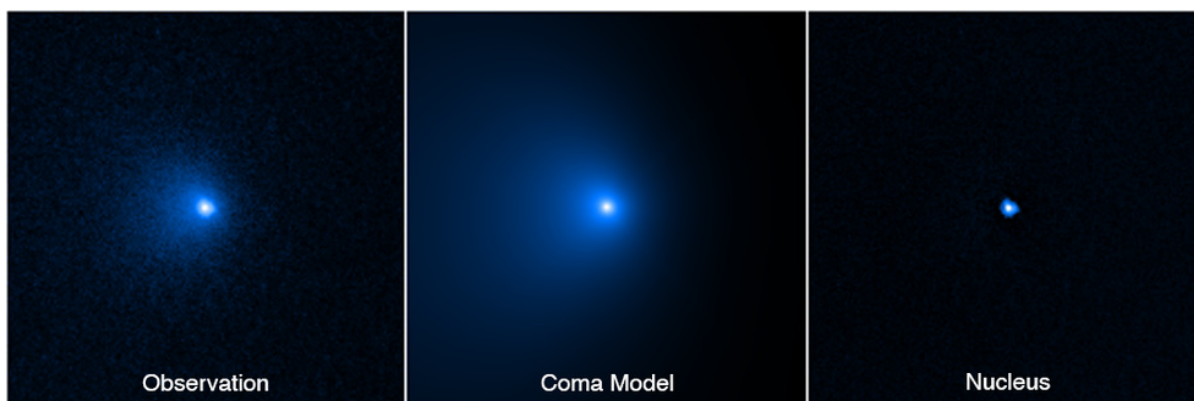
Tubingen and Potsdam, led by Prof. Klaus Werner, have discovered a new type of weird stars.

The spectra of the star sample, obtained by Large Binocular Telescope in Arizona, USA, and the Large Sky Area Multi-Object Fiber Spectroscopic Telescope (LAMOST) based at Xinglong and operated by the National Astronomical Observatories of the Chinese Academy of Sciences, were used to derive their temperature, surface gravity and elemental abundances. While normal stars have surfaces composed of hydrogen and helium, the stars discovered by Prof. Werner and his colleagues have their surfaces covered with carbon and oxygen, the ashes of He-burning - a very exotic composition for a star. The situation becomes more puzzling because the new stars have temperatures and radii that indicate they are still burning helium in their cores.

https://www.spacedaily.com/reports/Astronomers_find_freaky_stars_covered_in_helium_burning_ashes_999.html

Hubble Confirms Largest Comet Nucleus Ever Seen

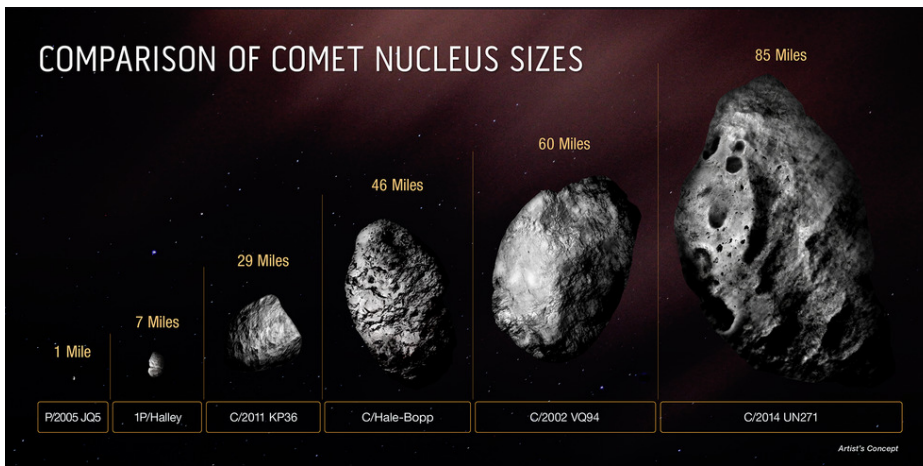
NASA's Hubble Space Telescope has determined the size of the largest icy comet nucleus ever seen by astronomers. The estimated diameter is approximately 80 miles across, making it larger than the state of Rhode Island. The nucleus is about 50 times larger than found at the heart of most known comets. Its mass is estimated to be a staggering 500 trillion tons, a hundred thousand times greater than the mass of a typical comet found much closer to the Sun.



This sequence shows how the nucleus of Comet C/2014 UN271 (Bernardinelli-Bernstein) was isolated from a vast shell of dust and gas surrounding the solid icy nucleus. On the left is a photo of the comet taken by the NASA Hubble Space Telescope's Wide Field Camera 3 on January 8, 2022. A model of the coma (middle panel) was obtained by means of fitting the surface brightness profile assembled from the observed image on the left. This allowed for the coma to be subtracted, unveiling the point-like glow from the nucleus. Combined with radio telescope data, astronomers arrived at a precise measurement of the nucleus size. That's no small feat from something about 2 billion miles away. Though the nucleus is estimated to be as large as 85 miles across, it is so far away it cannot be resolved by Hubble. Its size is derived from its reflectivity as measured by Hubble. The nucleus is estimated to be as black as charcoal. The nucleus area is gleaned from radio observations.

Credits: NASA, ESA, Man-To Hui (Macau University of Science and Technology), David Jewitt (UCLA); Image processing: Alyssa Pagan (STScI)

The behemoth comet, C/2014 UN271 (Bernardinelli-Bernstein) is barrelling this way at 22,000 miles per hour from the edge of the solar system. But not to worry. It will never get closer than 1 billion miles away from the Sun, which is slightly farther than the distance of the planet Saturn. And that won't be until the year 2031.



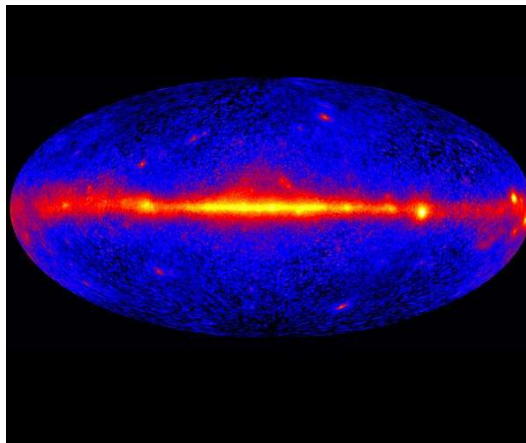
This diagram compares the size of the icy, solid nucleus of comet C/2014 UN271 (Bernardinelli-Bernstein) to several other comets. The majority of comet nuclei observed are smaller than Halley's comet. They are typically a mile across or less. Comet C/2014 UN271 is currently the record-holder for big comets. And, it may be just the tip of the iceberg. There could be many more monsters out there for astronomers to identify as sky surveys improve in sensitivity. Though astronomers know this comet must be big to be detected so far out to a distance of over 2 billion miles from Earth, only the Hubble Space Telescope has the sharpness and sensitivity to make a definitive estimate of nucleus size. Credits: Illustration: NASA, ESA, Zena Levy (STScI)

The comet has been falling toward the Sun for well over 1 million years. It is coming from the hypothesized nesting ground of trillions of comets, called the Oort Cloud. The diffuse cloud is thought to have an inner edge at 2,000 to 5,000 times the distance between the Sun and the Earth. Its outer edge might extend at least a quarter of the way out to the distance of the nearest stars to our Sun, the Alpha Centauri system.

See: <https://www.nasa.gov/feature/goddard/2022/hubble-confirms-largest-comet-nucleus-ever-seen>

Spinning stars shed new light on strange galactic signal

Researchers from The Australian National University (ANU) have found an alternative explanation for a mysterious gamma-ray signal coming from the centre of the galaxy, which was long claimed as a signature of dark matter. Gamma-rays are the form of electromagnetic radiation with the shortest wavelength and highest energy. The discovery may mean scientists have to re-think where they look for clues about dark matter.



The Galactic Centre Excess is an unexpected concentration of gamma-rays emerging from the centre of our galaxy that has long puzzled astronomers

https://www.spacedaily.com/reports/Spinning_stars_shed_new_light_on_strange_galactic_signal_999.html

Micronovae: Astronomers find three white dwarfs exploding at their poles

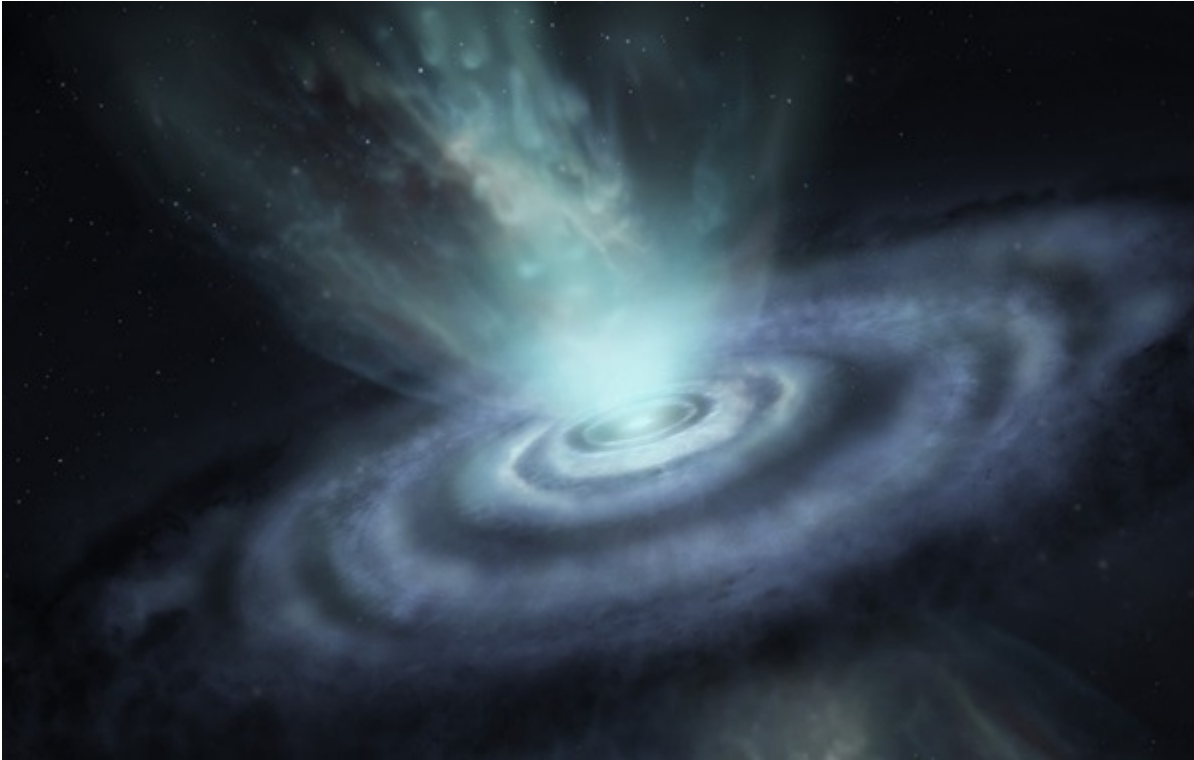


A white dwarf is stealing material from its companion, igniting a micronova at its pole in this artist's concept. Mark Garlick (<http://www.markgarlick.com/>)

When a white dwarf shares a solar system with a full-sized companion star, sometimes it will siphon gas from its larger neighbour. The accreted hydrogen and helium build up on the surface of the white dwarf until it reaches a critical temperature and pressure. Thermonuclear fusion ignites, combining the hydrogen into heavier elements and releasing a burst of energy and material across the surface of the white dwarf. That type of stellar explosion is called a nova. But astronomers have recently discovered another way that white dwarfs can rapidly burn off some of their stolen gains: *micronovae*. Micronovae are small explosions compared to novae, hence their name. That's because micronovae are contained near the magnetic poles of white dwarfs. While classical novae light up a white dwarf for several weeks, micronovae only shine for a few hours

<https://astronomy.com/news/2022/04/astronomers-discover-a-new-kind-of-stellar-explosion>

The DUDE abides: Astronomers spot smoke rings around V Hydrae



An artist's conception of the mysterious rings of generated from the death of V Hydrae, located in in the constellation Hydra. ALMA (ESO/NAOJ/NRAO)/S. Dagnello (NRAO/AUI/NSF)

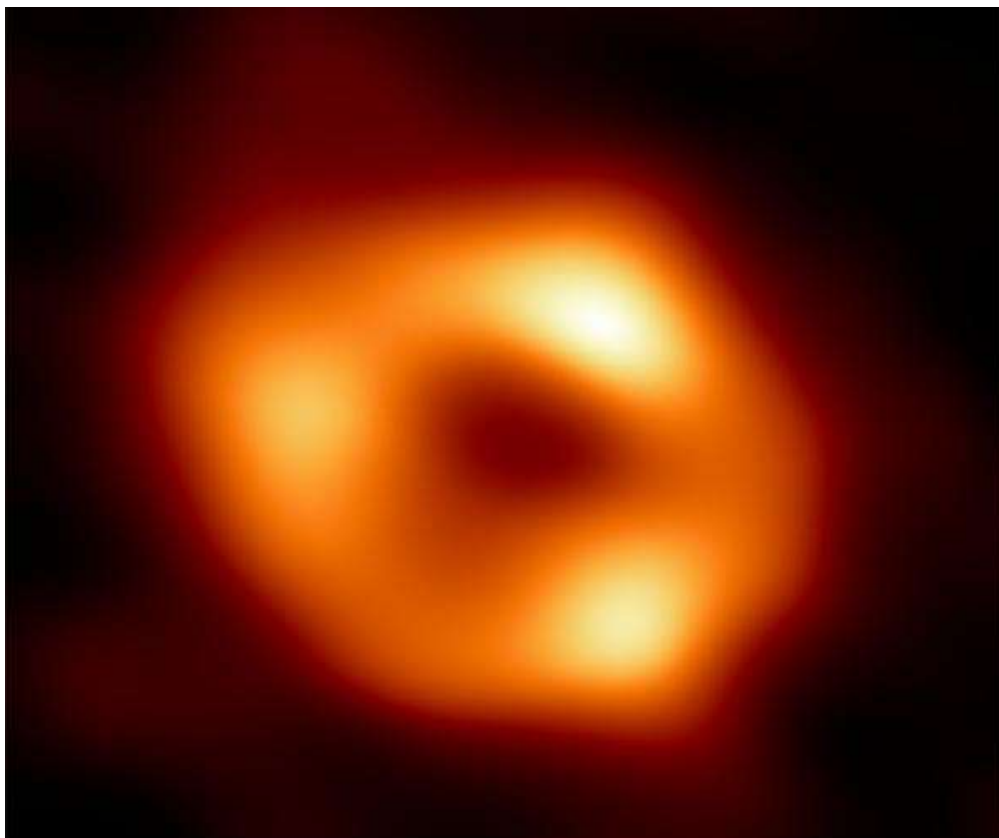
The carbon-rich star V Hydrae has been steadily puffing out layers of gas during the end of its life, enabling researchers to learn more about the evolution of aging giant stars. Over time, the stellar smoke rings have created a disc-shaped structure astronomers call a DUDE, or Disk Undergoing Dynamical Expansion (if you're not into the whole brevity thing). Located 1,300 light-years away in the constellation Hydra the Water Snake, V Hydrae sports six rings, hourglass-shaped features, and jet-like emissions. Due to its complex nature, astronomers recently investigated it using the Atacama Large Millimeter/submillimeter Array and data from the Hubble Space Telescope. V Hydrae is classified as an asymptotic giant branch (AGB) star: an evolved, cooler red giant that shares a similar or larger mass to our own Sun. Because it is not large enough to go off as a supernovae, it will most likely continue shedding matter over time, eventually becoming a white dwarf. Every roughly 8.5 years, V Hydrae expels a ring of loosely held gas, as seen here in this composite image.

<https://astronomy.com/news/2022/04/snapshot-the-dude-abides>

Astronomers reveal first image of black hole at Milky Way's centre

An international team of astronomers on Thursday unveiled the first image of a supermassive black hole at the centre of our own Milky Way galaxy - a cosmic body known as Sagittarius A*. The image - produced by a global team of scientists known as the Event Horizon Telescope (EHT) Collaboration - is the first, direct visual confirmation of the presence of this invisible object, and comes three years after the very first image of a black hole from a distant galaxy.

https://www.spacedaily.com/reports/Astronomers_reveal_first_image_of_black_hole_at_Milky_Ways_centre_99.html



This is the first image of Sagittarius A* (or Sgr A* for short), the supermassive black hole at the centre of our galaxy. It's the first direct visual evidence of the presence of this black hole. It was captured by the Event Horizon Telescope (EHT), an array which linked together eight existing radio observatories across the planet to form a single "Earth-sized" virtual telescope.

COMMITTEE MEMBERS

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