The PRETORIA CENTRE
of the
Astronomical Society of Southern Africa
www.pretoria-astronomy.co.za

NEWSLETTER SEPTEMBER 2019

NEXT MEETING

Venue: The auditorium behind the main building at Christian Brothers College (CBC), Mount Edmund, Pretoria Road, Silverton, Pretoria.
Date and time: Wednesday 25 September at 19h15.
Programme:

- **Beginner's Corner:** "A computer controlled mounting" by Johan Smit.
- **What's Up:** by Michael Poll.

---------- 10-minute break — library will be open. ----------

- **Main talk:** "History of the Radcliffe Observatory" by Dr Francis Thackeray.
- **Socializing over tea/coffee and biscuits.**

The chairperson at the meeting will be Michelle Ferreira.

NEXT OBSERVING EVENING

Friday 20 September from sunset onwards at the Pretoria Centre Observatory, which is also situated at CBC. Turn left immediately after entering the main gate and follow the road.

TABLE OF CONTENTS

Astronomy- related articles on the Internet

No ET life yet? Here's why that's important. A critical article about ET's.
https://www.livescience.com/66092-why-no-aliens.html?utm_source=ls-newsletter&utm_medium=email&utm_campaign=20190805-ls

Extreme life on Earth. From bacteria that can survive inside rocks to microbes that can withstand tremendous heat, cold and radiation, life can take some extreme forms. These enterprising creatures reveal not just the resilience of life on Earth, but the possibilities for life elsewhere in the Universe.
https://www.livesciehttps://www.livescience.com/china-far-side-moon-strange-substance.html?utm_source=ls-newsletter&utm_medium=email&utm_campaign=20190903-ls

Why thousands of Hawaiians are protesting a giant telescope on Mauna Kea.
Astronomers selected the Mauna Kea site after a rigorous five-year search for a place above the clouds that is stable, dry and protected from light pollution. Hawaiian groups are protesting and peacefully blocking construction of the **T**hirty **M**eter **T**elescope (TMT) on the dormant volcano Mauna Kea. To them, the volcano is a sacred site, revered as the "realm of the Hawaiian gods." It was, historically, a place only priests and royalty were allowed to visit.
https://www.livescience.com/66101-hawaii-jason-momoa-dwayne-johnson-telescope.html?utm_source=ls-newsletter&utm_medium=email&utm_campaign=20190806-ls

Meet the "Giant Elephant Trunks," mysterious cosmic structures 10 times bigger than the "Pillars of Creation".
https://www.livescience.com/there-be-elephant-trunks-in-space.html?utm_source=ls-newsletter&utm_medium=email&utm_campaign=20190904-ls

Interplanetary shock seen for 1st time. The phenomenon was an interplanetary shock, which is an interaction between two different patches of the stream of charged particles constantly flowing off the Sun, known as the solar wind.
https://www.livescience.com/nasa-detects-first-interplanetary-shock.html?utm_source=ls-newsletter&utm_medium=email&utm_campaign=20190814-ls

Right again, Einstein! Wobbling pulsar confirms general relativity theory. If two pulsars find themselves orbiting each other, general relativity predicts they can create a slight wobble as they rotate, like a slow-spinning top. This consequence of gravity is called relativistic spin precession.
https://www.livescience.com/wobbling-pulsar-confirms-einstein.html?utm_source=ls-newsletter&utm_medium=email&utm_campaign=20190910-ls

Observing: A piece of darkness - by Magda Streicher

Sometimes there are delightful hidden surprises among the stars – the secret to finding them is simply to go looking for them.

The insect constellation known as Musca (The Fly) conceals a unique dark nebula called the Dark Doodad. This lovely, fine streak of darkness was first noted by the American Dennis de Cicco, who named it and since then the name stuck.

It would not surprise me if most people have never heard of it, since very few catalogues list it. Where can the Dark Doodad be found? It reveals itself in absolute dark skies as a long, narrow, dark nebula running for almost 3 degrees. First find the globular cluster NGC 4372, which displays a large frosted round smudge, scattered and covered with fine frosted sparkling stars. Draw an imaginary line towards Alpha Muscae from this globular cluster and scan the area to the west with only the use of binoculars for this slim dark lane. The northern part of the dark nebula swings slightly east and also darker and wider.

It is speculated that the Doodad may possibly be related to the Coal Sack in the Crux constellation, if that is true, the nebula could be up to 400 light-years away from us.

A few years ago, Tim Cooper scanned the area around Musca and Crux and also found a new unlisted dark area nestling among the stars in this part of the Milky Way. Edward Emerson Barnard (1857 – 1923) used wide field glass photographs with the 24-inch Bruce telescope at Mount Wilson Observatory around 1892 of the Milky Way, which revealed dark cloud structures.

Think of the Doodad as a dollop of dark delight just waiting to reveal itself to the patient and curious observer. **Ω**

OBJECT	TYPE	RA	DEC	MAG	SIZE
Dark Doodad	Dark nebula	12 h 27.3 m	-71° 25’ 12”	-	150’ x 12’
NGC 4372	Globular cluster	12 h 06.2 m	-72° 43’ 41”	7.2	18’ x 6’

August 23rd 2019 observing evening report - by Michael Poll

No clouds but the sky is full of end-of-winter dust, and the ever-present light pollution. Even the brightest stars were a bit dim – for example, we could only just make out Delta Crucis, and Epsilon Crucis was marginal; of the Altair Trio, we could see Altair (alpha Aquilae) well enough, and Gamma (just to the north) was OK. Beta Aquilae (less bright than Gamma!) to the south was also marginal.

We were only two members present (Michael and José) with one telescope, and quite a few visitors, all of whom were newcomers - we were about a dozen in all. The visitors included Johannes who was there with a group of youngsters who were friends and relatives. Although Johannes had not been before, he was quite knowledgeable. As often happens recently for our observing evenings, there was a lot of discussion as well as observing. At least when outside one can point out some examples of what one is talking about.

Observing wise we concentrated a lot on naked eye observations to learn the way around the sky including using the Skymap.com publication. The stars and constellations we pointed out were Crux, Triangulum Australe, Alpha and Beta Centauri, Altair and the "Altair Trio", Vega, Scorpius with Antares, the "Teapot" of Sagittarius; and Spica going down in the west. Antares and Jupiter made distinct pair with contrasting colours.

Jupiter was almost directly overhead, with Saturn slightly further east. These were the first things we looked at telescopically. Jupiter showed three moons - Europa and Callisto were to the east and Ganymede was to the west. The fourth moon, Io appeared later in the evening – it had been in transit. As usual, views of Saturn were appreciated, and we could just glimpse one moon, presumably Titan. It was again pointed out the Jupiter moves eastwards faster than Saturn and will overtake it in December 2020. Asked where all the other planets were, we noted that Mars and Venus are more or less behind the Sun, and Mercury was also close to the Sun. Venus will become visible in the evening sky from about the end of September and we mentioned its change from a "morning star" to an "evening star". We explained how Mars only comes around about every two years, and we have to wait until later in 2020 until it becomes bright again.

Also in the telescope we showed Alpha Crucis and Alpha Centauri as examples of double and multiple stars. We also pointed out Mu Scorpii as an example of a naked eye double. We showed Messier 7 as an example of an open cluster. We also showed Vega and Antares in the telescope to show their contrasting colours.

The question of distances and the speed of light came up again, particularly in connection with Alpha Centauri. We started off with the speed of light (300 000 km per second) and with the Moon, which is about 400 000 km away, and compared this distance with the distance on any person's car odometer. We carried on from there – the distance light travels in one year; how long light takes to get here from the Sun (150 000 000 km away) and the distance to Alpha Centauri. **Ω**

Chairman's report for the meeting on 28 August 2019 – by Bosman Olivier

Some 25 people attended the meeting, with a few visitors who attended the previous week's Practical evening.

Johan Moolman started the meeting with a pictorial overview of the recent Karoo Star Party at the beginning of June. He delivered a comprehensive review of the activities and the people who attended with a series of magnificent photographs, for which he has become known. All who attended the Star Party enjoyed the memories conjured up by the photographs. I believe those who did not attend the Karoo Star Party were inspired to attempt to make the trip next time.

The What's Up section was handled by Johan Smit, who discussed planets and shadow transits, a few celebrations on certain dates during the month, galaxies to look out for and he also extended a few serious challenges.

He showed when the naked eye planets would be rising at the beginning of the month. His chart made it clear that Mercury, Venus and Mars were too close to the Sun to be observed without risk of serious eye damage at the beginning of the month. Jupiter and Saturn are well-placed to be visible during the evening.

He also explained the use of the chart indicating the rise and set times of the planets as it appears in the Sky Guide.

Johan next showed the transit times of Jupiter's moons and when shadows of these moons could be seen on the planet. Many of these events take place on Sunday evening and is therefore within reach of the average member to look at, without sacrificing too many hours sleep.

On the celebrations calendar Johan discussed the Carrington Event, a solar storm in 1859. A Coronal Mass Ejection hit the Earth's magnetosphere on 1 September, causing major chaos in the Earth's telegraphic systems. Operators received electric shocks when using their equipment and some could even send and receive messages when the equipment was totally disconnected form their power supplies. This was one of the largest geomagnetic storms recorded in history.

On 9 September 1839 John Herschel made the first photograph using a glass plate; the beginning of astrophotography.

Simon Plössl was born on 19 September 1794. He is known for the Plössl eyepiece which is used by many amateur astronomers today. He designed the eyepiece in 1860.

The first Canadian space tourist was Guy Laliberté 10 years ago on 30 September. He is the co-founder of 'Cricue du Soliel' or Circus of the Sun. He dedicated his flight to raising an awareness of water issues facing humankind on planet earth.

On the same day, in 1929, Fritz von Opel (Rocket Fritz) flew the first rocket powered aeroplane. He also experimented with rocket powered cars, motorcycles, railway carriages and speedboats. Many of his experiments ended in explosions. Despite all these daredevil stunts he died peacefully in 1971.

Johan ended his talk by issuing a challenge to members to identify Ceres and Asteroid 135 Hertha.

Danie Barnardo presented the main talk entitled "Physical Properties, Exploration and Geology of Venus".

He started off with the vital statistics of Venus. Although is often referred to as the planet of love, it is a hellish place, with an atmosphere of primarily CO_2, nitrogen and traces of sulphuric acid. Its surface temperature is 465º C, while its surface pressure is some 93 atmospheres! It is about 80% of the size of Earth and only 41 million kilometres from Earth. Mars is 71 million km from Earth. (Continued on next page.)

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The planet was already known 17 centuries BC and though to be two separate bodies; Lucifer (light bringer) and Vesper (Evening star). It is almost the same diameter as Earth and 80% of Earth's mass and gravity. It is 0.73 AU (108,2 million km) from the Sun. A day on Venus is 243 Earth days long and its orbital period is 225 Earth days. The magnetic field is weaker than on Earth, because of the slow rotation.

Venus has a retrograde motion and it has no moons. The air pressure on the surface of the planet is 93 times greater than on Earth or 1 000 meters under the sea on Earth.

It has 900 known impact craters; most meteors burn up in the dense atmosphere before reaching the surface.

The atmosphere consists of three cloud decks and a haze zone below them, In the upper deck of clouds consisting of sulphuric acid, winds of 100 km per second exist. In the region 10 to 50 km above the surface the atmosphere is convectively stable, with a horizontal global circulation. The surface of the planet is relatively flat with a red murkiness just above the surface.

Venus is the victim of a runaway greenhouse effect – it just kept getting hotter and hotter as infrared radiation is continually reabsorbed.

Venus has been known since prehistoric times since it is the brightest object in the sky. It appears in a Babylonian observation report from 1 600 BC. The Sumerians knew Venus was one object 3 000 BC already, while many people though it to be two objects.

Due to its position between the Sun and Earth, Venus displays phases like the Moon. These phases were first observed by Galileo and these observations supported the theories of Copernicus.

Venus' cloud cover hid the surface of the planet from earth bound observers until the 1960's when powerful Earth based radars pierced the clouds and gave us a glimpse of the topography of the planet.

From 1962 several spacecraft started visiting Venus and some even landed, although it is problematic due to the harsh conditions. The Venera 13 lander (Russia) lasted 127 minutes before it expired.

Danie explained that the Magellan mission to Venus mapped 98% of the planet between 1990 and 1994 by means of synthetic aperture radar at a resolution of better than 100m. The ESA Venus Express orbiter studied the complex dynamics and chemistry of the atmosphere. The latest mission to Venus is the Japanese Akatsuki orbiter that has been studying the climatic circulation of Venus since 2015.

Geologically Venus consist of a crust (70km), a mantle (2 840km) and a core (3 000km). The crust is mostly silicate rock, the mantle probably consists of olivine (a *Mg/Fe silicate)* and spinel (*a more densely packed version of olivine*) near the core.

As a result of the Magellan orbiter's capabilities to map the planet with a 100 accuracy of the surface, it is though that Venus was completely resurfaced by volcanic activity between 300 and 500 million years ago. A large "continent", Aphrodite, stretches around the equator where the rough surfaces were deformed by tectonic forces in the crust.

About 70% of the surface consists of low-lying areas covered by lava. There is also no evidence of tectonic plates, although there are convection currents in the mantle causing stresses in the crust. These are not strong enough to cause large-scale continental plates moving.

There are two "continent",s Aphrodite which is about the size of Africa and Ishtar, about the size of Australia. Ishtar contains the highest mountains on Venus, the Maxwell mountains rising to about 11 000 meters. (Continued on next page.)

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The low-lying regions contain several volcanic structures, typical broad-based volcanoes and “pancake” lava domes. There are also shield volcanoes with a diameter of 80 km with a single crater.

The pancake domes are though to be slow outpourings of viscous silica-rich lava with flat tops and usually a central crater. They can be up 80 km in diameter and the surrounding cliffs up to 749 meters high.

Danie pointed out several other structures on the lowlands of Venus, including lava channels of 740 km in length, and evidence to tectonic forces causing ridges and cracks.

There are two large highland areas, i.e. Ishtar and Aphrodite and they are referred to as “continents” by researchers. The highest of these highland areas are the Maxwell Mountains in the Ishtar region, with a height of 11 000 meters. Mount Everest is 8 848 meters high. It is uncertain how these highland regions came to be, one theory is they are the result of mantle plumes that caused the updoming of the Venus crust. They are also called Tesserae terrain or “Venus snow” because they look white on the radar images.

According to Danie we can look forward to exiting findings when the next wave of Venus exploration starts when the planned Russian/USA mission to Venus – the Verena-D – will hopefully launch. Another vehicle that is planned as part of the mission to explore the Venus atmosphere is the proposed Venus Atmosphere Manoeuvrable Platform (VAMP).

Danie also discussed the potential of life on Venus. According to him scientists are increasingly finding life form in inhospitable environs on Earth, such as the hot springs in Yellowstone, the hydrothermal vents in the extremely hot “black smokers” along the deep-water oceanic rift valley in the Atlantic Ocean. Some of these life forms can feed on carbon dioxide and even produce sulphuric acid. The Verena-D mission will be looking for signs of life in the carbon dioxide clouds of Venus. If they are found, they will probably by restricted to microbes.

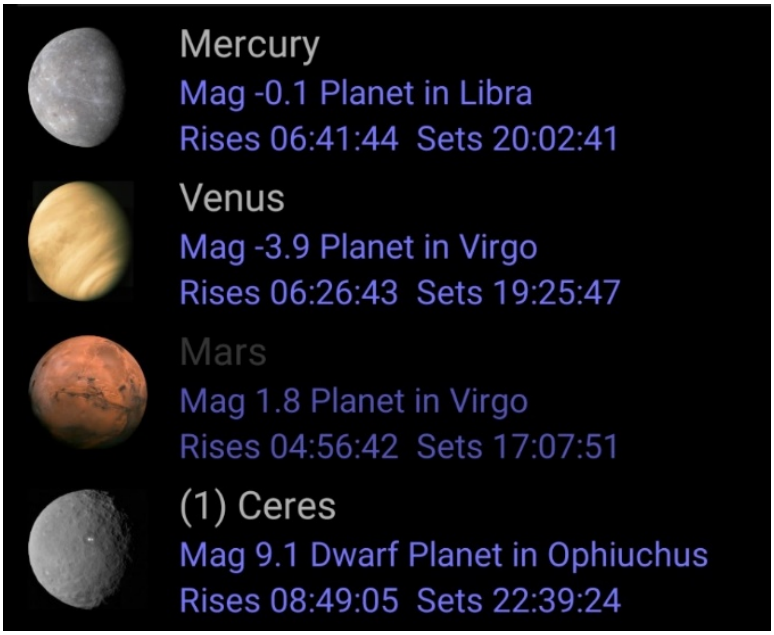
He closed with a discussion of the question that the Earth could become like Venus. There is no consensus on the matter but Danie warns that a modest increase of 3,5ºC could spell disaster for food production and subsequent food shortages on Earth. The meeting concluded with the usual socialising over coffee and biscuits. **Ω**

What's Up in October 2019 - by Percy Jacobs

Phases of the Moon

Dark Sky - ~ 1st & last week of Oct (poor viewing conditions middle 2 weeks of Oct)
Full Moon – 13th Oct
New Moon – 28th Oct

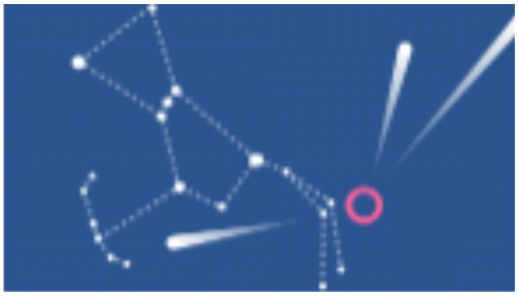
Planets



Events

Meteor showers

2019 Meteor Shower	Rate/Hr	Peak	Look	Constellation	Parent Comet
22nd Oct Orionids	15	01h26	NE	Orion	Comet 1P Halley



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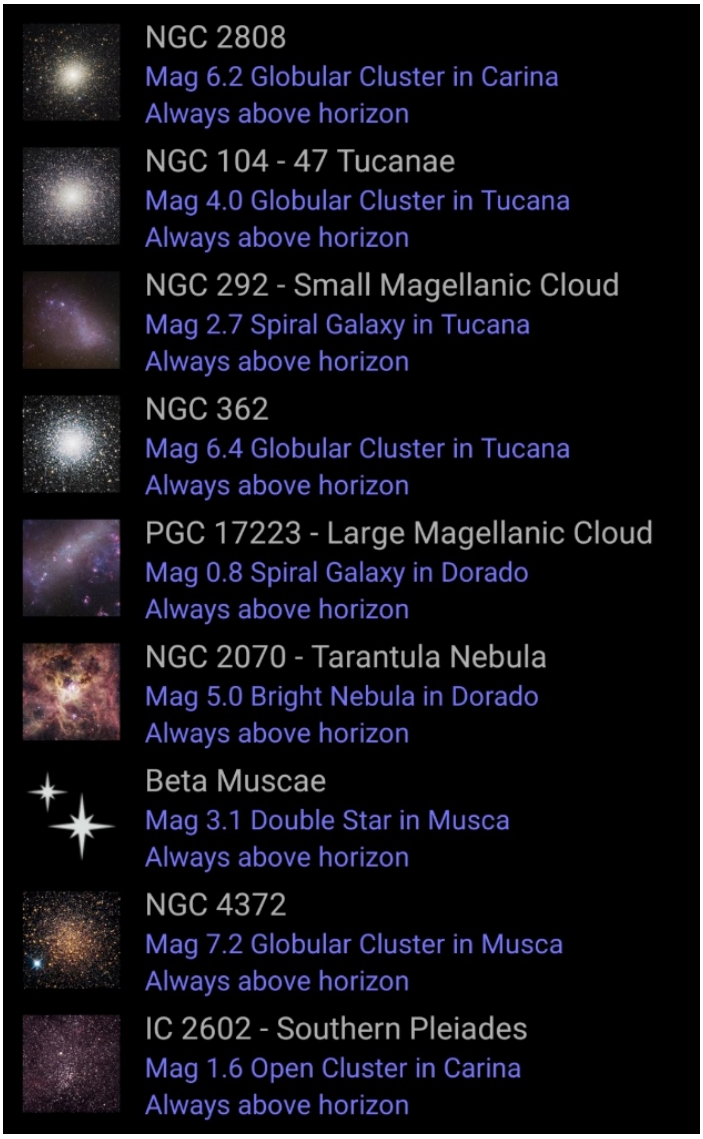
Highlights



NOTICE BOARD

- **Beanies.** Beanies will be offered for sale @ R40.00 each at every monthly meeting, until they are sold out.
- **Old newsletters:** All old newsletters from January 2004 onward are on our website. They contain a record of our Centre's activities as well as astronomical information.
- **Database:** Members are reminded that a data base of the books in our library is to be found on our website.

Astronomy basics: 11 fascinating facts about the Milky Way

https://www.livescience.com/63847-facts-about-the-milky-way.html

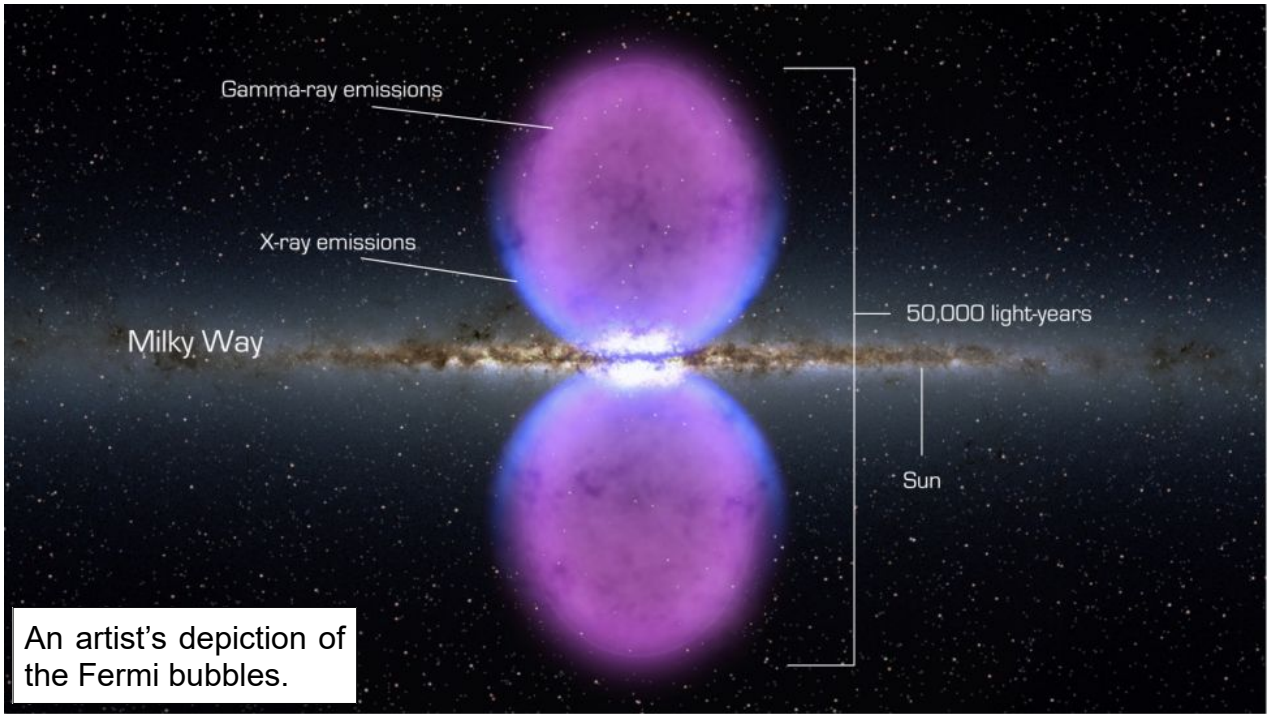
Photographs taken at ScopeX 2019 by Johan Moolman

Top photograph, facing the camera, from top right clockwise:
Johan Smit, an interested visitor, Neville Young and his associate, Christi Geldenhuys, Neville Young again, Bosman Olivier, Johan Jordaan.

Bottom photograph, from top right clockwise:
Percy Jacobs, his spectroscopy presentation and set-up, Percy Jacobs (X3),
Andy Overbeek, Prof Barbara Cunow, Danie Barnardo.
At bottom left you can see Percy unsuccessfully attempting to "blow up" Saturn... only to EVENTUALLY realise Saturn has "sprung a leak".

Feature of the month: The Fermi bubbles revisited

In 2010, astronomers working with the **Fermi Gamma-ray Space Telescope** announced the discovery of two giant blobs of dilute hot gas. These blobs are centred on the core of the Milky Way galaxy, but they extend above and below the plane of the galaxy for over 25 000 light-years. Their origin is still a mystery, and theories abound.



An artist's depiction of the Fermi bubbles.

https://www.livescience.com/fermi-bubbles-radiation-blob-mystery.html?utm_source=ls-newsletter&utm_medium=email&utm_campaign=20190905-ls

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