"The Southern Cross"

HERMANUS ASTRONOMY CENTRE NEWSLETTER

MAY 2022

Monthly Meeting

(Third Monday of each month)

April

No meeting was held as it coincided with the public holiday, Monday 18th April, Family Day of the Easter weekend.

May

16th May, commencing 18.30. The presenter is Dr Jenny Morris of the Hermanus Astronomy Centre. The topic will be announced in due course.

2022 meeting dates: For your diaries. The dates of the monthly meetings for 2022 are as follows: 16 May, 20 June, 18 July, 15 August, 19 September, 17 October and 21 November.

Special Interest Group activities

Cosmology

(the first Monday of each month)

April

On **4th April**, Derek Duckitt presented three videos under the heading "*General Relativity*".

The first was "Intro to General Relativity", presented by Matt O'Dowd, followed by *"The Real Meaning of E=mc²"* and *"Are Space and Time an Illusion?",* both presented by Gabe.

May

The **2nd May** meeting has been cancelled as this is a public holiday in lieu of Workers' Day on Sunday 1st .

Next meeting will be on **6th June**, the topic will be advised in due course.

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

Astrophotography

(Second Monday of each month)

April

On **11th April**, members discussed their post-processing of images using the software *Siril*.

May

9th May, the choice of topic will be in accordance with members' wishes.

Members are currently communicating digitally about image processing they do at home.

For further information, please contact Deon Krige: deonk@telkomsa.net

Study Group

(Now the last Monday of each month)

March and **April**

On **9th March**, members watched and discussed videos on *"Treating all Cancers"* and *"Bladeless Wind Generators".*

On **25th April**, the topic was *"Gravity as an Energy Storage system"*. Members watched three videos and discussed this, at times, controversial subject.

May

23rd May, the topic will be advised in due course.

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

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.

Arrangements are also underway to continue or begin work on analemmatic sundials at local primary schools, directed by Pierre de Villiers.

Stargazing

Please note that currently all our meetings are virtual, held on Zoom. All Zoom meetings are scheduled to commence at 18.30. Zoom 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.

Future Trips

No outings are being planned at present.

GEARING'S POINT ASTRONOMY EDUCATION DISPLAY (GPAED)

The amended proposal has been submitted to the National Lottery Commission. Approval from them has been granted at last and Pierre De Villiers and his subcommittee is driving the implementation to get it done within the prescribed time limit.

The **Friends of the Observatory campaign** was launched several years ago when preliminary work began on plans to construct an astronomical observatory in Hermanus. Over the years, members have been very generous, for which we are deeply grateful. It may seem logical to assume that, now money has been awarded by the National Lotteries Board, pledge monies are no longer needed. Unfortunately, that is not the case. NLC funds can only be used once the plans have been formally approved by the Municipality.

We would, therefore, be very grateful if members could either continue to contribute to the campaign or start becoming a contributor. Both single donations and small, regular monthly donations, of any amount, are welcome. Contributions can take the form of cash (paid at meetings), or online transfer, The Standard Bank details are as follows:

Account name – Hermanus Astronomy Centre
Account number – 185 562 531
Branch code – 051001

If you make an online donation, please include the word 'pledge', and your name, unless you wish to remain anonymous.

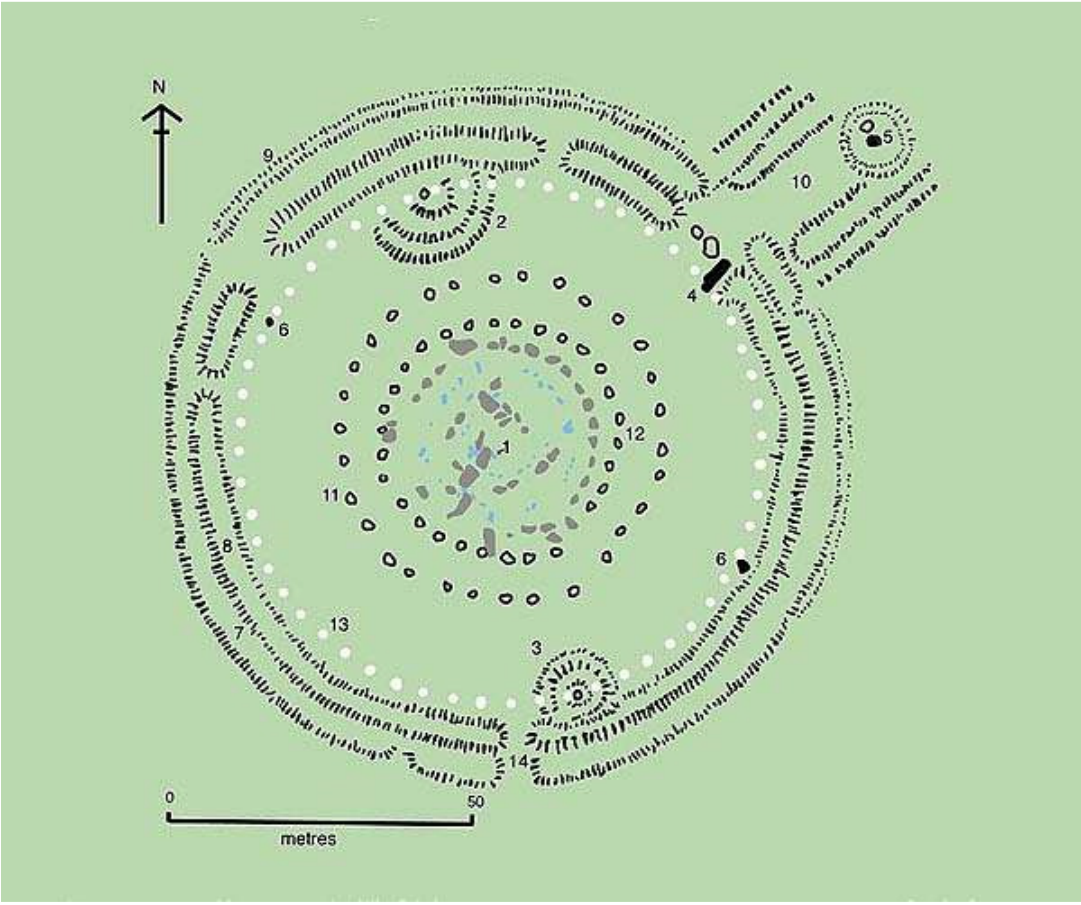
ASTRONOMY NEWS (Compiled by Pieter Kotzé)

Astronomers map mysterious element in space

A research team led by Lund University in Sweden has provided an important clue to the origin of the element Ytterbium in the Milky Way, by showing that the element largely originates from supernova explosions. The ground-breaking research also provides new opportunities for studying the evolution of our galaxy. Ytterbium is interesting because it may have two different cosmic origins. Researchers believe that one half comes from heavy stars with short lives, while the other half comes from more regular stars, much like the sun, and that they create Ytterbium in the final stages of their relatively long lives. It has been speculated that Ytterbium was thrown into space by supernova explosions, stellar winds and planetary nebulae. There, it accumulated in large space clouds from which new stars formed

(See: https://www.universetoday.com/154671/need-some-more-ytterbium-who-doesnt-heres-where-you-can-find-it-in-space/)

Stonehenge served as an ancient solar calendar - new analysis



Plan view of layout of Stonehenge.

It has long been thought that the famous site of Stonehenge served as an ancient calendar, given its alignment with the solstices. Now, research has identified how it may have worked. New finds about the stone circle's history, along with analysis of other ancient calendar systems, prompted Professor Timothy Darvill from Bournemouth University to take a fresh look at Stonehenge. Crucially, recent research had shown that Stonehenge's sarsens were added during the same phase of construction around 2500 BC. They were sourced from the same area and subsequently remained in the same formation. This indicates they worked as a single unit. His proposed calendar works in a very straightforward way. Each of the 30 stones in the sarsen circle represents a day within a month, itself divided into three weeks each of 10 days. Additionally, an intercalary month of five days and a leap day every four years were needed to match the solar year.

(See: https://www.newscientist.com/article/2310095-stonehenge-may-have-been-a-giant-calendar-and-now-we-know-how-it-works/)

New evidence proves acceleration of quasar outflows at scale of tens of parsecs

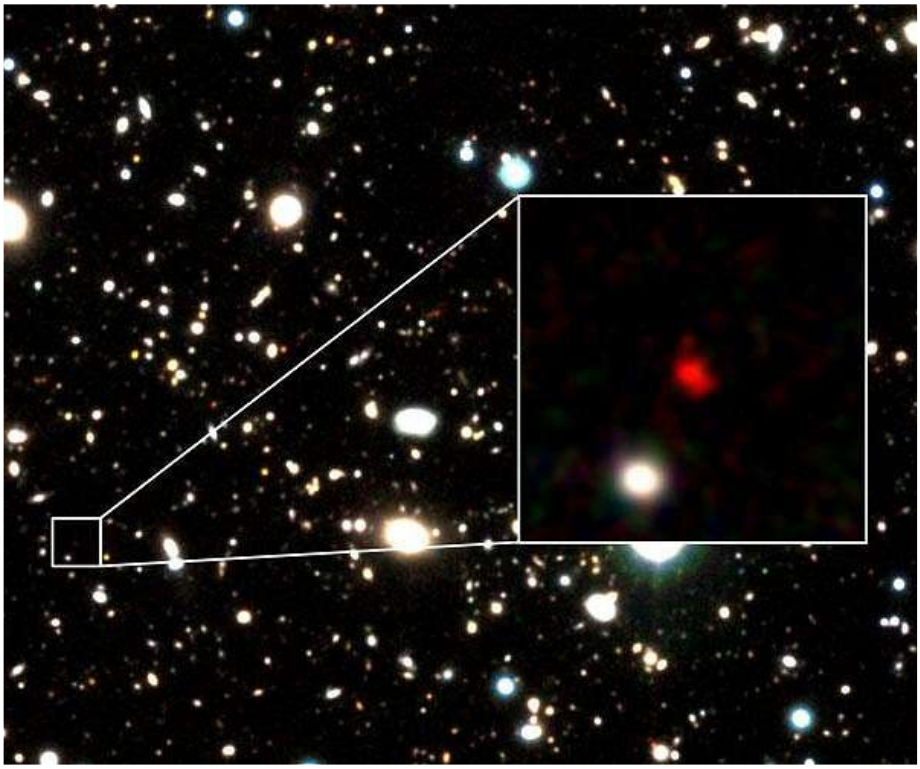
Dr. HE Zhicheng and his co-workers from the University of Science and Technology of China (USTC) of the Chinese Academy of Sciences created a new way to measure the physical properties of galactic ionized gas, and discovered the acceleration of quasar outflows at the scale of tens of parsecs for the first time. Their paper was published on Science Advances. According to modern theories on galactic formation and evolution, the mechanism of Active Galactic Nuclei (AGN) feedback suggests that the gigantic black hole at a galactic centre modulates its evolution by blowing ionized gas, namely the quasar outflow, preventing a potential oversized growth of black hole. They obtained the kinetic information regarding quasar outflows and discovered the acceleration at a scale of tens of parsecs for the first time, which far exceeded that predicted by the traditional accretion disc wind model.
(See:
https://www.spacedaily.com/reports/New_evidence_proves_acceleration_of_quasar_outflows_at_scale_of_tens_of_parsecs_999.html)

Astronomers discover largest molecule yet in a planet-forming disc

Using the Atacama Large Millimeter/submillimeter Array (ALMA) in Chile, researchers at Leiden Observatory in the Netherlands have for the first time detected dimethyl ether in a planet-forming disc. With nine atoms, this is the largest molecule identified in such a disc to date. It is also a precursor of larger organic molecules that can lead to the emergence of life. Dimethyl ether is an organic molecule commonly seen in star-forming clouds, but had never before been found in a planet-forming disc. The researchers also made a tentative detection of methyl formate, a complex molecule similar to dimethyl ether that is also a building block for even larger organic molecules. The discovery of dimethyl ether suggests that many other complex molecules that are commonly detected in star-forming regions may also be lurking on icy structures in planet-forming discs. These molecules are the precursors of prebiotic molecules such as amino acids and sugars, which are some of the basic building blocks of life.
(See:
https://www.spacedaily.com/reports/Astronomers_discover_largest_molecule_yet_in_a_planet_forming_disc_999.html)

Most distant galaxy candidate yet

An international astronomer team has discovered the most distant galaxy candidate to date, named HD1, which is about 13.5 billion light-years away. This discovery implies that bright systems like HD1 existed as early as 300 million years after the Big Bang. This galaxy candidate is one of the targets of the James Webb Space Telescope launched late last year. If observations with the James Webb Space Telescope confirm its exact distance, HD1 will be the most distant galaxy ever recorded.



Three-color image of HD1, the most distant galaxy candidate to date, created using data from the VISTA telescope. The red object in the centre of the zoom-in image is HD1. (Credit: Harikane et al.)

(See: https://www.scientificamerican.com/article/astronomers-spot-most-distant-galaxy-yet-13-5-billion-light-years-from-earth/)

The Milky Way is on a collision course — and it's not the first time

The night sky could look like this in about 4 billion years, when the Andromeda Galaxy is expected to collide with our own Milky Way.
NASA/ESA/Z. Levay and R. van der Marel/STSCI/T. Hallas/and A. Mellinger

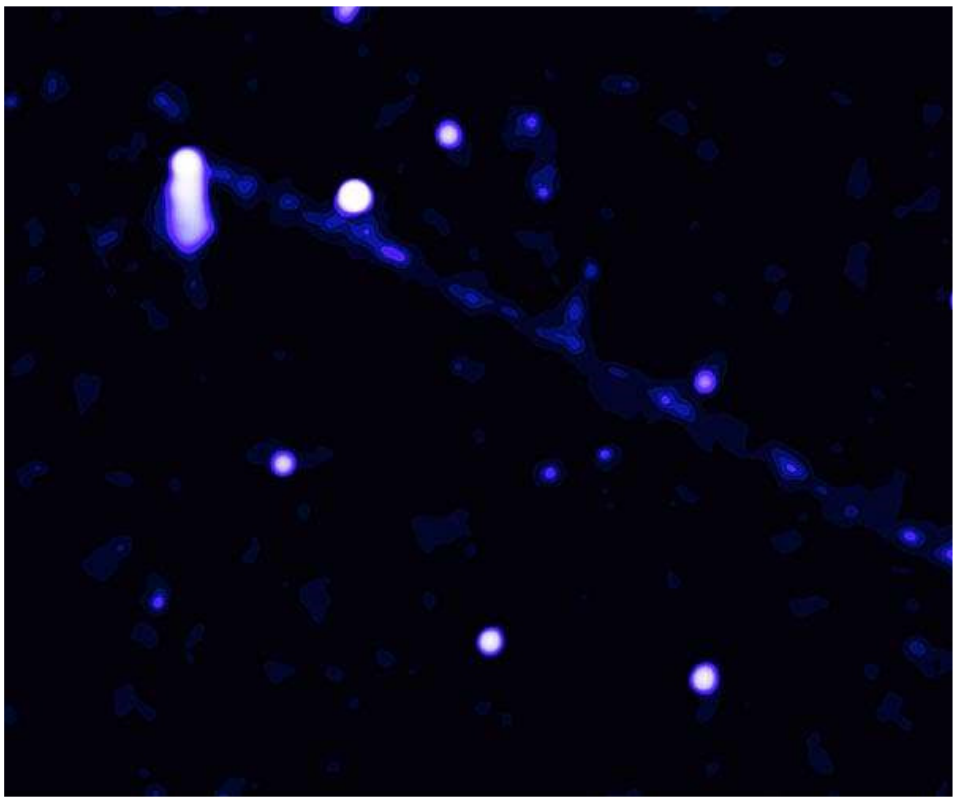
Stars and galaxies move around us at a pace that seems glacial on human time scales. Their dance is exceedingly gradual, taking place over billions of years. But if we could see time the same way the stars do, the neighbourhood around our Milky Way Galaxy would appear surprisingly active. Galaxies swing around one another, slowly spiralling together until they merge. Many don't travel alone but bring companions with them, in a dark collision that may tear some stars from the heart of their homes and splay them across the sky. Other regions grow rich in gas and dust and begin, in their newfound opulence, to birth new stars. The dance of the galaxies is slow and violent, filled with both life and death. The Milky Way drives the motion of the collection of more than 100 galaxies known as the Local Group. Within that group, only the Andromeda Galaxy is larger than

the Milky Way — roughly 125 percent more massive — and like our galaxy, it has a spiral shape. Two smaller galaxies stand out: the Triangulum Galaxy, dancing around Andromeda, and the Large Magellanic Cloud (LMC), orbiting the Milky Way.

(See: https://earthsky.org/space/earths-night-sky-milky-way-andromeda-merge/)

Tiny Star Unleashes Gargantuan Beam of Matter and Antimatter

Observatory and ground-based optical telescopes shows an extremely long beam, or filament, of matter and antimatter extending from a relatively tiny pulsar, as reported in our latest press release. With its tremendous scale, this beam may help explain the surprisingly large numbers of positrons, the antimatter counterparts to electrons, scientists have detected throughout the Milky Way galaxy.



The pulsar known as PSR J2030+4415 creating a long filament. This beam may help explain the surprisingly large numbers of positrons, the antimatter counterparts to electrons, scientists have detected at Earth. This image from NASA's Chandra X-ray

(See:https://www.spacedaily.com/reports/Tiny_Star_Unleashes_Gargantuan_Beam_of_Matter_and_Antimatter_999.html)

Cosmic-ray scans to explore hidden secrets of Great Pyramid of Giza

Researchers have spent decades attempting to uncover the inner mysteries of the Great Pyramid to understand its engineering and purpose. In 2015, the ScanPyramids project brought together experts from France, Japan and Egypt to find several non-invasive techniques to reveal what lies inside the Great Pyramid. In 2017, scientists were finally able to peek inside using particle physics. The ScanPyramids project, which led to the initial discovery of the two voids, utilized muon

tomography. However, researchers explain that the new venture will include a telescope system that is 100 times more powerful than the technology used in 2017. It will image muons from nearly all angles and will, for the first time, produce a true tomographic image of such a large structure. Scientists will rely on cutting-edge technology to scan the Great Pyramid. According to the new research paper, advanced cosmic-ray scans in the form of muons will be employed to peer inside the structure. Muons are created when high-energy particles like cosmic rays collide with the atoms in Earth's atmosphere. The resulting elementary particles, the muons, are more powerful than X-rays. Muon tomography utilizes cosmic rays of muons to generate a 3D image through thicker material. This technology will be used to penetrate deep into the structure and get a clear view of what lies inside the pyramid.

(See:https://astronomy.com/news/2022/04/cosmic-ray-scans-used-to-explore-secrets-of-great-pyramid-of-giza)

For more information on the Hermanus Astronomy Centre and its activities, visit our website at www.hermanusastronomy.co.za

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COMMITTEE MEMBERS

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