New Zenith

The Monthly Newsletter of the Vectis Astronomical Society

Vol 29 Issue 10 — November 2021 *When Printed, this Newsletter costs VAS at least £1*

Society News

Well, the clocks have gone back and the night's are drawing in. For me this is a favourite time of the astronomical year. Wrapped up warm and getting outside with a telescope or binoculars to see the Winter sky.

There's plenty to see; Jupiter, Saturn, Orion are all pretty easy targets and Peter's Night Sky on Page 4 of NZ gives even more objects to look out for.

Keep your eye on the weather forecast for a clear sky and come and join us at the observatory on a Thursday evening.

November's Monthly Meeting

This will be a Zoom meeting

Please do not come to the Newchurch Pavilion, it won't be open.

See the Back Page of this NZ for details of this meeting.

Dark Skies - A Light at Last

It looks like there may be some progress in our quest for Dark Skies Status on the Isle of Wight.

The Council are keen to help with the problem which, along with Covid, had rather stalled our application.

The problem has been the colour temperature of the streetlights in Brighstone. It is outside the limits set by the International Dark-Sky Association (IDA) and could only be lowered by replacing the existing lights. The cost of this was outside anything which could be afforded by the local Council and way beyond the means of VAS.

However a way through this has been identified by the Council and Island Roads.

It seems that our application is almost ready to restart so let's look forward to a **dark** 2022!

Brian Curd

VAS Website: wightastronomy.org

Submissions or letters to New Zenith are always welcome and should be sent to:

The Editor, New Zenith
Belvedere
St John's Crescent
Sandown
Isle of Wight
PO36 8EE
Tel: 07594 339950 or email: **editor@wightastronomy.org**

Material for the next issue by the 6th of the month please.

Registered Charity No 1046091

Observatory Diary

Monday, 19.30hrs	Members Only and by arrangement Telescope and night sky training. Please contact Martyn Weaver 07855 116490
Thursday	Members (19.30hrs) and Public (20.00hrs). Informal meeting and observing

VAS Website: wightastronomy.org

Contents this Month

2021 Monthly Meetings

Check *http://www.wightastronomy.org/meetings/* for the latest information

Date	Subject	Speaker
26 Mar	Space Traffic Control	Dr Stuart Eves
23 Apr	HOYS	Dirk Froebrich
28 May	Can we live on Mars?	Greg Smye-Rumsby
25 Jun	The Astronomy of Robert Hooke in Context	Paul Bingham
Jul	No Meeting	
27 Aug	**AGM followed by open meeting**	
24 Sep	Two Eyes are Better than One - Binocular Astronomy	Stephen Tonkin
22 Oct	Gravitational Waves	Dr Laura Nuttall
26 Nov	**Martin Lunn FRAS, MBE** ***John Goodricke and Edward Pigott the 'Fathers of Variable Star Astronomy***	**This will be a Zoom Meeting**

Observatory Visits Booked

No bookings so far
Please phone me for the current situation (number on the front page)
It would be appreciated if members could avoid using the observatory at these times.

IMPORTANT

Could all VAS members please ensure they notify the Membership Secretary of any change of address.

To ensure our compliance with GDPR rules, we must maintain accurate membership records.

VAS Contacts 2021

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Others	Dudley Johnson

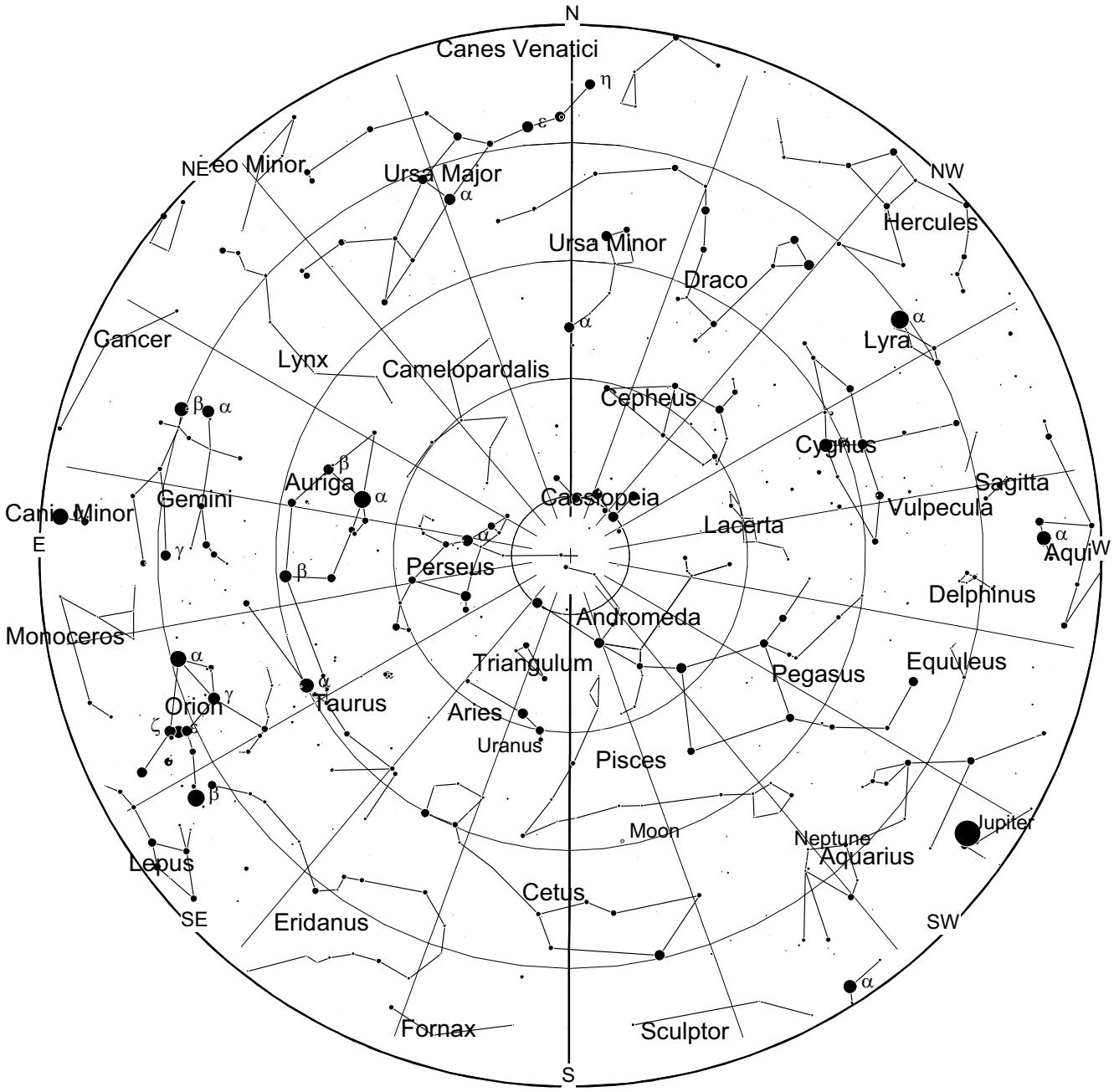
Important

Members using the observatory MUST enter a line or two in the Observatory Log Book.

On several occasions, lights, heaters and the Meade LX200 have been left on!

When leaving, please ensure all is secure and all lights, heaters and telescopes are TURNED OFF.

November 2021 - Sky Map



View from Newchurch Isle of Wight UK - 2200hrs - 15 November 2021

The Triangulum Galaxy is a spiral galaxy 2.73 million light-years from Earth in the constellation Triangulum. It is catalogued as Messier 33 or NGC 598. The Triangulum Galaxy is the third-largest member of the Local Group of galaxies, behind the Andromeda Galaxy and the Milky Way. It is one of the most distant permanent objects that can be viewed with the naked eye.

The galaxy is the smallest spiral galaxy in the Local Group (although the smaller Large and Small Magellanic Clouds may have been spirals before their encounters with the Milky Way), and is believed to be a satellite of the Andromeda Galaxy or on its rebound into the latter due to their interactions, velocities, and proximity to one another in the night sky. It also has an H II nucleus.

November 2021- Night Sky

Moon Phases

New	First Qtr	Full	Last Qtr
4th	11th	19th	27th
			

Planets

Mercury

Mercury makes an appearance in the morning sky at the beginning of the month. The table show the altitude and azimuth at 06:30. The planet increases in brightness as it gets closer to the Sun, so it may be visible after this time but will be seen against an increasingly brightening sky.

On the 3rd Mercury is about 6° below and slightly to the left of the very thin crescent moon.

Azimuth & Altitude for Mercury at 06:30 for November

Date	Az	Alt	Date	Az	Alt
1	114.5	10	6	114.5	6
2	114.5	9.5	7	114	5.5
3	114.5	9	8	114	4.5
4	114.5	8	9	114	4
5	114.5	7	10	114	3

Venus

Venus is very close to the horizon at sunset and sets about 2 hours after the Sun. Being very bright object makes it relatively easy to spot if it is a clear evening with very few clouds close to the horizon. If it can be seen very low down it will look distinctly red in colour rather than brilliant white as the atmosphere scatters the blue light.

Mars

This month Mars is in the morning sky but is too close to the Sun to be visible before sunrise. On the 10th and 11th Mercury and Mars are in close conjunction, only about 1° apart, A telescope will be needed for any chance of being able to observe this very challenging event.

Jupiter

In the early evening Jupiter will be very prominent in the south-south-western sky. Apart from the Moon it is by far the brightest object In this part of the sky and is easily identifiable. It can be seen before any stars as soon as the sky starts to darken. A pair of binoculars will show the four Galilean moons and a small telescope will show the cloud bands and if the timing is right the great red spot.

Saturn

Look to the west of Jupiter to find the much noticeably fainter, though still bright, Saturn. A small telescope will show the rings, but a larger aperture instrument is needed to see much detail. The planet itself is quite bland and requires a large telescope to be able to see any of the faint cloud features.

Uranus

On bonfire night Uranus is at opposition in the constellation of Aries, but the nearest bright stars are in Cetus, it can be found about 5° above the fourth magnitude star Mu Ceti, There are a number of stars of similar brightness close by so a planetarium program will assist greatly in identifying the planet which can be easily seen using a pair of 10x50 binoculars.

Neptune

Neptune is located 3° east of the fourth magnitude star Phi Aquarii. There are no other bright guide stars nearby. At magnitude 8 Neptune can not be seen with the unaided eye, but can be found using binoculars. Use a planetarium program or the finder chart in recent New Zenith to help find this outer planet.

Meteor Showers

The annual Leonid meteor shower produced by the dust trail from comet Swift-Tuttle, peaks this month on the night of 17th/18th. Unfortunately the less bright meteors will be washed out by the light of the almost full moon.

Deep Sky

M31 Galaxy
RA 0h 43m Dec 41° 54' mag 4.5

Easily visible to the naked eye this galaxy is at least twice the width of the full moon and the largest member of the local group. It is seen as an oval smudge in the central northern part of Andromeda. Viewed from this galaxy our own Milky Way would look very similar if somewhat smaller.

In dark skies binoculars just show Andromeda's two companion galaxies, but a telescope is really needed to appreciate them. Through a small telescope the view of Andromeda is not that much better than binoculars, it is such a large object that it completely fills the field of view with anything other than very low magnification. A larger telescope will show the dust lanes and allow tracing out of the spiral arms.

M33 Galaxy
RA 1h 34m Dec 45° 8' mag 7

M33 in Triangulum is one of a number of galaxies that shares the common name Pin Wheel. It is another member of our local group of galaxies, but somewhat smaller than

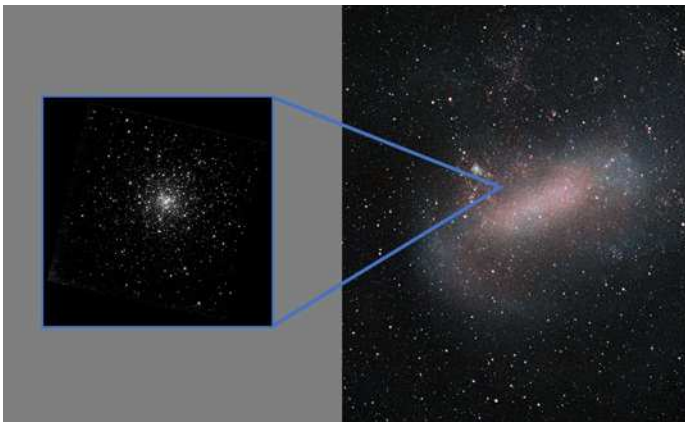
the Milky Way being only 1/7 its size. This galaxy despite its relatively bright apparent magnitude its large size, about that of the full moon makes it very difficult to see. It can be glimpsed in our skies with a pair of 10x50 binoculars as a slight brightening of the background sky. A telescope of at least 8 inches diameter is needed to see any structure in the spiral arms, and then it can be difficult. Don't be put off by the difficulties it is a worthwhile object for observation.

NGC1499 California Nebula
RA 4h 1m Dec 36° 21' mag 5.0

This very large nebula can be found just to the north of Menkib, Xi Persei. Although it may have a magnitude of 5 this light is spread out over an area of some 2 x 1 degrees making the surface brightness very low. It can be seen in large aperture binoculars and rich field telescopes but, when using a telescope, the magnification must be kept to the minimum available to stand any chance of seeing it. A hydrogen beta nebula filter will help to increase the contrast of the nebula. This is a good target for long exposure photography.

Peter Burgess

Astronomers confirm the Large Magellanic Cloud is a galactic cannibal



The Large Magellanic Cloud (right) is the Milky Way's biggest satellite galaxy. One of its globular clusters, NGC 2005 (left), is likely the remnant of a galaxy the LMC once devoured.

Galaxies grow by attracting and absorbing smaller galaxies, beefing up their mass along the way. We have ample evidence our Milky Way has done exactly that, as well as a roadmap to how our galaxy will continue to bulk up in the future. We already know the Milky Way is surrounded by a plethora of smaller satellite galaxies that it will eventually devour. The largest of these is the Large Magellanic Cloud (LMC). But now, researchers have shown that the galactic food chain extends even further: They have found evidence the LMC has likewise gobbled up its own share of small galaxies in its past, allowing it to grow into the sizable satellite we see today.

The evidence comes from one of the LMC's globular clusters. These are ancient, compact groups of stars that, because they are so long-lived, can provide clues about a galaxy's history. In this case, researchers studied 11 globular clusters in the LMC, comparing the mix of elements within their stars. One stood out: the cluster NGC 2005, which has fewer elements such as copper, calcium, silicon, and zinc than its brethren.

That elemental difference led researchers to surmise that NGC 2005 doesn't have the same origin story as the other clusters. Instead, it's likely all that's left of a small galaxy the LMC gobbled up billions of years ago. Most of the unlucky galaxy was fully absorbed into the LMC, making it indistinguishable from the LMC's own stars. But the central region of the galactic snack survived in the form of a globular cluster. The find, the team says, convincingly shows that even small galaxies can prey on each other to grow, more fully completing our picture of hierarchical galaxy evolution.

From: https://astronomy.com/

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3. After you've checked out, the retailer will make a donation to VAS at no extra cost to you whatsoever!

There are no catches or hidden charges and VAS will be really grateful for your donations.

Thank you for your support.

Things Are Looking Brighter! But Not The Stars

Looking up at the night sky, you can usually tell the difference between various man-made objects. Planes go fairly slowly across the sky, and you can sometimes see them blinking green and red. Meteors are fast and difficult to see. Geostationary satellites don't appear to move at all because they are orbiting at the same rate as earth's rotation, while other orbit types will zip by.

SpaceX has committed to reducing satellite brightness, and some observations have confirmed that new models are a full magnitude darker, right at the threshold of naked-eye observation. Unfortunately, it's only a step in the right direction, and not enough to satisfy astronomers, who aren't looking up at the night sky with their naked eyes, naturally.

The satellites aren't giving off the light themselves. They are merely reflecting the light from the sun back to the earth, exactly the same way the moon is. Thus something that is directly in the shadow of the Earth will not reflect any light, but near the horizon the reflection from the satellites can be significant. It's not practical to only focus our observatories in the narrow area that is the Earth's shadow during the night, so we must look closer to the horizon and capture the reflections of the satellites.

What Would Satisfy Astronomers?

When photographing the stars, the galactic paparazzi are using complicated and sensitive equipment. The exposure times are very long in order to gather enough light. But when a satellite passes over, its brightness can saturate the CCD, which doesn't just ruin one pixel in the image, but a whole line as the satellite streaked through the shot. Further, the camera is focused way beyond low earth orbit, so the satellite is blurry, making the thin line into a wide gash across the image. Thus in any given image, the efficiency of the image, or how many pixels are usable, is significantly impacted by any satellite passing overhead.

Even if the satellites were completely black, though, their passing in front of stars would cause the stars to appear have brief dips in brightness. Rather than having a bright gash across the image it would be a dark gash. Astronomers use dips in brightness for everything from exoplanet detection to estimations of nebula density.

The relative movement of all of the celestial bodies, and the rotation of Earth and position of the observatory are all calculated by a scheduler that determines when the best time is to take a photo of a specific part of the sky. It's certainly possible to add the positions of satellites into that calculation to determine when is the optimum time to take a photo without interference. But with thousands of satellites already in space, and tens of thousands more planned, the windows are getting shorter and shorter, the delays until the right time is available are getting longer and longer, and the calculations become not about avoiding images with satellites but just reducing the number of gashes.

Astronomers can calculate the exact loss of efficiency caused by the satellites. At the Rubin Observatory LSST, they have found that with 48000 LEO satellites in orbit, about 30% of all LSST images would contain at least one satellite trail, and at least 1% of pixels would be lost. Further, because multiple images must be taken to compare, and a lot more math has to be applied to pixels to mathematically erase the trails (as long as the pixels hadn't reached saturation), the extra effort required would extend surveys by several months.

The effects could be catastrophic. When it's so bright in here that we can't see out, we can't identify external threats, like approaching asteroids. We already know where many of the nearby stars are and the mechanics of their motion, but we don't often know about the much smaller, much dimmer asteroids that may have paths we don't know about, that could intersect with ours. Being able to detect them requires constant attention to the vastness of our surroundings, and they could easily be masked by a passing satellite, delaying their detection.

So what's the right amount for astronomers? The idealists might say only theirs. The pragmatic want to work with the space companies to take measures to reduce their impact. And the fearful worry that if efforts aren't put in from the beginning then it will become a free-for-all with nobody bothering to put in the work to reduce their impact.

What About Us?

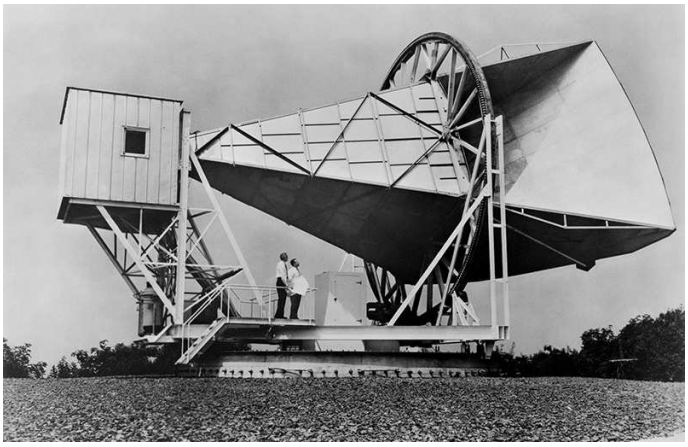
It's one thing for the individual satellites to be visible to the naked eye, but even if they were darkened, the cumulative effect of tens of thousands of satellites scatters enough light that the night sky becomes brighter overall. With all the objects currently in the sky it's estimated to be about 10% brighter already than it was in the 70s. If you live in the city and can't already see the stars, maybe this doesn't affect you at all. But for everyone else, this may mean the difference between seeing the Milky Way and not. Being able to see it in Montana was profound; for the whole world to be denied that so that some people can get better Internet is disappointing.

Read more with comments:
https://hackaday.com/

Why Simplicity Works

Does the existence of a multiverse hold the key for why nature's laws seem so simple?

It's May 1964 and, on a low hillside in New Jersey, the physicists Robert Woodrow Wilson and Arno Allan Penzias are listening in on the Universe. They are standing beneath what looks like a gargantuan ear trumpet attached to a garden shed: the Holmdel Horn Antenna, built by Bell Laboratories to investigate microwaves as an alternative to radio waves for telecommunication. When interest in microwave communication waned, Bell lent out the Holmdel horn to interested scientists.



The Holmdel Horn Antenna in New Jersey, United States. Courtesy Wikipedia

Penzias and Wilson were interested. Both aged around 30, they planned to map the sky with microwaves. But they were baffled: when they pointed the horn at a dark region beyond the galaxy and only sparsely populated with stars, instead of the silence they expected, they detected a kind of background hiss – a hiss that filled the entire sky.

Meanwhile, the physicist Robert H Dicke was working on a related puzzle. Two decades earlier, Dicke had invented the microwave detector. Now he and his lab were trying to develop sensitive instruments to test the cosmological predictions that emerged from Albert Einstein's general theory of relativity, particularly how it related to Edwin Hubble's astonishing discovery that the Universe is expanding. The reigning, steady-state theory claimed that the Universe had always been expanding, balanced by a continuous creation of new matter. The rival theorists, including Dicke, took expansion at its face value, running it backwards in time to propose that, about 14 billion years ago, the Universe burst into existence in a cataclysmic explosion from a very tiny point.

An exploding universe should have left a uniform faint cloud of microwave radiation, which Dicke's team was determined to find. News of the group's efforts reached Penzias and Wilson, prompting Penzias to give Dicke a call. Over a brownbag lunch, Dicke's colleagues recall him picking up the receiver, repeating phrases such as 'horn antenna' and nodding. After hanging up, he turned to his group and said: 'Well boys, we've been scooped.' Dicke realised that Penzias and Wilson had discovered the Big Bang.

The uniformity of the cosmic microwave background (CMB) tells us that, at its birth, 'the Universe has turned out to be stunningly simple,' as Neil Turok, director emeritus of the Perimeter Institute for Theoretical Physics in Ontario, Canada, put it at a public lecture in 2015. '[W]e don't understand how nature got away with it,' he added. A few decades after Penzias and Wilson's discovery, NASA's Cosmic Background Explorer satellite measured faint ripples in the CMB, with variations in radiation intensity of less than one part in 100,000. That's a lot less than the variation in whiteness you'd see in the cleanest, whitest sheet of paper you've ever seen.

Wind forward 13.8 billion years, and, with its trillions of galaxies and zillions of stars and planets, the Universe is far from simple. On at least one planet, it has even managed to generate a multitude of life forms capable of comprehending both the complexity of our Universe and the puzzle of its simple origins. Yet, despite being so rich in complexity, some of these life forms, particularly those we now call scientists, retain a fondness for that defining characteristic of our primitive Universe: simplicity.

Much more at: https://aeon.co/

Night Sky Underground Map Mug

From: Royal Museums Greenwich

Radio Signals From Distant Stars Suggest Hidden Planets

Using the world's most powerful radio antenna, scientists have discovered stars unexpectedly blasting out radio waves, possibly indicating the existence of hidden planets.

The University of Queensland's Dr Benjamin Pope and colleagues at the Dutch national observatory ASTRON have been searching for planets using the world's most powerful radio telescope Low Frequency Array (LOFAR) situated in the Netherlands.

“We've discovered signals from 19 distant red dwarf stars, four of which are best explained by the existence of planets orbiting them,” Dr Pope said.

“We've long known that the planets of our own solar system emit powerful radio waves as their magnetic fields interact with the solar wind, but radio signals from planets outside our solar system had yet to be picked up.

“This discovery is an important step for radio astronomy and could potentially lead to the discovery of planets throughout the galaxy.”

Previously, astronomers were only able to detect the very nearest stars in steady radio emission, and everything else in the radio sky was interstellar gas, or exotica such as black holes.

Now, radio astronomers are able to see plain old stars when they make their observations, and with that information, we can search for any planets surrounding those stars.

The team focused on red dwarf stars, which are much smaller than the Sun and known to have intense magnetic activity that drives stellar flares and radio emission.

But some old, magnetically inactive stars also showed up, challenging conventional understanding.

Dr Joseph Callingham at Leiden University and ASTRON and lead author of the discovery, said that the team is confident these signals are coming from the magnetic connection of the stars and unseen orbiting planets, similar to the interaction between Jupiter and its moon, Io.

“Our own Earth has aurorae, commonly recognised here as the northern and southern lights, that also emit powerful radio waves -- this is from the interaction of the planet's magnetic field with the solar wind,” he said.

“But in the case of aurorae from Jupiter, they're much stronger as its volcanic moon Io is blasting material out into space, filling Jupiter's environment with particles that drive unusually powerful aurorae.

“Our model for this radio emission from our stars is a scaled-up version of Jupiter and Io, with a planet enveloped in the magnetic field of a star, feeding material into vast currents that similarly power bright aurorae.

“It's a spectacle that has attracted our attention from light years away.”

The research team now wanted to confirm the proposed planets do exist.

“We can't be 100 per cent sure that the four stars we think have planets are indeed planet hosts, but we can say that a planet-star interaction is the best explanation for what we're seeing,” Dr Pope said.

“Follow-up observations have ruled out planets more massive than Earth, but there's nothing to say that a smaller planet wouldn't do this.”

The discoveries with LOFAR are just the beginning, but the telescope only has the capacity to monitor stars that are relatively nearby, up to 165 light years away.

With Australia and South Africa's Square Kilometre Array radio telescope finally under construction, hopefully switching on in 2029, the team predict they will be able to see hundreds of relevant stars out to much greater distances.

From: https://www.sciencedaily.com/

Astronomy Podcasts

A podcast is an episodic series of spoken-word digital audio files that a user can download to a personal device for easy listening. Streaming applications and podcasting services provide a convenient and integrated way to manage a personal consumption queue across many podcast sources and playback devices.

There are dozens of astronomy podcasts out there and it’s down to you to decide which one (or more) suit your particular taste and interests.

A good place to start is at:

https://player.fm/featured/astronomy

Strange Radio Waves Emerge from the Direction of the Galactic Center

Astronomers have discovered unusual signals coming from the direction of the Milky Way's centre. The radio waves fit no currently understood pattern of variable radio source and could suggest a new class of stellar object.

"The strangest property of this new signal is that it is has a very high polarisation. This means its light oscillates in only one direction, but that direction rotates with time," said Ziteng Wang, lead author of the new study and a PhD student in the School of Physics at the University of Sydney.

"The brightness of the object also varies dramatically, by a factor of 100, and the signal switches on and off apparently at random. We've never seen anything like it."

Many types of star emit variable light across the electromagnetic spectrum. With tremendous advances in radio astronomy, the study of variable or transient objects in radio waves is a huge field of study helping us to reveal the secrets of the Universe. Pulsars, supernovae, flaring stars and fast radio bursts are all types of astronomical objects whose brightness varies.

"At first we thought it could be a pulsar - a very dense type of spinning dead star -- or else a type of star that emits huge solar flares. But the signals from this new source don't match what we expect from these types of celestial objects," Mr Wang said.

Mr Wang and an international team, including scientists from Australia's national science agency CSIRO, Germany, the United States, Canada, South Africa, Spain and France discovered the object using the CSIRO's ASKAP radio telescope in Western Australia. Follow-up observations were with the South African Radio Astronomy Observatory's MeerKAT telescope.

Professor Tara Murphy also from the Sydney Institute for Astronomy and the School of Physics, said: "We have been surveying the sky with ASKAP to find unusual new objects with a project known as Variables and Slow Transients (VAST), throughout 2020 and 2021.

"Looking towards the centre of the Galaxy, we found ASKAP J173608.2-321635, named after its coordinates. This object was unique in that it started out invisible, became bright, faded away and then reappeared. This behaviour was extraordinary."

After detecting six radio signals from the source over nine months in 2020, the astronomers tried to find the object in visual light. They found nothing.

They turned to the Parkes radio telescope and again failed to detect the source.

Professor Murphy said: "We then tried the more sensitive MeerKAT radio telescope in South Africa. Because the signal was intermittent, we observed it for 15 minutes every few weeks, hoping that we would see it again.

"Luckily, the signal returned, but we found that the behaviour of the source was dramatically different - the source disappeared in a single day, even though it had lasted for weeks in our previous ASKAP observations."

However, this further discovery did not reveal much more about the secrets of this transient radio source.

Mr Wang's co-supervisor, Professor David Kaplan from the University of Wisconsin-Milwaukee, said: "The information we do have has some parallels with another emerging class of mysterious objects known as Galactic Centre Radio Transients, including one dubbed the 'cosmic burper'.

"While our new object, ASKAP J173608.2-321635, does share some properties with GCRTs there are also differences. And we don't really understand those sources, anyway, so this adds to the mystery."

The scientists plan to keep a close eye on the object to look for more clues as to what it might be.

"Within the next decade, the transcontinental Square Kilometre Array (SKA) radio telescope will come online. It will be able to make sensitive maps of the sky every day," Professor Murphy said. "We expect the power of this telescope will help us solve mysteries such as this latest discovery, but it will also open vast new swathes of the cosmos to exploration in the radio spectrum."

Video showing an artist's impression of signals from space.

From: https://www.sciencedaily.com/

The Road to Launch and Beyond for James Webb Space Telescope

Now that NASA's James Webb Space Telescope has safely arrived at its launch site in French Guiana, on the northeastern coast of South America, technical teams have begun making progress on the final checklist of preparations before liftoff later this year.

These preparations are expected to last 55 days from the observatory's arrival by ship to the day of launch.

After Webb arrived at the Arianespace clean room facilities in French Guiana, contamination control technicians ensured the observatory is clean and contaminant free following its 5,800 mile journey. Then engineers ran a final set of electrical and functional tests and checked the stowed mechanical configuration to ensure delivery went smoothly. A trained crew in special hazmat suits will soon begin the two-week process of loading the spacecraft with the hydrazine fuel and nitrogen tetroxide oxidizer it will need to power its rocket thrusters to maintain its orbit. Next, Webb will move to the nearby vehicle integration building to be lifted and mounted on top of the Ariane 5 rocket "stack." The final few remove-before-flight "red-tag" items are taken off, and a few remaining add-before-flight "green tag" items are installed. Then the rocket fairing is lifted and lowered over top and locked into place, signifying the conclusion of a long journey. At this point, Webb will be very nearly ready to launch from Europe's Spaceport, also known as the Guiana Space Center (CSG).

As a fully integrated launch vehicle with Webb as the payload, the Ariane rocket will roll out to the launch pad a few days before launch. Engineers monitor the rocket via electrical connections running from the payload control room to the pad through an umbilical attachment to the vehicle that separates at liftoff. A few hours before liftoff, the rocket is loaded with liquid hydrogen fuel and liquid oxygen oxidizer. About a half hour before launch, engineers in the payload control room switch the spacecraft from external electrical power to the spacecraft's on-board battery.

Webb's launch will be a pivotal moment for NASA and its partners, ESA (European Space Agency) and the Canadian Space Agency (CSA), but it is only the beginning. The following 29 days will be an exciting but harrowing time. Thousands of parts must work correctly, in sequence, to unfold Webb and put it in its final configuration, all while it flies through the expanse of space alone, to a destination nearly one million miles away.

Webb's 29 days on the edge begin upon liftoff. After 206 seconds of flight, at an altitude of about 75 miles above the atmosphere, the two halves of the rocket fairing that shields the observatory during ascent are separated by a pyrotechnic system with springs that expose the observatory to space. Ground teams expect to receive communication from Webb shortly after separation. Webb will then separate from the launch vehicle nearly 28 minutes after launch, and from this point on the ground team at the Space Telescope Science Institute in Baltimore will be in full control, to begin the most complex sequence of deployments ever attempted in a single space mission.

Webb's first deployment, the extension of its solar array, will occur between 31 to 33 minutes after liftoff, stopping the drain on the observatory's internal battery by supplying nearly 2 kilowatts of power to drive the spacecraft's electrical systems and avionics. To enable the highest data rate communication to the ground through NASA's Deep Space Network (DSN), the onboard medium and high-gain antenna platform is deployed at two hours.

At 12 and a half hours after launch, Webb will fire its thrusters, performing the first of several critical course corrections that send the observatory towards its final destination in orbit. The observatory will pass the Moon nearly two and a half days after launch, faster than the time it took Apollo astronauts to reach lunar orbit.

Webb's first large deployment, the extension of its sunshield frame known as a unitized pallet structure, folds down nearly three days after launch, opening the observatory up to continue expanding. This represents the start of all major deployments and is scheduled to take approximately five hours for both front and back pallets to fold down completely.

Four days after launch, a deployable tower will extend to separate the telescope mirrors and instruments from the spacecraft bus. This separation effectively isolates the telescope from vibrations and conducted heat coming from the spacecraft bus. Additionally, this extension allows for the rest of Webb's larger deployable components, like its sunshield and primary mirror, to have enough room to make their own sequence of complex movements afterwards.

Sunshield membrane deployments formally begin approximately five days after launch, as special covers that protect the sunshield during ascent will roll out of the way. Next, a critical juncture in the mission will occur when all of the 107 sunshield release mechanisms, or special pins that keep the five sunshield layers locked into place, need to fire on cue and pull themselves out to free the membranes. After all sunshield pins have been successfully removed, two wings, known as mid-booms, extend to pull each of the sunshield layers out into their characteristic diamond formation nearly a day later. Following full deployment, each of the five layers are tensioned and separated using special pulleys and motor systems. Sunshield deployments and tensioning are expected to conclude between eight to nine days after liftoff but can be slowed down to circumvent any unforeseen issues if they arise.

Following the conclusion of sunshield tensioning, a special radiator behind the primary mirror is deployed to help cool down the scientific instruments.

Next, Webb's optics, and NASA's new eye on the cosmos, open up. Telescope deployment begins by unfolding and latching into place the tripod holding the secondary mirror, and it is expected to conclude two hours into the 10th day after liftoff. The secondary mirror is one of the most important pieces of equipment on the telescope, essential to the success of the mission. This smaller circular mirror plays an important role in collecting light from Webb's 18 primary mirrors into a focused beam. Primary mirror deployment is set to begin on the 12th day, with the mirror's side panels, each holding three primary mirror segments, taking nearly three hours to extend out and latch into place. At 13 days in, Webb's large-scale deployments are expected to conclude with the locking in of its primary mirror wings, revealing the telescope in all its glory.

A 10-day, multi-step process to move all 18 primary mirror segments out of their launch configuration will begin after the mirror wings are latched in and conclude on day 25. To begin fine-tuning the mirrors, 126 extremely precise actuators on the backside of the mirrors will position and subtly bend or flex each mirror into a specific prescription, a process that will take months.

On the 29th day, Webb will fire its thrusters once again to insert itself into its prescribed orbit at the second Lagrange point, or L2, nearly one million miles away from Earth, formally concluding the most difficult and complex deployment sequence ever attempted in space.

From: https://phys.org/news/

Call for Armchair Astronomers to Help Find Unknown Worlds

Astronomers at the University of Warwick have joined partners around the world in launching a new online initiative, calling for volunteers to come forward and help to search for extrasolar planets.

The online citizen project, Planet Hunters Next-Generation Transit Search (NGTS), is enlisting the help of the public to examine five years' worth of digital footage showing some of the brightest stars in the sky.

The footage was captured by twelve NGTS robotic telescopes based at the European Southern Observatory (ESO) Paranal Observatory in Chile - they make high precision measurements, sensitive enough to detect the signatures of exoplanets.

Professor Peter Wheatley from the Astronomy and Astrophysics Group at University of Warwick leads NGTS. He said: “It is exciting to be able to involve the public in our search for planets around other stars. We control the NGTS telescopes from the University of Warwick, and we process all the data here, but we are pretty sure our computer programs are missing some planets. These will be the most unusual signals and so probably some of the most interesting planets. Humans are still smarter than machines, and I can't wait to see what our volunteers unearth.”

Dr. Meg Schwamb explains: “If the orbit of an exoplanet is seen at just the right angle from Earth, we may observe the planet passing directly in front of its host star, known as a transit. This causes the planet to periodically block a portion of the starlight we observe, and the star appears to dim ever so slightly for a few hours.

“Every 10 seconds, the NGTS telescopes capture the light from 1,000s of stars in the sky looking for the tell-tale signatures of an exoplanet transit.

“Computers are searching through the NGTS observations looking for the telltale repeated dips in starlight due to planet transits. The automated algorithms produce lots and lots of possible candidate transit events that need to be reviewed by the NGTS team to confirm whether they are real or not.

There is no application process to join the Planet Hunters NGTS project. Anyone with a web browser can dive right into the data and start searching for these possible hidden worlds and helping to check the best candidate planets identified on the website.

More at: https://phys.org/

THE BACK PAGE

LINKS, COMMENTS AND OBSERVATIONS

Important News - Virtual Monthly Meetings

As the Observatory is now **OPEN** and we can now use the Newchurch Pavilion, most monthly meetings will now be back to normal.
That is they will be held in the Pavilion.

We may still use Zoom from time-to-time and these meetings will be clearly marked in the Monthly Meetings list on Page 2.

If there are Zoom meetings please use this link:

https://us02web.zoom.us/j/81142510951?pwd=a2RCQXZKMmRMeXBMSXEvU0dxS2gzUT09
Meeting ID: 811 4251 0951 and Passcode: 346096

Monthly Meeting

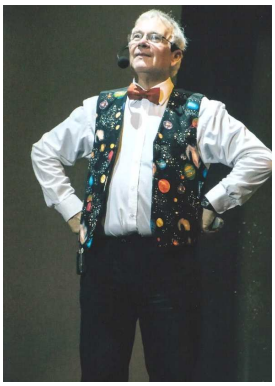
19.30 Friday November 26th 2021

A Zoom Presentation

Speaker: Martin Lunn, FRAS, MBE

"John Goodricke and Edward Pigott the 'Fathers of Variable Star Astronomy'"

They were an odd couple. John Goodricke was deaf and unable to speak, and Edward Pigott dressed like a dandy, but for a brief moment in time from 1781-1786 they changed the face of astronomy. They discovered stars that changed in brightness and explained why this happened. Goodricke would die before his twenty-second birthday and both their lives could have been written into a soap opera. ***This is the story of the Fathers of Variable Star Astronomy****.*



Bio: Martin Lunn studied for his degree in astrophysics whilst working as a guard on British Rail in the 1970s. From 1989 until 2011 he was Curator of Astronomy at the Yorkshire Museum in York, and in 1998 was presented with an MBE for services to astronomy and education.

Martin is a Fellow of the Royal Astronomical Society and currently sits on the council. He also presents lectures on cruise ships all over the world, and to various clubs and societies at home. He used to have a monthly astronomy feature on BBC Radio York and now has his own weekly Astronomy Show on a community radio station called Drystone Radio, which can be heard on line (*Shows | Drystone Radio*). Martin also writes a monthly 'What's in the night sky?' feature for the Craven Herald newspaper which covers the Yorkshire Dales.

At The Observatory

1. **Please bring a torch.**
2. **Make sure you close and lock the car park gate if you are the last to leave.**

Articles Needed

NZ needs astronomy related content. Contact details on page 1.

"Anyone who sits on top of the largest hydrogen-oxygen fueled system in the world, knowing they're going to light the bottom, and doesn't get a little worried, does not fully understand the situation"
John Young

"Astronomy taught us our insignificance in Nature"
Ralph Waldo Emerson

"I chucked the law for astronomy, and I knew that even if I were second-rate or third-rate, it was astronomy that mattered"
Edwin Hubble

"Telescopes are in some ways like time machines"
Martin Rees

"The difference between stupidity and genius is that genius has its limits"
Albert Einstein

"The earth is simply too small and fragile a basket for the human race to keep all its eggs in"
Robert Heinlein