New Zenith

The Monthly Newsletter of the Vectis Astronomical Society

Vol 29 Issue 7 — August 2021 *When Printed, this Newsletter costs VAS at least £1*

Society News

Observatory News

We Are Open Again!

The observatory will re-open from Thursday 12th August (19.30 - 21.30).

There is no need to book a place BUT we will still have restrictions in place so there are a few restrictions in place:

- A maximum of 8 persons (excluding staff) can be allowed inside the observatory at any time.
- All visitors must wear face coverings unless proof of exclusion can be provided.
- All visitors must make best efforts to avoid contact with others outside their own group.
- All visitors are expected to take precautions for their own safety.

The Future

It looks like we may soon be on the home stretch as far as Covid is concerned but, we won't be taking any chances and it is likely that we will have some restrictions for a while yet.

Monthly Meetings

In person meetings will resume on the 27th August with our AGM and a General Open Meeting to discuss the current situation and VAS plans for the future.

It's be good to get back to near normal again, I look forward to seeing a good turnout!

We will of course keep a very close eye on any Covid-19 developments, so please keep up to date using the web site - http://www.wightastronomy.org.

Please stay safe - we can see some light at the end of this tunnel - it would be a great shame to have to wind things back again!

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.

The Vectis Astronomical Society and the Editor of the New Zenith accept no responsibility for advice, information or opinion expressed by contributors.

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

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

President	Barry Bates president@wightastronomy.org
Chairman	Bryn Davis chairman@wightastronomy.org
Secretary	Richard Flux secretary@wightastronomy.org
Treasurer	Stewart Chambers treasurer@wightastronomy.org
Observatory Director	Brian Curd director@wightastronomy.org
Programme Organiser	Simon Gardner progorg@wightastronomy.org
Astro Photography	Simon Plumley ap@wightastronomy.org
Outreach	Elaine Spear outreach@wightastronomy.org
NZ Editor	Brian Curd editor@wightastronomy.org
Membership Secretary	Mark Williams members@wightastronomy.org
NZ Distribution	Graham Osborne distribution@wightastronomy.org
Others	Dudley Johnson

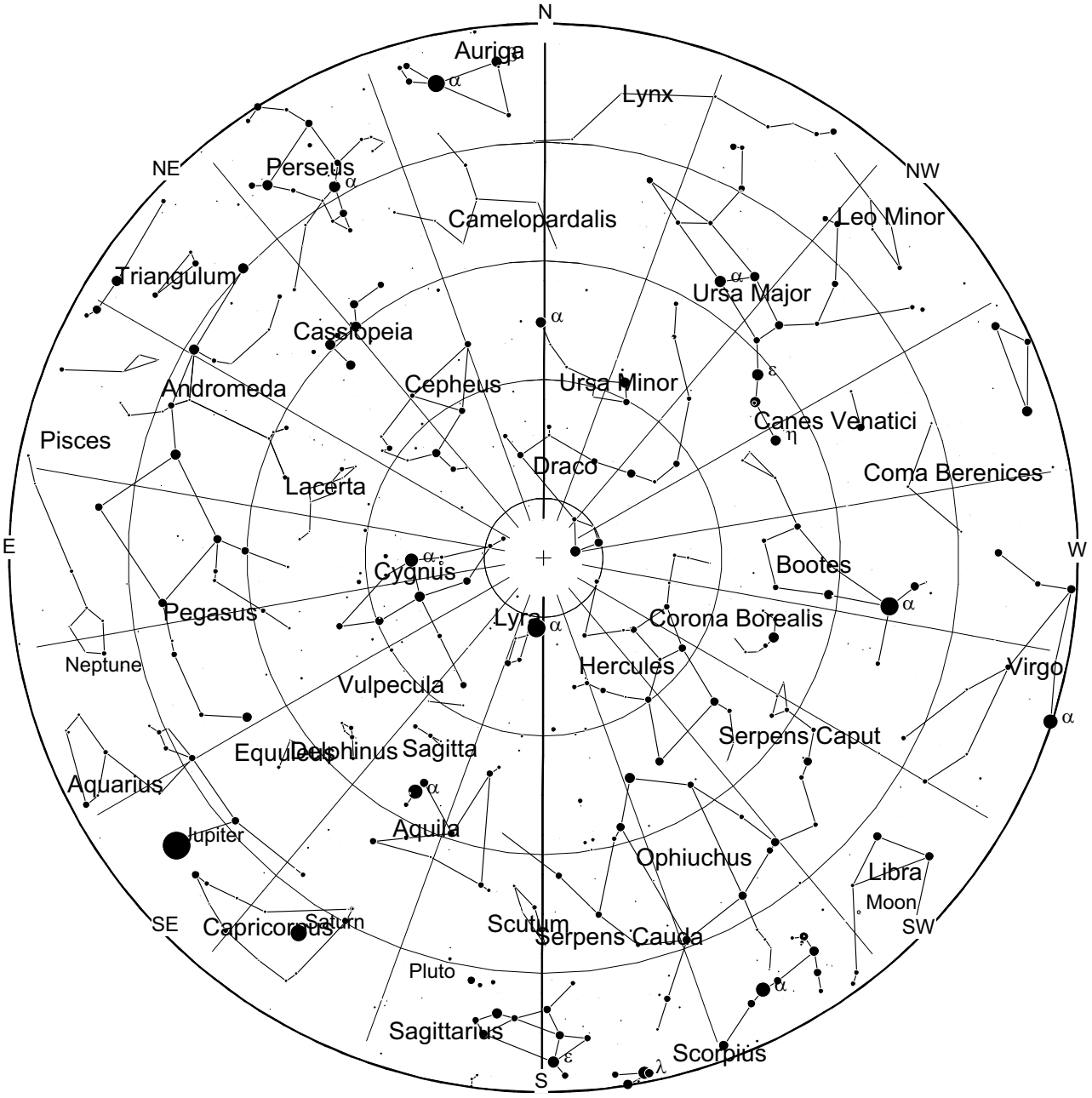
Important

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.

August 2021 - Sky Map



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

Jupiter is the largest planet in the Solar System. It is a gas giant with a mass more than two and a half times that of all the other planets in the Solar System combined, but slightly less than one-thousandth the mass of the Sun. Jupiter is the third-brightest natural object in the Earth's night sky after the Moon and Venus. It is named after the Roman god Jupiter, the king of the gods, because of its observed size.

Jupiter is primarily composed of hydrogen, but helium comprises one quarter of its mass and one tenth of its volume. It likely has a rocky core of heavier elements, but like the other giant planets, Jupiter lacks a well-defined solid surface. The outer atmosphere is visibly segregated into several bands at different latitudes, with turbulence and storms along their interacting boundaries. A prominent result of this is the Great Red Spot, a giant storm that is known to have existed since at least the 17th century, when it was first seen by telescope.

This article is licensed under the GNU Free Documentation License.
It uses material from the Wikipedia article "Jupiter".

August 2021- Night Sky

Moon Phases

New	First Qtr	Full	Last Qtr
8th	15th	22nd	30th
			

Planets

Mercury

Late summer evening apparitions of the inner planets are poor; the planets are very close to the horizon at sunset making them difficult to observe. Mercury late this month and into next is in this position; it is at best only about 6° above the horizon at sunset and sets about a half an hour after the Sun while the sky is still very bright. It will be a challenging object to observe.

Venus

Low in the south-west after sunset Venus will, like Mercury be visible for about half an hour after the Sun has set, but being so much brighter will stand out against the bright twilight sky.

Mars

Mars is close conjunction with the Sun this month (almost on the opposite side from us here on the Earth) and will not be visible until later in the year when it re-appears in the morning sky.

Jupiter

Jupiter is at opposition this month and is visible all night. It is best viewed between midnight and 2AM when it can be found low in the south. It is the brightest star like object in that part of the sky making it easy to find. A pair of binoculars will show the four Galilean moons and a small telescope the cloud bands and perhaps, if the timing is right the great red spot will be visible, though being so low in the sky the atmospheric turbulence after a warm day will disturb the view.

Saturn

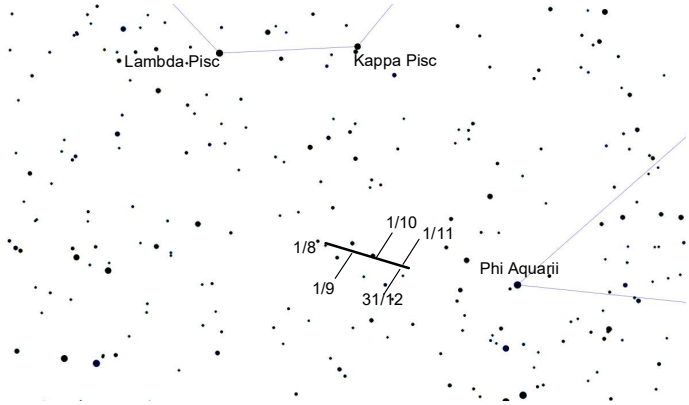
Like Jupiter, Saturn is visible all night. It can be found a little lower and to the right of Jupiter. It is not a bright, but is still brighter than any nearby star and has a noticeable yellow hue. The rings, although closing up are still putting on a good show.

Uranus

The early morning sky is still too bright to observe Uranus this month.

Neptune

Neptune is to be found in the constellation of Aquarius close to the border of Pisces. There are no nearby bright stars to act as guides making it rather difficult to locate. The map shows the path Neptune will take for the rest of the year; being so far away it does not move very quickly against the star background. At magnitude 8 Neptune is faint but can still be seen quite easily with a pair of binoculars.



Path of Neptune for 2021

Deep Sky

M11 The Wild Duck Cluster
RA 18h 51m Dec -6° 16' mag 7.0

Easily seen in binoculars as a fuzzy patch in the Scutum Star clouds, this cluster gets its name from the V shape formed by two long chains of stars on its northern edge. They are supposed to represent the V formation of a flock of wild ducks flying across the Milky Way.

NGC7207 Planetary Nebula
RA 21h 7m Dec 42° 16' Mag 8.5

This is a small rectangular shaped planetary nebula that is more difficult to see than its magnitude would imply. It is a better target for visual observers with larger telescopes or those with CCD cameras.

NGC6940 Open Cluster
RA 20h 35m Dec 28° 20' mag 6.3

With its location surrounded by dark dust lanes the impression is of all the stars in the locality brushed into a small pile leaving the surrounding area relatively empty. This is a rich cluster with many multicoloured loops, chains and groupings.

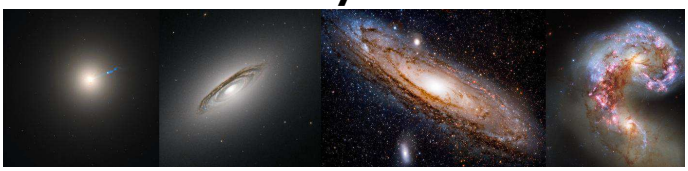
Meteor Showers

The Perseid meteor shower associated with the debris from comet Swift Tuttle peaks this year on the night of 12/13 August. The shower is long lasting with meteors at low numbers being visible from mid July up until the 23rd.

Weather permitting, observing conditions this year are good with the waxing crescent moon setting at around 10:30 when the sky has darkened adequately to observe the show.

Peter Burgess

Thousands of Galaxies Classified in a Blink of an Eye



Different shapes of galaxies, left to right: elliptical, lenticular, spiral, and irregular/miscellaneous. Credit: NASA/Hubble (elliptical galaxy M87), ESA/Hubble & NASA (lenticular galaxy NGC 6861 and the colliding Antennae galaxies), and David Dayag (the Andromeda spiral galaxy).

Astronomers have designed and trained a computer program which can classify tens of thousands of galaxies in just a few seconds, a task that usually takes months to accomplish.

In research published today, astrophysicists from Australia have used machine learning to speed up a process that is often done manually by astronomers and citizen scientists around the world.

“Galaxies come in different shapes and sizes” said lead author Mitchell Cavanagh, a PhD candidate based at The University of Western Australia node of the International Centre for Radio Astronomy Research (ICRAR).

“Classifying the shapes of galaxies is an important step in understanding their formation and evolution, and can even shed light on the nature of the Universe itself.”

Mr Cavanagh said that with larger surveys of the sky happening all the time, astronomers are collecting too many galaxies to look at and classify on their own.

“We're talking several million galaxies over the next few years. Sometimes citizen scientists are recruited to help classify galaxy shapes in projects like Galaxy Zoo, but this still takes time.”

This is where convolutional neural networks, or CNNs, come in. In today's high-tech world, these kinds of computer programs are everywhere, used in everything from medical imaging, stock markets and data analytics, to how Netflix generates recommendations based on your viewing history.

In recent years, CNNs have begun to see wider adoption in astronomy. Most of the existing CNNs that astronomers use are binary - is this a spiral galaxy or not? - but this new CNN uses multiclass classification - is this an elliptical, lenticular, spiral, or irregular galaxy? - with more accuracy than the existing binary networks.

Mr Cavanagh said that machine learning is becoming more widespread in astronomy.

“The massive advantage of neural networks is speed. Survey images that would otherwise have taken months to be classified by humans can instead be classified in mere minutes.”

“Using a standard graphics card, we can classify 14,000 galaxies in less than 3 seconds.”

“These neural networks are not necessarily going to be better than people because they're trained by people, but they're getting close with more than 80% accuracy, and up to 97% when classifying between ellipticals and spirals.”

“If you place a group of astronomers into a room and ask them to classify a bunch of images, there will almost certainly be disagreements. This inherent uncertainty is the limiting factor in any AI model trained on labelled data.”

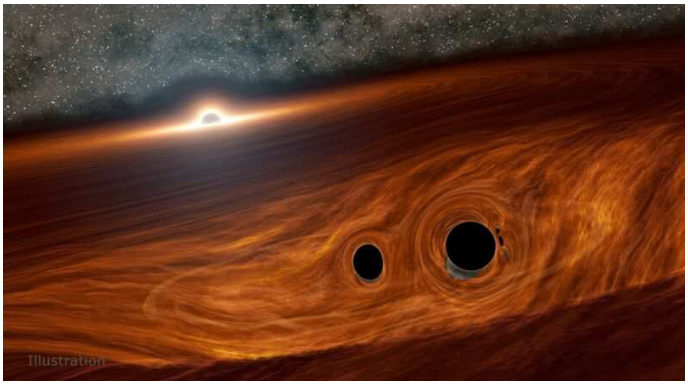
One great advantage of this new AI is that the researchers will be able to classify more than 100,000,000 galaxies at different distances (or redshifts) from Earth and in different environments (groups, clusters etc). This will help them understand how galaxies are being transformed over time, and why it might happen in particular environments.

The CNNs that Mr Cavanagh has developed aren't just for astronomy. They can be repurposed for use in many other fields, as long as they have a large enough dataset to train with.

“CNNs will play an increasingly important role in the future of data processing, especially as fields like astronomy grapple with the challenges of big data,” he said.

More at: https://www.eurekalert.org/

Cluster Full of Black Holes may be Spitting Out Stars



As we carefully map the stars of our Milky Way, we're able to identify features that tell us of its history. These include local details, such as the stars that have passed through an area from which something would be able to detect Earth. And it includes far larger structures, like the trails of stars left behind by smaller galaxies that have merged with our own.

But one feature we've discovered has been a bit confusing: trails of stars that are too small and thin to have come from a galaxy collision. There are dozens of them that we've not identified a source for. Their size suggests they came from a globular cluster, but there's no obvious mechanism for these clusters to eject stars at a rate sufficient to generate this sort of stream.

Now, a team of researchers has suggested a not-so-obvious mechanism: Over time, clusters may become dominated by black holes that eject all the stars.

Unclustering

Globular clusters are dense groups of stars that orbit the Milky Way together. They're held in association by their mutual gravity. Complex interactions will inevitably eject some of the stars, but not at an appreciable rate, which makes the clusters extremely long-lived.

The researchers started by looking at an unusual globular cluster called Palomar 5. It has both extended tails of lost stars, and its total mass is relatively small, making it diffuse compared to other clusters we've studied. The lower density makes it easier for Palomar 5 to lose stars, but it could also have been caused by past star loss, creating a bit of a chicken-and-egg problem. So, the researchers decided to model globular cluster evolution and try to find a model that could produce something that looks like Palomar 5.

The researchers created a model that takes a cluster of stars and models their gravitational interactions with each other and the Milky Way as they orbit the galactic center. They were able to run these simulations for billions of years. By changing the parameters, they could find which factors were associated with clusters that ended up looking like Palomar 5.

The secret ingredient turned out to be black holes. When black holes stayed in the cluster following their formation - meaning the supernova didn't impart enough motion to send them flying off elsewhere in the galaxy - they gradually ejected nearly 90% of the cluster's mass. This drops the density of the cluster nearly three orders of magnitude, in part by star ejections and in part by the black holes driving off gas and other material by heating it.

In the model that best fit Palomar 5, the cluster was left with nearly a quarter of its content being black holes, with 124 of them in total. These black holes were also substantially more massive than they would have been at formation (average mass being about 17x that of the Sun), suggesting they had fed extensively or undergone mergers.

The Future is Black

The researchers also looked at model runs that didn't produce a cluster that looked like Palomar 5 to understand how black holes could influence globular cluster evolution. The key factor that determines whether a cluster has a black-hole-rich future is its initial density. If the star cluster is dense enough, the gravitational interactions tend to eject black holes before they can take over.

If a cluster is going along this path, then it will eject over half its stars over a three billion year period, and this is a sufficient rate to create the trails of stars that started this investigation.

In lower density clusters, the black holes end up near the center, and stars get ejected instead. The researchers say that, under some conditions, a cluster can evolve to the point where it's essentially 100 percent black hole, with almost all the stars ejected.

The big weakness of the model is that it doesn't include interactions among the stars, black holes, and the gas found in the cluster. The last of these factors, the gas, can mediate friction that can slow bodies and prevent their ejection, but it was left out of the model.

On the plus side, this can be checked against reality. The fact that tails are mostly produced during the end stage of some clusters suggests that only a fraction of the globular clusters in the Milky Way should have them - roughly four. And tracking the motion of stars within a cluster should be able to detect the gravitational influence of black holes, allowing us to get an estimate of their numbers. So, it's possible that this idea will be tested before we have sufficiently powerful GPUs to run similar simulations that include gas.

See: https://arstechnica.com/

NASA's James Webb Space Telescope Passes Key Review Ahead of Fall Launch

NASA's James Webb Space Telescope, seen here during testing operations at Northrop Grumman's Space Park in California, is scheduled to launch in fall 2021. (Image credit: NASA/Chris Gunn)

NASA's next big space telescope just took a big step forward toward its planned launch this fall.

The $9.8 billion James Webb Space Telescope mission has passed a key launch review, keeping it on track to lift off atop an Ariane 5 rocket before the end of the year, European Space Agency (ESA) officials announced last week.

"This major milestone, carried out with Arianespace, the Webb launch service provider, confirms that Ariane 5, the Webb spacecraft and the flight plan are set for launch," ESA officials wrote in a July 1 update. "It also specifically provides the final confirmation that all aspects of the launch vehicle and spacecraft are fully compatible."

While Webb is primarily a NASA mission, ESA and the Canadian Space Agency (CSA) are important partners. The CSA is providing the telescope's guidance sensor and one of its scientific instruments. ESA is contributing some science gear to the mission as well and is also providing launch services, procuring the Ariane 5 heavy lifter to get Webb off the ground.

The launch will take place from Europe's Spaceport in Kourou, French Guiana. Mission teams are working toward a launch readiness date of Oct. 31, but liftoff is not expected to actually take place on Halloween.

"The precise launch date following 31 October depends on the spaceport's launch schedule and will be finalized closer to the launch readiness date," ESA officials wrote in the same statement.

After launch, Webb will head to the Sun-Earth Lagrange Point 2, a gravitationally stable point in space about 930,000 miles (1.5 million kilometers) from our planet. The observatory, which features a 21.3-foot-wide (6.5 meters) primary mirror and a deployable sunshade the size of a tennis court, will then begin observing the cosmos in infrared light. It will study the universe's oldest stars and galaxies and hunt for signs of life in the atmospheres of alien planets, among many other tasks.

On two recent missions, the Ariane 5 rocket experienced issues with the system that enables separation of the payload fairing, the protective nose cone that encapsulates satellites during launch. Those missions were still successful, but the rocket was more or less grounded while teams worked to troubleshoot the issue, as Space News reported.

As a result, the Ariane 5 has not flown since August 2020. But its hiatus will end soon: The rocket is scheduled to launch two communications satellites on July 27. And there's another Ariane 5 mission on the docket before the Webb launch — another communications-satellite mission, which is targeted for late September, according to Spaceflight Now.

More at: https://www.space.com/

Remember

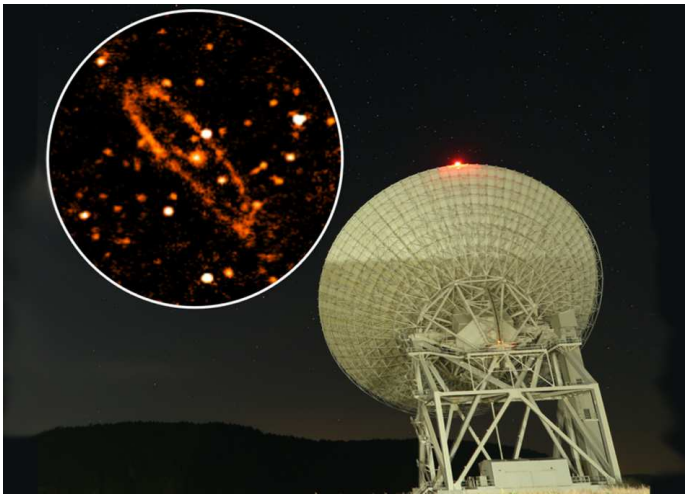
It's AGM Time!

Please make an extra effort to attend the meeting this year.

It's your chance to have a say about how VAS is run.

See the nomination form on page 11.

The Most-detailed Radio Image of Andromeda Galaxy to Date



Radio image of Andromeda galaxy at 6.6 GHz (inset), captured using the Sardinia Radio Telescope in Italy. CREDIT S. Fatigoni et al (2021)

Scientists have published a new, detailed radio image of the Andromeda galaxy - the Milky Way's sister galaxy - which will allow them to identify and study the regions of Andromeda where new stars are born.

The study - which is the first to create a radio image of Andromeda at the microwave frequency of 6.6 GHz - was led by University of British Columbia physicist Sofia Fatigoni, with colleagues at Sapienza University of Rome and the Italian National Institute of Astrophysics. It was published online in Astronomy and Astrophysics.

"This image will allow us to study the structure of Andromeda and its content in more detail than has ever been possible," said Fatigoni, a PhD student in the department of physics and astronomy at UBC. "Understanding the nature of physical processes that take place inside Andromeda allows us to understand what happens in our own galaxy more clearly - as if we were looking at ourselves from the outside."

Prior to this study, no maps capturing such a large region of the sky around the Andromeda Galaxy had ever been made in the microwave band frequencies between one GHz to 22 GHz. In this range, the galaxy's emission is very faint, making it hard to see its structure. However, it is only in this frequency range that particular features are visible, so having a map at this particular frequency is crucial to understanding which physical processes are happening inside Andromeda.

In order to observe Andromeda at this frequency, the researchers required a single-dish radio telescope with a large effective area. For the study, the scientists turned to the Sardinia Radio Telescope, a 64-metre fully steerable telescope capable of operating at high radio frequencies.

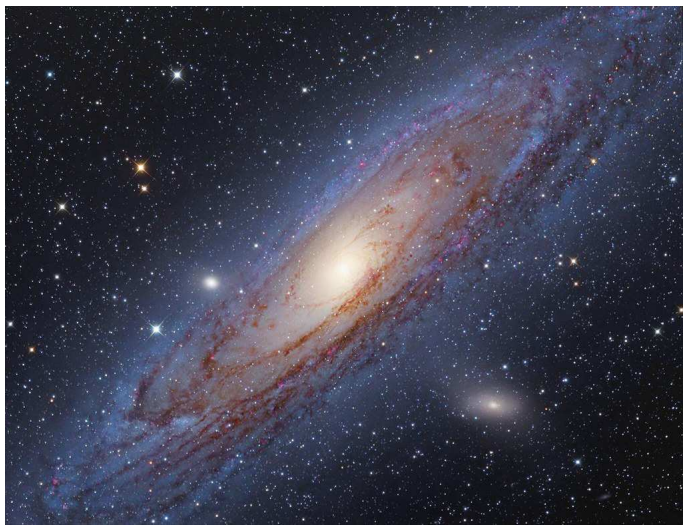
It took 66 hours of observation with the Sardinia Radio Telescope and consistent data analysis for the researchers to map the galaxy with high sensitivity. They were then able to estimate the rate of star formation within Andromeda, and produce a detailed map that highlighted the disk of the galaxy as the region where new stars are born.

"By combining this new image with those previously acquired, we have made significant steps forward in clarifying the nature of Andromeda's microwave emissions and allowing us to distinguish physical processes that occur in different regions of the galaxy," said Dr. Elia Battistelli, a professor in the department of physics at Sapienza and coordinator of the study.

"In particular, we were able to determine the fraction of emissions due to thermal processes related to the early stations of new star formation, and the fraction of radio signals attributable to non-thermal mechanisms due to cosmic rays that spiral in the magnetic field present in the interstellar medium," Fatigoni said.

For the study, the team developed and implemented software that allowed - among other things - to test new algorithms to identify never-before-examined lower emission sources in the field of view around Andromeda at a frequency of 6.6 GHz. From the resulting map, researchers were able to identify a catalog of about 100 point sources, including stars, galaxies and other objects in the background of Andromeda.

More at: http://spaceref.com/



New Radio Receiver Opens Wider Window to Radio Universe

Researchers have used the latest wireless technology to develop a new radio receiver for astronomy. The receiver is capable of capturing radio waves at frequencies over a range several times wider than conventional ones, and can detect radio waves emitted by many types of molecules in space at once. This is expected to enable significant progresses in the study of the evolution of the Universe and the mechanisms of star and planet formation.

Interstellar molecular clouds of gas and dust provide the material for stars and planets. Each type of molecule emits radio waves at characteristic frequencies and astronomers have detected emissions from various molecules over a wide range of frequencies. By observing these radio waves, we can learn about the physical properties and chemical composition of interstellar molecular clouds. This has been the motivation driving the development of a wideband receiving system.

In general, the range of radio frequencies that can be observed simultaneously by a radio telescope is very limited. This is due to the characteristics of the components that make up a radio receiver. In this new research, the team of researchers in Osaka Prefecture University (OPU) and the National Astronomical Observatory of Japan (NAOJ) has widened the bandwidth of various components, such as the horn that brings radio waves into the receiver, the waveguide (metal tube) circuit that propagates the radio waves, and the radio frequency converter. By combining these components into a receiver system, the team has achieved a range of simultaneously detectable frequencies several times larger than before. Furthermore, this receiver system was mounted on the OPU 1.85-m radio telescope in NAOJ's Nobeyama Radio Observatory, and succeeded in capturing radio waves from actual celestial objects. This shows that the results of this research are extremely useful in actual astronomical observations.

"It was a very emotional moment for me to share the joy of receiving radio waves from the Orion Nebula for the first time with the members of the team, using the receiver we had built," comments Yasumasa Yamasaki, an OPU graduate student and the lead author of the paper describing the development of the wideband receiver components. "I feel that this achievement was made possible by the cooperation of many people involved in the project."

When compared to the receivers currently used in the Atacama Large Millimeter/submillimeter Array (ALMA), the breadth of frequencies that can be simultaneously observed with the new receivers is striking. To cover the radio frequencies between 211 and 373 GHz, ALMA uses two receivers, Band 6 and 7, but can use only one of them at a given time. In addition, ALMA receivers can observe two strips of frequency ranges with widths of 5.5 and 4 GHz using the Band 6 and 7 receivers, respectively. In contrast, the new wideband receiver can cover all the frequencies with a single unit. In addition, especially in the higher frequency band, the receiver can detect radio waves in a frequency range of 17 GHz at a time.

"It was a very valuable experience for me to be involved in the development of this broadband receiver from the beginning to successful observation," says Sho Masui, a graduate student at OPU and the lead author of the research paper reporting the development of the receiver and the test observations. "Based on these experiences, I would like to continue to devote further efforts to the advancement of astronomy through instrument development."

This wideband technology has made it possible to observe the interstellar molecular clouds along the Milky Way more efficiently using the 1.85-m radio telescope. In addition, widening the receiver bandwidth is listed as one of the high priority items in the ALMA Development Roadmap which aims to further improve the performance of ALMA. This achievement is expected to be applied to ALMA and other large radio telescopes, and to make a significant contribution to enhance our understanding of the evolution of the Universe.

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

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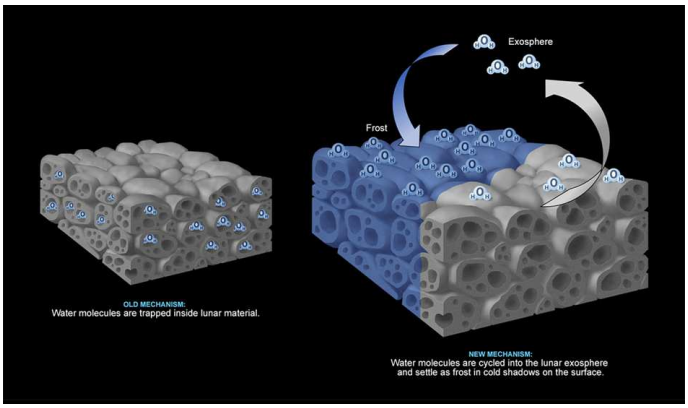
The Importance of Surface Shadows In The Moon Water Puzzle



Scientists are confident that water ice can be found at the Moon's poles inside permanently shadowed craters - in other words, craters that never receive sunlight.

But observations show water ice is also present across much of the lunar surface, even during daytime. This is a puzzle: Previous computer models suggested any water ice that forms during the lunar night should quickly burn off as the Sun climbs overhead.

“Over a decade ago, spacecraft detected the possible presence of water on the dayside surface of the Moon, and this was confirmed by NASA's Stratospheric Observatory for Infrared Astronomy in 2020,” said Björn Davidsson, a scientist at NASA's Jet Propulsion Laboratory in Southern California. “These observations were, at first, counterintuitive: Water shouldn't survive in that harsh environment. This challenges our understanding of the lunar surface and raises intriguing questions about how volatiles, like water ice, can survive on airless bodies.”

A new study suggests that shadows created by the “roughness” of the lunar surface provide refuge for water ice, enabling it to form as surface frost far from the Moon's poles. They also explain how the Moon's exosphere (the tenuous gases that act like a thin atmosphere) may have a significant role to play in this puzzle.

Water Traps and Frost Pockets

Many computer models simplify the lunar surface, rendering it flat and featureless. As a result, it's often assumed that the surface far from the poles heats up uniformly during lunar daytime, which would make it impossible for water ice to remain on the sunlit surface for long.

So how is it that water is being detected on the Moon beyond permanently shadowed regions? One explanation for the detection is that water molecules may be trapped inside rock or the impact glass created by the incredible heat and pressure of meteorite strikes. Fused within these materials, as this hypothesis suggests, the water can remain on the surface even when heated by the Sun while creating the signal that was detected by SOFIA.

But observations of the lunar surface show that the amount of water decreases before noon (when sunlight is at its peak) and increases in the afternoon. This indicates that the water may be moving from one location to another through the lunar day, which would be impossible if they are trapped inside lunar rock or impact glass.

Davidsson and Hosseini revised the computer model to factor in the surface roughness apparent in images from the Apollo missions from 1969 to 1972, which show a lunar surface strewn with boulders and pockmarked with craters, creating lots of shady areas even near noon. By factoring this surface roughness into their computer models, Davidsson and Hosseini explain how it's possible for frost to form in the small shadows and why the distribution of water changes throughout the day.

Because there is no thick atmosphere to distribute heat around the surface, extremely cold, shaded areas, where temperatures may plummet to about minus 210° Celsius), can neighbor hot areas exposed to the Sun, where temperatures may reach as high as 120° Celsius.

As the Sun tracks through the lunar day, the surface frost that may accumulate in these cold, shaded areas is slowly exposed to sunlight and cycled into the Moon's exosphere. The water molecules then refreeze onto the surface, reaccumulating as frost in other cold, shaded locations.

“Frost is far more mobile than trapped water,” said Davidsson. “Therefore, this model provides a new mechanism that explains how water moves between the lunar surface and the thin lunar atmosphere.”

A Closer Look

While this isn't the first study to consider surface roughness when calculating lunar surface temperatures, previous work did not take into account how shadows would affect the capability of water molecules to remain on the surface during daytime as frost. This new study is important because it helps us to better understand how lunar water is released into, and removed from, the Moon's exosphere.

Much more at: http://spaceref.com/

VAS Officers and Committee Nominations 2021/22

For those wishing to stand for election at the AGM of the Society to be held on Friday 27th August 2019 at 7.00pm.

Name and Address of Nominee:

Standing for

- Chairman .....❑
- Treasurer.....❑
- Secretary.....❑
- Observatory Director.....❑
- Membership Secretary.....❑
- Programme Organiser.....❑
- Committee .....❑

Proposed by: .....

Seconded by: .....

Signature of Nominee:.....

Notes

- The Committee meets once each month usually on a Thursday evening at 18.30 before the usual club night.
- No person can be elected to more than one position.
- Only adult fully paid-up members may stand for election (or propose or second).

All completed nomination forms to be received by the Secretary at least 14 days before the AGM.

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

It'll be good to meet up properly again - please let's all behave sensibly.
Keep washing your hands, keep a sensible distance between you and any others not in your group, and wear a face covering in crowded spaces.

A Few Moon Facts

The Moon exerts a pull on Earth, causing our planet to be slightly egg-shaped.

It affects water even more, creating tides and causing the oceans to pile up towards one side of the planet, forming a 'tidal bulge'.

This bulge is dragged around with the Moon as it orbits. As Earth rotates faster than the Moon – 24 hours versus 27.3 days – the bulge moves slightly ahead of the Moon's position in orbit.

The Moon pulls back on it, effectively trying to slow it down and causing Earth's rotation rate to gradually slow down over time as a result.

As the two bodies interact through gravity, this tugging causes Earth to lose energy while the Moon gains energy.

Because of this energy boost the Moon is slowly spiralling outwards, moving away from us by 3.8cm per year.

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.

"It is harder to crack prejudice than an atom"
Albert Einstein

"The Universe, as has been observed before, is an unsettlingly big place, a fact which for the sake of a quiet life most people tend to ignore"
Douglas Adams

"In physics, you don't have to go around making trouble for yourself – nature does it for you"
Frank Wilczek

"Sometimes I think the surest sign that intelligent life exists elsewhere in the universe is that none of it has tried to contact us"
Bill Watterson

"America is the only country where a significant proportion of the population believes that professional wrestling is real but the moon landing was faked"
David Letterman

"I have never let my schooling interfere with my education"
Mark Twain