New Zenith

The Monthly Newsletter of the Vectis Astronomical Society

Vol 29 Issue 5 — June 2021

When Printed, this Newsletter costs VAS at least £1

Society News

Observatory News

I'm pleased to announce that we are about to restart Thursday evening observatory meetings. This will be on a fully monitored basis which will hopefully lead to more normal opening in July 2021.

There are some rules though:

1. Those attending must be members of VAS.
2. The maximum number of people allowed in the observatory is 6 (*including 1 committee member*).
3. All visitors must book their visit before attending. ***No booking = no entry!***
4. The system starts on Thursday 10th June.

These rules will be continually reviewed and amended as needed.

As the VAS website is freely available to the public, it will not show any of the above information during June.

Hopefully we will be able to open up more fully in July.

Thursday Bookings - Members Only

Bookings will be on a *first-come-first-served* basis and applies to all members including committee.

Bryn Davis is taking the bookings and can be contacted by email (see page 2) or by phone 406125.

Online Virtual Meetings

A new link for our monthly meetings is in place and is listed in the recent email sent to all members and also on the back page of this NZ.

Brian Curd

VAS Website: wightastronomy.org

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

The Editor, New Zenith
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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.

Observatory Diary

The diary is currently empty!

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

All Monthly Meetings are ONLINE ONLY

Please DO NOT attend the Observatory or Pavilion

ONLINE ONLY

Sorry but we are still unable to hold face-to-face monthly meetings during the Covid-19 virus pandemic.

Please see the Back Page for the latest information

VAS Contacts 2021

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Important

The observatory reopens for MEMBERS ONLY Thurs 10th June

YOU MUST BOOK

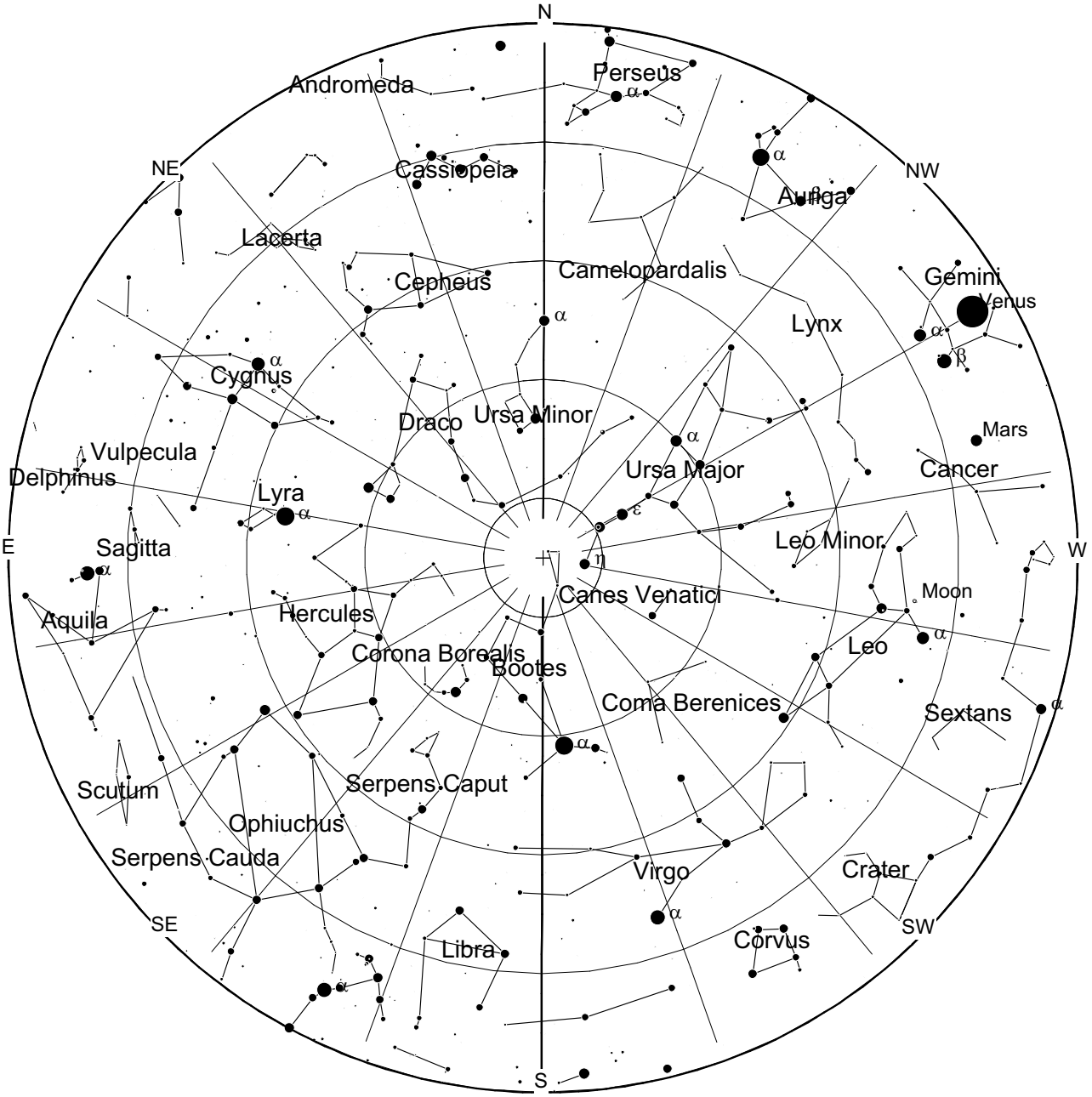
See the front Page

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.

June 2021 - Sky Map



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

Messier 12 (NGC 6218) is a globular cluster in the constellation of Ophiuchus. It was discovered by the French astronomer Charles Messier on May 30, 1764, who described it as a "nebula without stars". In dark conditions this cluster can be faintly seen with a pair of binoculars. Resolving the stellar components requires a telescope with an aperture of 8 in (20 cm) or greater. In a 10 in (25 cm) scope, the granular core shows a diameter of 3' (arcminutes) surrounded by a 10' halo of stars.

Roughly 3° northwest from the cluster M10 and 5.6° east southeast from star Lambda Ophiuchi, M12 is about 15,700 light-years from Earth and has a spatial diameter of about 75 light-years. The brightest stars of M12 are of 12th magnitude. It is rather loosely packed for a globular and was once thought to be a tightly concentrated open cluster.

June 2021- Night Sky

Moon Phases

New	First Qtr	Full	Last Qtr
10th	18th	24th	2nd
			

Summer Solstice

The summer solstice, the time at which the Sun is at its most northerly point in the sky occurs this year on June 21 at 04:32.

Planets

Mercury

Mercury is on the other side of the Sun this month. It will return as the Morning Star next month.

Venus

Look to the northwest after sunset and Venus is very conspicuous even against the bright sunset sky. A telescope will show that it is exhibiting an almost full gibbous phase. This is not a particularly good evening apparition as the month progresses Venus does not rise much higher above the horizon, but instead moves further towards the south away from the Sun.

Mars

Mars is now a challenging object low in the west after sunset. The sky is quite bright for some time after sunset and Mars is now only magnitude 1.7, a little fainter than Castor and Pollux the two stars that are to its right and difficult to see against the bright sky. On the 13th the crescent moon is slightly above and to the right.

Jupiter

In 'wee small hours' of the morning Jupiter can be found low in the south east. It is by far the brightest object in that part of the sky and an easy target for small telescopes or binoculars. Binoculars will show the four Galilean moons and a telescope will enable the bands and if the timing is right the great red spot. Being so low down in the sky atmospheric turbulence will tend to spoil the view somewhat.

Saturn

Like Jupiter Saturn is also visible low down in the early morning sky. It is located further to the west than Jupiter and is not so bright; it is still brighter than any of the surrounding stars so is still easy to spot. A small telescope will show the rings which are now closing, but still are still well worth viewing. Like Jupiter any observation of Saturn will be hampered by turbulence.

Uranus & Neptune

The sky is currently too bright to observe either of the outer ice giant planets.

Deep Sky

M12 Globular Cluster
RA 16h 47m Dec -1° 57' mag 8.0

M12 is located in the centre of the constellation of Ophiuchus a rather large constellation next to the summer Milkyway who's outline is made up from 2nd and 3rd magnitude stars. In most clusters the smaller stars are those with the greatest numbers, they live longer and outlast the larger members that either explode as supernovae or become white dwarves at the end of their lives. M12 appears to have a surplus of large stars and it is though that it has lost it's smaller members through interactions with the Milkyway and by the time the Sun comes to the end of it's life this globular will have been completely shredded.

M10 Globular Cluster
RA 16h 58m Dec -4°7' mag 7.5

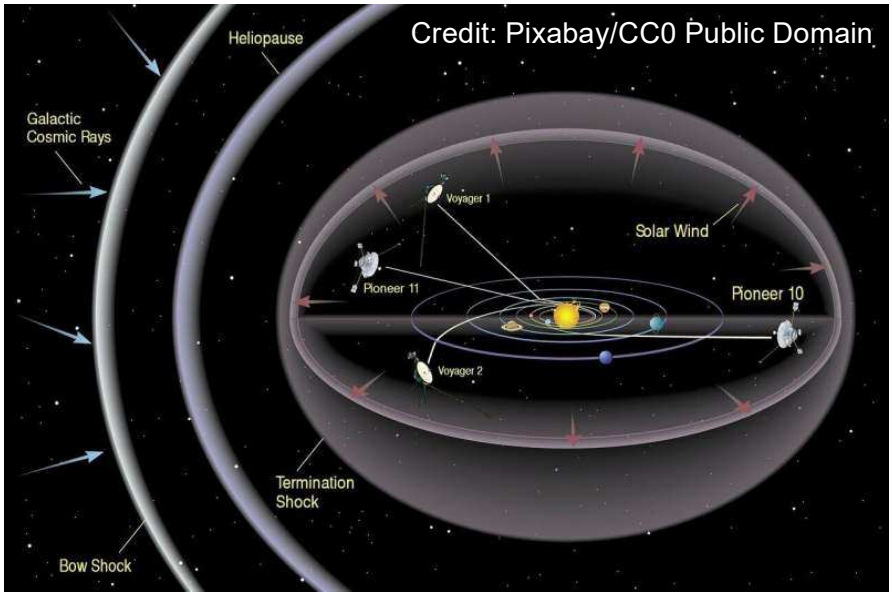
Just 3 degrees south and east of M12 is another classic globular cluster, slightly brighter with a condensed core covered in what appears to be a dusting of sugar. This ball of stars is just over 14,000 light years away is 2,000 light years closer than M12 but still racing away from us by almost 70km every second.

M4 The Cat's Eye, Globular Cluster
RA 16h 24m Dec -26° 33' mag 7.5

At about 7200 light years this 10,000 million year old cluster may be the closest globular cluster to our solar system. This core of this cluster is rather looser than most globulars with a distinct chain of stars running across its centre.

Peter Burgess

In the Emptiness of Space, Voyager 1 Detects Plasma 'hum'



Voyager 1 - one of two sibling NASA spacecraft launched 44 years ago and now the most distant human-made object in space - still works and zooms toward infinity.

The craft has long since zipped past the edge of the solar system through the heliopause - the solar system's border with interstellar space - into the interstellar medium. Now, its instruments have detected the constant drone of interstellar gas (plasma waves), according to Cornell University-led research published in Nature Astronomy.

Examining data slowly sent back from more than 14 billion miles away, Stella Koch Ocker, a Cornell doctoral student in astronomy, has uncovered the emission. "It's very faint and monotone, because it is in a narrow frequency bandwidth," Ocker said. "We're detecting the faint, persistent hum of interstellar gas."

This work allows scientists to understand how the interstellar medium interacts with the solar wind, Ocker said, and how the protective bubble of the solar system's heliosphere is shaped and modified by the interstellar environment.

Launched in September 1977, the Voyager 1 spacecraft flew by Jupiter in 1979 and then Saturn in late 1980. Travelling at about 38,000 mph, Voyager 1 crossed the heliopause in August 2012.

After entering interstellar space, the spacecraft's Plasma Wave System detected perturbations in the gas. But, in between those eruptions - caused by our own roiling sun - researchers have uncovered a steady, persistent signature produced by the tenuous near-vacuum of space.

"The interstellar medium is like a quiet or gentle rain," said senior author James Cordes, the George Feldstein Professor of Astronomy. "In the case of a solar outburst, it's like detecting a lightning burst in a thunderstorm and then it's back to a gentle rain."

Ocker believes there is more low-level activity in the interstellar gas than scientists had previously thought, which allows researchers to track the spatial distribution of plasma - that is, when it's not being perturbed by solar flares.

Cornell research scientist Shami Chatterjee explained how continuous tracking of the density of interstellar space is important. "We've never had a chance to evaluate it. Now we know we don't need a fortuitous event related to the sun to measure interstellar plasma," Chatterjee said. "Regardless of what the sun is doing, Voyager is sending back detail. The craft is saying, 'Here's the density I'm swimming through right now. And here it is now. And here it is now. And here it is now.' Voyager is quite distant and will be doing this continuously."

Voyager 1 left Earth carrying a Golden Record created by a committee chaired by the late Cornell professor Carl Sagan, as well as mid-1970s technology. To send a signal to Earth, it took 22 watts, according to NASA's Jet Propulsion Laboratory. The craft has almost 70 kilobytes of computer memory and - at the beginning of the mission - a data rate of 21 kilobits per second.

Due to the 14-billion-mile distance, the communication rate has since slowed to 160-bits-per-second, or about half a 300-baud rate.

More at: https://phys.org/news/2021-05-space-voyager-plasma.html

If Necessary, Mars Rover Curiosity Could Rip Its Own Wheels Off to Stay Mobile

Overhead view of LF during the Pigeon-Toe manoeuvre
Photo: California Institute of Technology

The Mars Science Laboratory rover Curiosity landed on Mars in August of 2012. After a year of exploring Gale Crater, JPL engineers noticed some wear on Curiosity's wheels, in the form of dents and small holes in the wheels' 0.75mm thick aluminium skin. While not unexpected, the wear on the wheels kept increasing at a higher rate than JPL had planned for, and by early 2017 (after about 16km of driving), the rover had experienced the first breaks in the much thicker structural elements that hold its wheels together, called grousers.

Each of Curiosity's wheels has 19 grousers, so one or two broken ones isn't much of a concern. But if enough of the grousers snap off, the worst-case scenario is that the inside of the wheel could loosen and make contact with the cabling that connects the motor inside the wheel hub with the motor controller inside the body of the rover. That could potentially render the wheel inoperable, or even cause electrical damage that could mess up control of other motors around the rover.

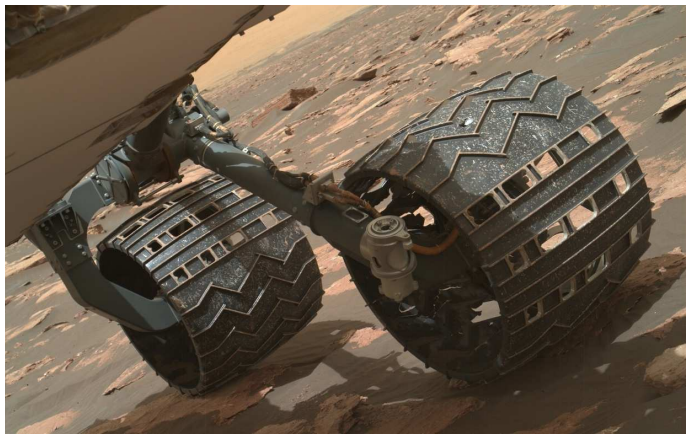
JPL's Wheel Wear Tiger Team ("Tiger Teams" being a thing that has a history at NASA going back to Apollo 13) took a look at the problem, and came up with some recommendations about where and how to drive that have been very successful at reducing wheel wear rates. But since there's no way of eliminating wheel wear completely, they also came up with a backup plan that they could implement if the wheel damage approaches catastrophic. It involves Curiosity finding a nice sharp rock and using it to rip out the insides of its own wheels.

Every 1000 meters of driving, Curiosity pulls over and uses the Mars Hand Lens Imager (MAHLI) on the end of its robotic arm along with its Mastcam camera to snap some pictures of its wheels so that JPL can keep track of wheel wear. The images below show one of the flight wheels in pristine condition, along with a MAHLI image taken on 4 April 2021, showing extensive skin damage and a missing grouser on one of the rover's middle wheels.

A new MSL flight wheel (left), compared to a MAHLI image of one of Curiosity's middle wheels (right) taken on Mars on April 4, 2021.

Images: JPL, NASA/JPL-Caltech/MSSS

As of mid-April, Curiosity has driven a total of 25.246 km, and JPL has found one broken grouser on the right middle wheel along with three broken grousers on the left middle wheel, the third of which happened within the last 1000 meters of driving. The grousers on the front and rear pairs of wheels are all intact. The wheels will remain functional even if most of the aluminium skin is missing; it's really the grousers that keep the structure of the wheel stable.



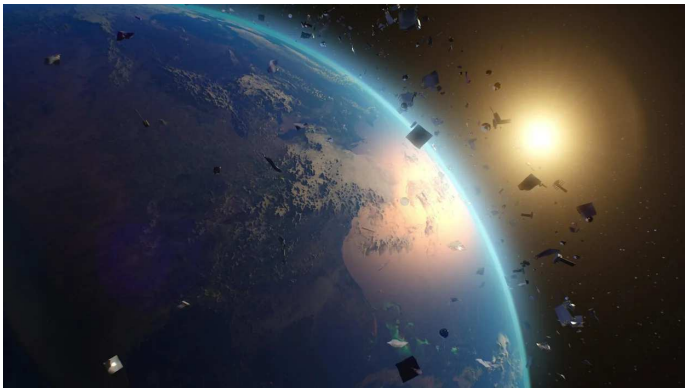
An image showing the odometry features on Curiosity's wheels, taken on Mars on January 26, 2017.

Image: NASA/JPL-Caltech/MSSS

In addition to the 19 grousers that go around the wheel, each wheel also has an odometry feature, which is a section of the wheel that has a pattern of holes in it. These holes help the rover visually track its progress, and they also spell out "JPL" in Morse code, because why not. The odometry feature is more structurally robust, and JPL expects that it'll hang on even if all the grousers on a wheel break.

***Much** more at: https://spectrum.ieee.org/*

How Space Debris Created the World's Largest Garbage Dump



Space debris orbiting Earth.
Credit Framestock via Adobe Stock

- Space debris is any human-made object that's currently orbiting Earth.
- When space debris collides with other space debris, it can create thousands more pieces of junk, a dangerous phenomenon known as the Kessler syndrome.
- Radical solutions are being proposed to fix the problem, some of which just might work. (See the video embedded toward the end of the article.)

In 1957, the Soviet Union launched a human-made object into orbit for the first time. It marked the dawn of the Space Age. But when Sputnik 1's batteries died and the aluminium satellite began lifelessly orbiting the planet, it marked the end of another era: the billions of years during which space was pristine.

Today, the space above Earth is the world's "largest garbage dump," according to NASA. It's littered with 8,000 tons of human-made junk, called space debris, left by space agencies over the past six decades.

The U.S. now tracks more than 25,000 pieces of space junk. And that's only the debris that ground-based radar technologies can track. The U.S. Space Surveillance Network estimates there could be more than 170 million pieces of space debris currently orbiting Earth, with the majority being tiny fragments smaller than 1 mm.

Space Debris: Trashing a Planet

Space debris includes all human-made objects, big and small, that are orbiting Earth but no longer serve a useful function. A brief inventory of known space junk includes: a spatula, a glove, a mirror, a bag filled with astronaut tools, spent rocket stages, stray bolts, paint chips, defunct spacecraft, and about 3,000 dead satellites — all of which are orbiting Earth at speeds of roughly 18,000 m.p.h.

Most space junk is floating in low Earth orbit (LEO), the region of space within an altitude of about 100 to 1,200 miles. LEO is also where most of the world's 3,000 satellites operate, powering our telecommunications, GPS technologies, and military operations.

"Millions of pieces of orbital debris exist in low Earth orbit (LEO) — at least 26,000 the size of a softball or larger that could destroy a satellite on impact; over 500,000 the size of a marble big enough to cause damage to spacecraft or satellites; and over 100 million the size of a grain of salt that could puncture a spacesuit," wrote NASA's Office of Inspector General Office of Audits.

If LEO becomes polluted with too much space junk, it could become treacherous for spacecraft, threatening not only our modern technological infrastructure, but also humanity's ability to venture into space at all.

By allowing space debris to accumulate unchecked, we could be building a prison that keeps us stranded on Earth for centuries.

An Outsized Problem

Space debris of any size poses grave threats to spacecraft. But tiny, untrackable micro-debris presents an especially dreadful problem: A paint fragment chipped off a spacecraft might not seem dangerous, but it careens through space at nearly 10 times the speed of a bullet, packing enough energy to puncture an astronaut's suit, crack a window of the International Space Station, and potentially destroy satellites.

Impacts with space debris are common. During the Space Shuttle era, NASA replaced an average of one to two shuttle windows per mission "due to hypervelocity impacts (HVIs) from space debris." To be sure, some space debris are natural micrometeoroids. But much of it is human-made, like the fragment that struck the starboard payload bay radiator of the STS-115 flight in 2006.

"The debris penetrated both walls of the honeycomb structure, and the shock wave from the penetration created a crack in the rear surface of the radiator 6.8 mm long," NASA wrote. "Scanning electron microscopy and energy dispersive X-ray detection analysis of residual material around the hole and in the interior of the radiator shows that the impactor was a small fragment of circuit board material."

The European Space Agency notes that any fragment of space debris larger than a centimetre could shatter a spacecraft into pieces.

***Much** more at: https://bigthink.com/*

Hubble Spots a Cosmic Cloud's Silver Lining

Image credit: ESA/Hubble, R. Sahai

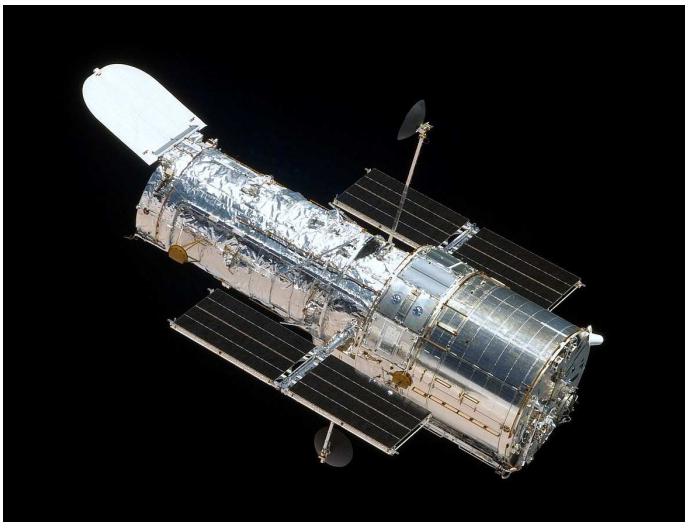
This image taken with the NASA/ESA Hubble Space Telescope showcases the emission nebula NGC 2313. Emission nebulae are bright, diffuse clouds of ionized gas that emit their own light.

The bright star V565 (center of the image) highlights a silvery, fan-shaped veil of gas and dust, while the right half of this image is obscured by a dense cloud of dust.

Nebulae with similar shapes were once called "cometary nebulae" because the star with an accompanying bright fan looked like a comet with a bright tail.

The language that astronomers use changes as we become better acquainted with the universe, and astronomical history is littered with now-obsolete phrases to describe objects in the night sky, such as "spiral nebulae" for spiral galaxies.

From: http://spaceref.com/



Leicester Astronomers Look Ahead to First Light from James Webb Space Telescope

Leicester space scientists will join a group of global experts investigating fundamental questions about our Universe, after being granted time to use the most advanced observatory ever built.

A total of 286 scientific targets identified by astronomers and planetary scientists at the University of Leicester were selected from more than 1,000 submitted by researchers from 44 countries, for a portion of the 6,000 observing hours available in the first year of operation (Cycle 1) for the James Webb Space Telescope (JWST).

Considered the successor to the Hubble Space Telescope, the JWST will launch in late 2021 and will begin delivering a flood of scientific data in 2022, after the spacecraft unfolds its 6.5m-diameter mirror, travels 1.5 million km from Earth, and checks the functioning of all of its instruments.

Leicester researchers will use the JWST for a number of projects, examining how stars and planets form, identifying new galaxies, and attempting to answer the question of how liquid water – a key building block of life as we know it – is transported through space.

Professor Emma Bunce is head of the University's School of Physics and Astronomy and President of the Royal Astronomical Society. She said: "The James Webb Space Telescope is such a highly-anticipated tool for astronomers across the world – and we're absolutely no different in looking forward to the first batch of science data in 2022.

"We're all very excited to see so many Leicester projects allocated time for science on such a high-profile mission, especially given the University's involvement in building one of its key instruments.

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

Moonlight: Europe Plans Constellation of Lunar Satellites

The Moon is about to become a busy place. Over the next few years, an international fleet of orbiters, smallsats, rovers, and eventually crewed missions are set to explore the Moon. And the European Space Agency (ESA) thinks all of those missions could benefit from an independent satellite network.

Apollo-era missions only had line-of-sight communications with Earth, which restricted landings to the equatorial to mid-latitudes on the lunar nearside. But now the ESA has announced its "Moonlight" initiative, in which two consortia of companies — led by Surrey Satellite Technology and Telespazio — will explore the concept of placing a permanent satellite network around the Moon. The network would provide an independent navigation system, giving rovers and crewed missions alike more autonomy to access the Moon's entire surface, including the polar regions and the lunar farside.

"Reaching the Moon is the first step," says Elodie Viau (ECSAT / ESA) in a recent announcement. "Staying on the Moon is what comes next."

Ultimately, the ESA envisions Moonlight as a means to open up the Moon to commercial enterprises as well as lower the entry ticket to smaller nations and private smallsat missions. If a nation or corporation wants to field a mission on or around the Moon in the future, access to a communications network will already be in place and available.

"We're proud of supporting the UK's and EU's position on the global scene," says Phil Brownnett (Surrey Satellite Technology), "and we're proud to be part of this fantastic effort to establish a sustainable presence on the Moon."

To this end, the ESA already has several related projects in development. One is the European System Providing Refueling Infrastructure and Telecommunications (ESPIRIT) module, which is planned for the Lunar Gateway platform, expected to be in orbit around the Moon by 2024 at the earliest.

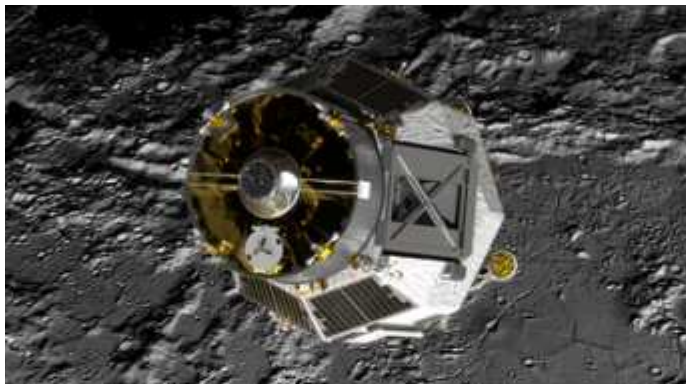
Another upcoming mission is the Lunar Pathfinder, which will demonstrate communications technology in lunar orbit. It's already in development and set to launch in 2024. Pathfinder will also feature a space weather detection component to characterize the lunar environment for future orbiters. China launched its own similar Queqiao relay in 2018 to carry out the Chang'e 4 mission on the lunar farside.

The Lunar Pathfinder will provide a proof of concept for the full-fledged Moonlight constellation, which might be made up of three or four satellites in lunar orbit, plus on-orbit spares. The satellites will provide navigation information that should eventually reach the 1-meter accuracy currently seen in the ESA's Galileo navigation network around Earth. The system would support lunar development and even economic activity at the Moon.

The United Nations is also currently working to set standards for GPS systems around the Earth, and this standardization will likely extend to Moon-based systems as well.

The current timeline would see the Moonlight consortia present their feasibility study to the ESA in 2022 and start development in 2023, with the goal of fielding the constellation over the next four to five years.

The ESA's other contributions to NASA's Artemis initiative to return humans to the Moon include partnership on the Lunar Gateway, building the European Space Module component for the Orion spacecraft for deep space exploration, and developing the European Large Logistic Lander for lunar mission resupply.



More at: https://skyandtelescope.org/

One Small Step Toward Cleaning Up Space Junk

Entry room of the European Astronaut Centre in Cologne, Germany. Maja Hitij/Getty Images

For decades, experts have been warning about the rise of space junk in Earth's orbit. In the Space Age, there have been thousands of rocket and satellite launches, and not everything that goes up into orbit comes back down. Now, thousands of dead satellites and thousands more small pieces of junk remain circling Earth - all of which pose a significant threat to space infrastructure and could inadvertently take down satellite arrays if poorly managed.

Recently the problem has been getting worse.

Even objects just centimeters in size pose grave threats given the speed of objects maintaining orbit and the difficulty in tracking smaller pieces of junk. What was likely a speck of paint chipped multiple layers of the ISS's Cupola window back in 2016. It turns out that pretty much anything can be dangerous if it smacks into you at approximately 17,150 miles per hour.

Efforts to properly dispose of rockets and orbiters - like lowering the perigee (basically the point closest to Earth) of objects' orbits through propulsion burns to allow for controlled burn-up upon atmospheric re-entry - could help to mitigate the growth of space junk. But very few actors have worked toward cleaning up existing junk. In fact, to date no space organization has successfully captured and disposed of an "uncooperative" object in orbit (that is, one in an unstable rotation). Current methods of orbital capture usually require intense control of both the capturer and the target object.

Thankfully, the European Space Agency is trying to establish a new scientific precedent with its ClearSpace-1 Mission. The mission - formally announced in late 2020 in collaboration with ClearSpace SA - will launch in 2025 in an attempt to use an experimental capture system to remove a Vega Secondary Payload Adapter still in orbit from a 2013 mission. To that end, the ClearSpace start-up has recently founded a U.K. subsidiary to oversee the mission.

This is not the ESA's first attempt to clean up space junk. It also funded the 2018 RemoveDEBRIS test of a net apparatus, but it didn't actually clean up real space junk due to property rights under international law that states anything sent into orbit remains the property of the nation who launched it. The new effort is working to clean-up existing space debris, and since the ESA owns some space junk the ClearSpace-1 mission has the legal authority to do so. However, it is a relatively small and easy target to start the ESA's efforts, as the VSPA is nothing compared with the double-decker bus-sized Envisat which the ESA lost contact with in 2012.

Recently, private industry has undertaken missions to tackle space junk, but in fairly limited ways. In March, the Japanese-U.K aerospace company Astroscale launched ELSA-d, whose mission is to track a dummy satellite and eventually dispose of it. NEO-01, launched by Shenzen startup Origin Space in late April, intends to capture space junk via net and burn it through use of its propulsion system. ELSA-d, while great in theory, uses a magnetic system that could not be deployed on current junk - only to remove future satellites outfitted with the magnetic docking system from orbit. And NEO-01's net technology would be used predominantly for space mining operations - not orbital cleanup.

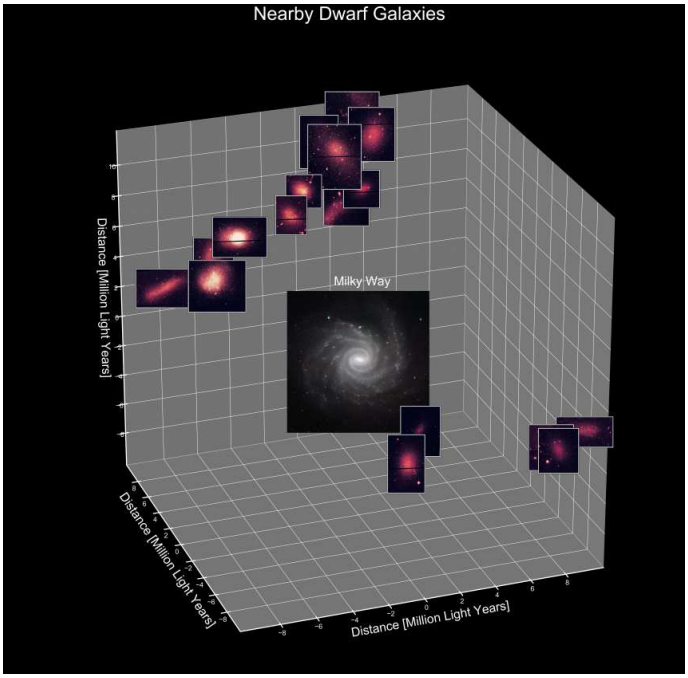
Decluttering space will require much more. So, space organizations - both commercial and national - need to join efforts to finally clean up their proverbial room of orbit. At the national level, major contributors to existing space junk like Russia, the United States, and China need to do more work including waste disposal missions of their own. Especially given the millions of dollars these projects will cost, international collaboration is a must. This collaboration must also include new diplomatic agreements banning the intentional detonation of satellites and other objects in orbit - something both China and India have done in the past. These in-orbit explosions only multiply the number of pieces of space junk that existing satellite arrays must contend with.

At the corporate level, governments need to introduce market incentives for companies to clean up and minimize their contributions to space junk as well. This could take the form of financial responsibility for satellite accidents or annual fees for orbital use. Simply put, companies are not concerned with the costs their satellites impose upon space as a common resource. Without these incentives and renewed interest from international leaders in space exploration, space junk will continue to fester.

More at: https://slate.com/

36 Dwarf Galaxies had Simultaneous 'Baby Boom' of New Stars

Surprising finding challenges current theories on how galaxies grow



The Milky Way-like galaxy NGC 1232 (center) shows the Milky Way's location and relative size. Images of dwarf galaxies are centered close to their true locations but have been magnified for visibility. Credit: Charlotte Olsen

Three dozen dwarf galaxies far from each other had a simultaneous "baby boom" of new stars, an unexpected discovery that challenges current theories on how galaxies grow and may enhance our understanding of the universe.

Galaxies more than 1 million light-years apart should have completely independent lives in terms of when they give birth to new stars. But galaxies separated by up to 13 million light-years slowed down and then simultaneously accelerated their birth rate of stars, according to a Rutgers-led study published in the Astrophysical Journal.

"It appears that these galaxies are responding to a large-scale change in their environment in the same way a good economy can spur a baby boom," said lead author Charlotte Olsen, a doctoral student in the Department of Physics and Astronomy in the School of Arts and Sciences at Rutgers University - New Brunswick.

"We found that regardless of whether these galaxies were next-door neighbors or not, they stopped and then started forming new stars at the same time, as if they'd all influenced each other through some extra-galactic social network," said co-author Eric Gawiser, a professor in the Department of Physics and Astronomy.

The simultaneous decrease in the stellar birth rate in the 36 dwarf galaxies began 6 billion years ago, and the increase began 3 billion years ago. Understanding how galaxies evolve requires untangling the many processes that affect them over their lifetimes (billions of years). Star formation is one of the most fundamental processes. The stellar birth rate can increase when galaxies collide or interact, and galaxies can stop making new stars if the gas (mostly hydrogen) that makes stars is lost.

Star formation histories can paint a rich record of environmental conditions as a galaxy "grew up." Dwarf galaxies are the most common but least massive type of galaxies in the universe, and they are especially sensitive to the effects of their surrounding environment.

The 36 dwarf galaxies included a diverse array of environments at distances as far as 13 million light-years from the Milky Way. The environmental change the galaxies apparently responded to must be something that distributes fuel for galaxies very far apart. That could mean encountering a huge cloud of gas, for example, or a phenomenon in the universe we don't yet know about, according to Olsen.

The scientists used two methods to compare star formation histories. One uses light from individual stars within galaxies; the other uses the light of a whole galaxy, including a broad range of colors.

"The full impact of the discovery is not yet known as it remains to be seen how much our current models of galaxy growth need to be modified to understand this surprise," Gawiser said. "If the result cannot be explained within our current understanding of cosmology, that would be a huge implication, but we have to give the theorists a chance to read our paper and respond with their own research advances."

"The James Webb Space Telescope, scheduled to be launched by NASA this October, will be the ideal way to add that new data to find out just how far outwards from the Milky Way this 'baby boom' extended," Olsen added.

Rutgers co-authors include Professor Kristen B. W. McQuinn; Grace Telford, a postdoctoral associate; and Adam Broussard, a doctoral student. Scientists at the University of Toronto, the Harvard-Smithsonian Center for Astrophysics, Johns Hopkins University and NASA's Goddard Space Flight Center contributed to the study.

More at: https://www.rutgers.edu/

THE BACK PAGE

LINKS, COMMENTS AND OBSERVATIONS

Virtual Monthly Meetings

This is the new recurring link for our online Monthly Meetings
Please save it and delete all other links

To Join the Zoom Meeting

Please use this link:

https://us02web.zoom.us/j/81142510951?pwd=a2RCQXZKMmRMeXBMSXEvU0dxS2gzUT09

Meeting ID: 811 4251 0951
Passcode: 346096

If you possibly can, please join us for the next one. Our speakers (and club committee) give their time and effort to make the presentations as interesting as possible and they deserve our support.

Outreach Plans

During the COVID-19 lockdown and tight restrictions meant all of our plans for events and outreach had to be postponed or cancelled.

We are now starting over again to organise small events that abide with current guidelines, so you can see we are beginning to get active again.

As restrictions ease further, we shall endeavour to get out there to more events.

The Plan so far:

Space Camp - St Helens School - June
Space Camp - Gurnard Primary School - July
Stargazing Evening - Wight Horse Riding School - TBC Sept/Oct
VAS Observatory Tour for Young Astronomers - Oct

We shall also be involved with more Space camps when they relaunch in the Autumn Term

Elaine Spear
Outreach Officer

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.

"The scientific theory I like best is that the rings of Saturn are composed entirely of lost airline luggage"
Mark Russell

"A study of economics usually reveals that the best time to buy anything is last year"
Marty Allen

"Whether you think you can or you think you can't, you're right"
Henry Ford

"Strive not to be a success, but rather to be of value"
Albert Einstein

"Even in empty space, time and space still exist"
Sean M Carroll

"I'm sure the universe is full of intelligent life. It's just been too intelligent to come here"
Arthur C Clarke

"There are no passengers on spaceship Earth. We are all crew"
Marshall McLuhan