

Galactica

Astronomy and Space Science Magazine

What's Inside?

Highlights From March
Moon Phases And Planet Visibility
What's Awaiting in April
Student's Corner
Historical Events Happened In April
Events By SPACE
Train Your Brain

Galactica is a monthly magazine about astronomy & space science published by SPACEIndia targeting amateur astronomers. Each monthly issue includes astronomy news, space launches, what's up in the sky for every month, events and announcements done by space team, reader-submitted astrophotographs and articles on astronomy & astrophysics for general readers, article about historical missions and events of astronomy and more. All of this comes in an easy-to-understand user-friendly style that's perfect for astronomers at any level.

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ABOUT SPACE

SPACE is the pioneer organization working towards development of science and astronomy in India. It aims to create a scientifically aware society and contribute to the technological and social development of the country.

SPACE organization belongs to an astronomical league, diligently working towards development in astronomy and space science through astronomical tutorials, modules, curriculum for education requirements of schools & students in India. We constantly engage in offering introductory astronomy, science about space, astrophysics, telescopes and internet astronomy to masses.

Vision: To popularize hands on space science & STEM Education through various fun filled pioneering concepts, services and programs.

Mission: To develop and popularize space science & STEM Education in India and establish a global association with national & international space science agencies, societies, amateur, professional organisations, government agencies and space observatories.



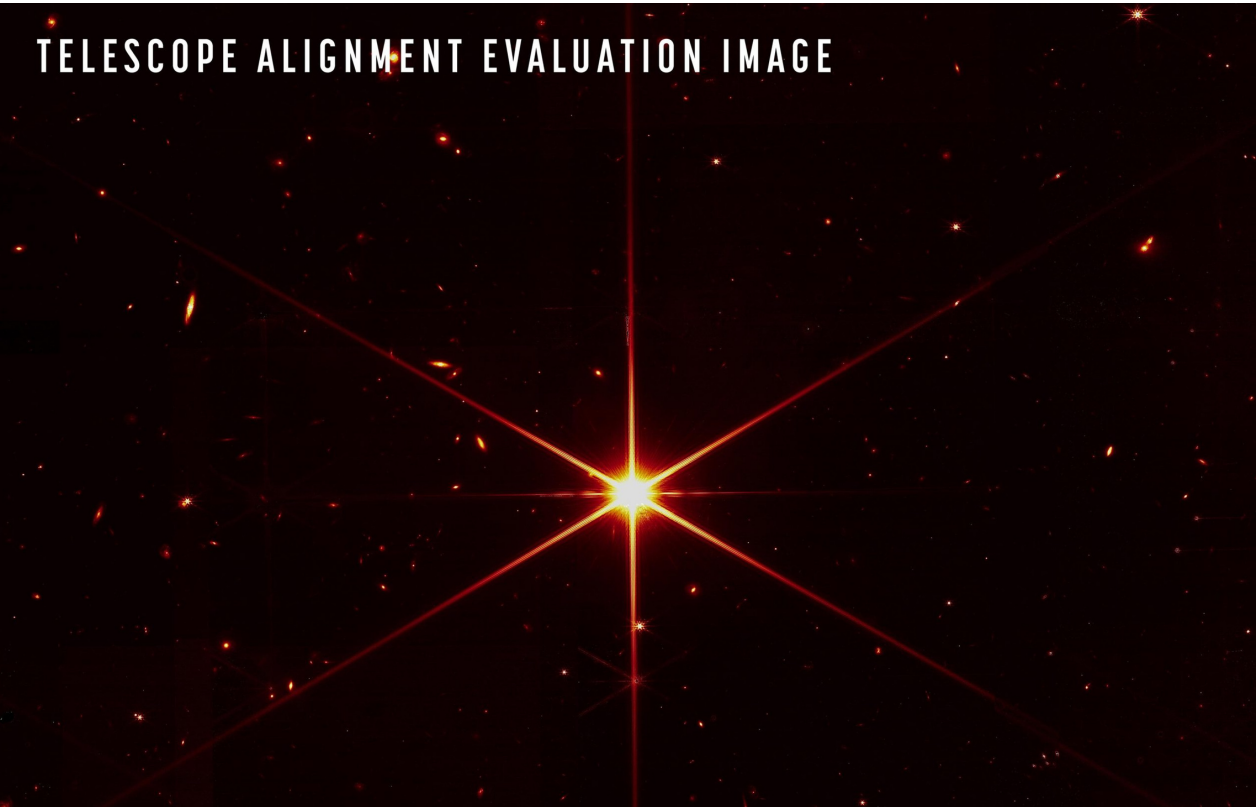
**Mr. Sachin Bahmba
CMD, Space**

CMD'S MESSAGE:

Space and Astronomy is the future for the young generation of our country. This is a great means to inculcate scientific temperament among the masses. Such astronomy sessions will provide a hands on learning platform to students wherein they explore the real world of science. I wish for the young students to let their ambitions soar and think big as they are the future of our country.

HIGHLIGHTS OF MARCH 2022

TELESCOPE ALIGNMENT EVALUATION IMAGE



(Image credit: This image made available by NASA on Wednesday, March 16, 2022 shows star 2MASS J17554042+6551277 used to align the mirrors of the James Webb Space Telescope, with galaxies and stars surrounding it.)

The James Webb Space Telescope (JWST) has passed its first assignment with flying colours, after it handed in a spectacular photo to NASA. On Wednesday, 16th March the officials at the space agency shared a stunning photo of a star captured by the telescope during its alignment process, in which several in-focus galaxies and distant stars can be seen in the background.

The Webb's primary mirror is made up of an array of 18 individual mirrors that, once properly aligned, will act as a single mirror. And even though that self-alignment is still in the works, researchers said they were blown away by the test images already being captured by the fledgling telescope.

"The images are focused together as finely as the laws of physics allow," Marshall Perrin, Webb deputy telescope scientist at the Space Telescope Science Institute in Baltimore, told CNN.

"But as we were focusing on those bright stars, we couldn't help but see the rest of the universe coming into focus behind them, to see the more distant stars and galaxies coming into view."

"We said last fall that we would know that the telescope is working properly when we have an image of a star that looks like a star," Lee Feinberg, Webb optical telescope element manager at NASA's Goddard Space Flight Center, told Cosmos magazine.

"Now you're seeing that image. And I'm happy to say that the optical performance of the telescope is absolutely phenomenal, it is really working extremely well. The performance is as good if not better than our most optimistic prediction."

For the test, Webb focused on a star called 2MASS J17554042+6551277. A red filter was applied to the image, to highlight the contrast of the star and galaxies. Astronomer Phil Plait shared some images to Twitter, comparing the JWST image to previous images of the same star captured by other satellites.

**THE JAMES WEBB SPACE TELESCOPE
HAS BECOME A SPACE ROCKSTAR**

MARS HELICOPTER INGENUITY COMPLETES 22ND FLIGHT

March 22 (UPI) -- NASA's Mars helicopter Ingenuity completed its 22nd flight over the weekend, the space agency announced.

"The trip lasted 101.4 seconds and Ingenuity got up to 33 feet in the air," NASA's Jet Propulsion Laboratory said in a tweet Monday. "The team is planning another flight perhaps as early as later this week."

During its first 21 flights, Ingenuity flew a total of 15,247 feet and stayed in the air for nearly 39 minutes, according to a flight log from the mission team. Ingenuity has been scouting possible routes and destinations for Perseverance as the rover hunts for signs of ancient life on Mars. The pair landed in Mars' Jezero Crater in February 2021, a site that hosted a lake and river delta billions of years ago.

Also Tuesday, NASA's Mars Reconnaissance Orbiter captured an image of China's Zhurong rover on the surface.

The spacecraft's High Resolution Imaging Science Experiment camera captured about 0.93 miles of tracks Zhurong has made traveling since landing in May 2021, showing it inspected the parachute and backshell that helped it land on the planet and surveyed surface features such as dunes.

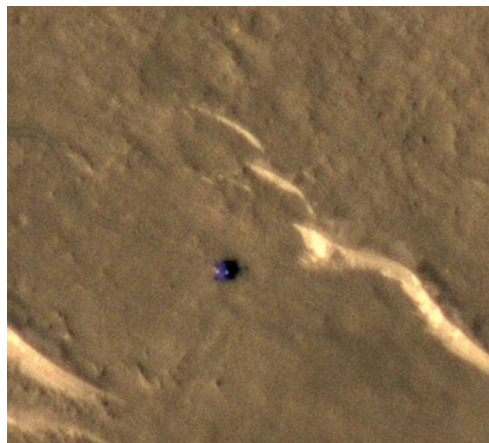


NASA's Mars helicopter Ingenuity completed its 22nd flight over the weekend, the space agency announced. Photo courtesy NASA/JPL-Caltech

A NASA spacecraft orbiting Mars has spotted China's Zhurong rover down on the surface, providing an epic overview of the vehicle's travels through the red dirt.

The Mars Reconnaissance Orbiter (MRO) captured the image of Zhurong on March 11, according to a post from the researchers behind MRO's powerful HiRISE (High Resolution Imaging Science Experiment) camera.

Despite MRO orbiting 179 miles (288 kilometers) above, HiRISE managed to pick up the roughly 0.93 miles (1.5 km) of tracks that Zhurong has made journeying south since landing in May 2021, a cutout image with increased contrast shows.



ELON MUSK SAYS SPACEX'S HUGE STARSHIP ROCKET WILL 'HOPEFULLY' LAUNCH ON 1ST ORBITAL FLIGHT IN MAY



(Image credit: Cnbc)

SpaceX's huge Starship rocket for eventual trips to the moon and Mars could go orbital for the first time just two months from now, if all goes according to plan.

SpaceX is developing Starship to take people and cargo to the moon, Mars and beyond. The vehicle consists of two elements: a first-stage booster called Super Heavy and an upper-stage spacecraft known as Starship.

Starship and Super Heavy are both designed to be completely and rapidly reusable, and both will be powered by SpaceX's new Raptor engine – 33 for Super Heavy and six for Starship. It's a challenge to build so many engines, but SpaceX is on track to have enough for the first Starship orbital test flight soon, company founder and CEO Elon Musk said.

"We'll have 39 flightworthy engines built by next month, then another month to integrate, so hopefully May for orbital flight test," Musk tweeted on Monday (March 21).

That target is also dependent on the timely resolution of an environmental review that the U.S. Federal Aviation Administration (FAA) is conducting of Starship launch operations at Starbase, SpaceX's facility in South Texas. That view is scheduled to wrap up by March 28, FAA officials have said.

SpaceX has performed a number of Starship test launches already, but those have involved prototype upper-stage vehicles with a maximum of three Raptor engines that flew just 6.2 miles (10 kilometers) high or so. The upcoming orbital test flight will mark the first-ever launch of a Super Heavy as well as the first liftoff of a six-engine Starship.



Five European spacecraft, including a telescope searching for dark matter and dark energy, have been left without a launch ticket after Russia stopped supplying rockets to Europe in response to economic sanctions against the invasion of Ukraine.

The European Space Agency (ESA) is now looking for alternatives to get these spacecraft into orbit.

"We are installing an external group of experts to help assess the situation," ESA director general Josef Aschbacher said in a news conference held virtually on Thursday (March 17). "In about a month's time, I expect the results to be known. And then we will see what is a realistic scenario of launcher opportunities in the next months and years."

Europe's launch provider, Arianespace, has been offering launches on Russia's mid-weight Soyuz rocket from the European spaceport in Kourou, French Guiana, since 2011. The Russian workhorse launcher conveniently complemented Europe's own light-weight Vega and the heavy-lift Ariane 5. Russia, however, scrapped the cooperation on Feb. 26 and pulled its personnel from the facility in response to sanctions imposed by European states in response to the invasion of Ukraine. (ESA represents 22 core member states; Ukraine is not one of them.)

In April, two satellites of Europe's navigation constellation Galileo (an alternative to the U.S. GPS), were supposed to launch on Soyuz. The Earth-observing satellite Earthcare, part of Europe's climate monitoring constellation Copernicus, had its ticket for a ride on a Soyuz booked for March 2023. ESA also planned a 2023 Soyuz launch for its Euclid telescope, which will study the expansion of the universe and hunt for the evidence of dark matter and dark energy. One French national satellite has also been stranded, Aschbacher said.

Dark-matter hunter and 4 other European spacecraft need rockets after Russia invasion

In addition to its existing launchers, Europe is currently working toward maiden flights of two new rockets. Vega C, a more powerful version of the Vega rocket, is expected to take to the sky for the first time in late May. The heavy-lift Ariane 6, already several years delayed, still has a few milestones to pass before launch, including a hot firing test of its upper stage.

Aschbacher said that only after these milestones are completed, ESA could establish a new frequency of launches from Kourou.

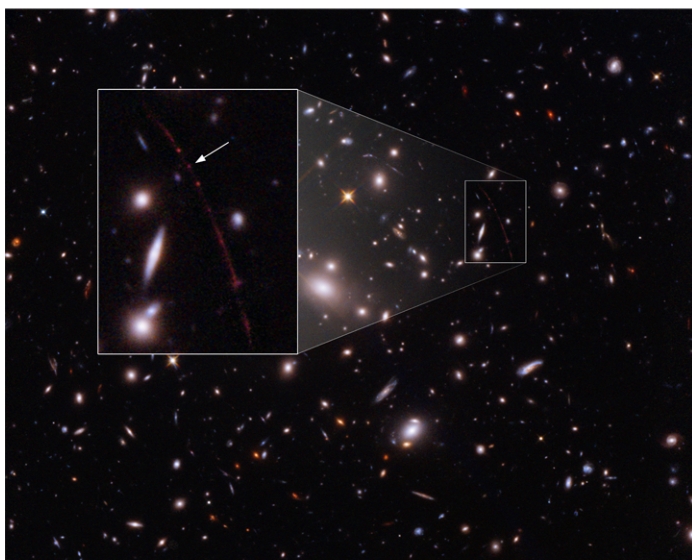
Europe, however, may face problems with its Vega rocket family, which uses Ukraine-made engines in its first stage. The Yuzmach factory, based in Ukraine's space capital in Dnipro, has so far not been targeted by Russia's missiles, according to sources in Ukraine. However, the factory's future is uncertain.

ESA is therefore looking for possible replacement technology that would be made in ESA member states, Daniel Neuenschwander, ESA's director of space transportation, said in the press conference.

RECORD BROKEN: HUBBLE SPOTS FARTHEST STAR EVER SEEN

A LUCKY COSMIC ALIGNMENT HAS REVEALED A SINGLE SOURCE OF LIGHT IN THE FIRST BILLION YEARS AFTER THE BIG BANG, SETTING UP A MAJOR CONFIRMATION FOR THE JAMES WEBB SPACE TELESCOPE IN ITS ROOKIE YEAR.

Even NASA's powerful Hubble Space Telescope can benefit from some assistance, as evidenced in its latest discovery: a record-breaking star so distant that a combination of the telescope's sophisticated instrumentation and nature's natural magnifying glass was needed to spot it. The star, nicknamed Earendel by astronomers, emitted its light within the universe's first billion years. It's a significant leap beyond Hubble's previous distance record, in 2018, when it detected a star at around 4 billion years after the big bang. Hubble got a boost by looking through space warped by the mass of the huge galaxy cluster WHL0137-08, an effect called gravitational lensing. Earendel was aligned on or very near a ripple in the fabric of space created by the cluster's mass, which magnified its light enough to be detected by Hubble. NASA's James Webb Telescope will follow-up to learn about Earendel's brightness, temperature, and composition. While the chances are slim that Earendel is one of the universe's first-generation stars, astronomers are eager for its insights into the environment of the early universe.



(Image credit: Hubblesite)

If follow-up studies find that Earendel is only made up of primordial hydrogen and helium, it would be the first evidence for the legendary Population III stars, which are hypothesized to be the very first stars born after the big bang. While the probability is small, Welch admits it is enticing all the same.

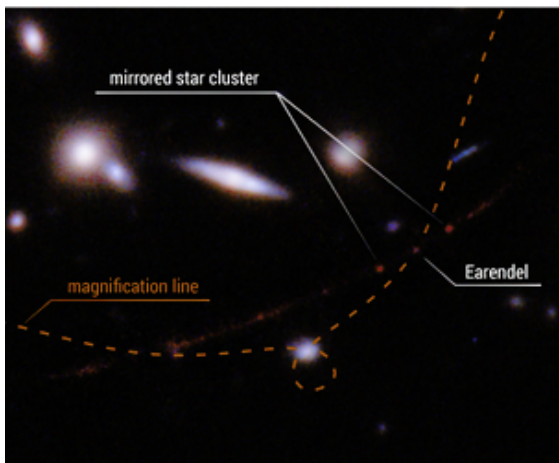
"With Webb, we may see stars even farther than Earendel, which would be incredibly exciting," Welch said. "We'll go as far back as we can. I would love to see Webb break Earendel's distance record."

Confirmation with Webb

Astronomers expect that Earendel will remain highly magnified for years to come. It will be observed by NASA's James Webb Space Telescope. Webb's high sensitivity to infrared light is needed to learn more about Earendel, because its light is stretched (redshifted) to longer infrared wavelengths due to the universe's expansion.

"With Webb we expect to confirm Earendel is indeed a star, as well as measure its brightness and temperature," Coe said. These details will narrow down its type and stage in the stellar lifecycle. "We also expect to find the Sunrise Arc galaxy is lacking in heavy elements that form in subsequent generations of stars. This would suggest Earendel is a rare, massive metal-poor star," Coe said.

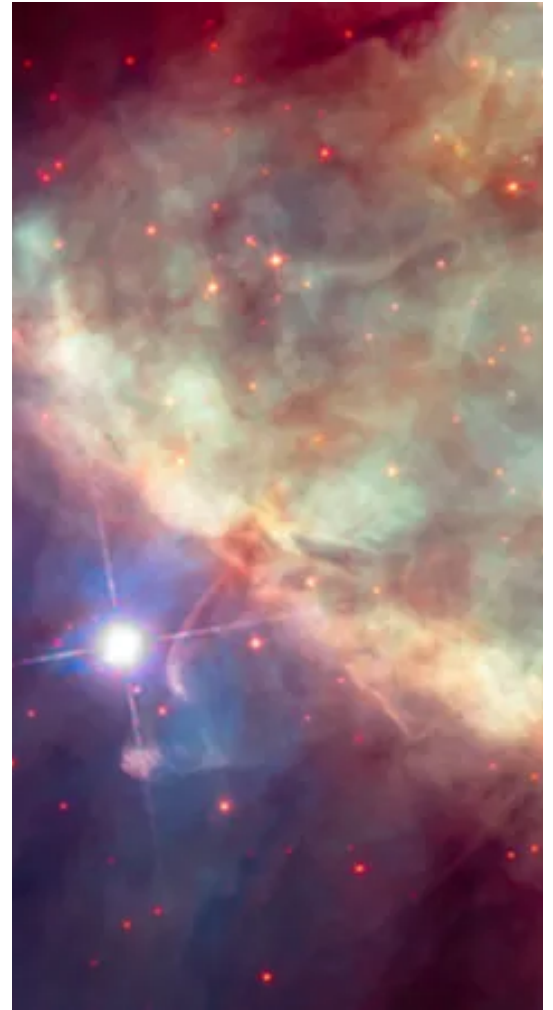
Earendel's composition will be of great interest for astronomers, because it formed before the universe was filled with the heavy elements produced by successive generations of massive stars.



(Image credit: Hubblesite)

About This Image:

The star nicknamed Earendel (indicated with arrow) is positioned along a ripple in spacetime that gives it extreme magnification, allowing it to emerge into view from its host galaxy, which appears as a red smear across the sky. The whole scene is viewed through the distorted lens created by a massive galaxy cluster in the intervening space, which allows the galaxy's features to be seen, but also warps their appearance—an effect astronomers call gravitational lensing. The red dots on either side of Earendel are one star cluster that is mirrored on either side of the ripple, a result of the gravitational lensing distortion. The entire galaxy, called the Sunrise Arc, appears three times, and knots along its length are more mirrored star clusters. Earendel's unique position right along the line of most extreme magnification allows it to be detected, even though it is not a cluster.



ON THIS DAY IN SPACE! MARCH 22, 1997: COMET HALE-BOPP FLIES BY EARTH

On March 22, 1997, a super bright comet by the name of Hale-Bopp made its closest approach to Earth. It was bright enough for people to see without telescopes or binoculars for over 18 months.

Comet Hale-Bopp still holds the record for being visible to the naked eye for longer than any other comet, and it was probably the most-viewed comet in history.

It passed by Earth at a safe distance of about 120 million miles before continuing its orbit around the sun.

As it got closer to the sun, Hale-Bopp's two blue and white tails grew bigger and brighter. By the time it made it to the sun on April 1, it was shining brighter than every star in the sky except for Sirius.

The James Webb Space Telescope will point in on a portion of the famous Orion Nebula, the closest region of mass star-formation to Earth, to learn more about how massive young stars shape their environments.

The Orion Nebula, some 1,350 light-years away from Earth, is known as a stellar nursery. Dense clouds of gas and dust in this region collapse into stellar embryos that gradually grow bigger until the pressure and heat in their cores increases enough to trigger nuclear fusion.

Because of the amount of dust, the hearts of stellar nurseries are obscured from the view of optical telescopes. But infrared light, in which the James Webb Space Telescope will observe the universe, can penetrate those clouds and reveal the secrets of star formation.

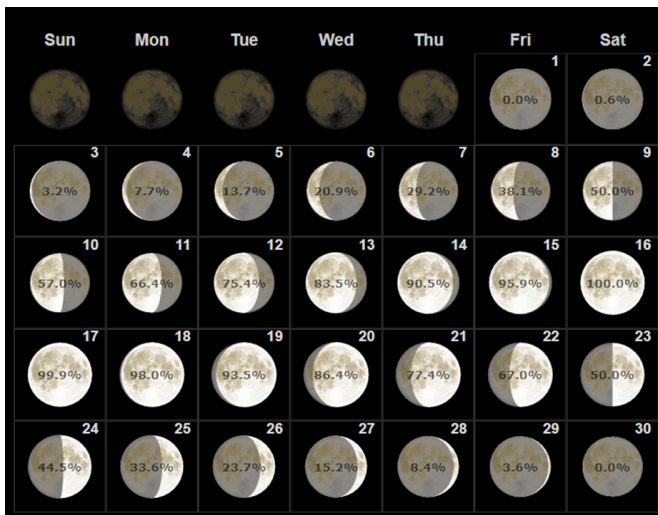
WHAT'S UP IN THE SKY - APRIL 2022

LUNAR CALENDAR

IMPORTANCE OF MOON PHASES FOR STARGAZERS

One might wonder why it is important to refer moon phases for star gazing. The reason is that the phases of Moon reflects a great deal of illumination, and because the Moon is so close to us, it overrides the brightness of other celestial objects.

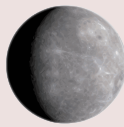
So, What Moon phase is best for stargazing? "The New Moon and the days immediately before and after new moon(Crescent phases)" are among the best times for stargazing. Whereas, The Remaining phases like Full Moon, waxing or waning gibbous, the first or third quarter Moon offer a time to zoom and witness the features of the Moon.



PLANETS VISIBILITY

Mercury

Impressive in the evening sky, sets over 2 hours after sunset by end of April



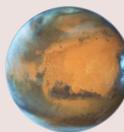
Venus

Bright morning planet, low before sunrise. Near Mars and Saturn at start of month, close to Jupiter at end.



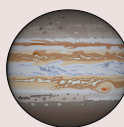
Mars

Morning planet. Prominently visible through the whole month in the eastern direction before sunrise.



Jupiter

Might be difficult to watch in early April but prominently visible after mid April.



Saturn

Prominently visible through the whole month in the eastern direction before sunrise.



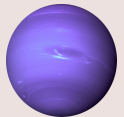
Uranus

Evening planet, just visible at start of April, then rapidly lost.



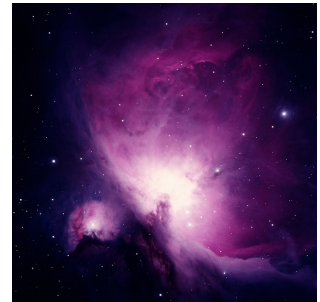
Neptune

Morning planet, but not viable for observation this month.

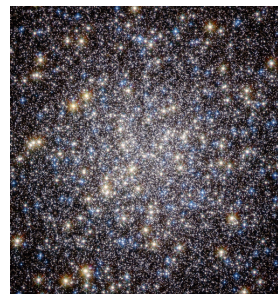


BRIGHT DEEP SKY OBJECTS

The Orion Nebula is a diffuse nebula situated in the Milky Way, being south of Orion's Belt in the constellation of Orion. It is one of the brightest nebulae and is visible to the naked eye in the night sky. It is 1,344 ± 20 light-years away and is the closest region of massive star formation to Earth.



The Hercules Cluster in the constellation Hercules also known as M13 is considered to be the finest globular cluster in the northern half of the heavens. It's found in a star pattern called the Keystone a lopsided square between the two brightest stars of northern spring and summer, Vega and Arcturus.



The M81 and M82 galaxies are a pair of galaxies located in the constellation, Ursa Major. M81 (Bode's Galaxy) is a spiral galaxy that lies approximately 11.8 million light-years away, while M82 (The Cigar Galaxy) is an irregular galaxy at roughly the same distance away from Earth.



The Leo Triplet is a small group of galaxies about 35 million light-years away in the constellation Leo. This galaxy group consists of M65, M66, and NGC 3628. Each member of the Leo Triplet is a spiral galaxy, although it may not initially appear as though this is the case.





SPACE™

EMPOWERING LIFE THROUGH SCIENCE



GLOBAL ASTRONOMY MONTH

CELEBRATE THE PASSION OF ASTRONOMY
WITH SPACE AND ASTRONOMERS WITHOUT
BORDERS IN APRIL!

One People ✦ One Sky

Global Astronomy Month (GAM) –
Every year in April, the world's largest
annual celebration of astronomy offers
a unique demonstration of the power of
the night sky to bring people together
from around the world. GAM is an
inspiring expression of the universal
passion for astronomy we all share,
whoever or wherever we are.





Global
Astronomy
Month

presented by Astronomers Without Borders

Events and Registration

SPACE has immense pleasure to bring to you the Global Astronomy Month (GAM) celebrated by Astronomers Without Borders (AWB), worldwide.

The celebration by SPACE is to bring new ideas and opportunities for people to participate in, strengthening AWB's motto, One People, One Sky. We want to bring this global celebration to every astronomy enthusiasts. Everyone is encouraged to celebrate any event from the suggested list.

Activities for this year's GAM celebrations are classified under different categories. Register the ones you propose to do.

Link for registration: <https://forms.gle/UbqNHMPAMcanpS7w6>

Highlight each event conduction with photographs on Facebook, Instagram and Twitter during and after the event, using the listed tags and hashtags. A poster as provided can be posted on display boards and used to encourage the students to participate and disseminate information about the event.

Participants will be recognized by their efforts by SPACE, under different award categories. The winning participant will be presented with the certificate from SPACE for the year and will be uploaded on the website in the first week of June. In addition, Astronomers Without Borders will be giving out awards for the two competitions Astropoetry and AstroArt.

Please note that the awards will be conferred, only to fully reported events and activities, so kindly make sure all events are well photographed and documented.

We look forward to everyone joining SPACE in this global international celebration of astronomy.

For details about events check this link:

<https://www.astronomerswithoutborders.org/events/calendar>

ROCKET LAUNCHES IN APRIL 2022

ULA Atlas V 500 Series

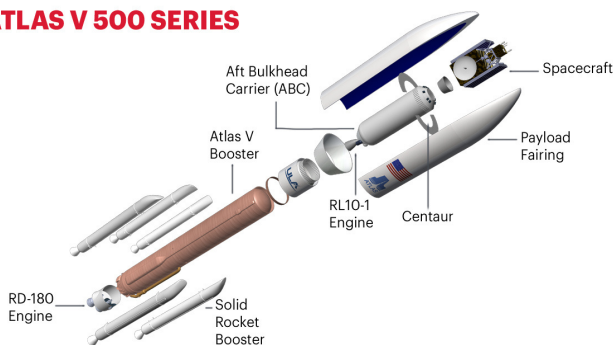
DATE: April, 2022

VEHICLE: United Launch Alliance Atlas V 500 Series

MISSION: A United Launch Alliance Atlas 5 rocket will launch the USSF 12 mission with Wide Field Of View, or WFOV, experimental missile warning satellite for the U.S. Space Force.

LAUNCH SITE: Cape Canaveral Air Force Station - SLC 41.

ATLAS V 500 SERIES



(Image credit: Ulalaunch.com)

The Atlas V

American orbital launch vehicle. The Atlas V launch vehicle system was a completely new design that succeeded the earlier Atlas series. Atlas V vehicles were based on the 3.8-m (12.5-ft) diameter Common Core Booster (CCB) powered by a single Russian RD-180 engine. These could be clustered together, and complemented by a Centaur upper stage, and up to five solid rocket boosters, to achieve a wide range of performance.

NASA and SpaceX will launch the Crew-4 mission to the ISS

DATE: April 19, 2022

VEHICLE: SpaceX Falcon 9

MISSION: A SpaceX Falcon 9 rocket will launch a Crew Dragon spacecraft on its seventh flight with astronauts. NASA astronauts Kjell Lindgren and Robert Hines, and European Space Agency astronaut Samantha Cristoforetti will launch on the Crew Dragon spacecraft to begin a six-month expedition on the International Space Station. A fourth crew member will be named later.

LAUNCH SITE: Kennedy Space Center - LC-39A.

Falcon 9

Falcon 9 is a partially reusable two-stage-to-orbit medium-lift launch vehicle designed and manufactured by SpaceX in the United States. The latest version of the first stage can return to Earth and be flown again multiple times.

The Falcon 9 was intended to enable launches to low Earth orbit (LEO), geosynchronous transfer orbit (GTO), as well as both crew and cargo vehicles to the International Space Station (ISS).



(Image credit: Scitechdaily.com)

Indian start-up Pixxel targets satellite launch

DATE: April 1, 2022

VEHICLE: PSLV-C51

MISSION: To build a health monitor for the planet through a constellation of cutting edge hyperspectral small satellites.

LAUNCH SITE: Satish Dhawan Space Centre SHAR, Sriharikota.



Pixxel

Pixxel is a space data company, building a constellation of hyperspectral earth imaging satellites and the analytical tools to mine insights from that data. The constellation is designed to provide global coverage every 24 hours, with the aim of detecting, monitoring and predicting global phenomena.

Russia suspends Soyuz launch operations in French Guiana



(Image credit: ESA.in)

Blaming European sanctions enacted after Russia's invasion of Ukraine, the Russian space agency said Saturday it is recalling dozens of engineers and technicians from French Guiana and suspending Soyuz rocket operations there, grounding a pair of European navigation satellites previously set for launch in early April.

The decision, announced by Russian space agency chief Dmitry Rogozin, also brings into question the long-term future of the Soyuz launch base at the Guiana Space Center, a European-run spaceport on the northeastern coast of South America. Russian teams were preparing a Soyuz rocket and Fregat upper stage for launch April 5 from the spaceport near Kourou, French Guiana, with two European Galileo navigation satellites. The two European satellites and their Russian launch vehicle have already been delivered to the space center, but the preparations require expertise from Russian crews.

"In response to EU sanctions against our enterprises, Roscosmos is suspending cooperation with European partners in organizing space launches from the Kourou cosmodrome and withdrawing its technical personnel, including the consolidated launch crew, from French Guiana," Rogozin tweeted Saturday.

The Soyuz launch base in French Guiana entered service in 2011 under the auspices of a cooperative agreement between Roscosmos and the European Space Agency. Since then, 27 Soyuz rockets have launched from the Guiana Space Center, carrying Galileo navigation satellites, commercial communications and Earth observation payloads, space science missions, and French and Italian military satellites.

French Guiana is an overseas department of France, meaning the spaceport is built on the territory of a NATO country. The Soyuz launch pad in French Guiana is European-owned, and the French launch service provider Arianespace oversees launch operations at the site. It took three years and cost European governments \$800 million to develop the Soyuz launch capability in French Guiana. The European Union announced new sanctions this week against Russia, targeting Russian businesses and defense enterprises after Russia's military invaded Ukraine. On Friday, the EU said it would freeze any European assets of Russian President Vladimir Putin.

Roscosmos said there are 87 Russian citizens currently in French Guiana preparing for the planned Soyuz launch in April. They are employees of NPO Lavochkin, which manufactures the Fregat upper stage, and the Progress Rocket Space Center, builder of Russia's Soyuz rocket. There are also staff at the Guiana Space Center from TsENKI, a Russian company that provides ground infrastructure and support services for space missions.

India To Launch PSLV - EOS-6 (Oceansat-3)

Oceansat-3 is a part of ISRO's Oceansat program. Its main purpose is ocean observation, which includes gathering ocean color data, sea surface temperature measurements and wind vector data.

Destination: Sun-Synchronous Orbit

Mission: Earth Science

Oceansat-3 is a multi-sensor ocean observation satellite, expected to operate until at least 2027. The following instruments and/or notable devices onboard are:

- OSCAT - OceanSat Scatterometer
- OCM - Ocean Color Monitor
- SSTM - Sea Surface Temperature Monitor
- A-DCS - Advanced Data Collection System

OSCAT is an instrument for measuring wind speeds and vectors at sea level. This is a newly developed instrument, operating in the Ku-band (13.515 GHz). It has two conical scanning beams, providing four views of each location from different angles. The instrument has a resolution that ranges between 25 km or 50 km, depending on conditions.

OCM is an instrument for measuring ocean color and aerosols. It is an evolution of the previous OCM instruments already flown on Oceansats 1 and 2. The instrument operates in visible and near infra-red portions of the electromagnetic spectrum, using 13 narrow-bandwidth channels. It scans using a "pushbroom" technique, providing 6000 pixels per line. The resolution of the instrument is 360 m or 1080 m, depending on conditions.

SSTM, the sea surface temperature monitor instrument, works alongside OCM. It has a 2-channel radiometer which makes measurements at both 11 and 12 μm wavelengths. This can resolve down to 0.15 K (0.15 $^{\circ}\text{C}$ / 0.27 $^{\circ}\text{F}$) at a mean temperature of 300 K (~27 $^{\circ}\text{C}$ / ~80 $^{\circ}\text{F}$) on both wavelengths.

The Advanced Data Collection System (also known as "Argo-3") is not a measuring instrument, but is a transponder for exchange of data messages from onboard data collection platforms. It also provides location data about the satellite. It operates at a carrier frequency of 401.65 MHz with a bandwidth of 110 kHz. This provides a data rate between 400 to 4800 bps, depending on conditions.



(Image credit: DRDO)

Launch Vehicle: PSLV-CA

This flight is a PSLV-CA ("core alone") flight, meaning that it does not feature any strap-on side boosters. In the absence of any strap-on boosters, the PSLV is a four stage rocket, using a variety of propellants.

Stage One (PS1): It uses hydroxyl-terminated polybutadiene propellant, using an S139 solid rocket motor. This stage has a 110 second burn time, with the motor featuring an efficiency of 137 seconds ISP. It has a maximum thrust of 4800 KN.

Stage Two (PS2): It uses Unsymmetrical dimethylhydrazine as fuel and N_2O_4 as oxidiser. The Vikas engine on this stage was developed by the Liquid Propulsions Systems Centre. The motor runs for a burn time of 133 seconds, with the engine having an efficiency of 293 seconds ISP.

Stage Three (PS3): It uses HTPB solid propellant, similar to the first stage, and features an S-7 engine. This stage runs for 83 seconds burn time, and the motor has an efficiency of 295 seconds ISP. Maximum thrust on this is 240 KN.

Stage Four (PS4): This is a liquid-fueled stage, using monomethyl hydrazine for fuel and mixed oxides of nitrogen for oxidiser. The stage has two PS-4 engines, each of which produce 6.6 KN of thrust. The stage runs for 525 seconds of burn time, and has an efficiency of 308 seconds ISP.



(Image credit: Everydayastronaut)

FIVE NEW SATELLITES FROM SATELLOGIC TO LAUNCH ONBOARD THE SPACEX TRANSPORTER-4 MISSION

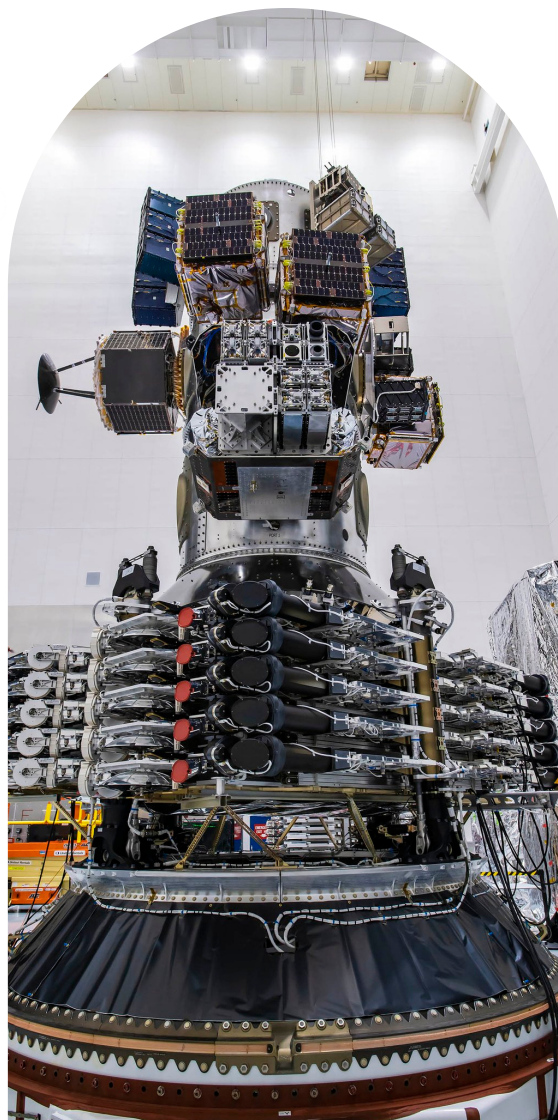
Satellogic Inc. has shipped five satellites to be launched in early April from Cape Canaveral – the launch will be part of SpaceX’s Transporter-4 mission onboard a Falcon 9 reusable, two-stage rocket, under SpaceX’s Rideshare program.

The upcoming launch includes the first deployment of Satellogic’s new Mark V satellite model. This new generation of satellites enhances the company’s constellation with improved cameras, radios, computers, and other subsystems compatible with all components from previous models, offering Satellogic’s customers higher quality products.

The remaining satellites are four updated NewSats Mark IV. These improved satellites contain increased onboard storage and upgrades to the propulsion and navigation systems. The enhancements include manufacturability and cost saving processes used in preparation for the start-up of Satellogic’s High-Throughput Plant in the Netherlands later this year.

The new Mark V model includes a new proprietary-designed multispectral camera as the primary payload that will boost image quality with 70 cm native resolution and significantly improve the Signal-to-Noise Ratio and the Dynamic Range of the images. The new satellite also increases swath by 40%, optimizing Satellogic’s constellation size while guaranteeing world remap capabilities and reducing imagery costs. The Mark V also includes a new generation of onboard computers with enhanced processing power, allowing for better operations and improved efficiency.

Satellogic’s customers have the opportunity to fly their own hardware in space onboard each NewSat Hosted Payload bay without the purchase of an entire satellite. This bay’s modular design and standard interface definition facilitate hardware integration in the company’s manufacturing plants, provide transparent operations for customers, and optimize time to orbit from contract signature to launch date.



(Image credit: Elonx.net)

The Mark IVs include Hosted Payloads from Satellogic’s customers and the company’s last-mile testing of future payloads, including onboard edge computing for customers who want to run their algorithms where data is generated, and future radio frequency (RF) products. With this Hosted Payload, Satellogic will begin to equip its satellites with a payload that enables its constellation to geolocate devices that emit RF signals.

This launch is part of Satellogic’s previously announced plans for 2022 and will expand Satellogic’s fleet to 22 satellites delivering high-resolution data from space. Satellogic plans to launch up to 12 additional spacecraft later this year, offering up to seven daily revisits of any point of interest, which would result in a total of 34 commercial satellites in orbit by first quarter of 2023.

The company intends that its constellation will include over 200 satellites by 2025, providing Satellogic with the capacity to remap the entire Earth daily. By democratizing EO imagery, Satellogic is able to serve previously underserved verticals, and partner with US government and Dedicated Satellite Constellations customers around the world, to provide new insights into the occurrence and progression of economic activities, security risks, and natural events unfolding across the globe.

NASA & AXIOM PLANNED FOR 1ST PRIVATE ASTRONAUT MISSION TO ISS

Axiom Space Mission 1

Type: Tourism

The first-ever private mission to the International Space Station (ISS) will be taking off soon. Planned and organised by the private space company Axiom Space, this mission will bring a collection of researchers into space to conduct key studies and experiments in the special circumstances space provides. Axiom-1 (the name given to this first mission) has received permission from NASA and has secured a Dragon spacecraft from SpaceX.

This is obviously a big event, marking the start of commercial space travel, but when will it happen, who will be taken on the flight and what is their purpose on-board? We have answered these questions and more below.

When will the flight take place?

The flight was originally planned for the end of 2021 but has now seen a few delays. The team seemed settled on a late March launch but that has now been moved back. We'll now see Axiom-1 launch on April 3. Most of these delays were due to additional preparations that were needed as well as space station traffic management.

The mission is expected to be 10 days long, giving the team enough time to perform their experiments and research on the ISS.

Who will be on the flight?

The crew that will be taken on this flight has now been announced. Originally, Tom Cruise and Doug Liman were suggested as part of a plan to film in space. However, the full crew now includes Michael López-Alegría as the Spacecraft commander, Larry Connor as the Pilot and Mark Pathy and Eytan Stibbe as Mission Specialists.

While this will be the fifth spaceflight for Michael López-Alegría, for the other three members of the crew this will be their first flights. Michael is a former NASA pilot and now the vice president for Axiom Space. Connor, Pathy and Stibbe are all investors and philanthropists.



(Image credit: Spacefocus.com)

What is the purpose of the Axiom-1 flight?

Axiom Space is a company that is focusing on making space travel more commercially available. With the Axiom-1 flight, this will be the first private mission to the International Space Station. By making space travel more commercially viable, Axiom Space is hoping to improve our understanding of space and the human body by bringing researchers into space.

While on the ISS, the crew members won't just be taking in the expansive views, they will be conducting research into science, education and outreach. Axiom claims this will include 100 hours of human-tended research across approximately 25 different experiments. Each passenger will be undertaking a different key research.



(Image credit: Spacefocus.com)

****Note: Launch dates of missions are scheduled to be launched in April 2022 but may subject to change.**

ASTRONOMICAL EVENTS - APRIL 2022

LYRIDS METEOR SHOWER

The Lyrid Meteor Shower is usually active between April 16 and 25 every year. It tends to peak around April 22 or 23.

Oldest Recorded Meteor Shower

Named after constellation Lyra, the Lyrids are one of the oldest recorded meteor showers—according to some historical Chinese texts, the shower was seen over 2,500 years ago. The fireballs in the meteor shower are created by debris from comet Thatcher, which takes about 415 years to orbit around the Sun. The comet is expected to be visible from Earth again in 2276.

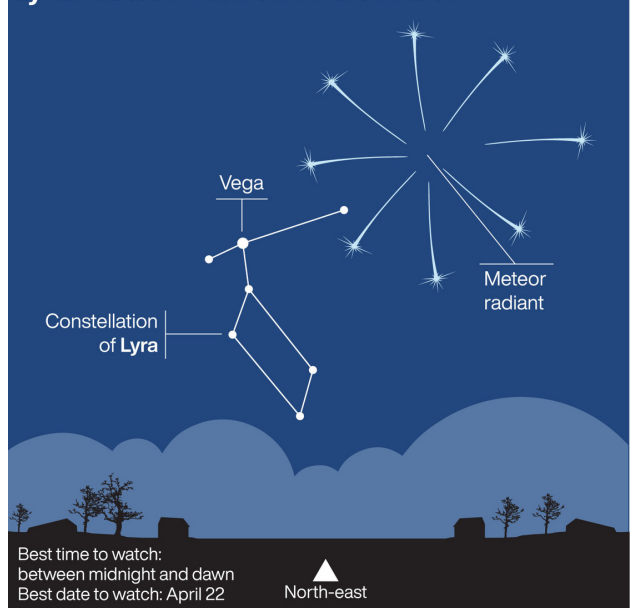


How to See the Lyrids

You don't need any special equipment or a lot of skills to view a meteor shower. Even though all you really need is a clear sky, lots of patience, and our handy Interactive Meteor Shower Sky Map with a visibility conditions meter to see a meteor shower, the following tips can help maximize your shooting star viewing experience.

- Find a secluded viewing spot, away from the city lights. Once at the venue, your eyes may take 15 to 20 minutes to get used to the dark.
- Dress for the weather, and make sure you are comfortable, especially if you plan to stay out long. Bring a blanket or a comfortable chair with you—meteor watching can be a waiting game.
- Once you have found your viewing spot, lie down on the ground and look at the sky. You can use any Interactive Meteor Shower Sky Map or the table to find the direction of the radiant; the higher the radiant is above the horizon, the more meteors you are likely to see.
- Meteor showers appear to originate from the radiant, but meteors can appear in any part of the sky.

Lyrid meteor shower: where to look



(Image credit: timeanddate.com)

MERCURY AT GREATEST EASTERN ELONGATION

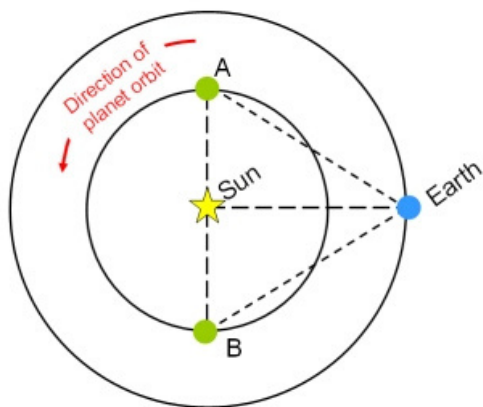
Best day to observe mercury



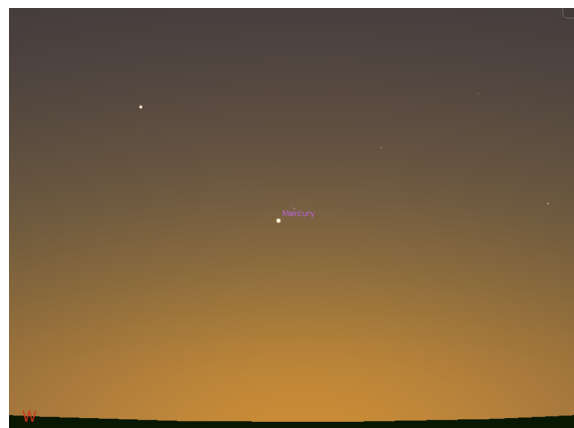
(Image credit: Stellarium.org)

What's Elongation

Astronomers use the word elongation to describe the angular distance - the distance on the sky's dome - between the sun and one of the inner planets in our solar system, Mercury or Venus. Elongations are measured in degrees eastward or westward of the sun. Greatest elongations signal the best time to observe one of the inner planets. At greatest elongation, Venus or Mercury is typically farthest from the sun's glare.



The position of an inferior planet at greatest western elongation (position A) and greatest eastern elongation (position B). In both cases, the elongation measured is less than 90 degree.



(Image credit: Stellarium.org)

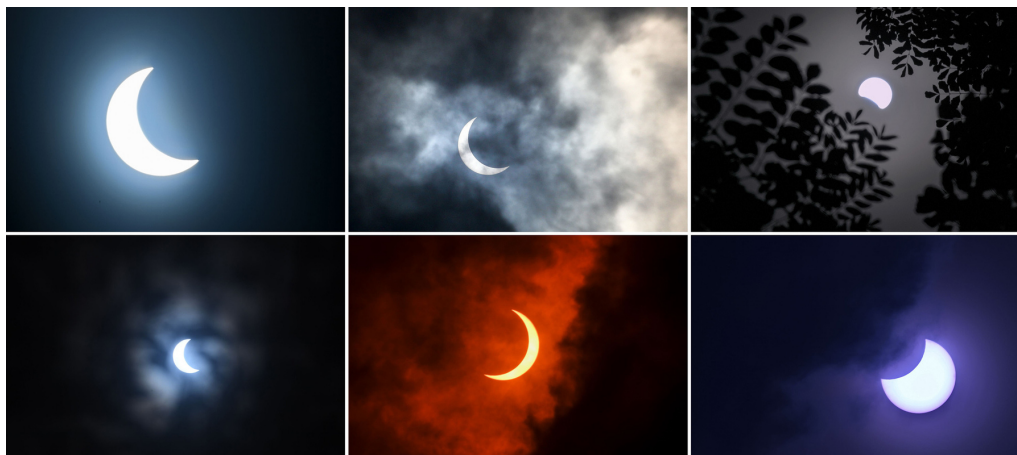
Greatest Eastern Elongation

On April 29, 2022 The planet Mercury reaches greatest eastern elongation of 20.6 degrees from the Sun. This is the best time to view Mercury since it will be at its highest point above the horizon in the evening sky. Look for the planet low in the western sky just after sunset.

"Maximum & Minimum Angular distance of Mercury from the sun (seen from the Earth)at greatest elongation are 28 & 18degrees respectively."

PARTIAL SOLAR ECLIPSE OF APRIL 30, 2022

This partial solar eclipse is visible from the southeast Pacific, and south of South America. But the eclipse path doesn't fall on one of Earth's most populated regions.



Eclipses in 2022

Two solar and two lunar eclipses are going to occur this year. The first solar eclipse will occur on April 30, 2022. After 15 days, on May 15, the year 2022 will witness the first lunar eclipse. The last solar eclipse of 2021 will be seen on December 4.

The eclipse which is going to happen on 30th April will be partial one. A partial solar eclipse occurs when only the penumbra (the partial shadow) passes over you. In these cases, a part of the sun always remains in view during the eclipse. How much of the sun remains in view depends on the specific circumstances.



(Image credit: time.com)

"This eclipse is a member of a semester series. An eclipse in a semester series of solar eclipses repeats approximately every 177 days and 4 hours (a semester) at alternating nodes of the Moon's orbit"

Saros 119

It is a part of Saros cycle 119, repeating every 18 years, 11 days, containing 71 events. The series started with partial solar eclipse on May 15, 850 AD. It contains total eclipses on August 9, 994 AD and August 20, 1012, with a hybrid eclipse on August 31, 1030. It has annular eclipses from September 10, 1048, through March 18, 1950. The series ends at member 71 as a partial eclipse on June 24, 2112. The longest duration of totality was only 32 seconds on August 20, 1012. The longest duration of annularity was 7 minutes, 37 seconds on September 1, 1625. The longest duration of hybridity was only 18 seconds on August 31, 1030.

Metonic series

The metonic series repeats eclipses every 19 years (6939.69 days), lasting about 5 cycles. Eclipses occur in nearly the same calendar date. In addition, the octon subseries repeats 1/5 of that or every 3.8 years (1387.94 days). All eclipses in this table occur at the Moon's ascending node.

CONJUNCTIONS FOR THE MONTH

Conjunction - Occasionally two or more objects meet up with each other in our sky. Astronomers use the word conjunction to describe these meetings. Technically speaking, objects are said to be in conjunction in that instant when they have the same right ascension on our sky's dome. Practically speaking, objects in conjunction will likely be visible near each other for some days.

The word conjunction comes from Latin, meaning to join together. Maybe you remember the old Conjunction Junction cartoons from the 1970s. In language, conjunctions relate to clauses brought together in sentences with words like and. In astronomy, conjunctions relate to two or more objects brought together in the sky.

An astronomical conjunction describes a few different types of meetings. The first two types we're describing here - inferior and superior conjunctions - involve the sun and thus can't be seen.

Conjunction of Mars and Saturn

Date: 5th April, Planets Saturn, & Mars will align in the early morning sky. Look towards east before sunrise.

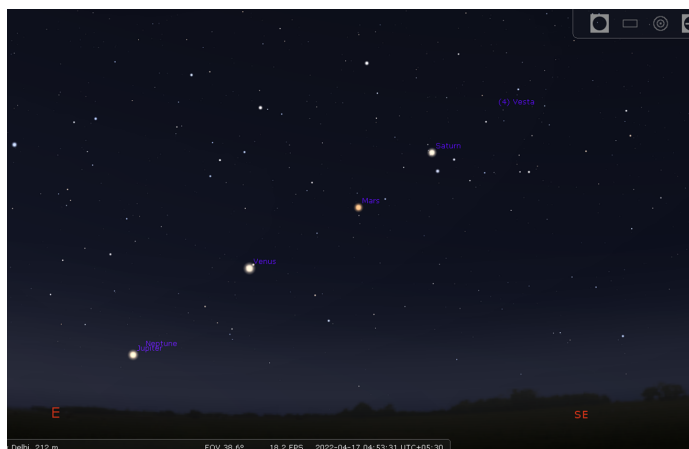


Place: Chennai / Date: 5th April / Time: 4AM

(Image credit: Stellarium)

Conjunction of Vesta with Venus, Mars, Jupiter and Saturn

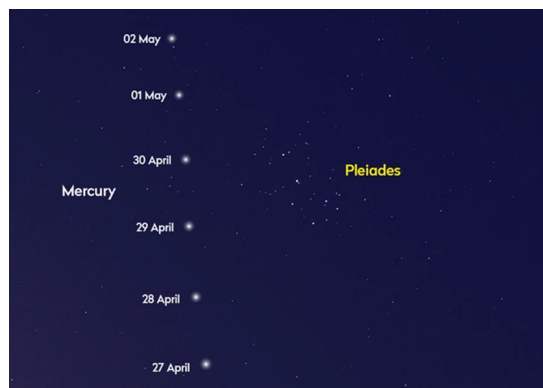
Date: 17th April, planets such as Venus, Mars, Jupiter and Saturn will align at almost Equidistant distance along with Asteroid Vesta before sunrise.



(Image credit: Stellarium)

Conjunction Mercury and Pleiades

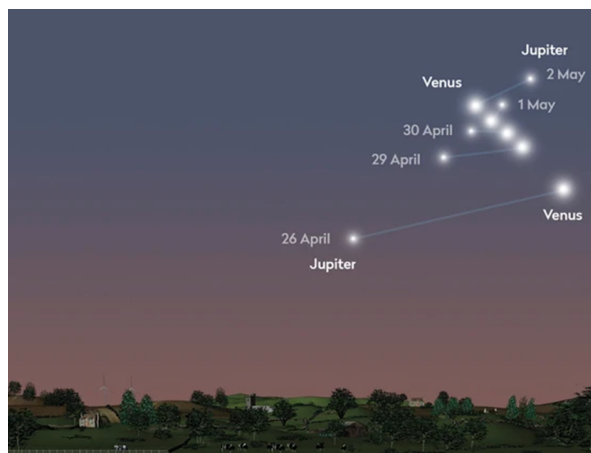
Date: 29th & 30th April, Mercury sets approximately two hours after the Sun at the end of April, that time it will appear near to the Pleiades open star cluster.



(Image credit: Skyatnight.com)

Conjunction of Venus and Jupiter

Date: 30th April & 1st May, Venus has a spectacular morning conjunction with Jupiter at the end of April and into early May. Visible in the morning sky approximately 30-45 minutes before sunrise. Closest apparent separation of 22' 43" occurs on 1 May.



(Image credit: Skyatnight.com)

STUDENT'S CORNER

Know about the Kardashev Scale in search for extraterrestrials

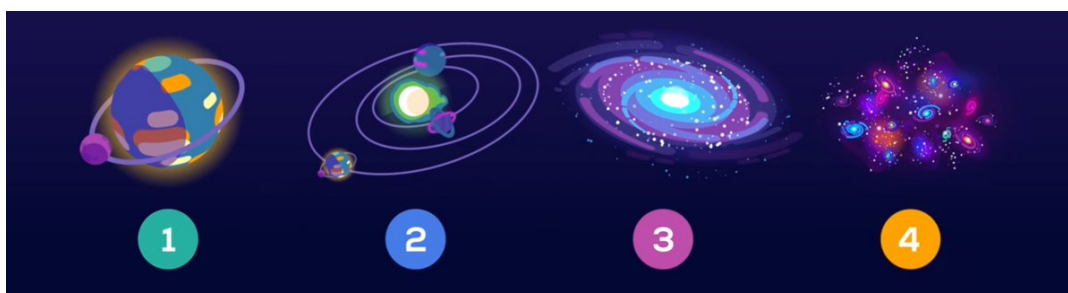
Sourajit Mandal

iAstronomer member, Space India.



With the advancement of space science and research, the humans believe in the presence of extraterrestrials in the outer world. These extraterrestrials can be either superior or inferior to us in terms of intelligence. They could be friendly or harmful. But the possibilities are endless.

In order to further progress in the search of extraterrestrials what we should first realize is the fact that there can be various levels of civilization present in the vast universe. These levels can be categorized according to the use of their energy in order to survive. First proposed by Russian astrophysicist- Nikolai Kardashev in 1964, the Kardashev scale is a scale of measuring the energy usage of a civilization. This scale would help us in understanding the possibility of existence of extraterrestrials in our universe. This scale originally had 3 types,



Type 1- A civilization that is using all the energy of its home planet.

Type 2- A civilization that is using all the energy of its home star. It would most likely have built a Dyson Sphere in this stage.

Type 3- A civilization that is using all the energy of its home galaxy. It would probably have built many Dyson Spheres in this stage.

To bring more accuracy, subscales were added. We humans proudly stand into our position in the Kardashev scale- 0.75!

After Kardashev proposed the theory more hypothetical scales have been added. Now, finally we have types till 6 in the Kardashev scale.

Type 4- A civilization that controls and uses the energy of the entire universe.

Type 5- A civilization that controls and uses the energy of multiple universes.

Type 6- A civilization that uses and controls the entire multiverse. It is capable of creating and destroying its own universes.

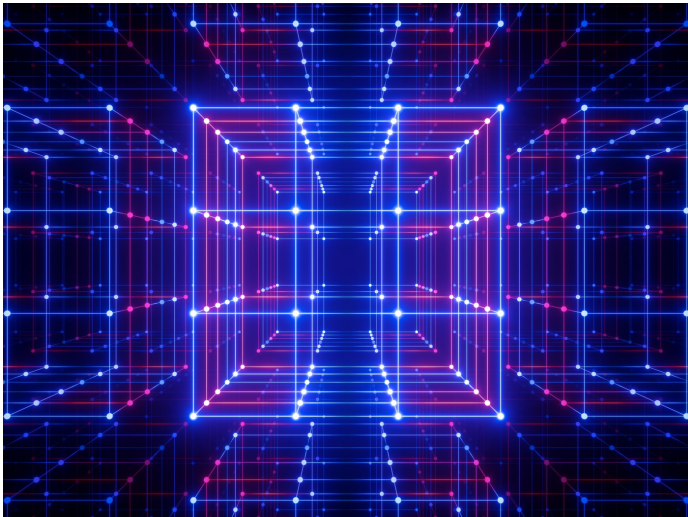
The concept of Kardashev scale, though hypothetical would help the scientists to estimate and further develop the idea of alien civilizations and give us an idea of our own future.

“Think outside the Tesseract”

Paavni Mehrotra

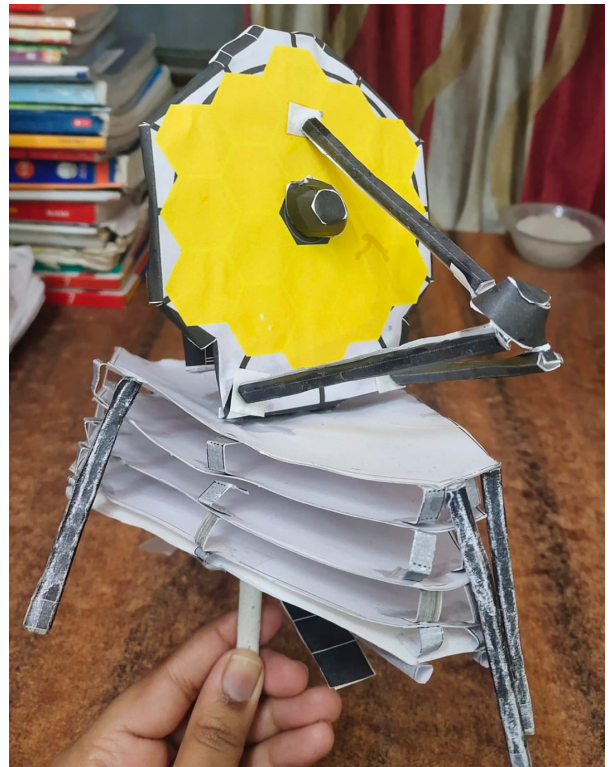
iAstronomer member.

Hollywood blockbuster *Interstellar*, dimensions are a complicated yet mind-boggling concept. Not only do they exist in our mathematics syllabus in school, but play a significant role in answering some unsolved mysteries today. In physics and mathematics, the dimension of a mathematical space or object is defined as the minimum number of coordinates needed to specify any point within it. A line would have one dimension because only one coordinate is needed to specify a point on it. Whereas, a concrete surface would have a dimension of two because two coordinates are needed to specify a point on it. In classical mechanics, space and time are different categories and refer to absolute space and time. The infamous conception of the world being a four-dimensional space has gained unexpected popularity over the recent years. The four dimensions of spacetime consist of events that are not absolutely defined in terms of space, but rather are known relative to the motion of an observer.

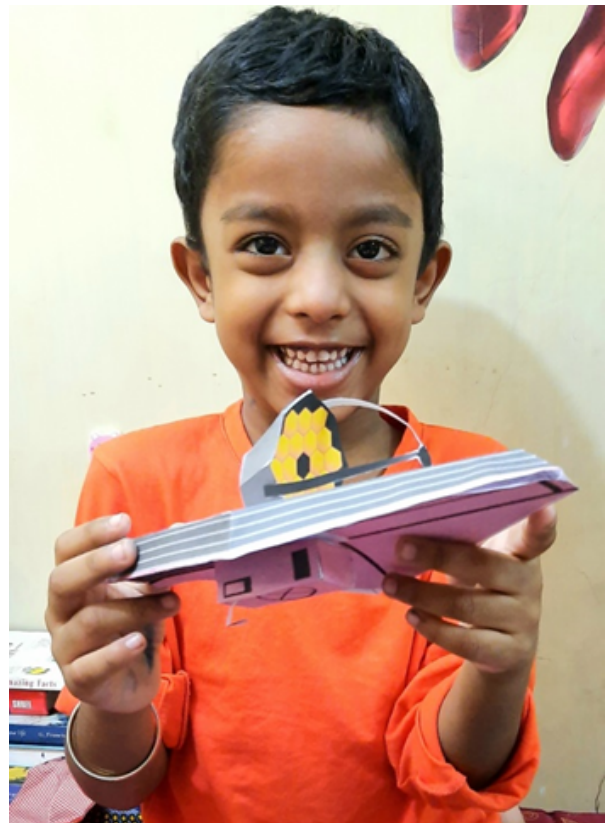


Research has been done on whether the laws of physics permit time travel, but no firm answers have been established till date, with debate being common among scientists of opposing opinions. A rotating black hole could connect myriads of wormholes to different parts of space-time geometry. A journey to the past violates the law of causality, which requires that the cause of an event always precedes the effect. However, it is only imposed by logic and rational reasoning, and not the theory of relativity. Upon deep pondering and deliberation, one could assume that a black hole could be a sort of time travel machine. Nonetheless, a journey back through time is an affront to common sense, yet time paradoxes have been pleasantly represented in works of science-fiction. Take the blockbuster *Interstellar* as a prime example. Starring Anne Hathaway and Matthew McConaughey, the film revolves around the team’s journey through a wormhole,

JWST by spacians



Meera Singh
iAstronomer member.



Chiranjeev Logesh
iAstronomer member.



Impacts of Space Exploration

Hasini Krishna

iAstronomer member.

Space Exploration plays a major role in our life and it is disappointing that many of us do not realize this even though we are part of the current generation. Throughout the years multiple arguments were made related to the impacts of space exploration. Even though only 0.48 % of the government spending goes into space exploration, people still argue that the money that goes into space exploration should be given to the poor. Despite all this, understanding the positive and negative impacts of space exploration from different perspectives can help us improve on it for the better.

If we look at the impacts from an environmental and social perspective there are quite a few negative impacts. From an environmental perspective, a lot of resources get wasted if a mission fails, such as chemicals that's are used for research purposes, etc. Space debris is another problem that can cause huge issues and problems to the environment. If space debris increases, it can hit the earth causing disturbance to the environment. Both of these examples are hazardous and dangerous for humans. To understand the impacts that it creates from a social perspective we need to understand what social perspective actually means. It has to do with the society, social structures and other important ideas. Many of our cultural beliefs about the astronomy and space might be different from the what is really true about the universe (according to our current research). This can affect the beliefs that certain people might have and can negatively impact the people who believe in their cultural beliefs. Additionally, this can affect a person's identity and arguments about this can cause chaos.

Nevertheless, space exploration is not all that bad. It has positively impacted our lives; we just have not noticed it! From an economical perspective, space exploration can really help space flight companies like Virgin Galactic who have been able to send people to space, make more money and develop into a bigger and better company. The knowledge that we have acquired from space exploration is vital if we want to reach space. To add on, space exploration has also helped us come up with some amazing technology which can help us save money, here is an example, Shock absorbers for buildings can protect buildings that are in earthquake prone areas.

This was originally designed to protect space shuttles during their launch. Reconstruction after a disaster can become expensive but this piece of technology can help save lives and expensive expenses! From a political perspective, space exploration can help countries to come together for example the collaboration between NASA (USA) and ROSCOSMOS (Russia) for the creation for the ISS was able end the Cold War between these two countries. Space exploration can also help in globalization and can strengthen the relationship between countries too!

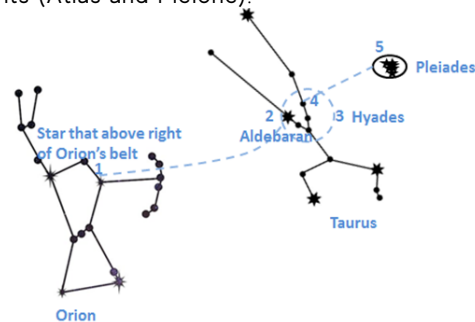
To conclude, space exploration does have a few negative impacts, but we can work on them to turn them into a positive impact, in addition, understanding both of them from different perspectives can help us explore space in a much better way.

JOURNEY TO THE PLEIADES

Sajan Saravanan

iAstronomer member.

Pleiades is a hundred-million-year-old open star cluster in Taurus constellation. The Pleiades or Seven Sisters is the most well-known star cluster in the night sky which is a group of stars that are formed from the same huge cloud of dust and gas. The Pleiades found within the constellation Taurus marking the bull's shoulder. The cluster is made up of 100s of stars; six of them are visible to the naked eye. Telescopes reveal nine bright stars in the cluster which are seven divine sisters and two parents (Atlas and Pleione).



Steps to find Pleiades:

1. Find Orion by looking three stars marking Orion's belt then look for the star that lies above right of Orion belt.
2. Trace the curved line through the sky along Orion's out stretched arm and continue the line little further until it reaches a star that is red in colour called Aldebaran.
3. We can form a V-shaped group of stars from Aldebaran in the Taurus constellation known as Hyades (star cluster).
4. Next look at the star that marks the bull's other eye at the other side of the V-shape.
5. Trace a line from that Taurus eye, until it reaches a very bright cluster of stars called Pleiades.

Terraforming the Barren Planet - MARS

Sourajit Mandal

iAstronomer member.

Have you ever thought of colonizing Mars? Let us suppose you have, and you thought that must be way too difficult. If you did, you are absolutely WRONG! We only need time and money to colonize Mars.

So first let's know some of the basic geography of Mars. Mars has two poles like most planets in our solar system. However, it has just got a little special feature than other planets. Its poles have ice! That too, the ice is not of carbon or any other element, it has water!

Do you know about the story of Goldilocks? Goldilocks was not able to bear the too hot or too cold porridges and was not able to bear the too hard or soft beds. The same condition is applicable in Space too. Life does not form in too hot or too cold areas. The zone where life can form is therefore called by the scientists as the 'Goldilocks Zone'. The position of Mars in our solar system is towards the edge of this Goldilocks Zone. This creates a possibility for the existence of life on Mars. Keeping these factors in mind, with the help of our current technologies we can attempt to make Mars a self-sustainable planet for our existence. The attempt to create a habitable place on a different planet is known as 'Terraforming'.

To terraform Mars, first we have to make oceans there. As I told you Mars has polar ice caps, we can melt those to get oceans. For melting them we have to make specialized swarm robots with solar panels. The robots will have eight arms each. The arms will tightly grab the ice and create a pressure. The robots will convert solar energy to heat energy and melt the ice, thereby making a stretch of water body. This might take some months. Then we will wait until the oceans naturally spread over along the planet forming continents in between.



Once oceans are formed, the next step will be leaving large amounts of cyanobacteria in the Martian oceans. Billions of years ago, the conditions on Earth were mostly like that of Mars. In the oceans many anaerobic bacteria developed the ability to make their own food by using sunlight and formed what is known today as 'cyanobacteria'.

When some of these floated above in the water they attained a new ability, photosynthesis. At that time the atmosphere had a lot of carbon dioxide and nearly no oxygen. With the new ability, they could use the available carbon dioxide, and make more oxygen, therefore bringing a huge change in the atmosphere. When other bacteria ate cyanobacteria, they also gained the ability to do photosynthesis. These cells were the chloroplasts of the present-day plants. Using this fact, if Cyanobacteria's are left in the oceans of Mars, they will produce oxygen the natural way. However, this would be a slow process. So, we can also use the method of electrolysis in the water to produce some oxygen artificially. After this we can start planting trees and plants in the Martian soil.

We will now have to plant plants that require less nutrients or are genetically modified plants. We will take Rhizobium bacteria there to decompose dead plants. After some years the soil will be fertile enough to plant more plants. After this Mars will be completely terraformed.

But wait, there's more! During the whole process we have to take greenhouse gases there to trap heat. Without it our oceans will freeze. Mars' surface temperature is normally -60°C .

We must also remember here that due to Mars' distance from the sun and the smog created by the greenhouse gases, the sunlight reaching the surface of Mars might be near to nil. To resolve this problem, we will use a series of convex and concave lens. Using the idea of how satellites keep rotating our Earth and do not fall on them, we will launch these glasses in a position where Mars' gravity will make it rotate forever. These glasses will be reflecting the sunlight with more intensity on the surface of Mars.

After all the things are done, we will send humans there. If a person's normal weight is 80 Kgs on Earth, it will become 2.66 times lesser in Mars which will affect the muscles and bones. To overcome the problem, we have two ways: 1. increasing our weight for 2.66 times (which is not possible) 2. or exercising a lot. If generations of humans are born in Mars then evolution would take place. The people there will have lighter and taller bodies. They will also use the most oxygen available to them.

The entire process of terraforming will take around 5 generations. This terraforming will make humans an interstellar species. Once terraformed, it will also help Earth repair itself as millions of people will go to Mars.

Rocket Trash

Hridhaan solanki
iAstronomer member.

Rockets will probably stand first in a competition of the most important technology we have. It is the launcher of satellites, rovers, telescopes and more. Without them, there is no way we could launch these types of equipment into space. Satellites, for example, are sent through rockets and they are used from finding black holes to knowing if it will rain tomorrow. Rovers, like curiosity which is sent from a rocket, is used to study martian conditions which is the basis of making successful Martian colonization.

This may sound incredible, as it is, but Unfortunately, it has a dark side. There is a simple rule for making victorious rockets, the More the fuel, the weight and more the weight, the more the fuel needed. Due to this rule, it is impossible to send rockets. So, we have made such rockets that when the fuel of a tank is over, the tank drops off as there is no need to carry the weight of the empty tank. This technique is the very root of the problem. While some of these discarded fuel tanks crash into earth, most of these are stranded in the earth's orbit at the speed of ~23000 miles per hour which is faster than the speed of a gunshot.

This junk is very dangerous. Scientists predict that there are trillions of suck pieces. These pieces are not dangerous by themselves but they can be very destructive if they hit one of the satellites orbiting earth. Due to the immense speed, being hit by debris the size of a pea would be like being hit by a plasma gun. Destruction is already happening, each year 3-4 satellites are destroyed by sick pieces.

The debris might hit a satellite which then becomes more debris which hit more satellites and make more debris, It's like a chain reaction. As space is very empty, the first few collisions would be rare but soon it will pick up pace.

For example, the First time 1 satellite is destroyed, next 10, then 50, until none are left. If all satellites are destroyed, we would be back to the life of the 19th century and no rockets would be able to launch for decades, ultimately, destroying humanity's dream about space exploration. Dreams of mars and moon colonisation might be set back for centuries to come. Still, it's not too late to fix our mess. Scientists have certain ideas regarding it.

The most common way is direct capture and return missions which are being tested now. This is about just sending a satellite with a net to directly catch the debris and bring it back to earth. Another option includes giant electromagnets missions. As most of the debris is made of metal, we can put a giant electromagnet in orbit which can be used to deflect the debris towards earth, this is a pretty better option as unlike direct capture, it never "touches" the debris and prevents being more trash itself. Yet another option includes satellites with lasers! The lasers can be used to vaporize small objects and for big objects they can be used to deflect the object into a safer orbit. Whatever technique we use, we must do something fast as this problem is as big as the problem of plastic pollution.

Astrophotographs by students



Tanisha Kumar iAstronomer member.



Saran Suryakodi iAstronomer member.



Kanishk Rai
iAstronomer member.



Kavitha
iAstronomer member.

HISTORICAL EVENTS THAT HAPPENED IN APRIL

THE PIONEER 11

April 5, 1973: NASA launched Pioneer 11 on an Atlas-Centaur launch vehicle managed by NASA's Glenn Research Center. NASA's Pioneer 11, a sister spacecraft to Pioneer 10, was the first spacecraft to study Saturn up close. The mission ended in 1995 and Pioneer 11 is on a trajectory to take it out of the solar system.

- Pioneer 11 is one of five spacecraft on a trajectory that will take them out of our solar system.
- Pioneer 11 will pass near the star Lambda Aquila in almost four million years.
- Like Pioneer 10 and Voyager 1 and 2, Pioneer 11 carries a message from humanity to the cosmos.

Pioneer 11 passed through the asteroid belt without damage by mid-March 1974. Soon, on April 26, 1974, it performed a midcourse correction (after an earlier one on April 11, 1973) to guide it much closer to Jupiter than Pioneer 10 and to ensure a polar flyby.

Pioneer 11 penetrated the Jovian bow shock on Nov. 25, 1974, at 03:39 UT. The spacecraft's closest approach to Jupiter occurred at 05:22 UT on Dec. 3, 1974, at a range of about 42,500 kilometers from the planet's cloud tops, three times closer than Pioneer 10. By this time, it was traveling faster than any human-made object at the time, more than 171,000 kilometers per hour.

Because of its high speed during the encounter, the spacecraft's exposure to Jupiter's radiation belts spanned a shorter time than its predecessor although it was actually closer to the planet.

Pioneer 11 repeatedly crossed Jupiter's bow shock, indicating that the Jovian magnetosphere changes its boundaries as it is buffeted by the solar wind. Besides the many images of the planet (and better pictures of the Great Red Spot), Pioneer 11 took about 200 images of the moons of Jupiter. The vehicle then used Jupiter's massive gravitational field to swing back across the solar system to set it on a course to Saturn.

After its Jupiter encounter, on April 16, 1975, the micrometeoroid detector was turned off since it was issuing spurious commands which were interfering with other instruments. Course corrections on May 26, 1976, and July 13, 1978, sharpened its trajectory towards Saturn.

Pioneer 11 detected Saturn's bow shock on Aug. 31, 1979, about 1.5 million kilometers out from the planet, thus providing the first conclusive evidence of the existence of Saturn's magnetic field.

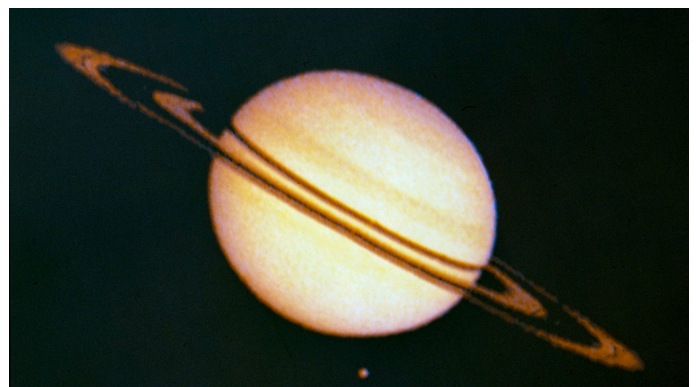
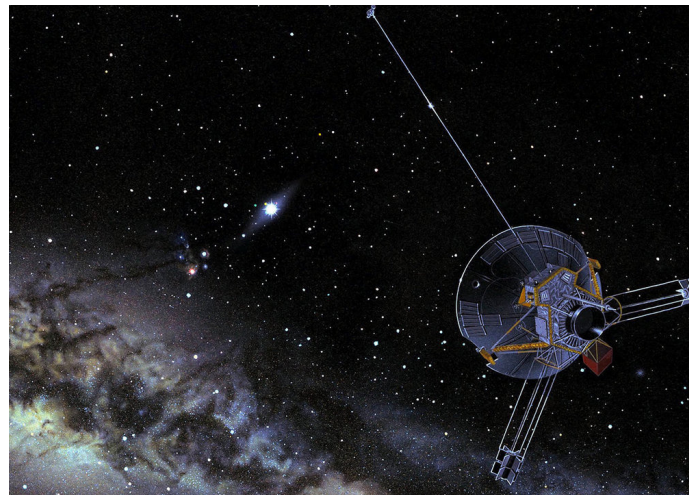
The spacecraft crossed the planet's ring plane beyond the outer ring at 14:36 UT Sept. 1, 1979, and then passed by the planet at 16:31 UT for a close encounter at a range of about 13,000 miles (20,900 kilometers). It was moving at a relative velocity of about 71,000 miles per hour (114,000 kilometers per hour) at the point of closest approach.

During the encounter, the spacecraft took 440 images of the planetary system, with about 20 at a resolution of about 56 miles (90 kilometers). The images of Saturn's moon Titan (at a resolution of 112 miles or 180 kilometers) showed a featureless orange fuzzy satellite. A brief burst of data on Titan indicated that the average global temperature of Titan was minus 315 degrees Fahrenheit (minus 193 degrees Celsius).

Among Pioneer 11's many discoveries were a narrow ring outside the A ring named the F ring and a new satellite 124 miles (200 kilometers) in diameter. The spacecraft recorded the planet's overall temperature at minus 292 degrees Fahrenheit (minus 180 degrees Celsius) and photographs indicated a more featureless atmosphere than that of Jupiter. Analysis of data suggested that the planet was primarily made of liquid hydrogen.

After leaving Saturn, Pioneer 11 headed out of the solar system in a direction opposite to that of Pioneer 10, toward the center of the galaxy in the general direction of Sagittarius.

By Nov. 5, 2017, Pioneer 11 was estimated to be about 97.590 AU (9.1 billion miles or 14.599 billion kilometers) from Earth.



(Image credit: NASA)



On April 12, 1961, cosmonaut Yuri A. Gagarin, onboard the Vostok 1 spacecraft, became the first human in space. The voyage, which began with launch at 9:07 am Moscow time, entailed one orbit around Earth, lasting 1 hour 29 minutes, and ended at 10:55 am in the Soviet Union with his safe return to Earth. It also brought Gagarin immediate worldwide fame.

The beginning of the space era for mankind

The General Assembly, in its resolution A/RES/65/271 of 7 April 2011, declared 12 April as the International Day of Human Space Flight "to celebrate each year at the international level the beginning of the space era for mankind, reaffirming the important contribution of space science and technology in achieving sustainable development goals and increasing the well-being of States and peoples, as well as ensuring the realization of their aspiration to maintain outer space for peaceful purposes."

12 April 1961 was the date of the first human space flight, carried out by Yuri Gagarin, a Soviet citizen. This historic event opened the way for space exploration for the benefit of all humanity.

The General Assembly expressed its deep conviction of the common interest of mankind in promoting and expanding the exploration and use of outer space, as the province of all mankind, for peaceful purposes and in continuing efforts to extend to all States the benefits derived there from.

The first successful launch of NASA

April 25, 1958: The National Advisory Committee for Aeronautics (NACA, now NASA) completed the first successful launch and inflation of a sphere. The sphere was 12 feet in diameter and was launched by a Nike-Cajun sounding rocket to take air density measurements. After its deployment, NACA tracked the sphere using radar and onboard instrumentation.



EVENTS BY SPACE

MESSIER MARATHON 2022 - STARGAZING AND ASTROPHOTOGRAPHY TRIP

SPACE is proud to announce about the Stargazing and Astrophotography Trip - Messier Marathon 2022 which was conducted on 26th - 27th March at two locations one Astroport, Sarika and YMCA, yelagiri hills, Tamil nadu. An expedition where you will spend the night under the pristine dark skies observing and photographing the celestial jewels. Along with that we all will be part of Messier Marathon, an annual observation event for amateur astronomers where they attempt to view all 110 Messier Objects. These objects are Deep Sky Objects (DSOs) which include Galaxies, Nebulae, and Star Clusters. March is the only month when one can observe all 110 objects in a single night from sunset to sunrise.



HIGHLIGHTS OF THE EXPEDITION

- Orientation to the night sky and basics of star gazing
- Using sky maps and Planisphere
- Constellation watch
- Hands on training on Telescopes and Binoculars
- Introduction to Messier Catalog and planning for the observation
- Messier Marathon: Hunt the 110 Messier objects from sunset to sunrise using 200mm Dobsonian telescope
- Planetary and Lunar observation
- Basics of DSLR, Practical Astrophotography, and Smartphone Astrophotography
- Observation using a computerized telescope
- Observing and capturing Milkyway Galaxy



Participants got captured under the Milkyway Arm

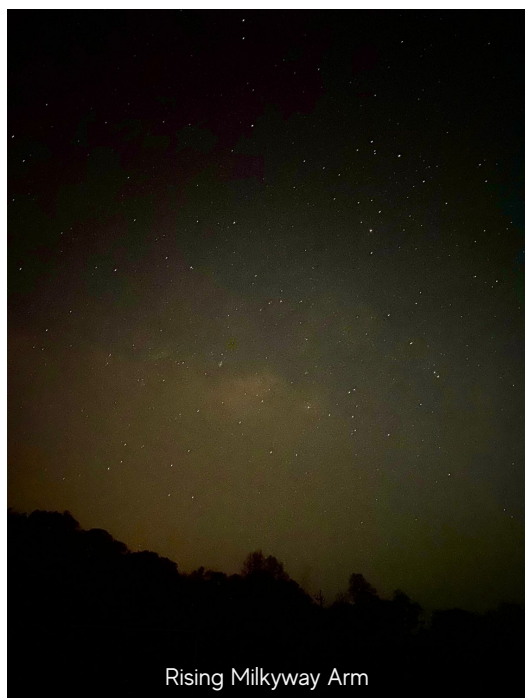
Location; Astroport Sarika



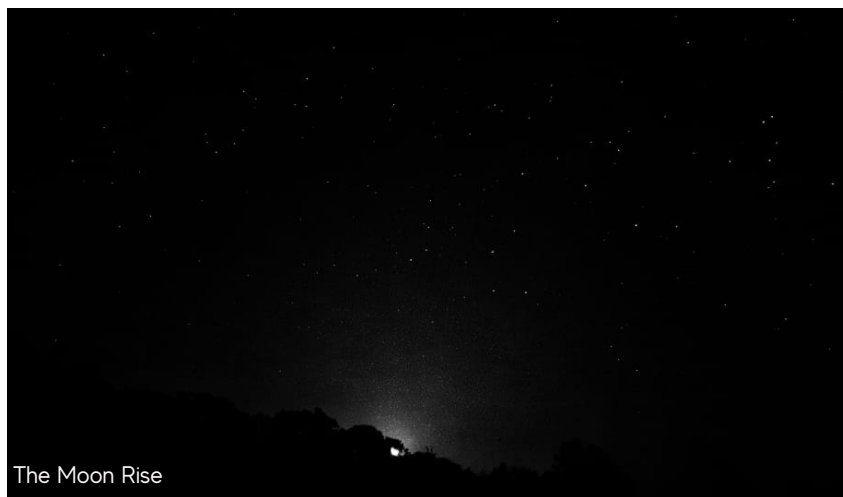
Location; YMCA, Yelagiri Hills



Astrophotographs taken during the event by the participants



Rising Milkyway Arm



The Moon Rise



Conjunction of planets Venus(Center), Mars(Top) and Saturn(Bottom)with Moon



Crescent Moon



Arm of our Milkyway Galaxy

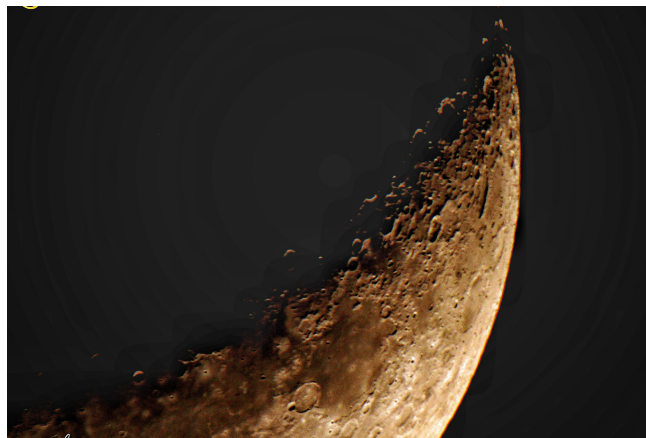
ASTROPHOTOGRAPHS BY SPACE TEAM



130EQ telescope captured in front of our Milkyway Galaxy Arm



Star Trail



Crescent Moon captured from 8inch Dobsonian telescope

**Captured by SPACE Educator Mr.Ranjith Kumar.

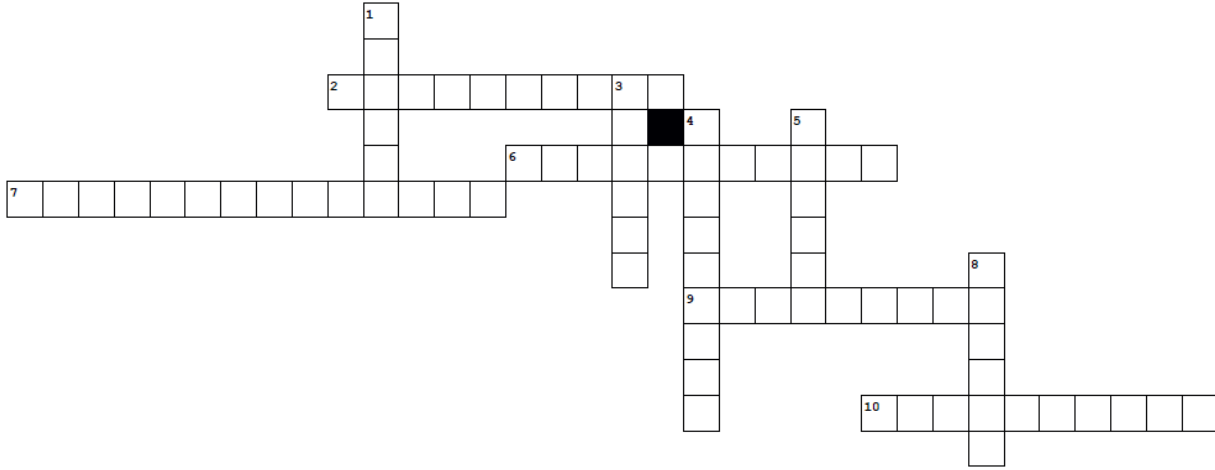


Star Trail

**Captured by SPACE Educator Mr.Yogesh Kumar Joshi.

TRAIN YOUR BRAIN

CROSSWORD



Down

1. what is the closest open cluster to our solar system?
3. Which moon is closest to orbit its planet?
4. What is the closest spiral galaxy to us?
5. Which scientist discovered that the universe is expanding?
8. An astronomer who discovered the law of planetary motion

Across

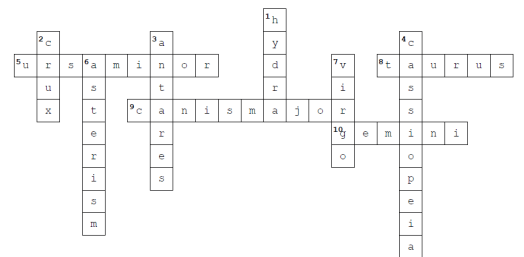
2. who is the father of Indian astronomy?
6. the nearest star-forming region to Earth
7. an open cluster in the constellation Cancer
9. the name for a meteor after it hits the ground
10. who first discovered that the earth revolves around the sun?

ASTRONOMY WORD PUZZLE

C	N	A	S	O	A	R	Y	A	B	H	A	T	A
A	H	I	H	B	A	I	G	R	E	R	R	A	B
T	S	A	C	A	N	N	O	N	S	M	E	C	U
S	H	E	N	G	L	E	T	E	G	N	I	N	R
T	G	T	N	D	H	E	A	E	C	R	S	O	B
R	U	Y	O	E	R	U	H	B	R	G	S	T	I
N	A	R	L	U	H	A	Y	C	N	R	E	W	D
H	B	H	Y	A	N	T	S	G	S	E	M	E	G
A	M	D	E	A	G	H	S	E	E	R	R	N	E
E	O	N	L	A	E	R	U	O	K	N	E	E	L
P	T	O	L	E	M	Y	A	B	T	H	S	H	E
R	A	G	A	S	N	H	E	N	B	A	A	K	E
S	Y	E	H	N	R	A	N	K	G	L	R	R	R
A	E	I	N	S	T	E	I	N	C	E	E	E	N

- ARYABHATA
- TOMBAUGH
- NEWTON
- CHANDRASEKHAR
- BURBIDGE
- PTOLEMY
- HUYGENS
- HALLEY
- MESSIER
- HERSCHEL
- HUBBLE
- LAGRANGE
- EINSTEIN
- ERATOSTHENES
- CANNON

Answers for last month puzzles.



C	O	N	S	T	E	L	L	A	T	I	O	N	N
O	R	E	A	Y	M	O	N	O	R	T	S	A	C
C	L	U	S	T	E	R	E	M	C	N	L	A	E
R	P	M	E	T	E	O	R	A	E	C	N	E	P
S	Y	E	S	R	E	V	I	N	U	E	U	E	O
C	L	R	N	S	R	E	V	O	R	R	T	E	C
O	E	C	L	I	P	S	E	S	R	R	B	S	S
S	I	D	B	I	N	O	C	U	L	A	R	S	E
M	Y	E	L	O	N	G	A	T	I	O	N	E	L
O	O	O	E	P	O	N	A	S	E	S	S	N	E
L	N	L	A	S	T	E	R	O	I	D	I	T	T
O	C	B	K	U	C	R	O	C	K	E	T	T	L
G	O	E	L	T	T	U	H	S	E	C	A	P	S
Y	O	C	C	U	L	T	A	T	I	O	N	R	M

**Answers for this month puzzles will be shared in next magazine.

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