SPACE™
EMPOWERING LIFE

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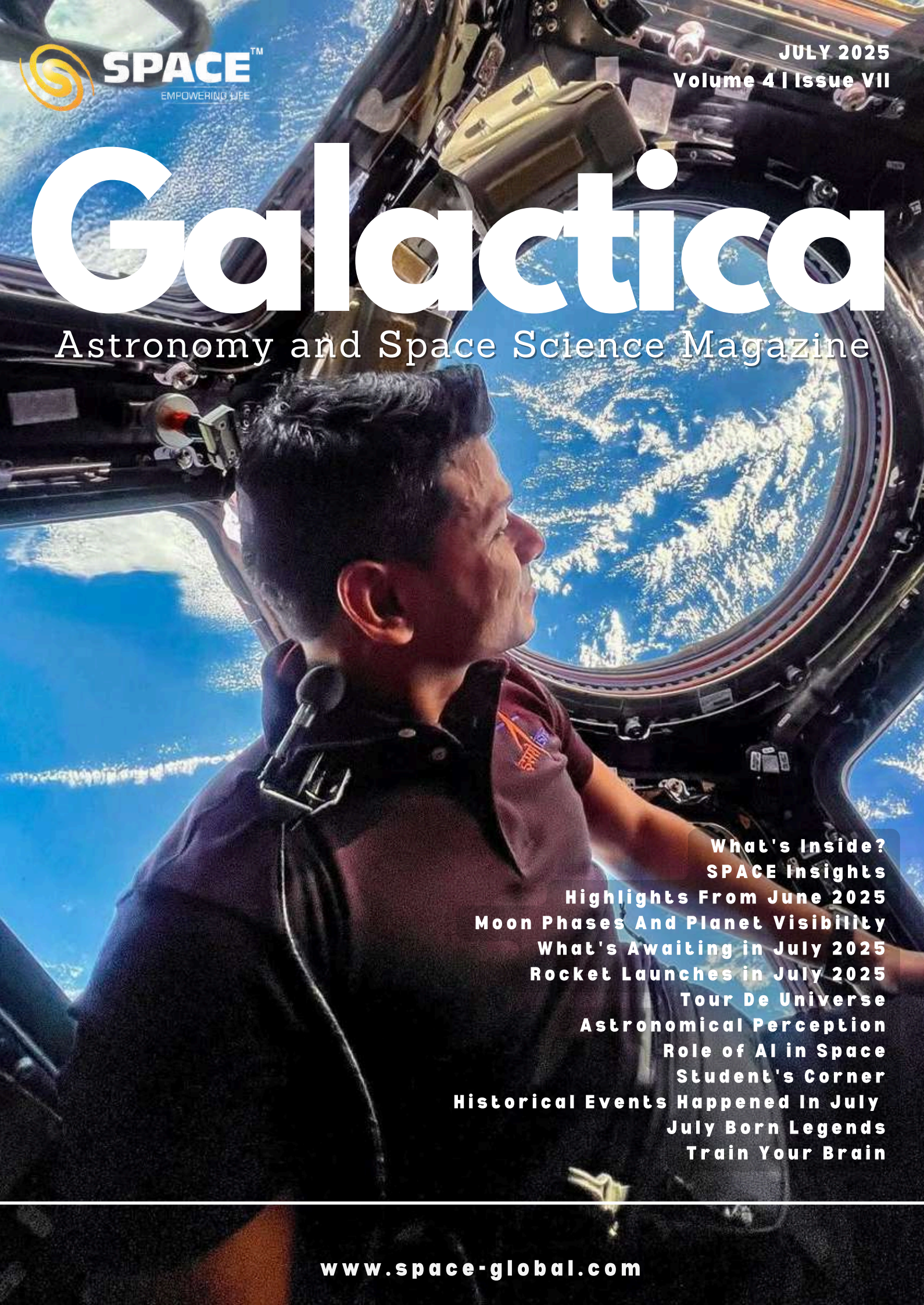
Galactica

Astronomy and Space Science Magazine



www.space-global.com

Galactica is a monthly magazine about astronomy & space science published by SPACE India targeting amateur astronomers. Each monthly issue includes astronomy news, space launches, what's up in the sky every month, events and announcements done by the space team, Astrophotographs and articles on astronomy & astrophysics submitted by the readers for the general audience, and the article about historical missions & 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.

Team

ABOUT SPACE

Legacy of 24 years | Pioneer Organization | 10000+ Activities Developed | 1000+ Schools Associated | 1.5M+ Students Engaged | 10K+ Outreach Events | 10+ Cities Presence

SPACE is the pioneer organization working towards the 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, and 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 the 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, and professional organizations, government agencies, and space observatories.

CMD's Message

Dr. Sachin Bahmba, CMD, SPACE

Space and Astronomy are 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 for students wherein they explore the real world of science, I wish for young students to let their ambitions soar and think big as they are the future of our country.

Co-founder's Message

Astronomy education is important as it builds curiosity, critical thinking, and problem-solving skills, helping young minds prepare for the future. It encourages innovation, exploration, and a scientific mindset.

Ms. Shalini Bahmba, Co-founder, SPACE

Young learners build creativity and confidence through hands-on, experiential learning, preparing them for careers in space science and technology. We aim to cultivate future innovators who will lead progress, discovery, and global advancement.

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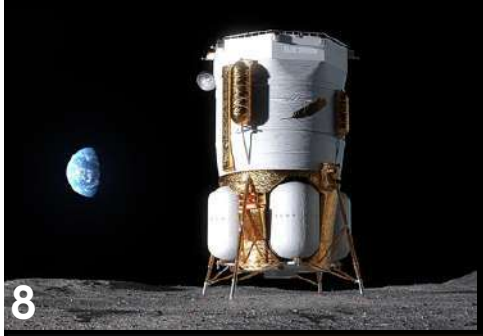

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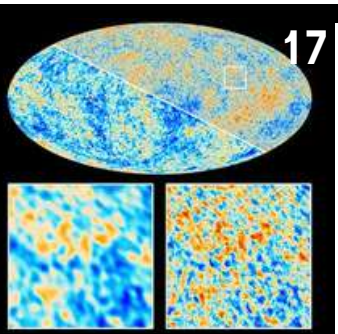
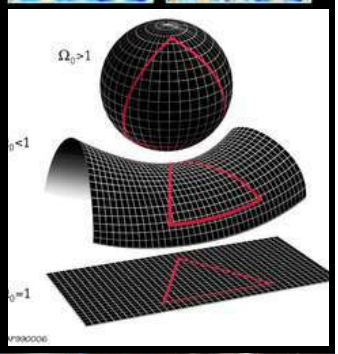
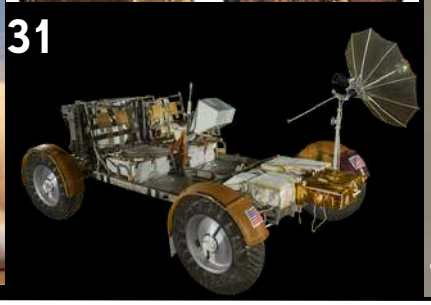
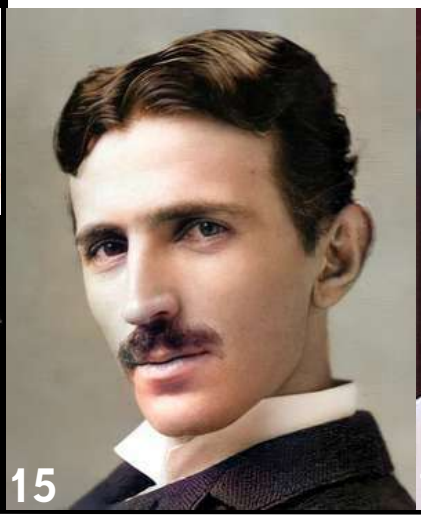








Space Insights

FROM OUR LAUNCHPAD TO A UNIVERSE OF OPPORTUNITY: SPACE SUMMER CAMP

At Space Education Foundation, our mission has always been to bring the cosmos closer to home for everyone. For over two decades, we have been at the forefront of astronomy and space science education, striving to ignite a spark of curiosity in young minds. That's why we were incredibly thrilled to partner with the visionary UCatapult Foundation for a truly special initiative this summer: a six-week virtual summer camp for the bright, aspiring students of Zilla Parishad and Ashramshala schools in rural and tribal India.

This collaboration represented a powerful synergy. Under the inspiring leadership of Dr. Sachin Bahmba (Chairman Space Education Foundation) and Ms. Prema Mishra (Founder UCatapult Foundation), has been doing phenomenal work in bridging the urban-rural education divide. Their deep-rooted presence and understanding of the needs of students in districts like Jalgaon, Nandurbar, and Gadchiroli provided the perfect platform for us to share our passion for space.

Our team at Space Education Foundation had the privilege of designing and leading sessions that took students on a captivating journey across the universe. We aimed to make complex topics like the solar system, planetary science, and stellar phenomena fun, visual, and easy to grasp, proving that a lack of fancy equipment is no barrier to exploration.

100 RURAL/TRIBAL STUDENTS | 6+ HOURS OF ONLINE ENGAGEMENT | 3+ DISTRICTS IMPACTED

A cornerstone of our contribution was the AIASC Asteroid Search Training. In this unique workshop, supported by NASA and the International Astronomical Search Collaboration (IASC), we guided students through the process of analyzing real-time astronomical data. It was a proud moment for us to see these young learners engage in authentic scientific research, contributing to a global effort to track near-earth objects. This wasn't just a lesson; it was real-world science in action, providing an unparalleled experiential learning opportunity.

This summer camp was a testament to what can be achieved when organizations with a shared vision for education come together. At Space India, we are more committed than ever to our mission of democratizing space science. We look forward to continuing this journey, fostering scientific temper, and empowering the next generation of explorers, scientists, and dreamers across India.

EXPLORING THE COSMOS: SPACE ARCADE'S MONTHLY TELESCOPIC OBSERVATION

On the night of June 28, 2025, under a gentle moonlit sky in Chennai, SPACE ARCADE conducted its Monthly Telescopic Observation session, bringing together around 30 eager participants for an immersive stargazing experience.

With the Moon and Mars on display, participants had the chance to observe stunning lunar features and glimpse the red planet through telescopes. The SPACE ARCADE team guided the group through the session, helping them operate different instruments and understand the unique features and capabilities of each telescope.

The telescope lineup included the Space Voyage 130 EQ Reflector Telescope, 8" SCT Computerised Goto Telescope, Space launcher 76mm reflector telescope and Space launcher 60mm Refractor telescope, giving attendees a hands-on understanding of how various optical systems work in real-time observation.

Participants' Feedback

"Happy to see your team creating awareness on astronomy for the public. Thank you!" - Deva Sundaram

"Very cool experience. Please conduct more events!"- Swasthiga

From curious minds to budding astronomers, the event showcased SPACE ARCADE's passion for making astronomy accessible, engaging and educational.

Follow us on Instagram to stay updated on future events: @SpaceArcadeInd

CASAGRAND INTERNATIONAL SCHOOL EMBARKS ON A STELLAR JOURNEY WITH UITS PROGRAM

Space India is thrilled to announce the successful launch of the Universe in the School (UITS) program at Casagrand International School. This marks the school's inaugural year participating in the program, and it has already made an inspiring beginning across all three of its Chennai campuses - Perumbakkam, Thiruvanmiyur, and Kelambakkam.

Through the UITS program, a dedicated Space India educator is assigned to each campus and conducts engaging astronomy sessions for students from Grades 1 to 9, following a carefully planned timetable. Unlike conventional teaching methods, the sessions are interactive, inquiry-driven, and brimming with hands-on experiments that bring space science to life in the classroom.

The theme for the first month was "The Sun", during which students explored a spectrum of solar concepts. Younger students learned that the Sun is a star, while older students dove into more complex topics such as solar layers, sunspots, and differential rotation.






The theme for the first month was "The Sun", during which students explored a spectrum of solar concepts. Younger students learned that the Sun is a star, while older students dove into more complex topics such as solar layers, sunspots, and differential rotation.
A variety of enriching activities were conducted, including:
·Clay modeling of the Sun
·Calculation of solar diameter
·Tracking sunspots
·Safe solar observation using tools, like solar view goggles, 50 mm telescope with solar filter, 8-inch Dobsonian telescope, pinhole projector, telescopic projection, and ball projector

The remarkable enthusiasm and curiosity shown by the students have laid a strong foundation for continued astronomical exploration. With this inspiring start, Casagrand International School and Space India aim to nurture a generation of young minds eager to explore the cosmos and driven by a passion for scientific discovery.

HIGHLIGHTS OF JUNE 2025

Vera C. Rubin Observatory: A New Eye on the Universe

First released image from the Rubin Observatory, the Trifid and Lagoon nebulae

A small section of the Vera C. Rubin Observatory's view of the Virgo Cluster

High atop Cerro Pachón in Chile stands one of the most powerful astronomical tools ever built the Vera C. Rubin Observatory. Named after pioneering astronomer Dr. Vera Rubin, whose work provided early evidence for dark matter, this revolutionary observatory is set to transform our understanding of the cosmos.

What sets the Rubin Observatory apart is its ambitious mission the Legacy Survey of Space and Time (LSST). Over the next 10 years, it will map the entire visible southern sky every few nights using the largest digital camera ever constructed, a 3.2-gigapixel marvel capable of capturing vast swaths of sky in exquisite detail.

On June 20, 2025, the observatory began its first full science operations, marking the start of a new era in astronomy. Within just days, it released its first images, capturing over 10 million galaxies and unveiling stunning views of nebulae like the Trifid and Lagoon Nebulae. Even more astonishing, it detected over 2,100 previously unknown asteroids, including several near-Earth objects a significant leap forward for planetary defense.

But the observatory's goals go far beyond stunning images. By collecting an unprecedented volume of data, it will help scientists investigate dark matter, dark energy, and the cosmic structure of the universe. Its real-time alert system will flag supernovae, asteroid movements, and other celestial events as they happen creating a dynamic, time-lapse view of the changing night sky.

What makes Rubin truly extraordinary is its promise to democratize science. Its data will be freely available to researchers and students around the world, turning the universe into a global classroom.

With its eyes on billions of stars and galaxies, the Vera C. Rubin Observatory is a discovery engine and a powerful tribute to a woman who changed astronomy forever.

AXIOM-4: India's Return to Human Spaceflight After 41 Years

Welcomed by the Expedition 73 crew with celebrations, hugs, and zero-gravity drink, the Axiom-4 spacecraft successfully docked with the International Space Station (ISS) on June 26, 2025, carrying Peggy Whitson, Shubhanshu Shukla (India's first astronaut aboard ISS), Slawosz Uznanski, and Tibor Kapu with toy swan named "Joy" flew aboard as a symbolic fifth crew member.

Arrival to ISS-
Hours after docking, the crew began familiarization and initiated microgravity research. Notably, Shukla slept for long hours over in the Crew Dragon spacecraft during different segments of the mission. Ax-4 is the most science-intensive private mission to date, featuring 60 experiments from 31 countries.

India's Goals?
ISRO-has lined up 7 Major Projects to be performed by Shubhanshu Shukla, designed to support India's upcoming Gaganyaan objectives which will majorly focus on crew health, food sustainability, and biotech solutions in microgravity.

1.Space Microalgae: Investigates how edible microalgae grow and metabolize in microgravity and radiation, with potential for oxygen production and nutrition systems.

2.Myogenesis: Uses human muscle stem cell cultures to study muscle regeneration & mitochondrial activity, testing supplements for space-induced muscle mechanisms.

Credits:newindianexpress

3.Sprouts: Examines seed germination, growth, and genetic expression to assess crop viability and crew nutrition.

4.Voyager Tardigrade: Studies survival, revival, reproduction, and transcriptomic responses of tardigrades in microgravity
5.Voyager Displays: Analyzes astronauts' cognitive and visual interactions with electronic screens, critical for interface design in microgravity.

6.Cyanobacteria in Microgravity: Compares metabolic and proteomic responses of cyanobacteria grown with urea or nitrate, considering their use in life-support and carbon recycling.

7.Food Crop Seeds: Monitors growth and yield parameters of various crop seeds, essential for future space farming capability.

8. STEMonstrations: These will include four different STEAM outreach activities for Indian students.

Strategic impact:
It would be pioneering operational experience in microgravity protocols (plant, cell, biotech), providing data essential for India's 2026–27 crewed mission

For India, Axiom 4 is the first ISS mission by an Indian since 1984, fortifying Gaganyaan planning, space farming protocols, and bio-innovations.
This mission will not only provide the reference data for Gaganyaan mission, but will also be the gateway for Indian human space program era in future.

From left are, Pilot Shubhanshu Shukla from India, Commander Peggy Whitson from the U.S. and Mission Specialists Sławosz Uzanański-Wiśniewksi from Poland and Tibor Kapu from Hungary.Credits:Axiom Space

NASA'S PUNCH SPOTS SOLAR BLASTS

NASA's Polarimeter to Unify the Corona and Heliosphere (PUNCH) mission a quartet of suitcase sized satellites launched on March 11, 2025 has captured its first views of colossal solar storms, known as coronal mass ejections (CMEs).

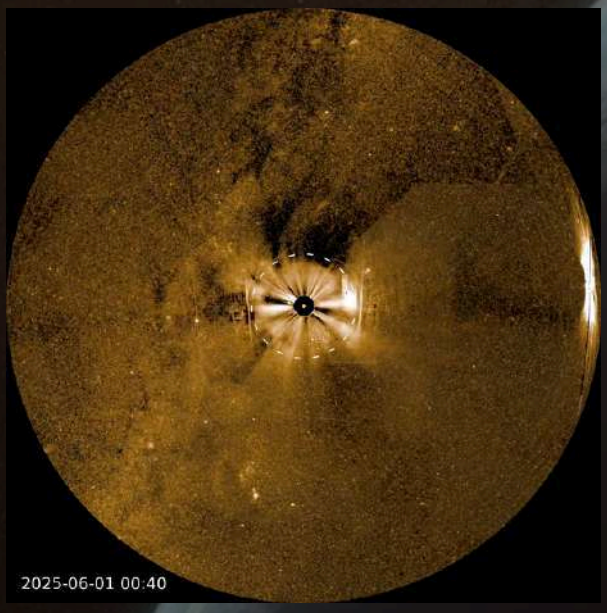
Lashed by streams of plasma and magnetic fields, these eruptions can disrupt satellites, GPS, power grids, and endanger astronauts but also fuel magnificent auroras on Earth.

During late May into early June, PUNCH's three Wide Field Imagers recorded multiple CMEs sweeping out in all directions, creating a mesmerizing time-lapse halo around the Sun amidst background landmarks like the Moon, Venus, Jupiter, and Orion. Meanwhile, its Narrow Field Imager (a built in coronagraph) blocked the Sun's glare to highlight finely detailed, bulb-shaped ejections seen on June 3.

PUNCH functions as a "virtual instrument," combining data from all four satellites in sun-synchronous orbit to deliver 3D, wide-field perspective of the Sun's corona and emerging solar wind.

Principal Investigator Craig DeForest emphasized that while these first images are amazing, the mission's true strength lies ahead, once satellites align precisely and data pipelines mature enabling routine, real-time space-weather tracking across the inner solar system.

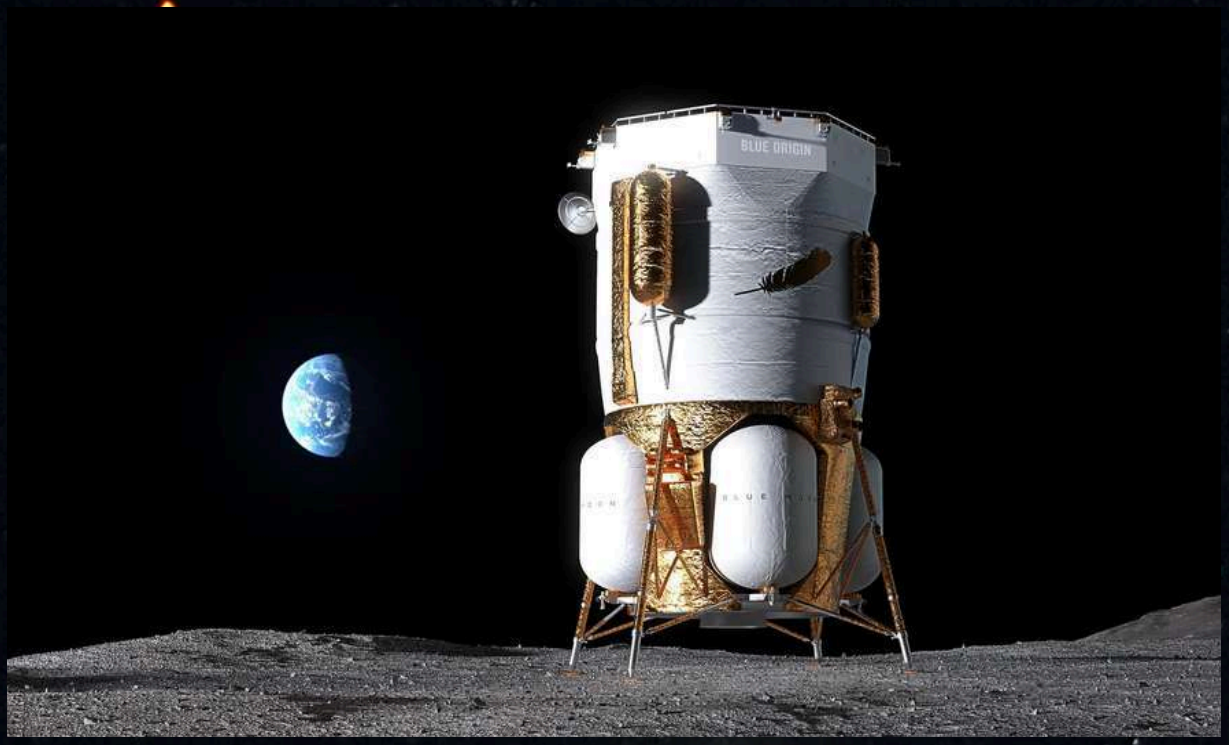
As Solar Cycle 25 nears peak activity, PUNCH's ability to monitor CMEs in 3D is vital. It not only offers spectacular visuals but strengthens our capacity to predict and mitigate space-weather hazards protecting modern technological infrastructure and someday, crewed missions into deep space.



A stunning CME (Coronal Mass Ejection) was caught by the Narrow Field Imager on one of NASA's four PUNCH spacecraft–seen rising dramatically above the blocked-out Sun. Credit: NASA / SwRI

An artist's concept shows the four satellites of NASA's PUNCH mission observing the Sun's outer atmosphere, the corona. Credit: Southwest Research Institute

BLUE ORIGIN CHARTS A NEW COURSE TO THE MOON



Blue Origin has unveiled an ambitious blueprint to establish a sustainable human presence on the Moon, introducing advanced lunar landers and a novel "Transporter" tanker system. Central to this vision is the Blue Moon Mark 2 lander, designed to deliver up to 30 metric tons of cargo or accommodate four astronauts on the lunar surface.

Complementing it is the Mark 1, a robotic lander capable of transporting up to 3 metric tons, serving both as a technology demonstrator and a cargo delivery system.

Supporting these landers is the innovative Transporter vehicle. Launched via Blue Origin's New Glenn rocket, the Transporter collects residual propellant from the rocket's upper stage in low Earth orbit. It then transports approximately 100 metric tons of liquid hydrogen and oxygen to lunar orbit, refueling the Blue Moon landers and enabling extended missions.

These developments are integral to NASA's Artemis program, with the Mark 2 lander slated for crewed missions under Artemis V. The Transporter's capability to deliver fuel to lunar orbit is a significant step toward sustainable lunar exploration.

Blue Origin's comprehensive approach, combining advanced landers with orbital refueling infrastructure, marks a pivotal advancement in lunar exploration. By addressing the challenges of fuel logistics and payload delivery, the company is laying the groundwork for a sustained human presence on the Moon.

TRANSPORTER-14: A COSMIC FAREWELL

In a heartfelt fusion of science and sentiment, SpaceX's Transporter-14 mission lifted off on Monday, June 23 at 2:25 p.m. PT from Vandenberg Space Force Base in California, carrying more than 150 capsules of cremated remains and DNA samples into space.

The memorial payload, arranged by Houston-based company Celestis, was part of their Perseverance Flight, a symbolic mission of remembrance. Since 1994, Celestis has specialized in launching human and pet remains, as well as DNA from loved ones and celebrities, on spaceflights, celebrating lives through cosmic journeys.

This particular flight included a wide range of memorials, from everyday space dreamers to sci-fi legends like Gene Roddenberry and Nichelle Nichols. In partnership with the European aerospace firm The Exploration Company (TEC), the payload flew aboard TEC's Mission Possible capsule, marking the firm's first customer payload delivery to orbit.

The hand-off of Celestis' Perseverance Flight Payload at The Exploration Company's Munich facility. (Image credit: TEC)

Once deployed into low Earth orbit, the memorial capsules completed several orbits of the planet before reentering the atmosphere. The capsule then splashed down in the Pacific Ocean, where it was recovered and the flown capsules returned to families as space-traveled mementos.

Among the stories that flew was that of Matteo Barth, a 3-year-old boy from Germany, who became the youngest European to send DNA into space, joining his late grandfather in a symbolic tribute of generational connection and exploration. This was Celestis' 12th "Earth Rise" mission and 25th overall, turning remembrance into a journey among the stars.

WHAT'S UP IN THE SKY - JULY 2025

LUNAR CALENDAR

IMPORTANCE OF MOON PHASES FOR STARGAZERS

One might wonder why it is important to refer to moon phases for star gazing. The reason is that the phases of the Moon reflect 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 the 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 offers a time to zoom in and witness the features of the Moon.

PLANETS VISIBILITY

Mercury
Greatest eastern elongation (25.9°) on 4 July, poorly located in evening sky.

Venus
In conjunction with Uranus 4 July and near M35 on 31 July.

Mars
The Red Planet is poorly positioned in the evening sky, making it a bit tricky to spot.

Jupiter
May be visible low above northeast horizon from mid-July in the dawn twilight.

Saturn
Improving morning planet, reaching 34° altitude under relatively dark twilight on 31 July.

Uranus
Conjunction with Venus on 4 July. Reaching 16° altitude at the end of the month.

Neptune
Very near Saturn. Reaches 30° altitude under darkness by the end of the month.

BRIGHT DEEP SKY OBJECTS

Butterfly Cluster also known as M6 is located in Scorpius constellation with an apparent magnitude of 4.2. It is visible to naked eye under dark sky and is excellent binocular target. It is around 100 million years old located 1600 light years away from Earth.

North America Nebula also known as NGC 7000 or Caldwell 20 is located in Cygnus constellation with apparent magnitude of 4 and is best observed from Northern Hemisphere. To the naked eye, M24 will only appear as a bright patch of stars.

NGC 6205 or Hercules Cluster is located in Hercules constellation and is best observed from northern Hemisphere. It has an apparent magnitude of 5.8. It is 23000 light years away and stands out beautifully in binoculars as a fuzzy ball of light.

NGC 6523 also known as Lagoon Nebula is best observed from both hemisphere. It is found in the Sagittarius constellation and has an apparent magnitude of 6.0. The object is easily distinguishable with binoculars. This emission nebula is located 4000 light years away. We can use a small telescope for detailed view.

EYES IN SPACE - JUNE 2025

NASA's Webb Digs into Structural Origins of Disk Galaxies

A team of astronomers has used NASA's James Webb Space Telescope to study 111 edge-on disk galaxies spanning over 11 billion years. These galaxies, like our Milky Way, often feature two distinct stellar disks – a thick and a thin one. e researchers discovered that the thick disk forms first, followed by the thin disk, and the timing of this transition depends on the galaxy's mass. Massive galaxies developed thin disks earlier, around 8 billion years ago, while smaller ones followed later.
The findings support the "turbulent gas disk" scenario, where early star-forming turbulence gives rise to thick disks. As star formation stabilizes the gas, thinner disks form. This study offers crucial insights into how galaxies – including our own – evolved, bridging the gap between the early universe and today's galaxies. Webb's sensitivity and resolution have made it possible to distinguish these structures at such great distances for the first time.

Webb Telescope Captures First Direct Image of Saturn-Mass Planet

NASA's James Webb Space Telescope has made a groundbreaking discovery: a likely planet named TWA 7 b, directly imaged for the first time using the telescope's Mid-Infrared Instrument (MIRI). This Saturn-mass planet orbits the young red dwarf star TWA 7, about 34 light-years away. Astronomers detected the faint infrared glow of the planet by blocking the star's light, revealing a hidden object embedded in one of three dusty rings around the star.

Located roughly 50 times the Earth-Sun distance from its host star, the planet's position, brightness, and temperature match predictions for a young, cold planet shaping the surrounding debris disk. If confirmed, this marks Webb's first direct planetary image and the lightest planet ever seen using this method. The discovery offers new insights into planetary formation and the role such planets play in sculpting their cosmic environments. Further observations are planned to confirm the planet's nature.

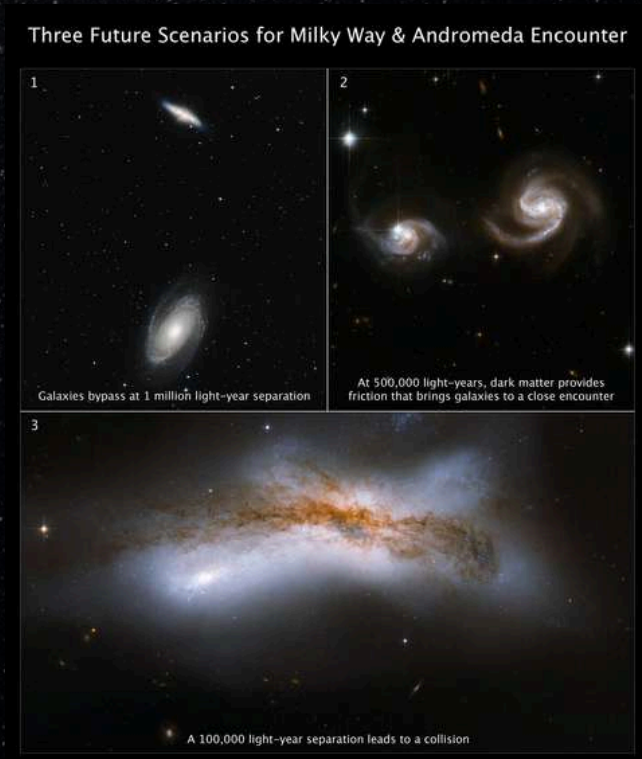
Stellar Light Shines on Sombrero Galaxy in Webb's Near-Infrared View

The iconic Sombrero galaxy, located 30 million light-years away, has received a fresh look through NASA's James Webb Space Telescope. Observed in near-infrared light using Webb's NIRCam, the galaxy's glowing central bulge stands out, while its surrounding dust disk appears less prominent. This is because near-infrared wavelengths pass through dust more easily, allowing more starlight to shine through.
Visible nearly edge-on from Earth, the Sombrero's tilted inner disk and varied globular clusters hint at a turbulent past possibly the result of ancient galactic mergers.

Each of the galaxy's roughly 2,000 globular clusters shows different chemical signatures, supporting this theory.
The new image also reveals red giant stars and distant galaxies in the background, enriching our understanding of stellar evolution and galactic structure. By studying such galaxies across multiple wavelengths, astronomers gain vital insights into the formation and history of cosmic systems.

Hubbles New Data Casts Doubt on Milky Way-Andromeda Collision Fate

A new study using over a decade of NASA/ESA Hubble and ESA Gaia data shows that the predicted Milky Way-Andromeda galaxy collision is far less certain than once thought. Researchers now estimate only a 50% chance of a collision within 10 billion years, challenging earlier predictions of an inevitable merger in 4.5 billion years. Factors like the influence of the Large Magellanic Cloud and Andromeda's satellite galaxy M33 alter the galaxies' trajectories. This finding highlights the complexity of cosmic dynamics, leaving the Milky Way's fate uncertain and the future of our galactic neighborhood an open question.



Tour de Universe

Sailing the Southern Skies: The Story of Carina

The constellation Carina, whose name means "the keel" in Latin, occupies a prominent place in the southern sky, rich in history, myth, and fascinating astronomical features. Once part of the larger constellation Argo Navis–the ship of Jason and the Argonauts–Carina now sails the heavens as an independent constellation, following its division by the French astronomer Nicolas Louis de Lacaille in the 18th century.

Mythological Origins:

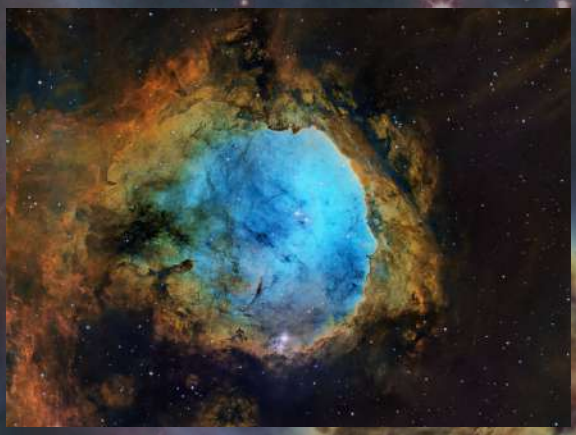
Carina's origins are deeply rooted in Greek mythology. It was originally part of Argo Navis, the grand ship that carried Jason and his crew on their quest to retrieve the Golden Fleece.

After completing their perilous journey filled with adventures, including encounters with harpies, sirens, and dragons, the gods honored the voyage by placing the ship among the stars. Due to the vast size of Argo Navis, later astronomers divided it into three separate constellations: Carina (the keel), Vela (the sails) and Puppis (the stern). Though Carina has no separate myth distinct from the ship itself, its celestial location continues to remind stargazers of the ancient stories of courage, leadership and adventure.

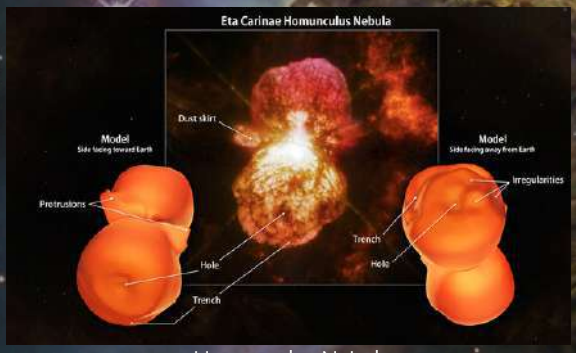
Position in the Sky

Carina is located in the southern celestial hemisphere, best observed between February and May from locations south of the equator or in low northern latitudes. It lies between the constellations Vela and Puppis and shares the sky with Centaurus and Canis Major. Carina's brightest star, Canopus (Alpha Carinae), is the second brightest star in the night sky after Sirius. With an apparent magnitude of -0.72, Canopus has long served as a key navigational star, particularly for ancient mariners.

Exploring the constellation



Gabriela Mistral Nebula NGC 3324



Homunculus Nebula

The Carina Nebula (NGC 3372)

Eta Carinae (Star System)

Carina is also home to the Carina Nebula (NGC 3372), one of the largest and brightest diffuse nebulae visible in the sky. This stellar nursery, rich in gas and young stars, presents a stunning view for both professional astronomers and amateur stargazers.

Eta Carinae and its surrounding constellation, Carina, is a treasure trove of deep sky objects – especially bright nebulae and star clusters – making it a favorite for astronomers in the Southern Hemisphere. Here are the main deep-sky objects (DSOs) in the Eta Carina region and the Carina constellation:

1. The Carina Nebula (NGC 3372)
   - Type: Emission Nebula
   - Also Known As: Great Carina Nebula
   - One of the largest and brightest nebulae in the sky, even visible to the naked eye in dark skies. It spans over 300 light-years and contains massive star-forming regions.
2. Eta Carinae (Star System)
   - Type: Luminous Blue Variable (LBV)
   - Status: A massive, unstable binary star system possibly heading toward a supernova.
   - Surrounding Nebula: Homunculus Nebula – a small, bipolar reflection nebula ejected during Eta Carinae's 19th-century outburst.
3. Homunculus Nebula
   - Type: Reflection and emission nebula
   - Associated With: Eta Carinae
   - Feature: Dusty bipolar structure surrounding Eta Carinae, formed during the "Great Eruption" in the 1840s.
4. NGC 3532 – Wishing Well Cluster
   - Type: Open Cluster
   - Magnitude: 3.0
   - Description: A brilliant open cluster of about 150 stars, appearing like a pile of silver coins – hence the name.

5 NGC 3324 – Gabriela Mistral Nebula
   - Type: Emission Nebula
   - Description: Located at the edge of the Carina Nebula, this bright nebula resembles a side-profile of a face – earning it the name "Gabriela Mistral Nebula" due to its resemblance to the Chilean poet.
   - Also Known For: Seen in Webb Telescope images in 2022.

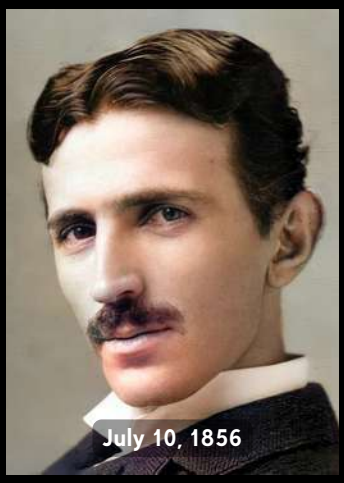
Happy Birthday

Gordon J. Stanley

Gordon J. Stanley (16 July 1746 – 22 July 1826) was a pioneering radio astronomer who co-discovered the first known radio galaxy, Cygnus A, in 1947 with John G. Bolton. His groundbreaking work helped establish radio astronomy as a crucial tool in understanding the universe beyond visible light. As director of the Owens Valley Radio Observatory, he advanced radio telescope development. Stanley's legacy endures in modern astrophysics and the study of cosmic radio sources like quasars and pulsars. (Credit: Stanley family)

Nikola Tesla

Nikola Tesla (10 July 1856 – 7 January 1943) was a visionary inventor and electrical engineer whose work revolutionized alternating current (AC) electricity. Holding over 300 patents, he contributed to wireless communication, X-rays, and electromagnetism and built the Tesla coil, still used in radio and TV technology. Though underappreciated in his time, Tesla's genius later earned him worldwide recognition. His legacy continues to inspire scientists, engineers, and inventors across generations. (Credit: reddit.com)



Giuseppi Piazzi

Giuseppe Piazzi (16 July 1746 – 22 July 1826) was an Italian astronomer and mathematician best known for discovering Ceres, the first and largest asteroid, on January 1, 1801. Initially thought to be a planet, Ceres is now classified as a dwarf planet. Piazzi's precise observations advanced celestial mechanics, and his star catalog improved stellar position accuracy. His discovery of Ceres marked a major milestone, opening a new field in astronomy and deepening our understanding of the solar system. (Credit: Wikipedia)

Happy Birthday

Jayant Narlikar

Jayant Vishnu Narlikar (19 July 1938 – 20 May 2025) was a renowned Indian astrophysicist and science communicator who challenged the Big Bang theory with the Hoyle-Narlikar theory of gravity. A Cambridge scholar and collaborator of Fred Hoyle, he proposed the quasi-steady state cosmology. He founded IUCAA in Pune in 1988 and popularized science through books, TV shows, and lectures in multiple languages. Honored with the Padma Bhushan and Padma Vibhushan, he inspired generations with his scientific and literary brilliance. (Credit: Wikipedia)

Wilhelm Bessel

Friedrich Wilhelm Bessel (22 July 1784 – 17 March 1846) was a German astronomer and mathematician who first measured a star's distance "61 Cygni", using stellar parallax in 1838. He predicted an unseen companion to Sirius, later confirmed as Sirius B. His accurate star catalogs advanced astrometry, and his mathematical Bessel functions remain vital in physics. Bessel's work bridged observational and theoretical astronomy, making him a key figure in stellar measurements and mathematical sciences. (Credit: Wikimedia)

Vera Rubin

Vera Rubin (July 23, 1928 – December 25, 2016) was an American astronomer whose study of spiral galaxy rotation curves in the 1970s provided strong evidence for dark matter. She found that stars on the edges moved as fast as those near the center, defying Newtonian physics without unseen mass. Despite gender barriers, she became a trailblazer for women in science. Her legacy endures in modern astronomy and the Vera C. Rubin Observatory named in her honor. (Credit: Carnegie Institution of Washington)

ASTRONOMICAL PERCEPTION

WHAT SHAPE IS THE UNIVERSE

For as long as humans have gazed at the stars, we've always wondered what is the true shape of the cosmos. Is space an infinite flat sheet, a vast cosmic saddle, or a colossal balloon curving back on itself. The answer isn't just about geometry it's about the fate of the universe itself.

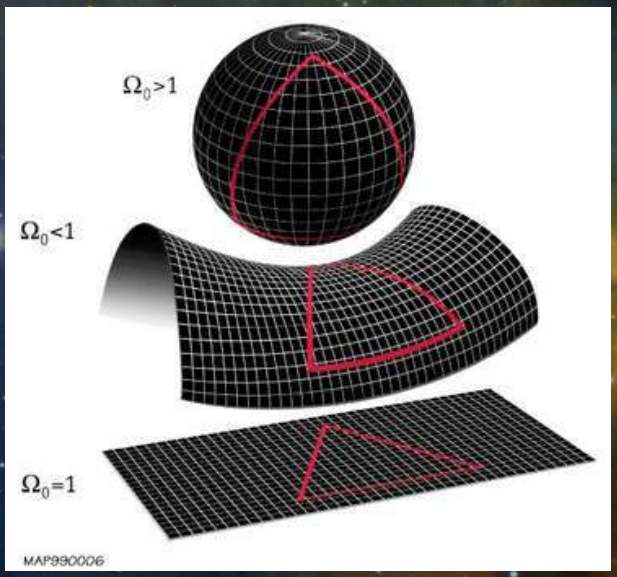
Ancient Visions: From Myths to Mathematics

Ancient civilizations imagined the universe in ways that reflected their beliefs. The Babylonians saw a celestial dome, while Greek philosophers like Ptolemy envisioned Earth encased in nested crystalline spheres. But it was Einstein who, in 1917, first applied mathematics to the question. His theory of general relativity suggested that space time could bend, twist, and even fold depending on the universe's contents.

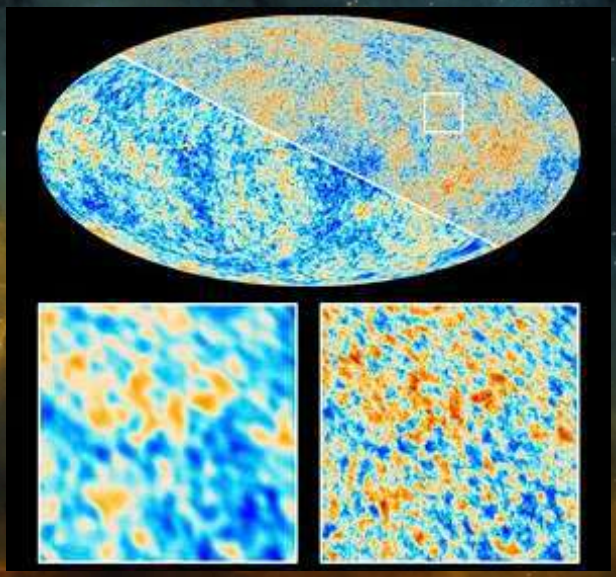
The Great Debate: Three Possible Shapes

Scientists now believe the universe could have three possible geometries, each tied to its density (**Ω**):

- **Flat (Ω = 1)** – Like an endless sheet of paper, parallel lines never meet. This is the universe predicted by cosmic inflation and supported by most observations.
- **Closed (Ω > 1)** – A spherical universe where space curves back on itself. Travel far enough, and you'd return where you started like circumnavigating a globe.
- **Open (Ω < 1)** – A hyperbolic, saddle shaped universe where space expands infinitely, stretching galaxies into eternal isolation.



The local geometry of the universe determined by the Density parameter Ω. (Credit: NASA.org)



The cosmic Microwave Background Radiation as seen by WAMP and Planck. (Credit: NASA.org)

The Experiments That Changed Everything

How do we test something as vast as the universe's shape.

- **Cosmic Microwave Background (CMB):** The afterglow of the Big Bang holds clues. In 2001, NASA's WMAP satellite measured tiny temperature fluctuations, suggesting a flat universe with astonishing precision.
- **Planck Satellite (2013):** Even more detailed CMB maps reinforced flatness but left a tantalizing hint could there be a slight curve we haven't detected yet.
- **Baryon Acoustic Oscillations:** By studying galaxy distributions, astronomers measure how space stretches, further supporting flatness.

The Twist: Is Flat Really Flat

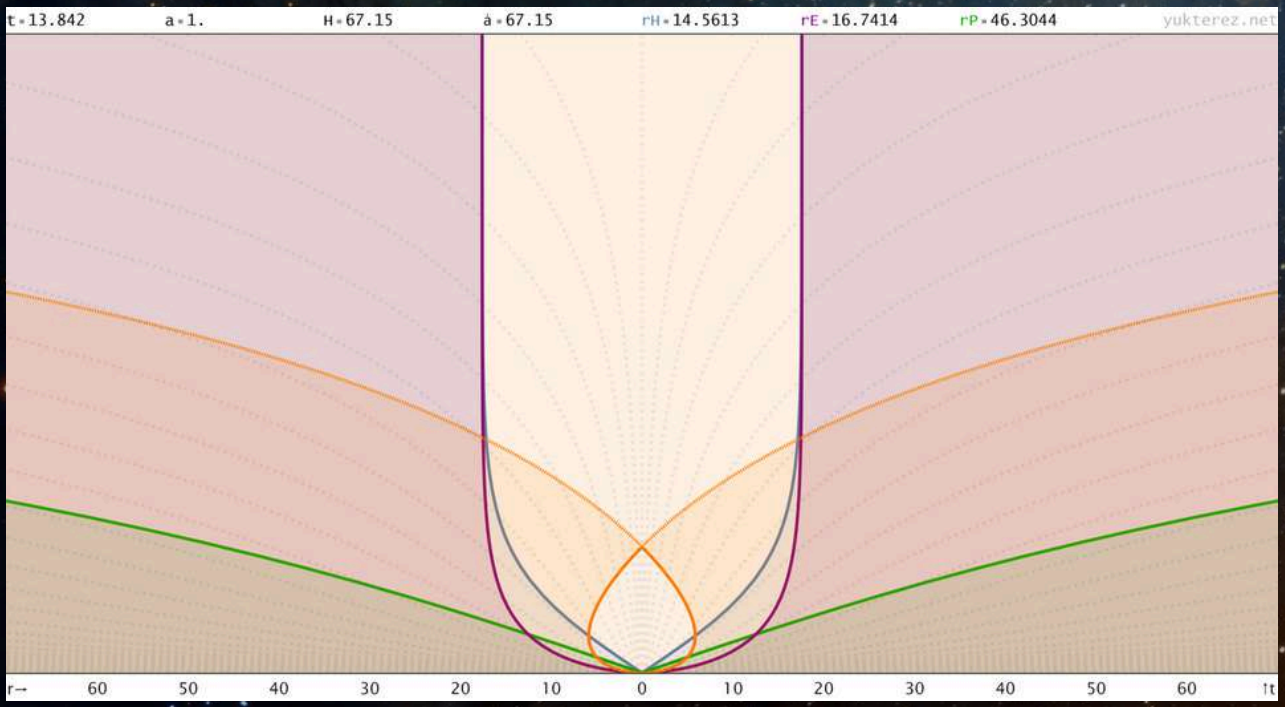
Here's the catch our universe appears flat, but is it truly infinite. Or could it be like a video game world, where traveling far enough loops you back to the start. Some theories, like the dodecahedral space hypothesis, suggest the universe might be finite yet flat in local measurements.

The Future of Cosmic Geometry

Dark energy complicates things. If it accelerates expansion forever, even a flat universe could become indistinguishable from an open one over trillions of years. Future missions like the Euclid telescope aim to map dark matter's influence, refining our cosmic blueprint.

Conclusion: The Universe's Greatest Illusion?

For now, the evidence leans toward flatness but sometimes science do thrives on mystery. Maybe Aristotle was wrong about the Aether, but his instinct was right space is never just empty. It's a dynamic, bending stage where the greatest show of the universe itself unfolds.



Proper Distance spacetime diagram of our flat ΛCDM (Lambda cold dark matter) universe. (Credit: flrw.yukterez.net)

Role Of AI in Space

The Final Algorithm: AI's Role in Space Gaming

Step into the future of gaming, where artificial intelligence and space exploration collide to create thrilling cosmic adventures. From managing spacecraft and colonizing distant planets to making first contact with alien civilizations and navigating wormholes, the experiences are as vast and varied as the universe itself.

OffWorld AI Robotics

Image Credits: Wikipedia

Launched in 1990, Wing Commander set new standards for space games with its cinematic storytelling and intense combat. Featuring branching missions and reactive NPCs, it introduced early forms of intelligent gameplay. Though predating modern AI, its dynamic narrative laid the groundwork for today's space sims. A major influence on games like Star Citizen, its legacy lives on in how AI shapes immersive, choice-driven space exploration experiences.

Image Credits: selfsimilar.org

Image Credits: wowroms.com

Elite Dangerous

Released in 2014, Elite Dangerous is a groundbreaking space simulation game that offers a 1:1 scale recreation of the Milky Way with over 400 billion star systems. Powered by advanced AI, the game features realistic physics, dynamic economies, and evolving NPC factions that react to player choices. Whether trading, exploring, mining, or engaging in combat, players shape their own path in a living galaxy. Its intelligent systems and massive scale redefine what's possible in open world space exploration games.

Image Credits: store.steampowered.com

Image Credits: playstation.com

Image Credits: Frontier Developments

Image Credits: Steampowered

No Man's Sky

Launched in 2016 by Hello Games, No Man's Sky redefined space exploration gaming with its use of AI and procedural generation. Players can journey across a universe of over 18 quintillion unique planets—each featuring distinct landscapes, lifeforms, weather, and ecosystems. AI algorithms dynamically generate everything from alien languages to mission paths, making every player's adventure truly one-of-a-kind.

Image Credits: dlcompare.in

Image Credits: gamerant.com

Image Credits: xbox.com

Starfield

Image Credits: Wikipedia

Released in 2025 by Bethesda, Starfield is a next-generation space RPG that blends expansive world-building with AI-driven gameplay. Set in a richly detailed universe, the game features over 1,000 explorable planets, dynamic environments, and intelligent NPCs with adaptive dialogue and behaviors. AI powers procedural planet generation, mission design, and faction interactions, creating a deeply personalized experience. With its immersive storytelling, realistic space travel, and complex choices, Starfield marks a major leap in AI-enhanced space exploration games.

Image Credits: npr.org

Image Credits: pcgamer.com

Rocket launches in JULY 2025

BlueBird Block 2 #1

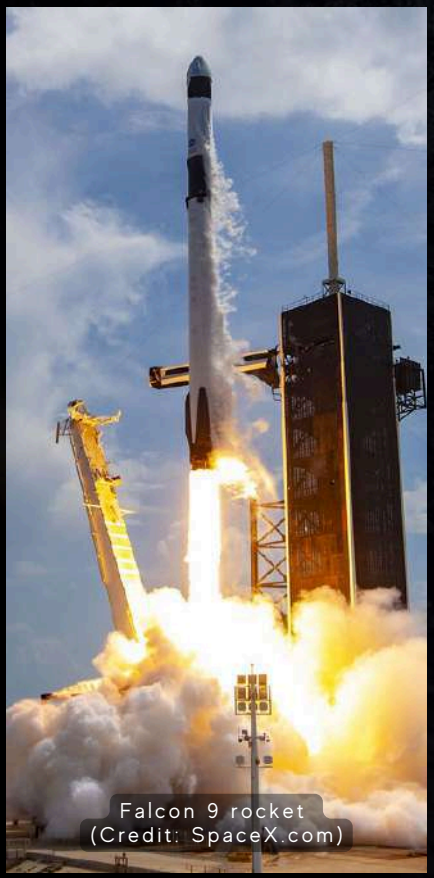
Scheduled for launch in 2025, ISRO's LVM3 rocket will deploy the BlueBird Block 2 #1 mission from Satish Dhawan Space Centre, Sriharikota.

BlueBird Block 2 #1 is a critical Earth observation satellite for India's national security and environmental monitoring. The mission features advanced imaging technology equipped with cutting edge electro optical sensors, the satellite will deliver sub meter resolution imagery for defense applications while monitoring agricultural patterns and natural resources. Its real time data transmission capabilities will enhance India's situational awareness and strategic planning.

The data collected will support both civilian and defense operations, contributing to national security and sustainable development goals.

Bluebird Block 2 #1 Satellite
(Credit: Totaltele.com)

Crew-11



Falcon 9 rocket
(Credit: SpaceX.com)

Scheduled for launch on July 31, 2025, SpaceX's Falcon 9 rocket will deploy the Crew-11 mission to the International Space Station from Kennedy Space Center, Florida.

Crew-11 is a critical crew rotation mission for NASA's Commercial Crew Program, ensuring continuous human presence in space. The mission features SpaceX's upgraded Crew Dragon spacecraft, designed for long duration orbital operations and advanced scientific research.

Equipped with life support systems and thermal protection, the spacecraft will transport four astronauts to conduct over 200 microgravity experiments. Its autonomous docking capabilities and real time health monitoring ensures mission safety and operational efficiency.

The crew's research will focus on biomedical science, material physics, and Earth observation, benefiting global health and technology development.

Bion-M No. 2

Scheduled for launch in July 2025, Russia's Soyuz 2.1a rocket will deploy the Bion M No. 2 biosatellite from the Baikonur Cosmodrome in Kazakhstan. Bion M No. 2 is a state of the art spacecraft designed to advance biological research in space, with a focus on the effects of microgravity and cosmic radiation on living organisms.

Equipped with specialized habitats, the satellite will carry mice, microorganisms, and plant samples to study physiological changes, genetic adaptations, and long term spaceflight impacts. Its advanced life support systems and real time monitoring capabilities will provide critical data on bone density loss, muscle atrophy, and cellular responses to radiation key challenges for future deep space missions. The mission paves the way for safer, longer duration crewed missions to the Moon, Mars, and beyond.

Soyuz-2.1a Rocket
(Credit: NASA.org)

Ionosfera-M 3 & 4

Soyuz 2.1b/Fregat-M Rocket
(Credit: NASA.org)

Scheduled for launch in July 2025, Russia's Soyuz 2.1b/Fregat-M rocket will deploy the Ionosfera-M 3 & 4 satellites from the Vostochny Cosmodrome. These advanced scientific satellites are designed to study Earth's ionosphere a critical layer of the upper atmosphere that influences radio communications, satellite navigation, and space weather effects.

Equipped with high precision plasma sensors, electromagnetic field detectors, and solar radiation monitors, the Ionosfera M satellites will investigate ionospheric disturbances, solar terrestrial interactions, and geomagnetic storms in unprecedented detail.

Their data will enhance the accuracy of global navigation systems, improve space weather forecasting, and support research on atmospheric anomalies affecting aviation and spacecraft operations. Helping scientists better understand and predict space weather's impact on Earth's technological infrastructure.

CO3D & MicroCarb

Scheduled for launch in July 2025, ESA's Vega C rocket will deploy the CO3D and MicroCarb satellites from Europe's Spaceport in Kourou, French Guiana. CO3D is an Earth imaging system comprising two satellites equipped with advanced optical instruments. These will generate ultra precise 3D terrain models with 50 cm resolution, revolutionizing urban development, disaster management, and environmental monitoring.

This mission, carries breakthrough spectroscopy technology to measure atmospheric carbon dioxide with unprecedented accuracy. As the first European satellite dedicated to monitoring CO_2 sources and sinks, it will provide essential data for climate research and empowering policymakers, scientists, and civil protection agencies worldwide.

Vega C rocket
(Credit: jeff Foust)

USSF-106


VC4S Rocket
(Credit: SpaceX.com)

Scheduled for launch in July 2025, United Launch Alliance's Vulcan VC4S rocket will deploy the USSF-106 mission from Cape Canaveral Space Force Station, Florida.

USSF-106 is a critical national security payload for the U.S. Space Force, designed to enhance space domain awareness and secure military communications. The mission features advanced surveillance technology to monitor orbital activity and protect vital space assets from emerging threats.

Equipped with cutting edge sensors and encryption systems, the spacecraft will provide real time tracking of objects in geosynchronous orbit while testing next generation space situational awareness capabilities.

****Note: Launch dates of the missions are scheduled to be launched in JULY 2025 but may subject to change.**

ASTRONOMICAL EVENTS - JULY 2025

MERCURY AT GREATEST EASTERN ELONGATION

As daylight fades on July 4, 2025, the evening sky offers a rare and radiant visitor, Mercury. The smallest planet in our solar system reaches its greatest eastern elongation, shining briefly in the twilight sky. For sky watchers across the globe, this marks one of the best evenings to catch a glimpse of this elusive world before it disappears into the Sun's glare.

What Does "Greatest Eastern Elongation" Mean?
Mercury reaches greatest eastern elongation when it appears farthest to the east of the Sun in our sky, this time about 26 degrees away. Because it orbits inside Earth's path, Mercury never strays far from the Sun's position in the sky and is usually difficult to observe.
However, around elongation, Mercury pulls away from the Sun just enough to be visible after sunset, offering a unique chance to spot it in darkening twilight. Through a telescope or strong binoculars, Mercury may also reveal a half-phase, much like a miniature version of the Moon.

Why This Moment Matters?
Mercury's swift orbit and close proximity to the Sun make it one of the hardest naked-eye planets to observe. These elongations are valuable observing windows where Mercury becomes accessible for both casual observers and dedicated sky watchers. This event offers an excellent opportunity to explore planetary motion, phases, and the mechanics of inner planet orbits. Moments like these also inspire public curiosity and connect us with the ongoing rhythm of our solar system.

How and Where to See It?
Date: July 4, 2025
Time: Look 30–60 minutes after sunset, when Mercury is highest in the sky before it sets.
Location: Face west-northwest. In cities like Chennai or Cape Town, Mercury will appear low on the horizon in twilight, about 26° from the Sun.
Tools: No telescope needed! Just a clear western horizon free of buildings or trees. Binoculars can help pick Mercury out of the fading light.
Weather Tip: Be sure to check your local forecast. A few low clouds can block your view of this low-altitude target.

Did You Know?
Mercury is the fastest planet in the solar system, orbiting the Sun in just 88 days. At this elongation, it lies about 97 million km from Earth. Mercury is currently in the constellation Gemini, near the bright twin stars Castor and Pollux.
On July 4, Mercury will shine low in the twilight sky, a fleeting point of light before night takes over. Whether you're an astronomer or simply watching the sunset, this little planet offers a quiet spectacle, reminding us that even the smallest worlds leave a big impression.

EARTH AT APHELION

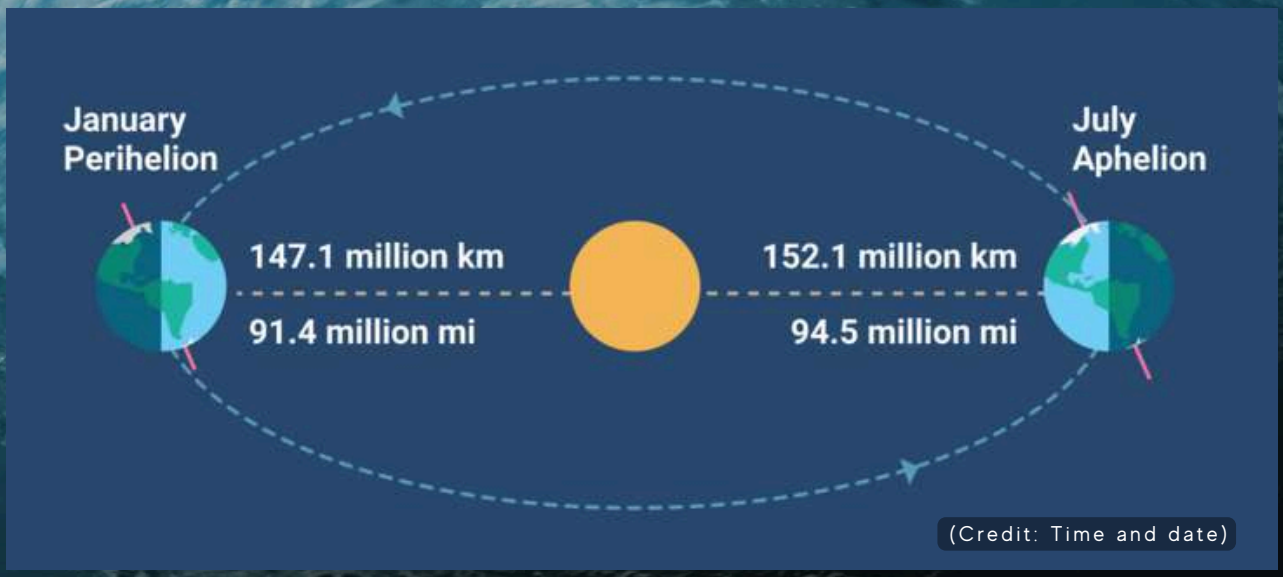
While July might bring scorching heat to much of the Northern Hemisphere, Earth is actually farthest from the Sun during this time. On July 3, 2025, our planet reaches a point in its orbit called aphelion, sitting about 152.1 million kilometers (94.5 million miles) from the Sun—nearly 5 million kilometers farther than it was in January.

What Is Aphelion?

Aphelion is the moment when Earth is at the greatest distance from the Sun in its elliptical orbit. Its opposite, perihelion, occurs in early January, when Earth is closest to the Sun. These two points mark the extremes of our planet's slightly oval-shaped path. Contrary to what many believe, the distance from the Sun does not cause the seasons—those are driven by the 23.5° tilt of Earth's axis.

A Changing Ellipse

Earth's orbit isn't fixed. Gravitational forces from other planets and the Moon cause slow variations in its shape. Every 100,000 years, the orbit shifts from nearly circular to more elliptical and back. This changing shape is measured by its eccentricity, which currently makes Earth's orbit only mildly oval.



Timing and the Solstice

Earth reaches aphelion about two weeks after the June solstice, and perihelion follows two weeks after the December solstice. Though the Sun's distance changes, the axial tilt has a greater effect on how sunlight hits different parts of Earth, creating the familiar cycle of seasons. Aphelion doesn't occur on the same day each year. Its timing shifts gradually due to long-term gravitational interactions. For example, in 1246, perihelion aligned with the December solstice, now, it occurs about two weeks later. This drift will continue over the coming millennia.

Did You Know?

The words perihelion and aphelion are Greek in origin: peri means near, apo means far, and Helios means Sun. These two points are collectively known as apsides, which describe the nearest and farthest points in any orbit around a star.

CONJUNCTIONS FOR THE MONTH

A phenomenon grabs the imagination of scientists and stargazers alike in the vast panorama of the night sky, where stars shine like distant diamonds and planets roam over the cosmic canvas. Conjunctions, those ethereal moments in the heavens when heavenly bodies appear to collide, provide a mesmerizing sight that connects us to the beauty of the cosmos. The word "Conjunction" comes from Latin, meaning to join together.

From Earth's perspective, a conjunction occurs when two planets or a planet and the Moon or Sun align. Solar conjunctions are invisible to us. Moon-planet conjunctions occur throughout the month, every month, as the Moon passes past each planet. The planets in The Great Conjunction and when multiple align are rare and captivating conjunctions. 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.

Conjunction of Saturn and Moon

On July 16th, witness a stunning celestial pairing of the Moon, shining brilliantly at magnitude -12.22 and the Saturn, glowing at magnitude 0.92, in a beautiful conjunction. Don't miss this dazzling dance in the eastern sky around 11.00 p.m. perfect for star gazers and sky lovers.

Conjunction of Moon and Pleiades

On July 20th, don't miss the celestial conjunction of the Moon, glowing at magnitude -11.39 and the Pleiades cluster, shining at magnitude 1.59. Look towards the eastern sky around 2.00 a.m., for a magical early morning spectacle, perfect for early risers and sky gazers.

Conjunction of Venus and Moon

On July 22nd, catch a dazzling celestial conjunction as the Moon with magnitude -10.29 meets the Venus with magnitude -3.92 in the early morning sky. Look at the east around 3:30 a.m. to witness this brilliant pairing, a breathtaking pairing that promises to light up the dawn.

Conjunction of Moon and Mars

On July 28th, witness a striking celestial encounter as the Moon, glowing at magnitude -10.54, approaches the Mars, shining at magnitude 1.58. Look to the western sky around 7:30 p.m. to catch this beautiful conjunction, an evening delight for astronomy lovers and sky watchers.

STUDENT'S CORNER

Why a Day Has 24 Hours

Sourajit Mandal, Astronomy Camp Student

Have you ever thought about why our day is divided into 24 hours, and why each hour has 60 minutes, and each minute has 60 seconds? Most people do not question this system because it has always been a part of everyday life. However, this system did not appear by chance. It was developed over thousands of years, shaped by ancient civilizations, their knowledge of the sky, and their understanding of numbers and time. This structure is deeply connected to astronomy, mathematics, and the way early humans observed the world around them.

Let us begin with the 24-hour day. This idea comes from ancient Egypt, around 2000 BCE. The ancient Egyptians were skilled observers of the sun, the stars, and the movement of shadows. During the daytime, they used sundials to measure time based on the sun's position in the sky. They divided the day into ten parts, or hours. Then, they added one hour for the twilight period at sunrise and another hour for the twilight period at sunset. This gave them a total of twelve hours for the daytime.

To balance the system, the Egyptians also divided the night into twelve hours. They did this by observing a group of stars called "decans," which rose in the sky at regular intervals throughout the night. By counting the appearance of these stars, they could divide the night into equal parts. When combined, the twelve hours of day and the twelve hours of night created the 24-hour day we use today. Later, the Greeks adopted this system, and after them, the Romans continued it.

Eventually, it became the standard for timekeeping across many parts of the world. But... why does each hour contains 60 minutes, and each minute contains 60 seconds? Why... 60 and not 100 or some other value? This idea, comes from the ancient Babylonians, who lived in Mesopotamia more than 4,000 years ago. The Babylonians used a number system based on the number 60. This system is called sexagesimal. Although most modern number systems use a base of 10, the Babylonians preferred 60 because it is divisible by many smaller numbers, such as 2, 3, 4, 5, and 6. This made calculations easier, especially when working with fractions and measurements.

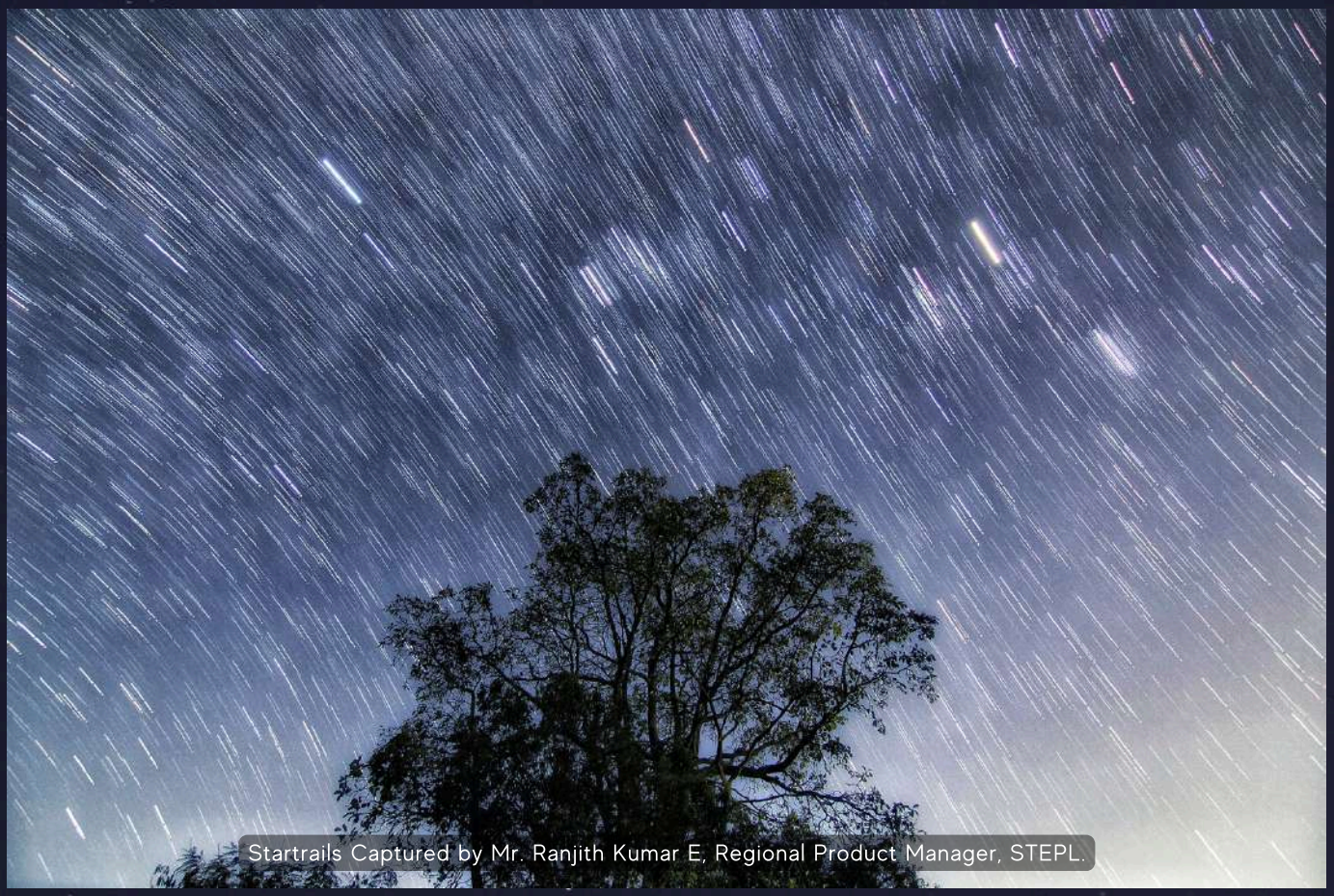
The Babylonian number system was used not only for math but also for astronomy. Later, Greek astronomers such as Hipparchus used Babylonian ideas when they needed a way to divide hours and angles into smaller parts. They divided one hour into 60 smaller units, which they called “minuta prima”, meaning “the first small part.” Then, they divided each of those units into 60 even smaller parts, called “minuta secunda”, or “the second small part.” Over time, these terms became the words minute and second.

This way of dividing time also matches the way the Earth moves. A full circle is made up of 360 degrees, a concept that also comes from the Babylonians. The Earth rotates approximately 15 degrees every hour. If you divide 360 degrees by 15 degrees per hour, you get 24 hours in a full day.

This connection between geometry, astronomy, and time shows how carefully the system was built and how well the parts fit together. Even in the modern world, where we use digital devices and measure time in milliseconds, the structure of our timekeeping still comes from these ancient systems. We continue to use the 24-hour day, the 60- minute hour, and the 60-second minute. This is because the system is both practical and deeply rooted in human history.

In conclusion, the way we measure time today is not random. It is the result of thousands of years of observation, calculation, and careful thinking by people from ancient civilizations. Their systems were passed down through generations and slowly improved, eventually becoming the global standard, we now follow. This system is a reminder of how human curiosity and knowledge have shaped the way we understand

ASTROPHOTOGRAPHS FROM SPACE TEAM



Startrails Captured by Mr. Ranjith Kumar E, Regional Product Manager, STEPL.

Moon Captured by Mr. Dewank Rathi, Educator, STEPL.

Moon Captured by Ms Gowri Priya, Educator, STEPL.

HISTORICAL EVENTS OF JULY

1988'S COSMIC CLUE: THE FIRST SUSPECTED EXOPLANET

In the realm of astronomical milestones, the first suspected detection of an exoplanet holds a significant place. In **July 1988**, a Canadian team of astronomers **Bruce Campbell, Gordon Walker and Stephenson Yang** reported the first indications of a planet orbiting the star **Gamma Cephei.**

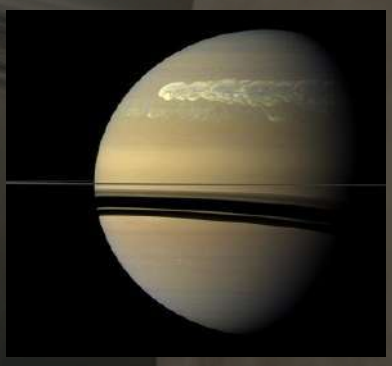
Visualization of the gas giant, Gamma Cephei A b, also known as "Tadmor". Source: NASA

Their observations, made using precise radial velocity measurements, suggested the presence of a companion object influencing the motion of the star. This candidate, later named **Gamma Cephei Ab,** marked the beginning of humanity's journey into discovering planets beyond our solar system. Around the same time in **1989, Anthony Lawton and P. Wright** also announced similar findings, further supporting the hypothesis. However, the discovery remained controversial for years, as the limitations of technology made it difficult to rule out stellar activity or measurement noise. It wasn't until 2003 that the planet's existence was confirmed, retroactively establishing Gamma Cephei Ab as the first exoplanet candidate ever identified.

FIRST ORBIT OF SATURN: CASSINI'S HISTORIC ARRIVAL

The Cassini-Huygens spacecraft was launched in 1997 as a joint project of the space agencies of the United States, Europe, and Italy.
Source: NASA

As spring approached and sunlight returned to Saturn's north pole, Cassini studied the polar hexagon and the dark hurricane at its center.
Source: The New York Times



The change in seasons brought a huge storm that wrapped around Saturn's northern hemisphere. Cassini detected lightning deep within the planet.
Source: The New York Times

On **July 1, 2004**, NASA's Cassini spacecraft made history by becoming the first spacecraft to enter orbit around Saturn. This milestone marked the beginning of a **13-year mission** that would transform our understanding of the gas giant, its iconic rings, and its diverse family of moons.

Launched in **1997**, Cassini carried with it the European Space Agency's Huygens probe, which achieved another first landing on Titan, Saturn's largest moon, in January 2005. The descent of Huygens revealed a world with rivers, lakes, and weather systems strikingly similar to Earth's, though composed of methane and ethane. The mission's grand finale in 2017 involved a series of daring dives between Saturn and its rings before Cassini plunged into the planet's atmosphere.

FIRST STEPS ON MARTIAN SOIL MADE BY WHEELS

On **July 4, 1997,** NASA made history with the successful landing of Sojourner, the first operational rover on another planet. Part of the Mars Pathfinder mission, **Sojourner became the first wheeled vehicle to explore the Martian surface**, marking a new era in robotic planetary exploration.

Weighing just **11.5 kilograms** and roughly the size of a microwave oven, Sojourner was small but mighty. Sojourner operated for 83 sols (Martian days)–far beyond its intended 7-day lifespan. Its success paved the way for future missions, including the Spirit, Opportunity, Curiosity, and Perseverance rovers, each expanding humanity's reach on the Red Planet.

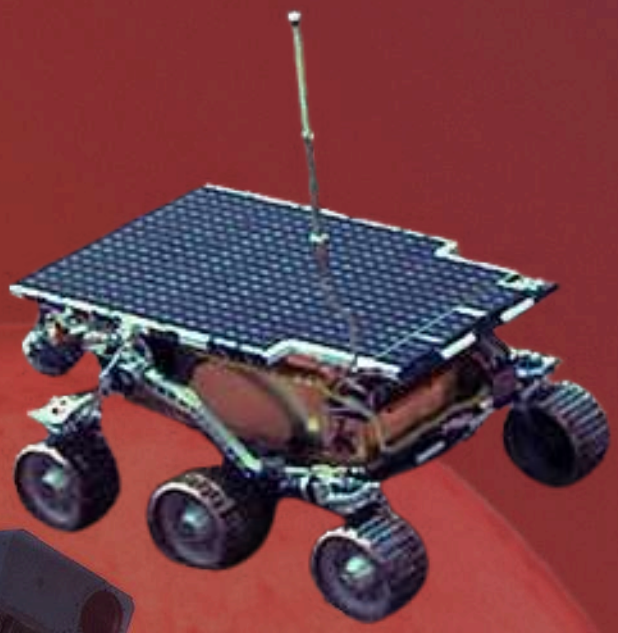


Image Credits: Wikipedia

Sojourner operated for **83 sols** (Martian days)–far beyond its intended 7-day lifespan. Its success paved the way for future missions, including the Spirit, Opportunity, Curiosity, and Perseverance rovers, each expanding humanity's reach on the Red Planet.
This tiny rover's bold journey demonstrated the power of mobility in space exploration and set the foundation for decades of Martian discovery.

LRV: NASA'S MOON CRUISER THAT REDEFINED EXPLORATION

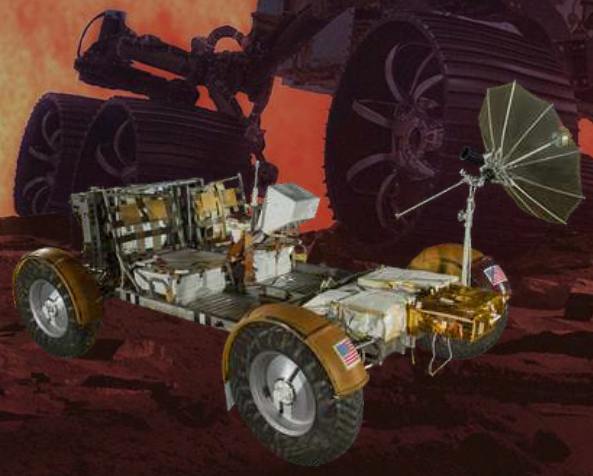


Image Credits: NASA

Nicknamed the "**moon buggy**," the **Lunar Roving Vehicle (LRV)** became the first motor vehicle to operate on another celestial body. Developed by NASA and used during the Apollo 15, 16, and 17 missions between 1971 and 1972, the LRV transformed lunar exploration by dramatically increasing astronauts' range and mobility.

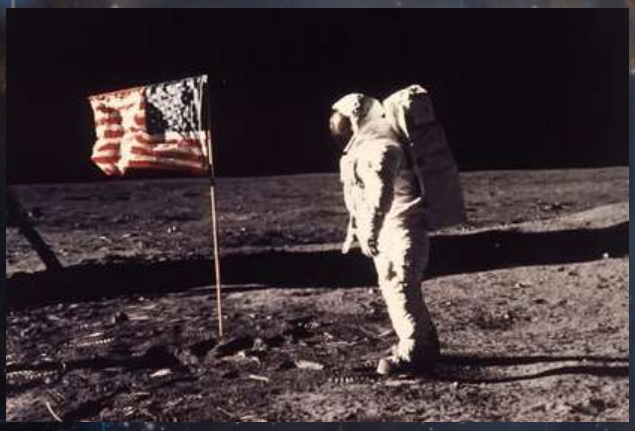
Weighing around **210 kilograms** and powered by batteries, the LRV could carry two astronauts and their gear across the rugged Moon terrain at speeds of up to 13 km/h.

First deployed on **Apollo 15** in **July 1971,** the LRV covered over **27 kilometers** in total across all three missions. Its simple yet robust design made it highly effective in the Moon's low gravity and challenging conditions. Today, these rovers remain parked on the lunar surface–silent reminders of a golden era in space exploration.

MOONWALK BEGINS: THE DAY HUMANS LEFT HOME

On **July 20, 1969,** history was made when **Neil Armstrong** became the first human to walk on another celestial body—the Moon. As commander of NASA's Apollo 11 mission, Armstrong descended the lunar module's ladder and stepped onto the Moon's surface, delivering one of the most iconic statements in human history:

"That's one small step for a man, one giant leap for mankind."



Astronaut "Buzz" Aldrin Jr. poses for a photograph beside the U.S. flag deployed on the moon during the Apollo 11 mission on July 20, 1969.
(AP Photo/NASA/Neil A. Armstrong)

The astronauts spent over two hours on the lunar surface, collecting samples, conducting experiments, and placing the American flag. The event was watched by over **600 million** people worldwide, making it one of the most unforgettable broadcasts ever.

The Moon landing not only fulfilled **President John F. Kennedy's** goal of sending a man to the Moon and returning him safely to Earth—it also marked the dawn of human exploration beyond Earth. This moment symbolized the peak of human ingenuity and international ambition during the space race.

BREAKING VACUUM: FIRST WOMAN TO WALK IN SPACE

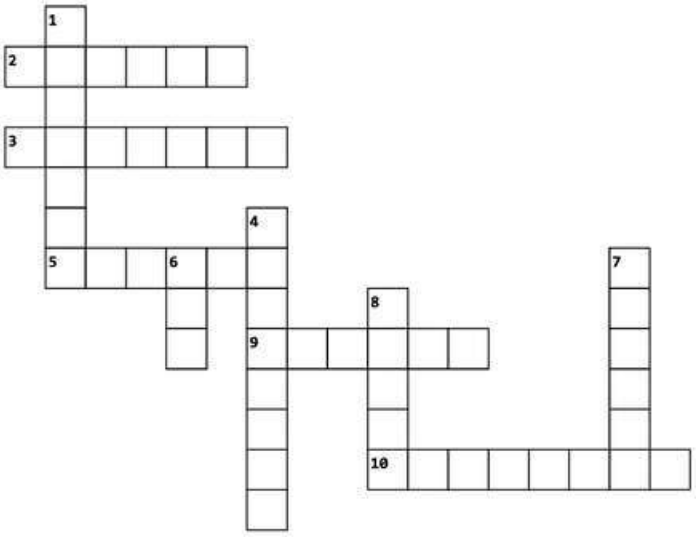
Svetlana Savitskaya, the second woman in space and the first woman to go to space twice (Image credit: Bettmann / Contributor via Getty Images)

On July 25, 1984, Soviet cosmonaut Svetlana Savitskaya became the first woman to perform a spacewalk (extravehicular activity or EVA), marking a groundbreaking milestone in human space exploration. Exiting the Salyut 7 space station, she spent 3 hours and 35 minutes outside in space alongside fellow cosmonaut Vladimir Dzhanibekov.

During the EVA, Savitskaya demonstrated advanced space operations, including welding, cutting, and soldering—tasks that simulated potential in-orbit construction and repair work. Her historic achievement came two decades after the first-ever spacewalk by Alexei Leonov and firmly established women as active participants in complex spaceflight operations. Her contribution laid the foundation for future generations of female astronauts, engineers, and explorers.

TRAIN YOUR BRAIN

CROSSWORD



Across

2. What constellation contains the Large Magellanic Cloud?
3. Who discovered four of Saturn's moons?
5. What country did the Tunguska even occur in?
9. What ancient element did Aristotle say filled space?
10. What space object type is Kamo'oalewa classified as?

Down

1. What spacecraft became the first to enter interstellar space?
4. What spacecraft first returned asteroid samples?
6. What is the Latin word for 'Sun'?
7. What mission featured the first U.S. spacewalk?
8. What country achieved the first daytime lunar laser ranging?

Astronomy Word Puzzle

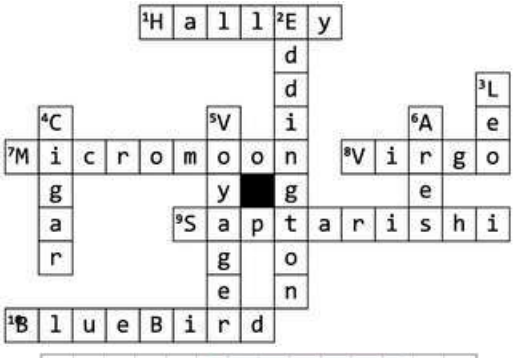
Constellation Quest Begins!

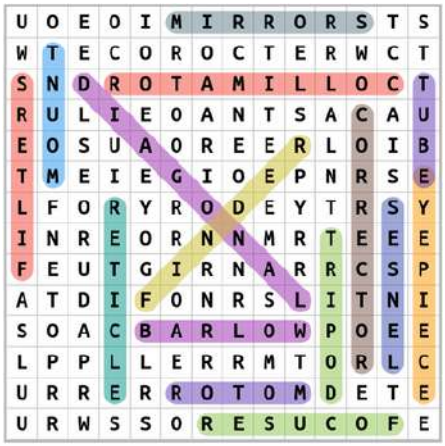
Northern Sky Constellations

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

PERSEUS
CYGNUS
AQUILA
HERCULES
BOOTES
PEGASUS
CEPHEUS
URSAMINOR
AURIGA
ANDROMEDA
CASSIOPEIA
LACERTA
URSAMAJOR
DRACO
LYRA

Answers for last month puzzles.





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

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