SPACE™
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Galactica

Astronomy and Space Science Magazine



What's Inside?

SPACE Insights
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What's Awaiting in November 2026
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Train Your Brain

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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

Editor in Chief
Sachin Bahmba

Contributors
Anika Jha
Space Students

Editor
Priyadharshini D

Assistant Editors
Gowri Priya P R
Sai Krishnan
Nithin Vijay
Kaaviya V

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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



Ms. Shalini Bahmba, Co-founder, SPACE

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. 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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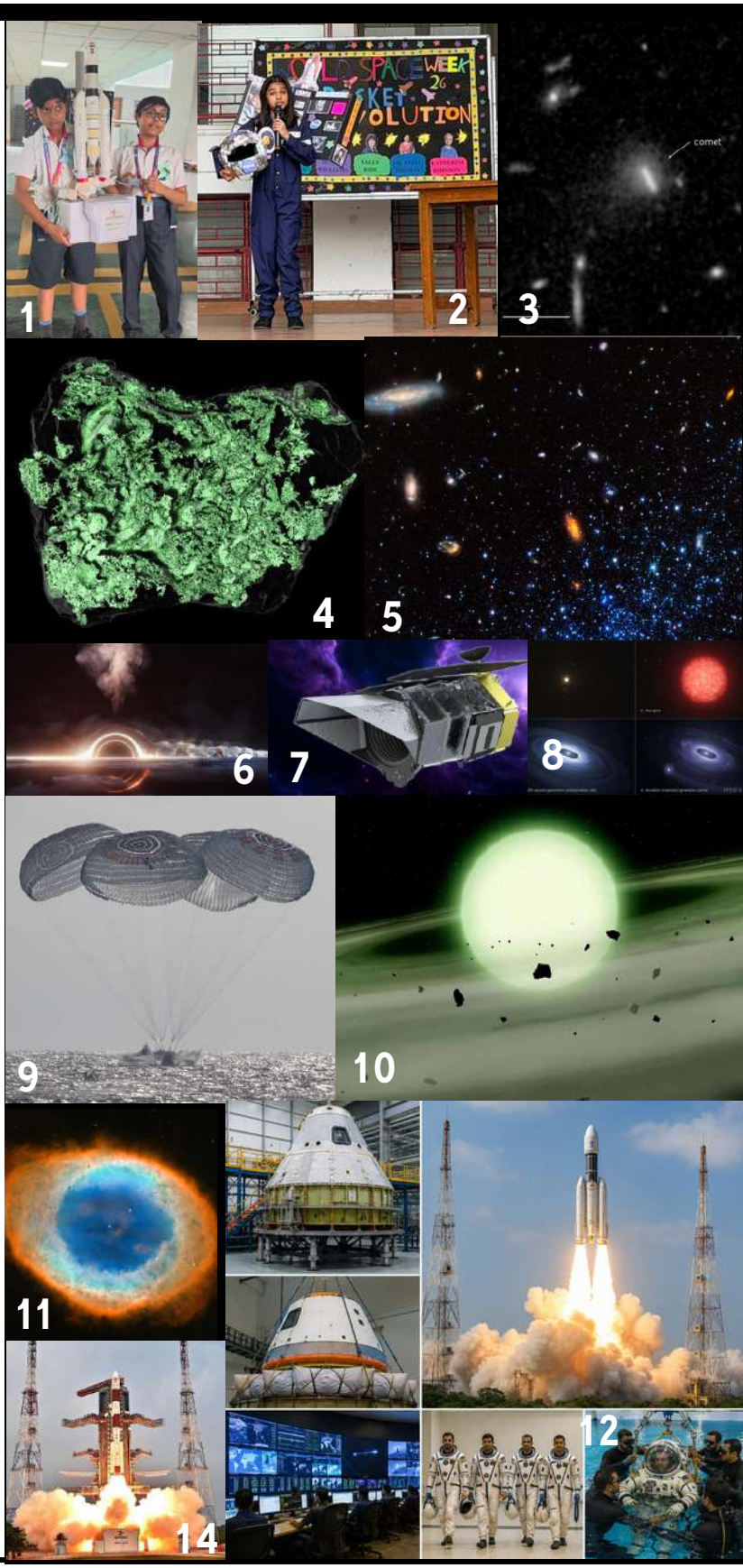

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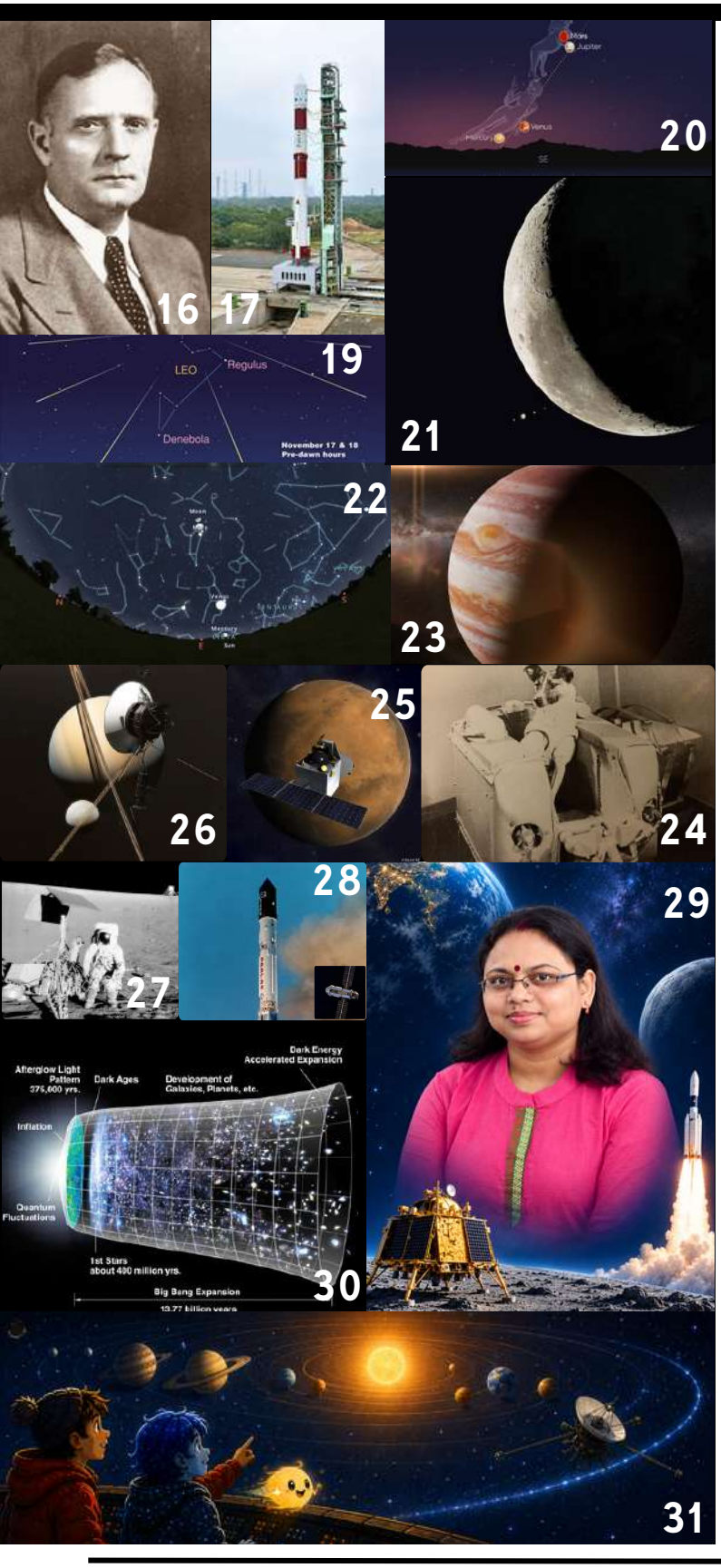

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WORLD SPACE WEEK 2026

ROCKET REVOLUTION: EXPLORING BEYOND BOUNDARIES

World Space Week (WSW) 2026, celebrated under the global theme "Rocket Revolution," was marked across five Universe in the School (UITS) schools in Delhi NCR – K.R. Mangalam World School, Vikaspuri; Bal Bharati Public School, Pitampura; K.R. Mangalam World School, Vaishali; Sri Venkateshwar International School, Dwarka; and Delhi Public School, Sector 19, Faridabad.

The theme highlighted the evolving world of rocket technology, innovations in space launch systems and the expanding possibilities of space exploration. Reflecting this spirit, the celebrations featured a diverse range of interactive activities, creative presentations and hands-on experiences, providing students with opportunities to explore space science beyond textbooks.













WORLD SPACE WEEK 2026

ROCKET REVOLUTION: EXPLORING BEYOND BOUNDARIES

The celebrations featured a diverse range of interactive activities, creative presentations and hands-on experiences, inspiring students to explore the wonders of space beyond textbooks. Highlights included an immersive Virtual Reality experience of the International Space Station, an Escape Room Challenge testing scientific reasoning and teamwork, and a speech competition on black holes, India's space journey and rocket technology at K.R. Mangalam, Vikaspuri. Bal Bharati Public School, Pitampura, presented Rocket Revolution, featuring a skit on Dr. A.P.J. Abdul Kalam, a ramp walk celebrating women in space and a space pledge.

At K.R. Mangalam, Vaishali, students extended the celebrations through a community outreach initiative at Robin Hood NGO, combining rocket launches, telescope demonstrations and a street play with acts of kindness. Sri Venkateshwar International School showcased rocketry through stomp rocket launches, astronaut landing demonstrations, space models and an interactive quiz. Meanwhile, Delhi Public School, Faridabad, introduced young learners to astronomy through an informative presentation, video screening and quiz.

Together, these celebrations fostered scientific curiosity, creativity, collaboration and communication, encouraging students to question, explore and imagine possibilities beyond boundaries.









HIGHLIGHTS OF OCTOBER 2026

ESA DISCOVERS ITS FIRST COMET



Comet C/2026 S1 (Euclid) observations in context. Credit: European Space Agency

What happens when a telescope built to explore distant galaxies discovers a new visitor in our own Solar System? That is exactly what happened when the European Space Agency's (ESA) Euclid space telescope spotted a previously unknown comet, named Comet C/2026 S1 (Euclid), in images captured between 16 and 24 September 2026.

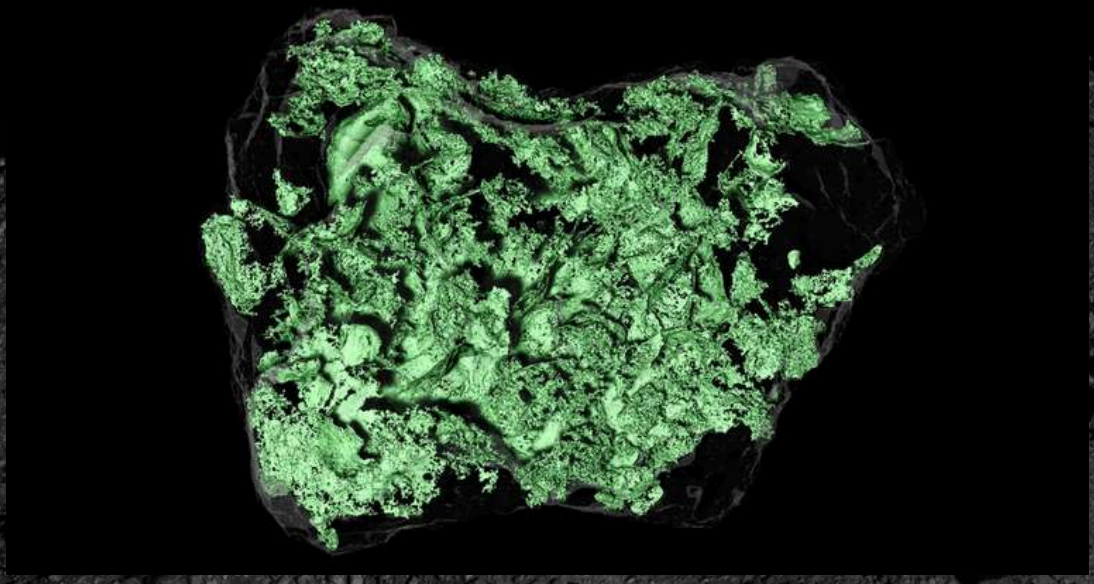
Located approximately 1.3 billion kilometres from Earth, the comet travels through the distant regions of the Solar System, on an orbit that extends far above the plane of the planets. Its journey around the Sun takes thousands of years, making it a fascinating object for astronomers to study.

Euclid was designed to map distant galaxies and investigate the mysteries of dark matter and dark energy, not to hunt for comets. Yet, its specialised software detected a streak across several images. Further analysis revealed a fuzzy cloud of dust and gas surrounding the object, providing a clue that it was an active comet.

The discovery was especially remarkable because Euclid usually avoids the crowded plane of the Solar System to capture clearer images of distant galaxies. Its step-and-stare observing method also makes it difficult to revisit moving objects. A fortunate combination of the comet's orbit and the telescope's observations made this unexpected discovery possible.

This discovery is more than a new addition to the comet catalogue. It demonstrates how space telescopes can make unexpected scientific breakthroughs and helps scientists prepare for future missions, including ESA's Comet Interceptor, which aims to explore a suitable, little studied comet or other primitive object. Sometimes, looking far into the Universe can lead to surprising discoveries much closer to home!

Asteroid Bennu's Hidden Secret NASA Solves a Space Mystery



Asteroid Bennu particle analyzed with X-ray computed tomography scanning. This specimen shows the most common types of crack networks observed in Bennu samples. One has an extensive and connected framework of curved cracks, whereas the other has sparse, straight, and flat fractures. Credit: NASA/Scott Eckley

NASA's OSIRIS-REx mission has helped scientists solve a fascinating mystery surrounding asteroid Bennu. Research published in March 2026 and highlighted again in October revealed how hidden cracks inside Bennu's enormous boulders explain their unusual ability to lose heat rapidly.

The mystery began in 2007, when NASA's Spitzer Space Telescope observed that Bennu's surface heated and cooled quickly, a property known as low thermal inertia. Scientists initially believed this indicated a surface covered with fine, sand-like material.However, when OSIRIS-REx arrived at Bennu in 2018, it discovered a rugged landscape filled with massive boulders instead of the expected smooth terrain.

This raised an important question: How could such enormous rocks cool so quickly?
On 20 October 2020, OSIRIS-REx successfully collected samples from Bennu, which were returned to Earth on 24 September 2023.Using advanced X-ray computed tomography (XCT), laser-based thermal imaging, and computer simulations, researchers examined the samples' internal structures. Their findings revealed that Bennu's rocks contain numerous tiny pores and extensive networks of cracks.
These internal fractures restrict heat transfer, allowing the boulders' surfaces to cool much faster than ordinary solid rocks.The findings, published in Nature Communications in March 2026, provided the missing explanation for Bennu's unusual thermal behaviour and gained renewed attention in October 2026.

Why Is This Discovery Important?
Understanding how heat moves through asteroid rocks helps scientists interpret telescope observations, study asteroid surfaces, and improve models of their physical properties.
Bennu's hidden cracks demonstrate how studying tiny asteroid samples can reveal remarkable secrets about objects millions of kilometres away, offering new insights into the formation and evolution of our Solar System.

Astronomers Uncover New Secrets of the Universe's First Five Minutes



The research team focused on 15 of the most "pristine" small, remote galaxies ever discovered for these papers. Credit: NASA, ESA, CSA, K. McQuinn (STScI), J. DePasquale (STScI)

What happened during the first five minutes of our Universe? Scientists have taken a remarkable step towards answering this question by measuring the amount of helium formed shortly after the Big Bang with unprecedented precision.

An international research team, including scientists from the University of Minnesota, has achieved a major breakthrough in understanding the Universe's earliest moments. The findings, published in five research papers in The Astrophysical Journal and highlighted on 20 October 2026, provide new insights into the conditions that existed nearly 13.8 billion years ago.

Using the powerful Large Binocular Telescope, researchers conducted 130 hours of observations, studying 15 small, distant galaxies that have undergone very little chemical evolution. These galaxies act as cosmic time capsules, preserving clues about the Universe's original composition.

By examining more than 10 helium spectral lines and 15 hydrogen lines, scientists measured the primordial helium abundance with an uncertainty of just 0.5%, making the results three times more precise than previous measurements.

This discovery is significant because helium was among the first elements formed during the Big Bang. Its abundance provides valuable evidence about the temperature, density, and fundamental particles present in the early Universe.The improved measurements also allowed scientists to investigate the number of neutrino families, offering an important test of the Standard Model of particle physics.

This breakthrough demonstrates how studying distant galaxies can reveal the Universe's earliest history. With increasingly precise observations, astronomers are moving closer to understanding the fundamental processes that shaped the cosmos we observe today.

Astronomers Discover a Universal Rule Behind Black Hole Eruptions



Tidal disruption event close up. Credit: Science Communication Lab

Black holes are among the most mysterious objects in the universe, known for their immense gravitational pull and ability to consume surrounding matter. In an exciting discovery reported in October 2026, astronomers identified a surprising universal rule that may explain when black holes release powerful jets of high-energy particles into space.

Researchers found that black holes, regardless of their size, can produce powerful jets when their feeding rate drops to approximately 2% of the Eddington limit. This limit represents the balance between the inward pull of gravity and the outward pressure of radiation. Remarkably, the same threshold appears to apply to stellar-mass black holes, around ten times the Sun's mass, and supermassive black holes, millions of times heavier.

The research, led by scientists including Adelle Goodwin and Benjamin Mummery, examined how black holes behave after consuming stars in events known as tidal disruption events (TDEs). These occur when a star ventures too close to a black hole and is torn apart by its intense gravitational forces.

Scientists identified two distinct patterns of jet formation. Some black holes launch jets almost immediately during intense feeding, while others remain quiet for hundreds or even thousands of days before suddenly producing powerful radio jets as their feeding rate decreases.

Published in Nature Astronomy, the findings establish an important connection between smaller black holes in our Milky Way and enormous black holes at the centres of distant galaxies.

This discovery offers astronomers a new way to predict when black holes may erupt, revealing that even the universe's most extreme objects could follow the same fundamental physical rules.

NASA'S ROMAN SPACE TELESCOPE PRECISION IMPROVED 30%



NASA's Roman Space Telescope has achieved nearly 30% better image quality than expected, setting the stage for stunning cosmic discoveries.
Credit: NASA; background by AI/ScienceDaily.com

NASA's Nancy Grace Roman Space Telescope has exceeded expectations during optical testing. Its Wide Field Instrument achieved an optical error nearly 30% lower than the original requirement, promising sharper images of the cosmos.

Engineers at NASA's Goddard Space Flight Center tested the Wide Field Instrument's 18 detectors, filters, calibration system, and temperature controls. These tests help ensure accurate measurements and reliable observations across different wavelengths of light.

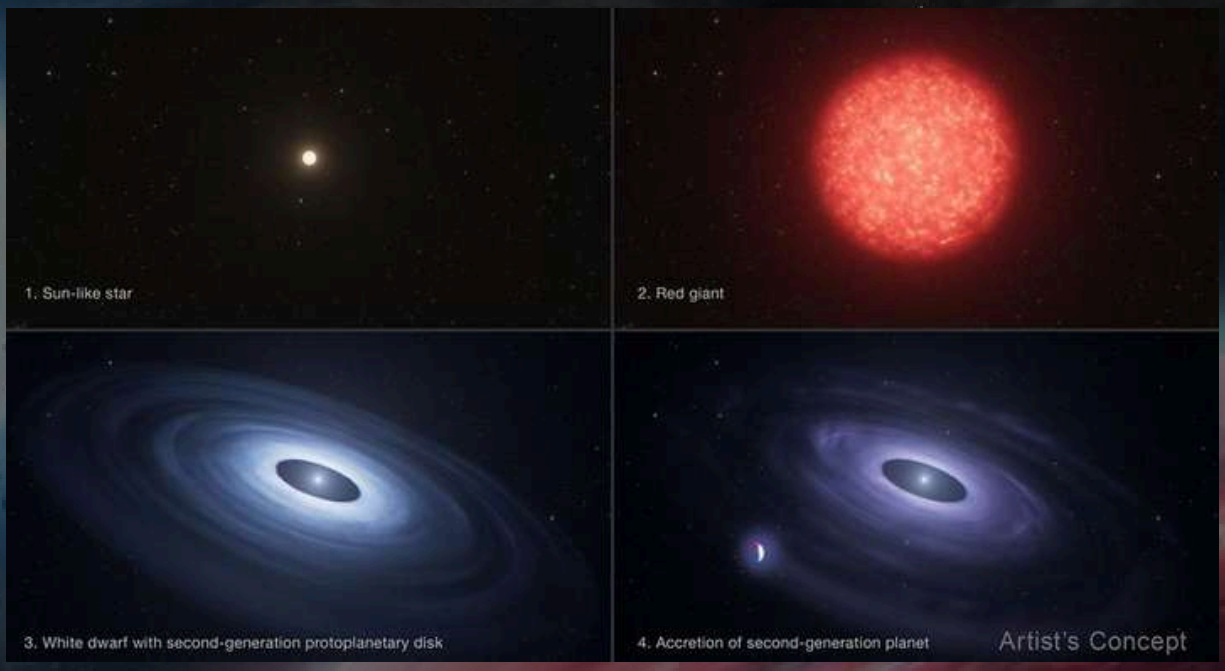
Roman's mirrors were already remarkably well aligned before launch. Engineers made only minor adjustments, including moving the secondary mirror by approximately one-sixteenth the diameter of a human hair. This tiny change helped improve the telescope's focus.

The team also refined the Coronagraph Instrument, which blocks light from bright objects to help scientists study faint objects nearby, including potential exoplanets.

Roman's wide-field observations will help scientists study dark matter, dark energy, distant galaxies, and exoplanets. By surveying large regions of the sky, it will provide valuable insights into the structure and evolution of the universe.

With both scientific instruments meeting or exceeding expectations, Roman has reached an important milestone in its preparation for scientific observations. Its exceptional optical performance promises a sharper view of the cosmos and new opportunities to explore the mysteries of our universe.

Hubble's Clues to a Second-Generation Planet



This artist's concept, not to scale, imagines the evolution of a Sun-like star (1) into an aging red giant (2) and then a small, bright white dwarf surrounded by a disk of its expelled outer layers (3), from which a second-generation planet forms (4). Illustration: NASA, ESA, Leah Hustak (STScI)

Astronomers revisiting NASA's Hubble Space Telescope data have found unusual chemical signatures around the white dwarf HS 0209+0832, suggesting a possible second-generation planet formed from material released by a dying star.

White dwarfs are the dense remnants of stars that have exhausted their nuclear fuel and shed their outer layers. While Earth formed alongside the young Sun, second-generation planets may form from material expelled during a star's final stages.

Hubble's 1999 observations contained around 100 unidentified chemical features. Using updated data, astronomer Jamie Williams identified a strong signature of niobium, a heavy element that may provide clues about the star's death.

NASA's TESS satellite detected repeating brightness changes, suggesting a possible Jupiter-sized planet orbiting about 6 million kilometres from the white dwarf.

The star's intense heat may be stripping gas from the planet's atmosphere, creating a comet-like tail and releasing material onto the white dwarf.

Scientists will continue studying this system to determine whether second-generation planets exist elsewhere. If confirmed, the discovery could show that a star's death may give rise to a new generation of planets.

NASA'S CREW-12 RETURNS HOME AFTER 237 DAYS IN SPACE



The SpaceX Crew Dragon Freedom spacecraft is seen as it lands with NASA astronauts Jessica Meir, Jack Hathaway, ESA astronaut Sophie Adenot, and Roscosmos cosmonaut Andrey Fedyaev aboard in the Pacific Ocean off the coast of Los Angeles on Oct. 8, 2026. Credit: NASA/Keegan Barber

NASA's SpaceX Crew-12 astronauts have returned safely to Earth after 237 days aboard the International Space Station (ISS). Their mission covered more than 100 million miles and over 3,792 orbits around Earth. The crew included NASA astronauts Jessica Meir and Jack Hathaway, ESA astronaut Sophie Adenot, and Roscosmos cosmonaut Andrey Fedyaev.

During their mission, the astronauts conducted experiments on stem cell production, on-demand IV fluid technology, heart health, nutrition, and blood flow in microgravity. These studies could improve healthcare and help prepare astronauts for long-duration missions.

The crew launched on February 13 and docked with the ISS the following day. Their 237-day mission provided valuable experience in living and working in microgravity, helping scientists understand the challenges astronauts may face during longer journeys into deep space.

Crew-12 also achieved significant spacewalk milestones. Jessica Meir completed four spacewalks, bringing her career total to seven, while Sophie Adenot became the first French woman to venture outside the ISS.

The mission highlights the importance of scientific research and international cooperation aboard the space station. The knowledge gained will help NASA prepare for future human missions to the Moon and Mars, bringing humanity closer to exploring beyond Earth.

THE FIRST GREEN STAR, WD J1330+6435



Illustration Credit & Copyright: Mark A. Garlick/University of Warwick

Astronomers have discovered that white dwarfs can display unusual colours, including green and pink, due to their atmospheric chemistry.

Astronomers at the University of Warwick have found that white dwarf stars, the dense remnants of stars like our Sun, can appear in unexpected colours. Their research, published in RAS Techniques and Instruments, identifies the first white dwarf predicted to look genuinely green to the human eye.

Unlike most stars, whose colours mainly depend on temperature, white dwarfs have dense atmospheres where elements such as carbon, calcium, and sodium change how light is absorbed and emitted.

One example, WD J1330+6435, may appear chartreuse-green because of elements introduced by rocky debris from its former planetary system. Another, WD J1011+2845, located about 48 light-years away, may appear salmon-pink due to carbon on its surface.

Researchers studied 151 white dwarfs and found five with unusual colours. Their findings suggest that around one in every 30 white dwarfs may display an unexpected colour, although most appear white.

These colours help astronomers understand the chemical composition of white dwarfs and discover clues about planetary systems that once surrounded them. Even in the final stages of a star's life, its unusual colours can reveal surprising secrets about the universe

WHAT'S UP IN THE SKY - NOVEMBER 2026

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

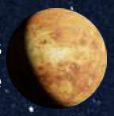
Mercury

Reaches inferior conjunction on 4 November and rises before sunrise on 15 November and 30 November.



Venus

Morning planet, rapidly improving. Rises 56 mins before sunrise on 1 Nov, and four hours before on 30 Nov when it reaches mag. -4.5.



Mars

Morning planet visible near Jupiter, Regulus, and the Moon from Nov 2.



Jupiter

Morning planet in Leo, near Moon, Mars, and Regulus, reaching 50° altitude from Nov 21.



Saturn

Evening planet in Cetus reaches a peak altitude of 38° under dark skies.



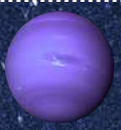
Uranus

Clearly visible in Taurus at magnitude +5.6, reaching opposition on 25 November.



Neptune

Reaches its peak altitude in darkness at a magnitude of +7.8 in Pisces.



BRIGHT DEEP SKY OBJECTS

Messier 30 (M30) is a globular cluster located in the constellation Capricornus. The cluster lies approximately 28,000 light-years from Earth and has an apparent magnitude of 7.7. I It lies approximately 3° east and 0.75° south of Zeta Capricorni. It can be observed using binoculars or a small telescope, appearing as a faint, fuzzy patch of light.





Messier 27 (M27), also known as the Dumbbell Nebula, is a planetary nebula located in the constellation Vulpecula. It lies approximately 1,200 light-years from Earth and has an apparent magnitude of 7.5 which glows in faintly green colour. It can be observed using binoculars or a small telescope, appearing as a faint, dumbbell-shaped patch of light.

Messier 57 (M57), also known as the Ring Nebula and NGC 6720, is a planetary nebula located in the constellation Lyra. It lies approximately 2,000 light-years from Earth and has an apparent magnitude of 8.8.It is best observed through a telescope, appearing as a small, faint ring of light in the constellation Lyra.





Messier 71 (M71) is a globular cluster located in the constellation Sagitta, approximately 13,000 light-years from Earth. With an magnitude of 8.2, it appears as a faint, hazy patch of light and can be observed using binoculars or a small telescope. It is also catalogued as NGC 6838.

ROCKET LAUNCHES IN NOVEMBER 2026

GAGANYAAN-1: INDIA'S FIRST STEP TOWARDS HUMAN SPACEFLIGHT



Gaganyaan-1 (G1) is the first uncrewed experimental mission of the Indian Space Research Organisation's (ISRO) Gaganyaan human spaceflight programme. Targeted for the fourth quarter of 2026 (October–December), it will test technologies required to safely send Indian astronauts into space and bring them back to Earth. The launch is planned from the Satish Dhawan Space Centre, Sriharikota, aboard the Human-Rated Launch Vehicle Mark-3 (HLVM3).

The LVM3 is a powerful three-stage rocket featuring two solid-fuel S200 boosters, an L110 liquid-fuel core stage and a C25 cryogenic upper stage. For Gaganyaan, it has been adapted as HLVM3 to meet the strict safety and reliability requirements of human spaceflight.

The spacecraft consists of the Crew Module (CM) and Service Module (SM). The Crew Module provides a protected environment for astronauts and withstands the extreme heat of atmospheric re-entry, while the Service Module provides propulsion, power and essential support systems. The Crew Escape System is designed to move the Crew Module away from the rocket during an emergency.

The mission will carry Vyommitra, ISRO's half-humanoid robot, to evaluate spacecraft systems and support preparations for future crewed flights. It will test critical technologies, including life-support systems, avionics, thermal protection, parachute deployment and safe recovery of the Crew Module

Gaganyaan-1 is a major milestone in India's journey towards independent human spaceflight. The programme aims to send three Indian astronauts, known as Gaganyatris, into low Earth orbit at approximately 400 kilometres for a three-day mission before safely returning them to Earth. Its success will strengthen India's space capabilities and support future ambitions, including the proposed Bharatiya Antariksh Station.

CRS NG-25: RESUPPLYING THE SPACE STATION


Falcon 9 Block 5 (Credit: spacelaunch schedule)

CRS NG-25 is a cargo resupply mission developed by Northrop Grumman for NASA's Commercial Resupply Services programme. The mission will deliver essential supplies, scientific experiments and equipment to the International Space Station (ISS). Its launch is planned aboard a SpaceX Falcon 9 Block 5 rocket from Cape Canaveral, Florida, USA.

The Falcon 9 Block 5 is a two-stage, partially reusable rocket powered by Merlin engines. Its first stage is designed to return to Earth and land for reuse, while the second stage carries the spacecraft into orbit. The mission's cargo spacecraft will transport food, crew supplies, research equipment and materials for scientific investigations aboard the ISS.

CRS NG-25 will support astronauts living and working aboard the space station, enabling research in microgravity, technology demonstrations and experiments that benefit future space exploration. These resupply missions are vital for maintaining the ISS and advancing international scientific cooperation.

THE SEA GOD SURVEYS: EARTH OBSERVATION

The Sea God Surveys (iQPS Launch 9) is a satellite deployment mission for Japan's Institute for Q-shu Pioneers of Space (iQPS). Scheduled for no earlier than 4 November 2026, it will launch aboard Rocket Lab's Electron rocket from Launch Complex 1, Mahia Peninsula, New Zealand. The mission will carry the QPS-SAR-20 satellite, named WADATSUMI-II, into orbit.

The Electron is a two-stage, lightweight orbital launch vehicle developed by Rocket Lab to deploy small satellites. Its first stage uses nine Rutherford engines powered by liquid oxygen and kerosene. Designed for dedicated satellite launches, Electron provides reliable access to low Earth orbit for commercial and scientific missions.

The QPS-SAR-20 satellite uses synthetic aperture radar (SAR) technology to capture high-resolution images of Earth, even through clouds and in darkness. It will strengthen iQPS's satellite constellation, supporting frequent Earth monitoring and applications such as disaster response, infrastructure monitoring and environmental observation.


Electron (Credit: spacelaunch schedule)

THE MOUNTAIN GOD RISES: EARTH IMAGING


Electron (Credit: nextspaceflight)

The Mountain God Rises (iQPS Launch 10) is a satellite deployment mission for Japan's Institute for Q-shu Pioneers of Space (iQPS). Scheduled for November 2026, it will launch aboard Rocket Lab's Electron rocket from Launch Complex 1, Mahia Peninsula, New Zealand. The mission will deploy the QPS-SAR-19 satellite, named YAMATSUMI-II, to strengthen Japan's growing Earth-observation capabilities.

The Electron is a two-stage, lightweight orbital rocket developed by Rocket Lab to launch small satellites efficiently. Its first stage uses nine Rutherford engines powered by liquid oxygen and kerosene. Designed for dedicated satellite launches, Electron provides flexible and reliable access to orbit for commercial, scientific and Earth-observation missions.

The QPS-SAR-19 satellite uses synthetic aperture radar (SAR) technology to capture high-resolution images of Earth during the day, at night and through clouds. These observations can support disaster management, infrastructure monitoring, urban planning and environmental studies.

PROGRESS MS-36: DELIVERING ESSENTIAL SUPPLIES TO THE ISS

Progress MS-36 (97P) is a Russian cargo resupply mission operated by Roscosmos for the International Space Station (ISS). It is scheduled to launch on 24 November 2026 aboard the Soyuz 2.1b rocket from Baikonur Cosmodrome, Kazakhstan. The spacecraft will carry essential supplies and equipment for astronauts living aboard the station.

The Soyuz 2.1b is a three-stage launch vehicle equipped with four strap-on boosters and upgraded engines for improved performance. Known for its reliability, it is used to transport cargo spacecraft and satellites into orbit. Its powerful propulsion system enables it to carry the Progress spacecraft towards the ISS.

The Progress MS-36 spacecraft will deliver food, water, fuel, oxygen, scientific equipment and other essential supplies for astronauts aboard the ISS. The mission is also expected to carry equipment associated with Teledroid, a robotic system intended to assist cosmonauts during spacewalk-related operations. By supporting station maintenance and scientific research, this mission will help sustain the crew and advance future space technologies.



Soyuz 2.1b (Credit: spacelaunch schedule)

TDS-01: DEMONSTRATING NEXT-GENERATION SPACE TECHNOLOGIES



PSLV XL (Credit:spacelaunch schedule)

TDS-01 (Technology Demonstration Satellite-01) is an Indian technology demonstration mission developed by the Indian Space Research Organisation (ISRO). Scheduled for November 2026, it is planned to launch aboard the PSLV-XL rocket from the First Launch Pad at the Satish Dhawan Space Centre, Sriharikota. The satellite will be placed into a geostationary transfer orbit to test advanced technologies for future Indian space missions.

The PSLV-XL (Polar Satellite Launch Vehicle-XL) is a four-stage rocket equipped with six powerful strap-on boosters. It uses alternating solid- and liquid-fuel stages to provide the thrust needed to carry satellites into orbit. Known for its versatility and reliable performance, the PSLV-XL has supported major Indian missions, including Chandrayaan-1, and is designed to deploy payloads into different orbital paths.

TDS-01 will demonstrate several advanced technologies, including a high-power electric propulsion system, atomic clocks, travelling-wave-tube amplifiers and a quantum communication payload. These experiments aim to improve satellite manoeuvrability, precise timekeeping and secure communications. The mission will help ISRO validate new technologies for future communication satellites and strengthen India's capabilities in advanced space engineering.

****Note: Launch dates of the missions are scheduled to be launched in NOVEMBER 2026 but may subject to change.**

Happy Birthday


November 2, 1885

Harlow Shapley

Harlow Shapley (November 2, 1885 – October 20, 1972) was an American astronomer, who served as head of the Harvard College Observatory from 1921–1952, Shapley used Cepheid variable stars to estimate the size of the Milky Way Galaxy and the Sun's position within it. In 1953 he proposed his "liquid water belt" theory, a concept now known as a habitable zone, suggesting that planets at suitable distances from their stars could have conditions that allow liquid water to exist.

Fred Lawrence Whipple

Fred Lawrence Whipple (November 5, 1906 – August 30, 2004) was an American astronomer who worked at Harvard College Observatory. He earned his PhD in astronomy from the University of California, Berkeley, in 1931. He studied comet orbits and helped map Pluto's orbit in 1930. In 1950, he proposed the "dirty snowball" model of comets and invented the Whipple shield to protect spacecraft from micrometeoroids, making significant contributions to astronomy and space technology.


November 5, 1906


November 9, 1934

Carl Sagan

Carl Edward Sagan (November 9, 1934 – December 20, 1996) was an American astronomer, planetary scientist, and science communicator. He contributed to the Mariner, Viking, and Voyager missions and helped develop the Voyager Golden Record. He co-wrote and narrated the famous television series Cosmos: A Personal Voyage (1980), winning two Emmy Awards and a Peabody Award. He also won the Pulitzer Prize for his book The Dragons of Eden.

Christian Doppler

Christian Andreas Doppler (November 29, 1803 – March 17, 1853) was an Austrian mathematician and physicist. He studied mathematics, physics, and philosophy and later became a professor at Prague Polytechnic Institute. In 1842, he introduced the Doppler Effect, which explains how the observed frequency of a wave changes due to the relative motion between its source and the observer. He also proposed using this principle to explain the colours of binary stars.


November 29, 1803

Happy Birthday


November 15, 1738

William Herschel

Frederick William Herschel (November 15, 1738 – August 25, 1822) was a German-British astronomer and composer who discovered the planet Uranus in 1781. He built large telescopes and systematically studied stars and nebulae. He discovered that many objects thought to be nebulae were actually star clusters. He also published catalogues of thousands of nebulae and developed a theory of stellar evolution, making important contributions to modern astronomy..

Edwin Hubble

Edwin Powell Hubble (November 20, 1889 – September 28, 1953) was an American astronomer who made major contributions to cosmology. He demonstrated that many nebulae were actually galaxies beyond the Milky Way. Using Cepheid variable stars, he measured distances to distant galaxies. In 1929, he established Hubble's law, providing evidence that the universe is expanding. The Hubble Space Telescope was named in his honour.


November 20, 1889


Novemeber 15, 1958

Sandip Chakrabarti

Sandip Chakrabarti (born November 15, 1958) is an Indian astrophysicist known for his research on black holes and high-energy astrophysics. He studied matter flow and nucleosynthesis around black holes. In 1995, he proposed that gamma-ray bursts could be the birth cries of black holes, an idea supported by observations in 2013. He also researched accretion disks and their influence on gravitational-wave signals.

Jitendra Nath Goswami

Jitendra Nath Goswami (born November 18, 1950) is an Indian scientist from Jorhat, Assam. He served as the chief scientist of Chandrayaan-1. He was also associated with Chandrayaan-2 and Mangalyaan. His research focuses on the Solar System, astrophysics, and cosmic rays. He contributed to studies of lunar samples and the role of radioactive aluminium-26 in the formation of the Solar System. He also served on the Physical Sciences jury for the Infosys Prize from 2016 to 2018.


Novemeber 18, 1950

SETBACKS THAT BUILT SPACE SUCCESS

WHEN ROCKETS STUMBLE LESSONS FROM PSLV-C62

Every space mission is a journey into the unknown. Sometimes, even the best-laid plans encounter unexpected challenges.



PSLV-C62 at Sriharikota before launch. (Credit: ISRO)

A Mission Takes Flight:
On 12 January 2026, India's PSLV-C62 rocket lifted off from Sriharikota, carrying EOS-N1 (Anvesha), an Earth observation satellite, and 15 other satellites. The mission began with hopes of advancing scientific research and space technology.

What Went Wrong?
Near the end of the rocket's third stage, an unusual roll-rate disturbance occurred, followed by a deviation in its flight path. As a result, the satellites could not reach their intended orbits.
This was PSLV's second consecutive launch failure, following the PSLV-C61 mission in May 2025. The Indian Space Research Organisation (ISRO) began investigating the anomaly to understand what went wrong.

Why Does It Matter?
EOS-N1 was designed for Earth-observation applications, while the other satellites represented diverse scientific and technological goals. Each payload reflected months of hard work, innovation, and careful planning. Losing the opportunity to complete their missions was a significant setback.

Turning Setbacks into Learning:
Space exploration has never been a story of success alone. Every launch generates valuable data, and investigating failures helps scientists identify problems, improve engineering designs, and strengthen future missions. Understanding what went wrong is essential to making future launches more reliable.

The Lesson for Young Explorers:
A failed mission does not mean failed science. PSLV-C62 reminds us that progress comes not only from celebrating achievements but also from asking difficult questions, learning from evidence, and having the courage to try again.
Reaching for the stars takes courage. Learning from the journey is what brings us closer.

SPACE PARADOXES: GLITCHES IN THE COSMOS

BOLTZMANN BRAINS: WHAT IF YOUR MEMORIES WERE A COSMIC ACCIDENT?

What If Your Memories Were Not Real?

Your memories tell the story of your life your childhood, your school, your friends, and the people you love. But here is a strange question: What if a brain could have all these memories without ever experiencing any of them?

The Boltzmann Brain paradox explores this unusual possibility. Could a brain form through a random arrangement of particles in the universe, complete with memories of a past that never happened? Even stranger, how can we be certain that the world we experience matches the reality outside our minds?

The Science Behind the Mystery:

To understand this idea, we need to explore **entropy**. In physics, entropy measures how many microscopic arrangements correspond to a particular overall state. The second law of thermodynamics tells us that the total entropy of an isolated system tends not to decrease.

Random fluctuations can sometimes produce unlikely arrangements of particles. In certain theoretical models, an extraordinarily rare fluctuation could even produce a brain with apparent memories.

Such an event would be incredibly unlikely. However, in some models of a universe that lasts for an extremely long time, scientists ask whether these rare events could eventually occur.

A Brain or an Entire Universe?

Here is where the paradox becomes fascinating. In some cosmological models, a randomly formed brain could be more probable than an entire universe with a long, orderly history of stars, planets, and life.If a theory predicts that such brains should vastly outnumber observers with genuine histories, scientists must ask whether something is missing from that theory.

Can We Trust What We Experience?

Our minds help us understand the world, but we experience reality through our senses, memories, and thoughts. The Boltzmann Brain paradox pushes this question to an extreme: how could an observer distinguish a genuine past from convincing but false memories?

This does not mean our memories are false or that reality is an illusion. Instead, it challenges scientists to examine the assumptions behind their explanations of the universe. If even our memories can be questioned in a thought experiment, how can science help us understand what is real?

Sometimes, the strangest questions lead us towards a deeper understanding of the cosmos and our place within it.

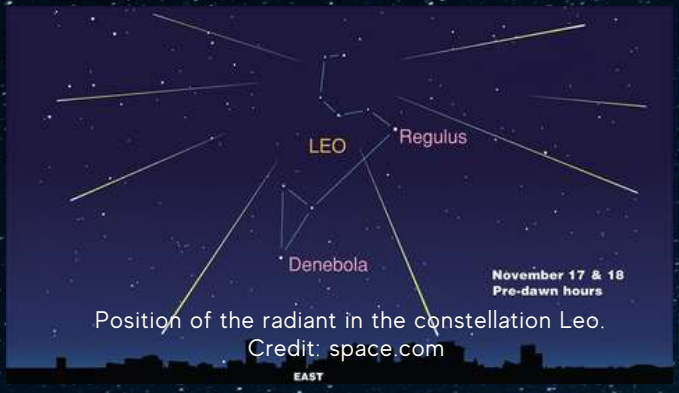
ASTRONOMICAL EVENTS

Leonids Meteor Shower
November 17–18, 2026

The Leonids are among the fastest annual meteor showers, originating from debris left behind by Comet 55P/Tempel-Tuttle. These particles enter Earth's atmosphere at approximately 71 km/s, producing swift, luminous streaks across the night sky.

The shower is expected to peak around November 17–18, 2026, with a zenithal hourly rate of approximately 15 meteors under ideal conditions.

Although the Leonids have produced spectacular meteor storms in the past, no major storm is expected in 2026.



Position of the radiant in the constellation Leo.
Credit: space.com

The best time to watch is after midnight until dawn, when the constellation Leo rises higher in the eastern sky. Meteors may appear anywhere across the sky, even though their apparent paths originate from Leo. No telescope or binoculars are required. Choose a dark location away from city lights, allow your eyes 20–30 minutes to adjust, and watch patiently for these fast-moving celestial streaks.

Mercury Greatest Western Elongation
November 20 2026

Mercury, the smallest planet in the Solar System and the closest to the Sun, is often challenging to observe because it never appears far from the Sun in Earth's sky. However, during greatest western elongation, Mercury reaches its maximum apparent angular distance west of the Sun, offering a favorable opportunity to spot the planet in the morning sky before sunrise.

Around November 20, 2026, Mercury is expected to reach greatest western elongation, at an angular separation of approximately 19.6° from the Sun. It will appear as a bright, star-like point of light against the morning twilight. Its apparent brightness will be around magnitude −0.5, although visibility will depend on its altitude, atmospheric conditions, and the brightness of the sky.

Toward the eastern to southeastern horizon approximately 30–60 minutes before sunrise. Choose an observing site with an unobstructed horizon, away from tall buildings and trees.

Mercury can be seen with the naked eye under favorable conditions, while binoculars may help locate it against the twilight sky. Never point binoculars or a telescope toward the Sun. This event provides an excellent opportunity to understand Mercury's orbit and observe one of the Solar System's most elusive planets.

Uranus at Opposition

November 25, 2026

Opposition occurs when Earth lies approximately between the Sun and an outer planet, placing the planet opposite the Sun in our sky. During this alignment, the planet rises around sunset and remains visible for much of the night, providing a favorable opportunity for observation.

On November 25, 2026, Uranus will reach opposition, shining at approximately magnitude +5.6. Although it may be visible to the naked eye under exceptionally dark skies, binoculars or a telescope are recommended, particularly in urban areas.

Uranus will be located in the constellation Taurus, near the region of the Pleiades and Hyades star clusters. It will climb higher as the night progresses, reaching its highest point around midnight. Exact timings depend on the observing location.

To observe Uranus, choose a dark location away from artificial lights and allow your eyes to adjust to the darkness. Binoculars can help you locate the planet among the surrounding stars, while a telescope may reveal its tiny blue-green disk. Use Stellarium to identify its precise position and distinguish it from nearby stars before beginning your observation.

This opposition offers an excellent opportunity to explore Uranus, a distant ice giant known for its unusually tilted rotation axis.

A Planet Parade at Dawn

November 14, 2026

A planetary alignment, often called a planet parade, occurs when several planets appear together in the same region of the sky as viewed from Earth. Although they are separated by vast distances in space, their positions along the Solar System's orbital plane can make them appear grouped from our perspective.

Around November 14, 2026, Mercury, Venus, Mars, and Jupiter are expected to appear in the morning sky. Venus will shine brilliantly, Jupiter will appear prominent, Mars will display a reddish hue, and Mercury may be challenging to spot near the horizon.



The eastern to southeastern sky before sunrise, around 5:00–5:30 AM IST. Choose a location with a clear horizon, away from buildings and trees. All four planets may be visible to the naked eye under favorable conditions, while binoculars can help locate Mercury. Never point optical equipment toward the Sun.

This grouping offers a wonderful opportunity to compare planetary brightness and colors in a single morning session. The viewing arrangement changes from day to day, so observing on several consecutive mornings can reveal these changes.

Jupiter's Lunar Occultation
November 3, 2026

A lunar occultation occurs when the Moon passes directly in front of a distant celestial object, temporarily blocking it from view. During this event, Jupiter will appear to move behind the Moon and later emerge from the opposite edge. Although Jupiter is much larger than the Moon, it appears smaller in our sky because it is vastly farther away from Earth.

When and Where Can It Be Seen?

The lunar occultation of Jupiter is predicted to occur during the early morning of November 3, 2026. For observers in Chennai, the event is expected to begin at approximately 2:32 AM IST, when Jupiter disappears behind the Moon, and end around 3:05 AM IST, when it reappears. The Moon will be positioned in the eastern sky, approximately 23° above the horizon at the beginning of the event and 31° high at reappearance. Jupiter will shine at approximately magnitude −1.9, making it a bright object to locate near the Moon. The Moon will be a waning crescent, illuminated by roughly 38% of its visible surface..



How Can You Observe It?

Choose an observing location with a clear view of the eastern horizon, away from buildings and trees. Begin observing at least 15–20 minutes before the predicted disappearance so you can locate Jupiter and follow the event from its beginning. Although the naked eye can help you identify the Moon and Jupiter, a telescope is recommended to observe Jupiter disappearing behind the lunar edge and emerging again.

Binoculars may also help, but a telescope provides a more detailed view.

Why Is This Event Worth Watching?

A lunar occultation offers a rare opportunity to witness the Moon gradually cover a bright planet and reveal it again moments later. Observing Jupiter disappear and reappear at the Moon's edge helps us understand how celestial objects move and align from our perspective on Earth. The event also demonstrates why an observer's location matters in astronomy, as the same alignment may produce an occultation in one region and only a close conjunction in another. For skywatchers, it is a chance to experience the dynamic nature of the night sky through direct observation.

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 as distant diamonds and planets roam over the cosmic canvas. Conjunctions, those ethereal moments in the heavens when heavenly bodies appear to collide, provide a mesmerising 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 Moon near Mars

On November 2, the waning Moon will appear close to reddish Mars, which will shine at approximately magnitude +0.8, in the eastern sky before sunrise. Both objects will be visible to the naked eye, while binoculars can help reveal the surrounding star field.Mars will appear as a faint reddish point of light beside the brighter Moon, creating an attractive pairing for early-morning skywatchers.



Place: Chennai / Date: 02th November / Time: 05:00 am.

Conjunction of Mars near Jupiter

On November 16, reddish Mars (approximately magnitude +0.6) will appear close to brilliant Jupiter (magnitude −2.0) in the eastern pre-dawn sky. The two planets can be observed with the naked eye or binoculars. Jupiter will outshine Mars, making it easier to identify the two planets in the morning sky. A telescope may reveal Jupiter's disk and its four largest moons, while Mars will appear as a small reddish point.



Place: Chennai / Date: 16th November / Time: 05:30 a.m.

Conjunction of Moon near Jupiter

On November 30, the waning gibbous Moon will appear close to bright Jupiter (approximately magnitude −2.2) in the eastern sky during the early morning hours. Both will be easily visible to the naked eye, while binoculars may reveal Jupiter's four largest moons. The Moon's brightness will contrast Jupiter's steady glow, creating an attractive sight before sunrise.



Place: Chennai / Date: 30th November / Time: 05:30 a.m.

Conjunction of Jupiter near Mars

On November 30, reddish Mars (approximately magnitude +0.4) will appear near bright Jupiter (approximately magnitude −2.2) around 5:00 AM IST in the eastern sky. Both planets will be visible to the naked eye, while binoculars can provide a closer view. Both planets can be observed with the naked eye, while binoculars or a telescope.



Place: Chennai / Date: 30th November / Time: 05:00 a.m.

STUDENTS CORNER

THE GIANT JUPITER

by Vedav Vivek 8-N

The largest planet in our solar system so big that 1300 planets the size of Earth can fit inside. It has a diameter approximately 139,820 km which 11 times that of Earth. The planet Jupiter, the fifth planet from the Sun beyond the asteroid belt is a mystery so huge it questioned scientist through the ages of humanity.

The planet Jupiter named after the Roman god of the Skies is more than what it seems to our eye, for the greatest supriese of all was that, the planet is mainly made up ofliquid and gases mainly hydrogen and helium. The gas present inside the planet turns into liquid due to the planets high and internal pressure.

Jupiter has a thin atmosphere of ammonia beneath which is a 25,000 km deep ocean of liquid hydrogen. The planet Jupiter though the largest the surface moves at a remarkable fast rate of 45,000 km per hour. Jupiter has confirmed 79 moons and takes 12 Earth years to orbit the Sun. The tourist highlight of this Giant is the ;Great Red Spot; a huge raging storm with a size wider than the diameter of Earth, for span 330 years and still on till date.

The thing that is most Surprising is the Jupiter is getting smaller at the time at a rate of 2cm (1 inch) every year. It happens as the planet itself generates more heat that it absorbs from the sun.In Conclusion The planet the exploration of Jupiter is one of main enchanted voyage which will inspire us today and continue tomorrow.

November

THIS MONTH IN HISTORY

01

NOV 1977

DISCOVERY OF CHIRON

On 1 November 1977, astronomer Charles Kowal discovered 2060 Chiron using observations from Palomar Observatory in California. Chiron follows an unusual orbit between Saturn and Uranus and became the first recognized member of a group of small Solar System bodies now known as centaurs. These objects occupy the region between the giant planets and can display characteristics of both asteroids and comets. Chiron's discovery expanded our understanding of the outer Solar System and raised new questions about how small icy bodies evolve over time.
(image credit: Celestia)





HOOKER'S FIRST LIGHT

On 2 November 1917, the 100-inch Hooker Telescope at Mount Wilson Observatory in California began astronomical observations. At the time, it was among the world's largest telescopes, enabling astronomers to investigate faint and distant objects in unprecedented detail. Edwin Hubble later used the telescope to study Cepheid variable stars in other galaxies, helping establish that the universe extends beyond the Milky Way. Observations made with this telescope also contributed to evidence for the expansion of the universe, transforming modern astronomy and cosmology.
(image credit: Wikimedia Commons)

02

NOV 1917

03

NOV 1957

FIRST ANIMAL ON ORBIT

On 3 November 1957, the Soviet Union launched Sputnik 2, carrying Laika, a dog who became the first animal to orbit Earth. The mission followed the success of Sputnik 1 and demonstrated that a living organism could be launched into orbit. However, Sputnik 2 was not designed to return Laika safely to Earth, and she died during the mission. Her flight became an important, though tragic, milestone in the development of human spaceflight and raised lasting questions about animal welfare in scientific research.(image credit:en.wikipedia.org)



November

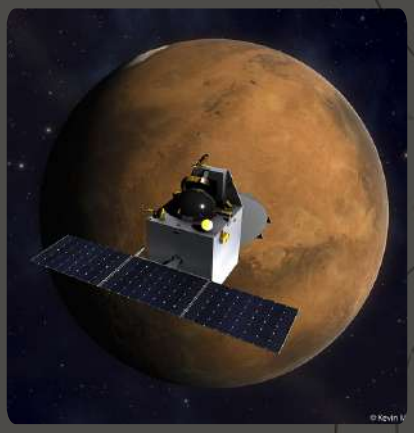
THIS MONTH IN HISTORY

05

NOV 2013

LAUNCH OF MARS MISSION

On 5 November 2013, the Indian Space Research Organisation (ISRO) launched the Mars Orbiter Mission, also known as Mangalyaan, aboard the PSLV-C25 rocket from Sriharikota, India. The mission aimed to demonstrate India's ability to design, launch, and operate a spacecraft travelling to Mars. After its journey, the spacecraft entered Martian orbit on 24 September 2014. India became the first country to reach Mars orbit on its first attempt, marking a major achievement in the country's planetary exploration program. (image credit: isro.gov.in)





LUNAR ORBITER 2 LAUNCH

On 6 November 1966, NASA launched Lunar Orbiter 2 to photograph the Moon and identify potential landing sites for the Apollo and Surveyor missions. After reaching lunar orbit, the spacecraft captured detailed images of the lunar surface, including craters, plains, and rugged terrain. These images helped scientists and mission planners assess possible locations for future astronaut landings. Lunar Orbiter 2 was part of a series of missions that systematically mapped the Moon before crewed exploration.(image credit: www.nasa.gov)

06

NOV 1966

07

NOV 1996

MARS GLOBAL SURVEYOR

On 7 November 1996, NASA launched Mars Global Surveyor aboard a Delta II rocket to investigate the Red Planet. The spacecraft reached Mars in September 1997 and studied its surface, topography, atmosphere, and magnetic field. Its observations revealed evidence of ancient water-related geological processes and helped researchers understand how the Martian landscape changed over time. The mission also supported the planning of later Mars landers by mapping the surface in detail.(image credit: NASA/JPL)



November

THIS MONTH IN HISTORY

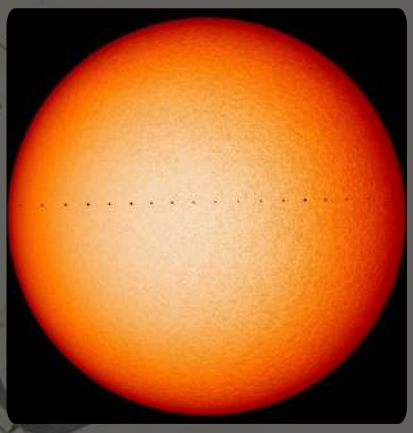
09

NOV 1967

APOLLO 4 LAUNCHED

On 9 November 1967, NASA launched Apollo 4, the first uncrewed test flight of the Saturn V rocket. The mission tested the massive launch vehicle and the Apollo spacecraft systems that would eventually carry astronauts to the Moon. It also evaluated the command module's heat shield during a high-speed return through Earth's atmosphere. Apollo 4 completed its objectives successfully, demonstrating that key systems could work together as planned. This achievement helped prepare NASA for subsequent crewed missions and the eventual Apollo lunar landings..(image credit: NASA)





MERCURY TRANSITS

On 11 November 2019, Mercury passed between Earth and the Sun in an event known as a planetary transit. From Earth, Mercury appeared as a tiny black dot moving across the Sun's bright disk. Such transits are uncommon because Mercury's orbit is tilted relative to Earth's orbital plane. The event provided an opportunity to demonstrate orbital geometry. Observers needed a properly equipped solar telescope or certified solar filter; looking directly can cause eye damage.
(image credit: NASA)

11

NOV 2019

12

NOV 1980

VOYAGER 1 FLYBY TO SATURN

On 12 November 1980, NASA's Voyager 1 spacecraft made its closest approach to Saturn. It photographed the planet's atmosphere, investigated its rings, and observed several moons, including Titan. Its close encounter with Titan also influenced its trajectory, sending it out of the plane of the planets. Voyager 1's flyby became one of the most important milestones in outer Solar System exploration and provided discoveries that continued to guide planetary research.
(image credit: gtgraphics.de)



November

THIS MONTH IN HISTORY

PHILAE LANDS ON COMET 67P

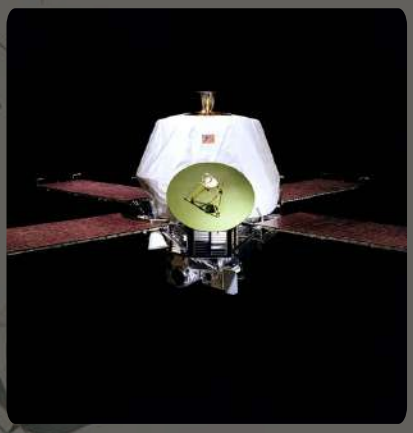
12 NOV 2014

On 12 November 2014, the European Space Agency's Philae lander attempted the first landing on a comet. It separated from the Rosetta spacecraft and descended toward Comet 67P/Churyumov–Gerasimenko. Because its anchoring system did not work as planned, Philae bounced several times before settling on the surface. Despite its challenging landing, the probe returned measurements about the comet's composition and physical properties. The mission provided valuable information about the icy bodies left over from the formation of the Solar System. (image credit: en.wikipedia.org)



MARINER 9 MARS ORBITER

14 NOV 1971

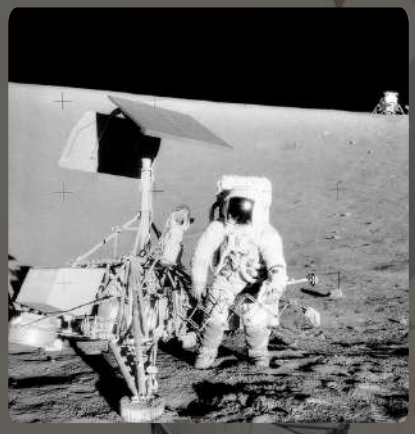


On 14 November 1971, NASA's Mariner 9 spacecraft entered orbit around Mars, becoming the first spacecraft to orbit another planet. A global dust storm initially obscured much of the Martian surface, delaying detailed observations. Once the atmosphere cleared, Mariner 9 mapped the planet and photographed enormous volcanoes, the Valles Marineris canyon system, and the moons Phobos and Deimos. The mission established orbital mapping as a powerful tool for planetary exploration.(image credit:wikipedia)

APOLLO 12 ON THE MOON

19 NOV 1969

On 19 November 1969, Apollo 12 astronauts Charles Conrad and Alan Bean landed the lunar module Intrepid in the Ocean of Storms, while Richard Gordon remained in lunar orbit. The astronauts collected lunar samples, deployed scientific instruments, and visited the nearby Surveyor 3 spacecraft, which had landed in 1967. Apollo 12 demonstrated the value of precise lunar landings and expanded the scientific objectives of human exploration beyond the historic first landing of Apollo 11.(image credit: NASA)



November

THIS MONTH IN HISTORY

FIRST ISS MODULE LAUNCH

20 NOV 1998

On 20 November 1998, Russia launched Zarya, the first module of the International Space Station (ISS). The module provided early power, propulsion, and storage capabilities as the orbital laboratory began taking shape. Other modules were subsequently launched and connected, creating a large international research facility in low Earth orbit. Its development represents decades of international cooperation in human spaceflight and supports research that is difficult to conduct under Earth's gravity. (image credit: spaceflight.nasa.gov)



INDIA'S SOUNDING ROCKET



On 21 November 1963, India launched its first sounding rocket from Thumba, near Thiruvananthapuram, Kerala. The Nike-Apache rocket carried instruments used to investigate the upper atmosphere and marked an important beginning for India's organized space research program. Early experiments helped Indian scientists gain experience in atmospheric measurements, and space-related technology. This modest launch laid part of the foundation for the development of ISRO and India's later satellite and launch-vehicle programs.(image credit: vssc.gov.in)

21 NOV 1963

INDIA'S HYSIS SATELLITE

29 NOV 2018

On 29 November 2018, ISRO launched HysIS, the Hyperspectral Imaging Satellite, aboard the PSLV-C43 rocket from Sriharikota. The satellite was designed to observe Earth using many narrow spectral bands, allowing scientists to distinguish materials by how they reflect sunlight. Unlike conventional cameras, hyperspectral instruments provide detailed spectral information. HysIS strengthened India's Earth-observation capabilities and demonstrated the scientific value of advanced imaging technology from space.(image credit: ISRO)



STORIES OF INDIA'S GREATEST MINDS

Dr. Ritu Karidhal
The Rocket Woman of India



Dr. Ritu Karidhal Srivastava, widely celebrated as the "Rocket Woman of India," is a distinguished senior scientist at the Indian Space Research Organisation (ISRO). Born on April 13, 1975, Lucknow, Uttar Pradesh, her fascination with outer space began in early childhood. She spent her nights stargazing, tracking the phases of the moon, and meticulously collecting newspaper clippings about NASA and ISRO projects.

Driven by her passion, she pursued higher education with exceptional focus, earning her Bachelor's and Master's degrees in Physics from the University of Lucknow. She went on to secure a Master of Engineering in Aerospace Engineering from the prestigious Indian Institute of Science (IISc) in Bengaluru. Her childhood dream became a reality in 1997 when she officially joined ISRO.

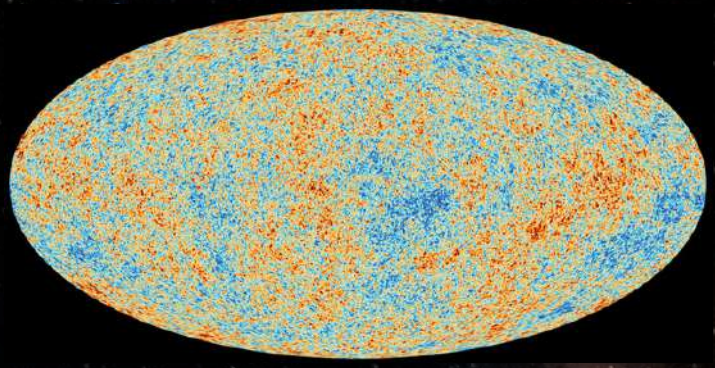
Dr. Karidhal's career is defined by her leadership in India's most ambitious space frontiers. She thrust into the national spotlight as the Deputy Operations Director for India's Mars Orbiter Mission (Mangalyaan), where she successfully designed the spacecraft's autonomous fault detection system. Her brilliance later led to her appointment as the Mission Director for the Chandrayaan-2 and Chandrayaan-3 lunar explorations. Her critical role in orchestrating the historic soft landing of Chandrayaan-3 near the Moon's south pole cemented her legacy. A recipient of the ISRO Young Scientist Award and the UP Gaurav Samman, Dr. Karidhal stands as a towering icon for women in STEM worldwide.

ASTRONOMY & SPACE TERM

COSMIC MICROWAVE BACKGROUND

THE ECHO OF THE EARLY UNIVERSE

The Cosmic Microwave Background (CMB) is the faint glow of microwave radiation that fills the entire Universe. It is considered the oldest light we can observe, originating about 380,000 years after the Big Bang, when the Universe had cooled enough for electrons and protons to combine into neutral atoms. Before this, light was constantly scattered by free electrons, making the Universe opaque. Once atoms formed, light could travel freely through space. Today, this ancient radiation has cooled to just 2.7 K (−270.45°C) because of the expansion of the Universe.

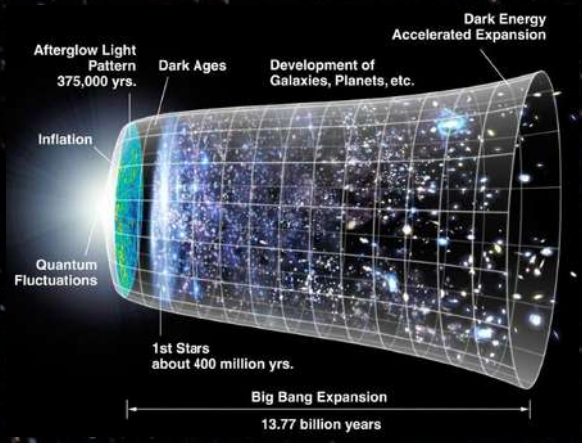


Tiny variations in the CMB reveal slight differences in the density of the early Universe. These fluctuations eventually grew under gravity and became the galaxies, galaxy clusters, and large-scale structures we observe today.

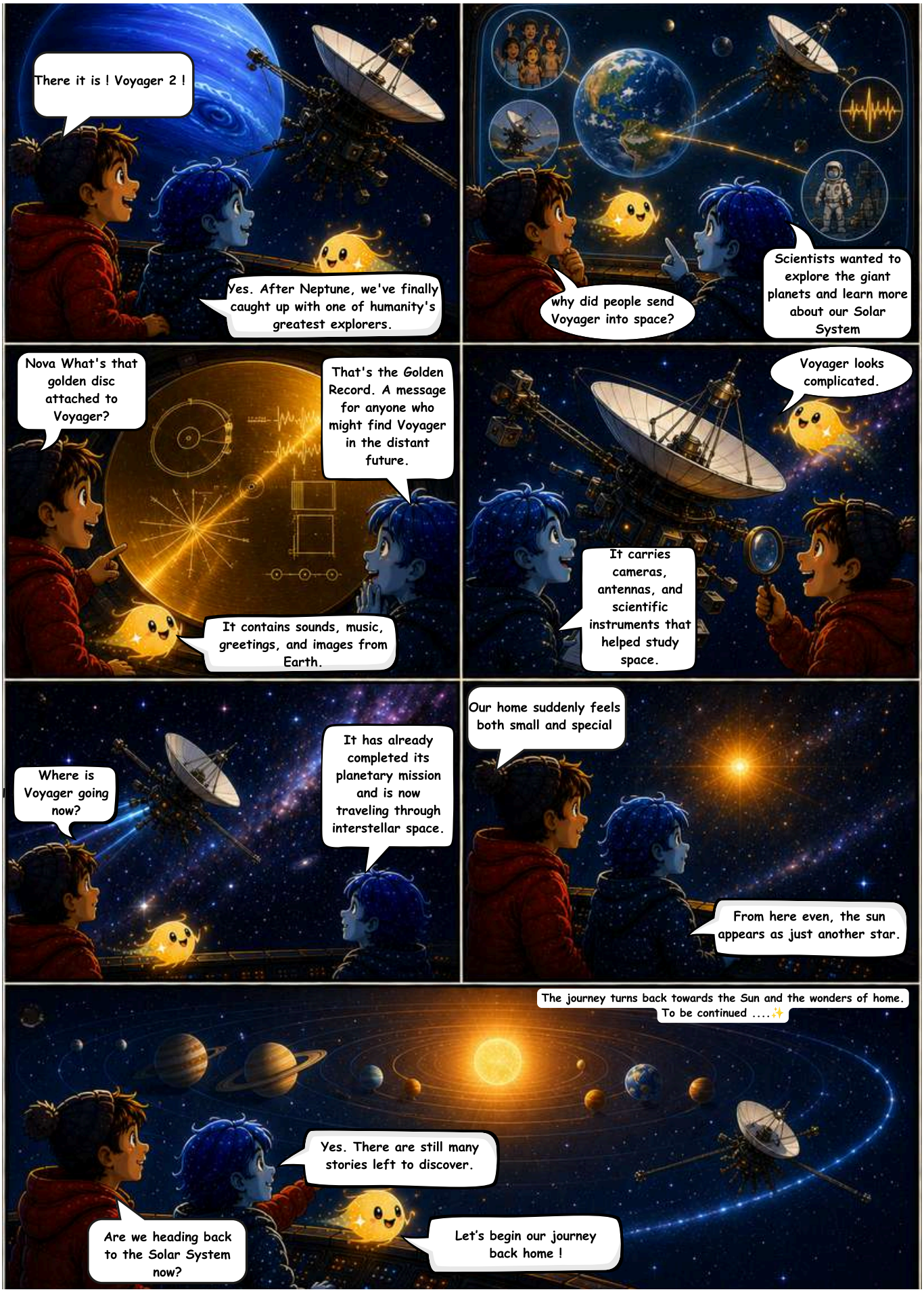
PLANCK EPOCH

THE EARLIEST MOMENT OF THE UNIVERSE

The Planck Epoch refers to the earliest known stage of the Universe, beginning immediately after the Big Bang and lasting until about 10^{-43} seconds. During this incredibly brief period, the Universe was unimaginably hot and dense, and all four fundamental forces may have been unified. At such extreme energies and tiny scales, the effects of quantum mechanics and gravity would both have been important. However, our current theories cannot fully describe what happened during this epoch because a complete theory of quantum gravity has not yet been developed. Scientists therefore cannot say with certainty what the Universe was like before or during the Planck Epoch. Understanding this earliest stage could help explain how the Universe evolved from its initial state into the vast cosmos we observe today.

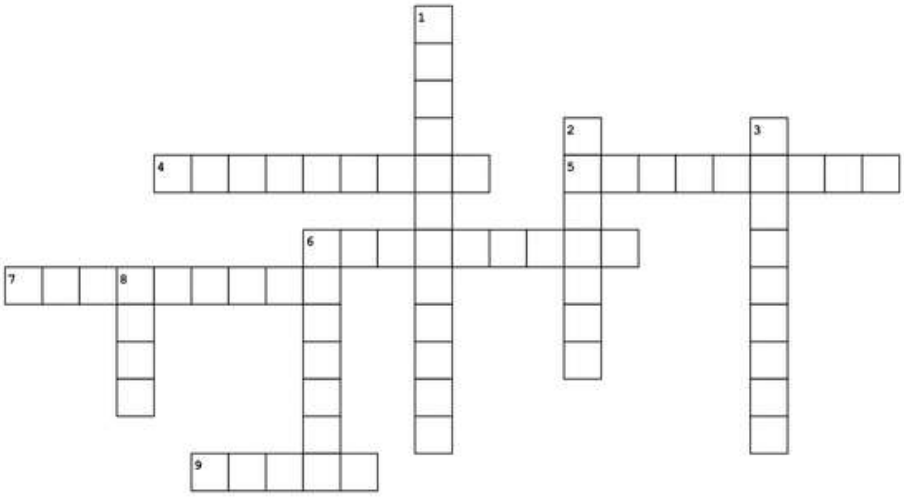


COSMIC JOURNEY- MESSENGER FROM EARTH



TRAIN YOUR BRAIN

CROSSWORD



Across

4. Which spacecraft was the first successful rover to operate on the surface of Mars?

5. Which ancient Indian astronomer proposed that Earth's rotation explains the apparent daily motion of the stars?

6. What is the name of the newly identified lunar crater ?

7. Which German company developed the SR75 sounding rocket?

9. Which famous comet is responsible for the Orionid meteor shower?

Down

1. Which NASA rover carried the MOXIE experiment to Mars?

2. Which spacecraft was launched aboard Space Shuttle Atlantis on 18 October 1989 to study Jupiter?

3. Which launch vehicle delivered ten Qianfan broadband satellites?

6. Which gas in Neptune's atmosphere absorbs red light and reflects blue light?

8. Which planet's air is being considered as a resource for making rocket fuel?

Astronomy Word Puzzle

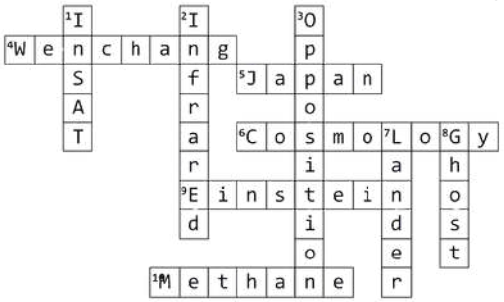
Variable Stars

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

ALPHECCA
ALMAAZ
BETELGEUSE
WURREN
MIRA
MEKBUDA
RASALGETHI
SHELIAK
ALGOL
MINTAKA
POLARIS
PROPUS
VEGA

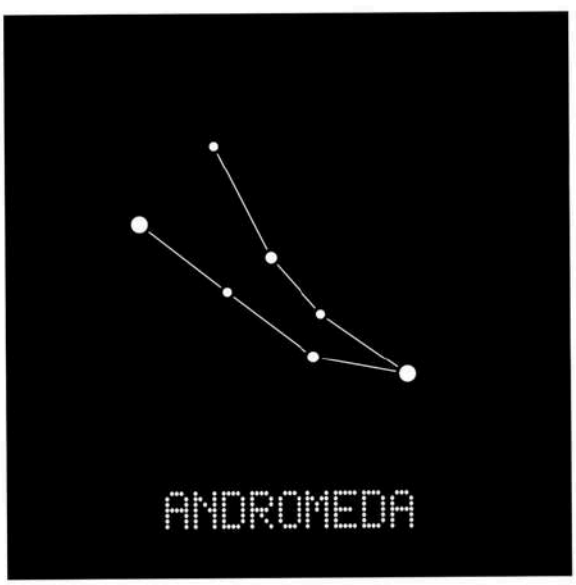
****Answers for this month puzzles will be shared in next magazine.**

Answers for last month puzzles.

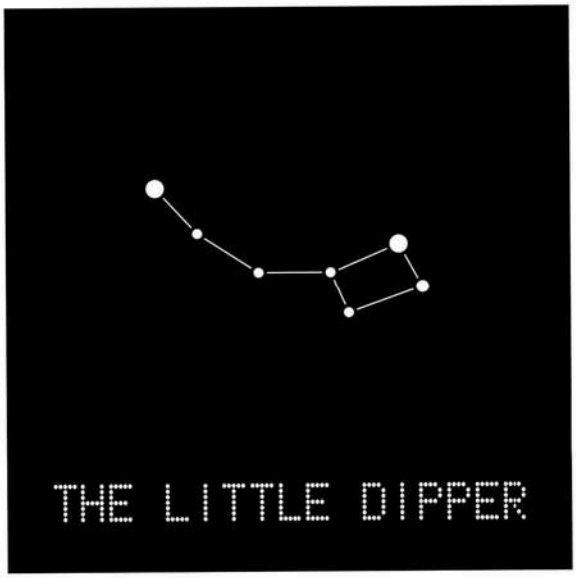


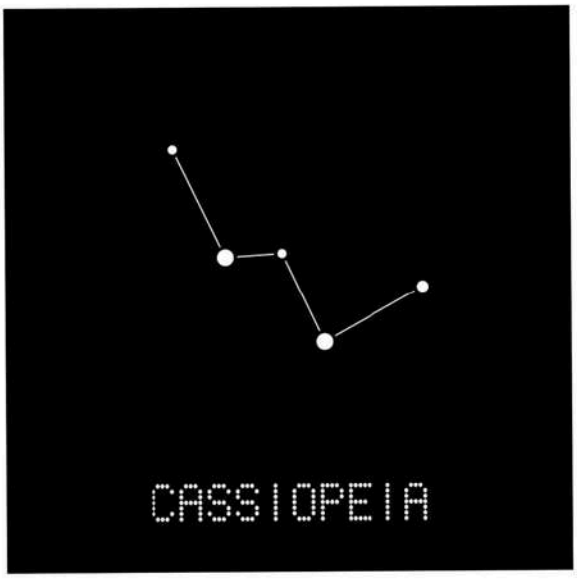
O	E	I	I	T	O	S	I	S	D	D	O	T	D
A	O	Y	U	M	E	U	R	O	P	A	E	E	S
E	E	O	E	I	I	D	E	S	J	Y	O	T	P
P	E	T	C	M	A	A	T	N	O	O	M	H	R
I	N	S	L	A	M	L	P	I	O	I	O	Y	O
M	O	I	E	S	U	E	H	E	T	A	E	S	M
E	I	L	I	M	S	C	U	T	T	A	T	O	E
T	D	L	R	J	A	N	U	S	S	U	N	I	T
H	S	A	A	D	D	E	N	O	S	U	S	A	H
E	Y	C	N	H	U	N	O	T	I	R	T	D	E
U	U	D	S	O	B	O	H	P	E	T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

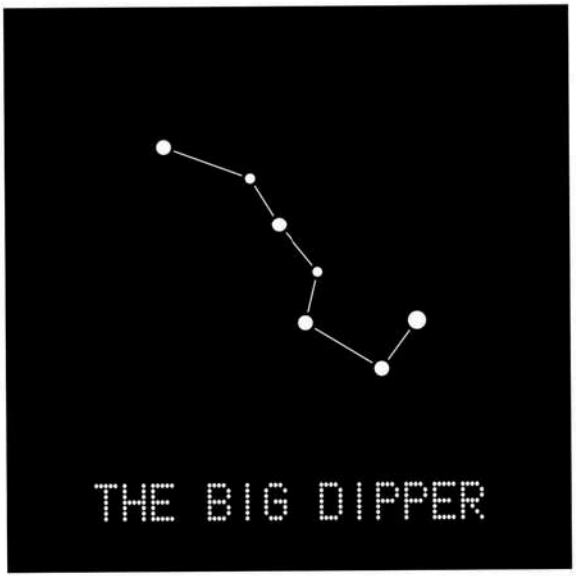
MISSION: DO IT YOURSELF

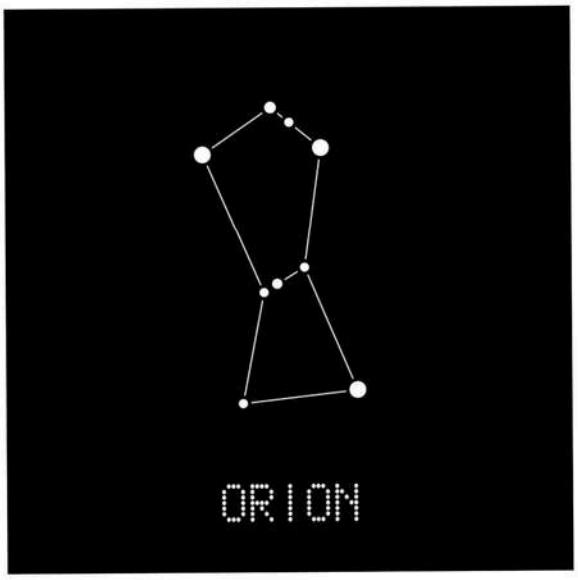












INSTRUCTIONS

- Cut out all the pieces.
- Fold and glue the main piece into a rectangular box with both ends open.
- Cut the marked slit and make holes in the constellation card matching the white star dots and letters.
- Insert the card into the slit and shine an LED torch through the opposite end.
- Project the constellation onto a wall in a dark room.

MISSION: DO IT YOURSELF





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SPACE TECHNOLOGY & EDUCATION PVT. LTD.
Plot No.3, Institutional Area, Sector 11, Dwarka, New Delhi 110075, India
www.space-global.com info@space-global.com +91-7402074020 | +91-11-45086320

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