SPACE™
EMPOWERING LIFE

World Space Week OCTOBER 4-10

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Galactica

Astronomy and Space Science Magazine

What's Inside?

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

Cover Photo: Official poster for World Space Week 2025, depicting the theme "Living in Space."

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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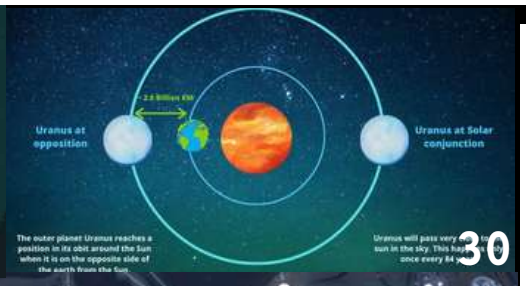
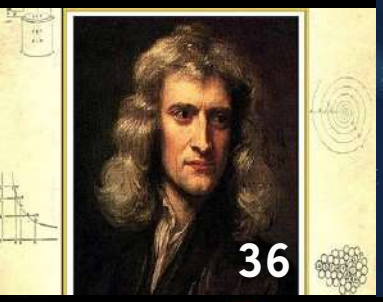
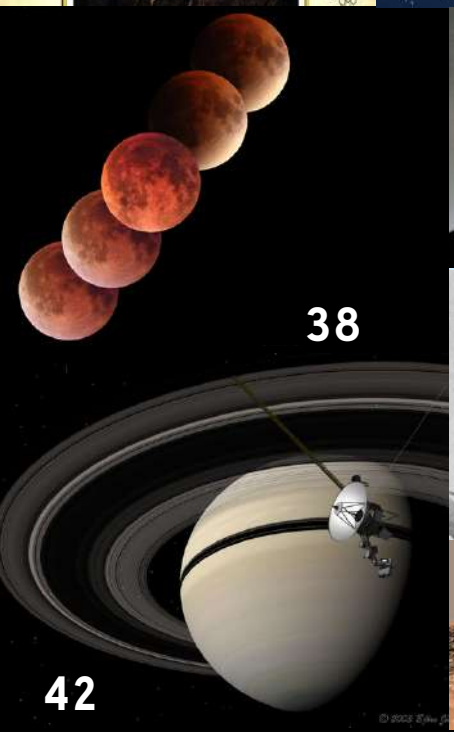






SPACE INSIGHTS

Meet the Cosmonaut: Denis Matveev

Celebrating Indo-Russian Collaboration in Space Exploration

On 10th October 2025, the Russian Centre of Science and Culture, New Delhi, became a beacon of global cooperation as SPACE India, in collaboration with the Russian House, hosted the landmark event "Meet the Cosmonaut: Denis Matveev." Organized under the Official National Celebrations of World Space Week 2025, themed "Living in Space," this remarkable gathering celebrated the enduring Indo-Russian partnership that continues to shape humanity's pursuit of the stars.

The event brought together over 250 participants - students, educators, scientists, and dignitaries, for an unforgettable encounter with Cosmonaut Denis Matveev, Pilot-Cosmonaut of the Russian Federation and Hero of the International Space Station (ISS). For the young participants, meeting a real cosmonaut was not merely an interaction, it was an awakening, a moment where dreams of space transformed into tangible inspiration.

The proceedings commenced with a solemn tribute ceremony at the Russian House's commemorative plaque, honouring pioneers of global space exploration. The ceremony, led by Ms. Elena Remizova, Director of the Russian House, and graced by Mr. Denis Matveev, Mr. Igor Koreshev from the Cosmonaut Training Center, and Dr. Sachin Bahmba, Founder and CMD of SPACE India, symbolised decades of scientific camaraderie and the shared vision of peaceful space exploration.

The highlight of the event was an interactive dialogue with Cosmonaut Matveev, whose vivid accounts of life aboard the ISS captivated the audience. Speaking of the trials and triumphs of long-duration missions, he offered rare insight into the human experience of living and working beyond Earth. The Q&A session that followed brimmed with curiosity, as students posed intelligent questions on astronaut training, mission safety and the next frontier, Mars.

In his address, Dr. Sachin Bahmba reflected on SPACE India's two-decade journey in advancing astronomy and STEM education across the nation. As an ISRO Space Tutor, SPACE India continues to bridge classrooms with the cosmos, giving students direct exposure to the world's space community.

Complementing the session were a screening of the acclaimed Russian film "The Age of Pioneers" and a special exhibition on Indo-Russian Space Heritage, tracing milestones from Sputnik 1 to Soyuz T-11.

For participating schools, from Delhi to Gujarat and beyond, this event was a once-in-a-lifetime privilege. "Meet the Cosmonaut: Denis Matveev" emerged not merely as an event, but as a symbol of friendship, knowledge, and aspiration, reaffirming that when nations collaborate, humanity's journey among the stars truly begins.

DPS Faridabad Celebrates World Space Week 2025: My Home on the Moon

As part of the World Space Week 2025 celebrations and on the occasion of National Students' Day, marking the birth anniversary of Dr. A.P.J. Abdul Kalam, the bright and curious students of Classes 1 and 2 at Delhi Public School, Sector 19 Faridabad, participated in an imaginative and interactive drawing activity on the theme "My Home on the Moon." Conducted in collaboration with SPACE India, the session provided students with a unique opportunity to explore the possibilities of living in space while expressing their creativity and futuristic thinking.

The activity combined art and science, helping students grasp basic concepts of space exploration while enabling them to creatively illustrate their vision of life among the stars. It encouraged curiosity, innovation, and critical thinking, allowing students to dream about the future of human space living.

The session was a meaningful way to celebrate both World Space Week and National Students' Day, inspiring students to embrace learning and discovery. By blending creativity with scientific concepts, it reminded young learners that imagination, curiosity, and innovative thinking are the first steps toward future exploration and discovery in space, nurturing a lifelong interest in science and the universe.

During the activity, students were encouraged to envision life beyond Earth, imagining how humans might build homes, cities, and communities on the Moon. They were inspired to think about how people would live, work, and move around in a lunar environment. Using colors, imagination, and innovative ideas, students drew futuristic lunar houses, rocket-powered vehicles, glowing moon gardens, and cozy habitats surrounded by stars, distant planets, and other celestial wonders. Many also incorporated creative details such as energy-efficient structures, communication towers, and recreational spaces for astronauts, reflecting their understanding of how human life in space could be designed.

Universe For All 2.0: A Night of Space Learning

On October 3, the young explorers of Universe For All 2.0 from Classes 5 and 6 at Delhi Public School, Sector 19 Faridabad, embarked on an unforgettable cosmic adventure in collaboration with SPACE India. The one-night evening session, themed around "Living in Space," was organized in alignment with the World Space Week 2025 theme, offering students a unique opportunity to explore the wonders of the universe while understanding the possibilities of human life beyond Earth.

The session began with an engaging discussion on the fascinating topic of living in space, where students learned about the challenges, innovations, and importance of sustaining life beyond our planet –especially on the Moon and Mars. Through an interactive video, they explored NASA's Artemis Mission, which aims to return humans to the Moon and pave the way for future missions to Mars. The activity inspired them to think like scientists and engineers, envisioning what life might be like for future astronauts living off Earth. Based on this learning, students also solved interactive worksheets that reinforced their understanding and encouraged creative thinking about space habitats and survival in extraterrestrial conditions.

Following the classroom session, students stepped outdoors for a guided night sky tour that brought theory to life. Under a crystal-clear evening sky, they identified prominent constellations such as Lyra ,Cassiopeia and Ursa Major while learning fascinating stories behind these celestial patterns. They also discovered how to locate the Pole Star using these constellations, an ancient navigation technique still relevant in modern astronomy.

The highlight of the evening was the telescopic observation through the powerful 200 mm Dobsonian telescope. As students took turns at the eyepiece, excitement filled the air. They observed the Moon's craters and maria in stunning detail and were mesmerized by the sight of Saturn with its breathtaking rings and visible moons. For many, it was their first time seeing these celestial bodies up close, and the experience left them awestruck.

The evening beautifully combined learning, exploration, and inspiration, sparking curiosity and deepening every student's love for astronomy–truly capturing the spirit of World Space Week 2025.

COSMIC CREATIVITY: STUDENTS BRING 'LIVING IN SPACE' TO LIFE | WSW 2025

As the world looked skyward this October, young dreamers across India turned their imaginations toward the stars. World Space Week 2025, celebrated from October 4th to 10th under the United Nations theme "Living in Space," became a national showcase of creativity, curiosity, and futuristic thought.

Led by SPACE India, the celebrations encouraged students to envision what life beyond Earth might look like – from sustainable habitats on distant planets to emotional connections in a zero-gravity world. Through three national competitions – Stamp Making, Astro Creator, and Astro Toon – participants transformed the vastness of space into art, stories, and illustrations that reflected hope, innovation, and human resilience.

After an extensive and thoughtful evaluation, the following young visionaries have emerged as the winners of World Space Week 2025.

Winners of World Space Week 2025 Competitions

Stamp Making Competition:

Rank	Title/Theme	Student Name	School Name
1st	Tree of Life	Jiya Bhayana	Delhi Public School, Sector 45, Gurugram
2nd	Rise of Life	Sanvi Upadhyaya	Delhi Public School, Sector 45, Gurugram
3rd	Reflections of Earth	Divit Dubey	Amity International School, Sector 6, Vasundhara, Ghaziabad

Astro Creator Competition:

Category	Rank	Title/Theme	Student Name	School Name
Grades 6-8	1st	Mission Luna 7	Era Khanna	Darbari Lal DAV Model School, Pitampura
	2nd	The Cosmic Pioneers: Thriving in Space	Aksh Pradhan	Imperial Heritage School, Gurugram
	3rd	Connection with Space	Pranay	Bal Bhavan Public School, Mayur Vihar
Grades 9-10	1st	The Last Transmission	Atharv Nayak	Modern Public School, West Shalimar Bagh
	2nd	The Last Broadcast	Vedant Dhaoundiyal	Bal Bhavan Public School, Mayur Vihar

Category	Rank	Title/Theme	Student Name	School Name
Grades 9-10	3rd	The Echo Paradox	Harit Aggarwal	B.C.M. Arya Model Sr. Sec. School, Ludhiana
Grades 11- 12	1st	Living in Space	Sourajit Mandal	MatriKiran High School, Gurugram
	2nd	Life Beyond Space	Hitakshi Nagpal	B.C.M. Arya Model Sr. Sec. School, Ludhiana

Astro Toon Competition:

Category	Rank	Student Name	School Name
Grades 1-4	1st	Khushee Jain	Delhi Public School, Sector 45, Gurugram
	2nd	Siddharth Maity	Bal Bharati Public School, GRH Marg
	3rd	Yashvi Sahu	Salwan Public School, Mayur Vihar
Grades 5-7	1st	Neel Hait	Bal Bharati Public School, GRH Marg
	2nd	Anaisha Agarwal	DLDAV Model School, Pitampura
	3rd	Kartikey Goel	DLDAV Model School, Pitampura
Grades 8-10	1st	Keshav	Bal Bhavan Public School, Mayur Vihar
	2nd	Soumya Gupta	Amity International School, Sector 6, Vasundhara
	3rd	Nandana Singh	Amity International School, Mayur Vihar
Grades 11-12	1st	Atharva Keswani	Bal Bharati Public School, GRH Marg
	2nd	Navya Chaturvedi	Amity International School, Sector 6, Vasundhara
	3rd	Sanjay M	Vels Vidhyalaya Sr. Sec. School, Kovilpatti, Tamil Nadu

Every entry reflected the dreams of a generation ready to redefine humanity's place in the universe. E-certificates have been issued to all participants, and winners will receive their prizes by early December 2025.

As World Space Week 2025 draws to a close, one message shines through the cosmos – **the journey to the stars begins in the imagination of the young.**

World Space Week 2025: Creating Innovating Solutions

World Space Week 2025, observed globally from October 4 to October 10, evolved into a remarkable celebration of curiosity, learning and imagination for students participating in SPACE India's Universe in the School (UITS) program. Centered around the theme "Living in Space," the week highlighted how advancements in space technology and exploration can contribute to solving one of the planet's most urgent priorities: long-term space settlement.

Throughout the week, students from different schools engaged in a wide range of interactive and educational activities designed to spark a deeper connection with the cosmos. From astronomy workshops and stargazing sessions to creative contests and science exhibits, the celebrations blended fun with learning, nurturing both creativity and scientific curiosity. These efforts not only deepened students' understanding of the universe but also encouraged them to imagine future careers in space science—an aspiration strongly supported by SPACE India and its mission to promote scientific thinking among young learners. The initiative also echoed the visionary goals of ISRO, India's space agency, whose pioneering contributions to space research and exploration continue to inspire the nation.

One of the week's most memorable events took place at K. R. Mangalam World School, Vaishali. Through Virtual Reality, students experienced a thrilling spacewalk, getting a real feel of what it's like to move in microgravity and observe the International Space Station (ISS) up close. Two students were even given the rare opportunity to visit the Russian Centre of Science and Culture and interact with an astronaut, gaining first-hand insights into life in space. Students of Grade IV also created a water filtration system to understand the importance of clean water recycling aboard the ISS.

At Delhi World Public School, Noida Extension, students took part in the "Test Your Lungs" and "Muscle Endurance" challenges to learn how astronauts must stay physically fit for space missions. Adding to this, the "Sat from Trash" sessions promoted resourcefulness, creativity, and an understanding of satellite structure and function using sustainable, recycled materials.

SD International School, Panipat, organized "Sat from Trash," an innovative activity where students from Classes IV to IX created satellite models from waste materials based on the theme "Living in Space." The event blended creativity with scientific understanding while promoting sustainability. Students showcased unique models reflecting the role of satellites in supporting life and exploration in space, transforming discarded items into symbols of innovation and environmental responsibility.

At Delhi Public School, Greater Faridabad, the students took a creative leap at the "Space Café," donning chef hats and serving up cosmic snacks that blended imagination with flavor. They explored the wonders of space in the sweetest way, turning World Space Week into a truly out-of-this-world experience. The curious explorers at the "Astronomers' Corner" also reached for the stars through exciting space-themed activities, from discovering planets to unraveling simple cosmic mysteries.

At SVIS, Sector 18, Dwarka, students participated in a series of astronaut-style physical assessments, including muscle endurance, balancing, lung capacity, and hand-eye coordination tests, to understand the significance of physical and mental training for astronauts. During the celebration, teachers observed the Sun and its sunspots through a 50 mm refractor telescope, while students competed to create Martian and Lunar bases using the most essential modules. Students of Grade II also took part in fun space-themed games such as "Mapping the Universe" and "Which Is That Planet?"

In K. R. Mangalam, Vikaspuri, students of Grades IV to VI participated in the "Astronaut Food Challenge," where they prepared or brought nutritious, astronaut-style food during Zero Period. They also took part in the "Poster Challenge," designing their own "Space Menu" posters that showcased creative and healthy astronaut-friendly meals. Students of Grades V to VIII created models of space plants or hydroponic systems and explained how their designs could survive and grow in space. Meanwhile, students of Grades VI to VIII engaged in "Space Sports," filled with fun and educational physical activities where they tested their strength like astronauts and learned how zero gravity affects muscles.

At K. R. Mangalam, Gurugram, students of Grade III learned how astronauts survive in space through a "Dress Up the Astronaut" activity, where they used a template to prepare an astronaut's suit. Students of Grade IV wrote postcards and used AI to generate their images in space through the unique "Postcard to Earth" activity. Students of Grade V designed their own satellites using the essential facilities needed to survive in space through the "My Satellite" activity, while students of Grade VI created imaginative satellites from waste materials under the "Sat from Trash" initiative.

These activities held across Delhi's schools highlight the remarkable impact of World Space Week 2025 and SPACE India's dedication to advancing space science education. Through these events, students explored the wonders of the cosmos and discovered how space science can help address pressing global issues like climate change. As India prepares for the next era of space exploration, fostering curiosity and ambition among young learners will pave the way for future scientists, engineers, and innovators. The joint efforts of schools, teachers, and SPACE India play a vital role in this endeavor, strengthening India's standing in global space research while motivating the next generation of space pioneers.

Bollywood Beats & Festive Feels: Celebrating Diwali the Spacian Way!

This Diwali, SPACE India transformed into a full-fledged Bollywood's Red-Carpet where "Spacians" celebrated the festival of lights with glitz, glamour and endless smiles! Held on 14th October 2025, the theme "Is Saal Diwali Bollywood Wali" turned our celebration into a cinematic spectacle, with everyone stepping into the shoes of their favorite movie stars.

From Mumtaz's timeless vintage charm and Sushmita Sen's iconic Chunari Chunari grace, to Paaji from Kuch Kuch Hota Hai, Raveena Tandon's alure, Rajinikanth's unbeatable swag, the giggling Shava Shava girls and even Jai from Sholay - every corner sparkled with filmy flair and festive fun!

The evening began with a Lamp Lighting Ceremony led by Dr. Sachin Bahmba, Ms. Jaishree Chaddha, Mr. Vikrant Narang, Ms. Pooja Choudhary, and Ms. Manalee Deka, invoking the blessings of Maa Lakshmi.

What followed was a spectacular display of Bollywood dialogues, dazzling dance performances, and bursts of laughter from Team Education, HR, Astroport, Operations, and Client Relationship, along with solo acts that truly stole the spotlight! Our anchors kept the momentum alive throughout the evening, ensuring smooth transitions and cheerful engagement between performances.






Adding sparkle to the celebration were the Fun Awards Best Dressed, Best Group Performance, Best Duo and Best Dialogue – honoring the night's most entertaining stars. Mouth-watering delicacies and starters added flavor to the festivity, while our PAN India team joined virtually, keeping the SPACE spirit shining nationwide!

The grand finale? A groovy DJ session, endless dancing, photo ops, and Diwali gifts for all, wrapping up a night filled with light, laughter, and lasting memories.

HIGHLIGHTS OF OCTOBER 2025

NASA FACES SHUTDOWN AMID U.S. GOVERNMENT FUNDING LAPSE

President Donald Trump speaks inside the Vehicle Assembly Building following the launch of a SpaceX Falcon 9 rocket carrying the company's Crew Dragon spacecraft on NASA's SpaceX Demo-2 mission at NASA's Kennedy Space Center in Florida. (Image credit: NASA/Bill Ingalls)

Congress of the U.S. failed to pass the funds for the financial year 2026 to fund the government. The financial year, known as the fiscal year, starts in October. This failure resulted in the shutdown of the government, which led to funding cuts for NASA.

As much as 85% of NASA's workforce was left without pay because of the shutdown. The uncertainty about when the shutdown will be lifted continues. It extends beyond NASA. The NSF (National Science Foundation), the agency that funds ground-based astronomy, is also facing major cuts because it also gets most of its funding from the federal government.
Because of the shutdown, educational support, public access to NASA centers, and most research activities are at a halt.

If this shutdown continues for a long time, it will result in the continuation of the suspension of research, including research done in universities and institutes funded by NASA. It will also affect long-term goals, leading to backlogs of future missions that are on pause because of the shutdown. International collaborations, such as partnerships with foreign agencies and institutes, will also be affected.

National Aeronautics and Space Administration (NASA), an independent agency working towards space exploration through various space programs, shut down most of its operations on October 1, 2025.

The official website mentions that it is currently closed due to a lapse in government funding. NASA gets funds from the federal government of the U.S.
Only essential operations are at work, such as the monitoring of the International Space Station and defense programs.

For years and decades, NASA has worked towards the progression of taking humanity beyond Earth by becoming the first agency to send humans to the Moon, sending rovers to Mars, launching orbiting missions to outer planets, and sending the first spacecraft to touch the Sun.

NASA has experienced similar challenges in the past. During the government shutdowns in 2013, 2018, and 2019, most NASA staff were affected, including work on research and mission development, which resulted in delays.

COMET LEMMON (C/2025 A6): A ONCE-IN-A-MILLENNIUM VISITOR LIGHTING UP OUR SKIES

A bright wanderer has graced our night skies – Comet Lemmon (C/2025 A6) – a rare celestial traveler making its closest approach to both Earth and the Sun this season. For skywatchers, this October and November mark an extraordinary opportunity to witness one of nature's most breathtaking cosmic spectacles.

What is Comet Lemmon?

Discovered on January 3, 2025, by the Mount Lemmon Survey in Arizona, USA, this comet is a long-period visitor that takes nearly 1,350 years to complete one orbit around the Sun. In other words, no one alive today will see it return – making this a truly once-in-a-lifetime event.

Closest Approach Dates:

- Closest to Earth: October 21, 2025 – at a distance of about 0.60 AU (90 million km).
- Closest to the Sun (Perihelion): November 8, 2025 – at 0.53 AU (79 million km).

How Bright Is It?

From mid-October, Comet Lemmon began to brighten significantly, reaching a magnitude of +4 to +5 by late October, visible to the naked eye under dark skies and stunning through binoculars or small telescopes. It remains bright through early November (around magnitude 4.7) before gradually fading in the Sun's glare.

When and Where to Watch (India):

Best viewing time – just after sunset in late October and early November. Look westward near the horizon, where the comet will drift through Serpens and Ophiuchus. Appearing as a soft, greenish fuzzy glow, it rewards those with patience and a dark viewing spot.

Why It Matters:

With an orbital period of over a millennium, Comet Lemmon won't return for centuries. This is a "now or never" event for astronomers and enthusiasts alike – a fleeting moment to connect with the cosmos and witness a visitor that has traveled for centuries to meet our gaze.

So, grab your binoculars, step under the stars, and don't miss this celestial performance of the decade – because Comet Lemmon is writing its short but shining chapter in the skies above us.

Other Orbital Specifications

Discovery: D. Carson Fuls of the Mount Lemmon Survey, January 3, 2025.

Previous perihelion: Inbound orbital period suggests the comet's last pass occurred around the 7th century AD.

Orbital period (post-perihelion): Approximately 1,155 years.

Next return: Around the year 3175.

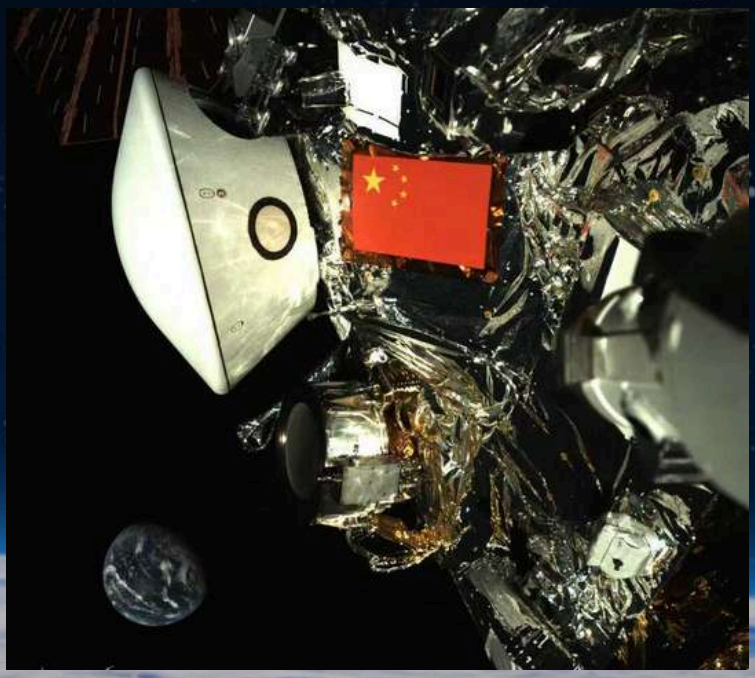
Orbit characteristics: The comet follows a retrograde orbit, moving in the opposite direction to the planets, and is highly inclined at 143.66° relative to the ecliptic.

CHINA'S TIANWEN 2 SPACECRAFT SNAPS A SELFIE WITH EARTH

Tianwen-2 is a mission developed by the China National Space Administration (CNSA) to collect samples from asteroids. It will explore the near-Earth asteroid 2016 HO3 (Kamo'oalewa), gather material from its surface and return it to Earth. The spacecraft will also research the main-belt comet 311P/PANSTARRS, which orbits farther from the Sun than Mars.

Launched on 28 May 2025, from a launch center in southwest China, the mission has been in orbit for 125 days, during which it has completed several key tasks, including self-checks of its electronic systems. It marks China's first attempt to bring back a sample from an asteroid, a milestone in the country's advancing space program.

On China's National Day, CNSA released a striking "selfie" of Tianwen-2 captured by a small camera mounted on its robotic arm, offering the public a rare glimpse of the spacecraft in action.



Tianwen-2 alongside Earth, captured by the probe during its deep-space journey. (Image Credit - CNSA)

Earth Captured by Tianwen-2 probe.

Kamo'oalewa, a near-Earth object discovered in 2016, gets its name from a Hawaiian term meaning "oscillating celestial object." Often called Earth's quasi-moon, it orbits the Sun in sync with our planet and rotates unusually fast for an asteroid. By the end of 2027, Tianwen-2 is expected to collect and return samples from Kamo'oalewa before continuing its journey to study the comet 311P/PANSTARRS.

Tianwen-2 is part of China's larger "Tianwen" series of planetary exploration missions. Following the success of Tianwen-1, which orbited Mars and deployed the Zhurong rover, the program continues to expand China's reach in the solar system.

The Tianwen missions reflects China's growing ambition in deep space exploration. Beyond collecting asteroid samples, it seeks to uncover insights into the origins of the solar system and the building blocks of life on Earth. The data and experience gained from this mission will pave the way for future interplanetary ventures, marking another confident step in China's journey toward exploring the wider universe.

FIRST EVIDENCE OF A 4.5-BILLION YEAR OLD 'PROTO EARTH'

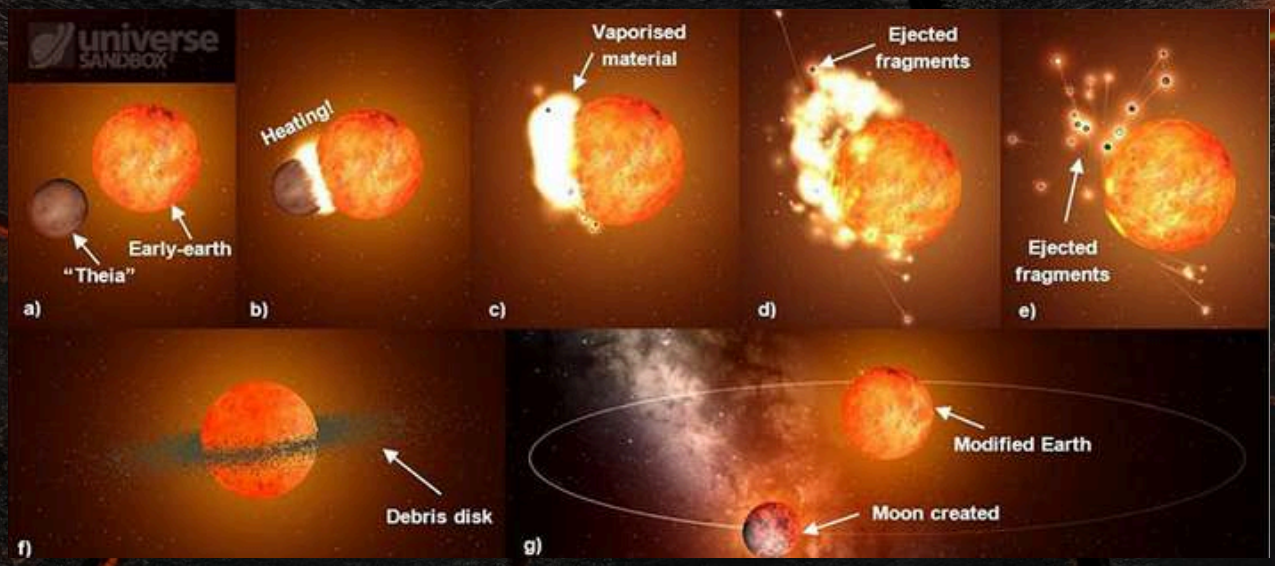
We live on planet Earth, and our Earth is about 4.5 billion years old. But the Earth was not always as it is now; it was once just a chunk of rock full of lava, called the proto Earth. This state of the Earth didn't last long. Scientists believe that a Mars-sized object collided with this proto-Earth. The impact blasted out debris and a huge rock that later became our Moon. This collision also changed the chemistry of the Earth. Whatever the chemical composition of the proto-Earth was, it was completely altered. All signs of this proto-Earth were lost until recently.

On October 14, 2025, scientists from MIT published a study that identified the first direct evidence of the proto-Earth.

Potassium is a chemical element with the atomic number 19. It naturally occurs in three isotopes: potassium-39, potassium-40 and potassium-41. In 2023, scientists analyzed different meteorites formed at various times and locations in the solar system that they had gathered from around the Earth. They found different isotopes of potassium in these samples, which could be used to trace the building blocks of Earth.

Generally, rocks on Earth have high levels of potassium-39 and potassium-41 and only small traces of potassium-40. In a new study, a team gathered rocks from the oldest and deepest parts of Earth, including Greenland, Canada and Hawaii. Researchers found a subtle deficiency of potassium-40 meaning potassium-40 was present in even smaller amounts than it usually is in rocks indicating a potassium imbalance.

The research team conducted a simulation where they studied the changes in the potassium-40 deficient rocks when impacted by the meteorites they had gathered. The results showed a high fraction of potassium-40, matching the composition of current day rocks. This suggested that the rocks found in Greenland, Canada and Hawaii are remnants of the proto-Earth.



Artistic representation of the collision hypothesis model a) Mars-sized object (Theia) impacts a hot early-Earth at 45 degrees, within the first 100 million years of the solar system. b) initial impact displaying immense heating from the compression of Theia, causing vaporisation of Theia and early-Earth material. c) impact knocks the early-Earth titling its axis of rotation (changing its obliquity), excavation begins as vaporised and solid material is ejected from the impact site. d) Ejected solid fragments and vaporised material spread further from the impact site, e) Vaporised material dissipates and cools leaving larger ejected fragments to spread from the impact site. f) Ejected material organises into a debris disk surrounding the Earth. g) accumulation of hot debris material into a hot early-Moon with a magma ocean, orbiting around a hot modified earth. (Image Credit- The Open University).

A VISITOR FROM ANOTHER STAR! MEET COMET 3I/ATLAS

A view of comet 3I/ATLAS taken by the Gemini South Telescope.(Image credit: International Gemini Observatory)

Comet 3I is the third comet discovered by the Asteroid Terrestrial impact Last Alert System (ATLAS), a survey telescope in Río Hurtado, Chile. The observation of 3I/ATLAS was first reported on July 1, 2025. The "I" in the name of the comet stands for "interstellar," indicating that it came from outside our solar system. The "3" represents that it is the third known interstellar object.

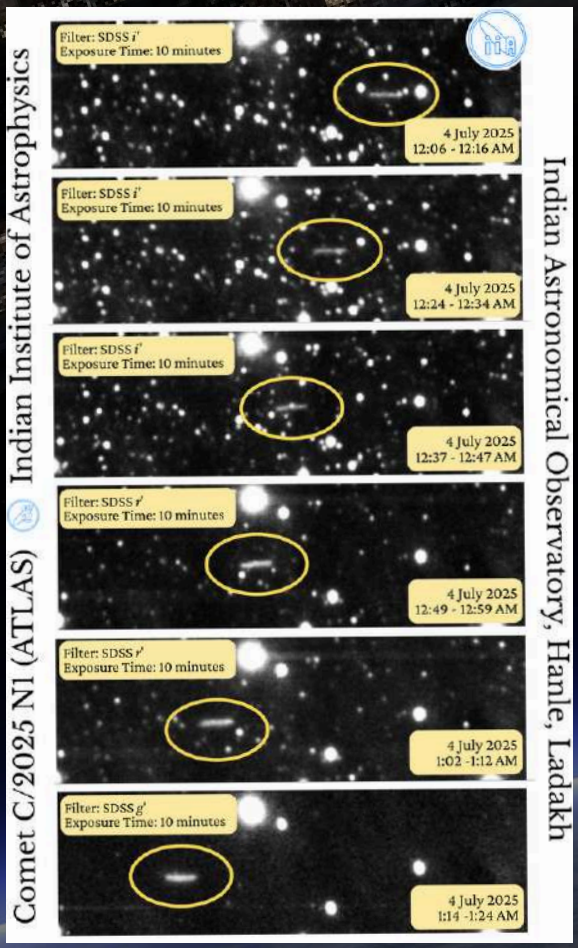
The first two interstellar objects that passed through the inner solar system were 1I/'Oumuamua and 2I/Borisov. They were discovered in 2017 and 2019, respectively. Observing interstellar objects like these gives us valuable opportunities to study bodies formed outside our solar system.The first interstellar object barely showed any activity–1I/'Oumuamua exhibited no visible properties whereas 2I/Borisov showed activity such as outgassing and dust ejection.

A few hours after the initial discovery of 3I/ATLAS, its pre-discovery images were identified from June 28–29, 2025, in the Zwicky Transient Facility.

At the time of discovery, 3I/ATLAS had a magnitude of 17.7–17.9 in the o-band filter. Early observations show that this object has a large eccentricity and, hence, a hyperbolic orbit. From this orbit, it is possible to predict its trajectory.

3I/ATLAS poses no threat to Earth because it is approaching only as close as 1.8 AU. It will reach its closest point to the Sun on October 30, 2025, at a distance of 1.4 AU.
How do we know it is not from our solar system? It is moving too fast to be bound by the Sun's gravity and follows a hyperbolic trajectory.

How do we know whether it is an asteroid or a comet? From telescopic observations, it appears that 3I/ATLAS has an icy nucleus and a coma–a bright cloud of gas and dust that surrounds the comet as it approaches the Sun. That is why it is categorized as a comet.

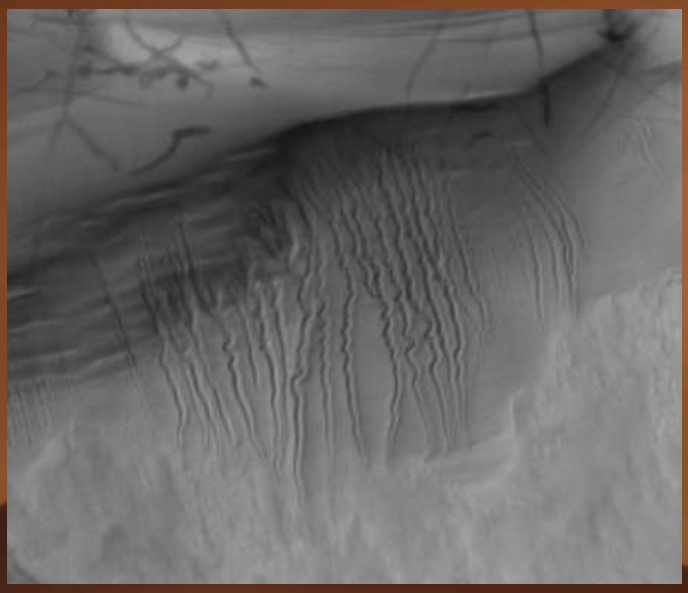


Six 10-minute exposures of the Comet 3I/ATLAS using the Himalayan Chandra Telescope, IAO, Hanle, Ladakh. (Image Credit - IIAP)

THE RED PLANET'S MYSTERIOUS SURFACE AND SEARCH FOR LIFE

Mars is one of the planets in our solar system the fourth planet from the Sun, to be specific. Humans have sent many robotic explorers to Mars to study it.

Scientists have not yet found any living things on Mars, but they are looking for signs of life. A very basic sign of life is water, and Mars has rocks and soil on its surface that could have formed only in the presence of liquid water.
Mars has dunes on it. A dune is sand piled up and shaped by the wind. As the wind blows the sand, it begins to accumulate in small stacks, creating dunes.



Gullies created by blocks of CO_2 ice, on dunes in Galle crater. (Image Credit: NASA/ JPL-Caltech)

There have also been gullies seen on Mars. Gullies are small, narrow ducts likely formed by running water in the soil billions of years ago. Gullies are common on Mars.However, in a recent observation on October 13, 2025, a team of researchers at Utrecht University found unusual gullies in the dunes on Mars. They had an unusual twisting shape. They looked recent and were formed deep in the sand. Scientists questioned their formation and proposed a theory that blocks of carbon dioxide helped form these gullies.

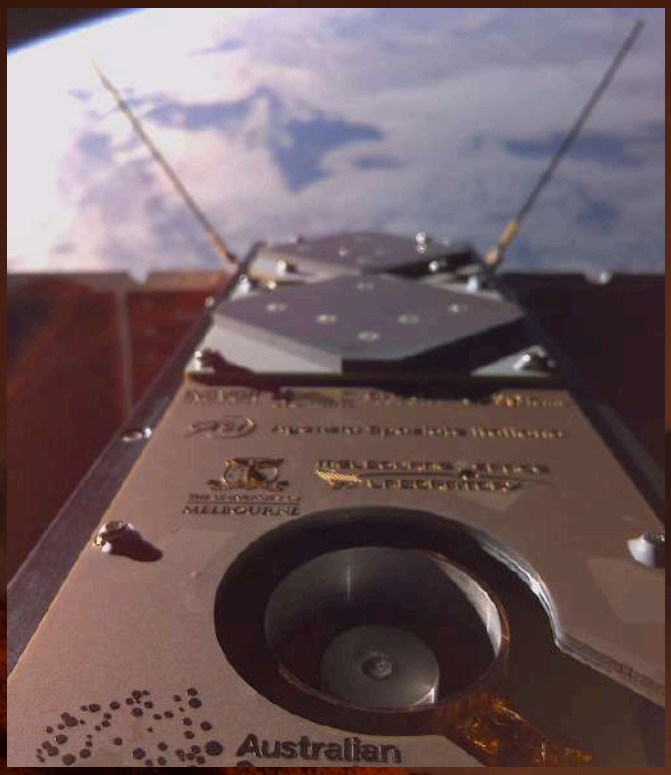
Example of gullies seen on the surface of Mars from the orbiting Global Surveyor spacecraft. (Image Credit: NASA/JPL/MSSS)

There is also the formation of ice on Mars during its winter, with temperatures falling as low as -120 degrees Celsius. This causes a temperature difference between the warm dunes of sand and the ice, resulting in sublimation. This leads to the formation of ice explosions, which cause the ice blocks to move downward, resulting in the creation of gullies.

Are there living microbes on Mars?
Researchers sealed E. coli bacteria in test tubes with solutions of pure water ice and exposed the samples to radiation equivalent to 50 million years. The results showed that more than 10% of amino acids the building blocks of proteins survived the radiation.

This study points in the direction of studying the insides of ice present on Mars.

AUSTRALIA'S SPIRIT SATELLITE: A NEW DAWN IN SPACE RESEARCH



The first image taken by the SpIRIT selfie camera. (Image Credit: University of Melbourne)

Earth and Moon seen from SpIRIT. (Image Credit: University of Melbourne)

A New Era for Australian Space Science: Launched in December 2023 aboard a SpaceX Falcon 9 rocket, the Space Industry – Responsive – Intelligent – Thermal (SpIRIT) nanosatellite marks a remarkable milestone for Australia. It is the first Australian-funded space telescope to carry a foreign scientific payload, developed in collaboration with the Italian Space Agency. This mission showcases Australia's growing presence in international space research.

Mission and Purpose: SpIRIT's primary goal is to detect gamma-ray bursts–the Universe's most energetic explosions, occurring when massive stars die or collide. By observing these bursts, scientists can study the origins of black holes and the evolution of the cosmos. The satellite has already completed over 9,000 orbits around Earth since launch.

Technological Achievements: A unique feature of SpIRIT is its selfie stick, protected by a winged thermal management system, which captured a stunning image of itself in space –marking the successful completion of its first mission phase.

Future and Legacy: Expected to remain in orbit for around 1,000 days, SpIRIT will continue to scan the skies until its natural deorbit in mid-2027. This pioneering mission symbolizes Australia's leap into advanced space technology and international scientific collaboration.

WHAT'S UP IN THE SKY - NOVEMBER 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
After the inferior conjunction on 20 November, visible in the morning sky at the end of the month.

Venus
A dazzling morning star that brightens the dawn sky before fading away later in the month.

Mars
Not visible this month. Keep an eye out in the coming months as it reappears!

Jupiter
A bright morning planet in Gemini, shining high in the sky when it's in the south.

Saturn
A clear evening planet, easy to see under dark skies all month.s all month.

Uranus
A bright evening planet, best to observe around its opposition on 21 November.

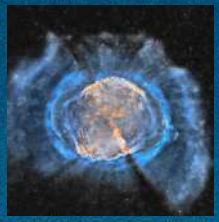
Neptune
An evening planet seen close to Saturn in the sky.

BRIGHT DEEP SKY OBJECTS

M29 (Cooling Tower) is an open cluster that's situated in the Cygnus constellation and can be seen with binocular and telescope. The cluster is certainly worth a look due to its location and unusual shape. It appears like a squashed dipper that loosely resembles the main stars of Ursa Major.

Lagoon Nebula (M8) was discovered in 1654 by the Italian astronomer Giovanni, sought to catalog nebulous objects in the night sky so they would not be mistaken for comets. This star-forming cloud of interstellar gas is located in the constellation Sagittarius and its apparent magnitude of 6 makes it faintly visible to the naked eye in dark skies.

M27 (Dumbbell Nebula) was the first planetary nebula discovered. This nebula results from an old star that has shed its outer layers in a glowing display of color. M27 cab be found in Vulpecula constellation. and has an apparent magnitude of 7.5.

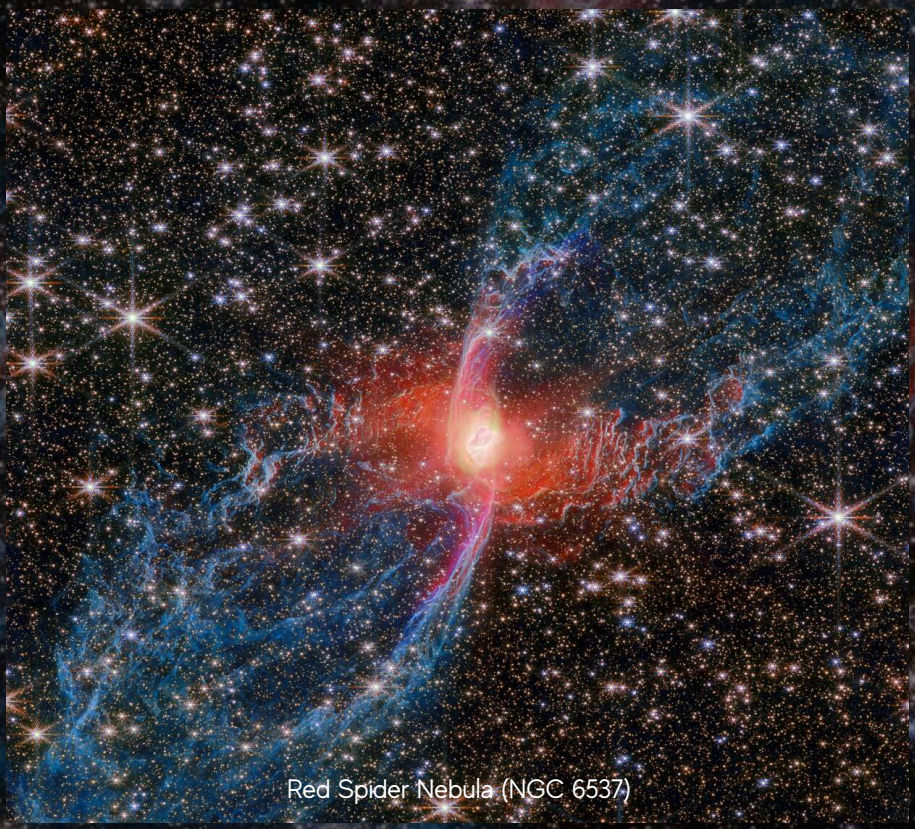


The Andromeda Galaxy, located about 2.5 million light-years away, is the nearest large galaxy to the Milky Way and shines at a magnitude of 3.4. Visible to the naked eye under dark skies, it appears as a soft, elongated glow and is on a slow collision course with our galaxy.

EYES IN SPACE - OCTOBER 2025

A Dying Star's Final Art: Webb's Stunning View of the Red Spider Nebula

The James Webb Space Telescope, launched in 2021, observes in the infrared spectrum, allowing it to look back over 13 billion years to the universe's infancy. JWST has captured the earliest galaxies GLASS-z13 and CEERS-93316–which formed just a few hundred million years after the Big Bang. It has revealed intricate star-forming regions like the Carina Nebula and provided detailed spectra of exoplanet atmospheres, detecting water vapor, carbon dioxide, and methane on distant worlds such as WASP-39b. JWST's ability to peer through cosmic dust has reshaped our understanding of how galaxies and stars evolve.



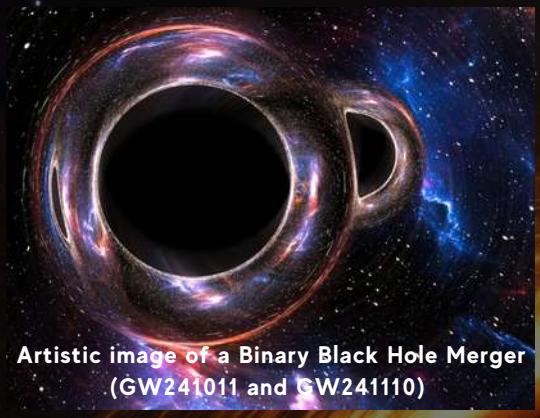
Red Spider Nebula (NGC 6537)

NASA's James Webb Space Telescope (JWST) has captured a breathtaking new image of NGC 6537, also known as the Red Spider Nebula, using its Near-Infrared Camera (NIRCam). This planetary nebula, formed from the dying stages of a Sun-like star, displays intricate webs of glowing gas against a backdrop of thousands of stars. When such stars exhaust their fuel, they shed their outer layers, and ultraviolet light from the exposed core ionizes the gas, making it shine brilliantly.

Webb's image reveals remarkable details unseen before, including the hot, luminous central star surrounded by a disc of warm dust. In earlier Hubble images, the star appeared faint and blue, but Webb's infrared sensitivity has exposed it as bright red–evidence of the surrounding hot dust. Scientists believe a hidden companion star may also be shaping the nebula's dramatic hourglass structure, similar to that seen in the Butterfly Nebula.

The nebula's sprawling blue "legs," stretching nearly three light-years, are bubbles of gas inflated over thousands of years by powerful stellar winds. Additionally, Webb detected jets of ionized iron forming an elegant purple "S" shape–signatures of high-speed outflows colliding with earlier ejected material. Together, these discoveries showcase the nebula's dynamic, evolving beauty as a dying star's final masterpiece.

Scientists Uncover Two "Impossible" Black Hole Mergers



Artistic image of a Binary Black Hole Merger (GW241011 and GW241110)

In the silent fabric of the cosmos, colossal collisions can send ripples across space-time—gravitational waves. In late 2024, Earth received two such messages from the distant universe. The international LIGO-Virgo-KAGRA Collaboration announced the detection of two remarkable events, GW241011 and GW241110, revealing black holes spinning in never-before-seen ways.

The first event, GW241011, detected on October 11, 2024, came from about 700 million light-years away. Two black holes—17 and seven times the mass of the Sun—merged, one spinning at extraordinary speed.

A month later, GW241110 was recorded, involving black holes sixteen and eight times the Sun's mass. Astonishingly, one black hole spun opposite to its orbital direction—a cosmic first.

These unusual spins suggest "second-generation" black holes, born from earlier mergers in dense star clusters. Their discovery not only deepens our understanding of black hole evolution but also reaffirms Einstein's general relativity under extreme conditions.

Gravitational waves, once only theoretical, have become the universe's own language—telling stories of creation, chaos, and rebirth. Each detection brings scientists closer to decoding how black holes form, grow, and shape the universe itself.

Artistic image of a Binary Black Hole Merger (GW241011 and GW241110)

Three Earth-Sized Worlds Found Orbiting a Double Sun System

TOI-2267 Mario Sucerquia.
(Image Credit: Sciencenewstoday.org)

Two Suns, Three Worlds, One Breakthrough

In a quiet corner of the galaxy, 190 light-years away, astronomers have discovered three Earth-sized planets orbiting within a binary star system called TOI-2267. This finding, published in Astronomy & Astrophysics, defies long-held theories that such systems are too unstable for planet formation.

Using NASA's TESS mission and ground-based telescopes like SPECULOOS and TRAPPIST, researchers confirmed that each of the two suns hosts orbiting planets – a first in exoplanet science.

The discovery challenges existing models of planetary birth and stability, suggesting that even in chaotic gravitational environments, nature can craft orderly, resilient worlds.

Tour de Universe

Phoenix Constellation: The Celestial Bird of Rebirth

Phoenix is a beautiful constellation that lies in the southern sky. It was named after the mythical bird that is said to rise from its own ashes, symbolizing immortality and renewal. The constellation was introduced by Dutch astronomer Petrus Plancius in the late 16th century, based on the observations of navigators Frederick Houtman and Pieter Dirkszoon Keyser. It first appeared on Plancius' celestial globe in 1598 and later in Johann Bayer's famous Uranometria atlas in 1603.

Phoenix is best visible from the Southern Hemisphere, particularly from Australia and South Africa, during the summer months. It is located between latitudes +32° and -80°, surrounded by constellations such as Eridanus, Grus, Fornax, Hydrus, Sculptor, and Tucana. Along with Pavo, Tucana, and Grus, it forms the group known as the "Southern Birds."

The constellation covers an area of 469 square degrees and ranks 37th in size. Its brightest star, Ankaa (Alpha Phoenicis), shines with a magnitude of 2.4 and represents the fiery heart of the phoenix. Other notable stars include Beta Phoenicis and Gamma Phoenicis, both giant stars. Phoenix also hosts fascinating deep-sky objects like Robert's Quartet a group of four interacting galaxies and the Phoenix Cluster, one of the most massive and luminous galaxy clusters known, containing a rapidly growing supermassive black hole.

Mythological Significance and Deep Sky Wonders of the Phoenix Constellation

Robert's Quartet, a compact group of four galaxies—NGC 87, NGC 88, NGC 89, and NGC 92

The Phoenix constellation derives its name and inspiration from one of the most powerful and enduring myths in human history—the legend of the phoenix, a bird that symbolizes immortality, renewal, and rebirth. Across many ancient cultures including the Greek, Egyptian, Persian, Indian, and Chinese, the phoenix represented the eternal cycle of life, death, and resurrection.

In Greek mythology, the phoenix was described as a magnificent bird with glowing red, gold, and purple feathers. It was said to live for about 500 years before building a nest made of fragrant woods such as cinnamon and myrrh. The bird would then set the nest on fire, perishing in the flames, only for a new phoenix to rise from the ashes. The Roman poet Ovid, in his famous work Metamorphoses, immortalized this tale of rebirth and continuity. In Egyptian mythology, the phoenix was associated with the sun god Ra and was known as Bennu, the sacred bird of Heliopolis—the "City of the Sun." It symbolized the rising sun and the idea that life is constantly renewed.

Just as the mythical bird is reborn in fire, the Phoenix constellation also represents cosmic creation and transformation through its deep sky objects. The Phoenix Cluster is one of the most massive and energetic galaxy clusters known, producing stars at a rate hundreds of times greater than that of our Milky Way. It also contains a rapidly growing supermassive black hole, about 20 billion times the mass of the Sun, which powers intense X-ray emissions visible across the cosmos.

Another extraordinary object within the constellation is Robert's Quartet, a compact group of four galaxies—NGC 87, NGC 88, NGC 89, and NGC 92—that are interacting and merging, creating new regions of star formation. These galaxies, located around 160 million light-years away, embody the cosmic dance of destruction and renewal that mirrors the phoenix's myth.

Thus, the Phoenix constellation beautifully connects myth and science—it stands as a celestial symbol of eternal renewal, reflecting the phoenix's story of rebirth while showcasing the universe's ongoing cycle of creation among the stars.

Rocket launches in NOVEMBER 2025

Sentinel-1D

Scheduled for launch in November 2025, Arianespace's Ariane 62 will deploy ESA's Sentinel-1D satellite from Kourou, French Guiana. The mission will provide weather, day and night radar imaging of Earth's land, oceans, and ice using a C band Synthetic Aperture Radar (SAR). Sentinel-1D will join the existing Sentinel-1 constellation to ensure continuous environmental monitoring, disaster response, and maritime surveillance. The satellite also supports climate research and maintains data continuity for the Copernicus programme.

Ariane 62 Rocket
(Credit: JODY AMIET)

ESCAPADE

New Glenn Rocket
(Credit: Mike Killian)

Scheduled for launch in November 2025, Blue Origin's New Glenn rocket will deploy NASA's ESCAPADE (Escape and Plasma Acceleration and Dynamics Explorers) mission to Mars. This pioneering mission will send two identical smallsats, Blue and Gold, to study Mars' magnetosphere and atmospheric interactions with the solar wind. The spacecraft will be launched from Cape Canaveral Space Force Station, Florida, marking Blue Origin's first interplanetary mission. ESCAPADE aims to enhance understanding of planetary atmospheric loss, contributing to broader insights into planetary evolution and habitability.

Bandwagon 4

Scheduled for launch in November 2025, SpaceX's Bandwagon-4 dedicated rideshare mission will lift off aboard a Falcon 9 Block 5 from Cape Canaveral Space Force Station (SLC-40) in Florida. The flight is part of SpaceX's small satellite rideshare programme and will carry dozens of microsatellites and nanosatellites for commercial and government customers into a mid inclination low Earth orbit.

The mission underscores the shift toward cost effective access to space for small payloads, increasing launch cadence and operational flexibility in the commercial launch sector.

SpaceX's Falcon 9 Rocket
(Credit: SpaceX)

CAS500-3

Scheduled for launch in November 2025, CAS500-3 will be deployed by Korea Aerospace Research Institute's KSLV-2 (Nuri) rocket from the Naro Space Center in South Korea. The satellite serves as a technology verification and space science research platform under the Ministry of Science & ICT, operating in a Sun Synchronous orbit for Earth observation and systems testing. CAS500-3 continues Korea's effort to build a compact advanced satellite series and enhance domestic access to critical space capabilities.

KSLV-2 Rocket (Credit: KARI)

Soyuz MS-28

Soyuz-2.1a rocket
(Credit: Florian Kordinan)

Scheduled for launch in November 2025, Soyuz MS-28 will lift off aboard a Soyuz-2.1a rocket from Baikonur Cosmodrome (Site 31/6) for Roscosmos. The mission will carry two Russian cosmonauts Sergei Kud Sverchkov and Sergei Mikayev along with Christopher Williams from NASA to the International Space Station. They will rendezvous with the station in low Earth orbit (~51.66° inclination) and serve as part of Expedition 74. The mission underscores ongoing international crew exchange and Russia's eastward role in human spaceflight logistics.

Sentinel-6B

Scheduled for launch in November 2025, SpaceX's Falcon 9 Block 5 will deploy the Sentinel-6B satellite from Vandenberg Space Force Base, California. This mission continues the Copernicus Sentinel-6/Jason-CS series, providing high precision sea surface height measurements to monitor global sea level rise and ocean conditions. Sentinel-6B carries a Poseidon-4 radar altimeter, Advanced Microwave Radiometer (AMR-C), and GNSS Precise Orbit Determination (POD) instruments. The satellite will operate in a 10 day repeat orbit at 1,336 km altitude and 66° inclination, ensuring continuity of the sea level data record initiated in 1992.

SpaceX's Falcon 9 Rocket
(Credit: SpaceX)

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

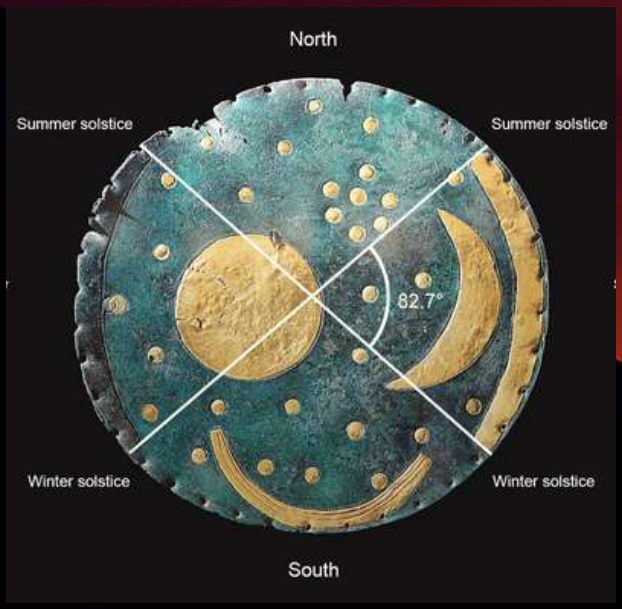
ASTRONOMICAL PERCEPTION

THE MOON: HUMANITY'S ETERNAL COMPANION

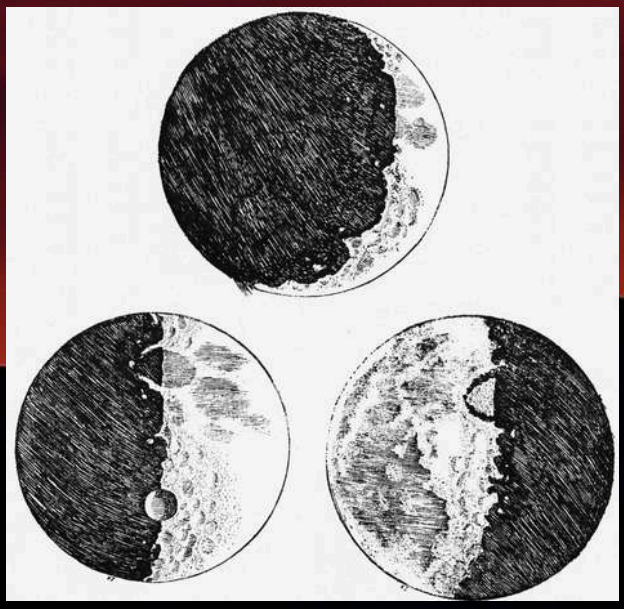
Ancient Wonder and Early Observations: For millennia, the Moon has captivated humanity. Ancient civilizations saw it as a divine presence a silver god, a wandering spirit, or a celestial lantern. They wondered how it glowed in the night sky did it shine with its own light, or did it borrow from the Sun. Observing its changing phases, early humans began to track time. The Moon guided calendars, measured months, predicted seasons, and even helped sailors navigate vast oceans. In every culture, the Moon was more than a celestial object it was a marker of rhythm and life itself.

Measuring the Moon Size, Distance, and Brightness: Curiosity soon turned into systematic study. Greek philosophers, such as Aristarchus, attempted to measure the Moon's size and its distance from Earth using geometry and careful observation of lunar eclipses. Later astronomers refined these calculations, measuring its brightness, apparent magnitude, and orbital motions. With the invention of the telescope, Galileo revealed mountains, valleys, and craters. Provinding the evidence that the Moon was a rugged, tangible world, not a flawless celestial orb. Each experiment and observation gradually transformed the Moon from myth into science.

Mapping and Understanding the Lunar Surface: As centuries passed, astronomers meticulously mapped the Moon. The Observations revealed a surface scarred by impacts, volcanic flows, and tectonic shifts.



The Nebra Sky Disk (c. 1800–1600 BCE), which was used to predict the sky. (Credit: Frank Vincentz)



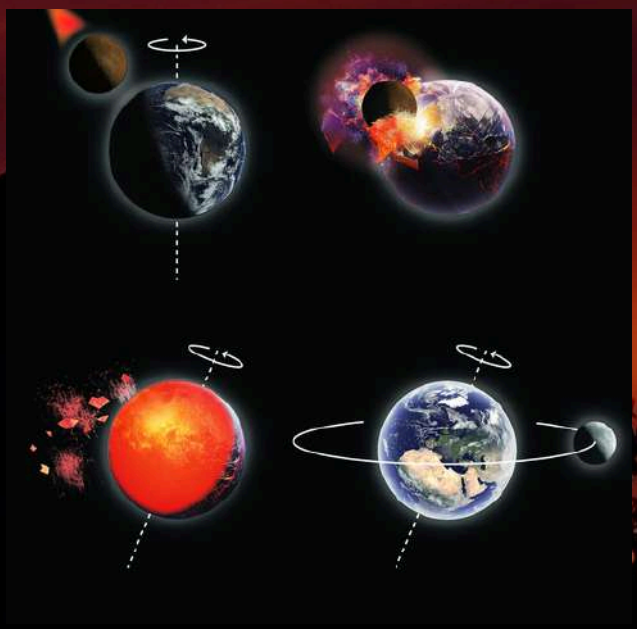
The first sketches of the Moon from the first Telescopic observation. (Credits: Galileo Galilei)

The Moon, once a symbol of perfection and mystery, became a laboratory for studying planetary formation, helping humanity understand the dynamics of celestial bodies across the Solar System.

Humanity Reaches the Moon: As 20th century brought a dramatic leap the Moon became reachable. Rockets and space missions transformed dreams into reality, culminating with Apollo 11 in 1969, when humans first walked on its surface. Astronauts collected lunar rocks and soil, returning 382 kilograms of material to Earth. These samples told a story of violent beginning of the Moon, formed from debris after a collision between Earth and a Mars sized object billions of years ago. For the first time, humans had not only seen the Moon up close but could also uncover its origin and history.

The Moon Today: Gateway to the Future: The Moon is no longer only a relic of the past it is a platform for the future. Missions from NASA, India's Chandrayaan, and China's Chang'e are exploring lunar water ice, minerals, and terrain suitable for human habitats. Scientists envision bases on the Moon to support research, generate energy, and serve as a launch point for deep-space exploration. The Moon continues to inspire not only science but imagination, blending our need to explore with the quest to understand our place in the universe.

A Celestial Companion: From myth to measurement, from calendars to rockets, the Moon has shaped humanity's understanding of time, physics, and possibility. It remains a guide, a teacher, and a symbol of curiosity. Every crater, every shadow, every phase tells a story not just of the Moon, but of ourselves. As we plan to settle its surface and push farther into the cosmos, the Moon reminds us that wonder, coupled with inquiry, can transform dreams into discovery.



Our Moon resulted from a giant impact between the young Earth and a smaller protoplanet. (Credit: ESO/G. Glasø/M. Kornmesser)

Astronaut Harrison H. Schmitt next to Moon boulder nicknamed "Tracy's Rock". (Credits: Eugene A. Cernan)

Role Of AI in Space

From Pixels to Planets: Machine Learning Decoding Alien Landscapes

NASA's ESDS Program Action strategy for Earth Science from acquisition through processing and distribution. (Credits: NASA)

AI linked Marsquakes with new impact craters using orbital images captured by Mars Reconaissance Orbiter (Credits: news9live)

Artificial Intelligence (AI) and Machine Learning (ML) have revolutionised planetary data analysis, providing scientists with advanced tools to interpret massive and complex datasets collected from various space missions. With the continuous flow of data from orbiters, landers, rovers, and telescopes, AI and ML help researchers uncover patterns and insights that would be impossible or extremely time consuming to detect manually. When applied to Big Data collections, such as NASA's Earth Science Data Systems (ESDS) Program, AI enables rapid and efficient analysis of years of imagery and measurements to identify hidden relationships and trends.

Deep Learning: A Powerful Extension
A closely related branch, deep learning, uses large neural networks with multiple layers to recognise intricate patterns in vast datasets. This approach takes advantage of powerful computational systems and refined training techniques, making it ideal for planetary science applications where data complexity is immense.

Image Recognition and Surface Mapping
One of the most important uses of AI in planetary data analysis is image recognition and surface mapping. Space agencies like NASA and ESA employ AI algorithms to examine high resolution images captured by spacecraft orbiting planets such as Mars, Venus, and Jupiter's moons. These algorithms automatically detect and classify geological structures like craters, volcanoes, valleys, dunes and polar ice caps. For instance, AI models have identified new impact craters on Mars and monitored surface changes over time, tasks that would otherwise require extensive manual inspection.

Autonomous Navigation on Other Worlds
Another vital contribution is in autonomous navigation and decision making for rovers such as Curiosity and Perseverance. These rovers use AI to traverse rough terrain, avoid obstacles and select scientifically valuable targets independently, ensuring efficiency even when communication delays occur with Earth.

AI and Machine Learning have become indispensable in planetary science. They enhance exploration, improve data interpretation and accelerate discovery, allowing humanity to better understand the diverse worlds within our solar system and beyond.

ASTRONOMICAL EVENTS - NOVEMBER 2025

THE BEAVER SUPERMOON: NOVEMBER'S BRIGHTEST NIGHT

On the night of November 5, 2025, the Moon will put on one of the most dazzling displays of the year. Known as the Beaver Moon, and sometimes called the Frost Moon, this full Moon will also be the biggest and brightest supermoon of 2025.

A full Moon occurs when the Sun, Earth, and Moon align in a straight line, with Earth perfectly positioned in the middle. At that moment, the side of the Moon facing us is fully lit by sunlight, making it glow brilliantly in the night sky. What makes this particular full Moon extra special is that it happens to occur right when the Moon is at its closest point to Earth, a stage called perigee. When these two events coincide, the result is a supermoon that looks noticeably larger and brighter than usual.

At 5:30 p.m. (IST) on November 5, the Moon will reach its full phase, shining from a distance of about 356,980 kilometers away, which will be the closest full Moon distance of the year. Because of this closeness, the Moon will appear roughly 8% larger and up to 30% brighter than an average full Moon.

The name Beaver Moon has its roots in Native American and early colonial traditions. November was the time when beavers busied themselves building their winter lodges, and trappers would set their beaver traps before the waterways froze. Other traditional names for this Moon include the Frost Moon or Mourning Moon, marking the arrival of colder nights and the transition toward winter.

For sky enthusiasts, this is a perfect opportunity to step outside and enjoy nature's glow. The Moon will rise around dusk, travel high across the night sky, and set around dawn, giving you plenty of time to watch. No telescope is needed; even a casual glance will reveal its golden hue as it rises and its crisp silver tones later in the night. If you have binoculars, take a closer look at the craters, ridges, and maria (the dark plains) that make our Moon so fascinating.

As the Beaver Supermoon lights up the November sky, take a moment to pause. Whether you are watching alone, with family, or under a blanket of stars, this glowing orb connects us to centuries of wonder and reminds us how the Moon continues to guide, inspire, and quietly illuminate our nights.

LEONIDS METEOR SHOWER

Every November, the night sky puts on one of its most enchanting performances – the Leonids Meteor Shower. This year, it will be active from November 6 to November 30, 2025, reaching its peak on the nights of November 17 and 18. During these two nights, observers under dark skies can expect to see around 10 to 15 meteors every hour. With only a thin crescent Moon in the sky, its light will not interfere much, creating almost perfect viewing conditions.

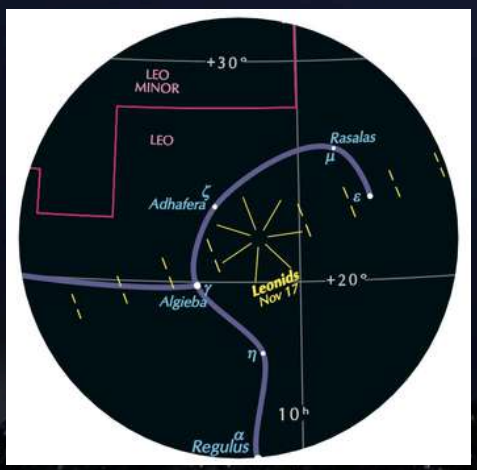
The Leonids get their name from the constellation Leo, where the radiant point lies, the part of the sky where the meteors appear to come from. The shower happens when the Earth moves through a trail of dust and debris left behind by Comet 55P Tempel Tuttle, a small icy body about 3.6 kilometers wide that orbits the Sun once every thirty-three years. Each time the comet nears the Sun, it leaves behind fresh dust particles, which become the glowing streaks we see blazing through the atmosphere.

The Leonids have a legendary reputation. At times, they have produced what astronomers call meteor storms, when hundreds or even thousands of meteors flash across the sky every hour. The most spectacular storm occurred in 1966, when witnesses saw a dazzling downpour of light, about forty to fifty meteors every second. Although the 2025 shower will not reach those levels, the combination of a dark sky and favorable conditions promises a breathtaking sight.

For viewers in New Delhi, the radiant will rise in the eastern sky around 11:45 p.m., climb steadily through the night, and reach its highest point just before dawn around 6 a.m. The higher it gets, the more meteors you are likely to see. For viewers in Chennai, the shower will not be visible before around 00:07 each night, when its radiant point rises above your eastern horizon. It will then remain active until dawn breaks around 05:43 a.m.

You will not need a telescope or binoculars. All you need is an open area away from city lights, a comfortable place to sit or lie down, and patience. Give your eyes about twenty minutes to adjust to the darkness. The meteors can appear anywhere in the sky, though they will seem to radiate from the direction of Leo. Each bright streak is a tiny piece of cometary dust burning up as it races through Earth's atmosphere at nearly seventy kilometers per second.

As you watch these trails of ancient cosmic dust flash across the heavens, remember that you are witnessing a celestial story that began thousands of years ago. The Leonids are more than just falling stars; they are a beautiful reminder that the universe is alive, timeless, and always in motion.

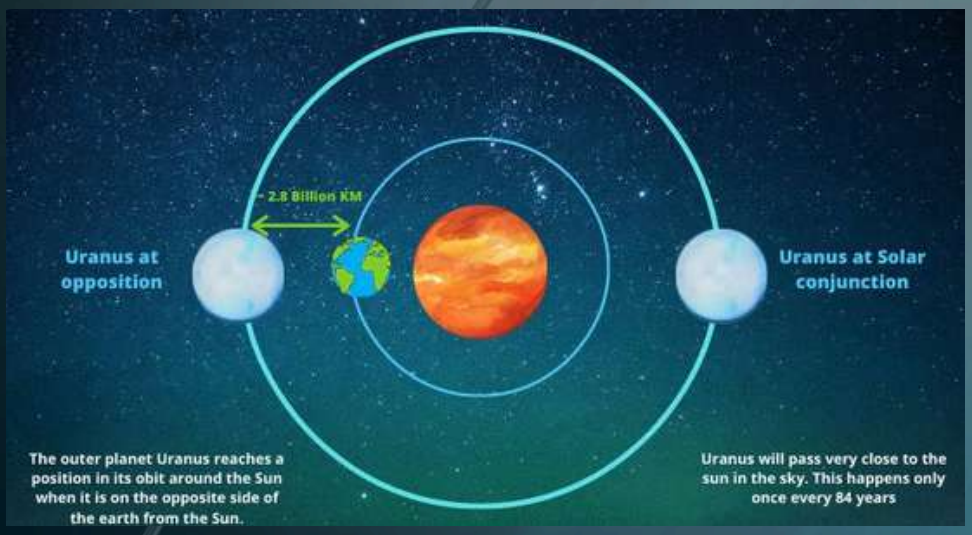


URANUS AT OPPOSITION

As the evenings of November turn cool and clear, the night sky offers a rare treat for curious stargazers. On 21 November 2025, Uranus, one of the most distant worlds in our Solar System, will reach opposition, a special alignment when Earth comes directly between the Sun and the planet. In simple terms, it is when Uranus is at its closest and brightest for the year, shining opposite the Sun in the sky.

During this time, Uranus glows with a magnitude of about +5.6, which is just faintly visible to the naked eye under perfectly dark skies. While spotting it without aid can be tricky, a pair of binoculars or a small telescope will easily reveal its subtle greenish-blue tint, a tiny distant orb that once marked the edge of our known Solar System.

This year, Uranus will be located in the constellation Taurus, the Bull. It will rise in the east around sunset, climb to its highest point near midnight, and remain visible until dawn. For observers in India, especially around Delhi and other northern regions, this means an entire night to catch a glimpse of this icy giant. Local rise and set times may vary slightly depending on your exact location, but the pattern stays the same, evening to morning visibility with the planet glowing faintly among the stars.



What exactly does opposition mean?
It is when the Sun, Earth and a planet line up in a straight line, with Earth in the middle. This alignment not only brings the planet closest to us but also allows sunlight to reflect fully off its surface, making it appear brighter and clearer than usual.

Even then, Uranus is a small target. Its apparent size is only about 3.8 arcseconds, meaning it looks like a tiny disk even through a telescope. But finding it can be an incredibly rewarding experience, a quiet and humbling reminder of how vast our cosmic neighborhood truly is.

For students and astronomy enthusiasts, this event is a perfect opportunity. So, mark 21 November on your calendar. Step outside, look up, and let the wonder of Uranus at opposition light up your November night.

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 Moon and Saturn

On November 2nd, the ringed planet Saturn near the constellation Aquarius will meet the bright Moon near the constellation Pisces in the South-eastern direction. Saturn is at a magnitude of 0.9 and the Moon has a magnitude of -12.62.

Place: New Delhi / Date: 02nd November / Time: 06.20 p.m.

Conjunction of Pleiades and Moon

On November 6th, the Pleiades star cluster or seven sisters will meet the Moon in the Eastern sky in the constellation Taurus. The Pleiades is at a magnitude of 1.59 and the Moon has a magnitude of -12.78.

Place: New Delhi / Date: 06th November / Time: 06.10 p.m.

Conjunction of Moon and Jupiter

On November 10th, the gaseous giant Jupiter will meet the Moon in the North-eastern direction near the constellation Gemini. Jupiter is at a magnitude of -2.25 and the Moon has a magnitude of -12.23.

Place: New Delhi / Date: 10th November / Time: 10.50 p.m.

Conjunction of Moon and Saturn

On November 29th, the planet Saturn will meet the Moon in the South-eastern direction near the constellation Pisces. Saturn is at a magnitude of 1.06 and the Moon has a magnitude of -12.24.

Place: New Delhi / Date: 29th November / Time: 06.00 p.m.

STUDENT'S CORNER

More About Universe

Vetrivel.T, iAstronomer

Introduction

We know that the universe is vast and also that human being does not really know its measure. In fact, the Milky Way galaxy, in which our solar system lies is only one amongst the hundred billion galaxies which exist in the universe! The Milky Way is part of the local group- a group of over 20 or more neighbor galaxies. With extensive research, we have been able to learn more about the composition and the shape of the universe.

Chemical Elements

Matter contains chemical elements. A chemical element is any substance that cannot that can not be further broken down into simpler substance by ordinary chemical processes.

Hydrogen and Helium are the main chemical components of the universe and were produced when the universe first came into the existence. Some other 90- odd chemical elements are created in the stars, but these make up only a small percentage of the overall mass of the universe.

These other elements are called 'Metals' by astronomers, though in ordinary usage we do not refer to element like oxygen and carbon as metal. The quantity of 'metals' varies depending on how stars were formed in that region.

Shape of the Universe

Scientists have concluded that the mass cause space to curve. When objects move within that curved space, they are forced to alter or change their direction. If space is curved, then the shape of the universe may be one of these three types – flat, spherical or saddle – shaped. How significant are these shapes to understanding the universe?

The saddle-shaped structure has negative structure. The flat surface is said to have zero curvature. The spherical surface has positive curvature.

If space has negative curvature, it means that the universe has no limits and will continue to expand forever. This is called as open universe.

If space has zero curvature, then the universe has no limits and will expand forever, nut the expansion rate will gradually approach to zero. This is termed a flat universe.

If space has positive curvature, it means expansion will eventually stop and contraction will begin. So, galaxies will stop moving away from each other and get closer. As a result, the universe will disintegrate. This is closed universe.

Recent observation show that the expansion of the universe is speeding up. This strongly implies that the universe is geometrically 'flat'. However, this still remains one of the major unexpanded problems in modern cosmology.

Mystery Of Fast Radio Bursts

Jiya Jaiswal, Camp Student

You are alone on a quiet night when suddenly a thunderous knock disturbs the silence. You slowly open the door with your heart pounding.. but there's no one there. No signs of life. Just an unsettling silence.

This is the same mystery of Fast Radio Bursts (FRBs). They are transient radio waves originating from the depths of space lasting for only a few milliseconds.They emit an enormous amount of energy equivalent to what the Sun emits over several days or even years. This makes them some of the most energetic signals ever detected from deep space adding to the mystery of their origins.

Duncan Lorimer and his student David Narkevic discovered the first FRB in 2007 while analyzing pulsar data from the Parkes Radio Telescope in Australia. This 5-millisecond burst, later named the Lorimer Burst, appeared to have traveled billions of light-years. Initially suspected to be a data glitch but further analysis confirmed its deep-space origin. The discovery left scientists puzzled, fueling endless speculation about what could have caused it.

One widely accepted explanation is that they are caused by the collision of two magnetars as they possess a magnetic field over a thousand times stronger than that of other neutron stars.This collision generally can lead to the production of two waves- gravitational waves that can distort space and time and the other FRBs.

Scientists have also made the discovery on how gravitational waves are formed when two heavy objects collide like two merging black holes.This discovery strengthens the growing evidence that violent cosmic events could be linked to FRBs. It has also been suggested that if they originate from black hole explosions, they could provide the first direct evidence of quantum gravity effects.

One of the wildest theories can be the sign of extraterrestrial intelligence which we usually refer to as aliens possibly demonstrating advanced technological signals, or technosignatures.. When the first repeating radio signal was detected, some scientists initially considered the possibility that it originated from a distant civilization.The mysterious source was even nicknamed "LGM-1" (Little Green Men-1), reflecting the possibility that we might not be alone.

Another exotic potential source is cosmic strings which are hypothetical relics from the birth of the universe. These dense filaments of energy are thought to thread space and time after interacting with hot plasma of the early universe which resulted in powerful radio bursts. If true, FRBs wouldn't be mere flashes of radio waves,they could be remnants of the early universe, providing valuable insights into physics that we have yet to fully understand.

In recent research,astronomers discovered radio waves from a galaxy that is about 2-billion light years away from earth and is believed to be more than 11 billion years old. FRBs are associated with this galaxy that was believed to be dead.

Yet, despite all these theories, the true origins of FRBs still remains a mystery.And here's the real question, what if these signals aren't just random bursts of energy but a pattern, a message, maybe even a warning?The universe is sending a message but are we really paying attention?

3I/ATLAS: Expanding the Horizons of Interstellar Discovery

Nikhilesh, iAstronomer

The celestial body known as 3I/ATLAS stands out as one of the most captivating astronomical finds in recent years. In late 2019, the asteroid was first observed by Hawaii's Asteroid Terrestrial Impact Last Alert System (ATLAS) and quickly drew global attention because it appeared to be the third interstellar object to enter our solar system.

The title "3I" means "third interstellar," following the groundbreaking detections of 1I/'Oumuamua and 2I/Borisov, both of which transformed what scientists knew about objects originating from beyond our solar neighborhood.

At first, 3I/ATLAS appeared as a dim, fast-moving object with traits similar to those of a comet. Its hyperbolic orbit implied that it was not gravitationally bound to the Sun and suggested that it could have come from deep interstellar space. During the study, astronomers observed that its speed and trajectory matched those expected from an object passing through another star system.

Although subsequent studies debated whether it truly was interstellar, the excitement surrounding 3I/ATLAS continues to shape research into transient astronomical phenomena.

3I/ATLAS is significant because it provides insights into the movement and composition of materials from outside our solar system. Bodies such as this may contain dust, ice, and organic compounds that have formed under conditions unlike those found near the Sun. By examining how such objects reflect light and analyzing their spectral fingerprints, scientists can better understand the diversity of matter throughout the galaxy. Although observation time was limited, these glimpses offer important data about how molecules form and how other planets evolve.

The discovery of such a body has only become possible through rapid technological advances. Modern telescopes, advanced imaging systems, and alert networks such as ATLAS allow researchers to identify and monitor elusive objects before they disappear into space again.

This collaboration between automated detection systems and scientific expertise marks a major step forward in our ability to explore the universe.

The Spiritual Dimension of the Multiverse

M Vishnu Sakthi, Club Student

The multiverse-the concept of infinite or innumerable universes beyond our own has been in the minds of scientists and spiritual thinkers for many decades. Where physics explains it with the theories of the Many Worlds Interpretation, string theory, and cosmic inflation, the multiverse is not merely a physical phenomenon in spirituality but now becomes the bridge between science and consciousness in explaining the nature of existence, identity, and purpose.

From a scientific perspective, the multiverse arises to explain mysteries that a single universe model cannot. The Many Worlds Interpretation postulates that every quantum decision creates new universes, while the Eternal Inflation model describes endless "bubble universes" forming within an expanding cosmic field. Yet, these theories raise profound questions: if there are infinite versions of us, then what happens to individuality or free will? It's an existential crisis if every other possible version of us already exists somewhere, then what does that make our choices here mean?

Spiritual traditions, especially Eastern philosophies like Advaita Vedanta, see this dilemma differently. Non-dual philosophy teaches that all multiplicity is ultimately an illusion Māyā-arising from one underlying consciousness known as Brahman. It means that every universe, every form, and every being is but a manifestation of this one infinite awareness. Reality runs on two levels: the empirical, Vyāvahārika, in which the multiverse is real, and the ultimate, Pāramārthika, where only pure consciousness exists. Science studies the structure of the illusion; spirituality pursues the truth behind it.

Ancient cosmologies mirror these ideas. Hindu scriptures describe several worlds or lokas, complete with their own laws and beings, while Buddhist teachings speak of realms shaped by karma and consciousness. These traditions suggest that reality is layered and interconnected similar to the multiverse, but with a moral and spiritual focus.

Some modern spiritual views go even further, suggesting that a "Higher Self" or "Oversoul" exists across many universes at once. In this model, time is not linear but simultaneous, and each version of ourselves adds to a common evolution of consciousness. Every decision and insight here informs the total journey of the soul. Instead of rendering life without meaning, this notion renews it as a huge spiritual ecosystem, where everything one does has dimensional consequence. Ultimately, the spiritual aspect of the multiverse shifts attention from outer exploration to inner realization. It reminds us that the true frontier may not lie among galaxies but within consciousness itself. Whether or not science proves parallel universes exist, the idea encourages us to live with awareness, compassion, and purpose, knowing that beneath all possible realities lies only one unifying truth: consciousness itself.

ISAAC NEWTON- PAVING THE PATH OF MODERN ASTRONOMY

Sourajit Mandal, Astronomy Camp

Isaac Newton, is no doubt, one of history's greatest scientists. He worked in gravity, optics, thermodynamics, mathematics, alchemy, and many more. His work was so foundational that students are still learning it in schools today.

In 1665, The Great Plague pandemic started in Europe. It was like Covid-19 pandemic that we witnessed recently. This forced Newton to stay in his home in the countryside. This quiet time was a huge, unexpected gift that historians call his "year of wonders." During this pandemic, he started developing his best ideas about gravity, light, and an entirely new branch of mathematics called calculus.

His greatest book, the "Philosophiæ Naturalis Principia Mathematica" was really considered the rulebook for the entire universe. It was the book that introduced his three famous laws of motion and his idea of gravity… the same idea which showed that the force that pulls an apple down to the ground also keeps the planets in orbit. Rocket science, for example, is built entirely on his third law of motion (for every action, there is an equal and opposite reaction). By proving that his gravity law worked perfectly with Kepler's rules for planetary movement, Newton turned the study of space from simply watching the stars into a proper field of science.

The Principia covered more than just faraway planets. Newton's laws explained the rise and fall of ocean tides, showing they were caused by the Moon and Sun's gravitational pull. He also worked out that the Earth was not a perfect ball, but slightly wide at the middle, so called an oblate spheroid. This clever prediction was later proven right by global measurements, confirming his accuracy. He even figured out the very slow wobble of the Earth's axis, which is essential for making long-term astronomical calendars and charting the 'heavens' over thousands of years.

Newton also completely changed how we see light. His experiments with glass prisms showed that white light is actually a mixture of all colours. This idea led to spectroscopy, a key tool that astronomers use to find what distant stars are made up of. To help with this, he invented the reflecting telescope in 1668 now known as the Newtonian telescope. This was a brilliant move, as it used a mirror instead of glass lenses, getting rid of the fuzzy colour rings that ruined older designs. This invention paved the way for every large telescope that has come since. His own invention of calculus provided the necessary mathematics to work out every orbital path and space journey, from probes like Voyager to the Hubble Space Telescope.

Besides all this brilliance, Newton's sharp, competitive side was clearly shown in the brachistochrone problem. His rival, Johann Bernoulli, set a challenge to find the path a ball would take to roll down fastest between two points. It was meant to be incredibly difficult, which nobody could solve for weeks. The busy Newton however, received the problem much later, solved it in a single night, and sent the answer to Bernoulli without signing. Bernoulli immediately realised that this proof was not done by anyone else, but Newton. He famously declared, "I recognise the lion by his claw." This brilliant solution to finding the best, fastest path is still used today to plan the most fuel-efficient routes for modern space probes.

Newton also found a method to calculate the value of pi much easily. At that time, mathematicians used to bisect polygons on many sides to calculate the approximate value of pi. This was a tedious job. Newton on the other hand, using calculus, developed a much easier method to work out the value of pi. Working carefully by hand, Newton found pi to an incredible 16 decimal places in very less amount of time. Even today, NASA uses 15 decimal places for high accuracy interplanetary navigation, which is sufficient for the precision needed for missions, as more digits would not significantly improve results for most realistic calculations.

Despite Newton being very well known, he was a private person who often argued with other scientists. Newton's ideas are the strong foundations for almost all modern physics. His world-changing ideas continue to push us further towards the stars.

WHEN STARS COLLAPSE: THE STRANGE LIFE OF NEUTRON STARS

Varsha S K, iAstronomer

Have you ever wondered what happens when a star dies not just fading away, but collapsing into something so dense that a spoonful of it would outweigh a mountain? That's the strange and haunting story of neutron stars the ghost hearts of the universe, born from the explosive deaths of massive suns. Imagine a star many times bigger than our Sun, glowing fiercely for millions of years. Deep inside, it fuses hydrogen into helium, creating the energy that makes it shine. But stars aren't immortal.

When their nuclear fuel runs out, their balance collapses. Gravity takes over, pulling everything inward. The core shrinks, pressure rises, and then boom! a supernova tears the star apart in a cosmic explosion brighter than billions of suns. What remains is astonishing: a tiny core, no bigger than a city, yet heavier than the Sun itself. Under unimaginable pressure, atoms collapse.

Protons and electrons fuse into neutrons, forming a single gigantic atomic nucleus a neutron star. To grasp how extreme this is, imagine squeezing Mount Everest into a teaspoon. That's the density we're talking about. The gravity on a neutron star is so intense that if you dropped a pebble from just one meter above, it would hit the surface at a speed close to 2 million kilometers per hour. No pause, no fall just instant impact. And yet, these ghostly stars are not dark tombs.

Many spin rapidly, flashing beams of radiation into space. If those beams sweep across Earth, we see a steady rhythm of blinks like the pulse of a cosmic heartbeat. These are pulsars, spinning hundreds of times per second. One neutron star, named PSR J1748-2446ad, spins more than 700 times every second faster than a blender, made entirely of crushed atoms. Inside, things get even stranger. Scientists believe the matter in a neutron star's core is so compressed that the laws of physics begin to break down.

The interior might contain exotic forms of matter perhaps "quark soup," the raw material from which all particles were once made. No laboratory on Earth can recreate these conditions; neutron stars are the universe's own experiments in the impossible. Sometimes, they don't stay alone. Two neutron stars can collide, unleashing energy so powerful that it shakes the fabric of spacetime itself. These ripples called gravitational waves were first detected on Earth in 2017.

That single cosmic event not only proved Einstein's theories right but also revealed something breathtaking: the collision forged gold, platinum, and other heavy elements. In other words, the precious metals we treasure on Earth were created in the fiery embrace of dying stars.

For something so small, neutron stars carry enormous meaning. They remind us that endings in the universe are rarely final. Even after a star explodes, a piece of it survives spinning, glowing, whispering across the void. They are remnants of chaos turned into beauty, destruction turned into creation. So, next time you look up at the quiet night sky, think of them tiny, invisible hearts beating somewhere in the distance.

Each one is proof that even in death, the universe continues to create. Because sometimes, the brightest stars don't fade away. They just become smaller denser and infinitely more mysterious.

VISUAL ARTS FROM SPACE – ASSOCIATED ASTRONOMERS

Moon Captured by Vetrivel. T, iAstronomer

ASTROPHOTOGRAPHS FROM SPACE TEAM

Moon dressed like Saturn (due to clouds) Captured by Mr. Ranjith Kumar E, Regional Product Manager, STEPL.

Happy Birthday


November 2, 1885

Harlow Shapley

Harlow Shapley (November 2, 1885 – October 20, 1972) was an American astronomer who advanced the understanding of the Milky Way. He found that the Sun's position is not at the galaxy's centre, but in its outskirts, a groundbreaking discovery that reshaped cosmic perspective. He also contributed to debates on the scale of the universe and popularised astronomy through education and outreach.(Image Credits: Wikipedia)


November 7, 1855

Edwin H. Hall

Edwin H. Hall (November 7, 1855 – November 20, 1938) was an American physicist best known for discovering the Hall Effect in 1879. His experiment showed that when a magnetic field is applied perpendicular to an electric current in a conductor, a measurable voltage appears across it. The Hall Effect remains vital in modern physics . (Image Credits: biografiasyvidas)


November 7, 1888

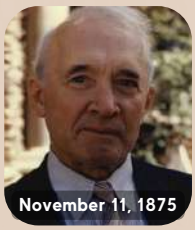
C. V. Raman

C. V. Raman (7 November 1888 – 21 November 1970) was an Indian physicist celebrated for discovering the Raman Effect in 1928, which explains how light changes its wavelength when it passes through a transparent material. For this discovery, he received the Nobel Prize in Physics in 1930. His pioneering research laid the foundation for Raman spectroscopy, a key tool in physics and material science.(Image Credits: young.downtoearth)


November 9, 1934

Carl Sagan

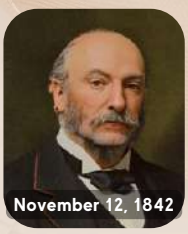
Carl Edward Sagan (November 9, 1934 – December 20, 1996) was an American astronomer, astrophysicist, and science communicator. He popularised science through books like Cosmos and the award winning TV series of the same name, inspired generations to explore the universe. He also played a key role in NASA missions, leaving a lasting legacy in both science and public education.(Image Credits: nmspacemuseum)


November 11, 1875

Vesto Slipher

Vesto Slipher (November 11, 1875 – November 8, 1969) was an American astronomer who performed the first measurements of radial velocities for galaxies. He discovered dark absorption bands in the spectra of Jupiter, Saturn, and Neptune, leading to the identification of their atmospheric chemical constituents and marking a milestone in planetary spectroscopy and atmospheric studies.

Happy Birthday



John Rayleigh

John W. Rayleigh (12 November 1842 – 30 June 19192) was a British physicist known for his groundbreaking work in acoustic, optics, fluid dynamics. He discovered Rayleigh scattering, reason why the sky appears blue and co-discovered the noble gas argon, received the Nobel Prize in Physics in 1904. His research laid the foundation for modern physics. (Image Credits: Wikimedia commons)

William Herschel

William Hershel (15 November 1738 – 25 August 1822) was a German born British astronomer and composer, best known for discovering the planet Uranus in 1781, expanding the Solar System. He investigated infrared radiation, built advanced telescopes for his observations and studied thousands of stars and nebulae. His work laid the foundation for modern astronomy.(Image Credits: Wikipedia)

Alan Shepard

Alan Shepard (November 18, 1923 – July 21, 1998) was an American astronaut, naval aviator, and test pilot, famous for being the first American in space on May 5, 1961, aboard Freedom 7. He later commanded the Apollo 14 mission in 1971, becoming the fifth person to walk on the Moon. Known for his courage and determination, he became a symbol of America's pioneering spirit in human space exploration.(Image Credits: Wikipedia)

Edwin Hubble

Edwin Powell Hubble (November 20, 1889 – September 28, 1953) was an American astronomer who revolutionized understanding of the universe. He provided the first observational evidence that other galaxies exist beyond the Milky Way and formulated Hubble's Law, showing that the universe is expanding and the Hubble Space Telescope was later named in his honour.(Image Credits: Wikipedia)

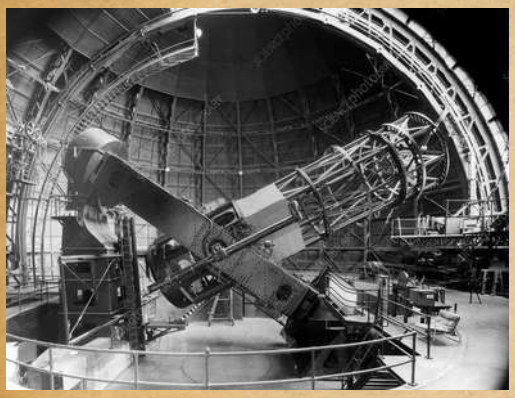
Christian Doppler

Christian Doppler (29 November 1803 – 17 March 1853) was an Austrian physicist and mathematician best known for discovering the Doppler effect, which explains how the frequency of waves, changes for an observer moving relative to the source. This principle is widely used to measure the motion of stars and galaxies, making him a pivotal figure in understanding wave behaviour and motion.(Image Credits: Wikipedia)

HISTORICAL EVENTS OF NOVEMBER

Discovery of Chiron

On November 1, 1977, astronomer Charles Kowal discovered Chiron at Palomar Observatory, identifying a mysterious object orbiting between Saturn and Uranus. Initially classified as an asteroid, Chiron later revealed comet-like behavior, earning dual status as both a minor planet and a comet designated 2060 Chiron and 95P/Chiron. It became the first known centaur, a class of icy bodies with unstable orbits crossing those of the giant planets. Chiron's discovery expanded our understanding of the solar system's transitional zones and hinted at a population of hidden, hybrid objects beyond the asteroid belt.
(Image credits: astrobiology.com)



Hooker Telescope Sees First Light

On November 2, 1917, the Hooker Telescope at Mount Wilson Observatory in California saw "first light," marking a new era in observational astronomy. With its 100-inch mirror, it was the world's largest telescope for over three decades. This powerful instrument enabled Edwin Hubble to discover galaxies beyond the Milky Way and prove the universe's expansion. The Hooker Telescope transformed our cosmic perspective, shifting astronomy from charting stars to understanding the universe's structure and evolution. Its legacy continues to inspire astronomers and physicists alike.
(Image credits: sciencephoto.com)

Laika Launches into Orbit

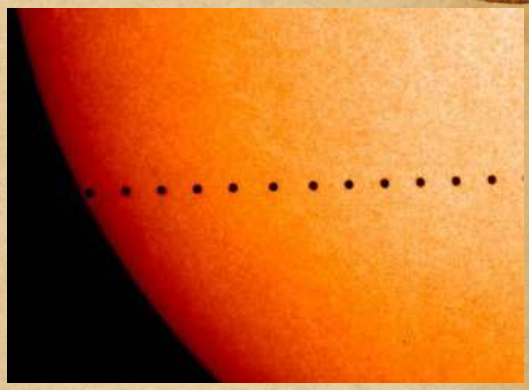
On November 3, 1957, the Soviet Union launched Sputnik 2, carrying Laika, the first living creature to orbit Earth. This historic flight marked a major milestone in space exploration, proving that life could survive launch and weightlessness. Though Laika's journey ended tragically, her mission paved the way for human spaceflight and raised global awareness about the ethics of animal testing. The spacecraft transmitted vital biological data, and Laika became a symbol of both scientific progress and compassion. Her legacy endures in memorials and the hearts of space enthusiasts worldwide.
(Image credits: rferl.org)

Mars Global Surveyor Launches

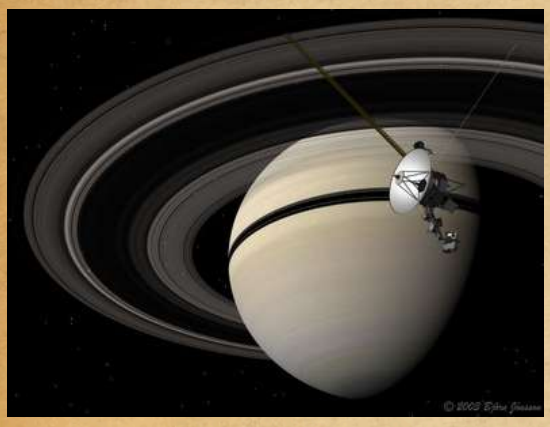
On November 7, 1996, NASA launched the Mars Global Surveyor (MGS), a pioneering orbiter designed to map the Martian surface with unprecedented detail. After arriving at Mars in September 1997, MGS began a multi-year mission, capturing high-resolution images, studying the planet's topography, gravity, and magnetic field. It revealed layered terrains, ancient river valleys, and signs of past water activity that reshaping our understanding of Mars' climate history. MGS operated for nearly a decade, far exceeding its original mission timeline, and laid the groundwork for future missions like Mars Odyssey and Curiosity. (Image credits: NASA.gov)

HISTORICAL EVENTS OF NOVEMBER

Mercury Transit Across the Sun



On November 11, 2019, skywatchers witnessed a rare celestial alignment: Mercury passed directly between Earth and the Sun, appearing as a tiny black dot gliding across the solar disk. This event, known as a transit of Mercury, occurs only about 13 times per century. Visible from parts of the Americas, Europe, and Africa, the 2019 transit lasted nearly five and a half hours. Scientists used the opportunity to refine orbital models and calibrate solar instruments. For observers, it was a striking reminder of the clockwork precision of our solar system. (Image credits: yorku.ca)



Voyager 1's Saturn Flyby

On November 12, 1980, NASA's Voyager 1 spacecraft performed a close flyby of Saturn, revealing the planet's majestic rings and complex moons in unprecedented detail. The probe captured stunning images of Saturn's atmosphere, discovered intricate ring structures, and studied magnetic fields and radiation belts. It also provided the first close-up views of Titan, Saturn's largest moon, hinting at a thick atmosphere and possible surface liquids. This encounter marked a turning point in outer solar system science, propelling Voyager 1 on its journey toward interstellar space where it continues to send data today. (Image credits: inspiredpencil.com)

The Great Leonids Meteor Storm

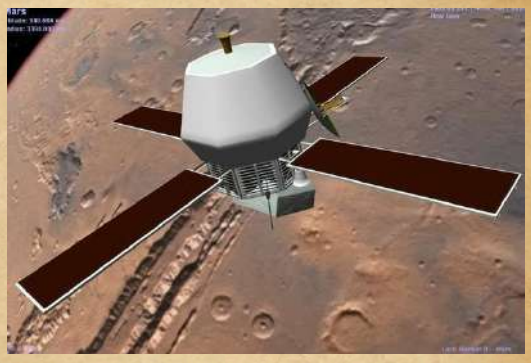
On the night of November 12–13, 1833, North America witnessed the Great Leonids Meteor Storm, with an estimated 100,000 meteors per hour streaking across the sky. The dazzling display terrified many and inspired awe, becoming a pivotal moment in public interest in astronomy. It was the first meteor storm widely documented in newspapers and journals, leading scientists to recognize meteors as celestial phenomena rather than atmospheric ones. The event helped establish the link between meteor showers and cometary debris, laying the foundation for modern meteor science. (Image credits: brian.carnell.com)

Venera 14's Final Transmission

On November 13, 1982, the Soviet spacecraft Venera 14 sent its final data from the surface of Venus before succumbing to the planet's extreme conditions. Having landed months earlier, it transmitted groundbreaking information about Venusian soil composition, atmospheric pressure, and temperature. The probe captured images and even deployed a mechanical arm to test surface texture. Venera 14's endurance in the hostile environment, nearly 500°C and crushing pressure, demonstrated Soviet engineering prowess and expanded our understanding of Earth's sister planet. It is one of the most successful Venus lander missions in history.
(Image credits: space.com)

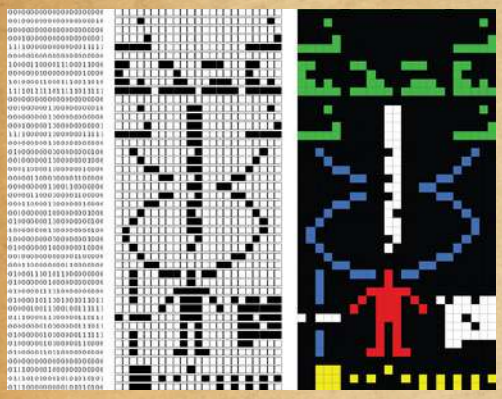
HISTORICAL EVENTS OF NOVEMBER

Mariner 9 Becomes First Orbiter of Mars



On November 14, 1971, NASA's Mariner 9 made history by becoming the first spacecraft to orbit another planet, Mars. Arriving during a global dust storm, it initially saw only a blank, reddish haze. But as the storm cleared, Mariner 9 revealed towering volcanoes, vast canyons, and dried riverbeds, reshaping our understanding of the Red Planet. Its success paved the way for future Mars missions and marked a turning point in planetary exploration.
(Image credits: alchetron.com)

Transmission of the Arecibo Message



On November 16, 1974, scientists at the Arecibo Observatory in Puerto Rico beamed a powerful radio signal toward the M13 globular star cluster, 25,000 light-years away. Known as the Arecibo Message, humanity's first deliberate attempt to communicate with extraterrestrial intelligence. The binary-coded signal contained information about Earth's biology, mathematics, and technology which includes a human figure and DNA structure. The transmission showcased advances in radio astronomy and sparked global interest in SETI (Search for Extraterrestrial Intelligence). It remains a cultural and scientific milestone in our quest to connect across the cosmos. (Image credits: ianwarn.net)

Explorer 66 Launches to Study Cosmic Radiation

On November 18, 1989, NASA launched Explorer 66, also known as COBE (Cosmic Background Explorer), to investigate the faint microwave radiation left over from the Big Bang. This mission provided the first detailed measurements of the cosmic microwave background (CMB), confirming the universe's origin in a hot, dense state. COBE's data supported the Big Bang theory and revealed tiny temperature fluctuations, seeds of galaxies we see today. Its groundbreaking results earned John Mather and George Smoot the Nobel Prize in Physics in 2006, and set the stage for future missions like WMAP and Planck. (Image credits: science.nasa.gov)

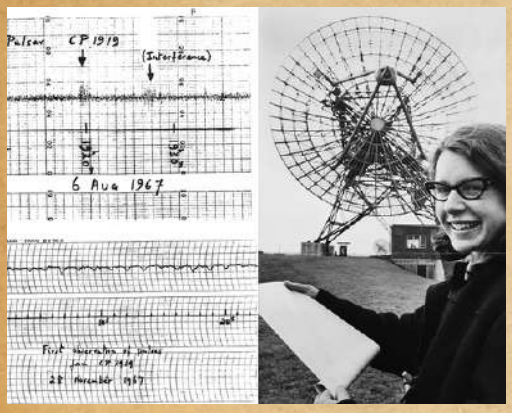
Zarya Module Launches

On November 20, 1998, the Russian-built Zarya module was launched into orbit, marking the beginning of the International Space Station (ISS). As the first component of the ISS, Zarya provided essential power and propulsion, laying the foundation for a global collaboration in space. Its successful deployment initiated one of the most ambitious engineering and scientific projects in human history. Over the years, the ISS has become a hub for international research, technological innovation, and peaceful cooperation among nations. Zarya's launch was the first step toward a permanent human presence in low Earth orbit. (Image credits: esa.int)

HISTORICAL EVENTS OF NOVEMBER

Curiosity Rover Launches to Mars

On November 26, 2011, NASA launched the Mars Science Laboratory mission, carrying the Curiosity Rover aboard an Atlas V rocket from Cape Canaveral. Designed to explore Gale Crater, Curiosity was the most advanced rover ever sent to Mars, equipped with a suite of instruments to study the planet's geology, climate, and potential for past life. Its successful landing in August 2012 using a daring "sky crane" maneuver captivated the world. Curiosity has since uncovered evidence of ancient lakes and organic molecules, transforming our understanding of Mars as a once-habitable world.
(Image credits: science.nasa.gov)

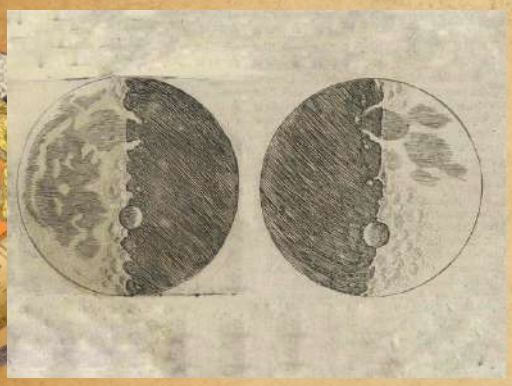


Discovery of the First Pulsar

On November 28, 1967, Jocelyn Bell Burnell and Antony Hewish discovered the first pulsar, PSR B1919+21, while analyzing radio signals at Cambridge University. Initially dubbed "LGM-1" (Little Green Men), the regular pulses sparked speculation about extraterrestrial origins. Soon, they realized it was a rapidly rotating neutron star emitting beams of radiation. This breakthrough revealed a new class of celestial objects and deepened our understanding of stellar evolution. Pulsars became vital tools for studying gravity, timekeeping, and even detecting gravitational waves. Bell Burnell's discovery remains one of the most iconic moments in modern astrophysics. (Image credits: space.com)

Hubble Captures NGC 7027

On November 28, 2000, the Hubble Space Telescope captured breathtaking images of NGC 7027, a young and compact planetary nebula in the constellation Cygnus. The images revealed intricate layers of gas and dust sculpted by stellar winds from the dying central star. With ultraviolet and infrared filters, Hubble exposed glowing arcs, knots, and shock fronts, evidence of dynamic processes shaping the nebula. NGC 7027's vivid colors and complex structure made it a favorite among astronomers and educators, showcasing Hubble's power to unveil the beauty and physics of stellar death.
(Image credits: apod.nasa.gov)

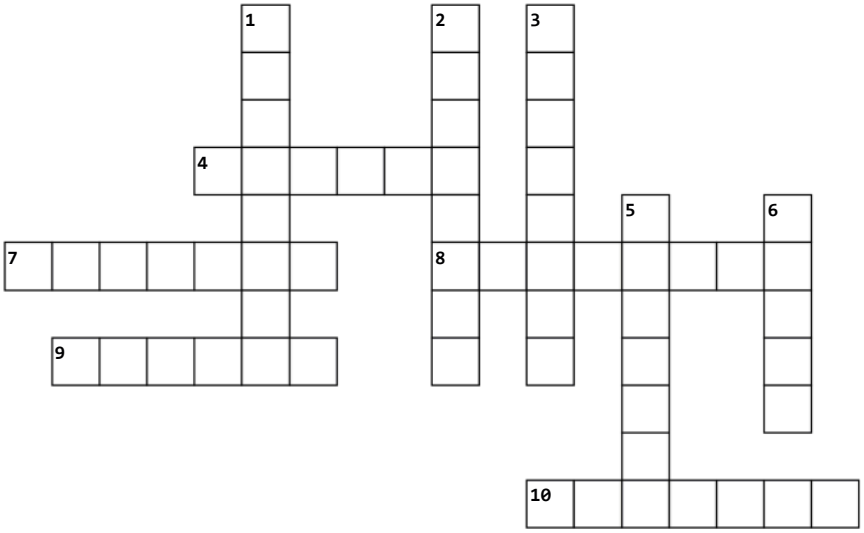


Galileo Sketches the Moon

On November 30, 1609, Galileo Galilei used his handmade telescope to observe the Moon and created detailed sketches that challenged centuries of celestial belief. Instead of a smooth, perfect sphere (as taught by Aristotelian cosmology) Galileo's drawings revealed rugged terrain, craters, and mountains. These observations, published in Sidereus Nuncius (1610), provided visual evidence that celestial bodies were not flawless and unchanging. Galileo's lunar sketches marked a turning point in scientific thought, laying the foundation for telescopic astronomy and the modern understanding of the cosmos. (Image credits: planetarymapping.elte)

TRAIN YOUR BRAIN

CROSSWORD



Across

4. Which astronomer who proved Andromeda is a separate galaxy?

7. Which Greek astronomer first catalogued Corona Borealis?

8. Sputnik 1 was launched from which cosmodrome in Kazakhstan?

9. In which Indian state is the Semiconductor Laboratory (SCL) located?

10. The Nebra Sky Disk was discovered in which country?

Down

1. What is the name of the first known interstellar object to pass through our Solar System, discovered in 2017?

2. What type of formation was the "Mars's Bright Angel" region once shaped by?

3. Which company uses AI for real-time network optimization and low-latency internet services?

5. Which spacecraft first captured Saturn's hexagonal north-pole pattern in the 1980s?

6. What does Corona Borealis mean in Latin?

Astronomy Word Puzzle

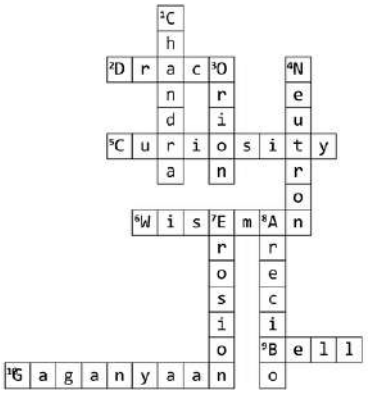
Space Missions

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

INSIGHT
VOYAGER
GALILEO
SPUTNIK
CHANDRAYAAN
LUNA
MANGALYAAN
ARTEMIS
NEW HORIZONS
PIONEER
VIKING
PERSEVERANCE
APOLLO
ROSETTA
CASSINI

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

Answers for last month puzzles.



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