SPACE™
EMPOWERING LIFE

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Galactica

Astronomy and Space Science Magazine

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

Team

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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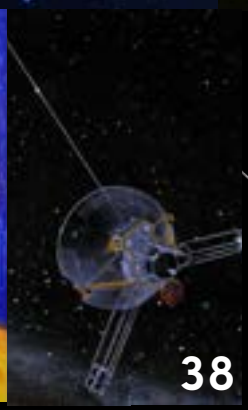
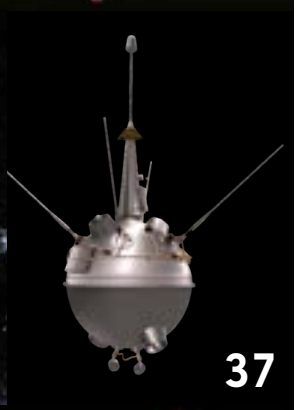
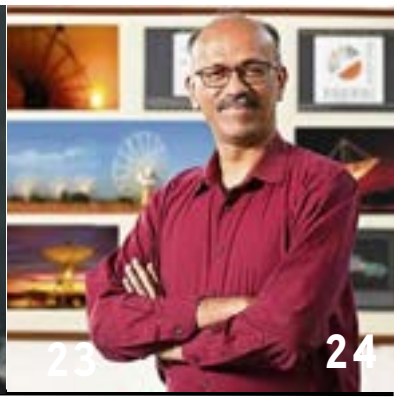






SPACE INSIGHTS

NATIONAL SPACE DAY 2025:WHERE HERITAGE MEETS THE COSMOS

On 23rd August 2025, Jaipur's historic Jantar Mantar transformed into a living observatory as SPACE India, in collaboration with the Department of Tourism, Rajasthan, celebrated National Space Day. The event beautifully merged India's ancient astronomical legacy with its modern space achievements, making it a cultural-scientific dialogue.

The inauguration replaced the traditional lamp-lighting with a hydro-rocket launch, symbolizing India's leap into the future. Dignitaries included Hon'ble Smt. Diya Kumari, Deputy CM of Rajasthan, Ms. Rukmani Riar, and Dr. Sachin Bahmba, alongside educators and hundreds of enthusiastic students.

Highlights included student interactions on Chandrayaan-3, live demonstrations of the Samrat Yantra's precision, hydro-rocketry, telescope pointing, a vibrant space quiz, and an immersive exhibition tracing India's cosmic journey. Despite monsoon rains limiting sky visibility, students engaged deeply in indoor exhibitions, experiments, and discussions with experts—turning challenges into opportunities for richer learning.

This collaboration positioned Rajasthan as a hub for scientific heritage tourism, proving that monuments like Jantar Mantar are not static relics but active classrooms of innovation. The event also underscored India's identity as a Vishwa Guru in space sciences, blending centuries of knowledge with global leadership in exploration.

More than a celebration, National Space Day 2025 became a statement of intent—showing how partnerships between government, academia, and private organizations can inspire youth, strengthen national pride, and create a model for future science-heritage festivals.

The day ended, but its echo begins—a promise that India will honor its cosmic past while boldly shaping its cosmic future.

EXPLORING THE COSMOS: SPACE ARCADE'S TELESCOPIC OBSERVATION - AUGUST

Space Arcade successfully conducted its Monthly Telescopic Observation Session in Chennai, bringing together around 20 curious participants eager to explore the night sky . Unfortunately, the parallel session scheduled in Delhi had to be cancelled due to unfavorable weather conditions.

Despite the smaller group, the evening proved to be an enriching experience. Attendees had the opportunity to observe both the Moon and Mars, with clear skies allowing for a detailed view of lunar features and a brief but captivating glimpse of the Red Planet. The session featured a range of telescopes, including: Space Voyage 130 EQ Reflector Telescope, 8" SCT Computerized Goto Telescope, Space Launcher 76mm Reflector Telescope, Space Launcher 60mm Refractor Telescope.

Participants were guided by the SPACE ARCADE team in operating the instruments and learning about their distinct capabilities and optical systems. The hands-on approach enabled participants to gain a deeper appreciation of astronomical observation and telescope functionality.

Here are some of the participant feedback:
Great experience, conduct more such observations in future - Ashish

The view of the moon was surreal, thank you. - Swetha

This session reflects SPACE ARCADE's continued efforts to promote astronomy awareness and make space science accessible and engaging for the public. Our team remains committed to delivering quality educational experiences through every event




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

MANTHAN 2025 - CELEBRATING INTERNSHIPS THAT INSPIRE

On 4th August 2025, Delhi Public School, Faridabad, in collaboration with Space India, proudly hosted Manthan 2025 – Celebrating Internships That Inspire, an event that blended recognition, innovation, and inspiration. The program was organized to honor the achievements of students who completed internships and to showcase the spirit of scientific learning through engaging astronomy
activities.

The highlight of the day was the felicitation of 16 students who had completed internships with Space India in four significant domains–Photography & Videography, Presentation Making, Content Writing, and Product Development. These internships provided students with an opportunity to hone their creative and technical skills while contributing meaningfully to real-world projects. Each intern was awarded a certificate of appreciation, symbolizing their dedication, commitment, and excellence. The moment was a proud one for the school community, as these young achievers stood as role models for their peers.

The event also featured an Astronomy Showcase, where students from Classes IX and X presented 11 fascinating hands-on activities. Exhibits such as a Virtual Reality Tour of the International Space Station, Space Hydraulics, Jantar Mantar Model, Vortex Cannon, Comet Making, Planisphere Reading, Sundials, Stellarium Software, Air Rocketry, and Basics of Optics transformed the campus into a hub of exploration and wonder. Each activity was thoughtfully designed to make science interactive and enjoyable. The students confidently explained the working principles behind the models, sparking curiosity among parents and guests, who were thoroughly impressed by their knowledge and enthusiasm.

The presence of esteemed dignitaries added grandeur to the event. The Chief Guest, Mr. Himanshu Gupta, IAS, Secretary CBSE, along with Dr. Sachin Bahmba, CMD Space India, Principal, Delhi Public School, Faridabad, Ms. Sangeeta Chakravarty, Vice Principal, Mr. Sandeepan Rishi, and Ms. Manalee Deka, Assistant Director (Education), graced the occasion with their inspiring presence. Their encouraging words motivated the students to continue their journey of discovery and to embrace learning beyond classrooms.

Parents expressed immense joy and pride in witnessing their children engage so passionately in scientific exploration. They appreciated the school and Space India for providing such valuable platforms that bridge theoretical knowledge with practical understanding. The dignitaries also praised the students for their creativity and the faculty for nurturing such inquisitive young minds.

Principal Ms. Sangeeta Chakravarty, in her address, extended heartfelt gratitude to the dignitaries, parents, and Space India for their constant support. She emphasized that such opportunities prepare students to face future challenges with confidence and also inspire them to pursue careers in science, technology, and research. She congratulated the interns and applauded the astronomy showcase participants for their dedication and curiosity.

The event concluded on a celebratory note, leaving behind cherished memories and a renewed enthusiasm for learning. Manthan 2025 stood as a true testament to the school's vision of holistic education—encouraging innovation, honoring achievement, and inspiring students to dream big and reach for the stars.

VIKSIT BHARAT IN ORBIT: A COSMIC ONLINE PANEL DISCUSSION ON NATIONAL SPACE DAY

Date: August 21, 2025.
Time: 4:30-6:00 PM.
To commemorate the success of historic Chandrayaan-3 mission as National Space Day, Space India successfully organized a power-packed lineup of distinguished panelists of- scientists, directors, professors, engineers, policy experts, educators, and visionaries and explore the past, present, and future of Indian space exploration in a dynamic online panel discussion based on this year's theme.

Held virtually on YouTube, the event served as a platform to celebrate achievements in space science by India, engage in meaningful conversations about India's next steps among the stars, success of Chandrayaan-3, acknowledge ISRO's remarkable contributions to India's growing presence in the global space community and highlight the achievements of Indian Astronaut Shubhanshu Shukla during Axiom Mission 4 aboard the ISS.

Distinguished Panelists:
Each panelist brought a unique perspective from their work in government, academia, private industry, and public outreach in the field of space science and STEM:

1. Dr. Sachin Bahmba, Founder & CMD, SPACE Group of Companies.
2. Shri N M Desai, Director, Space Applications Centre (SAC), Ahmedabad.
3. Dr. Sanjeev Kumar Varshney, Science facilitator, Professor Emeritus, Former Adviser International, DST, Editor PINSA.
4. Dr Praveen Saini, Sr. Principal Scientist and Professor, CSIR-NPL.
5. Mr. Pradip Chakraborty, Sr. Engineering Associate, Aryabhatta Research Institute of Observational Sciences.

Key Discussion Themes:
The 90-minute session, hosted by Ms. Pruthvi Sreenivas, explored a range of topics designed to ignite curiosity and inspire action for young Indian minds. Here are some takeaway highlights,

1.Pioneering the Space Education
The mission and focus of Space India is to create jobs and awareness in the education and Astro tourism concepts which we have already pioneered including STEM and space education in schools and colleges.
- Dr. Sachin Bahmba, Founder & CMD, SPACE Group of Companies.

2.Fulfilling the visions of Vikram Sarabhai
SAC, ISRO has been innovatively using space technologies for the benefits of common man of India and we can look forward to missions like Indian Navigation System, Quantum Technology Systems, Space Tourism, India on the Moon and deployment of Bharat Antariksh Station in less than a few decades which will set milestones for Indian Space Flight and Space Mission programs.
-Shri N M Desai, Director, Space Applications Centre (SAC), Ahmedabad.

3.Normalizing the space sector
India is doing remarkably well in space science and technology domain and we are developing some of the complex integrated systems useful for both Indian civilian and military areas.
-Dr. Sanjeev Kumar Varshney, Science facilitator, Professor Emeritus, Former Adviser International, DST, Editor PINSA.

4.Thriving with the fundamentals
We need to build upon the fundamentals of space education depending upon our interests and start pursuing that sub field with an objective based approach of the broader area of space science.
-Dr Praveen Saini, Sr. Principal Scientist and Professor, CSIR-NPL.

5.Integrating Science and Technology
Science and technology is an integrated term. Without technology, science is lame and without science, technology is blind. Furthermore, Astronomy is an embedded part of space science, without which it cannot be coordinated.
- Mr. Pradip Chakraborty, Sr. Engineering Associate, Aryabhatta Research Institute of Observational Sciences.

Audience Engagement:

With over 1,700 live attendees and thousands more viewing the recorded session, audience participation was robust. Questions ranged from the feasibility of Mars colonization to career pathways in space science.
Interactive polls, live Q&A, and social media engagement with the hashtag #SpaceIndiaPanel2025 kept the energy high and the conversation flowing across digital platforms.

Thoughtful Takeaways:

As National Space Day reminds us each year, space is more than a destination- it's a shared Indian dream. This panel discussion underscored that the journey ahead must be inclusive, innovative, and inspiring. Whether you're a student, scientist, policymaker, or simply a stargazer, your voice matters in shaping the future of Indian space.

Let's continue the curiosity and conversations- because space is for everyone and it is the time for India to lead the space sciences.

THE COSMIC MIND FORUM: INSPIRING YOUNG MINDS THROUGH ASTRONOMY

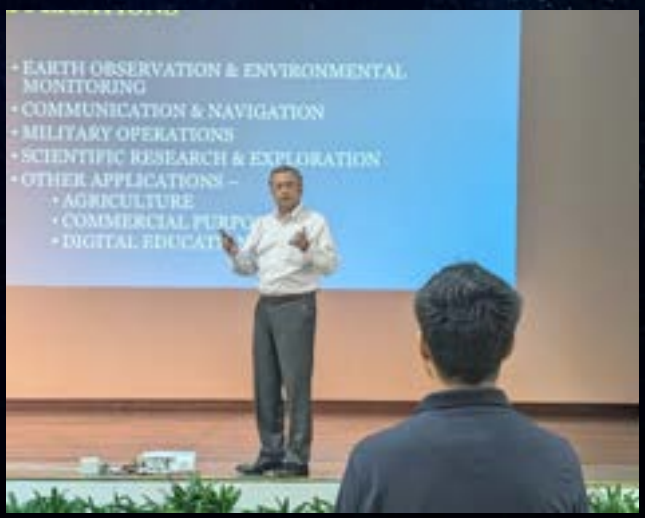
On August 5, 2025, Matri Hall buzzed with curiosity and excitement as MatriKiran High School hosted The Cosmic Mind Forum, an enriching event designed for students from grades 6 to 12. The forum, managed by astronomy educator Mr. Deepak Kumar along with a team of facilitators, brought together young learners to explore the wonders of space and science.

The highlight of the day was a captivating session by the distinguished guest speaker, Dr. Sujit Banerjee, Consultant for International Science Diplomacy and former Senior Director (Scientist) at the Department of Science and Technology, Government of India. Dr. Banerjee was warmly welcomed and felicitated before he took the stage to inspire students with his words.

The event featured an impressive astronomy display, including a model of Chandrayaan-3, a replica of the historic Shiv Shakti point, a 200mm Dobsonian telescope, and a detailed Jantar Mantar model. These exhibits brought India's scientific achievements and astronomical heritage to life.

In his session, Dr. Banerjee focused on two themes: Careers in Space and STEM and Space Science for a Better Earth. He encouraged students to pursue opportunities in space research and technology, while also highlighting how space science can help solve global issues such as climate change and disaster management. His interactive approach kept students engaged, addressing their questions with patience and depth.

The forum concluded with Principal Ms. Jyoti Guha presenting a certificate and token of gratitude to Dr. Banerjee, marking the end of an inspiring day filled with knowledge, curiosity, and applause.



NATIONAL SPACE DAY 2025: INDIA'S YOUNG MINDS SHOOT FOR THE STARS

From Delhi's cultural heart to Chennai's classrooms and Nagpur's buzzing science hub, National Space Day 2025 didn't just mark a date – it sparked a movement. Organized by SPACE India with partners across the country, this year's celebrations carried the bold theme "Viksit Bharat Leading to a New Space Race." And young India responded with energy that was nothing short of cosmic.

In Delhi, the Russian Centre of Science and Culture transformed into a launchpad for ideas. Scientists, diplomats, and students shared the stage, proving space exploration isn't just about rockets – it's about curiosity, collaboration, and courage.

In Chennai, SPACE India and Heartfulness International School turned a poster-making contest into a patriotic art revolution, where vibrant colours sketched India's role as a global space leader. And in Nagpur, Raman Science Centre buzzed with activity as students presented bold space concepts while younger kids launched stomp rockets sky-high, turning Newton's Laws into pure adrenaline.

Everywhere, the creativity was electric. Posters imagined futuristic moon bases, interplanetary missions, and eco-conscious satellites. Judges didn't simply evaluate – they probed, challenged, and applauded students who defended their ideas with clarity and confidence. Breaks felt like intermissions between galaxies, alive with debates, selfies with scientists, and a shared excitement that space is India's next big frontier.

The celebrations were more than competitions – they were incubators for future leaders. Students spoke of discovering their voice. Teachers saw curiosity ignite like never before. Even parents left inspired, hearing their children talk about building rockets and exploring Mars.

National Space Day 2025 wasn't just about remembering Chandrayaan-3's triumph. It was a call to dream bigger. Across Delhi, Chennai, and Nagpur, young India didn't just look at the stars – they reached for them. And if this is the next generation of scientists, artists, and explorers, one thing is certain: India's space story is only getting started – and the countdown has already begun.

KR MANGALAM WORLD SCHOOL, GURUGRAM COSMIC MIND FORUM

The Cosmic Mind Forum, an enriching event for students in grades VI, took place at Auditorium Hall on August 20, 2025. The forum's proceedings were managed by Mr. Shubham Maheshwari, an astronomy educator and a team of facilitators from KR Mangalam World School.

The highlight of the event was a captivating session led by the esteemed guest speaker, Dr. Ugur Guven, who serves as an Advisory Council Member of the United Nations Center for Space Science and Space Technology Education in Asian-Pacific Region (UN CSSTEAP), Actively involved in NASA LEAG meetings and Lunar Workshops and HOD of G.D. Goenka Aerospace department.

The forum commenced with a warm welcome and Tilak Ceremony of Dr. Guven. This was followed by the lamp lighting and the welcome note by the Coordinator of Middle wing, Mrs. Yachna Arora. Dr. Guven's session was both informative and inspiring, focusing on two key areas. He spoke on "Adity L1 and the future expect of space sciences," providing valuable insights into how students can pursue exciting careers in astronomy, space science, and technology.

Additionally, he covered the vital role of space technology in addressing global challenges such as climate change and disaster management. Throughout his interactive session, Dr. Guven actively engaged with the students, fielding their questions and ensuring their doubts were thoroughly addressed.

The event concluded with a formal gesture of appreciation from the school. Coordinator Mrs. Yachna Arora presented Dr. Guven with a certificate and a token of gratitude, a handmade painting by students and a planter. The session ended with a huge round of applause from the attendees, celebrating a day of learning and inspiration.

HIGHLIGHTS OF AUGUST 2025

Artemis 2 Crew Practices Moon Mission Together

NASA's Artemis 2 astronauts have taken a major step toward their historic journey around the moon. On July 31, 2025, the crew suited up in their launch and entry suits and entered the Orion spacecraft together for the first time at NASA's Kennedy Space Center in Florida.

The crew, Reid Wiseman (commander), Victor Glover (pilot), Christina Koch (mission specialist), and Canadian astronaut Jeremy Hansen, will launch no earlier than April 2026 for a 10-day lunar flyby, marking the first crewed mission beyond low-Earth orbit since Apollo 17 in 1972.

The event, known as a suited crew test, gave the astronauts firsthand experience of Orion's powered systems and procedures. Once inside the capsule, they connected to life support and communications, while engineers simulated ground and flight conditions, including emergency scenarios such as leaks or system malfunctions.

Beyond the simulations, the astronauts rehearsed in-flight activities, including stowing equipment, sleep arrangements, and use of Orion's hygiene bay. The exercise was designed to ensure the crew is prepared for every aspect of their mission.

Artemis 2 follows the success of Artemis 1 in 2022, which saw Orion complete a 25.5-day uncrewed lunar mission. With that achievement setting high expectations, the crew remains focused on vigilance and readiness as they prepare to extend human spaceflight deeper into the solar system.

Mars in August – A Month of Geological Marvels

August 2025 brought compelling insights into Mars's past and present through feats of exploration. In Gale Crater, Curiosity marked its 13th year with energy-saving enhancements while uncovering a rock that looks astonishingly like coral. Simultaneously, planetary scientists continue to probe unexplained mineral layers, and Perseverance captured a surreal panorama, giving Mars an artificially blue sky. Each discovery deepens our grasp of the Red Planet's watery history and geological complexity.

Curiosity's Coral-Like Find on Its 13th Martian Anniversary

After nearly 13 years on Mars, NASA's Curiosity rover has not slowed down. Instead, engineers enhanced its autonomy and multitasking capabilities, optimizing its radioisotope power unit for more efficient science operations, reducing idle time and increasing productivity on the Martian surface.

NASA's Curiosity viewed this coral-shaped rock on July 24, 2025.
(Image credit: NASA/JPL-Caltech/MSSS)

On July 24, Curiosity snapped an intriguing image of a wind-eroded rock just an inch wide that strikingly resembles coral. Scientists believe it formed billions of years ago when mineral-rich water seeped into fractures in the rock. Over time, wind erosion exposed the branching mineral structures, offering a striking token of Mars's hydrated past.

Unseen Mineral Layers: A Martian Mystery

Mars keeps surprising us with its chemistry. Recent studies highlight unusual iron sulfate layers that might represent an entirely new mineral type. Led by Janice Bishop at NASA Ames, researchers believe these layers challenge our understanding of Mars's mineral diversity and the chemical processes that shaped its terrain.

A close up image of the surface of Mars.
(Image credit: NASA/JPL-Caltech)

These findings have broader implications: discovering a previously unknown mineral could shed new light on Mars's geologic evolution and past environmental conditions, critical clues for understanding whether the planet could once have supported life.

Perseverance's Blue-Sky Panorama

While much of Mars' story is told through its red, dusty landscapes, NASA's Perseverance rover recently offered a breathtakingly different perspective. Using advanced imaging techniques, engineers simulated what Mars might look like under an Earth-like blue sky. The result is surreal: the familiar terrain of Jezero Crater, scattered with rocks and sand dunes, bathed in soft shades of blue instead of rusty reds.

This exercise isn't just for artistic curiosity, it provides a deeper way to connect with Mars. By visualizing the Red Planet under familiar conditions, scientists and the public alike gain a stronger sense of place, imagining what it might feel like to stand on Mars during a future human mission. The re-colored sky also highlights details in the terrain that are sometimes masked under Mars' naturally dusty, reddish atmosphere. It's a reminder that while Mars feels distant, it may one day be a place where humans look up at the sky and feel at home.

Two versions of Perseverance rover's 96-image panorama of the "Falbreen" region on Mars taken on May 26, 2025. At top, a natural-color version of the mosaic; on bottom, an enhanced-color version.
(Image credit: NASA/JPL-Caltech/ASU/MSSS)

Looking Ahead

August 2025 has shown us that Mars is as captivating as ever. Curiosity's remarkable longevity demonstrates the resilience of our robotic explorers. The hint of an undiscovered mineral keeps scientists on the edge of new breakthroughs. And Perseverance's simulated blue skies allow us to dream of a future where Mars doesn't just belong to our telescopes and rovers, but to human footsteps as well.

Mars continues to tell its story in fragments, through ridges, rocks, and skies, and each fragment brings us closer to understanding one of the most intriguing worlds in our solar system. With every new discovery, our vision of Mars becomes sharper, richer, and more human. The Red Planet reminds us that exploration is not just about reaching new places, but about expanding our imagination of what's possible.

GEOPHYSICISTS WARN OF ONGOING SEISMIC RISKS ON THE MOON

Apollo 17 astronaut Harrison H. Schmitt examines a boulder at Station 6, base of North Massif in Taurus-Littrow valley. The boulder was displaced by a strong moonquake about 19 million years ago – evidence supporting recent study findings that the Lee-Lincoln fault remains seismically active. (Image credit: NASA/JSC/ASU)

As nations prepare for a new era of lunar exploration, scientists warn that "moonquakes" may present hidden risks to future bases and landers.

A study published on July 30 in Science Advances analyzed the Apollo 17 landing site in Taurus-Littrow valley to understand how seismic activity has shaped the lunar surface. Researchers found evidence that underground faults, such as the Lee-Lincoln scarp, have produced repeated moonquakes over tens of millions of years. These faults may still be active, raising concerns for future infrastructure.

While the daily odds of a damaging quake near an active fault are just 1 in 20 million, the risk accumulates over time. For a decade-long lunar mission, scientists estimate the probability at roughly 1 in 5,500. "It's similar to going from lottery odds to being dealt a four of a kind poker hand," said Nicholas Schmerr, a geophysicist at the University of Maryland.

The concern is especially relevant as NASA's Artemis program seeks to establish a long-term human presence on the Moon. Unlike Apollo spacecraft, new vehicles such as the Starship Human Landing System may be more sensitive to seismic shaking.

Lacking a dense network of seismometers, scientists studied boulder trails and landslides around Taurus-Littrow, linking their patterns to seismic activity. Modeling a magnitude 3.0 moonquake showed shaking strong enough to dislodge rocks and destabilize slopes.

The takeaway, researchers stress, is clear: avoid building near active scarps. Careful site selection could mean the difference between safety and structural risk in humanity's return to the Moon.

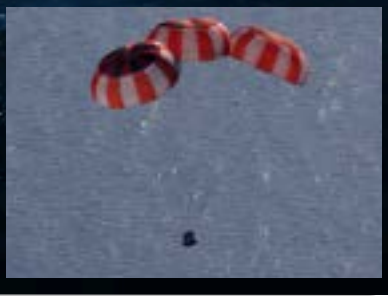
ISRO CONDUCTS FIRST AIR DROP TEST FOR GAGANYAAN

On August 24, 2025, the Indian Space Research Organisation (ISRO) achieved a major milestone in its ambitious Gaganyaan human spaceflight programme by successfully conducting the first Integrated Air Drop Test (IADT-01) at the Satish Dhawan Space Centre (SDSC), Sriharikota. The test validated the end-to-end performance of the parachute-based deceleration system, a critical component designed to ensure the safe splashdown of the Crew Module (CM).

The demonstration involved a simulated Crew Module weighing about 4.8 tonnes, which was released from an altitude of nearly 3 km using an Indian Air Force Chinook heavy-lift helicopter. Upon release, the onboard avionics commanded the initiation of the deceleration sequence. The process began with the firing of Apex Cover Separation (ACS) mortars, deploying ACS parachutes to safely jettison the module's apex cover. This was followed by the deployment of drogue parachutes that provided the first stage of deceleration. Subsequently, pilot parachutes were fired to extract and deploy the main parachutes, each 25 metres in diameter. Together, the ten parachutes deployed in precise sequence, reducing the module's terminal velocity to about 8 m/s, ensuring a safe touchdown scenario.

The test simulated a possible launch pad abort situation, validating not only the parachute deployment system but also the performance of onboard avionics, telemetry, and data recording systems. After splashdown, the simulated module was efficiently recovered by INS Anvesha and transported to Chennai port.

The achievement was the result of extensive pre-test modeling, dummy trials, and coordination among multiple national agencies. Alongside ISRO, the Indian Air Force, DRDO, Indian Navy, and Indian Coast Guard played vital roles. With IADT-01 completed, ISRO has taken a significant step forward in ensuring crew safety. More tests under varied conditions are planned in the coming months as India steadily advances toward its first human spaceflight.



NASA'S WEBB DISCOVERS A NEW MOON AROUND URANUS

NASA announced on August 19, 2025, that the James Webb Space Telescope (JWST) had uncovered a new, previously unknown moon orbiting Uranus. Provisionally designated S/2025 U1, the discovery was made by a team from the Southwest Research Institute (SwRI) using Webb's powerful Near-Infrared Camera (NIRCam). This brings the planet's known moon tally to 29.

The initial detection occurred on February 2, 2025, when Webb captured a series of 10 long-exposure images. Measuring only about 10 kilometers (6 miles) in diameter, S/2025 U1 is remarkably small—so faint that even NASA's Voyager 2 spacecraft missed it during its historic 1986 flyby.

The moon orbits Uranus' equatorial plane at a distance of 35,000 miles (56,000 kilometers) from the planet's center, nestled between the inner moons Ophelia and Bianca. Its nearly circular orbit suggests it may have formed close to its present position. Once officially approved by the International Astronomical Union (IAU), the moon will join Uranus' family of satellites, all named after characters from Shakespeare and Alexander Pope.

"This object is small, but its discovery is significant," said Maryame El Moutamid of SwRI. "No other planet has as many small inner moons as Uranus, and their complex relationships with the rings hint at a chaotic history."

The finding underscores the importance of JWST, whose unprecedented infrared sensitivity allows scientists to detect faint, distant objects invisible to earlier missions. Nearly four decades after Voyager 2 revealed Uranus' mysterious world, Webb continues to push the frontier—reminding us that even the solar system's outer planets still hold secrets.

Astronomers using NASA's James Webb Space Telescope discovered a new moon orbiting Uranus in images taken by Webb's NIRCam (Near-Infrared Camera). This image shows the moon, designated S/2025 U1, as well as 13 of the 28 other known moons orbiting the planet. (The small moon Cordelia orbits just inside the outermost ring, but is not visible in these views due to glare from the rings.) Due to the drastic differences in brightness levels, the image is a composite of three different treatments of the data, allowing the viewer to see details in the planetary atmosphere, the surrounding rings, and the orbiting moons. The data was taken with NIRCam's wide band F150W2 filter that transmits infrared wavelengths from about 1.0 to 2.4 microns. NASA, ESA, CSA, STScI, M. El Moutamid (SwRI), M. Hedman (University of Idaho)

WHAT'S UP IN THE SKY - SEPTEMBER 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
Near Regulus in morning sky, lost from 3 Sept onwards. Solar conjunction on 13 Sept.

Venus
Rising 3 hours before the Sun on 1 Sept. Daylight lunar occultation on 19th Sept.

Mars
Evening planet, poorly located in the sky, not visible this month.

Jupiter
Improving morning planet reaching 51° altitude on 30 Sept. Near Wasat 6 & 7 Sept.

Saturn
Well presented this month, opposition on 21 Sept with a peak altitude around 34°.

Uranus
Improving morning planet, reaching peak altitude of 57° in darkness from 22 Sept on.

Neptune
Cold planet, near Saturn, reaching opposition on 23 Sept.

BRIGHT DEEP SKY OBJECTS

Pyramid Cluster also known as M39 is located in Cygnus constellation with an apparent magnitude of 4.6 in Northern Hemisphere. It is visible to naked eye under dark sky and is excellent binocular target. There are 15 bright stars in the cluster.

Andromeda galaxy also known as NGC 224 or M31 is located in Andromeda constellation with apparent magnitude of 3.4 and is best observed from Northern Hemisphere. To the naked eye, M24 will only appear as a faint patch of light.

NGC 7000 or Caldwell 20 is located in Cygnus constellation and is best observed from Northern Hemisphere. It has an apparent magnitude of 4.0. It is 2590 light years away and it resembles the outline of North American continent.

IC 5070 also known as Pelican Nebula is best observed from Northern Hemisphere. It has an apparent magnitude of 5.9. The object is easily distinguishable with binoculars. It is located 1,800 light years away from Earth. We can use a small telescope for detailed view.

EYES IN SPACE – AUGUST 2025

Closest Sun-Like Neighbor May Host a Hidden Giant Planet, Webb Reveals

Artist's concept depicts a gas giant planet that NASA's Webb telescope found around Alpha Centauri A.

Astronomers using NASA's James Webb Space Telescope have reported strong evidence of a giant planet orbiting Alpha Centauri A, part of the triple star system just 4 light-years away–the closest stellar system to our Sun. While Proxima Centauri already hosts confirmed planets, detecting worlds around Alpha Centauri A and B has long been difficult.

Webb's Mid-Infrared Instrument (MIRI), using a coronagraphic mask to block starlight, revealed a faint object about two Earth-Sun distances from Alpha Centauri A. Simulations suggest it may be a Saturn-like gas giant in an elliptical orbit, though follow-up observations in 2025 did not detect it, likely because of orbital position. If confirmed, this would be the closest directly imaged planet around a Sun-like star and a landmark discovery for exoplanet science. Though not habitable, such a planet could provide unprecedented insights into planetary formation and survival in complex multi-star systems.

TRAPPIST-1 d: Webb Telescope Rules Out an Earth-Like Atmosphere

This artist's concept shows the volatile red dwarf star TRAPPIST-1 and its four most closely orbiting planets.

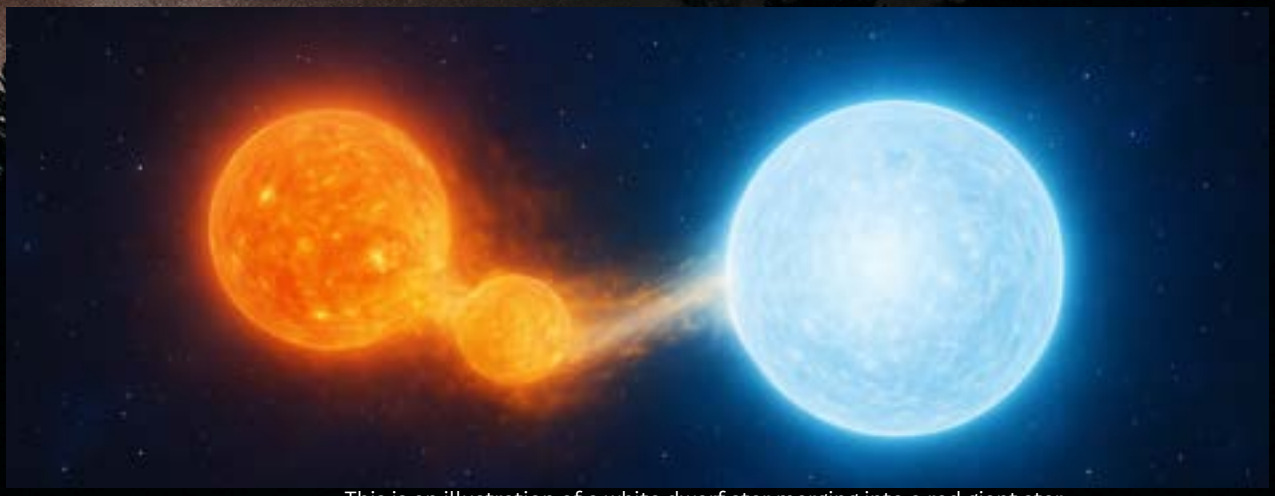
The exoplanet TRAPPIST-1 d, once considered a candidate for habitability due to its Earth-like size and position in the star's temperate zone, has been found to lack an Earth-like atmosphere, according to NASA's James Webb Space Telescope. Located 40 light-years away, the TRAPPIST-1 system hosts seven rocky planets orbiting a red dwarf star. Webb's NIRSpec instrument detected no signs of water, carbon dioxide, or methane on TRAPPIST-1 d, suggesting it may have only a thin Mars-like atmosphere, thick Venus-like clouds, or none at all. The star's frequent flares may strip away atmospheres, posing challenges for life. However, astronomers remain hopeful that the system's outer planets might retain atmospheres, offering crucial insights into which worlds could sustain water–and possibly life–around red dwarfs.

The Ghostly Spiral: NGC 45's Low Surface Brightness Mystery

This NASA/ESA Hubble Space Telescope image highlights the delicate spiral arms of NGC 45, a galaxy 22 million light-years away in Cetus. The portrait combines two observing programs: one surveyed 50 nearby galaxies in ultraviolet to near-infrared light to study star formation, while the other focused on H-alpha light, a key tracer of star-forming nebulae, seen here as bright pink-red patches. NGC 45 is especially intriguing because it belongs to the class of low surface brightness galaxies, which appear unusually faint due to having relatively few stars compared to their gas and dark matter content. Though difficult to detect, such galaxies may represent 30–60% of all galaxies. Studying them with Hubble helps astronomers better understand galaxy formation and evolution.

Spiral galaxy NGC 45.in constellation Cetus

When Stars Collide: The Ultra-Massive White Dwarf Discovery



This is an illustration of a white dwarf star merging into a red giant star

An international team using NASA's Hubble Space Telescope discovered an ultra-massive white dwarf, WD 0525+526, formed from the merger of two stars rather than a single star's evolution. Located 128 light-years away, it is 1.2 times the Sun's mass and unusually hot at 21,000 K. In visible light, it appeared typical, but Hubble's ultraviolet spectrum revealed carbon in its atmosphere–a sign of a violent merger that stripped away most hydrogen and helium. This discovery highlights that many seemingly normal white dwarfs may have merger origins, previously undetectable without UV observations. WD 0525+526 has the lowest atmospheric carbon among known merger remnants, illustrating Hubble's unique ability to study such extreme stars and helping astronomers explore the frequency and outcomes of stellar collisions.

Sources- https://science.nasa.gov/missions/hubble/nasas-hubble-uncovers-rare-white-dwarf-merger-remnant/

Tour de Universe

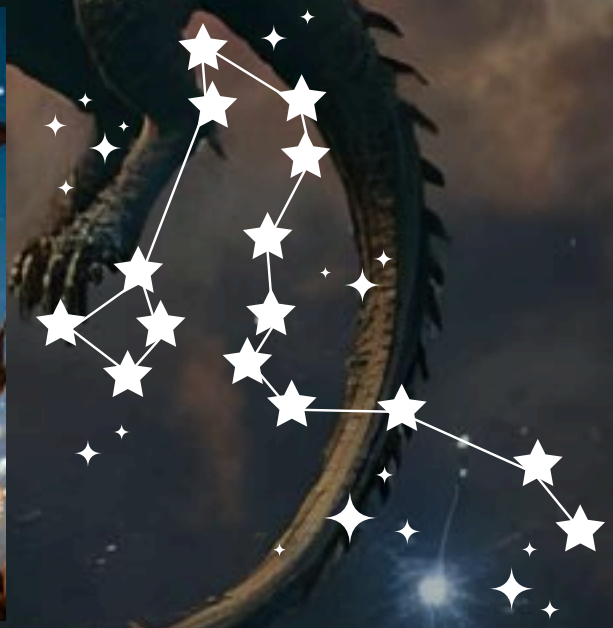
Draco Constellation: The Dragon of the Night Sky

Position in the Sky

Draco occupies a prominent location in the northern celestial hemisphere. It weaves its way between the two bear constellations, Ursa Major (the Great Bear) and Ursa Minor (the Little Bear). The dragon's "tail" begins near the handle of the Big Dipper and coils around the Little Dipper, eventually ending with its "head" near Hercules and Lyra. Unlike many constellations, Draco does not have particularly bright stars—its brightest star, Eltanin (Gamma Draconis), shines at magnitude
2.2. Yet its serpentine path across the northern sky makes it easy to trace once identified. Because Draco circles the north celestial pole, it is visible year-round from most northern latitudes. For stargazers in mid-northern regions, Draco is best observed during summer evenings, when it lies high overhead.

Myths and Legends

Draco's association with dragons dates back to ancient cultures. In Greek mythology, Draco is often identified with the dragon Ladon, who guarded the golden apples in the Garden of the Hesperides. According to the legend, Hercules, in one of his twelve labors, was tasked with stealing these precious apples. To accomplish this, he had to defeat Ladon, the ever-vigilant, many-headed dragon. Once slain, the dragon was placed among the stars by the goddess Hera, immortalized as the constellation Draco. Another Greek interpretation connects Draco to the Gigantomachy, the great battle between the Olympian gods and the giants. In this version, the dragon represents a giant hurled into the sky by Athena. In Roman times, Draco was also linked to dragons and serpents, while in Norse mythology, some scholars associate it with the dragon Níðhöggr, who gnawed at the roots of the World Tree, Yggdrasil. For many ancient peoples, dragons symbolized chaos, guardianship, and hidden treasures—fitting for a constellation that conceals many deep-sky objects.



Exploring The Constellation


NGC 6053


NGC 4236

Deep-Sky Objects in Draco

Despite lacking very bright stars, Draco hosts a rich collection of deep-sky treasures:

- NGC 6543 (Cat's Eye Nebula): One of the most famous planetary nebulae, located about 3,300 light-years away. Through telescopes, it reveals intricate structures resembling layered shells, a striking view of a dying star's final stages.

- NGC 5866 (Spindle Galaxy): Often identified with Messier 102, this edge-on spiral galaxy presents a thin, elegant profile.

- NGC 5985, NGC 5982, and NGC 5981 (The Draco Trio): A spectacular grouping of three galaxies, showing spiral, elliptical, and edge-on disk types side by side.

- Abell 2218: A massive galaxy cluster in Draco, located over 2 billion light-years away.

It has been extensively studied by the Hubble Space Telescope, particularly for the way its gravity bends light from even more distant galaxies a phenomenon called gravitational lensing.

Significance for Astronomy

Draco's importance extends beyond mythology. Its stars record the slow shift of Earth's axis across millennia, as demonstrated by Thuban's role as the ancient pole star. Its deep-sky objects, from planetary nebulae to galaxy clusters, provide astronomers with opportunities to study both stellar evolution and the large-scale structure of the universe.

Conclusion

Draco may not dazzle the casual skywatcher with brilliance, but it is a constellation rich in history, science, and wonder. Coiling around the north celestial pole like a guardian of the sky, it carries with it ancient myths of dragons, tales of cosmic treasures, and celestial objects that continue to inspire astronomers. Whether one is gazing at its faint stars or exploring its hidden galaxies through a telescope, Draco reminds us of the enduring connection between mythology and the cosmos.


Tadpole Galaxy


Spindle galaxy

Rocket launches in SEPTEMBER 2025

IMAP

Scheduled for launch in September 2025, SpaceX's Falcon 9 will deploy NASA's IMAP (Interstellar Mapping and Acceleration Probe) to the Sun Earth L1 point. This mission will study the heliosphere's boundary and particle acceleration mechanisms using advanced cosmic ray detectors. Secondary payloads include the GLIDE heliophysics mission and SWRI's TWINS. IMAP's data will enhance space weather forecasting and deepen understanding of solar interstellar interactions. The launch highlights NASA's use of commercial partners for high priority science missions.

SpaceX Falcon 9 rocket
(Credit: SpaceX.com)

SpaceX Falcon 9 rocket
(Credit: SpaceX.com)

NAOS

Scheduled for September 2025, SpaceX's Falcon 9 will launch the Nanosatellite for Earth Observation and Ocean Monitoring (NAOS) from Cape Canaveral. This advanced microsatellite will monitor oceans, track pollution, and study climate impacts using high resolution multispectral sensors. Its real time data will aid researchers addressing algal blooms, oil spills, and coastal erosion. NAOS exemplifies the critical role of small satellites in enhancing global sustainability efforts by providing cost effective, frequent Earth observation to support marine conservation and climate resilience strategies.

EscaPADE

Scheduled for launch in September 2025, Blue Origin's New Glenn rocket will deploy the Escape and Plasma Acceleration and Dynamics Explorers (EscaPADE) mission to Mars from Cape Canaveral. This NASA funded mission features two identical spacecraft designed to study how solar wind strips the Martian atmosphere. By analyzing magnetic fields and ionized particles, EscaPADE will provide critical data on planetary evolution and atmospheric loss. The mission underscores the growing role of commercial rockets in deep space exploration, advancing our understanding of Mars's history and potential habitability.

Blue Origins New Glenn rocket
(Credit: Totaltele.com)

Maiden Flight

Scheduled for launch in September 2025, RFA's RFA One rocket will undertake its Maiden Flight from SaxaVord Spaceport, Scotland. This inaugural mission is designed to validate the performance and reliability of Europe's first commercially developed small satellite launch vehicle.The flight will demonstrate key systems, including the rocket's kerolox powered first stage and payload deployment mechanism, while carrying several test and customer payloads to orbit. Success will position RFA as a competitive player in the small launch market, offering dedicated access to space for European satellites.

RFA's RFA One Rocket
(Credit: Spacewatch.global)

Obzor-R No.1

Russia's Soyuz-2.1b
(Credit: Bill Ingalls.)

Scheduled for September 2025, Russia's Soyuz-2.1b will launch the Obzor-R No.1 Earth observation satellite from Vostochny Cosmodrome. This advanced satellite features synthetic aperture radar (SAR) and optical sensors for all weather, high resolution monitoring of land use, disasters, and industrial activity. It will support agriculture, forestry, and emergency response with 1m optical and 5m SAR resolution imagery. As the first satellite in its constellation, Obzor-R enhances Russia's remote sensing capabilities and contributes to global environmental monitoring efforts, underscoring its commitment to civil and strategic Earth observation.

ViaSat-3 EMEA

Scheduled for September 2025, United Launch Alliance's Atlas V will deploy the ViaSat-3 EMEA satellite from Cape Canaveral. This advanced communications satellite will deliver terabit class broadband across Europe, the Middle East, and Africa. Featuring a software defined payload and massive reflector, it aims to provide high speed internet to remote and underserved regions, supporting residential, mobility, and government users. As the final Atlas V mission, it marks the end of an era while enabling global connectivity and digital inclusion.

Atlas V Rocket
(Credit: Craig Bailey)

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

Happy Birthday

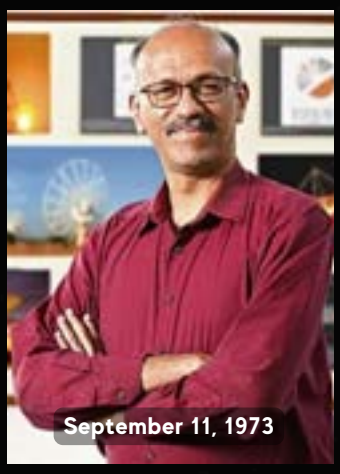

September 7, 1914

James Van Allen

James Van Allen (September 7, 1914 – August 9, 2006) was a pioneering American physicist and space scientist, renowned for discovering the Van Allen radiation belts that encircle Earth. His groundbreaking instruments aboard Explorer 1 in 1958 provided the first direct evidence of Earth's trapped radiation zones which shaped numerous space missions and expanded our knowledge of the magnetosphere. His remarkable legacy continues to inspire scientists and students worldwide in the ongoing quest to explore space. (Credit: Wikipedia)

Nissim Kanekar

Nissim Kanekar (born September 11, 1973) is an Indian astrophysicist known for his pioneering research in radio astronomy and cosmology. He uses radio telescopes to study distant galaxies, cosmic gas and the evolution of fundamental constants in the universe. His groundbreaking work has provided vital insights into the nature of dark energy and galaxy formation. He continues to inspire young researchers and contribute significantly to astrophysics worldwide. (Credit: Banner Images - Dorje Angchuk)


September 11, 1973


September 15, 1938

James W. Christy

James W. Christy (born September 15, 1938) was an American astronomer best known for discovering Pluto's largest moon, Charon, in 1978 while working at the U.S. Naval Observatory. His keen observation of an unusual bulge in photographic plates of Pluto led to this groundbreaking find, doubling our understanding of the Pluto system. His discovery reshaped planetary science and helped confirm Pluto as part of a binary system. His work remains a cornerstone in the study of distant worlds in our solar system. (Credit: Wikimedia Commons)

Happy Birthday

September 17, 1857

K. Tsiolkovsky

Konstantin Tsiolkovsky (September 17, 1857 – September 19, 1935), the "Father of Astronautics," was a Russian scientist who laid the groundwork for modern space exploration. He pioneered concepts such as liquid-fueled rockets, multistage designs, and the famous "rocket equation." He firmly believed humanity's future lay in space, inspiring generations of scientists and engineers. His once-dreamlike ideas became the basis of real space programs, making him one of the most influential figures in astronautics history. (Credit: Tsiolkovsky.org)

Sunita Williams

Sunita Williams (born September 19, 1965) is an American astronaut of Indian-Slovenian origin, renowned for her long-duration spaceflights. A U.S. Navy officer and test pilot, she joined NASA in 1998. She spent over 300 days in space aboard the International Space Station, performing spacewalks that set records for women. She conducted scientific experiments, supported ISS construction, and inspired millions with her dedication and remains a symbol of perseverance, exploration, and global pride in human space achievements. (Credits: NASA)

September 19, 1965

September 25, 1920

Satish Dhawan

Satish Dhawan (25 September 1920 – 3 January 2002) was a pioneering Indian aerospace engineer and a visionary leader, widely regarded as the architect of India's modern space program. Serving as Chairman of ISRO from 1972 to 1984, he guided the development of India's first satellites and launch vehicles, making the nation self-reliant in space technology. He strongly emphasized research, innovation in space science for national development. His leadership laid the foundation for ISRO's remarkable global achievements. (Credit: Wikipedia)

Astronomical Perception

NEUTRON STARS AND PULSARS HEARTBEATS OF THE COSMOS

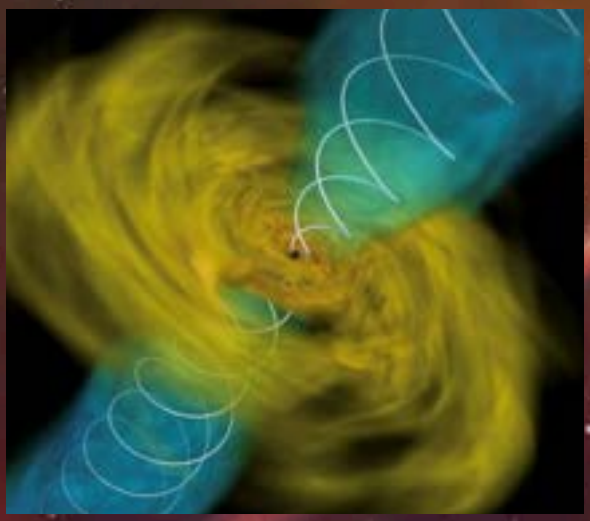
The Signals That Shouldn't Exist:

It was the summer of 1967 at the Mullard Radio Astronomy Observatory (MRAO) in Cambridge, England. A massive new radio telescope built, designed to study the flickering of distant quasars. Graduate student Jocelyn Bell Burnell, was given the task of analyzing chart recordings produced by the Telescope. For months, she combed through hundreds of feet of paper every day, distinguishing genuine cosmic signals from earthly interference.

Then, one day, she spotted a sharp, regular pulse repeating every 1.3 seconds. Unlike quasars, which flickered irregularly, this was precise. At first, she suspected its as an interference perhaps a stray signal from Earth, But the pulses returned, steady and unyielding they nicknamed it (LGM-1) Little Green Men.

From Anomaly to Discovery:

Bell Burnell's noticed that the pulses came from a particular region of sky, rising and setting with the stars. This ruled out any Earth based interference. Soon, more pulsating sources were found. In February 1968, Hewish, Bell Burnell, and their colleagues published the discovery what we now call pulsars. This discovery was revolutionary and provided the first direct evidence for neutron stars, which had been theorized in the 1930s by Baade and Zwicky after the first studies of supernovae. For three decades, neutron stars had been an elegant but unproven idea. Now, thanks to a young student's sharp eyes and a wire strewn radio telescope in Cambridge, the theory had finally been confirmed.



Simulated Image of two neutron stars colliding.
(Credit: A. Tchekhovskoy, R. Fernandez, D. Kasen)

Pulsar radiating beams in deep space.
(Credit: Nazarii Neshcherenskyi)

How Pulsars Changed Science:

After the discovery, observatories around the world tuned their radio telescopes to hunt for more pulsars. The Arecibo Observatory in Puerto Rico, the world's largest single dish telescope at the time, detected dozens revealing just how diverse their signals could be. Some pulsed every second, while others rotated hundreds of times per second millisecond pulsars. By the mid 1970s, the discovery of binary pulsar provided confirmation of Einstein's general relativity, showing that two pulsars orbiting each other radiated energy in the form of gravitational waves.

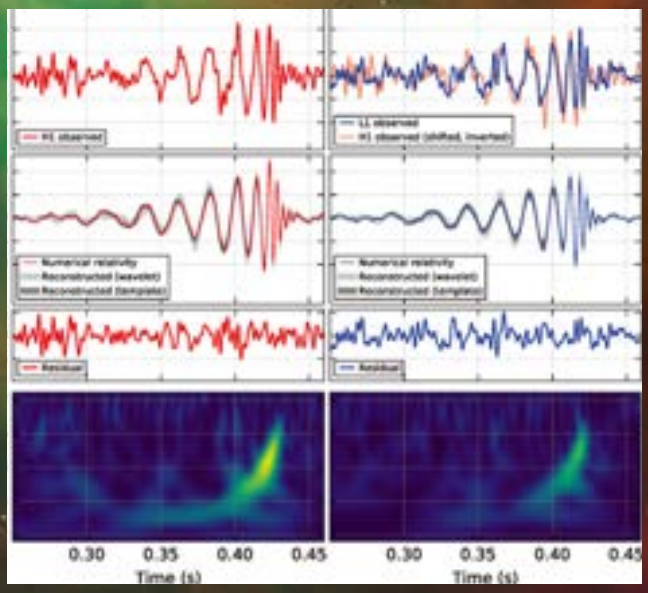
Since then, pulsars have been studied not only in radio wavelengths but also in X-rays and gamma rays, thanks to space telescopes like NASA's Chandra X-ray and Fermi Gamma ray space Telescopes. Each observation has revealed their superfluid interiors, their monstrous magnetic fields with matter at the edge of known physics.

Pulsars as Cosmic Clocks and Rulers:

Today pulsars are more than astronomical curiosities they are among the most precise natural clocks in the universe. Their radio pulses arrive with such regularity surpassing the accuracy of atomic clocks on Earth. By carefully timing these signals, astronomers can measure the tiniest shifts in a pulsar's motion, detect distortions in spacetime, and even test the predictions of general relativity. When observed from multiple telescopes, differences in pulse arrival times allow us to calculate distances with remarkable precision, effectively turning pulsars into a galactic positioning system. In this way, they have become indispensable tools for mapping the cosmos and keeping time on a universal scale.

Conclusion:

Pulsars remind us that even in death, stars can guide and illuminate. They are lighthouses of the cosmos, keeping time with unfaltering precision.



LIGO measurement of gravitational waves on 11 February 2016. (Credit: B. P. Abbott et al)

Illustration showing the NANOGrav project observing pulsars. (Credit:T. Klein)

Role Of AI in Space

AI: The Future of Space Farming and Life Support

As humanity prepares for long duration missions to the Moon, Mars, and beyond, sustaining life in space becomes a major challenge. Carrying all food, water and oxygen is impractical for long duration missions. Instead, astronauts must rely on growing food and recycling vital resources in space. Here, Artificial Intelligence (AI) plays a vital role.

AI in Space Farming

Farming in space requires complete control over the environment. Plants must grow under artificial light, with recycled water and limited nutrients. AI-powered systems use sensors and machine learning to monitor conditions such as temperature, humidity and carbon dioxide. They can automatically adjust lighting, nutrient delivery and irrigation to ensure healthy plant growth. AI also detects early signs of disease, predicts yields and helps optimize limited resources. This ensures astronauts can rely on fresh, nutritious crops during missions.

AI in Life Support Systems

Beyond food, astronauts need safe air and clean water. AI-driven life support systems manage closed-loop habitats where every drop of water and breath of oxygen must be recycled. Intelligent algorithms track air composition, predict resource use and instantly detect failures. Automated corrections prevent life threatening situations, while simulations help design robust, fault tolerant systems for future space colonies.

Companies and Research

NASA and the European Space Agency are leading experiments in AI-assisted hydroponics and greenhouses aboard the International Space Station. Companies like Bloomfield Robotics focus on crop monitoring, while Paragon Space Development Corporation develops advanced life support technologies. Researchers are also testing autonomous "farmbots" to manage crops in microgravity.

A Future Beyond Earth

AI for farming and life support is more than just space survival it can inspire sustainable practices on Earth. By learning to grow food and recycle resources in extreme environments, humanity not only prepares for interplanetary exploration but also for a greener, more sustainable future at home.

NASA's Biomass Production Chamber performing vertical farming. (Credit: NASA)

CSS Farms grows root crops using NASA-inspired hydroponic technology. (Credit: NASA)

ASTRONOMICAL EVENTS - SEPTEMBER 2025

SEPTEMBER EQUINOX

On September 22, 2025, Earth will experience the September equinox, a moment when day and night are nearly equal worldwide. This astronomical milestone marks the beginning of autumn in the Northern Hemisphere and spring in the Southern Hemisphere.

What is an Equinox?
The word equinox comes from the Latin aequus (equal) and nox (night). During an equinox, the Sun's apparent path crosses the celestial equator, resulting in nearly equal lengths of day and night for most locations on Earth.

Why It Happens
Earth's axis is tilted by about 23.5 degrees relative to its orbit around the Sun. Twice a year, in March and September, the tilt aligns so that the Sun is directly above the equator, creating the equinoxes.

Astronomical Significance
For astronomers, equinoxes serve as key reference points for measuring celestial coordinates. The September equinox is also known as the autumnal equinox in the north and vernal equinox in the south, signaling seasonal shifts in daylight, temperature, and weather patterns.

When and Where to See It
The exact moment of the September equinox in 2025 will occur at 12:20 UTC. While the event is not visually dramatic like an eclipse, observers may notice the Sun rising exactly in the east and setting exactly in the west, a rare alignment that happens only twice a year.

The September equinox is a quiet reminder of our planet's steady motion and balance. It's a perfect occasion to reflect on the interconnected cycles of nature and the harmony between Earth and sky.

SATURN AT OPPOSITION

Image Credit: Vito Technology, Inc.

On 21 September 2025, Saturn reaches opposition, placing it directly opposite the Sun in Earth's sky. This alignment means Saturn will be visible all night, rising at sunset, reaching its highest point around midnight, and setting at sunrise. For stargazers, this is one of the year's best opportunities to observe the ringed planet at its brightest.

What Opposition Means

Opposition occurs only for planets farther from the Sun than Earth (Mars, Jupiter, Saturn, Uranus, and Neptune). During this event, the planet is fully illuminated by the Sun and at or near its closest approach to Earth. For Saturn in 2025, this means a distance of about 8.55 astronomical units and a disk size of 19.4 arcseconds.

Viewing Saturn This Year

At opposition, Saturn will shine at magnitude 0.6 in the constellation Pisces, appearing as a bright yellowish "star" in the east after sunset. While the planet is easily visible to the naked eye, binoculars will not reveal its famous rings, you'll need a small telescope. This year, Saturn's rings will be tilted by only 2 degrees, appearing almost edge-on from Earth, making them nearly invisible to our view.

Best Time to Look

The exact moment of opposition occurs at 05:10 GMT (10:40 a.m. IST), but Saturn will be well-placed for viewing for several weeks around this date, remaining visible in the sky from 6:06 p.m. until 6:03 a.m. the next morning. Find a location with a clear eastern horizon and minimal light pollution to get the best view.

Why It's Worth Watching

Saturn's opposition offers an ideal viewing window for amateur and professional astronomers alike. The planet will be bright, large, and perfectly positioned for hours of observation, a night-long showcase of one of the most captivating worlds in the solar system.

NEPTUNE AT OPPOSITION

Image Credit: Vito Technology, Inc.

On 23rd September 2025, Neptune will reach opposition at 5:10 p.m. IST and it will be there in the night sky from 6:03 p.m. until 6:04 a.m. the following morning. Shining at magnitude 7.8, Neptune will not be visible to the naked eye but can be spotted through binoculars or a telescope. During this opposition, Neptune will appear as a tiny bluish disk located in the constellation Pisces, close to the faint stars that mark the region of the autumn sky.

How to Observe Neptune

To find Neptune, look toward the eastern sky after sunset in the opposite direction from the Sun. Unlike Jupiter or Saturn, Neptune is much fainter, so it requires at least strong binoculars or a small telescope for a clear view. Through modest telescopes, Neptune appears as a small, steady blue dot, distinct from twinkling stars. Stargazing apps can be particularly useful to pinpoint its exact position among the dim background stars.

Why This Opposition Matters

Opposition is always the most favorable time to view a planet, as it is fully illuminated by the Sun and remains in the sky throughout the night. For Neptune, this is especially valuable since it is the most distant planet in the Solar System. Around opposition, Neptune also comes closest to Earth for the year – about 28.9 astronomical units away – making it appear slightly brighter and larger than usual, though still a challenge for casual observers.

A Distant Giant Revealed

While Neptune may not dazzle like Jupiter or Saturn, its oppositions are important moments for astronomers and enthusiasts. Careful observation with larger telescopes can reveal its subtle bluish hue, the hallmark of its methane-rich atmosphere. For many, simply knowing they are looking at the farthest planet in our Solar System adds a special sense of wonder to the night sky.

TOTAL LUNAR ECLIPSE

A lunar eclipse occurs when the Earth comes directly between the Sun and the Moon, casting its shadow on the lunar surface. During a total lunar eclipse, the Moon passes completely through the Earth's central umbra (the darkest part of its shadow), often turning a striking reddish-orange or coppery color, commonly referred to as a dramatic "Blood Moon."

The September 2025 Eclipse

On 7th September 2025, skywatchers will witness a total lunar eclipse. The eclipse will begin with a penumbral phase, followed by the partial and then total stages as the Earth's shadow steadily covers the Moon. The maximum eclipse will reveal the Moon fully immersed in Earth's umbra, glowing in hues of copper and red.

Visibility of the Event

This eclipse will be widely visible across Africa, Europe, Asia, and Australia, with partial visibility in other regions. In India, observers will be able to witness the entire event, from the start of the penumbral phase until the end of the eclipse, making it an excellent opportunity for observation.

During a total lunar eclipse, the moon appears to turn red while passing through Earth's shadow. This year features two spectacular total lunar eclipses.

Eclipse Phase Timings (IST)

- Penumbral eclipse begins (P1): 8:58 pm IST, Sep 7.
- Partial eclipse begins (U1): 9:57 pm IST, Sep 7.
- Total eclipse begins (U2 / "red Moon" starts): 11:00 pm IST, Sep 7.
- Greatest eclipse: 11:41 pm IST, Sep 7.
- Total eclipse ends (U3 / "red Moon" ends): 12:22 am IST, Sep 8.
- Partial eclipse ends (U4): 1:26 am IST, Sep 8.
- Penumbral eclipse ends (P4): 2:25 am IST, Sep 8.

How to Observe Safely

Unlike solar eclipses, lunar eclipses require no protective equipment. The Moon is perfectly safe to view with the naked eye, binoculars, or a telescope. In fact, binoculars or small telescopes can enhance the view, revealing surface details of the Moon as it gradually darkens and reddens.

A Celestial Spectacle

The Total Lunar Eclipse of September 2025 promises to be a memorable event for stargazers and casual skywatchers alike. Mark your calendars, gather with friends or astronomy clubs, and enjoy one of nature's most beautiful sky shows under the night sky.

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.

Place: Chennai / Date: 08th September / Time: 07.30 p.m.

Conjunction of Moon and Saturn

On September 8th, enjoy a stunning celestial conjunction as the bright Moon (magnitude -12.75) pairs with Saturn (magnitude 0.65) in the eastern sky around 7.30 p.m. This evening spectacle offers a delightful view for sky enthusiasts, showcasing the Moon's brilliance alongside Saturn's steady glow, a sight worth watching and photographing.

Conjunction of Pleiades and Moon

On September 12th, witness a dazzling celestial conjunction as the Moon (magnitude -12.34) aligns with the Pleiades star cluster (magnitude 1.59) in the eastern sky around 11.30 p.m. This breathtaking pairing will illuminate the night, offering stargazers a magical view of Earth's natural satellite beside the sparkling Seven Sisters.

Place: Chennai / Date: 12th September / Time: 11.30 p.m.

Place: Chennai / Date: 17th September / Time: 02.30 a.m.

Conjunction of Moon and Jupiter

On September 17th, witness a dazzling celestial conjunction as the Moon (magnitude -11.10) aligns with Jupiter (magnitude -1.91) in the western sky around 2:30 a.m. The Moon's radiant glow paired with Jupiter's majestic shine creates a breathtaking spectacle, offering astronomy lovers and stargazers an unforgettable cosmic treat.

STUDENT'S CORNER

Space Force

Sourajit Mandal, Astronomy Camp

Have you ever thought about how much of your daily life depends on objects quietly orbiting hundreds of kilometers above your head? Not the moon or distant planets, but thousands of satellites...the unseen architects of our modern world. That banking app on your phone, the GPS guiding you to a new restaurant, even the weather forecast you checked this morning...all of this relies on these orbiting machines. But here's the catch: this reliance is becoming increasingly fragile. Space, once thought of as calm and empty, is actually a zone of intense competition.

Think of the internet as the lifeblood of our interconnected society. Satellites are the arteries and veins, tirelessly moving data around the globe. They make everything possible...from international calls to military communications. Disrupt that system, and the consequences could be severe. And now, this critical infrastructure is becoming a potential battleground. Space may look empty, but it is far from conflict-free.

This is where the United States Space Force comes in. Established in 2019, it isn't about sci-fi fighting in orbit. Its "Guardians" have a much more immediate task: protecting America's interests in space. They manage GPS, track over 45,000 objects to prevent collisions, and keep vital military satellite communications running. Essentially, they safeguard our high-tech way of life.

The U.S., however, is not alone. China's space program has made incredible strides...from landing a rover on the far side of the moon to building its own space station. China aims to be a leading space power by 2045. In April 2024, it reorganized its military space operations into a separate branch, the People's Liberation Army Aerospace Force (PLAAF), to manage its growing satellite fleet. These satellites are crucial for navigation, intelligence, and even precision strikes.

So... what exactly do these space forces do? Much of their work is "space domain awareness" that is, tracking satellites and space debris to know what's happening up there at all times. But there is a more... aggressive side as well. Both nations are developing ways to deny the other's access to space, whether by jamming signals, dazzling satellites with lasers, or even sending "inspector" satellites that could interfere with foreign spacecraft.
This rivalry is not just about military power- it is also about technology and economic dominance. While the U.S. currently spends far more on space...around 69 BILLION dollars in 2022 compared to China's $16 billion...China's focused, state-led approach is closing the gap, especially in navigation technology.

Space is no longer just a frontier for exploration. It has become a strategic arena where invisible forces shape our life on Earth. Just like the universe is full of unseen particles popping in and out of existence, the quiet actions of satellites and space forces are quietly defining the future. Humanity's reach into the cosmos is growing more complex, and the future, it seems, is being written in the stars.

NISAR Satellite

Ankita Gupta, UITS Student, BCS Dharampeth

Picture Earth as a living, breathing organism–its continents shifting, its oceans rising, its forests pulsing with change. Most of these changes are invisible to us, but not for long. But how do scientists keep track of it all? The answer lies beyond Earth itself, in a cutting-edge satellite called NISAR (NASA-ISRO Synthetic Aperture Radar)–a mission designed to map and monitor our world like never before.

The NISAR Satellite, a joint project between NASA and the Indian Space Research Organization (ISRO), was launched on July 30, 2025, from the Satish Dhawan Space Centre in Sriharikota. India. This satellite is designed to tack changes in Earth's surface including land deformation, glacier movement and ecosystem dynamic, using advanced dual-frequency Synthetic Aperture Radar (SAR) technology.

Key features of NISAR:

- **Dual - Frequency of SAR:** NISAR is the first satellite to use two different radar frequencies, L - and (24 cm wavelength) and - S - band (12 cm wavelength), to measure changes in Earth's surface.
- **High - Resolution Imaging:** The satellite will capture high resolution images of Earth's surface, with a resolution of 3 to 10 meters, and map the entire globe in 12 days.
- **All weather capability:** NISAR's radar technology allows it to penetrate clouds and vegetation, making it capable of observing Earth's surface in all weather conditions, day or night.
- **Earth Observation:** The satellite will provide detailed observations of Earth's land and ice surfaces, including of natural hazards like earthquakes, tsunamis and landslides.

With an expected lifespan of at least three years, the data it provides will serve scientists, policymakers, and communities across the world. In a world facing rapid climate change, natural disasters, and population pressure, NISAR will be like a planetary health monitor–constantly scanning, recording, and alerting us to Earth's subtle shifts.

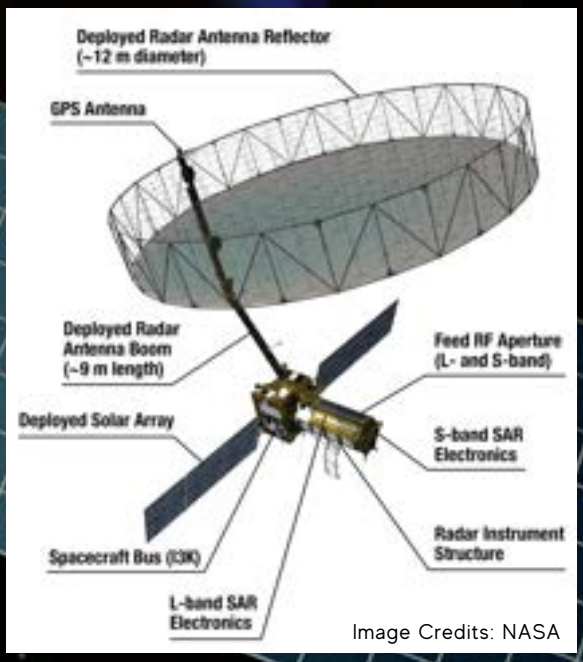


Image Credits: NASA

NISAR is more than just a satellite–it's humanity's shared effort to better understand and protect our only home. By uniting American technology with Indian innovation, NISAR will not just orbit Earth; it will help safeguard it. Every image and every radar signal will bring us closer to predicting disasters, protecting communities, and ensuring a sustainable future.

The Great Attractor

Shourya Kothare, UITS, BCS State Board, Sadar

Have you ever felt the pull of something you couldn't see but knew was there? Our galaxy is experiencing just that—an invisible tug drawing it across the universe at breakneck speed. Astronomers call this mysterious force the Great Attractor, a hidden giant in space that has puzzled scientists for decades.

The region of gravitational attraction in intergalactic space and the apparent central gravitational point of the Laniakea supercluster. This supercluster includes our milky way as well as about 100000 other galaxies.

The observed attraction suggests a localized concentration of mass having the order of 10 to the power of 16 solar masses. However, it is observed by the Milky way's galactic plane, lying behind the zone of avoidance (ZOA).

The attraction ss observable by its effect on the motion of galaxies and the associated clusters over a region of hundreds of millions of light years across the universe. These galaxies are observable; all are redshifted in accordance with the Hubble flow. The variations in the redshifts are known as peculiar velocities and cover a range from 100 km/s to 700km/s depending on the types of galaxies and on the great attractor.

The Great Attractor isn't the final destination of our motion. Astronomers discovered that this region itself seems to be moving toward an even larger, more massive concentration of galaxies known as the Shapley Supercluster (about 650 million light-years away in the constellation Centaurus).

The Great Attractor remains partly hidden, wrapped behind the dust and stars of our own Milky Way, but its pull is undeniable. It reminds us that the universe is not only vast but also full of enigmas that challenge our understanding of gravity, matter, and cosmic structure. As our telescopes grow sharper and our maps of the cosmos expand, perhaps one day we'll uncover the true identity of this unseen giant. Until then, we are travelers on a journey—carried by the gravitational whisper of something far greater than ourselves.

Image Credits: E. Alderson

VISUAL ARTS FROM SPACE ASSOCIATED ASTRONOMERS

Aditya L1 drawn by Grace Fernandes of Casagrand International School, Perumbakkam, UITS.

Aditya L1 PSLV Rocket drawn by Thanishkha Sri of Casagrand InternationalSchool,Perumbakkam, UITS.

ASTROPHOTOGRAPHS FROM SPACE TEAM

Milky way Arm and Moon Captured by Mr Sebin Sebastian, Educator, STEPL.

HISTORICAL EVENTS HAPPENED IN SEPTEMBER

Luna 2's Shimmering Signature on a New World

Luna 2, launched by the Soviet Union on September 12, 1959, etched itself in history as the first spacecraft to reach, and impact, another celestial body–the Moon. Hurtling toward its target, Luna 2 released a sodium vapor cloud to create a visible trail in space, a spectacle witnessed from observatories on Earth. On September 14, it struck east of Mare Imbrium, near the Aristides, Archimedes, and Autolycus craters, marking the Moon with tiny metallic pennants inscribed with "USSR September 1959" in Cyrillic script.

Not merely a technological feat, Luna 2's mission delivered a symbolic gesture–a quiet announcement that humanity had begun to explore and leave artifacts on other worlds. The moment Luna 2's radio signal ceased, history paused–ushering in a new age of curiosity, national pride, and eternal wonder for the Moon and beyond.

LUNA-2 (Source: NASA)

Luna 16: Robotic Hands Bring Home Moon Soil

LUNA-16 (Source: NASA)

Luna 16, launched by the Soviet Union in September 1970, became the world's first fully robotic lunar sample return mission. After landing in Mare Fecunditatis, its automated drill collected lunar soil, which was safely returned to Earth–101 grams in all–just 12 days later. The achievement was a milestone: for the first time, lunar samples traveled home without human hands, marking a new era for space exploration and automated science.

Exploring Titan: Then & Now

Titan, Saturn's largest moon, has fascinated scientists for centuries since its discovery by Christiaan Huygens in 1655. The exploration of Titan began in earnest when Pioneer 11 flew through the Saturn system on September 1, 1979, becoming the first spacecraft to study this mysterious moon. Pioneer 11 confirmed Titan's atmosphere and characteristics, setting the stage for future missions.

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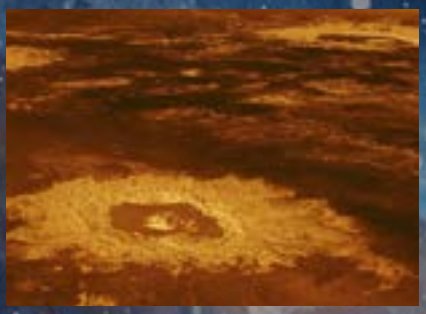
Since then, Titan has revealed secrets of its thick, hazy atmosphere and surface, which includes lakes and rivers of liquid hydrocarbons–mission data primarily provided by the Cassini-Huygens spacecraft in the 2000s. The Huygens probe made history by landing on Titan in 2005, sending back detailed images and measurements from its intriguing surface. Looking ahead, NASA's Dragonfly mission is set to launch in 2028. This innovative rotorcraft will spend three years making multiple landings across Titan to study its atmospheric and surface conditions in unprecedented detail. Dragonfly aims to better understand Titan's chemistry, geology, and potential habitability, continuing humanity's quest to uncover the mysteries of this planet-like moon.

Artist's concept of Dragonfly's entry, descent and landing, and its liftoff to explore the surface of Titan. Source: NASA

"Dragonfly isn't a mission to detect life — it's a mission to investigate the chemistry that came before biology here on Earth."

~ Zibi Turtle, Principal Investigator, Johns Hopkins Applied Physics Laboratory

Mapping Venus from Space: The Magellan Breakthrough



Three impact craters are displayed in this three-dimensional perspective view of the surface of Venus. NASA/JPL-Caltech

On September 1, 1992, NASA's Magellan spacecraft achieved a historic milestone by completing the first comprehensive map of Venus's surface. Launched in 1989 aboard the Space Shuttle Atlantis, Magellan used synthetic-aperture radar (SAR) to penetrate Venus's dense, cloud-covered atmosphere, unveiling the planet's hidden landscapes with remarkable clarity.

Beyond imaging, Magellan used subtle changes in its orbit to map Venus's gravitational field, shedding light on the planet's internal structure. Its mission ended in 1994 with a controlled crash onto the Venusian surface, forever marking a historic achievement in planetary exploration.

Rosetta: The First Spacecraft to Orbit a Comet

On September 10, 2014, the European Space Agency's (ESA) Rosetta spacecraft made history as the first spacecraft to orbit the nucleus of a comet, specifically Comet 67P/Churyumov-Gerasimenko. After a decade-long journey launched in 2004, Rosetta rendezvoused with the comet on August 6, 2014, and conducted an unprecedented 17-month study of the comet's surface, environment, and evolution.

In addition to the orbiter, Rosetta carried the Philae lander, which performed the first soft landing on a comet's surface in November 2014, transmitting valuable data despite limited battery life.The mission ended in 2016 when Rosetta performed a controlled descent and landing on the comet's surface, closing the chapter.

An illustration of Philae. Credit: ESA/ATG medialab

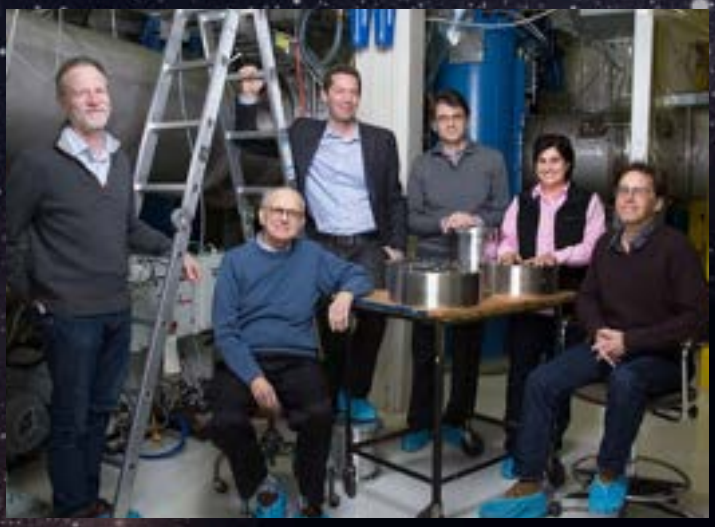
Japan's MINERVA-II1: First Rovers to Roam an Asteroid

An artist's illustration of Hayabusa2's MINERVA-II1A and MINERVA-II1B rovers exploring the surface of the asteroid Ryugu. (Image credit: JAXA)

On September 21, 2018, Japan's Hayabusa2 mission made history by deploying the MINERVA-II1 rovers—Rover-1A (HIBOU) and Rover-1B (OWL)—onto asteroid 162173 Ryugu. These tiny, hopper-equipped rovers were the first operational robots to land and move autonomously on an asteroid's surface.

The rovers successfully transmitted stunning visuals back to Hayabusa2, unveiling the asteroid's surface and providing critical insights into its composition and topography. MINERVA-II1's success advanced asteroid exploration and helped pave the way for Hayabusa2's sample collection mission. The rovers remain on Ryugu, silent sentinels marking a groundbreaking moment in robotic planetary exploration.

The First Direct Detection of Gravitational Waves



Left to right: David Shoemaker, Rainer Weiss, Matthew Evans, Erotokritos Katsavounidis, Nergis Mavalvala, and Peter Fritschel. Image Credits: Bryce Vickmark

The LIGO observatory has provided scientists with the first-ever direct detection of gravitational waves, ripples in the fabric of spacetime predicted in 1915 by physicist Albert Einstein. The waves originated from the merger of distant black holes, envisioned here in a computer simulation. Image Credits: SXS

On September 14, 2015, history was made when the Laser Interferometer Gravitational-Wave Observatory (LIGO) detected gravitational waves for the very first time. This groundbreaking observation, known as GW150914, captured ripples in spacetime caused by the merger of two massive black holes nearly 1.3 billion light-years away.

The signal was incredibly brief, lasting less than a second, yet it carried powerful information—confirming a key prediction of Albert Einstein's general theory of relativity made a century earlier. The black holes, with masses of about 29 and 36 times that of the Sun, spiraled inward and merged, releasing energy equivalent to three solar masses in gravitational waves.

LIGO's detectors, located in Hanford, Washington, and Livingston, Louisiana, sensed these spacetime ripples with extraordinary precision, measuring distortions thousands of times smaller than the width of a proton. This discovery marked the birth of gravitational-wave astronomy, opening a new window into the cosmos beyond traditional electromagnetic observation. Announced publicly on February 11, 2016, the detection confirmed that black hole mergers occur in the universe and that gravitational waves can be directly measured.

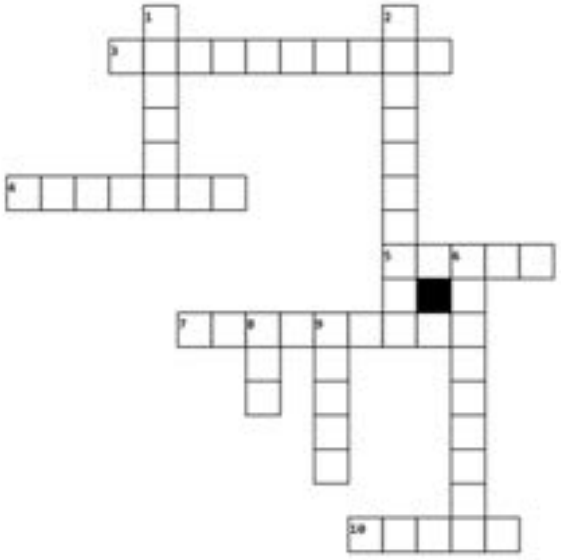
This monumental achievement not only earned the 2017 Nobel Prize in Physics but also revolutionized how scientists study the most extreme phenomena in the universe.

"Our observation of gravitational waves accomplishes an ambitious goal set out over five decades ago to directly detect this elusive phenomenon and better understand the universe, and, fittingly, Einstein's legacy on the 100th anniversary of his general theory of relativity."

~David Reitze, LIGO Laboratory executive director of the California Institute of Technology in Pasadena.

TRAIN YOUR BRAIN

CROSSWORD



Across

3. Astronaut Shubhanshu Shukla returned to Earth aboard which spacecraft?

4. The Soviet dogs Belka and Strelka orbited earth on spacecraft ____ 5.

5. Name of the joint NASA-ISRO radar satellite launched in July 2025.

7. The Bowen Orbital Spaceport is located in which country?

10. Australia's Eris rocket launch took place in which city of Queensland?

Down

1. The Lucy mission's primary goal is to explore which group of asteroids?

2. Indian observatory in Tamil Nadu used in astronomy research?

6. Einstein's concept linking space and time into one fabric.

8. First photo of Earth from space was captured by Explorer____ in 1959.

9. What type of black hole was discovered devouring a star in a distant galaxy?

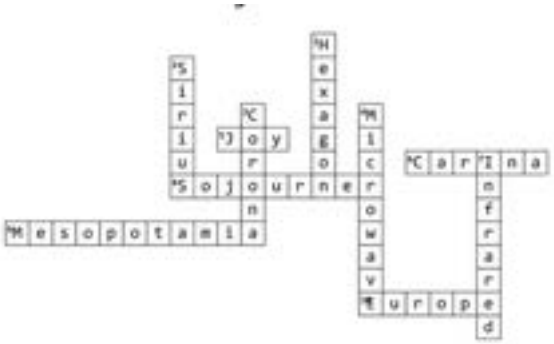
Astronomy Word Puzzle

Brightest Star in the Sky

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

ALTAIR
SIRIUS
CANOPUS
PROCYON
DENEB
RIGEL
ARCTURUS
ACRUX
HADAR
CAPELLA
ACHERNAR
POLLUX
ALDEBARAN
VEGA
BETELGEUSE

Answers for last month puzzles.



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

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GALACTICA MAGAZINE

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