SPACE™
EMPOWERING LIFE

JUNE 2025
Volume 4 | Issue VI

Galactica

Astronomy and Space Science Magazine

JUNE 30: International Asteroid Day

www.space-global.com

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

Team

ABOUT SPACE

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

SPACE is the pioneer organization working towards the development of science and astronomy in India. It aims to create a scientifically aware society and contribute to the technological and social development of the country, SPACE organization belongs to an astronomical league. diligently working towards development in astronomy and space science through astronomical tutorials, modules, and curriculum for education requirements of schools & students in India. We constantly engage in offering introductory astronomy, science about space, astrophysics, telescopes, and internet astronomy to the masses.

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

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

CMD's Message

Dr. Sachin Bahmba, CMD, SPACE

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

Co-founder's Message

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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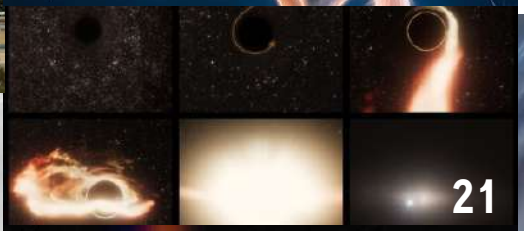
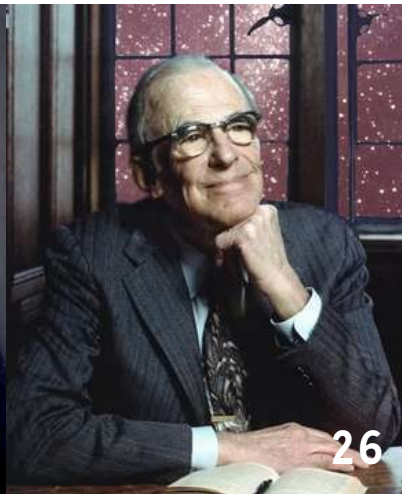




Space Insights

EXPLORING THE COSMOS: SPACE ARCADE'S MONTHLY OBSERVATION

On the evening of 10 May 2025, under a clear and quiet Chennai sky, SPACE ARCADE hosted its Monthly Telescopic Observation, welcoming around 20 enthusiastic skywatchers to an inspiring night of discovery.

The evening began with a walkthrough of the night sky, gradually guiding participants to telescopic views of a stunning gibbous Moon, the gas giant Jupiter with its Galilean moons, and the red planet Mars, glowing steadily in the distance.

With expert guidance from the SPACE ARCADE team, attendees learned the basics of telescope setup and alignment along with some introductory tips on astrophotography.

The observing session featured a dynamic telescope lineup, including the Space Voyage 150 EQ, Explore Scientific 80 EQ Refractor, Space Launcher 76mm and 8" SCT Computerized GoTo Telescope (Schmidt-Cassegrain Telescope). Each instrument brought its own depth and detail to the viewing experience, allowing participants to observe the Moon's craters and planetary features up close.

Participants' Feedback

1. "Thank you so much for arranging such a wonderful event–we felt elated to watch the Moon. It was so lively, and the team explained it well." – Janane S
2. "It's my first time viewing the planets. Had a great time–hope we'll look at some more next time!" – Mahendran
3. "It's our first visit and we had a good time watching the Moon and planets. There was enough help to view all that was observable." – Balaji K

From awe-filled first views to shared learnings under the stars, the event reflected SPACE ARCADE's commitment to making space exploration hands-on, fun, and educational for everyone.




Stay updated on upcoming events by following SPACE ARCADE on Instagram: @SpaceArcadeIndia

THROUGH THEIR EYES: OUR STARGAZING COMMUNITY IN ACTION

See what's possible with our telescopes!

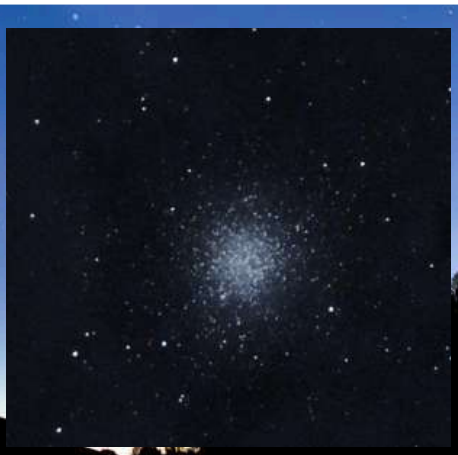
These amazing photos were taken by real customers using the telescopes they bought from us. From the Moon to distant galaxies, their images show just how powerful and clear our telescopes really are.

Ready to explore the universe? Join our stargazing community and start your space journey today!

Full Moon
Process:
This full moon was captured on 15 December 2024 at 8:11 PM from Gurugram.
The image was taken with the help of the GSO 8" Dobsonian Telescope along with a smartphone.
Focal length: 1200mm, Aperture: 8"
•Eyepiece : GSO Super view 30 mm plossl
•Smartphone:One Plus 12,Focal ratio: f/1.6,ISO: 50,
Exposure: 1/415 s

Darsh Bhatnagar

Saturn
Process:
This image of Saturn was captured on 15th December at 8:02 PM from Gurugram.The image was taken using GSO 8" Dobsonian Telescope along with a smartphone.
•Focal length: 1200mm, Aperture: 8"
•Eyepiece: Celestron Omni series 4mm eyepiece
•Smartphone:One plus 12,Focal ratio:f/2.6,ISO: 4000,Exposure: 1/24 s



Omega Centauri
Process:
Telescope Used:- Celestron Powerseeker 114EQ
Camera Used:- Poco X3 Pro (Phone Camera)
6 × 30 secs Stacked in Deep Sky Stacker and Processed in Siril.
Bortle Scale- 7 to 8 Skies

Shakthivel Ramesh

Jupiter and its moons Io, Callisto and Europa
Capture Date:- 28/12/2024
Capture Time:- 23: 57
Telescope Used:- Celestron Powerseeker 114EQ
Camera Used:- Poco X3 Pro (Phone Camera)
300 frames Stacked in Autostakkert and processed in Registax and final touches in Snapseed.

ASTRONOMY SHOWCASE AT QUALCOMM INDIA - BANGALORE

An exciting and immersive Astronomy Showcase was conducted at the Qualcomm India in Bangalore, in collaboration with Space India, sparking scientific curiosity and wonder among young minds and their families. The workshop saw enthusiastic participation from around 210 children of Qualcomm employees, while the accompanying Astronomy Showcase drew an impressive audience of over 1300 attendees.

The workshop's centerpiece was the engaging Comet Kitchen session, where children got an exciting hands-on experience to make their own comets using dry ice and other materials. This interactive activity offered a fun and educational experience that helped the participants understand the composition and behavior of these icy celestial wanderers.

The Astronomy Showcase was a vibrant celebration of space science, packed with interactive learning and playful exploration. Participants tested their physical and mental readiness to become astronauts through challenges such as lung capacity tests, muscle endurance tests and engaging games like Save the Earth, Light up the Alien. The creative corners allowed children to express their imagination by creating their own constellations and colouring cosmic scenes, blending art with astronomy.

In the demonstration area, the live comet-making session fascinated onlookers, while the planetary weight station gave children a memorable experience of weighing themselves on different planets to understand gravity. The experience zone further enriched the day with virtual reality journeys through space, hands-on telescope sessions and thrilling pop rocket launches.

The enthusiastic participation and positive feedback from both children and parents reaffirmed the value of such initiatives in nurturing scientific thinking and inspiring the next generation of innovators and explorers.

INTELLOVATION 2025: A Journey Through Space at Bal Bhavan Public School

INTELLOVATION 2025, an interschool event hosted at Bal Bhavan Public School, Mayur Vihar-1 on the 9th and 13th of May, turned into a cosmic adventure for students, through a series of engaging and educational space activities conducted by Space India. With students from multiple schools participating, the event provided a vibrant platform for young minds to explore science in the most exciting way—through space.

Among the most fascinating activities was the Comet Making session, where students witnessed a live demonstration of a comet replica, mimicking the tail formation as it passed near the sun. This left the young learners amazed and excited to share their own space facts and curiosity.

Interactive activities like Ring the Planets and Meteor Attack helped younger students learn about planets, meteors, comets, and asteroids in an engaging way.

The event reached its peak with the Planetarium Show, the showstopper of INTELLOVATION. Students were taken on a virtual journey from missions to the Moon and flybys of planetary moons, to exploring distant galaxies and nebulas, each session was tailored to different age groups. Whether it was wandering through planetary wonderlands or diving into deep space, students were left in awe.

Led by our passionate space team including dedicated astronomers, these activities welcomed around 300 students, making learning fun, accessible, and unforgettable. For many, it was their first step into the wonders of the universe—and certainly not the last.

Bridging Education and Exploration Team 'Maharashtra' at SPACE

On 3rd May, a distinguished delegation from Nagpur, members of the Maharashtra Regional Education Board, visited the SPACE India Headquarters at Dwarka, Sector 11. The visit was a celebration of shared educational values, centered around innovation, experiential learning, and the future of space science education in India.

The visit commenced with a thrilling hydro rocketry demonstration, capturing the spirit of hands-on learning that SPACE India brings to classrooms. This was followed by a detailed display of our educational and takeaway kits, showcasing the tools and materials that enable students to engage deeply with astronomy concepts.

The delegates then experienced our Virtual Reality (VR) activity, where they virtually explored planets, galaxies, and celestial phenomena–bringing abstract concepts to life in a highly interactive way. This was followed by solar observation through a Dobsonian telescope, offering a rare and fascinating view of the Sun.

A special part of the visit was the tour of our Research & Development Lab (PDT), where the team was introduced to a variety of indigenously developed kits, instruments, and activities. These innovations, built by our in-house teams, reflect our dedication to creating impactful, curriculum-aligned resources for schools and educators nationwide.

The Maharashtra delegation concluded their visit with high appreciation and encouraging feedback, impressed by the depth of content, the hands-on approach, and the quality of educational tools on display. Their words and engagement reaffirmed our collective commitment to nurturing scientific curiosity among students and empowering educators with the right tools to do so.

Innovation Ignites Minds at Dabrbari LAL DAV Public School, Pitampura

On 20th May 2025, Dabrbari LAL DAV Public School, Pitampura, transformed into a vibrant hub of scientific curiosity and innovation as it hosted its Annual Science Exhibition. The event began with an informative briefing session, where students were introduced to the various activities planned for the day and prepared scripts to guide their presentations. With great enthusiasm and confidence, the students took charge of their stations, each designed to engage the audience with interactive and educational demonstrations.

One of the most exciting attractions of the exhibition was the AR/VR experience. Visitors donned virtual reality headsets and were transported to the International Space Station, experiencing what it feels like to walk in space and view Earth from orbit. The use of Augmented and Virtual Reality provided a powerful tool for immersive learning, combining the real world with digital elements to create a lifelike simulation that captivated everyone's imagination. Another fascinating activity was comet making, where student volunteers recreated the look and texture of a comet using everyday kitchen ingredients like dry ice, soil, and water. This hands-on demonstration gave the audience a unique insight into the physical composition and behavior of comets in space.

The flame test demonstration added a burst of color to the event, as different chemical compounds were mixed with methanol to produce vividly colored flames, each representing the elements seen in meteor showers. This visually stunning activity explained the science behind how various elements emit specific colors when burned, making complex chemical concepts accessible and engaging. At the Rover on Mars station, students showcased their DIY models of NASA's Curiosity rover, explaining the function and importance of each part. This activity highlighted the ingenuity and engineering behind space exploration in a way that was both educational and exciting.

The Vortex Cannon activity was equally captivating, as students used glycerol to create smoke and then launched smoke rings using a homemade cannon, demonstrating the physics of air pressure and motion. In another fun and educational station, visitors could weigh themselves on different planets. By adjusting for each planet's gravity, participants discovered how much they would weigh on Earth, Moon, Mercury and Jupiter gaining a better understanding of gravitational differences across the solar system.

Engineering principles were brought to life in the Truss Building activity, where students explained the design and function of trusses in architectural structures. Using simple materials, they showed how these frameworks support bridges and buildings, underscoring the importance of design in structural engineering. The Lung Capacity Test provided a practical lesson in human biology, as students demonstrated how balloon inflation can measure lung strength and discussed the significance of lung health and proper breathing.

Rounding off the exhibition was the Telescope Pointing activity, where volunteers guided visitors in using telescopes to observe terrestrial objects. Although it was held during the day, the activity offered a glimpse into how telescopes function and introduced basic concepts of astronomical observation. Throughout the day, parents, teachers, and the school principal moved from one activity to another, expressing admiration and appreciation for the students' efforts and their impressive grasp of scientific concepts.

The science exhibition at Dabrbari LAL DAV Public School was more than just an event; it was a celebration of exploration, creativity, and the spirit of scientific inquiry. It not only brought classroom concepts to life but also inspired both students and visitors to view science as an exciting and integral part of our everyday world

Convention of Indian Universities 2025 at DPS Sector 19. Faridabad

Delhi Public School, Sector 19, Faridabad organized the Convention of Indian Universities 2025–a dynamic platform designed to guide students through career planning and higher education opportunities. Aligned with the CBSE's framework of Educate, Intern, Counsel, and Empower, the event focused on equipping students with the necessary information and exposure to make informed academic choices.

The convention featured insightful sessions and panel discussions with educationists, career counselors, and institutional representatives from across India. Dr. Sachin Bahmba, Founder and Chairman of Space Group of Companies, was invited as one of the panelists. He contributed to a discussion on the importance of incorporating Space Science and Astronomy into mainstream education.




Dr. Bahmba shared how experiential learning in astronomy not only benefits science education but also strengthens skills in mathematics, critical reasoning, and cross-disciplinary thinking.In addition to the discussions, attendees were introduced to various initiatives the school has undertaken to broaden scientific learning. Of particular interest was the school's SOAR (Space Observation and Research) Observatory, which reflects the institution's commitment to practical science education.

Mr. Himanshu Gupta, Secretary, CBSE, visited the observatory during his tour of the campus and appreciated the school's efforts to integrate hands-on learning into the curriculum. The Convention of Indian Universities 2025 served as a meaningful step toward building awareness among students about diverse academic and career paths, while encouraging collaboration between schools and industry experts for future-ready education.

AIASC 2025 Training Workshop At The Indian Heights School

The AIASC 2025 Offline Training Workshop was successfully conducted on May 19, 2025, at The Indian Heights School, Dwarka, as part of SPACE India's flagship initiative – the All India Asteroid Search Campaign (AIASC). In collaboration with the International Astronomical Search Collaboration (IASC) at Hardin-Simmons University, Texas, USA, AIASC has empowered thousands of students since 2010 to contribute to real NASA data, leading to over 11,000 preliminary discoveries, 76 provisional discoveries, and contributions to NASA and JPL's Near-Earth Object program.

The workshop focused on hands-on training with Astrometrica software, led by Mr. Arun Yadav and Mr. Ravi Kumar, who guided students through asteroid identification and campaign participation. Their sessions were well-received by students, coordinators, and guests alike.

The host school's support played a key role in the event's success. Ms. Madhu, the school's Founder and Chairperson, remained fully engaged throughout, attentively listening to presentations and personally capturing event highlights. Her involvement reflected the school's genuine commitment to promoting scientific learning.

Comic Mind Forum at Bal Bharti Public School, Pitampura

Under the dynamic mentorship of Ms. Saloni Verma, SPACE educator, Cosmic Mind Forum was successfully conducted at Bal Bharati Public School, Pitampura on 7th May 2025. The event brought together 12 dedicated student volunteers, their class teachers, and coordinator Ms. Anjali Verma in an immersive learning experience that bridged the realms of material science and space technology.

This interactive session offered students a rare chance to dive into the real-world impact of scientific innovations. At its heart was the keynote by Dr. Parveen Saini, Senior Principal Scientist at CSIR-National Physical Laboratory. With over 100 publications and international collaborations, Dr. Saini's expertise in conducting polymers, carbon nanotubes, graphene nanocomposites, and waste-to-wealth technologies brought fresh perspective to the budding minds.

The Q&A session saw vibrant participation from Grade VIII students who engaged in thoughtful discussions on plastics, composting, and India's trajectory in space research. The event concluded with a heartfelt vote of thanks by Ms. Namrata Alwadhi, HOD Science, who underlined the importance of such platforms in cultivating interdisciplinary curiosity.

Akashgami Spardha: The Interhouse Hydro-Rocketry Competition at KR Mangalam, Vikaspuri

On May 6th, 2025, K.R. Mangalam World School, Vikaspuri, hosted the thrilling Interhouse Hydro-Rocketry Competition – Akashgami Spardha at the school football court. The event brought together enthusiastic students from different houses, eager to showcase their scientific skills and creativity.

Participants designed and built hydro-rockets using principles of air and water pressure. The excitement peaked during the launch phase as rockets shot into the sky, competing for height, distance, and duration. Judges also considered rocket design and build quality, adding a creative element to the scientific challenge.

The competition concluded with the announcement of the winning team, whose rocket demonstrated remarkable precision, performance, and innovation.
Akashgami Spardha was more than a contest–it was an engaging learning experience that sparked curiosity and teamwork. It exemplified the school's commitment to experiential education and inspired students to apply science in fun and meaningful ways.

Matrikiran High School's Stellar Celebration

On May 3rd, 2025, Matrikiran High School in Gurugram hosted a unique Parents' Day event, where parents experienced a hands-on learning day focused on astronomy. The event featured live solar observations, constellation exploration, and interactive activities combining science, math, literature, and physical education.

Parents created models of celestial bodies, designed space missions, and participated in astronomy-themed games and exercises. The celebration provided a platform for parents to engage with their children's learning process, fostering a deeper understanding of astronomical concepts. With enthusiasm and support, parents actively participated in the event, making it a resounding success.

Matrikiran High School extends its gratitude to all participating parents and looks forward to more innovative events in the future. This event showcased the school's commitment to innovative learning experiences, leaving parents inspired and eager for more.

Celebrate Labour Day with Solar Observation for School Staff

On the occasion of Labour Day, our young astronomy enthusiasts organized a special Solar Observation Session dedicated to the school's supporting staff as a gesture of gratitude and appreciation for their tireless work.
The event aimed not only to honor their efforts but also to spark curiosity and awareness about the Sun—our nearest star. Students took the initiative to educate the staff about the importance of safe solar observation.

They explained why looking at the Sun directly is harmful to our eyes, as its intense light and ultraviolet radiation can cause permanent damage to the retina, even during short glances.

To ensure a safe and engaging experience, students demonstrated three safe methods of observing the Sun:
Solar View Goggles: Staff members were invited to wear specially designed solar goggles that allowed them to view the Sun safely.

Pinhole Projector: Students showcased how a simple pinhole setup can project a clear image of the Sun on a surface, allowing indirect viewing.

Dobsonian Telescope with a Solar Filter: The highlight of the session was observing the Sun through a Dobsonian telescope equipped with a certified solar filter, offering a detailed view of sunspots and solar activity.

The event was filled with learning, laughter, and awe, as the supporting staff experienced the wonders of astronomy in a safe and guided environment. It was a heartwarming moment where science met gratitude, creating a memorable experience for all involved.

Soaring Beyond Limits: Journey with Ucatapult Foundation to Inspire Brilliance

Exploring the cosmos has never been more exciting!

In a groundbreaking collaboration with Ucatapult Foundation, our organization recently launched a dynamic Astronomy and Space Science Camp for students of Grades 8 to 10. Conducted online over the course of six engaging evening sessions, the camp has become a thrilling platform for young minds to dive into the wonders of the universe.

From planets and galaxies to black holes and life beyond Earth, the sessions are crafted to ignite curiosity and foster scientific thinking. What sets this initiative apart is the high level of student engagement. Participants are not just passive listeners—they are inquisitive explorers. Each session buzzes with questions, discussions, and a genuine passion for the cosmos.

"I've never seen students this excited before," shared our educator. "They're constantly asking questions, sharing their thoughts, and bringing fresh perspectives to every topic. It's incredibly energizing."The interactive nature of the sessions coupled with visually engaging content and real-world astronomical insights has transformed learning into an immersive experience.

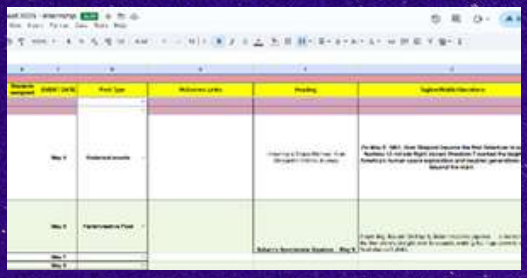
The virtual format has not dampened enthusiasm; if anything, it has brought students from different regions together under one starry sky. This collaboration stands as a shining example of what can be achieved when education meets innovation. As the camp continues, we look forward to uncovering more stars—not just in the sky, but in the bright young minds of our students. Because when young eyes look up at the night sky with wonder, the future of science shines a little brighter.

DPS Faridabad Students Participate in Space India Internship Program

Eighteen bright students from Delhi Public School, Sector-19, Faridabad recently completed a dynamic month-long internship with Space India, immersing themselves in the exciting world of space science and creative technology. The program offered a choice of four specialized domains: Product Development, Creative Presentation Design, Creative Writing, and Photography & Videography.

With a blend of online and on-site sessions, the interns received expert guidance while working on real-world projects that sharpened their innovation, problem-solving, and communication skills. From crafting unique science-based content to designing space-related prototypes and capturing compelling visuals, students explored the fusion of creativity and scientific exploration.

This hands-on learning experience not only enhanced their technical capabilities but also deepened their appreciation for the vast potential of space science. The internship was a transformative journey—one that ignited curiosity, encouraged critical thinking, and empowered the next generation of space enthusiasts.



Content Writing

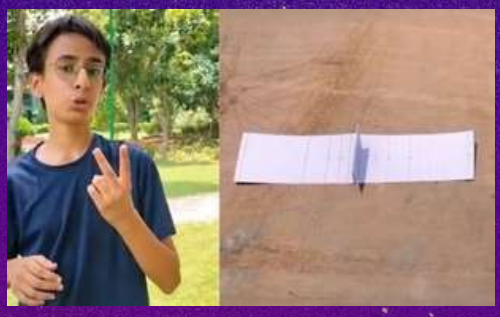
Since May 1st, DPS Sector-19 interns Shreyali, Bhavna, and Aarnav have been immersed in content creation at Space India. They crafted impactful write-ups, identified content gaps, and explored SEO techniques. Through Blog 1 and Blog 2, they showcased creativity and precision. Regular updates via a Digital Progress Sheet kept their learning structured and goal-oriented, marking a month of growth in digital writing.

Creative Presentation Making

In the Creative Presentation Making Field, students learned to gather relevant content and design engaging presentations using Microsoft PowerPoint and Canva. They focused on creative content placement, formatting techniques, and effective color scheming. Each student created two well-structured presentations, enhancing their visual communication and digital design skills.

Product Development

In May 2025, 16 students of class Xth to XIIth from the Delhi Public School, Faridabad completed an enriching internship with Space India's product development team. Participants contributed to several exciting projects, including processing of moon images to bring out vivid colours in them, measuring solar rotation, testing sundials and even measuring the distance of a near earth object from earth. Students were mentored by Mr. Vikrant Narang, CTO, Space. Contributions from the students will help Space India bring the best in Astronomy and Space Education in the country.

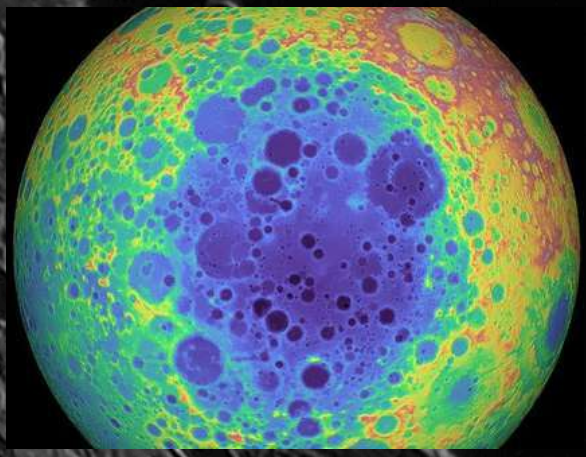


Photography and Videography

During the one-month internship in photography and videography, students explored DSLR camera components and functions, mastering manual settings for creative control. They learned to use a T-mount adapter to connect DSLRs with telescopes for planetary photography. Hands-on sessions included capturing celestial images and applying image processing techniques using specialized software. This intensive training provided foundational skills in both terrestrial and astrophotography, fostering technical proficiency and artistic expression through real-world applications and digital editing tools.

HIGHLIGHTS OF MAY 2025

Artemis and the Moon's Molten Secrets



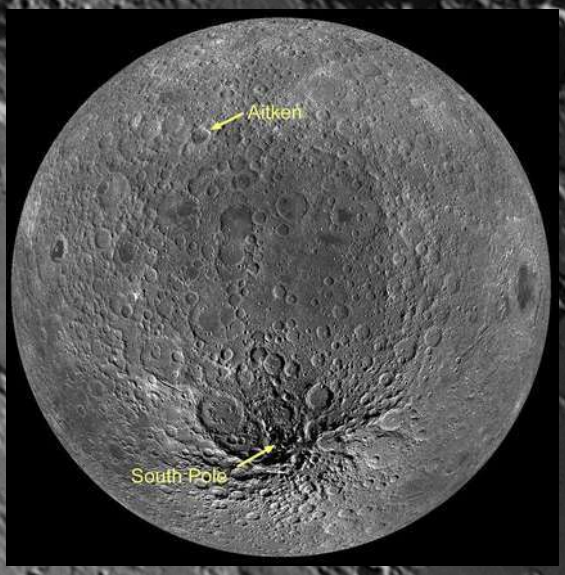
Elevation data shows the lunar South Pole-Aitken Basin, the largest and oldest impact basin on the moon, in blue & purple. (Image credit: NASA)

Beneath the Moon's serene surface lies a dramatic history written in molten stone and cosmic violence. Now, a 4.3 billion year old wound, the South Pole–Aitken (SPA) basin, may soon give up one of its deepest secrets: remnants of the Moon's ancient magma ocean.

Forged by a colossal impact in the Moon's infancy, the SPA basin stretches over 2,500 kilometers. Unlike most craters, SPA may have punched through the crust, unearthing material from the lunar mantle, the very rock that once churned in the Moon's fiery belly. For planetary scientists, these fragments are nothing short of treasure.

"We believe Artemis astronauts could return samples of this untouched mantle," says planetary scientist Jeff Andrews-Hanna. "And these samples may hold the story of the Moon's final crystallization phase."

As the Moon cooled, lighter minerals floated to form its crust while denser materials sank. But some odd elements: potassium, rare earths, and phosphorus (KREEP), got stuck in the mix. Traces of these have been spotted in SPA's ejecta, hinting that something ancient and primal lurks there.



The image highlights how much this ancient impact event affected the moon's far side. (Image credit: NASA)

When Artemis touches down, it won't just mark a return to the Moon, it could spark a leap back in time. Combined with samples from the Moon's nearside, like the Procellarum KREEP Terrane, SPA rocks may unlock the timeline of the lunar interior's evolution. And maybe, just maybe, we'll find the missing pages of Earth's own origin story, written long ago in the Moon's molten past.

These ancient lunar relics may carry the signature of events that shaped both worlds. With every sample collected, we get closer to decoding the shared cosmic heritage of Earth and its only natural satellite. Each fragment of lunar rock is a time capsule, preserving clues from the dawn of our solar system.

Breaking Sunlight China's Lunar Laser Success

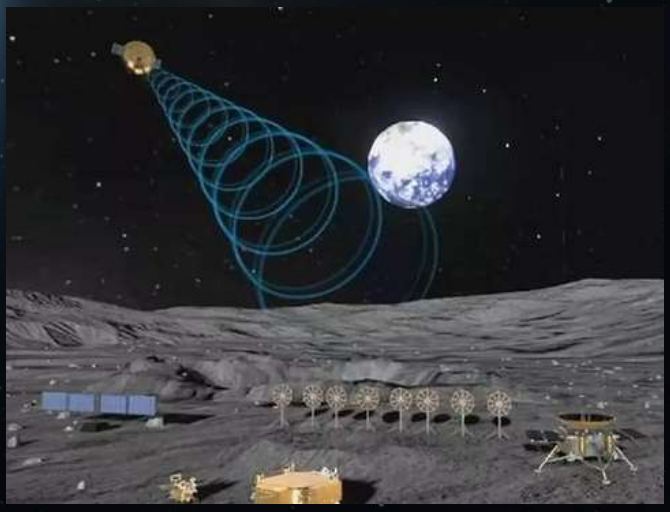
In a groundbreaking advancement for lunar exploration, China's Deep Space Exploration Lab (DSEL) has successfully completed the world's first daytime laser ranging experiment between Earth and the Moon. Conducted using the Tiandu-1 satellite, this achievement marks a significant leap in deep-space navigation, overcoming a longstanding limitation that previously restricted such high-precision measurements to nighttime only.

Daytime Laser Ranging Breakthrough

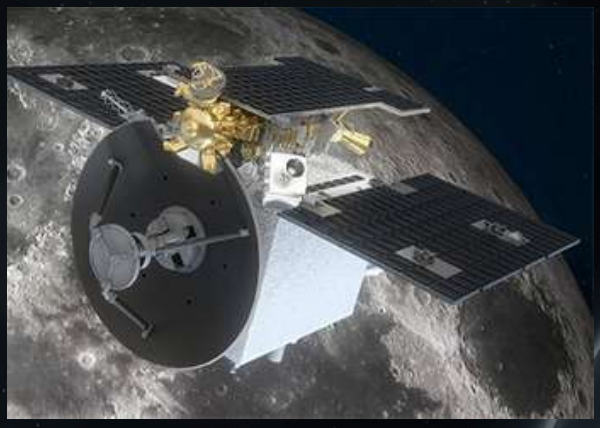
Traditional laser ranging in Earth-Moon space has been hindered by the Sun's intense brightness, which overwhelms the faint laser signals needed for precise measurements. This new experiment, however, demonstrated that laser ranging can be reliably performed during daylight by effectively filtering out solar background noise. This opens new opportunities for around-the-clock space communication and navigation.

Tiandu-1: A Key Technology Demonstrator

The experiment centered on Tiandu-1, a technology demonstration satellite developed for lunar communications and navigation. It plays a vital role in testing critical technologies for China's future deep-space missions, including the upcoming International Lunar Research Station (ILRS).



China's Tiandu-1 satellite conducts laser ranging in Earth-moon space under daylight.
(Image Credit: https://www.bastillepost.com/)



Tiandu 1 and Tiandu 2 before separation.
(Image Credit: https://space.skyrocket.de/)

Role of the Deep Space Exploration Lab

DSEL, operating under the Chinese Academy of Sciences, led the experiment. The organization is at the forefront of developing core technologies for China's space ambitions, focusing on precise positioning, autonomous navigation, and deep-space communication.

Implications for Lunar Missions

Achieving daytime laser ranging improves Earth-Moon navigation accuracy and reliability key for supporting sustained lunar exploration efforts. It enhances real-time tracking, positioning, and communication for spacecraft, laying a foundation for building and operating the ILRS and other future deep-space infrastructure.

China's latest success demonstrates its growing capabilities in advanced space technology and paves the way for more resilient and versatile lunar exploration systems.

GAGANYAAN TIMELINE SHIFTS TO 2027

India's first crewed spaceflight under the Gaganyaan mission has been officially pushed to early 2027, reflecting ISRO's commitment to safety and mission readiness. Originally targeted for 2022, the timeline has shifted to allow for rigorous testing and preparation. The mission will carry Indian astronauts into low Earth orbit for a three-day stay before returning via ocean splashdown.

The crew for the H1 mission comprises four Indian Air Force test pilots Prasanth Balakrishnan Nair, Ajit Krishnan, Angad Pratap, and Shubhanshu Shukla,who are currently undergoing final astronaut training. They will be divided into two teams for the H1 and H2 missions.

The spacecraft will be launched aboard the Human-rated LVM3 (HLVM3) rocket, which features advanced safety measures including a crew escape system. According to ISRO, 90% of the required infrastructure is already complete, with final validations in progress.

Union Minister Jitendra Singh emphasized that three uncrewed flights must be conducted first, as human lives are at stake. The G1 mission, scheduled for late 2025, will carry Vyomitra, a half-humanoid robot, to simulate human spaceflight. G2 and G3 will follow in 2026.

The revised timeline underlines India's measured and responsible approach to human space exploration.

Tianwen 2 Lifts Off: A Journey Through Time and Rock

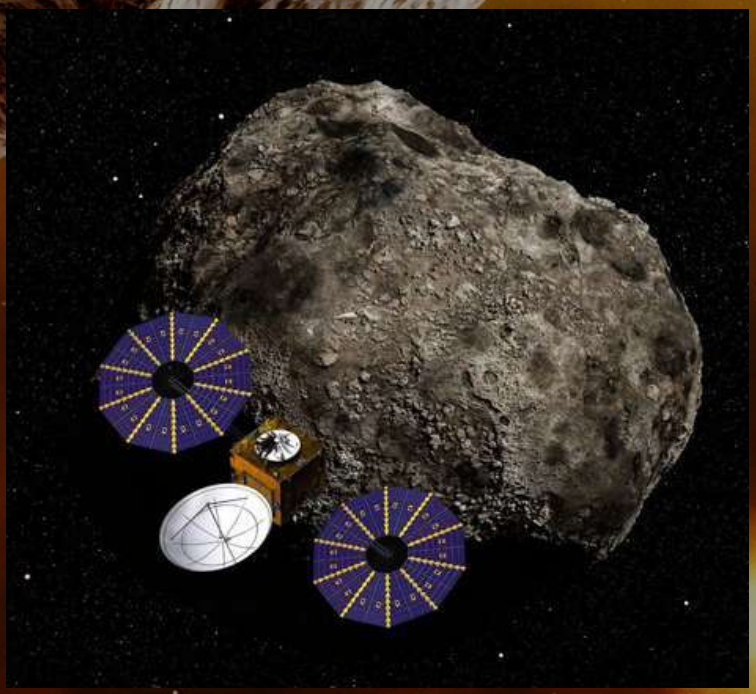
China's deep space dreams took another leap forward as the Tianwen 2 mission successfully launched on May 28, 2025. Riding atop a Long March 3B rocket from the Xichang Satellite Launch Center, the spacecraft is now on its way to intercept a mysterious near-Earth asteroid named Kamo'oalewa, also known as 2016 HO3.

This odd little space rock, possibly a fragment of the Moon thrown into orbit by a past impact, is the mission's first target. Tianwen 2 aims to collect samples and bring them back to Earth by 2027, using a suite of innovative tools and sampling techniques. If terrain permits, the spacecraft will even attempt a direct landing on the asteroid—no small feat for such a tiny and tumbling target.

But Tianwen 2's journey doesn't end there. After returning its precious cargo to Earth, it will use our planet's gravity to slingshot toward a second, more distant destination: the comet 311P/PANSTARRS, arriving around 2035. This hybrid space body (part asteroid, part comet) could unlock secrets about the origin of Earth's water.

Armed with cameras, spectrometers, analyzers, radar, and a magnetometer, Tianwen 2 will orbit and study the comet in detail, potentially reshaping our understanding of the solar system's evolution.

China's Tianwen 2 asteroid sample-return mission launches on May 28, 2025. (Image credit: CASC)

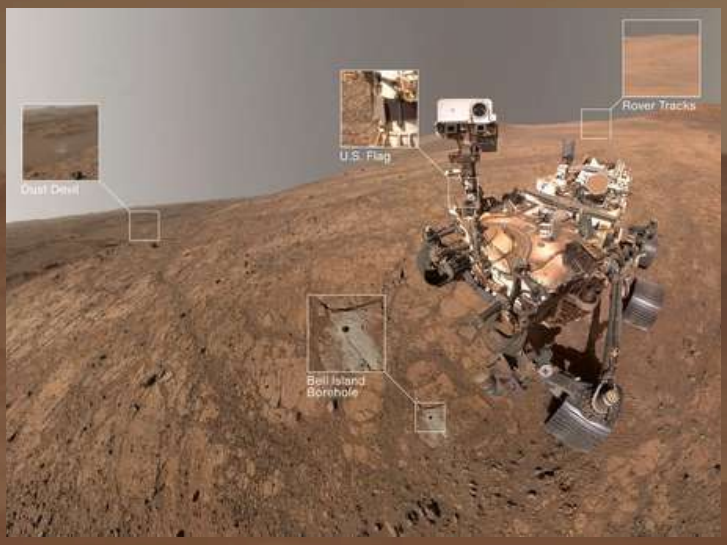


Tianwen-2 mission,will aim to fly to near-Earth asteroid 2016 HO3, probe it and retrieve testing samples. (Image Credit: orbitaltoday.com)

Following the success of Tianwen 1 at Mars, China's interplanetary journey is gaining momentum. With Tianwen 3 (Mars sample return) and Tianwen 4 (headed for Jupiter and possibly Uranus) on the horizon, the stars are only getting closer for China's space program.

Dust Devil Joins Perseverance's Selfie

What better way to celebrate your 1,500th Martian day than with a selfie? NASA's Perseverance rover marked this milestone by capturing a stunning self-portrait at its "Pine Pond" workspace on the rim of Jezero Crater. But as the rover's WATSON camera stitched together 59 images for its fifth-ever selfie, a surprise guest swirled into the frame, a towering Martian dust devil!



NASA's Perseverance took this selfie on May 10, 2025. The small dark hole in the rock in front of the rover is the borehole made when Perseverance collected its latest sample. The small puff of dust left of center and below the horizon line is a dust devil. (Image credit: NASA)

NASA featured as "Image of the Week" for Week 224 (May 25 - 31, 2025) of the Perseverance rover mission on Mars. (Image Credit: NASA)

Measuring about 100 meters (328 feet) across, the dust devil appeared in the distance like a cosmic photobomber. Though Perseverance frequently films these whirlwinds with its Navcam, this marks the first time the WATSON camera, mounted at the end of the rover's robotic arm, has caught one in action. With Jezero in peak dust devil season (late northern spring), the timing was perfect for this dramatic cameo.

The selfie also spotlights Perseverance's 26th drilled sample, a spherule-rich rock named "Bell Island," believed to have formed during ancient volcanic or impact events. This sample offers a glimpse into Mars' distant past, when lava and cosmic chaos sculpted the red planet's terrain.

Having secured its prize, Perseverance has now moved on to a new site called "Copper Cove," a bright-toned bedrock area where scientists hope to unlock further clues about Jezero's layered history.

With every image and sample, Perseverance continues to uncover Mars' secrets, even if the planet occasionally decides to steal the spotlight with a spinning column of dust.

WHAT'S UP IN THE SKY - JUNE 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
Best placed at end of June in evening sky. 2%-lit waxing Moon nearby 26 June.

Venus
Morning planet. Greatest western elongation 1 June.

Mars
Low altitude evening planet. Conjunction with similar brightness star Regulus 16 June.

Jupiter
Evening planet, near Sun. Solar conjunction 24 June, thereafter a morning planet.

Saturn
Another poorly located morning planet, currently close to Neptune.

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

Neptune
Difficult morning planet. Possibly visible on 19 June, when it will be near Saturn and 47%-lit waning Moon.

BRIGHT DEEP SKY OBJECTS

The Galactic Center lies in the Sagittarius constellation and is the core of our Milky Way galaxy. Best seen from the Southern Hemisphere, it hosts a supermassive black hole and appears as a faint, glowing band in the sky.

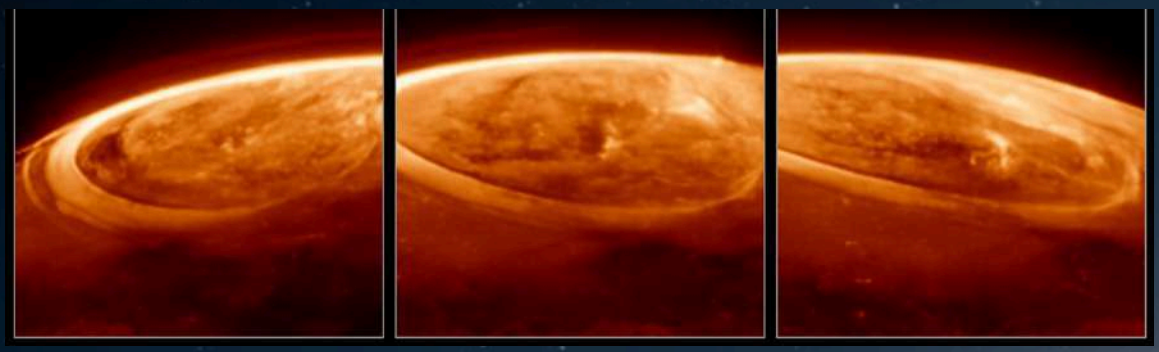
Small Sagittarius star Cloud also known as M24 is located in Sagittarius constellation with apparent magnitude of 2.5 and is best observed from both Hemisphere. To the naked eye, M24 will only appear as a bright patch of Milky way.

NGC 6705 or M11 is located in Scutum constellation and is best observed from both Hemisphere. It has an apparent magnitude of 6.3. It is one of the most densly populated and massive open clusters which can be easily seen through Binloculars.

IC4592 also known as Blue Horsehead Nebula is best observed from both hemisphere. It is found in the Scorpius constellation and has an apparent magnitude of 4.0. The object is too large to be observed through telescope but is a great target for Astro photographers. It is a reflection nebula close to Rho Ophiuchi Cloud.

EYES IN SPACE - MAY 2025

Jupiter's Lights Show: Webb Captures Fiery Auroras That Fizz and Flash



NASA's James Webb Space Telescope captured vivid, fast-changing auroras at Jupiter's north pole, far brighter and more dynamic than Earth's. Fueled by solar particles and volcanic material from moon Io, these displays revealed unexpected variability in H3+ emissions. Some features defied comparison with Hubble's data, offering new insights–and mysteries–about Jupiter's powerful magnetosphere and upper atmosphere.

Cosmic Cotton Candy: Hubble Captures Vivid Clouds in a Nearby Galaxy

This vivid image from the NASA/ESA Hubble Space Telescope showcases the Large Magellanic Cloud, a nearby dwarf galaxy 160,000 light-years away in the constellations Dorado and Mensa. Captured using Hubble's Wide Field Camera 3, the scene reveals colorful gas clouds through a blend of ultraviolet, visible, and infrared light. By combining five filtered images, astronomers highlight features the human eye can't naturally see. While the cotton candy-like colors may appear artistic, they're scientifically mapped to represent real wavelengths.

These striking visuals offer not only aesthetic appeal but also valuable insight into the structure and composition of this galactic neighbor.

Cosmic Encounter: Star Torn Apart by a Wandering Black Hole

This six-panel illustration depicts a tidal disruption event (TDE) caused by a roaming supermassive black hole. A star is captured, stretched, and torn apart by the black hole's gravity. Its remnants form an accretion disk, emitting radiation across the spectrum. The resulting energy flash appears offset from the galaxy's core, where a larger, central black hole resides.

First Clear Detection of Frozen Water in Distant Young Star System

Astronomers have confirmed the presence of frozen water—crystalline water ice—in a debris disk around a Sun-like star 155 light-years away, using data from NASA's James Webb Space Telescope. While water vapor had been detected before, this is the first clear evidence of solid ice beyond our solar system.

The ice is mixed with fine dust particles, resembling tiny "dirty snowballs." This discovery supports long-held theories about ice in planet-forming systems and mirrors conditions in our Kuiper Belt. Scientists say this breakthrough opens new avenues for studying how ice influences planet formation and the delivery of water to rocky worlds.

Tour de Universe

Pegasus: The Mythical Winged Horse

In the rich tapestry of Greek mythology, Pegasus stands out as a creature of divine beauty and enduring fascination. The white, winged horse was born from the blood of the slain Gorgon Medusa, springing forth alongside his brother Chrysaor when Perseus beheaded her.

This miraculous birth was steeped in divine drama—Medusa, once a beautiful maiden, had been cursed by Athena and defiled by Poseidon. Pegasus, though born in violence, would go on to embody inspiration and heroism.

Pegasus's early journeys led him to Mount Helicon, where he encountered the Muses. Striking the ground with his hoof, he created the sacred spring Hippocrene, believed to inspire poetry and art. This connection forever tied Pegasus to creativity and the divine spark of inspiration.

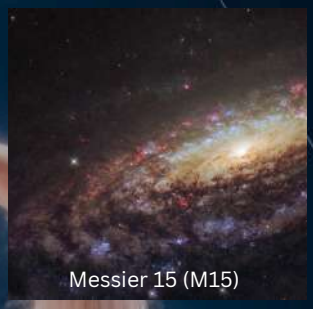
His most famous adventure was alongside the hero Bellerophon, who tamed Pegasus with a golden bridle given by Athena. Together, they defeated the fire-breathing Chimaera from the skies. Yet Bellerophon's arrogance led him to attempt an ascent to Mount Olympus—a move the gods punished by sending a gadfly to sting Pegasus, causing Bellerophon's fall. Pegasus, however, ascended to Olympus and was later honored by Zeus as a constellation.

The constellation Pegasus graces the northern sky and ranks as the seventh largest, covering 1,121 square degrees. First cataloged by Ptolemy in the 2nd century, its most notable feature is the Great Square of Pegasus. It hosts remarkable deep-sky objects like Messier 15, NGC 7331, Stephan's Quintet, the Einstein Cross, and NGC 7742. With Enif as its brightest star and the July Pegasids meteor shower associated with it, Pegasus continues to captivate both astronomers and storytellers alike.

Stephan's Quintet

Einstein_cros

Seyfert_Galaxy_NGC_7742



Messier 15 (M15)

Messier 15 (M15) – A bright globular cluster located about 33,000 light-years away. It's one of the oldest known clusters and is visible through binoculars.

Stephan's Quintet – A group of five galaxies interacting gravitationally. It's a famous target for both professional and amateur astronomers.

Einstein Cross – A gravitationally lensed quasar, where the light from a distant quasar is bent around a galaxy to appear as four distinct images.

NGC 7742 – An unusual unbarred spiral galaxy with a ring structure, also known as a "ring galaxy."

Rocket launches in JUNE 2025

Nanosatellite for Earth Observation and Ocean Monitoring

Scheduled for launch in June 2025, SpaceX's Falcon 9 rocket will deploy the Nanosatellite for Earth Observation and Ocean Monitoring (NAOS) from Cape Canaveral, Florida. NAOS is a cutting edge microsatellite designed to enhance Earth observation with advanced multispectral imaging, focusing on ocean health, atmospheric conditions, and coastal changes.

Equipped with high resolution sensors, NAOS will monitor marine ecosystems, track pollution, and study climate driven ocean dynamics in unprecedented detail. Its compact yet powerful payload enables real time data transmission, supporting environmental agencies, researchers, and policymakers in addressing challenges like algal blooms, oil spills, and coastal erosion.

The NAOS mission underscores the growing role of small satellites in global sustainability efforts, providing cost effective, high frequency data to improve climate resilience and marine conservation strategies.

SpaceX Falcon 9 Rocket
(Credit: Official SpaceX Photos.)

Escape and Plasma Acceleration and Dynamics Explorers

ESCAPADE spacecraft
(Credit: Science.nasa.gov)

Scheduled for launch in June 2025, Blue Origin's New Glenn rocket will carry NASA's EscaPADE (Escape and Plasma Acceleration and Dynamics Explorers) mission from Cape Canaveral Space Force Station in Florida.

This ambitious mission represents a major leap in Martian atmospheric science, deploying twin identical spacecraft to study how solar wind strips away Mars' atmosphere a process that transformed the planet from a potentially habitable world to its current barren state.

The EscaPADE probes featuring innovative 6U CubeSat designs adapted from the successful Blue Ghost lunar lander platform. Each spacecraft carries instruments to measure magnetic fields, ion fluxes, and plasma waves with unprecedented precision. The dual spacecraft approach enables simultaneous measurements at different locations in Mars' magnetosphere, providing the first 3D view of atmospheric escape processes. This mission will deliver critical data about Mars' climate evolution and atmospheric loss rates, with direct implications for understanding planetary habitability across our solar system.

NASA-ISRO Synthetic Aperture Radar

Scheduled for launch in June 2025, ISRO's GSLV Mk II rocket will carry the NASA-ISRO Synthetic Aperture Radar (NISAR) satellite from the Satish Dhawan Space Centre, Sriharikota. NISAR is the world's first mission to use dual-frequency SAR (L-band by NASA and S-band by ISRO) for Earth observation. It will monitor land surface changes with centimeter level accuracy, regardless of weather or daylight, enabling year-round data collection.

NISAR will provide vital information on ecosystem dynamics, ground deformation, and ice sheet movement, supporting climate research and natural disaster management. Its high-resolution data will be instrumental in tracking deforestation, monitoring agriculture, managing water resources, and improving early warning systems for earthquakes and landslides.

The mission NISAR will strengthen climate models and support sustainable development through precise, science-based decision-making on a global scale

NISAR Satellite
(Credit:nisar.jpl.nasa.org)

Greenhouse Gases Observing Satellite

H-IIA Rocket
(Credit: jpl.nasa.gov)

Scheduled for launch in June 2025, Japan's H-IIA rocket will carry the Greenhouse Gases Observing Satellite-Global Water (GOSAT-GW) from the Tanegashima Space Center. GOSAT-GW is Japan's advanced mission combining greenhouse gas monitoring with global water cycle observation, representing a significant upgrade from previous GOSAT satellites.

The satellite with the help of thermal infrared spectrometer and a cloud-aerosol imager can measure atmospheric carbon dioxide and methane concentrations with unprecedented precision day and night, providing continuous climate data regardless of weather conditions.

GOSAT-GW will deliver critical insights into climate change mechanisms by tracking greenhouse gas sources and sinks. Its comprehensive data will support international climate agreements, improve emission reduction strategies, and enhance our understanding of the water cycle's role in climate systems.

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

Happy Birthday

Kip Throne

Kip Thorne (born June 1, 1940) is a renowned American theoretical physicist celebrated for his work on black holes, wormholes, and gravitational waves. A key figure in the LIGO project, he shared the 2017 Nobel Prize in Physics for the discovery of gravitational waves. Thorne is also known for blending science with storytelling, serving as the scientific advisor for the film Interstellar. His contributions have advanced our understanding of the universe and inspired both scientists and the general public alike. (Credits: princetonianamuseum)

Charles Messier

Charles Messier (6 June 1730 – 12 April 1817) was a French astronomer best known for creating the Messier Catalog, a collection of 110 deep sky objects such as nebulae, star clusters, and galaxies. Passionate about comet hunting, he compiled this list to help astronomers distinguish permanent sky objects from new comet discoveries. His catalog became a cornerstone in deep sky astronomy and is still widely used by amateur and professional astronomers today. His contributions greatly enhanced our understanding of the night sky and observational astronomy. (Credits: Wikimedia)

Giovanni Cassini

Giovanni Cassini (8 June 1625 – 14 September 1712) was an Italian born astronomer who made significant contributions to planetary science. He discovered four of Saturn's moons, namely, Iapetus, Rhea, Tethys and Dione and identified the division in Saturn's rings. He also made accurate measurements of planetary orbits and helped determine the rotational periods of planets like Jupiter and Mars. Later he moved to France, becoming the first director of the Paris Observatory. His legacy lives on through NASA's Cassini spacecraft, named in his honor. (Credits: space.com)

Happy Birthday

Carolyn S. Shoemaker

Carolyn S. Shoemaker (June 24, 1929 – August 13, 2021) was a remarkable American astronomer for discovering the famous Comet Shoemaker-Levy 9 that collided with Jupiter in 1994. She began her astronomical career later in life and became one of the most prolific comet discoverers. Working with geologist Eugene Shoemaker, she contributed significantly to the study of planetary impacts and crater formations. Her legacy continues to inspire aspiring astronomers and highlights the impact of passion driven scientific discovery. (Credits: Wikipedia)

Lyman Spitzer

Lyman Spitzer (June 26, 1914 – March 31, 1997) was a groundbreaking American astrophysicist who played a central role in advancing both space based astronomy and plasma physics. He was the first to propose space telescopes in the 1940s and was instrumental in the development of the Hubble Space Telescope. He also made important contributions to understanding star formation, interstellar gas, and controlled nuclear fusion. In recognition of his impact, NASA named the infrared-observing Spitzer Space Telescope in his honor.
(Credits: Wikipedia)

George E. Hale

George Ellery Hale (June 29, 1868 – February 21, 1938)was a visionary American astronomer and instrumental figure in building some of the world's most important observatories, including Mount Wilson, Palomar. He invented the spectroheliograph, revolutionizing solar observation by capturing images of the Sun's atmosphere. He championed large scale telescope projects, helping advance astrophysics and our understanding of the universe. His leadership and innovations have left a profound impact on modern astronomy. (Credits: Wikipedia)

Astronomical Perception

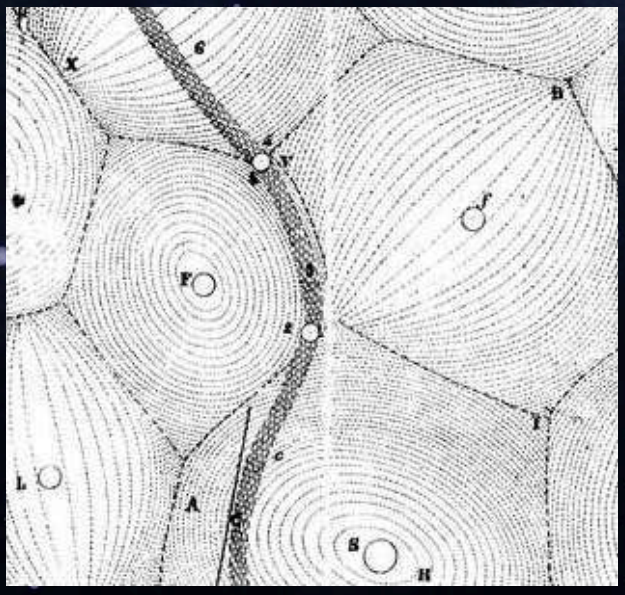
THE LUMINIFEROUS AETHER

For as long as we've had eyes to look skyward, we've asked one simple question how does light from the Sun reach us across the great void of space. There's nothing there no wind, no water. So what carries the light.

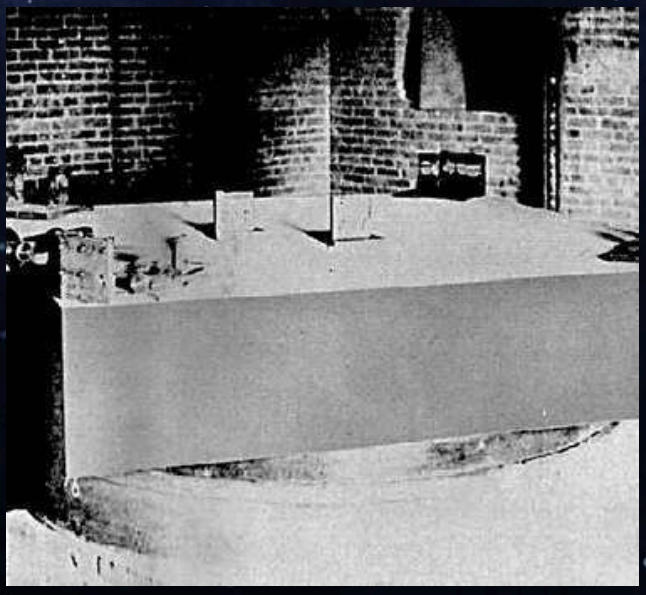
Ancient civilizations like the Egyptians imagined the Sun god Ra sailing through the sky in his celestial boat. The Babylonians and Greeks tracked the heavens with awe and mathematics. But it was Aristotle who gave us a bold proposition: the heavens, he said, must be made of something else a fifth element. Beyond earth, water, air, and fire, there was aether a pure, divine substance that filled the cosmos and gave the stars their perfect motion. Space, in his view, could not be empty.

The idea stuck around, roman philosophers adopted it. Islamic scholars preserved and debated it. In the Renaissance, thinkers like Rene Descartes described the universe as a giant machine, where no force could act at a distance so surely something invisible must connect it all.

As science advanced, so did our picture of light. By the 17th and 18th centuries, Christiaan Huygens had described light as a wave, while Newton saw it as a stream of particles. But waves whether on water or air a medium. So once again, the idea of aether came roaring back, this time as the luminiferous aether an invisible jelly filling all of space, allowing light to ripple through it.



Rene Descartes depiction of aether around celestial bodies.(Credit: loc.gov)



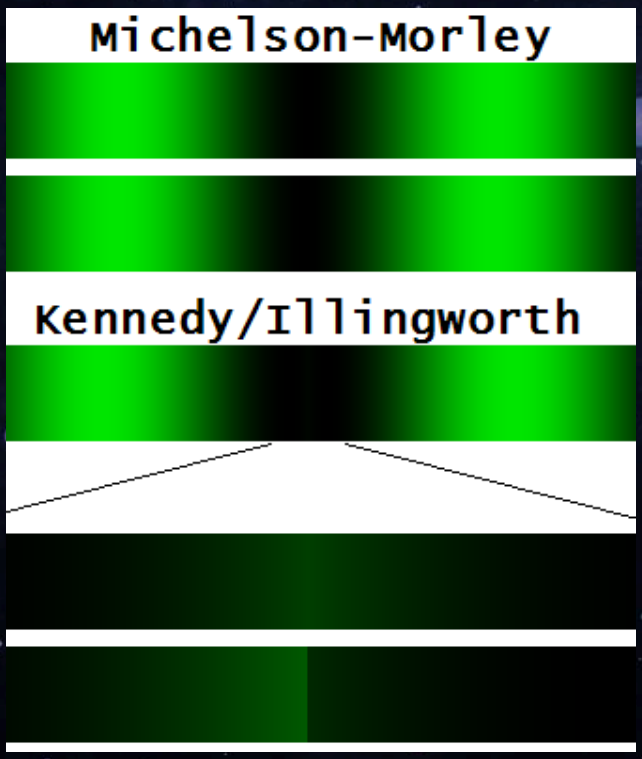
Setup of Michelson and Morley Experiment. (Credit: Case Western Reserve University)

But science doesn't thrive on good stories. It demands proof. Enter Michelson and Morley, 1887. They built an interferometer so sensitive it could detect Earth's motion through the aether. They expected to see interference patterns shift as our planet plowed through this universal medium.

When they performed their experiment the result shook physics to its core. They found Nothing. No drift, no wobble, no trace, No aether. It was the scientific equivalent of tuning a telescope to the heavens and finding darkness where starlight was expected. If light didn't need a medium, maybe the aether was never there to begin with.

And then came Einstein. In 1905, his theory of special relativity dismissed the need for aether entirely. Light didn't need a medium space and time themselves bent to its will. Time and space, once seen as fixed and absolute, became fluid, dynamic participants in the cosmic dance.

But here's the twist even today, we talk about quantum fields, dark energy, and a vacuum that isn't truly empty. In every point of space, particles flicker into existence and vanish. No, it's not Aristotle's aether. But the idea that space itself holds secrets still holds. Maybe he wasn't wrong because in the grand theater of the cosmos, space is never just space. It's the stage where reality performs its greatest wonders.



Simulation of the Kennedy/Illingworth refinement of the Michelson & Morley experiment.(Credit: Stigmatella aurantiaca)

Fringe Pattern produced with a Michelson interferometer using white light. (Credit: Alain Le Rille)

ROLE OF AI IN SPACE

Mining the Stars: How AI is Unlocking Asteroid Treasures

With Earth's resources under pressure, space mining is quickly transforming from a futuristic concept into a practical approach to satisfy growing demands. Space mining involves extracting valuable minerals from asteroids, moons, and other celestial bodies. Here are some notable AI-driven space mining companies working on technologies for extraterrestrial resource extraction:

Moon Express

(Image Credits: NASA)

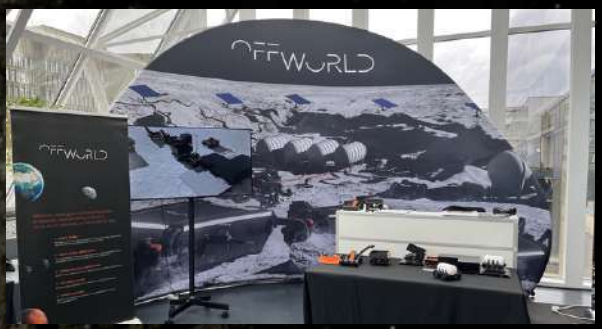
Moon Express is a private space company aiming to mine the Moon for valuable resources like Helium-3, rare Earth elements and water ice. By integrating AI into its operations, it seeks to improve the efficiency and reliability of its robotic spacecraft, such as the MX-1E lander.

Planetary Resources

(Image Credits: Consensys.space)

Planetary Resources, (ConsenSys) aimed to mine asteroids for water and precious metals. AI is used in identifying resource-rich asteroids, analyzing space data and enabling autonomous navigation. It also aids in advancing technologies for future space resource extraction.

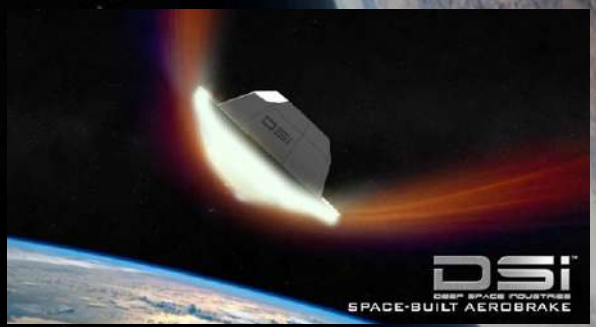
OffWorld AI Robotics



(Image Credits: pbs.twimg.com)

OffWorld AI Robotics develops AI powered autonomous robot swarms for space mining on the Moon, asteroids and Mars. Their robots perform precise excavation and material processing, adapt to harsh environments, and collaborate efficiently.

Deep Space Industries



(Image Credits: John Lewis)

Deep Space Industries (DSI) was a pioneering American company in asteroid mining, founded in 2013. It developed spacecraft like FireFly, DragonFly for resource prospecting and the Prospector-X satellite to test asteroid exploration technologies.

ASTRONOMICAL EVENTS - JUNE 2025

VENUS AT GREATEST WESTERN ELONGATION

As the world slumbers, the cosmos has a surprise waiting just before sunrise on June 1, 2025. Venus, famously known as the Morning Star, reaches its greatest western elongation, making it the brightest natural object in the eastern sky before dawn. For skywatchers, it's a sight not to miss, a celestial jewel lighting up the early hours.

What Does "Greatest Western Elongation" Mean?
In astronomical terms, Venus reaches greatest western elongation when it appears farthest west of the Sun as seen from Earth, in this case, 45.4 degrees away. This separation makes Venus highly visible in the morning sky, rising well before the Sun and glowing brightly against the fading darkness.
This isn't just a visual treat, it's a geometric alignment that beautifully illustrates how planets orbit the Sun. Venus, being an inferior planet (closer to the Sun than Earth), shows phases just like our Moon. Around elongation, it displays a half-lit phase, which can be glimpsed through a telescope or strong binoculars.

Why This Moment Matters
Elongations offer ideal opportunities to observe inner planets like Venus and Mercury, which otherwise remain hidden by the Sun's glare. This event provides a rare chance to study Venus's phase, brightness, and position relative to Earth, especially useful for amateur astronomers, educators, and photographers.
Moreover, events like these spark public curiosity and remind us of our planet's place in the solar dance, highlighting the clockwork precision of celestial mechanics.

How and Where to See It
Date: June 1, 2025
Time: Look between 4:00 a.m. till sunrise (around 5:30 a.m.), when Venus is highest in the sky.
Location: Face east-northeast. In cities like New Delhi, Venus will rise around 3:45 a.m. and be about 77° above the horizon before dawn.
Tools: No telescope is needed! A clear view of the eastern sky, away from light pollution, is enough. Binoculars or a small telescope may reveal Venus's half-phase.
Weather Tip: Check your local forecast the night before, cloudy skies may obscure your view.

Did You Know?
- Venus is brighter than any star in the night sky.
- The planet is currently about 72 million km from Earth.
- This elongation places Venus in the constellation Taurus, not far from the brilliant star Aldebaran.

On June 1, let Venus be your early morning guide. Whether you're an amateur astronomer or simply someone seeking beauty in the sky, this planetary performance is worth waking up for. As dawn approaches, Venus will gleam like a distant lighthouse, reminding us that even in the quietest hours, the universe has wonders to share.

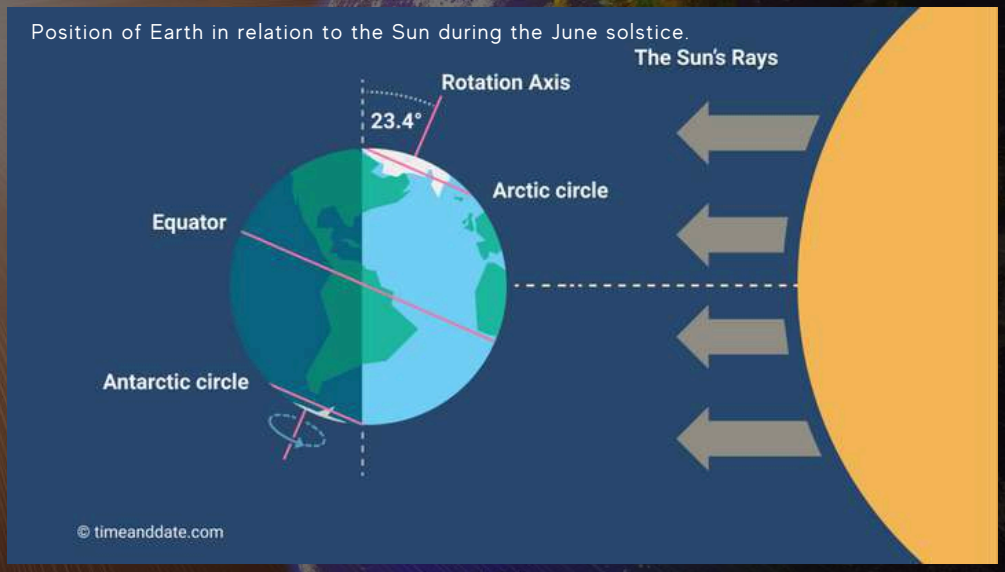
JUNE SOLSTICE GLOW-UP

The Longest Day of the Year

Mark your calendars for June 21, 2025, the Summer Solstice is here, bringing the longest day and shortest night of the year for the Northern Hemisphere. On this day, the Sun reaches its highest point in the sky, and daylight lingers longer than on any other day.
The word "solstice" comes from Latin, sol (Sun) and sistere (to stand still). And that's just what the Sun appears to do: pause in the sky before slowly beginning its descent southward again.

What's Actually Happening?

The solstice occurs because Earth is tilted at 23.5 degrees on its axis. On June 21, the North Pole is tilted closest to the Sun, making it appear directly overhead at the Tropic of Cancer.



This astronomical alignment happens once a year and officially marks the start of summer in many cultures. While most solstices fall on June 20 or 21, the 2025 solstice occurs slightly later, a rare but not unprecedented shift due to Earth's orbital quirks and leap year adjustments.

How Long is the Day?

Depending on your location, daylight hours on June 21 can extend up to 16+ hours in northern latitudes like Europe or North America. In India, cities like Delhi or Mumbai will see about 14 hours of sunlight, with sunrise around 5:25 a.m. and sunset around 7:30 p.m.

The Cultural Light

From the Scandinavian Midsummer festivals to Indigenous Sun dances, cultures around the world have long honored the solstice as a time of renewal, gratitude, and light. In India, it coincides with the monsoon season's early stirrings, a perfect balance of fire and water.

The Summer Solstice on June 21, 2025, is more than just an astronomical marker, it's a celebration of light, life, and celestial harmony. Wherever you are, take a moment to bask in the sunlight, tilt your face to the sky, and greet the longest day with awe.

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 Mars and Moon

On June 01st, the Red planet Mars and the Moon will have their closest approach in the evening sky. The Mars will shine at a magnitude of 1.29, while the Moon will appear at a magnitude of -11.48. This celestial event will be visible from around 07.00 p.m.

Conjunction of Moon and Saturn

On June 19th, witness the celestial conjunction of the Moon and the Lord of Rings Saturn in their closest approach. The Moon will shine at a magnitude of -11.94, while the Saturn will appear at a magnitude of 1.05. This celestial event will be visible from around 12.40 a.m.

Conjunction of Moon and Pleiades

On March 5th, the Moon and the Pleiades, also known as the Seven Sisters, will have their closest approach in the Eastern sky. The Moon will shine at a magnitude of -10.10 while the Pleiades will appear at a magnitude of 1.59. This celestial event will be visible from around 03.40 a.m.

Conjunction of Moon, Mercury and Beehive Cluster

On June 27th, witness the conjunction of the Moon, the Mercury, and the Beehive Cluster. The Moon will shine brightly at magnitude -9.59, Mercury at 0.24, and the Beehive Cluster will glow gently at 3.09. This celestial event will be visible from 07.30 p.m.

STUDENT'S CORNER

AI and Space

Sourajit Mandal, Astronomy Camp Student

AI is everywhere. Agree or not, artificial intelligence has become an inevitable part of our day to day lives. From ChatGPT, YouTube recommendations, everything has some AI in it these days. Even scientific research has been transformed due to AI. And so has space exploration.

Artificial intelligence is becoming an integral component of modern space exploration. Its ability to process enormous data and make independent decisions is revolutionizing the way we understand and engage with the universe. One of the most exciting modes in which AI is assisting us presently is in looking for new stars and planets. Space telescopes such as TESS and Kepler gather huge amounts of data every day. Much more than any human team would be able to analyse by themselves.

Artificial intelligence comes in and thoroughly scans this data for minute dips or variations in light coming from far-off stars. Even the smallest of changes can mean that a planet is transiting across the face of the star, a technique called the transit technique. With the pace and accuracy of AI, thousands of exoplanets have been found, some of which can potentially have life-friendly conditions. Such a planet-hunting revolution would be impossible without AI since the volume of data is simply too great for conventional analysis techniques.

Besides discovering new worlds, AI plays a key role in operating spacecraft and planetary rovers. Consider NASA's Mars rover Perseverance, for a second. Working millions of kilometres from Earth means communication signals can take from a few minutes to almost an hour to reach. This is why live control is not possible, and Perseverance is based on AI to steer around Martian obstacles on its own. The rover employs machine learning to detect roadblocks such as rocks and cliffs, plan safe paths, and even select scientific targets worth investigating in more detail. This independence enables the mission to move forward effectively and maximizes the scientific payoff of the information gathered, while minimizing the requirement for continuous human oversight.

Artificial intelligence is also an effective tool for examining the vast volumes of imagery and sensor data obtained by space telescopes and satellites.

AI programs can differentiate galaxies, identify transient events such as supernova explosions, and identify solar flares much more quickly than human researchers. This instant detection is essential since some cosmic phenomena need to be responded promptly in order to safeguard instruments and make follow-up observations. Early prediction of solar storms, for instance, can prevent shielding satellites and save astronauts from hazardous radiation, potentially preserving costly equipment and even lives.

Space weather prediction ranks among the most important domains where AI is bringing about a change. Solar storms, triggered by outbursts of charged particles from the Sun, may disrupt satellite activity, jam navigation systems, and even destroy power grids on Earth. AI models can forecast these storms earlier and more accurately by examining real-time solar data. Early warnings enable satellite operators and space agencies to take early action in the form of shutting down vulnerable systems or changing satellite orbits to reduce damage.

In the area of communications, AI assumes a growing role in controlling the intricate networks that link satellites, space stations, and Earth. With thousands of satellites circling the globe, keeping communication links fast and effective is an ongoing challenge. AI assists by optimising data traffic, anticipating technical issues before they arise, and automatically fine-tuning network settings to maintain seamless data transmission. Intelligent management is crucial for deep space missions where signal loss and delays can have a major effect on operations.

Artificial intelligence is already transforming space exploration in some very amazing ways. From mapping far-off planets and navigating independent rovers to analysing cosmic activity and handling messages, AI informs and enables us both to understand the universe more fully and to explore it cost-effectively and securely. AI is an important and dynamic component of current space travel, and its functions will only grow as humanity ventures further into the universe.

Lost in Space? Not Any More!

Anoushka Rajkumar, Astronomy Camp Student

Introduction:
Any fan of The Lord of the Rings would agree that not all those who wander are lost. But what purpose does wandering serve in space? In a realm where every direction leads to the unknown, navigating with purpose becomes essential. Early planetary probes like Pioneer and Voyager used surprisingly advanced navigation methods, combining thrusters with celestial observations and Earth-based tracking to chart their courses. To appreciate how far space navigation has come, it helps to look back at its evolution.

The Evolution of Space Navigation:
Navigation in space drew heavily from techniques used at sea and in the air. In the earliest days, navigation was fully Earth-based, relying on simple radio tracking and radar. By the 1960s and '70s, more sophisticated systems such as sun sensors and star trackers began to emerge. While missions were still largely pre-programmed, course corrections were calculated on Earth and sent remotely. Building on these advancements, modern spacecraft now navigate with increasing autonomy. For instance, spacecraft orbiting Earth commonly use GPS for real-time positioning, vastly improving navigation accuracy.

Methods of Navigating the Cosmos
Spacecraft rely on a range of navigation tools, each suited to different environments and mission goals. Here are the key methods:

Radio: The primary method for deep space tracking remains sending signals between Earth and spacecraft, then measuring the time delay. This approach is similar to sonar or echolocation, where the return time of signals helps calculate distance.

For example, NASA's Deep Space Network tracks Voyager 1, currently billions of miles from Earth, by measuring radio signal travel times.

Celestial Navigation: Used mainly for orientation, this technique locks onto known celestial bodies like stars, planets, and the Sun, acting much like a compass. The Voyager probes use star trackers to maintain their attitude, ensuring their antennas point toward Earth for communication.

Inertial Navigation: By measuring acceleration and rotation with gyroscopes and accelerometers, spacecraft track their motion without external input. The Apollo missions used inertial navigation systems to maintain spacecraft orientation during lunar journeys, though small errors accumulated over time–called "drift"–that needed correction.

Optical Navigation: Spacecraft capture images of nearby bodies–moons, planets, stars–to refine their trajectories. The New Horizons mission to Pluto used optical navigation by photographing background stars and Pluto itself to adjust its course precisely.

GPS: GPS satellites orbit Earth and provide precise positioning, but this system only works near Earth. The International Space Station relies on GPS for real-time location data, enabling precise maneuvering in low Earth orbit.

Autonomous Navigation: Onboard systems detect nearby terrain and obstacles to navigate without immediate input from Earth. NASA's Mars rovers, like Curiosity and Perseverance, use autonomous navigation to traverse the Martian surface, identifying hazards and plotting safe paths.
Ground Stations

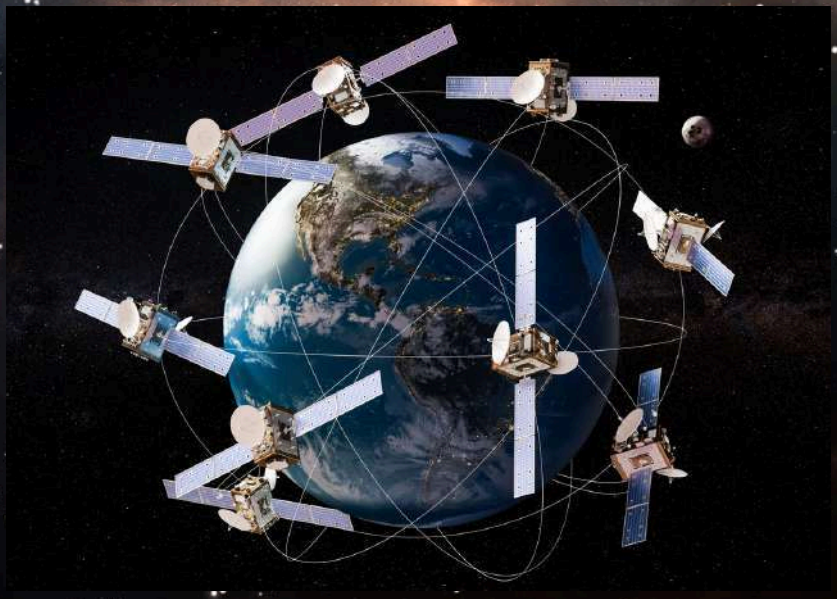
Supporting all these navigation methods is a global network of ground stations that communicate with spacecraft, enabling navigation and command. These stations send and receive radio signals, measuring the time delay to calculate distance and velocity. For example, India's Satish Dhawan Space Centre in Sriharikota hosts ground stations that monitor launch vehicles and spacecraft, playing a critical role in mission success.

What's Next?
AI and Machine Learning: AI-driven navigation systems are increasingly important for spacecraft venturing where real-time Earth communication is impossible. NASA's Perseverance rover uses AI to autonomously navigate Mars' rocky terrain, making decisions without waiting for commands.

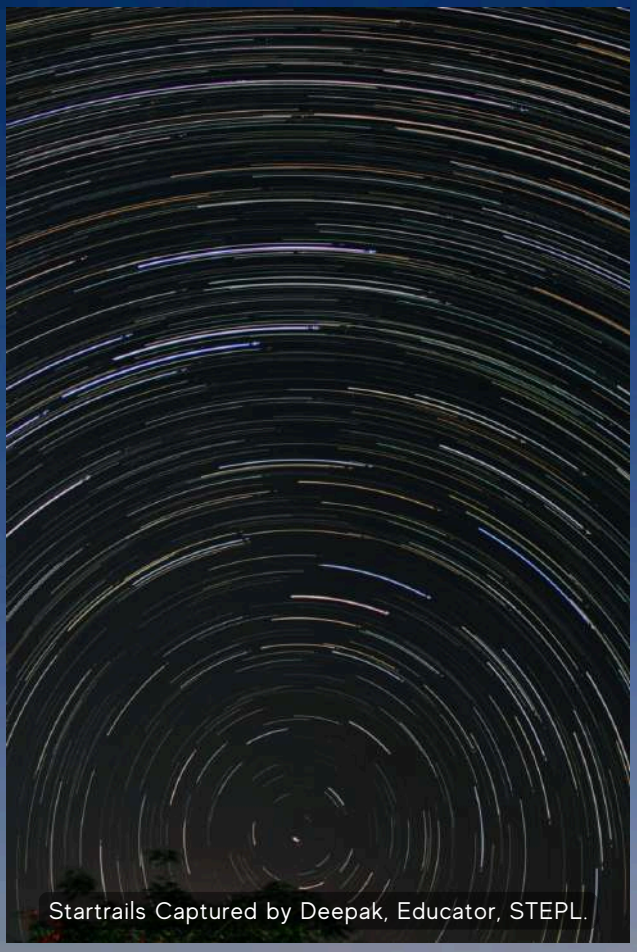
Pulsar-Based Navigation (XNAV): Pulsars—rapidly spinning neutron stars emitting regular X-ray pulses—are being studied as natural cosmic lighthouses. Their consistent pulses could help spacecraft autonomously determine their position deep in space, beyond GPS reach.

Swarm Navigation: Future missions may deploy fleets of small, well-equipped spacecraft working together. By sharing data and coordinating movements, these swarms could improve navigation accuracy and field of vision, especially when exploring asteroids or moons.

Conclusion:
From humble beginnings relying on Earth's radio signals to the promise of AI and pulsar-guided autonomy, space navigation continues to evolve. As humanity reaches farther into the cosmos, mastering navigation will transform aimless wandering into purposeful exploration and discovery.



ASTROPHOTOGRAPHS FROM SPACE TEAM



Startrails Captured by Deepak, Educator, STEPL.

Sombreo Galaxy Captured by Shiril, GAPL.

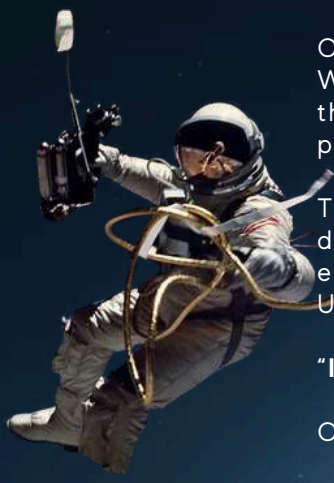
ASTROPHOTOGRAPH FROM SPACE ASSOCIATED ASTRONOMERS

Sun Captured by Aryan Gupta, iastronomer.

Jupiter Captured by Dinesh K, Educator, STEPL.

HISTORICAL EVENTS HAPPENED IN JUNE

STEPPING INTO THE STARS: ED WHITE AND AMERICA'S FIRST SPACEWALK



On **June 3, 1965,** as Earth turned silently below, astronaut Edward H. White II made history. During the **Gemini 4** mission, White became the first American to walk in space, floating **200 miles** above our planet at a speed of **17,000 miles per hour.**

Time flies when you're having fun! It certainly did for White, who didn't hold back on expressing his displeasure with the thought of ending his spacewalk. "**I'm not coming in…This is fun,**" White said. Upon ending his stroll in space, White said,

"I'm coming back in, and it's the saddest moment of my life."

On Your Left: Edward H. White (Image Credit: NASA)

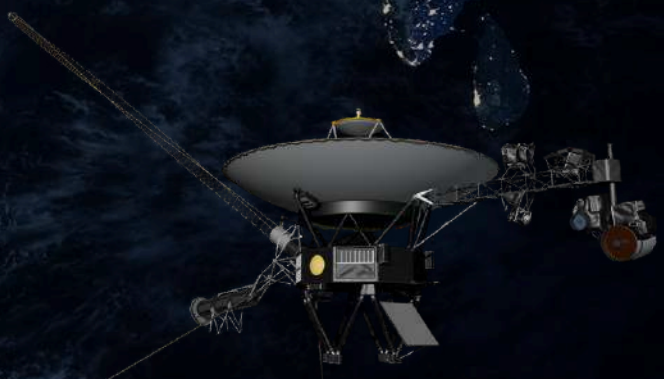
The **first American spacewalk** was a part of the **four-day** Gemini IV mission to study the effects of prolonged spaceflight. **Ed White** served as the mission pilot and **James McDivitt** as the mission commander. The crew of two spent the remainder of their flight conducting 11 experiments, which included Earth photography and spacecraft navigation. Tragically, Ed White later lost his life in the Apollo 1 fire in 1967.

Gemini IV astronauts Ed White and Jim McDivitt at Cape Kennedy's Launch Pad 19 on June 1, 1965

VOYAGER 1: HUMANITY'S SILENT MESSENGER TO THE STARS

Launched on **September 5, 1977, Voyager 1** was built for exploration–but not just any kind. It was destined to go farther than any human-made object ever had. Originally designed to study **Jupiter and Saturn,** this small yet mighty spacecraft eventually became the first to pass beyond all known planets of our solar system, venturing into the mysterious realm of interstellar space.

By **August 2012**, Voyager 1 officially crossed the **heliopause**, the invisible boundary where the Sun's solar wind yields to the interstellar medium.
Among its many accomplishments, Voyager-1 captured breath taking images of the outer planets and gifted the world with the iconic "**Pale Blue Dot**" photo, a tiny **Earth** suspended in a sunbeam, reminding us of our fragile place in the universe.



Voyager 1 (Credit: The Daily Galaxy)

HAYABUSA: FIRST-EVER ASTEROID SAMPLE RETURN FROM 25143 ITOKAWA

An artist's concept of Japan's Hayabusa landing on the asteroid Itokawa.

Asteroid 25143 Itokawa (Image Credit: NASA)

In a historic leap for space science, Japan's Hayabusa mission became **the first spacecraft to return samples from an asteroid–25143 Itokawa.** Launched in 2003 by JAXA, Hayabusa reached the small, rocky asteroid in 2005 and, despite technical challenges, managed to collect microscopic dust particles from its surface.
After a seven-year journey, Hayabusa's return capsule landed in Australia in 2010, bringing back over 1,500 particles. These samples revealed that Itokawa is a **rubble-pile asteroid**–a loose collection of debris from a past cosmic collision.

The asteroid was named for Hideo Itokawa (1912-1999), who is regarded as the father of Japanese rocketry. He was an aerospace engineer who initiated Japan's first launch tests of the solid rocket series called Pencil in 1955. Under his leadership, Japanese rockets reached space by 1960 and put the country's first satellite into orbit in 1970.

Hayabusa's success opened the door for future missions, deepening our understanding of asteroids and the early solar system.

ALBERT II: THE UNSUNG PIONEER OF SPACE TRAVEL

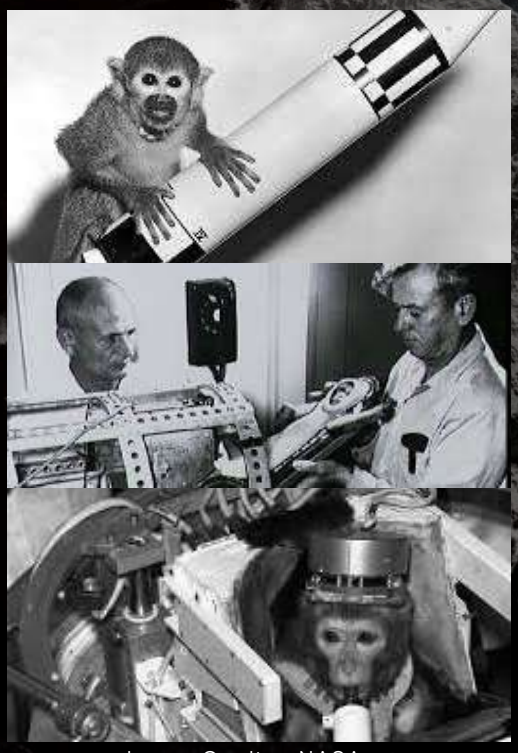


Image Credits: NASA

Before humans ever touched the edge of space, it was a rhesus monkey named **Albert II** who paved the way. On June 14, 1949, Albert II became the first mammal in space, launched aboard a V-2 rocket by the **United States Air Force.**

He reached an altitude of **83 miles (134 km)**, just past the Kármán line–the boundary of space. Sadly, although Albert II survived the weightless journey, a parachute failure during re-entry led to his tragic death.

Albert II's mission was more than a milestone–it was a foundation. His journey provided the first biomedical data from space and proved that living organisms could survive beyond Earth's atmosphere, setting the stage for future human spaceflight.

Though his name is less known, Albert II remains a brave symbol of exploration in the early days of space science.

The First Women to Blaze Trails in Space

Valentina Tereshkova The First Woman in Space

On **June 16, 1963,** history soared beyond Earth's atmosphere when **Valentina Tereshkova, a 26-year-old** Soviet cosmonaut, became the first woman in space. Aboard **Vostok 6**, she orbited the Earth **48 times** over nearly **three days**, proving that space was not a frontier limited by gender.

Born to a humble family and trained as a textile worker and parachutist, Tereshkova was selected for her resilience, intelligence, and courage. Her solo flight made her not only a symbol of Soviet space achievement but also an enduring global icon of women's empowerment in science and exploration. Her words still echo through history:

"Hey sky, take off your hat, I'm coming!"

Sally Ride America's First Woman in Orbit

On **June 18, 1983**, physicist and astronaut **Dr. Sally Ride** made history aboard the space shuttle Challenger (STS-7) as the **first American woman in space.** At just 32, she also became the youngest American astronaut to reach orbit.

Her five-day flight involved deploying satellites and conducting experiments, but her greatest impact was showing young girls that space wasn't just for men.

Despite the media's focus on her gender, Sally Ride remained focused on the mission, famously saying:

"I didn't set out to be a role model, but I realize that I am, and I'm proud of it."

MOON'S HIDDEN HISTORY: THE SCIENCE BEHIND THE FAR SIDE SAMPLES

In a ground breaking feat of space exploration, China's Chang'e-6 mission made history in June 2024 by returning the first-ever samples from the far side of the Moon, the side perpetually turned away from Earth.

Chang'e-6 took several images of its leg and surroundings, which were stitched together to make this panorama. Credit: CNSA.

The robotic lander touched down in the South Pole-Aitken basin, one of the oldest and deepest lunar craters, scooping up nearly 2 kilograms of lunar soil and rock.

Chang'e-6 meticulously dug up soil samples from the lunar surface and subsurface.

Preliminary analyses hint at volcanic surprises, including new insights into the Moon's internal heat and composition. These discoveries may help unlock the Moon's mysterious past and even inform future manned missions.

Image on your left: Chang'e-6 meticulously dug up soil samples from the lunar surface and subsurface.

With Chang'e-6, China hasn't just explored the far side–it's redefined what's possible in lunar science.

THE DAY THE SKY EXPLODED: THE MYSTERIOUS TUNGUSKA EVENT OF 1908

On June 30, 1908, the skies over Siberia, Russia, erupted in a fiery blast that flattened over 2,000 square kilometers of forest, an area nearly the size of a major city. Known as the Tunguska Event, it remains the largest asteroid-related explosion in record.

The approximate location of the Tunguska event of 1908 in Siberia, Russia. Image via Wikimedia Commons

Witnesses described a blinding light, followed by a shockwave that knocked people off their feet and shattered windows hundreds of kilometers away. Yet, no crater was ever found.

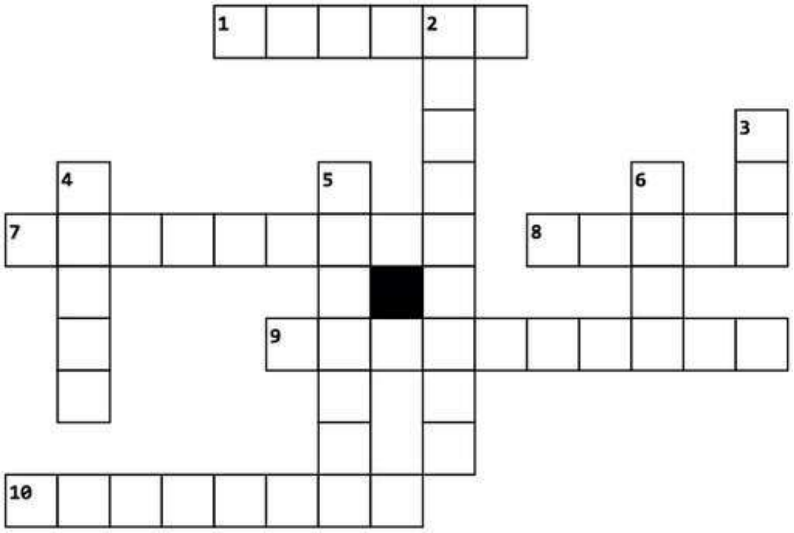
Aftermath of the Tunguska event: The Siberian countryside after an explosion in the atmosphere above the Podkamennaya.

Scientists now believe a 65-80 meter-wide asteroid or comet exploded in the atmosphere, releasing energy equal to 10-15 megatons of TNT–more than 1,000 times that of the Hiroshima bomb.

Despite decades of research, mysteries remain. Was it a comet? An asteroid? Something else entirely?

TRAIN YOUR BRAIN

CROSSWORD



Across

1. What comet is the source of the Eta Aquarids?
7. What is the term for a Full Moon at apogee?
8. Which European gravitational wave detector joins LIGO in listening to the cosmos?
9. What is the Big Dipper called in Hindy astronomy?
10. What is the name of the satellite launching aboard GSLV MkIII in May 2025?

Down

2. Which British astronomer tested Einstein's theory of relativity in 1919?
3. What constellation is K2-19b found in?
4. What is the nickname of the galaxy M82 in Ursa Major?
5. What was the spacecraft that measured Uranus' spin in 1986?
6. Who was Mars known as in Greek mythology?

Astronomy Word Puzzle

Zoom into the anatomy of a telescope!

Telescope Toolkit

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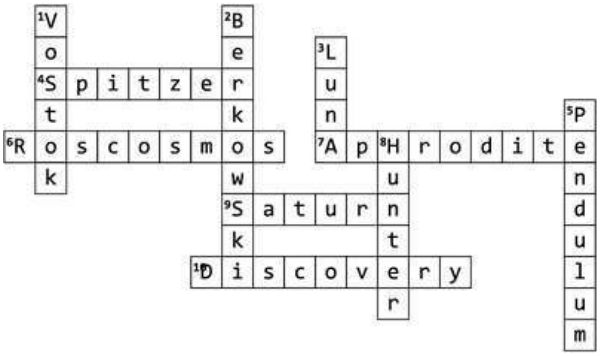
S	O	A	C	B	A	R	L	O	W	P	O	E	E
L	P	P	L	L	E	R	R	M	T	O	R	L	C
U	R	R	E	R	R	O	T	O	M	D	E	T	E
U	R	W	S	S	O	R	E	S	U	C	O	F	E

TRIPOD
DIAGONAL
COLLIMATOR
MOTOR
MOUNT
LENSES
RETICLE
FINDER
EYEPIECE
CORRECTOR
MIRRORS
FOCUSER
BARLOW
FILTERS
TUBE

Answers for last month puzzles.



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

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JUNE 2025| VOLUME 4 | ISSUE VI

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