SPACE™
EMPOWERING LIFE

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Galactica

Astronomy and Space Science Magazine

What's Inside?

www.space-global.com

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

Team

ABOUT SPACE

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

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

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

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

CMD's Message

Dr. Sachin Bahmba, CMD, SPACE

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

Co-founder's Message

Ms. Shalini Bahmba, Co-founder, SPACE

Astronomy education is important as it builds curiosity, critical thinking, and problem-solving skills, helping young minds prepare for the future. It encourages innovation, exploration, and a scientific mindset. Young learners build creativity and confidence through hands-on, experiential learning, preparing them for careers in space science and technology. We aim to cultivate future innovators who will lead progress, discovery, and global advancement.

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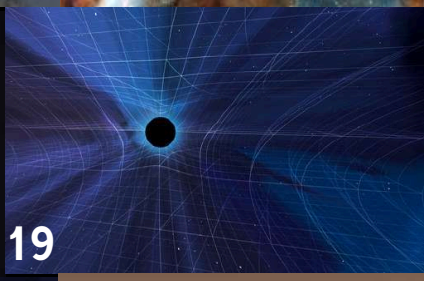

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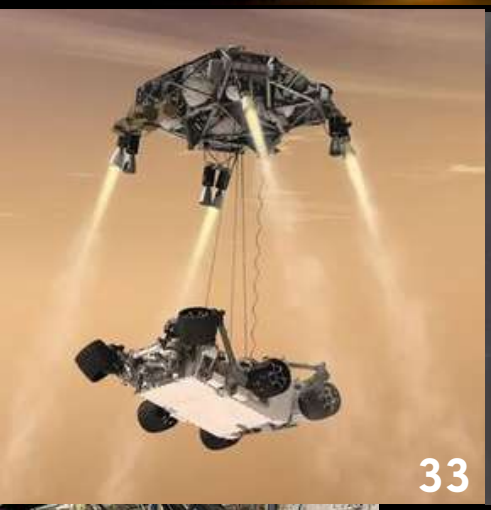
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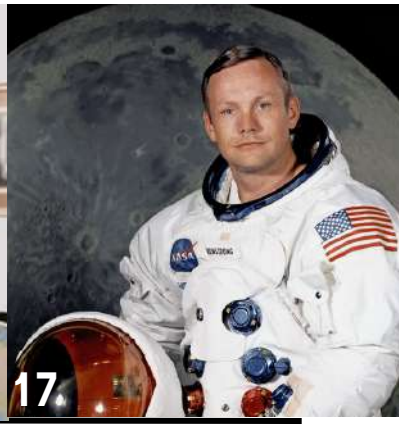
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From Chandrayaan-3 to Gaganyaan: Why India Needs a National Space Day

As India reaches new heights in space exploration from the success of Chandrayaan-3 to the upcoming Gaganyaan human spaceflight mission the idea of celebrating a National Space Day has never been more timely.

But what is National Space Day?
National Space Day in India commemorates the historic Chandrayaan-3 lunar landing on 23 August 2023. Prime Minister Narendra Modi declared this date officially as National Space Day in recognition of India's breakthrough in lunar exploration.

While countries like the U.S. have already established such days, India too deserves a moment to recognize the incredible efforts of ISRO scientists, engineers, educators, and young dreamers who are propelling our space journey forward.

Why should we celebrate it?
Because India's space journey is more than just missions, it reflects our nation's strength in science, education, innovation, and global collaboration. From launching low-cost satellites to deep-space missions, India has proven that brilliance isn't bound by budget, but fueled by passion.

Recognizing a National Space Day will not only pay tribute to past milestones but also ignite interest in science among the younger generation, strengthen public engagement, and shine a spotlight on India's leadership in peaceful space exploration.

In a country where every student has the potential to be a future scientist, explorer, or engineer, celebrating space is a way of celebrating our future.

Let's give India's sky-bound dreams the recognition they deserve, by marking a day for the stars.

In celebration of National Space Day 2025, **SPACE India** proudly presents a series of landmark events across the nation, uniting students, educators, and space enthusiasts under the inspiring theme "Viksit Bharat in Orbit: Leading the New Space Race."

Kicking Off with Insight: Online Panel Discussion: The celebrations will begin on 21 August at 4:30 PM with an engaging Online Panel Discussion, live on YouTube. The panel will feature eminent space scientists and educators who will reflect on the monumental success of Chandrayaan-3, highlight ISRO's groundbreaking contributions, and spotlight the inspiring journey of Indian researcher Shubhanshu Shukla during Axiom Mission 4 aboard the International Space Station. The session is aimed at igniting a deep interest in space science and STEM careers among India's youth.

Student-Led Innovation: School Celebrations Across India: From 8 to 23 August, schools across the country will take the lead in hosting vibrant School-Led Celebrations, turning classrooms into hubs of exploration and creativity. Activities will include model making, hands-on experiments, space science quizzes, and more. SPACE India will provide expert guidelines and teacher training to ensure impactful implementation. Each participating school will submit a report of their activities, which will be compiled into a national report shared with ISRO–recognising the collective effort of India's student community in celebrating space science.

Fostering Global Exchange: Event at Russian House, New Delhi: On 25 August, SPACE India will collaborate with Russian House, New Delhi, to host a day of international scientific exchange. The event will include a curated film screening showcasing Russia's legacy in space exploration, poster presentations by students, and an interactive design thinking workshop. The day will celebrate the spirit of international cooperation and the shared human pursuit of knowledge beyond Earth.

Art Meets Science: Poster Making Competition in Chennai: A dedicated Offline Poster Making Competition will be held on 21 August at Heartfulness International School, Chennai, inviting students from Grades 3 to 12 to creatively depict India's achievements and future aspirations in space. This event will encourage students to explore the intersection of art and science while deepening their understanding of India's role in space exploration.

Hands-On Exploration: Raman Science Centre, Nagpur: On 22 August, the Raman Science Centre in Nagpur, in partnership with SPACE India, will host a dynamic day of activities designed to immerse students in the spirit of scientific inquiry. The event will feature poster presentations, a hands-on workshop, and an exhilarating water rocketry demonstration, all curated to foster experiential learning and excitement around space science.

SPACE INSIGHTS

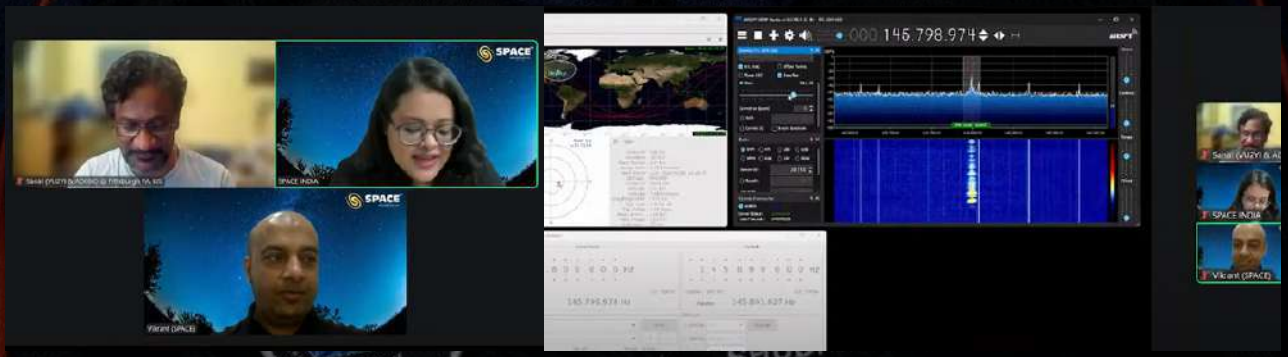
FROM ISS TO YOUR SCREEN: THE ANTARIKSHVANI EXPERIENCE

On July 4th and 8th, an extraordinary event named Antarikshvani captivated students, bringing the marvels of space communication right into their classrooms. This live YouTube broadcast, designed to showcase the power of HAM radio, successfully connected students with Shubhanshu Shukla's conversation from the International Space Station (ISS). The event was a resounding success, drawing a large number of eager students who actively participated and had their questions answered.

The Antarikshvani team included Dr. Sanath Kumar, Mr. Vikrant Narang, Mr. Ranjith Kumar (Technical), Ms. Manalee Deka (Presenter), Mr. Ravi Kumar and Mr. Deepak Kumar (OBS).

The primary objective of Antarikshvani was to demystify HAM radio and illustrate its incredible capability to facilitate real-time communication with individuals in space. Through this event, students were given a rare and invaluable opportunity to directly experience the thrill of space communication.

By listening in on Shubhanshu Shukla's actual interaction from the International Space Station, they not only learned about the technical aspects of amateur radio but also grasped its profound significance in enabling communication beyond our planet. This direct exposure aimed to make the concept of space communication tangible and relatable, fostering a deeper understanding of scientific endeavors in space.



The overwhelming participation and enthusiastic questions from students were clear indicators of the event's profound impact and success. Students from various backgrounds and age groups joined the live stream, demonstrating a keen interest in both space and the innovative technology of HAM radio.

Their insightful queries, expertly addressed by the team, highlighted the educational value of Antarikshvani. The event truly succeeded in sparking curiosity, inspiring a new generation to explore the fascinating realms of science, technology, and space communication and perhaps even consider future careers in these exciting fields.

EXPLORING THE COSMOS: SPACE ARCADE'S MONTHLY TELESCOPIC OBSERVATION - 5TH JULY 2025

Space Arcade successfully conducted its Monthly Telescopic Observation Session in Chennai, bringing together around 15 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:
"We really enjoyed the day, and my child was especially delighted to see the Moon for the first time. It was a memorable experience." - Ashok Amirtharaj.
"This was my first time attending such an event, and I thoroughly enjoyed the overall experience." - Lavina Bajaj.
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

TASTE OF GALAXY: A DELICIOUS TRIP THROUGH SPACE AT ST. MARTIN'S DIOCESAN SCHOOL

St. Martin's Diocesan School, Delhi Cantt. was bursting with flavour and imagination as students of Classes 1 and 2 embarked on a one-of-a-kind culinary journey through the cosmos during the "Taste of Galaxy" event – a unique blend of food, fun and space exploration.

Organised under the Astronomy Club sessions by Space India, this event was designed to engage young minds with the wonders of space science – but with a tasty twist! Students arrived dressed as astronauts, aliens, rockets and planets, ready to share not just their cosmic creativity, but also their galaxy-inspired treats.

Event Highlights:

- Space-Themed Dishes: From UFO Uttapams to Meteorite Laddoos, Rocket Sandwiches to Alien Idlis, students and parents prepared an exciting range of food items inspired by celestial objects. The creativity was unmatched and the taste – truly out of this world!
- Show and Tell Presentations: Each child got a chance to explain the space connection behind their dish, boosting their confidence and helping them learn to express scientific concepts in simple ways.
- Hands-On Learning: The event turned abstract space ideas into tangible, tasty experiences. Children learned about planets, stars, and rockets while tasting their way through the galaxy.
- Parent Participation: Parents actively helped in preparing themed dishes and encouraging their kids to learn the science behind them, making it a collaborative and heartwarming event.

A Truly Galactic Experience: "Taste of Galaxy" was not just about food – it was a beautiful blend of sensory learning, creativity, and confidence building. The young learners explored outer space using their five senses, making the vast universe feel closer, relatable, and so much fun!

This event was a stellar example of how science can be taught beyond textbooks – through creativity, joy, and flavour. The smiles, the excitement, and the twinkling eyes of the children said it all – they truly got a taste of the galaxy!

INDIA'S SPACE HERO RETURNS: A CLASSROOM CELEBRATION

In a historic moment for India, Shubhanshu Shukla became the second Indian to travel to space and the first to reach the International Space Station (ISS) aboard the Axiom-4 mission launched on 25th June 2025. His return on 15th July sparked celebrations across schools, where students turned this achievement into an inspiring learning experience.

Bal Bharati Public School, Pitampura
Guided by Astronomy Educator Ms. Saloni Verma, students from Grades II to X tracked the 18-day mission, explored the ISS, and studied experiments conducted onboard. On 7th July, they waved at the ISS from their homes and watched the live interaction between PM Modi and Shubhanshu, igniting pride and curiosity.

Delhi Public School, Greater Faridabad
Students paid tribute through a session titled "Shubhanshu Shukla: Journey from Air Force to Space." Using presentations, skits, and storytelling, they explored his life, highlighting the hard work and discipline behind his journey – inspiring peers to aim high.

St. Ursula Girls' High School & Jr. College, Nagpur
The school held a special assembly on 15th July, where students viewed the live landing and participated in a poster competition on space exploration. They also shared video messages, expressing admiration and dreams of reaching the stars.

The Indian Heights School
Class 4 students watched a video on Shukla's journey and sent heartfelt messages of welcome and gratitude, deeply moved by his contribution to the nation.

HIGHLIGHTS OF JULY 2025

New Interstellar Object 3I/ATLAS - The Oldest Known Cosmic Visitor

In a groundbreaking discovery, astronomers have identified a rare interstellar object–3I/ATLAS–now making a fleeting visit through our solar system. It's only the third known interstellar object, and quite possibly the oldest comet ever observed.

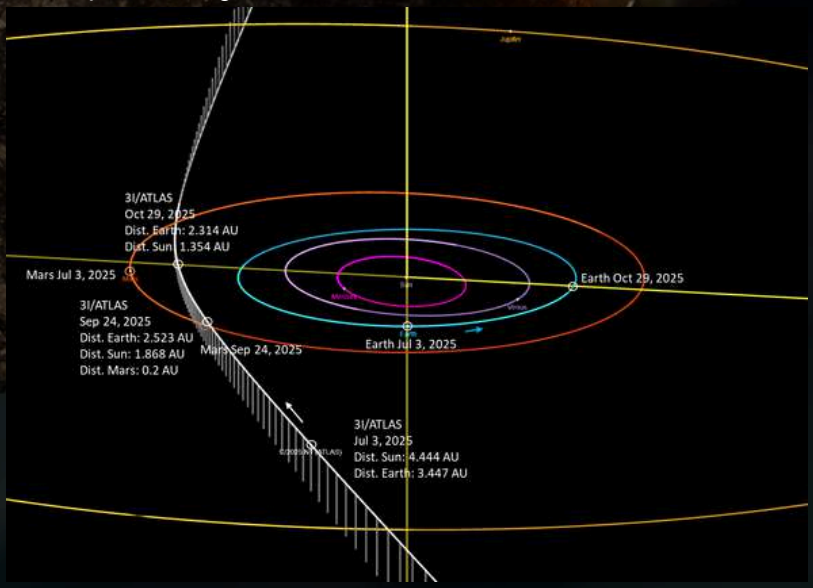
Spotted in early 2025 by the ATLAS survey system in Hawaii, 3I/ATLAS was flagged for its unusual orbit. Unlike local comets that revolve around the Sun, this one is on a hyperbolic path, which means it's not from our solar system,it's just passing through from the vastness of space.

What Does "Interstellar" Mean?
The term interstellar refers to anything that originates outside our solar system, from the space between stars. Interstellar objects, like 3I/ATLAS, are not bound by the Sun's gravity. They come from faraway star systems and only enter our neighborhood briefly before continuing their journey through the galaxy.

Why 3I/ATLAS Is So Special?
What sets 3I/ATLAS apart is its ancient, untouched composition. Scientists believe it may have formed over 4.5 billion years ago, possibly even before our own Sun existed. It's rich in ices, dust, and organic material similar to comets from our solar system, but far older. This makes it a time capsule from the early universe, carrying clues about how planetary systems form and evolve across the galaxy.

When and Where to Spot It?
3I/ATLAS is currently moving through the constellation Virgo and will come closest to Earth in mid September 2025. It won't be visible to the naked eye, but if you have a mid-sized telescope, you might catch a glimpse of this ancient traveler as a faint, glowing blur.

Interstellar visitors are incredibly rare. Once 3I/ATLAS swings past the Sun, it'll vanish back into deep space never to return. For astronomers, every second counts as they study this icy messenger from a distant world.



A JPL graphic showing the interstellar comet flying through Solar System. Image Credits://fosstodon.org/

Astronaut Shubhanshu Shukla Safely Returns to Earth

After months in space, Indian-origin astronaut Shubhanshu Shukla has safely returned to Earth, marking the successful end of a groundbreaking international space mission. The return capsule, aboard SpaceX's Crew Dragon, splashed down in the Pacific Ocean, concluding a mission that pushed the boundaries of deep-space research and international collaboration.

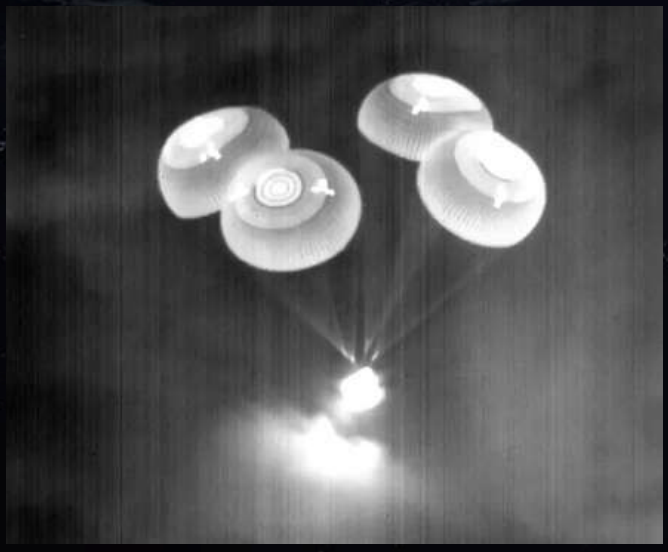
Shukla was part of a multi-national crew on board the International Space Station (ISS), where he contributed to critical experiments in low gravity, including micro-organism behavior in space, satellite repair simulations, and long-term habitation studies. His role was especially notable for conducting live educational outreach programs, inspiring students across India and the world.

The capsule's re-entry and recovery were executed flawlessly, with recovery teams stationed in the Pacific retrieving the astronauts within minutes of splashdown. Dressed in a smiling blue flight suit, Shukla waved to the cameras, thanking mission control and audiences worldwide for their support.

In a post-landing statement, Shukla said, "Floating above Earth gives you perspective on science, on unity, and on how small differences vanish when you're looking at the planet from orbit."

His return marks a proud milestone for India's growing space legacy, showcasing how Indian minds are now contributing at the global frontier of space exploration. The mission also underscores the growing partnership between ISRO and international space agencies like NASA & ESA.

Shukla will now undergo a standard health recovery protocol and debriefing before returning to India, where a hero's welcome awaits. His next mission? Inspiring a generation of future explorers.



SpaceX Dragon "Grace" splashing down off the coast of San Diego, CA with Astronaut Shubhanshu Shukla.

ROGUE BLACK HOLE FOUND TERRORIZING UNFORTUNATE STAR IN DISTANT GALAXY

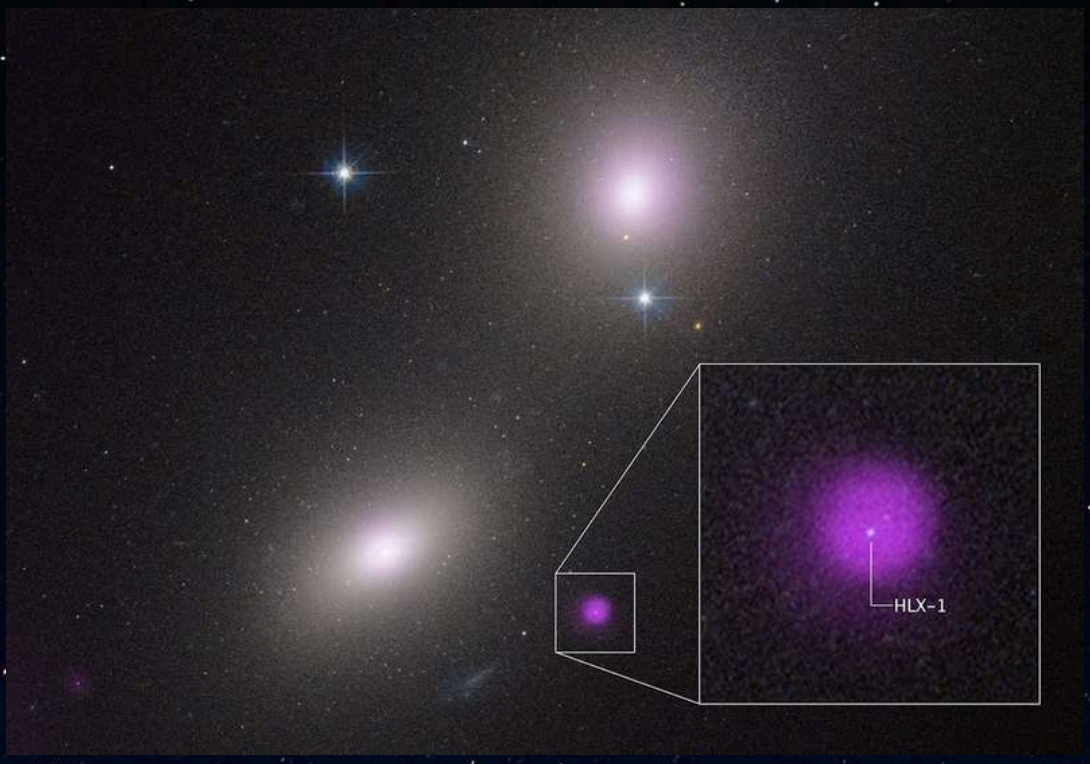
Astronomers made a startling discovery in a distant galaxy about 1 billion light-years away: a rogue black hole–a black hole that is not tied to the center of any galaxy was caught in the act of devouring a star. This rare and violent event, known as a tidal disruption event (TDE), occurred when a star drifted too close to the black hole and was ripped apart by its extreme gravity.

Half of the star's material was pulled into the black hole, while the rest was ejected outward, lighting up the surrounding space in a burst of energy visible across multiple wavelengths. This brilliant flare was first detected using the Hubble Space Telescope, and follow up observations confirmed that the source was not at the core of the host galaxy. Instead, the black hole was drifting on its own through intergalactic space earning the title rogue.

A rogue black hole is a black hole that moves freely through the galaxy or intergalactic space, not fixed at a galactic center like most supermassive black holes. These cosmic wanderers are believed to be the result of gravitational slingshot events such as galaxy collisions or black hole mergers that fling them out of their original locations.

This discovery is significant because it offers rare evidence of such an elusive object. Rogue black holes are normally invisible, making them hard to detect unless they interact with matter, like in this case. The dramatic death of the star illuminated the black hole's position, giving astronomers a rare chance to observe its behavior.

The finding raises exciting questions about how many rogue black holes may be drifting silently through the universe, and whether similar hidden giants exist closer to home. It's a vivid reminder that space is not only vast and beautiful but also full of dark, roaming giants that can turn stars into stardust without warning.



A Hubble Space Telescope image of a pair of galaxies: NGC 6099 (lower left) and NGC 6098 (upper right). The purple blob depicts X-ray emission from a compact star cluster. The X-rays are produced by an intermediate-mass black hole tearing apart a star. Image Processing: Joseph DePasquale (STScI)

NASA'S LUCY REVEALS STUNNING VIEW OF ASTEROID DONALDJOHANSON

On April 20, 2025, NASA's Lucy spacecraft flew past the asteroid Donaldjohanson, capturing the most detailed images ever taken of this small, ancient space rock. The flyby served as a successful dress rehearsal ahead of Lucy's main mission: exploring the Jupiter Trojan asteroids.

Donaldjohanson, located in the main asteroid belt, is about 4 km wide and has a distinct peanut-like shape, indicating it may be a contact binary, two bodies fused together. Just before closest approach, Lucy's L'LORRI imager captured stunning views from a distance of 1,700 miles (2,700 km), revealing a rough, cratered surface. Some features as small as 130 feet (40 meters) are visible in the images.

In July 2025, NASA released the first complete full-frame images of Donaldjohanson, stitched together from Lucy's approach sequence. These new visuals gave scientists the clearest view yet of the asteroid's full shape and terrain. A stereo image pair was also shared, allowing 3D viewing of the surface by crossing one's eyes, a fun yet powerful way to examine its topography.

Scientists continued analyzing the data in July, confirming Donaldjohanson's elongated structure and preparing models of its internal composition. The spacecraft itself remains healthy and is currently cruising at over 30,000 mph (50,000 km/h) through the asteroid belt.

Lucy's next big moment will come in August 2027, when it begins visiting the Jupiter Trojans, a unique class of asteroids that orbit in tandem with Jupiter. Over 15 months, Lucy will explore at least six asteroids, including two small moons discovered by the mission team.

Donaldjohanson's brief encounter proved that Lucy is on track bringing us one step closer to unlocking the mysteries of the early solar system.

A stereo image pair combining the last complete approach image (right) with a slightly clipped image taken 72 seconds later (left). For a three-dimensional view of the asteroid's structure, cross your eyes while focusing on the image. Note: The contrast of each image has been enhanced to make surface features easier to see and to compensate for small differences in lighting. Additionally, the perceived depth may vary due to factors such as the space between your eyes and your distance from the screen.Credits:NASA/Goddard/SwRI/Johns Hopkins APL/Brian May/Claudia Manzoni

NISAR SATELLITE LAUNCHED: BIG LEAP IN EARTH OBSERVATION

On July 30, 2025, ISRO and NASA successfully launched the NISAR satellite (NASA-ISRO Synthetic Aperture Radar)—a joint mission that marks one of the most significant Earth observation collaborations to date. Blasting off from Satish Dhawan Space Centre aboard India's GSLV Mk II rocket, NISAR is now en route to its final orbit, ready to monitor our planet like never before.

What is NISAR?

NISAR is the first satellite to use two radar frequencies (L-band and S-band) to observe Earth's surface changes with incredible detail. Its cutting-edge synthetic aperture radar will scan Earth's land, ice, forests, oceans, and crustal shifts. It's designed to track phenomena like earthquakes, landslides, glacier movements, floods, and deforestation—helping scientists better understand climate change, natural disasters, and ecosystem dynamics.

A Global Collaboration

NISAR represents a 50-50 partnership between NASA and ISRO. While NASA provided the L-band radar system, ISRO contributed the S-band radar, spacecraft bus, and launch vehicle. This mission is a strong symbol of international cooperation in space science and climate research.

Why It Matters

NISAR will orbit Earth every 12 days, capturing consistent, high-resolution radar images. The data will be freely available to the global science community and decision-makers, enhancing everything from agriculture forecasting to urban planning and disaster response.

This July 2025 launch not only strengthens India-U.S. space ties but also empowers humanity to better monitor and protect Earth's changing environment.

NISAR is expected to operate for at least three years, sending back a continuous stream of vital data for a world that's rapidly transforming.

AUSTRALIA'S FIRST ORBITAL ROCKET MAKES BOLD DEBUT – THEN CRASHES

July 30, 2025 – Bowen, Queensland
Australia's ambitions in space took a dramatic turn as Gilmour Space Technologies launched its first orbital class rocket, Eris, marking a historic moment for the nation. Though the rocket failed to reach orbit, the event signaled a major step forward in the country's space journey.

The 23-meter, three-stage rocket lifted off successfully from the Bowen Orbital Spaceport in North Queensland, igniting all engines and soaring into the sky for 14 seconds. However, the flight ended abruptly when Eris veered off course and crashed. The mission was uncrewed, and no injuries or damage to the launch pad were reported.
CEO Adam Gilmour called the launch a "partial success," noting that ignition, liftoff, and data transmission went as planned. "Of course, we hoped for a longer flight, but this is a historic milestone for Australia," he said.

Eris uses a hybrid propulsion system and is designed to carry small satellites into low Earth orbit. Despite the crash, the rocket gathered crucial in-flight data, helping engineers analyze engine behavior and aerodynamic stability.

This was Australia's first orbital launch attempt in over 50 years, since the UK's Black Arrow launch from Woomera in 1971. Backed by federal grants and private investment, Gilmour Space plans further test flights within the next year.

While the rocket didn't make it to space, the launch has ignited national pride and global attention. Experts stress that early failures are common in rocket development and vital to future success.

Australia has now officially entered the race for independent space access. The countdown to the next attempt has already begun.

Eris became the first Australian Made orbital rocket to launch from Australian soil.
Credit: @GilmourSpace/X

EYES IN SPACE – JULY 2025

NGC 1786: Hubble Unlocks Secrets of Ancient Star Clusters

NGC 1786, Globular Cluster

The NASA/ESA Hubble Space Telescope has captured a detailed image of NGC 1786, a globular cluster located in the Large Magellanic Cloud, about 160,000 light-years from Earth in the constellation Dorado. Once thought to consist of stars formed at the same time, globular clusters like NGC 1786 are now believed to contain multiple generations of stars. The image is part of a study comparing old globular clusters in nearby dwarf galaxies with those in the Milky Way. These tightly bound star systems act as galactic time capsules, offering valuable clues about early galaxy formation. By studying clusters like NGC 1786, astronomers aim to better understand how galaxies such as the LMC and the Milky Way formed and evolved over time.

Webb Peers Into the "Toe Beans" of the Cat's Paw Nebula

Cat's Paw Nebula (NGC 6334)

To celebrate three groundbreaking years of cosmic exploration, NASA's James Webb Space Telescope has unveiled a stunning new image of the Cat's Paw Nebula (NGC 6334), a massive star-forming region located about 4,000 light-years away in the constellation Scorpius. Focusing on a single "toe bean" within this celestial paw, Webb's near-infrared view reveals intricate structures of gas, dust, and young stars previously hidden from view.

This fresh glimpse showcases a vibrant cosmic landscape—fiery red clumps where massive stars are forming, glowing blue regions carved by stellar radiation, and dense brown-orange filaments of dust shielding stars still in formation. A standout area dubbed the "Opera House" displays a layered, circular structure filled with dynamic stellar activity.

Using its powerful NIRCam instrument, Webb has once again surpassed expectations, capturing the chaotic beauty of star birth. The image highlights Webb's ability to resolve fine details, far surpassing past views from Hubble and Spitzer. According to NASA, Webb's discoveries are opening doors for future missions and inspiring new questions about the universe. As it continues to scratch the cosmic surface, Webb promises to reveal even more wonders hidden in the stars.

Hubble Reveals Forgotten Globular Cluster in Stunning Detail

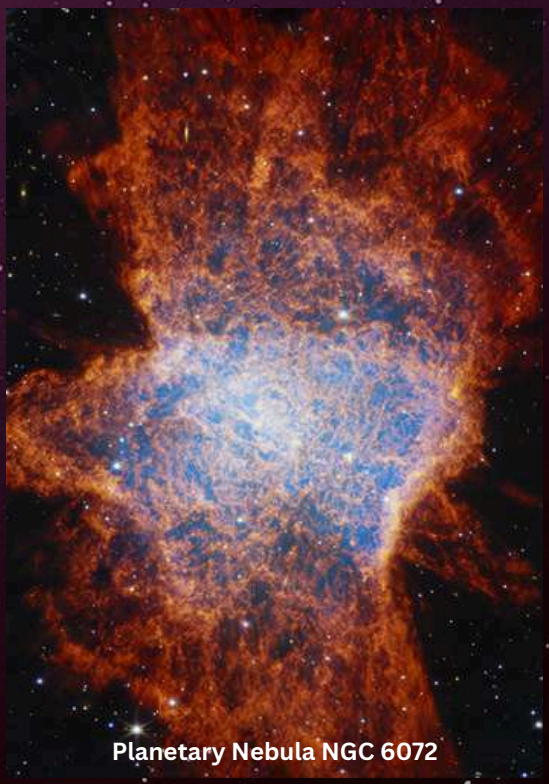
NASA's Hubble Space Telescope has turned its lens toward a long-overlooked globular cluster named ESO 591-12 (also known as Palomar 8), unveiling a dazzling collection of densely packed stars. These spherical star groups, often containing tens of thousands to millions of stars, are among the oldest structures in galaxies. In this vibrant image, red and blue stars indicate a range of stellar temperatures – with red stars being cooler and blue ones hotter.

Captured as part of the Hubble Missing Globular Clusters Survey, this observation is helping astronomers resolve individual stars within the Milky Way's dense stellar systems, something ground-based telescopes cannot achieve. The program is focused on completing a detailed census of the galaxy's globular clusters – especially those previously unobserved by Hubble. These findings are key to understanding the Milky Way's early formation and the evolution of its ancient star systems.

ESO 591-12 (Palomar 8)

NGC 6072: A Messy Farewell to a Dying Star

NASA's James Webb Space Telescope has revealed a spectacular and complex view of NGC 6072, a planetary nebula formed from a dying star shedding its outer layers. Unlike most symmetrical planetary nebulas, NGC 6072 appears irregular and clumpy, hinting at more than one star influencing its shape. Webb's infrared images show multiple elliptical outflows and a disk of gas likely formed from these stellar interactions. Astronomers believe a companion star may be responsible for the distorted structure, pushing and shaping material over time. Glowing gas, dusty lobes, and concentric rings suggest dynamic processes at play, including fast stellar winds and possibly pulsations. As the central star fades, the nebula will slowly disperse into space, enriching the cosmos with heavy elements – key ingredients for future stars and planets. By studying such formations, scientists hope to better understand the complex final stages of stellar life, including what might someday happen to our own Sun.



Planetary Nebula NGC 6072

Tour de Universe

Hydra Constellation: The Celestial Water Snake of the South

Hydra, the Water Snake, is the largest constellation in the night sky, covering a vast area of 1303 square degrees. Positioned in the southern celestial hemisphere, it stretches across a third of the sky, winding sinuously from just below Cancer to between Libra and Centaurus. Hydra is one of the oldest known constellations, catalogued by Ptolemy in the 2nd century CE and deeply rooted in both Greek and Babylonian mythology.

Location and Visibility:
Hydra lies in the second quadrant of the southern sky (SQ2) and is visible between latitudes +54° and -83°. It shares its borders with several constellations including Cancer, Leo, Virgo, Libra, Centaurus, Crater, Corvus, and Sextans. Despite its size, Hydra contains only one bright star–Alphard (α Hydrae) making the rest of its stars more subtle in the night sky.

Mythology: In Greek mythology, Hydra represents the Lernaean Hydra, a multi-headed serpent slain by Heracles as part of his Twelve Labors. The serpent had regenerative powers–when one head was cut off, two would grow in its place. Only by cauterizing the necks after decapitation with help from his nephew Iolaus, could Heracles defeat the monster. The myth also includes a crab sent by Hera to distract Heracles, which became the constellation Cancer.
An alternate myth links Hydra to the water snake blamed by Apollo's crow (Corvus) for its delay in fetching water. Apollo, upon seeing through the deception, placed the crow (Corvus), the cup (Crater), and Hydra in the sky as constellations. In the heavens, the snake eternally guards the cup, keeping the crow from quenching its thirst.

Exploring The Constellation

Messier 48 (M48) Open Cluster

Messier 68 (M68) Globular Cluster

Messier 83 Pinwheel Galaxy

Ghost of Jupiter (NGC 3242)

Deep Sky Treasures

Despite its sparse star field, Hydra boasts remarkable deep-sky objects, including:

- Messier 48 (M48) – A bright open cluster, 1,500 light years away.
- Messier 68 (M68) – A globular cluster located 33,600 light years from Earth.
- Messier 83 (M83) – The Southern Pinwheel Galaxy, a spectacular barred spiral galaxy just 14.7 million light years away.
- Hydra Cluster – A massive galaxy cluster with over 150 large galaxies and abundant dark matter, 190 million light years distant.
- Ghost of Jupiter (NGC 3242) – A bright planetary nebula, also known as the "Eye Nebula".
- NGC 3109 – An irregular galaxy interacting with the Antlia Dwarf.
- NGC 3621 – A rare bulgeless spiral galaxy with three suspected black holes.
- NGC 3314 – A visually stunning pair of overlapping galaxies.
- ESO 510-G13 – A twisted spiral galaxy, evidence of galactic merger activity.
- NGC 5694 – One of the oldest known globular clusters, over 12 billion years old.

Meteor Showers

Hydra is associated with two minor meteor showers: the Alpha Hydrids and Sigma Hydrids, which peak in late December and January respectively.

Conclusion

Spanning mythology, deep sky wonders, and fascinating stellar variety, Hydra remains a constellation of both grandeur and mystery. Though not the brightest in the sky, its cosmic treasures and legendary tales make it one of the most significant constellations for astronomers and myth-lovers alike. From glowing carbon stars to distant galaxies and mythic monsters, Hydra the Water Snake winds through our skies, ancient and eternal.

Happy Birthday


August 1, 1818

Maria Mitchell

Maria Mitchell (August 1, 1818 – June 28, 1889) was America's first professional female astronomer and a pioneering figure in science. In 1847, she discovered a comet through a telescope, which became known as "Miss Mitchell's Comet," earning her international acclaim. Her remarkable achievement led to her becoming the first female member of the American Academy of Arts and Sciences. Her legacy lives on as a symbol of curiosity, perseverance, and the importance of women in astronomy. (Credit: Maria Mitchell Association)

Neil Armstrong


August 5, 1930

Neil Alden Armstrong (August 5, 1930 – August 25, 2012) was an American astronaut, aeronautical engineer, and the first human to walk on the Moon. On July 20, 1969, during NASA's Apollo 11 mission, he stepped onto the lunar surface and declared, "That's one small step for man, one giant leap for mankind." A former Navy pilot and test pilot, he flew over 200 types of aircraft. His legacy continues to symbolize bravery, excellence, and humanity's enduring quest to explore the vast frontiers of space. (Credit: Wikipedia)


August 10, 1927

Vainu Bappu

Manali Kallat Vainu Bappu (10 August 1927 – 19 August 1982), known as the "Father of Modern Indian Astronomy," made significant contributions to Indian science. He co-discovered a comet and formulated the Bappu-Bok relation, which helps determine the brightness of stars. A visionary leader, he helped establish major observatories, including the Vainu Bappu Observatory in Tamil Nadu. His dedication and vision inspired generations of students to explore the universe and contributed greatly to India's position in global astronomy. (Credits: Duraspace)

Happy Birthday

August 12, 1919

Vikram Sarabhai

Vikram Ambalal Sarabhai (12 August 1919 – 30 December 1971), hailed as "Father of the Indian Space Program". He believed that space technology could help solve real-life problems in India like communication, education and weather forecast. He founded ISRO and guided the launch of India's first satellite, Aryabhata. He also helped set up top research institutions like IIM Ahmedabad and the Physical Research Laboratory. His work laid the foundation for India's space success, including missions like Chandrayaan and Mangalyaan. (Credit: Wikipedia)

John Flamsteed

John Flamsteed (19 August 1646 – 31 December 1719) was an English astronomer and created one of the most accurate star catalogs of his time, listing over 3,000 stars. He also made the first recorded observations of Uranus, though he mistook it for a star. He laid the foundation stone for the Royal Greenwich Observatory, which later became the center for timekeeping and astronomical research. His dedication and precision laid the groundwork for many discoveries in modern astronomy and inspired generations of stargazers. (Credit: Wikipedia)

August 19, 1646

August 30, 1871

Ernest Rutherford

Ernest Rutherford (30 August 1871 – 19 October 1937) was a physicist known as the "Father of Nuclear Physics". He was the first to show that atoms have a tiny, dense center called the nucleus. His famous gold foil experiment led to the discovery that most of an atom is empty space. Rutherford also discovered the concept of radioactive half-life and named the alpha, beta, and gamma rays and received the Nobel Prize in Chemistry in 1908. His groundbreaking research changed the understanding of the atom, nuclear science and energy. (Credit: Wikipedia)

ASTRONOMICAL PERCEPTION

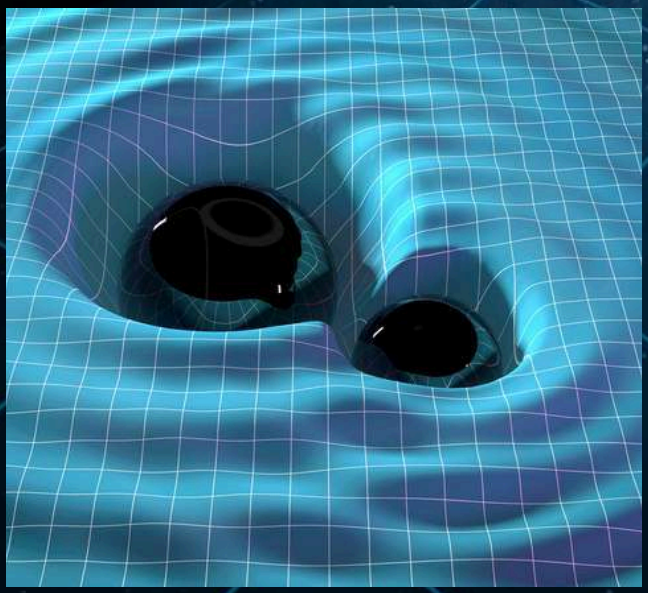
FROM INVISIBLE FORCE TO COSMIC CURVE: THE STORY OF GRAVITY

The Apple That Started It All:

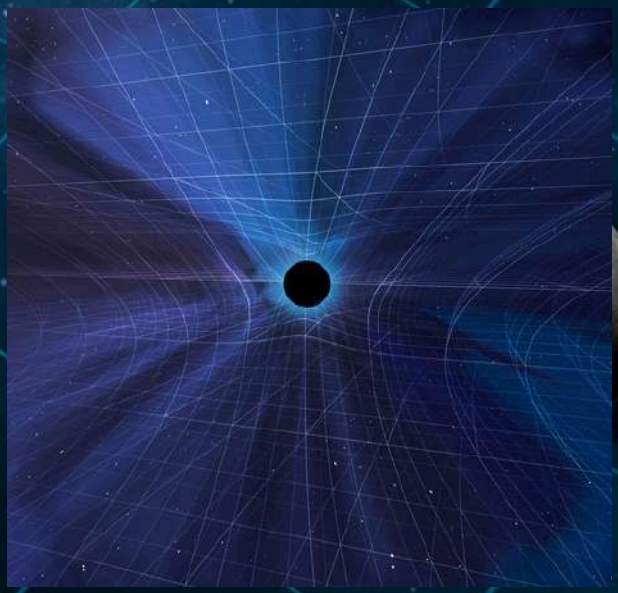
It all began with a falling apple or at least, that's the story we love to tell. When young Isaac Newton watched that fateful fruit plummet to the ground, he saw more than just a simple fall. He saw a hidden force at work, one that governed not just apples but the Moon's path around Earth and Earth's dance around the Sun. Newton's genius was to capture this cosmic tug of war in elegant mathematics, declaring that every object in the universe pulls on every other with a force proportional to their masses. Yet when pressed about how this invisible force worked across empty space, the great scientist simply replied, "I frame no hypotheses" a humble admission that while he could describe gravity's effects perfectly, its true nature remained a mystery.

Einstein's Cosmic Epiphany:

Two centuries later, a rebellious patent clerk named Albert Einstein would solve Newton's mystery in the most unexpected way. Einstein realized gravity wasn't a force at all it was the space itself bending and warping. Imagine space and time as a giant trampoline, with stars and planets creating dips and curves in the fabric. Objects simply don't fall because they're pulled, they simply follow the natural curves of this cosmic landscape. When starlight was observed bending around the Sun during a 1919 solar eclipse by Arthur Eddington , exactly as Einstein predicted, it was proof that space itself could curve a revolutionary idea that would forever change our understanding of reality.



Two massive bodies Warping Space & Time. (Credit: earthsky.org)

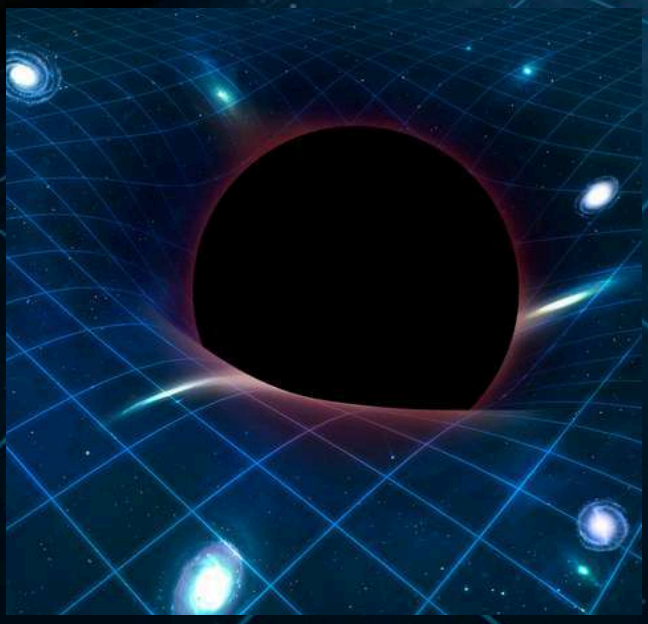


A 4D View of a body warping Space and Time around it. (Credit: earthsky.org)

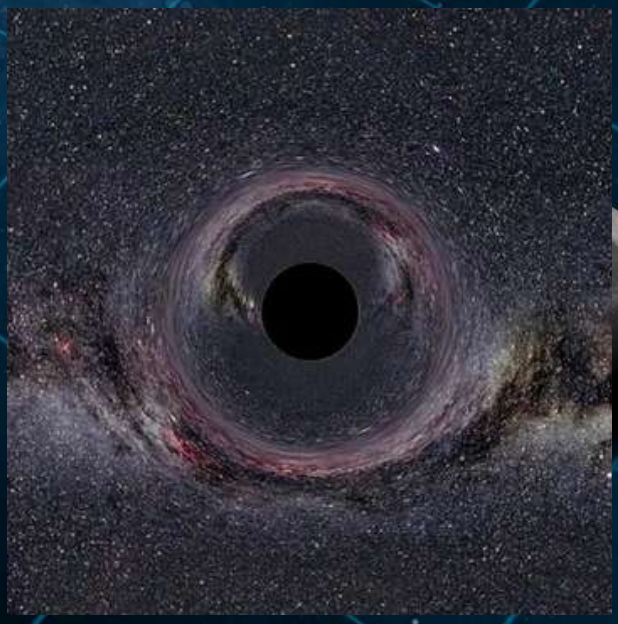
The Ultimate Gravity Showdown:
The battle between these two visions of gravity played out in cosmic phenomena. Newton's equations perfectly explained most planetary orbits, but Mercury's strange wobble remained unexplained until Einstein showed it was due to spacetime curving near the massive Sun. While Newton thought light should travel straight regardless of gravity, Einstein proved it bends around massive objects like water flowing around a rock. Even our modern GPS systems rely on Einstein's corrections to Newton's laws, accounting for how time runs slightly faster in Earth's weaker gravity. Without relativity's insights, your smartphone's maps would be off by miles within minutes.

Two Geniuses, One Complete Picture:
Today, we live in a world where both Newton and Einstein are right just about different things. Newton's gravity still rules our everyday lives, perfectly predicting everything from falling apples to rocket trajectories. But Einstein's relativity governs the cosmic scale, explaining black holes, the expansion of the universe, and the very fabric of spacetime itself. Together, they give us the complete picture Newton gave us gravity's language, while Einstein revealed its poetry. So next time you see something fall, remember you're witnessing not just a simple force, but the curvature of the universe itself, a dance of matter and spacetime that began with an apple and continues to shape our understanding of reality.

Conclusion: Still Gravity's case remains open. Those falling apples and orbiting planets are cosmic snippets leading to deeper truths. Einstein gave us spacetime's curves, but the full picture still shimmers just beyond our reach. Now it's your turn to climb. The next chapter of gravity's story, reconcile gravity with quantum mechanics, or discover why the universe expands faster than it should. Remember, Newton only saw further because he "stood on giants shoulders" and so can you.



Galaxies following cosmic curve around a super massive black hole. (Credit: earthsky.org)



Artist's concept of supermassive black hole at the center of a galaxy. (Credit: earthsky.org)

Role Of AI in Space

Beyond Earth: How Robots and AI Are Leading the Way

Artificial Intelligence (AI) and robotics have become essential tools in space exploration, especially for missions beyond Earth where human presence is limited or impossible. These advanced technologies allow us to explore distant celestial bodies like the Moon, Mars and Asteroids with precision, safety and efficiency.

Robots on the Moon

Robotic missions to the Moon began with the Soviet Luna program and the American Surveyor series. Recently, India's Chandrayaan-3 lander and rover demonstrated the power of robotic exploration by studying the Moon's surface near the south pole. These robots can navigate harsh terrain, perform scientific experiments and relay crucial data back to Earth without risking human lives.

Rovers on Mars

Mars is a prime example of how robotics and AI have transformed planetary exploration. NASA's rovers Spirit, Opportunity, Curiosity, Perseverance and China's Zhurong rover have conducted extensive research on the Martian surface. Equipped with AI, these rovers can analyze rock samples, search for signs of water or life and make autonomous decisions such as choosing the safest path forward. Perseverance even collects rock cores for a future return mission.

Exploring Asteroids

Asteroids are important for understanding the early solar system. Japan's Hayabusa2 and NASA's OSIRIS-REx missions used robotic spacecraft to approach, study and collect samples from asteroids Ryugu and Bennu. These missions relied heavily on AI to guide spacecraft during precise maneuvers in microgravity environments where human control from Earth would be too delayed.

The Future

With plans to send humans to Mars and establish lunar bases, AI and robotics will become even more crucial. They will build habitats, mine resources, repair equipment and serve as assistants to astronauts.

Image Credit: Ommcom News

Image Credit: Wikipedia

WHAT'S UP IN THE SKY - AUGUST 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
Morning planet, difficult to see at the start of the month, easier to spot after 19 Aug.

Venus
Morning planet, near M35 at the start of Aug. Jupiter conjunction 12 Aug. Near M44 31 Aug.

Mars
The Red Planet is Poorly located in bright evening twilight, a bit tricky to spot.

Jupiter
52 arcminutes from Venus 12 Aug at 08:30 IST (03:30 UT).

Saturn
Morning planet, reaching peak altitude of 35° under darkness from 17 Aug.

Uranus
Morning planet, best end Aug when reaches 48° altitude in dark conditions.

Neptune
Morning planet near Saturn. Reaches peak altitude of 36° under darkness from 17 Aug.

BRIGHT DEEP SKY OBJECTS

Great Sagittarius Cluster also known as M22 is located in Sagittarius constellation with an apparent magnitude of 4.9. It is visible to naked eye under dark sky and is excellent binocular target. It is around located 10,600 light years away from Earth.

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 6611 or Eagle Nebula is located in Serpens constellation and is best observed from Northern Hemisphere. It has an apparent magnitude of 5.9. It is 5700 light years away and it resembles an eagle with spread wings.

NGC 6205 also known as Hercules Globular Cluster is best observed from Northern hemisphere. It has an apparent magnitude of 5.8. The object is easily distinguishable with binoculars. It is located 23,000 light years away from Earth. We can use a small telescope for detailed view.

Rocket launches in AUGUST 2025

BlueBird Block 2 #1

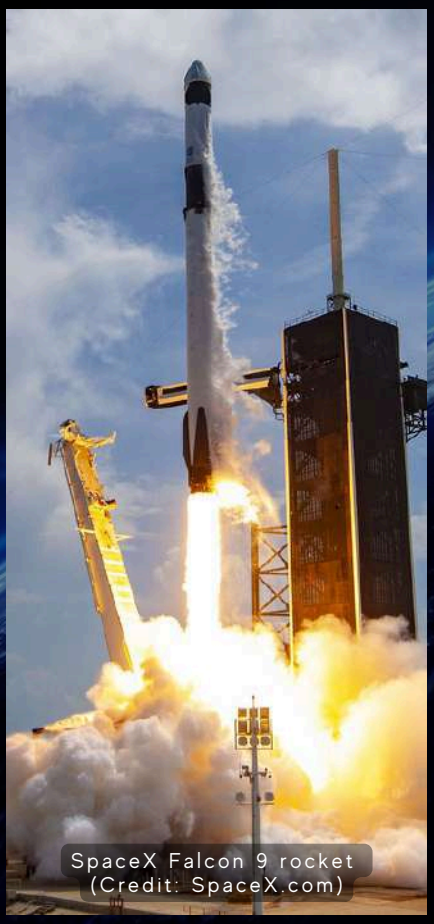
Scheduled for launch in 2025, ISRO's LVM3 rocket will deploy the BlueBird Block 2 #1 mission from Satish Dhawan Space Centre, Sriharikota.

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

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

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

Dragon CRS-2 SpX-33



SpaceX Falcon 9 rocket (Credit: SpaceX.com)

Scheduled for launch in August 2025, SpaceX's Falcon 9 rocket will deploy the Dragon CRS-2 SpX-33 mission to the International Space Station from Kennedy Space Center, Florida.

Dragon CRS-2 SpX-33 is a critical resupply mission delivering essential cargo and scientific experiments to the ISS. The mission features SpaceX's upgraded Dragon 2 cargo spacecraft, designed for high capacity payload delivery and return.

Equipped with pressurized and unpressurized cargo sections, the spacecraft will transport over 3,300 kg of supplies, including life support equipment, crew provisions and cutting edge research experiments. Its reusable design and precision docking capabilities ensure efficient and cost-effective resupply operations.

The cargo will enable studies in biology, physics, and technology development, contributing to advancements in space exploration and Earth based applications.

Bion-M No. 2

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

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

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

Metop-SG A1

Metop-SG A1 satellite
(Credit: eoportal.org)

Scheduled for launch in August 2025, Ariane 6 rocket will deploy the Metop-SG A1 satellite from Guiana Space Centre, French Guiana.

Metop-SG A1 is a critical next generation meteorological satellite for the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT), designed to revolutionize weather forecasting and climate monitoring. The mission features advanced hyperspectral infrared and microwave sounding instruments for unprecedented atmospheric data collection.

Equipped with cutting edge MET image sensors, the satellite will deliver high resolution vertical profiles of temperature, humidity, and atmospheric composition. Its real time data transmission capabilities will enhance global numerical weather prediction accuracy by up to 15% benefiting aviation safety, severe weather warnings, and long-term climate studies.

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

ASTRONOMICAL EVENTS - AUGUST 2025

MERCURY AT GREATEST WESTERN ELONGATION

As dawn breaks on August 19, 2025, early risers have a chance to witness a subtle yet beautiful event, Mercury at its greatest western elongation. The innermost planet of our solar system rises just before the Sun, shining briefly in the twilight of early morning. For observers in both urban and rural locations, this is one of the best mornings to spot Mercury before it fades into daylight.

What Does "Greatest Western Elongation" Mean?
Mercury reaches greatest western elongation when it appears farthest to the west of the Sun in our sky, this time about 18 degrees away. Since Mercury orbits close to the Sun, it's often hidden in the Sun's glare. But during elongation, the planet swings just far enough from the Sun's position to be visible for a short while before sunrise.

Around this point, Mercury may show a half-lit phase when viewed through a telescope, looking like a tiny crescent Moon. This appearance is due to the angle of sunlight reflecting off Mercury's surface relative to Earth.

Why This Moment Matters?
Mercury's tight orbit and proximity to the Sun make it the hardest naked-eye planet to observe. Western elongations are perfect windows for spotting Mercury in the morning sky, especially for those in the Northern Hemisphere. Events like these help amateur astronomers and sky watchers connect with the dynamic motion of our solar system's inner worlds.

How and Where to See It?
Date: August 19, 2025
Time: Look 30–60 minutes before sunrise, when Mercury is highest above the eastern horizon.
Location: Face east-northeast. In cities like Delhi or Cairo, Mercury will appear low and bright just above the horizon.
Tools: No telescope required, just a clear and a flat view of the eastern sky. Binoculars can help, especially under light-polluted skies.
Weather Tip: Check for clear conditions. Mercury will be low in the sky, and even a thin layer of clouds can block your view.

Did You Know?
Mercury is not only the smallest but also the fastest planet, completing one orbit in just 88 Earth days. At this elongation, it's approximately 117 million km from Earth. The planet currently lies in the constellation Cancer, not far from the bright star Procyon.

On August 19, watch Mercury rise in the stillness before dawn, a quiet reminder that the universe is always in motion, offering fleeting moments of wonder to those who seek them.

PERSEIDS METEOR SHOWER

As night falls on August 12, 2025, stargazers across the globe can look forward to the annual Perseids meteor shower, one of the year's most active and visually stunning displays. With favorable weather and dark skies, it's a perfect opportunity to witness the cosmos in motion.

What Is a Meteor Shower?
A meteor shower occurs when Earth passes through streams of debris (tiny particles) shed by comets, that burn up in our atmosphere at high speed, producing bright streaks of light, commonly known as "shooting stars."

Why "Perseids"?
The meteors appear to originate from a point in the sky near the constellation Perseus, giving the shower its name. This radiant point rises in the northeast late at night, making the pre-dawn hours the best time for viewing.

The Perseid Meteor Shower as seen from Ontario, Canada.
(Image Credit: iStockphoto.com/Jorge Figueiredo)

The Source: Comet Swift-Tuttle
The Perseids are caused by Comet 109P/Swift-Tuttle, which orbits the Sun every 133 years. As Earth intersects its dusty path, we encounter a flurry of comet fragments that ignite upon atmospheric entry.

When and Where to Watch:
Peak Night: August 12–13, 2025.
Best Time: Post-midnight to pre-dawn.
Moon Alert: A waning gibbous Moon will reduce visibility slightly, but the brighter meteors and fireballs will still be visible in clear, dark skies.

The Perseids are a cosmic reminder of our planet's dynamic journey through space. So grab a blanket, find a quiet spot away from city lights, and watch nature's silent fireworks unfold overhead.

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: 12th August / Time: 10.00 p.m.

Conjunction of Moon and Saturn

On August 12th, witness a stunning celestial conjunction of the Moon, shining brilliantly at magnitude −12.56 and the Saturn, glowing at magnitude 0.78, in the eastern sky around 10.00 p.m, perfect for star gazers and sky watchers.

Place: Chennai / Date: 12th August / Time: 04.00 a.m.

Conjunction of Venus and Jupiter

On August 12th, don't miss another celestial conjunction of the Venus, glowing at magnitude −3.87 and the Jupiter, shining at magnitude -1.78, in the eastern sky around 4.00 a.m., a magical early morning spectacle worth watching.

Place: Chennai / Date: 17th August / Time: 04.00 a.m.

Conjunction of Pleiades and Moon

On August 17th, catch a dazzling celestial conjunction as the Pleiades with magnitude 1.59 meets the Moon with magnitude -11.80 in the eastern sky, around 4:00 a.m, a breathtaking pairing that promises to light up the sky.

Place: Chennai / Date: 26th August / Time: 07.00 p.m.

Conjunction of Moon and Mars

On August 26th, witness a striking celestial conjunction of the Moon, glowing at magnitude −10.12, and the Mars, shining at magnitude 1.61 in the western sky around 7:00 p.m, perfect for astronomy lovers.

STUDENT'S CORNER

The Earths Magnetic Field and our Hidden Power

Sourajit Mandal, Astronomy Camp Student

Have you ever wondered why a compass always points to the north? How does it know which direction to point in? The secret lies in something invisible… but very powerful. Something that allows us to not get toasted by deflecting harmful solar wind and cosmic radiations the Earth's magnetic field.

The Earth acts like a giant magnet. It has a north pole and a south pole, and an invisible magnetic field stretching all around the planet. This magnetic field is extremely important. It helps animals navigate, it makes compasses work, and most importantly, it protects us from dangerous radiation coming from the Sun.

But where does this magnetic field come from? To understand that, we need to travel deep inside the Earth. Beneath our feet, below the ground and even below the rocks, there is a core made mostly of iron and nickel. The outer part of the core is so hot that the metal is in liquid form. This liquid metal flows and swirls due to heat from the center of the Earth and the planet's rotation. When metal moves like that, it creates electric currents. And when electric currents move, they generate a magnetic field. Scientists call this process the geo-dynamo.

But here is something surprising: the magnetic field is not fixed. Over long periods of time, the magnetic poles have actually flipped, meaning that the magnetic north becomes south, and the magnetic south becomes north. This is called a geomagnetic reversal, and it has happened many times in Earth's history. The last full flip occurred about 780,000 years ago.

Now, you might wonder, does the flip happen suddenly? Or… Why does it happen at all? This flip happens due to complex motion of molten magma in the Earth's core, in a process called geodynamo. This process takes thousands of years. During that time, the magnetic field becomes weaker and more complicated. However, these changes do not affect us creatures in any direct way. When the field flips, gravity does not change nor does the planet does not suddenly spin backwards.

The Earths poles however, also move is another way. There is another kind of pole shift called true polar wander. This is when the Earth's rotational axis, the imaginary line the planet spins around, moves slightly. This can happen when mass shifts around the surface of the Earth. For example, if a lot of ice melts at the poles, or if water is stored in one place, it can move the planet's balance just enough to cause the poles to drift.

The truly astonishing part is humans have unknowingly also caused a change in the earths polar wander! When we build huge dams, such as the Three Gorges Dam in China, we hold back vast amounts of water. That water has weight. Moving it all to one place actually changes how mass is spread around the Earth. According to NASA, the Three Gorges Dam shifted enough water to move the Earth's rotational pole by nearly one meter. Think about that… by building a dam, we changed the way the entire planet spins.

So, does all this even matter? Understanding the magnetic field helps protect our satellites, electricity networks, and even astronauts in space. Learning how our actions affect the Earth's balance helps scientists study climate change and rising sea levels.

The Earth is not just a quiet rock in space. It moves, it shifts, it flips, and it responds to both nature and people. The next time you hold a compass, remember–it is pointing to something that is alive, dynamic, and always changing. Maybe also remember… we humans are powerful enough, to move our entire planet.

Space Time Fabric

Jiya Paroche, BCS Dharampeth, Nagpur

A giant invisible quilt holding together the universe as if it is stitched. Yes, you all guessed it right. Space Time fabric is the one! We all know there is 2D and 3D space. Let's explore this fascinating world of this fabric today.

In 2D space, you only have two directions – like going left or right, and forward or backward – just like a flat sheet of paper or a video game where characters can only move in two directions. We call these the x and y coordinates.

Now, let's move one step ahead. In our real world, we live in 3D space – length, width, and height. That means we can also move up and down. Imagine holding a toy car: you can roll it forward and backward (first direction), side to side (second direction), and even lift it up or down (third direction).

But here's the interesting part – in physics, we don't just have space, we also have time. Einstein taught us that space and time are connected, like threads woven together into a single "fabric." This is called space-time. In this fabric, time acts like the fourth dimension. 3 dimensions of space being length, width and depth while time can move forward in the linear progression, sideways between possible timelines and along each one of those as it unfolds.

So, if we combine our 3D space with time, we get 4D space-time. It's not a magic world from a cartoon, but it's how scientists explain the way the universe actually works. Every moment you live, you're moving not only through space but also through time – and you can never stop moving forward in time!

Think of it like this: if you're walking down a street, you're moving through space. But as the seconds tick by, you're also moving through time. Both your space path and your time path together make your journey through space-time.

Now, imagine the "fabric" of space-time like a giant stretchy trampoline. If you put a heavy ball in the middle, the fabric bends. This is how planets and stars bend space-time around them. When smaller objects move nearby, they follow these curves – this is what we feel as gravity. So yes, there is 3D space-time (three space directions plus time), and we also talk about 4D space-time (which still means three space dimensions and one time dimension).

Now, instead of 3 spatial (length, width and depth)and one temporal dimension (time) if we reverse with 3 temporal and one spatial we can theorize that one particle follows more than one trajectory at once, making it possible to land in more than one future simultaneously. In advanced theories, scientists even imagine extra hidden dimensions, but those are for another day!

That's the magic of the space-time fabric – the invisible stage on which the whole universe plays out its story.

Stellar Leaps: The New Age of Space Technology

Daksh Kaware, BCS Dharampeth, Nagpur

Since ancient times, people have been captivated by astronomy and space research. Vedic documents that describe the solar system, planets, stars, eclipses, and even comets show that these topics have been studied in India from the dawn of civilization. India's contemporary space exploration accomplishments were ultimately made possible by this rich legacy.

Observatories like as Kodaikanal and Madras (Chennai) have long been used in astronomy research. However, the development of the rocket, a potent and successful modern scientific device, marked the true leap into space research. Using tons of propellants, a rocket is a vehicle made to travel into space to carry spacecraft and satellites.

A rocket must reach a speed of at least 17,800 miles per hour and travel in a curving circle around the Earth, above the majority of the atmosphere, in order to achieve orbit. It will stay in orbit and avoid being dragged back by gravity thanks to this speed.

The first coordinated step towards atmospheric and space-related studies was the founding of the Indian Meteorological Department at Colaba, Bombay (now Mumbai) in 1823, which officially marked the beginning of India's space exploration.

The Indian Space Research Organization (ISRO), which is housed inside the Department of Space, is now the highest authority overseeing the country's space program. ISRO oversees the administrative and scientific facets of space technology and its uses. A number of specialized centers collaborate with ISRO, such as:

Sriharikota's SHAR Center.
Center for Vikram Sarabhai Space.
Ahmedabad's Space Applications Center.
Bengaluru's ISRO Satellite Center.

Facilities for the launch of spacecraft were built at Thumba, Kerala, under the visionary direction of Dr. Vikram Sarabhai. As a result, a two-stage sounding rocket was successfully launched in 1969, marking a significant accomplishment. India thereafter started to make steady progress toward becoming a major force in space exploration worldwide.

Today, India's space technology adventure embodies the ideal fusion of tradition, creativity, and ambition–from ancient stargazing to the launch of interplanetary missions–truly ushering in an era of brilliant leaps into the future.

LOST IN SPACE

I'M LAYING ON THE GRASS, LOST IN REVERIE
STARING AT THE SKY AS VAST AS THE SEA
THE WAY THE STARS ARE DAZZLING
AND NEVER EVER DIMMED
MY EYES ARE BRIMMED WITH THESE
GLITTERING GIANTS
YEARNING WHAT'S SO HIGH
AS ITS STELLAR BEAUTY CAPTURES ALL OUR
EYES
NEBULAES, ASTEROIDS, COMETS AND
CONSTELLATIONS
WHICH GOES ON AND ON WITH INFINITE
COMBINATIONS

SOMETIMES AS BRIGHT AS LUCIDA
SOMETIMES AS MYSTERY AS A BLACKHOLE
ITS ENIGMATICAL FACTS STILL TO BE
UNFOLD
I DESIRE TO BE LOST IN SPACE
DISCOVER PLACES THAT NO ONE CAN TRACE
DIVING INTO PARALLEL UNIVERSES
WHILE EXPLORING ALL OTHER SPACE
WANDERES
STILL STAR GAZING ON THE GRASS
EVERYTHING HELD UPON OUR SACRED
COSMOS
I'M DEEPLY IN LOVE WITH ITS SPARCLE
WHICH DELIVERS MANKIND ALL SORTS OF
MIRACLES
I'M LOST IN SPACE OVER MY STAR GAZE!

-Magathi.M.Kumar, Astronomy Club Student

ASTROPHOTOGRAPHS FROM SPACE TEAM

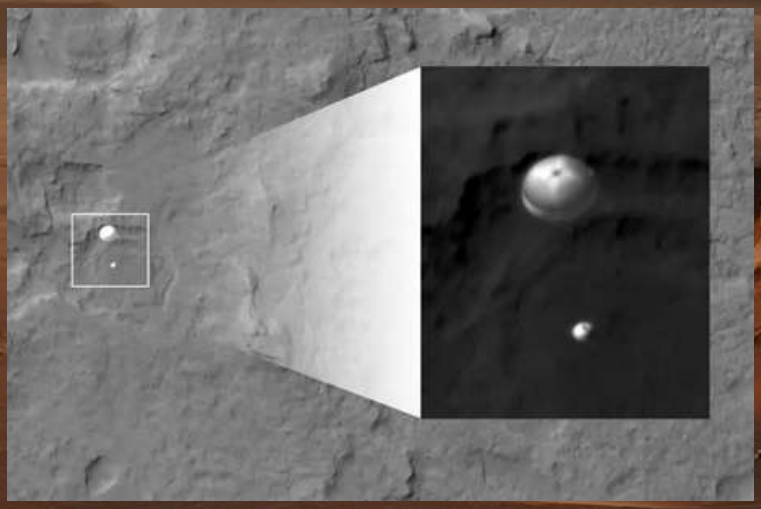
Milkyway arm Captured by Mr. Ranjith Kumar E, Regional Product Manager, STEPL.

HISTORICAL EVENTS OF AUGUST

DANGLING OVER MARS: THE DARING SKY CRANE THAT CHANGED PLANETARY LANDINGS FOREVER

On **August 6, 2012,** NASA redefined what it means to land on another world. The Curiosity rover, part of the Mars Science Laboratory mission, wasn't just another robot—at nearly **900 kg**, it was the heaviest and most advanced machine ever sent to the Martian surface. And the way it landed? Nothing short of revolutionary.

Artist's illustration of NASA's Mars rover Curiosity landing via sky crane on Aug. 5, 2012. (Image credit: NASA)



Curiosity rover and its parachute were spotted by NASA's Mars Reconnaissance Orbiter as Curiosity descended to the surface on Aug. 5 PDT (Aug. 6 EDT), 2012. (Image credit: NASA)

NASA introduced a bold and untested technique: **the sky crane maneuver.** As Curiosity approached the Red Planet, a parachute slowed its descent. Then came the real showstopper—at about **20 meters above Mars**, a hovering descent stage fired up its thrusters and lowered the rover on cables like a science-fiction rescue scene. Once the rover's wheels gently kissed the Martian soil, the cables were cut and the descent stage flew away to crash safely elsewhere.

One of the first images sent back by Curiosity rover. (Source: NASA)

This nerve-wracking sequence, known to engineers as the "**seven minutes of terror,**" wasn't just cinematic—it worked flawlessly.

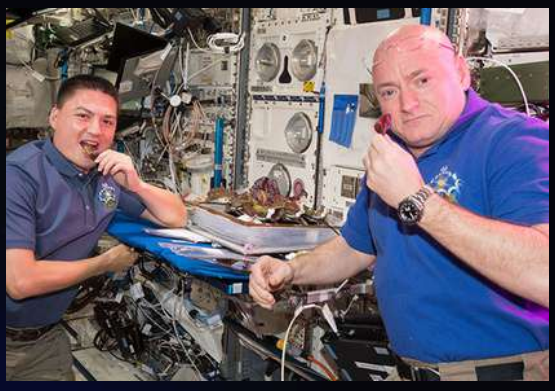
Perseverance in 2021 used an enhanced version of the same technique.

The entry, descent, and landing team for NASA's Curiosity Mars rover celebrates the spacecraft's touchdown on Aug. 5, 2012. (Source: NASA)

This wasn't just a landing. It was a leap of faith in engineering—and it changed the way we explore other worlds.

FIRST SALAD IN SPACE

On **August 10, 2015**, astronauts aboard the ISS Expedition 44 made history by eating red romaine lettuce grown entirely in space. Cultivated in NASA's Veggie system, the "Outredgeous" lettuce matured over **33 days under LED lights in microgravity.** Half the harvest was eaten, and half sent back to Earth for analysis. This marked the first time fresh food was consumed in orbit, **a milestone in space farming.** Beyond nutrition, it offered psychological comfort and paved the way for self-sustaining missions to Mars—proof that a small salad can signal giant leaps in space sustainability.



NASA astronauts Kjell Lindgren, left, and Scott Kelly harvest the first red lettuce grown on the International Space Station as part of the Veggie investigation. (Image Credits: NASA)

FIRST PHOTO OF EARTH FROM SPACE

Sunlit area of the Central Pacific Ocean and its cloud cover. (Source: NASA)

On August 14, 1959, NASA's Explorer 6 satellite captured the first photo of Earth from orbit, revealing cloud formations over the central Pacific ocean. At the time, the satellite was crossing Mexico. Taken from 17,000 miles above and transmitted over 40 minutes to Hawaii, the grainy image marked a turning point in how humanity viewed our planet—from space, not a map.

Launched just a week earlier, Explorer 6 was NASA's first Earth-science mission, pioneering space-based observation. Though crude, the photo laid the groundwork for future satellites like TIROS-1 and iconic images like "Earthrise."
It was more than data—it was our first cosmic mirror, reflecting Earth's beauty and fragility.

BEFORE HUMANS: THE FIRST EARTHLINGS TO ORBIT THE PLANET

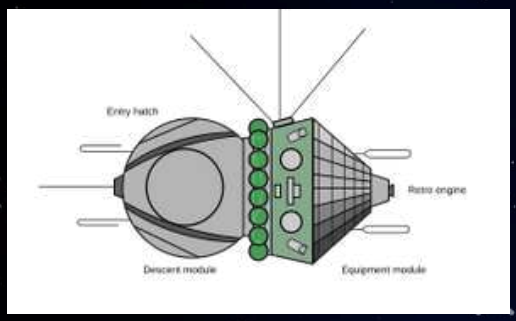
On August 19, 1960, Soviet spacecraft Sputnik 5 sent the first living beings—including dogs Belka and Strelka along with 40 mice, 2 rats, a rabbit, and various plants and fungi—into orbit and returned them safely. The 27-hour mission proved that these organisms could survive space travel, paving the way for human flights.

On your left: **Belka and Strelka** in the arms of **Oleg Gazenko, 1960** (Institute of Biomedical Problems, Moscow)

Russian stamp commemorating the 50th anniversary of the space flight of Belka and Strelka.

FIRST DUAL CREWED SPACEFLIGHT AND FREE FLOAT

In **August 1962**, the Soviet Union launched **Vostok 3 and 4** just a day apart, achieving the first dual-crewed orbit, first spacecraft-to-spacecraft radio contact, and the first human free float in space. **Andriyan Nikolayev floated inside Vostok 3**, while **Pavel Popovich orbited in Vostok 4**, marking a major leap in human spaceflight and multi-craft coordination.



Vostok 3KA capsule (Source: NASA)

Andriyan Nikolayev (Left) & Pavel Popovich
Source: Getty Images

VOYAGER 2: FIRST TO NEPTUNE

Launched on **August 20, 1977**, **Voyager 2 became the only spacecraft to explore all four gas giants–Jupiter, Saturn, Uranus, and Neptune**–using a rare planetary alignment. Its closest flyby of Neptune on **August 25, 1989**, revealed fierce winds, the Great Dark Spot, ring arcs, new moons, and icy geysers on Triton. Voyager 2 set the gold standard for deep space exploration and continues to shape our understanding of outer worlds.

VOYAGER-2 (Source: NASA)

EARTHRISE IN 1966: LUNA 12'S PIONEERING VIEW AND LUNAR MAPPING TRIUMPH

The first photo of Earth from the moon was taken on August 23, 1966. (Source: NASA)

On **August 23, 1966**, the unmanned Soviet spacecraft **Luna 12** delivered a landmark achievement: it became the first probe to capture an image of Earth from lunar orbit, offering humanity its earliest look back at our home from the Moon. But Luna 12 delivered more than a single iconic photo–it was also the **first probe to systematically map the lunar surface from orbit**. Equipped with television imaging systems capable of high **(~15–20 m) resolution**, the mission produced detailed photographic mosaics of lunar terrain. These early surface maps helped reveal the Moon's geography, crater structures, and promising landing sites.

CHANDRAYAAN-3: INDIA'S MOONSHOT TO THE LUNAR SOUTH POLE

On **August 23, 2023,** at approximately **18:03 IST**, India's Chandrayaan-3 mission made history with a soft lunar landing near the **Moon's south pole**—a first for any nation and marking India as the **fourth country** ever to land softly on the lunar surface. The Vikram lander descended autonomously and alighted near the cratered terrain between **Manzinus C and Simpelius N**, now named **Statio Shiv Shakti.**

In doing so, **India became the first country to reach this uncharted lunar territory**, an area long believed to hold reserves of frozen water and crucial insights into the Moon's ancient past.

Shortly after landing, the **Pragyan** rover deployed and conducted in-situ chemical analyses, covering around **100 meters** and making **23 measurements of lunar soil** composition—including iron-rich anorthosite—via instruments like an **X-ray spectrometer** and the **ChaSTE thermophysical probe (measuring surface temperatures).** The landing site, at **~70° S latitude**, placed Chandrayaan-3 into the largely unexplored high-latitude region thought to harbor frozen water in shadowed craters.

Chandrayaan-3 spacecraft Image Source: **ISRO**

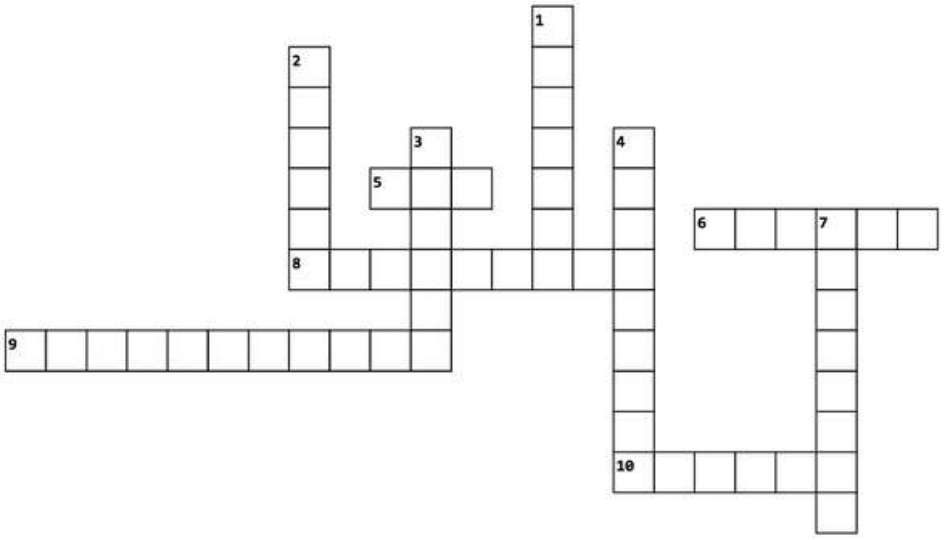
Unlike previous missions that focused on the equatorial belt of the Moon, **Chandrayaan-3 targeted the polar highlands—a region riddled with shadowed craters and extreme terrain.** Landing here not only demonstrated exceptional engineering precision but also positioned India at the forefront of next-generation lunar exploration. With this achievement, **India didn't just aim for the Moon—it nailed the landing where no one had dared to touch down before.**

Prime Minister Narendra Modi shares a warm embrace with Indian Research Organization (ISRO) Chief S. Somanath during his visit to the ISRO Telemetry Tracking and Command Network (ISTRAC), in Bengaluru (ANI Photo)

Prime Minister Narendra Modi visits the ISRO Telemetry Tracking and Command Network (ISTRAC), in Bengaluru on Saturday.
(ANI Photo) (PIB)

TRAIN YOUR BRAIN

CROSSWORD



Across

5. What is the name of the Axiom-4 symbolic toy crew member?

6. Which constellation's name means "the keel"?

8. What is the name of the first rover on Mars?

9. In which ancient region did Babylonians live?

10. Which country built the Huygens probe?

Down

1. Which shape was observed at Saturn's north pole?

2. Which is the brightest star in the night sky?

3. What is the Sun's outer layer visible during an eclipse?

4. What background radiation helps probe the universe's shape?

7. What type of light helps detect exoplanets through heat?

Astronomy Word Puzzle

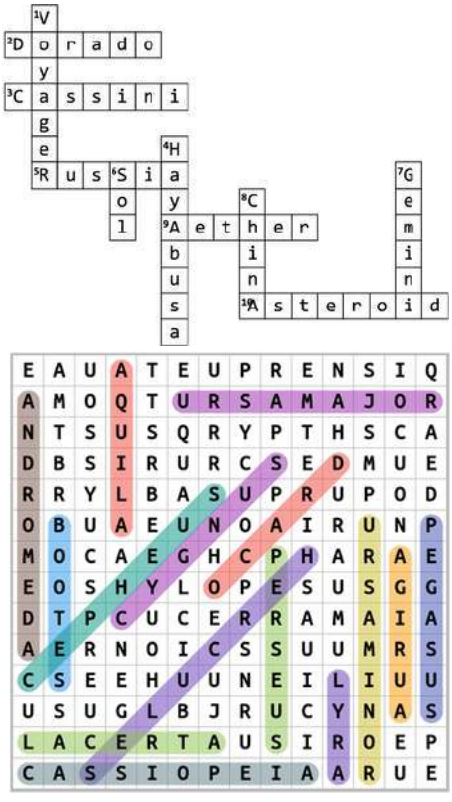
Constellation Quest: Part II

Southern Sky Constellations

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

MENSA
CARINA
INDUS
TUCANA
OCTANS
APUS
PAVO
DORADO
TELESCOPIUM
HYDRUS
PHOENIX
CHAMAELEON
CENTAURUS
VOLANS
CRUX

Answers for last month puzzles.



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

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