SPACE™
EMPOWERING LIFE

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Galactica

Astronomy and Space Science Magazine



What's Inside?

SPACE Insights
Highlights From June 2026
Moon Phases And Planet Visibility
What's Awaiting in July 2026
Space Paradoxes
Setbacks That Built Space Success
Stories of India's Greatest Minds
Historical Events Happened In July
Student's Corner
Astronomy & Space Term
July Born Legends
Mission: Do It Yourself
Train Your Brain

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

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ABOUT SPACE

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

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

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

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

CMD's Message



Dr. Sachin Bahmba, CMD, SPACE

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

Co-founder's Message

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.



Ms. Shalini Bahmba, Co-founder, SPACE

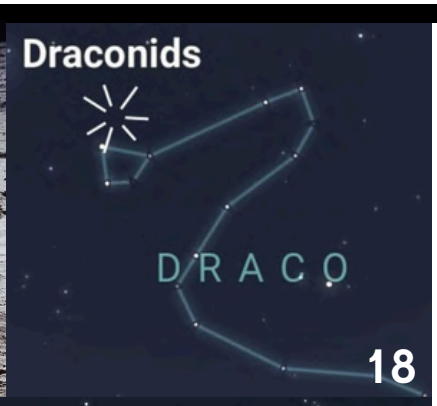
LIST OF

Page no.	Topics
1	**SPACE INSIGHTS**
	Highlights of June 2026
4	Private Industry Takes the Lead on NASA's 2028 Mars Orbiter Mission
5	NASA Captures Powerful Jet from Historic M87 Black Hole
6	Dr. Mylswamy Annadurai Designing Tamil Nadu's Curriculum
7	NASA's Plan to Fix Canadarm2
8	SRO Partners with Hack2Skill to Launch Bharatiya Antariksh Hackathon 2026
9	Menstruation in Space Will Be Studied for the First Time with 'Operation Period'
10	**What's up in the sky - July 2026**
11	**Rocket Launches in July 2026**
13	**Setbacks That Built Space Success**
14	**Space Paradoxes: Glitches in the Cosmos**
15	**July Born Legends**
	Celestial Spectacles - July 2026
17	Comet 10P/Tempel 2: A Returning Visitor of the Solar System
17	Earth at Aphelion: Annual Journey to the Edge
18	Southern Delta Aquariids Meteor Shower: A Summer Shower of Shooting Stars



CONTENTS

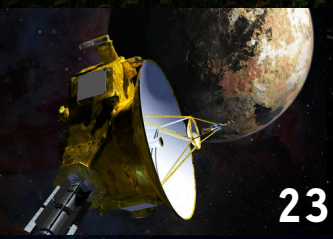
















18 Gamma Draconids Dragon's Breath Across the Sky

19 Conjunctions for the month

20 Students Corner

21 Ask the Universe

22 Stories of India's Greatest Minds

23 Historical events of July

26 Astronomy & Space Term

27 Astrophotography by SPACE Team

28 Cosmic Journey- The Gaint

29 Mission: Do It Yourself

30 Train Your Brain



SPACE INSIGHTS

The Sky Belonged to Everyone: Bringing the Universe to Noida

As dusk settled over Yamuna Enclave in Noida, an ordinary basketball court transformed into a gateway to the cosmos. Under the banner of **Celestial Evening – Under the Stars, SPACE Education Foundation,** in collaboration with community leader **Mr. Sitaram Sankararaman,** brought together families, young learners, and sky enthusiasts for an evening that celebrated curiosity, discovery, and the timeless connection between humanity and the night sky.

In an age where attention is often captured by glowing screens, the event invited participants to turn their gaze toward a far older source of light. Children arrived with excitement, parents with curiosity, and neighbours with a shared sense of anticipation. Together, they gathered beneath an open sky, united by a desire to explore the wonders that have inspired generations of dreamers, navigators, and scientists.

The journey began with hands-on activities using planispheres and digital sky-mapping tools, introducing participants to the art of navigating the heavens. As constellations emerged overhead, learning moved beyond theory and into experience. The night became a classroom without walls, where every star held a story and every planet became an invitation to explore.





The highlight of the evening was the live observation session led by **Dr. Sachin Bahmba, Founder and CMD of SPACE Group of companies**. Guiding participants across the celestial landscape, he revealed the Moon in striking detail and introduced them to the brilliance of **Venus, Jupiter, and Deep sky objects** through an impressive array of telescopes. For many young learners, it was their first encounter with these distant worlds not as illustrations in a book, but as real places suspended in the vastness of spaceThe event carried an even deeper significance through its partnership with Mr. Sitaram Sankararaman, whose community library has long nurtured a culture of learning among local children. Together, a garage filled with books and a field filled with telescopes stood as powerful reminders that education flourishes wherever curiosity is encouraged. Whether through the pages of a book or the lens of a telescope, every discovery begins with a question.

As the planets continued their silent journey across the night sky, the evening gradually drew to a close. The telescopes eventually fell silent, but the questions did not. They travelled home with every child, every parent, and every dreamer who had gathered beneath the stars. After all, the true measure of an evening like this is not how many planets were observed, but how many imaginations were set into orbit.

CM Yogi Adityanath Explores India's Astro-Heritage

"The Sun has guided civilizations for millennia marking time, shaping calendars, and inspiring humanitys earliest quest to understand the cosmos."

In a remarkable confluence of heritage, science, and vision, SPACE India curated a unique solar observation session for the Hon'ble Chief Minister of Uttar Pradesh, Shri Yogi Adityanath Ji, at the sacred Gorakhgiri Parvat in Mahoba. Set against a landscape steeped in spiritual and cultural significance, the initiative celebrated India's enduring relationship with the Sun one that stretches from ancient astronomical traditions to the frontiers of modern scientific exploration.

At the heart of the session was an immersive demonstration of solar observation, where traditional knowledge and contemporary technology came together in a compelling narrative of discovery. Through solar telescopes, observational instruments, and discussions rooted in the principles of the Surya Siddhantam, he witnessed how centuries old calculations and observations continue to resonate with modern scientific understanding.

The sacred grounds of Gorakhgiri Parvat offered a fitting backdrop for this unique experience. Revered for its association with Baba Gorakhnath Ji, the site became a meeting point between history and innovation, where the wisdom of ancient astronomers found expression through modern tools designed to study our nearest star.



Shri Yogi Adityanath Ji engaged closely with the demonstrations, exploring the scientific concepts behind solar observations and gaining insights into the remarkable precision of India's traditional astronomical knowledge. The interaction underscored the growing importance of preserving and celebrating India's scientific heritage while inspiring future generations to engage with astronomy and space science.



Beyond the observations themselves, the event marked an important step towards a larger vision. By highlighting the astronomical and cultural significance of Gorakhgiri Parvat, the initiative reinforced the potential of the region to emerge as a destination where heritage, education, and scientific exploration intersect. It reflected a shared commitment to creating meaningful opportunities for public engagement with astronomy while promoting regional development through innovative approaches such as Astro-Tourism.

As the sunlight bathed the sacred hills of Gorakhgiri Parvat, the occasion served as a powerful reminder that while technology continues to expand our view of the universe, the spirit of exploration that drives us forward has always been part of our story.

Beneath the Path of Totality “Masterclass on Eclipse Chasing”

In a remarkable celebration of curiosity and exploration, SPACE India, in collaboration with the American Center, New Delhi, brought together students, parents, teachers, and astronomy enthusiasts for an unforgettable masterclass, Adventures in Eclipse Chasing. More than a session on astronomy, it was an invitation to journey into one of nature’s most awe-inspiring spectacles and experience the thrill of exploration.

The occasion was made especially significant by the presence of **Dr. Sachin Bahmba**, Founder and CMD, SPACE Group of companies, widely regarded as the Father of Astrotourism and one of the country’s most accomplished eclipse chasers. For the participants, this was far more than a learning experience it was an opportunity to hear firsthand from a pioneer whose passion for the cosmos has inspired generations to venture beyond the familiar and seek wonder beneath distant skies.



As the session unfolded, eclipses emerged not merely as astronomical events, but as reminders of the extraordinary harmony that governs our universe. Scientific concepts blended seamlessly with stories, myths, and centuries of human fascination with the heavens. Through engaging discussions and immersive simulations, participants stepped into the role of eclipse chasers, tracing paths of totality and understanding the precision, patience, and planning required to witness one of nature’s rarest phenomena.





The narrative deepened as **Dr. Bahmba** shared captivating stories from the HeliOdyssey expeditions across Europe, Asia, and America. His experiences of pursuing the Moon's shadow across continents transformed eclipse chasing from a scientific pursuit into a story of adventure, perseverance, and wonder. Through his words, participants discovered that the sky is not merely something to observe it is something to follow.

Inspired by these journeys, participants turned their gaze towards the upcoming Great African Eclipse of August 2, 2027.

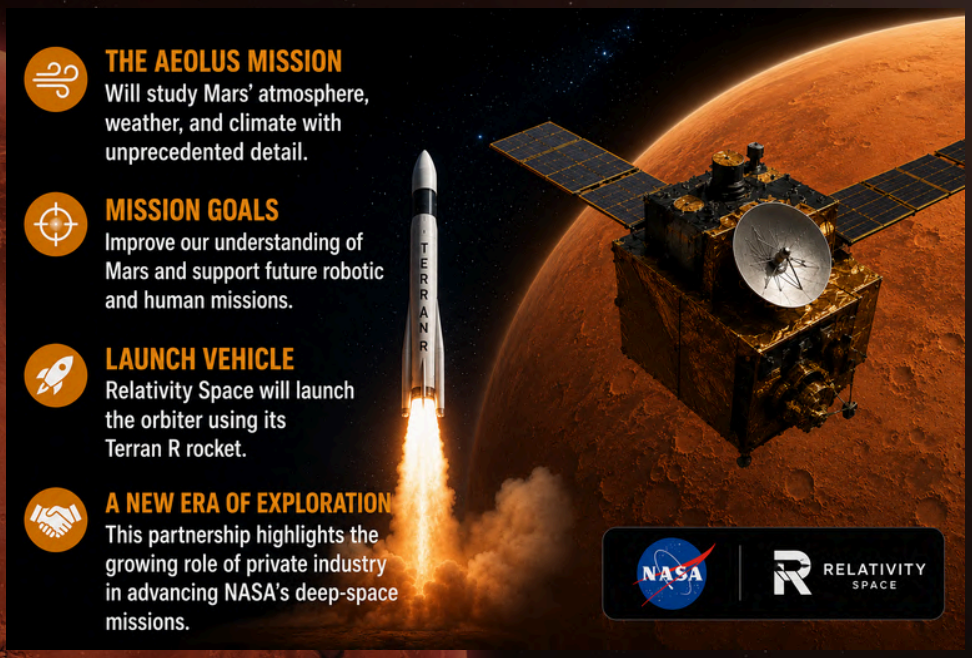
As the session concluded, it left behind a question.

When the Moon's shadow sweeps across Africa in 2027, will you be standing beneath the path of totality?

HIGHLIGHTS OF JUNE 2026

Private Industry Takes the Lead on NASA's 2028 Mars Orbiter Mission

NASA has announced an exciting new partnership with the private space industry to advance the exploration of Mars. In a significant step toward commercial participation in deep-space missions, California-based Relativity Space has been selected to design, build, launch, and operate NASA's next Mars orbiter, known as the Aeolus mission, which is scheduled for launch in 2028.



NASA's next Mars orbiter, Aeolus mission.

The Aeolus orbiter will carry a suite of scientific instruments developed by NASA to study the Martian atmosphere in unprecedented detail. The mission will provide the first daily global measurements of Mars' weather and environmental conditions, including winds, temperatures, dust storms, and cloud patterns. Scientists expect this data to greatly improve our understanding of the Red Planet's climate and atmospheric processes.

One of the mission's primary goals is to support future robotic and human exploration of Mars. By collecting accurate atmospheric data, Aeolus will help engineers design safer landing systems and better predict environmental conditions for future missions. The information gathered could prove essential for planning future astronaut expeditions to the planet.

Relativity Space, known for its innovative approach to rocket manufacturing and reusable launch systems, will use its upcoming Terran R rocket for the mission. The company is currently developing the rocket as its next-generation launch vehicle capable of carrying heavy payloads beyond Earth orbit.

NASA officials describe this collaboration as an example of how public-private partnerships can accelerate scientific discovery while reducing costs and development time. The Aeolus mission represents a new era in planetary exploration, where commercial companies play a larger role in helping humanity expand its presence across the solar system. If successful, it could pave the way for more privately built and operated missions to Mars and beyond.

NASA Captures Powerful Jet from Historic M87 Black Hole



A jet erupts from M87* the first black hole imaged by humanity.

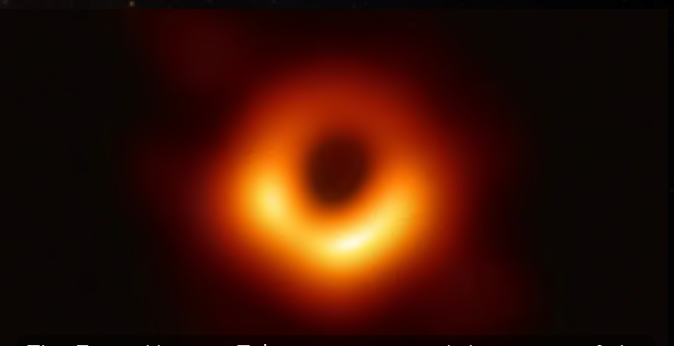
NASA's Chandra X-ray Observatory has captured the most detailed X-ray images ever taken of a powerful jet erupting from the supermassive black hole at the center of the galaxy Messier 87 (M87). This black hole, known as M87*, became famous in 2019 when astronomers released the first direct image of a black hole, a historic achievement made possible by the Event Horizon Telescope.

Located about 55 million light-years from Earth, M87* is a giant cosmic monster with a mass approximately 6.5 billion times that of the Sun. For more than a century, astronomers have observed a bright jet of high-energy particles shooting out from the galaxy's core. These jets are produced when matter falling toward the black hole is redirected and accelerated to nearly the speed of light by powerful magnetic fields.

Using observations collected between 2012 and 2025, Chandra tracked changes within the jet in unprecedented detail. Advanced image-processing techniques revealed complex structures and knots of energetic material moving through the jet. Some regions even appeared to travel faster than light, a visual effect known as "superluminal motion," which occurs when objects move close to light speed in the direction of Earth.

The new observations provide scientists with valuable clues about how supermassive black holes launch and sustain enormous jets that can extend thousands of light-years into space. These jets play a crucial role in shaping their host galaxies by influencing star formation and redistributing energy throughout the surrounding environment.

By continuing to monitor M87, astronomers hope to better understand the extreme physics operating near black holes and how these mysterious objects influence the evolution of galaxies across the universe. The findings demonstrate the remarkable power of X-ray astronomy in revealing some of the most energetic phenomena in the cosmos.



The Event Horizon Telescope captured this image of the supermassive black hole in galaxy M87

Dr. Mylswamy Annadurai Designing Tamil Nadu's Curriculum

Popularly known as the "Moon Man of India," Mylswamy Annadurai has played a remarkable role in advancing India's space program and inspiring millions of students to dream beyond the skies. After serving as a distinguished scientist at the Indian Space Research Organisation (ISRO), he has dedicated himself to strengthening science education by contributing to the Tamil Nadu School Education Curriculum Team, helping shape a future-ready generation of learners.

Annadurai is best known for his leadership in two of India's most celebrated space missions–Chandrayaan-1, India's first mission to the Moon, and Mangalyaan (Mars Orbiter Mission), India's historic mission to Mars. These achievements demonstrated India's technological capabilities and inspired young minds across the nation to explore careers in science, technology, engineering, and mathematics (STEM).

Recognizing that scientific curiosity begins in the classroom, Annadurai has actively contributed to curriculum development in Tamil Nadu. His vision is to make science education more engaging, practical, and connected to real-life applications. He believes that students learn best through questioning, experimentation, observation, and hands-on experiences rather than rote memorization.

As a member of the Tamil Nadu School Curriculum Team, he has encouraged the integration of modern scientific concepts, space technology, environmental awareness, and innovation into school education. His efforts aim to equip students with critical thinking, problem-solving abilities, and the confidence to embrace emerging technologies.

Beyond curriculum development, Annadurai frequently interacts with students, teachers, and educational institutions through lectures and outreach programs. He motivates young learners to remain curious, think creatively, and view challenges as opportunities for discovery. His message is simple yet powerful: every child has the potential to become a scientist, innovator, or problem solver when provided with the right guidance and opportunities.

Mylswamy Annadurai's journey from a small town in Tamil Nadu to becoming one of India's most respected space scientists is a testament to the power of education, perseverance, and curiosity. Today, his continued contribution to school education ensures that countless students are inspired to explore the universe and shape a brighter future through science.



Dr. Mylswamy Annadurai
Designing Tamil Nadu's Curriculum

NASA's Plan to Fix Canadarm2

One of the most important pieces of equipment aboard the International Space Station (ISS), the Canadian-built robotic arm known as Canadarm2, has suffered a malfunction, prompting NASA and its international partners to prepare an urgent repair mission. Fortunately, engineers already have a plan in place to restore the vital system.

The problem was first detected on May 27, 2026, during routine operations when one of Canadarm2's wrist joints showed unusually high motor currents and failed to move as expected. After extensive diagnostics, NASA, the Canadian Space Agency (CSA), and MDA Space—the company that built the arm—determined that the affected joint would need to be replaced during a spacewalk.

Canadarm2 has been a cornerstone of ISS operations since 2001. The 17-meter-long robotic arm is used to capture cargo spacecraft, move equipment around the station, and support maintenance activities outside the orbiting laboratory.

Over its 25 years of service, it has completed more than 50 spacecraft captures and countless other critical tasks. Despite being well beyond its original design life, the arm remains essential to station operations.

The good news is that Canadarm2 was designed with repairs in mind. Its modular structure allows damaged components to be removed and replaced in orbit. A spare wrist-joint assembly is already aboard the station, eliminating the need to launch replacement hardware from Earth.

NASA has scheduled a spacewalk for June 30, 2026, during which astronauts Jessica Meir and Chris Williams will replace the faulty joint. The operation is expected to last approximately six and a half hours. Once completed, Canadarm2 should return to full functionality, ensuring the ISS can continue receiving cargo spacecraft and conducting essential maintenance activities.

The planned repair highlights both the challenges of maintaining aging space infrastructure and the ingenuity of engineers who design systems capable of being repaired hundreds of kilometers above Earth.



ISRO Partners with Hack2Skill to Launch Bharatiya Antariksh Hackathon 2026



ISRO Launches Bharatiya Antariksh Hackathon

The Indian Space Research Organisation (ISRO) has joined hands with Hack2Skill to launch the Bharatiya Antariksh Hackathon 2026, a nationwide innovation challenge aimed at inspiring students to develop solutions for real-world space and climate-related problems. The initiative reflects India's growing commitment to fostering innovation and nurturing the next generation of space scientists, engineers, and technology leaders.

The hackathon invites undergraduate, postgraduate, and research students from across the country to participate in teams and tackle a wide range of challenges inspired by India's space missions and scientific goals. Participants will work on problem statements related to artificial intelligence, satellite imagery, climate modelling, lunar exploration, exoplanet detection, solar flare forecasting, agriculture, and remote sensing technologies.

Powered by Hack2Skill, one of India's leading innovation platforms, the challenge provides students with an opportunity to collaborate, innovate, and showcase their technical abilities on a national stage. Unlike traditional competitions, the hackathon emphasizes problem-solving and practical applications that can contribute to India's expanding space ecosystem.

A key highlight of the program is the mentorship offered by ISRO scientists and domain experts. Selected teams will receive guidance throughout the competition, helping them refine their ideas and develop impactful solutions. Outstanding participants may also be considered for internship opportunities with ISRO, providing valuable exposure to real-world space research and technology development.

The launch of this national space innovation challenge demonstrates ISRO's commitment to engaging young minds in the country's scientific and technological progress. By encouraging students to address complex challenges through innovation and teamwork, the initiative aims to strengthen India's future space workforce and inspire groundbreaking ideas that could support upcoming missions and scientific discoveries.

Menstruation in Space Will Be Studied for the First Time with 'Operation Period'

For decades, space agencies have studied how microgravity affects the human body, from bones and muscles to the heart and brain. However, one important aspect of human health has remained largely unexplored: menstruation. Now, a pioneering initiative called Operation Period aims to change that by conducting the first dedicated scientific study of menstruation in space.



Ms. MANJU, Founder,ED. Operation Period

The mission, known as Operation Period-01 (OP-01), is scheduled for 2027 and will fly aboard a suborbital spacecraft operated by Virgin Galactic. Led by researchers and advocates Manju Bangalore and Priya Abiram, the project seeks to understand how menstrual fluid behaves in microgravity and how menstrual hygiene products perform in space.

Despite more than 100 women having traveled to space, there has never been a dedicated quantitative study of menstruation under spaceflight conditions.

Currently, many astronauts choose to suppress menstruation during missions using hormonal methods such as oral contraceptives or intrauterine devices (IUDs). While this approach is effective, the lack of scientific data means astronauts have limited information about managing natural menstrual cycles in space. As humanity prepares for longer missions to the Moon and Mars, understanding menstrual health in space will become increasingly important.



Researchers believe the findings could help improve astronaut health, mission planning, and resource management. The study may also contribute valuable knowledge to reproductive and menstrual health research on Earth, where significant gaps still exist.

Operation Period represents more than a scientific experiment; it is a step toward making space exploration more inclusive. By addressing an overlooked area of human health, the mission highlights the need to design future space programs that consider the needs of all astronauts.

As space exploration enters a new era, Operation Period promises to provide crucial data that could benefit both future space travelers and millions of people on Earth.

WHAT'S UP IN THE SKY - JULY 2026

LUNAR CALENDAR

IMPORTANCE OF MOON PHASES FOR STARGAZERS

One might wonder why it is important to refer to moon phases for star gazing. The reason is that the phases of the Moon reflect a great deal of illumination, and because the Moon is so close to us, it overrides the brightness of other celestial objects.

So, What Moon phase is best for stargazing? "The New Moon and the days immediately before and after the new moon (Crescent phases)" are among the best times for stargazing. Whereas the Remaining phases like Full Moon, waxing or waning gibbous, the first or third quarter Moon offers a time to zoom in and witness the features of the Moon.



PLANETS VISIBILITY

Mercury
Visible low in the eastern sky before sunrise.

Venus
Visible brightly in the western evening sky after sunset.

Mars
Visible in the eastern sky before sunrise each morning.

Jupiter
Visible all night in the constellation Aquila this month.

Saturn
Poor morning planet initially, improving slightly in visibility throughout June.

Uranus
Uranus is near the Sun, so it's lost in glare and not safely visible.

Neptune
Not visible this month; remains too close to the Sun for observation.

BRIGHT DEEP SKY OBJECTS



Butterfly Cluster also known as M6 is located in Scorpius constellation with an apparent magnitude of 4.2. It is visible to naked eye under dark sky and is excellent binocular target. It is around 100 million years old located 1600 light years away from Earth.



North America Nebula also known as NGC 7000 or Caldwell 20 is located in Cygnus constellation with apparent magnitude of 4 and is best observed from Northern Hemisphere. To the naked eye, M24 will only appear as a bright patch of stars.



NGC 6205 or Hercules Cluster is located in Hercules constellation and is best observed from northern Hemisphere. It has an apparent magnitude of 5.8. It is 23000 light years away and stands out beautifully in binoculars as a fuzzy ball of light.



NGC 6523 also known as Lagoon Nebula is best observed from both hemisphere. It is found in the Sagittarius constellation and has an apparent magnitude of 6.0. The object is easily distinguishable with binoculars. This emission nebula is located 4000 light years away. We can use a small telescope for detailed view.

ROCKET LAUNCHES IN JULY 2026

SOYUZ MS-29

Soyuz MS-29 is a planned Russian crewed space mission operated by Roscosmos. The spacecraft is scheduled to launch on 14 July 2026 from Baikonur Cosmodrome aboard a Soyuz-2.1a rocket. The mission will carry three crew members, including NASA astronaut Anil Menon, to the International Space Station (ISS).

The mission uses the modern Soyuz MS spacecraft model, an upgraded version of the long-running Soyuz series. It features improved navigation, communication, and safety systems designed for reliable human transportation to and from low Earth orbit. The spacecraft is expected to remain docked to the ISS for approximately eight months.

The primary purpose of Soyuz MS-29 is crew transportation and scientific support for ISS Expeditions 74 and 75. During the mission, the crew will conduct scientific research, technology demonstrations, and station maintenance activities while supporting international cooperation in space exploration.



Soyuz 2.1a
(Credit:thespacedevs)



Electron
(Credit:thespacedevs)

LOXSAT-1

LOXSAT-1 is a NASA-supported technology demonstration mission developed by Eta Space to test advanced cryogenic fluid management in orbit. The mission is currently scheduled for launch in July 2026 aboard a Rocket Lab Electron rocket from Launch Complex 1 in New Zealand. It will operate in Low Earth Orbit and collect data for approximately nine months.

The mission uses a Rocket Lab Photon-LEO satellite bus integrated with a liquid-oxygen (LOX) storage and transfer system. This spacecraft model is designed to demonstrate technologies such as cryogenic propellant storage, fluid transfer, docking interfaces, and long-duration fuel management in space.

The primary purpose of LOXSAT-1 is to prove that super-cooled rocket propellants can be safely stored and transferred in orbit. This capability is essential for future space refueling stations, lunar missions, deep-space exploration, and commercial propellant depots, helping spacecraft travel farther without carrying all their fuel from Earth.

AMAZON LEO LA-08

Amazon Leo (LA-08) is a planned satellite deployment mission for Amazon's broadband internet constellation, formerly known as Project Kuiper. The mission is scheduled to launch on 3 July 2026 from Space Launch Complex 41 at Cape Canaveral Space Force Station, Florida. It will be carried into Low Earth Orbit by a United Launch Alliance (ULA) Atlas V 551 rocket.

The launch vehicle for this mission is the Atlas V 551, a heavy-lift rocket featuring a five-meter payload fairing, five solid rocket boosters, and a two-stage configuration. The payload consists of Amazon Leo satellites that form part of a planned constellation of more than 3,200 satellites designed to operate in Low Earth Orbit.

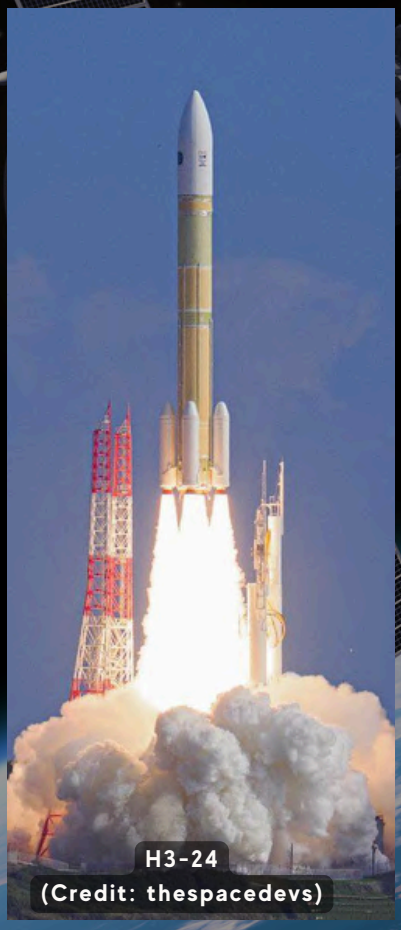
The primary purpose of Amazon Leo (LA-08) is to expand Amazon's global satellite internet network, providing high-speed, low-latency broadband connectivity. The constellation is intended to improve internet access for customers worldwide, especially in remote and underserved regions where traditional broadband infrastructure is limited.



Atlas V 551
(Credit: thespacedevs)

HTV-X2

HTV-X2 is the second flight of Japan's next-generation cargo spacecraft program operated by the Japan Aerospace Exploration Agency (JAXA). The mission is scheduled for launch in July 2026 from the Tanegashima Space Center aboard an H3-24W rocket developed by Mitsubishi Heavy Industries. It will travel to the International Space Station (ISS) carrying supplies, equipment, and scientific payloads.



H3-24
(Credit: thespacedevs)

The spacecraft model used is the HTV-X, an upgraded successor to the H-II Transfer Vehicle (HTV). HTV-X features improved cargo capacity, enhanced power generation through deployable solar arrays, and more efficient operational systems. It is specifically designed for ISS resupply missions and future space logistics applications.

The primary purpose of HTV-X2 is to deliver cargo and scientific experiments to the ISS while demonstrating advanced spacecraft technologies. The mission supports ongoing station operations, international research activities, and future developments in automated docking and space transportation systems.

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

SETBACKS THAT BUILT SPACE SUCCESS

THE LOST MARS PROBE AND A MODERN-DAY MYSTERY

A Journey to Mars:
In July 1988, the Soviet Union launched Phobos 1, a spacecraft built to explore Mars and its largest moon, Phobos. The mission was part of an ambitious program to study the Martian environment, the solar wind, and the mysterious moon that circles Mars. Scientists hoped the spacecraft would reveal new information about Mars and help them understand the origin and composition of Phobos.

A Mission Lost:
The mission progressed smoothly until 2 September 1988, when communication with the spacecraft was suddenly lost. Investigations later showed that a command sent from Earth contained a single-character error. This mistake accidentally activated a ground-test routine that switched off the spacecraft's attitude-control system, which kept it properly oriented in space.

Without this system, Phobos 1 could no longer point its solar panels toward the Sun. As power levels dropped, the spacecraft lost its ability to communicate with Earth and eventually became unresponsive. Despite several attempts to recover contact, the spacecraft was never heard from again. The incident remains one of the most famous examples of how a tiny error can lead to the failure of a major space mission.



A Phobos Spacecraft. (Credit: Soviet Space Program)



Artist's impression of Hayabusa2 touching down on asteroid 1998 KY26(Credit: ESO)

Lessons Learned:
Although Phobos 1 never reached Mars, the mission provided valuable lessons for future space exploration. The loss emphasized the importance of software verification, command-checking procedures, and safety systems that prevent critical instructions from being executed accidentally.
The incident encouraged space agencies to improve mission-control protocols and introduce additional safeguards for spacecraft operations. These lessons continue to influence the design and management of modern interplanetary missions.

A Modern-Day Mystery:
Scientists searched for the missing spacecraft using powerful telescopes, but it was never found. More than three decades later, researchers proposed that an object known as dark comet 1998 KY26 could possibly be the lost spacecraft. The idea remains highly speculative, and most scientists consider the object to be a natural body.
A future visit by Japan's Hayabusa2 extended mission in 2031 may help determine whether this mysterious object is simply an asteroid–or the long-lost Phobos 1 spacecraft.

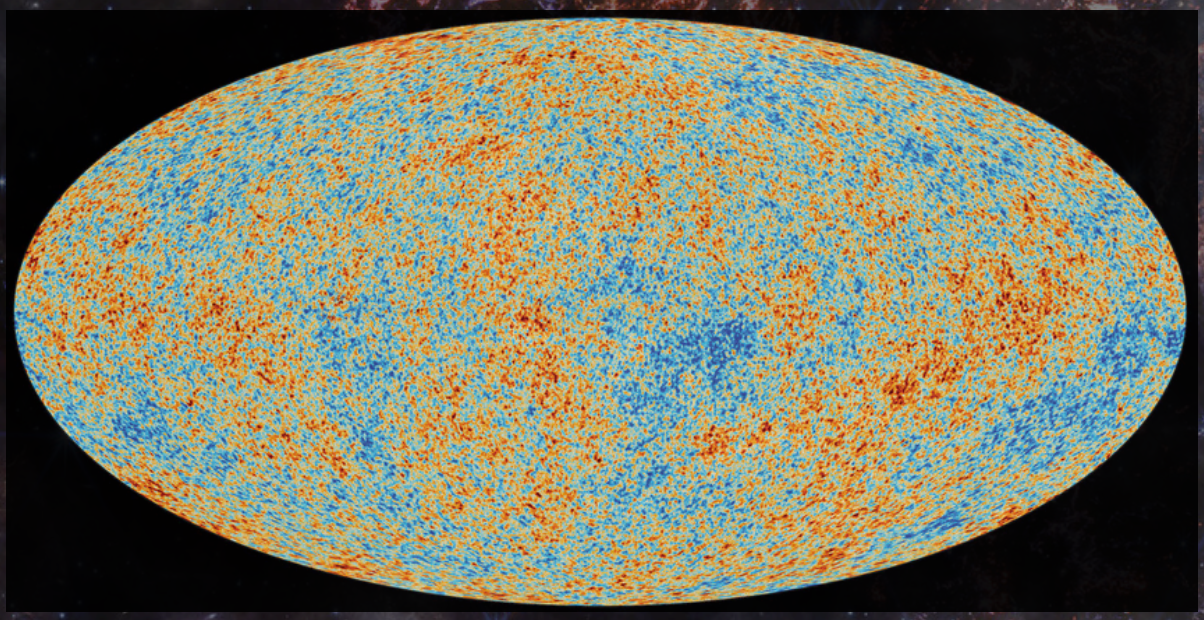
SPACE PARADOXES: GLITCHES IN THE COSMOS

COINCIDENCE OR CONNECTION?

The Mystery of Cosmic Uniformity

Introduction:

The Horizon Problem is an important issue in cosmology that arises from observations of the Cosmic Microwave Background (CMB), the radiation left over from the early universe. The CMB has nearly the same temperature in every direction, indicating a remarkable level of uniformity across the observable universe.



Cosmic Microwave Background Radiation. (Credit: ESA)

Why Is It a Problem?

A horizon is the greatest distance over which information or energy can travel. According to the standard Big Bang model, many regions of the universe were too far apart to exchange information when the CMB was formed. If these regions could not interact, it is difficult to explain why they ended up with nearly identical temperatures.

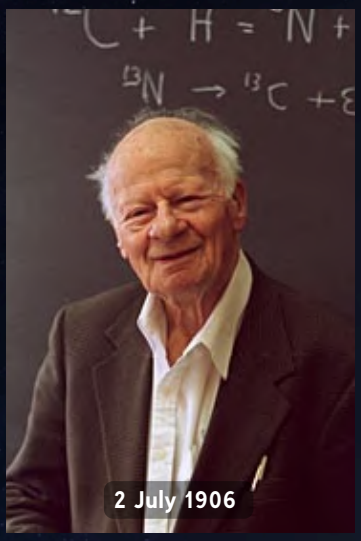
Inflation as a Solution:

To solve this puzzle, scientists proposed the idea of cosmic inflation. Inflation suggests that the universe expanded extremely rapidly in its earliest moments. Before this expansion, regions that are now very far apart were close enough to interact and reach the same temperature. Inflation then stretched them across the universe while keeping their similar properties.

A Continuing Mystery:

Although inflation is the most widely accepted explanation, some scientists argue that the universe may simply have started out uniform. This raises an important question: does the universe's uniformity need an explanation, or is it just one of its initial conditions? The Horizon Problem continues to inspire discussion as scientists work to better understand the origins of our universe.

Happy Birthday



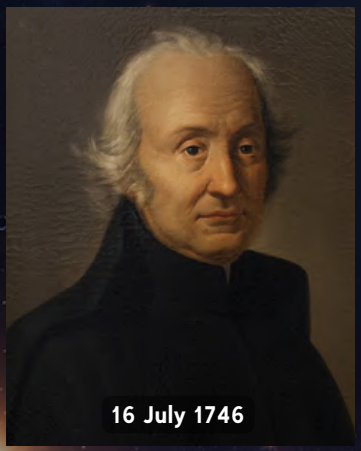
Hans Bethe

Hans Bethe (2 July 1906 – 6 March 2005) was a German-American physicist whose groundbreaking research explained how stars produce energy. In 1938, he described the proton-proton chain and the carbon-nitrogen-oxygen (CNO) cycle, the nuclear fusion processes that power the Sun and other stars. His discoveries solved one of astronomy's greatest mysteries and laid the foundation for modern stellar astrophysics. For this remarkable achievement, he was awarded the Nobel Prize in Physics in 1967. Bethe's work transformed our understanding of stellar evolution, nucleosynthesis, and the life cycles of stars, making him one of the most influential astrophysicists of the twentieth century. (Credits :© 1996 Michael Okoniewski)

Jocelyn Bell Burnell

Jocelyn Bell Burnell (born 15 July 1943) is a Northern Irish astrophysicist best known for co-discovering the first radio pulsars in 1967. While studying as a postgraduate student at the University of Cambridge, she noticed unusual, highly regular radio signals that were initially nicknamed "Little Green Men" because of their precision. These signals were later identified as rapidly rotating neutron stars called pulsars. Her discovery revolutionized astronomy by revealing a completely new type of celestial object. Bell Burnell has since become a leading advocate for science education, diversity, and equal opportunities in scientific research. (Credits:physicsworld.com)

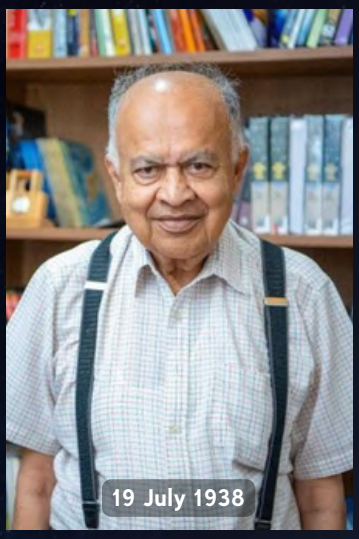




Giuseppe Piazzi

Giuseppe Piazzi (16 July 1746 – 22 July 1826) was an Italian astronomer and Theatine priest who made one of astronomy's most important discoveries. On 1 January 1801, while observing the night sky, he discovered Ceres, the first known object in the asteroid belt. Initially classified as a new planet, Ceres is now recognized as a dwarf planet and remains the largest object in the asteroid belt between Mars and Jupiter. Piazzi's discovery opened the door to the study of asteroids and significantly expanded our understanding of the Solar System's structure and formation.(Credits:wikipedia)

Happy Birthday



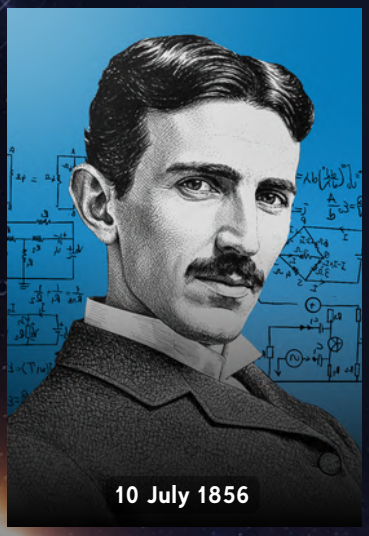
Jayant Vishnu Narlikar

Jayant Vishnu Narlikar (born 19 July 1938) is one of India's most distinguished astrophysicists and science communicators. He collaborated with Sir Fred Hoyle to develop the Hoyle-Narlikar theory of gravitation, an alternative cosmological model based on conformal gravity. His research has contributed significantly to cosmology, gravitation, and the large-scale structure of the Universe. Narlikar has also played a major role in promoting astronomy education through lectures, books, and public outreach. As the founder-director of the Inter-University Centre for Astronomy and Astrophysics (IUCAA), he has inspired generations of students and researchers across India.
(Credits: astron-soc.in)

Vera Rubin

Vera Rubin (23 July 1928 – 25 December 2016) was an American astronomer whose pioneering observations provided the strongest evidence for the existence of dark matter. By studying how galaxies rotate, she found that stars at their outer edges moved much faster than expected, suggesting the presence of an invisible form of matter. Her research transformed modern cosmology and changed our understanding of the Universe. Rubin also broke barriers for women in science, becoming a role model for future generations. Her discoveries continue to influence astronomical research and the search for the mysterious dark matter. (Credits: American Institute of Physics)





Nikola Tesla

Nikola Tesla (10 July 1856 – 7 January 1943) was a visionary inventor and electrical engineer whose innovations shaped the modern world. In 1899, while conducting experiments at his Colorado Springs laboratory, Tesla detected mysterious rhythmic radio signals from space. He believed they could be messages from intelligent extraterrestrial life and carefully documented his observations. Although scientists later concluded that the signals were likely natural radio emissions from celestial objects such as planets, the Sun, or distant stars, Tesla's observations sparked interest in cosmic radio waves. His curiosity anticipated the field of radio astronomy and inspired future searches for signals from the Universe. (Credits: interestingengineering)

ASTRONOMICAL EVENTS

Comet 10P/Tempel 2

A Returning Visitor of the Solar System

During July 2026, skywatchers can follow the journey of Comet 10P/Tempel 2, a periodic comet that returns to the inner Solar System every 5.4 years. Discovered by German astronomer Wilhelm Tempel in 1873. This Jupiter-family comet is an ancient remnant of the Solar System's formation and offers astronomers a glimpse into its distant past.

Throughout July, the comet will gradually brighten as it approaches its perihelion (closest point to the Sun) on August 2, 2026. Expected peak brightness by the end of this month is of magnitude around 8–10. Under dark skies, it may be visible through binoculars, while small telescopes will provide a much better view of its diffuse coma. The comet is in the constellation Aquarius at the beginning of July, moving steadily southeastward. Around July 10–11, it crosses into Capricornus, where it remains for the rest of the month. Observers can look for it in the late evening and early morning hours, when it is well placed above the southern horizon.

Tracking Comet 10P/Tempel 2 over several nights provides a rewarding experience, as its movement against the background stars can be noticed from week to week. For amateur astronomers and astrophotographers July 2026 offers an excellent opportunity to observe one of the year's most accessible comets and witness a relic from the early Solar System making another visit to our skies.



Comet Tempel2 amongst the stars of Cetus
Credit: russellastronomy.com

Earth at Aphelion

Annual Journey to the Edge

On July 6, 2026, Earth will reach aphelion, the point in its orbit where it is farthest from the Sun. At this time, Earth will be approximately 152.1 million kilometers away from the Sun, about 5 million kilometers farther than at perihelion, which occurs in early January. Interestingly, aphelion does not cause the seasons. Although Earth is farthest from the Sun, it is summer in the Northern Hemisphere and winter in the Southern Hemisphere. This is because seasons are determined by Earth's axial tilt rather than its distance from the Sun.

The difference in distance causes only a small change in the Sun's apparent size and the amount of solar energy reaching Earth. During aphelion, the Sun appears slightly smaller in the sky than it does at perihelion. Although this change is difficult to notice without precise measurements, it demonstrates that Earth's orbit is not a perfect circle but a slightly elliptical one. Earth's journey to aphelion is a reminder of the dynamic nature of our planet's motion around the Sun and the fascinating mechanics that govern our Solar System.

Southern Delta Aquariids Meteor Shower

A Summer Shower of Shooting Stars

The Southern Delta Aquariid Meteor Shower is one of the year's most reliable meteor showers and will reach its peak during the night of July 30-31, 2026. The shower is active from mid-July to late August and is best observed from the Southern Hemisphere and tropical regions, making it a favourable event for observers in India. The meteors appear to radiate from the constellation Aquarius, near the star Delta Aquarii, from which the shower gets its name. Under dark skies, observers may see 20-25 meteors per hour near the peak. These meteors are known for producing long, graceful trails that streak across the sky. The exact parent body of the Southern Delta Aquariids remains uncertain, though astronomers suspect it may be associated with the periodic comet Comet 96P/Machholz.



Position of the radiant in the constellation Aquarius. Credit: theskylive.com

In 2026, viewing conditions will be less favorable because the peak occurs just one day after the Full Moon on July 29. The bright moonlight will wash out many of the fainter meteors, reducing the number visible to the naked eye. However, the brightest meteors should still be observable. The best time to watch the shower is between midnight and dawn, when Aquarius climbs higher in the southeastern sky. No telescope or binoculars are required simply find a dark location, allow your eyes to adapt to the darkness, and enjoy nature's celestial fireworks.

Gamma Draconids

Dragon's Breath Across the Sky



Position of the radiant in the constellation Draco.Credit: spaceandtelescope.com

The Gamma Draconid Meteor Shower is a minor annual meteor shower that reaches its peak around July 28-29, 2026. The meteors appear to radiate from the constellation Draco, near the star Gamma Draconis, which gives the shower its name.

In 2026, observations will be affected by the bright Moon, as the shower peaks close to the Full Moon on July 29. This will make faint meteors difficult to detect, leaving only the brighter streaks visible. Nevertheless, patient observers under dark skies may still catch a few meteors radiating from Draco.

The best viewing time is from late evening until dawn, when Draco is well positioned overhead. No special equipment is needed just a comfortable viewing spot and a clear sky. While modest in activity, the Gamma Draconids offer another opportunity to enjoy the ever-changing beauty of the night sky and witness small fragments of cosmic debris burning up in Earth's atmosphere.

CONJUNCTIONS FOR THE MONTH

A phenomenon grabs the imagination of scientists and stargazers alike in the vast panorama of the night sky, where stars shine as distant diamonds and planets roam over the cosmic canvas. Conjunctions, those ethereal moments in the heavens when heavenly bodies appear to collide, provide a mesmerising sight that connects us to the beauty of the cosmos. The word "Conjunction" comes from Latin, meaning to join together.

From Earth's perspective, a conjunction occurs when two planets or a planet and the Moon or Sun align. Solar conjunctions are invisible to us. Moon planet conjunctions occur throughout the month, every month, as the Moon passes past each planet. The planets in The Great Conjunction and when multiple align are rare and captivating conjunctions. Technically speaking, objects are said to be in conjunction in that instant when they have the same right ascension on our sky's dome. Practically speaking, objects in conjunction will likely be visible near each other for some days.

Conjunction of Mars and Uranus

On July 4, Mars and Uranus appear close together in the pre-dawn sky. Mars shines at magnitude +1.5 with its familiar reddish-orange glow, while Uranus glows at magnitude +5.8 and may require binoculars to spot. Look toward the eastern horizon before sunrise to observe this fascinating planetary conjunction.



Place: New Delhi / Date: 04th July / Time: 04:00 AM.

Conjunction of Moon and Saturn



Place: New Delhi / Date: 08th July / Time: 04:00 AM

On July 8, the Moon passes close to Saturn in the early morning sky. Saturn shines at magnitude +0.7 with a steady golden appearance, creating a beautiful pairing with the bright Moon at -10.2 magnitude. Look toward the southeastern sky before dawn for the best view of this attractive and easily observable conjunction.

Conjunction of Moon and Mars

On July 12, the Moon appears near Mars in the pre-dawn sky, creating a striking celestial pairing. Mars shines at magnitude +1.5 and displays its distinctive reddish-orange color. Look toward the eastern horizon before sunrise to enjoy this conjunction, which offers an excellent opportunity to locate the Red Planet.



Place: New Delhi / Date: 12th July / Time: 05:00 AM

Conjunction of Moon and Venus



Place: New Delhi / Date: 17th July / Time: 07.30 P M.

On July 17, the Moon and Venus appear close together in the evening sky, creating a beautiful conjunction for observers. Venus shines brilliantly at magnitude -4.1, making it one of the brightest objects visible after sunset. Look toward the western horizon during twilight to enjoy this striking pairing.

STUDENTS CORNER

THE LUCKY ONES

VETRIVEL. T

Introduction:
An infinite number of stars exist within our universe. Some of them are better known than others because they are more easily visible with the unaided eye and are perhaps the brightest objects in the celestial sky. Most of them will, therefore, also have been observed and studied for many years. Which are some of these lucky stars that have received so much attention and left human beings star struck?

Polaris:
Polaris is the present North Star. Eart spins around its axis. If you follow this imaginary line from the northern pole, it would point to a particular star, which is the Polaris and therefore referred to as the North Star. Since it is close to be North Pole, this star has been used as a tool for navigation in the northern hemisphere and is also known as the Guiding Star. Due to the wobbling of Earth's axis, in about another 14,000 years, it will slowly start pointing away from the Polaris towards a new North Star!

Alpha Centauri:
The Alpha Centauri is a triple star system and is the closest to the Sun. It consists of Proxima Centauri (its dimmest component) and its brightest components – Alpha Centauri A and B. When seen from Earth, it is the fourth brightest star after Sirus, Canopus and Arcturus. It lies in the southern constellation Centaurus. Alpha Centauri was designed as Rigil Kentaurus by the IAU in 2016; the word is of Arabic origin and means 'foot of the Centaur'.

Betelgeuse:
Betelgeuse is one of the m0st luminous stars seen at night and the second – brightest in the Orion constellation. It is a red supergiant and it sure is humungous, being nearly 950 times larger that the Sun! Its name comes from the Arabic word 'bat al – jawz', which means 'giant' s shoulder'. Betelgeuse can be easily spotted due to its position in Orion and its deep red hue.

Sirius:
Sirius is significant in more ways than one, firstly it is the brightest star among all other stars seen from Earth. Ancient Egyptians called it Sothis and believed it to be the cause of the Nile floods, which always seemed to coincide with the first rising of Sirius in the year. It is a binary star in the constellation Canis Major. It has a radius 1.71 times that of the Sun. Sirius means 'sparkling' or 'scorching' in Greek.

Vega:
Vega is the fifth – brightest star in the night sky and the brightest star in the northern constellation, Lyra. It is located at a distance of approximately 25 light years, which makes it one of the Sun's closer neighbours. Vega is surrounded by a sphere of dust similar to the solar system's Kuiper Belt. Its claim to fame one day in the future will be that it will become the next North Star by 14,000 CE.

Rigel:
Rigel is one of the brightest bluish - white supergiants in the Orion constellation. Its distance from the Sun is about 870 light years and it is 47,000 times more luminous than the Sun.

ASK THE UNIVERSE

How the Universe have been made? (Question from Drishti Grade 6)

The Universe is believed to have begun about 13.8 billion years ago with the Big Bang, a rapid expansion from an extremely hot, dense state. As the Universe expanded, it cooled, allowing tiny particles to form atoms, mainly hydrogen and helium. Gravity pulled these gases together to create the first stars and galaxies. Inside stars, nuclear fusion produced heavier elements, which later formed planets, moons, and eventually the ingredients for life. The Universe continues to expand today, and scientists are still studying its origin, evolution, and the mysterious roles of dark matter and dark energy in shaping the cosmos.

Is there a another planet like Earth. Why Earth alone has life and how , when and where does it started (Question from Vignesh Aditya Grade 5)

Scientists have discovered thousands of planets outside our Solar System, called exoplanets. Some are located in the "habitable zone," where temperatures may allow liquid water, but no confirmed evidence of life has been found beyond Earth. Earth supports life because it has liquid water, a protective atmosphere, the right temperature, a strong magnetic field, and a stable climate over billions of years.

Life on Earth is thought to have begun around 3.5–4 billion years ago. The most widely accepted idea is that simple organic molecules formed in Earth's early oceans and gradually combined into the first self-replicating cells through natural chemical processes. Another hypothesis, called Panspermia, suggests that the building blocks of life may have arrived on Earth aboard comets or meteorites. Scientists continue to study these ideas, and the exact origin of life remains one of science's greatest mysteries.

What is the biggest black hole? (Question from Garvit Sharma Grade 6)

The biggest known black hole is TON 618, located about 10.4 billion light-years from Earth. It has an estimated mass of around 66 billion times the mass of the Sun, making it one of the most massive black holes ever discovered.

A black hole forms when an enormous amount of matter is packed into a tiny region, creating gravity so strong that not even light can escape. TON 618 lies at the center of an extremely bright quasar, where it actively pulls in vast amounts of gas and dust. As this material spirals inward, it heats up and emits tremendous energy, making the quasar visible across billions of light-years.

Scientists continue searching for even larger black holes, but based on current observations, TON 618 remains the largest known black hole in the Universe.

STORIES OF INDIA'S GREATEST MINDS

SUNITA WILLIAMS

FROM INDIAN HERITAGE TO THE STARS

Sunita Williams is one of the most accomplished astronauts in the world. Her remarkable journey from a family with Indian roots to becoming a NASA astronaut has inspired millions of people. Through her courage, dedication, and passion for space exploration, she has shown that hard work and determination can turn even the biggest dreams into reality. She continues to encourage students to pursue careers in science, technology, engineering, and mathematics (STEM).

Where was Sunita Williams born?
Sunita Williams was born in Euclid, Ohio, USA, and grew up in Needham, Massachusetts. Her father is of Indian origin from Gujarat, and her mother is of Slovenian heritage. From a young age, she enjoyed sports, adventure, and learning new things. She later joined the United States Navy, where she became a helicopter pilot before being selected as a NASA astronaut.

Why is Sunita Williams famous?
Sunita Williams is famous for her long-duration missions aboard the International Space Station (ISS). She has spent more than 600 days in space over multiple missions and completed several spacewalks, making her one of the most experienced astronauts in the world. She has contributed to scientific research, technology demonstrations, and the maintenance of the space station, helping advance human space exploration.

What challenges did she face?
Becoming an astronaut required years of education, military service, and intensive training. Sunita Williams faced physically demanding exercises, underwater simulations, survival training, and the challenges of living and working in microgravity. Despite these difficulties, she remained determined and successfully completed every mission with dedication and confidence.

Sunita Williams is remembered as a symbol of perseverance, excellence, and international cooperation in space exploration. Her achievements continue to inspire young minds, especially students interested in science and space. Her journey reminds us that with curiosity, determination, and hard work, anyone can reach for the stars.





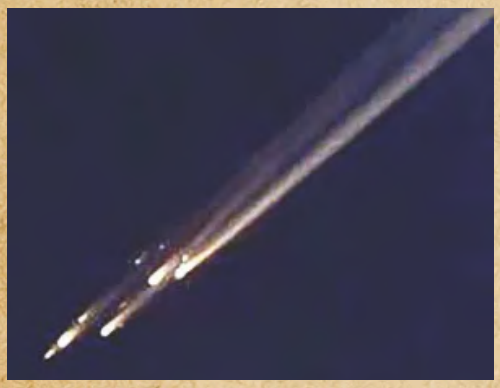
Sunita Williams during a conversation with Dr. Sachin Bahmba, CMD - SPACE group

HISTORICAL EVENTS OF JULY

MARS PATHFINDER LANDING



On July 4, 1997, NASA's Mars Pathfinder successfully landed in Ares Vallis on Mars, marking a major achievement in robotic planetary exploration. The mission deployed the Sojourner rover, which became the first rover to operate on Mars. Using an innovative airbag landing system, Pathfinder demonstrated new technologies for future missions. The spacecraft returned thousands of images, weather measurements, and geological observations, helping scientists better understand the Martian environment. Its success proved that relatively low-cost missions could produce significant scientific results and paved the way for future Mars rover programs. (Image Credits: NASA/JPL)

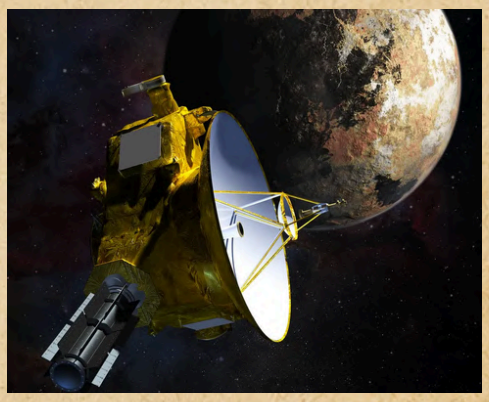


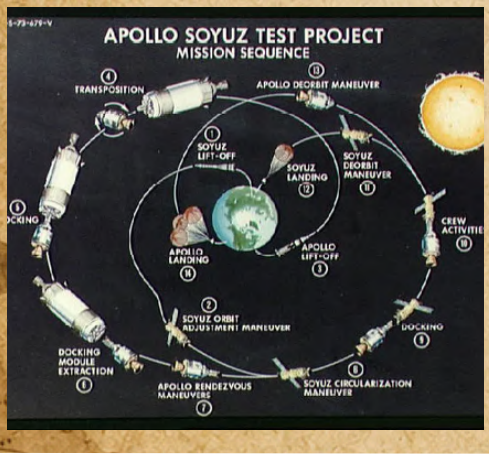
SKYLAB REENTRY

On July 11, 1979, Skylab, America's first space station, reentered Earth's atmosphere after spending more than six years in orbit. Launched in 1973, Skylab hosted three astronaut crews who conducted groundbreaking research in solar astronomy, Earth observation, and human adaptation to long-duration spaceflight. Although plans existed to boost Skylab into a higher orbit, delays in the Space Shuttle program prevented such efforts. Most of the station burned up during reentry, with some debris reaching Western Australia. Skylab's accomplishments provided valuable experience that influenced future space stations, including the International Space Station. (Image Credits: www.nasa.gov)

NEW HORIZONS PLUTO FLYBY

On July 14, 2015, NASA's New Horizons spacecraft made its closest approach to Pluto after a journey of more than nine years. The historic flyby marked humanity's first exploration of the distant dwarf planet. Images and data revealed an unexpectedly complex world featuring towering ice mountains, vast frozen plains, atmospheric haze layers, and signs of ongoing geological activity. Scientists were surprised by Pluto's diversity and dynamic environment. The mission also studied Pluto's moons and expanded knowledge of the Kuiper Belt, revolutionizing understanding of the outer Solar System and distant icy worlds. (Image Credits: www.jpl.nasa.gov)





APOLLO–SOYUZ TEST PROJECT LAUNCH

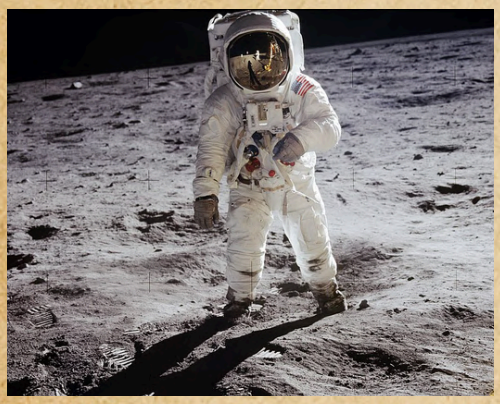
On July 15, 1975, the United States launched the Apollo spacecraft for the Apollo–Soyuz Test Project, the first international crewed spaceflight mission between the United States and the Soviet Union. Two days later, Apollo successfully docked with the Soviet Soyuz spacecraft in orbit, symbolizing cooperation during the Cold War. Astronauts and cosmonauts conducted joint experiments, exchanged greetings, and demonstrated international teamwork in space. The mission established important technical standards and diplomatic relationships that would later support multinational projects, including the International Space Station and many cooperative space exploration efforts.(Image Credits: www.space.com)

HISTORICAL EVENTS OF JULY

APOLLO 11 LAUNCH



On July 16, 1969, Apollo 11 launched from Kennedy Space Center atop a Saturn V rocket, carrying astronauts Neil Armstrong, Buzz Aldrin, and Michael Collins toward the Moon. The mission represented the culmination of years of scientific innovation, engineering excellence, and national commitment. Watched by millions around the world, the launch marked humanity's first attempt to land astronauts on another celestial body. After entering a translunar trajectory, the crew began their historic journey. Apollo 11 would soon achieve one of the greatest milestones in human exploration and scientific achievement. (Image Credits: en.wikipedia.org)

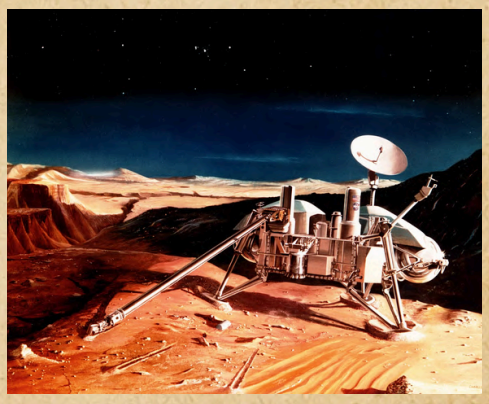


FIRST HUMAN MOON LANDING

On July 20, 1969, Apollo 11 achieved humanity's first crewed lunar landing when the Lunar Module Eagle touched down in the Sea of Tranquility. Later that day, Neil Armstrong became the first human to walk on the Moon, followed by Buzz Aldrin. The astronauts conducted scientific experiments, collected lunar samples, and documented the surface through photographs and observations. Their achievements fulfilled a major goal of the Space Race and demonstrated humanity's ability to travel to another world. The event remains one of the most celebrated milestones in exploration and scientific history. (Image Credits: en.wikipedia.org)

VIKING 1 MARS LANDING

On July 20, 1976, NASA's Viking 1 lander became the first spacecraft to successfully land on Mars and conduct long-term scientific operations. The mission transmitted detailed images of the Martian landscape and carried out experiments to study the planet's atmosphere, soil composition, weather, and potential signs of life. Viking 1 operated far beyond its planned mission duration and provided a wealth of scientific information. Its discoveries greatly enhanced understanding of Mars and established a foundation for future robotic exploration missions that continue investigating the planet today. (Image Credits: www.space.com)





MERCURY-REDSTONE 4

On July 21, 1961, astronaut Gus Grissom flew aboard Liberty Bell 7 during the Mercury-Redstone 4 mission, becoming the second American to travel into space. The suborbital flight lasted about fifteen minutes and successfully completed all planned objectives, providing NASA with valuable experience in human spaceflight operations. After splashdown, however, the spacecraft's hatch unexpectedly opened, causing the capsule to fill with water and sink before it could be recovered. Despite the incident, the mission contributed important knowledge that supported the continued development of America's early crewed space program. (Image Credits: www.space.com)

HISTORICAL EVENTS OF JULY

DISCOVERY OF CHARON



On July 22, 1978, astronomer James Christy discovered Charon, Pluto's largest moon, while examining images at the United States Naval Observatory. The discovery transformed scientific understanding of the Pluto system by revealing that Pluto was accompanied by a substantial satellite. By studying Charon's orbit, scientists were able to calculate Pluto's mass much more accurately than before. The finding also provided new insights into the formation and evolution of distant Solar System bodies. Decades later, NASA's New Horizons mission would reveal remarkable details about both Pluto and Charon. (Image Credits:svs)

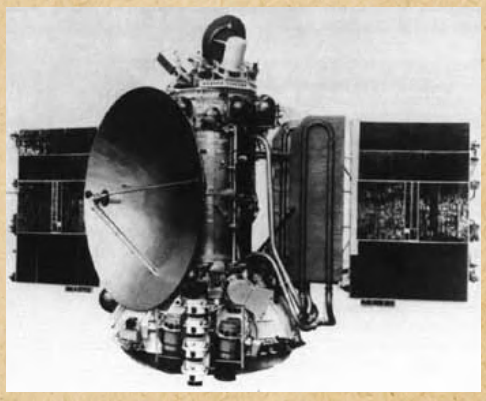


APOLLO 11 SPLASHDOWN

On July 24, 1969, the Apollo 11 astronauts safely returned to Earth after completing humanity's first successful lunar landing mission. Neil Armstrong, Buzz Aldrin, and Michael Collins splashed down in the Pacific Ocean, where recovery teams aboard the USS Hornet welcomed them home. As a precaution, the astronauts entered a quarantine program to ensure that no unknown lunar contaminants were brought back to Earth. Their safe return marked the successful completion of one of the most ambitious exploration missions ever undertaken and demonstrated the remarkable capabilities of human spaceflight. (Image Credits: www.nasa.gov)

MARS 5 LAUNCH

On July 25, 1973, the Soviet Union launched Mars 5, an orbiter designed to study Mars as part of its ambitious Mars exploration program. After arriving at the Red Planet, the spacecraft conducted atmospheric observations, collected scientific measurements, and transmitted valuable images of the Martian surface. Although technical problems shortened its operational lifetime, Mars 5 successfully returned important data before communications were lost. The mission contributed significantly to scientific understanding of Mars and demonstrated the Soviet Union's continuing efforts to explore the Solar System during an era of intense planetary exploration. (Image Credits: NASA)





STS-114 DISCOVERY LAUNCH

On July 26, 2005, Space Shuttle Discovery launched on mission STS-114, NASA's first shuttle flight following the Columbia tragedy of 2003. The mission focused on testing new safety procedures, inspection techniques, and repair methods developed to improve shuttle operations and crew protection. Discovery also delivered supplies and equipment to the International Space Station while conducting engineering evaluations in orbit. The successful mission marked NASA's return to flight and demonstrated the agency's commitment to enhancing safety. STS-114 became an important milestone in the continuation of human spaceflight operations. (Image Credits:www.launchphotography.com)

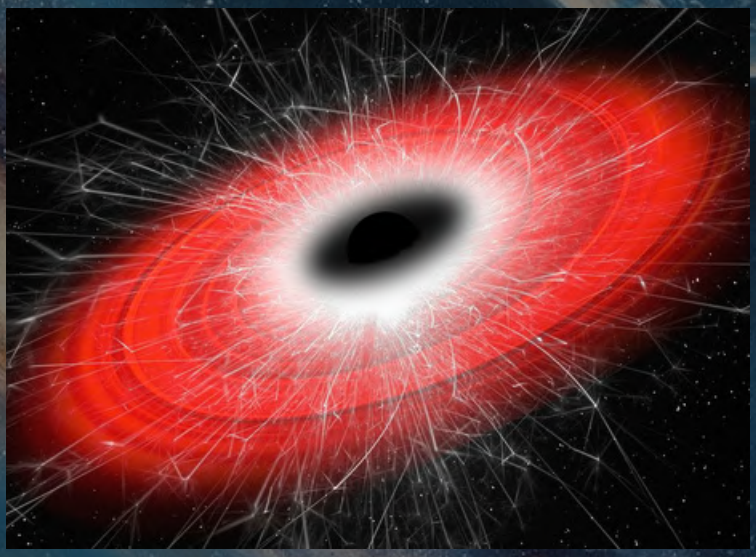
ASTRONOMY & SPACE TERM

HAWKING RADIATION

WHEN BLACK HOLES SLOWLY EVAPORATE

Hawking radiation is a theoretical phenomenon proposed by physicist Stephen Hawking in 1974, suggesting that black holes are not completely black. According to quantum mechanics, pairs of virtual particles constantly form and disappear in empty space. Near a black hole's event horizon, one particle may fall into the black hole while the other escapes into space as radiation.

To an outside observer, it appears as though the black hole is emitting energy. Because this radiation carries away energy, the black hole gradually loses mass and slowly evaporates over extremely long periods of time. Hawking radiation is important because it combines ideas from quantum physics, gravity, and thermodynamics, helping scientists better understand the nature of black holes and the fundamental laws governing the universe.



DECOHERENCE

FROM QUANTUM TO CLASSICAL

Decoherence is a process in quantum physics that explains how the unusual behavior of quantum particles gradually disappears as they interact with their surroundings. In the quantum world, particles can exist in multiple states at the same time, a phenomenon known as superposition. However, interactions with light, heat, air molecules, or other particles disturb these delicate quantum states.



As a result, the system loses its coherence and begins to behave according to the familiar laws of classical physics. Decoherence helps explain why everyday objects do not display obvious quantum effects, even though they are made of quantum particles. This phenomenon is especially important in the field of quantum computing, where scientists work to preserve coherence for as long as possible. Understanding decoherence is key to unlocking the full potential of quantum technologies.

ASTROPHOTOGRAPHY BY SPACE TEAM



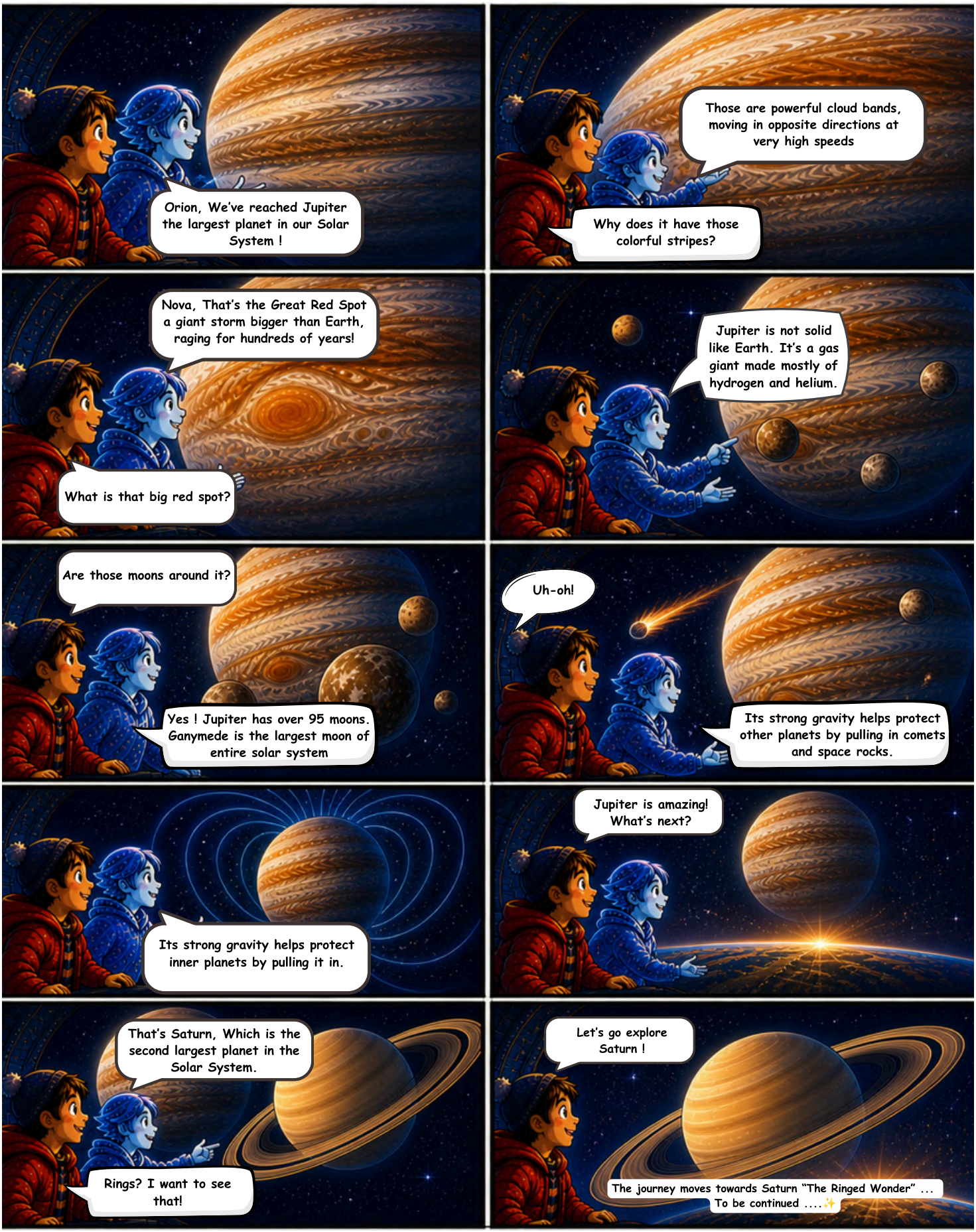
Orion & Lepus constellations were captured and marked by Mr. Sebin Sebastian, Educator, STEPL.





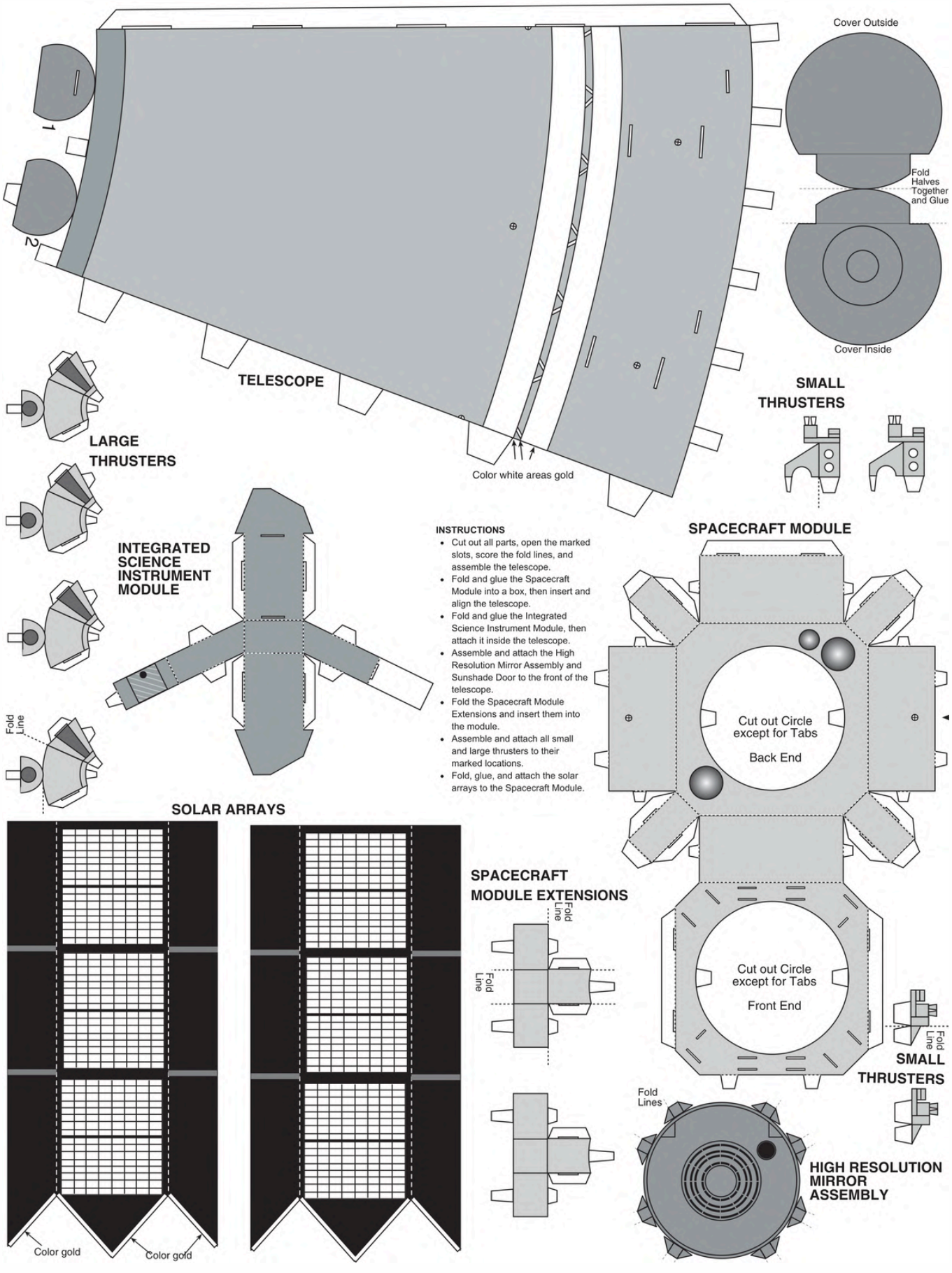
Star trail & Scorpious constellation were captured by Mr. Mohit Agarwal, Educator, STEPL.

COSMIC JOURNEY- THE GIANT



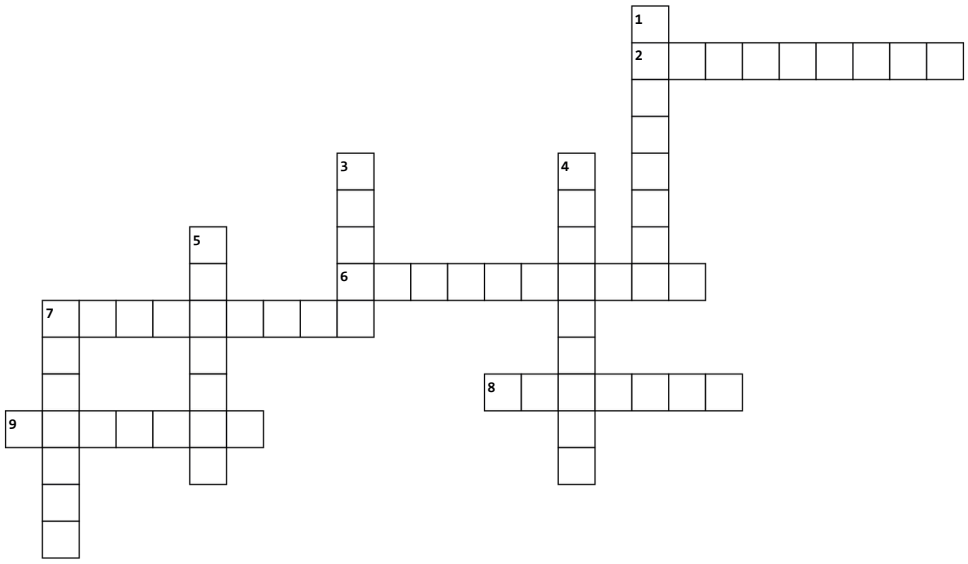
MISSION: DO IT YOURSELF

CHANDRA X-RAY OBSERVATORY



TRAIN YOUR BRAIN

CROSSWORD



Across

2. What scientific field studies the origin and evolution of the Solar System?

6. In which continent is the IceCube Observatory located?

7. Indian physicist who contributed to quantum optics and weak interactions?

8. Name of the mission that collected particles from Sun?

9. What fuel does the Prometheus engine use along with aoxygen?

Down

1. What is the imaginary plane in which most planets orbit the Sun?

3. The scientist introduced the concept of the Cosmic Calendar?

4. Tiny particles are studied by the KATRIN experiment?

5. In which Indian state was Kalpana Chawla born?

7. In which region of Russia did the Tunguska explosion occur?

Astronomy Word Puzzle

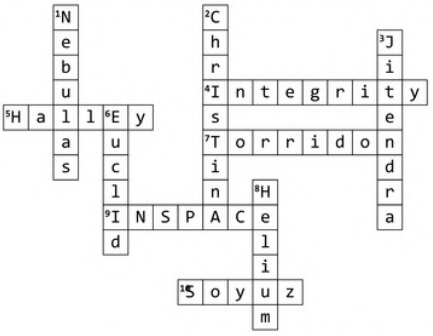
Lunar Features

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

CRISIUM
SOMNIORUM
SERENITATIS
NUBIUM
KEPLER
AUSTRALE
ARISTOTELES
IRIDUM
EPIDEMIARUM
PROCELLARUM
INGENII
COPERNICUS
ARISTARCHUS
HUMORUM
VAPORUM
IMBRIUM
MORTIS
TYCHO

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

Answers for last month puzzles.





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