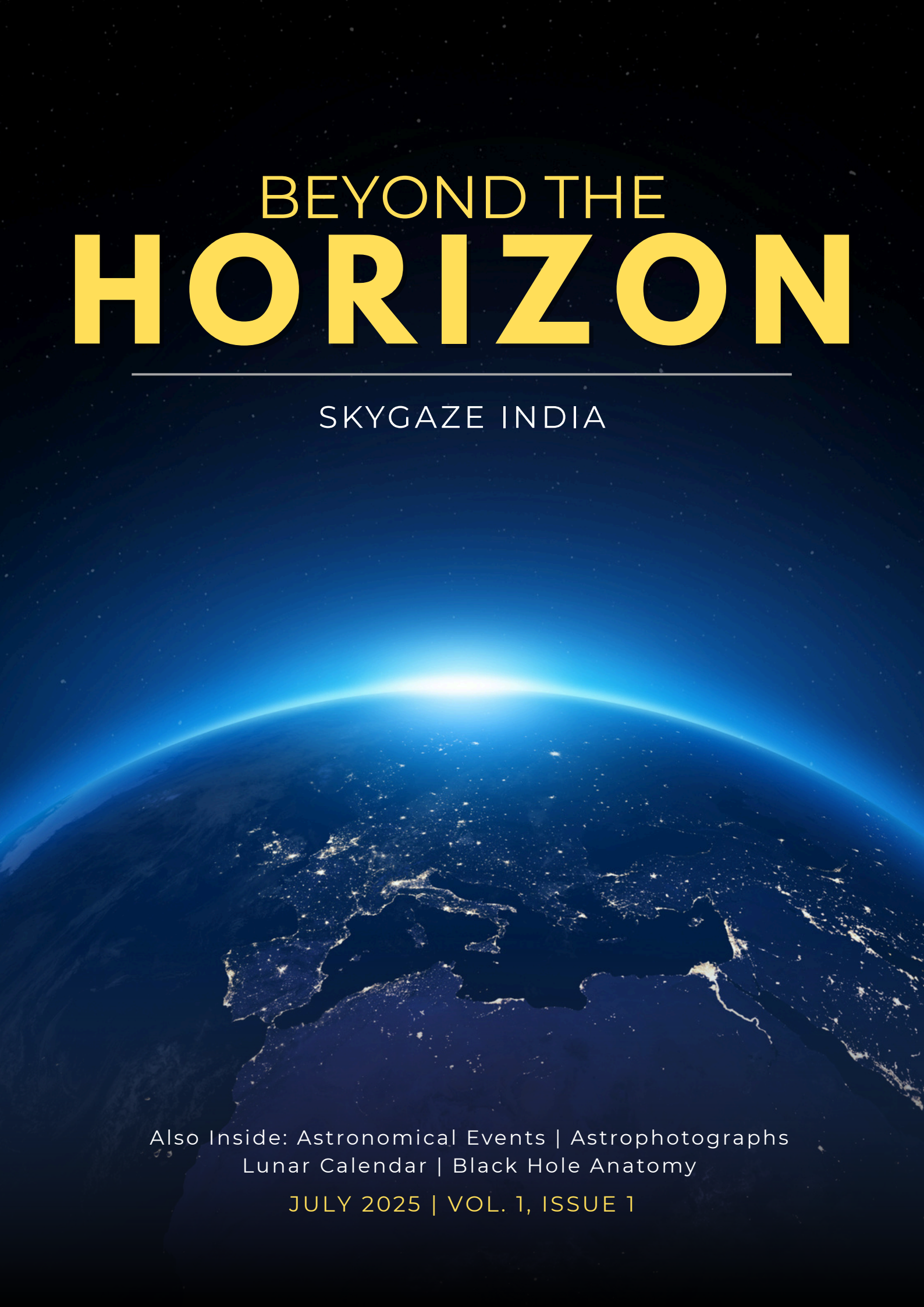
BEYOND THE HORIZON

SKYGAZE INDIA



Also Inside: Astronomical Events | Astrophotographs
Lunar Calendar | Black Hole Anatomy

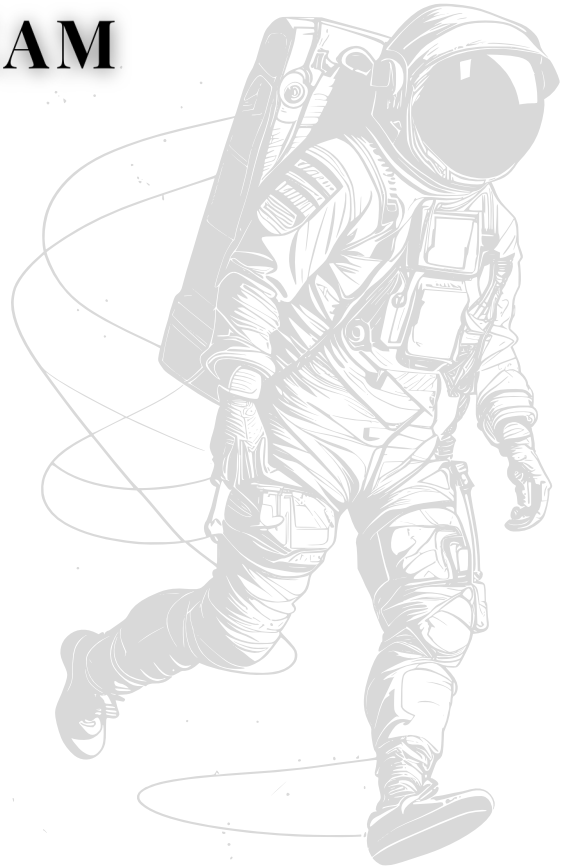
JULY 2025 | VOL. 1, ISSUE 1

INTRODUCTION

Beyond the Horizon is Skygaze India's monthly publication, crafted to ignite curiosity and deepen public interest and engagement with the cosmos.

Each issue brings you a blend of celestial event highlights, astrophotography features, insightful articles, and exclusive content from our community of astronomy enthusiasts. From understanding black holes to spotting planets with the naked eye, we aim to make space science accessible, inspiring, and visually engaging.

OUR TEAM



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"At Skygaze India, our mission is to make space science accessible— to bring the cosmos closer by turning complex knowledge into everyday curiosity for all."

Harsh
Founder & CEO

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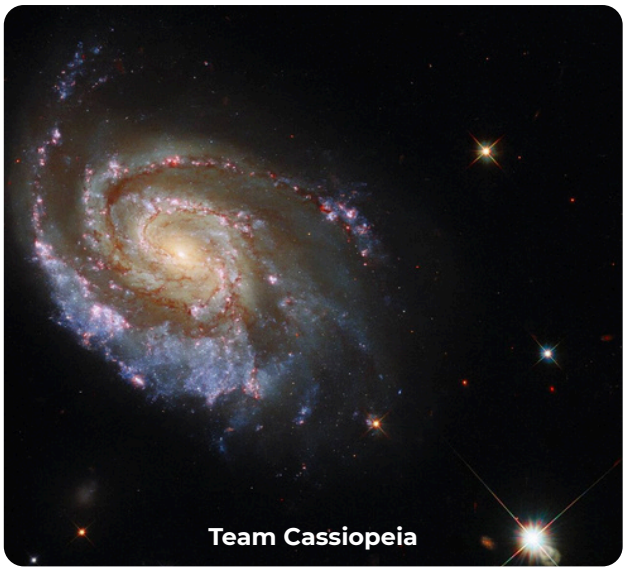
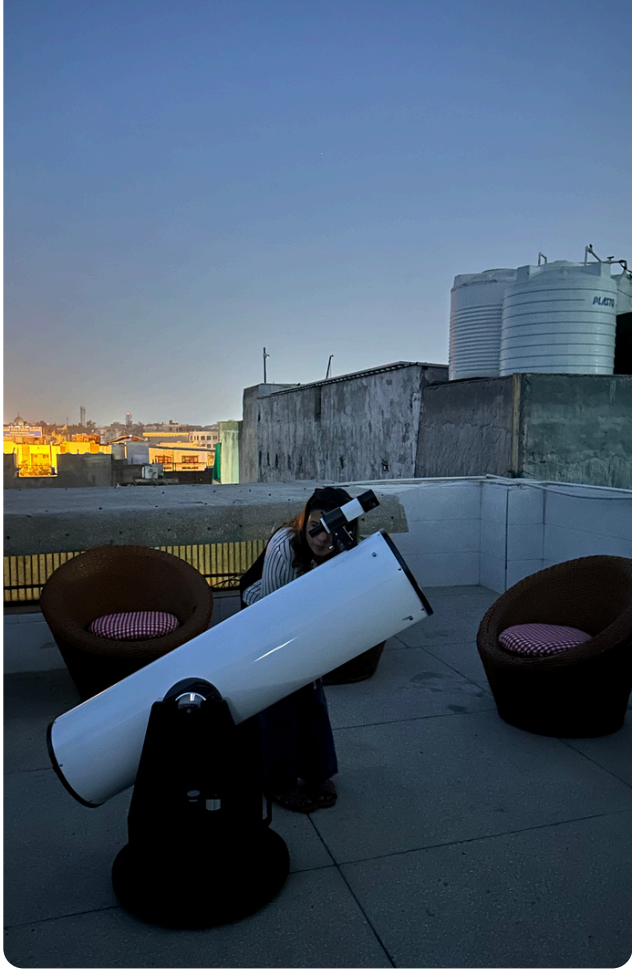
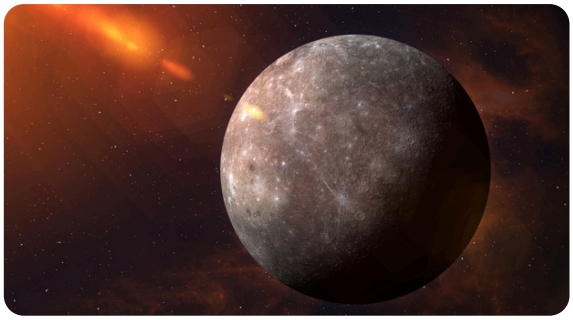




ASTRONOMICAL EVENTS - JULY



JULY 2: MERCURY AT GREATEST EASTERN ELONGATION

This is the best time to see the elusive planet Mercury. Look for a bright, star-like dot low on the western horizon about 30-45 minutes after sunset, when it will be at its farthest angular distance from the Sun.

JULY 4 – EARTH AT APHELION

On this day, Earth reaches its most distant point from the Sun in its orbit. Interestingly, this serves as a great reminder that our seasons are caused by Earth's tilt, not its distance, as it remains summer in the Northern Hemisphere.

JULY 11 – BUCK FULL MOON

The Buck Full Moon, named for the time of year when deer grow new antlers, will rise in the east just as the Sun sets. Its brilliant illumination provides a perfect opportunity for photos or a casual moon-gazing session.

JULY 25: NEW MOON

The New Moon is invisible from Earth as its sunlit side faces away from us. This creates the darkest skies of the month, providing a perfect, moonless opportunity to view faint wonders like the Milky Way, distant galaxies, and nebulae.

JULY 29-30: DELTA AQUARIDS METEOR SHOWER (PEAK)

This annual meteor shower occurs as Earth passes through a trail of cometary dust. For the best view of its peak, find a dark spot away from city lights and look towards the southern sky after midnight. No telescope is needed to enjoy the show, which can produce up to 20 meteors per hour.

LUNAR CALENDAR JULY

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		01 40% First Quarter 6.44 day	02 49.64% First Quarter 7.35 day	03 59.14% First Quarter 8.25 day	04 68.25% First Quarter 9.14 day	05 76.71% Waxing Gibbous 10.03 day
06 84.25% Waxing Gibbous 10.93 day	07 90.62% Waxing Gibbous 11.84 day	08 95.53% Waxing Gibbous 12.76 day	09 98.74% Full Moon 13.71 day	10 99.99% Full Moon 14.67 day	11 99.12% Full Moon 15.65 day	12 96.03% Waning Gibbous 16.65 day
13 90.74% Waning Gibbous 17.67 day	14 83.44% Waning Gibbous 18.71 day	15 74.4% Waning Gibbous 19.75 day	16 64.03% Last Quarter 20.81 day	17 52.85% Last Quarter 21.88 day	18 41.42% Last Quarter 22.96 day	19 30.35% Waning Crescent 24.05 day
20 20.26% Waning Crescent 25.14 day	21 11.76% Waning Crescent 26.24 day	22 5.35% Waning Crescent 27.34 day	23 1.38% New Moon 28.42 day	24 0% New Moon 29.49 day	25 1.14% New Moon 1.01 day	26 4.57% Waxing Crescent 2.02 day
27 9.92% Waxing Crescent 3.01 day	28 16.81% Waxing Crescent 3.97 day	29 24.84% Waxing Crescent 4.9 day	30 33.66% First Quarter 5.82 day	31 42.94% First Quarter 6.72 day		

MIND-BLOWING FACT OF THE MONTH

You can see up to 2,500 stars on a dark new moon night—but from a city, you barely see 20.
Due to light pollution, most of us have never seen the real night sky. In fact, 1 out of 3 people on Earth can't even see the Milky Way anymore.

JUNE RECAP

STARGAZING AT KUNSKAPSSKOLAN INTERNATIONAL SCHOOL

On 5th June 2025, Skygaze India hosted an exciting stargazing session at Kunskapsskolan International School, Gurugram. With over 40 participants, the night sky turned into a live science classroom!

Using our Celestron Refractor 102 AZ and a 10-inch Dobsonian telescope, students observed the Moon, Mars, and various stars — many for the very first time.

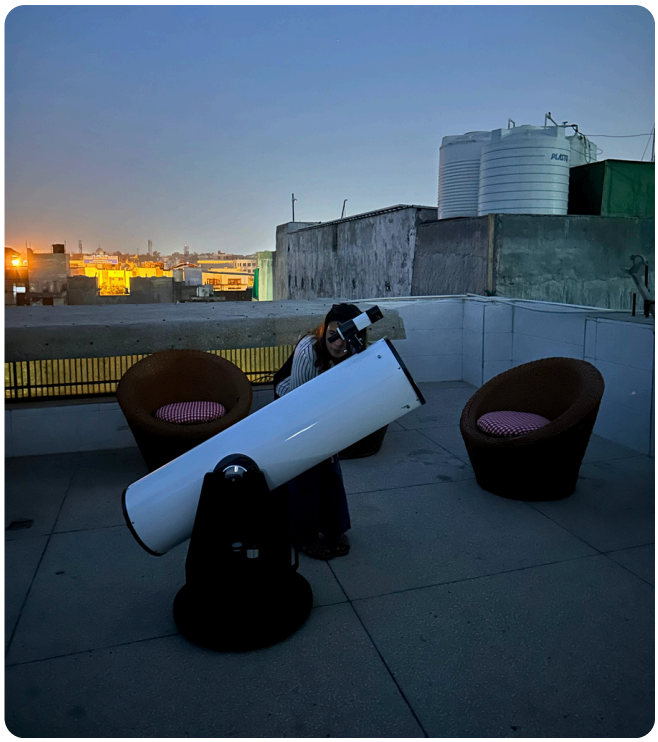
The joy on their faces as they viewed the lunar craters and the red glow of Mars was unforgettable. Feedback from both students and faculty was overwhelmingly positive.

> "It was a really wonderful experience. My colleagues and students enjoyed it thoroughly. As a science teacher I always taught my students about the moon and everything but observing them with telescopes for the first time was beautiful."
>
> Science Teacher, Kunskapsskolan International School

STARGAZING HIGHLIGHTS - JUNE

Skygaze India conducted multiple stargazing events throughout June, bringing the wonders of the night sky to students, families, and sky lovers across Delhi-NCR.

From observing the **Moon and Mars** to identifying **bright stars and constellations**, each session offered hands-on telescope viewing, guided explanations, and memorable sky moments.

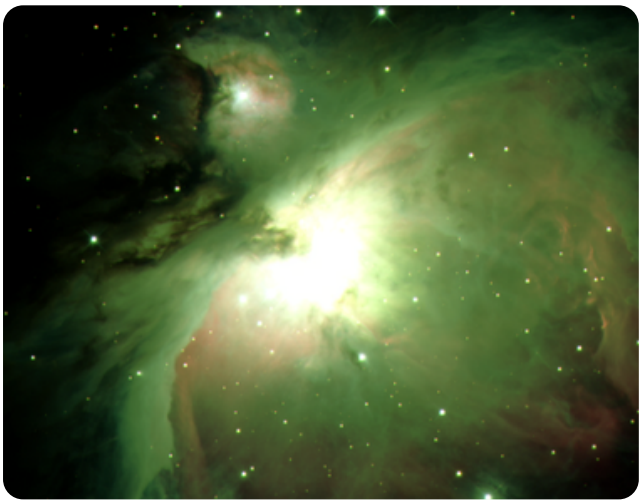


"We were very excited for stargazing because this is the first time we've heard anything like this—especially in NCR. We actually enjoyed it thoroughly. Our experience was amazing—truly amazing. We saw the moon, Mars, and stars and learned a lot of new things about the moon and its different parts. Our son Kanishk was very, very excited, and the experience was amazing. And we are looking forward to come again."

Megha Arora
Stargazing Enthusiast

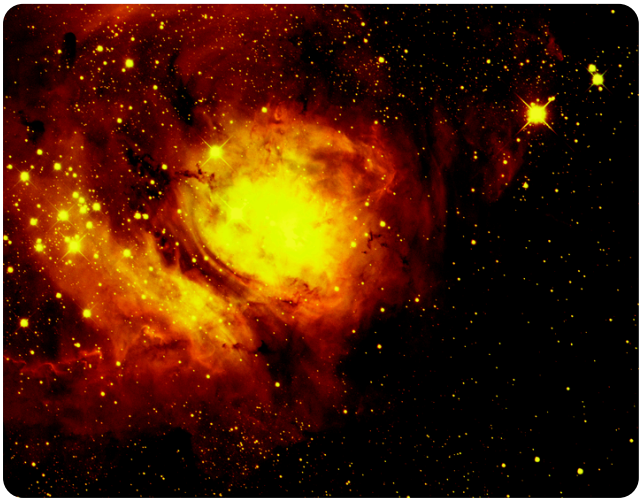
ASTROPHOTOGRAPHS

Flame Nebula



The Orion (M42)

NGC 2244



Lagoon Nebula

The photographs on this page were taken using the **0.4m Las Cumbres Observatory Telescope**, utilizing three filters: V (green), R (red), and B (blue).

Each image was carefully processed using **FITS Liberator** and **GIMP software**, showcasing a complete workflow—from scheduling observations to refining image quality. This process not only enables scientific analysis but also brings out the aesthetic beauty of distant cosmic objects.

The images below offer a glimpse into the breathtaking nature of our universe—where stars, nebulae, and galactic formations come to life through the lens of dedication and skill.

Captured and processed by:

Mr. Gukuu Bingunmeh Justpa,
Student, University of Energy and Natural Resources, Ghana
Amateur scientist, Pan-African Citizen e-Lab

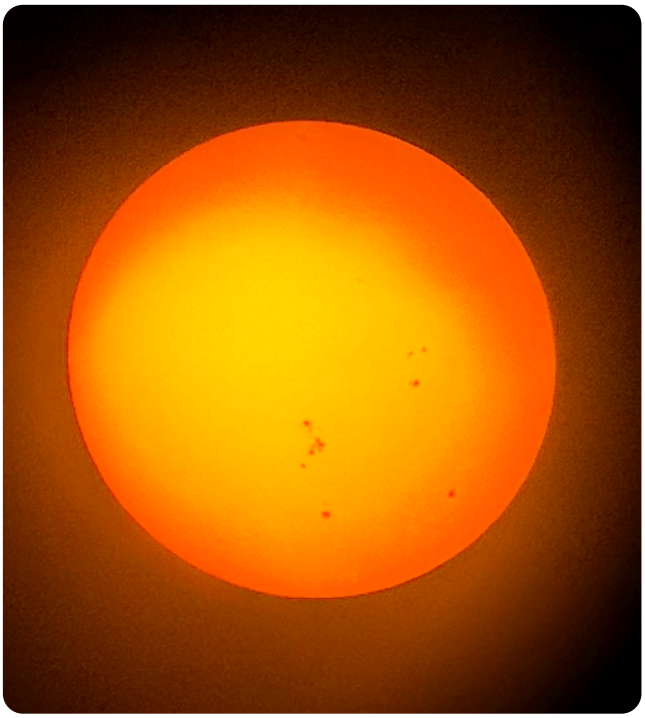
The Trifid Nebula (M20) captured by Mr. Sadok Hafsa, Member of Team Cassiopeia, Algeria.

NGC 6984 – Spiral Galaxy captured by Mr. Mohamed Omar Zeyada, Founder of Team Cassiopeia, Egypt.

M51 – The Whirlpool Galaxy captured by Mr. Sadok Hafsa, Member of Team Cassiopeia, Algeria.

Orion Nebula captured by Ms. Douaa Zaid, Member of Team Cassiopeia, Algeria.

First Quarter Moon captured by Mr. Vishal Kumar, Student at Chander Prabhu Jain College, Delhi, India



Sunspots captured by Mr. Harshit Verma, Student at Vivekananda Institute of Professional Studies, Delhi, India

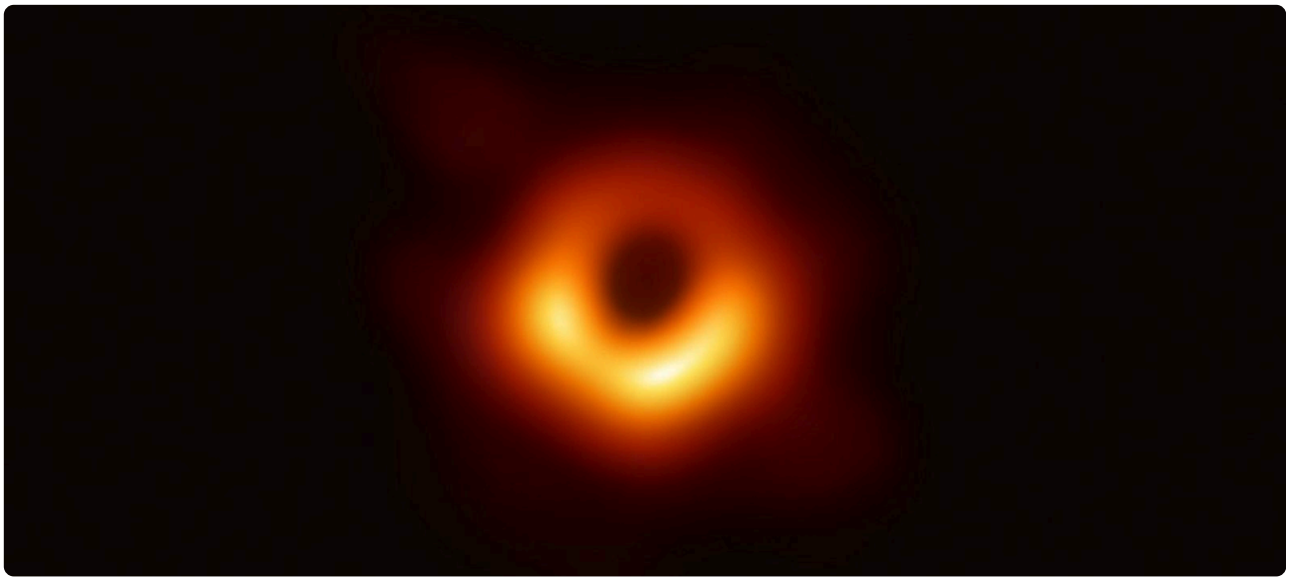
Orion Constellation, captured by Mr. Harsh, Founder at Skygaze India, Delhi, India

FEATURE YOUR WORK NEXT MONTH !

Have an astrophotograph you'd love to share with the world?
We're inviting submissions for our next issue of Beyond the Horizon, a Skygaze India publication.

Submit via email on support@skygazeindia.com

BLACK HOLES: THE MYSTERIOUS MONSTERS OF THE UNIVERSE



First picture of a black hole, captured using Event Horizon Telescope

Black holes are among the most fascinating and misunderstood objects in the universe. They're not actually "holes," but regions in space where gravity is so strong that **nothing—not even light—can escape.**

To understand why black holes trap even light, we need to first understand a concept called **escape velocity**.

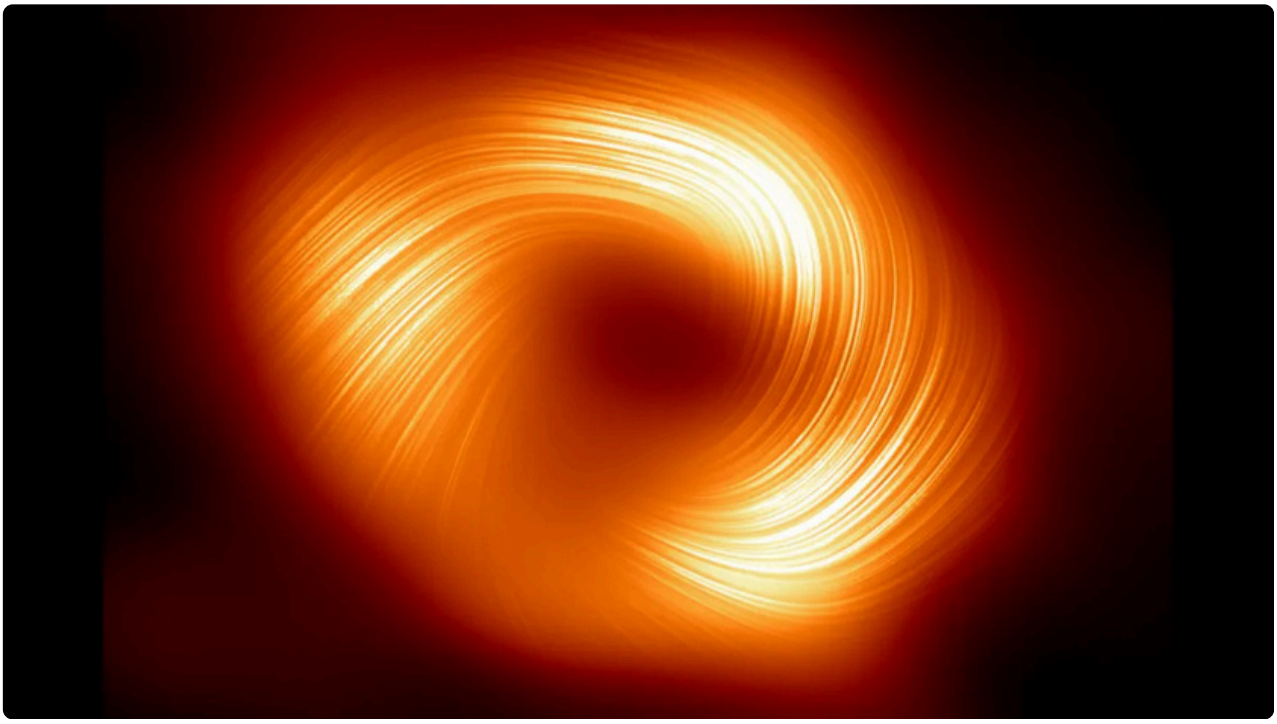
Escape velocity is the minimum speed an object needs to escape the gravity of a planet or star—without falling back. For example, if you launch a rocket from Earth, it must reach a speed of about **11.2 km/s (40,320 km/h)** to overcome Earth's gravity and enter space. If it goes slower, gravity will pull it back down.

In the case of a **black hole**, the mass is so dense and the gravity so intense that its escape velocity is **greater than the speed of light** — which is **about 300,000 km/s**. Since nothing in the universe can travel faster than light, that means nothing can escape a black hole once it crosses a certain point — known as the **event horizon**.

This is why black holes appear completely black — they don't reflect or emit any light, making them invisible against the backdrop of space. We can only detect them by how they affect nearby matter or light.

In 2019, scientists captured the first-ever image of a black hole using the **Event Horizon Telescope**—a historic moment in astrophysics. What appeared was a glowing ring of gas surrounding a dark shadow, located in the center of galaxy M87, over 55 million light-years away.

Most black holes are born from the dramatic **death of massive stars**. When a star much larger than our Sun **runs out of fuel**, it can no longer hold itself up against the force of its own gravity. The outer layers explode in a massive event called a **supernova**, and the core collapses inward.



The supermassive black hole at the heart of the Milky Way Sgr A* seen in polarized light for the first time. (Image credit: EHT Collaboration)

If the remaining core is heavy enough, it keeps collapsing — shrinking down into an **infinitely dense poin**t known as a **singularity**. The gravity becomes so strong that it creates a black hole. Not all stars become black holes — only those with enough mass after collapse can cross this threshold.

Surrounding every black hole is a boundary called the **event horizon**. Think of it as the **invisible edge** of the black hole — the point where escape becomes impossible.

If anything — a star, a spacecraft, even light — crosses the event horizon, it's **gone forever**. No signal or information can escape from beyond this point. To an outside observer, time appears to slow down near the event horizon, adding to the mystery of black holes.

This is what makes them so fascinating and terrifying — they represent a place in the universe where **our current understanding of physics breaks down**.

CONTRIBUTE TO BEYOND THE HORIZON!

Have an astronomy article, story, or thought to share? We're inviting written submissions for our next publication!

Submit via email on support@skygazeindia.com

ANATOMY OF BLACK HOLE

Singularity: The singularity is the center of a black hole where all the matter is squeezed into an extremely small point. It has infinite density and gravity so strong that nothing can escape.

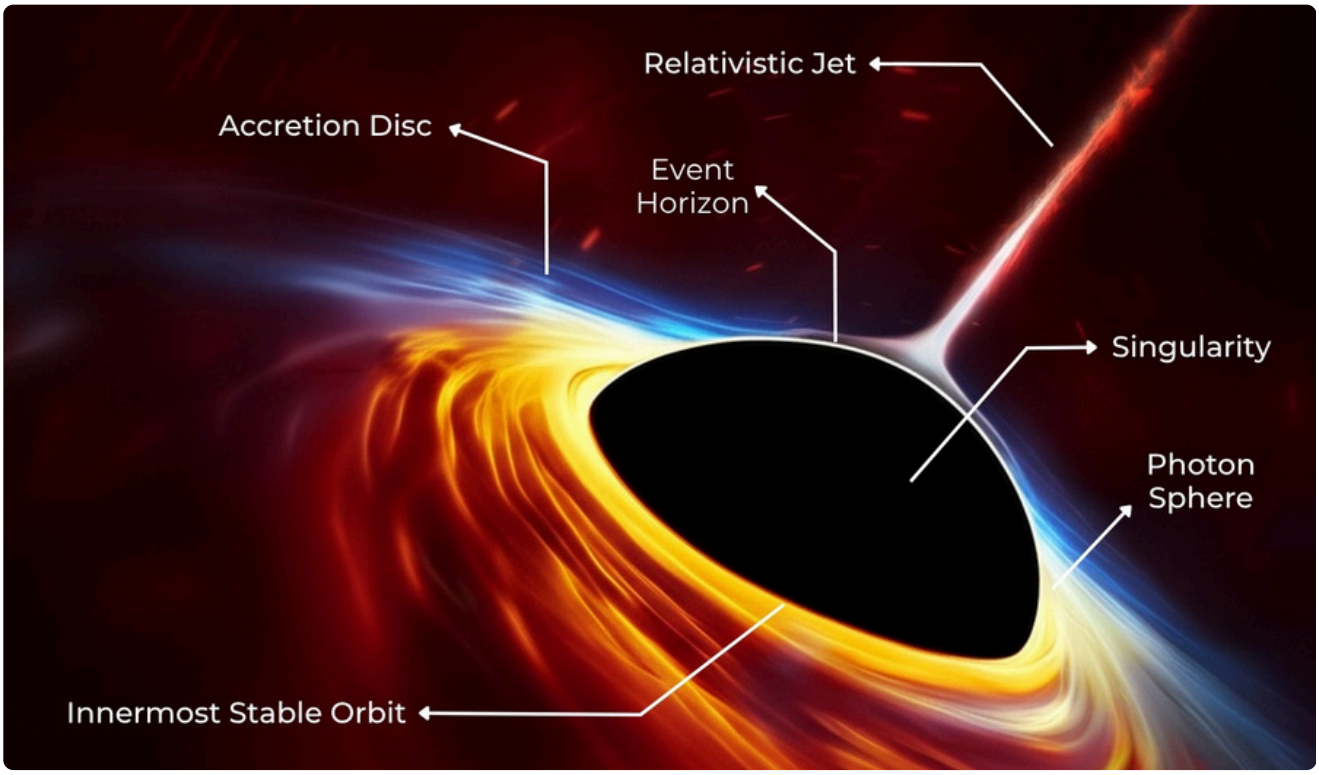
Event horizon: It is the boundary around a black hole. Once something crosses this point, it can't come back — not even light. It's like a one-way door into the black hole, which is why black holes appear completely dark from the outside.

Photon Sphere: The photon sphere is a region just outside the event horizon where gravity is so strong that light can orbit the black hole. Light may spin around for a short time before falling in or escaping, creating glowing rings and strange effects in black hole images.

Accretion Disc: An accretion disc is a ring of hot gas and dust spinning around a black hole. As the material gets pulled in, it heats up and glows brightly, giving off light and X-rays. This glowing disc helps scientists detect black holes even though the black hole itself is invisible.

Innermost Stable Orbit: This is the closest distance from a black hole where something can safely orbit without falling in. If an object gets even slightly closer, it will spiral into the black hole. It marks the limit between a stable path and being pulled in forever.

Relativistic Jets: Some black holes shoot out jets of energy from their poles. These powerful beams are formed by fast-spinning gas and magnetic fields outside the black hole. The jets move close to the speed of light and can stretch for thousands of light-years into space.



THIS MONTH IN INDIAN SPACE HISTORY

JULY, 1980 | **ROHINI SATELLITE 1 LAUNCH**

18

The first satellite launched into orbit by an Indian-made rocket, SLV-3, carrying Rohini-1. With this success, India became the seventh nation in the world to develop its own launch vehicle.

JULY, 2019 | **CHANDRAYAAN-2 LAUNCH**

22

Chandrayaan-2 was India's second mission to the Moon. Though the lander lost contact during descent, the orbiter continues to deliver valuable scientific data about the Moon's surface and environment.

JULY, 2023 | **CHANDRAYAAN-3 LAUNCH**

14

India's third lunar mission, aboard the LVM3-M4 rocket from Sriharikota. Significant step in India's space exploration journey, eventually making India the first country to land near the Moon's south pole.

JULY, 2023 | **PSLV-C56 / DS-SAR MISSION**

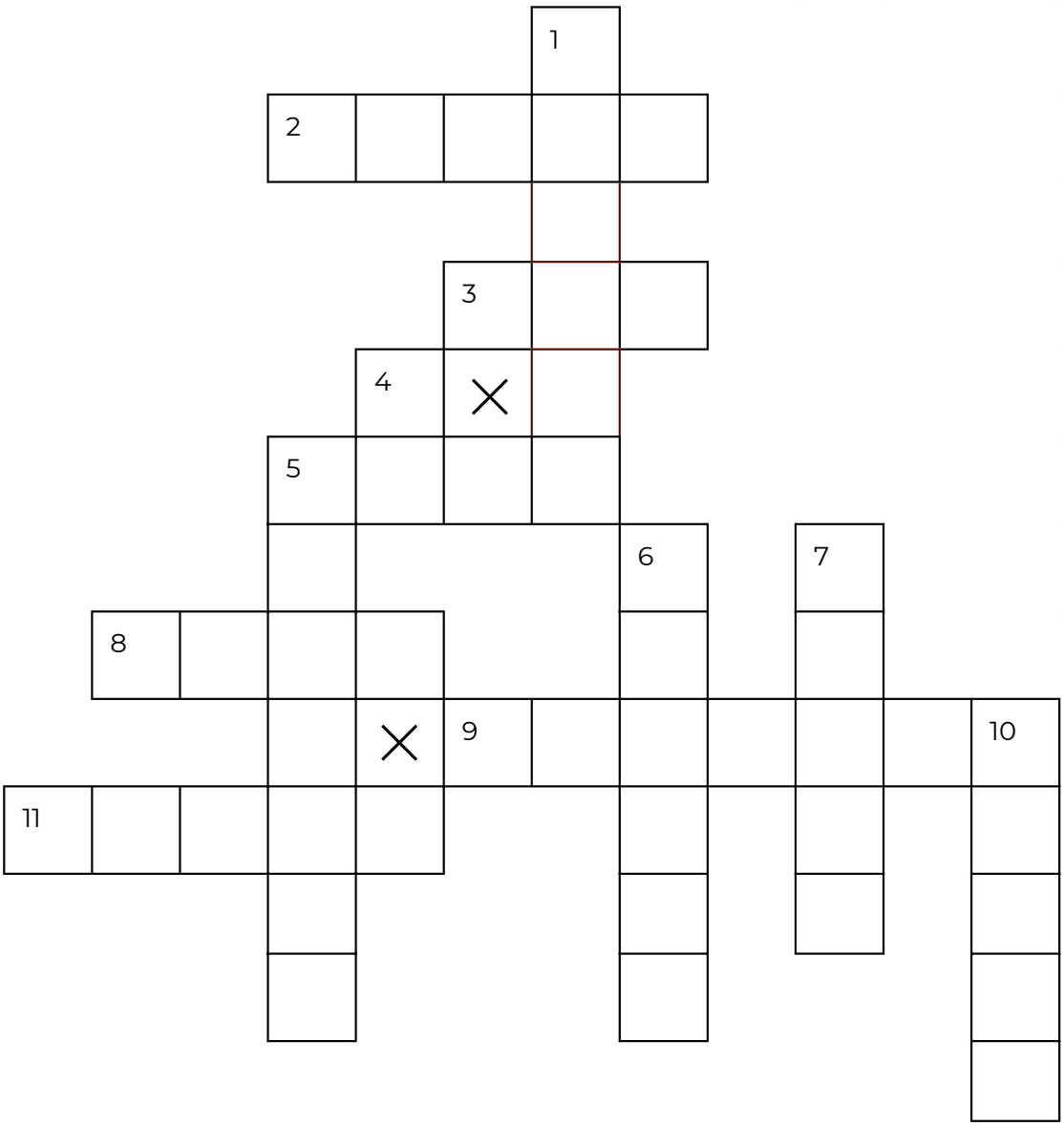
30

ISRO successfully launched PSLV-C56, placing Singapore's DS-SAR satellite and six co-passenger satellites into orbit. This mission reaffirmed India's role as a reliable global commercial launch partner.

SKYGAZE ACADEMY

Welcome to Skygaze Academy, we're making science simple. As a next-generation educational platform, powered by Skygaze India, we harness the power of AI and IT to demystify complex subjects, with a special focus on space science. We break down intricate theories and abstract ideas into logical, digestible modules.

CROSSWORD PUZZLE



Across

2. The largest moon of Saturn
3. The heart of our solar system
5. Earth’s only natural satellite
8. A planet with two small moons, Phobos and Deimos
9. The farthest planet from the Sun in our solar system
11. A planet with sulfuric acid clouds

Down

1. A planet with beautiful rings and the second-largest in our solar system
4. The most volcanically active body, one of Jupiter’s moons
5. The smallest planet in our solar system
6. The largest planet in the solar system
7. Earth's outer layer
10. The only known planet to support life

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