J'PURA ASTRONOMY CLUB

E-MAGAZINE

ASTERISM

ASTERISM
ASTERISM



2026 · Issue 4.0

ARTEMIS II

AROUND THE MOON AND HOME AGAIN

Our bilingual report, in English and Sinhala

4.0

THE 2026 MEGA-TELESCOPE RACE
BLACK HOLE STARS · FAST RADIO BURSTS
LAVA WORLDS · PUZZLE INSIDE

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Twelve ways to look up



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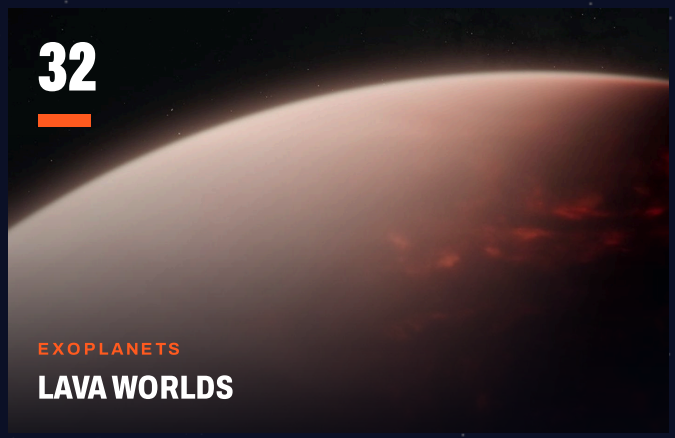
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ASTRONOMY CLUB
UNIVERSITY OF SRI JAYEWARDENEPURA

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Eyes to the eyepiece at Stargaze '26

J'PURA ASTRONOMY CLUB PRESENTS

STARGAZE '26

A night where curiosity met the cosmos

10–11 JANUARY 2026 | MAHARAGAMA CENTRAL COLLEGE

On the unforgettable nights of January 10th and 11th, 2026, the grounds of Maharagama Central College echoed not with silence, but with curiosity, excitement, and wonder, as the J'pura Astronomy Club successfully conducted its much-anticipated Astronomy Night Camp, *Stargaze '26*. From the very beginning to the final goodbye, the camp unfolded as a journey through science, friendship, and the vast beauty of the universe.

Students from different faculties of our university, along with participants from other universities, gathered with a shared passion for astronomy. From the registration desk to the observation grounds, every arrangement was clear, meaningful, and thoughtfully organized, creating a welcoming and inspiring atmosphere for everyone present.





Lighting the traditional oil lamp, and the opening address

The camp was not limited to night-sky observation alone. A series of engaging and interactive activities were carefully planned to keep the enthusiasm alive throughout the sleepless night. Guest lectures by knowledgeable speakers, including our chief guest **Dr. Janaka Adassuriya**, added immense value, deepening our understanding and creating a truly astronomical environment that fueled curiosity and discussion.

As the night progressed, excitement danced alongside uncertainty. At times, clouds challenged our hopes, briefly hiding the stars we longed to observe. Yet, the sky seemed to tease us only for a while before finally yielding to our expectations. The observation sessions, conducted in collaboration with the Astronomical Society of the University of Colombo, allowed us to witness the magnificent beauty of celestial objects, leaving everyone in awe.





Telescopes out once the clouds cleared, and guests following the talks

DUSK TO DAWN

The night, in eight moments

ARRIVAL
Registration and welcome

LECTURES
Guest talks and the chief guest

STARGAZING
Telescopes, once the clouds parted

SHUTTLE MASTER '26
Water rocket competition

PAPER ASTRONAUT
The challenge that beat sleep

MIDNIGHT
Movie session: The Martian

BONFIRE
Songs, dances and warmth

DAWN
Prizes, sweet buns and tea



Phone torches up for the Paper Astronaut Challenge

The camp was further enriched with unique and entertaining activities. The **water rocket competition, Shuttle Master '26**, became one of the most thrilling highlights, where participants finally brought their creations to life. Adding to the excitement, the **Paper Astronaut Challenge** kept everyone energized and helped us escape the weight of sleepiness during the long night. At midnight, participants gathered for a special movie session featuring *The Martian*, creating a perfect blend of science and entertainment under the stars.

The bonfire brought warmth to the cold night, not just physically but emotionally. Surrounded by firelight, songs and dances added life and color to the darkness, turning the camp into a celebration rather than just an event. Delicious meals served throughout the night ensured comfort and energy, making sure no one felt the weight of sleeplessness too heavily.

What made Stargaze '26 truly remarkable was the discipline maintained throughout the camp. From time management to activity coordination, participants followed guidelines responsibly, allowing every session to proceed smoothly and meaningfully. This discipline ensured safety and order while reflecting the maturity, respect, and shared commitment of everyone involved, creating an environment where learning and enjoyment flourished together.

"The sky seemed to tease us only for a while before finally yielding to our expectations."







Rockets ready for Shuttle Master '26, the bonfire, and songs through the night



Lift-off: a water rocket leaves the pad in Shuttle Master ’26

Under the guidance of our honorable madams and sirs, and with the tireless dedication of the President of the Astronomy Club and the entire organizing committee, Stargaze ’26 became a resounding success. Their leadership, commitment, and teamwork transformed a simple idea into a memorable reality.

Time seemed to move differently that night. Though the camp lasted hours, it felt surprisingly short, as every moment was filled with excitement and learning.

Soon after, the sun could no longer wait to join us. As dawn arrived, it gently reminded us that the night had come to an end. With prize-giving for competition winners, heartfelt votes of thanks, and the warmth of sweet buns and hot tea, we bid farewell to *Stargaze ’26*; not as an ending, but as a promise.

Before leaving, we cleaned the grounds that had supported our journey, honoring them with gratitude. With hearts full of experience, knowledge, friendship, and inspiration, we said goodbye, already looking forward to coming together again for *Stargaze ’27*.

Stargaze ’26 was not just a camp. It was a night where dreams met stars, curiosity found direction, and memories were written across the sky. ■



Prize-giving for the Shuttle Master ’26 winners



The Stargaze ’26 family

The 2026 MEGA-TELESCOPE *Race*

THE STARTING GRID

Three titans leading the charge

1



NANCY GRACE ROMAN

NASA · launched 30 August 2026

2



XUNTIAN

China · bound for orbit in 2027

3



VERA C. RUBIN

Chile · surveying since June 2026

While the James Webb Space Telescope has spent recent years unraveling cosmic mysteries one tiny pinprick of sky at a time, astronomy in 2026 has officially entered a new era.

WORDS BY VISHWA JAYASUNDARA

Welcome to the Mega-Telescope Race, where the goal is to capture sweeping, panoramic views of the cosmos.

For astrophysics students, computer scientists, and space enthusiasts alike, the revolutionary instruments launching into action right now will define the next decade of academic research, finally helping us decode dark energy, dark matter, and galactic evolution.

Here are the three titans leading the charge.



ZOOMING OUT How much sky each telescope captures in a single shot, drawn to scale against Hubble's.

> *We are no longer just zooming in; we are zooming out.*



NASA'S WIDE-FIELD MARVEL

NANCY GRACE ROMAN SPACE TELESCOPE

Launched aboard a SpaceX Falcon Heavy on 30 August 2026, Roman is designed to survey the cosmos at a blistering pace.

THE BIG PICTURE

A field of view 100 times larger than the Hubble Space Telescope at the same pristine resolution, capturing the equivalent of 100 Hubble images in a single shot.

THE HARDWARE

A 2.4 m primary mirror equipped with a monstrous 300-megapixel infrared camera.

THE MISSION

To map billions of galaxies, directly image exoplanets, and measure the mysterious properties of dark energy that are tearing the universe apart.

100×

Hubble's field of view, at the same pristine resolution

2.4m

primary mirror, the same size as Hubble's

300MP

infrared camera, the eye behind the mirror

THE NAMESAKE

Mother of Hubble

Before Hubble could fly, someone had to champion the dream of space-based astronomy. The telescope honors Dr. Nancy Grace Roman, NASA's first Chief of Astronomy and the first woman to hold an executive position at the agency.

Affectionately known as the "Mother of Hubble," her relentless advocacy in the 1960s and 70s convinced a skeptical government to fund telescopes in space. Naming this next-generation observatory after her is a tribute to the visionary who fundamentally changed how humanity sees the stars.

2

巡天

Xuntian means "surveying the heavens"



300×
HUBBLE'S SKY IN ONE SHOT

CHINA'S FLAGSHIP OBSERVATORY

XUNTIAN SPACE TELESCOPE

Expected to reach low Earth orbit in 2027, it represents a monumental leap in space-based surveying.

THE BIG PICTURE

Xuntian will observe an area of the sky 300 times larger than Hubble can capture in a single shot.

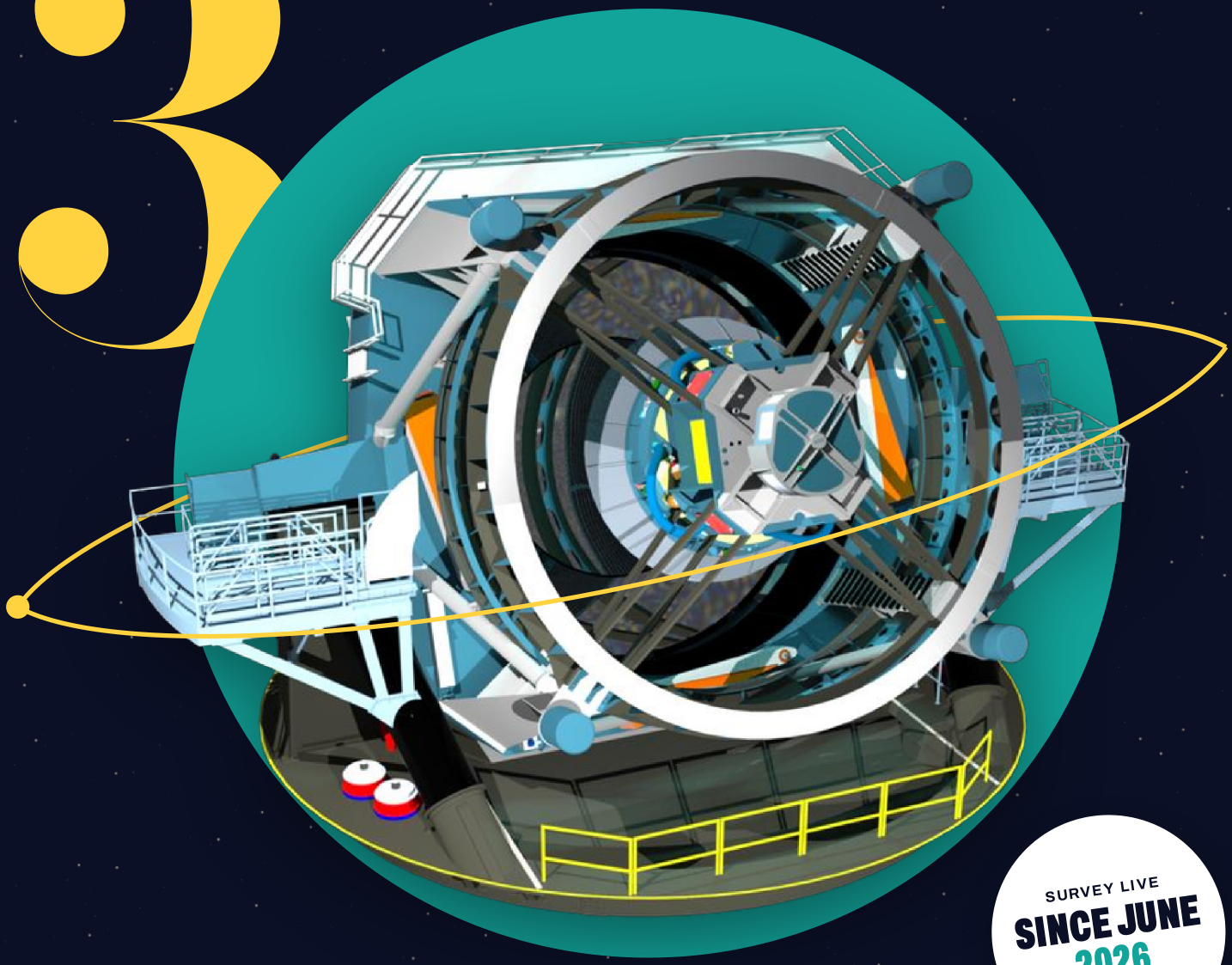
THE HARDWARE

It will co-orbit with the Tiangong space station, allowing astronauts to dock and perform hands-on upgrades and repairs, a massive advantage for telescope longevity.

THE MISSION

To catalog massive galaxy clusters and trace the invisible distribution of dark matter across the universe.

3



SURVEY LIVE
SINCE JUNE
2026

A GROUND-BASED TITAN

VERA C. RUBIN OBSERVATORY

Operating from a mountain peak in Chile, Rubin released its first-light images in 2025 and began its 10-year survey at the end of June 2026.

8.4 m
primary mirror

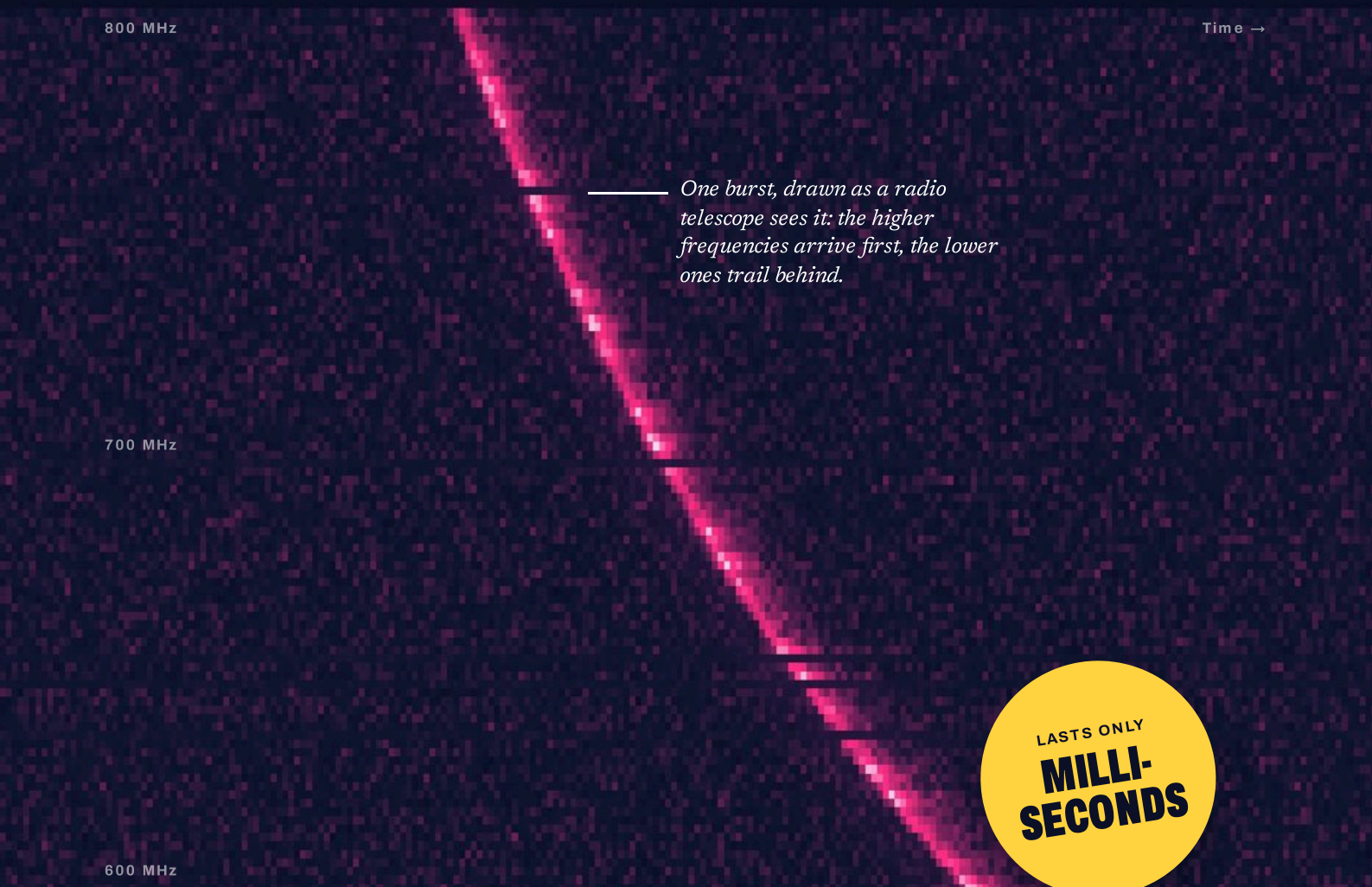
3,200 MP
the largest digital camera ever built

10 YRS
a cinematic time-lapse of the universe

THE MISSION

Scanning the entire Southern Hemisphere sky every few nights to track near-Earth asteroids, passing comets, and sudden stellar explosions (supernovae) in real time. ■

Images: Roman, space.com. Xuntian and Vera C. Rubin Observatory, Wikipedia.



One burst, drawn as a radio telescope sees it: the higher frequencies arrive first, the lower ones trail behind.

The Mystery of

FAST RADIO BURSTS

Unravelling powerful signals from deep space

WORDS BY P. THASHMIDHA

Imagine receiving a powerful signal from billions of light-years away that lasts for only a few milliseconds. These mysterious signals, known as Fast Radio Bursts (FRBs), are among the most fascinating phenomena discovered in modern astronomy.

WORDS BY P. THASHMIDHA

Fast Radio Bursts are extremely short and powerful pulses of radio waves that mostly originate outside our Milky Way galaxy. Although they last for only milliseconds, they can release enormous amounts of energy. Since the first FRB was discovered in 2007, astronomers have detected thousands of these events, but their exact origins remain one of the great mysteries of the Universe.

THE DISCOVERY OF FRBS

The first FRB was identified in 2007 by astronomers analysing archival data from the Parkes radio telescope in Australia. The event, known as the Lorimer Burst, initially raised doubts because scientists were unsure whether it was a genuine astronomical signal or interference. Later discoveries confirmed that these mysterious bursts were real and occur throughout the Universe.

One of the most important discoveries was that some FRBs repeat. Repeating FRBs produce multiple bursts from the same region of space, suggesting that their sources can survive after producing a burst. Other FRBs have only been observed once, although this does not necessarily mean that they can never repeat.

MILESTONES

From one strange blip to thousands of bursts

2007

Parkes radio telescope, Australia

THE LORIMER BURST

The first FRB is spotted in archival data, at first met with doubt.

2020

28 April

SGR 1935+2154

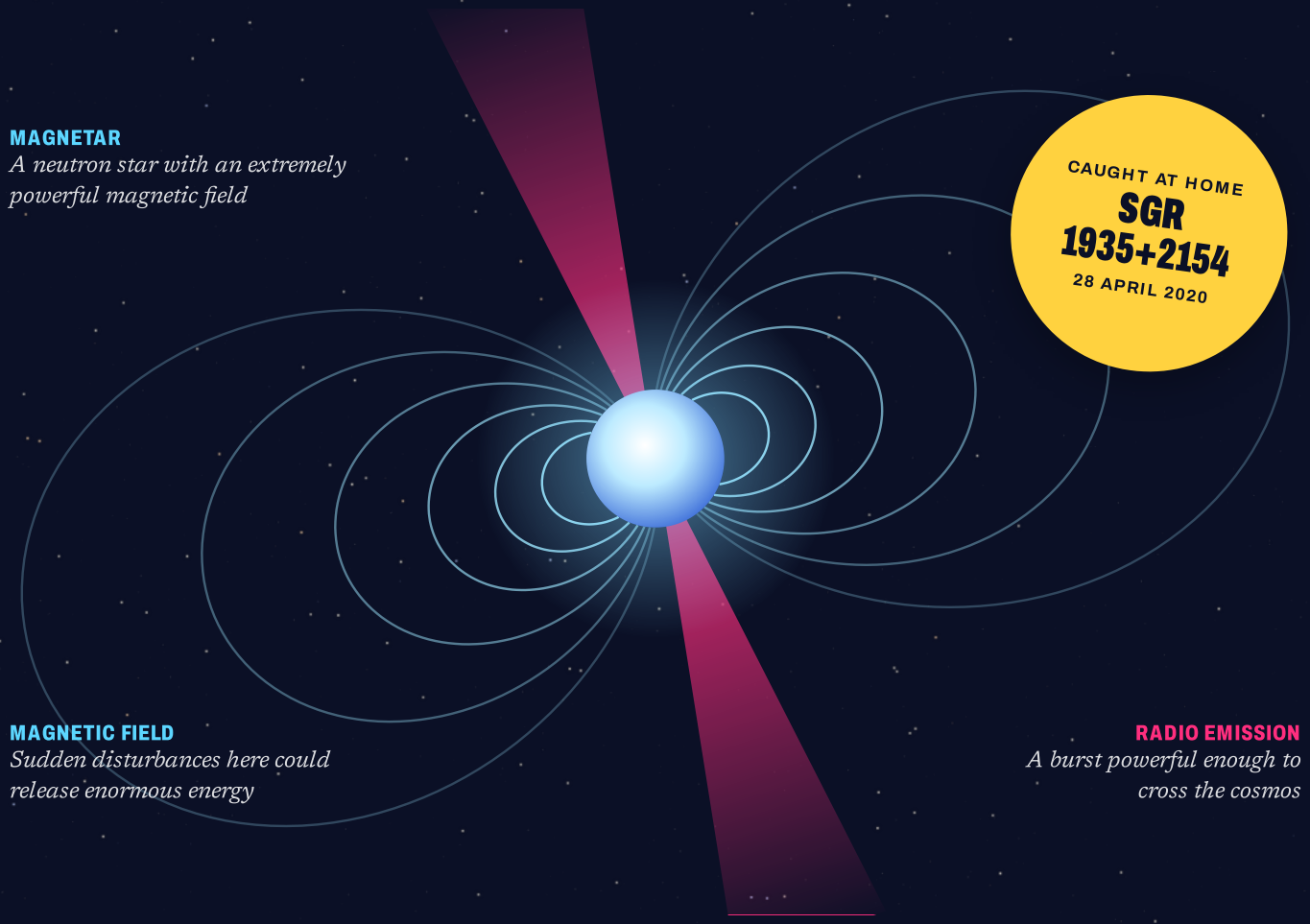
An FRB-like burst from a magnetar inside our own Milky Way.

2026

CHIME/FRB collaboration

A MAJOR CATALOGUE

4,539 bursts from 3,641 unique sources, including 83 repeaters.



MAGNETARS: A POSSIBLE SOURCE

One of the leading explanations for FRBs involves magnetars. Magnetars are a type of neutron star with extremely powerful magnetic fields. Sudden changes or disturbances in these magnetic fields could release enormous amounts of energy and produce powerful radio emission.

A major breakthrough occurred on 28 April 2020, when astronomers detected an intense radio burst from SGR 1935+2154, a magnetar located within the Milky Way. Radio and X-ray observations of the event provided strong evidence that magnetars are capable of producing FRB-like bursts. However, this discovery did not completely solve the mystery. Scientists still do not know whether all FRBs are produced by magnetars. Other possible explanations include interactions involving neutron stars and other extreme cosmic objects.

HOW ARE FRBS DETECTED?

FRBs are detected using powerful radio telescopes. One important facility is the Canadian Hydrogen Intensity Mapping Experiment (CHIME), which surveys a large portion of the sky and has detected a huge number of FRBs.

Scientists study characteristics such as the burst's duration, frequency, brightness and polarisation. They also study a phenomenon called dispersion. As radio waves travel through ionised matter in space, different frequencies arrive at Earth at slightly different times. Measuring this effect provides information about the material the signal passed through.

This makes FRBs more than mysterious signals. They can act as cosmic probes, helping astronomers study gas, plasma and magnetic fields between galaxies.

THE 2026 CHIME/FRB CATALOGUE, BY THE NUMBERS

4,539
bursts

3,641
unique sources

83
repeating sources

FRB research is rapidly expanding. In 2026, the CHIME/FRB collaboration released a major catalogue containing 4,539 bursts from 3,641 unique sources, including 83 repeating sources. The much larger dataset allows scientists to compare different FRBs and search for patterns that could reveal their origins.

Recent observations have also found FRBs in unexpected galactic environments. These discoveries suggest that the origins of FRBs may be more diverse than previously thought.

THE MYSTERY CONTINUES

Despite significant progress, many questions remain unanswered.

?

Why do some FRBs repeat while others do not?

?

Are magnetars responsible for all FRBs?

?

What exact physical process produces such enormous amounts of energy in only milliseconds?

Future observations with more sensitive radio observatories may provide the answers. By detecting more FRBs and locating their sources more accurately, scientists hope to determine whether these bursts are produced by one particular type of cosmic object or by several different mechanisms.

Fast Radio Bursts are brief but extraordinarily powerful signals that provide scientists with a unique opportunity to study the extreme Universe. The discovery of an FRB-like burst from a Milky Way magnetar was a major breakthrough, but it did not completely solve the mystery.

As thousands of new bursts continue to be detected, each signal provides another piece of the puzzle. These fleeting messages from deep space may eventually reveal not only the origins of FRBs but also new information about the hidden matter, magnetic fields and extreme environments that exist throughout our Universe. ■

BY P. THASHMIDHA
Department of Biosystems Technology, University of Sri Jayewardenepura

Sources: NASA; Nature.
Opening-page burst and magnetar are illustrations.



JADES9186 One of Webb's "little red dots". NASA, ESA, CSA, STScI, Dale Kocevski (Colby College)

BLACK HOLE STARS

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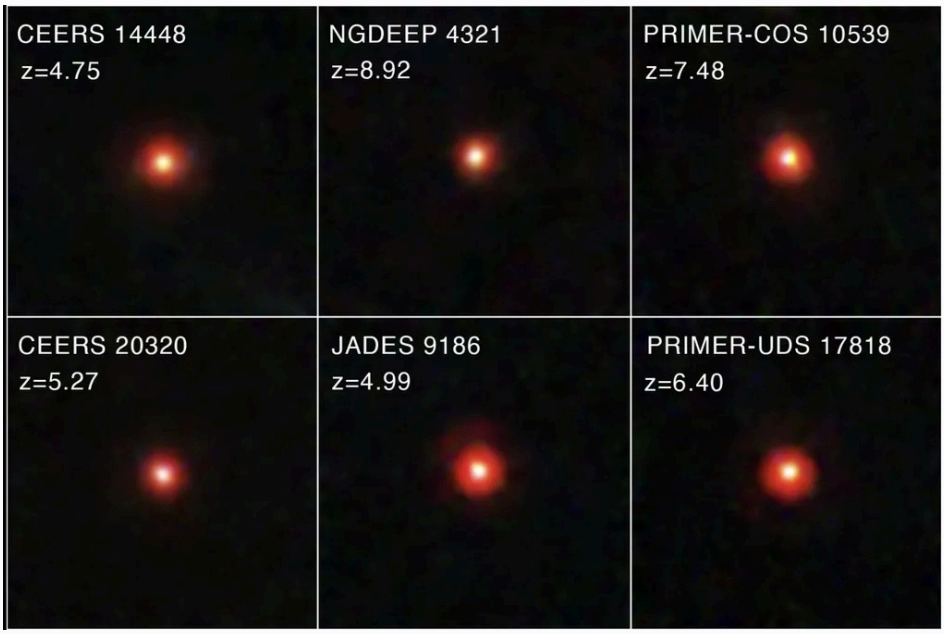
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නාසා (NASA) ආයතනයට අයත් ජේම්ස් වෙබ් අභ්‍යවකාශ දුරේක්ෂය (JWST) මඟින් විශ්වයේ ඈත එතෙර නිරීක්ෂණය කිරීමට පටන් ගත් තැන් සිට, මෙතෙක් තාරකා විද්‍යාඥයන් හඳුනාගෙන නොතිබූ අපූර්ව ආකාශ වස්තූන් රැසක් අනාවරණය වෙමින් පවතී. ඒ අතරින් වඩාත්ම කුතුහලය දනවන සුවිශේෂී සොයාගැනීමක් වන්නේ "කුඩා රතු ලක්ෂ්‍ය" (Little Red Dots - LRDs) ලෙස හඳුන්වන ආකාශ වස්තූන්ය. ජේම්ස් වෙබ් දුරේක්ෂය ලබාගන්නා මුල් විශ්වයේ ගැඹුරු අභ්‍යවකාශ ඡායාරූපවල පුංචි රතු පාට තිත් මෙන් විසිරී ඇති මේවා මොනවාදැයි තාරකා විද්‍යාඥයන්ට මුලදී විශාල ගැටලුවක් විය.

නමුත් දැන්, විද්‍යාඥයන් විශ්වාස කරන්නේ ඔවුන් මෙම අභිරහස විසඳීමට සමත්ව ඇති බවයි. එනම්, මේවා "කළු කුහර තාරකා" (Black Hole Stars) ලෙස හැඳින්වෙන, සම්පූර්ණයෙන්ම අලුත්ම වර්ගයේ ආකාශ වස්තු විශේෂයක් බවයි.

WORDS BY PAMUDITHA THANTHULAGE



300+

LITTLE RED DOTS FOUND

LITTLE RED DOTS Little red objects found by the James Webb Space Telescope. The "z" values correspond to redshifts of the dots, or where they're located in the universe. Image credit: NASA, ESA, CSA, STScI, Dale Kocevski (Colby College).

"කළු කුහර තාරකාවක්" යනු කුමක්ද?

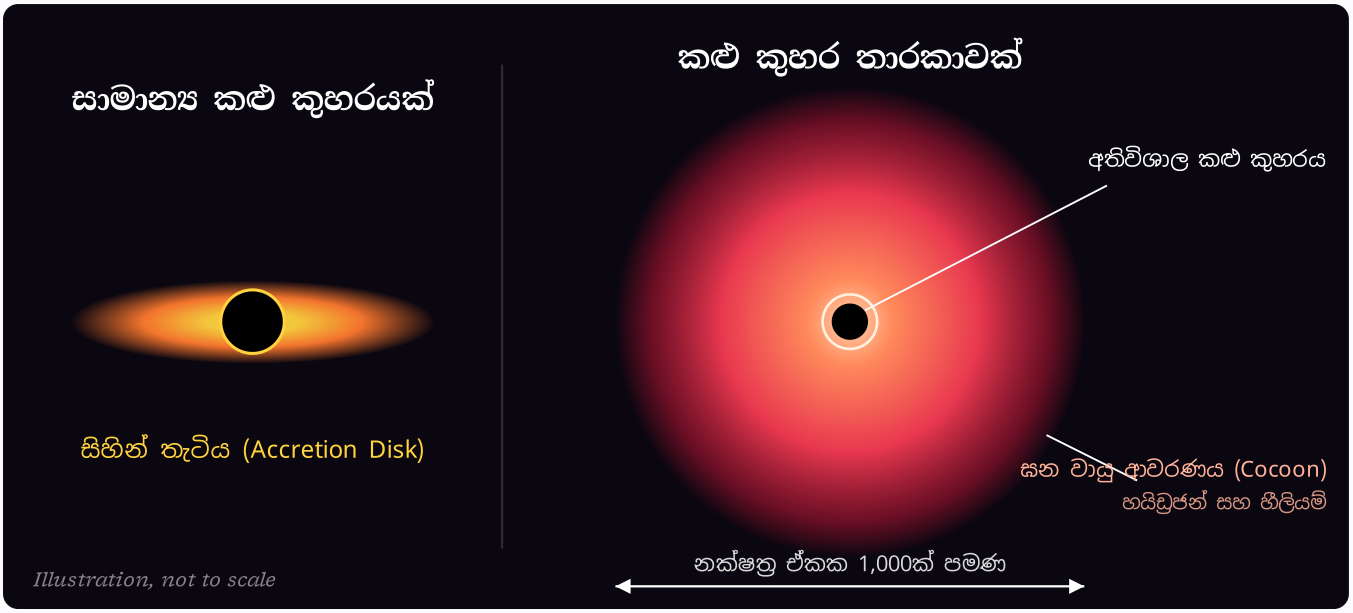
"කළු කුහර තාරකාවක්" යනු අප සාමාන්‍යයෙන් දකින ආකාරයේ තාරකාවක් නොවේ. සාමාන්‍ය තාරකාවක් යනු එහි අභ්‍යන්තරයේ සිදුවන න්‍යෂ්ටික සංලයන (Nuclear Fusion) ක්‍රියාවලියෙන් බලගැන්වෙන වායු ගෝලයකි. අනෙක් අතට, සාමාන්‍ය කළු කුහරයක් වර්ධනය වන්නේ තමන් වටා ඇති ද්‍රව්‍ය සිහින් තැටියක් ආකාරයට (Accretion Disks) ඇදගැනීමෙනි.

නමුත් "කළු කුහර තාරකාවක්" යනු මේ දෙකෙහිම එකතුවෙන් හැදුණු අපූරු ආකාශ වස්තුවකි. මෙහි මධ්‍යයේ සූර්යයා මෙන් 100,000 ගුණයක් පමණ විශාල අතිවිශාල කළු කුහරයක් පවතින අතර, එම කළු කුහරය වටා හයිඩ්‍රජන් සහ හීලියම් වායුවලින් සැදුම්ලත් අතිවිශාල ඝන ආවරණයක් (Cocoon) පිහිටා ඇත.

මෙම වායු ආවරණය කොතරම් විශාලද යත් (සූර්යයා මෙන් 100,000 ගුණයක් එනම්, නක්ෂත්‍ර ඒකක 1,000ක් පමණ විහිදී පවතී), එය කළු කුහරයක් වටා ඇති සාමාන්‍ය තැටියකට වඩා තාරකාවක පිම්බුණු වායුගෝලයකට සමාන වේ. කළු කුහරය මඟින් පිටකරන ශක්තිය මෙම වායු ආවරණය මඟින් උරාගෙන නැවත පිටතට විහිදුවයි. ඒ නිසා, මෙහි මධ්‍යයේ ඇත්තේ න්‍යෂ්ටික ශක්තියක් නොව ගුරුත්වාකර්ෂණ ශක්තියක් වුවද, එය තාරකාවකට සමාන දීප්තියකින් සහ තද රතු පැහැයකින් බැබළීමට පටන් ගනී.

සුවිශේෂී සොයාගැනීම: MoM-BH*-1

මෙම පර්යේෂණයේ ප්‍රධානතම සාක්ෂිය වන්නේ MoM-BH*-1 ලෙස නම් කරන ලද ආකාශ වස්තුවයි. 2023 වසරේදී ජේම්ස් වෙබ් ඡායාරූපවලින් ප්‍රථමයෙන්ම නිරීක්ෂණය කරන ලද මෙය, එකල සොයාගත් අධිකම රතු පැහැයෙන් යුත් ආකාශ වස්තුව ලෙස කැපී පෙනුණි. මෙය සැබෑ ආකාශ වස්තුවක්ද නැතහොත් දත්තවල සිදුවූ දෝෂයක්දැයි තහවුරු කරගැනීමට ජේම්ස් වෙබ් දුරේක්ෂයේ "Mirage or Miracle" (MoM) නමැති නිරීක්ෂණ



වැඩසටහන යටතේ මෙය වැඩිදුර අධ්‍යයනය කරන ලදී.

මැසචුසෙට්ස් තාක්ෂණ ආයතනයේ (MIT) තාරකා විද්‍යාඥ රොහාන් නායිදු (Rohan Naidu) ගේ මෙහෙයවීමෙන් සිදුකළ මෙම පර්යේෂණයේ තොරතුරු සුප්‍රකට Nature විද්‍යා සඟරාවේ පළ විය. මෙම ආකාශ වස්තුවෙන් නිකුත්වන අමුතු ආලෝක රටාව පැහැදිලි කිරීමට සාමාන්‍ය තාරකා ආලෝකය හෝ අභ්‍යවකාශ ධූලි සමත් වූයේ නැත. පසුව සිදු කළ ගණනය කිරීම්වලදී තහවුරු වූයේ, අතිවිශාල කළු කුහරයක් වටා පිහිටි වායු ආවරණයකින් මෙම ආලෝකය නිකුත් වන බවයි.

මෙය විශ්වයේ විශාලතම ගැටලුවක් විසඳන්නේ කෙසේද?

ජේම්ස් වෙබ් දුරේක්ෂය දියත් කළ තැන් සිට තාරකා විද්‍යාඥයන් හමුවේ තිබූ ලොකුම ගැටලුවක් වූයේ, මහා පිපිරුමෙන් (Big Bang) වසර බිලියනයක් ඇතුළත, සූර්යයා මෙන් බිලියන ගණනක් විශාල 'සුපිරි කළු කුහර' (Supermassive Black Holes) නිර්මාණය වූයේ කෙසේද යන්නයි. සාම්ප්‍රදායික සිද්ධාන්තවලට අනුව කළු කුහරයක් ඉතා සෙමින් පදාර්ථ උරා ගනිමින් එතරම් විශාල වීමට දීර්ඝ කාලයක් ගතවිය යුතුය.

නමුත් මෙම "කළු කුහර තාරකා" මඟින් එම ගැටලුවට සාර්ථක පිළිතුරක් ලැබෙයි. කළු කුහරයකට සිහින් තැටියකින් පදාර්ථ ඇදගන්නවාට වඩා, තමන් වටා ඇති මෙවැනි වායු ආවරණයකින් ඉතා වේගයෙන් පදාර්ථ ගිල දැමිය හැකිය. එමඟින් මුල් විශ්වයේදී කළු කුහරවලට ඉතා කෙටි කාලයකින් අතිවිශාල ලෙස වර්ධනය වීමට හැකියාව ලැබුණි.

මහා පිපිරුමෙන් වසර බිලියනයක් ඇතුළත, සූර්යයා මෙන් බිලියන ගණනක් විශාල සුපිරි කළු කුහර නිර්මාණය වූයේ කෙසේද?

"කළු කුහර තාරකාවක්" යනු මේ දෙකෙහිම එකතුවෙන් හැදුණු අපූරු ආකාශ වස්තුවකි.

විද්‍යාඥයන් විශ්වාස කරන්නේ, අධික ලෙස තාරකා ගහන ගෝලීය තාරකා ගුච්ඡ (Globular Clusters) තුළ සිදුවන තාරකා ගැටීම් නිසා නිර්මාණය වන "සුපිරි තාරකා" ඒකාබද්ධ වීමෙන් මෙම කළු කුහර තාරකා නිර්මාණය වන බවයි. කළු කුහරය විසින් මෙම වායු ආවරණය සම්පූර්ණයෙන්ම ගිල දැමූ පසු, වායු ස්ථරය අතුරුදහන් වී මෙම වස්තුව නැති වී යයි. මුල් විශ්වයේ මෙම කුඩා රතු තිත් බහුලව තිබුණද, වර්තමාන විශ්වයේ ඒවා දැකගත නොහැක්කේ මේ නිසාය.

අනාගත නිරීක්ෂණ සහ නව පිටුවක්

මෙම කුඩා රතු තිත් අහම්බෙන් හමුවූ දුර්ලභ වස්තූන් නොවේ. මේ වන විටත් මෙවැනි වස්තූන් 300කට අධික ප්‍රමාණයක් සොයාගෙන ඇති අතර, ජේම්ස් වෙබ් දුරේක්ෂයේ සෑම ගැඹුරු නිරීක්ෂණයකදීම පාහේ මේවා හමුවේ. මෙයින් පැහැදිලි වන්නේ මුල් විශ්වයේ මේවා ඉතා සාමාන්‍ය දෙයක් වූ බවයි. යම් හෙයකින් මෙම කුඩා රතු තිත් සියල්ලම කළු කුහර තාරකා නම්, අපගේ ක්ෂීර පථය (Milky Way) මධ්‍යයේ ඇති කළු කුහරය ඇතුළුව වර්තමානයේ පවතින සෑම සුපිරි කළු කුහරයක්ම, මුලින් මෙවැනි "කළු කුහර තාරකාවක්" ලෙස පැවති ඇත.

තාරකා විද්‍යාඥයන් පවසන්නේ, මුල් විශ්වයේ කළු කුහරවල වර්ධනය ගැන මෙතෙක් තිබූ මතයන් සැබෑ ලෙසම නිරීක්ෂණය කිරීමට ජේම්ස් වෙබ් දුරේක්ෂය මඟින් දැන් මඟ පෑදී ඇති බවයි. ඉදිරියේදී විකිරණ දුරේක්ෂ (Radio Telescopes) ඇතුළු අනෙකුත් නවීන උපකරණ මඟින් සිදුකරන පර්යේෂණ හරහා මෙම "කළු කුහර තාරකා" පිළිබඳ වැඩිදුර තොරතුරු තහවුරු කරගැනීමට විද්‍යාඥයන් බලාපොරොත්තු වේ. ■

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7. Figure image credit: NASA, ESA, CSA, STScI, Dale Kocevski (Colby College).

BY PAMUDITHA THANTHULAGE
Faculty of Urban and Aquatic Bioresources, University of Sri Jayewardenepura

කළු කුහර තාරකා — JWST සොයාගැනීම් පිළිබඳ විද්‍යා ලිපියකි



LUNAR DUST

SPECIMEN 01 LUNAR REGOLITH

SUBJECT	An astronaut's bootprint in lunar dust
SOURCE	Apollo mission photograph, NASA

LUNAR SCIENCE

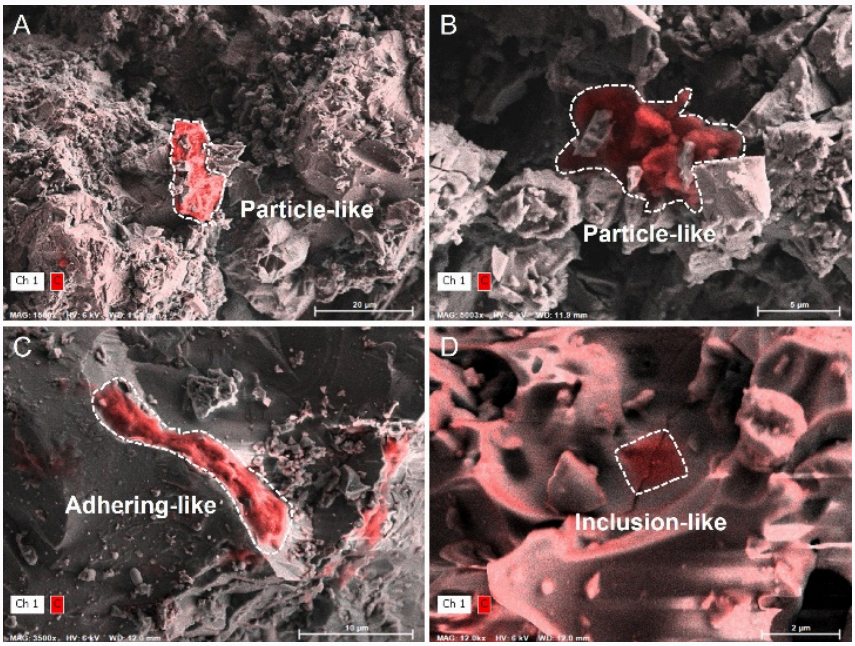
The Moon's Tiny Archive

More than just dust beneath an astronaut's boots

When we look at the Moon, we see a grey, rocky surface covered with craters. But beneath the surface is a fascinating material called lunar dust, which forms part of the Moon's regolith. Although it looks ordinary, this fine dust contains valuable information about the Moon and the history of our Solar System.

Lunar dust is both a challenge and a scientific resource. During the Apollo missions, dust stuck to astronauts' spacesuits and entered their spacecraft. It caused irritation to the eyes, nose and throat and could also damage equipment. Therefore, controlling lunar dust will be an important challenge for future Moon missions.

WORDS BY CHALUSHA SIRIWARDHANA



SPECIMEN 02 LUNAR SOIL

SAMPLES	Chang'e-6 (A–B) and Chang'e-5 (C–D)
METHOD	Scanning electron microscope images overlaid with carbon maps from energy-dispersive spectroscopy
RED	Representative organic matter
IMAGE	Hao Jialong's group

Lunar dust is an important scientific resource as well as a challenge for future astronauts.

At the same time, scientists are discovering that lunar soil can preserve organic compounds: carbon-based chemical materials that are important when studying the origins of life. Analyses of samples returned by China's Chang'e-5 and Chang'e-6 missions have found nitrogen-containing organic materials in lunar soil.

These discoveries do not mean that life existed on the Moon. Instead, the organic materials may have been brought to the Moon by asteroids and comets. After reaching the lunar surface, they could have been changed by meteorite impacts, heat and the solar wind.

The Moon is especially useful for studying ancient materials because it does not have the same level of weather, water and geological activity as Earth. As a result, its surface can preserve evidence from billions of years ago. In this way, lunar dust acts like a natural time capsule, recording events from the early Solar System.

As humans prepare to return to the Moon, studying its dust will become increasingly important. Every tiny grain may contain clues about ancient impacts, solar activity and the movement of organic materials through space.

Lunar dust is therefore much more than grey powder. It is a tiny archive of cosmic history that may help scientists understand the Moon, the Solar System and the chemical journey that eventually led to life on Earth. ■

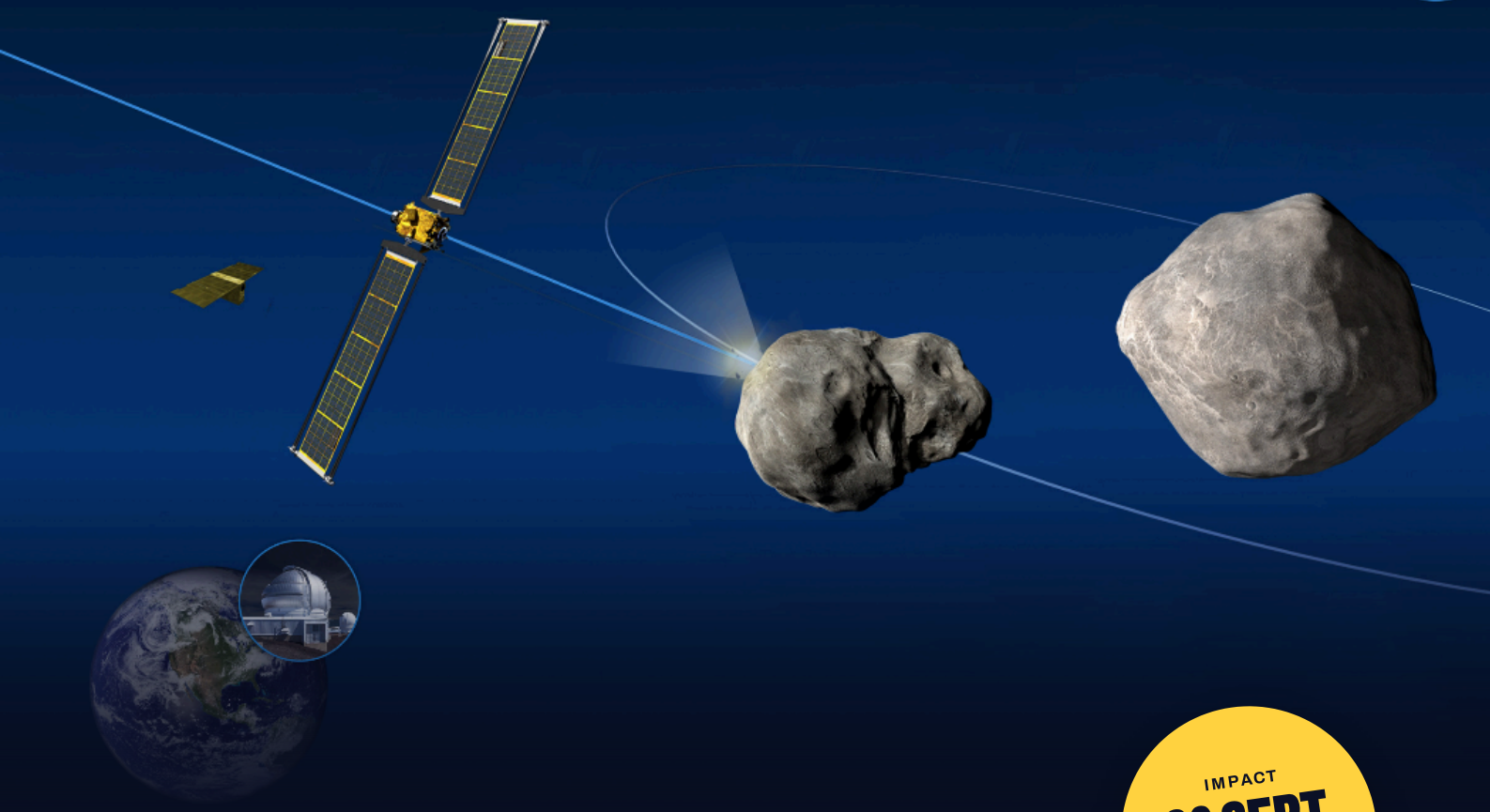
What a single grain can record

01 **ANCIENT IMPACTS**

02 **SOLAR ACTIVITY**

03 **ORGANIC MATERIALS ON THE MOVE**

BY CHALUSHA SIRIWARDHANA
Faculty of Technology, University of Sri Jayewardenepura



IMPACT
26 SEPT
2022

PLANETARY DEFENCE

The Gentle Push

HOW HUMANITY LEARNED TO MOVE A STAR

A short story of stone, silence, and one perfect collision

Somewhere between Mars and Jupiter, and scattered far beyond, drift millions of quiet stones. Most have wandered since before the Earth had oceans, before life had even opened its first eye. They ask for nothing. They simply turn, slowly, in the dark.

But every so often, one of these old wanderers bends its path toward us.

For most of human history, we could only watch the sky and hope. If a great stone ever came for Earth, there was no plan, only prayer, or luck, or the calm of not knowing. But a few years ago, quietly, without much fanfare, that changed forever.

WORDS BY P. KRISHANI KOSHALIYA

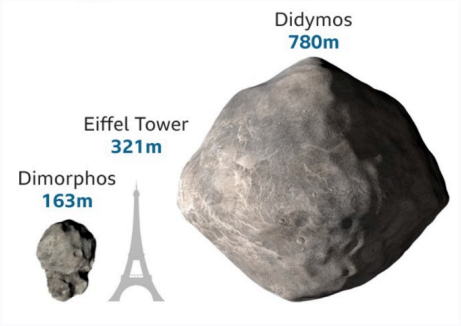
PART ONE

A SPACECRAFT WITH ONE PURPOSE

In the autumn of 2021, a small machine no bigger than a delivery van set out across the black. It carried no weapons, no explosives, no clever tricks. It carried only itself, and a single instruction: *become a bullet*.

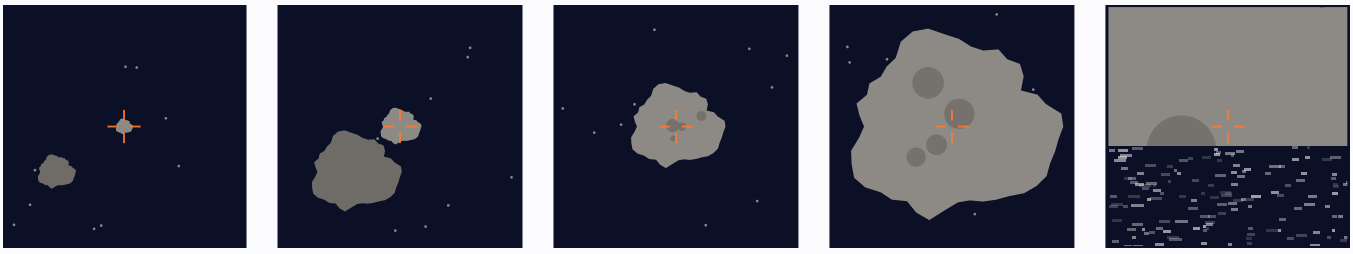
Its target was a modest little moon of stone called Dimorphos, quietly circling a larger asteroid named Didymos, the way a pebble might circle a pebble. Neither one meant Earth any harm. They were chosen simply because they were close enough to reach, and far enough away to be safe: a place to rehearse, without risk, for a danger that hasn't yet arrived.

For ten months, the spacecraft fell silently through space, alone, correcting its aim by fractions of a degree. And then, in its last few minutes alive, its cameras woke up and looked straight ahead. What they saw was extraordinary: a grey, cratered little world growing larger in the frame, second by second, closer and closer, until the picture simply stopped.



THE PAIR Dimorphos and Didymos beside the Eiffel Tower. Image supplied by the author.

"It carried only itself, and a single instruction."



THE FINAL APPROACH Growing larger in the frame, until the picture simply stopped. Illustration.

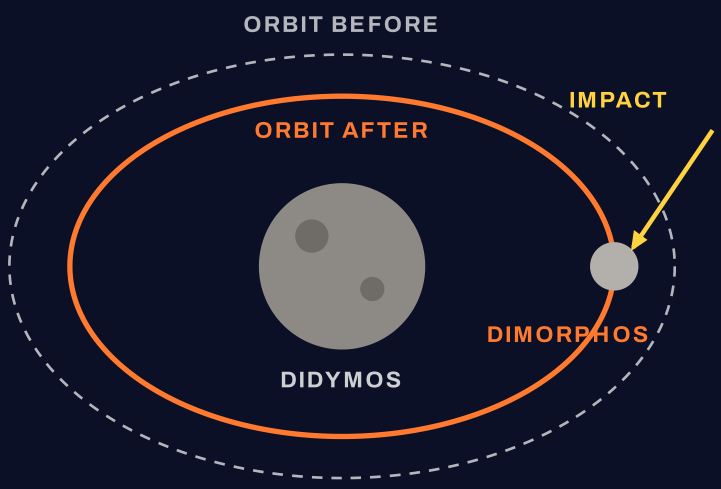
It had arrived.

PART TWO

THE SOUND OF NOTHING, AND THEN EVERYTHING

There is no sound in space, so the impact itself was silent. But fourteen thousand miles per hour of speed does not need noise to be violent. In an instant, the small machine was gone, scattered into dust and metal, its short life spent entirely on a single, perfect collision.

Back on Earth, astronomers pointed their telescopes at the sky and waited to see whether anything had changed. It was a strange kind of patience: waiting to find out if a rock, some seven million miles away, was now moving even slightly differently than it had the day before.



Change exaggerated for clarity

ONE ORBIT, BEFORE

11 h 55 min

HOPED-FOR CHANGE

About 10 min

MEASURED CHANGE

−32 min

The old orbit had taken Dimorphos eleven hours and fifty-five minutes to circle its companion.

Scientists hoped, cautiously, for a change of perhaps ten minutes. That alone would have proven the idea worked. Instead, they found something far stranger and more wonderful: the orbit had shortened by thirty-two minutes.

WHY THE UNIVERSE SURPRISED US

The reason turned out to be beautiful in its own right. Dimorphos was not, as many imagined, a single solid boulder. It was closer to a pile of rubble, held together loosely by its own faint gravity: countless smaller stones drifting together like a flock that never quite lands.

When the spacecraft struck, it didn't simply transfer its own force and stop there. It punched a spray of rock and dust out into space, and that ejected material acted like an invisible second engine, pushing the asteroid forward on its own. The asteroid, in a strange sense, helped move itself.

It was the closest thing space has ever offered us to a magic trick, except every part of it was real, and measured, and true.

A QUIET KIND OF HISTORY

What happened that day rarely makes it into everyday conversation, and yet it deserves to. For the entire span of human history, we lived at the mercy of the sky, unable to do anything but watch it. Now, for the first time, we know something we never knew before:

We can reach out and gently change the path of another world.

Not through force. Not through destruction. Through patience, precision, and a single, quiet push, years in advance, so that a small nudge today becomes the difference between a strike and a miss tomorrow.

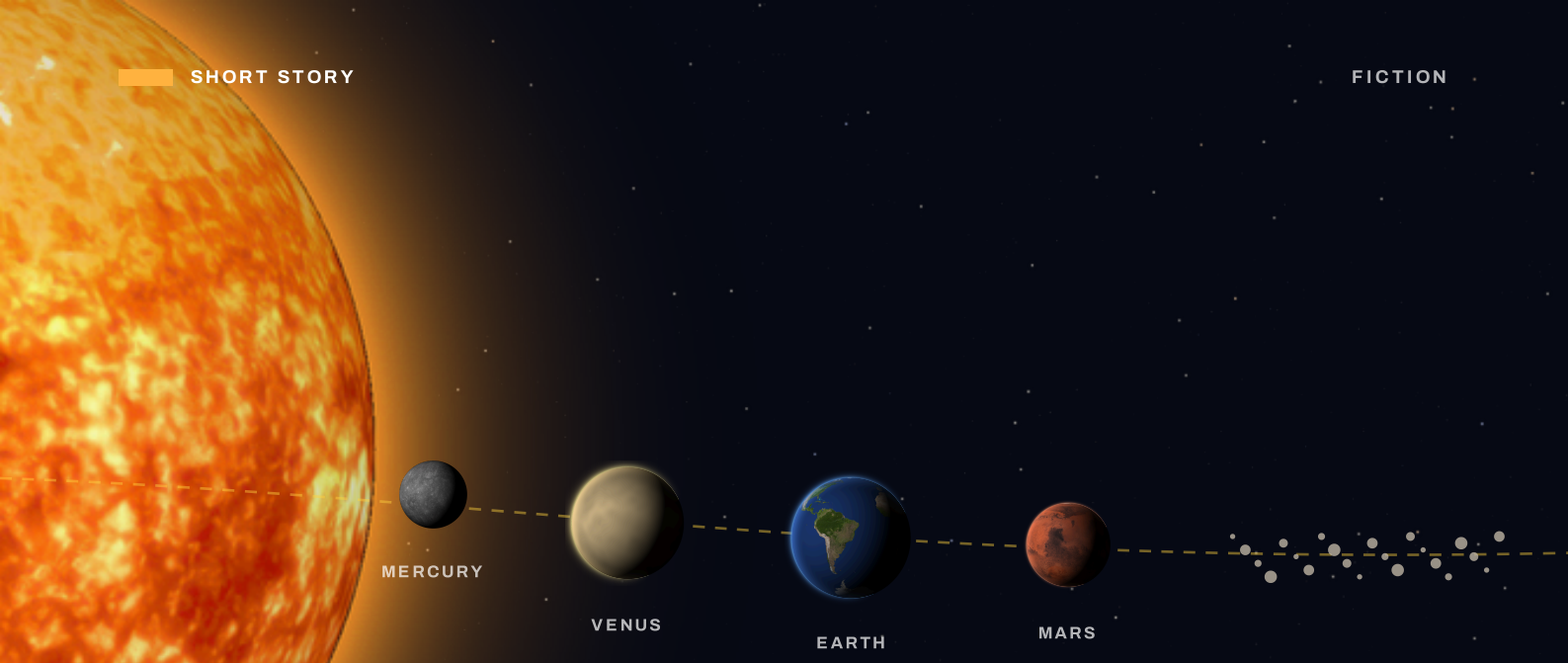
Nothing threatens Earth right now. This was never about an emergency. It was about answering an old and honest question before we ever truly needed the answer: *if the sky ever did send something our way, would we simply watch, or could we act?*

For the first time, we know we can act.

And somewhere out there, Dimorphos keeps turning, just a little differently than it used to, carrying, in its new and slightly shorter orbit, the quiet proof that we are no longer only watchers of the sky. ■

BY P. KRISHANI KOSHALIYA
Faculty of Technology, University of Sri Jayewardenepura

Opening image supplied by the author.
Orbit diagram and final-approach frames are illustrations.



SHORT STORY

A Journey Through the Solar System

One rooftop, one night, eight planets

WORDS BY AMASHA KAUSHANI

On a quiet night, an undergraduate student named Arjun was sitting on the university rooftop, staring at the stars. He had always studied the solar system through diagrams and equations, but that night, something strange happened.

As he looked at the Moon, a voice whispered, "You have read about us for years. Why not visit?"

Before Arjun could answer, the ground beneath him disappeared. In an instant, he was floating beside a glowing spaceship.

"Welcome aboard," said the Sun.

Arjun stared in disbelief. "The Sun can talk?"

"Of course," the Sun replied. "But first, hold on!"

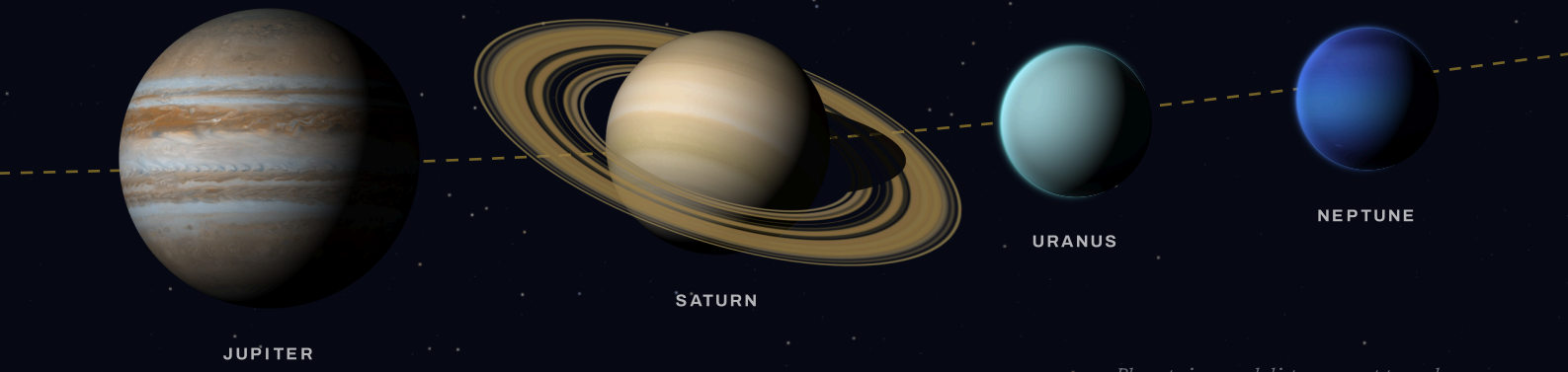
The spaceship moved toward **Mercury**, the smallest planet and the closest to the Sun. Its surface looked like an ancient battlefield, covered with craters. "My days are extremely hot," Mercury explained, "but my nights are freezing."

Next came **Venus**, hidden beneath thick clouds. Arjun expected a beautiful world, but Venus was more like a giant pressure cooker. Its atmosphere trapped enormous amounts of heat.

Then the spaceship reached **Earth**.

From space, Earth looked like a blue jewel surrounded by darkness. Arjun suddenly understood why astronauts often describe Earth as fragile. Oceans covered much of its surface, while clouds moved slowly across continents.

"You are special," said the Sun. "Not because you are the center of the universe, but because Earth provides conditions where life has developed."



Planet sizes and distances not to scale

The journey continued to **Mars**, the red planet. Its mountains, valleys, and ancient riverbeds made Arjun wonder whether water had once flowed across its surface.

"Maybe one day humans will visit me," Mars said.

"Maybe," Arjun replied.

Beyond Mars was a vast region filled with rocky objects: the **asteroid belt**. The spaceship carefully passed through it and approached the giant planets.

First came **Jupiter**, enormous compared with Earth. Its Great Red Spot looked like a gigantic storm spinning through its atmosphere.

"I am the largest planet," Jupiter said proudly.

"But you are mostly gas," Arjun replied.

Jupiter became silent for a moment.

Then they reached **Saturn**.

Arjun was speechless.

Its magnificent rings stretched across space like an enormous cosmic painting. Saturn explained that its rings were made mainly of countless pieces of ice and rock.

After Saturn came **Uranus**, rotating in a strangely tilted position, followed by distant **Neptune**, where powerful winds raced through its cold blue atmosphere.

Finally, the spaceship traveled beyond Neptune.

Arjun looked back.

The planets were now tiny points of light orbiting the Sun.

He realized that the solar system was not simply a collection of planets memorized for an examination. It was a dynamic system shaped by gravity, motion, heat, collisions, and billions of years of cosmic history.

The Sun spoke again.

"Everything you have seen began from the same ancient cloud of gas and dust."

Arjun looked at his hands. The atoms in his body had been forged through cosmic processes long before he was born.

"So," he whispered, "I am also part of the solar system."

The Sun smiled.

"You were never separate from it."

Suddenly, Arjun opened his eyes.

He was back on the university rooftop. The stars were still above him, and his textbook was open beside him.

He looked at the chapter titled *The Solar System*.

For the first time, the diagrams did not look like diagrams.

They looked like places he had visited.

And somewhere beyond the university, Earth continued its silent journey around the Sun: one small planet carrying billions of stories through an unimaginably large universe. ■

DO YOU KNOW?

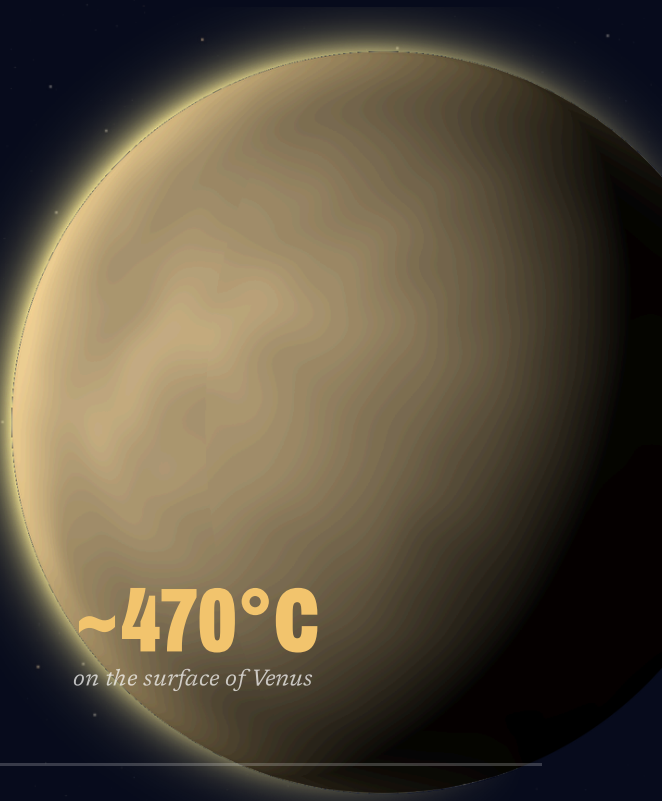
Four quick facts from the club's Do You Know? series

01

Venus: a once Earth-like planet?

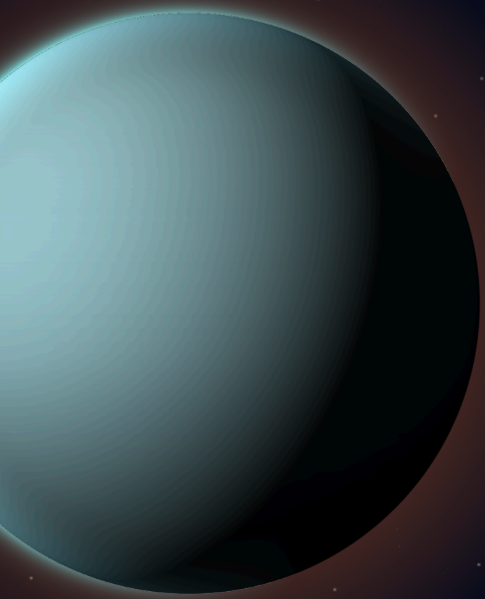
Venus is one of the most interesting planets in the Solar System, and recent studies suggest that it may have once had oceans and a climate similar to Earth, making it potentially habitable billions of years ago. However, due to a runaway greenhouse effect caused by a thick carbon dioxide atmosphere, Venus became extremely hot, with surface temperatures around 470°C. Scientists have also detected traces of phosphine gas in its atmosphere, which on Earth is often linked to biological activity, raising the possibility of microbial life in Venus's upper clouds where conditions are less extreme. Despite this, the presence of life is still uncertain, as the phosphine detection is debated and could be due to unknown chemical processes rather than living organisms.

INFORMATION: AMASHA KAUSHANI



02

Uranus's internal heat



For many years, scientists believed that Uranus had almost no internal heat because measurements showed it gave off nearly the same amount of energy as it received from the Sun. This made Uranus unusual compared to other giant planets like Jupiter, Saturn, and Neptune, which all release significant internal heat leftover from their formation. However, new research using improved data analysis and advanced models has shown that Uranus actually does emit a small but measurable amount of internal heat. This means the planet is still slowly releasing energy trapped inside since its formation, or generated by slow internal processes deep within its interior. This discovery helps scientists better understand Uranus's thermal evolution, including how its interior is structured and how heat moves inside the planet. It also has practical importance, because knowing how much heat Uranus produces helps scientists design better instruments and missions for future spacecraft exploration of this distant planet.

INFORMATION: AMASHA KAUSHANI

03

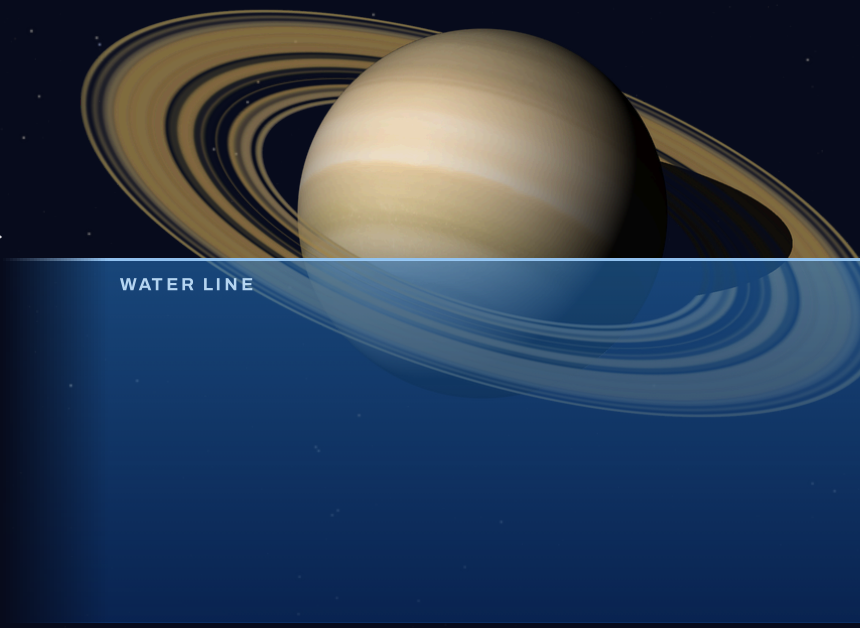
The planet that could float

Do you know that Saturn is so light that it could float on water if there were an ocean big enough? Even though it is the second-largest planet in our solar system, its density is lower than water. Saturn is also famous for its stunning ring system, made mostly of ice and rock particles, making it one of the most beautiful planets to observe.

INFORMATION: HASHINI SIRIWARDENA

0.69
Saturn's density, g/cm³

1.00
water, g/cm³



Illustration



55 Cancri e, illustration

04

The "diamond planet"

Astronomers have discovered a fascinating exoplanet called 55 Cancri e that may be rich in carbon, with extreme pressure turning much of it into diamond. This super-hot planet orbits very close to its star, reaching scorching temperatures, yet its unique composition makes it one of the most unusual worlds ever found. Imagine an entire planet sparkling like a giant gemstone in space: proof that the universe is far more extraordinary than we can imagine.

INFORMATION: HASHINI SIRIWARDENA

Do You Know? is the J'Pura Astronomy Club's social media series. Original series graphics by Nethmi Bhayogya. Planet illustrations rendered for this magazine from planetary texture maps; not to scale.



TOI-561 b, artist's concept. NASA, ESA, CSA, R. Crawford (STScI)

Planets where rocks melt

LAVA WORLDS

Imagine a planet where the ground beneath your feet is not solid rock, but a vast ocean of molten lava. Such extreme worlds are not science fiction.

Astronomers have discovered lava worlds: rocky planets orbiting so close to their stars that their surfaces can reach temperatures high enough to melt rock.

These planets are very different from Earth. Some complete an entire orbit around their stars in less than a day. Their permanent daysides can become incredibly hot, while their nightsides may be much cooler. Because of their extreme environments, scientists once expected these planets to lose their atmospheres quickly.

But recent observations from the James Webb Space Telescope (JWST) are changing that picture. JWST can study the infrared radiation coming from these distant planets and investigate their temperatures and possible atmospheres. Observations of planets such as TOI-561 b have provided evidence suggesting that some lava worlds may actually retain thick atmospheres despite their extreme conditions.

HOW CAN AN ATMOSPHERE SURVIVE?

So, how can an atmosphere survive on a planet hot enough to melt rock? One possible answer lies beneath the atmosphere itself. A molten surface, or magma ocean, may continuously release gases through a process called **outgassing**. In other words, the planet's interior could help replenish an atmosphere that would otherwise escape into space.

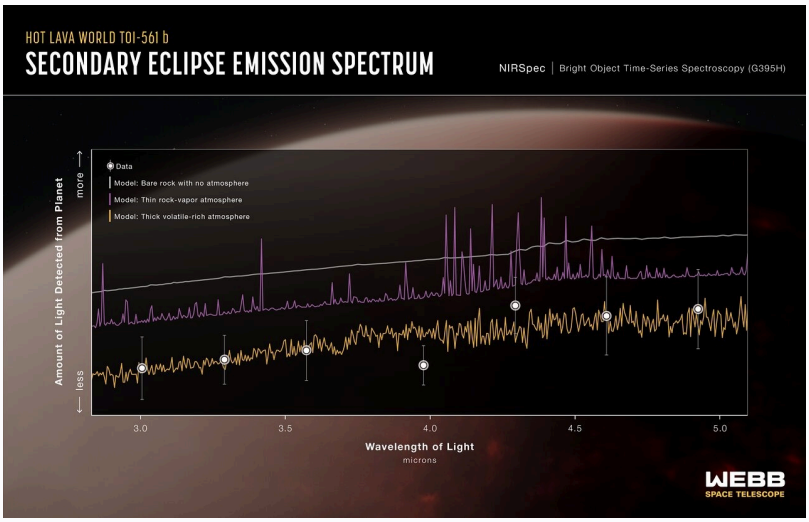
WORDS BY LASITH RAVISHAN



TOI-561 b and its star, artist's concept. NASA, ESA, CSA, R. Crawford (STScI)

THE EVIDENCE

WHAT WEBB ACTUALLY MEASURED

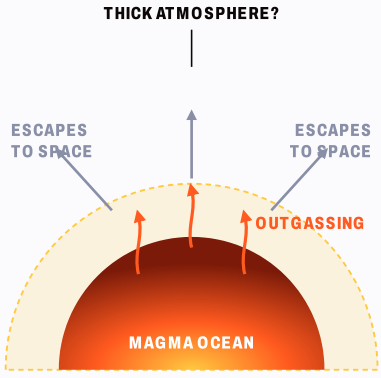


REAL DATA Webb's measurements (white dots) sit well below the bare-rock model and match a thick, volatile-rich atmosphere. NASA, ESA, CSA, R. Crawford (STScI)

< 11 hours
One full orbit of TOI-561 b around its star

~2,700 °C
Dayside heat expected if it were bare rock

Dimmer
Webb saw less light than bare rock would give off: the sign of an atmosphere



TOPPING UP Outgassing may replace gas lost to space. Illustration.

Although lava worlds are unlikely to support life, they are extremely valuable to astronomers. They provide a natural laboratory for studying how rocky planets form, lose their atmospheres, and evolve under extreme conditions. Studying these distant worlds may even help scientists understand the early history of Earth, when our own planet was much hotter and more geologically active.

The discovery of possible atmospheres around such extreme planets reminds us that the Universe is far more diverse than we once imagined. With JWST continuing to explore these mysterious worlds, astronomers may soon discover that even planets covered in fire have stories hidden within their atmospheres.

Worlds of fire may hold some of the biggest clues about how planets are born, change, and survive.

Sources: NASA, "Webb Detects Thick Atmosphere Around Broiling Lava World" (TOI-561 b), with its artist's concepts and NIRSpec emission spectrum; University of Chicago, atmosphere on HD 3167 b; arXiv, "JWST MIRI reveals a potential atmosphere on TOI-431 b".

MISSION COMPLETE

ARTEMIS II

COMPLETES LUNAR MISSION

ආටෙමිස් II චන්ද්‍ර මෙහෙයුම සම්පූර්ණ කරයි



Earthset, photographed by the Artemis II crew through Orion's window, 6 April 2026. NASA

10 days
around the Moon and back

4
astronauts on board

1.1 million km
travelled from launch to splashdown

406,771 km
from Earth: the farthest humans have ever been



LIFTOFF 1 April 2026, Kennedy Space Center. NASA



THE CREW From left: Jeremy Hansen (mission specialist, Canadian Space Agency), Christina Koch (mission specialist), Victor Glover (pilot) and Reid Wiseman (commander), back in Houston. NASA

ENGLISH

Artemis II completes lunar mission

NASA's Artemis II, launched on April 1, 2026, sent four astronauts, Reid Wiseman, Victor Glover, Christina Koch and Jeremy Hansen, on a historic 10-day journey around the Moon. The crew traveled over 700,000 miles, performed a lunar flyby, and tested the Orion spacecraft's systems.

The spacecraft, Integrity, safely splashed down on April 10, and the crew returned to Houston. The mission paves the way for Artemis III and future human missions to the Moon and Mars.

සිංහල

ආටෙමිස් II චන්ද්‍ර මෙහෙයුම සම්පූර්ණ කරයි

2026 අප්‍රේල් 1 වන දින දියත් කරන ලද නාසා හි ආටෙමිස් II මෙහෙයුම මගින් රීඩ් වයිස්මන්, වික්ටර් ග්ලෝවර්, ක්‍රිස්ටිනා කොච් සහ ජෙරමි හැන්සන් යන ගගනගාමීන් සිව්දෙනා සඳ වටා ඓතිහාසික දින 10 ක ගමනක් වෙත රැගෙන යන ලදී. සැතපුම් 700,000 කට වඩා ගමන් කළ මෙම කාර්ය මණ්ඩලය, සඳ ආසන්නයෙන් පියාසර කරමින් ඔරියන් අභ්‍යවකාශ යානයේ පද්ධති සාර්ථකව පරීක්ෂාවට ලක් කළහ.

'ඉන්ටග්‍රිටි' (Integrity) අභ්‍යවකාශ යානය අප්‍රේල් 10 වන දින ආරක්ෂිතව පෘථිවියට පැමිණි අතර, කාර්ය මණ්ඩලය නැවත හූස්ටන් වෙත ළඟා විය. මෙම ඓතිහාසික මෙහෙයුම ආටෙමිස් III ඇතුළු සඳ සහ අඟහරු වෙත සිදුකිරීමට නියමිත අනාගත මානව අභ්‍යවකාශ මෙහෙයුම් සඳහා මඟ පාදයි.

INFORMATION BY THILINI RAJASEKARA

Photos and mission figures: NASA

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Icicles on the launch structure on the morning of the launch. NASA

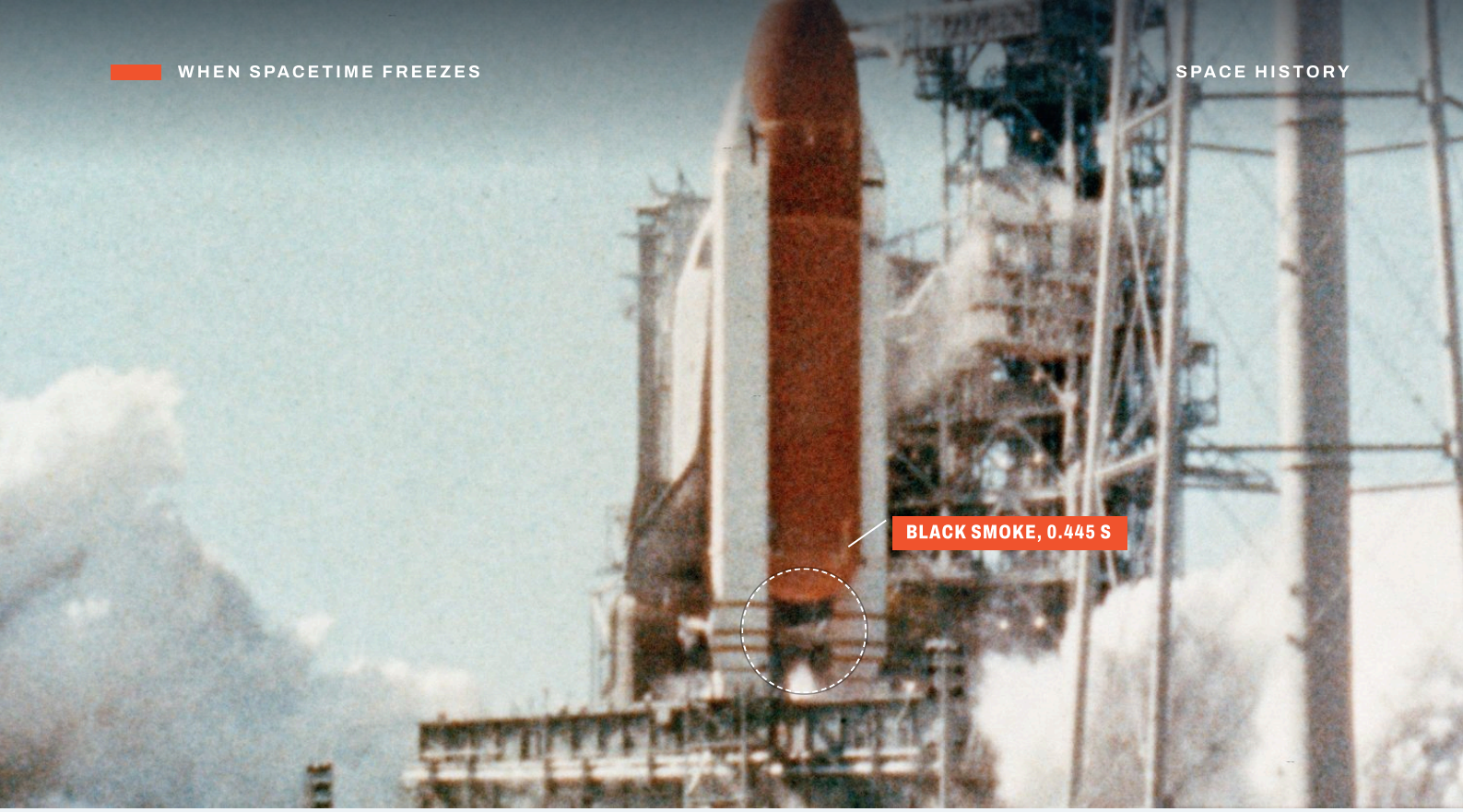
SPACE HISTORY · MATERIALS SCIENCE

WHEN SPACETIME FREEZES

How a microscopic polymer failure halted our journey to the stars

Humanity's quest to look deeper into the cosmos often focuses on massive feats of physics–the curving of spacetime, the raw power of rocket propulsion, or the light-gathering capacity of giant telescope mirrors. But the grandest astronomical ambitions can hinge on the smallest, most ordinary pieces of matter. Sometimes, the path to the stars is blocked not by the mysteries of deep space, but by the behavior of a simple rubber ring on a freezing morning.

WORDS BY CHIRATH PERERA



LIFTOFF *0.445 seconds after ignition, the first puff of black smoke appears near a field joint on the right-hand solid rocket booster. NASA*

THE MORNING THE SHUTTLE GROUNDED TO A HALT

On January 28, 1986, the Space Shuttle *Challenger* broke apart 73 seconds after liftoff, claiming the lives of seven crew members. While the tragedy stunned the world, the root cause wasn't an astrophysical anomaly or a failure of orbital mechanics. It was a failure of material science.

The Solid Rocket Boosters (SRBs) used massive segments sealed together by synthetic rubber O-rings. When the boosters ignited, hot gases expanded the metal casing, and the rubber rings were supposed to act as an instantaneous, elastic seal. However, the air temperature at launch was an unusually cold 2°C (36°F), and parts of the booster joints were colder still. That single environmental factor changed everything.

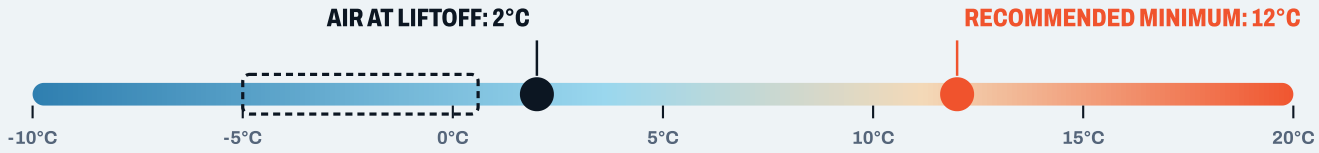
THE CHEMISTRY CULPRIT: THE GLASS TRANSITION PROBLEM

As industrial chemistry and materials science reveal, elastomers—the flexible polymers we call rubber—rely on molecular freedom. Long, tangled polymer chains slide and flex past one another, giving the material its bouncy "resiliency memory."

Every polymer has a critical threshold known as the **Glass Transition Temperature (T_g)**. When cooled down near or below this transition point, those molecular chains lose their mobility. The flexible elastomer undergoes a phase-like shift, transforming into a stiff, brittle, glass-like substance.

HOW COLD WAS IT?

About 8°C colder than any earlier shuttle launch

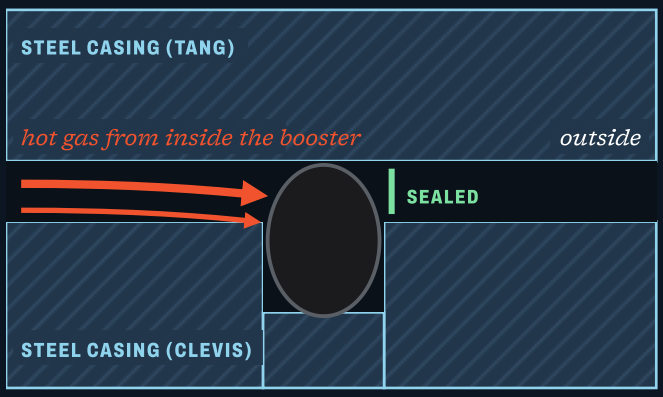


Coldest part of the booster joint (estimate): about –5 to 1°C

INSIDE THE BOOSTER JOINT

ONE RING, TWO TEMPERATURES

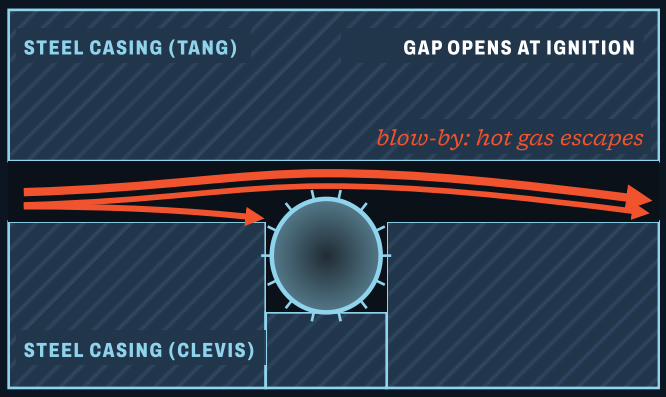
WARM RUBBER



O-RING

The ring springs back and seals the gap.

COLD RUBBER, 28 JAN 1986

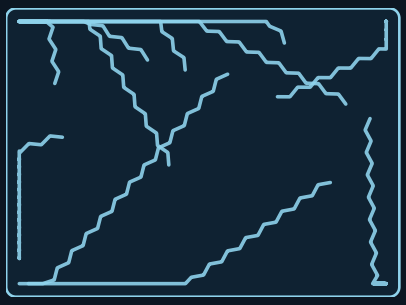


O-RING, STIFF

Too stiff to follow, it leaves a path for hot gas.



WARM: RUBBERY
Tangled chains slide and flex past one another.



NEAR T_G: GLASSY
The same chains lock in place and stop moving.

On that cold January morning, the O-rings dropped near their T_g threshold. When the rocket ignited, the metal joints rotated and opened under immense pressure, but the chilled rubber had lost its elasticity. It was too stiff to spring back and fill the gap. Hot gas blow-by occurred, burning through the seal and ultimately leading to disaster.

"A microscopic failure in polymer chain dynamics had brought a titan of spaceflight down."

THE BLACKOUT YEARS

No shuttle flights for 32 months — *Launch that had been planned*

28 JAN 1986
Challenger lost; the shuttle fleet is grounded

15 MAY 1986
Ulysses had been due to launch on Challenger

27 OCT 1986
Hubble's target launch date, aboard Atlantis

29 SEP 1988
Discovery returns the shuttle to flight (STS-26)

24 APR 1990
Discovery launches Hubble (STS-31)

6 OCT 1990
Discovery launches Ulysses (STS-41)



FINALLY FREE *Four years after Challenger, Hubble drifts away from Discovery's robotic arm over the Andes, 25 April 1990. NASA*

WHAT THIS MEANT FOR ASTRONOMY

For the world of astronomy, the *Challenger* disaster was more than a heartbreaking loss of life; it was a sudden, multi-year blackout for deep-space science.

At the time, the Space Shuttle was the heavy lifter of the astronomical community. It wasn't just launching weather satellites; it was the designated vehicle to deploy humanity's next generation of eyes on the universe.

- **The delayed Sun watcher:** *Challenger* was originally scheduled to deploy the *Ulysses* spacecraft to study the uncharted polar regions of our Sun.
- **The grounded telescope:** Most famously, the launch of the **Hubble Space Telescope**—which was meant to happen shortly after—was delayed for years as the entire shuttle fleet was grounded for safety redesigns.

For nearly three years, NASA's pipeline for deploying major space-based observatories came to a standstill. Our window to the stars was temporarily shut because a polymer couldn't handle the cold.

ENGINEERING FOR THE INFINITE VOID

The tragedy permanently transformed how scientists and engineers approach material science in space exploration. It taught us that looking deep into the universe requires absolute perfection in our materials down to the molecular level.

Today, whether engineers are designing seals for James Webb's cryogenic cooling systems, protective polymer thermal blankets for Mars rovers, or hull materials for deep-space probes, the lessons of the O-ring live on. We learned that the cosmos is unforgiving, and exploring it means respecting the fundamental chemistry of materials—proving that sometimes, understanding the fate of the universe starts with understanding a single polymer chain. ■



IN MEMORY OF THE CREW OF STS-51L

Francis R. (Dick) Scobee *commander*
Michael J. Smith *pilot*
Judith A. Resnik *mission specialist*
Ellison S. Onizuka *mission specialist*
Ronald E. McNair *mission specialist*
Gregory B. Jarvis *payload specialist*
S. Christa McAuliffe *Teacher in Space*

The crew during countdown training at Launch Complex 39B, 9 January 1986. NASA

BY CHIRATH PERERA

Photos: NASA. Launch temperatures: Report of the Presidential Commission on the Space Shuttle Challenger Accident; AccuWeather. 1986 launch plans: AmericaSpace.

ASTRONOMY PUZZLE

How much do you know about the Universe?

33 words
are hidden in the grid. They run across, down and diagonally, forwards and backwards. Tick them off as you go.

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

- ☐ APHELION
- ☐ APOGEE
- ☐ ASTEROID
- ☐ AURORA
- ☐ BLACK HOLE
- ☐ BLUESHIFT
- ☐ COMET
- ☐ CONSTELLATION
- ☐ ECLIPSE
- ☐ GALAXY
- ☐ LIGHT YEAR
- ☐ MAGNITUDE
- ☐ METEOR
- ☐ MOON
- ☐ NEBULA
- ☐ NOVA
- ☐ OORT CLOUD
- ☐ ORBIT
- ☐ PARALLAX
- ☐ PARSEC
- ☐ PERIGEE
- ☐ PERIHELION
- ☐ PLANEMO
- ☐ PLANET
- ☐ PLASMA
- ☐ PULSAR
- ☐ QUASAR
- ☐ REDSHIFT
- ☐ SATELLITE
- ☐ STAR
- ☐ TELESCOPE
- ☐ ZENITH
- ☐ ZODIAC

GLOSSARY

What the words mean

APHELION The specific point in an object's orbit (like Earth) where it is farthest from the Sun.

APOGEE The point in an object's orbit (like the Moon or a satellite) where it is farthest from Earth.

ASTEROID A small, rocky body orbiting the Sun, mostly found in the asteroid belt between Mars and Jupiter.

AURORA Glowing light displays in a planet's atmosphere (like Earth's Northern Lights) caused by solar radiation interacting with magnetic fields.

BLACK HOLE A region where gravity is so strong that nothing, not even light, can escape.

BLUESHIFT The shortening of light wavelengths coming from an object moving toward an observer, shifting its light toward the blue end of the spectrum.

COMET A cosmic ball of frozen gases, rock, and dust that develops a glowing tail when passing close to the Sun.

CONSTELLATION A recognized group of stars that forms an imaginary pattern in the night sky.

ECLIPSE An event where one celestial body passes into the shadow of another, blocking its light.

GALAXY A massive, gravitationally bound system consisting of stars, stellar remnants, gas, dust, and dark matter.

LIGHT YEAR The distance light travels in one Earth year (about 5.88 trillion miles / 9.46 trillion km).

MAGNITUDE A measure of the brightness of a star or celestial object (lower/negative numbers mean brighter objects).

METEOR The streak of light created when a piece of space debris burns up in Earth's atmosphere ("shooting star").

MOON A natural satellite that orbits a planet or smaller celestial body.

NEBULA A giant interstellar cloud of dust and gas where stars are often born.

NOVA A sudden, dramatic increase in the brightness of a star caused by a nuclear explosion on its surface.

OORT CLOUD A distant, spherical shell of icy objects surrounding the solar system, thought to be the origin of long-period comets.

ORBIT The curved, gravitationally bound path an object takes around a planet, star, or moon.

PARALLAX The apparent shift in an object's position when viewed from two different angles, used to calculate cosmic distances.

PARSEC A unit of astronomical distance equal to roughly 3.26 light-years.

PERIGEE The point in an object's orbit where it is closest to Earth.

PERIHELION The point in an object's orbit where it is closest to the Sun.

PLANEMO Short for "planetary-mass object": a body large enough to be rounded by its own gravity, but not massive enough to fuse hydrogen like a star.

PLANET A large celestial body orbiting a star that has enough gravity to be round and cleared in its orbital neighborhood.

PLASMA The high-temperature state of matter composed of free ions and electrons, making up stars and interstellar gas.

PULSAR A highly magnetized, rapidly rotating neutron star that emits beams of electromagnetic radiation.

QUASAR An extremely bright, energetic active galactic nucleus powered by a supermassive black hole.

REDSHIFT The lengthening of light wavelengths coming from an object moving away from an observer, indicating the expansion of the universe.

SATELLITE Any object, natural or artificial, that orbits a larger celestial body.

STAR A glowing sphere of hot plasma powered by nuclear fusion at its core.

TELESCOPE An instrument designed to gather and magnify light to observe distant astronomical objects.

ZENITH The point in the sky directly above an observer's head.

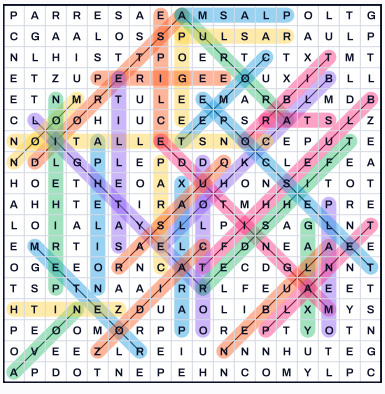
ZODIAC An area of the sky extending along the path of the Sun, divided into twelve traditional constellations.



PUZZLE BY W.P. NETHMI BHAYOGYA

Found them all? Check your grid against the answers.

Stuck? Hunt for the rare letters first: QUASAR, ZENITH, ZODIAC, GALAXY and PARALLAX are quick wins.



ANSWERS All 33 words, highlighted.

MEET THE TEAM

Team Asterism

The editorial and media team who brought Asterism 4.0 together.



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ASTERISM | 4.0

Clear skies.

THE E-MAGAZINE OF THE J'PURA ASTRONOMY CLUB
UNIVERSITY OF SRI JAYEWARDENEPURA · 2026



Back cover: the lunar horizon, from the Artemis II Earthset photograph. NASA