

THE AERONAUTICS AND SPACE TECHNOLOGY CLUB
IIT (ISM) DHANBAD
PRESENTS



STELLARKA

THE ANNUAL ASTRONOMY MAGAZINE

EXPLORING UNIVERSE

JAMES WEBB UNFOLDING
THE EVOLUTION OF
THE UNIVERSE

ARTEMIS MISSION

SENDING HUMANITY BACK
TO MOON

ENERGY GAIN FROM NUCLEAR FUSION

FOR THE FIRST TIME, A POSITIVE
GAIN FROM NUCLEAR FUSION

AND MORE!!

HOLOGRAPHIC
WORMHOLE

UPCOMING
CELESTIAL
EVENTS

CLUB
GALLERY

BLACK HOLE IMAGING

CONTENTS



Webb will solve mysteries in our solar system, look beyond to distant ...

Artemis NASA's program to return astronauts to the lunar surface

scientists created a wormhole in a lab

About ARKA **Page 3**

James Webb Space Telescope **Page 4**

Artemis Mission **Page 7**

Holographic Wormhole **Page 10**

Nuclear Fusion Ignition **Page 13**

Black Hole imaging **Page 16**

Private Aerospace Startups In India **Page 19**

Space Facts **Page 22**

Exciting Discoveries **Page 24**

Upcoming Celestial Events **Page 25**

Club Activities **Page 27**

Club Gallery **Page 29**

Credits **Page 30**



ABOUT ARKA

THE AERONAUTICS AND SPACE TECHNOLOGY CLUB OF IIT (ISM) DHANBAD.

THE OFFICIAL AERONAUTICS AND SPACE TECHNOLOGY CLUB OF IIT (ISM) DHANBAD, OR ARKA, IS THE ASSOCIATION FOR RESEARCH AND KNOWLEDGE IN ASTRONOMY, FOUNDED ON DECEMBER 5TH, 2017, WITH CAPABLE DIRECTION

ARKA WAS FOUNDED BY SIX SENIORS FROM THE 2017 CLASS TO GIVE STUDENTS, AMATEURS, AND ENTHUSIASTS ALIKE A PLACE TO FURTHER THEIR UNDERSTANDING OF THE COSMOS. AT ARKA, WE ARE ADAMANT THAT GENUINE CURIOSITY IN ASTROPHYSICS, PHYSICS, ASTRONOMY, AERONAUTICS AND SPACE TECHNOLOGIES TRIUMPHS OVER ANY PERCEIVED INTELLECTUAL SUPERIORITY.

AS A RESULT, ARKA CONSISTENTLY HIRES THE MOST MOTIVATED STUDENTS, GIVING PEOPLE FROM VARIOUS EDUCATIONAL LEVELS AN EQUAL CHANCE TO HAVE A PLACE AT THE TABLE. THE CLUB'S MANY DIVISIONS TAKE TURNS HOSTING CLUB EVENTS.

MEMBERS MAY WRITE ARTICLES, CREATE GRAPHICS, PRODUCE VIDEOS, OR DO COMPUTATIONAL OR THEORETICAL ASTRONOMY.



The computational wing focuses on the use of computing power in the field of astronomy, whereas the theoretical wing works with celestial mechanics and astrophysics. Depending on one's interests and level of commitment to the club, one can participate in several categories. We at ARKA are eager to provide time and resources to every individual who has the desire to pursue a given subject, keeping the club's benefit in mind, even though basic knowledge is desired before joining any team.

Members will have access to the Sky Watcher 12, the exclusive Dobsonian telescope owned by ARKA, on campus. Photographs made with the telescope are a wonder to look at, providing stunning vistas of the Dhanbad night sky. On a regular basis, movie evenings are arranged, when everyone in attendance watches a film with an astronomical theme at the student activity center.

Some of the most anticipated activities are nighttime treks for stargazing.





JAMES WEBB SPACE TELESCOPE

UNFOLDING THE EVOLUTION OF THE UNIVERSE

JAMES WEBB SPACE TELESCOPE

Overview

The James Webb Space Telescope (sometimes called JWST or Webb) is a large infrared telescope with a 6.5-meter primary mirror. Webb is an international collaboration between NASA, ESA (the European Space Agency), and the Canadian Space Agency (CSA). NASA's Goddard Space Flight Center in Greenbelt, Maryland, is managing the development effort. The main industrial partner is Northrop Grumman; the Space Telescope Science Institute will operate Webb after launch.

Launch

It was launched on 25 December 2021 on an Ariane 5 rocket, developed by Arianespace for the European space agency (ESA), from Kourou, French Guiana, and arrived at the Sun-Earth L2 Lagrange point in January 2022.

Magnification

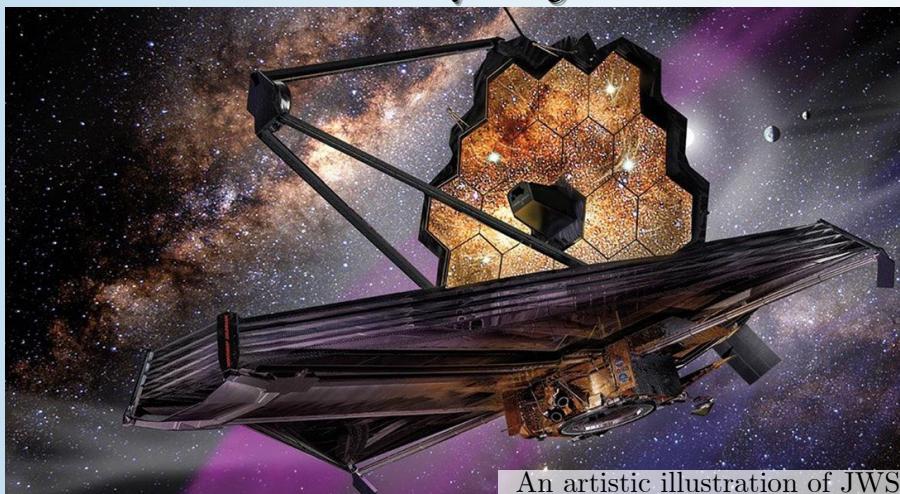
Webb has the capacity to look 13.6 billion light years distant—which will be the farthest we've ever seen into space.

Location and Orbit

The Sun-Earth L2 Lagrange point, which is about 1,500,000 km (930,000 mi) outside of Earth's orbit around the Sun, is where JWST is currently in a halo orbit. It orbits at a distance of between 250,000 and 832,000 km (155,000-517,000 mi) from L2 to avoid both the Moon's and Earth's shadows. This arrangement keeps the temperature of the spacecraft constant and below the 50 K (-223°C ; -370°F) necessary for faint infrared observations.

Mirrors of JWST

The primary mirror of the James Webb Space Telescope (JWST) has a diameter of 6.5 meters and is made up of 18 unique hexagonal mirrors (21 feet). The mirror's polished surface area is 26.3 square meters (283 square feet), but the additional support struts block 0.9 square meters (9.7 square feet), making the total collecting area 25.4 square meters (273 sq ft). The Hubble telescope's 2.4-meter (7.9-foot) diameter mirror, with a 4.0-square-meter collecting area, is more than six times larger than this (43 sq ft). The mirror is made out of an infrared-reflective thin layer of strong glass that is covered with a thin layer of gold.



An artistic illustration of JWST

DID YOU KNOW?

THE JWST IS NAMED AFTER JAMES E. WEBB, WHO WAS THE ADMINISTRATOR OF NASA FROM 1961 TO 1968 DURING THE MERCURY, GEMINI, AND APOLLO PROGRAMS.



IMAGE GALLERY OF JWST



The JWST has captured some of the most beautiful images of early Universe

The Phantom Galaxy, or core of M74, is shown in Image 1. The Phantom Galaxy, located almost 32 million light-years away in the constellation Pisces, is almost face-on to Earth. Webb used its Mid-InfraRed Instrument (MIRI) to study M74 in order to understand the origins of star formation in the nearby cosmos. This photograph was made accessible to the general public on August 29, 2022.

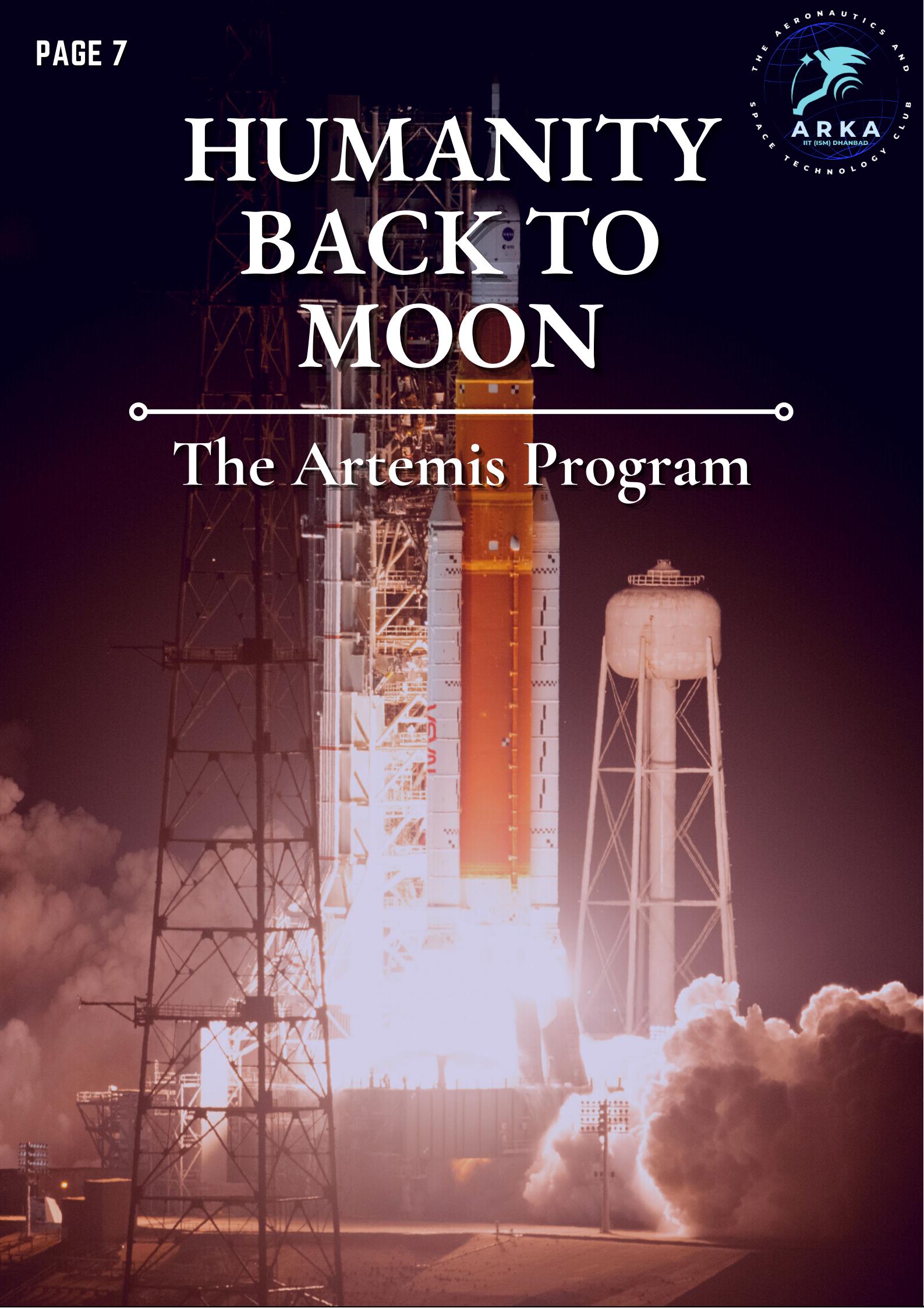
Image 2 depicts the well-known "Pillars of Creation" in the Eagle Nebula. (also known as the Star Queen Nebula and listed as Messier 16 or M16 and NGC 6611 in catalogues). John Charles Duncan made the initial discovery of the object in 1920 using a photograph obtained with a 60-inch telescope at Mount Wilson Observatory. The Hubble Space Telescope subsequently photographed the object in 1995. Finally, an image on the near-infrared and mid-infrared wavelengths was captured by the James Webb Telescope, which was noticeably more distinct and gave a far clearer view of the formation of stars. This photograph was made accessible to the general public on October 19, 2022.

The "Cosmic Cliffs" region of the Carina Nebula, also known as NGC 3372, is shown in Image 3. The JWST employed its Near Infrared Camera (NIRCam), which is situated between 8500 and 9100 light-years (2600 and 2800 parsec) distant and has a spectrum range from the edge of the visible (0.6 m) to the near infrared (5 m). On July 12, 2022, the picture was released.



HUMANITY BACK TO MOON

The Artemis Program

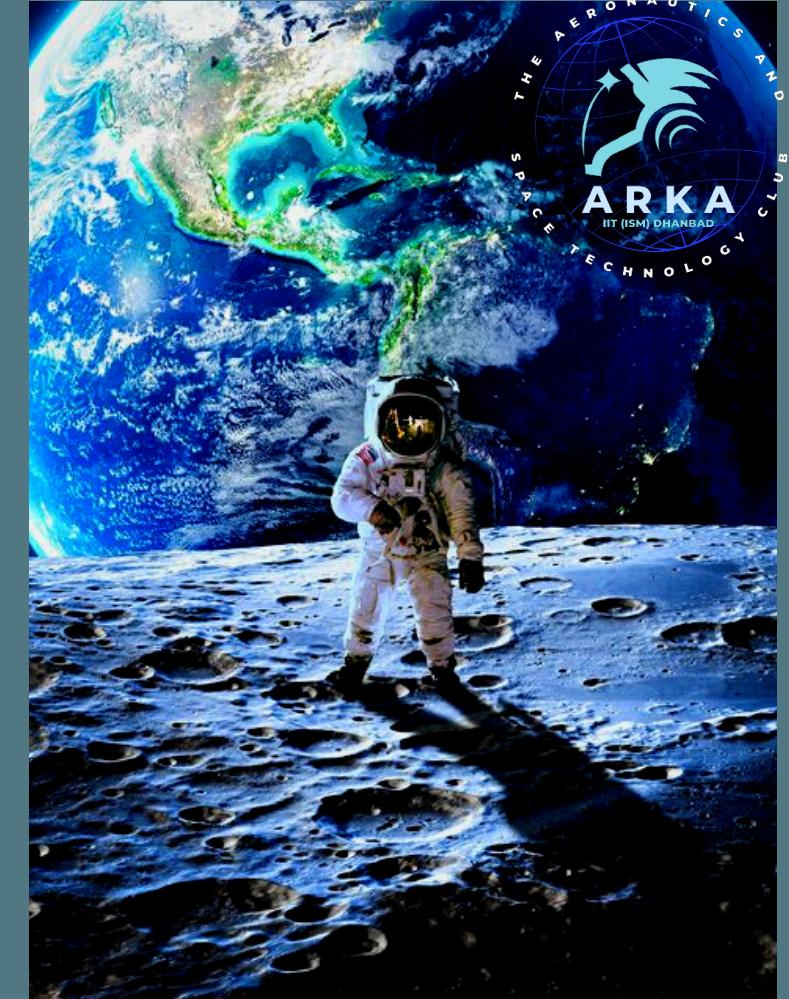




CATCH SOME WAVES IN

THE ARTEMIS PROGRAM

Humanity's desire to go back to Moon



The Artemis program is a robotic and human Moon exploration program led by the United States' National Aeronautics and Space Administration (NASA) along with three partner agencies: European Space Agency (ESA), Japan Aerospace Exploration Agency (JAXA), and Canadian Space Agency (CSA).

The program intends to reestablish a human presence on the Moon for the first time since the Apollo 17 mission in 1972. The major components of the program are the Space Launch System (SLS), Orion spacecraft, Lunar Gateway space station and the commercial Human Landing Systems.

Orion's first launch on 16 November 2022 as the Artemis 1 mission, with robots and mannequins aboard. According to plan, the crewed Artemis 2 launch will take place in 2024, the Artemis 3 crewed lunar landing in 2025, the Artemis 4 docking with the Lunar Gateway in 2027, and future yearly landings on the Moon thereafter.

With Artemis missions, NASA will land the first woman and first person of color on the Moon, using innovative technologies to explore more of the lunar surface than ever before.

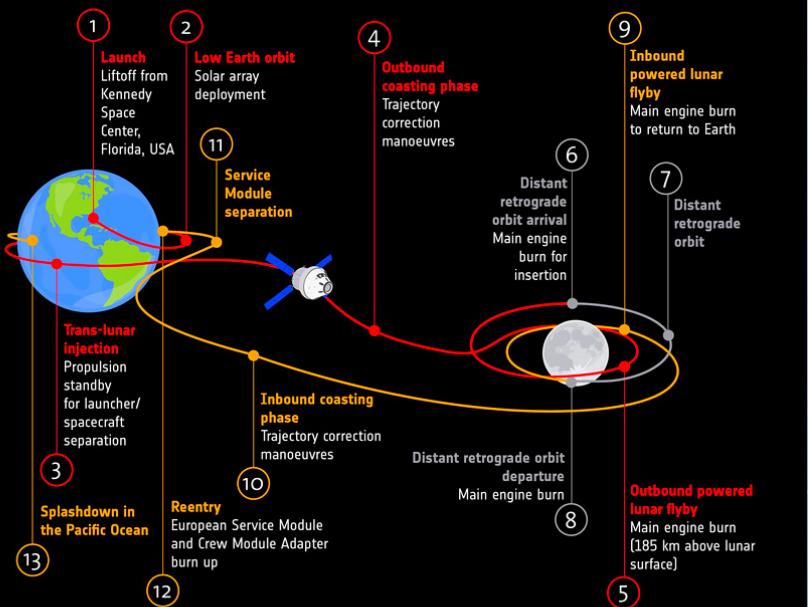


DID YOU KNOW?

1. YOU ALWAYS SEE THE SAME SIDE OF THE MOON.

2. THE MOON HAS QUAKES TOO.

Artemis 1 step-by-step



Base Camp

As NASA gets ready to place the first woman and the second man on the lunar South Pole in 2024, the agency's Artemis program has stoked enthusiasm in lunar exploration across the globe. By the end of the decade, NASA and its expanding worldwide partners will develop long-term exploration.

For astronauts to have a place to live and work on the Moon, the agency's Artemis Base Camp proposal features a contemporary lunar cabin, a rover, and even a mobile house. Early missions will include brief surface stays, but when the base camp is built, it should be possible for the crew to stay there for up to two months at a time.

DID YOU KNOW?

THE ARTEMIS PROJECT WAS NAMED AFTER ARTEMIS, THE GODDESS OF HUNT, IN SOME MYTHS THE MOON, AND TWIN SISTER OF APOLLO (A REFERENCE TO APOLLO PROJECT)

But, Why the Moon?

In order to advance science, advance the economy, and inspire the Artemis Generation of explorers, we are returning to the Moon. This lunar exploration program's abundance of knowledge will inspire a new generation of pioneers, explorers, visionaries, and wonderers.

The numerous occupations that are sustaining us now are the start of a lunar economy that will result in the creation of thousands of jobs all over the world.

Why the moon then? Because the successes of the Artemis generation will inspire upcoming human exploration endeavors.

Mars is calling. We therefore need to comprehend what it takes to set up a colony in our area before we develop a community on a different cosmic beach.

Artemis - 1

Exploration Mission-1 (EM-1) or Artemis 1, commonly referred to as Artemis I, were unmanned moon orbiting missions. The first significant space mission of NASA's Artemis program, Artemis 1, saw humanity resume lunar exploration after a hiatus caused by the Apollo program. It was the Space Launch System (SLS) rocket and Orion spacecraft's initial integrated flight test. Its main objective was to test the Orion spacecraft in order to get ready for upcoming Artemis missions, especially its heat shield. These missions seek to restore human presence on the Moon while also showcasing the commercial and technological frameworks needed for upcoming research projects, such as the exploration of Mars.



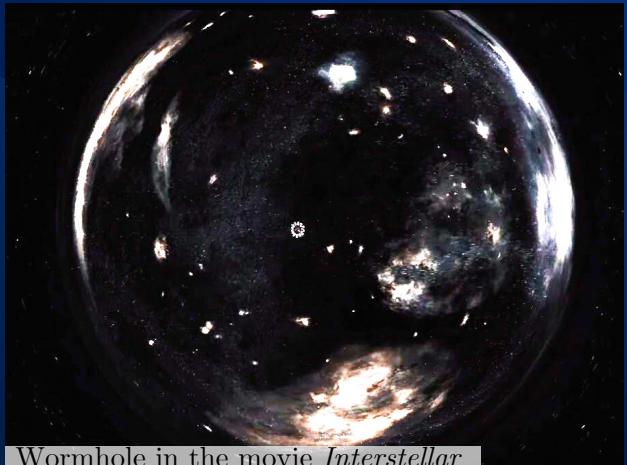
The future of the Artemis mission holds a hope for the human endeavor to reach out into the cosmos, to explore and to create a generation of pioneers, explorers and dreamers.



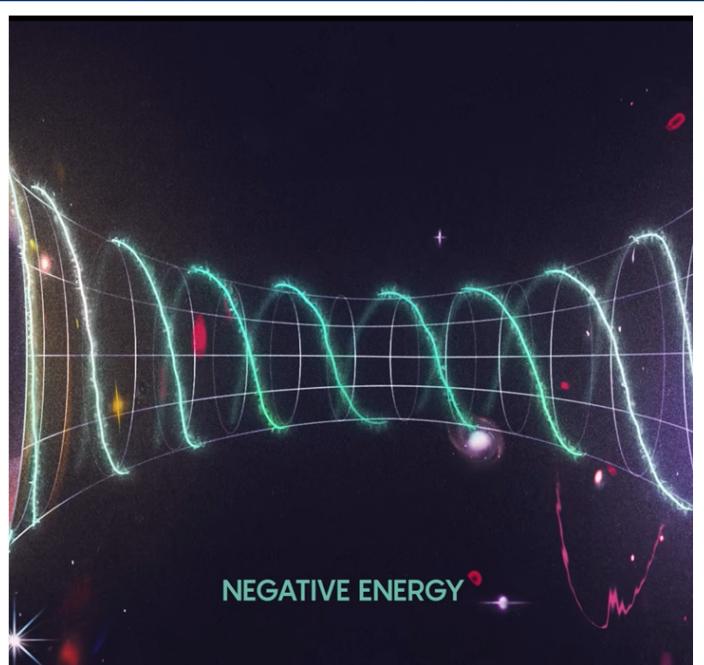
Holographic Wormhole

Holographic Wormhole in the lab

The holographic principle is the driving force behind our understanding of how to link the two most well-known theories of modern physics, general relativity and quantum mechanics. This idea permits theories combining quantum physics and gravity to be utterly equivalent to theories combining simply quantum mechanics. A hologram appears when it is projected onto a flat surface, while a dual is a similar alternate description that has less dimensions than its gravitational equivalent. With a quantum computer, we build a state resembling a hologram whose twin is a wormhole, then develop this state to represent a message travelling through the wormhole. depicts a 3D image



Wormhole in the movie *Interstellar*



DID YOU KNOW?

A wormhole is actually a very tiny tear in the fabric of space-time, about 10-33 cm.

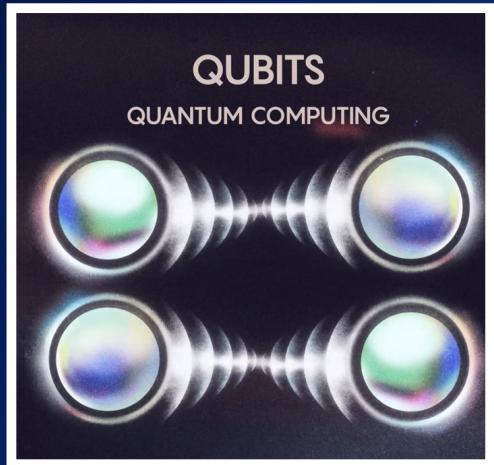


Zlokapa, a waifish orchestra child who joined Spiropulu's research team as a Caltech undergrad, was one of the group's success secrets. A talented programmer, Zlokapa taught the system to eliminate as many network connections as possible while keeping a crucial wormhole signature by mapping the particle interactions of the SYK model onto the connections between neurons of a neural network. The method reduced the hundreds of four-way contacts to just five

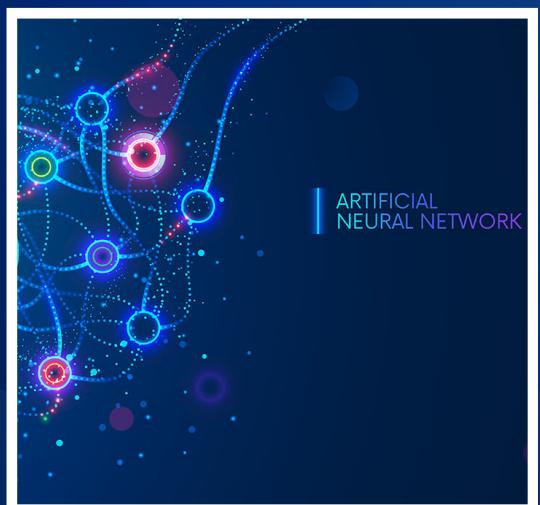
The group then began programming the qubits in Sycamore. In the left and right SYK systems, where each particle is entangled with one on the other side, seven qubits may encode a total of 14 matter particles—seven in each system. After then, one of the particles from the left SYK model is exchanged with an eighth qubit that is in some probabilistic mixture of states 0 and 1. The states of the other particles on the left immediately entangle with the potential states of that qubit, distributing its information evenly among them like a drop of ink in water. The qubit entering the left mouth of a one-dimensional wormhole in AdS space is holographically dual to this.



Holographic Wormhole in the lab



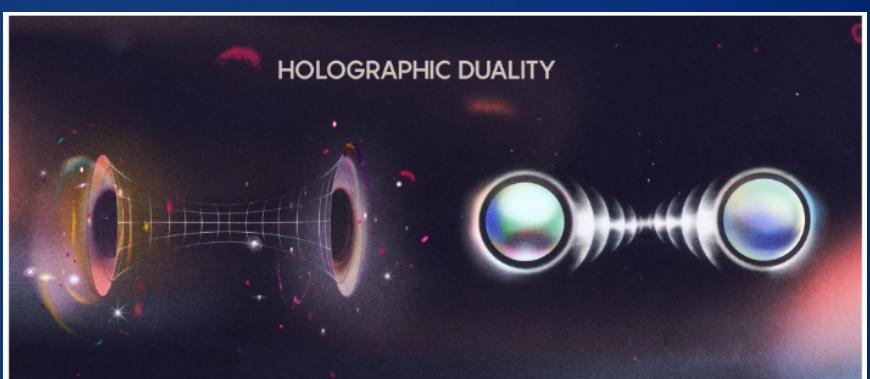
The scientists hunt for a peak in the data that indicates a distinction between two cases: If they see the peak, it indicates that qubit rotations that are dual to pulses of normal, positive energy do not let qubits to teleport whereas rotations in the other way that are dual to pulses of negative energy do. (Rather, they bring about the wormhole's closure.)



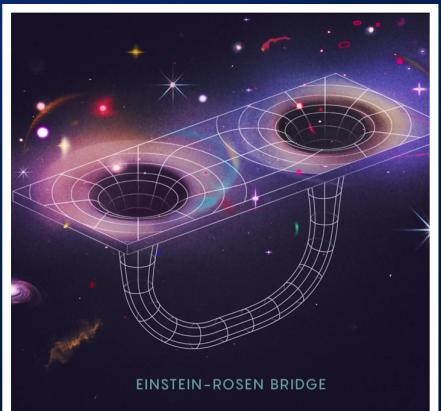
DID YOU KNOW ?

Why it is called Wormhole ? A wormhole is a tunnel-like connection through space-time, much like the real tunnels bored by worms in a (Newtonian) apple.

The group began programming the qubits in Sycamore. In the left and right SYK systems, where each particle is entangled with one on the other side, seven qubits may encode a total of 14 matter particles—seven in each system. After then, one of the particles from the left SYK model is exchanged with an eighth qubit that is in some probabilistic mixture of states 0 and 1. The states of the other particles on the left immediately entangle with the potential states of that qubit, distributing its information evenly among them like a drop of ink in water. The qubit entering the left mouth of a one-dimensional wormhole in AdS space is holographically dual to this.

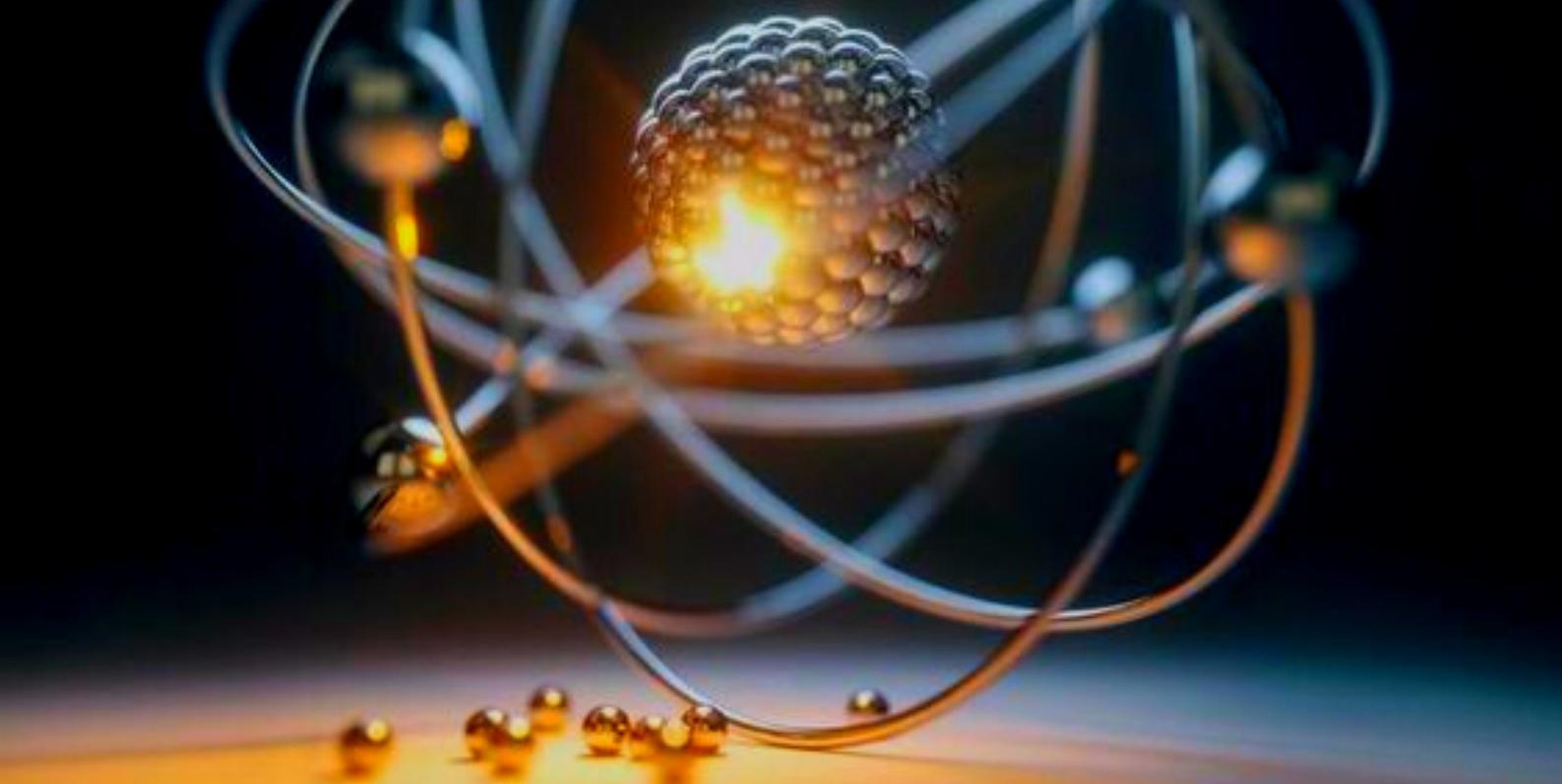


Contrary to expectations, the researchers discovered a second wormhole dynamics signature, a nuanced pattern in the way information spread and un-spread among the qubits known as "size-winding," despite the wormhole's skeleton simplicity. The fact that size-winding is still visible despite the SYK model being sparsified is an experimental finding concerning holography as they hadn't taught their neural network to do so.



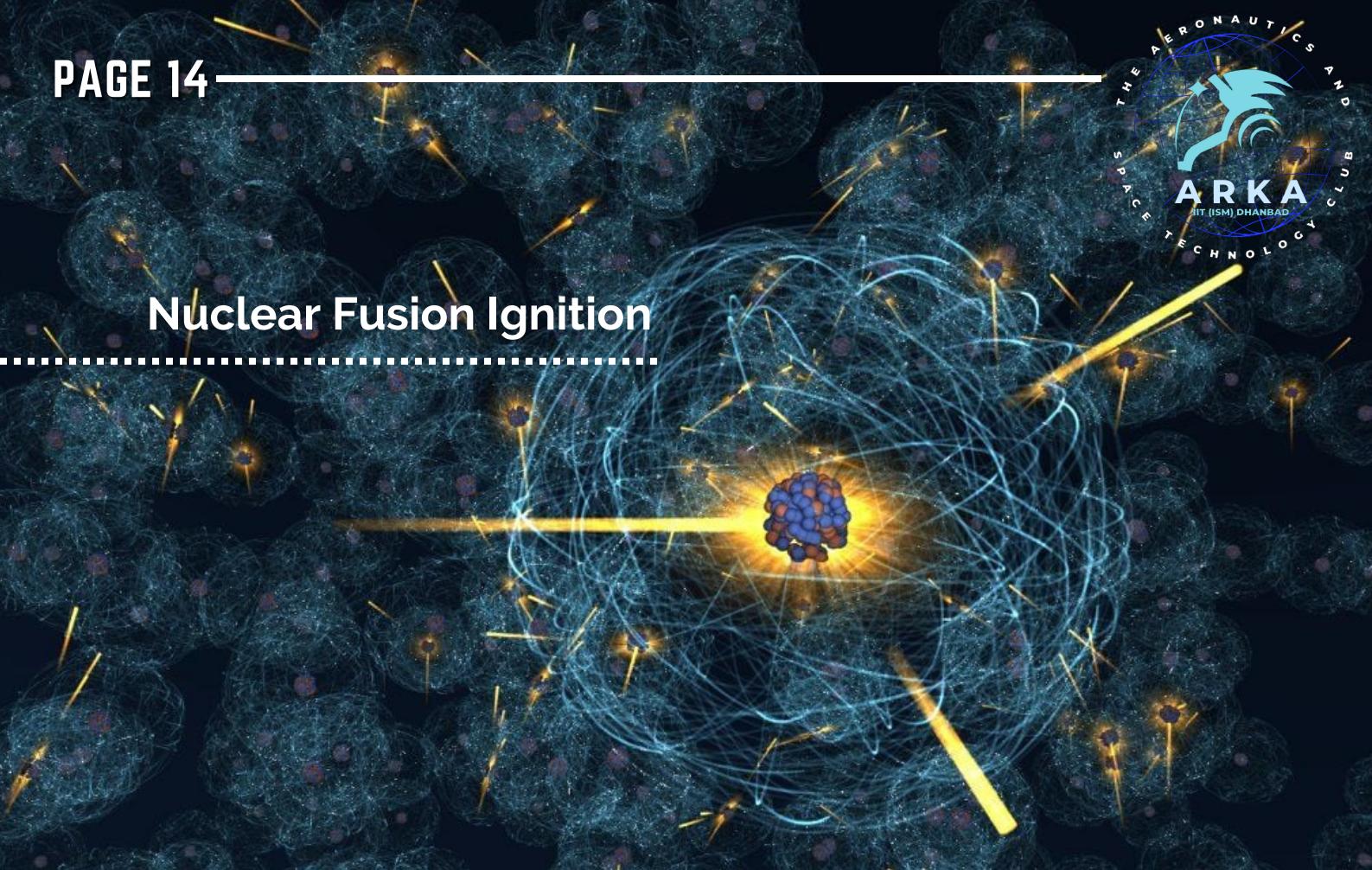


Researchers achieved breakthrough in Nuclear Fusion Reaction



A POSITIVE ENERGY GAIN

Nuclear Fusion Ignition



Scientists have made a breakthrough in nuclear fusion! An energy gain from nuclear fusion was produced by American scientists at the Lawrence Livermore National Laboratory (LLNL) in California. Breakthrough could lead to limitless supply of renewable energy - breaking our dependency on fossil fuels, which have harmed the atmosphere of Earth and caused drastic climate changes.

News of net energy gain from nuclear fusion has aroused enthusiasm around the world for the first time ever. Nuclear fusion is thought to be able to produce an unlimited source of clean energy, and it's produced more energy than is required to make it.

Quest for fusion

If nuclear fusion can be replicated on Earth on an industrial scale, it has the potential to generate almost infinite amounts of clean, secure, and affordable energy. This is because fission produces four times as much energy per kilogramme of fuel as fusion, and around four million times more energy than burning coal or oil.

The term "net energy gain" from fusion refers to the fact that fusion tests at the National Ignition Facility (NIF), Lawrence Livermore National Laboratory (LLNL), in the United States, recently produced more energy than the experiment required (3.15 megajoules vs 2.05 MJ). Fusion experiments thus far have either used more energy or have been energy neutral.

Over the past 70 years, researchers have been pursuing fusion with a range of goals in mind, including energy security.

Deuterium and tritium, two hydrogen isotopes, have been fused at the National Institute for Fusion Studies (NIF) in California, USA. An energetic helium nucleus made up of two protons, two neutrons, and one neutron is produced when the two isotopes fuse.

The experiment involves smashing together deuterium and tritium particles with light from 192 lasers to create helium nuclei, which fuse to release energy.



Nuclear Fusion Ignition

What is its energy potential?

Fusion projects in China, the UK, and Germany have reported many achievements in recent years. In addition to the LLNL project in the United States, France is still working on the International Thermonuclear Experimental Reactor (ITER). According to the paper, 33 private businesses provided feedback on the Fusion Industry Association's 2022 report. These companies currently get 4.8 billion dollars in aid, which is an increase of around 1.7 times compared to 2021 levels.



The "net energy gain" of the NIF is clearly a good thing, but for a variety of reasons, it still appears that successful fusion energy use is a long way off.

Firstly, the cost. The ITER facility, for instance, may cost between 22 and 65 billion dollars, according to its administration (by the US department of energy). The considerable parasitic power drain comes afterwards. Fusion reactors need a huge amount of electricity to operate. To charge the lasers for the NIF success, 400 MJ were required (3.15 MJ output vs. 2.05 MJ input). The total facility's electrical needs should be included.

Thirdly, NIFs were only one instance. In order to really fulfil energy demand, it needs to be done a million times quicker using 1,000 times more efficient lasers.



BACK TO THE IMAGING

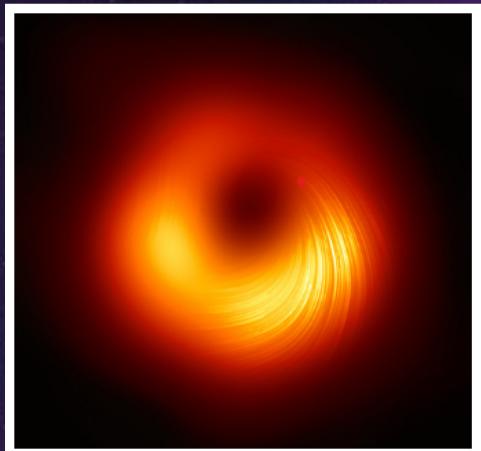
FINALLY SHEDDING SOME
LIGHT ON SOMETHING THAT
WE COULD ONLY SEE IN
THEORY AND IN SIMULATION

Black Hole Imaging



Feeling “light”? Maybe it’s only that you’re here on Earth. Enter a mysterious location in the cosmos where gravity prevents even light from escaping. You are correct; it is a black hole. Black holes are difficult to locate. Since light cannot escape from them due to their intense gravity, scientists must look for signs from their surroundings, one of which is the Event Horizon of a black hole.

What is this “Event Horizon” exactly? The black hole’s event horizon is the point at which escape velocity exceeds the speed of light. Due to the event horizon, black holes, which are extremely dark, appear to be among the brightest objects in space. Accretion is the phenomenon that appears in the play. The gas spirals like water down a drain as it approaches the black hole from nearby stars. It rubs against itself and heats up as it does this. A sea of positive ions and negative electrons is produced when a gas is so heated that it pushes apart its own atoms. A means to observe these “dark monsters” is through a black hole, and it is best to do it using radio waves as they can travel farther and across more intergalactic hurdles than other types of light.



How to build an Earth-sized radio telescope?

A black hole is an extraordinary object with extremely strong gravity, but when observed from Earth it would look like a tiny dot. But how can such a revolutionary telescope be created?



A fact to be noted is that, the larger the diameter of the telescope, the better the resolution. This is true both for optical and radio telescopes, which means that a tremendously large telescope is needed to observe a small object that can barely be seen from Earth — like a black hole. The technique of Interferometry comes to our rescue.

Why only Radio Telescope?

The answer to this obvious question is as mentioned above about dense gases in the view path of a black hole through which long wavelength radio waves can pass easily.

The second reason for choosing Radio Signals is again their long wavelength which allows easy maintenance of coherence between data from various components of the interferometer.

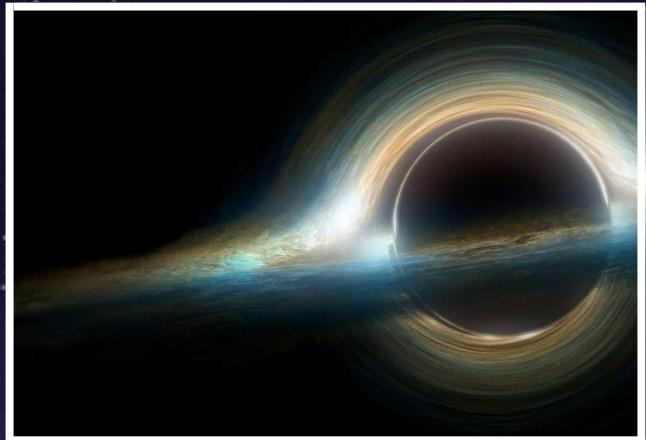
The Event Horizon Telescope (EHT)

The EHT is a global partnership that makes use of the Very Long Baseline Interferometry (VLBI) technique to link radio dishes all around the world. Eight separate telescopes make up the EHT array, which are located in France, Spain, Greenland, Chile, the United States (Arizona and Hawaii), Mexico, and the South Pole. With this aperture size, the EHT team has so far successfully obtained the images of two black holes, M87 in the Virgo A galaxy's center and Sagittarius A* in the Milky Way's core.

DID YOU KNOW?

one minute in a black hole would be roughly 1,700,000 years.

Black Hole Imaging



The EHT's first release : M87

The year of 2019 offered the world the first visual evidence of the mysterious character of the stories of General Theory of Relativity, EHT released the first image of M87 black hole sitting at the center of Virgo A galaxy. This elliptical galaxy gets its name from the constellation Virgo.

In 2019 the Event Horizon Telescope obtained images of the central region of M87 that showed an asymmetric ring of radio emission surrounding a dark object. The central object is the black hole's shadow, which is about five times larger than the black hole itself.

The black hole is six and a half billion times the mass of the Sun and 55 million light years away from us. In 2021 the team at EHT produced another image of the same black hole but with new insights. The image provided an exciting view of the swirling magnetic field around the event horizon.

"We are now seeing the next crucial piece of evidence to understand how magnetic fields behave around black holes, and how activity in this very compact region of space can drive powerful jets that extend far beyond the galaxy," as explained by Monika Mościbrodzka, Coordinator of the EHT Polarimetry Working Group and Assistant Professor at Radboud Universities in the Netherlands.

EHT had another surprises for us.so lets have a look to our own galaxy's center

The Beast that Lives Inside the Milky Way!

The story begins with our first tantalizing hints of its presence in 1918, when the astronomer Harlow Shapley first noticed stars congregating toward the center of the Milky Way. Later observations detected powerful radio emissions coming from this spot located in the Sagittarius constellation. By now the theory of General Relativity bought the name of a Black hole on the list of suspects. In the 21st century, scientists solidified this idea by tracking the motions of stars.

Finally after 3 years of its first release EHT presented the world , image of Sagittarius A* the black hole at the center of our own galaxy The Milky Way. The image reveals about the spin and orientation of the black hole.





INDIA MAKING ITS MARK ON THE WORLD

PRIVATE AEROSPACE STARTUPS IN INDIA

The Government of India established the Indian Space Association (ISPA) in 2021 to open up the Indian space industry to private sector and start-ups. The founding members of this organization include a number of private businesses, including Larsen & Toubro, Nelco (Tata Group), OneWeb, MapmyIndia, and Walchandnagar Industries. The Director General of ISPA was chosen to be Lieutenant General Anil Kumar Bhatt.

In June 2020, the Indian Government unveiled a number of initiatives to de-regulate the private space industry, and the Indian National Space Promotion and Authorisation Centre (INSPACe) was established to foster the development of technology into Non-Government Private Entities (NGPEs), as defined by the Department of State. The draught of the ISRO's Space Communication Policy, which was released in October 2020, highlighted NGPEs as a critical component. The NALSAR Centre for Aerospace and Defence Laws is currently working on a new Space Activities Bill and a space policy to govern space manufacturing and the legal facets of the business in India as of 2021.





Some of the private startups in India



Hyderabad-based Skyroot Aerospace Private Limited is an Indian private aerospace manufacturer and provider of commercial launch services. Former ISRO engineers and scientists created the business. It plans to create and deploy a line of small lift launch vehicles designed specifically for the market for small satellites. Skyroot Aerospace has been working on its Vikram series of expendable small lift launchers. Rockets are designed for very quick assemblies. They also have plans to develop a fully reusable vehicle. On November 18th 2022, Skyroot Aerospace successfully completed the first launch of a privately developed rocket from Indian soil.

Bellatrix Aerospace is a Bangalore-based Indian private aerospace manufacturer and small satellite company. The company was founded in 2015. It intends to launch its own rocket, Chetak, in 2023. The two-stage Chetak rocket is propelled by their own Aeon engines. The Chetak rocket will use liquid methane as fuel. In 2019 it announced plans to use water as propellant for an electric propulsion system. On 8 February 2021 they announced that they partnered with Skyroot Aerospace. In June 2022, the company raised \$8 million in a Series A funding round to pursue the development of in-space propulsion systems.



Earth2Orbit (E2O) is India's first privately funded space venture. It began with the goal of seeing India emerge as a global space player, rather than being limited to a government-run program. E2O has an organic business model with multiple avatars. E2O is enthusiastic about what it does. It is value-driven rather than valuation-driven.



Some of the private startups in India

pixxel

Pixxel is a private space technology company based in the United States and India that plans to launch a constellation of 30+ hyperspectral earth observation microsatellites into sun-synchronous orbit in the 2020s. In 2019, Awais Ahmed and Kshitij Khandelwal founded it while still students at BITS Pilani. Pixxel was also the only Asian space startup to be accepted into the 2019 Techstars Starburst Space Accelerator in Los Angeles.

An Indian private aerospace manufacturer with its headquarters in Hyderabad, called Dhruva Space Private Limited. Sanjay Srikanth Nekkanti founded the company in 2012, and it specializes in the construction of small satellites for the commercial, governmental, and academic markets. It offers comprehensive space engineering services for the launch, orbit, and ground domains.



SPACE FACTS



Gomez's Hamburger is less fun than it sounds like - a sun-like star that comes close to the end of its lifespan. The bun of the burger are made of light reflecting off dust, while the patty is formed by a dark bond dust. Dusty-licious

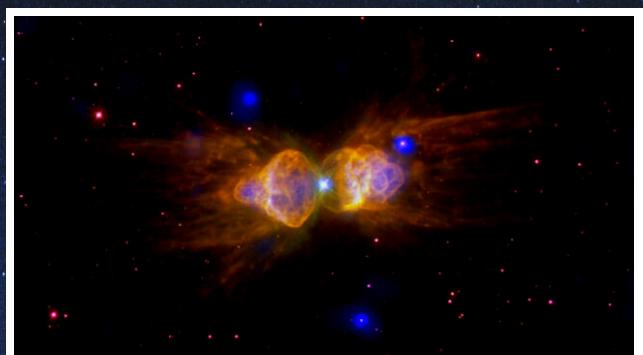


When world biggest star die by exploding in a supernova, a gravitational collapse can take place that squishes atoms in the star's core together so hard that they only avoid becoming a black hole by the skin of their teeth.

Neutron star are so incredibly compressed that the density of a neutron star is the as compressing a Boeing 747 airplane into a cubic millimeter - a tea spoon of a neutron star has same mass as 900 Great Pyramids of Giza. They are insanely hot: The inside of a neutron star be over 1,000 times hotter than the core of sun. If that wasn't already hectic enough, there are some that spin as fast as 642 times per second.



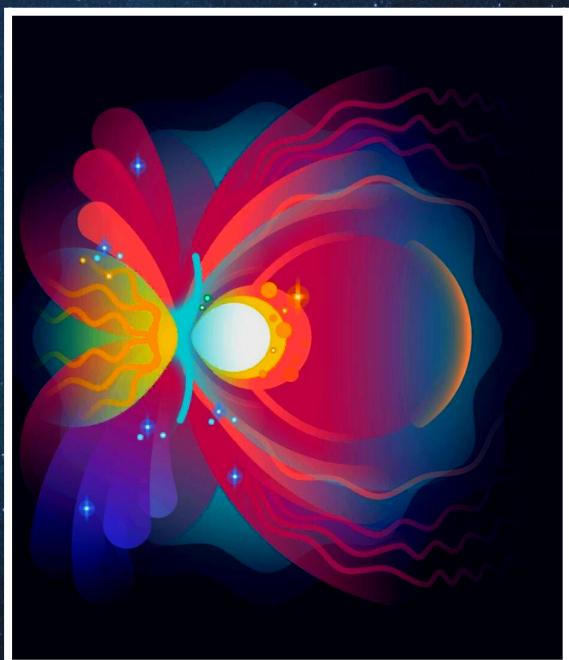
Shaped like a giant hourglass with an eye in its middle, the hourglass nebula is one of the most beautiful objects that can be observed from Earth. The eye in the center is red giant, emitting high-energy solar winds that spread around the star in two flattened rings. These ejected particles emit light as result of being trapped in the star's complex magnetic fields



SPACE FACTS



If you think supernova explosion is the bright, you don't even know half of it! When a star's core collapses to make a neutron star, almost single electron gets converted to high energy neutrino. In fact, 1% of energy of a supernova is in light - the other 99% is invisibly carried away by neutrinos. The universe is teeming, with so much energy that they can cause nuclear reactions on the rare occasions they interact with atoms on Earth



The OMG Particle need to get a grip. it's the highest energy particle ever detected, the equivalent of taking the kinetic energy of a thrown ball and packing it into one single proton. we don't know where exactly its comes from, but it's somewhere in space where crazy things are happening. Because they're traveling so close to the speed of light, These protons have their length contracted by a trillion times! seen from Earth, they'll whiz by like tiny little proton pancakes.



Tied with Big Dipper for the biggest celebrity constellation, Orion is the great hunter in our night sky. If you look carefully on a clear night, you can see the great Orion Nebula right beneath Orion's belt. The Nebula contains an estimated 2,000 times the mass of our Sun and one of the best - observed stellar nurseries - a hotbed of new stars. Observing the Orion Nebula has helped astronomers understand more about stars and planets form

EXCITING DISCOVERIES



ALIEN PLANET FOUND SPIRALING TO ITS DOOM AROUND AN AGING STAR



Astronomers have discovered an exoplanet whose orbit is decaying around an evolved, or older, host star for the first time. The devastated world appears doomed to spiral ever closer to its maturing star, eventually colliding and obliterating itself.

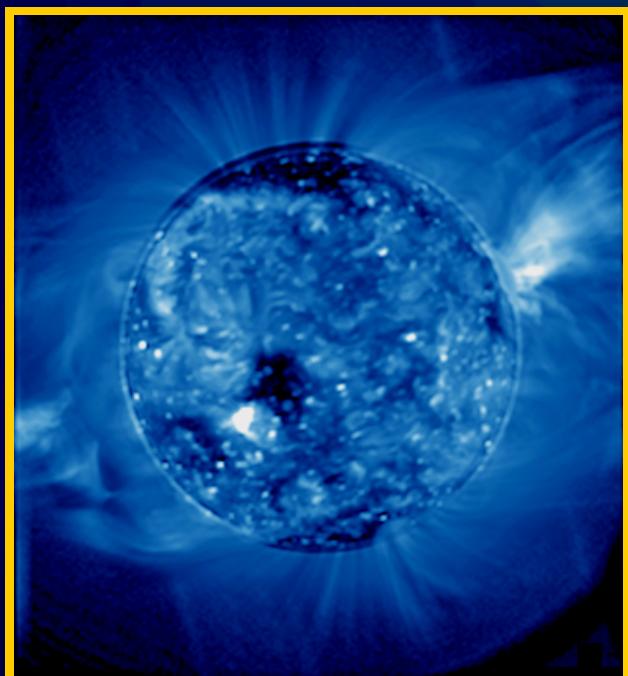
By providing the first look at a system at this late stage of evolution, the discovery provides new insights into the long-winded process of planetary orbital decay.

FIRST ULTRAVIOLET IMAGING OF SUN'S MIDDLE CORONA

Long, web-like structures were discovered that discharge particles from the Sun into space.

Southwest Research Institute (SwRI), NASA, and the Max Planck Institute for Solar System Research (MPS) collaborated to discover web-like plasma structures in the Sun's middle corona. In a new study published in *Nature Astronomy*, the researchers describe their innovative new observation method for imaging the middle corona in ultraviolet (UV) wavelength.

The findings could help scientists better understand the origins of solar wind and how it interacts with the rest of the solar system.





Upcoming CELESTIAL EVENTS

Every year, the night sky offers us with a number of breath-taking sights to see. There is no difference in 2023. Consequently, this list of several meteor showers and eclipses is going to occur in 2023

Meteor showers:

January 3, 4 - Quadrantids Meteor Shower. The Quadrantids is an above average shower, with up to 40 meteors per hour at its peak. The shower runs annually from January 1-5. It peaks this year on the night of the 3rd and morning of the 4th. This year the nearly full moon will block out most of the fainter meteors.

August 12, 13 - Perseids Meteor Shower. The Perseids is one of the best meteor showers to observe, producing up to 60 meteors per hour at its peak. The shower runs annually from July 17 to August 24. It peaks this year on the night of August 12 and the morning of August 13. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Perseus, but can appear anywhere in the sky.

October 7 - Draconids Meteor Shower. The Draconids is a minor meteor shower producing only about 10 meteors per hour. The shower runs annually from October 6-10 and peaks this year on the the night of the 7th. Best viewing will be in the early evening from a dark location far away from city lights. Meteors will radiate from the constellation Draco, but can appear anywhere in the sky.



October 21, 22 - Orionids Meteor Shower. The Orionids is an average shower producing up to 20 meteors per hour at its peak. The shower runs annually from October 2 to November 7. It peaks this year on the night of October 21 and the morning of October 22.

November 17, 18 - Leonids Meteor Shower. The Leonids is an average shower, producing up to 15 meteors per hour at its peak. This shower is unique in that it has a cyclonic peak about every 33 years where hundreds of meteors per hour can be seen. That last of these occurred in 2001. The shower runs annually from November 6-30. It peaks this year on the night of the 17th and morning of the 18th.

December 13, 14 - Geminids Meteor Shower. The Geminids is the king of the meteor showers. It is considered by many to be the best shower in the heavens, producing up to 120 multicolored meteors per hour at its peak. The shower runs annually from December 7-17. It peaks this year on the night of the 13th and morning of the 14th. This should be an great year for the Geminids.

December 21, 22 - Ursids Meteor Shower. The Ursids is a minor meteor shower producing about 5-10 meteors per hour. The shower runs annually from December 17-25. It peaks this year on the the night of the 21st and morning of the 22nd. Best viewing will be just after midnight from a dark location far away from city lights.

Eclipses:

An eclipse occurs when a planet or a moon, or any heavenly body moves into the shadow of another heavenly body. 2023 will have a total of 4 eclipses. Two of them will be Total and Annular solar eclipses on 20th April and 12th October, whereas the other two will be Penumbral and Partial lunar eclipses on 5-6th May and 28-29th November.

Club Activities



The Aeronautics and Space Technology Club (ARKA) of IIT (ISM) Dhanbad organizes a variety of enjoyable, interesting, interactive, and educational activities.

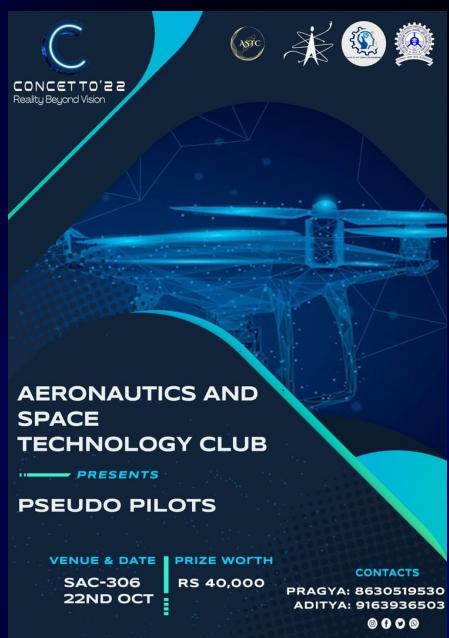
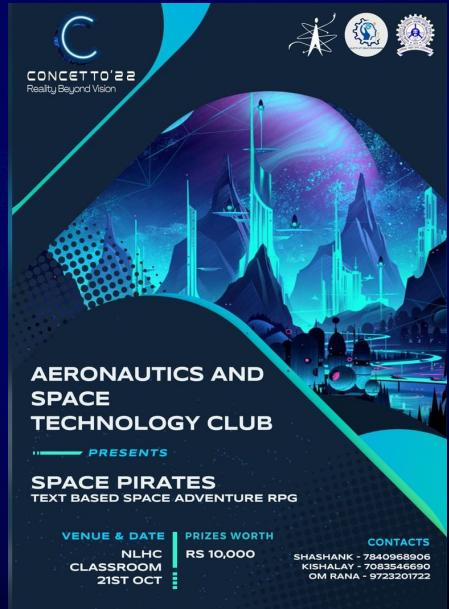


One of the major highlight for the club this year was during the CONCETTO '22, the annual and largest Techno-Management festival of IIT (ISM) Dhanbad in Eastern India.

Of all the numerous events going on during the fest, the ARKA club didn't hesitate and stood out and successfully organized some of the major events of the fest like,

1. Sky is the Limit: A working glider designing competition.
2. Space Pirates: A Text based Space Adventure RPG.
3. Pseudo Pilots: An innovation challenge to tinker gray matter and to test engineering skills.

These events marked a major amount of participation from the college and outside.



Club Activities



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One of the major activities carried by the club is the star gazing event. The club organizes this event with the view of sharing the wonders of the universe with each and everyone.

During this event, the club successfully tries to showcases the cosmic objects such as The Moon, Jupiter and its Moons, Saturn and its Rings, Mars, Orion Nebula, The Pleiades, and many more.

The club uses its Sky Watcher 12 telescope, an exclusive Dobsonian telescope owned by the club and two of its Celestron SkyMaster binoculars.

During the event, the club also organizes some discussion events, where the club members try to educate the fellow audience about the various aspects of astronomy, astrophysics, cosmic evolution and also the stories of various constellations passed down to us by our ancestors.



Club Gallery



The Aeronautics and Space Technology Club (ARKA) of IIT (ISM) Dhanbad organizes a variety of enjoyable, interesting, interactive, and educational activities.



Image - 1

Image - 1 shows the Orion Constellation, photographed on 8th October 2022.

Image - 2 shows the amazing Partial Solar Eclipse occurred and photographed on 25th October 2022.

Image - 3 and Image - 4 shows the spectacular "Blood Moon" for the last time in 2022. Photographed on 8th November 2022.

Image - 2



Image - 3



Image - 4

Image - 5 shows the full moon of 9th October 2022, famously the day is known as the day of "Sharad Purnima" in India.



Image Credits: Members of ARKA

Image - 5



MAGAZINE CREDITS

Remember to look up at the stars and not down at your feet.

-Prof. Stephen Hawking

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About ARKA

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Black Hole imaging

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Club Activities

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Holographic Wormhole

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Exciting Discoveries

by Priyanshu Mool

Artemis Mission

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by Nikhil Chopra

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Upcoming Celestial Events

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CURIOSITY IS THE KEY TO PROBLEM SOLVING...



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/ Arka - Astronomy club,
IIT Dhanbad

Somewhere, something incredible is waiting
to be known.

-Dr. Carl Sagan