



ASTRONOMY MAGAZINE



What's inside

Highlights from January
Moon phases and planet visibility
What's awaiting in February
Student's corner
Announcements by SPACE
Train your brain

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ABOUT SPACE

SPACE is the pioneer organization working towards development of science and astronomy in India. It aims to create a scientifically aware society and contribute to the technological and social development of the country.

SPACE organization belongs to an astronomical league, diligently working towards development in astronomy and space science through astronomical tutorials, modules, curriculum for education requirements of schools & students in India. We constantly engage in offering introductory astronomy, science about space, astrophysics, telescopes and internet astronomy to masses.

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

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



Mr. Sachin Bahmba
CMD, Space

CMD'S MESSAGE:

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

HIGHLIGHTS OF JAN 2022

THE QUADRANTID METEOR SHOWER PEAK!

Date: 2nd January

Most meteor showers originate from comets, but the Quadrantids originate from an asteroid named 2003 EH1. The asteroid takes 5.52 years to orbit our sun and when Earth passes through the particles left by this asteroid, we see the shower.

During the peak of the meteor shower, there can be between 60 to as many as 200 Quadrantid meteors per hour, depending on the night conditions and the surrounding darkness. The Quadrantids, which are larger explosions of light and colour persist longer than an average meteor streak.

CHINA'S MARS ORBITER SNAPS AMAZING SELFIES WITH RED PLANET

China's Tianwen 1 spacecraft at Mars pulled a big New Year's surprise with stunning new images captured by a small camera that flew free of the orbiter to snap epic selfies above the Red Planet.

The new images published by the China National Space Administration show Tianwen 1 above Mars' north pole, with its solar arrays and antennas on display, as well as a partial closeup of the orbiter and a view of the Red Planet's northern ice cap.

The Mars shots were taken by a small camera device released by the orbiter which then took images and sent them to Tianwen 1 via Wi-Fi on 4th January.



“Comet Leonard traveling at a speed of 158,084 miles per hour, relative to Earth.”

COMET LEONARD CLOSEST APPROACH TO THE SUN

On 3rd January, The comet will approach our Sun at a distance of roughly 56 million miles which is about one-third of the Earth's distance to the sun. Leonard will have to survive the Sun's intense gravitational force at that distance, along with the solar wind. So like many other comets making that close swing by the Sun, there's a risk Leonard may fall apart. But even if the comet survives the journey, NASA said in a statement, "its trajectory will fling it into interstellar space, never to return."

COMET LEONARD SHINES AMID AURORA AND METEOR SHOWER IN STUNNING FOOTAGE BY CHINESE SPACECRAFT

A small space telescope (Yangwang 1) launched by a Chinese space resources company captured an epic shot of the brightest comet of the year on the backdrop of an aurora and passing meteors.



SPACEX LOFTS 49 STARLINK SATELLITES TO ORBIT AS 1ST LAUNCH OF 2022

Two more Falcon 9 missions with Starlink satellites are planned.

On Thursday, January 6, Space X launched its first Falcon 9 rocket of the year 2022 from NASA's Kennedy Space Center in Florida, sending a new stack of Starlink satellites into orbit. The Falcon 9 rocket was launched at 4:49 pm EST, carrying a stack of 49 Starlink satellites. As per the reports of Space.com, during the launch broadcast, SpaceX engineer Jessie Anderson announced that Falcon 9 has successfully launched from Launch Complex 39 at Kennedy Space Center, carrying 49 Starlink satellites to low Earth orbit.

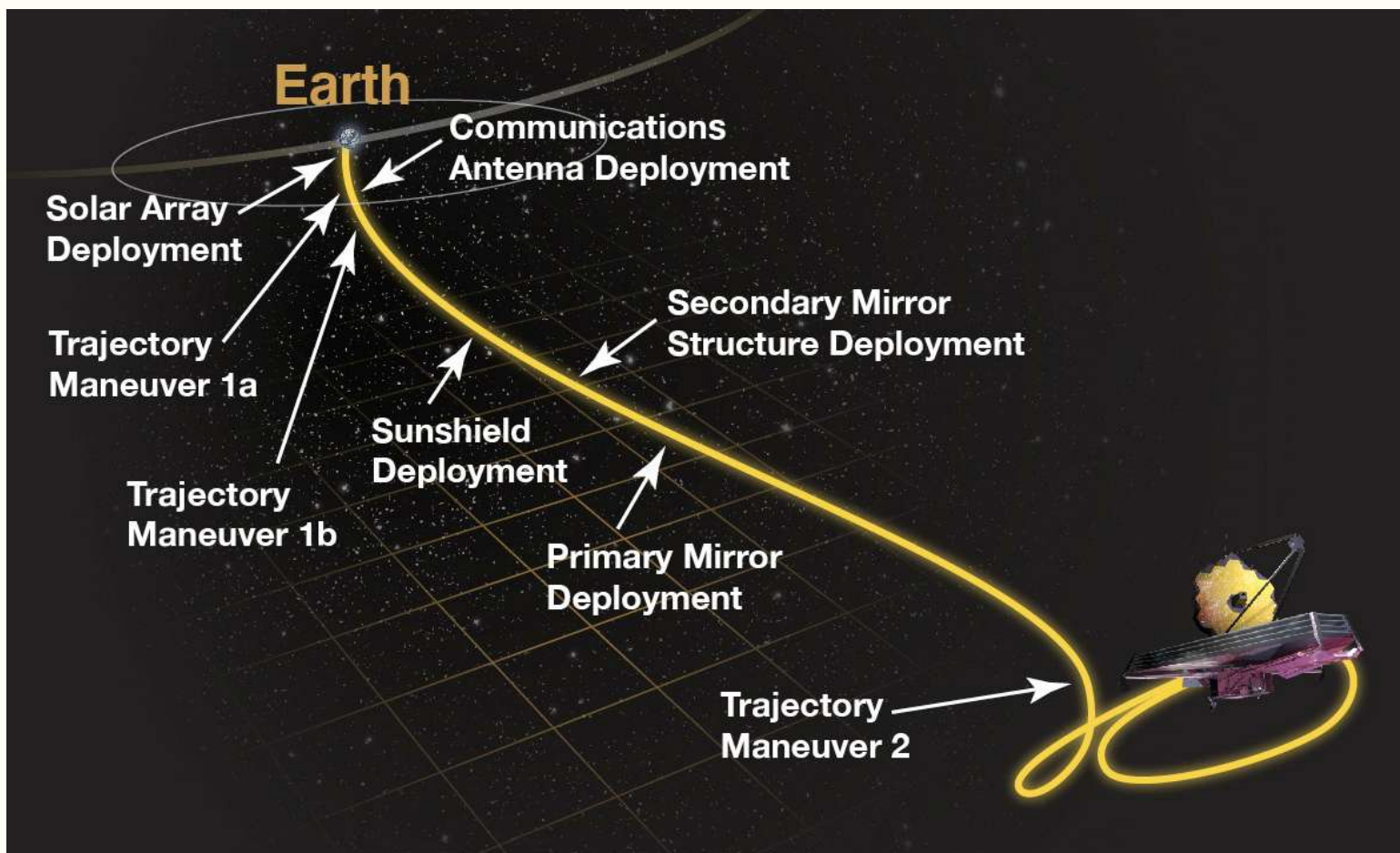
About 1 hour after liftoff, SpaceX tweeted that the 49 Starlink satellites had successfully deployed. With 31 launches in a single year in 2021, SpaceX set a new record of most launches in a year. SpaceX is expected to continue to strive to maintain its high launch rate this year.

Thursday's launch is the 35th dedicated Starlink launch since 2019, It is part of SpaceX's ongoing attempts to build and upgrade its Starlink broadband infrastructure. With this launch, the total number of Starlink satellites with flat panels has surpassed 2,000. It also supports the company's attempts to launch new satellites that have been improved over the years.



(Image Credit: Space flight now)

THE JAMES WEBB SPACE TELESCOPE IS FULLY DEPLOYED



The James Webb Space Telescope (Webb) – the world's largest and most complex science telescope – was successfully launched into space atop a European Ariane 5 rocket on December 25, 2021. The \$10 billion revolutionary space observatory – a joint effort between NASA, the European Space Agency, and the Canadian Space Agency – is designed to detect the faint infrared light from the earliest stars and galaxies formed over 13.5 billion years ago.

"It's a time machine," NASA Administrator Bill Nelson said. "It's going to take us back to the very beginnings of the universe. We are going to discover incredible things that we never imagined."

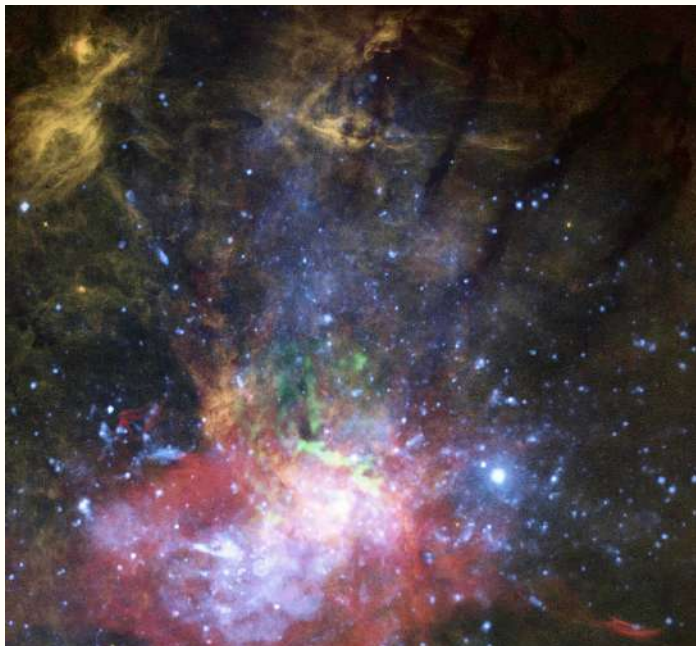
Shortly after launch, the mission control team on Earth began a series of complex maneuvers to remotely open the massive 6,161.4 kg (13,584 lb) spacecraft. On December 28, 2021, the scientists successfully opened Webb's 70-foot sun shield, which had been neatly folded inside the payload section of the launch rocket. The tennis court-sized shield consists of five layers of thin plastic sheets, each about the width of a human hair. They are coated with reflective material to protect Webb from the light and heat of the Sun, Earth, and Moon.

"Unfolding Webb's sunshield in space is an incredible milestone, crucial to the success of the mission," said Gregory L. Robinson, Webb's program director at NASA Headquarters. "Thousands of parts had to work with precision for this marvel of engineering to fully unfurl. The team has accomplished an audacious feat with the complexity of this deployment – one of the boldest undertakings yet for Webb."

The next challenge was opening Webb's primary mirror. The 21.3-foot-wide (6.5-meter) instrument comprised 18 gold-plated hexagonal segments arranged across a central post and two side wings. It had been tucked away inside the nose cone of the launch rocket. The tricky two-day process ended on January 8, 2022, after the mirror's final hexagonal piece was successfully locked into place.



"AFTER 6 MONTHS FROM LAUNCH: WEBB WILL BEGIN ITS SCIENCE MISSION AND START TO CONDUCT ROUTINE SCIENCE OPERATIONS".



The Milky Way's Supermassive Black Hole Is Leaking Gas

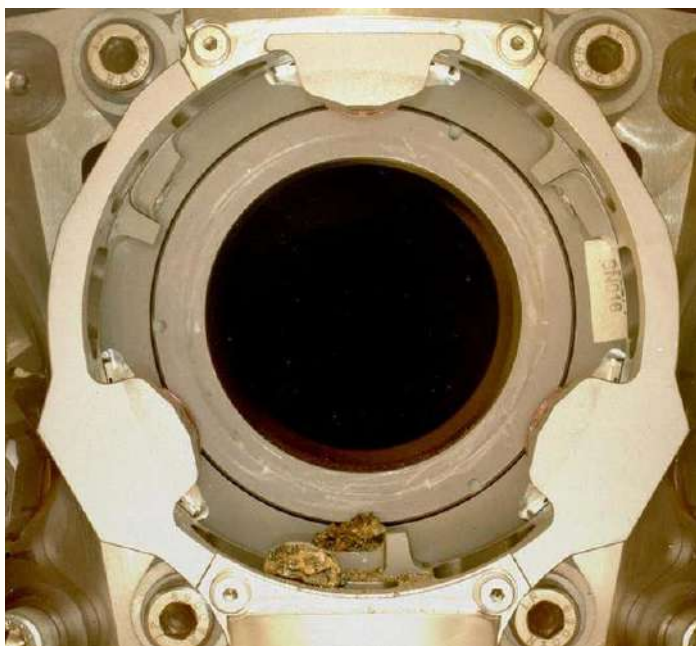
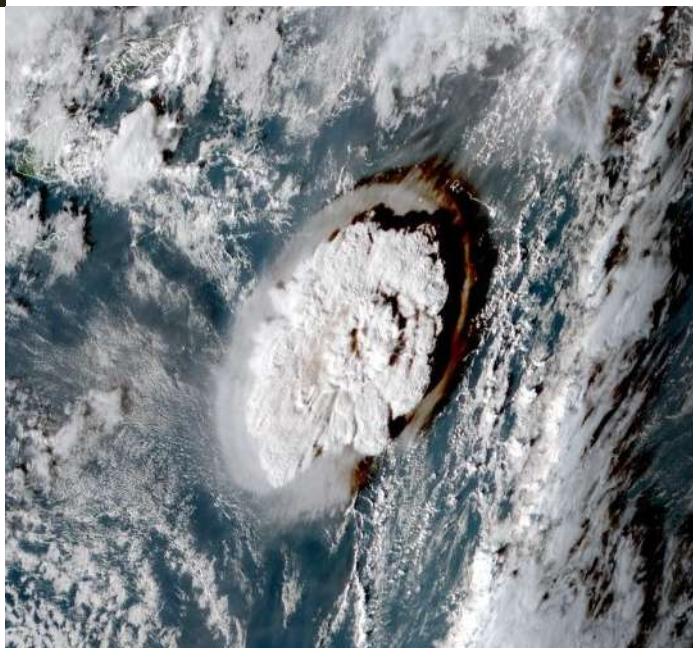
Our Milky Way's central black hole has a leak. This supermassive black hole looks like it still has the vestiges of a blowtorch-like jet dating back several thousand years. NASA's Hubble Space Telescope hasn't photographed the phantom jet but has helped find circumstantial evidence that it is still pushing feebly into a huge hydrogen cloud and then splattering, like the narrow stream from a hose aimed into a pile of sand.

This composite image is of X-rays, molecular gas, and warm ionized gas near the galactic center. The orange-colored features are of glowing hydrogen gas. One such feature, at the top tip of the jet is interpreted as a hydrogen cloud that has been hit by the outflowing jet. The jet scatters off the cloud into tendrils that flow northward. Farther down near the black hole are X-ray observations of superheated gas colored blue and molecular gas in green. These data are evidence that the black hole occasionally accretes stars or gas clouds, and ejects some of the superheated material along its spin axis. (image Credit: NASA, ESA, and Gerald Cecil)

Tonga's Incredible Underwater Volcano Eruption Seen From Space

A powerful underwater volcano eruption in Tonga on Saturday (Jan. 15) was captured as it happened in stunning images from an Earth-watching satellite, showing the sheer power for the explosive event in the South Pacific.

The volcano eruption on the island of Hunga Tonga-Hunga Ha'apai is visible as a spectacular explosion in views from the GOES West Earth-observing satellite operated by the U.S. National Oceanic and Atmospheric Administration (NOAA). A video of the eruption shows a vast plume from the volcano rising high into the atmosphere like a giant mushroom during the eruption as a shockwave extends outward from Hunga Tonga-Hunga Ha'apai, one of the 170 islands that make up the South Pacific kingdom of Tonga.



The Mars Rover Perseverance Has Pebbles Stuck In Its Drill. NASA Has A Plan To Fix It.

NASA's Perseverance team announced that the Mars rover managed to dislodge the pebbles clogging its sample cache system, a problem that has vexed the robot since last month.

The sampling caching system is arguably the most vital component of the Perseverance mission, as analyzing Martian rocks in detail will contribute to all of NASA's Mars goals: figuring out if life ever existed on the planet, understanding its ancient climate and geology, and preparing for human exploration there. The samples collected by Perseverance will be brought to Earth in the early 2030s, if all goes according to plan.

But this is Mars, so rarely does a plan not encounter a snag or two. In Perseverance's case, the most recent issue occurred when the rover was caching a sample it cored from a rock called Issole. Some rock fell out of the sample tube as it was being put into the bit carousel, a lazy-Susan-like contraption meant to store the rock samples on the rover. (The rover has 43 sample tubes aboard, seven of which have been filled so far).



NEW YEAR, NEW CHAIRMAN FOR ISRO

On January 14, 2022, Shri. S. Somanath assumed charge as Secretary, Department of Space and Chairman, Space Commission.

Shri. Somanath assumed charge after a stint of four years as the Director, Vikram Sarabhai Space Centre (VSSC), Thiruvananthapuram. He also served as the Director of Liquid Propulsion Systems Centre (LPSC), Valiamala, for two and half years.

Shri. Somanath obtained B. Tech in Mechanical Engineering from TKM College of Engineering, Kollam, and Masters in Aerospace Engineering from Indian Institute of Science, Bangalore, specializing in Structures, Dynamics, and Control with a Gold Medal. He joined VSSC in 1985 and was a team leader for the Integration of PSLV during the early phases.

Shri. Somanath is an expert in the area of system engineering of Launch vehicles. His contributions in PSLV and GSLV MkIII were in their overall architecture, propulsion stages design, structural and structural dynamics designs, separation systems, vehicle integration, and integration procedures development.

He is the recipient of the 'Space Gold Medal' from the Astronautical Society of India. He received the 'Merit Award' and 'Performance Excellence award' from ISRO and a 'Team excellence award' for GSLV Mk-III development. He is a Fellow of the Indian National Academy of Engineering (INAE), a Fellow of the Aeronautical Society of India (AeSI), Astronautical Society of India (ASI), and a Corresponding Member of the International Academy of Astronautics (IAA). He is in the bureau of the International Astronautical Federation (IAF) and a recipient of the National Aeronautics Prize from the Aeronautical Society of India (ASI).

He has published papers in journals & seminars in structural dynamics and control, dynamic analysis of separation mechanisms, vibration & acoustic testing, launch vehicle design, and launch services management.



(Image Credit: insights)

The race for space exploration is heating up with major powers focussing on having a base on the Moon, to help operate beyond the International Space Station (ISS). As the US is realigning its strategy to return humanity to the Moon, China is not far behind. On 16th January, its scientists have created an "artificial moon" on Earth to test technology and equipment in low gravity. Located in the eastern Jiangsu province, the facility is expected to provide vital research for China's lunar missions. It is likely to be launched soon, though no date has been finalised.

CHINA BUILDS 'ARTIFICIAL MOON'

Moon has a gravitational pull that is one-sixth of the Earth. However, developing that environment here, despite Earth's higher pull, is significant and could boost lunar exploration multi-fold. American space agency NASA currently trains its astronauts in managing themselves in microgravity in parabolic flights.

The Chinese facility is said to replicate low-gravity environments for a very long duration. This would make Chinese astronauts less dependent on parabolic flights to train themselves or low gravity environments to test new rovers and technologies. "While low gravity can be achieved in an aircraft or a drop tower, it is momentary," lead scientist Li Ruilin, from the China University of Mining and Technology, told the South China Morning Post. Li said the simulator they are building can provide low gravity for "as long as you want."

The simulator will be filled with rocks and dust to create an environment similar to the lunar surface. There's one problem with the Chinese "moon": its size. The simulator is about two feet in diameter, so there's not much room for a manoeuvre. This facility can only be used to test equipment and not for astronaut training.



The BrahMos (designated PJ-10) is a medium-range ramjet supersonic cruise missile that can be launched from submarine, ships, aircraft or land. It is the world's fastest anti-ship cruise missile currently in operation.

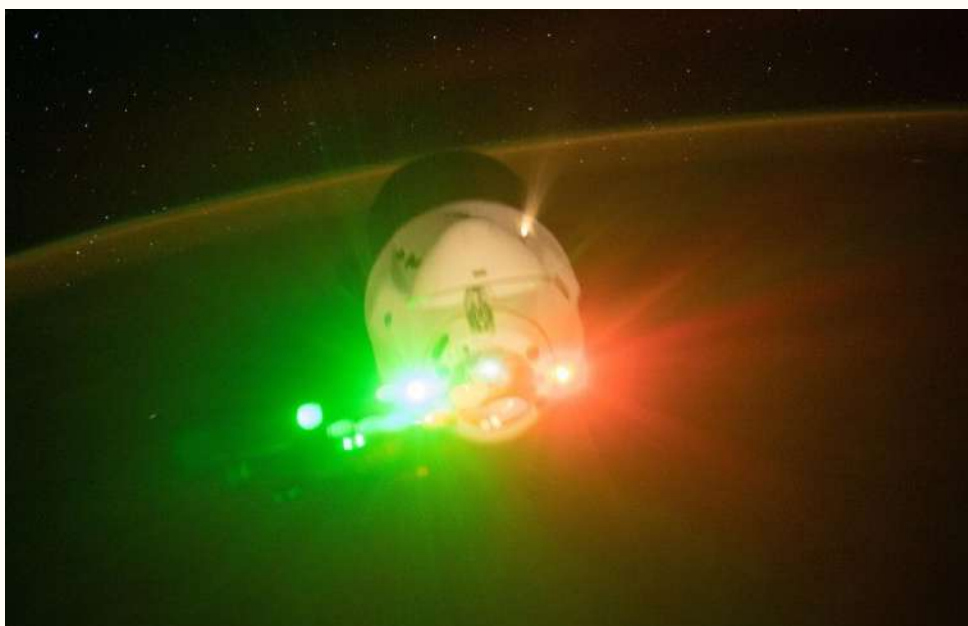
The indigenously built missile is fitted with stealth technology and a guidance system with advanced embedded software which provides the missiles with special features as it sustains supersonic speed all through the flight.

"BrahMos is a joint India-Russia venture, between the DRDO and Russia's NPO Mashinostroyeniya, which, together, formed the Brahmos Aerospace. The missile derives its name from two rivers: the Brahmaputra in India and the Moskva of Russia".

**ON 20TH JAN, INDIA SUCCESSFULLY TESTFIRES NEW
VERSION OF THE BRAHMOS SUPERSONIC CRUISE
MISSILE.**

SPACEX DRAGON RETURNED TO EARTH FROM ISS

On 24th January, The SpaceX Cargo Dragon resupply ship ended its mission today returning to Earth over 4,900 pounds of science experiments and station hardware for analysis and inspection. Dragon had undocked from the station on Sunday at 10:40 a.m. EST.



Dragon fired its braking engines Monday afternoon dropping the cargo craft out of orbit and back into Earth's atmosphere. The U.S. spacecraft parachuted to a splashdown off the coast Florida at 4:05 p.m. EST.

Meanwhile, space science continued on the orbital lab as the crew explored a wide variety of microgravity phenomena today. A pair of botany studies kept NASA Flight Engineers Raja Chari and Kayla Barron busy with the duo investigating how to grow crops in space and how microgravity affects cotton genetics. ESA (European Space Agency) astronaut Matthias Maurer installed hardware for the Fluidics experiment to study how to optimize fuel systems for spacecraft.

Maintenance is always ongoing aboard the station ensuring the crew stays healthy and lab systems operate successfully. NASA Flight Engineer Mark Vande Hei started the day tearing down and stowing unused life support gear then photographed payload racks to document their current configurations. NASA Flight Engineer Thomas Marshburn worked throughout the day on U.S. spacesuit batteries and chargers.

Cosmonauts Anton Shkaplerov and Pyotr Dubrov spent the day conducting their complement of science and maintenance in the orbiting lab's Russian segment. Shkaplerov used a myograph to measure his muscle strength in microgravity before routing air ducts inside the ISS Progress 79 cargo craft. Dubrov had some minor post-spacewalk cleanup work to do prior to swapping fuel bottles inside the Combustion Integrated Rack.

North Korean missile test captures photos of Earth from space



North Korea has released photographs which it said were taken from its most powerful missile launch in five years.

The unusual pictures taken from space show parts of the Korean peninsula and surrounding areas.

Pyongyang confirmed on Monday it had tested a Hwasong-12 intermediate range ballistic missile (IRBM).

At its full power it can travel thousands of miles, putting areas like US territory Guam within striking distance.

The latest test has raised alarm again among the international community.

Pyongyang has conducted a record number of seven missile launches in the past month alone - an intense flurry of activity that has been strongly condemned by the US, South Korea, Japan, and other nations.

ANTARCTICA - THE METEORITE TREASURE HUNT



(Image Credit: BELARE 2019-2020 meteorite recovery expedition)

Hundreds of thousands of meteorites remain on or just beneath the subzero surface, offering scientists a tantalizing glimpse into the beginnings of our solar system. A half-century of retrieval operations have turned up some spectacular finds, including fragments from the moon and Mars.

Yet, Antarctic meteorite expeditions are more or less potluck: many missions return, after much cost and no little danger, empty-handed.

"Currently, it's all trial-and-error," said Steven Goderis, a geochemist at Brussels' Vrije University. "Visit an ice field during a reconnaissance mission and see what you get, often based on chance and past experience."

Now, a Belgian-Dutch team of scientists says it has created the first "treasure map" showing where meteorites may be found, using machine learning to better the odds of researchers retrieving the space rocks, according to a study published Wednesday in the journal *Science Advances*.

Around 45,000 meteorites have been collected from Antarctica, nearly two-thirds of all meteorites found so far on Earth.

"There are probably fewer meteorites falling per acre of land in Antarctica than in other parts of the world," said Ralph Harvey, principal investigator at the National Science Foundation's Antarctic Search for Meteorites program and a professor at Case Western Reserve University.

Zekollari and his team used data from previous expeditions, as well as satellite imagery, to identify four key conditions that could predict the presence of meteorites in a given area. They then fed these observations into an algorithm to create their map.

"We had the continentwide data and we knew places where they already found meteorites that we could use to train the algorithm," said Veronica Tollenaar, a doctoral fellow at the Université Libre de Bruxelles in Brussels.

"But if you want to find things that fell from the sky, lay out a big white sheet. And Antarctica is a 5,000-kilometer-wide sheet."

The meteorites are not dispersed equally. On landing, they embed themselves in the ice sheet.

Over time, they move as the ice moves, pushed toward the ocean and thrust upward to the surface into what are called blue ice areas.

He said local conditions such as temperature, wind velocity and topography can make meteorite hunting a game of chance.

"We'll go to an ice sheet where we think conditions are great, and we'll search an area the size of a tennis court and find 100 specimens on it," Harvey, who has taken part in 24 Antarctic missions, said. "Then we'll search an area the size of Delaware and we'll find nothing."

"But we also needed data from places where they did not find meteorites. This was kind of challenging because there is very little data on unsuccessful missions."

These "unsuccessful" missions were left unlabeled, leaving the algorithm to infer based on an interplay of temperature, ice velocity, slope and radar data, whether or not an area was likely to contain meteorites.

Testing the machine's accuracy using independent expedition data, the team found it was correct more than 80 percent of the time. All told, it estimates that there are 300,000 to 900,000 pieces of space rock still undiscovered across Antarctica.

"That's a big contrast to meteorites found in North Africa, because the finder owns them and it is very hard to use them for research," said Tollenaar, lead author of the study published in *Science Advances*.

"There is monetary value in these things, and that is hampering science a lot. It's very beautiful to own a meteorite but if you can learn from it, I would say that's even more beautiful."

The team stresses its map does not guarantee all future expeditions will find meteorites.

"The disclaimer is this is just based on modeling," Zekollari said.

"But we hope it can make some missions more successful."

However, the task of getting to some of the remotest and most inhospitable regions on the planet remains.

"Logistically, it's super difficult," Tollenaar said. "Dangerous, even. There are lots of areas where people have never been. It's exploring our own planet while finding other planets."



(Image Credit: NBCNews.com)

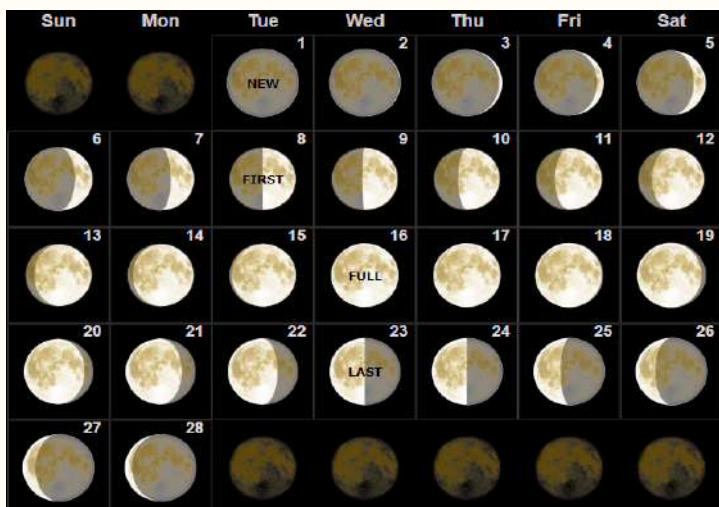
WHAT'S UP IN THE SKY - FEB 2022

LUNAR CALENDAR

IMPORTANCE OF MOON PHASES FOR STARGAZERS

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

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



PLANETS VISIBILITY

Mercury

Dim morning object, not well placed. Best seen just before mid-month.



Venus

Bright morning planet, rising over two hours before sunrise.



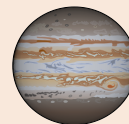
Mars

Brightening morning object, near Venus towards the end of February.



Jupiter

Bright evening planet, rapidly lost to the twilight during the month.



Saturn

Lines up with the Sun in the sky on a Feb and is unlikely to be seen this month.



Uranus

Magnitude +5.8 Uranus loses altitude during February but remains a viable target.



Neptune

The evening twilight catches up Neptune so it will be lost from the view.



BRIGHT DEEP SKY OBJECTS



The Pleiades, also known as The Seven Sisters, Messier 45, and other names by different cultures, is an asterism and an open star cluster containing middle-aged, hot B-type stars in the north-west of the constellation Taurus. At a distance of about 444 light years, it is among the nearest star clusters to Earth.

The Beehive Cluster, is an open cluster in the constellation Cancer. One of the nearest open clusters to Earth, it contains a larger population of stars than other nearby bright open clusters.



The Orion Nebula is a diffuse nebula situated in the Milky Way, being south of Orion's Belt in the constellation of Orion. It is one of the brightest nebulae and is visible to the naked eye in the night sky. It is 1,344 ± 20 light-years away and is the closest region of massive star formation to Earth.

ROCKET LAUNCHES IN FEB 2022

SOYUZ WILL LAUNCH ONEWEB'S SATELLITE INTERNET CONSTELLATION



(Image credit: Space.com & OneWeb)

10-FEB

The OneWeb satellite constellation is a planned initial 648-satellite constellation which is in the process of being completed in 2022, with a goal to provide global satellite Internet broadband services to people everywhere, started in 2021. An Ariespace Soyuz rocket will launch a set of satellites into orbit for OneWeb's satellite internet constellation. The mission, called OneWeb 13, will lift off from French Guiana.

About Soyuz:

The medium-lift Soyuz entered service from Europe's Spaceport in French Guiana during 2011, bringing the industry's longest-operating launcher to the world's most modern launch base. Soyuz is a four-stage launcher, designed to extremely high reliability levels for its use in manned missions. Vehicles flown from the Spaceport are evolved versions that include an updated digital flight control system, an increased-performance third stage and the larger Soyuz ST payload fairing. The startup of Ariespace's Soyuz missions from French Guiana opened a new chapter in the history of this robust vehicle, which introduced the space age with the launch of Sputnik – the world's first satellite – in 1957. Since then, Soyuz has been in continuous production, demonstrating its unmatched reliability with more than 1,900 manned and unmanned missions performed to date.





SPACEX TO LAUNCH TOP- SECRET US SPY SATELLITE

On Feb 02, the first launch of the year from Vandenberg Space Force Base in California, set for Wednesday afternoon, will send a payload into orbit for the U.S. government's spy satellite agency aboard a SpaceX Falcon 9 rocket.

The mission will deploy a payload for the National Reconnaissance Office into orbit after liftoff from Vandenberg at 3:18 p.m. EST.

The Falcon 9's reusable first stage booster, flying for the first time, will return to Vandenberg for landing about eight minutes after launch. Loud double sonic booms will be heard in the Vandenberg area as the rocket descends toward Landing Zone 4 for its vertical touchdown.

"Upon re-entry of the vehicle, spectators and local residents from Santa Barbara, Ventura and San Luis Obispo counties can anticipate hearing multiple sonic booms as the vehicle breaks the sound barrier," the Space Force's Space Launch Delta 30 at Vandenberg said in a press release.

It will mark the fourth landing of a Falcon rocket booster at Vandenberg. SpaceX plans to refurbish the booster for another flight later this year for the NRO, an agency spokesperson told Spaceflight Now.

The launch from Vandenberg, located on the Pacific coastline between Los Angeles and San Francisco, comes amid a busy stretch of missions on SpaceX's schedule.

Two Falcon 9 rockets are awaiting takeoff from Florida's Space Coast with an Italian radar remote sensing spacecraft and the next batch of SpaceX's Starlink internet satellites.

SpaceX is set to make its fifth try to launch Italy's COSMO-SkyMed Second Generation radar satellite at 6:11 p.m. EST (2311 GMT) Monday from pad 40 at Cape Canaveral Space Force Station. Bad weather kept the Falcon 9 rocket on the ground at pad 40 on Thursday, Friday, and Saturday, then a cruise ship ventured into the offshore hazard area under the rocket's flight path Sunday.

SpaceX Falcon 9 rocket to launch spy satellites for US NRO

Another Falcon 9 rocket is standing vertical a few miles to the north on pad 39A at NASA's Kennedy Space Center, awaiting liftoff with another batch of Starlink internet satellites. SpaceX has pushed back that launch in a ripple effect from the COSMO-SkyMed launch delays.

The Starlink mission, SpaceX's 36th flight dedicated to launching satellites for the internet network, is now slated to blast off no earlier than 1:56 p.m. EST Tuesday.

That will be followed by the launch for the National Reconnaissance Office Wednesday across the country at Vandenberg Space Force Base.

The payload for the NRO mission, officially designated NROL-87, will ride SpaceX's Falcon 9 rocket into a polar orbit, heading south from Vandenberg over the Pacific Ocean. The NRO hasn't disclosed any details about the payload on the NROL-87 mission.

The rocket will "carry a national security payload designed, built, and operated by the agency," the NRO said in a press kit for the mission.

The spy satellite agency manages a fleet of intelligence-gathering satellites with super-high resolution imaging capabilities. The NRO's fleet includes optical and radar observing satellites to keep close eyes on foreign military movements from space.

The NRO also has satellites that track worldwide naval forces, and eavesdrop on foreign communications.

While the exact purpose of the payload on the NROL-87 mission remains secret, procurement documents released before SpaceX's selection as the launch provider indicated the mission would deploy its cargo into an orbit about 318 miles (512 kilometers) above Earth, with an inclination of 97.4 degrees to the equator.

ROCKET LAB READIES ELECTRON FOR LIFT-OFF



(Image credit: Rocket Lab)

Rocket Lab USA, Inc (Nasdaq: RKLB), a leading launch and space systems company, has today announced the launch window for its first Electron mission in 2022, a dedicated mission for BlackSky (NYSE: BKSJ) through global launch services provider Spaceflight Inc.

Electron is scheduled to launch the "Without Mission A Beat" mission from Rocket Lab Launch Complex 1 in New Zealand during a launch window that opens February 4, 2022 UTC. The "Without Mission A Beat" launch will be the fifth and sixth satellites delivered to space for BlackSky by Rocket Lab in the past three months. This dedicated mission will be Rocket Lab's 24th Electron launch and first mission of 2022. Rocket Lab will not be attempting to recover Electron for this mission.

While this next mission was due to be the final launch in a series of back-to-back missions for the company as part of a multi-launch deal actioned last year, Spaceflight has since commissioned an additional sixth launch for BlackSky on Electron to take place in 2022. That dedicated mission will continue BlackSky's rapid business expansion by deploying another pair of Gen-2 Earth-imaging satellites to a precise location in low Earth orbit for its growing satellite constellation.

Rocket Lab CEO Peter Beck says: "This next mission is part of the largest number of satellites BlackSky have committed in a single deal to a launch provider, and we're proud to be their trusted partner to help grow their constellation. BlackSky adding another mission to the Rocket Lab manifest is further confirmation of Electron's status as the dedicated small launch champion, and we're ready and eager to deliver these missions for BlackSky in the weeks to come."

These upcoming BlackSky missions begin a busy year of Electron launches for Rocket Lab, including more bulk dedicated launches for government and commercial satellite operators,

other singular dedicated and rideshare missions, and Rocket Lab's mission to the Moon for NASA on the upcoming CAPSTONE mission scheduled to launch from New Zealand in the first half of the year.



(Image credit: Rocket Lab)

RESUPPLY MISSIONS TO THE INTERNATIONAL SPACE STATION

Antares rocket will launch the Cygnus NG-17 cargo resupply mission to the ISS

Cygnus NG-17, previously known as Cygnus OA-17, is the seventeenth planned flight of the Northrop Grumman robotic resupply spacecraft Cygnus and its sixteenth flight to the International Space Station (ISS) under the Commercial Resupply Services (CRS-2) contract with NASA. The mission is scheduled to launch on 19 February 2022. It is the sixth launch of Cygnus under the CRS-2 contract.

Orbital ATK (now Northrop Grumman Innovation Systems) and NASA jointly developed a new space transportation system to provide commercial cargo resupply services to the International Space Station (ISS). Under the Commercial Orbital Transportation Services (COTS) program, Orbital ATK designed, acquired, built, and assembled these components: Antares, a medium-class launch vehicle; Cygnus, an advanced spacecraft using a Pressurized Cargo Module (PCM) provided by industrial partner Thales Alenia Space and a Service Module based on the Orbital GEOStar satellite bus.



Cygnus NG-17 mission patch



(Image credit: Nasa space flight.com)

Roscosmos To Resupply The International Space Station

A Soyuz-2.1 will launch Progress MS-19 to the International Space Station from Baikonur Site 31 on 16 February 2022 on a fast-track trajectory. Around 3 hours 20 minutes after the launch, Progress MS-19 will automatically dock to the zenith (space-facing) port of the MIM2 Poisk module and continue its mission for 196 days, supporting Expedition 66 and Expedition 67 missions aboard the ISS.

****Note: Launch dates of missions are scheduled to be launched in Feb 2022 but may subject to change.**

ASTRONOMICAL EVENTS - FEB 2022

METEOR SHOWER FOR THE MONTH



The α -Centaurid meteor shower will be active from 28 January to 21 February, producing its peak rate of meteors around 9 February.

Over this period, there will be a chance of seeing α -Centaurid meteors whenever the shower's radiant point – in the constellation Centaurus – is above the horizon, with the number of visible meteors increasing the higher the radiant point is in the sky.

The Alpha Centaurids are a meteor shower in the constellation Centaurus, peaking in early February each year. The average magnitude is around 2.5, with a peak of about three meteors an hour.

Conjunction - Occasionally two or more objects meet up with each other in our sky. Astronomers use the word conjunction to describe these meetings. Technically speaking, objects are said to be in conjunction in that instant when they have the same right ascension on our sky's dome. Practically speaking, objects in conjunction will likely be visible near each other for some days.

The word conjunction comes from Latin, meaning to join together. Maybe you remember the old Conjunction Junction cartoons from the 1970s. In language, conjunctions relate to clauses brought together in sentences with words like and. In astronomy, conjunctions relate to two or more objects brought together in the sky.

An astronomical conjunction describes a few different types of meetings. The first two types we're describing here – inferior and superior conjunctions – involve the sun and thus can't be seen.

Conjunction of Moon and Jupiter

Date: 3rd Feb, close appearance of Moon and Jupiter for the month. You can find them in west direction (Evening).



Conjunction of Venus and Mars

Date: 13th Feb, close appearance of Venus and Mars for the month. You can find them in east direction (Morning).



(Image credit: Stellarium)

MERCURY AT GREATEST WESTERN ELONGATION

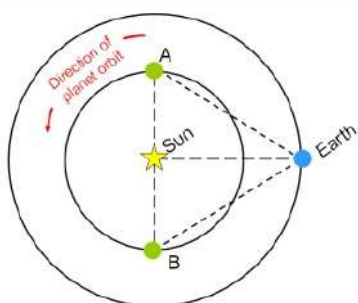
Best day to observe mercury



(Image credit: Starwalk)

What's Elongation

Astronomers use the word elongation to describe the angular distance – the distance on the sky's dome – between the sun and one of the inner planets in our solar system, Mercury or Venus. Elongations are measured in degrees eastward or westward of the sun. Greatest elongations signal the best time to observe one of the inner planets. At greatest elongation, Venus or Mercury is typically farthest from the sun's glare.



The position of an inferior planet at greatest western elongation (position A) and greatest eastern elongation (position B). In both cases, the elongation measured is less than 90degree.

(Image credit: astronomy.swin.edu.au/cosmos/e/elongation)

Greatest Western Elongation

On February 2022 elongation of Mercury, the planet shines at magnitude around 0.1. Mercury will get a little bit brighter later in the month as it drops closer to the sun. But, of course, when it's closer to the sun it will be harder to see as sunrise approaches. Mercury's greatest western elongation is on February 16. But the dates before and after this are all nominal times to spot Mercury. In fact, Mercury's highest altitude in the morning sky is on February 9.

"Maximum & Minimum Angular distance of Mercury from the sun (seen from the Earth)at greatest elongation are 28 & 18degrees respectively."

Conjunction of Moon, Mars and Venus

Date: 27th Feb, the Moon, Mars and Venus will align in the early morning sky. Look for the trio in the constellation Sagittarius before sunrise.



(Image credit: Stellarium)

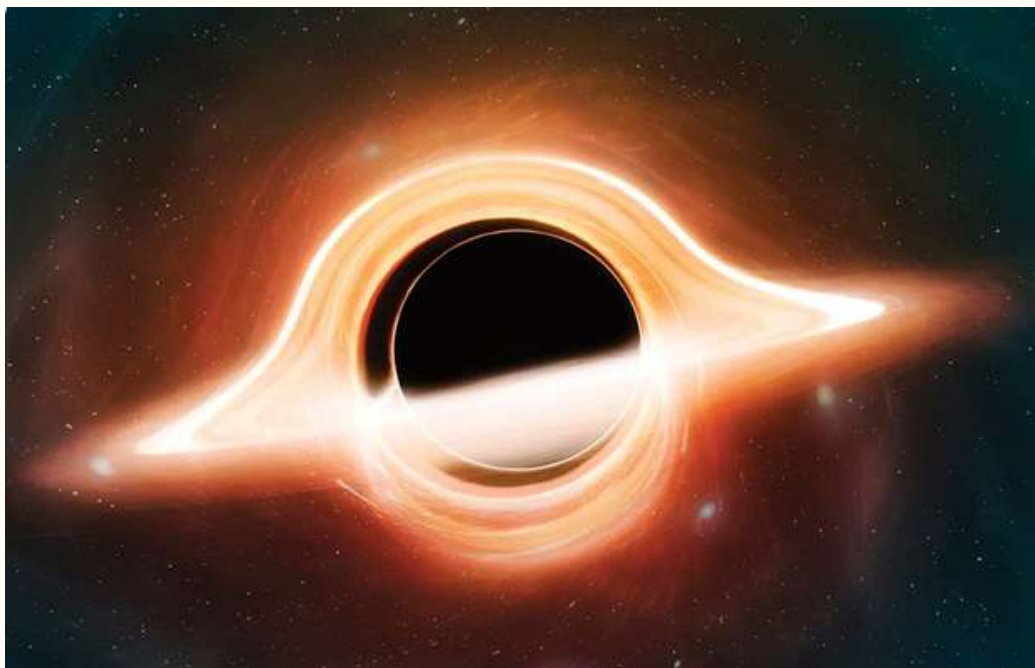
Planetary Parade with Moon

Date: 28th Feb, the Moon, Saturn, Mercury, Mars & Venus will align in the early morning sky. Look towards east before sunrise.



(Image credit: Stellarium)

STUDENT'S CORNER



The Mystery King: Blackhole

An Article by Daksh Rathi
iAstronomer member, Space India.

Introduction

A black hole is a region of space that has so much density, and such a great gravitational pull that no nearby objects can escape. Black holes also have a horizon, if you stay outside the horizon you will be safe and the black hole cannot suck you in. The line of singularity is an important part of black holes it is a region in black hole where matter is crushed into infinite density.

The pull of gravity is very strong, making the black holes mass become compressed into a space with zero volume. Some people worry about the sun becoming a black hole, but there's no way that could happen because only stars that weigh considerably more than sun can become black holes.

To find a black hole scientist's measure how much mass is there in that area. It is likely that there is a black hole if there is a large mass concentrated in a small volume and the mass is dark. In addition, if the object's mass is more than 3 times the sun's mass it is labeled as a black hole.

Scientists have discovered black objects with mass more than 10 million times that of the sun. Nobody knows for sure what these are, but scientists are beginning to wonder if these black objects are at the center of every universe.

Theories

There are many theories regarding black holes. The two of them are "the Stephen Hawking theory of black holes" and "the 2012 black hole theory". The Stephen Hawking theory of black hole states that black hole transforms what goes into them, but after the black hole disappears, the transformed objects are sent into space.

The 2012 black hole theory said that a black hole would swallow up the earth in 2012. There are two endings in this theory one is that the earth would be thrown out of its orbit and we would burn up or freeze to death after a span of two weeks to 2 months the other ending shows our deaths coming quicker.

As the black hole neared earth, the weather would become unpredictable. The atmosphere would disappear and everything would turn into little pieces. These pieces would keep getting torn apart until nothing was left. With either ending to this theory we would all end up dead.

Conclusion

I think the Stephen Hawking theory makes sense because the world did not end in 2012. This theory also makes sense because it states that a black hole transforms things that it sucks up and then spits them out when it evaporates this is what I imagine a black hole doing so this theory makes sense to me. However, scientists will continue to investigate and find more information on our universe and all the mysteries in it.



Spaghettification

Blog by Samyak Darshan S Jain
iAstronomer member.

We all might have heard about pasta named spaghetti. It is a long, thin, solid, cylindrical pasta and a staple food in Italian cuisine. But in astrophysics, Spaghettification is the vertical stretching and horizontal compression of objects into long thin shapes, like spaghetti in a very strong non-homogeneous gravitational field, caused by extreme tidal forces. It is sometimes referred to as the noodle effect. This effect mostly takes place near a black hole, where the stretching is so powerful that no object can withstand it.

When an object falls inside a black hole, it gets spaghettified or stretched near the event horizon. It gets stretched by the gravity force exerted by the singularity. Stephen Hawking described a fictional astronomer falling in a black hole, and gets stretched in the event horizon. If the astronaut falls by his feet first, he would feel the gravitational force more at his feet more than at his head. And also, the right side of the body will be pulled to the left and left side of the body to the right, this means that the body is being compressed. Within a small region the horizontal compression balances the vertical stretching so that small objects being spaghettified experience no net change in volume.

The thing is would we get killed when we fall into a black hole?! Well, you don't need an expert to tell, that a person compressed like spaghetti will be as good as dead or into pieces. These happen due to the tidal forces at the surface and centre of the object. The force of these objects are calculated by the tensile force at the centre and for non uniform objects the tensile force is smaller and it is larger at the surfaces of the object. This happens due to the inverse square law, where a physical quantity is inversely proportional to the square of the distance. And in this case the force is inversely proportional to cube of the distance.

The tidal force near the surface of a white dwarf is much stronger, causing a maximum tensile force of up to 0.24 N. Near a neutron star, the tidal forces are again much stronger: if a rod falls vertically to a neutron star of 2.1 solar masses, let alone melting, it would break at a distance of 190 km from the center, well above the surface of the star.

In the previous case objects would actually be destroyed and people killed by the heat, not the tidal forces - but near a black hole, objects would actually be destroyed and people killed by the tidal forces, because there is no radiation near a black hole. Moreover, a black hole has no surface to stop a fall. Thus, the in falling object is stretched into a thin strip of matter.

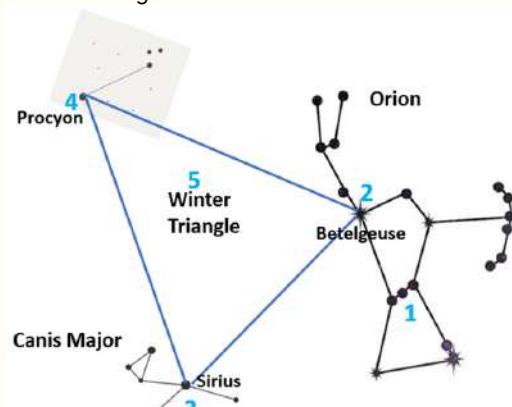
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The point at which tidal forces destroy an object or kill a person will depend on the black hole's size. For a super massive black hole, such as those found at a galaxy's center, this point lies within the event horizon, so an astronaut may cross the event horizon without noticing any squashing and pulling, although it remains only a matter of time, as once inside an event horizon, falling towards the center is inevitable.

Adventure from Orion

By Sajan Saravanan,
iAstronomer member.

Orion represents a mythical hunter holding a club of bronze in one hand and head of lion in another. The stars of Orion can be joined to form the shape of hunter. A line of three stars at the center makes up Orion's belt. Canis Minor and Canis Major are Orion's hunting dogs. The three stars from these three constellations forms a winter triangle.



Steps to find winter triangle

- 1) The simple way to find Orion is by looking for Orion's belt. It is made up of three stars that form an almost straight line in the sky.
- 2) If you look above the star at the left of Orion's belt, you reach a star called Betelgeuse.
- 3) To find Canis major, draw a straight line from Betelgeuse to the brightest star called Sirius.
- 4) To find Canis minor, trace a straight line eastward from the base of Orion's club until you reach two bright stars. The bright one is called Procyon.
- 5) Form a triangle, by connecting Betelgeuse (from Orion), Sirius (from Canis major) and Procyon (from Canis minor) you can see winter triangle.

BEING A STAR!!!

I live high in the sky,
 I am very bright,
 I form from dust and gas,
 Guess who am I?
 Oh, yes! I am a star,
 Shinning like a diamond, in the night sky.
 I am blue when I am young,
 I am white when I am an adult,
 I am red when I am old and dead.
 I am rich in hydrogen and helium
 I love to be a star in every stage of me.

Poem by Gianna Rachel. A,
 iAstronomer member.



Captured by Abdul Rehman
 iAstronomer member.



Captured by Daksh Rathi
 iAstronomer member.

ASTROPHOTOGRAPHS BY SPACE TEAM



Large Magellanic Cloud



Winter Milkywayarm with Andromeda
 galaxy and pleiades cluster

These amazing astrophotographs are captured by an astronomy educator Ranjith Kumar from space team. He went to Munnar, Kerala district to observe the night sky since, the light pollution is less there. He further added that this will be his first shot of large magellanic cloud - the nearest galaxy from our milkyway galaxy. He also captured winter milkyway arm with andromeda galaxy and pleiades cluster.



January Full Moon trail



Winter Milkywayarm

ANNOUNCEMENT BY SPACE

WORLD SPACE WEEK 2021 - RESULT ANNOUNCEMENT

World Space Week is an international celebration of science and technology, and their contribution to the betterment of the human condition. The United Nations General Assembly declared in 1999 that World Space Week will be held each year from October 4-10. These dates commemorate two events:

October 4, 1957: Launch of the first human-made Earth satellite, Sputnik 1, thus opening the way for space exploration

October 10, 1967: The signing of the Treaty on Principles Governing the Activities of States in the Exploration and Peaceful Uses of Outer Space, including the Moon and Other Celestial Bodies.

Where and how is World Space Week celebrated?

World Space Week consists of space education and outreach events held by space agencies, aerospace companies, schools, planetaria, museums, and astronomy clubs around the world in a common timeframe. These synchronized space events attract greater public and media attention.

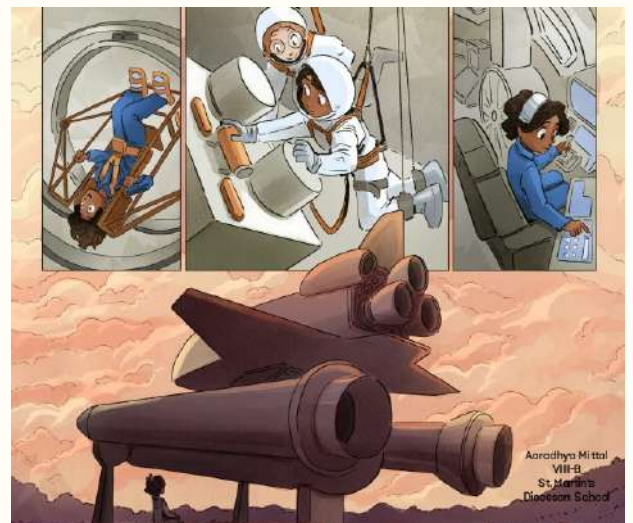
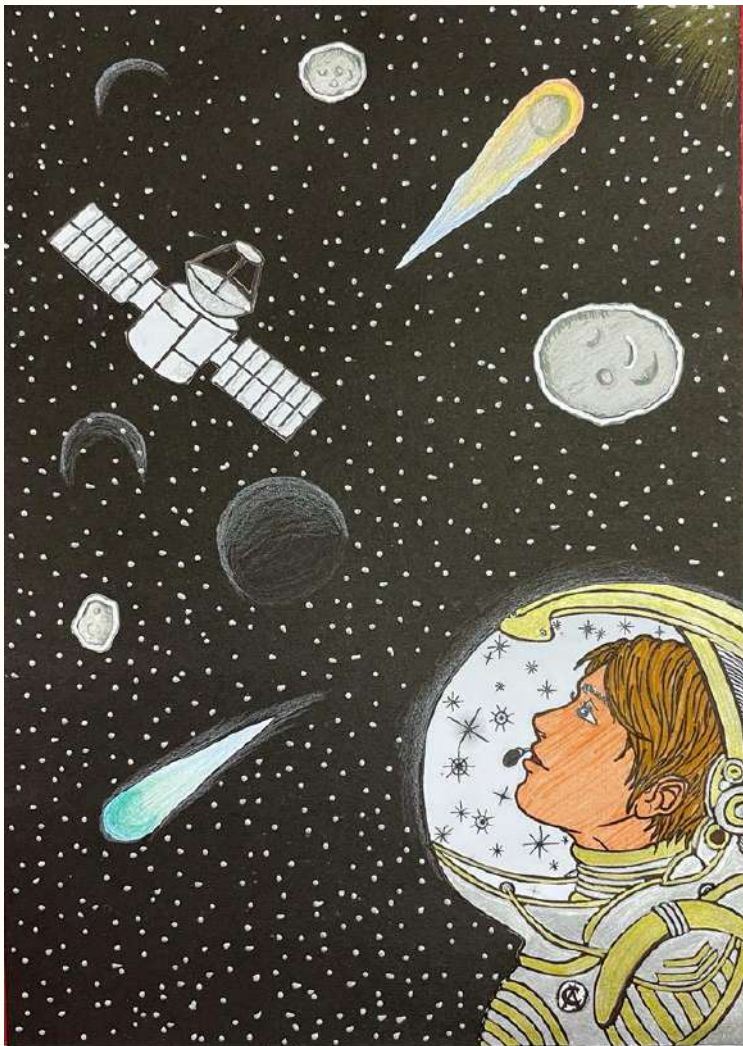
SPACE India conducted various events in order to celebrate the world space week (Oct 4-10). We announced the results for the events and we are extremely happy to share the winners list and some of the best works from various events.



Rank	Participant Name	Name of Institution
National Astrotoon Competition		
Category 1: Class 1st to 2nd		
First	Vedika Keswani	Bal Bharati Public School GRH Marg Delhi
Second	Saatvik talwar	Bal Bharati Public School GRH Marg Delhi
Third	Shiv	St.Martin's School, Delhi cantt. Church Road
Category 2: Class 3rd to 5th		
First	Yug Bansal	Amity International School ,Sector 43 Gurugram
Second	Ayush kandar	Bal Bharati Public School GRH Marg Delhi
Third	Divyansh Sain	St.Martin's School, Delhi cantt. Church Road
Category 3: Class 6th to 8th		
First	Aavya Mittal	St.Martin's School, Delhi cantt. Church Road
Second	Aaradhya Mittal	St.Martin's School, Delhi cantt. Church Road
Third	Avni Jain	Bal Bharati Public School GRH Marg Delhi
Category 4: Class 9th to 12th		
First	Vaani Gupta	Bal Bharati Public School, Sector -21, Noida
Second	Aryanshika Chugh	The Mann School, Holambi New Delhi
National Infographic competition		
Category 1: 6th-8th		
First	Dhairya Chawla	Bal Bharati Public School GRH Marg Delhi.
Second	Shriya Pasricha	Amity International School, Sec-43, Gurugaon.
Third	Jhanvi Singh	Seth Anandram Jaipuria School
Category 2: 9th-12th		
First	Pratik Ravindra Deshmukh	Vidyalley International School, Pune.
Second	Aryanshika Chugh	The Mann School, Holambi Khurd, New Delhi.
Third	BHAVIKA	Bal Bharati school ganga ram campus, New Delhi.
Category 3: Adults		
First	Nidhi Khanijo	Apeejay school panchsheel park, New Delhi.
Second	Vaishnavi Vijay Chavan	NA
SAT From TRASH Competition		
Category 1: 3rd-5th		
First	Divya Pahujaani	Sadhu Vaswani International School for Girls, New Delhi -21
Second	Datwik Tripathi	Brain International School, H block, Vikaspuri
Third	Sajan Saravanan	Trileaves global school
Category 2: 6th-8th		
First	Chaitanya Gupta	Apeejay School Panchsheel Park
Second	Hridhan Dawar	Bal Bharati Public School, Ganga Ram Hospital Marg
Third	Vaishnavi	st.martin diocesan school
Category 3: 9th-12th		
First	Humaam Asim	The Shri Ram school Aravali, Gurgaon
Second	Sanyam jain	Amity International School Mayur Vihar Delhi

Some of the best works from various events,

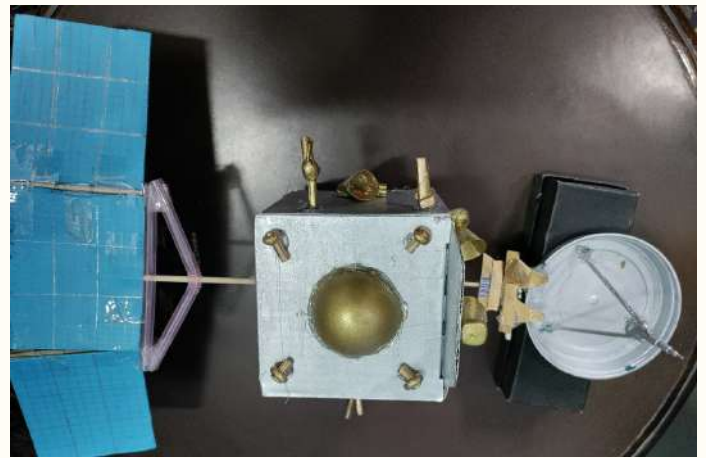
NATIONAL ASTROTOON COMPETITION



SAT FROM TRASH COMPETITION



Sajan Saravanan from Trileaves Global school



Sanyam Jain from Amity International school

NATIONAL INFOGRAPHIC COMPETITION



INDIAN TRIDEVI IN SPACE

Kalpna Chawla
1st Indian women to work as astronaut in mission with Nasa with space time 31days 14hours and 54mins

Sunita Williams
2nd Indian women to work at NASA in various mission as astronaut with highest time spend in space that is 321 days 17 hours and 15 mins

Srisha Bandla
3rd Indian women in space as space tourist with space time 1 min 10 secs

Vaishnavi Vijay Chavan

WOMEN IN SPACE

CHRONOLOGY

First Man in Space
Yury Gagarin
USSR
April 12, 1961
Vostok 1

Youngest Person in Space
Gherman Titov
Aug. 6-7, 1961
First to spend more than one day in space
Vostok 2

First American in Space
Alan Shepard
American
May 5, 1961
Mercury-Redstone 3 (Freedom 7)

First American In Orbit
John Glenn
Feb 20, 1962 Mercury-Atlas 6 (Friendship 7)
& Oldest Person In Space (77 yrs) Oct. 28-Nov. 7, 1998, STS-95 (Discovery)

First Person to Walk in Space
Aleksey Leonov
March 18-19, 1965 (Voshkod 2)

First Woman in Space
Valentina Tereshkova
(June 16, 1963)
Youngest woman in space (aged 26).
Only woman to make a solo spaceflight.

First American Woman in Space
Sally Ride
First American Woman In Space
STS-7 (June 16, 1983)
STS-41-G (October 5, 1984)
Eileen Collins
First female shuttle pilot and shuttle commander
STS-63 (Feb. 3, 1995)
STS-84 (May 15, 1997)
STS-93 (Jul. 23, 1999)
STS-114 (Jul. 26, 2005)

First Woman to perform a Space Walk (July 25, 1984)
Svetlana Savitskaya
First woman to fly on a space station (Salyut 7, 1982).
First woman to make two spaceflights.

First Mother In Space
Anna Lee Fisher
(Nov. 8, 1984)
STS-51-A

Oldest Woman to Fly In Space
Wally Funk
(July 20, 2021)
Blue Origin NS-16

First Indian-Origin (naturalized U.S. citizen) woman in space. Died in the Columbia disaster.
Kalpna Chawla
(Nov. 19, 1997) STS-87
(Jan. 16, 2003) STS-107

Timeline of Women in Space:

- 1961: Yuri Gagarin - first man in space
- 1961: Alan Shepard - first American in space
- 1961: Gherman Titov - first to spend more than one day in space; youngest person (25 years old) in space
- 1963: Valentina Tereshkova - first woman in space
- 1968: William Anders, Frank Borman, James Lovell - first to fly around the Moon
- 1968: Neil Armstrong, Edwin ("Buzz") Aldrin - first to walk on the Moon
- 1969: Georgy Dobrovolsky, Viktor Patsayev, Vladislav Volkov - first stay on a space station; first to die in space
- 1978: Sigmund Jähn - first German astronaut in space
- 1983: Sally Ride - first American woman in space
- 1984: Rakesh Sharma - first Indian in space; Marc Garneau - first Canadian in space
- 1986: Franklin Chang-Diaz - first Hispanic American in space
- 1990: Akiyama Tomiko - first Japanese in space; first commercial astronaut (1991)
- 1991: Helen Sjeraman - first Briton in space; first non-U.S., non-Russian female astronaut
- 1994: Sergey Krikalyov - first Russian in U.S. spacecraft
- 1999: Eileen Collins - first female space shuttle commander
- 2001: Dennis Tito - first space tourist
- 2003: Yang Lwei - first Chinese astronaut in space
- 2004: Michael Smith - first private spaceflight
- 2008: Yi So-yeon - first Korean astronaut in space

Nidhi Khanijo from Apeejay school, New Delhi

Women In Space

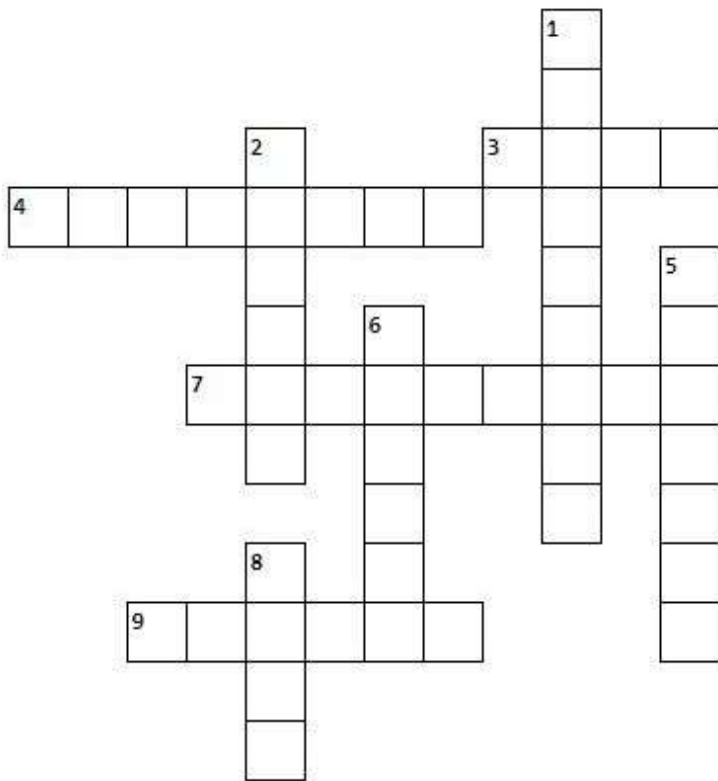
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Pratik Ravindra Deshmuth from Vidyavalley international school, Pune

TRAIN YOUR BRAIN

CROSSWORD



Across

- 3. What is the main factor that determines what a star will become?
- 4. what is the most abundant gas in the main sequence star?
- 7. What is the name of the explosion at the death of a massive star?
- 9. a spinning neutron star that emits rapid pulses of energy

Down

- 1. What is the final stage of a Very massive stars?
- 2. What do we use to classify the temperature, brightness, and size of stars?
- 5. _____ is a force that causes dust particles to stick together.
- 6. Stars are formed from a big cloud of gas & dust known as?
- 8. what is the colour of hot stars?

ASTRONOMY WORD PUZZLE

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

- MOON
- PLUTO
- COMET
- ERIS
- MERCURY
- METEOR
- ASTEROID
- LEO
- SATURN
- MARS
- WHITE DWARF
- SUPERGIANT
- SUPERNOVA
- NEPTUNE
- BLACK DWARF
- SUN
- EXOPLANET
- NEBULA
- ORION
- EARTH

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

THERE IS A SCIENTIST IN EVERY CHILD LET'S DISCOVER IT



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