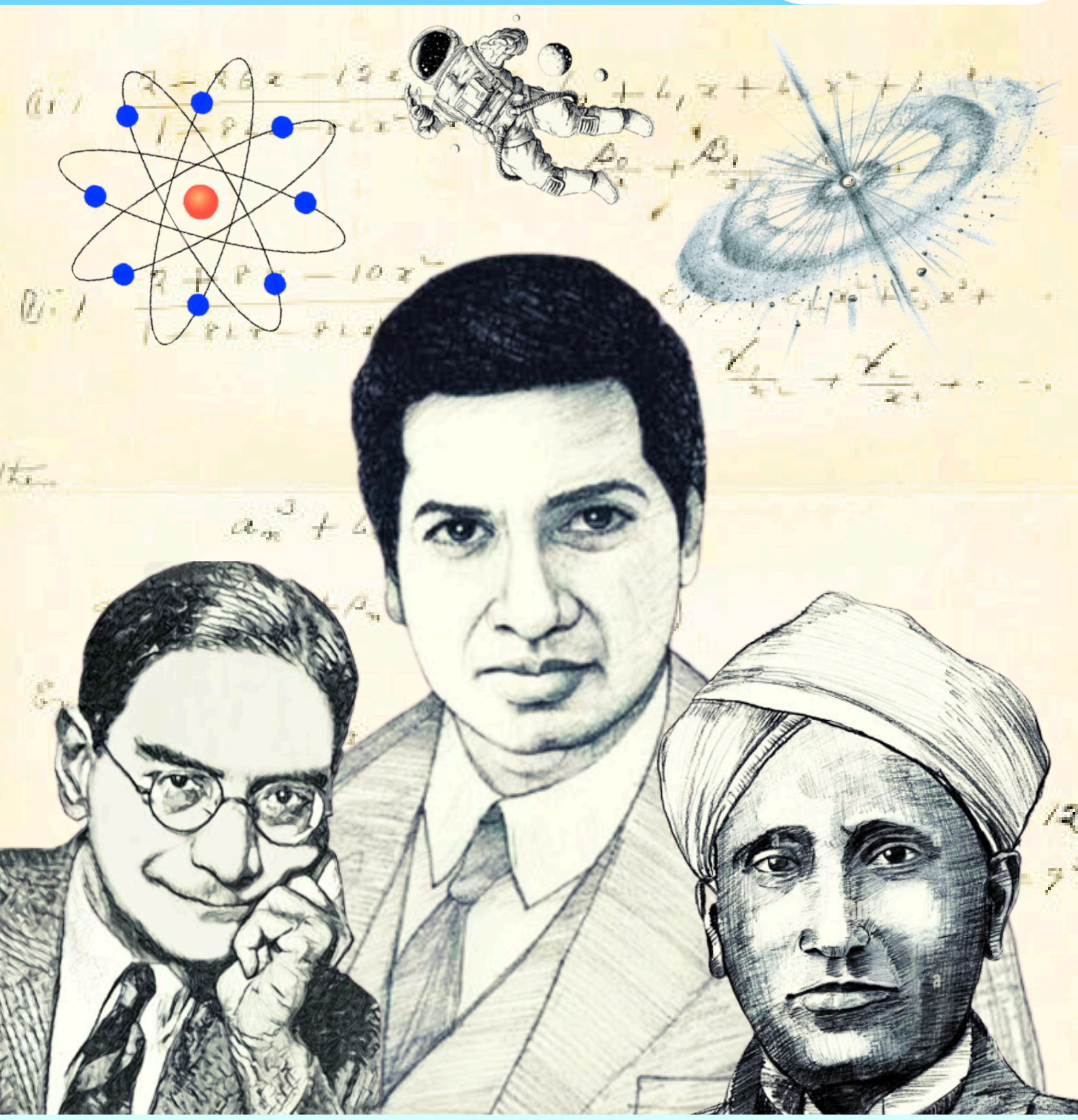
:: Designed By ::
VYOM- Astronomy Club

2023-2024

Pratibimb

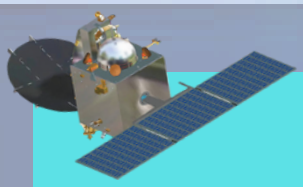
Annual Magazine

विज्ञानं ब्रह्म



Shri Mata Vaishno Devi University, Katra

ॐ श्री वैष्णवी नमः



VYOM
SMVDU-Katra
Astronomy Club Section

Published By:

Board of Students Publication
Shri Mata Vaishno Devi University
Katra, Jammu & Kashmir

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VYOM
SMVDU-Katra

Situated at the holy feet of Shri Mata Vaishno Devi and in the prestigious University of India Shri Mata Vaishno Devi University,Katra,J&K.

The Astronomy Club named as VYOM was established with the aim of acquainting the students with the unlimited possibilities of space and also to make them aware of the great historical space heritage of India. From A Student group to an Astronomy Club VYOM made its path by the help of Board of Cultural Activities (BCA)

The official name of the Astronomy Club,SMVDU would be व्योम/VYOM, a Sanskrit word meaning space and sky. The logo of the Astronomy Club depicts a high aim and an infinite boundaries of space through consellations,space and telescope.

In the establishment of VYOM, there is a glimpse of visionary thinking, which is to establish awareness related to space science and astronomy among the students and through seminars, webinars and discussions, to extract the knowledge form coral from the sea of astronauts and use it for the service of the nation and to fulfill the goals of the university.

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Katra-Jammu & Kashmir

Special Thanks to

- **Hon'ble Vice Chancellor, SMVDU**

Prof. (Dr.) Pragati Kumar, Hon'ble Vice Chancellor has always encouraged and guided the program of Astronomy Club. His office has also been providing us cooperation. The blessings of the Hon'ble Vice-Chancellor are an inspiration for us which gives us the strength to continue organizing programs related to astronomy for the university family.

विज्ञानं ब्रह्म

SMVDU

Katra-Jammu & Kashmir

Special Thanks to

• Board for Students Publication

Dr. Anurag Kumar (President, BSP)

The BSP President has always been very supportive of us. This magazine is being published successfully under his guidance.

Milind Shukla (General Secretary, BSP)

BSP General Secretary is also the coordinator of VYOM, he dedicated this issue of Pratibimb to VYOM, special thanks to him for that, also for the re-introduction of Pratibimb magazine.

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विज्ञानं ब्रह्म
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Katra-Jammu & Kashmir

Special Thanks to

• Board of Cultural Activities

Dr. Rakesh Kumar (President,BCA)

The BCA President has always been very supportive of us. He has always encouraged us in conducting different events and activities in the astronomy club.

Dr. Kamini Pathania (Vice President,BCA)

The BCA Vice President has supported us a lot. She has always encouraged us to keep the club active. On various occasions she has come forward to help us. We will always be grateful to her.

• Office of Dean of Student Welfare

The DSW office has been supportive and cooperative of us. Without their cooperation conducting events would be impossible.

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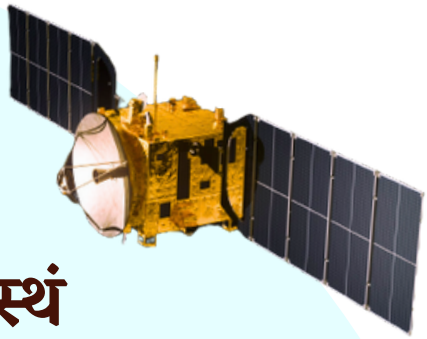


सिद्धांत शिरोमणी गोलाध्याय -भुवनकोश - (6)

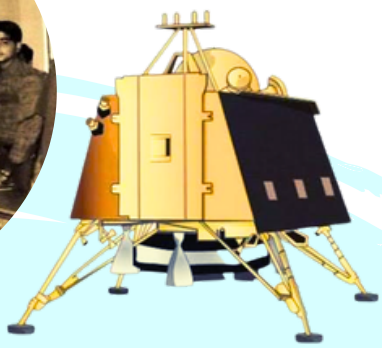
आकृष्टिशक्तिश्च मही तया यत् खस्थं
गुरुस्वाभिमुखं स्वशक्तत्या।
आकृष्यते तत्पततीव भाति
समेसमन्तात् क्व पतत्वियं खे।।

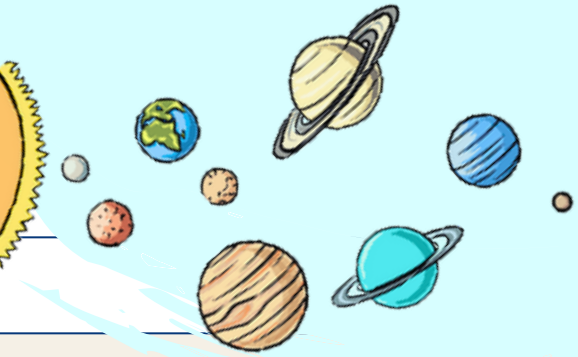
Siddhant Shiromani Goladhyaya-Bhuvankosh- (6)

Earth has the power of attraction. The earth pulls heavy objects towards it with its force of attraction and due to attraction they fall on the ground. But when the same force appears in the sky from all sides, how can anyone fall? That is, the planets remain motionless in the sky because the gravitational forces of various planets maintain a balance.

।।Siddhant Shiromani।।
By: Shri Bhaskaracharya II
Greatest Mathematician & Astronomer

CONTENTS





The first meeting of VYOM was held at the Red Rock area. In which the upcoming events, sections and competitions of the Astronomy Club were discussed as well as the future of the club was also discussed.All the members gave their views and gave ideas to run the club successfully.

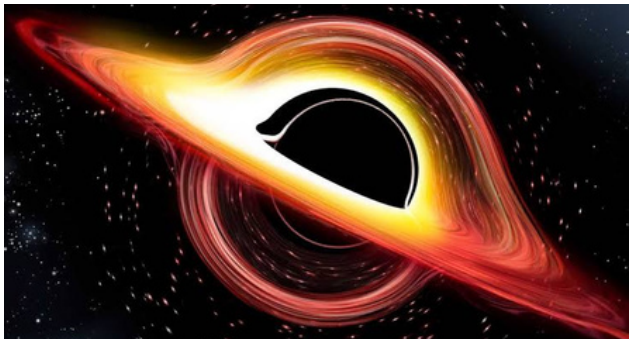
Telescope

Celestron AstroMaster 130 EQ Reflector Telescope model is capable of giving correct views of land and sky. The Celestron AstroMaster 130 eq reflector telescope produces bright, clear images of the Moon and planets. It is easy to see the moons of Jupiter and the rings of Saturn with every one of these fine instruments. For views of the brighter deep space objects like galaxies and nebulae, we recommend the larger aperture and greater light gathering ability of the Newtonian type reflector telescopes.

Pratibimb 2

Club Activities

• OPENING: The regular and the first proper meeting of VYOM started at 5:05 p.m.



• TOPIC: Today's meeting's central topic was "BLACK HOLES".

• Interactive discussion on "What is a Black Hole?" took place.

• "TIMELINE OF THE ORIGIN OF THE CONCEPT OF BLACK HOLES" was explained

I. 1783: First idea of black hole was announced by English Country Parson- "JOHN MICHELL".

II. 1915: Karl Swarzschild solved Einstein's equations for the case of a black hole, which he envisioned as a spherical volume of warped space surrounding a concentrated mass and completely invisible to outside world.

III. 1916: Einstein published his "General Theory of Relativity".

IV. May 29,1919: Sir Arthur Eddington (one of the brightest experimental Physicist of his time) visited to the remote island of Principe (west coast of Africa) on a total Solar eclipse and experimentally proved Albert Einstein's General Theory of Relativity.

V. 1930: Subrahmanyam Chandrashekhar determined what is now known as Chandrashekhar limit-that a star having a mass more than 1.44 times the mass of the Sun does not form a white dwarf but instead continues to collapse, blows off its gaseous envelope in a supernova explosion, and becomes a neutron star. And even more massive star continues to collapse and becomes a black hole.

VI. 1939: Robert J Oppenheimer and one of his students produced a paper "On Continued Gravitational Contraction" which predicted the existence of what are today known as black holes. This also proved the work of S. Chandrashekhar.

VII. Special Mentions: John Wheeler, Stephen Hawking.

• Types of Black Holes: Stellar Mass Blackholes, Intermediate mass blackholes, Supermassive blackholes were discussed.
• Discussion on Large Hadron Collider (LHC) and initially predicted existence of tiny or quantum blackhole that may suck or destroy the Earth.

Club Activities

• VYOM meeting for all the teams started at 6:30 pm on 17th May 2022

•Topic of the Discussion : Time

Some described the Time by metaphysical approach, some took help of Einstein's Theory of Special Relativity and Theory of General Relativity to explain the time.

Concepts such as Time related effects around black hole , Time travel and is it possible ?, Ease of time travel to future and past , Time is a perception , Time is an illusion, Theory of Everything , Oscillation of expanded Universe from heat death back to Big Bang , Faster than Light travel , Astronaut Scott Kelly and his twin as alive example of effects of Theory of Relativity, Chronons were discussed breifly.

At the end of presentation of each student discussions took place in which some suggestions , doubts were raised from listeners .

Suggestions such as more organized , dedicated and activity based approach to be followed were added.

The fourth meeting of VYOM was the closing semester meeting. In this meeting, the earlier topics of VYOM were discussed thoroughly and the programs to be held in the new semester were placed in front of the members. In the meeting, all the members were teamed up by making small discussions and ideas sharing among them. session took place by which all the members came to know about new things.

Chandrayaan-3: Oxygen, sulphur, iron, silicon; list of findings made on the Moon's surface so far:

India on August 23 scripted history as ISRO's ambitious third Moon mission Chandrayaan-3's Lander Module (LM) touched down on the lunar surface, making it only the fourth country to accomplish the feat and the first to reach the uncharted south pole.

Since the the rover Pragyan has rolled out on the moon's surface, various observations have been made in pursuit of lunar secrets at the South Pole.

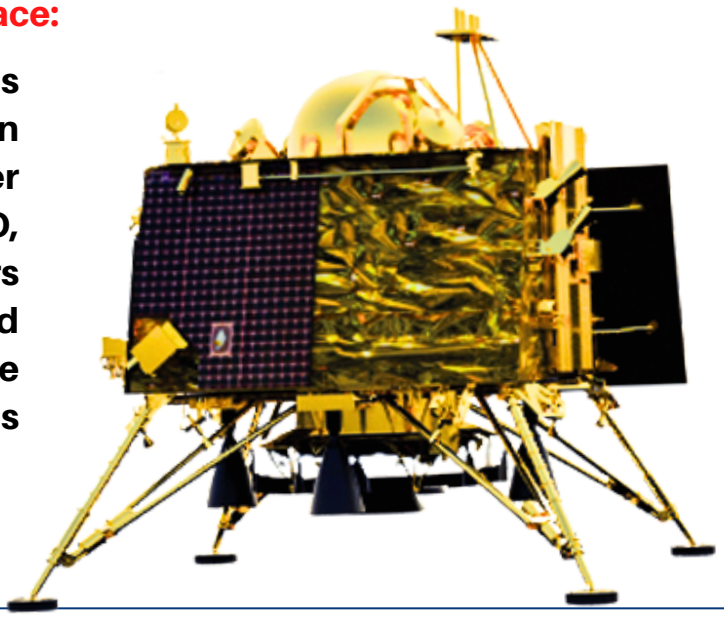
Here are the list of findings made on the Moon's surface so far:

1. Temperature recorded on the Lunar surface:

On 27 August, ISRO released a graph of the temperature variation on the lunar surface and a senior scientist of the space agency also has expressed surprise over the high temperature recorded on the Moon. The space agency shared an update saying that Chandra's Surface Thermophysical Experiment (ChaSTE) payload onboard Chandrayaan-3's Vikram lander measured the temperature profile of the lunar topsoil around the pole to understand the thermal behaviour of the Moon's surface. While speaking to news agency PTI, ISRO scientist B H M Darukesha said, "We all believed that the temperature could be somewhere around 20 degree centigrade to 30 degree centigrade on the surface but it is 70 degree centigrade. This is surprisingly higher than what we had expected."

2. 4-meter diameter crater on Moon's surface:

On 27 August, while plying on the Moon's surface, Chandrayaan-3 Rover faced an obstacle as it came across a 4-meter diameter crater. In an update from ISRO, it said the crater was positioned 3 meters ahead of its location. ISRO then decided to command the Rover to retrace the path and informed that the Rover was now safely heading on a new path.



3. Elements on the moon:

On 30 August, the Laser-Induced Breakdown Spectroscope instrument onboard 'Pragyan' rover of Chandrayaan-3 ‘unambiguously confirmed’ the presence of sulphur in the lunar surface near south pole. Other elements like Aluminum (Al), Calcium (Ca), Iron (Fe), Chromium (Cr), Titanium (Ti), Manganese (Mn), Silicon (Si), and Oxygen (O) are also detected. The space agency further added that the search for Hydrogen (H) is underway.

PM Modi had announced the decision to name the spot where Chandrayaan-3 Vikram lander made soft landing as 'Shiv Shakti Point' and the site where the Chandrayaan-2 lander crash-landed on the Moon's surface in 2019 would be known as "Tiranga Point". Also, August 23, the day the Chandrayaan-3 lander touched down on the lunar surface, would be celebrated as ‘National Space Day’

Why discovery of sulphur on Moon is limportant

The discovery of sulphur on the Moon by the Chandrayaan-3 rover Pragyan is significant because it could provide clues about the Moon's formation and evolution. Sulphur is a common element in the solar system, but it is rare on the Moon. So, its presence in the south pole region is thought to be a sign of the presence of water ice. Water ice is important because it could be a source of water for future human exploration of the Moon. It could also be used to produce fuel and oxygen for spacecraft. In addition, water ice could provide a habitat for microbes, which could have implications for the search for life beyond Earth. The lunar south pole is different from the nearside. It is much older and colder, and has not experienced any volcanic activity for billions of years.

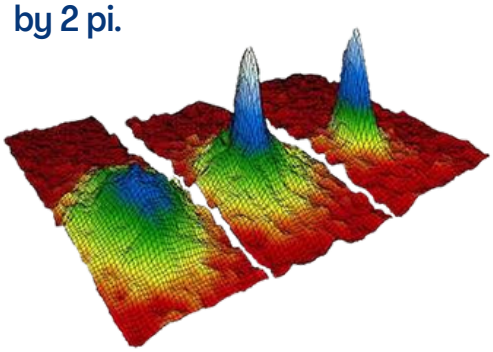
It is also covered by thick layers of regolith, which is the loose dust and rock that blankets the lunar surface. The regolith acts as a shield that protects the underlying rocks from erosion and contamination by solar wind and cosmic rays.

Therefore, finding sulphur on the south pole is unexpected and intriguing. The presence of sulphur on the Moon could also help scientists to understand the

SCAN

Bose-Einstein Condensation

In June 4,1924 the Indian physicist Satyendra Nath Bose sent Einstein a paper in which he derived the Planck law for black-body radiation by treating the photons as a gas of identical particles. Einstein generalized Bose's theory to an ideal gas of identical atoms or molecules for which the number of particles is conserved and, in the same year, predicted that at sufficiently low temperatures the particles would become locked together in the lowest quantum state of the system. We now know that this phenomenon, called Bose-Einstein condensation (BEC), only happens for "bosons" – particles with a total spin that is an integer multiple of h, the Planck constant divided by 2 pi.



Velocity-distribution data (3 views) for a gas of rubidium atoms, confirming the discovery of a new phase of matter, the Bose–Einstein condensate.

Left: just before the appearance of a Bose–Einstein condensate.

Center: just after the appearance of the condensate. Right: after further evaporation, leaving a sample of nearly pure condensate.

Bose-Einstein condensate is a rare state (or phase) of matter in which a large percentage of bosons collapse into their lowest quantum state, allowing quantum effects to be observed on a macroscopic scale. The bosons collapse into this state in circumstances of extremely low temperature, near the value of absolute zero.

Satyendra Nath Bose developed statistical methods, later utilized by Albert Einstein, to describe the behavior of massless photons and massive atoms, as well as other bosons. This "Bose-Einstein statistics" described the behavior of a "Bose gas" composed of uniform particles of integer spin (i.e. bosons). When cooled to extremely low temperatures, Bose-Einstein statistics predicts that the particles in a Bose gas will collapse into their lowest accessible quantum state, creating a new form of matter, which is called a superfluid. This is a specific form of condensation which has special properties.

Genius Bose

SN Bose delivered his quantum formulations to Albert Einstein on June 4 in 1924, and Einstein instantly recognised it as a key quantum mechanics breakthrough.

Bose's rise to fame began in academia. Bose's enthusiasm in mathematics was stifled by his father, an accountant, who would create an arithmetic homework for him to answer each day before going for work. Bose began studying for a Bachelor of Science degree at **Presidency College** in Calcutta at the age of 15, and later received a Master's in Applied Mathematics at the **University of Calcutta**.He confirmed his prestigious academic status by graduating first in his class for both degrees.

Research Anniversary

Black holes have theoretical opposites known as white holes

Black holes are known for their voracious appetites; their influence is so strong that even light can't escape their gravity. But they have a theoretical converse – white holes.

They are effectively the opposite of their dark relatives, spitting out light and matter instead of trapping it.

So far, they are purely hypothetical objects; astronomers are contemplating how they could form in reality.

One teaspoonful of neutron star would weigh the same as the entire human population

A netron star's density is mind-boggling. These stars are composed almost entirely of neutrons packed together in a tiny radius.

Just a teaspoonful of this material would weigh over a trillion kilograms — more than the weight of the entire human population (which reaches a few hundred billion kilograms).

To make something as dense as a neutron star, the whole of humanity would need to be crammed into a space the size of a sugar cube.

Only 5% of the universe is actually visible.

The universe comprises protons, neutrons, and electrons. The visible universe includes entire galaxies and celestial objects like planets, moons, asteroids, the Sun, and other stars.

Although the universe might seem big, visible galaxies make up only a small portion of it, while the rest is composed of dark energy and dark matter.

While scientists have collected a ton of useful astronomy information about space, little is known about these two. Dark matter is a mass that doesn't emit light or energy and accounts for 27% of the entire universe.

Fun Facts

Pratibimb 8

News

India's first liquid mirror telescope has been commissioned atop Devasthal, a hill in Uttarakhand. The liquid mirror telescope, which is the largest in Asia, will observe the overhead sky to identify transient or variable objects such as supernovae, gravitational lenses, space debris, and asteroids.

The telescope, dubbed the Indian Liquid Mirror Telescope (ILMT), will help survey the sky, and make it possible to observe several galaxies and other astronomical objects just by staring at the strip of the sky above, the Department of Science and Technology (DST), Government of India, said on its website.

A liquid mirror telescope is a special type of reflecting telescope that uses a liquid as the primary mirror, instead of aluminised glass. The liquid is usually mercury, and is poured into a rotating dish. As a result of the rotation, two fundamental forces — gravity and inertia — act on the mercury. Inertia is the resistance of an object to its state of rest or motion. The gravity pulls down on the surface of the liquid, while the inertia pulls the liquid sideways at the edge of the dish.

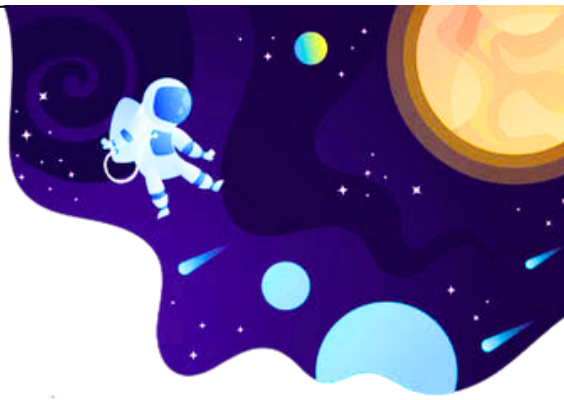
The causes the liquid to form a uniform and perfect parabola, which is the ideal reflecting surface for a telescope. A liquid mirror telescope surface remains smooth and flawless with little or no maintenance. Also, the gravity and inertia can make the liquid return to its original state if it is disturbed.

India's first liquid mirror telescope will use mercury as the primary mirror. The scientists from India, Belgium, and Canada spun a pool of mercury to ensure that the surface is curved into a parabolic shape, which is ideal for focusing light. A thin transparent film of mylar has been used to protect the mercury from wind, according to the DST.

The light reflected from the liquid passes through a sophisticated multi-lens optical corrector. This will ensure that sharp images are produced over a wide field of view. The images will be recorded by a large-format electronic camera located at the focus of the telescope.

According to the DST, Paul Hickson from the University of British Columbia said that the rotation of the Earth causes the images to drift across the camera, but the motion is compensated electronically by the camera. Hickson, who is an expert in the field of liquid mirror technology, added that the mode of operation increases the observing efficiency of the telescope and makes it particularly sensitive to faint and diffuse objects.

आर्यभट्ट प्रेक्षण विज्ञान शोध संस्थान
ARYABHATTA RESEARCH INSTITUTE OF OBSERVATIONAL SCIENCES
(AN AUTONOMOUS INSTITUTE UNDER DST, GOVT. OF INDIA)



Mind Games

1. The duration of a Synodic month is approximately?
2. The time taken by a signal which moves at the speed of light through space to travel from a spacecraft to earth is called as?
3. Which of the following clocks is most accurate?
4. The position of a planet when it is nearest to the Sun is called?
5. On which of the following planets of the solar system does the sun rise in the west and set in the east?

SCAN QR for Answers

ASTRO photography

Awanish Prajapati
Clicked From:
Canon EOS 3000D
(University of Allahabad)

Mridul Chaudhary
Clicked From:
Samsung S20 FE

"Exploration is wired into our brains. If we can see the horizon, we want to know what's beyond.

- Buzz Aldrin (One of The Astronauts from APOLLO 11)

A VISIONARY OF INDIAN SPACE PROGRAMME

Sarabhai's name will remain inseparable from India's space programme. It was Sarabhai who put India on the international map in the field of space research. But then he made equally pioneering contributions in other fields. He worked in the fields of textiles, pharmaceuticals, nuclear power, electronics and many others incessantly till last.

The most striking aspect of Sarabhai's personality was the range and breadth of his interests and the way in which he transformed his ideas into institutions. Sarabhai was a creative scientist, a successful and forward looking industrialist, an innovator of the highest order, a great institution builder, an educationist with a difference, a connoisseur of arts, an entrepreneur of social change, a pioneering management educator and more.

However, the most important thing is that besides being all that he was a very warm human being with tremendous compassion for others. He was a man who could charm and win the hearts of all those who came in contact with him. He could instantly establish a personal rapport with those with whom he interacted. This was possible because he could convey a sense of respect and trustfulness to them and also a sense of his own trustworthiness.

He was a dreamer with a seemingly unmatched capacity for hard work. He was a visionary, who could not only see opportunities but created some where none existed. To him the object of life, as Pierre Curie (1859-1906), the French Physicist who was co-discoverer with his wife Marie Curie (1867-1934) of polonium and radium, has observed, was "to make life a dream and to turn the dream into a reality". What is more, Sarabhai taught many others how to dream and to work towards realising the dream.

The success of India's space programme is a testimony to his. Sarabhai was a "rare combination of an innovative scientist, forward looking industrial organiser and imaginative builder of insitutions for the economic, educational and social upliftment of the country". He had an excellent sense of economics and managerial skill. No problem was too minor to him. A large part of his time was taken up by his research activities and he continued to supervise research till his untimely death. Nineteen people did their PhD work under his supervision. Sarabhai independently and in association with his coleagues published eighty-six research papers in national journals.

We are told that anybody, irrespective of his position in the organisation, could meet Sarabhai without any fear or feeling of inferiority and Sarabhai would always offer him/her a seat and make him/her relax and talk on equal terms. He believed in an individual's dignity and tried hard to preserve it. He was always in search of a better and efficient way of doing things. Whatever he did, he did it creatively. He displayed extreme care and concern for the younger people. He had immense faith in their potentialities. He was always ready to provide opportunities and freedom to them.

Vikram Ambalal Sarabhai was born on August 12, 1919 to a wealthy family at Ahmedabad. During his childhood his ancestral home. The Retreat at Ahmedabad, used to be visited by important people from all walks of life. This played an important role in the growth of Sarabhai's personality. His parents were Ambalal Sarabhai and Saraladevi Sarabhai. Sarabhai had his early educatio in the family school started by his mother Saraladevi on the line propoounded by Mme. Maria Montessori. After completing his Intermediate Science examination from Gujrat College, Cambridge (UK) in 1937 where he obtained his Tripos in Natural Sciences in 1940. At the outbreak of the Second World War he returned to India and joined the Indian Institute of Science at Bangalore where he took up research in cosmic rays under the supervision of C.V. Raman. He published his first research paper entitled "Time Distribution of Cosmic Rays" in the Proceedings of Indian Academy of Sciences.

Sarabhai's work on cosmic rays during the period 1940-45 included the study of the time variations of cosmic rays with Geiger-Muller counters at Bangalore and at the high level station in the Kashmir Himalayas. After the war he returned to Cambridge to work for his PhD is cosmic ray physics. In 1947, he was awarded PhD by the Cambridge University for his thesis `Cosmic Ray investigation in Tropical Latitudes'. He also carried out an accurate measurement of the cross-section for the photofission of U-238 by 6.2 MeV y-rays which formed a part of his PhD thesis. After getting his PhD he returned to India and continued his research in cosmic ray physics. In India he studied interplanetary space, solar-terrestrial relationships and geomagnetism.

Sarabhai was a great institution builder. He established or helped to establish a large number of institutions in diverse fields. Ahmedabad Textile Industry's Research Association (ATIRA) was the first institution that Sarabhai helped to build. This assignment he undertook just after returning from Cambridge after obtaining a PhD in Cosmic ray physics. He had no formal training in textile technology. Formation of ATIRA was an important step towards modernising textile industry in India. At the time of establishing ATIRA there were no quality control techniques in majority of the textile mills. At ATIRA, Sarabhai created conditions for the interaction of different groups and fifferent disciplines which cross fertilise each other. While hiring personnel at ATIRA Sarabhai ignored the requirement of experience. The various institutions established and looked after by Sarabhai benefitted from each other's experience and techniques to their mutual advantage. Some of the most well-knon institutions established by Sarabhai are :-

- Physical Research Laboratory (PRL), Ahmedabad
- Indian Institute of Management (IIM), Ahmedabad
- Community Science Centre, Ahmedabad
- Darpan Academy for Performing Arts, Ahmedabad (alongwith his wife)
- Vikram Sarabhai Space Centre, Thiruvananthapuramm
- Space Applications Centre, Ahmedabad
- Faster Breeder Test Reactor (FBTR), Kalpakkam
- Varaiable Energy Cyclotron Project, Calcutta
- Electronics Corporation of India Limited (ECIL), Hyderabad
- Uranium Corporation of India Limited (UCIL), Jaduguda, Bihar

After the death Homi J Bhabha in January 1966, Sarabhai was asked to assume the responsibilities of the office of the Chairman, Atomic Energy Commission. At that time he was deeply involved in three major areas. In his own words (what he wrote to the Prime Minister accepting the offer):

"Currently I have substantive responsibilities in three areas. Firstly, at the Physical Research Laboratory as Director and Professor of Cosmic Ray Physics, where I continue my research and the supervision of doctoral candidates. Second, as Chairman of the Indian National Committee for Space Research Programme as well as the project for the development of rockets and space technology. Thirdly, I have been concerned with policy making, operations, research planning and evaluation of a significant segment of the family business interests, particulary centered around chemicals and pharmaceuticals". He had also regular association with the Laboratory of Nuclear Science of the Massachussetts Institute of Technology, USA. But all these did not deter Sarabhai from assuming the new responsibility in the interest of the country. He had to disassociate himself from the family business. He was at the helm of both atomic energy and space research programmes in India from May 1996 till his death.

Sarabhai had realised the enormous potentialities inherent in space science and technology for a wide range of social and economic development activities – communication, meterology/weather forecasting, and exploration for natural resources, to name only a few. The Physical Research Laboratory, Ahmedabad, established by Sarabhai pioneered research in space sciences and subsequently in space technology. Sarabhai also spearheaded the country's rocket technology. He played a pioneering role in the development of satellite TV broadcasting in India.Sarabhai was also a pioneer of the pharmaceutical industry in India. He was among the very few in the pharmaceutical industy who recognised that the highest standards of quality should be established and maintained at any cost.

It was Sarabhai who first implemented Electronic Data Processing and Operations Research Techniques in the pharmaceutical industry. He played an important role in making India's pharmaceutical industry self-reliant and self-manufacture of many drugs and equipment in the country.

Sarabhai was a man of deep cultural interests. He was interested in music, photography, archaeology, fine arts and so on. With his wife Mrinalini, he established Darpana, an institution devoted to the performing arts.
He believed that a scientist should never shut himself up in an ivory tower or overlook the problems faced by the society in mere academic pursuit of pure science. Sarabhai was deeply concerned with the state of science education in the country. To improve the same he had established the Community Science Centre.

He had an uncanny ability to gauge the capability of a person just by talking to him for a few minutes. In fact he used to frequently say that he could judge a person from the sparkle in his/her eyes. He believed in systematically developing people. At times he will go out of the way to give a person full opportunity of developing himself/herself. He had a pleasant personality. It is said that by his mere smile he was able to transmit a great deal of inspiration to all those who worked with him.

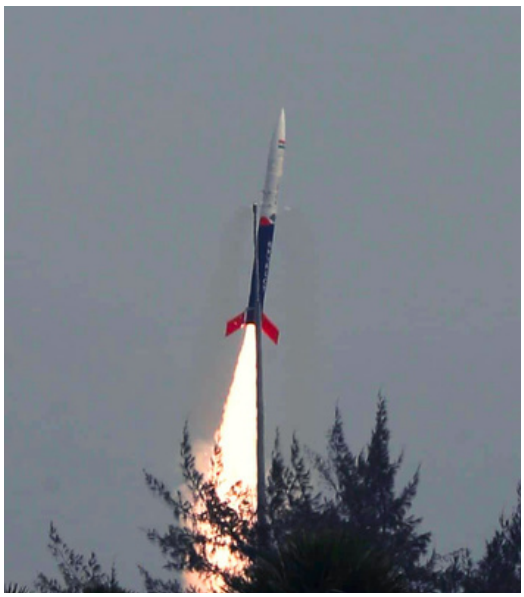
Sarabhai died on 30 December 1971 at Kovalam, Thiruvananthapuram, Kerala. In 1974, the International Astronomical Union at Sydney decided that a Moon Crater BESSEL in the Sea of Serenity will be known as the Sarabhai Crater.

“

A person who does not have respect for time and does not have a sense of timing can only achieve little.

- Vikram Ambalal Sarabhai

India’s first private rocket blasts off successfully



Skyroot Aerospace, an Indian Space-Tech startup, has launched its first rocket into space at 11:30 am. The Vikram-S rocket, the first of the Vikram-series took off from the ISRO (Indian Space Research Organisation) launchpad in Sriharikota. This is the first private rocket launch taking place in India.

Skyroot Aerospace on Friday made history by launching India's first privately made rocket Vikram-S into space. The successful launch marks the entry of the private sector into the Indian space program, which has so far, remained government-controlled and funded.The Vikram-S rocket launched from the sounding rocket complex of the Indian Space Research Organisation (ISRO)'s Satish Dhawan Space Centre in Sriharikota. The rocket was launched with three customer payloads into space touching an altitude of over 90 kilometers.The company said that the Vikram-S rocket touched a peak altitude of 89.9 kilometers gaining a speed of Mach 5, five times the speed of sound. The launch vehicles met all the mission parameters, clearing the stage for the company to launch the Vikram-I rocket next year.

Scan & Watch full Launch:

Genius And Infinite Man: Ramanujan

In 1918, Indian mathematician Srinivas Ramanujan was admitted to the hospital in London, where he was visited by his colleague and long-time friend G H Hardy. The fellow mathematician had arrived in a taxi which was numbered '1729' and had thought about it on his way to the room, upon entering Ramanujan's room, Hardy blurted "it was rather a dull number," after a brief hello.

When Ramanujan came to know of the number, the mathematician said "No Hardy, it is a very interesting number. It is the smallest number expressible as the sum of two cubes in two different ways." This conversation, which is the base of the mysterious Hardy-Ramanujan number is documented in his biography 'The man who knew infinity' by Robert Knaigel.

THE MYSTERY OF RAMANUJAN NUMBER:

Ramanujan explained that 1729 is the only number that is the sum of cubes of two different pairs of numbers: 123 + 13, and 103 + 93.
It was not a sudden calculation for Ramanujan. According to his biography, "Years before, he had observed this little arithmetic morsel, recorded it in his notebook and, with that easy intimacy with numbers that was his trademark, remembered it."The unique number later came to be known as the Hardy-Ramanujan number.

December 22 is marked as the National Mathematics Day every year, remembering one of India's greatest mathematicians Srinivasa Aiyangar Ramanujan, who contributed to explaining the analytical theory of numbers and worked on elliptic functions, continued fractions, and infinite series.Born on December 22, 1887, in a small village Erode southwest of Chennai in a Tamil Brahmin Iyengar family. A student who failed exams due to his negligence for non-mathematical subjects, Ramanujan worked on summing mathematical geometric and arithmetic series.

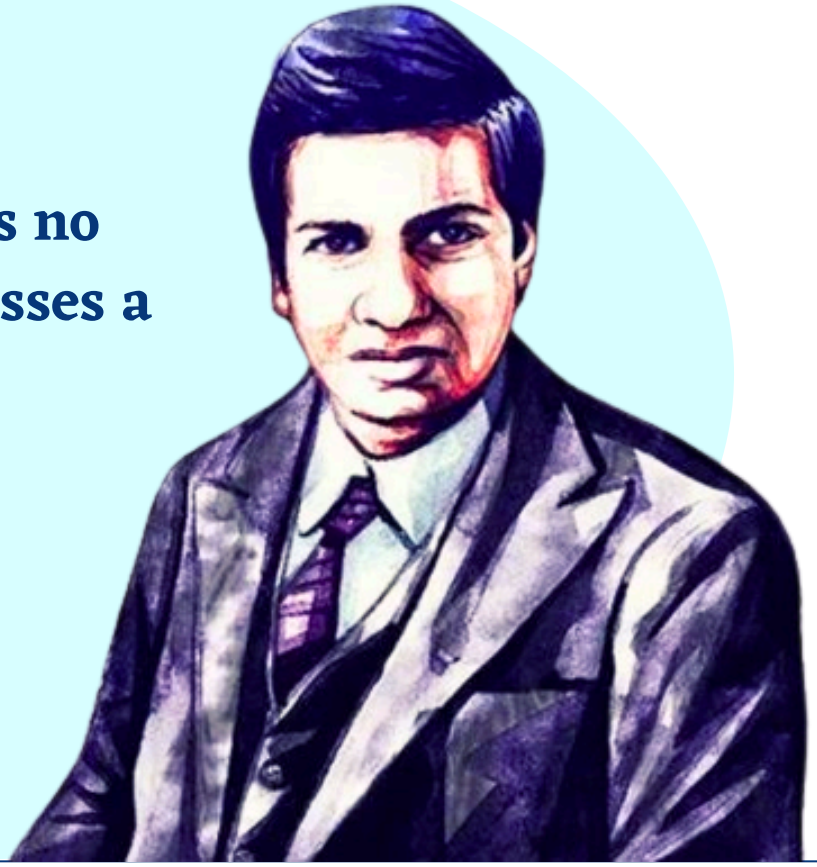
Ramanujan's flair for mathematics was first recognised by a colleague when he started working as a clerk in the Madras Port Trust in 1912. His work was documented in the Journal of the Indian Mathematical Society, where he showed the relations between elliptic modular equations.

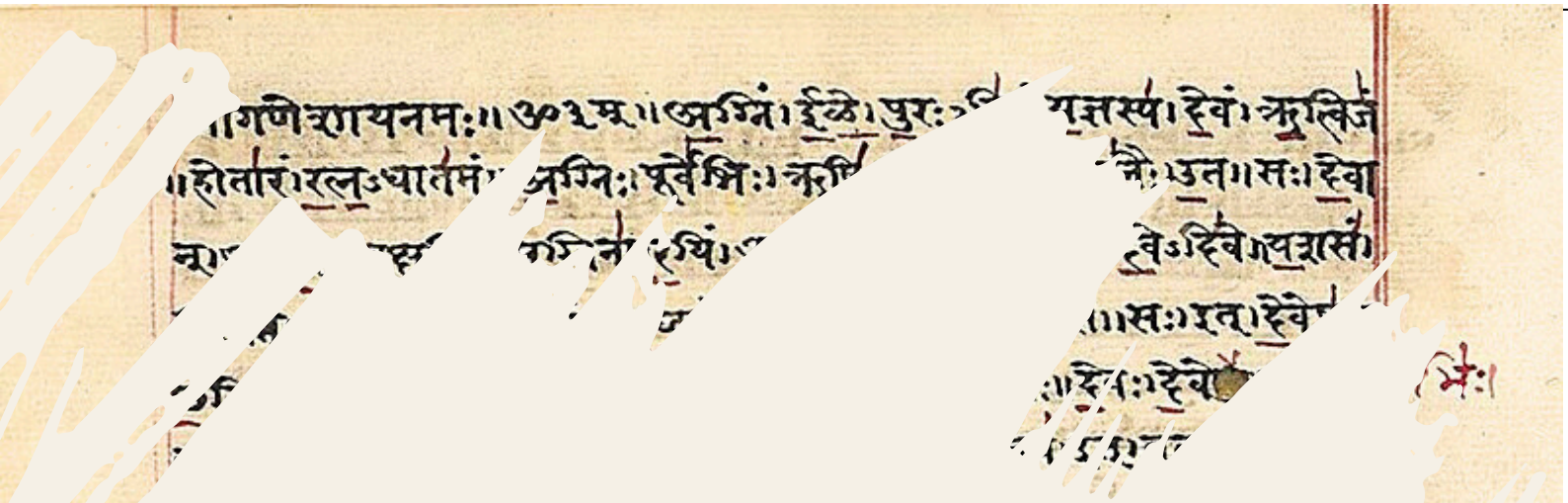
In 1913, Ramanujan, who had not been a university graduate, was invited by G H Hardy to Cambridge and then began their long-standing collaboration that changed the field of mathematics. He graduated from Cambridge in 1916 with a Bachelor of Arts by Research. In 1918, he was elected a fellow of the Cambridge Philosophical Society, followed by an election as a fellow of the Royal Society of London.

At the time of his death in 1920, Ramanujan had discovered his own theorems and independently compiled 3900 results.

An equation for me has no meaning, unless it expresses a thought of God.

- S. Ramanujan





नोदनविशेषाभावानोर्ध्वं न तिर्यग्गमनम् ।।
[5.1.8]

In the absence of a particular impulse the upward and sideward movement is not possible or we can also say that the projectile can't move upwards unless there is an impulse created .

(Vaisheshika Sutra By Maharishi Kanad)

VYOM, Astronomy Club,SMVDU organized KHAGOL Quiz Competition

On the occasion of World Space Week 04-10 October, the Astronomy Club of Shri Mata Vaishno Devi University, Katra, J&K "VYOM" in association with the Board of Cultural Activities (BCA) organized KHAGOL Quiz Competition.In which students of Engineering, Science, Architecture, Management and Arts faculties participated enthusiastically.

Shivansh Dwivedi, Skand Kumar Mishra and Anant Kamal Nayan stood First, Second and Third in the KHAGOL Quiz Competition.

VYOM rewarded and encouraged the winners of top three position with attractive prizes and also presented certificates to all the participants.

The Chief Co-ordinators in organizing the competition were Ayush Aarya, Milind Kumar Shukla, Piyush Bhardwaj and Dheeraj Kumar, Vandana, Sadhvi, Rounit Ranjan Sinha, Praman Pandey, Harshdev Singh and Mridul Chaudhary as Assistant Co-ordinators.

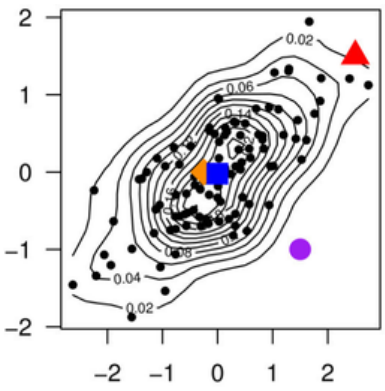
Mahalanobis Distance

It was introduced by **Prof. P. C. Mahalanobis** in 1936 and has been used in various statistical applications ever since. However, it's not so well known or used in the machine learning practice. Well, let's get into it. So computationally, how is Mahalanobis distance different from Euclidean distance?

1. It transforms the columns into uncorrelated variables
2. Scale the columns to make their variance equal to 1
3. Finally, it calculates the Euclidean distance.

The above three steps are meant to address the problems with Euclidean distance we just talked about. But how? Let's look at the formula and try to understand its components.

The Mahalanobis distance (MD) is **the distance between two points in multivariate space**. In a regular Euclidean space, variables (e.g. x, y, z) are represented by axes drawn at right angles to each other; The distance between any two points can be measured with a ruler. For uncorrelated variables, the Euclidean distance equals the MD. However, if two or more variables are correlated, the axes are no longer at right angles, and the measurements become impossible with a ruler. In addition, if you have more than three variables, you can't plot them in regular 3D space at all. The MD solves this measurement problem, as it measures distances between points, even correlated points for multiple variables.



• Mahalanobis distance plot example. A contour plot overlaying the scatterplot of 100 random draws from a bivariate normal distribution with mean zero, unit variance, and 50% correlation. The centroid defined by the marginal means is noted by a blue square.

The Mahalanobis distance measures distance relative to the centroid — a base or central point which can be thought of as an overall mean for multivariate data. The centroid is a point in multivariate space where all means from all variables intersect. The larger the MD, the further away from the centroid the data point is.

Uses:

The most common use for the Mahalanobis distance is to find multivariate outliers, which indicates unusual combinations of two or more variables.

The spirit and outlook of 'Sankhya' will be universal, but its form and content must necessarily be, to some extent, regional. We shall keep the special needs of India in view without, however, restricting the scope of the journal in any way. We shall naturally devote closer attention to the collection and analysis of data relating to India, but we shall try to study all Indian questions in relation to world problems.... The study of modern statistical methods in its infancy in our country, and we do not expect to be able to achieve immediate results. We shall be satisfied if we can help by our humble efforts to lay the foundations for future work.

- Prashanta Chandra Mahalanobis

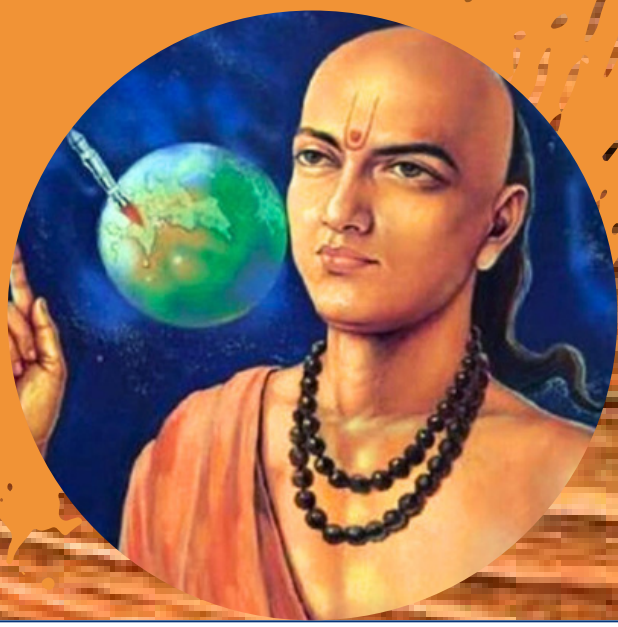
“

प्रग्रहणान्ते धूम्रः खण्डग्रहणे शशी भवति कृष्णः।
सर्वग्रासे कपिलः सकृष्णताम्रस्तमोमध्ये॥
- आर्यभटीयम्, ४.४६

At the begining & end of its eclipse, moon appears smoky.When half obscured, it is black.When totally obscured, it is tawny.When far inside earth's shadow, dark copper.

- Aryabhatiyam,4.46.

”



The Raman Effect

In 1921, C.V. Raman was on a trip to Europe when he noticed the striking blue colour of some icebergs and the Mediterranean Sea. He was inspired to want to understand the reason behind the phenomenon.

He conducted experiments with transparent blocks of ice and light from a mercury arc lamp. He recorded the spectra from shining the light through ice and detected what would come to be known as the Raman Lines, caused by the Raman Effect.The Raman Effect is the process of scattering of light particles by molecules of a medium.

The scattering occurs due to a change in the wavelength of light as it enters the medium. When a beam of light travels through a dust-free, transparent chemical, a small fraction of the light emerges in directions other than where it should.

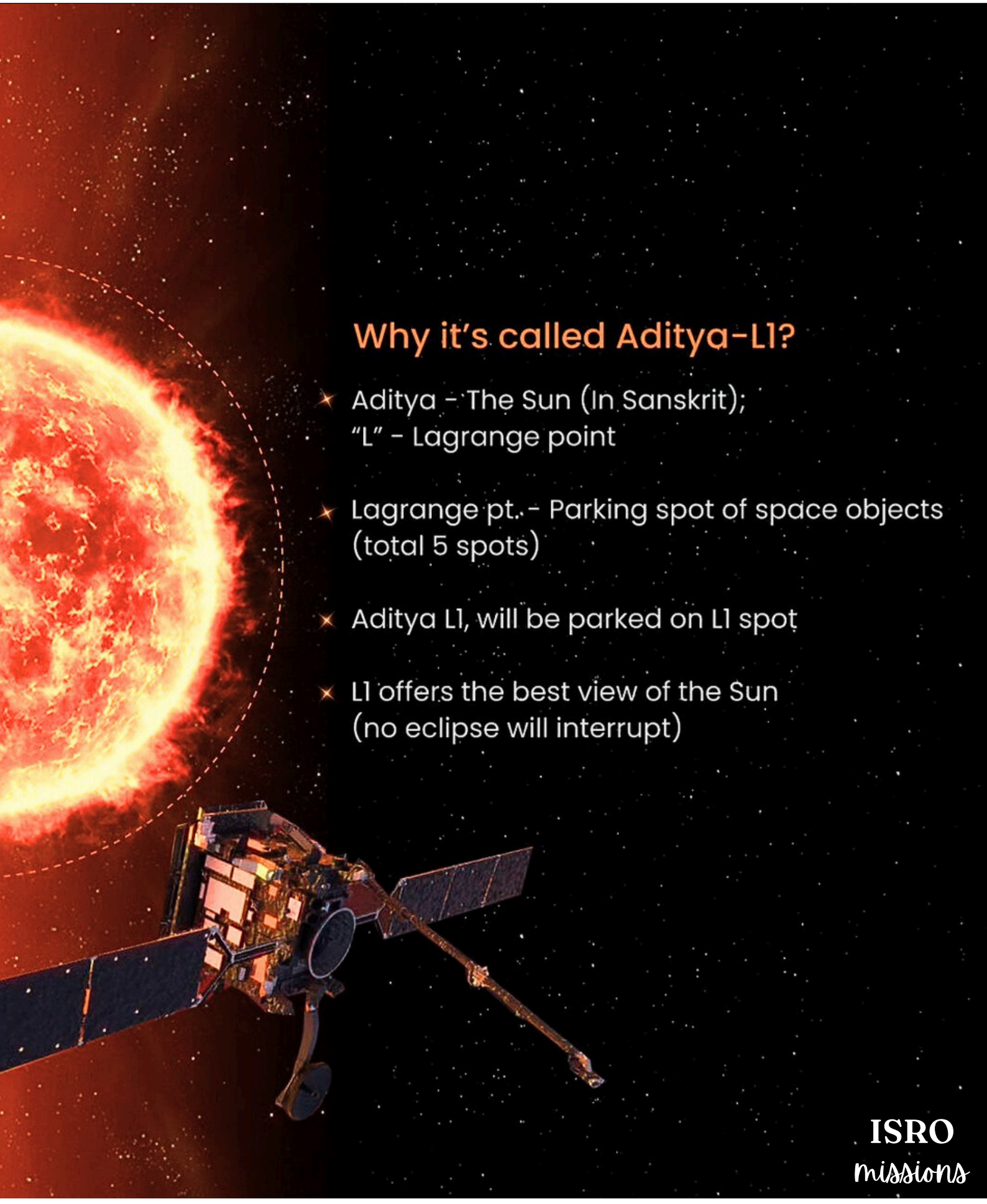
Light consists of particles called photons, whose energy is directly proportional to the frequency with which they travel. When they strike molecules in a medium at high speeds, they bounce back and scatter in different directions depending on the angle with which they hit the molecules.

Most of these scatterings are elastic — the photons retain their energy and are deflected with the same speed as they were traveling with.

However, once in a while, the molecules of the medium light passes through absorb or give energy to photons that strike them. The light particles then bounce with decreased or increased energy, and thus, frequency.When frequency shifts, so does wavelength.

This means that light refracted from a body, like the Mediterranean Sea or an iceberg, can appear to be of a different colour.

The effect is extremely negligible when measured and occurs in very low amounts, but each medium contains a specific molecular scattering signature, related to the particular molecule and its numbers.This gave birth to the field of Raman spectroscopy, which has extensive applications around the globe, and across fields.


Why it's called Aditya-L1?
Aditya - The Sun (In Sanskrit);
"L" - Lagrange point
Lagrange pt. - Parking spot of space objects
(total 5 spots)
Aditya L1, will be parked on L1 spot
L1 offers the best view of the Sun
(no eclipse will interrupt)
ISRO
missions


Why it's called Aditya-L1?
Aditya - The Sun (In Sanskrit);
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(total 5 spots)
Aditya L1, will be parked on L1 spot
L1 offers the best view of the Sun
(no eclipse will interrupt)


ISRO's Aditya L1 is taking India near the Sun.
Here's what you need to know:
To be precise, it will be 14.85 Cr. km away from the Sun.
This will help scientists study the Sun's current activities and understand how things like solar flares affect space weather.
Budget of the mission - ₹400 Cr. (Approx).

Why only till Lagrangian Point 1?

Sun to Earth's distance - 15 Cr. km

Sun's Temperature - 5,500°C - 1.5 Cr.°C

- Not going closer to the sun means the temperature is not too hot.
- This will help scientists study the Sun's current activities and understand how things like solar flares affect space weather.

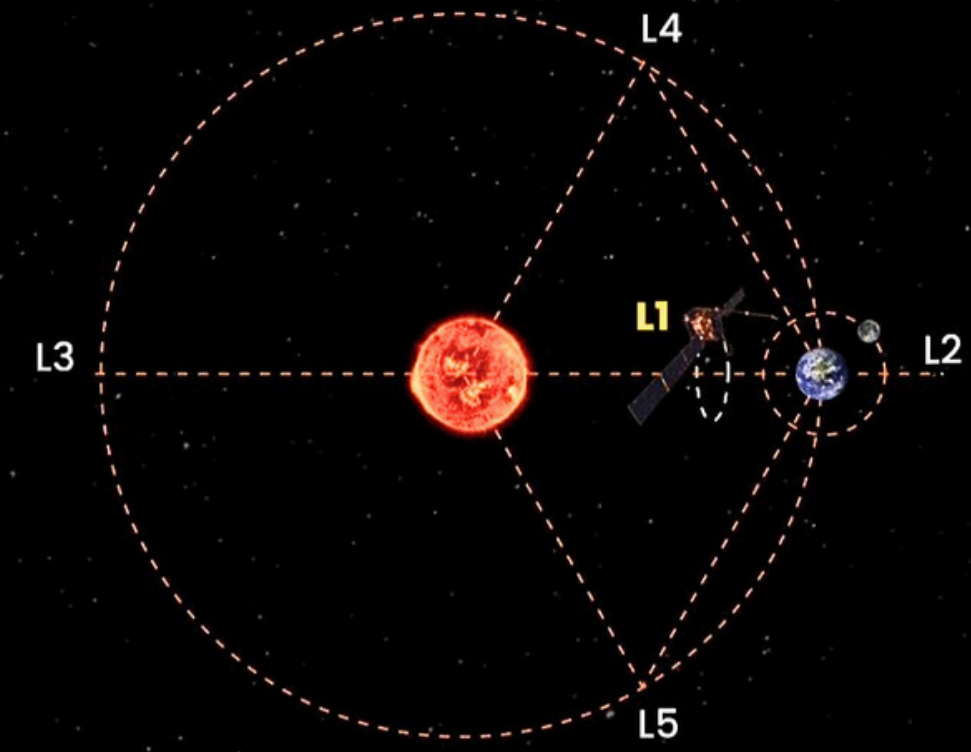


Illustration of lagrange point of the Sun-Earth system

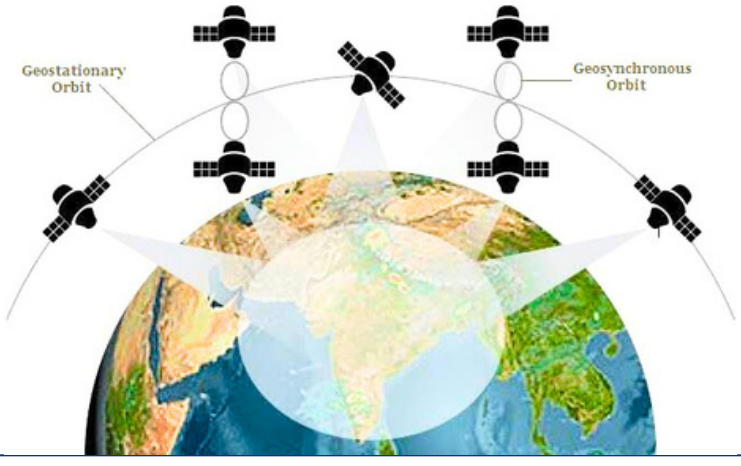
Navigation with Indian Constellation (NavIC)

To meet the positioning, navigation and timing requirements of the nation, ISRO has established a regional navigation satellite system called Navigation with Indian Constellation (NavIC). NavIC was erstwhile known as Indian Regional Navigation Satellite System (IRNSS).

NavIC is designed with a constellation of 7 satellites and a network of ground stations operating 24 x 7. Three satellites of the constellation are placed in geostationary orbit, at 32.5°E, 83°E and 129.5°E respectively, and four satellites are placed in inclined geosynchronous orbit with equatorial crossing of 55°E and 111.75°E respectively, with inclination of 29° (two satellites in each plane). The ground network consists of control centre, precise timing facility, range and integrity monitoring stations, two-way ranging stations, etc.

NavIC offers two services: Standard Position Service (SPS) for civilian users and Restricted Service (RS) for strategic users. These two services are provided in both L5 (1176.45 MHz) and S band (2498.028 MHz). NavIC coverage area includes India and a region up to 1500 km beyond Indian boundary. NavIC signals are designed to provide user position accuracy better than 20m and timing accuracy better than 50ns. NavIC SPS signals are interoperable with the other global navigation satellite system (GNSS) signals namely GPS, Glonass, Galileo and BeiDou

Scan For More Information



Prof. Satish Dhawan: Pioneer of Indian Space

Prof. Dhawan was a man of varied academic expertise. His degrees included Bachelors in Mathematics and Physics, Masters in English Literature, BE in Mechanical Engineering, MS in Aeronautical Engineering and double PhD - in Aeronautics and Mathematics.

Prof. Satish Dhawan, one of the pioneers of India's space journey, was born in Srinagar on September 25, 1920. The Padma Vibhushan awardee was known for his prowess in various fields. Let us remember the exemplary mathematician and aerospace engineer on his birth anniversary through his selected achievements that led India's space programme to soaring success.

Dhawan completed his PhD from California Institute of Technology in 1951 while serving as an advisor to eminent aerospace scientist Professor Hans W. Liepmann. Then, Dhawan joined the Indian Institute of Science (IISc), Bengaluru as a faculty member and was later appointed its youngest and the longest serving director (for around nine years). Prof. Dhawan's pilot project cleared the way for the construction of the world-class wind tunnel facilities at Bengaluru's National Aerospace Laboratories (NAL). He put a lot of work into boundary layer research, even when he was in charge of the Indian space program. The ground-breaking book Boundary Layer Theory by Hermann Schlichting summarises his most significant achievements. He took charge of the Indian space programme following the sudden death of Vikram Sarabhai on December 30, 1971. Prof. Dhawan became the Secretary of India's Department of Space in May 1972. He assumed leadership of both the Space Commission and ISRO, which had just been formally established. Prof. Dhawan had extraordinary leadership skills, which he implemented while constituting project teams at ISRO. APJ Abdul Kalam, Roddam Narasimha, and UR Rao, among others, were chosen by him to lead projects that resulted in the development of SLV-3, India's first launch vehicle, and Aryabhata Satellite.

.The most significant contributions made by Satish Dhawan are summarised in Hermann Schlichting's seminal work, Boundary Layer Theory. At IISc, he built the nation's first supersonic wind tunnel. Additionally, he was a pioneer in the study of trisonic flows, three-dimensional boundary layers, and separated boundary layer flows. His other notable accomplishments include the following:

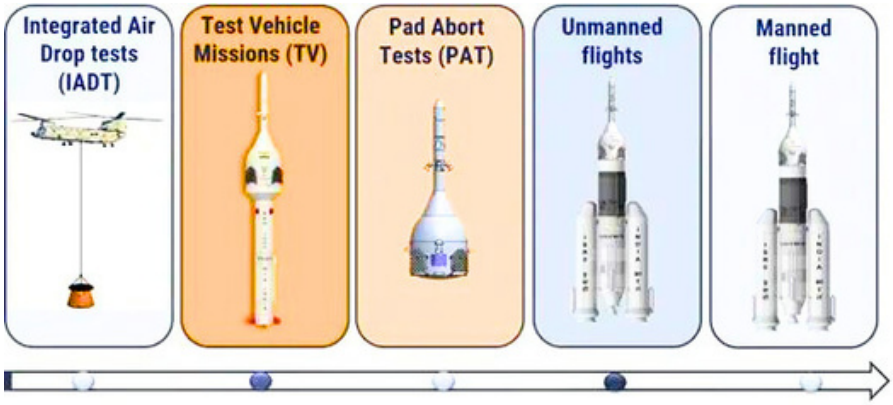
- 1953: "Direct measurements of skin friction", Technical Report 1121, National Advisory Committee for Aeronautics, Washington DC.
- 1958; "Some properties of boundary layer flow during the transition from laminar to turbulent motion", Journal of Fluid Mechanics
- 1967: "Aeronautical Research in India", (22nd British Commonwealth Lecture), Journal of the Royal Aeronautical Society.
- 1982: "A glimpse of fluid mechanics research in Bangalore 25 years ago", in India: Surveys in fluid mechanics, Indian Academy of Sciences
- 1988: Developments in Fluid Mechanics and Space Technology, Indian Academy of Sciences.
- 1991: "Bird flight", Sadhana Proceedings in Engineering Sciences, Indian Academy of Sciences.
- 2000: Special Section on Instabilities, transitions, and turbulence, Current Science

“

Prof. Dhawan was the most renowned researchers in the field of turbulence and boundary layers, recognized as the "Father of Experimental Fluid Dynamics Research."

List of Upcoming Missions of ISRO

1. Gaganyaan



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2. NISAR

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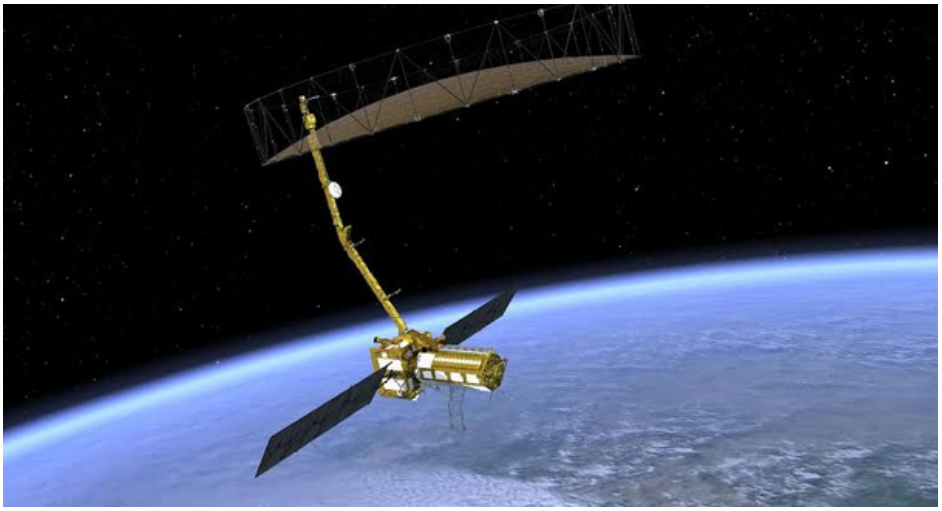
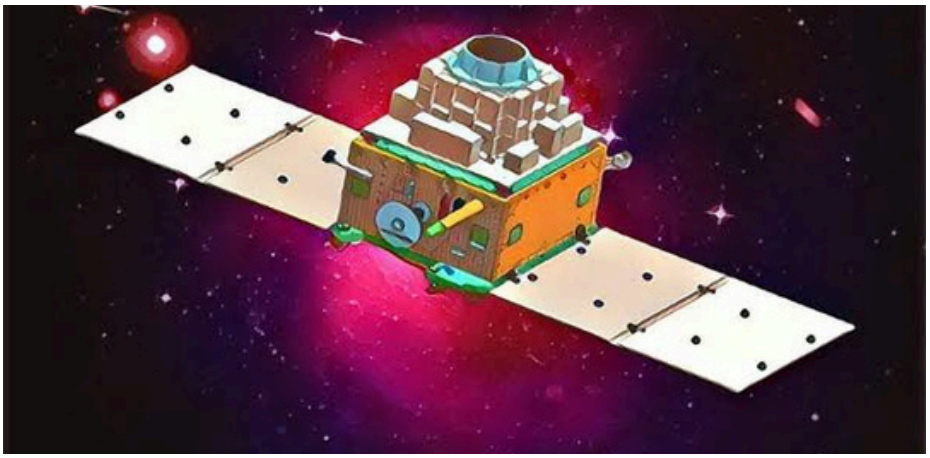


3. X-ray Polarimeter Satellite (XPoSat)



Scan For More Information

There are five capabilities which are most essential for economic development and nation building and if we develop these five capabilities in our students then we will produce a special kind of learner. The combination of five characteristics such as capacity for research, capacity for creativity and innovation, capacity to use high technology, capacity for entrepreneurial leadership and capacity for ethical leadership will result in the development of an enlightened citizen. I hope that the students of SMVDU will imbibe these qualities and become productive and proud citizens of the country.

- Dr. APJ Abdul Kalam
Former President of India
& Great Scientist

On 5th of April 2024 VYOM the Astronomy Club of SMVDU hosted an enlightening Workshop cum Introductory Session focused on telescope. The workshop was organised to bring the universe closer to students and astronomy enthusiasts and the event aimed to demystify the complexities surrounding telescopic observations and inspire a deeper appreciation for the night sky.

The Workshop cum Introductory Session on Telescopes was not only an educational experience but also a testament to the growing interest in astronomy among students. It provided a solid foundation for beginners and offered seasoned stargazers new insights into their passion.

The Astronomy Club expressed hopes that this event would spark a lasting interest in celestial observations, leading to more such gatherings in the future.

Establishment of SMVDU

Shri Mata Vaishno Devi University (SMVDU) has been established under THE JAMMU AND KASHMIR SHRI MATA VAISHNO DEVI UNIVERSITY ACT, 1999. An Act of the J&K State Legislature (ACT No. XII of 1999 dated 12th May 1999) as an autonomous, highly Technical & fully Residential University.

The University started functioning as an academic unit in Aug 2004 when it was inaugurated on 19th August 2004 at the hands of the then Hon'ble President of India Dr. A.P.J Abdul Kalam. Dr. Kalam also delivered the first lecture to the students of the University.

Campus Contact

Shri Mata Vaishno Devi University Campus,
Sub-Post Office, Katra, Jammu and Kashmir 182320

PRO Contact

Public Relations Office, SMVDU, Saraswati Dham,
Rail Head Complex, Jammu - 180012

www.smvdu.ac.in