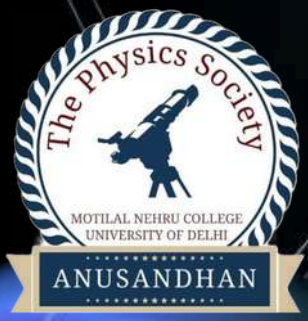

QUANTA

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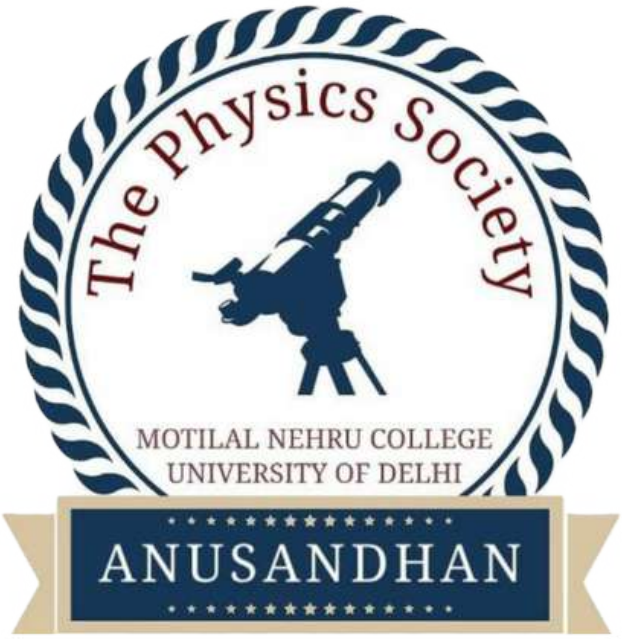
ANUSANDHAN

The Physics Society

Where it all just starts, Physics Accelerates !



DEPARTMENT OF PHYSICS
MOTILAL NEHRU COLLEGE
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PRINCIPAL'S MESSAGE

I am extremely happy and proud of the Department of Physics of our College who is going to publish its annual magazine "QUANTA" this year too. I heartily congratulate the students, teachers and staff of the department for being able to achieve this feat. The Physics department of our college is well known for their timely contributions and excellence in making our college stand with pride, and it is our honor to have such qualified teachers and staff in the department of Physics.

I wish the best for the students of the department and all the members of the Anusandhan Physics Society and pray for their success.

Prof. Yogeshwar Sharma
Officiating Principal,
Motilal Nehru College,
University of Delhi

TEACHER IN CHARGE'S MESSAGE

The initiation of the Magazine – QUANTA 2024 is done with the intention to harbour the scientific temperament amongst students. It serves the need of the hour where innovations along with the pragmatic approach to teaching and learning go a long way in bringing about joyful learning.

I take this opportunity to congratulate students and all the esteemed faculty members who have worked day and night to accomplish this tedious task of compiling the various articles, poems, and other relative information in the form of this Magazine.

Prof. Seema Vats
TIC - Department of Physics,
Motilal Nehru College,
University of Delhi

FROM THE EDITORIAL DESK

Collecting information is a very important part of a human's lifetime. From the basic information of knowing how to hold a spoon to interpreting the mammoth universe, humans are growing day by day and so does their capabilities are. But Science is not about collecting information. It is about organising that information and then systematically interpreting it.
Quanta, our annual magazine is also a book of various informations within itself. But the special part about it, is the fact that it is not just information collection, but a way of explanation of this information.

Inspite of all the challenges we faced, the editorial team is so happy of the fact that, this magazine turned into a reality from a draft of few pages. We would like to thank each and every person involved in making this magazine. The editorial team promises you that, while you read through it, you will be entertained and mesmerised by most of the contents.

In case, the reader has any suggestion or feedback, they may mail us at **anusandhanphysicssociety@gmail.com.** We would be very happy to learn from your reviews and make our next edition better.

Kaustav Kapil
Student Editor,
Quanta 2024

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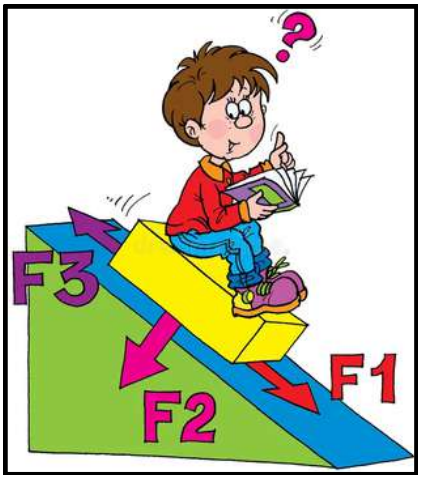
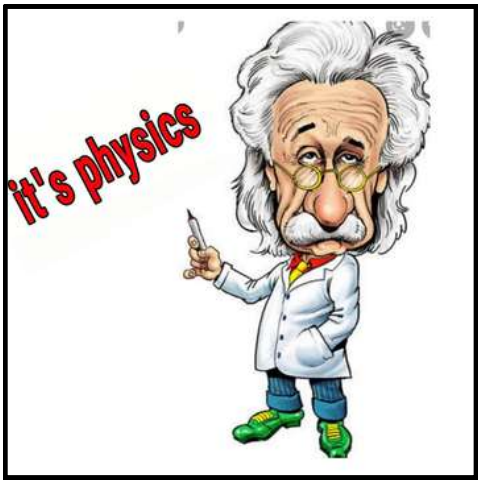




Role of Physics in Vikshit Bharat 2047

Grishika

In the narrative of a nation's development, the role of physics stands as a guiding star, illuminating the path towards progress, innovation and sustainability. Physics, often regarded as the fundamental science, provides the underlying principles and frameworks that drive technological advancements, infrastructure development, and societal transformation. Viksit Bharat is a voice of youth , it's a vision to make India a completely developed nation by the year 2047 and for this understanding the pivotal role of physics becomes paramount. Physics serves as the bedrock upon which the edifice of modern civilization is built. Its principles underpin the functioning of everything from the smallest subatomic particles to the vast expanses of the cosmos. In the context of Viksit Bharat, physics transcends the confines of academic discourse, permeating every aspect of societal advancement.

At the heart of Viksit Bharat lies innovation, and physics serves as the catalyst for transformative ideas. From the development of renewable energy technologies to the creation of efficient transportation systems, it underpins the innovation ecosystem. The principles of electromagnetism, thermodynamics, and quantum mechanics fuel breakthroughs in clean energy, revolutionizing the nation's energy landscape and reducing dependence on fossil fuels .Whether it's the design of high-speed rail networks, the construction of sustainable buildings or the implementation of smart city solutions , physics provides the fundamental understanding necessary for engineering marvels. Concepts such as fluid dynamics and structural mechanics ensures the safety, efficiency, and sustainability of infrastructure projects.

Physics intersects with biology and medicine, driving advancements in healthcare and biotechnology that enhance the quality of life for citizens of the nation . Techniques such as magnetic resonance imaging (MRI) and positron emission tomography (PET) rely on principles of physics to provide noninvasive diagnostic imaging, enabling early detection and treatment of diseases. Furthermore, physicsbased technologies facilitate drug delivery systems, genetic engineering, and regenerative medicine, ushering in an era of personalized healthcare and medical breakthroughs . It's education fosters critical thinking, problem-solving skills, and scientific literacy essential for India's workforce to thrive in a knowledge-based economy. Investment in scientific research and development, supported by academic institutions, research laboratories, industry collaborations, drives innovation and technological advancement in India. By nurturing a culture of curiosity and inquiry, physics education fuels the nation's intellectual capital and contributes to its competitiveness on the global stage.

Physics principles underpin satellite communication and navigation systems, enabling India to develop advanced satellite technologies. Satellites facilitate communication across vast distances, providing reliable internet connectivity, telecommunication services, and broadcasting capabilities to remote regions. Additionally, satellite-based navigation systems like the Indian Regional Navigation Satellite System (IRNSS) enhance transportation safety, logistics management, and disaster response, fostering economic growth and societal development also physics-based satellite technologies bolster India's national security and strategic capabilities. Satellite surveillance and reconnaissance support defence operations by monitoring border regions, tracking security threats, and providing early warning of potential conflicts. Furthermore, satellite-based communication and navigation systems enhance military logistics, intelligence gathering, and battlefield coordination, ensuring the nation's security and sovereignty.

Physics plays a foundational role in India's quest for development by driving technological innovation, enabling infrastructure development, promoting sustainability, advancing healthcare, nurturing human capital, and fostering scientific research. By leveraging the principles of physics effectively, India can realize its potential as a developed nation and address the challenges of the 21st century in a sustainable and equitable manner. Moreover, physics education has nurtured a generation of scientists, engineers, and innovators equipped with the knowledge and skills to tackle complex problems and drive innovation across diverse sectors. By fostering a culture of scientific inquiry, critical thinking, and technological advancement, physics has cultivated India's intellectual capital and positioned the nation as a global leader in science, technology, and innovation.

In essence, physics has been a cornerstone of India's journey towards Viksit Bharat, empowering the nation to realize its full potential and achieve sustainable development for generations to come.

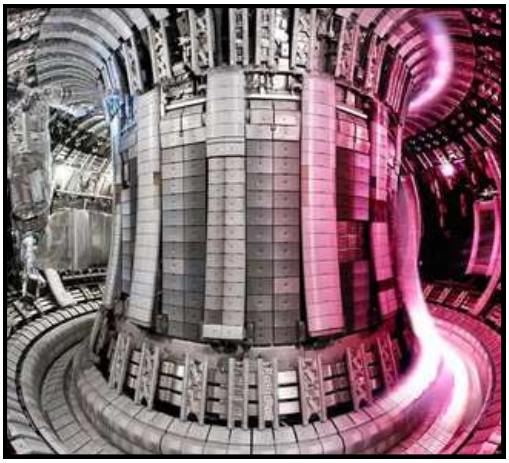
“Science is a beautiful gift to humanity, we should not distort it. Science does not differentiate between multiple races.”

- A.P.J Abdul Kalam

NUCLEAR FUSION : ENERGY OF THE FUTURE

Kaustav Kapil

Energy is a requirement which will be always less the more one can generate. Put some constraints in it, the world will come to a pause following them. Thus, it is crucial that we have a sustainable way to generate energy for commercial use. A way which takes out all the constraints in one go. Imagine a world without coal. You could see earth's environment reviving and getting better, but your AC's and lights aren't working. This is what Fusion can give, your lights and AC's running and zero damage to the environment. We know the sun is a very clean source of energy for us. How about having a little one here on earth only.



The process to make our personal sun is called Nuclear Fusion. Scientifically, Nuclear Fusion is the process in which two nucleuses of very light atoms combine up to form a relatively larger atom nucleus. Think of two wheat doughs which are put together. The dough gets bigger. Sounds so simple right, but practically it is very hard. The simple reason behind the toughness of the process lies in the environment required for it. The sun we all know requires tremendous amounts of pressure and temperature to fuse its fuel of hydrogen.
Nearly 15.7 million ° C and 340 billion times the pressure on earth. To create such extreme conditions is a major task.

Nuclear Fusion is being experimented across various facilities in the world. But commercially it hasn't turned out to be viable till now. International Thermonuclear Experimental Reactor (ITER) located at Cadarache, France is a very ambitious project that aims at creating a viable reactor for commercially making Fusion based energy production a success. With 50 MW of input power, ITER aims at producing 500 MW of output power. India is a member nation is 60+ billion USD project. Including European Union, China, USA, South Korea, Russia, Japan are the other signatories of the ITER agreement. This enables these nations to have data and technology access for their individual research interests.

Nuclear Fusion is mainly carried out through two primary methods. Magnetic Confinement Fusion (MCF) and Inertial Confinement Fusion (ICF). Imagine the gas around you to be so hot that on interaction with your skin, it instantly vapourises you. Such a state of matter (gas) is called Plasma, which are achieved at extremely high temperatures and are electrically and magnetically interactive. High powered magnetic fields can thus interact with this plasma and get a hold on the plasma. This is MCF. This plasma can thus be used to sustain the environment required for fusion.

In ICF, fuel is shot with extremely powerful lasers such that an implosion occurs which results in increasing pressures and temperatures tremendously. Facilities across the world have started working on processes that involve them in one, to increase efficiency. This is the physics behind fusion in the current world.

India is currently investing highly in accelerating the Indian Nuclear Fusion Program. Key projects like SST-1, SST-2 and ADITYA are India's most ambitious fusion research projects. Currently 2.8% of energy demand is filled with Nuclear Energy in India. Department of Atomic Energy of the Indian government is constantly pushing its limit through various projects to increase the nuclear energy capacity to 23,000 MW by the year 2030. Nuclear fusion, when commercially viable, will create a revolution in the energy sector. No carbon emissions, no biohazards, no risk of reactor explosion accidents and good energy output is what Fusion technology promises.

Adopting such energy sources is the decision for a better future. A true initiative for the ambition of a "Viksit Bharat"!

"The important thing is not to stop questioning. Curiosity has its own reason for existence."

-Albert Einstein

DYSON SPHERE

Jitanshu Samal

In the vast expanse of the cosmos, humanity's fascination with harnessing the power of stars has led to the conceptualization of awe-inspiring mega structures. Among these is the Dyson Sphere, a theoretical construct proposed by physicist Freeman Dyson in 1960, which remains a captivating subject in discussions about advanced civilization and energy acquisition. This article delves into the concept of the Dyson Sphere, exploring its origins, variations, and implications for the future of humanity.

Why would anyone construct such a bizarre monstrosity? According to British-American theoretical physicist Freeman Dyson, who first speculated about these putative structures in 1960, an intelligent alien species might consider the undertaking after settling on some moons and planets in their local stellar neighbourhood. The sphere would be composed of a shell of solar panels around the star, making it so that all of its energy radiated would hit one of these panels, where its energy could be collected and used. Thus a Dyson sphere would create not only immense living space, but also gather extraordinary amounts of energy.

Freeman John Dyson

Building a Dyson sphere would be extraordinarily complex, if at all possible. Thus its conception assumed a super-advanced civilization. First, creating the shell would require super strong materials with a tensile strength vastly exceeding any known material to ensure the sphere doesn't tear itself apart. In addition, the sphere would be gravitationally unstable. If any part of the sphere were moved even slightly closer to the Sun, its gravitational binding would be disturbed and part of the sphere would be pulled in towards the Sun.

Types of Dyson Spheres:

While the original concept proposed by Dyson envisioned a solid shell surrounding the star, subsequent developments in the field have explored various iterations and adaptations of the idea. These includes;

1. **Dyson Swarm:** Rather than a single solid structure, a Dyson Swarm consists of a vast array of orbiting satellites or habitats around the star, collectively capturing its energy output. This approach allows for greater flexibility and scalability compared to a single monolithic structure.
2. **Dyson Bubble:** In this variant, a network of interconnected bubbles or habitats encases the star, providing living space and energy collection surfaces. The Dyson Bubble concept offers the advantage of modularity and redundancy, enabling easier maintenance and adaptability.
3. **Dyson Shell:** This represents the original concept proposed by Freeman Dyson, where a solid shell completely encompasses the star, capturing its entire energy output. While theoretically feasible, constructing such a massive structure presents formidable engineering challenges.

The concept of Dyson Spheres stands as a testament to human curiosity, imagination, and ambition. While still firmly rooted in the realm of theoretical speculation, advancements in science and technology continue to bring this once-fanciful idea closer to reality. Whether as a symbol of our boundless aspirations or a practical solution to our energy needs, the Dyson Sphere remains a captivating beacon guiding humanity's journey into the cosmos.

Life Of a Star

Harshvardhan

Stars are like the superstars of the universe, right? They light up space like nobody's business. But have you ever wondered how they do it? Well, get ready to find out, because we're about to break down the whole star life cycle thing. So, here's the deal: stars begin their journey as clouds of gas and dust hanging out in space. But then, gravity steps in and starts pulling everything together, making the cloud collapse in on itself. That's when things really heat up – literally. Nuclear fusion kicks in, and bam! You've got yourself a full-blown star, shining bright in the cosmic sky. But like everything else, stars don't last forever. Some go out in a blaze of glory as supernovae, while others just quietly fade away into things like black holes or neutron stars. It's a wild ride out there in space, and stars are at the center of it all. So, if you're ready to uncover the mysteries of the universe, buckle up and get ready to learn everything about the epic journey of stars.

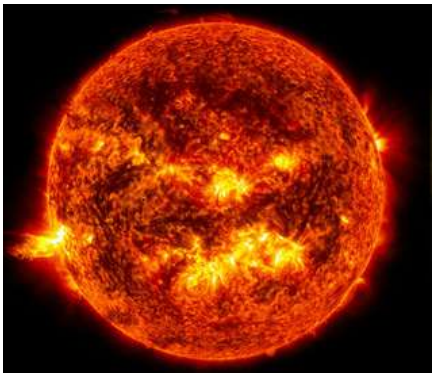
BIRTH: Stars don't just pop into existence out of thin air. Nope, they've got their own journey, just like the rest of us. It's a pretty long one, too, before they end up twinkling away in the night sky, catching our gaze with their mesmerizing beauty.

Nebula: Nebulas are vast clouds of gas and dust scattered throughout galaxies. These clouds primarily consist of hydrogen and helium, along with trace amounts of other elements. These nebulas are the birthplaces of all the stars and planets. Some of the famous Nebulas are Helix Nebula, Crab Nebula and Butterfly Nebula.

Crab Nebula

Gravitation Collapse: Suddenly due to the gravity influence of a nearby star or passing star, can trigger the collapse of a portion of a Nebula. As this happens, the gas and dust within the region begin to collapse under their own gravity.

Protostar: Within the collapsing region, a dense core begins to form. This core consists of the densest part of the collapsing material and serves as the future protostar. As the core continues to collapse, it heats up due to gravitational energy. When the core of a protostar reaches the necessary temperature, nuclear fusion ignites at its center, marking its birth. The protostar is surrounded by an accretion disk, a swirling disk of gas and dust that continuously feeds material onto it. As material falls onto the protostar, it releases a massive amount of energy, generating powerful stellar winds and outflows. These winds and outflows clear surrounding material and shape the environment around the protostar.



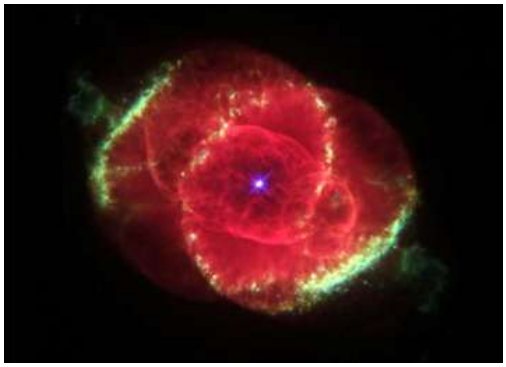
MAIN SEQUENCE AND OLD AGE: After millions of years of traveling through space, a protostar hits a crucial point where what happens next depends on how big it's gonna get. If it's destined to become a supergiant, it might end its life in a massive explosion, lighting up the cosmos in a blaze of glory. But if it's more on the giant side, it might just quietly fade away into nothingness. So yeah, size really does matter in the life of a star.

Small/Medium size Stars: After a protostar finishes gathering all the gas and dust around it, it becomes a fully formed star. One of its possibilities is to be a small or medium size star just like our own star, Sun. As they burn their core fuel, the immense pressure due to nuclear fusion comes into play but gets canceled out due to the gravitational pull that holds the star from expanding out. This is known as Hydrostatic Equilibrium. But after turning all the hydrogen to helium, the pressure becomes so immense that the core starts to contract while the outer layers start to expand causing it to become a RED GIANT and making them look like Yellowish-orange hue.

Large/Massive size Stars: Another possibility is to be a massive star like Rigel and Betelgeuse. The basic life of a large/massive star is the same as that of a small/medium size. The only difference is that instead of becoming a Red Giant, they become a RED SUPERGIANT. However, the size of the star has to be 8 to 40 times more massive than the size of the Sun. As the star's radius increases, its surface temperature drops i.e. below 4100 K (3826°C). This makes them shine with a Red Color.

DEATH AND REMAINS

- **Red Giant:** As the star expands and spending around 1 billion years as Red Giant, its core becomes denser and denser, its outer atmosphere that expanded will eventually fade away in a beautiful Planetary nebula and the core itself will become a White Dwarf which will eventually shed matter and create new nebula to restart the whole star life cycle once again.
- **Red Supergiant:** Same can't be said about the Red Supergiant. As they are more massive, their fuel burns faster and will burn until the core becomes an Iron core. Eventually, that core will just collapse resulting in a huge Supernova. During a supernova, the outer layers of the star are ejected into space, enriching the interstellar medium with heavy elements and leaving behind either a Neutron Star or Black Hole



As we explore the life of a star, we witness its journey from birth to death, shaping the universe as it goes. From the fiery beginnings in gas clouds to the stunning transformations and eventual end, stars leave an unforgettable mark. Their brilliance enriches the cosmos with essential elements and illuminates the mysteries of space. Their stories remind us of the vastness and wonder of the universe, inviting us to marvel at its beauty and contemplate our place within it.

Lost in Time: The intriguing world of Déjà vu

Shubham

“I have been here before”. Have you experienced Déjà vu? That glitch in the matrix! If yes, then you are not alone. For those who have not, this phenomenon might be nearly impossible to even imagine. It is that shadowy feeling that you get when a situation seems familiar. Despite its prevalence, déjà vu remains one of the most enigmatic experiences of humankind, sparking curiosity and fascination across cultures and generations. Introduced by French psychic researcher Emile Boirac in his book “L’Avenir des Sciences Psychiques” (The Future of Psychic Sciences), the French term Déjà vu means – “already seen”.

Imagine entering a place for the first time and feeling you have visited it before for no apparent reason. Everything about it, the people around you, the discussions even – everything feels strongly familiar like you are living through a memory from the past. This is the classic déjà vu feeling that crosses age, gender, and cultural barriers, leaving many to wonder about its origins and significance. Although the precise explanation of déjà vu is still unknown, there are a number of ideas that try to explain this strange feeling. According to a well-known idea, a brief "glitch" in the brain's memory retrieval process causes deja vu. This hypothesis suggests that the brain misinterprets an unfamiliar environment as familiar when it comes to memories from the past, which results in the feeling of déjà vu. According to some fascinating study on brain function, what we interpret as deja vu is a brain misfire that occurs between conception and encoding into memory, meaning that anything we "see" is actually recorded twice: once subliminally and againsuperluminally. This gives us the "feeling" that we have actually seen what we were seeing since our brains had actually experienced it. According to some study data, those who experience deja vu more frequently also tend to travel more and bring along more movies. Since these individuals possess a greater number of memories that could potentially be the origin of deja vu.

You might be familiar with a very similar kind of subjective phenomenon. This is referred to as "the tip of the tongue" experience. When you can't access a word that you believe is right there on the tip of your tongue, ready to be recalled, it's known as the "tip of the tongue experience."

Deja vu is explained neurologically by activity in the temporal lobe of the brain, which is involved in the generation and recall of memories. According to one explanation, deja vu happens when there is a lag in the information that travels from the brain's sensory input regions (such as the visual cortex) to the parts that integrate it into memories (such as the hippocampus).

Typically, the sensory areas process environmental information before sending it to the hippocampus to be stored as a new memory. There might be a hiccup or delay in this procedure, though, in the case of deja vu. This may cause one to have the odd impression that what is happening is a recurrence of a memory from the past, even though it is entirely fresh.

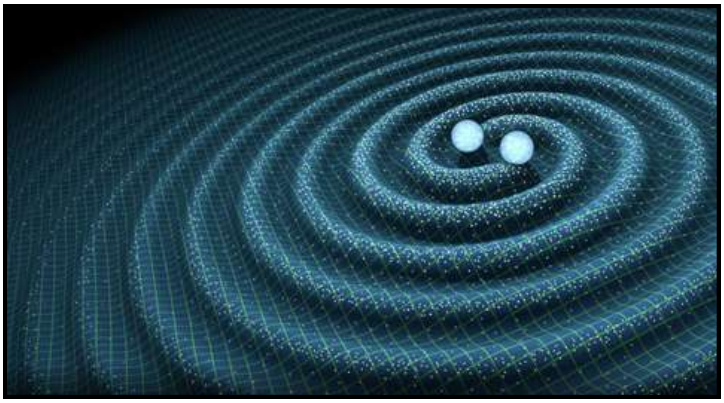
Another neurological explanation involves the concept of familiarity. The brain has a system for assessing the familiarity of a situation, which helps us distinguish between new and old experiences. This system may misfire during déjà vu, leading the brain to interpret a novel experience as familiar. The sense of having been there or done that before may result from a gap between the actual experience and the brain's expectations based on past experiences. Recurring perception may also be triggered by emotions. Certain experts think that having déjà vu can be more likely when one is in an elevated emotional state, such as tension or anxiety. This implies that our emotional states could affect how we view and understand new scenarios, which could result in familiarity-inducing feelings. A few individuals hunt their minds for dreams that resemble their present situations. Some believe that the events presented here are the result of things from previous lifetimes continuing into this one. It is impractical to justify, confound, or question either of the two assumptions. Belief is what determines whether or not this is about past lives.

Numerous literary and artistic creations have been influenced by the enigmatic quality of deja vu, which has captivated the attention of writers, filmmakers, and artists. Deja vu has been portrayed as a supernatural experience that transcends time and space in everything from classic literature to popular movies, adding mystery and suspense to storytelling.

What I conclude is that deja - vu is not related to time itself, but rather a sensuous paradox. Several theories on déjà vu have been proposed by neuroscientists, however, none of them have ever been proven to be true. Deja - -vu remains one of the most intriguing and perplexing experiences known to humankind. Despite decades of research and a plethora of theories attempting to explain its origins, the phenomenon continues to remain unexplained. From neurological theories implicating misfiring in the brain's recognition system to psychological viewpoints relating it to memory and cognition, the quest to understand this phenomenon has sparked the curiosity of scientists and laypeople alike. While we may not yet fully comprehend its mechanisms, the universal nature of deja - vu serves as a testament to the complexity and wonders of humankind.

GRAVITON

Ayush Kant Singh



In particle physics it is believed that every field corresponds to a particle or one can say that field exists because of its fundamental particles exists e.g. electric field due to flow of electrons or ect .
This leads us to a very famous question and prove of the statement above that how particles get mass or why they differ in masses?

A sort of answer or theory to that is given by a very famous british theoretical physicist Peter Higgs in 1964 , he said there is a field (named higgs field) is responsible for that “the more time a particle interacts with this field the more mass it is going to have”. But if that is so true there should be particle that corresponds or represents the higgs field and in 2012 cern announced that they found out a particle now known as higgs boson.

Lets try to understand how particles are detected lets understand the detectors physics in short. A tracking device records tiny electrical signals that particles trigger as they move through the device. A computer program then reconstructs the recorded patterns of tracks. A calorimeter measures the energy loss of the particle. After measuring the momentum and energy loss of the particle we can determine its mass and then their identities.

Graviton is very hard to detect as it doesn’t interact with matter and has very low energy. Graviton can be a potential answer to the mathematical inconsistency physicists as they apply quantum mechanics to gravity

HOW IT WORKS

Physics behind a SPEAKER

Speaker in a device which uses the variance of magnetic field from the solenoid with the help of a permenant magnet to produce sound. We know that when current flows in through the solenoid, magnetic field lines of uniform strength are produced inside the solenoid which is directly proportional to the current and number of turns in he solenoid. By Right Hand Thumb Rule we can see the direction in which the field is produced. Thus we can also alter the direction of polarity by changing the direction of current.

Thus when the changing poles of the solenoid interacts with the permanant magnetic field then a repulsion and attraction force is generated which causes vibrations in the audible range and thus we hear sound.

So greater the current will be, stronger the fields will be. Stronger the fields will be and thus stronger repulsions and attractions forces will be. So ultimately this will cause the vibrations falling in more clearer.

When we increase the volume in the speaker then we increase in the magnetic field strength in the solenoid and vice versa. Better the sound quality, powerful the permanant magnet used along side the membrane used to transmit the vibrations in the air. This is how a speaker works

-Hariom Sharan

Working of Charger Adapter

A smartphone charger adapter is a vital component that allows users to recharge their devices conveniently. It serves as the intermediary between the electrical outlet and the smartphone, converting the alternating current (AC) from the outlet to the direct current (DC) required by the smartphone's battery.

At its core, a smartphone charger adapter comprises several key components working together seamlessly to ensure efficient and safe charging. These components include a transformer, rectifier, voltage regulator, and various safety mechanisms.

Transformer: The transformer is one of the primary components of the charger adapter. It consists of two coils of wire, known as the primary and secondary coils, wrapped around a core usually made of ferrite or laminated iron. When AC voltage from the electrical outlet is applied to the primary coil, it induces an alternating magnetic field in the core. This magnetic field then induces a voltage in the secondary coil, which is used to power the smartphone.

Rectifier: The output of the transformer is still AC voltage, but smartphones require DCvoltage to charge. This is where the rectifier comes into play. The rectifier circuitry converts the AC voltage into pulsating DC voltage. Typically, a bridge rectifier configuration is used, consisting of diodes that allow the current to flow in only one direction, effectively converting the negative half cycles of the AC input into positive ones.

Filtering Capacitor: The pulsating DC output from the rectifier still contains ripples or fluctuations in voltage. To smooth out these ripples and provide a more stable DC output, a filtering capacitor is used. This capacitor charges during the peaks of the pulsating DC voltage and discharges during the troughs, effectively reducing the fluctuations in voltage.

Voltage Regulator: While the filtering capacitor helps to stabilize the output voltage, it may not provide a constant voltage level required by the smartphone. To ensure that the voltage remains within the acceptable range, a voltage regulator is employed. The regulator circuitry maintains a constant output voltage despite variations in the input voltage or load conditions. This ensures that the smartphone receives a consistent and safe voltage level for charging.
Safety Mechanisms: Charger adapters also incorporate various safety mechanisms to protect both the smartphone and the user. These include overvoltage protection, overcurrent protection, short circuit protection, and thermal protection. Overvoltage protection prevents the output voltage from exceeding safe levels, while overcurrent protection limits the current supplied to the smartphone to prevent damage. Short circuit protection detects and interrupts the flow of current in the event of a short circuit, and thermal protection prevents the adapter from overheating by shutting down operation if temperatures rise to unsafe levels.

Overall, the smartphone charger adapter operates by converting AC voltage from the electrical outletinto stable DC voltage suitable for charging the smartphone's battery. It achieves this through a seriesof components including a transformer, rectifier, filtering capacitor, voltage regulator, and safety mechanisms. By ensuring a stable and safe charging process, the adapter plays a crucial role in keeping smartphones powered and ready for use.

-Rohit Punia

Augmented Reality (AR) Glasses

Nowadays technology has turned new tables and AR glasses is one of the advanced gadget in terms of tech. Augmented Reality (AR) glasses are like magic glasses that blend digital images with what you see around you. But how do they work? Let's uncover the science that makes them tick.

AR glasses have special lenses that act like tiny projectors. They take digital images and beam them into your eyes, so it feels like the digital stuff is right there in the real world with you. It's a bit like watching a movie on a screen, but the screen is your glasses, and the movie is all around you!
These glasses are pretty smart. They have sensors that can tell which way you're looking and how you're moving your head. They also have cameras that can see what's happening around you. So, they know where you are and what's nearby. This helps them put digital things in the right place in your real world.
Inside those glasses is a tiny computer. It's super fast and really clever. It takes all the information from the sensors and cameras and uses it to figure out where to put the digital images. It's like a director of a play, telling everyone where to stand and what to do, but it happens really, really quickly!
Finally, designers and engineers put all these parts together in a way that's comfortable to wear and looks cool. They make sure everything fits just right and that the glasses are easy to use. It's like putting together a puzzle, making sure all the pieces fit perfectly. So, that's how AR glasses work! They use fancy lenses, smart sensors, powerful computers, and careful design to bring digital dreams into the real world.

-Parth Khare

POETRY

Dance of the Particles

In the realm where particles dance,
A quantum waltz, a mystic trance.
A world unseen, yet so profound,
Quantum mechanics, truth unbound.

Particles tiny, in waves they sway,
Uncertainty rules, in a peculiar play.
Heisenberg whispers, a cosmic decree,
Precision lost in uncertainty's sea.

Entangled partners, in a cosmic tango,
Spinning in unison, no matter how far they go.
Einstein puzzled, with skepticism in his gaze,
"Spooky action at a distance," a quantum haze.

Schrodinger's cat, in a paradoxical state,
Neither alive nor dead, a curious fate.
A wave function collapses, reality unveiled,
In the quantum theater, truth is exhaled.

Quantum leaps in energy's embrace,
Electrons jump, in a quantum race.
Orbitals dance, a cosmic ballet,
In the quantum realm, where wonders lay.

Tunnelling through barriers, a magical feat,
Particles defy, in a quantum retreat.
Probability clouds, a shimmering ballet,
Uncertainty reigns in the quantum display.

Quantum world, a puzzle so grand,
Wave-particle duality, hand in hand.
In the quantum orchestra, where chaos entwines,
Symphony of the cosmos, where uncertainty shines

– Sudarshan Kumar

Precission of the Universe

Do you believe in God?
The precision of the universe leave me shocked.

Scientists explaining universal phenomenons in different ways.
Still a lot of mysteries hide in the sun rays.

There is a lot of things and phenomenons to discover
There remains a lot of a chapters in this universe to be covered.

– Ritika Sheoran

SCIENTIST WHO PAVED THE WAY

Dr. Narinder Singh Kapany

Imagine a world without fiber optics, where the internet, telecommunications, and medical imaging are but mere shadows of their current capabilities. Such a world would be inconceivable without the groundbreaking work of Dr. Kapany, often dubbed as the "Father of Fiber Optics," yet tragically overlooked in mainstream narratives of scientific history.
Born in Moga, Punjab, India, in 1926, Narendra Singh Kapany possessed an insatiable curiosity and an inborn passion for unraveling the mysteries of light.

His inquisitiveness led him to challenge the notion that light could only travel in straight lines. This questioning spirit eventually drove him to explore optics and fiber transmission and thus, resulted in groundbreaking research in fiber optics! Growing up in Dehra Dun, Kapany was surrounded by a rich educational environment. The foothills of the Himalayas provided a serene backdrop for intellectual pursuits. His teachers and mentors encouraged his scientific curiosity, fostering a love for learning. Later he pursued his higher education at Agra University, India. In 1952, he embarked on an academic journey to Imperial College London, greatly influenced by communication technology of England. At Imperial College, he worked diligently on his Ph.D. degree in optics from the University of London, which he successfully obtained in 1955.

During his time at Imperial College, Kapany collaborated with Harold Hopkins on a project involving Mr. Hopkins' THREORY OF ABERRATION and Endoscope which led to the invention of Optical Fibers. Kapany is credited with coining and popularizing the term "fiber optics" in an article published in Scientific American in 1960. His prolific career resulted in over 120 patents, and he was a member of the National Inventors Council.

Collaborating with Harold Hopkins

A physicist and optical engineer, Hopkins was known for his theoretical prowess and on the other hand Dr. Kapany possessed a practical mindset and an insatiable curiosity.
At Imperial College, Kapany and Hopkins worked tirelessly on transmission through fibers. In 1953, they achieved a significant milestone: high-resolution image transmission through a large bundle of optical fibers. Previous attempts at using fibers for image transmission had limitations, but their technique allowed much better image quality.
Almost simultaneously, Dutch scientist Bram van Heel developed optical cladding, which complemented their work and catalyzed the field of fiber optics.

SCIENTIST WHO PAVED THE WAY

The MISSING Nobel prize

In 2009, Charles Kuen Kao received the Nobel Prize for his work on optical fibers, which built upon Kapany's foundational research. In 1966, Charles Kao made a critical discovery: he demonstrated that fibers of very pure glass could transport sufficient light for long-distance communication. But Dr. Kapany's contributions were foundational. They were more applied and practical, bridging the gap between science and engineering. On the other hand, the scientific community's reaction to Charles K. Kao receiving the Nobel Prize in Physics in 2009 was a mix of admiration, celebration, and some lingering debates. Debates centered on whether Kapany's applied contributions were undervalued compared to Kao's theoretical breakthrough.

Dr. Narinder Singh Kapany was gracious in his response to Charles K. Kao receiving the Nobel Prize in Physics in 2009 for his work on optical fibers. When asked about being overlooked by the Nobel committee, Kapany stated:

"What can you say about this? It is known that Prof. Kao started work in this field many years after me. He faced competition too. I don't think there should be any controversy about it. It is up to the Swedish Academy to decide."

Despite the omission, Kapany's legacy as a pioneer in fiber optics remains significant.

Entrepreneur and Philanthropist

In 1960, Kapany founded Optics Technology Inc., a company specializing in the processes of innovation and technology management. As the chairman of the board, president, and director of research, he bridged the gap between scientific research and practical applications. His entrepreneurial spirit ensured that the breakthroughs made by him and Professor Harold Hopkins in the 1950s would lead to real-world advancements.

Kapany's philanthropic endeavors includes him being the founding chairman and a major funder of The Sikh Foundation for over three decades, promoting Sikh culture, heritage, and arts and running programs in publishing, academia, and the arts, fostering education and cultural understanding.

In summary, Dr. Narendra Singh Kapany's groundbreaking work in fiber optics reshaped the world of communication and technology. His legacy of innovation and determination serves as an inspiration to all, reminding us of the transformative power of curiosity and perseverance. Dr. Kapany's contributions continue to leave a lasting impact, shaping the future of science and inspiring generations to dream big and push boundaries.

Rakshita Singh

SCIENTIST WHO PAVED THE WAY

Anna Mani

“A student of CV Raman, she made independent India self-reliant in measuring aspects of the weather, and helped lay the ground for harnessing solar and wind power as alternative sources of energy.”

Anna Modayil Mani, a pioneering scientist, is a name that is often overlooked in the annals of history. Born on August 23, 1918, in the small town of Pudukkottai, India. From humble beginnings as a young girl fascinated by the wonders of the natural world, she went on to become one of India's most influential and accomplished scientists. Her early life was marked by a deep fascination with the world around her. Growing up in a modest household, she found solace in exploring the wonders of nature that surrounded her.

From a tender age, she exhibited a keen interest in the sciences and was constantly seeking answers to the questions that piqued her curiosity. Her parents, recognizing her thirst for knowledge, encouraged her to pursue her studies and provided her with the support she needed to nurture her budding scientific mind.

Education

Mani completed her Bachelor’s degree in physics in 1939 from Presidency College in Chennai. Her time at college was transformative, as she delved into the intricacies of the subject that captivated her. She was also actively engaged in research and experiments, honing her skills and expanding her understanding of the field.

She then worked as a demonstrator at the Women’s Christian College in the same city. On the advice of a professor, she went to the Indian Institute of Science, Bengaluru, to conduct original research. At CV Raman’s laboratory, Mani studied the spectra of rubies and diamonds. And in 1945, she submitted her doctoral thesis to the Madras University.

Anna Mani's Contributions to Science

Anna Mani's contributions to the field of science span a wide range of disciplines. Her expertise and groundbreaking research in meteorology, solar radiation, and atmospheric physics have left an indelible mark on the scientific community.

One of Anna Mani's notable contributions was her pioneering research in the field of atmospheric physics. She conducted extensive studies on the behavior of atmospheric aerosols and their impact on climate and weather patterns. Her groundbreaking findings provided crucial insights into the complex dynamics of the Earth's atmosphere and laid the foundation for further research in the field.

Mani’s team in 1967, developed the Indian ozone sonde, a balloon-borne instrument to measure ozone levels. For her work on ozone-level measurements from 1960 to 1990, Mani received a citation from the International Ozone Commission. Furthermore, Anna Mani's research extended to the field of meteorology, where she focused on improving measurement techniques and instrument design.

Her innovations in this area have played a crucial role in enhancing weather forecasting accuracy, enabling us to better predict and prepare for natural disasters.

Awards and Recognition:

“I should be most unhappy to wake up without the prospect of some work to do,” “But when I have done it, I enjoy reading and listening to music.” She said in an interview in the World Meteorological Organization bulletin in 1991.

In 1962, she was awarded the prestigious Padma Shri, one of India's highest civilian honors, for her exceptional contributions to atmospheric physics. Her dedication and pioneering work have also been acknowledged by various international organizations, including the World Meteorological Organization and the International Union of Geodesy and Geophysics.

Life of A Lady Scientist!

Notably, she not only excelled in a male-dominated field but also inspired other women to pursue their dreams beyond societal limitations. As she once stated,

“Me being a woman had absolutely no bearing on what I chose to do with my life”

Anna Mani's life was not always about science. She was a nature lover and her pet dogs kept her active. Throughout her life, Anna Mani remained humble and dedicated to her work, never seeking recognition or acclaim. Her insatiable curiosity, unwavering passion, and relentless pursuit of knowledge serve as a testament to the power of perseverance and dedication. Despite facing numerous obstacles and societal constraints, she remained steadfast in her pursuit of scientific excellence.

Anna Mani's journey also underscores the importance of fostering a spirit of curiosity and a love for learning from an early age. By nurturing a sense of wonder and encouraging young minds to explore the world around them, we can inspire future generations to embark on their own transformative journeys of scientific discovery.

– **Rakshita Singh**

SCIENTIST WHO PAVED THE WAY

In the annals of science, few names shine as brightly as G.N. Ramachandran. His groundbreaking contributions to understanding protein structure, particularly in collagen, not only revolutionized our comprehension of biomolecules but also laid the foundation for advancements in DNA research. Because of his visionary personality, he was called by a renowned scientist C V Raman to head the Department of Physics at the University of Madras at the early age of 30.
mysteries and that inspires every field of science to this date.

G.N. Ramachandran, born in India in 1922, displayed an early fascination with science, which led him to pursue a bachelor's degree in PHYSICS from the University of Madras. Thereafter he became interested in collagen and other biomolecules due to his curiosity about how things work at a tiny level. He teamed up with a biochemist and together they studied collagen, a protein found in our bodies, which is like the glue holding our tissues together. By using his physics knowledge, Ramachandran figured out some important things about the structure of collagen. This helped scientists understand more about how our bodies function and led to discoveries that have helped in medicine and other fields.

Throughout his career, Ramachandran received numerous accolades and honours in recognition of his groundbreaking research. His contributions were acknowledged through prestigious awards, including the Shanti Swarup Bhatnagar Prize for Science and Technology, the Padma Bhushan, and the Fellowship of the Royal Society. Additionally, his legacy is honoured through the Ramachandran Institute for Science and Technology, established to further interdisciplinary research and education.

Through his pioneering work on the Ramachandran plot and his insights into protein structure, he has not only expanded our understanding of the natural world but also laid the foundation for countless advancements in medicine, biotechnology, and beyond.
Ramachandran's journey shows how different branches of science can work together to solve big mysteries and that inspires every field of science to this date.

-Annu Priya

The Wind Whispers: Unveiling the Magic of Ionic Wind

Sudarshan Kumar

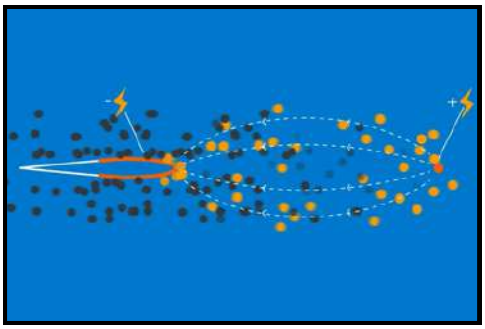
ABSTRACT

Imagine a wind that is not born from the spinning of blades, but rather from the intricate dance between electricity and air. This enthralling phenomenon, known as ionic wind, provides us with a fascinating glimpse into a future where technology harnesses the power of silent gusts, propelling spaceships through the vast expanse of the cosmos and purifying the very air we breathe. In this article, we will delve into the scientific intricacies of this electrifying wind, explore its myriad applications, and catch a glimpse of the exciting possibilities that lie on the horizon.

INTRODUCTION

Ionic wind is the flow of air generated by the interaction of charged particles (ions) with neutral air molecules in an electric field. When a high voltage applied between electrode pairs such as sharp needles or small diameter wires and lesser curved surfaces gives rise to corona discharge around the electrode vicinity. The sharp edge acts as an emitter electrode and the other as a collector electrode. The high electric field around the electrode vicinity leads to electrical breakdown and causes ionization of the gas. The air molecules around the corona discharge region are ionized and driven towards the collector electrode. The ions collide with neutral molecules, resulting in momentum transfer of air. This movement is known as ionic wind.

To achieve higher wind speed, different electrode configurations such as needle–cylinder, needle–plate, wire–plate, pin–mesh, pin–plate, wire–inclined wing, rod–plate, point–parallel plate, wire–wire, point–cylinder configurations with different numbers of needles and arrangements have been designed and developed.



HISTORICAL BACKGROUND

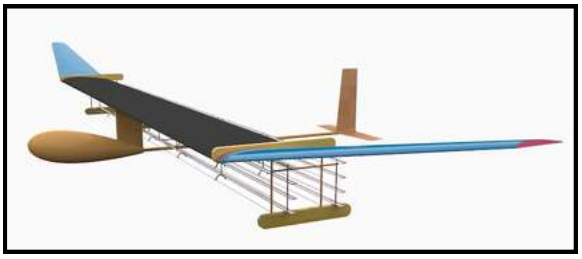
The ionic wind phenomenon has been known for centuries dating all the way to Francis Hauksbee who first observed the “electric wind” phenomena in 1709, with such notable scientists such as Sir Isaac Newton, Benjamin Franklin, and Michael Faraday all recording their own observations of the effect In the modern era, ionic winds began to be considered for practical engineering applications with two seminal publications by Stuetzer (1959) and Robinson (1961), who developed some of the fundamental relations still used today. Though investigations for heat transfer applications enjoyed some attention in the 1960s and 1970s, it is only recently that it has become a viable technological option, with companies such as Tessera Technologies, Inc. and Ventiva exploring technologies for laptop and LED cooling.

SIGNIFICANCE IN PRESENT SCENARIO

The unique capability of ionic wind to surpass conventional limitations is what makes it significant. It provides silent, precise, and often fuel-efficient solutions in various fields, ranging from cooling electronics to propelling spacecraft. Unlike fans, it operates noiselessly, enhancing airflow in confined spaces such as laptops or creating gentle breezes without any disturbance. In the aerospace industry, it enables fuel-free propulsion for satellites and probes, thereby reducing launch weight and cost. Moreover, it holds promise for a cleaner future. Ionic wind air purifiers effectively capture dust, pollen, and even harmful bacteria, while ongoing research explores its potential to neutralize viruses and bacteria in the air. This silent breeze is not merely a scientific curiosity; it represents a whisper of revolution, pushing boundaries in diverse fields and offering a glimpse into a future where air itself becomes a tool for cleaner technology, quieter journeys, and healthier environments.

Applications

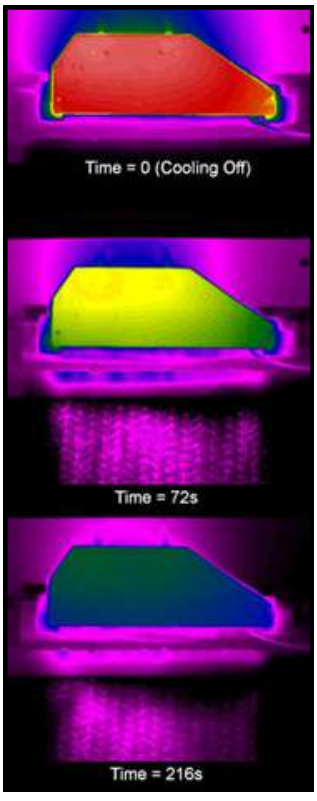
1 . Plane with no moving parts: In a groundbreaking experiment, MIT researchers have harnessed the power of an ion drive, a propulsion mechanism predominantly used in outer space, to propel a model airplane indoors, eliminating the requirement for conventional moving parts. If the technology were to be expanded, it would result in the creation of future aircraft that are significantly safer, quieter, and more manageable. Above all, it would eradicate combustion emissions as the entire process is fueled solely by batteries.



The first flight became a reality thanks to electrohydrodynamic propulsion, a technique that has been in existence since the 1960s. Visualizing this concept is more challenging compared to a conventional spinning propeller, as it harnesses the power of ionic wind.

The thruster generates ions in the air surrounding two electrodes by utilizing extremely high voltages, specifically 40,000 volts in the case of the plane. This process creates an electric field that propels the ions from a smaller electrode to a larger one. As the ions travel, they collide with regular air molecules, resulting in the formation of an ionic wind that propels the plane forward. Notably, since the ions move between stationary electrodes, there is no need for any moving parts to power the aircraft. These features of ionic wind can be exploited to create silent UAVs, drones etc.

2. Tessera's ionic cooler: Laptop users are well-acquainted with the familiar sound of the fan whirring as it activates when the processor's temperature reaches approximately 100 °F. With the continuous trend of smaller and thinner laptops and electronics, researchers are actively exploring alternative cooling techniques that minimize bulkiness and noise levels.



These infrared images show Tessera's ionic-cooling system in action. After the device is turned on, a plume of air carries heat away from the system.

A unique concept involves utilizing ions to generate a cooling breeze by propelling air molecules across a heated microprocessor, thereby effectively cooling the system. While ionic-cooling systems have been previously showcased in research laboratories, Tessera, an international chip-packaging company headquartered in San Jose, CA, has successfully integrated an ionic-cooling system into a functional laptop.

Tessera's ionic cooler is positioned in close proximity to a laptop vent. By utilizing heat pipes, which employ the process of evaporation and condensation of a fluid, the cooler effectively extracts heat from the laptop's processing units and directs it towards the ionic-cooling system. The ionic-cooling device comprises of two electrodes: one that ionizes air molecules like nitrogen, and another that functions as a receiver for these molecules. When a voltage is applied between the electrodes, the ions migrate from the emitter electrode to the collector. As they traverse, their momentum causes neutral air molecules to be propelled across a heated area, resulting in its cooling.

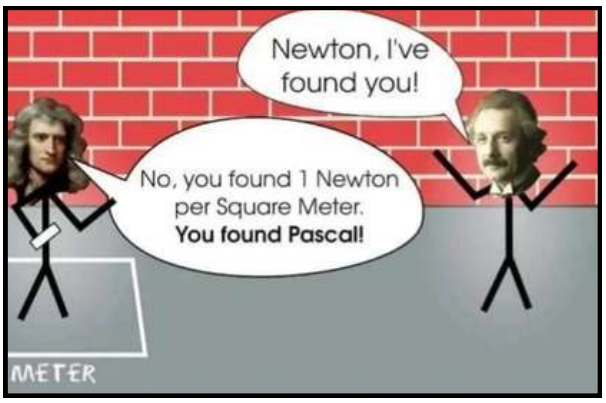
Conclusion:

Whispering a Brighter Future.

We have ventured through the scientific intricacies of this electric breeze, marveled at its diverse applications, and glimpsed the exciting possibilities it holds. From propelling whisper-quiet planes through the cosmos to purifying the very air we breathe, ionic wind offers a transformative vision for a cleaner, quieter, and more sustainable future. But this journey is far from over.

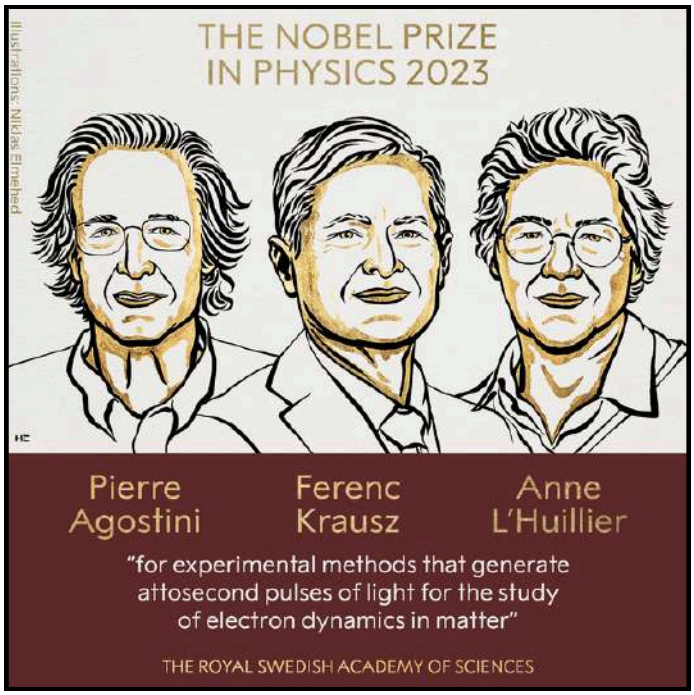
As we close the pages of this article, let us remember that the future is not etched in stone, but woven from the threads of possibilities. In the gentle sigh of the ionic breeze, we hear not just the whispers of the past, but the echoes of a world yet to be. A world where silent flight transcends the bounds of science fiction, where clean air becomes a birthright, and where technology dances hand-in-hand with nature, whispering a brighter future for all.

LAUGH IT OUT LOUD



Nobel Prize in Physics 2023: Shedding Light on the Ultrafast

Harshvardhan



Prize Topic: For experimental methods that generate attosecond pulses of light for the study of electron dynamics in matter.

The Work:

These three scientists revolutionized the field of ultrafast physics by developing methods to create extremely short pulses of light. These pulses, measured in attoseconds (an attosecond is one billionth of a billionth of a second), are brief enough to capture the movement of electrons within atoms and molecules.

Previously, studying these rapid processes was like watching a movie made of still images – the motions were a blur. Imagine trying to understand a complex dance by only seeing snapshots of the dancers' positions.

The ability to generate attosecond light pulses is like filming the dance with a high-speed camera, allowing us to see the individual movements of the electrons with incredible detail. This newfound ability has opened doors to entirely new areas of research, providing scientists with a window into the ultrafast world of electrons:

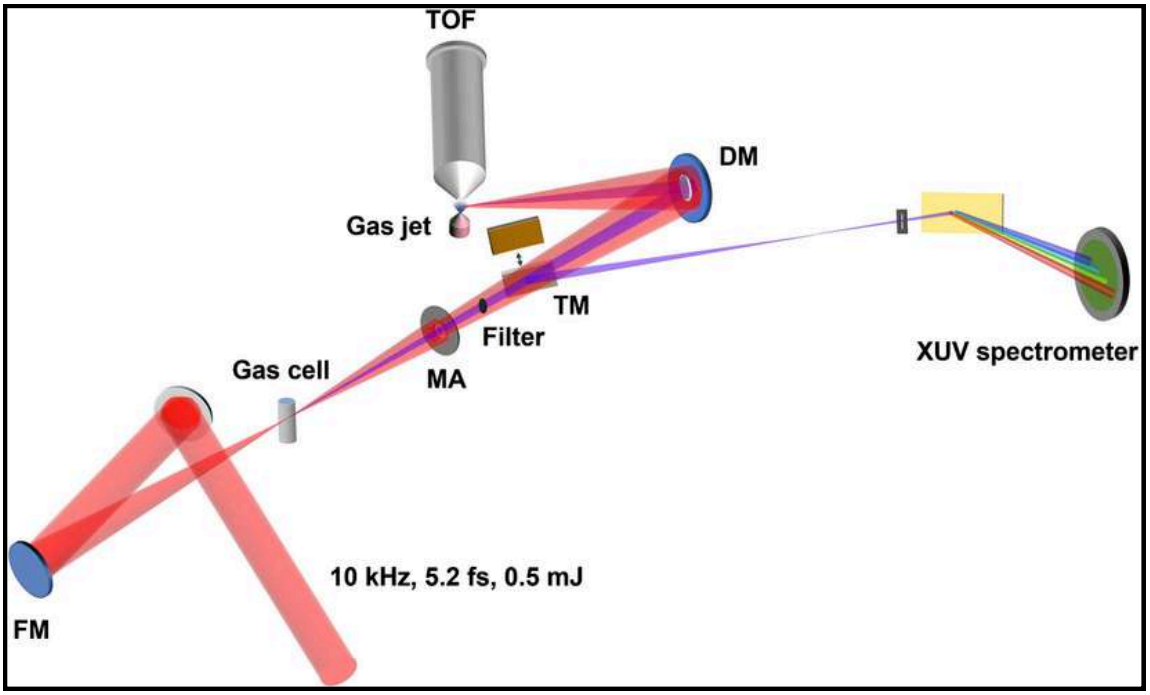
Observing electron behaviour in chemical reactions: Chemical reactions are fundamentally driven by the movement of electrons between atoms. By capturing electron motion on an attosecond timescale, scientists can now observe how these tiny particles interact and rearrange themselves during a reaction. This knowledge is crucial for understanding reaction mechanisms, developing new catalysts, and designing new materials with specific properties.

Tracking electron movement during bond formation and breaking: The formation and breaking of chemical bonds involve the transfer of electrons between atoms. Attosecond light pulses allow scientists to track these electron transfers in real time, providing a deeper understanding of how bonds form and break at the atomic level. This knowledge can be applied in various fields, including drug discovery, materials science, and the development of new manufacturing processes.

Understanding the fundamental properties of matter at its most basic level: Electrons are the building blocks of atoms and molecules, and their behaviour dictates the properties of all matter. By studying electron dynamics with attosecond pulses, scientists are gaining new insights into the fundamental laws that govern the behaviour of matter on the atomic and molecular scale. This knowledge has the potential to revolutionize our understanding of materials, chemical reactions, and even biological processes.

Nobel Prize in Physics 2023: Shedding Light on the Ultrafast

Harshvardhan



Laureate Contributions:

Anne L'Huillier discovered a new effect when intense laser light interacts with atoms in a gas. This effect, known as "high harmonic generation," became the foundation for creating attosecond pulses.
Pierre Agostini built upon L'Huillier's work, demonstrating that high harmonic generation could be used to produce even shorter light pulses than previously thought possible.
Ferenc Krausz took a different approach, developing a method to isolate single attosecond light pulses for further study.

Significance:

The ability to study electron dynamics in real-time has broad implications for various fields, including:
Material Science: By understanding how electrons behave in materials, scientists can design new materials with specific properties, such as superconductors that operate at higher temperatures or ultra-strong, lightweight materials for aerospace applications.
Chemistry: Capturing electron motion during chemical reactions provides fundamental insights into how molecules react and form new bonds. This knowledge can be used to develop more efficient catalysts, create new drugs, and improve industrial processes.
Technology Development: Attosecond science has the potential to revolutionize various technologies. For example, it could lead to the development of more efficient solar cells by optimizing light absorption processes or create new types of lasers with ultra-precise control over light properties.

Jantar Mantar Positional Astronomy Observation Project 2023

Jaskirat Singh

In the 18th century, **King Sawai Jai Singh II** made significant contributions through the creation of unique architectural expressions in the form of massive open-air observatories, commonly referred to as Jantar Mantar. "Jantar" is a colloquial deviation from "Yantra, " meaning instrument, and "Mantar" is derived from "Mantrana, " signifying "to calculate". The king constructed masonry astronomical instruments in the pre-telescopic era, on a grand scale at five locations in India: Delhi, Jaipur, Ujjain, Varanasi, and Mathura to facilitate precise astronomical measurements and predictions.

The Jantar Mantar in Delhi is an astronomical observatory featuring several unique instruments, including the **Samrat Yantra** (a large equinoctial dial), the **Misra Yantra** (a combination of five instruments), the **Jai Prakash** Yantra (consisting of two hemispherical structures), and **Ram Yantra** (consisting two large cylindrical buildings). These prominent instruments are used to measure local solar time, and equatorial as well as ecliptic coordinates of celestial objects, such as the Sun, Moon, Stars, and Planets, with a high degree of precision.

Collectively, these instruments aid in predicting and understanding various astronomical phenomena, including solar and lunar eclipses, solstices, equinoxes, and the positions of stars and planets in the sky.

The roots of this research endeavour can be traced back to the efforts of the late **Dr. Nandivada Rathnasree**, the director of the Nehru Planetarium - Prime Ministers Museum and Library in New Delhi, who in 2004, initiated the revival of the Delhi Observatory for astronomical research with a particular emphasis on positional astronomy.

- **MISRA YANTRA**

Misra Yantra is a combination of five different astronomy instruments or Yantras with varied applications. The instruments are – the Laghu Samrat Yantra, Niyat Chakra, Agra Yantra, Karkarasivalaya Yantra, and the Dakshinottara Bhittin Yantra. The study primarily delved into the intricate functionality of the Niyat Chakra which translates to 'instrument for declination'. It comprises four semicircular marble dials—two on each side of the central staircase, with the staircase itself functioning as a Gnomon.

The marble slabs on the dials are marked by graduations, providing a means to denote degrees of declination when a shadow is cast by the central staircase on either set of the semicircular dials.

Furthermore, these four semicircles do not lie flat but are inclined to the plane of the Delhi meridian at 77.18°W, 69.50°W, 69.42°E, and 77.22°E respectively from the West to the East. It is meant to duplicate the declination readings of celestial objects for the meridian arcs at four global locations that are Greenwich, England; Zurich, Switzerland; Notkey, Japan; and Serichew, Pic Islands.

- **RAM YANTRA**

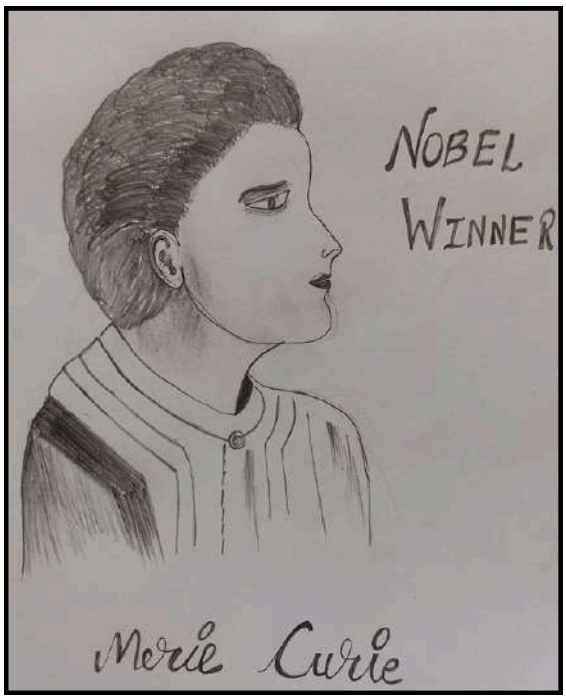
The Ram Yantra, an instrument with two large quadrants, serves to measure the ecliptic coordinates of celestial objects. It's an open structured instrument with its height equal to its radius, viz., 24 feet 6.5 inches. It has a central gnomon of diameter 5 feet 3.5 inches which cast on graduated 30-floor sectors and walls with in-between spaces, viz., 6 degrees. These floor sectors and walls are engraved with scales, subdivided into degrees and minutes. Concentric arcs are drawn on the floor and inner walls for measuring azimuth. Whilst, for measuring altitude, a set of radial lines is drawn on the floor, further inscribed on the inner wall.
Measuring the altitude and azimuth coordinates of the Sun under the JMPAO project has provided valuable insights into the instrument's capabilities and demonstrated the importance of data up to a better accuracy within the percentage error of 0.01 - 0.1 degrees.

As part of the JMPAO project, efforts were dedicated to comprehending the Misra Yantra's function in measuring the Sun's declination along Delhi's meridian during its east-to-west daytime trajectory. It is believed that the instrument is engineered to gauge the Sun's declination within specific time intervals when the sun's rays align closely with either the inner or outer chakra. The observations have provided valuable insights into the instrument's capabilities and the error provoked by several difficulties such as Inaccuracy and dissimilarities in the division scales of both chakras, neglect of refraction correction, and off-pointed gnomon.

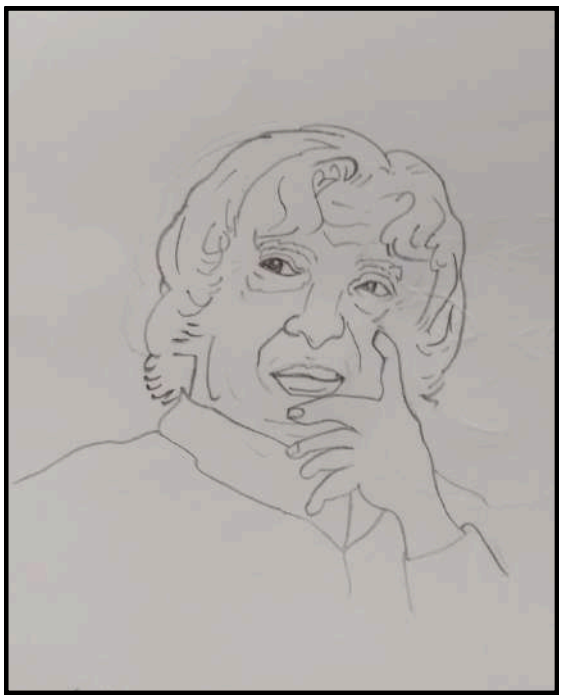
The Jantar Mantar Positional Astronomy Observations (JMPAO) project, spearheaded by the Nehru Planetarium - Prime Minister's Museum and Library in New Delhi, delved into a comprehensive analysis of various Yantras (astronomical instruments). The project, guided by experts in the field, meticulously evaluated the capabilities of these Yantras. The work on Ram Yantra (North building) and Misra Yantra was presented at the 42nd annual meet of the Astronomical Society of India (ASI), which took place in Bengaluru in February 2024.

Two posters were selected for the 42nd ASI annual meet with 4 students of Motilal Nehru College namely Jaskirat Singh, Rakhi Suklan, Kaushal Joshi, Kaustav Kapil being the co-authors of the posters alongside Megha Rajoria who was the guiding light of the project. The posters presented at the ASI meet gained a lot of appreciation throughout the event.
Such projects lays the foundation for students to acknowledge the rich scientific history of India and also allows them to get the mindset of a researcher.

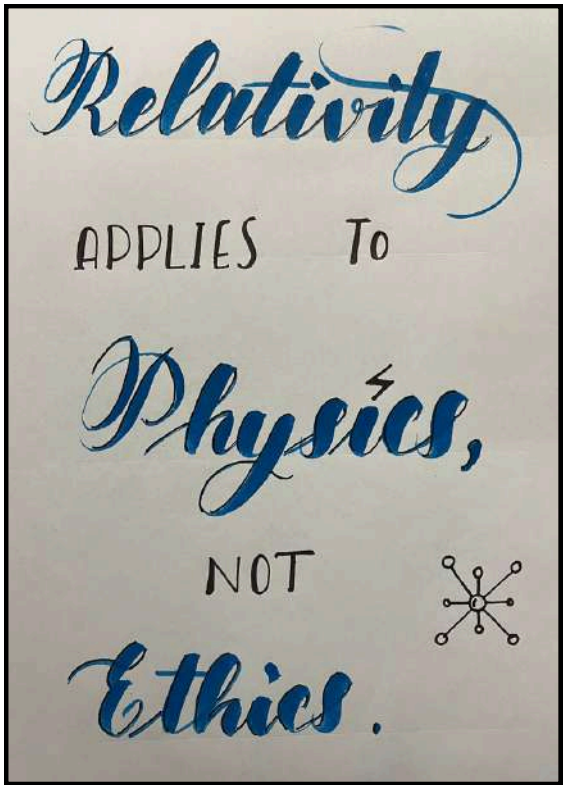
ART & SKETCHES



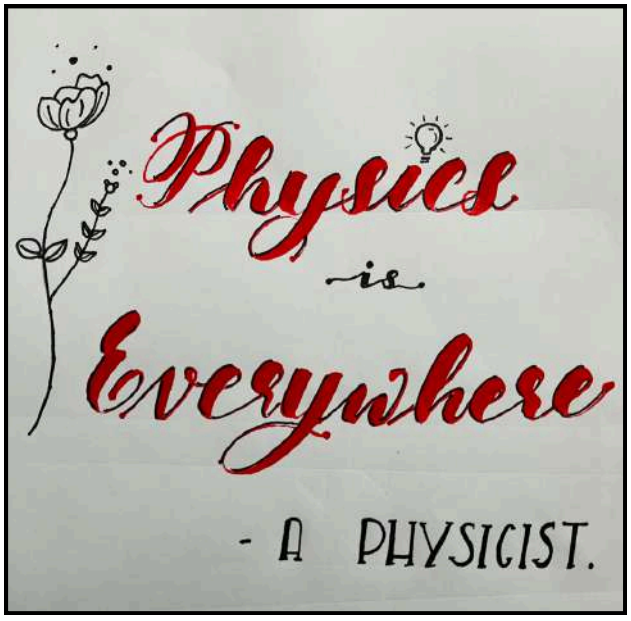
RITIKA SHEORAN



VISHAL



HARSH AGARWAL



HARSH AGARWAL

FRAME OF MEMORIES

Anusandhan Physics Society 2023-24

Faculty 2023-24

FRAME OF MEMORIES

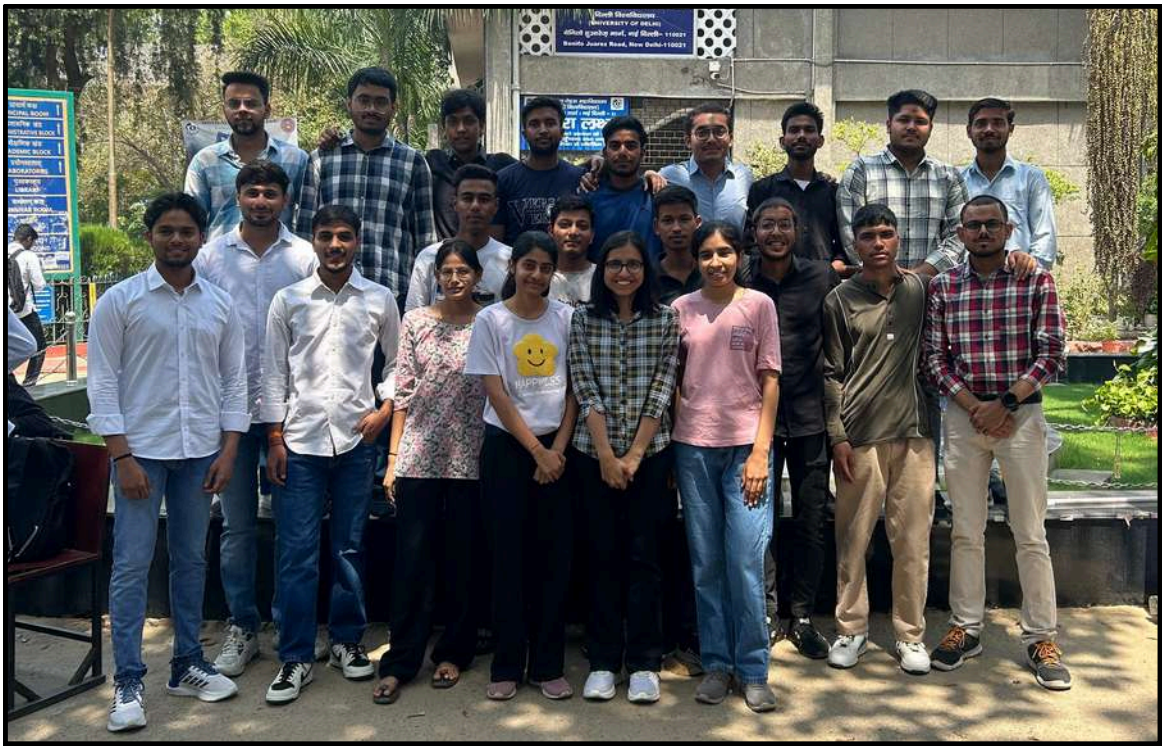
Non Teaching Staff 2023-24

Batch of 2023-26/27 - B.Sc. (H) Physics

FRAME OF MEMORIES

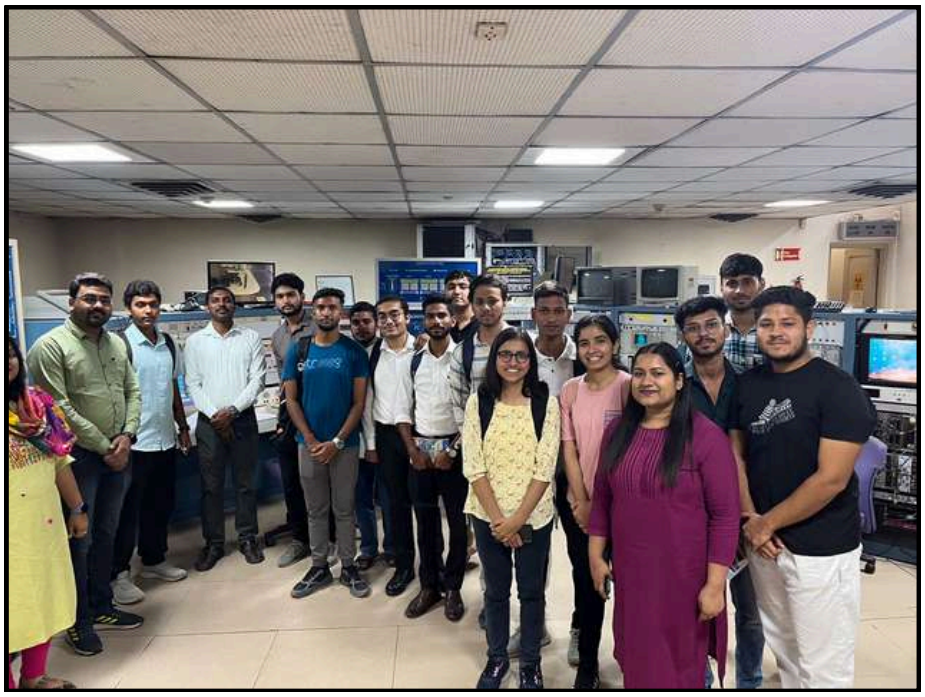
Batch of 2022-25/26 - B.Sc. (H) Physics

Batch of 2021-24 - B.Sc. (H) Physics



Motilal Nehru College at Rashtrapati Bhavan for “Rastrapati Vichar Vimarsh Shrinkhla” lecture by ISRO Chairman - Shri. S. Somanath

Department of Physics, Motilal Nehru College's visit to IUAC, New Delhi



" WITHOUT PHYSICS, UNIVERSE WOULD START FALLING APART "

TEAM QUANTA 2K24

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Rakshita Singh

Vishal

Jaskirat Singh