

DEPARTMENT OF PHYSICS - ANNUAL NEWSLETTER, 2025-26

MACROCOSM

KALINDI COLLEGE
UNIVERSITY OF DELHI

FROM ATOMS
TO INFINITY



from the

TEACHER CHIEF-EDITOR

It gives me immense pleasure to present this edition of Macrocosm, centered on the profound and ever-inspiring theme—"From Atoms to Infinity." Physics, at its heart, is a journey that begins with the tiniest constituents of matter and stretches endlessly into the vast expanse of the universe. This theme beautifully captures the essence of our discipline—bridging the microscopic world of atoms, electrons, and quantum phenomena with the cosmic scale of galaxies, dark matter, and the infinite universe.



Dr. Savita Sharma
Editor-in-Chief

As students and educators of physics, we are constantly navigating between these two extremes. On one hand, we delve into the intricacies of atomic structures, nanomaterials, and quantum mechanics; on the other, we explore astrophysics, cosmology, and the fundamental laws that govern the universe. This seamless transition from the infinitesimal to the infinite is not just a scientific pursuit, but a philosophical reflection of curiosity, imagination, and the human quest for understanding.

At the atomic level, we witness the elegance of nature in its most fundamental form—order within chaos, governed by precise laws and probabilities. As we expand our perspective, the same principles echo across the universe, reminding us of the interconnectedness of all things. It is this unity that makes physics not merely a subject, but a way of perceiving the world.

This edition of Macrocosm is a testament to the intellectual enthusiasm, creativity, and dedication of our students and faculty. The articles, research insights, and contributions reflect a deep engagement with contemporary scientific ideas while remaining rooted in foundational concepts. I am particularly delighted to see young minds exploring innovative themes, questioning established notions, and contributing meaningfully to scientific discourse.

I extend my heartfelt appreciation to the editorial team, contributors, and everyone involved in bringing out this newsletter. Your collective efforts have transformed this vision into a vibrant academic expression. Let this issue inspire all of us to continue questioning, exploring, and expanding our horizons—from the smallest atom to the infinite cosmos.

Wishing you all an enriching and enlightening reading experience.

from the

STUDENT CHIEF-EDITOR

Dear readers,

I think it's kind of insane when you really sit with it- how everything we know exists somewhere between atoms and infinity.

That's the space this issue of Macrocosm lives in. Not just as a theme, but as a feeling. The idea that the same universe that builds something as small and precise as an electron also stretches out into something so vast that we'll probably never fully understand it. And somehow, we exist right in between trying to make sense of both.

What you'll find here is a collection of perspectives that move across that entire scale. Some pieces are rooted in the microscopic, where precision matters and small changes mean everything. Others lean into the vast and abstract, where questions matter more than answers. Together, they reflect something I've come to appreciate more while working on this understanding isn't confined to one scale. It's a continuous stretch, connecting the smallest building blocks to the largest unknowns. There's also something quietly humbling about this theme. The realization that no matter how much we figure out, there's always more and more layers, more depth, more distance. And maybe that's not frustrating. Maybe that's what keeps it meaningful.

We have also included an exclusive interview of our esteemed faculty- Prof. Monika Bassi. I hope you'll find something valuable and inspiring from it.

If, while reading this, you find yourself pausing for a second thinking a little deeper, or just feeling that brief moment of "that's actually wild" then this issue has done its job. From atoms to infinity, we're all just somewhere along the spectrum, trying to understand.

Hope you'll have a good time reading this <3



Suruchi Singh
Student Chief Editor

from the

STUDENT CHIEF-EDITOR

There is something unique about physics. It teaches us that there are always two aspects in which we may view the world – those that we cannot see and those that we cannot imagine. The theme of this issue of Macrocosm is "From Atoms to Infinity." It has nothing to do with scale – small or big. This is the approach that allow one to begin with one object and finish with reflections about everything else.

From simple ideas like electron behavior, we begin a journey that stretches from notebook equations to the wonders of the universe.

All articles of this particular edition of the journal share the same feature – curiosity and thirst for knowledge. Scientifically-oriented articles, imaginative hypotheses, and thought-provoking considerations constitute its content. Exploratory articles raise questions and express amazement toward some physical phenomena. Whether it is a reflection of scientific research, conceptual considerations, storytelling through images, or anything else every article is written by a student who tries to grasp and feel physics rather than just study it as an academic discipline.

And what makes our student journal unique is that it does not tell people what to think about. It gives people a chance to speak up. It reveals how we – the students – view science, how fascinating we find it, how confusing, how creative and enthusiastic. This is not an ordinary collection of articles; it is an attempt to demonstrate how young people learn to view the universe as a combination of logical reasoning and creativity.

Happy Reading!



Afreen Chaudhary
Student Chief Editor

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About the Theme:

From Atoms to Infinity

The theme "From Atoms to Infinity" showcases the large and interesting world of Physics- From the smallest form of matter to the infinite universe, it is a wonderful world where everything is being explored. A journey through the microscopic world of atoms, electrons, galaxies, and the mysteries of space and time.

There is atom on one extreme of this spectrum, the building block of matter and the portal to quantum mechanics, and modern technology. On the other extreme lies infinity, the never-ending universe, all the questions surrounding it, dark matter, relativity and reality itself. These two extremes combined symbolizes the ability of physics to connect the unseen and the unimaginable.

"From Atoms to Infinity" is not only a theme related to physics; it is a celebration of curiosity, discovery, and the pursuit of knowledge without end. Physics is not only a study of the universe; it is a journey of wonder, from the smallest particles to infinity itself.

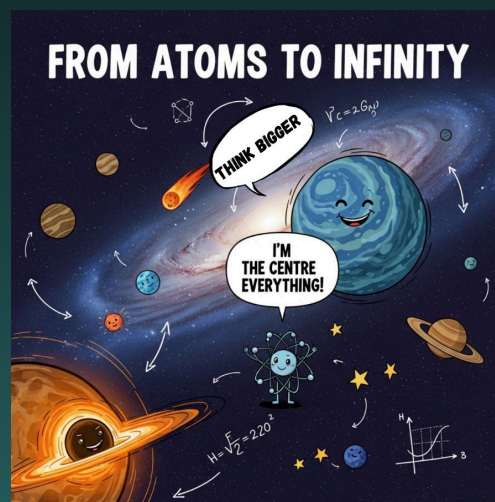


Image Courtesy: Pinterest.com

INSIDE THE ATOMIC REALM WITH SATORU GOJO

The atomic world is weird. Not "a bit confusing" weird, but nothing behaves the way you expect weird. We grow up thinking matter is solid, predictable, and structured. But zoom in far enough, and that certainty dissolves. Inside an atom, there are no tiny balls neatly orbiting a nucleus as you might think. Instead, there are probability clouds where electrons might be. Not are. Might be. At this scale, physics stops giving definite answers and starts speaking in chances.



Image Courtesy: CBR.com

To make sense of this, I'd actually like to borrow an idea from Satoru Gojo- the Honoured One of course. Take his Limitless. The closer something or someone gets to him, the slower it becomes, as if space itself stretches endlessly. You never quite reach him. In the atomic world, something similar happens when you try to pin down an electron. The more precisely you try to locate it, the more uncertain everything else becomes. It's not just a measurement problem, it's how nature works. This idea is captured in the uncertainty principle. You can't know everything at once. If you try to lock down position, momentum slips away. If you fix momentum, position blurs. It's like reality itself refuses to be fully caught.

Now let us talk about Gojo's Six Eyes, which supposedly let him see everything with perfect clarity. Physics quietly disagrees. I swear it's sometimes lowkey frustrating to watch JJK as a physics graduate. In the quantum world, observation isn't neutral. Observing something is not just "looking", it means interacting with it or measuring it. The moment you measure something, you disturb it. You don't just see reality, you change it. So unlike Gojo, we don't get perfect knowledge. We get limits, built into the universe itself. The observer effect talks exactly about this. When electrons pass through two slits without observation then they act like waves and we get an interference pattern. But the moment we observe which slit they are passing through, they start acting like particles and the pattern disappears. So Gojo's six eyes are not possible in the way he has them. It is scientifically not possible. Scientifically, at best, his six eyes would be something that has extremely high precision measurement and causes minimal disturbance to the system.

Moving on to an even stranger topic: **Quantization**. Electrons don't just take any energy they want. They can only exist at specific levels, like steps on a staircase. No standing in between. If they jump, they jump in exact amounts. And this is where Ryomen Sukuna fits in quite well (I don't want to mention him, but I have to, to explain this). Sukuna's power doesn't unfold gradually. It appears in sharp, decisive bursts, each action precise and complete in itself. In a similar way, electrons don't "slide" between energy levels. They transition instantly, absorbing or releasing exact packets of energy. No in-between states, no half-measures. Just clean, discrete jumps. This becomes even clearer when particles are trapped in tiny spaces, like in quantum dots. Here, their behavior is strictly controlled by boundaries. And honestly, this is where

Gojo's Domain Expansion fits in perfectly. His "Infinite Void" traps everything inside a defined space and overwhelms it with information. In atomic systems, confinement does something similar. It forces particles into fixed patterns and discrete states. The rules are strict. The freedom is gone. And suddenly, everything becomes quantized.

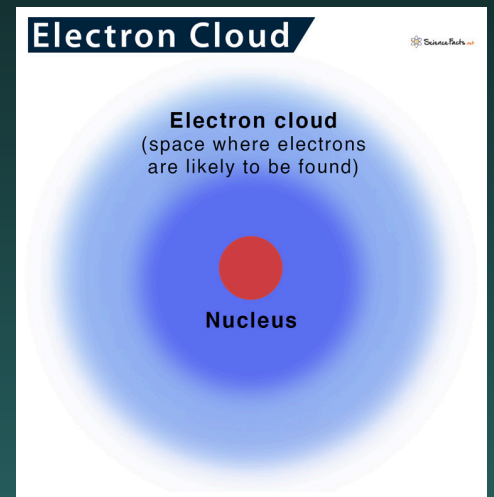


Image Courtesy: Sciencefacts.com

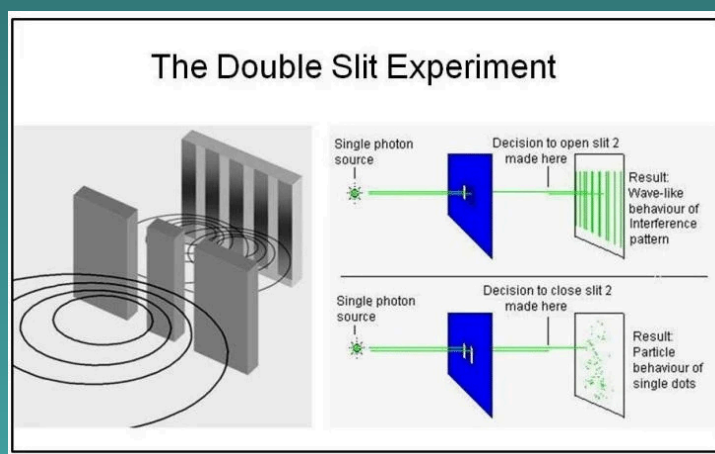
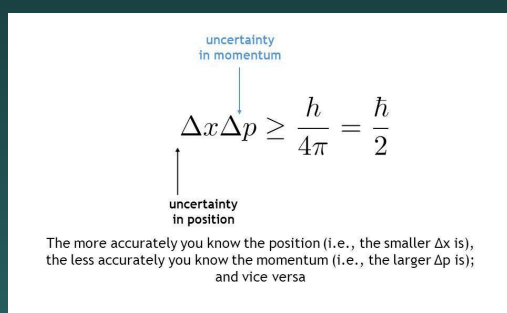


Image Courtesy: researchgate.net

What makes the atomic realm so fascinating is that it refuses to behave like the world we're used to. Things are uncertain, discrete, and deeply dependent on how you observe them. It's not intuitive. It's not simple. But it is consistent. And sometimes, the best way to understand something this strange is to look at it sideways. Through metaphors. Through imagination. Even through characters like Gojo and Sukuna. Because somewhere between atoms and infinity, reality stops being obvious, and starts being interesting and I think that's the fun of it.

HEISENBERG'S UNCERTAINTY

The universe's most basic boundaries hold people back from attaining true understanding of everything. *The Heisenberg Uncertainty Principle states that we cannot know both the position and momentum of a particle at any moment.* The equation $\Delta x \Delta p \geq \frac{h}{2}$ shows that the product of two variables must exceed a certain value. The reality of this situation exists because of fundamental laws which govern the universe. When researchers attempt to observe particles at tiny scales, they cause actual disturbances to those particles. The more we try to find exact locations of the object, the more we lose track of its actual movement. This concept brought about a fundamental transformation in the scientific field of physics. The universe operates through probabilities instead of providing definite outcomes. Even Albert Einstein found this unsettling, yet experiments continue to confirm it. Life itself exists as an uncertain existence which exceeds the boundaries of physics. We plan, predict, and analyze but never with complete certainty. Our pathways through life exist as flexible paths which can change direction at any moment.



The diagram shows the Heisenberg Uncertainty Principle equation: $\Delta x \Delta p \geq \frac{h}{4\pi} = \frac{\hbar}{2}$. An arrow points from the text "uncertainty in momentum" to Δp , and another arrow points from "uncertainty in position" to Δx . Below the equation, a caption reads: "The more accurately you know the position (i.e., the smaller Δx is), the less accurately you know the momentum (i.e., the larger Δp is); and vice versa".

Image Courtesy: medium.com

The concept achieves perfect expression through Schrödinger's cat, which functions as a well-known thought experiment that shows a cat inside a box remains both alive and dead until someone looks inside. The concept sounds impossible, but nature operates on this principle at the quantum level.

Uncertainty serves as a strength which protects knowledge because it shows that the universe contains hidden truths which remain unknown.

SPACE, TIME, & RELATIVITY

People held the belief that space and time existed as distinct permanent entities for more than 200 years. The introduction of Einstein's groundbreaking Relativity theory completely transformed that belief system. Einstein introduced the concept which states that space and time exist as interconnected components of a unified spatial-temporal framework known as space time. The framework of relativity presents a model which shows how massive celestial bodies create gravitational effects through their spatial deformations of time-space fabric.

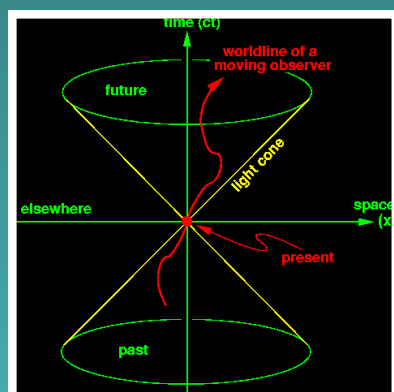
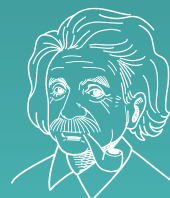


Image Courtesy: einstein.stanford.edu

Time Dilation :

The concept of time dilation stands as one of relativity's most captivating results. Time does not pass at the same rate everywhere. When someone approaches a black hole's extreme mass or reaches near-light speed his time slows down in relation to an observer stationed at a distance.



Relativity :

Relativity provides us with a new framework which enables us to study the universe. The theory describes all celestial movements which include planets and black holes while its principles also support contemporary systems such as GPS technology. Einstein's research demonstrated that space and time possess greater dynamic potential and enigmatic qualities than people previously believed.

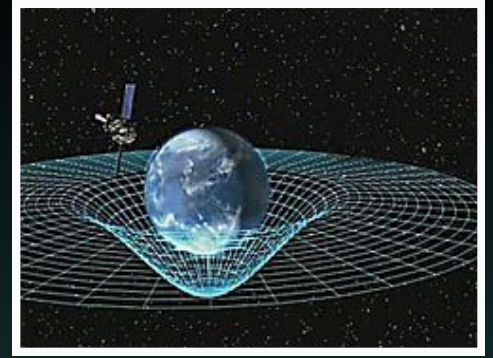


Image Courtesy: wikipedia.org

THE COSMIC FRONTIER

The universe contains an extensive array of hidden secrets which scientists continue to study. The study of the cosmos enables astronomers to perform time-based observations because distant celestial bodies emit light which requires millions or billions of years to travel to Earth. Astronomers believe the universe began with the Big Bang around 13.8 billion years ago. The universe developed into its current state through the process of galaxy and star and planet formation which occurred after that initial cosmic event. Scientists have discovered various parts of the universe, but, as of now, there are still many areas that remain undiscovered.



Image Courtesy: wikipedia.org

Scientists estimate that ordinary matter i.e. everything we see, from stars to planets makes up only a small fraction of the cosmos. The universe contains components called Dark Matter and Dark Energy which scientists do not yet understand but which control the cosmos expansion process and the cosmic structure development.

Scientists use powerful telescopes and space missions and advanced theories to study the cosmic frontier which explains the universe's beginning and its future. Each new discovery expands the boundaries of human understanding.

Researching the cosmos reveals that our universe exists as an expansive space which contains numerous scientific puzzles that scientists have yet to solve.



Image Courtesy: wikipedia.org

INDIAN SCIENCE & FUTURE PHYSICS

India has played an important role in the development of modern physics and continues to contribute significantly to scientific progress. The scientific world received permanent contributions from such great physicists C.V. Raman who discovered the Raman Effect and Satyendra Nath Bose who developed the Bose-Einstein Condensate. Their discoveries advanced theoretical physics and created inspiration for scientific research which continued for generations throughout India and the entire world.

India maintains this tradition through its research institutions and universities and its space exploration programs. The Indian Space Research Organization operates various space missions which include satellite development and planetary research and satellite research.

Indian researchers currently focus on developing new technologies in three fields which include quantum technology and particle physics and astrophysics.

Image Courtesy: isro.gov.in



Image Courtesy: wikipedia.org

India will achieve a positive future for its physics research since the country receives more funding for scientific studies and innovative projects. Young scientists and students now take part in creating new discoveries and technologies. India will enhance its exploration of cosmic mysteries while it advances because its role in space research will increase.

~ SHWETA SHARMA B.SC. (HONS) PHYSICS 3RD YEAR

THE GHOST IN THE MACHINE

The Neutrino Mystery

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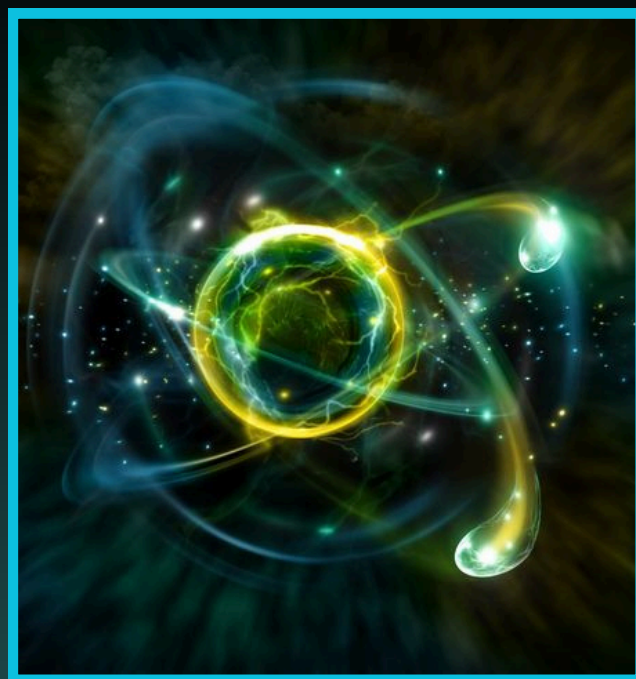


Image Courtesy: techexplorist.com

Introduction

In the vast zoo of subatomic particles, one stands out as the ultimate escape artist: The Neutrino. often referred to as "Ghost Particles", Neutrinos are among the most abundant yet most elusive inhabitants of our universe. At any given second, about 65 Billion Neutrinos are streaming through every square centimeter of your Body. Yet, you feel nothing. Because these particles rarely ever interact with ordinary matter, they can pass through light years of solid lead as easily as a breeze passes through a screen door.

Born From Chaos

Neutrinos are born from high energy events-The nuclear furnace of our Sun, Cataclysmic supernova explosions, and the decay of radioactive elements. Because they carry no electric charge and have a mass so tiny it was long thought to be zero, they travel in straight lines from their source, acting as cosmic messengers from the deep interior of stars.

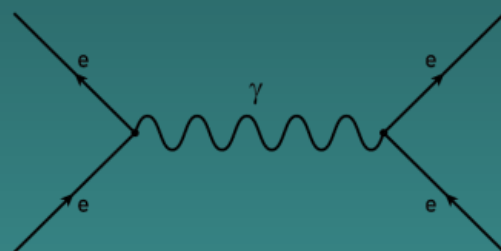
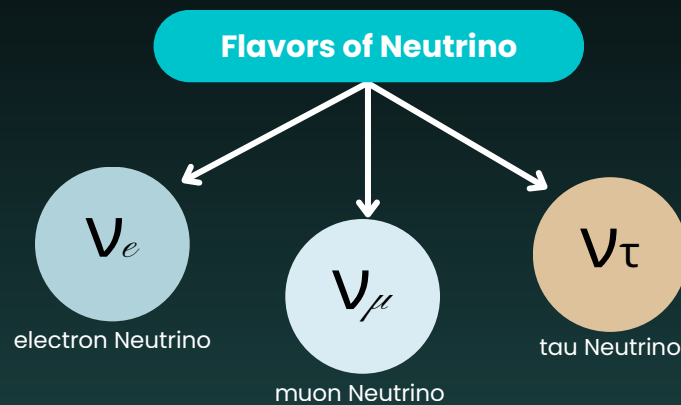


Image Courtesy: shutterstock.com

The Flavor Shifting Paradox

For years, physicist faced the "Solar Neutrino Problem", where detectors on Earth saw only a fraction of the expected neutrinos. The solution revealed a bizarre quantum quirk: Neutrino Oscillation. neutrinos do not participate in the electromagnetic interaction or the strong interaction. Consequently, neutrinos typically pass through normal matter unimpeded and with no detectable effect. Neutrinos come in three 'flavors'-electron, muon, and tau. As they travel at near light speed, they spontaneously morph from one flavor into another.

This discovery was revolutionary because, according to the law of physics, a particle can only change its identity if it experience time, and it can only experience time if it has non zero mass.



Why They Matter

Studying Neutrinos is like looking at the universe's "raw feed". While light from the Sun's core takes thousands of years to reach the surface, neutrinos escape instantly, providing a real time heartbeat of stellar fusion. They may also hold the key to why the universe is made of matter rather than antimatter.

For students of Physics and Engineering, the neutrino serves as a humble reminder: some of the most profound secrets of the cosmos are hidden in the things we cannot see.

About The Author

Saurabh Singh is an integrated M. Tech candidate at the University of Allahabad, specializing in Electronics & Communication. His work focuses on system strategy and Digital infrastructure, ranging from 5G/6G signal optimization to IoT- based resource management for national initiatives.

~ SHWETA SHARMA B.SC. (HONS) PHYSICS 3RD YEAR

ENTROPY - From Thermodynamics to DATA SCIENCE

The Universal Language of Uncertainty

Entropy is a fundamental scientific concept with far-reaching implications. While many view entropy purely as a measurement of disorder, it actually conveys much more information. In essence, entropy describes the number of different possible microscopic arrangements for a given observable macroscopic state. Since the 19th century, we have used this concept to explain everything from steam engines, to now using it to train AI models. The idea of entropy provides an overarching theme in all areas (mechanics, information theory, and probability) and provides a beautiful mathematical description that we can use to understand modern data science!

Entropy in Thermodynamics: The Arrow of Time

The early scientific inquiry into the operations of heat engines that occurred during the Industrial Revolution led to the introduction of entropy into the field of classical thermodynamics. A prominent thermodynamicist, Rudolf Clausius, was one of the earliest scientists to include entropy as part of his thermodynamic theory in order to account for why certain processes can occur spontaneously while other processes cannot. For example, heat flows from hotter objects to cooler objects spontaneously; however, it requires the performance of work by an external agency to reverse the flow and transfer heat from the cooler to the hotter.

The Second Law of Thermodynamics states that in a closed system, the overall entropy of that system never decreases during the course of an experiment (or in nature).

Statistical Mechanics: Entropy as Probability

Ludwig Boltzmann later gave entropy a statistical foundation. He proposed the famous equation:

$$S = k \log W$$

where S is entropy, k is Boltzmann's constant, and W represents the number of microscopic states compatible with a macroscopic configuration. The greater insight is one of astounding magnitude: Nature displays a preference for probability.

Therefore, systems evolve toward a configuration that can occur with the maximum number of possibilities. The probabilistic nature of physics is what has allowed for the development of Quantum Mechanics and the creation of our current understanding of Complex Systems.

Entropy in Information Theory: Measuring Uncertainty

In 1948, Claude Shannon introduced a remarkably similar concept while developing information theory. Shannon sought to quantify the uncertainty in a message. He defined information entropy as:

$$H = - \sum p(x) \log p(x)$$

where $p(x)$ is the probability of each possible message outcome.

The Shannon entropy formula has a very similar mathematical form to the Boltzmann formula for entropy. This similarity is not simply because of coincidence; both information systems and physical systems are described by the same kinds of probability distributions. For example, in physics, entropy is a measure of uncertainty regarding the arrangements of molecules; in communication, entropy is a measure of uncertainty regarding individual symbols within a message.

Entropy in Data Science and Machine Learning

Entropy is an important part of today's data science practices. Decision tree algorithms use entropy to determine how to divide the data in a way that will reduce the uncertainty regarding the target variable.

Entropy measures the degree of impurity of a series of data values. If there is an equal number of positives and negatives in the data set, there would be a high value for entropy. If most of the data values are from one of the two categories, there would be a low value for entropy. Using the entropy measure, the algorithm computes the amount of "information gain," or how much the entropy value decreased after dividing the data set into two segments. The ideal split of the data would be the one with the maximum amount of information gain, which means the uncertainty of the eventual outcome has been decreased the most. Many machine learning models operate by reducing uncertainty in data through entropy-based measures.

Entropy shows up in numerous areas of machine learning outside of just decision trees; e.g., with regularization techniques, probabilistic models and neural networks. In addition, when working with Bayesian statistics, entropy allows one to quantify the uncertainty associated with estimating parameters. When working on reinforcement learning (RL), entropy can be used as a means of motivating behaviour which fosters sample-exploration by creating policies which don't become deterministic too soon into their development.

Overall, today's AI systems have a strong basis in the mathematics of entropy as demonstrated throughout this article.

Entropy and Optimization: A Shared Principle

Both physical systems and artificial intelligence models evolve toward equilibrium under constraints. In thermodynamics, entropy relates to the distribution of energy and the availability of usable energy (free energy). In machine learning, optimization functions guide models toward minimal loss states.

Although the contexts differ, both systems seek stable configurations governed by probabilistic principles. The axiom of maximum entropy states that, given all other things being equal, the probability of being right based on limited data will be highest when it is also the distribution of maximum entropy. This eliminates the risk of adding unreasonable information and, therefore, is the basis of other statistics (such as the Bayesian formalism), including natural language processing. Therefore, the concept of entropy does not only provide for a measure of disorder; rather it also represents the application of logical reasoning based on incomplete data.

Entropy Beyond Science: A Universal Framework

Entropy has applications across various fields, including physics, data science, and biology; and in cosmology, it is used to better understand how the universe will eventually end. One proposed outcome is that if entropy tends to always increase, the universe will eventually stabilize and reach thermodynamic equilibrium, meaning that there would no longer be usable energy available.

Biologists see the link between entropy and evolution, as well as complexity in living organisms. Living organisms maintain low internal entropy by exporting entropy back into their environment. Because of this equilibrium, there is local order created while the overall level of entropy in the universe continues to increase.

Conclusion: The Mathematics of Change

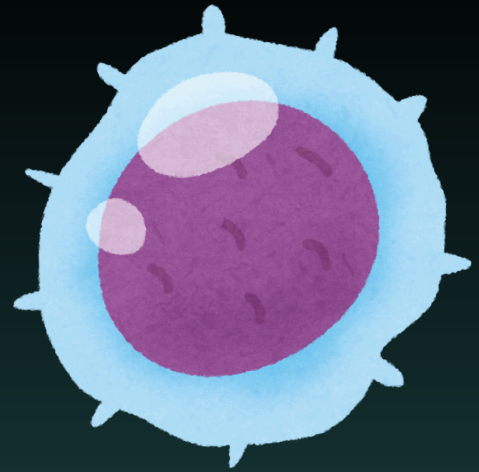
In addition to just being a term used in science, entropy can be seen as the connecting link between a variety of unrelated topics (such as heat engines, information systems, AI and cosmology). The fundamental idea or concept (in this case) is really one of measuring uncertainty and/or probability through entropy. That concept or definition includes how we can describe how things happen in one direction only, how to compress data, and how machines learn through the use of data.

The original use of entropy started with developing a way to define steam engine operation. Now entropy has become an amazing way to define the concept of change, in particular how all things change whether it be molecules colliding within a container or neurons firing off within a neural network. In essence, entropy provides the mathematical basis for understanding how very complex systems develop and change over time.

Entropy is structured out of uncertainty, and in a probabilistic universe, it does not represent chaos, it represents a form of structure that develops out of the uncertainties we see around us. Entropy also demonstrates the existence of a very significant underlying mathematical order to the apparent randomness we experience and provides the connection between data science (your world) with thermodynamics (the physical world), thereby demonstrating that both are subject to the same principles.

BIOPHYSICS AND CANCER TREATMENT

Where Physics Meets Medicine



How Electric Fields and Nanotechnology Are Changing Cancer Treatment

Cancer is one of the most serious health challenges in the world today. According to global health reports, millions of new cancer cases are diagnosed every year, making it one of the leading causes of death worldwide. Traditional treatments such as surgery, chemotherapy, and radiation therapy have helped many patients, but these treatments can also cause severe side effects and may not always successfully eliminate aggressive tumours. Because of these challenges, scientists are exploring new approaches that combine different scientific fields to develop more effective treatments.

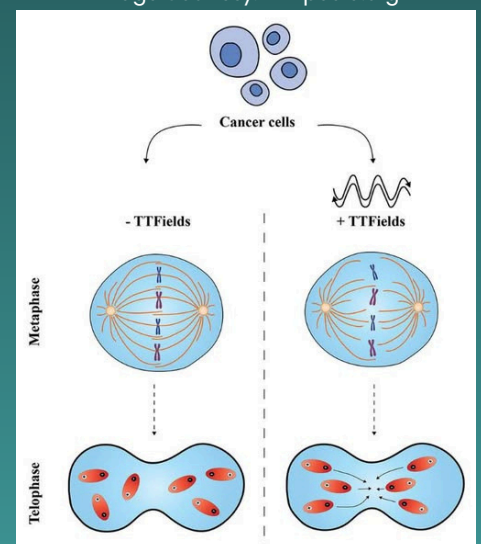
One promising direction is the combination of **biology** and **physics**, known as **biophysics**. This field studies how physical principles such as forces, energy, and electrical interactions influence biological systems. By applying concepts from physics to cancer research, scientists are gaining a deeper understanding of how tumors grow and how they can be treated more effectively.

Cancer develops when normal cells undergo genetic mutations that disrupt the natural regulation of cell growth and division. Instead of dividing in a controlled way, these mutated cells multiply rapidly and form masses of abnormal tissue called **tumors**. Tumors can be either benign or malignant. Benign tumors grow slowly and remain localized, while malignant tumors invade surrounding tissues and can spread to other organs through a process called **metastasis**.

Although cancer has long been considered mainly a genetic disease, modern research shows that physical factors also play an important role in tumor development.

The mechanical properties of tissues, cell movement, and electrical signals within cells all influence how cancer cells grow and spread. Understanding these physical interactions helps researchers design innovative therapies that target cancer in new ways. One of the most innovative examples of this approach is **Tumor Treating Fields (TT Fields) therapy**. TT Fields is a non-invasive cancer treatment that uses low-intensity alternating electric fields to interfere with the growth of cancer cells.

Image Courtesy: wikipedia.org



In this therapy, special adhesive electrodes are placed on the patient's skin around the tumor area. These electrodes are connected to a portable device that generates electric fields with frequencies between **100 and 300 kHz**. The electric fields disrupt the process of **cell division (mitosis)**, which is essential for cancer cell growth. During mitosis, cells form a structure called the **mitotic spindle** that separates chromosomes into two daughter cells. TT Fields interfere with this structure by disrupting microtubules, preventing proper chromosome separation. As a result, the cancer cells fail to divide and eventually die.

Another important effect occurs during the final stage of cell division known as **cytokinesis**. Electric fields create uneven forces inside the dividing cell, causing charged molecules and organelles to move toward the center. This phenomenon disrupts the internal structure of the cell and leads to unsuccessful cell division. Since cancer cells divide much more frequently than normal cells, they are more sensitive to these electric fields.

TT Fields therapy has already been approved for certain cancers such as **glioblastoma**, an aggressive brain tumor, and **malignant pleural mesothelioma**. One major advantage of this therapy is that it produces minimal systemic side effects compared with traditional treatments.

Another rapidly growing area of cancer research is **nanotechnology**. Nanotechnology works with extremely small particles, called nanoparticles, that are measured in nanometers. These tiny particles can be used to improve cancer detection, imaging, and drug delivery.

For example, nanoparticles such as **quantum dots** can help scientists detect cancer cells with high accuracy. Nanotechnology can also be used to deliver anticancer drugs directly to tumor cells. This targeted delivery system allows drugs to reach the tumor more efficiently while reducing damage to healthy tissues.

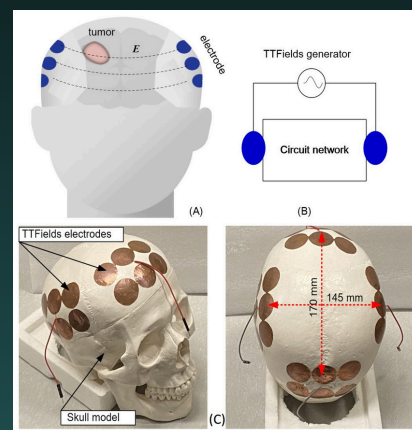


Image Courtesy: peerj.com

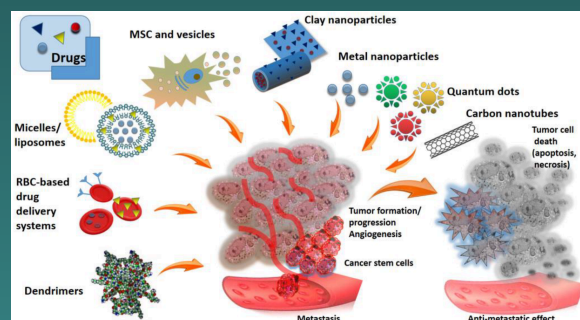
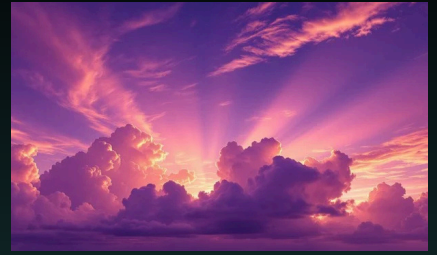


Image Courtesy: wikipedia.org

The integration of **biology, physics, and nanotechnology** is opening new possibilities in cancer research. Innovative approaches such as TT Fields and nanoparticle-based therapies demonstrate how interdisciplinary science can lead to safer and more effective treatments. As research continues, these technologies may play a crucial role in developing personalized cancer therapies and improving survival rates for patients worldwide.

THE FORMATION OF PURPLE TWILIGHT SKY



Radiative Transfer & Atmospheric Scattering.

The formation of purple twilight skies is an advanced atmospheric optical phenomenon governed by electromagnetic wave propagation, wavelength-sensitive scattering, and radiative transfer. Such infrequent color shows, though often seen as aesthetic, are immediate expressions of the basic physical laws at work in the atmosphere of the Earth.

The radiation rays reaching the earth are divided into a continuous range of electromagnetic spectra that range from 380nm (violet) to 700nm (red). When the photons enter the atmosphere, they can be scattered by the atmospheric constituents, which are mostly made up of nitrogen (N₂) and oxygen (O₂) that exist as trace gases, aerosols, and hydrometeors. Since the size of a molecule is very small compared to visible wavelengths, the initial theory of scattering is the Rayleigh scattering theory.

The Rayleigh law states that the intensity of scattering is inversely proportional to the fourth power of wavelength ($I \propto 1/\lambda^4$), and light of shorter wavelengths scatters much more efficiently than light of longer wavelengths. This is provided by selective scattering, which gives the daytime sky its blue sky color. Violet light has a lower visibility than blue; but, since the sun is weaker in the violet spectrum, and the retina is less sensitive, the blue-yellow prevails in human vision.

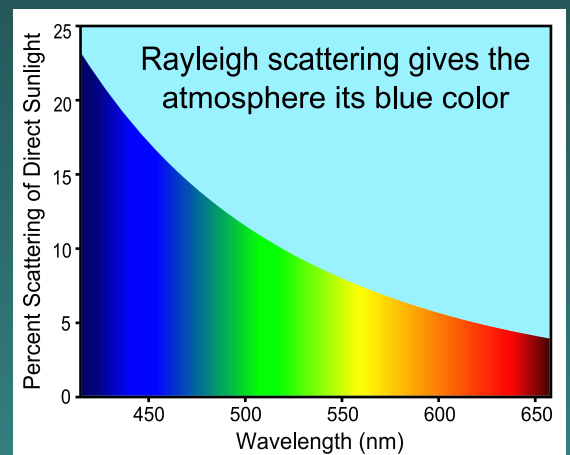


Image Courtesy: commons.wikimedia.org

At twilight, there is a great change in atmospheric geometry. As the solar zenith angle gets bigger, incident sunlight gets a considerably longer optical path length through the troposphere and the stratosphere. In this long path, shorter wavelengths will have more than one scattering event, and they will not be in the direct transmission line. The radiation then passes on to the rest of the world and is consequently spectrally enriched at longer wavelengths, which are mostly red and orange.

Nevertheless, red wavelengths cannot result in purple coloration. Rather, the purple will be generated by spectral superposition. The remaining blue-violet light is not pushed out in the atmosphere and is mixed with the prevailing red light. This system is gathered together by the human visual system to give perceived magenta or lavender.

This effect is physiologically enhanced by the spectral response of cone detectors. Human cones do not have violet receptors, and so purple is formed in the neural response due to red and blue cones being stimulated at the same time.

Besides Rayleigh scattering, Mie scattering is also very vital in the formation of the purple sky. Mie theory is used when it is needed to quantify the scattering of particles with radii similar to the wavelengths used in the visual spectrum, i.e., between 0.1 and 10 micrometers. Examples of such particles are the atmospheric aerosols, mineral dusts, smoke, sulfate droplets, and volcanic ash.

Mie scattering has a weaker dependence on the wavelength and strong forward scattering, unlike Rayleigh scattering. The shorter wavelengths are redistributed back to the observers via aerosols, and this allows residual blues to coexist with transmitted red-incident light. When this occurs, the intensity of purple is greatly increased.

The real-life examples of this mechanism are volcanic activity. In the event of major eruptions, sulfur dioxide and ashes poured to the stratosphere to create sulfate aerosol, and atmospheric optical depth increases. Bright observations of the purple and magenta sunsets were witnessed all over the world after eruptions like Krakatoa (1883). Therefore, these events ensured the contribution of aerosol microphysics to the alteration of radiative transfer.

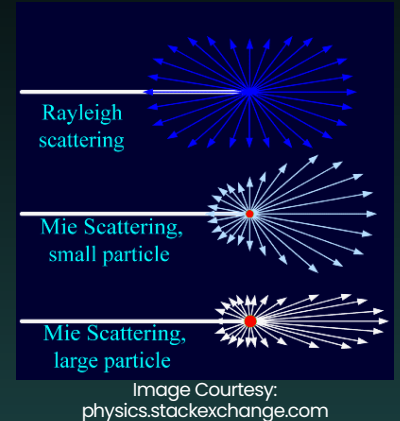
Twilight coloration is also further modulated by cloud microphysics. The glacial cirrus clouds that grow in the high altitude are made up of hexagonal ice crystals that reflect and refract the scattered sunlight in complicated angular distributions. A altostratus and altocumulus cloud in the middle level, having supercooled drizzles, multiplies the number of scattering paths, thus adding chromatic gradients. Reflectance efficiency is dependent on the cloud optical thickness, phase, and effective radius of the particles.

Radiative transfer equation (RTE): The entire process of interaction of radiations with air constituents is represented mathematically as the radiative transfer equation (RTE):

$$dI/ds = -kI + j + \int P(\Omega' \rightarrow \Omega) I(\Omega') d\Omega'$$

where I represents radiance, k is the extinction coefficient, j is emission, and P is the scattering phase function. The equation can only be solved by integrating absorption, scattering, and emission processes in the atmosphere over various layers.

Spectral modification also takes place through absorption. The Ozone only absorbs the waves of the Chappuis bands (500–700 nm) to slightly dampen the yellow-green radiation. The absorption favors transmitted light towards red and blue extremes and, in effect, favors the formation of purple.



There is a heavy force from environmental variables. Changes in scattering efficiency are caused by aerosol loading, relative humidity, atmospheric pressure gradients and temperature inversions. High-humidity hygroscopic aerosol growth causes aerosols to have a larger radius, forming more intense Mie scattering. The effect of urban pollution is the enhancement of twilight coloration and the decrease of aerosol concentration, which causes the attenuation of chromatic intensity, due to the conditions following the rainfall.

Therefore, purple twilight skies are inherent markers of the composition of the atmosphere. Significant optical principles are used in modern satellite remote sensing to retrieve aerosol optical depth, cloud properties, and parameters of radiative forcing. The spectroradiometers are examples of instruments used to measure climate effects as well as energy balance using scattered sunlight.

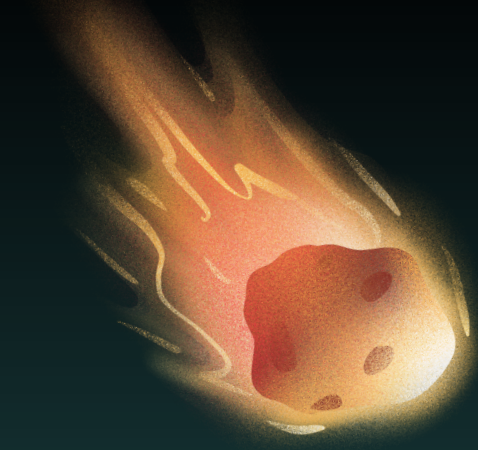
Outside of the relevance to the Earth, these optical processes resemble astrophysical phenomena. The similar physics in interstellar dust clouds is to scatter starlight with analogous physics, creating colors of the nebula under the influence of particle size distributions and wavelength interactions. Therefore, twilight skies are, in a local sense, a universal similarity of radiating processes.

Educationally, the purple sunsets offer real-life examples of the optical properties of waves, including the scattering cross-sections, photon transport, and the thermodynamics of the atmosphere. They depict the scaling up of interactions of microscopic particles to macroscopic levels of distribution.

At the end of the day, there are no accidental purple skies. They are the images of the electromagnetic radiation acting upon a heterogeneous gaseous substance under the strict geometrical conditions. Every twilight is an atmospheric laboratory and shows what interaction takes place between solar radiation, particle physics, and human perception.

These processes elucidate the phenomenon of scientific literacy and appreciation of physics that is inherent in daily life. When the sky gets violet, it outshines photons at astronomical distances, which is subjected to selective scattering and eventually reaches retinal receptors, a quintessential production of innovation in optics, atmospheric, and neuroscience.

Even the fanciest beauty of the moment is forced to obey the inviolable physical laws by purple twilight skies.



What if the asteroid hasn't wiped out dinosaurs?



Image Courtesy: Pinterest.com

Our earth used to be filled with so much greenery & lustre during the time of the dinosaurs. The dinosaurs were dominating earth in huge numbers & ruled earth for more than 200 million years. But one day changed it all when an asteroid the size of mount Everest came towards earth at hyperspeed & crashed into earth. This event wiped out all the dinosaurs & wiped out almost 95% of all life on earth. So, taking in what if scenario, let's consider how different the earth would have been if the asteroid didn't hit earth.

There might not have been enough plant species to support life. Or things could have gone a different way if the asteroid might have been smaller or some dinosaurs might have survived the impact & live on till the earth turns into former conditions again. Then smaller dinosaurs might have survived & evolved to be smaller due to the lack of food available after the impact. They might have been the size of the mammals, still big enough like elephants. We might have seen them still to the present time in wildlife & zoos. The food chain might have been completely different then what we get to see now. They could have been limited to one continent only due to the continental drift. Their eggs might be the largest among all life & it might be served in the restaurants.



Image Courtesy: wikipedia.com

The asteroid might have been deflected towards somewhere else in space & the earth would have been protected from it. Then dinosaurs might have ruled earth for several million more years. The present species like mammals and amphibians might have not come into existence. Every species might have feared the ravage of the t-rex. Earth's food chain might have been disrupted due to the huge numbers of hunting by the millions of dinosaurs bloomed in life.

ARTIFICIAL INTELLIGENCE IN GAS SENSING

Teaching Machines to Smell



What if a machine could smell?

Researchers are developing systems which can identify gases like the human nose although it may sound futuristic. This technology is called Electronic Noses or E-nose.. They use lots of sensors to look at gases. They are being used more and more in factories and in hospitals to check the air.

These Electronic Noses are different from gas sensors, which can only find one kind of gas in the air. The Electronic Nose works by looking at the signals from sensors. For one experiment they used sensors with different coatings, like ZnO , TeO_2 , SnO_2 and TiO_2 . The different coatings make the sensors react differently when they find gas molecules so each gas has its own special sign.

The problem is that these sensors make a lot of data and it is hard to look at it all. That is where Principal Component Analysis or PCA comes in. PCA helps take a lot of data and makes it simpler so we can still see what is important.

Then scientists can use something called Artificial Neural Networks or ANN to look at the signs from the gases. The Artificial Neural Network is like a computer version of the brain and it can find patterns that are hidden which is really useful, for figuring out what the Electronic Noses are smelling or in this case what gases the Electronic Noses are detecting with the help of Electronic Noses. After training the network will be able to recognize gas samples based on their unique reactions. The use of PCA helps to find the important features and ANN helps to classify them making gas recognition very effective.

This technique improves how well the detection method can tell gases apart and makes it more accurate. It also helps the method to work better in life, where gases are usually mixed together not alone. It is an example of how physics, material science and artificial intelligence come together. The combination of these fields leads to an approach, for smart gas recognition. Gases can be detected accurately and selectively using this method. In a world where invisible pollutants and hazardous vapours pose serious risks, teaching machines to “smell” may be one of the most practical innovations of modern science.

PROF. MONIKA BASSI

The inspiration of Physics Students

Q. What first sparked your interest in physics, and how did that curiosity evolve over time?

My interest in physics grew naturally from a deep love for science and a strong comfort with mathematics. Physics appealed to me because it offered logical ways of understanding the world, & I always enjoyed discussing concepts with my teachers & classmates. These conversations nurtured my curiosity and gradually strengthened my connection with the subject.

Teaching is not something I do as a duty, but something that gives me deep joy. I began teaching my classmates during my school days, and this continued through college and up to my M.Sc. Many of my friends would regularly come to my home to study, and explaining concepts to them became a natural extension of my own learning. My classmates often told me that I would one day become a lecturer.

I have never felt that teaching is merely a profession for me—it feels more like a calling. Teaching uplifts me emotionally; even on days when I am unwell or have a headache, standing in front of the class and engaging with students leaves me feeling refreshed and energized. Without medicine, a long lecture often makes me feel better. Over time, physics and teaching became inseparable parts of my life, shaping not only my academic journey but also my sense of purpose.

Q. Who were the mentors or role models who influenced your journey as a physicist and teacher?



I have been fortunate to learn from many inspiring teachers throughout my academic journey, from school to postgraduate studies. Their encouragement, patience, and emphasis on conceptual clarity shaped not only my understanding of physics but also my philosophy of teaching. From them, I learnt that teaching is not merely about completing a syllabus, but about igniting curiosity, building confidence, and helping students believe in their own potential.

Beyond my teachers, my greatest mentors have been my parents. My mother, a graduate in Political Science, pursued her education at a time when higher education for women was far less common and often accompanied by social limitations. Yet she believed deeply in the power of education to transform lives. Her faith in learning was unwavering, and she passed this belief on to all her

children. She taught us that education is not just a path to a career, but a source of strength, dignity, and independence.

My father's constant encouragement, patience, and trust gave me the confidence to move forward even during difficult phases. Together, my parents created an environment filled with love, reassurance, and quiet motivation. Their unwavering support, often expressed without words, has been the strongest pillar of my journey. Whatever I am today is a result of their belief in me, their sacrifices, and their constant reminder that effort and honesty always matter.

As a teacher, I carry these values into my classroom every day. I hope my students feel the same encouragement, warmth, and belief that I was fortunate to receive, because when someone believes in you, learning becomes possible, and dreams begin to feel achievable.

Q. Did you always envision yourself in academia, or did your career path take unexpected turns?

Yes, I always envisioned myself as a teacher. Teaching was never a backup plan or a choice I discovered later; it has always felt like my natural path. I often feel that I was born to teach; it is what gives meaning and direction to my life. I cannot imagine myself doing anything else with the same sense of fulfillment.

For me, teaching has always been the priority. While my academic journey involved growth, learning, & responsibility,

the core purpose never changed. Academia gave me the space to do what I love most: engage with students, share knowledge, and grow alongside them. Rather than unexpected turns, my journey feels like a steady alignment between who I am and what I do.

Q. How has teaching changed since you began your career, both in classrooms and in students' approach to learning?

I began my teaching career as a lecturer in 1997, and over the past 29 years, I have seen tremendous changes in teaching as well as in students' approach to learning. With rapid advances in science and technology, classrooms have become more dynamic, interactive, and resource-rich. Access to information is easier, and learning extends far beyond textbooks.

What I find most encouraging is today's students. They are more informed, intellectually curious, and focused. Students now ask deeper questions, seek conceptual understanding, and are eager to explore ideas independently. Their confidence and exposure to technology have added a new dimension to the learning process.

For teachers, this evolution is a reminder to keep learning alongside students. While methods and tools continue to change, the essence of teaching remains the same – to guide, support, and inspire. When teachers and students grow together, the classroom becomes a shared space of discovery, curiosity, and mutual respect.

Q. Was there a point in your career when you doubted your path or faced burnout? How did you rediscover motivation?

No, I have never truly doubted my path or experienced burnout in the way it is often described. Teaching has always been a source of energy for me rather than exhaustion. Even when the workload was heavy or challenges arose, my commitment to teaching remained unchanged.

What sustained me was the joy I derive from the classroom. Teaching gives me strength and emotional balance; engaging with students, explaining concepts, and seeing their understanding grow has always been deeply motivating. Instead of needing to rediscover motivation, I find it renewed every day through my interaction with students. For me, teaching itself has always been the motivation.



Q. Are there any habits, routines, or hobbies that help you stay grounded outside of academics?

Yes, music and physical fitness play an important role in keeping me grounded. I deeply enjoy singing, especially classical music, & have undergone professional training for 5 years. Music gives me emotional balance and calm, it allows me to disconnect from daily responsibilities and reconnect with myself.

Alongside this, regular exercise is an essential part of my routine. I go to the gym consistently and enjoy a mix of cardio, stretching, and weight training. Physical activity helps me maintain discipline, energy, and mental clarity.

Together, music and fitness keep me balanced and refreshed, enabling me to return to academics with renewed focus and enthusiasm.

Q. Can you share a memorable experience where a student's growth deeply impacted you?

One experience that deeply moved me was an interdisciplinary research project we undertook last year titled "Analysis of Air Quality in Delhi: Examining the Effects of Urbanization on Particulate Matter Concentration." What made this project especially meaningful was that there were two students from the geography department actively involved, working across disciplines to understand a real and pressing problem.

These students went on to present the paper at an international conference on Geospatial Innovations for Biodiversity Conservation, Climate Resilience, & Sustainable Development Across Multi-Domain Ecosystems held on April 9, 2025. Watching them present their work with such confidence, clarity, and maturity on an international platform was an immensely proud moment for me. Their growth - from learning research methods to communicating their findings so effectively - reassured me that we had truly helped shape them as young researchers.

Moments like these remind me why teaching and mentoring are so rewarding. Seeing students evolve into confident thinkers and presenters is far more fulfilling than any personal achievement, and it reinforces my belief in the power of guidance, trust, and interdisciplinary learning.

Q. How do you make complex topics more accessible and relatable?

I always begin at the ground level. Before introducing any new or advanced concept, I make sure that students are comfortable with the basics, often revising ideas they have already studied in their school syllabus. This helps build confidence & creates a common starting point for everyone in the classroom.

I use many examples and encourage open discussion, making the classroom highly interactive. By inviting questions and allowing students to think aloud, I try to turn learning into a shared process rather than a one-way delivery. Breaking complex ideas into simple steps and connecting them to familiar experiences helps students overcome hesitation and develop clarity. My aim is to make students feel that physics is approachable, logical, & something they can genuinely enjoy.

Q. What advice do you give to students who feel intimidated by physics?

I always tell students that there is absolutely no need to be afraid of physics. Fear usually arises from gaps in basic understanding, not from the subject itself. Once the fundamentals are clear and concepts are approached step by step, physics begins to feel logical & manageable.

I also often tell my students, half-jokingly, that nobody has ever suffered by learning physics & that I am standing right in front of them as proof, still alive after studying and teaching physics for so many years. This usually brings a smile and helps break the fear barrier. I encourage students to ask questions freely, make mistakes, & engage without hesitation. When fear disappears, curiosity takes its place, and physics becomes not only understandable but enjoyable.

Q. One experiment or demonstration you never get tired of explaining in class?

There isn't a single experiment that I can point to, as I genuinely enjoy teaching a wide range of experiments & demonstrations. I particularly enjoy conducting digital electronics experiments, as they help students understand how simple logical ideas combine to form complex systems.

Analog electronics experiments - especially those involving operational amplifiers and multivibrators - are equally engaging, as they create a clear and satisfying connection between theory and real hardware.

I also enjoy teaching abstract concepts from mathematical physics, such as complex numbers and conformal transformations, by visualizing them using Python. When students see these ideas represented through code and simulations, their initial hesitation often transforms into curiosity and confidence. For me, the real joy of teaching lies in witnessing that moment when theory, experimentation, and computation come together in a meaningful and memorable way.

Q. If you weren't a physicist or teacher, what alternate career might you have chosen?

I have never really imagined myself in any other profession. Teaching has always been my first and only choice. It is not something I see as a job, but as a passion that gives meaning to my life.

From the very beginning, I felt naturally drawn to teaching, and over time, that feeling only grew stronger. The classroom is where I feel most fulfilled and connected. For me, there was never a second option, because teaching, in itself, has always been the destination.

Q. A physics concept you find most beautiful or elegant?

One of the most beautiful and elegant ideas in physics, in my view, comes from the theory of relativity. What fascinates me most is how it challenges our everyday understanding of time and reality. Concepts such as the twin paradox beautifully illustrate how time is not absolute, but depends on motion – an idea that is both counterintuitive and profound.

Another striking example is the presence of mesons detected at the Earth's surface. These particles are produced high in the upper atmosphere when cosmic rays collide with air molecules, yet they are observed in laboratories nearly ten kilometres below their point of origin. According to classical expectations, they should decay long before reaching the Earth. Their very presence is a direct and elegant demonstration of time dilation predicted by relativity.

What makes these ideas especially beautiful is that they are not just theoretical curiosities – they are experimentally verified truths. Relativity shows us that nature is far richer and more surprising than our intuition suggests, and that elegance in physics often lies in ideas that reshape how we understand the universe itself.

Q. Finally, what message would you like to share with students aspiring to build a future in science?

I would like to tell students that science is a journey of curiosity, patience, and honesty. Do not be afraid of challenges; every difficulty you face while learning science is shaping your thinking and strengthening your understanding. Focus on building strong fundamentals, ask questions freely, and never hesitate to explore beyond the syllabus.

Science rewards those who are curious and persistent. It is not about being perfect, but about being willing to learn, unlearn, and learn again. If you approach science with sincerity and passion, it will open doors you never imagined. Most importantly, enjoy the process of learning, because when learning gives you joy, success follows naturally.

Astrophysics Facts

If Cosmic Objects were People

BLACK HOLE *The Serial Killer*

The charming and attractive one that pulls you in, manipulative enough to leave no way out.

With one of the strongest gravitational fields known, it does not simply pull objects, it curves spacetime itself so severely that all possible future trajectories point inward once the event horizon is crossed. The event horizon is not a physical surface but a causal boundary beyond which escape is impossible, because doing so would require exceeding the speed of light.



Image courtesy: astrocamp.org

The gravity near a black hole also varies sharply across space, producing extreme tidal forces that stretch and compress objects in a process known as spaghettification. To an outside observer, time appears to slow down for objects approaching the event horizon due to gravitational time dilation, making their escape appear to freeze indefinitely.

DARK MATTER *The Illuminati*

Perfect 'theory' material, invisible but influences everything.



Image courtesy: news.ucsc.edu

It does not emit, absorb, or interact with electromagnetic radiation, making it completely invisible to direct observation. Its presence is inferred through its gravitational influence on visible matter, radiation, and the large-scale structure of the universe.

Galaxies rotate at speeds that cannot be explained by the gravity of visible matter alone, without additional unseen mass, they would fly apart.

Dark matter provides the extra gravitational binding needed to hold galaxies together and is believed to make up about 85% of all matter in the universe. It forms massive halos around galaxies, quietly governing their structure and motion without ever revealing itself directly.

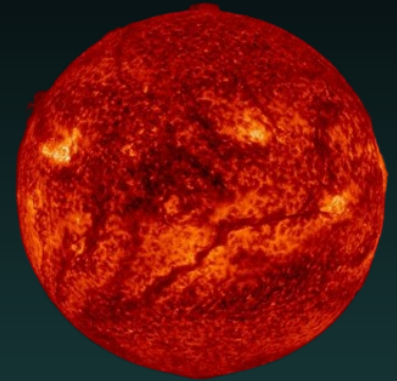
RED GIANT *The Ones with a Mid-Life Crisis*

Stable for several years, followed by a sudden pivot destroying all that it built.

Red giants form when a star exhausts hydrogen fuel in its core, disrupting the equilibrium between inward gravitational collapse and outward pressure from nuclear fusion. With fusion no longer occurring in the core, gravity causes it to contract and heat up, while hydrogen fusion continues in a surrounding shell.

This additional energy causes the outer layers to expand enormously, sometimes extending hundreds of times the star's original radius. As the surface expands, it cools and emits redder light.

During this phase, the expanding star can engulf nearby planets. Our Sun is expected to enter this stage in about five billion years.



NEUTRON STAR *The Angry Delinquent*

The violent one that you don't want to pick a fight with.



Image courtesy : esa.int

Created when massive stars exhaust their nuclear fuel and undergo gravitational collapse during a supernova explosion, neutron stars are remnants where gravity has compressed matter beyond atomic structure. Protons and electrons are forced to combine into neutrons, forming an object supported by neutron degeneracy pressure.

Despite containing more mass than the Sun, neutron stars are only about 20 kilometers in

diameter, making them extraordinarily dense. Their rapid rotation and extremely strong magnetic fields accelerate charged particles and emit intense radiation beams. In some cases, these beams sweep across Earth in precise intervals, observed as pulsars.

STARS *The Ex you Can't Move On From*

Its perception is stuck in the past, present state ignored.

Light travels at a finite speed, meaning observing distant stars is equivalent to looking back in time. A star located millions of light-years away is seen as it existed millions of years ago, not as it exists now. This delay occurs because information cannot travel faster than light.

As distance increases, so does the time delay between emission and observation. Many stars visible in the night sky may no longer exist in their observed form, but their past state continues to propagate outward through spacetime.

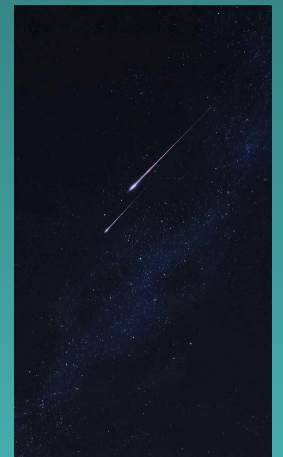


Image courtesy : esa.int

When I Look at the Universe !!!

When I look at the universe,
I don't see stars anymore.
I see questions
unanswered, ancient, patient.

Sometimes I feel
the universe is looking back at me,
curious about its own reflection
in a pair of human eyes.

They say we're made of stardust,
but I think
I'm made of questions
burning quietly,
just trying to last a little longer
before fading into understanding.

In class,
when equations fill the board,
I don't just see numbers.
I see stories
of motion, of time,
of how even chaos follows rules
we're still learning to read.

When I study gravity,
I think about how everything falls
apples, people,
and sometimes, beliefs.

In thermodynamics,
I see heartbreak
energy changing form,
never lost,
just not where it used to be.

Maybe that's why I love physics.
It doesn't lie.
It doesn't pretend to know everything.
It just observes,
measures,
waits.

And somewhere between
the atoms and the galaxies,
between Newton's apple
and Einstein's dream,
I realise
the universe isn't cold.
It feels.
And somehow,
so do I.

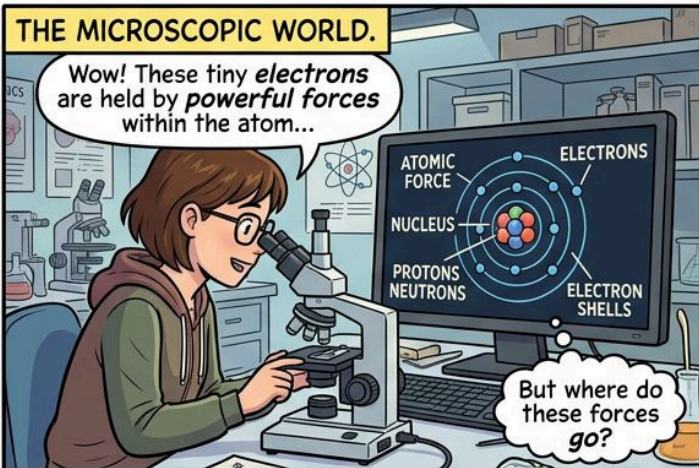
~ Jyotsna Bhatia
B.Sc. Physics (II Year)

Author's Note: Jyotsna is a second-year Physics honours student who believes science and poetry speak the same language both seek meaning in the unknown.

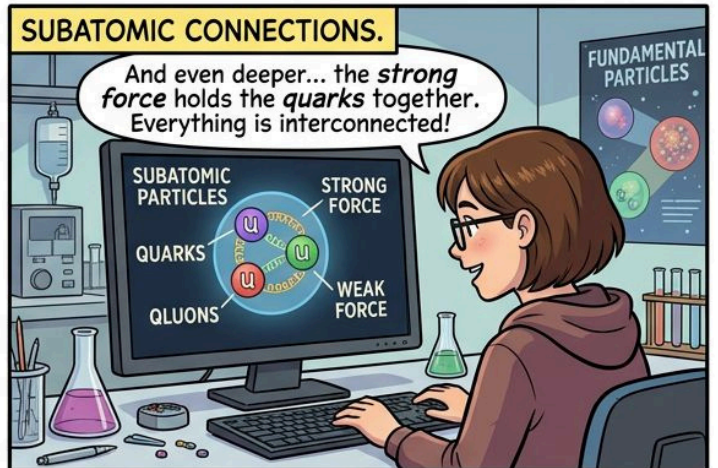
FROM ATOMS TO INFINITY

A STUDENT PHYSICS MAGAZINE

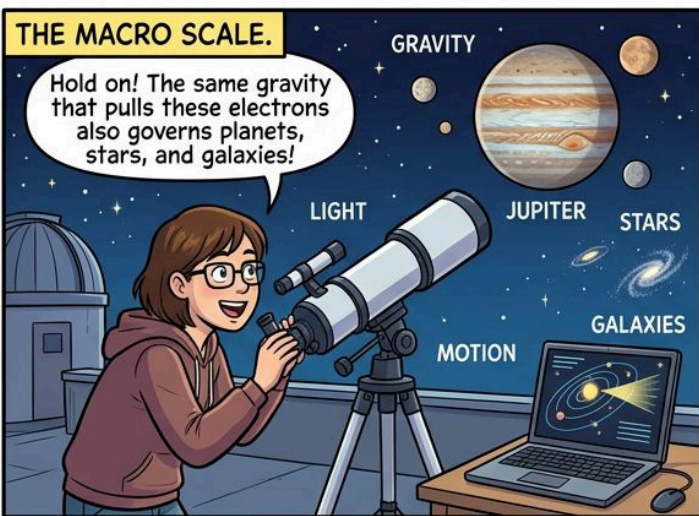
THE MICROSCOPIC WORLD.



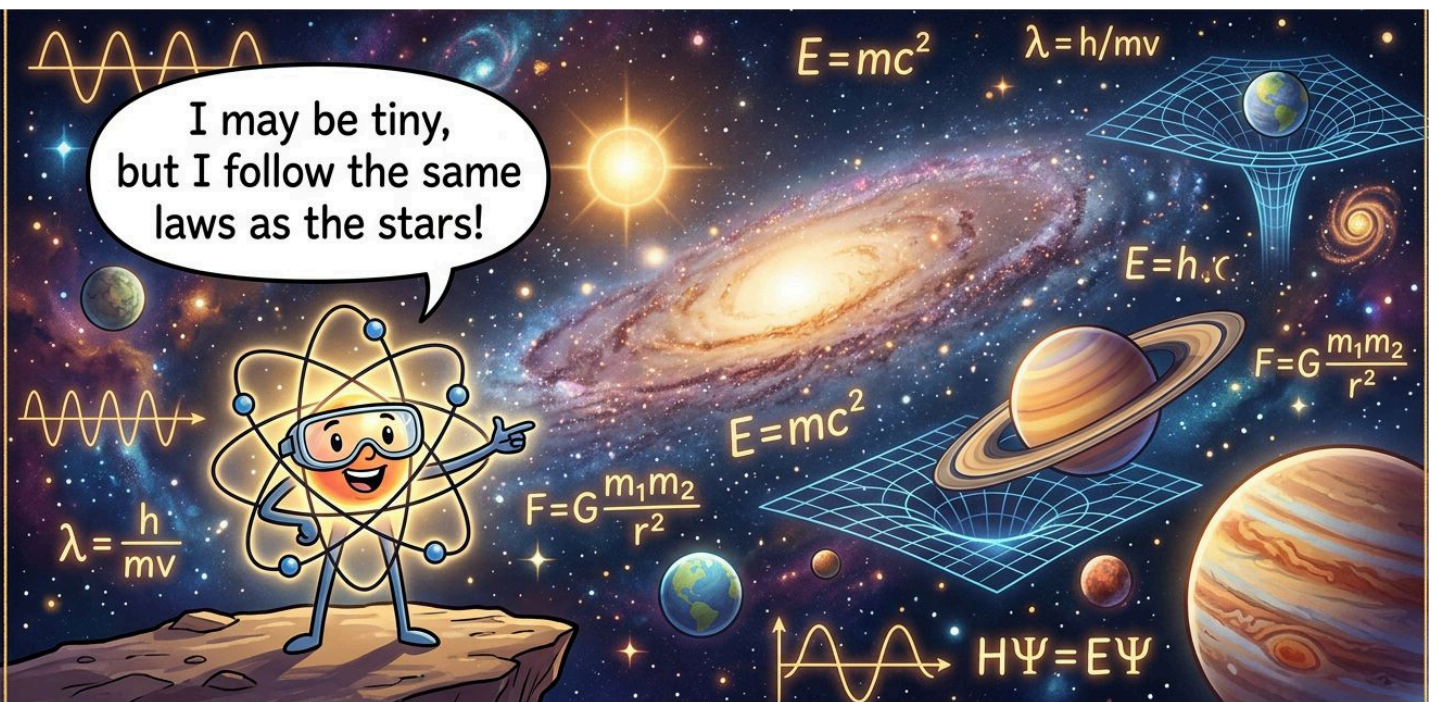
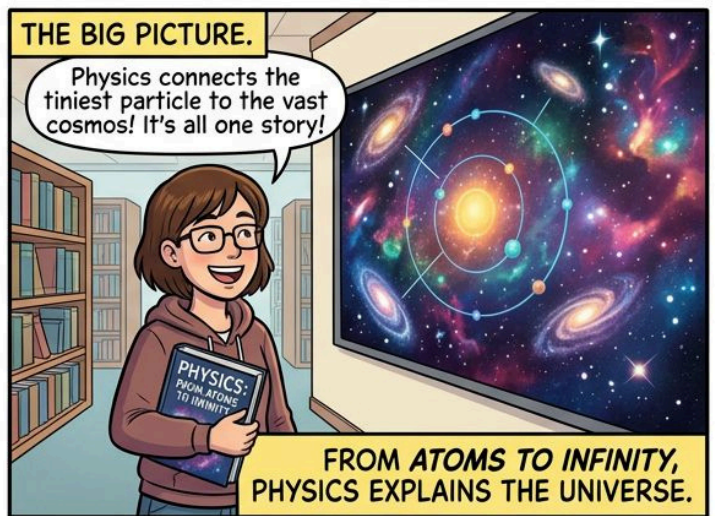
SUBATOMIC CONNECTIONS.

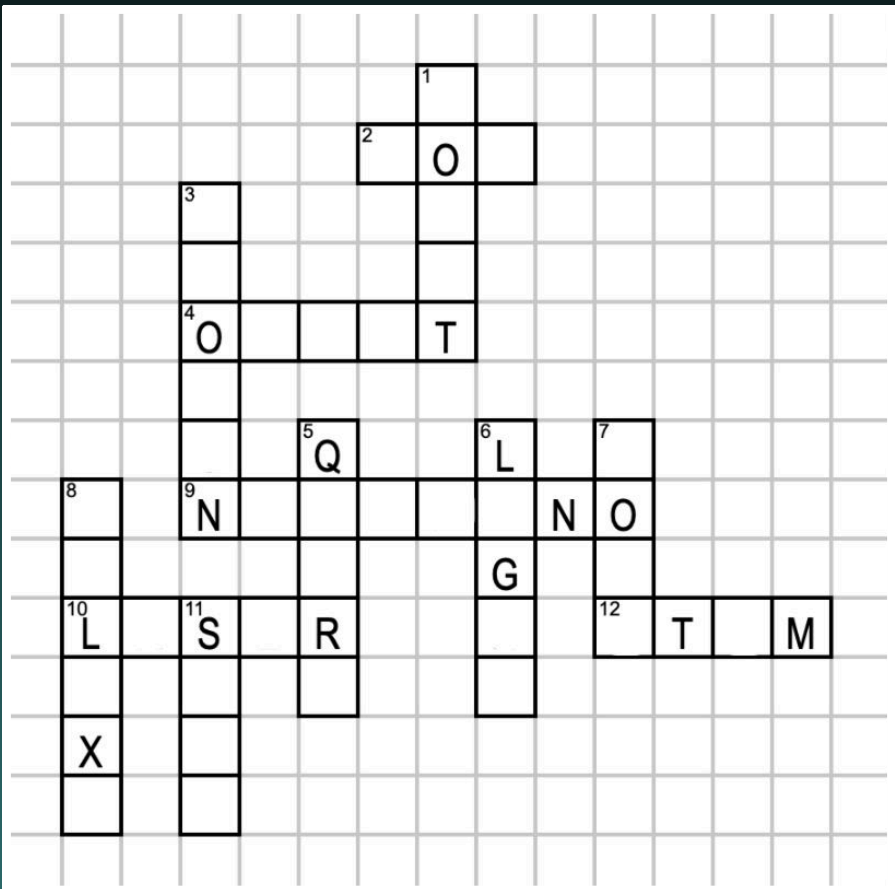


THE MACRO SCALE.



THE BIG PICTURE.





ACROSS

2. A fundamental particle that makes up protons and neutrons.
4. Electromagnetic radiation visible to the human eye.
9. A massive system of stars, gas, dust, and dark matter.
10. A massive glowing ball of gas that produces its own light and heat.
12. An atom or molecule that carries an electric charge.

DOWN

1. The basic building block of matter.
3. The path followed by a planet or electron around a center.
5. A device that produces a focused beam of light.
6. An almost massless particle that rarely interacts with matter.
7. An icy celestial object that develops a glowing tail near the Sun.
8. The elementary particle of light.
10. A massive glowing ball of gas that produces its own light and heat.
11. A sudden brightening of a star caused by an explosive event.

Physics Quiz Challenge

Test your knowledge and see how far your curiosity can take you

Questions

1. What is the smallest unit of an element that retains its chemical properties?
2. Which particle carries a negative electric charge?
3. What is the speed of light in vacuum?
4. Which law explains the relationship between pressure, volume, and temperature of an ideal gas?
5. What phenomenon explains why the sky appears blue?
6. Which scientist developed the theory of relativity?
7. What is the name of the boundary around a black hole beyond which nothing can escape?
8. Which force keeps planets in orbit around the Sun?
9. What is the SI unit of energy?
10. What device converts light energy directly into electrical energy?
11. What is the approximate time taken by sunlight to reach Earth?
12. Which branch of physics studies the behavior of matter at very small scales?
13. What are ripples in space-time called?

Did You Know?

1. If an atom were the size of a stadium, its nucleus would be no bigger than a pea at the center.
2. There are more possible ways to shuffle a deck of cards than there are atoms on Earth.
3. The Sun loses about 4 million tons of mass every second.
4. The light reaching your eyes from distant stars is a message from the past.
5. If the Sun suddenly disappeared, Earth wouldn't know for 8 minutes.
6. A single bolt of lightning can heat the air to temperatures hotter than the surface of the Sun.
7. Venus has a day longer than its year. It rotates so slowly that one full spin takes longer than one orbit around the Sun.
8. If you could fold a piece of paper 42 times, it would reach the Moon—mathematically.

GALLERY

Physics Department



Department of Physics 1st Year



Department of Physics 2nd Year

GALLERY

Physics Department



Department of Physics 3rd Year



Department of Physics 4th Year

GALLERY

Physics Department



Dissertation students with supervisors



Faculty, Department of Physics

MEET *the team*



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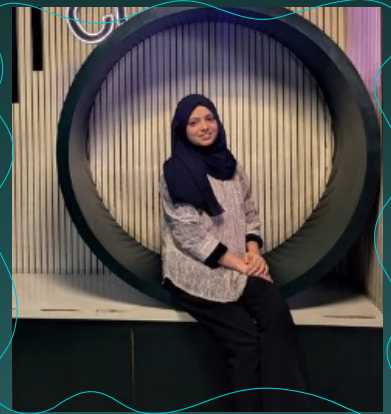
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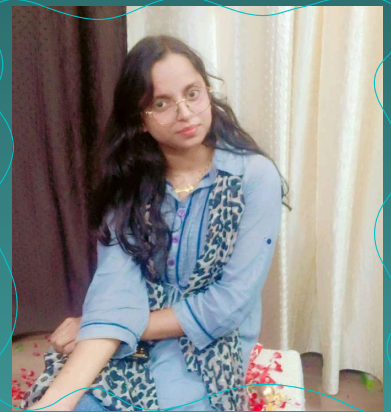
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