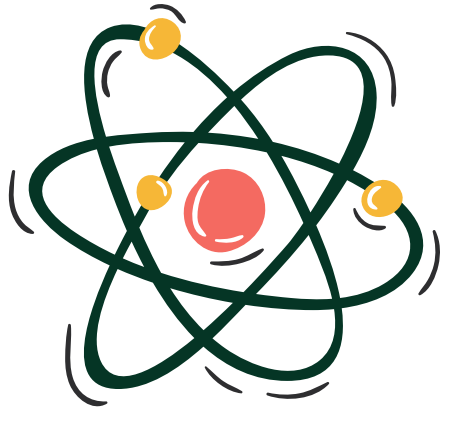




Vigyandrishti

विज्ञानदृष्टि 2026



Think



Learn



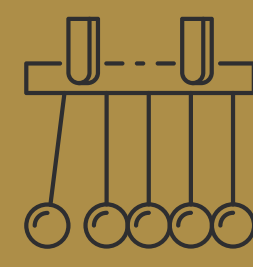
Explore



Collaborate



Inspire



The Vedanta Physics Society

Department of Physics
NSCBM Government College Hamirpur (HP)

Message from the Principal

Dear Students and Readers,

It gives me immense pride to commend the Vedanta Physics Society on the publication of their magazine, VigyanDrishti. This initiative beautifully captures the spirit of scientific inquiry and academic excellence that we continually strive for at our institution. This milestone is a testament to the passion, creativity, and intellectual curiosity that thrives within our academic community.



VigyanDrishti acts as a crucial bridge between foundational textbook learning and the dynamic, ever-evolving world of scientific innovation. By providing a dedicated platform for young physicists to articulate their ideas and share their research, this magazine nurtures critical thinking and a profound curiosity for the physical sciences. It is wonderful to see our students actively engaging in scientific discourse.

I extend my warmest appreciation to the editorial board, the contributing writers, and everyone whose hard work has brought this vision to fruition. Your collective dedication has resulted in a truly remarkable resource that will enrich our entire academic community. As you explore the articles and insights within these pages, I hope you are inspired to question deeply, discover boldly, and push the boundaries of your own understanding. Wishing the entire team of VigyanDrishti continued success in all their future endeavors.

Dr. Satish Soni

Dr. Satish Soni

Principal

NSCBM Government College Hamirpur

Message from the HOD

Dear Students, Faculty members and Readers,

The academic session has been a vibrant and enriching journey for the Department, marked by enthusiastic participation, academic engagement, creativity, and a strong spirit of scientific inquiry.

Throughout the session, the faculty and students collectively organized and participated in a wide range of academic and co-curricular activities, providing students with opportunities to learn beyond the confines of the classroom.

The Induction Programme helped acquaint the new students with the academic environment, facilities, and opportunities available in the Department. The celebration of Teachers' Day provided a meaningful occasion to acknowledge the invaluable role of teachers and strengthen the bond between teachers and students. National Science Day was celebrated with enthusiasm. The students are benefited by the knowledge and experience of distinguished academicians of experts talks. Workshops provided practical exposure and encouraged students to develop new skills and a deeper understanding of various aspects of physics.

I am particularly pleased to see the enthusiasm, curiosity, creativity and active participation demonstrated by our students in these activities.

I sincerely appreciate the dedicated efforts of the faculty members and the active involvement of our students in making these programmes successful. I hope that "Vigyandrishti" will continue to provide a meaningful platform for showcasing the academic achievements, scientific ideas, creativity, and experiences of our students.

Neelam Guleria

Prof. Neelam Guleria

Head, Department of Physics

NSCBM Government College, Hamirpur (H.P.)



Just as a prism unfolds the hidden spectrum within a single beam of light, true education reveals the brilliant, multifaceted potential within every curious mind

Message from the Convenor

Dear Students, Faculty, and Science Enthusiasts,

It is with great pride and excitement that I present to you the third edition of VigyanDrishti, brought to you by the Vedanta Physics Society. Much like the quantum world, where possibilities remain boundless until observed - the study of physics requires us to embrace uncertainty, look closer, and uncover the fundamental mechanics of our reality. This third issue continues our ongoing journey of exploration and curiosity.



Watching VigyanDrishti evolve and grow has been a remarkable experience for all of us. It is a space where we can continuously collapse the wave function of our ideas into tangible, shared discoveries. This publication serves as an enduring platform for young minds to entangle their thoughts, express their research, and inspire one another. I am deeply grateful to our editorial team, contributors, and every student who has channeled their energy into bringing this latest edition to life.

As you turn these pages, I hope you experience the resonance of the passion and enthusiasm poured into each piece. Let this edition be a catalyst for your own scientific adventures, reminding us that even the smallest quantum leap in understanding can shift our entire perspective. Together, let's ensure VigyanDrishti remains a strong symbol of our collective dedication to learning and innovation.

Welcome to the journey, and happy reading!

Lavli Rana

Prof. Lavli Rana

Convenor

The Vedanta Physics Society

NSCBM Government College, Hamirpur (H.P.)

2025-26

Society Council

Faculty Members



Prof. Prashant Sharma



Prof. Suresh Kumar



Dr. Rohit Sandal



Dr. Ashwani Kumar



Dr. Virender Pratap Singh

Letter from the Editor

Dear Readers,

Welcome to the third edition of VigyanDrishti. Serving as the President of the Vedanta Physics Society and leading it has been one of the most rewarding experiences of my academic journey, and presenting this third edition of the magazine to you is a remarkably proud moment for our entire department. This magazine is not just a collection of articles; it is a true reflection of the evolving ideas and relentless curiosity that define our society.

This past year has been an incredible adventure. From organizing society events to keeping our departmental momentum going, we have truly seen it all. Beyond just managing schedules, we actively cultivated an environment where scientific curiosity thrived. Each project became a unique experiment in leadership, revealing that the true essence of our work lies in our shared dedication to elevating the academic spirit and exploring new intellectual horizons together.

My deepest gratitude goes to the Divine for inner peace, my parents for encouragement, my professors' for their invaluable mentorship and my friends whether beside me or miles away for keeping me grounded. You each helped me navigate countless hurdles, refined my vision, and continually pushed me to be my absolute best.

As you flip through the pages of this third edition, I hope you feel the collective heartbeat, hard work, and passion of our department.

Priyansh Dehal..

Priyansh Dehal

President

The Vedanta Physics Society

NSCBM Government College, Hamirpur (H.P.)



Excellence is the quiet, relentless dedication to outdoing our own yesterday, until our personal standard inherently becomes the benchmark for tomorrow.

Our Team

Dear Explorers,

Welcome to the latest release of our publication! As the Student Creative Head, it is a absolute joy to share a collection that celebrates the vibrant intersection of scientific thought and artistic imagination.

"As Science and Art are anchored in the same human urge to inquire, to express, to understand."

Our vision for these pages was simple to make knowledge feel alive. Science isn't just about formulas on a whiteboard, it is a story waiting to be told. Through creative layouts, thoughtful visual design, and engaging commentary, we set out to craft a reading experience that is as visually inspiring as it is intellectually stimulating.

Inside, you will find a curated blend of deep scientific concepts, exciting modern discoveries, and fresh perspectives from our student community. Every feature has been put together to spark your curiosity, challenge your thinking, and offer a fresh lens on the world around us.

Take your time turning these pages, immerse yourself in the ideas, and let your curiosity lead the way.

Yavindra Thakur

Yavindra Thakur

Creative Head, The Vedanta Physics Society

NSCBM Government College Hamirpur



Active Members:



Asheesh



Avantika



Disha Sharma



Kashish

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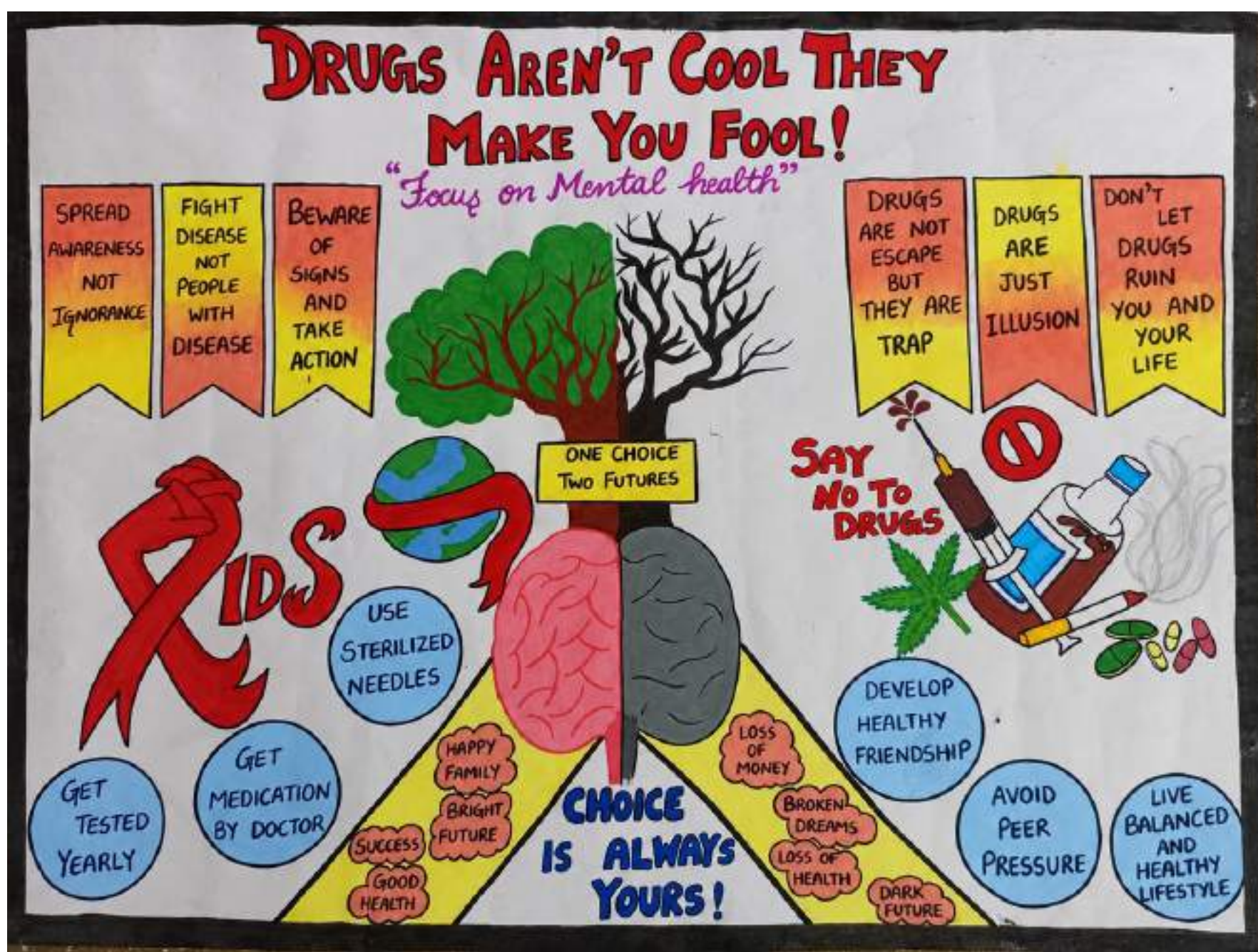
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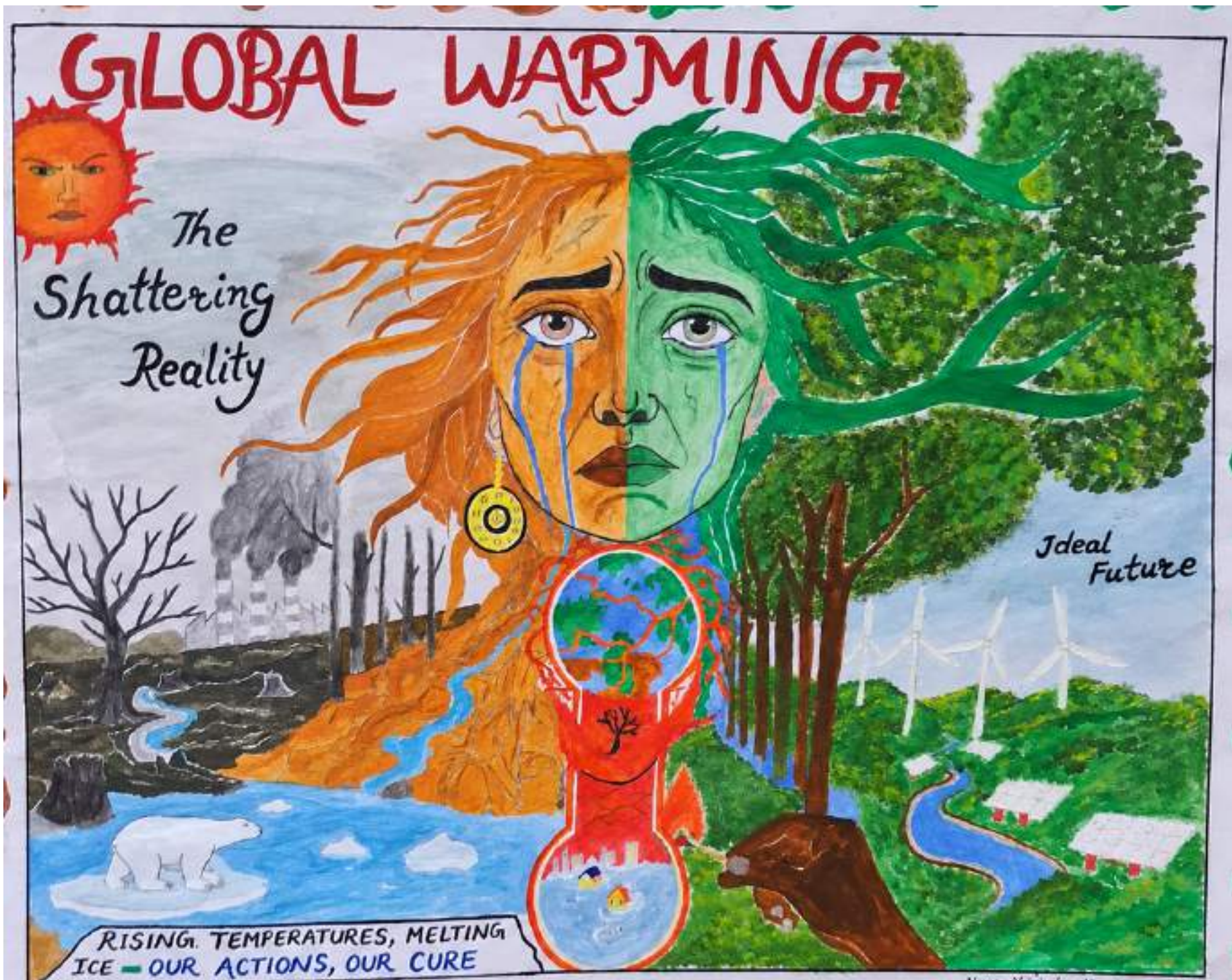
THE CREATIVITY SPECTRUM

Showcasing the diverse talents, vibrant events, and artistic flair of our student community.

Physics is often seen strictly through the lens of equations and theories, but the minds in our department are equally driven by boundless creativity and dynamic energy. This section is a colorful showcase of how our students explore the world beyond the traditional classroom and laboratory. From beautifully crafted handmade posters that blend art with science, to the successful events that have brought our society together, these pages capture our collective spirit.



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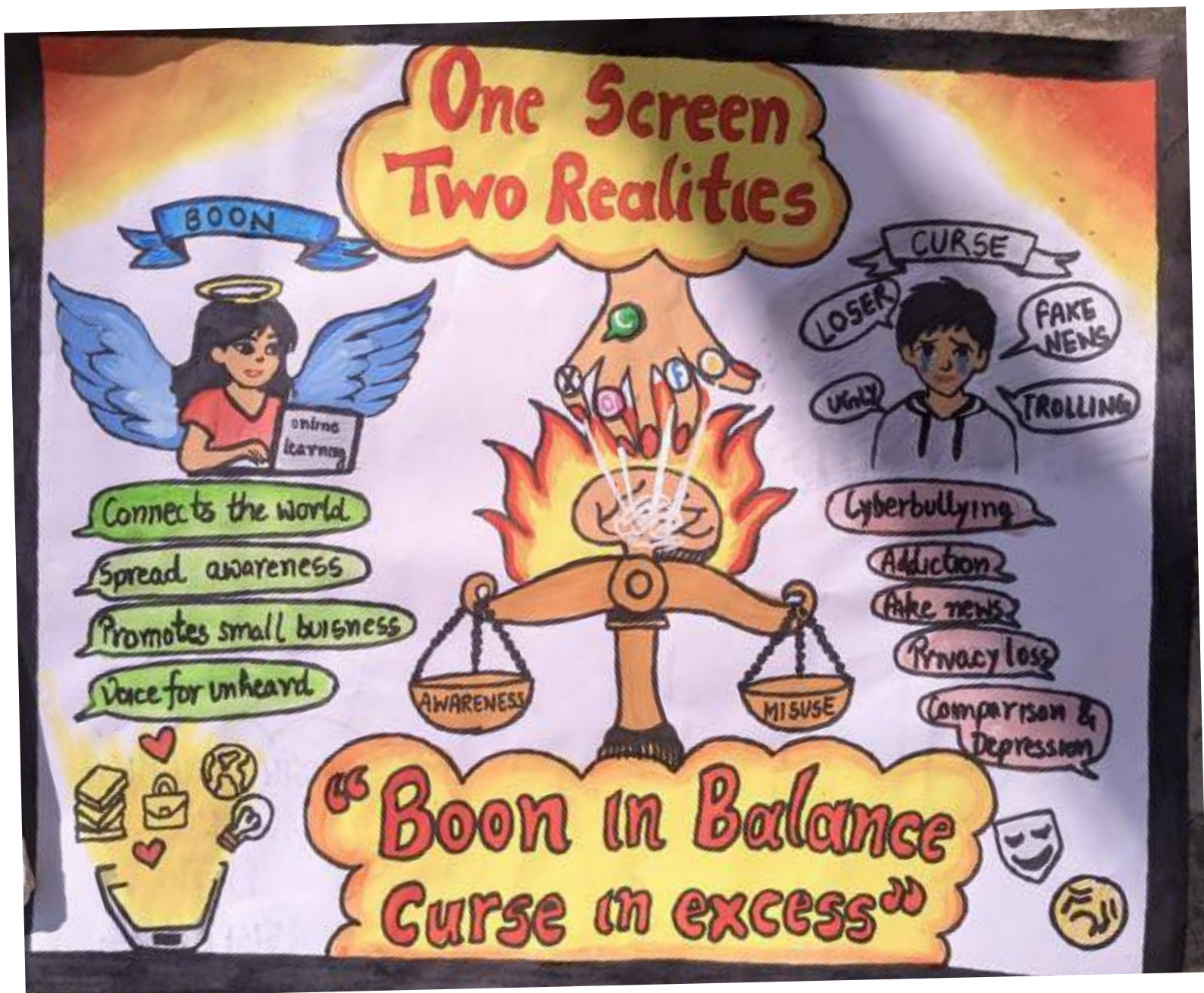
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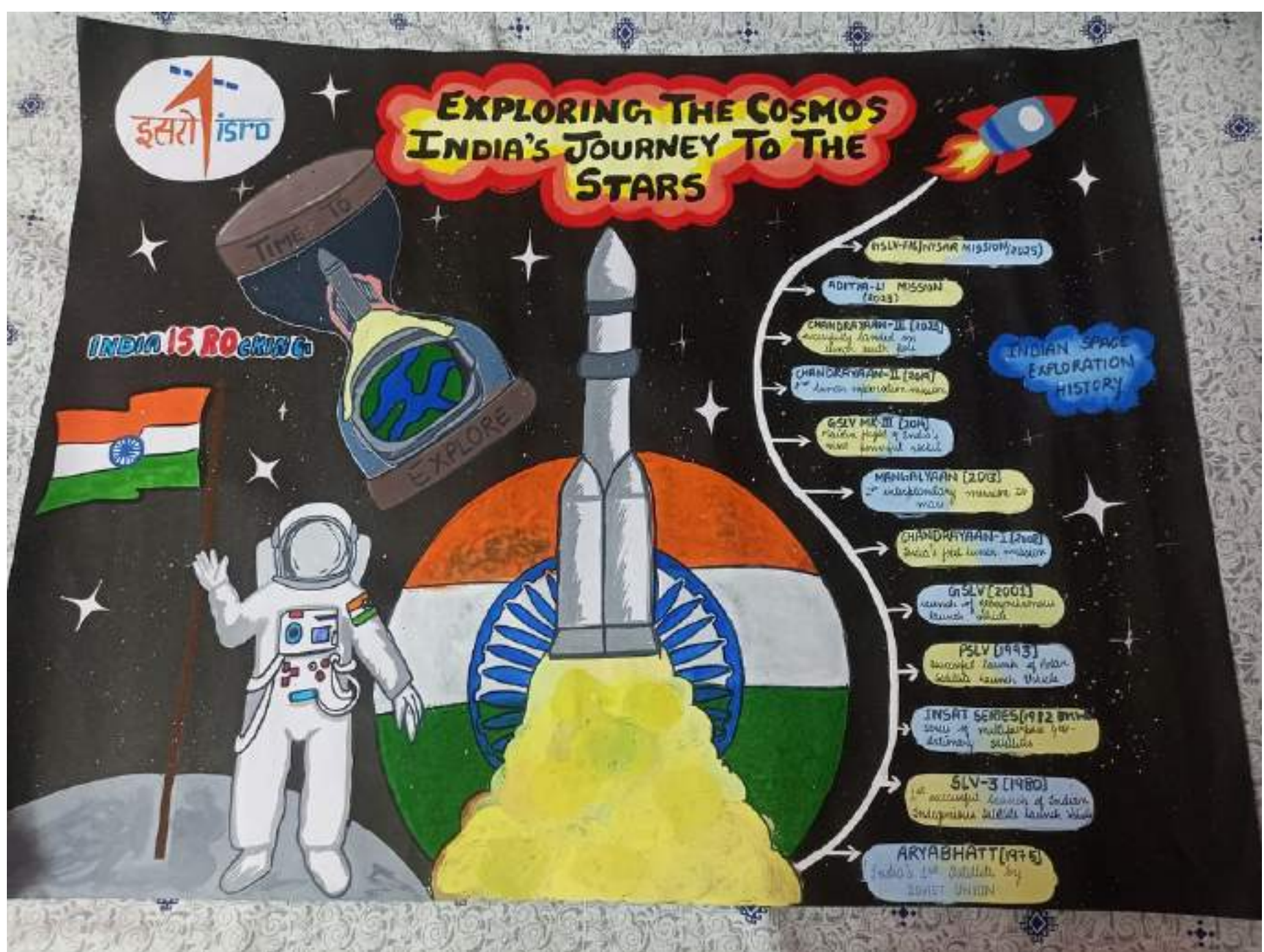
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BSC Physics 3rd Year Students



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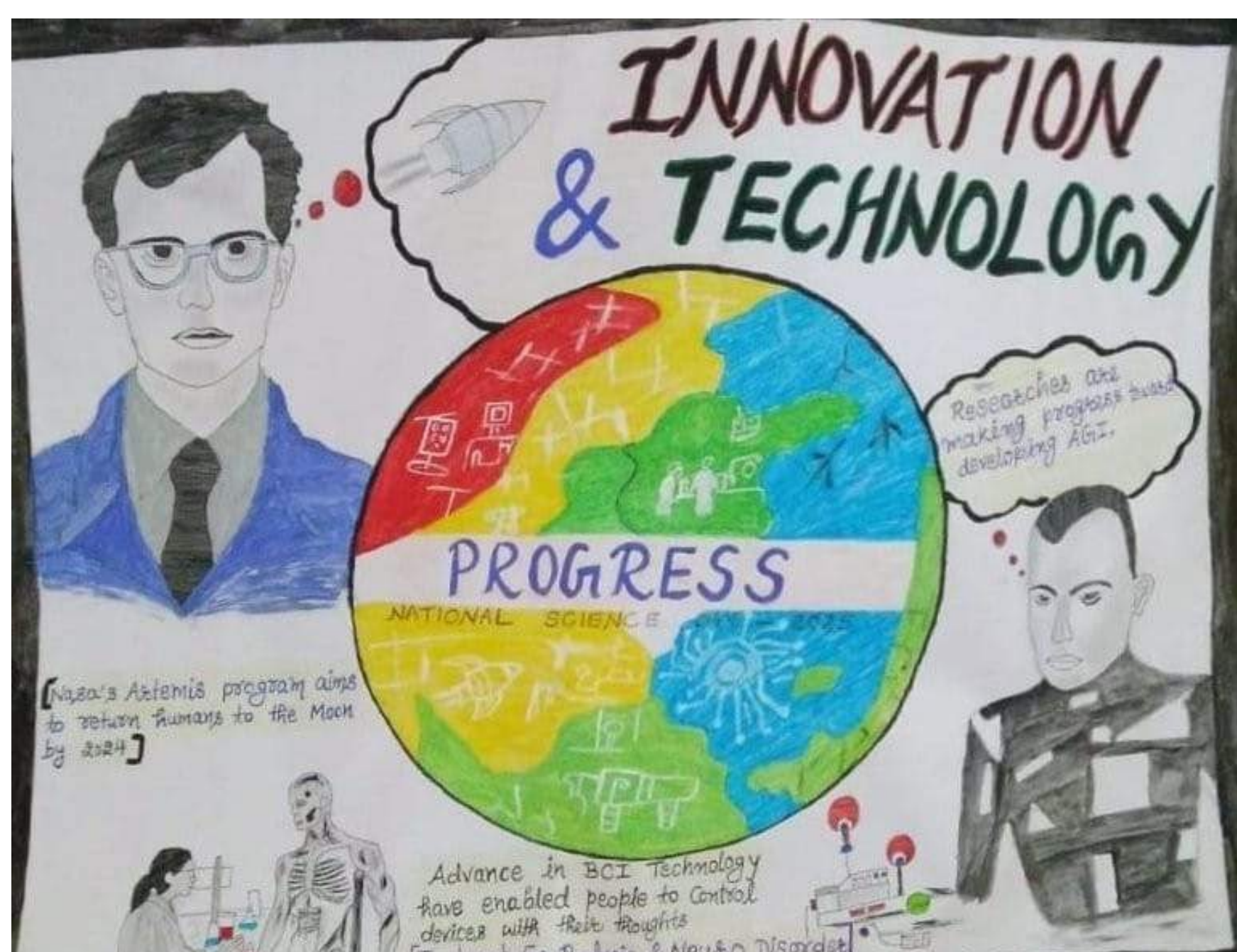
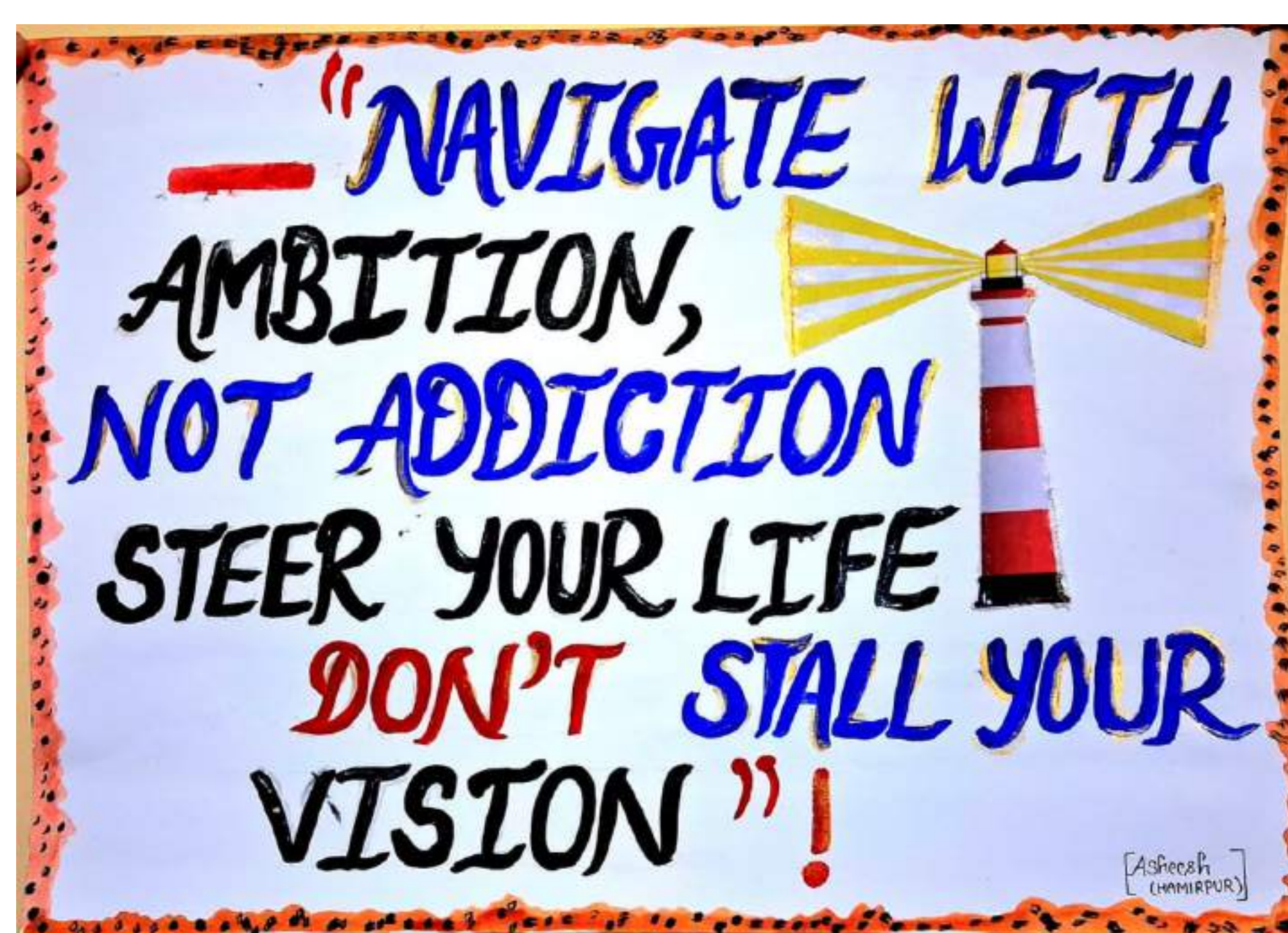


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1. Yavindra Thakur (MSc Physics 3rd Sem)
2. Disha Sharma (MSc Physics 1st Sem)



1. Yavindra Thakur (MSc Physics 3rd Sem)
2. Disha Sharma (MSc Physics 1st Sem)

THEORETICAL THREADS

Exploring fascinating physical phenomena and contemporary science through the words of our students

When Nothing Isn't Nothing Vacuum Birefringence

How extreme magnetic fields can make empty space behave like an optical material ?

WHAT IF EMPTY SPACE WERE NOT TRULY EMPTY?

According to quantum electrodynamics (QED), the vacuum has quantum properties that become important under extremely strong electromagnetic fields. One fascinating prediction is vacuum birefringence—the idea that a powerful magnetic field can change how different polarizations of light travel through vacuum. The effect was theoretically proposed in the 1930s through the work of Werner Heisenberg and Hans Euler, but detecting it directly has been extremely challenging.

MAGNETARS: NATURE'S EXTREME LABORATORY

A magnetar is a highly magnetized neutron star. Its magnetic field can exceed 10^{13} gauss, making it one of the most extreme electromagnetic environments known. This makes magnetars natural laboratories for testing QED. In recent observations of the magnetar 1E 1547.0-5408, NASA's Imaging X-ray Polarimetry Explorer (IXPE) measured the polarization of X-rays emitted by the star. The unusually strong polarization and its alignment with the magnetic-field geometry provide strong evidence consistent with vacuum birefringence.

WHY IS IT IMPORTANT?

In ordinary materials, birefringence occurs because different polarizations of light experience different optical properties. Vacuum birefringence is remarkable because no conventional material is required. The intense magnetic field changes the effective quantum properties of the vacuum, allowing different polarization states of light to propagate differently. This observation is important because it provides a way to test QED under conditions far beyond those easily achievable on Earth. It also helps scientists understand magnetars, neutron stars and the behavior of light in extreme environments.



BSc Third Year 2025-26

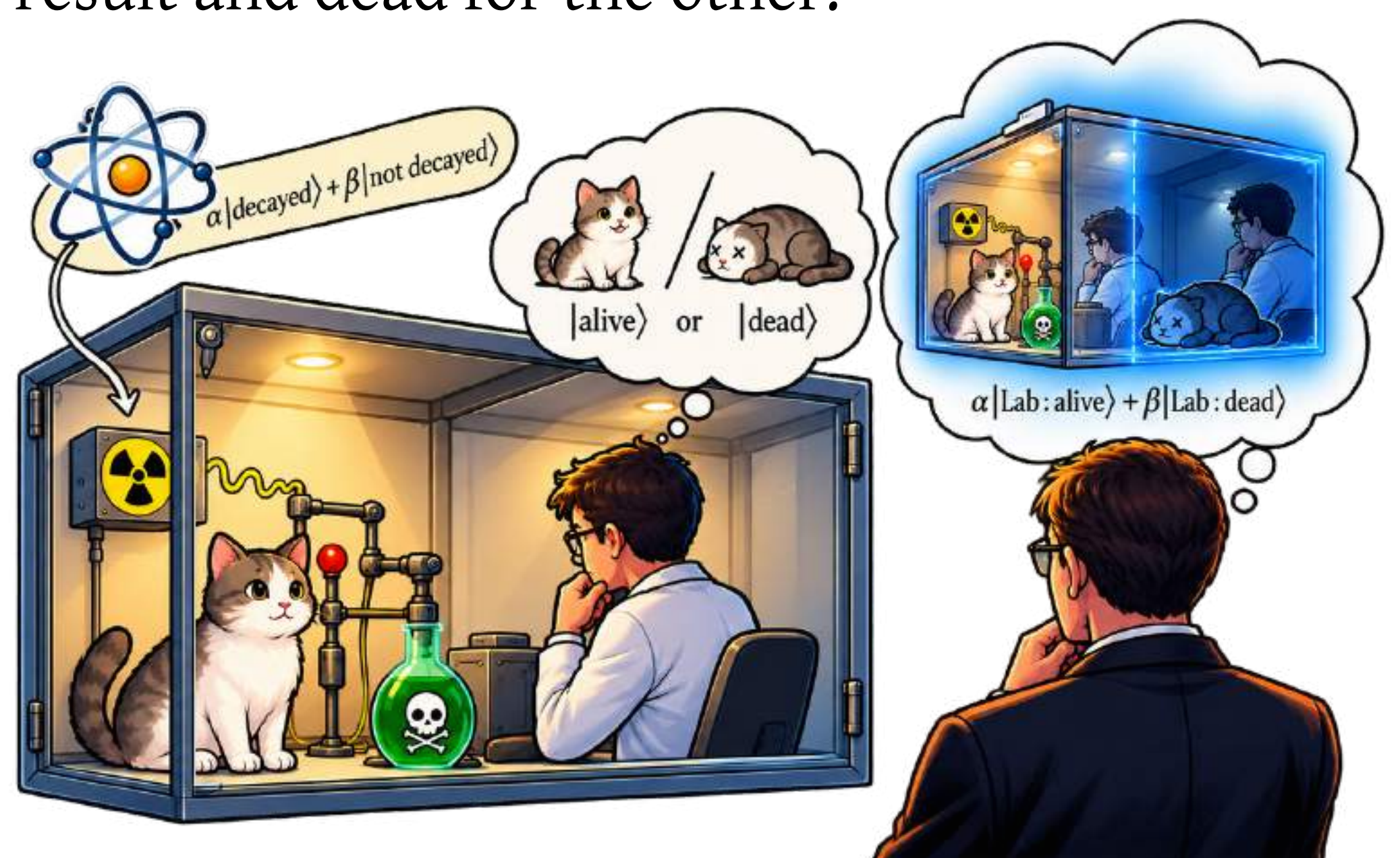
From Schrödinger's Cat to the Question of Reality

When does a quantum measurement actually become real and does reality depend on the observer?

The **Wigner's Friend Paradox** is a thought experiment in quantum mechanics proposed by physicist **Eugene Wigner**. It extends the famous Schrödinger's Cat paradox by introducing multiple observers and asking a deeper question: Can two observers experience different realities while both remain consistent with quantum theory?

Imagine a sealed laboratory containing a radioactive atom, a detector, and a cat. Before measurement, the atom can be described as being in a **superposition of decayed and undecayed states**. Since the detector is coupled to the atom, it also becomes entangled with these possibilities. When the cat interacts with the detector, its state becomes correlated with the outcome - alive for one result and dead for the other.

Now consider Wigner, who stands outside the sealed laboratory. Since he has not yet opened the door, quantum mechanics allows him to describe the entire laboratory including the atom, detector, cat, and Wigner's friend as a single quantum system that remains in a superposition.



But the friend inside the laboratory has already observed a definite outcome. From the friend's perspective, the measurement has produced a definite reality. From Wigner's perspective, however, the laboratory can still be treated as a quantum superposition.

This creates a profound puzzle: if one observer has a definite outcome while another can describe the entire system as a superposition, whose description represents reality?

The paradox therefore moves beyond Schrödinger's Cat. It challenges our understanding of measurement, observation, quantum superposition, and the nature of reality itself. Later developments, including the Frauchiger–Renner no-go theorem, have further explored the consistency of assigning definite outcomes to quantum observations.

The Three-Body Problem

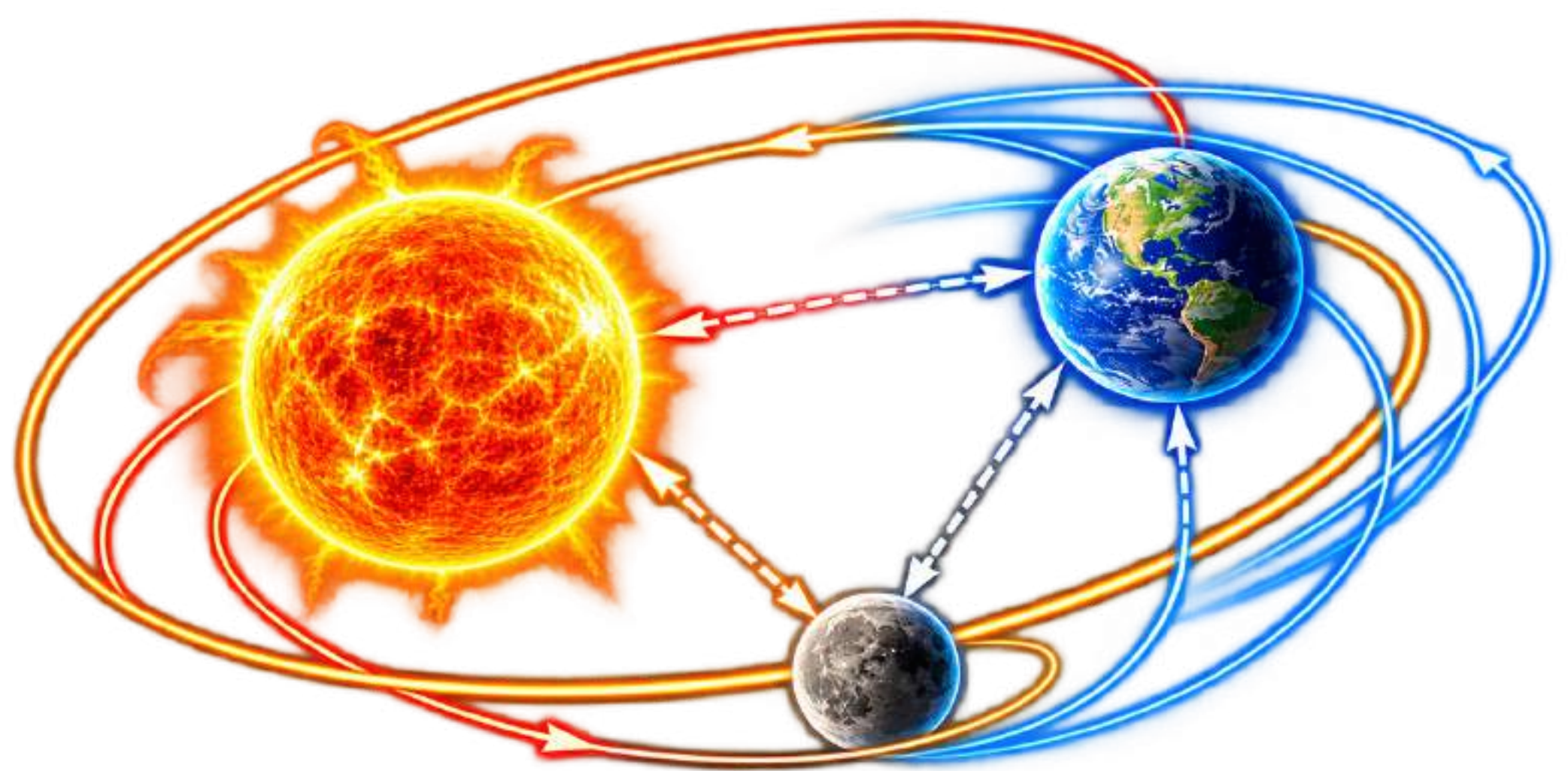
When Three Become Unpredictable

If we can predict the motion of two bodies, why does adding just one more make the problem so difficult?"

Imagine two objects moving under the influence of gravity. Their motion can be described precisely using **Newton's laws of motion** and **universal gravitation**. The famous two-body problem has an exact mathematical solution, giving us predictable orbits such as those of planets around the Sun.

But what happens when a third body is introduced?

This seemingly simple addition transforms the problem dramatically. The three-body problem asks how three objects move when each exerts a gravitational force on the other two. Unlike the two-body case, there is no general closed-form solution that predicts the motion of all three bodies for every possible initial condition.



The difficulty arises because the motion of each body continuously changes the gravitational forces acting on the others. A tiny difference in the initial position or velocity can eventually produce a very different trajectory. This is closely connected with the idea of chaotic dynamics, where deterministic systems can display extremely sensitive dependence on initial conditions.

The three-body problem has fascinated physicists and mathematicians for centuries. Special solutions do exist. For example, the **Lagrange points** describe particular configurations in which the gravitational forces and orbital motion combine in a special way.

The problem is also important in modern astronomy. Understanding gravitational interactions among stars, planets, moons, asteroids, and spacecraft often requires sophisticated numerical simulations rather than simple analytical equations.

Neutron Star

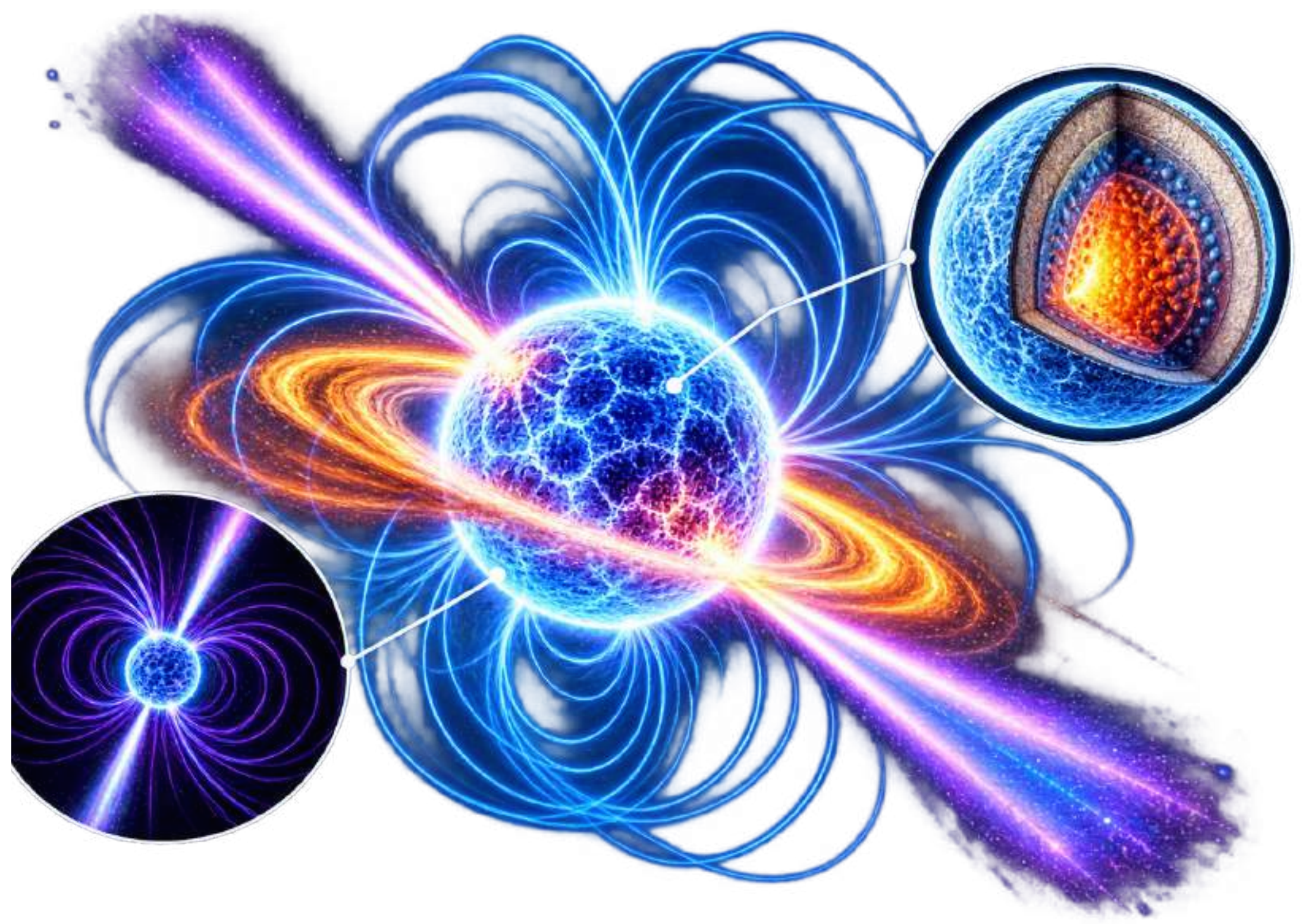
The Universe's Extreme Laboratories

“What happens when a star’s entire mass is compressed into a sphere only a few kilometres across?”

When a massive star reaches the end of its life, its core can collapse under its own gravity in one of the most violent events in the universe. If the remaining core is sufficiently massive but does not collapse into a black hole, it can form a neutron star - an extraordinarily dense object composed predominantly of neutron-rich matter.

A typical neutron star may contain more mass than the Sun compressed into a sphere roughly the size of a city. Its density is so enormous that a tiny amount of neutron-star material would have an unimaginable mass on Earth.

The collapse also dramatically increases the star’s rotation rate. Conservation of angular momentum can cause the newly formed neutron star to rotate many times per second. Some neutron stars emit beams of electromagnetic radiation from their magnetic poles. If these beams sweep across Earth as the star rotates, we observe regular pulses of radiation. Such objects are called pulsars.



Neutron stars also possess some of the strongest magnetic fields known in the universe. The most strongly magnetized examples are called magnetars, whose intense magnetic activity can produce powerful bursts of X-rays and gamma rays.

Their story does not end there. When two neutron stars spiral together and merge, they can produce gravitational waves and powerful electromagnetic signals. Such events can also create and disperse heavy elements, providing an important connection between stellar evolution, gravitational physics, and the chemical history of the universe.

Neutron stars therefore act as natural laboratories where matter, gravity, magnetism, and nuclear physics reach conditions that cannot easily be reproduced on Earth.

Shape Memory Alloys

Materials That Remember

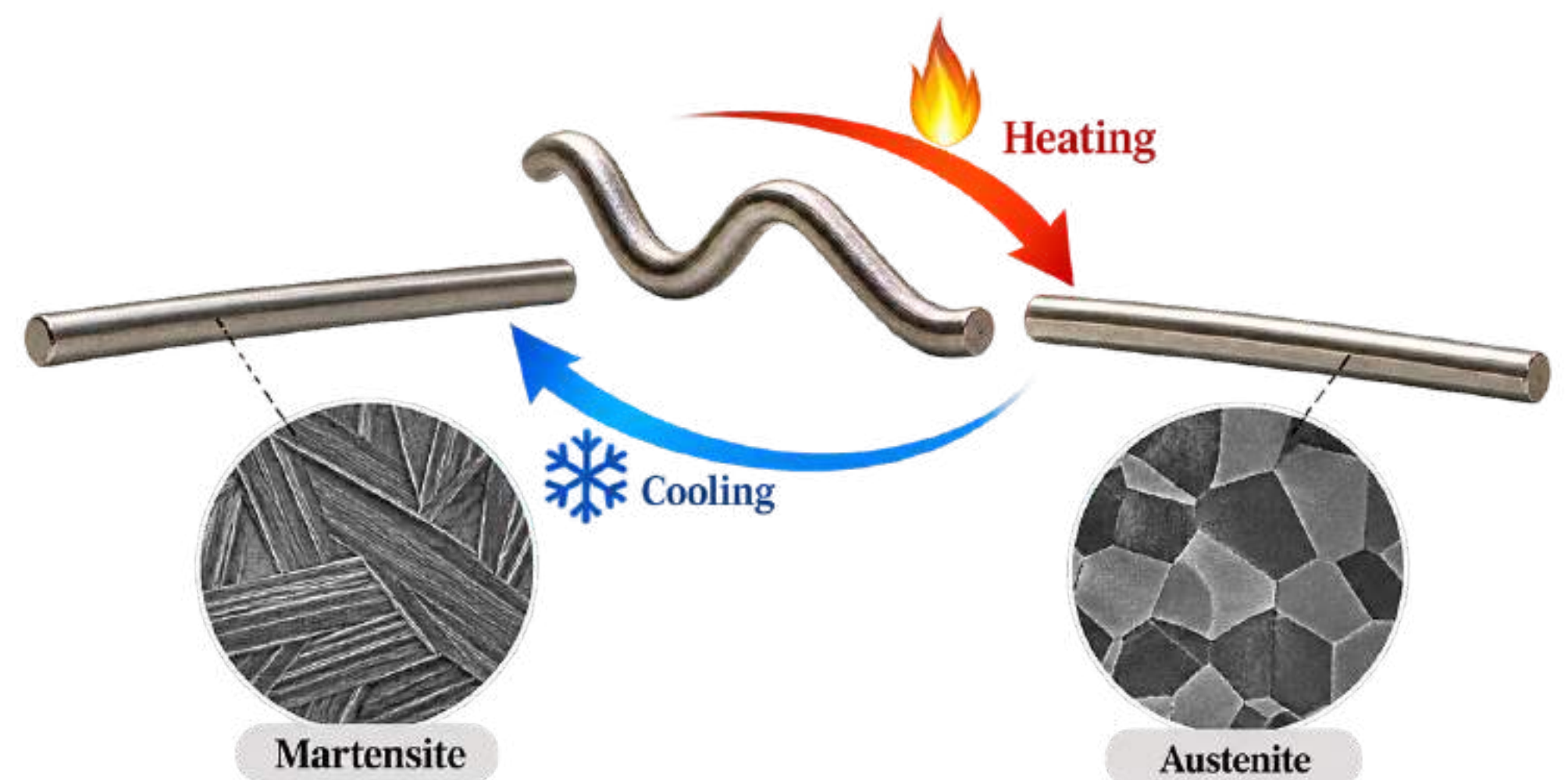
Can a material be deformed and still remember the shape it was originally made to have?

Imagine bending a metal wire into a new shape and then heating it- only to watch it return to its original form. This remarkable behaviour is not science fiction; it is a property of a class of smart materials known as **shape memory alloys (SMAs)**.

Shape memory alloys can undergo significant deformation at relatively low temperatures and later recover their original shape when heated above a characteristic transformation temperature. This phenomenon is known as the **shape memory effect**.

The most widely studied shape memory alloy is **nickel-titanium (NiTi)**, commonly known as Nitinol. Its unusual behaviour originates from a reversible transformation between two crystal structures: martensite at lower temperatures and austenite at higher temperatures.

When the alloy is in its martensitic state, it can be deformed relatively easily. Upon heating, the crystal structure transforms into austenite, allowing the material to recover its previously programmed shape. On cooling, it can return to the martensitic phase.



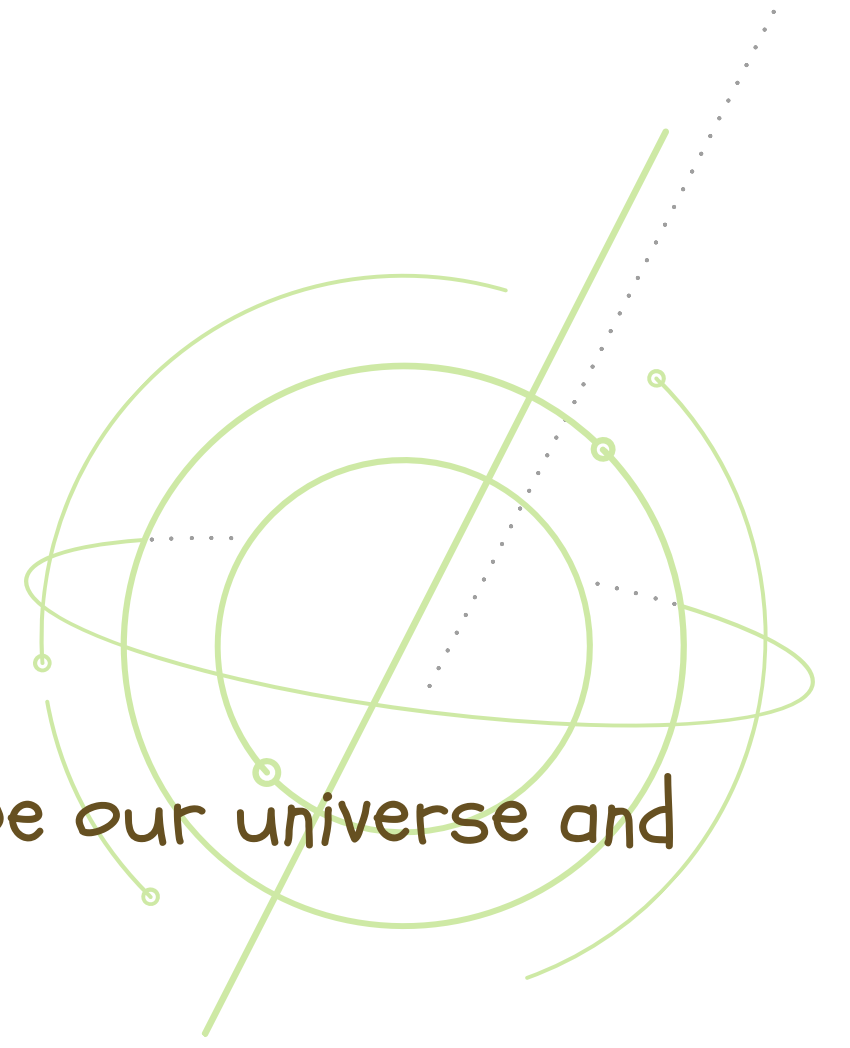
Shape memory alloys also exhibit the **superelastic effect**. At an appropriate temperature, an SMA can undergo substantial deformation under applied stress and recover its original shape once the stress is removed without requiring significant heating.

These properties make SMAs useful in medical stents, orthodontic wires, actuators, robotics, aerospace components, and temperature-sensitive devices.

The fascinating part is that the material does not actually “remember” its shape in the way a living organism does. Its memory arises from a reversible rearrangement of its crystal structure.

NOBLE LAUREATES

Celebrating the Nobel Laureates whose groundbreaking discoveries continue to shape our universe and inspire our studies.



The 2025 Laureates: The Quantum Mechanics of Circuits

The 2025 Nobel Prize in Physics was jointly awarded to **John Clarke, Michel H. Devoret, and John M. Martinis**. They were recognized for their groundbreaking discovery of **macroscopic quantum mechanical tunnelling** and **energy quantisation** in an **electric circuit**. By extending quantum tunneling from microscopic scales to large, visible systems, their work proved that superconducting circuits can exhibit quantum behaviors. This extraordinary milestone paved the way for the superconducting qubits that now form the backbone of practical quantum computers and ultra-sensitive quantum sensors.

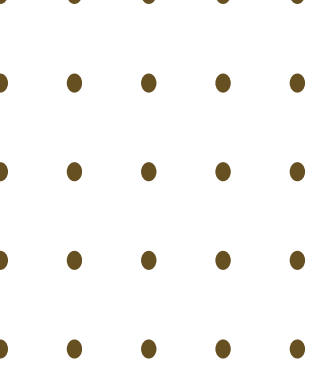
- John Clarke
- Michel H. Devoret
- John M. Martinis.



The 2026 Laureates: Unlocking the Universe with Ghost Particles

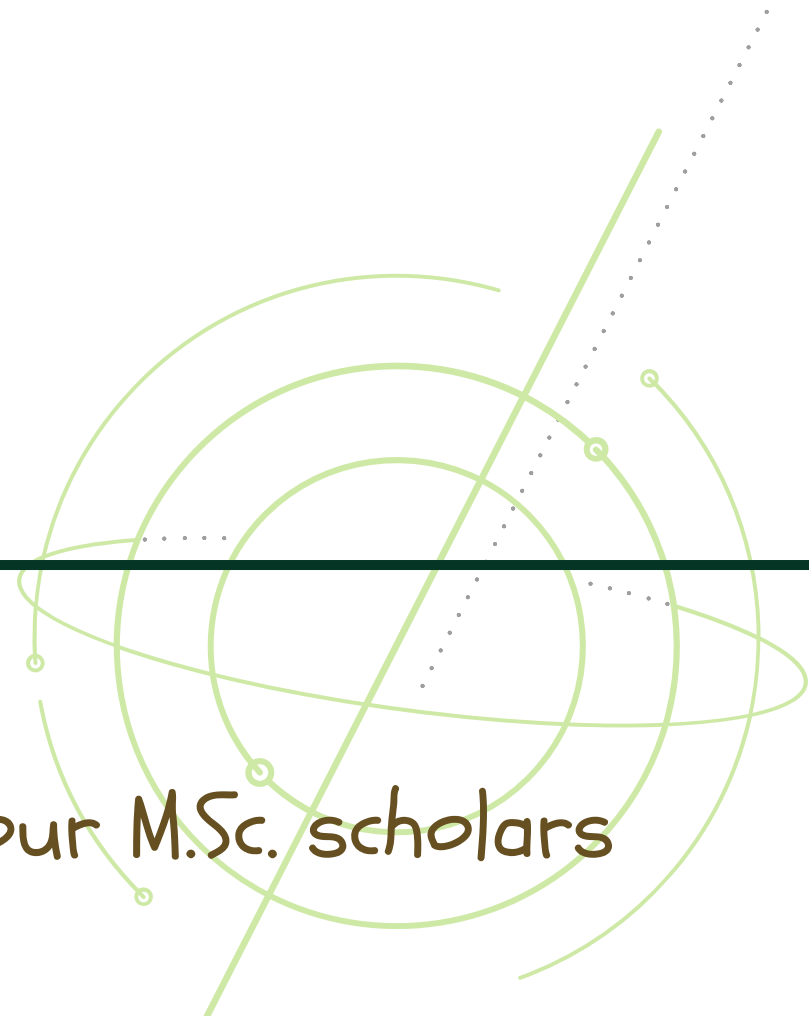
The 2026 Nobel Prize in Physics has been awarded to Belgian-American physicist **Francis Halzen** from the University of Wisconsin–Madison. He was recognized "**for decisive contributions to the IceCube Neutrino Observatory and the discovery of high-energy neutrinos of astrophysical origin**". Halzen first proposed the visionary idea of using pristine glacial ice at the South Pole as a particle detector back in 1988. Today, the IceCube observatory utilizes a cubic kilometer of Antarctic ice, embedded with thousands of light sensors, to detect high-energy neutrinos.





RESEARCH FRONTIERS

Spotlighting the advanced research and publication-bound projects of our M.Sc. scholars



This section proudly highlights the rigorous academic work undertaken by our M.Sc. scholars. Moving beyond the standard curriculum, these students have engaged in complex, independent projects. The abstracts presented here represent countless hours of research, meticulous data analysis, and unwavering dedication.

- 1 Energy Audit of NSCBM Govt. College Hamirpur, H.P.
 - 2 Structural Analysis of Doped Lithium Ferrites synthesized by Sol-Gel Autocombustion Technique
 - 3 A Study on the Binding Stability of a 3-QDO system using Continuos Variable Quantum Computing
 - 4 Study of Structural and Optical Properties of Neodymium Stannate
 - 5 Statistical Model Calculation of Neutron Capture Cross-sections for r-process Gold Production using EMPIRE
 - 6 Study of photovoltaic properties of Europium Stannate as a Transparent Conducting Oxide
 - 7 A Theoretical Study of Interatomic Potentials in Alkali Metals
- 

MOMENTS IN MOMENTUM

A visual timeline of the energy, celebrations, and milestones that defined our year.

A body in motion stays in motion, and the Vedanta Physics Society has certainly been moving at an incredible pace! From the welcoming energy of our Induction Programme to the cosmic celebrations of Space Day, our calendar has been packed with activity, learning, and collaboration. This section is a visual journey through our most memorable days, capturing the highlights, the shared laughter, and the successful initiatives we pulled off together. Take a look back at the timeline of events and the vibrant faces that made this academic year so unforgettable

INDUCTION PROGRAMME (4/08/2025)



NATIONAL SPACE DAY (23/08/2025)



TEACHERS DAY CELEBRATION (09/09/2025)



NDLI CLUB REGISTRATION (19/09/2025)



WORKSHOP ON QUANTUM TUNNELING (17/10/2025)



WELCOMING OF DHE (3/11/25)



VIRTUAL LABS WORKSHOP (09/12/2025)



COMPETITIVE EXAMS WORKSHOP (27/12/2025)





NSCBM GOVT. COLLEGE HAMIRPUR
DEPARTMENT OF PHYSICS

COMPETITIVE EXAMS WORKSHOP

UNLOCK YOUR POTENTIAL (IIT JAM, GATE)

DATE: DECEMBER 27, 2025 | TIME: 11:00 AM IST | VENUE: HYBRID MODE | ROOM NO. 142

 **RESOURCE PERSON:**
Srijan Sharma (IIT Madras Alumni)

designed by @anirvanshi

NATIONAL SCIENCE DAY (28/02/2026)



LECTURE SERIES BY TOP EXPERTS (07/04/2026)



MSC 4TH SEM PROJECT SUBMISSION (11/08/2026)



EXPANDING HORIZONS

Celebrating our students' academic journeys, from intensive internships and specialized workshops to prestigious doctoral placements.

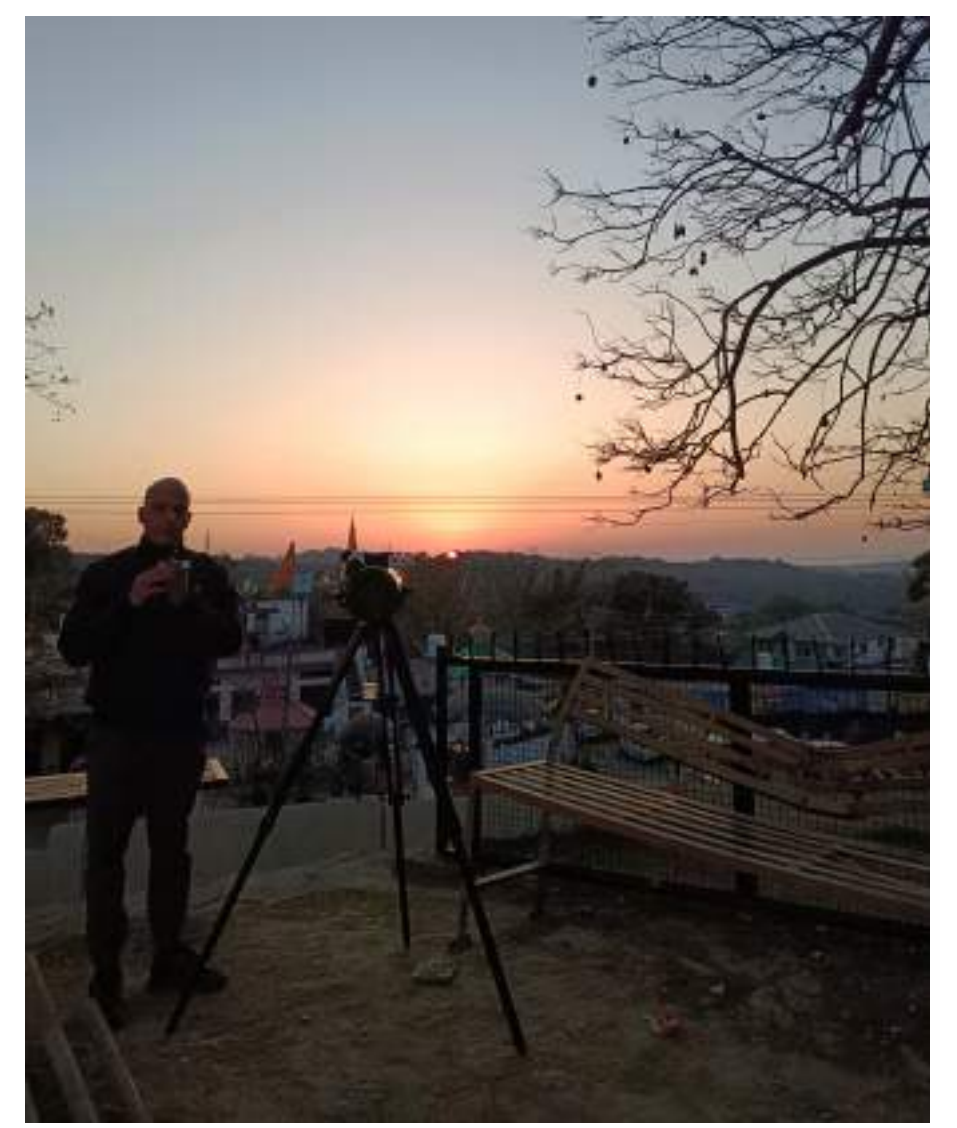
As physics scholars, our quest for knowledge frequently takes us beyond the familiar walls of our department. This section proudly highlights the students who have stepped out to expand their academic footprints and gain invaluable real-world exposure.



COSMIC CAPTURES

Capturing the wonders of our solar system, from daytime solar photography to nighttime lunar observations.

Physics is just as much about observing the cosmos as it is about understanding equations on a page. This section highlights two incredible days where we took our curiosity outdoors, set up the telescope, and simply looked upward. We explored the sky in two completely different lights - gathering one evening to focus our lenses on the intricate craters and vast plains of the Moon, and shifting our focus on another day for a fascinating daytime solar photography session.



BEYOND THE CHALKBOARD

Sharing moments of joy, celebration, and gratitude



THE FRESHER'S FIESTA

Welcoming the newest members of our physics family with an unforgettable Freshers' Party.

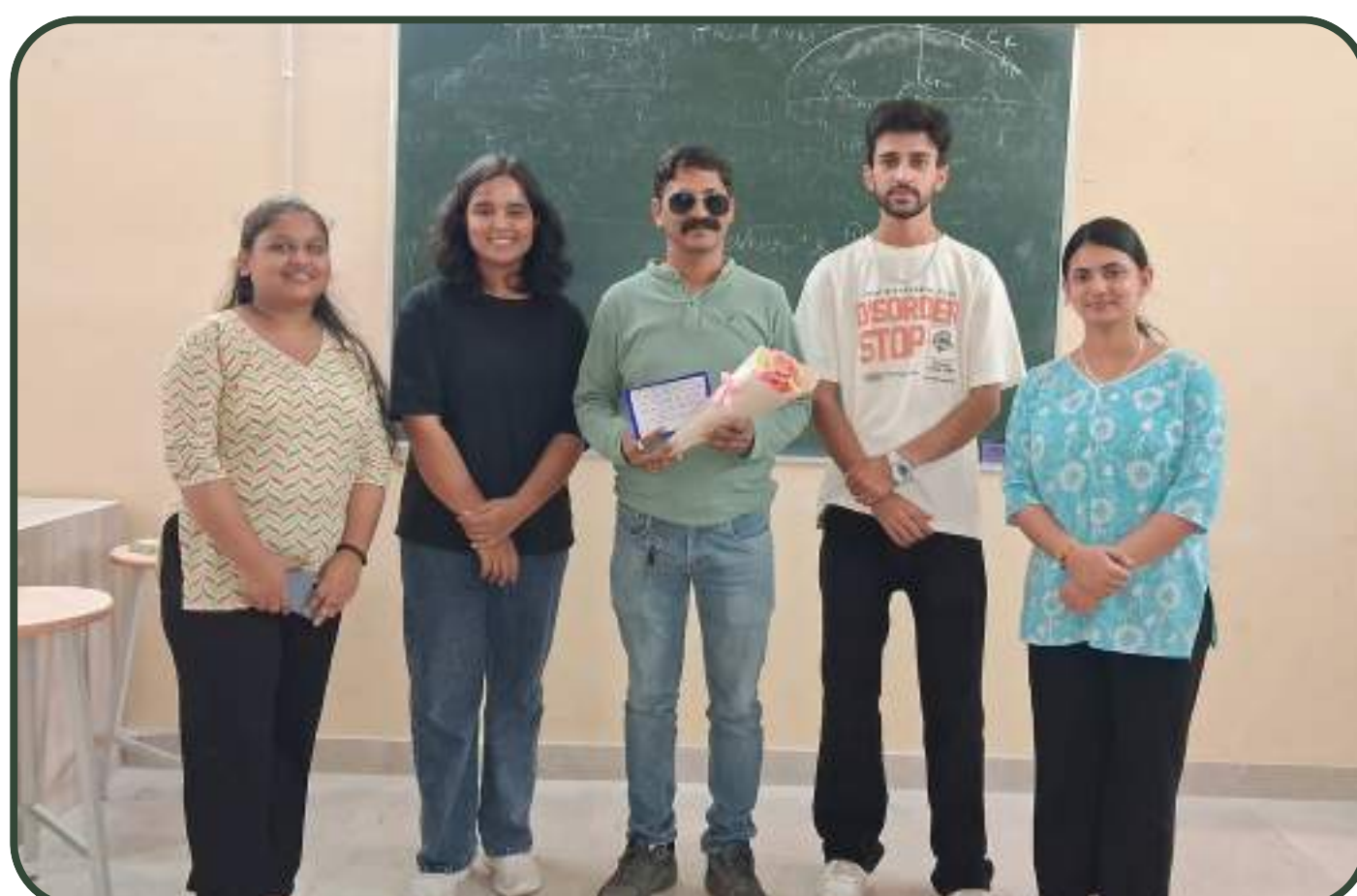
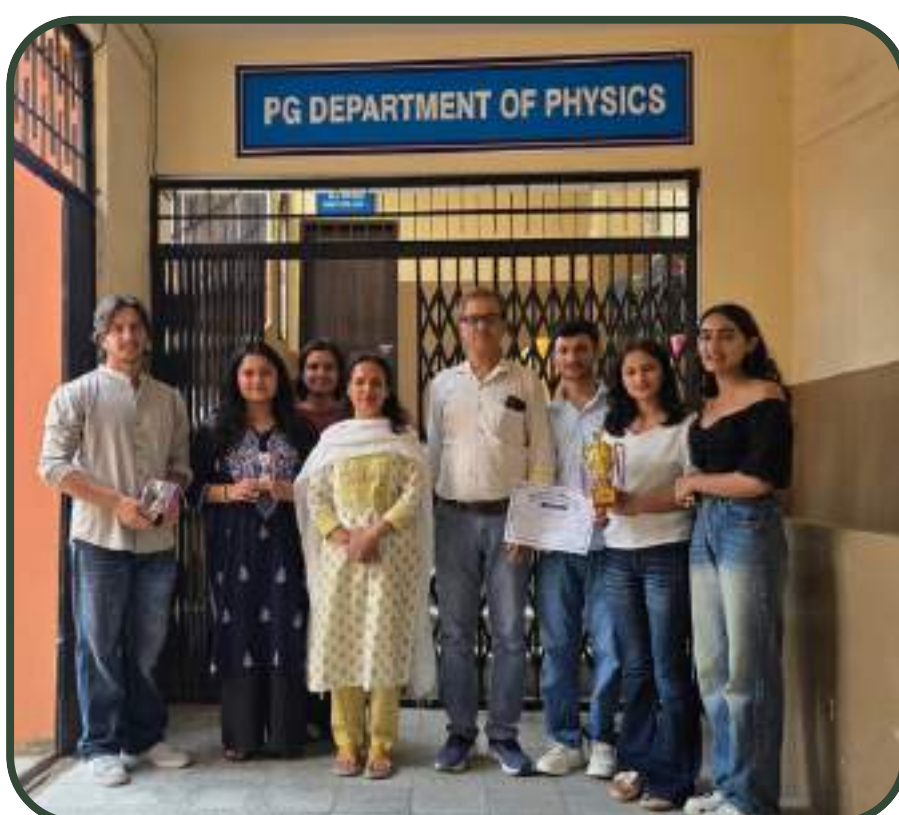


PARTING GLANCES

Bidding a heartfelt farewell to our seniors as they embark on their next great adventures.



THE Memory LAB





Thank you for an unforgettable year of science, collaboration, and community.

As we bring this third edition of VigyanDrishti to a close, we want to extend our deepest gratitude to everyone who made this academic year so extraordinary. A society is only as vibrant as its members, and the Vedanta Physics Society has truly thrived because of your relentless energy, participation, and passion. Whether you stepped up to organize an event, shared your ideas and thoughts, cheered on your peers, or simply brought your curiosity to our gatherings, you have been an essential part of our shared success.

Physics teaches us that once momentum is established, it drives us relentlessly forward. It is our most sincere hope that the Vedanta Physics Society continues on this incredible trajectory - scaling new heights, fostering a spirit of inquiry, and breaking new ground. May the coming years bring even deeper collaborations, brighter discoveries, and continued excellence. Thank you for making this journey so remarkable. Keep exploring, keep questioning, and keep reaching for the stars!

Thank You.

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