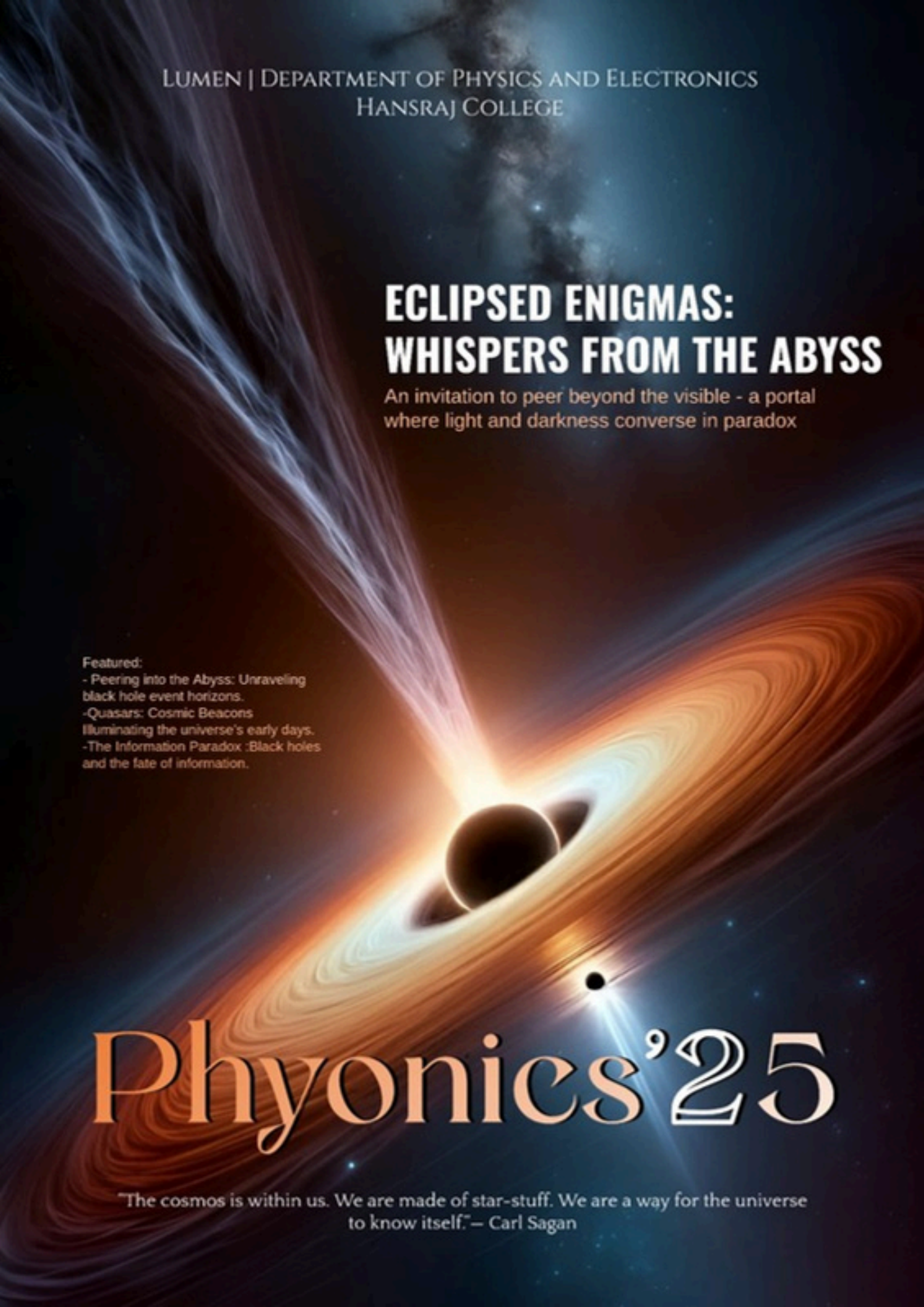
LUMEN | DEPARTMENT OF PHYSICS AND ELECTRONICS
HANSRAJ COLLEGE

ECLIPSED ENIGMAS: WHISPERS FROM THE ABYSS

An invitation to peer beyond the visible - a portal where light and darkness converse in paradox

Featured:
- Peering into the Abyss: Unraveling black hole event horizons.
-Quasars: Cosmic Beacons Illuminating the universe's early days.
-The Information Paradox :Black holes and the fate of information.



Phyonics'25

"The cosmos is within us. We are made of star-stuff. We are a way for the universe to know itself."— Carl Sagan

Phyonics'25

THE ANNUAL MAGAZINE
DEPARTMENT OF PHYSICS AND ELECTRONICS
HANSRAJ COLLEGE , UNIVERSITY OF DELHI

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DISCLAIMER

Lumen – The Physics and Electronics Society of Hansraj College welcomes you to the latest edition of our college magazine, PHYONICS'25 .We are a community of highly motivated and curious students who are passionate about exploring as well as expressing various domains of science and technology. The sole aim of society is to provide a platform for these ignited minds to enhance their knowledge through hands-on experience, discussions, and through numerous other ways leading to their holistic development.

The publication of this magazine stands as a testament to the collective effort and dedication of every member who has invested their time and expertise in its creation. From the writers who poured their thoughts onto the page, to the artists who brought those words to life with their illustrations, to the editors who meticulously crafted each sentence - every contribution, big or small, has played a vital role in bringing this publication to perfection.

The articles, images related to the articles, and views expressed and published in this magazine are solely the work of the respective authors and do not necessarily reflect the opinions or beliefs of the college or society as a whole. It is the responsibility of the authors to ensure that their write-ups are original and their own. Although all efforts have been made to maintain authenticity and accuracy, the editorial team and the technical team cannot be involved in any case of plagiarism.

With these words, we invite you to delve into the diverse array of ideas, narratives and encounters that our society presents. May this magazine spark inspiration, broaden understanding, and fuel your curiosity, serving as a reflection of the vibrant community that we are proud to be a part of.

Happy reading!!!!

ACKNOWLEDGEMENT

LUMEN : The Physics and Electronics Society of Hansraj college is a community of students who are passionate about exploring the fascinating world of science and technology. Our vision and mission solely focuses on working together with extraordinary minds, giving life to the creative ideas and executing the possibilities we create.

It gives us immense pleasure to extend heartfelt gratitude and appreciation to every member of our society for their commitment and hard work in publishing this year's annual magazine PHYONICS'25. The dedication and commitment shown by each and every individual involved in the production of this magazine have truly been exemplary. From the authors and editors to the designers and photographers, each individual has played a significant role in making this magazine a success. We could not have produced this magazine without their dedication, skill, and imagination.

We take great pride in the achievements of our department, and we believe that this magazine will be a fitting tribute to the hard work and commitment of our team LUMEN.

ABOUT LUMEN

LUMEN: The Physics and Electronics society of Hansraj college has always been an eye opening, promoting and supporting front that has given great opportunities and knowledge for all the students around the college who have keen interest in Physics and related subjects. They have always worked for the betterment of the department and have always been updated of science thus reaching out to a lot of students in the most advanced manner.

Our society is dedicated to promoting interest and understanding of Physics among the student body, and providing opportunities for members to explore the subject outside of the classroom. We organize a range of events and activities throughout the year, including talks by guest speakers, lab tours and a lot more activities . This academic year we arranged the events which were celebrating the beauty of science, exploring the various realms of Physics, appreciating the wide applications of Electronics and at the same time keeping the students abreast with the advancements and demand of the recent times and making them aware of the various fields they could explore that could help them build a better career.

Like every year LUMEN proving themselves better, this year also marked great achievements and events that saw high hand success. The society has many times also marked the integrity between students led by heads that showcase amazing leadership qualities and have worked with the students to get everybody involved.

PHYONICS 2025

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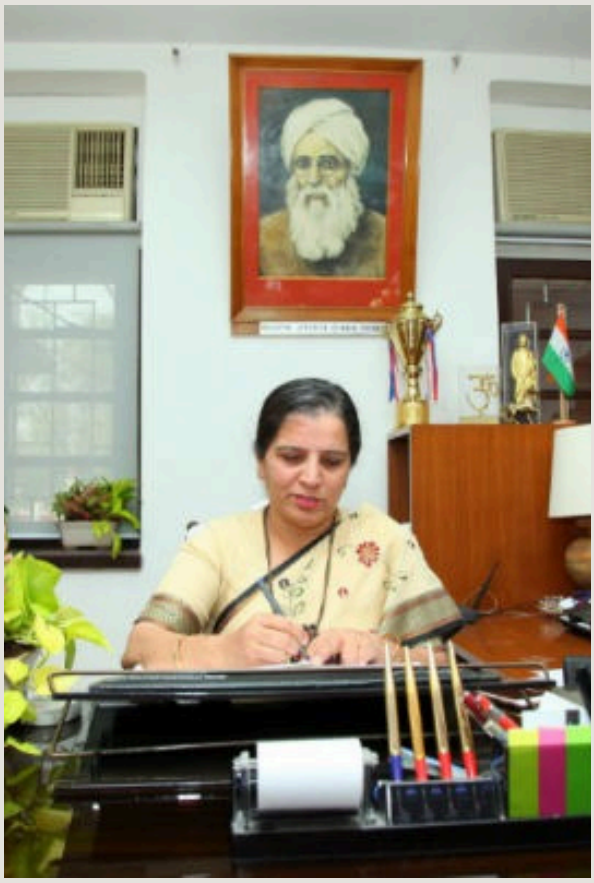


Dr. Rama
Principal,Hansraj College

भौतिकी विज्ञान विभाग की वार्षिक पुस्तिका के चतुर्थ संस्करण के प्रकाशित होने पर समस्त अध्यापकगण एवं विद्यार्थियों को हार्दिक बधाइयाँ।

जब मुझसे कहा गया कि विभाग की वार्षिक पुस्तिका प्रकाशित हो रही है और हमें आपका संदेश चाहिए, तो यद्यपि मैं हिंदी ऑनर्स की छात्रा रही हूँ, फिर भी विज्ञान के प्रति मेरा सदैव गहरा सम्मान रहा है। मेरा मानना है कि विज्ञान ने मानव को प्रकृति के गहन अध्ययन हेतु प्रेरित किया है, तकनीक को और बेहतर बनाने का मूलभूत ज्ञान प्रदान किया है, तथा अन्य अनेक क्षेत्रों में भी हमारे ज्ञान का विकास किया है।

इसमें कोई संशय नहीं है कि दिल्ली विश्वविद्यालय देश का एक श्रेष्ठतम विश्वविद्यालय है। हम निरंतर प्रयासरत हैं कि इसे न केवल देश, बल्कि विश्व के श्रेष्ठ विश्वविद्यालयों में स्थान दिलाएँ। पूरे भारतवर्ष की प्रतिभाएँ दिल्ली विश्वविद्यालय के विभिन्न महाविद्यालयों में अध्ययनरत है।

मैं कामना करती हूँ कि हंसराज महाविद्यालय के भौतिकी विभाग के विद्यार्थी भी अपनी प्रतिभा से कॉलेज की गौरवशाली पूर्व छात्र-छात्राओं की श्रेणी में सम्मिलित हों, और 'द वॉल ऑफ हंसराज' को अपनी मुस्कुराती हुई तस्वीरों से सुशोभित करें।

सभी छात्र-छात्राओं को मेरी शुभकामनाएँ एवं आशीर्वाद।

प्रो. (डॉ.) रमा
प्राचार्या
हंसराज कॉलेज, दिल्ली विश्वविद्यालय

MESSAGE FROM TEACHER-IN-CHARGE

Dr. Ravi Kumar Verma
Teacher-in-charge

It gives me great pleasure to contribute a few words to Lumen's annual magazine. As the Teacher-in-Charge of the Department of Physics, I have had the opportunity to observe the enthusiasm, dedication, and creativity with which the members of Lumen have carried forward their activities throughout the year.

Lumen is more than just a society—it is a dynamic space where science meets expression, and where students explore beyond textbooks, applying their curiosity and imagination to bring physics to life in innovative ways. Whether through events, discussions, or collaborations, the society continues to nurture a culture of inquiry and inspiration.

I would like to extend my heartfelt gratitude to our Principal, Dr. Rama, whose unwavering support and encouragement have always motivated us to strive for excellence. I also thank the committed and spirited members of Lumen, who, under able student leadership, have made this academic year truly memorable.

May this magazine serve as a reminder of all that has been achieved and as an inspiration for future endeavors. I wish Lumen continued success in all its pursuits.

MESSAGE FROM CONVENER

Kudos to our 'LUMEN' team for successfully rolling out the 2025 edition of PHYONICS magazine. The magazine is a testament to persistent scientific endeavours of students of Physics and Electronics department. It's another successful year for LUMEN society. The society has been active through the year, hosting various events and providing a platform for students to shine their technical and creative skills. I thank all the students and the faculty members for their contributions in shaping the magazine. Also would like to recognize and appreciate the efforts of editorial and technical teams in developing and publishing the magazine.

Dr. D Srikala
Convener

I take this opportunity to invite each one of you to read the magazine and encourage the society and students alike. I am confident that the society would continue to set new benchmarks in their zeal for scientific excellence.

I wish you the very best for all your future endeavours!

MESSAGE FROM CONVENER

Dr. Nishant Shankhwar
Convener

LUMEN Hansraj is a society of eager young minds of the Department of Physics and Electronics of one of the most prestigious colleges of the University of Delhi. Starting from the inaugural event at the beginning of the academic session, our brilliant and enthusiastic students work tirelessly in organization and coordination of numerous scientific events throughout the year including educational trips to laboratories and research centers, celebration of important scientific events such as National Science Day, National Space Day, Innovation Day, etc., organization of quizzes, science exhibition and other science competitions.

The sole aim of all the hardwork is keep the passion towards science and technology alive in hearts of their peers in order to keep them motivated towards pursuing a career in science. Scholars of the present are the scientist, leaders, entrepreneurs of the future, who are going to be pivotal in the evolution of human civilization. Hence, sincere efforts are made to provide best scientific exposure and experience to our students, so that it leads to their holistic development as an individual by the time they graduate.

All the above is possible because of the very competent core team of LUMEN members, who are proficient in their respective skill sets and fulfil their responsibilities efficiently, which makes me feel proud and delighted as a Convener. I congratulate the LUMEN team members (technical, editorial, PR, etc.) and all other students for their significant roles in various achievements of the department, extend my best wishes for your future endeavours!

MESSAGE FROM COORDINATOR

Dr. Aman Phogat
Coordinator

It gives me a immense pleasure to address you as we celebrate yet another successful academic year for the Department of Physics and Electronics. The achievements of the department's LUMEN society reflects the collaborative dedication of our students and faculty, whose continued efforts have fostered quality in both academics and extracurricular activities

I would like to thank our esteemed Principal, Prof.(Dr.) Rama for her constant support and leadership, which has helped in the progress of our department.

I applaud LUMEN team and its members for organizing wide variety of educational activities throughout the year, which have significantly shaped the academic and personal development of our students. I would also like to express my heartfelt gratitude to the teacher incharge
Dr. Ravi Kumar Verma, and the LUMEN conveners, whose dedication and hard work continue to inspire not only the students but also the fellow colleagues.

Congratulation once again to the entire LUMEN team and best wishes for the next year.

MESSAGE FROM COORDINATOR

Dr. Neelakshi Borah
Coordinator

It is of immense pleasure for me write about the current LUMEN team and pour my best wishes for the release of their brain child “Phyonics-2025”, annual magazine of dept. of Physics and Electronics. “Phyonics” serves as the podium for our young buds to express their original thoughts and imaginative ideas.

It takes a continuous coherent effort to bring them all together and present in a beautifully organized way to the world. The LUMEN team has continued with same enthusiasm and rapport to bring forward the annual magazine in its best ever form for this year. No doubt this version of the “Phyonics” will flourish us with entertainment and brain storming thoughts.

I am sure the magazine will serve as a source of inspiration, motivation and guidance to the forthcoming students of this auspicious department. My heartfelt congratulations to the entire technical and editorial team members of LUMEN. I convey my gratitude and best wishes to the team and hope they all will shine like bright stars in the future and will keep on making us proud. Thank you.

MESSAGE FROM PRESIDENT

Ajwa
President

It is with immense pride and joy that I extend my warmest greetings to all the readers of Phyonics'24–25 on behalf of Team Lumen: The Physics and Electronics Society of Hansraj College. Our annual magazine stands as a testament to the spirit of exploration, innovation, and collaboration that defines our society. It reflects the dedication and creativity of students who continuously strive to dive deeper into the fascinating world of physics and electronics.

This edition of Phyonics brings together an eclectic collection of insightful articles, technical write-ups, achievements, and creative contributions. It celebrates the academic and extracurricular accomplishments of our members—from excelling in competitive exams and research internships to making their mark in placements and beyond.

Throughout the academic year, Lumen has organized a range of engaging events including expert lectures, hands-on workshops, competitions, and fun-filled departmental fests. Each event has been a step forward in building a dynamic and inclusive space for learning and growth. I am truly grateful to the hardworking members of our PR, Editorial, Technical, and Event teams whose dedication has been the driving force behind every successful initiative.

Having joined Lumen as a member, and eventually serving as the President for the academic session 2024–25, this journey has been nothing short of transformative. It has given me countless memories, invaluable lessons, and a deeper appreciation for teamwork and leadership. I feel honored to have led such a passionate and inspiring team.
As we present this year's edition of Phyonics, I hope it not only informs and engages but also ignites a sense of curiosity and wonder in every reader. Here's to the legacy of Lumen , and to the bright, ever-curious minds that will carry it forward.

MESSAGE FROM VICE-PRESIDENT

Arnav Singh
Vice-President

It is with immense pride and joy that I pen down this note for Lumen's annual magazine. This year has been one of growth, creativity, and collaboration—a testament to the spirit of every member who has poured their heart into making Lumen a vibrant and inspiring space.

As the Vice President, I have had the privilege of witnessing our collective passion translate into powerful performances, thought-provoking discussions, and memories that will stay with us long after the curtains fall. Lumen has always stood for expression and experimentation, and this year we dared to explore, challenge, and celebrate.

This magazine is more than a compilation of our activities—it is a reflection of our journey, our ethos, and the many voices that shape who we are. I hope it offers a glimpse into the energy and enthusiasm that define Lumen, and that it inspires its readers just as much as Lumen has inspired all of us.

To everyone who contributed to this edition—thank you for making it truly special. Here's to the light we carry and the stories we continue to tell.

MESSAGE FROM VICE-PRESIDENT

Shrishti Malik
Vice-President

My journey with LUMEN began in my first year, when I joined the Editorial Team—a space that allowed me to give voice to my thoughts and refine my expression. Surrounded by a group of passionate and creative minds, I was constantly inspired to think beyond boundaries and embrace the power of teamwork.

As I pen down this message for Phyonics, I find myself reflecting on a journey filled with growth, collaboration, and discovery. What started as a small step to be part of something meaningful soon turned into an experience full of learning, teamwork, and growth. I've come to realise that it's not just the roles we hold, but the people we meet and the moments we share that truly make the journey special

Stepping into the Vice President's role for the session 2024-25 was a leap—one filled with new responsibilities, learning curves, and countless moments of collaboration. From planning events and guiding teams to handling unexpected challenges. Every experience has taught me something invaluable. I've come to realize that leadership is not about always having the answers, but about creating an environment where everyone feels heard, valued, and empowered to contribute

This session has been a beautiful spectrum of emotions—excitement that fueled ambition, nervousness that sparked growth, joy in the little wins, and pride in the collective achievements. From curating meaningful content to orchestrating events that left a mark, every experience with LUMEN has not only enriched my college journey but has also been instrumental in shaping the person I am becoming.

To the incoming team—you are inheriting a legacy shaped by passion, trust, and a shared vision. Cherish it, challenge it, and take it to even greater heights. Never underestimate the light within you—let it illuminate new paths, inspire new dreams, and ignite a wave of curiosity and courage

As this chapter gently ends, my heart is full of gratitude—thank you for the journey, the lessons, and the incredible honor leading this team called LUMEN.

MESSAGE FROM EDITORS

Dear Readers,

Ankit Kumar
Editor-in-Chief

With great joy and excitement, I welcome you to this year's edition of Phyonics'25. As you flip through the pages, you will find more than just articles—you'll find the passion, dedication and crossroads of curiosity that makes our community come alive.

This magazine is a celebration of Physics, not merely as a subject, but as a methodology of thinking, a means to explore the world, challenge everything known and uncover the vast experience of it. Be it essays, creative and literal expressions or features filled with insight, Phyonics'25 hosts the electrifying spirit of our scholastic and scientific undertakings.

Every single piece is brought to life by an outstanding team. My gratitude stands boundless when it comes to the collaborative work of the Lumen society, the contributors who poured their absolute talent, and the editorial team whose boundless passion brought Phyonics'25 together. This experience has been as eye-opening as it has been rewarding.

Have a good read!

Keshav Jindal
Editor-in-Chief

It gives me immense pleasure to present to you Phyonics-25—a testament to the passion, creativity, and intellect that define the Physics Department of Hansraj College.

This year's edition is more than just a magazine; it is a reflection of the vibrant spirit that our department embodies. From documenting the dynamic events organized by our physics society, LUMEN, to showcasing original research and insightful articles on diverse topics, this issue brings together the voices and visions of budding physicists who dare to ask, explore, and imagine.

Alongside academic and analytical pieces, we have also ventured into creative spaces—reviewing films through the lens of physics, capturing the poetic expressions that touch upon themes far beyond the realm of science, and sharing the experiences of our peers who have excelled in competitive exams like GATE and IIT JAM. Each section is crafted with care, offering something to learn, something to ponder, and something to simply enjoy.

Co-editing this magazine has been a journey of growth and inspiration. I am deeply grateful to my fellow Editor-in-Chief, Ankit Kumar, for his continued support and collaboration throughout this process. And of course, none of this would have been possible without the tireless efforts of our amazing team of contributors who put their heart into every detail.

As you flip through these pages, I hope you find moments that resonate with your curiosity and remind you why physics continues to capture our imagination generation after generation.

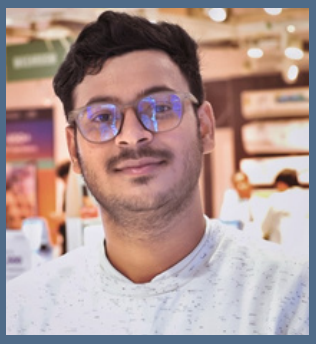
Warm regards

LUMEN COUNCIL MEMBERS

Ajwa
President

Arnav Singh
Vice-President

Shrishti Malik
Vice-President



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Keshav Jindal
Cheif Executive Head

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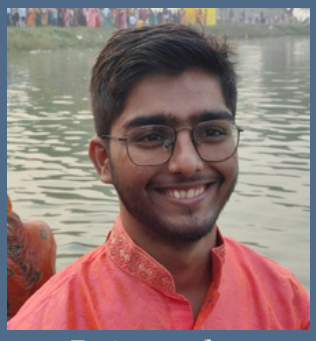
Secretary

Ankit Kumar
Joint-Secretary



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Amrish Patel
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EDITOR'S NOTE

In every corner of inquiry—be it academic, artistic, or anecdotal—there lies a story waiting to be told. Phyonics, this year's edition of Lumen's annual magazine, is not just a compilation of contributions; it is a curated journey through thought, reflection, and expression. As we piece together moments from classrooms, corridors, and contemplative spaces, we find ourselves standing at the intersection of creativity and intellect.

We begin with Idea Influx, a section dedicated to the analytical and the inquisitive. Here, students engage deeply with questions that challenge the ordinary, offering well-structured insights and fresh perspectives.

Next, Science on Screen casts a critical eye on science in cinema. Through thoughtful reviews of scientific films and documentaries, this section reflects on how complex ideas are translated to the screen—and how those representations shape public understanding.

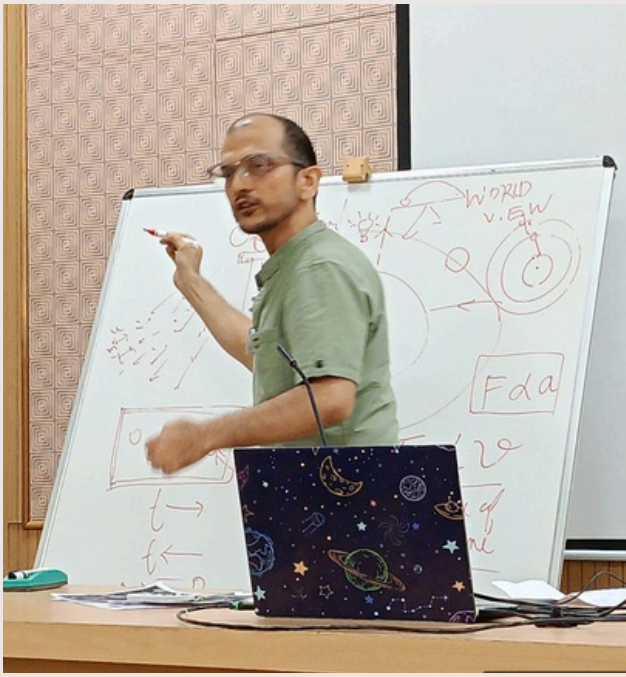
The Poetry Corner gives voice to the unquantifiable. In this space, science meets sensitivity, and words find their rhythm in silence, emotion, and resonance. These pieces remind us that there is beauty not only in discovery but in how we speak of it.

Moving forward, The Art Board showcases the creative brilliance that often goes unnoticed in academic corridors. Be it sketches, photographs, or digital illustrations, this section captures science and life through a visual lens.

We close with Campus Diaries, a heartfelt collection of memories, musings, and conversations. It's a reminder that behind every equation, poem, or brushstroke is a lived experience—a story unfolding in real time, within the campus we call home.

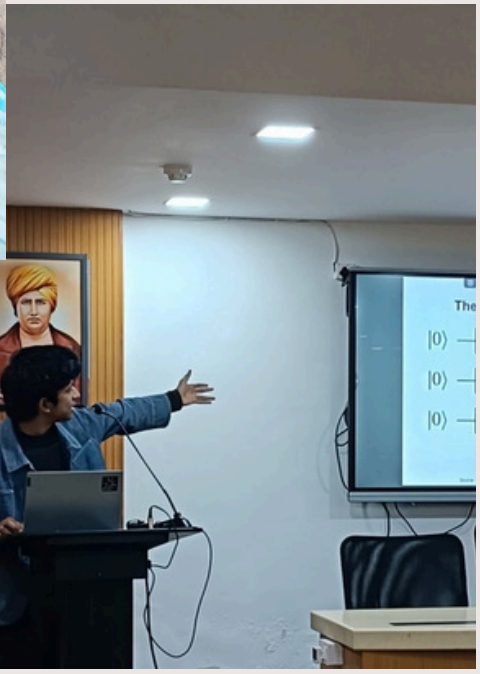
As you turn each page, may you find both thought and feeling—may you read with wonder, and pause with curiosity.

Ankit Kumar
Joint Secretary, Lumen | Editor-in-Cheif, Phyonics



OUR EVENTS

2024-2025

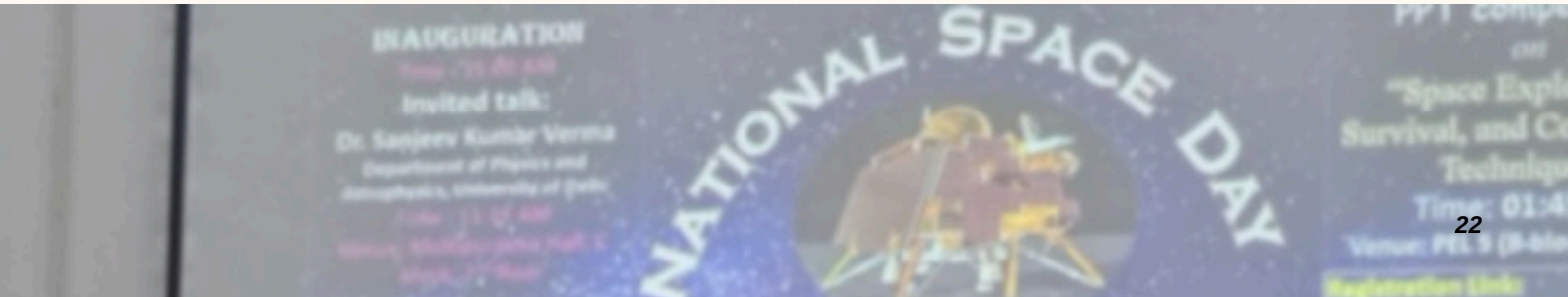


Space Day Celebration

Fall into Beauty of Space

The Hansraj College Physics and Electronics Society, LUMEN, celebrated National Space Day on 23rd August 2024 by organizing a series of events. It began with the inaugural session and a Speaker Session by Dr. Sanjeev Kumar Verma, who showcased India's advancements in space and future missions.

A Documentary Screening of "75 Years Journey of ISRO" exposed the incredible contribution of the organization towards space exploration. The Quiz Competition tested the awareness level of the students on Indian space research, bringing forth enthusiasm and competitive spirit. The event concluded in a PPT Competition on "Space Exploration, Survival, and Colonization Techniques" in which the students presented innovative ideas on human space exploration and planet colonization. The event successfully increased students' interest in space science, encouraging exploration and innovation in the field.



ORIENTATION PROGRAM

Physics Department

The Hansraj College Physics and Electronics Society, LUMEN, organized an Orientation Programme to welcome the new batch and provide valuable academic guidance. The session familiarized the students with the credit system, the New Education Policy (NEP), and subject distribution between theory and lab.

The induction was held within an academic setup with the instructional staff explaining extensively the curriculum as well as the functioning mechanism of the credit system on NEP 2020.

The standouts of the session were:

- **Understanding the Credit System**: Credit assignment and its effect on scheduling courses.The New Education Policy (NEP) 2020 prescribes a multidisciplinary degree and encourages choosing flexible courses.
- **Subject and Credit Allocation**: Balance between core, elective, and laboratory courses with a mix of the finest theory and practical training.
- **Lab and Theory Integration**: Emphasis on laboratory work in the reinforcement of theory concepts and teaching of laboratory exams.

SOLAR ENERGY TRAINING PROGRAMME

On 14th October 2024, Mahatma Gandhi Institute for Combating Climate Change (MGICCC) organized a one-day workshop on Solar Energy for Sustainable Development. 3rd year students and Lumen members participated in the session and were enlightened on solar technology and sustainability.

Experts discussed renewable energy applications and climate change mitigation strategies, giving students useful information for future professional lives in the green energy sector.

THROWING LIGHT ON DARK MATTER

The Hansraj College Physics and Electronics Society, LUMEN, conducted a speaker session on 23rd October 2024. The speaker session, Throwing Light on Dark Matter, was given by Professor Amitabha Mukherjee from the Department of Physics and Astrophysics, University of Delhi.

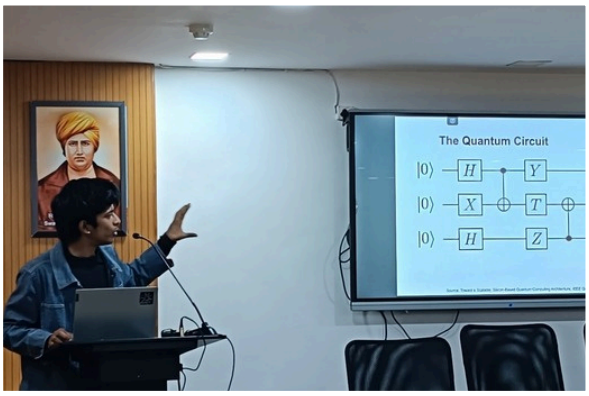
Dark matter was explained to us by Professor Mukherjee, explaining to us how dark matter is invisible and can be observed only through its gravitational influence. He explained to us how important it is, accounting for 27% of the universe and 85% of galactic matter. He explained to us its signatures of observation in galaxy rotation curves, gravitational lensing, and cosmic microwave background radiation.

The session also discussed how dark matter research has led to results for galaxy evolution, the acceleration of the universe, and alterations in gravitational laws. It helps a lot in making progress in fundamental physics as well as discovering new particles. The session concluded with students having reflective insights into one of the universe's largest mysteries.

NATIONAL SCIENCE

Hansraj College organized a National Science Day Workshop on Innovative Technologies in Scientific Research with the theme Vikshit Bharat @2047

The inaugural day of the workshop, 27th February 2025, began with the inauguration ceremony in which there was a guest speakers' address. The speeches emphasized the importance of scientific research and innovation to mold the future of India. After the inauguration session, there were the departmental presentations in which the different departments emphasized their contributions towards scientific advancement and innovation.



During the afternoon session, the Inter-College Paper Presentation Competition was organized, and the themes of the competition involved sustainable innovation, green energy, climate technology, and new technologies such as AI and quantum computing. The students presented their research ideas, demonstrating the understanding of scientific challenges and creating new solutions.

The day concluded with the final round of paper presentations, where shortlisted teams presented their work before the panel of judges. The presentations were a testament to the best research and analytical skills, and the stage was laid for the final assessment and conferring the awards the next day.

DAY 2

The second day of Hansraj College National Science Day Workshop was held on 28th February 2025 and was followed by interactive sessions to create scientific curiosity and innovation. The day began with practical science experiments and a workshop to create practical applications of scientific concepts. The participants were very much interested in these sessions and developed useful experiential learning. This was followed by a speaker session, where the experts expressed their opinions on the role of science and technology in achieving a developed and sustainable India. Their speeches highlighted the need for multidisciplinary research and innovation to address world problems

Along with the workshop, there was a Bridge Building Competition too, organized by LUMEN – The Physics and Electronics Society of Hansraj College. The engineering prowess of the students was demonstrated in the shape of stable bridges constructed using the principles of physics and material science. There was also a session on Myth Busters where myths, which were scientific in nature, were tested and busted by providing fact-based explanations.

The event was capped with a prize-giving ceremony to honor the exemplary contributions and performances of participants in different competitions. The winners of the paper presentation competition and bridge-building competition were rewarded for their creative ideas and problem-solving abilities.

The two-day workshop proved to be successful in generating scientific interest in the students in such a manner that they apply their minds and make technological innovations for a developed India.

Data Analysis in Astronomy

Report on Hands-on Workshop: Data Analysis in Astronomy

The Hansraj College Physics and Electronics Society, LUMEN, conducted a workshop on "Data Analysis in Astronomy" on 7th March 2025. It was conducted by Dr. Priya Hasan and Prof. S.N. Hasan of Maulana Azad National Urdu University, Hyderabad, who conducted fruitful sessions on "Stellar Stories of HR Diagram" and "Galactic Cannibalism."

Experts led participants to learn how to read astronomical data through software like TopCat, Aladin, and DS9. Tutorials on the Hertzsprung-Russell (HR) Diagram, types of galaxies, and the process of Galactic Cannibalism were conducted. Hands-on experience of working with real astronomical datasets were provided in the session, enabling students to gain essential data analysis skills in astronomy. It was an enjoyable and interactive session enhancing participants' astrophysics and observing techniques knowledge.

Ideas Influx

This section features thought-provoking articles, insightful essays, and groundbreaking student research from the departments of Physics and Electronics.

X-RAY ASTRONOMY

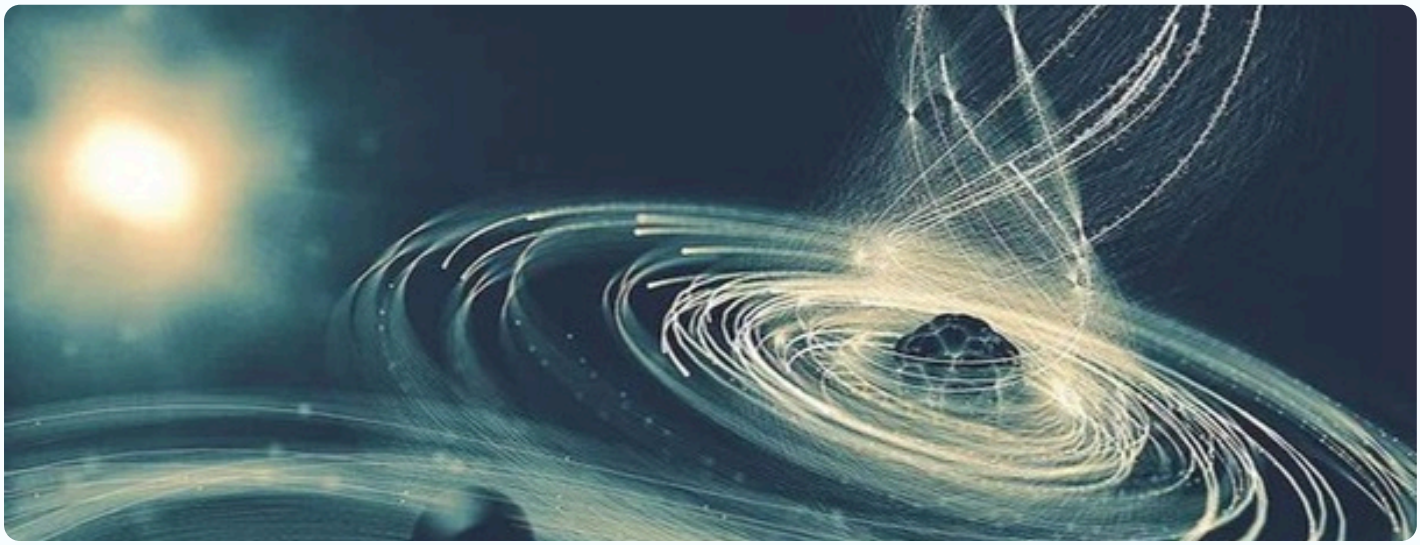
The X-ray photons span the energy range of about 0.1-100 keV, which corresponds to the K shell absorption edge of neutral carbon up to the rest mass energy of the electron, i.e. a photon wavelength of about 0.01-10 Angstorm. The X-ray astronomy largely focusses on probing physical processes under extreme conditions of extremely high density (~10^14 g/cm^3), extremely high temperature (1 million to 100 million K), extremely strong magnetic field (upto 10^14-15 G) and extremely strong gravitational potentials (GM/(rc^2) ~ 1). There are numerous cosmic objects that emit at X-ray wavelengths and regular monotoring of their X-ray emission over the years has profoundly influenced our understanding of chemical and dynamical evolution of structures on all scales. The common examples include huge and energetic supernova explosion, isolated neutron stars and magnetars, white dwarfs, compact objects in binary system, hot gas in galaxy clusters with temperature reaching almost 50 million degrees and accreting supermassive black holes.

The Earth's atmosphere is mostly opaque to X-rays. Therefore, the X-ray astronomy is primarily based on placing X-ray telescope much above the absorbing layers of the Earth's atmosphere. The first planetary X-rays were discovered in 1950s with the first ever detection of terrestrial X-rays. But the X-ray astronomy effectively began in early 1960s with the use of high-altitude balloons and rockets which led to discovery of Scorpius X-1, the first source of X-rays outside our solar system.

Launched in 1970, UHURU marked the beginning of the satellite-based X-ray astronomy. This was followed by detection of X-rays from Jupiter by Einstein X-ray observatory in 1979 and discovery of X-ray emissions from comets by ROSAT in 1996. These detections eventually paved way for the highly dynamic field of solar system X-rays. The most commonly used astronomical X-ray detector is the proportional counter which consists of a sealed chamber of an electrically neutral gas (argon or xenon are commonly used). When an X-ray photon enters this chamber, it photoionizes the gas atom, thereby producing a photoelectron. The number of photoelectrons produced is therefore related to the energy of the incoming X-ray photon. With the advent of modern technologies, the proportional counters are now capable of tracing the position of the incident X-ray photon along with its energy and time of arrival.

Examples of X-ray proportional counters include IPC, PSPC, PCA and LAXPC, respectively onboard the *Einstein* X-ray observatory, ROSAT, RXTE and Indian mission AstroSat. In addition to the proportional counters, charge-coupled devices (CCDs) are also commonly used as X-ray detectors to record the energy and time of arrival of the incident X-rays. Just like optical CCDs, a photon interacts with a solid layer of an array of electrodes, thereby forming a pixel of the image. Examples of X-ray CCDs include, SSI, ACIS and EPIC, respectively, onboard the ASCA, Chandra and XMM-Newton X-ray space missions. Often, microchannel plates (bundles of millions of extremely narrow lead-oxide glass tubes) are used to detect X-ray photons. These plates offer the best spatial resolution amongst the other X-ray detectors, compromising on its inability to provide information about the energy of the incident X-ray photon. Examples include, HRI and HRC, respectively onboard the Einstein observatory and Chandra X-ray observatory.

Over the last six decades, the sensitivity of instrumentation for X-ray astronomy has improved by more than 9 orders of magnitude, facilitating us to explore fainter, deeper and further systems. The X-ray astronomers often measure three properties of the incoming photon: the direction of the incoming photon in the sky, its time of arrival and its energy.These measurements make up the basic tools of X-ray astronomy: imaging, time-domain study and spectral analysis, respectively. And each of these tools reveal different aspect of the X-ray source. An image shows the brightness (number of incoming photns) of the object in the spatial domain (specific location in the sky).



Ofcourse, the spatial resolution of the detector plays a siginifcant role in imaging analysis and with XRISM launched in September 2023, we now have instruments that can offer a high spectral resolution of ~5 eV at soft energies which can convincingly reveal the structures of the X-ray emitting regions. The fluctuations in intensity of the source over a period of time serves as a valuable tool to study the atmosphere and structures present in the vicinity of the X-ray emitting source. And through spectroscopic measurements, astronomers study the variation in the intensity of the incoming radiation as a function of energy. Such analyses can give a lot of information such as mechanism of X-ray emission (Compton scattering, bremsstrahlung, blackbody radiation, cyclotron radiation, etc.), abundance, temperature, ionisation and density of an element in the cosmic object, the magnetic field of the object, the size and mass of the system and information on the wind dynamics.

Another important diagnostic tool for examining the geometry of the celestial sources is the polarization study which provides a deep insight to the radiation mechanism, and the local anisotropies in the electric, gravitational and magnetic fields. Without doubt, POLIX, the Polarimeter Instrument in X-rays, onboard the XpoSat, launched in January 2024 is India's giant leap in advanced X-ray astronomy and is anticipated to bring substantial results in the X-ray polarization measurements of neutron stars, black holes and active galactic nuclei.

Clearly, the X-ray astronomy has transformed our understanding of the enormous cosmos and it is currently in its golden era, floursishing with loads of information of the highly dynamic Universe.

Professor
Chetana Jain

NANOTECHNOLOGY IN MEDICINE: A QUANTUM LEAP IN HEALTHCARE

Nanotechnology is revolutionizing medicine with nanotechnology, the science of working with matter at the atomic or molecular level, which has a profound impact on various fields. It refers to the design, manufacture, and application of materials and devices that are on the nanometer scale. Researchers are opening doors to unprecedented opportunities for diagnosing, treating, and even curing diseases. Among the most promising technologies are quantum dots and nanobots, which can revolutionize healthcare. However, can these miniature technologies cure diseases? How will medicine be transformed by Nanotechnology?

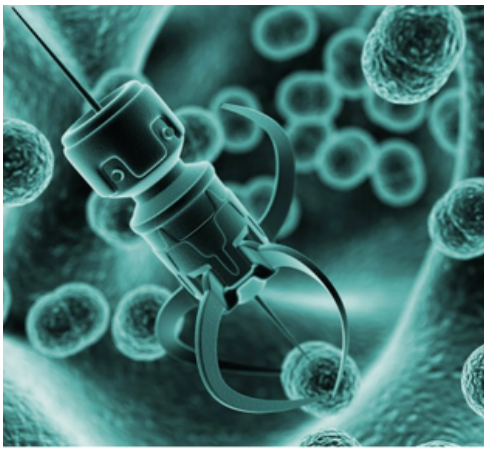
Nanoparticles are particles with sizes in the order of nanoscale. They have characteristic physical and chemical properties compared to their bulk equivalents. Drug delivery is one of the most promising applications of nanotechnology in medicine. Nanoparticles are engineered to deliver drugs in a targeted fashion, enhancing efficacy with reduced side effects. This approach is referred to as "targeted drug delivery".

QUANTUM DOTS: ILLUMINATING THE FUTURE OF DIAGNOSTICS

Quantum dots (QDs) are semiconductor particles at the nanoscale that have special optical and electronic properties. When they are hit by light, they glow in specific wavelengths, which makes them extremely useful in medical diagnostics and imaging. In cancer diagnosis, for example, quantum dots can be made to attach themselves to cancer cells, lighting them up with precision. This facilitates early detection of cancers that may otherwise be undetectable. As Dr. Shuming Nie, a nanotechnology research pioneer, once put it, "Quantum dots are like tiny beacons that can light up the hidden corners of disease, offering a new way to see what was once invisible." QDs are also being researched for their therapeutic applications in personalized medicine, wherein they can monitor drug delivery and measure treatment effectiveness in real time.

NANOBOTS: THE TINY SURGEONS OF TOMORROW

Nanobots or nanorobots are microscopic robots that have been programmed to carry out precise functions in the body. Such devices, sometimes no bigger than a few nanometers, are able to move through the blood, mend tissue, administer medicine, and even kill pathogens or cancer cells with precision. One of the most thrilling uses of nanobots is in drug delivery. Conventional chemotherapy, for instance, targets both cancer cells and healthy cells, causing extreme side effects. Nanobots can be designed, however, to target drugs to tumor cells, reducing collateral damage. In the years to come, nanobots may even conduct complicated surgeries on the cellular level, rendering open procedures obsolete.



Nanotechnology is being used for several applications including Cancer treatment wherein Nanoparticles are being made to enhance cancer diagnosis and treatment. For example, dendrimers have been found to target chemotherapeutic agents in cancer cells with little or no toxicity to normal cells; Detection of Diseases with Nanosensors has been constructed to detect rapidly pathogens, biomarkers, and other disease markers; Vaccines since Nanotechnology has a major contribution in developing new vaccine strategies. Nanoparticles can be used as adjuvants to amplify immune responses or as delivery vehicles for antigens, producing better and more stable vaccines.

At our level of knowledge of this technology currently, we have different challenges and concerns. Despite their potential, quantum dots and nanobots are also challenged by several significant hurdles. Among these is safety, where the long-term impact on the human body is not yet fully grasped.

For example, quantum dots constructed from heavy metals such as cadmium carry toxicity risks, whereas nanobots would activate immune reactions or fail inside the body. Therefore, in summary, Nanotechnology, especially with quantum dots and nanobots, has the potential to revolutionize medicine. We may not yet have all the solutions, but one thing is certain: the future of medicine will be created by the small, but powerful, universe of nanotechnology.

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Arnav Singh
B.Sc (H) Electronics

SPACE JUNK AND THE KESSLER SYNDROME : ARE WE TRAPPING OURSELVES IN ORBIT?

As humanity ventures further into space, a growing problem threatens our future beyond earth: space junk. Also known as orbital debris, space junk consists of defunct satellites, spent rocket stages, and fragments from past collisions. With thousands of object moving around earth, scientists warn of a dangerous chain reaction known as Kessler syndrome. Since the launch of the first artificial satellite , Sputnik 1, in 1957, the number of human-made objects in orbit has increased dramatically. Today there are more than 30,000 tracked pieces of debris larger than 10 cm, along with millions of smaller fragments.

WHAT IS SPACE JUNK?

Space junk is the colloquial name given to what NASA terms orbital debris and is officially defined as all man made objects in earth's orbit that no longer serve as a useful purpose. Example can be as large as obsolete satellites and upper stages of rockets or as small as a 1mm paint fleck or piece of dust from solid fuel rocket booster. One of the main reason of increase in space debris is the collisions between orbital objects. These collisions are rare but where they do occur the impact can have as much energy as a powerful explosion creating thousand of individual pieces of debris. Most collisions are accidental but in recent years a new danger has emerged: Antisatellite weapons or ASAT, ASAT
or antisatellite weapon is technology used to destroy or disable satellites in orbit. Space debris in lower orbits tend to re-enter atmosphere within a few years . These items mostly burn up as they travel through atmosphere and disintegrate before they can reach the ground. However, in general further the debris is from the planet ,the longer it'll remain in orbit. For example- Debris in geostationary orbit which is some 22,000 miles from surface of earth and very stable, can remain there almost indefinitely. Indeed, it is believed that some examples could still be orbiting the earth millions of years from now or even longer.

WHAT IS KESSLER SYNDROME?

Proposed by NASA scientist Donald J.Kessler in 1978, Kessler syndrome is a scenario where space debris in lower earth orbit reaches a critical density leading to chain reaction of collisions. Each collision generates more fragments increasing the risk of further impacts. Over time this could make certain orbits unusable, threatening satellites, space stations and future space missions. With increasing satellite launch and space junk accumulation the risk of Kessler Syndrome is growing . Efforts to mitigate the problem include tracking debris, designing satellites for safer disposal and developing technologies for active debris removal. Without intervention space could become dangerously cluttered limiting humanity's ability to explore and utilize it safely.

ARE WE TRAPPING OURSELVES IN ORBIT?

If we continue to add debris to Earth's orbit without addressing the problem, we risk limiting our ability to access and explore space safely. Some experts warn that we may already be near a tripping point, where space debris collisions become self- sustaining, accelerating the onset of Kessler Syndrome. As we continue launching satellites, space probes, and crewed missions, we are unintentionally creating a self inflicted trap around our planet. The growing amount of space debris in Earth's orbit raises a critical question: Are we making space inaccessible for ourselves? If we fail to manage this issue, we could be sealing off certain regions of space, making future missions increasingly difficult and dangerous. The more we pollute Earth's orbit, the harder it becomes to operate in space. If we do not address this problem soon, future generations may struggle to explore beyond the planet-or worse, find themselves trapped under a shell of debris that we created. The race is on to develop solutions before we permanently lock ourselves out of space.

Pallavi Bhandari
B.Sc (H) Electronics

The Billionaire Space Race: Scientific Progress or Just Ego

THE CASE FOR SCIENTIFIC PROGRESS

Undoubtedly, private companies have contributed to scientific and technological progress. SpaceX's development of reusable rocket technology has dramatically reduced launch costs, making space more accessible. Innovations such as the Falcon Heavy, Starship, and Blue Origin's New Shepard are setting the stage for interplanetary exploration.
But it is to be mentioned that this research and innovation isnt done purely for research and discovery purposes, but it has a certain black side also. These big companies also want to gain from space tourism, which is very lucrative for many high-worth individuals.

THE EGO FACTOR: BILLIONAIRES SEEKING LEGACY?

Critics argue that the billionaire space race is less about human progress and more about personal legacy-building. Unlike government space programs, which operate with broader scientific and exploratory missions, private space ventures are often seen as branding exercises, enhancing the status and public image of their founders.

The extravagant spaceflights of Jeff Bezos and Richard Branson, which lasted mere minutes, have been labeled as glorified publicity stunts rather than significant scientific breakthroughs.

There is a grey side for space technology, but it's important for humanity to get to the next step of civilisation to become an interplanetary species. For this we need to develop our space programs to that level, though government agencies like NASA, Roscosmos even isro had done trendmes good job in developing it in the previous centrue and we have came a very long way and we had to go to a very long way, for that these will need help of the private players to drive innovations, there is a necessary parthship needed for the humanity to become inter planetary species.
In the end, I want to mention that space tech is not like bio-medicine tech in which most of the discovery and innovation were held in times of atrocities in World War 1 and 2.
But it's a field where innovations were done purely in the pursuit of curiosity.

Ankit Krish
B.Sc (H) Electronics

JWST: UNVEILING THE SECRETS OF THE EARLY UNIVERSE

In the beginning our universe was very hot and dense. As the universe cool down, the electrons interacted with the nuclei forming the first atoms. A few 100 million years later the first stars and eventually galaxies appeared, but how did they form? This thing will help us understand a ten billion dollars time machine which has been in development for over 20 years.

Suppose that you are 65 million light years from the Earth in some part of the Virgo Cluster, and you possess a hugely powerful telescope to which you can turn to look at the Earth. Peering through the telescope, you could observe what the dinosaurs were like on our world. Naturally, we will experience numerous problems in getting there, but we are discussing a wonderfully powerful telescope here.The James Webb Space Telescope is just that. It is 100 times stronger than the Hubble Telescope. Simply compare the size of their primary mirrors, and yet James webb's mirror is 100 and 13 kg 200 and 40 lighter.The telescope operates in the infrared spectrum. The infrared radiation can cut through the dust cloud and let us view the stars forming within. Also, einstein's theory of relativity explains that space between objects within our universe opens up, and light also expands.

When light from the initial stars and galaxies moves towards us, its waves get longer and the light also turns infrared, which is commonly referred to as reds shift. Each time you gaze up at the night sky, just realize that there are numerous stars and galaxies, whose light stretched and became invisible or too weak for you to detect. So let's ask a question. How is the James Webb Space Telescope going to be able to detect that light? It will be aided by an enormous mirror which will amplify the amount of light gathered. The greater the light, the clearer the image. The mirror is constructed of 18 hexagonal segments, each 1 1.3 two meters 4.3 in diameter. This configuration will allow the crew to fold the mirror on the ground and open it in space. Then the focus of the mirror will be calibrated by shifting the various segments with an accuracy of one to 10001 10 thousand of the thickness of a human hair. The light is collected onto the secondary mirror, then it is reflected and sent to the scientific tools after it is filtered.

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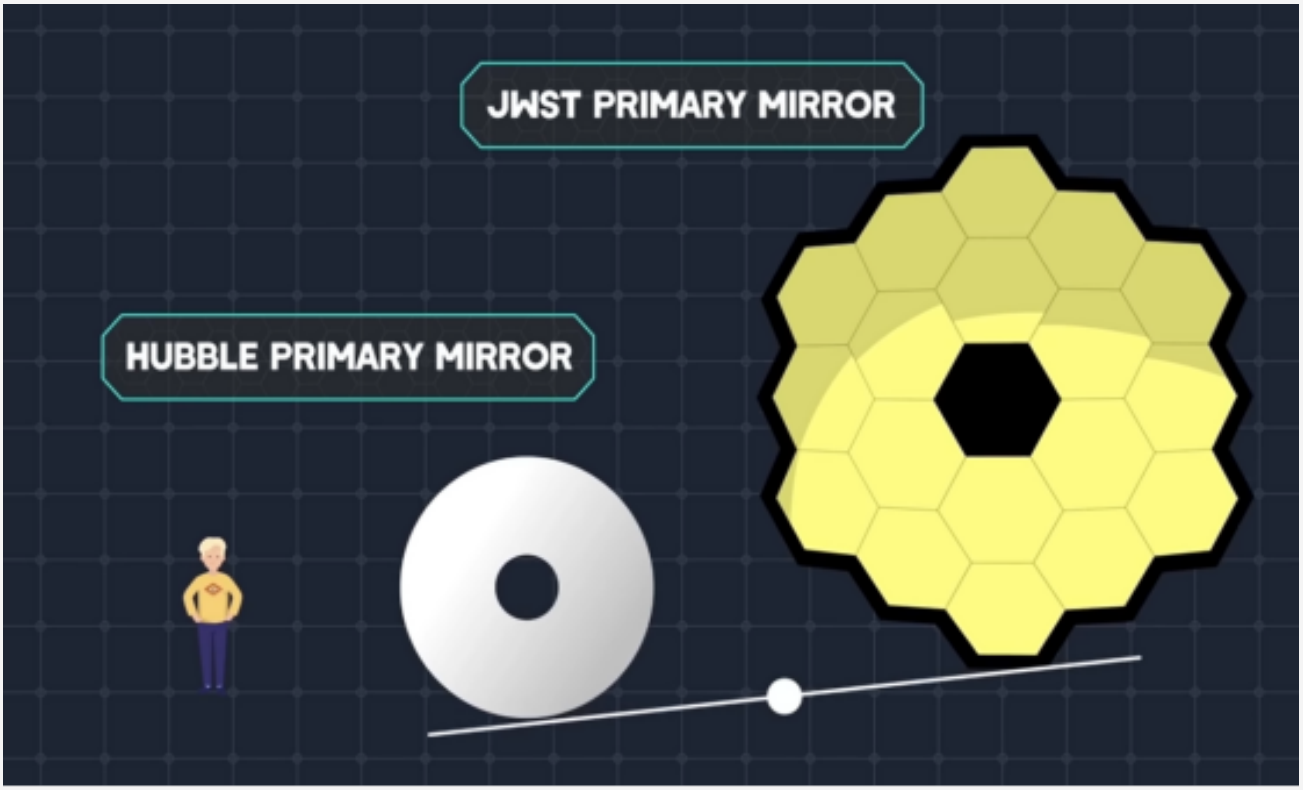
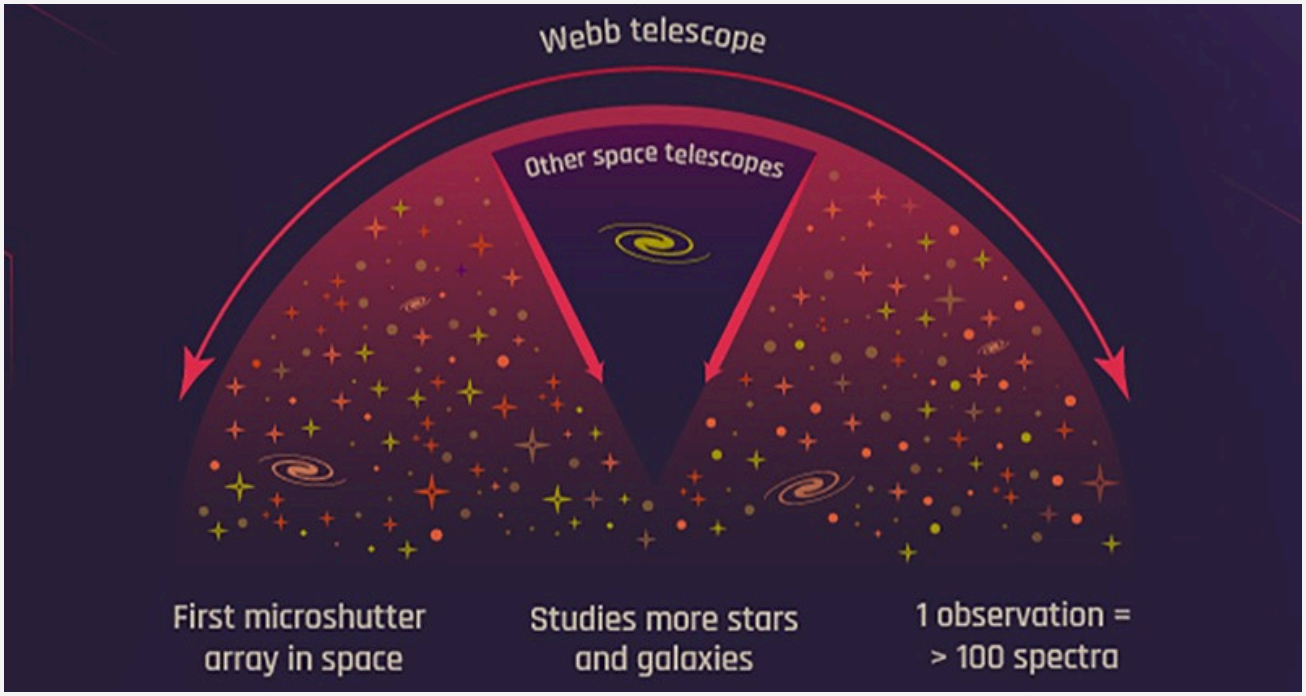


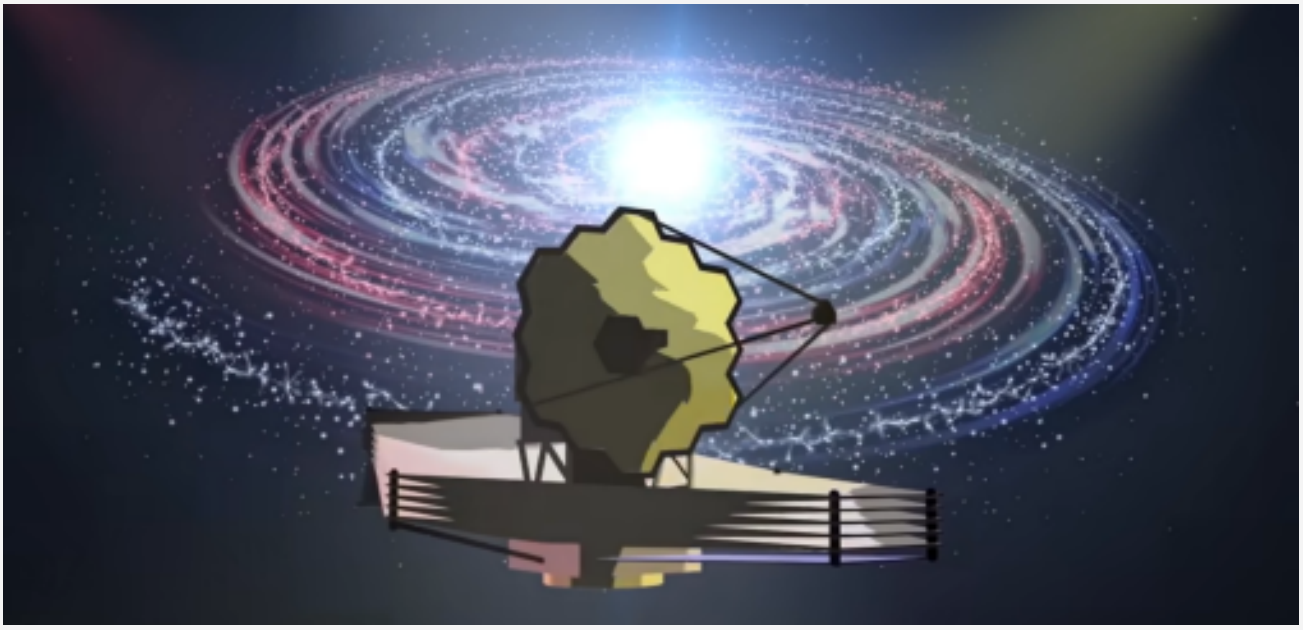
Ten sensitive detectors enable it to sense the light of the first stars and galaxies. Additionally. NERAMM is fitted with chronographs and what are they think that you're hiding the sun behind your hand? By covering the bright light, you are able to view the road in front of you. A coronagraph has a similar principle, this feature will enable scientists to view more dimly lit stars, galaxies and even photograph exoplanet.But Nizam cannot tell us all we want to know about the physical characteristics of a planet. Is there water, air impossible to tell? So another instrument named Near Spec will be operating with the same range. By analyzing the spectrum of light coming from an object we can determine its mass, temperature and chemical makeup. The molecules and atoms of an object imprint themselves on the spectrum as dark lines. But to examine the weakest light, the telescope must gawk at the object for more than 100 hours, which is eons.But the scientists did not toil for ten years for nothing, surely.To prevent wasting the telescope resources on a single object, the NEAR SPEC has a superpower of giving spectroscopies of 100 objects at a time, which was accomplished by creating a new technology known as micro shutter system. The system consists of 200 and 50 thousand shutters that open and close. If ever you have seen the night sky in a city or town and contrasted it with what is visible at night in the countryside, you could most likely telllt the difference. It occurs because of the excess amount of light present in the city. Thus, the Microns shutter system will prevent the unnecessary light, enabling us to view the faintest object that is lit. The light is then spread into the spectrum and transmitted to the detectors how much light there is in outer space.

There is an enormous amount and in order to only record the pertinent light, the telescope must be constantly pointed at various targets. This will be made possible through the use of the Fine Guidance Sensor FGS. Also, researchers from the Canadian Space Agency created the Near-infrared Imager and Stiltless Spectrograph, which photographs and takes spectroscopies in near infrared light as well. But what can we do with thick dust clouds that block the view? The near-infrared light may not be able to pass through.



And that brings us to the final tool. Miri also has a camera and a spectrograph, but it operates in a different infrared light range, one with longer waves that can pass through the dense dust clouds. Its sensitive detectors will enable us to see the red-shifted light of far-off galaxies, newly born stars and comet. The problem with Miri is that if this device is not cooled to 6.7 Kelvin, or 200 and 66.5 Celsius, it begins to trap its own heat. So scientists created another cooling system known as Cry Coololer. Essentially, it's a high-tech refrigerator where helium will run long pipes summoning miri to the correct temperature. Consequently.But now we have another problem, the Sun, the Moon, and Earth emitting heat, and as a solution to this problem, the engineers created an amazing passive cooling system for the telescope, the Sun Shield. The dimensions of this shield are 21 meters long and 14 meters wide. The shield consists of five layers with a gap between each layer of material so that they can cool effectively. Each of the layers is constructed using a special type of film that is capable of withstanding extremely high temperatures. Such a material is referred to as Captain. Furthermore, all layers have an aluminum coating and the initial two an extra layer of doped silicone to withstand even higher temperatures for the Suns shield.For the ability to conceal the telescope from the Sun, the Moon, and Earth at the same time, the Just must be 1.5 million kilometers from Earth.For context, the Hubble Space Telescope was just 500 and 47 kilome. The James Webb Space Telescope will journey to a special place called Lari 0.2. It is one of the Solar System's five locations where gravitational forces enable the objects to stay in a stable position relative to Earth. Remember how we discussed a folding mirror. In the same way, the suns shield and numerous other parts will be foldable like this. The scientists can fold the telescope and fit it inside the rocket ARIAN V, which is the most trustworthy rocket that can launch the telescope into space. And now let's discuss the most thrilling thing, the potential of the James Webb Space Telescope. We've already spoken about its potential to detect faint infrared radiation from the first stars and galaxies. So what comes next well? For instance, you can detect the warmth signal of a bumblebee at the moon distance using the just. Why would you want to detect a bumblebee?

Do you know Saturn is not the only planet with rings? Uranus.Neptune, and Jupiter do too.It's just that in the visible spectrum, their rings are indistinct and dark. Employing the transit method in infrared, the telescope will be capable of informing us about how the rings around the four planets have formed. Well what about in-depth analysis of an exoplanets atmosphere.



The scientists want to study the planet that sits in the habitable zone, meaning they may hold water. Through the use of the telescope, we will be able to discover the chemical makeup of those planets' atmospheres. Scientist Maioaku believes that the probability of finding an alien civilization is really good. The telescope will be able to inform us more of the origin of galaxies, stars, and planet. It can potentially reshape science as we know it. The universe holds many secrets, but the James Webb Space Telescope will most likely be able to reveal these mysteries and meanwhile we will keep surprising you with new articles.

Aryan Rana
B.Sc (H) Electronics

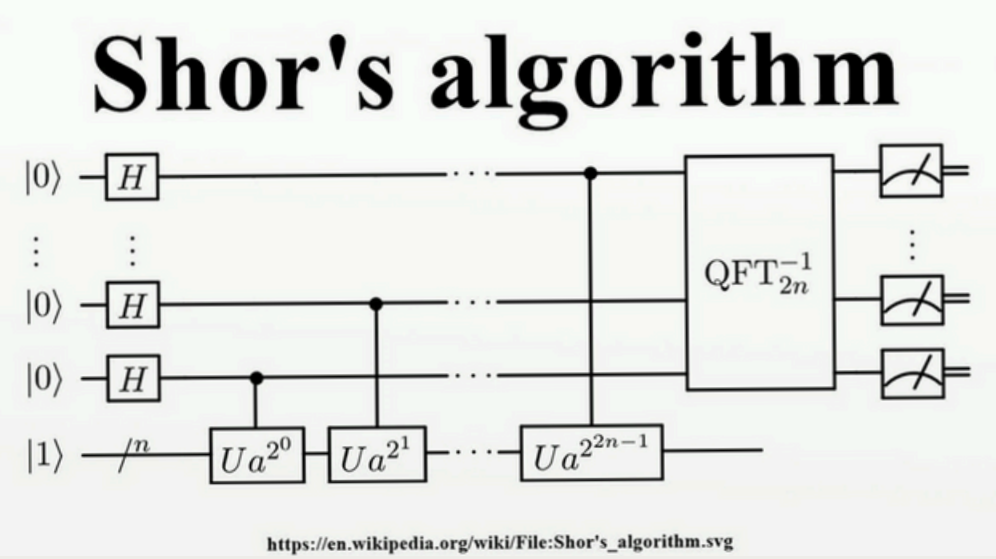
Decoding the Quantum Crucible: Forging a New Era of Computation

While quantum computing offers exponential potential for solving complex problems, it's a developing field, and classical computing remains crucial for many tasks. Quantum computers are still in development, and the path to widespread quantum advantage is a complex one, with both hardware and algorithm advancements playing key roles.

The relentless march of classical computing, predicated on Moore's Law, has propelled us into an era of unprecedented technological advancement. However, the inherent limitations of classical bits are becoming increasingly apparent, prompting a global exploration of the quantum realm. Quantum computing, leveraging the counterintuitive principles of superposition and entanglement, promises to revolutionize computation, but the path to practical quantum advantage remains a complex and multifaceted challenge.

At the heart of this revolution lies the qubit, a quantum analog of the classical bit. Unlike its binary counterpart, the qubit can exist in a superposition of states, representing both 0 and 1 simultaneously.
This, coupled with entanglement, where multiple qubits become correlated in a manner that defies classical explanation, enables quantum computers to perform certain computations exponentially faster than their classical counterparts. The theoretical implications are profound, spanning diverse fields. One of the most compelling, and potentially disruptive, applications is the implementation of Shor's algorithm. This algorithm, if successfully executed on a sufficiently large and fault-tolerant quantum computer, could factorize large numbers in polynomial time, effectively rendering current public-key cryptography, such as RSA, obsolete.

This vulnerability necessitates a proactive shift towards post-quantum cryptography, a field dedicated to developing cryptographic algorithms resistant to quantum attacks. Research into lattice-based cryptography, code-based cryptography, and multivariate cryptography has intensified, aiming to secure our digital infrastructure against future quantum threats.



Beyond cryptography, quantum simulation stands as a cornerstone of quantum computing's potential. The ability to simulate complex quantum systems, such as molecules and materials, holds immense promise for accelerating scientific discovery. In drug discovery, quantum simulations could accurately predict molecular interactions, enabling the design of novel pharmaceuticals with enhanced efficacy and reduced side effects. This could revolutionize the pharmaceutical industry, significantly shortening drug development timelines and reducing costs. In materials science, quantum simulations could facilitate the discovery of new materials with tailored properties, such as high-temperature superconductors, advanced catalysts, and novel quantum materials. This could drive innovation in energy, electronics, and other industries. Furthermore, quantum algorithms are being explored for solving complex optimization problems that are intractable for classical computers. Applications range from logistics and supply chain management to financial modeling and artificial intelligence. Quantum optimization algorithms, such as the Quantum Approximate Optimization Algorithm (QAOA) and Variational Quantum Eigensolver (VQE), are being actively researched for their potential to solve real-world problems. Despite the theoretical promise, the realization of practical quantum computers faces significant technical hurdles. Qubit decoherence, the loss of quantum coherence due to interactions with the environment, remains a critical challenge. Researchers are exploring various strategies to mitigate decoherence, including topological quantum computation, which aims to encode quantum information in topological states that are inherently robust to noise. Quantum error correction is another essential component of fault-tolerant quantum computing. The development of efficient quantum error correction codes, such as surface codes and color codes, is crucial for protecting quantum information from errors. However, these codes typically require a significant overhead of physical qubits to encode a single logical qubit, posing a scalability challenge.

Scalability is another major hurdle. Building quantum computers with a large number of high-quality qubits requires overcoming significant engineering challenges. The development of robust qubit fabrication techniques, efficient control and calibration systems, and sophisticated cryogenic infrastructure is essential. Various hardware platforms are being explored, each with its own advantages and disadvantages. Superconducting qubits, trapped ions, photonic qubits, and neutral atoms are among the leading contenders. Each platform faces unique challenges related to qubit coherence, scalability, and control.

The development of quantum algorithms and software is also a critical area of research. Quantum programming languages, such as Qiskit, Cirq, and PennyLane, are being developed to facilitate the design and implementation of quantum algorithms. The development of quantum software development kits (SDKs) and cloud-based quantum computing platforms is democratizing access to quantum computing resources, enabling researchers and developers to experiment with the technology. Hybrid quantum-classical computing approaches are gaining traction, leveraging the strengths of both classical and quantum computers.

These approaches aim to solve complex problems by partitioning them into classical and quantum subproblems, allowing each type of computer to handle the tasks it performs best.

The path to practical quantum advantage is likely to be iterative, with incremental progress and breakthroughs along the way. Near-term quantum devices, often referred to as noisy intermediate-scale quantum (NISQ) devices, are being explored for their potential to solve specific problems that are intractable for classical computers. The development of fault-tolerant quantum computers remains a long-term goal, requiring significant advances in qubit technology, error correction, and control.

The quantum computing landscape is characterized by intense competition and collaboration. Governments, academic institutions, and private companies are investing heavily in quantum research and development. International collaborations are fostering the exchange of knowledge and expertise, accelerating the pace of innovation. Standardized benchmarks and metrics are being developed to evaluate the performance of quantum computers, enabling comparisons between different platforms and tracking progress over time.

The quantum revolution is not merely a technological endeavor; it is a scientific and societal transformation. Preparing for this future requires a concerted effort from researchers, engineers, policymakers, and the public. Investing in quantum education and workforce development, fostering collaboration between academia and industry, and promoting public awareness of quantum technologies are crucial steps. The quantum enigma presents a formidable challenge, but the potential rewards are immense. By embracing the complexity and fostering a collaborative spirit, we can unlock the transformative power of quantum computing and shape a future defined by quantum innovation.

Shrishti Malik
B.Sc (H) Physics

IS THE UNIVERSE PLAYING IN REVERSE?

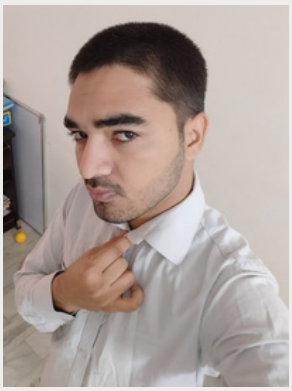
“Jules Henri Poincare, a famous nineteenth-century French mathematician who anticipated many aspects of relativity theory, once put it in this way. Suppose, he said, that during the night, while you were sound asleep, everything in the universe became a thousand times larger than before. Poincare meant everything: electrons, atoms, wavelengths of light, you, yourself, your bed, your house, the earth, the sun, the stars. When you awoke, could you tell that anything had changed? Is there any experiment you could perform that would prove you had altered in size?”.I Wasn’t Expecting This Much Existential Crisis In The First Few Opening Lines From The Book “Relativity Simply Explained” By Martin Gardner.

It Took Me A While To Digest The Fact That “NOTHING Will Seem To Be Changed And There Is No Experiment We Can Perform To PROVE”. Indeed It Would be Hard To Digest As My Old Diet Was Based On The Fact that “ Everything In The Universe Would Be a Thousand Times Larger Than Before”. In Other Words, What Jules Henri Poincare Wants To Say With This Thought Experiment is That “ Length Is Relative, A Pencil is Large in comparison to a hydrogen Atom But at The Same Time Much Smaller Than The Size Of Earth. If The Ratio Between The Difference In Lengths Stays Constant, We Wouldn’t Able To Perceive Any Change Irrespective Of How Many Times It Get Bigger Than Before”.

I Don’t Know How You Define “Time” But I Can Bet You Have Never Seen Time as “Entropy Increasing”. Don’t Panic,It Is Just a Measurement of Randomness. This Would Be Easy If You See the World From Matter And Particles Perspective. It’s In Nature That Particles Go Randomly Arranged Than In A Symmetrical Order As Probability Of Making Such Order Is So Less (Almost Zero). In Other Words, A Particle Keeps Getting Distorted Into a Random Structure. This is What Textbooks Called “The Second Law Of Thermodynamics” which States Randomness(Entropy) Of A System Keeps Increasing.

We Associate This Entropy Increasing With the “Forward Direction Of Time”. As Entropy Increases, Times Moves Ahead. This Is The Very Reason Why We Aren’t Aware Of Future Events Because the Future Exists In Higher Entropy. Third Case Could Be “Entropy Decreasing” which Means Particles Are Getting More Ordered Than Before And If So “A Broken Glass would seems to Heal Into A Perfect Glass With Time”

But Here Is The Beauty Of Relativity, Remember The Thought Experiment That Started The Article, Similarly How In The World Could You Say That “The Universe Isn’t Playing In Reverse” If You Have Never Ever In Your Life Experienced How It Feels Like Reversing The Universe?” And Even If The Universe Is Playing In Reverse, We Wouldn’t Notice Anything It Would Be the same As Now. What If The Reaction occurs before the Action where We Are Calling “Reaction” an Action and Action as “Reaction”. No Matter How You Alter The Timeline Forward or Backward. Physics Law Still Holds. And if They Do So How Do You Know if We Are In a forward timeline Or a backward timeline? And Even If Entropy Increasing is a sign of moving in Forward, Entropy Decreasing wouldn’t feel Any Different. If physics holds true in both directions, then forward and backward time are indistinguishable. So, can we ever truly say which way we are moving?



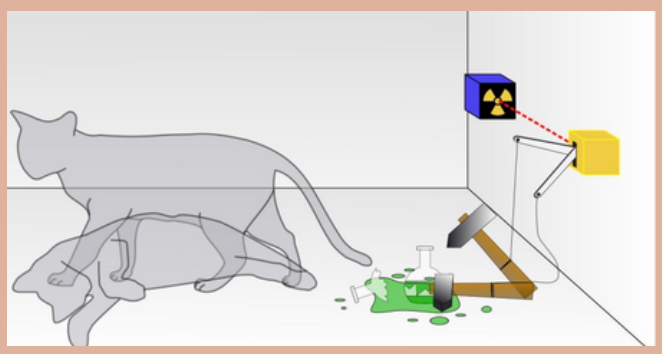
Aditya
B.Sc. Physical Science

SCHRÖDINGER'S CAT REVISITED:
WHAT DOES IT TELL US ABOUT REALITY

With the advent of the 20th century came one of the biggest breakthroughs of science- **Quantum Mechanics**, a theory which makes headlines even today. In present times physicists and researchers claim that objective reality doesn't exist, a mind-boggling conclusion drawn from quantum mechanics. This particular insight of quantum mechanics even troubled Erwin Schrödinger, the founding father of quantum mechanics. He wrote about the interpretation of quantum mechanics, saying, "I don't like it, and I am sorry I ever had anything to do with it." To illustrate the paradoxical nature of quantum mechanics he came up with a thought experiment- **Schrödinger's Cat**.

Quantum mechanics allows existence of superposition. Superposition is a system that exists in multiple states simultaneously until a measurement is made, at which point it collapses into a single definite outcome. Superposition is not only limited to microscopic particles, it can be amplified to macroscopic size. In his hypothetical cat experiment, Schrödinger demonstrated this amplification.

In a closed box we have a cat, a flask of poison, a radioactive source and a trigger mechanism. The trigger has a fifty percent chance of going off. If the trigger shatters the flask, the poison is released, killing the cat. Till we measure it, the radioactive source is in a superposition of both decayed and undecayed states, so before we look into the box the cat is both dead and alive.



How we understand this experiment depends on our interpretation of quantum mechanics and on how we interpret the mathematics behind it. The most widely accepted interpretation is the Copenhagen interpretation. The Copenhagen interpretation talks about the collapse of wave function when a measurement is made. It states that observation is necessary to determine an outcome. Some interpretations go further, arguing that consciousness itself plays a role in collapsing quantum possibilities into a single outcome.

Then comes the Marvel Studios' favorite interpretation, the **Many-Worlds Interpretation**. All the outcomes that can happen, happen in separate universes. Rather than collapsing into one outcome, the universe splits into multiple parallel realities. So, the cat lives in one universe and is dead in another.

There are other interpretations like the Pilot Wave Theory and Superdeterminism. It is impossible to distinguish between different interpretations of mathematics through experimentation but Superdeterminism and under particular conditions, Pilot Wave Theory make different predictions than Copenhagen or Many-Worlds.

Schrödinger originally designed this thought experiment to criticize the strange implications of quantum mechanics, rather than to prove that cats can exist in a limbo between life and death. However, the paradox remains a powerful way to explore fundamental questions about reality. Schrödinger's Cat explores the strange and counterintuitive nature of quantum mechanics. It does not provide a definitive answer to the nature of reality but instead raises the question whether reality is an independent, objective entity or something shaped by observation and interaction.

Ajwa
BSc. (H) Physics

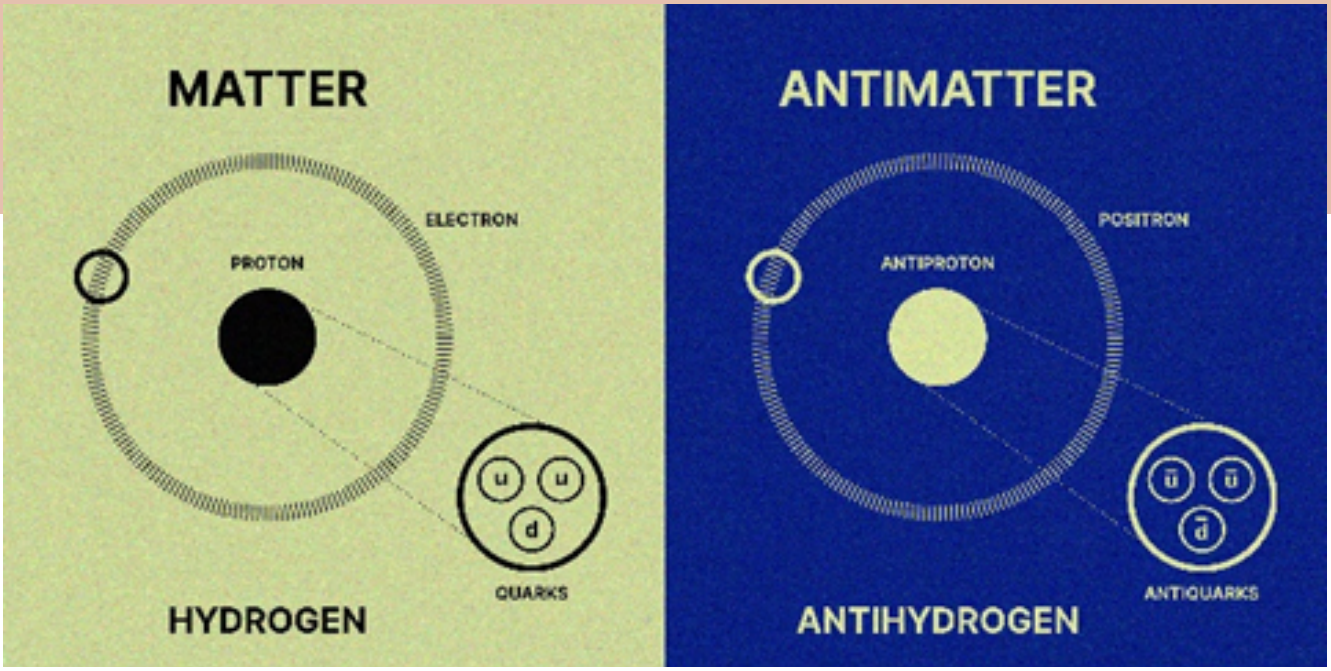
Antimatter

Could it be the Key to Unlimited Energy?

Everything in the world as we see around us is made out of matter – rocks, plants, cars, animals, and us humans. "Matter" is a cluster of a substantial number of quantum particles: electrons, quarks, muons, tauons, and so on. And for all of these particles, there exists a complimentary antiparticle. These antiparticles have exactly the same properties as their corresponding counterparts; the only difference between them is their opposing charges.

These antiparticles are opposite excitations of the same quantum field, pretty much like how the equation x2 = 4 has two solutions: 2 and -2, which are the same values with opposite signs. When antiparticles come in contact with a particle, they annihilate each other, leaving behind only photons to carry a large amount of energy.

The reverse of this is also possible – particle-antiparticle pairs can be formed out of pure radiation. In fact, this is how the first particles of the universe are believed to have been formed. So, in theory, every fundamental particle should have a corresponding antiparticle, and these antiparticles should combine to form antimatter; but in reality, almost none of it exists. This puzzling lack of antiparticles in our universe works in our favour, since otherwise the universe wouldn't exist. But it also raises the question, if particle-antiparticle contact results in annihilation, and every particle is believed to be created with a partner antiparticle, shouldn't the world have been destroyed just as it was created? Why is there such a large-scale imbalance in the existence of particles and antiparticles?



CERN's antimatter factory, which successfully created antihydrogen, is trying to find an explanation for this imbalance. Maybe antihydrogen does not in fact behave the same as hydrogen. Maybe gravity affects it ever so slightly differently.

According to our initial understanding of antiparticles, performing CPT transformations to create antiparticles from particles should keep the laws of physics unchanged. These CPT transformations are charge conjugation (swapping the charge of the particle), parity inversion (mirror inversion of particles), and time reversal (motion and spin of particle is reversed). We believed the universe to be CPT symmetric and expected antimatter to be treated the exact same way as matter. However, these assumed symmetries failed when Chinese-American physicist Chien-Shiung Wu's cobalt-60 experiment proved that parity inversion is violated in beta decay. So, despite our original belief, a mirror image of our universe would be distinguishable from our own. Later, charge-parity symmetry was also disproven due to peculiarity in the decay of K-mesons. These experiments and a possible violation of full CPT symmetry can explain the lack of antiparticles in our universe.

Coming to our main topic of discussion, we know that matter and antimatter release a huge amount of energy when they meet, far exceeding the energy released in nuclear fission or fusion reactions. Can this energy be harnessed in a way that is useful for us? Can this destructive process be used as a source of unlimited energy? Can this energy be used to run cars, devices, and industries?

Unfortunately, antimatter cannot be used as an efficient unlimited energy source. Despite the large amount of energy that is released during particle-antiparticle contact, antimatter does not typically occur in nature: it has to be created. This process of creation of antiparticles is extremely difficult and requires a very large amount of energy. Even the storage of antimatter uses up a lot of energy and is a very challenging task because it needs to be isolated from any normal matter to prevent annihilation. The inefficiency of antimatter production is enormous; you get only about a tenth of a billion (10-10) of the invested energy back. If we could assemble all the antimatter ever made at CERN and annihilate it with matter, we would have only enough energy to light a single electric light bulb for a few minutes. Because of these reasons, using this energy becomes uneconomical with our present-day technology.

Despite the limitations we currently face, antimatter has the potential to be an incredibly powerful energy source in the future. Current research focuses majorly on producing more efficient ways to generate antimatter in particle accelerators and developing storage technologies. With successful advancements in these fields, we could obtain extremely high energy densities for future interstellar travel and specialized power sources like high-energy particle colliders.

Shristi Duarah
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THE AI PARADOX: INNOVATION VS. JOB LOSS

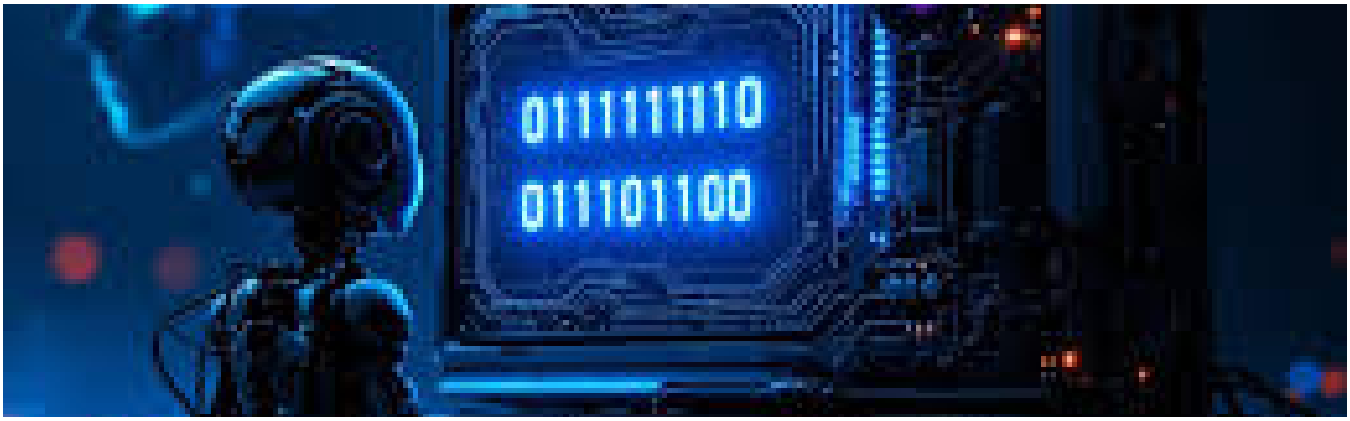
"AI is not a substitute for human intelligence; it is a tool to amplify human creativity and ingenuity."

AI is everywhere these days—from instagram reelsalgorithms to self-driving cars. It's the coolest tech trend of our generation, and it's evolving at lightning speed. But here's the catch: while AI has the potential to change the world for the better, it also comes with some serious risks. It's this weird paradox where AI is both super helpful and kind of scary at the same time.

AI is shaking up how we do scientific research. It's speeding up drug development, solving cosmic mysteries, and making research faster and more accurate. But at the same time, it's threatening jobs in the scientific community. Will AI work with scientists or replace them? Let's dive into the complex relationship between AI-driven innovation and the risks it poses to scientific jobs.

How AI is Changing Scientific Research

AI is revolutionizing research in big ways. Tools like deep learning, machine learning, and natural language processing are making research more precise and efficient. Here's how: Science often involves analyzing massive datasets. AI can process and interpret this data way faster than humans. For example, in genomics, AI helps identify disease markers from genetic data in hours instead of months. In Astronomy, AI-powered image recognition helps spot exoplanets and classify galaxies with insane accuracy. AI is also making lab work more efficient. AI-driven robots can now run experiments, record results, and adjust parameters in real-time



The Dark Side: Job Displacement in Science

As awesome as AI is, it's also causing job insecurity in the scientific community. AI isn't replacing scientists entirely, but it's taking over many tasks that researchers used to do. This shift is raising some serious concerns:

Tasks like data processing, literature reviews, and even writing parts of research papers are being automated. AI can now generate hypotheses, run statistical analyses, and more. As AI takes over these tasks, researchers might find their roles shrinking or changing.

Less Funding for Human Scientists

Governments and private organizations might start funding AI-driven research over traditional methods. If AI can run experiments with minimal human input, institutions might hire fewer researchers, leaving fewer opportunities for young scientists

Over-Reliance on AI and Mistakes

AI isn't perfect. It relies on huge amounts of data, but it can still make mistakes due to biased training data or misinterpreted results. If scientists rely too much on AI without double-checking its work, it could lead to flawed research. Unlike humans, AI can't question assumptions, use intuition, or spot anomalies outside its training data.

Finding a Balance: Be collaborative not a replacement

Instead of seeing AI as a threat, the scientific community should focus on making AI a collaborator, not a replacement. Here's how we can strike that balance:

Focus on Creativity and Critical Thinking: As AI handles routine tasks, scientists should focus on higher-level thinking, creativity, and ethical decision-making. Researchers need to shift from data processing to critical analysis and innovation.

Conclusion

AI is undeniably transforming scientific research, making it faster, more accurate, and more efficient. But it also raises valid concerns about job loss and the future of human researchers. The key is to integrate AI as a tool that enhances science, not replaces it. By redefining the role of scientists, using AI ethically, and fostering collaboration, we can harness AI's potential while keeping human creativity and intellect at the forefront. The future of research should be about teamwork—AI and humans working together to innovate and discover.

Akshat Singh
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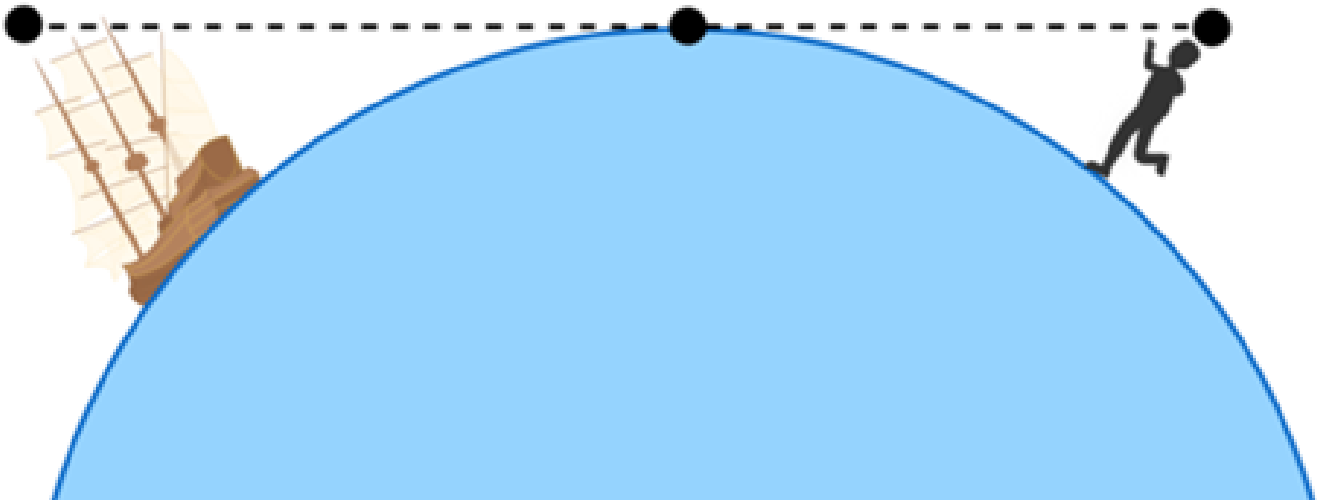


HOW GREEK MEASURED THE EARTH?

In the third century BCE , Eratosthenes, a Greek librarian in Alexandria , Egypt , determined the earth's circumference to be 40,250 to 45,900 kilometers

Astronomy is oldest of the natural sciences and it's no wonder that it is, since the endless shimmering spots, that we call stars, laying on the empty black canvas of the night sky has been a source of inspiration and for us and our ancestors alike. From our perspective on earth, it is quite easy to believe that the earth is largely flat and the sun and moons are celestial objects that orbit our planet in varying cycles of the days and the months. However, with just a little bit of critical thinking and inspection, we can figure out that the former is not true at all.

Let's take a look at the various ways that we could measure the cosmos (as our ancestors have before us).

The Disappearing Hull, a telltale sign of Earth's Curvature:

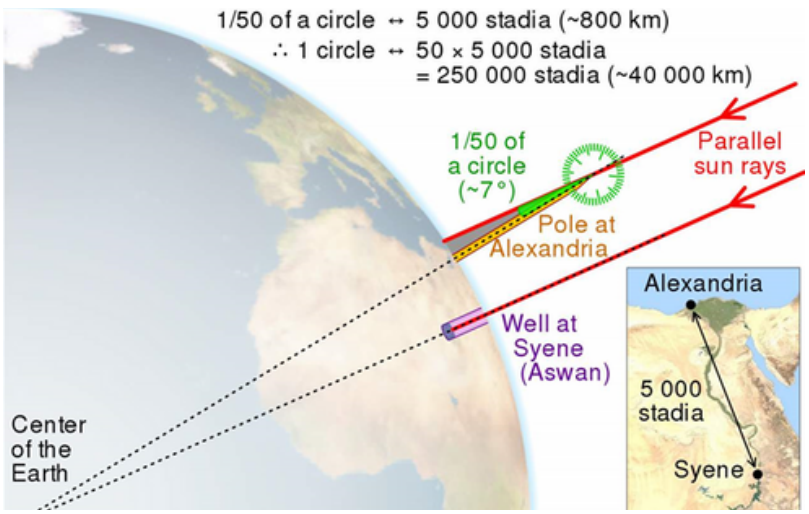
The curvature of the Earth blocks the view of the lower part of the ship first, while the higher parts remain visible for longer. This observation was noted by ancient Greek philosophers and later by sailors during the Age of Exploration. This simple observation clearly tackles and defers the idea of the "flat earth". To add to this, observations such as the apparent "freely floating" motion of the moon and sun were used to infer that that the earth must be similarly floating too.

Eratosthenes, A noon in Alexandria and the Measurement of the Earth:

One of the most remarkable achievements in ancient astronomy was the measurement of the Earth's circumference by Eratosthenes. He had heard that at noon on the summer solstice (June 21), the Sun was directly overhead in Syene (modern Aswan, Egypt), meaning objects cast no shadow. However, In Alexandria, Eratosthenes measured the angle of the Sun's rays using a vertical stick (gnomon).

The shadow created indicated that the Sun's rays were hitting Alexandria at an angle of 7.2 degrees. Eratosthenes argued that the angle between Alexandria and Syene (7.2°) was the same as the central angle of Earth subtended by the arc between the two cities.

So, he showed that the ratio between the distance between Alexandria and Syene (5000 Stadia) to the circumference of earth was equal to the ratio between central angle between the two cities (7.2°) and the whole earth's (360°).



The Sun and the Moon:

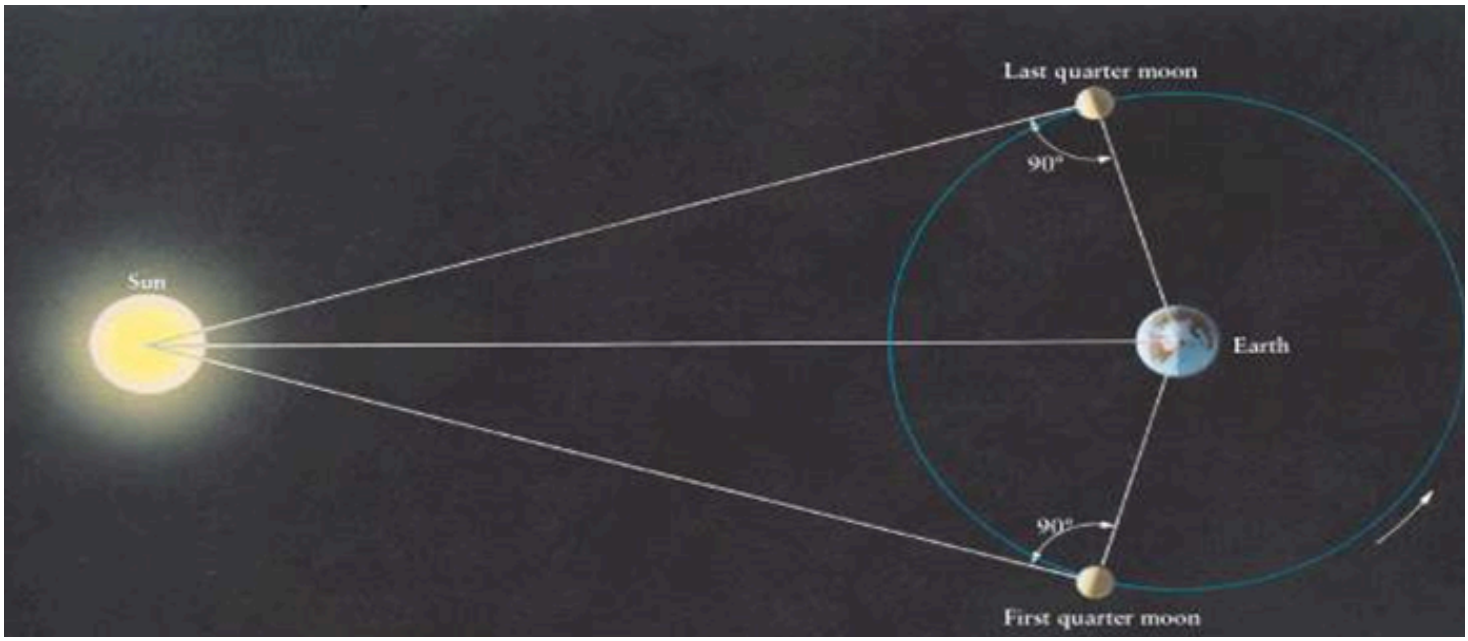
It was observed that a lunar eclipse lasts roughly 4 hours, and that the moon's orbit around the earth is roughly 28 days. This along with the assumption that the earth's casted shadow during a lunar eclipse is roughly equal to the earth's diameter, Aristarchus of Samos calculated the moon's distance from earth (i.e. radius of its orbit).

Take a look at the image here, it displays the earth's shadows on the surface of moon, assuming that the Earth's shadow was roughly the same size as the earth. itself, we can calculate the ratio of earth's size to the moon's.

However, the Greeks deployed a multitude of different brilliant methodologies to calculate the moon's size (they didn't have cameras DUH!)

One more observation that helped the ancient astronomers immensely was the fact that the moon and sun's apparent sizes were the same from our planet. Meaning, the ratio of their diameters to their distances from the earth were equal.This also enables us to roughly estimate the size/distance of the Sun. (As seen during a solar eclipse).

So, knowing the size of earth's orbit (assumed to be circular), we can estimate the Sun's diameter. Aristarchus, to our rescue yet again, used simple trigonometry and the knowledge of the phases of the moon to estimate this distance.



For us to see a half moon, the angle between the earth and the sun, from the moon is 90°. Half Moons however are not at the half point of new and full moons (at 14 days), instead they are slightly closer to the new moon, as the illustration shows). This difference in angle of the half-moon from the middle point, of the moon's orbit, enables us to determine the Distance to the Sun. As it turned out, this was a very hard measurement to make (again, Aristarchus didn't have cameras or telescopes).

That concludes our short tour of how to measure the stars right here from the comfort of our planet, without satellites or cameras by the ancient Greeks, Indians and Egyptians.

Shubham Rawat
B.Sc (H) Physics

Consciousness and Quantum Mechanics: A New Perspective on Reality

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How Quantum Mechanics and Consciousness Are Connected

In normal physics, things follow fixed rules—like gravity pulling things down or light moving at a certain speed. But quantum mechanics, which studies very small particles like electrons, shows that things don't always follow these rules.

The Double-Slit Experiment – Scientists discovered that when small particles (like electrons) pass through two small slits:

- If no one is watching, the particles act like waves, creating a pattern.
- But when someone observes them, they suddenly behave like particles.

This means that the simple act of *watching* changes how reality works!

The Role of Consciousness – Physicists like John von Neumann and Eugene Wigner suggested that our mind (or consciousness) might be responsible for this change. In other words, the way we observe or think about something could actually decide how it behaves.

The Uncertainty Principle–Heisenberg's principle states that you cannot measure both the position and speed of a particle at the same time. The moment you measure one, the other becomes uncertain. This suggests that reality at the smallest level is not fixed—it's influenced by observation and uncertainty.

The Many-Worlds Theory – Are There Other Versions of Reality?

In 1957, Hugh Everett proposed the **Many-Worlds Interpretation** of quantum mechanics. According to this theory: Every time a decision or measurement is made, the universe splits into different versions of reality.

- For example, if you decide to have tea instead of coffee, one universe exists where you have tea, and another where you have coffee.
- Both versions of reality exist, but you only experience one of them.

Some scientists believe that this splitting of realities is linked to our consciousness. This means that our mind might not just observe reality—it could help create it!
If true, this could connect physics with psychology, helping us understand how our mind shapes the world around us.

Is the Brain a Quantum Computer?

Scientists used to think that the brain worked like a machine, controlled by electrical signals. But now, some scientists believe that the brain might work more like a quantum computer.

Microtubules and Quantum Coherence – Roger Penrose and Stuart Hameroff suggested that quantum activity happens inside tiny structures in brain cells called **microtubules**.

- These microtubules might store information and create thoughts in the same way that quantum computers process data.
- This could explain why human consciousness is so complex and different from artificial intelligence (AI).

Superposition in the Brain – Just like particles in quantum physics can exist in multiple states at once, human thoughts might also work the same way.

- · For example, when you are trying to decide between two options, your brain might exist in both states at once until you finally make a choice.

Can Consciousness Help Us Live Forever?

The idea of preserving consciousness beyond death is no longer just science fiction.

Neuralink and Consciousness Transfer – Elon Musk's company Neuralink is working on a brain chip that could connect human minds to computers.

- Early tests have shown that monkeys can control computers using only their thoughts after getting a Neuralink implant.
- If Neuralink works for humans, it could allow scientists to copy human consciousness onto a computer.

Uploading Consciousness – If this works, scientists could scan and upload a person's consciousness into a computer or even a humanoid robot.

- This could allow people to live forever as a digital version of themselves.
- Skills and knowledge could be transferred instantly from one mind to another, making it possible to "download" new abilities.

Why Some Scientists Are Skeptical

Not all scientists agree with these ideas.

- Some argue that the brain is too warm and noisy for quantum activity to happen.
- Others believe that consciousness is purely biological and has nothing to do with quantum mechanics.

But if Penrose, Hameroff, and Musk are right, it could change how we understand human consciousness, life, and death.

What This Means for the Future

If consciousness really works at the quantum level, it could mean:

✓ Reality is not fixed—it's shaped by how we think and observe the world.
✓ Human minds could become immortal through technology.
✓ AI might not be a threat if we merge human minds with machines.

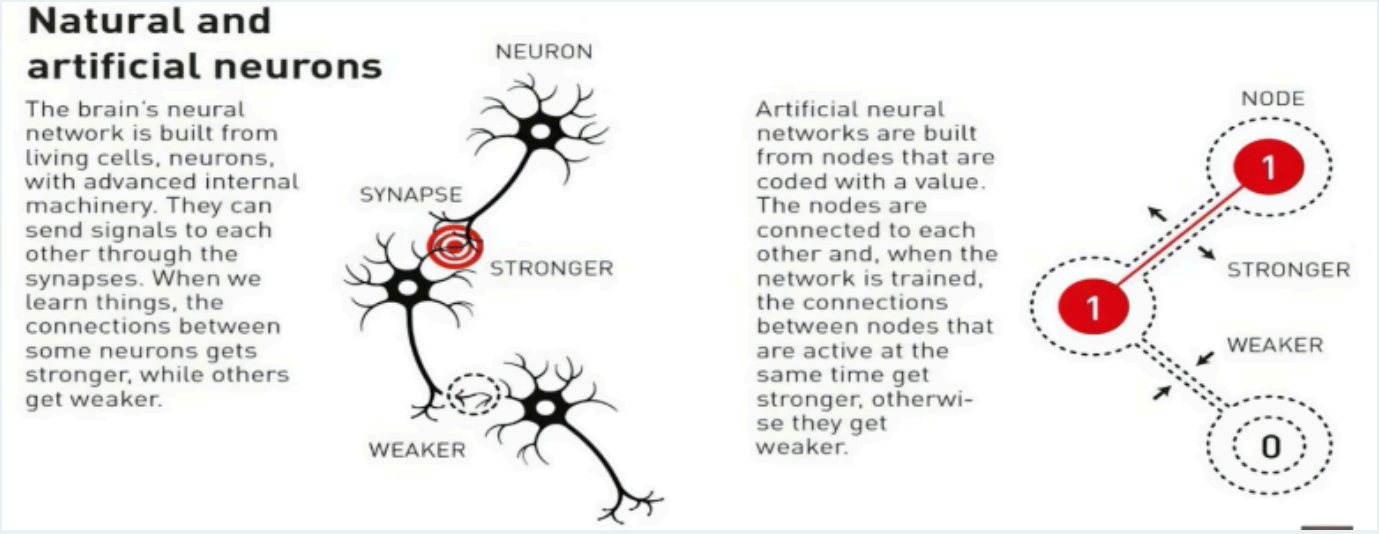
Conclusion

The idea that consciousness and quantum mechanics are connected is exciting and mysterious. If the brain works like a quantum system, it could mean that human thoughts directly affect reality. The possibility of uploading consciousness into a computer raises big questions about what it means to be human. We are just beginning to explore the connection between mind and matter—this could lead to the biggest scientific discovery of all time!

Shivam Singh
B.Sc (H) Electronics

The Nobel-Winning Work: Neural Networks as Physical Systems

The Nobel Prize in Physics took a milestone step in October 2024 by awarding John J. Hopfield and Geoffrey E. Hinton for their path-breaking work on artificial neural networks, which underlie modern artificial intelligence (AI). Their findings, based on physics and neuroscience, have transformed machine learning, cognition, and creativity. This article explores their groundbreaking contributions and their far-reaching effects on scientific progress, technological advancement, and social impact over the next few years.



The Nobel-Awarded Work: Neural Networks as Physical Systems

1. John J. Hopfield: Memory Association and Energy Landscapes

–It was in 1982 that Hopfield created the Hopfield network, a model which was inspired by the memory storing processes of animal brains. The work of his used concepts of statistical mechanics, which is a physics branch that describes how systems (like magnets or gases) go to their energy minimum states.

2. Geoffrey Hinton: Boltzmann Machines and Probabilistic Learning

–Hinton's Boltzmann machines(1985) extended Hopfield's work by adding probabilistic learning, inspired by thermodynamics and Ludwig Boltzmann's statistical frameworks for modeling gas molecules.

Key Innovation

–Like gas molecules, which distribute energy probabilistically, Boltzmann machines adjust neural links to discover latent patterns within data. This innovation enabled unsupervised learning, with AI learning in the absence of explicit human guidance.

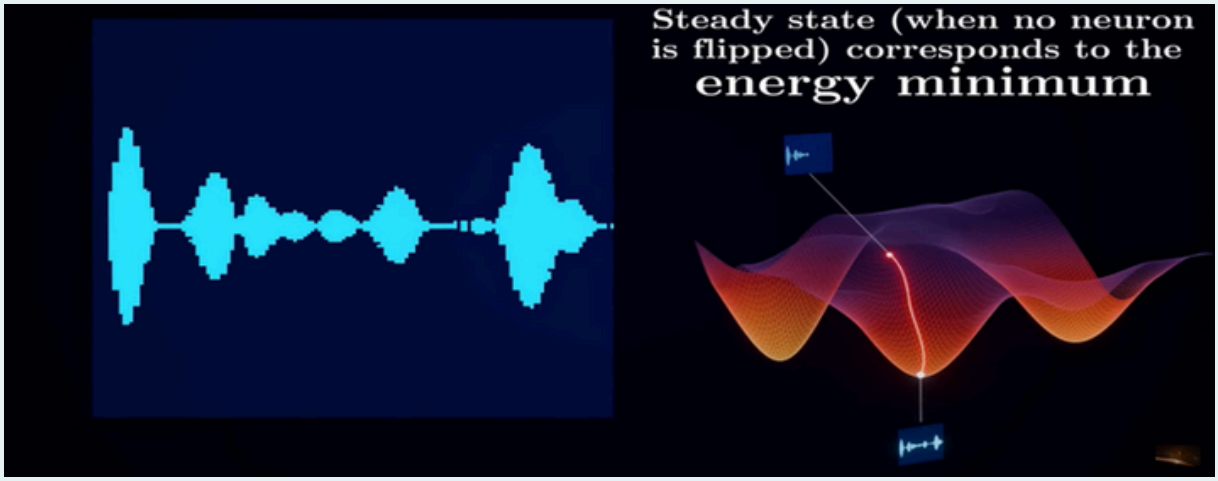
- Example: Trained on cat and dog pictures, a Boltzmann machine is capable of recognizing attributes like ears or tails on its own.

Why Physics? The Science Behind the Code

The Nobel Committee's decision to grant AI research in Physics highlights an important realization: neural networks are physical systems.

- Energy Minimization: Hopfield's networks resemble how magnets line up spins to minimize energy.
- Thermodynamic Learning: Boltzmann machines of Hinton treat information as molecules in a gas, governed by probabilistic principles.

By interpreting AI in terms of physics, Hopfield and Hinton upgraded computers from calculators to systems that learn, predict, and create.



What Their Work Means for the Future

The idea of preserving consciousness beyond death is no longer just science fiction.

1. Accelerating Scientific Discovery

- Medicine: Neural networks scan genomic information to forecast disease risks and craft customized treatments.
- Climate Science: AI algorithms maximize renewable energy grids or model climate change effects.
- Example: Hopfield-inspired algorithms enabled DeepMind's AlphaFold (2024 Chemistry Nobel) to predict protein structures, transforming drug discovery.

2. Smarter Technology, Everywhere

- Autonomous Systems: Autonomous vehicles and drones employ neural networks to maneuver in complex environments.
- Human-Machine Collaboration: AI assistants such as ChatGPT augment creativity, education, and decision-making.

3. Ethical Frontiers

The laureates themselves caution against the dangers of AI:

- Bias: Flawed data used to train algorithms can entrench discrimination.
- Autonomy: Uncontrolled weapons or uncontrolled AI systems are existential risks.
- Jobs: Automation may put millions out of work unless societies innovate.

Hinton has called on policymakers to focus on "ethical AI governance," making sure technology serves human values.

Conclusion: A New Era of Physics-Driven Innovation

The 2024 Nobel Prize in Physics honors not just technical accomplishment—it represents a paradigm shift in our understanding of intelligence. By analyzing neural networks as physical systems, Hopfield and Hinton opened the door to AI's ability to address humanity's greatest challenges, from disease cures to climate change.

But their legacy is also a challenge. As AI transforms our world, we need to weigh innovation against responsibility, making these tools useful for all of humanity. In Hopfield's words: "The future belongs to those who understand that machines can think, but humans must guide why they think."

This Nobel Prize isn't just about the past—it's a roadmap for a future where physics and AI collaborate to unlock the unimaginable.

Priyanshu
B.Sc (H) Electronics


INTERSTELLAR
a film by
CHRISTOPHER NOLAN
Science On Screen
Science On Screen
Science On Screen

TENET 2020

Christopher Nolan's Tenet ventures into speculative physics by dramatizing the concept of time manipulation through the lens of entropy—a fundamental thermodynamic quantity dictating the direction of time. The film revolves around a fictional technology that enables "inversion," a process whereby the entropy of objects or individuals is reversed, allowing them to move backward through time relative to the surrounding world.

Rooted loosely in the second law of thermodynamics, which states that entropy in a closed system tends to increase, Tenet introduces a hypothetical future where technology allows for entropy to be locally and artificially reversed. The narrative builds on this inversion to orchestrate complex temporal interactions, including reverse motion, causality loops, and temporally synchronized combat operations.

Although the science is speculative and dramatized, the film creatively engages with real scientific themes such as determinism, the arrow of time, and closed timelike curves—concepts found in theoretical physics and discussions of time travel in the context of general relativity. Tenet serves as both a cerebral thriller and a provocative prompt for scientific imagination, inviting viewers to reconsider the nature of time and causality.

Raj Chaurasiya

THE MARTIAN: FROM MARS-MAN TO EARTH-IT

IF HUMANITY DOES NOT LAND ON MARS IN MY LIFETIME, I WOULD BE VERY DISAPPOINTED – ELON MUSK

The heading and quote both hint at something related to Mars. Yes, I'm talking about the Red Planet—and the best science fiction movie centered around it—The Martian. The Martian (2015) is a science fiction film about human survival that showcases incredible problem-solving, determination, and a surprisingly humorous guide to perseverance in the face of adversity. Set against the stunning backdrop of Mars, the movie is Ridley Scott's adaptation of Andy Weir's novel. It goes beyond a typical space thriller, becoming both a cultural phenomenon and a favorite among science fiction enthusiasts.

ABOUT THE MOVIE:

In this movie, the central character is Dr. Mark Watney, an astronaut and botanist. The plot unfolds in the year 2035, when the crew of NASA's Ares III mission is exploring Acidalia Planitia on Mars. A violent dust storm threatens to topple their Mars Ascent Vehicle (MAV), forcing an emergency evacuation. During the chaos, Mark Watney is struck by debris and presumed dead. With the MAV in danger of collapsing, the remaining crew launches back to their orbiting vessel, the Hermes, leaving Watney behind. However, Watney regains consciousness after the storm, injured and with a low oxygen warning. He makes his way back to the crew's habitat module, where he treats his wounds. As he begins to recover, Watney starts recording a video diary to document his experience.

Unable to communicate with Earth, Watney realizes that his only chance of rescue lies in the next Mars mission—Ares IV—which is scheduled to arrive in four years and will land 3,200 kilometers away from his current location. His immediate concern becomes survival, especially food. Using his expertise as a botanist, he transforms part of the Habitat into a makeshift farm. He fertilizes Martian soil with the crew's bio-waste and produces water by chemically extracting it from leftover rocket fuel. Ingeniously, he grows potatoes from whole ones originally saved for a special Thanksgiving meal. Meanwhile, he also begins modifying a rover to prepare for the long journey to the Ares IV MAV site.

Back on Earth, NASA satellite planner Mindy Park notices shifted equipment in satellite images of the Martian surface and concludes that Mark Watney is still alive. NASA director Teddy Sanders makes the news public but controversially decides not to inform the Ares III crew, who are on their return journey to Earth, despite strong objections from flight director Mitch Henderson. Meanwhile, Watney embarks on a month-long journey in the rover to recover the long-dormant Pathfinder probe, which lost contact in 1997. Ingeniously, he uses Pathfinder's camera to establish visual communication with NASA, marking a major breakthrough in his efforts to survive.

NASA transmits a software patch that links the mission's rover with Pathfinder, enabling text-based communication with Watney. Eventually, Sanders permits Henderson to inform the Ares III crew that Watney is alive. Disaster soon strikes when the Habitat's airlock malfunctions and blows out, injuring Watney and destroying his potato crops. Though he manages to repair the airlock, the loss of food leaves him once again facing starvation. To help him survive until the arrival of Ares IV, Mars mission director Vincent Kapoor and Jet Propulsion Laboratory (JPL) director Bruce Ng coordinate a resupply mission. In a rush to meet the deadline, Sanders orders routine safety inspections to be skipped. Tragically, the resupply spacecraft disintegrates shortly after launch due to an oversight. In a surprising turn, the China National Space Administration offers to use a launch vehicle originally meant for their Shen space probe to help resupply Watney. Meanwhile, NASA astrophysicist Rich Purnell devises a risky alternative plan that would involve redirecting the Hermes spacecraft to retrieve Watney. Sanders initially rejects the plan, deeming it too dangerous for the Hermes crew—but Henderson covertly forwards Purnell's proposal to them.

The Hermes crew unanimously votes in favor of Rich Purnell's plan and diverts their course back to Mars to rescue Watney. Sanders is forced to publicly support their decision but privately demands Mitch Henderson's resignation once the mission is complete. After seven months, Watney begins a 90-sol journey to Schiaparelli Crater, where the Shelter Habitat and the pre-positioned MAV for Ares IV are located. To prepare for launch and rendezvous with the Hermes, he must drastically reduce the MAV's weight by stripping it of non-essential components. During liftoff, the MAV runs out of fuel before reaching the required velocity, making direct pickup impossible.

Commander Lewis quickly improvises by detonating an explosive in the Hermes' forward airlock, allowing the rapid escape of air to slow the spacecraft. She then uses a tethered Manned Maneuvering Unit to reach Watney, but the distance remains too great. In a final act of ingenuity, Watney pierces his pressure suit, using the escaping air to propel himself toward Lewis. The maneuver works, and she catches him—ending his 561 sols alone on Mars.

Upon returning to Earth, Watney becomes a survival instructor for future astronaut candidates. Five years later, as the Ares V mission prepares to launch, those involved in Watney's rescue are shown continuing their lives, shaped by the mission that changed everything.

SUMMARY OF THIS MOVIE:

These scenarios highlight exactly where The Martian truly shines. Watney's journey isn't just about survival on Mars—it's a celebration of innovation, resilience, and the human spirit. The film's best plot points revolve around the power of human ingenuity, portrayed through a character whose clarity of mind and enthusiasm are both engaging and educational. What makes the film even more special is its use of humor, which adds a refreshing twist to an otherwise high-stakes survival story.

The Martian also emphasizes the collaborative nature of science, showcasing the vital roles played by engineers, programmers, and scientists across the globe. It explores profound themes of hope, perseverance, and the innate human drive to explore the unknown. In doing so, the movie reminds us that even in the cold, vast expanse of space, connection and creativity can triumph.

At its core, the film is deeply optimistic: it suggests that with determination, teamwork, and a bit of scientific know-how, we can overcome even the most impossible odds and find our way back home. Visually, the movie is stunning—its breathtaking panoramas of the Martian landscape elevate the experience and ground the story in a hauntingly beautiful setting.

More than just a sci-fi movie, The Martian is an inspiring tale about what we can achieve when we work together and refuse to give up. It shows that even in the face of overwhelming adversity, a little science, a lot of humor, and a few potatoes can go an incredibly long way. That, in itself, is a truly remarkable message—and a powerful statement about human potential.

Manit Dubey

RADIOACTIVE

Marie Curie's Personal and Professional Struggles

The movie discovers the personal life of Maria Salomea Skłodowska-Curie, known simply as Marie Curie, along with how her personal life affected her professional life deeply.The movie starts with the struggles of Marie Curie getting access to a lab and lab equipment to perform scientific research. She struggled more as a woman than as a scientist.

A Life-Changing Partnership with Pierre Curie

After that, she met Pierre Curie. Her life changed totally. They worked together, sharing ideas and collaborating on experiments. Together, they discovered two new elements — polonium and radium — and conducted pioneering research on radioactivity, a term they coined. Their work earned them the Nobel Prize in Physics in 1903, which they shared with Henri Becquerel.

Tragedy and Preservence

After Pierre's tragic death in an accident, Marie was broken but continued her research with the same dedication. She later received a second Nobel Prize in Chemistry in 1911 for her discovery of radium and polonium, becoming the first person to win two Nobel Prizes in different scientific fields. Her daughter also invented the artificial radioactivity along with her husband Frédéric Joliot-Curie and they received noble prize for this, thus adding to the Curie family legacy of five Nobel Prizes.(It wasn't in the movie)

The Dual Impact of Scientific Discoveries

The movie also shows how her discoveries had a big impact — like helping treat cancer but also leading to things like nuclear weapons. It highlights both the good and the not-so-good sides of science. This reminds me a quote

"नैतिकता के बिना ज्ञान का पीछा नहीं किया जा सकता"

Overcoming Struggles and Rejection

The movie shows how being an outsider for the natives Marie Curie faced personal struggles, heartbreak, and rejection, but stayed strong and never gave up on science. Despite everything, she kept going and made a lasting impact on the world.

A legacy that broke barriers

The movie focuses that her legacy, not just as a scientist, but as a woman who broke barriers and paved the way for generations of women in science.

A Powerful Closing Image

The movie ends with the iconic image from the Solvay International Conference of 1927 speaks volumes without even needing words — a room full of the greatest scientific minds like Einstein, Bohr, and Planck, yet only one woman among them: Marie Curie.

Ankit Maurya


THE POETRY CORNER
The Poetry Corner

Oh how I adore gazing at past
in the present sky
the moon, the stars,
and the sun, 8 min old, afar,
The future? I already know
I design it on my own
and the present is gone.
The disaster,
for a scientist to hear a writer
terrible mind, its imagination
running wild
Connecting the dots, like the
constellation
Time's an illusion or just the time
dilation?

-Tejal Chadha

अधमता के रास्ते से

मिला-खोकर जो उत्साह,
लिखता भावों की पीड़ा।
आत्म-व्यथा की आत्म-कथा से,
रंजित शोकों की क्रीड़ा।।
थे बंधे जो पर-बंधन के,
कपटी-कुंठित चालों से।
कह रहे आज वो,
मुद्राओं की चुभती फिजाओं से।।
क्या दे सकता कोई?
सत्ता को शक्ति की विरह-वेदना।
तब साथ मिली व्याकुल–व्यष्टि से,
प्रारोहों की नर सेना।।
मन के मृदु हृदय से उठती,
होड़ की कुटिल ये आग।
मानवता के मद–वित्तों से,
शांत-चीरों पर लगती दाग।।
फिर हुआ है दुष्कृत्य तो,
अभया का अवतार हो।
हर बाला की बाहु में,
रक्त से सनी कृपाण हो।।
इस विकृति को प्रकृति से,
एक नई आकृति मिले।
अब विश्वगुरु के अटल लक्ष्य को,
नियति की जागृति मिले।।

- Atri Dev

Haunted by the Memories

The season has changed, and its Autumn again, The air smells different, but the memories stay the same. The falling leaves remind me of her, Once a charming face, is now only a blur. She was perfect, like a day of Spring, Moved with elegance, like a flower dancing. Her smile could warm you up on a winter night, And her eyes were beautiful, filled with hopeful Bright. I cherished each day, I spent with her, Her memories are the only hope, That pushes me forward. And on the dark night, cold and screaming, I stood over her body, shivering. The night is my only regret, Only if there wasn't a knife, to be held and to stab. She wasn't wrong, only a bit different, And I wasn't angry, just a moment of indifference. But I loved her, in each of my living moments, And I still keep a picture of her, looking dead and content.

-Aayush Sharma

A safe touch
When the fastrack of the metro lurked..
With scary looks and scars brushed...
Stomped with traces of rushed unknowns...
Dangling devils in the crowds when trown...
In a hell left to be haunted down...
All shivered and messed up was about to drown
In my ruffled thoughts with my stumbled crown..
Losing it all... Sinking and shrinking myself...
When a familiar touch made me catch my breath...
Flabbergasted I opened my eyes...
That were held behold in safe arms to slide...
Pulling me out from my rumpled disappearance
Reassured me with eyes about a safe stance
Trancing it all as it entered into my subconscious thoughts...
As if that familiar face knew it all...
Held the hands and vanished the droll...
Crowds invisiblized and frowns evanesced...
A gruesome metro ride and it's barren thorns
Flashes as a touch that's beautifully adorned

- Sneha Dey

Tunnelling effect

ऊपरी बातें बहुत हुई....
आज कुछ बारीकियां सुनानी है,
छोटे से atom के छोटे से electron की कहानी है!

बंधनों ने उसे कसकर बांधा है..
अपनी जिंदगी का वो महज़ एक प्यादा है..
ताकत ही नहीं उसमें की बंधनों को तोड़ दे,
नहीं है काबिलियत कि किस्मतो को मोड दे!
वो जानता है असमर्थ है,
मगर एक और नाकाम कोशिश का इरादा है....
क्या है न, थोड़ा ज़िद्दी ज्यादा है!

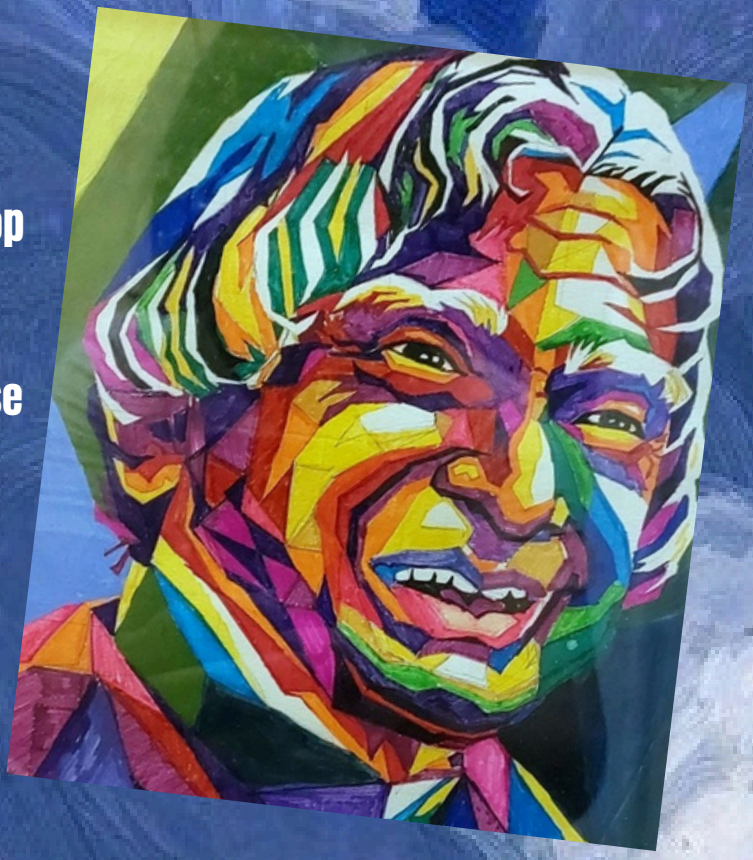
ये क्या हुआ??
उसने ये क्या कर दिखाया है!
वो दीवारें तो उसकी काबिलियत से परे थी,
जिन्हें वो पार कर आया है!

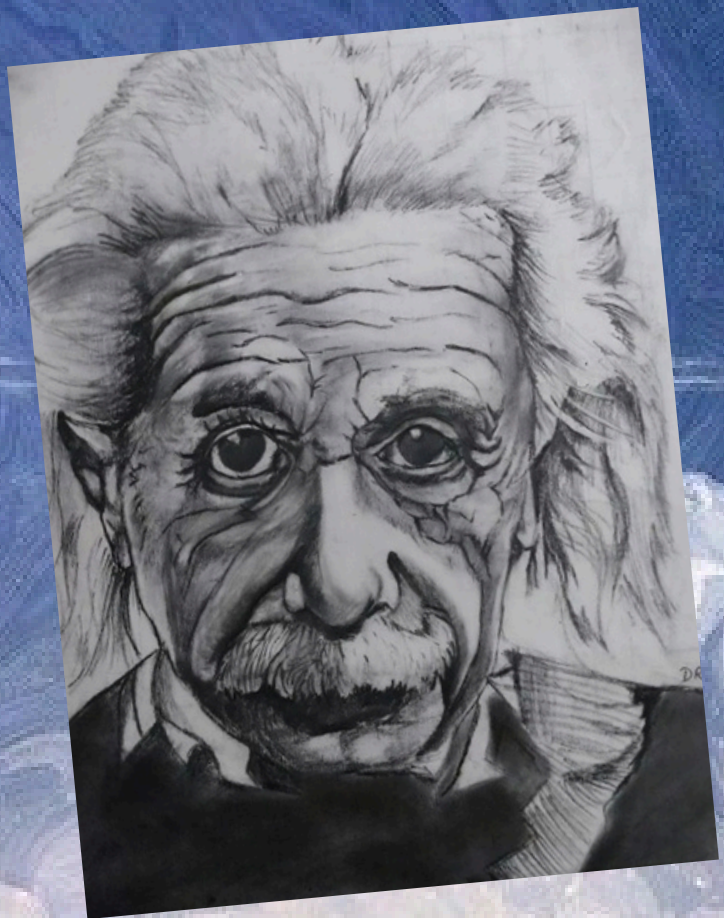
मेरे ख्वाब भी तो..
असलियत से दूर हैं!
कहां लेकर जायेगा,
ये नाकाम कोशिशों का फितूर है!
क्या ये काबिलियत से ऊंची दीवारें पार हो सकेंगी?
या tunnelling effect केवल किताबों में मशहूर है

- Yashasvi Jain

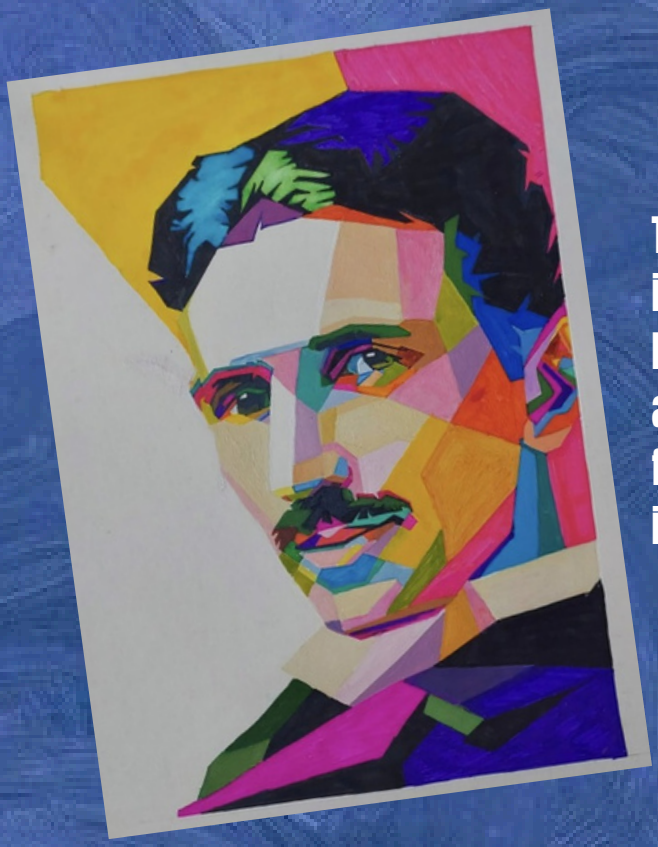

THE ARTBOARD
The Artboard

This painting is a vibrant, geometric pop art portrait of Dr. A.P.J. Abdul Kalam, known as the "Missile Man of India" and a beloved former President. The use of bold, intersecting shapes in a spectrum of bright colors captures his visionary spirit and charismatic personality.





This artwork is a realistic graphite drawing of Albert Einstein, the legendary physicist known for the theory of relativity. The detailed shading and expressive lines bring out the depth of his thoughtful gaze, emphasizing wisdom and introspection.



This portrait of Nikola Tesla, the visionary inventor and electrical engineer known for his contributions to the development of alternating current (AC) electricity. The fragmented color blocks reflect his dynamic intellect and imaginative mind.

This similarly styled portrait of Albert Einstein, the theoretical physicist famed for the theory of relativity. The divided use of color on his face symbolizes the multifaceted nature of his genius, merging emotion and intellect.

artist

Dhrupad Ranjan
BSc (H) Physics

CAMPUS DIARIES 2025

GOODBYE DEAR SENIORS

A heartfelt farewell to our seniors!

As you are near the end of your undergraduate journey, we take this moment to celebrate your achievements and express gratitude. you have worked tirelessly, overcome challenges, and grown in ways that will shape your future. your time here has not only been about academics but also about the friendships, guidance, experiences, and memories that have made this journey so special.

The relationships you have built—both in the classroom and beyond—will remain invaluable as you step into new chapters of your life. take a moment to value those who have supported you, and hold on to the friendships that have been formed.

As you move forward, whether into research, the workforce, or new academic pursuits, remember to stay true to your passions. the road ahead may be uncertain, but never lose the curiosity and determination that brought you here. be fearless in chasing your dreams, and don't hesitate to explore our of the box paths to achieve them.

We wish you all the success and happiness that life has to offer. this is not a goodbye—it is a reminder that you will always have a place here, among juniors who will miss you and cheer for you from afar.

"Goodbyes are not forever. Goodbyes are not the end. They simply mean we'll miss you until we meet again."

With warmest regards and best wishes,
On behalf of Your Juniors

Farewell Hansraj

From nervously walking through the gates of Hansraj on the first day to now, standing at the edge of goodbye—it's been an unforgettable journey. These walls have seen our laughter, our stress during exams, our random mid-week breakdowns, and our small victories. Hansraj wasn't just a college; it was a world of its own. Thank you for shaping us. We carry the memories, always.

-Arnav Singh

Hansraj has been more than just an institution—it's been a living, breathing part of our youth. The lawns, the corridors, the societies, the friends, the 8 a.m. lectures we barely made it to—they'll all be missed. As we step into the next chapter, we leave with full hearts and stories we'll be telling for years.

- Ankit Kumar

They say college changes you—and they were right. I came to Hansraj hoping to figure out who I was. I'm leaving still figuring it out, but this place gave me the courage to keep asking the right questions.

These three years were not always easy. There were days of doubt, deadlines, heartbreaks, and confusion. But there were also the days filled with laughter, with wins—big and small—and with the kind of joy that can only come from shared dreams and collective madness.

To my professors, thank you for your guidance. To my friends, thank you for your love. To the juniors, thank you for your energy. And to Hansraj, thank you for being the backdrop to some of the best years of my life.

- Keshav Jindal

Farewell Hansraj

Seventeen. That's how old I was when I first stepped into Hansraj College. I still remember standing outside the gate, heart pounding, holding my fees receipt like it was a ticket to a dream I hadn't yet understood. The walls looked ancient and wise, the corridor echoed with a hundred voices and laughter, and I—just a boy with nervous energy and a backpack—walked in not knowing that the next three years would hold some of the most unforgettable moments of my life. That first day, I looked around at all the new faces. Some smiled, some were just as awkward as I was, and some already looked like they belonged. The Fresher's Party came like a wave of color. I was too shy to dance, but I did anyway. Someone from the back shouted, "Hansraj mein aaya hai, ab darr kaisa?" and I laughed louder than I had in weeks. That was the start of everything. It wasn't just a party—it was the beginning of friendships, late-night conversations, shared Maggi in the canteen, and memories we'd stitch together forever. From first benches to backbenches, from scribbled notes to "Bhai, proxy lagwa dena," college became less about classes and more about the people sitting next to you in those classes. I don't even know when we started calling the Sudama Tea Stall our unofficial common room. How many hours were spent there, sitting on those rickety stools, sipping chai and discussing everything from pyaar to politics. Our mass bunks were more coordinated than any group project. Then there were the fests—Confluence, Mecca, the madness of getting passes, pretending to volunteer just to get backstage, dancing till the DJ ran out of tracks. Those were the days when we felt infinite. I remember once, at a fest, my friend turned to me and said, "Bhai, zindagi isi moment ke liye toh hai," and I believed him with every part of my heart. We weren't just living days; we were living stories. But college wasn't all fun—it was safe spaces and soul talks too. It was sitting on the flat terrace at 2 AM talking about fears, failures, and future dreams. It was learning that the people we meet here—these strange, beautiful, chaotic souls—become our chosen family. And now it's farewell. A word that feels too small to hold the weight of so many memories. I watched everyone walk into the farewell hall dressed in their best, looking grown-up, but the eyes? Still carried the innocence of first-year. We hugged too tightly, laughed too loudly, and cried a little when no one was watching. Someone played that old song in the background, "Abhi na jao chhodkar, ke dil abhi bhara nahi…" and that was it—my heart broke in the softest way possible. Because it wasn't just about leaving a college. It was about leaving a version of ourselves that only existed in these three years. I don't know what life will look like five years from now. But I do know this—on some random day, I'll walk past Hansraj again. Maybe as a stranger, maybe successful, maybe just tired from the world. But the moment I look through that gate, I'll see the boy I used to be—17, nervous, excited, whole—and I'll smile. Because Hansraj wasn't just a college. It was a home that raised me. Thank you for the best years of my life.

-Raunak Yadav

STUDENT SPOTLIGHT

From late-night lab experiments to acing competitive exams, the students of the Physics and Electronics Department have consistently pushed boundaries and redefined what's possible. Whether it's cracking IIT-JAM, securing placements in top firms, or contributing to research that matters —these individuals stand as a testament to perseverance, intellect, and quiet determination. Here's to celebrating those who dared to go beyond the syllabus and made a mark worth remembering.

LUMEN

2025

"It's not that I'm so smart, it's just that I stay with problems longer."

-Albert Einstein

Anoop Kumar

TIFR- MUMBAI

IIT JAM AIR-383

Hello everyone

My name is Anoop Kumar and I am a student of B.Sc(H) Physics 3rd year. I have got selected in TIFR Mumbai for Integrated PhD in Department of Nuclear and Atomic physics. I owe the credit of my selection to my teachers and seniors who supported me throughout this journey. After receiving the mail that I had qualified TIFR GS, I was afraid whether I would even qualify the written test but I was motivated by my teachers Namrata ma'am, Sushil sir and my mentor Rangoli ma'am. I got guidance for the interview process from my teachers and seniors and I was able to clear the three stages of TIFR selection.

I would guide my juniors to pay attention to college classes and prepare well during BSc. Give emphasis on understanding the concepts taught in college as they will help throughout your life. Engage in extracurricular activities, participate in inter-college competitions and seminars as they help in enriching your personality. I would advise the students preparing for any other competitive exam also to give your best during your Bsc period itself because taking a year drop can be very stressful.

Hello everyone!

I'm Pareekshit Sinwar, a final-year B.Sc. (Hons) Physics student at Hansraj College. I'm happy to share that I have secured an All India Rank of 39 in the IIT JAM Physics exam 2025 and have also been selected for the prestigious I-Ph.D. program at ICTS-TIFR Bangalore.

This journey has been full of learning, challenges, and personal growth. I'm truly grateful to my teachers and college for their constant support and guidance, which helped me build strong fundamentals and stay motivated throughout the preparation process.

I joined the IIT JAM course at Elevate Classes in July 2024 and stayed committed to attending all lectures sincerely. I focused on understanding the basic concepts clearly and solved as many previous year questions as possible. Along with this, I dedicated regular time to self-study and revised important topics frequently. Preparing for competitive exams like JAM requires a disciplined and consistent approach, and I believe that consistency, a smart strategy, and belief in oneself make all the difference.

For those who are preparing for such exams, I would suggest staying focused on the basics and practicing problems regularly. Solving previous year questions with a proper 3-hour timer helped me a lot and I highly recommend doing the same, one question at a time with full attention. Even if you are preparing mainly for JAM, I suggest also appearing for exams like TIFR and JEST, as they help strengthen your understanding and make the JAM exam feel more manageable.

Trust yourself, be patient with the process, and keep working steadily. I wish you all the very best in your academic journey ahead!

Pareekshit

ICTS-TIFR

IIT JAM AIR-39

IIT JAM
AIR 49

Ritish Gupta

Hey folks, I am Ritish Gupta, a final year Bsc.(H) Physics student at Hansraj College, University of Delhi.
I have secured AIR 49 in IIT JAM PHYSICS 2025.
In 12th class I figured that I wanted to give it back to the society so I made up my mind of becoming a professor. In second year of my college, I started my preparation for IIT JAM 2025. The faculty of Career Endeavour really helped me in my preparation and clarifying the doubts. At one point just before the exam I lost hope but what encouraged me was the words and support from my father after which I prepared well without thinking about the end result. My family, girlfriend and friends supported me throughout my preparation and encouraged me to aim for more. I would say my perseverance and determination is what made me achieve AIR-49. Though preparation for this exam coincided with my semester exams but what helped me was time management, consistency and a proper goal that I set for each day and would work accordingly.
For future aspirants, I would say that nothing is too far if you work for it everyday. What matters is your mindset and belief in yourself.

IIT JAM
AIR 80

Ankit Kumar

Hello everyone,
I am Ankit Kumar, third year B.Sc Physics Hons. student, at Hansraj College, University of Delhi.
With a score of 51.6/100, I have secured AIR-80 in IIT-JAM Physics 2025.
I thank my parents and my teachers for their constant support and understanding nature. I am thankful to my friends who provided a healthy competitive environment throughout my preparation.
To make a firm decision that I have to crack this exam was the first step in my journey. After that moment, all my day to day decisions were made keeping in mind my goal. One other thing that is needed is a realization that clears away all our delusions and distractions and lets us see our truths as they are.
Cut short, took Career Endeavour's classes in Jan 24, cleared its backlogs till June after sem-4 exams, then started taking 2 lec. daily (may vary as per ones need), did ques from practice booklets after completion of a subject, started subject-wise revision as Dec began, solved all prev 10 year papers, gave 4-5 full mock tests .
Of course lots of study is important but its just one dimension of the requirement. Even after lots of hard work we might fail because all is not known to us about the criterion of success.

Harshit Sharma

TIFR- MUMBAI

TIFR- HYDERABAD

IIT JAM AIR-50

Hi there,

I'm Harshit Sharma, a final-year B.Sc. Physics (Hons) student from Hansraj College, Delhi University. I have secured an All-India Rank of 50 in the IIT JAM exam and have successfully cleared interviews for TIFR Bombay and TIFR Hyderabad. For this achievement, I would like to thank all my teachers, who helped me make my concepts crystal clear—something that played a crucial role in cracking the JAM examination.

As for preparation tips, I would just like to say: stick to the standard and well-known textbooks for each subject. Build your concepts from these. For practice, you can join a coaching institute if it suits your learning style, but make sure you have an equally strong grasp of both numerical techniques and theoretical concepts, as they form the foundation for scoring well in the JAM examination.

Also, make it a point to solve previous years' question papers of JEST and TIFR—they are extremely helpful.

Although I want to thank all my professors once again for their support, if I had to mention one in particular, it would be Sushil Sir, whose classes I truly enjoyed and learned a lot from.

In the end, I just want to say: read good books, solve a lot of problems, and keep learning.Thank you, and all the very best to future aspirants!

Tannu

ICTS

IIT JAM AIR-64

With Gratitude to Hansraj College

Hello everyone, myself Tannu, BSc Physics(hons) final year student in Hansraj College. I secured AIR 64 in JAM Physics and got selection for the Integrated PhD programme at ICTS-TIFR.

It has been a dream come true—and none of it would have been possible without the strong academic and personal foundation laid at Hansraj College.

Hansraj didn't just teach me physics but also provides an environment that constantly pushed me to explore, question, and grow. The guidance from my professors, the vibrant academic environment, and the constant encouragement from the Physics Department played a pivotal role in my success.

I am especially thankful for the support system I found in my mentors and friends. Hansraj was the place where my curiosity turned into clarity and my passion turned into purpose.

To my friend—you were the constants during the ups and downs. And to Hansraj, thank you for being the foundation of my academic spirit and ambition.

As I move ahead, I will always carry the spirit of Hansraj with me. Here's to new beginnings, rooted in strong foundations.

Thank you and All the very best to future aspirants.

Hemant

IIT JAM AIR 51

From experiencing failure in JEE Advanced after my 12th to securing an All India Rank of 51, life feels like it has come full circle for me. Ever since I was a child, I have dreamt of achieving something meaningful — not just for myself, but to make my family proud. For the past 3–4 years, I had been searching for that one opportunity to prove myself, and today, it feels like all the pieces have finally come together.

This journey taught me something invaluable: talent matters, but it will always come second to hard work and perseverance. Learning from the mistakes I made during JEE Advanced, I made a firm promise to myself — I would not repeat them. I began preparing from my very first year of college, diving deep into my curriculum, reading beyond what was required, and most importantly, trusting the guidance of my teachers.

In my second year, to maintain consistency and discipline, I joined a online coaching program and gave it everything I had for more than a year. I appeared for TIFR GS 2025 and JAM 2025, and was blessed to qualify both. Through TIFR GS, I received interview calls from all TIFRs, and through JAM, I earned an interview call from IISc Bangalore — a dream come true.

When my juniors ask me how it happened, I always tell them the same thing: consistency and self-belief can move mountains. Keep telling yourself that you can — even on the hard days, especially on the hard days — and one day, you will wake up and realize that you have.

I am forever grateful to my family, my friends, and my teachers. Their faith in me, even when I doubted myself, made all the difference. This success belongs to them as much as it belongs to me.

Shivam Bisht

Jai hind everyone

My self CSM Shivam Bisht I have served as company sergeant major in NCC in 2024-25 I have successfully completed Ek Bharat Shreshtha Bharat (EBSB) camp which was held from 26th October to 6th November, 2023 at NCC Bhawan, Rohini in Delhi. The Delhi Directorate welcomed the Jammu, Kashmir and Ladakhd Directorate.

This camp was particularly an exchange-based camp which involved the exchange of cultures, ideas, and beliefs between the two directorates. Cultural programs were held regularly to give an opportunity to the cadets to showcase their talent. This camp also involved the visiting of the places of historical importance that were located in Delhi.

The EXPA Cadet Programme was also held in this camp which involved the overall development and character build up of the cadets of both directorates.

This camp truly highlighted the concept of Unity in Diversity i.e., even though both Directorates have entirely different lifestyle and culture, when we come together under one roof, aiming for a common goal, there is no one to stop us, a learning this camp gave to all those who attended it.

I have also been awarded ADG appreciation Award for backing 1st position in reel making competition in directorate level.

Highlights


C


CHAHAL
IAS

Physics Faculty Members

Sushil Kumar
Professor
M.Sc. M.Phil. Ph.D

Pradeep Kumar
Associate Professor
Ph. D.

Namrata Soni
Professor
M.Sc. Ph.D

Maya Verma
Associate Professor
M.Sc. Ph.D

Bhavna Vidhani
Associate Professor
M.Sc., M.Tech.

Hema Chutani
Associate Professor
M.Sc. , Ph.D.

Davuluri Srikala
Associate Professor
M.Sc. Ph.D

Chetana Jain
Professor
M.Sc., Ph.D.

Ravikant Prasad
Assistant Professor
M.Sc. Ph.D.

Satyam Kumar
ASSISTANT PROFESSOR
M.Sc, Ph.D

Chanchal Yadav
Assistant professor
M. Sc., M. Tech

Neelakshi N. K. Borah
Assistant Professor
M. Sc. Ph.D.

Ganesh Lal
Assistant Professor
M.Sc., M.Tech (IITD), PhD

Aman Phogat
Assistant professor
Ph.D.

Yogesh Kumar
Assistant professor
M.Sc., B.ED., Ph.D. (High Energy Physics)

Dr. Rangoli Bhatnagar
Assistant Professor
Ph.D.

Jnaneswari Gellanki
Assistant Professor
PhD - Lund University, Sweden

Neelam Singh
Assistant Professor
M.Sc. Ph. D

Sanjeev Kumar (Physics)
Assistant Professor
Ph.D.

Shivani Chaudhary
Assistant Professor
PhD

Electronics Faculty Members

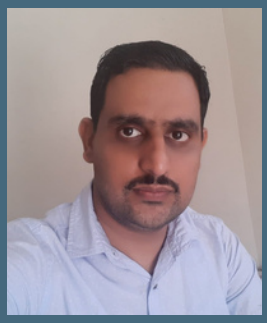
Mamta Saini
Associate Professor
M.Sc., M.Phil., Ph.D.

Mona Bhatnagar
Professor
M.Sc. M.Phil. Ph.D.

Amit Sehgal
Professor
M.Sc. Ph.D

Yagyadatta Goswami
Assistant Professor
Ph.D.

Mukesh Kumar Sahu
Assistant Professor
Ph.D.



Ravi Kumar Verma
Assistant Professor
Ph.D

Nishant Shankhwar
Assistant Professor
Ph. D

Rajender Prasad Tiwari
Assistant Professor
M.Sc. Ph.D

PUZZLE

WORD SEARCH

QUANTUM
RELATIVITY
OSCILLATION
AMPLIFIER
PHOTOVOLTAIC
INDUCTION
MODULATION
DIFFRACTION
RESISTIVITY
IMPEDANCE

I	M	P	E	D	A	N	C	E	I	S	A
A	N	E	Q	U	A	N	T	U	M	O	M
N	N	T	U	L	I	A	N	R	A	I	P
E	T	I	L	N	V	N	I	A	O	I	L
N	R	E	L	A	T	I	V	I	T	Y	I
E	D	V	I	T	P	R	T	I	L	T	F
N	N	N	O	I	T	C	U	D	N	I	I
N	L	E	L	M	O	I	N	M	V	S	E
M	O	D	U	L	A	T	I	O	N	U	R
N	O	I	T	A	L	L	I	C	S	O	I
C	I	N	A	E	T	I	U	I	L	A	I
T	R	E	S	I	S	T	I	V	I	T	Y

WHAT AM I?

I AM A SEMICONDUCTOR DEVICE,
I ALLOW CURRENT TO FLOW ONLY IN ONE DIRECTION.
WITHOUT ME, CIRCUITS WOULD BE CHAOTIC!

(Answer – „Diode”)

DECODE THIS FAMOUS SCIENTIST'S NAME, HIDDEN IN BINARY CODE!

01001110 01101001 01100011 01101111 01101100 01100001 00100000 01010100 01100101 01110011 01101100 01100001

(HINT:
CONVERT EACH 8-BIT BINARY INTO A LETTER.)

(Answer – „Nicola Tesla”)

“Phyonics isn't just a magazine. It's the voice of a department that questions everything.”

LUMEN
HANSRAJ

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