



LUMINEUX

ANNUAL NEWSLETTER OF THE
PHYSICS DEPARTMENT

8TH
EDITION

2024-2025

WHAT QUANTUM PHYSICS TEACHES US IS THAT
EVERYTHING WE THOUGHT WAS PHYSICAL IS NOT
PHYSICAL."

BRUCE H. LIPTON

OUR MENTORS



Prof. Savita Roy initiated the Physics Department of Daulat Ram College and it is her immense support and guidance that the department has been achieving excellence and will continue to do so. She has inspired all of us by her efforts, discipline and in many noble ways. Her warm and welcoming nature makes her a delightful human, in person. Over the years her dedication, curiosity and love for Physics subject has been remarkable. It is a pleasure to be lead and represented by such an astonishing personality

Dr. Onkar Mangla is the backbone of the Physics department. His incomparable teaching ability and focus on providing the best resources for his students are unparalleled. His extensive knowledge in the subjects he teaches reflects his passion for teaching as well as learning. He leaves no room for error in his teaching and is a master of his subject.



Dr. Renu Singla is an extremely talented and professional professor. She is highly supportive and kind towards her pupils. Dr. Singla possesses profound knowledge in her field and believes in repeating the topic until everyone in the class understands it. Her adherence to the department is worth its weight in gold. We look forward to upcoming years of cherishing her

Dr. Omwati Rana makes her lecture interesting by focusing on the concept of the topic and always being ready to address the doubts of the students. With her motivational words, she encourages the students to work hard in the subject and volunteer in various competitions. She gets things done with utmost perfection in every college or departmental event. She is a true inspiration to students molding them into their best version.



Dr. Nisha Bala is a jolly individual, she always has a smile on her face and keeps the classroom environment chill yet very educational. She always reaches out with helping hands to her students. She enthusiastically takes part in department activities and puts immense hard work into her lectures. Her contributions to the subject is exceedingly valuable. We look forward to growing under her sunshine.



Dr. Manoj Giri teaches with nuance and a gentle soul. His approach to complicated topics makes them enjoyable and easy to grasp for novice students. His nuanced teaching ability reflects his wealth of knowledge. He's always conscious of providing the best to his students and helps them independently solve problems with the correct guidance.

Dr. Shivani Aggarwal is the most dynamic and approachable professor to her students. She uplifts her students' motivation and encourages them to work hard on their careers in this huge competitive world. Her lectures are interactive and highly informative with great examples. She shares her experiences and brings out the desired result from the students.



Ms. Manisha Meena is a devoted and diligent professor. Her lectures are stimulating and she encourages us to be creative and think about the solutions to the problems ourselves. She is empathetic towards her students and provides an atmosphere where students can freely ask queries and are tutored. Her efforts and commitment to her work and her apprentices are priceless. Yearning to be influenced by noble qualities.

Dr. Neeru Sehdev is best known for her attention to detail and emphasis on discipline. Her methodical approach to teaching is admirable. She makes sure each and every student understands and does not hesitate to ask questions. She strives to see her students succeed and imbibes her emphasis on diligence and sincerity amongst all of us.



EDITORIAL NOTE

NEWSLETTER EDITOR



RIDA E ZEHRA
(2nd YEAR)

Welcome to another illuminating edition of "Lumineux," your window into the captivating world of physics! As your newsletter editor, I am thrilled to bring you a collection of articles, updates, and insights that reflect the dynamic and ever-evolving nature of our field.

"Lumineux" is more than just a magazine; it's a platform for sharing knowledge, fostering dialogue, and inspiring the next generation of physicists. We encourage you to engage with the content, share your thoughts, and contribute to the ongoing conversation.

Thank you for your continued support and enthusiasm. We hope you find this edition both informative and inspiring.

NEWSLETTER EDITOR



HIMANSHI SIKHWAL
(1st YEAR)

It is with great excitement that I welcome you to this edition of Lumineux, the magazine that celebrates the wonders of physics and the boundless curiosity it inspires. As the editor, it has been a privilege to collaborate with a team of brilliant minds to bring this publication to life. Physics, at its core, unravels the mysteries of the universe, from the tiniest particles to the vast expanse of galaxies. Every article, experiment, and feature in this magazine reflects the dedication, creativity, and passion of our contributors. From thought-provoking insights to innovative research, this issue is a testament to the incredible work happening within our department. A heartfelt thanks goes out to our team, advisors, and contributors for their hard work and commitment. This magazine is a shining example of what can be achieved when knowledge and passion come together..

Happy reading!



Anjali Yadav
President

I am honored to write this note as the President of the Physics Department for Lumineux. Reflecting on my journey—from joining as a curious student to embracing this leadership role—I am filled with gratitude. The unwavering support from my teachers and peers has been instrumental in my growth, both academically and personally. My heartfelt thanks to all contributors and faculty for making Lumineux a true beacon of inspiration. These moments will remain etched as some of the most memorable of my life. Thank you coherence !

UNION MEMBERS



Anjali Yadav
President



Sherya
secretary



Pranjali Mishra
Treasurer



Aaliya



Anushka
Co-Joint secretary

EXTENDED UNION MEMBERS



Himanshi Sikhwal
Newsletter Editor



Rida E Zehra
Newsletter Editor



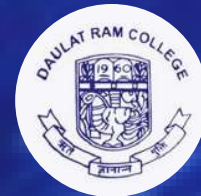
Nidarshna Singh
Social Media handler



Sejal
Graphic Designer



Kritika Kumari
Graphic Designer



EVENTS OF 2024-25

TEACHER ' S DAY

गुरु पारस को अन्तरो, जानत है सब सन्त । वह लोहा कंचन करे, ये करि लये महन्त ॥

The physics department 2024-25 session embarked on with a sparkling and energetic celebration on Teacher's Day. The event began with a cake-cutting ceremony and teachers receiving greeting cards and gifts. The atmosphere was energized with the poetry and musical enchantment by the poets and singers of our physics department. The event concluded on a joyous note with the group photograph.



DEPARTMENT UNION ELECTION



"The ballot is stronger than the bullet."- Abraham Lincoln

On September 21, 2024, Coherence the physics union of Daulat Ram College conducted Union Election . This time there was a tough competition for each and every post . Elections elections were held for the post of president vice president, secretary ,Treasurer,joint secretary and Co join secretary.

ANJALI YADAV and VARNIKA CHOUDHARY for the post of President And SAMARPITA MANHAS, RIDA E ZEHRRA and RIDDHIMA URAON for the post of vice President. STUTI and SHREYA for the post of secretary and ANSHU and PRANJALI MISHRA for the post of treasurer, AALIYA SIDDIQUA and PRIYANKA PRAKHYA for the post of joint secretary, and ANUSHKA, ANU SAMOTA, MEGHA KANWAR SHEKHAWAT, NAMRATA, PRACHI, RANJANA and SHEJAL for the post of co-joint secretary participated enthusiastically. The competition for each post was very tough. There was a very small difference of votes among all the participants.

The election was conducted online with complete transparency. Maximum number of students had casted their votes. The result was announced on the same day at 5 pm, in which Anjali Yadav , Samarpita Manhas ,Sherya , Pranjali Mishra , Aaliya and Anushka won for the post of won for the post of president,vice president,secretary,treasurer,joint secretary and co-joint secretary respectively. Everyone participated in the elections with great enthusiasm and high inspirit. Everyone campaigned , presented themselves and their views to the students very well.This is how this election has given us the union of 2024-25.

After this, students for te post of extended union were selected via tasks. There was a very tough competition in it too. But limited students were to be chosen. So for the post of Graphic Designer:- Sejal(1st year) and Kritik Kumari (2nd year) Social Media handler:- Nidarshna Singh and Newsletter Editor:-Rida E Zehra (2nd year) and Himanshi Sikhawal(1st year).





EVENTS OF 2024-25



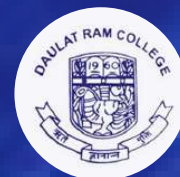
INAUGURAL LECTURE



Coherence, the Physics Association at Daulat Ram College, University of Delhi, commenced with its inaugural lecture on 10th October, 2023. Dr. Pradeep Goswami, an E-scientist from INMAS-DRDO was invited as the chief guest for the phenomenal event. He delivered a fascinating talk on "RADIOLOGICAL AND NUCLEAR WARFARE AGENTS." As an Indian it is our tradition to remember the god before any event so the event was commenced with the lighting of lamp in front of devi Saraswati and recitation of Saraswati Vandana. This was followed by the video presentation highlighting all the previous year's achievements and departmental activities. Then Prof. Savita Roy welcomed Dr. Pradeep Goswami to the stage. Dr. Goswami's enlightening lecture discussed the uses of radiation in warfare, and, offering valuable insights into new inventions in DRDO and their applications. He further encouraged students to explore the field of radiation, highlighting the career options in it. After his captivating talk, principal mam facilitated the union members and extended union members with batches. Dr. Omwati Rana concluded the program by offering gratitude towards Dr. Goswami, Principal mam, Teachers and all Students present there.



EVENTS OF 2024-25



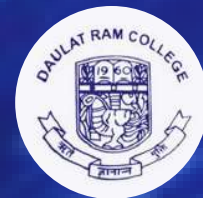
“DWELLING INTO THE SPACE”

On 20th October 2024, Daulat Ram college received an invitation for the energetic and insightful session on Indian Space Odyssey In Search of New Frontiers by Dr. S. Somanath Distinguished Scientist, Chairman, ISRO & Space Commission Secretary, Dept. of Space. The event was organised by Aakashwani a renowned radio station on the occasion of the birthday of Dr. Sardar Vallabhai Patel (the iron man of India) on Saturday, 26th October 2024 at 04.00pm at 'Rang Bhawan Auditorium', Akashvani Bhawan, Parliament Street, New Delhi, 110001. We reached there with our professors Dr Omwati Rana and Dr. Manoj Giri at 3 pm and get settled to our respective positions till 3:30 pm, the event started at 4 pm with the lighting of lamp in front of the photograph of Dr. Sardar Vallabhai Patel. After that the video of the president of India (Smt. Droupadi Murmu)'s message on that auspicious occasion was displayed. Then Dr. Somanath was welcomed on the stage for the talk, he gave us insight of the different ongoing and upcoming projects of the ISRO. He mentioned about the Indian person going to the space from India itself, he further told us about the Chandrayans, and the various rockets and satellite made by ISRO and the upcoming and ongoing manufacturing of them. He also talked about the role of private sector collaborations in the development of the space researches in India. He not only told us about the technologies but also their applications in various fields like agriculture, remote sensing etc. He further mentioned about the collaborations of India with Japan and other countries to develop indigenous technologies for space. The main focus of his talk was that to make India a self-reliant nation in the field of space and research. He concluded his talk by opening up the door of space for all the young and bright minds of our nation and inviting them to come to the field of space research and development. The event had concluded at 5:30 pm with the distribution of the refreshment boxes.





EVENTS OF 2024-25



“Navigating The World – Physics Behind Satellite Navigation”

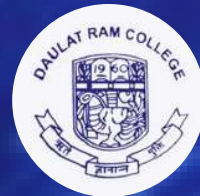
On 13th February 2025, PHYSICS DEPARTMENT (Daulat Ram College) in collaboration with Indian Women Scientists' Association (IWSA) Delhi Branch is pleased to organized a delightful lecture on Navigating The World – Physics Behind Satellite Navigation. This initiative aims to promote awareness about Navigating system of the world among students. The event began with with a warm welcome by Miss Gayatri and Miss Dixita, who greeted the distinguished speaker Dr. Amitava Sen Gupta (Ex-Acting Director, CSIR-National Physical Laboratory), Dr. Poonam Arora (Sr. Pr. Scientist, CSIR-NPL and secretary, IWSA Delhi Branch), Dr. Daya Soni , Ms. Abha Shukla, Dr. G Sumana of CSIR-National Physical Laboratory as well as teachers, and students.

The ceremony commenced with the lamp lighting ceremony and rendition of Saraswati Vandana and KUL GEET of Delhi University by students from the department and Following this, Prof. Savita Roy (Principal ma'am) welcomed our esteemed guest Dr. Amitava Sen Gupta with a potted plant as a token of appreciation. Then Dr. Omwati Rana mam felicitate's Prof. Savita Roy (Principal ma'am) and prof. savita roy delivered a welcoming speech afterward Dr. Poonam Arora graced us with her powerful voice and enlightening us. Then came the moment, everyone was waiting for which is lecture Commenced by our chief guest Dr. Amitava Sen Gupta. During his presentation, Dr. Amitava Sen Gupta dwelled into her topic, which provided us insight to the the topics like Satellite Navigation Systems, Basic Principles of Satellite Navigation, Physics of Satellite Orbits, Signal Transmission and Reception, Sources of Errors in Satellite Navigation, Global Navigation Satellite Systems (GNSS) and Applications of Satellite Navigation has not only informed but also empowered all to make career on that field The lecture was not only engaging but also highly informative, appreciated by all attendees.the event concluded by a vote of thanks.





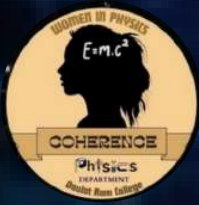
Research Publications of Students: 2024-25



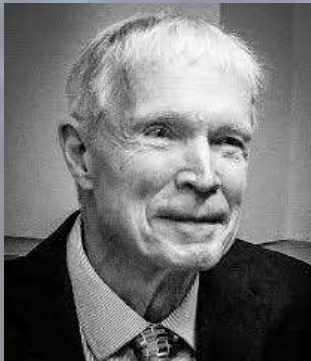
1. Priyanshi Sharma and Kanchan Dagar, An Analysis of the Electronic Absorption Spectrum of Disperse Orange 3—An Azo Dye. J. Electron. Mater. 53 (12) 7509–7514 (2024), Springer, IF: 2.2 <https://doi.org/10.1007/s11664-024-11440-y>.

2. Priyanshi Sharma and Kanchan Dagar, Photo-physical Parameters of Disperse Red 1 in the Homogenous Medium, in “3rd Advanced Functional Materials & Devices for Sustainable Development (AFMD-2025) at ARSD College (University of Delhi) March 3rd-5th, 2025).





NOBLE PRIZE WINNER IN PHYSICS IN 2024



John J. Hopfield



Geoffrey E. Hinton

John J. Hopfield and Geoffrey E. Hinton have been awarded the 2024 Nobel Prize in Physics. Their work has indeed been foundational to the development of modern machine learning.

Foundational Contributions:

- Their work focused on artificial neural networks, which are computing systems inspired by the structure and function of the human brain.
- They developed key methods that allow computers to learn from data, which is the core principle behind machine learning.
- Specifically, Hopfield created associative memory models, and Hinton developed algorithms that allowed neural networks to learn complex patterns.

Impact on Modern Machine Learning:

- Their research has laid the groundwork for many of the AI technologies we use today, including image recognition, speech recognition, and natural language processing.
- Their work has been instrumental in the rise of "deep learning," a powerful form of machine learning that uses multiple layers of neural networks.
- In essence, the Nobel Committee recognized their pioneering work that has enabled the current boom in artificial intelligence.
- Sources and related content

"Chronos in Chaos"

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”



जीवन का चक्र

कही धूप है, कही पतझड़, कही फूल नहीं खिलते,
कही खिल के झड़ जाते हैं। कभी आती है चाँद से चकाचौंध
करने वाली रौशनी, तो कभी अमावस की रात है। पंख है पर
उड़ नहीं पाते, समंदर है पर प्यास नहीं बुझती। कभी आँधी
आती है ऐसी की सब उड़ जाए, कभी बारिश होती है ऐसी कि
सब झड़ जाए।

छुटकी की तब बात सुन पिता ज़ोर से ठहाके लगाए, लाल मुँह
डबडबाई आंखे मानों सोंच रही हों, इनकी हँसी कैसे रोकी
जाए। चलने की आहट, हवा की गुनगुनाहट, सब सुन्न हो गई।
चेहरे की लालिमा और अट्टहास जाने कहाँ खो गई।

आंधी थी पर एक पेड़ अब भी खड़ा था, बारिश हुई पर एक
पत्ता अब भी बचा था। फूल झड़ गए हैं तो दूसरे खिल जाएंगे,
कड़ी धूप है तो बादल फिर लहराएंगे।

रेत नहीं है तू जो हवा के एक झोके से उड़ जाएगी, मिट्टी नहीं
है जो तेज़ बारिश में बह जाएगी। बर्फ नहीं है जो तेज़ धूप में
पीपल जाएगी।

लोहा है तू जो तप कर के नया रूप लेता है, वो कोयला जो
अंत में हीरा बन जाता है, वो सिपी जो समंदर की गहराई में
मोतियाँ चमकाती है।

हाथ में एक फूल की पंखुड़ी तोड़ते हुए तब छुटकी ने कहा,
अब बचा ही क्या है

काँपती आवाज़ गर्जना हो जैसे जब पिता ने उसके हाथ में
आईना देते हुए कहा देख तो गया ही क्या है।

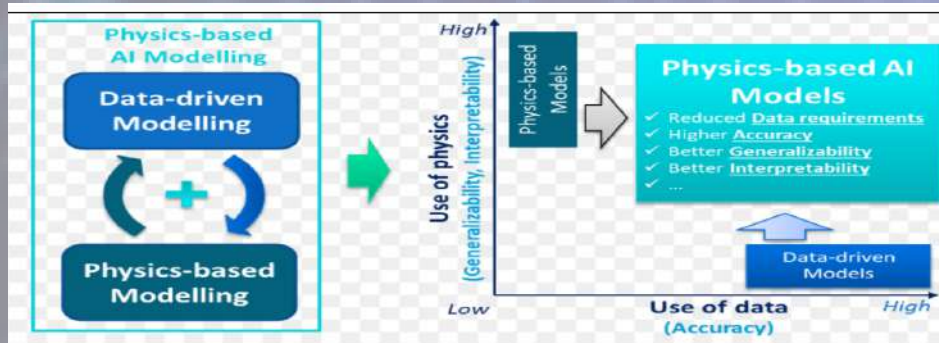
BY

MUSKAN

From Data to Discovery: AI's Impact on Physics

Introduction To AI In Physics Research

"Success in creating AI would be the biggest event in human history. Unfortunately, it might also be the last, unless we learn how to avoid the risks."... By Stephen Hawking



Artificial Intelligence (AI) is revolutionizing the field of physics research by offering innovative tools and techniques to analyze data, run simulations, and make predictions. AI is used to enhance the accuracy and efficiency of simulations, optimize experimental setups, and predict the behavior of complex systems. This convergence of AI and physics is leading to groundbreaking discoveries and fostering interdisciplinary collaborations that push the boundaries of scientific inquiry. As AI continues to evolve, its impact on physics research is expected to grow, unlocking new opportunities for exploration and understanding of the physical universe. With the ability to process and analyze vast amounts of data quickly and accurately, AI is transforming how physicists interpret experimental results and uncover new insights. AI algorithms, such as machine learning and neural networks, can sift through large datasets generated by experiments, simulations, and observations. AI-driven data analysis improves the precision of measurements and predictions in various fields of physics, from particle physics to astrophysics. By automating the data analysis process, AI allows physicists to focus on higher-level research questions and theoretical developments and leads to more efficient experimentation.

Automating Discovery of Universal Laws

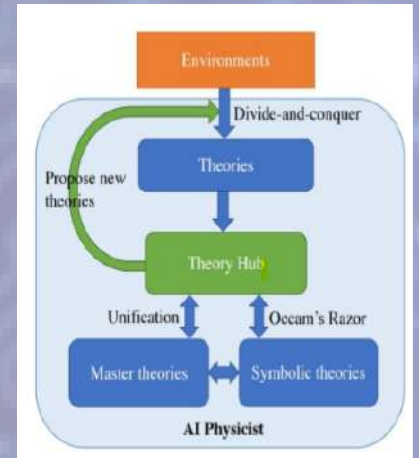
Automating the discovery of universal laws in physics involves using advanced AI algorithms to analyze large datasets, recognize patterns, and generate hypotheses. This process includes data collection, cleaning, pattern recognition, and feature extraction, followed by mathematical modeling and experimental verification. Despite its potential to enhance our understanding of fundamental principles, challenges such as complexity, interpretability, and generalization must be addressed to ensure the discovered laws are universally applicable and align with existing theories.



Implications Of AI In Scientific Research

"AI is transforming physics research by enhancing data analysis and precision, but we must navigate ethical challenges responsibly." - Dr. Jane Smith

In experimental physics, AI optimizes the design and execution of experiments, predicting outcomes and allocating resources efficiently. It can automate routine tasks, allowing physicists to focus on creative and complex problem-solving. Moreover, AI enables interdisciplinary collaboration, applying techniques from computer science to physics, fostering innovation. However, the integration of AI raises ethical considerations, including potential biases in algorithms and the need for transparency. Researchers must navigate these challenges to ensure the responsible and fair use of AI. Overall, AI revolutionizes physics research by enhancing efficiency, precision, and innovation, while also requiring careful management of ethical implications.



How Might AI Shape The Future Of Physics Research?

AI has the potential to revolutionize physics research by enhancing data analysis, improving simulations, and assisting in experimental design. It can process massive amounts of data efficiently, identify patterns, and predict outcomes, leading to better understanding and discoveries in fields like quantum mechanics, astrophysics, and materials science. AI can aid in the development of new theoretical models and facilitate interdisciplinary research, making it a powerful tool for solving previously unsolvable problems and advancing the frontiers of physics. Overall, AI's integration into physics research holds promise for accelerating scientific progress and innovation. It's advancing astrophysics by studying black hole collisions, aiding in quantum mechanics simulations, analyzing particle accelerator data, and modeling condensed matter systems, such as superconductors. These applications enable faster discoveries, deeper insights, and more accurate predictions, transforming the field.

Conclusion

The integration of Artificial Intelligence (AI) into physics research represents a transformative leap in scientific inquiry. AI's capabilities in data analysis, predictive modeling, and simulations are revolutionizing how physicists approach complex problems, leading to more accurate, efficient, and insightful discoveries. AI is an indispensable tool in modern physics research, driving progress and pushing the boundaries of what is possible. The future of physics, augmented by AI, holds immense potential for groundbreaking innovations and transformative breakthroughs. AI-driven approaches are driving breakthroughs in various areas of physics, such as high-energy physics, astrophysics, and materials science.

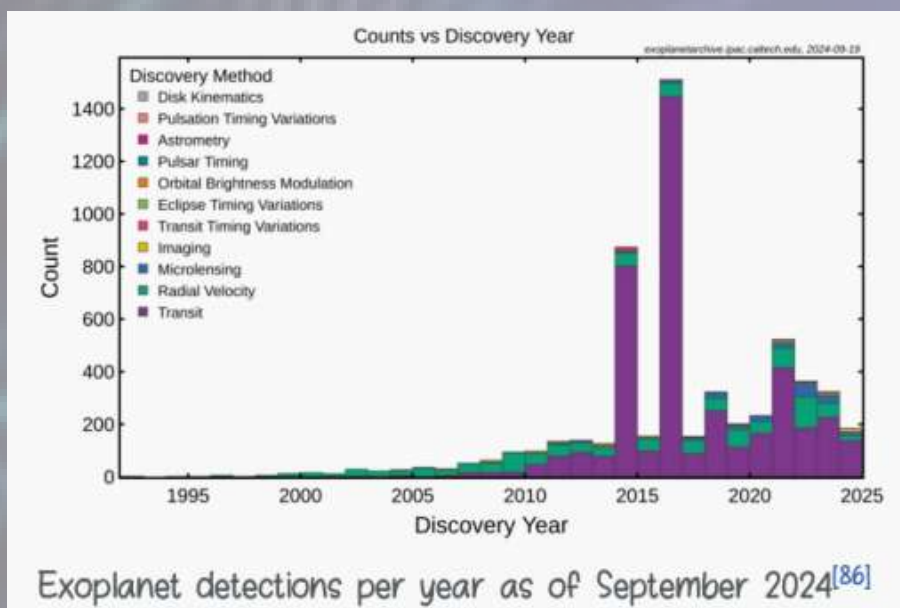
By Dr. Omwati Rana..

INTRODUCTION

The search for exoplanets orbiting stars beyond our solar system has revolutionized our understandings of the universe and the potential for life beyond earth. The first confirmed detection of an exoplanet was in 1992 around a pulsar and the first detection around a main-sequence star was in 1995. As of 20 March, 2025 there are 5,862 confirmed exoplanets in 4,373 planetary systems with 985 systems having more than one planet. The discovery of exoplanets has intensified interest in the search for extraterrestrial life. There is special interest in planets that orbit in a star's habitable zone where it is possible for liquid water, a prerequisite for life as we know it, to exist on the surface. However the study of planetary habitability also considers a wide range of other factors in determining the suitability of a planet for hosting life.

HISTORY OF DETECTION

There are many methods of detecting exoplanets. Transit photometry and Doppler spectroscopy have found the most, but these methods suffer from a clear observational bias favouring the detection of planets near the star; thus, 85% of the exoplanets detected are inside the tidal locking zone. Almost all planets detected so far are within the Milky way. However, there is evidence that extragalactic planets, exoplanets located in other galaxies, may exist. The nearest exoplanets are located 4.2 light years (1.3 parsecs) from Earth and Orbit Proxima Centauri, the closest star to the sun. The least massive exoplanet known is Drauger (also known as PSR B1257+12 A or PSR B1257+12 b), which is about 30 times the mass of Jupiter. Rogue planets are those that are not in planetary systems. Such Objects are generally considered in a separate category from planets, especially if they are gas giants, often counted as sub-brown dwarfs.



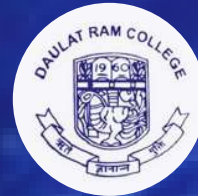
Formation and evaluation

Planets may form within a few to tens (or more) of millions of years of their star forming. The planets of the solar system can only be observed in their current state, but observations of different planetary systems of varying ages allows us to observe planets at different stages of evolution. An example is kepler-51b which has only about twice the mass of Earth but is almost the size of Saturn, which is a hundred times the mass of Earth. Kepler-51b is quite young at a few hundred million years old.

By Anshika Patel (1st year)



The Dark Side Of The Universe: Dark Matter And Dark Energy



Introduction of Cosmic Puzzles

"In terms of the most astonishing fact about which we know nothing, there is dark matter and dark energy. We don't know what either of them is. Everything we know and love about the universe and all the laws of physics as they apply, apply to four percent of the universe. That's stunning." – Neil deGrasse Tyson

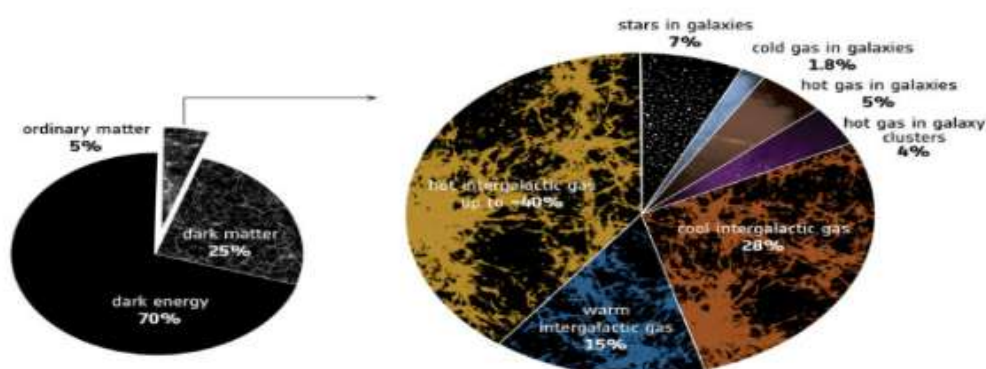
When we want to know the mystery of universe so first we have to know two most mysterious component of universe which are dark matter and energy. So 'what is dark matter?'- Dark matter is one of the most fascinating mysteries in modern astrophysics. It's a form of matter that does not emit, absorb, or reflect light, making it invisible to current instruments. It's estimated that dark matter makes up about 27% of the universe, vastly outweighing the mere 5% composed of visible matter. The rest is dark energy, which makes up roughly 68% of the universe and is responsible for its accelerated expansion.

Now the next question raises - What is Dark Energy? So that the answer of this fascistic question is Dark energy is an even more mysterious component of the universe than dark matter. It is thought to be responsible for the accelerated expansion of the universe. While dark matter exerts a gravitational pull, dark energy seems to work in the opposite way, causing the universe to expand at an ever-increasing rate. Dark energy is hypothesized to make up about 68% of the universe.

The primary evidence for dark energy comes from observations of distant supernovae and the cosmic microwave background. These observations suggest that the universe's expansion rate is increasing, rather than slowing down under the influence of gravity.

If we solved the mystery of dark matter or energy the what happened (a most important question):-

if we solved the mystery of dark matter or energy the what happened is a common questions which rises in our mind so its answer is Solving the mysteries of dark matter and dark energy would revolutionize our understanding of the universe, enhancing cosmological models and potentially leading to new theories in physics. It could inspire groundbreaking technological advancements and possibly provide new energy sources. Such a discovery would have profound philosophical implications, challenging our perception of reality and our place in the cosmos. Ultimately, it would mark a monumental leap in human knowledge and capability, ushering in a new era of scientific progress. Solving the mystery of dark matter and dark energy is crucial because it holds the key to understanding the fundamental nature of the universe. Unlocking their secrets could revolutionize our understanding of cosmology, physics, and the universe's evolution. It could lead to new technological advancements and energy solutions, shaping the future of science and technology.

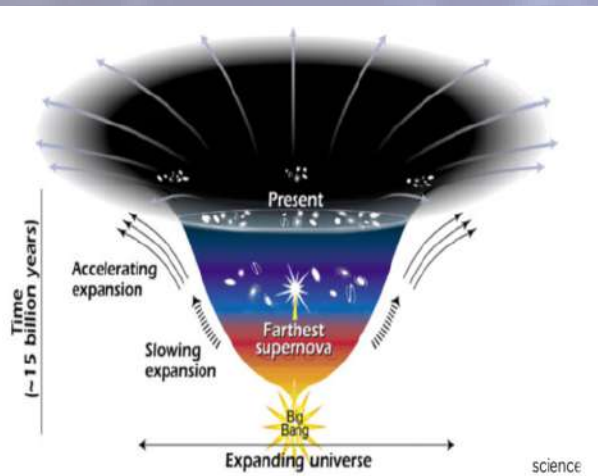


Property	Dark Matter	Dark Energy
Composition	- Hypothesised Non-baryonic exotic particles	- Hypothetical form of energy
Abundance	- 27% of the total universal mass	- 68% of the total mass
Distribution	- Clumped halos around galaxies	- Smooth across space
Gravity Effect	- Attractive binding force	- Repulsive accelerating force
Signatures	- Gravitational effects on galaxies and clusters	- Cosmic acceleration measured from the supernova, CMB and large-scale structures
Impact	- Seed for galaxy and structure formation	- Drives accelerated expansion and influences the ultimate fate of the universe

The Mystery of Dark Matter and Dark Energy

As of now, the mysteries of dark matter and dark energy remain largely unsolved. Dark matter is hypothesized to make up about 27% of the universe. It doesn't emit, absorb, or reflect light, making it invisible and undetectable by conventional means. We only know it exists because of its gravitational effects on visible matter, such as the way galaxies rotate. Scientists are exploring various candidates for dark matter, including Weakly Interacting Massive Particles (WIMPs), axions, and sterile neutrinos, but none have been definitively detected yet.

Dark energy is believed to constitute roughly 68% of the universe and is responsible for its accelerated expansion. Unlike dark matter, dark energy appears to be a property of space itself, possibly related to the cosmological constant in Einstein's equations. Its true nature remains one of the most profound mysteries in cosmology. Key contributions from scientists like Vera Rubin, Fritz Zwicky, Saul Perlmutter, Brian Schmidt, and Adam Riess have advanced our understanding, but their exact nature remains unknown.



Conclusion

In conclusion, the enigmatic entities of dark matter and dark energy remain two of the most profound mysteries in modern cosmology. Despite their invisible nature, they have a significant impact on the universe, accounting for approximately 95% of its total mass-energy content. Dark matter, although unseen, influences the structure and formation of galaxies, while dark energy drives the accelerated expansion of the universe. The quest to unravel these cosmic puzzles is ongoing, with researchers employing advanced methods and technologies to probe deeper into the universe. Each discovery brings us closer to understanding these profound mysteries, keeping the spirit of scientific exploration alive. The hope is that future discoveries and advancements in technology will eventually reveal the true nature of dark matter and dark energy.

By Himanshi Sikhwal (1st year)



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