MANIPAL UNIVERSITY
JAIPUR

PRATHAM

DECEMBER | 2025

Issue: 7

Physics Research Advancements by Thoughtful Humankind and their Achievements Miscellany

Quarterly Newsletter

Department of Physics
School of Physical and Biological Sciences
Faculty of Science, Technology and Architecture

https://jaipur.manipal.edu/fosta/department-of-physics.php

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Meet the Editors

Aashima Sharma
Research Scholar

Kritika Garg
Research Scholar

Sandeep Kumawat
Research Scholar

Shefali Pareek
Research Scholar

Editorial Advisor

Dr. Manoj Kumar Saini
Associate Professor

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Message from HoD

Dr. Kamakhya P. Misra
Head, Department of Physics
Manipal University Jaipur

Editorial

It gives me immense pleasure to present the latest issue of the Pratham aQuarterly Newsletter of Department of Physics, Manipal University Jaipur. This publication reflects the collective energy, enthusiasm, and achievements of our faculty, students, and collaborators who continue to uphold the department's tradition of academic excellence and research innovation.

In recent months, our department has made significant strides in both teaching and research. From fostering curiosity-driven learning in the classroom to advancing cutting-edge investigations in materials science, photonics, nanotechnology and nuclear sciences, we continue to cater to the vibrant scientific community. The engagement of our students, particularly the research scholars, in attending and organizing the conferences, workshops, and outreach activities is highly encouraging. It underscores our commitment to experiential learning and holistic development.

This newsletter highlights contributions of our faculty colleagues through publications, conferences, and collaborations, which strengthen the department's reputation as a hub of intellectual growth. As we move forward, our focus remains on expanding interdisciplinary research, enhancing laboratory infrastructure, and encouraging innovative teaching methods that inspire the next generation of physicists.

I extend my heartfelt appreciation to the editorial team for their dedicated efforts in bringing together this issue. I hope the readers will find it both informative and inspiring. Let us continue to work together towards excellence in physics education, research, and societal impact.

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Vision

Excellence in Physics education that deepens its foundation and cultivates critical skills, while advancing the cutting-edge research.

Mission

- To offer a transformative learning experience that equips students with a solid foundation in Physics, preparing them for successful careers in academia, industry, and beyond.
- To foster a research culture among students, enabling their contribution to the scientific enterprise.
- To apply Physics research to innovate for advancing industries and enhancing lives.
- To promote Physics and scientific literacy through community engagement, public lectures, and outreach programs.

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Faculty Highlights

Dr. Saikat Chattopadhyay, Associate Professor, Department of Physics is awarded as 2nd Best Oral Presentation in "5th International Conference on Condensed Matter & Applied Physics (ICC 2025)" held on December 12th - 15th

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Students' Achievements

Ashish Kumar
Research Scholar

1. Poster Presentation:
- Enhanced Light Absorption and Photocatalytic Activity in α-Bi2O3?MWCNTs Composites at National Conference on Materials Science & Technology-2025(NCMST-2025)
- Optical Band Gap Tuning and Enhanced Photocatalytic Performance of Manganese and Iron Doped Tin Oxide at 2nd International Conference on Advances in Condensed and Nano Materials (ICACNM-2025)

3. Oral Presentation: Empowering Solar Technologies: A Review of Machine Learning-Driven Photovoltaic Systems at 7th IEEE International Conference on Cybernetics, Cognition and Machine Learning Applications (ICCCMLA 2025)

Deepika Maan
Research Scholar

1. Poster Presentation: Enhanced Optical and Photocatalytic Performance of Manganese and Cobalt Doped Zinc Oxide Nanocomposites under Visible Light Irradiation at 2nd International Conference on Advances in Condensed and Nano Materials (ICACNM-2025)

Guru Kishore B.
Research Scholar

1. Oral Presentation: On the Thesis experiment for Beam Time Request (BTR) and got approved.

Jyoti Kumari
Research Scholar

1. Poster Presentation: Development of Optimized Calcite Thin Film on Silicon Nanowires for Hydrophilic Surface at Innovations, Advances in Material Science for Sustainable Goals (IAMSSG 2025)

Karishma Jain
Research Scholar

1. Publications: "Tuning the Morphology and defect density of Mg(OH)2 Nanoplatelets through Microwave-Assisted Wet Synthesis for photocatalytic applications."; Journal: Ceramics International; Impact Factor: 5.6, Quartile: Q1
2. Oral Presentation: A Review on Robust Machine Learning Models for Water Quality Prediction
Conference: 7th IEEE International Conference on Cybernetics, Cognition and Machine Learning Applications (ICCCMLA 2025)

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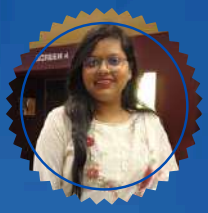
Students Achievements



Kritika Garg
Research Scholar

1. Publication:
- Investigation of N-4-n-pentyloxy Benzylidene-4-heptylaniline Schiff base Liquid Crystal Structure and Dynamics using DFT methods; Journal: Discover Applied Sciences; Impact Factor: 2.8; Quartile: 1
2. Oral Presentation:
- A Comprehensive DFT analysis of Two Homologs nO.m Series Liquid Crystalline Compounds (5O.m,m=14,16) at National Symposium Cum Workshop on Computational Materials
3. Poster Presentation: In-Depth Spectroscopic Study of 5O.m Liquid Crystalline Compounds(m=14,16): A Review at 32nd National Conference on Liquid Crystals (NCLC 2025)
4. Attended a Workshop on "Hands-on Training on Gaussian 16."
5. Attended an FDP on "Recent Trends in Quantum Science and Technology"

Manoj Vishwakarma
Research Scholar

1. Poster Presentation: Raman Spectroscopy and Density Functional Theory Analysis of CB6O.O8 Dimeric Liquid Crystal at International Conference on Emerging Trends in Physical and Life Sciences (ICETPLS-2025)
2. Attended "A National Symposium cum Workshop on Computational Materials."

Nihal Kumawat
Research Scholar

1. Oral Presentation: On the Thesis experiment for Beam Time Request (BTR) and got approved.

Omprakash Yadav
Research Scholar

1. Oral Presentation: Frequency Dependent Optical Response of Rb2AgInBr6 using Density Functional Theory at National Conference on "Impact of AI on Human Society and Science & Technology"
2. Attended an FDP on "Recent Trends in Quantum Science and Technology"
3. Attended "A National Symposium cum Workshop on Computational Materials."

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Students Achievements

Sandeep Kumawat
Research Scholar

1. Oral Presentation: On the Thesis experiment for Beam Time Request (BTR) and got approved.

Shefali Pareek
Research Scholar

1. Poster Presentation: Moringa-Based Nanogels for Cartilage Regeneration at 40th International Conference Bio-MANTHAN 2025 at IIT Ropar.
2. Workshop:
   - "Redefining Cell Culture Automated 3D systems for tomorrow's therapies".
   - Workshop and Hands-on training at IIT Ropar, BIOMANTHAN 2025

Tara Chand Badiwal
Research Scholar

1. Poster Presentation: Electron Beam Deposited Cu2O Thin Films: Structural and Optical Optimization Through Annealing at National Conference on Materials Science & Technology-2025(NCMST-2025)

Ugrasen Singh
Research Scholar

1. Publications:
   - "Different Phase Matching Schemes of Terahertz Wave Generation Using Periodic Poled Lithium Niobate for Real -World Applications"; Journal: Physics Open; Impact Factor: 1.4; Quartile: 2
   - Book Chapter: "Thermal Expansion Effects on Quasi-phase- Matched"; Publisher: Springer Nature
2. Poster Presentation: Numerical Investigation of Electro-Optic Effect on Second Harmonic Generation Spectra in Segmented Quasi-Phase-Matching Devices at SCOPOSIS -2025
3. Awards:
   - Recipient of SCOPOSIS-2025 Award
   - Optica Travel Grant awarded in SCOPOSIS-2025

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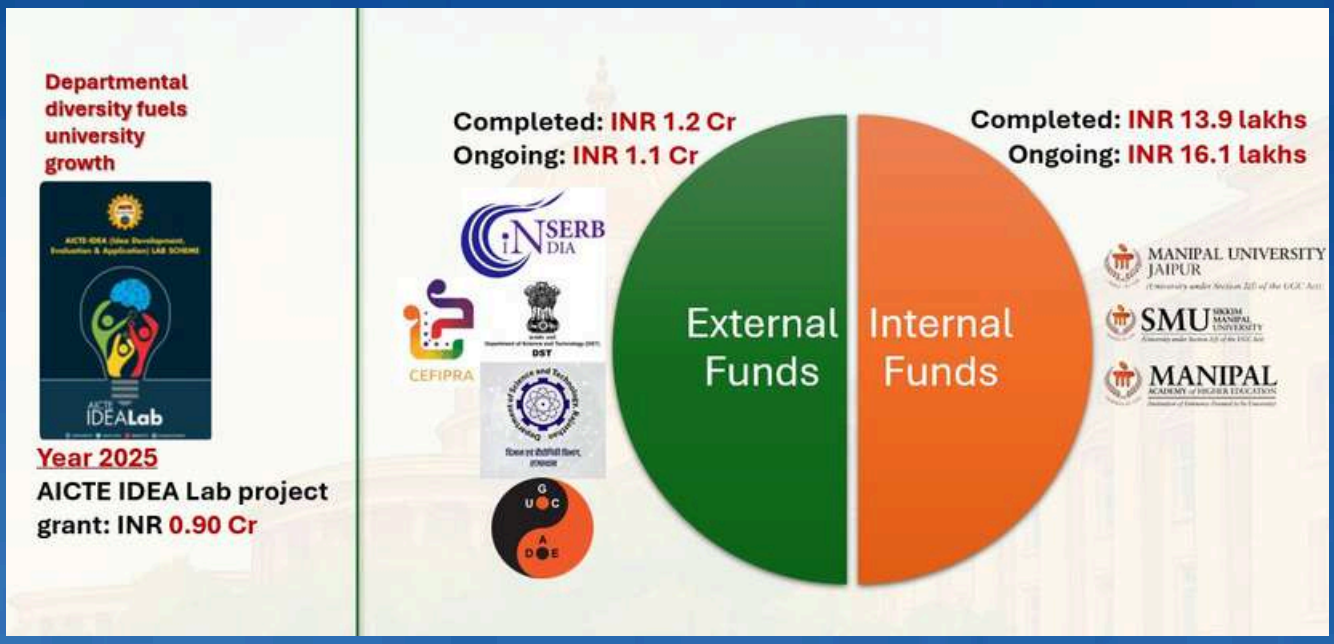
Updates



The image highlights the strong growth in departmental research funding, showcasing a balanced contribution from external and internal funding sources. External funding has seen significant success with INR 1.2 Cr completed projects and INR 1.1 Cr ongoing projects, supported by prestigious agencies such as SERB, DST, UGC, and others. Internal funding also reflects steady progress with INR 13.9 lakhs completed and INR 16.1 lakhs ongoing projects, backed by Manipal University initiatives. Notably, the department has also secured the AICTE IDEA Lab project grant of INR 0.90 Cr in 2025, underscoring its commitment to innovation, research, and academic excellence.

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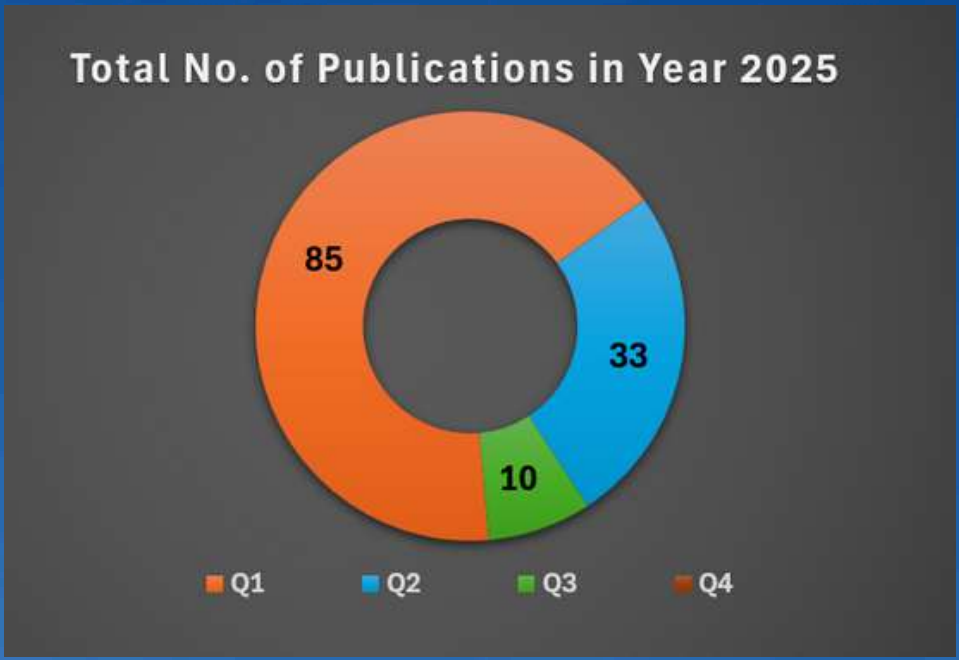
Updates



The graph presents the quarter-wise distribution of departmental publications for the year 2025, reflecting the quality and impact of research output. A major share of publications falls in Q1 (85 papers), highlighting strong presence in top-ranked journals. This is followed by Q2 with 33 publications and Q3 with 10 publications, while no publications were recorded in Q4. Overall, the distribution underscores the department's emphasis on publishing in high-impact journals and maintaining strong research standards.

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Updates

Congratulations to Our PhD Graduates

The Department of Physics extends heartfelt congratulations to the following scholars for successfully earning their PhD degrees. Their commitment, groundbreaking research, and academic excellence have made remarkable contributions to the scientific community.

👨‍🎓 1. Dr. Kanchan Soni

📝Thesis Title: "Investigation of Heavy Metal Resistance of Metabolic Profiling of Bacterial Isolates Native to Marine Environment."

🎓 Supervisor: Dr. Ashima Bagaria

👨‍🎓2. Dr. Shikha Sharma

📝Thesis Title: "Investigation of Structural and Optoelectronic Properties of Solar Energy Conversion Materials."

🎓 Supervisor: Dr. Amit Soni; Co-Supervisor: Dr. Jagrati Sahariya

👨‍🎓3. Dr. Arpana Pal Sharma

📝Thesis Title: "Nanogenerators using Polymer Nanocomposites."

🎓 Supervisor: Dr. Dhaneswar Mishra; Co-Supervisor: Dr. Uvais Valiyaneerilakkal & Prof.(Dr.) Kulwant Singh

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Updates

The Department is pleased to announce the joining of a new faculty member, marking a valuable addition to our academic and research community. Their arrival strengthens the department's commitment to excellence in teaching, research, and innovation, and we look forward to the new perspectives and contributions they will bring.

Dr. Pravin Kumar Singh, Assistant Professor

Educational Qualifications:

- PhD Physics, Department of Physics and Material Science, Madan Mohan Malaviya University Of Technology, Gorakhpur, India (2019).
- M.Tech: Optoelectronics and Laser Technology, School of Electronics and Photonics from Pt. Ravishankar Shukla University, Raipur, India (2015).
- M.Sc.: Electronics and Communication, School of Electronics, Devi Ahilya Vishwavidyalaya, Indore, India (2012).
- B.Sc. : Physics, Electronics, Mathematics, DDU Gorakhpur University, Gorakhpur, India (2010).
- Area of Expertise: Phase change materials, solar cells, SPR sensors, nanogenerators.

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Events

Glimpse

The Department of Physics conducted an industrial visit on 20th November, 2025 for students and research scholars at TechnoS Instruments. The visit provided practical exposure to advanced materials processing, Raman spectroscopy, and modern instrumentation. Students explored various working laboratories, including Raman, Lithium Battery, 3D Printing, Drone Technology, and Embedded Systems labs. The interaction also highlighted opportunities for industry-academia collaboration in research, internships, and technology development.

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Events

Glimpse

The Department of Physics organized a Faculty Development Program focusing on recent advances in quantum science and technology. The program brought together experts and participants to discuss emerging research directions and applications in quantum systems. Interactive sessions and expert talks enriched participants' understanding of contemporary challenges and opportunities in the field. The event strengthened academic collaboration and research-oriented learning.

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Events

Glimpse

A one-day development program was conducted to explore the interdisciplinary role of emotion, computation, and communication in everyday life. The sessions highlighted the integration of psychological aspects with computational and communication technologies. Participants actively engaged in discussions that bridged theory with practical applications. The program encouraged holistic thinking across science, technology, and human behaviour.

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Events

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(University under Section 2(f) of the UGC Act)

A FIVE DAY
FACULTY DEVELOPMENT PROGRAM
ON
"Sustainable Energy Technologies" in ICT mode
[December 1-5, 2025]

Organized by:
Department of Physics and
Department of Electronics and Communication Engineering,
In collaboration
with
National Institute of Technical Teacher Training and Research (NITTTR), Chandigarh
MUJ TEC and HR Department

Steps for applying:
Step 1: All participants are required to create their online account through one-time registration as a new user (while registering, select yourself as Participant).
Link: (https://fdp.nitttrchd.ac.in/backinguo/)
After registration, participants can:
- Manage/Update their profile.
- Apply for the Training Programme.
- View all the trainings they have applied and attended.

Step 2: Verify your mobile number through OTP. (Without mobile number verification, participants will not be able to log in.)
Step 3: After logging in, click on "Apply for STC" in the left menu.
Step 4: Select the Department "Electrical Engineering" and Mode as "Online" for the course.
Step 5: Apply for the FDP (ICT-87, "Sustainable Energy Technologies") and select an occupation.
Select the venue, Registered remote center, as "Manipal University Jaipur, Jaipur, Rajasthan".
Step 7: In the next step, "Whether you are Faculty/Staff/Student of AICTE-approved Technical Institute or Govt./Private Technical Universities", select yes and submit.
Step 8:Pay the course Fees of Rs. 590/- will be charged from every participant.

Coordinators:	Contact Details:
Dr. Rashi Nathawat	9833857570
Dr. Deepika Bansal	7742889057
Dr. Ritu Garg	9138324825
Mr. Ashish Vijay	8302306543

Glimpse

The Department of Physics, in collaboration with allied departments, organized a five-day Faculty Development Program on sustainable energy technologies. The program covered recent developments in renewable energy, energy storage, and green technologies. Expert lectures and discussions provided valuable insights into sustainable solutions for future energy needs. The event contributed significantly to capacity building and interdisciplinary research awareness.

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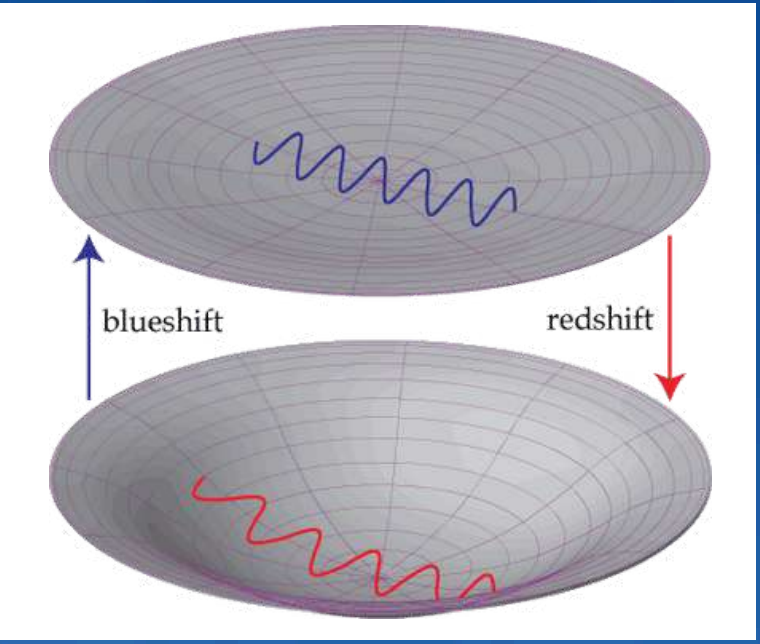
Physics Playground

The Escaping Photon

A photon is emitted from the surface of a massive star. As it climbs out of the star's gravitational field, what happens to its energy, frequency, and wavelength? If energy is lost, where does it go?



Did You Know?

Gravitational redshift was first confirmed experimentally in 1959 in the Pound-Rebka experiment, using gamma rays over a height of just 22.5 meters on Earth!

Answer:

The photon undergoes gravitational redshift:

- Energy decreases
- Frequency decreases
- Wavelength increases

In General Relativity, global energy conservation does not strictly apply in curved spacetime. The observed energy change reflects differences in spacetime geometry between emission and detection.

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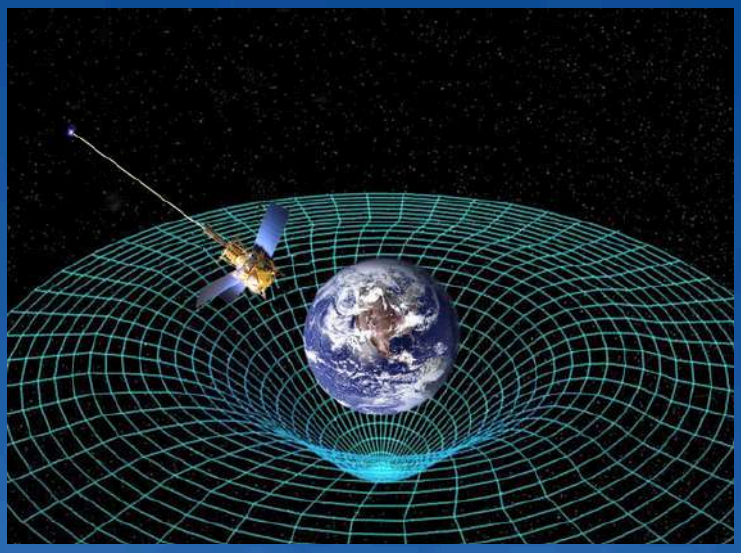
Physics Playground

🔭The Faster Clock

Two identical atomic clocks are synchronized.

- Clock A remains on Earth.
- Clock B is placed in a satellite orbiting Earth.

After one year, which clock shows more elapsed time, and why?



💡 Did You Know?

GPS satellites must correct their clocks by about 38 microseconds per day due to relativistic effects-otherwise, navigation errors would grow by kilometers!

✓ Answer:

The satellite clock (Clock B) shows more elapsed time.

Although motion slows it down (special relativity), weaker gravity in orbit speeds it up (general relativity). The gravitational effect dominates.

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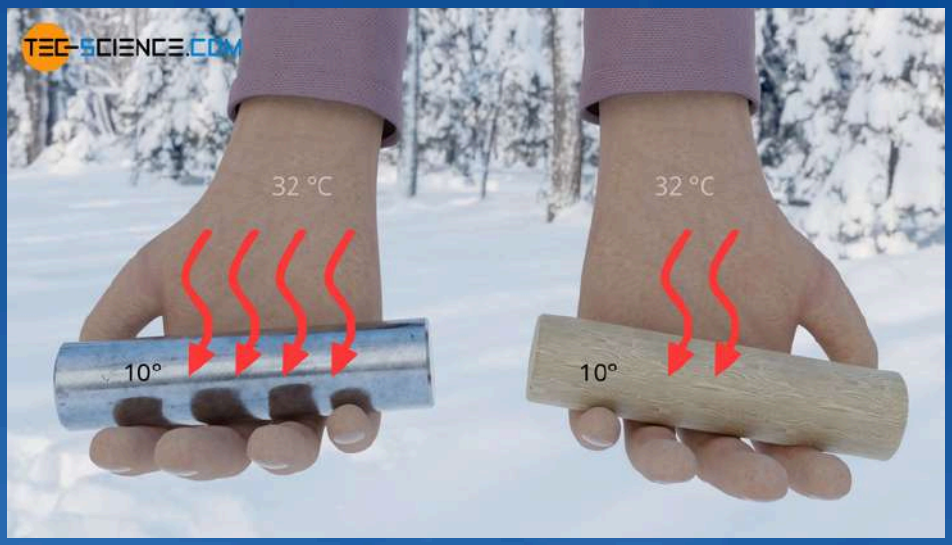
Physics Playground



The Silent Heat Flow

A metal block and a wooden block are at the same temperature.

When touched, the metal feels colder. Why?

Did You Know?

This is why tiles feel colder than carpets in winter-even though both are at room temperature.

Answer:

Metal has a much higher thermal conductivity, so it draws heat from your skin faster than wood. The rapid heat loss creates the sensation of cold, despite equal temperatures.

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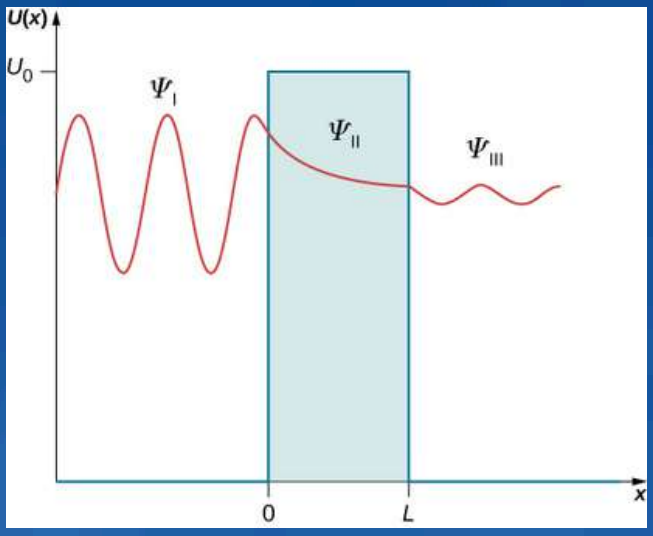
Physics Playground

The Quantum Barrier

Classically, a particle cannot cross a barrier if its energy is lower than the barrier height. Why can it do so in quantum mechanics? Does this violate energy conservation?



Did You Know?

Quantum tunnelling is essential for nuclear fusion in the Sun-without it, stars wouldn't shine!

Answer:

This phenomenon is called quantum tunnelling.
The particle's wavefunction extends into the barrier, giving a finite probability of appearing on the other side. Energy conservation remains intact; the particle never gains extra energy.

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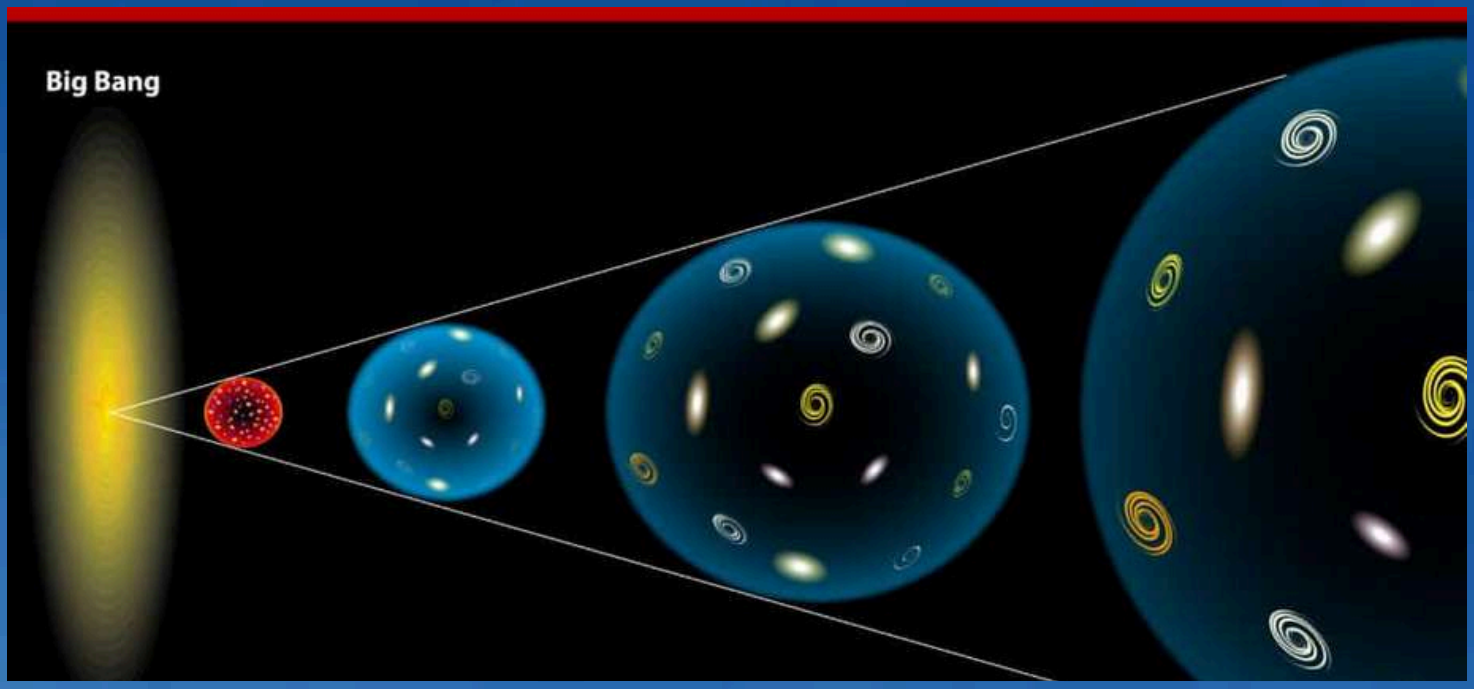
Physics Playground



The Expanding Universe Paradox

If the universe is expanding, why don't atoms, planets, or galaxies expand with it?

Did You Know?

Even the Milky Way and Andromeda galaxies are moving toward each other, despite cosmic expansion!

Answer:

Cosmic expansion is significant only on very large scales. Local forces-electromagnetic forces in atoms and gravity in galaxies-are far stronger than the expansion effect, keeping bound systems intact.

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Fact or Fiction ?

❌ Fiction: Heavier objects fall faster than lighter ones.

✔ Fact: In the absence of air resistance, all objects fall at the same rate, regardless of mass.

🧠 Why?
Gravity accelerates all objects equally. The famous Apollo 15 experiment showed a hammer and a feather hitting the Moon's surface at the same time.

❌ Fiction: Sound travels faster in air than in solids.

✔ Fact: Sound travels fastest in solids, slower in liquids, and slowest in gases.

🧠 Why?
Sound speed depends on how quickly particles transmit vibrations. Particles in solids are closely packed, allowing faster transmission.

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Fact or Fiction ?

❌ Fiction: The Sun is yellow.

✔ Fact: The Sun is actually white.

🧠 Why?

Earth's atmosphere scatters blue light, making the Sun appear yellow or orange. From space, sunlight appears white.

❌ Fiction: Energy is always conserved everywhere in the universe.

✔ Fact: Energy conservation is not strictly global in an expanding universe.

🧠 Why?

In General Relativity, spacetime itself evolves. For example, photons lose energy due to cosmic expansion (redshift), without transferring it elsewhere.

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Fact or Fiction ?

❌ Fiction: Black holes suck everything nearby.

✔ Fact: Black holes attract objects just like any other mass-they don't act like cosmic vacuum cleaners.

🧠 Why?
Only objects that come very close to the event horizon are trapped. If the Sun were replaced by a black hole of the same mass, Earth's orbit would remain unchanged.

❌ Fiction: Quantum physics allows anything to happen.

✔ Fact: Quantum mechanics is probabilistic, not chaotic.

🧠 Why?
While outcomes are uncertain, probabilities follow strict mathematical rules, making quantum theory one of the most precisely tested frameworks in physics.

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Journeys Beyond Campus

Dr. Richa Sharma, Alumni (Research Scholar)
Department of Physics
Manipal University Jaipur

"Completing my PhD in Physics from Manipal University Jaipur was a truly enriching and transformative experience. The university's vibrant academic community, world-class infrastructure, and expert faculty played a significant role in shaping my research. The Department of Physics, with its strong focus on interdisciplinary research and innovation, resonated with my interests. I'm grateful for the guidance of my research guide and the opportunities that came my way, from conferences to cultural events. The research labs and facilities were simply marvelous, providing the perfect environment to explore and experiment. This experience not only honed my scientific acumen but also contributed significantly to my personal and professional growth."

Dr. Prarbdh Bhatt, Alumni (Research Scholar)
Department of Physics
Manipal University Jaipur

"My PhD journey in the Department of Physics at Manipal University under the guidance of Dr. Nilanjan Halder was a blend of serious research, constant learning, and many memorable moments. Manipal's vibrant campus, open academic culture, and diverse student community made the entire experience far more than just laboratory work. I enjoyed the excitement of designing experiments, the frustration of failed measurements, and the joy when data finally made sense-often after countless cups of late-night coffee with lab mates.

The journey taught me to think critically, handle experimental setbacks with patience, and approach problems creatively. Beyond research skills, I learned teamwork, time management, and how to keep a sense of humor even when instruments refused to cooperate. Those years shaped me from a curious student into a confident researcher, and I carry both the scientific discipline and the happy memories of Manipal with me in every step of my career."