BIJNI COLLEGE
বিজনী সোলোঁসালিমা
ESTD 1969

Department of Physics

Bijni College, Bijni

Chirang, Assam

Knowledge • Inquiry • A Better Tomorrow

Explore
Understand
Innovate

THE PHYSICS BEATS

DEPARTMENTAL NEWSLETTER

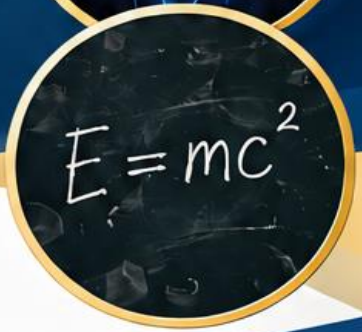
Volume 2 | Issue 1 | Session: 2025 - 2026













LEARNING BEYOND CLASSROOMS | STUDENT ENGAGEMENT | RESEARCH & INNOVATION | COMMUNITY OUTREACH | A BRIGHTER TOMORROW

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Publisher

Department of Physics
Bijni College, Bijni

Edition

Volume 2, Issue 2

Published at

www.bijnicollege.ac.in



Principal's Message

It gives me immense pleasure to extend my greetings to the Department of Physics on the publication of *The Physics Beats*, Volume 2, Issue 2, for the session 2025–2026. I appreciate the department's sincere efforts in providing students with opportunities for academic learning, scientific exploration, practical experience and overall development. The various programmes, including seminars, educational visits, National Science Day activities, mentoring, internship and add-on programmes, reflect the department's commitment to meaningful and holistic education.

I congratulate the faculty members and students for their active participation and wish *The Physics Beats* continued success in inspiring curiosity, creativity and scientific thinking.

Dr. Birhashgiri Basumatary

Principal, Bijni College



Message from HOD

It is a pleasure to present *The Physics Beats*, Volume 2, Issue 2, for the session 2025–2026. This academic year has been enriched with diverse activities that encouraged our students to learn beyond the classroom. From the induction programme and educational visit to seminars, mentoring, internship, add-on programmes and faculty exchange, every initiative aimed to strengthen students' academic knowledge, practical skills and confidence.

I sincerely appreciate the efforts of our faculty members and students and hope that *The Physics Beats* continues to inspire curiosity, scientific thinking and a passion for learning.

Sanjita Ray

Head, Department of Physics

Bijni College

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Ref. No. IQAC/BC/MSS/N26-4

Date: 07/09/026



From the Desk of Coordinator, IQAC, Bijni College

To,

Jayshri Narzary, Assistant Professor, Dept. of Physics
Editor, THE PHYSICS BEATS, E-Newsletter, Vol-II, Issue-1, August 2025-July 2026
Published by the Department of Physics
Bijni College, Bijni, Assam, India-783390

Subject: Message to The Editor, THE PHYSICS BEATS, E-Newsletter, Vol-II, Dept. of Physics

Dear Editor,

I extend my warm greetings and sincere appreciation to you, your team and students of the department for your dedicated efforts in bringing out this edition, THE PHYSICS BEATS, *Vol-II, Issue-1, August 2025 to July 2026*, E-Newsletter of the department of Physics of Bijni College. The E-Newsletter serves as a valuable platform to showcase department's initiatives, achievements, and best practices, reflecting collective commitment to quality enhancement in every sphere of academic and extracurricular activities conducted and participated by the faculty and students of Physics department of Bijni College.

Your meticulous work in compiling diverse contributions, maintaining high editorial standards, and presenting the content in an engaging manner has ensured that the E-Newsletter, THE PHYSICS BEATS not only informs but also inspires its readers.

I look forward to your continued collaboration in documenting and disseminating the progress of our IQAC activities, thereby fostering a culture of excellence and continuous improvement.

Wishing you and your team continued success in all future editions.

Warm Regards,

(Dr. Babul Basumatary)
Co-ordinator, IQAC, Bijni College

Co-Ordinator
IQAC
Bijni College, Bijni



Editorial Note

It gives me immense pleasure to present ***Volume 2, Issue 2 of The Physics Beats****, a newsletter of the Department of Physics, Bijni College, for the session* ***2025–2026****. This edition reflects a year filled with learning, participation, exploration and meaningful academic experiences. The newsletter brings together the major activities of the department, including the induction programme, educational visit to Central Institute of Technology (CIT), Kokrajhar, cultural and science outreach activities, departmental seminar, wall magazine, mentoring programme, add-on programme and faculty exchange initiatives, etc. The different programmes undertaken during the year demonstrate the department's effort to create an environment where students can learn not only through lectures but also through interaction, observation, experimentation, presentation and practical engagement.*

I hope that The Physics Beats *will continue to be a platform for sharing ideas, celebrating achievements and encouraging scientific curiosity among our students. May every edition inspire our young learners to question, explore and discover the world around them through the fascinating language of physics.*

With best wishes,

Jayshri Narzary
Editor, The Physics Beats
Department of Physics, Bijni College

Research & Publications Highlights

1. Role of Physics in addressing Sustainability Challenges

Sanjita Ray |Anwesha, Vol. 6, ISBN: 978-81-988549-2-6| 2025

Sustainability is essential for conserving Earth's limited resources and ensuring a better future for coming generations. With the growing world population and increasing demand for energy, food, water, and raw materials, sustainable solutions have become a global necessity. Physics provides the fundamental principles behind many technologies that support sustainable development. Solar energy utilizes the photoelectric effect, while wind turbines, hydropower, and geothermal systems rely on principles of mechanics, fluid dynamics, and heat transfer. Physics also contributes to energy-efficient buildings through thermal insulation, electric vehicles and sustainable transportation, environmental monitoring using remote sensing, and efficient water and waste management. Sustainable agriculture further benefits from soil physics and biophysics. The article emphasizes that reducing greenhouse-gas emissions and shifting towards clean and renewable energy are crucial for protecting the environment.

2. Artemis II: Humanity First Crewed Return to the Moon in Half a Century

Sayed Jawahar Hussain |Anwesha, Vol. 6, ISBN: 978-81-988549-2-6| 2025

Artemis II is NASA's first crewed Artemis mission and a major step in human deep-space exploration. Four astronauts will travel around the Moon aboard the Orion spacecraft, launched by the Space Launch System. The mission will test life-support systems, navigation, propulsion, and human health during deep-space travel. Despite technical delays, Artemis II will help prepare for future sustainable lunar exploration and eventual human missions to Mars. It also demonstrates the importance of international cooperation and technological innovation in advancing space exploration.

Research & Publications Highlights

3. Property Mapping of ZnO Composites via Al and Cu Incorporation: A Multifunctional Dilute Magnetic Semiconductor

J. Narzary et al. | Materials Science and Engineering: B | 2026

DOI: 10.1016/j.mseb.2025.119064

The study explores Al–Cu incorporated ZnO as a multifunctional dilute magnetic semiconductor, focusing on its structural, optical, dielectric, electrical and magnetic properties. The findings demonstrate the tunability of ZnO through co-substitution and defect engineering, with room-temperature ferromagnetism and promising multifunctional characteristics relevant to spintronic and advanced electronic applications.

4. Enhanced ferromagnetism and dielectric performance in (Cr, Ce) co-doped SnO_2 DMS

J. Narzary et al. | Ceramics International | 2026

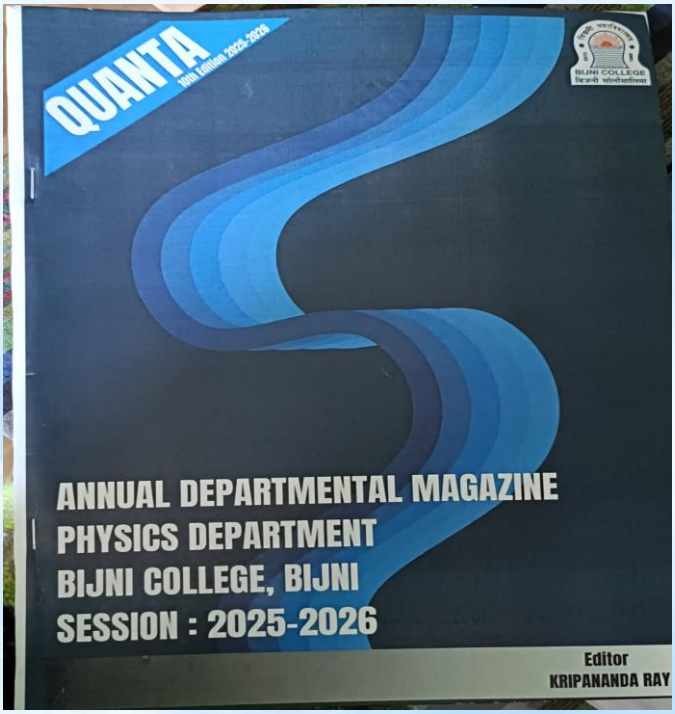
DOI: 10.1016/j.ceramint.2026.06.352

This study investigates the structural, optical, dielectric, electrical and magnetic properties of pure and (Cr, Ce) co-doped SnO_2 dilute magnetic semiconductors synthesized through the solid-state reaction method. X-ray diffraction and Rietveld refinement confirmed the tetragonal rutile structure of SnO_2, while co-doping resulted in lattice distortion, reduced crystallite size and the generation of oxygen-vacancy defects. Optical and spectroscopic analyses further supported the presence of oxygen-vacancy-related defect states, with the optical band gap widening up to 3.75 eV. A significant enhancement in dielectric performance was observed with co-doping, characterized by an increased dielectric constant.

DEPARTMENTAL PUBLICATION HIGHLIGHTS



THE IMAGE- A DEPARTMENTAL WALL MAGAZINE



QUNTA- ***A DEPARTMENTAL ANNUAL MAGAZINE***

NEWSLETTER
VOL 2, ISSUE 1
(2025-2026)

DEPARMENTAL ACTIVITIES ACADEMIC YEAR: 2025-2026

INDUCTION PROGRAMME FOR FYUGP 1ST SEMESTER STUDENTS

Dept. of Physics, Bijni College, 07 August 2025: The Department of Physics organized an induction programme for the FYUGP 1st-semester students of the 2025–2026 batch to familiarize them with NEP 2020 and help them settle comfortably into departmental and college life. The programme was inaugurated by the Head of the Department, Sanjita Ray, who explained the academic structure across eight semesters, flexible entry and exit provisions, the internship component in the 4th semester, sessional examinations and planned departmental activities. Faculty member Syed Jawahar Hussain introduced students to college activities, NSS and important institutional responsibilities. The programme concluded with a photo session with the newly admitted students.



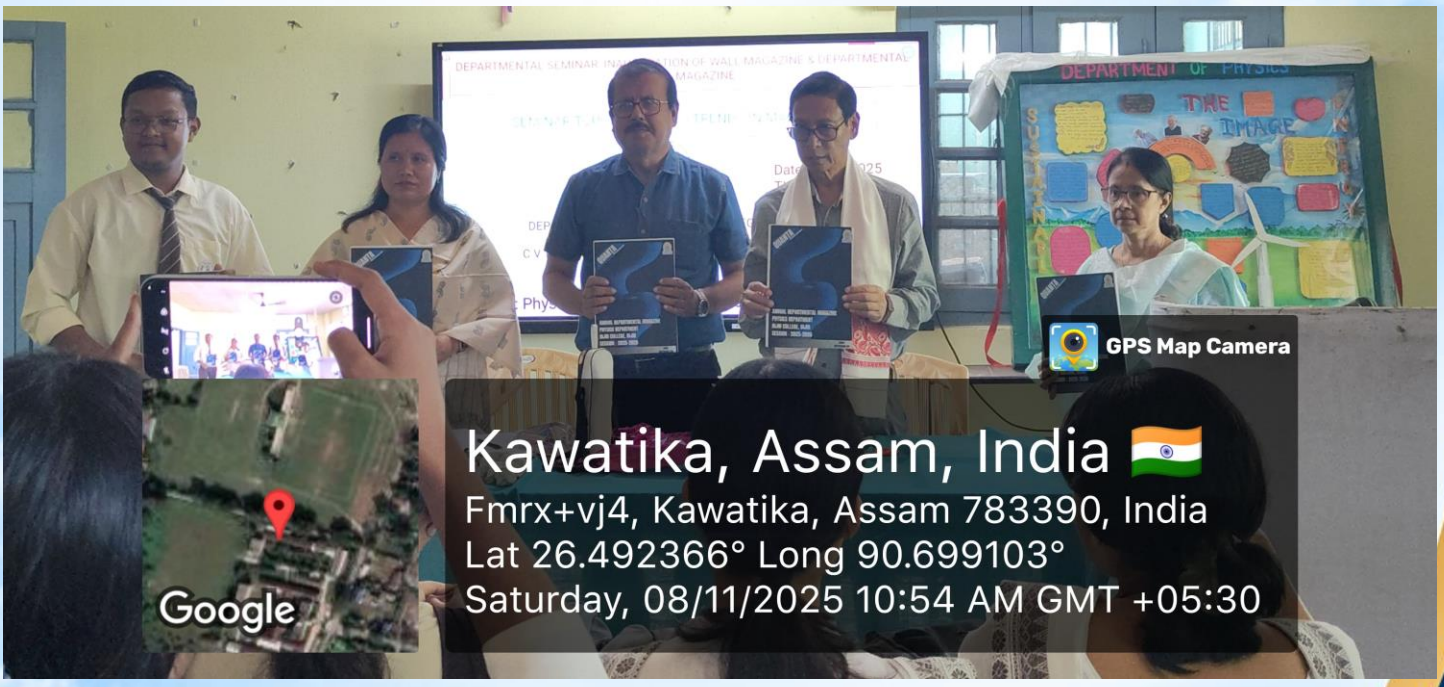
FRESHMAN SOCIAL (2025-2026)

Dept. of Physics, Bijni College, 28 August 2025 : Freshman social program for the Batch 2025-2026 students was arranged by the department of Physics on 28/08/2025 in association with C.V. Raman Physics Forum of the dept. The program was inaugurated with a song from 3rd semester students. Respected Principal, Dr. Birhash Giri Basumatary and Vice Principal, Sabita Ray delivered their inspirational speech. There were many programs viz: song, dance, recitation from students. They also keep a competition for selecting Mr. and Mrs. Freshers. The program was concluded with a speech from HOD.



Seminar, Inauguration of Wall Magazine and Departmental Annual Magazine

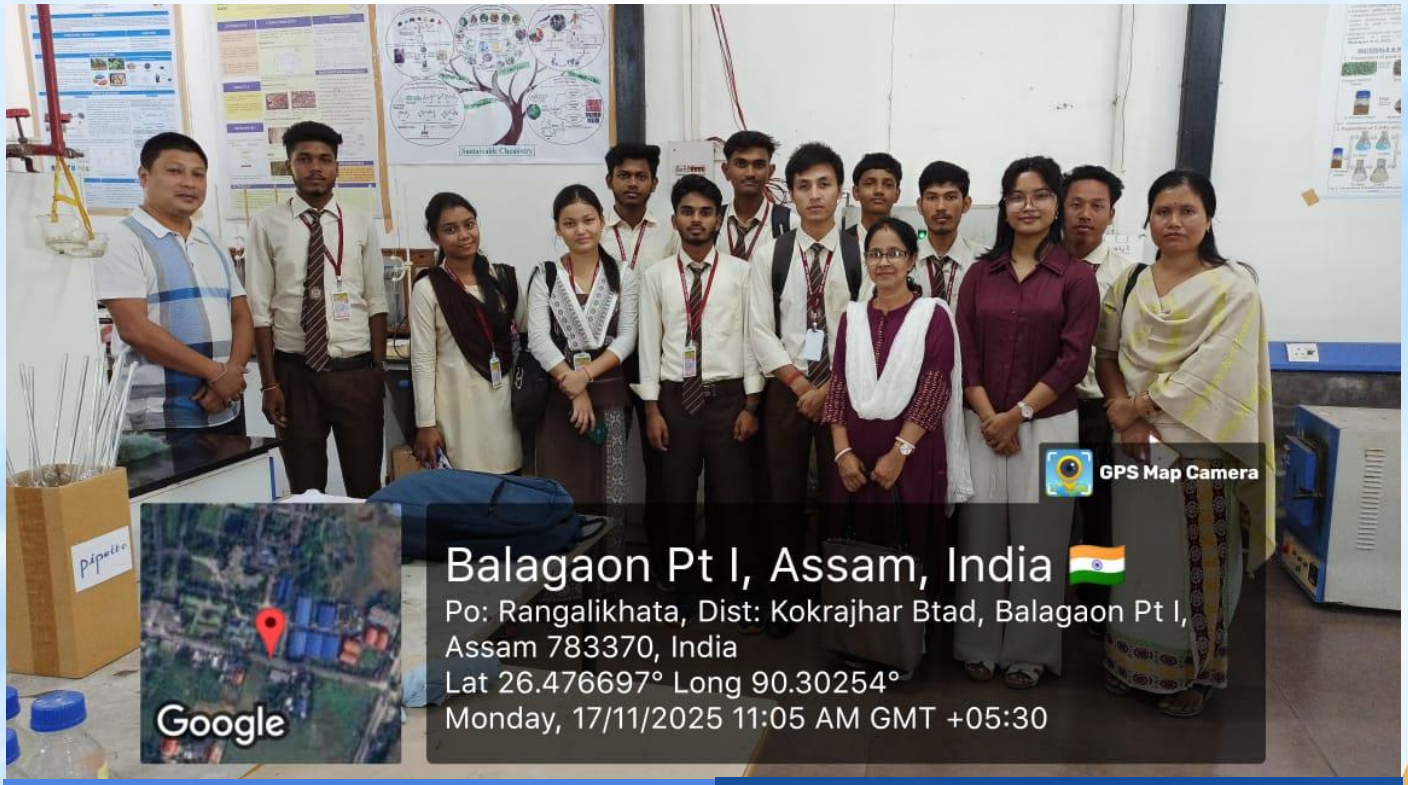
Dept. of Physics, Bijni College, 08 November, 2025: The Department of Physics, in association with the C. V. Raman Physics Forum**,** organized a Seminar and the inauguration of the Wall Magazine "THE IMAGE" and Departmental Annual Magazine **"QUANTA"**on 8 November 2025. The program was inaugurated by the respected Principal, Dr. Birhash Giri Basumatary, with an inspiring address emphasizing the importance of creativity, knowledge sharing, and academic activities. The seminar featured an engaging presentation followed by an interactive session, where students actively participated and exchanged ideas. The inauguration of the magazines provided a platform for students to showcase their scientific creativity, writing, and innovative ideas. The program concluded with an encouraging speech by the Head of the Department**.**





EDUCATIONAL VISIT TO CIT KOKRAJHAR

Dept. of Physics, Bijni College, 17 November, 2025: The Department of Physics, in association with the C. V. Raman Physics Forum, organized an educational visit to the Central Institute of Technology (CIT), Kokrajhar, on 17 November 2025 as part of the 5th Semester Major Course syllabus. CIT Kokrajhar is a centrally funded technical institute under the Government of India, offering programmes such as B.Tech., B.Des., M.Tech., M.Des., and Ph.D. During the visit, students explored various well-equipped laboratories and the Central Library. The programme provided valuable exposure to modern scientific facilities, experimental techniques, research activities, and higher-education opportunities, thereby enriching their academic knowledge and scientific outlook.







FACULTY EXCHANGE PROGRAM

Dept. of Physics, Bijni College, 11 December, 2025: The Department of Physics, Basugaon College, in collaboration with the Department of Physics, Bijni College, organized a Faculty Exchange Program to promote academic interaction and knowledge sharing. As part of the program, Mr. Mahanta Chouhan, Assistant Professor, Department of Physics, Basugaon College, delivered an insightful session on important research developments in magnetism, highlighting its significance and contemporary applications in physics. He also interacted with students and discussed various aspects of research and higher studies in the field. The program provided students with valuable exposure to a contemporary area of physics and encouraged academic collaboration, scientific curiosity, and research-oriented learning.



CULTURAL RALLY ON "CULTURAL HERITAGE OF BTR"

Dept. of Physics, Bijni College, 04 February, 2026: As part of the **56th College Week**, the Department of Physics, in association with the C. V. Raman Physics Forum**, organized a** Cultural Rally on "Cultural Heritage in BTR" on 4 February 2026. Students and faculty members from different departments of the college enthusiastically participated in the rally, showcasing the rich cultural traditions, heritage, and diversity of the Bodoland Territorial Region (BTR). The program was inaugurated by the respected Principal, Dr. Birhashgiri Basumatary**,** with an inspiring speech emphasizing the importance of preserving and celebrating cultural heritage. The rally fostered unity, cultural awareness, and a strong sense of pride among the participants.



Observation of National Science Day, 2026

Dept. of Physics, Bijni College, 28 February, 2026: The Department of Physics, Bijni College, observed National Science Day on 28 February 2026 with the theme **"Women in Science: Catalysing Viksit Bharat."** To create awareness among young learners about the importance of science and scientific thinking, the department organized an outreach program at 542 No. Nadhyapara Natunpara L.P. School**.** The programme was inaugurated with an inspiring speech by S. J. Hussain**,** faculty member of the department. Dr. Anindita Chakravarty highlighted the significance of National Science Day and the contributions of women to science. Students presented various activities, making the program engaging and informative. The Headmaster delivered the concluding remarks.



MENTOR-MENTEE PROGRAM

Dept. of Physics, Bijni College, 02 April, 2026: The Department of Physics organized a **Mentor–Mentee Program** to provide students with academic guidance, personal support, and career-oriented counselling. A mentor is more than an advisor; a mentor helps students recognize their strengths, develop essential skills, set realistic goals, and understand how their educational choices can shape their future careers. Under the guidance of departmental faculty members S. Ray, S. J. Hussain, and J. Narzary, interactive sittings were conducted with students. Various academic, personal, and career-related concerns were discussed, and possible solutions were explored. Students were encouraged to approach their mentors freely whenever they faced difficulties. The program concluded with an inspirational address by the HOD.





INTERNSHIP CERTIFICATE DISTRIBUTION PROGRAM

Dept. of Physics, Bijni College, 08 May, 2026: Internship is a part of FYUGP in 4th.semester with 2 credits. Students have to join in this program. This year (2026) Students from department of Physics participated in this program in PHED, Bijni and completed 30 hours. They worked under JJM project and did water analysis for different parts of Bijni Town area. At the end they prepared a Report, Power point for presentation and explained their project work in presence of Departmental Faculty and the officials PHED.



CERTIFICATE DISTRIBUTION OF ADD –ON PROGRAM ON "BASIC PHYSICS"

Dept. of Physics, Bijni College, 26 May, 2026: As an integral component of the FYUGP, the Department of Physics, Bijni College, organized a 30-hour Add-on Programme titled "Basic Physics" from 25 April to 26 May 2026. The programme was designed to provide students with an opportunity to explore interesting topics beyond the prescribed syllabus. The sessions covered diverse areas such as Importance of Mathematics in Physics, Relativity, Astrophysics, Dark Matter and Dark Energy, Electronics, and other related topics. The programme generated considerable interest among students, as the topics introduced them to broader concepts beyond their regular coursework. The classes were conducted interactively, encouraging students to ask questions, discuss concepts and satisfy their curiosity about various areas of physics. The programme also helped develop scientific curiosity and broaden the students' understanding of the subject. It concluded on 26 May 2026 with a certificate distribution ceremony for the participating students.





FACULTY EXCHANGE PROGRAM

Dept. of Physics, Bijni College, 20 May, 2026 : Faculty exchange program was arranged by the department of Physics, Basugoan College in collaboration with Department of Physics, Bijni College on 20.05.2026. The program was inaugurated with a speech from HOD, Physics of the host college. Mrs. Jayshri Narzary, Assistant Professor from department of Physics, Bijni College gave a speech on condensed matter physics and interacted with the students of Basugoan College. The topic was current and very interesting and also fruitful to students. The program was concluded with a short speech from faculty of the department.



PRIZES & ACHIEVEMENTS



FIRST PRIZE, INTER-DEPARTMENTAL CRICKET COMPETITION, 56TH COLLEGE WEEK



2ND PRIZE, QUIZE COMPETITION, 56TH COLLEGE WEEK
NAME (L to R): SUJAY DAS, BISHAL SUTRADHAR & HASEN ALI



KRIPANANDA RAY
FIRST PRIZE, MARATHAN COMPETITION, 56TH COLLEGE WEEK



KRIPANANDA RAY
3RD PRIZE, WEIGHTLIFTING COMPETITION, 56TH COLLEGE WEEK



KRIPANANDA RAY
1ST PRIZE, BOOK COVER DESIGN COMPETITION, 56TH COLLEGE WEEK



SWRJI MUCHAHARY
Miss Bijni College
Indigenous cultural Symposium

STUDENT'S CORNER

1

PHYSICS: UNDERSTANDING THE UNIVERSE AROUND US

-Rupam Marak, Student, 4TH Semester (Physics), Bijni College

Physics is often described as the science of matter, energy, space and time, but its significance extends far beyond these fundamental concepts. It is a way of understanding how nature works—from the motion of a falling object to the behaviour of atoms, stars and galaxies. The principles of physics form the foundation of many modern technologies, including smartphones, medical imaging, satellites, renewable energy systems and semiconductor devices.

One of the fascinating aspects of physics is its ability to connect phenomena at vastly different scales. Quantum mechanics helps us understand the microscopic world of atoms and particles, while relativity provides a framework for understanding space, time and gravity. Modern physics continues to explore profound questions concerning dark matter, dark energy, black holes and the origin of the universe. Beyond equations and theories, physics develops logical reasoning, problem-solving and scientific thinking. In an age driven by technological advancement, learning physics not only helps us understand the natural world but also inspires us to imagine and create the technologies of tomorrow.

2

PHYSICS IN EVERYDAY LIFE

-Nazma Sultana, Student, 4TH Semester (Physics), Bijni College

Physics is present in almost every aspect of our daily lives, although we may not always notice it. When we ride a bicycle, use a mobile phone, cook food, listen to music or switch on a light, we are experiencing applications of physics. The laws of mechanics explain motion and balance, thermodynamics explains the transfer of heat, and electromagnetism forms the basis of electricity and communication technologies. Modern devices rely heavily on physics. Smartphones use semiconductor physics, cameras depend on optics, and wireless communication involves electromagnetic waves. Medical technologies such as X-rays, MRI and ultrasound also demonstrate how fundamental physical principles can be transformed into tools that improve human health. Understanding physics therefore helps us appreciate the technology surrounding us. More importantly, it develops scientific thinking—the ability to observe, question, analyse and find logical explanations. Physics encourages us to move beyond simply asking **"what happens?"** and motivates us to ask **"why does it happen?"** Thus, physics is not confined to laboratories or classrooms; it is an integral part of everyday life and the technology that shapes our modern world.

3

FROM ATOMS TO THE UNIVERSE

-Sujay Das, Student, 6TH Semester (Physics), Bijni College

One of the most remarkable features of physics is its ability to describe nature across an enormous range of scales. At the microscopic level, quantum physics explains the behaviour of atoms, electrons and fundamental particles. At the other extreme, astrophysics and cosmology investigate stars, galaxies, black holes and the evolution of the universe. Between these extremes lies an equally fascinating world of materials and phenomena. The collective behaviour of atoms and electrons gives rise to properties such as electrical conductivity, magnetism, superconductivity and optical response. These properties form the foundation of modern materials science and numerous technological applications. Many mysteries, however, remain unsolved. Scientists continue to investigate the nature of dark matter and dark energy, the interiors of black holes, the origin of the universe and the possibility of new particles and interactions. Physics therefore represents an ongoing journey of discovery. Every new observation raises new questions, and every answer often leads to another mystery. This continuous search for knowledge makes physics not only a fundamental science but also one of the most exciting fields of human intellectual exploration.

4

PHYSICS: THE LANGUAGE OF NATURE

-Kripananda Ray, Student, 4th Semester (Physics), Bijni College

Physics is one of the fundamental sciences that helps us understand the rules governing the natural world. From the motion of planets and the formation of stars to the behaviour of electrons and atoms, physics provides a framework for explaining phenomena that we observe every day. It connects the smallest particles with the largest structures in the universe. The development of physics has transformed human civilization. Electricity, telecommunications, computers, lasers, medical imaging, nuclear technology and space exploration are all rooted in physical principles. Today, emerging fields such as quantum computing, nanotechnology, photonics and materials science are opening new possibilities for technological advancement. Physics is not merely a collection of equations and theories. It teaches us to observe carefully, question assumptions, analyse evidence and solve problems logically. It encourages curiosity and develops the ability to look at familiar phenomena from a new perspective. In this sense, physics is both a science of nature and a powerful way of thinking. As our understanding of the universe continues to grow, physics remains at the forefront of scientific discovery, inspiring us to ask one of the most fundamental questions: **How does nature work?**

THEORETICAL PHYSICS • STUDENT PERSPECTIVE

Vector Info-Dynamics: Is Information the Hidden Reality of the universe?

-Hasen Ali, Student, 2nd Semester (Physics), Bijni College

Look around you. Everything we see—stars, light, atoms, and gravity—is governed by energy, matter, and fundamental forces. But what if we're only looking at the surface? What if something even deeper is orchestrating the entire cosmos?

Enter Vector Info-Dynamics (VID). It's an ambitious theoretical framework built on a fascinating question: Is information itself a fundamental building block of physical reality?

> *"VID suggests two distinct sides of the cosmic coin: Active Information, which drives observable matter and fields, and Static Information, a candidate for explaining the hidden mystery of Dark Matter."*

Rethinking Matter and Space-Time

- **Active Information:** Powers the observable universe. It governs dynamic interactions across matter, radiation, and physical fields.
- **Static Information:** Operates quietly in the background. VID proposes this non-radiating state as a fresh angle toward solving the riddle of dark matter.

By weaving together ideas from quantum information theory, classical thermodynamics, and black hole physics, VID explores whether the movement of information is what actually generates gravity and shapes space time.

The Next Horizon

Vector Info-Dynamics is currently an evolving hypothesis—an exciting spark of intuition waiting for mathematical machinery. The next crucial milestone is translating these core concepts into formal equations and testable predictions to see if nature agrees.

The Physics of a Solar Eclipse

-*Abhijit Barman, Assistant Professor, Dept. of Physics*

A solar eclipse is an astronomical event that occurs when the Moon passes between the Sun and the Earth. As the Moon blocks sunlight, it casts a shadow on the Earth. People standing in different parts of this shadow may see a total or partial solar eclipse. The moon is blocking the sun's light from reaching Earth, but there is more to the situation than just that. Their relative distance to Earth is one of the most important factors. The sun is about 400 times further from Earth than the moon and has a diameter about 400 times larger than the moon. As a result, both the sun and moon appear to be the same size in the sky, allowing the moon to perfectly block out the sun and cast a shadow on Earth during a total eclipse. During this event, the sky becomes darker and the Sun's outer atmosphere, called the corona, can be seen. A partial solar eclipse occurs when only a part of the Sun is covered by the Moon. Sometimes, the Moon appears slightly smaller than the Sun, leaving a bright ring around it; this is called an annular eclipse. A partial eclipse is the most difficult to explain, since it has the most variability. All but a sliver of the sun may be blocked, or the moon can barely cover any of the sun. In general, though, a partial solar eclipse happens when the moon is not quite directly between the observer and sun, but is still in the way of some sunlight.

Together as a Department

