FIRST EDITION 2023-2024

THE PHYSICA FILES

PHYSICS ANNUAL MAGAZINE

SCHOOL OF STUDIES IN PHYSICS AND ASTROPHYSICS

PT. RAVISHANKAR SHUKLA UNIVERSITY, RAIPUR (C. G.)

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EDITOR'S MASSAGE

It is with great pleasure that we present this edition of our departmental magazine, a testament to the dedication, curiosity, and intellectual rigor of our academic community. This magazine serves as a platform to showcase the latest advancements, innovative research, and insightful perspectives contributed by our faculty, students, and researchers.

As we navigate an era of rapid scientific and technological progress, our department continues to foster a culture of inquiry and excellence. Through this publication, we aim to inspire discussions, celebrate achievements, and provide a glimpse into the diverse and dynamic work being carried out within our discipline.

I extend my sincere gratitude to all the contributors and the editorial team for their efforts in making this issue a reality.

Prof. Nameeta Brahme
Editor-In Chief
SoS in Physics and Astrophysics

Student Corner

Articles about Scientist

Werner Heisenberg: The Journey Behind the Uncertainty Principle

Werner Heisenberg, a pivotal figure in 20th-century physics, was born on December 5,1901, in Würzburg, Germany, and passed away on February 1, 1976, in Munich. His contributions to quantum mechanics, particularly the uncertainty principle, earned him the Nobel Prize in Physics in 1932, announced in 1933.

Heisenberg's academic journey began at the Ludwig Maximilian University of Munich, where he studied physics and mathematics under Arnold Sommerfeld and Wilhelm Wien from 1920 to 1923. He also attended Georg-August University of Göttingen, working with Max Born, James Franck, and mathematician David Hilbert. His 1923 doctorate from Munich, titled "On stability and turbulence of liquid flows"focused on fluid dynamics. In 1924, he completed his habilitation at Göttingen under Born, researching the anomalous Zeeman effect.

Heisenberg intended to study pure mathematics at the University of Munich. In 1920, at age 18, he approached mathematician Ferdinand von Lindemann to discuss his plans, but Lindemann dismissed him, suggesting he lacked the originality for mathematics. This encounter redirected him to physics, where he enrolled under Arnold Sommerfeld, a prominent physicist known for his work on atomic theory. Sommerfeld recognized Heisenberg's talent immediately, allowing him to attend advanced seminars despite his novice status.His interest in physics was influenced by philosophical readings, such as Plato's Timaeus, during hikes in the Bavarian Alps, and discussions with peers on atomic understanding. A significant event was attending the Bohr Festival in June 1922 in Göttingen, where he met Niels Bohr, whose lectures on atomic physics, deeply impacted his career trajectory.

Post-education, Heisenberg collaborated with Born and Bohr, marking his entry into quantum mechanics. In 1925, he published the "Quantum Theoretical Reinterpretation of Kinematic and Mechanical Relations" paper, a major reinterpretation of old quantum theory. That year, with Born and Pascual Jordan, he developed matrix mechanics, published in a series of papers, elaborating quantum mechanics through matrices, as seen at Matrix Mechanics. This work laid the foundation for his Nobel recognition.

In 1927, while at Bohr's institute in Copenhagen, Heisenberg formulated the uncertainty principle, a cornerstone of quantum mechanics.The story,unfolded during Bohr's skiing holiday, when Heisenberg realized that observing a particle, like an electron, alters its state. Measuring position accurately required a short-wavelength, high-energy beam, disturbing momentum, while measuring momentum needed a longer wavelength, affecting position accuracy.

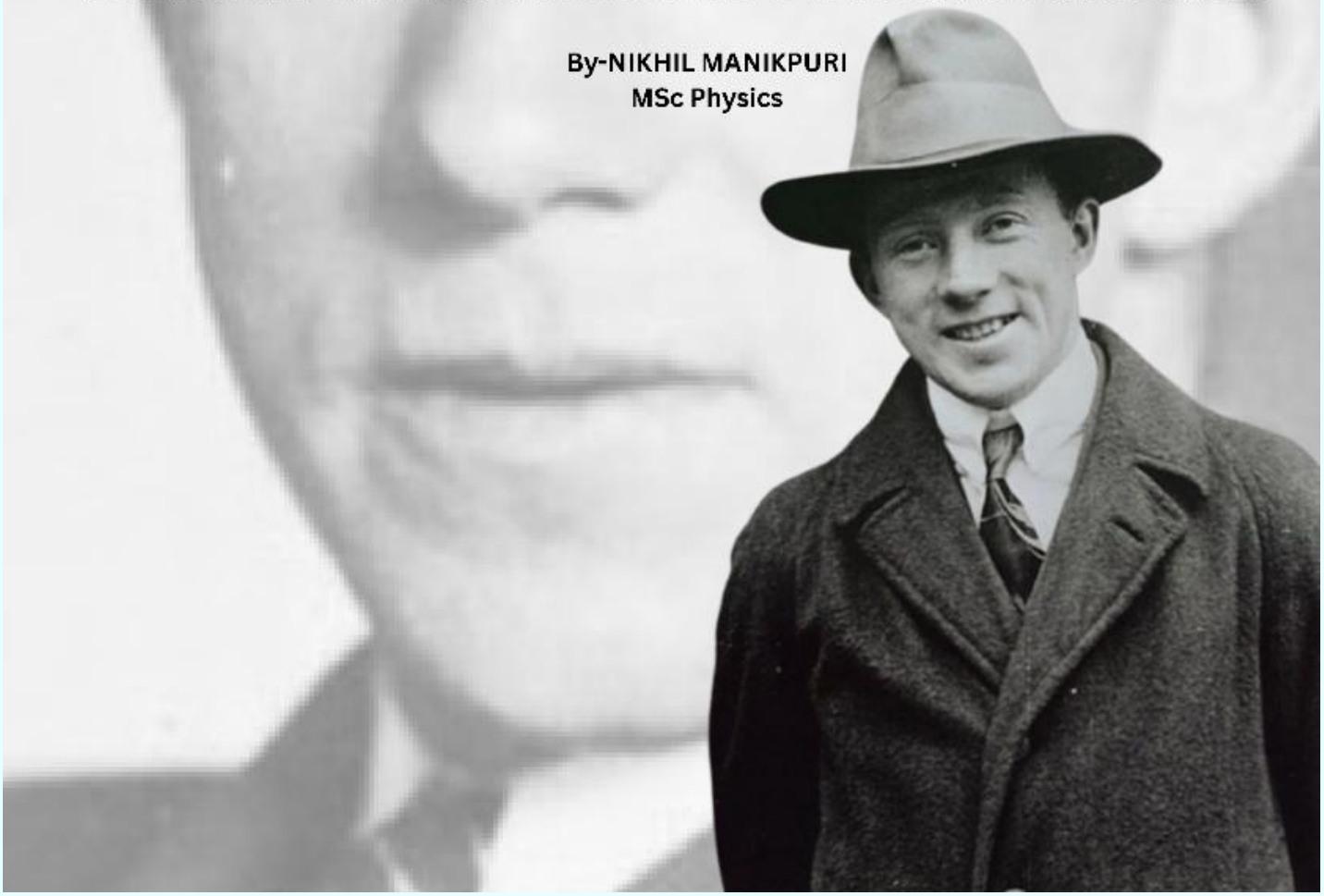
. This challenged classical physics' precision, leading to the principle that position and momentum cannot be simultaneously known precisely.

He first described this in a February 1927 letter to Wolfgang Pauli, using “imprecision”, later published. This principle, central to the Copenhagen interpretation, was recognized in his 1932 Nobel Prize, announced in 1933, for "The Creation of Quantum Mechanics". Heisenberg's quote, "The uncertainty principle refers to the degree of indeterminateness in the possible present knowledge of the simultaneous values of various quantities with which the quantum theory deals; it does not restrict, for example, the exactness of a position measurement alone or a velocity measurement alone,"encapsulates its essence.

Heisenberg's contributions extended beyond quantum mechanics. In 1932, he proposed the neutron-proton model of the nucleus, submitting three papers. In 1934 and 1936, he published on positron theory, with papers like "Remarks on Dirac’s Theory of the Positron," physical interpretation of Dirac Equation. From 1936 to 1938, he worked on cosmic-ray showers, presenting theories in two papers, followed by four more. During World War II, his role in Germany's nuclear program, remains controversial, with debates over whether he hindered or aided weapon development. Post-war, he researched turbulence, publishing papers in 1948 and 1950, and continued cosmic-ray studies, with papers from 1949 to 1955. His 1955-1956 Gifford Lectures, published as "Physics and Philosophy: The Revolution in Modern Science," reflected on physics' philosophical implications.

Werner Heisenberg’s brilliance reshaped physics with the uncertainty principle, reflecting his quest to understand nature. From Munich to wartime challenges, he died in 1976, leaving a legacy that inspires researchers to explore quantum frontiers ahead.

By-NIKHIL MANIKPURI
MSc Physics



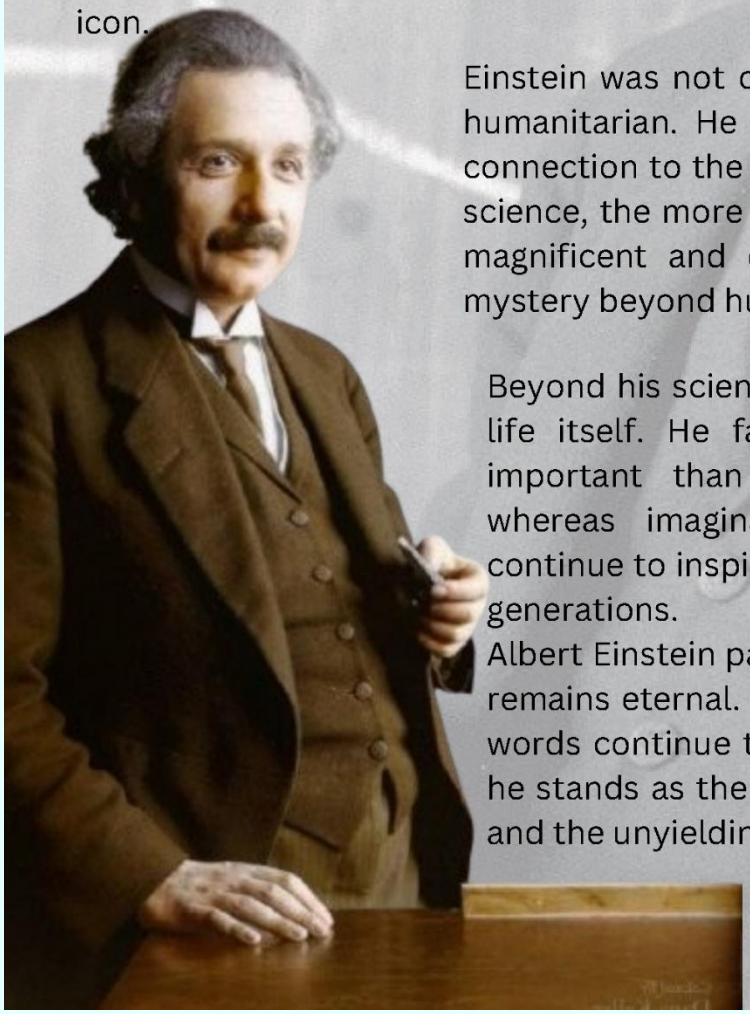
Albert Einstein: The Genius Who Transformed Physics

Albert Einstein, one of the most influential scientists in history, was born on March 14, 1879, in Ulm, Germany. His groundbreaking work in theoretical physics revolutionized our understanding of the universe. He is best known for developing the theory of relativity, particularly the famous equation E = mc^2, which describes the relationship between energy and mass.

Einstein once said, “The important thing is not to stop questioning. Curiosity has its own reason for existing.” This mindset defined his entire life. As a child, he was fascinated by the mysteries of nature, often questioning the world around him. Despite facing difficulties in the rigid educational system, he excelled in mathematics and physics, proving that true genius is driven by passion rather than convention.

In 1905, often referred to as his “miracle year,” Einstein published four groundbreaking papers that laid the foundation for modern physics. These papers included his work on the photoelectric effect, which later earned him the Nobel Prize in Physics in 1921, as well as his revolutionary theories on special relativity and the equivalence of mass and energy.

His most famous contribution, the general theory of relativity, proposed in 1915, reshaped our understanding of gravity. This theory predicted that massive objects like the sun could bend light, a phenomenon confirmed during a solar eclipse in 1919. This discovery catapulted Einstein to international fame, making him a global scientific icon.



Einstein was not only a scientist but also a philosopher and humanitarian. He believed in the power of science and its connection to the divine, famously stating, “The more I study science, the more I believe in God.” He saw the universe as a magnificent and ordered creation, filled with beauty and mystery beyond human comprehension.

Beyond his scientific genius, Einstein’s wisdom extended to life itself. He famously remarked, “Imagination is more important than knowledge. For knowledge is limited, whereas imagination encircles the world.” His words continue to inspire scientists, thinkers, and dreamers across generations.

Albert Einstein passed away on April 18, 1955, but his legacy remains eternal. His discoveries changed the world, and his words continue to ignite curiosity and wonder. To this day, he stands as the ultimate symbol of intelligence, creativity, and the unyielding pursuit of truth.

By-DAMINI SAHU
MSc- Physics

“The Untold Brilliance of Satyendra Nath Bose”

In the bustling intellectual streets of early 20th-century Kolkata, a young mind was stirring — one that would go on to revolutionize physics. His name? Satyendra Nath Bose — a name that might not ring as loudly as Einstein’s, but whose legacy echoes through every particle collider, quantum lab, and physics textbook across the world.

Bose didn’t just follow science. He *reshaped* it.

In 1924, while teaching a postgraduate class, Bose noticed something odd about how particles like photons behaved. He challenged the century’s most accepted wisdom and derived Planck’s law — not by using classical assumptions, but by treating photons as indistinguishable. Bold? Yes. Revolutionary? Absolutely. His findings were so ahead of their time that journals refused to publish them.

So what did Bose do?

He wrote directly to Albert Einstein, stating with humble confidence, “Respected Sir, I have ventured to send you the attached paper…” Einstein, impressed by Bose’s clarity and originality, translated it into German himself — and got it published.

And just like that, Bose-Einstein statistics were born.

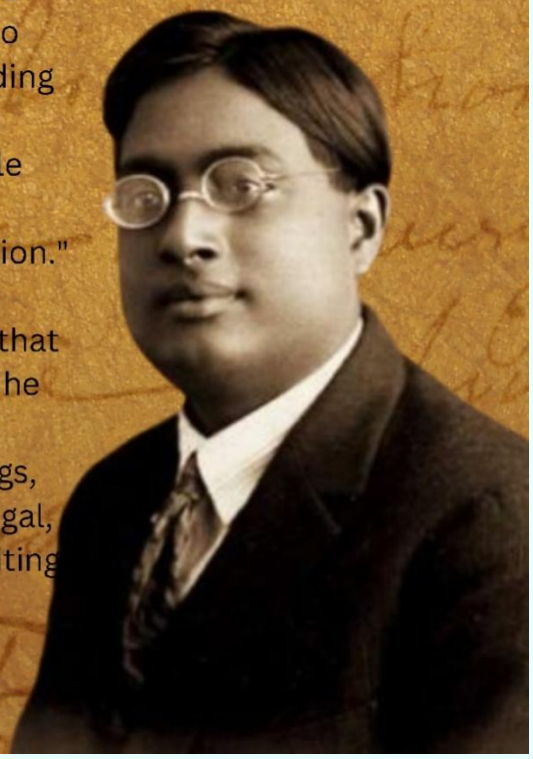
These ideas later led to the theoretical foundation of the Bose-Einstein Condensate — a new state of matter, realized 70 years later in the lab. Today, particles that obey Bose’s statistics are called bosons — named after him. Imagine: a single paper, and the man’s name is now woven into the very fabric of the universe.

But who was Bose outside the equations?

He was a self-taught polyglot, passionate about music, philosophy, and even literature. A teacher who inspired thousands not by force, but by wonder. A scientist who rejected offers from abroad because he believed in building India’s scientific future.

Here’s what Bose once said — a reflection of his humble brilliance:

"I have done my work. The rest is up to the young generation."



While many chase fame, Bose chased truth. He believed that ideas mattered more than recognition. And in doing so, he carved a legacy deeper than any award.

So next time you hear of a boson — whether it’s the Higgs, photon, or gluon — remember the quiet genius from Bengal, who once dared to write to Einstein… and ended up rewriting the universe.

By-ISHA PANDYA
MSc Physics

"Curious Like a Child, Brilliant Like a Legend: The Story of Richard Feynman"

Richard Feynman: The Magician Who Played with Atoms

Imagine a scientist who could crack safes, play bongos in the middle of physics conferences, sketch like an artist, and still have enough brainpower left to unlock the secrets of the universe. That's Richard Feynman for you — a man who made science not just brilliant, but thrilling.

Born in 1918 in New York, Feynman was no ordinary child. He once wired his home with a homemade burglar alarm... at age 11. He loved to fix radios just by "thinking," a talent that earned him early fame. But what truly made him unforgettable was how he thought differently. Where others saw equations, Feynman saw puzzles and games.

He wasn't just a Nobel Prize-winning physicist — he was a storyteller, a rebel, a joker. In the Manhattan Project, while helping build the atomic bomb at Los Alamos, he amused himself by picking locks and cracking safes just to prove it could be done. Even in the heart of deadly serious work, he stayed playful.

But perhaps his most mind-blowing contribution was a vision — a challenge that launched an entire field. In 1959, Feynman gave a legendary talk titled "There's Plenty of Room at the Bottom." In it, he asked: what if we could write the entire Encyclopedia Britannica on the head of a pin? What if we could manipulate atoms, one by one? At that time, the idea sounded like sci-fi — but Feynman's talk laid the foundation of nanotechnology. Today's nanoscience labs, quantum dots, and molecular machines owe their spark to that bold imagination.

He also revolutionized how we understand the behavior of particles with something called Feynman diagrams — simple doodles that untangled the madness of quantum electrodynamics. It won him the Nobel Prize in 1965. But he never let the prize inflate his ego. In fact, he once said, "I've won the prize. But the real pleasure is in finding things out."

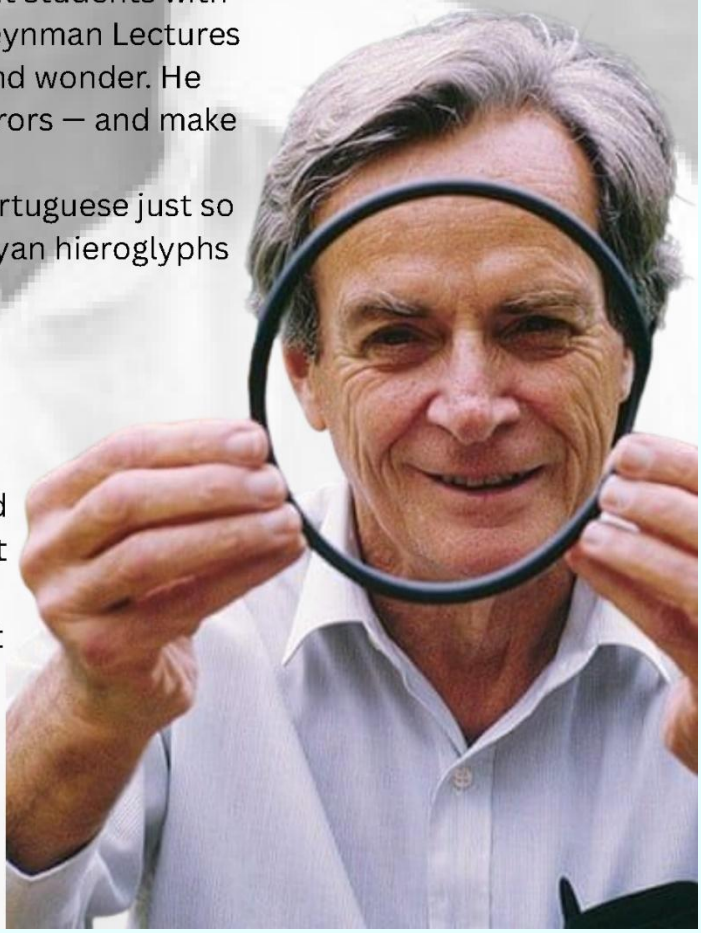
And boy, did he love finding things out. He taught students with the same fire he used to explore the world. His Feynman Lectures on Physics remain unmatched in clarity, wit, and wonder. He could explain antimatter using ice cubes and mirrors — and make you laugh while learning it.

His curiosity was infectious. Once, he learned Portuguese just so he could give a lecture in Brazil. He explored Mayan hieroglyphs and studied biology.

"I think it's much more interesting to live not knowing than to have answers which might be wrong," he said. That was Feynman — fearless in the face of mystery.

Richard Feynman died in 1988, but he left behind a legacy far beyond physics equations. He taught us to question, to explore, to never be afraid of not knowing. "The first principle is that you must not fool yourself — and you are the easiest person to fool," he said.

He was a scientist, yes. But more than that, he was a spark — the kind that ignites curiosity in every mind it touches.



By- JHARNA NETAM
MSc- Physics

Student Thoughts

सर जो तेरा चकराए या दिल डूबा जाए
आजा प्यारे पास हमारे काहे घबराए काहे घबराए
Physics है सबसे मुश्किल, समझ ना हमको उसकी
जिसको अच्छे से समझा दो, चमके Physics उसकी
सुन सुन सुन अरे बेटा सुन इस Physics के बड़े-बड़े गुण
हर Doubt का आप सभी के पास है उपाय
काहे घबराए, हम काहे घबराए

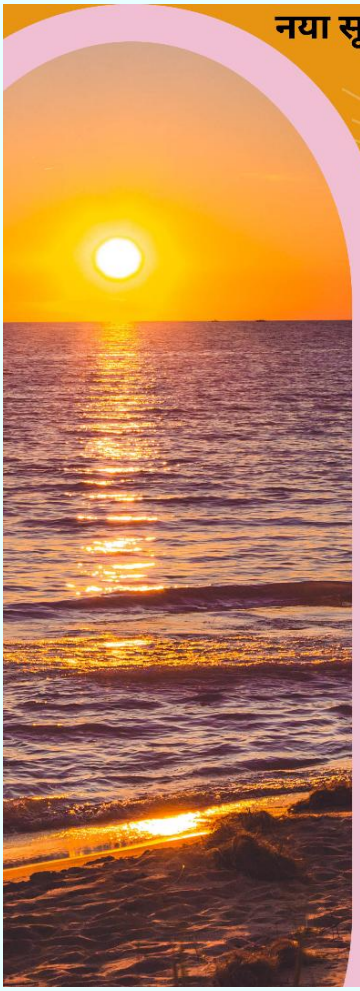
सर जो तेरा चकराए या दिल डूबा जाए
आजा प्यारे पास हमारे काहे घबराए काहे घबराए

Electronics का लफड़ा या Dynamics हो तगड़ा
सब लफड़ों का बोझ हटे, जब Solution हो तगड़ा
सुन सुन सुन अरे बेटा सुन इस Physics के हर जगह Use
हर Doubt का आप सभी के पास है उपाय
काहे घबराए, हम काहे घबराए

सर जो तेरा चकराए या दिल डूबा जाए
आज प्यारे पास हमारे काहे घबराए काहे घबराए

By-Jyoti Sahu

नया सूरज



हे नव वर्ष के सूरज
अबकी आना परिवर्तन लेकर।

ऊर्जादाता
मैं भी कर पाऊं तुम्हारे जैसा
नित नियम का पालन
मुझे सिखाना।

प्रकाशदाता
मैं भी कर पाऊं तुम्हारे जैसा
निरंतर संघर्ष
मुझे सीखाना।

हे आदित्य
मेरे अंतरमन में भी हो
न्यूक्लियर फ्यूजन,
जिससे गढ़ सकूं मैं नए विचार
मुझे वह ताप देना।

हे भानु
मुझे फिर देना नवोदय
ज्ञान के प्रकाश का,
मेरे आत्मविश्वास का।

हे रवि
अपनी गामा एक्स यू वी किरणों से
मिटा देना सदा के लिए
अंधविश्वास ,अनैतिकता
और अवैज्ञानिकता को।

हे दिनकर
मुझे ढलना सीखना
नए परिस्थितियो में,
मुझे उगना सिखाना
हर अंधियारे के बाद

हे प्रभाकर
अबकी आना परिवर्तन लेकर।

~नीरज कुमार लहरे
MSc Physics

चौदह मार्च

तीन दशमलव एक चार,
चौदह मार्च लाया इश्तहार
पाई दिवस मनाए बार बार।

ई और एम सी स्क्वेयर
की होती बराबरी,
सापेक्षता का सिद्धांत क्रांतिकारी,
बताने वाले ने जन्म लिया इस दिन
महान वैज्ञानिक आइंस्टीन।

अलविदा कह गए
वैज्ञानिक हॉकिंग यह बतलाकर,
क्वांटम मैकेनिक्स और
सापेक्षता को मिलाकर ,
काले नहीं होते है ब्लैक होल,
ब्रह्मांड के नए दरवाजे खोल।

मिटाने चंद्रग्रहण के अंधविश्वासों को,
मजबूत करने विज्ञान के प्रयासों को,
आज आई है पृथ्वी,
भास्कर और चंद्रमा के बीच
सूर्य के प्रकाश, धरा की छाया से
दिखने लगा लाल मयंक।

चंद्र ग्रहण कहते जिसे
यह तो सुंदर होली है,
दिनकर और वसुंधरा ने
मामा को रंगी रंगोली है।
होली है होली है।

(14 march 2025 पर अल्बर्ट आइंस्टीन ,स्टीफेन हॉकिंग वैज्ञानिकों को याद करते हुए होली और चंद्रग्रहण पर कविता)

By- NEERAJ KUMAR LAHARE
MSc Physics

सीखिए

देना सीखिए, छोड़ना सीखिए,
कोई नुकसान भी कर दे, सहना सीखिए।

रोना सीखिए, हँसना सीखिए,
कोई छोटी बातों पर ग़ुस्सा भी कर दे, माफ़ करना सीखिए।

चुप रहना सीखिए, बोलना सीखिए,
कोई कड़वा भी बोल दे, मुस्कुराना सीखिए।

पढ़ना-लिखना सीखिए, खेलना-कूदना सीखिए,
कुछ समय निकालकर पढ़ाना सीखिए।

अड़ना सीखिए,झुकना सीखिए,
सच के लिए खड़े रहना सीखिए।

करुणा सीखिए, प्रेम करना सीखिए,
कोई जानवर लात मार भी दे तो
Physics का third law of motion लगाये बिना,
गले लगाकर प्रेम देना सीखिए।

चलना सीखिए, रुकना सीखिए,
यदि कोई बाँधना चाहे तो
दौड़ना- भागना सीखिए।

सीख लेना सीखिए, सीख देना सीखिए,
सीख सीख के
सिखाना सीखिए।

By-LAXMI SAHU
MSc Physics

PHYSICS

Physics is not just about classical and quantum,
here Einstein, Newton and Feynman have their own fandom.

Physics love discovering the mysteries of universe,
that’s the reason its syllabus is so diverse.

Physics is easy ,till its about F=ma,
But when we grow up, it makes the pendulum of our brain sway.

Being a student of Physics I embrace the beauty of the unknown,
which lead to the seed of curiosity in me to be sown.

Though physics is vast, my poem is a humble invitation,
to explore the wonders of this cosmic creation.

ISHA PANDYA
Msc Physics

Events

Glimpse of events in this year

Chandrayan-3 for students on 23rd August 2023 live telecasting

रोमांचित हुए स्टूडेंट्स, लगाए इसरो तुझे सलाम के नारे

चांद पर ह

रविवि में जश्न

सिटी रिपोर्टर. रायपुर

चांद की धरती पर चंद्रयान-3 जैसे ही टचडाउन हुआ, भारत माता की जय, इसरो तुझे सलाम के नारे रविवि के एस्ट्रो फिजिक्स डिपार्टमेंट में गूंजने लगे। यहां न केवल एस्ट्रो फिजिक्स के स्टूडेंट्स मौजूद रहे, बल्कि उनके परिवार सदस्य और दोस्त भी लाइव प्रसारण देखने पहुंचे। यहां स्टूडेंट्स को लैंडिंग का लाइव प्रसारण दिखाया गया। खगोल भौतिकी की पीएचडी स्कॉलर किरण ने कहा कि ये सफलता सदियों तक याद रखा जाएगा। पहले इसरो स्टूडेंट्स को रिक्रूटमेंट के लिए बुलाता था, लेकिन आज हर कोई इसरो जाना चाहता है। एमएससी फर्स्ट ईयर की स्टूडेंट्स इला धुरंधर ने कहा कि चांद पर इसरो का यह कदम दुनिया के लिए ऐतिहासिक है। इस दौरान फिजिक्स एंड एस्ट्रो फिजिक्स के टीचर्स के साथ स्टूडेंट्स और रिसर्च स्कॉलर मौजूद रहे। इसके अलावा शहर के सभी सरकारी और प्राइवेट स्कूलों में भी चंद्रयान-3 की लैंडिंग का प्रसारण बच्चों को दिखाया गया।

One Day Workshop on "**Multidisciplinary Research and Challenges**" on 4th December 2023.Prof. S. J. Dhoble, Professor, RTM Nagpur University, Nagpur delivered a talk on the title of "**Multidisciplinary Research and Challenges**" and Dr. **N. Ugemuge, Anand Niketan College, Warora delivered their lecture on the title of "Intellectual Property Right (IPR)".**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Seminars


ONE DAY SEMINAR ON
"Quantum Computing"
Plenary Talk on
"Basics of Quantum Computations"
By
Prof. Y. M. Gupta
Director (Academic), Rungta Group of Institutions, Bhilai (R1)
Venue: Seminar Hall Physics
Date: 6th March 2024
Time: 1:00 PM
Coordinators
Dr. Y. K. Mahipal
Mr. C. K. Belodhiya
Organized by
School of Studies in Physics & Astrophysics,
and Institutional Innovative Council
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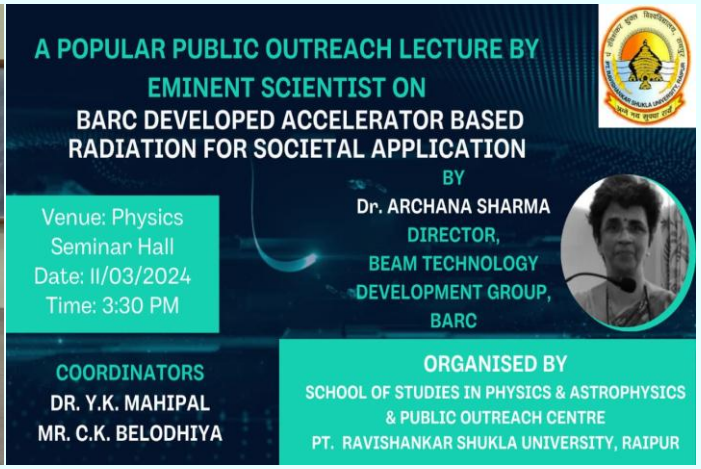
A POPULAR PUBLIC OUTREACH LECTURE BY
EMINENT SCIENTIST ON
BARC DEVELOPED ACCELERATOR BASED
RADIATION FOR SOCIETAL APPLICATION
BY
Dr. ARCHANA SHARMA
DIRECTOR,
BEAM TECHNOLOGY
DEVELOPMENT GROUP,
BARC
Venue: Physics
Seminar Hall
Date: II/03/2024
Time: 3:30 PM
COORDINATORS
DR. Y.K. MAHIPAL
MR. C.K. BELODHIYA
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Other Activities

School of Studies in Physics and Astrophysics
Pt. Ravishankar Shukla University, Raipur

"Annual Sports Meet -2024"

Tug of War

Cricket

Running

Badminton

Chess

Carrom

University Science Instrumentation Center (USIC)
School of Studies in Physics and Astrophysics
Pt. Ravishankar Shukla University, Raipur (C. G.)

Skill Development Program

Drill Machine

Milling Machine

XRD

Photoluminescence

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