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# IITBBS Express

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PICTURE CREDIT: DR. V. VINOJ

# IIT Bhubaneswar REP signs MoU with Odisha Livelihoods Mission to Transform SHGs into MSMEs

In a significant step towards fostering entrepreneurship at the grassroots level, IIT Bhubaneswar Research & Entrepreneurship Park and the Odisha Livelihoods Mission (OLM) signed a Memorandum of Understanding today, marking the launch of a structured incubation initiative aimed at transforming Self-Help Groups (SHGs) into Micro, Small and Medium Enterprises (MSMEs).


The MoU was exchanged between Prof. Shreepad Karmalkar, representing IIT Bhubaneswar, and Ms. Pravati Parida, Deputy Chief Minister, Government of Odisha on 8th June 2026. Ms. Mansi Nimbhal, IAS, Commissioner-cum-Secretary to Government, Department of Mission Shakti, Odisha; and Dr Monika Priyadarshini, IAS, Director, Mission Shakti, also graced the occasion.

Under this initiative, each incubatee will receive end-to-end support for Udyam registration, regulatory compliances, and enterprise certifications. IIT Bhubaneswar will also extend its technical expertise to file patents and facilitate product certifications for select niche products of the state, aimed at building distinctive regional recognition and market identity.

The project will be led by Dr. Nihar Ranjan Jena, Assistant Professor, and Dr. Dukhabandhu Sahoo, Associate Professor, School of Humanities, Social Sciences and Management, IIT Bhubaneswar.

The initiative is expected to create a robust entrepreneurial ecosystem in Odisha, providing SHGs with the institutional backing needed to scale their enterprises and integrate into the formal economy.

# 30th ICMS at IIT Bhubaneswar Highlights Microfossils' Role in Climate Research and Energy Security

The three-day 30th Indian Colloquium on Micropaleontology and Stratigraphy (ICMS-2026) concluded at IIT Bhubaneswar, bringing together leading Earth scientists, researchers and industry experts to deliberate on the role of micropaleontology and stratigraphy in addressing challenges related to climate change, energy security and sustainable resource management.

Organised by the School of Earth, Ocean and Climate Sciences (SEOCS), IIT Bhubaneswar, the event marked a significant milestone as IIT Bhubaneswar became the first Indian Institute of Technology to host the prestigious colloquium since its inception in 1971. The conference received 234 research abstracts and featured over 145 poster presentations, along with plenary lectures, keynote addresses and technical sessions covering biostratigraphy, palaeoclimatology, palaeoceanography, marine geology, geochronology, environmental change, energy exploration and applications of artificial intelligence in geosciences.


The inaugural ceremony was graced by Prof. Shreepad Karmalkar, Director, IIT Bhubaneswar; Prof. Avinash C. Pandey, Director, Inter-University Accelerator Centre (IUAC), New Delhi; Prof. Mahesh G. Thakkar, Director, Birbal Sahni Institute of Palaeosciences (BSIP), Lucknow; Prof. Subhasish Tripathy, Director, University Visvesvaraya College of Engineering (UVCE), Bengaluru, and former Head of SEOCS, IIT Bhubaneswar; Shri Sanjay Kumar Dash, Deputy Director General, Geological Survey of India; Prof. Anil K. Gupta, Professor, IIT Kharagpur and Co-Chairman of the ANRF-ARG Programme in Earth Sciences; and Prof. Devesh K. Sinha, President of the 30th ICMS and Professor at the University of Delhi.


Addressing the conference, Prof. Shreepad Karmalkar, Director, IIT Bhubaneswar, emphasised that micropaleontology and stratigraphy have evolved beyond academic inquiry into critical tools for hydrocarbon exploration, resource mapping and understanding global climate dynamics. He noted that microfossils provide valuable insights into ancient environments, evolutionary transitions, and major climatic events, with direct implications for energy security and environmental sustainability.

Speakers collectively underscored the importance of interdisciplinary research, advanced analytical facilities, and emerging technologies such as artificial intelligence and machine learning in advancing Earth science research. They called upon young researchers to leverage these tools and collaborations to address future challenges related to climate resilience, sustainable resource exploration and environmental stewardship.

In his Presidential Address, Devesh K. Sinha highlighted the vital role of micropaleontology in understanding Earth's history and evolution. The conference concluded with a collective commitment to fostering interdisciplinary research to address environmental challenges and promote sustainability.

Earlier, Raj K. Singh delivered the welcome address, while Sourav Sil proposed the vote of thanks. Discussions underscored the significance of microscopic fossils in reconstructing past climates, oceanic and atmospheric changes, biodiversity evolution, and hydrocarbon exploration. Experts also highlighted the integration of micropaleontology with geochemistry, sedimentology, molecular biology, isotope studies, and data-driven methods.

Technical sessions focused on climate variability, monsoon evolution, ocean circulation, sea-level changes, palaeoecology, and basin evolution, with special emphasis on the growing use of artificial intelligence and machine learning in fossil identification and geological data analysis. The valedictory session was attended by N. V. Chalapthy Rao and other dignitaries.

# IIT Bhubaneswar Researchers advance Arsenic Detection Technology for Safer Drinking Water

Researchers from the Sensors and Spectroscopy Research Group, School of Electrical and Computer Sciences (SECS), Indian Institute of Technology (IIT) Bhubaneswar, led by Dr. Sayan Dey, have made significant advances in arsenic detection technologies aimed at improving water quality monitoring and public health. The research focuses on developing affordable, sensitive, and field-deployable solutions for detecting arsenic contamination in drinking water, which remains a major concern in many parts of India and the world.

Building on their scientific research, the team has developed a compact, portable and hand-held arsenic detection device named “ArsenSafe” through Nano Semic Pvt. Ltd., a startup incubated at the Research and Entrepreneurship Park, IIT Bhubaneswar, led by Dr. Sayan Dey and Dr. Akshay K., faculty members of the Institute. Designed for rapid, cost-effective and on-site testing, ArsenSafe enables accurate arsenic detection without the need for laboratory infrastructure and chemicals, making water-quality assessment faster and more accessible. The handheld device uses an rGO-based sensing device and is designed for easy operation with minimal setup and training. Government agencies, public health departments, environmental monitoring organisations, water treatment providers, industries, NGOs and even individual consumers can deploy it. The current prototype has achieved a sufficiently high Technology Readiness Level (TRL) and has been tested on the water sample from the IIT campus and adjacent areas.

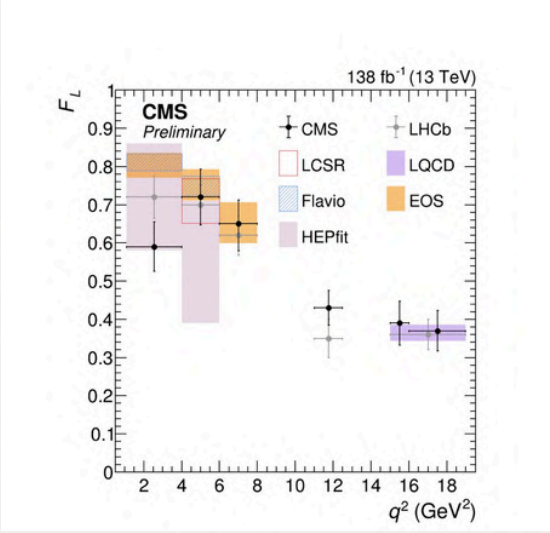
In a recent article published in ‘Environmental Science: Nano’ of the Royal Society of Chemistry (RSC), the team comprising Dr. Sayan Dey, Arijit Pattra, Bathula Sathwik and Dr. Himanshu P. Padole, presented an advanced micro sensor based on reduced graphene oxide (rGO) and its derivatives to detect extremely low levels of arsenic in consumable water complying with the World Health Organization safety recommendations. It demonstrated a significant contribution towards improving human health and sanitation by carefully blending nanotechnology and machine learning. The Editorial Board of ‘Environmental Science: Nano’ has invited the article to be featured in its special themed collection on “Nanosensing,” recognising the significance of the work. The recognition from the Royal Society of Chemistry and the development of ArsenSafe together highlight IIT Bhubaneswar’s growing contribution to nanotechnology-driven environmental monitoring and its efforts to address critical societal challenges through research and innovation.

# IIT Bhubaneswar Research Featured in Prestigious CERN Courier Magazine

Research carried out by scientists from the School of Basic Sciences at IIT Bhubaneswar has been featured in the latest issue of Energy Frontiers, a special section of the internationally renowned CERN Courier magazine. The article, titled “A Sharper Probe of a Rare Bs Decay,” highlights important findings from the Compact Muon Solenoid (CMS) experiment at CERN’s Large Hadron Collider (LHC), one of the world’s largest and most advanced scientific research facilities.

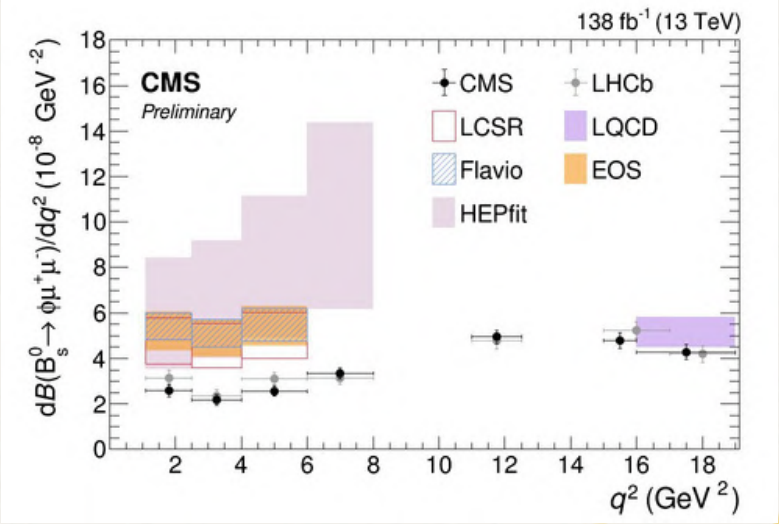
The featured article is based on a study conducted as part of the CMS Collaboration at CERN, to which IIT Bhubaneswar researchers Dr. Seema Bahinipati, Mr. Rishabh Raturi and Dr. Samarendra Nayak made significant contributions. The study investigates extremely rare behaviour of subatomic particles, helping scientists better understand how the fundamental building blocks of the universe interact with one another.

The findings revealed certain differences between experimental observations and existing theoretical predictions. While further studies are needed, such observations are important because they may provide clues to new scientific phenomena that are not yet fully explained by current theories of particle physics.




IIT Bhubaneswar has been an active participant in the CMS Collaboration through its research in experimental particle physics. Researchers from the Institute contribute to international efforts aimed at understanding the fundamental laws of nature by analysing data generated at the Large Hadron Collider. The feature in CERN Courier recognizes the valuable scientific contributions made by the IIT Bhubaneswar team as part of this major global collaboration.

The inclusion of the Institute’s research in CERN Courier is a matter of pride for IIT Bhubaneswar. The magazine is widely respected in the fields of particle physics and accelerator science and is read by researchers, educators, policymakers, and science communicators across the world. The feature highlights the growing international recognition of research being carried out at the Institute.



The CMS experiment is one of the flagship experiments at CERN and brings together thousands of scientists, engineers, technicians, and students from around the world. The collaboration is widely known for its role in the discovery of the Higgs boson and continues to explore some of the biggest mysteries of the universe, including the nature of matter, energy, space, and time.

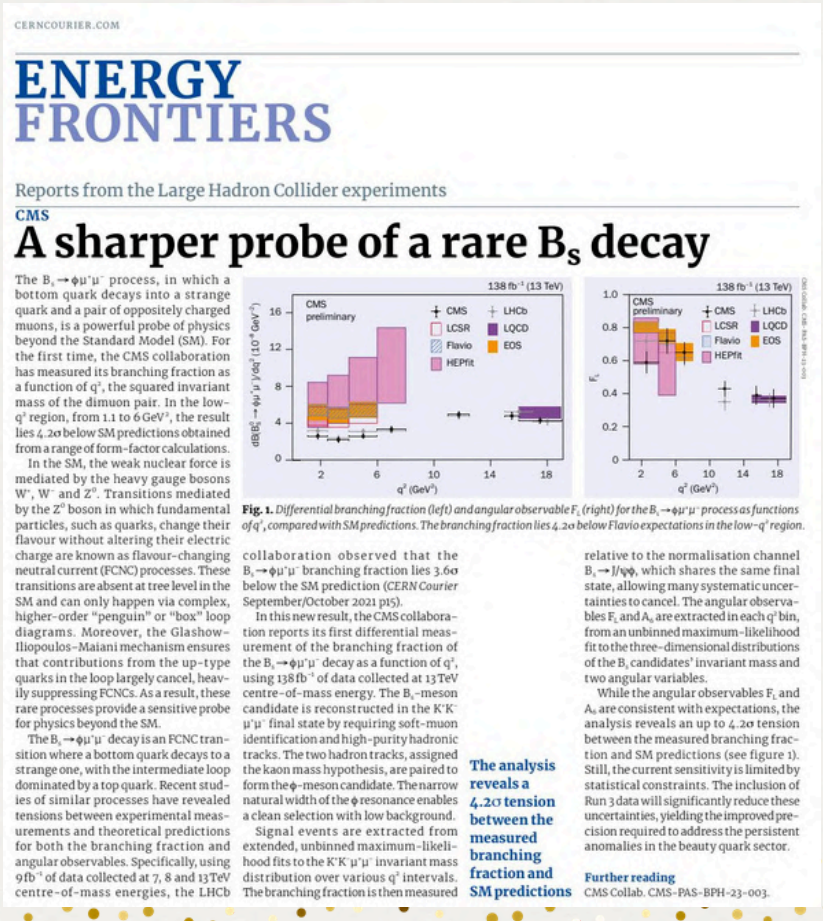
Expressing their happiness over the recognition, the researchers noted that the feature reflects the increasing global visibility of IIT Bhubaneswar's research contributions and highlights the important role being played by Indian institutions in international scientific collaborations.

This achievement further strengthens IIT Bhubaneswar's reputation as a leading centre for scientific research and demonstrates its commitment to advancing knowledge through world-class research and international partnerships.

About the CMS Collaboration

The Compact Muon Solenoid (CMS) is one of the largest scientific collaborations in the world and is one of the flagship experiments at CERN's Large Hadron Collider. It brings together thousands of scientists, engineers, technicians, and students from institutions across the globe to study the fundamental building blocks of the universe and answer some of the most important questions in modern science.

Link of the Paper: https://cerncourier.com/wp-content/uploads/2026/06/CERNCourier2026MayJun-digitaledition.pdf



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CMS

## A sharper probe of a rare $B_s$ decay

The $B_s \to \phi\mu^+\mu^-$ process, in which a bottom quark decays into a strange quark and a pair of oppositely charged muons, is a powerful probe of physics beyond the Standard Model (SM). For the first time, the CMS collaboration has measured its branching fraction as a function of $q^2$, the squared invariant mass of the dimuon pair. In the low-$q^2$ region, from 1.1 to 6 GeV$^2$, the result lies 4.2$\sigma$ below SM predictions obtained from a range of form-factor calculations.

In the SM, the weak nuclear force is mediated by the heavy gauge bosons $W^+$, $W^-$ and $Z^0$. Transitions mediated by the $Z^0$ boson in which fundamental particles, such as quarks, change their flavour without altering their electric charge are known as flavour-changing neutral current (FCNC) processes. These transitions are absent at tree level in the SM and can only happen via complex, higher-order "penguin" or "box" loop diagrams. Moreover, the Glashow–Iliopoulos–Maiani mechanism ensures that contributions from the up-type quarks in the loop largely cancel, heavily suppressing FCNCs. As a result, these rare processes provide a sensitive probe for physics beyond the SM.

The $B_s \to \phi\mu^+\mu^-$ decay is an FCNC transition where a bottom quark decays to a strange one, with the intermediate loop dominated by a top quark. Recent studies of similar processes have revealed tensions between experimental measurements and theoretical predictions for both the branching fraction and angular observables. Specifically, using 9 fb$^{-1}$ of data collected at 7, 8 and 13 TeV centre-of-mass energies, the LHCb collaboration observed that the $B_s \to \phi\mu^+\mu^-$ branching fraction lies 3.6$\sigma$ below the SM prediction (*CERN Courier* September/October 2021 p15).

In this new result, the CMS collaboration reports its first differential measurement of the branching fraction of the $B_s \to \phi\mu^+\mu^-$ decay as a function of $q^2$, using 138 fb$^{-1}$ of data collected at 13 TeV centre-of-mass energy. The $B_s$-meson candidate is reconstructed in the $K^+K^-\mu^+\mu^-$ final state by requiring soft-muon identification and high-purity hadronic tracks. The two hadron tracks, assigned the kaon mass hypothesis, are paired to form the $\phi$-meson candidate. The narrow natural width of the $\phi$ resonance enables a clean selection with low background.

Signal events are extracted from extended, unbinned maximum-likelihood fits to the $K^+K^-\mu^+\mu^-$ invariant mass distribution over various $q^2$ intervals. The branching fraction is then measured relative to the normalisation channel $B_s \to J/\psi\phi$, which shares the same final state, allowing many systematic uncertainties to cancel. The angular observables $F_L$ and $A_6$ are extracted in each $q^2$ bin, from an unbinned maximum-likelihood fit to the three-dimensional distributions of the $B_s$ candidates' invariant mass and two angular variables.

**The analysis reveals a 4.2$\sigma$ tension between the measured branching fraction and SM predictions**

While the angular observables $F_L$ and $A_6$ are consistent with expectations, the analysis reveals an up to 4.2$\sigma$ tension between the measured branching fraction and SM predictions (see figure 1). Still, the current sensitivity is limited by statistical constraints. The inclusion of Run 3 data will significantly reduce these uncertainties, yielding the improved precision required to address the persistent anomalies in the beauty quark sector.

**Further reading**

CMS Collab. CMS-PAS-BPH-23-003.



**Fig. 1.** *Differential branching fraction (left) and angular observable $F_L$ (right) for the $B_s \to \phi\mu^+\mu^-$ process as functions of $q^2$, compared with SM predictions. The branching fraction lies 4.2$\sigma$ below Flavio expectations in the low-$q^2$ region.*

# Five-Day Training Programme on Open-Source Library Management Systems

The Central Library of IIT Bhubaneswar organized a five-day training programme on “Library Automation Using Koha and Library Website Development Using WordPress” under the Open-Source Library Management Systems (OSLMS) initiative for Library and Information Science (LIS) professionals. The programme aimed to provide practical knowledge and hands-on training in open-source technologies for library automation and website development.

Inaugurating the programme, Dr. Akshay Kumar Rath highlighted the evolution of libraries into digitally enabled knowledge centres, while Dr. Naresh Chandra Sahu, Chairperson In-Charge, Central Library, appreciated the enthusiastic participation of LIS professionals from across the country. Dr. Bibhuti Bhusan Sahoo, Deputy Librarian and Coordinator, outlined the objectives of the programme and emphasized the importance of technical skill development in modern library services.


The training featured intensive hands-on sessions on Koha, WordPress, and other digital library tools, focusing on library automation, resource management, and digital service delivery.



Addressing the valedictory session, Prof. Subhransu Ranjan Samantaray, Dean (PG&R Programmes), IIT Bhubaneswar, underscored the role of digital library systems in advancing knowledge access and innovation. Dr. Satya Ranjan Sahu, Sr. Principal Scientist and Head, Knowledge Resource Centre, CSIR-IMMT, highlighted the evolution of Koha and the growing need for continuous learning among library professionals. Sessions were conducted by Dr. Sambhunath Sahoo and Mr. Praveen Kumar R.

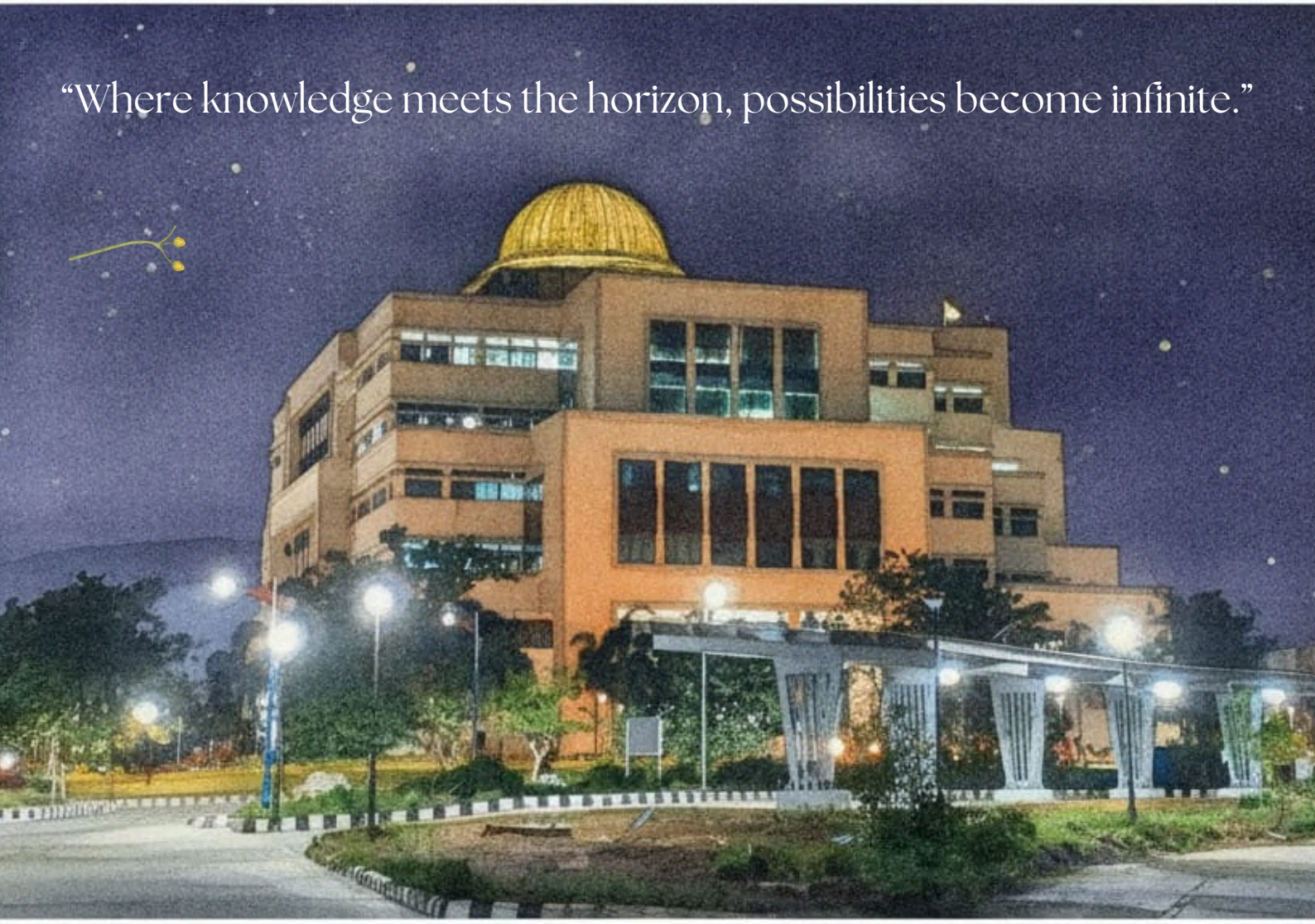
The programme concluded with certificate distribution, providing participants a valuable platform to enhance technical competencies and explore innovative approaches to modern library management through open-source technologies.

# Plantation drive to mark World Environment Day

IIIT Bhubaneswar, reiterating its commitment towards a clean and green environment, celebrated World Environment Day in line with the theme of the year, 'Inspired by Nature. For Climate. For Our Future'. To mark the occasion, the Institute conducted a plantation drive inside the campus and planted around 100 avenue, fruit-bearing and flowering plants.

Prof. Shreepad Karmalkar, Director, IIT Bhubaneswar inaugurated the plantation drive. Among others, Prof. Vijay Shankar Pasupureddi, Dean (Sponsored Research & Industrial Consultancy); Prof. Sarat Kumar Panda, Chairperson-Infrastructure; Dr. Narsa Reddy Tummuru, Co-Chairperson-Infrastructure; Shri Bamadev Acharya, Registrar; Dr. Sivaiah Bathula, NSS Coordinator; Shri K. Rabin Kumar Dora, Superintending Engineer; Smt. Shruti Karmalkar, President, Residential Clubs of the Institute; faculty members, staff, students, NSS volunteers and residents of the campus participated in this drive and planted saplings. Shri Kamireddy Visweswara Reddy, Horticulturist of the Institute, coordinated the programme.

"Where knowledge meets the horizon, possibilities become infinite."



# HAPPY READING!