

Department of Science & Technology

Monthly Report

March, 2024

I. Important policy decisions taken and major achievements during the month:

A. Science for Society

- The Aryabhata Research Institute of Observational Sciences (ARIES) outreach team conducted a two-day programme on astronomy at a college in Shahjahanpur, Uttar Pradesh from 15-16 March 2024. It consisted of a demonstration of telescope, stargazing, sunspot observations and a popular talk. 100 students and 50 staff members participated in the programme.
- A hybrid national conference was organized by the Indian Institute of Astrophysics (IIA) on “Astro-Tourism and Astro-Entrepreneurship in India” from 11-12 March 2024. 70 participants attended the conference in person and 50 participants attended online. 32 talks and 2 open discussions were organized. A group has been formed with all participants and IIA will continue to lead the national effort in coordinating astro-tourism.
- North East Centre for Technology Application and Reach (NECTAR) conducted the PM Vishwakarma Job Role programme from March 6th to March 12th, 2024 which focused on carpentry skills and 26 artisans participated in this programme. Through hands-on training and theoretical sessions, participants enhanced their carpentry expertise, fostering self-reliance and economic empowerment. Also, 24 participants engaged in an intensive program under SANKALP Phase II, focusing on enhancing their skills as automatic-making Machine operators, from February 26th to March 26th, 2024. Through practical training, participants gained expertise essential for efficiency and productivity in their roles.
- NECTAR organized training sessions in Mizoram, focused on Craft Baker Job roles under PMKVY 4.0, empowering individuals with baking skills. Meanwhile, in Meghalaya's West Jaintia Hills District, hands-on training sessions by NECTAR delved into squash and juice processing techniques, fostering local expertise and promoting agro-based industries. These programs exemplify efforts to enhance vocational skills and catalyze economic growth in the region.
- National Innovation Foundation (NIF) reported that five grassroots innovation-based technologies viz. rice puffing machine, manure making machine, mini daal mill, corn shelling and potato harvester were widely disseminated amongst farmers, local youth and women in the State of Manipur during Mar 19-20, 2024. In the Kendrapara district of Odisha, another grassroots innovation namely the onion root-leaf cutting machine was disseminated amongst farmers.
- The Indian National Academy of Engineering (INAE) organized a two-day workshop on "Skilling, Reskilling and Upskilling - Need of the Hour for Self-Reliant India" which was held at NIT Srinagar during March 4-5, 2024. The workshop was organized under the umbrella of the SERB-INAE Outreach Program for NE, Jammu & Kashmir (J&K) and Ladakh. The objectives of this two-day skill development workshop were to create an eco-system and the

importance of skilling and upskilling. The aim was to create an ecosystem of employability for youths, with a special target towards J&K.

- Indian Science Congress Association (ISCA) Amravati Chapter organized an Inter-Collegiate University Level Seminar Competition for undergraduates on 16th March 2024. ISCA Coimbatore Chapter organized a workshop on ‘Gardening-Horticultural approach for Recreational, Economic Reliance and Conservation of Traditional Crop Varieties for Health Care’ on 31st March 2024.
- The progress of the completed projects supported under the Building Energy Efficiency program was reviewed in a meeting held on March 12, 2024.
- The International Association Society of Exploration Geophysicists (SEG) felicitated DST for its supporting and nurturing role during the International Workshop on the Role of Geosciences in Carbon Storage on 19th March 2024 in Mumbai.
- A site review of DST-supported NCoE-CCU at IIT Bombay was organised and conducted on 18th March 2024.
- DST supported one Major R&D programme at Hemvati Nandan Bahuguna Garhwal University (A Central University), Srinagar (Garhwal), Uttarakhand to work on "Integrated Cryospheric Observations and Associated Hazards in Changing Climate, Central Himalaya" under the National Mission for Sustaining the Himalayan Ecosystem (NMSHE).
- Committees constituted by DST screened proposals received under the following programmes:-

S. No.	Programme/Plan	No. of Proposals screened	Date of screening
1.	Scheduled Caste Sub Plan (SCSP)	400	06-07 March, 2024
2.	Technology Interventions for Disabled and Elderly (TIDE)	673	13-14 March, 2024
3.	Tribal Sub Plan (TSP)	400	19-20 March, 2024

- 50 completed projects under the Scheme of Young Scientists and Technologists (SYST) programme were evaluated by the Expert Committee on 27-28 March 2024.

B. Technology Development

- Researchers of the Centre for Nano and Soft Matter Sciences (CeNS) have developed an antimicrobial nanoformulation containing mixed metal oxides (MMO) of TiO₂, ZnO, SiO₂, and CuO with silver nanoparticles (MMO-Ag) capped with a cationic surfactant by the hydrothermal route. The developed nanoformulation possesses a high specific surface area. The nanoformulation exhibits excellent antimicrobial properties against gram-negative (*E. coli*), gram-positive (*S. aureus*) bacteria, and bacteriophage viruses, superior to the spherical morphology.

- Scientists of Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) have synthesized a novel & highly efficient photocatalyst that can convert carbon dioxide to high-value products, ethene and ethylene, which are used as fuel gases and also for the polymer industry. This recent breakthrough has facilitated the development of the country's first plant that can convert CO₂ into methanol. This involves directly connecting the fuel streams from a power generation plant in Telangana.
- A group of researchers from JNCASR have synthesised a material that exhibits the properties of both glass and metal and can efficiently convert waste heat to electricity. The research can help advance processes in thermoelectric energy conversion, where waste heat from sources like industrial processes in power plants, households and vehicle exhausts can be converted into electricity.

C. Human Capacity Building

- **International Women's Day:** The Department of Science and Technology celebrated International Women's Day on March 08, 2024. Two technical sessions on Physical and Mental Well-being of Women: Maintaining Work-life Balance' and 'Role of Women in Start-ups' were conducted. More than 200 DST Officials including the Joint Secretary, Heads of the Divisions and Scientists participated in this event physically. Officials from DST's AIs have also attended the programme. The programme was live-streamed on YouTube and 1200 people viewers watched the programme. An Oral Health Camp was also organized at Technology Bhawan by the resident doctors of Maulana Azad Institution of Dental Sciences, New Delhi. A video on Nari Shakti @DST was also unveiled on this occasion. Success stories of girls and women benefitted under different programmes of DST's Women in Science and Engineering-KIRAN (WISE-KIRAN) Scheme have also been shared.
- Five orientation sessions, Twenty-one career counselling sessions and Thirty-two role model sessions were conducted by different JNVs for Vigyan Jyoti scholars. Further, sixteen KP visits, Twenty-two tinkering workshops, eleven science camps, and Forty-five subject-specific lectures were conducted.
- The Programme Advisory Committee (PAC) has reviewed the progress of the Consolidation of University Research for Innovation and Excellence (CURIE) project at Rama Devi Women's University, Bhubaneswar. The Committee also visited dedicated labs supported through the CURIE programme.
- To support women scholars to pursue research in Basic and Applied Sciences, DST conducted a meeting of the first Subject Expert Committee (SEC) on Life Sciences under WISE-PhD.
- To enhance awareness of the Women in Science and Engineering (WISE) – Societal Challenges with Opportunities (SCOPE) Programme a two-day capacity-building workshop was conducted at BAIF, Pune. The workshop covered diverse thematic areas like agriculture, engineering, health and nutrition, Natural Resource Management, green and clean energy applications, and Climate actions.
- Under the INSPIRE-MANAK programme, State Level Exhibition and Project Competitions were organized in Andhra Pradesh, Chandigarh and Haryana; Nine District Level exhibitions and project competitions were organized in Gujarat and a Mentoring Workshop was organised for selected students of Tripura.

- INSPIRE scholarship of ₹20,53,74,352/- was released to 5203 students and an amount of ₹33,92,000/- was released towards the KVPY Fellowship for 34 students.
- An amount of ₹7,41,40,219/- was released as INSPIRE Fellowship to 194 existing INSPIRE Fellows and an amount of ₹19,65,37,363/- was released to 357 new students.
- The results of the INSPIRE Faculty Fellowship (IFF)-2023 Call were declared under the 9 domain areas which includes newly introduced Translational Research in R&D. 116 Fellows were selected under IFF-2023 and an amount of ₹9,62,00,000/- has been approved as first instalment to 67 INSPIRE Faculty Fellows during the month.
- 3 projects were supported under the programme Human and Institutional Capacity Building focusing on the Indian Himalayan Region:
 - Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar campus on "Impact Assessment of Climate Change on Agriculture in Kashmir Himalayas (Phase II)"
 - Rajiv Gandhi University, Rono Hills, Doimukh, Arunachal Pradesh on "Influence of micro-level climatic variations on honeybee nesting ecology and consequent impact on horticultural and agricultural production
 - North Eastern Regional Institute of Science and Technology (NERIST), Nirjuli (Itanagar), Arunachal Pradesh on "Impact of Climatic Variables on Heat Stress and Real-Time Monitoring with IoT-Based Solutions for Sustainable Agricultural Livelihoods.
- The Bihar State Climate Change Cell organized a one-day workshop, on "Climate Change Mitigation and Adaptation in the Forestry Sector" on 20th March 2024 in Patna. Innovative strategies, best practices and emerging trends in climate change, mitigation and adaptation were discussed.
- Himachal Pradesh Knowledge State Climate Change Cell along with Govt Girls College Shimla organized a one-week training-cum-workshop on IPR & CC adaptation at Shimla from 21st to 28th March 2024.
- DST-Center of Excellence on Climate Change Impacts and Adaptation for a Climate Resilient North East India” established at the Department of Environmental Science, Tezpur University supported under the National Mission for Sustaining Himalayan Ecosystem (NMSHE) organized North-East Conclave on Climate Change.
- DST-CoE on Climate Change established at IIT Bombay held an 'Induction Workshop for IIT Bombay Undergraduate Climate Enthusiasts' on 8-9th March 2024 to cultivate awareness about the vibrant field of climate studies.
- A Training Course for Study Directors of GLP Test Facilities was conducted from March 18-20, 2024 at the Indian National Science Academy (INSA), New Delhi wherein 100 candidates participated. The training course focused on the OECD Principles of GLP Document Numbers 22 and 24 concerning Data integrity and Quality Improvement tools and GLP.
- 3rd Meeting of the re-constituted Technical Committee on GLP was held on March 27, 2024, in DST. The committee considered 16 cases of various Test Facilities (TFs) for GLP

certification/ Re-certification/ extension in scope/ Continuation of GLP certification, based on GLP inspections conducted for the TFs.

- The First Meeting of the sub-committee constituted for the preparation of guidance document for the GLP certification scope of NGCMA was held at the Indian National Science Academy (INSA), New Delhi on March 20, 2024, wherein comments received from various stakeholders on the draft scope were considered.
- Sree Chitra Tirunal Institute for Medical Science and Technology (SCTIMST) signed a MoU with M/s Citizen Industries, Gujarat for the development of a “box–tunnel system with secured gates for mice transfer and enrichment” on 1st March 2024.

D. Scientific Research

- Scientists of Aryabhata Research Institute of Observational Sciences (ARIES) discovered systems of two blue straggler stars orbiting around each other in an open cluster in our galaxy using the Ultra-Violet Imaging Telescope (UVIT) mounted on AstroSat. ARIES scientists unveiled a pioneering approach to continuously quantify CO contributions from fossil fuel combustion and biomass burning in the Central Himalayan region, addressing a critical gap. Its results are of paramount importance for targeted air quality management strategies.
- Scientists of Bose Institute (BI) working in the field of quantum theory of gravity, found a symplectic formulation of the type IIB effective scalar potential which is induced by a holomorphic superpotential having a set of four pairs of S-dual fluxes. The main advantage of this approach is the fact that it can be applied for generic models, beyond the toroidal compactification, and at the same time can help in understanding the deeper insights of the effective scalar potentials.
- It is a general perspective that, the oceanic circulation conveyor belt is slowing down, which could be a reason for the warming on both the poles (Antarctica and the Arctic). A study led by scientists of Birbal Sahni Institute of Palaeosciences (BSIP) reported that in the past 65,000 to 60,000 years, the oceanic circulation was slowed down, and the impact on the Arabian Sea also influenced the Indian Ocean monsoon system. This study documented the warming signal in the cold period around 65,000 to 60,000 years.
- Chiral bent-core liquid crystals (LCs) are endowed with exceptional stability across a broad range of temperatures. In this context, researchers of the Centre for Nano and Soft Matter Sciences (CeNS) have studied a new fluorinated molecule with chirality as cholesterol. These molecules exhibit a chiral dark conglomerate (DC) phase over a broad temperature range of ~85°C in an enantiotropic manner. The study unveils the long-range DC phase, showing domains of opposing chirality belonging to the sponge-type DC phase.
- Wadia Institute of Himalayan Geology (WIHG) reported the following research outcomes: The Arias intensity maps prepared for the scenario earthquake correspond to the Uttarkashi (1991) and Chamoli (1999) earthquake epicentres, revealed that 51% and 45% of the Uttarakhand region are susceptible to landslides; It was noticed that the recent climate warming in the Himalaya may be traced back to the end or even the coldest time of the Little Ice Age. The temperature and precipitation data (1901-2018) of the climate research unit (CRU) suggest an increase in the temperature and a decrease in precipitation during the winter

period. This increase in temperature (shift from solid to liquid precipitation) has been identified as one of the major factors responsible for the decrease in snowfall over the Indian Himalayan region; The past one thousand years' climatic records were constructed from Chopta Bugyal, Garhwal Himalaya, which infer significant climatic change during the Little Ice Age; Evidence of Neoproterozoic arc magmatism has been identified from Lesser Himalayan sedimentary sequence.

- Agharkar Research Institute (ARI) published 06 papers, Aryabhata Research Institute of Observational Sciences (ARIES) published 12 research papers, Birbal Sahni Institute of Palaeosciences (BSIP) published 05 research papers, the Centre for Nano and Soft Matter Sciences (CeNS) published 04 articles, Institute of Advanced Study in Science and Technology (IASST) published 06 research papers, Indian Institute of Astrophysics (IIA) published 06 research papers, Indian Institute of Geomagnetism (IIG) published 08 research papers, Sree Chitra Tirunal Institute for Medical Science and Technology (SCTIMST) published 09 research papers in various national and international peer-reviewed scientific journals. Indian Academy of Sciences (IASC) reported that a total of 88 articles were published in 11 different journals.
- International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI) reported that two Indian patents were granted. 01 Indian patent of both CeNS and IASST were granted. SCTIMST reported that 07 Indian patents and 01 design registration were granted. National Innovation Foundation (NIF) facilitated in granting of 34 patents.

E. International Cooperation

- DST participated in a panel discussion on standards and regulations for Green Hydrogen in the 13th EU-India Smart Energy Workshop/ international conference under the India Smart Utility Week 2024 held on March 13, 2024, in New Delhi.
- DST organized two-panel discussions on Emerging Technologies for Utilities in the 10th Edition of India Smart Utility Week (ISUW 2024). An International Conference and Exhibition on Smart Energy and Smart Mobility was held on March 13, 2024, in New Delhi.
- **Nano Mission** - Phase II of the India-Japan collaborative project was completed. Scientists from 47 Indian research institutes, universities, IITs used this facility and published more than 160 research papers.
- India-UK collaborative project was extended up till June 2024 to utilize the allocated beamtime at RAL Rutherford Appleton Laboratory. This will enable the Indian Researchers to finish the in-line experiments.
- The Bilateral steering committee meeting under India@DESY (Deutsches Elektronen-Synchrotron) was held on 12th March 2024 to discuss the possibility of extending the current collaboration on Petra III and partnering in the experiments in PETRA IV, which will be an advanced research infrastructure with more accuracy and brilliance of the beamline. PETRA IV will allow the measurement of individual objects on the smallest scales record the structure, energy states and functions of advanced materials and study snapshots of important in-situ reactions relevant to energy and environment. This existing partnership has aided more than 1000 Indian researchers from 60 institutes to use the synchrotron radiation source PETRA III at DESY for their research in advanced materials and nanoscience. The collaboration has also

resulted in more than 340 scientific publications with an average impact factor of 7, in areas such as novel quantum materials, advanced materials for energy and clean environment and semiconductors. A scientific workshop was organised which was attended by 100 participants from Indian universities, research institutes, and industry experts like Tata Steel, and reported on new research results and discussed the future scientific opportunities with DESY and Germany. The workshop also hosted pedagogic outreach talks on synchrotron X-rays for college students.

F. National Technology Mission

- 3rd meeting of the Mission Coordination Committee (MCC) for the “National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS)” was held on March 20, 2024, under the chairmanship of the Secretary, DST. The meeting was attended by the Directors of the Host Institutes along with the Project Directors and CEOs of Technology Innovation Hubs (TIHs) under NM-ICPS.
- Startups supported under 5 TIHs of NM-ICPS participated during the Start-up Expo at Techkriti, the "Technical and Entrepreneurial festival" at IIT Kanpur from 15th & 16th March 2024 and demonstrated their technologies/products in advanced technology verticals.
- The 2nd meeting of the Mission Governing Board (MGB) for the National Quantum Mission (NQM) was held under the Chairmanship of Dr Ajai Chowdhry on 23rd March 2024 in Hybrid mode to discuss the strategy to support Start-ups working in the areas of Quantum Technologies and review strategy for the establishment of Technical Groups.

G. Scientific Infrastructure Building

- Under the National Geospatial Programme (NGP) a consultative meeting was held on 5th March 2024 at Ambedkar International Centre, New Delhi under the Chairmanship of GDPDC with the stakeholders i.e., Industry/start-ups working in the field of Geospatial technologies and applications. The consultation was carried out through three brief sub-group meetings focused on Solutions and Services, Hardware and Software and India as the R&D and Manufacturing base.
- The technical activities and future road map of the Geospatial Information Science and Engineering Hub (GISE hub), IIT Bombay was reviewed by the Secretary, DST on 8th March 2024 at IIT Bombay.
- A panel discussion on ‘Understanding the future training requirements’ was held on 18th March 2024 at IIRS, Dehradun as a part of the IIRS Academia Meet (IAM-2024). During the discussions, future training requirements as per the expertise of IIRS in alignment with National Geospatial Policy 2022 and the possible role of IIRS were highlighted.
- A Geospatial Capacity Building Workshop on ‘Spatial Thinking for Localizing the SDGs’ for Teachers/ Educators from the Jammu region was organized jointly with SERT-Jammu on 27th March 2024, at Government Sri Ranbir Model Higher Secondary School, Jammu. This workshop aimed to raise knowledge of geospatial technologies and their applications amongst

the Schoolteachers who can be nodes for inculcating spatial thinking in young minds. More than 30 teachers from the Jammu region attended the workshop.

- A meeting was held under the chairmanship of the Surveyor General of India on 27th March 2024 at SoI-Dehradun to discuss handing over the NGF project from the Survey of India (SoI) to Wadia Institute of Himalayan Geology (WIHG). In the meeting, it was discussed to expedite the process of handing over and preparing a lease agreement between SoI and WIHG.
- DST supported a pilot scale Test Bed with IIT Delhi as a Knowledge Partner and Thermax Ltd as a Technology Provider for the deployment of CCU Technologies in the Power sector for conversion of CO₂ to methanol.
- DST supported the establishment of the State Climate Change Centre of Ladakh UT to assist States to take up vulnerability and risk assessment, human capacity building programmes, public awareness programmes and institutional capacity building and also take up state-specific research and development.
- Under the Fund for Improvement of S&T Infrastructure in Universities and Higher Educational Institutions (FIST) call for Proposals was announced by DST for 2024, which aims at providing basic infrastructure and enabling facilities for promoting R&D activities in new and emerging areas in universities & other educational institutions. DST FIST supported Solid State and Structural Chemistry Unit at IISc Bangalore, in collaboration with scientists from Japan, Denmark and the United States have proposed a new synthetic material design which is capable of controlling temperature and helps in converting insulator to conductor and paves the way for producing novel superconductors and new material design. 23 new projects amounting to approximately Rs. 24.0 Cr were sanctioned under the FIST Program.
- Under the Promotion of University Research and Scientific Excellence (PURSE), DST has announced Call for Proposals against which 148 applications have been received. On March 18, 2024, an Industry-Academia meeting titled "Synergies in Science: A One-Day Industry-Academia Exchange" was held under the auspices of DST PURSE. Approximately 200 participants, comprising MSc/Ph.D. students and faculty members from various science departments of Dibrugarh University, actively participated in the event.
- As per mandate of the Sophisticated Analytical Instruments Facility (SAIF) scheme, the SAIF Centre at IIT Bombay organized a one-day Workshop on Thermal Analysis Technique - Dynamic Mechanical Analysis (DMA) basics and applications on 29th March 2024. This workshop was attended by large numbers of students, researchers and technical staff from various organizations.