

Department of Science & Technology

Monthly Report

April, 2024

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

A. Technology Development

- AG Chitra Tuberculosis diagnostic kit developed by Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), Trivandrum was launched on 8th April 2024. SCTIMST developed this kit as an open platform system to provide affordable, fast, and accurate diagnosis of pulmonary tuberculosis. Following successful independent validation, the Central Drugs Standard Control Organization (CDSCO) has approved the kit for manufacturing and commercialisation. This TB kit can be used in any qPCR machine, which means that the existing COVID-19 testing infrastructure established during the pandemic can be utilized for tuberculosis screening on a large scale.
- International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI) completed the Know-How Demonstration for the Process of applying barrier coating for biodegradable containers made from coconut shell and bamboo powders and the know-how document was handed over to Agropak Pvt Ltd., Bengaluru. As a part of CARS-DRDO project, HD graphite-based components, flap seals, carbon bushes and piston rings were developed for shut-off valve assembly.

B. Science for Society

- Indian Academy of Sciences (IASC) published 102 articles in 11 journals. It also conducted one refresher course and 10 lecture workshops. Indian National Science Academy (INSA) and the National Centre for Good Governance (NCGG) jointly organized the Leadership Development Program in Science & Technology (INSA-NCGG LEADS April- 2024) from 1-7 April 2024 at INSA, New Delhi.
- Under the SC/ST Community Development project, the Institute of Advanced Study in Science and Technology (IASST) initiated scientific interventions for nutritional characterization and to optimize the production of traditional fermented fish Shidal. This was launched in the market on 05.04.2023.
- Hands-on-training programme was organised by National Innovation Foundation (NIF) and NIF Incubation and Entrepreneurship Council - NIFentreC with support from the Watershed Cell-cum-Data Centre in Khunti and the Saranda Forest Division in Chaibasa for enabling the use of grassroots innovations such as Sanitary pad making machine and Sal leaf plate and bowl making machine at Khatanga, a tribal village of Rania Block in Khunti district,

and Gua forest range, spread across the Saranda Forest division in Chaibasa district, Jharkhand.

- A Scientific Research Conference in Hindi was organized at the Agharkar Research Institute (ARI) on 3-4 April 2024. Sixty-one research articles on health, energy, biodiversity, climate, agriculture, nanobioscience were presented.
- Aryabhata Research Institute of Observational Sciences (ARIES) organised its annual Training School in Observational Astronomy (ATSOA) - 2024 from 22nd April - 3rd May 2024, for M. Sc., Integrated MS and B.Tech students in order to train them on various topics related to telescopes, optical data analysis techniques, star formation and evolution, galactic and extra galactic astronomy.
- North East Centre for Technology Application and Reach (NECTAR) successfully organized training for the job role of Beekeeper under the Pradhan Mantri Kaushal Vikas Yojana 4.0 (PMKVY 4.0) in collaboration with the Meghalaya Farmers' Empowerment Commission (MFEC). The training session aimed to equip participants with essential skills. Under PMKVY 4.0 Nectar also organized a training on “Data Entry Operator for Persons with Disabilities”.
- NECTAR sponsored the first Eco starch Bio-Plastic manufacturing unit in the Northeast India. The main initiative is to assess possibilities related to technology in the country and take it to remote places of the North East Region and using the available raw material in the community and empowering the society using technology. NECTAR also organized 10-day Bamboo Processing and Value Addition Training in April 2024, welcoming participants from Ghana.
- DST organized “9th Expert Committee meeting” at WIHG Dehradun on 30th April, 2024. In this meeting, project proposals for State R&D (Uttarakhand) and Major Research and Development Programme (MRDP) under National Mission for Sustaining Himalayan Ecosystem (NMSHE) were evaluated. The progress/outcome of two ongoing Major Research and Development (MRDP) Programme under both the missions- National Mission for Sustaining Himalayan Ecosystem (NMSHE) & National Mission on Strategic Knowledge for Climate Change (NMSKCC) were reviewed. Also, two Concept notes for State R&D programme (Leh) under NMSHE were evaluated.
- Bihar State Climate Change Cell organized two-day workshop on " The Changing Climate and Extreme Events over the Gangetic Plain" on 8th-10th April, 2024 in Gaya. In this meeting the Department of Environmental Science, in collaboration with Indian Meteorological Society (IMS), local chapter IMS Patna organized an event of National Seminar on “Changing Climate and Extreme Events over the Gangetic Plain”, at Vivekananda Auditorium, Central University of South Bihar, Gaya.
- Technology Information, Forecasting & Assessment Council (TIFAC) hosted an internal

workshop on April 25, 2024, dedicated to sectoral prioritization within the Technology Needs Assessments (TNA) project, supported by the National Mission on Strategic Knowledge for Climate Change (NMSKCC). The primary objective was to rank the identified sectors based on predefined criteria and leveraging collective understanding to guide future interventions effectively.

- Centre of Excellence (CoE) in Glacial Studies for the Western Himalaya at the University of Kashmir conducted field campaign of Snow-Aerosol-Interaction Experiment (SAIE-2024) and Human Resource Training at High Altitude Field Research Laboratory, Gulmarg.
- Expert Team assessed and reviewed the progress made in the project “CRISPR mediated genetic correction of Sickle Cell disease (SCD) towards clinical trials in a small patient cohort” at CSIR-Institute of Genomics and Integrative Biology (CSIR-IGIB), New Delhi. The project is being run in consortia mode at six institutions namely CSIR-Institute of Genomics and Integrative Biology (CSIR-IGIB), New Delhi, in collaboration with (i) AIIMS, New Dehi (ii) Indian Institute of Chemical Technology (IICT), Hyderabad (iii) National Institute of Immunohaematology (NII), Mumbai (iv) Chandulal Chandrakar Memorial (CCM), Govt. Medical College, Durg, Chhattisgarh and (v) Narayana Nethralaya (NNF), Bengaluru. All the six institutions presented the progress made so far under the project
- The “Programme Advisory Committee(PAC) meeting for Scheduled Caste Sub Plan (SCSP)” was held during 23-25 April 2024 at IIT Delhi to consider 65 new proposals received against the call for Science, Technology and Innovation(STI) Hubs and individual proposals.
- The “Expert Committee(EC) meeting for Tribal Sub Plan (TSP)” was held on 30 April 2024 at IIT Delhi, New Delhi to consider 21 new proposals received against the call for proposals under Scheduled Tribe category.
- Annual meeting of State S&T Councils was held at Research & Innovation Park, IIT Delhi during 5-6 April 2024. During the meeting, the interventions undertaken by the S&T Councils to strengthen the STI ecosystem were reviewed. Further, the deliberations were held on catalazing the STI ecosystem at the State/UT level.

C. Human Capacity Building

- Brainstorming meeting to discuss and strategize the implementation of Vigyan Jyoti UG/PG programme were held which focused on enhancing opportunities for female students in STEM fields. The key points of discussion were to review current UG and PG courses offered in STEM fields, status of participation of female students at UG/PG and Ph.D. levels in different fields of STEM and identification of underrepresented fields/discipline in STEM. Around 40 Experts from different parts of the country actively participated,

discussed various STEM courses and shared their views.

- Under Vigyan Jyoti Scheme, 203 Orientation and Students Parent Counseling Sessions and four Career counseling sessions were conducted. Summer Learning Camp 2024 was organized for Vigyan Jyoti scholars of 45 Knowledge Centre JNVs of the Hyderabad region of NVS from 12th April 2024 in virtual mode. The camp is centred around the following themes, namely, Experiential learning-based academic sessions (Math, Physics, Chemistry, Biology), Life Skills, Career Counseling, Sustainable Development, and Women & Environment. In addition to this, nine Role Model sessions, three Knowledge Partners (KP) visits, twelve tinkering workshops, three science camps and thirty-five subject-specific lectures were conducted for Vigyan Jyoti scholars.
- The Department has recently launched a new programme Women's Instinct for Developing and Ushering in Scientific Heights & Innovation (WIDUSHI) to support senior women scientists to conduct research in Basic & Applied Sciences. The 1st meeting of the Programme Advisory Committee (PAC) was organized to evaluate the proposal received under WIDUSHI. Nine projects have been recommended for DST's support.
- A meeting of the Subject Expert Committee (SEC) under the Women Scientist Scheme-B (WOS-B) on Engineering, IT Solutions & Artificial Intelligence (EIT&AI) was held to review the progress and outcome of completed projects.
- Under INSPIRE –MANAK programme, State Level Exhibition and Project Competitions are organized in Kerala, Gujarat, Jammu & Kashmir, Maharashtra; District Level Exhibition and Project Competition were organized in Karnataka (30), Maharashtra (9) and mentoring Workshop for selected students of Meghalaya and Jammu & Kashmir were also organised.
- Under INSPIRE Fellowship, Level-2 Evaluation results of about 624 applicants along with 57 re-evaluation applicants were announced in 1st week of April 2024 and 130 INSPIRE Fellows were converted from JRF to SRF.
- DST chaired the 38th meeting of the Organization for Economic Cooperation and Development (OECD) Working Party (WP) on GLP during April 16-18, 2024 at OECD Headquarters Paris, France. The WP brought together around 160 representatives from 50 national authorities that monitor chemical test facility compliance with GLP to ensure quality data for regulatory decision-making, which saves governments and industry more than 300 million euro per year. It is a matter of great pride for the country and would go a long way in keeping India in the lead role in framing policies which are for the benefit of the country.

D. Scientific Research

- S.N. Bose National Centre for Basic Sciences (SNBNCBS) examined genetic alterations in

kindlins across 10,000 patients with 33 cancer types. The findings reveal that cancer-specific alterations, particularly prevalent in advanced tumor stage and during metastatic onset.

- In a research led by scientists of Birbal Sahni Institute of Palaeosciences (BSIP), it has been found that the terrestrial seasonal climate is quantified using the plant proxy and infer that during the Eocene Thermal Maximum 2 when atmospheric carbon dioxide concentration was greater than 1000 ppmv near the palaeo-equator ($\sim 0.6^\circ\text{N}$), the rainfall decreased significantly, leading to the expansion of deciduous forests. This study raises important questions about the future survival of equatorial rain-forests and biodiversity hot-spots under increased carbon emissions.
- Centre for Nano and Soft Matter Sciences (CeNS) researchers have demonstrated a significant advancement in enhancing photoluminescence (PL) intensity by the inclusion of high-index dielectric nanoparticles into a dye-doped blue phase liquid crystal (BPLC). In another study, CeNS researchers have demonstrated that the incorporation of restricted rotation in chiral liquid crystal (LC) molecules, achieved through the insertion of the triple bond, facilitates the competition between the two incompatible fluid structures yielding twist grain boundary (TGB) phases having chiral smectic C (SmC^*) structure. Precisely, the synthesis and characterization of novel optically active dimers incorporating cholesterol and phenyl 3- phenylpropiolate segments interconnected by an ω -oxyalkanoyloxy spacer with varying lengths and parity have been achieved.
- Scientists from WIHG conducted RF analysis and Inversion study at three seismic stations located over the Tripura fold-belt, which detected a shallow upper mantle discontinuity at 60-65 km depth which is interpreted as “Hales” discontinuity. The expansion of the Proglacial Lake near Durung-Drung Glacier, Zaskar Himalaya was notable, with approximately an increase of 164% in area and 190% in water volume between 2004 and 2023. It was studied that these substantial increments underscore intensified glacial melt processes, emphasizing the vulnerability of the region's glacial dynamics to climate change.
- In the area of quantum gravity, scientists of Bose Institute (BI) studied de Sitter (dS) conditions in type IIA compactifications with non-geometric fluxes. Exploiting the fact that the F-term scalar potential can be written as a bi-linear form, they studied the most generic case and found four necessary conditions needed to achieve de Sitter vacua. Further, imposing a useful Ansatz in which the F-terms are proportional to the respective Kaehler derivatives, they derived additional constraints and classified the possible dS no-go scenarios in terms of the so-called axionic fluxes. In another study, scientists of BI tested a new detector-Bakelite RPC made with new method of linseed oil coating, in the streamer mode for the first time with cosmic ray and an efficiency greater than 90% is achieved. Also, using unsupervised machine-learning techniques, BI scientists have developed a symptom-based drug prediction model for lifestyle-related chronic diseases. A web server was created for end users to access the prediction models.
- A team lead by researchers of Raman Research Institute (RRI) worked on characterizing

entanglement of high dimensional bipartite states. One of the important findings made was that the statistical correlators could distinguish between the separable, distillable and bound entanglement domains of the one-parameter Horodecki two-qutrit states. The relations, linking Negativity with the statistical correlators, were derived for Horodecki states in the domain of distillable entanglement. The results hold potential to open a potentially rich direction of study which is applicable for both distillable and bound entangled states.

E. Publications of research papers, articles, journals & granting of Patents by

Research Institutes

- Institute of Advanced Study in Science and Technology (IASST) published 04 research articles, Agharkar Research Institute (ARI) published 02 research articles, Sree Chitra Tirunal Institute for Medical Science and Technology (SCTIMST) published 15 research papers, Birbal Sahni Institute of Palaeosciences (BSIP) published 09 research papers, Indian Institute of Geomagnetism (IIG) published 10 research papers, Indian Institute of Astrophysics (IIA) published 09 research papers, Centre for Nano and Soft Matter Sciences (CeNS) published 04 articles, Aryabhata Research Institute of Observational Sciences (ARIES) published 08 research papers in various national and international scientific journals. Sree Chitra Tirunal Institute for Medical Science and Technology (SCTIMST) reported that 11 national patents were granted and Centre for Nano and Soft Matter Sciences (CeNS) reported that 01 national patent was granted. Technology Information Forecasting and Assessment Council (TIFAC) facilitated in granting 02 patents and National Innovation Foundation (NIF) facilitated in granting 09 patents

F. International Cooperation

- A Project Monitoring Committee (PMC) meeting was held online on 6th April 2024 to review the progress of project “U.S.-India collaborative for smart distribution System with Storage (UI-ASSIST)” supported under the Indo-US Joint Clean Energy Research and Development Centre (JCERDC) program.
- Under the Clean Energy Transition Partnership (CETP) Joint Call CM-04 CCUS, DST has received 13 pre-proposals, out of which 2 full proposals has been selected for final stage of evaluation. Eligibility evaluation for the two full proposals was done based on National Eligibility and Funding guidelines.

G. National Technology Mission

- First meeting of Third Party Evaluation Committee under “National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS)” was held on April 11, 2024, under the chairmanship of Prof. Anurag Kumar, Former Director, IISc Bangalore to evaluate the Mission against the set targets & deliverables based on the set parameters.

- Under National Quantum Mission (NQM), a brainstorming session with startups working in the areas of Quantum Technologies was conducted on April 09-10, 2024 to understand the readiness level of the technology/products being developed by startups. The first meeting of Mission Technology Research Council (MTRC) was held on April 10, 2024 to develop a strategy for assessing the pre-proposals received for establishing the Technical Groups.
- The Screening Committee met for screening of pre-proposals received under National Quantum Mission on April 20, 2024 at DST, New Delhi.

H. Scientific Infrastructure Building

- Two Awareness Workshops on ‘Spatial Thinking for localizing the SDGs’ for Teachers and Educators from the Thiruvanthapuram (Kerala) and Gurugram (Haryana) were organized in coordination with SERT Kerala and Haryana, which served as a means of raising knowledge of geographic technologies and their applications. This workshop aimed to raise knowledge of geospatial technologies and its applications amongst the School-teachers who can be nodes for inculcating the spatial thinking in the young minds. A large number of teachers/educators from various districts of Kerala and Haryana attended the workshop.
- The 4th Programme Management and Monitoring Committee (PMMC) meeting of National Centre for Geodesy (NCG) and Regional Centre of Geodesy (RCG) was organized on 25th April 2024 at IIT, Kanpur. Meeting was aimed to review the technical progress of the NCG and RCGs and discuss their mid-course correction and future Roadmap. During the meeting NCG and RCGs presented the progress to the committee chaired by Padma Shri Dr. V. P. Dimri.
- Meeting held with Prof. K. C. Tiwari, Delhi Technological University to discuss the possible mechanism of standardization of curriculum for courses in the Geospatial stream as per New Education Policy (NEP) and NET exam for Geospatial domain.
- A meeting was held with Shri Shrikant Shastri, Chairman GDPDC regarding Phase 1 of National Geospatial Policy 2022 i.e., Mission Dronagiri, with the aim to create 04 startup accelerators across the country focusing on 03 different themes. Further, a discussion meeting was held with TTI division to discuss the mechanism for establishing startup accelerators for short term in accordance with Mission Dronagiri.
- A draft Call for Proposal is being developed from the division for inviting proposals in consortium mode on innovative Geospatial Technology and Solutions. It is envisaged that this call may serve not only as a catalyst for stimulating the development of impactful project proposal while providing vital support for successful implementation and ongoing operations via utilizing Geospatial tools etc. but also discover inventive and practical ways of incorporating cutting-edge geospatial technology and capabilities, as well as maximizing the utilization of data and tools. A copy of the CFP was shared with Chairman GDPDC for

his inputs.

- R&D Support was provided for the following:
 - Indian Institute of Technology Kharagpur for “mmMap Indoor Multi-user Localization, Navigation and Mapping using Millimeter Wave Sensing”
 - Indian Institute of Technology Tirupati for “Improvement of geoid model derived from EGM at regional scale by advanced gravimetric geoid modelling, a case study in Kanpur and Unnao district of UP”
- A Consultative Meeting on R&D areas for Methane Monitoring and Mitigation Technologies across sectors was organized by DST on 15th April 2024. This received an enthusiastic response from stakeholders from various R&D Labs, Academia, Industries spanning over diverse sectors such as Oil and Natural Gas, Coal Mining, Wastewater, Landfills, etc.
- Under the Fund for Improvement of S&T Infrastructure in Universities and Higher Educational Institutions (FIST) scheme of the Department of Science and Technology, 987 applications were received, showcasing a commendable interest in advancing research infrastructure. The Department has diligently worked towards extending the deadline to accommodate these proposals, demonstrating a commitment to foster scientific progress and innovation across the Nation.
- The Programme Management Board (PMB) for Promotion of University Research and Scientific Excellence (PURSE) has been re-constituted for further evolution of the scheme. PMB shall evaluate the proposals received for support under PURSE 2024. The PMB shall also review and assess the progress and suggest any mid-course correction of the project supported Under PURSE.
- The Sophisticated Analytical & Technical Help Institute (SATHI) facility at Indian Institute of Technology, Kharagpur plays a pivotal role in propelling the development of new materials, innovative products, and cutting-edge technologies in advanced materials characterization. The state-of-the-art R&D infrastructure, including Time-of-Flight Secondary Ion Mass Spectrometry (TOF-SIMS) and High-Resolution Transmission Electron Microscopy (HRTEM), which was inaugurated by Secretary-DST, on 12th April-2024, in the presence of Prof. V. K. Tewari, Director of IIT Kharagpur; will work in a collaborative framework by connecting with MSMEs, Startups, Industries, and Academic Organizations. This facility is guided by a self-sustaining roadmap and it will facilitate R&D across networked Institutions, Industries, and Universities in the area. With such a compelling proposition, the DST-SATHI facilities across the country have the potential to fortify the R&D infrastructure landscape of the Nation.
- As Sophisticated Analytical Instruments Facility (SAIF) program has completed five decades of dedicated service to the nation, it was decided to undertake a comprehensive

review of the SAIF Program in its entirety, by an external Expert Committee. The performance of 15 centres within ambit of SAIF scheme was also reviewed in this meeting held on 2nd & 3rd April 2024 at JNCASR Bangalore.