



From the Director's Desk

I am glad to present before you the “Annual Report & Audited Statement of Accounts” of the Institute of Physics (IoP), Bhubaneswar, for the fiscal year 2020-21. This Annual Report provides a summary of our academic and research efforts and achievements. IoP, Bhubaneswar is a self-contained institute under the Department of Atomic Energy (DAE), Government of India. It is one of India’s leading research institutes dedicated to high-quality cutting-edge research in experimental and theoretical physics, namely, theoretical high energy physics, theoretical condensed matter physics, theoretical nuclear physics, quantum information, experimental condensed matter physics, and experimental high energy nuclear physics.



This year, IOP members have published 88+ papers in high-quality international peer-reviewed journals, demonstrating the outstanding level of research. Members of the Institute have also engaged with scientists from several national and international institutes virtually and published several research papers. One of the HEP group members, Prof. S. K. Agarwalla has received the prestigious “Swarnajayanti Fellowship 2019-20” from Department of Science and Technology (DST), India and “N. S. Satya Murthy Award 2020” from the Indian Physics Association (IPA). Prof. D. Chaudhuri has received SERB-MATRICES project grant and is selected as an Associate of ICTS-TIFR, Bangalore. Prof. K. Ghosh has been elected as Associate of IASc, Bangalore. Prof. M. Mitra has received the Indo-French bilateral collaborative research grant, funded by the Indo-French Centre for the Promotion of Advanced Research (IFCPAR/CEFIPRA).

Despite the pandemic impact, 40+ seminars, colloquia, and workshops were conducted online. The Institute also conducted outreach programs for communicating Science and scientific temper to school and college students, teachers, and the public. Our members enthusiastically celebrated National Science Day and open house days/discussions by delivering popular scientific talks. Activities like night sky viewing with telescopes on the occasion of the Jupiter-Saturn great conjunction were held for IOP members and their families, with strict following of Covid-safety norms. The Institute has also observed the 46th Foundation Day on 4th September 2020, in which Dr. Rajeev Swain from the Institute of Life Sciences (ILS), Bhubaneswar gave a talk on a timely topic, “COVID-19 pandemic: How it started and how it may end”.

Finally, I would like to express my sincere appreciation for the support and encouragement that we have received from all the faculty members, research scholars, staff members, and well-wishers of the IOP community, including the Governing Council (GC) members. I would also like to acknowledge the efforts of the members of the Committee who have worked very hard to bring out this Annual Report.

Professor Karuna Kar Nanda
Director, IOP

Contribution of Institute of Physics (IOP) towards DAE Vision

Brief Summary of Annual Report 2020-2021

Institute of Physics, Bhubaneswar is a premier research institute of the country, engaged in research in the frontier areas of theoretical and experimental condensed matter physics, theoretical high energy physics, theoretical nuclear physics, ultra-relativistic heavy-ion collisions, astroparticle physics and cosmology, quantum information, experimental high-energy nuclear and particle physics and interdisciplinary areas such as quantum computation, biological physics, complex systems, nano-science and materials science.

The Institute is actively involved in the International Collaborations with CERN (Switzerland), BNL (USA), ANL (USA), GSI (Germany), Max Planck Institute (Germany), and other laboratories abroad and also has been participating in various research activities related to India-based Neutrino observatory. It has also many state-of-the-art experimental facilities like, 3MV pelletron particle accelerator, electron cyclotron resonance-based accelerator, high-resolution transmission electron microscope, molecular beam epitaxy systems, pulsed LASER deposition system, Raman spectrometer, photoemission spectrometer, etc. The Institute has the distinction of having a very successful doctoral program and has produced a large number of highly trained and qualified scientists. By now, more than seventy scholars who have done their Ph.D. at the Institute are occupying prestigious faculty/scientist positions in almost all the leading research Institutes, IISc, IITs, NITs, IISERs, NISER, Central and State Universities in the country. **The Institute has strong outreach program targeted at students of Schools, Colleges, and Universities for the popularization of science as well as DAE's programmes related to Atomic Energy.**

The condensed matter theory group at IOP is actively involved in pursuing research with the main focus on understanding the organization of bacterial chromosome, active matter, fluctuation theorem, topological aspects of quantum condensed matter systems, quantum transport in Dirac/Weyl materials, quantum magnetism, and the interplay of strong correlation and topology in artificial lattice systems.

The experimental high energy physics groups at IOP are participating in the collider-based experiments at various international laboratories, such as CMS and ALICE experiments at CERN-LHC, STAR experiment at RHIC, BNL (USA), and the proposed CBM experiment at FAIR, GSI (Germany). The groups contribute to the studies of the properties of the observed Higgs boson and searches for beyond the Standard Model particles in proton-proton collision events at LHC as well as the studies of Quark-Gluon plasma, a state of matter in the early universe, which are recreated in heavy-ion collisions. Furthermore, the groups contribute to the R&D of state-of-the-art detectors for future experiments.

Other Activities

4.1 Foundation Day

On September 4, 2020, the 46th Foundation day of the Institute was observed. The day was marked in low key due to the pandemic and the sad demise of India's ex-President. Due to the pandemic situation, only about 20 persons were physically present. However, everybody could join over the Google Meet or YouTube link.

During the program, a message from the Director, Prof. S. M. Yusuf was read, and the institute activity report was presented. Retired employees were also felicitated. In the academic part of the program, Dr. Rajeev Swain of the Institute of Life Sciences gave a talk on a timely topic, "COVID-19 pandemic: How it started and how it may end". The program ended with a vote of thanks by the Registrar.



Foundation Day Celebration



Talk by Dr. Rajeev Swain, ILS, Bhubaneswar

4.2 Outreach Programme

Prof. A. M. Srivastava

1. Hosted online Discussion on the topic: "Motion" in the Physics Open Discussion (POD) session organized by the Bigyan Chetana Manch, Bhubaneswar for school students on 27th September 2020.
2. Conducted night sky-view session on the occasion of The **Jupiter-Saturn great conjunction**, on 21st December 2020, at IOP Bhubaneswar. The program was conducted with an 8" Schmidt-Cassegrain 2 meter focal length telescope (computer-controlled with a GPS system), for IOP members and their families, with the strict following of Covid-safety norms.
3. Hosted the Physics Open Discussion (POD) session at Cohen International School, 3rd January 2021.



4. Hosted the Physics Open Discussion (POD) session for school students with Bigyan Chetana manch, 30th January 2021.

4.3 Activities of Official Language Cell

Official Language Implementation

In pursuance of the Official Language Policy of the Government of India, Rajbhasha Ekak of the Institute is promoting the progressive use of Hindi in IIT Bhubaneswar. Presently the Cell has one sanctioned post of Junior Hindi Translator, which is lying vacant. The Institute is wholly tried to follow the rules and regulations of the Govt. of India related to Official Languages Hindi by deputing other staffs and officers of the Institute. Some of

On-Going Activities

Translation of Institute Annual Report, Annual Accounts, Audit Report and various other documents which comes under Section 3(3) of Official Language Act, 1963. In addition, various other letters and correspondence, replies etc., are either translated or prepared in Hindi. The Rajbhasha Ekak also try to ensure the effective implementation of the Official Language policy of Govt. of India at the Institute. The Ekak ensures the bilingual display and use of different nameplates, notice boards, rubber stamps, routine type forms and also help in preparing bilingual Degrees certificate awarded by the Institute.

Hindi Workshop

Hindi Training and Workshop Time to time, Rajbhasha Anubahg impart Hindi training to all Institute employees who have no working knowledge in Hindi. To solve the problem faced by the employees in using the official language, the Rajbhasha Anubhag organised workshops/training for the employees of the Institute and member office of TOLIC Bhubaneswar. In the reporting year, the following workshops were organised: Role of Technicians in Implementation of Official Language on 26.03.2021, Use of Technologies in Implementation of Official Language on 30.12.2020, An Introduction: Department of Atomic Energy on 29.06.2020.

Hindi Pakhwada-2020

Hindi Pakhwada Ceremony During 14-28 September 2020 Institute organised "Hindi Pakhwada" in the Institute. Several Programmes and competitions in Hindi were organised for employees and students of our Institute and as well as for students of neighbouring institutes during the 14 days long Hindi Pakhwada.. On 14th September 2020, Hindi Diwas was celebrated in the institute collabotation with Institute of Life Sciences, Bhuabaneswar. Hon'ble Director I/c. Prof. Pankaj Agarwal graced the occasion. In his speech, he praised the winners of various competitions and said that