

Outreach Programme

Vigyan Pratibha Programme

Homi Bhabha Centre for Science Education (HBCSE) has conducted “Weekly sessions of discussion seminars” through webinar during October 2020 to February 2021 under the Vigyan Pratibha Programme. SINP has co-ordinated the programmes in the Eastern Region of the country from time to time. Through these seminars, the participants were trained in various topics based on Science and Mathematics through discussions and various hands-on-activities.

Students' Awards

Best Performance Awards for Students

Suman Das and **Koustav Pal** have been awarded the best performance prize in Post M.Sc. jointly, in the session 2019-20 in Physics.

Sourav Mandal has been awarded the best performance prize in Post M.Sc. in the session 2018-19 in Biophysical Sciences.

Suman Das and **Koustav Pal** have been awarded the *A.P. Patro Memorial Prize* in Post M.Sc. jointly for the session 2019-20 in physics.

Best Thesis Awards 2020

- Dr. Avik Banerjee [guide Prof. Gautam Bhattacharyya] for his PhD work on the subject *Composite higgs and physics beyond the standard model*
- Dr. Avik Banerjee [guide Prof. Arnab Kundu] for his research work on *Aspects of AdS/CFT with fundamental flavours*
- Dr. Arnab Singh [guide Prof. Milan K. Sanyal and Prof. Mrinmay Mukhopadhyay] for his thesis *Low Dimensional Magnetic Structures*

PhD Awarded (April 2020 to March 2021)

1. Dr. Arpita Das, [Prof. Sankar De] Study of laser induced coherent phenomena in the rubidium atomic medium, Homi Bhabha National Institute, Mumbai, 9th March, 2021 [PDC]
2. Dr. Sweta Singh [Prof. Partha Saha] Role of epstein-barr virus in epithelial cell cancer, Homi Bhabha National Institute, Mumbai, 2nd March 2021 [PDC]
3. Dr. Rajarshi Bhattacharya, [Prof. Subir Sarkar] Search for Higgs boson pair production in the $HH \rightarrow b\bar{b}r\bar{r}$ channel in p-p collisions using CMS data at $\sqrt{s} = 13$ TeV at the LHC, Homi Bhabha National Institute, Mumbai, 26th February, 2021 [PDC]

Summary

(April 2020 - March 2021)

Founded as the “Institute for Nuclear Physics” in 1949, SINP acquired its present name after the demise of its founder Director, Prof. Meghnad Saha, a famous astrophysicist well-known for his discovery of the Thermal Ionization Equation. The Post-M.Sc. course in Physics, perhaps the first of its kind in the country, was launched way back in 1953 in this Institute. The purpose was to train highly motivated students for research in Nuclear Science. In subsequent years, SINP has expanded the scope of the course to embrace other areas of Physics and Biophysical Sciences, and since 1993-94, the course has become an integral part of the doctoral work in SINP.

SINP is engaged in basic scientific research in several frontier areas of Physical and Biophysical sciences. The research activities of the Institute are distributed in four groups: [A] Biophysics & Chemical Sciences, [B] Atomic, High Energy, Nuclear and Plasma Physics, [C] Theory, Astroparticle Physics and Cosmology, [D] Condensed Matter Physics, Surface Physics and Material Science. Scientific Information and Resource Division (SIRD) integrates and coordinates the activities in teaching & training of Post-M.Sc. students, summer and undergraduate programmes, library, M.N. Saha Archive, and organizes outreach programs of the Institute and Vigyan Pratibha Programs (which nurtures science talents among school students). Presently the Institute has sixty-nine (69) faculty members, one hundred and thirty (130) research scholars and post-doctoral fellows. Thirteen (13) students have been inducted in Post-M.Sc. course this year.

Major accomplishments of the Institute in R&D include

- i) Initiation of commissioning of FRENA (Facility for Research in Experimental Nuclear Astrophysics). It has been installed in 2018 and is in the process of receiving the AERB permission for trial operation. A small high vacuum chamber is being fabricated for gamma and charged particle measurements.
- ii) After successful commissioning of GIXS beamline (BL-13) at Indus-2 synchrotron radiation facility, the SINP beamline at RRCAT, Indore has been running under trial permission. All safety measures are in place, and an application has been made to AERB in February, 2021, for the safety approval. A comprehensive users’ manual has been prepared. Daily maintenance work, operation and users’ support for the beamline is provided by RRCAT and SINP. It is used to characterize ultrathin, nanostructured films and multilayers in different measurement modes, depending on the nature of the films and required information.
- iii) Developing the Jaduguda underground National laboratory to operate at a depth of 555 m with data of cosmic muon flux, radon and gamma rays being monitored and recorded by scientists. During the period 2020-2021, the wireless communication from the mine to the data monitoring Unit at the Health Physics Section of UCIL has been completed. From the tower of JUSL at the underground, there is a radio link to the Health Physics Laboratory. The institute is also engaged in several large international collaborations, like CMS, ALICE, MAGIC, etc.

During this period researchers of SINP had published **368** (average impact factor (IF) of **4.794**) scientific articles in refereed journals of which **133** are in international collaborations (IC). **143** of 368 articles were published in journals of IF > 5 (of which **66**

and to understand the structures and properties of controlled low dimensional (LD) systems with emphasis on the nanostructuring, ordering and surface interface tuning (NOSIT) of energy harvesting materials (EHMs). In future we would like to be in the forefront of Biophysics and Smart Materials.

Scope of the Project

- Cellular and molecular basis of cancer.
- Structural insights on viral and human proteins.
- Novel cancer biomarkers and therapeutic strategies.
- Epidemiological correlation of level of radioactivity and oxidative stress with cancer.
- Installation of UPAIN T Imaging, Liquid Handling system for crystallization, EPR, Quantitative ESI-MS and an animal house.
- Synthesis and characterization of materials and device structures having large local/non-local magnetoresistance and topological properties.
- Demonstration of next-generation coherent electronics based on topologically protected states.
- Synthesis of efficient magnetocaloric, spin-caloric and thermoelectric materials/devices.
- Controlled growth of LD EHMs, characterization of their structures using scattering, microscopy and spectroscopic techniques facilities and finally measurement their properties.
- Installation of a small and wide-angle X-ray scattering (SAXS-WAXS) and a versatile scanning electron microscope (VSEM) facilities.
- Plans to tilt the X-ray beam from the synchrotron source with a mirror to measure the in-plane grazing incidence diffraction from the liquid surfaces and determine the structure of the assembly of nanoparticles / biomolecules on the liquid surface at the SINP beamline facility at RRCAT.

Infrastructure Developments (ID)

The primary aim of the project is to develop, upgrade and maintain the central facilities of the Institute that are open to use for all students, staff, faculty members and visitors. The central facilities consist of several activities of the Institute, such as training of personnel, outreach programs, research, workshop, fire fighting & safety, civil & electrical works, repairing and upgrading sites, central computing facility, network infrastructure, etc. The full project will be implemented through various sections and facilities of the Institute. The project will provide support to the HRD component of the Institute.

Scope of the Project:

- Outreach programs.
- Re-modeling of Library and M N Saha Archive.
- Campus e-Surveillance (CCTV).
- Procurement of Safety equipment (Radiation, Fire, Chemical and others).
- Renovation & Installation of Fire fighting pipe line above the ground.
- Construction of new campus in Belgachia.
- Installation and Distribution of transformer system.