From the Director's Desk....

It is a pleasure to see the first issue of RRCAT newsletter for 2016 ready for publication. This issue includes news items about the latest accomplishments of the Centre in R&D activities, human resource and infrastructure development, and outreach activities during the second half of 2015.

The Indus synchrotron radiation facility is operating round-the-clock along with continuous and intense efforts put in to upgrade the accelerators as well as the user facilities. A major up-gradation has been the design, procurement, installation and commissioning of three insertion devices in different long straight sections of the Indus-2 storage ring. This will facilitate entry into the 3rd generation source regime. This issue includes a report on the commissioning of the APPLE-2 undulator which will provide synchrotron radiation with variable polarization. The Centre also has a programme for development of fourth generation light sources, namely free electron lasers. The infra-red free electron laser is in an advanced stage of commissioning. This has involved indigenous development of linac structures, transport lines and extremely stable RF systems and magnet power supplies. R&D activities are continuing apace for indigenous development of various sub-systems required for further upgradation of the Indus facility. The R&D programme on superconducting RF cavities is also progressing well. The first 1.3 GHz nine-cell superconducting RF cavity has been fabricated and is undergoing surface preparation for its performance test. A single-cell 650 MHz cavity has been fabricated, processed and tested using in-house developed facilities. A glimpse of some of these activities can be seen in this issue.

The Indus synchrotron source national facility is in great demand. Over the past five years the number of users has increased eight-fold and researchers from nearly 100 institutions across the country have made use of it. This shows the increasing refinement of the accelerator performance as well as the user facilities. In fact, the number of user experiments in the last year is 390 despite two long shutdowns taken for installation of the three undulators. The recent R&D studies done using the Indus facilities include structural studies on various materials, development of compound hard X-ray lenses and determination of three-dimensional structures of several new protein molecules.

In the area of lasers, our Centre has made laudable contributions in developing customized laser cutting equipment and procedures for nuclear reactor maintenance. This has resulted in significant cost reduction and man-rem savings. This issue includes news items describing some of this work. The importance of this work is underlined by the fact that an MOU has been signed with NPCIL to provide them with specialized laser cutting technology for various applications in nuclear reactors. There have been significant achievements in R&D using lasers. Quasi-mono-energetic acceleration of ions and protons has been demonstrated from the interaction of intense, ultra-short laser pulses with specially designed gold/carbon layered targets. Laser based techniques like Raman optical tweezers, photo dynamic therapy, photonic nano-jets and optical coherence tomography are being developed for various bio-medical applications including cell analysis and wound healing.

In December 2015, the 24th National Laser Symposium was organized at our Centre, with a special session devoted to the International Year of Light- 2015. Another major event was the 32nd DAE Safety & Occupational Health Professionals Meet which was organized in October 2015. The two themes of the Meet were "Safety in Evolving and Advanced Technological Applications" and "Positive Health Management". The past year was also a celebration of our Department completing 60 years. Under the Public Outreach Programme, several events named "Kan aur Prakash Vigyan Saptah (कण और प्रकाश विज्ञान सप्ताह)" were organized at different cities in Madhya Pradesh. The events included exhibitions, lectures and competitions and allowed us to reach out to a large number of teachers, students, and members of public. The Diamond Jubilee commemorative structure with its attractive and elegant design has become a must-see point for all visitors to our campus.

I congratulate the Editorial Board for their excellent efforts in bringing forth the wide spectrum of the recent activities and achievements of the Centre and in bringing out the Newsletter on time.

With best wishes,

February 26, 2016

P. D Gupta

(P D Gupta)
Director