



From the Director's Desk...

I am happy to see the second issue of this year's RRCAT Newsletter ready for publication. The issue gives an account of recent activities and important accomplishments of the Centre, during the first half of this year.

Both the synchrotron radiation sources, Indus-1 and Indus-2, have been operating in the round-the-clock mode. On June 19, 2014, Indus-2 reached yet another major milestone : operation at beam current exceeding 200 mA at 2.5 GeV energy. This has been accomplished after carrying out a number of R&D efforts which include the enhancement in the capacity of the solid state RF power amplifiers to 225 kW, optimization of electron beam orbit, vacuum conditioning, deployment of bunch-by-bunch feedback system and global fast orbit feedback control in the Indus-2 storage ring. Our next major target in Indus-2 is the up-gradation of its storage ring by incorporating five insertion devices in the straight sections. The planned insertion devices have already been designed and two planar undulators are scheduled to be installed in the storage ring during the next 2-3 months.

I am happy to note that the Indus beamlines are being used by an increasing number of researchers. Some notable recent applications are characterization of the Lyman-alpha photometer payload of the Mars orbit mission, development of compound refractive x-ray lenses using the lithography beamline, x-ray diffraction, x-ray fluorescence and EXAFS studies on a variety of materials, and high resolution crystallography of several novel protein structures. The availability schedule of the Indus synchrotron sources is displayed on the internet and users can make online bookings for the beamtime.

Two major future projects of DAE in the area of accelerators, viz. Accelerator Driven System and Spallation Neutron Source, would require a large number of superconducting RF cavities. RRCAT has set up an extensive infrastructure for fabrication, processing and performance evaluation of such cavities. Single-cell 650 MHz niobium cavity and five-cell 1.3 GHz cavity developed in-house have recently been tested at Fermilab, USA and have shown excellent performance. Further, the commissioning of a Vertical Test Stand for the performance characterization of such cavities has made us more self-reliant. On the societal front, the electron linac irradiation facility has been extensively used by researchers from several national laboratories and agricultural universities for mutation breeding of a variety of seeds.

Coming to the area of laser R&D and applications, this issue carries reports on several important achievements. Fibre-coupled Nd:YAG laser with remote control operation has been successfully deployed for underwater gas-assisted laser cutting of pressure tube stubs of PHWR at Kakrapar Atomic Power Station. Advancements have also been made in the Nd:YAG lasers, fibre lasers, Copper Vapour Lasers (CVLs) and CVL pumped dye lasers. Ordering of haemoglobin molecules in RBC's and further development of Doppler optical coherence tomography, high harmonic generation from nano-particle containing plasmas, ultrashort pulse K- α x-ray source for time-resolved x-ray diffraction, and enhanced loading of cold atoms in magneto-optical traps are some examples of innovative research and developments.

The Centre as well as its residential complex are situated in a panoramic surrounding with rich flora and fauna, including a beautiful lake. It is of paramount importance for us to preserve this rich environment bestowed by nature, concurrent with the expansion of the scientific programmes. An advisory committee for "Clean and Green Campus" is actively in operation since January 2014 towards this cause. As a part of this initiative, a Nisargruna bio-gas plant has been set up in the campus for treating the bio-degradable waste. This has also drawn keen interest from several organisations in and around Indore and has enhanced our public outreach.

I am sure this issue will provide the readers a glimpse of our recent progress. The issue is also the first one from the re-constituted Editorial Board. I wish to express my appreciation of the diligent efforts and hard work put in by the earlier Editorial Board in bringing the newsletter regularly and ensuring high quality of contents. I also wish to compliment the new Editorial Board for maintaining the high standards with a comprehensive newsworthy coverage.

With best wishes.

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