From the Director's Desk....

I am happy to see the first issue of year 2017 of the RRCAT Newsletter ready for publication. The issue gives an account of the recent activities and important accomplishments of the Centre in research and development activities during the second half of the last year (2016).

During 2016, both the synchrotron radiation sources Indus-1 and Indus-2 were operated in round-the-clock mode for 340 days. Remaining 26 days were planned shut-downs for maintenance / upgradation. The beam availability to the users in 2016 was more than 7200 hours for Indus-1 and more than 5200 hours for Indus-2. As a result of this beam availability and due to sustained efforts by the beamline scientists, the Indus usage jumped up by 64% from 390 in 2015 to 640 in 2016. Along with continuous operation of the Indus synchrotrons for the users from all over the country, R&D efforts are also going on the upgrade the capabilities of Indus, which include development of a system for measuring first and second integrals of APPLE-2 undulator magnetic field, implementation of an automatic sequence based on machine states to switch off Indus-2 injection system to enhance the life of pulse power supplies, along with power saving. A software which has been developed for baking application, and successfully used in the baking cycles conducted for the commissioning of the three undulators U1, U2 & U3 in Indus-2, is reported in this issue. On the beamline front, calibration of a Si-PIN detector to go on ISRO's second Chandrayaan space mission in 2018, was carried out on BL-16 beamline of Indus-2. One may recall that for Mangalyaan mission also, the Lyman alpha spectrometer was calibrated on Indus-1 beamline. Two of Indus-2 beamlines, EXAFS beamline BL-9 and ADXRD beamline BL-12, have hit centuries of journal papers published on the work carried out on them.

The first signature of lasing, with an estimated gain of ~10^4 has been achieved in the infra-red free electron laser of RRCAT operating at ~ 34 micron wavelength. This is the first observation of lasing in an FEL in the country. Our laser programme is quite well geared to meet various specialized needs of DAE. To increase the life of 9 coolant channels of RAPS-3 power reactor, remote laser cutting of triangular blocks at its 18 yoke assemblies was carried out. In KAPS-2 reactor, *in situ* removal of 3 coolant channels was carried out for post irradiation examination. RRCAT has developed a 630 W pulsed Nd:YAG laser for laser cutting of fuel sub-assemblies of the Prototype Fast Breeder Reactor (PFBR), in hot cell at IGCAR. RRCAT has recently supplied to NFC, Hyderabad a laser marker to mark end plates of fuel bundles, which has been installed in the production line for trials. This issue carries a report on laser diode driver for the laser marker system. Experimental observation and phase realization of Talbot array illumination for 2-dimensional phase grating has also been reported. In the area of laser R&D and applications, this issue carries reports on several important achievements like development of a diode pumped 1.4 kW fibre coupled continuous wave Nd:YAG laser, development of a magneto-optical trap for cooling of fermionic ^{83}Kr atoms, development of metrology system for end plugs for Fast Breeder Test Reactor (FBTR) fuel pins, compensation of phase errors in a tiled single grating laser pulse compressor, etc.

As the Centre is situated in a panoramic surrounding with rich flora and fauna, while expanding the scientific programmes, it is of paramount importance for us to preserve this rich environment bestowed on us by nature. As a part of this initiative, two vermiculture plants have been set up, which yield vermin-compost by disposing garden waste in an eco-friendly way. As part of our renewable energy initiative, a roof-top solar photovoltaic generating system has been commissioned for common area lighting in the Diamond Jubilee Guest House.

I am sure this issue will provide the readers a glimpse of our recent progress. I would like to end by expressing my appreciation of the efforts made by the Editorial Board to bring out the newsletter regularly to highlight the R&D activities of our Centre.

With best wishes,

(P.A. Naik)
Director