



From the Director's Desk...

It gives me immense pleasure to present this issue of the RRCAT Newsletter covering the period July–December 2025. This issue captures a vibrant spectrum of scientific, technological, engineering, and institutional achievements accomplished across the Centre. The activities reported here span some of the most challenging frontiers of modern science and technology, which includes accelerator physics, superconducting RF systems, synchrotron radiation sources, high-power lasers, free-electron lasers, advanced materials, cryogenics, vacuum science, precision instrumentation, additive manufacturing, biomedical diagnostics, and applied photonics.

The continued reliable operation and technological enhancement of the Indus synchrotron radiation facilities remain a matter of great satisfaction. These national facilities support a large user community and play a pivotal role in enabling cutting-edge research across multiple scientific disciplines. Equally encouraging is the progress achieved in development of SSR-2 superconducting RF cavities, compact low level RF systems, cryogenic infrastructure for testing superconducting magnets, and indigenous development of critical accelerator subsystems, all of which strengthen our long-term capabilities in accelerator science and technology.

The achievements reported by the Laser Group are equally noteworthy. Advances in high-power laser systems, ultrafast science, laser-driven ion acceleration, optical coatings, semiconductor-based radiation detector technologies, and high-energy laser components demonstrate the Centre's continuing leadership in laser research. The successful demonstration of laser-driven proton acceleration at the PW Laser Facility represents an important milestone and opens new opportunities for frontier research in high-energy-density and plasma science.

The contributions in materials science and advanced technologies further illustrate the multidisciplinary nature of RRCAT's research ecosystem. These include opening up of the IR-FEL facility for external users, additive manufacturing for strategic and aerospace applications, development of advanced hyperspectral imaging system, Chromox ceramic based detector for hydrogen ions, flexible triboelectric energy harvesting devices, and Raman spectroscopy-based diagnostics reflect our commitment to translating fundamental research into impactful technologies.

The improvements in the IT infrastructure, advanced manufacturing technologies, and civil infrastructure continue to provide crucial support to various important projects of RRCAT, thereby enabling scientific programmes to progress efficiently and reliably. The theme articles on IR-FEL and LIBS summarize the recent developments which have taken place in these fields in the Centre.

I am particularly pleased to note the Centre's growing contributions to major national and international scientific programmes. The indigenous development of high-RRR niobium sheets, which were handed over by Dr. Ajit Kumar Mohanty, Chairman, AEC, and Secretary, DAE, to Shri Unmesh D. Malshe, the then Director, RRCAT, represent a major milestone in this direction. In addition, development of advanced accelerator components, superconducting technologies, and participation in collaborative programmes with leading international laboratories underline the confidence that the global scientific community places in RRCAT's technical expertise and scientific capabilities. Such collaborations not only enrich our scientific environment but also position India as a valued contributor to large-scale international scientific endeavours. The list of publications presented in this issue is a testament of the high quality of research being pursued at the Centre, and points towards the dedication, innovation, and excellence of our scientific community.

Beyond the scientific accomplishments, this issue also highlights our sustained focus on personnel safety, environmental stewardship, staff welfare activities, skill development, Hindi language promotional activities, and various community engagement. These dimensions are essential for all-round development of RRCAT staff members and a happy, healthy, vibrant scientific community.

My hearty congratulations to Shri Alok Singh and Shri Sachin Kumar Agrawal for being bestowed the Homi Bhabha Science and Technology Maan Patra for the year 2025 for their outstanding contribution to the Department. I also congratulate the other award winners in different categories, and look forward to many more such laurels for my colleagues in the years to come.

The RRCAT Newsletter occupies a special place among our institutional publications. It serves not only as a record of achievements but also as a valuable window through which the scientific community, collaborating institutions, policymakers, students, and the public can appreciate the challenging and impactful research and development activities being pursued at the Centre. I congratulate all contributors whose efforts have culminated in the achievements reported here.

I place on record my deep appreciation for the efforts put in by the newly constituted Editorial Board. The team has demonstrated remarkable commitment and professionalism in compiling and presenting this issue in an engaging manner. I am confident that the Newsletter will continue to evolve into a vibrant and widely appreciated publication that effectively communicates the Centre's accomplishments to the scientific community and society at large.

With best wishes,
June 17, 2026

Viraj P. Bhanage
Director, RRCAT