

There was a session of two special evening talks by internationally renowned scientists: (1) “The beginnings of gravitational wave astronomy: current state and future” by Prof. Rainer Weiss (Physics Noble Laureate 2017), MIT, USA, and (2) “Plasmonic Technologies for Alloyed Hybrid Meta-surfaces” by Prof. Martin Olivier, Swiss Federal Institute of Technology, Lausanne (EPFL), Switzerland. These talks were highly appreciated by the participants. During NLS-29, there was a separate session for the industry presentation in which information about laser and related products was presented by different vendors.



Prof. Rainer Weiss (Physics Noble Laureate for 2017) delivering his special evening talk during NLS-29. In the inset: Prof. Somak Raychaudhury, Director, IUCAA, Pune, conducting this session.

It is a matter of great pride and honor that Dr. G. Sathesh Reddy, Secretary, Department of Defence R&D and Chairman, Defence Research and Development Organisation (DRDO), Govt. of India, was the Chief Guest at the inaugural function of NLS-29 on 12th Feb, 2021. His gracious online presence and motivating address to the participants and delegates added value to the Symposium. During the inauguration of NLS-29, Shri Debashis Das, Director, RRCAT, Indore and Shri Purushottamdas Pasari, Chancellor, SVVV, Indore, were special guests who addressed the participants and delegates in online mode. On this occasion of inauguration, Shri S. V. Nakhe, President, ILA, presented the ILA perspective of the NLS event. The function was presided by Prof. U. Dhar, Vice Chancellor, SVVV, Indore, who presented his views on symposium and new education policy in his address to participants. During the inaugural session, Chief Guest released e-proceedings of NLS-29 and inaugurated the Exhibition Gallery from vendors of lasers and related products, in online mode. More than 10 industries and vendors displayed their products related information in the exhibition.

Indian Laser Association plays an active role in various ways in planning the NLS. Over the years, the short tutorial courses organized by ILA on laser related advanced topics, preceding the NLS, have become quite popular among the young researchers. This year, just before the NLS-29, on 10th and 11th

February 2021, two short courses were offered by ILA. These are: (1) “LASER - A Versatile Tool for Research and Technology Development” (Course Co-ordinators: Dr Suprajya Thakur and Dr. Manvendra Kumar, SVVV, Indore) and (2) “Quantum Metrology” (Course Co-ordinators: Dr Sendhil Raja and Dr. Vibhuti Bhushan Tiwari, RRCAT, Indore). Many young researchers from various parts of country attended these courses, which will be beneficial to their future growth.

Reported by:
S. R. Mishra (srm@rrcat.gov.in)

N.7: Industrial and radiation safety in RRCAT

Industrial safety: Fire & Safety Cell of RRCAT puts efforts to ensure that safe working environment prevails in the Centre. It also instructs the individuals to adhere to the safe work practices and complies with all administrative checks and controls. To meet these objectives, various safety measures are being continuously followed, which includes safety inspections at various levels. The objectives of these inspections are to analyze and eliminate the associated job hazards, which may become reason for the potential accidents. Internal Safety Inspection Committees for Accelerator and Laser Labs, Safety Review Sub-committees for EAG, PAG, LGB, MSG and TDSG and Apex Safety Committee (ASC) of RRCAT are regularly monitoring, reviewing and ensuring implementation of various safety related measures. Internal safety inspection committees are regularly visiting various laboratories and buildings of RRCAT. Committees observe the industrial safety aspects and gives recommendations to improve safety, wherever necessary. These safety inspections are carried out in the presence of Building Safety Officer (BSO) and deputy BSO of the respective buildings, and the reports are submitted to ASC.

The Internal Safety Inspection Committee for Accelerator ensured that radiation fields and other hazardous factors in accessible areas were within the relevant regulatory stipulated limits; no one remained trapped or was present inside the areas with high radiation fields during operation while the primary particle beam was switched on; there was protection against noxious fumes and gases that might be formed during the accelerator beam operation or in radiation processing of materials; an efficient fire protection system was in place; safety was adequately taken care of against all other conventional and industrial hazards, and non-ionizing radiation, which might arise from operation in various subsystems in the facility. The fire protection system was checked to ensure that it was working efficiently and there was adequate protection against noxious fumes and gases. Similarly, Internal Safety Inspection Team for Laser, ensured that everyone using laser were aware of the risks, for example, watches and other jewelries that might enter the optical plane were not allowed in the laboratory; all non-optical objects that were close to the optical plane had a matt finish in order to prevent specular reflections; adequate eye protection was provided to everyone in the room if there was a significant risk

of eye injury; alignment of beams and optical components were performed at a reduced beam power wherever possible. Construction Safety Committee is also working to look into safety concerns related to construction sites. During inspection visit, the committee ensured that every worker who was involved at construction site was trained to use personal protective equipment (PPE), like full body harness, helmet, shoes and gloves, etc. This committee also conducted physical test for the labours, working at height and height passes were issued to the successful candidates.



Photographs during physical test for issuing of height passes to construction labour.

All other safety review sub committees at RRCAT reviewed the safety issues, related to design, modification, operation and maintenance works etc., and gave their recommendations to improve the safety features and ensured the compliance for shortcomings, if found. All the recommendations and reports of these committees were put up for the approval of ASC of RRCAT. ASC also reviewed the recommendations of AERB inspection team and its compliance for the relevant period. The status of occupational health check-up of employees working in laser labs, workshops, chemical facility and radiation zone was also reviewed by ASC. Besides, ASC also reviewed the status of testing and maintenance of pressure vessels and cranes, status of earth pits, their maintenance and resistance measurement, status of occupational health check-up of employees of different categories (such as of employees engaged in hazardous jobs, other radiation workers, drivers, welders), eye checkup of employees working in lasers, audiometry of employees working in noisy area, medical examination of contractor workers engaged in preparation and serving of food in Guest House canteen, etc., status of license from MP Pollution Control Board for operating Chemical Treatment Facility in RRCAT, status of operation and maintenance of fire pump house, status of license for inflammable store, status of recruitment of Safety Officer, status of height pass, compliance status of deficiencies observed in illumination and noise levels at various locations of work, compliance status of adherence to work permit system in Indus complex, compliance status of corrective measures taken after an accident, compliance status of recommendations of Internal Safety Inspection Committees, etc.

All necessary documents and records in compliance with AERB guidelines were maintained for regulatory inspection by the regulator. Regular noise and illumination measurements are done as per the guidelines set in Atomic Energy Factory Rules - 1996 and corrective measures are taken to improve the observed deficiencies, if any. Regular coordination and data collection from Administration, Medical Centre, Security, CISF, and other sections/divisions on various aspects of industrial safety and reporting to the regulator was done in the form of “Quarterly Status Report of RRCAT on Safety, Health and Environment, Industrial Hygiene Surveillance Report, Industrial Safety Award Report, Plant Accidents details report, etc.”.

Radiation safety: Radiation surveillance was provided to all radiation facilities to ensure radiation safety of staff and workers. During this period (Jan-June 2021), Indus-1 was operated with maximum beam current up to 125 mA at 450 MeV and Indus-2 up to 142.5 mA at 2.5 GeV. Radiological surveillance was provided during the operation of both the synchrotron radiation facilities and their beamlines. Induced radioactivity measurement on accelerator components was carried out during Indus shut down. Response check of area radiation monitors and survey instruments were carried out at the radiation facilities (Indus-1, Indus-2 and beam lines, ARPF, IRFEL, gamma chamber, HTS, and VTS). Personal dosimetry for 535 workers (including temporary) was carried out during the period (due to COVID-19, the TLDs of 1st quarter was continued for the 2nd quarter and dose report is awaited). The bio-metrics of 9 new radiation workers was uploaded on National Occupational Dose Registry System. In order to comply with the COVID-19 work environment management guidelines, the dosimeter issue and return were done through a counter at Health Physics Unit, Indus-1 and online training on radiation safety was provided to radiation workers through HPU portal. The pocket dosimeters, which are returned after use by radiation workers on daily basis, were disinfected using UVC sanitation chamber at Health Physics Unit. Quarterly testing of various equipment / instruments of Emergency Response Centre was carried out and kept in a preparedness state for responding to any radiological emergency. Refresher course on radiation safety at Indus Accelerator Complex for Indus operation staff was provided in two batches on 23rd and 30th March 2021. Training programme on safe operation of Horizontal Test Stand facility was conducted on 26th March 2021. Document on radiological experiences during the operation of Indus-2 during the 5-year period (2016-2020) was prepared and submitted to AERB along with other documents for renewing the operational license by AERB. Environmental radiation monitoring of 11 locations at RRCAT campus and ARPF site was carried out and no increase in radiation level was observed due to operation of the radiation facilities.

*Reported by:
Vivek Bhatnagar (vivek@rrcat.gov.in)*