

N.8: RRCAT Seminars during January 2016 to June 2016

1. A Novel Indigenous Technology for Niobium to Austenitic Stainless Steel Brazed Joints:

Delivered by **Shri Abhay Kumar**, SOG, Accelerator Components Design and Fabrication Section, on June 21, 2016.



Development of reliable Nb-316L stainless steel (SS) transition joints is an important step towards use of austenitic SS helium vessel for SCRF cavities of particle accelerators. In this regard, a novel brazing recipe and a unique design for manufacture and assembly have been developed at RRCAT and the technology is standardized for producing defect-free, strong and ductile "Nb pipe/316L SS flange" brazed joint with repeatable joint characteristics. Important features of the development include (i) freedom from brittle intermetallic compounds, (ii) uniform and controlled joint thickness, (iii) efficient utilization of braze filler metal, (iv) simplified pre-braze fitting procedure, (v) environment friendly cleaning procedure and (vi) relaxed storage conditions for pre-braze assembly. The new technology marks significant improvement over existing global vacuum brazing practice. Various aspects of the technology were discussed.

2. Choices for Low Loss Accelerator Designs for a Spallation Neutron Source:

Delivered by **Dr. Deepak Raparia**, Head, Pre-injector systems, Collider Accelerator Department of BNL, USA, on June 3, 2016.



The main concern in designing a spallation neutron source is the beam loss. This talk discussed various design strategies to keep the beam losses as low as possible, by making a proper choice of accelerator configuration, linac frequency, linac block diagram, beam neutralization in low energy beam transport, transition energy for warm to superconducting structure, high energy beam transport, injection painting schemes, ring lattices, beam collimation, electron cloud etc.

3. Application of high power Nd:YAG lasers in nuclear field:

Delivered by **Dr. B. N. Upadhyaya**, SOG, Advanced Solid State Laser Section, Solid State Laser Division, on May 20, 2016.



Any job related to nuclear field is often a challenging task due to risk of high radiation exposure, secondary waste generation, space restriction, and contamination. Thus, remotely operable non-contact techniques are always preferable. High power Nd:YAG lasers with fiber optic beam delivery is an attractive choice under these conditions. In order to cater nuclear field related requirements, high power fiber coupled pulsed Nd:YAG lasers with average power up to 1 kW have been indigenously developed at RRCAT along with several innovative laser material processing techniques and tooling. Over last one decade, these laser processing techniques have been successfully deployed for in-situ refurbishing in several Indian nuclear power plants and resulted in huge reduction in radiation dose consumption along with saving in time and cost. This seminar covered details of these laser material processing techniques and their deployment in nuclear field.

4. Recent Topics of Synchrotron Radiation Sources in Japan:

Delivered by **Prof. Makoto Watanabe**, Professor emeritus at Tohoku University, Japan, on March 11, 2016.



Synchrotron radiation sources and the application of these sources in various pure and applied sciences has been an active field in Japan, since the inception of first generation synchrotron light sources in early 1970s. An overview on the recent topics on synchrotron based science research was presented. The presentation also focused on a recent effort in the form of a book "A Guide to Synchrotron Radiation Science" written for guiding young scientists/graduate students interested in using synchrotron radiation sources or considering entering the field of accelerator design/optical engineering.

5. Gravitational Wave Event GW150914: Heralding the era of Gravitation Wave Astronomy:

Delivered by **Dr. Sendhil Raja S.**, Head, Laser & Optical Instrumentation Lab, Advanced Lasers and Optics Division on Feb 24, 2016.

On Sept 14, 2015 the two Advanced Laser Interferometer Gravitational Wave Observatories (aLIGO) detected an event (labeled GW150914) which was the first detection of Gravitation Waves in a "man-made" Detector. The talk covered an overview of Gravitational Wave Detectors, both bar detectors and interferometer based detectors. The talk included a detailed description of aLIGO, and a discussion on the first Gravitational Wave event GW150914 detected by these detectors. Setting up of a third aLIGO detector in India (LIGO-India) and efforts towards this activity at RRCAT were also described.



6. Spectroscopy of chiral molecules with femtosecond UV/VUV pulses:

Delivered by **Dr. Bhargav Ram Niraghatam**, Laboratory for Physical Chemistry, ETH Zurich, Germany on Jan 6, 2016.

Chirality is a ubiquitous phenomenon in nature seen across fundamental processes in particle physics, molecular chemistry, biology and has wide applications in food and pharmaceutical industry. Existing techniques of detecting chirality in molecules are based on circular dichroism in absorption. In the last decade, photoionization of chiral molecules by circularly polarized light has been demonstrated as a sensitive probe of chirality. Photoelectron angular distributions show strong signatures of chirality where electrons are scattered forward or backward depending on the handedness of molecule or light. The development of femtosecond laser sources and high harmonic generation (HHG) in gases has enabled VUV/XUV molecular spectroscopy. With techniques to generate circularly polarized high harmonic generation reported recently, this allows us to study the photoionization of chiral molecules. The seminar covered all these aspects.



*Reported by:
Rama Chari (chari@rrcat.gov.in)*

N.9: Honours and Awards:

H.1: Dr. Tarun Kumar Sharma, SOG and Head, Semiconductor Physics & Devices Lab., Solid State Lasers Division, RRCAT has been conferred MRSI Medal by Materials Research Society of India in recognition of his significant contributions to the field of Material Science and Engineering on February 18, 2016 at Jorhat, India.



H.2: Best Poster Awards:

1. A paper from Semiconductor Physics & Devices Lab., Solid State Lasers Division, RRCAT was selected for the Best Poster Award during the DAE-BRNS Symposium on Condensed Matter Physics under Extreme Conditions (CoMPEC-2016), held at BARC during April 13-16, 2016. The award carried a cash prize of Rs. 5,000. The details of the poster paper is given below.

Title: "Role of disorder and multi-valley scattering on the dynamics and effective mass of excitons in Al_xGa_{1-x}As/GaAs quantum wells investigated by magneto-photoluminescence"

Authors: S. Haldar, G. Vashisht, S. Porwal, S. K. Khamari, V.K. Dixit, T. K. Sharma and S. M. Oak

Shri S. Haldar, SRF, HBNI, RRCAT, who presented the poster paper received the award.



2. A paper from Computer Division, RRCAT was awarded best poster under category "Security Systems" during 9th DAE Vision for Information Exchange 2016 (DAE-VIE 2016) Symposium on "Emerging Trends in Instrumentation & Control and Computer Systems", which was held at Indira Gandhi Centre for Atomic Research, Kalpakkam during 23-24 June 2016. The award carried a cash price of Rs. 2000/- and a citation. The details of the poster paper is given below:

Title: Information and Application Security using open source database for Internet accessible deployment

Authors: Alok Jain, Diptikant Pathy, Manish Manyal, Gitika Khare, Umesh Sharma, Sarthak Gupta, Alpana Rajan, Jitendra Patil

Shri Alok Jain, SO/F, Computer Centre, Computer Division, who presented the poster paper received the award.

