Issue 117
Apr 2023

The Fourth State

Newsletter of the Institute For Plasma Research, Gandhinagar, Gujarat (India)

Swachhatha Pakhwada 2023

"Swachhta-Pakhwada-2023" was observed at IPR during 16-28 February, 2023. As part of this drive, all IPR staff members actively and enthusiastically participated in this drive through different activities like Swachhata walk, Webinar, Slogan Competition, Drama Competition, Online Quiz Competition, Debate Competition, Poem Competition etc. The inauguration of the *Swachhatha Phakwada* was held on 16-Feb-2023.

Inauguration of the Swachhatha Pakhwada 2023 at IPR

IPR staff doing the "Swachhatha Walk" in IPR campus

Swachhatha Pakhwada 2023

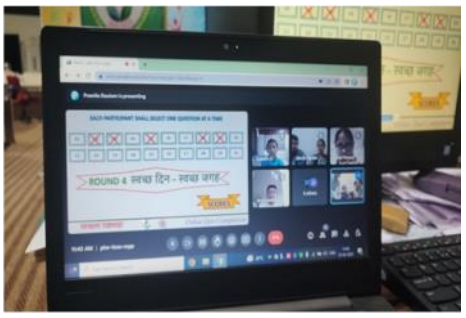


Webinar on “Waste to Wealth using Thermal Plasma Technologies” By Dr. S. K. Nema on 24 Feb, 2023

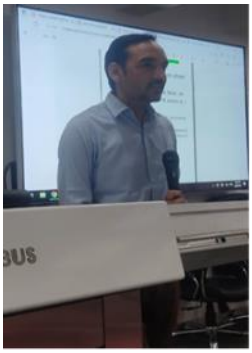


Drama Competition in progress on 24 Feb, 2023



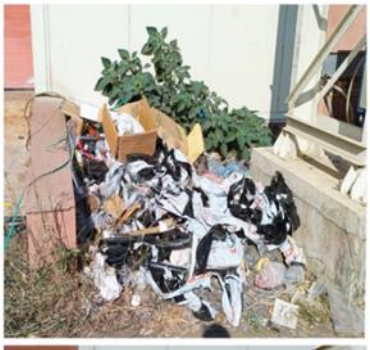


Online Quiz Competition in progress on 27 Feb, 2023





Debate and Poem Competition in progress on 28 Feb, 2023





Removal of junk/scrap from office rooms and labs during Swachhata Pakhwada period

Swachhatha Pakhwada 2023

The concluding session of the “Swachhta-Pakhwada-2023” was conducted on 28-Feb-2023. Director IPR led the “Swachhatha Pledge” and also distributed the prizes to winners of various competitions organized during the fortnight.



(L) Director IPR reading the Swachhatha Pledge to IPR staff (R) Vote of Thanks by Mainak Bandyopadhyay





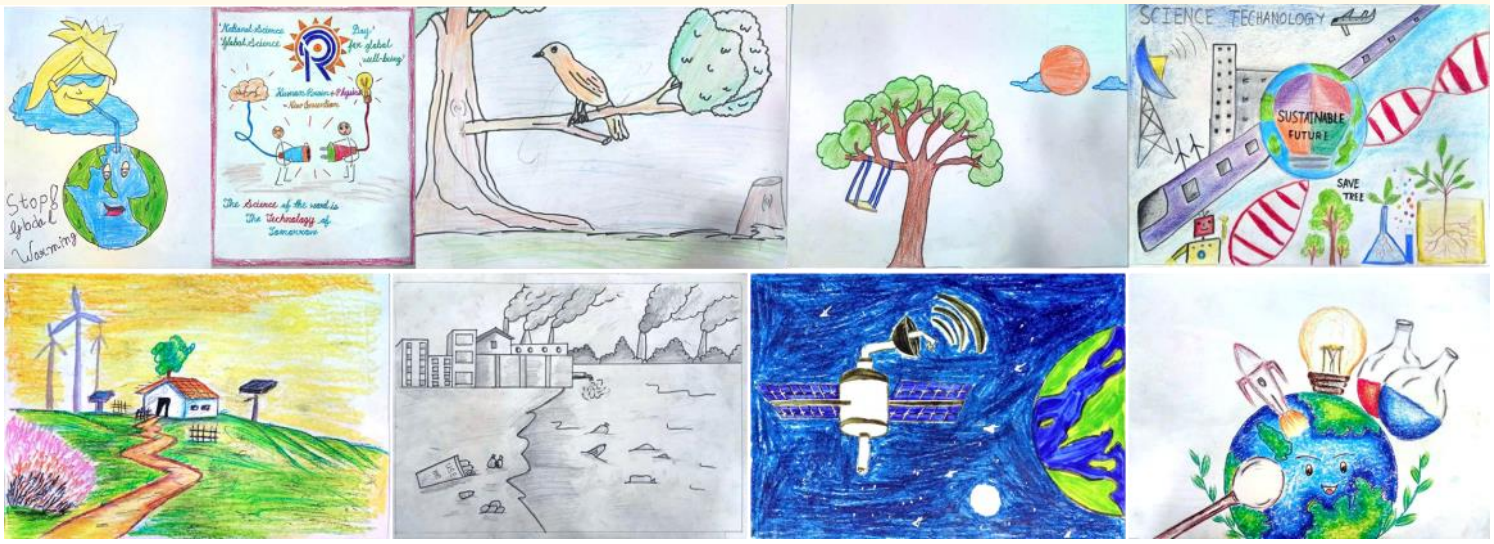





(L&M) Team awards being presented by Dean R&D (R) The Swachhata Pakhwada team

National Science Day 2023 @CPP

Outreach Cell of CPP-IPR, in active co-operation of the faculty members, staff and research scholars, celebrated the National Science Day on 28th February, 2023 with day-long activities. The theme for this year's events was "Global Science for Global Wellbeing." To mark the occasion, several competitions (essay writing and poster designing on the theme, science model, science quiz, drawing, extempore speech etc.) were organized for school and college students from greater Sonapur and Guwahati. Over 400 students and teachers from 24 schools and colleges visited the campus on the day and participated in various events. An exhibition of the works carried out at CPP-IPR (through posters and demonstrations) was also organized on the occasion.



Some of the prize winning entries for the drawing competition.

The drawing competition in progress.

View of the audience

The NSD 2023 prize distribution



The NSD 2023 prize distribution

The organizing team of NSD 2023 at CPP-IPR

तकनीक के साथ, विज्ञान की बात

''तकनीक के साथ, विज्ञान की बात'' हिंदी वक्तव्य श्रृंखला के अंतर्गत 24 फरवरी 2023 को छठा व्याख्यान संस्थान के सेमिनार हॉल में आयोजित किया गया। श्री राजीव शर्मा, वैज्ञानिक अधिकारी-ई ने '' क्रायोजेनिक्स तकनीक की जानकारी एवं इसके अनुप्रयोग'' (Information on Cryogenic Technology and its Application) विषय पर व्याख्यान दिया। शर्मा जी ने क्रायोजेनिक तापमान के निर्माण की प्रक्रिया, क्रायोजेनिक अवस्था में विभिन्न द्रव पदार्थों की प्रक्रिया,अंतरिक्ष में रॉकेट के प्रणोदन में , सुपरकंडक्टिविटी में इसके उपयोग आदि पर विस्तार से प्रकाश डाला और आईपीआर में क्रायोजेनिक तकनीक से किये जा रहे विभिन्न अनुप्रयोग पर विस्तृत चर्चा की। साथ ही उन्होंने क्रायोजेनिक के भंडारण की चुनौतियों एवं सावधानियों से भी अवगत कराया एवं इसके खतरों से बचाव हेतु अपनाए जा रहे सुरक्षा मानकों एवं दिशा निर्देशों के अनुपालन हेतु संस्थान के प्रयासों पर भी चर्चा की। अंत में सेमिनार हॉल में उपस्थित श्रोताओं के लिए इस पर विषय पर आधारित प्रश्नोत्तरी प्रतियोगिता आयोजित की गई और विजेताओं को पुरस्कार प्रदान किये गये।


Science Day Talk @ Rai University

Dr. Anitha V. P. gave an invited talk entitled "*A plethora of avenues for science & technology innovations – a quick scroll through the known-unknowns*" at the Rai University, Ahmedabad as part of their National Science Day celebrations. .


Academic Visits to IPR

Date	Institution	Visitors
09-Mar-2023	M. S. University, Baroda	55 students of MSc Physics and 2 faculty
13-Mar-2023	Pandit Deendayal Energy University, Gandhinagar	44 students (BSc/MSc Physics) and 3 faculty
14-Mar-2023	A.G. Teachers' College, Ahmedabad	33 students (B.Ed.) and 2 faculty
15-Mar-2023	Rai University, Ahmedabad	34 students (BSc/MSc Physics) and 2 faculty
17-Mar-2023	L. D. College of Engineering, Ahmedabad	56 students (B.Tech IC) and 4 faculty

Students and teachers of Pandit Deendayal Energy University (PDEU) Gandhinagar, during their visit to IPR

Students and teachers of A.G. Teachers' College, Ahmedabad, during their visit to IPR

Students and teachers of Rai University, Ahmedabad, during their visit to IPR

Plasma Exhibition & Training Program @ Somaiya University, Mumbai

IPR conducted a scientific outreach activity on plasma, its applications and nuclear fusion at the Somaiya Vidyavihar University, Mumbai, during 20-24 February, 2023. This 5-day program had the plasma exhibition which was open to public as well as a training programme on plasma, its applications and nuclear fusion that was attended by 38 participants.

The event was inaugurated by Dr. R. K. Vatsa, Head Public Awareness Division of DAE, who also visited the exhibition and interacted with the student volunteers of Somaiya University who were explaining the various exhibits. The concluding session was conducted on 24th February and was presided over by Prof. V. N. Rajasekharan Pillai, Vice Chancellor of Somaiya University, who also visited the exhibition and encouraged the student volunteers to look for avenues to pursue plasma science & technology as a career.

Over 2500 students from Somaiya Vidyavihar University as well as schools in and around Mumbai visited the exhibition. Popular talks and quiz were also conducted for visiting students. More details available **HERE**.

Inauguration of the Plasma Exhibition at Somaiya Vidyavihar University.

Dr. Vatsa and other dignitaries visiting the Plasma Exhibition

The Plasma Exhibition at Somaiya Vidyavihar University.

Plasma Exhibition & Training Program @ Somaiya University, Mumbai



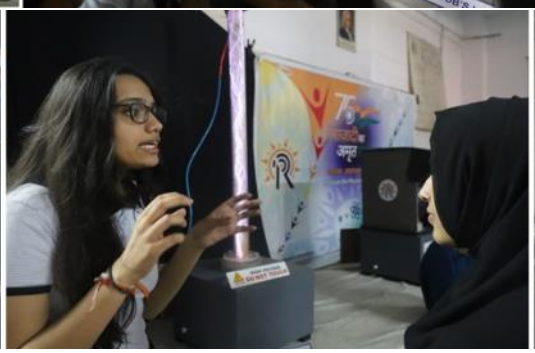
Introducing plasma to visiting students


Training programme on plasma and its applications for teachers










Volunteers from Somaiya University explaining the exhibits to visitors



Prof. V. N. Rajasekharan Pillai, Vice Chancellor of Somaiya University, visiting the exhibition

International Women's Day @ CPP

CPP-IPR celebrated the International Women's Day – 2023 at CPP-IPR on March 6, 2023. Centre Director Dr. B.K. Saikia inaugurated the event. As a mark of respect and in order to propagate women empowerment in the society, two local entrepreneurs, Mrs. Ranjita Saikia Deka and Mrs. Madhumita Basumatary respectively, were invited to share their ideas and journey in their life. They were duly welcomed and appreciated because of their achievement and contribution to the society. Few nearby women were invited to the programme in order to create awareness on women entrepreneurship. Mrs. Gita Rani Bhattacharya, a freelance consultant on gender and development, delivered a lecture on the issues related to women empowerment which further bolstered the spirit of the event. A quiz competition on women's achievements was also conducted among the staffs and guests.

Images from the International Women's Day @ CPP-IPR

52nd National Safety Week – 2023 @ IPR

The 52nd National Safety Week was celebrated at IPR from 4-10 March 2023. This year's theme was "Our Aim – Zero Harm." The Institute organized various competitions online to create safety awareness among its employees. Competitions were organized for the employees of IPR, FCIPT & ITER-India on *Slogan in Gujarati, Hindi & English*, *Online Quiz and Essay Writing in Gujarati, Hindi & English* based on decided theme. Overwhelming response was received from the employees for various competitions. In addition to this, safety division has conducted Safety Induction Training for Newcomers, demonstration of firefighting equipment for security personnel & employees, awareness session for safety co-ordinators and First-Aid Training during this week.

During the Concluding Session conducted on 10th March, the welcome address was given by Shri Rajesh Kumar, Member - Safety Committee, which was followed by a talk on "*Best Safety Practices during Electrical Maintenance Work*" by Shri C.K.Gupta, "*Thoughts on safety*" by Dr. S. Mukherjee, Dean (Admin.). Safety Pledge administered by Shri Sunil Kumar, Chairman – Safety Committee. Director IPR then delivered a Message on Safety. He emphasised that new experiments and projects may be reviewed by constituting Design Safety Review Committee (DSRC). He informed that we all must create a culture of safety where safety is not just a matter of compliance, but a way of life. Finally, Shri Devendra Modi, Member Secretary – Safety Committee presented the vote of thanks.

Competition	First Prize	Second Prize	Third Prize
Gujarati Slogan	Manish Vasani	Jatinkumar Patel Rajnikant Amaliar	Jignesh Chauhan
Hindi Slogan	Gaurang Mahesuria	Hemantkumar Hadiel	Paresh Panchal Mitesh Patel
English Slogan	ManoahStephen M.	Manish Vasani	Shirin Bhesania
Gujarati Essay	Dikens Christian	Murtuza Vora	Chirag Bhavsar & Pratibha Gupta
Hindi Essay	Pratibha Gupta	Jyoti Agarwal	-
English Essay	Tejas Parekh	Abhishek Sharma	Rohit Agarwal
Quiz	Tushar Patel & Nikunj Patel	Shiju Sam & Amit Ojha	Sunil Bassi

Winners of the various competitions organized during NSW-2023 at IPR

(L-R) Shri Rajesh Kumar, Shri C.K.Gupta and Shri Devendra Modi speaking during NSW-2023 at IPR

(L) Dr. S. Mukherjee and (R) Dr. Shashank Chaturvedi addressing the gathering

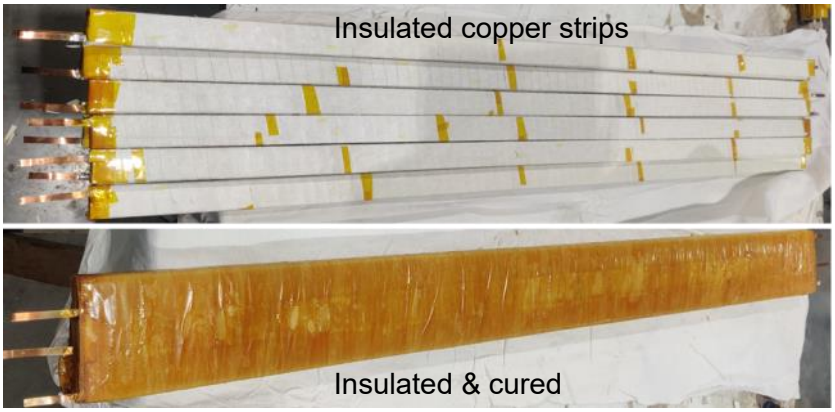

The safety oath being administered

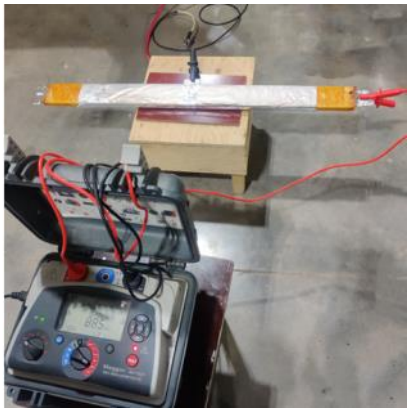


Some of the prize winners of NSW competitions and (R) training in fire extinguishers

Development Of Insulation System for SST-1 In-Vessel Coils

As a part of SST-1 Upgradation, 2 sets of In-vessel coils (PF#6 and New VF coils) are envisaged for radial control and long pulse plasma operation. In-situ coil winding, high temperature & high voltage compatible insulation are challenging tasks to realize these two pair of coils. Considering the temperature rise due to vacuum vessel baking ~100°C and voltage ~120 V of these coils, a Class-H compatible insulation system has been proposed. A prototype matrix of 3 x 2 copper conductors, having turn-to-turn insulation of thickness~1.5 mm as well as ground insulation thickness~2.5 mm has been fabricated to replicate the winding pack (WP) of in-vessel coils using available copper strips of length 900 mm, width 25 mm, and thickness 6 mm. Insulated winding pack has inserted inside SS casing and electrically isolated using Teflon spacers. Electrical characterization of this prototype sample includes IR and tanδ measurements, before and after encasing at room temperature and 50°C backing. After simulating baking cycle of prototype sample, IR and tanδ measurement tests were repeated again at 100 °C. The observed leakage current during electrical testing is in the range of Nano Ampere (nA) at 10 kV DC.



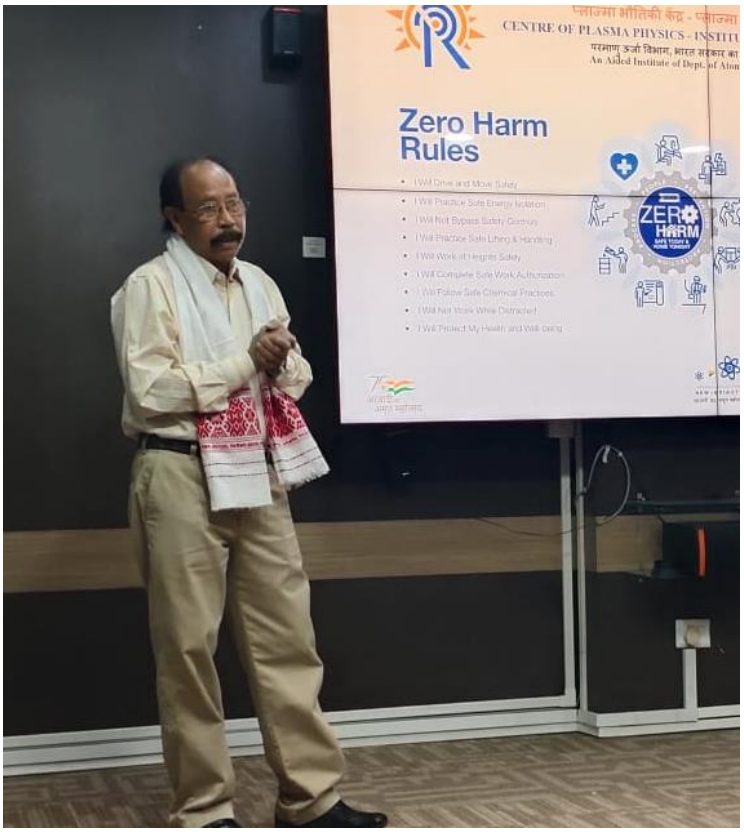


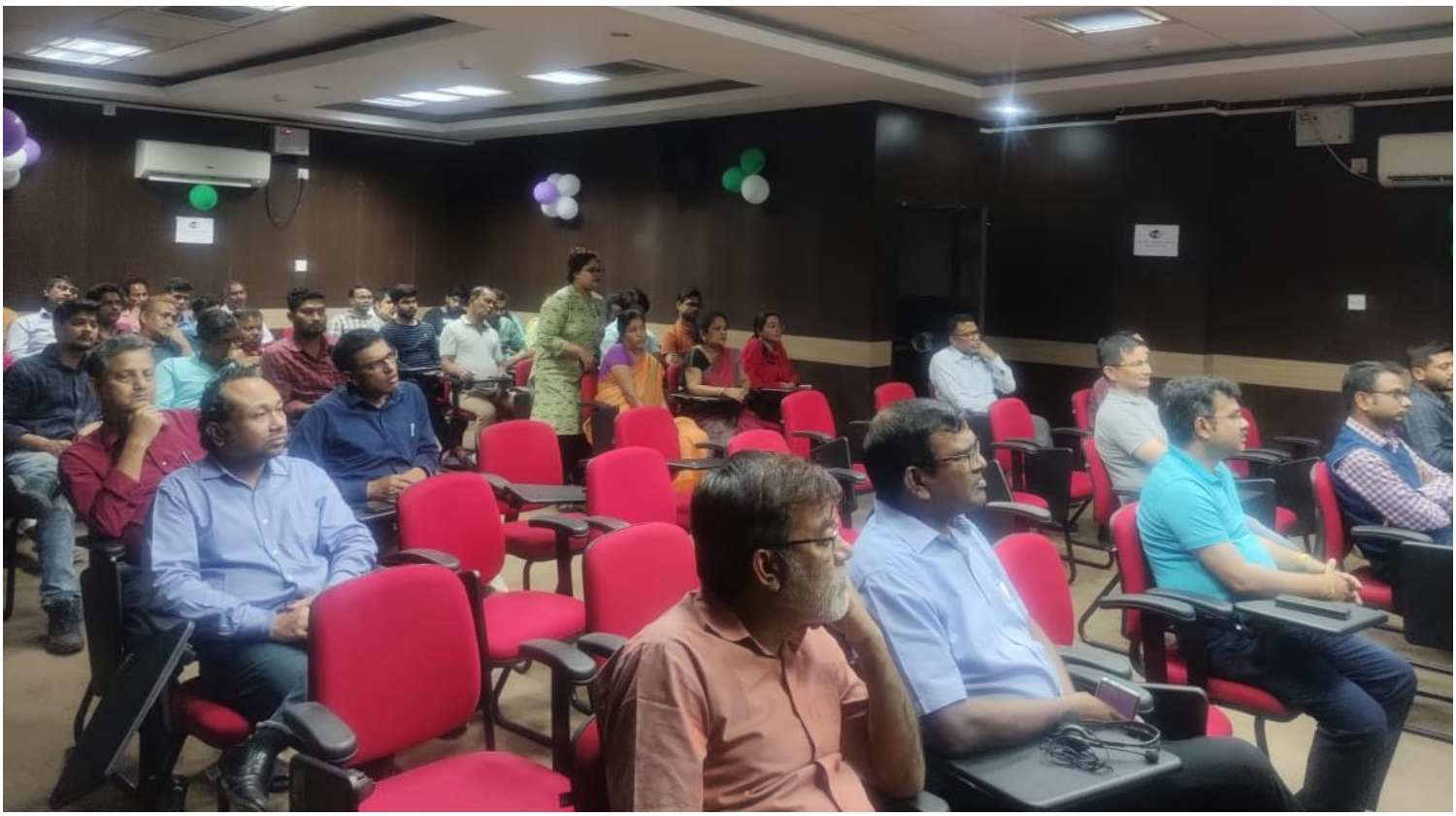
(L) Fabrication of Prototype insulation sample (R) Electrical characterization of insulation sample

National Safety Week Campaign @ CPP-IPR

CPP-IPR observed the 52nd National Safety Week Campaign to promote safety awareness among its staff members. The observation included Safety Awareness Slogan, Essay and Quiz competitions. Slogan & Essay competition were in three languages (Assamese, Hindi and English) based on this year's theme "Our Aim-Zero Harm" as decided by the National Safety Council of India. The competitions received a good response from the staff members.

On the last day of the campaign, i.e., 10th March 2023, the concluding session was held. The program started with a welcome speech by Mr. Pallab Das, Project Scientific Officer (Electrical), followed by a General Safety Awareness talk delivered by the guest of honour, Mr. Kamal Borgohain. Mr. Borgohain has vast industry experience and has worked in various countries and companies as Safety Officer. The winners of various competitions were awarded in the concluding session.





Images from the National Safety Week Campaign @CPP-IPR

Factory Acceptance Test of ITER Auxiliary Cold Boxes

ITER Cryo-distribution (CD) system distributes cooling power from the ITER Cryoplant, by means of forced flow of cryogens to users such as superconducting magnets (Toroidal Field (TF), Poloidal Field (PF), Correction Coil (CC), Central Solenoid (CS) and Magnet Structure (ST)) and other users like, High Temperature Superconductor (HTS) current leads, Cryopumps (CP), Thermal shield etc.

ITER CD system comprises of various Auxiliary Cold Boxes (ACBs) namely, ACB-CP, ACB-TF, ACB-CS, ACB-PF, ACB-ST and Thermal shield & cooling system (TSCS) to distribute cooling power to the applications at required pressure, temperature and mass flowrates. The manufacturing of ACB-CP, ACB-TF and ACB-CS has been completed and Factory Acceptance Test (FAT) has also been successfully carried out complying to the technical requirements. These are Quality Class 1(QC-1) components with overall dimensions 5.6 m length, 5 m width and 4.8 m height. The major inspections carried out during FAT for whole CD cold boxes are, pressure test as per European Pressure Equipment Directives (PED), helium leak test of all process circuits and vacuum shell, functions test of Cryogenic valves, overall dimensional check and cleanliness check (including endoscopic examination) etc. The stringent criteria of helium leak test for internal piping ($<10^{-8}$ mbar l/s) from process to vacuum and also other helium leak criteria (atmosphere to vacuum, process to atmosphere) has been successfully achieved. The pressure test of all the internal circuits of ACBs has been successfully performed within the requirements and these three cold boxes are almost ready for the final packaging and transport.

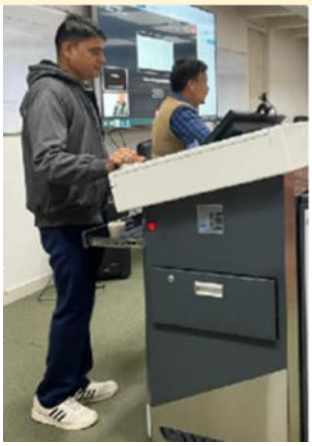
Auxiliary Cold Boxes ACB2 and ACB5 ready for dispatch to ITER

CPP-IPR News

Dr. Shashank Chaturvedi, Dr. P.K. Atrey and Dr. Vinay Kumar during their visit to the labs at CPP-IPR on 15-3-2023

Training sessions by GeM Urgent Purchase Committee

The newly constituted GeM Urgent Purchase Committee (GUPC) holds the responsibility of procurement of goods without quotation since 3rd November 2022. These procurements are handled using collaborative mechanism, involving seven number of assigned GeM Buyers (AGBs), thirty seven number of GeM consignees called as Divisional Urgent Purchaser (DUPs), and Account Section under active interaction with IPR Purchase and Store Division, and Chairperson SPC. The training was conducted into two sessions. First session, held during 24-27 Nov 2022 at seminar hall, was conducted by Shri R. Sugandhi, Shri Nipen Nath and Shri Yogesh Dadeech. It was focused on general know-how of GeM procurement and set-up of GeM accounts. The second session was held on 24 Jan 2023 in the hybrid mode and was conducted by Shri Anand Visani and Shri L N Srikanth using detailed power point presentations having GeM screens. Apart from AGBs and DUPS, many staff members from IPR, FCIPT and CPP-IPR attended the training on online GMEET platform. The document management system for GUPC activities is configured on IPR Document and Record Management System (IDRMS) by Shri V K Patel of Computer Division. The forms and prepared SOP documents are made available on Intra Server by Shri Hemant Joshi of Computer Division for easy access by all. All assigned GeM Buyers have completed all online training course of GeM learning management system portal and passed the Silver and Gold certifications. GUPC will organize similar event in future to keep peoples updated in-line with the evolution of GeM portal.



Shri L M Srikanth, Shri Ramesh Joshi and Shri Anand Visani making their GeM related presentations

Outreach Activities of CPP-IPR

In the month of March 2023, CPP-IPR's Outreach Cell conducted two "**Seminar-cum-Workshop on Plasma Physics**" at two colleges of Shillong, Meghalaya, to sensitize the students of the colleges about plasma physics. The first programme was held at St. Edmund's College on 6th March and was attended by around 70 students of the college. The second programme was conducted the next day i.e. on 7th March at Synod college and was attended by around 100 students of the college. During the technical session, Dr. Rakesh Moulick gave a talk on introduction to plasma physics, followed by a talk on basics of experimental plasma physics by Dr. Ngangom Aomoa and a talk on fusion technology by Dr. B. J. Saikia. After the talks, the participants were shown a glow discharge plasma and a plasma globe, and the role and working principle of the various components of the set-ups were explained to them.




Past Events @ IPR

- ***Mr. Deepak Sharma,*** gave a talk on "*Optimization of design parameters for Tritium Breeding Blanket Module*" on 16th February 2023
- ***Dr. Kailash C Mittal,*** Retired Senior Scientist, BARC, Mumbai, gave a talk on "*High Intensity Low Energy Electron Accelerators for Sub Critical Micro Nuclear Reactors*" on 23rd February 2023 **(Colloquium #320)**
- ***Dr. Prashant Kumar,*** IIT Delhi, gave a talk on "*Investigations on the effect of plasma boundary and electrode asymmetry on plasma behavior in planar DC discharges*" on 28th February 2023
- ***Dr. Razia Nongjai,*** gave a talk on "*Ion Implantation of Al and its Alloys and its Characterization*" on 1st March 2023
- ***Prof. Jean-Philippe Ansermet,*** Ecole Polytechnique Federale de Lausanne, Switzerland, gave a talk on "*Gyrotrons for Nuclear Magnetic Resonance high-performance spectrometers*" on 2nd March 2023 **(Colloquium #321)**
- ***Dr. Dipak Bhowmik,*** IIT Kanpur, gave a talk on "*Nano ripple patterning and band gap tailoring of muscovite mica sheet using plasma based ultra-low and low energy ion sputtering*" on 3rd March 2023
- ***Dr. Gaurav Shukla,*** gave a talk on "*Multi-anode X-ray Source for Calibration of ITER – X-ray Crystal Spectrometers*" on 9th March 2023
- ***Dr. Pawan Kumar,*** gave a talk on "*Design and Characterization of Curling Probe for density Measurements in reactive Plasmas*" on 10th March 2023
- ***Mr. Bharat Singh Rawat,*** gave a talk on "*Studies on extraction of an ion beam and its transport from a multi-cusp gridded ion source*" on 13th March 2023
- ***Dr. Shrichand Jakhar,*** gave a talk on "*Medical radionuclides production using fusion neutrons: Overview and Prospectus*" on 13th March 2023
- ***Mr. Vikas Rathore,*** gave a talk on "*Study of Plasma Activation of Water and its applications in Antimicrobial and Agricultural activities*" on 14th March 2023
- ***Dr. Sandeep Rimza,*** gave a talk on "*Thermal mixing and flow behavior of hot and cold fluid in the high-temperature joint for experimental helium cooling loop (ECHL)"* on 14th March 2023
- ***Dr. Debajyoti Ray,*** Bose Institute, Kolkata, gave a talk on "*Towards the Development of a Novel Destruction Approach of Volatile Organic Compounds (VOCs) Using Non-Thermal Plasma Coupled with Heterogeneous Catalysts*" on 17th March 2023
- ***Dr. Prasad Perlekar,*** TIFR Centre for Interdisciplinary Sciences, Hyderabad, gave a talk on "*Turbulence in buoyancy-driven bubbly flows*" on 17th March 2023 **(Colloquium #322)**
- ***Mr. U.R. Sheshagiri Rao,*** Central Power Research Institute, Bangalore, gave a talk on "*Challenges of High Voltage Systems Development, Testing, and Safety*" on 21st March 2023

Upcoming Events

- Magnetism 2023 Conference, University of Manchester, April 3-4, 2023; https://www.iop.org/events/magnetism-2023
- APS April Meeting "Quarks to Cosmos" 2023, Minneapolis, 15-18 April 2023; https://rb.gy/twwpeq
- 4th International Conference on Data-Driven Plasma Science (ICDDPS-4) jointly held with 14th EU-Japan Joint Symposium on Plasma Processing (JSPP-14), Okinawa Institute of Science and Technology (OIST), Japan, 16-21 April 2023; http://www.ppl.eng.osaka-u.ac.jp/ICDDPS4/index.html
- Interdisciplinary Surface Science Conference, Manchester, U.K, 17-19 April 2023; https://www.iop.org/events/interdisciplinary-surface-science-conference
- International Congress on Advances in Nuclear Power Plants (ICAPP), South Korea, 23–27 April 2023; https://www.ans.org/meetings/view-icapp2023/
- Dones XCITECH: 1st Dones School on Science and Technology, Granada, Spain, 23-28 April 2023; https://www.xcitech-school.org/
- 17th Cryogenics 2023: IIR International Conference & Exhibition, Germany, 24-28 April 2023; https://www.cryogenics-conference.eu/

Know Your Colleague

Priyadarsini Gaddam obtained her B.Tech Degree in (Electronics & Instrumentation Engineering) from the Sai Spurthi Institute of Technology, B. Gangaram (affiliated to JNTU Hyderabad) In the year 2008, she joined as a trainee in the TTP-2008 batch and subsequently appointed as an Engineer SC. During and after training, she has been working on VME based Data acquisition system using LabVIEW , VxWorks and Tornado S/W for SST-1 Magnets. She then catered to the electronics-based requirements of Langmuir probe Diagnostics, triggering System for BETA machine and signal conditioning electronics for different users. Presently, she is with the DAC Division (Data Acquisition and Control) developing LabVIEW based applications like Automation of instruments for Plasma column experiment, GUI for Plasma thruster experiments, Calibration of mass flow meters etc. and also programming different brands of HMI's as per the user requirements.

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Plasma Exhibition & Training Program @ Somaiya University, Mumbai

IPR Team along with the student volunteers of the IPR exhibition at the Somaiya University, Mumbai

Adieu

On behalf of IPR Newsletter, I wish **Shri K. K. Mohandas** a very happy, healthy and productive retired life. Mohandas has been a very active member of the Newsletter as well as Outreach team right from the beginning and has contributed in several ways to this publication. Having worked with him for better part of 28 years, I know him as a very sincere and a totally hand-on person, with an excellent ability in building things which led him to contribute immensely in many of IPR's early R&D projects, especially in the BETA Lab. Playing the role of a science educator in the Outreach Division, he was also responsible for designing and building many of the working models on plasma that are currently being used by the Outreach division in its activities. He superannuated from service after more than 30 years of dedicated service to IPR on 31-March-2023.

A V Ravi Kumar

The IPR Newsletter Team

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