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The Fourth State

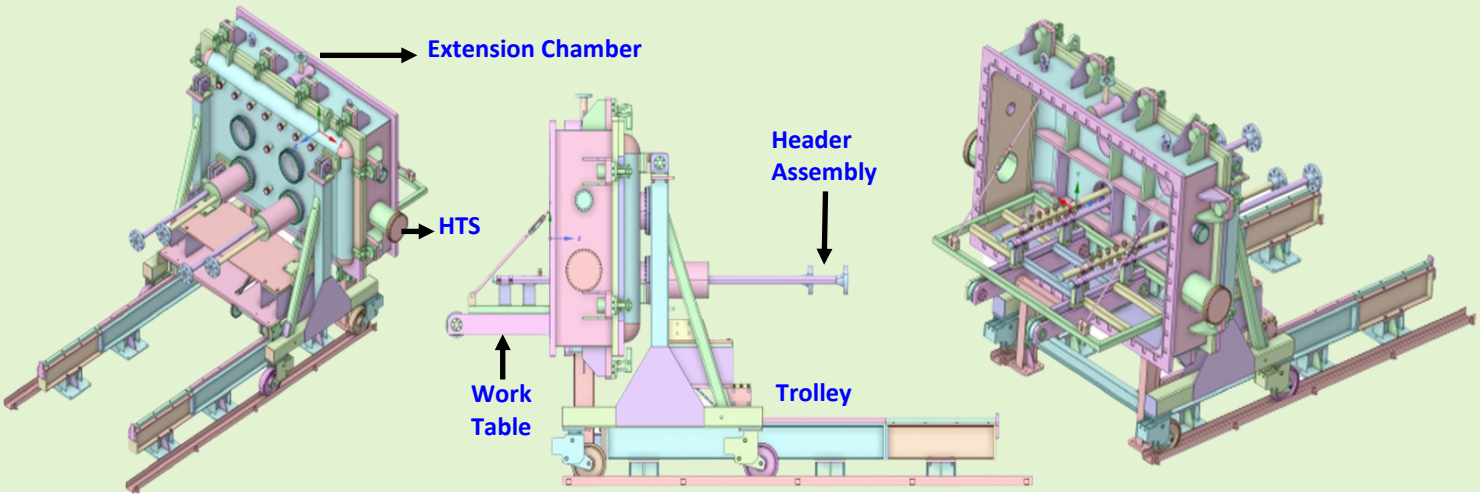
Newsletter of the Institute For Plasma Research, Gandhinagar, Gujarat (India)

Upgradation Of High Heat Flux Test Facility (HHFTF)

High Heat Flux Test Facility (HHFTF) is established at Institute for Plasma Research, primarily for the thermal load testing of water-cooled Plasma Facing Components (PFC) & Plasma Facing Materials (PFM) that are expected to withstand steady-state and transient heat flux of the order of 10MW/m^2 and 20MW/m^2 respectively, during the tokamak operation.

To enhance the capability of HHFTF for testing Helium Cooled Plasma Facing Components (PFC) such as First Wall of Test Blanket Module and Helium Cooled Divertor, Helium cooled Target Handling System (HTS) is designed and fabricated. Experimental Helium Cooling Loop (EHCL) will be integrated with HTS of HHFTF for supply of High Pressure High Temperature Helium Gas up to 80 bar Pressure, 400°C Temperature and 400 g/s Mass Flow Rate.

HHFTF will be used for testing both water cooled and helium cooled PFCs using respective Water cooled and Helium cooled Target handling Systems (WTS & HTS). HTS can handle helium cooled test components weighing up to 2000 kg and size of 2m (Width) x 1.2m (Height) x 0.8m (depth). An Extension Chamber (EC) is integrated with the existing D-shaped vacuum chamber increasing the chamber volume from 5m^3 to 6.8 m^3.



Schematic of EC & HTS assembly

(L) HTS & WTS at Parking location (R) Assembly of HTS-EC-D chamber

हिंदी कार्यशाला

राष्ट्रीय न्यायालयिक विज्ञान विश्वविद्यालय (NFSU), गांधीनगर में दिनांक 28 जून 2023 को हिंदी कार्यशाला का आयोजन किया गया। इस कार्यशाला में प्लाज़्मा अनुसंधान संस्थान की हिंदी अधिकारी श्रीमती संध्या दवे को '**कंप्यूटर पर हिंदी के प्रयोग के लिए उपाय**'' विषय पर प्रशिक्षण देने हेतु आमंत्रित किया गया। श्रीमती संध्या दवे ने कंप्यूटर पर हिंदी के प्रयोग की आवश्यकता, यूनिकोड का योगदान, कंप्यूटर पर हिंदी भाषा को कैसे सक्रिय करें, विभिन्न प्रकार के कीबोर्ड, हिंदी के विभिन्न फॉन्ट, हिंदी अनूवाद टूल्स, वॉइस टाइपिंग टूल्स, कंप्यूटर पर हिंदी में प्रकाशन सामग्री तैयार करना, हिंदी भाषा प्रशिक्षण ऐप आदि पर विस्तार से चर्चा की और प्रतिभागियों के संदेहों को दूर किया।

कार्यशाला की कुछ झालकियाँ

Academic Visits to IPR

Date	Institution	Visitors
28-Jun-2023	Delhi Public School,, Gandhinagar	38 students of 11 & 12th Std and 2 teachers

Students and teachers from Delhi Public School, Gandhinagar, during their visit to IPR

Academic Visits to CPP-IPR

Date	Institution	Visitors
27-Jun-2023	Department of Physics, Sankardev College, Shillong, Meghalaya	12 students of BSc Physics and 4 faculty
27-Jun-2023	Department of Physics, Mangaldai College, Upahupara, Assam	27 students of BSc Physics and 3 faculty
05-Jul-2023	St. Francis School, Dhupdhara, Goalpara, Assam	35 students (Class 8, 9 & 10) and 6 teachers

Students from the Mangaldai College, Upahupara, Assam, during their visit to CPP-IPR

Students from the Sankardev College, Shillong, during their visit to CPP-IPR

Students of St. Francis School, Dhupdhara, Goalpara, Assam, during their visit to CPP-IPR

Plasma Exhibition @ Aizawl (Mizoram)

IPR outreach conducted a week-long scientific outreach programme at Aizawl in the state of Mizoram. The programme was organized at Innovation Facility Centre of the Mizoram Science, Technology & Innovation Council (MSTIC) at Aizawl during 12-16 June, 2023. This is IPR's first outreach activity in the state of Mizoram. The programme consisted of an exhibition on plasma, its applications as well as introductory talks on plasma for visiting students. The event was inaugurated by Er. H. Lalsawmliana, Chief Scientific Officer, Directorate of Science & Technology, Govt. of Mizoram. Mr. Samuel Lalmalsawma, Principal Scientific Officer, MISTIC gave the welcome speech and Mr. P. C. Lalngilneia, Senior Scientific Officer introduced the concept of plasma in vernacular language to the students. BSc Physics students from the Dept. of Physics, Pachhunga University College, Aizawl were trained by IPR team to explain the exhibits to visiting students in their local language. Officers from various Government Departments, including pollution control visited the exhibition and expressed their interest in using plasma technology in their field of work. During the 5 days, over 650 students and 25 teachers from 12 schools in the Aizawl region as well as general public and government employees visited the exhibition. For more details, click **HERE**.

Inauguration of the Plasma Exhibition at Aizawl (Mizoram)

The Plasma Exhibition at Aizawl in progress

Student volunteers explaining the plasma exhibits to visitors

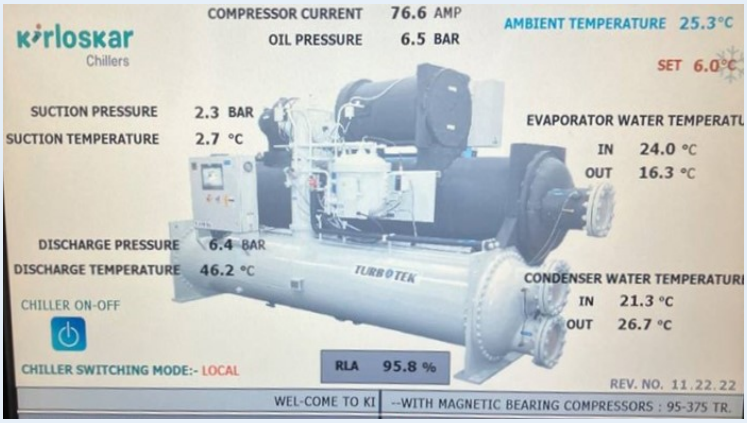
Plasma Exhibition @ Aizawl (Mizoram)

Images from the Plasma exhibition held at Aizawl (Mizoram)

First Chill @ ITER Site With Indian Chillers

The integrated commissioning of three of the water-cooled chillers of 1137 TR (4 MW) capacity, supplied by India to ITER Project has been completed successfully in May-June 2023 and this is a remarkable milestone towards operating cryoplant and other HVAC systems as per ITER schedule.

These chillers, key equipment of ITER Chilled Water System (CHWS), were manufactured by M/s Kirloskar Chillers Private Limited (KCPL) and are supported by 6.6 kV/ 140A soft starters. KCPL manufactured these chillers in 2017-18 complying to ITER site requirements including seismic qualification and CE marking and, in this process, KCPL achieved the feat of manufacturing largest chiller ever manufactured in Indian factory under 'Make in India'. As per the overall progress of site activities at ITER, the commissioning activity was initiated in 2023.



First chill (May/June 2023)

"ITER Star Award" for ITER-India Colleagues

Three of ITER-India colleagues Pratik Patel, Mahesh Jadhav and Mitul Patel have been selected for 'ITER Star Award' for the first semester of 2023. This Pubic Recognition ITER Star Award initiated recently by ITER, is awarded every semester to ITER staff, in recognition of being exceptional, either through specific achievements, behaviors or values. IPR congratulates all these Star Award winners!

Pratik Patel, Technical Responsible Officer of ITER-India Cryodistribution system is currently engaged in the design, manufacturing, inspection of Auxiliary Cold Boxes and the design of Thermal Shield cold valve box.

Mahesh Jadhav, a system integrator at ITER, is currently responsible for the preparation of Engineering Work Packages for the installation of ITER Cooling Water System networks inside Tokamak Complex and auxiliary buildings.

Mitul Patel, certified as Quality Lead Auditor and PE/NPE (Pressure equipment/Nuclear Pressure Equipment) representative at ITER, is responsible for quality supervision/surveillance of ITER assembly contracts & training ITER staff in welding.

राष्ट्रीय हिंदी वैज्ञानिक संगोष्ठी – 2023

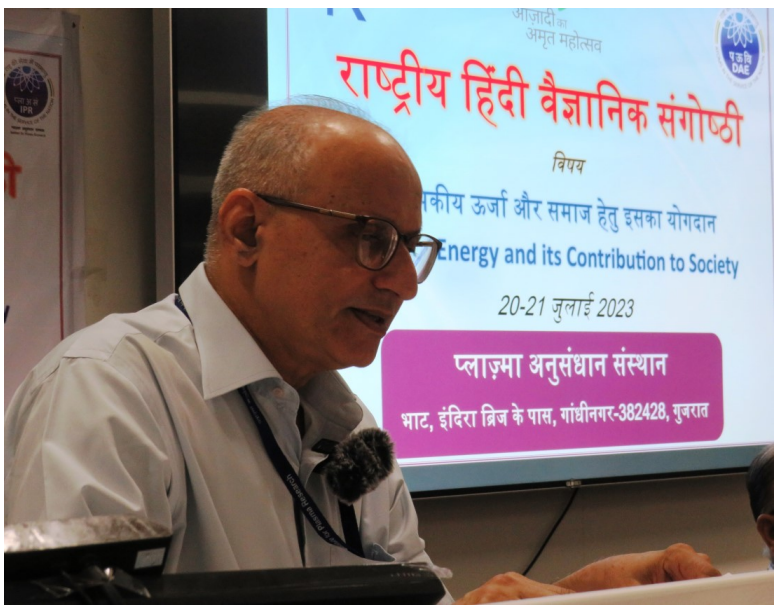
प्लाज़्मा अनुसंधान संस्थान द्वारा दिनांक 20 एवं 21 जुलाई 2023 को "नाभिकीय ऊर्जा और समाज हेतु इसका योगदान" विषय पर राष्ट्रीय हिंदी वैज्ञानिक संगोष्ठी का आयोजन किया गया जिसमें परमाणु ऊर्जा विभाग की विभिन्न इकाइयों/संस्थाओं/संगठनों/उपक्रमों के प्रतिनिधियों ने भाग लिया। संगोष्ठी के उद्घाटन सत्र में मुख्य अतिथि के रुप में श्री राजेश कुमार बहल, समूह निदेशक (सेवानिवृत्त) अंतरिक्ष उपयोग केंद्र, इसरो एवं विशिष्ट अतिथि के रूप में प्रो. सुरेंद्र कछवाह, वरिष्ठ प्रोफेसर, पंडिल दीनदयाल एनर्जी यूनिवर्सिटी, गांधीनगर को आमंत्रित किया गया था। उद्घाटन सत्र में गणमान्य जनों द्वारा दीप प्रज्जवलन किया गया।

राष्ट्रीय हिंदी वैज्ञानिक संगोष्ठी के संयोजक डॉ. प्रवीण कुमार आत्रेय ने सभी प्रतिभागियों एवं श्रोताओं का स्वागत किया। अध्यक्ष के रूप में उपस्थित निदेशक महोदय डॉ. शशांक चतुर्वेदी ने सभा को संबांधित करते हुए राजभाषा हिंदी में इस संगोष्ठी के महत्व पर प्रकाश डाला और सभी प्रतिभागियों को इस प्रयास में उत्साहपूर्वक भाग लेने के लिए बधाई दी। मंचासीन महानुभावों द्वारा इस संगोष्ठी की सारांश पुस्तिका का विमोचन किया गया। इसके पश्चात सम्माननीय अतिथियों द्वारा संबोधन के साथ तकनीकी विषय पर प्रस्तुतियां दी गई। प्रो. सुरेन्द्र कच्वाह ने 'औद्योगिक अनुप्रयोगों में कैविटेशन का महत्व और उपयोग' एवं श्री राजेश कुमार बहल ने 'क्वंटम (QKD) और प्रकाशीय संचार-अंतरिक्ष उपयोग' विषय पर व्याख्यान दिया।

इस दो दिवसीय संगोष्ठी में कुल 38 मौखिक प्रस्तुतियां दी गई, जिसमें भाभा परमाणु अनुसंधान केंद्र, ब्रिट, इंदिरा गांधी परमाणु अनुसंधान केंद्र, परमाणु खनिज अन्वेषण एवं अनुसंधान निदेशालय, न्युक्लियर पॉवर कारपोरेशन ऑफ़ इंडिया लिमिटेड, इलेक्ट्रानिक्स कारपोरेशन ऑफ इंडिया लिमिटेड, परिवर्ती ऊर्जा साइक्लोट्रॉन केंद्र, परमाणु ऊर्जा नियामक परिषद, राजा रामन्ना प्रगत प्रौद्योगिकी केंद्र, परमाणु ऊर्जा केन्द्रीय विद्यालय, भौतिकी संस्थान, प्लाज़्मा अनुसंधान संस्थान एवं सहयोगी संगठन – FCIPT एवं ITER के प्रतिनिधि शामिल थे। यह संगोष्ठी हाइब्रिड माध्यम से आयोजित की गई, जिसमें ऑनलाइन माध्यम से 6 प्रस्तुतियाँ शामिल थी। इस संगोष्ठी के विभिन्न सत्रों की अध्यक्षता डॉ. सूर्यकान्त गुप्ता, श्रीमती सुप्रिया नायर, डॉ. मनोज कुमार गुप्ता, डॉ. सूर्य कुमार पाठक, डॉ. ब्रज किशोर शुक्ला, डॉ. रंजना गंगराडे एवं डॉ. कुमार अजय द्वारा की गई।



(L) श्री राजेश कुमार बहल को स्मृति चिन्ह प्रदान करते हुए निदेशक महोदय डॉ. शशांक चतुर्वेदी (M) प्रो सुरेन्द्र कच्छवाह को स्मृति चिन्ह प्रदान करते हुए डॉ. प्रवीण कुमार आत्रेय (R) सभी का स्वागत करते हुए डॉ. प्रवीण कुमार आत्रेय



(L) सभा को संबोधित करते हुए डॉ. शशांक चतुर्वेदी (R) प्रस्तुति देते हुए प्रो सुरेन्द्र कच्छवाह

राष्ट्रीय हिंदी वैज्ञानिक संगोष्ठी – 2023

इस संगोष्ठी में मुख्य विषय "नाभिकीय ऊर्जा और समाज हेतु इसका योगदान" के अंतर्गत चार उप-विषय शामिल थे – 1) वर्तमान ऊर्जा संकट में नाभिकीय ऊर्जा की भूमिका और नेट जीरो कार्बन में इसका योगदान, 2) परमाणु प्रौद्योगिकी के उपयोग में आर्टिफिशियल इंटेलिजेंस की भूमिका, 3) अटल इनक्यूबेशन सेंटर के लिए परमाणु ऊर्जा विभाग में उपलब्ध तकनीकियाँ एवं 4) ऊर्जा उत्पादन में नाभिकीय विखंडन एवं नाभिकीय संलयन की भूमिका।

21 जुलाई 2023 को पऊवि के विभिन्न यूनिटों से आए प्रतिभागियों के लिए आईपीआर के आउटरीच प्रभाग द्वारा आउटरीच हॉल में स्थित प्रायोगिक मॉडलों का अवलोकन कराया गया एवं आउटरीच गतिविधियों की प्रस्तुति दी गई। साथ ही आदित्य टोकोमॅक प्रयोगशाला का भी विजिट कराई गई।

21 जुलाई 2023 को समापन सत्र का आयोजन किया गया, जिसमें 20 एवं 21 जुलाई 2023 को आयोजित प्रस्तुतियों के लिए श्रेष्ठ प्रस्तुतिकरण पुरस्कार दिये गये। पहले दिन की श्रेष्ठ प्रस्तुति हेतु श्री मकरंद सिद्ध भट्टी, भौतिकी संस्थान, श्री राजेश कुमार जैन, बीएआरसी, श्री परितोष चौधरी, आईपीआर एवं श्री कृष्ण कुमार गोटेवाल, आईपीआर को पुरस्कार प्रदान किये गये। दूसरे दिन की श्रेष्ठ प्रस्तुति हेतु श्री सरनजीत, आरआरकैट, श्री सत्य प्रभाकर, बीएआरसी सुश्री स्नेहलता अग्रवाल, आईपीआर एवं श्री आरोह श्रीवास्तव, आईपीआर को पुरस्कार प्रदान किये गये। अंत में धन्यवाद ज्ञापन के साथ कार्यक्रम का समापन किया गया।

इस संगोष्ठी के आयोजन हेतु गठित समिति एवं उप-समिति के सदस्यों के योगदान से इसे सुचारू रूप से संपन्न किया गया। डॉ. प्रवीण कुमार आत्रेय, श्री राज सिंह, डॉ. सूर्य कुमार पाठक, डॉ. ब्रज किशोर शुक्ला, डॉ. सूर्यकान्त गुप्ता, डॉ. ललित मोहन अवस्थी, डॉ. मनोज कुमार गुप्ता, श्रीमती सुप्रिया नायर, डॉ. रितेश सुगन्धी, श्री देवेन्द्र मोदी, श्री अनुज हार्वे, श्री आनंद विसानी, एवं डॉ. संध्या दवे, श्री मुकेश सोलंकी, श्री सिलेल शाह, श्री देवेन्द्र मोदी, श्री हर्षद चामुण्डे, श्री हितेश सुथार, श्री प्रशांत कुमार, श्री श्रवण कुमार, सुश्री प्रतिभा गुप्ता, श्री पिनाकिन देवलुक, श्री बादल सेवक एवं श्री फैसल खान।


(L) प्रस्तुति देते हुए श्री राजेश कुमार बहल (M) धन्यवाद ज्ञापन देते हुए श्री राज सिंह (R) विजेताओं को पुरस्कार पद्रान करते हुए डॉ पी. के. आत्रेय



विजेताओं को पुरस्कार पद्रान करते हुए (L) श्री निरंजन वैष्णव (M) डॉ. सूर्य कुमार पाठक (R) डॉ. ब्रज किशोर शुक्ला

Conference Presentation

Mr. Rajiv Sharma (SST-1 Cryogenic Division) gave an Invited talk entitled "Helium leak testing in Cryogenic systems" at the NDT Technical Meet organized by the Indian Society for Non-destructive Testing - ISNT Ahmedabad Chapter on July 22, 2023 at Ahmedabad.

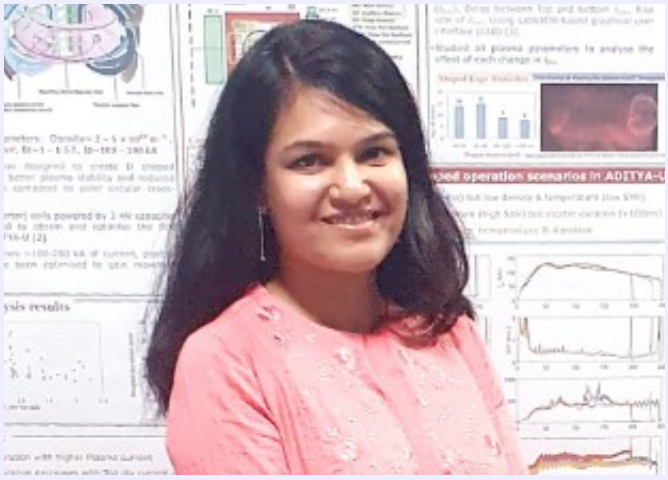
Past Events @ IPR

- ***Ms. Anshika Chugh,*** gave a talk on "*Soft active particles in confined geometries*" at International Workshop on Active Matter at Surfaces and in Complex Environments, Max Planck Institute for the Physics of Complex Systems, Dresden, 19-23 June 2023
- ***Mr. Urmil M. Thaker,*** gave a talk on "*Review of Cockcroft-Walton High Voltage Low Current DC Power Supplies*" at DAE-BRNS National Symposium on High Voltage- Energy Storage Capacitors and Applications (HV-ESCA-2023), DAE Convention Centre, Anushakti Nagar, Mumbai, 22-24 June 2023
- ***Dr. Smurti Ranjan Mohanty,*** gave an invited talk on "*Inertial Electrostatic Confinement Device: An Excellent Neutron and X-ray Generator"* at DAE-BRNS National Symposium on High Voltage- Energy Storage Capacitors and Applications (HV-ESCA-2023), DAE Convention Centre, Anushakti Nagar, Mumbai, 22-24 June 2023
- ***Dr. Sanil Shah,*** Institute of Infrastructure Technology Research and Management (IITRAM), Ahmedabad, gave a talk on "*Numerical study of heat transfer between impinging jets and flat moving surface*" on 23rd June 2023
- ***Mr. Ajay Kumar Pandey,*** gave a talk on "*Guided and Leaky Modes Characteristics of Dielectric Loaded Helix Structure*" on 3rd July 2023
- ***Dr. Lalita Sharma,*** Indian Institute of Technology, Roorkee, gave a talk on "*Atomic structure and collisional properties of impurity ions of fusion plasma interest*" on 4th July 2023 (Colloquium #326)
- ***Mr. Sanjeev Kumar Pandey,*** gave a talk on "*Linear and non-linear waves in spatially non-uniform 1D Vlasov-Poisson Plasmas*" on 04th July 2023
- ***Mr. Rudrang B. Chauhan,*** M. S. University of Baroda, Vadodara, gave a talk on "*Plasma oxidation of FeCrAl alloys*" on 06th July 2023
- ***Dr. Syed Enamur Rahaman,*** Indian Institute of Technology, Dhanbad, gave a talk on "*Consideration of Physical Effects in Analysis of Harmonically Tuned Power Amplifier to Improve Its Theory and Design*" 07th July 2023
- ***Dr. Snehanshu Maiti,*** Deutsches Elektronen-Synchrotron (DESY), Germany, gave a talk on "Astrophysical *MHD turbulence and Cosmic ray transport*" on 10th July 2023
- ***Dr. Asha Panghal,*** gave a talk on "*Synthesis, Structural and Microstructural study of Al2O3 composite for application in Nuclear reactors*" on 13th July 2023
- ***Mr. Kushagra Nigam,*** gave a talk on "*Parametric study on EM field simulations of MPCVD cavity" at 3rd Conference on Plasma Simulation*", Indian Institute of Astrophysics, Leh, Ladakh, 13-15 July 2023
- ***Dr. Varun Savadi,*** University of Petroleum & Energy Studies, Dehradun, gave a talk on "Investigation *of Thin Layer Activation in Strategically Important Rare Earth Materials*" on 14th July 2023
- ***Dr. Ashutosh Dubey,*** Central University Gujarat, Gandhinagar, gave a talk on "*Graphene oxide nanocomposites for hydrogen storage application*" on 18th July 2023

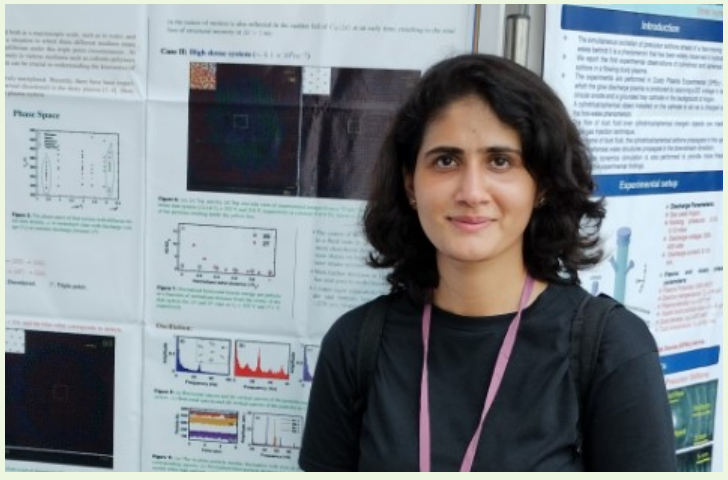
Upcoming Events

- Utility Working Conference and Vendor Technology Expo (UWC 2023), Marco Island, FL, United States, 6-9 August 2023; https://www.ans.org/meetings/view-uwc2023/
- 21st International Conference on Environmental Degradation of Materials in Nuclear Power Systems - Water Reactors, St. John's, Newfoundland, Canada, 6-10 August 2023; https://cns-envdeg.org/
- National Symposium on Gaseous Discharges (NSGD-2023), Pondicherry University, Puducherry, 9-11 August 2023; https://shorturl.at/akBU8
- International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering (M&C 2023), Niagara Falls, Ontario, Canada, 13-17 August 2023; https://www.ans.org/meetings/view-372/
- 20th International Topical Meeting on Nuclear Reactor Thermal Hydraulics (NURETH-20), Washington, D.C., United States, 20-25 August 2023; https://www.ans.org/meetings/view-nureth20/
- FuseNet PhD Event, Lausanne, Switzerland, 23-25 August 2023; https://fusenet.eu/event/phd-event-2023
- Summer Training Course in plasma physics (SUMTRAIC 2023), Czech Republic, Prague, 28 August - 8 September 2023; https://indico.ipp.cas.cz/event/23/

Awards & Recognitions



Dr. Harshita Raj won the Best Poster Award at the National Symposium on High Voltage - Energy Storage Capacitors and Application (HV-ESA) 2023 held at BARC, Mumbai during 22nd June - 24th June 2023, for her poster on "*Capacitor bank-based power supply used for shaped plasma operation in ADITYA-U Tokamak, a milestone in Indian Fusion Program".*



Ms. Swarnima Singh (Research Scholar) was awarded the 2023 PPCF/EPS/IUPAP Student Poster Prize at the European Plasma Physics Conference 2023 (EPS 2023) held in Bordeaux, France during 3rd July - 7th July 2023, for her poster on "*Experimental observation of a triple point for a complex (dusty) plasma".*

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Know Your Colleague

Mr. Shailesh Kanpara completed his B.E. degree in Metallurgy from M.S. University, Baroda. After graduation, he worked at Jindal SAW Ltd and Heavy Metal & Tubes Ltd., for a while before joining IPR as Scientific Officer-C in 2010 and was associated with the High Temperature Technologies Division. He has been actively involved and worked towards the development of Plasma facing materials such as Tungsten (W), W based alloys, W laminates, Wf-W composite, W-Cu FGM, etc. using powder metallurgical route and its testing and characterization. He has also worked on development of W coating on CuCrZr, IN-RAFM steel and SS substrate material using thermal spray technology for First Wall application followed by its high heat flux testing and characterization. He is presently involved in establishment of Tin-Lithium (Sn-Li) alloy production facility for liquid surface PFCs, fabrication of Helium cooled divertor mock-up and development of miniature specimen test technique.

Plasma Exhibition @ Innovation Facility Centre, Aizawl (Mizoram)

IPR team with the volunteers from Pachhunga University College, Aizawl during the Plasma exhibition held at Aizawl

The IPR Newsletter Team

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