

Issue 103

February 2022

# The Fourth State

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



## 73rd Republic Day Celebrations @ IPR & CPP-IPR

The 73rd Republic day was celebrated both at IPR and CPP-IPR keeping in mind the covid-19 protocols. Dr. Shashank Chaturvedi, Director, IPR was given a guard of honour by the security staff and then he hoisted the national flag at IPR. Dr. B. J. Saikia hoisted the national flag at CPP-IPR in a function attended by limited staff members and security staff.

In his address to IPR staff, IPR Director remembered the staff members whom IPR lost due to covid. He appreciated the various achievements of IPR in spite of testing covid times as well as the contributions from the medical team, administration, accounts and many others whose contributions kept the institute going during the pandemic.

Developments in the areas of remote handling and VR and deep learning, 14MeV fusion neutron facility, Aditya-U campaigns, indigenously developed ECR plasma source for space applications, development of indigenous nuclear activation code, Plasma activated water, Plasma thruster, work carried out in SST-1 and India's commitments to ITER were touched upon by him during his address.







Director IPR addressing the gathering after hoisting the flag



Dr. B. J. Saikia, Scientific officer, CPP-IPR hoisting the flag at CPP-IPR







## Handover Ceremony of Liner Material for Plasma Thruster for TDS-01 Satellite of ISRO

IPR has completed work under an MoU with Vikram Sarabhai Space Centre (VSSC) on "Plasma Erosion Characterization of Anode Liner Material". This study was initiated by VSSC to qualify indigenously-developed BN/SiO<sub>2</sub> anode liner material for erosion studies used in Stationary Plasma Thrusters (SPT). For this purpose, IPR developed a low energy ion beam facility equipped with *in-situ* erosion measurement to test the ceramic material that was developed by VSSC, under thruster operating conditions. Based on a large number of erosion experiments performed by the IPR, feedback was given to VSSC to improve the material properties. The studies carried out at IPR showed 20% less erosion compared with the imported anode liner material, while maintaining all other required properties. Finally, the indigenously developed anode liner material for a 300 mN Stationary Plasma Thruster (SPT) cleared all quality tests and is approved for use in the upcoming TDS-01 mission in PSLV C54. A technology handover ceremony was arranged on 27 Dec, 2021 by VSSC, in the presence of Director VSSC, Director LPSC, Director CEERI and Dean (Admin) IPR. This work was carried out by a team consisting of Mr. Sooraj K. P., Dr. Basanta Parida and Dr. Mukesh Ranjan of FCIPT.



Clockwise : BN/Silica composite liners, the 300mN SPT and handing over ceremony in the presence of Director, VSSC



The ITER Disruption Mitigation System (DMS) utilizes Shattered Pellet Injectors [SPIs] located at six different ports of the ITER Tokamak intended to protect the plasma-facing components during the disruption event. The largest pellets for ITER DMS have a diameter of ~28 mm. The cryolines, which distribute the required cryogenic fluids to the DMS network, are to be designed, manufactured and supplied by an Indian industry, INOX. In order to validate the design, manufacturability and mitigate the technical risks, a mock-up of DMS cryoline was tested at ITER-India Cryogenics Laboratory (IICL), IPR.

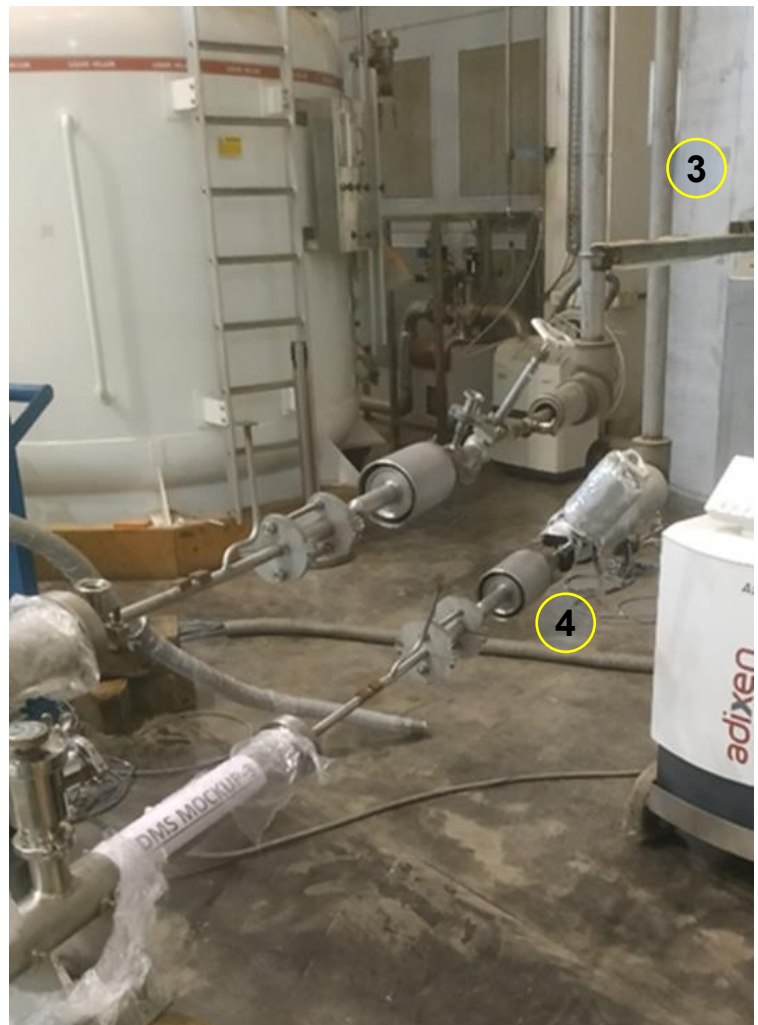
The DMS cryoline's mock-up is a flexible cryoline element with vacuum barriers at the rigid ends having nearly same length for the part of the ITER DMS cryoline network. The overall length is around 14 meters and the diameter of the Outer Vacuum Jacket (OVJ) is DN 65.

The main objectives of the test on mock-up of DMS cryoline at IICL are to measure the pressure drop and the heat load at 80K with gaseous helium since the internal construction of the line is not exactly as per DMS design. This test was conducted to compare theoretical/ analytical assessment with actual results. The test facility at IICL was regulated to meet the test conditions by delivering a mass flow rate ranging from 0.5 to 4 g/s at an 80 K temperature with a pressure range of 3 to 7 bar (abs.).

The pressure drop of the mock-up DMS cryolines was measured for various mass flow rates and different operating conditions; a pressure drop of 371 mbar ( $\pm 7$  mbar) measured for a mass flow rates of 4 g/s ( $\pm 1\%$ ). The heat load was derived for various mass flow rates after reaching steady state condition; actual heat load of 10 W ( $\pm 1.5$  W) at 90 K temperature level was concluded.



External view of the interface coupler



External view of the interface coupler (1) Mockup of the DMS cryoline (2) External interface coupler (3) 80K cold box (4) Internal of interface coupler



10 जनवरी 2022 को विश्व हिंदी दिवस के अवसर पर सुबह 11 बजे हिंदी विज्ञान प्रश्नोत्तरी का आयोजन माइक्रोसॉफ्ट टीम के माध्यम से किया गया। इस प्रश्नोत्तरी में संस्थान की तकनीकी गतिविधियों पर आधारित कुल 60 प्रश्न सम्मिलित किये गये। इस प्रतियोगिता में कुल 61 प्रतिभागियों ने भाग लिया। प्रश्नोत्तरी के संकलन हेतु आईपीआर, एफसीआईपीटी, इटर-भारत के इन सदस्यों ने योगदान दिया है - डॉ. महेन्द्रजीत सिंह, डॉ. जयदीप घोष, श्री अजय कुमार, डॉ. भरत दोशी, श्रीमती छाया चावडा, डॉ. सूर्यकान्त गुप्ता, डॉ. ललित अवस्थी, डॉ. रितेश सुगंधी, श्रीमती सुप्रिया नायर, श्री उपेन्द्र प्रसाद एवं श्री राज सिंह। प्रश्नोत्तरी प्रतियोगिता के विजेता इस प्रकार है -

प्रथम पुरस्कार	डॉ. श्रीचन्द्र जाखर, आईपीआर श्री आशिश यादव, इटर-भारत डॉ. भरत दोशी, आईपीआर
द्वितीय पुरस्कार	डॉ. मनोज कुमार गुप्ता, आईपीआर
तृतीय पुरस्कार	श्री अनुज कुमार गर्ग, इटर-भारत श्री आनन्द विसानी, एफसीआईपीटी सुश्री आभा माहेश्वरी, इटर-भारत



(L) व्याख्यान देते हुए श्री निरंजन वैष्णव, मुख्य प्रशासनिक अधिकारी (R) श्री निरंजन वैष्णव को शॉल भेंट करते हुए श्री राज सिंह



विश्व हिंदी दिवस समारोह में निदेशक महोदय द्वारा संस्थान के मासिक हिंदी समाचार "प्लाज्मा समाचार" का वर्चुअली विमोचन किया गया। इस समाचार पत्र में संस्थान की तकनीकी गतिविधियों को हर महीने प्रमुखता से प्रकाशित किया जाएगा। समाचार पत्र के विमोचन के पश्चात् विश्व हिंदी दिवस के उपलक्ष्य में एक व्याख्यान का आयोजन किया गया। श्री निरंजन वैष्णव, मुख्य प्रशासनिक अधिकारी, आईपीआर द्वारा "सेवानिवृत्ति के लाभ" विषय पर सेमिनार हॉल में व्याख्यान दिया गया, जिसे लाइव प्रसारित किया गया। श्री निरंजन वैष्णव जी ने सेवानिवृत्ति से संबंधित केंद्रीय सरकार के नियमों पर पूरे विस्तार से चर्चा की एवं श्रोताओं के शंकाओं को दूर किया।

## Emerging Scientist Award



**Dr. Prateek Varshney**, PDF, IPR, received the Emerging Scientist Award for his talk entitled "*Terahertz (THz) field generation by Laser Beating in Semiconductor Plasma*" delivered at the (Virtual) National Conference on Plasma Science and Application, organized by Sardar Vallabhbhai National Institute of Technology (SVNIT), Surat, during 20-21 December 2021.



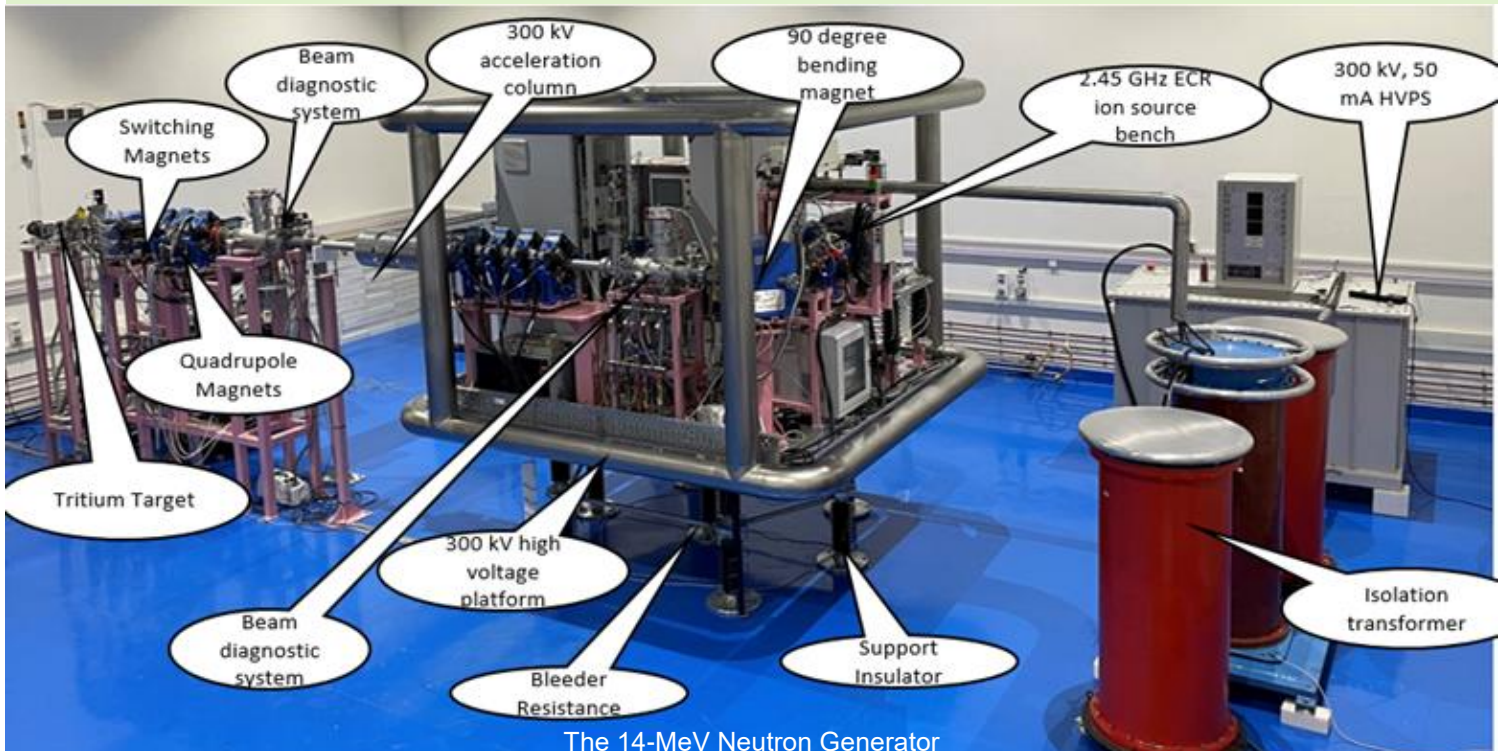
IGCAR, कलपाक्कम द्वारा 11-10 जनवरी, 2022 को 'समाज-कल्याण में विकिरण एवं नाभिकीय प्रौद्योगिकी के अनुप्रयोग' विषय पर अखिल भारतीय हिंदी वेब संगोष्ठी का आयोजन किया गया। इस वेब संगोष्ठी में परमाणु ऊर्जा विभाग की विभिन्न इकाईयों/उपक्रमों/संगठनों के प्रतिनिधियों ने भाग लिया। इस वेब-संगोष्ठी का लक्ष्य विभिन्न गैर-विद्युत संबंधी क्षेत्रों में विकिरण और नाभिकीय प्रौद्योगिकियों के लाभकारी उपयोग और समाज के लिए उनके महत्व को हिंदी भाषा में उजागर करना था। इस दो-दिवसीय वेब-संगोष्ठी के दौरान 'समाज-कल्याण में विकिरण एवं नाभिकीय प्रौद्योगिकी के अनुप्रयोग' शीर्षक के अंतर्गत विभिन्न विषयों पर आमंत्रित एवं सहयोग प्रस्तुतियाँ दी गईं। आईपीआर की ओर से इस वेब संगोष्ठी में दिनांक 10 जनवरी 2021 को श्री राजीव शर्मा, वैज्ञानिक अधिकारी-डी ने "अतिसुचालक फ्यूजन चुम्बकों के लिए न्यूट्रान प्रतिरोधी इन्सुलेशन पदार्थ का स्वदेशी विकास" विषय पर सहयोग प्रस्तुति दी। दिनांक 11 जनवरी 2021 को श्री राज सिंह, वैज्ञानिक अधिकारी-एच ने "फ्यूजन क्रांति - कितनी भरोसेमंद"? विषय पर आमंत्रित मुख्य व्याख्यान दिया।



वेबिनार में प्रस्तुति देते हुए श्री राजीव शर्मा एवं श्री राज सिंह

## Commissioning Of Accelerator-Based 14 MeV D-T Neutron Generator Facility

An accelerator-based 14-MeV neutron generator has been commissioned at IPR. It consists of an Electron Cyclotron Resonance Ion Source (ECRIS), Low Energy Beam Transport (LEBT) system, Electrostatic Acceleration, Medium Energy Beam Transport (MEBT) system, a 300kV 50 mA High Voltage Power Supply (HVPS), Beam diagnostic system (BDS), Switching Magnet (SM) and Rotating tritium target. Deuterium ions produced from a 2.45 GHz ECR source are accelerated up to 300 keV and impinge on a rotating Titanium Tritide (TiT) thin-film target to produce 14 MeV fusion neutrons. It can be used to study the effect of these neutrons on different blanket and plasma-facing materials, benchmark experiments for Fusion Evaluated Nuclear Data, etc. Initial trial operations have demonstrated a neutron yield of  $7 \times 10^{11}$  n/s, which is expected to go up to  $5 \times 10^{12}$  n/s at full strength, which would then make this the most powerful neutron source in India.

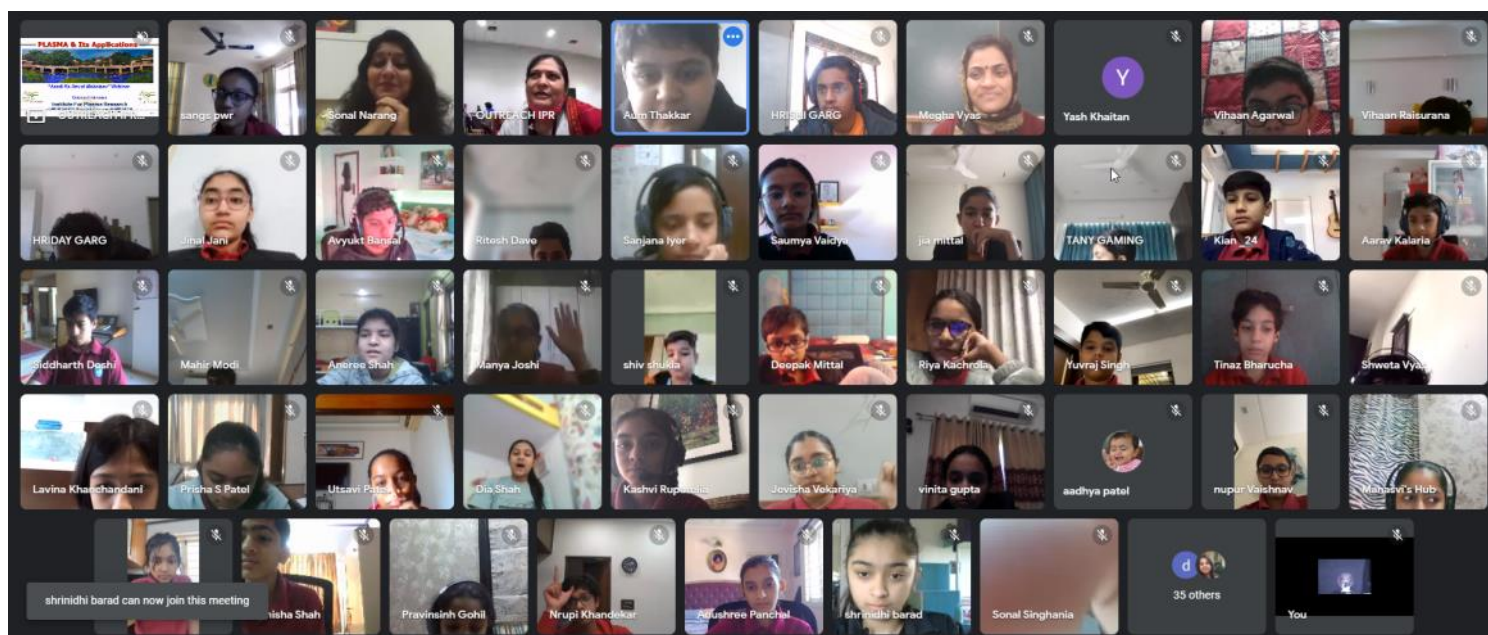


The 14-MeV Neutron Generator



The AKAM webinar programmes conducted by Outreach Division during the month of January 2022 to mark 75 years of Independence are as follows;

Date	Institution	Programme	Participants
11-Jan-2022	Anand Niketan School, Satellite, Ahmedabad	1-day AKAM webinar on plasma, its applications and fusion for class 7 students	92 students of class 7 and 7 teachers
12-Jan-2022	Anand Niketan School, Satellite, Ahmedabad	1-day AKAM webinar on plasma, its applications and fusion for class 8 students	85 students of class 8 and 6 teachers



Students of Anand Niketan School, Satellite, Ahmedabad attending the webinar.



The **Azadi Ka Amrut Mahotsav** On-line Colloquium series began in Sept, 2021. This series of popular science lectures aimed at students and general public is proposed to continue till August 2022.

The FIFTH talk in the series was a popular talk on 6th January, 2022 by **Dr. Jay Kothari**, Director and consultant at Critical Care Department, Apollo Hospital entitled "The new trends of Covid-19"

2nd National Science Gaming Competition 2021 organized by Aryabhata Science Club, Ranka, Garhwa (Jharkhand) in association with IPR/ITER-India. 106 participants from across India participated in this fusion game competition from which 17 participants were awarded medals and certificates based on the points they earned playing the "Operation Tokamak" Game.

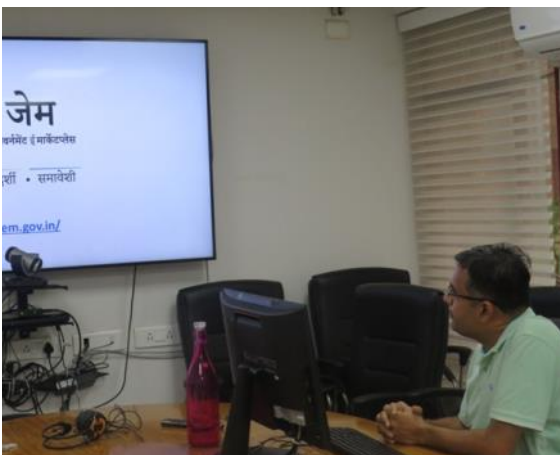


Declaration of the prizes of the 2nd National Science Gaming competition

संस्थान में दिनांक 21 जनवरी 2021 हिंदी सेमिनार का आयोजन ऑनलाइन माध्यम से किया गया, जिसमें संस्थान की वैज्ञानिक/तकनीकी गतिविधियों पर प्रतिभागियों द्वारा पावर पॉइंट प्रस्तुतियाँ दी गईं। हिंदी सेमिनार में एक आमंत्रित व्याख्यान एवं पाँच सहयोगी प्रस्तुतियाँ दी गईं। सेमिनार के प्रारंभ में डॉ. भरत दोशी, वैज्ञानिक अधिकारी-एच ने "एब्रेसिव(अपघर्षक) वॉटर जेट मशीनिंग- एक गैर-पारंपरिक मशीनिंग प्रक्रिया" विषय पर व्याख्यान दिया। डॉ. भरत दोशी ने इस विषय पर विस्तार से चर्चा की और आईपीआर में उपलब्ध इस मशीन की कार्यप्रणाली से श्रोताओं को परिचित कराया एवं उनके संदेहों का निवारण किया।

सेमिनार के अंत में श्री राज सिंह ने तकनीकी विषयों को हिंदी भाषा में सरलता से प्रस्तुत करने के लिए सभी प्रतिभागियों की सराहना की एवं धन्यवाद दिया। हिंदी सेमिनार की प्रस्तुतियों का मूल्यांकन श्री सुनिल कुमार एवं डॉ. सूर्यकान्त गुप्ता द्वारा किया गया। सेमिनार में उत्कृष्ट प्रदर्शन हेतु श्री राजीव शर्मा एवं श्री एल एन श्रीकांत ने प्रथम पुरस्कार, श्री रितेश सुगंधी ने द्वितीय पुरस्कार एवं सुश्री दृष्टि खण्डूरी तथा श्री गौतम वडोलिया ने तृतीय पुरस्कार प्राप्त किया है। हिंदी सेमिनार की प्रस्तुतियाँ इस प्रकार हैं:

प्रस्तुतिकर्ता	विषय
डॉ. भरत दोशी MESD प्रभाग (आमंत्रित व्याख्यान)	एब्रेसिव(अपघर्षक) वॉटर जेट मशीनिंग- एक गैर-पारंपरिक मशीनिंग प्रक्रिया Abrasive Water Jet Machining- a non-conventional machining process
श्री एल एन श्रीकांत SST-1 क्रायोजेनिक प्रभाग	एसएमपीवी नियमों के अनुसार प्रेशर रिलीफ वॉल्व का परीक्षण Testing of Pressure relief valves as per SMPV rules
सुश्री दृष्टि खण्डूरी LVPD-प्रभाग	तापमान मापन प्रणाली Temperature Measurement System
श्री गौतम वडोलिया PSED - प्रभाग	उन्नत निर्माण तकनीकियाँ : इलेक्ट्रॉन बीम वेल्डिंग तकनीक का अवलोकन / Advanced fabrication Techniques: Overview of Electron Beam Welding Technique
श्री राजीव शर्मा SST-1 क्रायोजेनिक प्रभाग	हीलियम गैस सिलेंडरों का सामयिक हाइड्रोस्टैटिक परीक्षण, निरीक्षण और प्रमाणन / Periodic Hydrostatic Testing, Inspection and Certification of Helium Gas Cylinders
डॉ. रितेश सुगंधी LVPD-प्रभाग	गवर्नमेंट ई मार्केटप्लेस का अवलोकन An Overview of Government e-Marketplace

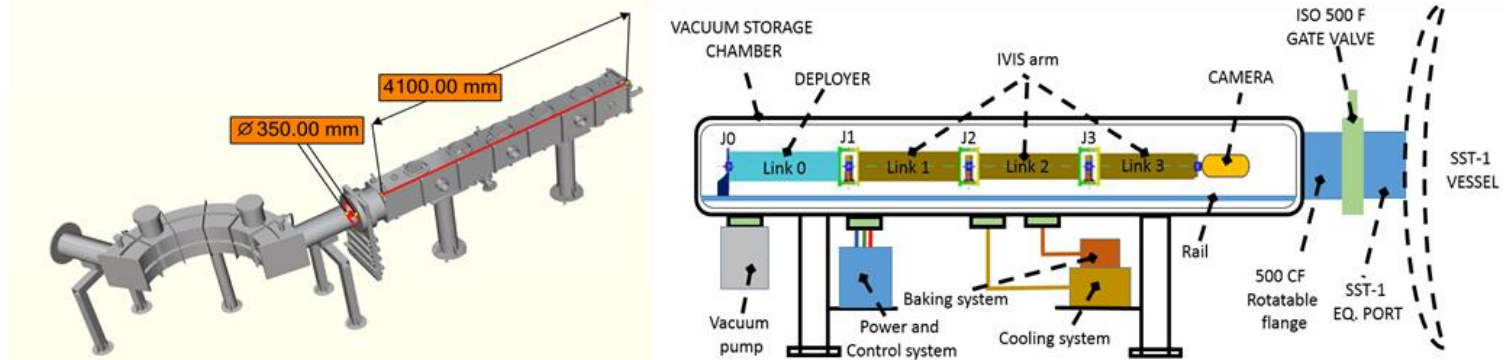


हिंदी सेमिनार की छवियाँ



Plasma facing components (PFCs) in a tokamak are subjected to high heat & particle fluxes, which damages them over a period of time. Hence periodic inspection is essential for health monitoring of PFCs in-between plasma experiments, and this must be done without breaking the ultra-high vacuum. An In-Vessel Inspection System (IVIS) has been developed at IPR to perform remote in-service inspection inside a toroidal vacuum vessel (VV).

The IVIS is compatible with  $10^{-7}$  mbar vacuum and  $100^{\circ}\text{C}$  temperature. It consists of a 6-DOF articulated arm with reach up to 4 m, mounted on a linear guide and a vacuum storage chamber (VSC). IVIS is controlled remotely using virtual reality based monitoring and control. During initial testing, **position repeatability of  $\pm 2\text{mm}$**  has been achieved. IVIS can also be adapted for inspection & maintenance in any large system having a challenging environment like vacuum, temperature, narrow spaces etc.



(L) IVIS System with a toroidal chamber (R ) Overall systematic of the IVIS System

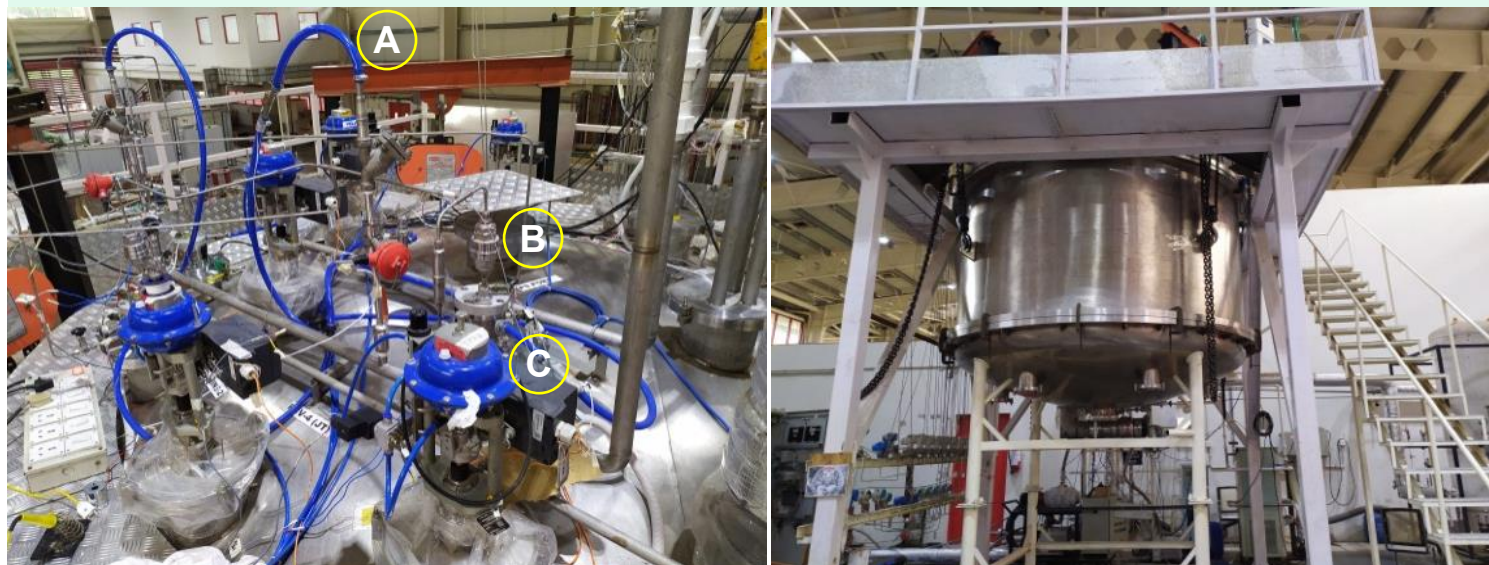


The IVIS System being tested



The LCPC division is actively involved in the development of an indigenous liquid helium refrigerator plant. This plant has many critical components that have been developed indigenously, and only the helium turbines and cryogenic valves were procured. In such a helium plant operation, it is essential that the helium compressor as well as the oil removal system are required to be of very high quality, and these have been developed by the LCPC division by using an open-loop air compressor. The assembly of this helium plant was completed in June-2021. Three high speed cryogenic helium turbines of speeds 2.2, 1.6 and 1.1 lakh RPM respectively, to be used for cooling helium below 80 K were integrated with the cold box and their nominal inlet helium temperatures are 33, 15 and 7 K respectively.

Different systems and sub-systems were operated step by step and validated before a complete helium plant operation. After these steps, complete plant was operated on 16th Dec-2021 to test its performance. The target performance was 200 W refrigeration at liquid helium temperature ~4.5 K. This plant has the capability of alternate operational scenarios, such as refrigeration power of ~500 W at ~15 K and 1000 W at ~50 K. These options however, cannot be used simultaneously. Cooling power at ~15 K will be useful for cooling the MgB<sub>2</sub> superconductor system and liquefaction of hydrogen and its isotopes. Cooling power at ~50 K will be useful for cooling high temperature superconductor systems. This system can also be easily converted into a liquefier too, if required.



(L) the cryogenic turbines installed (A) Cooling water (B) Turbine-1 (C) Cryogenic valve (R) The assembled cold box.



(L) Indigenously developed helium compressor and oil removal system (R) Components of the cold box being assembled.

### Upcoming Events

- ◆ 28th National Symposium on Cryogenics and Superconductivity (NSCS28), IIT Kharagpur, 01-04th February 2022. <https://www.nscs28.com/>
- ◆ International Conference on Recent Advances in High Pressure Science and Technology (ICReAch 2022), Indira Gandhi Centre for Atomic Research, Kalpakkam, 08-10th February 2022. <https://icreach2022.com/>
- ◆ DAE-BRNS International Symposium on Vacuum Science and Technology and its Applications in Accelerators (VSTAA-2022), DAE Convention Centre, Anushakti Nagar, Mumbai, 16-19th February 2022. [http://www.barc.gov.in/div/78\\_312\\_s1195.pdf](http://www.barc.gov.in/div/78_312_s1195.pdf)
- ◆ International Conference on Renewable Energy (ICRE 2022), (Online), University of Rajasthan, Jaipur, 25-27th February 2022. <https://sites.google.com/view/icre2022>



- ◆ **Ms. Priyanka Tiwari**, gave a talk on "*Polarization-Insensitive Metasurface Based Switchable Absorber/ Resorber*" at 2021 IEEE Asia Pacific Microwave Conference (APMC 2021), Brisbane, Australia, 28th November 2021-1st December 2021
- ◆ **Dr. Mukesh Ranjan**, gave an invited talk on "*Plasma Produced Patterns for Health and Food Applications*" at Plasma Processing of Nanomaterial and Its Applications (PPNA)-2021, Organized by IPR, 3rd December 2021
- ◆ **Talks presented at IEEE Pulsed Power Conference & Symposium on Fusion Engineering (PPC-SOFE 2021), 12-16 December 2021**
  - **Mr. Piyush Prajapati**, gave a talk on "*Conceptual Design of Heat Extraction Test Reactor (HxTR) Systems*"
  - **Ms. Bhoomi S. Gajjar**, gave a talk on "*Boron Carbide as High Energy Shielding Material for ITER*"
- ◆ **Mr. Rohit Mathur**, gave a talk on "*Simulation study of Luneburg Lens on K-band horn antenna for FMCW Reflectometry Applications*" at 2021 IEEE Indian Conference on Antennas and Propagation (InCAP), Malaviya National Institute of Technology, Jaipur, 13-16th December 2021
- ◆ **Ms. Priyanka Tiwari**, gave a talk on "*Design and Simulation of a Water Based Polarization-Insensitive and Wide Incidence Dielectric Metasurface Absorber for X-, Ku- and K-Band*" at 2021 IEEE Indian Conference on Antennas and Propagation (InCAP 2021), Malaviya National Institute of Technology, Jaipur, 13th-16th December 2021
- ◆ **Dr. Yogendra Kumar**, gave a talk on "*Surface modifications study of Si substrate in Ar/O<sub>2</sub> RF plasma for semiconductor device applications*" at 65th DAE Solid State Physics Symposium (DAE-SSPS 2021), Bhabha Atomic Research Centre, Mumbai, 15-20th December 2021
- ◆ **Ms. Priyanka Tiwari**, gave a talk on "*Design and Simulation of a Polarization-Independent Switchable Metasurface Resorber/Absorber*" at IEEE MTT-S International Microwave and RF Conference (IMaRC 2021), Indian Institute of Technology, Kanpur, 17th-19th December 2021
- ◆ **Talks presented at Virtual National Conference on Plasma Science and Applications (PSA), Sardar Vallabhbhai National Institute of Technology (SVNIT), Surat, 20-21 December 2021**
  - **Dr. S.K. Nema**, gave a Plenary Talk on "*Advances in Non-Thermal Plasma Technologies and its Applications*"
  - **Dr. Prateek Varshney**, gave a talk on "*Terahertz (THz) field generation by Laser Beating in Semiconductor Plasma*"
  - **Mr. Ansh Patel**, gave a talk on "*Application of data driven techniques for plasma diagnostic signal analysis*" and received **Best Oral Presentation Award**
  - **Mr. Jagabandhu Kumar**, gave a talk on "*Measurement of fast electron bremsstrahlung emission (FEB) in the energy range of 20 keV to 350 keV from SST-1 tokamak employing CdTe detector*"
  - **Mr. Kiran Patel**, gave a talk on "*Pneumatic Calibrator for Heterodyne Interferometer*"
  - **Mr. Tajinder Singh**, gave a talk on "*Modelling the electrostatic microturbulence transport in Aditya-U tokamak*"
  - **Ms. Y. Patil**, gave a talk on "*Estimation of negative ion density of oxygen DC magnetron plasma using Langmuir probe*"
- ◆ **Dr. Anshu Verma**, Indian Institute of Technology Delhi, gave a talk on "*Exploring Thruster Potential of Compact ECR Plasma Source*" on 22nd December 2021
- ◆ **Dr. Shashank Chaturvedi**, Director, IPR, gave a talk on "*Deployable Technologies from Plasma Science: Present-day & Future*" at 12th Indian Nuclear Society (INS) Webinar Series, on 25th December 2021
- ◆ **Mr. Hitensinh Vaghela**, gave a talk on "*Porous Media Approach in Hydraulic Performance Evaluation of Cable-in-Conduit Conductor in Superconducting Magnet Applications*" at 48th National Conference on Fluid Mechanics and Fluid Power (FMFP-2021), BITS, Pilani Campus, Rajasthan, 27-29 December 2021, and received **Best Paper of the Session Award**
- ◆ **Ms. Nidhi Rathee**, gave a talk on "*Breaking of Large Amplitude Electrostatic Waves in Inhomogeneous Plasmas*" on 28th December 2021
- ◆ **Dr. S.R. Mohanty**, gave an invited talk on "*Study of Neutron and X-ray Emission from Inertial Electrostatic Confinement Fusion Device and their Usage*" at International Conference on Plasma Science and Application 2021 (ICPSA2021), Nanjing University of Science and Technology, China, 29th December 2021
- ◆ **Dr. Rakesh Moulick**, gave an invited talk on "*Scientific Significance of Shrimad Bagavad Gita*" at a webinar organized by Rangapara College, Rangapara, Sonitpur, Assam, 29th December 2021
- ◆ **Ms. Sukriti Hans**, gave a talk on "*Exploring dynamics of nanoscale features with different ion beam parameters to improve their efficiency in an application*" at National Conference on Recent Trends in Materials Science and Technology (NCMST-2021), Department of Space, Thiruvananthapuram, 29-31 December 2021
- ◆ **Dr. Jay Kothari**, Apollo Hospital, Ahmedabad, gave a talk on "*The new trends of Covid-19*" on 6th January 2022 (Colloquium #308)
- ◆ **Prof. Kanak Saha**, Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune, gave a talk on "*Extreme-UV pho-*

## Know Your Colleague



**Mr. Abhijeet Kumar**, an Electronics Engineer and Diploma in VLSI design from CDAC, ACTs Pune, earlier worked with R&DE (Engineers), Pune (DRDO Lab) as JRF on GUI designing of Aircraft Arrestor Gear System in MATLAB. He joined IPR in 2008 as Engineer-SC in Aditya DAQ Division and currently working as Scientific Officer-E with Electronics & Instrumentation Division. He designed & developed various PXI based DAQ application in LabVIEW for ADITYA, BETA and BASIC Lab. He developed USB based DAQ system in FPGA using VHDL coding in Xilinx ISE. His expertise includes development of universal interface DAQ board using Zynq-7000 SoC (System on Chip) which required skilled VHDL coding & C programming for ARM processor. He is also carrying out several PCB Layout for various projects using Altium Designer and also guided some M.Tech. students for their embedded electronics projects.

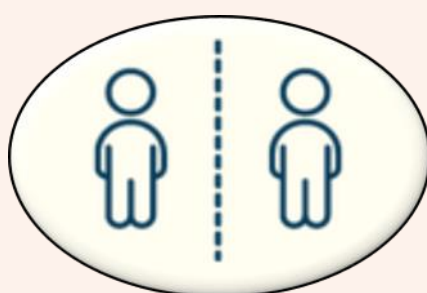


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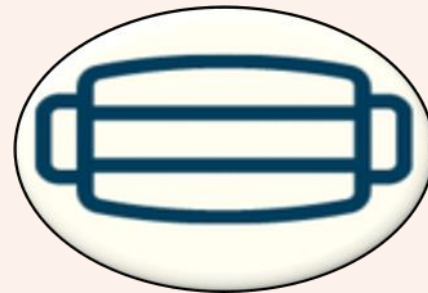
### Help Fight The Covid-19 Pandemic



**Wash Your Hands frequently  
With Soap**



**Ensure Social Distancing  
At ALL times**



**Always WEAR a Mask  
When you go outside**

- ◆ Avoid touching your eyes, nose and mouth
- ◆ If you have fever, cough and difficulty in breathing, seek medical care early
- ◆ Stay informed and follow advice given by your healthcare provider

- ◆ Inform Office immediately if you or any family member tests positive
- ◆ Follow SMS - **S**ocial Distancing : **M**ask : **S**oap/ Sanitizer
- ◆ Strictly follow social distancing while outdoors, especially at work.

**Please get yourselves vaccinated  
against Covid-19**

**कृपया अपने आप को कोविड -19 के  
खिलाफ टीकाकरण करवाएं**

**For your safety and for the safety of your co-workers, ensure that you always use  
Arogya Setu App**

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