

Issue 063

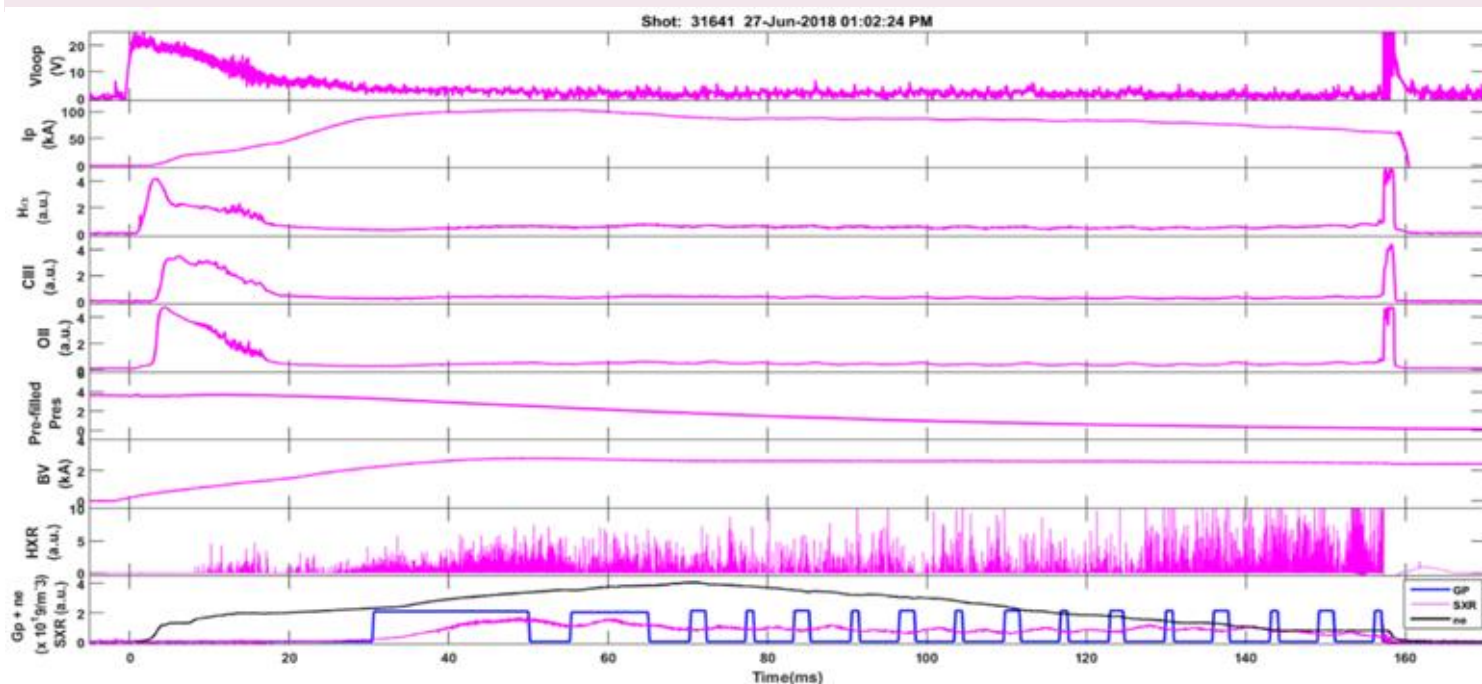
October 2018

The Fourth State

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

ADITYA Upgrade : Phase-II Operation

ADITYA-U is now compatible with both circular as well as shaped plasma operation. After installation of major diagnostics systems for Phase-II plasma operation, vacuum vessel baking systems have been installed. ADITYA-U vacuum vessel has been successfully baked up to $\sim 130^{\circ}\text{C}$ in subsequent baking cycles for the purpose of achieving lower base vacuum. The base pressure of the order of $\sim 9 \times 10^{-9}$ Torr has been achieved after solving all leaks. After all the relevant preparations, the Phase-II plasma operation were resumed in ADITYA-U in February 2018 in a Graphite limiter (toroidal belt limiter) configuration and continued to achieve plasma parameters close to design parameters. Plasma discharge performance improvement along with several experiments include mainly the fuelling with Supersonic Molecular Beam Injection (SMBI), plasma position measurement with different techniques such as magnetic probes, Sine-Cosine, optical In-Out measurements and real time control of plasma position using Fast Feed Back Power Supply (FFPS) have been performed. In addition to that the broad hydrogen gas puffing as well as multiple hydrogen gas puffing of different pulse width and amplitude have been introduced for runaway control and density enhancement during plasma current flat-top with proper interlock of pulses have been regularly operated during Phase-II operation. Auxiliary heating other than Ohmic heating is required for heating the tokamak plasmas. Recently, Electron Cyclotron Resonance (ECR ~ 42 GHz and ~ 150 W) wave has been successfully launched in ADITYA-U tokamak. The toroidal magnetic field of the order of max. 1.35 T (90% of the design value) has been operated during this experiment. During Phase-II plasma operation, Plasma current of ~ 100 kA-120 kA with plasma duration of 100-180 ms has been achieved. Booster Power supply assisted vertical field raised the plasma current up to 135 kA. Plasma pulse length enhancement has been performed with application of negative converter power supply. The maximum Line-averaged electron density of $\sim 4 \times 10^{19} \text{ m}^{-3}$ corresponding to central density of $6.7 \times 10^{19} \text{ m}^{-3}$ has been achieved for the first time in ADITYA-U tokamak. The electron temperature of the order of 250 -300 eV has been obtained. Neon gas puff assisted radiative improved confinement and the experiments related to plasma shaping will be performed in near future.



ADITYA-U Phase-II discharge showing density enhancement with sonic gas puffing.

The Technology Transfer and Collaboration Division of DAE (TTCD) organized an interaction programme on technologies developed by all the units of DAE. This event was organized by the NPCIL Nuclear Power Station at Kaiga, Uttara Karnataka during 26-30 August, 2018 in the sidelines of the 3rd Journalists' Workshop in collaboration with the National Union of Journalists, (NUJ) School of Journalism organized by DAE at Kaiga Atomic Power Plant site, Karnataka during August 27-30, 2018. From IPR, Dr. Nirav Jamnapara, Dr. Suryakant Gupta and Dr. Ravi A V Kumar attended the event and showcased four of the major technologies that have been developed by IPR and is currently in use *i.e*, Plasma Nitriding, Plasma Pyrolysis, Plasma treatment of textiles and Atmospheric Pressure Plasma Jet Technology. The exhibition was inaugurated by the Chief Executive Officer of Uttar Kananda Zilla Panchayat, Shri. Mohammad Roshan, IAS, in the presence of Site Director of Kaiga NPCIL, Shri. Sanjay Kumar, Head of Public Awareness Department of DAE Shri. Ravi Shankar and others. Other than the interaction with the journalists participating in the event, the staff and residents of the Kaiga township also visited the exhibition.



संस्थान में 31 अगस्त, 2018 से 14 सितम्बर, 2018 तक हिंदी पखवाड़ा समारोह 2018 के दौरान स्टाफ सदस्यों के लिए 13 प्रतियोगिताएं आयोजित की गईं, जिसमें बहुत ही उत्साह के साथ प्रतिभागियों ने भाग लिया। कुल 9 प्रतियोगिताएँ 'क', 'ख' एवं 'ग' भाषा वर्ग के प्रतिभागियों के बीच अलग-अलग आयोजित की गईं। 31 अगस्त को सुलेखन प्रतियोगिता आयोजित की गई जिसमें प्रतिभागियों को हिन्दी भाषा के महत्व को उजागर करने वाला अनुच्छेद, सुंदर एवं स्पष्ट शब्दों में लिखने को कहा गया था। 4 सितम्बर को हिंदी टाइपिंग प्रतियोगिता रखी गई, जिसमें प्रतिभागियों को निर्धारित समय में कंप्यूटर पर हिंदी टाइपिंग हेतु एक अनुच्छेद दिया गया। 5 सितंबर को नारा लेखन एवं निबंध लेखन प्रतियोगिता में नारा लेखन हेतु तत्काल विषय दिया गया – विज्ञान और नैतिकता। इस व्यापक विषय पर प्रतिभागियों ने नारे बनाए, जो गागर में सागर की तरह थे। प्रतियोगियों द्वारा प्रस्तुत नारों में कम शब्दों में सार्थक और गूढ़ बात कही गई थी। निबंध लेखन के अंतर्गत दिये गये विभिन्न विषयों पर प्रतियोगियों ने अपने मौलिक विचार प्रस्तुत किये। हिंदी कार्यशाला का आयोजन 6 सितंबर को किया गया, जिसमें कर्मचारियों को कंप्यूटर पर हिंदी के विभिन्न सॉफ्टवेयर से अवगत कराया गया। स्पीच टू टेक्स्ट, टेक्स्ट टू स्पीच, शब्दकोश, राजभाषा विभाग के ई-टूल्स आदि की जानकारी प्रदान की गई एवं इन सॉफ्टवेयर के माध्यम से कार्यशाला में उपस्थित कर्मचारियों को अभ्यास भी कराया गया। हिंदी सहित अन्य प्रादेशिक भाषाओं के सुगमता से उपयोग की जानकारी सभी के लिए लाभदायक रही। पखवाड़े के दौरान संस्थान की गतिविधियों पर आधारित वैज्ञानिकी/प्रशासनिक विषय से संबंधित आलेख एवं पोस्टर हिंदी अनुभाग में जमा किये गये। 7 सितंबर, 2018 को ऑनलाइन “चित्र देखो, कहानी लिखो” प्रतियोगिता में कर्मचारियों को चार चित्र ईमेल द्वारा भेजे गये, जिसमें से किसी एक चित्र पर हस्तलिखित कहानी लिखने के लिए एक घंटे का समय दिया गया। इस प्रतियोगिता में कर्मचारियों ने उत्साह पूर्वक भाग लिया और अपनी सृजनशक्ति का परिचय दिया।

टिप्पणी एवं अनुवाद प्रतियोगिता 10 सितंबर को आयोजित की गई। इस प्रतियोगिता के अंतर्गत प्रतिभागियों के लिए कार्यालयीन उपयोग में आने वाले वाक्यांशों एवं अनुच्छेद का अनुवाद एवं टिप्पणी और मसौदा से संबंधित प्रश्न तैयार किये गये। 11 सितम्बर को कहानी वाचन प्रतियोगिता रखी गई। कहानी वाचन के प्रतियोगियों ने आईपीआर के पुस्तकालय से हिन्दी साहित्य से स्वयं कहानी चयन करके पूरे हाव-भाव के साथ अभिव्यक्त की। प्रतिभागियों द्वारा



चयनित कहानियाँ वाकई यथार्थ से जुड़ी एवं शिक्षाप्रद थी। कहानी चयन करते हुए प्रतिभागियों को हिन्दी साहित्य की कई उद्देश्यपूर्ण एवं सफल कहानियों से रूबरू होने का अनुभव हुआ। इस प्रकार सदस्यों को हिन्दी साहित्य से जोड़ने का इस प्रतियोगिता का उद्देश्य सफल रहा।

12 सितंबर को आयोजित वाद-विवाद प्रतियोगिता का विषय था – विश्व के विकसित देशों की तुलना में भारत में उच्च शिक्षा का स्तर संतोषजनक है या नहीं? इस विषय पर पक्ष और विपक्ष में प्रतियोगियों ने अपने विचार प्रस्तुत किये। इसके बाद श्री राज सिंह द्वारा संचालित ‘चाय पर चर्चा’ कार्यक्रम

में ‘इंटर में अपनी भागीदारी का, भारत किस तरह से अधिक से अधिक फायदा उठा सकता है?’ इस विषय पर प्रतियोगियों द्वारा सामूहिक चर्चा की गई।

14 सितंबर को हिंदी दिवस के अवसर पर तात्कालिक भाषण एवं स्वरचित कविता पाठ प्रतियोगिता श्री हरीश चंद्र खण्डूरी के सौजन्य से आयोजित की गई। हिंदी पखवाड़ा समारोह के कार्यक्रमों में प्रतियोगियों के साथ श्रोताओं ने भी उत्साहपूर्वक भाग लिया। 14 सितंबर को समापन समारोह में संस्थान के निदेशक एवं राभाकास के अध्यक्ष डॉ. शशांक चतुर्वेदी ने परमाणु ऊर्जा विभाग के सचिव के प्रेरणास्पद संदेश का वाचन किया। श्री प्रवीण कुमार आत्रेय, वैज्ञानिक अधिकारी-एच एवं राभाकास के सदस्य ने गृह मंत्री के संदेश का वाचन कर संस्थान में राजभाषा के सुचारू रूप से कार्यान्वयन हेतु स्टाफ सदस्यों को प्रेरित किया। निदेशक महोदय ने संस्थान में शुरू की गई अंतर-अनुभागीय चल राजभाषा शील्ड योजना के अंतर्गत राजभाषा में श्रेष्ठ कार्य हेतु संस्थान के पुस्तकालय अनुभाग को इस शील्ड से सम्मानित किया एवं राजभाषा में उत्कृष्ट कार्य करने के लिए श्री सुनील मिसाल, कार्यालय सहायक – ए एवं सुश्री प्रतिभा गुप्ता, वैज्ञानिक अधिकारी - एसएफ को वर्ष 2017-18 का राजभाषा पुरस्कार प्रदान किया। साथ ही हिन्दी प्रवीण एवं पारंगत परीक्षा उत्तीर्ण करने वाले स्टाफ सदस्यों को निदेशक द्वारा प्रमाण-पत्र वितरित किये गये और बाद में हिन्दी पखवाड़ा समारोह के सभी विजेताओं को पुरस्कृत किया गया।

निदेशक महोदय ने संस्थान में हिंदी के व्यापक प्रचार-प्रसार हेतु नये सॉफ्टवेयर एवं तकनीकी के प्रयोग करने के प्रभावी सुझाव दिये और संस्थान में यथाशीघ्र इसका क्रियान्वयन करने को कहा। अंत में राजभाषा कार्यान्वयन समिति के उपाध्यक्ष श्री राज सिंह ने हिन्दी पखवाड़ा समारोह को सफल बनाने हेतु सभी को धन्यवाद दिया। हिंदी पखवाड़ा समारोह के आयोजन हेतु एक उपसमिति का गठन किया गया था, जिसमें ये सदस्य सम्मिलित थे - श्री सरोज दास, डॉ. सूर्यकांत गुप्ता, श्री कलीम खान, श्री प्रशांत कुमार एवं सुश्री प्रतिभा गुप्ता। सभी सदस्यों के सहयोग से हिंदी पखवाड़ा समारोह की गतिविधियाँ सुचारू रूप से संपन्न हुई। इतर में श्री कलीम खान एवं एफसीआईपीटी तथा विधाता लैब में श्री आनंद विसानी ने वहाँ के कर्मचारियों के लिए प्रतियोगिताओं का आयोजन किया। हिंदी पखवाड़ा समारोह की विभिन्न प्रतियोगिताओं के मूल्यांकन में संस्थान के इन सदस्यों ने अपना योगदान दिया - श्री अनिल कुमार त्यागी, सुश्री आभा माहेश्वरी, श्री उदय कुमार, श्री शम्भुनाथ, श्री राज सिंह, डॉ. सूर्यकान्त गुप्ता, श्री अजय कुमार, श्री मुकेश झा, श्री श्रवण कुमार, श्री अनुज हार्वे, सुश्री फाल्गुनी शाह, सुश्री सुप्रिया नायर, श्री हितेश गुलाटी, सुश्री रेणु बहल, श्री भरत दोशी, श्री निरंजन वैष्णव, डॉ. सूर्य कुमार पाठक, श्री हर्षद चामुण्डे, श्री हरीश चन्द्र खण्डूरी, श्री सुनील मिसाल एवं डॉ. संध्या पी दवे।



हिंदी पखवाड़ा समारोह की कुछ तस्वीरें

The 6th meeting of the Plasma & Fusion Research Committee (PFRC) of the Board of Research in Nuclear Sciences (BRNS) was held at IPR during 6-7 September, 2018. The following members attended the meeting Prof P I John (Chairman), Prof. Prabal Chattopadhyay, Shri. D. K. Dalal (Project Officer, BRNS), Shri. P. K. Atrey, Prof Amit Roy, Prof. G Amarendra, Dr. Ravi A. V. Kumar (Member Secretary, PFRC) and Dr. N. Ramasubramanian. During this 2 day meeting, 19 new R&D projects and 46 ongoing projects were reviewed. Of the new projects, 17 were approved with a budget allocation of ~ Rs.4.01 Crores.



The 6th PFRC review meeting in progress at IPR

Free Eye-Care Camp @CPP-IPR

A free eye screening camp was conducted by Sri Sankardeva Nethralaya, Guwahati, a premier eye care hospital of the north-east, at CPP-IPR campus on 20th September, 2018. Two specialists of the hospital attended the camp and advised of CPP-IPR staff and their family members, as well as the supporting contractual staff of the institute, numbering over 50, on their various eye related problems.



The eye-care camp in progress at CPP-IPR

Significant progress was made in shipments of Cryolines to ITER. Almost 40% of manufacturing and shipments of Cryolines & Warm lines to ITER has been done, and the assembly work at ITER site is progressing.



Various cryoline components being shipped to ITER, France

iThenticate Training Session at IPR

IPR Library organized a training session on iThenticate, the web-based plagiarism detection tool on 29 August 2018 at IPR Seminar Hall. The training was aimed at learning and acquiring better understanding of the features and functionalities of the software for conducting similarity checks for IPR publications (including Journal submissions, MTech Dissertations, PhD Thesis, etc.). The interactive session was also live-streamed for remote access and a large number of staff members and research scholars attended the session.



Session on “Getting Published the Digital Age” @ IPR

IPR Library organized IEEE session on "Getting Published the Digital Age" on 05 September 2018 at IPR Seminar Hall. The informative session was conducted by Ms. Anindita Pandey, Regional Publishing Manager, Taylor & Francis Journals. The session included guidance on writing for an academic journal, tips to keep in mind before submission, the peer review process, dealing with reviewers' comments, crafting the title and composing the abstract, etc. The session also included a discussion on common ethical issues in academic publishing. The session was attended by a large number of staff members and research scholars.



Name Of the Institution	Date	Number of visitors
Institute of Advanced Studies , Gandhinagar	7 th September 2018	26 MSc (Physics); first and second year students and 2 faculty members
Sheth M. N. Science College, Patan	12 th September 2018	54 students of BSc. Physics
Ratnamani Science College, Becharaji, Mehsana,	14 th September 2018	31 B.Sc 3 rd and final year students and two faculty members
Smt. R.G. Patel Girls Secondary School., Sector-23, Gandhinagar	18 th September 2018	100 High school and Higher secondary School Students
Silver Oak College of Engineering & Technology, Ahmedabad	19 th September 2018	36 students of 3 rd & 4 th Year B.E Electronics & Communication Engineering and two faculty members.
C. U. Shah University, Wadhwan	20 th September 2018	49 students of final year B.Tech Electrical/B. Tech Third Year Electrical.



Students of C. U. Shah University, Wadhwan, during their visit to IPR



Students of Institute of Advanced Studies , Gandhinagar during their visit to IPR

Construction of Neutronics Laboratory Building at IPR campus is nearing completion. Both outside and inside civil works, plumbing, electrical and fire detection works has been completed. HVAC works are currently in progress.



(L) The view of the neutronics building. (R) Ground floor corridor



(L) View of the shield room (neutron generator room) of the neutronics building. (R) First floor corridor

Superannuation - Farewell Function

The farewell function on the occasion of superannuation of two of our colleagues Dr. D. Chenna Reddy and Dr. S. V. Kulkarni was held on 31st August 2018, at IPR Seminar Hall. They were accompanied by their family members. Director, Dean, and others wished them well ! They were also presented with mementoes on behalf of Staff Club. Dr. Chenna Reddy joined IPR after completion of his PhD from PRL Ahmedabad and PDF from UK and Dr. Sanjay Kulkarni Joined IPR after completion of his PhD at IISc, Bangalore and PDF from USA. On behalf of IPR, we wish them a happy and healthy retired life !



(L-R) Mrs. & Dr. Reddy, Dr. Kulkarni & Mrs. Kulkarni and Director, IPR during the farewell function.



Dr. Sanjay V. Kulkarni
Joined IPR : 02-07-1990
Retired on : 31-5-2018



Dr. D. Chenna Reddy
Joined IPR : 26-04-1990
Retired on : 31-08-2018

Congratulations !



Prof. Subroto Mukherjee, Dean Academics and head, LIGO Division was elected as the "Fellow of Indian National Academy of Engineering" (INAE) this year (2018) for the recognition of his distinguished contribution to "Engineering". The ceremony to confer this award will be held at Hyderabad during Dec 14-15, 2018 during INAE Annual Convention. On behalf of IPR, we congratulate him on this achievement.



Mr. Amitkumar V Patel from ITER-India has been selected to be the recipient of the "INAE Young Engineer Award 2018", instituted by the Indian National Academy of Engineering. The award will be presented to him during the INAE Annual Convention to be held at Hyderabad during Dec 14-15, 2018. On behalf of IPR and ITER-India, we congratulate him on this achievement.

IPR @ Conferences



Mr. Pranjal Singh, PhD scholar from IPR presented a paper entitled "*Role of angular orientation of dipoles on work function during cesium deposition on a metal surface – a phenomenological model*" at the 6th International symposium on Negative Ions, Beams and Sources (NIBS-18) held at Novosibirsk, Russia during 3-7 Sept, 2018.



Mr. Debrup Mukhopadhyay, PhD scholar from IPR presented a paper entitled "*Negative Hydrogen ion density measurement in a permanent magnet based Helicon Ion source (HELEN-I) using cavity ring-down spectroscopy technique*" at the 6th International symposium on Negative Ions, Beams and Sources (NIBS-18) held at Novosibirsk, Russia during 3-7 Sept, 2018.

Past Events @ IPR

- ◆ **Prof. B. V. R. Tata**, University of Hyderabad, gave a talk on "*Like Likes Like: Experiments on Charged Colloids to Dusty Plasmas*" on 17th August 2018 (Colloquium # 290)
- ◆ **Dr. Tapasi Ghosh**, Federal University of Goias, Brazil, gave a talk on "*Simulation, Track Reconstruction and Data Analysis Techniques for High Energy Physics Experiments*" on 23rd August 2018
- ◆ **Prof. Lekha Nair**, Jamia Millia Islamia, New Delhi, gave a talk on "*Knowledge from Damage: Ion Beam Interactions with Surfaces and Molecules*" on 28th August 2018
- ◆ **Dr. Vanarajsinh Jashavantsinh Solanki**, Indian Institute of Science, Bengaluru, gave a talk on "*Porous Metal Oxides: Synthesis and Applications*" on 30th August 2018
- ◆ **Dr. Arvind Kumar Saxena**, Institute for Plasma Research, Gandhinagar, gave a talk on "*Mass spectrometric and Optical emission spectroscopic study of atomic and molecular clusters*" on 31st August 2018
- ◆ **Dr. Aniruddha Samanta**, School of Material Science and Nanotechnology, Jadavpur University, Kolkata, gave a talk on "*Development of Smart Bio-Materials*" on 7th September 2018
- ◆ **Dr. Umesh Gaur**, National Institute of Technology, Jalandhar, gave a talk on "*Magnetic nanostructures: nano scale properties and recent applications*" on 14th September 2018
- ◆ **Mr. Atul Kumar**, Institute for Plasma Research, Gandhinagar, gave a talk on "*Study of novel features in laser-plasma interactions*" on 17th September 2018
- ◆ **Mr. Kartik Mohan**, Institute for Plasma Research, Gandhinagar, gave a talk on "*To Design, Analyse and Develop Resonant Converter based DC power supply for the pre-driver stage amplifier*" on 17th September 2018
- ◆ **Mr. Sandeep Kumar**, Institute for Plasma Research, Gandhinagar, gave a talk on "*Collective structures in strongly coupled dusty plasmas*" on 18th September 2018
- ◆ **Dr. Somesh Tewari**, Technion Israel Institute of Technology, Israel, gave a talk on "*Underwater Electrical Wire Explosion*" on 20th September 2018
- ◆ **Dr. Venkatraman**, Bharathiar University, Coimbatore, Tamilnadu, gave a talk on "*Fabrication and Characterization of a 3D Positive Ion Detector and its Application*" on 27th September 2018

- ◆ 9th International Conference on Multiscale Materials Modeling (MMM 2018), Osaka, Japan, 28 October – 2 November 2018. <http://mmm2018.jp/>
- ◆ 60th Annual Meeting of the APS Division of Plasma Physics and 71st Annual Gaseous Electronics Conference, Portland, Oregon USA, 5-9 November 2018 <https://www.aps.org/meetings/meeting.cfm?name=DPPGEC18>
- ◆ 23rd American Nuclear Society (ANS) Topical Meeting on the Technology of Fusion Energy (TOFE 2018), Orlando, Florida, 11-15 November 2018 http://www.ans.org/meetings/m_245
- ◆ 2018 ANS Winter Meeting and Nuclear Technology Expo - Embedded Topical International Topical Meeting on Advances in Thermal Hydraulics, Orlando, FL, United States 11-15 November 2018 http://www.ans.org/meetings/c_1
- ◆ 11th International Conference on Atomic and Molecular Data and Their Applications (ICAMDATA 2018), Cambridge, MA, USA, 11-15 November 2018 <https://projects.iq.harvard.edu/icamdata/home>
- ◆ 2nd Asia-Pacific Conference on Plasma Physics (AAPPS-DPP2018), Kanazawa, Japan, 12-17 November 2018 <http://www.aappsdp.org/DPP2018/>
- ◆ International Conference on Cold Plasma Sources and Applications (COPSA2018), Ypres, Belgium, 19-23 November 2018 <http://www.copsa.ugent.be/>
- ◆ 5th European Conference on Trapped Ions (ECTI 2018), Rehovot, Israel, 18-22 November 2018 <http://www.weizmann.ac.il/conferences/ECTI2018/fifth-european-conference-trapped-ions-ecti>
- ◆ IAEA Fusion Energy Conference (FEC-2018). Gandhinagar, Gujarat, 22-27 October 2018

Know Our Colleagues



Mr. Dharmesh Purohit joined the institute in 2001 in RF Division/ECRH group with 2 years' experience in erection, commissioning and maintenance of Instrumentation systems at Reliance Petroleum Limited, Jamnagar. He was actively involved in the design and development of electronics and instrumentation needed for Data Acquisition and control systems in the RF division and actively participated in the operation of ECRH-Gyrotron system. While in internal deputation in ICRH section, he designed and developed interfaces, signal conditioning electronics and control of Automatic impedance matching network for the ICRH system. He completed his Bachelor of Engineering (Electronic & communication) from Gujarat University (LD College of Engg) in 2008 and in 2009 he was selected to work as EC system technical officer in ITER Organization, France. He worked as Technical Responsible officer for EC control system, Cable tray system and low power electrical system of ECRH. On his return in 2014 he resumed his work for ECRH division and contributed his experience in Gyration operation-control in SST-1 experiments and in the upgrade of ECRH control system.

Mr. Snehal Jayswal joined the institute in 2001 in SST-1 Assembly Division. He has contributed to fabrication, installation and commissioning of SST-1 Assembly and the SST-1 refurbishment in the areas of commissioning of TF and PF coils, cryostat, vacuum vessel, TR coils, support structure and Plasma facing components. He has carried out metrology and quality control aspect of the SST-1 Assembly, Aditya tokamak and other IPR systems. He had single handedly carried out metrology measurements during the refurbishment of SST-1. He has received training in various non-destructive Testing (NDT) techniques and has been involved in different NDT activities at IPR. He has contributed in design and modelling through CATIA and ANSYS software for various SST-1 components. Presently, he is engaged in the design, analysis, installations of various IPR projects / assignments as a member of the Engineering Design and Analysis (EDAS) division.



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