

Issue 060

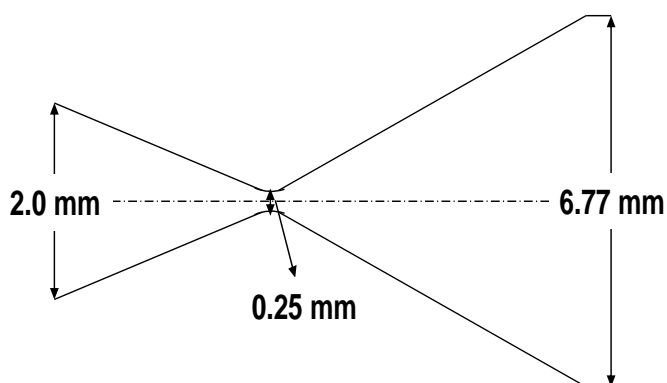
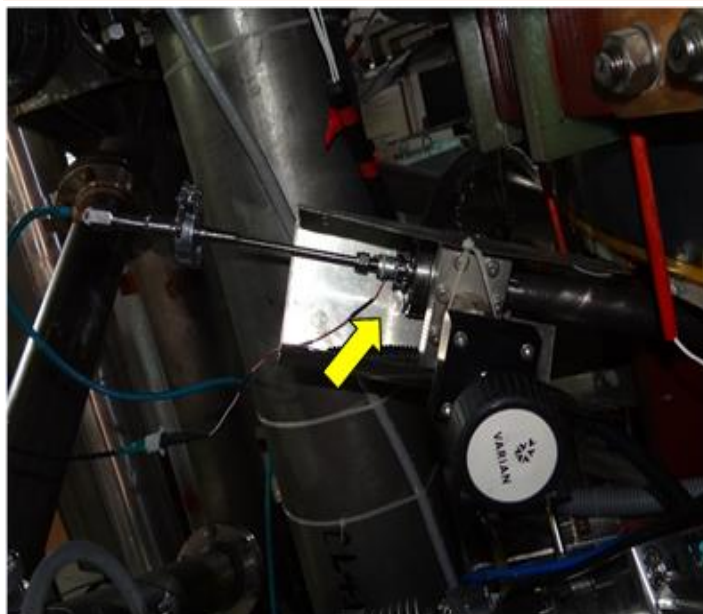
July 2018

# The Fourth State

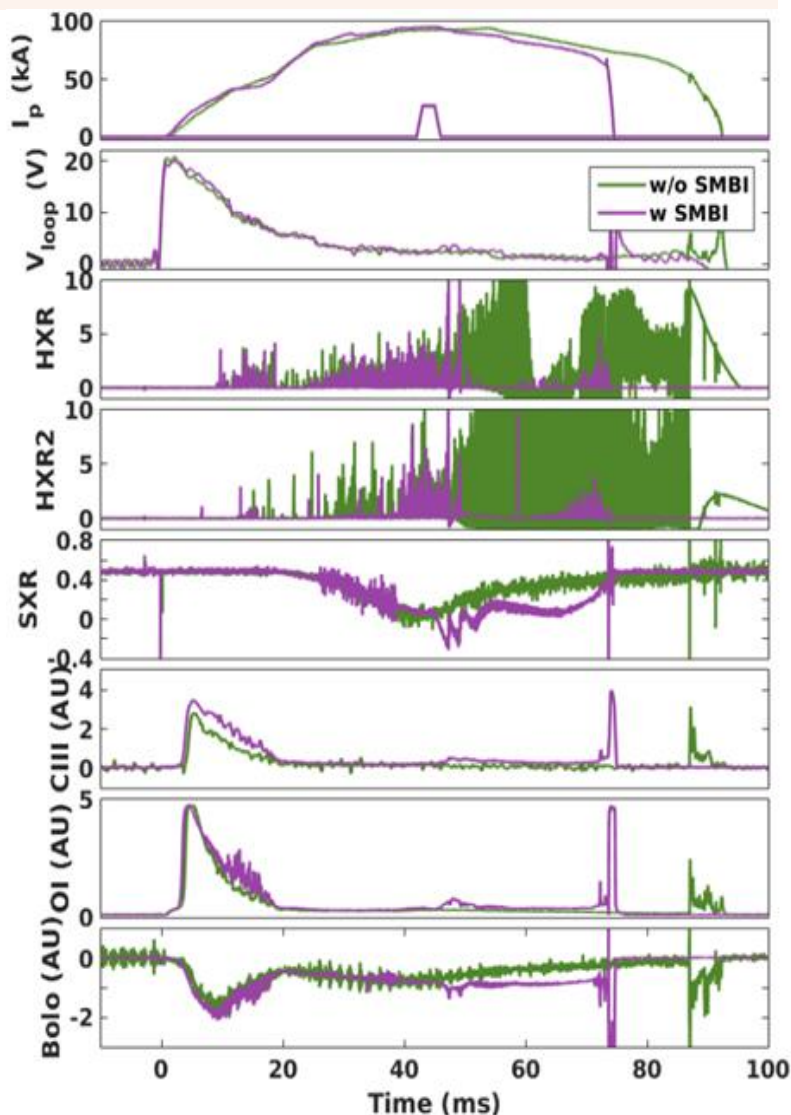
Newsletter of the Institute For Plasma Research, Gandhinagar, Gujarat (India)

## Supersonic Molecular Beam Injection (SMBI) System on the Aditya-U Tokamak

An SMBI system is installed on the low field side of the Aditya-U tokamak to enable deep penetration of the fuel gas inside the plasma. The system comprises of a Laval nozzle of throat diameter of 0.25 mm. Inlet and exit diameters are 2.0 and 6.77 mm respectively and a fast response solenoid valve. The plenum gas pressure can be varied to adjust the throughput of the beam. A particle flux of  $2.6 \times 10^{22}$  particles/s is achievable at a plenum pressure of 10 bar. The system is designed to operate at Mach 10 for 4 bar plenum pressure. At present single and multiple pulses of SMBI has been injected at 3.5 bar plenum pressure and 2 ms pulse duration. The system is intended for runaway electron mitigation studies and MHD (tearing mode) studies. Initial results of SMBI operation are quite encouraging. Two shots with (#31143) and without (#31137) SMBI are shown below. SMBI pulse of 2 ms is shown in the  $I_p$  panel. Significant reduction of hard X-ray with SMBI denoting runaway mitigation can be seen. A small reduction in  $I_p$  (runaway contribution reduced) confirms this finding. No significant increase in impurities like C and O is observed. Sharp increase in soft X-ray signal indicates increase in density. This work has been accomplished with important contributions from Mr. Siju George (VESD), Mr. Y. Paravastu (SOD), Mr. B. Arambhadiya (EID) and Mr. K. A. Jadeja (AOD). Contributor : Santanu Banerjee (ATD)



Top : The SMBI valve setup on Aditya-U with the Laval nozzle shown with yellow arrow. Bottom : The schematic of the nozzle.



Two plasma shots with (#31143) and without (#31137) Supersonic Molecular Beam Injection



The 4th International Yoga Day was celebrated on 21 June 2018 at IPR as per the protocol set by the Ministry of Ayush, Govt of India. IPR staff, clad in khadhi kurtas, participated in the mass yoga session under the guidance of a yoga expert. Various *asanas* as well as meditation were practiced by IPR staff as part of the yoga session. In the afternoon, an interactive talk on “*Benefits of Yoga, Disease free body and Stress free mind*” and “*Yoga - A Holistic Way of Life*” by Dr. Mukeshchandra Patel, was arranged in the seminar hall in which, the yoga expert explained the benefits of yoga & disease free body and a stress free mind.



Images from the 4th International yoga day celebrations at IPR





Images from the 4th International yoga day celebrations at IPR



Talk by yoga expert Dr. Mukeshchandra Patel



## Training Programme On Plasma Science & Technology @ Guwahati

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The 3rd training programme in the joint IPR-NCSTC scientific outreach series "Awareness-Cum-Training Programme On Plasma Science & Technology and Energy from Nuclear Fusion" NCSTC and IPR was conducted at Guwahati during 7-8 June, 2018. 40 Physics teachers of high/senior school and junior colleges from the eastern states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Orissa, Sikkim, Tripura and West Bengal attended this training programme. The meeting was held at the Regional Science Center, Khanapara, Guwahati during 7-8 June, 2018. The inauguration of the programme was done by Dr. Ranjit Barman, Senior Scientific Officer & Head I/C of the Assam Science, Technology and Environment Council (ASTEC) along with Shri. Basudev Mandal, Scientific Officer of Regional Science Center, Guwahati, Prof. Kalyal Goswami, Center Director, CPP-IPR, Sonapur and Dr. Ravi A V Kumar from IPR. The chief guest for the event was Plasma Physicist and founder director of CPP, Prof. S. Bujarbaruah.



(L) Inauguration of the programme by Dr. Ranjit Barman (R) Dr. K Goswami addressing the gathering



Participants of the IPR-NCSTC training programme held at Guwahati



(L) Interactive sessions with the trainers (R) Training in progress

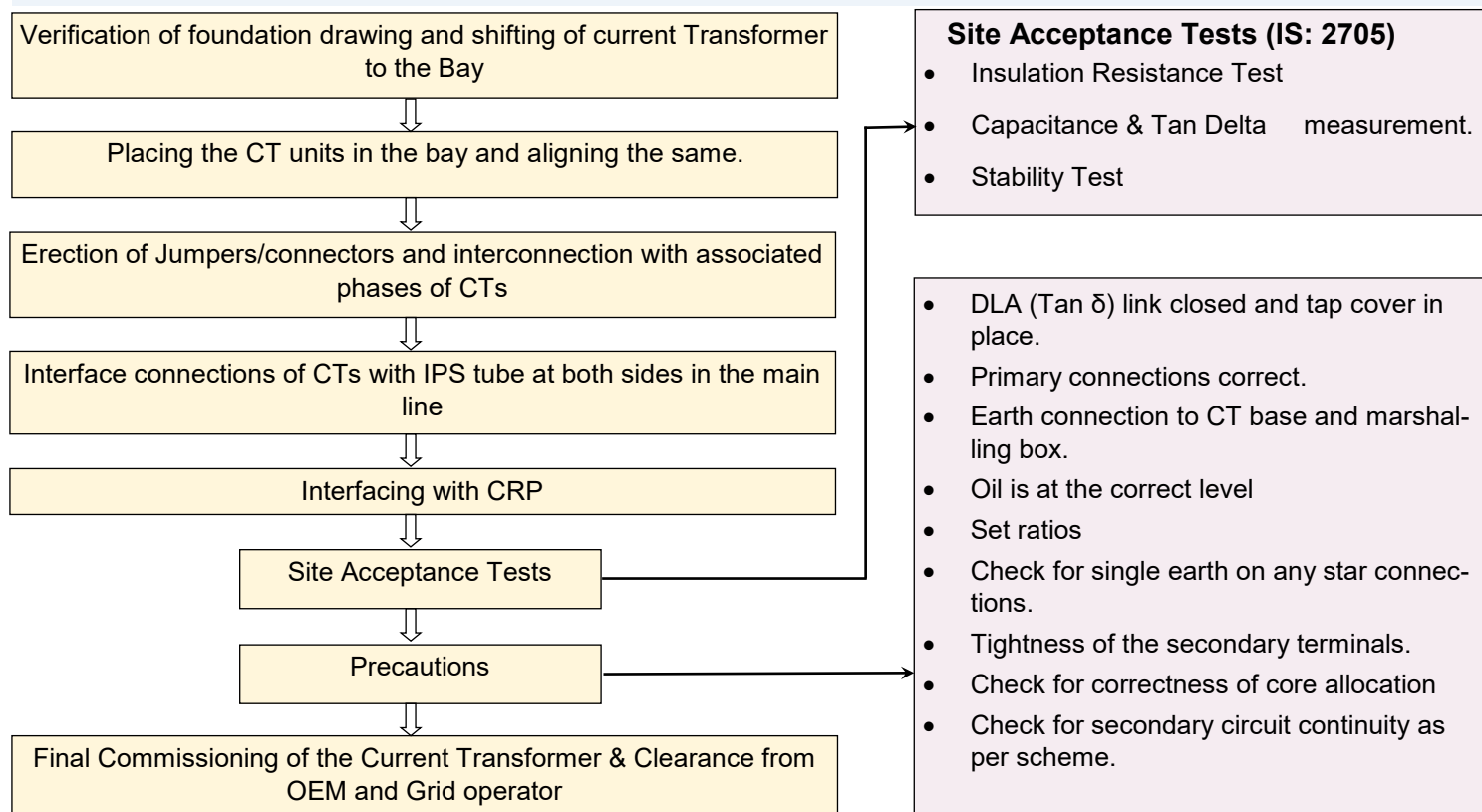


(L) The hands-on training area (R) hands-on training in progress



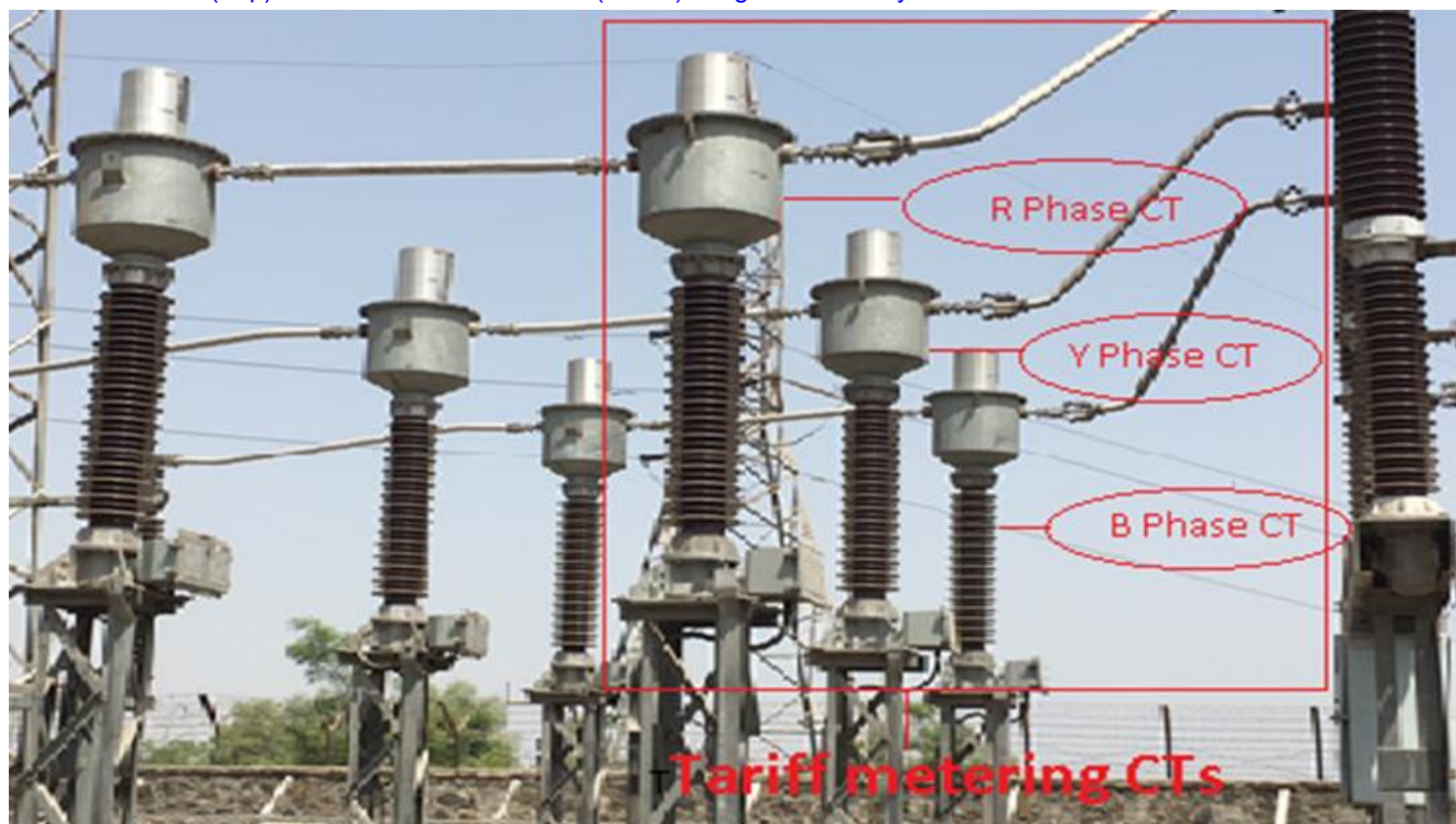
## Installation, Testing and Commissioning of Tariff Metering Current Transformer at 132kV IPR Substation

The 132 kV substation at IPR hosts 4 nos. of 132 kV / 11.5 kV main step down transformers of rating ranging 31.5 MVA, 37.5 MVA and 2 x 15 MVA and 1 no. of 132kV/22 kV step down transformer of rating 31.5 MVA. Tariff metering CTs are required at load end (IPR substation) to measure IPR power consumption. The CTs which were installed were specifically procured for metering purpose as per the specifications provided by the grid operator (UGVCL). The work covers important procedures, check points, testing formats, etc. which are required for erection, testing and commissioning of current transformers for its good performance. The Flow Chart for Erection, Testing and Commissioning of Tariff metering Current Transformers are as follows:



Particulars	132 KV CTs	Ratio	40 / 1 A (for 6000 kVA catered on 132 kV)	Type	1-Phase, Oil cooled, outdoor type
Class of Accuracy	0.2s for tariff metering core	Rated burden	05 VA for tariff metering core	Insulation Level	275/650 KV for 132 KV

(Top) Technical details of the CT (Below) Image of the newly installed Current Transformer



In the Neutronics laboratory building, all the RCC works have been completed. The slab de-shuttering in the Neutron Generator hall and the plastering has been completed. The external stone cladding works of the building is also over. Currently, the flooring, painting, installation of door/windows, electrical works, water proofing and other external development works are currently in progress.



The completed external stone cladding of the Neutronics Laboratory

## राजभाषा के क्षेत्र में उपलब्धि

नगर राजभाषा कार्यान्वयन समिति की दसवीं छमाही बैठक 26 अप्रैल, 2018 को पावर ग्रिड कॉर्पोरेशन ऑफ इंडिया लिमिटेड, गांधीनगर के सौजन्य से फॉर्च्युन हवेली के सम्मेलन कक्ष में आयोजित की गई। राजभाषा नीति के श्रेष्ठ कार्यान्वयन हेतु पुरस्कार योजना के तहत इस बैठक में वर्ष 2017-18 के लिए राजभाषा के क्षेत्र में श्रेष्ठ कार्यनिष्पादन हेतु गांधीनगर स्थित सदस्य कार्यालयों

को पुरस्कृत किया गया। जनगणना कार्यालय, गांधीनगर को प्रथम पुरस्कार, देना बैंक, अंचल कार्यालय गांधीनगर को द्वितीय पुरस्कार, केन्द्रीय विद्यालय संगठन, अहमदाबाद संभाग को तृतीय पुरस्कार एवं प्लाज्मा अनुसंधान संस्थान, गांधीनगर को सांत्वना पुरस्कार प्रदान किया गया। प्लाज्मा अनुसंधान संस्थान की ओर से डॉ. शशांक चतुर्वेदी, निदेशक, श्री राज सिंह, वैज्ञानिक अधिकारी – जी एवं डॉ. संध्या पी. दवे, कनिष्ठ हिंदी अनुवादक ने यह पुरस्कार ग्रहण किया। पुरस्कृत कार्यालयों में राजभाषा संबंधी कार्यों से जुड़े कर्मचारियों को उनके उल्लेखनीय योगदान के लिए पुरस्कार दिया गया। डॉ. संध्या दवे को कार्यालय में राजभाषा कार्यान्वयन में उल्लेखनीय योगदान के लिए सांत्वना पुरस्कार के रूप में शील्ड और प्रमाणपत्र दिया गया।





The annual General Board Meeting (GBM) of IPR staff club was held on 26th April 2018 in IPR Seminar Hall. The previous committee presented the brief overview of the activities done throughout the year. In the GBM the new staff club executive committee has been elected for this financial year 2018-19. This new committee will carry out the activities outlined by the previous committee and will also initiate some new activities for this year. The first meeting of the new committee was held the same week. The first event to be organized by the new IPR staff committee will be International Yoga Day on 21<sup>st</sup> June, 2017. The new Staff Club members reiterated their commitment to run the Staff Club to the best of their capabilities.

						
President <b>Paritosh Chaudhuri</b>	General Secretary <b>Dinesh Nair</b>	Jt. Secretary (IPR) <b>Amulya Sanyasi</b>	Jt. Secretary ITER – IN <b>Suvitha Kartha</b>	Jt. Secretary FCIPT <b>Kushagra Nigam</b>	Cultural Secretary <b>Dharmesh Purohit K.</b>	Jt. Cultural Secretary <b>Karishma Qurishi</b>
						
Jt. Secretary – <b>Parag Panchal</b>	Treasurer <b>Hitesh Suthar</b>	Jt. Treasurer <b>Vishnu Prajapati</b>	Sports Secretary <b>Tusharkumar Raval Y</b>	Jt. Sports Secretary <b>Vishwaraishi Maurya</b>	Jt. Sports Secretary <b>Sudhir Rai</b>	

Elected Staff Club Executive Committee Members for the term 2018-19

## International Yoga Day celebration @ CPP-IPR

The international yoga day was celebrated at CPP-IPR on 21st June 2018. Dr. Manash Choudhury, CPP-IPR's Visiting Authorized Medical Officer (VAMO), who is also an expert in Yoga, gave yoga demonstrations as well as delivered a talk on "Yoga and Meditation". Employees and students of the institute participated in the activities with great enthusiasm.





- ♦ **Mr. Sunil Kumar**, Bhabha Atomic Research Centre, Mumbai, gave a talk on "Experimental and computational study to Suppress thermal stratification in a water pool with shrouds" on 4th June 2018
- ♦ **Dr. Subrata Pradhan**, Institute for Plasma Research, Gandhinagar, gave a talk on "Novel Quench Detection Technique in Pulsed Superconducting Magnets" on 6th June 2018
- ♦ **Mr. Rudrashish Panda**, Kalinga Institute of Industrial Technology, Bhubaneswar, gave a talk on "Efficient second harmonic generation with 1D ZnO nanostructures and their application for realization of ultrafast laser diagnostic system" on 11th June 2018
- ♦ **Mr. Vinod Saini**, Institute for Plasma Research, Gandhinagar, gave a talk on "Development of High Speed 1D-2V PIC-MCC Numerical Engine for Plasma Thruster" on 14th June 2018

## Upcoming Events

- ♦ Gordon Research Seminar: Plasma Processing Science - Understanding and Controlling Plasmas for Future Industries, Bryant University, United States, 4-5 August 2018. <https://www.grc.org/plasma-processing-science-grs-conference/2018/>
- ♦ Gordon Research Seminar: Plasma Processing Science - Fundamental Insights in Plasma Processes, Bryant University, United States, 5-10 August 2018. <https://www.grc.org/plasma-processing-science-conference/2018/>
- ♦ 2018 Asia-Pacific Conference on Plasma and Terahertz Science (APCOPTS-2018), Xian City, China, 15-18 August 2018 <http://tps.xait.cc/>
- ♦ 18th International Conference on Positron Annihilation (ICPA 2018), Orlando, Florida, 19-24 August 2018 <http://physics.bgsu.edu/icpa18/>
- ♦ Joint ICTP-IAEA Workshop on Physics and Technology of Innovative Nuclear Energy Systems, Trieste, Italy, 20-24 August 2018. <https://www.iaea.org/events/joint-ictp-iaea-workshop-on-physics-and-technology-of-innovative-nuclear-energy-systems>
- ♦ International Conference on Many Particle Spectroscopy of Atoms, Molecules, Clusters and Surfaces (MPS 2018), Budapest, Hungary, 21-24 August 2018. <http://mpsbudapest2018.com/>
- ♦ 6th PSSI-Plasma Scholars Colloquium (PSC-2018), Sikkim Manipal Institute of Technology, Rangpo, Sikkim, 24-26 August, 2018. <https://smu.edu.in/smit/news-events/events-list/PSC-2018.html>
- ♦ 22nd European Conference on Dynamics of Molecular Systems (MOLEC 2018), Dinard, France, 26-31 August 2018 <https://molec2018.sciencesconf.org/>

## Know Our Colleagues



**Mr. Chirag Bhavsar** joined IPR in 2001 in SST-1 Power system division and was actively involved in Execution/Installation, Testing, Commissioning, Operation & Maintenance of 132kV IPR Substation & Associated Equipment's, 22kV, 11kV Indoor substation, 415V distribution systems, 220 V DC system, SCADA system, Emergency power system and also in the estimation of AC HT/LT power requirement of PF converter Transformers, Electrotherm PS, ELM PS etc. He contributed in Equipment selection, Generation of Specification, Estimation of AC/DC Power requirement, selection of cables size and preparation of Power and control cable schedule and layouts for various HT/LT distribution systems. He also participated in the Operation, testing & Maintenance of 10kA TF Power supply and APC Power supply. Presently, he is an active member of Electrical Power distribution section (EPDS) in Power system Division (PSD) and has contributed in Design/Execution, inspection, testing and commissioning of 220V DC Protection system with DC chargers, DCDB and battery banks. He is also involved in Operation, Maintenance & Troubleshooting of 1700KVA DG sets.

**Ms. Gayatri Ashok Kumar** joined IPR in 2001 in ICRH of RF division. She has been mainly working in Basic Plasma Physics related experiments in Antenna Test Facility Chamber. She was part of team doing experiments related to the pre-ionization, plasma production and testing of diagnostics used in the SST-1 prototype antenna, Fast wave antenna for Aditya and the Ion Bernstein wave antenna. Projects for summer school students, PhD students and engineering students have been carried in the Antenna Test Facility with her guidance and support. Presently she has been given the responsibility of ICRH diagnostics on Aditya-U and SST-1. Also responsible for integration, testing and acquisition of data from ICRH diagnostics on Aditya and SST-1 and actively involved in the basic physics experiments in RF lab.



## The IPR Newsletter Team

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