

हिन्दी वक्तव्य

राजभाषा कार्यान्वयन समिति, आईपीआर द्वारा दिनांक 6 नवम्बर, 2015 को हिन्दी वक्तव्य का आयोजन किया गया। आरंभ में प्रो.रत्नेश्वर झा ने इस हिन्दी वक्तव्य श्रृंखला के वक्ता निदेशक महोदय का संक्षेप में परिचय दिया। निदेशक प्रो.धीराज बोरा ने 'इटर में मेरे अनुभव' विषय पर अपना वक्तव्य प्रस्तुत किया। आईपीआर के निदेशक बनने से पहले प्रो.धीराज बोरा कडराच, फ्रांस में इटर अंतर्राष्ट्रीय संगठन में 6 वर्षों तक CHD विभाग के उप महानिदेशक एवं निदेशक के रूप में कार्य कर चुके हैं। इस वक्तव्य में इटर में अपने कार्यकाल के दौरान इन्हें जिन चुनौतियों एवं कठिनाईयों का सामना करना पड़ा, उन अनुभवों को श्रोताओं के साथ बांटा। साथ ही उन्होंने किसी भी संगठन की सफलता के लिए एक सशक्त प्रबन्धन प्रणाली की आवश्यकताओं पर प्रकाश डालते हुए समूह में एकजुट होकर निष्ठा भाव से कार्य पद्धति अपनाकर सफलता हासिल की जा सकती है, इस सूत्र को अपनाने की सलाह दी। संक्षेप में उनका मंतव्य था - एक सही दृष्टिकोण या लक्ष्य को पाने के लिए जो प्रक्रिया अपनाई जाती है वह परिणाम को ध्यान में रखते हुए ठोस एवं नीतिबद्ध होनी चाहिए, साथ ही हमारा आपसी सामूहिक व्यवहार और पारदर्शी छवि ही इस दृष्टिकोण को पाने में सार्थक सिद्ध हो सकते हैं। लक्ष्य प्राप्ति करने की यह संपूर्ण प्रणाली सही मूल्यों पर आधारित होनी चाहिए।

वक्तव्य के बाद प्रो.बोरा ने उपस्थित स्टाफ सदस्यों के प्रश्नों का उत्तर देकर उनकी शंकाओं का समाधान किया। लक्ष्य प्राप्ति के लिए उन्होंने प्रबंधन प्रणाली को सशक्त बनाने एवं अपनी क्षमता को विकसित करने के सूत्र प्रदान किये। इस वक्तव्य के माध्यम से संस्थान के कर्मचारियों को सामूहिक रूप में सक्रिय रहकर अपनी कार्यक्षमता को विकसित करने की प्रेरणा मिली, इसके लिए श्रोतागण ने निदेशक महोदय को आभार व्यक्त किया। कम्प्यूटर केन्द्र द्वारा इस वक्तव्य का लाइव टेलिकास्ट किया गया, जिससे अन्य सदस्यों को भी इसका लाभ मिला।



The 2nd Indo-Italian Bilateral Workshop, NEEM-2015 (Nanoscale Excitations in Emergent Materials) was held in Rome from 12-14 October, 2015. This was a follow-up of the 1st Indo-Italian Bilateral Workshop, NEEM-2013 that was held in Ahmedabad in the November of 2013. The present Bilateral workshop was also jointly coordinated by the organising members from Institute for Plasma Research (India) and National Laboratory of Frascati & University of Sapienza, Rome (Italy). The Indian Embassy in Rome as well as the Italian Ministry of External Affairs supported and had also contributed in kind to this programme. A number of scientists and students working in the area of nanomaterials participated and delivered talks and presented posters. From India, 11 speakers, including Prof. D. Bora (Director, IPR) and Dr. D. Kanjilal (Director, IUAC, Delhi) delivered talks. Apart from these eleven speakers there were other Indian speakers from Sweden (3), Singapore (2) and Italy (1) who delivered talks in the programme. The topics that were covered during the programme included Nanomaterials for Energy and fusion, Technological applications of Nanostructures, Nanoparticles and nanostructured Materials etc.



The Indian Ambassador to Italy, H.E. Basant Gupta interacting with Prof. D. Bora after the inaugural session of NEEM-2015

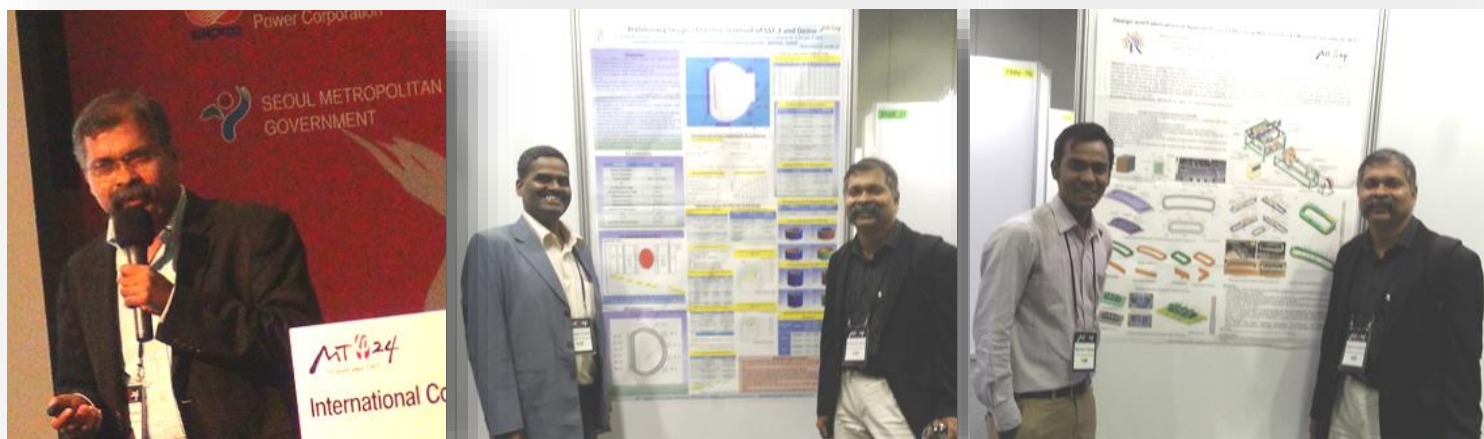
The programme was held in the Conference Hall of CNR, Rome and it was inaugurated by the Indian Ambassador to Italy, His Excellency, Shri. Basant Gupta. The Ambassador was welcomed by the Director General of National Research Council (CNR), Italy. Also present during the welcome session were the Rector of the Physics Department of University of Sapienza, Rome and other officials from the Regional administration in Rome.

Prof. D. Bora delivered the opening lecture on “Challenges in Material Development for Fusion Reactors and India’s Initiatives” followed by other talks. A separate session on Materials for Fusion and Energy was also organized.



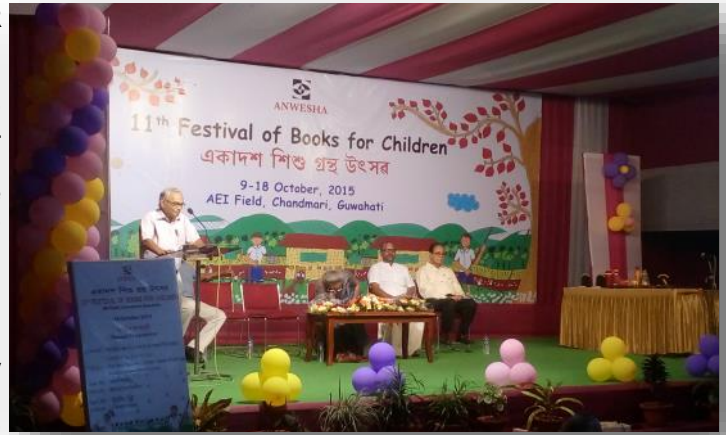
IPR at Magnet Technology- 24 conference

Dr. Subrata Pradhan, Mr. Upendra Prasad and Mr. Mahesh Ghate from IPR participated in the one of the largest conferences of the fusion magnet community, the **International conference on Magnet technology MT- 24** at COEX, Seoul, Korea from 18-23 Oct-2015. It was 50th anniversary of Magnet Technology since its commencement in 1965 and at this occasion plenary speaker **Sir Martin Wilson** prominently mentioned about SST-1 during his talk on “**50 golden years of applied superconductivity**”. Dr. Pradhan delivered oral talk on “*Technology developments towards ELM coils manufacturing appropriate for Tokamak*”. Upendra Prasad and Mahesh Ghate presented poster on “*Preliminary Design of Central solenoid for SST-2 and Demo Reactor*” and “*Design and fabrication of Special Purpose Winding machine for non-coplanar RMP Coils for JET*” respectively.



Subrata Pradhan, Upendra Prasad and Mahesh Ghate at the MT-24 Conference

As part of its Silver Jubilee year outreach programme, CPP-IPR participated in the 11th Festival of Books for Children held from October 9 to 18, 2015, at Assam Engineering Institute Field, Chamari, Guwahati. Festival of Books for Children is a unique annual event of Guwahati, organized by Anwasha, a socio-cultural organization, to expose children to the wonderful world of books and inculcate the habit of reading among them. To take children beyond their classrooms a number of activities were also held during the ten day event. The event was inaugurated by Hon'ble Governor of Arunachal Pradesh, Sjt. J. P. Rajkhowa.



CPP-IPR opened a stall in the festival to expose children to the world of science in general and plasma physics in particular by exhibiting a few posters and through multimedia presentations and live demo of a glow discharge plasma chamber. A science quiz competition was also held among the students of Class VIII to X on 14th October in which as much as 19 teams participated. Teams from Maria's Public School (Birkuchi), Asom Jatiya Vidyalaya (Noonmati) and Maharshi Vidyamandir (Borsajai) won the first, second and third prize in the quiz competition, respectively. A video conference of the Director, IPR, with school children was scheduled on October 17, but couldn't be realized. Instead, Dr. B. J. Saikia, scientist-SE of CPP-IPR interacted with the children gathered for the occasion at the venue. Prof. S. Bujarbarua, founder centre director of CPP-IPR graced the valedictory function on October 18 as an invited guest and distributed the prizes.



Images of CPP-IPR's Outreach programme at the 11th Festival of Books for Children at Guwahati

Modification of Electrical Motor of Vacuum Pumps of SST-1 Cryogenic System

The Rotary vacuum pumps were not functional due to failures in its foreign make "Leroy Somer" electric motor. The refurbishment job with Indian make motor of Crompton Greaves (CG) with Vacuum pump has been carried out at Ahmedabad. These vacuum pumps are integral parts of the cryogenic plant and system of SST-1 and are regularly used for evacuation, purging, leak testing and other activities.

The electrical motor performance test has been carried out with load condition and has hence achieved acceptable parameters. By this activity, a **foreign component** of the system has been successfully replaced by an indigenous one.

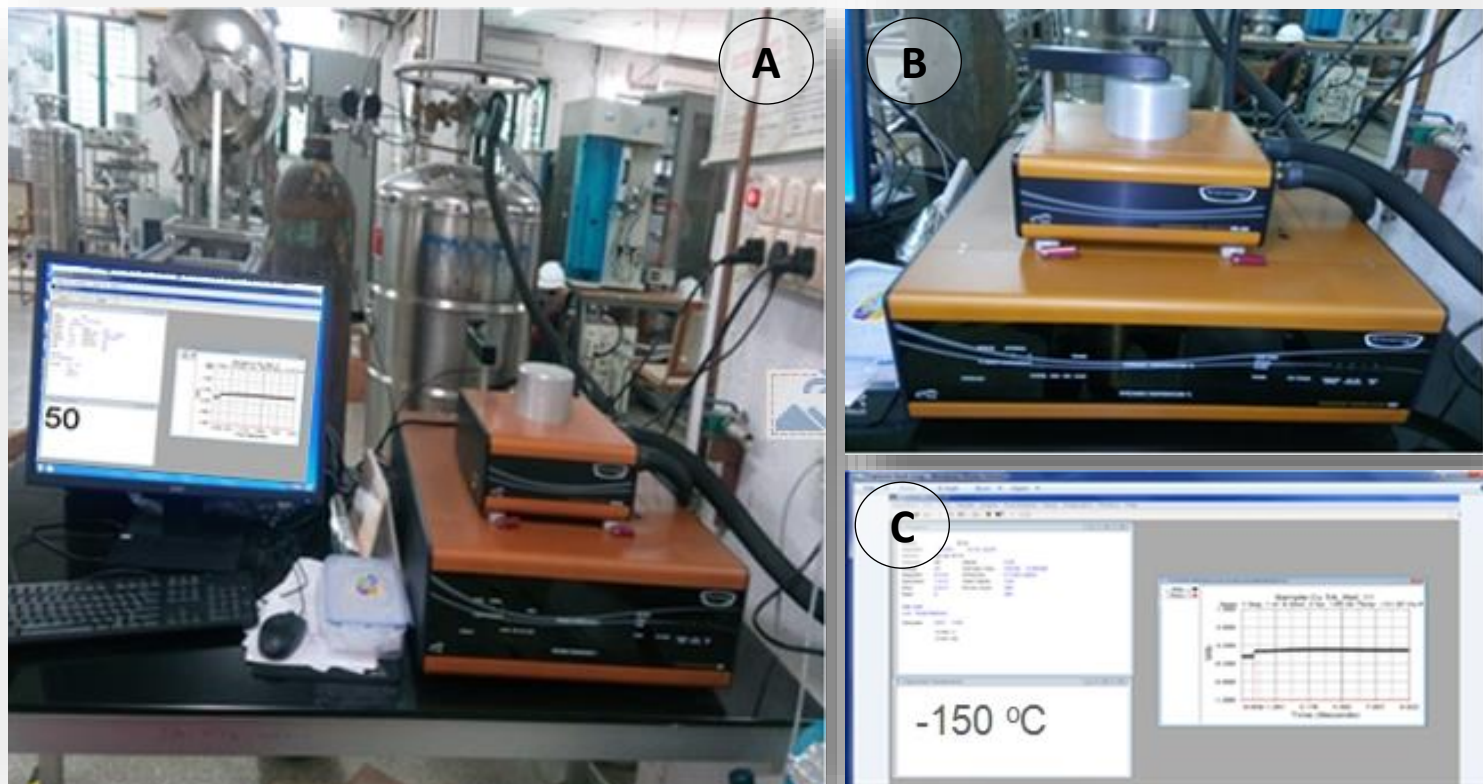
Test Parameters

Electrical motor runs for: 40 hours
 Current measured with load: 4.6 AMP
 (Rated: 8.8 Amp)
 Maximum temperature observed on motor body:
 64.0 °C (Class B type insulation in motor)
 Vacuum level : <math> < 10^{-3}</math> mbar on mouth of pump
 Full load Torque: 7.39 N-m
 Starting Torque: 18.475 N-m



Current, Temperature and Vacuum measurements using the converted Indian motor

The thermal conductivity value of many materials at cryogenic temperature varies by orders of magnitude. In the field of cryogenic applications, the materials used have to be optimised for thermal conductivity value. An important aspect in applications such as cryoadsorption cryopump is proper adhesion of the activated carbon granules onto the metallic panel. Not much data is available in literature on samples of activated carbons adhered to metallic sheet at cryogenic temperatures. Cryoadsorption Cryopump and pellet Injector division took initiative to establish an in house facility to measure thermal diffusivity, heat capacity, and conductivity of materials at low temperatures. The facility is now operational. Results of thermal conductivity measurement were validated for standard samples of OFHC (Oxygen Free High Conducting) copper and Stainless Steel grade SS316 and were in accordance with reported literature.



Clockwise : (A) Integrated facility for thermal conductivity measurements down to -150°C , (B) Xenon flash analyzer (low temperature module) (C) Real-time monitoring of experimental data

Facility of Helium Recovery System (HRS)

It is necessary to couple liquid Helium based experiments to a recovery system for conserving helium gas as its cost is on higher side and is rare imposing limitations on its availability. The recovery system recovers gaseous helium released by cryogenic systems using it as a cryogen to cool down the systems down. HRS recovers helium from exhaust of experimental systems in a gas bag. The gas bag is connected to a recovery compressor which compresses the gas to a high pressure and is stored in helium gas cylinders or can be taken to Liquid Helium Plant in a closed loop operation. HRS for applications under project Cryoadsorption Cryopump & Pellet injector is now installed at IPR Extended Lab (Vidhata). This facility, from its concept to commissioning, took one year to complete.



(L-R) Helium Recovery Line, Helium Gas Bag (Volume: 10 m^3), Stagnant Type Cylinder Bank (STCB) with 96 cylinders in total and Helium Recovery Compressor (Capacity: $20\text{ m}^3/\text{hr}$)

Congratulations !



Dr. Amita Das, Senior Professor H+, was elected as FELLOW, by the National Academy Of Sciences, India in 2015 for her outstanding contribution towards scientific research.

Congratulations !!!



Dr. Mainak Bandyopadhyay of DNB Group, ITER-India, received a certificate of appreciation from the Editorial Board of the Journal of Fusion & Engineering Design (Elsevier) as an Outstanding Reviewer for the Journal in the year 2015. Congratulations !!

A "Research Scholars' Meet" for the faculty members pursuing their PhD in EC Engineering in various institutions in Gujarat was organized on 5th November, 2015 at IPR. The event was coordinated by Dr.-Ing. Suryakant Gupta of IPR and Dr. R. A. Thakker (Research Coordinator – SPFU and Prof. EC, VGEC – Chandkheda). There are good number of faculty from Engineering Colleges of Gujarat State pursuing their PhD and doing research work in the area of Electronics and Communication Engineering. These faculty members work independently and they have very limited opportunities to interact among themselves or get exposed to state-of-the-art technologies. With the tremendous growth in the field of Electronic and Communication, is it essential that these researchers are provided some kind of a platform for interaction and discussion.

In this one-day event, the welcome speech was given by Prof. Dr. S. Mukherjee of IPR. Prof. Usha Neelkanthan (SPFU Coordinator) presented about SPFU and TEQIP research strand activities. Dr. N. M. Devashryee (Prof. EC, Nirma University) gave a talk on research methodology. Dr. Mekie Joycee of IIT Gandhinagar discussed about the recent trends in multi-core architecture. Prof. Chirag Paunwala (SCET – Surat) and Prof. J. N. Sarvaiya (SVNIT – Surat) delivered interesting talks on research opportunities in Image Recognition and Registration, respectively. Six PhD scholars: Amit Rathod, Haresh Judal, Avani Vithalani, Shahid Modasiya, Sandip Dawda and C. R. Parekh delivered oral presentation about their ongoing PhD work. More than 40 ME students of few nearby engineering colleges also attended the event. Mr. Amit Srivastava of IPR discussed the avenues for EC Engineers in IPR. The vote of thanks and summary of event was delivered by Dr. R. A. Thakker.



Repairing of Main LN₂ Cryogenic Transfer Line of LN₂ Distribution of SST-1

A doubled walled vacuum insulated LN₂ cryogenic transfer line is used for main supply of LN₂ cooling @ 77 K of SST-1 LN₂ thermal shield, cold box LN₂ heat exchanger, Purifier, Current feeder and IFDC sub-systems of SST-1. The leak was observed in main LN₂ line and its repair and performance tests at operating conditions of LN₂ transfer line were carried out in-house. The vacuum/evacuation, MLI wrapping, welding and assembly in congested space and safety aspect at 12 meter height were the challenges experienced during repairing task.

The leak was found in cryogenic Bellows of inner process line. The Helium leak rate in sniffer condition: 3.1×10^{-6} mbar l/s @ 1.5 and 3.5 bar (g) after welding as per EJMA standard. No soap bubbles were detected in all weld joints of the inner process line at pressure 1.3 bar (g) at actual location. Vacuum level of $< 1.3 \times 10^{-2}$ mbar was hold (24 hours) in outer jacket of repaired section transfer line. The performance of transfer line has been validated by operating at 80 K.



Welding in progress



The location of the leakage in the section of LN₂ transfer Line, and the repaired LN₂ line.

A memorandum of Understanding between IPR, Gandhinagar and ARCI, Hyderabad on the 'Development of ODS RAFM /RAF steel for fusion reactor applications', was signed by Prof. D. Bora (Director, IPR) and Prof. G. Sundararajan (Director, ARCI) on 4th November 2015 at ARCI, Hyderabad.

The MoU will provide speedy production of ODS RAFM/RAF steel powders for the development of ODS steel plates for Fusion Reactor Materials Development and Characterization Division (FRMDC) programme of IPR under APEX-3 Projects.

During the occasion of signing this MoU, Dr. P.M. Raole, Mr. B. Ramesh Kumar, Dr. Sameer Khirwadkar, Mr. E. Rajendra Kumar and Mr. S Kanpara from IPR were present.



Swachchhata Abhiyan

Under the *Swachchhata Abhiyan* and "Diwali Safai", the contractual housekeeping staff (ladies) of IPR were invited to participate in an Essay Writing competition, the subject being, "*Safai nu mara jivan ma mahatva*" on 9th November 2015. Out of the 26 lady cleaning staff, 18 participated in the competition. They were honoured with prizes considering updated knowledge, expression and hand writing. The following were awarded prizes for the content of the essays ; Vaghela Taraben Maheshbhai, Parmar Kapilaben Muljibhai, Vaghela Jashiben Pravinbhai and Vaniya Vasantben Vishnubhai.



The contractual cleaning staff of IPR at the Director's office for receiving the prizes. Shri Raj Singh and Ms Chhaya Chavda organized the event for the housekeeping ladies.

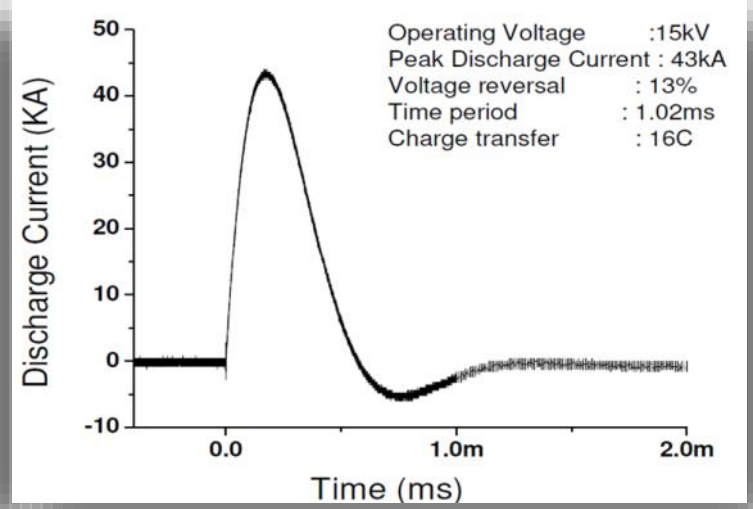
Aditya Upgrade - Update

The assembly of Aditya upgrade progressing in full swing. The inner "C"s of all the 20 refurbished TF coils were installed on the bottom "I" beam. Next, the 4 inner divertor coils and the 2 inner fast feedback coils were wound in-situ (Yellow coils in picture). After the divertor coil assembly, the semi torus of the vacuum vessel was placed on the machine. The other half of the torus will be installed next followed by the completion of the TF coils.



Different views of the Aditya vacuum vessel being installed. One half of the vessel as well as the inner section of the coils have been mounted.

A 100 kJ Pulse Power System (PPS) was successfully test fired at Pulse Plasma Accelerator Laboratory (PPAL) of CPP-IPR. This 100kJ PPS is one one of the modules of the 200kJ PPS, which will be used to drive a coaxial plasma accelerator. The PPS consist of five numbers of 180 μ F energy storage capacitors connected parallel with the help of SS flat plates of 15mm thickness at both ground and HV end. Between the two SS plates, two insulating plates of Delrin having 15 mm are fixed. The connection from capacitor bank to a high power ignitron switch (NL8900) is done by 8 numbers of URM67 coaxial cables of length 4 meters each. Another 8 numbers of URM 67 cables were connected from the ignitron to a dummy load of 140m Ω and a 20 μ H pulse shaping inductor assembly. First discharge was taken at 1 kV without any difficulty. And then, we took shots by increasing the voltage gradually. It was 2.20pm on 30/10/2015 when CPP-IPR witnessed the successful operation of its 100kJ PPS at 15kV with a peak current around 43.7 kA and discharge time period of 1.0 millisecond.



(L) The 100 kJ capacitor bank with PPAL team. (R) Typical discharge current waveform from the 100kJ system.

India @ ITER

IN-DA Delegation comprising of Dr R.B. Grover, Prof D. Bora, Mr Arun Srivastava and Mr Ujjwal Baruah participated in ITER council meeting (IC-17) held during 18-19 November 2015 at IO. They had a brief interaction with Indian staff present here on 19th November.



Prof. Dhiraj Bora interacting with the Indians working at ITER

Diwali Festival was celebrated with great enthusiasm on November 14, in Aix-en-Provence. This celebration was organized by the Indians working in ITER during the Diwali weekend. Event comprised of dance, various competitions for children, skit , which was followed by dinner.



Indians at ITER celebrating Diwali

- ◆ **Mr. Someshwar Dutta**, Institute for Plasma Research, Gandhinagar, gave a talk on "Design Philosophy of Advanced 3D RMP Coils for ELM Control" on 3rd November 2015
- ◆ **Dr. P. N. Maya**, Institute for Plasma Research, Gandhinagar, gave a talk on "Overview of Comparison of Plasma-Wall Interactions (PWI) in Tungsten and Carbon First Wall Tokamaks" on 6th November 2015
- ◆ **Dr. Shankar Mahadevan**, Esgee Technologies Inc., Texas, U.S., gave a talk on "Simulation of non-equilibrium and equilibrium plasma discharges for industrial application" on 24th November 2015 (Colloquium # 257)
- ◆ **Mrs. Renu Bahl**, Institute for Plasma Research, Gandhinagar, gave a talk on "Radio Frequency Quadrupole Accelerator Project at IPR and recent visit to CPHS, a neutron facility at China" on 26th November 2015

Upcoming Events

- ◆ Winter School on Nonlinear Dynamics, Indian Statistical Institute, Kolkata, 9-18 December 2015 (<http://www.isical.ac.in/~wsnd2015/>)
- ◆ International Workshop on Antenna Innovations and Modern Technologies (iAIM-2015) for Communications, Navigations & Remote Sensing Systems, 26-27 December, 2015, Ahmedabad (<http://www.ieeeapmttguj.org>)
- ◆ Winter Conference on Plasma Spectrochemistry, Tucson, Arizona USA, 10-16 January 2016, (<http://icpinformation.org/>)
- ◆ Winter School on Condensed Matter Physics, Indian Statistical Institute, Kolkata, 11-22 January 2016 (<http://www.isical.ac.in/~isinano2016/>)
- ◆ 30th National Symposium on Plasma Science & Technology (Plasma-2015), 1-4 Dec, 2015, SINP, Kolkata
- ◆ 10th Asia Plasma & Fusion Association Conference (APFA 2015), 14-18 Dec 2015, Gandhinagar, Gujarat (<http://www.ipr.res.in/APFA2015/>)
- ◆ Indian Particle Accelerator Conference (InPAC-2015), 21-24 Dec, 2015 TIFR, Mumbai (<http://www.inpac-2015.org/mumbai>)
- ◆ National Laser Symposium (NLS-24), 2-5 December, 2015, RRCAT Indore (<http://www.ila.org.in/nls24/>)
- ◆ National Science Day 2016, 8-9 January, 2016, Institute for Plasma Research, Gandhinagar.

Know Our Colleagues



Dr. Indranil Bandyopadhyay joined IPR in 1991 as a Research Scholar and later in 1995 as a scientist in the Modelling Group of SST-1. He had the primary responsibility of physics design of the plasma radial and vertical position control of SST-1 and also part of the plasma shape control. He visited TCV tokamak in Lausanne, Switzerland and ASDEX-UG tokamak in IPP, Garching in 1998 to work on plasma control system. He is the author of the RZIP control model, which has been used and validated in a number of tokamaks. His areas of expertise include modelling of plasma axi-symmetric control, shape control, plasma scenario modelling and modelling of disruptions and runaway currents in tokamaks. He is one of the global experts in the Tokamak Simulation Code (TSC). He has worked extensively in modelling of ADITYA and SST-1 discharges using TSC code and has a number of publications in National and International journals. Presently he is Group Leader, Fusion Physics, Information Technology and IO-DA coordination at ITER-India. Indranil is an expert in the Science and Technology Advisory committee of ITER and is the only Indian participant to attend all the STAC meetings since its initiation. He is a member of the Program Advisory Committee (PAC) of the DIII-D tokamak at General Atomics, San Diego, USA since 2014. He is also the Leader of the Working Group 10 (WG-10) of the ITPA MHD topical group responsible for the halo current modelling.

Dr. Shantanu Karkari joined IPR as a research scholar in 1995 and conducted his work on electron beam interaction with objects in plasma. He did his post-doctoral at University of Manchester Institute for Science and Technology, U.K in plasma diagnostics using time-and energy resolved mass-spectrometry/ emissive probe techniques for investigating bi-polar pulsed magnetron discharges; Later in 2004 he joined the NCPST, Dublin City University, Ireland as a Research Officer and worked in the field of microwave technique for electron density diagnostic in low temperature plasmas. During his research career abroad, he also received a British Patent. He then joined IPR in 2010 to join as Associate Professor-I and since then he has been actively engaged in developing the Magnetized Beam Plasma Surface Interaction Division. He is presently a member of academic committee and mentor of SSEC-Bhavnagar engineering college under GTU-TEQIP-II program. He is a collaborator in international projects funded by ISCA-Science Foundation Ireland-India initiative program and Indo-Taiwan project funded by Department of Science and technology. He is also a recipient of the Indo-Liverpool fellowship program at the University of Liverpool, U.K. His current research goals are directed towards investigating intense magnetized plasma confined in a magnetic mirror; with the aim of supporting vibrant research activities towards fusion application.



The IPR Newsletter Team

Ritesh Srivastava	Tejas Parekh	Ravi A. V. Kumar	Priyanka Patel	Swati Roy	Mohandas K.K.
Suryakant Gupta	Ramasubramanian N.	Chhaya Chavda	Shravan Kumar	Hiral B Joshi	

Institute for Plasma Research
Bhat, Near Indira Bridge
Gandhinagar 382 428,
Gujarat (India)



Web : www.ipr.res.in
E-mail : newsletter@ipr.res.in
Tel : 91-79-2396 2000
Fax : 91-79-2396 2277