

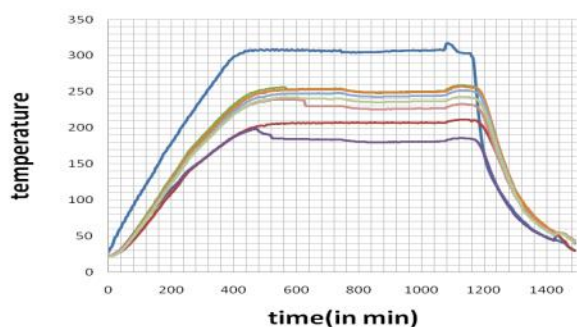
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The 4th State

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

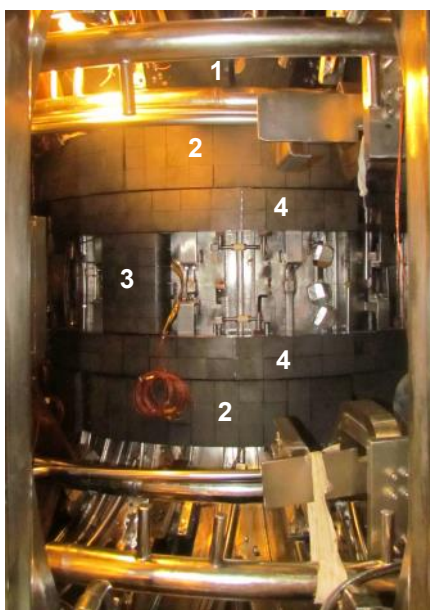
SST - 1 News

Significant progress has been made on the SST-1 up-gradation activities. Segmental PF-6 coil has been installed inside the vacuum vessel. Baking of all copper modules with isolators & bellows was carried out to in excess of 250 °C to validate the leak tightness of brazing joint and performance of isolators and bellows in operating conditions. Copper modules/back plates were connected as per their designed configuration.



Baking profile during the baking of copper modules

Final installation of copper modules along with graphite tiles and temperature sensors is in progress. Supply and return headers for baking and cooling of first wall components have been installed. Initially all the inboard side modules will be installed with inter connecting tubing followed by the leak testing of all the welding connections.



Installed components: (1) Main baffle (2) IDP- Inboard divertor plate (3) Inboard Limiter (4) IPS- Inner passive stabilizer

Science Carnival @ Science City

As part of the National Science Day celebrations of the Gujarat Council of Science City and The Gujarat Council of Science & Technology (GUJCOST), Govt of Gujarat, a Science Carnival was organized at the Science City from 26th February to 5th March 2015. IPR was invited to participate in this carnival and of the 12 exhibits that were presented by IPR, 9 were working models. Demonstration of radiation shielding, Tesla transformer, magnetic levitation and non-Newtonian fluids were quite popular amongst the visitors to the IPR stall. Static models of SST-1, Plasma pyrolysis and plasma treatment of wool were also displayed apart from informative posters. More than 20 volunteers from IPR participated in this activity and managed the IPR exhibits during the week long carnival.



(L-R) Prof. Dhiraj Bora explaining the tokamak model to the visiting students on the opening day of the Carnival. Demonstration of magnetic levitation and radiation shielding by IPR volunteers.

The "CNC Abrasive Waterjet Cutting Facility" of Divertor and First Wall Technology Development Division at IPR was formally inaugurated by Prof. D. Bora, Director, IPR on 23rd February 2015.

The cutting demonstration on the machine was given by Dr. K. P Singh during the inauguration ceremony. A memento which is cut using CNC Abrasive Waterjet machine was handed over to the Director of IPR. Few key-chains cut using the machine were also distributed to some of the invited staff members.

CNC Abrasive Waterjet Cutting Facility (OMAX 60120) having X-Y Table size of 3000mm x 1500mm with 40 HP high pressure pump producing 60 ksi pressure can efficiently cut a variety of metallic as well as non-metallic materials such as SS, Copper, Tungsten, CFC, Graphite, Aluminium etc. The advantage of this cutting technology is the precise (near net shape) cutting of the materials without much loss of materials during cutting process. Moreover, unlike other typical cutting processes that use heat source for cutting, the cutting process in waterjet is performed at room temperature thereby avoiding problems such as Heat Affected Zone (HAZ) in materials.



Tungsten Environment in Steady State Tokamak (WEST)



Dr. Daniel Raju attended the Second Governing Board Meeting on the WEST (Tungsten (W) Environment in Steady State Tokamak, an up-gradation of TORE SUPRA and essentially a test bed for the ITER) project of CEA/IRFM France at Chateau on 5th March 2015. The meeting evaluated the present status and future direction of the WEST and Dr. Raju, on behalf the director Prof. Dhiraj Bora, gave a summary presentation to highlight IPR's contributions and future activities on this project. IPR is collaborating in the areas of Plasma Control System, CODAC, Wall Monitoring System, actively cooled tungsten divertor and also, contributing in-kind the procurement of various acquisition units.

The 44th National Safety Week was celebrated at IPR from 4-10 March 2015. As a part of the celebration, the institute organized various competitions to create safety awareness among its employees. Competitions on a) *Slogan in Hindi & English languages*, b) *Poster*, c) *Quiz* and d) *Essay Writing in Hindi & English languages* based on decided topics for the employees at IPR, FCIPT & ITER-India. Overwhelming response was received from the employees for various competitions. In addition to this, Safety Section has **screened short video films** on various topics during this week. This included Mechanical Hazards, Weakest Link, Electrical Safety at the workplace, How to prevent falls, etc. Many staff members took part in the celebrations. The concluding Session was organised on 10th March. A talk on “*Compressed Gas Cylinder Safety*” by D. V. Modi, Safety Officer, screening of a short video film on “*Emergency Evacuation Procedure*”, talks by Dr. Chenna Reddy, Chairman – Safety Committee and administration of the “*Safety Pledge*” by the ACAO, Safety Quiz for Audience were some of the programmes for the day. Prizes were distributed to the winners of various competitions. Display of safety posters, prize winning posters by IPR’ites and an exhibition of industrial as well as radiation safety equipment was also organized.



(L-R) Quiz contest in progress, Exhibition of safety equipment, Speech by Chairman-Safety Committee, Dr. Chenna Reddy



(L-R) the 1st and 2nd prize winning safety posters by IPR employees



Prizes being distributed to the winners of various competitions.

Video show on safety



The audience taking the “Safety Pledge”

Competition Name	First Prize	Second Prize	Third Prize
Poster	Unnati Patel	K.G. Parmar	Payal Chirandas, Anuj Garg
English Slogan	Pratibha Gupta	Mohit Jadon	-
Hindi Slogan	Sunil Misal	Rajnikant A	Mitesh Patel
English Essay Writing	Gaurav Purwar	Bharat Doshi	Dilshad Sulaiman
Hindi Essay Writing	Pratibha Gupta Sandhya Dave	Nirav Jamnapara	K.G.Parmar
Quiz	Pratibha Gupta Pramod Parmar	Rajiv Sharma	Vishal Jain Vrushank Mehta

CPP-IPR observed the 44th National Safety Week. As part of the celebration, the centre organized various competitions to create safety awareness amongst its employees. On 4th March, the inaugural day, competitions on *Slogan* and *Quiz* were organised for the employees. Enthusiastic response was received for the various competitions. Prof. K.S.Goswami, Centre Director, Dr. B. K.Saikia, Associate Professor-II and Mrs. D. Kalita, Administrative Officer-I delivered talks on various safety related topics. The concluding Session was organised on 10th March 2015. Prizes were distributed to the winners which was followed by valedictory address by Centre Director and Mr. A. Baishya, the safety co-ordinator.



(L-R) Centre Director Prof. K. S. Goswami addressing the gathering. Distribution of prizes by Prof. Goswami.

Competition	First Prize	Second Prize	Third Prize
Slogan writing	Nikash Kalita	Ananya Phukan	Satindra Sarma
Quiz	Nilam Jyoti Datta	Neelanjana Buzarbaruah	Mayur Kakati, Monojit Chakraborty

Design Cup Cricket Tournament - 2015

“Design Cup - 2015” was organized by the National Institute of Design (NID) on 7th Feb 2015 at the Gujarat Sports Complex Ground, Near Gujarat University. Five teams participated in this tournament. IPR team qualified for the finals which was played against SAC, ISRO. In the final match played on 22nd Feb 2015, SAC defeated IPR team by 21 runs.

Highlight of final match

- IPR team won the toss and elected to field first.
- SAC team scored 104/9 runs in 25 over.
- IPR Team scored 83/10 runs in 21 over.
- SAC won the match with 21 runs.



The IPR Team with the Runner-up Trophy



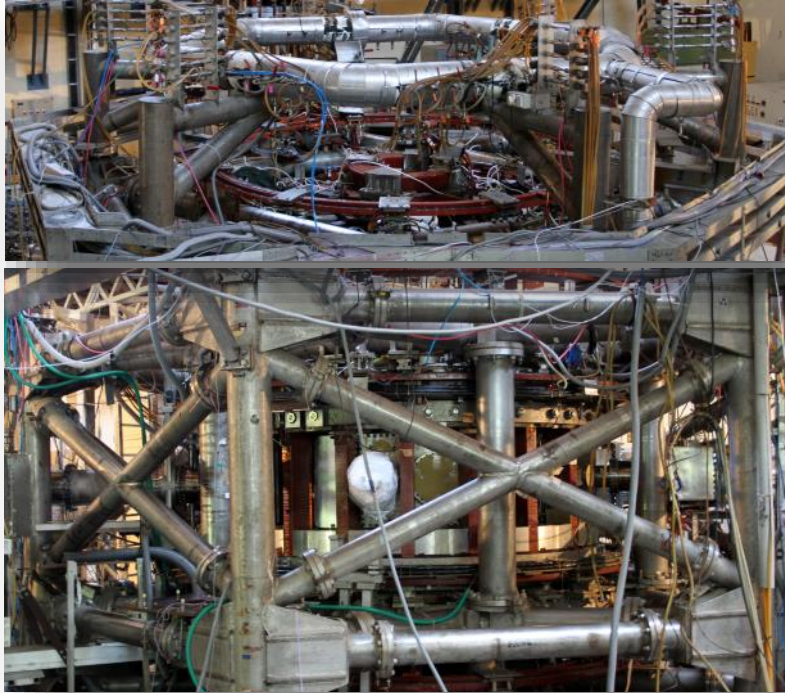
IPR Team

Best performances from IPR in final match of Design Cup ;

Harshad Chauhan	18 runs
Mohit Jadon	16* runs and 3 wickets



IPR canteen under renovation. The car parking area was converted into a makeshift canteen.



"Aditya" tokamak in the process of being dismantled for up-gradation. (L-R) Top and side views of the Tokomak, an optical diagnostics port with deposition on the window. Personnel undertaking the dismantling process.

Safety Program @ Bhat Village

As a part of DAE Diamond Jubilee Celebration Year, Safety Section has conducted an outreach program on "Road Safety" & "Family Safety" on 22nd March 2015 for the villagers of Bhat village. Few short videos on topics were also screened.



Mr. Devendra Modi, Safety Officer IPR, conducting the safety awareness programme at Bhat Village.

Mr. Hitesh Mandaliya Joined IO in Water Cooling Section. Mr. C .Chakrapani recently returned to IPR after completing his 5 year contract in March 2015. Current strength of Indian staff deputed at IO is 19 including 4 staff from other institutes.

Indians residing in Aix-en-Provence and Manosque organised a get together on weekend in garden in St. Tulle to celebrate Holi festival on 8th March. Color packets were brought in by ITER-India Colleagues just few days before the occasion. Celebrations included cultural activities & games, color play and in the end a group Photo. Such few annual events enable the Indians staying in the nearby area to come together with family members.



IPR'ites and other Indians residing in Aix-en-Provence and Manosque celebrating Holi.

Vikram Sarabhai Space Cup Trophy - 2015



IPR finished at third position by defeating PRL in the recently concluded Vikram Sarabhai Space Cup football trophy which was held at the KAHANI Football academy grounds at Vastrapur, Ahmedabad. This tournament had teams from institutes such as SAC, PRL and IPR.

Fulltime score: (1-1) with Mr. Sonu Yadav scoring the goal for IPR. The game went on to penalty shootouts, which IPR won with a score of (5-4). Successful penalty shoots taken by Dhiren Mohapatra, Ashwin Joy, Soumen Ghosh, Modhugambi Laishram and Sonu Yadav. IPR goal keeper Mr. Vinay Menon was one of the major architects of IPR's victory as he saved one goal in the penalty shoot out. Ashwin Joy was declared the "Man of the match".

Holi @ IPR

Holi was celebrated at IPR on the evening of 5th March 2015 with a lot of fun and frolic. Along with the traditional "thandai", sweets and gulal, a rib tickling "हास्य कवि सम्मेलन" was also organized by the staff club at the IPR lawns and many of the IPR staff members displayed their humorous side.



(L-R) IPR'ites celebrating Holi. The "हास्य कवि सम्मेलन" in progress.

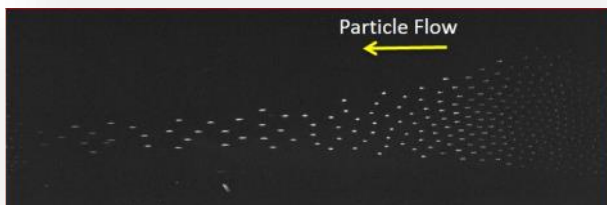


(L-R) Prof. Sen delivering the welcome speech at the inaugural function. Demonstration of Tesla coil by IPR volunteers.

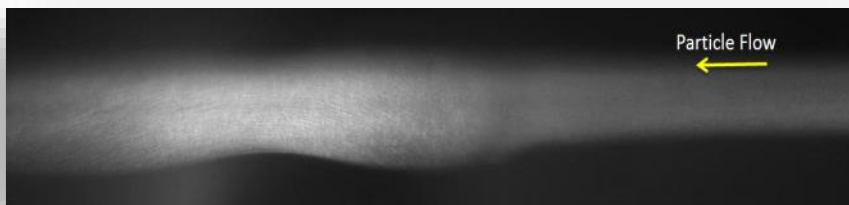
Studies on Complex Plasmas

A complex (dusty) plasma consists of electrons, ions and negatively (or positively) charged micron sized dust particles. In laboratory experiments, when the micron sized dust particles are introduced in the plasma, they get negatively charged by collecting electrons and ions and start to float near the sheath region by balancing mainly the gravitational force and the electrostatic force. Recent experiments were conducted on flow induced excitation of linear and nonlinear waves/structures in Dusty Plasma Experimental (DPEX) device at IPR.

We generate the flow by adjusting the pumping speed and the gas flow rate. Depending upon the discharge parameters, the dust fluid velocity changes and as a result, we are able to excite the linear and nonlinear waves/structures in our device.



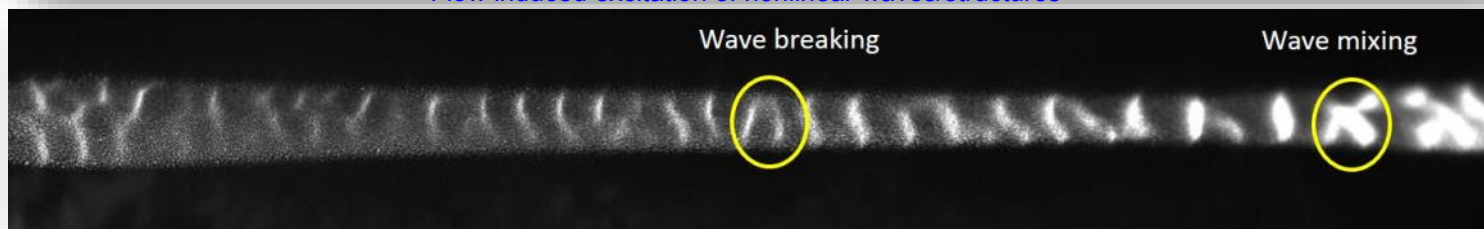
Neutral drag induced flow of particle in single particle level



Neutral drag induced flow of particle in fluid level



Flow induced excitation of nonlinear waves/structures



Flow induced sound wave excitations in dusty plasma

Women Excellence Awards 2015

Utkarsh Healthcare Foundation India celebrated womanhood and women's achievement by felicitating 11 women achievers of Gujarat. The program entitled "Women Excellence Awards 2015" was held at Hotel Regenta, Ahmedabad on 8th March 2015. **Prof. Amita Das** of IPR was one of the recipients of the Achievers Award for her contribution as a scientist and innovator.

The Awards were given by Mayor of Ahmedabad Ms. Minaxiben Patel, Ms. Nayana M. Patel, Director, Mamta Industries and Ex. President of Gujarat Chambers of Commerce (Women's wing), and Ms. Aarti Purohit, CEO and Director of Neo Politan Pizza Ltd.



Prof. Amita Das (third from left) along with the other recipients of the award.

- ◆ **Prof. B. K. Dutta**, BARC/HBNI, gave a talk on "*Mechanical Properties of Material at Extended Irradiation for Next Generation Nuclear Reactors*" on 26th February 2015 (Colloquium # 248)
- ◆ **Dr. Partha Saikia**, CPP-IPR, Sonapur, Assam, gave a talk on "*Plasma diagnostics of DC planar magnetron glow discharge*" on 4th March 2015
- ◆ **Dr. Sanjib Sarkar**, Department of Physics, Jadavpur University, Kolkata, gave a talk on "*Experimental investigation on cogenerated dusty plasma*" on 5th March 2015
- ◆ **Prof. Howard Wilson**, Director, York Plasma Institute, University of York, Heslington, York, UK, gave talks on "*Models for small ELM regimes in tokamaks*" and "*Drift kinetic theory for Neoclassical Tearing Modes*" on 10th and 11th March 2015
- ◆ **Mr. G. Veda Prakash**, Institute for Plasma Research, gave a talk on "*Compact pulsed power using liquid dielectrics*" on 11th March 2015
- ◆ **Mr. Jashwant Sonara**, Institute for Plasma Research, gave a talk on "*Cable Engineering Management in ITER*" on 16th March 2015
- ◆ **Prof. Ulrike Feudel**, Universitat Oldenburg, gave a talk on "*Extreme events in excitable systems*" on 19th March 2015
- ◆ **Mr. Bhargavkumar Choksi**, Institute for Plasma Research, gave a talk on "*Experimental studies on the Neutral Beam System of DIII-D Tokamak*" on 26th March 2015
- ◆ **Mr. Somesh Vinayak Tewari**, Accelerator and Pulse Power Division, BARC, Trombay, gave a talk on "*Study of surface flashover of insulator in gases at high pressure*" on 27th March 2015

Upcoming Events

- ◆ 6th International Particle Accelerator Conference (IPAC'15), Richmond, Virginia USA, 3-8 May 2015 <http://www.ipac15.org/>
- ◆ 17th International Conference on Emerging Nuclear Energy Systems (ICENES2015), Antalya, Turkey, 10-14 May 2015 <http://icenes2015.org/index.php>
- ◆ 15th International Conference on Plasma-Facing Materials and Components for Fusion Applications (PFMC15), Aix-en-Provence, France, 18-22 May 2015 <http://irfm.cea.fr/pfmc15/index.html>
- ◆ International Conference on Plasma Sciences (ICOPS 2015), Antalya, Turkey, 24-28 May 2015 <http://www.ece.unm.edu/icops2015/>
- ◆ 8th Chaotic Modeling and Simulation International Conference (CHAOS 2015), Paris, France, 26-29 May 2015 <http://www.cmsim.org/>
- ◆ 8th IAEA Technical Meeting on Steady State Operations of Magnetic Fusion Devices (TMSSO2015), Nara, Japan, 26-29 May 2015 <http://tmssso2015.nifs.ac.jp/>
- ◆ 14th Workshop on the Physics of Dusty Plasmas, Auburn, Alabama USA, 26-29 May 2015 <http://psl.physics.auburn.edu/wdpd2015/>

Silver Stars Of IPR



Mr. Atish L. Sharma Joined IPR in 1991. He has been actively involved in PCB design and assistance in general electronics of Aditya Data Acquisition and Control group as well as various diagnostics till 1996. Since then he has been involved in the electronics of SST-1 Data Acquisition system.



Mr. Raghuraj Singh joined IPR in 1992 with the RF group and contributed towards development of high power RF systems for plasma heating and current drive experiments on Aditya Tokamak. Presently he is working with IC H&CD group at ITER-India and involved in the developmental activities of very high power (MW) RF sources and associated sub systems for ITER 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	