

Issue 06  
June 2015

# The Fourth State

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

*From the editorial desk*

The editorial committee of the IPR newsletter wishes to thank all the IPR staff members for their encouragement and support that they have given to the revived newsletter. We hope that this will continue for all the forthcoming issues of "The Fourth State". Please feel free to send any comment / suggestion to the committee at <newsletter@ipr.res.in> for improvement of the look and contents of the newsletter.

## 250th Colloquium @ IPR

The 250th Colloquium of IPR was presented by former Director of IPR, Prof. P. K. Kaw. His talk on "Tokamak Physics" touched upon the various theoretical as well as experimental aspects of fusion, including physics of magneto-hydrodynamic (MHD) phenomena in a Tokamak. He also summarized the salient features of the performance of Tokamaks as magnetic containers for hot plasmas for their utilization in fusion reactors. His talk concluded with a view where tokamaks were compared to other mysterious objects in Physics, namely, living matter !! The talk was attended by many of the IPR staff. We look forward to hearing more such lectures from on various topics of physics.



## 1st Meeting of the Plasma & Fusion Research Committee (P&FRC) - BRNS

The first meeting of the newly constituted Plasma & Fusion Research Committee (P&FRC) of the BRNS was held at IPR during 14-15 May 2015. During this meeting, 26 new projects of value ₹ 7.59 Crores were reviewed along with 20 ongoing projects.

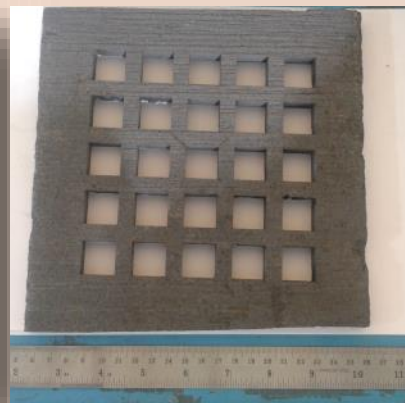
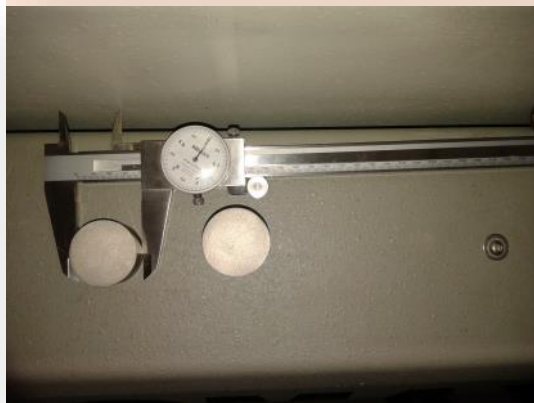


Professor P. I. John chaired the meeting along with members of the committee i.e., Prof A K Ray, Prof. Prabal Chattopadhyay, Dr. Sangita, Shri. D. K. Dalal and Dr. Ravi A V Kumar (Member Secretary). Dr. N. Ramasubramanian conducted the proceedings of the review meeting. Two of the members could not attend the meeting.

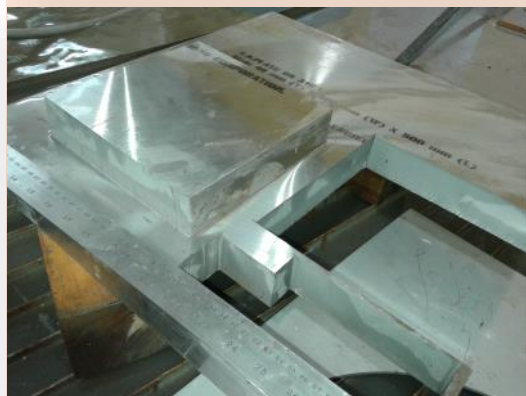
The P&FRC meeting in progress (L-R) Prof. P. I. John, Prof. A. K. Ray, Prof. P. K. Chattopadhyay, Dr. Sangita and Shri D. K. Dalal.

## CNC Waterjet Abrasive Cutting Facility @ IPR

A state of the art water-jet CNC abrasive cutting machine facility has been installed at IPR and used for machining of various materials. This facility was inaugurated by Director IPR on 23rd Feb 2015. IPR users wanting to use this facility may do so by filling in the request form which is available on the DFTD group home page of IPR, <http://www.ipr.res.in/dftd/documents/W-jet%20usage-Form.pdf>. Some of the jobs undertaken at this facility are shown below.



Machining of Tungsten alloy ( $W-1\%La_2O_3$ ) plate for the tiles preparation was performed successfully for on-going GTU academic project 2014-2015. Graphite plate was also machined with low pressure water. LHCD CuCrZr modules have been cut using CNC Waterjet Cutting machine. The surface quality after machining was observed to be excellent.



40 mm thick SS316LN plate machining and 19mm thick ETP copper (pulse power)

## Inauguration of High Current 2.45 GHz ECR Ion Source @ IPR

The recently installed PANTECHNIK make High Current ECR ion source at the Fusion Neutronics Laboratory (FNL) was inaugurated by Prof. D. Bora on 27th May 2015. This ion source is capable of generating proton beam of 30 mA current and deuteron beam of 21 mA current at 40 keV energy. This source will be used in the upgradation plan of the 14-MeV neutron generator which is expected to yield  $10^{12}$  n/s.



(L) Prof. D Bora inaugurating the ECR ion source facility. (R) view of the ion source system.



## Silver Jubilee Year of CPP-IPR

On April 1, 2015, Centre of Plasma Physics – Institute for Plasma Research (CPP-IPR) entered 25<sup>th</sup> year of its existence. Prior to its merger with IPR in 2009, the institute was known as Centre of Plasma Physics (CPP), and was incepted on April 1, 1991.

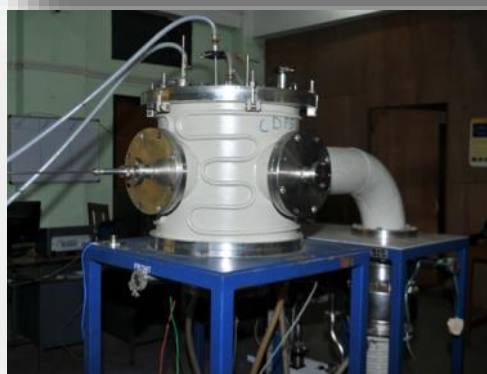
Research in the plasma physics in Assam, however, had started a decade earlier in 1982 when Prof. Bujarbarua left Dibrugarh University to join as a fellow of an NGO named Assam Science Society in Guwahati. Prof. Bujarbarua started theoretical research under a project funded by Indian Space Research Organization (ISRO). Initially the working space for the project was provided by the Department of Mathematics, Gauhati University; later it was shifted to Assam Agricultural University campus at Khanapara, Guwahati. To expand the research activities in both theoretical and experimental plasma physics, Prof Bujarbarua submitted a proposal to Govt. of Assam in 1988 and subsequently received financial assistance.

On April 1, 1991, Govt. of Assam announced the establishment of CPP as an autonomous research institute to pursue basic research in theoretical and experimental plasma physics and its related areas under its Department of Higher Education. It came into existence through untiring efforts of Prof. S. Bujarbarua backed by the unstinting support of Late A. Saikia, IAS, the then Commissioner of Education, Govt. of Assam. The Centre started functioning in a rented campus in Dispur, Guwahati. In 1996, the institute was transferred to the Department of Science, Technology and Environment of Govt. of Assam. Services of the employees were purely temporary at this stage and the scientists performed their research works with external projects funded by different agencies like Department of Science & Technology, Indian Space Research Organization, Board of Research in Nuclear Science, etc.

In the late 1990s, CPP received several grants to expand its infrastructure and research activities. Govt. of Assam had allocated 6.61 acres of land to it at Sonapur, 20 km east of Guwahati for setting up of the permanent campus. Tata Tea Pvt. Ltd., a leading business enterprise of north-east India, donated a building (the present administrative building). Financial assistance from Govt. of India under the Non-lapsable Central Pool Fund allowed the Centre to construct a laboratory building as well as to expand and enrich the research facilities. Another grant came from MPLAD fund of Dr. Manmohan Singh, former Prime Minister of India, to construct hostel-cum-canteen building. In April, 2004, CPP shifted its activities to its modestly-built permanent campus on a picturesque hillside in Nazirakhat, Sonapur.

The association of erstwhile CPP with IPR is as old as its inception. Prof. Bujarbarua was an alumnus of the Plasma Physics Program group of Physical Research Laboratory in the 1970s. With the establishment of CPP in 1991, Prof. P. K. Kaw, then Director of IPR, became the founder chairperson of its Governing Council. Many prominent scientists of IPR were associated with CPP as council members. CPP and IPR scientists have also collaborated in defining and executing various research projects. In 2007, a more formal collaborative programme between CPP and IPR was initiated, which eventually culminated into the merger of CPP with IPR on 29<sup>th</sup> May, 2009.

To know more about CPP-IPR, please visit <http://www.cppipr.in>.





## High Energy TEM Facility @ IPR

IPR has recently procured an advanced materials characterization equipment: Transmission Electron Microscope (TEM). TEM will be installed and commissioned at FCIPT.

A TEM is basically a powerful microscope that uses a beam of highly accelerated (up to 300 kV) mono-energetic electron beam as a source of illumination. The instrument is capable of obtaining images at very high magnification (up to over one million times), coupled with very high spatial resolution. With the addition of certain attachments, the instrument acquires analytical capabilities and accordingly compositional and structural analysis can be carried out. In short, a TEM can provide topographical, morphological, compositional and crystalline information of specially prepared samples.

TEMs are very sensitive to mechanical vibrations, acoustics, and electromagnetic interference and hence must be housed in an area that isolates them from these effects. A new building is being constructed at FCIPT, taking these stringent requirements into consideration. A special anti-vibrational platform has been constructed with a concrete block of 1 m depth, in the TEM instrument room.

In order to restrict the acoustics and to help maintain the temperature stability inside the TEM room, walls of this room have been constructed as a double walled structure with glass wool sheets placed in between.

Civil and electrical work of the lab building is almost finished and HVAC work is in progress. The installation and commissioning of the TEM is expected to start in the month of June 2015.



The low vibration building which will house the 300kV TEM at the FCIPT Campus

## हिन्दी सेमिनार 2015

इस वर्ष दिनांक 9 एवं 10 अप्रैल, 2015 को दो दिवसीय हिन्दी सेमिनार का आयोजन किया गया। हिन्दी सेमिनार का उद्देश्य राजभाषा हिन्दी के प्रभावी प्रचार-प्रसार हेतु संस्थान की गतिविधियों को हिन्दी में प्रस्तुत करने हेतु कर्मचारियों को एक मंच प्रदान करना है। इस दो दिवसीय सेमिनार में कुल 12 प्रतिभागियों ने भाग लिया। 8 प्रतिभागियों ने तकनीकी एवं विज्ञान से संबंधित विषयों पर और 4 प्रतिभागियों ने विभिन्न प्रशासनिक विषयों पर पावर पॉइन्ट प्रस्तुति दी। प्रस्तुतिकर्ताओं ने अंत में श्रोतागणों के जिज्ञासापूर्ण प्रश्नों का उत्तर देकर उनके संदेहों को दूर किया। डॉ. तेजेन कुमार बसु, सलाहकार, आईपीआर ने निर्णायक के रूप में इन सभी प्रपत्र प्रस्तुतिकरण का मूल्यांकन किया। दिनांक 10 अप्रैल, 2015 को समापन समारोह में निदेशक महोदय ने श्रेष्ठ प्रस्तुति देने वाले विजेताओं और शेष सभी प्रतिभागियों को पुरस्कार प्रदान किये। वैज्ञानिक/तकनीकी प्रस्तुति के लिए श्री भरत दोशी को प्रथम पुरस्कार, श्री संतोष पंड्या को द्वितीय पुरस्कार एवं श्रीमती ज्योति अग्रवाल को तृतीय पुरस्कार प्रदान किया गया एवं प्रशासनिक विषय पर प्रस्तुति के लिए श्री सुनिल मिसाल को प्रथम पुरस्कार, श्री एच.के.शर्मा को द्वितीय पुरस्कार एवं श्री आदित्य पंचसारा को विशेष पुरस्कार प्रदान किया गया। अंत में श्रेष्ठ प्रश्न पूछने वाले श्रोतागणों को भी पुरस्कृत किया गया।



हिन्दी सेमिनार की झलकियाँ



## New Vacuum Vessel for Aditya Tokamak Upgrade

The existing Aditya tokamak is being upgraded into a machine with divertor operation and improved plasma control to support the future Indian Fusion program in a big way. The new vacuum vessel, with circular cross section, is under fabrication at M/s Godrej & Boyce Ltd., Mumbai. The vessel is being fabricated as two semi torus.

Apart from the complexity of the job and the fact that this vacuum vessel requires to be completed with high dimensional accuracy, the manufacturers, in collaboration with IPR are putting in their sincere efforts to achieve these requirements. The fabrication of all circular and non-circular ports have been completed. Four elbows constitute a half tori. The semi-tori is assembled by joining of two elbows. All the peripheral, top and bottom ports of semi torus 1 have been welded and leak tested. After stress relieving, final machining will be carried out. Similarly the other semi tori will also be fabricated and tested.



Images of the new vacuum vessel for Aditya under fabrication and testing at M/s Godrej & Boyce Ltd., Mumbai.

## IPR @ Conferences

The 7th International Conference on the Frontiers of Plasma Physics and Technology was organized in Kochi, Kerala during 13-17 April 2015. Prof. Dr. Dhiraj Bora delivered a talk on "Indian Initiatives in Magnetically Confined Fusion Research". Talks were also presented by Dr.-Ing. Suryakant Gupta "Pervasive use of Eco-friendly and Energy Efficient Plasma Technology for Societal benefits" and Dr. Debshish Chandra "Simulation of ELMS in presence of RMPS using CUTIE code". Posters were also presented by IPR research scholars. Ms. Akanksha Gupta, Research Scholar from IPR received the best poster award. This award had a cash prize of Rs. 9000 and a citation from the Journal of Laser & Particle Beams.





Dr. Joydeep Ghosh participated in the 14th ITPA Transport & Confinement TG Meeting, which was held at the IO, St Paul Lez Durance, France during 05-07 May 2015. The IN-DA delegation led by Prof. Abhijit Sen participated in the STAC-18 meeting which was also held at IO, St Paul Lez Durance, France during 11-13 May 2015.

IPR Director, Prof. Dhiraj Bora Visited IO Headquarter in the week starting 18th May. Mr. Rajendra kumar and other Members of TBM group participated in TBM Project Coordination Group Meeting PBM-PC-13 during 19-22 May 2015. The IN-DA Delegation participated in MAC-19 meeting held at IO, St Paul Lez Durance, France during 26-28 May 2015.

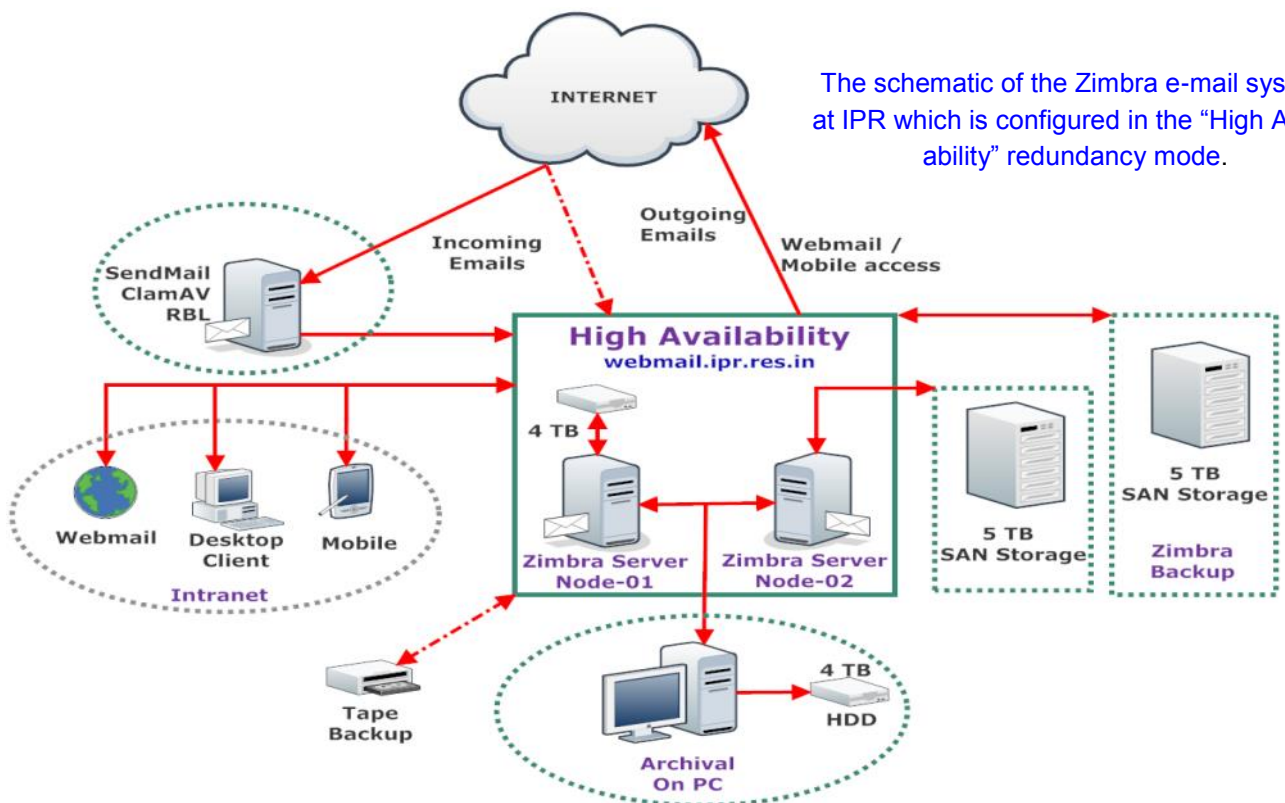
Mr. Laxmikant Bansal from IPR has been recently selected for a position in IO.



The Indian delegation who attended the MAC-19 meeting at ITER, France. (L-R) : Amita Das, Arun Srivastava, Indranil Bandyopadhyay , Ujjwal Baruah, Shishir Deshpande and H. A. Pathak.

### IPR Zimbra Email System

The Zimbra Email system installed at IPR last month has been made fully functional with the two e-mail servers configured in "High Availability" redundancy mode. This will enable the email system to function even if any one of the two e-mail servers are out of operation. In addition to this, two levels of backup for the incoming and outgoing emails ensure that no email is lost in the event of a catastrophic failure. This email facility, capable of delivering emails to mobile devices has been extended to over 870 staff members of IPR/ FCIPT and CPP.





## New Staff Club Committee

During the last GBM of the Staff club held on 12th April, 2015, IPR staff members elected the members of the Staff Club committee for the year 2015-16. On behalf of IPR staff, the Newsletter welcomes the committee.



Name	Post
Dr. Promod Kr. Sharma	President
Mr Sudhir Singh Vala	Secretary
Mr. Parag Panchal	Treasurer
Ms Shailja Tiwari	Cultural Secretary
Mr. Yagnesh Trivedi	Sports Secretary

(L-R) : Ms Shailja Tiwari, Mr Sudhir Singh Vala, Mr. Yagnesh Trivedi, Dr. Promod Kumar Sharma and Mr. Parag Panchal who were elected as members of the Staff Club Committee.

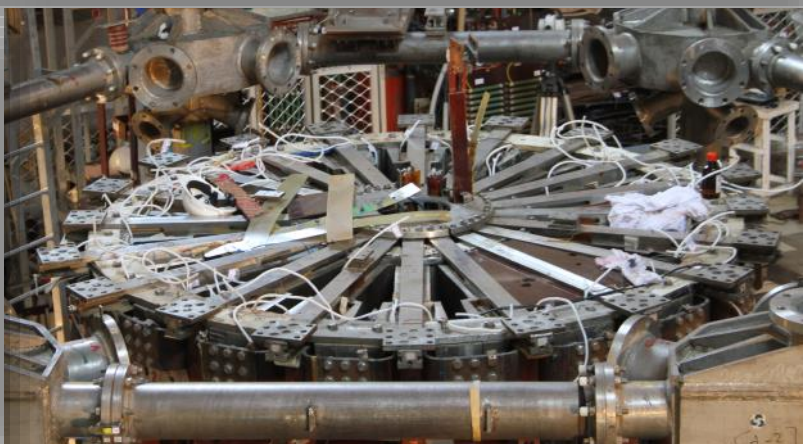


To keep our staff fit and healthy, the Staff Club has taken steps to revamp the gymnasium at IPR. The maintenance of the entire exercise and workout machines was taken up on priority, and all of them are in working order currently.

IPR staff are encouraged to visit the gym to keep themselves healthy & fit.

## Aditya Upgradation : Dismantling of the Machine

Dismantling of Aditya Tokamak in progress. The TF coils and the vacuum vessel are scheduled to be dismantled next.





- ♦ **Dr. Bharat Kakati**, Centre of Plasma Physics-Institute for Plasma Research, Sonapur, Assam, gave a talk on "Development of a cesium coated dusty negative hydrogen ion source" on 1st May 2015
- ♦ **Mr. Aditya Krishna Swamy**, Institute for Plasma Research, Gandhinagar, gave a talk on "Global Gyrokinetic Studies of Electromagnetic Microinstabilities in Tokamaks" on 1st May 2015
- ♦ **Prof. P. K. Kaw**, DST Year of Science Professor at Institute for Plasma Research, Gandhinagar, gave a talk on "Tokamak Physics: Brief Overview and A Perspective" on 7th May 2015 (Colloquium # 250)
- ♦ **Prof. Prabhat Ranjan**, Executive Director, Technology Information, Forecasting and Assessment Council (TIFAC), Delhi, gave a talk on "Glimpse of TIFAC activities" on 8th May 2015
- ♦ **Dr. Daly Davis**, Visiting Scientist, Institute for Plasma Research, gave a talk on "Imaging Crystal Spectrograph for SST-1" on 11 May 2015
- ♦ **Mr. Srikanta Sahu**, TBM Division, Institute for Plasma Research, gave a talk on "Liquid Metal R & D Activities Under IPR-UCLA collaboration" on 13 May 2015
- ♦ **Dr. Pamidi Sastry**, Principal Investigator and Lead Scientist of Superconductivity and Cryogenics Laboratory, Center for Advanced Power Systems, Florida State University, USA, gave a talk on "Current R&D Activities at the Florida State University Center for Advanced Power Systems in Superconducting Power Devices" on 18th May 2015

### Upcoming Events

- ♦ Workshop on RFQ Accelerators and Associated Technologies, Institute for Plasma Research, Gandhinagar, 9-10 June 2015 <http://www.ipr.res.in/RFQA/>
- ♦ 22nd International Symposium on Plasma Chemistry (ISPC 22), Antwerp, Belgium, 5-10 July 2015 <https://www.uantwerpen.be/en/conferences/ispc22/>
- ♦ Pacific Symposium on Pulsed Power and Applications, Maui, Hawaii USA, 5-7 August 2015 <http://p3e.ttu.edu/symp2015/>
- ♦ Magnetic Reconnection in Plasmas Summer School, Stockholm, Sweden, 5-10 August 2015 <http://agenda.albanova.se/conferenceDisplay.py?confId=4460>

### Know Our Colleagues



**Mr. Sumod C.B.** joined IPR in 1993 in the Instrumentation department which catered to different experiments and systems in the entire Institute. He is presently associated with the NBI Power Supply and Data Acquisition group and has been involved in the successful development and commissioning of multi megawatt Regulated High Voltage Power Supplies (RHVPS) for Fusion and Accelerator applications. He is a member of team involved in development and installation of the full RHVPS system of 100kV, 25A at BARC, Mumbai.

**Mr. Motibhai N. Makwana** joined IPR in 1993 in the Aditya Pulsed Power (APPS) group involved in the operation and maintenance of 132/11 KV substation, 11KV switchgears, Converter Power Transformers, Aditya Pulse power Supply and Utility power supply to IPR premises. He was on a five-year deputation with ITER France from 2009 and worked with the Steady State Electrical Network and Pulsed Power Electrical Network design team where his role as interface responsible officer was to manage documenting Electrical requirements of domestic agencies with respect to their various systems. After his return, he is once again with the APPS Group which also delivers power to SST 1. He is also engaged in the Aditya upgrade activity related with the Power supply systems.



### 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	