

Issue 044

March 2017

# The Fourth State

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

## Martyrs' Day Observed at IPR

Two minutes of silence was observed at 11:00 am on 30-Jan-2017 as a mark of respect to the father of our nation Mahatma Gandhi as well as for all those who gave their lives in the struggle for India's freedom. Employees gathered near IPR Administration block for this and paid their respects on Martyrs' Day.

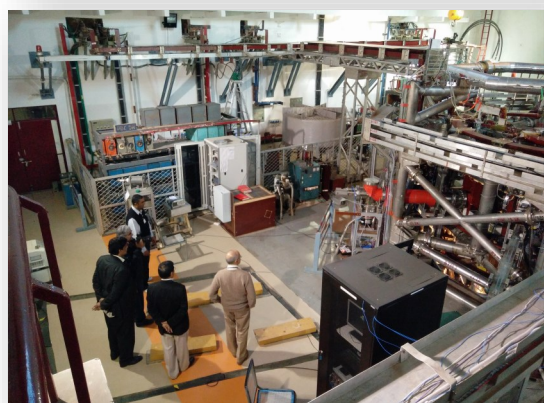


## IPR Visit by NDTV Team

Mr. Pallava Bagla, the scientific correspondent of NDTV visited IPR in the middle of January 2017. He visited the various laboratories in the three campuses of IPR. He interacted with the FCIPT staff to understand the various technologies developed at FCIPT. He also visited the Aditya-Upgrade tokamak, high heat test facility (HHTF) as well as the ITER-India laboratories. Based on his visit to IPR, he has published an article entitled "*Indian scientists exploiting healing powers of plasma*", in the Economic Times. You can read the article [HERE](#).



(Left) Mr. Pallava Bagla with FCIPT staff (Right) Director IPR explaining Aditya Upgrade tokamak to Mr. Bagla



(L-R) In the Aditya Hall; Dr. Samir Khirwadkar explaining the high heat test facility to the visitors.





**Mr. Ashok D Mankani, Engineer SG** of the Ultra High Voltage System Division of IPR has qualified the National Certification Examination for Energy Auditors conducted by the Bureau of Energy Efficiency under the Ministry of Power.



**Dr. Balakrishnan V Nair, Engineer SG** of the Electrical Maintenance Section has been accepted as a "Fellow" of the Institution of Engineers (India) on 31-Jan-2017. He will be associated with the Gujarat State Centre of the IEI.

## IPR Participation in "Samvaad"



"Samvaad: In Pursuit of Wisdom" was organised at the Aditya Silver Oak Institute of Technology, Ahmedabad on 22-24 December 2016. Dr. Subroto Mukherjee and Dr. Mukesh Ranjan delivered invited talks on various plasma based technologies and research possibilities. This state level symposium was organised to upgrade the faculty and students regarding the current areas of research in science and technology.

Dr. S Mukherjee (Left) and Dr. Mukesh Ranjan (Right) delivering their invited talks during the meeting



## IPR-NCSTC Joint National Scientific Outreach Programme



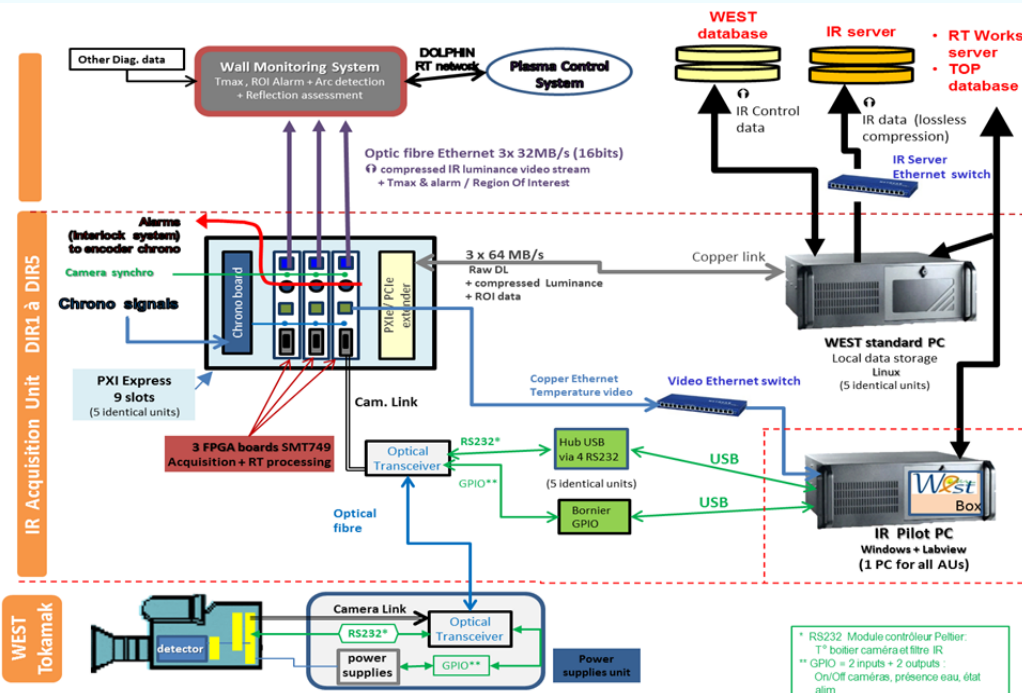
A joint proposal between IPR and The National Council for Science & Technology Communication (NCSTC) of DST entitled "Awareness-Cum-Training Programme on Plasma Science & Technology and Energy from Nuclear Fusion" which was submitted to NCSTC last year has been approved. This programme envisages to organize five awareness-cum-training programmes of three days duration for teachers each in five different zones of the country, ie., New Delhi (North), Bangalore (South), Guwahati (East), Gandhinagar (West) and Bhopal (Central) at high school / higher secondary

school level over a period of 12 months. Each programme would have about fifty resource teachers as participants teaching physics at high school / higher secondary / college levels. The programmes will have popular talks, hands-on experiments in plasma and related areas, science activity kits related to the topics, posters and a book entitled "Living with Plasmas". This programme will be executed by Dr. Ravi A. V. Kumar (PI) and Dr. N. Ramasubramanian (Co-PI) along with Dr. Anitha V. P., Ms. Chhaya Chavda, Mr. K. K. Mohandas, Dr. Suryakant Gupta and Mr. Raj Singh, who are the other core members of the team.



## IPR-CEA Collaboration

**Mr. Sunil Belsare** had been deputed from Divertor and First-Wall Technology Development Division, IPR, for working on the WEST tokamak project in France. He worked with STEP (Service Tokamak Exploitation & Pilotage) group under the guidance of Mr. Benjamin SANTRAINE, Ms. Nathalie RAVENEL and Dr. Philippe MOREAU. He had development Data Acquisition Unit for Magnetic and IR Diagnostics for the WEST project. The development work for the magnetic diagnostics was carried out on the tore supra development framework namely TSDAQ. The developed software source code is capable to do the configuration, triggering, acquisition and transfer of the data to the centralized database (Tsbase).



IR diagnostics architecture of WEST

He developed driver application for cRIO NI 9154 FPGA based slow data acquisition, NI 7851R FPGA based slow and fast Data Acquisition for the Linux OS (Cent OS 6.4) using "FPGA C API" library and interfacing of TSdaq\_client of DMAG with TSdaq.

The IR diagnostics is used to measure the surface temperature of the plasma facing components in order to ensure their protection. He developed the main source library using C/C++ API for the establishment of IR1 (Divertor and Antennas infrared monitoring) and IR2 (Wide Angle infrared view) data acquisition and control of all the associated cameras of IR diagnostic.



"Basant Panchami" or the coming of spring was celebrated at IPR hostel on 1st Feb 2017. On this occasion, the students of IPR organized a "Saraswati Puja" at the IPR hostel. Students and staff of IPR participated in this event.



Images from the Basant Panchami celebrations at IPR hostel.

## News From CPP-IPR

Installation of a 33KV substation has been completed recently at CPP-IPR. The substation has a 2.5MVA, 33KV/0.433KV step-down transformer in order to cater to the total demand of power load of CPP-IPR which is ~1.5MW. The substation will be fully operational after completion of all qualification tests by the end of the February.



A group of about 40 B.Sc. students from Birjhora Mahavidyalaya, Bongaigaon, visited CPP-IPR on February 17, 2017. The students visited various laboratories and witnessed demonstrations of various experiments and also interacted with the scientists and engineers at CPP. Earlier, Prof. K. S. Goswami, Centre Director, welcomed the students and gave a popular talk on R&D in plasma physics.

(Clockwise) Images of the substation, view of the students from Birjhora Mahavidyalaya, Bongaigaon, who visited CPP-IPR on February 17 2017.



## IPR Divisions & Groups - NBI Power Supply and Data Acquisition Division



(L to R) : Sumod C.B, Paresh J. Patel , Karishma A. Qureshi, Laxmi Narayan Gupta, Dipalkumar P. Thakkar, Vijaykumar B. Vadher

Neutral Beam Power Supply and Data Acquisition division has the basic mandate to provide controlled and uninterrupted operation of Neutral beam injection system and to acquire experiment data for online as well as for post experiment data analysis . Division is responsible for design, development, operation, maintenance and utilization of power converters required for the NB injector experiment with dedicated control supports for numerous subsystems and holds a patent in the design and development of the Regulated High Voltage Power Supply (RHVPS) system for the SST-1 heating systems. Team has developed dedicated data acquisition systems for Neutral Beam Calorimetry, Ion Source Parameter measurement and Cryogenics Instrumentation through a centralized control system using VME along with PLCs.



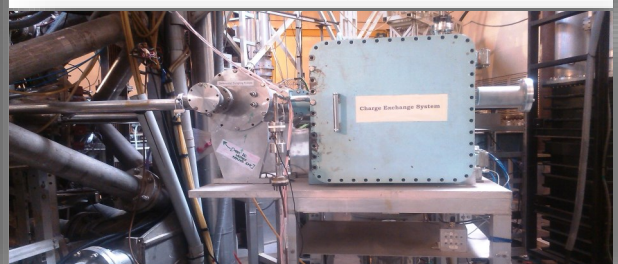
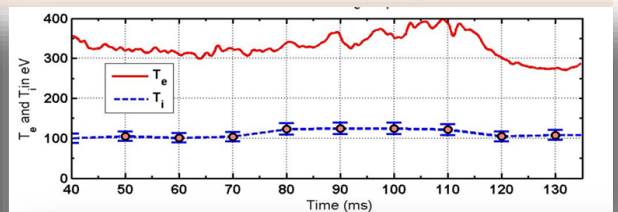
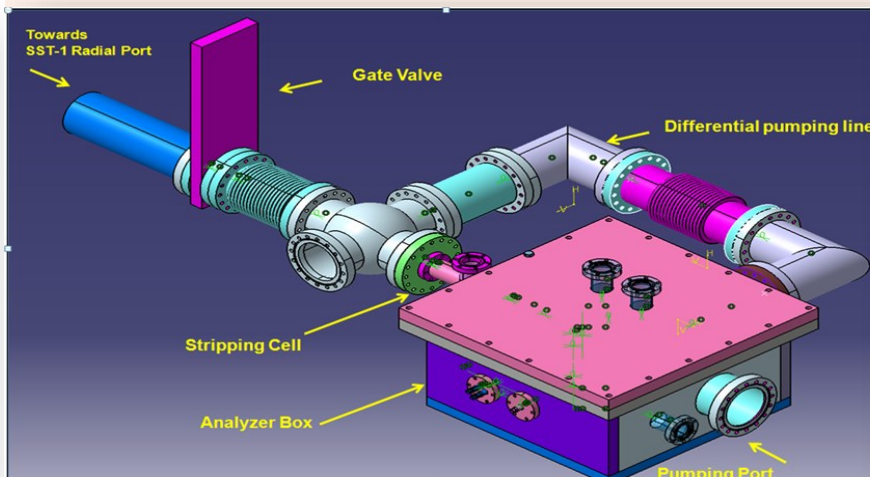
In the Auxiliary building, roof sheeting and Tremix flooring works have been completed. The wall cladding, structural steel painting and door fixing and electrical panel works are in progress. In the laboratory building, approximately 80 % of the structural steel work has been completed. First floor RCC and ground floor Tremix flooring as well as HVAC works are in progress. Installation of firefighting pump and piping work is in progress in the pump-house building.



Clockwise (from top) : The completed auxiliary building flooring ; Firefighting pump being installed in the pump house ; panoramic view of the auxiliary and laboratory building structures.

## Charge Exchange Neutral Particle Analyzer (CX-NPA)

This diagnostics aims to measure the core ion temperature of plasma in Aditya as well as in SST-1 based on its passive mode of operation. It uses retarding electrostatic field to separate the energy components of the CX- neutrals (ionized after its exit from stripping cell) escaping from plasma. The diagnostics has been successfully registered the ion temperatures in Aditya and has been operational during recent SST-1 campaigns where the system was tested for the DAQ performance and acquired the dark count levels during plasma shots.



(Clockwise) The layout of CXD-NPA system for SST-1 ; Temporal evolution of core-ion temperature  $T_{i0}$  and  $T_{e0}$  for Plasma Shot#29387 of Aditya Tokamak; Image of the CX-NPA diagnostics on Aditya Tokamak.



This year, the annual picnic was organized by the IPR staff club during 10-12 February 2017. The picnic was to the picturesque Kutch region of Gujarat. IPR staff got to see the grandeur of the Kutch Palace, the beaches of Mandvi as well as the magnificent white deserts of Kutch. The staff and family could also take part and enjoy the festivities at the Rann Utsav. More than 400 participants (IPR staff and family) took part in this fun filled weekend picnic.







### Mendeley Institutional Edition (MIE) Training at IPR

IPR Library organized training sessions for the Mendeley Institutional Edition (MIE) on 02 February 2017, both at IPR and FCIPT Seminar Halls. MIE provides premium features such as more Storage space, Collaboration with colleagues, Content usage analysis and more. The training sessions were aimed to explore these advance features and acquire better understanding of the Reference Manager Tool to manage, organize references and annotate PDFs on any device, which are very helpful in carrying out research work. Many students and staff members attended the training and participated in the interactive sessions.



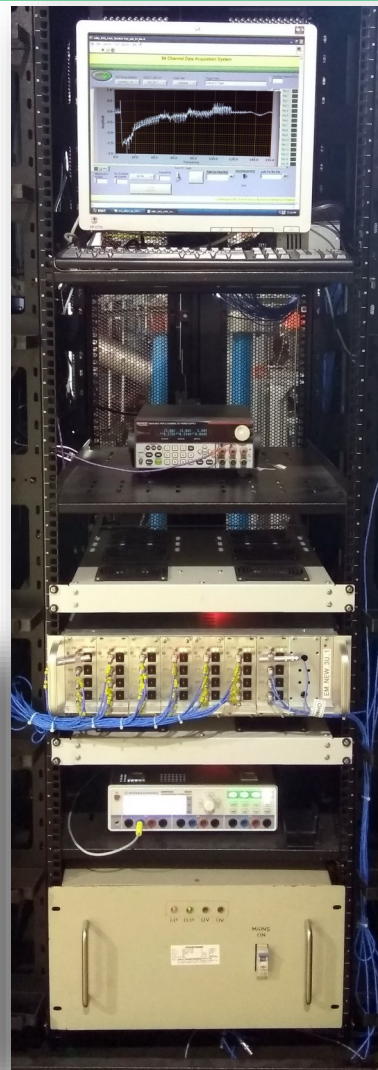
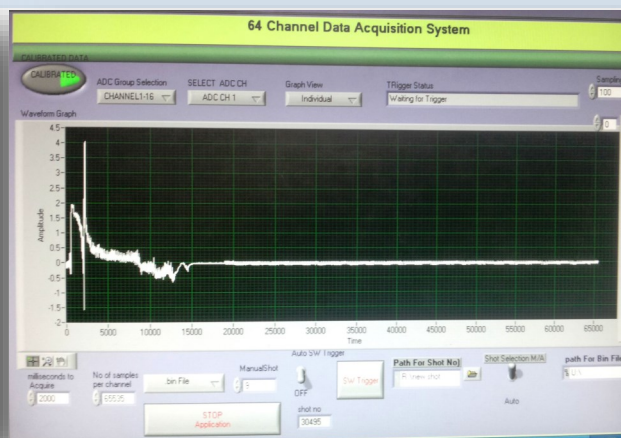
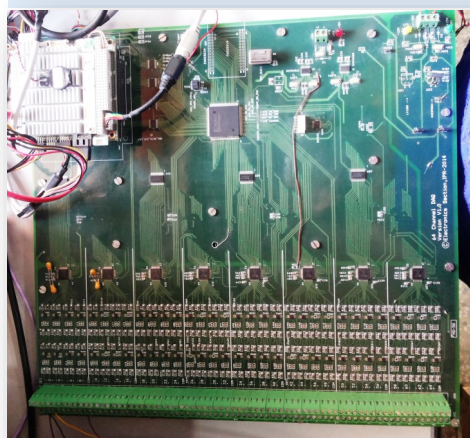


The 64 channel data acquisition system (DAS) is designed and developed by the Electronics and Instrumentation group to meet the demand of acquisition channels for Electromagnetic diagnostics. The main design criteria were to design system using minimum resources and flexible enough to integrate with existing data acquisition system of Aditya and SST-1 Tokamak.

The system is standalone in itself with inbuilt processor, local storage and Ethernet communication. The inherent features are simultaneous sampling of 200kS/s/ch with 16 bit resolution. To make system embedded and compact, hardware is designed using 8 Analog Inputs ADC chip, 4Mx16 bit RAM memory, FPGA, PC/104 bus and single board computer. The Aditya data acquisition system is based on PXI and CAMAC hardware.

To integrate DAS with existing Aditya data acquisition system, the GUI based client application is developed in LabVIEW which accepts pulse/trigger information directly from Aditya control server and transfer acquired data in Aditya server. Since system is compact and standalone, it can be very well integrated with signal conditioning electronics of each diagnostics in same Rack. This arrangement will reduce long interconnected cables (10 to 12mts) which used to exist between Electronics and Aditya DAQ system, improving signal to noise ratio too.

Presently the system is integrated with electronics of EM diagnostics and operational in Aditya Tokamak.



(L-R) The indigenously assembled DAQ board; the GUI for users ; The complete system installed for the Aditya Tokamak.

## Wild Flora of IPR Campus



It's a familiar but certain cycle in the life of a plant, and being a wild one makes it more difficult. Cometh the first drops of the rains, and there is prolific sprouting of the seeds that have been waiting to take roots since almost a year. There seem to be a sense of urgency as if they know that they do not have much time to grow, flower, and ensure that their seeds are dispersed well before they are razed to the ground as unwanted weeds ! For those few weeks, the walkways and the sides of the roads in IPR get a green cover, soon to be dotted with tiny but beautiful flowers. The only aim for these plants is to ensure that the soil is once again scattered with their seeds, which will once again go through the long wait till the next monsoons arrive. Thus the cycle of life continues, as it has always been since eternity !



- ♦ **Dr. Mukul Bhatnagar**, FCIPT, Institute for Plasma Research, Gandhinagar, gave a talk on "*Growth Dynamics and Plasmonic response of Silver nanoparticles deposited on nanodots/nanorippled templates*" on 25th January 2017
- ♦ **Ms. Akanksha Gupta**, Institute for Plasma Research, Gandhinagar, gave a talk on "*Shear flows in 2D strongly coupled fluids: A theoretical and computational study*" on 27th January 2017
- ♦ **Dr. Rakesh Moulick**, Centre of Plasma Physics-IPR, Sonapur, Assam, gave a talk on "*Formation of collisional sheath in multicomponent plasma*" on 27th January 2017
- ♦ **Ms. Surabhi Jaiswal**, Institute for Plasma Research, Gandhinagar, gave a talk on "*Nonlinear excitations in flowing complex plasmas*" on 2nd February 2017
- ♦ **Prof. H. Bailung**, Professor and Head, Physical Sciences Division, IASST, Guwahati, gave a talk on "*Ion Acoustic rouge waves in multicomponent plasma*" on 3rd February 2017 (Colloquium # 267)
- ♦ **Prof. G.P. Zank**, Eminent Scholar, Distinguished Professor and Director, Centre for Space Physics and Aeronomic Research, University of Alabama, Huntsville, USA, gave a talk on "*A Nearly Incompressible Description of Low-Frequency Turbulence*" on 7th February 2017 (Colloquium # 268)
- ♦ **Mr. Mangilal Choudhary**, Institute for Plasma Research, Gandhinagar, gave a talk on "*Experimental studies on collective phenomena in dusty plasmas*" on 8th February 2017
- ♦ **Mr. Avdhesh Kumar**, Physical Research Laboratory, Ahmedabad, gave a talk on "*On the Chiral Imbalance and Weibel Instabilities*" on 13th February 2017
- ♦ **Mr. Vara Prasad Kella**, Institute for Plasma Research, Gandhinagar, gave a talk on "*Ion-flow driven instabilities in sheath-presheath of low temperature plasma*" on 20th February 2017

### Upcoming Events

- ♦ Indo-Japan Accelerator School (IJAS 2017), Indian Institute of Technology Roorkee, 9-11 March 2017 <http://www.iitr.ac.in/ijas2017>
- ♦ 44th Institute of Physics Plasma Physics Conference, University of Oxford, United Kingdom, 3-6 April 2017 <http://plasma2017.iopconfs.org/home>
- ♦ IOP Nuclear Physics Conference 2017, University of Birmingham, Birmingham, 3-6 April 2017 <http://nuc17.iopconfs.org/home>
- ♦ 8th International Conference on the Frontiers of Plasma Physics and Technology (FPPT-8), Vina del Mar, Valparaíso, Chile, 3-7 April 2017 <http://www.fppt-series.org/>
- ♦ International Conference on Functional Materials, Characterization, Solid State Physics, Power, Thermal and Combustion Energy (FCSPTC-2017), Eluru, Andhra Pradesh, 7-8 April 2017 <http://www.fcsptc.org/>
- ♦ 2nd European Conference on Plasma Diagnostics (ECPD 2017), Bordeaux, France, 18-21 April 2017 <https://ecpd2017.sciencesconf.org/>
- ♦ 18th International Vacuum Electronics Conference (IVEC 2017), London, United Kingdom, 24-26 April 2017 <http://www.ivec2017.org/>
- ♦ Advanced and Novel Accelerators for High Energy Physics Roadmap Workshop (ANAR2027), CERN, Switzerland, 27-28 April 2017 <https://indico.cern.ch/event/569406/>

### Know Our Colleagues



**Mr. Hitesh Mehta** joined IPR in 1997 and initially held responsibilities as the caretaker of the Institute's students' hostel at Navrangpura and staff cottages at Rushwi Park, Ghatlodiya. Presently, he is handling different general administration portfolios like transport, IPR hostel, guest house and canteen. He is a multitasking person who involves himself in different activities of IPR in various capacities as and when required. He is an active member during special functions and activities like conferences, National Science Day etc. that are hosted by IPR from time to time. His major involvement in these functions relate to the logistics of transportation and accommodation of the participants of the event.

**Mr. Dinesh Nair**, joined the Institute in November 1997 in Administration Dept., and was initially associated with medical (CHSS) section, handling work related to processing of medical bills, appointment of new doctors/ hospitals, dependents' approval, first aid management, T.A. for interview candidates and matters relating to staff benevolent fund scheme etc. He moved to the Administration-I section recently where he is taking care of air travel, processing of housekeeping, air travel bills, contracts on casual labour and general maintenance. His areas of work also include annual staff property returns, assets and liabilities returns, CVO reports required by the DAE viz., details of vigilance, anticorruption, disciplinary, public grievances, parliament related and foreign visitors. Currently he is the general secretary of the IPR staff club for the term 2016-2017.



### The IPR Newsletter Team

Ritesh Srivastava	Tejas Parekh	Ravi A. V. Kumar	Priyanka Patel	Dharmesh P	Mohandas K.K.
Suryakant Gupta	Ramasubramanian N.	Chhaya Chavda	Shravan Kumar	Supriya N	Harsha Machchhar