

Issue 061
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The 4th State

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

New Canteen Building @ CPP-IPR

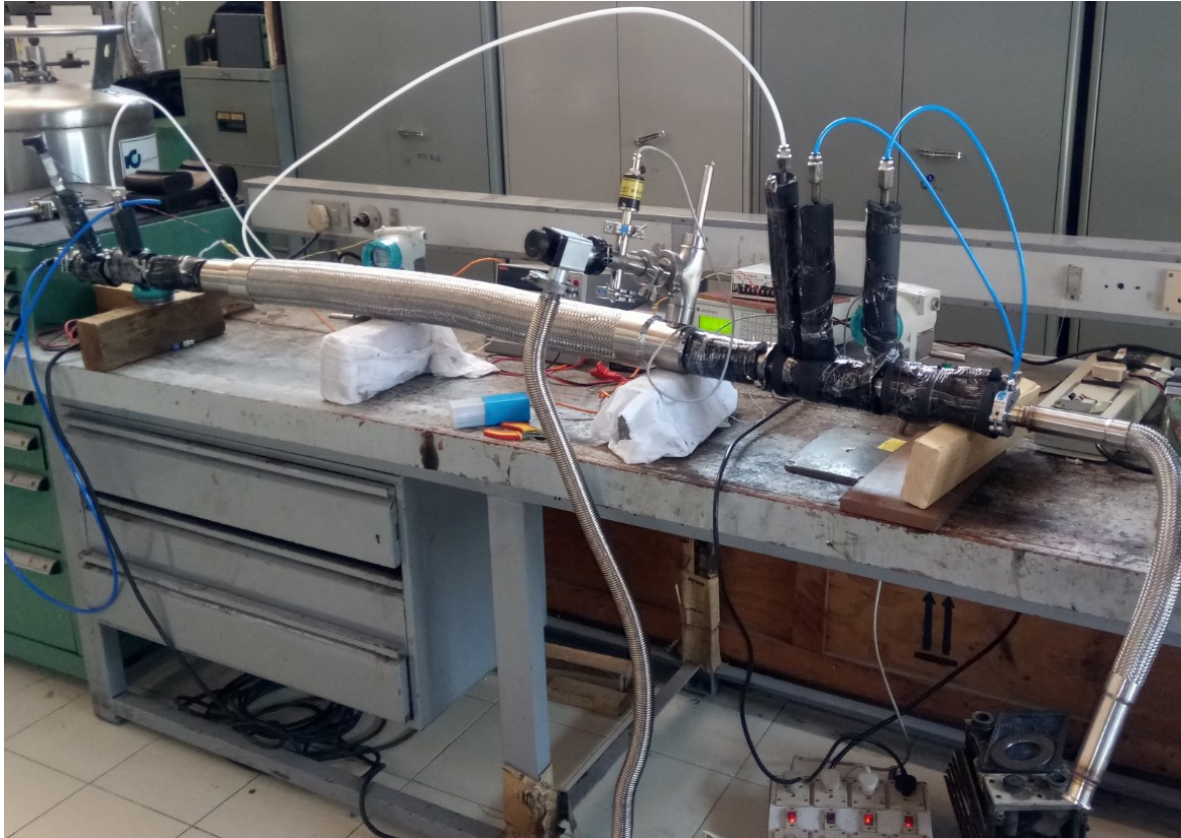
On 29th June, 2018, Prof. K. S. Goswami, Centre Director, CPP-IPR, formally opened the newly constructed canteen building in the presence of former Centre Director Prof. S. Bujarbarua and the employees, students and guests of CPP-IPR. The canteen started functioning in the new building from 2nd July, 2018.



View of the new canteen building



(L) Prof. Goswami opening the new canteen building (R) Prof. Bujarbaruah lighting the lamp during the opening.



Pressure drop and Flow measurement at 300 K and 77 K of Cryo Flexible Line

Continuing the task of undertaking in-house development of cryogenic flexible lines, the performance tests, namely, pressure drop, flow measurement and vacuum performance at pressure 1.0-2.0 bar (a), 300 and 77 K temperature have been carried out. From the test results, it was established that the pressure drop is 3-4 times in flexible corrugated line as compared to the straight pipe line. The maximum pressure drop obtained was 5.3 mbar in the 1 meter length transfer line. No vacuum degradation, leakage, frosting and condensation were observed in the line. The pressure drop and flow rate are found in acceptable range.

The development and performance test of similar line of bigger size and length is being continues. The performance tests have been carried out in MEL lab, IPR by Cryo crew.
Contributor : Rajiv Sharma, SST-1

Re-routing of LN2 Phase Separator Hydraulics of 80 K Distribution System of SST-1

During SST-1 experiment, leakage of liquid nitrogen was observed from the 80 K vent line of LN2 distribution system of SST-1. In order to prevent such leakages, analysis was done and an alternate routing of the hydraulics 80 K return paths to the inlet of 15 and 25 litre phase separators respectively were carried out. The tasks of fabricating the inner process pipe, vacuum barrier, grinding, cutting, assembly and welding has been carried out on-site under severe space constraint. The NDT examination (dye penetrant test) of weld joints, vacuum and helium leak performance tests have been carried out on-site and the results were found to be under acceptable limits. Contributor : Rajiv Sharma, SST-1



(L) Welding of 80 K Return Lines to LN2 Phase Separator (R) Dye penetration NDT test of the line

SPIDER (**S**ource for **P**roduction of **I**on of **D**euterium **E**xtracted from **R**adio Frequency plasma) is one of two test beds planned on the ITER Neutral Beam Test Facility in Padua, Italy under collaboration between Europe, India and IO. This is the world's largest negative ion source ever built. ITER-India has contributed the calorimeter and the acceleration grid power supply.

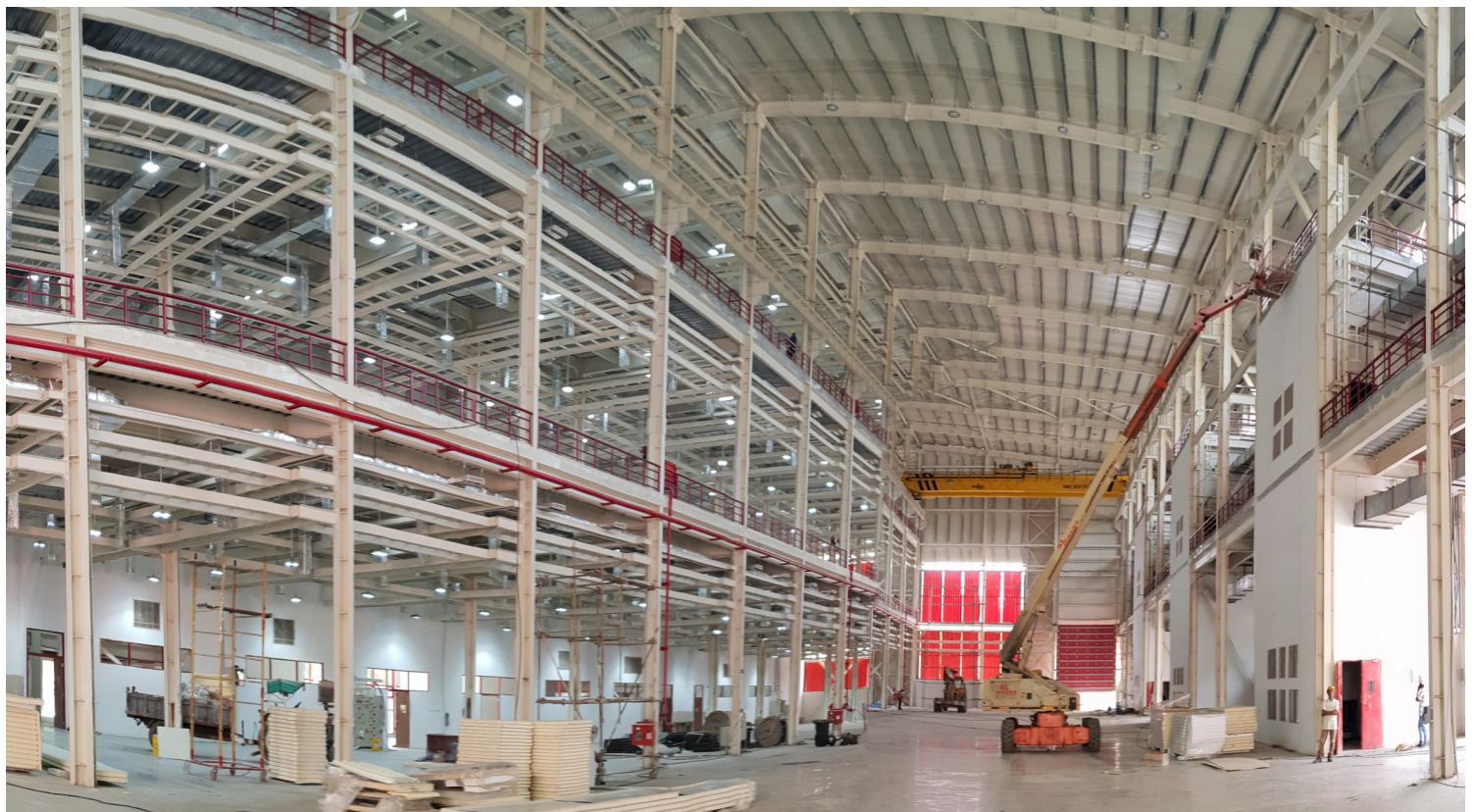
SPIDER was officially launched at the Consorzio RFX facility in Padua, Italy on 11 June 2018, with a successful plasma-generating experiment. In near future, this type of experiment will be run for longer periods to begin extracting negative ions. The knowledge generated from these experiments will be greatly useful for ITER.



Representatives of ITER Organization, Europe, India and industry at the inauguration of SPIDER.

IPR Infrastructure

In the Laboratory and Auxiliary Building at IPR campus, the work is nearing completion. Firefighting equipment works, Electrical and HVAC works, civil works, final painting, windows, cleaning and external development works are in the final stages of completion. The passenger lifts in the building have been installed and their operational license has been obtained from the competent authority. The roads surrounding the buildings are also now available for use.



The 4th 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 Gandhinagar during 21-22 June, 2018. 40 Physics teachers of high/senior school and junior colleges from the western states of Gujarat, Maharashtra, Rajasthan, Goa and Daman & Diu attended this training programme. The meeting was held at the Science City, Ahmedabad. The training programme was inaugurated by Shri Ravinder Gaur, DST and was presided over by Dr. Natottam Sahoo Member Secretary, GUJCOST, Shri S. D. Vora, Executive Director, Gujarat council of Science City, Shri. P. K. Atrey and Dr. Ravi A V Kumar from IPR. Apart from hands-on experiments, several models on plasma applications were also exhibited for the benefit of the participants.



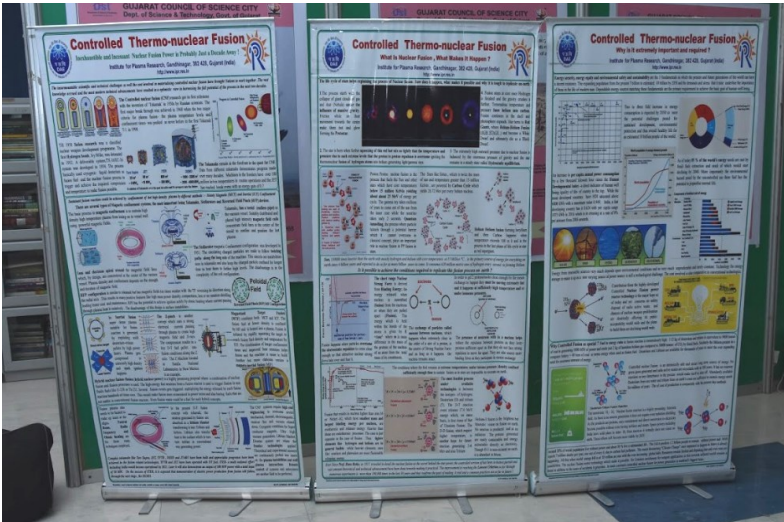
Inauguration of the programme by Shri Ravinder Gaur (DST)



Participants of the IPR-NCSTC training programme held at Gandhinagar



Demonstration of the Science Activity Kit



Exhibits and posters and training session in progress



Interactive hands-on training session in progress

Best Out Of Waste

Many glass light shades which are currently not in use were found in the scrap yard as a waste. These scrapped light shades are now being used as the pots for the ornamental plants. These "pots" now have been placed near the second security gate cabin. Our sincere thanks to Saroj Das, Chhaya Chavda and Paritosh Chaudhuri for coming up with this wonderful idea of reusing the scrapped lamp shades for beautification of IPR campus and to S. M. Patel for implementing their idea !



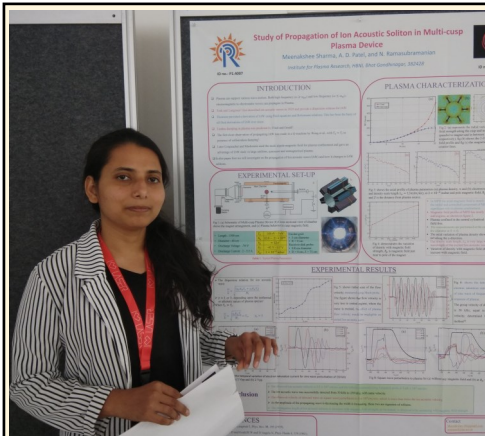
Name of the Institution	Date of visit	Number of visitors
Institute of Advanced Research, Gandhinagar	13-Jun-2018	19 students from MSc Physics
Nirma University, Ahmedabad	28-Jun-2018	32 students of ME (Cryogenics)
L D College of Engineering, Ahmedabad	09-Jul-2018	27 students of BE (Information Technology)
Government Engineering College, Gandhinagar	16-Jul-2018	40 students of Metallurgical Engineering
Swaminarayan Dham International, School (SDIS), Gandhinagar	20-Jul-2018	47 students of 11th and 12th standards.



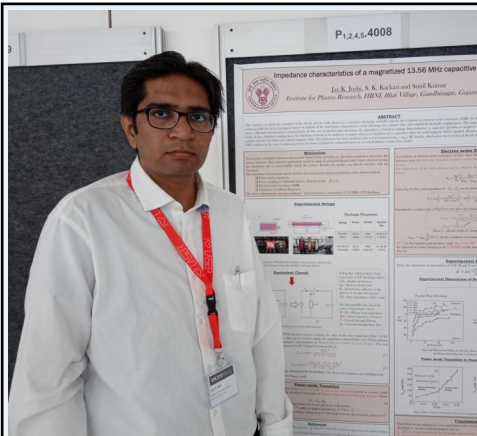
Students from the Institute of Advanced Research, Gandhinagar during their visit to IPR



Students from the IT department of L.D.College of Engineering College, Ahmedabad during their visit to FCIPT



Meenaskhee Sharma, PhD scholar attended the 45th European Physical Society Conference on Plasma Physics 2-6 July, 2018 at Prague, Czech Republic and presented a poster entitled "Study of Propagation of Ion Acoustic Soliton in Multi-cusp Plasma Device". She received the "Best Poster Award" for the same.

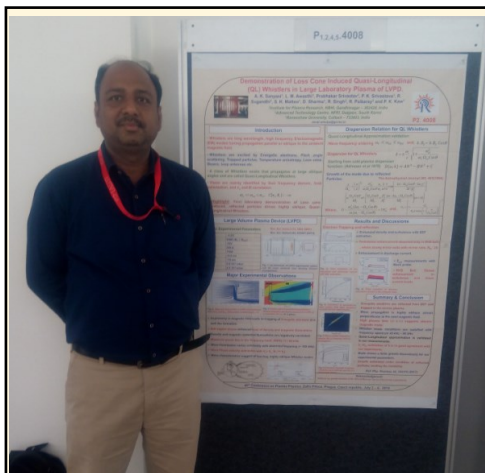


Jay K Joshi, PhD scholar attended the 45th European Physical Society Conference on Plasma Physics 2-6 July, 2018 at Prague, Czech Republic and presented a poster entitled "Impedance Characteristics of a magnetized 13.56 MHz capacitive discharge"



Avinash Kumar Pandey, PhD scholar attended the 45th European Physical Society Conference on Plasma Physics 2-6 July, 2018 at Prague, Czech Republic and presented a poster entitled "Using biased hairpin probe for determining negative oxygen ions in a double plasma device"

Alamgir Mondal, PhD scholar attended the 45th European Physical Society Conference on Plasma Physics 2-6 July, 2018 at Prague, Czech Republic and presented a poster entitled "Effect of ablation geometry on the dynamics, composition and geometrical shape of thin film plasma"



Amulya Sanyasi attended the 45th European Physical Society Conference on Plasma Physics 2-6 July, 2018 at Prague, Czech Republic and presented a poster entitled "Demonstration of Loss Cone Induced Quasi-Longitudinal (QL) Whistlers in Large Laboratory Plasma of LVPD."

Nature @ FCIPT



The lush green flora of FCIPT offers many opportunities to observe the various species of birds that are part of the campus. They live in harmony, and their joy is quite visible at times! Birds indeed are indicators of our environment. If they don't seem happy, something is seriously wrong! (Photos by Mukesh Ranjan)

Past Events @ IPR

- ◆ **Dr. Mayur Shukla**, CSIR-Central Glass and Ceramic Research Institute, Kolkata, gave a talk on "Joining of ceramic materials by microwave-assisted brazing" on 22nd June 2018
- ◆ **Dr. Mithun Karmakar**, Saha Institute of Nuclear Physics, Kolkata, gave a talk on "Excitation and Breaking of Non-linear Plasma Wave" on 06th July 2018
- ◆ **Dr. Sunil Rawat**, Institute for Plasma Research, Gandhinagar, gave talk on "(i) Molecular dynamics simulations for the primary state of damage in tungsten single crystals, and (ii) Probe voltage due to the driver coil and eddy current loops in a conducting plate on 11th July 2018
- ◆ **Mr. Aritra Chakraborty**, Institute for Plasma Research, Gandhinagar, gave a talk on "Design of High Power and High Frequency Inverter Based Power Supply for Particle Accelerators" on 16th July 2018
- ◆ **Dr. Madhusudan Raghunathan**, Swiss Plasma Center, EPFL, Lausanne, Switzerland, gave a talk on "Exploring 3D Ideal Geometric Effects on Bootstrap Current and Impurity Accumulation" on 20th July 2018
- ◆ **Dr. Subrata Pradhan**, Institute for Plasma Research, Gandhinagar, gave a talk on "Magnetic Field Controlled Delivery of Drugs Being Adsorbed Onto Porus Nano-Structures" on 25th July 2018
- ◆ **Mr. Arghya Mukherjee**, Institute for Plasma Research, Gandhinagar, gave a talk on "Study of The Breaking of Relativistically Intense Longitudinal Waves in a Homogeneous Plasma" on 26th July 2018

- ◆ 7th International Conference on Mathematical Modeling in Physical Sciences (IC-MSQUARE-2018), August 27-31, 2018, Moscow, Russia. <https://icmsquare.net/>
- ◆ 22nd International Conference on Gas Discharges and their Applications (GD2018), Novi Sad, Serbia, 2-7 September 2018. <http://gd2018.ipb.ac.rs/>
- ◆ 16th International Symposium on High Pressure Low Temperature Plasma Chemistry (HAKONE 2018), Beijing, China, 2-7 September 2018. <http://hakone.csp.escience.cn/dct/page/1>
- ◆ 6th International Symposium on Negative Ions, Beams and Sources (NIBS'18), Budker Institute of Nuclear Physics SB RAS and Novosibirsk State University, Russian Federation, 3-7 September 2018. <http://indico.inp.nsk.su/event/11/>
- ◆ 19th International Conference on the Physics of Highly Charged Ions (HCI 2018), Lisbon, Portugal, 3-7 September 2018. <http://hci2018.pt/>
- ◆ 25th International Conference on High Resolution Molecular Spectroscopy (HRMS 2018), Bilbao, Spain, 3-7 September 2018. <http://www.chem.uni-wuppertal.de/conference/>
- ◆ Quantum Effects in Small Molecular Systems: Faraday Discussion, Edinburgh, UK, 10-12 September 2018. <http://www.rsc.org/events/detail/26107/>
- ◆ International Conference and School on Plasma Physics and Controlled Fusion (ICPPCF-2018), Kharkov, Ukraine, 10-13 September 2018. <https://www.kipt.kharkov.ua/conferences/ipp/2018/>
- ◆ 7th Euro-Asian Pulsed Power Conference with 22nd International Conference on High-Power Particle Beams, Changsa, China, 16-20 September 2018. <http://www.eappc-beams2018.org/>
- ◆ 30th Symposium on Fusion Technology (SOFT 2018), Sicily, Italy, 16-21 September 2018. <https://www.soft2018.eu/>

Know Our Colleagues



Mr. Kirit M Parmar, an electrical engineering graduate from L D College of Engineering, Ahmedabad, joined IPR in 2001 with the RF group. He has handled high voltage and high current power supplies required for the RF group, including high power ICRH, LHCD and ECRH divisions and is presently associated with the ICRH division. He has extensive experience with 11kV voltage variation systems up to 2MVA and HVDC supplies up to 60kV, 10A. He has designed and developed power supplies up to 7.5kV DC, 6A for triode based CWRF amplifiers and has characterized and revamped $\pm 650A$, 225V Fast Ferrite Tuner Power supply for the DST 42 GHz, 200kW Gyrotron. He is also involved in development of 4.5MW, 3s, 30kV Resistive dummy load, Ignitron based fast operating crowbar protection system for RF and microwave tubes, design and development of IGBT based high voltage DC series switch to be used in protection of triode and tetrode based RF amplifiers. He has guided graduate and under-graduate students for academic projects. He has been an associate in developing a novel technology which is in the process of receiving Indian Patent now.

Mr. Praksah S Bhawankar joined the Institute in 2001 in Aditya Vacuum Group. He was responsible for UHV testing, installation, commissioning and routine operation and maintenance of vacuum pumps and various UHV components installed in Aditya Tokamak. He was instrumental in setting up a test-stand facility for UHV and outgassing measurement of in-vessel diagnostic subsystems which were to be tested before installation in Aditya vacuum vessel. Also involved in the optimization of ECR discharge cleaning and contributed to automation of glow discharge cleaning (GDC) process. From 2004 he has been part of Aditya operation division where he helped prepare Aditya machine for plasma shots. He has worked in error magnetic field measurements in Aditya machine and installed in-vessel magnetic diagnostic such as Mirnov and Diamagnetic. He has made significant contribution in design, calibration, data analysis and successful installation of Cosine and Sine coils which are used for horizontal and vertical measurements respectively in Tokamak plasma. Currently he is associated with the Analytic Division, working on image pre-processing which are being used to train their deep learning models.



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