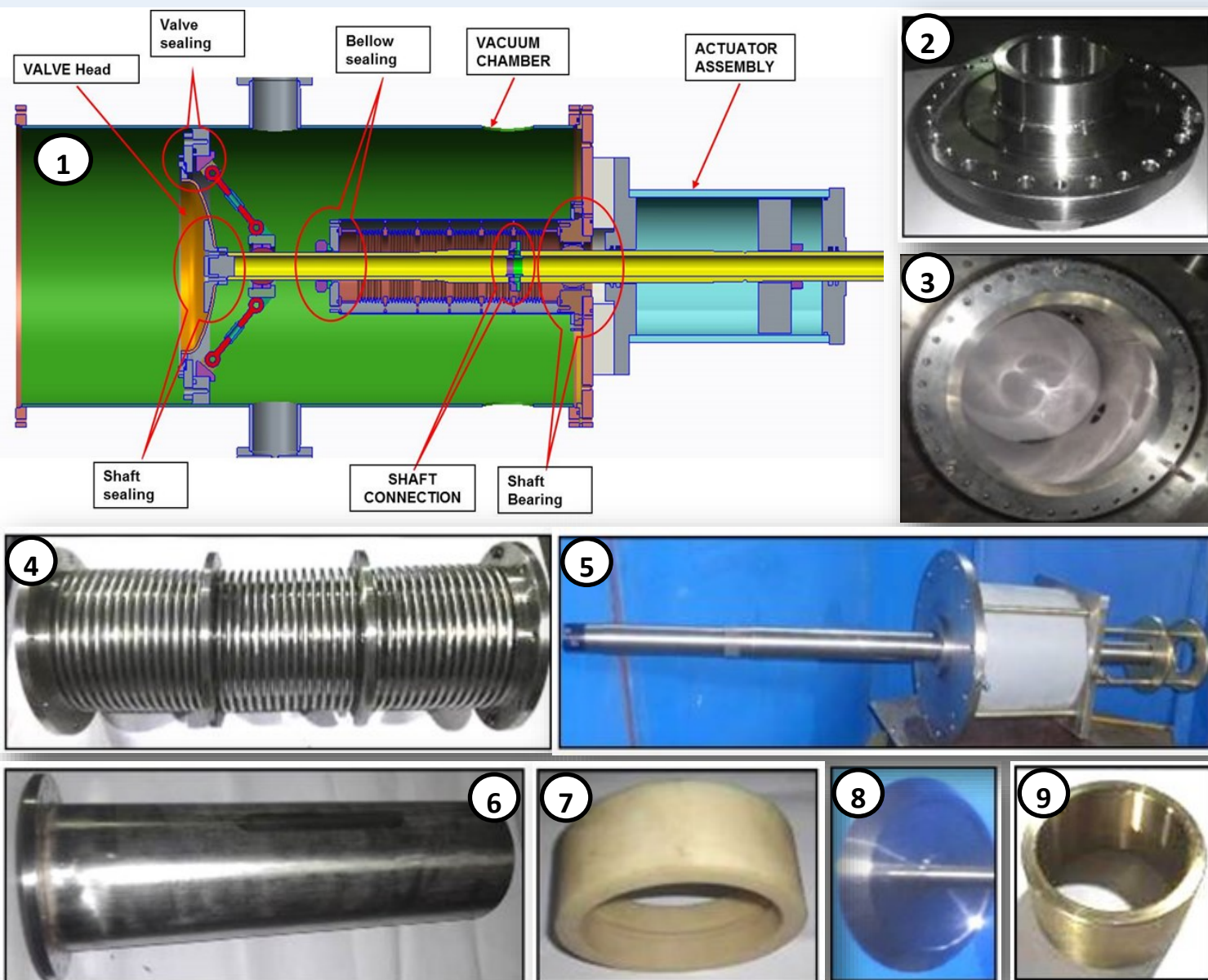


Indigenous Development of Axial Valve for Cryo-Pump

The Cryopump and Injector Division group at IPR has been engaged in the development of technology for isolation of cryopump from the tokamak during regeneration and other maintenance activities. The cryopump is essentially a gas entrapment device which works on the principle of cryo-adsorption of gases at their sub-boiling temperature. Over a time period, the pumping capacity of the cryopump reduces mainly due to the saturation in the sorbent's adsorption capacity. In such an event, the cryopump needs to be regenerated. During this process, all the entrapped gases are released from the sorbent and pumped out by means of a suitable mechanical device such as turbomolecular and a roughing pump.

During this activity, in order to avoid migration of gases from the pump back into the vacuum chamber, a suitable valve needs to be positioned between the vacuum chamber and the cryopump. Development of this valve is being carried out at IPR. The functional requirement of system is as follows: (1) UHV compatible & compact in size (2) Thermally stable (Drastic Temperature regime:- 80 K or below on pump side and up to ~ 450 K on tokamak side) (3) Number of cycles of operation, at least ~5000 with minimal maintenance. (4) RAMI (Reliable, Accessible, Maintainable and Inspectionable).



Fabricated components of the axial valve : (1) Schematic of the axial valve (2) Bellow mounting adapter (3) Seal mounting flange (4) Bellows (5) Pneumatic actuator assembly (6) Bellow guiding cylinder (7) Guide for bellow (8) Valve (9) Bush

Advanced B.Sc. Course

Like in the previous years, Vikram A. Sarabhai Community Center, Ahmedabad and Gujarat Science Academy is organizing the Advanced B.Sc. Programme during 13th May – 4th June. This programme is meant for the B.Sc.(Physics) Second year students of the colleges of Gujarat state. It is presently a residential programme for about 21-25 days during the summer vacation and is being hosted by St. Xavier's College, Ahmedabad. This programme is funded by GUJCOST and supported by IPR and PRL. IPR encourages its faculty and students to participate in the programme as resource persons. One of the scientists from IPR is working as one of the directors of the programme. Mathematical Physics, Electro-Magnetic theory and Quantum Physics are main topics covered in the programme apart from a hands-on experiments under the guidance of scientists of IPR/PRL. During this program, the participants visited IPR, PRL, SAC, VASCSC and Gujarat Science City. Over the years, due to this programme, awareness about the possibilities of a fruitful career in physics has improved in Gujarat, which has resulted in many of the students who attended this program opting for physics as career. Some have joined IPR and PRL, and some have qualified for M.Sc. courses of IITs and IISERs.



The participants of the Advanced BSc Programme during their visit to IPR on 20th May, 2017

IPR Divisions & Groups - Neutral Negative Ion Beam (NNB) group

The Neutral Negative Ion Beam (NNB) group activities may broadly be classified into (i) ROBIN (ii) Twin Source, (iii) Indian Test Facility (INTF) and (iv) the related R&D experiments. Group has set up the 100 kW RF power based -ve ion source experiment test bed ROBIN with a Cesium source capable of delivering 35 kV/6 A ion beam of H⁻, ~30 mA/cm² power density. ROBIN is presently operational and H⁻ beams have been extracted at 27 mA/cm², with electron to ion ratio of ~1. The two driver based Twin Source powered by a single 1 MHz, 180 kW RF generator has the objective of understanding the physics and technology of multi-driver coupling. Plasma of density ~ 10¹⁸ m⁻³, in a volume of ~ 0.5 m³ chamber is expected from this experiment from which ~ 10 – 12 A of negative hydrogen ion current @ 40 kV could be extracted. The Indian Test Facility, INTF is being setup to characterise the large ion source for ITER and provide support for Diagnostics of neutral beam, by testing the performance of components as per the agreement with ITER organization. The Group has also developed materials and major technologies within the country for the Beam Line Components (BLC) in collaboration with NFTDC.



(Sitting: L-R) Parmar Kanubhai, Mistri Hiren, Soni Jignesh, Chakraborty Arun Kumar, Gahlaut Agrajit

(Standing L-R) Sharma Dheerajkumar, Prajapati Bhavesh, Sonara Jashwant, Panya Kaushal, Vuppugalla Mahesh, Patel Kartik, Pandey Ravi.

The Green Man of IPR

In 2014, when the Newsletter first reported the efforts of Mr. Raj Singh in planting saplings and nurturing them, little did we think that today, after three years, those saplings would have survived. But as we can all see, as one drives along the ring road near the Gujarat University grounds in Vastrapur, a stretch of healthy and green trees lining the street. Mr. Raj Singh's trees are now landmarks not only in physical terms, but as a symbol of what one can do for the city and environment. He has planted hundreds of trees all over the city, most of which he tries to nurture into majestic trees. To know how he manages to do it, one has to be with him in the evening on his way back home from work. Before leaving office, he loads his car with canisters of water which he then uses to water those saplings. The newsletter wishes to applaud Mr. Raj Singh for his continuing efforts in greening the city and for by setting a fine example to others by doing so.



Top-Left : An image from 2014 when the saplings were planted. The other images show what those saplings look like today.

Anti-Terrorism Day @ IPR

Every year May 21 is observed as Anti-Terrorism Day to wean away the youth from terrorism and the cult of violence by highlighting the suffering of common people and showing as to how it is prejudicial to the national interest. A "Pledge-taking" ceremony in observance of Anti-Terrorism Day was held near Administrative Building, IPR on 19th May 2017 as 21st May 2017 was a closed holiday. Dr. Shashank Chaturvedi, Director, IPR administered the pledge to all the employees.



(L) Director Dr. Shashank Chaturvedi administering the pledge to IPR staff present during the ceremony. (R) view of the IPR staff present.

राजभाषा कार्यान्वयन समिति, आईपीआर द्वारा संस्थान की गतिविधियों पर हिन्दी में प्रस्तुति करने के उद्देश्य से हिन्दी सेमिनार का आयोजन हर साल किया जाता है। इस वर्ष 12 मई, 2017 को आयोजित हिन्दी सेमिनार में वैज्ञानिक/तकनीकी एवं सामान्य प्रशासनिक विषयों पर स्टाफ सदस्यों द्वारा विविध छः विषयों पर पावर पॉइंट प्रस्तुति दी गई। प्रस्तुतिकरण के दौरान प्रश्नोत्तरी प्रतियोगिता रखी गई जिसमें श्रोताओं ने उत्साह से भाग लिया। कंप्यूटर केन्द्र द्वारा सेमिनार की वीडियो रिकॉर्डिंग की गई। डॉ. सूर्यकांत गुप्ता एवं श्रीमती छाया चावडा ने इस सेमिनार के प्रस्तुतिकरणों का मूल्यांकन किया। प्रशासनिक/सामान्य प्रस्तुति के अंतर्गत श्री सुनिल मिसाल को प्रथम एवं श्री पी.के.आत्रेय को द्वितीय पुरस्कार दिया गया एवं तकनीकी/वैज्ञानिकी प्रस्तुति के अंतर्गत श्री कनुभाई परमार को प्रथम, श्री नितीन बैरागी को द्वितीय, श्री भरत दोशी को तृतीय एवं श्री राजीव शर्मा को प्रोत्साहन पुरस्कार दिया गया। समापन समारोह में पिछले सत्र में हिन्दी परीक्षा (प्रवीण) उत्तीर्ण करने वाले सदस्यों को प्रमाणपत्र वितरित किये गये। सेमिनार के दौरान आयोजित प्रश्नोत्तरी प्रतियोगिता के विजेताओं को भी पुरस्कार प्रदान किये गये।

क्रम.सं	प्रतिभागियों के नाम	विषय
1	भरत दोशी	टोकामक संलयन के अलावा नाभिकीय संलयन प्रौद्योगिकी के अन्य विकल्प पर एक अद्यतन (An update on alternate Fusion Technologies: other than Tokamak)
2	राजीव शर्मा	अतिचालक चुम्बकों के लिए न्यूट्रॉन प्रतिरोधी स्वदेशी इन्सुलेशन संयंत्र का विकास (Development of indigenous insulation material for superconducting magnets under influence of intense neutron irradiation)
3	सुनिल मिसाल	अचल सम्पत्ति का रीटर्न कैसे भरें? (How to file Immovable property return)
4	कनुभाई परमार	रॉबिन के लिए शक्ति आपूर्ति प्रणाली (Power Supply System for ROBIN)
5	प्रवीण कुमार आत्रेय	जीतने की आदतें (Winning Habits)



The construction work of the Laboratory & Auxiliary building is moving fast towards completion. In the Auxiliary Building, the construction work is nearing completion. Aluminum windows, control room partition, painting and other finishing works as well as electrical works is in progress. In the Laboratory building, major structural steel work has been completed and currently, the staircases and roof gutter structural works are in progress. RCC and Tremix flooring works on +0.00 level, +7.75 m level, +15.50 m level have been completed. Painting, brick work & plaster, Kota stone flooring works are in progress. HVAC ducting and pipe line work, fire fighting pipe line works are also being carried out. The materials for the two lifts have been received at site.



(L) Inside the auxiliary building showing the control room partition. (R) The cooling stations outside the auxiliary building.



(L) Inside the Laboratory building showing the main structure. (R) The completed Tremix flooring of the laboratory building.



(L) The transformer bays in the auxiliary building. (R) Erection of Roof Purlins and side runners in progress in the laboratory building.

IPR @ Meetings

Ms. Harshita Raj, Research Scholar from Aditya Group attended the 9th ITER International School Physics of disruptions and control (IIS-2017) which was held during 20-24 March, 2017 at Cadarache, France. She also presented a poster entitled "Observation of multiple MHD modes in Aditya upgrade Tokamak" during the school.



Infrastructure Development - Neutronics Laboratory

The construction of the Neutronics laboratory building has been started. Located at the western corner of the IPR campus, this radiation safety building having a footprint of 33.25x18.6m and built over a total area of ~ 900sqm will house the neutron sources at IPR. This two floor building has a radiation safety vault (neutron generator hall) of area of 15x15m which has 1.5 meter thick RCC wall and 0.5m thick slab for radiation shielding purpose.



3D visualization of the Neutronics Laboratory building



The construction of the Neutronics Laboratory : (L) Footing steel work (R) PCC work in progress

हिन्दी वक्तव्य की श्रृंखला में 24 मई, 2017 को श्री हृदेश कुमार शर्मा, लेखा अधिकारी-11 द्वारा "अनुसंधान संस्थाओं में प्रशासनिक अधिकारियों की भूमिका" - विषय पर वक्तव्य दिया गया। श्री शर्मा जी ने अपने वक्तव्य में अनुसंधान संस्थाओं में प्रशासनिक अधिकारियों की भूमिका इंजन में ईंधन के समान होती है- इस बारीक विषय पर ध्यान आकृष्ट किया। विज्ञान संबंधी अधिकारियों/कर्मचारियों को प्रशासन संबंधी व्यवस्था से अवगत कराना आवश्यक है, तभी संपूर्ण प्रबंधन व्यवस्था सुचारु रूप से चल सकती है - इन सभी बिंदुओं पर उन्होंने विस्तार से चर्चा की और श्रोताओं की शंकाओं का समाधान किया।



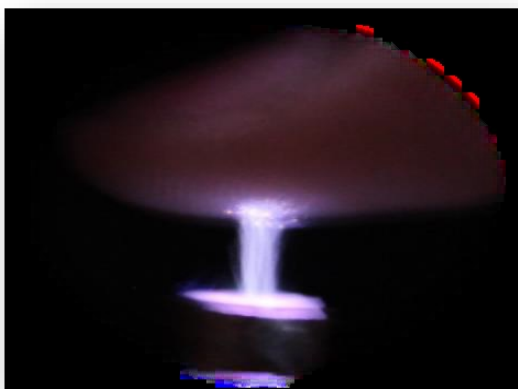
वक्तव्य प्रस्तुत करते हुए श्री हृदेश कुमार शर्मा

धन्यवाद देते हुए श्री राजसिंह

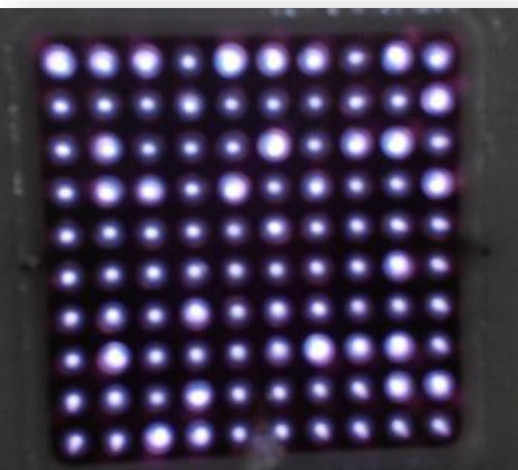
प्रो. काव द्वारा भेंट प्राप्त करते हुए
श्री हृदेश कुमार शर्मा

Biomedical Applications of Atmospheric Pressure Plasma Jet

Facilitation Center for Industrial Plasma Technologies (FCIPT), has developed state-of-the-art atmospheric pressure plasma jets using dielectric barrier discharge. The plasma jet so formed can be touched with bare hands and one of the major applications envisaged is in the area of bio-medical applications. Besides this, an atmospheric plasma jet array was also developed for the surface modifications of larger areas. These plasma jets find applications in the areas of biomedical, agriculture, textiles etc. This technology developed by FCIPT has been transferred to an industrial partner in Ahmedabad for possible commercial exploitation.



(L) Single plasma jet (R) Catheter jet for biomedical applications



(L) Multiple jet array for large area applications (R) Catheter jet being used for treatment of *Tinea Cruris* (fungal skin infection).

Salient Features

- ◆ Plasma apparatus is portable
- ◆ Operates on 24 V batteries
- ◆ Gas used = Argon
- ◆ Flow rate = 25-30 LPM
- ◆ Frequency = 25-55 kHz
- ◆ Power = 2.5W

Applications

- ◆ Can be used for coagulation of blood for emergency situations.
- ◆ Can be used for certain skin diseases.
- ◆ Have potential in the treatment of cancer.
- ◆ Can be used for the removal of pesticides from vegetables.
- ◆ Can be used for the treatment of seeds to enhance their germination rate.
- ◆ Can be used to enhance surface properties of the polyester.
- ◆ Catheter Jet for invasive applications.

- ♦ **Dr. Girjesh Gupta**, Inter-University Centre for Astronomy and Astrophysics, Pune, gave a talk on "Role of MHD waves and small-scale transients in the heating of solar corona" on 4th May 2017
- ♦ **Ms. R. S. Joshi**, FCIPT, Institute for Plasma Research, Gandhinagar, gave a talk on "Diagnostics of Electrostatic Discharges and Postulations for Arc Mitigation Techniques on Satellite Solar Panels" on 4th May 2017
- ♦ **Prof. Raghavan Rangarajan**, Physical Research Laboratory, Ahmedabad, gave a talk on "Gravitinos, Reheating and the Matter-Antimatter Asymmetry of the Universe" on 4th May 2017 (Colloquium # 271)
- ♦ **Dr. Bidyut Kumar Das**, ITER-India, Institute for Plasma Research, Gandhinagar, gave a talk on "Laser photo-detachment based negative ion diagnostics development - Status update" on 8th May 2017
- ♦ **Mr. Modhuchandra Laishram**, Institute for Plasma Research, Gandhinagar, gave a talk on "Dynamics of a confined dust fluid in sheared flow of streaming plasma" on 9th May 2017
- ♦ **Dr. Abhishek Atreya**, Physical Research Laboratory, Ahmedabad, gave a talk on "The Cosmic Fluid: Chiral Instability and all that" on 11th May 2017
- ♦ **Ms. Bhumika Thakur**, Institute for Plasma Research, Gandhinagar, gave a talk on "The study of the dynamics of delay coupled nonlinear oscillators and some model applications" on 22nd May 2017

Upcoming Events

- ♦ Plasma Physics by Laser and Applications (PPLA 2017), Messina, Italy, 5-7 July 2017. <http://www.ppla2017.it/>
- ♦ International conference on Phenomena of Ionized Gases (ICPIG-2017), Lisbon, Portugal, 9-14 July 2017 <http://icpig2017.tecnico.ulisboa.pt/>
- ♦ 12th International Workshop on Non-neutral Plasmas (NNP-2017), Lawrence University, Wisconsin, USA, 10-13 July 2017 <https://www.lawrence.edu/s/nnp17>
- ♦ 30th International Vacuum Nanoelectronics Conference (IVNC-2017), Regensburg, Germany, 10-14 July 2017 <http://www.vacuumnanoelectronics.org/>
- ♦ 25th International Symposium on Ion-Atom Collisions (ISIAC), Palm Cove, Queensland, Australia, 23-25 July 2017 <http://atom.curtin.edu.au/isiac/>
- ♦ 30th International Conference on Photonic, Electronic and Atomic Collisions (ICPEAC 2017), Cairns, Australia, 26 July - 1 August 2017 <http://icpeac30.edu.au/>
- ♦ 23rd International Symposium on Plasma Chemistry (ISPC23), Montreal, Canada, 30 July - 4 August 2017 <http://ispc23.com/>
- ♦ High Energy Density Science Summer School, La Jolla, California, USA, 30 July - 11 August 2017 <https://goo.gl/>

Know Our Colleagues



Mr. Rambabu Sidibomma, an M.E from LD Engineering College Ahmedabad, joined IPR as a technical trainee in 1997 and later on in the NBI group where he designed Cooling Water Distribution System, resolved the NBI interface issues with SST-1 machine and undertook review of FEA analysis and fabrication of the Vacuum Vessel. He was with ITER-IO for 5 years in 2008 and contributed in structural analysis of PF coil support and the thickness, curvature and slope optimisation by parametric study. He also contributed with design inputs for modification of support structures and material selection and received hands on experience in writing macros for geometry creation/correction/modifications etc. and in running batch mode solutions for the given loading cycle and linear and non-linear structural analysis. He re-joined NBI After his stint at ITER and his latest works include design and fabrication of Beam Transmission Duct, Shine-Through Armour and support structure for 50 Tonnes Vacuum Vessel for dead and seismic loads. He has designed and developed a methodology for lifting the 25 Tonne Vacuum Vessel and loading it on to SSNBI in confined space. His areas of interests include design of heat transfer and mechanical systems by analytical calculations and analysis using ANSYS software.

Mr. Pinakin Kantilal Leuva joined the drafting section of the Institute in 1998. He has contributed extensively for SST-1 preparing design layouts and schematics, detailed engineering drawings and 3D models in CATIA for different subsystems like LHCD, NBI and also other systems like LVPD. His work included checking interfaces with other sub systems and diagnostics, documentation and record keeping and the bills of material. He has received training in Designer-B & Designer-A (ENOVIA) Conducted by the ITER INDIA. He had been to ITER IO France for three months in 2013 working on cooling water systems and also got an opportunity later as a CAD Technician in 2015 at its Central Integration Office where he had the rich work experience in Systematic Methodology of IO Standards with ENOVIA and CATIA 3D Models. He received training for equipment & system and was successfully certified on the use of CATIA V5 equipment & system modules for plant design under the ITER IO environment.



The IPR Newsletter Team

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