Issue 085

August 2020

The Fourth State

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

Final Shipment of ITER Cryostat Modules

The ITER Cryostat, an In-Kind Contribution to ITER from India, is a large stainless vessel (nearly 30 metres each in diameter and height) and weighing almost 3850 tons, which will be the largest vessel of its kind when fully built. The manufacturing of ITER Cryostat is in 4 major sections viz. Base Section, Lower Cylinder, Upper Cylinder and Top Lid – which are further manufactured in sectors in India and sub-assembled at the on-site workshop at ITER site, France. The Base Section, Lower Cylinder and Upper Cylinder have been completed and delivered to ITER, of which, the Base Section (1250 tons), the heaviest single component of ITER machine, has also been installed in May 2020. The manufacturing in sectors of the 4th and last section of ITER Cryostat, i.e. The Top Lid has been completed at L&T Heavy Engineering, Hazira. This marks the end of manufacturing activity for ITER Cryostat on Indian soil and successful demonstration of heavy engineering/manufacturing of its kind. A ceremony to recognize this important milestone and to flag-off the shipment was held at L&T Hazira on 30th June, 2020 with limited physical attendance and larger attendance globally with remote connection. The occasion was graced over video by Dr. V.K. Saraswat (Member-NITI Aayog), Dr. Bernard Bigot (DG-ITER), Dr. K.N. Vyas (Secretary DAE and Chairman AEC), Shri A.M. Naik (Group Chairman-L&T), Sh. S N Subrahmanyam (CEO & MD, L&T), Shri S.K. Sharma (CMD, NPCIL), Dr. Shashank Chaturvedi (Director-IPR), team members of ITER-India, IPR, ITER Organization, L&T and collaborating agencies.



(L) Dr. V. K. Saraswat, NITI Aayog (M) Shri S N Subrahmanyan CEO, L&T (R) Shri A. M. Naik, Group Chairman, L&T



(L) Dr. Bernard Bigot, ITER France, (M) Shri K. N. Vyas (Secretary DAE and Chairman AEC), (R) Shri Ujjwal Baruah


(L) Dr. Shashank Chaturvedi (M) Shri Baruah receiving the memento from L&T and breaking the traditional coconut to mark the flagging off event

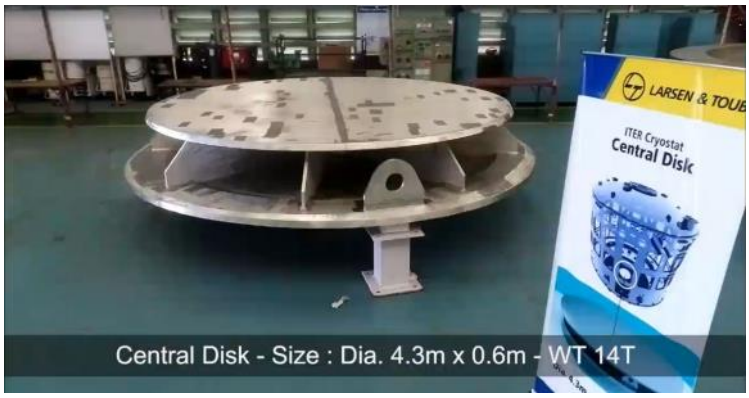
Final Shipment of ITER Cryostat Modules… Continued

The event recognized the challenges and achievements in the journey towards the realization of the Cryostat project. The 12 Top Lid main sectors and other components, weighing a total of 650 tons, will be shipped soon to ITER site involving complex logistics for shipment of such heavy items.

On reaching ITER site, the top lid sectors will be further assembled/welded/tested at the on-site workshop to complete the fourth and final subassembly (Top Lid) of ITER Cryostat, further to the already completed Base Section, Lower Cylinder and Upper Cylinder.

(L) The top cover of the cryostat (R) Components ready to roll out of the shop floor.

(L) Cryostat components ready for shipping (R) On the way to flagging off the final shipment



(L) Central disk of the cryostat (R) Top lid sectors ready for shipment

(L) Shri Ujjwal Baruah and Shri Arun Chakraborty cutting the ribbon to mark the flag off (R) Flagging off the final shipment

Visit of Gujarat Education Minister to IPR

Shri Bhupendrasinh Chudasama, Honourable Minister of Revenue, Education (Primary, Secondary and Adult), Higher and Technical Education and Law and Parliamentary Affairs, Government of Gujarat, visited IPR on 15 July, 2020. He held discussions with Director IPR and despite his busy schedule, he made a quick visit to IPR's 1 Petaflop High Performance Computing Facility ANTYA, the Aditya-U tokamak where he saw a live shot, and a short visit to the SST-1 tokamak Hall.


(L) Shri Chudasama at IPR (R) At the Computer Center

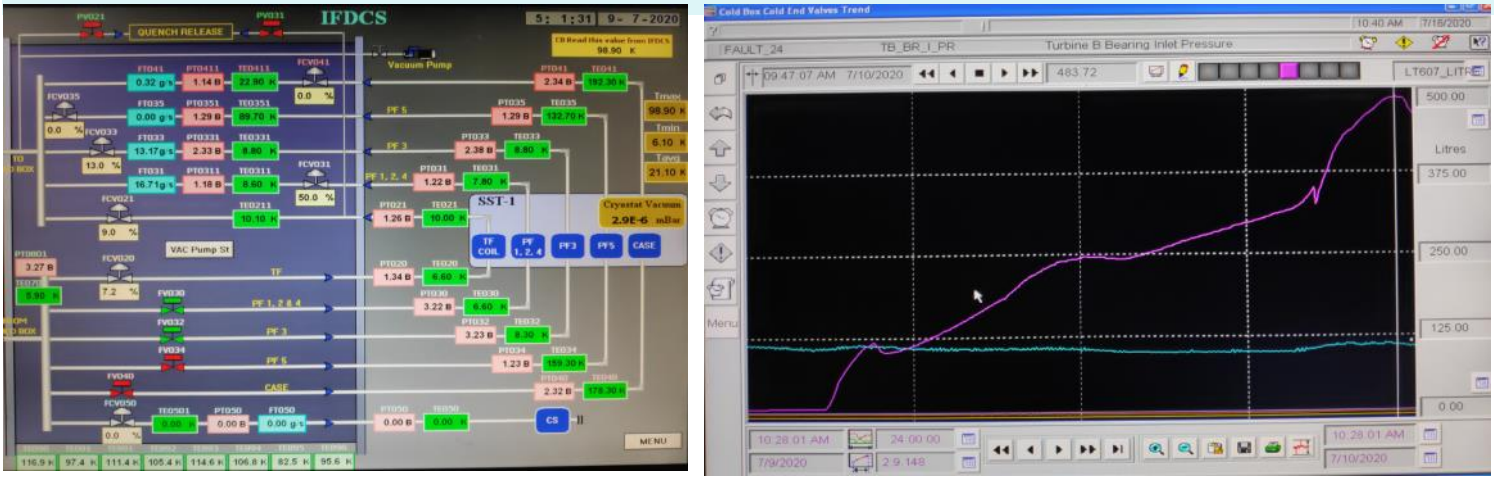

(L) Visiting the SST-1 Tokamak (R) Visiting the Aditya Tokamak


Shri Chudasama observing the Aditya operations


(L) Shri Chudasama and Director, IPR at Aditya control room (R) Shri Chudasama leaving IPR after the visit.

Cooldown for SST-1 Campaign

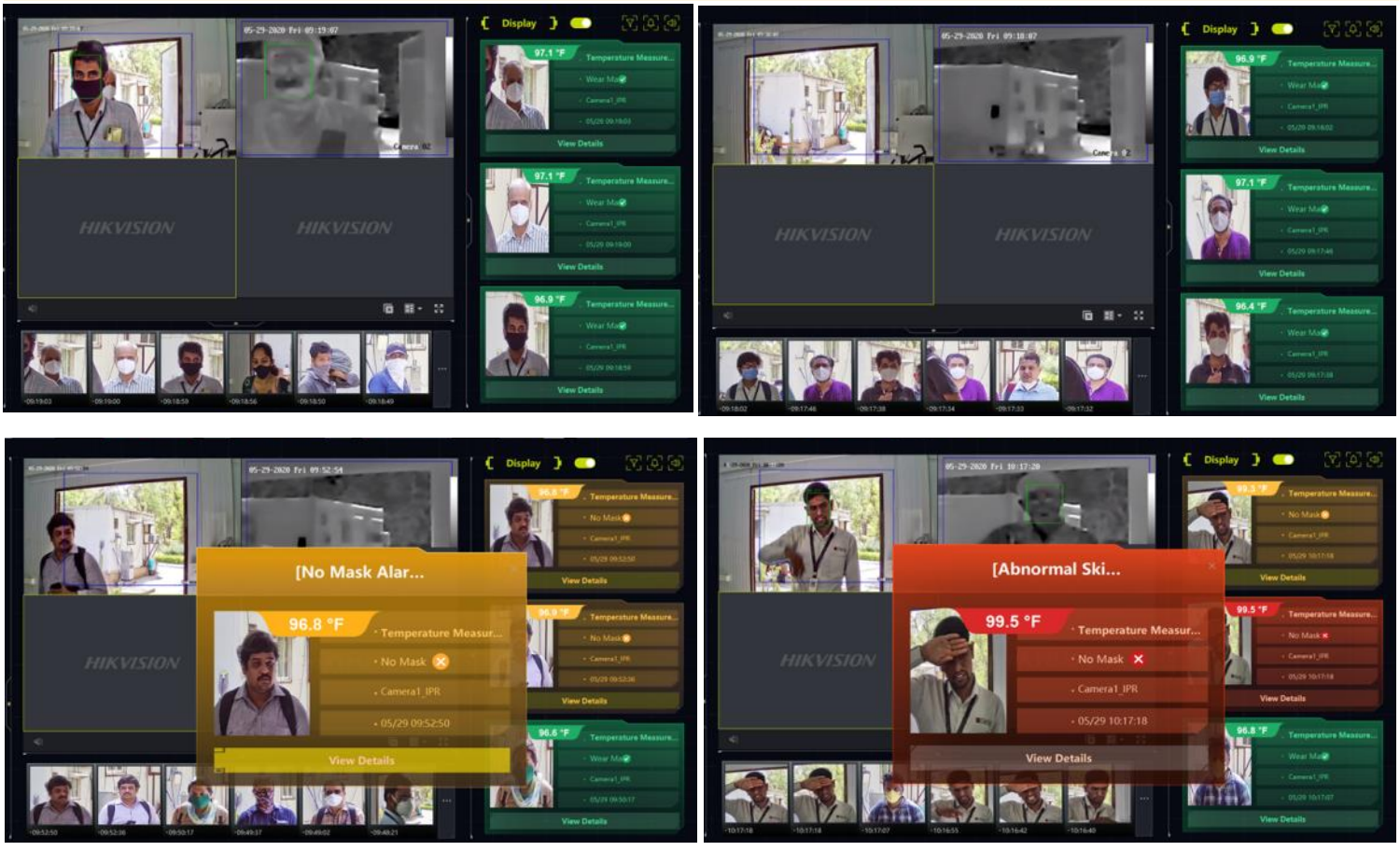
During June-July 2020, the SST-1 Cool down and Plasma Experiment campaign has been carried out. The mandate of this specific campaign was to energize the PF-3 coils under in-house realized power supplies and additional 02 (Two) (+/-) pair of current leads. Simultaneous cool down of SST-1 cold mass have been shown and finally superconducting state in the TF as well as PF-3 coils were achieved along with liquid helium yield of about 40-50 l/h obtained for the safe operation of the current leads. This was first time attempt to energize the PF-3 superconducting coils and in a step 100 A, 200 A, …up to 600 A current were charged and validated in the PF-3 coils at the ramp rate of 1 kA/s. During this campaign, the vacuum of the vacuum vessel as well as Cryostat were found adequate to have plasma shots in SST-1 machine. Along with the PF-3 coils, the TF coils were also charged up to 1.35 T for the plasma experiments.



(L) GUI of Integrated Flow and Distributed Control System (IFDCS) for cryogenics (R) showing trend of Liquid Helium level which is increasing (pink line) with TF and PF3 magnets in superconducting state including PF3 Vapour Cooled Current Leads (VCCL)s.

Temperature Screening System at IPR

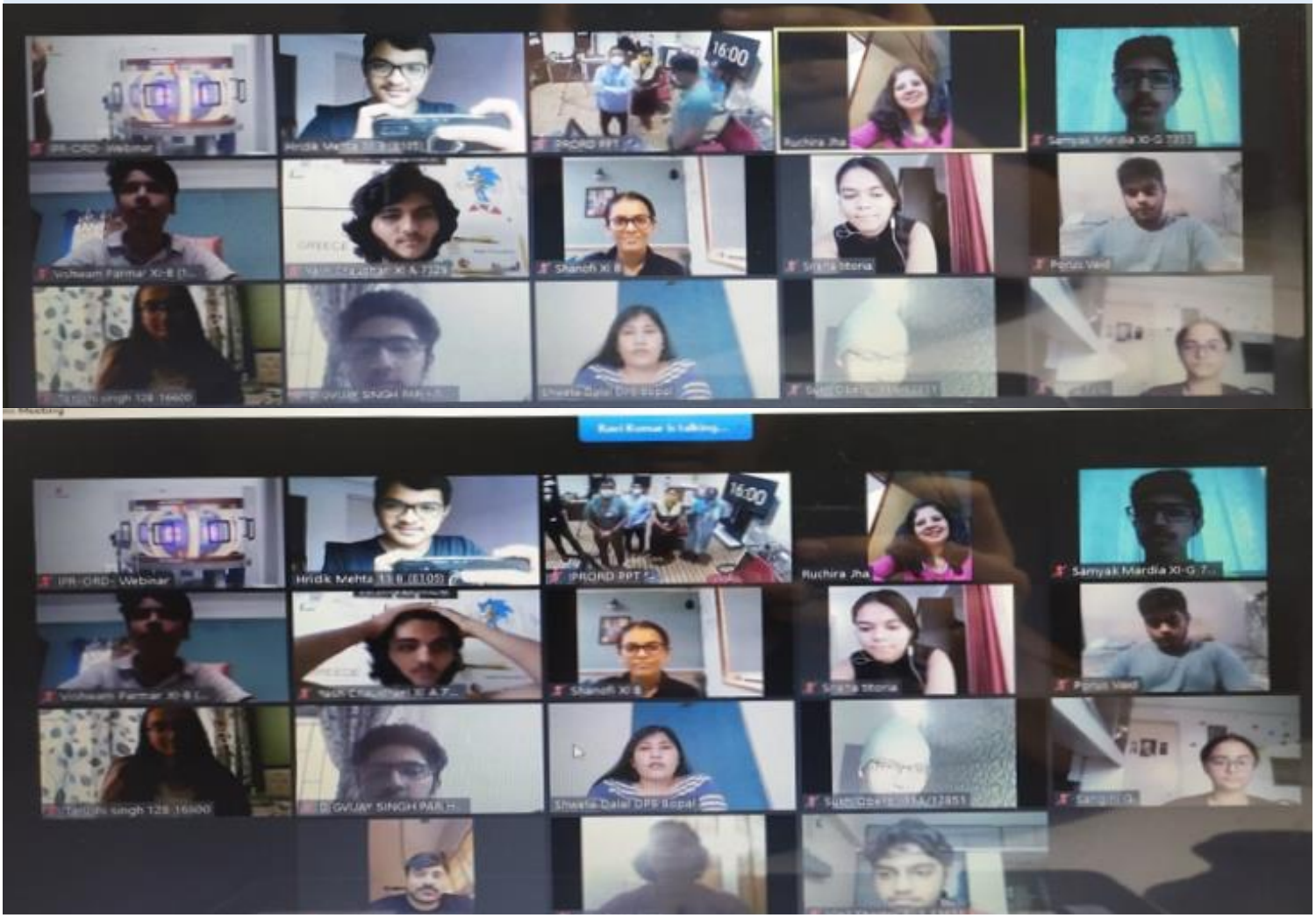
In compliance with the MHA guidelines issued for Covid-19 prevention, a Temperature Screening Thermographic Bullet camera is installed for measuring the forehead skin temperature of employees, visitors *etc.,* entering through Gate-2 cabin of IPR. Thus camera has a capability of scanning temperature from a distance of 2-3 meters and raise an alarm in case of fever detection. It is a walk-through system that can undertake temperature measurement of people coming even in group thus avoiding long waiting times. The temperature measurement range is from 30^0C-45^0C and the Fever alarm is set for a measured temperature of 37^0C and above. The system also automatically detects if the person has worn a mask or not. This has been implemented courtesy the Campus Security Committee, DACD & IPR-Administration.



Screenshots of the temperature monitoring system installed at IPR

IPR Outreach

With the Covid pandemic restrictions, IPR outreach has setup the infrastructure for organizing webinars for school and college students as well as teachers of science stream. For schools, the 2 hour programme has an introduction talk on plasma followed by demonstrations of plasma and application based exhibits and an interaction session. The longer, 2-day programme for college students and science teachers will have a total of four talks, experiment demonstrations and interaction sessions distributed over 2 days. The first programme was conducted for the science students of 10th, 11th and 12th classes of the Delhi Public School, Bopal, Ahmedabad on 9th and 10th of July, 2020. Over 175 participants from 10-12th standards as well as teachers participated in the interactive webinar.



Images from the webinar organized by Outreach Division for DPS, Bopal.

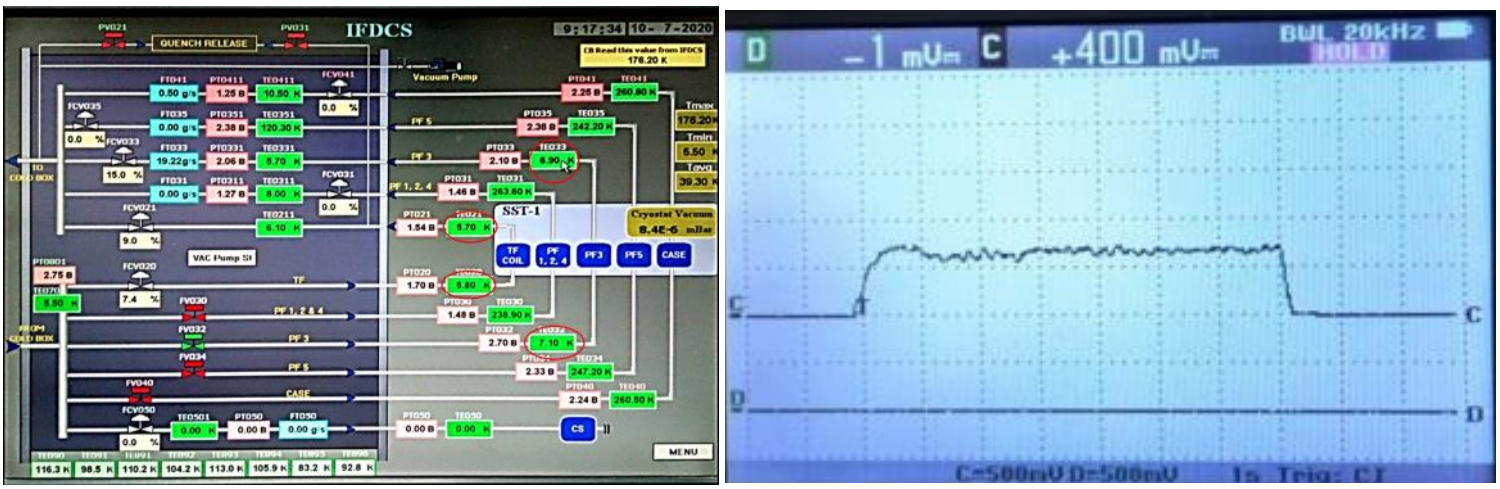
In SST-1 PF#3 Magnet Coils Energized For The First Time

In the April 2020 issue of Newsletter, we had reported installation of 2 additional pairs of current-leads for PF#3 superconducting coils. Now, for the first time, the TF and PF#3 magnet coils along with its six current-leads have been cooled down to superconducting state successfully during the recent SST-1 Campaign #26.

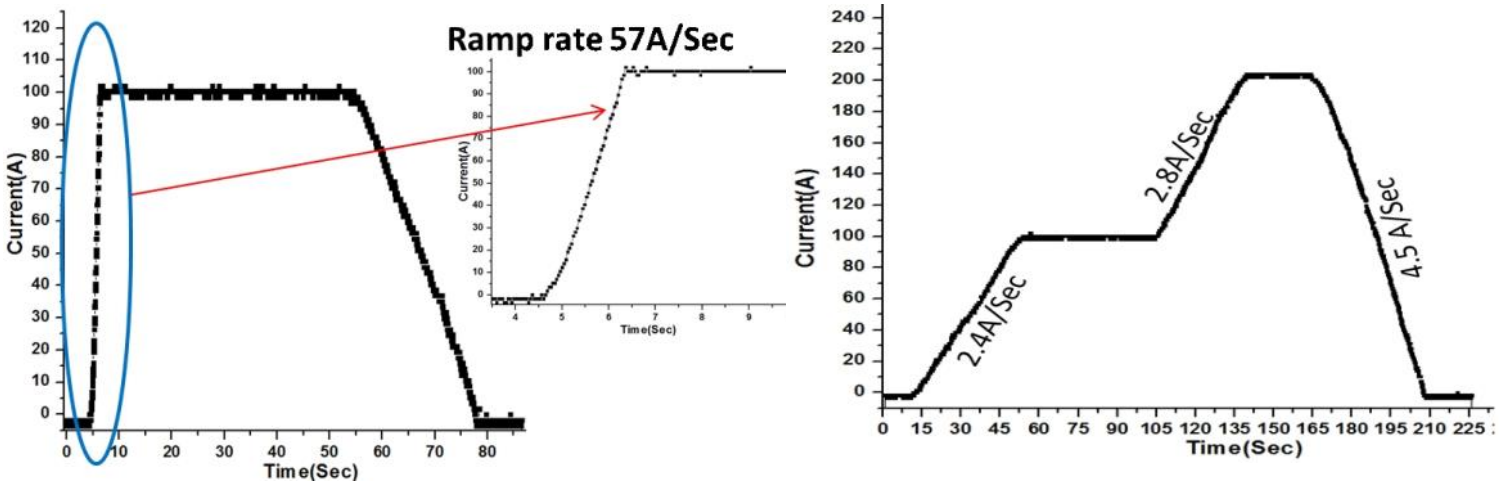
This campaign has been initiated for testing the integrity of PF#3 magnet power supply and the remote operation from the SST-1 central control room. Before energizing the PF #3 coils, a few stand-alone test were carried out by passing 200 A at the ramp up rate of 2.4-2.8 A/s and ramp down with 4.5 A/s. The PF #3 bus-bar joint resistance was also measured around 1nΩ.

PF#3 magnet power supply has also been operated during this campaign. It is indeed an achievement for the SST-1 team to energize the PF#3 coils to the 600 A/turn at the ramp rate of 1 kA/s. The flattop was kept around 7 seconds. Each of the PF#3 magnet coils (upper and lower) has 192 turns.

These tests carried out on PF#3 coils have opened various avenues for carrying out experiments in the upcoming campaigns to modify plasma equilibrium scenarios along with the longer pulse using LHCD.



(L) Simultaneous cool down of TF and PF magnets (inlet/outlet temperatures shown with red circles) (R) PF#3 coils energized with 600A/turn at the ramp rate of 1kA/s for around 7 second.

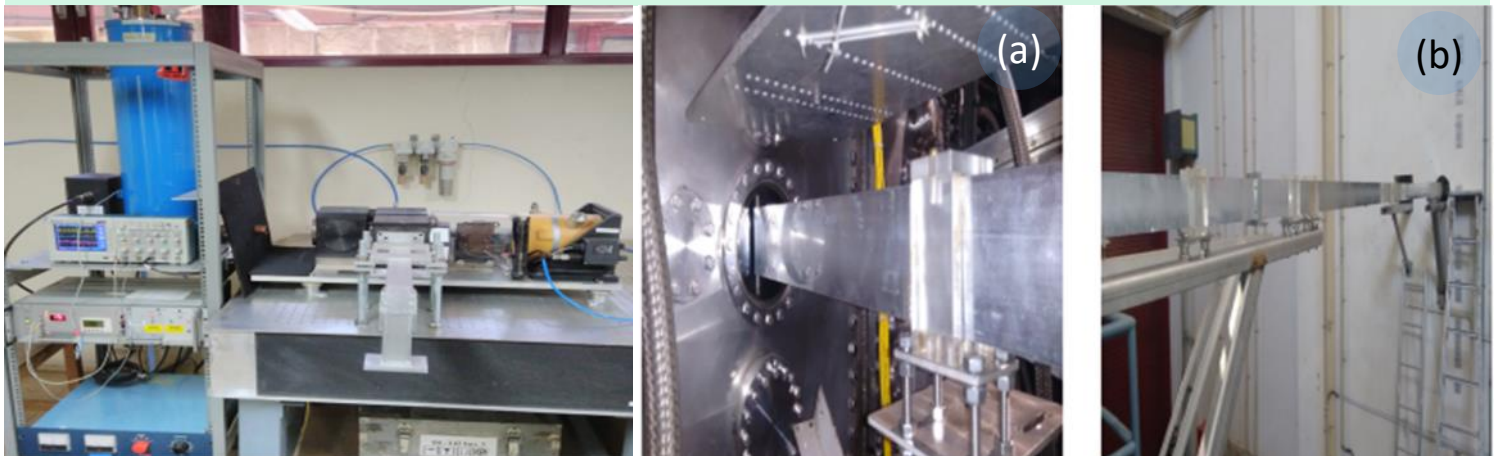


Stand-alone tests of PF#3 magnet coils with 200A Power supply

Rainclouds Over IPR

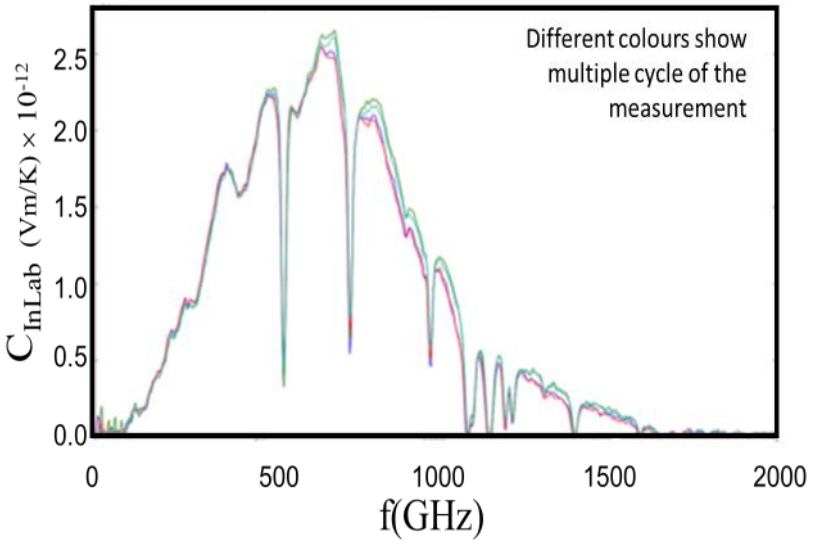
Fourier Transform Michelson Interferometer Diagnostic for SST-1

A fast scan Fourier transform Michelson interferometer system has been recently installed on SST-1 tokamak. The diagnostic determines electron temperature profile and its evolution by measuring electron cyclotron emissions (ECE) from plasma in 70-500 GHz frequency range. The system has a spectral resolution of 3.66 GHz and can generate an electron temperate profile every 17 ms during plasma operation. A wave collection and transport system has been designed and employed to transport signal from SST-1 hall to diagnostics lab. To reduce transmission losses, the layout of transmission line has been done using oversized S-band waveguides and mitre bends in TE01 mode.



(L) The Michelson Interferometer System (M&R) Waveguide installation inside SST-1 hall (a) at radial port #12 (b) towards diagnostics lab

The system can be absolutely calibrated with hot – cold technique. In-lab calibration of the diagnostics has been carried out in the frequency range 70-500 GHz by periodic switching between the cold source and room temperature source. Digital signal filtering and coherent averaging of the raw data is done to obtain difference interferograms. The difference interferograms are Fourier transformed and by using Rayleigh-Jeans law to determine the sensitivity of the diagnostics. To reduce the averaging time and improve the signal to noise ratio during absolute calibration, a high temperature black body source at 873 K has been developed with a maximum temperature variation of 10 K along the surface. Radiation temperature of the calibration source has been measured and radiation losses have been calculated in the entire frequency range.



(L) The high temperature black body source with an operating temperature of 600°C (R) In-lab calibration of the Michelson Interferometer System.

WHO Recommends The Following Simple Steps To

Follow Steps

Stay Safe

Wash your hands frequently with soap
Maintain social distancing
Avoid touching your eyes, nose and mouth
Practice respiratory hygiene
If you have fever, cough and difficulty in breathing, seek medical care early
Stay informed and follow advice given by your healthcare provider

Download and use "Arogya Setu" app of the Government of India to fight the Covid-19 pandemic.

Past Events @ IPR

- ***Dr. Mukti Ranjan Jana,*** Institute for Plasma Research, Gandhinagar, gave a webinar on "*Physics and Technology of Ion Acceleration System for Fusion Research*" at National Webinar on Advancement of Plasma Physics and Nanoscience, organized by Department of Physics, Kharagpur College, West Bengal, on 30th June 2020
- ***Dr. Pintu Bandyopadhyay,*** Institute for Plasma Research, Gandhinagar, gave a webinar on "*Physics of Dusty Plasmas: Recent Experiments*" at National Webinar on Advancement of Plasma Physics and Nanoscience, organized by Department of Physics, Kharagpur College, West Bengal, on 30th June 2020
- ***Dr. Gaurav Kumar Singh,*** Institute for Plasma Research, Gandhinagar, gave a talk on "*Design verification of inner piping and deviation in 80K Cryopump for LIGO-India*" on 7th July 2020
- ***Dr. Jyoti Pandey,*** G.B. Pant University, Uttarakhand, gave a talk on "*Nuclear Data for Fusion Reactor Design*" on 8th July 2020
- ***Mr. Jay K Joshi,*** Institute for Plasma Research, Gandhinagar, gave a talk on "*Inferring the Magnetization effect in high density CCRF Discharges- an Electrical Approach*" on 9th July 2020
- ***Ms. Meenakshee Sharma,*** Institute for Plasma Research, Gandhinagar, gave a talk on "*Perturbation Studies in a Plasma Confined by Multi-Pole Line-cusp Magnetic Field*" on 10th July 2020
- ***Dr. Umesh Kumar,*** Institute for Plasma Research, Gandhinagar, gave a talk on "*Effect of multiple-sources on toroidal plasma in BETA: Current filament, ECR and Electron Drift Injector*" on 16th July 2020
- ***Dr. Infant Solomon,*** Vellore Institute of Technology, Chennai, gave a talk on "*Diamond like Carbon Coating: Fundamentals and Related Applications in Automotive Parts*" on 17th July 2020

Upcoming Events

- 2nd International Conference on Future Learning Aspects of Mechanical Engineering (FLAME 2020), Amity University, Noida, 5-7 August 2020. https://www.amity.edu/flame2020/default.asp
- 30th Summer School and International Symposium on the Physics of Ionized Gases (SPIG2020), Serbia, 24-28 August 2020. http://spig2020.ipb.ac.rs/

हिंदी नारा लेखन प्रतियोगिता

संस्थान में वित्तीय वर्ष 2020-21 में हर महीने एक हिंदी प्रतियोगिता आयोजित करने हेतु एक हिंदी प्रतियोगिता समिति की गठन किया गया है। लॉकडाउन के कारण अप्रैल और मई महीने में किसी भी प्रतियोगिता का आयोजन नहीं किया जा सका। इस समिति द्वारा 29 जून, 2020 को संस्थान के कर्मचारियों के लिए ऑनलाइन नारा लेखन प्रतियोगिता आयोजित की गई। प्रतियोगिता के दिन सभी प्रतिभागियों को नारा लेखन का विषय ईमेल द्वारा भेजा गया और उस विषय पर नारा लिखकर या टाइप कर आधे घंटे में ईमेल से भेजने का निर्देश दिया गया। नारा लेखन का विषय था- 'महामारी और हमारी जीवनशैली'। यह प्रतियोगिता क, ख एवं ग भाषा वर्ग के कर्मचारियों के लिए अलग-अलग आयोजित की गई, जिसमें कुल 103 प्रतिभागियों ने भाग लिया (क-39, ख-56 एवं ग-8)। नारा लेखन प्रतियोगिता के परिणाम इस प्रकार है-

पुरस्कार	भाषा वर्ग ('क' क्षेत्र)	भाषा वर्ग ('ख' क्षेत्र)	भाषा वर्ग ('ग' क्षेत्र)
प्रथम पुरस्कार	प्रशांत कुमार	बादल सेवक	समीरन मुखर्जी
द्वितीय पुरस्कार	लक्ष्मी नारायण गुप्ता	हिरल बी. जोषी	अल्फोंसा पी.

Know Your Colleague

Mr. Kumar Ajay (SO-F) joined IPR through the Technical Training Program batch of 1996 (TTP-3) and was subsequently appointed as Scientist-SC (Physics) in the Charge Exchange Diagnostics and IR Thermography Division. During his tenure as Scientist-SC, he designed and developed the Neutral Particle Analyzer based Charge Exchange Diagnostics (CX-NPA) System for SST-1. He also worked for the maintenance of the Aditya Charge Exchange Diagnostics System, its operation and subsequent upgradation. The design of the existing Charge exchange system (during 2008) was modified to suppress the radiative VUV noises to achieve the first measurements of core Ion Temperature of Aditya Ohmic plasma. The NPA based CXD was designed, developed and integrated with the SST-1 machine under his supervision during 2013 and its DAQ was successfully tested for CXD signals during SST-1 campaigns. He has been supervising the Charge Exchange Diagnostics and IR Thermography Division as the section head since 2011.

The IPR Newsletter Team

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