

Issue 062

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The 4th State

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

72nd Independence Day Celebrations @ IPR

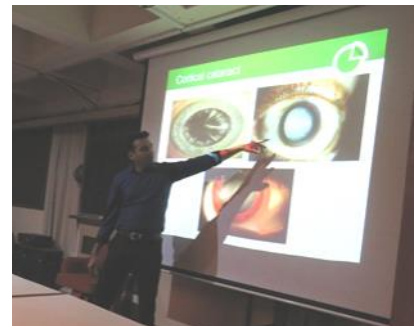
On the occasion of the 72nd Independence Day 2018, the Director, IPR hoisted the national flag. After the national anthem, Director delivered addressed the IPR staff and family members present during the occasion. After refreshments, a seminar on eye health was arranged by Staff Club. More than 200 members took the benefit of free eye check up conducted during this occasion. This was followed by a seminar on Awareness on Common types of Cancer. A competition on patriotic singing was also held for IPR staff and family members. The days programme concluded with lunch.



IPR staff and family members at the flag hoisting ceremony



The flag hoisting ceremony (R) Director IPR addressing the gathering after the flag hoisting ceremony.



(Clockwise from Top) Audience attending the talks (a) On eye health by Dr. Nikhil Prajapati, ContaCare Eye Hospital (b) Awareness on Common Cancers by Dr. Jigna Bhattacharya, Radiation Oncologist, Sterling Hospitals



The free eye checkup camp organized by Staff Club on the occasion of independence day underway.

72nd Independence Day Celebrations @ CPP-IPR

The 72nd Independence Day was observed at CPP-IPR. Prof. B. K. Saikia, Acting Centre Director, hoisted the tricolor in the presence of the employees and their family-members.



Planting & Distribution of Saplings

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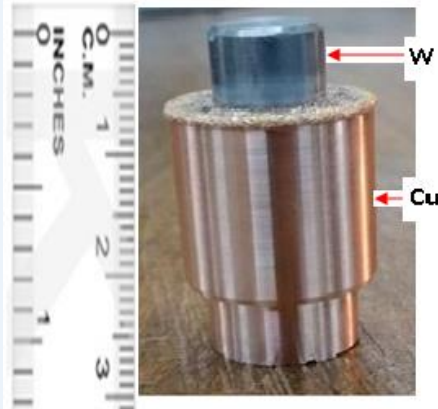
As part of the “Green Campus, Clean Campus” initiative of IPR Staff Club, tree saplings were distributed to IPR staff on 24th July, 2018. The event was inaugurated by Director, IPR by handing over a sapling to IPR staff and also by planting one in the campus grounds. Staff members also planted several saplings during this event.



High Temperature Technologies Division (HTTD) of IPR is currently involved in various activities such as technology development, characterization and testing of materials etc. Various joining techniques are employed to achieve the joining of materials for plasma facing components such as copper casting, coating, vacuum brazing, diffusion bonding and welding. Among them, W-Cu electrode development is another parallel interesting R&D area.

An arc is generated when the voltage is applied to the electrode (cathode) and nozzle body (anode). During plasma spraying, metal or ceramic powder is melted in the plasma arc and then propelled at high speed against the workpiece surface that is to be coated. Electrodes are water cooled at copper side. However, the temporary temperatures at the nozzles and electrodes attain more than 10000°C. Electrodes are the major consumables in plasma spray application. Electrodes are eroded during plasma spray and the projected life is around 10-15 hrs. Thereby, a challenge lies in the technology development of W-Cu electrodes to ensure reduced manufacturing costs, but keeping the quality at par with electrodes available in the international market.

Recently, HTTD could able to fabricate the W-Cu electrode for thermal plasma spray application. The joining of W-Cu is carried out by copper casting technique using suitable casting fixture made of graphite material under (Argon + 4% H₂) inert gas environment at 1100°C. These electrodes have been successfully tested at the operating parameters temperatures in the range of 1800°C to 3200°C.



(Top) The completed Cu-W electrode (L) The batch casting of the electrodes in progress (R) Copper cast on tungsten rod

In-house Repairing of Crucial Helium Leaks joints in Cryogenic Systems of SST-1

The helium leak tightness of each sub-systems of cryogenic plant is one of the main factors for the efficient operation of helium plant by preventing the losses of helium gas. Helium leaks observed in the order of 10^{-3} mbar-l/s in safety valve connections; Rupture disc coupler, Current Feeder system pressure connections and oil removal filter system assembly were identified and subsequently repaired as and where required by replacing the couplings of damaged starting threads, application of high pressure thread sealant, insertion of PTFE gasket and safety valve and Rupture disc. The innovative solution of installation of NRV (Non-Return valve) in Return circuit of Main Cryogenic Dewar which prevented the excess back pressure on safety v/v ($< 10\%$ as per API 520) outlet which leads to reduced performance or leaks. Performance tests at operational parameters has been carried out of repaired joints and found in acceptable limit. The repaired helium leaks order has enhanced from 10^{-3} to $< 1.2 \times 10^{-5}$ mbar-l/s which reflects in a huge amount of saved helium gas. The technical challenges in this task were In-house setting of set pressure of pressure safety valve, installation and performance test as per system needs, dissimilar materials sealing at high pressure, working in congested space and height. - Rajiv Sharma, SST-1



Vacuum Performance test of Rupture Disc, Pressure Safety Valve and ORS Filter System of Helium Compressor Unit SST-1

हिंदी प्रश्नोत्तरी प्रतियोगिता में आईपीआर के सदस्यों की सक्रिय प्रतिभागिता

नगर राजभाषा कार्यान्वयन समिति, गाँधीनगर के तत्वावधान में 10 जुलाई, 2018 को मुख्यालय तटरक्षक क्षेत्र (उत्तर-पश्चिम), गाँधीनगर द्वारा हिंदी प्रश्नोत्तरी प्रतियोगिता का आयोजन किया गया था, जिसमें आईपीआर के दो कर्मचारियों ने भाग लिया। यह प्रतियोगिता नराकास गाँधीनगर के सदस्य कार्यालयों/बैंकों के बीच आयोजित की जा रही थी, अतः इसमें दो प्रतिभागियों के चयन हेतु 28 जून को आईपीआर में एक आंतरिक प्रश्नोत्तरी प्रतियोगिता आयोजित की गई और उसमें से दो विजेताओं - श्रीमती शिल्पा खंडकर, वैज्ञानिक सहायक-सी एवं श्री रजनीकांत भटासना, वैज्ञानिक सहायक - बी को नराकास प्रतियोगिता हेतु नामित किया गया। 10 जुलाई, 2018 को मुख्यालय तटरक्षक क्षेत्र (उत्तर-पश्चिम), गाँधीनगर में आयोजित हिंदी की सामान्य जानकारी एवं राजभाषा विषयक प्रश्नोत्तरी प्रतियोगिता बहुत ही रोचक एवं प्रतिस्पर्धा पूर्ण रही। इस हिंदी प्रश्नोत्तरी प्रतियोगिता में आईपीआर के श्री रजनीकांत भटासना (एवं टीम) ने प्रथम पुरस्कार एवं श्रीमती शिल्पा खंडकर (एवं टीम) ने तृतीय पुरस्कार जीता है।



स्वरचित हास्य कविता पाठ का आयोजन

तेज रफ्तार वाली जिंदगी में एक-साथ हंसने और कविता के माध्यम से अपने सृजनशील हास्य भाव को उजागर करने के उद्देश्य से प्लाज़्मा अनुसंधान संस्थान में नगर राजभाषा कार्यान्वयन समिति, गाँधीनगर के सौजन्य से 10 अगस्त, 2018 को स्वरचित हास्य कविता पाठ प्रतियोगिता का आयोजन किया गया। इस काव्यपाठ प्रतियोगिता में नराकास गाँधीनगर के सदस्य कार्यालयों/बैंकों के अधिकारियों/कर्मचारियों ने बहुत ही उत्साहपूर्वक भाग लिया और अपनी स्वरचित हास्य कविताएं प्रस्तुत कीं। स्वरचित हास्य कवितापाठ का आनंद लेने और प्रतियोगियों के उत्साहवर्धन हेतु नराकास, गाँधीनगर कार्यालय के कर्मचारीगण भी श्रोता के रूप में उपस्थित हुए थे। इस काव्य प्रतियोगिता में नराकास, गाँधीनगर के सदस्य कार्यालय - राष्ट्रीय सहकारी विकास निगम, भारतीय भूवैज्ञानिक सर्वेक्षण, जनगणना कार्य निदेशालय, बैंक ऑफ इंडिया, प्लाज़्मा अनुसंधान संस्थान, बैंक ऑफ बड़ौदा, भारतीय स्टेट बैंक, भारतीय सर्वेक्षण विभाग, भारतीय खेल प्राधिकरण, मुख्यालय तटरक्षक क्षेत्र (उत्तर-पश्चिम) गाँधीनगर से कुल 15 अधिकारियों/कर्मचारियों ने भाग लिया। हास्य कविता पाठ प्रतियोगिता का मूल्यांकन करने हेतु गुजरात विद्यापीठ के हिंदी विभाग के प्रोफेसर डॉ. रामगोपाल सिंह एवं अंतरिक्ष उपयोग केन्द्र, अहमदाबाद की वरिष्ठ हिंदी अधिकारी श्रीमती नीलू सेठ को आमंत्रित किया गया। इस अवसर पर सभी प्रतियोगी कवियों ने हास्य से ओतप्रोत अपनी स्वरचित कविता सुनाई। इन्हें प्रोत्साहित करने हेतु संस्थान के स्टाफ सदस्य एवं निदेशक महोदय भी इस आयोजन में सम्मिलित हुए। सभागार में राजभाषा कार्यान्वयन

स्वरचित हास्य कविता पाठ का आयोजन(2)

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समिति के उपाध्यक्ष श्री राजसिंह के संचालन का चुटिला अंदाज और नये कवियों की हास्य रचना की दमदार अभिव्यक्ति और खासकर हास्य भाव की पुष्टि करनेवाले श्रोताओं के ठहाकों ने इस आयोजन को सफल बनाया।

कविता पाठ के बाद श्रोताओं के लिए राजभाषा प्रश्नोत्तरी प्रतियोगिता आयोजित की गई और सही उत्तर देनेवाले श्रोताओं को पुरस्कृत किया गया। इसके पश्चात निर्णायकों ने काव्य पाठ के विजेताओं की घोषणा की। प्रथम पुरस्कार – श्री सचिन नाडकर्णी, भारतीय स्टेट बैंक, द्वितीय पुरस्कार - श्री वी.के.अग्रवाल, भारतीय खेल प्राधिकरण, तृतीय पुरस्कार - श्री विनीत कुमार जैन, बैंक ऑफ बड़ौदा, दो प्रोत्साहन पुरस्कार - श्री सुरेन्द्र सिंह दहिया, भारतीय खेल प्राधिकरण एवं श्री रजनीकांत भट्टासना, प्लाज़्मा अनुसंधान संस्थान को दिए गए। इन विजेताओं को नराकास, गांधीनगर की आगामी बैठक में घोषित पुरस्कार दिए जाएंगे।



The 5th and final 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 Bengaluru during 12-13 July, 2018. 67 Physics teachers of high/senior school and junior colleges from the Southern states of Andhra Pradesh, Telangana, Kerala, Karnataka and Tamilnadu attended this training programme. The meeting was held at the Choksi Hall, Indian Institute of Science, Bengaluru and was organized by the Karnataka State Council for Science & Technology. The training programme was inaugurated by Prof. S. Subramanian, Secretary, KSCST. Dr. S. G. Sreekanteswara Swamy, Executive Secretary KSCST and Dr. Ravi A V Kumar from IPR presided over the inauguration. This training programme saw the largest participation amongst all the 5 regions. Apart from hands-on experiments, 10 posters on plasma and its applications were also exhibited for the benefit of the participants. The IPR team consisted of Chhaya Chavda, Harsha Machchhar and K K Mohandas. With this programme, IPR has successfully completed the NCSTC project for popularization of plasma and its applications. Over 250 high school and BSc physics teachers from all over the country were introduced to the basics of plasma and its applications during the course of the 5 training programmes. The impact of the programme was such that more than 10 teachers from various regions have conducted several training programmes for their students and teachers with the resource materials provided by IPR as part of the training programme.



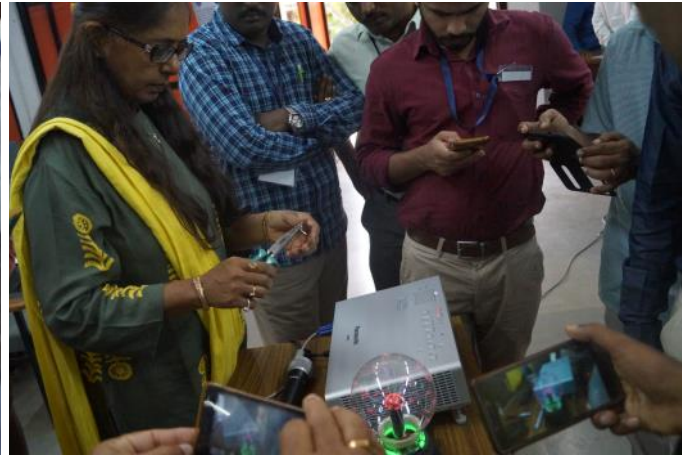
Inauguration of the programme (L) Prof. S. Subramanian (R) Dr. S. G. Sreekanteswara Swamy (KSCST)



Participants of the IPR-NCSTC training programme held at IISc, Bengaluru



Training programme in progress



Images from the interactive sessions of the training programme.

Adieu !

Prof. K. S. Goswami, Centre Director, CPP-IPR, retired from services at CPP-IPR w.e.f. 31st July, 2018. Prof. Goswami joined the erstwhile Centre of Plasma Physics as Assistant Professor in April, 1991. A theoretical plasma physicist, Prof. Goswami has published more than 70 research papers in peer-reviewed journals and supervised over 13 scholars for their Ph.D. degree during his tenure. His most significant contribution is in the field of nonlinear dynamics of plasma including formation of nonlinear coherent structures like electrostatic electron holes, current free double layers, etc. He won the Biraj Mohan Das Young Scientist Award in 1996 and was Vice President of Plasma Science Society of India during 2008-10. He took over as the Centre Director of CPP-IPR in 2010 and served in that position till his retirement. On behalf of IPR and CPP-IPR, the Newsletter wishes him a happy, healthy and fruitful retired life !



Professor Kalyan Goswami, CPP-IPR

Name of the Institution	Date of visit	Number of visitors
Vishwakarma Engg College, Chandkheda, Ahmedabad	3-Aug-2018	60 students (Chemical Engineering) + 2 Staff
Marwadi University, Rajkot	14-Aug-2018	58 students (EC and IT) + 2 Staff
Marwadi University, Rajkot	16-Aug-2018	58 students (EC and IT) + 2 Staff
Participants of the workshop organized by Marc Foundation, a CSR arm of Nirmal Energy , Ahmedabad and funded Vigyan Prasar, DST	23-Aug-2018	27students (Journalism and Mass Communication) + 3Staff
ITM Universe Vadodara	28-Aug-2018	46 students (CSE) + 2Staff



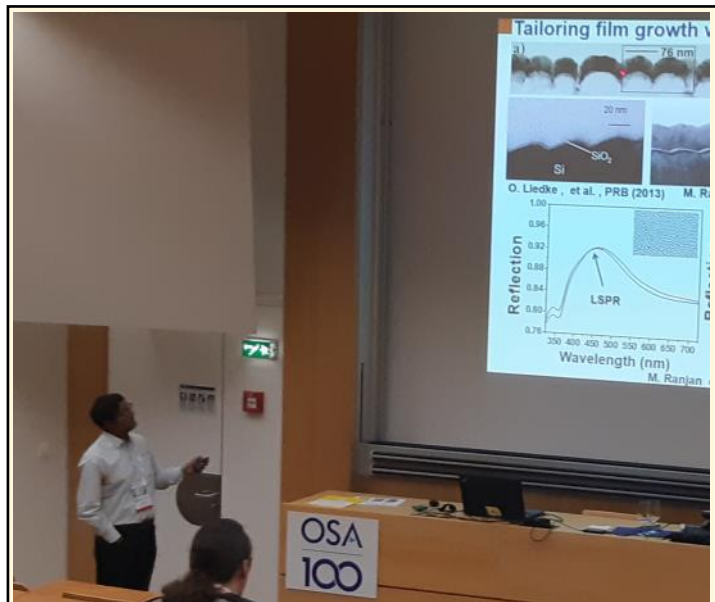
Students from the Vishwakarma Engineering College, Chandkheda, Ahmedabad during their visit to IPR



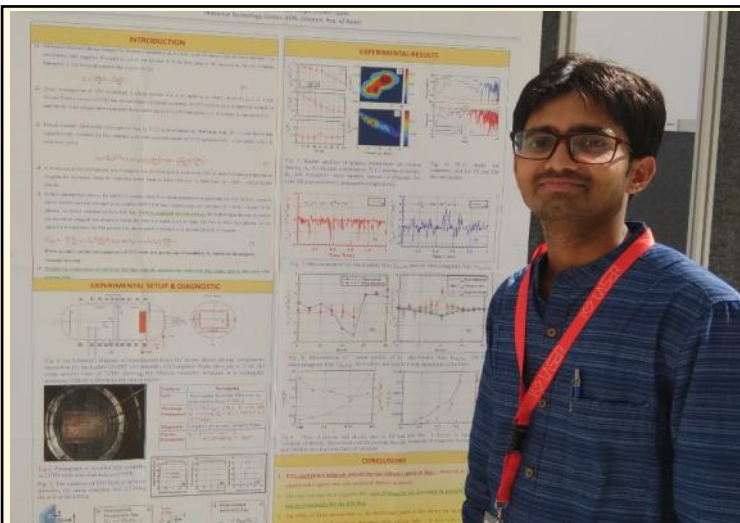
Students of BE (Computer Science) from the Marwadi University, Rajkot during their visit to IPR



Students of Journalism from MARC Foundation, during their visit to IPR



Dr. Mukesh Ranjan gave a presentation entitled “Dense Nanoparticles Arrays for SERS Sensors and Plasmonic Solar Cells” at the Advanced Photonics Congress-2018 held at Zurich, Switzerland during 2-5 July, 2018. The conference was jointly organized by Optical Society of America (OSA) and ETH, Zurich.



Prabhakar Srivastav, PhD scholar, attended the 28th Symposium on Plasma Physics and Technology (SPPT-2018) and 45th European Physical Society Conference on Plasma Physics 2-6 July, 2018 at Prague, Czech Republic and presented posters entitled “Electron Temperature Gradient (ETG) turbulence induced particle transport due to finite electromagnetic fluctuations” and “Electron Temperature Gradient (ETG) Turbulence Induced Particle Transport in Finite Beta Laboratory Plasma” respectively

IPR was invited to participate in the “Digital Health Technologies for a World Free of TB” that was held at New Delhi during July 24-26, 2018. The conference was jointly organized by USAID and the Ministry of Health and Family Welfare, Govt. of India. At the meeting, IPR demonstrated the AI tool “Deep CXR”, developed at IPR. This tool automates chest X-Ray screening for 11 different pulmonary diseases like TB, lung nodules, pneumothorax, cardiomegaly etc. The tool was also demonstrated as a video during the session on “India Govt. digital health initiatives”. Ms. Sutapa Ranjan and Mr. Agraj Abhishek from the Analytics Division represented IPR at this meeting.



IPR’s “Deep CXR” tool at the demonstration booth. Inset : Ms. Sutapa Ranjan describing the tool to the audience.

IPR Library organized an IEEE session on "*Enhancing Your Research Experience for better Technical Writing*" on 20 August 2018 at IPR Seminar Hall. This informative session was conducted by Dr. Dhanu Pattanashetti, Client Services Manager from IEEE. The session included the tips and tricks for accelerating the research, problem-solving with various search functionalities, publishing choices, article structuring, where to publish, publishing ethics, various tools to discover relevant articles, time-saving features for research using IEEE Xplore Digital Library, and many other related topics. The interactive session was attended by a large number of staff members and research scholars.



(L) Dr. Dhanu Pattanashetti from IEEE delivering the talk (R) The audience during the training session

IITRAA-Ahmedabad Meeting @ FCIPT/IPR

IIT-Roorkee Alumni Association (IITRAA), Ahmedabad Chapter meeting was organised at FCIPT/IPR on 19 August 2018. Delegates from various government agencies (ISRO, ONGC, Indian Railways, IIT-Gandhinagar, GSPL, Custom, Income Tax etc.) and private industries (Selan Exploration Tech., ESSR etc.) participated in the event. A talk on "*Harnessing Plasmas for a Better Tomorrow*" was delivered by Dr. Mukesh Ranjan also an Alumni of IIT-Roorkee. Some of the IPR technologies were also demonstrated to the participants.



- ♦ **Dr. Arka Bokshi**, Culham Centre for Fusion Energy, UK, gave a talk on "Towards a new (toroidal drift mode) theory of small-ELMs" on 27th July 2018
- ♦ **Dr. Jyoti Kumar Atul**, Institute for Plasma Research, Gandhinagar, gave a talk on "Finite Temperature and Magnetic Shear Induced Stabilization of Multiple Instabilities in Convective Fluid Plasma Transport Scenario" 30th July 2018
- ♦ **Mr. Roopendra Singh Rajawat**, Institute for Plasma Research, Gandhinagar, gave a talk on "Study of electrostatic instabilities in current carrying cold plasmas" on 2nd August 2018
- ♦ **Dr. Bibhu Prasad Sahoo**, Institute for Plasma Research, Gandhinagar, gave a talk on "Particle transport in Aditya Scrape-off Layer and its relation to Discharge Density and Power using EMC3-EIRENE model" on 7th August 2018
- ♦ **Mr. Ratan Kumar Bera**, Institute for Plasma Research, Gandhinagar, gave a talk on "Fluid Simulation of electron beam driven wakefield in a cold plasma" on 9th August, 2018
- ♦ **Prof. Rahul Pandit**, Division of Physical and Mathematical Sciences, Indian Institute of Science, Bangalore, gave a talk on "Two-dimensional turbulence in fluids with particles, conducting fluids, fluids with polymer additives, binary-fluid mixtures, and superfluids" on 09th August 2018 (Colloquium # 289)
- ♦ **Dr. Raj Kumar**, CSIR-Central Scientific Instruments Organization, Chandigarh, gave a talk on "Applications of holographic optics" on 13th August 2018
- ♦ **Ms. Garima Joshi**, Nirma University, Ahmedabad and Institute for Plasma Research, Gandhinagar, gave a talk on "Experimental study of plasma in electronmagnetohydrodynamic regime" on 14th August 2018

Upcoming Events

- ♦ 4th International Conference on Physics and Technology of Reactors and Applications (PHYTRA4), Marrakech, Morocco, 17-19 September 2018. <http://phytra4.gmtr.ma/>
- ♦ 16th International Conference on Plasma Surface Engineering (PSE 2018), Garmisch-Partenkirchen, Germany, 17-21 September 2018. <https://www.pse-conferences.net/pse2018.html>
- ♦ 7th International Conference on Trapped Charged Particles and Fundamental Physics (TCP 2018), Traverse City, Michigan, USA, 30 September - 5 October 2018. <https://indico.fnal.gov/event/16019/>
- ♦ Workshop on Numerical Modeling in MHD and Plasma Physics: methods, tools, and outcomes. Honor of academician Anatoly Alekseev's 90th Birthday, Novosibirsk, Russia, 11-12 October 2018. <http://conf.nsc.ru/mhd18/en/>
- ♦ 2018 International Workshop on Radiative Properties of Hot Dense Matter, Hamburg, Germany, 21-26 October 2018. <https://indico.desy.de/indico/event/18869/>
- ♦ 27th IAEA Fusion Energy Conference (FEC 2018), Ahmedabad, India, 22-27 October 2018. <http://www.fec2018.in/>

Know Our Colleagues



Mr. Yohan S. Kristi joined IPR in 2001 with the Electronics group. He was initially involved in the design of electronics and instrumentation measurement chain, testing, installation, commissioning, routine operation and maintenance for different types of plasma diagnostics like Magnetic probe, PMT, Soft X-Ray and Bolometer for the SST-1. In 2006 he was assigned to work in SST-1 Magnet Division and was given the responsibility of large Quench detection and protection system for the SST-1 TF magnet system. He significantly contributed to the development of electronics and instrumentation for cryogenic and thermo-mechanical measurement and data acquisition, monitoring control system for the SST-1 magnet system, as well as in the field of quench measurement system and innovative measurement techniques like EBCT, DCM Self-compensation for low signal measurement for superconductor joints etc. He is currently deputed to ITER Organization and working with the Magnet Division in Magnet Instrumentation and In-Vessel Coil Section and works on the design of the instrumentation measurement chains for LV and HV signals, qualification, the instrumentation system installation and test procedures/protocols, integrating instrumentation into the coils and feeders and control interface to the CODAC.

Mr. Sudhir Kumar Sharma joined IPR in July 2001 in the Water Cooling and AC Section. His contribution in WCS & AC section started with the installation, testing and commissioning of 4.7 MW capacity SST-1 Water Cooling System (WCS) and Water Distribution System (WDS). He has carried on many related works and systems for IPR, FCIPT and IPR-Extension from concept to completion through the tendering process. He also contributed in the design, procurement, testing and commissioning of Precision Air Conditioning system for Transmission Electron Microscope (TEM) Lab to fulfil very stringent environmental requirement and DX type Air conditioning system for HVDC lab, RHVPS lab, Aditya Control Room, FCIPT Seminar Hall, IPR-Extension Lab etc. He has participated in several SST-1 operation campaigns since its inception. His other areas of expertise in design software include AutoCAD, CATIA and Fathom for P&ID preparation, Piping & plant layout design and flow analysis.



The IPR Newsletter Team

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