

Issue 116

Mar 2023

# The Fourth State

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



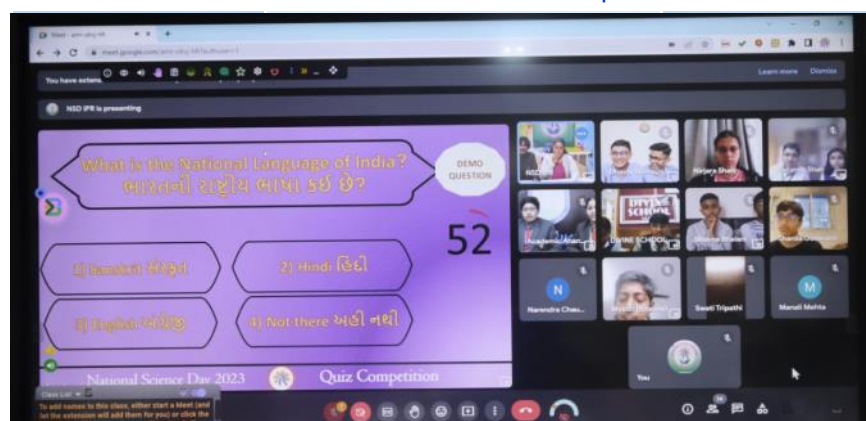
## National Science Day 2023

The National Science Day 2023 was organized during 4-7 Feb, 2023 as an online event. Competitions were held in both offline (Poster and Essay) as well as online (Quiz, Skit, Eloquence and Science models) modes.

Around 227 students and 09 teachers from 55 schools across Gujarat state participated in the various competitions that were conducted online over a week. Students and teachers from 23 schools won a total of 39 prizes. Details of prizes are listed on the [NSD2023 website](https://www.nsd2023.org/).

Position	School	Prizes won	Points
1st Place	Kokilaben Dhirubhai Ambani Reliance Foundation School, Jamnagar	Essay (E), Essay (H), Model (T), Eloquence (H) and Eloquence (G)	42 points
2nd Place	Anand Niketan, Maninagar, Ahmedabad	Essay (G), Eloquence (G), Eloquence (H) and Skit	30 points
3rd Place	Amity School [CBSE], Bharuch	Poster (G), Poster (H), Model (S)	22 points

Top three schools in NSD-2023

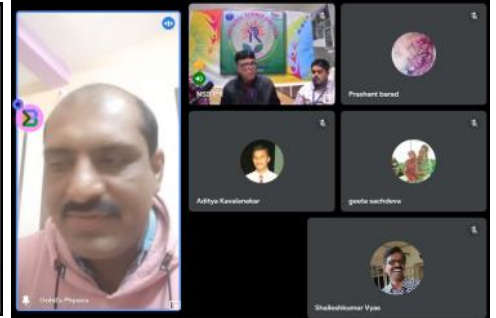


Quiz competition in progress



Skit competition in progress

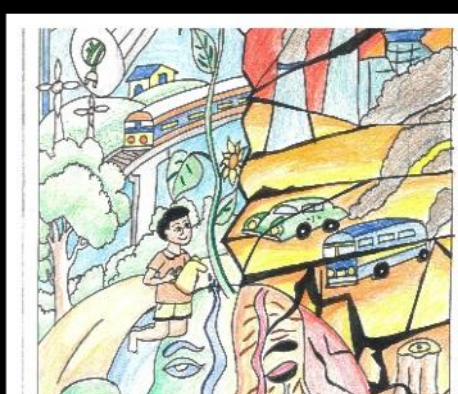
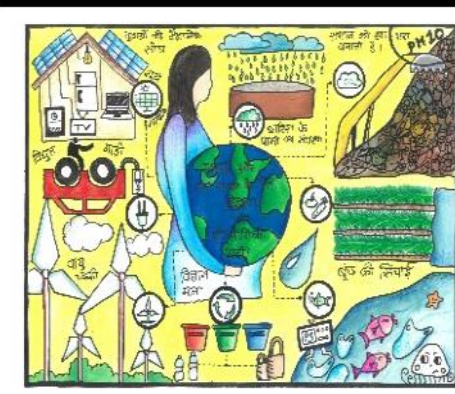
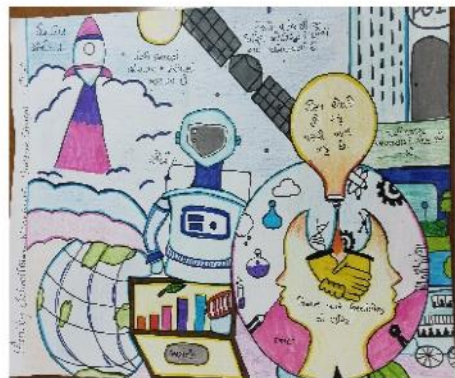
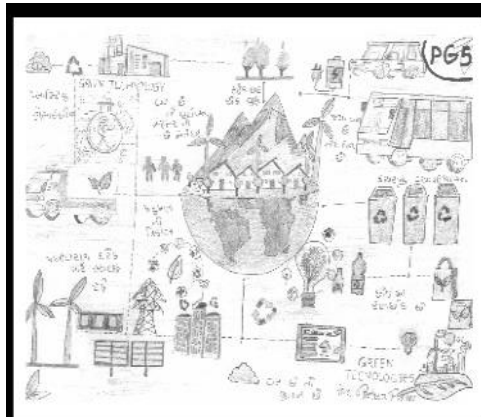




Science Model competition for school teachers in progress



Science Model competition for students in progress



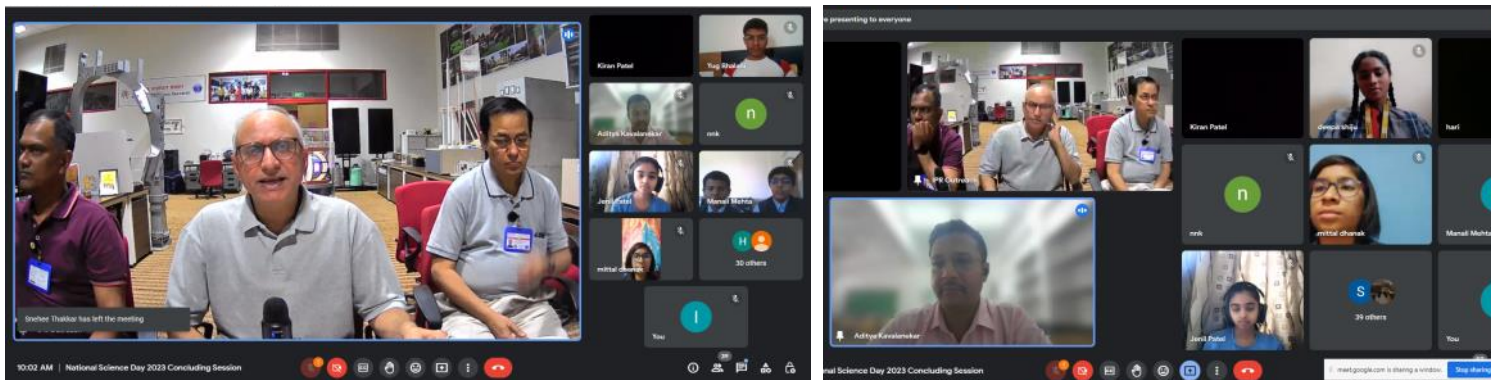
Prize winning entries for the Poster competition



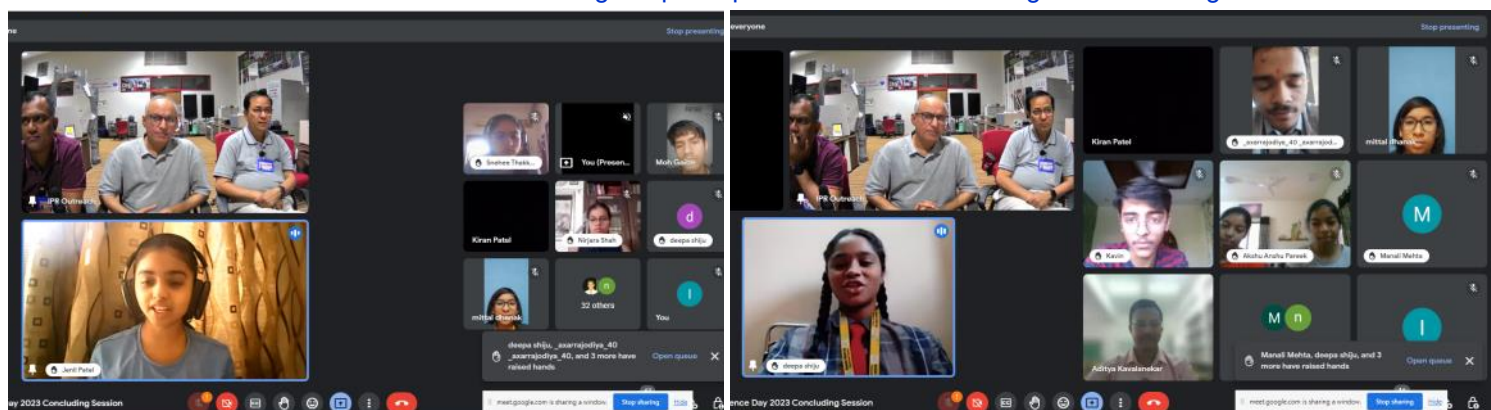
The concluding session of NSD-2023 was conducted online on 28th Feb, 2023. The session was presided over by Director IPR Dr. Shashank Chaturvedi, and Dean (R&D), Dr. P K Atrey. Director IPR addressed the participants online, which was followed by the declaration of prize winners and feedback from participants.



Eloquence competition in progress



Dr. Shashank Chaturvedi addressing the participants of NSD-2023 during the concluding session.



(Top) Images from the feedback from NSD participants (Bottom) NSD 2023 team with Director and Dean R&D.



Dr Anup Singh, Director General of Nirma University and Dr. Rajesh Patel, Director of the Institute of Technology Nirma University visited IPR on 18th Feb, 2023 for discussions with Director, IPR regarding a MoU which will allow more R&D and academic collaborations with IPR. They also visited the IPR outreach exhibition.



(L) Dr. Anup Singh and Dr. Rajesh Patel with Director IPR and Dean R&D, IPR (R) at the Outreach Exhibition hall



Dr. Anup Singh and Dr. Rajesh Patel with Dr. Jaydeep Ghosh at the Outreach Exhibition hall

## Remembering India's Martyrs



IPR staff observing a minute's silence to mark the Martyrs' Day on 30th Jan, 2023 in the memory of those who sacrificed their lives during struggle for India's freedom.



## Remembering India's Martyrs



CPP-IPR staff observing a minute's silence to mark the Martyrs' Day on 30th Jan, 2023 in the memory of those who sacrificed their lives during struggle for India's freedom.

## अखिल भारतीय हिंदी वैज्ञानिक संगोष्ठी में प्रतिभागिता

विश्व हिंदी दिवस के उपलक्ष्य में, दिनांक 10 एवं 11 जनवरी 2023 को राजभाषा कार्यान्वयन समिति, इंदिरा गांधी परमाणु अनुसंधान केंद्र (IGCAR, Kalpakkam), सामान्य सेवा संगठन एवं भारतीय नाभिकीय विद्युत निगम लिमिटेड, कल्पाक्कम के तत्वावधान में इंगांपअक, कल्पाक्कम में "जलवायु परिवर्तन नियंत्रण में नाभिकीय एवं अन्य प्रगत प्रौद्योगिकियों की भूमिका" शीर्षक पर आयोजित अखिल भारतीय हिंदी वैज्ञानिक संगोष्ठी- 2023 (AIHSS -2023) में संस्थान के श्री आनंद विसाणी, वैज्ञानिक अधिकारी-ई एवं सुश्री आभा माहेश्वरी, वैज्ञानिक अधिकारी-ई ने भाग लिया एवं पोस्टर प्रस्तुत किये। श्री आनंद विसाणी ने 'सामाजिक अनुप्रयोगों के लिए पर्यावरण के अनुकूल प्लाज्मा प्रौद्योगिकियाँ' विषय पर पोस्टर प्रस्तुत किया तथा पोस्टर प्रस्तुतिकरण में प्रथम पुरस्कार प्राप्त किया। सुश्री आभा माहेश्वरी ने 'इटर के लिए भारतीय प्लाज्मा गुणवत्ता मापन तंत्रों (प्लाज्मा डायग्नोस्टिक्स) का अवलोकन (ओवरव्यू) विषय पर पोस्टर प्रस्तुत किया। इस दो दिवसीय अखिल भारतीय हिंदी वैज्ञानिक संगोष्ठी में आमंत्रित व्याख्यान, सहयोगी व्याख्यान एवं पोस्टर के साथ कुल 74 प्रस्तुतिकरण दिये गये।





IPR participated in the **MahaEduFest 2023** that was organized by Indo Science Education Trust and the NM Foundation and Research Centre, at the Lokseva-e-School and Junior College, Pashan, Pune during 13-17 Feb, 2023. ISRO and PRL also participated in this exhibition. IPR displayed 25 exhibits and posters consisting of working and static models related to plasma, its applications as well as tokomaks and the ITER project. The exhibition was inaugurated by Shri A. S. Kiran Kumar, Member Space Commission and the former Chairman of the Indian Space Research Organization [ISRO] & Secretary Department of Space and was attended by several distinguished former scientists from ISRO. Shri Kiran Kumar, along with other distinguished scientists also visited the IPR exhibition.

Over the week, more than 6000 students and 150 teachers from over 43 schools in Pune attended the exhibition. Around 50 selected students of classes 9-11 from the host school were trained to explain the exhibits to the visiting students and public. School teachers visiting the exhibition were also provided with resource materials on plasma such as posters, science activity kit, comic book and a popular book on plasma. More details [HERE](#).



Shri A. S. Kiran Kumar addressing the gathering during the inauguration of the MahaEduFest 2023 at Pune



Shri A. S. Kiran Kumar during his visit to IPR exhibition.



Introducing plasma to visiting students





Images from the IPR exhibition at the MahaEduFest 2023



Date	Institution	Visitors
25-Jan-2023	A. D. Patel institute of Technology, Anand, Gujarat	50 students of BE/B.Tech (IT) and 2 teachers
27-Jan-2023	Bahauddin Science College, Junagadh, Gujarat	18 students of MSc Physics and 5 teachers
31-Jan-2023	V.P. & R.P.T.P. Science College, Vallabh Vidyana- gar, Anand, Gujarat	43 students of TY BSc Physics and 5 teachers
01-Feb-2023	OM Science college, Junagadh	41 students of BSc/MSc physics and 3 teachers
08-Feb-2023	Indo Science Education Trust, Pune	25 students of 9-12 std and 3 teachers



Students and teachers of A. D. Patel institute of Technology, Anand, during their visit to IPR



Students and teachers of Bahauddin Science College, Junagadh, Gujarat, during their visit to IPR



Visitors from the IndoScience Education Trust, Pune during their visit to IPR



## Outreach Activities @ CPP-IPR

In the month of February 2023, the Outreach Cell of Centre of Plasma Physics-Institute for Plasma Research (CPP-IPR) conducted two **"Seminar-cum-Workshop on Plasma Physics"**. The main objective of these programmes was to sensitize the college students of North Eastern region of India about plasma physics. The first programme was held at Jagiroad College, Jagiroad, Assam on 2<sup>nd</sup> February, 2023 and was attended by 43 students from Jagiroad college and 11 students from Dimoria College, Khetri, Assam. The second programme was conducted at Anandaram Dhekial Phookan College, Nagaon, Assam on 17<sup>th</sup> February, 2023 and was attended by more than 250 students of the college.

During the technical session of the programmes, Dr. Rakesh Moulick gave a talk on introduction to plasma, which was followed by Dr. Ngangom Aomoa who gave a talk on the basics of experimental plasma, touching upon the physics of production of plasma in laboratories with brief introduction to the various laboratories of CPP-IPR. After the two talks, there was also a demonstration session where the students were shown a glow discharge plasma, and the role and working principle of the various components of the set-up was explained to them.



Images from the various outreach events organized by CPP-IPR



Atal Innovation Mission (AIM) under NITI Aayog had selected IPR as one of the incubation centres for being recognized and funded as 'Atal Incubation Centre'. Subsequent to this approval in January 2023, a team comprising of Mr. Prithvi Sai Penumadu and Mr. Rajeev Kumar from AIM, NITI Aayog visited IPR on 23<sup>rd</sup> January 2023 towards reviewing the status of the IPR's incubation centre. The guests were introduced with various activities being conducted by IPR and how IPR has been contributing to societally and industrially relevant technologies apart from its long term vision on realizing magnetically confined tokamak systems as source of energy.

The visitors were showcased the proposed incubation centre site at FCIPT and all societally relevant technologies such as PAW, plasma textile technology, plasma sterilization, plasma pyrolysis, plasma nitriding, plasma based coatings, SPIX lab. The visitors were also shown the various characterization labs at FCIPT. Subsequently, they visited several labs in IPR including Agastya cryopump lab, divertor and high heat flux lab, remote handling and robotics lab, multi-physics lab for AI systems demo, drag reduction laboratory, plasma antenna lab and computer centre. The next day, the guests also visited Outreach division where all experimental plasma systems for educating school children were demonstrated. Such systems for children were deeply appreciated and Mr. Rajeev informed IPR that he shall connect with Atal Tinkering Labs (ATL) team at AIM, NITI Aayog for further utilization of the plasma models by various ATL schools.



Images from the visit of AIM-NITI Aayog team to IPR



A Cooling Water System (CWS) with 15 MW heat rejection capacity has been designed to reject the heat generated by various experimental set ups installed inside ITER-India and IPR laboratories. The key aspect of the CWS design lies in meeting the diverse requirements, with inlet temperatures 20°C and 35°C, from demineralized water to ultra-pure water with ionic conductivity as low as  $\leq 0.1 \mu\text{S/cm}$ , the supply pressure up to 2.4 MPa and critical dissolved oxygen limit of  $\leq 0.01 \text{ ppm}$ .

Major equipment of this CWS include FRP Cooling tower with cooling capacity 15 MW with cold water basin capacity of 40000 liter, Water cooled screw chiller of 300 TR capacity (2 nos.), centrifugal pump sets up to 200 KW motor rating with VFD/ YD Starters, Plate type heat exchangers (5 nos.) with capacities upto 9 MW (1 no.), storage tank of 50,000 liter capacity, Pressurizer of 1 m<sup>3</sup>, SS piping up to 250 NB, CS piping up to 500 NB, Valves of different types and sizes, electrical power cabling, instrumentation, MCC panel, SCADA system, etc. After successful completion of detailed design & engineering, the project has entered the site execution phase. In order to recognize the commencement of site activities, a small event was organized inside the plant room on 24<sup>th</sup> January 2023 at IPR.



Event marking the commencement of site activities for the new water cooling system

## Past Events @ IPR

- ◆ **Mr. H. L. Swami**, gave a talk on “IPR 14 MeV Neutron Irradiation Facility and its Proposed Utilization for Radiopharmaceuticals Research” at NAARRI International Conference (NICSTAR-2023) on Radiation Technologies: Challenges & Opportunities for Sustainable Development, Kerala, 9-12 January 2023
- ◆ **Mr. Jagannath Mahapatra**, gave a talk on “Magnetohydrodynamic study of Magnetic Island Coalescence – Role of Shear Flows” on 18th January 2023
- ◆ **Mr. Shivam Kumar Mishra**, gave a talk on “Radiation Reaction Effects on Laser Driven Acceleration of Charged Particles” on 20th January 2023
- ◆ **Dr. Sarvesh Kashyap**, Indian Institute of Technology (BHU) Varanasi, gave a talk on “Numerical and experimental studies on evaporative cooler” on 20th January 2023
- ◆ **Mr. Vijay Bedakihale**, gave an invited talk on “Challenges in welding during fabrication of ultra-high vacuum systems and components” at National Welding Seminar 2022 on 21st January 2023
- ◆ **Dr. Ujjwal K Baruah**, gave a talk on “Simulating the Sun: Fusing Atoms”, at Amalthea - IIT Gandhinagar’s Annual Technical Summit, on 22nd January 2023
- ◆ **Mr. Prince Kumar**, gave a talk on “Study on rotating dusty plasma equilibria and their excitations in strongly coupled quasi- localized regime” on 25th January 2023
- ◆ **Dr. Nancy Verma**, Raman Research Institute, Bengaluru, gave a talk on “Laser Ablation and Surface Structuring of Selected Solid Targets” on 3rd February 2023
- ◆ **Dr. Avnish Kumar Pandey**, gave a talk on “Impact of Electron Temperature inhomogeneity on radial Plasma Properties in a cylindrical CCP discharge and a revisit on SCR method” on 10th February 2023

## Upcoming Events

- ◆ Power and Energy Conference (PECI 2023), Electrical and Computer Engineering Building (ECEB), University of Illinois, Urbana, 2-3 March 2023; <https://peci.ece.illinois.edu/>
- ◆ Physics Teachers Education Coalition Conference (Phystec-2023), Las Vegas, 3-4 March 2023; <https://phystec.org/events/2023-phystec-conference>
- ◆ 15th International Symposium on Advanced Plasma Science and its applications for Nitrides and Nanomaterials/16th International Conference on Plasma-Nano Technology and Science (ISPlasma2023 / IC-PLANTS2023), Nagoya, Japan, 5-9 March 2023; <https://www.isplasma.jp/>
- ◆ 10th International Conference on Frontiers of Plasma Physics and Technology (FPPT-10), Tribhuvan University, Kathmandu, Nepal, 13-17 March 2023; <https://fpptseries.org/>
- ◆ Radio Astronomy School 2023, National Centre for Radio Astrophysics of the Tata Institute of Fundamental Research (NCRA-TIFR), Pune, 13-24 March 2023; <https://conf1.ncra.tifr.res.in/event/9/>
- ◆ 49th IOP Annual Plasma Physics Conference, Oxford, 27-30 March 2023; <https://www.iop.org/events/49th-iop-annual-plasma-physics-conference>



Title	Page No
National Science Day 2023	1-3
Observance of Martyr's Day @ IPR & CPP-IPR	4, 5
अखिल भारतीय हिंदी वैज्ञानिक संगोष्ठी में प्रतिभागिता	5
Plasma Exhibition at MahaEduFest 2023	6-7, 12
IPR Academic visits	8

Title	Page No
Outreach Activities @ CPP-IPR	9
Visit of AIM-NITI Aayog Team	10
New Cooling Water System @ IPR	11
Past and upcoming events	11
KYC	12

### Know Your Colleague



**Mr. Rajamannar Swamy** joined IPR as a technical trainee in 2009 after completing his M.Tech from NIT, Calicut. He started working with High Temperature Technologies Division in 2010 and has actively involved in establishment of High Heat Flux Test Facility (HHFTF). He mainly contributed in the design, fabrication, installation, commissioning, operation and maintenance of various sub-systems of HHFTF like vacuum system, target handling system, High Pressure High Temperature Water Circulation System and secondary cooling system.

Presently he is involved in design and development of new target handling system and extension chamber for testing helium cooled test components in HHFTF. His areas of interest include design and analysis of mechanical systems. As part of academics, he has supervised M.Tech and summer school students.

### Plasma Exhibition at MahaEduFest 2023



IPR Team along with the student volunteers of the IPR exhibition at the MahaEduFest 2023 held at Pune

### The IPR Newsletter Team

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

Institute for Plasma Research  
Bhat, Near Indira Bridge  
Gandhinagar 382 428,  
Gujarat (India)



Web : [www.ipr.res.in](http://www.ipr.res.in)  
E-mail : [newsletter@ipr.res.in](mailto:newsletter@ipr.res.in)  
Tel : 91-79-2396 2000  
Fax : 91-79-2396 2277