IWSA NEWSLETTER

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Ganit Pratiyogita Team at AECS-5, Anushaktinagar, Mumbai on 26th November 2023

Ganit Pratiyogita Team at Tarapur, along with the students on 26th November 2023

Millet Mahotsav at IWSA Headquarters on 9th December 2023

HSNC University in association with IWSA conducted a National Symposium on Millet Convergence at K.C. College, Churchgate, Mumbai on 18th December 2023

Grand Finale of Year of Millets

BRANCHES

Roorkee 1979, Hyderabad 1979, Pune 1980, Nagpur 1982, Kolhapur 1982, Delhi 1987
Kalpakkam 1987, Baroda 1988, Amravati 2010, Bengaluru 2018, Nellore 2018

BRNS sponsored Popular Science lectures at colleges

BRNS Lecture at Mukesh Patel College, Vile Parle, Mumbai on 13th September 2023

BRNS Lecture at Rajiv Gandhi College, Vashi, Navi Mumbai on 14th September 2023

BRNS Lecture at Union Christian College, Aluva, Kochi on 10th October 2023

BRNS Lecture at St. Teresa's College, Ernakulam on 19th September 2023

BRNS Lecture at St. Xavier's College, Mumbai on 24th November 2023

BRNS Lecture at SIES College of Arts, Science and Commerce, Nerul, Navi Mumbai on 11th October 2023

BRNS Lecture at CKT College, Mumbai on 30th November 2023

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From the Editor's Desk

Dear IWSA members,
Season's Greetings to all of you!

With the hectic Golden Jubilee celebrations behind us, we are now back into our regular activities.

In this quarter, our academic activities at the HQ included regular BRNS sponsored Popular Science lectures which were conducted in schools (5), colleges (10), and the public awareness lectures (7), which were conducted under our "Science and our life" (SAOL) series. Several of our IWSA members presented papers in National and International Conferences on "Sustainability" in which the Learning Garden and Living Museum of IWSA was showcased. Some of our members also participated in a National Conference on "Millets Convergence".

In November 2023, we conducted our first, completely in-house managed, IWSA Ganit Pratiyogita (IGP 2023), an inter-school, Mathematics Olympiad equivalent exam for 7th and 8th std students of DAE CBSE schools. A very interesting Article on "Designing of Small Modular Reactors" written by our member, Dr. Umasankari Kannan, retd. Head of the Reactor Physics Design Division, BARC, has been included in this issue.

Our Community Programs' organisers have also been very active. The Nursery School and Education Committee, the Day Care and Working Women's Hostel committee, Computer Education Committee, Library committee, and Health Care Centre were all busy organising several community-based programs, including a small event for the mentally and physically challenged children of our society. We also held a Millet Mahotsav @ IWSA to commemorate the International Year of Millets. The importance of different types of millets, their sustainable growth requirements, their nutritive value, and different easy to cook recipes of millets were highlighted in this Mahotsav.

We have taken this opportunity to write about inspiring women achievers, congratulated our IWSA women achievers, and written about the outstanding work of the Nobel Laureates of 2023. The highlight achievement of this quarter was the appointment of our member, Dr Lalitha Dhareshwar on the National Council for Science & Technology Communication (NCSTC) Division's Apex Advisory Committee for Science and Technology Communication, by the Government of India.

Different activities undertaken by the IWSA branches from Amravati, Baroda, Bangaluru, Kalpakkam, Kolhapur, Nagpur, Nellore and Roorkee have been described in this issue.

I hope all our readers keep updated about the activities at IWSA, initiate new ideas, and contribute towards the growth of our academic, educational and community programs.

Dr. Sheela Donde
drdonde@gmail.com

President's Message

The theme of the year-long celebration of IWSA's Golden Jubilee was "Look Back to Move Forward and Soar". The varied activities planned by IWSA HQ and the eleven Branches reflect this theme. The Popular Science lectures organized by HQ as well as the branches follow the tradition set by the senior members more than a decade ago. But several novel ideas have been introduced to widen the scope of the Popular Science lectures. The lectures organized for School students explain the basic concepts through demonstration of experiments involving participation of the students. There were two lectures on Robotics, one in English and the other in Marathi, where the students could make models of some remote-controlled cars. These new ideas encourage the students to take up science for their higher studies. Similarly, the "Science and Our Life" series of lectures brings in online lectures of interest to public at large. Many varied activities are being planned in addition to the regular lecture series. After the success of the first Mathematics Olympiad held last year by the headquarters, this year too a successful Mathematics Olympiad was conducted for Atomic Energy Central Schools, Anushaktinagar under the name IWSA Ganit Pratiyogita (IGP 2023).

Several IWSA members participated in National and International Symposia on Sustainability and presented their work which brought in a lot of visibility to IWSA. IWSA members were invited to deliver lectures on Teacher's Day, International Day of Scientific Culture and other important events in Mumbai and Navi Mumbai. Dr. Lalitha Dhareshwar has been appointed as a member of the National Council for Science & Technology Communication (NCSTC) Division's Apex Advisory Committee for Science and Technology Communication, which is an honour and recognition of IWSA's efforts in Science Communication. IWSA celebrated the international Year of Millets 2023 by organizing Millet Mahotsav at IWSA and participating in the National Conference on Millet Convergence, nurturing seeds of sustainability. Students from management institutes came forward to work with IWSA as volunteers in these events which is creating a positive impact in their career path and expanding our outreach.

The visit of Dr. Pheroza Godrej to IWSA which coincided with the celebration of the 91st Birthday of Dr. Sudha Padhye was a memorable event for us. Activities organized by IWSA's library, health centre, computer centre, Early Childhood Education programs go on adding feathers to IWSA's cap. All the branches of IWSA have their own unique activities through which they reach out to society in various educational and community welfare programs. This Newsletter brings interesting articles on topics such as Small Modular Reactors which can replace carbon-based power plants, on Nobel prizes 2023, several interesting stories of women achievers of past and current years. As the annual festival season commences, I wish all our readers and their families the best of times and good health.

Dr. Shyamala Bharadwaj
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Reports from Head Quarters

Science Awareness Programs

A. IWSA – BRNS Popular Science Lectures for Colleges

These lectures were conducted onsite at various Colleges on the topics of interest to the College. The speakers were identified by IWSA. Students from various classes-FY BSc-to-MSc, attended the lectures along with faculty. For each of the lectures the audience was informed about IWSA and the college. The lectures were followed by discussions with the speaker.

1. Date: **13th September 2023**
   Title: **Recent Advances and Applications in Superconductors**
   Speaker: **Dr. Avradeep Pal,** Assistant Professor, Department of Metallurgical Engineering and Materials Science, IIT Bombay, Powai, Mumbai.
   Venue: **Mukesh Patel School of Technology Management & Engineering (MPSTME), NMIMS University, Mumbai**

   Abstract: The discovery of superconductivity in 1911 firmly paved the way to the realization that even macroscopic materials in the solid state are inherently quantum mechanical in nature. Prof. Pal traced the fascinating story of the discovery and development of superconductivity starting from the history of superconductivity to a detailed explanation of the scientific concepts governing the phenomenon of superconductivity. He gave a glimpse into the future of what lies ahead in the field of superconductivity and its applications ranging from quantum computing to the designing of Josephson junctions.

   Outreach: 120

2. Date: **14th September 2023**
   Title: **Polycystic Ovary Syndrome (PCOS)**
   Speaker: **Dr. Anushree Patil,** Scientist E (Deputy Director), Head of Division of Clinical Research, In charge of Multidisciplinary PCOS Clinic at ICMR-NIRRCH, Mumbai
   Venue: **Rajiv Gandhi College of Arts, Science and Commerce, Vashi, Navi Mumbai**

   Abstract: Polycystic Ovary Syndrome (PCOS) is becoming an area of global and national health concern. It requires a life cycle approach from adolescence to menopause and treatment is different at different stages of a woman's life. It is the most prevalent female endocrine disorder with estimates ranging from 2.2% to as high as 26%. It has long term metabolic and health related co-morbidities.
   The other metabolic abnormalities associated with PCOS are obesity, dyslipidemia, insulin resistance, and hypertension, which confer an increased risk of long-term health consequences such as type II diabetes mellitus and cardiovascular risk. Women with PCOS are about three times more likely to develop endometrial cancer compared with women without it.
   Therapy should focus on the short term as well as the long-term reproductive, metabolic, cosmetic, and psychological aspects of the condition along with counselling of family and caregivers to provide social support. In the long run PCOS has an enormous financial implication on families, medical systems, and health economies.

   Women with PCOS primarily present with varied symptoms to general physicians. Referral to various specialties is required. Holistic evidence-based management of PCOS at an early age

can prevent long term morbidities. Integrated Multidisciplinary PCOS clinics with holistic care under one roof for weight reduction, nutrition, cosmetic and psychological issues are required to improve overall health, patient adherence and to combat the rising burden of PCOS and Non-Communicable Diseases (NCDs). ICMR-NIRRCH has established a Multidisciplinary PCOS Clinic in Mumbai. Such an approach can serve as an opportunistic window for screening and treating co-morbidities beyond reproductive health at an early age. Lifestyle modification interventions play a key role in this condition.
All these aspects were discussed in detail and queries related to PCOS were addressed.

Outreach: 100

3. Date: **19th September 2023**
   Title: **From Genes to Gene Editing: Developments in Biosciences**
   Speaker: **Dr. Susan Eapen,** Former Senior Scientist, Bhabha Atomic Research Centre, Mumbai
   Venue: **St. Theresa's College, Ernakulam, Kochi.**

   Abstract: Based on his experiments on garden pea in the middle of the 19th century, Gregor Mendel found that traits were inherited as discrete units called factors and he laid the foundation of genetics. The word 'Gene' was coined later by Wilhelm Johanssen. A major landmark was attained in 1953 when James Watson and Francis Crick devised the double helix model of DNA – the hereditary material. Various milestones like development of restriction enzymes, recombinant DNA techniques, cloning of genes, genetic engineering of organisms, stem cell therapy, genome sequencing, 3-D printing of organoids/ organs, lab-grown meat etc. were presented. In this lecture, Dr. Susan Eapen dealt with development of microbes which produce biodegradable plastics as well as organisms which degrade pollutants and take up heavy metals. Precise editing of genome using a variety of techniques, specially using CRISPR-CAS 9, was presented. Applications of genome editing for treatment of diseases and ethical issues of genome editing were also discussed.

   Outreach: 100

4. Date: **10th October, 2023**
   Title: **What can nanoengineered materials do in modern medicine?**
   Speaker: **Dr. Deepthy Menon,** Amrita School of Nanosciences & Molecular Medicine, Amrita Vishwa Vidyapeetham, AIMS-Kochi
   Venue: **Department of Chemistry & Physics, Union Christian College, Aluva, Kochi**

   Abstract: Nanomaterials, which are materials with nanoscale dimensions, typically ~ 100 nm, possess radically distinct physico-chemical properties, in comparison to their bulk counterparts. Owing to such size scale effects, the utility of nanomaterials in diverse areas of science and technology have emerged. In the field of medicine, the use of nanotechnology is revolutionizing the way diseases are diagnosed and treated. It is the unique interactions offered by nanoscale materials at the cellular level that allows for such remarkable differences. Thus, a variety of smart and innovative materials have emerged with applications in medicine, spanning areas such as diagnosis, bio-sensing, drug delivery as well as tissue engineering. The enhanced sensitivity and specificity offered by nanomaterials upon interaction with biological systems makes this diversity possible. In this talk, Dr. Deepthy Menon gave an overview of the benefits of using nanomaterials in medicine, be it in imaging, therapy or tissue regeneration.

   Outreach: 70

5. Date: **10th October 2023**
   Title: **Climate Change and Extreme events**
   Speaker: **Dr. Arpita Mondal,** Associate Professor, Department of Civil Engineering, Indian Institute of Technology Bombay, Powai Mumbai
   Venue: **SIES College of Arts, Science and Commerce, Nerul, Navi Mumbai.**

   Abstract: Human-induced climate change has been responsible for enhanced greenhouse gas effect and global warming. Dr. Arpita Mondal discussed what causes global warming and how it affects the earth's climate system, with a particular focus on extreme events such as heat waves, floods, and droughts. She also highlighted the physical processes governing such changes and some statistical techniques that are used to model them. Finally, she briefly touched upon what the implications for such extreme events can be for the city of Mumbai and delineated pathways to deal with this pressing global challenge.

   Outreach:100

6. Date: **24th November 2023**
   Title: **Bio-inspired catalyst design strategy for sustainable H_2 production from water**
   Speaker: **Dr. Arnab Dutta,** Associate Professor, Department of Chemistry, Indian Institute of Technology Bombay, Powai Mumbai
   Venue: **Department of Chemistry, St. Xaviers' College, Mumbai** (Empowered Autonomous)

   Abstract: The current global energy requirement is primarily dependent on conventional fossil fuels (coal, oil, natural gas), which invariably emit a copious amount of CO_2, leading to adverse climate change effects. Renewable energy resources (solar, wind, tidal, etc.) have emerged as apt alternatives to resolve this conundrum; however, they require a stable energy vector due to their intrinsic intermittence. Hydrogen molecule fits the bill as it can be directly used in a fuel cell for energy production following a greener pathway. Therefore, hydrogen production has become a bustling research area via sustainable methods. Since water is an abundant resource of protons and covers over 71% of the planet, hydrogen evolution from water becomes useful. Our group has developed a strategy for designing synthetic catalysts based on the architectural framework of enzyme active sites. The inclusion of proton exchanging outer coordination sphere feature is found to be a key component for enhancing the catalytic performance for an otherwise weak catalyst core. This outer coordination sphere feature can be incorporated in the form of amino acids, vitamins, neurotransmitters, drug molecules, and even nucleic bases. The evolution of this unique genre of bio-inspired catalysts and its optimized application for electrochemical and photochemical H2 evolution were discussed in this lecture.

   Outreach: 100

7. Date: 30th November 2023
   Title: **Host-pathogen interplay in the emergence and re-emergence of viral diseases**
   Speaker: **Dr. Vainav Patel,** Head, Department of Biochemistry & Virology, NIRRCH, Parel, Mumbai
   Venue: **Department of Microbiology, Changu Kanu Thakur College, New Panvel**

   Abstract: During this lecture, Dr. Patel addressed basic epidemiological principles such as prevalence, incidence, and their relevance to surveillance of viral infections followed by reviews of important past, present, emerging and re-emerging viral infections relevant to child and maternal health. Specifically, technological tools, vaccination success stories, their limitations, challenges of chronic viral infections and lessons learnt from emerging and re-emerging epidemics were covered

for viruses such as Herpes, HBV, HIV, Zika and CMV. The view of changing epidemiology spanning the last 100 years were also highlighted regarding both successes and failures in our ability to combat viral infections. He discussed these aspects of both equilibrium (HSV, CMV, HPV) and non-equilibrium (HBV, HIV, Ebola) viral infections as well as lessons learnt from recent epidemics of Nipah, Zika & SARS-CoV-2. The current controversy regarding intentional non-vaccination and its implications for public health, as evidenced by re-emergence of measles and mumps were also discussed.

Outreach: 73

8. Date: **12th December, 2023**
   Title: **Biological advances in crop protection methods**
   Speaker: **Dr. Annamma A. Odaneth, Group Leader** - Biotechnology, R&D Chemistry, R. D. Shroff UPL Research Centre, Thane
   Venue: **Department of Botany & Department of Microbiology, Ramnarain Ruia Autonomous College, Matunga East, Mumbai**

   Abstract: Crops are vulnerable to significant damages resulting in lower yield and substantial economic losses for farmers. Crop protection methods are, therefore, critical in agriculture as it increases crop yield and quality providing protection to crops from insects, fungi, and even weeds. In conventional farming, agents used include insecticides, herbicides, and fungicides aimed to eradicate pests, weeds, and diseases that would otherwise kill crops. While these measures can help to lessen risks, an overabundance of them could be harmful to the environment and humans. As a result, it is critical for farmers to consider adopting integrated pest management (IPM) approaches, which include the use of various tactics such as crop rotation, biological control, and cultural practices, thereby reducing reliance on chemical inputs. Biologically supported cutting-edge approaches take a more selective and environmentally benign approach to crop protection, thereby, ensuring the long-term profitability of farming. Sustainable agricultural method developments are focused to mitigate climate change by lowering greenhouse gas emissions and increasing carbon absorption in the soil. New biological crop protection solutions are continuously being developed and researched to reduce the demand for agro-chemicals. Insects such as ladybirds and parasitic wasps are typically used in these treatments due to their capacity to reduce pest populations organically and efficiently. Microorganisms that prevent pests and disease-causing organisms from growing include bacteria and fungi. These bacteria fed directly to crops would also aid to enhancing the soil's natural defences. Sustainable crop protection solutions may be found in the use of pheromones and plant extracts, both of which are currently being researched. The use of biotechnology enabled newer methods through the combination of DNA and RNA editing systems by understanding and exploiting plant–pathogen interactions pave the way for next generation of Integrated Targeted Pest Management Methods. Dr. Annamma Odaneth discussed all these practices in detail in her lecture.

   Outreach: 111

9. Date: **16th December, 2023**
   Title: **Decoding Metagenomics: Concepts, Tools, and Applications**
   Speaker: **Dr. Vikrant Bhor,** Scientist E, Department of Molecular Immunology & Microbiology, NIRRCH, Parel, Mumbai
   Venue: **Dept. of Biotechnology, SIES College of Arts, Science & Commerce, Sion (W), Mumbai**

   Abstract: Metagenomics, a cutting-edge tool that transcends the limitations of traditional microbiological methods, allows comprehensive genomic analysis of microbial communities within a particular environment. It is powered by next generation sequencing (NGS) technology which along with advanced computational algorithms enables high resolution mapping of microbial genomic

content. The rapid advances in metagenomics over the past decade have facilitated parallel developments in the fascinating science of the 'microbiome'. This in turn has led to both fundamental discoveries as well as translational applications in diverse fields spanning environmental sciences to health care. Dr. Bhor provided an overview of the basic concepts, details on the variety of tools employed and finally focus on some of the pathbreaking applications of metagenomics.

Outreach: 80

10. Date: **18th December, 2023**
Title: **An Epigenetic Road to Genome Instability in Response to Persistent Stress**
Speaker: **Dr. Sanjay Gupta,** Principal Investigator, Carcinogenesis, Genome Biology and Precision Medicine, ACTREC, Kharghar, Navi Mumbai
Venue: **Department of Biological Sciences, Sunandan Divatia School of Science, SVKM'S NMIMS,** deemed to be University**, V.L. Mehta Road, Vile Parle (W), Mumbai**

Abstract: Everyone encounters stress during their lifetime; stressors include responsibilities, societal influences, early-life hardship, hormone imbalance, and environmental exposures. The body responds, referred to as the fight-or-flight response, to stressors by releasing stress and tropic hormones. The fight-or-flight response manages short-term or low-dose stressors, although persistent or long-term stress can be detrimental. Research has shown that long-term persistent stress disrupts the physiological and homeostatic state. Multiple studies have shown that stress has a link to cancer risk; however, the relationship could be indirect.
In the presentation, Dr. Gupta discussed in detail whether any direct association exists between persistent stress, histone isoform mRNA polyadenylation, and cancer. Almost all eukaryotic messenger RNAs have a poly(A) tail, which is crucial for translation initiation and mRNA stability throughout the cell cycle. Interestingly, histone isoforms mRNA does not have poly(A) tail, expressed at high levels during the DNA replication or S-phase, and decrease rapidly at the end of the S-phase of the cell cycle. If histone isoform mRNA gets a poly(A) tail, the stability should increase with presence in all cell cycle phases, potentially leading to genomic instability and cellular transformation.
The recent in vitro and in vivo studies in cancer models and human tissues have shown that persistent exposure to stress downregulates mRNA binding protein, stem-loop binding protein (SLBP), a key factor for post-transcriptional regulation of histone isoform mRNA polyadenylation. The balance between mRNA binding proteins, SLBP, and ARE binding proteins, HuR, and BRF1 at 3'UTR regulates the stability of polyadenylated histone isoforms mRNA transcripts. These changes contribute to histone-DNA stoichiometry alterations, transcriptional deregulation, cell-cycle variation, genomic instability, and cancer development.

Outreach: 108

B. IWSA – BRNS Popular Science Lectures for Schools

These lectures were conducted onsite at various schools on the topics of interest as advised by the principal. The speakers were identified by IWSA. Students from classes-8th Std to 12th Std attended the lectures. The abstracts are given below.

1. Date: **14th September 2023**
Title: **Learning Current Electricity and Applications through Demonstrations and Experiments**

Speaker: **Prof. Kartikeyan Subbu**, Assistant Professor, Department of Physics, Mithibai College of Arts, Chauhan Institute of Science and Amrutben Jivanlal College of Commerce and Economics, Vile Parle (W), Mumbai
Venue: **St. Mary's High School, Mazagaon, Mumbai**

Abstract: In this lecture, Prof. Karthikeyan explained basic concepts of electricity (8th Standard class level) with demonstrations. These include generation of electricity through chemical processes, working of batteries, measurement of voltage and current, construction of an electromagnet and its application. In the context of 'renewable source' of electricity a photovoltaic cell was shown. Simulation of electric circuits using an open-source software 'Phet' was introduced.

Number of attendees: 183

2. Date: **28th November, 2023**
   Title: **Radiation and its application in preservation of food**
   Speaker: **Dr. Yojana Singh,** Retd. Senior Manager, Market Research & Publicity (MR&P) Board of Radiation and Isotope Technology (BRIT), DAE BARC Vashi Complex, Sector – 20 Vashi, Navi Mumbai
   Venue: **Smt. Radhikabai Meghe Vidyalaya, CIDCO Sector 16, Airoli, Navi Mumbai**

Abstract: Since the creation of universe, natural radiation has been an integral part of our environment. However, man has learnt the use of artificial radiation merely a century ago. Since then, application of radiation has played a significant role in improving the quality of life of human beings. Though we are aware of its importance, the fear created by use of nuclear weapons is so deep, that we are still struggling to overcome it.
Department of Atomic Energy, DAE, is contributing significantly for the development of nation using nuclear energy & radiation in health, agriculture, industries & research.
In this lecture the utility and importance of radiation of Food was explained by Dr. Yojana Singh.
Food irradiation is used because this technology can reduce food loss and facilitate agricultural exports –important for our country to sustain agriculture economy –a great help for our farmers. Traditional methods of preservation like freezing, boiling, salting, pasteurization etc. was good for our needs at home or small business but not for the nation or to sustain the population's needs.
At the National level, today with a growing population a new sustainable and economical method is very important for preservation of food.

Number of attendees: 160

3. Date: **1st December 2023**
   Title: **Learnings in STEM - Using the robotic kit Witblox**
   Speaker: **Ms. Linsha Prakashan**, Co-Founder and COO at Witblox, Mumbai
   Venue: **New City International School, Kharghar, Navi Mumbai**

   Abstract: Educational Robotics is an interdisciplinary learning environment based on the use of robots and electronic components as the common thread to enhance the development of skills and competencies in children. WitBlox is a Robotics Learning Tool developed for children. It helps children learn Design, Hardware, Electronics, and Programming. It contains Lego-like electronic sensors, using which children can make any circuit logic. It's easy to plug, connect, and start building projects. In the session, a hands-on robotic workshop was conducted for children to make them understand the concepts of power, input, control, and output. A pre- and post-assessment was also conducted in order to know how much the children have learned.

   Number of attendees: 50

4. Date: **18th December 2023**
   Title: **: Down the Rabbit Hole: Decoding Nature's Tiniest Mysteries**
   Speaker: **Mr. Carl Rosario,** Physics Teacher, B.D. Somani International School
   Venue: **St. Mary's ICSE School, Koperkhairane, Navi Mumbai**

   Abstract: The aim of the talk is to help students appreciate and understand the study of sub-atomic particles. This talk will focus on the timelines and methods of discovery of electrons, protons and neutrons which are the main atomic particles that we know of. Through this timeline journey, of the discovery of these particles, we will learn electricity. There will be a few engaging demonstrations, experiments and activities to help grasp concepts in an intuitive way. It will be an exciting exploration and deeper understanding of the subatomic universe.

   Number of attendees: 300

5. Date: **22nd December 2023**
   Title: **Remote controlled Car**
   Speaker: **Mr. Rajesh Deshmukh,** Robotics Engineer, Witblox, Mumbai
   Venue: **New City Saraswati Vidhyalaya, Murbi Village, Kharghar, Navi Mumbai**

   सारांश

   ऑटोमेशनमधील नवीनतम ट्रेंड कोणते आहेत व त्याच्या मागची वैज्ञानिक तत्त्वे व तांत्रिकी ज्ञानकाय आहे?
   अभियांत्रिकी डिझाइन प्रक्रिया किंवा अभियांत्रिकीचे विशाल क्षेत्र हे ऑटोमेशनचे एक रोमांचक क्षेत्र आहे.
   बरेच विद्यार्थी गणित आणि विज्ञानातील मनोरंजकता गमावतात आणि विज्ञान, तंत्रज्ञान, अभियांत्रिकी आणि गणित क्षेत्रांचा पाठपुरावा करत नाहीत, आणि म्हणून दररोज वापरत असलेल्या गॅझेटचे कार्य समजूशकत नाहीत. या व्याख्यानात प्राथमिक अभियांत्रिकी आणि डिझाइन प्रकल्प वापरून अधिक सखोल प्रकल्पावर चर्चा केली जाईल ज्यामुळे मुलांना आपण शाळेच्या वर्गात शिकत असलेल्या मूलभूत संकल्पनांमधून तंत्रज्ञान कसे विकसित होते हे समजण्यास मदत होईल. या व्याख्यानात ऑटोमेशनमधील नवीनतम ट्रेंड काय आहेत, ट्रान्समीटर आणि रिसीव्हर्स कसे कार्य करतात आणि समस्या सोडवणारे कसे बनतात हे, "रिमोट कंट्रोल कार" चे उदाहरण वापरून समजावण्यात येईल.
   आज आपण रिमोट कंट्रोल कार काय असते हे शिकणार आहोत, आणि आपण बनवणार सुद्धा आहोत. आपण आपल्या कल्पनेनुसार त्या त्या कार चे डिझाईन करू शकतो व बनवू शकतो.
   कार बनवण्यासाठीवापरले आहे टी-एक्स आर-एक्स ब्लॉक्स. टी-एक्स म्हणजे ट्रान्समिटर, आणि आर-एक्स म्हणजे रिसिव्हर. या ब्लॉक्समध्ये आर-एफ टेक्नॉलॉजी चा वापर करून माहिती एका ठिकाणाहून दुसऱ्या ठिकाणी पोहोचवली जाते. गाडी सरळ चालवण्यासाठी दोन्ही चाके समान दिशेने फिरणे गरजेचे असते, यासाठी आपण टी-एक्स वरील a1 व b1 बटन दाबावे.आपल्याला रिमोट कंट्रोल कार बनवण्यासाठी लागणारे साहित्य: विटब्लॉक्स, पावर दोन मोटर, मोटर ड्रायव्हर ब्लॉक्स, आणि टी-एक्स आर-एक्स ब्लॉक्स जो आपल्या रिमोट चे काम करेल. मी हे प्लास्टिकचे विटब्लॉक्सपार्ट्स आणले आहेत जे आपल्याला साचे बनवायला मदत करतील.

   Number of attendees: 100

C. IWSA – BRNS "Science and Our Life (SAOL)" Series of Webinars

These Science Lectures for General Public were conducted on Google Meet online platform of IWSA, on the various topics of interest to the general public. The speakers were identified by IWSA.

1. **37th SAOL Lecture**
   Date: **9th September 2023**
   Title: **Revitalizing Ecosystems: The Forests by Heartfulness Conservation Initiative**
   Speaker**: Dr. Ananya Rao,** Senior Scientist, Forests by Heartfulness, Heartfulness Institute & Individual Specialist, UNESCO MGIEP, New Delhi

   Abstract: Forests by Heartfulness is a unique greening initiative by the Heartfulness Institute addressing the pressing challenges of climate change and environmental degradation which all of humanity is facing in the Anthropocene. This ambitious project redefines the concept of greening by focusing on the preservation and expansive propagation of rare, endangered, and indigenous plant species.
   With its flagship model at Kanha Shanti Vanam, India, the initiative has transformed 1500 acres of barren, semi-arid land into a thriving oasis using innovative scientific techniques and intuitive knowledge. Forests by Heartfulness now has mega greening projects across the country and is expanding worldwide as well. The endeavors of Forests by Heartfulness have received recognition by the United Nations Environment Programme (UNEP); Harita Mitra and Harita Haram awards from the Telangana State and the Government of India. Forests by Heartfulness exemplifies a holistic approach to conservation, symbolizing hope, and action in the face of environmental challenges. Dr. Ananya S. Rao guided the online participants of the webinar through the virtual journey of the evolution of this remarkable initiative, Forests by Heartfulness.
   Outreach:50

2. **38th SAOL Lecture**
   Date: **14th October 2023**
   Title: **Digital Eye Strain or Computer Vision Syndrome**
   Speaker**: Dr. Sayali S. Bhedasgaonkar,** DNB(Oph), FPCS (Oph), DOMS, MBBS, Senior Consultant, Dept. of Ophthalmology, BARC Hospital, Mumbai

   Abstract: Digital Eye Strain, also known as Computer Vision Syndrome, encompasses a range of eye and vision-related problems that arise from prolonged use of electronic displays, including desktops, laptops, tablets and cell phones. These devices have become an unavoidable part of our daily routine and so are the problems related to them. However, with some simple adjustments with our screen usage and lifestyle choices, we can effectively overcome these problems. Dr. Sayali Bhedasgaonkar explained to the participants simple techniques and exercises for addressing these concerns and improving our eye health. She also made the webinar interesting by posing some quiz questions to the participants and they could judge for themselves about how much they have understood the topic.

   Outreach:**50**

3. **39th SAOL Lecture**

Date: **10th November 2023**

Title: **Captive Management of Humboldt Penguins at Mumbai Zoo & the Importance of Zoos in Conservation, Education & Research**

Speaker**: Dr. Madhumita Kale-Vaze,** Head Veterinarian, Humboldt Penguin Section, Veermata Jijabai Bhosale Udyan & Zoo, Byculla, Mumbai

Abstract: Humboldt penguins were bought to a zoo in India for the first time in July 2016. Considering they were a foreign species, it was a challenge to successfully manage them in captivity.

The Byculla Zoo's penguin enclosure is a state-of-the-art facility that recreates the penguins' natural habitat as much as possible. The zoo also has a breeding program for Humboldt penguins, and 11 chicks have been hatched at the zoo in recent years.

The Humboldt penguins at Byculla Zoo are a valuable addition to the zoo's collection and an important part of its conservation efforts. The zoo's breeding program helps to ensure the survival of this species, and the penguins are also an educational tool that helps to teach visitors about the importance of wildlife conservation. Dr. Madhumita discussed their management in detail and how she and her colleagues in the zoo were able to successfully breed them in captivity in India.

Zoos play a vital role in conservation, both directly and indirectly. They help to conserve endangered species through captive breeding, research, and reintroduction programs. Zoos also educate the public about wildlife conservation and raise money to support conservation efforts in the wild. In short, zoos are essential partners in the fight to save our planet's biodiversity.

Outreach:38

4. **40st SAOL Lecture**

Date: **25th November 2023**

Title: **The Unexplored World of Caves**

Speaker**: Ms. Dhanusha Kawalkar,** Senior Research Biologist & PhD Scholar at Sálim Ali Centre for Ornithology and Natural History, (South India Centre of Wildlife Institute of India), Coimbatore & CEO, Speleological Association of India.

Abstract: Caves as ecosystems are often overlooked and go unnoticed by all of us because of inaccessibility, absence of light, and other unknown conditions. Hence, the subterranean ecosystems remain unexplored and insufficiently studied. Caves are unique and fragile habitats with their own energy production and conservation mechanisms. The isolated habitats are also considered the best natural laboratories. Even though after understanding the functional roles of caves and karsts, at present, these ecosystems possess a serious threat from cement production, coal mining, water pollution, and other anthropogenic activities, which could cause the extinction of cave species before they have even been documented. As caves form a unique yet vulnerable part of our natural and archaeological heritage, they must be protected, conserved, and restored. Hence, this talk is a way to promote safeguarding karst and cave areas worldwide and improve our understanding of the functioning of cave ecosystems.

Outreach:40

5. **41st SAOL Lecture**
   Date: **16th December 2023**
   Title: **Empowerment through preparedness: A key strategy to enhance women's resilience to disasters**
   Speaker**: Ms. Hemlata Pawagadhi**, Director & Managing Trustee, Nauka Talim Charitable Trust, Baroda and Co-Convenor, IWSA Baroda Branch

   Abstract: In the face of escalating global temperature and the looming spectre of climate change, the likelihood of more frequent and severe disasters is on the horizon. While disasters concern us all, a disquieting reality surfaces – women, in particular, are more vulnerable across all phases of disaster management, from preparedness to recovery. Communities' capacities to tackle the disasters and enhancing their resilience building is incomplete without women`s comprehensive involvement in disaster resilience efforts. However, women face unique challenges in disaster situation due to social, economic, and cultural factors. These includes limited access to information, resources and decision-making power which make them vulnerable to the devastating consequences of disasters. On the other hand, women possess a wealth of local knowledge, an understanding of their surrounding ecosystems and a robust social network that, if harnessed effectively can significantly contribute to disaster mitigation, response, and rebuilding. A disaster resilient community necessitates not only gender sensitive policy formulation but also an integrated approach that brings together local communities, government agencies, civil society, academic institutions, non-government organizations, the private sector, and international organizations. There is an urgent need for innovative strategies to achieve these collaborative goals. A holistic approach that goes beyond conventional norms, innovative strategies and inventive ways are needed for truly fortifying women in communities against disaster and empowering them for disaster management.

   Outreach: 18

6. **42nd SAOL Lecture**
   Date: **22nd December 2023**
   Title: **Chandrayaan Missions Of India**
   Speaker: **Dr. Mayank Vahia**, Retd. Prof. Department of Astronomy and Astrophysics, Tata Institute of Fundamental Research, Mumbai & Retd. Dean, School of Mathematical Sciences, SVKM's NMIMS (Deemed to be University) Vile Parle(w), Mumbai

   Abstract: India has sent 3 missions to the Moon in the Chandrayaan series. The first one was an orbiter and the third one was a lander. Dr. Vahia discussed the science that came from the 3 missions together and explained what we have learned about the moon from these missions.

   Outreach: 35

7. **43rd SAOL Lecture**
   Date: **29th December 2023**
   Title: **Bombay to Bihar – how a young doctor helped transform the lives of women & children in the villages of Bihar**
   Speaker: **Dr. Taru Jindal,** MS (Obst. & Gynaec), IBCLC Trauma Informed Coach, Lactation Consultant & Vaginismus Coach, Mumbai.

   Abstract: Propelled by the desire to be 'where I am really needed', Dr. Taru Jindal left Mumbai to work in rural Bihar in 2014. According to her, the two years that followed were probably the most beautiful years of her life. She worked in a district hospital in Champaran which was in shambles and doctors had deserted the hospital. In a year's time she could turn it into an award-winning hospital which has now become a role model for the country. She then worked in a remote area of

Patna district to help transform health of women and children in villages steeped in male domination and superstition, surviving mainly on treatment by 'jhola chaap' doctors. This was nothing less than an adventurous journey, filled with both tears and joy. This journey is chronicled in her book, "A Doctor's experiments in Bihar" (English) & "Haan Yeh Mumkin hai" (Marathi), soon to be converted into a movie. Dr. Taru Jindal shared her experiences of this adventurous journey in this lecture.

Outreach: 36

D. Participation of IWSA Members at the 5th International Conference on "Sustainability Education" on 19th & 20th September 2023 at New Delhi

The following paper was presented by Dr. Seema Purohit at the 5th International Conference on Sustainability Education, which was held at India Habitat Centre, New Delhi on 19th & 20th September 2023. Ms. Vijaya Chakravarthy also attended the conference and participated in the proceedings.

Topic: Learning Garden Living Museum: A Case Study of Sustainability Education

Authors: Dr. Seema Purohit, Mrs. Vijaya Chakravarty, Dr. Rita Mukhopadhyaya & Dr. Paramjit Anthappan

Abstract: People in cities are rapidly getting alienated from the natural world. 'Plant Blindness', the inability to see or notice plants is also increasingly becoming rampant. This insensitivity to flora is one of the major causes of neglect of plants leading to species extinction and loss of biodiversity. Loss of plant biodiversity is detrimental to society and threatens the stability of all of the planet's ecosystems. Unless people identify plants and learn how to use them in their daily lives, they will not feel the urge to protect them. To reinforce sustainability education among the general population, especially children and youth, the Indian Women Scientists' Association [IWSA] initiated a Learning Garden Living Museum [LGLM] at its premises. The garden is open to all visitors from tiny tots to super seniors. IWSA is working towards increasing awareness about the role of plants in human lives**.** IWSA through its various educational and skill development programs with school students, college interns, and volunteers is carrying out several conservation programs to educate and empower the community. LGLM is divided into several Bio-geographical regions and ecosystems. A large arboretum of native and medicinal plants for students and researchers to study. Several installations made from waste relating to eco-restoration, mangrove ecosystems, Butterfly life cycle, and Desert ecosystems have been put up along with visual displays of native birds and butterflies. A Tree Library, where children can read outdoors and also have fun while learning has been set up.

E. Participation of IWSA Members at Interdisciplinary National Conference on Scientific Approaches for Sustainable Environment on 4th & 5th December 2023 at Wilson College, Mumbai

IWSA members Ms. Vijaya Chakravarthi and Dr. Sweedle Cerejo Shivkar participated in the Interdisciplinary National Conference on Scientific Approaches for Sustainable Environment on 4th & 5th December 2023 at Wilson College, Mumbai and presented the following paper:

Topic: Traditional Ecological Knowledge of Ethno-Bengali Cuisine - Choddoshak in Biodiversity Conservation & Nutrition Security

Authors: Ms. Vijaya Chakravarty and Dr. Sweedle Cerejo-Shivkar

Abstract: Traditional Ecological Knowledge (TEK) is acquired through the close interaction between people and the natural world over several generations. The local resources have been influential in the subsistence of the indigenous communities, their use has been inseparable and vital component of the same. One of the major consequences of loss of Traditional ecological knowledge is environmental degradation. Studies often put the blame of ecological degradation on humans, and it is important to study the reverse of how human actions have helped in conservation. Documenting these ecological practices and analyzing their nutritional and medicinal values are important. A multi-disciplinary approach —Conservation biology, Anthropology and Ethnobotany is important for the study.

India has a rich repertoire of food practices based on traditional ecological knowledge. Many practices come in the guise of religion and promote identification of plant species and their conservation. Choddoshak, an ethno-medicinal cuisine of Hindu Bengalis is prepared from fourteen wild, green, leafy vegetables belonging to thirteen different botanical families. Choddo means fourteen and Shak is leafy vegetables. Choddoshak contributes to both species as well as dietary diversity.

These vegetables are Nutrition-dense, packed with medicine and provide several eco- services. These 14 plants are climate-smart and survive in high temperature and drought- like conditions. In the times of climate change they are ideal for food and nutrition security.

F. Participation of IWSA Members at the International Conference on Biological Sciences for Sustainable Future on 15th and 16th December 2023 at D.Y. Patil Deemed to be University, Navi Mumbai

IWSA Members Ms. Vijaya Chakravarthy, Dr. Srirupa Mukherjee and Ms. Vijaya Tilak participated at the International Conference for Sustainable Future on 15th and 16th 2023 at D.Y. Patil Deemed to be University, Navi Mumbai and presented the following papers:

1. Creation of Bio-Geographical Landscapes in Small Spaces for Sustainability Education

Authors: Dr. Srirupa Mukherjee and Ms. Vijaya Chakravarthy

Abstract: Greenery in cities is decreasing at an alarming rate. Space is at a premium and not readily available for plantation. ‘Plant blindness’, the phenomenon of not noticing plants and the inability to distinguish between species is a threat to sustainability. City dwellers are losing connection with the land. ‘Nature-deficient disorder’ is observed in both children as well as adults. This results in depression, obesity, and low levels of Vitamin D. The well-being of the community as well as the planet is compromised. People who don’t have positive experiences outdoors are unable to love and are not inclined toward nurturing the environment.

Zero acreage planting i.e., use of walls, terraces, window sills, and restricted tiny spaces is the need of the hour. Indian Women Scientists' Association has created an eco-friendly, 'Learning Garden Living Museum' in small, isolated spaces in their premises to promote biodiversity and 'sustainability education'.

Several Living models of bio-geographical regions like tropical rainforests, deserts, wetlands, coasts, Western Ghats, and the Deccan Plateau have been created. Container gardening in discarded drums has been developed. Medicinal plants from ancient Siddha, Ayurveda and Unani to modern Homeopathy and Allopathy as well as folk lore have been showcased. Plants, which attract multiple pollinators have been planted all over the garden. Modern techniques of QR codes, geo-tagging, hydroponics, drip irrigation, and electronic sensors to study underground moisture are incorporated.

2. Conscious Garden Practices for Sustainable Management of Natural Resources

Authors: Dr. Sweedle Cerejo-Shivkar, Ms. Vijaya Chakravarthy and Ms. Vijaya Tilak

Abstract: Gardens have been at the epicentre for education and recreation. Sustainability has become important to be understood and implemented in every sector. Sustainable Garden practices include water management, soil management, and mindful propagation practices to self-sustain a garden. Indian Women Scientists' Association's (IWSA) Learning Garden (LG) practises various methodologies. It imparts education to understand the plant species and intricacies of the food web and to manage the natural resources well. An amalgamation of conventional methods and modern technology influences the working of the Learning Garden. Managing the water, garden waste and preserving the soil is paramount to the conservation of these invaluable resources. Since 2018, with ample interactions with schools, colleges, professionals, and individuals from various walks of life the Learning Garden disseminated knowledge about biotic and abiotic components and their management to make a thriving open laboratory of the web of life.

G. IWSA – Student Internship Program

ITM BUSINESS SCHOOL internship 4th-16th December 2023

ITM (Institute of Technology and Management) Group of Institutions was founded in 1991 and has since become one of India's leading providers of technical and professional higher education where students have the options to select programs in engineering, management, health sciences, hotel management, culinary arts, design, and other fields.

As a part of experimental learning and Corporate Social Responsibility (CSR) activity, every year students from ITM Business School at Kharghar, Navi Mumbai undergo an internship program of two weeks, where students get to experience how a Non-Governmental Organisation (NGO) works. This year 20 students had taken up an internship program between 4th to 16th of December 2023 with IWSA. The main goal of this internship was to organize an event called "**MILLET MAHOTSAV – Gathering of Art & Science for Millet Awareness."**

The main activities that were carried during the internship program were research and a survey about the current scenario of knowledge about millets in nearby societies. The interns also spread awareness about the importance of millets through social media and visiting nearby schools, colleges, and societies. The students actively contributed to the growth and operation of IWSA during the internship and received hands-on experience in teamwork, event planning, research and survey, book review, the importance of effective reporting, and audio-video book presentations.

To sum up, the internship provided the students with insightful knowledge of content production, team dynamics, and event administration.

H. Garden-Based Learning (GBL) Activities

1. Visit of St. Mary's School Children on 30th September 2023.

About 40 students and two teachers attended the field visit. The program commenced with a ppt presentation on Mangroves followed by a garden trail to each section. Children enjoyed the visit and later they were taken to the mini seashore to show the mangroves along with IWSA members.

2. Farewell Function for IWSA's Gardener Munshiji's on 5th October 2023.

IWSA's Gardener Munshiji was felicitated with a shawl, coconut and Tulsi plant and adorned with a flower crown. All staff and members sang a song on nature. Members shared their experiences of working with him and praised his efforts and Munshiji shared his three-decade journey at IWSA.

3. Visit of Plant Swap Group on 14th October 2023.

About 30 members of a plant swap group visited IWSA's Garden on 14th October 2023. Seeds, saplings, and cuttings were exchanged between members of plant swap group and IWSA members.

4. Visit of Children from Vatsalya Foundation on 8th November 2023.

About 27 children aged between 7 and 14 years and four staff members along with the Director of Vatsalya Foundation, Ms. Swathi Mukherjee visited IWSA Garden as part of Children's Day Celebration. After the garden trail, children participated in diya painting competition. The children presented all IWSA members with creative Thank you card. The children were curious to know more about birds and other plants.

5. Fairy garden workshop and Christmas Party on 23rd December 2023.

This program consisted of story-telling session, creative poster making session on butterfly life cycle and other engaging activities for kids. Seven kids participated in this event. The children made use of the selfie point where they proudly showcased the fairy garden pots.

I. IWSA Ganit Pratiyogita (IGP 2023)

On 5th September 2023, at a meeting at IWSA, the name **IWSA Ganit Pratiyogita 2023 (IGP2023)** was coined. It was our first, completely indigenously designed, and managed, inter-school Mathematics examination. It was decided that the exam would be conducted on **26th November 2023**, for 7th and 8th Class students of the CBSE Board, of Atomic Energy Central Schools of DAE, based in Anushaktinagar. Later, the Tarapur Center was also included, as per their request. A registration fee of Rs 250/- was charged per student.

5 external experts from the field, namely, Ms Vidyutaa Kashyap, Ms Prasanna Srivatsan, Ms Sujata K V, Ms Janice Gonsalves and Ms Gloria Fernandes contributed to the Question Banks for Class 7 and Class 8 of the CBSE Board. IWSA Faculty independently designed 2 sets of question papers from these question banks, from which one hybrid question paper of each class was randomly selected, printed, and used for the exams. Eleven IWSA members served as invigilators / supervisors for the exams on 26th November 2023, at the two centres.

A total of 225 students registered, and 205 (110 boys and 95 girls), appeared for the exams. 14 boys and 5 girls won the awards. The Prize distribution event was held on 23rd December 2023 in the IWSA auditorium, from 3 pm to 6 pm. This was also an occasion to celebrate the National Mathematics Day 2023, which fell on 22nd December. The chief Guest was Prof. Dr. S G Dani, Distinguished Prof. of Mathematics, Centre for Excellence in Basic Sciences, University of Mumbai. The Guest of Honor was Dr. Mrs. Jyotsna Dani, Visiting Faculty, CEBS, University of Mumbai. All participating students were given e Certificates. Approximately 150 persons including students, parents, guests, teachers, IWSA members and staff attended the event.

J. Invitations received by IWSA Members from Colleges, DST, AERB and other Institutions.

1a. Dr. Shyamala Bharadwaj was invited by Seva Mandal Education Society located at Matunga, Mumbai which runs several colleges with more than 6500 women students on its campus as Chief Guest for their Teacher's Day Celebration on **5th September 2023.** During this celebration, several teachers of the Seva Mandal Education Society's Colleges were honoured. Dr. Shyamala Bharadwaj delivered the Chief Guest's address and emphasized the great role played by the teachers in shaping the lives of the future generation of the citizens of our country.

1b. Guru Nanak College of Arts, Science & Commerce, Sion, Mumbai in Association with National Center for Science Communicators (NCSC) celebrated International Day of Science Culture on **30th September 2023**. A one-day International Symposium was organized on this day in Hybrid mode where eight speakers spoke on the Theme of the Symposium, and this was followed by Panel Discussion on Diversity, Inclusion and Equity involving three panelists. Dr. Shyamala Bharadwaj was one of the eight invited speakers. She spoke on the inherent qualities and practical way scientific culture is deployed for organizational and societal benefits by BARC and IWSA. She also highlighted the work done by IWSA to inculcate the scientific culture among students and society at large.

2a. On **8th November 2023,** Ms. Vijaya Chakravarthy was invited by KBP college event entitled 'Millet Mela 2023 to give a talk on the 'Ecological & Nutritive aspects of Millets' and to judge the poster & cooking competitions. Dr Paramjit Anthappan and Ms Mangala Ghorpade represented IWSA at the program. Thirteen millet books were purchased by interested visitors

2b. Navi Mumbai Moms (NMM), Nerul invited, Ms. Vijaya Chakravarthi to speak about the importance of millets for nutrition and mother's role in introducing children to dietary diversity through their own food choices and making nutritious food available at home. Navi Mumbai moms is a group of about 7000 women which acts as a platform for women of Navi Mumbai to interact with each other and acts as a network to promote their interests/businesses. Ms. Vijaya Chakravarthy's lecture was organized at "10th Anniversary special NMM Momprenuers Bazaar 2023" **on 9th December 2023** at Nerul. 'NMM Mompreneurs Bazaar' is an annual event organized by NMM where the members of this group put up stalls for exhibition/sale of a variety of products like clothing, jewellery, handmade stuff, home decor, food etc. IWSA's book "Millets for Children" was also put up for sale and several books could be sold at this exhibition cum sales event.

3. Dr. Rita Mukhopadhyaya was invited to be one of the External Advisory Chair for the National Seminar on "Frontiers of Radiopharmaceuticals and Radiological Agents in Healthcare: Opportunities and Challenges". The Seminar was sponsored by Atomic Energy Regulatory Board (AERB) and organized by Faculty of Pharmacy, C.V. Raman University, Bhubaneswar. It was held at RIHC Auditorium, C.V. Raman University, Bhubaneswar during **15th and 16th December 2023**. Dr. Rita Mukhopadhyaya had sent a comprehensive message to the organizers about the diagnostic, therapeutic efficacy of radioisotopes, labelled compounds/biomolecules, and the environmental safety of their usage. She also highlighted the role played by IWSA in popularizing science and scientific thinking amongst all strata of society for the past 50 years.

4. Dr. Lalitha Dhareshwar has been appointed as a member of the National Council for Science & Technology Communication (NCSTC) Division's Apex Advisory Committee for Science and Technology Communication. The main mandate of NCSTC Division of Department of Science & Technology (DST) is to communicate Science and Technology to masses, stimulate scientific and technological temper and promote such efforts. An Office Memorandum dated **16th November 2023** regarding her appointment to the Apex Advisory Committee was received by Dr. Lalitha Dhareshwar from the Ministry of Science & Technology, Government of India. The tenure of this appointment is for three years.

K. Millet Mahotsav conducted on 9th December 2023 at IWSA

IWSA, Vashi, Navi Mumbai, celebrated "International year of Millets" on 9th December 2023 from 10:00 am to 8:00 pm.

A team of IWSA members, along with help from 20 students from ITM College, Kharghar, NM, who were interns at IWSA, organized "Millet Mahostav" at IWSA.

Dr. Yojana Singh, Convener for "Millet Mahotsav" gave a brief outline of the program. Dr. Nootan Bhakal, Vice President, IWSA talked about activities of IWSA and its mandates and Dr. Vijaya Chakravarty talked on the Importance of Millets.

After the inaugural session, other programs started with Cooking and Poster competitions. Twenty-three participants from various fields participated in the cooking competition and 3 awards were given. Dr. Anuradha Shekhar and Dr. Smitha Kekatpure were the judges for the cooking competition. For poster competition, we did not get good response due to ongoing exams of children. Still one prize for each batch (12-15 y and 16-18y) was given. Two Judges, Ms. Sudha Bharshikar and Ms. Aruna Joshi were invited to judge the poster competition. After the competitions, two doctors Dr. Nikki and Dr. Pankaj from Suddhi Ayurvedic Hospital, Vashi who use millets for treating various aliments in humans were invited to share their experiences. Mr. Bajaj from Satellite City Rotary Club gave a brief outline of the club. We received donations of Rs. 5000/- each from Rotary Club and Ayurvedic Hospital for the Millet Mahotsav. All the judges, doctors, and donors for our program, were felicitated.

The evening program started from 3:00 pm and went on till 8:00 pm. The Chief Guests for the evening program were Smt. Taral from Rotary club and Smt. Jasmine Manoj from WOW. All evening programs were conducted in open space of IWSA in garden. Eleven stalls were put up and various items of millets were exhibited and were available for sale. There was a nutrition counselling desk which had many visitors, and a registration stall where the Millet book by IWSA was displayed for sale. Beautiful Selfie point was set up by interns which was used by many visitors and IWSA members. A Fairy Garden point was set up for selling plants maintained by IWSA members. Several programs such as

singing, dancing, conducting Quiz, games for children and adults were carried out by interns with help from IWSA mentors. Live pottery class was conducted, and many participants enjoyed learning the art of making pots. Various prizes were given on the spot for events including for best stall etc.

Around 300 visitors attended the Millet Mahotsav and enjoyed the program.

L. Participation of IWSA team at the "National Conference on Millet Convergence," on 18th December 2023 at KC college, Mumbai

A team of IWSA Members participated as knowledge partners during "National Conference on Millet Convergence, nurturing seeds of sustainability" on 18th December 2023 by HSNC University, at KC College, Churchgate, Mumbai.

Dr. Hemlata Bagla, VC, HSNC University welcomed all the participants and inaugurated the conference. Smt. Rujuta Diwekar, renowned nutritionist was the Chief Guest and Padma Shree Smt. Rahibai Popere, the seed mother of India was the Guest of Honor for the program. They gave excellent talks on millets and its advantages. Smt. Rahibai informed how she started collecting seeds for many years for the future of the country. The diverse use of millets was highlighted by all guest speakers. Around 200 students participated in this conference which was well organized by KC college dedicated team of staff and students.

Dr. Susan Eapen and Dr. Rita Mukhopadhyaya from IWSA were part of the organizing team. During the event, IWSA put up a stall for nutrition counselling, for displaying books on millets and all the information about IWSA.

The following talks were delivered by experts during the conference:

1. "Journey of Millets & Sustainable Development Goals" by Dr. Vijaya Chakravarty from IWSA
2. "Millets as Nutri Cereals" by Smt. Anuradha Shekar from IWSA
3. "Millets: Crop Introduction, Current Scenario, Research & Future Scope" by Dr. Yogesh Ban, Crop Breeder
4. "Economic & Environment Friendly Millet Production" by Dr. Ajit Gokhale, Founder Natural Solutions
5. "Uses of Millets in Maintaining Good Health" by Dr. Raj Bandari, Technical Advisor to Indian Institute of Millets Research, ICAR-IIMR
6. "Entrepreneurship & Millets" by Mr. Mahendra Choriya , Chairman, Yash Group of Companies
7. "Millet Business Ideas & Opportunities" by Mr. Tatyasaheb Phadtare, Director Samrudhi Agro Group

Mr. Shriram Singh, Zonal Head Emkay Global & Ex member Think Tank at Niti Aayog, spoke at the Valedictory Ceremony.

Community Programs

A. Indirabai Padhye Nursery School and Education Committee

1. HCC organized a program of cooking and distributing millet snacks, along with the recipe cards, for parents of Nursery Students on 2nd September 2023.

2. Nursery Children celebrated Janmashtami 0n 7th September 2023.

3. On 13th September 2023, Nutri-Carnival was organized by Dr. BMN College of Home Science in the National Nutrition Month, showcasing a play-way approach to Nutrition education and Awareness. IWSA's ECCE Trainees attended this Carnival.

4. Hindi Divas Pratiyogita was conducted on 14th September 2023.

5. Dr. Pheroza Godrej, during her visit to IWSA on 15th September 2023, visited the exhibition of Teaching Aids developed by ECCE students and appreciated their efforts.

6. ECCE Trainees conducted Ganesh Chaturthi lessons for Nursery Students on 27th September 2023.

7. A Garba session was organised by Ms. Neeta Shah on 21st October 2023.
It was a music and movement activity for the ECCED trainees.

8. Children's Day was celebrated on 21st November 2023. ECCED teachers took the initiative to celebrate children's day with the trainees This activity was aimed at bond building between the teacher and trainees and celebration included Tattoo making, Games and Treasure hunt.

9. IWSA Multipurpose Hall was one of the centres for conducting the First semester exams for ECCED students. Eighteen students from Women's India Trust (WIT), Panvel also appeared for this examination at IWSA Centre. The exams were held from 7th to 16th December 2023 and the facilities for smooth conduction of the exams were provided by IWSA Nursery and ECCED staff along with help from IWSA office staff.

10. After the exams a group of students visited a reputed pre-school, 'Daffodils', at Thane (owned by one of our ex-students) and participated in the Sports Day Celebrations of the school.

11. Another group visited 'Ikshaha Day Care' at Belapur as part of alternative learning space.

12. Christmas was celebrated in the Nursery before the school was closed for holidays.

B. IWSA's Day Care and JMM Working Women's Hostel

Celebrations by Day Care Children

(i) Dahi Handi was celebrated by ten children on 7th September 2023.
(ii) "Eco –friendly Ganesha workshop" was conducted by Ms. Manisha Chand on 16th September 2023. Eight children participated in the workshop.
(iii) On 27th September 2023, Ganesh Chaturthi was celebrated.

C. IWSA's Satish Haware Computer Education Centre

1. **Webinar on "Deep Fakes in Academia & Research – Understanding Risks and Opportunities" on 12th September 2023**

A webinar on "Deep Fakes in Academia & Research – Understanding Risks and Opportunities" was organized by IWSA in association with Department of Information Technology, B. K. Birla College,

Kalyan (Empowered Autonomous Status) on 12th September 2023. The speaker was Dr. Rajesh K. Maurya, Author & Asst. Professor, Department of IT, SVKM's Usha Pravin Gandhi College, Mumbai.

Dr. Maurya started the webinar by introducing the topic of Deep Fakes in Science and discussed in detail the following important aspects of Deep Fakes:

- Threats to Scientific Integrity
- Ethical and Legal Dimensions
- Strategies for Protection
- Technological Advancements

About 136 participants attended the webinar.

2. Webinar on "Data Science and Applied Machine Learning" on 15th October 2023.

A webinar on "Data Science and Applied Machine Learning" was organized by IWSA in association with Lake Water Bioinformatics on 15th October 2023. Mr. Neeraj Gaur, Co-Founder of Lake Water Bioinformatics and his team conducted the webinar. About 28 participants attended the webinar.

D. IWSA's Piroshja Godrej Foundation Library

(i) Dr. Bakhthaver Mahajan, Chairperson, Board of Trustees, IWSA reviewed the "Sixth Extinction" written by Ms. Elizebeth Kolbert on 7th October 2023. This book elaborates on how human activity has contributed to the fast extinction of different forms of life and points out ways to mitigate our biggest environmental problems. This program was aimed at creating awareness amongst students about our traditional library transformation into an e granthalaya and encouraging them to register and become our members. Thirty-five students from KBP college and fifteen students from Rajiv Gandhi college actively participated in the book review session. They were accompanied by faculty members from both the colleges. Including the IWSA members, the total outreach for the program was about 70.

(ii) A book entitled **CHODDOSAKH** authored by Ms. **Vijaya Chakravarty,** IWSA Member and Principal Designer of IWSA's Learning Garden and Ms. **Katie Bagli,** a renowned author of books for children was released on 21st October 2023 at IWSA's Multipurpose Hall. The book was released by Dr. Kishore Rithe, Director, BNHS.

Chodoshak is a story about biodiversity sustainability and traditional conservation practices told in a delightful way by evoking children's imagination. The 14 plants are nutrition dense, medicinal and climate smart they promote food security and prevent micronutrient deficiency.

The children participated in the ghost parade and Ms Sushmita Karmarkar illustrator of the book drew caricatures of ghosts. Ms Samita Aiyer made illustrations of the children who participated in the ghost parade. Ms Arpita Vora, voice-over-artist, regaled the audience with interesting anecdotes and recipes from the book.

Outreach: 40

E. IWSA's Murli Laj Chugani Health Care Centre

1. Recipe Demonstration of Use of Millets to Parents of Nursery School Children on 2nd September 2023

To commemorate the International Year of Millets 2023, HCC organized a recipe demonstration on the use of millets. The event took place on 2nd September 2023 and was tailored for the parents of IWSA's Nursery School Children. The primary goal of this program was to raise awareness about the nutritional benefits of millets and motivate parents to incorporate these nutritious grains into their daily diet.

Recipe Demonstrations: The event featured two quick and easy millet snack recipe demonstration by Ms. Priya and Ms. Snehalata

1) Delicate Millet Nutri Snack: This wholesome snack can be used as an evening snack.
2) Millet Patties (recipe by Ms. Tripta Tewari):

These millet patties showcased the delicious potential of millet as an ingredient and can be used in sandwiches or just as evening bites.

Ms. Priya elaborated on various types of millets and their respective nutritional values. She highlighted millets as an environmentally friendly and hardy crop and emphasized their potential to help prevent present lifestyle diseases. This discussion aimed to enlighten the audience about the importance of incorporating millets into their current meal plans.

Parents were unfamiliar with millets and their preparation methods. Therefore, few steps to enhance the nutritional value, digestibility, and flavour of millet-based dishes were emphasized. Mothers actively participated by shaping millet patties in various forms, providing them with a hands-on experience to familiarize themselves with the texture.

2. Activity for Special Needs Children from Arambha Foundation, Koparkhairane on 7th October 2023

IWSA's Health Care Centre and Learning Garden, in association with Arambha Foundation, organized an engaging activity for special needs children.

About the school: Arambha Foundation established in 2014 in Koparkhairane was initiated under the leadership of its founder Mrs. Rakhi Pandit who along with her committed team perpetuated a new lease of life for children with physically and mentally challenged children belonging to the disadvantaged community. The children were Autistic, with mild Down Syndrome, mild MR (mental retardation), but not wheelchair bound. They were capable of following directions.

About the Program: Fifteen children accompanied by three school teachers, participated in a series of activities designed to provide them with opportunities to play, socialize, and learn.

Objective and Approach: The primary objective of this activity was to offer a nurturing environment and involve the children in physical and fine motor skills development. The program was aimed to help them explore the sensory experience of the garden while working on focus, attention, flexibility, and rigidity.

Two-Part Program: To meet these unique needs of the children, the activity was divided into two enriching sessions:

1. Garden-based Tasks: The children gathered in the beautiful IWSA garden, forming three groups, each led by an IWSA volunteer and a teacher. The day began with playful activities such as walking in circles, holding hands, and singing songs. Afterward, the children were assisted to the tables that were set with small saplings, pots, soil, water, and sponges. They were guided to plant saplings in pots. Each child filled the pots with soil, planted a sapling, and watered it by squeezing a sponge dipped in water, all at their own comfortable pace.

The children were also taken to a sensory tour through the garden, exploring touch, smell, sight, taste, and sound. Aromatic plant cuttings allowed them to crush leaves and experience the scents and textures. For auditory stimulation, they were handed a stick to gently glide over suspended glass bottles, producing musical tones. The children were actively engaged and enjoyed this playful exploration of sound and touch.

2. Music Therapy by Dr. Revati Nalawade: The day continued with an exciting session in the TV room led by Dr. Revati Nalawade, paediatric physiotherapist of IWSA's Health Care Centre. Here, the children danced and mimicked movements to the background music. Their enthusiastic participation was supported by the teachers and IWSA volunteers who joined in the music therapy session. Dr. Revati provided individualized assistance to help the children utilize the space with movement, even allowing one child to perform a solo dance.

After the session, refreshments were provided, and the children were overjoyed to explore the play area.

Outcome: This engaging activity helped in honouring the skills and strengths of each child and foster meaningful experience for their emotional and physical wellbeing.

This heartwarming event was a testament to how care and inclusion can bring a positive difference in the community, and we look forward to many more such initiatives in the future.

3. Participation of Health Care Centre at Millet Mahotsav and Millets Conference

On 9th December 2023, Health Care Centre in association with Dr. BMN College opened a nutrition counselling desk at the Millet Mahotsav at IWSA Headquarters. Four students of final year PG students addressed various concerns raised by participants, mostly young working mothers who visited the desk. At the desk various millet items such as millet tarts, millet nachos and millet muffins were presented for free tasting. A similar desk was opened at KC College on 18th December 2023 for the Millet Convergence Conference.

Other Activities at IWSA Head Quarters

Visit of Dr. Pheroza Godrej to IWSA and Celebration of 91st Birthday of IWSA Founder Member Dr. Sudha Padhye

Dr. Pheroza Godrej, Chairperson, Godrej Archives Council visited IWSA on 15th September 2023. On the same day, IWSA had planned to celebrate the 91st birthday of IWSA's Founder Member, Dr. Sudha Padhye.

Dr. Shyamala Bharadwaj, President, IWSA welcomed Dr. Pheroza Godrej, Dr. Sudha Padhye and all the IWSA members present on the occasion. Both the dignitaries were felicitated by senior IWSA Members and Trustees.

Dr. Sudha Padhye recollected the earlier days of IWSA and the close association between IWSA and the Godrej family.

Dr. Pheroza Godrej presented the work on 'Mangroves' by Godrej Foundation and some thought-provoking comments about preserving and taking care of our environment.

Dr. Rita Mukhopadhyaya, Immediate Past President, IWSA talked about the work on Mangroves by college interns carried out at IWSA.

Dr. Bakhtaver Mahajan, Chairperson, Board of Trustees, explained about the future work planned by IWSA on 'Conservation of Mangroves at Vashi Creek'.

Thus, the visit of Dr. Pheroza Godrej and the celebration of the 91st birthday of Dr. Sudha Padhye was a memorable event.

Reports from Branches

Amravati Branch

BRNS lecture

Date: **1st November 2023**
Topic: **Opportunities for Girls in the Armed Forces**
Speaker: **Col. Himanshu**, Commanding Officer, 4 Maha Girls BN, NCC Amravati
Venue: **Vidya Bharati Mahavidyalaya Amravati**
This lecture was held in association with National Cadet Corps Unit of Vidya Bharati Mahavidyalaya, Amravati.

The program started with the felicitation of chairperson Dr. P. S. Yenkar, Principal of Vidya Bharati Mahavidyalaya Amravati followed by felicitation of guest speaker Col. Himanshu, Commanding Officer, 4 Maha Girls BN, NCC Amravati and felicitation of Capt. Dr. M. M. Rathore, in charge of NCC unit, Vidya Bharati Mahavidyalaya Amravati. Capt. Dr. M. M. Rathore delivered an introductory speech of the guest lecture where she introduced the guest speaker and highlighted various achievements of the Col. Himanshu. Later Col. Himanshu started his speech with an introduction to the armed forces. He shared his life experiences regarding the armed forces. He explained various job opportunities in the armed forces for girls and explained steps to grab these job opportunities. He cleared all the doubts of the students during the discussion session. Further Dr. P. S. Yenkar delivered a presidential speech in which she guided and motivated students for job opportunities in the armed forces.

The program was hosted by Mrs. Pradnya Jawarkar, Assistant Professor from Department of Chemistry. A total of 150 participants attended the guest lecture. A vote of thanks was proposed by Mrs. Pradnya Jawarkar.

Baroda Branch

BRNS lecture

Date: **21st September 2023**
Topic: **Lymphatic delivery: A new paradigm for systemic and site-specific drug delivery**
Speaker**: Prof. Krutika Sawant**, Head of the Department of Pharmacy, Maharaja Sayajirao University
Venue: **C. V. Ramakrishnan Seminar Hall of Biochemistry Department, Maharaja Sayajirao University of Baroda, Vadodara**

This program was held in association with the Department of Biochemistry, The Maharaja Sayajirao University of Baroda, Vadodara. The programme was organized by the coordinator Prof. C. Ratna Prabha, who is also the Co-Convener of IWSA, Baroda branch under the guidance and encouragement of the Convener Mrs. Hemlata Pavagadi and former Convener Prof. Sandhya Garge. Around 120 students, faculty members from three different universities and pharma industries attended the lecture.

Several routes for the administration of drugs exist and all have their advantages and drawbacks, however, the oral route of administration remains by far the most convenient route for patients. Drugs administered via this route undergo first-pass metabolism, significantly reducing the plasma drug concentration and as a result, effectivity. A classical method to bypass this is to administer a prodrug. Prof. Sawant introduced the students to a distinct alternative to prodrug administration.

The lymphatic system has long been overlooked as a route for drug administration, she shed light on ways to exploit this system to deliver drugs such as methotrexate and cefotaxime of low bioavailability and low water solubility. She briefly discussed approaches of delivery to the lymphatic system via pulmonary, intestinal, intraperitoneal, and intradermal/ subcutaneous routes using nano-sized drug delivery systems and their success in comparison to conventional oral and IV routes.

Prof. Sawant combined these approaches to improve drug administration. She discussed the encapsulation of drug molecules in particular drug carriers such as NLCs (Nanostructure lipid carriers), SLNs (Solid lipid nanoparticles), and Polymeric nanoparticles. These methods of encapsulation protect the drug from first-pass metabolism and allow the drugs to be directly taken up by the intestinal lymphatic system, thereby increasing bioavailability.

Prof. Sawant explained a few of the case studies related to drug delivery utilizing the lymphatic pathway. Highlights of those studies include, (i) Intestinal lymphatic transport of LH SLNs enhanced the bioavailability by reducing the first-pass metabolism. Pharmacokinetics results showed the improved oral bioavailability of LH over 5.16 folds after incorporation into SLNs as compared to LH suspension. (ii) Pharmacodynamics study on schizophrenia-induced rats proved that the cognitive function of these rats was improved which confirmed the antipsychotic potential of LH-SLNs in the treatment of schizophrenia. In conclusion, the SLNs demonstrated a great potential for oral delivery of poorly water-soluble and lower bioavailability drugs like LH.

In summary the lecture clearly explained the routes of drug administration, the problems faced in drug availability and what are modern advances to overcome the problems and how drugs can be effectively administered. The lecture was appreciated for its invaluable information content and immense clarity.

Bengaluru Branch

Awareness camp on Menstruation for housekeeping lady staffs on **10th November 2023**

An awareness camp on menstruation for housekeeping lady staffs was arranged by Women's Cell, B.M.S College of Engineering in association with the Department of Biotechnology, BMSCE and Indian Women's Scientist Association, Bangalore HQ under ICSSR, GOI Short-term Empirical Research Project entitled "A Study of Social Awareness and Education about Eco-friendly Menstruation Hygiene Practices in Rural Karnataka" on 10th November 2023. The speakers were Ms Pavithra G(Researcher) and Ms Jayashri Deshpande (Field officer), Bangalore, ICSSR, GOI. Dr K P Lakshmi, Chairperson of BMSCE Women's Cell addressed the gathering and shared the importance of the talk. Dr. Savithri Bhat, Professor and Convener of IWSA, Bengaluru branch from Department of Biotechnology, BMSCE Bangalore and Dr. Rashmi S Shenoy, Member of Women's Cell, welcomed speakers of the day by presenting roses. The camp started with introduction of both the speakers. Ms Pavithra G(Researcher), the first speaker of the day took over the stage to talk about her journey towards usage of eco-friendly menstrual practices. She presented insightful information on menstruation, and how it has been a taboo and less discussed term in most parts of the world. She emphasized that menstrual management is a vital part of human existence and if not managed properly it has an adverse effect on the lives of women. Even though the human race is developing and adapting at an astonishing pace there are various taboos associated with menstruation. She then addressed all the housekeeping women on the disadvantages of using menstrual pads and how plastics can disrupt the normal balance of our ecosystem. She mentioned the health effects of long-term usage of pads, thus causing itchiness and various diseases due to the leaching of chemicals from the sanitary pads. She provided awareness on usage of menstrual cups as a safe menstrual hygiene device that can be inserted into the vagina during menstruation for prolonged duration. A demo video was shown to participants that contained different ways to fold the menstrual cup and insert safely. Ms. Pavithra also explained the method of sterilization of cup. She also spoke on the economic and health benefits of choosing menstrual cups over other conventional methods. The participants were amused by the session and posted several queries to the speaker. The speaker patiently answered all the questions addressed by the participants and cleared their doubts. Ms Jayashri along with student volunteers distributed survey questionnaire to all the participants to collect valuable data post- seminar as an initiative taken under ICSSR, GOI project. Ms Jayashri clarified the queries and assisted the participants in filling of the survey form. Free samples of the cup were presented to interested participants who were motivated to use the cups after the awareness program. Around 31 cups were distributed amongst the participants. The session was concluded with vote of thanks and the speakers were presented with a token of appreciation for their valuable time and efforts in creating an awareness regarding menstrual hygiene amongst the participants. All the participants appreciated the seminar.

Outcomes

1. The house keeping ladies of the college were made aware about menstrual hygiene and eco-friendly practices.
2. Free hampers were distributed to the interested participants and survey was performed.

Outreach: 100

Kalpakkam Branch

Date: **26th September 2023**
Event: **SHAKTI-2023 Event**
Title**: Women in Technological Advances and Social Upliftment**
Venue**: Sarabhai Auditorium, IGCAR, Kalpakkam.**

This event was held in collaboration with the Indian Society of Heating, Refrigerating and Air Conditioning Engineers (ISHRAE), Kalpakkam Chapter in association with IGCAR

The mandate of the event is to initiate transformation and to showcase the core challenges and opportunities in various technologies from the energy conservation platform and global environmental issues. Every year, this event invites women of excellence from various industry covering manufacturing, sustainability, architecture, entrepreneurship, and other facets with experience in working on prestigious projects across India. This year 300 members including 15 members of ISHRAE from other chapters and participants from DAE fraternity attended the event.

Mrs. S. Rajeswari, Convener-SHAKTI-2023 welcomed the gathering, Ms. Jayanthi, National Women Chair, ISHRAE briefed about the genesis of event. Mrs. Jemimah Ebenezer, Convener, IWSA spoke about the activities of IWSA and Shri. Yogesh Thakkar, National President, ISHRAE about the activities of ISHRAE. Dr. B. Venkatraman, Distinguished Scientist, Director, IGCAR presided over the function. In his presidential address, he emphasised on achieving cleaner India by fruitful collaboration among forums of scientists, engineers and academia towards the research and development of green technologies. Dr. K. Rajalakshmi Menon, Distinguished Scientist & Director, Centre for Air Borne Systems, DRDO inaugurated the function. In her inaugural address, she highlighted the indigenous development of Airborne Surveillance Systems with efficient thermal management for the defence applications.

The technical session included excellent talks by two eminent speakers followed by technical visits to various facilities. Dr. Kalpana Balakrishnan, Dean (Research), Department of Environmental Health Engineering, Sri Ramachandra Institute of Higher Education and Research, in her keynote address titled “Addressing household air pollution in rural India: Triple air pollution for health, climate and sustainability” stressed upon the importance of monitoring and controlling household air pollution in rural India and its mitigation for better breathing air quality. Dr. Jayanthasri Balakrishnan, Motivational Speaker and Scholar from Coimbatore, who is a very popular media personality, delivered the special address. In her address, she pointed out the duty of empowered women to conduct the outreach programs to pave a way for social upliftment. All the lectures were very informative and interesting. Lectures were well received by the audience. Mrs. K. Shivakamy compered the program and Dr. B. Sasi, Secretary, IWSA, Kalpakkam proposed the vote of thanks.

Kolhapur Branch

Date: **9th September 2023**
Event: **Workshop on ‘How to Cope up with Hormonal Changes and Health Awareness for Boys and Girls’**
Venue: **Dr. Ganpatrao Deshmukh Mahavidyalaya, Sangola**

Adolescent boys and girls undergo hormonal changes and often face a situation where they do not understand the physical, emotional changes and personal hygiene. Many parents are unable to

communicate with their children about such hormonal changes. Hormonal imbalances are more common during puberty, menstruation, pregnancy, menopause.

To understand such issues, Dr. Ganpatrao Deshmukh Mahavidyalaya, Sangola and Indian Women Scientist's' Association, Kolhapur Branch organized the workshop wherein a gynaecologist explained to the girl students and their mothers about hormonal changes and how to cope up with such changes. Dr. Seema Gaikwad, the IWSA Convener, coordinated the activity along with the leading Gynaecologist and Obstetrician of Kolhapur, Dr Alpana Chaugule (MBBS, DGO).

A balanced diet is an important part of overall health especially in hormonal imbalance. Therefore, another session on "Health Awareness regarding Mind Setup" was conducted by Dr. Sopan Chaugule (Laparoscopic & Coloproctological Surgeon). He delivered a speech on healthy diet during hormonal changes for mind setup.

The sessions started with a presentation followed by an open house with students. A very positive response was marked as children participated very actively in the session. The workshop was well appreciated by the audience. About 65 boys and 120 girls and 32 mothers participated in this workshop.

Nagpur Branch

Date: **10th December 2023**
Event: **Nature Walk and Bird Watching Event for School Students**
Venue: Gorewada Lake Nagpur

The walk was organized for school children with a view to instil in them a sense of appreciation of biodiversity and conservation. This was a belated celebration of Children's Day 2023 by IWSA

Gorewada Lake area is a haven for many aquatic species of birds as well as forest birds. Under the able guidance of Mr Pushkar Kulkarni, Field Scientist and Birdwatcher of Central India Bird Academy, children sighted and recorded in their notebooks around 20 to 22 species of aquatic and forest birds. Children were briefed about nesting habits, feeding habits, flight, and movements of the birds. Typically, migratory birds visit Gorewada during October-November and stay till March. Migratory Red Crested Pochard and Osprey were cited apart from the regular resident birds. Forest birds Red breasted fly catcher and Black redstart were notably seen. A few yellow footed green pigeons "The Bird of Maharashtra" were also observed. Two individuals of Orange Breasted Green Pigeons a rarity to this region was a special sighting. Purple heron standing between the grasses on the lakeside was a delight to watch. The joy of watching the winged wonders in the lap of nature was contagious amongst the children and their enthusiasm in early winter morning was especially worthy. Dr. Bharati Ganu executive member of IWSA coordinated the event and was supported by members Dr. Lalita Sangolkar, Dr Shalini Chahande, Dr.Saroj Desai, Dr.Rajashree Bapat, Secretary Mrs Prachi Lakhe, Conv_ener Dr. Seema Somalwar, Co- Convener Dr. Rita Israni and Founder member Dr. Anuradha Gadkari. Expert Mr. Pushkar Kulkarni was felicitated by giving a memento. The event aligned with IWSA's mission to develop scientific temperament in the society. About twenty children from standard IV to standard VIII from different schools participated in the event.

Nellore Branch

Date: **23rd September 2023**
Event**: Lecture on SCOPE OF BIOINFORMATICS at**
Venue: **Sasi English Medium School on**

The scope of bioinformatics was clearly explained to the 8th and 9th standard students of Sasi English Medium school at Tirupati on 23.09.2023 by the speaker, Dr Neelima Raj,
Assistant professor of Biochemistry, AIMS Institutes, Bangalore. She started with the definition of bio informatics and how it is applied with the tools of computation and analysis for the interpretation of biological data. She explained about the interdisciplinary nature of this field, and it can be applied in computer science, mathematics, physics, and biology. She elaborated on the future trends of research in bio informatics giving an example of Single-Molecule Protein Sequencing Analysis.

About 40 students from 8th Standard and 46 students from 9th Standard attended the lecture.

Roorkee Branch

Date: **26th November 2023**
Event: **Vijaya Agarwala Memorial Mathematics Olympiad - Maths & Science Fair 2023 (VAMMO - Maths & Science Fair - 2023)**
Venue: **Multi-Purpose Hall and Lawn of the National Institute of Hydrology (NIH), Roorkee**

The inspiration to organize such an activity was drawn from our beloved Prof. Vijaya Agarwala (1949 - 2016), the founder of the Indian Women Scientist Association Roorkee Branch. Coordinator Dr Rama Mehta and IWSA Roorkee team approached nearly 25 schools in Roorkee in September 2023 and invited one project from each of the classes 6th to 9th. A total of 94 projects in Maths and Science had been enrolled. The last date for project submission was 20th October 2023.

The Science Fair was inaugurated by Ms. Mala Chauhan, Educationist, & Principal of Greenways School, Roorkee.

There were 94 entries from 20 schools and more than 359 students participated.

A team of three judges evaluated the projects of each class. There were 12 judges, scientists from NIH (National Institute of Hydrology), CBRI (Central Building Research Institute), professors from IIT Roorkee, and Industrialists. The judges appreciated the innovation and creativity of the participants.

They gave their valuable time and interacted with the participants. 1st, 2nd, 3rd, & consolation prizes were awarded to each class. A total of 16 cash prizes were given to the teams of students.

The first prize was Rs. 2500 with a Trophy & certificate. The second prize was for Rs. 1500 with a certificate, the Third prize was for Rs. 1000 with a certificate, and Rs. 500 with a certificate was given as a consolation prize. All participants got certificates of merit, and 86 coordinators were awarded certificates of appreciation.

Lot of fun was added to the FAIR, such as a Lucky Draw from entry tickets, Tombola, and other games, along with stalls of interesting eatables.

More than 500 visitors visited the models and benefited from students' new & innovative ideas.

Article

Approach to Small Modular Reactor design –

A simplified overview

Umasankari Kannan[1] and Devesh Raj[2]
[1]Ex-Head, Reactor Physics Design Division
[2]Reactor Physics Design Division
Bhabha Atomic Research Centre, Mumbai

1.0 Introduction:

Nuclear energy is an important component of the energy mix to achieve net-zero carbon generation or carbon neutrality. To this end, Small Modular Reactors (SMRs) will play a great role as they are based on existing technology and can be easily deployed within a short time span [1]. As the name suggests, small and modular is the key. Small with respect to power capacity and possibly physical dimensions, albeit physics design is not merely miniaturization of existing designs. Implications of relatively increased neutron leakage due to increased surface to volume ratio and limited fuel management options available compared to standard designs needs to be addressed. Modular implies that these reactor modules can easily be integrated into a larger power generating unit. SMRs are also being seen as possible candidate to replace carbon-based power plants which will need to be either repurposed or abandoned if stipulated climate control targets are to be met. World over, including in India, several reactors are being considered and their feasibility to be built and operated in the already existing infrastructure of other power plants is being studied.

2.0 Decarbonisation in the energy sector

In its Sustainable Development Goal (SDG) 7, the UN has stated “to ensure access to affordable, reliable, sustainable and modern energy for all” [2]. About 80% of the power production today is still by fossil fuels. This proportion will have to be gradually decreased in some countries and drastically reduced in others to meet the SDG.

The current thinking is that the world will be able to achieve carbon neutrality by using renewable resources for energy generation.

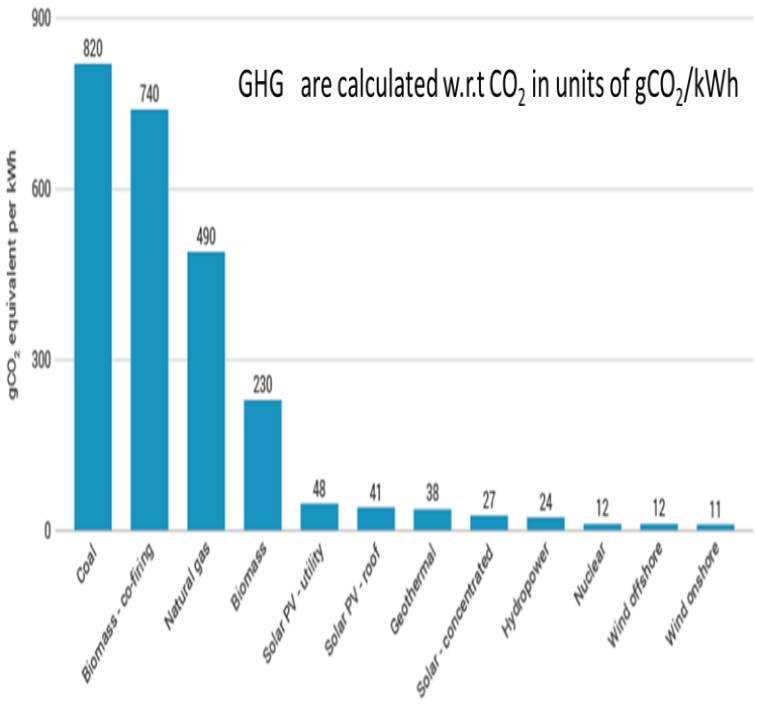

Fig.1 GHG emissions from various energy sources

(https://www.world-nuclear.org/information-library/energy-and-the-environment/carbon-dioxide emissions - from-electricity)

The greenhouse gases (GHG) emissions of different energy sources are compared using a parameter CO2 equivalent unit of gCO2/kWh.

From Fig.1, it can be seen that nuclear energy is a clean and green technology for power generation [3]. Though the installed capacity of renewables, solar, wind, biomass is increasing steadily, they all have their own issues such as availability, installation costs and operation and handling wastes. The COP26 international climate conference took place in Glasgow orchestrated that the main goal was to secure global net zero by mid-century and keep a maximum of 1.5 °C of warming. IPCC recommends a reassured focus on renewables and that the nuclear share will have to be enhanced [4]. For India, the goal of net zero is accepted to be achieved by 2070. In the year 2015, to help mitigate the impacts of CO2 emissions, India had set a target of producing 175 gigawatts (GWe) of renewable energy by 2022, with 100 GWe coming from solar, 60 GWe from wind, 10 GWe from biomass energy, and 5 GWe from small hydropower [5]. These are being revamped consistently. With respect to nuclear power the goal is to increase the installed capacity from nuclear power to about 22000 MWe which is about 3 times the current capacity.

2.1 Options for capacity building for nuclear energy

The options then are to rapidly increase the energy production by using existing and mature designs for larger deployment. In addition to this, it would be prudent to go for small nuclear reactors which can be easily set up, operated, and possibly allow utilizing existing infra-structure resulting in economic and smooth transition from primarily carbon-based grid to clean and green grid. And if they can be modular in design, several units can be set up in a large site. These are usually called as Small Modular Reactors and by the definition of IAEA produce power in the range of 30 MWe to 300 MWe [6]. In fact, any currently operating reactors can be chosen as a candidate for an SMR – the CANDU heavy water reactor, the light water Pressurised Water Reactor (PWR), small fast reactor, Boiling water reactors (BWR), High temperature Graphite Reactors (HTGRs), Molten Salt reactors and even small fast reactors.

Globally the share from nuclear is about 10% from about 450 reactors. Of these 80% constitute light water based PWRs. Their technology is well proven and requires a smaller land footprint. To replace fossil fuel-based power plants, the PWR based SMRs offer an excellent option. Also, worldwide SMRs are viewed favourable for various types of applications in addition to electricity generation, such as use in remote areas not covered by grid, for district heating, as ice breakers in the arctic and cold regions, desalination and other energy intensive industries like petroleum refining.

3.0 Salient features of an SMRs

SMRs might prove economic and efficient gateway for transition to clean and green energy. If they have enhanced safety, they could be used to replace conventional fossil fuel plants irrespective of population centres nearby. Such Improved safety features will eliminate the possibility of radioactivity release and reduce the need for large emergency planning zones required for the conventional large PWRs. Being small has also another advantage that they can be built in the same land as fossil fuel plants, where the other balance of plant may be used. The major design features of an SMR are listed below:

- small size core
- Rate power between 30 MWe to 300 Mwe
- Modular design

- Low power density
- Optimum fuel residence time
- Enhanced safety
- Factory built/assembled components
- Reduced construction time
- Decay heat removal by passive means
- Low or no exclusion zone

The small reactor core implies that the neutron leaking from the core will be higher because of increased surface to volume ratio. These designs envisage optimum power production from small cores. The residence time and the desired fuel burnup depends on the type of application the SMRs will be used for. The power generators for off grid remote areas require long cycle lengths which might be achieved by increased fissile loading either by increasing enrichment or heavy metal loading. If the SMRs are to be deployed as replacements of the existing coal fired plants utilising the existing infra-structure, they must have low source term content during cycle which might be achieved by attaining lower discharge burnup from low enriched fuel. However, this would require frequent refuelling. The modular design envisages factory fabrication, convenient transportation, and deployment of additional units to enhance plant capacity.

4.0 Design requirement of SMRs

There are several designs being considered for SMRs [7]. To understand the basic concepts in a better way two reactor concepts are considered here, namely light water reactor based SMR and another the High Temperature based SMR. With respect to design the SMRs cannot be perceived as a direct scaling down of larger power units. The compact reactor core and related process systems will have to be optimized to desired power distribution and heat removal and enhanced safety. The scaling should lead to off-site fabrication and easy transportability and at the same time ensure robust safety. Engineered systems may be required to be augmented to achieve safety by passive means. The radioactive source term will have to be minimised to reduce the exclusion zone.

4.1 Design features of Light Water coolant based SMRs

As mentioned earlier, because of their operating experience and maturity in design, pressurised light water reactor based SMRs are good options for near term deployment of SMRs. By virtue of the moderating properties of light water for fission neutrons, PWRs are comparatively small and can be designed in smaller dimensions using appropriate enrichments. These reactors usually use enrichments up to 5% in U-235 and achieve the desired burnups by appropriate fuel management. These reactors are operated in multi batch fuel management scheme (usually three) and hence the cycle length and energy can be optimized.

Some PWR based SMRs are designed as an integral reactor which incorporate primary loop components in integrated structure where the entire core, steam generators and pressurizer are placed in a pressure vessel. The whole unit then behaves as a complete unit of nuclear island and the balance of the plant (turbine, generator, condenser) can be just integrated. The pressure vessel acts as a containment of radioactivity. Some designs also have the steam generator outside the Reactor Pressure Vessel (RPV).

PWR based SMRs can be designed to have required operating power and flexible power density within the boundaries of design standards by optimizing the fissile inventory enrichment. The advantage of integral designs having large primary coolant inventory is that the power excursions during the progress

of any transient will be slow and can be mitigated with inherent feedback such as fuel and coolant temperature feedback reactivity. This ensures enhanced safety. With passive safety features and large available water inventory the PWR based SMRs eliminate the core melt in severe accident conditions for prolonged period and hence the core damage frequency is reduced to about one order below the operating PWRs. Several of PWR designs are operating and under construction as SMR.

In Table 1, a few existing PWR designs are mentioned. In relation to Table 1 the SMR are expected to have core diameter of about 1.5 m or vessel diameter about 2.0 m. The discharge burnups of about 60 GWd/Te can be achieved with existing fuel designs in large PWRs given in Table-1. SMRs to be deployed in the near term may have lower burnups for the corresponding fuel enrichments and hence the refuelling frequency would be increased.

Table 1 Typical features of a few operating conventional PWRs

Reactor design	**Active core height cm**	**Active core diameter cm**	**H/D ratio**	**U235 wt.%**	**Average Discharge Burnup GWd/Te**
AP1000	427.0 cm	305.0	1.40	--	50
EPR	420.0 cm	376.7	1.115	4.9%	64.6
VVER-KK	353.0 cm	316.0	1.117	3.9%	43

4.2 Design features of High temperature based SMRs (HTRs)

To have high operating temperatures, helium gas is used as coolant. An important safety feature of HTRs is achieving inherent safety by using TRISO (Tri-structural isotropic) fuel particles, where the three structural layers beyond the fuel kernel help in retaining the fission gasses. The fuel kernels are usually 500 to 900 μm. These are coated with SiC and PyC layers. The particles are packed in a graphite bore region with a pre-determined packing fraction for the desired power density. The reactor operates with lower power density. Another important feature is that the SiC layer acts and a miniature containment even for very high temperatures and thus eliminates the requirement for large concrete containments. In another variant, the fuel particles can be integrated in a graphite matrix in a pebble geometry where the pebbles float in the coolant. This has advantages of achieving low power density and reaching higher temperatures. BARC has designed a Compact High Temperature Reactor (CHTR) and Innovative High Temperature Reactor (IHTR) [8,9]. Due to its potential of mitigating power transients and effective containment, the high temperature-based reactors have enhanced safety and can be used as SMRs.

5.0 Overview of the SMRs being built in the world

Both land-based and marine-based SMR designs have been developed and are under operation in Russian federation. In Germany, High Temperature Gas cooled reactors (HTGRs) were operated successfully on the Th-U233 cycle and have been shut down subsequently. The objective to reduce CO2 emissions was the main driver to relook into the SMR designs and make it potentially viable for energy generation. Use of existing land footprint of retired or aging coal fired plant is another advantage and that

is why many countries are gearing up these SMR designs. More than 100 conceptual SMR designs are being developed and some 83 of them have been considered as candidate reactor designs [7]. Some small reactors have been successfully deployed for power production and other non-electrical uses. In Table 2, a few SMR designs being developed world over are listed and their status is also mentioned. Figure 2 presents the cutaway view of the integral PWR designs.

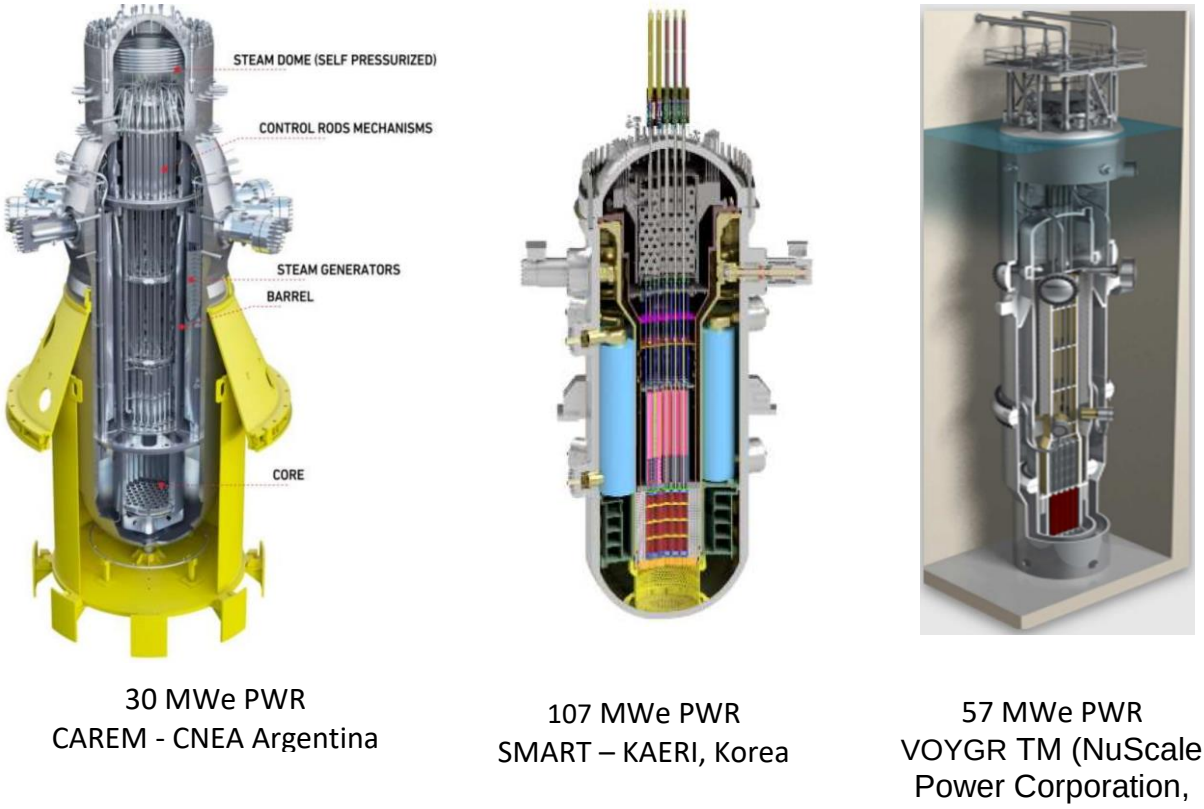

Fig. 2. Cutaway view of few light - water based SMRs **(Ref. 1)**

Table 2 Overview of SMRs being developed in the world

Design	**Output Power MWe**	**Type**	**Designers**	**Country**	**Status**
WATER COOLED SMALL MODULAR REACTORS					
CAREM 30	30	PWR	CNEA	Argentina	Under construction
ACP100	125	PWR	CNNC	China	Under construction
NUWARD	2 × 170	PWR	EDF, CEA, TA, Naval Group	France	Conceptual design
SMART	107	PWR	KAERI and K.A. CARE	S. Korea	Standard design approval received
Design	**Output Power MWe**	**Type**	**Designers**	**Country**	**Status**
KLT-40S	2 × 35	PWR	JSC Afrikantov OKBM	Russia	In operation

Table 2 contd.

Design	Output Power MWe	Type	Designers	Country	Status
RITM-200N	2 × 53	PWR	JSC Afrikantov OKBM	Russia	Detail design
UK SMR	443*	PWR	Rolls-Royce and Partners	UK	Conceptual design
NuScale	6 × 77	PWR	NuScale Power Inc.	USA	US NRC certification
BWRX-300	270–290	BWR	GE-Hitachi	USA	Pre-licensing
HIGH TEMPERATURE GAS COOLED SMALL MODULAR REACTORS					
HTR-PM	210	HTGR	INET, Tsinghua University	China	In operation
GTHTR300	100-300	HTGR	JAEA	Japan	Pre-licensing
Xe-100	82.5	HTGR	X-Energy LLC	USA	Basic design
FAST NEUTRON SPECTRUM SMALL MODULAR REACTORS					
EM^2	265	GMFR	General Atomics	USA	Conceptual design
MOLTEN SALT SMALL MODULAR REACTORS					
Integral MSR	195	MSR	Terrestrial Energy Inc.	Canada	Conceptual design
KP-FHR	140	Pebble bed salt cooled	KAIROS Power, LLC.	USA	Conceptual design
MICROREACTORS					
U-Battery	4	HTGR	Urenco	UK	Conceptual design
MMR	5-10	HTGR	Ultra Safe Nuclear Corporation	USA, Canada	Conceptual design
Aurora	1.5	FR	OKLO, Inc.	USA	Conceptual design

* Despite having power more than 300 MWe, it is considered SMR by UK

To illustrate the design features explicitly, a few of the light water-based land and marine SMRs are compared in Table 3. It is mentioned that light water-cooled reactor technology is a well proven design and has been successfully deployed all over the world and a suitable candidate to be used as an SMR. The heat removal and conversion to electric power using light water is simple in design and with minimal modifications can be used for all the potential applications as SMRs.

It is also worthwhile to compare the dimensions and fuel cycle of these designs. It can be seen in Table 3 that PWRs, both the square lattice and the hexagonal versions can be adapted for SMRs. The integral PWR type SMRs is a very safe design as is based on passive heat removal and that it can be handled as a single unit and can be transported as such.

Being integral, i.e. housing all the primary loop components including steam generator in the pressure boundary also increases safety and reliability.

The control can also be similar to the traditional PWRs, which use control rods and soluble boron in moderator for reactivity control. Availability factor is usually high due to multiple units which can be further increased by reducing the outage time through fuel management scheme. Since, the reactor core is smaller, in case of multi-batch fuel management, the number fuel assemblies to be replaced will be smaller but more frequent. Improved schemes such as keeping replacement core ready in a multiunit site, the outage can be reduced significantly.

Small cores have certain disadvantages. Owing to decreased heavy metal loading the cycle energy and hence cycle length is small. Achievable burnup for given enrichment is also relatively low and this will require optimising residence time or cycle length. It is seen in Table 3 that most designs have achieved 24 month refuelling period with a three-batch refuelling cycle. This implies that after 2 years, one-third of the core is replaced. Again, since the number of assemblies are smaller, each reactor may require a lower reload fuel inventory than a commercial large PWR.

6.0 Summary

This article gives a brief on the physics design aspects of SMRs. The enriched uranium fuelled light water cooled PWR design has been mostly pursued for near term deployment in most countries. The safety aspects will require a thorough review as the emphasis is on no or reduced exclusion zone to facilitate utilization of existing grid and fossil fuel power related infrastructure. This would require a detailed safety studies and demonstration.

Table 3 Comparison of water cooled SMR designs [Source Ref-7]

	CAREM (CNEA - Argentina)	**SMART (KAERI-Korea)**	**NuScale (NuScale Power Inc – USA)**	**KTL-40S (OKBM Afrikantov-Russian Federation)**	**RITM-200M (OKBM Afrikantov-Russian Federation)**
Reactor Type	Integral PWR	Integral PWR	Integral PWR	PWR	Integral PWR
Power Thermal / Electrical (MWe)	100 / 30	365 / 107	200 / 60	150 / 35	175 / 50
Fuel configuration	UO2 pellet Hexagonal array	UO2 pellet 17 x 17 Square array	UO2 pellet 17 x 17 Square array	UO2 in Silumin matrix	UO2 pellet Hexagonal array
Fuel enrichment	3.1 % U-235	< 5.0% U-235	~4.95% U-235	18.6% U-235	<20.0
Number of fuel assemblies in the core	61	57	37	121	241
Fuel cycle	24 months Batch	30 months Batch refuelling	24 Months Batch refuelling	30-36 months	Upto120

Table 3 contd.

	CAREM **(CNEA - Argentina)**	**SMART** **(KAERI-Korea)**	**NuScale** **(NuScale Power Inc – USA)**	**KTL-40S (OKBM Afrikantov-Russian Federation)**	**RITM-200M (OKBM Afrikantov-Russian Federation)**
Coolant/Moderator	Light Water	Light Water	Light Water	Light Water	Light Water
Coolant configuration	Natural circulation	Forced Circulation	Natural circulation		
Reactivity control	Control rods	Control rods and Soluble boron	Control rods and Soluble boron	Control rods	Control rods
Reactor Vessel dimensions Height/Diameter (m)	11/3.2	18.5 / 6.5	17.7/ 2.7	4.8 / 2.0	8.6 / 3.45
Intended use	Power Generation	Power Generation	Power Generation	Floating reactor	Deployed in 6 prototype icebreakers

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Dr. Umasankari Kannan has retired from Bhabha Atomic Research Centre and was heading the Reactor Physics Design Division. Her areas of specialisation include, thorium utilisation, Nuclear Data Physics for the thorium fuel cycle and fuel cycle studies. Her major contributions were in the physics design of Advanced Heavy Water Reactor (AHWR) and Indian Pressurised Water Reactor (IPWR). She has designed many irradiation experiments and provided physics support to reactor safety. She has co-authored a book "Physics of Nuclear Reactors" which has been published by Academic Press in 2021. As a faculty at the HBNI, she has guided many PhD students in the field of Reactor Physics and Nuclear Engineering. She has over 746 publications including 112 papers in peer reviewed Journals and international conferences, 149 papers in national conferences and 6 technical articles on thorium utilisation.

Dr. Devesh Raj works in the Reactor Physics Design Division of Bhabha Atomic Research Centre. His work area involves physics design of Pressurized Water Reactors, Processing and generation of nuclear data libraries, Study of nuclear fuel cycles and development application of required computer codes.

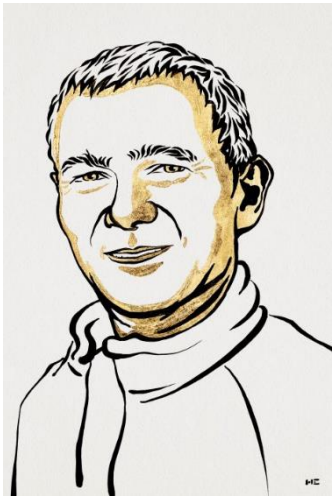
Nobel Prizes 2023

Chemistry

Nobel Prize in Chemistry 2023

Moungi G. Bawendi, Louis E. Brus and Aleksey Yekimov are awarded the Nobel Prize in Chemistry 2023 for the discovery and development of quantum dots. Quantum dots are tiny semiconducting crystals whose nanoscale size gives them unique optical and electronic properties. These tiny particles have unique properties and now spread their light from television screens and LED lamps. They catalyse chemical reactions, and their clear light can illuminate tumour tissue for a surgeon.

Moungi G. Bawendi **Louis E. Brus** **Aleksey Yekimov**



Moungi G. Bawendi

Born: 1961, Paris, France
Affiliation at the time of the award: Massachusetts Institute of Technology (MIT), Cambridge, MA, USA

Bawendi was one of the most cited chemists of the decade from 2000 to 2010. He is a leading figure in the research and development of quantum dots.

A major challenge in quantum dot research was to find ways to create high quality quantum dots that are stable and uniform. Bawendi is recognized for his work in developing standardized methods for quantum dot synthesis. In 1993, Bawendi, and his PhD students David J. Norris and Christopher B. Murray, reported on a hot-injection synthesis method for producing reproducible quantum dots with well-defined size and with high optical quality. This breakthrough in chemical production methods made it possible to "tune" quantum dots according to size and achieve predictable properties as a result. It gave scientists much greater control over the material and made it possible to achieve precise and reproducible results.

The method opened the door to the development of large-scale technological applications of quantum dots in a wide range of areas. Quantum dots are now used in light-emitting diodes (LEDs), photovoltaics (solar cells), photodetectors, photoconductors, lasers, biomedical imaging, biosensing and other applications.

Louis E. Brus

Born: 1943, Cleveland, OH, USA
Affiliation at the time of the award: Columbia University, New York, NY, USA

Brus is a foundational figure in the research and development of quantum dots.

Brus was independently the first to synthesize them in a solution in 1982. At the time, he was studying organic photochemistry on cadmium sulfide particle surfaces using pump–probe Raman spectroscopy, looking for possible applications for solar-energy. He noticed that the optical properties of the crystals changed after leaving them for 24 hours. He attributed this change in band gap energy to Ostwald ripening when the crystal increased size.

Brus provided the theoretical framework for understanding the behaviour of quantum dots in terms of quantum size effects. He identified the connection between the particle size of semiconductors and the wavelength of the light they emit, now known as the Brus equation.

Brus tried to contact researchers in the Soviet Union. It was in 1990, that he finally met Alexey Ekimov and Alexander Efros, who had first developed the semiconductor nanocrystals in glass in 1981 under more rudimentary conditions, however their research was not available in the United States.

At Bell Labs, Brus worked with postdoc researchers Paul Alivisatos and Moungi Bawendi in a research project with organometallic synthetic chemist Michael L. Steigerwald on reducing the size of the quantum dots.

Aleksey Yekimov
Born: 1945, Leningrad, USSR (now St. Petersburg, Russia)
Affiliation at the time of the award: Nanocrystals Technology Inc., New York, NY, USA

After graduation, Ekimov moved to the Vavilov State Optical Institute to conduct research. He began studying semiconductor-activated glasses, known as Schott glasses, and developing theories to

explain their colour. When the glasses were heated and then cooled, copper chloride crystals formed, as revealed by X-rays, creating blue colours. Smaller crystals produced bluer glass.

In 1981, Ekimov, along with Alexei A. Onushchenko, reported the discovery of quantum size effects in copper chloride nanocrystals in glass, a phenomenon known now known as quantum dots. During his time at the institute he further investigated these system and developed the theory of quantum confinement with Alexander Efros.

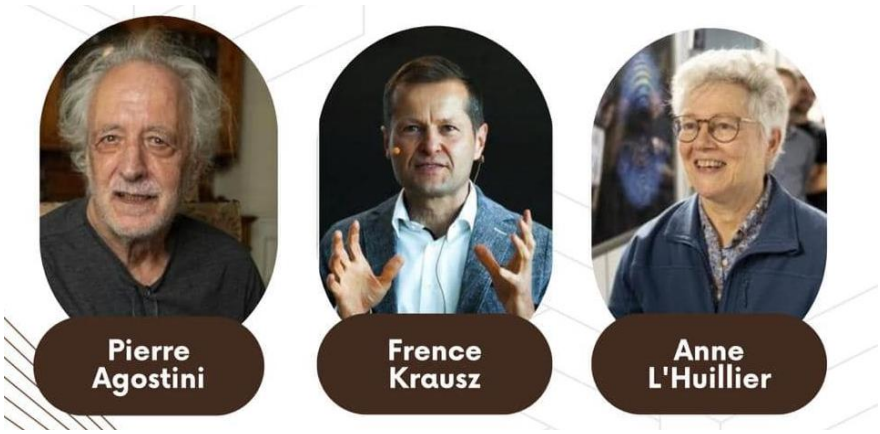
Since 1999, Ekimov has been living and working in the United States as a scientist for Nanocrystals Technology, a company based in New York State.

(**Dr. Shyamala Bharadwaj)**

Sources: **https://www.nobelprize.org/prizes/chemistry/2023/summary/**
Wikipedia

Physics

The Nobel Prize in Physics was announced on 3rd of October 2023 by the Nobel Prize committee. The Royal Swedish Academy of Sciences has decided to award the Nobel Prize in Physics 2023 to Pierre Agostini, Ferenc Krausz and Anne L'Huillier "for experimental methods that generate attosecond pulses of light for the study of electron dynamics in matter."



Anne Geneviève L'Huillier is a French physicist, and professor of atomic physics at Lund University in Sweden. She leads an attosecond physics group which studies the dynamics of electrons in real time, which is used to understand the chemical reactions on the atomic level.

Pierre Agostini is a French experimental physicist and Emeritus professor at the Ohio State University, known for his pioneering work in strong-field laser physics and attosecond science.

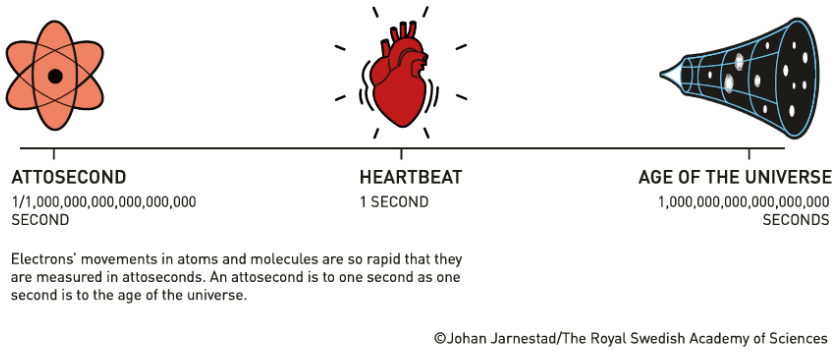
Ferenc Krausz is a Hungarian physicist working in attosecond science. He is a director at the Max Planck Institute of Quantum Optics and a professor of experimental physics at the Ludwig Maximilian University of Munich in Germany.

What was their work? Experiments to capture the shortest of moments with ultra-short light pulses:

Background: Physicists have relentlessly worked on the generation of laser pulses of Ultra-short duration. It started with the Nobel Prize in 2018 to **Gérard Mourou** and **Donna Strickland** who paved the way towards the shortest and most intense laser pulses ever created by mankind. They created the Femtosecond duration laser pulses by the novel technique of Chirped Pulse Amplification. One femtosecond is 10^{-15} Sec.

The limits of ultra-short laser pulses have been stretched further by these three Nobel Laureates in Physics 2023. Light pulses of few Attoseconds were generated (1 attosecond- 10^{-18}Sec). These scientists are being recognised for their experiments, which have given humanity new tools for exploring the world of electrons inside atoms and molecules. Pierre Agostini, Ferenc Krausz and Anne L'Huillier have demonstrated a way to create extremely short pulses of light that can be used to measure the rapid processes in which electrons move or change energy.

What is an Attosecond light pulse?



Electrons' movements in atoms and molecules are so rapid that they are measured in attoseconds. An attosecond is to one second as one second is to the age of the universe.

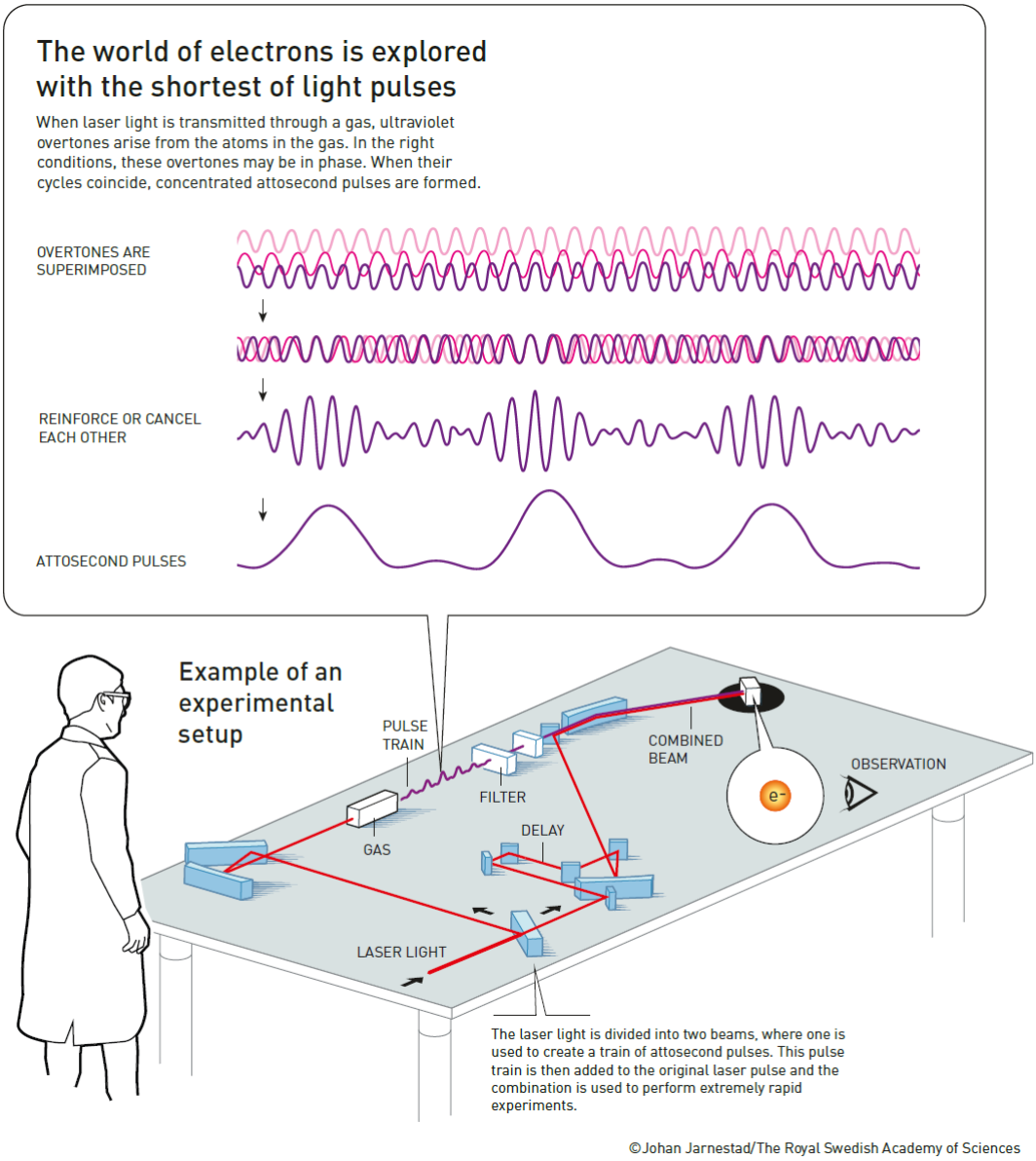
Fast-moving events flow into each other when perceived by humans, just like a film that consists of still images is perceived as continual movement. If we want to investigate really brief events, we need special technology. In the world of electrons, changes occur in a few tenths of an attosecond – an attosecond is so short that there are as many in one second as there have been seconds since the birth of the universe.

How do you generate Attosecond pulses of light?

The laureates' experiments have produced pulses of light so short that they are measured in attoseconds, thus demonstrating that these pulses can be used to provide images of processes inside atoms and molecules.

In 1987, **Anne L'Huillier** discovered that many different overtones of light arose when she transmitted infrared laser light through a noble gas. Each overtone is a light wave with a given number of cycles for each cycle in the laser light. They are caused by the laser light interacting with atoms in the gas; it gives some electrons extra energy that is then emitted as light. Anne L'Huillier has continued to explore this phenomenon, laying the ground for subsequent breakthroughs.

In 2001, **Pierre Agostini** succeeded in producing and investigating a series of consecutive light pulses, in which each pulse lasted just 250 attoseconds. At the same time, **Ferenc Krausz** was working with another type of experiment, one that made it possible to isolate a single light pulse that lasted 650 attoseconds.



The laureates' contributions have enabled the investigation of processes that are so rapid they were previously impossible to follow. "We can now open the door to the world of electrons. Attosecond physics gives us the opportunity to understand mechanisms that are governed by electrons. The next step will be utilising them," says Eva Olsson, Chair of the Nobel Committee for Physics. There are potential applications in many different areas. In electronics, for example, it is important to understand and control how electrons behave in a material. Attosecond pulses can also be used to identify different molecules, such as in medical diagnostics.

(Dr. Lalitha Dhareshwar)

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4. Illustration: Overtones (pdf)
5. Illustration: Laser light interacts with atoms in a gas (pdf)
6. Illustration: The world of electrons is explored with the shortest of light pulses (pdf)

Physiology and Medicine

Drew Weissman and Katalin Kariko

This year's Nobel Prize in Physiology and Medicine has been awarded to biochemist Katalin Kariko and Drew Weissman for discoveries of mRNA vaccine which was used against COVID-19. Kariko, a professor at Szeged University, Hungary and an Adjunct professor at University of Pennsylvania, USA and Weissman, University of Pennsylvania, USA did groundwork for immunization using messenger RNA (m-RNA), which was later used for developing mRNA COVID vaccine and moved at record breaking speed to immunize people and thus saved millions of lives.

The mRNA COVID 19 vaccine was manufactured by Moderna and Pfizer-BioNTech using the technology developed by Kariko and Weissman. The mRNA that is delivered instructs cells to create copies of a protein that is found on SARS-CoV-2 virus particles, called spike protein. This stimulates the body to make antibodies that target the protein, as well as triggering other immune responses.

For a long time, mRNA vaccines were considered unfeasible because the body breaks down infected mRNA. Kariko and Weissman swapped uridine nucleotide in mRNA with pseudo-uridine nucleotide, thus bypassing the cell's innate immune defences. They successfully demonstrated that changing the type of RNA nucleotides within the vaccine altered the way in which cells could see it.

The discovery of mRNA vaccine has opened up a novel chapter for medicine and can be used for a number of other diseases including influenza, HIV, malaria, Zika, Cancer etc.

Another key component of COVID-19 mRNA vaccine was the use of lipid nanoparticles (LNP), which surround the modified RNA helping its entry into cells. Although COVID 19 jabs put mRNA vaccine on the map, the technology's impact is revolutionary, which will reach far and wide.

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(Dr. Susan Eapen)

Women Achievers

1. Dr. KATALIN KARIKO - A Woman Nobel Laurate, who refused to Quit.

Dr. Katalin Kariko is a Hungarian – American Biochemist, who laid the ground work for m-RNA vaccines, for which she has been awarded Nobel prize In Physiology and Medicine in 2023 along with American immunologist Drew Weissman.

Early Years: Katalin Kariko was born and grew up in Hungary in a small home without running water, refrigerator, and television.

Her father was a butcher and mother, a bookkeeper. She excelled in science in school and did her B.Sc. Degree in Biology in 1978 and a Ph.D. in Biochemistry in 1982 from University of Szeged. She did her post-doctoral research in the Institute of Biochemistry, Biological Research Centre (BRC) in Hungary. In 1985, her lab at BRC lost its funding and she along with her husband and two-year-old daughter migrated to USA.

From 1985 – 88, she served as a post-doctoral fellow at Temple University of Philadelphia. Later she joined University of Pennsylvania, where she faced lot of problems. In 1990, she worked on m-RNA based gene therapy while she was an Adjunct Professor. Funding on m-RNA research was stopped since authorities thought it was not a viable technology and she was not promoted to Associate Professor. The University demoted her, cut her pay and described her as not of "good quality faculty". Meanwhile she was struck with cancer, but she survived. In 1997, she met Drew Weissman by a chance encounter at a xeroxing room and Dr. Drew was impressed by her inquisitiveness and knowledge and they started working together on m-RNA. Their work on therapeutic use of m-RNA initially led to inflammatory reactions. Kariko and Weissman overcame this problem by replacing uridine in m-RNA with pseudo-uridine, which prevented inflammatory reactions and the results were published in prestigious journals like Nature and Science.

They also developed a delivery technique in which the m-RNA was packed in lipid nanoparticles. Soon Kariko and Weissman founded a small company RNARx. Later she joined Moderna / Astra Zeneca as Vice President in 2013, while maintaining the adjunct professorship at the university. Kariko's work laid the foundation for BioNTech and Moderna to create therapeutic m-RNA vaccine.

When COVID-19 stuck the world, she developed m-RNA vaccine for COVID-19 at record speed, which saved the lives of millions. mRNA vaccines have potential applications for treatment of cancer, cardio-vascular and metabolic diseases.

Kariko received more than 130 international awards and shared 2023 Nobel Prize in Physiology and Medicine with Dr. Drew Weissman. Her life is the story of a scientist who struggled, endured, and refused to quit.

References: Wikipedia.

2. Project Director Aditya L-1 Nigar Shaji

Shaji, who joined the elite space agency in 1987, rose through the ranks to become the project director of India's first solar mission. The 59-year-old, who was earlier the associate project director of Resourcesat-2A, which is still operational, is also the programme director for all lower orbit and planetary missions. She started her stint in ISRO by working at the Sriharikota spaceport off the Andhra coast

and was later shifted to the U R Rao Satellite Centre in Bengaluru, which is the key centre for developing satellites.

Born to a Muslim Tamil family in Sengottai in Tamil Nadu's Tenkasi district, Shaji did her schooling in Sengottai before getting admitted to the Government College of Engineering, Tirunelveli, under Madurai Kamaraj University, where she earned an engineering degree in electronics and communications. Later, she did her masters in electronics from Birla Institute of Technology, Mesra. Shaji's father Sheikh Meeran, a mathematics graduate who turned to farming by choice, always inspired her to do something big in life. "Both my parents were very supportive throughout my childhood. Because of their continued support, I rose to such heights," she said in a media interview recently.

Clearing any misconception about gender discrimination in the space agency, Shaji said she never faced any gender bias in ISRO. It was due to the continued support of her seniors she has been able to reach this position today. "Being the team leader, many people now work under me. So, I groom the same way my seniors groomed me," Shaji said. Shaji and her team started working on the Aditya L1 project in 2016. Though the Covid pandemic stalled their work around 2020 when ISRO activities came to a near halt, the project work never stopped. She and her team continued to work on the solar observatory containing seven scientific instruments, which was launched on 2nd September 2023. Shaji and her team kept a hawk's eye on the spacecraft throughout its journey towards the L1 point from the Earth after several manoeuvres. Due to their hard work, Aditya-L1 has finally reached its destination, the halo orbit, from where the spacecraft will observe the Sun without any hindrance or occultations.

The 59-year-old, who is playing a key role in several ISRO missions, has now become a role model for many women who want to pursue a career in space science.

3. Maria Conceição: Breaking 9 Guinness World Records for Children's Transformation

Maria Conceicao's story is one that reaches great heights, but also one that takes many falls. Her path has often been steep, with plenty of twists and turns often out of her control.

Maria has faced adversity from an early age. How Maria went from a difficult start in life to become the first Portuguese woman to summit Mount Everest is just one of her incredible stories, and there are many more. She is also the first Portuguese woman to the North Pole and the South Pole. She does all of this for a cause. It's part of a mission. But it's a story that we can all learn from.

Maria's difficult childhood experience has given her a mindset that makes her determined to help others in difficult situations. But it hasn't been easy. Maria has constantly found herself needing to find a way through seemingly impossible barriers and obstacles or having to find a new or better way to do things. She never gives up.

In 2005, she started an initiative in the slums of Bangladesh where she has helped 101 families, and more than 600 children get an education. Among other things, she built one of the most advanced schools in Bangladesh, despite not even having completed grade 6 herself. But after 8 years it all came tumbling down due to matters beyond her control.

She showed great resilience and determination, in finding new ways to get the slum children back to school.

Maria's story gives incredible examples of innovation, leadership, and agility to keep her project going, to keep her promise to those slum children.

A never give up attitude and a strength to constantly re-invent herself and her strategy, Maria believes that you can always find a path to success.

Maria's foundation has been in operation now for 10 years and provided education to over 600 children. It has always been a struggle to fund the foundation. "In the early days there seemed to be an abundance of money in Dubai, but when the recession came, donations and funding disappeared almost overnight," Maria noted. Maria then had to take desperate measures to get attention, raise awareness and make public appeals for help.

"I run to secure the future of my children in Dhaka."

In 2010 Maria summited Mount Kilimanjaro, to draw attention for her cause to educate vulnerable groups of children in Bangladesh. In 2011 she made a successful trek to the North Pole and walked a marathon on each of the 7 emirates in the UAE in 7 days. In 2013 she became the first Portuguese woman to summit Mount Everest and since then has ran 7 ultra marathons on 7 continents in 6 weeks, 7 ultra marathons in 7 days and 7 marathons on 7 continents in 11 days.

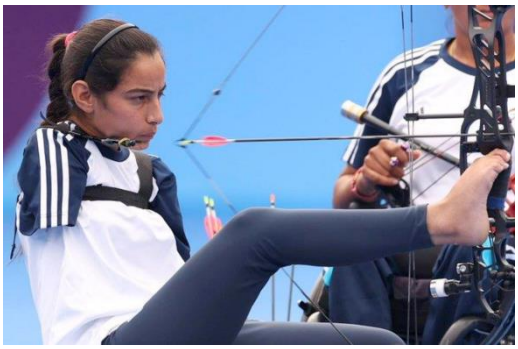
She did not have any athletic inclination before embarking on these challenges. Many, including personal trainers, advised her not to attempt such ambitious feats. She still decided to push forward out of desperation to raise awareness and funds, but she also hopes that her efforts give a positive message to the children in the slums. She wants the children to realise that despite the expectations of people or society, you can achieve much more.

Maria has received several awards and recognition for her work, including European Union Woman Innovators Award, Emirates Humanitarian Woman of the Year 2009, Emirates Woman of the Year 2009, Most Inspiring Woman of GCC 2010, Sustainable leadership Award 2013, Inspiring Change Award 2014 and several more.

https://herstory.pro/portrait/maria-conceicao/

https://www.mariadaconceicao.com/about-me/

4. Sheetal Devi, the First and the only International Para-Archery Champion without Upper Limbs



Sheetal Devi (born 10 January 2007) is an Indian Para-archer. Devi was born with a rare medical condition called phocomelia, which makes her the first and the only international para-archery champion without upper limbs. She received the Arjuna Awardee 2023 from the President of India on 9 January 2024. In the women's compound bow at the 2022 Asian Para Games, Devi received two gold medals in mixed doubles and women's individual after winning a silver medal in women's double compound.

She was born in Loidhar village, Kishtwar district in Jammu and Kashmir. In 2019, Sheetal attended a youth event in Kishtwar where she was noticed by the Indian Army's Rashtriya Rifles unit resulting in the Army supporting her education and providing medical assistance.

In the youth event organized by Indian army, the army coaches Abhilasha Chaudhary and Kuldeep Wadhwan noticed her confidence and decided to train her. As she was born with Phocomelia, she had no arms. So firstly, the coaches decided to help her with prosthetics. But the medics said that prosthetics were not possible in her case. Here, she said that she was fond of and has expertise in climbing trees using her legs. This was a very pleasant surprise for the coaches. Now coaches had one more challenge to face, they had never trained a person for archery who has no arms. But coaches did some research about whether it was possible to train her, and eventually they came to know about Matt Stutzman , who was armless and used his legs for archery. This made coaches very confident and within 11 months of training, Sheetal Devi participated in Asian Para Games and won two gold medals for India.

(Source: Wikipedia)

IWSA Achievers

1. Professor Savita Ladage gets prestigious Royal Society of Chemistry prize.

Professor Savita Ladage from Homi Bhabha Centre for Science Education (HBCSE), an autonomous institute affiliated to Tata Institute of Fundamental Research, has been selected by the London-based Royal Society of Chemistry (RSC) to receive its Nyholm Prize for Education, in recognition of her contribution to advancing chemistry education.

The Excellence in Education Prizes, including the Nyholm Prize, celebrate individuals working in primary, secondary, further education, and higher education, encompassing teachers, technicians, and more.

A resident of Mumbai, Dr. Ladage is being honoured for her contribution to the importance of chemical education which includes mentoring chemistry educators and initiating impactful teacher and student programmes aimed at promoting chemistry education in India.

Mr. Helen Pain, chief executive of RSC, commended Dr. Ladage's "outstanding commitment" to chemistry education, emphasising its crucial role in shaping the future and preparing young individuals to tackle societal and environmental challenges. He added that "Professor Ladage's work demonstrates an outstanding commitment to chemistry education, and it is our honour to celebrate their considerable contribution."

Dr. Savita is passionate about teaching and learning chemistry. She interacts with chemistry students and teachers, especially at undergraduate level. One of her main interests has been chemistry lab education and helping students to make observations more carefully and critically. She designs experiments and highlights the associated procedures, difficulties and errors involved,

and the data. Savita wants to change the perception of students and teachers of chemistry lab education.

Dr. Savita Ladage is an IWSA Member, and we are indeed proud of her achievements

https://www.hindustantimes.com/cities/mumbai-news/professor-savita-ladage-to-get-prestigious-royal-society-of-chemistry-prize-101702493527…

https://www.rsc.org/prizes-funding/prizes/2023-winners/professor-savita-ladage/

2. Dr. Sunita Mahajan – the Superwoman who participated in supercomputing

Computer field has progressed by leaps and bounds. Now we have computing power in handheld Smart phones. With the multiple apps available, we can easily perform many things. But in the early days, things were quite different when computers were just available only to Government Institutions and Research Institutions. Bhabha Atomic Research Centre (BARC) was one such Institution, where there was a constant need for faster and faster computers to be utilised in various projects of Atomic Research.

Building a fast supercomputer was quite a challenge about three decades ago. One of the team members of the then Computer Division of BARC that successfully rose to face this challenge was Dr. Sunita Mahajan.

In 1990, first Supercomputer 'ANUPAM', was developed, based on parallel processing technology. Later versions were faster and helped in programming for many highly complex programs, 'Tejas', the Light Combat Aircraft being one such example.

Along with her busy schedule of being a computer scientist, Dr. Mahajan associated herself with Indian Women Scientists' Association (IWSA) and Women Graduates Union and contributed immensely to computer education and community welfare. She joined BARC in 1969 as a Senior Scientific Officer and retired in 2000. Then she joined SNDT - Women's University as an Associate Professor. Parallel Computing was the focus of her research.

"In the beginning of 90's decade, we felt the need for high-speed computers that were not available in the market. We were exploring new techniques to gain high speed in computing which led to Parallel Computing (means joining many computers to run one program) was thought about". Dr. Mahajan's team participated in joining many computers and establishing proper communication between them. Initially 16, 32 and 64 computers were joined. Fortran was supplemented by parallel processing Subroutine Library. Using this technique many Scientific programs were run successfully.

Taking an example of programming for a new combat aircraft we use Computational Fluid Dynamics technique. There is a bifurcated duct located in every aeroplane to control the flow and its thickness is critical and is determined by using Computational Fluid Dynamics (CFD) Techniques. In 1999, using a single computer, the CFD program took 21 days to complete. When run on 'ANUPAM' it took 3-4 days. Later versions could complete this in 3-4 minutes. This could complete the design of the air duct and 'Tejas' was proudly flying in our air space.

ANUPAM is being used for solving many such highly complex programs like weather prediction, protein molecule design and several others.

At IWSA, Dr. Mahajan has been the President and Chairperson of Board of Trustees. Even today, she takes keen interest in the activities of IWSA and guides her younger colleagues at IWSA.

Newspaper Article in Maharashtra Times, dated 21st Oct 2023 – by Manisha Thakur Jagtap, Navi Mumbai

Unsung heroine: Henrietta Leavitt and her contributions in Astronomy

On the evening of December 12, 1921, 53-year-old astronomer Henrietta Swan Leavitt succumbed to cancer. Leavitt worked nearly 30 years at the Harvard College Observatory, during which her achievements failed to receive sufficient recognition.

Leavitt was born in Massachusetts in 1868 and was one of a small group of women in the United States who had the opportunity to attend university. She first enrolled at Oberlin College before transferring to Harvard University's school for women, later named Radcliffe. There she studied art, philosophy, language, and mathematics. In her final year, she took a course on astronomy at the Harvard College Observatory.

By the end of the nineteenth century, the number of women with college degrees had increased tremendously, but there were still few professional positions available to women with a formal college education and even fewer in the sciences. With a newfound interest in astronomy, and the financial support from her family, Leavitt opted to volunteer as a research assistant at the Harvard College Observatory.

Edward Pickering, the observatory's director, brought together a group of women to catalogue all the stars captured on Harvard's photographic plate collection. These skilled workers were not allowed to operate telescopes, but they contributed to the analysis of data that led to major scientific discoveries. Some of the women from this group, called "computers," classified stars by their colours, brightness, and spectra. Pickering assigned Leavitt the task of studying variable stars, a type of star that varies in brightness over time.

Cataloguing variable stars was tedious work. Leavitt had to compare pairs of photographs, recorded on plates of glass, taken of the same part of the sky on different nights. She painstakingly examined every star – each photographic plate contained thousands of stars – looking for the smallest change in brightness. Through close observation and sustained attention, Leavitt noticed a significant pattern in the appearance of Cepheid stars, a type of variable star that varies in brightness with a regular "period" (the time it takes for a star to cycle between all levels of brightness).

Leavitt observed that Cepheid stars with long periods were relatively brighter than Cepheid stars with short periods. She determined there was a direct relationship between the period of a star's

dimming and the star's intrinsic brightness. This meant that if an astronomer could measure the period of any Cepheid star, they could infer its intrinsic brightness. Once a star's intrinsic brightness is known, astronomers can calculate how far away the star is by knowing how light dims the further it travels. This was quickly recognized as a valuable new tool to measure distances to this class of variable star even when located far from Earth.

Leavitt excelled at examining photographic plates. She was efficient at spotting variable stars on each photograph she analysed and was skilled in determining their change in brightness. Though Pickering acknowledged and awarded Leavitt for her skills and abilities – she was eventually paid 30 cents per hour, five cents more than most computers – he limited the type of work she could tackle. Few of the women computers were permitted to work independently on questions they may have had about the universe. Though Leavitt wanted to continue her work to understand Cepheid variables, as a computer she had little control over her work and was assigned other tasks. She was not permitted to take up the theoretical work that would have enabled her discovery of the unique property of Cepheid stars to be put into practice. That activity was reserved for the men astronomers that followed her. She died before realizing the full impact of her discovery.

The accomplishments of Edwin Hubble, the American astronomer who established that the universe is expanding, also were made possible by Leavitt's groundbreaking research. Hubble often said that Leavitt deserved the Nobel Prize for her work. Mathematician Gösta Mittag-Leffler, a member of the Swedish Academy of Sciences, tried to nominate her for that prize in 1925, only to learn that she had died of cancer three years earlier. (The Nobel Prize is not awarded posthumously.)

One hundred years after her death, historians, librarians, archivists, authors, and artists recognize Leavitt's contributions to astronomy.

https://pweb.cfa.harvard.edu/news/remembering-astronomer-henrietta-swan-leavitt

IWSA Head Quarters in Vashi, Navi Mumbai

BRNS Popular Science Lectures in Colleges

BRNS Lecture at Ruia College, Mumbai on 12th December 2023

BRNS Lecture at SIES College (Sion), Mumbai on 16th December 2023

BRNS Lecture at NMIMS, Vile Parle (W) Mumbai on 18th December 2023

BRNS Popular Science Lectures in Schools

BRNS Lecture at St. Mary's High School, Mazagaon, Mumbai on 14th September 2023

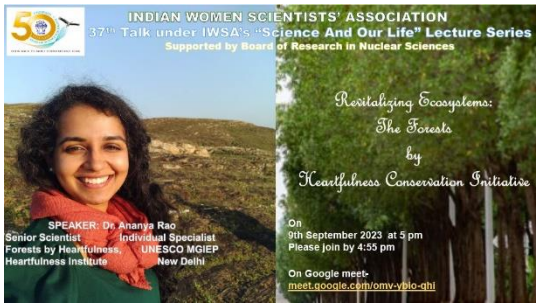
BRNS Lecture at Smt. Radhikabai Meghe Vidyalaya, Airoli, Navi Mumbai on 28th November 2023

BRNS Lecture at New City International School, Kharghar, Navi Mumbai on 1st December 2023

← BRNS Lecture at St. Mary's ICSE School Koperkairane, Navi Mumbai on 18th December 2023

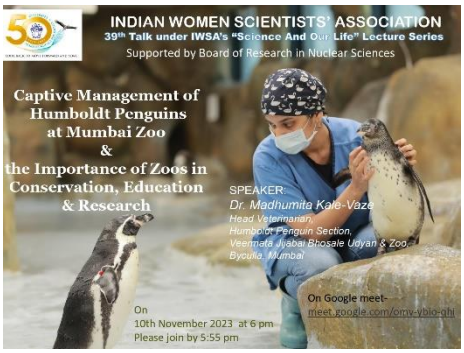
BRNS Lecture at New City Saraswati Vidyalaya, Murbi Village, Kharghar, Navi Mumbai on 22nd December 2023 →

Webinars under the “Science and Our Life” Series

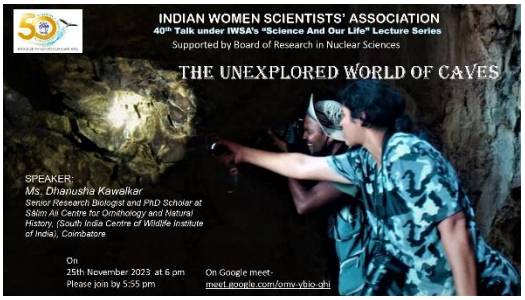


37th SAOL on 9th September 2023

38th SAOL on 14th October 2023

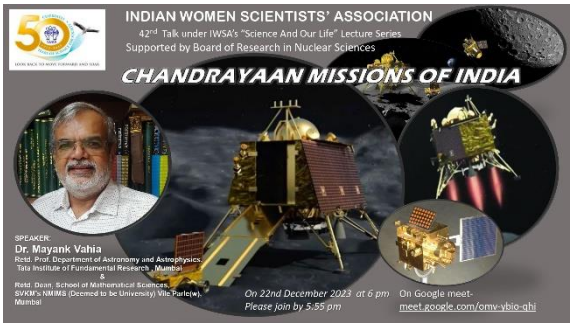


39th SAOL on 10th November 2023

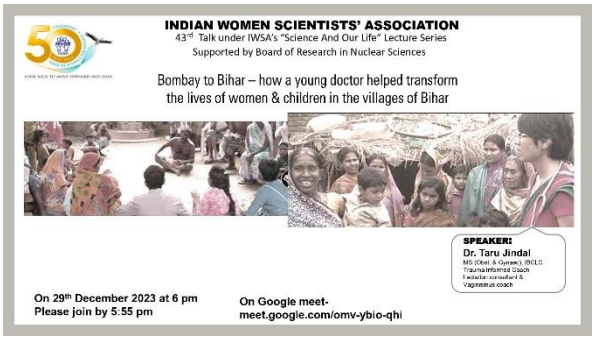


40th SAOL on 25th November 2023

41st SAOL on 16th December 2023



42nd SAOL on 22nd December 2023



43rd SAOL on 29th December 2023

Activities of IWSA

Participation of IWSA Members at 5th International Conference on Sustainability Education, September 19-20, 2023, New Delhi

Participation of IWSA Members at at International Conference Biological Sciences for Sustainable Future on 15th and 16th December 2023 at D.Y. Patil Deemed to be University, Navi Mumbai

ITM BUSINESS SCHOOL internship 4th-16th December 2023

Students along with Mentors

IWSA Learning Garden Activities

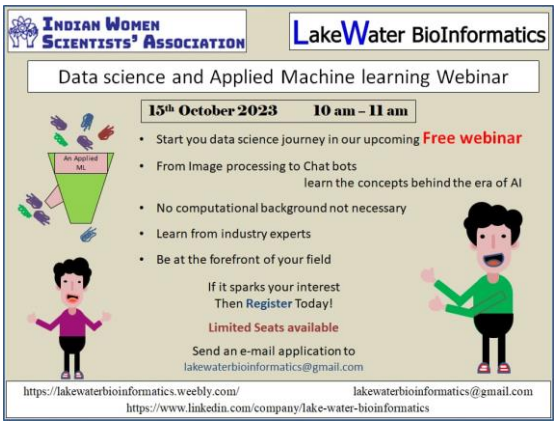
Visit of Students from St. Mary's School 30th September 2023

Visit of Children from Vatsalya Foundation 8th November 2023

Fairy Garden Workshop 23rd December 2023

Visit of Dr. Pheroja Godrej and Celebration of Dr. Sudha Padhye's 91st Birthday on 15th December 2023

Webinars organised by Computer Education Centre



Activities by IWSA's Piroshja Godrej Foundation Library

Book Review by Dr. Bakhtaver Mahajan on 7th October 2023

Review of book CHODDOSAKH on 21st October 2023

IWSA's Murli Laj Chugani Health Care Centre

Recipe Demonstration of Use of Millets to Parents of Nursery School Children on 2nd September 2023

Activity for Special Needs Children from Arambha Foundation, Koparkhairane on 7th October 2023

Nutrition counselling desk set up by Health Care Centre at KC College on 18th December 2023 for the Millet Convergence Conference.

Activities from our branches

Amravati Branch

BRNS Lecture on "Opportunities for Girls in the Armed Forces" on 1st November 2023

Baroda Branch

BRNS Lecture on "Lymphatic delivery: A new paradigm for systemic and site-specific drug delivery " on 21st September 2023

Bengaluru Branch

Awareness camp on Menstruation for housekeeping lady staffs on 10th November 2023

Kalpakkam Branch

SHAKTI-2023 Event "Women in Technological Advances and Social Upliftment" on 26th September 2023

Kolhapur Branch

Workshop on 'How to Cope up with Hormonal Changes and Health Awareness for Boys and Girls" on 9th September 2023

Nagpur Branch

Nature Walk and Bird Watching Event for School Students on 10th December 2023

Nellore Branch

Lecture on SCOPE OF BIOINFORMATICS at Sasi English Medium School on 23rd September 2023

Roorkee Branch

Vijaya Agarwala Memorial Mathematics Olympiad - Maths & Science Fair 2023
26th November 2023

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