NUCLEAR NEWS

THE MONTHLY NEWSLETTER

JANUARY & FEBRUARY 2021

Indian Youth Nuclear Society (IYNS) is a non-profit organization with the aim to spread awareness about the benefits of nuclear energy among general public and to encourage our youth to learn and contribute to the nuclear energy program.

IYNS

IN THIS ISSUE

ARTICLE OF THE MONTH

Written by Ms Niharika Tagotra (Page 4), *the article "Geopolitics of Nuclear Energy" is the author's view on how geopolitical issues have shaped the global nuclear energy sector. It also discusses the impact of the observed diversification of the nuclear energy sector on global strategic agreements.*

HIGHLIGHTS OF THE MONTH

Missed an event from IYNS? *No Problem! This Section presents an account of the events organized by the Indian Youth Nuclear Society in January and February* 2021. *Articles featured in this issue:-*

- *Interactive Lecture Session on the Safety of Advanced Nuclear Reactors* (Page 7)
- *"Being Informal With..." Shri* K.N. *Vyas - Secretary* DAE *& Chairman* AEC (Page 8)
- *The signing of* MOU *between* IYNS *and Shiv Nadar Schools* (Page 11)
- *National Conclave on India's Sustainable Development-*2021 (Page 12)

OUR UPCOMING EVENTS

Get ready for another exciting and eventful month! The entire team of IYNS *works round the clock to bring new experiences and information to our followers. To kick-start March* 2021, IYNS *has planned the following events:-*

- *"People Should Know!"* (Page 14)
- *"Being Informal With..." Dr Archana Sharma (Senior Adviser for Relations with International Organisations at* CERN) (Page 15)

FOREWORD

Dear avid readers of the IYNS newsletter, Greetings for the New Year 2021!

2020 has been a year of uncertainties and deviations. However, all of us have learnt that knowledge and understanding give us hope for life and sustainability. Whether it is a vaccine, climate concerns or energy security, all of this requires the apprehension of the issue and the logical solution for the same. With this lesson, the Indian Youth Nuclear Society (IYNS) has tried its best to share awareness and insight with the bright people of our country.

During last year, IYNS began online activities to reach and connect with people at large. The IYNS YouTube channel is now full of several informative videos and being constantly liked by numerous people. It was June when we successfully conducted its first 'Online International Webinar Series' and could reach 15,000+ students and faculty members during the week-long sessions. In July, we started a unique tête-à-tête series with eminent Indian scientists named "Being Informal With...". It has been appreciated by considerable and distinguished personalities. It has also become one of the most awaited shows on our YouTube channel. In August, IYNS established the "Women in Nuclear in India (WiN-India) Association" to encourage and empower the women associated with the Indian nuclear industry. The launch on 'Indian Independence Day' highlighted the importance of such an organisation in our country. We also flagged off the round the 'Plantation drive' in our country. We encourage everyone to contribute to this noble cause and share the photo or the video with us to inspire others. I take this opportunity to invite all of you to contribute your plant to the fight against climate change. September was dedicated to the week-long workshop on 'Nuclear Security' in association with Amity University and World Institute for Nuclear Security (WINS) for scientists, technicians and engineers. Students, academicians and young professionals got acquainted with the best security practices used across the globe. The month long 'Energy Boot Camp 2020' during October-November organised in association with Shiv Nadar Schools and Vidyagyan academies is one of our flagship events. This successful online event received a lot of acknowledgement and recognition within educational forums and international media. Through multifarious activities organised during the boot camp, we could spread the words about the benefits of nuclear technologies and climate change to more than 20,000 students, their families and faculties. Along with these coronal events, IYNS organised a number of online events including webinars, lectures, interactive sessions and others. We also collaborated with esteemed organisations and institutions like Homi Bhabha National Institute, ITER Organization, etc.

In 2021, we are going to launch a new series "People Should Know!" where experts will be discussing the key questions and queries from the public about nuclear technologies, climate change and related policies. We will also launch the second season of "Being Informal With..." from July and increase the premiering frequency to twice a month. Many new activities will be presented to all of you.

I would like to take this opportunity to heartily thank all of you for your kind love and support you have showered upon us. Kindly continue the same this year as well. The team IYNS is wholeheartedly dedicated to making our country aware of the benefits of advanced technologies to make their life better. I would also like to thank all the IYNS members and managers for their striving day and night efforts to make it possible. Take care and stay safe!

Dr Nitendra Singh
President, IYNS

ARTICLE OF THE MONTH

Geopolitics of Nuclear Energy

Ms Niharika Tagotra
(Nuclear Physicist and PhD Candidate, International Politics, JNU)

The global nuclear energy sector has undergone profound changes in the last decade, with the geopolitics around it evolving much in tandem. Over the last few years, there has been a monumental shift in the global nuclear energy sector, with the traditional nuclear-supplying bigwigs like the US, Canada and some Western European nations replaced by countries like Russia and China as lead suppliers of nuclear-related technologies across the world. Additionally, the demand centre for nuclear energy has also shifted from the West to the East in the new and emerging economies in the Middle East and Asia-Pacific. This shift has significant implications for the geopolitics of the nuclear energy sector, which to date remains strategic in nature, highly regulated by national governments and international organizations, a key pillar of energy security, and an important foreign policy tool for countries.

USA: Nuclear Industry in Decline

The said shift in the nuclear energy sector was prompted by the Fukushima disaster in 2011, which caused the Western nations to retrench and created space for new suppliers like Russia and China. Currently, the US has 94 licensed to operate nuclear power plants, generating about 20% of the total electricity in-use*. The most recent addition to the US NPPs came online in 2016, and there has been a dearth of new construction in the sector ever since, even though about 10 NPPs are due to retire by 2025**. The decline in the nuclear energy industry in the US was made starkly evident when the global nuclear major Westinghouse announcing bankruptcy in 2017.

** https://www.nrc.gov/reactors/power.html*
*** Nakano, Jane (2020), The Changing Geopolitics of Nuclear Energy, https://bit.ly/37kH0FU*

Russia: Rosatom- One-stop Nuclear Shop

The situation has been quite contrary in Russia, which has emerged as the centre of the global nuclear energy industry and the main exporter of nuclear technology. The Russian nuclear energy major Rosatom is a state-owned enterprise which is both vertically and horizontally linked, thus making it a one-stop nuclear shop. Rosatom's range of activities covers the entire nuclear fuel cycle from operating the country's NPPs, to maintaining Russia's nuclear-powered icebreakers and manufacturing various NPP related components. Between 2009 and 2018, Rosatom accounted for 23 of the 31 export orders placed around the world, and by 2018, it was involved in the construction of 36 NPP units in 12 countries*. In 2017, notably the same year that Westinghouse announced bankruptcy, Rosatom signed a US$ 30 billion worth agreement with Egypt for the construction of El Daaba NPP. Additionally, Rosatom is involved in the construction of Akkuyu NPP in Turkey, Rooppur NPP in Bangladesh, and other units in countries like China, India, Uzbekistan and Belarus.

China: Leapfrogging to advanced nuclear technology

A second emergent player in the nuclear energy sector has been China which is fast leapfrogging to advanced nuclear reactor technologies and emerging as the alternative supplier. Domestically, China has 48 operational NPPs, with another 18 under construction**. Nuclear power in China is expected to rise annually at a rate of 1.9%. China's rapid rise in the civil nuclear industry, as with many of its other sectors, has been supported by its domestic laws mandating technology transfer. In 2007, Westinghouse was awarded a major contract of building four Generation III AP1000 nuclear reactors in China, but with a mandatory transfer of technologies. This allowed China access to AP1000 reactor designs, which have been tweaked to make way for China's indigenously developed Hualong One Reactor, making it their main export product. Additionally, nuclear energy has been well integrated into China's Belt and Road Initiative (BRI) as a part of which China is implementing nuclear power projects in at least 28 BRI countries***. Today, China is participating in NPP construction in countries including Pakistan, Iran, Turkey and South Africa, and has signed MoUs with Kenya, Egypt, Sudan, and Kazakhstan****.

** Schepers, Nevine (2019), Russia's Nuclear Energy Exports: Status, Prospects and Implications, https://www.sipri.org/sites/default/files/2019-02/eunpdc_no_61_final.pdf*

*** Banks, George David (2017), The Rise of China's Civilian Nuclear Program and its Impact on US National Interests, https://accf.org/wp-content/uploads/2017/03/ACCF_China_paper_03.pdf*

**** Nakano, Jane (2020), The Changing Geopolitics of Nuclear Energy, https://bit.ly/37kH0FU*

***** Nuclear Power in China 2021, https://www.world-nuclear.org/information-library/country-profiles/countries-a-f/china-nuclear-power.aspx*

Demand-side Shift

In addition to the supply side changes, demand for nuclear power has also significantly shifted from the west to the east. India has been pursuing the development of its civilian nuclear energy, slowly but steadily. Saudi Arabia has announced plans to construct two large nuclear power reactors, UAE's first NPP, the Barakah NPP, was commissioned in 2020. NPP construction is already underway in Turkey and Bangladesh, while several other emerging economies have announced their plans for including nuclear power in their total energy mix. The problem of cost inflation that has plagued the nuclear energy sector for many years is now being tackled by replacing the giant NPPs with the easily scalable Small Modular Reactors (SMRs) that produce up to 300 MW of energy. This step opens the prospect of nuclear making a definite comeback through advanced and scalable reactor designs.

Geopolitical Ramifications

The observed diversification of nuclear energy sector away from the traditional bigwigs of western nations and towards the east can have many significant ramifications on the geopolitics of nuclear energy. In the first instance, with the observed retrenchment of the US from the nuclear industry, the global non-proliferation institutions supported by them run the risk of being considerably weakened or side-lined by countries with state-sponsored nuclear energy industries governed by opaque regulations and little accountability. This lack of regulatory oversight of a sector that is much strategic in nature, with multifaceted outputs, can also threaten the global non-proliferation regime. Secondly, nuclear energy is making a comeback after years of slowdown observed in the post-Fukushima era. This comeback is supported by the growing concerns over climate change and countries' growing commitment towards carbon neutrality and net-zero emissions, which cannot be fulfilled by renewable energy alone. This makes it even more important for the global nuclear regime to be further strengthened, making it more inclusive, transparent, accessible and regulated. Thirdly, nuclear energy is a potent foreign policy tool that locks countries in a buyer-supplier relationship for at least 40 years. This helps cement bilateral ties and as has been observed in many cases, leads to the culmination of other bilateral and strategic agreements. The expansion of supplying countries' area of influence through the implementation of NPP projects is a direct corollary of the oil geopolitics that was observed in the preceding decade and needs greater attention by all stakeholders.

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HIGHLIGHTS OF THE MONTH

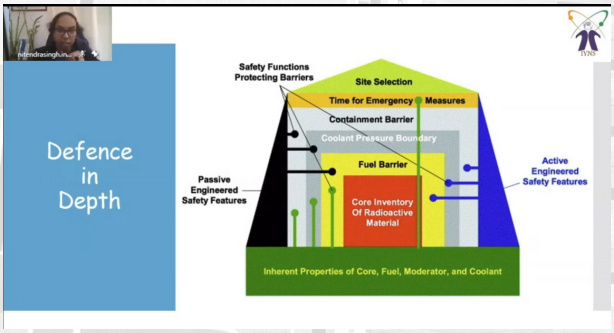
Interactive Lecture on the "Safety of Advanced Nuclear Reactors" January 17, 2021

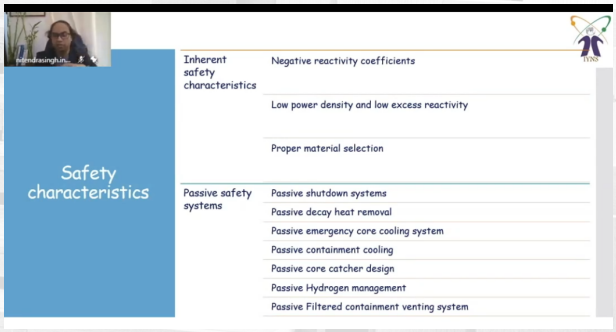
IYNS and Amity Institute of Nuclear Science and Technology jointly organized an Interactive Session on the "Safety of Advanced Nuclear Reactors" on *January 17, 2021, at 17H30 (IST).* This session was delivered by Dr Nitendra Singh (President IYNS).

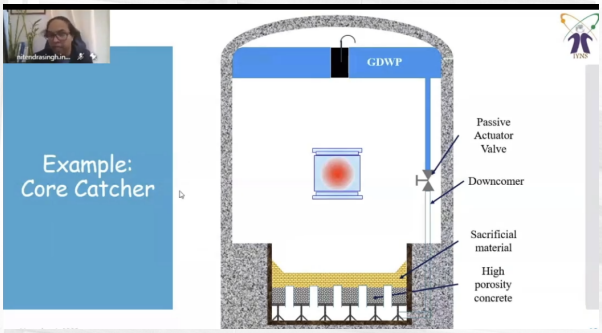
During this session, Dr Singh discussed the concept of *Nuclear safety* and its importance in the context of commercial nuclear reactors. He described the safety functions associated with nuclear power plants and explained the concept of *"Defence in Depth"* and its applicability to the nuclear industry. Furthermore, he highlighted the safety criteria deployed to ensure nuclear safety during normal operating as well as accident conditions. Dr Singh also described the *Advanced Nuclear Reactor Designs* and the key design features (namely the *Inherent Safety Characteristics* and the *Passive Safety Systems*), in particular, the *Core Catcher Passive Safety System design* that distinguish them from the current nuclear power plant designs.

Post-lecture, Dr Singh engaged the students in an insightful discussion, where he answered the questions associated with the different concepts associated with the working of the nuclear reactors, the startup of controlled nuclear fission in the conventional reactors and the questions associated with the licencing processes and regulations for nuclear facilities in India and around the world. He also discussed the role of safety and security in the nuclear context and the evolution of these concepts post the Three Mile Island and Fukushima Nuclear Disasters.

We encourage our readers to visit the IYNS YouTube Channel to view this informative and dynamic discussion by visiting *https://youtu.be/IO6oKkCFfCY*.



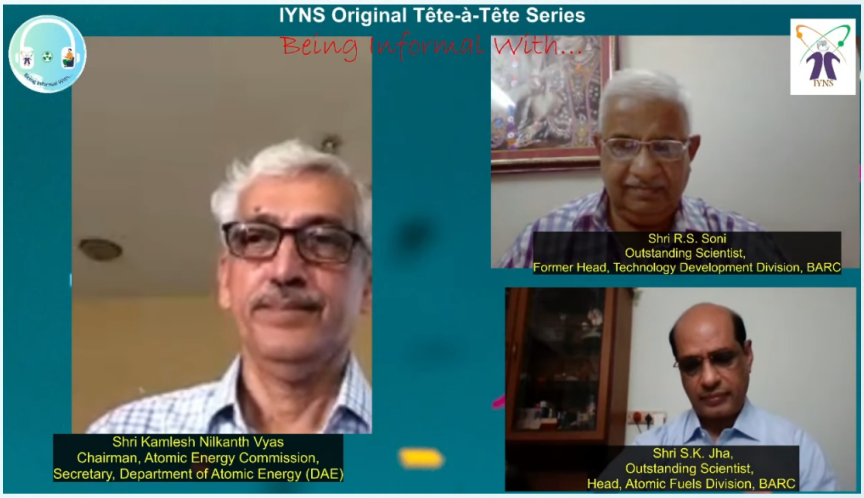




"Being Informal With..." Shri K.N. Vyas
IYNS's original Tête-À-Tête Series
January 31, 2021

The IYNS team had another successful episode of its original Tête-À-Tête Series: "Being Informal With..." on *January 31, 2021*, with Shri K.N. Vyas *(Chairman of Atomic Energy Commission and Secretary to the Department of Atomic Energy).* One of the distinguished scientists of the prestigious Training School of *Bhabha Atomic Research Centre*, Shri Vyas is known for his exemplary research work in the areas of *"Nuclear fuel design for Indian nuclear reactors and strategic applications", "Thermal hydraulics and stress analysis of critical reactor core components"* and *"Design & analysis of the Test Blanket Module (TBM) for the International Thermonuclear Experimental Reactor (ITER).* Furthermore, Shri Vyas has been conferred several awards, which include the *Indian Nuclear Society Outstanding Service Award 2011, Homi Bhabha Science and Technology Award 2006,* and the *DAE Award* in the years 2007, 2008, 2012 and 2013. He is also a Fellow of the *Indian National Academy of Engineers.*

During this session, Shri Vyas and Dr Singh were also joined by Shri R.S. Soni *(Outstanding Scientist and Former Head of the Technology Development Division at BARC)* and Shri S.K. Jha *(Outstanding Scientist and the Head of the Atomic Fuels Division at BARC).*



Our host engaged Shri Vyas in an engrossing discussion on his journey from being a part of the Fuel Design and Development Section at BARC and the change in his research focus to the realm of Reactor Thermalhydraulics, to being the front leader of the Indian Nuclear Sector as the Chairman of the Atomic Energy Commission. He discussed with Shri Vyas the idea behind ***Vigyan Samagam - India's first-ever global Mega-Science exhibition*** and the valuable contributions made by people DAE and DST (Department of Science and Technology) to bring together several collaborative mega-science projects under one roof. They shared a spirited conversation on the ***Public-Private Partnership for non-power applications of nuclear technology*** and the possibility of the inclusion of Small Modular Reactor designs to the nuclear reactor fleet of India. Dr Vyas also talked about DAE's role in addressing ***climate change*** and to meet India's Intended Nationally Determined Contribution (INDCs) targets committed at COP 21 in Paris. He explained the concept behind the inauguration of "Madhuban" forests in Anushakti Naga and how this project can be effective in Carbon Capture and BARC's contribution to this climate change mitigation project.

Our accompanying guests also shared their experiences of being involved with Shri Vyas on a personal and professional level. Shri S.K. Jha and Shri R.S. Soni shared with us their experience of working with Shri Vyas. They applauded Shri Vyas's enthusiasm for acquiring new knowledge, his persistence and his tremendous leadership that positively drove his team members to achieve the best possible results. Shri Soni also shared with us, some stories of Shri Vyas's childhood and their shared academic life at the Training School of BARC.

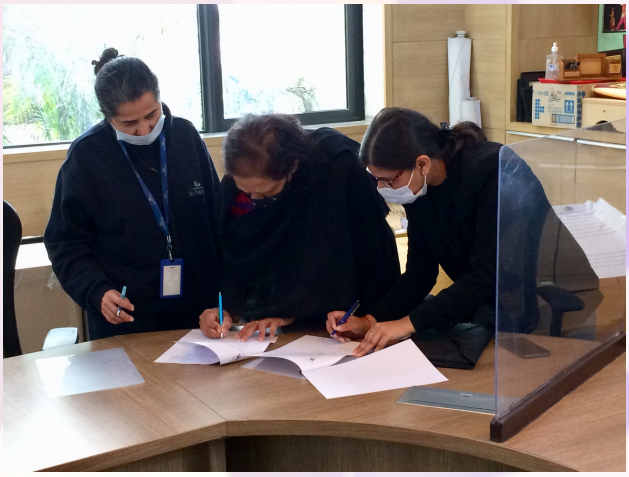
Towards the end of the session, Dr Singh asked Shri Vyas about DAE's short, medium and long term plans for increased power production from nuclear and renewable sources in terms of installed capacity and percentage in the energy mix. Shri Vyas stressed the importance of nuclear energy for fighting climate change issues. Furthermore, keeping up with the tradition of the show, our host asked Shri Vyas to nominate guests who should be invited to the Being Informal With... platform. Shri Vyas nominated **Shri S.K. Mehta (President, Indian Nuclear Society), Shri A.K. Anand (Former Director, Reactor Projects Group BARC) and Shri S.A. Bhardwaj (Former Chairman, AERB).**

We would like to thank Shri K.N. Vyas and our guests once again for taking out the time to share these inspiring stories with us. We also express our sincerest gratitude towards our viewers for supporting this venture. The episode is available on the IYNS YouTube Channel and can be viewed by visiting https://youtu.be/ysWuliugPD4. We look forward to your active participation in our upcoming episodes as well!

The Signing of an MOU between IYNS and Shiv Nadar Schools Feruary 8, 2021

Continuing its effort to encourage STEAM education and inculcate scientific temperate in the younger generation, IYNS signed a Memorandum of Understanding (MoU) with Shiv Nadar School (SNS), Noida on February 08, 2021. The MoU was signed by Ms Shashi Banerjee *(Principal, SNS - Noida)*, Ms Vinita Sharat *(STEAM Coordinator, SNS - Noida)*, Dr Nitendra Singh *(President, IYNS)*, and Ms Sunaina Kundra *(General Manager, IYNS)*.

The organizations have joined hands to enlighten future minds, broaden their horizon to think out-of-the-box and provide them exposure to real-world problems and opportunities. Through this collaboration, novel ideas in the area of education shall be implemented with the setting up of the *Energy Innovation Labs, the introduction of radiation education, cross-school learning concept, Educational Boot Camp, and concept of climate change and sustainability*. Year-long events and activities will be conducted providing students with the chances to explore and learn. Both sides were enthusiastic and optimistic about this collaboration, hoping to make a valuable contribution to the education of bright minds.



National Conclave on India's Sustainable Development - 2021
Feruary 14, 2021

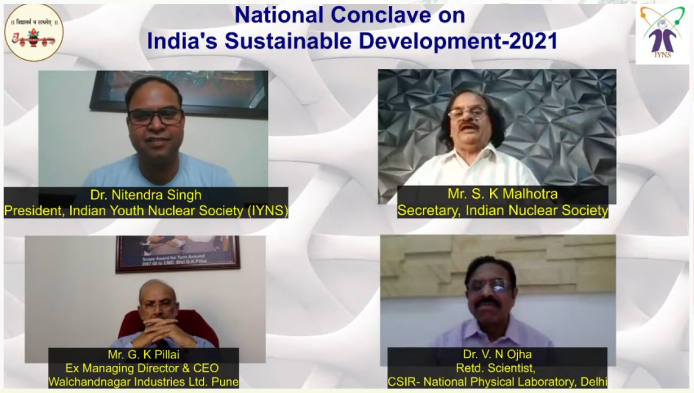
Science and Technology are the pillars of energy security and sustainable development for any country. The ability of a nation to secure sufficient, affordable and consistent energy supplies for its domestic, industrial, transport and health care requirements is overlooked time and again. In this wake, IYNS, Aatma Ram Sanatan Dharma College (University of Delhi) and the Phaltan Educational Society's College of Engineering (Pune) jointly organized a *National Conclave on India's Sustainable Development-2021* on February 14, 2021. This event included a *Panel Discussion* with experts from the industry, academia, and research domain, emphasizing the issues of energy security in India and the significance of standardization and calibration in the Indian industry. The Panelists included Mr S. K Malhotra *(Secretary, Indian Nuclear Society)*, Mr Anuj Bhatnagar *(Deputy Director, Bureau of Indian Standards)*, Mr G. K Pillai *(Managing Director, Walchandnagar Industries)*, Dr V. N Ojha *(Retd. Scientist, CSIR- National Physical Laboratory, Delhi)* and Dr Nitendra Singh *(President, IYNS)*.

The event was launched by Dr Rajeev Singh *(Associate Professor, ARSD College, University of Delhi)*, which was followed by an engaging talk by the chief guest Mr Ujjwal K Baruah *(Director, ITER-India)*. on the work being carried out at ITER-India and the important role of the ITER project to attain global sustainable development goals. Following this opening note, Dr Nitendra Singh continued as the moderator for the Panel Discussion among the experts. This discussion focused on the *"Role of Standardization & Calibration in Energy and Industrial Development of India"*. During this discussion, Mr Malhotra shared with us his views on the role of Nuclear energy in achieving sustainable development and energy, the relation between the import of materials and Energy Security of the nation and the role of standardization in Energy Security. He mentioned the existing challenges for providing global energy security and its impact on Global Climate Change. He stressed the need to reduce our greenhouse gas emissions to combat the rising global temperature and highlighted the seriousness of adopting Renewable as well as Nuclear energy sources to work towards the decarbonization of the world economy.

"He also went on to explain how the Indian Energy Security relies heavily on the import of the renewable energy materials from other nations and emphasized the need to enhance the production of the components required to reduce this dependency and become a self-reliant, sustainable and great economic power. He also applauded the efforts made by the Indian Nuclear Industry and the Indian Nuclear Power Program to help achieve energy security and explained how the standardization process in the nuclear sector can lead to reduced cost of construction and a lower gestation period, thereby accelerating the process of decarbonization of the national economy.

Mr G.K. Pillai supported the points mentioned by Mr Malhotra and building on the premise, he explained how the existing technological capability, knowledge bank and India's young population can be combined to work towards achieving energy security. He also justified the role of the standardization process and how it results in amplifying energy security by increasing productivity and profitability as well as reducing setup and operational costs, without loss of employment for the population. Moreover, he urged for increasing participation of Small and Medium Scale Enterprises in the process and also called for support from Large Scale Industries for the improvement of their manufacturing practices and quality standards. In connection to this enlightening submission by Mr Pillai, Dr V.N. Ojha added how the calibration process is necessary for the industries and leads to improving the reliability and quality of the overall technology. He also emphasized the need for setting up calibration test facilities in the country not only for standardizing the in-house manufactured products but also for better inspection of the imported materials.

Following the individual submissions by the Panelists, the session was opened to questions from the audience, where students and young professionals, to which they participated enthusiastically. The session was then formally closed by Dr Ajay V. Deshmukh (*Principal, Phaltan Educational Society's College of Engineering*) who thanked our chief guest, the panellists and the participants for their valuable contribution to make this session a success. The Conclave is available on the IYNS YouTube channel and we encourage our followers and readers to witness this scintillating conversation by visiting https://youtu.be/wg4O-gR3L4s.



OUR UPCOMING EVENTS

"People Should Know!"
March 21, 2021

IYNS has started a new **Interview Series** named *"People Should Know!"* and it's first episode on *"India's Three-Stage Nuclear Power Program"* will be aired on *March 21, 2021* at 17H30 (IST).

To discuss this topic, we have invited **Mr S.K. Malhotra (Secretary, Indian Nuclear Society).** Mr Malhotra has been associated with the *Department of Atomic Energy (DAE)* and *BARC* in R&D activities related to heavy water - an important nuclear material for the Indian Nuclear Power Program. He was also the *Head of the Public Awareness Department of DAE* and since 1999, he has been tirelessly working on creating mass awareness about atomic energy through the outreach programme of the DAE. For his work, he has received many accolades from *DAE,* the *Indian Nuclear Society (INS*) and the *Public Relations Society of India.*

The session is open to all public and we encourage our followers and readers to participate in it by visiting:
https://www.youtube.com/c/IndianYouthNuclearSocietyIYNS

Getting to know our scientists better...
March 28, 2021

The IYNS team is proud to present its guest for the upcoming episode of our chat show - "Being Informal with..." which is to be aired on its YouTube channel on March 28, 2021. Our goal is to air interactive sessions with the eminent scientists of our nation, every month on our YouTube channel. As the name suggests, the talk will be informal and very casual. Through these sessions, our host Dr. Nitendra Singh brings to you their non scientific/technical side along with their experiences, life lessons and their advice.

Our guest for this session is Dr Archana Sharma *(Senior Adviser for Relations with International Organisations at CERN).* Dr Sharma has worked on several *CERN experiments* both on R&D being involved in designing and prototyping, and on running laboratories for construction, installation and commissioning of large scale gaseous detectors. She is the *founder and leader of CMS GEM Collaboration*, for exploiting one of the most sensitive detectors for trigger and tracking in the CMS Experiment at LHC, with the highest discovery potential.

She has been active in the field since 1989 mainly working on instrumentation especially gaseous detectors. She is the *pioneer of simulations and experimentation on wire chambers, resistive plate chambers and micro-pattern gaseous detectors* over the last three decades. She is the author and co-author of over 800 publications and is invited regularly for keynote talks in international conferences and public addresses in various science and technology events. Furthermore, Dr Sharma runs an NGO called *Life Lab Education and Research Foundation* with the main objective to create partnerships with educational institutions for the benefit of the underprivileged.

We invite all our followers to actively participate in the sessions and also bring them the opportunity to ask their own questions to our guests by posting them on our website http://iyns.in/being-informal-with/.

MEET OUR TEAM

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REACH OUT TO US!

Join us to help our cause to support Nuclear Energy!

To register at IYNS : http://iyns.in/iyns-registration/
For more information visit http://iyns.in/contact/

Handmade 'Rangoli' made by students of Nutan Mahavidyalaya, Maharashtra

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