

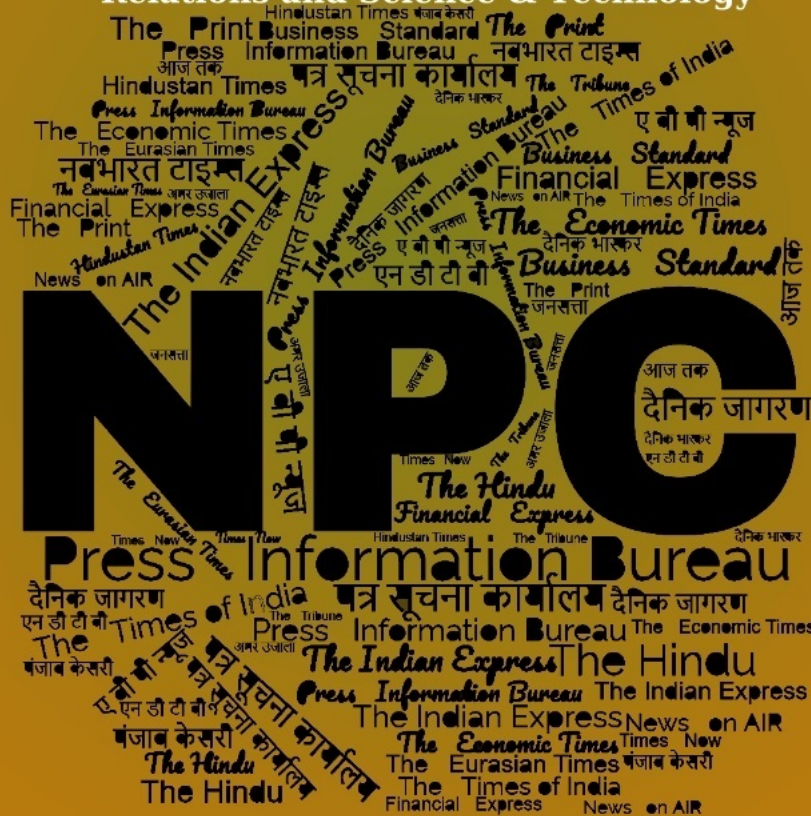
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समाचार पत्रों से चयित अंश Newspapers Clippings

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Press Information Bureau
Government of India

Ministry of Defence

Wed, 28 Feb 2024

DRDO celebrates National Science Day

The Defence Research & Development Organisation (DRDO) celebrated National Science Day 2024 through lectures, orations and open house activities in its laboratories and establishments on February 28, 2024. A special function was organised by Defence Science Forum (DSF) at DRDO Bhawan in New Delhi. Secretary Department of Defence R&D and Chairman DRDO Dr Samir V Kamat presided over the function. Prof. Ajay Kumar Sood, Principal Scientific Advisor to Government of India was the Chief Guest.

The National Science Day is celebrated on 28th February every year to commemorate the discovery of 'Raman Effect' in 1928 by Sir Chandrasekhara Venkata Raman, which led to the Nobel Prize being awarded to him in 1930. The purpose of celebrating this day is to enhance scientific temper, popularisation of science and encouraging innovative activities by infusing scientific temperament in the masses and creating a positive scientific research culture.

On the occasion, the Chairman DRDO greeted the scientific community and spoke about the relevance of this year's theme as per the Prime Minister's ambitious vision to transform the nation as Viksit Bharat.

Key note address was delivered by Prof. Ajay Kumar Sood, Principal Scientific Advisor to Government of India on 'Cracking an age old thermodynamic puzzle in micro heat engines'. A lecture was also delivered by Dr MA Maluk Mohamed, Co-founder and VP research M/s Twin Health, Chennai on 'Precision health management using digital twin', wherein, he brought out how an individual with chronic Metabolic Diseases can benefit using this technology.

A total of 39 oration papers were received from various DRDO labs/establishments, out of which three papers were selected for presentation. Shri Nomila Adinarayana Prasanth, Sc 'D' from ARDE, Pune, Dr Amit Pratap, Sc 'F' from CHESS, Hyderabad and Dr Pankaj Kumar Sharma, Sc 'F' from CFEES, Delhi delivered the talks on their respective areas of work and were felicitated by Prof. Ajay Kumar Sood, PSA.

During the event, DRDO song was released by Chairman DRDO and awards were given to the lyrics writer and music composer. A Monograph written by Dr AK Chakrabarti, Ex Director DRDL, Hyderabad on “Innovative practices in product development through the eyes of product developer” was released by PSA.

About Defence Science Forum

Defence Science Forum (DSF) is a platform of DRDO where scientists of various disciplines interact to foster fellowship, exchange ideas with luminaries of different disciplines and undertake feasibility and planning of all inter-disciplinary projects where expert opinion is required.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2009903>

Defence News

Defence Strategic: National/International



**Press Information Bureau
Government of India**

Ministry of Defence

Wed, 28 Feb 2024

Launch of Ammunition cum Torpedo cum Missile Barge, LSAM 18 (Yard 128) 4th Barge of 11 X Ammunition cum Torpedo cum Missile (ACTCM) Barge Project on 28 Feb 24 at M/S Suryadipta Project Pvt Ltd, Thane

The launch of ‘Ammunition Cum Torpedo Cum Missile Barge, LSAM 18’, 4th Barge of 11 x ACTCM Barge Project, built by MSME Shipyard, M/s Suryadipta Projects Pvt Ltd, Thane for Indian Navy, was undertaken on 28 Feb 24. The launching Ceremony was presided over by Cmde Shirish Dube, Directorate of Ship Production.

The contract for building 11 X ACTCM Barge was signed between MoD and M/s Suryadipta Projects Pvt Ltd, Thane on 05 Mar 21. The availability of these Barges would provide impetus to operational commitments of *IN* by facilitating Transportation, Embarkation and Disembarkation of articles/ ammunition to *IN* Ships both alongside jetties and at outer harbours.

These Barges are indigenously designed and built under relevant Naval Rules and Regulation of Indian Register of Shipping. The model testing of the Barge during design stage was undertaken at

Naval Science and Technological Laboratory, Visakhapatnam. These Barges are proud flag bearers of Make in India initiative of Government of India (GoI).

<https://pib.gov.in/PressReleasePage.aspx?PRID=2009887>



**Press Information Bureau
Government of India**

Ministry of Defence

Wed, 28 Feb 2024

Defence Secretary interacts with German Defence Industry

Defence Secretary Shri Giridhar Aramane interacted with the Federal Association of the German Security and Defence Industry (BDSV) at Berlin on 28 Feb, 2024. In a meeting organized by BDSV, Defence Secretary outlined the recent changes in the Indian defence industry through progressive reforms, making it attractive to invest in India, and to enter into partnerships with the Indian defence industry.

Shri Giridhar Aramane highlighted that India is progressively moving towards into the next defence innovation, manufacturing and maintenance hub in Asia.

The Managing Director of BDSV Dr Hans Christoph Arzpodien welcomed the Defence Secretary to the event, and provided the German defence industry perspective. The meeting was also attended by Shri P Harish, Ambassador of India to the Federal Republic of Germany.

A number of German defence companies were present, represented by their top leadership, and an engaging discussion on business and investment possibilities was conducted.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2009867>

THE ECONOMIC TIMES

Wed, 28 Feb 2024

India explores Export of Defence Equipment to Oman to elevate Strategic Partnership

Eyeing to expand the India-Oman strategic partnership close on the heels of Sultan Haitham bin Tarik's India trip, deputy national security adviser Vikram Misri visited Muscat to explore collaboration in different sectors including possible defence exports to the sultanate.

During Misri's visit, discussions were held on strategic, military and security cooperation including defence exports, and maintenance of Oman's ports apart from cooperation in disaster management, oceanography and artificial intelligence, ET has learnt.

The deputy NSA also met Gen Sultan bin Mohammed Al Nomani, minister of the Royal Office in Oman and a key figure in the country's decision-making process. The two sides also gave a push to a bilateral trade deal which could be concluded in a record time.

India has a robust defence partnership with Oman, its oldest strategic partner in the Gulf, and New Delhi is keen to add meat to its ties through possible exports of defence items. The list may include artillery systems, ET has learnt.

India and Oman enjoy a great degree of trust, but Muscat has resources and the market is therefore competitive. India may have to compete with some of the global players, according to a person familiar with the issue. Last month, defence secretary Giridhar Aramane co-chaired the 12th Joint Military Cooperation Committee with Mohammed Bin Naseer Bin Ali Al Zaabi, Oman's secretary general, Ministry of Defence, in Muscat, and the two sides signed a memorandum of understanding pertaining to procurement of defence material and equipment which would provide a framework for a new area of defence collaboration.

While joint defence exercises are regular, India had supplied Oman with rifles in the past. Oman has a strategic location that gives India access to the key part of the Indian Ocean Region that is volatile besides giving access to Eastern and Southern Africa. Recently Oman allotted a specific zone to India in the strategically located Port of Duqm, a development that will help enhance India's role in the Western and Southern Indian Ocean Region.

The move will augment the Indian Navy's role as a net security provider amid the ongoing crisis in the Red Sea and the Western Indian Ocean Region. The port provides a logistical base for India in the field of maritime cooperation. It will also enhance India's role as a first responder in humanitarian assistance and disaster relief.

The Red Sea crisis demonstrates the importance of strategically located capabilities and logistics that can play a role in enhancing security of merchant shipping, ensuring freedom of navigation and safeguarding commerce on the high seas.

<https://economictimes.indiatimes.com/news/defence/india-explores-export-of-defence-equipment-to-oman-to-elevate-strategic-partnership/articleshow/108088159.cms?from=mdr>

THE ECONOMIC TIMES

Wed, 28 Feb 2024

India, Germany set to carry out Joint Military Exercise in Indo-Pacific

India and Germany have resolved to closely collaborate on hightechnology for military use in line with a broader aim to develop defence cooperation as a key pillar of the bilateral strategic partnership. Ways to further bolster strategic cooperation figured prominently at a meeting of the India-Germany high defence committee that was held in Berlin on Tuesday. Following the talks,

officials said India and Germany are set to carry out joint military exercises in the Indo-Pacific, in reflection of their growing defence ties.

The Indian delegation at the talks was headed by Defence Secretary Giridhar Aramane while the German side was led by State Secretary at German defence ministry Benedikt Zimmer.

"Both sides discussed a range of bilateral security and defence issues, with a focus on developing defence cooperation as a key pillar of the strategic partnership between India and Germany," the defence ministry said.

"They exchanged views on the regional security situation, discussed likely joint exercises with Germany in the Indo-Pacific, and deliberated on potential defence industrial projects and proposals. It said both sides emphasised on the need for a closer defence partnership and connecting the defence industries from both sides together. "Of particular focus was the collaboration in high technology in defence," the ministry said in a statement.

The high defence committee meeting follows the visit of German Federal Minister of Defence Boris Pistorius to India last year. Aramane also interacted with prominent think tank German Institute of International and Security Affairs (Stiftung Wissenschaft und Politik) in Berlin.

<https://economictimes.indiatimes.com/news/defence/india-germany-set-to-carry-out-joint-military-exercise-in-indo-pacific/articleshow/108072570.cms>

THE ECONOMIC TIMES

Wed, 28 Feb 2024

Indian Coast Guard Ships conclude Exercise Dosti, Head to Galle, Sri Lanka

Indian Coast Guard (ICG) ships Samarth and Abhinav have docked in Galle following the completion of Exercise Dosti in Male.

The official Twitter account of India in Sri Lanka, @IndiainSL, announced the arrival, highlighting the vessels' visit for training and professional engagement with the Sri Lankan Coast Guard to bolster interoperability and camaraderie. "@IndiaCoastGuard Ships Samarth and Abhinav in Galle! On completion of #ExerciseDosti in Male, the ICG ships are visiting Sri Lanka for training and professional interaction with SL Coast Guard to enhance interoperability and camaraderie," in an official post on X.

The visit underscores India's commitment to enhancing maritime cooperation and strengthening ties with Sri Lanka. Exercise Dosti, conducted in the Maldives, served as a platform for joint training and cooperation between the Indian and Maldivian coast guards, focusing on maritime security and rescue operations.

Now, with the Indian Coast Guard ships in Galle, both nations are poised to further their collaboration in maritime affairs. Training sessions and professional interactions between the Indian and Sri Lankan Coast Guard personnel aim to enhance coordination and mutual understanding in maritime operations.

The presence of Indian Coast Guard ships in Sri Lanka not only promotes bilateral cooperation but also emphasises the importance of regional maritime security and stability. Through joint exercises and exchanges, both countries seek to strengthen their capabilities and respond effectively to emerging maritime challenges in the Indian Ocean region.

The visit of ICG ships Samarth and Abhinav to Galle reaffirms the longstanding ties between India and Sri Lanka and underscores their shared commitment to maritime safety and security. Earlier, the official Twitter account of Indian Coast Guard, announced, "As part of the joint operational activities of trilateral exercise #DOSTI XVI, training on #PollutionResponse and #MARPOL was conducted onboard @IndiaCoastGuard ship Samarth on February 24.

Pollution response measures of containment using booms and recovery using skimmers were showcased." As the training and professional interactions progress, the engagement between the Indian and Sri Lankan Coast Guard is expected to foster a safer and more secure maritime environment in the region.

<https://economictimes.indiatimes.com/news/defence/indian-coast-guard-ships-conclude-exercise-dosti-head-to-galle-sri-lanka/articleshow/108069634.cms>

The Tribune

Wed, 28 Feb 2024

China's Nuke Arsenal growing fast: Report

Modernisation of China's nuclear arsenal has both accelerated and expanded in recent years. It is now believed to have one of the fastest-growing nuclear arsenals among the nine nuclear-armed states, says the latest issue of 'Nuclear Notebook' produced by the 'Bulletin of the Atomic Scientists'.

China now possesses roughly 500 nuclear warheads, with more in production to arm future delivery systems. The details have been researched by the Federation of American Scientists' Nuclear Information Project, the report said.

"China has significantly expanded its ongoing nuclear modernisation programme by fielding more types and greater numbers of nuclear weapons than ever before," it said.

The report said since its previous edition on China in March 2023, the country has continued to develop its three new missile silo fields for solid-fuel intercontinental ballistic missiles (ICBMs), expanded the construction of new silos for its liquid-fuel DF-5 ICBMs, has been developing new var-

iants of ICBMs and advanced strategic delivery systems, and has likely produced excess warheads for eventual upload onto these systems once they are deployed.

China has also further expanded its dual-capable DF-26 intermediate-range ballistic missile force, which appears to have completely replaced the medium-range DF-21.

<https://www.tribuneindia.com/news/india/chinas-nuke-arsenal-growing-fast-report-595536>



Wed, 28 Feb 2024

Strengthening Bilateral Defence Ties: Brazil-India 2+2 Ministerial Dialogue & MTA for IAF

The stage is set for a historic event as Brazil and India prepare for their inaugural 2+2 Ministerial Dialogue in New Delhi next month. Ambassador Kenneth Haczynski Da Nobrega has confirmed this significant development, highlighting the pivotal role of defence in the burgeoning economic partnership between the two nations.

Scheduled for March, this milestone dialogue underscores Brazil's strategic focus on three key pillars: Defence, Agriculture, and Energy. The 2+2 maiden dialogue is expected to take place from March 14 – 15 and the G to B meetings will take place around March 12.

As anticipation builds, high-level defence delegations, led by the Secretary of Defence Production and representatives of major defence companies under the umbrella of the Brazil Association of Defence Industry, are poised to converge in India.

Beyond conventional aerospace discussions, the agenda promises to explore cutting-edge realms including Artificial Intelligence and nano-technology, signalling a commitment to innovation and collaboration. Amidst these preparations, both countries are poised to leverage their strengths for a mutually beneficial resource exchange, navigating challenges and fostering synergy in the defence landscape.

Financial Express Online has reported previously, Brazil is keen on collaborating with Indian companies in areas such as aircraft manufacturing, satellite building, space control, electronic warfare, cyber defence, and the exchange of raw materials. To overcome challenges in establishing identical factories, both countries aim to leverage their strengths for a productive resource exchange while avoiding trade embargoes.

Expected Agenda of the Maiden 2+2 Ministerial Dialogue

During the talks the two sides are expected to focus on political and strategic dimensions. Brazil is keen to have a detailed discussion on freedom of navigation, deal with the growing threat of piracy especially in the South Atlantic Region and western Africa; as well as strengthening relations in South East Asia.

The two sides are expected to discuss joint production of military platforms, have joint air force and navy exercises.

Scorpene Club

The Brazilian Navy is operating Scorpene Class submarines. Therefore, negotiations are going on between the two navies for signing an MoU for reducing cost for the repair and maintenance of the Scorpene submarines as well as technical cooperation and training.

Brazil is manufacturing nuclear nuclear-powered general-purpose attack submarines, and is planning for modernization of the existing fleet of submarines.

BrahMos Missile

According to senior officials, the government of Brazil has expressed interest in the BrahMos-NG (New Generation) version of the short-range ramjet supersonic cruise missile for its Army. The missile, an Indo-Russia joint venture, is already inducted in the Indian armed forces and is being sought by other countries in the South American region. Brazil has also expressed interest in indigenous Akash and Astra Missiles.

Financial Express Online has been the first to report about the growing interest for these missiles from countries in South America including Brazil, Chile, Argentina and Venezuela.

Why is Brazil interested in BrahMos?

“There have been initial talks between the two sides. Due to the global pandemic everything was put on hold,” a senior officer said.

Last year, several Indian companies including BrahMos Aerospace had participated in the largest defence expo in Brazil – LAAD.

Why BrahMos-NG?

The Brazilian Air Force is flying the Swedish Gripen-E of SAAB Company, which was delivered to it in 2019.

Also, “The Brazilian aircraft Embraer can also be a suitable platform for BrahMos –NG,” said the officer quoted above.

“For Brazil, the Indo-Russian missile BrahMos-NG can be a suitable choice for their new Gripen aircraft. The new BrahMos-NG system is designed for a wide range of fighter aircraft platforms with best-in-class specifications.”

Embraer in India

As reported by Financial Express recently, Brazilian aerospace company Embraer has recently announced its collaboration with Mahindra Group for the C390 Millennium multi-mission aircraft for the Indian Air Force.

“We also have a very concrete interest in Embraer in setting up not only the assembly line but jointly manufacturing the C390 MTA depending on the IAF. Brazil boasts of a dynamic defence industrial base and is seeking local collaborations in India,” said a senior officer.

Two major defence companies are already present in India and have set up their manufacturing base for small arms and ammunition.

Companhia Brasileira de Cartuchos (CBC) Brazil, the world's second-largest ammunition manufacturer, and Stumpp Schuele & Somappa India (SSS Defence) are in a joint venture to produce ammunition for all calibers like: 9 mm, 7.62×39 mm, 7.62×51 mm, .338 Lapua and 12.7 mm. And, as per the terms of the joint venture, can export to a third country after fulfilling India's requirements.

Another Brazilian company Taurus Armas S.A. has tied up with Jindal Defence for manufacturing small arms.

Various Visits Last year

In 2023, Commander of Brazilian Army General Tomas Miguel Ribeiro Paiva accompanied by an official delegation was on a six-day visit to India. This is the first time that Commander of the Brazilian Army travelled to India and this visit came ahead of the G20 Summit where the President of Brazil was participating and ceremonially took over the presidency of G20.

On day one of his maiden visit (August 29, 2023) General Tomas called on General Manoj Pande, the Chief of the Army Staff and they exchanged ideas and held constructive discussions on various contemporary issues.

Both sides also discussed issues pertaining to strengthening bilateral cooperation between the two armies. He later called on General Anil Chauhan, the Chief of Defence Staff and interacted with Giridhar Aramane, the Defence Secretary. These discussions underscored the shared goals of enhancing defence cooperation and collaboration between the two nations. The visit of General Tomas Miguel Mine Ribeiro Paiva underlined the deep-rooted bond between the armies of India and Brazil.

@ LAAD (DefExpo) event in Rio

In 2023 the Ministry of Defence showcased various defence platforms. Representatives from Defence Research and Development Organisation, Bharat Dynamics Ltd., Yantra India Ltd., Bharat Electronics, Mazagon Dock Shipbuilders Ltd., (MDL) and the Indo-Russian joint venture BrahMos were present. Private sector was represented by Kanpur based MKU Ltd.

Also, a high-level delegation led by Joint Secretary Anurag Bajpai has been to the South American nation and had meetings with the top leadership in the Ministry of Defence.

MDL officials had also visited Brazil and had meetings with the top Brazilian Navy officials. The focus was on identifying areas in the defence sector where the two countries can collaborate, especially in the area of submarine building, maintenance and repair.

The Commander of the Brazilian Navy visited India and the focus was on Coastal Systems and a contract with Mumbai-based Mazagon Dock Limited (MDL) to acquire Offshore Patrol Vessels is expected to be firmed up.

In an earlier interaction General Luis Antônio Duizit Brito, former Secretary of Defence Products Division in Brazil, highlighted the deepening naval cooperation between the two nations. These visits and interactions underscore the strengthening ties between Brazil and India in defence and

technology, as they work together to address common challenges and opportunities on a global stage.

India-Brazil Defence Cooperation

The two countries have a multifaceted relationship which is based on values and a convergence of views on many global issues. Both countries are cooperating bilaterally and multilaterally at various foras including the United Nations, BRICS, IBSA, G20, and ISA.

The focus of talks in the defence sector is based on the “Triple-Helix” approach which is followed by the South American nation. This emphasizes innovation and R&D for its army, navy and air force.

<https://www.financialexpress.com/business/defence-strengthening-bilateral-defence-ties-brazil-india-22-ministerial-dialogue-mta-for-iaf-3408311/>

Science & Technology News



Wed, 28 Feb 2024

National Science Day: The Raman Effect, which CV Raman won the Nobel for

In 1986, the Government of India, under then Prime Minister Rajiv Gandhi, designated February 28 as National Science Day to commemorate the announcement of the discovery of the “Raman Effect”.

This was the discovery which won physicist Sir CV Raman his Nobel Prize in 1930. Conducting a deceptively simple experiment, Raman discovered that when a stream of light passes through a liquid, a fraction of the light scattered by the liquid is of a different colour. This discovery was immediately recognised as groundbreaking in the scientific community, being the subject of over 700 papers in the first seven years after its announcement.

What is the “Raman Effect”? Why is it so important? Most importantly, who was the man behind this momentous discovery?

A young prodigy conducting after-hours research

Raman was born to a family of Sanskrit scholars in Trichy (present-day Tiruchirapalli) in the Madras Presidency in 1888. At the age of only 16, He received a BA degree from Presidency College in Madras, and was placed first in his class. While studying for his MA degree, at the age of

18, he got published in the Philosophical Magazine: this was the first research paper ever published by Presidency College.

Due to his ill health, he was unable to travel abroad for further education. Thus, in 1907, he got married and settled down in Calcutta as an assistant accountant general. While still a full-time civil servant, Raman began after-hours research at the Indian Association for the Cultivation of Science (IACS). Raman raised the profile of IACS, doing some award-winning research as well as conducting public demonstrations with charisma. At the age of 29, he finally resigned from his civil services job and took up a professorship in Presidency College, Calcutta.

A voyage across the ocean leads to interest in the scattering of light

By 1921, CV Raman had gained a solid reputation as a top scientific mind both in India and in the West. That year, he made his first journey to England. It was on the return journey that Raman would make an observation that would change his life and science forever.

While passing through the Mediterranean Sea, Raman was most fascinated by the sea's deep blue colour. Dissatisfied with the then-accepted answer ("the colour of the sea was just a reflection of the colour of the sky"), his curious mind delved deeper.

He soon found out that the colour of the sea was the result of the scattering of sunlight by the water molecules. Fascinated by the phenomenon of light-scattering, Raman and his collaborators in Calcutta began to conduct extensive scientific experiments on the matter – experiments that would eventually lead to his eponymous discovery.

<https://indianexpress.com/article/explained/explained-sci-tech/national-science-day-cv-raman-9185655/>



Press Information Bureau
Government of India

Ministry of Science & Technology

Wed, 28 Feb 2024

India has conducted the First Human Clinical Trial of Gene Therapy for Haemophilia A (FVIII Deficiency) at Christian Medical College (CMC) Vellore, says Dr. Jitendra Singh

India has conducted the first human clinical trial of gene therapy for haemophilia A (FVIII deficiency) at Christian Medical College (CMC) Vellore.

This was disclosed here today by Union Science & Technology Minister (Independent Charge) Dr. Jitendra Singh while addressing the "National Science Day 2024" programme in Vigyan Bhavan.

Dr Jitendra Singh further informed that the programme is supported by the Department of Biotechnology, the Centre for Stem Cell Research - a unit of InStem Bengaluru, in collaboration with Emory University, USA at Christian Medical College, Vellore. The trials involved deploying a

novel technology of using a lentiviral vector to express a FVIII transgene in the patient's own haematopoietic stem cell which will then express FVIII from specific differentiated blood cells.

The Minister expressed the hope that manufacturing of this vector will commence soon in India and proceed with further clinical trials.

Stating that the National Science Day commemorates the discovery of "Raman Effect" by Nobel Laureate Sir CV Raman, Dr Jitendra Singh recalled C.V. Raman's words that India could progress only through science, more science and still more science, and said that after Prime Minister Shri Narendra Modi took over, India is truly under the "Raman Effect" as PM Modi accords very high priority to science and keeps reiterating that science and technology are imperative to achieve the goal of Viksit Bharat.

Highlighting India's giant strides in S&T under PM Modi, the Union Minister of State (Independent Charge) Science & Technology; MoS PMO, Personnel, Public Grievances, Pensions, Atomic Energy and Space said India's bio-economy has grown 13 folds in the last 10 years from \$10 billion in 2014 to over \$130 billion in 2024.

"India is ranked as the world's 3rd largest Startup Ecosystem with more than 100 unicorns and Incubators under DST are providing job opportunities to nearly 1.5 lakh youth. The Aroma Mission and Purple Revolution are examples of Agricultural transformation through science, innovation and technology which also gave a new avenue for Agri-startups," he said.

Speaking on India's efforts in Advanced Technologies, Dr. Jitendra Singh said "India is ready to match the global standards in Quantum Technology, Artificial Intelligence and Machine Learning. He said, we are not only on the same page but in some ways even ahead of others". He further shared that to enhance the effectiveness of AI, we are also using human interface at different levels.

On increasing role of women scientists due to equal opportunity in S&T, Dr Jitendra Singh categorically mentioned that the women scientific community has been empowered under PM Modi as many of the Scientific Institutions and programmes, including Space Missions, are women-led.

Dr. Jitendra Singh also expressed his confidence in the Anusandhan National Research Foundation that it will prove to be a boon for research and development as the Government has taken efforts to make it a comprehensive forum not only of scientists and industry but also researchers from social sciences and humanities.

Dr. Jitendra Singh said that in the wake of recent scientific achievements, it may be underscored that the rising trajectory of India over the past 10 years is being witnessed globally.

"We are globally among the top five countries in scientific research publications, 40th in Global Innovation Index (GII) showcasing remarkable climb from 81st rank in 2015 and our patent filing has crossed 90,000 which is highest in two decades," he said.

"All this is due to strengthening of S&T ecosystem in the country under PM Modi in fields such as Artificial Intelligence, Astronomy, Solar & Wind Energy, Semiconductors, Climate Research, Space Research and Biotechnology. Indian scientific breakthroughs have reached from the lab to moon; with the successful landing of *Chandrayaan-3* on south pole of moon, India became the first country to achieve this feat," he said.

On the occasion, Dr Jitendra Singh unveiled a compendium of SATHI Clusters by felicitating heads of IIT Hyderabad, BITS Pilani, ICT Mumbai etc. He also released a White paper on ‘Evolution: Catalysing technology led ecosystem for Bharat e-Mobility.

Speaking on the occasion, Dr. V.K Saraswat, Member Niti Aayog shared that currently 15 companies are producing Bullet proof vests for our soldiers using indigenous technology as PM Modi has said no soldier should martyr due to lack of Bullet proof vest.

In his address, Prof. A.K. Sood, Principal Scientific Adviser, Government of India shared that RUTA i.e. Rural Technology Action Group – recognises potential in rural India to foster innovation at ground level in rural areas.

Addressing the gathering, Professor Abhay Karandikar, Secretary DST said, “it is clearly evident that our scientific endeavours have the power to shape not only the future of our nation but also contribute significantly towards global advancement”.

Dr Rajesh Gokhale, Secretary, Department of Biotechnology (DBT), Dr Kalaiselvi, DG-CSIR, Dr. Rashmi Sharma, Head, NCSTC, DST also addressed the function.

The National Science Day (NSD) is celebrated every year on 28 February to commemorate the discovery of the ‘Raman Effect’. The Government of India designated 28 February as National Science Day (NSD) in 1986. On this day Sir C.V. Raman announced the discovery of the ‘Raman Effect’ for which he was awarded the Nobel Prize in 1930. On this occasion, theme-based science communication activities are carried out all over the country. The theme for National Science Day 2024 was ‘Indigenous Technologies for Viksit Bharat’.

The Raman Effect

Simply put, the Raman Effect refers to the phenomenon in which when a stream of light passes through a liquid, a fraction of the light scattered by the liquid is of a different colour. This happens due to the change in the wavelength of light that occurs when a light beam is deflected by molecules.

In general, when light interacts with an object, it can either be reflected, refracted or transmitted. One of the things that scientists look at when light is scattered is if the particle it interacts with is able to change its energy. The Raman Effect is when the change in the energy of the light is affected by the vibrations of the molecule or material under observation, leading to a change in its wavelength.

In their first report to Nature, titled “A New Type of Secondary Radiation,” CV Raman and co-author KS Krishnan wrote that 60 different liquids had been studied, and all showed the same result – a tiny fraction of scattered light had a different colour than the incident light. “It is thus,” Raman said, “a phenomenon whose universal nature has to be recognised.”

Raman would go on to verify these observations using a spectroscope, publishing the quantitative findings in the Indian Journal of Physics on March 31, 1928.

The importance of the discovery

CV Raman’s discovery took the world by storm as it had deep implications far beyond Raman’s original intentions. As Raman himself remarked in his 1930 Nobel Prize speech, “The character of

the scattered radiations enables us to obtain an insight into the ultimate structure of the scattering substance.” For quantum theory, in vogue in the scientific world at the time, Raman’s discovery was crucial.

The discovery would also find its use in chemistry, giving birth to a new field known as Raman spectroscopy as a basic analytical tool to conduct nondestructive chemical analysis for both organic and inorganic compounds. With the invention of lasers and the capabilities to concentrate much stronger beams of light, the uses of Raman spectroscopy have only ballooned over time.

Today, this method has a wide variety of applications, from studying art and other objects of cultural importance in a non-invasive fashion to finding drugs hidden inside luggage at customs.

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Press Information Bureau
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Ministry of Science & Technology

Wed, 28 Feb 2024

"CSIR-NML and KAMP Empower 150+ Teachers Nationwide with Cutting-Edge Experiential Learning Techniques in Science Education"

On the 27th of February, a specialized online teacher training program took place, accommodating over 150 teachers from diverse schools, all across the nation. The program focused on the theme 'Fostering Experiential Learning in Science Education, Beyond the Textbook'.

This event marked KAMP's fifth Continuous Professional Development program tailored for teachers in collaboration with the CSIR-NML. Participating educators engaged in comprehensive training sessions conducted by subject matter experts, covering various dimensions of science education. Through this program, the teachers received the opportunity to interact and learn from prestigious scientists, Dr. Sandip Ghosh Chowdhury (Chief Scientist and Head of Materials Engineering Division at CSIR-NML), Dr. K. Gopala Krishna (Chief Scientist of Materials Engineering Division at CSIR-NML) and Dr. Animesh Jana (Senior Scientist and PI of Jigyasa, CSIR-NML).

The scientists delved into an array of subjects during their presentation, providing a comprehensive introduction to CSIR-NML. They specifically highlighted major focus areas within CSIR-NML, such as materials, minerals, national priorities at government level, effective management of primary and secondary resources, among others. In their insightful discussion, the scientists introduced innovative tools aimed at enhancing the learning experience. They emphasized strategies for effective learning, smart teaching methodologies, and the importance of experiential learning.

Additionally, they presented hands-on examples to illustrate key concepts, focusing on topics such as the concept of primary colors and electromagnetic induction, including the intriguing aspect of

contactless electricity transport. This multi-faceted approach not only broadened the understanding of the teachers but also provided valuable insights into fostering a dynamic and engaging learning environment for students.

Towards the end of the session, Mr. Aniket Arora (Outreach Coordinator, KAMP) expressed his gratitude to all the Speakers and participants present in the session. He also mentioned the importance of such events and how KAMP believes that such experiential learning is the key to fostering teachers and students' deep interest in and understanding of science & other developments in India.

Additionally, he informed the teachers about the upcoming activities like the online Knowledge Sharing Sessions, Scientific Excursions for students as well as Continuous Professional Development for educators to explore, discover, and engage with various scientific disciplines in a real-world setting at various eminent CSIR laboratories/Research Organizations in India.

About CSIR-NML

CSIR-National Metallurgical Laboratory (CSIR-NML) is a leading Indian research organization specializing in Minerals, Metals, and Materials, with a focus on science, technology, industrial services, and human resource development.

Since its establishment, CSIR-NML has diversified its research areas, including extractive metallurgy, alloy development, refractory materials, corrosion studies, mathematical modeling of metallurgical processes, mineral research, advanced materials, integrity evaluation of industrial components, surface engineering, and sustainable metals production.

About KAMP

Knowledge and Awareness Mapping Platform is an Initiative and Knowledge Alliance of the Council of Scientific & Industrial Research (CSIR) - National Institute of Science Communication and Policy Research (NIScPR) and industrial partner M/S Nysa Communications Pvt. Ltd. (NCPL), it intends to develop creativity, meaningful learning, critical reading, and thinking skills that bring out the inherent abilities of the students.

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ThePrint

Thu, 29 Feb 2024

India's first space station and human mission to Moon: what ISRO is planning after Gaganyaan

India is preparing to firm up its presence in space. After launching the Gaganyaan mission, the Indian Space Research Organisation plans to set up the country's first space station by 2035 and put a human on the Moon by 2040.

These missions, “to be completed in the new ‘Amrit Kaal’” according to Prime Minister Narendra Modi, are important successors to Gaganyaan, which will send a human mission to space. ISRO will simultaneously conceptualise these projects while working on the human spaceflight capabilities of Gaganyaan.

ThePrint explains ISRO’s upcoming missions and what we know about their launch dates, modules, and collaboration opportunities.

Indian space station

The Bharatiya Antariksha Station (BAS) is the official name for the Indian orbital space station, a project unveiled in 2019 by the then ISRO chief K. Sivan. It was initially supposed to be completed by 2030, but the Covid pandemic delayed the timeline.

According to an article published in the *Accelaron Aerospace Journal*, the space station is expected to weigh 20 tonnes or 20,000 kg and will orbit 400 km above the Earth’s surface.

The first module of the space station will be propelled into orbit by 2028, ISRO chairman S. Somanath said at an event in December 2023. Modules are spacecraft sections, which, once assembled, form the space station. For example, the International Space Station (ISS), the largest single structure ever put in space, has over 40 modules at the moment.

Currently, two space stations are operational in the Earth’s orbit — the ISS, launched in 2000 as a collaboration between five space agencies in the US, Canada, Japan, Europe, and Russia, and the Tiangong Space Station, which China launched in 2021.

In 1971, the Soviet Union launched the first-ever space station, Salyut (salute), and followed that up by launching six more improved space stations, up to Salyut 7. Rakesh Sharma, India’s first astronaut to go to space in 1984, spent eight days on board Salyut 7 in a joint operation between ISRO and the Soviet Interkosmos space agency. Salyut 7 finally left orbit in 1991. Experience gained from the Salyut stations helped the Soviet Union launch the Mir Space Station in 1986. The Mir station remained in orbit till 2001, spending 15 years in space. Russian cosmonaut Valeri Polyakov, who spent 438 days on the Mir station, holds the record for the longest human space mission till now. A Salyut-derived module remains in orbit at the core of the Russian segment of the ISS.

India’s space station programme plans to allow astronauts to stay in orbit for 15-20 days. It is currently in the conceptualisation stage. In a Lok Sabha reply on 7 February, Minister of State of Science and Technology Jitendra Singh said ISRO was working on deciding the number of modules and docking ports the station would have.

The Indian space station has already received collaboration support from the United States. In November 2023, NASA administrator Bill Nelson announced during his visit to India that the agency was willing to collaborate with India on the space station. NASA has also committed to sending an Indian astronaut to the ISS by the end of 2024. The chosen astronaut will be the second Indian to go to space after Rakesh Sharma. Nelson has said ISRO, not NASA, will choose the astronaut.

About progress on the space station, ISRO spokesperson B.H.M. Daruksha said work is underway. “It has to happen step-by-step. Gaganyaan will set the stage for the space station. While we launch it, we’re also working on other research projects needed for the station. It’s all part of the larger plan for ‘Amrit Kaal’ space research,” he told ThePrint.

ISRO announced on 5 January 2023 that it had tested a fuel cell-based power system (FCPS) on PSLV Orbital Experimental Module 3 (POEM3). POEM3 launched the X-ray Polarimeter Satellite (XPoSat), a space observatory to study polarisation of cosmic X-rays, on 1 January. The FCPS is a hydrogen- and oxygen-based power generator with zero emissions. It only produces water and heat as byproducts, which, ISRO said, makes it “ideal for space missions where humans are involved”, including the Indian space station.

Moon mission

Modi and Somanath have said that ISRO plans to send a man to the Moon by 2040. While there have been few updates regarding the programme’s details, India did sign the Artemis Accords in 2023.

Established by NASA in 2020, the accords are an international agreement to further space exploration, moon landings specifically, through international cooperation. The NASA website states that through the Artemis mission, NASA plans to land the first woman, the first person of colour, and the first international partner astronaut on the Moon.

ISRO’s Chandrayaan-3 mission in 2023 will contribute to the human moon landing mission. Chandrayaan-3 was the first mission to land on the Moon’s South Pole, a previously unexplored region. In 2008, Chandrayaan-1 first found evidence of water molecules on the Moon. After that, NASA conducted a series of studies to assess the presence of water on the Moon. The Moon’s South Pole is said to have water ice or frozen water, which could be an important discovery that could help lead to future Moon missions, including human-led ones, to that region. NASA’s Artemis-3 programme, scheduled for 2026, already plans to send the first humans to the Moon’s South Pole.

There have been no announcements about collaborations or locations for India’s human Moon mission yet, but Daruksha said ISRO is open to commercial inputs and private sector investment.

Preliminary work for the human Moon mission has already begun, however. ISRO’s Human Space Flight Centre, inaugurated in 2019, is working on the fundamentals of human space flight missions that would help the Gaganyaan and Moon missions. Its mandate includes modifying launch vehicles (LVM) to human requirements, designed with crew escape systems (CES). The crew training programmes at the centre will also help in future missions, including the one to Moon.

<https://theprint.in/india/indias-first-space-station-and-human-mission-to-moon-what-isro-is-planning-after-gaganyaan/1982362/>

