



ISASBHARAT

Newsletter

Vol 24, No.3

July-Sep, 2024

From Editor's Desk

Dear all ISAS Members

It gives me immense pleasure in bringing out third issue of the year 2024. Nobel prize in chemistry is awarded to David Baker, Demis Hassabis and John Jumper for decoding protein design and structures. It is matter of great achievement for India as the second Ship Submersible Ballistic Nuclear (SSBN) submarine is commissioned.



This has enhanced India's defence capability. enormously. In a momentous recognition of India's achievements in space exploration, Dr. S. Somanath, Secretary of the Department of Space and Chairman of the Indian Space Research Organisation (ISRO), has been awarded the prestigious International Astronautical Federation (IAF) World Space Award for the remarkable success of the Chandrayaan-3 mission. Tata Group is poised to become one of the first private sector players to enter the nuclear power business in India.

Neuralink's brain computer interface device "Telepathy " allows people to browse the internet or control digital devices with just their thoughts. Group captain Subhanshu Shukla will most likely become the first Indian in space in 40 years with Indian Space Research Organisation (ISRO) naming him the 'prime' astronaut for the first ISRO-NASA mission to the International Space Station, scheduled for any time after October this year. A California-based startup, REM space, claimed that it succeeded in an experiment involving two individuals who communicated in their dreams on September 24. Scientists utilizing the James Webb Space Telescope have made a groundbreaking discovery on Charon, Pluto's largest moon. For the first time, researchers have detected carbon dioxide on Charon's frozen surface. There is one good news for Yoga lovers, a study shows that 'Yoga Nidra' practice brings deep relaxation and increased awareness. To promote the use of neutron-based methods in cultural and heritage sciences, the Directorate of Archaeology and Museums (DOAM), Government of Maharashtra, has entered into an MoU with Bhabha Atomic Research Centre (BARC) to explore the potential of neutron-based non-destructive technique.

Dr. Pradeep Kumar

Editor, ISAS Newsletter

Sr. No.	Title	Page No.
1	Nobel Prize in Chemistry awarded to David Baker, Demis Hassabis & John Jumper for decoding protein design structures.	4-8
2	Defense Minister Set to Commission India's Second Nuclear-Powered Submarine in Visakhapatnam	9-10
3	NTPC-NPCIL Joint Venture Likely to Invest Rs 50,400 Cr in 2,800 MW Nuclear Power Plant	11-12
4	ISRO Chief S Somnath receives prestigious IAF World Space Award for Chandrayaan-3	13-14
5	Tata Group to Be the 1st Private Entity to Enter Nuclear Power Business	15-17
6	Raja Ramanna, the Physicist Who Turned Down Saddam Hussein's Nuclear Offer	18-22
7	India All Set to Commission Its 2nd Nuclear-Powered Missile Submarine	23-24
8	What's new with Neuralink and how is the brain implant device progressing?	25-27
9	ISRO-NASA mission to ISS: 40 years after Rakesh Sharma, Subhanshu Shukla to be 2nd Indian to travel to space	28-30
10	Two people communicated in their dreams, scientists claim experiment successful	31-32
11	Social Media Has Direct Impact On Mental Health: US Surgeon General To NDTV	33-37
12	NASA's Webb Telescope Detects Carbon Dioxide On Surface Of Pluto's Largest Moon Charon	38-39
13	'Yoga Nidra' Works, Says MRI: IIT And AIIMS Researchers Uncover Brain Benefits	40-42
14	How Sitting Too Long Is Impacting Your Health: The Surge Of Dead Butt Syndrome	43-44
15	MoU between Bhabha Atomic Research Centre & Directorate of Archaeology and Museums, Government of Maharashtra	45-47
16	DAE Inaugurates MACE, Asia's Largest and World's Highest Imaging Cherenkov Observatory, at Hanle, Ladakh	48-52

Nobel Prize in Chemistry Awarded to David Baker, Demis Hassabis and John Jumper for Decoding Protein Design and Structures

The Nobel Prizes for 2024 in Chemistry was awarded to David Baker “for computational protein design” along with Demis Hassabis and John M. Jumper “for protein structure prediction”. The 2024 Nobel Prize for chemistry was shared by David Baker “for computational protein design” along with Demis Hassabis and John Jumper “for protein structure prediction,” the Royal Swedish Academy of Sciences announced on Wednesday (October 9, 2024).

Heiner Linke, chair of the Nobel Committee for Chemistry, said the award honoured research that connected the sequence of amino acids that make up a protein and the protein’s structure. Baker led a team that in 2003 designed a new protein using bespoke software methods. They and others have since refined these methods to be able to point the way to ‘designer’ proteins intended for specific applications. Johan Åqvist, a former chair of the chemistry Nobel Committee, called the variety of proteins developed by Baker et al. to be “absolutely mind-blowing” and that “it seems that you can almost construct any type of protein with this technology”.

Hassabis and Jumper received the other half of the prize for their hand in developing an artificial intelligence model called AlphaFold 2 that could predict the structures of millions of proteins. Human scientists had done that for only around 1.7 lakh proteins until then, although the structures and patterns therein were used to train AlphaFold.



NOBELPRISET I KEMI 2024
THE NOBEL PRIZE IN CHEMISTRY 2024



KUNGL.
VETENSKAPS-
AKADEMIEN
THE ROYAL SWEDISH ACADEMY OF SCIENCES



Photo: University of Washington

David Baker
University of Washington
USA

"för datorbaserad proteindesign"

"for computational protein design"



Photo: The Royal Society

Demis Hassabis
Google DeepMind
United Kingdom

"för proteinstrukturprediktion"

"for protein structure prediction"



Photo: BSWA Foundation

John M. Jumper
Google DeepMind
United Kingdom

#NobelPrize

THE
NOBEL
PRIZE

“Four years ago in 2020, Demis Hassabis and John Jumper managed to crack the code. With skillful use of artificial intelligence, they made it possible to predict the complex structure of essentially any known protein in nature,” Linke said.

The Nobel Prize for Hassabis and Jumper comes relatively quickly after the corresponding work, around four to six years. There is usually a gap of a few decades between the work and the prize because the former doesn't immediately prove to be of “greatest benefit to humankind” -- a criterion for winning.

For example, John Goodenough shared the 2019 chemistry prize for his work on lithium-ion batteries in the late 1970s. John Nash, Jr. won part of the Nobel Memorial Prize in Economic Sciences in 1994 for work he had done in the 1950s.

The chemistry prize this year also continues a relatively new tradition in this category of the prize going to non-chemists -- although 1981 chemistry laureate

Roald Hoffmann has interpreted this to be a mark of chemistry's "far and influential reach", especially in biochemistry and molecular biology.

Baker works at the University of Washington in Seattle and Hassabis and Jumper work at Google Deep Mind in London.

The Prize for Physiology or Medicine, won by Victor Ambros and Gary Ruvkun for the discovery of microRNA and its role in post-transcriptional gene regulation, kicked off a week of Nobel Prize announcements. The Physics Nobel, announced on October 8, was awarded to John Hopfield and Geoffrey Hinton for their work on machine learning with artificial neural networks. The winners of the Literature, Peace and Economic Sciences Prize will be declared on October 10, October 11, and October 14 respectively.

The 2024 Nobel Prize for chemistry was shared by David Baker "for computational protein design" along with Demis Hassabis and John Jumper "for protein structure prediction," the Royal Swedish Academy of Sciences announced on Wednesday (October 9, 2024).

Last year the Nobel Prize for Chemistry was jointly awarded to Moungi G. Bawendi, Louis E. Brus and Alexei I. Ekimov for the discovery and synthesis of quantum dots. Heiner Linke, chair of the Nobel Committee for Chemistry, said the award honoured research that connected the sequence of amino acids that make up a protein and the protein's structure.

Baker led a team that in 2003 designed a new protein using bespoke software methods. They and others have since refined these methods to be able to point the way to 'designer' proteins intended for specific applications.

Johan Åqvist, a former chair of the chemistry Nobel Committee, called the variety of proteins developed by Baker et al. to be “absolutely mind-blowing” and that “it seems that you can almost construct any type of protein with this technology”.

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Nobel Prize in Physics 2024: John Hopfield, Geoffrey Hinton awarded for work on machine learning. The prizes carry a cash award of 10 million Swedish kronor (nearly \$900,000) and will be awarded on December 10.

The Nobel Prize was created by Swedish inventor Alfred Nobel, who in his will dictated that his estate should be used to fund “prizes to those who, during the preceding year, have conferred the greatest benefit to humankind”.

(with inputs from PTI)

Defence Minister Set to Commission India's Second Nuclear-Powered Submarine in Visakhapatnam

29 August, 2024 | by Sumit Bhattacharjee

Source website link: <https://www.thehindu.com/news/national/commissioning-of-indias-second-nuclear-submarine-insarighat/article68579761.ece>

The commissioning of the second nuclear submarine is expected to be done in presence of the top defence, national security and military officials. Defence Minister Rajnath Singh is all set to commission India's second Ship Submersible Ballistic Nuclear (SSBN) submarine, at Visakhapatnam at the secretive Ship Building Centre (SBC) in the Eastern Naval Command on Thursday (August 29, 2024).

Though this has been kept under wraps and the commissioning is set to be done discreetly, sources in the Navy confirm that the Defence Minister is in the city for that purpose. The boat christened as INS Arighat, translated to 'destroyer of the enemy', with pennant number S3, is the second in its class after INS Arihant, which was commissioned in August 2016. This enhances India's nuclear triad capabilities and deterrence power in all the three sectors of land, sea and air.

Mr. Singh is expected to stay only for a few hours in Visakhapatnam, after arriving some time post noon and thereafter flying to Thiruvananthapuram from INS Dega, where is scheduled for a night halt.



INS Arighat is said to be similar to INS Arihant, but has more refined capabilities. It is about 112-metre long and weighs around 6,000 tonnes. The nuclear reactor which is embedded in its hull can power the submarine to about 12 to 15 knots on surface and up to 20 to 24 knots when submerged. She can carry about 10 to 12 K-15 nuclear tipped submarine-launched ballistic missiles (SLBMs) and like INS Arihant is equipped with four vertical launch tubes to launch the missiles. The missiles have a range of about 750 km. As per a former naval submariner, nuclear-powered submarines can act as a big deterrent to hostile nations, keeping India's 'no first-use policy'.

Nuclear-powered submarines are more stealthier and run more deep and silent. They need not surface or snorkel for oxygen to recharge its batteries. The third nuclear-powered INS Aridhman, which is said to be bigger and more sophisticated and can weigh around 7,000 tonnes, is also under construction. This submarine will have more vertical tubes and can carry ballistic missiles with a range of over 3,000 km. It is learnt that INS Arighat has already undergone extensive sea trials.

NTPC-NPCIL Joint Venture Likely to Invest Rs 50,400 Cr in 2,800 MW Nuclear Power Plant

03 August, 2024 | by ET Bureau

NTPC Ltd and the Nuclear Power Corporation of India are likely to invest around Rs 50,400 crore in the 2,800 MW Mahi-Banswara nuclear power plant, which will be jointly developed by the two state-owned companies. The power generator expects the tendering process for the nuclear power project to start in the current financial year.

NTPC Ltd and Nuclear Power Corporation of India are likely to invest around Rs 50,400 crore for 2,800 MW Mahi-Banswara nuclear power plant to be jointly developed by the two state-owned companies.

The power generator expects the tendering process for the nuclear power project to start in the current financial year, people in the know said.



A proposal for transfer of the nuclear units to joint venture Anushakti Vidhyut Nigam Ltd from parent NPCIL is likely to go for approval of the Cabinet this month. However, the company will not be involved anymore in the 1,400 MW Chutka Madhya Pradesh Atomic Power Project, which was also to be jointly developed with NPCIL, the person said.

For the power major, the Mahi-Banswara project would be an experience to carry forward its nuclear energy plans on a standalone basis, the person said.

Green IPO

The company is also looking to list its green arm in November targeting a 10% dilution of its stake, the person said. In November, NTPC Green Energy Ltd (NGEL) is likely to have a total installed capacity of 4,000 MW, another 8,000 MW under construction, and 8,000 MW more in various stages of development.

NGEL will drive India's largest power producer's ambitious clean energy programmes. The company will have subsidiaries and joint ventures to carry out the projects. The power generator's subsidiary will be the flag bearer of its aim to add 60 GW renewable energy capacity by 2032. It is also looking to develop pumped hydro storage and green hydrogen and ammonia manufacturing projects.

Coal Procurement

For the first time, NTPC has issued an order to procure coal to the tune of 1 million tonnes from the commercial coal mines. These mines were opened for the private sector in 2020. This tender, which was placed last month, is on fuel transported to plant on 'quantity and quality' basis and the cost is projected to be lower than import, the person added.

Source website link: <https://economictimes.indiatimes.com/industry/energy/power/ntpc-npcil-joint-venture-likely-to-invest-rs-50400-cr-in-2800-mw-nuclear-power-plant/articleshow/112232774.cms?from=mdr>

ISRO Chief S Somnath receives prestigious IAF World Space Award for Chandrayaan-3

The award ceremony, held in Milan, Italy, celebrates India's significant contributions to lunar exploration and its growing prominence in the global space community.

India Today Science Desk
New Delhi,UPDATED: Oct 14, 2024 21:25 IST



AF World Space Award given to Isro chief for Chandrayaan-3.
(Photo: Isro)

In Short

Chandrayaan-3 historic landing near the Moon's south pole on August 23, 2023

It marked India as the first nation to achieve this feat

Dr. Somanath's leadership was instrumental in guiding the mission

In a momentous recognition of India's achievements in space exploration, Dr. S. Somanath, Secretary of the Department of Space and Chairman of the Indian Space Research Organisation (ISRO), has been awarded the prestigious International Astronautical Federation (IAF) World Space Award for the remarkable success of the Chandrayaan-3 mission. The award ceremony, held in Milan, Italy, celebrates India's significant contributions to lunar exploration and its growing prominence in the global space community. Chandrayaan-3's historic landing near the Moon's South Pole on August 23, 2023, marked India as the first nation to achieve this feat, placing it in an elite group of countries capable of lunar landings.

ISRO is honored to announce that Dr. S. Somanath, Secretary DOS and Chairman ISRO, has received the prestigious IAF World Space Award for Chandrayaan-3's remarkable achievement. This recognition celebrates India's contributions to space exploration.

Dr. Somanath's leadership was instrumental in guiding the mission to success, overcoming the challenges faced by its predecessor, Chandrayaan-2.

The mission not only demonstrated India's technological prowess but also provided valuable scientific data, including the detection of sulfur and other elements in the lunar soil. The IAF World Space Award recognises outstanding contributions to space science, technology, and exploration. This honour for Chandrayaan-3 shows the mission's significance in advancing our understanding of the Moon and paving the way for future lunar exploration endeavours.

The success of Chandrayaan-3 has inspired a new generation of scientists and engineers in India, boosting interest in space exploration and STEM fields across the country. It has also opened doors for international collaborations, positioning India as a key player in shaping the future of space exploration.

Tata Group to Be the 1st Private Entity to Enter Nuclear Power Business

05 August, 2024 | by Verdaan



Tata Group is poised to become one of the first private sector players to enter the nuclear power business in India. Group chairman N. Chandrasekaran recently announced that Tata Power is exploring participation in "small modular nuclear reactors (SMNRs)" once the government grants necessary permissions.

To recall, it was in late 2022 when Union minister Dr Jitendra Singh invited participation of private sector and Start-ups to explore the development of SMR (Small Module Reactors) technology within India. SMRs are nuclear fission reactors that are smaller than conventional nuclear reactors as we know it, and are modular in use.

The Indian government plans to invite companies to invest approximately \$26 billion in the sector to reduce carbon emissions. This move aligns with global

trends toward greater acceptance of nuclear energy as countries seek to meet emission goals.

In its latest annual report, Tata Power has mentioned, "As large reactors face constraints and safety concerns, there has been a shift towards SMNRs. Governments are increasingly supporting SMNR development, unveiling new funding plans." While challenges exist in building SMRs, countries like China, Russia, and the U.S. are leading the way in this segment. In contrast, India's nuclear energy expansion has been slower, with Nuclear Power Corporation of India Ltd. (NPCIL) recently commissioning two 700 MW units at Kakrapar nuclear power station in Gujarat after a six-year gap.

As of now, India operates 24 nuclear reactors with a combined capacity of 8.1 gigawatts (GW). India aims to add 18 more nuclear reactors by 2031–32, bringing the total nuclear power capacity to 22.4 GW. These include 10 indigenously designed pressurized heavy water reactors (PHWRs).

At present, the law bars private firms from building nuclear power plants in the country. However, they can supply equipment and components and participate in civil construction outside the reactors.

The Indian government is seeking \$26 billion (Rs2.16 trillion) in private investment for its technology. Energy industry to decarbonize the power sector. Talks are ongoing with private companies like Reliance Industries, Tata Power, Adani Power, and Vedanta.

Notably, in her Budget 2024 speech, Finance Minister Nirmala Sitharaman announced plans to develop Bharat Small Reactors (BSRs) as part of India's push to expand its nuclear energy capabilities. BSRs are compact nuclear reactors designed to generate electricity on a smaller scale compared to traditional large nuclear power plants.

They are based on India's tried and tested 220-megawatt pressurized Heavy Water Reactor (PHWR) technology, with 16 operational units already in the country. The key innovation with BSRs is the government's decision to partner with the private sector for their development and deployment. This marks a historic shift, as the Atomic Energy Act of 1962 previously did not permit private sector participation in nuclear energy generation.

While BSRs align with global trends in nuclear energy, they are distinct from small modular reactors (SMRs). SMRs involve factory-made, easily assembled reactors, whereas BSRs build upon India's existing PHWR technology

Source website link: <https://www.indianweb2.com/2024/08/tata-group-to-be-1st-private-entity-to.html>

Raja Ramanna, the Physicist Who Turned Down Saddam Hussein's Nuclear Offer

Physicist Raja Ramanna, who passed away on September 24, 2004, played a pivotal role in India's nuclear journey. Known for his integrity, he once refused Saddam Hussein's offer to lead Iraq's nuclear programme.

Source website link: <https://www.indiatoday.in/education-today/gk-current-affairs/story/raja-ramanna-nuclear-physicist-said-no-to-saddamhussein-2605890-2024-09-24>



Physicist Raja Ramanna, who passed away on September 24, 2004, played a pivotal role in India's nuclear journey. (Photos: India Today (l), Getty Images(r))

In 1978, Dr. Raja Ramanna, one of India's most distinguished nuclear physicists, found himself in a situation few could imagine. Invited to Iraq as a guest of Saddam Hussein, Ramanna was given a grand tour of Iraq's nuclear facility. The visit seemed cordial—until the Iraqi dictator made a startling proposal. Saddam Hussein, eager to develop Iraq's nuclear capabilities, offered Ramanna a powerful and lucrative position. He wanted the Indian physicist to lead Iraq's nuclear programme.

For a moment, Ramanna was shaken. The weight of this offer, given the volatile political landscape, was daunting. But his conscience was clear: he was loyal to India. Choosing integrity over ambition, Ramanna politely declined and hastily caught the next flight back home. Relieved to be back in India, he had escaped what could have been a dangerous entanglement. This incident shows both the respect Ramanna commanded internationally and his unwavering commitment to his homeland.

EARLY LIFE AND PASSION FOR PHYSICS

Born on January 28, 1925, in Tumkur, Karnataka, Ramanna was an exceptional child, with diverse interests in both music and science. While his musical talents led him to master the piano, it was his love for physics that ultimately defined his life's work. His educational journey took him to Madras Christian College, where his fascination with nuclear physics grew, and later to King's College London, where he obtained his PhD. This was the post-independence era of India, a time when bright minds like Ramanna were needed to build the nation.



Raja Ramanna with Atal Bihari Vajpayee (Photo: India Today)

After his studies, Ramanna returned to India, joining the Tata Institute of Fundamental Research (TIFR) under the legendary Homi J Bhabha. Here, Ramanna's career took off.

He played a crucial role in the construction of India's first nuclear reactor, Apsara, which was successfully operational by 1956. The experience solidified his place among the country's top scientific minds.

RAJA RAMANNA AS A NUCLEAR PIONEER

Ramanna's contributions went far beyond Apsara. He became a pivotal figure in India's nuclear weapons programme, leading up to the country's first nuclear test, known as the Pokhran-I test or the 'Smiling Buddha', in 1974.

This test was a watershed moment in India's scientific and political history, placing the nation among the world's nuclear powers. Ramanna's technical expertise and strategic foresight were instrumental in making it happen. While the international community had mixed reactions, with many countries imposing. Apart from the notable encounter with Saddam Hussein, Ramanna had many encounters with major personalities, including the father of India's nuclear programme, Homi J Bhabha, and former President and nuclear scientist APJ Abdul Kalam.

Bhabha had handpicked Ramanna for some of the most critical nuclear projects in the country, including the development of reactors and reprocessing technologies. Their collaboration was one of the reasons behind India's advancements in nuclear science. He was deeply aware of the geopolitical implications of nuclear power and remained committed to using nuclear science for peaceful purposes, always advocating that it should serve humanity.



Raja Ramanna with APJ Abdul Kalam (Photo: India Today)

A VISIONARY LEADER AT ATOMIC RESEARCH CENTRE

In 1981, Ramanna became the director of the Bhabha Atomic Research Centre (BARC), a position that further solidified his leadership in India's nuclear programme. Under his guidance, BARC advanced its research into nuclear reactors and fuel reprocessing, ensuring that India would remain self-sufficient in nuclear technology despite the sanctions it faced.

Ramanna was also instrumental in fostering a culture of scientific innovation in India. He encouraged the next generation of scientists to think beyond the obvious, ensuring that India's scientific future was secure. Even after retiring from active research, Ramanna's influence lingered through his roles as an advisor and mentor.

MUSIC AND PRIVATE LIFE

Behind the physicist was a deeply artistic man. Ramanna was an accomplished pianist with a love for Western classical music. Music wasn't just a hobby for him—it was a lifelong passion that offered a creative outlet to balance his intense scientific pursuits.

He often performed for close friends and family, demonstrating a side of his personality few would expect from a nuclear scientist. In his personal life, Ramanna

was a devoted family man. He was married to Malathi, and together they had three children. His ability to balance a high-stakes career with a rich family life was evidence of his strong character and discipline.

LEGACY OF A SCIENTIFIC GIANT

Raja Ramanna passed away on September 24, 2004, but his contributions continue to shape India's scientific landscape. His role in India's nuclear journey cannot be overstated, and his ethical approach to science set a high standard for future generations.

Ramanna was not only a scientist but also a statesman, serving in India's Parliament as a Rajya Sabha member from 1997 to 2003. His legacy endures in the institutions he helped build, the policies he shaped, and the generations of scientists he inspired. Raja Ramanna was, and remains, a national treasure whose work continues to influence India's nuclear and scientific policies.

India All Set to Commission Its 2nd Nuclear-Powered Missile Submarine

11 August, 2024 | by Shivani Sharma and Shahil Sharma

The Indian Navy is all set to commission its second nuclear-powered submarine, INS Arighat, and has also got the government's nod to construct six nuclear submarines to strengthen its strategic deterrence.

The INS Arighat, India's second indigenously built SSBN, is currently in the final stages of trials.

- INS Arighat to be commissioned into Indian Navy soon
- Government also approved 6 new nuclear submarines
- Moves will boost India's maritime defense capabilities

India's nuclear submarine programme has achieved a significant milestone, marking dual advancements that will bolster the nation's maritime defence capabilities. The Indian Navy is on the verge of commissioning its second nuclear-powered ballistic missile submarine (SSBN), the INS Arighat. Simultaneously, the government has given the green light to a project involving the construction of six nuclear submarines (SSNs), a strategic move that underscores India's commitment to enhancing its naval prowess.

The INS Arighat, India's second indigenously built SSBN, is currently in the final stages of trials and upgrades as required by the Indian Navy. According to sources, the submarine is expected to be officially commissioned into service within the next two months. Once commissioned, INS Arighat will join INS Arihant, which was inducted into the Navy in 2016, as part of India's growing fleet of nuclear submarines. These vessels are critical components of a four-SSBN project, with two additional submarines, currently designated S4 and S4*, under construction at the Indian Navy's Ship Building Centre in Visakhapatnam.

INS Arighat boasts impressive capabilities, including a maximum surface speed of 12–15 knots (22–28 km/h) and up to 24 knots (44 km/h) when submerged.

Mirroring its predecessor, the submarine features four launch tubes in its hump and can carry up to four nuclear-capable K-4 Submarine Launched Ballistic Missiles (SLBMs) with a range exceeding 3,500 kilometres.

Alternatively, it can be equipped with twelve K-15 SLBMs, which are capable of carrying conventional warheads over a distance of approximately 750 kilometres. The K-15 missiles can also be outfitted with strategic nuclear warheads. Additionally, INS Arighat will be armed with torpedoes, further enhancing its defensive and offensive capabilities.

In tandem with the imminent commissioning of INS Arighat, India is set to embark on the construction of six nuclear submarines (SSNs) this year, a project that is expected to cost over Rs1 lakh crore (approximately \$12 billion).

The project will see around 96 per cent of the components and technology sourced indigenously, with only a few critical technologies being acquired from allied nations. These SSNs, equipped with cutting-edge stealth technology and autonomous drones, are poised to revolutionise India's maritime warfare capabilities.

This ambitious initiative is part of India's broader strategy to strengthen its naval forces in response to escalating regional maritime challenges. The focus on indigenous production aligns with the "Make in India" initiative, a government-driven effort to enhance self-reliance in defence manufacturing and reduce dependence on foreign technology.

As India continues to assert its presence in the Indian Ocean and beyond, these advancements mark a crucial step forward in ensuring the nation's security and strategic interests in the region.

Source website link: <https://www.indiatoday.in/india/story/india-nuclear-submarine-programme-ins-arighat-and-6-ssns-to-be-inducted-intonavy-soon-2580703-2024-08-11>

What's new with Neuralink and how is the brain implant device progressing?

Recently, Elon Musk shared a major update on the latest progress of Neuralink's technology. Here's all that you need to know about the brain-computer interface. Elon Musk is in the news for a lot of reasons but last week, the billionaire futurist grabbed headlines yet again when he revealed that the brain-computer interface (BCI) device made by his startup Neuralink has been implanted in a person's brain – for the second time. Speaking on a podcast released on August 2, Musk further said that eight more people could be implanted with the brain chip by 2024 as part of its clinical trials for humans. Based on the first human trial, it's safe to say that Neuralink's BCI device (nicknamed 'Telepathy') allows people to browse the internet or control digital devices with just their thoughts. But what more can a Neuralink-assisted brain currently do? How is that different from what it hopes to do? And what are the challenges that stand in the way?

What is Neuralink, and why has it grabbed attention?

The neurotechnology startup behind Neuralink started out as a medical research company in California, US, back in 2016. The next year, heads turned after it was reported that SpaceX's Elon Musk was backing the venture. Neuralink is reportedly headquartered in Fremont, California, with additional facilities in Austin, Texas. In simple terms, Neuralink reads the electrical signals generated by neurons in the human brain and then uses those signals to control devices such as typing on a computer screen. But brain-computer interfaces that came before Neuralink were capable of the same. In fact, a 2006 study allowed paralysed test subjects to move a cursor on a computer screen.

But the reason why people are excited about Neuralink is because the implant is much smaller, making it easier to insert into the brain. It is roughly the size of a coin and is equipped with over 1,024 electrodes that are distributed across 64 super-thin, highly-flexible threads. A surgical robot implants the device in the brain by inserting these threads so that it goes deeper than the fluids and membranes surrounding the brain, until it reaches the cortex – which is the region of the brain that controls movement. The entire surgery only takes about 30-40 minutes, Dongjin Seo, Neuralink’s co-founder and president, has said.

After the device is implanted, the electrodes read electrical signals from the brain and transmit signals to an external device via Bluetooth. How have Neuralink’s human trials played out? In May 2023, Neuralink received approval from the US Food and Drug Administration (FDA) to begin its in-human clinical trial called the ‘PRIME study’. It became the third BCI to be sanctioned for long-term testing in humans, according to a report in the scientific journal Nature. As for its human test subjects, the company said that it is looking for people older than 22 years who have quadriplegia due to vertical spinal cord injury or ALS, The Verge reported.

That same year, Noland Arbaugh became the first person in the world to be implanted with a Neuralink device. He is paralysed from below the shoulders due to a diving accident and initially had to use a tablet by holding a stick in his mouth. However, in the recent podcast, Musk revealed that Arbaugh is now able to perform a host of different tasks such as playing video games, browsing the internet, posting on social media, and moving a cursor on his laptop – simply by thinking. Now, Neuralink has successfully implanted its BCI device in a second human who had also suffered a spinal cord injury earlier, according to Musk. Out of the 1,024-array, around 400 electrodes are transmitting signals from the second patient’s brain, he said. What are Elon Musk’s future plans for Neuralink?

Based on his previous remarks, Musk has ambitious plans for Neuralink as he envisions that the brain implant will be able to not just assist paralysed patients but also help them walk. He has also publicly stated that Neuralink will be able to treat memory loss, addiction, insomnia, schizophrenia, seizures, psychosis, and more.

During last week's podcast, Musk reportedly said that the ultimate goal of Neuralink is to merge the human brain with artificial intelligence (AI). He also hopes to release upgraded models of the device, as per reports.

What are the controversies and challenges surrounding Neuralink?

Neuralink has had its fair share of controversies and hurdles. A month after the BCI device was implanted in Arbaugh's head, about 85 per cent of the electrode-carrying, flexible threads retracted from his brain. As a result, the device's capabilities took a hit. Furthermore, Matthew MacDougall, Neuralink's head of neurosurgery, said that quite a few of the chip's electrodes were dislodged due to an air pocket that was created during surgery.

In response, Neuralink increased the sensitivity of the chip by tweaking its algorithm which gave Arbaugh better control of the device. Learning from past mistakes, MacDougall had said in July that the surgical team for the second implant would avoid creating any air pockets by sculpting a hole that would allow for the device to be implanted lower in the cranium and the flexible threads to be inserted deeper into the cortex.

But those are just the technical challenges. Neuralink's work has also attracted significant regulatory scrutiny in the past over reports that monkeys used as test subjects allegedly suffered gruesome deaths. Over 1,500 sheep, pigs, and monkeys died due to animal testing that was allegedly rushed, according to a Reuters report.

ISRO-NASA mission to ISS: 40 years after Rakesh Sharma, Subhanshu Shukla to be 2nd Indian to travel to space

ISRO on Friday said it had selected Shukla, 39, and Group Captain Prasanth Balakrishnan Nair, 48, for the Axiom-4 mission, and named Shukla as the ‘prime’ astronaut, meaning he would be the one who would go to the International Space Station.



Group captain Subhanshu Shukla will most likely become the first Indian in space in 40 years with Indian Space Research Organisation (ISRO) naming him the ‘prime’ astronaut for the first ISRO-NASA mission to the International Space Station, scheduled for any time after October this year. ISRO on Friday said it had selected Shukla, 39, and Group Captain Prasanth Balakrishnan Nair, 48, for the Axiom-4 mission, and named Shukla as the ‘prime’ astronaut, meaning he would be the one who would go to the International Space Station. Nair is the backup for this mission. He will take over in case Shukla is unable to go due to any reason.

Only one Indian has ever been in space till now – Rakesh Sharma – who was wing commander when he flew on a Soviet spacecraft in 1984.

Shukla and Nair are among the four Indian air force officers selected for India's first manned space mission, Gaganyaan, that is now tentatively scheduled for next year. The two will undergo further mission-specific training for the next eight weeks, an ISRO official said. All four selected officers have already undergone rigorous training for the Gaganyaan mission.

Axiom-4 is the fourth mission by private space company Axiom Space in collaboration with NASA. The spacecraft would be launched by a SpaceX rocket. Apart from Shukla, three other astronauts — one each from Poland, Hungary and the United States — will travel to the International Space Station. India's partnership in this mission was a result of an agreement between New Delhi and Washington during Prime Minister Narendra Modi's trip to the United States last year.

The Axiom-4 spacecraft would remain docked with the ISS for 14 days. Besides the astronauts, it will carry cargo, and supplies, for the ISS. The exact date of the launch is not yet decided. NASA, on its website, says the mission was scheduled not earlier than October 2024. However, Poland's space agency POLSA, in a separate announcement today, said the mission was expected only next year. Shukla, 39, a fighter pilot who hails from Lucknow in UP, was commissioned in the IAF in 2006 and has over 2,000 hours of flying experience. He has flown a variety of IAF fighter jets including Sukhoi-30 MKIs, MiG-21s, MiG-29s, Jaguars, Hawks, Dorniers, and the AN-32 aircraft. Nair is a recipient of the sword of honour at the Air Force Academy and was commissioned in the IAF in 1998. He is a category A flying instructor and a test Pilot with over 3000 hours of flying

experience. He is an alumnus of the United States Staff College and has commanded Sukhoi-30 squadron. India's Gaganyaan mission is dependent on experience gained from the ISS mission by the Indian astronauts.

This particular activity (Indo US collaboration on a space mission) is something that the US wants and India also finds it beneficial for the Indian space programme because once an Indian prepares to go to the ISS they will undergo a training in the US and they are going to come back and discuss how the training and this will help design our Gaganyaan better," ISRO chairman Somanath said in 2023.

Two people communicated in their dreams, scientists claim experiment successful

A California-based startup, REMspace, claimed that it succeeded in an experiment involving two individuals who communicated in their dreams on September 24.



REMspace said it used 'specially designed equipment' like a server, apparatus, Wi-Fi and sensors for the dream experiment, but did not specify what technology it used. (Photo: REMspace/YouTube)

Participants used special equipment to exchange a message

Word 'Zhilak' was successfully communicated during lucid dreaming

Technology awaits scientific review and approval

Ever thought of talking to someone while dreaming? Well, it seems that scientists in California have brought this phenomenon close to reality after they achieved the first two-way communication between individuals through lucid dreaming.

REMspace, a California-based startup that designs technology to enhance sleep and lucid dreaming, exchanged a message between two participants, selected for the experiment, who were asleep on September 24, Dailymail.com reported.

he participants were both experienced lucid dreamers, meaning that they had honed the skill of being aware that they were dreaming while still asleep. Lucid dreaming occurs during the REM (Rapid Eye Movement) stage of sleep, a period when the brain is most active and dreams are vivid.

Social Media Has Direct Impact On Mental Health: US Surgeon General To NDTV

"There is a need to protect our children," the Surgeon General said, adding that it is a priority for him and his department to "make mental health the priority that it needs to be."

There is a direct connection between social media use and mental health, especially among teenagers, the US Surgeon General Vice Admiral Vivek Murthy told NDTV today. He said that his office had even issued an advisory in this regard, appealing for more focus on this very concerning issue. The US Surgeon General is the doctor to all of the United States of America. The Surgeon General is consulted by the President of the US on all public health issues and health-related emergency matters. It is one of the topmost posts in the US and is responsible for America's overall healthcare system, new technology in the sector, and scientific advancement in medicine. The current Surgeon General, Vice Admiral Vivek Murthy spoke exclusively to NDTV today on a range of issues, including a growing mental health crisis globally and how social media impacts it.

"There is a need to protect our children," the Surgeon General said, adding that it is a priority for him and his department to "make mental health the priority that it needs to be." He said that "Many countries are struggling with mental health crisis, with many cases of depression, anxiety, and sadly suicide."

'THE STIGMA'

Vice Admiral Murthy explained that his advisory aims to focus on the "stigma around mental health", which he says "makes it harder for patients to talk about it at home with their families, and makes their struggle harder because not often can

they ask for the help they need." As an increasing number of young adults are battling mental health issues globally, the top doctor of the United States said, "Fundamentally what we have to do is to see mental health for what it is - It is part of our overall health, and mental health is just as important to a person as their physical health is, and must be treated with the urgency and priority that it deserves."

'GENERATIONAL DIFFERENCES, COMMUNITY OUTLOOK'

"Older generations are not always used to talking about mental health issues," the Surgeon General said, acknowledging that "different generations look at mental health differently, as do different communities." "While older generations do not talk about it openly, the younger generations are far more open and sensitive to mental health challenges," he said. Speaking about cultural views on mental health and the stigma attached to it, Vice Admiral Murthy said, "We see a lot of cultural differences when it comes to viewing mental health issues. My family is originally from India, and the Indian-American community which I grew up in, we never spoke about mental health issues. In fact, it was something that was seen as a source of shame." Giving an example of his own experience of the stigmatisation of mental health challenges, he said, "I had an uncle who sadly lost his life to suicide. I remember the sense of shame around the family that something like this had happened. There was so much concern about telling other people what had happened because of what they would think about the family. That kind of stigma and the message it sends to both young and old people, is that these issues are just not okay to talk about."

"We need to change this. I aim for a day where we can talk about the mental health issues we face just as easily as we would about a sprained ankle or heart disease. We need to talk about it with the same amount of openness" he said.

'BUILDING BLOCKS OF A FULFILLING LIFE'

Young people are under tremendous pressure and stress of performing well in life, said the top doctor, and so, I asked a lot of young adults what success means to them, he added. "We need to ask ourselves what we are doing to define success for young people in order to help them having a fulfilling life. When I spoke to young people in the US, many of them said they feel they are being asked to hustle behind a definition of success that is largely dependent on - 'How much money you make', 'How much fame you can acquire', and 'How much power can you attain' - And while there is nothing wrong in wanting to amass power, fortune and fame, if we feel that that is what is going to lead to long-term fulfilment, unfortunately life's experiences and challenges tends to make us feel the other way," he said.

"So, if we really want our children to be truly and deeply fulfilled, the thing we need to increasingly think about is - How can we help them build a life that is focussed on meaning, on purpose, on service, and on community - because these are the building blocks of fulfilment that we all ultimately want for our children," he explained.

THE ESSENTIAL INGREDIENT TO MANAGE STRESS

Delving on the issue of stress and the pressures faced by young individuals, Vice Admiral Murthy said, "We need to see and understand where the pressures being faced by our children are coming from. We also need to mitigate and manage them

to make the environment that our children are growing up in much more hospitable and welcoming."

Explaining his statement, he added, "One of the things we know is that pressure is a lot easier to deal with - stress in general, is a lot easier to deal with when we have social support around us. Which is why the issues of loneliness and isolation being a broader epidemic is a serious problem in the US and increasingly across the world."

SUICIDE - THE DEEPEST PAIN, A GLOBAL EPIDEMIC

Speaking about an ever-increasing suicide rate globally, the Surgeon General said, "Suicide is one of the most painful consequences of all of the broader mental health challenges we are facing today. The thought of losing your child to suicide is the deepest pain for any parent to deal with." He further explained that "Suicide deaths have increased significantly across the world in the last two decades." This, he says, is due to several reasons: Loneliness has become a profound issue among children. It affects the entire population, but is hitting young people the hardest. It is now an epidemic across the world.

The impact of violence and the fear of violence - Over 50 per cent children in the US now fear a school shooting. Negative news and mobile phones - Most children today carry or have access to smartphones that are constantly buzzing with negative and violent headlines which make them feel like their life and the future is bleak because nothing positive is happening around the world.

Most of all, Technology and Social Media - Children are, on average, spending more than 3 hours a day on social media. By doing so, they face double the risk of

depression and anxiety. It is one of the many reasons we have to address the harms of social media.

'WE'VE FAILED AS A SOCIETY'

Social media algorithms are what make these platforms so addictive. These algorithms have a direct impact on the brain and the hormones secreted by it. But there are no laws to keep these algorithms in check. While even smoking or drinking have their own set of laws to not pose a risk to the public, social media firms have no such rules to bind them from using their algorithms indiscriminately.

Elaborating on the challenges faced in combating the harms of social media, the Surgeon General said, "For the last 20 years that social media has been around, we have broadly failed as a society to ensure that social media companies meet safety standards."

Giving the example of cars, Vice Admiral Murthy explained that "Cars have a basic level of safety and standards in place. These standards ensure that that brakes are working, the seat belts and the engine are in sound condition, the frame of the car is such it protects the occupants of the vehicle. But we do not have anything like that, especially in the US, when it comes to checks and balances for social media. There are no safety standards to protect children in particular from its harmful effects."

NASA's Webb Telescope Detects Carbon Dioxide On Surface Of Pluto's Largest Moon Charon

The team found traces of carbon dioxide and hydrogen peroxide on the moon, roughly half the size of Pluto.

Scientists utilizing the James Webb Space Telescope have made a groundbreaking discovery on Charon, Pluto's largest moon. For the first time, researchers have detected carbon dioxide on Charon's frozen surface, according to a study published in Nature Communications. Led by the Southwest Research Institute, the team found traces of carbon dioxide and hydrogen peroxide on the moon, which is roughly half the size of Pluto. This breakthrough discovery builds upon previous findings of ice, ammonia, and organic compounds on Charon. The study explains that hydrogen peroxide forms when ice is broken down by charged particles, releasing hydrogen and oxygen atoms that combine. This highly reactive compound is commonly used in bleaches and disinfectants. The presence of the chemical suggests Charon's icy surface is altered by ultra-violet light and solar wind from the distant Sun, according to the study. The discovery sheds new light on Charon's composition and chemical processes, offering valuable insights into the Pluto system's mysterious and icy landscape.

"The detection of carbon dioxide was a satisfying confirmation of our expectations. The detection of hydrogen peroxide on Charon was unexpected. I honestly did not anticipate finding evidence of it on the surface," said Silvia Protopapa, lead author of the study.

Every small body in the outer solar system is a unique piece of a larger puzzle that scientists are trying to put together," Protopapa added.

Pluto, once hailed as the ninth and final planet in our Solar System, underwent a reclassification in 2006. The International Astronomical Union (IAU) convened to establish a formal definition of a planet, resulting in Pluto's demotion to dwarf planet status.

About Pluto's Moon Charon:

Charon was first discovered in 1978 by James Christy and Robert Harrington at the U.S. Naval Observatory in Flagstaff, Arizona. This moon is remarkably similar to Pluto, earning it the nickname "Pluto's smaller twin." Measuring approximately 1,200 kilometres in diameter, Charon is half the size of Pluto, making it the largest known satellite relative to its parent body in our Solar System.

Charon and Pluto's orbital dance is unique. While Charon orbits Pluto, the pair also spins around a central point, resembling a double dwarf planet system. This contrasts with the Earth-Moon system, where the Moon orbits Earth without affecting its position. Pluto's failure to clear its orbit due to Charon's gravitational influence contributed to its reclassification as a dwarf planet.

'Yoga Nidra' Works, Says MRI: IIT And AIIMS Researchers Uncover Brain Benefits

Yoga Nidra practice causes many changes in brain activity, including in areas involved in regulating emotions, mind wandering, and sleep.

ScienceEdited by Nikhil PandeyUpdated: September 24, 2024 2:26 pm IST

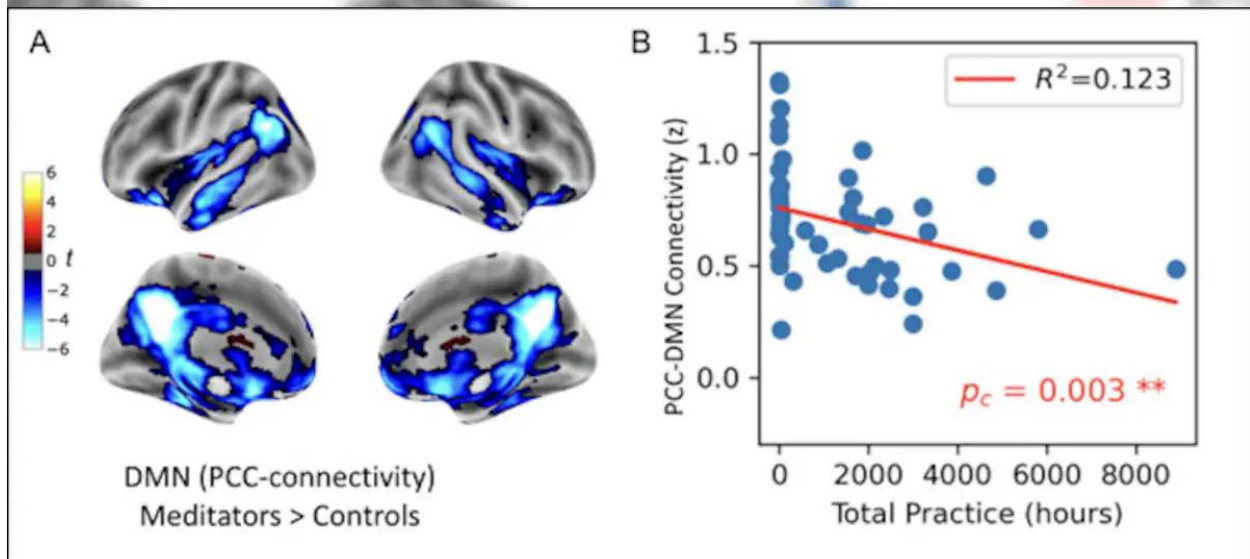


The conscious sleep practice known as 'Yoga Nidra' has long fascinated people with its promise of improving mental and physical health. Now, Indian researchers have explored these effects by scanning brains with functional magnetic resonance imaging (fMRI) technology to understand its value better. Researchers from IIT Delhi, AIIMS Delhi, and Mahajan Imaging Delhi have conducted this study, which was published in the international journal *Scientific Reports*, exploring the neural mechanisms underlying 'Yoga Nidra'. The study shows how 'Yoga Nidra' practice

brings deep relaxation and increased awareness. It also shows that more significant brain changes occur during 'Yoga Nidra' practice in individuals with greater experience in yoga/meditation.

According to a release by the Indian Institute of Technology Delhi, the study, titled "Functional connectivity changes in meditators and novices during 'Yoga Nidra' practice," included two groups: 30 meditators (householders with an average of 3000 hours of experience in meditation and/or yogic practices) and 31 matched novice controls. The study found that the Default Mode Network behaves differently (less connected) in experienced meditators compared to novices. This difference in brain communication patterns helps us understand how 'Yoga Nidra' modulates our brain functions, promoting a state of deep relaxation while staying aware.

The study found a strong link between the amount of meditation and yoga practice participants had and the reduction in DMN connectivity during 'Yoga Nidra'. In other words, the more hours participants spent practicing meditation and yoga, the more noticeable the changes in their brain activity during 'Yoga Nidra'. These results could potentially indicate that experienced meditators have reduced mind-wandering as compared to novices, leading to changes in the DMN connectivity.



The researchers behind this study say 'Yoga Nidra' (YN) practice, a meditative technique originating from the ancient Indian tradition, has garnered global attention for its potential to improve psychological well-being and health. Despite the growing interest in its clinical applications, a comprehensive understanding of the underlying neural correlates of YN remains largely unexplored.

How Sitting Too Long Is Impacting Your Health: The Surge Of Dead Butt Syndrome

To combat dead butt syndrome, experts recommend incorporating regular physical activity, stretching, and strengthening exercises targeting the gluteal muscles.

ScienceEdited by Nikhil PandeyUpdated: September 05, 2024 6:36 pm IST



A new medical ailment that is becoming more prevalent is concerning medical specialists and drawing attention to the risks associated with a more sedentary lifestyle. Gluteus medius tendinosis, commonly known as "dead butt syndrome," is a disorder marked by a weak or inactive gluteus medius muscle. It is frequently brought on by extended sitting, driving, or excessive screen time.

Experts caution that this health condition may result in a variety of issues, such as injuries to the knee, hip pain, and lower back pain. Dead butt syndrome is becoming increasingly common as more individuals spend their days slumped over computers or in front of screens.

"The name sounds silly, but the side effects are serious," said Jane Konidis, a specialist in physical medicine and rehabilitation at the Mayo Clinic in Rochester, Minnesota told The New York Times. "The gluteus maximus is one of the strongest muscles in the body and biggest shock absorbers," she said. "If it's not working properly, it can cause a domino chain of issues, from hamstring tears and sciatica to shin splints and arthritis in the knees."

Gluteal amnesia happens when the muscles in your rear become so weak from inactivity they seem to forget how to function, meaning they fail or become slow to activate. This is different than a leg or arm "falling asleep" because of a compressed nerve; you won't feel pins and needles. Some people may feel a dull ache while sitting, but most people don't feel any pain until they go for a jog or hike, reported The NYT.

Sluggish glutes can result in other muscles and joints, especially in the lower back and knees, picking up the slack, Dr Konidis said.

To combat this issue, healthcare providers recommend incorporating regular physical activity, stretching, and strengthening exercises that target the gluteal muscles. By prioritising overall health and well-being, individuals can help prevent dead butt syndrome and its associated complications.

MoU between Bhabha Atomic Research Centre & Directorate of Archaeology and Museums, Government of Maharashtra

01 October, 2024 | by dae.gov.in

Source website link: <https://dae.gov.in/mou-between-bhabha-atomic-research-centre-directorate-of-archaeology-and-museums-government-ofmaharashtra/>

Archaeological sites and cultural heritage artifacts are of great importance for defining the characteristics of a nation. Moreover, cultural tourism by interested tourists to national monuments, national buildings, national museums, contributes substantially to the creation of national wealth. Therefore, effective conservation and preservation of the cultural heritage is a necessity of hour. During the conservation of artefacts it is of paramount importance that the structure and composition of the artifact is thoroughly understood. Cultural-Heritage artefacts, in particular ancient ones, still pose many interesting and important challenges, such as the correct determination of their historical and cultural timeframe, their location and method of production, and the choice of suitable treatments and environmental conditions for their restoration and conservation.



Amongst the large variety of physical and chemical techniques, neutron-based imaging methods are able to provide unique information, thanks to their particular interaction mechanisms with matter. Neutrons by the virtue of non-destructive nature and large penetration depth provide an invaluable tool to Conservation scientists by deciphering the internal morphological structure, there by providing an important insight into the craft ship and manufacturing practices of our ancestors.

Therefore, to promote the use of neutron-based methods in cultural and heritage sciences, the Directorate of Archaeology and Museums (DOAM), Government of Maharashtra, has entered into an MoU with [Bhabha Atomic Research Centre \(BARC\)](#) to explore the potential of neutron-based non-destructive techniques set up by Technical Physics Division of Physics Group, BARC at the Dhruva and APSARAU nuclear research reactors in the characterization of ancient artifacts in their collection. The MoU was signed at BARC by Dr. S. M. Yusuf, Director, Physics Group, BARC and Shri. Sujitkumar Ugale, Director, Directorate of Archaeology and Museums, in presence of officials from DOAM, Government of

Maharashtra, Shri. Hemant Dalavi and Dr. Mayur Thakare and [BARC including Dr. L M Pant, and Dr S. Adhikari](#) on 02.09.2024.

Mr. Vivek Bhasin, the Director of the Bhabha Atomic Research Centre, extended his felicitations to both sides regarding this initiative and expressed his optimism that this Memorandum of Understanding will facilitate the utilization of neutron imaging within the domain of archaeological sciences.

Dr A. K. Mohanty, the Chairman, Atomic Energy Commission, stated that this MoU will facilitate the utilization of DAE research reactors for the societal cause and contributing to appreciation of the intricate and sophisticated craftsmanship that has been meticulously developed and perfected by our illustrious ancestors throughout the annals of history.

DAE Inaugurates MACE, Asia's Largest and World's Highest Imaging Cherenkov Observatory, at Hanle, Ladakh

MACE project plays a significant role not only in advancing scientific research but also in supporting the socio-economic development of Ladakh: DAE Secretary and Chairman, Atomic Energy Commission Dr. A.K. Mohanty.

The Major Atmospheric Cherenkov Experiment (MACE) Observatory has been inaugurated by [Dr. Ajit Kumar Mohanty, Secretary DAE & Chairman of the Atomic Energy Commission](#), at Hanle, Ladakh, on 4th October 2024. MACE is the largest imaging Cherenkov telescope in Asia. Located at an altitude of ~4,300 m, it is also the highest of its kind in the world. The telescope is indigenously built by BARC with support from ECIL and other Indian industry partners. The inaugural of MACE Observatory was a part of the Platinum Jubilee year celebrations of the DAE. The event commenced with the unveiling of commemorative plaques by Dr. Mohanty at the MACE site at Hanle, Ladakh, thereby officially inaugurating the MACE Observatory.



Secretary DAE & Chairman AEC inaugurates the MACE observatory at Hanle, Ladakh on 4th Oct 2024

In his inaugural address, DAE Secretary Dr. Mohanty applauded the collective effort that brought the MACE telescope to fruition. He stated that the MACE Observatory is a monumental achievement for India, and it places our nation at the forefront of cosmic-ray research globally. He further added that this telescope will allow us to study high-energy gamma rays, paving the way for deeper understanding of the universe's most energetic events. Dr. Mohanty emphasised the significant role that MACE project plays not only in advancing scientific research but also in supporting the socio-economic development of Ladakh. Students were encouraged to explore careers in astronomy and astrophysics, with Dr. Mohanty expressing hope that the MACE project would inspire future generations of Indian astronomers, scientists, and engineers. Dr. Mohanty also paid tribute to India's pioneering contributions to the field, including the work of Dr. Homi J. Bhabha, whose legacy continues to inspire India's cosmicray research.



Inaugural Address of Dr. Ajit Kumar Mohanty, Secretary, DAE & Chairman, AEC

Shri Ajay Ramesh Sule, Additional Secretary, DAE, stressed the importance of balancing tourism and scientific activities within the Hanle Dark Sky Reserve (HDSR) and encouraged students to pursue careers in science and technology.

Inaugural Address of Dr. Ajit Kumar Mohanty Secretary, DAE & Chairman, AEC

Speaking on the occasion, Dr. Annapurni Subramaniam, Director, Indian Institute of Astrophysics (IIA), highlighted the fruitful collaborative efforts between several constituent Units of DAE and the IIA. Shri Sajjad Hussain Mufti, Chief Conservator of Forests, UT Ladakh, outlined the key features of the Hanle Dark Sky Reserve and the focus on community engagement. He reaffirmed the UT administration's unwavering commitment to supporting DAE's scientific activities. Dr. S. M. Yusuf, Director, Physics Group, BARC, in his welcome address, emphasized the importance of the MACE telescope in advancing India's space and cosmic-ray research capabilities. The vote of thanks was delivered by Dr. K. K. Yadav, Head of Astrophysical Sciences Division of BARC, followed by a visit to the state-of-the-art MACE Control Room. The dignitaries present on the occasion interacted with the team of astronomers and technicians.



Release of Special Pictorial Compilation during the event

A pictorial compilation documenting the journey of the MACE project was also released on the occasion. Dr. Mohanty felicitated the representatives of the Nambardars (village leaders), the school headmaster, and the venerable Lama of

the Handle Gompa. A special film on the MACE telescope was screened, showcasing the scientific and technological advancements made during the project. The day concluded with a guided tour of the MACE Observatory, giving attendees an exclusive look at the world-class observatory that establishes India on the global advanced astronomy map.



Dignitaries on the dais during the inauguration of the MACE observatory 4th Oct 2024 (Left to Right: Shri A. R. Sule, Additional Secretary, DAE; Dr. A. K. Mohanty, Secretary, DAE & Chairman, AEC; Shri Hussain Mufti, Chief Conservator of Forests, UT of Ladakh; Prof. Annapurni Subramaniam, Director, IIA; Dr. S. M. Yusuf, Director, Physics Group, BARC)

The inauguration of the MACE telescope marks a significant step forward for Indian astrophysics and cosmic-ray research. Situated at an altitude of $\sim 4,300$ m, the MACE telescope will observe high-energy gamma rays, contributing to global efforts to understand the most energetic phenomena in the universe, such as supernovae, black holes, and gamma-ray bursts. This facility will also complement global observatories, strengthening India's position in the field of multi messenger astronomy. Looking ahead, the MACE project aims to foster international collaborations, advancing India's contributions to space research and bolstering

India's position in the global scientific community. The observatory will also serve as a beacon of inspiration for future generations of Indian scientists, encouraging them to explore new frontiers in astrophysics.



Release of Special Pictorial Compilation during the event