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समाचार पत्रों के चयनित अंश
Newspapers Clippings

डीआरडीओ समुदाय को डीआरडीओ प्रौद्योगिकियों, रक्षा प्रौद्योगिकियों, रक्षा नीतियों, अंतर्राष्ट्रीय संबंधों और विज्ञान एवं प्रौद्योगिकी की नूतन जानकारी से अवगत कराने हेतु दैनिक सेवा

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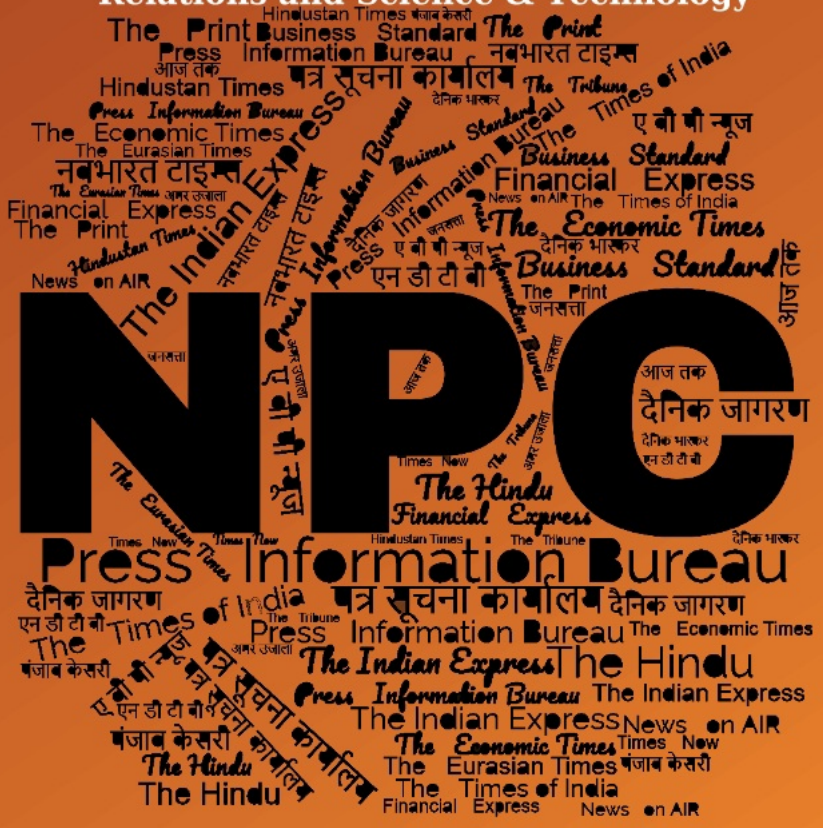

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DRDO News

Wed, 27 Nov 2024

भारत के इस मिसाइल से थर-थर कांपेगें चीन और पाकिस्तान जैसे देश, जल्द हो सकता है परीक्षण

भारत आज से लेकर 30 नवंबर के बीच में सबमरीन लॉन्च बैलेस्टिक मिसाइल का परीक्षण कर सकता है. इसके लिए भारत ने NOTAM जारी किया है जिसमें 3,490 किलोमीटर तक की रेंज के मिसाइल परीक्षण की जानकारी दी गई है. ये मिसाइल टेस्ट विशाखापटनम में बंगाल की खाड़ी के पास किया जायेगा. ये किस तरह की मिसाइल होगी इसका खुलासा तो फिलहाल अभी नहीं किया गया है, लेकिन इस बात की संभावना है कि ये मिसाइल K4 या K5 हो सकती है.

K5 और K4 मिसाइलों को कहां बनाया गया?

K5 और K4 मिसाइलों का विकास भारत की **रक्षा अनुसंधान और विकास संगठन** (DRDO) द्वारा किया गया है. ये ऐसी मिसाइल हैं, जिनकी जद में आधा चीन तो पूरा पाकिस्तान आता है. यह मिसाइल भारत के परमाणु प्रोग्राम का भी हिस्सा है. सबमरीन लॉन्च बैलेस्टिक मिसाइल K5 को बनाने में पूरे 8 साल का समय लगा है. दुनियां में बढ़ते युद्ध संकट के बीच भारत अपने आपको लगातार मजबूत और सशक्त करने में लगा है..हाल ही के दिनों में भारत ने ऐसी कई मिसाइलों का परीक्षण किया जिनसे पड़ोसी मुल्कों में खलबली है और इससे सबसे ज्यादा चीन परेशान है.

कई मिसाइलों का कर रहा है परीक्षण

हाल ही में DRDO ने पहली लंबी दूरी की हाइपरसोनिक मिसाइल का परीक्षण किया था. DRDO ने 16 नवंबर को ओडिशा के तट से दूर डॉ एपीजे अब्दुल कलाम द्वीप से अपनी लंबी दूरी की हाइपरसोनिक मिसाइल के सफलतापूर्वक उड़ान परीक्षण किया है. इस हाइपरसोनिक मिसाइल को भारतीय सशस्त्र बलों की तीनों सेनाओं के लिए डिजाइन किया गया है. ये मिसाइल 1500 किमी से अधिक दूरी तक पेलोड ले जा सकती है.

इससे पहले रक्षा अनुसंधान और विकास संगठन (DRDO) ने इंटीग्रेटेड टेस्ट रेंज चांदीपुर से 1,000 किमी से अधिक की रेंज वाली लॉन्ग रेंज लैंड अटैक क्रूज़ मिसाइल (LRLACM) का पहला उड़ान परीक्षण किया. मोबाइल आर्टिकुलेटेड लॉन्चर से ओडिशा के तट पर ये सफल परीक्षण किया गया. सूत्रों के मुताबिक, भारत करीब 200 स्वदेशी लॉन्ग रेंज अटैक क्रूज़ मिसाइल को नेवी में शामिल कर सकता है.

ऐसे में DRDO ने इनके प्रदर्शन को बेहतर बनाने के लिए लगभग 20 अतिरिक्त परीक्षण उड़ानों की योजना बनाई है जिसमें, स्वदेशी रेडियो–फ्रीक्वेंसी के जरिए टर्मिनल होमिंग भी शामिल है. एक हजार किलोमीटर से अधिक की रेंज के साथ यह मिसाइल अपनी समुद्री–स्किमिंग क्षमताओं के साथ भारतीय सशस्त्र बलों खासतौर से नौसेना की शक्ति में जबरदस्त इजाफा देगी.

https://www.tv9hindi.com/india/submarine-launched-ballistic-missile-may-be-tested-in-bay-of-bengal-in-visakhapatnam-in-india-between-27-30-november-drdo-2967806.html

Defence News

Defence Strategic: National/International

Press Information Bureau
Government of India

Ministry of Defence

Wed, 27 Nov 2024

Second Edition of Defence Datathon, a tri-services data analytics competition, concludes at College of Defence Management, Secunderabad

College of Defence Management, Secunderabad, a premier tri-services training institute under Headquarters Integrated Defence Staff, successfully concluded the second edition of Defence Datathon, a pioneering tri-services data analytics competition on 27 November 2024. The participants from the three services as well as Indian Coast Guard showcased their data analytical skills to provide insights on diverse datasets for innovative solutions to various strategic and operational challenges. The top 10 participants presented their solutions and five winners were felicitated.

The primary aim of the competition was to promote a culture of data-driven decision-making within the Armed Forces. The four themes chosen for Datathon 2024 related to current strategic events and challenges faced including 'War of the 21st Century: The Israel-Hamas Conflict', 'Decrypting the Buzz: the China-Taiwan Dynamics', 'Designing Dietary Preferences for Armed Forces and Deciphering India's Trade Trajectory', The Datathon witnessed overwhelming participation reflecting the growing enthusiasm for leveraging data analytics. The competition was conducted in a phased assessment process, culminating in a final evaluation by accomplished subject matter experts.

The Datathon has been a successful in promoting data centricity amongst defence forces. Data is often called the "ammunition" of the modern digital battlefield, and the capabilities to harness big data will decide outcomes in information age military conflicts. Initiatives like CDM Datathon therefore align military processes to the information age.

https://pib.gov.in/PressReleasePage.aspx?PRID=2078175

Press Information Bureau
Government of India

Ministry of Defence

Wed, 27 Nov 2024

Army Chief General Upendra Dwivedi Visits Headquarters Southern Command - Felicitated Veteran Achievers, Witnessed Southern Star Idea Innovation Display

Delivered Keynote Address During General Bc Joshi Memorial Lecture At Savitribai Phule Pune University

On the 2nd day of his visit to Pune, General Upendra Dwivedi, the Chief of the Army Staff (COAS) visited the Headquarters Southern Command, where he reviewed the operational preparedness of the Command and ongoing preparations for the Army Day Parade 2025 which is scheduled to be conducted in Pune for the first time on 15th January 2025.

During the visit, the COAS felicitated two veterans with the Veteran Achievers Award for their exceptional post-retirement contributions. Details of both the veteran achievers are as given below:

•**Colonel Shashikant G Dalvi (Retired):** Colonel Shashikant G Dalvi (Retired), commissioned into 21 RAJPUT and later transferred to the Corps of EME in 1972, has dedicated his post-retirement life to water conservation and environmental sustainability. A pioneer in Rainwater Harvesting (RWH), he designed Pune's first roof top RWH project in 2003, making a housing society tanker-free. Through his organisation PARJANYA, he has implemented over 650 RWH projects, reducing annual Carbon dioxide emissions by 9,360 tonnes and helping villages and urban areas achieve water self-sufficiency. Actively involved with schools, communities and industries, he has transformed villages, conducted awareness campaigns and addressed policymakers on sustainable water solutions, earning widespread recognition for his impactful work. In the year 2017 and 2019 he was also invited by Ministry of Urban Development to address Members of Parliament on RWH in metropolitan cities and on Kaun Banega Crorepati show to speak on RWH respectively.

•**Subedar Clerk (Staff Duties) Suneeth S:** Subedar Clerk (Staff Duties) Suneeth S from Army Service Corps was enrolled into the Indian Army on 28th August 1990. He retired on 31st August 2020 after an illustrious 30-year career in the Indian Army. Post retirement he has been instrumental in advancing the welfare of veterans, veer naris and widows through his close association with the Army Veterans Node, Southern Command. He has provided invaluable assistance with SPARSH documentation, facilitated Digital and Manual Life Certificates for bedridden beneficiaries and supported many in dire need. Additionally, he has also played a key role in organising numerous Ex-servicemen rallies across various districts to enable direct interaction with the veterans and their families, while also

facilitating job opportunities for veer naris and widows through the Army Welfare Placement organisation, demonstrating his unwavering dedication to the armed forces community.

The COAS also witnessed the Southern Star Idea Innovation Display. The event showcased a dynamic blend of innovations, successful Internal Research and Development (IR&D) projects, and collaborations with the industry. This display served as a platform for showcasing cutting-edge technological advancements, highlighting the Indian Army's commitment to modernising and enhancing its operational capabilities through innovation and collaboration with the private sector.

The COAS expressed his appreciation for the efforts of the innovators, researchers and industry partners involved in the projects. He commended the forward-thinking approach to developing solutions that address contemporary military challenges and emphasised the critical role that innovations play in maintaining the Army's strategic edge. The COAS highlighted that such initiatives are vital for sustaining the Army's operational readiness, ensuring it remains agile and equipped to meet future challenges in an ever-evolving security landscape.

Later in the day, the COAS delivered a keynote address during General BC Joshi memorial lecture organised by Savitribai Phule Pune University (SPPU). This annual event pays tribute to the memory and legacy of late General BC Joshi, Ex COAS, a distinguished leader who made significant contributions to both the Indian Army and the field of higher education.

The event was attended physically by academic scholars, military officials, students, faculties and distinguished guests, and streamed live to all students of the university.

General Dwivedi, in his talk on the topic "Role and Contribution of Indian Army in Securing India's Growth Story," highlighted the pivotal role of the Indian Army in not only safeguarding the nation's borders but also contributing to national development, security and strategic growth. Excerpts from the COAS talk are as given below: -

•**Security as an Enabler of Growth:** The COAS emphasised that security is a vital enabler of sustainable growth, not an obstacle, and that the Indian Army is a key provider of security for a "Progressive" and "Peaceful" India by 2047.

•**Humanitarian Assistance and Disaster Relief (HADR):** The COAS mentioned that the NDMA was conceptualised under the aegis of General NC Vij who had first-hand experience of Bhuj Earthquake in the Year 2001. The Indian Army has contributed significantly to disaster relief efforts, including creating 17 HADR bricks for emergency response across India.

•**Border Area Tourism:** The COAS highlighted the promotion of border tourism in 48 identified areas and said that the Army has the potential to double tourist numbers in the next five years. The Army also supports adventure activities and tourism, including initiatives like the Trans-Himalayan trek and opening battlefields like Kargil and Siachen Glacier to tourists.

•**Infrastructure Development:** The Indian Army contributes to national infrastructure, including roads, bridges, and telecommunications, aligned with national projects like PM Gati Shakti. In the past five years, 4,400 km of roads and 19 km of bridges have been constructed, with more projects planned, including vital roads in Arunachal Pradesh.

•**Smart Borders and Connectivity:** The Indian Army facilitates improved communication in remote areas by providing mobile connectivity to villages along the borders and using green energy for power in the Himalayas.

•**Economic Development and Employment:** The Indian Army creates economic opportunities through local businesses and its humanitarian efforts. Its Operation Sadbhavana fosters trust between the military and local communities, with an outlay of Rs 150 Crores for Northern Border initiatives.

•**Socio-Cultural Contributions:** The Indian Army promotes national integration and unity through its apolitical, areligious stance, fostering camaraderie. It supports educational projects, traditional sports, and socio-economic initiatives like creating museums and promoting local cultures.

•**Education, Health, and Environment:** The Indian Army runs educational institutions, including 430 Army Public Schools/ Army Pre Primary Schools and facilitates management of Sainik Schools besides being involved in healthcare initiatives, such as providing medical support in remote areas. It also advocates for environmental conservation through afforestation and water body rejuvenation projects.

•**Mission Olympics 2036:** The Indian Army is preparing for the 2036 Olympics by developing a talent pool through sports programs and organising events like the Durand Cup and Kashmir Premier League.

•**Environmental Sustainability:** The Indian Army is committed to ecological sustainability, planting millions of saplings, rejuvenating water bodies, and contributing to national initiatives like the Clean Ganga Mission.

•**Economic Contributions:** The Indian Army plays a significant role in India’s self-reliance, with 85% of its capital expenditure on 'Made in India' defence hardware. It is also driving the Atmanirbhar Bharat initiative, contributing significantly to local economies, such as in Ladakh.

•**Technological Advancements:** The Indian Army is aligned with national technological missions and promotes indigenous defence technology development, with numerous projects in areas like cyber, communication, and space. It supports startups and MSMEs under various initiatives.

•**Defence Diplomacy:** The COAS emphasised the role of Indian Army in enhancing India’s global strategic influence, participating in UN peacekeeping missions, and expanding its defence diplomacy efforts through defence wings worldwide. The Army’s contribution to international peacekeeping and training foreign personnel strengthens India’s global alliances.

The event reflected a strong bond between the university and the armed forces, an enduring partnership that General BC Joshi helped nurture. General Joshi, during his tenure as the General Officer Commanding-in-Chief of the Southern Command, was a stalwart of the university community. His legacy includes delivering the convocation address at SPPU and laying the foundation stone for the university's iconic "Gateway of Knowledge," which was later renamed as

the “General BC Joshi Dwar” in his honour following his untimely demise on 18th November 1994.

In addition to his military service, General BC Joshi’s foresight in higher education led to the establishment of the Chhatrapati Shivaji Chair in Policy Studies at the university. He also advocated for strengthening the relationship between the university and the armed forces, particularly in the areas of national security, policy analysis, and strategic studies.

General BC Joshi Memorial Lecture series, instituted jointly by the Department of Defence and Strategic Studies and Headquarters Southern Command in 1995, was designed to recognise and perpetuate his contributions to national security and education. The series, which has been held annually ever since, serves as a platform for thought leaders and key figures in defence and strategic studies to engage in critical dialogue. In 2005, the Chief of Staff Committee resolved that the lecture would be delivered by one of the three Service Chiefs, rotating annually.

Since then, the lecture series, has seen prominent speakers from all services of the armed forces, continuously fostering greater understanding of India’s strategic priorities and the role of the military in achieving the nation’s objectives.

https://pib.gov.in/PressReleasePage.aspx?PRID=2078116

Press Information Bureau
Government of India

Ministry of Defence

Wed, 27 Nov 2024

Defence Partnership Days to be organised in New Delhi for close collaboration between Armed Forces & Industry

In order to foster collaboration between the Armed Forces and industry, a key event – Defence Partnership Days – will be organised jointly by the Centre for Joint Warfare Studies and Indian Military Review, on 28 - 29 November 2024, in New Delhi. The event is designed to bridge government and business stakeholders, and to facilitate strategic engagements through a series of targeted business-to-government (B2G) and business-to-business (B2B) meetings. General Anil Chauhan, Chief of Defence Staff, will inaugurate the event along with Secretary (Defence Production), Shri Sanjeev Kumar.

Over 200 companies and 100 officers from the Ministry of Defence and Armed Forces, dealing with technology and procurement will participate in the event. In addition, an exhibition by 75 companies will be organized to showcase what the industry has to offer for building the nation’s defence capabilities.

Prime Contractors, OEMs, Manufacturers, Suppliers, Service Providers, MSMEs, Start-ups, Industry Associations and Investors will gather to interact with Ministry of Defence and Armed

Forces procurement officers, including DRDO and Coast Guard officers, as well to have B2B meetings. It will be primarily an opportunity to meet key nodal and project officers dealing with procurement, indigenisation, Make-1, Make-2, Import Substitution, Problem Statements, GSQRs, RFIs, RFPs and design & development to seek and offer solutions to strengthen the capabilities of the armed forces and also to expand the boundaries of their own businesses.

https://pib.gov.in/PressReleasePage.aspx?PRID=2077911

Press Information Bureau
Government of India

Ministry of Defence

Wed, 27 Nov 2024

Army Chief General Upendra Dwivedi Presents President's Colours To Four Battalions Of Mechanised Infantry

General Upendra Dwivedi, Chief of the Army Staff (COAS), presented the prestigious President's Colours to four battalions of the Mechanised Infantry during a solemn ceremony at the Mechanised Infantry Centre and School (MIC&S), Ahilyanagar. The event, held on November 27, was a recognition of their exemplary and meritorious service to the Nation. The President's Colours were awarded to the 26th and 27th Battalions of Mechanised Infantry Regiment and 20th and 22nd Battalions of Brigade of The Guards, marking a proud moment for the youngest battalions of the Arm. The grand ceremony was attended by a large number of veterans, military personnel, and civil dignitaries, underscoring the significance of this honour.

The COAS reviewed the Colour Presentation Parade, applauding the immaculate standards displayed by the marching and mounted contingents of the four Mechanised Infantry battalions. On behalf of the President of India, he presented the prestigious President's Colours to the battalions, recognising their exemplary service and dedication to the Nation. He congratulated all ranks, particularly the honoured battalions, and commended the professionalism of the Mechanised Infantry in both war and peace. As youngest and most versatile combat arms of the Indian Army, the Mechanised Infantry blends the best of Infantry and Mechanised Forces. Its battalions, renowned for their valour and prowess, are deployed across all theatres and in UN Peacekeeping missions.

In his address, the COAS mentioned that the Mechanised Infantry Arm, since its inception in 1979, has distinguished itself as a modern and professional force within the Indian Army, demonstrating exceptional courage, discipline, and operational proficiency in key operations such as Op PAWAN, Op VIJAY, Op RAKSHAK, and Op SNOW LEOPARD, as well as in UN peacekeeping missions. Today, four battalions of Mechanised Infantry are being honoured with the President's Colours for their exemplary service and numerous achievements, including their contributions to both combat and peacetime operations. Amidst rapidly evolving warfare dynamics, the Mechanised Infantry

continues to modernise with advanced systems such as Futuristic Infantry Combat Vehicles, Nag Missile Systems, Canister Launched Anti-Armour system, Mini Remotely Piloted Aircrafts and Integrated surveillance and target system strengthening its role as a decisive force in future conflicts. These modernisation efforts are progressing on the foundation of self-reliance. The Indian Army takes immense pride in their professionalism and dedication, which inspire all ranks to uphold the highest standards and contribute significantly to the nation's defence. The COAS also asked the units to play an important role in Indian Army's decade of transformation initiative.

Originating from historical military traditions where flags represented a unit's identity, the President's Colours is one of the highest honours awarded to a military unit in the Indian Army. Historically serving as rallying points in battle, military Colours, while now largely symbolic, continue to foster morale, motivation, and a sense of belonging among troops. The Colours, a ceremonial flag bearing the unit's insignia and motto, are presented to units upon completing specified meritorious service to recognise their contributions in operations and peacetime. This prestigious honour is conferred during a grand ceremonial parade, often attended by the President or senior officials like the Chief of the Army Staff.

During the ceremony, the COAS also felicitated four Veteran Achievers for their contribution towards wellbeing of the ex-servicemen fraternity and the society. He conveyed his best wishes to all ranks and families and exhorted all ranks of the Arm to continue striving for excellence while serving the Nation keeping with the core values and ethos of the Indian Army.

https://pib.gov.in/PressReleasePage.aspx?PRID=2077868

Press Information Bureau
Government of India

Ministry of Defence

Wed, 27 Nov 2024

Defence Secretary to inaugurate 11th National Maritime Search and Rescue Exercise & Workshop of Indian Coast Guard in Kochi

The 11th edition of Indian Coast Guard's National Maritime Search and Rescue Exercise & Workshop (SAREX-24) will be conducted under the aegis of National Maritime Search and Rescue Board in Kochi, Kerala on November 28-29, 2024. The event will be inaugurated by Defence Secretary Shri Rajesh Kumar Singh. Indian Coast Guard (ICG) Director General S Paramesh, who is also the National Maritime Search and Rescue Coordinating Authority, will be among the dignitaries attending the event.

The theme will be ‘Enhancing Search and Rescue capabilities through Regional collaboration’. It signifies ICG’s commitment to provide succor during large-scale contingencies regardless of location, nationality or circumstances in the Indian Search & Rescue Region and beyond.

The first day of the event will feature various programmes, including table-top exercise, workshop & seminars involving participation of senior officials from government agencies, Ministries & Armed Forces, various stakeholders and foreign delegates. On the second day, the sea exercise involving two large scale contingencies will be carried out off the Kochi coast with participation of ships & aircraft of ICG, Navy, Indian Air Force, Passenger Vessel & Tug from Cochin Port Authority and boats from the Customs.

The first contingency will simulate distress onboard a passenger vessel having 500 passengers onboard, while the second scenario will depict ditching of civil aircraft with 200 passengers. The response matrix in the sea exercise will involve various methods to evacuate distressed passengers, wherein the advent of new-age technology using satellite-aided distress beacons, drones to deploy a life buoy, air droppable life rafts, operation of remote controlled life buoy will be demonstrated. The exercise is designed not only to evaluate efficiency of operations and coordination with national stakeholders, but also to aptly focus on cooperative engagements with the littorals and friendly countries.

Over the years, ICG has evolved as a premier maritime agency rightfully steering the Government’s efforts towards a stable and effective Maritime Search and Rescue construct. An MoU was signed with Indian Ocean Rim Association member states for coordinating SAR in the Indian Ocean Region and ICG is the implementing agency. Further, ICG has been nominated as a nodal agency for SAR activities in the Indo-Pacific Region. ICG’s increased focus to the maritime safety aspect will go a long way in strengthening India’s global responsibility in sync with Prime Minister Shri Narendra Modi’s vision of Security and Growth for All in the Region (SAGAR).

https://pib.gov.in/PressReleasePage.aspx?PRID=2077822

THE TIMES OF INDIA

Thu, 28 Nov 2024

'Nuclear-capable ballistic missile tested from INS Arighaat'

India is learnt to have tested a nuclear-capable submarine-launched ballistic missile (SLBM), designed for a strike range of 3,500-km, from the newly commissioned nuclearpowered submarine INS Arighaat on Wednesday, reports Rajat Pandit.

There was, however, no official word on the missile test that took place off Visakhapatnam in the Bay of Bengal in the morning. Sources said it was the solid-fuelled K-4 missile that was tested from the 6,000-tonne INS Arighaat. The K-4 has so far only been tested from submersible pontoons over the last several years.

A detailed analysis of Wednesday's test results will show whether the missile firing was actually a success and met the laid down trial objectives and parameters, the sources added. A few days ago, India had issued a public area warning and notice to airmen (NOTAM) for an intermediate range missile test over a 3,490-km flight corridor in the Bay of Bengal between Nov 27 and 30.

INS Arighaat, the country's second nuclear-powered submarine with nuclear-tipped ballistic missiles (called SSBN in naval parlance), was commissioned on Aug 29. The submarine can carry K-4 missiles, unlike her forerunner INS Arihant armed only with 750-km range K-15 missiles. India plans to induct the third SSBN, with a displacement of 7,000-tonne, as INS Aridhaman early next year.

https://timesofindia.indiatimes.com/india/nuclear-capable-ballistic-missile-tested-from-ins-arighaat/articleshow/115747030.cms

THE ECONOMIC TIMES

Wed, 27 Nov 2024

Unlike eastern, northern borders where threat is defined, in Andamans its invisible: CINCAN

Commander-in-chief, Andaman and Nicobar Command (CINCAN), Air Marshal Saju Balakrishnan on Wednesday asserted that unlike eastern and northern borders of the country, where the threat is defined, the enemies are invisible and the challenges are very tough in the archipelago.

Around 6,000 kg of methamphetamine worth Rs 36,000 crore was seized from a Thailand-bound trawler with six Myanmarese crew near Barren Island in the Andaman Sea on November 23. It was the largest maritime seizure in India. The trawler is suspected to have developed some technical snag and drifted towards Indian waters.

Speaking to PTI, Balakrishnan said, "On the challenges here, I would like to say that unlike the eastern and northern borders, where the adversaries are known, the Indian Ocean (in Andaman and Nicobar Islands) has invisible enemies. But despite these challenges, I would like to assure people that the Andaman and Nicobar Command is fully prepared to handle any untoward incident."

"Following the biggest catch, we have experienced new on-ground challenges and intensified our vigil to protect India's maritime boundaries. To secure a vast region, it has to be a combination of space-based surveillance, aircraft patrolling and ship-based patrolling. This, along with intelligence feedback we get from several agencies. All these together are the only way to ensure safety and security of this archipelago. We are utilising all these resources to keep our waters safe from intruders," he added.

The CINCAN commended the Indian Coast Guard (ICG) Dornier aircraft, which spotted the vessel during routine patrolling on November 23.

“I personally feel that the future of maritime security will depend on the way India enhances its capability in this region. Andaman and Nicobar is a strategic outpost as far as India's security is concerned. We clearly understand the important role that this archipelago plays in the overall strategic scenario.”

"Every day, many international ships pass through this region and our government is very much aware that we need to enhance our capability. The future of maritime security of this region will be determined by the way India enhances its capability," he added.

This was not the first time that such banned contraband was seized in Indian waters in Andaman and Nicobar Islands. In 2019 and 2022, similar drug seizures were made from foreign vessels while they tried to enter Indian waters.

https://economictimes.indiatimes.com/news/defence/unlike-eastern-northern-borders-where-threat-is-defined-in-andamans-its-invisible-cincan/articleshow/115735041.cms

THE ECONOMIC TIMES

Wed, 27 Nov 2024

Aviation tech firm delivers 'one-of-its-kind' logistics drone to Indian Army

A leading drone manufacturer in the unmanned aerial vehicle (UAV) technology domain on Wednesday announced the successful delivery of a "one-of-its-kind" logistics drone to the Indian Army, aimed at enhancing its capabilities in challenging terrains. The Sabal 20 logistics drone has been manufactured by EndureAir Systems.

The firm announced the "successful delivery of one-of-its-kind Sabal 20 Logistics Drone to the Indian Army", saying it marks a "significant milestone" in enhancing the logistics capabilities of the defence forces operating in challenging terrains, according to a statement issued by the company.

The aviation technology company was incubated on the corridors of IITKanpur in 2018, with the objective to provide world-class drone technology that is best suited for both defence and civilian applications, it said.

"Sabal 20 is an electric unmanned helicopter based on variable pitch technology, designed specifically for aerial logistics, capable of carrying payloads of up to 20 kilogram, equivalent to 50 per cent of its own weight, with scalable options for future requirements," it said.

Building on the legacy of the Chinook helicopter, Sabal 20 features high efficiency of large rotors and the exceptional load-carrying capability of a tandem rotor configuration, the firm said.

This design ensures remarkable stability, superior high-altitude performance, minimised turbulence risk and outstanding lifting capacity across diverse terrains, the statement said.

"We are honoured to contribute towards the progress of the Indian Army, modernising its logistics capabilities. With EndureAir's Sabal 20, we reaffirm our commitment to providing indigenous, innovative UAV solutions that empower our armed forces and support their mission-critical needs in diverse environment, ensuring operational excellence," Abhishek, director and cofounder of EndureAir, was quoted as saying in the statement.

Sabal 20 is engineered to meet rigorous operational demands, supporting missions such as long-range deliveries, high-altitude operations and precision logistics, the firm said.

This delivery underscores EndureAir's dedication to supporting India's defence sector through the "Make in India" and "Atmanirbhar Bharat" initiatives, fostering self-reliance and advancing UAV manufacturing. Sabal 20 reflects the company's vision of blending innovation with purpose to address real-world challenges, it added.

https://economictimes.indiatimes.com/news/defence/aviation-tech-firm-delivers-one-of-its-kind-logistics-drone-to-indian-army/articleshow/115740775.cms

THE ECONOMIC TIMES

Wed, 27 Nov 2024

BEML inks pact with Mazagon Dock Shipbuilders to develop technologies for marine sector

State-owned BEML on Wednesday said it has signed an agreement with Mazagon Dock Shipbuilders to develop technologies for the marine industry. The company aims to leverage the opportunity to expand its expertise into the marine sector, BEML said in a statement.

"BEML and Mazagon Dock Shipbuilders Ltd (MDL) have entered into a strategic Memorandum of Understanding (MoU) to jointly advance research and development in cutting-edge technologies for marine applications," it said.

As part of the agreement, BEML will provide technical support for the design and manufacturing of strategic equipment, specifically suited for marine applications.

MDL will make dedicated facilities available to BEML's research team, facilitating the development, testing and validation of innovative technologies and systems. Together, the two organisations aim to drive innovation and deliver cuttingedge solutions, aligning with India's vision of Atmanirbhar Bharat (selfreliant India) and strengthening the nation's maritime capabilities.

BEML aims to leverage the partnership with MDL to develop solutions for futuristic marine applications to expand its expertise in the marine sector, the company said.

BEML CMD Shantanu Roy said, "The collaboration underscores our commitment to reducing dependency on imports for the defence forces while strengthening our manufacturing capabilities and contributing to India's selfreliance in the defence and maritime domain".

Mazagon Dock Shipbuilders specialises in the construction of wardships and submarines for the Indian Navy, ships for coast guard as well as other maritime platforms for commercial purposes. BEML, under the Ministry of Defence, operates in three verticals construction and mining, rail and metro and defence and aerospace.

https://economictimes.indiatimes.com/news/defence/beml-inks-pact-with-mazagon-dock-shipbuilders-to-develop-technologies-for-marine-sector/articleshow/115738964.cms

THE ECONOMIC TIMES

Wed, 27 Nov 2024

Desi drone maker hums Chinese piracy

An Indian drone company has alleged copyright infringement of its autopilot technology by Chinese entities and has asked the government to crack down on imports to protect its intellectual property rights. Chennai-based Zuppa Geo Navigation Technology has written to Directorate General of Foreign Trade (DGFT), seeking a ban on imports from Chinese companies that, it alleges, have infringed on its patent.

In a representation to DGFT, the Indian company has said it was awarded a patent in April this year for a real-time computing architecture called 'system of disseminated parallel control computing in real time'. The patent was granted after a nine-year scrutiny, the company said.

The company has petitioned that a Shanghai-based company, JIYI Robot, has been exporting autopilots to India that directly violate this intellectual property rights. Another company named CUAV based out of China too is supplying autopilots that allegedly infringe on its copyright, Zuppa Geo said.

https://economictimes.indiatimes.com/news/defence/desi-drone-maker-hums-chinese-piracy/articleshow/115742605.cms

THE WEEK

Wed, 27 Nov 2024

US Navy boosts Indo-Pacific might with another 'apex predator': Fast-attack submarine USS Minnesota joins Guam fleet

The US deployed the Virginia-class fast-attack submarine USS Minnesota at Naval Base Guam, a naval installation located on Apra Harbor, occupying the Orote Peninsula. The move— part of the

strategic laydown plan of the US for naval forces in the Indo-Pacific region—has been billed as a power posture amid growing tensions with China.

Guam, the westernmost US territory in the Pacific and is closer to major Asian cities, including Beijing, plays a major role in the US military strategy and geopolitical positioning in the Indo-Pacific region. It serves as a strategic outpost in the Western Pacific, playing a crucial role in maintaining stability across the region. The US Navy said the security environment in the Indo-Pacific requires that the US Navy stations the most capable units forward.

The presence of the new submarine will help the US enhance deterrence in the region.

Virginia-class submarines are the US Navy's next-generation attack submarines and are set to replace the aging Los Angeles-class submarines. The first Virginia-class fast-attack submarine to be forward deployed to Guam, USS Minnesota joins four Los Angeles-class fast-attack submarines forward deployed in the Pacific.

Capable of supporting various missions, including anti-submarine warfare, anti-surface ship warfare, strike warfare, and intelligence, surveillance, and reconnaissance, the presence of the submarine will further enhance the US Navy's operational capabilities and further strengthen deterrence efforts throughout the Indo-Pacific.

"This posture allows flexibility for maritime and joint force operations, with forward-deployed units ready to rapidly respond to deter aggression and promote a peaceful and prosperous Indo-Pacific region," the Navy said in a statement.

Hailed as the "apex predators of the sea", Guam's fast-attack submarines serve as the tip of the spear, helping to reaffirm the submarine forces' forward-deployed presence in support of a free and open Indo-Pacific, the US Navy added.

https://www.theweek.in/news/defence/2024/11/27/us-navy-boosts-indo-pacific-might-with-another-apex-predator-fast-attack-submarine-uss-minnesota-joins-guam-fleet.html

The Indian EXPRESS

Thu, 28 Nov 2024

Dealing with the China question

- By C. Raja Mohan

India will need to move much faster on the reform front than it has so far to cope with the massive gap in the defence capabilities with China as well as seize the international opportunity for the transformation of its defence industrial base.

Two recent defence agreements, highlighted during Defence Minister Rajnath Singh's visit to a Southeast Asian defence ministerial forum in Laos, point to the many untapped possibilities for

developing India's security cooperation with like-minded Asian countries. Building defence networks with Asian friends is an urgent imperative for India amid China's growing military capabilities and the urgent need for modernisation of India's defence industrial base.

The agreement with Australia facilitates air-to-air refuelling between Indian and Australian military aircraft. This will extend the reach of both air forces and promote their interoperability. In his consultations with his Japanese counterpart, Rajnath Singh continued recent conversations with Tokyo on defence industrial collaboration.

A few days earlier, Delhi and Tokyo signed a Memorandum of Understanding (MoU) on joint production of stealth equipment for Indian warships. Though limited in scope, these agreements point to the direction India and its Asian partners must travel, given their shared interests in the regional security order.

One key concern is Chinese assertiveness on territorial disputes in the region. To be sure, Beijing is turning on its charm diplomacy these days after years of muscular unilateralism on disputed frontiers with its neighbours, including India, and intense "wolf-warrior" diplomacy. Sceptics remind us that China's mood could easily swing the other way at any time.

What matters more than Beijing's current positive diplomatic posture is the nature of Chinese military capability. Current intentions must always be viewed in the context of China's military weight on the ground. Its defence expenditure overshadows that of its neighbours, including India and Japan, combined.

Beijing's defence production has reached formidable proportions, thanks to China's expansive industrial infrastructure, impressive military modernisation over the last three decades, and massive investments in defence research and development. Consider this example: China commissioned 70 submarines between 1995 and 2020 — nearly three a year. This scale of military production hasn't been seen since the height of the Second World War.

No Chinese neighbour, including major powers like India, can cope alone with the rapidly widening gap between their defence capabilities and Beijing's. This explains why China's Asian neighbours have been open to greater security cooperation with the United States over the last decade. For most, including Delhi, it's clear that stabilising the Asian balance of power requires America's presence.

There was a time when the region believed in "Asia for Asians" and saw no reason for "external powers" to maintain their military presence. China still plays on this sentiment, arguing that "outsiders" shouldn't meddle in its disputes with Asian neighbours.

Few in Asia today accept this "Asia for Asians" rhetoric, though not all express this openly for fear of offending Beijing. Many of them can see that the slogan of "Asia for Asians" is about consolidating Chinese primacy over the region. In fact, China's assertiveness has produced strong regional support for American armed forces in Asia. It's also Washington's fear of Beijing replacing it as Asia's dominant power that drives increased US strategic attention to the region.

The question isn't about the political legitimacy of American military presence in Asia, but rather its intensity and sustainability. Unlike earlier, the US no longer enjoys overwhelming military dominance in the East Asian theatre. China's People's Liberation Army (PLA) is eroding that

dominance on a daily basis. Though US armed forces and weaponry remain qualitatively superior, the PLA's quantitative advantage is beginning to shift the regional balance. Another challenge is America's involvement in multiple theatres.

While China can focus its military resources on its immediate Asian neighbourhood, the US must spread its forces across Europe, the Middle East, and Asia. Hopes of reducing US commitments to Europe and the Middle East to focus on Asia have diminished significantly in recent years. America's NATO commitments have proven enduring due to the collapse of postCold War security arrangements in Europe and Russia's 2022 invasion of Ukraine.

Similarly persistent is American involvement in the Middle East. The October 7, 2023, terror attacks on Israel and Tel Aviv's ongoing war against Gaza and Lebanon have pulled the US back into the region. While some in Washington claim the US can fight on all three fronts, sceptics highlight the growing challenges of effective operations across these theatres.

A major US military constraint is its inability to meet weapons demands — ammunition, missiles, or drones — for ongoing conflicts in Europe and the Middle East. The renowned American military-industrial complex can't mass-produce weapons to meet current demands, let alone prepare for a potential conflict with China in Asia.

Many American military production facilities are outdated, and the US defence industry lacks skilled personnel. As it works to revamp its defence industry, the US is turning to allies and partners. Washington, for instance, is negotiating collaboration with Japanese and Korean shipyards to regain maritime competitiveness against China. Policy makers in Tokyo and Seoul have problems of their own — a declining population and an ageing workforce.

The reshaping of global defence supply chains amid growing military challenges is also urgent for Europe, which struggles to meet the war material needs of Ukraine. This new international situation presents an opportunity to accelerate the modernisation of India's defence production system.

Delhi has signed defence industrial roadmaps with the United States and France and plans to negotiate with Italy. India has talked of a greater role for the Indian private sector in defence production and has put special emphasis on arms exports.

A high-level committee of the government has also recommended the reorganisation of the Defence Research and Development Organisation. India has also stepped up its military diplomacy in the region and beyond.

India will need to move much faster on the reform front than it has so far to cope with the massive gap in the defence capabilities with China as well as seize the international opportunity for the transformation of its defence industrial base.

https://indianexpress.com/article/opinion/columns/c-raja-mohan-writes-dealing-with-the-china-question-9694080/

THE HINDU BusinessLine

Wed, 27 Nov 2024

HAL CMD in Russia to ink contract for licence manufacturing of 240 Su-30MKI engines

A delegation led by defence PSU Hindustan Aeronautics Ltd (HAL) CMD, DK Sunil, is in Russia to sign a deal for licence manufacturing of 240 AL-31FP Aero Engines for Su-30MKI fighter jets presently in service with the Indian Air Force (IAF).

The delegation's visit to Russia from Monday came after Ministry of Defence (MoD) signed a contract with HAL on September 9, this year, for 240 AL-31FP Aero Engines for Su-30MKI jets at a cost of over ₹26,000 crore.

The twin-engine Su-30MKI are due for major upgrades to enhance its operational lives with significantly elevated combat capability, as part of about ₹63,000 crore fund approved earlier by Defence Acquisition Council (DAC).

HAL will replace existing engines of Sukhois which have to be discarded after every 2,000 hours of flying, sources in HAL aware of development told businessline.

A Su-30MKI has a life of 6,000 hours and requires 3 sets of engines in its lifetime, the HAL sources explained.

Sourcing components

Sources said that for HAL to licence manufacture engines here, the Navratna defence PSU has to get into an agreement with Russia to source components since drawing and raw materials are their intellectual property.

Besides critical engine parts which Russia is unlikely to give licence for manufacturing here, there are assemblies, sub-assemblies, 60 to 70 alloys, and 200-300 bars like raw materials which fill an engine kit of a Sukhoi, sources explained while referring to the highly technical and complex engineering behind it.

However, due to global conflict, the supply chain of raw materials for engine manufacturing has been majorly disrupted, sources pointed out which would also be taken up during Indian delegation meeting with Russians.

These aeroengines, which will be manufactured by HAL's Koraput Division, are expected to fulfil the IAF's requirement to sustain the operational capability of the Su-30 fleet for the defence preparedness of the country. The IAF has 260 such jets in its fleet. Based on life expiry of engines, the fighters will go in for replacement.

The HAL, which has been doing the maintenance and repair of SU-30MKIs, handed over to the IAF the first AL-31FP Aero Engine, manufactured under the 240 engine contract, last month. IAF

sources said that it could be from engine kits HAL has already bought from the Russia for repair and maintenance of the jets.

As per the contractual delivery schedule, the HAL would supply 30 aero-engines per annum. Over the next eight years, the supply of all 240 AL-31FP Aero Engines would be completed. By the end of the delivery programme, HAL would enhance the indigenisation content up to 63 percent in the engine manufacturing.

https://www.thehindubusinessline.com/incoming/hal-cmd-in-russia-to-ink-contract-for-licence-manufacturing-of-240-su-30mki-engines/article68919087.ece

Business Standard

Wed, 27 Nov 2024

IIT Kanpur develops revolutionary tech to make aircraft invisible to radar

High-technology cooperation between indigenous defence industry and academia has begun yielding results. On Tuesday, Indian Institute of Technology Kanpur (IIT-K) announced a breakthrough in stealth technology, which would make combat systems like tanks and fighter aircraft invisible, or near-invisible to enemy radar.

Designated a “meta-material surface cloaking system” (MSCS), this has been named the Anālakṣhya by its inventors in IIT-K. It is of major interest to the Defence Research & Development Organisation (DRDO) in its development of the Advanced Medium Combat Aircraft (AMCA) -- a “stealth fighter” that is being engineered to be near-invisible to the enemy’s air defence radar.

The technology has undergone extensive laboratory and field testing between 2019 and 2024, proving its efficacy across diverse conditions. The system is currently under acquisition by the Indian armed forces, signalling its strategic importance to national security.

According to a statement, 90 per cent of the Anālakṣhya MSCS is sourced indigenously. In a significant move towards industrial production, the technology has been licensed to a private company “Meta Tattva Systems”, which will oversee its manufacturing and deployment.

Stealth systems avoid detection by enemy radar through two devices. First, by engineering its external surface with small jagged panels that scatter radar waves, rather than large flat surfaces that reflect back radar waves to be detected by enemy radar antennae.

The second device that renders battlefield systems such as stealth fighters hard to detect is their surface composition. Flat, metallic surfaces enable detection by reflecting radar waves. In contrast, absorptive surfaces absorb a high percentage of the synthetic aperture radar (SAR) waves.

“This textile-based, broadband, meta-material microwave absorber offers near-perfect wave absorption across a broad spectrum, significantly enhancing stealth capabilities against SAR imaging,” IIT-K said on Tuesday.

Developed by a team of IIT-K researchers, this system sets a new benchmark in multispectral stealth capabilities, offering transformative applications in defence, national security, and specialised industries.

The Anālakṣhya MSCS not only offers wave absorption across a broad spectrum, it also provides effective protection from missiles that use radar guidance.

https://www.business-standard.com/external-affairs-defence-security/news/iit-kanpur-develops-revolutionary-tech-to-make-aircraft-invisible-to-radar-124112701035_1.html

Business Standard

Wed, 27 Nov 2024

India-Singapore Bilateral Exercise AgniWarrior 2024 to commence today

The India-Singapore bilateral military exercise, AgniWarrior 2024 will take place in Maharashtra from November 28 to November 30.

The details of the exercise were shared on X (formerly Twitter) by the Additional Directorate General of Public Information, IHQ of MoD (Army).

The exercise is scheduled to take place at the Devlali Field Firing Ranges, part of the School of Artillery in Maharashtra.

The bilateral exercise, which will last from November 28 to November 30, the primary objective of the exercise is to enhance professional military interactions between the artillery units of India and Singapore.

The ADGPI also noted that the exercise will see the two countries exchange best practices between the Indian Army and Singapore Armed Forces.

Another interesting component that the exercise will see is providing a platform for cultural exchanges, thereby strengthening the bond between the two nations.

The exercise comes a month after Dr Ng Eng Hen, Singapore's Minister of Defence, visited India to co-chair the sixth India-Singapore Defence Ministers' Dialogue in New Delhi, with his Indian counterpart Rajnath Singh.

With 2025 set to mark 60 years of diplomatic relations between India and Singapore, both Ministers had agreed to further step up defence cooperation and achieve new milestones. They also consented to extend the bilateral agreement on the Joint Military Training Army for an additional five years, stated the press release.

Recognising their natural partnership for co-development and co-production of defence equipment, both sides agreed to enhance industry cooperation, focusing on collaboration in niche domains such as automation and artificial intelligence.

The Ministry of External Affairs noted that India-Singapore relations were elevated to a Comprehensive Strategic Partnership during the visit of Prime Minister Narendra Modi to Singapore in September 2024. With a shared history, a long tradition of friendship based on trust and mutual respect, and extensive cooperation across a wide range of areas, India-Singapore cooperation has deepened and diversified over the years.

https://www.business-standard.com/external-affairs-defence-security/news/india-singapore-bilateral-exercise-agniwarrior-2024-to-commence-today-124112800046_1.html

The EurAsian Times

Wed, 27 Nov 2024

Russia's "Monster ICBM" RS-28 Sarmat, That Can Ruin Opponents In A Single Strike, Close To Combat Duty

Russia's Strategic Missile Forces (RVSN) continue to make strides in modernizing its nuclear arsenal, with work advancing on the deployment of the RS-28 Sarmat intercontinental ballistic missile (ICBM) system. In a recent article published in the Russian Defense Ministry's Bulletin of Military Education, RVSN Commander Sergei Karakaev announced that work is ongoing to place the latest Sarmat silo-based missile system on combat duty, according to the state news agency TASS.

According to Karakaev, the fifth-generation Yars and Avangard missile systems are already operational, and the Sarmat system, featuring a liquid-propellant heavy missile, is in the final stages of being ready for combat duty. "The work continues on putting the latest Sarmat silo-based missile system into combat duty," Karakaev stated.

The article outlines the continued rearmament of Russia's missile regiments, with more than 88% of the RVSN's missile technology now composed of modern systems. This rearmament, driven by the state's defense program, is central to Russia's military readiness, particularly in an era of heightened tensions with NATO and the ongoing conflict in Ukraine.

Karakaev also highlighted the importance of military education within the RVSN in his piece. It notes that "a continuous system of education has been created in the Strategic Missile Forces: from the Suvorov military school to the academy, and this system works."

The article pointed out that as warfare evolves, especially with the introduction of new weapons and technologies, Russia's military education system is rapidly adapting to meet these changes. "The development of the Strategic Missile Forces, the development of new forms and methods of warfare, as well as the experience of the NMD, the operation, and use of weapons and military

equipment entering the troops pose tasks for the military education system to quickly adjust the content of the training. In this regard, the universities of the Strategic Missile Forces annually update the content and expand the range of educational programs being implemented, switch to independently developed educational standards," the article noted.

The commander further said that, in the context of the ongoing special military operation in Ukraine and the growing activities of NATO forces, the Strategic Missile Forces play a crucial role in deterring large-scale aggression against Russia and its allies.

RS-28 Sarmat Missile Faces Setbacks?

The RS-28 Sarmat intercontinental ballistic missile (ICBM) is designed to carry nuclear warheads across vast distances, capable of striking targets in Europe and the United States. With a range of 18,000 km (11,000 miles) and a launch weight of over 208 tonnes, the Sarmat is a powerful addition to Russia's strategic arsenal.

The 35-meter-long missile, dubbed "Satan II" in the West, has been touted by Russian officials as a weapon without global equivalent, particularly with its ability to carry up to 16 independently targetable nuclear warheads and the Avangard hypersonic glide vehicles, a system that President Vladimir Putin has claimed is unmatched by Russia's adversaries.

The Sarmat missile made its first launch on April 20, 2022, from the Plesetsk Cosmodrome in the Arkhangelsk region. Following the successful test, President Putin highlighted the missile's technological superiority and unprecedented capabilities in modern warfare. However, despite these assertions, the missile's development has faced delays and testing challenges. Initially, Russian officials projected that the Sarmat would be ready for deployment by 2018 to replace the Soviet-era SS-18.

Yet deadlines have continuously been postponed. The Kremlin later set a target for the missile's combat readiness by the end of 2022, but this deadline was also not met. In June 2023, Putin declared that the Sarmat would be deployed "soon," though without specifying a timeline. By September 2023, Roscosmos chief Yuri Borisov claimed that the Sarmat strategic complex had entered combat duty.

However, in October, Putin announced the completion of the missile's development, noting that only administrative steps remained before large-scale production and active service deployment. In February 2024, Putin again assured that the heavy ICBM would soon be deployed on combat duty, yet recent events have cast doubt on the missile's reliability.

In September 2024, a test of the RS-28 Sarmat ended in a catastrophic failure. Satellite images showed severe damage to the Plesetsk Cosmodrome and fires around the test site. While the exact cause of the failure remains uncertain, early analysis points to a possible mechanical issue with the missile's first-stage booster.

Experts, such as Dr. Sidharth Kaushal, suggest that Sarmat's propulsion system and lighter design may have contributed to the difficulties faced during development. Additionally, structural weaknesses within Russia's missile manufacturing infrastructure, including labor shortages at Proton-PM—responsible for the missile's propulsion system—could also be factors in the delays.

These setbacks are further compounded by the ongoing reliance on the aging SS-18 missiles, which the Sarmat is intended to replace. As delays continue, these older missiles will have to remain in service longer than anticipated, putting pressure on Russia's missile forces and their readiness.

https://www.eurasiantimes.com/russias-monster-icbm-rs-28-sarmat-that/

Science & Technology News

Press Information Bureau
Government of India

Ministry of Science & Technology

Wed, 27 Nov 2024

Aims and Objectives of BioE3 Policy

The objective of the BioE3 Policy is to set forth a framework that ensures the adoption of cutting-edge advanced technologies, and aligning innovative research for promoting Biomanufacturing. The BioE3 Policy outlines guidelines and principles for enabling mechanisms for 'Fostering High Performance Biomanufacturing' in the country across diverse sectors. The Policy aims at revolutionizing the biomanufacturing process for enhanced efficiency, sustainability, and quality while also accelerating the development and production of bio-based high-value products.

The BioE3 Policy is aligned with India's vision of Green Growth (announced in the Union Budget 2023-24) and also with the clarion call of the Hon'ble Prime Minister on 'Lifestyle for Environment (LiFE)' that envisions collective approach towards sustainability. The Policy also aligns with the Hon'ble Prime Ministers vision of 'Net-Zero' carbon economy of the country. Further, the Biomanufacturing and Biofoundry initiative has been announced as a scheme during Government's Interim Budget for 2024-25.

Highlights of achievements of India Bioeconomy over the last ten years are as follows:

As in December 2023, Bioeconomy contributes 4.25% to India's Gross Domestic Product (GDP) of $3.55 trillion. Indian Bioeconomy has grown from $10 billion in 2014 to $151 billion in 2023, achieving this target two years ahead of projections for 2025. Number of Biotech Startups have grown from 50 Biotech Startups in 2014 to 8,531 Biotech Startups in 2023. DBT-BIRAC have issued a joint call to invite proposals for setting up of "मूलांकुर BioEnablers – Biofoundries and Biomanufacturing Hubs" in the country. All the proposals received are under evaluation.

The BioE3 Policy aims at accelerating development of technologies for bio-based products and their commercialization by setting up of BioEnablers that include Bio-Artificial (Bio-AI) Intelligence Hubs, Biofoundries and Biomanufacturing Hubs across the country. Bio-AI hubs will

be set up to augment research and innovation for the development of technologies for bio-based products across the identified thematic sectors/subsectors of Biomanufacturing, by powering data-driven research and AI informed predictive analytics. The Bio Foundries and Biomanufacturing Hubs will aim at setting up of infrastructure/ facilities for augmenting scale up of technologies for bio-based products. The key performance indicators (KPIs) for meaningful success have been identified in terms of setting up of Bio Foundries and Biomanufacturing Hubs.

DBT-BIRAC have issued a joint call for proposals to invite applications for setting up of "मूलांकुर BioEnablers – Biofoundries and Biomanufacturing Hubs" in both academia and industry. The Bio-Enablers will also provide training and internship for building human resources with the required interdisciplinary, cross functional technical skills to foster biomanufacturing.

The BioE3 Policy is aligned with India's vision of Green Growth (announced in the Union Budget 2023-24) and also with the clarion call of the Hon'ble Prime Minister on 'Lifestyle for Environment (LiFE)' which envisions collective approach towards sustainability. The Policy also aligns with the Hon'ble Prime Ministers vision of 'Net-Zero' carbon economy of the country. Further, the Biomanufacturing and Biofoundry initiative has been announced as a scheme during Government's Interim Budget for 2024-25.

Based on National Consultation meeting and inter-ministerial consultations six thematic sectors along with sub sectors of national importance have been prioritised for implementation under the BioE3 Policy. These include (i) Bio-based chemicals and enzymes, (ii) Functional foods and Smart proteins, (iii) Precision biotherapeutics, (iv) Climate resilient agriculture, (v) Carbon capture and its utilization, (vi) Futuristic marine and space research. A series of Sectoral Expert Committee meetings have been conducted across the country and current scenario (both global and national), gaps and challenges as well as existing strengths and opportunities have been identified for each selected sector/ sub-sector. These are currently being addressed.

https://pib.gov.in/PressReleasePage.aspx?PRID=2078063

Press Information Bureau
Government of India

Ministry of Science & Technology

Wed, 27 Nov 2024

Nanozymes can transform biomaterials for use in medicinal & biomedical applications

Researchers are expanding the horizons of artificial enzymes known as "nanozymes" to use them as catalysts for transforming biomaterials for their futuristic use in medicinal and biomedical applications.

Several complex natural enzymes can act on proteins to generate functional proteins. However, the interplay of nanozymes with proteins has rarely been explored.

Scientists are now probing the unexplored roles of nanozymes in biological environments and their interplay beyond small molecule substrates due to their potential prospects in biotechnological and therapeutic interventions. They are also trying to develop next-generation artificial enzymes to overcome the current limitations of selectivity, specificity, and efficiency of existing artificial enzymes.

Researchers from the CSIR-Central Leather Research Institute (CLRI), working with the support of INSPIRE Faculty Fellowship and WISE Kiran Fellowship of the Department of Science and Technology (DST), investigated the chemistry at the interface of proteins and nanozymes to push the limits of artificial enzymes.

Dr. Amit Vernekar and his PhD students, Mr. Adarsh Fatrekar and Ms. Rasmi Morajkar have probed the crucial role played by manganese-based oxidase nanozyme (MnN) in stitching collagen, a vital structural protein in various biological tissues, through a covalent process known as “crosslinking” to produce biomaterials.

In a paper published in Chemical Science, journal of the Royal Society of Chemistry, they showed that MnN can activate collagen with the help of oxidase nanozyme and facilitate the covalent crosslinking of its tyrosine residues using only a trace amount of tannic acid under mild conditions, all the while maintaining the protein's triple-helical structure.

This approach not only showcases the novel prospects of nanozymes but also delivers an effective strategy to confer a remarkable 100% resistance to collagenase degradation, a significant challenge for the long-lasting use of collagen-based biomaterials.

In another research, the scientists have designed a bis-(μ-oxo) di-copper active site installed within the pores of metal-organic framework (MOF-808) to serve as an analogy for enzyme binding pockets and address the persistent challenges of selectivity, specificity, and efficiency in nanozymes.

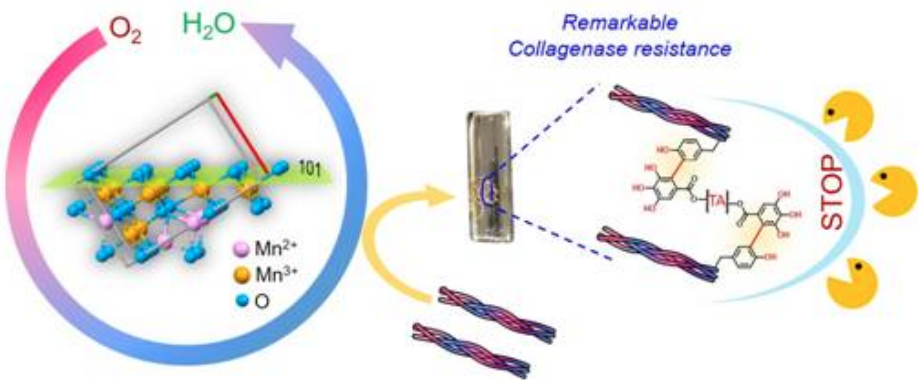
Their findings also published in Chemical Science illustrate that while this catalyst-by-design strategy effectively controls substrate dynamics and reactivity, it inadvertently compromises oxidase selectivity when small proteins, such as cytochrome c, which are larger than the pore opening of MOF-808, attempt to access the active site. This work exemplifies the need for careful consideration in the meticulous design of artificial enzymes related to nanomaterials, as the refined balance between desirable and undesirable reactivity in artificial enzymes is crucial for medicinal applications.

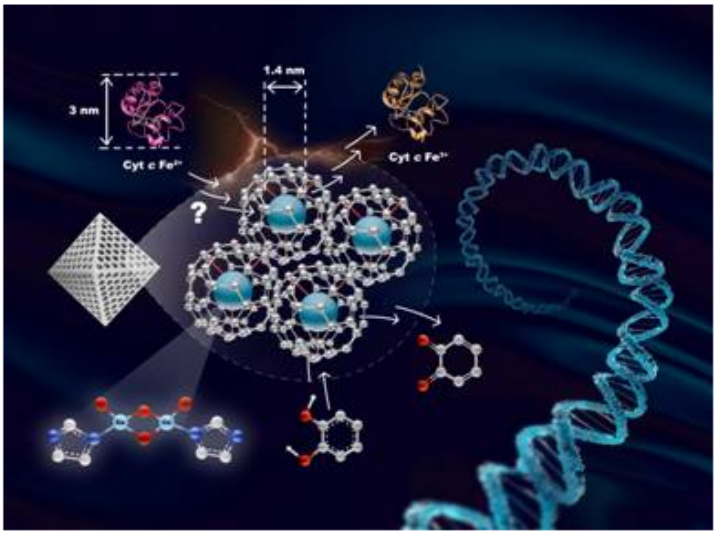
The research has expanded the repertoire of substrates to include complex biological molecules like collagen, pushing the limits of nanozymes beyond their known chemistry in functioning with small molecule substrates. This broadening of focus is important as it opens new avenues for the development of biomaterials for therapeutic applications, particularly those requiring intact structural properties. Through their research, they aim to establish guidelines for developing selective, specific, and highly active next-generation artificial enzymes for biomedical applications

The novelty of their work lies in its dual approach: first, by establishing a new paradigm for the interaction of nanozymes with structural proteins, and second, by highlighting the importance of substrate selectivity in the design of future artificial enzymes. These findings collectively

contribute to a more refined understanding of nanozyme chemistry, essential for advancing their utility in biotechnological and therapeutic contexts.

The study redefines collagen biomaterial development with enhanced stability and durability.





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Press Information Bureau
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Ministry of Science & Technology

Wed, 27 Nov 2024

Electrodeposition process developed for Ni-W alloy coatings can reduce friction

A new ecofriendly electrodeposition process for depositing Ni-W alloy coatings with multilayered architecture can reduce stress due to friction and prevent Heavy energy loss and failure of moving machine parts, such as gears.

Heavy energy loss and failure of moving machine parts, such as gears, in automobiles is attributed to relatively higher friction and wear and tear losses. Numerous efforts have been made to alleviate this issue through surface coatings/oxide layers so that the direct contact between the moving parts is eliminated. Among the sliding wear contacts, the heat generated at the contact surfaces allows the formation of oxide layers.

With the subsequent progress of materials wear, the oxide layer is removed either partially or fully and again formed as a cyclic process. Therefore, the effective dissipation of frictional heat from the mating surface during sliding wear also determines the service life of the components. In general, the thinner and well-adherent oxide layer with effective heat dissipation is recommended for obtaining the least wear rate. Researchers are working towards multilayers with alternate layers of high and low thermal diffusivity for enhancing the service life of engineering components.

Scientists from International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), an autonomous institution of the Department of Science & Technology (DST), Government of India led by Dr Nitin P. Wasekar have developed a new ecofriendly pulsed electrodeposition process for depositing Ni-W alloy coatings with multilayered architecture and exhibit outstanding mechanical properties along with low residual stresses.

The electrolyte they used contains the source of Ni and W ions that are co-deposited on the surface of desired component by application of pulsed currents. Through a sequential management of pulse currents in forward and reverse modes, the individual concentration of Ni and W in the Ni-W alloy coating were controlled. Adopting such a procedure in a repeated manner, the multilayered architecture has been successfully synthesized. It comprises of alternate layers of higher W containing nanocrystalline layer (with lower thermal diffusivity) sandwiched with lower W containing microcrystalline layers (higher thermal diffusivity), to the level of desired coating thickness.

It is further very interesting to note that the Ni-W multilayered coatings were deposited using a single electrolyte. The process designed is much simpler and easily adoptable by the industry. As W has 10 % larger atomic radius as compared to Ni atom, the alloy so formed is expected to generate tensile residual stress. The presence of waviness in multilayered architecture helped in enhancing the toughness and reducing the residual stress accumulation in coatings to the tune of 80-90 % as compared to monolithic (single layer) Ni-W coatings and hard chrome (HCr) coatings despite of their identical hardness range.

Accordingly, tests revealed that the wear rate of multilayered coatings (with 100 nm individual layer thickness) was almost half of monolithic Ni-W and 1/3rd of conventional hard chrome (HCr) coatings. Such a significant reduction in wear rate can be attributed to the concurrent reduction in coefficient of friction as a result of thin and adherent WO3 tribo-film.

Such a beneficial effect of favorable tribolayer formation will be realized upon careful dissipation of heat generated due to frictional forces. The overall heat dissipation is effectively modulated by means of the selected multilayered architecture wherein the heat generated in high W layer (lower thermal diffusivity 1.38×10-2 cm2/sec) is effectively compensated through the adjacent layer of low W content layer. Such modulated multilayer architecture can enhance service life of diverse industrial components.

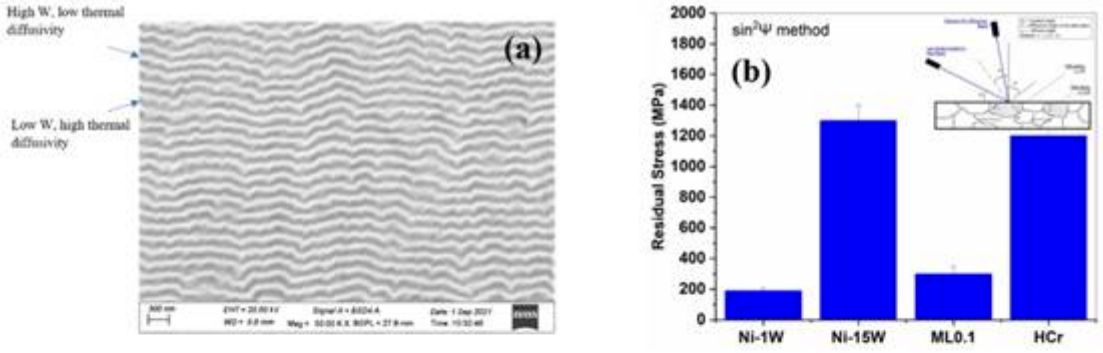

Fig. 1. (a) Ni-W alloy with multilayered architecture coating depicting 100 nm each layer of high W (bright layer) and low W (gray layer). (b) Surface residual stresses present in Ni 1at%W (low W), Ni 15at%W (high W), Ni-W multilayer with 100 nm layer thickness (ML0.1) and HCr (hard chrome coatings)

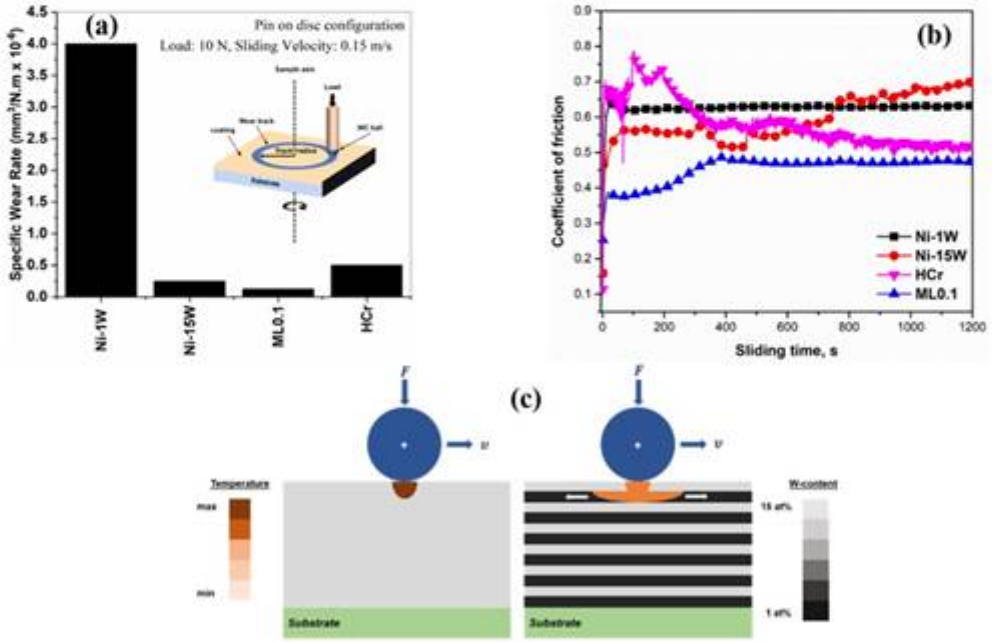

Fig. 2. Specific wear rates (a) and friction coefficient (b) for Ni 1at%W (low W), Ni 15at%W (high W), Ni-W multilayer with 100 nm layer thickness (ML0.1) and HCr (hard chrome coatings). (c) Mechanism of frictional heat generation in Ni-high W and its dissipation through Ni low W layer (Schematic)

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THE HINDU

Thu, 28 Nov 2024

New moiré superconductor opens the door to new quantum materials

Scientists are constantly engineering new materials that exhibit exotic properties. Moiré materials are a deceptively simple.

Take a material made of a single type of atom, like a block of graphite. Slice off a thin layer from the top so that you have a two-dimensional sheet of carbon atoms bonded together (graphene). Place one sheet on top of another. Finally, twist the top sheet by a small angle.

You now have a moiré material. These materials have unusual electronic and quantum properties. The one made of graphene has even been found to be a superconductor. In a recent study in Nature, scientists reported that moiré materials made from semiconductor materials can also be superconducting, a property once considered to be exclusive to the graphene system.

Exploring why semiconductor moiré materials behave differently from graphene in terms of superconductivity is key to advancing our understanding of quantum materials. This in turn can pave the way for new materials with more unusual properties — and unusual applications.

The moiré pattern

The researchers explored superconductivity in twisted bilayer tungsten diselenide (tWSe_2), a moiré material created by stacking two layers of tungsten diselenide, a semiconductor, and rotating one layer by a small angle. Even though the two layers of a moiré material have the same arrangement of atoms, the misalignment caused by the small twist produces a completely different pattern when seen from the top (see image above).

This is called the moiré pattern. In moiré materials, the moiré pattern gives rise to new behaviours that are not present in the individual 2D materials alone. This is because the twist leads to the formation of flat bands in the electronic structure of the material.

Flat bands to superconductivity

The electronic structure of a material describes how electrons in the material behave. The energy bands are a way to visualise the energy the electrons possess and how fast they move within the material.

Imagine the energy bands to be a ladder: each step (or band) represents the range of energies an electron can have. As you go up the ladder, the electron possesses more and more energy and momentum, meaning it will move faster.

A flat band means that the energy values of the electrons across the ladder are nearly constant, creating a flatregion within the band. In this scenario, all the electrons have the same energy, unlike in typical materials where the energy levels are spread out over a range.

Also in typical materials, electrons gain or lose kinetic energy when they move across different energy levels, which affects their speed and momentum. But in moiré materials, because the bands are flat, the electrons experience very little variation in energy. As a result, the electrons move slowly and are said to be heavy.

These slower-moving electrons are more likely to interact with each other, creating strong electron-electron interactions that aren’t seen in typical materials. These interactions can lead to the formation of Cooper pairs, where two electrons pair up across a short distance and move around as a single unit. This pairing is central to the phenomenon of superconductivity. (Leon Cooper, for whom the pairs are named, passed away on October 23.)

Their coordinated movement helps them avoid scattering, a process where electrons collide with atoms or impurities in the material and deviate from their path, causing electrical resistance. On the other hand, Cooper pairs can travel through the material without scattering, leading to zero resistance and energy loss, and thus superconductivity.

The devil in the twist

The researchers used $tWSe_2$ with a twist angle of 3.65º to form a moiré material. Then they examined how the electrons behaved when the material's electronic states were half-filled, a configuration strongly associated with superconductivity in moiré materials. (These states refer to the steps on the energy ladder: each state can accommodate a fixed number of electrons.)

They also examined the behaviour of the electrons when the energy gap between the sublattices within the material is small, since this influences the superconducting properties. Sublattices are smaller grids of groups of atoms within the material. The researchers found that tWSe was a robust conductor with a transition temperature of around –272.93º C. The transition temperature is the critical value below which a material enters the superconducting state, exhibiting zero electrical resistance.

The temperature observed is on par with those found in high-temperature superconductors. Conventional superconductors transition at around –250º C. The superconductivity in tWSe occurs precisely when the electronic states are half-filled. The team also found that the moiré material could transition to an insulating (nonconducting) state by altering the electronic properties of the material.

The material had a coherence length about 10-times longer than other moiré materials, meaning that its superconducting state is not fragile. The study also revealed that superconductivity in the moiré material occurred only in certain regions, determined by the filling of the electronic states. In its non-superconducting state, tWSe had the properties of a strongly correlated metal, where the strong electron interactions play a pivotal role in determining the material's overall behaviour.

Stability in unity

Previous research with tWSe has shown potential superconducting states, but it was unstable when researchers cycled it between room temperature and the transition temperature. The material couldn't maintain its superconducting properties because it was unstable. According to the new study, tWSe actually has a robust superconducting state — and one that's different from how the property emerges in graphene-based moiré materials.

For tWSe , superconductivity is driven by electron-electron interactions and half-band filling, while graphene-based systems depend on flat bands and electron-lattice interactions. As a result, while graphene-based systems become superconducting at higher temperatures, tWSe is more stable. This study creates a new avenue to explore superconductivity in semiconductor-based systems. It also offers valuable insights into the material's electronic structure changes when its 2D layers are twisted.

https://www.thehindu.com/sci-tech/science/new-moir%C3%A9-superconductor-opens-the-door-to-new-quantum-materials/article68918187.ece

THE ECONOMIC TIMES

Wed, 27 Nov 2024

Is Einstein's theory wrong? Scientists unveil groundbreaking weak spot

Albert Einstein’s general relativity has long explained how gravity warps space-time, shaping the Universe. Yet, a recent study suggests his predictions don’t entirely match the observed behaviour of the Universe during certain cosmic epochs. Researchers from the Universities of Geneva and Toulouse examined data from the Dark Energy Survey (DES) to explore the Universe’s accelerated expansion, revealing variances in gravitational distortions that prompt fresh scrutiny of Einstein's equations.

"Until now, Dark Energy Survey data have been used to measure the distribution of matter in the Universe," said Camille Bonvin, associate professor at the University of Geneva. "In our study, we used this data to directly measure the distortion of time and space, enabling us to compare our findings with Einstein's predictions."

Discrepancies Across Cosmic Eras

The study focused on four epochs—approximately 7 billion, 6 billion, 5 billion, and 3.5 billion years ago—when gravitational distortions, or "gravitational wells," were measured. These distortions are caused by celestial bodies warping space-time, a phenomenon central to Einstein’s theory and observable through gravitational lensing, where light bends around massive objects.

"We discovered that in the distant past—6 and 7 billion years ago—the depth of the wells aligns well with Einstein's predictions. However, closer to today, 3.5 and 5 billion years ago, they are slightly shallower than predicted by Einstein," explained Isaac Tutusaus, lead author and assistant astronomer at the Institute of Research in Astrophysics and Planetology, University of Toulouse.

Gravitational Wells and Their Significance

Einstein's theory describes space-time as a flexible sheet deformed by matter, creating gravitational wells. When light passes through these wells, its trajectory bends—a process first measured during the 1919 solar eclipse. The experiment confirmed Einstein's prediction of light bending due to gravity, which was twice as large as Newton’s estimate. This difference stemmed from Einstein's inclusion of time deformation alongside space deformation in explaining light curvature.

The DES, an international effort using the Victor M. Blanco Telescope in Chile, provides a comprehensive dataset by observing galaxies whose light has travelled billions of years to reach Earth. Its primary mission is to study dark energy, the mysterious force driving the Universe’s accelerated expansion. By analysing DES data, the research team gained insight into how gravitational wells have evolved over billions of years.

Potential Links to Dark Energy

The study’s findings raise questions about the relationship between dark energy and the growth of gravitational wells. The shallower-than-predicted wells in the recent past coincide with a period when the Universe's expansion accelerated, hinting at a potential connection between these phenomena.

"The discrepancy could mean that gravity wells have grown more slowly in the recent Universe," Tutusaus noted. "This aligns with the idea that the acceleration driven by dark energy might be affecting these distortions."

StatisticalInconsistencies and the Path Forward

The study identified a 3-sigma inconsistency between Einstein's predictions and observed data—a level that signals interest but falls short of disproving his theory. "This incompatibility is not large enough, at this stage, to invalidate Einstein's theory," said Natassia Grimm, a physicist at the University of Geneva.

"For that to happen, we would need to reach a threshold of 5 sigma. It is therefore essential to have more precise measurements to confirm or refute these initial results." General relativity, first published in 1915, has been repeatedly validated over the past century. Its core principle describes how massive objects curve spacetime, influencing phenomena like planetary orbits and black hole formations.

Gravitational lensing has become a vital tool for understanding cosmic structures, including the distribution of dark matter and the history of the Universe. However, the accelerating expansion of the Universe, discovered 25 years ago, introduced the concept of dark energy, a force that general relativity does not fully explain.

The DES's deep cosmic surveys allow scientists to probe these mysteries, with the recent findings highlighting potential gaps in current understanding. While Einstein’s theory remains a cornerstone of modern physics, the study underscores the evolving nature of scientific inquiry.

The subtle deviations observed in the recent Universe invite further exploration, pushing the boundaries of knowledge about space-time and dark energy. As Bonvin emphasised, "It is essential to have more precise measurements to understand whether general relativity holds universally or if new physics awaits discovery."

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