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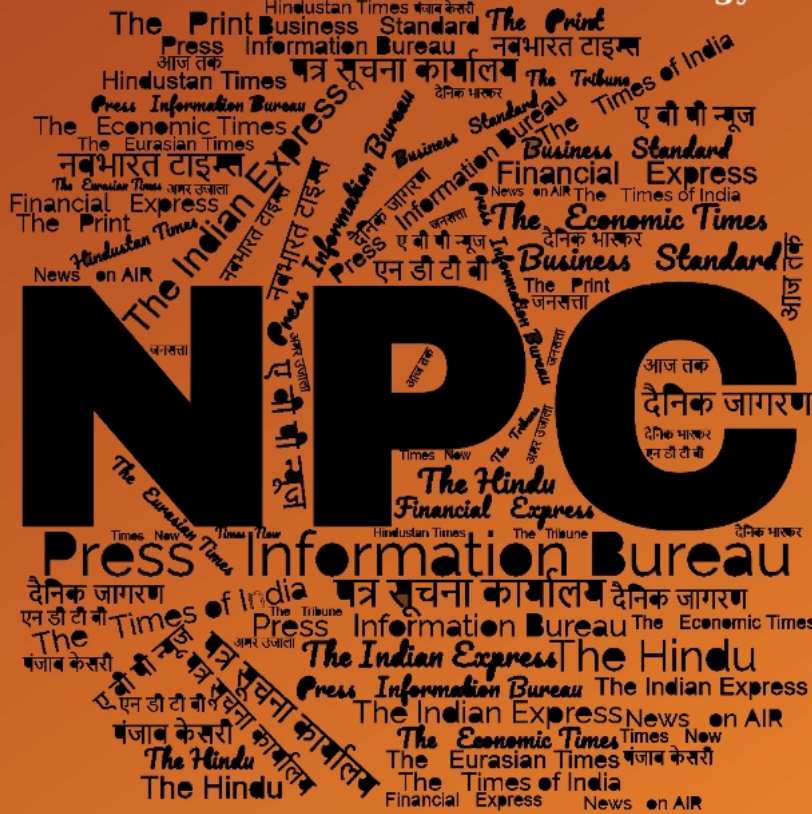
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Defence News

Defence Strategic: National/International



Press Information Bureau
Government of India

Ministry of Defence

Sat, 02 Nov 2024

Raksha Mantri Shri Rajnath Singh visits Field Gun Factory, Kanpur; Takes stock of critical indigenous defence capabilities

Raksha Mantri Shri Rajnath Singh, on November 02, 2024, visited the Field Gun Factory, Kanpur, a unit of Advanced Weapons and Equipment India Limited (AWEIL), in Uttar Pradesh. It specialises in manufacturing Barrel and Breach assemblies of various Artillery Guns and Tanks including Tank T-90 and Dhanush Gun.

During the visit, Raksha Mantri inspected key facilities, including the Heat Treatment and the New Assembly Shop of the factory, to take stock of critical indigenous defence capabilities. He was accompanied by Secretary (Defence Production) Shri Sanjeev Kumar and Secretary, Department of Defence R&D and Chairman DRDO Dr Samir V Kamat.

Following the visit to the shop floor, Shri Rajnath Singh was briefed by the CMDs of three Defence Public Sector Undertakings (DPSUs) based in Kanpur - AWEIL, Troop Comforts India Limited, Gliders India Limited - and Director of Defence Materials and Stores Research & Development Establishment, a DRDO laboratory located in Kanpur.

During the presentations, the CMDs of the new DPSUs apprised Raksha Mantri about the product profile, major ongoing projects, R&D efforts and modernisation activities being undertaken in their pursuit to meet the requirement of the Services.

AWEIL specialises in manufacturing of Small, Medium and large caliber Gun systems. The main products of TCL are Combat Uniforms, Ballistic Protective Gears, Extreme Cold Clothing and Tentages for high altitude. Whereas, GIL has the largest and oldest production unit of parachutes in India.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2070307>



**Press Information Bureau
Government of India**

Ministry of Defence

Sat, 02 Nov 2024

Training Visit By Delegation From South Africa Navy

A nine member delegation from South African Navy (SAN) led by RAdm (JG) Nevelie Kurt Howell, visited Headquarters Sea Training (HQST) at Southern Naval Command (SNC) from 21-31 Oct 24. The visit was aimed at enhancing bilateral Naval training cooperation between the two Navies through Operational Sea Training (OST) of ships and submarines conducted by Indian Navy's FOST Organisation.

During the visit, the head of delegation called on RAdm Upul Kundu, Chief of Staff, Headquarters Southern Naval Command and RAdm Srinivas Maddula, Flag Officer Sea Training and expressed the need to enhance professional engagement between both the Navies.

The visit focused on understanding various facets of conduct of Work Up through exposure to Harbour and Sea training activities undertaken by Indian Naval Work Up Team at Kochi. It also included visits to various training schools and establishments under SNC. Salient aspects included familiarisation with simulators, professional interactions and demonstration of Damage Control and Firefighting.

The successful conduct of the visit opens various avenues for training cooperation and reaffirms strong professional relationship between the two Navies. The training collaboration bears testimony to Indian Navy as the Preferred Training Partner in the IOR.

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**Press Information Bureau
Government of India**

Ministry of Defence

Fri, 01 Nov 2024

Indian Army Special Forces Contingent Departs For Indonesia For Joint Exercise 'Garud Shakti'

The Indian Army contingent comprising 25 personnel departed for Cijantung, Jakarta, Indonesia to take part in the 9th edition of India-Indonesia Joint Special Forces Exercise GARUD SHAKTI 24. The Exercise will be conducted from 1st to 12th of November 2024.

The Indian contingent is being represented by troops from The Parachute Regiment (Special Forces) and Indonesian contingent comprising 40 personnel is being represented by Indonesian Special Forces Kopassus.

The aim of Exercise GARUD SHAKTI 24 is to acquaint both the sides with each other's operating procedures, enhance mutual understanding, cooperation and interoperability between the Special Forces of both armies. The Exercise is designed to develop bilateral military cooperation and strengthen bond between two armies through conduct of discussions and rehearsal of tactical military drills.

The Exercise will involve planning and execution of special operations, orientation to advance special forces skills, sharing of information on weapon, equipment, innovations, tactics, techniques & procedures. Joint Exercise GARUD SHAKTI 24 will also involve jointly practicing Special Forces Operations in Jungle terrain, strikes on terrorist camps and a Validation Exercise integrating basic and advance special forces skills apart from gaining an insight into the lifestyle and culture of both countries to foster military cooperation.

The Exercise will provide an opportunity to both the contingents to strengthen their bond and share best practices. It will also act as a platform to achieve shared security objectives and foster bilateral relations between two friendly nations.

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**Press Information Bureau
Government of India**

Ministry of Defence

Fri, 01 Nov 2024

Shri Rajesh Kumar Singh assumes the office of Defence Secretary

Shri Rajesh Kumar Singh took over as Defence Secretary at South Block in New Delhi on November 01, 2024. He is a 1989-batch IAS officer from Kerala cadre, who had assumed the charge of the Officer on Special Duty (Defence Secretary-designate) on August 20, 2024.

Before taking charge, Shri Rajesh Kumar Singh laid a wreath and paid homage to the fallen heroes at the National War Memorial, New Delhi. "The nation will remain forever indebted to our brave soldiers who make the supreme sacrifice in the service of the motherland. Their extraordinary bravery and sacrifice is a source of strength & inspiration for us to make India a safe and prosperous nation," he said.

Earlier, Shri Rajesh Kumar Singh was holding the charge of Secretary, Department for Promotion of Industry and Internal Trade, Ministry of Commerce and Industry from April 24, 2023 to August

20, 2024. Prior to that, he held the post of Secretary, Department of Animal Husbandry & Dairying, Ministry of Fisheries, Animal Husbandry & Dairying.



The officer has held many other important positions in the Union Government as Director, Works and Urban Transport in the Ministry of Urban Development, Commissioner (Lands) - DDA, Joint Secretary - Ministry of Petroleum and Natural Gas, Joint Secretary - Department of Agriculture, Cooperation & Farmers Welfare and Chief Vigilance Officer – Food Corporation of India. He has also held important positions in the State Government as Secretary, Urban Development and lately as Finance Secretary, Government of Kerala.

Shri RK Singh succeeds Shri Giridhar Aramane, a 1988-batch IAS officer of Andhra Pradesh cadre, who superannuated from service on October 31, 2024.

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Press Information Bureau
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Ministry of Defence

Fri, 01 Nov 2024

Indian Army Contingent Departs For India- Us Joint Special Forces Exercise ‘Vajra Prahar’

The Indian Army contingent departed today for the 15th edition of India- US joint Special Forces Exercise VAJRA PRAHAR. The exercise is scheduled to be conducted from 2nd to 22nd November 2024 at Orchard Combat Training Centre in Idaho, USA. Last edition of the same exercise was conducted at Umroi, Meghalaya in December 2023. This will be second exercise of

the year between Indian and the US Army, the previous being Exercise YUDH ABHYAS 2024, conducted at Rajasthan in September 2024.

Contingents of both the countries taking part in the joint exercise will comprise 45 personnel each. The Indian Army contingent will be represented by Special Forces units and the US Army contingent will be represented by Green Berets of US.

Aim of Exercise VAJRA PRAHAR is to promote military cooperation between India and the US through enhancement of interoperability, jointness and mutual exchange of special operations tactics. The exercise will enhance combined capabilities in executing joint Special Forces Operations in desert/ semi desert environment. The exercise will focus on high degree of physical fitness, joint planning and joint tactical drills.

Drills/ aspects to be rehearsed during the exercise will include planning a Joint Team Mission, Reconnaissance Mission, employment of Unmanned Aerial Systems, execution of Special Operations, actions of Joint Terminal Attack Controller and Psychological Warfare in Special Operations.

Exercise VAJRA PRAHAR will enable the two sides to share their best practices and experiences for conduct of joint Special Forces Operations. The exercise will facilitate developing interoperability, bonhomie and camaraderie between soldiers of both the countries.

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Government of India

Ministry of Defence

Fri, 01 Nov 2024

Air Marshal Ajay Kumar Arora Takes Over As Air Officer-In-Charge Maintenance Of Iaf

Air Marshal Ajay Kumar Arora assumed the appointment of Air Officer-in-Charge Maintenance, Indian Air Force, at Air Headquarters (Vayu Bhawan), today. The Air Marshal, after taking over, laid a wreath at the National War Memorial in honour of the armed forces personnel who have made the supreme sacrifice for the nation.

Air Marshal Arora was commissioned in the Aeronautical Engineering stream of IAF in Aug 1986. He is a graduate of Air Force Technical College, Air Command and Staff College, USA and College of Defence Management, Secunderabad. An electronics and communication engineer by qualification, he is also an alumnus of IIT Kharagpur and a Doctrate degree holder in Management from University of Pune.

He has held key command and staff appointments in his illustrious career of 38 years. He was the Director General (Aircraft) before assuming the appointment of Air Officer-in-charge Maintenance.

The officer has been awarded with Vishisht Seva Medal in year 2018 and Ati Vishisht Seva Medal in 2024 for his distinguished service. He is married to Mrs Sangeeta and the couple is blessed with a son, Pulkit.

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Press Information Bureau
Government of India

Ministry of Defence

Thu, 31 Oct 2024

Singapore India Maritime Bilateral Exercise (Simbex)- 2024 Concludes

The 31st edition of Singapore India Maritime Bilateral Exercise (SIMBEX) was conducted from 23 to 29 Oct 2024. RSS Tenacious of Republic of Singapore Navy along with Indian Navy's INS Shivalik of Eastern Fleet and Long-Range Maritime Patrol Aircraft P8I participated in the exercise.

The Harbour phase of the exercise was held at Visakhapatnam from 23 - 25 Oct 24 which included Subject Matter Expert Exchanges (SMEEs), cross-deck visits, sports fixtures and pre-sail discussions.

The Sea Phase was held on 28 - 29 Oct 24, in the Bay of Bengal. The exercise saw advanced anti-air, anti-surface and anti-submarine exercises, seamanship drills and tactical manoeuvres further enhancing the interoperability between the two navies.

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Press Information Bureau
Government of India

Ministry of Defence

Wed, 30 Oct 2024

CDS Gen Anil Chauhan embarks on an official visit to Algeria

Chief of Defence Staff (CDS) Gen Anil Chauhan will embark on an official visit to Algeria from 31st October to 4th November 2024, reflecting the deepening ties between India and Algeria in the

realm of defence cooperation. This visit underscores the growing engagement between the two nations, which share a commitment towards strengthening diplomatic and military cooperation.

During his visit, Gen Chauhan is scheduled to call on the General of Army Said Chanegriha, Chief of Staff of the People's National Army, and engage in wide-ranging discussions with senior officials from the Ministry of National Defence (MoND) of Algeria. The discussions would focus on enhancing military cooperation, with emphasis on securing strategic interests, capacity building, training, technology exchange and 'Make In India' initiatives. In a significant step, the Chief of Defence Staff will also be signing a Memorandum of Understanding on Defence Cooperation, reaffirming the military collaboration between both nations.

A key highlight of the visit will be the Military Parade and Ceremony commemorating Algeria's 70th Anniversary of the Glorious revolution of 01 Nov 1954, where General Chauhan has been invited as the Guest of Honour. In furtherance to India's commitment to professional military training and education, the CDS is set to visit the prestigious Higher War School in Algeria, a premier institution known for training Algeria's military leadership, where he will address senior officers.

This visit is expected to elevate the defence partnership between India and Algeria, and foster mutual trust and understanding. The visit follows in close steps with the recently concluded visit of the President of India to Algeria, earlier in October 2024.

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Press Information Bureau
Government of India

Ministry of Defence

Wed, 30 Oct 2024

Develop high-end tech indigenously to realise the vision of Viksit Bharat: Raksha Mantri to youth at 65th Foundation Day of IIT Kanpur

“Cutting-edge tech must to establish an edge in modern-day warfare”

**“Defence exports will touch Rs 50,000 crore by 2029-30”: Raksha Mantri
MoUs exchanged between IIT Kanpur, DPSUs and other stakeholders at
the Foundation Day**

Raksha Mantri Shri Rajnath Singh called upon Indian youth to indigenously develop high-end technologies, which the country imports, to realise Prime Minister Shri Narendra Modi's vision

of Viksit Bharat. He was addressing the 65th Foundation Day celebrations at Indian Institute of Technology (IIT), Kanpur on November 02, 2024.

Raksha Mantri described 'technology' as the biggest factor behind the rapid changes taking place in every field today, with countries competing to master niche tech, such as Artificial Intelligence, to establish an edge in the current geopolitical scenario. Explaining it further, he pointed out that based on technological developments, there are three groups of countries – the first are at the pinnacle in advanced tech; the second have reached a stagnant state and third are at a stage of technological take-off.

Placing India in the third group, Shri Rajnath Singh stated that the nation is today surging towards the top position in technological advancements. He stressed on the need to get a hold on high-end technology, urging the young ignited minds to realise their potential and contribute to the country's progress. He termed institutions like IIT Kanpur as academic engines, which can provide a dynamism to India in the present competitive environment, and place it among the first set of countries.

Highlighting the increasing role of technology in the defence ecosystem across the globe amidst ongoing conflicts, Raksha Mantri said that the use of drones, laser warfare, cyber warfare, precision guided missiles and hypersonic missiles has transformed warfare into a technology-oriented one. "The biggest hurdle in achieving 'Aatmanirbharta' in defence is that we are compelled to import some high-end technologies necessary for our items. There is a need to focus on defence application of modern cutting-edge technologies in view of the changing nature of warfare," he added.

Shri Rajnath Singh assured the Government's full support in this endeavour and reiterated the commitment to take all stakeholders, including the private sector and academia, together to make India self-reliant in defence. "India has dreamed of becoming a developed nation by 2047 on the strength of our youth. We must put in all our power to realise that dream. There is a proverb, 'If you want to go fast, go alone. If you want to go far, go together'. We need to walk together to achieve our target," he said.

Enumerating the steps taken by the Government to promote self-reliance and innovation in defence, Raksha Mantri spoke about the Innovations for Defence Excellence (iDEX) initiative which provides a grant of Rs 1.5 crore to innovators and start-ups. He added that Acing Development of Innovative Technologies with iDEX (ADITI) scheme was launched to promote innovations in critical and strategic defence technologies, wherein start-ups are eligible to receive grant-in-aid of up to Rs 25 crore for their research, development, and innovation endeavours in defence technology.

Shri Rajnath Singh added that the Government's efforts of achieve self-reliance are yielding desired results as the defence exports, which were around just Rs 600 crore ten years ago, crossed a record number of Rs 21,000 crore in Financial Year 2023-24. He exuded confidence that the progress will continue and defence exports will reach Rs 50,000 crore by 2029-30.

Raksha Mantri pointed out that manufacturing of a technology involves three major steps - ideation, application & production - and institutions like IIT Kanpur can play a big role from

incubating ideas to creation of products. He underscored the importance of coming out with products and technologies, which become a necessity for the Armed Forces once they are developed.

As part of the celebrations, IIT Kanpur hosted a special event on defence innovation, aligning with the vision of 'Aatmanirbhar Bharat'. Shri Rajnath Singh visited a Defence Research, Product, and Incubation Showcase organised by the Start-up Incubation and Innovation Centre (SIIC) at IIT Kanpur, which highlighted pioneering solutions from 23 SIIC-incubated start-ups, presenting advancements in defence technology such as autonomous systems, AI-driven surveillance, and next-generation communication tools. Raksha Mantri engaged with Start-up founders and research teams at the exhibition stalls, commending their contributions to enhance national security.

Several MoUs were also signed to strengthen partnerships, including IIT Kanpur's collaborations with BEML and Hindustan Aeronautics Limited (HAL) to drive advancements in military logistics & defence innovation, and a partnership with Kanpur University to strengthen incubation efforts. Secretary of DDR&D and DRDO Chairman Dr Samir V Kamat presented sanction letters for six transformative DRDO projects, while SIDBI's Matching Offer for iDEX-funded start-ups further boosted essential funding support.

The event also included key discussions on the country's latest defence initiatives, such as iDEX's Defence India Start-up Challenge 12 and ADITI 2.0 Challenges, which provided attendees with valuable insights into the defence innovation landscape. A commemorative tree plantation, led by Shri Rajnath Singh, symbolised IIT Kanpur's enduring legacy in technological and defence advancement and commitment to sustainability.

Secretary (Defence Production) Shri Sanjeev Kumar, Secretary, Department of Defence R&D and Chairman DRDO Dr Samir V Kamat, Director of IIT Kanpur Prof Manindra Agrawal, Professor-in-Charge of SIIC Prof Deepu Philip, students and distinguished alumni of the institute attended the event.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2070338>



Sat, 02 Nov 2024

India-China disengagement along LAC: Patrolling resumes in Ladakh's Demchok, will commence soon in Depsang Plains

Moving swiftly after completing the process of disengagement at the friction points of Demchok and Depsang Plains along the Line of Actual Control in eastern Ladakh, Indian troops have resumed patrolling in the Demchok area.

Indian Army sources confirmed that "coordinated patrolling" began Friday in the Demchok area and would soon commence in the Depsang Plains.

This is in line with the agreement between India and China, announced on October 21, two days before Prime Minister Narendra Modi and President Xi Jinping held talks on the sidelines of the BRICS Summit in Russia to repair bilateral ties.

Relations between the two countries plunged after Chinese incursions in eastern Ladakh were detected in May 2020, triggering a military standoff along the LAC. The resumption of patrolling in Demchok came a day after the two armies exchanged sweets at border points along the LAC Thursday, also the Diwali day.

Earlier, the Chinese PLA had cut off Indian access to patrolling points (PPs) 10 to 13 in the Depsang Plains. In the Demchok area, Chinese troops had been squatting at the Charding Nullah.

In keeping with the agreement reached, talks are taking place at the level of local commanders — Brigadier rank and below. This agreement is important because the Chinese side, until a year ago, showed reluctance to even discuss Depsang Plains and Demchok while it agreed on disengagement at other friction points — PP 14 (Galwan valley), PP 15 (Hot Springs), PP 17A (Gogra), north and south banks of Pangong Tso.

The disengagement process in Demchok and Depsang Plains also involved removal of temporary structures. It marks the first step of a three-step process — disengagement, de-escalation and de-induction of troops in the border areas. In Beijing, the Chinese military said Thursday that troops of India and China are “making progress” in implementing the agreement to disengage from the friction points. But it declined to comment on reports that the disengagement had been completed.

Zhang Xiaogang, spokesperson for the Ministry of National Defence, told a media briefing in Beijing that “China and India have reached resolutions on the issues concerning the border areas through diplomatic and military channels”.

“The frontline troops of the two militaries are making progress in implementing resolutions in an orderly manner,” he said, reiterating the Chinese Foreign Ministry’s comments Wednesday. He, however, declined to comment on reports that Indian and Chinese troops had completed disengagement in Demchok and Depsang Plains and patrolling is set to commence.

On the bilateral agreement to disengage troops, Colonel Zhang said President Xi Jinping met with Prime Minister Narendra Modi on the margins of the BRICS summit in Kazan. “Both sides have agreed that China and India should view and handle the bilateral relations from a strategic and long-term perspective and make sure that the differences on specific issues will not affect the overall relationship,” he said.

“We hope the Indian side will work together with China to take important common understandings between the two leaders as guidance and continuously implement the above-mentioned resolutions and jointly safeguard peace and tranquillity along the border areas,” he said.

<https://indianexpress.com/article/india/patrolling-resumes-in-ladakhs-demchok-will-commence-soon-in-depsang-plains-9649298/>

OPINION: Not having a defence university reflects strategic myopia

- By Vice Admiral Biswajit Dasgupta (Retd)

Professional military education of the officer corps of any country is a strong determinant of the quality of its armed forces. Military officers are expected to be proficient in the management of violence. War is the ultimate arbiter of relationships between nations. It is also the most undesirable of measures adopted by any country in today's age when weapons of mass destruction threaten mutually assured destruction. Every avenue of diplomacy, negotiation and coercion must be exhausted before contemplating military conflict. For managing violence, therefore, several questions need to be considered.

What priorities drive the nation's policies? What importance does the government accord to different components of national security? Where do the armed forces fit in? What are the expectations from them in peace and war? Does the institutional design within and outside the armed forces enhance their effectiveness? How does the relationship of the military leadership with other civilian power groups such as politicians, bureaucrats, diplomats, scientists, academics and industry synergise national security interests? What are the safeguards against falling prey to partisan or narrow interests?

Wider understanding of these questions is the sine qua non of the management of violence. It is the duty of governments ensure that the leadership of the armed forces is intellectually equipped to discharge their responsibilities. This is enabled by professional military education. Many questions regarding national security fall outside the core competence of the military officer corps and requires the indulgence of the civilian political leadership, apex bureaucracy and academia. The training establishments of the armed forces have a historical legacy of professional training expertise that are second to none. Not surprisingly therefore, the Indian armed forces are known for their professionalism. Professional military education, however, is more than professional training. While the latter is more technical in content, the former provides the broader base for understanding matters that impinge upon national security. This includes appropriate knowledge of history, political science, international relations, technology and governance to name a few.

Officers of the Indian armed forces undertake periodic courses to prepare them for higher responsibilities. These courses are 'training-heavy' as it should perhaps be at junior levels, up to the rank of Major and equivalent. Beyond that, they should progressively become 'education-heavy' culminating at the level of the National Defence College where only the 'big picture' is screened. For this, three essentials have been identified by several high-level committees in the past.

First, there is a need to revamp syllabi in military institutions of higher learning. This must be done by a core group of experts, including specially chosen military officers. This same committee

should ideally review syllabi of the Defence Services Staff College, the three War Colleges, the College of Defence Management and the National Defence College as they could then curate a graded enrichment of the syllabi in keeping with the learning objectives of each institution.

Second, there is a need for permanent civilian faculty in these institutions. Military officers are not necessarily good educators. Their upbringing is training-focused and hence many may not even realise the value of a well-rounded professional military education. They are also appointed for short durations for meeting other career milestones. Permanent civilian faculty alongside military officers will provide continuity, diversity, alternate viewpoints and specific expertise, all so essential for quality professional military education.

Finally, India must have a defence university. It is understood that the armed forces had strongly recommended the establishment of such a university, to be named the Indian National Defence University (INDU). Land too, was identified close to the National Capital Region and for a while, it seemed all was moving well before the proposal suddenly went off the radar. In the meanwhile, the Raksha Shakti University in Gujarat got rechristened in 2020 as Rashtriya Raksha University (RRU), a Central University under the aegis of the Ministry of Home Affairs. The charter of this university covers internal and coastal security and it has no mandate over 'defence' education. There is hence no conflict of either mandate or interest if a separate defence university is established.

The defence university should coordinate professional military education, provide academic cover to identified military institutes, be the centre of excellence of defence research and run specialised courses for both military personnel and civilians. This would also generate better military expertise non-military people, the lack of which is an acknowledged weakness. The proposal to establish a defence university is not the military's fervent plea though it has been made out to sound like one. The military has been proactive to recommend what is in the national interest. The government must consider the matter urgently. Getting the professional military education model in India right will pay rich dividends. Not doing so will reflect abject strategic myopia.

<https://www.theweek.in/news/defence/2024/10/31/opinion-not-having-a-defence-university-reflects-strategic-myopia.html>

THEWEEK

Wed, 30 Oct 2024

What is the National Defense Industrial Strategy Implementation Plan, or NDIS-IP, of the US

The US department of defense (DoD), recently released National Defense Industrial Strategy Implementation Plan (NDIS-IP), outlining the ongoing and future actions of the department to modernise the country's defence industrial base. There are six initiatives under this plan, aiming to make the defense industrial ecosystem of the country more resilient, according to a DoD release.

"This implementation plan offers industry, global allies, and partners clear direction on the Department's priorities for industrial capacity building," said Assistant Secretary of Defense for Industrial Base Policy Laura Taylor-Kale, adding, "Implementing these initiatives will require coordinated efforts across the DoD."

The six initiatives in the NDIS-IP include the Indo-Pacific deterrence initiative, with a long-term focus on the production of munitions, missiles, and submarines. The second is the production and supply chains initiative, with a particular focus on onshoring defense-critical production capabilities, moving away from adversarial sources of capital, a deeper analysis of supply chain vulnerabilities, enhanced industrial cyber security, and critical materials stockpiling.

There is also increased emphasis on the AUKUS trilateral partnership, which comprises Australia, the United Kingdom, and the United States. The fourth is the capabilities and infrastructure modernisation initiative, which involves modernising the nuclear industrial base, organic industrial base, and maintenance, repair and overhaul and upgrade capacity of the DoD.

According to the DoD release, the department also aims to enhance the progress of the Replicator Initiative through various projects, studies and white papers; and to better deploy its current acquisition authorities. The last is the intellectual property and data analysis initiative, which focuses on ensuring the effective use of resources throughout a programme life cycle by fully integrating intellectual property planning into acquisition and product support strategies.

"A key focus of implementation is championing initiatives that are cross-cutting and not the sole responsibility of any one military service or component within the Department of Defense," Taylor-Kale said.

<https://www.theweek.in/news/defence/2024/10/30/what-is-the-national-defense-industrial-strategy-implementation-plan-or-ndis-ip-of-the-us.html>

THE ECONOMIC TIMES

Wed, 30 Oct 2024

IAF induction of Tejas Mark-1A delayed further as engine issues persist from US

The induction of the new indigenous Tejas Mark-1A jets for the Indian Air Force (IAF) has been delayed due to issues in the supply of engines by General Electric (GE), giving another blow to its already depleted operational capabilities, TOI reported. The delivery of the jets, initially scheduled for 2024-25, will now see only two to three jets instead of the promised 16, according to TOI sources.

Hindustan Aeronautics (HAL) faces a delay of around two years as GE has promised to supply the engines by March 2025. The deal for these 83 singleengine jets was signed in February 2021 and

amounted to Rs 46,898 crore. The delay was also flagged by both Prime Minister Narendra Modi and Defence Minister Rajnath Singh during their recent US visits.

“As per terms of the \$716 million contract, HAL could invoke penalty clauses in the case. But it’s an ongoing logistical issue that can be worked out between GE and HAL. GE says it has faced supply chain issues from one of its South Korean suppliers,” TOI quoted a source as saying.

HAL is also finalizing negotiations with GE for the co-production of the more powerful GE-F414 aero-engines in India, for the planned Tejas Mark-II fighters. This deal includes 80% transfer of technology and is estimated at around \$1 billion, with expectations to finalize the contract within this fiscal year.

The Tejas Mark-1A jets currently face delays in weapons integration and the incorporation of an Israeli radar system. This delay impacts the IAF’s plan to induct 180 Tejas Mark-1A and at least 108 Mark-2 jets over the next 15 years. The IAF has 30 fighter squadrons against the authorized 42.5 needed to manage threats from China and Pakistan.

Additionally, the IAF’s long-standing plan for 114 new 4.5-generation multirole fighter aircraft (MRFA), estimated at Rs 1.25 lakh crore, remains pending. The controversy over the Rs 59,000 crore deal for 36 Rafale fighters signed with France in 2016 has influenced the government’s approach to the MRFA procurement. “The Rafale controversy even reached the Supreme Court, with officials being summoned and documents connected to national security being shared. In the MRFA case, the procurement model and the level of indigenization are being finalized to break the logjam,” said a TOI source.

HAL states it has the capacity to manufacture 24 Tejas Mark-1A fighters annually, with plans to increase production to 36 jets per year. India also plans to develop a fifth-generation stealth fighter, the advanced medium combat aircraft (AMCA), with an approved development cost of over Rs 15,000 crore.

<https://economictimes.indiatimes.com/news/defence/iaf-induction-of-tejas-mark-1a-delayed-further-as-engine-issues-persist-from-us/articleshow/114765096.cms>

THE ECONOMIC TIMES

Fri, 01 Nov 2024

Indian companies on global US sanctions list will not impact defence ecosystem

Indian companies sanctioned by the US as part of a global effort to crack down on supply of dual use items to Russia will not have a major impact on the domestic defence ecosystem as most of them are not linked to any major project. Only one of them has limited work with the Defence Research and Development Organisation and the armed forces.

Out of the 19 Indian firms on the global list of 400 plus companies sanctioned, several are entities that seem to be just carrying out trading activities by purchasing western equipment including electronics and selling them to Russian companies that have been hit by western sanctions. Some of them, like Denvas Services , which mainly supplies digital kiosks for various services, also have Russian nationals as registered directors and shareholders.

It is legal for Indian companies to have foreign nationals as directors and there are no sanctions on conducting work with Russian entities. The company has been accused of procuring US-origin microelectronics for use in its advanced Russian conventional weapons. The only company in the list of sanctioned entities that seems to have limited work with the Indian defence ecosystem is RRG Engineering, which has worked with DRDO and supplied non-critical products to some services.

The company has been accused to have sent over 100 shipments of microelectronics to US-designated, Russia-based Arteks Limited Company. As per records, RRG has in the past supplied manpower to some DRDO labs to execute projects linked to setting up data centres and IT networks.

It has also supplied limited nuclear, biological and chemical warfare detectors to various services and units and claims to have worked on satcom stations as well. Industry sources said that such equipment is readily available within the Indian ecosystem and can easily be sourced when needed.

<https://economictimes.indiatimes.com/news/defence/indian-companies-on-global-us-sanctions-list-will-not-impact-defence-ecosystem/articleshow/114858644.cms>

THE ECONOMIC TIMES

Sat, 02 Nov 2024

Israel launches 'new era of warfare' Iron beam laser defence system; Here's how it works

Israel's new "Iron Beam" laser defence system is expected to be operational within a year, significantly enhancing the country's ability to counter aerial threats. The Israeli defence ministry recently announced a \$500 million investment in contracts with Rafael Advanced Defence Systems and Elbit Systems to boost production of this cutting-edge technology.

About the Iron Beam

Developed alongside the well-known Iron Dome, the Iron Beam is designed to neutralise various aerial threats, including missiles, drones, rockets, and mortars. Eyal Zamir, director general of the defence ministry, stated, "It heralds the beginning of a new era in warfare." This system aims to address the increasing missile and drone threats posed by Iran and its allies.

How the Iron Beam Works

The Iron Beam utilises a high-power laser to target and disable projectiles from hundreds of metres to several kilometres away. This method contrasts with Israel's existing missile defence approach, which relies on radar detection and interceptor missiles. Military analysts suggest that the laser system could enhance Israel's defences while also being more cost-effective.

Yehoshua Kalisky from the Institute for National Security Studies noted that each interception with the Iron Dome requires two missiles, costing approximately £50,000 each. In contrast, Rafael Advanced Defence Systems claims that laser interceptions have "almost zero cost per interception."

Current Defence Challenges

Recent military operations have highlighted the need for improved interception capabilities. The Israel Defence Forces (IDF) reported around 50 projectiles entering Israeli territory from southern Lebanon, with only partial interception success. The Iron Beam could particularly excel at countering drones, which have been difficult for the Iron Dome to intercept due to their small size and ability to change flight paths.

Despite its advantages, the Iron Beam faces significant limitations, particularly from weather conditions that can impede its effectiveness. Clouds, rain, and haze can reduce the system's target acquisition capabilities.

Additionally, the operation of the laser system requires substantial power resources. Other nations, including the United States and the United Kingdom, have developed laser defence systems, indicating a growing trend in military technology. However, Iran's capabilities regarding laser defence remain uncertain, with reports suggesting they may possess less powerful systems compared to the Iron Beam.

The Iron Beam is part of Israel's ongoing efforts to bolster its defence capabilities amid rising tensions in the region. The prototype was first showcased in 2021, and development has continued steadily since then. Military analysts believe that the introduction of laser technology will improve interception rates and reduce costs compared to traditional missile systems.

In the context of Israel's recent conflicts, including military operations in Gaza and Lebanon, the need for efficient aerial defence solutions has become increasingly pressing. The IDF's experience with frequent projectile launches from these areas underscores the urgency for systems like the Iron Beam to provide a timely response. Other countries are also exploring laser technology for defence.

The US Navy has tested high-powered lasers capable of destroying aircraft, while the UK has developed the DragonFire system for aerial defence. Meanwhile, reports indicate that Iran may have access to laser weaponry, but details about its capabilities remain vague and potentially less advanced than the Iron Beam.

<https://economictimes.indiatimes.com/news/defence/israel-launches-new-era-of-warfare-iron-beam-laser-defence-system-heres-how-it-works/articleshow/114872647.cms>

Chinese researchers develop AI model for military use on back of Meta's Llama

Top Chinese research institutions linked to the People's Liberation Army have used Meta's publicly available Llama model to develop an AI tool for potential military applications, according to academic papers and analysts.

In a June paper reviewed by Reuters, six Chinese researchers from three institutions, including two under the People's Liberation Army's (PLA) leading research body, the Academy of Military Science (AMS), detailed how they had used an early version of Meta's Llama as a base for what it calls "ChatBIT".

The researchers used the Llama 2 13B large language model (LLM) that Meta released in February 2023, incorporating their own parameters to construct a military-focused AI tool to gather and process intelligence, and offer accurate and reliable information for operational decision-making.

ChatBIT was fine-tuned and "optimised for dialogue and question-answering tasks in the military field", the paper said. It was found to outperform some other AI models that were roughly 90% as capable as OpenAI's powerful ChatGPT-4.

The researchers didn't elaborate on how they defined performance or specify whether the AI model had been put into service.

"It's the first time there has been substantial evidence that PLA military experts in China have been systematically researching and trying to leverage the power of open-source LLMs, especially those of Meta, for military purposes," said Sunny Cheung, associate fellow at the Jamestown Foundation who specialises in China's emerging and dual use technologies including AI.

Meta has embraced the open release of many of its AI models, including Llama. It imposes restrictions on their use, including a requirement that services with more than 700 million users seek a license from the company.

Its terms also prohibit use of the models for "military, warfare, nuclear industries or applications, espionage" and other activities subject to U.S. defence export controls, as well as for the development of weapons and content intended to "incite and promote violence".

However, because Meta's models are public, the company has limited ways of enforcing those provisions. In response to Reuters questions, Meta cited its acceptable use policy and said it took measures to prevent misuse.

"Any use of our models by the People's Liberation Army is unauthorized and contrary to our acceptable use policy," Molly Montgomery, Meta's director of public policy, told Reuters in a phone interview.

The Chinese researchers include Geng Guotong and Li Weiwei with the AMS's Military Science Information Research Center and the National Innovation Institute of Defense Technology, as well as researchers from the Beijing Institute of Technology and Minzu University.

"In the future, through technological refinement, ChatBIT will not only be applied to intelligence analysis, but also ... strategic planning, simulation training and command decision-making will be explored," the paper said.

China's Defence Ministry didn't reply to a request for comment, nor did any of the institutions or researchers. Reuters could not confirm ChatBIT's capabilities and computing power, though the researchers noted that its model incorporated only 100,000 military dialogue records, a relatively small number compared with other LLMs.

"That's a drop in the ocean compared to most of these models (that) are trained with trillions of tokens so ... it really makes me question what do they actually achieve here in terms of different capabilities," said Joelle Pineau, a vice president of AI Research at Meta and a professor of computer science at McGill University in Canada.

The research comes amid a heated debate in U.S. national security and technology circles about whether firms such as Meta should make their models publicly available. U.S. President Joe Biden in October 2023 signed an executive order seeking to manage AI developments, noting that although there can be substantial benefits to innovation," there were also "substantial security risks, such as the removal of safeguards within the model".

This week, Washington said it was finalising rules to curb U.S. investment in artificial intelligence and other technology sectors in China that could threaten national security. Pentagon spokesman John Supple said the Department of Defense recognised that open-source models had both benefits and drawbacks, and that "we will continue to closely monitor and assess competitors' capabilities".

'Cookie Jar'

Some observers say China's strides in developing indigenous AI, including setting up scores of research labs, have already made it difficult to keep the country from narrowing the technology gap with the United States.

In a separate academic paper reviewed by Reuters, two researchers with the Aviation Industry Corporation of China (AVIC) - which the United States has designated a firm with ties to the PLA - described using Llama 2 for "the training of airborne electronic warfare interference strategies".

China's use of Western-developed AI has also extended into domestic security. A June paper described how Llama had been used for "intelligence policing" to process large amounts of data and enhance police decision-making. The state-run PLA Daily published commentary in April on how AI could help "accelerate the research and development of weapons and equipment", help develop combat simulation and improve military training efficiency".

"Can you keep them (China) out of the cookie jar? No, I don't see how you can," William Hannas, lead analyst at Georgetown University's Center for Security and Emerging Technology (CSET), told Reuters.

A 2023 paper by CSET found 370 Chinese institutions whose researchers had published papers related to General Artificial Intelligence - helping drive China's national strategy to lead the world in AI by 2030. "There is too much collaboration going on between China's best scientists and the U.S.' best AI scientists for them to be excluded from developments," Hannas added.

<https://economictimes.indiatimes.com/news/defence/chinese-researchers-develop-ai-model-for-military-use-on-back-of-metas-llama/articleshow/114833324.cms>

THE ECONOMIC TIMES

Thu, 31 Oct 2024

What are solid-fuel missiles, and why is North Korea developing them?

North Korea said it launched an intercontinental ballistic missile on Thursday, in what South Korean officials said could be related to its development of new solid-fuel rocket engines. South Korea's defense minister said on Wednesday the North could seek new ICBM technology from Russia in exchange for deploying its troops to help in Ukraine, but other military officials in Seoul said Pyongyang's missile programme has progressed so far that it is unclear what help it needs. Here are some characteristics of solid-fuel technology, and how it can help the nuclear-armed North improve its missile systems.

What Are Some Advantages Of Solid Fuel?

Solid-fuel missiles do not need to be fuelled immediately ahead of launch, are often easier and safer to operate, and require less logistical support, making them harder to detect than liquid-fuel weapons. "These capabilities are much more responsive in a time of crisis," said Ankit Panda, a senior fellow at the U.S.-based Carnegie Endowment for International Peace.

What Is Solid-Fuel Technology?

Solid propellants are a mixture of fuel and oxidiser. Metallic powders such as aluminium often serve as the fuel, and ammonium perchlorate, which is the salt of perchloric acid and ammonia, is the most common oxidiser. The fuel and oxidiser are bound together by a hard rubbery material and packed into a metal casing. When solid propellant burns, oxygen from the ammonium perchlorate combines with aluminium to generate enormous amounts of energy and temperatures of more than 5,000 degrees Fahrenheit (2,760 degrees Celsius), creating thrust and lifting the missile from the launch pad.

Who Has That Technology?

Solid fuel dates back to fireworks developed by the Chinese centuries ago, but made dramatic progress in the mid-20th century, when the U.S. developed more powerful propellants. North Korea uses solid fuel in a range of small, shorter-range ballistic missiles, as well as in its new Hwasong-18 intercontinental ballistic missile. The Soviet Union fielded its first solid-fuel ICBM,

the RT-2, in the early 1970s, followed by France's development of its S3, also known as SSBS, a mediumrange ballistic missile. China started testing solid-fuel ICBMs in the late 1990s. South Korea has also said it has secured "efficient and advanced" solidpropellant ballistic missile technology, though in much smaller rockets so far.

Solid Vs Liquid

Liquid propellants provide greater propulsive thrust and power, but require more complex technology and extra weight. Solid fuel is dense and burns quite quickly, generating thrust over a short time. Solid fuel can remain in storage for an extended period without degrading or breaking down - a common issue with liquid fuel. North Korea said the development of its solid-fuel Hwasong-18 would "radically promote" its nuclear counterattack capability.

After the first launch last year, South Korea's defence ministry sought to downplay the testing, saying the North would need "extra time and effort" to master the technology.

<https://economictimes.indiatimes.com/news/defence/what-are-solid-fuel-missiles-and-why-is-north-korea-developing-them/articleshow/114807992.cms>

THE ECONOMIC TIMES

Fri, 01 Nov 2024

North Korea boasts of 'the world's strongest' missile, but experts say it's too big to use in war

North Korea boasted Friday that the new intercontinental ballistic missile it just test-launched is "the world's strongest," a claim seen as pure propaganda after experts assessed it as being too big to be useful in a war situation.

The ICBM launched Thursday flew higher and for a longer duration than any other weapon North Korea has tested. But foreign experts say the test failed to show North Korea has mastered some of the last remaining technological hurdles to possess functioning ICBMs that can strike the mainland U.S.

The North's Korean Central News Agency identified the missile as a "Hwasong-19" and called it "the world's strongest strategic missile" and "the perfected weapon system." The official media outlet said leader Kim Jong Un observed the launch, describing it as an expression of North Korea's resolve to respond to threats to North Korea's security.

The color and shape of the exhaust flames seen in North Korean media photos of the launch suggest the missile uses preloaded solid fuel, which makes weapons more agile and harder to detect than liquid propellants that in general must be fueled beforehand. But experts say the photos show the ICBM and its launch vehicle are both oversized, raising a serious question about their wartime mobility and survivability.

"When missiles get bigger, what happens? The vehicles get larger, too. As the transporter-erector launchers get bigger, their mobility decreases," Lee Sangmin, an expert at South Korea's Korea Institute for Defense Analyses.

The Hwasong-19 was estimated to be at least 28 meters long (92 feet) while advanced U.S. and Russian ICBMs are less than 20 meters long (66 feet), said Chang Young-keun, a missile expert at Seoul's Korea Research Institute for National Strategy.

He suggested that South Korea's warning on Wednesday that a North Korean ICBM launch was imminent was related to the missile's size. "In the event of a conflict, such an exposure makes the weapon a target of a preemptive attack by opponents so there would be a big issue of survivability," Chang said.

Lee Illwoo, an expert with the Korea Defense Network in South Korea, said North Korea may have developed a larger missile to carry bigger and more destructive warheads or multi-warheads. If that's the case, Lee said North Korea could have used liquid fuels as they generate higher thrust than solid fuels.

He said some advanced liquid propellants can be stored in missiles for a few weeks before liftoffs. Lee said North Korea may have placed a dummy warhead on the Hwasong-19 to make it fly higher. In recent years, North Korea has reported steady advancement in its efforts to obtain nuclear-tipped missiles.

Many foreign experts believe North Korea likely has missiles that can deliver nuclear strikes on all of South Korea, but it has yet to possess nuclear missiles that can strike the mainland U.S. The hurdles it has yet to overcome, according to experts, include ensuring its warheads survive the heat and stress of atmospheric reentry, improving the altitude control and guidance systems for the missiles, and being able to use multiple warheads on a single missile to defeat missile defenses.

"Acquiring reentry technology is currently the most important goal in North Korea's missile development, specifically for ICBMs, but they just keep increasing the ranges instead. This possibly suggests they still lack confidence in their reentry technology," Lee Sangmin said.

Chang said Friday's state media dispatch on the launch lacks details on the technological aspects of the Hwasong-19 and focused on publicity. Other North Korean claims about its weapons capabilities have been met with wide outside skepticism. In June, North Korea claimed to have tested a multiwarhead missile in the first known launch of such a weapon, but South Korea said the weapon instead blew up.

In July, when North Korea said it had test-fired a new tactical ballistic missile capable of carrying "a super-large warhead," South Korea said the claim was an attempt to conceal a botched launch. Observers say that Thursday's launch, the North's first ICBM test in almost a year, was largely meant to grab American attention days before the U.S. presidential election and respond to international condemnation over North Korea's reported dispatch of troops to Russia to support its war against Ukraine.

North Korea's reported troop dispatch highlights the expanding military cooperation between North Korea and Russia. South Korea, the U.S. and others worry North Korea might seek high-

tech, sensitive Russian technology to perfect its nuclear and missile programs in return for joining the RussianUkraine war.

<https://economictimes.indiatimes.com/news/defence/north-korea-boasts-of-the-worlds-strongest-missile-but-experts-say-its-too-big-to-use-in-war/articleshow/114836453.cms>

THE ECONOMIC TIMES

Sat, 02 Nov 2024

China's PLA Navy conducts historic dual aircraft carrier exercises in South China Sea

In a significant development, China's People's Liberation Army (PLA) Navy executed dual aircraft carrier formation exercises for the first time in the South China Sea, as confirmed by the navy. This milestone reflects China's ambition to enhance its naval capabilities and prepare for a wider array of complex maritime operations amid ongoing territorial disputes in the region, Channel News Asia (CNA) reported.

The exercises involved the Liaoning and Shandong, China's two active aircraft carriers, which operated together in a coordinated formation. According to a post on the PLA Navy's official Weibo account, the training manoeuvre extended into the Yellow Sea, East China Sea, and back to the South China Sea, underscoring the extensive operational range of the navy's carrier strike groups.

"In the South China Sea, the Liaoning and Shandong ship formations conducted a dual carrier formation exercise for the first time to hone and improve the combat capability of the aircraft carrier formation system," the statement read.

Conducting exercises with two aircraft carriers and their accompanying support vessels necessitates a high degree of operational flexibility, reported CNA.

This capability is crucial for demonstrating the PLA Navy's ability to deploy and sustain significant air and sea power in the face of potential challenges. The PLA emphasised that such exercises not only bolster their combat readiness but also serve as a formidable deterrent to possible adversaries in the region.

While the Liaoning and Shandong are fully operational, China's third aircraft carrier, the Fujian, was unveiled in June 2022 and is currently undergoing sea trials, CNA reported.

The advancement of China's carrier fleet is a strategic move that highlights the nation's growing naval power and its aspirations to assert greater influence over disputed waters in the South China Sea, where it has been embroiled in territorial disputes with several neighbouring countries.

<https://economictimes.indiatimes.com/news/defence/chinas-pla-navy-conducts-historic-dual-aircraft-carrier-exercises-in-south-china-sea/articleshow/114877688.cms>

US bolsters Middle East presence with ballistic missile defences to promote de-escalation

The United States is bolstering its military presence in the Middle East to safeguard its citizens, protect Israel, and promote de-escalation through diplomacy and deterrence. As part of this effort, US Secretary of Defense Lloyd Austin ordered the deployment of additional ballistic missile defence destroyers, fighter squadrons, tanker aircraft, and B-52 long-range strike bombers to the region.

In a statement, the Department of Defence (DoD) said, "In keeping with our commitments to the protection of US citizens and forces in the Middle East, the defence of Israel, and de-escalation through deterrence and diplomacy, the Secretary of Defence ordered the deployment of additional ballistic missile defence destroyers, fighter squadron and tanker aircraft, and several US Air Force B-52 long-range strike bombers to the region.

These forces will begin to arrive in the coming months as the USS ABRAHAM LINCOLN Carrier Strike Group prepares to depart."

It added, "These deployments build on the recent decision to deploy the Terminal High Altitude Area Defense (THAAD) missile defence system to Israel as well as DoD's sustained Amphibious Ready Group Marine Expeditionary Unit (ARG/MEU) posture in the Eastern Mediterranean. These movements demonstrate the flexible nature of the US global defence posture and the US capability to deploy worldwide on short notice to meet evolving national security threats."

The Pentagon statement further said that the Defence Secretary has reiterated his commitment that the United States will take all the necessary measures to defend its people. "Secretary Austin continues to make clear that should Iran, its partners, or its proxies use this moment to target American personnel or interests in the region, the United States will take every measure necessary to defend our people," the statement said.

The move comes after Austin on Thursday spoke with Israeli Minister of Defense Yoav Gallant to explore opportunities for de-escalation amidst rising Middle East tensions. Their conversation highlighted the US' support for Israel's security, particularly in the face of threats from Iran and Iranian proxies.

Sharing a post on X, Austin wrote, "I spoke with Israeli Minister of Defense Yoav Gallant today to discuss opportunities for regional de-escalation. I reaffirmed that the United States remains fully prepared to defend US personnel, Israel, and partners across the region against threats from Iran and Iran-backed proxies."

<https://economictimes.indiatimes.com/news/defence/us-bolsters-middle-east-presence-with-ballistic-missile-defences-to-promote-de-escalation/articleshow/114866735.cms>

Another LCA manufacturing line by private sector economically unviable

A separate manufacturing line for the indigenous Light Combat Aircraft (LCA) by the private sector is economically unviable, sources said ruling out any such possibility while stating that the Hindustan Aeronautics Limited (HAL) will have capability to produce 24 jets next year with the private industry involved in a big way. This has one of the suggestions from various quarters to speed up the delayed LCA production.

“A single type of aircraft is not produced by two different companies anywhere in the world. It will be too much duplication, will increase costs and is economically unviable. Private sector will be involved more and more in the current programme with HAL being the lead integrator,” an informed source said. For instance, in addition to the big companies, there are also 270 Micro, Small, and Medium Enterprises (MSME) working with HAL.

Now the LCA orders are for 180 aircraft beyond the earlier 40, which is a sizeable number. So HAL has gone for a third line, next year the production rate of the LCA will reach 24 aircraft per year, the source noted.

Deliveries of the LCA-Mk1A by HAL to the Indian Air Force (IAF) have been delayed, in a major part due to non-delivery of F-404 engines by General Electric. The engine manufacturer has only two engines with which HAL will be able to handover two jets to the IAF this fiscal, sources said.

On the LCA-Mk1A, integration of the Israeli radar has been completed while weapon integration is on, sources said which includes air to air and air to ground weapons. The aircraft will be delivered while the integration will take sometime, sources said. In 2021, the Defence Ministry had signed a ₹48,000 crore deal with Hindustan Aeronautics Limited (HAL) to supply 83 LCA-Mk1A, a more capable fighter than the current LCA-MK1 in service. As per contract, three jets were scheduled to be delivered to the IAF in February 2024 and 16 aircraft per year for subsequent five years.

An order for 97 additional LCA-Mk1A is under process. In September 2022, the Cabinet Committee on Security gave sanction for the development of the LCA-Mk2 at a total cost of ₹9,000 crore, a bigger and more capable fighter than the present LCA, and is currently under development.

The LCA-Mk2 will be powered by the GE F414 engine which produces 98kN thrust compared to 84kN thrust of the GE-404 engine powering the LCA Mk1 and MK1A. Discussions are in advanced stages for license manufacturing the engine in India.

“Commercial terms of the agreement are being negotiated between HAL and GE. It is expected to be concluded this financial year,” sources said. On the LCA-Mk2, IAF Chief Air Chief Marshal A. P. Singh said last month that it is supposed to do its first flight by October 2025 and by December

2027 is supposed to be end of the Research & Development phase. Officials had stated that deliveries of the LCA-MK2 are expected to commence from 2032 by which time the deliveries of all 180 LCA-MK1A are expected to be completed.

As of now, the IAF has committed to procuring around 120 LCAMk2. In September, then IAF Chief ACM V.R. Chaudhari while stating that while HAL remain the lead, suggested more public-private partnerships or joint ventures with private partners to ramp up production of the LCA. “Our present orders of 83 LCA-Mk1As, which will be followed up with 97 more, will definitely take a few years to fructify.

The way forward is to diversify the production lines, have more public-private partnerships or joint ventures with private partners to have multiple weaponry lines as well as multiple production lines,” he had said. “That is the way we can catch up with our requirements and be able to export to other nations as well,” he added while stressing that HAL should take the lead in any model evolved.

<https://www.thehindu.com/news/national/another-lca-manufacturing-line-by-private-sector-economically-unviable/article68823216.ece>



Mon, 04 Nov 2024

AI big focus of SU-30MKI upgrade; IAF taking up pilot projects with IIT-Mumbai, says officer

The financial aspects of the comprehensive upgrade to the first batch of SU-30MKI jets are being worked out and the process would start as soon as it is approved, a senior official of the Indian Air Force said.

It can take around five to seven years to update the batch of 84 jets, and the IAF has taken up pilot projects with the Indian Institute of Technology, Bombay in regard to Artificial Intelligence-based engine and asset maintenance solutions, as well as for spares and inventory optimisation, he added.

“The financial aspects are being worked on. Once that is sorted out and the government authorises it, the upgrade will commence. If the government clears it, say early next year, we should start straight away. They have to do their due diligence for such a big project,” Air Marshal C.R. Mohan, Air Officer Maintenance told The Hindu in an interview ahead of his retirement on October 31.

“I would imagine it would take at least five to seven years. By the time it is fully realised, it takes that time for certifying, testing, modification etc. It is a major upgrade. These are ball park figures and not project figures,” he stated.

The Defence Acquisition Council has already given preliminary approval for the upgrade of 84 SU-30s. The IAF has a fleet of 259 Su-30MKIs, of the 272 contracted and manufactured in India

under licence from Russia. Former IAF chief Air Chief Marshal V.R. Chaudhari had stated earlier that the 84 jets will see the upgradation of 51 systems with an indigenous content of 78%. The Su-30s will constitute a bulk of the IAF's fighter strength for the foreseeable future and will remain in service beyond 2055.

While most of the upgrades will be carried out by the Hindustan Aeronautics Limited (HAL), original equipment manufacturer Russia would be involved in upgrading the fly-by-wire system and integration of systems, among others. A majority of the upgrades, including radar and avionics, will be indigenous. On the total number of jets that would be upgraded, the official said that would be planned based on the residual life. "We might do a limited upgrade for aircraft with limited life," he observed.

AI for inventory

The IAF has embarked on the path of automation and AI with the motto of "minimal human intervention, maximum combat potential" for the maintenance and overhaul of its diverse fleet, and inventory management. Currently, there is an electronic maintenance management system.

For instance, an engine has thousands of parts which are managed by a "hardware tree" currently. What the IAF is looking for, is to make the aircraft talk to the hardware tree, and the digital twin software to give specific preventive recommendations.

"From a parts management point of view, there are multiple types of aircraft, but sometimes the parts are the same but they have different part numbers," he noted and said "they are digitally fingerprinting these parts".

"We have started a pilot project again with IIT-B which will digitally fingerprint the parts," the Air Marshal stated.

"There are scanners which can generate the 3D drawings of the parts and there are X-ray scanners which will give the material composition of the part."

Currently, there are Global Item Gallery (GIG) numbers for various parts.

"For example, we take the digital drawing of a part, which will be associated with the GIG number, and use an AI algorithm which will scan digital drawings of the entire inventory of the IAF, and tell which GIG numbers are the same. Then we can reduce the inventory size of the IAF," he explained.

Certain parts may look the same, but on heat-treating will give different properties, depending on where they are used, particularly with the engine. IIT-B has excellent capability to look at micro structures. So they can certify that the heat-treated structure is actually the same. It will be physically done in the laboratory, he added.

"When we integrate the tri-service inventory, this will end up in enormous savings if we are able to do this," Air Marshal Mohan said, and added this is at the Request For Information (RFI) stage.

<https://www.thehindu.com/news/national/ai-big-focus-of-su-30mki-upgrade-iaf-taking-up-pilot-projects-with-iit-mumbai-says-officer/article68826449.ece>

Military exports rising, but country still among biggest arms importers

Even as figures released by the Defence Ministry show an impressive increase in military exports and domestic manufacturing of military equipment, the dichotomy remains that India continues to be the world largest importer of weapons, arms and military equipment.

Yesterday, speaking at an event at the Indian Institute of Technology, Kanpur, Defence Minister Rajnath Singh said India's self-reliance drive was "yielding desired results" and the country was poised to reach a target of Rs 50,000 crore in defence exports by 2029-30.

For the fiscal ending March 31 this year, India exported Rs 21,083 crore worth of equipment, to almost 100 countries. This is a huge increase from the year 2014-2015, when exports were a measly Rs 1,941 crore. Domestic manufacturing of military equipment stood at Rs 1,27,285 crore for the last fiscal. It was Rs 46,429 Cr for 2014-2015.

'Make in India' in defence equipment manufacturing is no more an elusive mirage, said an official, but added that despite locally making warships, fighter jet Tejas, nuclear submarine INS Arihant and missiles like Akash and BrahMos, New Delhi keeps on emerging among the top global importers of weapons.

The key imports are S-400 missiles, fighter jets, aero-engines, marine engines, armed UAV, among others. Sweden-based think-tank Stockholm International Peace Research Institute (SIPRI) which tracks arms sales globally, in its annual report in March this year said India was the world's top arms importer.

The SIPRI said: "India imported 9.8 per cent of all global arms trade between 2019-2023.: It compared two five-year blocks — 2014-18 and 2019-23 and said: "Arms imports increased by 4.7 per cent between these two five years."

India continues to import selected niche technologies. A senior official said once aero-engines and marine-engines start getting made in India, the import figures will come down.

At the MoD, the focus is on 'Make In India'. The Innovation for Defence Excellence (iDEX) is engaging industries, including MSMEs, startups, individual innovators, R&D institutes and academia, with a budget of Rs 498.78 crore for financial support.

Almost 75 per cent of the modernisation budget — that is Rs 1,05,518 crore — has been earmarked for domestic industries during this fiscal.

Some 12,800 items have already been indigenised, sources said. This list includes critical technology weapon systems like artillery guns, assault rifles, corvettes, sonar systems, transport aircrafts, light combat helicopters (LCHs), radars, wheeled armoured platform, rockets, bombs, armoured command post vehicle, among others.

Further, the MoD is focusing on cutting edge, critical and strategic technologies such as satellite communication applications, advance cyber technology, autonomous weapons, advancement in semiconductor technology, AI, quantum technology (QT), nuclear technologies and advance underwater surveillance system.

<https://www.tribuneindia.com/news/india/military-exports-rising-but-country-still-among-biggest-arms-importers>



Fri, 01 Nov 2024

India's WhAP Armoured Vehicles Triumph Over Chinese Type-08 in Moroccan Trials

India's Wheeled Armoured Platform (WhAP), produced by Tata Advanced Systems Limited (TASL), has officially outclassed China's Type-08 armoured vehicle in a series of demanding trials conducted by the Moroccan Army.

This performance led to a groundbreaking partnership between India and Morocco, marking a pivotal moment for Indian defence exports.

Financial Express Online in September has reported that TASL inked a contract with Morocco's National Defence Administration, making it one of India's largest global defence deals. Under this three-year agreement, Tata Advanced Systems Maroc (TASM) in Casablanca will produce up to 100 WhAPs annually, creating a substantial boost in local employment with 90 direct and 250 indirect jobs. This production initiative also sets a goal to raise the indigenous content in Morocco's WhAPs to 50%, showcasing Morocco's commitment to enhancing its own defence industry.

"This contract marks an important milestone for us as we continue to expand into global markets," TASL CEO Sukaran Singh remarked. Built to tackle rugged terrain and equipped with amphibious and mine-resistant capabilities, the WhAP is a highly versatile vehicle already trusted by the Indian Army for diverse missions.

For Morocco, this collaboration signifies a strategic shift. The country has been seeking to reduce reliance on major arms suppliers like the US., and its defence budget, projected at \$12.2 billion for 2024, reflects a focus on building a more self-sufficient defence infrastructure. Morocco has also approved two dedicated zones for military production, showing strong commitment to fortifying its domestic defence sector.

Meanwhile, India's role in African defence is growing. Through initiatives such as the India-Africa Defence Dialogue and joint training exercises, India has deepened its ties with African nations. This partnership with Morocco not only strengthens India's footprint in North Africa but also

opens doors for further collaboration, offering new pathways for defence technology exchange across the region.

<https://www.financialexpress.com/business/defence-indias-whap-armoured-vehicles-triumph-over-chinese-type-08-in-moroccan-trials-3654372/>



Fri, 01 Nov 2024

Ukrainian Onslaught On Russian Warships: Indian Navy Showcases Robotic Boat That Can Be Used In ISR & Hitting Targets

Low-cost unmanned aerial vehicles have been touted as the biggest change in modern warfare since World War II. Equally successful have been the unmanned surface vessels that have helped Ukraine, a country with virtually no navy, take out the majority of Russia's Black Sea Fleet.

The Indian Navy has demonstrated the capability of an autonomous surface vessel that traversed 1500 kilometers in the Arabian Sea without any human intervention. The Indian Navy is initiating the induction of 12 of these indigenously developed platforms.

The induction has come 26 years after 10-armed terrorists from Karachi entered Mumbai after sneaking the country's maritime border on speedboats. What ensued was one of the deadliest terror attacks that saw India's financial and entertainment capital living in terror for the next 60 hours, with 12 coordinated shootings and bombings in iconic locations across the city, including Chhatrapati Shivaji Terminus, Oberoi Trident and Taj Palace and Tower, among others.

The Unmanned Surface vessel that the Indian Navy is inducting will help plug any gaps in India's maritime security. The initial batch of 12 will pave the way for further refinement of the technology and upgrades in the future.

The autonomous surface vessel Matangi was developed by Sagar Defence Engineering and flagged off by Indian Defense Minister Rajnath Singh on October 29. Matangi is 13 meters in size and makes a sea transit from Mumbai to Tuticorin, a distance of 850 nautical miles or 1500 kilometers. It conducted the journey without human intervention, using the indigenously developed 'navigation & collision avoidance software.'

Officials told the EurAsian Times: "Matangi will be the eyes and ears for the Indian Navy and an important part of the OODA loop (Observe, Orient, Decide and Act). It can carry out hot pursuits at choke points."

The boat is satellite-controlled, giving it a limitless range. It can also be shifted to radio frequency and controlled by a warship or a helicopter. It can be refueled at sea and will play an important role in ISR (intelligence, surveillance, and reconnaissance).

It is mounted with a small gun. When fitted with weapons, it is capable of fulfilling multiple roles, such as reconnaissance, cargo transport, or armed strike missions.

The induction trial run was done last year. “This boat is smaller than most platforms in the Indian Navy, but it packs more punch in terms of endurance. It is a chota packet, bada dhamaka (small packet and big punch),” the official added.

“The autonomous run by Matangi for 1,500 kilometers has not been done on a global level so far,” the official informed. The vessel’s adaptability allows it to be reconfigured for tasks like surveying coastal zones or seabeds, transporting sonar equipment, or even being used as an electronic warfare platform.

The Indian Navy has drawn its lessons from the exploits of the Ukrainian Navy, which in late 2022 carried out an audacious raid on the Russian Black Sea Fleet using uncrewed surface vessels as ‘suicide craft.’ The attack heralded a new era of sea warfare. Matangi can also be used to carry out Kamikaze attacks against adversaries’ warships.

The robotic boats used by the Ukrainian Navy in 2022 were very basic. They were equipped with electro-optical and infrared sensors as well as Starlink antennae, and they were powered in part by commercial off-the-shelf (COTS) technology, including a propulsion system from a recreational power jet.

Since then, the USV technologies have grown increasingly sophisticated, and Ukrainian forces have used a multitude of different systems, most recently arming them with multiple-launch rocket systems, to strike a greater number of small surface, air, and coastal targets.

The use of weaponized surface drones is bound to increase in the future. Individually, they may pose only limited danger, but they can be used as a fleet. Also, their low cost and low risk to lives can make them a potent threat.

The Unmanned Future Of Sea Warfare

The Indian Navy’s area of operation is vast, straddling the Gulf of Aden in the east to the Strait of Malacca in the West.

Piracy and frequent Chinese warships in the Indian Ocean Region make it prudent for the Indian Navy to keep a vigilant eye on the region. The Unmanned Surface Vessels will ease the issues of logistics and sustainment and help the Indian Navy extend its defensive perimeter.

A USV can carry a larger payload than aerial vehicles. It can damage critical portions of warships, such as engines and munition storage areas closer to the water surface, causing massive flooding. Explosive-laden USVs are inexpensive and can be used in large numbers.

If required, the USVs can linger indefinitely in unobtrusive places before they stealthily approach their targets, then strike in numbers that overwhelm the defenders’ ability to respond effectively.

<https://www.eurasiantimes.com/ukrainian-onslaught-on-russian-warship/>

Don't use govt email IDs for social media: Central govt policy for employees

Government employees must not use their official email addresses to register on any social media websites or other websites unless it is to perform an official function or they have the authorisation of their department's competent authority, according to the new central government email policy issued on Wednesday.

The policy, notified in the gazette by the ministry of electronics and information technology (MeitY), also mandated government employees, contractors and consultants to use their official government emails, which are operated by the National Informatics Centre (NIC), while discharging public functions. It also mandates government departments to differentiate between the email addresses of government employees and consultants/contractors.

This is the second iteration of the government's email policy to be notified in the gazette. The first was notified in February 2015. A senior government official and a former government official, both aware of the matter, said that even though this email policy is not a law, a gazette notification helps stress the importance of the policy across the board.

According to the former official, this updated policy had been in the works since at least December 2023. The senior official said that the policy had undergone multiple rounds of consultations within the government. Both the people cited above clarified that this policy is a general update released due to the changing cybersecurity landscape and was not necessitated by any specific or imminent threat.

In the new policy, entities and competent authority (MeitY secretary) are clearly defined and a lot of ambiguity related to the permission structure has been done away with. Since the Digital Personal Data Protection Act, 2023, has been notified (but not brought into force), the section related to privacy has also been removed.

Under the new policy, "core use organisations" (central government departments and other government-controlled entities that do not provide goods or services on commercial terms) and its users must use only NICeMail for official purposes. It is only when such a CUO has an office outside India that it can, with all due approvals, maintain alternative email services hosted outside India.

All CUOs that have their own independent email servers must have their servers located within India. The policy recommends such CUOs to consider migrating their email services to NICeMail services "in the interest of security and uniform policy enforcement".

The policy also requires departments that currently use @gov.in or @nic.in to instead migrate to @departmentname.gov.in mail domains so that information sanctity and integrity can be maintained when officials are transferred from one department/ministry to another, and so that the

ministry/department doesn't lose access to the official communication. For this, the department or ministry in question must register the domain name with NIC.

For instance, MeitY has registered the mail domain @meity.gov.in.

The policy gives government departments six months, that is until April 30, 2025, to complete this migration. The policy also distinguishes between organisation-linked email addresses and service-linked email addresses. The former refers to an email address such as jointsecretary-section69a@meity.gov.in so that when the current JS leaves, the email address can be used by their successor.

The latter refers to the individual-linked email address of government officers of the rank of joint secretary and above, such as nameoftheofficer@gov.in. For organised services other than general central service, this mail domain can bear the name of the service as well. For instance, the MHA uses @ips.gov.in for service-linked email addresses of members of the Indian Police Service. These service-linked addresses can only be used for communication related to the officers' service (vacation applications, term extensions, deputations, etc.), and not for official communication related to their position (such as joint secretary, DGP, etc.)

These two kinds of email addresses cannot be mapped to each other under the policy for security reasons. Emails received on the organisation-linked email address cannot be automatically forwarded to the service-linked email address.

The 2015 policy also recommended that designation-based official email addresses should be used for official purposes yet departments across the government continue to use Gmail and Yahoo email addresses, which are at times personal email addresses linked to an individual instead of those managed by the department. For instance, one of the "official" email addresses for journalists to get responses from the home ministry is mhamedia@gmail.com. For finance ministry, they are dprfinance@gmail.com and mofpi.pib@gmail.com.

On the day of or 30 days before the day of superannuation or voluntary retirement, the government department can assign its officer the use of a slightly altered service-linked email address so that it makes it clear that the person has retired. For IPS officers, for instance, it could change to @retiredips.gov.in, and for a member of the Navy, it could change to @navyveteran.gov.in. This, however, may be a paid service.

This step was taken because retired officials often continue to receive sensitive emails, and at times, some of them, want to retain their service-linked email addresses because they have never used another address in their lives, the senior government official cited above said.

If NIC detects any malicious link in the account of a user or an attachment with a malicious code, the policy empowers NIC to delete such content from the user's account. In such cases, NIC is also empowered to do a forensic analysis of any such email data and take assistance of third parties for this purpose.

<https://www.hindustantimes.com/india-news/dont-use-govt-email-ids-for-social-media-central-govt-policy-for-employees-101730312997936.html>



Press Information Bureau
Government of India

Ministry of Science & Technology

Wed, 30 Oct 2024

Model developed to understand equatorial ionospheric processes important for GNSS-based navigation

Scientists tracking a very narrow band of intense electric current in the earth's ionosphere called Equatorial ElectroJet through ground-based magnetometers in India's southern tip have developed an empirical model to understand the equatorial electrodynamical processes that can impact satellite orbital dynamics, Global Positioning Systems and other satellite communication links as well as electrical power grids.

Earth's geomagnetic equator passes very close to the southern tip of India, where a unique and very strong current of the order of 100 kA known as Equatorial ElectroJet (EEJ), flows at around 105-110 km height in the upper atmosphere. Due to this intense current jet, the geomagnetic field near the equator is uniquely enhanced by a few tens to a few hundreds of nano tesla (nT).

Measuring this current intensity through the geomagnetic field enhancement provides an important understanding of the variation of ionospheric electric field. Therefore, understanding and modelling of EEJ variations would have important applications in assessing the satellite orbital dynamics, Global Positioning Systems and other satellite communication links, electrical power grids, etc. IIG regularly measures this EEJ current using ground-based magnetometers located at an equatorial station Tirunelveli, very close to the southern tip of India.

Understanding the EEJ variations from long-term observations for more than two decades, scientists from Indian Institute of Geomagnetism (IIG) Navi Mumbai, an autonomous institute of Department of Science and Technology, have developed an empirical model that can predict the EEJ current very accurately. The research has been published in the journal Space Weather.

This model, named "Indian Equatorial Electrojet (IEEJ) Model" is the first empirical model that can accurately predict the Equatorial Electrojet over the Indian sector and has been made publicly available. The model's web interface facilitates the user to simulate the EEJ for any given date and solar activity conditions; and enables to obtain output in ASCII and/or PNG graphical formats.

The model can be used to understand the unique equatorial ionospheric processes and can have applications in GNSS-based navigation/positioning, transmission lines, and the oil/gas industry that uses long-distance pipelines.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2069472>



Anti-counterfeiting ink developed using luminescent nanomaterials can curb document duplication

A novel ink with enhanced security features developed with luminescent nanomaterials can help stop counterfeiting in currency, certificates, branded goods and medicines.

Counterfeiting is a growing problem worldwide and researchers are trying to find unique ways to prevent it. Luminescent properties of rare earth ions and the characteristic emissions of bismuth have long been known.

Scientists at the Institute of Nano Science and Technology (INST), an autonomous institute of Department of Science and Technology, have used this property of rare earth materials, to synthesis a first of its kind security ink based on luminescent nanomaterials with rare earth doping, enabling excitation dependent luminescence (Under both UV and NIR light it gives Visible emission).

The ink can overcome the limitations of current covert tags, which are security features usually visible only under UV light and can be easily duplicated.

The new ink offers enhanced security features through its ability to display different colours under various light wavelengths. Specifically, the ink appears vibrant blue under 365 nm light, pink under 395 nm light, and orange-red under 980 nm near-infrared (NIR) light and remains effective under a range of light, temperature, and humidity conditions.

The luminescent nanomaterial was synthesised using a simple co-precipitation method at 120°C. After synthesis, the nanomaterials were dispersed into commercially available PVC ink using sonication (process of dispersing nanoparticles into solvent by applying sound energy).

This mixture was then used to create patterns and letters through a screen-printing technique. These printed patterns, when exposed to different wavelengths of light, clearly showed the desired colour changes, proving the effectiveness of the ink.

By combining rare earth ions with well-known luminescent properties and bismuth with characteristic emissions the team was able to enhance the encryption and decryption capabilities of the ink, improving its security potential.

The luminescent ink made from these nanomaterials has significant potential to combat counterfeiting. It can be applied to fake-proof various items, including currency, certificates, medicines, and branded products. This allows both consumers and manufacturers to easily verify the authenticity of their items, providing a simple yet powerful tool to detect counterfeits.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2069470>



Novel experiment to explore the limits of quantum theory for arbitrarily massive objects

Scientists have devised an experiment for testing the domain of validity of quantum theory for objects much more massive than the usual microphysical objects (atoms, molecules etc), beyond which the classical theory has to be necessarily used. This study can also help in developing high precision quantum sensors which are important tools in the cutting- edge quantum technologies.

The principles of Quantum Mechanics replacing that of Newtonian classical mechanics were developed nearly 100 years back. Yet, a number of quantum foundational issues remain problematic. For example, the boundary between the quantum mechanical microworld and the large scale macroscopic classical world of everyday objects obeying Newtonian Laws remains unspecified. The question--up to what level the quantum mechanical principles be valid for macroscopic objects-- continues to be one of the most fundamental open questions in contemporary physics.

This question is also intimately related to another hotly pursued fundamental issue-- testing whether gravity is quantum mechanical or not.

All the proposed laboratory-based schemes seeking to demonstrate the quantum mechanical nature of gravity crucially rest on assuming applicability of fundamental quantum principles for sufficiently massive objects.

However, the state –of- the- art demonstrations of quantum features have so far reached only up to macromolecules of masses ten thousand times the hydrogen atom. Hence, breakthrough ideas, feasible to be implemented experimentally in the near future, are the need of the hour in order to scale up the tests of macroscopic quantumness to ever more massive objects.

Prof. Dipankar Home from Bose Institute, Kolkata, an autonomous institute of the Department of Science and Technology (DST), in collaboration with D. Das, S. Bose (University College London) and H. Ulbricht (University of Southampton, UK) have addressed this challenge by formulating a novel procedure for demonstrating an observable signature of quantum behaviour for an oscillating object like pendulum having any large mass.

These scientists have found a novel way for detecting measurement induced disturbance for an arbitrarily massive quantum mechanical pendulum. They have formulated an implementable scheme based on using lasers to suspend a single nanocrystal of silica (a microscopic glass bead) as it oscillates around the focal point of a small parabolic mirror carved out of a block of aluminum housed in a vacuum chamber.

In a typical classical pendulum, the bead would move regularly from point A to point B and back again, unaffected by any observation. However, a quantum pendulum should behave very differently. Its position will change depending on whether or not someone is watching. If we were to detect at any instant where the pendulum bob was, there would be an immediate change of its future behavior. Such a disturbance is an unavoidable consequence of any measurement process involving quantum mechanical system. The scheme proposed by these scientists would enable detecting such measurement induced quantum disturbance for objects much more massive than usual microphysical objects.

Given the present state-of-the-art technology, this envisaged experiment could be realizable in the coming years for systems ranging from oscillating nano-objects (like that of a grain of dust, about trillion times heavier than hydrogen atom) to oscillating mirrors having effective mass of about 10 kg used for gravitational wave detection.

An experimental study has already been launched by one of the co-authors of this paper, Prof. H.Ulbricht and his group at University of Southampton, UK using optically levitated nano-diamonds about billion times heavier than hydrogen atom.

Thus, this work would pave the way for experiments providing the most emphatic demonstration of large scale quantumness and would open up the possibility for leveraging such macroscopic quantumness for practical applications, such as by developing high precision quantum sensors which are key ingredients in the emerging quantum technologies.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2070133>



Mon, 04 Nov 2024

First science result from Aditya-L1 mission is out

The first science result from the Aditya-L1 mission, India's first scientific mission dedicated to studying the Sun, is out.

Scientists who developed Visible Emission Line Coronagraph (VELC) onboard Aditya-L1 precisely estimated the onset time of a coronal mass ejection that erupted on the Sun on July 16. VELC is the spacecraft's primary payload.

The Indian Space Research Organisation (ISRO) launched Aditya-L1 on September 2, 2023, from the Satish Dhawan Space Centre in Sriharikota. The spacecraft's VELC payload was developed by the Indian Institute of Astrophysics (IIAp), Bengaluru.

The Sun is a very active object and often spews vast quantities of plasma in violent eruptions called coronal mass ejections (CMEs).

"These are the most powerful explosions happening in our solar system," the team of IIAp scientists involved with the VELC's operations said in a statement shared with The Hindu.

“When a CME blows past the earth, it can damage the electronics in satellites in near-earth space and disrupt radio communication networks on the earth.”

The team added that using unique data obtained with the VELC payload, members could precisely estimate the onset time of a CME that erupted from the Sun on July 16. The results of the study, by R. Ramesh, V. Muthupriyal, Jagdev Singh, K. Sasikumar Raja, P. Savarimuthu, and Priya Gavshinde, are set to be published in a forthcoming edition of the peer-reviewed journal *Astrophysical Journal Letters*.

According to the team’s statement, the study provides valuable insights into similar energetic eruptions on the Sun.

“Observation of the CMEs as they originate on the Sun and understanding their plasma characteristics is one of the major science goals for VELC, and we are happy that the instrument did exactly that,” R. Ramesh, senior professor at IIAp and the principal investigator of the VELC payload, told *The Hindu*.

Prof. Ramesh added that with the Sun approaching the maximum phase of its current solar cycle (no. 25), CMEs are expected to occur more frequently. So continuously monitoring the Sun with the VELC is expected to provide valuable scientific data.

“The CMEs are usually observed in visible continuum light only when they have propagated well away from the Sun’s surface. However, unique spectroscopic observations with the VELC like in our study, lets us study the CMEs very close to the solar surface itself for the first time,” study coauthor and IIAp project scientist Dr. Muthupriyal said.

According to Jagdev Singh, another coauthor, “Knowing the thermodynamic properties of the CMEs near the Sun are very important to understand their source regions on the Sun and VELC is precisely doing that.”

ISRO placed the Aditya-L1 spacecraft in a halo orbit around the first earth-Sun Lagrange point (or L1) on January 6, a little more than four months after its launch. The spacecraft has a mission life of five years.

<https://www.thehindu.com/sci-tech/science/aditya-l1-first-science-result-velc-coronal-mass-ejection-solar-cycle/article68825244.ece>



Fri, 01 Nov 2024

India’s first analog space mission to simulate extra-terrestrial conditions on Mars and Moon kicks off

India’s first Mars and Moon analog mission at Leh in Ladakh to simulate life in an interplanetary habitat has been inaugurated. Indian Space Research Organisation (ISRO), AAKA Space Studio

Pvt. Ltd, the University of Ladakh, IIT Bombay, and the Ladakh Autonomous Hill Development Council have collaborated in this endeavour.

Collaborative effort

ISRO on Friday posted on X (formerly Twitter), “India’s first analog space mission kicks off in Leh! A collaborative effort by Human Spaceflight Centre, ISRO, AAKA Space Studio, University of Ladakh, IIT Bombay, and supported by Ladakh Autonomous Hill Development Council, this mission will simulate life in an interplanetary habitat to tackle the challenges of a base station beyond Earth.”

Aastha Kacha, founder of AAKA Space Studio Pvt. Ltd said this mission is designed to simulate extraterrestrial conditions on Mars and the Moon, enabling India to enhance its human spaceflight capabilities.

“The mission site, located in Ladakh, was chosen for its unique environment that closely resembles Martian and lunar surfaces, offering a natural laboratory for testing habitat sustainability, life support systems, and the human experience of isolation. For the next 21 days, an analog astronaut from AAKA Space Studio will reside within the habitat, conducting essential research to support India’s human spaceflight aspirations,” Ms. Kacha said.

AAKA Space Studio further said that the mission centres on testing a human-centred habitat prototype developed by it. Designed to support both physical needs and psychological well-being, the habitat integrates a range of innovative technologies like airlock and Extra-Vehicular Activities (EVA zone), Circadian lighting system, hydroponics, environment monitoring system and stand-alone power system.

According to AAKA Space Studio, the Airlock and EVA Zone is a dedicated space for preparing for EVA while maintaining habitat integrity; the Circadian lighting system simulates natural daylight cycles to support astronauts’ sleep-wake patterns, the hydroponics and food preparation area supports sustainability and fresh food production, the stand-alone power system utilises renewable energy to ensure uninterrupted power and the environmental monitoring system tracks habitat conditions to support optimal functioning.

Why Ladakh was chosen

AAKA Space Studio said that Ladakh was chosen for its unique environmental characteristics, which closely mirror those of Mars and the Moon.

“The Diurnal shifts from 15°C to -10°C, which simulate the thermal challenges of extraterrestrial environments, enabling testing of the habitat’s thermal insulation. Situated over 3,500 meters above sea level, Ladakh’s oxygen levels are only 40% of sea level, allowing researchers to test life support systems for low-pressure conditions similar to Mars,” AAKA Space Studio said.

It further said that the region’s sandy, rocky soil resembles Martian and lunar regolith, ideal for research on rover mobility and in-situ resource utilisation.

<https://www.thehindu.com/news/national/karnataka/indias-first-analog-space-mission-to-simulate-extra-terrestrial-conditions-on-mars-and-moon-kicks-off/article68820184.ece>

Astronomers just found complex carbon molecules in space – a step closer to deciphering the origins of life

A team led by researchers at MIT in the United States has discovered large molecules containing carbon in a distant interstellar cloud of gas and dust. This is exciting for those of us who keep lists of known interstellar molecules in the hope that we might work out how life arose in the universe.

But it's more than just another molecule for the collection. The result, reported today in the journal *Science*, shows that complex organic molecules (with carbon and hydrogen) likely existed in the cold, dark gas cloud that gave rise to our Solar System. Furthermore, the molecules held together until after the formation of Earth. This is important for our understanding of the early origins of life on our planet.

Difficult to destroy, hard to detect

The molecule in question is called pyrene, a polycyclic aromatic hydrocarbon or PAH for short. The complicated-sounding name tells us these molecules are made of rings of carbon atoms. Carbon chemistry is the backbone of life on Earth. PAHs have long been known to be abundant in the interstellar medium, so they feature prominently in theories of how carbonbased life on Earth came to be.

We know there are many large PAHs in space because astrophysicists have detected signs of them in visible and infrared light. But we didn't know which PAHs they might be in particular. Pyrene is now the largest PAH detected in space, although it's what is known as a "small" or simple PAH, with 26 atoms.

It was long thought such molecules could not survive the harsh environment of star formation when everything is bathed in radiation from the newborn suns, destroying complex molecules. In fact, it was once thought molecules of more than two atoms could not exist in space for this reason, until they were actually found.

Also, chemical models show pyrene is very difficult to destroy once formed. Last year, scientists reported they found large amounts of pyrene in samples from the asteroid Ryugu in our own Solar System. They argued at least some of it must have come from the cold interstellar cloud that predated our Solar System. So why not look at another cold interstellar cloud to find some? The problem for astrophysicists is that we don't have the tools to detect pyrene directly – it's invisible to radio telescopes.

Using a tracer

The molecule the team has detected is called 1-cyanopyrene, what we call a "tracer" for pyrene. It is formed from pyrene interacting with cyanide, which is common in interstellar space. The researchers used the Green Bank Telescope in West Virginia to look at the Taurus molecular cloud or TMC-1, in the Taurus constellation.

Unlike pyrene itself, 1-cyanopyrene can be detected by radio telescopes. This is because 1-cyanopyrene molecules act as small radio-wave emitters – tiny versions of earthly radio stations.

As scientists know the proportions of 1-cyanopyrene compared to pyrene, they can then estimate the amount of pyrene in the interstellar cloud. The amount of pyrene they found was significant. Importantly, this discovery in the Taurus molecular cloud suggests a lot of pyrene exists in the cold, dark molecular clouds that go on to form stars and solar systems.

The complex birth of life

We are gradually building a picture of how life on Earth evolved. This picture tells us that life came from space – well, at least the complex organic, pre-biological molecules needed to form life did.

That pyrene survives the harsh conditions associated with the birth of stars, as shown by the findings from Ryugu, is an important part of this story. Simple life – consisting of a single cell – appeared in Earth's fossil record almost immediately (in geological and astronomical terms) after the planet's surface had cooled enough to not vaporise complex molecules.

This happened more than 3.7 billion years ago in Earth's approximately 4.5 billion history. For simple organisms to then appear so quickly in the fossil record, there's just not enough time for chemistry to start with mere simple molecules of two or three atoms.

The new discovery of 1-cyanopyrene in the Taurus molecular cloud shows complex molecules could indeed survive the harsh conditions of our Solar System's formation. As a result, pyrene was available to form the backbone of carbon-based life when it emerged on the early Earth some 3.7 billion years ago.

This discovery also links to another important finding of the last decade – the first chiral molecule in the interstellar medium, propylene oxide. We need chiral molecules to make the evolution of simple lifeforms work on the surface of the early Earth. So far, our theories that molecules for early life on Earth came from space are looking good.

<https://www.thehindu.com/sci-tech/science/astronomers-just-found-complex-carbon-molecules-in-space-a-step-closer-to-deciphering-the-origins-of-life/article68814297.ece>



Sat, 02 Nov 2024

ICMR announces 'First in the World Challenge' to encourage scientists to find innovative ideas to tackle health issues

Aimed at encouraging Indian scientists to come up with innovative ideas for finding solutions to difficult health problems, the Indian Council of Medical Research (ICMR) has announced a new initiative called "First in the World Challenge".

The Council, which is the apex body in India for the formulation, coordination and promotion of biomedical research and is one of the oldest medical research bodies in the world, said that the scheme proposes to foster novel, out of the box, futuristic ideas, new knowledge generation, discovery / development of breakthrough health technologies (vaccines, drugs/ therapeutics, diagnostics, interventions etc.), which has never been thought, tested or tried in the world till date.

“The proposal must have bold research ideas with significant wide-ranging impact and if successful should have potential ‘first of its kind’ biomedical and technological innovations for better health outcomes in the global context,” said the Council in its order.

It added that proposals aiming for ‘incremental knowledge’ or ‘process innovation’ will not be funded through this scheme. The announcement adds that this is a high risk, high reward initiative where the odds of success may be variable.

“But ICMR considers it worth taking the risk to achieve something which no one in the world has ever done before. This program believes in taking big chances for big rewards. Every attempt may not work out, but the successes will bring about a huge revolution in biomedical science,” it noted.

The proposals can be submitted by an individual or by a team of researchers (either from a single institute or from multiple institutes). The selection committee will be formed by experts of high repute, innovators, policy makers, scientists with outstanding record of conducting and nurturing research and innovation in the biomedical domain.

<https://www.thehindu.com/sci-tech/health/icmr-announces-first-in-the-world-challenge-to-encourage-scientists-to-find-innovative-ideas-to-tackle-health-issues/article68822688.ece>

THE ECONOMIC TIMES

Sun, 03 Nov 2024

Raise the Space Bar: As SpaceX provides some of cheapest satellite launches, what can ISRO do to reclaim cost advantage?

Everyone gasped when SpaceX did it the first time. April 8, 2016. The Falcon 9 rocket launched a cargo capsule to the International Space Station and its first stage landed on a floating barge off the coast of Florida, making it reusable.

It was a historic first, a spectacle like never before. October 13, 2024. Elon Musk’s Space Exploration Technologies Corp aka SpaceX raised the bar even higher when it tested the much larger and heavier Starship rocket. The party piece was the return of the first-stage booster, which was plucked out of air by the giant robotic arms of the launch tower.

The world gasped again. One of SpaceX’s greatest contributions to engineering has been the normalisation of jaw-dropping feats.

Something else also happened with each of those launches. It drastically slashed the cost to reach low-earth orbit —160-1,000 km above the surface— thereby unshackling the space economy. The baseline cost of a kilogram of payload on SpaceX is estimated to be \$5,000, a tenth of what it used to be.

This has resulted in an exponential growth in the number of satellites orbiting the earth— from 4,256 in 2016 to 10,019 in 2024. By 2030, the US Government Accountability Office projects this number to reach 58,000. That brings us to India and its space agency, the Indian Space Research Organisation (Isro).

For decades, Isro's key strength in the global space arena has been its ability to deliver by making the best use of available resources. It provided low-cost access to space, thanks to its emphasis on cost engineering and resource optimisation. But Isro no longer has the cost advantage.

It has lost that crown to SpaceX. The latter's cost of access, according to various estimates, is way below Isro's. Some analysts ET spoke to put Isro's baseline cost at four or five times that of SpaceX. In essence, as a new space economy unfolds and as the global launch services market booms, Isro is increasingly becoming uncompetitive. Isro needs to reengineer itself to compete better in this new space era.

This is something Isro chairman S Somanath himself acknowledged while delivering the Sardar Patel Memorial Lecture in New Delhi earlier this week.

“Elon Musk is making heads turn with his type of rockets, which he has captured with chopsticks. People are asking, when Isro is going to do this. I know he unsettles all of us. It is happening to the Russians, Chinese, everyone is looking at Elon Musk.” ET's mail to Isro has not got a response at the time of going to press.

FRUGAL ENGINEERING

To understand what needs to change, we need to first analyse what helped Isro have the cost advantage in the pre-SpaceX age. The guiding principle for the space agency, which was set up after scientist Vikram Sarabhai advocated for it in the 1960s, was to find ways of using space to improve the lives of millions in India.

Former Nasscom president Kiran Karnik, who was with Isro for 20 years from 1969, reminisces that the sharp focus in the initial decades was on developing engineering solutions at the lowest possible cost for the greater common good —from weather prediction to remote sensing to telecommunications.

With such applications being the starting point, launch vehicles like the Advanced Satellite Launch Vehicle and the Polar Satellite Launch Vehicle were designed keeping in mind the mass of the satellites that were being launched. This optimisation translated into engineering choices. For example, if there was a choice to be made between an expensive alloy, the higher grade 75 of aluminium, or a cheaper, lower-grade 65, Isro went for the latter.

What counted was not just the cost of the input metal, but also of tooling and the work required, which can be disproportionately higher with higher grades of metal. Another critical factor was labour arbitrage lower in India than in, say, the US. According to a space startup founder, the

starting salary for engineers in Silicon Valley is as high as \$120,000, while in India it will be a fraction of that.

The simplicity of Isro's missions also helped prune costs. While satellites with a longer life need to have levels of redundancy, most exploratory missions, including Chandrayaan and Mangalyaan, were designed for shorter mission life and had fewer components on board, all of which helped keep the costs in check.

A case in point is the payload mass of the Mars orbiter Mangalyaan, which, being a technology demonstrator, was just 13.4 kg. Meanwhile, MAVEN, a Nasa spacecraft that was also launched in November 2013, had 65 kg of various instruments as payload. Isro lost communications with Mangalyaan in 2022.

In contrast, MAVEN is still going strong. There was immense optimism around 2010 that Isro was about to dominate the launch services market. Karnik says, "Ten years back, we thought we were going to be top of the world because we felt our costs were so much lower than anybody else, even lower than the Chinese." Then SpaceX happened.

Rajeswari Pillai Rajagopalan, resident senior fellow at the Australian Strategic Policy Institute (ASPI), says cost was what made Isro competitive till around a decade ago. "They are going to have to change in a big way. But the question is if they can change, considering their overheads are of a space agency, while they are competing with nimble startups."

What SpaceX has done

Cost-optimisation, led by process, people and material, may not be enough for Isro to compete aggressively with SpaceX and a raft of other startups popping up in the launch services market—from the US to Rocket Lab in New Zealand to Chinese players like LandSpace. SpaceX's cost savings and optimisation have come from aggressively reimagining the rocket launch itself. The company approaches launches like a business, not a space agency. It emphasises on sweating the same hardware multiple times, high levels of vertical integration and increased use of robotics in manufacturing, which cuts down expenses. Its holy grail is a fully reusable rocket. For now, reusability of the first stage of a rocket saves time in not just manufacturing but also between launches.

The first stage of one such Falcon 9 rocket has been used as many as 23 times. SpaceX prefers to land Falcon 9 first stages on terra firma to reduce the cost of recovery and transportation from a barge in the ocean. It will also cut turnaround time, quite like low-cost airlines. SpaceX's approach to testing, too, is different. James Pethokoukis, senior fellow at the American Enterprise Institute, says in an essay on SpaceX, "Instead of extensive ground testing and a cautious pace to minimize launch failures—which can lead to longer development timelines and higher costs— SpaceX embraces rapid iteration and learning from failure."

What ISRO needs to do:

Is it even ISRO's dharma to compete with the likes of SpaceX? A partner in a VC firm says the two have very different mandates. "SpaceX is autocratically run by one individual and has an insane amount of capital to pursue their business, while Isro is a national space agency," he says.

While that is true, both SpaceX and Isro compete for the same satellite launches in an open market. It is too lucrative an opportunity to not put effort behind it. New Space India Ltd, the commercial arm of Isro, earned a revenue of Rs 2,940 crore and a net profit of Rs 467 crore in FY23. In contrast, Payload, a space news publication, projects “that SpaceX’s revenue will increase from \$8.7 billion in 2023 to \$13.3 billion in 2024, driven by a return to growth for customer Falcon 9 launches and Starlink’s user base growing from 2.3 million customers to 3.8 million”.

While Isro’s mandate is broader than SpaceX’s, there is serious money to be made from a massive rise in global demand for satellites and launches. Perhaps, as Rajagopalan says, the only way to do this is to increase private participation in space, just as aggressively as Nasa did in the US, giving opportunities to SpaceX.

The Indian government has belatedly woken up to the importance of involving private enterprises and tapping the commercial potential of space by setting up the Indian National Space Promotion and Authorisation Centre (IN-SPACe) and a Rs 1,000 crore fund for space startups. The startups, which were hamstrung in their initial years due to lack of risk capital for space ventures, have started finding their mojo as well as investor interest. But, Rajagopalan says, the scale and pace of involving private players may need to go up several times if India wants to compete in the launch services market of the future. Perhaps a culture change is the starting point.

Isro currently dominates India’s space apparatus. Most people in the industry, particularly founders of startups, whom ET spoke to were afraid to come on record for fear of “how ISRO will take it”. While Isro is an organisation that makes India proud with pretty much everything it does, it needs to be “more open to experimentation,” to compete in what is going to be a highly costsensitive market, as a startup founder puts it.

The government may need to invest more. The latest budget saw a 4% increase in allocation to the Department of Space to Rs 13,042.75 crore, which, while welcome, may not be enough for Isro to push the boundaries. There is also a fear that an emphasis on space applications that has made Isro what it is today, has been diluted by a growing focus on more headlinegrabbing projects. This takes attention away from boring but critical projects.

An example of this is the Reusable Launch Vehicle-Technology Demonstrator, which was test flown in 2016. It took another eight years for the next test to happen, which was an autonomous landing mission. The long gap, say those in the know, happened because it was not prioritised by India’s space administration. “Access to space has become important. Reusability has become important,” Somanath said at the lecture, indicating some of the areas Isro needs to work on. “Miniaturisation of systems, especially electronics and software, and bringing intelligence into the systems have really enabled faster development cycles, less development costs.” Now, SpaceX has captured a rocket and thrown down the gauntlet in space. Isro has its task cut out.

<https://economictimes.indiatimes.com/news/science/raise-the-space-bar-as-spacex-provides-some-of-cheapest-satellite-launches-what-can-isro-do-to-reclaim-cost-advantage/articleshow/114889658.cms>

Voyager 1 ‘phones home’ after 43 years using 1981 tech across 15 billion miles

NASA's Voyager 1 spacecraft, now 47 years old, successfully reestablished communication with Earth on October 24 after a brief period of radio silence. This contact was facilitated through a rarely used radio transmitter, the S-band, which had not been activated since 1981.

The spacecraft, currently over 15 billion miles away in interstellar space, experienced a communication interruption starting on October 16, attributed to a shutdown of one of its transmitters.

Understanding the Communication Breakdown

The communication issue arose when the spacecraft's fault protection system activated due to high power usage, shutting down its primary X-band transmitter. This automated system is designed to conserve energy by turning off non-essential functions when necessary.

NASA engineers sent commands to the spacecraft on October 16 but were unable to detect any response until October 18. Communication halted entirely by October 19, prompting an investigation by the team at the Jet Propulsion Laboratory (JPL) in California.

Switching to the S-band Transmitter

Upon investigation, the team discovered that Voyager 1 had switched to the Sband transmitter, which consumes less power but has not been utilized for communication in decades. The S-band operates on a different frequency and transmits signals that are significantly weaker than those from the X-band. After confirming that the S-band was operational with a command on October 22, NASA received a response on October 24.

Caution Moving Forward

NASA engineers are proceeding cautiously as they analyze the cause of the fault protection activation. They are refraining from switching back to the Xband transmitter until they can determine the underlying issue. “Engineers are being cautious because they want to determine whether there are any potential risks to turning on the X-band,” stated Bruce Waggoner, Voyager mission assurance manager.

Voyager’s Historical Significance

Launched in 1977, Voyager 1 is the first human-made object to enter interstellar space. It has provided invaluable data, including discoveries of new moons and rings around Jupiter and Saturn. Despite the challenges of aging technology, the mission continues to yield significant scientific insights as it ventures further into the cosmos.

The recent communication challenge highlights the ongoing complexities faced by NASA as it manages the aging Voyager mission. The engineering team is now focused on ensuring the spacecraft's continued operation while investigating the recent anomalies.

<https://economictimes.indiatimes.com/news/science/voyager-1-phones-home-after-43-years-using-1981-tech-across-15-billion-miles/articleshow/114875351.cms>



Sun, 03 Nov 2024

Large Hadron Collider wraps up 2024 run of proton-proton collisions

The Large Hadron Collider has completed a highly successful run of colliding protons using a pair of beams circulating in opposite directions. By boosting particles to high energies, making them collide, and then carefully examining the resulting shower of short-lived particles, scientists can test and validate existing theories of physics, and potentially uncover unknown physics beyond human knowledge.

The performance of the Large Hadron Collider allowed scientists to gather much more data on particle interactions than all the previous proton collision runs conducted so far, thanks to significant upgrades to the world's most powerful particle accelerator.

There are a number of experiments or particle detectors positioned around the Large Hadron Collider, each of which are investigated by thousands of scientists from hundreds of academic institutions around the world. Most of the sub-detectors in the LHCb experiment was replaced or upgraded with the demanding data-gathering operations.

The upgrades allowed the particle physicists to gather more data and conduct more precise measurements. Apart from interactions between protons, the run has also allowed scientists to probe the collisions between protons and a variety of gases, potentially providing more valuable insights on particle interactions to scientists.

A constantly upgraded instrument

The Large Hadron Collider is being constantly upgraded between observation runs, allowing for capturing information on particle interactions at increasingly higher energy levels.

Along with the hardware for the acceleration and the detection, the data acquisition and trigger systems have also been upgraded, with the events being assembled at a bandwidth of 40 Tb per second.

Graphic Processing Units provide the first layer of event selection, followed by more sophisticated algorithms that are using an upgraded computer farm, providing scientists with real-time analysis

of collisions. Nearly 40 petabytes of data were collected during the run, that has been distributed to over 20 computing centres across the world for further analysis.

<https://www.news9live.com/science/large-hadron-collider-wraps-up-2024-run-of-proton-proton-collisions-2740253>

