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Thu, 05 May 2022

स्वदेशी तोप करेगी दुश्मन को नेस्तनाबूत, राजस्थान में हुआ सफल परीक्षण, जानें खासियत

भारत-पाक अंतरराष्ट्रीय सीमा स्थित सरहदी जिले की पोकरण फील्ड फायरिंग रेंज में सात दिनों तक लगातार एडवांस टोड आर्टिलरी गन सिस्टम एटीजेएस का परीक्षण किया गया। डीआरडीओ व सेना के अधिकारियों के निर्देशन में गत 26 अप्रैल से शुरू एटीजेएस तोप का परीक्षण दो मई को पूरा हुआ। सरहद पर हुए इस परीक्षण ने दुश्मन देश को भारत ने अपनी शक्ति का परिचय दिया है। गौरतलब है कि इस तोप का निर्माण करने वाली भारत में ही दो कंपनियों भारत फोर्ज लिमिटेड व टाटा एडवांस्ड सिस्टम्स लिमिटेड की ओर से छह-सात परीक्षण किए जा चुके हैं। 26 जनवरी 2017 को गणतंत्र दिवस परेड में इसका प्रदर्शन किया गया था। 155 एमएम व 52 केएल के नाम से पहचानी जाने वाली एटीजेएस तोप का माइनस तीन डिग्री तापमान में पूर्व में परीक्षण किया गया था। अब पोकरण फील्ड फायरिंग रेंज में 45 डिग्री से अधिक तापमान में इसका सफल परीक्षण किया गया है। सूत्रों के अनुसार यह तोप 48 किमी दूर बैठे दुश्मन के ठिकाने को नेस्तनाबूत करने की शक्ति रखती है। अब इसकी रेंज को 48 से बढ़ाकर 52 किमी तक करने का परीक्षण किया है।

2016 में पहला परीक्षण

- एटीजेएस तोप का पहला परीक्षण 2016 में किया गया था।
- इस तोप का वजन 18 टन है।
- यह सबसे लंबी दूरी तक वार करने में सक्षम स्वदेशी तोप है।
- यह तोप माइनस तीन डिग्री से प्लस 75 डिग्री तक एलिवेशन ले सकता है।
- इसकी फायरिंग रेंज 48 से 52 किमी तक बढ़ाने का प्रयास किया जा रहा है।
- इस सिस्टम को विकसित करने में करीब चार वर्ष लगे।

- भारतीय सेना के पास 155 एमएम की ऐसी फिलहाल सात गन हैं।

- इस तोप के बैरल की लंबाई 8060 मिलीमीटर है।

<https://www.patrika.com/jaipur-news/drdo-successfully-test-fired-advanced-towed-artillery-gun-in-rajasthan-7509830/>

Defence News

Defence Strategic: National/International

THE ECONOMIC TIMES

Wed, 04 May 2022

Deputy NSA visits Tanzania to widen Defence ties in Indian ocean region

Deputy national security adviser Vikram Misri visited Tanzania this week to strengthen defence ties with one of India's key partners in Eastern Africa and Indian Ocean Region (IOR) through measures including export of defence products. The two sides decided to boost bilateral defence ties, including capacity building, meeting Tanzania's defence requirements from India, besides agreeing to enhance maritime security cooperation, said officials.

Security partnership was a key element of Misri's talking points with the top leadership of Tanzania, which has a long coastline along the Indian Ocean Region, where India has been a net security provider. The Indian Ocean is the most important part of India's emerging maritime strategy, and in the quest to secure its interests in the strategic ocean, India aims to expand its security profile in East Africa. In the past few years, Mozambique has emerged as a key security partner for India in the region.

Misri's visit comes in the backdrop of efforts by China to build more overseas military bases in the Indian Ocean Region. India has traditionally enjoyed close political relations with Tanzania. From the 1960s to the 1980s, the political relationship involved shared commitments to anti-colonialism, non-alignment as well as South-South Cooperation and close cooperation in international fora.

<https://economictimes.indiatimes.com/news/defence/deputy-nsa-visits-tanzania-to-widen-defence-ties-in-indian-ocean-region/articleshow/91325319.cms?from=mdr>

Thu, 05 May 2022

Defence Ministry engages with private players to manufacture military items

The Indian Air Force Wednesday reached out to the domestic defence industry seeking their response on manufacturing eight military items, including simulators for Apache and Chinook helicopters, and communication systems. Besides that, three projects of the army, an Indian light tank, an autonomous combat vehicle, and integrated surveillance and targeting system for mechanised forces, too, have been offered to the Indian industry for design and development under the categories of Defence Acquisition Procedure (DAP)-2020. The move aims at rolling out the government's initiative to indigenise large parts of the defence procurement of three services of the army, air force, and navy, which are heavily dependent on imports. The industry will be provided financial support for the prototype development of these projects, said the Defence Ministry.

"This is for the first time since the launch of Industry friendly DAP-2020 that Indian Industry has been involved in the development of big-ticket platforms such as Light tank and Communication Equipment with Indian Security protocols," the Ministry pointed out indicating the seriousness of the exercise. The IAF, which organised a webinar, gave different presentations to the industry representatives to create awareness about the eight projects, three of them under Make-I and another five under Make-II categories, said the IAF.

Details of the meeting

The idea was to introduce and let the private industry know the IAF expectations and also hear their problems, said the air force sources present at the meeting. "Now, they have to come back with proposals on each of the projects briefed to them virtually," the sources added. The list of projects was accorded 'Approval In-Principle (AIP)' by the collegiate committee of the Defence Ministry. Other projects of the IAF Airborne Electro-Optical pod with Ground-Based System, Wearable Robotic Equipment for Aircraft Maintenance, Airborne Stand-off Jammer and Design & Development of Automatic Take-Off/Landing Recording System (ATORS). The IAF interaction with private players through the webinar was organised by the Society of Indian Defence Manufacturers (SIDM) — the apex body of the Indian defence industry.

<https://www.thehindubusinessline.com/news/national/defence-ministry-engages-with-private-players-to-manufacture-military-items/article65382447.ece>

Thu, 05 May 2022

‘Strategic Partnership’ Defence projects have yet to take off after five years

Not a single project has taken off under the much-touted ‘Make in India’ strategy five years after the strategic partnership (SP) model was promulgated to increase domestic defence manufacturing through tie-ups with international arms manufacturers. Long-term joint ventures between Indian companies and OEMs (original equipment manufacturers) with “deep and extensive” technology transfers were among the SP model projects identified by the defence ministry, ranging from the manufacture of new-generation submarines and helicopters to advanced fighters and futuristic main-battle tanks. However, the first project, Project-75 India (P-75I), to build six diesel-electric stealth submarines with airindependent propulsion for greater underwater endurance at an initial estimated cost of Rs 43,000 crore, is still a long way from being signed after the lengthy initial shortlisting and tender process.

The defence ministry sent the RFP (request for proposal) in July of last year to Mazagon Docks, a defence shipyard, and L&T, a private shipbuilder, who were to team up with one of the five shortlisted OEMs to submit techno-commercial proposals for the massive project. Naval Group-DCNS (France), Rosoboronexport (Russia), ThyssenKrupp Marine Systems (Germany), Navantia (Spain), and Daewoo (South Korea) were the foreign shipbuilders (South Korea). “Both the French and the Russians have publicly withdrawn from the competition. Two more people have raised concern about the technical and commercial situations,” a defence official said on Tuesday.

The other SP initiatives are still in the early stages of development. One of them is the Navy’s long-awaited purchase of 111 armed, twin-engine utility choppers for over Rs 21,000 crore to replace its single-engine Chetak helicopter fleet. Another is the Indian Air Force’s (IAF) quest for 114 new 4.5-generation fighters with “some fifth-generation capabilities” for over Rs1.25 lakh crore, which has seven international candidates but has failed to receive the defence ministry’s initial “acceptance of necessity.” The Army also published an RFI (request for information) in May-June of last year for the acquisition of 1,770 “future ready combat vehicles” or tanks in a staggered way.

“All of the SP model initiatives are stalled, raising serious doubts about the policy as a whole.” The deadline for submitting bids in P-75I, for example, has been repeatedly extended, and now stands at June 30,” according to another source “The SP model policy’s pricing methodology, which was announced in May 2017, is incorrect. Furthermore, long-term collaborations necessitate consistent and recurring orders, which are now prohibited under the guidelines,” he noted. The SP model was created with the intention of gradually developing capacities in the Indian private sector to design, develop, and produce complex weaponry for the armed forces’ future needs. “However, the public sector pushed its way in as well. “The entire approach needs to be reexamined,” an official stated.

<https://defenceaviationpost.com/strategic-partnership-defence-projects-have-yet-to-take-off-after-five-years/>

Thu, 05 May 2022

Army organising symposium to identify indigenous Defence technologies and hardware

The Northern Command of the Indian Army is holding a technology Symposium to provide a platform to the Indian vendors so that indigenous technology and hardware can be identified and used in the country's most active areas of operation. The Army in a statement on Wednesday said, "The symposium will pave the way to identify suitable technologies and products for subsequent trials and induction in Northern Command. As it will provide a unique platform to all vendors to come and showcase their products, innovations and technical capabilities." In total 160 vendors have been invited. The initiative will enhance the technical knowledge base of the participants through joint Army – Industry participation and acquaint everyone with the prevalent state of the technology.

"It will establish an ecosystem which is one of a kind for promoting an environment for knowledge diffusion on contemporary defence technologies," the Army said. North Tech Symposium is a major event that is conducted annually and this year it is being conducted after a gap of two years due to COVID. Northern Command looks after active borders with China and Pakistan along the Line of Actual Control and Line of Control respectively. In addition, the counter-insurgency and counter-terror operations in Jammu and Kashmir are also under its responsibility.

<https://www.newindianexpress.com/nation/2022/may/05/army-organising-symposium-to-identify-indigenous-defence-technologies-and-hardware-2449812.html>

THE TIMES OF INDIA

Thu, 05 May 2022

India-France Defence partnership strong, in line with Atmanirbhar Bharat: MEA

hasizing the strong strategic and defence partnership between India and , Foreign Secretary on Wednesday (local time) said that the defence cooperation between the two countries is in line with "our own domestic policy of Atmanirbharta (selfreliance)". The Foreign Secretary made the remarks while addressing a press briefing at the conclusion of the bilateral and delegation-level talks between Prime Minister and French President Emmanuel Macron.

Answering a question of possible agreements during the talks on further upgradation and orders of the French fighter aircraft Rafale, Foreign Secretary said that the talks did not necessarily cover individual platforms. "I think what you need to realise is when the two strategic partners speak, it covers the discussion in a format which is not necessarily focused on transactions on individual platforms," Foreign Secretary said. Talking further about the defence cooperation

between India and France, the Foreign Secretary reiterated that the two countries "are very strong strategic partners, and also have a very strong defence partnership".

The context of defence partnership is defined in the case of our two countries by not just trade in different platforms, but it also extends to co-development, co-designing, comanufacturing," Kwatra said. "This is also very much in sync and in line with our own domestic policy of Atmanirbharta, which also ofcourse extends very strongly in the field of defence," he added. The joint statement released by India and France at the end of the Prime Minister's visit also talked about the greater involvement of France in "Atmanirbhar Bharat" (self-reliant India). "As seen in the timely delivery of the Rafale despite the pandemic, the two sides enjoy synergy in the field of defence," the joint statement read.

"Taking forward this momentum, and based on their mutual trust, both sides agreed to find creative ways for France's deeper involvement in the 'Atmanirbhar Bharat' (Self-reliant India) efforts in advanced defence technology, manufacturing and exports, including through encouraging increased industry to industry partnerships," the statement added.

Both sides also welcomed the "ongoing intense cooperation across all defence domains" in the joint statement. Answering another question, on the possibility of coproduction of Rafale aircraft with France in India by the Hindustan Aeronautics Limited (HAL), Foreign Secretary Kwatra said that he could not comment specifically on that, but highlighted that there are many possibilities. "With regard to the co-production, possibilities... look, it's a very broad scope, and it's a very broad field of substance, and anything can be discussed and is possible in terms of what two countries can eventually agree to co-produce," Kwatra said. "So, I don't have a very specific answer to give you on that, but I think, it includes many possibilities," he added. The comments came on the final day of the three-day Europe visit of PM Modi, during the course of which the Prime Minister visited Germany and Denmark, before making a brief stopover in Paris.

<https://timesofindia.indiatimes.com/india/india-france-defence-partnership-strong-in-line-with-atmanirbhar-bharat-mea/articleshow/91329772.cms>



Thu, 05 May 2022

'Committed to Aatmanirbhar Bharat': France's naval group on submarine project

Earlier this week the French company said it would be unable to participate in India's P-75I submarine project because of conditions related to the DRDO's AIP system French company Naval Group on Tuesday said it remains 'fully committed' to India's 'aatmanirbhar Bharat' plans for maritime defence and that it shared the 'same bilateral trust and strategic ties' that marked the relationship between the two countries. "We continue to strengthen our existing commitments and close association with the industry and the Indian Navy... as such focusing efforts on integration of indigenous technology, such as AIP (air independent propulsion) from DRDO

(Defence Research and Development Organisation) in Indian Navy submarines," the firm tweeted.

Clarification on continued strong ties with India and the Indian Navy comes after the company this week said it was unable to participate in the government's P-75I submarine project, under which six conventional subs are to be built (domestically) for the country's naval defence.

<https://www.hindustantimes.com/india-news/committed-to-aatmanirbhar-bharat-france-s-naval-group-on-submarine-project-101651643285868.html>



Thu, 05 May 2022

Russia practises nuclear-capable missile strikes, says Defence ministry

After sending troops to Ukraine in late February, Russian President Vladimir Putin has made thinly veiled threats hinting at a willingness to deploy Russia's tactical nuclear weapons. Russia on Wednesday said its forces had practised simulated nuclear-capable missile strikes in the western enclave of Kaliningrad, amid Moscow's military campaign in Ukraine. The announcement came on the 70th day of Moscow's military action in the pro-Western country, with thousands killed and more than 13 million displaced in the worst refugee crisis in Europe since World War II.

After sending troops to Ukraine in late February, Russian President Vladimir Putin has made thinly veiled threats hinting at a willingness to deploy Russia's tactical nuclear weapons. During Wednesday's war games in the enclave on the Baltic Sea located between EU members Poland and Lithuania, Russia practised simulated "electronic launches" of nuclear-capable Iskander mobile ballistic missile systems, the defence ministry said in a statement. The Russian forces practised single and multiple strikes at targets imitating launchers of missile systems, airfields, protected infrastructure, military equipment and command posts of a mock enemy, the statement said.

After performing the "electronic" launches, the military personnel carried out a manoeuvre to change their position in order to avoid "a possible retaliatory strike," the defence ministry added. The combat units also practised "actions in conditions of radiation and chemical contamination". The drills involved more than 100 servicemen. Russia placed nuclear forces on high alert shortly after Putin sent troops to Ukraine on February 24. The Kremlin chief has warned of a "lightning fast" retaliation if the West directly intervenes in the Ukraine conflict. Observers say that in recent days, Russia's state television has attempted to make nuclear weapons use more palatable to the public. "For two weeks now, we have been hearing from our television screens that nuclear silos should be opened," Russian newspaper editor and Nobel Peace Prize laureate Dmitry Muratov said on Tuesday.

<https://www.hindustantimes.com/world-news/russia-practises-nuclear-capable-missile-strikes-says-defence-ministry-101651724855318.html>

Air Force destroys target vessel with ship-killing JDAM

The Air Force last week tested its new ship-killing guided bomb by using it to destroy a full-scale target vessel in the Gulf of Mexico. An F-15E Strike Eagle from Eglin Air Force Base in Florida on April 28 released a GBU-31 joint direct attack munition, or JDAM, that had been modified to strike a maritime target, the Air Force said in a release. This is the Air Force Research Laboratory's second test of this maritime JDAM concept, called the QUICKSINK Joint Capability Technology Demonstration. The first test in August used dummy versions of the weapon to make sure the redesigned weapon could hit different points on a target once released.

It represents a major step forward in the Air Force's ability to sink a ship. And it comes at a time of increasing concern about the potential for a conflict with a major power with a significant naval force. The U.S. military is worried about China's growing military capability and the possibility it could try to launch a swift invasion of the island nation of Taiwan. And last month, the Ukrainian military sunk the Russian Black Sea Fleet flagship Moskva in a stunning strike with its Neptune anti-ship cruise missiles. "QUICKSINK is an answer to an urgent need to neutralize maritime threats to freedom around the world," Col. Tony Meeks, director of AFRL's munitions directorate, said in the release.

The 2,000-pound GBU-31 JDAM is GPS-guided, but not self-propelled. After being released from an aircraft, the launching plane's speed and gravity give the JDAM velocity while fins guide it toward its intended target. The maritime version is intended to be able to hit both stationary and moving targets on the water. In a September 2021 interview with Military.com, Meeks said one of the bomb's modifications was a redesigned nose plug. This is intended to keep the bomb from veering off in an unintended direction if it hits the water before the target, which Meeks likened to skipping a stone across the surface of a pond. "What we're trying to understand is the physics, the dynamics, to prevent a JDAM from skipping off the surface of the water," Meeks said last September.

The Air Force is hoping this JDAM will give the service a new way to kill ships at a lower cost. Unlike traditional torpedoes launched by submarines, it would not travel under the water's surface to a target. "Heavy-weight torpedoes are effective [at sinking large ships] but are expensive and employed by a small portion of naval assets," Maj. Andrew Swanson, chief of advanced programs for the 85th Test and Evaluation Squadron at the 53rd Wing, said in the release. "With QUICKSINK, we have demonstrated a low-cost and more agile solution that has the potential to be employed by the majority of Air Force combat aircraft, providing combatant commanders and warfighters with more options."

The Air Force also said last year the GBU-31's GPS guidance system would be a major step up from the older GBU-24's laser guidance. If a laser-guided bomb were released against a ship, the pilot would have to loiter in the area and continue to illuminate the target with the laser until it strikes. This could put the pilot at risk of being shot down by the targeted ship. But after releasing a GPS-guided maritime weapon, the pilot could get out of the ship's range right away. And the GBU-31's GPS guidance would be able to work in all weather conditions, as opposed to laser-guided weapons, which can have difficulty operating in cloudy environments.

AFRL said its scientists and engineers are using the open systems architecture concept to develop the bomb's seeker that guides it in to the target. By using open systems architecture, AFRL said, the service will be able to "plug-and-play" components from different manufacturers, which it hopes will keep costs down and improve performance.

<https://www.defensenews.com/air/2022/05/04/air-force-destroys-target-vessel-with-ship-killing-jdam/>

Science & Technology News



पत्र सूचना कार्यालय
भारत सरकार

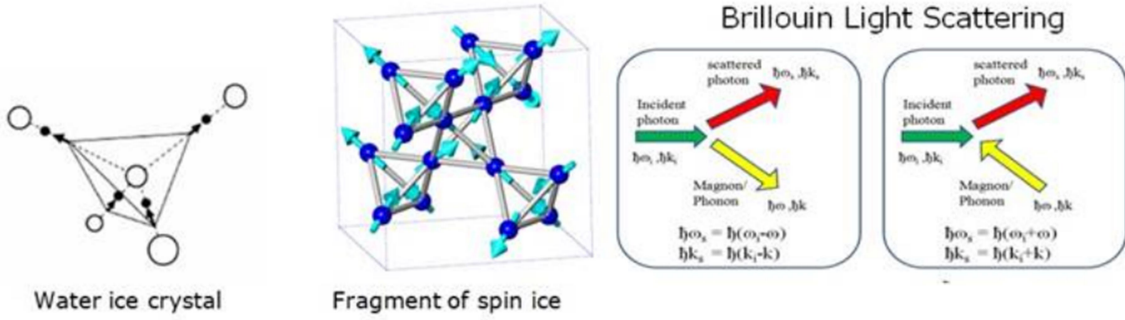
विज्ञान एवं प्रौद्योगिकी मंत्रालय

Thu, 04 May 2022 3:55 PM

शोधकर्ताओं ने पुनर्विन्यास किए जाने वाले मैगनॉन क्रिस्टल के व्यापक डिजाइन और इंजीनियरिंग के तरीकों की खोज की, जिनसे इलेक्ट्रॉनों के मुकाबले ज्यादा सक्षम तरीके से सूचना का हस्तांतरण संभव होगा

मैगनॉन भविष्य में कभी हमारे विचारों के वाहक के रूप में इलेक्ट्रॉन की जगह ले सकता है और अधिक सक्षम तरीके से नियंत्रण कर सकते हैं। शोधकर्ताओं ने पुनर्विन्यास किए जाने वाले प्रकार्यात्मक मैगनॉमिक क्रिस्टल के व्यापक डिजाइन और इंजीनियरिंग के तरीके खोजे हैं, जो मैगनॉन आधारित कंप्यूटिंग सिस्टम का मार्ग दिखा सकते हैं और कंप्यूटिंग व संचार उपकरणों में बदलाव का एक मिसाल पेश कर सकते हैं। इलेक्ट्रॉन सबसे हल्का ज्ञात कण है जो प्रोटॉन से लगभग दो हजार गुना हल्का है और सभी 'इलेक्ट्रॉनिक' उपकरणों में सूचना के वाहक हैं।

जैसे ही सीपीयू के सेमीकंडक्टिंग डिवाइस में इलेक्ट्रॉनों का प्रवाह होता है, वैसे ही संकेत तकरीबन प्रकाश की गति से मिलता है। हालांकि, यह प्रवाह वाइस में गर्मी उत्पन्न करता है, जिसे सीपीयू से बाहर निकालना पड़ता है।



इसलिए, दुनियाभर के वैज्ञानिक ऐसी सामग्री की खोज कर रहे हैं जिसमें चुंबकीय घूर्णन तरंगों का उपयोग गर्मी पैदा किए बिना सूचना के परिवहन के लिए किया जा सके। मैग्नोंन घूर्णन तरंगों के कण अवतार हैं जो नैनो आयामों के सूक्ष्म लौह चुंबकीय कणों की जाली के माध्यम से तरंगित हो सकते हैं। चूंकि मैग्नोंन कणवत होते हैं, इसलिए सामग्री के माध्यम से उनकी गति से किसी तरह की गर्मी उत्पन्न नहीं होती है। मैग्नोंन से नैनोसाइंस में एक उभरते अनुसंधान क्षेत्र, मैग्नाॅनिक्स पैदा हुआ है जो आवधिक चुंबकीय माध्यम के जरिये मैग्नाॅन्स या घूर्णन तरंगों को उत्तेजना, प्रसार, नियंत्रण और पता लगाने से संबंधित है।

विज्ञान और प्रौद्योगिकी विभाग के स्वायत्त संस्थान, एसएन बोस नेशनल सेंटर फॉर बेसिक साइंसेज में स्पिंट्रोनिक्स एंड स्पिन डायनामिक्स लैब के शोधकर्ता वैज्ञानिकों ने हाल ही में 'आर्टिफिशियल स्पिन आइस' के साथ मैग्नाॅटिक्स का विलय कर दिया है, जिससे व्यापक डिजाइन और इंजीनियरिंग के पुनर्विन्यास करने वाले प्रकार्यात्मक मैग्नाॅनिक क्रिस्टल के लिए तरीकों बन गए हैं। कृत्रिम घूर्णन बर्फ यानी एएसआई विभिन्न जाली पर व्यवस्थित युग्मित नैनोमैग्नेट से बने अधिसामग्री हैं। 'आइस' नाम चतुष्फलक के आकार के बर्फ क्रिस्टल के साथ आणविक संरचना में समानता से आया है जिसमें दो हाइड्रोजन परमाणु केंद्रीय ऑक्सीजन परमाणु के करीब होते हैं, और दो दूर होते हैं। घूर्णन बर्फ सामग्री भी कोने से जुड़े चतुष्फलक से बनी होती है। चतुष्फलक का प्रत्येक शीर्ष एक चुंबकीय आयन है जिसमें चुंबकीय गुरुत्व होता है। अपनी कम ऊर्जा की स्थिति में, वे दो भीतर और दो बाहर की व्यवस्था का अनुपालन करते हैं।

कृत्रिम स्पिन आइस (एएसआई) सिस्टम स्पिन आइस सिस्टम के सिद्धांतों को दोहराते हैं। वैज्ञानिकों के अनुसार, 'एएसआई के एक प्रकार्यात्मक मैग्नाॅनिक क्रिस्टल के रूप में सफल उपयोग उनके चुंबकीय सूक्ष्म स्थिति और आगामी घूर्णन तरंग गुणों की कुशल पुनर्विन्यास क्षमता पर निर्भर करेगा।' संक्षेप में यही उनके शोध का निष्कर्ष है।

अध्ययन का विषय एस एन बोस सेंटर और इंपीरियल कॉलेज, लंदन के बीच सहयोग है। जबकि एएसआई संरचनाएं डॉ विलियम की अध्यक्षता में प्रयोगशाला में इम्पीरियल कॉलेज में गढ़ी गई हैं। आर.

ब्रैनफोर्ड, एस.एन. बोस सेंटर में प्रो. अंजान बर्मन की टीम, इन एएसआई संरचनाओं में मैगनॉन के व्यवहार का अध्ययन कर रही है। संस्थान में विकसित एक प्रयोगात्मक संरचना का उपयोग करते हुए एस एन बोस सेंटर के वैज्ञानिक ब्रिलुवां प्रकाश प्रकीर्णन (बीएलएस) के माध्यम से नमूनों का अध्ययन कर रहे हैं। बीएलएस मैगनॉन्स या फोनॉन्स जैसे अर्धकणों से प्रकाश क्वांटम फोटॉन की एक लोचहीन प्रकाश प्रकीर्णन घटना है, जो बाहरी चुंबकीय क्षेत्र के प्रभाव में घूर्णन तरंग प्रसार और प्रकीर्णन को समझने में मदद कर सकता है।

पहले के प्रयोगों में मुख्य रूप से लौह-चुंबकीय प्रतिध्वनि तकनीक (एफएमआर) का इस्तेमाल किया जाता था, जिससे एएसआई के वैश्विक या बड़े पैमाने पर व्यवहार का अध्ययन करने में मदद मिलती थी। इसलिए, बीएलएस विधि पहले की प्रायोगिक विधियों से अलग है। बीएलएस का उपयोग करने वाले प्रायोगिक अवलोकनों को सिमुलेशन के माध्यम से समेकित और बहिर्वेशित किया जाता है। एसीएस प्रकाशनों में प्रकाशित उनके अध्ययन से पता चलता है कि एएसआई सिस्टम संभावित रूप से चुंबकीय सूक्ष्म स्थिति की एक विशाल विविधता को जन्म दे सकता है, जिसे वैश्विक या स्थानीय रूप से चुंबकीय क्षेत्र द्वारा नियंत्रित किया जा सकता है। इससे बाहरी चुंबकीय क्षेत्र में सूक्ष्म परिवर्तन, जैसे ओरिगेमी या कैलाइडोस्कोप द्वारा विभिन्न चुंबकीय क्रिस्टलों की प्रभावी रचना होगी। इसलिए, मैगनॉटिक सर्किट के घटकों के विभिन्न कार्य एक ही सक्रिय तत्व या मैगनॉनिक क्रिस्टल में केवल एक मामूली चुंबकीय क्षेत्र को बाहरी रूप से ट्यून करके किए जा सकते हैं जिनमें लागत और ऊर्जा की काफी बचत हो सकती है।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1822816>



Thu, 04 May 2022

Powerful Data Acquisition system to process space data obtained by the largest digital camera on earth

The Rubin Observatory's LSST Camera will take enormously detailed images of the night sky from atop a mountain in Chile. Down below the mountain, high-speed computers will send the data out into the world. What happens in between?

When the Vera C. Rubin Observatory begins photographing the night sky in a few years, its centerpiece 3,200 megapixel Legacy Survey of Space and Time camera will provide a massive amount of data useful to everyone from cosmologists to individuals who track asteroids that may strike Earth. You may already have read about how the Rubin Observatory's Simonyi Survey Telescope will gather light from the universe and shine it on the Department of Energy's LSST

Camera, how researchers will manage the data that comes from the camera, and the myriad things they'll try to learn about the universe around us.

What you haven't read about is how researchers will get that mountain of very detailed photos off the back of the world's biggest digital camera, down fiber optic cables, and into computers that will transmit them off Cerro Pachón in Chile and out into the globe. Gregg Thayer, a scientist at the U.S. Department of Energy's SLAC National Accelerator Laboratory, is the person in charge of Rubin's data acquisition system, which handles this essential process. Here, he walks us through some of the key steps. The data acquisition system starts right at the back of the focal plane, a composite of 189 digital sensors used to take night-sky images, plus several more used to line up the camera when taking images. 71 circuit boards take the raw pixels off the sensors and ready them for the next step.

At this point, two things need to happen. First, the data needs to get out of the cryostat, a high-vacuum, low-temperature and, Thayer says, "jam-packed" cavity that houses the focal plane and the surrounding electronics. Second, the data needs to be converted into optical signals for the fibers that go to the base of the camera. Because there's so little space inside the cryostat, Thayer and his team decided to combine the steps: Electrical signals first enter circuit boards that penetrate the back of the cryostat. Those circuit boards convert the data to optical signals that are fed into fiber optic cables just outside the cryostat.

Why fiber optics? Data inevitably fades into noise if you go far enough along a signal cable, and the cable here has to be long – around 150 meters, or 500 feet, to make it from the top of the telescope to the base. The problem is compounded by a three gigabit per second data rate, around a hundred times faster than standard internet; low power at the source to reduce heat near the digital camera sensors; and mechanical constraints, such as tight bends, that require cable interconnects where more signal is lost. Thayer says that copper wires designed for electrical signals, can't transmit data fast enough over the distances required, and even if they could, they're too big and heavy to meet the mechanical demands of the system.

Once the signal makes it down from the camera, it feeds into 14 computer boards developed at SLAC as part of a general-purpose data acquisition system. Each board is equipped with eight onboard processing modules and 10 gigabit-per-second Ethernet switches that connect the boards together. (Each board also converts the optical signals back to electrical ones.) Three of those boards read out the data from the camera and prepare it to be sent down the mountain and out to the U.S. data facility at SLAC and another in Europe. Three more emulate the camera itself – essentially, they allow researchers working on the project to practice taking data, perform diagnostics, and so on when the camera itself is unavailable, Thayer says.

The final eight boards serve a crucial but easily overlooked purpose. "There's a cable that goes down the mountain from the summit to La Serena, where it can get on the long-haul network to the U.S. and European data facilities," Thayer says. "If that cable is cut for whatever reason, we can buffer up to three days' worth of data to allow the telescope to keep operating during the repair."

From the base of the telescope, there's that one final leg down the mountain, and then data acquisition is complete. It's time for the data to head out into the world – but you can read about that here, here, and here. Vera C. Rubin Observatory is a federal project jointly funded by the National Science Foundation and the Department of Energy Office of Science, with early construction funding received from private donations through the LSST Corporation. The NSF-

funded LSST (now Rubin Observatory) Project Office for construction was established as an operating center under the management of the Association of Universities for Research in Astronomy (AURA). The DOE-funded effort to build the Rubin Observatory LSST Camera (LSSTCam) is managed by SLAC.

<https://scitechdaily.com/powerful-data-acquisition-system-to-process-space-data-obtained-by-the-largest-digital-camera-on-earth/amp/>



Thu, 04 May 2022

India can put a spacecraft on Venus in very short time, plan ready: S Somnath

The mission will be aimed at studying the Venusian atmosphere, which is toxic and corrosive in nature with clouds of sulfuric acid covering the planet. After successfully sending missions to the Moon and Mars that have established India as a space-faring nation, the Indian Space and Research Organisation (Isro) is ready to send an orbiter to Earth's mysterious twin — Venus. Isro chairman S Somnath, during a one-day meeting to discuss space-based studies, said that the capability of building and launching a mission to the planet exists with India.

The mission will be aimed at studying the Venusian atmosphere, which is toxic and corrosive in nature with clouds of sulfuric acid covering the planet. Isro chairman said that work on the mission has been going on for years and that the space agency is ready with a mission plan and funds needed to sustain the exploration. "Work has been going for years. Currently, the Venus mission is conceived, the project report is made, overall plans are ready, money identified, all that thing is done. Building and putting a mission on Venus is possible for India in a very short space of time, as the capability today exists with India," Somnath said.

WHY IS VENUS IMPORTANT?

Several countries, including the US, are planning to send missions to Venus as they try and understand how it became an inferno. Experts have long suggested that Venus was once like Earth and is therefore described as its twin. However, its fate was sealed due to climate change. As India emerges on the global stage as a champion of low-cost interplanetary missions, Venus is the next destination with plans to explore asteroids in the future. The one-day conference is being held by Isro to discuss different mission objectives for the orbiter and see if any additional observations can be made that have not been done in the past.

Isro chairman said that the mission team will work on identifying the uniqueness of the mission similar to what we saw with the Chandrayaan and Mangalyaan missions. "Goal is to review what unique additional knowledge observation can be done and see that we are not repeating what all has already been done. Repeating some of them is not a crime, but if we bring uniqueness, it will have an impact globally. It will be hailed only if it is unique, just like Chandrayaan and the Mars mission," Somnath said.

MISSIONS HEADED TO VENUS

Apart from Isro's orbiter mission, Nasa is sending two spacecraft to study Venus. The American space agency has earmarked nearly \$1 billion to explore the inferno world of Venus. The funding will be divided equally among the two missions dubbed DAVINCI+ and VERITAS which are expected to launch to Earth's evening star between 2028-2030. The missions aim to understand how Venus became an inferno-like world when it has so many other characteristics similar to Earth. Apart from Nasa, the European Space Agency has also announced a mission to the neighbouring planet. Europe's EnVision will be the next orbiter to circle over Venus, providing a holistic view of the planet from its inner core to the upper atmosphere. Isro is yet to release a timeline for the mission as work begins on building the spacecraft.

<https://www.indiatoday.in/science/story/india-can-put-a-spacecraft-on-venus-in-very-short-time-plan-ready-s-somnath-1945211-2022-05-04>

