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समाचार पत्रों से चयित अंश Newspapers Clippings

A Daily service to keep DRDO Fraternity abreast with DRDO Technologies, Defence Technologies, Defence Policies, International Relations and Science & Technology

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DIAT, C-DAC ink MoU for development of quantum computers

DRDO Chairman, Dr G Satheesh Reddy said DIAT and C-DAC coming together would result in meaningful collaboration towards the realisation of quantum computers in the country

Pune: Defence Institute of Advanced Technology (DIAT) and Centre for Development of Advanced Computing (C-DAC) have signed a memorandum of understanding (MoU) on Wednesday to collaborate for development of quantum computers. This was done as a part of Tech Fest 2021 of the C-DAC during a session on quantum computing.

DIAT is a research and academic institution under the Department of Defence Research and Development (DD R&D) and C-DAC is the premier research and development organisation of the Ministry of Electronics and Information Technology (MeitY). Both are located in Pune.

DRDO Chairman and Secretary, DD R&D, Dr G Satheesh Reddy said DIAT and C-DAC coming together would result in meaningful collaboration towards the realisation of quantum computers in the country. Dr Hemant Darbari, director general, C-DAC, expressed his hope over the initiative and said, as the first super computer of India came out of Pune, the quantum computer will follow the suit.

DIAT Vice-Chancellor Dr CP Ramanarayanan said it is very important to make India “future-ready” and successful development of quantum computers for civil and defence application is an essential step towards that. A large number of senior officers from DRDO, MeitY, Department of Science and Technology, and other participants were present virtually during the event.

Various facilities of the DRDO are currently working on different quantum technology-based applications.

Quantum technologies concern the study, control and manipulation of quantum principle-based systems with the goal of achieving information processing, secure communication and superior sensors beyond the limits of the classical systems. It is a deeply interdisciplinary field, lying in the cross-over of areas such as quantum physics, condensed matter physics, computer science, mathematics and electrical and electronics engineering.

In December 2020, in a key milestone in for quantum technology in India, DRDO Young Scientist Laboratory for Quantum Technologies, a DRDO facility based in Mumbai, developed a quantum random number generator, which has the ability to detect random quantum events and convert those into a stream of binary digits.

<https://indianexpress.com/article/cities/pune/diat-c-dac-ink-mou-for-development-of-quantum-computers-7429059/>



The MoU was signed as a part of Tech Fest 2021 of the C-DAC. (Express photo)

Explained: What is an anti-drone system developed by DRDO?

DRDO has developed an anti-drone system to neutralize enemy drone attacks including detection, Soft Kill (for jamming the communication links of drone) and Hard Kill (laser-based hard kill to destroy the drone) of enemy Drones

By Arfa Javaid

The Defence Research and Development Organisation (DRDO) has developed an anti-drone system to neutralize enemy drone attacks. The indigenous drone technology is capable of counter-attacks including detection, Soft Kill (for jamming the communication links of drone) and Hard Kill (laser-based hard kill to destroy the drone) of enemy Drones. The system is already demonstrated to Armed Services and other internal security agencies.

The indigenous DRDO Counter-Drone Technology is transferred to Bharat Electronics Limited (BEL). Simultaneously, Transfer of Technology (ToT) of the Counter-Drone System is offered to other companies.

The aforementioned information was shared by the Ministry of Defence in a written reply to Keshari Devi Patel and Kanakmal Katara in Lok Sabha on 28 July 2021.



Explained: What is an anti-drone system developed by DRDO?

What is an Anti-drone system?

Anti-drone systems detect and or intercept unwanted drones and unmanned aerial vehicles (UAVs). They are deployed to protect areas such as airports, critical infrastructure, large public spaces such as stadiums, and military installations and battlefields.

Need for anti-drone system

Increased use of unmanned drones to target, drop and supply weapons, explosives and ammunition across the western borders by the terror groups to their network in India, particularly in Jammu and Kashmir and Punjab has raised security concerns. Therefore, in a bid to counter these attacks, the DRDO has developed the anti-Drone system.

Anti-drone system developed by DRDO

- The system can detect and jam micro drones up to 3 km and use a laser to bring down a target up to 1-2.5 km depending on the wattage of the laser weapon. It has a radar detection range of four kilometres, a jamming range of more than two kilometres and a kill range of more than one kilometre.
- The system can identify drone threats instantly and terminate them. It has the capabilities to both detect and destroy drones in the air.
- It can effectively counter increased drone-based activity in the western and northern sectors of India.
- The drone system was first deployed to provide security cover to India's Republic Day Parade this year.
- The system was also deployed during the Modi-Trump roadshow in 2020 in Ahmedabad to thwart any aerial threat from drones.

How does the anti-drone system developed by DRDO work?

The anti-drone system houses a radar that helps in the 360-degree coverage to detect micro drones up to 4 km and the Electro-optical (EO) and infrared (IR) sensors that can detect micro drones up to 2 km in a specified direction. These sensors when paired with machine vision and artificial intelligence (AI) algorithms lessen the risk of false positives and false negatives.

EO/IR gimbals for anti-drone systems combine multiple cameras into one payload that can be mounted on a fixed site or moving vehicle.

Acoustic CUAS detection systems compare the noise made by drone propulsion systems to a database of sounds. However, their accuracy can be affected by other noises in the vicinity.

On 29 June 2021, Prime Minister Modi chaired a meeting attended by Cabinet Ministers to expedite the process of devising a drone policy for India. It is to be noted that India doesn't have a universal policy to deal with rogue drones.

<https://www.jagranjosh.com/general-knowledge/anti-drone-system-developed-by-drdo-to-counter-enemy-drones-1627561929-1>

COVID 19: DRDO's Contribution

THE HINDU

Fri, 30 July 2021

DRDO developing oxygen cylinders to meet Covid needs: Chairman

'It has contributed 350 technologies to various sectors during the last one year'

By G.V.R. Subba Rao

The Defence Research and Development Organisation (DRDO) hit the headlines two months ago when the Drugs Controller General of India (DCGI) approved anti-COVID oral drug, 2-deoxy-D-glucose (2-DG), developed by it.

Having transferred many technologies to the industry sector in general and healthcare in particular during the pandemic, the DRDO has now geared up to supply small oxygen cylinders to the patients in the event of the third wave of coronavirus pandemic, apart from manufacturing 2-DG drug in a massive way.

Speaking to *The Hindu*, DRDO G. Satheesh Reddy says that the DRDO contributed 350 technologies to the industry during the last one year.

Of this, 190 were related to the COVID-19, while the rest were related to defence sector. Defence laboratories were opened for conducting tests, he says.

"Now, the DRDO is developing technologies to produce small oxygen cylinders in a massive way. Likewise, the technology for setting up of small wings at hospitals, supply of 2-DG medicine are being worked out. The medicine would be manufactured through pharma companies," says Dr. Satheesh Reddy. The DRDO chief recalls that the experiments on the 2-DG began in 2001-02. Then the idea was to develop a therapeutic drug for radiation related effects. The technology was transferred to the Dr. Reddy's Labs around 2004. They have conducted a lot of trials since then, says Mr. Satheesh Reddy



The DRDO is planning to manufacture 2-DG drug in a massive way, says its Chairman G. Satheesh Reddy.

“We thought that it would work for COVID-19 too. So we experimented and it proved that it was working very effectively against the coronavirus affected cells. Then, we went ahead,” he explains. Dr. Satheesh Reddy says that the DRDO is working on clothing for low temperature environment for soldiers posted at higher altitudes.

Exports policy

Snow shoes, crevasse detection technologies, room heating elements, food heating, anti-frosting, anti-radiation creams are being developed for the soldiers, he says.

Referring to defence exports, Dr. Satheesh Reddy says lots of things have been simplified and new policies are being formulated to promote exports.

“Some work has been done. Some clearances are yet to be given,” he says while answering a question on the status of Missile Test Launch Facility at Nagayalanka.

“The Tirumala Tirupati Devasthanams (TTD) has approached us regarding the anti-drone system developed by the DRDO which is being used by the Tata, L&T and other clients. The TTD is buying the system,” says Dr. Satheesh Reddy, who was in the city to attend some programmes. Earlier in the day, he inspected the ongoing works at the Missile Test Launch Facility at Nagayalanka in Krishna district.

<https://www.thehindu.com/news/national/andhra-pradesh/drdo-developing-oxygen-cylinders-to-meet-covid-needs-chairman/article35619300.ece>



Fri, 30 July 2021

10 of 38 PSA plants under PM CARES Fund ready

Ranchi: State has completed the installation process of at least 10 of the 38 Pressure Swing Absorption (PSA) oxygen plants allotted to Jharkhand under the PM-CARES Fund, a report from the health department highlighted on Thursday.

The installation process of PSA plants has been completed at Sadar Hospitals in West Singhbhum, Ranchi, Godda and Deoghar. Besides, the oxygen plants have been installed at Rajendra Institute of Medical Sciences (RIMS) in Ranchi, Mahatma Gandhi Memorial (MGM) Hospital in Jamshedpur, Dumka Medical College and Hansdiha Hospital, SNMMCH Dhanbad and the newly-built All India Institute of Medical Sciences (AIIMS) in Deoghar.

The state aims at completing the installation process of all the 38 PSA plants under the Centre’s scheme by August 15, health officials said. At least 15 more plants, they said, should be ready by Sunday. The state was allotted at least one PSA plant in each district to ensure uninterrupted supply of liquid medical oxygen for patients in case a potential third wave of Covid-19 hits Jharkhand.

The Defense Research and Development Organisation (DRDO) was given the responsibility of site preparation and installation of at least 29 of the 38 PSA plants in Jharkhand, while the Central Medical Services Society (CMSS) and HLL Infra Services Limited (HITES) were roped in for the site preparation and installation of four and five PSA plants respectively, officials said.

Simdega Sadar Hospital, Saraikela Sadar Hospital, Palamu Medical College, SB Medical College in Hazaribag, Jamtara CHC, Jamshedpur Sadar Hospital, Ghatshila Sub-Divisional Hospital, Sadar Hospitals in Chatra and Bokaro and a few more community healthcare centres are expected to have their PSA plants ready by August 15, officials said.

During the allotment of the oxygen plants in June, the Centre had informed that the State government will have to appoint at least two technical persons for each PSA plant and one nodal officer for each of the hospitals benefiting from them in a bid to avert technical glitches, which earlier marred the efforts of the Centre while providing free ventilators to states under the PM-CARES Fund.

<https://www.dailypioneer.com/2021/state-editions/10-of-38-psa-plants-under-pm-cares-fund-ready.html>

कुशीनगर में डीआरडीओ बनाएगा सौ बेड का फाइबर अस्पताल

By मिथिलेश द्विवेदी

कुशीनगर: जिले के लोगों को कोरोना की तीसरी लहर से बचाने को डीआरडीओ कोविड अस्पताल बनाने जा रहा है। यह अस्पताल सौ बेड का होगा। फाइबर का बनेगा। इसमें ऑक्सीजन की सप्लाई देने को ऑक्सफैम इंडिया नामक संस्था दो करोड़ के खर्च से ऑक्सीजन प्लांट लगाएगी। जिला प्रशासन के निर्देश पर स्वास्थ्य विभाग इसका संचालक करेगा और जरूरी डॉक्टर व अन्य स्टाफ की व्यवस्था करेगा।

खड्डा विधायक जटाशंकर त्रिपाठी की पहल पर केन्द्र सरकार की मुख्य वैज्ञानिक सलाहकार ने डीआरडीओ को इसकी अनुमति प्रदान की थी। विधायक के पत्र का संज्ञाल लेकर डीएम एस राज लिंगम ने केन्द्र सरकार को पत्र लिखा था, जिसके बाद डीआरडीओ ने अस्पताल बनाने की मंजूरी दी है। फाइबर के इस अस्पताल में सौ बेड होंगे। डॉक्टर सहित प्रशासनिक ब्लॉक, कमरा, ट्राइएज क्षेत्र, आगंतुक क्षेत्र, वेंटिलेटर के साथ आईसीयू बेड, 100 मॉनिटर, हर बिस्तर पर ऑक्सीजन की आपूर्ति, पीपीई किट और सैनिटाइज़र, सीसीटीवी निगरानी प्रणाली, हाउसकीपिंग सेवाएं, फार्मसी, मेडिकल पैथोलॉजी लैब आदि विशिष्ट सेवाओं के उपकरण लगाए जाएंगे। डीआरडीओ ने इस तरह के अस्पताल लखनऊ, वाराणसी, पटना व मुजफ्फरपुर में भी बनाए हैं।

विधायक की पहल पर ऑक्सफैम इंडिया नामक स्वयं सेवी संस्था यहां ऑक्सीजन प्लांट लगाएगी। पिछले दिनों संस्था ने ऑनलाइन मीटिंग में प्रशासनिक अधिकारियों को इसकी जानकारी की। स्थान का चयन कर नक्शा भी जारी किया और जल्द काम शुरू करने की बात कही। संस्था ने विधायक से यह जानने के बाद कि इस पिछड़े में बिजली की भी समस्या रहती है, 55 केवीए का जेनरेटर प्रदान करने की भी मंजूरी दे दी। विधायक ने बताया कि जल्द ही दोनों संस्थाएं काम शुरू कर देंगी। डीआरडीओ को मौके पर फाउंडेशन बनाकर स्थानीय प्रशासन देगा। वहां कुछ दिनों में वह अपना अस्पताल सेट कर देगी। अधिकतम दो महीने में अस्पताल का संचालन शुरू हो जाएगा। डीएम एस राज लिंगम ने स्वास्थ्य विभाग को इस संबंध में जरूरी निर्देश जारी कर दिए हैं।

कोरोना के बाद भी चलेगा अस्पताल

विधायक जटाशंकर त्रिपाठी ने बताया कि भविष्य में भी अस्पताल चले, इसके लिए पीपीपी मॉडल पर संचालन के लिए स्थानीय संस्थाओं से संपर्क कर रहे हैं। कोरोना के अलावा भी अन्य बीमारियों का भी यहां इलाज होगा। पीपीपी मॉडल से संचालन के पहले हमें यह देखना होगा कि लोगों को यहां निःशुल्क या न्यूनतम खर्च पर स्वास्थ्य सेवाएं मिलें। इसके लिए कुछ संस्थाओं से बात की जा रही है।

डीआरडीओ आपात स्थितियों में इस तरह के अस्पताल तैयार करता है

डीआरडीओ इस तरह के अस्पताल युद्ध या अन्य आपात स्थितियों में इस तरह के अस्पताल तैयार करता है। बेहद कम समय में इसका निर्माण पूरा कर स्वास्थ्य सेवाएं शुरू कर दी जाती हैं। पीएम केयर्स फंड से कोरोना काल में इस तरह के अस्पताल देश के चुनिंदा शहरों में संचालित किए जा रहे हैं।

<https://www.livehindustan.com/uttar-pradesh/padrauna/story-drdo-will-build-a-hundred-bed-fiber-hospital-in-kushinagar-4273786.html>

Defence Strategic: National/International



Press Information Bureau
Government of India

Ministry of Defence

Thu, 29 July 2021 9:58PM

Commanders' Conference at Headquarters Training Command, IAF

Air Chief Marshal RKS Bhaduria, PVSM AVSM VM ADC, Chief of the Air Staff (CAS) visited Headquarters Training Command Bengaluru to attend the Training Command Commanders' Conference held on 28 & 29 July 21.

On arrival, the CAS was received by Air Marshal RD Mathur, PVSM AVSM VSM ADC, Air Officer Commanding-in-Chief Training Command. CAS was presented with a Guard of Honour at the Headquarters.

In his address to the Commanders, CAS highlighted the need to be vigilant and remain poised to undertake all operational tasks assigned to the IAF. CAS commended the hard work put in by all the training academies and stations under Training Command for ensuring timely completion of training commitments, despite severe constraints placed due to second wave of COVID. He also lauded the professionalism shown by air warriors of the Command during conduct of the International event - Aero India 21 and the Chiefs' of Air Staff Conclave held at Yelahanka during the month of February this year.

The CAS presented the 'Best Stations' trophies to the recipients and in his closing remarks urged the Commanders to continue their efforts towards building a strong foundation by grooming the young men and women in their formative years, since this forms the bedrock for enhancing the operational capability and transformation of the IAF.



<https://pib.gov.in/PressReleasePage.aspx?PRID=1740505>



Press Information Bureau
Government of India

Ministry of Defence

Thu, 29 July 2021 11:04AM

INS Talwar in exercise Cutlass Express-21 conduct of VBSS training by Indian Navy

Indian Naval Ship Talwar is participating in the multi-national maritime exercise Cutlass Express 2021 (CE 21), being conducted from 26 Jul to 06 Aug 21 in Kenya. In the harbour phase, which was conducted from 26 -28 Jul at Mombasa, a team of Indian Navy Marine Commandos (MARCOS) conducted training of personnel from navies of Kenya, Djibouti, Mozambique, Cameroon and Coast Guard of Georgia. The MARCOS shared the best practices in executing Visit, Board, Search, and Seizure (VBSS) operations with the participating foreign Navy sailors during the exercise, which was held at the Bandari Maritime Academy in Mombasa.



Exercise Cutlass Express is designed to improve regional cooperation, maritime domain awareness and information sharing practices to increase capabilities between the U.S., East African and Western Indian Ocean nations to counter illicit maritime activity in the Western Indian Ocean.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1740191>



पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Thu, 29 July 2021 11:04AM

आईएनएस तलवार 'कटलैस एक्सप्रेस-21' अभ्यास में शामिल भारतीय नौसेना द्वारा 'विजिट, बोर्ड, सर्च, सीज़र' का प्रशिक्षण

भारतीय नौसेना का जहाज तलवार बहु-राष्ट्रीय समुद्री अभ्यास 'कटलैस एक्सप्रेस 2021' (सीई 21) में हिस्सा ले रहा है। यह अभ्यास केन्या में 26 जुलाई, 2021 से छह अगस्त, 2021 तक चलेगा। बंदरगाह पर होने वाला अभ्यास मोमबासा में 26-28 जुलाई तक किया गया, जिसमें भारतीय नौसेना के मैरीन कमांडोज (मार्कोस) ने केन्या, जिबूती, मोजाम्बीक, कैमरून और जियोर्जिया के तटरक्षक दल के कर्मियों को प्रशिक्षण दिया। मार्कोस ने 'विजिट,' 'बोर्ड,' 'सर्च,' और 'सीज़र' (पहुंचना, चढ़ना, तलाशना, जब्त करना -- वीबीएसएस) ऑपरेशन का प्रशिक्षण दिया। इस अभ्यास में विदेशी नौसैनिकों ने हिस्सा लिया। यह अभ्यास मोमबासा के बंडारी मैरीटाइम अकादमी में किया गया।

'कटलैस एक्सप्रेस' अभ्यास को इस तरह तैयार किया गया है, जिसके जरिये क्षेत्रीय सहयोग, समुद्री सीमा सम्बंधी जागरूकता पैदा होगी तथा अमेरिका, पूर्वी अफ्रीका तथा पश्चिमी हिंद महासागर के बीच क्षमता बढ़ाने के लिये बेहतरीन तौर-तरीकों को साझा किया जायेगा। इसका मकसद पश्चिमी हिंद महासागर में गैर-कानूनी समुद्री गतिविधियों से निपटना है।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1740226>

Army Chief Naravane Discusses "issues Of Mutual Interest" With US Special Ops Commander

Indian Army Chief MM Naravane held talks with Commander of US Special Operations Command General Richard D Clarke, "bilateral defence cooperation" discussed

By Srshti Jha

Indian Army Chief MM Naravane on July 29 held talks with Commander of US Special Operations Command General Richard D Clarke. The focus of the discussion was on various key aspects of bilateral defence and security cooperation between both sides.

During his three-day visit to India, the US Commander held talks on various dimensions of bilateral defence cooperation and advanced support to further deepen military ties.



ADGPI Twitter

India and US deliberate on Afghanistan

Sources reported that General Naravane and General Clarke briefly deliberated on the evolving situation in war-torn Afghanistan.

Assuredly, the situation in Afghanistan remains a predicament because of Taliban-infused violence is on the surge as the military organisation is in a constant trying to make territorial gains in the State. This is pursuant to withdrawal of US armed forces and NATO troops ending Washington's 18-year long war with the Taliban after the 9/11 attacks. The ongoing power crisis in Afghanistan is particularly volatile given the shift of reigns as US and NATO forces prepare to exit. Currently waging war within the country, the Taliban is gaining more ground and is resorting to widespread violence to expand its influence across the country.

One of the reasons for Afghanistan and India's close ties is due to the latter's massive investment in Afghanistan. India has been a major stakeholder in the peace and stability of Afghanistan. As a close ally of Afghanistan, India has provided at least five military helicopters amid clashes. It had also invested nearly USD 3 billion in aid and reconstruction activities in the country. India has been supporting a national peace and reconciliation process which is Afghan-led, Afghan-owned and Afghan-controlled.

US Army Commander laid wreath at the National War Memorial

Prior to meeting General Naravane, the US official laid a wreath at the National War Memorial. The Indo-US defence ties have been on an upswing in the recent years. In October 2020, India and the US sealed the Basic Exchange and Cooperation Agreement (BECA) to further boost the bilateral defence ties. The accord provides for sharing high-end military technology, logistics between the two nations.

In June 2016, the US designated India as a "major defence partner" and elevated defence trade and technology sharing. The two countries also linked the Logistics Exchange Memorandum of Agreement (LEMOA) that allows respective militaries to use bases in each other's territory for purposes of repairing and replenishment of supplies.

Separately, General Naravane dialled Chief of Hellenic Army General Staff with a focus on defence cooperation between India and Greece.

<https://www.republicworld.com/india-news/general-news/army-chief-naravane-discusses-issues-of-mutual-interest-with-us-special-ops-commander.html>

Cochin Shipyard launches five vessels at one go

Kochi: Cochin Shipyard Ltd (CSL) on Wednesday launched five vessels at one go from its building dock at Kochi. The vessels launched are three Floating Border Outpost Vessels (FBOP) for the Border Security Force (BSF) and two 8000 DWT Mini General Cargo Ships for JSW Shipping & Logistics Pvt Ltd. CSL had launched five vessels at one go in November 2020 also.

The vessels were launched by NPOL (DRDO) scientist 'G' Rameetha K, in the presence of DIG (BSF) Shi Mukesh Tyagi, JSW Shipping VP Pranab K Jha, VP and CSL CMD Madhu S Nair. CSL director (technical) Bejoy Bhasker and CSL director (finance) Jose V J also attended the event along with top officials of JSW, BSF and CSL.

“The three FBOPs are important for the nation as they act as strategic base stations at the borders. We are proud to build these vessels indigenously for the safety of the country. JSW vessels will be a boost for the business through coastal and inland waterways. We are glad to associate with JSW who have set in motion the most ambitious coastal and inland transportation systems in the country,” said Madhu S Nair.

Tyagi said that FBOPs will significantly strengthen the BSF water wing deployed on the East and West international borders. Pranab K Jha meanwhile lauded the efforts of CSL for the progress of the work amidst these trying times.

The three FBOPs, with a length of 46m, are part of a series of nine vessels being built for the Water Wing of the BSF. These vessels are designed in-house by CSL & classed by Indian Register of Shipping. Each FBOP is designed with stowage arrangements for four fast patrol boats, which can be launched and hoisted using its own davit system. The vessels will act as a floating base for the flotilla of fast patrol boats and will supply petrol, fresh water and provisions to the smaller boats.

The Mini General Cargo Ships are part of a series of four similar ships being built for the JSW group. These ships will be used for transportation of dry bulk cargo such as coal, iron ore, dolomite, and limestone. The vessels, with a length of 122m and height of 7.20m and speed of 10 knots, will have a complement of 16 crew. These ships are expected to ply on the coastal route between Jaigarh Port and Dolvi Steel Plant in river Amba near Dharamtar Port.

<https://timesofindia.indiatimes.com/city/kochi/cochin-shipyard-launches-five-vessels-at-one-go/articleshow/84850756.cms>



Cochin Shipyard

Army wants emergency purchase of 20 avalanche rescue radars

By Rajat Pandit

New Delhi: The Army now wants 20 new avalanche rescue radars on a fast-track basis from abroad to ensure it can quickly locate soldiers who get buried under snow during natural calamities in high-altitude areas along the borders with China and Pakistan.

The tender or RFP (request for proposal) for the emergency procurement of the 20 avalanche rescue radars, along with 3,000 hand-held detectors and other accessories, specifies the Army wants the deliveries to be completed within 12 months of signing contract or before August 31 next year, whichever is earlier.



Representative image

The contract will include deliveries to the field ordnance depot at the Northern Command headquarters in Udampur as well as training to some personnel of the High-Altitude Warfare School (HAWS) at Gulmarg.

The Army often suffers casualties due to its soldiers being deployed in large numbers in avalanche-prone areas along the unresolved borders with China and Pakistan, including eastern Ladakh and the Siachen Glacier.

"Avalanche-related casualties take place despite best efforts in training, equipment and forecasting. The new radars, with equipment capable of functioning at temperatures up to minus 50 degree celsius, will help in quickly initiating rescue efforts and pinpointing location of buried soldiers to help in maximizing their survival chances," said an officer.

Incidentally, over 1,000 Indian soldiers, including over 35 officers, have lost their lives in the Siachen Glacier-Saltoro Ridge region since April 1984, when India's Operation Meghdhoot preempted Pakistan's Operation Ababeel to occupy almost all the dominating heights from 16,000 to 22,000-feet by a whisker.

Around three-fourths of these casualties have been caused by the severe terrain and climatic conditions in the Siachen region, with temperatures sometimes even dipping to minus 60 degree celsius, rather than enemy fire.

In February 2016, for instance, 10 ill-fated soldiers from the 19 Madras Regiment -- including Lance Naik Hanumanthappa Koppad who miraculously survived for over eight days -- had perished after being buried under a massive ice-wall avalanche in the northern Siachen Glacier.

Army officers say soldiers deployed in high-altitude regions are given prior training in mountain craft, ice craft, and survival in glaciated terrain to cope with any eventuality like avalanches, but sometimes it becomes impossible to fight nature.

<https://timesofindia.indiatimes.com/india/army-wants-emergency-purchase-of-20-avalanche-rescue-radars/articleshow/84860721.cms>

Finally, a step to energise maritime sector

It has taken over a decade after the 26/11 attacks and two decades since the Kargil Review Committee was set up for the govt's approval to aggregate the issues of the nation's maritime development under the security umbrella. It is hoped that the govt will not stop short of establishing a functionally effective structure for a truly integrated and fully secured development of the nation's maritime sector

By Vice-Admiral Pradeep Kaushiva (retd)

The recent announcement by the Government of India (GoI) to appoint a national maritime security coordinator is a step in the right direction. For the sake of posterity, it would be useful to trace the background of when, why and how the seed got planted.

Enacted by Parliament in 1958, India's Merchant Shipping Act had also constituted a National Shipping Board (NSB) to advise the government on the development of Indian shipping. The Deputy Chief of Naval Staff (DCNS), then being the second seniormost officer of the Indian Navy, was a member of the NSB.

In due course, however, the Vice-Chief became the number two man in the Naval Headquarters, but the DCNS remained a member of the NSB. When I was Director Naval Operations (DNO), the DCNS deputed me to attend the NSB meetings in 1996 and again in 1997.

During the 1997 meeting, while discussing the major ports, I raised a basic question: Who decides where to develop major ports in our country and in consultation with whom? I illustrated this with two examples. One, had the Navy been consulted for the security implications and consequences of even the temporary blocking of the entrance to the Gulf of Kutch (GoK) before the development of Kandla, or before setting up in the GoK the facility for Bombay High crude oil supply for all refineries in north India, from Mathura to Panipat? Two, were the Railways consulted for hinterland connectivity before developing the Jawaharlal Nehru Port? And, why did the rail/road/highway connectivity, container parks and related infrastructure not come up in time for the Jawaharlal Nehru Port Trust (JNPT) operationalisation?

Clearly, there appeared to be a need for a coordinator to ensure an integrated development of the nation's maritime sector with a built-in security overlay. I acknowledged that this was not the mandate of the NSB, but added, "Somebody should be doing it and 'maybe' the NSB could make such a recommendation."

On return to the NHQ, I sent this as an aide-memoire to the DG Shipping for inclusion in the minutes. In addition, all this was put down on file and routed to the DCNS and Chief of Naval Staff (CNS) for information. As expected, the minutes of the 1997 meeting were issued without my contribution.

At the Naval HQ, the CNS directed the naval staff to expand the scope and formalise a proposal for the constitution of the National Maritime Commission (NMC) to bring all maritime-related issues, underpinned by national security, on one table. His successors also weighed in on the proposal. The Navy offered to service the commission and provide the support infrastructure.

However, bureaucratic diffidence ensured that there was no progress, even though the proposal could not be snuffed out.

The Kargil Review Committee (KRC), formed after the 1999 Kargil war, picked up the proposal and recommended the formation of an apex body that would manage the nation's maritime affairs



Welcome: A maritime coordinator is needed to help ensure integrated development of the maritime sector with a built-in security overlay. PTI

by enforcing linkages between the Indian Navy, the Indian Coast Guard and other ministries and departments of the state and Central governments.

Its acceptance by the Group of Ministers provided the political heft for it to overcome the bureaucratic hurdles and it slowly gathered momentum.

By 2004, the proposed NMC had been extensively discussed inter-departmentally and a meeting was scheduled for May under the chairmanship of the Cabinet Secretary to formalise the proposal for approval by the Union Cabinet. However, with the General Election then delivering a surprise verdict, the issue went into limbo. Queries regarding the reason for the bureaucratic resistance brought out the unstated but underlying apprehensions about the Navy playing a predominant role and, more specifically, ‘who would call the shots?’ in the organisation.

After in-house discussions in 2005, the CNS took a pragmatic position that the subject was important, but the modality was not. And, in a fit of institutional self-abnegation, the Navy renounced all claims to leadership and offered to be just the secretariat of whatever body was constituted, but to no avail.

It can be inferred that the NMC proposal must have undergone many more transformations over the years as successive Chiefs of Naval Staff pursued it without success. The terror attacks in Mumbai on November 26, 2008, did generate a lot of paper and some security coordination on the ground. But, in the absence of political resolve, the integration of maritime development processes with security built in ab initio still remained elusive despite its strategic imperative.

It has taken over a decade after 26/11 and two decades since the KRC was set up for the GoI to announce its approval to aggregate the issues of the nation’s maritime development under the security umbrella. The decision to appoint a ‘national maritime security coordinator’ says a lot about the maturity of today’s decision-makers to finally throw off the yoke of unfounded, ill-conceived and self-serving doubts and apprehensions.

This bold decision can potentially infuse much-needed, albeit much-delayed, energy into the maritime sector that is today central not only to national economy but also to national security.

Details of the GoI mandate are yet to emerge in the public domain but it is hoped that the government will not stop short of establishing a functionally effective structure for a truly integrated and fully secured development of the nation’s maritime sector — and induct domain professionals as appropriate.

<https://www.tribuneindia.com/news/comment/finally-a-step-to-energise-maritime-sector-290159>



Press Information Bureau
Government of India

Department of Space

Thu, 29 July 2021 12:19PM

Space Activities Bill is under active consideration of the Government-Dr Jitendra Singh

The Bill aims at regulation and promotion of private players in space sector

Government committed to create an ecosystem to encourage more private participation in indigenous production of space technologies, services and devices

Union Minister of State (Independent Charge) Science & Technology; Minister of State (Independent Charge) Earth Sciences; MoS PMO, Personnel, Public Grievances, Pensions, Atomic Energy and Space, Dr Jitendra Singh said that the Space Activities Bill is under active consideration of the Government which will include aspects pertaining to regulation and promotion of private players in space sector. In a written reply to a question in the Rajya Sabha today, he said, Government is in the process of creating an ecosystem to encourage more private participation in indigenous production of space technologies, services and devices.

Government of India has announced space sector reforms in June 2020. The Indian National Space Promotion and Authorization Centre (IN-SPACe) was created as an independent nodal agency under the Department of Space with the mandate of promoting, handholding, licensing, authorization and monitoring of private space activities in India. Access to Department of Space (DOS) facilities and expertise are extended to private entities to support their space activities. Announcement of Opportunities were done offering challenges in new domains of space technology. Government of India is encouraging transfer of technologies developed in the field of space to Indian industries. Apart from this, Government of India is bringing in new sector policies and guidelines and also revising existing policies.

IN-SPACe which is under creation will have Safety and Security Directorate to ensure security of ISRO installations when allowing access to private entities. Public consultations were done and the relevant Departments and Ministries were consulted.

An exclusive webinar in 'Unlocking India's potential in space sector' consisting of four sessions covering the four verticals of space programme were organised with the participation of Industrialist/Academia/Start-ups as well as general public. All suggestions have been taken into consideration and appropriately addressed.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1740219>



Press Information Bureau
Government of India

Department of Space

Thu, 29 July 2021 12:18PM

Geo-imaging satellite “EOS-03” is scheduled for launch in third quarter of 2021-Dr Jitendra Singh

Geo-imaging satellite will help in near-real time monitoring of natural disasters like floods & cyclones

“EOS-03” would also enable monitoring of water bodies, crops, vegetation condition, forest cover changes etc.

Union Minister of State (Independent Charge) Science & Technology; Minister of State (Independent Charge) Earth Sciences; MoS PMO, Personnel, Public Grievances, Pensions, Atomic Energy and Space, Dr Jitendra Singh said that Geo-imaging satellite “EOS-03” is scheduled for launch in third quarter of 2021 that would enable near-real time monitoring of natural disasters like floods & cyclones. In a written reply to a question in the Rajya Sabha today, he said, ISRO realized EOS-03 is capable of imaging the whole country 4-5 times daily. In addition to natural disasters, EOS-03 would also enable monitoring of water bodies, crops, vegetation condition, forest cover changes etc.

The first developmental flight of Small Satellite Launch Vehicle or SSLV is scheduled in the fourth quarter of 2021 from Satish Dhawan Space Centre, Sriharikota. ISRO’s vast experience in Solid propulsion and heritage of proven design practices has enabled SSLV to be developed as a cost-effective, three stage, all-solid launch vehicle with a payload capability of 500 kg to 500 km planar orbit or 300 kg to Sun Synchronous Polar Orbit. SSLV is ideal for on-demand, quick turn-around launch of small satellites. The major technologies developed as part of realization of SSLV are flexible nozzle control with electro-mechanical actuators for all stages, miniaturized avionics and a velocity trimming module in the upper stage for precise satellite injection.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1740217>



Intriguing layer where internal rotation profile of Sun changes theoretically explained

It was long known the Sun's equator spins faster than the poles. However, a peek into the internal rotation of the Sun using sound waves revealed the existence of an intriguing layer where the rotation profile of the Sun changes sharply. The layer is called as near-surface shear layer (NSSL), and it exists very close to the solar surface, where there is an outward decrease in angular velocity.

Having long probed the explanation of this layer, Indian astronomers have found a theoretical explanation for its existence for the first time. Understanding NSSL is crucial for the study of several solar phenomena like sunspot formation, solar cycle, and it will also help in understanding such phenomena in other stars.

A researcher, Bibhuti Kumar Jha, from Aryabhata Research Institute of Observational Sciences (ARIES), an autonomous institute under the Department of Science and Technology, Govt. of India, along with the senior scientist, Prof. Arnab Rai Choudhuri, from the Indian Institute of Science, Bangalore, has for the first time given the theoretical explanation of the existence of NSSL in the Sun. This work has been published in the journal *Monthly Notices of the Royal Astronomical Society*.

In their study, they have used an equation called the thermal wind balance equation. It explains how the slight difference in temperature between solar poles and equator, called thermal wind term, is balanced by the centrifugal force appearing due to solar differential rotation. Most scientists believe that this condition is true only in the interior of the Sun, and it does not hold near the solar surface. In this work, the authors have shown that this belief actually holds near the surface as well.

They have noted that if this condition is true near the solar surface, it can explain the existence of NSSL, which is inferred in helioseismology (technique of using sound waves to peek inside the Sun) based observation.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1740238>

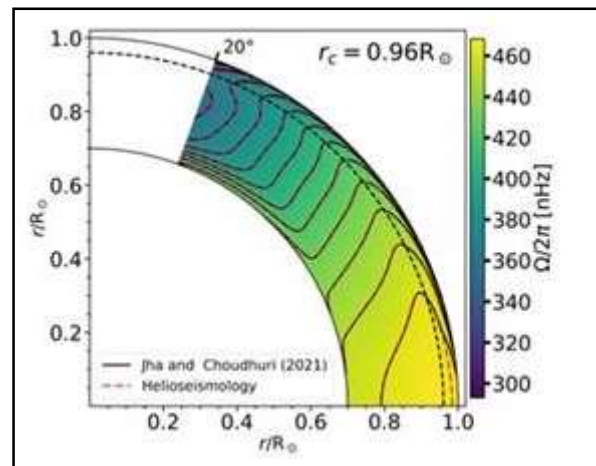


Fig: The solar rotation profile calculated based on the theoretical model given by Jha and Choudhuri (2021). The solid black and dashed red contours are the contours of constant angular rotation based on the model and observation, respectively.



पहेलीनुमा परत जहां सूर्य का आंतरिक रोटेशन प्रोफाइल बदलता है, की सैद्धांतिक व्याख्या

लम्बे समय से यह बात ज्ञात थी कि सूर्य की भूमध्य रेखा ध्रुवों की तुलना में अधिक तेजी से घूमती है। बहरहाल, ध्वनि तरंग का उपयोग करते हुए सूर्य की आंतरिक रोटेशन की जांच करने से एक पहेलीनुमा परत का पता चला जहां सूर्य का रोटेशन प्रोफाइल बहुत तेजी से बदलता है। इस परत को नियर-सर्फेस शीयर लेयर (एनएसएसएल) कहा जाता है और इसका अस्तित्व सौर सतह के बहुत निकट मौजूद होता है जहां एंगुलर वेलोसिटी में बाह्य रूप से कमी होती है।

इस परत की व्याख्या की लम्बे समय तक जांच के बाद, भारतीय खगोलविदों ने इसके अस्तित्व के लिए पहली बार एक सैद्धांतिक व्याख्या पाई है। एनएसएसएल को समझना सनस्पॉट फॉर्मेशन, सौर चक्र जैसी कई सौर घटनाओं के अध्ययन के लिए महत्वपूर्ण है और यह अन्य तारों में भी ऐसी ही घटनाओं को समझने में सहायक होगा।

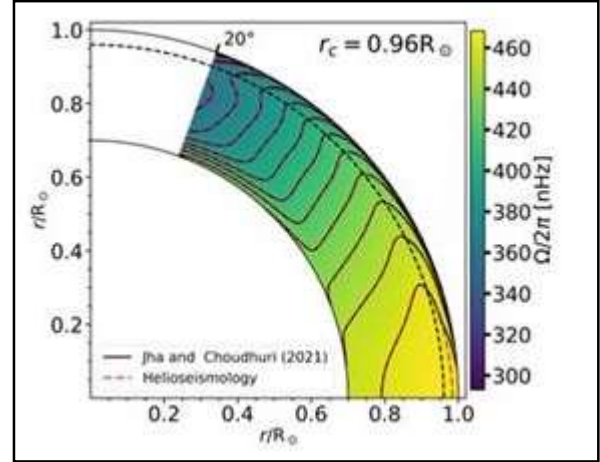
भारत सरकार के विज्ञान एवं प्रौद्योगिकी विभाग के

तहत एक स्वायत्तशासी संस्थान आर्यभट्ट रिसर्च इंस्टीट्यूट ऑफ ऑब्जर्वेशनल साइंसेज (एआरआईईएस) के शोधकर्ता बिभूति कुमार झा ने बेंगलुरु स्थित भारतीय विज्ञान संस्थान के वरिष्ठ वैज्ञानिक प्रो. अर्नब राय चौधरी के साथ मिलकर पहली बार सूर्य में एनएसएसएल के अस्तित्व की सैद्धांतिक व्याख्या की है। यह शोध पत्र रॉयल एस्ट्रोनॉमिकल सोसाइटी के जर्नल मंथली नोटिसेज में प्रकाशित हुआ है।

अपने अध्ययन में उन्होंने थर्मल विंड बैलेंस इक्वेशन नामक एक समीकरण का उपयोग किया। यह व्याख्या करती है कि किस प्रकार सौर ध्रुवों और भूमध्य रेखा, जिसे थर्मल विंड टर्म कहते हैं, के तापमान में मामूली अंतर का संतुलन सोलर डिफरेंशियल रोटेशन के कारण प्रतीत होने वाले सेंट्रिफुगल फोर्स के कारण होता है। अधिकांश वैज्ञानिकों का मानना है कि यह स्थिति केवल सूर्य के आंतरिक हिस्से में ही होती है और यह सौर्य सतह के निकट नहीं होती। इस शोध पत्र में, लेखकों ने प्रदर्शित किया है कि यह धारणा वास्तव में सतह के निकट भी होती है।

उन्होंने नोट किया कि अगर सौर सतह के निकट यह स्थिति सही है तो यह एनएसएसएल के अस्तित्व की व्याख्या कर सकती है जिसका अनुमान हेलियोसिज्मोलॉजी आधारित ऑब्जर्वेशन में लगाया जाता है।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1740266>



चित्र: सौर रोटेशन प्रोफाइल की गणना झा और चौधरी (2021) द्वारा दिए गए सैद्धांतिक मॉडल के आधार पर की गई। ठोस, काली और डैशड लाल पररेखाएं क्रमशः मॉडल और ऑब्जर्वेशन पर आधारित कोणीय रोटेशन की रूपरेखाएं हैं।

Researchers propose a method of magnetizing a material without applying an external magnetic field

Magnetizing a material without applying an external magnetic field is proposed by researchers at São Paulo State University (UNESP), Brazil, in an article published in the journal *Scientific Reports*, where they detail the experimental approach used to achieve this goal.

The study was part of the Ph.D. research pursued by Lucas Squillante under the supervision of Mariano de Souza, a professor at UNESP's Department of Physics in Rio Claro. Contributions were also made by Isys Mello, another Ph.D. candidate supervised by Souza, and Antonio Seridonio, a professor at UNESP's Department of Physics and Chemistry in Ilha Solteira. The group was supported by FAPESP.

"Very briefly put, magnetization occurs when a salt is compressed adiabatically, without exchanging heat with the external environment," Souza told. "Compression raises the temperature of the salt and at the same time rearranges its particles' spins. As a result, the total entropy of the system remains constant and the system remains magnetized at the end of the process."

To help understand the phenomenon, it is worth recalling the basics of spin and entropy.

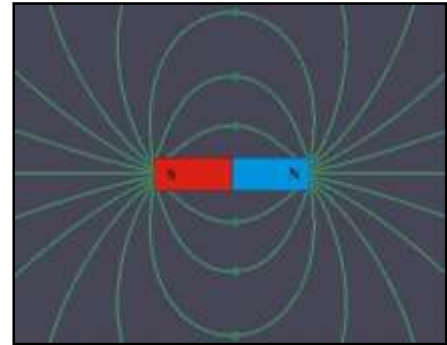
Spin is a quantum property that makes elementary particles (quarks, electrons, photons, etc.), compound particles (protons, neutrons, mesons, etc.) and even atoms and molecules behave like tiny magnets, pointing north or south—up spin and down spin—when submitted to a magnetic field.

"Paramagnetic materials like aluminum, which is a metal, are magnetized only when an external magnetic field is applied. Ferromagnetic materials, including iron, may display finite magnetization even in the absence of an applied magnetic field because they have magnetic domains," Souza explained.

Entropy is basically a measure of accessible configurations or states of the system. The greater the number of accessible states, the greater the entropy. Austrian physicist Ludwig Boltzmann (1844-1906), using a statistical approach, associated the entropy of a system, which is a macroscopic magnitude, with the number of possible microscopic configurations that constitute its macrostate. "In the case of a paramagnetic material, entropy embodies a distribution of probabilities that describes the number of up spins or down spins in the particles it contains," Souza said.

In the recently published study, a paramagnetic salt was compressed in a single direction. "Application of uniaxial stress reduces the volume of the salt. Because the process is conducted without any exchange of heat with the environment, compression produces an adiabatic rise in the temperature of the material. A rise in temperature means a rise in entropy. To keep total entropy in the system constant, there must be a component of local reduction in entropy that offsets the rise in temperature. As a result, the spins tend to align, leading to magnetization of the system," Souza said.

The total entropy of the system remains constant, and adiabatic compression results in magnetization. "Experimentally, adiabatic compression is achieved when the sample is compressed for less time than is required for thermal relaxation—the typical time taken by the system to exchange heat with the environment," Souza said.



he study shows that the phenomenon can be produced by means of adiabatic compression, without any exchange of heat with the environment. Credit: Geek3/Wikimedia Commons - commons.wikimedia.org/wiki/File:VFPT_bar-magnet-forces.svg

The researchers also propose that the adiabatic rise in temperature could be used to investigate other interacting systems, such as Bose-Einstein condensates in magnetic insulators, and dipolar spin-ice systems.

More information: Lucas Squillante et al, Elastocaloric-effect-induced adiabatic magnetization in paramagnetic salts due to the mutual interactions, *Scientific Reports* (2021). DOI: [10.1038/s41598-021-88778-4](https://doi.org/10.1038/s41598-021-88778-4)

Journal information: [Scientific Reports](https://www.nature.com/scientificreports/)

<https://phys.org/news/2021-07-method-magnetizing-material-external-magnetic.html>



Fri, 30 July 2021

Researchers kick-start magnetic spin waves at nanoscale in pursuit of low energy computing

An international team from Delft, Lancaster, Nijmegen, Kiev and Salerno has demonstrated a new technique to generate magnetic waves that propagate through the material at a speed much faster than the speed of sound.

These so-called spin waves produce a lot less heat than conventional electric currents, making them promising candidates for future computation devices with significantly reduced power consumption.

Physicists and engineers from all around the world are constantly thinking of ways to improve the performance of data processing devices. Many of their ideas revolve around substituting the electrical currents, which carry the signals in conventional electronics, with waves. Waves are coherent excitations, which means that information can be encoded into both the amplitude and the phase of the wave. Interference and diffraction, natural phenomena for a wave of any nature, enable the creation of so-called wave-based logic circuits, the tiny building blocks for future data processing applications. Since waves travel through materials with significantly lower resistance than electric currents, they have the potential to drastically reduce power consumption in future computing.



Credit: CC0 Public Domain

Spin waves in antiferromagnets

Magnetic waves, also called spin waves, are one of the most promising candidates for wave-based logic devices. Experiments using spin waves in regular (ferro)magnets have shown that it is possible to build small logic devices without using electrical currents. Ferromagnets are characterized by a net magnetization. Due to the latter, we can write and read magnetic information on ferromagnets with the help of an external magnetic field.

In recent years, there has been a focus shift towards the use of antiferromagnets. In antiferromagnetic materials, the microscopic magnetic moments of neighboring atoms—the spins—are tightly coupled and alternate between two opposite orientations, such that there is no net magnetisation. The existence of this alternating order leads to significantly higher spin-wave propagation velocities and the possibility of terahertz (trillion of hertz) operational clock-rates. However, absence of the magnetisation also makes antiferromagnets magnetically 'invisible': it is very hard to detect and influence the antiferromagnetic order. Practice has shown that generating and detecting spin waves that can move through antiferromagnetic media is even harder. As a result, computing concepts based on antiferromagnetic spin waves have so far existed as a

theoretically appealing but experimentally uncharted field of exciting opportunities. Finding new ways to control the 'magnetic moments' in antiferromagnets is therefore of crucial importance.

The international team of researchers has now succeeded in creating nanometer-size coherent magnetic waves in an antiferromagnet that travel at supersonic velocities through the material. Their trick was to use ultrashort pulses of light to both create and detect these spin waves. "While we knew that ultrashort pulses of light are capable of influencing magnetic properties of antiferromagnetic materials, the possibility to launch short-wavelength propagating spin waves with light was still quite unexpected", says researcher Jorrit Hortensius of Delft University of Technology. "This is because light pulses lack the momentum necessary to create short-wavelength—or large momentum—spin waves."

A local ultrafast kick

It has been known for a few years that ultrashort pulses of light might hold the key to creating high-frequency propagating spin waves. Within a picosecond (a millionth of a millionth of a second), such pulses can shake up the ordered magnetic system and start magnetic motion in antiferromagnets. However, typically the excited area remains localized and does not support propagation. Making the excitation to travel across the material required another hidden ingredient. "Most antiferromagnetic materials are dielectrics, which means that they are transparent for visible light. We instead used ultraviolet light that is absorbed strongly, so that we only shake the spins very close to the material's surface, within the so-called skin-depth", says researcher Dmytro Afanasiev. "The combination of the ultrafast kick with the strong confinement at the material's surface turned out to be the combination to induce the propagation of antiferromagnetic spin waves."

The spin waves have wavelengths of around 100 nm, which is a lot smaller than the wavelength of the light. This makes the researchers believe that they might have created even smaller spin waves, even though they cannot observe them with their current instruments. Jorrit Hortensius: "As spin waves with very small wavelengths are the most interesting for creating highly compact computational elements, we are very curious to know what the limit is."

This work brings future spin-wave devices in antiferromagnets closer to reality. Rostislav Mikhaylovskiy from Lancaster University says: "Traditionally the antiferromagnetic materials have been considered practically useless since they do not possess magnetisation. However, very recently the unique functionalities of antiferromagnets triggered a real boom in their studies. We believe that our findings will stimulate further research into antiferromagnetic spin waves and eventually bring an antiferromagnet-based logic device into practical reach—potentially opening the door to a radical reduction in the power needed for computing."

More information: J. R. Hortensius et al, Coherent spin-wave transport in an antiferromagnet, *Nature Physics* (2021). [DOI: 10.1038/s41567-021-01290-4](https://doi.org/10.1038/s41567-021-01290-4)

Journal information: [Nature Physics](https://phys.org/news/2021-07-kick-start-magnetic-nanoscale-pursuit-energy.html)
<https://phys.org/news/2021-07-kick-start-magnetic-nanoscale-pursuit-energy.html>

A new information storage and processing device

A team of scientists has developed a means to create a new type of memory, marking a notable breakthrough in the increasingly sophisticated field of artificial intelligence.

"Quantum materials hold great promise for improving the capacities of today's computers," explains Andrew Kent, a New York University physicist and one of the senior investigators. "The work draws upon their properties in establishing a new structure for computation."

The creation, designed in partnership with researchers from the University of California, San Diego (UCSD) and the University of Paris-Saclay, is reported in the Nature journal *Scientific Reports*.

"Since conventional computing has reached its limits, new computational methods and devices are being developed," adds Ivan Schuller, a UCSD physicist and one of the paper's authors. "These have the potential of revolutionizing computing and in ways that may one day rival the human brain."

In recent years, scientists have sought to make advances in what is known as "neuromorphic computing"—a process that seeks to mimic the functionality of the human brain. Because of its human-like characteristics, it may offer more efficient and innovative ways to process data using approaches not achievable using existing computational methods.

In the *Scientific Reports* work, the researchers created a new device that marks major progress already made in this area.

To do so, they built a nanoconstriction spintronic resonator to manipulate known physical properties in innovative ways.

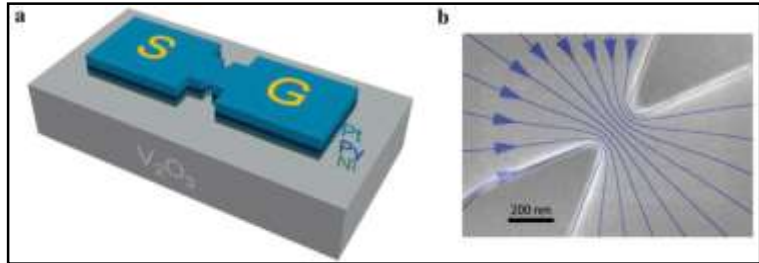
Resonators are capable of generating and storing waves of well-defined frequencies—akin to the box of a string instrument. Here, the scientists constructed a new type of resonator—capable of storing and processing information similar to synapses and neurons in the brain. The one described in *Scientific Reports* combines the unique properties of quantum materials together with that of spintronic magnetic devices.

Spintronic devices are electronics that use an electron's spin in addition to its electrical charge to process information in ways that reduce energy while increasing storage and processing capacity relative to more traditional approaches. A broadly used such device, a "spin torque oscillator," operates at a specific frequency. Combining it with a quantum material allows tuning this frequency and thus broadening its applicability considerably.

"This is a fundamental advance that has applications in computing, particularly in neuromorphic computing, where such resonators can serve as connections among computing components," observes Kent.

More information: Jun-Wen Xu et al, A quantum material spintronic resonator, *Scientific Reports* (2021). DOI: [10.1038/s41598-021-93404-4](https://doi.org/10.1038/s41598-021-93404-4)

Journal information: [Scientific Reports](https://phys.org/news/2021-07-storage-device.html)
<https://phys.org/news/2021-07-storage-device.html>



A schematic of a nanoconstriction spintronic resonator (a), which depicts signal (S) and ground (G) electrical contacts, along with the current flow (b), measured at 200 nanometers. Credit: NYU's Department of Physics

New research shines light on how Covid-19 can damage the brain

By Leah Rosenbaum

It's no secret that Covid-19 infections can have an effect on the neurological system. From the early days of the pandemic, reports of brain fog, memory issues and confusion showed that the virus impacts much more than the lungs. But what do we really know about how Covid-19 can damage the brain? Research presented at the Alzheimer's Association International Conference on July 29 sheds some light on how Covid-19 impacts brain function.

Severe Covid-19 Damages the Brain—But Brain Cells Can Recover

Researchers have already shown that a Covid-19 infection can lead to brain cell damage during the acute phase of the illness, particularly in patients who are sick enough to end up in the ICU. But according to new research, these brain cells seem to recover after three to six months. Nelly Kanberg, a researcher at the Institute of Biomedicine at the University of Gothenburg in Sweden, measured biomarkers in the brain that showed while brain cells in some patients became damaged during severe Covid-19, these biomarkers go back down to “normal” levels a few months after infection. This shows that the brain can recover and heal—though some patients will still suffer from long-term cognitive issues. One persistent mystery, Kanberg says, is that we don't yet know exactly how Covid damages the brain. It “may be a result of a combination of factors,” she says, including an inflammatory response, injuries to blood vessels and issues with clotting.

Older Adults Are More Likely To Have Neurological Issues After Covid-19 Infection

Another study conducted in Argentina found that adults over the age of 60 were likely to have issues with cognitive function, such as memory loss and confusion, after a Covid-19 infection. Gabriel A. de Erausquin, a neurology researcher at the University of Texas Health Science Center at San Antonio, says his study showed that among people age 60 and over, close to 60% of those exposed to Covid-19 have trouble with memory and cognition. This represents an almost tenfold increase in neurological issues in this population, he says. Interestingly, adults who have lost their sense of smell during a Covid-19 infection are more likely to have brain issues. This may be a clue to the relationship between Covid-19 and degenerative brain diseases like Alzheimer's disease, which can also involve loss of smell. “The [brain] regions affected by both overlap,” De Erausquin says. If these seniors don't recover fully, “then we are facing potentially a very large increase in Alzheimer's cases,” he says. De Erausquin plans to follow the 234-person study group for the next five years to see if the cognitive issues in older adults improve like those in Kanberg's study.

Younger Covid Patients Can Have Brain Problems, Too

A third study, conducted by George D. Vavougiou, a neurology research associate at the Athens Naval Hospital in Greece, found that it's not just elderly people who suffer cognitive issues after a Covid infection. In his study, people as young as 40 showed cognitive decline, including short-term memory issues and other forms of impairment, after infection with the virus. The people who were most likely to have brain issues were those who had post-Covid fatigue and poor lung function even after the initial infection was gone. Vavougiou says his findings show that doctors should screen Covid-19 patients, even young patients who didn't have severe disease, for symptoms of cognitive decline.

There Are Still A Lot Of Unknowns

Despite all this new evidence linking Covid-19 to cognitive issues, including memory problems that are similar to Alzheimer's disease, we still don't know exactly how Covid infections and cognitive issues are linked. Heather Snyder, vice president of Medical & Scientific Relations at the Alzheimer's Association, says that researchers around the world will continue to investigate exactly how Covid can impact the brain. In the meantime, patients shouldn't stress out too much. "Having Covid-19 does not mean that you're going to develop Alzheimer's," she says, "We don't know what that connection is." While the two diseases do seem to show some similarities, getting Covid-19 does not automatically mean that you will have issues with brain function. "We don't really know why one person does and one person doesn't," she says.

That being said, the best way to prevent brain damage from Covid-19 is to not get sick at all—yet another reason to encourage people to get vaccinated against the disease.

<https://www.forbes.com/sites/leahrosenbaum/2021/07/29/new-research-shines-light-on-how-covid-19-can-damage-the-brain/?sh=7f33de3557b8>

