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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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नवभारत टाइम्स

गुरुवार, 07 *जुलाई 2022*

चीन के ड्रोन की तरह ही ताकतवर है भारत का बाहुबली, पाकिस्तान की भी हर हरकत होगी नाकाम

भारत ने पिछले दिनों ऑटोनमस फ्लाइंग विंग टेक्नोलॉजी डेमॉन्स्ट्रेटर का पहला फ्लाइट टेस्ट किया और इसके साथ ही देश ड्रोन टेक्नोलॉजी में आत्मनिर्भर होने की तरफ बढ़ चुका है। डिफेंस रिसर्च एंड डेवलपमेंट ऑर्गनाइजेशन (DRDO India) की तरफ से तैयार ड्रोन पर रक्षा मंत्रालय की तरफ से बयान जारी किया गया। बयान में कहा गया है कि इस ड्रोन की पहली उड़ान एक मील का पत्थर है और अहम टेक्नोलॉजी के विकास की तरफ एक बड़ा कदम है। इस ड्रोन को स्विफ्ट या स्टेल्थ विंग फ्लाइंग टेस्टबेड भी कहा जा रहा है। भारतीय सेनाओं का स्वदेशीकरण करने की दिशा में ये ड्रोन एक बड़ा कदम है। ये ड्रोन घातक फाइटर ड्रोन का ही वर्जन है। ड्रोन की मदद से दुश्मन पर सटीक निशाना लगाया जा सकेगा।

ताकतवर भारत का ड्रोन विशेषज्ञों की मानें तो भारत का ये ड्रोन चीन के HQ-9/P का जवाब है। चीन का ये ड्रोन 100 किलोमीटर तक की रेंज में दुश्मन को जवाब दे सकता है। इसके अलावा क्रूज मिसाइल और एयरक्राफ्ट को एक सिंगल शॉट में ढेर कर सकता है। लेकिन सूत्रों की मानें तो ये रेंज बस एयरक्राफ्ट के खिलाफ ही है। क्रूज मिसाइल और छोटे टारगेट्स के लिए ये रेंज 25 किलोमीटर से भी कम है। भारत का घातक ड्रोन भारत-चीन हिमालय बॉर्डर पर विवाद में चीन के ड्रोन की तरह ही मजबूत रोल अदा कर सकता है।

साल 2020 में रिपोर्ट आई थी कि चीन ने जमीन से आसमान तक हमला करने वाली मिसाइल को भारत-चीन-नेपाल ट्राई बॉर्डर इलाके में तैनात कर दिया है। चीन का मकसद इसके जरिए क्षेत्र में एयरडिफेंस नेटवर्क को मजबूत करना था। इस ड्रोन के शामिल होने के बाद सेनाओं को नई ताकत मिल सकेगी। ड्रोन में एनपीओ सैटर्न AL-55 इंजान लगा है जिसे एक हाई परफॉर्मेंस वाला टर्बोफैन इंजन कहा जाता है। इस ड्रोन को बेंगलुरु स्थित एरोनॉटिकल डेवलपमेंट एस्टैब्लिशमेंट (ADE) की तरफ से तैयार किया गया है।

इस ड्रोन के सफल परीक्षण के बाद अहम और संवेदनशील मिलिट्री सिस्टम को शामिल करने का रास्ता साफ हो गया है।

https://navbharattimes.indiatimes.com/world/asian-countries/indias-new-stealth-drone-will-be-eying-on-china-boost-for-defence-capabilities/articleshow/92720478.cms

FINANCIAL EXPRESS
Read to Lead

Thu, 07 Jul 2022

Gaganyaan: What will India's Astronauts Eat During Their Space Flight? DRDO Chief Reveals

Department of Defence R&D and Chairman DRDO Dr G Satheesh Reddy said, "Developing food consumption in zero gravity space is a new and unique challenge, and our scientists are relishing this opportunity."

Six menus comprising vegetarian and non vegetarian Indian food items are being prepared for the crew of the country's first human spaceflight aboard the Gaganyaan. The crew of the first ever human mission from India will have a large variety of food to choose from which is being prepared by Defence Food Research Laboratory (DFRL) Mysore, a lab under Defence Research and Development Organisation (DRDO). Confirming this to Financial Express Online, in an exclusive conversation, Secretary, Department of Defence R&D and Chairman DRDO Dr G Satheesh Reddy said, "Developing food consumption in zero gravity space is a new and unique challenge, and our scientists are relishing this opportunity."

"The initial feedback received was incorporated and modified food products are ready for second phase of evaluation," Dr G Satheesh Reddy added. According to him, "DFRL has a lot of experience in developing food for extreme conditions. This includes soldiers posted in Siachen glacier, sailors in submarines, and scientists on expeditions to Antarctica etc."

What is on the menu?

There will be a wide choice for the crew of the first human mission. The six different menus which are expected to include very light items like upma, poha, idli for breakfast; there will be a choice of meat and vegetarian biryani for lunch and for dinner they can choose from chapatis and some gravy with vegetables and meat preparation to choose from.

Will they get dessert and other food items?

Yes. They will get an option of either halwa or any other alternative. There will be a choice for different fruit juices and tea/coffee. According to reports, the DFRL is expected to treat the food as mildly spicy and in case there is a need to make it spicier there will be sachets to add on. The first human mission is expected to be of a short flight of a week, therefore the food packages will be semi-hydrated. And the crew will have to add water to the package and warm it up. Due to

zero-gravity, there is a fear of water spillage and to control that the water will have to be added in a confined space.

Is there any bread on the menu?

No. as there is a fear of the bread crumbles floating in the space station. And there will be special straws for enabling the crew to have water or other liquids. And the special straw is being made by the scientists at DFRL.

Has DFRL made food items for space?

Yes. This DRDO lab has the distinction of making special mango bars for the first Indian in space – Squadron Leader Rakesh Sharma, who in 1984 was on board Russia's Soyuz T-11.

https://www.financialexpress.com/lifestyle/science/gaganyaan-what-will-indias-astronauts-eat-during-their-space-flight-drdo-chief-reveals/2586782/

FINANCIAL EXPRESS
Read to Lead

Thu, 07 Jul 2022

Future of PPP in Defence is Bright, and a Shining Example of AatmaNirbhar Bharat: DRDO Chief

India's Defence Research and Development Organisation (DRDO) has more than 50 laboratories across the country. All these laboratories are engaged in developing defence technologies in various sectors including combat vehicles, missiles, naval systems, advanced computing, aeronautics and armaments. And in over six decades this premier organisation has been contributing in the development of key military platforms and weapons for the three services.

Keeping in line with Prime Minister Narendra Modi's vision of "Atmanirbhar Bharat' in defence DRDO has been constantly working on futuristic technologies in the ecosystem and the sector like drones and anti-drone technology, robotics, cyber security, artificial intelligence, quantum computing and asymmetric technologies. Now the focus is to help make India self-reliant in military technology with the joint cooperation with the private industry, academia, start-ups, MSMEs. Secretary, Department of Defence R&D and Chairman DRDO Dr G Satheesh Reddy talks with Huma Siddiqui in New Delhi and shares updates on various projects DRDO is working on.

Following are excerpts:

There are around 88 projects that come under the Development-cum-Production Partner (DcPP) policy. What is the status of some of them including the Advanced Towed Artillery Gun System (ATAGS)?

The Advanced Towed Artillery Gun System (ATAGS) crossed a major milestone by successfully completing the validation trials between April 26 and May 2 this year at Pokhran Field Firing Range, wherein it met the specifications of the Army. ATAGS was developed along

with industry partners, Tata Advanced Systems Ltd and Bharat Forge Ltd, and active participation of other industries. The reliability of both the guns has been validated by firing multiple rounds in various zones, including burst, intense & sustained modes. Both the industries are today poised to take up production in large quantities. The future of public private partnerships in defence is very bright and a shining example of AatmaNirbhar Bharat initiative. All other projects with industries as DcPP are also progressing well. For example Indigenously developed Automatic Chemical Agents Detector and Alarm (ACADA) has been successfully developed through and inducted on Indian Naval ships along with industry partner M/s L&T .

Various kinds of bridges viz. 5M, 10m, modular bridges have been developed with industry like L&T and these systems have been successfully evaluated and inducted. Now private industry is also involved in development of missiles, bombs etc as DcPP. For example Bombs & VSHORAD by Adani group, Guided Pinaka & Grenade by Economic Explosives Ltd and ATAGS by Bharat Forge Ltd. Similarly, M/s BDL is the DcPP for Smart Anti Airfield Weapon (SAAW). The weapon has been realised and its integration on fighters of IAF is underway. Further, M/s BDL is also the DcPP for Advanced Light Weight Torpedo (ALWT).

There are talks that DRDO labs are working on increasing the distance of some of the missiles that have successfully completed tests. Is that correct?

Increasing the range of missiles is always good as it improves the capability. DRDO is continuously looking for advanced technologies to improve upon the capabilities of existing missiles. The research into propulsion technologies, types of fuels, navigation and control systems is a continuous ongoing effort to improve the performance of indigenous systems and weapons.

The Air independent Propulsion (AIP) is one big issue for Project 75. What is the status of the same and when can it be fitted on the boats which will start coming up for retrofits?

The AIP system has been developed by DRDO's Naval Materials Research Laboratory (NMRL), Ambernath. This is based on Fuel Cell and other technologies have been developed in the country. It has successfully gone through the mandatory requirement of a ground test for 14 days. Now the next step is to make a version to be fitted into the submarine. So, we need to make a plug and then incorporate it in the P-75 (Scorpene class submarine). We have started the work for developing the plug integrating it into the submarine.

What is the current status of Exoskeleton? Are you in talks with the private sector companies, as many claim they already have this technology?

Military exoskeleton is an emerging technology with low Technology Readiness Level (TRL) worldwide. Most of the exoskeleton available is for rehabilitative purposes. Military exoskeleton on the other hand requires non-obstructive movements while providing calibrated assistive forces. Various configurations of passive and active powered lower and upper extremity exoskeleton for augmentation applications are in various stages of development. DRDO is working with industry and academia to pursue the development.

What is the update on the Light Battle Tanks and other vehicles for the Indian Army?

The Light Battle tank is being developed by DRDO. Combat Vehicles Research & Development Establishment (CVRDE), Chennai is leading the project and design is complete based on the requirements of Indian Army and M/s L&T is involved as DcPP. In respect of other vehicles,

supply order has been placed on Armoured Vehicles Nigam Limited (AVANI) by the Ministry of Defence for manufacture and supply of 118 Nos of Arjun Main Battle Tank Mk IA, developed by DRDO. The WhAP vehicle developed by DRDO is also being produced by Tata Motors Limited for supply to the Indian Army.

In robotics – what is DRDO doing that can be shared with private sector companies for armed forces?

DRDO is working on many technologies in the area of robotics for the armed forces, which can be shared with the private sector as per our Transfer of Technology (ToT) guidelines. Centre for Artificial Intelligence and Robotics (CAIR), the Bengaluru based premier laboratory is developing technologies for various autonomous unmanned vehicles and robotic platforms. It includes, ground vehicle, underwater vehicle and small flying platforms. CAIR is also working on perception technologies for giving intelligence to various unmanned vehicles and robotics platforms using multi-modal sensing including vision, LIDAR, RADAR etc. These technologies enable the system to perceive the environment and interact with it to achieve mission goals.

Development of cognitive architecture to realize complex mission objectives with autonomous robotic platforms is also being done by CAIR. Many of these technologies have been transferred to Indian industry. This includes Multi Agent Robotic System (MARS) consisting of a heterogeneous team of mobile robots, a multi-agent robotic framework and AI-enabled perception, planning and navigation algorithms. There are some technologies for which work has been initiated for ToT to Indian industry namely an autonomous all-terrain unmanned ground vehicle for surveillance and patrolling applications. DRDO's R&DE (E) Pune has also been working on remotely operated vehicles. This includes the ROV Daksh and Mini Daksh which are designed for IED identification and handling as well as reconnaissance activities such as CBRN contamination monitoring etc. Private Industry is playing an important role in the robotics research ecosystem, and DRDO is partnering with them at various stages of developmental life cycle.

Is DRDO focusing on special clothing for soldiers in high altitude?

Yes, the Indian Army has been importing extreme cold weather clothing for use in high altitude regions and it is important to ensure that these are indigenously manufactured. DRDO has designed the Extreme Cold Weather Clothing System (ECWCS), which is ergonomically designed modular technical clothing with improved thermal insulation and physiological comfort based on the insulation required at various ambient climatic conditions in Himalayan regions during different levels of physical activity. The ECWCS embodies physiological concepts related to reduction in respiratory heat and water loss, unhindered range of motions and rapid absorption of sweat while providing waterproof, windproof features with adequate breathability and enhanced insulation as well as strength features required for high altitude operations. The ECWCS is suitable to be used in temperature ranges of $+15^{o}$ Celsius to -60^{o} Celsius. DRDO has handed over the technology to 5 different Indian companies in Dec 2021, and indigenously developed ECWCS will be available for induction by Armed Forces this year.

https://www.financialexpress.com/defence/fe-exclusive-future-of-ppp-in-defence-is-bright-and-a-shining-example-of-aatmanirbhar-bharat-drdo-chief/2586796/

Defence News

Defence Strategic: National/International

NewsOnAIR

Thu, 07 Jul 2022

इंटरनेशनल पुलिस एक्सपो 2022: मेक इन इंडिया को मिल रही मजबूती

देश के सशस्त्र सुरक्षाबलों के लिए आवश्यक उपकरणों हेतु पहले हमें अन्य देशों से आयात पर निर्भर रहना पड़ता था लेकिन पिछले 7-8 सालों में इस स्थिति में काफी बदलाव देखने को मिला है। खासतौर से केंद्र सरकार की महत्वकांक्षी आत्मनिर्भर भारत योजना की शुरुआत के बाद। दरअसल, इस योजना के तहत ही न केवल रक्षा क्षेत्र बल्कि अन्य कई क्षेत्रों में देश को आत्मनिर्भर बनने में मजबूती मिली है। यहां बात हो रही है रक्षा क्षेत्र में आत्मनिर्भरता की तो बता दें देश में स्वदेशी रूप से तैयार उपकरणों के प्रदर्शन के लिए इस दिशा में नई दिल्ली के प्रगति मैदान में दो दिवसीय इंटरनेशनल पुलिस एक्सपो 2022 की शुरुआत हुई। यह एक्सपो 6-7 जुलाई 2022 को को निर्धारित किया गया। एशिया के सबसे बड़े इस पुलिस एक्सपो के जरिए प्रभावी पुलिसिंग का समर्थन करने और एक मजबूत आंतरिक सुरक्षा बुनियादी ढांचे के निर्माण का प्रयास किया गया है। पुलिस एक्सपो में अपने उपकरणों के प्रदर्शन के लिए आए विभिन्न कंपनियों और स्टार्टअप्स ने प्रसार भारती न्यूज सर्विसेज (PBNS) से बात कर अपने उपकरणों की जानकारी दीं। आइए विस्तार से जानते हैं उनके बारे में…

”U SAFE” बचाएगा पानी में डूबते लोगों की जान

कुछ साल पहले तक एक ऐसे टेक्नोलॉजिकल प्रोडक्ट के बारे में सोचना भी मुश्किल होता था कि पानी में डूब रहे व्यक्तियों को रिमोट कंट्रोल की सहायता से बचाया भी जा सकता है। अब यह संभव है डिफेंस एक्सपो चेन्नई 2018 में लॉन्च U SAFE लाइफ बॉय के जरिए। जी हां, U SAFE लाइफ बॉय को रिमोट कंट्रोल की सहायता से किसी भी डूबते व्यक्ति तक पहुंचाया जा सकता है। ”U SAFE” से संबंधित अधिकारी ने PBNS को बताया की उनका यह प्रोडक्ट केंद्र स्तर पर आपदा नियंत्रण के लिए बनी फोर्स NDRF और SDRF प्रयोग में ले रही हैं। 15 किलोमीटर की स्पीड से चलने वाला यह लाइफ बॉय 200 किलोग्राम तक का भार उठा सकती है। इसके अलावा उन्होंने केंद्र सरकार की मेक इन इंडिया पहल पर

जोर देते हुए बताया कि इस तरह के एक्सपो से उन्हें ज्यादा लोगों तक पहुंचने में मदद मिलती है और जरूरतमंद संस्थाओं से सीधे बात हो जाती है।

INDO WINGS: मैपिंग और सर्विलेंस का तोड़

मैपिंग और सर्विलांस के लिए भी अब भारत को अन्य देशों पर निर्भर नहीं रहना है क्योंकि मेक इन इंडिया पहल के तहत 2019 में शुरू हुआ स्टार्टअप INDO WINGS देशी को स्वदेशी रूप से निर्मित मैपिंग और सर्विलांस के लिए तकनीक उपलब्ध करा रहे हैं। यह स्टार्टअप विशेष रूप से सर्विलांस और खेती के साथ-साथ डिफेन्स संबंधित उपयोग के लिए ड्रोन बनाती है। INDO WINGS ने PBNS से बात करते हुए बताया कि इनके प्रोडक्टस डिफेन्स और खेती जैसे क्षेत्र में सरकार के साथ मिलकर काम कर रही है। डिफेन्स के लिए सर्विलांस और एंटी ड्रोन सिस्टम के साथ-साथ स्मॉल एमयूनिशन ड्रॉपिंग फैसिलिटी पर भी यह स्टार्टअप तेजी से काम कर रहा है। स्टार्टअप्स को लेकर सरकार के फोकस पर PBNS को जवाब देते हुए INDO WINGS ने बताया कि केंद्र सरकार की पहल मेक इन इंडिया और स्टार्टअप इंडिया के तरफ से उन्हें सब्सिडी प्राप्त हुई है और इस तरह एक्सपो के माध्यम से उन्हें उनकी तकनीकों के जरूरतमंद लोगों तक पहुंचने में आसानी होती है

STELLAR: डेटा रिकवरी अब बेहद आसान

डेटा आज के समय में एक महत्वपूर्ण विषय है। डेटा का उपयोग हर क्षेत्र में है खासकर वैसे जो सॉफ्टवेयर आधारित तकनीक पर संचालित होते हैं। ऐसे में किसी कारण बस जरूरी डेटा डिलीट हो जाना एक बड़ी समस्या हो जाती है। इसी समस्या का समाधान लेकर आई है STELLAR जो डेटा रिकवरी के लिए उन्नत तकनीक उपलब्ध करने और खोए हुए डेटा को पूरी तरह रिकवर करने का काम करेगी। यह कंपनी इंटरनेशनल पुलिस एक्सपो 2022 में पहुंची थी। कंपनी की तरफ से उपस्थित अधिकारी ने PBNS को बताया कि कंपनी भारत सरकार से कई उपक्रमों सहित भारतीय सेना के साथ भी काम कर रही है। भारत सरकार के उपक्रमों में ONGC, NTPC, BHEL, HAL, RBI और DRDO मुख्य रूप से शामिल हैं। एक्सपो के बारे में STELLAR ने बताया कि इस तरह के आयोजन से उनकी पहुंच अधिक से अधिक लोगों तक जा पाती है, जिससे उनके विस्तार में काफी मदद मिलती है।

https://newsonair.com/hindi/2022/07/07/international-police-expo-2022-make-in-india-is-getting-stronger/

Thu, 07 Jul 2022

LAC पर चीन इस्तेमाल कर रहा 5G नेटवर्क! भारतीय जवानों को कम्युनिकेशन में आ रही समस्या, सुनाई देती है अजीब सी एक तेज आवाज

वास्तविक नियंत्रण रेखा (LAC) पर तैनात भारतीय सेना (Indian Army) के जवानों को रेडियो कम्युनियु केशन (Radio Communication) में काफी समस्या का सामना करना पड़ रहा है। ऐसा इसलिए क्योंकि चीन (China) अपनी तरफ सीमावर्ती इलाकों में अब 5G नेटवर्क (5G Network) शुरूशु कर रहा है। The New Indian Express की एक रिपोर्ट के मुताबिक, सूत्र ने बताया कि चीन LAC के अपनी तरफ जिस 5G वेव का इस्तेमा तेल कर रहा है। उसके कारण भारतीय सेना के कम्युनियु केशन डिवाइस में एक अजीब सी तेजते आवाज सुनाई देती है। इसके कारण भारत में अधिकारियों पर अब दबाव बढ़ गया है और वे इस समस्या से निपटने के लिए समाधान खोजने में जुटेहैं। एक सूत्र ने कहा,"रक्षा अनुसंधान और विकास संगठन (DRDO) उभरती समस्या का स्थायी समाधान खोजने के लिए काम कर रहा है।"

रिपोर्ट के मुताबिक,"इसके लिए एक नई सेटेलाइट लॉ न्च करने की योजना पर भी बातचीत चल रही है, जिसका इस्तेमाल भारतीय सेना करेगी। ये के-बैंडबैं फ्रिक्वेंसी का इस्तेमाल करने में मदद करेगी।" यह फ्रिक्वेंसी आम जनता के लिए या कमर्शियलर्शि इस्तेमाल के लिए खुली नहीं होगी। सूत्र ने कहा,"इसे केवल रक्षा बलों और रेडियो एस्ट्रोनॉमी के लिए इस्तेमाल करने के लिए अलग रखा जाएगा।" 'DRDO इसे अच्छे से हल कर सकता है' रिपोर्ट के मुताबिक, पूर्व रक्षा वैज्ञानिक रवि गुप्ता ने बताया,"उत्तरी सीमाओं पर तैनात भारतीय सैनिसै कों को कम्युनिकेशन नेटवर्क में काफी समस्याओं का सामना करना पड़ रहा है।" उन्होंने आगे कहा,"अगर चीन की तरफ से उत्तरी सी माओं पर इस्तेमाल किए जाने वाले 5G के कारण कम्युनिकेशन डिवाइस में कोई समस्या है, तो DRDO इसे अच्छे से हल कर सकता है।" यहां गौर करने वाली बात ये भी है कि जहांचीन ने LAC पर 5G की शुरुआत की है, तो वहीं भारत की तरफ सीमा से लगे इलाकों में मोबाइल नेटवर्क की काफी कमी है।

भारत के सीमवर्ती इलाकों में अब भी खराब हैं नेटवर्क लद्दाख के चुशुलशु के पार्षदर्ष कोंचोक स्टेनजिन सीमावर्ती इलाकों में खराब नेटवर्क को लेकर पहले भी आवाज उठाई थी। 2 जून को उन्होंने एक बार फिर ट्विटर के जरिए इस मुद्दे को उठाया था। उन्होंने ट्वीट किया,"सीमावर्ती गांवों में 4G के लिए ग्राउंड जीरो से अनुरोध है। चुशुलशु निर्वाचन क्षेत्र के गांव अभी भी बेहतर कम्युनिकेशन सुविधाओं से वंचित हैं। हमें

निचले दर्जे का नागरिक मत समझो। मेरे गांव सामान्य नहीं हैं। ये गांव सीमावर्ती गांव हैं, जिन्हें प्राथमिकता के तौर पर लिया जा ता है।" उन्होंने यह भी कहा कि चीन ने पैंगों पैंग झील पर पुल को पूरा करने के बाद भारतीय क्षेत्र के बहुत करीब हॉट स्प्रिंग के पास तीन मोबाइल टावर भी लगाए हैं। चीन पैंगों पैगत्सो पर बना रहा एक और पुलप, टैंक समेत सभी तरह के सैन्सैय वाहनों की हो सकती है आवाजा ही, भारत ने जताया विरोध उन्होंने आगे कहा,"क्या यह चिंता चिं की बात नहीं है? हमारे पास, जहा लोग रहते हैं, उन गांवों में 4G सर्विसर्वि भी नहींहैं। मेरे निर्वाचन क्षेत्र के 11 गांवों में 4G सर्विसर्वि नहीं है।" चीन ने हाल ही में पैंगों पैग झील पर एक पुल का निर्माण किया है, जिस पर भारत ने आपत्ति जताई है। भारत चीन के साथ 3,488 किलोमीटर की सीमा साझा करता है, जो जम्मू और कश्मीर, हिमाचल प्रदेश, उत्तराखंड, सिक्किम और अरुणाचल प्रदेश राज्यों के साथ चलती है। चूंकि सीमाएं साफ तौर से मार्क नहीं है, इसलिए कई इलाकों में सीमा को लेकर विवाद भी जारी हैं। 2020 में गलवान घाटी संघर्ष के बाद से दोनों देश के बीच सैन्सैय गतिरोध जारी है। इस मुद्दे को हल करने के लिए कई दौर की सैन्य और कूटनीतिक बातचीत हो चुकी हैं।

https://hindi.moneycontrol.com/news/india/china-is-using-5g-network-on-lac-indian-soldiers-are-facing-problems-in-radio-communication-strange-booming-sound-heard-651141.html

THE ECONOMIC TIMES

Fri, 08 Jul 2022

Need to Resolve LAC Issues Early: Jaishankar to Wang Yi

Foreign minister S Jaishankar called for an early resolution of all outstanding issues along the Line of Actual Control in eastern Ladakh when he met his Chinese counterpart Wang Yi in Bali on Thursday. An early meeting of the senior army commanders is being planned as part of efforts to end the impasse. Recalling disengagement in some friction areas, Jaishankar reiterated the need for complete disengagement from all the remaining areas to restore peace along the border, officials said after the meeting. It is understood that specifics of impasse along LAC were discussed. ET was the first to report that Jaishankar and Wang would meet in Bali and focus on the LAC impasse. The two may again meet on the sidelines of the foreign ministers' meeting of the Shanghai Cooperation Organisation from July 28 to 29 in Uzbekistan.

Jaishankar reaffirmed the importance of abiding by bilateral agreements and protocols, and the understandings reached between the two ministers during their previous conversations, officials said. Both ministers affirmed that the military and diplomatic officials of the two sides should continue maintaining regular contact and looked forward to the next round of senior commanders' meeting at an early date, officials said. During the meeting, Jaishankar reiterated that India-China relationship is best served by observing the three mutuals - mutual respect, mutual sensitivity and mutual interests. Recalling their meeting in March, the two reviewed the progress on some key issues discussed then, including the return of students to China. Jaishankar stressed the need for expediting the process and facilitating early return of students. ET has learnt

that besides students, families of several Indian professionals in China are stuck in India and are unable to return.

The two ministers also exchanged perspectives on other regional and global developments. Wang appreciated India's support during China's BRICS chairship and assured China's support for India's upcoming G20 and SCO Presidency. "Harmonious coexistence and common development of China and India will make great contributions to the cause of peace and development of mankind," the Chinese envoy to India said as the two ministers met.

Other Meetings

Jaishankar also met with his counterparts from Saudi Arabia, the UAE, South Africa, Mexico, Argentina besides hosts Indonesia and discussed issues such as G20, energy and food security and other shared interests.

https://economictimes.indiatimes.com/news/defence/need-to-resolve-lac-issues-early-jaishankar-to-wang-yi/articleshow/92733161.cms

Press Information Bureau
Government of India

Ministry of Defence

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MoD Approves Three Private Sector Banks to Provide Financial Services in Overseas Procurement

In line with further opening of allocation of Government business to Private Sector Banks by the Department of Financial Services, MoD has assigned three Private Sector Banks viz HDFC Bank Ltd., ICICI Bank and Axis Bank to provide the Letter of Credit and Direct Bank Transfer business for overseas procurement by the Ministry. MoUs in this connection have been signed with each of these three banks recently by PCDA, New Delhi on behalf of MoD.

Till now, only authorised public sector banks were utilised to provide these services to MoD. With this for the first time three Private Banks have also been allowed to provide financial services for overseas procurement by MoD.The selected banks may be allocated with LC business of Rs 2000 Crore, each on the capital and revenue side, for a period of one year on concurrent basis (Rs 666 Crore for each bank under both capital as well as Revenue). The performance of these Banks will be monitored regularly so as to take necessary further action as required.

https://www.pib.gov.in/PressReleasePage.aspx?PRID=1839797

IDN INDIAN DEFENCE NEWS
Global Defence, Aerospace & Security

Fri, 08 Jul 2022

MOD Issues RFI to Procure 24 Enhanced Capability Global Navigation Satellite System Jammer

The Ministry of Defence, Government of India, intends to procure approximately Quantity 24 Enhanced Capability Global Navigation Satellite System (ECGNSS) Jammer and associated equipment.

Intended Use of Equipment (Operational Requirements)

The ECGNSS Jammer is intended to protect our assets from hostile aircraft (utilising SNS based navigation), guided weapons/ missile/drone/ small Unmanned Aerial Vehicle (UAV) by jamming and spoofing the on-board GNSS thereby degrading their navigation/weapon delivery capabilities.

Broad Requirements - System Specifications.

The System should be able to Jam different SNS Constellations & ISM bands. The System should be able to spoof both in space and time domain different SNS Constellations. Constellations to be jammed and spoofed should be selectable with option for simultaneous jamming for all GNSS constellations. System should be capable of being controlled through a GUI on a laptop/PC locally and remotely via user network. System should provide both Omnidirectional and directional coverage. Directional antenna should be slew-able with manual intervention locally and through GUI remotely. Directional antenna should have provision to slew in Azimuth and manually in elevation. The directional antenna should be able to rotate ±180. The rate of rotation should be as fast as possible. The positioning accuracy of the antenna should be good The range of the jamming (both for omni and directional) should be controllable by user. The mapping of range to power output level to be provided for facilitating jamming distance.

The system should be configurable and controllable locally through the system PC and remotely over user network. The system should have a provision for accepting track data over network for cueing of the directional antenna. System should be compatible with existing IAF communication network with adequate IT and network security features. The system should work on 230 V, 50 Hz, 3 phase power supply, commercial as well as captive using DG Sets. It should have self-sufficiency in terms of captive power supply for 24x7 operations. The feasibility of providing green power technology based solution (Fuel cell/Solar).

The system shall confirm to operate under environmental condition with latest test methods of JSS 55555, EMI/EMC as per latest MIL STD 461E/ F and ESS as per latest MIL STD 2164 or any other latest National / International Military standard. System should be able to operate in terrains with temperature ranging from -200 C to + 550 C and height up to minimum 5000 mtrs (AMSL).

http://www.indiandefensenews.in/2022/07/mod-issues-rfi-to-procure-24-enhanced.html?m=1

THE TIMES OF INDIA

Thu, 07 Jul 2022

Army Now Wants a Small Satellite to Train its Signals Officers

In keeping with the ongoing advances in the military use of space, the Army now wants a small communication satellite for training its students from the Corps of Signals at the Military College of Telecommunication Engineering (MCTE) at Dr Ambedkar Nagar in Madhya Pradesh. The Army on Thursday issued a request for information (RFI) to Indian companies for designing, developing and fabricating the communication satellite, which will be launched by the Polar Satellite Launch Vehicle (PSLV) of Isro.

"Communication Satellites are used by advanced militaries, including the Indian Army, to provide ubiquitous communication coverage, including to remotest of the locations. They also provide a reliable redundancy to our existing communication infrastructure," the RFI said, while specifying the various technical parameters of the satellite. "The MCTE is planning to launch a small form factor student satellite with communication payload for training purpose as we need to train our officers on various aspects of space technology in general and about satellite communication in specific," it added. The project will include satellite link planning, satellite design, communication payload design, fabrication, assembly and testing of electrical and mechanical systems of a satellite.

"It will also include establishment and operation of an earth station, accessing, monitoring and controlling of the satellite to ensure we have a pool of trained manpower available to take on the requirement of planning and providing satellite communication for future," it said. The armed forces have a few dedicated satellites like the GSAT-7 for the Navy and GSAT-7A for the IAF. The defence ministry in November last year had also approved the Rs 2,236 core project to launch the GSAT-7C satellite for the IAF, while also giving the nod in March this year for the Rs 4,600 crore project for a GSAT-7B satellite for the Army, as was reported by.

https://timesofindia.indiatimes.com/india/army-now-wants-a-small-satellite-to-train-its-signals-officers/articleshow/92729868.cms

THE TIMES OF INDIA

Thu, 07 Jul 2022

Inaugural Defence Technology Exhibition - East Tech 2022 Kicks off in Kolkata

From assault rifles and pistols to military drones and gunnery simulators to armoured vehicles – a plethora of modern defence weapons, tech solutions, vehicles and tactical gears are up for display in the first ever defence tech exhibition in the city featuring 200 plus Indian manufacturers including large number of MSMEs and start ups for a two day exposition at Biswa Bangal Mela Prangan. The East Tech 2022 was inaugurated by Rana Pratap Kalita, General

Officer Commanding-in-Chief (GoC-IC) of the Indian Army's Eastern Command in presence of state chief secretary HK Dwivedi and city police commissioner Vineet Goyal along with other senior defence officials on Thursday. The exhibition was organised in association with Society of Indian Defence Manufactures (SIDM) and Confederation of Indian Industries (CII)to identify cutting-edge technologies needed for solving operational challenges in the Eastern Theatre and the Indian Army as a whole.

Army commander Kalita said the concept of the fair dawned upon him while he realised the Eastern Command receives a number of letters from private exhibitors to showcase their products and while interacting with troops in difficult terrains, they also spoke of modern equipment for better capability. “Generally the procurements are driven by the ministry of defence and there is a centralised defence expo. However, the army commander has special financial power for equipment required for capability enhancement for the fleet working in difficult conditions. We have 120 odd officers at the exhibition to check the products, shortlist those needed and go for procurement process,” said army commander Kalita. The state chief secretary lauded the initiative and proposed formation of a defence industrial corridor in the lines of and . “This is a golden opportunity for west Bengal to bring in investment and create jobs. We are upbeat given the large MSME sector we have and a pool of talented young boys and girls. We would like to have a defence manufacturing corridor in our state. If we have the right entrepreneurs, we would allot the land and whatever facilitation is required. Bengal has a locational advantage by the sheer presence of eastern command here. I would request the Eastern Command and the CII to help us in forming a state defence policy focussing on defence manufacturing units in the state,” said HK Dwivedi, the state chief secretary. The response from the Indian defence manufacturers was overwhelming as more than 200 Indian manufacturers including a large number of MSMEs and start ups, DRDO, DPSUs from throughout the country are participating in the event to showcase their latest and the most advanced weapon & equipment technology. “We have been providing shoes to the Indian army for 35 years. Recently we have started exporting workwear and defence clothing to a number of countries including Israel army. We are showcasing our lightweight 3.5 killo suits and jackets that can keep a soldier warm even at -50 degrees Celsius,” said Samarjit Singh, CEO of Icon Designs, a Kanpur based company.

Kalyani Group, a Pune based Indian conglomerate had on display a wide range of indigenously developed defense offerings like artillery gun systems, protected vehicles, armoured vehicles, multi motor drones, ammunition, small arms, defence electronics and air defence solutions. Also, at the expo was US based Zen Technologies that has a manufacturing unit in Hyderabad putting on display corner shot weapon system, mortar integrated simulator, medium machine gun simulator and containerised tubular shooting range. “We are a regular at the central defence expo and are happy to be here at the inaugural East Tech event. We have briefed our products to the army officers and are awaiting a positive feedback from them,” said Ramamurthy, a senior official of the company.

https://timesofindia.indiatimes.com/city/kolkata/inaugural-defence-technology-exhibition-east-tech-2022-kicks-off-in-kolkata/articleshow/92730063.cms

Hindustan Times

Fri, 08 Jul 2022

Top Officials of Indian Ocean States Discuss Maritime Safety

The meeting of deputy national security advisers of the Colombo Security Conclave was hosted by India's National Security Council Secretariat in Kochi. Delegations from Bangladesh and Seychelles participated as observers. Top security officials of India, the Maldives, Mauritius and Sri Lanka discussed maritime safety, countering terrorism and combating transnational crime at a meeting on Thursday. The meeting of deputy national security advisers of the Colombo Security Conclave was hosted by India's National Security Council Secretariat in Kochi. Delegations from Bangladesh and Seychelles participated as observers.

According to a statement from the external affairs ministry, the officials discussed the implementation of the roadmap for cooperation during 2022-23 and decisions made at the NSA-level meeting of the Colombo Security Conclave in March in the Maldives. The discussions focused on five pillars – maritime safety and security, countering terrorism and radicalisation, combating trafficking and transnational organised crime, cyber security, protection of critical infrastructure and technology, and humanitarian assistance and disaster relief.

Since last year, the Colombo Security Conclave has been playing an increasingly important role in fostering security cooperation between India and its neighbours in the Indian Ocean. Among those who participated in the meeting were India's deputy national security adviser Vikram Misri, the Maldives' foreign secretary Ahmed Latheef, Mauritius' principal coordinator for security matters, Yoidhisteer Thecka, and Gen Shavendra Silva, Chief of Defence Staff of Sri Lanka. The Secretariat of CSC in Colombo was represented by acting secretary MH Nishantha Peiris, director of naval operations and foreign naval cooperation. The delegation from Bangladesh was led by Lt Gen Waker Uz Zaman, principal security officer of the division of the armed forces. Seychelles was represented by Simon Archange Dine, chief of staff of the defence forces.

https://www.hindustantimes.com/india-news/top-officials-of-indian-ocean-states-discuss-maritime-safety-101657216696513.html

Hindustan Times

Fri, 08 Jul 2022

US House, A Key Push for Closer Ties with India

In separate amendments to the National Defence Authorization Act (NDAA), three US Congressmen have proposed that the US deepen defence ties with India, waive off sanctions that may be triggered by India's acquisitions of Russian weapons under the Countering America's Adversaries Through Sanctions Act (CAATSA), enhance the energy partnership with India, and work to reduce Indian dependence on Russian military equipment and energy sources and replace it with the US sources. NDAA is the umbrella legislation that defines the agencies responsible for America's defence, determines funding for these agencies, particularly the

Department of Defense (DoD), and frames the broad policies for the use of the funding. In June, the House Armed Services Committee (HASC) approved the Act with overwhelming bipartisan support. NDAA 2023, if and when passed, will provide over $800 billion for US national defence.

Congressman Ro Khanna, a member of HASC, Andy Barr, a member of the House Foreign Affairs Committee, and Ronnie Jackson, a retired rear admiral and member of HASC, have proposed the India-specific amendments. Khanna, a progressive Indian-American Democrat from California, has highlighted the threats posed by China's aggression against India, lauded the bilateral cooperation on emerging technologies, and sought an India-specific waiver under CAATSA. Barr, a Republican from Kentucky, has sought a report from the administration on reducing Indian dependence on Russian energy sources but also ways to deepen cooperation on clean coal technology and identify benefits to the US from enhanced energy partnership. Jackson, a Republican from Texas, has sought a report on ways that the US can support Indian defence.

The amendments, submitted to the House Committee on Rules, are only the first step of a long legislative process — the committee will meet next week to decide on a structured amendment process to be presented to the full House; the House will vote on amendments; the Senate will pass its own version of the legislation; the White House will then issue a statement of administrative policy indicating support or opposition for the legislations and specific provisions; and then the concerned members of the Senate and House will work on reconciling the two versions of the bill to come up with a final compromise version. But people familiar with developments on the Hill believe that the amendments, in themselves, indicate the bipartisan support in the Congress for the India-US strategic relationship. At a time when two resolutions have been introduced in the House expressing concern over India's human rights record — both resolutions have little chance of being taken up or passing — the substantive defence-related amendments are being seen as a sign that there are strong political constituencies on the Hill invested in the relationship with India.

In line with the US effort to encourage India to diversify its defence ties in the wake of Russia's invasion of Ukraine, the amendments also represent hope in American political and policy circles that the differences on Ukraine can be converted into an opportunity to deepen US-India defence partnership. The tone of the proposed amendments, which seek deeper ties with India, also stand in stark contrast with the dozens of amendments proposed with regard to China, which largely seek to impose costs on the Communist Party of China and enhance US support for Taiwan.

The Khanna amendment: CAATSA waiver

In his amendment, Khanna has a proposed a subsection that says the strong US-India defence partnership, "rooted in shared democratic values", is critical to advancing US interests in the Indo-Pacific. The partnership must be strengthened "in response to increasing threats in the Indo-Pacific regions, sending an unequivocal signal that sovereignty and international law be respected". Khanna's amendment then goes on to laud the US-India Initiative on Critical and Emerging Technologies (ICET) — announced during the Tokyo meeting between President Joe Biden and Prime Minister Narendra Modi — as a "welcome and essential step" to forge closer partnerships between the two countries in artificial intelligence, quantum computing, biotechnology, aerospace and semiconductor manufacturing. "Such collaborations between

engineers and computer scientists are vital to help ensure that the United States and India, as well as other democracies around the world, foster innovation and facilitate technological advances which continue to far outpaceRussian and Chinese technology."

In a section titled "Border Threats from China and reliance on Russian weapons", Khanna's amendment proposes that Congress recognise that India faces "immediate and serious regional border threats from China, with continued military aggression by the Government of China along the India-China border". It adds that the US should take additional steps additional steps to encourage India "to accelerate India's transition off Russian-built weapons and defence systems" while strongly supporting India's immediate defence needs. But it is in the final section of his amendment that Khanna intervenes in a key issue that has dominated headlines over the past few years, triggered by India's acquisition of the S-400 missile system from Russia. It proposes that while India faces immediate needs to maintain its "heavily Russia-built weapon systems", a waiver to sanctions under CAATSA is in the best interests of the US and US-India defence partnership "to deter aggressors" in light of Russia and China's close partnership. While the authority to waive off sanctions under CAATSA lies with the executive, the support within the Congress for an India-specific exemption under a legislation will send a political signal.

The Barr amendment: Energy partnership

In his amendment, Representative Andy Barr has asked that the Secretary of State, in consultation with both the US Trade Representative and Secretary of Energy, to submit a report on the US-India energy partnership to the concerned committees of both the Senate and the House within 90 days of the passage of the Act. This report, according to the amendment, should have a description of the following elements — opportunities for the US to replace Indian dependence on Russian energy with US energy sources; opportunities for technology sharing "to foster cleaner processing of fossil fuels, including clean coal technology"; the potential benefits to both US national security and economy from an enhanced energy partnership with India; and potential non-governmental partners, including universities, which could help assist with research on increased energy cooperation between the two sides. Among other reasons, Barr's interest in energy is also understood to emanate from the fact that the University of Kentucky, located in his home state, is home to the Centre for Applied Energy Research which works in fossil fuel research. A state legislation also funds and supports carbon storage research at the University of Kentucky.

The Jackson amendment: Defence boost

In his amendment, Ronny Jackson has sought a report from the DoD on three issues. These include the capability of the US industrial base to support projects, activities, and programmes anticipated to be taken up by Indian counterparts; the current platforms used by India that could hinder interoperability between the US and India; and the ways in which US support can serve as a viable alternative to any support offered by Russia or China. Jackson's amendment is seen as an acknowledgment of the "Make in India" effort of the government. It is also a reflection of the concern that persists within the US system of India's ties with Russia, but also a willingness to do more to offset those ties.

https://www.hindustantimes.com/india-news/in-us-house-a-key-push-for-closer-ties-with-india-101657212436435.html

Press Information Bureau
Government of India

Ministry of Science & Technology

Thu, 07 Jul 2022 3:56PM

AI Boosts Rural Connectivity & Healthcare

A total of 15 villages in different parts of the country may soon be seamlessly connected through a next-generation networking solution that can address congestion issues in 4G infrastructure and provide high-tech and affordable internet connectivity,

The network solution called GigaMesh wirelessly provides fibre-like backhaul capacity and paves the road for 5G. The solution has been developed by Astrome, a deep-tech startup expediting the implementation of 5G and rural telecommunications infrastructure through its patented millimetre wave E-band radios and satellite communication solutions. They have signed a contract with the Department of Telecommunication to start the pilot with 15 villages in India. Plans are afloat to scale the activity to more rural parts of India on the basis of the pilot. The startup is supported by AI & Robotics Technology Park (ARTPARK), the Technology Innovation Hub (TIH) at the Indian Institute of Science (IISc), which aims to chart the future for millimetre wave wireless communication on Earth and in space. ARTPARK is a not-for-profit foundation promoted by the Indian Institute of Science (IISc), Bengaluru, with support from the AI Foundry in a public-private collaborative model to promote technology innovations in artificial intelligence (AI) & Robotics with seed funding from the Department of Science & Technology (DST), Govt. of India, under the National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS) and from the Government of Karnataka. It is designed to bring about a collaborative consortium of partners from industry, academia, and government bodies.

GigaMesh, developed by Astrome, supported by ARTPARK, is world's first multi-beam E-band Radio that is able to communicate from one tower to multiple towers simultaneously while delivering multi GBPS throughput to each of these towers. A single GigaMesh device can provide up to forty links with 2+ Gbps capacity, communicating up to a range of ten kilometres. This flexibility in range makes it suitable for both decongesting the dense urban networks and extending rural coverage. With India's huge population in the rural segment, Astrome can help improve domestic internet connectivity. Major original equipment manufacturers (OEMs) like Ericsson, Siklu, Huawei and NEC have developed E-band products. While all of these products can only do point-to-point communication, requiring a large number of devices which increases the cost of deployment, Gigamesh by ARTPARK's startup, features multiple point-to-point communication in E-Band, lowering cost and is driven by software to make it easy to deploy, maintain and repair remotely.

Besides this, AI researchers at ARTPARK, in collaboration with HealthTech startup Niramai Health Analytix and the Indian Institute of Science (IISc), have also developed XraySetu, a

platform that can interpret chest X-rays with 98.86 % sensitivity toward COVID-19 within few seconds. ARTPARK also organised the ARTPARK Innovation Summit that brought industry, academia and the government under one roof to discuss important topics such as how to create next-generation connectivity in rural areas, health AI for Bharat, connecting Bharat with Drones, inclusive learning for the future and building AI and research ecosystem. Apart from this, they participated in an unmanned ground vehicle (UGV) experiment of the Indian Army and showcased India's only Legged Robotic Dog.

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Aditya-L1 Science Support Cell Exposes Students to Processes Happening on the Sun, Aditya-L1 Mission & Observational Data Analysis

Students from institutions and universities across India were exposed to the basic processes happening on the Sun, Aditya-L1 mission, and observational data analysis, as well as the current open problems that young researchers on the subject can address, at a workshop conducted by the Aditya-L1 Science Support Cell (AL1SSC). "This workshop will help in developing the next generation of solar physicists spread across various institutes and universities in India. It can train younger people from the university sector so that the user community can grow with time and would promote utilisation of data from Aditya L1 by a large number of students and scientists across India," said Prof. Dipankar Banerjee, Director, Aryabhatta Research Institute of Observational Sciences (ARIES).

The workshop from 27th June to 6th July 2022 by AL1SSC, a joint effort of the Indian Space Research Organisation (ISRO) and ARIES, Nainital, an autonomous institute under the Dept. of Science & Technology (DST), Govt. of India, is a part of the activities commemorating '75 years of India's Independence: Azadi ka Amrit Mahotsav' at ARIES. It covered talks and demo sessions on topics such as the sun, observation techniques, the Aditya-L1 mission, statistical & AI/ML techniques, and data analysis techniques by experts in solar physics from various institutes in India.

AL1SSC will be organising more such workshops before and after the launch of Aditya-L1 mission so that the scientific data can be explored by a larger community leading to the exciting scientific outcomes. The Aditya-L1 mission is India's first dedicated spacecraft mission to study the Sun. It will enable a comprehensive understanding of the dynamical processes of the Sun and address some of the outstanding problems in solar physics and heliophysics. AL1SSC has been set up to act as a community service centre for the guest observers in preparing science observing

proposals and analyzing science data. This support cell provides tools and documentations required to understand, download and analyse the data.

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The LHCb Experiment Leads to the Observation of an Exotic Tetraquark

Over the course of the 20th century, physicists have discovered numerous elementary particles. The largest family of these particles are the so-called hadrons, subatomic particles that take part in strong interactions. This broad family of particles contains numerous sub-sets of particles with similar properties. In 1964, M. Gell-Mann and G. Zweig introduced a renowned theory known as the "Quark Model," which clearly outlined the internal structure of hadrons. The Quark Model suggests that hadrons consist of either three quarks (baryons) or quark-antiquark pairs (mesons). While many uncovered hadrons fall into one of these two categories, the model also hypothesizes the existence of hadrons with more complex structures, such as pentaquarks (i.e., four quarks and an antiquark) and tetraquarks (i.e., two quark-antiquark pairs).

Many studies in the 1970s theorized about the possible mechanisms underpinning the formation of these complex hadron structures. All the hadrons uncovered up until 2003 had structures that match one of the two main types described by the Quark Model, yet some of the particles observed after that date are difficult to explain using the model. The LHCb experiment is a detector at the CERN Large Hadron Collider primarily aimed at unveiling differences between matter and antimatter by studying a specific type of particle, known as the "beauty quark." The LHCb Collaboration, the large group of researchers involved in the experiment, has recently observed an exotic tetraquark with an unusual structure, containing two charm quarks. "The discovery of the heavy charm quark in 1974 (observation of J/y mesons in 1974, often called as 'November revolution') and even heavier beauty quark in 1977, led to the recognition that tetraquarks consisting of two heavy quarks and two light antiquarks could have interesting and unusual properties," Vanya Belyaev, one of the researchers who carried out the study, told Phys.org. "However, experimental facilities suitable for the search and study for such 'double heavy' objects only appeared in the 21st century, with the start of the Large Hadron Collider at CERN."

At the LHC collider, physicists can study collisions between protons at very high energies, which promote the production of numerous heavy and double heavy particles. In 2011 and 2012, the LHCb collaboration analyzed a tiny fraction of the data collected at the LHC and found that the probability of the simultaneous production of two charm-anticharm quark pairs at these high energies was far from low, suggesting that the collider could enable the observation of double heavy objects. "With more data, in 2017 the LHCb collaboration reported an observation of the double charm baryon Xcc++ consisting of the two charm quarks and light u-quark," Belyaev

explained. "With this observation it became clear that if double charm tetraquarks exist, their observation would just a matter of the time."

Following the LHCb's observation of the double charm baryon Xcc++ , M.Karliner and J.Rosner were able to use its measured properties to precisely predict the properties that a hypothetical tetraquark would have. Such a tetraquark would consist of two charm quarks, a u-antiquark and a d-antiquark. The theoretical particle was named Tcc+. "The predicted properties of the Tcc+ tetraquark imply that the particle will exhibit itself as a narrow peak in the mass distribution for the pair of charmed mesons D*+ and D0, where D*+ and D0 are conventional charmed mesons consisting of (charm quark and anti-d-quark) and (charm quark and anti-u-quark)," Belyaev said. "It is interesting to note that the predicted mass of the Tcc+ tetraquark is very close to the sum of masses of the D*+ and D0 mesons, which also means that if the mass will be just 1% lower than the predicted value, the properties of the Tcc+ will be very different and will not be visible in the D*+ and D0 mass spectrum. If the mass will be just 5% higher, the peak will be wide (or even very wide) and it will be very difficult, almost impossible, to observe experimentally."

Essentially, the work by M. Karliner and J. Rosner pin-pointed the exact conditions that would be suitable to observe the hypothetical Tcc+ tetraquark. Their predictions were ultimately what guided the recent work by the LHCb collaboration. In their study, the collaboration carefully studied the mass spectrum of the D*+and D0 meson pairs, using a dataset containing all the data accumulated at the LHC collider from 2011 to 2018. In their previous analysis, conducted in 2012, the researchers used only 4% of the data available today to study the region of the relatively large masses of D*+ and D0 pairs. In their new analysis, they specifically focused on the region of masses that is closer to the sum of the D*+ and D0 meson masses. In this region, they observed over one hundred signal Tcc+ tetraquarks that form a strikingly narrow peak very close to the sum of the D*+ and D0 meson masses with an overwhelming statistical significance.

"The statistical significance we observed is so high that it totally excludes that the observed signal is a statistical fluctuation," Belyaev explained. "Since the D*+ meson consists of a charm quark and anti-d quark, and D0 meson consists of charm quark and anti-u-quark, it fixes the minimal quark content of that the observed as two charm quarks, anti-d-quar and anti-u-quark." The LHCb collaboration then performed numerous tests to validate their results. All these tests confirmed that the signal they observed was associated with a Tcc+ tetraquark. Finally, they measured the mass of the Tcc+ tetraquark and the width of its peak. "According to the laws of quantum mechanics, the width of the peak is related to the inverse lifetime of the particle, and we found that the width corresponds to a very long lifetime, one of the largest for the particles that decays due to strong interactions and the longest for all exotic hadrons found so far," Belyaev said. "In some sense, Tcc+ is Methuselah of the exotic hadrons."

The researchers have recently conducted a follow-up study, featured in Nature Communications, further exploring the properties of the Tcc+ particle. In this paper, they showed that the decay pattern is consistent with Tcc+→(D*+→D0p+)D0 . They also checked the distribution of the mass of D0D0 and D+D0 pairs and found that the enhancements in these spectra are very well consistent with the decays Tcc+→(D*+→D0p+)D0 with missing p+ meson and Tcc+→(D*+→D+p0/g)D0 with missing p0/g.

"We have not yet measured the quantum numbers of the Tcc+ particles directly, but we offered strong arguments in support for the total spin J and parity P of the observed particle, that are the most important quantum numbers, are JP=1+, in perfect agreement with expectations," Belyaev said. "To probe another important quantum number, isospin, we have studied mass spectra for the D0D0, D+D0, D+D+, D+D*+ pairs, searching for possible contributions from the hypothetical isospin partners. They found no signs suggesting that the isospin of the newly observed Tcc+ state is 0, in agreement with the predictions."

The Tcc+ tetraquark observed by the LHCb collaboration could have at least two different internal structures. For instance, it could have a "molecular-like structure," where two charm quarks are separated by a large distance, comparable to the size of the atomic nucleus, a "compact structure," where the distance between the two charm quarks is significantly smaller, or a combination of the two. In their recent follow-up paper, the team used a sophisticated model to determine what this structure could be and measured the fundamental properties of the Tcc+ state, including the scattering length, effective range and pole position, which are important when trying to determine a particle's internal structure. The values measured by the researchers are compatible with a molecular-like structure, yet this is yet to be confirmed.

The LHCb collaboration's observation of the Tcc+ tetraquark is a significant contribution to the field of high energy and particle physics. In fact, it has already sparked important theoretical discussions about nature of Tcc+, related molecular-like states, such as the enigmatic X(3872), and the general issue with the existence of the "compact tetraquarks." In its future studies, the collaboration plans to attempt to directly determine the quantum numbers of the new state, as so far they only attained strong, but indirect evidence of them.

"It is very important to understand the production mechanism of the Tcc+ state in proton-proton collision," Belyaev added. "Currently we have some counterintuitive observations—some distributions, like transverse momentum and track multiplicity are really puzzling and more data is needed for resolution. It will be very interesting to compare the production of the T_{cc}^{+} and X_{cc}^{++} particles—here a certain level of similarity is expected, but also to compare the properties, including production properties, of the T_{cc}^{++} particle and an enigmatic X(3872) particle."

https://phys.org/news/2022-07-lhcb-exotic-tetraquark.html