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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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DRDO News

DRDO Technology News

THE ECONOMIC TIMES

Wed, 28 July 2021

DRDO Chairman emphasises building of indigenous defence system

By Bikash Singh

Synopsis

Dr Reddy delivered a talk on "Building Future Defence Capabilities - Strategic Strides" and stressed on the need of building an indigenous defence system in the country as almost 50% of the defence contents/technologies were imported from outside the country.

Dr. G Satheesh Reddy Secretary DDR&D and Chairman DRDO said that under the new DRDO policy, Transfer of Technology and patents including life science, missile technology has been provided to entrepreneurs free of cost to boost the defence manufacturing process in the country.

Dr. Reddy mentioned that DRDO has also launched an M. Tech. Programme in Defence Technology in collaboration with various education institutes which aims to impart necessary theoretical and experimental knowledge, skill and aptitude in various defence technology areas.

IIM Shillong observed the 6th death anniversary of late former President of India, Dr. APJ Abdul Kalam. The event was conducted virtually by Dr APJ Abdul Kalam Centre for Policy Research and Analysis.

Dr Reddy delivered a talk on "Building Future Defence Capabilities - Strategic Strides" and stressed on the need of building an indigenous defence system in the country as almost 50% of the defence contents/technologies were imported from outside the country.

He emphasized in the 'Make in India' initiative which greatly depends on knowing the 'Know-how' & 'Know-why' of technology development for creating self-sustainability in the country. He also stressed on increasing the export potential while reducing the imports of such technologies to become a self-reliant country.

Dr. Reddy emphasised on the 'Quantum Communication between two DRDO laboratories' which demonstrates a safe and secured communications during the time of need. He mentioned about the 'Development cum Production Partner' (DCPP) programme provided by DRDO which allowed the private sector to co-develop missile system and have the rights to manufacture as well. Under the new DRDO policy, Transfer of Technology and patents including life science, missile technology etc. has been provided to entrepreneurs free of cost to boost the defence manufacturing process in the country.

Handholding support is also provided to these enterprises (2000 Tier I, II industries; 10,000 Tier III Industries has been provided assistance so far). 'Technology Development Fund' which is an initiative under DRDO to create self-reliance in Defence Technology as a part of the 'Make in India' initiative. This scheme encourages MSME's to create an eco-system for enhancing cutting edge technology capability for defence application. Basically, it encourages fresh graduates to

consider start-ups with the help of Incubation Centres to establish enterprises and to develop technologies needed for defence application

Dr. Reddy mentioned that DRDO has also launched an M. Tech. Programme in Defence Technology in collaboration with various education institutes which aims to impart necessary theoretical and experimental knowledge, skill and aptitude in various defence technology areas. These students are offered an opportunity of undergoing internship under DRDO. He also mentioned about the 'VAIBHAV' Summit that took place with the collaboration with IIM Shillong where global Indian researchers came together to resolve emergent challenges faced by the country. The aim of this programme was to create an ecosystem of Knowledge and Innovation in the country through global outreach.

He also revealed that a new scheme which promotes more of R&D via different academic institutes in the country is about to launch very soon.

https://economictimes.indiatimes.com/news/defence/drdo-chairman-emphasises-building-of-indigenous-defence-system/articleshow/84798340.cms

Business Standard

Wed, 28 July 2021

DRDO to build indigenous defence system to reduce import dependence

On the sidelines of his speech, Dr Reddy mentioned the various initiatives and achievements of the country in the defence sector

Shilong: DRDO Chairman Dr G Satheesh Reddy on Tuesday stressed on the need to build an indigenous defence system in the country as almost 50 per cent of such technologies are currently imported from other countries.

Reddy was addressing a programme through video conference on Building Future Defence Capabilities - Strategic Strides organised by IIM Shillong to mark the sixth death anniversary of former president APJ Abdul Kalam who died while delivering a lecture here.

The DRDO chairman emphasised the Make in India' initiative which greatly depends on knowing the Know-how' and Know-why' of technology development for creating self-sustainability in the country.

Under the new DRDO policy, transfer of technology and patents, including life science and missile technology, has been provided to entrepreneurs free of cost

Dr Reddy was all praise for the significant contribution of Dr Kalam in the development of science and technology and also in enhancing the defence capabilities of the nation.

He recalled Dr Kalam was described as the Missile man of India' under whose leadership five missiles - Agni, Aakash, Naag, Prithvi and Trishul had been developed.

On the sidelines of his speech, Dr Reddy mentioned the various initiatives and achievements of the country in the defence sector.

He also stressed on increasing the export potential while reducing the import of such technologies to become a self-reliant country.

Dr Reddy emphasised the Quantum Communication between two DRDO laboratories' which demonstrates safe and secure communications in times of need.

He mentioned the Development cum Production Partner' (DCPP) programme provided by DRDO which allowed the private sector to co-develop missile systems and have the rights to manufacture as well.

Under the new DRDO policy, transfer of technology and patents, including life science and missile technology, has been provided to entrepreneurs free of cost to boost the defence manufacturing process in the country.

Handholding support is also provided to these enterprises, he said.

Dr Reddy said that DRDO has also launched an M. Tech. Program in Defence Technology in collaboration with various educational institutes which aims to impart necessary theoretical and experimental knowledge, skill and aptitude in defence technology areas. These students are offered an opportunity of undergoing an internship under DRDO.

He referred to the VAIBHAV' Summit that took place with the collaboration with IIM Shillong where global Indian researchers came together to resolve emergent challenges faced by the country. This programme aimed to create an ecosystem of knowledge and innovation in the country through global outreach.

He also revealed that a new scheme that promotes more R&D via different academic institutes in the country is about to be launched very soon.

In his opening speech, IIM Shillong director Prof DP Goyal said Kalam was a visiting faculty at the institute.

It is an honour for IIM Shillong to have a centre named after Dr APJ Abdul Kalam that is specifically working for the development of the northeast region, he said.

(Only the headline and picture of this report may have been reworked by the Business Standard staff; the rest of the content is auto-generated from a syndicated feed.)

https://www.business-standard.com/article/current-affairs/drdo-to-build-indigenous-defence-system-to-reduce-import-dependence-121072701593_1.html

अमर उजाला

Wed, 28 July 2021

आत्मनिर्भर भारत: आयात पर निर्भरता घटाने के लिए स्वदेशी रक्षा प्रणाली बनाने पर ध्यान दे रहा डीआरडीओ

सार

डीआरडीओ के चेयरमैन डॉ. जी सतीश रेड्डी ने मंगलवार को स्वदेशी रक्षा प्रणाली तैयार करने की जरूरत पर जोर दिया। उन्होंने कहा कि वर्तमान में हम ऐसी 50 फीसदी प्रौद्योगिकी दूसरे देशों से आयात करते हैं। डॉ. रेड्डी आईआईएस शिलांग की ओर से आयोजित एक कार्यक्रम में वीडियो कॉन्फ्रेंसिंग के माध्यम से 'भविष्य की रक्षा क्षमताओं का निर्माण' विषय पर बोल रहे थे। यह कार्यक्रम पूर्व राष्ट्रपति डॉ. एपीजे अब्दुल कलाम की छठी पुण्यतिथि को मनाने के लिए हुआ। कलाम की मौत यहां लेक्चर देते हुए हुई थी।

विस्तार

शिलांग: डॉ. रेड्डी ने देश की रक्षा क्षमताओं को बढ़ाने और विज्ञान व प्रौद्योगिकी के क्षेत्र में कलाम के योगदान की सराहना की। उन्होंने कहा कि कलाम को भारत के मिसाइल मैन के नाम से जाना जाता था। उनके नेतृत्व में पांच मिसाइलें (अग्नि, आकाश, नाग, पृथ्वी और त्रिशूल) विकसित की गईं। इसके साथ ही उन्होंने 'मेक इन इंडिया' पहल की भी सराहना की और कहा कि इस पहल ने प्रौद्योगिकी के क्षेत्र में भारत को आत्मस्थिर बनानेने में मदद की है।

डीआरडीओ के अध्यक्ष जी सतीश रेड्डी - फोटो : एएनआई (फाइल)

अपने भाषण के दौरान डीआरडीओ प्रमुख डॉ. सतीश रेड्डी ने कि रक्षा क्षेत्र में देश की सफलताओं और विभिन्न पहलों का जिक्र किया। उन्होंने ऐसी आत्मनिर्भर देश बनने के लिए ऐसी प्रौद्योगिकी का निर्यात बढ़ाने और आयात को कम करने की आवश्यकता पर जोर दिया। इसके साथ ही डॉ. रेड्डी ने दो डीआरडीओ की दो प्रयोगशालाओं के बीच क्वांटम संचार पर जोर दिया, जो जरूरत के समय में सुरक्षित और सुरक्षित संचार प्रदर्शित करता है।

उन्होंने 'विकास सह उत्पादन पार्टनर' प्रोग्राम का उल्लेख किया। यह प्रोग्राम डीआरडीओ ने शुरू किया है जो निजी क्षेत्र को मिसाइल विकसित करने और उनका उत्पादन करने की अनुमति देता है। उन्होंने कहा कि देश में रक्षा उत्पादन की प्रक्रिया को रफ्तार देने के लिए डीआरडीओ की नई नीति के तहत उद्यमियों को प्रौद्योगिकी और पेटेंट (लाइफ साइंस और मिसाइल प्रौद्योगिकी समेत) का हस्तांतरण बिल्कुल मुफ्त में किया जा रहा है।

डीआरडीओ प्रमुख डॉ. रेड्डी ने कहा कि इसने रक्षा प्रौद्योगिकी के क्षेत्र में विभिन्न शिक्षण संस्थानों के साथ मिलकर एक एमटेक प्रोग्राम भी शुरू किया है। इस प्रोग्राम के छात्र-छात्राओं को डीआरडीओ की विभिन्न इंटर्नशिप के तहत मौके दिए जा रहे हैं। इसके साथ ही उन्होंने कहा कि देश के विभिन्न शिक्षण संस्थानों के माध्यम से आर एंड डी (शोध एवं विकास) को प्रोत्साहित करने के लिए एक नई योजना की शुरुआत भी बहुत जल्द की जाने वाली है।

https://www.amarujala.com/india-news/drdo-focuses-on-building-indigenous-defence-system-to-reduce-import-dependence-news-in-hindi

हिन्दुस्तान

Wed, 28 July 2021

अब दुश्मनों के आसमानी चाल को भी भारत करेगा ध्वस्त, सुरक्षाबलों को जल्द मिलेगी DRDO की एंटी ड्रोन तकनीक

By मदन जैड़ा

नई दिल्ली: देश में ड्रोन हमलों के बढ़ते खतरे के मद्देनजर रक्षा मंत्रालय विदेशों से एंटी ड्रोन तकनीक खरीदने के साथ-साथ देश में निर्मित तकनीक को भी लेने पर गंभीरता से विचार कर रहा है। सूत्रों का कहना है कि जल्द ही इस संदर्भ में डीआरडीओ की तकनीक की खरीद के लिए रक्षा अधिग्रहण परिषद को प्रस्ताव भेजा जा सकता है। बता दें कि डीआरडीओ ने एंटी ड्रोन तकनीक विकसित की है, जिसका कई मौकों पर वीआईपी सुरक्षा में इस्तेमाल भी किया जा चुका है।

Hexacopter Drone

कुछ समय पूर्व जम्मू एयरफोर्स स्टेशन पर हुए ड्रोन हमले के बाद तीनों सेनाएं, केंद्रीय सुरक्षा बल एवं राज्य पुलिस ऐजंसियों की तरफ से एंटी ड्रोन तकनीक हासिल करने के प्रयास तेज हो गए हैं। सेनाओं के लिए इजरायल की एंटी ड्रोन तकनीक भी खरीदने के प्रयास चल रहे हैं जिसमें एक डिवाइस होती है जिसे राइफल पर फिट करके उड़ते ड्रोन पर निशाना लगाया जा सकता है।

डीआरडीओ की तकनीक

डीआरडीओ की एंटी ड्रोन तकनीक कहीं ज्यादा प्रभावी है। इसके जरिये तीन-चार किलोमीटर के दायरे में ड्रोन की फ्रीक्वेंसी को जाम किया जा सकता है तथा लेजर वैपन से हमला कर उसे नष्ट किया जा सकता है। इसे पिछले साल 15 अगस्त को लालकिले की सुरक्षा में भी तैनात किया गया था। हाल में आंध्र प्रदेश सरकार ने इसे तिरुमला मंदिर में तैनात करने का फैसला किया है।

डीआरडीओ ने दिया प्रजेंटेशन

सूत्रों के अनुसार इस बीच डीआरडीओ की तरफ से सेना एवं सुरक्षा बलों को कई चरणों में एंटी ड्रोन तकनीक के प्रजेंटेशन दिए गए हैं। खबर है कि सशस्त्र बलों की तरफ से सकारात्मक फीडबैक मिला है। इसलिए कुछ संवेदनशील स्थानों पर तैनाती के लिए इस तकनीक को खरीदा जा सकता है।

साझीदारी में निर्माण संभव

सूत्रों के अनुसार यदि सुरक्षाबलों के लिए डीआरडीओ की एंटी ड्रोन तकनीक की खरीद का फैसला होता है तो इसके निर्माण के लिए रणनीतिक भागीदारी में निजी क्षेत्र की मदद ली जा सकती है। इससे कम समय में इसका ज्यादा संख्या में निर्माण करना संभव हो सकेगा।

https://www.livehindustan.com/national/story-indian-security-forces-may-soon-get-drdo-anti-drone-technology-amid-drone-attacks-threats-on-border-in-jammu-and-kashmir-india-hindi-news-4267377.html

COVID 19: DRDO's Contribution

THE HINDU

Wed, 28 July 2021

Salem GH to increase oxygen capacity

The hospital already has medical oxygen plants of capacities 35kl, 13 kl and 6 kl

Salem: Measures are under way to increase medical oxygen capacity at the Government Mohan Kumaramangalam Medical College Hospital here.

The GMKMCH is the tertiary care centre for COVID-19 treatment and the hospital has been catering to patients even from neighbouring Namakkal, Krishnagiri, Dharmapuri and Kalakuruchi districts. The hospital is one of the few hospitals in the region that could treat COVID-19 patients with other serious ailments as well.

Construction of medical oxygen generator plants progressing at the Government Mohan Kumaramangalam Medical College Hospital in Salem on Tuesday.

The need for medical oxygen during the second wave of the COVID-19 pandemic increased compared to first wave and additional medical oxygen plants and oxygen concentrators were arranged at the hospital to meet the medical oxygen needs.

The hospital on Monday received a 6 kl medical oxygen plant sponsored by private organisations here.

Valli Sathyamoorthy, Dean of the hospital, said the hospital had increased its medical oxygen facilities considering the possibility of third wave.

The hospital already had medical oxygen plants of capacities 35kl, 13 kl and 6 kl.

Dr. Valli said, "the hospital has also been allotted two Pressure Swing Adsorption medical oxygen generator plants under PM-Cares Fund and it is being installed by the DRDO and NHAI. The construction works for setting up the plants are progressing. Each plant can produce 1,000 litres per minute and a plant can support upto 100 beds."

Besides, the hospital also had a modular oxygen generator which could provide medical oxygen support to 20 beds.

Training

Dr. Valli said in view of the third wave and considering reports that children would be majorly affected, the Hospital had arranged beds with oxygen support and training was under way for staff regarding handling paediatric patients.

https://www.thehindu.com/news/cities/Coimbatore/salem-gh-to-increase-oxygen-capacity/article35571400.ece

अमर उजाला

Wed, 28 July 2021

सीएमओ ने सरकारी अस्पताल का निरीक्षण किया, कोविड वार्ड की व्यवस्थाएं परखी

काशीपुर: सीएमओ डॉ. डीएस पंचपाल ने एलडी भट्ट सरकारी अस्पताल का निरीक्षण कर कोविड और जरनल वार्ड की स्थिति का जायजा लिया। सीएमओ ने निर्माणाधीन ऑक्सीजन प्लांट का निरीक्षण कर सीएमएस को जरूरी दिशानिर्देश दिए। सीएमएस डॉ. पीके सिन्हा ने बताया कि अस्पताल में इस समय आठ वेंटिलेटर हैं। वार्ड के सभी 20 बेडों पर ऑक्सीजन सिस्टम लगाए गए हैं। उन्होंने बताया कि डीआरडीओ की ओर से लगाया ऑक्सीजन प्लांट जल्द ही पूरी क्षमता के साथ काम करना शुरू कर देगा। वहां बाल रोग विशेषज्ञ डॉ. राजीव पुनेठा, डॉ. कमलजीत सिंह, चीफ फार्मेसिस्ट पीसी रेखाड़ी आदि थे।

काशीपुर के सरकारी अस्पताल में कोविड वार्ड का निरीक्षण करते सीएमओ डॉ. पंचपाल। - फोटो :

https://www.amarujala.com/uttarakhand/udham-singh-nagar/cmo-inspects-hospital-kashipur-news-hld4326095173

DRDO on Twitter

DRDO @DRDO_India · 23h

In fond remembrance of Dr APJ Abdul Kalam on his sixth Death Anniversary, Floral tributes were offered by Chairman DRDO Dr G Satheesh Reddy and other Personnel at DRDO Bhawan. He led DRDO during 1992-1999 taking it to greater heights. #APJAbdulKalam

DRDO @DRDO_India · 19h

DRDO conveys warm greetings to All Ranks of @crpfindia on the occasion of their Raising Day. Service, sacrifice & contribution of CRPF towards the Nation's security shall always remain invaluable. #CRPFDay2021

Defence News

Defence Strategic: National/International

Press Information Bureau
Government of India

Ministry of Defence

Tue, 27 July 2021 10:48AM

Raksha Mantri Shri Rajnath Singh to attend SCO Defence Ministers' meeting in Tajikistan

Key Highlights:

- **Raksha Mantri leaves on a 3-day visit to Dushanbe today**
- **To address SCO Defence Ministers' meet tomorrow**
- **Member states to discuss defence cooperation issues**
- **RM also expected to meet his Tajik counterpart**

Raksha Mantri Shri Rajnath Singh is visiting Dushanbe, Tajikistan from July 27-29, 2021 to attend the annual meeting of the Defence Ministers of Shanghai Cooperation Organisation (SCO) member states. In the annual meeting, defence cooperation issues among SCO member states are discussed and a communique is expected to be issued after the deliberations. Shri Rajnath Singh's address at the meeting is slated for July 28, 2021.

During his visit to Dushanbe, the Raksha Mantri is also expected to meet his Tajik counterpart Col Gen Sherali Mirzo to discuss bilateral issues and other issues of mutual interest.

It may be recalled that Tajikistan is chairing the SCO this year and hosting series of Ministerial and official-level meetings.

https://pib.gov.in/PressReleasePage.aspx?PRID=1739352

पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Tue, 27 July 2021 10:48AM

रक्षामंत्री श्री राजनाथ सिंह ताजिकिस्तान में शंघाई सहयोग संगठन के रक्षा मंत्रियों की बैठक में हिस्सा लेंगे

प्रमुख बिंदुः

- **रक्षामंत्री तीन दिवसीय दौरे पर आज दुशांबे रवाना होंगे**
- **कल शंघाई सहयोग संगठन (एससीओ) के रक्षामंत्रियों की बैठक को सम्बोधित करेंगे**
- **सदस्य देश रक्षा सहयोग विषयों पर चर्चा करेंगे**
- **रक्षामंत्री की अपने ताजिक समकक्ष से मुलाकात संभावित**

रक्षामंत्री श्री राजनाथ सिंह 27 जुलाई से 29 जुलाई, 2021 तक दुशांबे, ताजिकिस्तान के दौरे पर रहेंगे, जहां वे शंघाई सहयोग संगठन (शंघाई कोऑपरेशन ऑर्गनाईजेशन - एससीओ) सदस्य देशों के रक्षामंत्रियों की वार्षिक बैठक में हिस्सा लेंगे। वार्षिक बैठक में एससीओ सदस्य देशों के बीच रक्षा सहयोग के मुद्दों पर चर्चा होगी और बातचीत के बाद बयान भी जारी हो सकता है। श्री राजनाथ सिंह बैठक को 28 जुलाई, 2021 को सम्बोधित करेंगे।

दुशांबे के दौरे के वक्त आशा की जाती है कि रक्षामंत्री अपने ताजिक समकक्ष कर्नल जरनल शेर अली मीर्ज़ा से मुलाकात करेंगे और आपसी हितों के अन्य मुद्दों सहित द्विपक्षीय मुद्दों पर चर्चा करेंगे।

याद रहे कि इस साल एससीओ की अध्यक्षता ताजिकिस्तान कर रहा है और मंत्रियों तथा अधिकारियों के स्तर पर कई बैठकों की मेजबानी कर रहा है।

https://pib.gov.in/PressReleasePage.aspx?PRID=1739385

Press Information Bureau
Government of India

Ministry of Defence

Tue, 27 July 2021 7:03PM

Commander-in-Chief, Andaman and Nicobar Command visits Headquarter Air Force Component in Port Blair

Key Highlights:

- **CINCAN reviews operational preparedness**
- **Emphasises on Tri-Services joint training**
- **Stresses on strengthening Air Defence of Andaman & Nicobar Islands**
- **Awards commendations to some air warriors for extraordinary dedication**

Commander-in-Chief Andaman and Nicobar Command (CINCAN) Lt Gen Ajai Singh visited the Headquarter Air Force Component in Port Blair to review the operational preparednesson July 27, 2021. He was received by Air Force Component CommanderAir Commodore S Sridhar. The CINCAN was briefed about the layout of Headquarter Air Force Component and the infrastructure development plan.

The CINCAN interacted with the air warriors and shared his vision on joint use of assets of the three services. He underscored the importance of Tri-services joint training and emphasised on the need to keep abreast with the emerging technologies to have an edge over the adversaries. He stressed that professional knowledge and hard work are the key to success.

Lt Gen Ajai Singh also visited Air Force Station Porthrapur and 153 Squadron known as the 'Island Sentinels'. During his interaction with the Indian Air Force personnel, he emphasised on strengthening the Air Defence of Andaman and Nicobar Islands whichhas gained strategic importance due to the changing geo-political situation in the Indian Ocean Region. He also awarded on-the-spot commendations to some air warriors for their extraordinary dedication and devotion to duty.

The CINCAN also visited the newly-built residential area for the Air Force personnel at Vayu Vihar, Brookshabad where he was briefed on the various welfare facilities developed at the residential area. He appreciated the efforts put in by the Air Force Component in effective air surveillance despite various challenges in the remote islands.

https://pib.gov.in/PressReleasePage.aspx?PRID=1739609

Wed, 28 July 2021

Indian Navy to develop use of UUV unmanned underwater vehicles

According to Dinakar Peri in The Hindu, with regard to naval operations, underwater domain awareness (UDA) is one of the most critical areas for India, Chief of the Naval Staff Admiral Karambir Singh said on 23 July. Vice Chief of Naval Staff Vice Adm Ashok Kumar said that to exploit the potential of unmanned technologies and platforms, the Navy had approved an "unmanned road map".

L&T is developing a number of Autonomous Underwater Vehicles(AUVs) in collaboration with the Italian EdgeLab. L&T displayed the Amogh, Adamya & the Maya AUVs in DefExpo2020 (Picture source: Twitter account of Strategic Frontier)

Chief of the Indian Naval Staff Admiral Karambir Singh said: "For instance, the discovery of 'Chinese-origin' autonomous underwater gliders in the Indonesian waters indicate the extent to which underwater technologies are being harnessed for military advantage by China", Dinakar Peri reports. "The U.S. too has made rapid advances in this field, and have given some exposure to their technologies and system that we too wish to pursue".

The focus towards Theatre and Strategic ASW is inevitable and vital: "Advancements in Theatre and Strategic ASW would lead to advantageous outcomes in our favor, allowing us to deploy our capabilities in the right place at the right time," Admiral Singh stressed.

Vice Adm. Kumar said the Navy had understood the importance of unmanned solutions and recently envisioned a detailed road map for itself in this realm. "We also intend to share with industry what we need, by when, at what cost and in what numbers, so that, potential collaborators understand the users' vision and align to the needs."

In the last couple of years, it was decided to adopt Unmanned Underwater Vehicles (UUVs) to cut down on the requirement of minesweepers. Vice Adm Kumar said that as the industry developed UUVs for military purposes, it wi imperative to consider their compatibility with the existing manned platforms as a critical deliverable. Based on this, Dinakar Peri reports, Vice Adm. Kumar listed out four categories of UUVs- man-portable Autonomous Unmanned Vehicles (AUVs) with swarm functionality with an endurance of the order of 10 to 20 hours, lightweight AUVs compatible with the existing lightweight torpedo tubes onboard ships and endurance of about two days, heavyweight AUVs compatible with the existing heavyweight tubes and endurance of the order of 3 to 4 days, and high endurance AUVs with a capability of at least 15 days submerged endurance.

https://www.navyrecognition.com/index.php/naval-news/naval-news-archive/2021/10240-naval-news-july-2021-navy-forces-maritime-defense-industry/10483-indian-navy-to-develop-use-of-uuv-unmanned-underwater-vehicles.html

Hindustan Times

Wed, 28 July 2021

France to deliver 35 Rafales by 2021-end, a solo fighter will join in Jan 2022

Given the reliability of strategic ally France, the Indian Air Force (IAF) and the Indian Navy have evinced keen interest in Rafale platform due to its weight to power ratio and maritime strike capabilities

By Shishir Gupta

New Delhi: France will have delivered a total of 35 omni-role Rafale fighters by end-2021 to India with a last fighter making a solo journey to soon to be activated Hashimara air base in north Bengal in January 2022. Already 26 fighters have been delivered with 24 landed in India and remaining two kept for IAF pilot and technician training in France.

A fully loaded Rafale fighter with Hammer, SCALP and Meteor air-to-air missile and munitions.

Given the reliability of strategic ally France, the Indian Air Force (IAF) and the Indian Navy have evinced keen interest in Rafale platform due to its weight to power ratio and maritime strike capabilities. Apparently, the IAF leadership wants to acquire another 36 Rafales in future and the Navy is looking at Rafale-M as a fighter option onboard INS Vikrant (Indigenous aircraft carrier-1), to be commissioned next year.

The induction of Rafale into western and eastern theatre has force multiplied Indian war making capabilities as the French fighter is armed with the longest range air-to-air Meteor missile in the sub-continent, Hammer air to ground smart munition and long range SCALP air to ground weapon. The Hammer missile, which has been acquired by India under emergency purchases, can be released at a height of mere 500 feet to hit a high altitude target more than 70 km away. The missile hugs the terrain and then climbs to a height of over 4000 metres before striking the target from a top down action. The Indian Rafales carry specially modified Hammer missiles due to high altitude targets, mountainous terrain and Chinese recently acquired Russian S-400 air defence systems. In fact, the French have offered to jointly develop Hammer and Meteor missiles with India with extended range and heavier payload.

While the French Rafale deliveries are slightly ahead of time, all eyes are on the activation of the Hashimara air base, which will house the second squadron of Rafale fighters with the first squadron being home based in Ambala. The presence of Rafale in India's eastern sector will add teeth to its military response in the sector with both Sikkim and Arunachal Pradesh being a defence priority.

The positioning of Hashimara is such that it covers the Chumbi Valley, Sikkim and the sensitive Siliguri corridor. While both Ambala and Hashimara are home bases of Rafale, the fighters with nuclear capability will be flying all over India and its littoral territories.

https://www.hindustantimes.com/india-news/france-to-deliver-35-rafales-by-2021-end-a-solo-fighter-will-join-in-jan-2022-101627377558804.html

नवभारत टाइम्स

Wed, 28 July 2021

चीन को जवाब देने के लिए भारत भी तैयार, आर्मी की इस खास यूनिट को पूर्वी लद्दाख में किया तैनात: रिपोर्ट

भारत- चीन के बीच सीमा पर तनाव कम होता नहीं दिख रहा है। चीन की ओर से सैनिकों की तैनाती और वास्तविक नियंत्रण रेखा (LAC) के पास निर्माण कार्य भी जारी है। चीन की ओर से खतरे को देखते हुए भारतीय सेना ने प्रमुख यूनिट को पूर्वी लद्दाख की ओर भेज दिया है।

नई दिल्ली: चीन की ओर से खतरे को देखते हुए भारतीय सेना ने प्रमुख यूनिट को पूर्वी लद्दाख की ओर ट्रांसफर कर दिया है। पूर्वी लद्दाख में अपनी ताकत को बढ़ाए रखने के लिए भारत ने सेना के 1 स्ट्राइक कोर का ट्रांसफर पूर्वी लद्दाख में कर दिया है। इस यूनिट के जवान पीपुल्स लिबरेशन आर्मी PLA की ओर से उठाए गए किसी भी कदम का मुकाबला करने के लिए लेह स्थित मुख्यालय की सहायता करेंगे।

द ट्रिब्यून की रिपोर्ट के अनुसार भारतीय सेना ने 1 स्ट्राइक कोर को पूर्वी लद्दाख में ट्रांसफर कर दिया है। पिछले साल मई से भारत और चीन की सेनाओं के बीच गतिरोध जारी है और पूर्वी लद्दाख में एलएसी पर अप्रैल 2020 की स्थिति बहाल होने की तत्काल कोई संभावना नहीं है। 1 स्ट्राइक कोर के अलावा, दो अन्य स्ट्राइक कोर पाकिस्तान से मुकाबले के लिए है।

इसका मुख्यालय अंबाला और भोपाल में है। किसी भी प्रकार से संघर्ष की स्थिति में स्ट्राइक कोर को स्वाभाविक रूप से फर्स्ट मूवर्स के रूप में प्रशिक्षित किया जाता है। 1 स्ट्राइक कोर के पूर्वी लद्दाख में जाने से भारत के मौजूदा सैनिकों की संख्या में इजाफा होगा।

चीनियों ने पूर्वी लद्दाख के डेमचोक में चारडिंग नाला के पास भारत की तरफ तंबू लगाए हैं। इन तंबुओं में जो लोग रह रहे हैं उनको 'तथाकथित नागरिक' बताया जा रहा है। भारत की ओर से इनको वापस जाने के लिए कहा गया है बावजूद इसके इनकी मौजूदगी बनी हुई है।

चीन पूर्वी लद्दाख में अपने सैनिकों की गतिविधि बढ़ा रहा है और बहुत तेज गति से सैन्य बुनियादी ढांचे का विकास कर रहा है। सूत्रों के अनुसार गहराई वाले इलाकों में चीनी सैनिकों के लगभग चार डिवीजन G219 राजमार्ग पर तैनात हैं, जो अक्साई चिन से होकर गुजरता है। भारत भी अब किसी भी चुनौती का सामना करने के लिए अपनी सैन्य ताकत बढ़ा रहा है।

https://navbharattimes.indiatimes.com/india/indian-army-moves-key-strike-elements-to-eastern-ladakh-focus-on-china/articleshow/84783173.cms

FINANCIAL EXPRESS
Read to Lead

Wed, 28 July 2021

India US Military cooperation is important in bilateral ties

Later this year the 4th round of 2+2 Ministerial Dialogue is scheduled to take place in DC and defence Minister Rajnath Singh and external affairs minister Dr S Jaishankar will travel to the US to attend this meeting

By Huma Siddiqui

The US Secretary of State Anthony Blinken's visit ahead of Foreign Ministerial Quad talks later this year is another indication of how important the US-India bilateral relationship has become for regional and global stability. The agenda of the visit starting today (July 27, 2021) is expected to focus on various aspects of regional and international security as well as further enhancing defence relations.

AP Image)

Over the weekend, sources had confirmed to Financial Express Online: "Defence transfers and technologies, more drills, policy exchanges as well as exploring ways and means to further deepen collaboration in the defence domain is on the agenda of talks." Later this year the 4th round of 2+2 Ministerial Dialogue is scheduled to take place in DC. Both defence Minister Rajnath Singh and external affairs minister Dr S Jaishankar will travel to the US to attend this meeting.

Over the last couple of decades wide ranging defense cooperation and expanding military-to-military engagement across services, information sharing, cooperation in emerging sectors of defense, and mutual logistics support have been the hallmark of the bilateral India-US relationship.

India-US Military Cooperation

Both countries have agreed to pursue enhanced cooperation with the US Indo-Pacific Command and other Commands.

"With the foundational agreements, LEMOA, COMCASA, and BECA, in place and India gaining entry into MTCR the governments are discussing the steps to be taken to understand their full potential for mutual benefit. The long pending acquisition of 30 Sea Guardian unmanned aircraft worth approximately USD 3 billion for the Indian Navy, Indian Army and the Indian Air Force brings various elements of this strategic partnership," sources told Financial Express Online.

When was the first mention of Guardian made?

It was publically made in 2017 in the White House joint government statement issued in Washington DC when Prime Minister Narendra Modi had visited that country.

The drones will come with different configurations as the payloads for each service is different. In 2020, during the ongoing standoff between the armies of India and China, the Indian Navy had leased two Sea Guardian drones from the US Company General Atomic.

According to reports, the outgoing Indian Navy Vice Chief Vice Admiral G Ashok Kumar has talked about the AoN for the Sea Guardians to come soon. "These MQ-9 Sea Guardian drones will help the Indian Navy to keep a close watch on any vessel of interest operating in the Indian Ocean Region."

Last week, India also took delivery of the first two Lockheed Martin-Sikorsky MH60R multi-role helicopters (MRH) in San Diego, California. These helicopters will soon join the Indian Navy.

QUAD

Japan, Australia, India, and the United States have been increasingly wanting to cooperate in the various economic and security domains.

The common thread in these major defence deals

As has been reported by Financial Express Online earlier, the negotiations for three major assets of the Indian Navy (P8I, MH-60R helicopters, Sea Guardian Drones) were spearheaded by world renowned scientist Dr Vivek Lall. He has been the architect of significant US-India Military trade in the last decade. He has played a very important role in further expanding the military sales between the two countries. As US India Business Council Board member Dr Lall was recently part of an interaction with Indian Finance Minister Nirmala Sitharaman for boosting bilateral investment and economic growth.

As a Board member of the US Japan Business Council, Dr Lall has also interacted with Prime Minister Suga of Japan on bilateral economic growth. The Quad heads of state recently said "We will begin cooperation on the critical technologies of the future to make sure that innovation is in line with a free, open, inclusive, and resilient Indo-Pacific."

The QUAD (the US, Japan, India and Australia) are already operating P-8I, MH-60R helicopters too. India has recently received two MH-60R and is awaiting its arrival. Also, all the QUAD countries are interested in the Sea Guardian drones.

Interoperability

As is known the Indian Navy is already flying the P-8I that has come from the US aerospace company for the carrying out anti-submarine warfare and surveillance. And when the Sea Guardians drones deal is done, they will further strengthen the Indian Navy's maritime reconnaissance. And it will be able to expand its area of surveillance and monitoring of the IOR as well as coastal boundaries and assets.

Indian Navy will become more potent with the Sea Guardian Drones flying in sync with the P8I as well as the MH60R helicopters.

Defence Deals in the pipeline

India and the US are in discussions for Raytheon's National Advanced Surface to Air Missile System-II; BAE Systems Naval Guns and the Sea Guardian Drones.

The Trump administration had also offered Patriot Advanced Capability (PAC-3) missile defence systems to India.

https://www.financialexpress.com/defence/india-us-military-cooperation-is-important-in-bilateral-ties/2298782/

Outlook

Wed, 28 July 2021

Indian Army to conduct 13 day long military exercise with Russian counterpart from August 1

The Army said 250 personnel from each side will participate in the 12th edition of the joint military exercise

Indian Army on Tuesday confirmed that India and Russia will jointly conduct a 13-day mega military exercise 'Indra 21' emphasizing on counter-terror operations in the Russian city of Volgograd from August 1.

They also mentioned that successful completion of the 12th edition of the exercise will be nothing short of touching another "milestone" in intensifying the bilateral security cooperation and will also serve to reinforce the longstanding bond of friendship between India and Russia.

The Army said 250 personnel from each side will participate in the 12th edition of the joint military exercise.

"The 12th edition of Indo-Russia joint military exercise Indra-21 will be held at Volgograd, Russia from August 1 to 13," the Army said.

It said the exercise will entail the conduct of counter-terror operations mandated under the UN's framework of joint forces against international terror groups.

"Exercise Indra-21 will further strengthen mutual confidence and interoperability between the Indian and Russian armies and enable sharing of best practices between the contingents of both the countries," the Army said in a statement.

"The exercise will be yet another milestone in strengthening security cooperation and will serve to reinforce the longstanding bond of friendship between India and Russia," it added.

It said the Indian Army contingent participating in the exercise will comprise a mechanised infantry battalion.

Volgograd is a major Russian city situated on the western bank of the Volga river.

https://www.outlookindia.com/website/story/india-russia-to-hold-13-day-mega-military-exercise-in-volgograd/389576

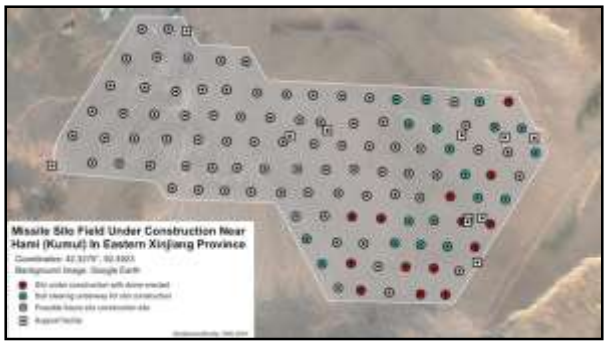
INDIA TODAY

Wed, 28 July 2021

Second Chinese nuclear missile silo field found in Xinjiang

China could be building its second-largest nuclear missile silo field near Hami in eastern Xinjiang, a new report by the Federation of American Scientists (FAS) suggests

New Delhi: A new report by the Federation of American Scientists (FAS) shows that China could be building its second-largest nuclear missile silo field near Hami in eastern Xinjiang. Although the work on this site began recently, based on commercial satellite imagery, FAS estimates that the facility could "eventually include approximately 110 silos". This comes in the backdrop of a June 30 report from the Middlebury Institute of International Studies which showed the first new Intercontinental Ballistic Missile (ICBM) silo field at Yumen in Gansu province could have 120 under-construction silos.



A recent report by FAS shows that China could be building its second-largest nuclear missile silo field near Hami in eastern Xinjiang. (Source: Twitter/@nukestrat)

Hami is 380km northwest of the Yumen missile silo field.

The report estimates that construction at the Hami site began around early March 2021 and "continues at a rapid pace". Annotated satellite imagery published on the FAS website shows a few erected shelters and cleared soil for another 19 silos. However, the grid-like outline visibly seen in the high-resolution imagery provided by Planet Labs indicates that the final number of finished silos could go up to 110.

Hans Kristensen, director of Nuclear Information Project, FAS, and author of the report noted that both the Hami and Yumen missile silo fields were located deeper inside the Chinese land than previously known ICBM base that would make those sites out of reach of the US conventional cruise missiles. "This will make them targets exclusively for nuclear missiles, mainly Trident," Kristensen posted on Twitter.

With the discovery of two new silo fields, the number of estimated under-construction silos in China has moved to approximately 250 which according to the FAS report are "more than 10 times the number of ICBM silos in operation today". The People's Liberation Army Rocket Force (PLARF) has additional smaller silos at Jilantai.

Matt Korda, a research associate for the Nuclear Information Project at FAS, who first identified the silo field, noted, "the number of new Chinese silos under construction exceeds the number of silo-based ICBMs operated by Russia, and constitutes more than half of the size of the entire US ICBM force. That being said, Russian + US nuclear arsenals still dwarf China's by a significant margin."

The FAS report emphasised that there was still no clarity over the intended operation of the new silos and the likely number of warheads each missile would carry. "Regardless, the silo construction represents a significant increase of the Chinese arsenal, which the Federation of American Scientists currently estimates includes approximately 350 nuclear warheads," read the FAS report. Chinese nuclear doctrine advocates a minimum nuclear deterrence and FAS experts believe that it is unlikely to change anytime soon.

"China is concerned that its current ICBM silos are too vulnerable to the US (or Russian) attack. By increasing the number of silos, more ICBMs could potentially survive a preemptive strike and

be able to launch their missiles in retaliation," observed Korda and Kristensen. Another possible motivation behind creating these new silos could be for “increasing the readiness of the ICBM force” as the PLARF transitions from liquid-fuel missiles to solid-fuel missiles. Another possible reason, according to the FAS, could be protecting its ICBMs against non-nuclear attacks as all the existing Chinese DF-5 silos are within range of the US conventional cruise missiles.

FAS experts think that the Chinese nuclear modernisation is driven by more than just missile defenses. “This includes the nuclear modernisation programmes of the United States, India, and Russia, the significant enhancements of the conventional forces of those countries and their allies, as well as China’s own ambitions about world power status," Korda and Kristensen wrote in their report.

https://www.indiatoday.in/world/story/second-chinese-nuclear-missile-silo-field-found-in-xinjiang-1833356-2021-07-27

THE TIMES OF INDIA

Wed, 28 July 2021

China is the world’s biggest digital adversary

By Gaurie Dwivedi

A lot has changed in the role of information in any warfare since the sabotage of enemy communication lines in the two world wars. The German communications infrastructure was crippled by British and Allied forces by what we now call hacking, a broad term that encompasses both access to the enemy country’s top secrets through covert means and sabotaging its critical communications grid. Since then, many technological breakthroughs have taken place enabling countries to now launch sophisticated attacks on each other to cause a complete breakdown of vital assets across civil and military domains. Future warfare will, therefore, not just depend on military superiority, but will also be decided by the ability to conquer new frontiers of technology, including cyber and outer space. Access to sensitive and secret information and technology will be a key determinant of any new-age combat.

Even in a minor/localised conflict with China, cyber warfare will play a vital role, both in determining the outcome and in setting the larger narrative. To create deterrence against China’s hegemonistic tendencies, it is vital to build superior cyber capabilities. Much before tanks roll out on the Ladakh border with India or frigates and aircraft carriers come out in the Taiwan Strait, China will unleash cyber warfare. The future of the present order will be determined by whether China is defeated in its attempts to weaponize information.

A holistic global cyber strategy to circumvent China’s proclivity to use data as a weapon of global dominance must be formulated. The urgency regarding this can be gauged from the fact that early this week there were fresh indications of how China has transformed into the biggest digital adversary, not just for America, but also for India and other nations.

America accused China’s all-powerful Ministry of State Security or MSS for a sophisticated cyber-assault on Microsoft’s Exchange email systems this year. Besides this strong accusation, the US Justice Department indicted four Chinese nationals for trade espionage. This is the latest in a series of reports where Chinese companies or contractors or nationals linked directly or loosely to the Chinese political establishment were allegedly involved in cyber-attacks.

In 2020, both India and Australia were at the receiving end of sophisticated cyber-attacks. According to some reports, a third of all cyber-attacks in India, allegedly, originate from China indicating the extent to which New Delhi’s key assets have been targeted by Beijing. A cyber-attack entails inserting malware or bug doors into critical infrastructure to cause temporary or even permanent damage. With the advent of technology, this entire exercise is done remotely, in little time, and is hard to detect. This makes such attacks a useful tool in any country’s arsenal, since

they can be deployed relatively easily, can cause disproportionate damage and allow nations to claim plausible deniability.

Cyber warfare has three clear aspects, and China has been beefing up its capabilities in all these spheres. The first aspect is to gather sensitive information about a rival country to compromise its national security. The second aspect is to cripple the adversary's national assets like power grids and telecom networks to cause massive disruptions, more so during peace time to send a war-like message. The third component of cyber war is to paralyse the enemy's military command systems during a full-blown military conflict. Just like nuclear weapons could alter the outcome of a war in the 20th century, cyber capabilities can achieve the same in the 21st century. The ability to defend against cyber-attacks, which may paralyse the lifelines of a country, is now almost as important as protecting physical borders.

But cyber-attacks are not just about crippling vital infrastructure; they are also about stealing industrial secrets, or 'cyber theft'. This is exactly what has worried America since in its indictment of the four Chinese nationals, where attempts were made to steal trade secrets in aviation, defence and bio pharmaceutical sectors. Sectors which are central to Chinese technology strategies for its Make in China 2025 and Make in China 2035 plans are at a heightened risk of cyber theft.

The world must, therefore, anticipate more attempts at industrial espionage by Chinese companies and need to guard its industrial secrets more than ever before. Industries that rely heavily on technology in sectors like aerospace, semiconductors, quantum, telecommunications, etc., need to keep their guard high.

Given the evolving nature of the threat and the sophisticated nature of these attacks, a concerted plan is needed. A holistic strategy needs a combination of America's naming and shaming, India's policy of banning apps where data security is at risk and Canberra's investments in bolstering digital infrastructure. US Secretary of State Antony Blinken's hard hitting statement regarding MSS should set the tone for a larger and collective approach to tackle the threat posed by cyber warfare, both civil, economic and military. Blinken said MSS "has fostered an ecosystem of criminal contract hackers who carry out both state-sponsored activities and cybercrime for their own financial gain."

Global data governance, which requires close cooperation amongst countries, unfortunately, has not kept pace with technological developments. Firstly, norms regarding collection, sharing and usage of data amongst nations need to be instituted. Secondly, interoperability standards for global data value chains that put together collection of data and access to data platforms must be created. Lastly, codified data governance standards to build trust and manage issues like data ownership, usage, security and privacy are the need of the hour. The Data Standards Task Force under the UN will create a single framework with clear regulations, norms and rules which must be adhered to by all member-nations. In all these efforts, India can play an active role by leveraging its traditional strengths in technology and providing insights from its own experiences of handling cyber-attacks.

I-warfare has no regard for national boundaries; the response to it must not either.

(Disclaimer: Views expressed above are the author's own.)

https://timesofindia.indiatimes.com/blogs/beyond-the-obvious/china-is-the-worlds-biggest-digital-adversary/

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Exploring quantum systems that don't find equilibrium

By Maria Engel

Some physical systems, especially in the quantum world, do not reach a stable equilibrium even after a long time. An ETH researcher has now found an elegant explanation for this phenomenon.

If you put a bottle of beer in a big bathtub full of ice-cold water, it won't be long before you can enjoy a cold beer. Physicists discovered how this works more than a hundred years ago. Heat exchange takes place through the glass bottle until equilibrium is reached.

Not only quantum systems, but also large objects such as the spiral galaxy NGC 1300 can adopt a meta-stable state that leads to surprising effects. Credit: Hubble Heritage Team, ESA, NASA

However, there are other systems, especially quantum systems, that don't find equilibrium. They resemble a hypothetical beer bottle in a bath of ice-cold water that doesn't always and inevitably cool to the temperature of the bath water, but rather reaches different states depending on its own initial temperature. Until now, such systems have puzzled physicists. But Nicolò Defenu, a postdoc at the ETH Zurich Institute for Theoretical Physics, has now found a way to elegantly explain this behavior.

A more distant influence

Specifically, we are talking about systems in which the individual building blocks influence not only their immediate neighbors, but also objects further away. One example would be a galaxy: the gravitational forces of the individual stars and planetary systems act not only on the neighboring celestial bodies, but far beyond that—albeit ever more weakly—on the other components of the galaxy.

Defenu's approach begins by simplifying the problem to a world with a single dimension. In it, there is a single quantum particle that can reside only in very specific locations along a line. This world resembles a board game like Ludo, where a little token hops from square to square. Suppose there is a game die whose sides are all marked 'one' or 'minus one', and suppose the player rolls the die over and over again in succession. The token will hop to a neighboring square, and from there it will either hop back or else on to the next square. And so on.

The question is, What happens if the player rolls the die an infinite number of times? If there are only a few squares in the game, the token will return to its starting point every now and then. However, it is impossible to predict exactly where it will be at any given time because the throws of the die are unknown.

Back to square one

It's a similar situation with particles that are subject to the laws of quantum mechanics: there's no way to know exactly where they are at any given time. However, it is possible to establish their whereabouts using probability distributions. Each distribution results from a different superposition of the probabilities for the individual locations and corresponds to a particular energy state of the

particle. It turns out that the number of stable energy states coincides with the number of degrees of freedom of the system and thus corresponds exactly to the number of allowed locations. The important point is that all the stable probability distributions are non-zero at the starting point. So at some point, the token returns to its starting square.

The more squares there are, the less often the token will return to its starting point; eventually, with an infinite number of possible squares, it will never return. For the quantum particle, this means there are an infinite number of ways in which the probabilities of the individual locations can be combined to form distributions. Thus, it can no longer occupy only certain discrete energy states, but all possible ones in a continuous spectrum.

None of this is new knowledge. There are, however, variants of the game or physical systems where the die can also contain numbers larger than one and smaller than minus one, i.e. the steps allowed per move can be larger—to be precise, even infinitely large. This fundamentally changes the situation, as Defenu has now been able to show: in these systems, the energy spectrum always remains discrete, even when there are infinite squares. This means that from time to time, the particle will return to its starting point.

Peculiar phenomena

This new theory explains what scientists have already observed many times in experiments: systems in which long-range interactions occur do not reach a stable equilibrium, but rather a meta-stable state in which they always return to their initial position. In the case of galaxies, this is one reason they develop spiral arms rather than being uniform clouds. The density of stars is higher inside these arms than outside.

An example of quantum systems that can be described with Defenu's theory are ions, which are charged atoms trapped in electric fields. Using such ion traps to build quantum computers is currently one of the largest research projects worldwide. However, for these computers to really deliver a step change in terms of computational power, they will need a very large number of simultaneously trapped ions—and that is exactly the point at which the new theory becomes interesting. "In systems with a hundred or more ions, you would see peculiar effects that we can now explain," says Defenu, who is a member of ETH Professor Gian Michele Graf's group. His colleagues in experimental physics are getting closer every day to the goal of being able to realize such formations. And once they've got there, it might be worth their while to have a cold beer with Defenu.

More information: Nicolò Defenu, Metastability and discrete spectrum of long-range systems, *Proceedings of the National Academy of Sciences* (2021). DOI: 10.1073/pnas.2101785118

Journal information: *Proceedings of the National Academy of Sciences*

https://phys.org/news/2021-07-exploring-quantum-dont-equilibrium.html

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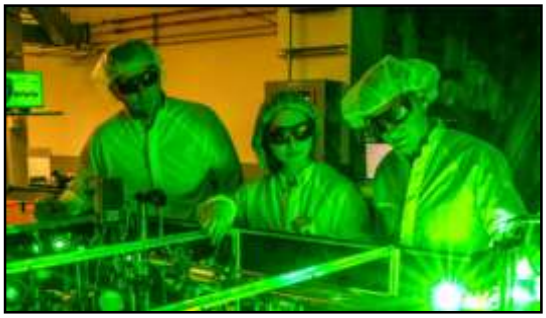
Optical innovation could calm the jitters of high-power lasers

The Berkeley Lab Laser Accelerator (BELLA) Center at the Department of Energy's Lawrence Berkeley National Laboratory (Berkeley Lab) has developed and tested an innovative optical system to precisely measure and control the position and pointing angle of high-power laser beams with unprecedented accuracy—without interrupting or disturbing the beams. The new system will help users throughout the sciences get the most out of high-power lasers.



Berkeley Lab doctoral student Fumika Isono (center), BELLA Center Deputy Director Jeroen van Tilborg (right), and research scientist Sam Barber set up a novel laser stabilization experiment at one of the BELLA Center's 100-TW-class lasers. Credit: Marilyn Sargent/Berkeley Lab

The experimental validation effort was led by doctoral candidate Fumika Isono of Berkeley Lab and UC Berkeley. Her findings are described in a paper published recently by the Cambridge University Press journal, High Power Laser Science and Engineering.

"This is a tremendous advancement in measurement and control that will benefit high-power laser facilities worldwide," said Cameron Geddes, Director of Berkeley Lab's Accelerator Technology and Applied Physics (ATAP) Division, of which the BELLA Center is a part.

Measurement without disturbance

People think of a laser as being so precise that it passes into the language as metaphor, but users with demanding applications know that laser beams move around at a tiny scale in response to the vibrations and variability of even the most controlled lab environment.

"Missing the target by as little as a few microns can make the difference between amazing science and an unwanted addition to background noise," said Isono.

Pointing angle offsets of less than a thousandth of a degree can result in unwanted complexities as well. That's where diagnostic sensors and feedback systems come into play.

Measuring these parameters both accurately and without intercepting the beam is the trick. Traditional methods either greatly sap the power of the beam by intercepting its pulses (which at any rate is difficult for intense, high-powered beams) or suffer inaccuracies because they are not measuring the beam exactly as delivered. The BELLA Center's innovative approach involves splitting off and monitoring a low-powered exact copy of the main beam, reflected from the rear surface of a specially designed final optic in the beam line.

The heart of this new approach is a laser architecture with three key attributes. First, it simultaneously provides five high-power pulses and a thousand low-power pulses per second, all following the same path. Second, the beamline design is optimized to keep the high-power and low-power pulses matched in size and divergence. Finally, it replaces one of the reflective beam line mirrors with an innovative wedge-shaped reflector that has specialty coatings on both the front and the rear surfaces.

Almost all of the main beam is reflected off the front surface of the optic without otherwise being noticeably affected. A tiny bit of the beam, representing perhaps 1% of the input power, propagates through the front surface and is reflected off the rear surface. This "witness beam" goes through any subsequent optics almost in parallel to the main beam, with just enough diversion for easy placement of measurement instruments. The end result is a witness beam with pointing angle and transverse position highly correlated to those of the main beam.

The result, said Isono, is "a measurement that won't interfere with the main laser beam, yet very accurately tells us about it."

Benefits for the BELLA Center and beyond

A near-future goal is using this diagnostic as part of a feedback system for active stabilization of the laser's transverse position and pointing angle. Preliminary studies with the 100-terawatt laser at BELLA Center have been promising. The manuscript lays out the prospect of removing the jitters on the high-power 5 Hz laser by actively stabilizing the low-power 1 kHz laser pulse train. Laser beam vibration and motion was observed to occur on a scale of a few tens of hertz, which is well within the range of a practical feedback system. A fivefold improvement in position and angle of high-power laser pulse delivery is expected.

The development of laser-plasma particle accelerators (LPAs), which is the primary mission of the BELLA Center, exemplifies the potential benefit of this innovation. LPAs produce ultrahigh electric fields that accelerate charged particles very rapidly, thereby offering the promise of a next generation of more compact, more affordable accelerators for a wide variety of applications. Since LPAs perform their acceleration within a thin hollow tube, or "capillary," they would benefit greatly from improved control of the drive laser beam position and pointing angle.

One immediate application at the BELLA Center is the use of a laser-driven plasma accelerator (LPA) to provide electron beams for a free-electron laser (FEL) – a device that produces bright photon pulses at a far higher energy and shorter wavelength than visible light.

"The undulator, the magnetic array at the heart of the FEL, has very strict requirements on electron beam acceptance, which directly relates to the LPA drive laser pointing angle and transverse fluctuations," said Isono.

The proposed kBELLA, a next-generation laser system that will combine high power with a kilohertz repetition rate, will be another likely application.

Interest from laser labs worldwide is anticipated. "This work is not limited to laser-plasma acceleration," said BELLA Center Director Eric Esarey. "It addresses a specific need throughout the high-power laser community, namely, proving a correlated low-power copy of the high-power pulse without significant interference. Anywhere a high-power laser beam needs to be delivered with some precision to any application, this diagnostic is going to make a big difference. Think of laser-particle collision experiments, or laser interactions with micron-precision targets such as capillaries or droplets."

More information: Fumika Isono et al, High-power non-perturbative laser delivery diagnostics at the final focus of 100-TW-class laser pulses, *High Power Laser Science and Engineering* (2021). DOI: 10.1017/hpl.2021.12

https://phys.org/news/2021-07-optical-calm-jitters-high-power-lasers.html

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Researchers create powerful quantum source with meta-lens array

Researchers for the first time have demonstrated a quantum light source based on a meta-lens array. The approach offers a promising platform for both high-dimensional photon entanglement and the coherent control of multiple photons, making it suitable for advancing quantum technologies for secure communication, computing, and other applications.

The work takes advantage of the ability to control light with tiny, precisely arranged nano/micro-structures patterened on an optical surface. The result is termed a metasurface. Din Ping Tsai from The Hong Kong Polytechnic University will present the research at the virtual OSA Advanced Photonics Congress to be held 26-30 July. Tsai's talk is scheduled for 27 July from 19:00—19:15 EDT (UTC—04:00).

"Our results indicate that a metasurface can provide a route for the generation and control of complex quantum states, not only increasing the quantum system dimensionality but also allowing for the coherent control of multiple photons, thus providing a compact and practical platform for the development of advanced on-chip quantum photonic information processing," said Tsai.

Quantum technologies can encode information using photons, the basic unit of light. While a classical computer encodes information using only two states, 0 and 1, quantum devices encode information in the relationships between photons. A single pair of entangled photons can contain multiple quantum states, allowing them to hold much more information than classical digital systems.

In the new work, Tsai and colleagues created a quantum light source that generates 100 pairs of entangled photons that are coupled and superimposed on each other. By generating entangled photon pairs simultaneously, the approach can be used to encode vast amounts of information in a tiny chip. To achieve this, the researchers combined a meta-lens array, a type of metasurface that uses tiny antennae to precisely enginner the wavefront of the light, with a nonlinear crystal (BaB_2O_4) to convert a photon of higher energy into a pair of entangled photons of lower energy using spontaneous parametric down-conversion. The meta-lens, made with an advanced nanofabrication process, consists of a series of gallium nitride (GaN) nano-pillars 800 nm high. Light is pumped from a laser through the 10x10 meta-lens array and then through the nonlinear crystal, generating 100 entangled photon pairs.

Because the quantum entanglement between photons is dependent upon the metasurface design, the researchers say this approach offers more flexibility in the manipulation of light than existing quantum sources, opening new avenues for quantum-optical technologies.

"Our metalens-array-based quantum photon source is compact, stable, and controllable, indicating a new platform for integrated quantum devices," said Tsai.

The researchers verified the resulting quantum states in two, three and four dimensions with fidelities of 98.4%, 96.6% and 95.0%, respectively. They also confirmed that the source has good photon indistinguishability, an important feature for multi-photon quantum sources, as well as appropriate power dependencies.

This exciting new research may help quantum information science realize many applications in our daily life in the future, such as quantum-enabled secure mobile communications, email access, online transactions, cashless payments, ATMs and e-banking, as well as high-level computing tasks such as machine learning, artificial intelligence, and neural networks. The research team of Prof. Tsai is dedicated to continuing their work on quantum applications based on meta-optics.

Provided by The Optical Society

https://phys.org/news/2021-07-powerful-quantum-source-meta-lens-array.html

CTV NEWS

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COVID-19 linked to 'significant' drop in intelligence: research

By Jackie Dunham

Toronto -- Individuals who recovered from COVID-19, including those who no longer had symptoms, exhibited significant "cognitive deficits," according to a large study out of the U.K.

The research, conducted by academics from Imperial College London, Kings College and the Universities of Cambridge, Southampton and Chicago, aimed to find out how COVID-19 affected mental health and cognition.

For the study, researchers analyzed data from 81,337 participants of the Great British Intelligence Test from January to December 2020. Of those participants, nearly 13,000 reported they had contracted the novel coronavirus.

Importantly, the study said that only 275 participants had completed the intelligence test both before and after contracting COVID-19.

For the rest of the participants, the researchers said they employed a linear model to predict general cognitive performance, or premorbid intelligence, based on age (to the third order), sex, handedness, ethnicity, first language, country of residence, occupational status, and earnings.

"Predicted and observed general performance correlated substantially, providing a proxy measure of premorbid intelligence of comparable performance to common explicit tests such as the National Adult Reading Test," the study stated.

What's more, the academics also found that their intelligence estimates for individuals pre-illness indicated that those who contracted COVID-19 were actually likely to have had a "somewhat higher as opposed to lower cognitive ability" before they were sick.

After controlling for those factors, they found that those who had COVID-19 underperformed when compared to those who never contracted the disease.

The cognitive deficits were particularly pronounced for test tasks that involved reasoning, problem solving, spatial planning and target detection, while those who had COVID-19 fared better when they were asked to complete simpler tasks, such as working memory span and emotional processing.

"These results accord with reports of long-COVID, where 'brain fog', trouble concentrating and difficulty finding the correct words are common," the authors noted. "Recovery from COVID-19 infection may be associated with particularly pronounced problems in aspects of higher cognitive or 'executive' function."

The authors said their results appear to show that COVID-19 infection is associated with cognitive deficits that can persist into the recovery phase, such as in cases of long COVID in which symptoms can last for weeks or months after the initial illness.

The level of underperformance was also dependent on the severity of illness in the group who had COVID-19 during the pandemic. The study said those who had been placed on a ventilator

during the pandemic exhibited the greatest cognitive deficits, so much so that it equated to a seven-point drop in IQ in a classic intelligence test.

The drop in intelligence among those who had been ventilated was also larger than the deficits observed in patients who had previously suffered a stroke or who reported learning disabilities, according to the paper.

The authors cautioned against drawing firm conclusions about the neurobiological or psychological basis for the intelligence deficits without brain imaging data; however, they said the results should serve as a clarion call for further research on the subject.

https://www.ctvnews.ca/health/coronavirus/covid-19-linked-to-significant-drop-in-intelligence-research-1.5524877