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DRDO News

DRDO Technology News

The Indian EXPRESS

Thu, 19 Aug 2021

HAL to respond to Malaysia RfP for LCA Tejas in September

Malaysia has shown interest in the Light Combat Aircraft (LCA) Tejas Mk-1A and India stands a good chance in bagging the deal, Madhavan said

By Aksheev Thakur

Bengaluru: Hindustan Aeronautics Limited (HAL), a public sector aircraft company, will be bidding to sell 18 LCA Mk1 A fighter aircrafts to the Royal Malaysian Air Force in the light of Malaysian authorities showing interest in the indigenous fighter planes, HAL chairman R Madhavan said Wednesday.

An indigenous LCA Tejas at the Aero India show in Bengaluru. (Express Photo)

HAL will respond to a Request for Proposal (RfP) from the Royal Malaysian Air Force (RMAF) in the third week of September, the HAL chairman said. Malaysia has shown interest in the Light Combat Aircraft (LCA) Tejas Mk-1A and India stands a good chance in bagging the deal, Madhavan added.

"There are many countries which are showing interest in LCA Mk-1A. Malaysia has issued the RfP and we are responding to it. It has to be sent in the third week of September. We stand a very good chance. There are eight more contenders including US, China and Russia," Madhavan said. Malaysia is looking at procuring 18 aircrafts with the probability of a follow up order of 18 more, he said.

"Regions which have exhibited interest in the LCA Mk- 1A are East Europe, South Asia, West Asia and South America. We see whether there is a demand from those countries and if they are trying to upgrade their Air Forces. Malaysia was in the process of upgrading their capabilities. We have been in business with them for the last two years," the HAL chairman said.

The LCA Mk-1A is a fourth-generation fighter aircraft with an Active Electronically-Scanned Array (AESA) radar, an Electronic Warfare (EW) suite, and is capable of air-to-air refuelling (AAR).

The main customer for HAL's indigenous LCA Mk1A or Tejas fighter aircraft is at present the Indian Air Force. The IAF initially ordered 20 LCA Tejas jets in the Initial Operational Clearance (IOC) phase of the aircraft and 20 more in the Final Operational Clearance (FOC) phase and has raised two squadrons with the aircraft.

In January this year, the IAF signed a Rs 48,000 crore-deal with HAL to buy 83 LCA-Tejas Mk1A aircrafts to be delivered over a period of nine years.

On Tuesday, HAL placed an order worth Rs 5,375 crore for 99 F404-GE-IN20 engines and support services with GE Aviation, USA to power the LCA. Madhavan said on Wednesday that work on the Tejas Mark II is progressing and ground trials will begin by December 2022.

The chairman stated that restrictions imposed during the lockdown in the second wave affected the supply chain of the company. “It is going to improve. We faced issues earlier due to restrictions on the movement of transport and people. The materials which have to come from abroad are also delayed because of the restrictions. However, this was until July. August is good,” Madhavan added.

The HAL chairman said the LCA stands a good chance of being bought by foreign air forces on account of fourth generation fighters still being relevant.

“You lose a lot of performance in terms of aerodynamics, and weapons cannot be mounted on a fifth generation aircraft if you want to have a small radar cross section. When you make fifth generation aircraft, the advantage is that it can penetrate the enemy defences, probably in the future, it may not be able to. Even the US is still ordering older aircrafts like F-15s,” Madhavan said.

https://indianexpress.com/article/cities/bangalore/hal-to-respond-to-malaysia-rfp-for-lca-tejas-in-september-7460766/

mint

Thu, 19 Aug 2021

HAL shares surge on signing largest ever deal for LCA Tejas. What are the key stock levels to watch

- ***HAL CMD said that it is the largest ever deal and the purchase order placed by HAL for LCA Tejas***

Shares of state-run aerospace behemoth Hindustan Aeronautics Limited (HAL) were trading more than 3% higher on Wednesday at ₹1,102 per share on the BSE after the company on Tuesday announced that it has placed an order of ₹5,375 crore for 99 F404-GE-IN20 engines and support services with GE Aviation, USA to power the Tejas Light Combat Aircraft (LCA).

HAL signs contract worth ₹5,375 Crore with GE Aviation, for supply of engines for Tejas aircraft (PTI)

"This is the largest ever deal and the purchase order placed by HAL for LCA," R Madhavan, CMD, HAL said. Madhavan said that HAL is working closely with GE Aviation for its support to boost the export potential of Tejas and also to supply spares to the global supply chain of GE 404 engines.

Santosh Meena, Head of Research, Swastika Investmart Ltd said that HAL is showing positive momentum in opening trade after the company said that it has placed an order of ₹5375 crore for engine and support services with GE aviation, the USA to power Tejas Aircraft. The company CMD says that this is the large ever deal and order placed by HAL.

"The news is positive but stock is still in a sideways trend with a well-defined range of 1050-1150 where a move above 1150 can lead to a rally towards the 1300-1350 zone while 1000 will be critical support at any correction," Meena added.

The Indian aerospace company claimed that the indigenously-built Tejas aircraft is one of the best in its class globally, powered by F404-GE-IN20 engines. The LCA was inducted into service in 2004.

Ordering of the engines marks a major milestone in the execution of 83 LCA contract with IAF, HAL said. The co-operation with GE Aviation will be further enhanced with the manufacturing of GE F414 engines in India for the upcoming LCA MkII program.

The highest thrust variant of the F404 family, the F404-GE-IN20 incorporates GE's latest hot section materials and technologies as well as Full Authority Digital Engine Control (FADEC) for reliable power and outstanding operational characteristics.

https://www.livemint.com/market/stock-market-news/hal-shares-surge-on-signing-largest-ever-deal-for-lca-tejas-with-ge-aviation-11629265558853.html

THE ECONOMIC TIMES

Thu, 19 Aug 2021

HAL rises 4% after Rs 5,375 crore order with GE Aviation

By Pawan Nahar

Synopsis

Shares of HAL have delivered over 30 per cent return in the year 2021 so far. The scrip was recently included in the F&O segment.

New Delhi: Shares of Hindustan Aeronautics (HAL) jumped 4 per cent on Wednesday after the company placed an order of Rs 5,375 crore with GE Aviation, USA.

The state-run aerospace behemoth has placed multimillion orders for 99 F404-GE-IN20 engines and support services with GE Aviation to power Tejas Light Combat Aircraft, the company said in a release. Following the update, shares of HAL soared 4 per cent to Rs 1,113 on Wednesday. BSE Sensex was trading 258.98 points, or 0.51 per cent, higher at 56,078.25 at the time of writing this report. The scrip had settled at Rs 1,067.60 on Tuesday.

"This is the largest ever deal and the purchase order placed by HAL for LCA," R Madhavan, CMD, HAL, said.

The company is working closely with GE for its support to pursue the export potential of LCA and also to supply spares to the global supply chain of GE 404 engines, he said. "The indigenously built Tejas aircraft is one of the best in its class globally, powered by F404-GE-IN20 engines and has been in service since 2004."

The defence sector PSU had reported a net profit of Rs 198.77 crore in June quarter as against a net profit of Rs 151.44 crore in the year ago quarter. Its net profit in March quarter stood at Rs 1,614.8 crore. The company reported an income from operations of Rs 1,616.23 crore in the quarter ended on June 30, 2021 as against an income of Rs 1,736.97 crore in the same quarter previous year.

Brokerage firm ICICI Securities said that Q1FY22 numbers were muted, with execution impacted by pandemic. Topline and EBITDA declined. There is no apparent risk to FY22E execution guidance given the current orderbook.

"Management expects to maintain a growth path with sufficient workloads in FY22. LCA deliveries are expected to start from March 24. HAL will start seeing double-digit growth from FY24. We maintain BUY with a target price of Rs 2,618," he added.

Shares of HAL have delivered over 30 per cent return in the year 2021 so far. The scrip was recently included in the F&O segment.

Santosh Meena, Head of Research, Swastika Investmart, said HAL is showing positive momentum in opening trade after the company said that it has placed an order.

"The news is positive but stock is still in a sideways trend with a well-defined range of Rs 1,050-1,150 where a move above Rs 1,150 can lead to a rally towards Rs 1,300-1,350 zone while Rs 1,000 will be critical support at any correction," he added.

https://economictimes.indiatimes.com/markets/stocks/news/hal-rises-4-after-rs-535-crore-order-with-ge-aviation/articleshow/85421200.cms

THE WEEK

Thu, 19 Aug 2021

US engine for Tejas a best-seller that powered Rafale, first stealth fighter

The F404 engine has powered at least 15 different combat aircraft and UAVs

On Tuesday, HAL announced that it had placed an order for 99 engines from GE Aviation in the US for the Tejas Mk1A fighters that will be built for the Indian Air Force.

R. Madhavan, the CMD of HAL, explained that the deal, valued at Rs 5,375 crore, for the F404 engines from GE was the "largest ever deal and the purchase order placed by HAL for LCA".

A Tejas fighter | Twitter handle of Indian Air Force

The latest deal is just an indicator of the sheer longevity of the F404 engine. The original F404 engine was selected by the US Navy in 1975 to power the F/A-18 Hornet (not to be confused with the F/A-18 E/F Super Hornet).

Since then, the F404 engine has powered at least 15 different combat aircraft and UAVs. These include the F-117 Nighthawk, which had two F404 engines. The F-117 was a ground-attack aircraft that is popularly called the first stealth fighter. The Swedish Air Force's Gripen fleet is powered by the RM12 engine, an adaptation of the F404.

The F404 even played a crucial role in developing the French Rafale fighter, considered the most advanced fighter in the Indian Air Force now. The first test flight of the Rafale in 1986 was flown with two F404 engines. The use of the F404 was necessitated by the fact that the French-built M88 engine was still in development when the Rafale prototype was ready for flight tests. The first M88 began flight tests in 1990 on a Rafale.

What explains the popularity of the F404?

GE has touted the F404 as being one of the first military engines developed with low maintenance costs in mind, with the aim to keep the overall operating cost of the aircraft low. The F404 had lesser thrust than the engines powering the F-15 and F-16 fighters, but was lighter in weight and had lower operating costs.

The stress on maintenance was prompted by the operating constraints on aircraft carriers, which were the primary operating base for the F-18 fighters. According to GE, the the six modules of the F404—fan, compressor, combustor, high-pressure turbine, low-pressure turbine and afterburner—are designed for convenient maintenance especially on an aircraft carrier, allowing engineers to quickly swap out a module for a spare.

The F404's modular structure made it easier to adapt to different aircraft requirements. It has been upgraded with a new full-authority digital engine control (FADEC) that controls all aspects of the engine and now can even monitor the powerplant's performance 'health'.

Multiple variants of the F404 have been developed for various aircraft. The version for the Tejas MK1A is called the F404-IN20 and is called the "highest-thrust" version of the engine. The Indian Air Force had originally planned to use the F404 to power the prototypes of the Tejas and use the indigenous Kaveri engine on production aircraft. However, the lack of progress on the Kaveri has led to continued reliance on the F404, which will power 123 Tejas fighters in total.

The F404 is being used to power the South Korean-built T-50 trainer and light-attack fighter. The F404 also powers the Boeing T-7A Red Hawk trainer jet, which was selected by the US Air Force in 2018 as its new advanced trainer. The US Air Force is expected to buy around 350 T-7A jets.

It is not just manned aircraft the F404 has powered. The engine was used to test the stealthy X-45C unmanned combat air vehicle, which was cancelled.

When the F404 GE-IN20 made its first flight on a Tejas in 2008, GE had claimed more than 4,000 F404 engines were in service worldwide. The orders for the Tejas, T-50 and T-7A mean the F404 would still be in production for at least another decade.

https://www.theweek.in/news/sci-tech/2021/08/18/us-engine-for-tejas-a-best-seller-that-powered-rafale-first-stealth-fighter.html

The Statesman

Thu, 19 Aug 2021

Kinnaur landslide: Experts visit accident site to suggest remedial measures

The experts' team comprised chief engineers of Union road transport and highways ministry, DRDO scientists, engineers of National Highways Authority of India, Ministry of Mines

Shimla: A team of experts from Union government agencies and scientists on Wednesday visited the landslide site at Nigulsari in Nichar tehsil of the Kinnaur district of Himachal Pradesh.

The experts' team comprised chief engineers of Union road transport and highways ministry, DRDO scientists, engineers of National Highways Authority of India, Ministry of Mines.

(SNS)

The experts will study the landslide area in order to find solutions to prevent future disasters and loss of human lives.

The National Highway Authority of India executive engineer K L Suman said the scientists and engineers inspected the site of the accident at Nigulsari to obtain data for scientific analysis.

He stated that the inspection was done with the aim of identifying causes of landslides, techniques and solutions to be used to prevent more such disasters and consequent damages in the future.

"The team has obtained data from the landslide to conduct scientific analysis of various factors behind the accident. The team will submit a report in the coming days so that work on taking remedial measures could be started at the site. In addition, the experts will also study and observe other potentially hazardous sites in the area to prevent such mishaps in future," he added.

On 11 August, a landslide followed by rockslides took place on National Highway 5 that engulfed an HRTC bus, Tata Sumo, Bolero and two cars (Alto and Accent).

28 persons had been killed in the accident while 13 persons were safely rescued from debris during search and rescue operation that continued for 6 days as the operations were halted by intermittent rockslides.

https://www.thestatesman.com/cities/kinnaur-landslide-experts-visit-accident-site-suggest-remedial-measures-1502996150.html

Thu, 19 Aug 2021

DRDO और NH मंत्रालय के इंजीनियर ने लैंडस्लाइड जोन का किया निरीक्षण

Kinnaur Landslide: 11 अगस्त को निगुलसरी में पहाड़ दरकने से एक बस सहित पांच वाहन मलबे की चपेट में आ गए थे। बचाव एवं राहत दल ने 13 लोगों को जिंदा बचाया था। वहीं, सात दिन तक लगातार चले सर्च आपरेशन के दौरान 28 लोगों के शव बरामद किए गए थे।

रिकॉन्गपिओ: हिमाचल प्रदेश के जनजातीय जिला किन्नौर में 11 अगस्त को पहाड़ दरकने से हुई तबाही के बाद अब रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) की टीम ने घटनास्थल का दौरा किया है। बुधवार को राजमार्ग मंत्रालय के इंजीनियरों की टीम के साथ डीआरडीओ के लोग निगुलसरी में पहुंचे और घटनास्थल का विस्तृत निरीक्षण व अध्ययन किया। ये टीमें जल्द ही अपनी रिपोर्ट देंगी। टीमों ने घटनास्थल के आसपास भूस्खलन संभावित क्षेत्र का भी अध्ययन किया है।

राष्ट्रीय राजमार्ग मंत्रालय और डीआरडीओ की टीम ने गहन अध्ययन किया है.

राष्ट्रीय राजमार्ग मंत्रालय और डीआरडीओ की टीम ने गहन अध्ययन किया है और उम्मीद जताई है कि लगातार भूस्खलन की घटनाओं को रोकने के लिए क्या किया जा सकता है। इंजीनियरों और साइंटिस्टों ने गहरी खाई में रस्सी के सहारे उतरकर अध्ययन किया है। बता दें कि हिमाचल के लाहौल, सिरमौर, किन्नौर सहित तमाम जिलों में पहाड़ दरक रहे हैं। कई जिलों में तो साफ मौसम में भी लैंडस्लाइडिंग हो रही है और यह चिंता की बात है।

क्या है मामला

11 अगस्त को निगुलसरी में पहाड़ दरकने से एक बस सहित पांच वाहन मलबे की चपेट में आ गए थे। बचाव एवं राहत दल ने 13 लोगों को जिंदा बचाया था। वहीं, सात दिन तक लगातार चले सर्च आपरेशन के दौरान 28 लोगों के शव बरामद किए गए थे। जिला प्रशासन के अनुसार अब कोई भी लापता नहीं है, लेकिन फिर भी कुछ दिन खोज अभियान जारी रखने का निर्णय लिया है।

https://hindi.news18.com/news/himachal-pradesh/reckong-peo-kinnaur-landslide-drdo-team-visited-nigulsari-landslide-spot-hpvk-3700731.html

राष्ट्रीय हिन्दी दैनिक
तरुणमित्र
श्रम ही आधार, सिर्फ खबरों से सरोकार

Thu, 19 Aug 2021

उत्तरकाशी की जादूंग वैली को पर्यटकों के लिए खोलने की मांग

देहरादून: प्रदेश के पर्यटन मंत्री सतपाल महाराज ने बुधवार को देश के रक्षा मंत्री राजनाथ सिंह से शिष्टाचार भेंट के दौरान उत्तरकाशी स्थित जादूंग वैली को पर्यटकों लिए खोले जाने का अनुरोध किया। प्रदेश के कैबिनेट मंत्री सतपाल महाराज ने बुधवार को देश के रक्षा मंत्री राजनाथ सिंह से उनके नई दिल्ली स्थित कार्यालय में शिष्टाचार भेंट के दौरान महाराज ने उनसे 1962 के भारत-चीन युद्ध के दौरान सुरक्षा कारणों के चलते खाली कराए गए नैसर्गिक सौंदर्य से परिपूर्ण उत्तरकाशी जनपद स्थित जादूंग गांव को पर्यटन की दृष्टि से खोलने का अनुरोध किया। रक्षा मंत्री ने महाराज से कहा कि वह इस संबंध में शीघ्र प्रस्ताव बनाकर उन्हें दें। निश्चित रूप से इस पर विचार किया जाएगा।

पर्यटन मंत्री महाराज ने रक्षा मंत्री राजनाथ सिंह से हरिद्वार में अंतरराष्ट्रीय हवाई अड्डे के निर्माण में सहयोग के लिए भी उनसे कहा। जिस पर उन्होंने उन्हें हर संभव सहयोग का भरोसा दिलाया। इस मौके पर महाराज ने रक्षा मंत्री से कहा कि डीआरडीओ के वैज्ञानिक ऐसे नकाब या हेलमेट बनाएं जिससे कि हवाई जहाज में हवा आने के स्थान से उनको जोड़ा जा सके। ऐसा करने से मास्क पहनने की आवश्यकता नहीं रहेगी। महाराज के सुझाव पर रक्षा मंत्री ने कहा कि वह डीआरडीओ के वैज्ञानिकों को निश्चित रूप से यह काम सौंपेंगे।

उत्तराखंड में सेना में भर्ती के विषय में चर्चा करते हुए महाराज ने रक्षा मंत्री से कहा कि सेना में महिलाओं की भर्ती होनी चाहिए। इसके लिए देहरादून एवं हल्द्वानी में शीघ्र ही भर्ती कैंप आयोजित किए जाने चाहिए।

https://tarunmitra.in/demand-to-open-jadung-valley-of-uttarkashi-for-tourists/406282

COVID 19: DRDO's Contribution

राज एक्सप्रेस

Thu, 19 Aug 2021

सुपर स्पेशियलिटी अस्पताल में स्थापित होगा सबसे बड़ा ऑक्सीजन प्लांट

इंदौर, मध्यप्रदेश : शहर के प्रमुख अस्पतालों में ऑक्सीजन प्लांट लगाने के लिए प्रशासन और सरकार की महत्वाकांक्षी योजना को कोविड-19 के तीसरे चरण के लिए तैयार किया जा रहा है।

By Mumtaj Khan

इंदौर, मध्यप्रदेश: शहर के प्रमुख अस्पतालों में ऑक्सीजन प्लांट लगाने के लिए प्रशासन और सरकार की महत्वाकांक्षी योजना को कोविड-19 के तीसरे चरण के लिए तैयार किया जा रहा है, क्योंकि सुपर स्पेशियलिटी अस्पताल में एक जोड़े में सबसे बड़े ऑक्सीजन प्लांट (एयर सेपरेटर) में से एक स्थापित किया जाएगा। बुधवार को यूनिट और प्लांट के पार्ट्स अस्पताल पहुंचे और इसे रक्षा अनुसंधान एवं विकास संगठन के इंजीनियरों द्वारा स्थापित किया जाएगा।

महात्मा गांधी मेमोरियल कॉलेज और संबंधित अस्पतालों में ऑक्सीजन आपूर्ति के नोडल अधिकारी डॉ ओपी गुर्जर ने कहा, "हमें बुधवार को ऑक्सीजन प्लांट की यूनिट मिली है। संयंत्र डीआरडीओ द्वारा विकसित किया गया है और इसे राष्ट्रीय राजमार्ग प्राधिकरण द्वारा अस्पताल को डोनेट किया जाएगा।"

उन्होंने कहा कि यह जिले का सबसे बड़ा ऑक्सीजन प्लांट (एयर सेपरेटर) होगा क्योंकि यह प्रति मिनट लगभग 2000 लीटर ऑक्सीजन उत्पन्न कर सकता है। डॉ गुर्जर ने यह भी बताया कि एमवायएच अस्पताल में 10 हजार लीटर का लिक्विड ऑक्सीजन प्लांट भी लगाया जाएगा, जिसके बाद 5000 लीटर और 1000 लीटर के मौजूदा प्लांट को एमआरटीबी और न्यू चेस्ट वार्ड में शिफ्ट किया जाएगा।

नोडल अधिकारी ने कहा, "हमारे पास चेस्ट वार्ड में 500 लीटर प्रति मिनट का ऑक्सीजन प्लांट भी स्थापित है, एमटीएच में 330 प्रति लीटर क्षमता का एक प्लांट और एमआरटीबी अस्पताल में 300 प्रति लीटर क्षमता का ऑक्सीजन प्लांट लगाया गया है।"

प्रशासन ने जिले में 41 ऑक्सीजन संयंत्र स्थापित करने की योजना बनाई है, लेकिन इकाइयों को स्थापित करने के लिए और अधिक निजी अस्पतालों के आगे आने से संख्या बढ़कर 47 हो गई है। प्रशासनिक अधिकारियों ने दावा किया कि 15 संयंत्र काम कर रहे हैं और बाकी अगस्त के अंत तक शुरू हो जाएंगे।

https://www.rajexpress.co/india/central-india/madhya-pradesh/indore-news-biggest-oxygen-plant-to-be-set-up-in-super-specialty-hospital

Defence News

Defence Strategic: National/International

Press Information Bureau
Government of India

Ministry of Defence

Wed, 18 Aug 2021 3:55PM

Raksha Mantri Shri Rajnath Singh to launch Defence India Startup Challenge 5.0

Key Highlights:

- ***Problem Statements from Services & DPSUs under DISC 5.0 to be launched***
- ***Designed to ensure military advantage for the future***
- ***Massive leap towards leveraging the startup ecosystem to develop defence technologies***
- ***To encourage startups to become more attuned to innovative concepts***

Three years after the launch of Defence India Startup Challenge 1.0 (DISC), Innovations for Defence Excellence (iDEX), Defence Innovation Organisation (DIO), will launch DISC 5.0 in New Delhi on August 19, 2021. iDEX provides a platform for different stakeholders in the defence & aerospace sectors, essentially acting as an umbrella organisation to oversee technology development and potential collaborations in the specific field. With initiatives such as DISC and Open Challenges, iDEX is able to utilise the strong science, technology and research talent base of the country to develop new capabilities in defence innovation. DISC 5.0 will have more challenges than the first four DISC editions taken together.

Problem Statements received from the Services and Defence Public Sector Undertakings (DPSUs) under DISC Round 5 will be launched by Raksha Mantri Shri Rajnath Singh. iDEX had been designed to infuse latest technology into military warfare closely intertwined with the needs of the Services and reduce dependence on imports, according to Secretary (Defence Production) Shri Raj Kumar.

The Problem Statements by the Services and DPSUs are designed to ensure military advantage in the foreseeable future. The winners receive grants up to Rs 1.5 crore from iDEX, along with support from Partner Incubators and guidance from the Nodal Officers who are the ultimate users.

The launch of DISC 5.0 will be a massive leap towards leveraging the startup ecosystem to develop India's defence technologies, equipment design and manufacturing capabilities. These challenges will also encourage startups to become more attuned to innovative concepts and inculcate the approach of creative thinking in India's budding entrepreneurs. Additional Secretary, DDP and CEO, DIO Shri Sanjay Jaju stated that the iDEX process has opened up a whole new ecosystem for Indian startups besides lending visibility to their work. He emphasised that in the long run, this would help these entities build credibility, and even corner foreign contracts.

iDEX features as a procurement avenue under the Defence Acquisition Procedure (DAP-2020). Ministry of Defence has earmarked a total of Rs 1,000 crore for domestic procurement through iDEX initiative for the financial year 2021-2022. Recently, the Raksha Mantri had approved a budget of Rs 498.8 crore for the next five years to support over 300 startups and foster innovation in defence & aerospace sectors. These announcements have provided assurance of domestic procurement for the myriad of innovations and products being developed by young entrepreneurs,

while enabling India's defence sector to contribute significantly towards $5-trillion economy goal by 2025.
https://pib.gov.in/PressReleasePage.aspx?PRID=1746937

पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Wed, 18 Aug 2021 3:55PM

रक्षा मंत्री श्री राजनाथ सिंह डिफेंस इंडिया स्टार्टअप चैलेंज 5.0 का शुभारंभ करेंगे

प्रमुख बातें:

- ***डिफेंस इंडिया स्टार्टअप चैलेंज 5.0 के तहत सेवाओं और डीपीएसयू से समस्या विवरण जारी किए जाएंगे***
- ***भविष्य के लिए सैन्य लाभ सुनिश्चित करने के लिए बनाया गया है***
- ***रक्षा प्रौद्योगिकियों को विकसित करने के लिए स्टार्टअप पारितंत्र का लाभ उठाने की दिशा में बड़ा कदम***
- ***स्टार्टअप्स को नवीन अवधारणाओं के प्रति अभ्यस्त बनने के लिए प्रोत्साहित किया जाएगा***

डिफेंस इंडिया स्टार्टअप चैलेंज 1.0 (डीआईएससी) के शुभारंभ के तीन साल बाद, इनोवेशन फॉर डिफेंस एक्सीलेंस (आई-डेक्स), डिफेंस इनोवेशन ऑर्गनाइजेशन (डीआईओ), दिनांक 19 अगस्त, 2021 को नई दिल्ली में डीआईएससी 5.0 की शुरुआत करेगा। आई-डेक्स रक्षा और एयरोस्पेस क्षेत्रों में विभिन्न हितधारकों के लिए एक मंच प्रदान करता है एवं अनिवार्य रूप से विशिष्ट क्षेत्र में प्रौद्योगिकी विकास और संभावित सहयोग की निगरानी के लिए एक अम्ब्रेला संगठन के रूप में कार्य करता है। डीआईएससी और खुली चुनौतियों जैसी पहलों के साथ, आईडीईएक्स रक्षा नवाचार में नई क्षमताओं को विकसित करने के लिए देश की मजबूत विज्ञान, प्रौद्योगिकी और अनुसंधान प्रतिभा का उपयोग करने में सक्षम है। डीआईएससी 5.0 में चुनौतियां इससे पहले वाले चार डीआईएससी संस्करणों की तुलना में अधिक होंगी।

डीआईएससी राउंड 5 के तहत सेवाओं और रक्षा सार्वजनिक क्षेत्र के उपक्रमों (डीपीएसयू) से प्राप्त समस्या विवरण रक्षा मंत्री श्री राजनाथ सिंह द्वारा लॉन्च किए जाएंगे। सचिव (रक्षा उत्पादन) श्री राज कुमार के अनुसार, आई-डेक्स को सैन्य युद्ध में नवीनतम तकनीक को शामिल करने के लिए डिजाइन किया गया था, जो सेवाओं की जरूरतों के साथ करीबी से जुड़ा हुआ है और आयात पर निर्भरता को कम करता है।

निकट भविष्य में सैन्य लाभ सुनिश्चित करने के लिए सेवाओं और डीपीएसयू द्वारा समस्या विवरण तैयार किए गए हैं। विजेताओं को आई-डेक्स से 1.5 करोड़ रुपये तक का अनुदान मिलता है, साथ ही पार्टनर इन्क्यूबेटरों से समर्थन और नोडल अधिकारियों से मार्गदर्शन मिलता है जो अंतिम उपयोगकर्ता हैं।

डीआईएससी 5.0 का आरंभ होना भारत की रक्षा प्रौद्योगिकियों, उपकरण डिजाइन और विनिर्माण क्षमताओं को विकसित करने के लिए स्टार्टअप पारितंत्र का लाभ उठाने की दिशा में एक बड़ा कदम होगा। ये चुनौतियाँ स्टार्टअप्स को नवीन अवधारणाओं के प्रति अधिक अभ्यस्त होने और भारत के नवोदित

उद्यमियों में रचनात्मक सोच के दृष्टिकोण को विकसित करने के लिए प्रोत्साहित करेंगी। अतिरिक्त सचिव, डीडीपी और सीईओ, डीआईओ श्री संजय जाजू ने कहा कि आई-डेक्स प्रक्रिया ने भारतीय स्टार्टअप के लिए उनके काम को दिखाने के अलावा एक नया पारिस्थितिकी तंत्र खोल दिया है। उन्होंने इस बात पर जोर दिया कि लंबे समय में इससे इन संस्थाओं को विश्वसनीयता बनाने में मदद मिलेगी और यहां तक कि विदेशी अनुबंधों को भी कम करने में मदद मिलेगी।

आई-डेक्स रक्षा अधिग्रहण प्रक्रिया (डीएपी-2020) के तहत एक अधिग्रहण मंच के रूप में कार्य करता है। रक्षा मंत्रालय ने वित्तीय वर्ष 2021-2022 के लिए आई-डेक्स पहल के माध्यम से घरेलू खरीद के लिए कुल 1,000 करोड़ रुपये निर्धारित किए हैं। हाल ही में रक्षा मंत्री ने रक्षा और एयरोस्पेस क्षेत्रों में 300 से अधिक स्टार्टअप और नवाचार को बढ़ावा देने के लिए अगले पांच वर्षों के लिए 498.8 करोड़ रुपये के बजट को मंजूरी दी थी। इन घोषणाओं ने युवा उद्यमियों द्वारा विकसित किए जा रहे असंख्य नवाचारों और उत्पादों के लिए घरेलू खरीद का आश्वासन प्रदान किया है, जबकि भारत के रक्षा क्षेत्र को 2025 तक 5-ट्रिलियन अर्थव्यवस्था लक्ष्य की दिशा में महत्वपूर्ण योगदान देने में सक्षम बनाया है।

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Press Information Bureau
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Ministry of Defence

Wed, 18 Aug 2021 11:55AM

Webinar between India & Malaysia on 'Indian defence industry global outreach for collaborative partnership'

Key Highlights:

- ***Part of series of webinars organised with friendly countries***
- ***Aims to boost defence exports & achieve US $5 billion defence export target by 2025***
- ***More than 150 delegates attend the webinar***
- ***Over 100 virtual exhibition stalls set up***
- ***Webinar organised by MoD through SIDM***

A webinar and expo between India & Malaysia on the theme 'Indian Defence Industry Global Outreach for Collaborative Partnership' was held on August 17, 2021. It was organised under the aegis of Department of Defence Production, Ministry of Defence through Society of Indian Defence Manufacturers (SIDM). The webinar was part of the series of webinars being organised with friendly foreign countries to boost defence exports and achieve the defence export target of US $5 billion by 2025.

Joint Secretary, Defence Industries Production (DIP), Ministry of Defence Shri Anurag Bajpai and other senior officials from both countries participated in the webinar. In his address, the Joint Secretary (DIP) highlighted that Indian defence products are of global standards and extremely cost effective. He said India has a robust shipbuilding industry with an ecosystem of world class public and private shipbuilding companies. He emphasised that India is positioning itself as a hub for aircraft maintenance, repair & overhaul activities and both the countries may collaborate in this sector. A knowledge paper prepared by SIDM-KPMG was also released during webinar.

Nine Indian companies, including Bharat Electronics Limited, Hindustan Aeronautics Limited, Garden Reach Shipbuilders & Engineers, L&T Defence and Bharat Forge Limited, gave

presentations on major defence platforms and products. From the Malaysian side, Aerospace Technology Systems Corporation, AMP Corporation, DEFTECH Unmanned Systems and Innopeak SDN BHD made company presentations.

The webinar was attended by more than 150 delegates. More than 100 virtual exhibition stalls were set up.

https://pib.gov.in/PressReleasePage.aspx?PRID=1746882

Press Information Bureau
Government of India

Ministry of Defence

Wed, 18 Aug 2021 7:24PM

'Joint guidance for the Australia – India Navy to Navy relationship' signed between Indian Navy & Australian Navy

A 'Joint Guidance for the Australia – India Navy to Navy Relationship' document was signed between the Indian Navy and Royal Australian Navy today, 18 August 2021. The signing ceremony was held virtually between Adm Karambir Singh, Chief of the Naval Staff, Indian Navy and Vice Admiral Michael J Noonan, Chief of Navy, Australian Navy.

The document is aligned to the '2020 Comprehensive Strategic Partnership' agreed by the Prime Ministers and aims to ensure shared approached to regional and global security challenges. The Joint Guidance would serve as a guideline document to showcase the intent of both the Navies to work together bi/ multi-laterally. The broad scope of the guidance is focussed on developing mutual understanding, cooperate for regional security, collaborate in mutually beneficial activities and to develop interoperability.

The highlights of document include close cooperation in regional and multilateral fora, including Indian Ocean Naval Symposium (IONS), Western Pacific Naval Symposium (WPNS), Indian Ocean Rim Association (IORA) and Expert Working Groups subordinate to the ASEAN Defence Ministers' Meeting Plus framework.

Bilateral defence relations between India and Australia have strengthened over the years. 'Comprehensive Strategic Partnership', Mutual Logistics Support Agreement, conduct of trilateral Maritime Security Workshop and RAN participation in Exercise MALABAR are significant milestones which underline the role played by both Navies in bolstering this relationship in recent times. The document would be pivotal in consolidating the shared commitment to promote peace, security, stability and prosperity in the Indo - Pacific region.

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Press Information Bureau
Government of India

Ministry of Defence

Wed, 18 Aug 2021 4:42PM

Indian Navy undertakes bilateral maritime exercise with Vietnam People's Navy

In continuation with ongoing deployment of Indian Navy ships in the South China Sea, INS Ranvijay and INS Kora undertook bilateral maritime exercise with Vietnam People's Navy (VPN) frigate VPNS Ly Thai To(HQ-012) on 18 Aug 21. The bilateral interaction aims to consolidate the strong bond shared by the two navies and would be another step towards strengthening India-Vietnam defence relations.

The Indian Naval ships arrived at Cam Ranh, Vietnam on 15 August 21 for harbour phase which included professional interactions with VPN maintaining extant Covid-19 protocols. The sea phase included surface warfare exercises, weapon firing drills and helicopter operations. Regular interactions between the two navies over the years have enhanced their interoperability and adaptability. This has ensured a quantum jump in the complexity and scale of professional exchanges. This visit also holds special importance as Indian Naval ships celebrated the country's 75th Independence Day in Vietnam.

Defence ties between the two countries have been robust. In June this year, the two countries undertook a defence security dialogue and Indian Naval ships have been frequently visiting Vietnamese Ports. Training cooperation between the two navies has been on the rise over the years.

INS Ranvijay is a guided-missile destroyer and the latest of the Rajput class. The ship was commissioned on 21 Dec 1987 and is equipped with an array of weapons and sensors which includes Surface to Surface Missile, Anti Air Missiles and guns, Heavy Weight Torpedoes, Anti Submarine Rockets and capable of carrying Anti Submarine Heli-copter (Kamov 28). INS Ranvijay is in company with INS Kora which is the lead ship of Kora class missile corvette. The ship is fitted with Surface-to-Surface missiles and Anti Air Guns.

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पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Wed, 18 Aug 2021 4:42PM

भारतीय नौसेना ने वियतनाम पीपुल्स नौसेना के साथ द्विपक्षीय समुद्री सैन्य अभ्यास किया

दक्षिण चीन सागर में भारतीय नौसेना के जहाजों की चल रही तैनाती के क्रम में आईएनएस रणविजय और आईएनएस कोरा ने 18 अगस्त 2021 को वियतनाम पीपुल्स नौसेना (वीपीएन) के वीपीएनएस ली थाई तो (एचक्यू-012) युद्ध-पोत के साथ द्विपक्षीय समुद्री सैन्य अभ्यास किया। द्विपक्षीय अभ्यास का उद्देश्य दोनों देशों की नौसेनाओं द्वारा साझा किए गए मजबूत रिश्ते को दृढ़ता से आगे ले जाना है और यह भारत-वियतनाम रक्षा संबंधों को मजबूती प्रदान करने की दिशा में एक महत्वपूर्ण कदम है।

भारतीय नौसेना के पोत 15 अगस्त 2021 को बंदरगाह चरण वार्ता के लिए वियतनाम के कैम रैन पहुंचे, जिसमें मौजूदा कोविड -19 प्रोटोकॉल को बनाए रखते हुए वियतनाम पीपुल्स नौसेना के साथ पेशेवर बातचीत भी शामिल थी। समुद्री चरण के दौरान सतही युद्ध अभ्यास, हथियारों से गोलीबारी अभ्यास और हेलीकॉप्टर संचालन शामिल थे। वर्षों से दोनों नौसेनाओं के बीच नियमित अभ्यास और बातचीत ने उनकी पारस्परिकता तथा अनुकूलन क्षमता को बढ़ाया है। इस प्रक्रिया ने व्यावसायिक आदान-प्रदान की जटिलता और अनुपात में भारी वृद्धि सुनिश्चित की है। इस यात्रा का विशेष महत्व भी है क्योंकि, भारतीय नौसेना के जहाजों ने वियतनाम में देश का 75वां स्वतंत्रता दिवस मनाया है।

दोनों देशों के बीच रक्षा संबंध प्रगाढ़ रहे हैं। इस साल जून में, दोनों देशों ने रक्षा सुरक्षा वार्ता की और भारतीय नौसेना के पोत अक्सर वियतनामी बंदरगाहों पर आते - जाते रहे हैं। पिछले कुछ वर्षों से दोनों नौसेनाओं के बीच प्रशिक्षण सहयोग भी बढ़ रहा है।

आईएनएस रणविजय एक मार्गदर्शित मिसाइल विध्वंसक और राजपूत श्रेणी का नवीनतम युद्ध-पोत है। इस पोत को 21 दिसंबर 1987 को कमीशन किया गया था और यह हथियारों तथा सेंसर की एक श्रृंखला से लैस है। यह पोत सतह से सतह पर मार करने वाली मिसाइल, एंटी एयर मिसाइल एवं बंदूकें, भारी वजन वाले टॉरपीडो, एंटी सबमरीन रॉकेट तथा एंटी सबमरीन हेली-कॉप्टर (कामोव 28) ले जाने में सक्षम हैं। आईएनएस रणविजय आईएनएस कोरा के साथ है, जो कोरा श्रेणी के मिसाइल कार्वेट का प्रमुख पोत है। यह पोत सतह से सतह पर मार करने वाली मिसाइलों तथा एंटी एयर गन से लैस है।

https://pib.gov.in/PressReleasePage.aspx?PRID=1747073

THE TIMES OF INDIA

Thu, 19 Aug 2021

Maintain operational readiness round the clock: IAF Chief to commanders

New Delhi: The Indian Air Force (IAF) has to maintain operational readiness round the clock, and it should have sustained focus on capability enhancement, Air Chief Marshal RKS Bhadauria told its commanders in Gandhinagar on Wednesday.

Air Chief Marshal RKS Bhadauria at the Commanders' Conference (ANI)

In his speech at the Commanders' Conference at the South Western Air Command, Bhadauria exhorted the commanders to leverage modern methods in training in order to enhance the understanding and capabilities of the new generation air warriors.

The two-day conference, which undertook an operational review of missions and tasks, ended on Wednesday.

Interacting with air warriors and civilian employees, Bhadauria appreciated their immense contribution in operational deployments and disciplined approach towards mitigating the Covid-19 crisis, the IAF's statement noted.

He highlighted the need for maintaining operational readiness round the clock and sustained focus on capability enhancement.

"He emphasized on the early operationalisation of newly inducted sensors and weapon systems," the statement said.

https://timesofindia.indiatimes.com/india/maintain-operational-readiness-round-the-clock-iaf-chief-to-commanders/articleshow/85431994.cms

THE WIRE

Thu, 19 Aug 2021

Indian Army initiates indigenous upgrade of infantry combat vehicles

The projected ICV upgrade would include fitting them with more powerful engines, third-generation thermal imager-based gunner and panoramic sights, modern fire control systems and automatic target trackers

By Rahul Bedi

Chandigarh: The Indian Army (IA) has initiated the indigenous upgrade of 811 of its licence built Soviet-era BMP-2/2K 'Sarath' infantry combat vehicles (ICVs) by equipping them with more powerful engines, night fighting capability and varied advanced systems.

ICV BMP II K SARATH passes through the Rajpath during the full dress rehearsal for the Republic Day Parade-2010, in New Delhi on January 23, 2010. Photo: Public.Resource.Org/Flickr CC BY 2.0

The force recently despatched a project sanction order (PSO) to 12 domestic private and public sector companies – referred to as Development Agencies (DAs) – to produce a retrofitted prototype within 52 weeks (or by July 31, 2022) for user trials, UK's *Jane's Defence Weekly* reported on August 17. One ICV apiece would be supplied to each potential vendor by the IA for this purpose, the classified 12-page PSO stated.

Thereafter, at least two vendors would be selected from amongst those who met the IA's preliminary staff qualitative requirement (PSQRs) for the upgraded ICVs, and the one that emerged L1, or the lowest bidder, would be shortlisted to series upgrade all 811 platforms, *Jane*'s stated.

The magazine said officials associated with the ICV upgrade stated that the BMP-2 upgrade would be processed under the Buy Indian-Indigenously Designed, Developed and Manufactured (Indian-IDDM) category of the Defence Procurement Procedure-2020 (DPP-2020), which mandates a 50% domestically sourced content for the retrofit.

The potential vendors on the IA's list include Alpha Design Technologies, Bharat Electronics Limited, Bharat Forge, Ordnance Factory Board (OFB) Larsen & Toubro (L&T), Reliance Defence and Infrastructure and Tata. All these companies would be permitted to enter into collaborative agreements with overseas original equipment manufacturers (OEMs) for the project, and according to industry sources many already had already finalised cooperative arrangements.

Official sources told *Jane*'s that the projected ICV upgrade would include fitting them with more powerful engines to replace their present UTD20/2 300hp power packs, third-generation thermal imager-based gunner and panoramic sights, modern fire control systems and automatic target trackers. The retrofit would also encompass upgrading the platforms on-board weapon systems that include a 30mm 2A42 auto-canon with dual ammunition feeds, capable of firing 9M113 Konkurs wire-guided anti-tank guided missiles (ATGMs) and a secondary coaxial 7.62x54mm machine gun.

Earlier, in July 2017, the Ministry of Defence (MoD) had approved the ongoing Rs 2,400 crore upgrade of 639 BMP-2/2K to BMP-2M standards by the state-owned OFB. This included fitting them with six cylinder four stroke UTD-23 supercharged 360hp diesel engines and thermal imaging fire control systems (TIFCS). Some are also reportedly being armed with the locally developed Nag ATGMs and automatic grenade launchers.

Equipping the ICVs with TIFCS', however, follows a rare admission by the force last year that the BMP2/2K's, inducted into service 1985 onwards were 'night blind' and that their sighting

systems, based on Image Intensifier Technology were 'not fit for modern day warfare'. Many such BMPs had been deployed to eastern Ladakh in response to the enduring standoff, since May 2020 between the IA and China's People's Liberation Army along their disputed Line of Actual Control or LAC.

The IA has so far acquired 2,691 BMP-2/2Ks since the mid-1980's, of which around 1,700 were presently operational, doubling in many instances as armoured ambulances, amphibious bulldozers and engineer reconnaissance vehicles. Some ICVs, with modified chassis have also been employed as Nag missile carriers (NAMICA) – capable of carrying up to six locally developed Nag ATGMs – and as part of the medium-range surface-to-air (SAM) Akash air defence missile systems to transport their indigenously designed Rajendra phased array fire control radar.

And in June 2020, the MoD had approved the procurement of 156 licence-built BMP-2 ICVs from the OFB Medak unit in Telangana that has been series producing the ICVs since 1987. Officials indicated that OFB Medak is required to complete delivery of all 156 ICVs within 24 months.

Weighing 14.3 tonnes and operated by a three-man crew, including the commander and gunner and powered by a UTD20/3 300hp diesel engine, the BMP-2s are capable of transporting seven fully-equipped infantrymen. The ICVs have an operational range of 600km and are capable of travelling at a maximum speed of 65kph on roads, 45kmph off-road and at 7kmph when engaged amphibiously..

According to *Jane*'s, the IA had kickstarted its long-delayed upgrade of 811 BMP2 ICVs to meet the challenge posed by the PLA in Ladakh. Senior IA officers, however, had told the magazine that the ICV upgrade was a 'major project' to execute locally and faced 'serious' financial and technological challenges. It was also possible that the deadline to produce a prototype in 52 weeks by July 2022 could also be rescheduled.

Jane's experts added that the 'Sarath' ICVs lacked several mission systems that were fairly standard, rendering an upgrade a 'necessity to avoid obsolescence' until a replacement platform was procured or the long-delayed Future Infantry Combat Vehicle or FICV was developed. The financially and technologically ambitious $12 billion FICV programme, initiated in 2009 to locally design and build 2,610 20-22 ton ICVs as replacements for the BMP-2.2Ks has been abandoned, revived and once again dumped several times.

Meanwhile, industry officials, for their part were sceptical over whether the ICV upgrade would meet the mandated 50% indigenous requirement for the programme, as a large proportion of systems needed for its upgrade would necessarily be imported, as developing them locally would not only be expensive but also time consuming.

"Hopefully, the elaborate ICV upgrade project will not flounder over the seemingly unattainable requirement for indigenisation in the name of *atmanirbharta* or self-reliance," said Amit Cowshish, former Ministry of Defence advisor on acquisitions. It's time for the MoD and services to err on the side of practicality in such programmes rather than get bogged down in procedural complexities, many of which are unattainable, he added.

https://thewire.in/security/indian-army-initiates-indigenous-upgrade-of-infantry-combat-vehicles

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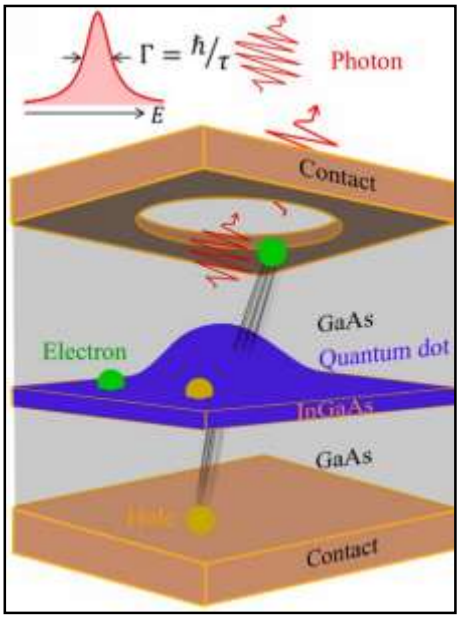
Thu, 19 Aug 2021

Nanostructure-based lasers for information and communication technologies

The internet of things (IoT) enables the interconnection and data transmission among a plethora of physical objects such as terminal devices, vehicles, and buildings that are embedded with electronics, software, sensors, actuators, and network connectivity. In 5G and 6G optical networks, high-speed and low-latency communications enable interconnection among a wide variety of endpoints through the IoT. Furthermore, quantum technologies are on the way to reshape the future of internet by providing considerably faster and largely more secure data transmission owing to new encryption protocols based on quantum laws. The rule of thumb of such key applications is that they all require the utilization of laser sources to perform complex tasks at ultra-fast speed and to enable broadband, secure and energy efficient communications.



Owing to the discrete energy levels, quantum dot lasers output unique features like thermal stability, feedback insensitivity and spectral purity. Credit: Frédéric Grillot, Jianan Duan, Bozhang Dong and Heming Huang

To achieve these goals, semiconductor nanostructures with low dimensionality like quantum dots and quantum dashes are one of the best attractive and heuristic solutions for achieving high performance lasers. In a new paper published in *Light Science & Application*, a team of scientists, led by Professor Frédéric Grillot from Télécom Paris, Institut Polytechnique de Paris, France, and co-workers have reviewed their recent findings on nanostructured lasers utilizing an active region made with quantum dot and quantum dash nanostructures. The study demonstrates the importance of using nanostructure based light emitters and highlights the impact these photonic devices have on industry and society. The importance of this work is performed owing to strong worldwide academic collaborators all experts in quantum dot technology.

"We highlight the potential of both quantum dot and quantum dash lasers for low noise operation because they feature a low population inversion factor and reduced amplified spontaneous emission noise as well as low linewidth enhancement factor. Lasers with narrow linewidth and low relative intensity noise are needed for coherent communication, optical atomic clocks, frequency synthesis, high-resolution spectroscopy and distributed sensing systems."

"Due to the tight level of integration of multiple optoelectronics components on a photonic chip, heterogeneously integrated hybrid semiconductor lasers on silicon are more reflection sensitive. We have proved the excellent stability against optical feedback of the epitaxial quantum dot lasers, which is the greatest achievement ever for pushing the development of isolation free transmissions on silicon chips" they added.

"Another peculiar feature of quantum dots results from their large optical nonlinearities with fast response speed. Using a single section of quantum dot lasers directly grown on silicon, it is

possible to achieve sufficient four-wave mixing conversion efficiency to demonstrate self-mode-locking with sub-picosecond pulse duration and kHz frequency-comb linewidth."

"Future perspective can consider deploying quantum dots in quantum technologies like for coherent and squeezing states of light. In particular, squeezing states can be used to replace shot-noise-limited laser sources whereby ultralow noise oscillator operating below the standard quantum limit is highly meaningful in metrology, spectroscopy and for any precision measurements. Besides, in quantum key distribution relying on entangled photons, a large squeezing bandwidth is desirable for achieving high-speed data transmissions" the scientists forecast.

"Based on the results reported in this article, scientists, researchers, and engineers can come up with an informed judgment in utilizing self-assembled nanostructures for applications ranging from silicon-based integrated technologies to quantum information systems."

More information: Frédéric Grillot et al, Uncovering recent progress in nanostructured light-emitters for information and communication technologies, *Light: Science & Applications* (2021). DOI: 10.1038/s41377-021-00598-3

Journal information: *Light: Science & Applications*

https://phys.org/news/2021-08-nanostructure-based-lasers-technologies.html

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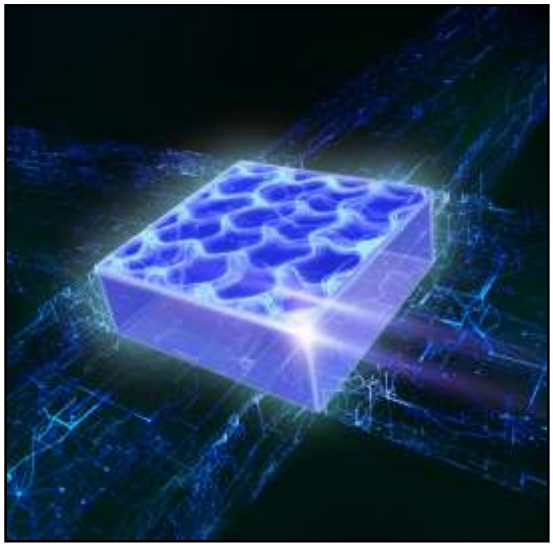
Thu, 19 Aug 2021

Two-dimensional supersolid quantum gas produced in the laboratory for the first time

Quantum matter can be solid and fluid at the same time—a situation known as supersolidity. Researchers led by Francesca Ferlaino have now created for the first time this fascinating property along two dimensions. They now report in the journal *Nature* on the realization of supersolidity along two axes of an ultracold quantum gas. The experiment offers many possibilities for further investigation of this exotic state of matter.



Two-dimensional supersolid quantum gas produced in the laboratory for the first time. Credit: IQOQI Innsbruck/Harald Ritsch

Quantum gases are very well suited for investigating the microscopic consequences of interactions in matter. Today, scientists can precisely control individual particles in extremely cooled gas clouds in the laboratory, revealing phenomena that cannot be observed in the every-day world. For example, the individual atoms in a Bose-Einstein condensate are completely delocalized. This means that the same atom exists at each point within the condensate at any given time. Two years ago, the research group led by Francesca Ferlaino from the Department of Experimental Physics at the University of Innsbruck and the Institute of Quantum Optics and Quantum Information at the Austrian Academy of Sciences in Innsbruck managed for the first time to generate supersolid states in ultracold quantum gases of magnetic atoms. The magnetic interaction causes the atoms to self-organize into droplets and arrange themselves in a regular pattern.

"Normally, you would think that each atom would be found in a specific droplet, with no way to get between them," says Matthew Norcia of Francesca Ferlaino's team. "However, in the supersolid state, each particle is delocalized across all the droplets, existing simultaneously in each droplet. So

basically, you have a system with a series of high-density regions (the droplets) that all share the same delocalized atoms." This bizarre formation enables effects such as frictionless flow despite the presence of spatial order (superfluidity).

New dimensions, new effects to explore

Until now, supersolid states in quantum gases have only ever been observed as a string of droplets (along one dimension). "In collaboration with theorists Luis Santos at Leibniz Universität Hannover and Russell Bisset in Innsbruck we have now extended this phenomenon to two dimensions, giving rise to systems with two or more rows of droplets," explains Matthew Norcia. This is not only a quantitative improvement, but also crucially broadens the research perspectives. "For example, in a two-dimensional supersolid system, one can study how vortices form in the hole between several adjacent droplets," he says. "These vortices described in theory have not yet been demonstrated, but they represent an important consequence of superfluidity," Francesca Ferlaino is already looking into the future. The experiment now reported in the journal Nature creates new opportunities to further investigate the fundamental physics of this fascinating state of matter.

New research field: Supersolids

Predicted 50 years ago, supersolidity with its surprising properties has been investigated extensively in superfluid helium. However, after decades of theoretical and experimental research, a clear proof of supersolidity in this system was still missing. Two years ago, research groups in Pisa, Stuttgart and Innsbruck independently succeeded for the first time in creating so-called supersolids from magnetic atoms in ultracold quantum gases. The basis for the new, growing research field of supersolids is the strong polarity of magnetic atoms, whose interaction characteristics enable the creation of this paradoxical quantum mechanical state of matter in the laboratory.

More information: Two-dimensional supersolidity in a dipolar quantum gas, *Nature* (2021). DOI: 10.1038/s41586-021-03725-7 , www.nature.com/articles/s41586-021-03725-7

Journal information: *Nature*

https://phys.org/news/2021-08-two-dimensional-supersolid-quantum-gas-laboratory.html

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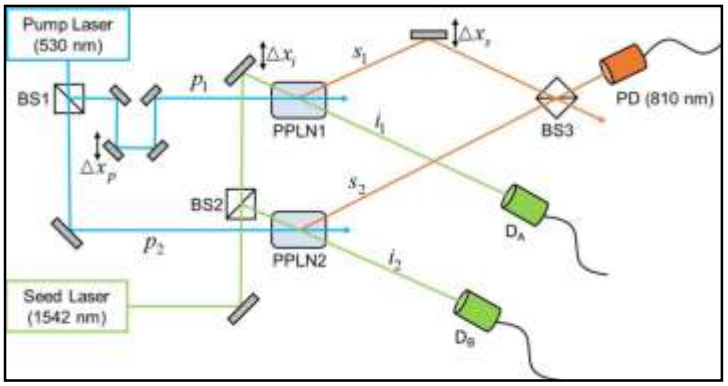
Thu, 19 Aug 2021

Experimental confirmation of wave-particle duality

The 21st century has undoubtedly been the era of quantum science. Quantum mechanics was born in the early 20th century and has been used to develop unprecedented technologies which include quantum information, quantum communication, quantum metrology, quantum imaging, and quantum sensing. However, in quantum science, there are still unresolved and even inapprehensible issues like wave-particle duality and complementarity, superposition of wave functions, wave function collapse after quantum measurement, wave function entanglement of the composite wave function, etc.



Two SPDC crystals, PPLN1 and PPLN2, are pumped and seeded simultaneously by the same pump and seed coherent lasers, respectively, resulting in the emission of two signal photons s1 or s2 for quantum interference detection at PD. Then, conjugate idler photons i1 and i2 provide the which-path (or which-source) information, where the controllable source purity is determined by the overlap between the SPACS of one of the idler modes and the unchanged coherent state of another idler mode. Two idler fields can be detected independently by detectors DA and DB. Credit: Institute for Basic Science

To test the fundamental principle of wave-particle duality and complementarity quantitatively, a quantum composite system that can be controlled by experimental parameters is needed. So far, there have been several theoretical proposals after Neils Bohr introduced the concept of "complementarity" in 1928, but only a few ideas have been tested experimentally, with them detecting interference patterns with low visibility. Thus, the concept of complementarity and wave-particle duality still remains elusive and has not been fully confirmed experimentally yet.

To address this issue, a research team from the Institute for Basic Science (IBS, South Korea) constructed a double-path interferometer consisting of two parametric downconversion crystals seeded by coherent idler fields, which is shown in Figure1. The device generates coherent signal photons (quantons) that are used for quantum interference measurement. The quantons then travel down two separate paths before reaching the detector. The conjugate idler fields are used for extracting path information with controllable fidelity, which is useful for quantitatively elucidating the complementarity.

In a real experiment, the source of quantons is not pure due to its entanglement with the remaining degrees of freedom. However, the quanton source purity is tightly bounded by the entanglement between the generated quantons and all the other remaining degrees of freedom by the relation $\mu_s = \sqrt{(1—E^2)}$, which the researchers confirmed experimentally.

The wave-particle duality and the quantitative complementarity $P^2 + V^2 = \mu_s^2$ (P, a priori predictability; V, visibility) were analyzed and tested using this entangled nonlinear bi-photon source (ENBS) system, where the superposition states of the quantons are quantum mechanically entangled with conjugate idler states in a controllable manner. It was shown that *a priori* predictability, visibility, entanglement (thus, source purity, and fidelity in our ENBS model) strictly depend on the seed beam photon numbers. This points to the potential application of this approach for the preparation of distant entangled photon states.

Richard Feynman once stated that solving the puzzle of quantum mechanics lies in the understanding of the double-slit experiment. It is anticipated that the interpretation based on the

double-path interferometry experiments with ENBS will have fundamental implications for better understanding the principle of complementarity and the wave-particle duality relation quantitatively.

This research was published in the journal *Science Advances.*

More information: Quantitative Complementarity of Wave-Particle Duality, *Science Advances* (2021). DOI: 10.1126/sciadv.abi9268

Journal information: *Science Advances*

https://phys.org/news/2021-08-experimental-wave-particle-duality.html

COVID-19 Research News

mint

Thu, 19 Aug 2021

Now, an Indian covid-19 vaccine made from plants?

The so-called N-terminal region of SARS-CoV-2 S-glycoprotein consists of a receptor-binding domain (RBD), and studies have shown that antibodies against this region can effectively block RBD ACE2 (host-receptor) interaction, according to scientists

By Neetu Chandra Sharma

New Delhi: Scientists in India plan to shortly begin clinical trials of a plant-based vaccine against covid-19, which could become one of the world's first such vaccines against the deadly disease.

Four categories of covid-19 vaccines are in use currently. (Photo: AP)

A senior official at India's plant genome research body said scientists are studying the plant Nicotiana benthamiana, a relative of tobacco, to develop a platform to make covid-related antigens to trigger immune response against the SARS-CoV-2 virus that causes covid-19.

Three research groups at the National Institute of Plant Genome Research (NIPGR), New Delhi, under the department of biotechnology, ministry of science and technology, in association with the International Centre for Genetic Engineering and Biotechnology (ICGEB) in New Delhi, are working on the project.

The so-called N-terminal region of SARS-CoV-2 S-glycoprotein consists of a receptor-binding domain (RBD), and studies have shown that antibodies against this region can effectively block RBD ACE2 (host-receptor) interaction, according to scientists. ACE2 receptor is the protein that provides the entry point for the coronavirus to hook on to and infect human cells.

"The leaf extracts of plants expressing the RBD and purified protein will be tested and used for immunization of mice in collaboration with ICGEB, New Delhi, with different doses to trigger a strong immune response against the virus. As plant-based vaccines provide ease of administration and monitoring, developing such a vaccine for SARS CoV-2 would assist in executing mass immunization drives," a spokesperson at NIPGR told Mint.

There are four categories of covid-19 vaccines that are in use currently—whole virus, protein subunit, viral vector and nucleic acid (RNA and DNA).

Inactivated vaccines such as Bharat Biotech's Covaxin use whole viruses whose genetic material has been destroyed, so they cannot replicate but can still trigger an immune response. Subunit vaccines such as the one from Biological E use pieces of the pathogen—often fragments of protein—to trigger an immune response.

Nucleic acid vaccines use genetic material—either RNA (Pfizer or Moderna) or DNA (Zydus Cadila)—to provide cells with the instructions to make the antigen.

In the case of covid-19, this is usually the viral spike protein. Once this genetic material enters human cells, the vaccine uses cells' protein factories to make the antigen trigger an immune response.

In viral vector vaccines such as Covishield, the adenovirus virus causing the common cold is used as a vector. Similar to nucleic acid vaccines, the body's own cellular machinery is hijacked to produce the antigen from those instructions to trigger an immune response.

"This plant-based vaccine against covid-19 is the first in India. It's an early lead and a very challenging task. Indian scientists are taking up all challenging research while fighting the pandemic. The current development is in a model system and the vaccine will take some time to develop; if successful, India will be among the first countries to have such a vaccine," said Dr. Renu Swarup, secretary, department of biotechnology.

A review published in the journal Vaccines recently said in terms of plant-based vaccines, there have been notable successes, both from a biochemical and a clinical perspective, with several clinical trials showing great promise.

The review noted that the American company, iBio, has announced it is developing a plant-produced subunit vaccine candidate based on segments of Sars CoV-2 spike (S) major surface glycoprotein fused to LickM, a carrier protein derived from Clostridium thermocellum b-1,3-1,4-glucanase, which has previously been used with influenza HA.

Similarly, Kentucky BioProcessing has also announced that it is developing a plant-produced subunit vaccine candidate that is currently being tested in phase 1–2 clinical trials. Scientific data on either of these candidate vaccines have not been made available so far.

https://www.livemint.com/science/health/indian-scientists-to-start-clinical-trials-of-plant-based-covid-shots-11629313754199.html