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Wed, 17 Nov 2021

Time to take our story to the world: India's defence manufacturers at Dubai Airshow

Dubai: Indias top defence manufacturers exhibiting at the ongoing Dubai Airshow feel that time has now come for the world to sit up and take note of their in-house production capabilities.

As many as 15 small to big-time players, including Hindustan Aeronautics Limited (HAL), Brahmos Aerospace and Defence Research & Development Organisation (DRDO), are participating in the five-day biennial event being held at the Al Maktoum International Airport at the Dubai World Central here until November 18.

Many representing them said it's the best platform and time has come to showcase to the wider region and the world what they are capable of.

"The indigenisation part has increased to such an extent that we are not really worried (about sanctions). Earlier, we used to depend on others and whenever a sanction came in, you would be really stuck. But I think today we are not in that state," said retired group captain R. Varadharajan from the DRDO, which is exhibiting as many as 16 new products and technologies at the region's top airshow, including the Tejas Light Combat Aircraft (LCA) that dazzled visitors on the event's opening day as part of an air display by Indian Air Force (IAF) alongside Sarang and Suryakiran aerobatics teams.

"What's changed over the years is that government support to make this happen has increased. Without government and political will, it cannot happen. So that has been the game-changer in the last few years. And I think we are on the path to further improve our indigenous content in the near future," a category F scientist at the Centre for Air-Borne Systems (CABS) at DRDO under the Ministry of Defence told IANS on the sidelines of the Airshow that's set to host 1,200 companies from 148 countries with over 85,000 visitors expected during the five days.

This comes as India prepares for a visit from Russian President Vladimir Putin for an annual bilateral meet with Prime Minister Narendra Modi early December alongside the arrival of the $5.4-billion Russian long-range surface-to-air missile defence shield 'S-400', as part of a "significant transaction" likely to trigger sanctions under USA's Countering America's Adversaries Through Sanctions Act (CAATSA) of 2017.

"We have been flying sorties with Tejas (here in Dubai) and the proof of the pudding is in eating, they say. It is there for you to see it in operation. It is one of the several products we want the world to take note of," he said, referring to the Tejas model on display at the India pavilion.

The Tejas that got final operational clearance in 2019 currently has three production models -- Tejas Mark 1, Mark 1A and trainer variant -- with the Mark 1 model on display for the first time at the Dubai Airshow alongside their Airborne Early Warning & Control System (AEW&C) and a host of missiles.

Other top DRDO products and technologies on display at the five-day event include bridging system Sarvatra, weapon locating radar Swathi, an anti-torpedo defence system (ATDS) and Pinaka, a multi-barrel rocket launching system that can fire 72 rockets in 40 seconds.

"So the entire modification in most of these techs, as well as the systems that are on board, have been done by DRDO. This only shows how far we have when it comes to a country producing military tech indigenously," added the retired captain.

"And what makes this collection so significant is the technology that we are offering. It is contemporary and yet forward-looking... And yes, all of it is 100 per cent indigenous," he added.

A spokesperson from BrahMos Aerospace, a joint venture between the Russian Federation's NPO Mashinostroyeniya and India's DRDO, said that it is time to tell "the story of their brilliance" all over again at the Dubai Airshow.

"It is notably the fastest supersonic cruise missile in the world. It's time we reminded the world that and the fact that we have been making it all for a while now," said the representative of the body that makes medium-range ramjet supersonic cruise missiles.

Based on the Russian P-800 Oniks cruise missile and other similar sea-skimming Russian cruise missile technology, they can be launched from submarines, ships, aircraft or land.

Earlier, Defence Minister Rajnath Singh, in his September address at the annual session of the industry body Society of Indian Defence, had urged Indian defence manufacturers to boost their production "in a changing global security scenario".

He was alluding to the fact that the share of procurement from domestic industry had increased to nearly 65 per cent for defence modernisation, and from private domestic industry to 15 per cent.

https://www.daijiworld.com/news/newsDisplay?newsID=894413

TIMESNOWNEWS.COM

Wed, 17 Nov 2021

Heartburn in Pakistan as India's Tejas steals the limelight at Dubai Air Show

The presence of the LCA Tejas aircraft, developed by India, at the Dubai Air Show has not gone down well with a section of the Pakistani society.

Dubai: The indigenously-built Tejas fighter jets of the Indian Air Force displayed their 'superior flying skills' at the Dubai Air Show here on Sunday. The Indian Air Force said apart from the Light Combat Aircraft (LCA), the Sarang Helicopter Display Team also showcased their might at the popular air show being held at the Al Maktoum Airport in Dubai.

LCA Tejas at Dubai for taking part in the Air Show at Al Maktoum International airport | Image courtesy:

The Tejas aircraft had reached Dubai on Friday to participate in the air show and on Sunday, they showcased their manoeuvrability as well as ease of handling apart from their superior flying ability.

However, the presence of the Tejas aircraft, developed by India, at the Dubai Air Show has not gone down well with a section of the Pakistani society. Apart from some social media users from the neighbouring country, even some verified Twitter handles belonging to Pakistani defence journalists used the occasion to mock the Indian fighter aircraft.

'Samosa', is what the Pakistani social media users including verified ones have resorted to calling the Tejas, which has become an attraction at the Dubai Air Show. They are alleging flaws in Tejas's design and likening it to a samosa (an Indian tea-time snack).

However, apart from the jealousy factor, the absence of a Pakistani fighter jet like the JF-17 at the Dubai Air Show could be one of the few reasons that have likely triggered the social media provocation from Pakistan.

Sample some of the tweets posted by Pakistani Twitter users including journalists:

It may be noted that five Dhruv Advanced Light Helicopters (ALHs) of the Sarang team, 10 BAE Hawk 132 aircraft of the Suryakiran team and three LCA Tejas aircraft are in Dubal for the air show that ends on Thursday.

The UAE government had sent an invitation to the IAF to participate in the Dubai Air Show along with some of the best aerobatics and display teams from across the world. These include the Saudi Hawks, the Russian Knights and the UAE's Al Fursan.

https://www.timesnownews.com/the-buzz/article/heartburn-in-pakistan-as-indias-tejas-steals-the-limelight-at-dubai-air-show/832428

WION

Wed, 17 Nov 2021

Tejas fighter plane will be a game-changer, says IAF pilot at Dubai Airshow

By Sumit Chaturvedi

Story highlights

Indian Air Force's Group Captain Manish Tolani spoke exclusively with WION at Dubai Airshow

Indian Air Force's (IAF) Light Combat Aircraft (LCA) Tejas showed its superior capabilities at Dubai Airshow on Tuesday. Tejas' superior flying skills were on display at an event that has attracted top manufacturers, civilian and military, from around the world.

Wion's Business Editor Sumit Chaturvedi in conversation with Indian Air Force's Group Captain Manish Tolani Photograph:(WION)

IAF's Group Captain Manish Tolani spoke exclusively with WION's Business Editor Sumit Chaturvedi about the fighter aircraft which he says would be a 'mainstay' in India's aerial combat arsenal.

"It's a pleasure to fly this aircraft," said Tolani, adding that Tejas was 'definitely' at the top when pitted against its contemporaries in the category.

"It is one of the best platforms in its category," he added.

When asked about qualities that make Tejas a state-of-the-art fighting machine, Tolani mentioned four-channel digital flyby wire. He said that the cockpit made fully of glass makes handling of the plane more effective. Tejas is capable of firing air-to-air and air-to-ground missiles.

"It will be a mainstay of Indian Air Force as it is evolving day-by-day," said Tolani drawing attention to significant improvements that have been made in the fighter plane in recent years.

"In years to come this (aircraft) will definitely be a game-changer"

Dubai Airshow has become a platform for not only the manufacturers to display their wares, but also for air forces around the world to show their might.

The Russian air force is displaying prototype of Su-75 'Checkmate', its new fifth-generation warplane. Pitched as a cost-efficient fighter jet, the Checkmate can fly at speeds of Mach 1.8 and a range of 2,800-2,900 kilometres. Dubai Airshow kicked off on November 14 and will conclude on November 18.

https://www.wionews.com/india-news/tejas-fighter-plane-will-be-a-game-changer-says-iaf-pilot-at-dubai-airshow-429850

Wed, 17 Nov 2021

India to modernise military communication with advanced Radios for net-centric warfare

India's armed forces are revamping their legacy communication system to fight a war in the net–centric battlespace. Previous attempts to overhaul the communication system through a global tender, however, have failed for unknown reasons

By Rishikesh Kumar

The Indian Army has announced the replacement of its Combat Net Radio (CNR) with state-of-the-art software defined radios (SDRs), which Indian companies will manufacture.

The present radio sets in the Indian Army are hardware-based, with separate radio sets for High Frequency, Very High, and Ultra High frequencies.

"The legacy radio sets have little or no data capability, thereby restricting the proliferation of network-centric operations. The High-Frequency SDR will address these operational and technological voids," a document issued by the Indian Army read.

The SDR will have enhanced data transmission capability, enhanced voice clarity, and data transmission accuracy in spectrally noisy environments. The state-of-the-art system supports multiple waveforms, making the communications harder to detect and jam using enemy radar.

The High-Frequency SDR will also have provisions for interoperability with legacy systems, with the ability to add, remove, or modify the systems' output.

Currently, India's public sector defence firms, the state-owned Defence Research and Development Organisation and the military's research and development labs have been working towards developing a family of modular and interoperable SDRs versions.

With the creation of theatre commands to fight the next wars in an integrated manner, the armed forces have been pushing for an interoperable communication system.

https://sputniknews.com/20211116/india-to-modernise-military-communication-with-advanced-radios-for-net-centric-warfare--1090764754.html

FINANCIAL EXPRESS
Read to Lead

Wed, 17 Nov 2021

Atmanirbhar Bharat: Indian Navy to commission two new platforms next week

Briefing the media on Tuesday in New Delhi, the Vice Chief of the Indian Navy Vice Admiral Satish Namdeo Ghormade, said "A destroyer 'Visakhapatnam' and Kalvari class submarine Vela will be commissioned."

By Huma Siddiqui

To deal with the growing Chinese presence in the Indian Ocean Region (IOR), the Indian Navy is getting ready to enhance its capability at sea when it commissions two new platforms in service next week. Despite the challenges due to the global pandemic of COVID 19, the Mumbai based Mazagon Dock Limited (MDL) has managed to deliver the two different platforms within the timeframe and these are going to add to the country's maritime prowess in the IOR.

The destroyer Visakhapatnam has almost 75 percent indigenous content on board(Credit: Indian Navy).

Briefing the media on Tuesday in New Delhi, the Vice Chief of the Indian Navy Vice Admiral Satish Namdeo Ghormade, said "A destroyer 'Visakhapatnam' and Kalvari class submarine Vela will be commissioned."

The destroyer "Vishakapatnam'' the first ship of Project 15B is going to be commissioned on November 21, 2021 when the defence minister Rajnath Singh will be the chief guest and later in the same week the Kalvari class submarine "Vela'' will get commissioned in the presence of the outgoing Chief of the Indian Navy Admiral Admiral Karambir Singh on November 25, 2021.

According to the Vice Chief of the Indian navy, the induction ceremonies will take place at the Mazagon Dock Limited (MDL) in Mumbai where both these platforms have been constructed with a large content on board being home made.

The destroyer Visakhapatnam has almost 75 percent indigenous content on board.

More about Destroyer Visakhapatnam

Y 12704 (Visakhapatnam), is the lead ship of Project 15B stealth guided missile destroyers. In 2011, the contract for four ships of Project 15B, as the Visakhapatnam class ships are known, was inked. This is a follow-on of the Kolkata class (Project 15A) destroyers which were commissioned in the last decade.

The four ships are named after major cities from all four corners of the country: Imphal, Surat, Visakhapatnam, and Mormugao.

When was the keel laid?

In October 2013 and the launch took place in April 2015. And according to the Indian Navy, design has largely maintained the hull form, propulsion machinery, many platform equipment and major weapons & sensors as the Kolkata class to benefit from series production.

It is a 163 metres long warship; maximum speed 30 knots with a full load displacement of 7400 tonnes.

Indigenous content

There is indigenous equipment in the 'Float' and 'Move' categories, and the new destroyer has major weapon systems on board which have been made in India:

(a) Medium Range Surface-to-Air Missiles (BEL, Bangalore).

(b) BrahMos Surface-to-Surface Missiles (BrahMos Aerospace, New Delhi).

(c) Indigenous Torpedo Tube Launchers (Larsen & Toubro, Mumbai).

(d) Anti-Submarine Indigenous Rocket Launchers (Larsen & Toubro, Mumbai).

(e) 76mm Super Rapid Gun Mount (BHEL, Haridwar).

"With the commissioning of the new destroyer, India is now a member of the elite group of nations which have the capability of constructing and designing advanced warships," he added.

Vela of the Kalvari class

"In the last 25 years, India has proven that it has the capability of building its own submarines. Very few countries globally have this ability in their industrial capacity," Vice Admiral Ghormade said.

Adding, "Building submarines is a very sophisticated exercise which involves small components and logically inside a submarine where the space is very limited".

This is the fourth submarine built at MDL through Transfer of Technology by the French Naval Group formerly known as DCNS.

What more did the VCNS say?

According to the Vice Chief, "To enhance the capability of the Indian Navy, to meet new challenges in the rapidly changing region of the IOR, efforts are being made to ensure that our force levels grow."

As has been reported earlier, the Indian Navy's in-house Directorate of Naval Design has been designing indigenous ships for over 57 years.

So far the Indian Navy has been putting its efforts to ensure that the designing and construction and other systems are local. It has been involved in designing small craft to Aircraft Carrier, and built more than 90 ships.

More Indigenous Ships

Responding to media queries, the top navy commander also said that currently, around 39 naval ships and submarines are in the process of being constructed in various Indian shipyards. These will help boost India's maritime prowess significantly.

Black Torpedo

Though the government has removed the Italian firm Leonardo of the Finmeccanica from the Black List, it cannot participate in the RFI for supplying torpedoes to the Indian Navy.

The Indian Navy had identified Black Shark torpedoes from the Italian company but had to issue fresh RFI after the company was blacklisted by the government.

Now, two companies are in the process of being assessed for the torpedoes which will be fitted on the Kalvari class submarines as well as India own Arihant class nuclear submarines.

Which are the two companies?

In the race out of five are just two: German Atlas Elektronik and French Naval Group. The Indian Navy needs around 100 heavyweight torpedoes.

https://www.financialexpress.com/defence/atmanirbhar-bharat-indian-navy-to-commission-two-new-platforms-next-week/2370379/lite/

ThePrint

Wed, 17 Nov 2021

India places orders for French HAMMER missiles to boost Tejas capabilities

Govt sources told ANI that the HAMMER missiles are in the process of being integrated with Tejas & will enhance aircraft's capability to take out hardened targets from stand-off distances

By Ajit K Dubey

New Delhi: In a step towards further strengthening the capabilities of the indigenous LCA Tejas fighter aircraft, the Indian Air Force has placed orders for HAMMER missiles from France which would allow it to take out any hardened bunkers or ground targets at stand-off ranges of more than 70 kilometres. The capability enhancement of the LCA Tejas fighter aircraft is being done in the middle of a military stand-off with China using the emergency procurement power granted by the Narendra Modi government to the defence forces.

File photo of the Tejas aircraft used by IAF | Wikimedia Commons

"The HAMMER missiles are in the process of being integrated with the LCA Tejas and it will significantly enhance its capability to take out hardened targets from stand-off distances," government sources told ANI.

The Indian Air Force had acquired the first lot of these HAMMERs for the Rafale fighters at the time when the aircraft had started coming to the IAF from France to further enhance the air to ground targeting capabilities of its most advanced plane.

Due to the urgency at that time in view of the Chinese aggression, the French authorities had agreed to supply them at a short notice for our Rafale combat aircraft.

HAMMER (Highly Agile Modular Munition Extended Range) is a medium-range air-to-ground weapon designed and manufactured for the French Air Force and Navy initially.

The HAMMERs would give India the capability to take out any bunkers or hardened shelters in any type of terrain including mountainous locations such as Eastern Ladakh, the sources said.

Indian armed forces have extensively utilised the emergency procurement powers granted to them in different phases by the government to equip themselves with necessary weaponry to handle any conflict or aggression by enemies on both sides.

The Indian Air Force is strongly supporting the indigenous LCA Tejas fighter aircraft programme by adding more and more capabilities of the aircraft.

The IAF has already operationalised two of its squadrons in the initial operational clearance and final operational clearance versions while a contract has been signed for the 83 Mark1As set to be delivered a couple of years from now.

The IAF has also its eyes set on the LCA Mark 2 and the AMCA being developed by the DRDO for it.

The Indian plane is already considered to be far more capable than the Pakistani and Chinese joint venture JF-17 fighter jet and with additions like the HAMMER, the Indian plane would be in a much higher category than them, an Indian fighter pilot said.—*ANI*

https://theprint.in/defence/india-places-orders-for-french-hammer-missiles-to-boost-tejas-capabilities/767046/

R. REPUBLICWORLD.COM

Wed, 17 Nov 2021

Indian Air Force orders HAMMER bunker buster for Tejas Fighter Jets from France

In the latest move that would further enhance the capabilities of India's LCA Tejas fighter aircraft, Indian Air Force has ordered HAMMER from France.

By Aanchal Nigam

In the latest move that would further enhance the capabilities of India's LCA Tejas fighter aircraft, the Indian Air Force has ordered 'HAMMER' missiles from France. The latest addition would allow IAF's Tejas to take out any hardened bunkers or ground targets at stand-off ranges of more than 70 kilometres. As per *ANI* report, the capability enhancement of LCA Tejas fighter aircraft is being done amid the military stand-off with China using the emergency procurement power granted by Prime Minister Narendra Modi's government to the country's defence forces.

(IMAGE: @PRODefNgp/Twitter)

Government sources told the news agency, "The HAMMER missiles are in the process of being integrated with the LCA Tejas and it will significantly enhance its capability to take out hardened targets from stand-off distances."

IAF has acquired the first lot of French HAMMER's for Rafale fighter jets at the time when the aircraft had started coming to the air force from the European nation to increase the air to ground strength of its most advanced plane. The media outlet stated that at the time, as there was Chinese urgency due to Chinese aggression, the French authorities had agreed to supply HAMMERs at short notice for our Rafales.

What is HAMMER?

HAMMER stands for Highly Agile Modular Munition Extended Range and it is a medium-range air-to-ground weapon that is specifically designed and manufactured for the French Air Force and Navy initially. HAMMERs would provide India with the capability to take any bunkers or hardened shelters irrespective of the terrain such as mountainous locations, revealed sources.

The media report noted that IAF has extensively utilised the emergency procurement powers granted by the government in different phases to equip themselves with the essential weaponry to handle any conflict or aggression by enemies. The Indian Air Force is strongly supporting the LCA Tejas fighter aircraft programme by adding additional qualities to the aircraft.

The IAF has already operationalised two of its squadrons in the initial operational clearance and final operational clearance versions while a contract has been signed for 83 Mark1As will be delivered a couple of years from now. Reportedly, IAF has also eyed the LCA Mark 2 and the AMCA being developed by the DRDO for it.

https://www.republicworld.com/india-news/general-news/indian-air-force-orders-hammer-bunker-buster-for-tejas-fighter-jets-from-france.html

DRDO on Twitter

Press Information Bureau
Government of India

Ministry of Defence

Tue, 16 Nov 2021 6:01PM

Curtain Raiser: Commissioning of Visakhapatnam and Vela

November would be a landmark month for the Indian Navy with Commissioning of 'Visakhapatnam', the first stealth guided missile destroyer ship of the Project 15B in the presence of Hon'ble Raksha Mantri Shri Rajnath Singh on 21 Nov 21. Commissioning of Vela, the fourth submarine of Project-75 is also scheduled on 25 Nov 21 and the Chief Guest for the event is Chief of Naval Staff. These would be followed by the launch of first ship of Survey Vessel Large project, Sandhayak in early Dec 21.

Visakhapatnam has been constructed using indigenous steel DMR 249A and is amongst the largest destroyers constructed in India with an overall length of 163m and displacement of over 7400 tons. The ship has a significant indigenous content of approx. 75% contributing towards AtmaNirbhar Bharat. The ship is a potent platform capable of undertaking multifarious task and missions spanning the full spectrum of maritime warfare. Visakhapatnam is equipped with array of weapons & sensors, which include supersonic surface-to-surface and surface-to-air missiles, medium and short-range guns, anti-submarine rockets and advanced electronic warfare and communication suit's. The ship is propelled by a powerful combined gas and gas propulsion which enables her speed of over 30 knots. The ship has the capability of embarking two integrated helicopters to further extend her reach. The ship boasts of a very high level of automation with sophisticated digital networks, Combat Management System and Integrated Platform Management System.

Six Submarines are being constructed under theProject-75. With the commissioning of Vela, the project would have crossed the half way mark. These submarines are being constructed at M/s MDL and construction is based on the French Scorpene class design. M/s Naval Group, the French collaborator for this project. The submarine has been slotted to join the Submarine fleet of the Western Naval Command. The indigenous Construction of Submarines is indicative of the maturity of the Indian construction capability as well as the realization of 'Atma-Nirbharta'. Vela is the fourth Submarine and has completed most of its trials and is combat worthy and ready to take on operational tasking.

'Sandhyak' is the first of the four Survey Vessels (Large) (SVL) Project being built by Garden Reach Shipbuilders & Engineers (GRSE), Kolkata for Indian Navy. The contract for building four SVL ships was signed between MoD and GRSE on 30 Oct 18. These large Survey ships envisaged to replace the existing Sandhayak Class survey ships are equipped with new generation hydrographic equipment including AUVs, ROVs, 11m survey boats and advanced indigenous data acquisition systems to collect and analyze for collecting oceanographic and geophysical data in the Indian Ocean Region.

The curtain raiser for the Commissioning ceremony and the launch was held on 16 Nov 21 by VAdm SN Ghormade, the Vice Chief of Naval Staff (VCNS) with Chief of Materiel, Controller of

Warship Production & Acquisition, Director General of Naval Design, Assistant Chief of Naval Staff (Submarines), Assistant Chief of Naval Staff (Policy & Plans), Director (Submarines & Heavy Engineering), MDL and Director (Shipbuilding), GRSE in attendance. Speaking on the occasion, the VCNS stated that the event highlights the capability and capacity of, not just the Indian Navy but also of MDL, Original Equipment Manufacturers (OEMs) and MSMEs in realizing the National Objectives of "Make in India" and "AtmaNirbhar Bharat".

On the occasion, VCNS also brought out that presently, 39 Naval ships and submarines are being constructed in various shipyards. This in turn has created enormous opportunities for not only the indigenous shipbuilding industry but also the associated support industries.

VCNS also brought out that the commissioning ceremony, also coincides with the 'Azadi ka Amrit Mahotsav' and 'Swarnim Vijay Varsh' celebrations, and the induction of INS Visakhapatnam and INS Vela, is thus not only another step towards strengthening our defence preparedness but also our humble tribute to the sacrifices made by our freedom fighters for the independence of the nation and our brave soldiers during the 1971 war.

https://pib.gov.in/PressReleasePage.aspx?PRID=1772352

Press Information Bureau
Government of India

Ministry of Defence

Tue, 16 Nov 2021 8:58PM

Indian Ocean Naval Symposium (Ions) – 2021 Conclave of Chiefs 15 -16 Nov 21, Paris, France

The 7th edition of Indian Ocean Naval Symposium (IONS) Conclave of Chiefs is being hosted by French Navy at Paris from 15 - 16 Nov 21. Vice Admiral R Hari Kumar, Flag Officer Commanding-in-Chief, Western Naval Command, is leading a two member Indian Naval delegation for this Conclave.

The Conclave of Chiefs is being attended by Chiefs of Navies/ Heads of Lead Maritime Agencies of IONS nations. Various bilateral interactions are also being conducted on the side-lines of the Conclave to facilitate a greater degree of maritime cooperation and understanding between the IONS nations. The 7th edition of IONS Symposium was held at Le-Reunion from 28 Jun - 01 Jul 21 in hybrid format due to COVID protocols. During the Symposium, it was agreed upon to conduct the extant Conclave of Chiefs at Paris.

IONS was conceived by the Indian Navy in 2008 as a forum which seeks to enhance maritime co-operation among Navies of the littoral states of the Indian Ocean Region by providing an open and inclusive platform for discussions on regionally relevant maritime issues that would lead to common understanding on the way ahead. The inaugural edition of IONS was held in Feb 2008 at New Delhi, with Indian Navy as the Chair for two years. The IONS Chair is presently held with France.

https://pib.gov.in/PressReleasePage.aspx?PRID=1772412

Hindustan Times

Wed, 17 Nov 2021

India beefs up sea power with new assets; armed drones in the works

India plans to induct 30 Predator drones, 10 each for the navy, air force and army, in a deal estimated to be worth $3 billion

By Rahul Singh

The Indian Navy will commission a modern locally built destroyer next week, along with a submarine constructed in the country with French collaboration, to strengthen its capabilities amid changing power dynamics in the Indian Ocean Region, navy vice chief Vice Admiral SN Ghormade said on Tuesday. This comes when a proposed procurement of armed drones from the US is set to come up for critical approval shortly.

File photo: Navy destroyer Visakhapatnam. (Indian Navy)

India plans to induct 30 Predator drones, 10 each for the navy, air force and army, in a deal estimated to be worth $3 billion.

Defence minister Rajnath Singh will commission the stealth guided missile destroyer Visakhapatnam in Mumbai on November 21 followed by the induction of a French-designed Kalvari class diesel-electric attack submarine, Vela, on November 25 at a ceremony to be presided over by navy chief Admiral Karambir Singh.

“The commissioning of Visakhapatnam and Vela are major milestones and showcase indigenous capacity to build complex combat platforms. This will enhance our capacity and fire power to address threats both in the above water and underwater domains,” Ghormade said. Both platforms have been built at Mazagon Dock Shipbuilders Ltd in Mumbai.

Visakhapatnam is the first warship of the navy’s Project-15B under which three more warships will be delivered by 2025. Vela is the fourth of the six Kalvari class submarines being constructed in the country with technology transfer from French firm Naval Group under a ₹23,562-crore programme called Project 75. The remaining two submarines will be commissioned in two years.

“Global and regional balance of power is shifting rapidly and the region of most rapid change is undoubtedly the Indian Ocean Region. Continuous efforts are on to ensure that our force levels grow progressively to enhance the capability of the Indian Navy to meet the emerging challenges,” the vice chief said.

The commissioning of Visakhapatnam, armed with a variety of locally built weapons and sensors, will reaffirm India’s presence among an elite group of nations with the capability to design and build advanced warships, he said. Vela is a potent platform and very few countries possess the capability to build submarines, Ghormade said.

While it may seem that there is a spate of new commissioning of ships, these are all overdue accretions, said maritime affairs expert Rear Admiral Sudarshan Shrikhande (retd).

“Given the threats and tasks of the Indian Navy, much more needs to be done, especially for indigenisation. One hopes that not only greater budgetary support but more Atmanirbharta (self-reliance) can be ensured in the years to come,” Shrikhande added.

India is also pursuing a project (P-75I) worth ₹40,000 crore for building six more advanced submarines in the country under the government’s strategic partnership (SP) model to bolster the Indian Navy’s underwater force levels and counter the rapid expansion of China’s submarine fleet.

The Indian strategic partners cleared to collaborate with the foreign players are Mazagon Dock Shipbuilders Limited and L&T. The foreign yards they can team up with for the project are the

French Naval Group, German conglomerate Thyssenkrupp Marine Systems, Russia's Rubin Design Bureau, Spain's Navantia and South Korea's Daewoo Shipbuilding & Marine Engineering Company.

On the proposed Predator purchase, Ghormade said "healthy discussions" were on among stakeholders and the case was progressing well. He said the proposal to buy the armed drones was likely to be taken up by the defence acquisition council (DAC) - India's apex procurement body - in a short while. DAC's approval for the drones is likely to be sought within the current financial year, HT has learnt.

The Indian Navy last year leased a pair of MQ-9B SeaGuardian drones (an unarmed variant of the Predators manufactured by General Atomics) from the US to boost its intelligence, surveillance and reconnaissance capabilities. The MQ-9Bs have helped the navy keep a close watch on the Indian Ocean at a time when it has stepped up surveillance in the region to check China's ambitions.

The commissioning of Visakhapatnam and Vela will be followed by the launch of Sandhayak in early December, the first of four large survey vessels to be built by Garden Reach Shipbuilders and Engineers (GRSE), Kolkata, Ghormade said. A ship's launch marks a significant milestone in its construction and refers to the vessel entering water for the first time.

The contract for building the four ships was signed between the defence ministry and GRSE in October 2018. "The ships will come with new generation hydrographic equipment and advanced technical capabilities for collecting oceanographic and geophysical data in the Indian Ocean Region," he added. Sandhayak is likely to be delivered to the navy in October 2022.

The Indian Navy's latest frigate, Tushil, was launched last month at the Yantar Shipyard in Kaliningrad, with Russia preparing to deliver two new warships to India in 2023.

Tushil is part of an over $2.5-billion deal with Russia for four more Krivak/Talwar class stealth frigates for the Indian Navy, two of which are being constructed at the Yantar Shipyard while the remaining two will be built at the Goa Shipyard Limited (GSL) with technology transfer from Russia, which is India's top arms supplier. Tushil is expected to be commissioned into the Indian Navy in mid-2023 followed by its sister ship in 2023-end.

GSL is expected to deliver the two frigates by 2026-27.

https://www.hindustantimes.com/india-news/india-beefs-up-sea-power-with-new-assets-armed-drones-in-the-works-101637080350776.html

The Indian EXPRESS

Wed, 17 Nov 2021

Explained: S-400 purchase & implications

Russia has begun delivery of S-400 air defence system to India. What is this system, why are they important for India, and how can the purchase from Russia impact India's relations with the US?

By Krishn Kaushik

A Russian official said in Dubai on Sunday that delivery of the S-400 air defence system, five of which were bought by India from Russia in 2018 for nearly US$5.5 billion, has begun, and is going on as per schedule. Sources in the establishment confirmed the development.

The first unit is expected to be operational by the end of the year. The acquisition has the potential to cause a diplomatic rupture between the US and India when the two countries are on a path to a tighter relationship.

S-400 is considered one of the most advanced air defence systems in the world. (Express Archive)

What is S-400?

Considered one of the most advanced and potent air defence systems in the world, S-400 Triumf has the capability to protect against almost all sorts of aerial attacks, including drones, missiles, rockets and even fighter jets. The system, intended to act as a shield over a particular area, is a long-range surface-to-air missile system. Named SA-21 Growler by NATO, and developed by Russia's Almaz Central Design Bureau, S-400 can engage intruding aircraft, unmanned aerial vehicles, cruise missiles, and ballistic missiles, a recent article in US Air Force's Journal for Indo-Pacific Command stated. It has "surfaced as an anti-access/area denial (A2/AD) asset designed to protect military, political, and economic assets from aerial attacks".

Each unit has two batteries, each of which has a command-and-control system, a surveillance radar, and engagement radar and four lunch trucks.

Russia has been developing S-400 since 1993. Testing began in 1999- 2000 and Russia deployed it in 2007. According to Washington-based Center for Strategic and International Studies think tank, its "mission set and capabilities are roughly comparable to the US Patriot system" but unlike some Patriot interceptors, "the S-400 does not currently employ hit-to-kill ballistic missile defence technology".

The system comes equipped with four types of missiles: short- range up to 40 km; medium-range up to 120 km; long-range 48N6 going as far as 250 km, and very-long-range 40N6E up to 400 km and a flight altitude of 180 km. It can simultaneously track up to 160 objects in a 600 km range, and target 72 objects in a 400 km range, according to a study.

How does it work?

S-400 detects an aerial threat approaching the air defence bubble (the area it has to protect), calculates the trajectory of the threat, and fires missiles to counter it.

It has long-range surveillance radars that sends information to the command vehicle. On identifying the target, the command vehicle orders a missile launch.

Think of the Iron Dome, recently used by Israel to protect against incoming rockets from Gaza May. Only, S-400 has the capacity to protect a much larger area from threats that are much farther.

Why has India bought them?

To protect against attacks by missiles, or fighter jets from China or Pakistan. A report in February by the think tank Observer Research Foundation mentioned that from the perspective of

the Indian Air Force, "there is no alternative system capable of serving its long-range air defence requirements, from the standpoint of either capability or cost". The S-400, it said, can "constrain the adversary's air operations even within their own airspace" a capability "unmatched by typical Western systems offered up as analogues".

The report compared S-400 with the American MIM-104 Patriot system, which it noted is "primarily oriented toward missile defence with less focus on the pure anti-aircraft role". It said S-400 can be deployed within five minutes, compared to 25 minutes for Patriot (PAC-3). It has a speed of 4.8 km/s compared to 1.38 km/s. It is cheaper too, with a per-battery cost of approximately $500 million, compared to the Patriot's $1 billion.

By when will they be delivered?

In Dubai, Director of Russia's Federal Service for Military-Technical Cooperation Dmitry Shugaev said: "Russia has started supplying S-400 air defence system to India, and the first division will be delivered by the end of 2021". India is slated to receive first of the five units it bought by end of the year.

India has placed an order for five units in October 2018. Initially, the delivery was to begin within 24 months, but has been delayed for several reasons. The government told Parliament in July 2019, around the time when India paid Russia around $800 million as the first tranche, that the final deliveries of all units are likely to be done by April 2023.

Who all have it?

Several nations have been interested in it. Belarus requested it in 2007 and got the first delivery in 2016. Algeria bought it in 2014 and got the first unit in 2015. Turkey had placed an order with Russia in December 2017, and delivery began in July 2019. Egypt, Saudi Arabi and Qatar have also shown interest.

What concerns India is that China placed an order in March 2014, and the delivery began in 2018. During the standoff in eastern Ladakh, which began in May 2020 and remains unresolved, China had reportedly deployed its S-400 along the Line of Actual Control.

Why is the US upset with it?

There are several reasons. One is that the US wants India to wean off its traditional reliance on Russian defence systems. Russia has been the largest defence partner for India over the decades, a relationship that is changing as India inches closer to the US diplomatically and strategically; imports from the US have gone up, largely at the cost of Russian imports.

A report by the Stockholm International Peace Research Institute on the trends in international arms transfer, released in March, said that while arms imports by India decreased by 33% between 2011–15 and 2016–20, Russia remained the largest supplier to India in 2011-15 and in the next half decade from 2016 -20. "However, Russia's deliveries dropped by 53 per cent between the two periods and its share of total Indian arms imports fell from 70 to 49 per cent. In 2011–15 the USA was the second largest arms supplier to India, but in 2016–20 India's arms imports from the USA were 46 per cent lower than in the previous five-year period, making the USA the fourth largest supplier to India in 2016–20." The report stated.

But the largr cause of concerns about the deal for Indo-American relationship lies in a 2017 law passed by the US named Countering America's Adversaries through Sanctions Act (CAATSA), whose objective is to counter American adversaries Iran, Russia and North Korea through punitive measures. Title II of the Act deals with sanctions in Russian interests, including its defence industry. The Act empowers the US President to impose at least five of the 12 listed sanctions mentioned in Section 235 on persons who engage in a "significant transaction" with Russian defence and intelligence sectors. The US imposed sanctions on Turkey, a longstanding NATO ally, in December 2020 over its purchase of the system.

In January, a US Congressional report warned that if India goes ahead with the purchase of the S-400 system, it may lead to sanctions. The report warned that "India's multi-billion dollar deal to purchase the Russian-made S-400 air defence system may trigger US sanctions on India" under CAATSA. A few days later, the outgoing US Ambassador to India Kenneth Juster raised issues of

"interoperability" between the forces of the two nations, which was viewed as a veiled reference to the S-400 deal.

India's External Affairs Ministry responded that "India and the US have a comprehensive global strategic partnership" and "India has a special and privileged strategic partnership with Russia". The ministry said "India has always pursued an independent foreign policy. This also applies to our defence acquisitions and supplies which are guided by our national security interests."

The issue remains unresolved, though. Two US senators had reportedly written to President Joe Biden last month, urging his administration to waive any sanctions against India over the purchase.

Now that the delivery has begun, it remains to be seen what action, if any, the US is willing to take, especially as it has made the Indo-Pacific its main area of focus to counter China's rise.

https://indianexpress.com/article/explained/s-400-purchase-air-defence-system-india-us-relation-7626388/

Wed, 17 Nov 2021

India set to seal $3 billion Predator drone deal with US by current fiscal

Story highlights

The proposal to acquire the MQ-9B long-endurance drones, armed with air-to-ground missiles, is likely to be cleared by the Defence Acquisition Council (DAC) in the next few weeks following which it will be placed before the PM-led Cabinet Committee on Security

India is set to finalise a long-conceived proposal to procure 30 multi-mission armed Predator drones from the US for the three services at an estimated cost of over $3 billion (around Rs 22,000 crore), official sources said on Tuesday.

Predator drones are a part of the weapons package offered by the US to India Photograph:(ANI)

The proposal to acquire the MQ-9B long-endurance drones, armed with air-to-ground missiles, is likely to be cleared by the Defence Acquisition Council (DAC) in the next few weeks following which it will be placed before the PM-led Cabinet Committee on Security, they said.

The sources said various key aspects of the procurement including the cost component and weapons package have already been finalised and the mega-deal is set to be sealed with the US by the current fiscal.

Vice Chief of India Navy Vice Admiral said the proposal will be placed before the DAC in a "short while".

"The whole effort of the procurement process is that we take a very balanced decision and therefore inputs of all stakeholders are taken. The process is on and we have progressed quite a bit on this process. This will move to DAC in a short while," he told reporters at an event.

The procurement proposal has been moved by the Indian Navy and all three services are likely to get 10 drones each.

The remotely piloted drones, manufactured by US defence major General Atomics, are capable of remaining airborne for around 35 hours and can be deployed on a range of missions including surveillance, reconnaissance, intelligence gathering and destroying enemy targets.

The medium-altitude long-endurance (MALE) Predator-B drone is the first hunter-killer UAV designed for long-endurance and high-altitude surveillance.

Indian armed forces have been focusing on procuring unmanned platforms including armed drones following the eastern Ladakh standoff with China and a drone strike on the Jammu airbase.

Explosives-laden drones were used to carry out the attack on the Jammu Air Force station in June in the first such instance of suspected Pakistan-based terrorists deploying unmanned aerial vehicles to strike at vital military installations in India.

In 2019, the US approved the sale of armed drones to India and even offered integrated air and missile defence systems.

The Indian Navy has been strongly pushing for the procurement to boost its overall surveillance over the Indian Ocean, a region that has witnessed increasing forays by Chinese ships and submarines in the last few years.

Last year, the Indian Navy received two Predator drones on lease from the US, primarily for surveillance over the Indian Ocean.

The two non-weaponised MQ-9B drones were leased for one year with the option of extending the period by another year.

In February last year, India sealed a $2.6 billion deal with the US for procurement of 24 MH-60 Romeo helicopters from American aerospace major Lockheed Martin for the Indian Navy. The delivery of the helicopters has already begun.

https://www.wionews.com/india-news/india-set-to-seal-3-billion-predator-drone-deal-with-us-by-current-fiscal-429862

THE TIMES OF INDIA

Wed, 17 Nov 2021

Navy wants to become 170-warship force in 10 years

By Rajat Pandit

New Delhi: The Navy aims to achieve its target of becoming a 170-warship force in another decade, even as it pushes for the conclusion of the tri-Service case for 30 armed MQ-9B Predator drones by next year as well as a third aircraft carrier in the years ahead, in the face of the collusive threat from China and Pakistan.

"We live in a time when global and regional balances of power are shifting rapidly and the region of most rapid change is undoubtedly the Indian Ocean Region (IOR). Continuous efforts are, therefore, on to ensure our force levels grow progressively to enhance capabilities to meet emerging challenges," Navy vice-chief Vice Admiral S N Ghormade on Tuesday.

The procurement case for the 30 armed MQ-9B Predator drones from the US "will move in a short while" for approval to the Rajnath Singh-led defence acquisitions council (DAC) after ongoing consultations with all the stakeholders for a "balanced decision", Vice Admiral Ghormade added.

TOI was the first to report that India had finalized the plan to acquire the drones -- 10 each for the Army, Navy and IAF -- for long-range precision strikes against hostile targets on land and sea. The deal includes some technology transfer as well as repair and maintenance facilities to be set up in India. After the Cabinet Committee on Security's final nod, the government-to-government deal with the US is likely to be inked next year.

The Navy, meanwhile, is set to get a major boost in combat power with the commissioning of the first of the four Visakhapatnam-class guided-missile destroyers (overall project cost Rs 35,000

crore) on November 21 and the fourth of the six Kalvari-class Scorpene submarines (Rs 23,000 crore) on November 25.

"Both built at Mazagon Docks at Mumbai are major milestones showcasing the Indigenous capacity to build complex combat platforms. They will enhance our capacity and firepower to address threats both in the above water and underwater domains," Vice Admiral Ghormade said.

"It's a matter of immense pride that as many as 39 warships and submarines are currently being constructed in various Indian shipyards (in addition, two frigates are being built in Russia)," he added.

But the earlier plan for the 130-warship Navy, with around 230 aircraft, helicopters and drones, to reach the figure of 170 warships and 320 aircraft by 2027 has been deferred by at least five years due to delays in acquisition plans and budgetary constraints.

This becomes all the more worrisome because China, which already has the world's largest Navy with around 350 warships and submarines, has now also begun to supply Pakistan with four multi-role stealth frigates and eight Yuan-class conventional submarines with air-independent propulsion for great underwater endurance, among other naval platforms and weapons, under deals worth over $7 billion inked earlier.

The Indian Navy had factored "all such threats from adversaries across the entire spectrum of warfare" into its mission-based, capability-dominant development plan. A third aircraft carrier "fits into this balanced force structure", said the Navy vice chief.

India currently has only one aircraft carrier, the 44,500-tonne INS Vikramaditya, inducted from Russia for $2.33 billion in November 2013. Another $2 billion was spent on procuring 45 supersonic MiG-29K fighters to operate from its deck.

The country's first indigenous aircraft carrier will be commissioned as INS Vikrant in August next year. But the 40,000-tonne carrier will become fully operational only after the requisite fighter and helicopter trials are completed from its deck by around mid-2023, as was earlier reported by TOI.

China already operates two carriers, Liaoning and Shandong, and is fast building two more with CATOBAR (catapult assisted take-off but arrested recovery) configuration to launch fighters as well as heavier aircraft for surveillance, early-warning and electronic warfare from its deck, like the US ones.

https://timesofindia.indiatimes.com/india/navy-wants-to-become-170-warship-force-in-10-years/articleshow/87743859.cms

Wed, 17 Nov 2021

IBM announces development of 127-qubit quantum processor

By Bob Yirka

IBM has announced the development of a 127-qubit quantum processor, both on its IBM Quantum page and during IBM Quantum Summit 2021. As part of its announcement, IBM also announced that computers running the new processor will be made available to IBM Quantum Network members and that the company has plans for launching two other, presumably more powerful processors it has named Osprey and Condor over the next two years. The current processor has been named Eagle.

Credit: IBM

Over the past decade, several big-name technology companies have been working hard to develop a truly functional and useful quantum computer. Such efforts have fallen into two main camps—those attempting to create a quantum computer using entangled photons and those using superconducting materials. The processors announced by IBM are all based on superconducting materials.

The announcement by IBM marks a record for superconducting quantum computers—the prior record for number of qubits was 64. The new mark of 127 suggests a massive increase in computing power, though IBM has yet to make public any data regarding the performance of its new machines. But that has not stopped the company from claiming that it has created the world's largest superconductor-based quantum computer. Representatives for the company have also claimed that the Eagle is the first processor that cannot be simulated on a traditional supercomputer. They herald its development as a major step toward the development and use of quantum computers that will be able to not only outperform classical computers but tackle some problems that would take traditional computers thousands of years to process.

The Eagle processor was built using a new technique—one that has qubit control components placed in a multiple physical layer architecture, with the qubits held in a separate layer. IBM says such an arrangement helps with stability. The company also says the same design will be used for both Osprey and Condor—the former will have 433 qubits and the latter 1121. The company is also suggesting that with the delivery of Condor, in 2023, the company will be delivering a machine with quantum advantage.

https://phys.org/news/2021-11-ibm-qubit-quantum-processor.html

PHYS.ORG

Wed, 17 Nov 2021

A nanoantenna for long-distance, ultra-secure communication

Information storage and transfer in the manner of simple ones and zeros—as in today's classical computer technologies—is insufficient for quantum technologies under development. Now, researchers from Japan have fabricated a nanoantenna that will help bring quantum information networks closer to practical use.

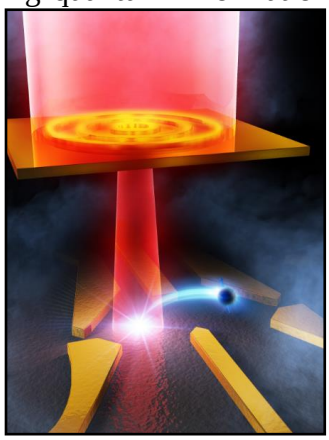


Fig.1 Conceptual illustration of efficient illumination of photons to semiconductor lateral quantum dots, by using a surface plasmon antenna and excitation of electrons in the quantum dots. Credit: Oiwa lab

In a study recently published in Applied Physics Express, researchers from Osaka University and collaborating partners have substantially enhanced photon-to-electron conversion through a metal nanostructure, which is an important step forward in the development of advanced technologies for sharing and processing data.

Classical computer information is based on simple on/off readouts. It's straightforward to use a technology known as a repeater to amplify and retransmit this information over long distances. Quantum information is based on comparatively more complex and secure readouts, such as photon polarization and electron spin. Semiconductor nanoboxes known as quantum dots are materials that researchers have proposed for storing and transferring quantum information. However, quantum repeater technologies have some limitations—for example, current ways to convert photon-based information to electron-based information are highly inefficient. Overcoming this information conversion and transfer challenge is what the researchers at Osaka University aimed to address.

"The efficiency of converting single photons into single electrons in gallium arsenide quantum dots—common materials in quantum communication research—is currently too low," explains lead author Rio Fukai. "Accordingly, we designed a nanoantenna—consisting of ultra-small concentric rings of gold—to focus light onto a single quantum dot, resulting in a voltage readout from our device."

The researchers enhanced photon absorption by a factor of up to 9, compared with not using the nanoantenna. After illuminating a single quantum dot, most of the photogenerated electrons weren't trapped there, and instead accumulated in impurities or other locations in the device. Nevertheless, these excess electrons gave a minimal voltage readout that was readily distinguished from that generated by the quantum dot electrons, and thus didn't disrupt the device's intended readout.

"Theoretical simulations indicate that we can improve the photon absorption by up to a factor of 25," says senior author Akira Oiwa. "Improving the alignment of the light source and more precisely fabricating the nanoantenna are ongoing research directions in our group."

These results have important applications. Researchers now have a means of using well-established nano-photonics to advance the prospects of upcoming quantum communication and information networks. By using abstract physics properties such as entanglement and superposition, quantum technology could provide unprecedented information security and data processing in the coming decades.

More information: Rio Fukai et al, Detection of photogenerated single electrons in a lateral quantum dot with a surface plasmon antenna, *Applied Physics Express* (2021). DOI: 10.35848/1882-0786/ac336d

https://phys.org/news/2021-11-nanoantenna-long-distance-ultra-secure.html

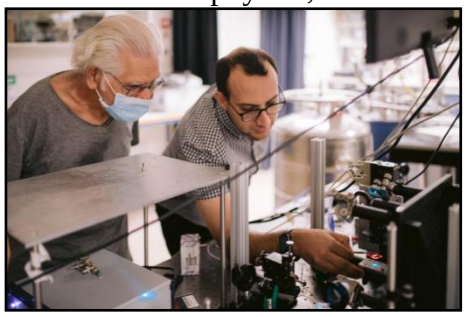
PHYS.ORG

Wed, 17 Nov 2021

Closer to a simple and efficient method of quantum encryption

Banks and government departments are already investing heavily in quantum encryption that relies on laser beams. However, laser beams often release several photons at once or none at all. A team at Hebrew University developed a system that uses fluorescent crystals. A laser beam shone at these quantum dots causes them to fluoresce and emit a stream of single photons.

Quantum computers will revolutionize our computing lives. For some critical tasks they will be mind-bogglingly faster and use much less electricity than today's computers. However, and here's the bad news, these computers will be able to crack most of the encryption codes currently used to protect our data, leaving our bank and security information vulnerable to attacks. Currently, most computer security relies on mathematical manipulations that, at present, ensure a very high level of security—it would take a regular computer billions of years to break one of those codes. However, in our quantum future, new methods of encryption that rely on the laws of physics, rather than mathematical equations, will need to be developed.



At work in the Quantum Lab. Credit: Yitz Woolf

One fruitful approach is to use the quantum properties of single photons (particles of light) to securely encrypt a message so that any attempt to hack it is immediately detectable by both the sender and recipient. However, getting a suitable source of single photons has been an immense challenge. Now, a team of researchers, led by Professor Ronen Rapaport and Dr. Hamza Abudayyeh of the Racah Institute of Physics at the Hebrew University of Jerusalem (HU), together with Professor Monika Fleischer, Annika Mildner and others at the University of Tübingen in Germany, has achieved a significant breakthrough. Their findings bring us closer to a simple and efficient method of quantum encryption, and were published in the recent edition of *ACS Nano*.

Banks and government departments are already investing heavily in quantum encryption that relies on laser beams. However, laser beams often release several photons at once or none at all. What is needed for optimum security is a source that can emit a fast but steady stream of single photons—in one direction and at room temperature.

The team at HU developed a system that uses fluorescent crystals in the form of specks so tiny that special microscopes are needed to see them. Known as quantum dots, each dot measures much less than a thousandth of the width of a human hair. A laser beam shone at the quantum dot causes it to fluoresce and emit a stream of single photons.

These quantum dots are individually mounted on golden pinheads—except, of course, it is a nano-pinhead, or nanocone, almost a hundred thousandth the size of a regular pinhead. Nanocone are able to increase the quantum dot emission of photons 20-fold. This stream of photons is then shot off in a single direction by a "Bragg grating' acting as a type of antenna.

The HU-Tübingen device is not only useful for quantum encryption, but in other situations that rely on quantum bits to encode information, such as quantum computation. "At present, we have a good prototype that has the potential for commercialization in the near future," shared Ronen Rapaport.

The advantage of quantum cryptography lies in its physical determinism. "Laws of science cannot be broken—a single photon cannot be split, no matter how hard one tries. Mathematical complexities might be very difficult to solve, however they are vulnerable to attack and breaches unlike quantum-based security systems," explained Hamza Abudayyeh. The team is currently

improving their device so that it can provide an even more reliable and efficient stream of single photons that could be used in a wide range of quantum technologies.

More information: Hamza Abudayyeh et al, Overcoming the Rate-Directionality Trade-off: A Room-Temperature Ultrabright Quantum Light Source, *ACS Nano* (2021). DOI: 10.1021/acsnano.1c08591

Journal information: ACS Nano

https://phys.org/news/2021-11-closer-simple-efficient-method-quantum.html

COVID-19 Research News

ScienceDaily

Wed, 17 Nov 2021

Why drug used to treat critically ill COVID-19 patients may only benefit males

Research into the way our immune systems respond to COVID-19 reveals the sex of a patient may affect how well drugs work

Summary:
A new study shows how dexamethasone, the main treatment for severe COVID-19 lung infections, alters how immune cells work, which may help male patients, but has little to no benefit for females.

A new study from the University of Calgary shows how dexamethasone, the main treatment for severe COVID-19 lung infections, alters how immune cells work, which may help male patients, but has little to no benefit for females.

These remarkable findings are the result of a multidisciplinary study published in *Nature Medicine*, led by Dr. Jeff Biernaskie, PhD, professor, Comparative Biology and Experimental Medicine in the Faculty of Veterinary Medicine (UCVM) and Dr. Bryan Yipp, MD, associate professor, Department of Critical Care Medicine, Cumming School of Medicine.

"We found that the males derived benefit from the steroids, and the females, at both the cellular level and at the population level, received limited benefit," says Yipp, Tier II Canada Research Chair in Pulmonary Immunology, Inflammation and Host Defense. "Currently, it's possible the mainstay therapy for severe COVID-19 that we're giving everybody is only benefiting half the population. This is a big problem."

How do our bodies battle COVID-19 infection?

At the onset of the pandemic, hospitals' treatments of the severely ill were not yet informed by research into how effective the drugs were under COVID-19 conditions. Steroids were the first identified drugs with proven benefit, but they were only moderately successful at reducing deaths, and exactly what they did was not understood.

In addition, when the study began, no one knew exactly how immune cells would react to COVID-19 infection at a cellular level. Why did some people get really sick while others did not? Why did certain drugs help some but not others?

"To be able to develop new treatments, we wanted to study how different people respond to SARS-CoV2 infection and how different immune responses dictate the severity of their disease," says Biernaskie, the Calgary Firefighters Burn Treatment Society Chair in Skin Regeneration and Wound Healing.

Yipp and Biernaskie sought to better understand how steroids helped and, at the same time, evaluate why a clinical trial of steroids in COVID-19 showed they only helped some males, but not females.

When Yipp accessed the provincial eCRITICAL database of all ICU admissions during the pandemic, he discovered that the introduction of dexamethasone therapy in Alberta reduced the number of males dying but had no affect on the female population. "That was an unsettling observation."

Analyzing thousands of immune cells from ICU patients

Blood was collected from both COVID-19 and non-COVID-19 patients who were admitted to Calgary ICUs in severe respiratory distress. Researchers in the Biernaskie lab used cutting-edge single cell RNA sequencing and bioinformatics techniques to simultaneously analyze the functional states of thousands of immune cells from each patient. This allowed them to document cellular behaviours at different stages of the disease (COVID-19 or non-COVID infections) and to measure treatment effects.

"We sampled as many patients as we could, not just at one time point but at a follow-up time point so we could get an idea of the evolution of the disease and the evolution of the immune response," says Biernaskie.

In most viral infections, proteins called interferons work to clear the virus quickly. But with COVID-19, rather than working fast, "the interferon response trickles along, which actually fuels the fire of inflammation, and then you get worse organ damage," says Yipp.

"What we found was that specifically in males, we see an exaggerated neutrophil interferon response, that is significantly restrained when a patient is given dexamethasone," says Biernaskie. "But with females, relative to males, their neutrophil interferon response was much more tempered, so dexamethasone had little effect."

Find therapies that benefit more people

After identifying the reasons why there's a sex bias in the way dexamethasone works, Yipp believes that the way forward is for researchers to figure out how to make therapies that benefit more people, or individualized therapies, also known as precision or personalized medicine, so that a blanket approach isn't being used.

Biernaskie and Yipp credit significant contributions from the trainees and junior scientists involved in the research, including Dr. Nicole Rosin and Sarthak Sinha who spent countless hours managing the project and analyzing the results.

The project was supported by a grant Biernaskie and Yipp received from the Thistledown Foundation and by the Calgary Firefighters Burn Treatment Society, "who enthusiastically supported my request to divert some of the CFBTS Chair funds to support this initiative early on in the pandemic," Biernaski says.

Story Source:

Materials provided by **University of Calgary**. Original written by Collene Ferguson, Faculty of Veterinary Medicine. *Note: Content may be edited for style and length.*

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