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DRDO News

COVID-19: DRDO's Contribution

sify.com

Wed, 19 Aug 2020

Skanray manufactures 30,000 advanced ventilators in record time

New Delhi: Having fulfilled the immediate target of delivering 30,000 ventilators to support India's fight against Covid-19, Skanray Technologies, the preferred partner selected by the Government of India, is all set to position India as an export hub for state-of-the-art ventilators.

Skanray, in its resolve to strengthen the visionary 'Atmanirbhar Bharat' and 'Make in India' platforms and provide critical support to the Government of India in strengthening the health infrastructure to fight the pandemic added 30,000 advanced ICU ventilators to the national stockpile.

The company is already in advanced talks with neighbouring countries including Bangladesh, Nepal, Sri Lanka to meet their requirements for advanced ventilators to aid their fight against the pandemic.

Skanray is also renegotiating with countries in Europe, Ukraine, Africa, Brazil, Mexico and the US where orders were held up due to the export ban.

Skanray manufactured 1,000 plus units of their globally certified advanced version of ventilators SkanResprio Plus for exports but due to ban were then supplied to state governments like Karnataka, Orissa and others, and now started producing new batches especially for exports to cover at least 50 per cent of the global demand.

Skanray is the only company with globally certified products, own design and manufacturing capability for ventilators and other medical equipments in India.

India, since Independence, had built an ICU ventilator base of about 15,000 nationwide and in the backdrop of the pandemic, an ambitious target of 75,000 ventilators was set up to be delivered in record time.

With 50 products, 100,000 installations, 700 plus professionals, 7 global facilities, and certifications by the European Safety Standards and 50 patents, Skanray emerged as a preferred partner for fulfilling the Government's mission.

Vishwaprasad Alva - Founder and Managing Director - Skanray said, "It has been a honour and a matter of great pride to partner with BEL, DRDO and the Government of India for this critical mission. We are thankful to the Honourable Prime Minister for his trust in our ability to be able to meet the country's requirement. On the back of the Government's push for 'Atmanirbhar Bharat' and 'Make in India', we were flooded with partnership offers from leading Indian and MNCs but in keeping the National Interest, we selected and formalized License agreement with BEL to manufacture CV 200, an ICU Ventilator."

He said that DRDO scientists also pitched into the Skanray/BEL team for code review, new mode design review, validation, and development of critical import substitutes in record time.

"We accepted the challenge and in collaboration with BEL, we were able to put together necessary production lines, test equipment, jigs and fixtures to brace up for the target of

manufacturing 1,000 ventilators per day. This is a unique PPP resulting into targeted success in record time and a potential to make India MedTech hub," he said.

"The journey is far from over. There are several countries around the world that continue to grapple with their requirements for medical equipment including ventilators in their fight against Covid-19. Today with the added capacities, India is well poised to become an export hub, starting with our neighbouring countries and meet the demand to fight the pandemic," he added.

https://www.sify.com/finance/skanray-manufactures-30000-advanced-ventilators-in-record-time-news-topnews-uita4Tcacafjg.html

DRDO Technology News

Wed, 19 Aug 2020

NAG Missile Carrier NAMICA boosts Indian Army's firepower

As India faces challenges from 'LoC to LAC', Indian Army is preparing to give a befitting reply to any misadventures carried out by neighbouring countries. Defence Minister Rajnath Singh launched NAG Missile Carrier (NAMICA) on August 14. It may be fitting that India sought to boost its firepower on the Independence Day of Pakistan

By Manish Prasad

New Delhi: As India faces challenges from 'LoC to LAC', Indian Army is preparing to give a befitting reply to any misadventures carried out by neighbouring countries. Defence Minister Rajnath Singh launched NAG Missile Carrier (NAMICA) on August 14. It may be fitting that India sought to boost its firepower on the Independence Day of Pakistan.

NAG Missile Carrier NAMICA boosts Indian Army muscle.

NAMICA has been made by Ordnance Factory in collaboration with Defence Research and Development Organisation (DRDO). The entire project costs about Rs 3 thousand crore.

NAMICA can fire missiles at a target located 7.5 kilometres away. The missiles carrier can be manned by 4 jawans of the Indian Army. NAMICA has hunter-killer capability.

Another feature of NAMICA is that its equally effective at night as it is during the day.

NAMICA can be used at night as well

The missile carrier has amphibious capability. This boosts its manoeuvrability greatly.

While NAMICA will be manned by 4 armymen, the commander of the group will be provided with independent panoramic sight which will help him for surveillance. The vehicle is equipped with Land Navigation System (LNS) as well.

Apart from this, NAMICA has silent watch capability which can come handy in both, night and day.

https://www.indiatvnews.com/news/india/nag-missile-carrier-namica-india-army-firepower-643061

ZEENEWS

Wed, 19 Aug 2020

IAF deploys LCA Tejas on western front, amid border tensions with China: Reports

The first LCA Tejas squadron, 45 Squadron (Flying Daggers) based out of Sulur under the Southern Air Command, was deployed in an operational role on the western front, close to the border with Pakistan, according to reports

By Krishna Mohan Mishra

Highlights

- ***Amid border tensions with China, the Indian Air Force (IAF) on Tuesday reportedly deployed the indigenous fighter Light Combat Aircraft (LCA) Tejas on the western front.***
- ***The first LCA Tejas squadron, 45 Squadron (Flying Daggers) based out of Sulur under the Southern Air Command, was deployed in an operational role.***
- ***The indigenous Tejas aircraft had been praised by Prime Minister Narendra Modi during his Independence Day speech.***

Amid border tensions with China, the Indian Air Force (IAF) on Tuesday reportedly deployed the indigenous fighter Light Combat Aircraft (LCA) Tejas on the western front.

The first LCA Tejas squadron, 45 Squadron (Flying Daggers) based out of Sulur under the Southern Air Command, was deployed in an operational role on the western front, close to the border with Pakistan, according to reports.

The indigenous Tejas aircraft had been praised by Prime Minister Narendra Modi during his Independence Day speech where he had stated that the deal to buy the LCA Mark1A version was expected to be completed soon.

While the first squadron of the planes is of the Initial Operational Clearance version, the second 18 Squadron `Flying Bullets` is of the Final Operational Clearance version and was operationalized by the IAF chief Air Chief Marshal RKS Bhadauria at the Sulur airbase on May 27.

The Indian Air Force and the Defence Ministry are expected to finalise the deal for the 83 Mark1A aircraft by the end of this year. In view of the Chinese aggression on the borders, the IAF had deployed its assets all along the borders with both China and Pakistan.

The forward airbases of the force have been equipped to take care of situations along the western and northern fronts and have seen extensive flying operations in the recent past, including both daytime and night operations.

The Tejas FOC made its first successful test flight in Bengaluru just a couple of months ago on March 17, 2020. Several advance technologies have been incorporated into the Tejas FOC including Air-to-Air refuelling and Beyond Visual Range (BVR) missile system to make the fighter a potent platform.

The IAF already operates 20 Tejas jets in Initial Operation Clearance (IOC) in the 45 Squadron while the 18 Squadron will also have 20 jets in FOC version with 16 fighters and 4 trainers.

IAF's No, 18 Squadron, formed on, April 15, 1965, with the motto "Teevra aur Nirbhaya", has an illustrious history. Flying Officer Nirmal Jit Singh Sekhon of the Squadron was decorated with the highest gallantry award Param Vir Chakra posthumously for his daring dogfight with Pakistani Sabre jets over the skies of Kashmir valley. The gallant action by the Flying Officer Nirmal Jit Singh Sekhon and the squadron led to unit earning the sobriquet Defenders of Kashmir Valley.

https://zeenews.india.com/india/iaf-operationally-deploys-lca-tejas-on-western-front-amid-border-tensions-with-china-reports-2303575.html

WION

Wed, 19 Aug 2020

IAF deploys indigenous combat fighter Tejas along Pakistan border

By Akash Rai

Story highlights

The LCA Tejas fighter which has been deployed at the western front is the Mark 1 version with air-to-air refuelling.

New Delhi: India's first homegrown fighter aircraft has been deployed at the western front along the Pakistan border amid rising tensions with China along the Line of Actual Control (LAC).

"The LCA Tejas was deployed by the Indian Air Force on the western front close to the Pakistan border to take care of any possible action by the adversary there," government sources told ANI.

Tejas aircraft Photograph:(AFP)

Tejas is a single-engined, lightweight, highly agile, multi-role supersonic fighter. It has quadruplex digital fly-by-wire Flight Control System (FCS) with associated advanced flight control laws. The first LCA squadron – No. 45 Squadron 'Flying Daggers' – equipped with IOC-standard aircraft became operational in July 2016.

The fighter which has been deployed at the western front (LoC) is the Mark 1 version with air-to-air refuelling (AAR) and beyond visual range (BVR) capabilities as well as updated avionics and flight control software.

The IAF and the Defence Ministry are expected to finalise the deal for the 83 Mark1A aircraft by the end of this year.

Mark1A is the advance version of Mark 1 with better avionics and flight control software, it fulfils all requirements of India Air Force. Mark 1A light fighter will have the same fuselage and General Electric (GE) F-404 engine as the Mark 1.

If the deal is signed by the end of this year then the delivery of the first Tejas Mark1A aircraft is expected to start in 2023.

Deployment of LCH

Recently India deployed it's two prototype twin-engined multirole light combat helicopter (LCH) apart from heavy lifter Chinook and heavy-duty Apache attack helicopter. IAF vice chief Air Marshal Harjit Singh Arora also took sortie in the LCH and examined its capabilities.

One of the twin-engined multirole rotorcraft conducted a simulated attack on a high-altitude target after which it landed at "one of the most treacherous helipads in the region", HAL had said.

The need for LCH rose at the time of Kargil war when a number of IAF attack helicopters targetted enemies sitting at the peak of the mountains.

LCH is capable of operating at the world's highest battle airfields (14kft to 18kft depending on the payload) and is comparable to any other fighter helicopter of its class. LCH with a narrow fuselage has pilot and co-pilot/gunners in tandem configuration incorporating a number of stealth features, armour protection and night attack capabilities.

"It is the lightest attack helicopter in the world designed and developed by HAL to meet the specific and unique requirements of the Indian armed forces reflecting the crucial role of HAL in Atma Nirbhar Bharat", Mr R Madhavan, CMD, HAL, said.

The IAF and the Indian Army together need around 160 LCHs. The Defence Acquisition Council (DAC) had approved the proposal for an initial batch of 15 LCHs. The IAF issued Request

for Proposal (RFP) for 15 Limited Series Production (LSP) helicopter (10 for IAF and 5 for Army) and HAL has been submitted. Price negotiation has also been completed with the order expected soon.

Deployment of Rudra

Rudra is also a homegrown product which is a weaponised version of HAL manufactured Advanced Light Helicopter (Dhruv). The deployment of Rudra was noticed when the helicopter was seen participating in the exercise which was demonstrated to the defence minister Rajnath Singh when he visited at the eastern front to meet soldiers and review military preparedness last month.

The Indian Army currently operates over 50 HAL-built Rudras, with more in the pipeline for a total fleet of 78 airframes and Rudras which are capable of firing anti-tank guided Nag missile (HELINA) which has been named now as Dhruvastra.

Currently, Rudras are equipped with 70mm rockets and 20mm M621 cannon on a Nexter THL-20 chin-mounted gun turret.

https://www.wionews.com/india-news/iaf-deploys-indigenous-combat-fighter-tejas-along-pakistan-border-321523

TIMES NOW हिंदी

Wed, 19 Aug 2020

पाकिस्तान को एक भी गलती पड़ेगी भारी, एयरफोर्स ने पश्चिमी मोर्चे पर LCA तेजस किया तैनात

LCA Tejas: भारतीय वायुसेना ने बड़ा कदम उठाते हुए स्वदेशी हल्के लड़ाकू विमान (LCA) तेजस को पाकिस्तान सीमा के साथ पश्चिमी सीमा पर तैनात किया है।

मुख्य बातें

- ***वायुसेना ने पाकिस्तान सीमा पर फाइटर एलसीए तेजस को तैनात किया***
- ***दुश्मन की किसी भी नापाक हरकत का माकूल जवाब दिया जाएगा***
- ***स्वदेशी तेजस विमान की प्रधानमंत्री नरेंद्र मोदी ने भी प्रशंसा की थी***

नई दिल्ली: पूर्वी लद्दाख में चीन के साथ जारी तनातनी के बीच भारतीय वायु सेना (IAF) ने बड़ा कदम उठाते हुए पाकिस्तान सीमा के साथ पश्चिमी मोर्चे पर स्वदेशी हल्के लड़ाकू विमान (LCA) तेजस को तैनात कर दिया है। सरकारी सूत्रों ने न्यूज एजेंसी ANI को बताया, 'LCA तेजस को भारतीय वायु सेना द्वारा वेस्टर्न फ्रंट पर पाकिस्तान सीमा के करीब तैनात किया गया है, ताकि वहां विरोधी द्वारा किसी भी संभावित कार्रवाई का ध्यान रखा जा सके।'

सूत्रों के अनुसार, दक्षिणी वायु कमान के तहत सुलूर स्थित पहला एलसीए तेजस स्क्वाड्रन, 45 स्क्वाड्रन (फ्लाइंग डैगर्स) को ऑपरेशनल भूमिका में तैनात किया गया है।

स्वदेशी तेजस विमान की प्रधानमंत्री नरेंद्र मोदी द्वारा स्वतंत्रता दिवस के भाषण के दौरान प्रशंसा की गई थी, जहां उन्होंने कहा था कि LCA Mark1A वर्जन को खरीदने की डील जल्द ही पूरा होने की उम्मीद है। पीएम ने कहा था, 'अपना तेजस भी...अपना तेज, अपनी तेजी और अपनी ताकत दिखाने के लिए आधुनिक जरूरतों के हिसाब से तैयार हो रहा है।'

जहां विमानों का पहला स्क्वाड्रन इनीशियल ऑपरेशनल क्लीयरेंस वर्जन का है, वहीं दूसरा 18 स्क्वाड्रन 'फ्लाइंग बुलेट' फाइनल ऑपरेशनल क्लीयरेंस वर्जन का है और वायुसेना प्रमुख एयर चीफ मार्शल आरकेएस भदौरिया द्वारा 27 मई को सुलूर एयरबेस में संचालन में लाया गया था। भारतीय वायु सेना और रक्षा मंत्रालय को इस वर्ष के अंत तक

83 Mark1A विमानों के लिए सौदे को अंतिम रूप देने की उम्मीद है। सीमाओं पर चीनी आक्रमण के मद्देनजर, भारतीय वायुसेना ने अपने विमानों को चीन और पाकिस्तान दोनों सीमाओं पर तैनात किया है।

लद्दाख में भी पूरी तैयारी

चीन के खिलाफ भारतीय वायु सेना को अब हिंदुस्तान एयरोनाटिक्स लिमिटेड (HAL) का भी साथ मिला है। एचएएल द्वारा बनाए गए दो हेलिकॉप्टरों की तैनाती लेह में हुई है। चएएल द्वारा विकसित ऐसे दो हल्के लड़ाकू हेलिकॉप्टरों की तैनाती लेह सेक्टर ऊंचाई वाले स्थानों पर की गई है। इन हल्के लड़ाकू विमानों की तैनाती के बाद से लेह में आईएएफ की सामरिक क्षमता में और इजाफा हो गया है। इसके अलावा भारत ने पूर्वी लद्दाख में एयर मिसाइल डिफेंस सिस्टम की भी तैनाती की है। यह मिसाइल सिस्टम सतह से हवा में मार करने में सक्षम है। यहां वायुसेना के लड़ाकू विमानों को भी किसी आपात परिस्थिति का सामना करने के लिए पूरी तरह से तैयार रखा गया है।

https://www.timesnowhindi.com/india/article/indian-air-force-deployed-lca-tejas-on-the-western-front-along-the-pakistan-border/308443

Defence News

Defence Strategic: National/International

THE TIMES OF INDIA

Wed, 19 Aug 2020

'Only India in the region does not accept the political, economic and military hegemony of China'

Among the Indian Army's operational commands, the Northern Command is perhaps strategically the most important one. It oversees the LAC between India and China, among other things. HS Panag, a former commander of both Northern and Central commands and author of the recently released book The Indian Army: Reminiscences, Reforms & Romance, speaks to Ajay Sura:

How would you assess China's approach to India?

The whole issue is about comprehensive national power, military capabilities and economic factors. China's defence budget is three times and GDP six times more than India. China has controlled its population and uplifted its standard of living. Because of these phenomenal and amazing achievements, China is far superior to India and has been asserting its hegemony over India. China genuinely believes these areas as their territory, like we believe Aksai Chin belongs to us. However, India is the only country in the region that does not accept the political, economic and military hegemony of China. India directly threatens two Chinese vulnerabilities, Tibet and the strategic sea lanes of communications through the Indian Ocean.

How would you compare Prime Minister Narendra Modi's approach with that of his predecessors' strategic restraint?

I don't think we followed strategic restraint with China even in the past. We have been very aggressive at the LAC in the past. We went up to Tawang in 1950; we planted our flag in Aksai Chin. Former PM Jawaharlal Nehru became aggressive without having the military capability.

However, for a long time peace and tranquillity prevailed and nothing had happened at LAC because China was not far ahead of India in terms of the economy, and India was quite capable.

Development of infrastructure by India at the LAC is the main reason behind such confrontations. Doklam was the first serious confrontation. India's strategic partnership with the US and its expanding diplomatic/ military relationships with Japan, Australia and Vietnam are also perceived as a direct threat.

Do you think the Indian army should now rethink its strategy on deployment of forces along the China border?

In Ladakh, we were not defending the LAC because there is only the ITBP, not the army. If we cannot demarcate the LAC, we will have to defend the areas and the need of the hour is to have one more division of the army to defend that area.

What's your take on the loss of 20 soldiers in unarmed combat?

There is no such 1993 agreement which says that nobody can use arms, but there is mention of maintaining "maximum restraint". ITBP had started going without weapons at the LAC. There is an overriding norm that if the lives of soldiers are threatened or territory is threatened, the commander can use the weapons at his disposal. Indian army is defending the borders not policing the borders and there was no reason to follow this norm. As far as the current incident is concerned, we underplayed and misread the situation presuming the Chinese will go away after some time. The exact reasons behind the current casualties will come after an inquiry by the army in due course.

What's the state of military reforms?

I don't think any major reform has taken place in the army recently and fundamentally we are still the same and not suited for modern warfare. Last military reforms were planned in the late 70s, which were largely executed in the 80s. The army today is still based on those reforms.

War in the future would be based on high technology and be of short duration. A strategic review is needed and should be done by the government, not army, as the national security strategy and defence planning is government's responsibility. This requires money, which comes from the government but our defence budget was perhaps the lowest in the last 58 years.

How serious is the issue of politicisation of armed forces?

Armed forces are always popular among the public. They are admired and backed by phenomenal public support. I think all political parties tend to exploit this image of the army for their own purposes. However, during the Modi government and to some extent during the Atal Bihari Vajpayee regime the concept of nationalism, which is opposed to patriotism, was used more for political purposes though the army is an organ of the state. Post-2014 the army was glorified and was involved in all kinds of activities and, to some extent, the sacrifice of soldiers was exploited for electoral purposes. As the selection for higher ranks is done by the government, such things may lead to a tendency among military hierarchy to bend with the government.

Is patriotism or nationalism the primary motivation for soldiers in battle?

Soldiers adhere to the Constitution, irrespective of which party is in power. Patriotism is an integral part of the military training curriculum, omnipresent in our insignia, salutations and ceremonial functions. This practice must continue.

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

https://timesofindia.indiatimes.com/blogs/the-interviews-blog/only-india-in-the-region-does-not-accept-the-political-economic-and-military-hegemony-of-china/

INDIA TODAY

Wed, 19 Aug 2020

China keeps hawk eye on critical Indian military bases

India Today's OSINT team analysed satellite images that indicate how China is keeping a close eye on these important locations from Ruili county in Yunnan province bordering Myanmar

By Col Vinayak Bhat

New Delhi: China is closely monitoring the Tezpur airbase in Assam and the Dr Abdul Kalam Island, India's missile testing facility off the Odisha coast. Both locations are extremely critical to India's strategic and military capabilities.

India Today's OSINT team analysed satellite images that indicate how China is keeping a close eye on these important locations from Ruili county in Yunnan province bordering Myanmar. The radar and monitoring facility indicate that China is not likely to hesitate in using space over Myanmar for its ballistic missiles directed towards India.

The 609 intelligence radar system on display at the Zhuhai air show. (Photo: Dickson Lee)

The Dr Abdul Kalam Island, previously known as Wheeler Island, is the main missile test ground of India.

Named after the famous scientist and former President of India, Dr APJ Abdul Kalam, the island holds India's premier Integrated Test Range missile facility where India tested nuclear capable long-range ballistic missile Agni IV and short range nuclear capable ballistic Agni I in 2018.

The Tezpur airport, also known as Salonibari Airport, is a dual use airbase for both civilian and military use. It is home to the No. 2 and No. 106 Squadrons of IAF's Sukhoi fighter aircraft, Su-30MKI.

The IAF recently had said Tezpur was ready for any challenge from across the border which is about 170km away.

New Radar Station

A new radar station was established after March 2018, following the Doklam standoff between the Indian and Chinese armies on the India-China-Bhutan trijunction lasting 73 days in 2017.

The radar has been deployed only 3km from Myanmar border, indicating China wants to gain maximum advantage of its range.

The satellite images vividly display a 13m wide, possibly a phased array radar mostly directed exactly towards the Dr Abdul Kalam Island which is 1,150km from the radar site.

The latest satellite imagery shows that the radar face is directed towards Indian Air Force's premier airbase at Tezpur, 575km from the radar, indicating that it probably also has a role in detection and monitoring of aircraft.

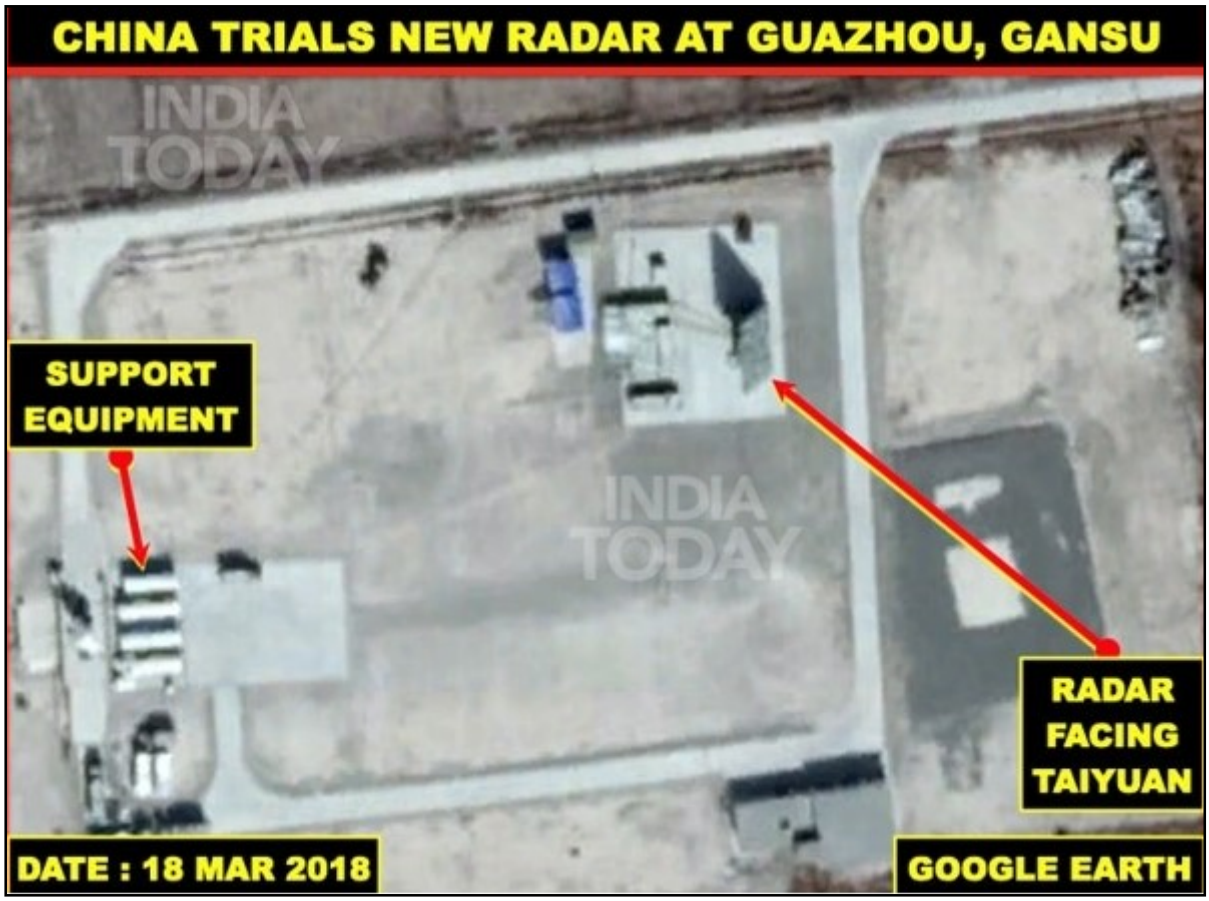
This radar is similar although slightly larger than Type-609 radar which was put on display at the 2018 Zhuhai Air Show.

The Type-609 Intelligence Radar system produced by the 14th Institute of China Electronics Technology Group Corporation (CETC) is known to detect stealth aircraft as well as ballistic missiles flying below the space limit.

The elevation profile of this new radar indicates that anything that goes up beyond 2.5km height from these two important locations in India will be picked up by this radar.

Radar Trials

A new phased array radar was observed conducting trials near town of Guazhou in Gansu province of central China.



The satellite image clearly suggests that the radar was monitoring China's missile and hypersonic glide vehicle WU-14's tests.

The radar location also trialled certain dish antennae used in control and monitoring of China's missiles systems. The radar's distance from Taiyuan Space Launch Centre indicates that the range of this radar possibly would be around 1,500km.

Measurement and Control Facility

The latest satellite images also indicate that a Measurement and Control Facility exists about 7km south of the radar location.

The satcom dishes and other equipment at this base suggest very strongly that this facility could have a possible role in directing Chinese ballistic missiles for midcourse corrections.

The IAF and India's Strategic Forces Command needs to take these bases into account during operational planning.

(Col Vinayak Bhat (Retd) is a consultant for India Today. A satellite imagery analyst, he served in the Indian Army for over 33 years.)

https://www.indiatoday.in/india/story/china-keeps-hawk-eye-on-critical-indian-military-bases-1712587-2020-08-18

Wed, 19 Aug 2020

Vital sea lanes of communications as a core interest for China: Inferences for India's National security

China's energy interests, constant pursuit for natural resources, expanding commercial interests combined with a quickly growing diaspora in the Indian Ocean Region will guarantee that PLAN's presence continues to develop in power

By L. Venkateswaran

China's meteoric rise has significant implications for India given its historically complicated bilateral relations, current asymmetric power disadvantage and increasingly competitive aspirational future between both countries. China has been gradually enhancing its strategic influence in India's neighbourhood. The recent boundary standoff in Ladakh over territorial claims has accompanied parallel cartographic claims by Nepal and Pakistan with possible prodding from China. Territorial claims are matters of a country's core interest that is non-negotiable and it is prepared to use force to have control. While Pakistan and Nepal's territorial claims may not prove to be serious challenges given India's comprehensive national power vis-à-vis these countries, there are evident trends emerging from China's pronouncements of its core interests that have implications for India's National Security particularly in its immediate neighbourhood.

Evident trends

First, China has always stated its core interests broadly providing it the flexibility to highlight specific issues as they become salient. The inclusion of 'national security' in Dai Bingguo's enunciation of core interests in 2009 and in China's first official listing of core interests in the 2011 white paper provides its leadership with a wide canvas to include any issue citing national security reasons in the future. Second, with enhancing military capabilities and growing economic leverages, China will not dilute or scale back pursuing its core interests. It will, instead, continue to expand alongside China's growing comprehensive national power and also remain flexible to reflect changing priorities. Third, China's leadership has placed the responsibility of safeguarding core interests firmly on the Chinese armed forces. It has also announced its desire to create an efficient military force particularly in the maritime domain to fight a short duration, high intensity regional informatised war.

Inferences for India

Historically, China has relied on maritime routes having been a significant trading nation, which has only increased considerably in recent times. China's shipping, at nearly 15 per cent, accounts the largest share of the world's shipping fleet. During the past two decades, China has understood the criticality of IOR due to multiple factors. In the next 30 years, it is expected to consume twice its energy requirements, which in turn will increase its dependence on imports for meeting these requirements indicating that its trade route is likely to remain similar. 75–80 per cent of its energy imports transported by sea, will have to transit through the IOR. The geographical contour of the Maritime Silk Road initiative, connecting with the China-Pakistan Economic Corridor through Gwadar port, is besides the East to West shipping route that intersects the Indian Ocean and is China's primary channel for energy supplies.

Second, its 13th Five Year Plan (FYP), framed in March 2016, focuses on projects for developing high-end equipment and systems for deep-sea investigation, ocean drilling, seafloor resources assessment and development, and marine tasks support. Chinese deep-sea exploration vessels, like its manned submersible Jiaolong in February 2017, are already undertaking research in the Indian Ocean. The International Seabed Authority has also awarded it a contract for seabed exploration for polymetallic sulphides in the region. Such exercises also enable generating data and information, which can be used for achieving military objectives including for underwater actions.

The geographical contour of the Maritime Silk Road initiative, connecting with the China-Pakistan Economic Corridor through Gwadar port, is besides the East to West shipping route that intersects the Indian Ocean and is China's primary channel for energy supplies.

Third, China is strengthening economic engagement including increasing exports, FDI flows under the BRI, selling military equipments and depending for various natural resources on IOR littoral countries. It has invested heavily in Africa on ports along the Eastern coast and has established its first military base in Djibouti in 2017. It is also constructing a deep-water port at Kyaukphyu in Myanmar, constructing the CPEC and Gwadar port in Pakistan, constructing the Colombo port and operating the Hambantota port in Sri Lanka and the Chittagong Port in Bangladesh. There are increased FDI flows to countries like Maldives, Mauritius and Seychelles and exports to IOR countries are amounting to 7-8% of its total trade and growing at 10% annually. China is also dependent on South Africa, Indonesia, Australia, Thailand for numerous natural resources like metals, ores, minerals and also for agricultural raw materials like natural rubber, raw cotton and various fibers.

Perceived vulnerability

The sea routes through the Indian Ocean, that China has to use for various purposes as above, contain key geographical choke points like the Straits of Hormuz, Malacca Straits, Lombok Straits and Sunda Straits. China's naval presence to nullify perceived challenges along these SLOCs is insufficient presently. At least theoretically speaking, Chinese ships are vulnerable to interception by a hostile rival in a possible conflict or even potential aggressive action in international waters. The PLAN has been forced to alter its "focus from offshore waters defense to the combination of offshore waters defence with open seas protection" by such a scenario.

Strategy

The Indian Ocean figures prominently in China's strategic thought. The 13th FYP, which outlines the overarching objectives to be completed for 2016-2020, prominently includes developing China into a strong maritime country. One of the important objectives identified is to protect and expand its maritime rights and interests. China is also aiming to participate actively in establishing and protecting international and regional maritime order, which is a clear revelation that it does not accept the prevailing status quo.

The Indian Ocean figures prominently in China's strategic thought.

President Xi Jinping has avowed, in July 2013, that China would "never abandon its legitimate maritime rights and interests; furthermore, it will never sacrifice its core national interests." The Defence White Paper 2013 states that: "The seas and oceans provide immense space and abundant

resources for China's sustainable development, and thus, are of vital importance to the people's well-being and China's future." The White Paper on Military Strategy 2015 observes that — "With the growth of China's national interests, its national security is more vulnerable to international and regional turmoil and the security of overseas interests concerning energy and resources, strategic SLOCs has become an imminent issue."

Increasing presence in the IOR

Before 2008, PLAN operated primarily in its coastal waters and the Western Pacific. Post 2008, PLAN has taken steps towards enabling this capability through one, anti-piracy missions along the Somalia coast and in the Gulf of Aden providing ample opportunity especially after the UNSC resolution in December 2008. It was initially involved in only escorting merchant vessels carrying humanitarian relief material for international organisations before subsequently expanding ambit to include escort of other nations ships. Second, PLAN ships have been also deployed for conducting exercises in the region and visiting countries including India. Its anti-piracy task forces have conducted workouts with other navies including the Royal Australian Navy and the Pakistan Navy in the IOR. Its naval personnel are now training and providing support in operating newly acquired platforms in Bangladesh, Pakistan, Iran and many African countries. Third, Chinese intelligence gathering ships are frequently visible observing movement and producing operational data in the IOR. Fourth, a submarine was deployed apparently for anti-piracy in end 2013; another submarine reportedly docked at Colombo port for refueling in 2014 and a submarine was reported at Gwadar in November 2016. Fifth, PLAN has also assisted in evacuating its citizens and other foreign nationals, for the first time, in Libya in 2011 and in Yemen in 2015. Then Indian Navy Chief Admiral Sunil Lamba stated in 2019 that the Chinese presence in the Indian Ocean at any juncture is reckoned to be six to eight vessels, besides the submarines.

Conclusion

These regular deployments and joint exercises in the IOR have enabled PLAN to ensure a high degree of interoperability, achieve primary experience of the operating environment, necessary exposure to create scenarios for future conflict and develop proficiency in efficiently supporting extended far-off operations over lengthy durations.

Access to the critical IOR SLOCs will remain a matter of vital importance to China in the future. China's energy interests, constant pursuit for natural resources, expanding commercial interests combined with a quickly growing diaspora in the IOR will guarantee that PLAN's presence continues to develop in power. Consequently, it will remain noticeably in all strategic thought and dominate maritime and military policy. Although, officially, China's interests or plan in the IOR has not been outlined yet, there is a possibility that it will include the protection of vital SLOCs, under which IOR could be categorised, as part of its core interests in the future. This has significant implications for India's ability to operate freely in the region.

(The views expressed above belong to the author(s).)

https://www.orfonline.org/expert-speak/vital-sea-lanes-of-communications-as-a-core-interest-for-china/

oneindia®

Wed, 19 Aug 2020

Amidst tensions with China, why the Indo-Japan ACSA agreement is important

By Vicky Nanjappa

New Delhi: A much anticipated summit between Prime Minister Narendra Modi and Japanese Prime Minister, Shinzo Abe is scheduled to take place next mont.

The summit would witness the signing of the Acquisition and Cross Servicing Agreement (ACSA). The meeting that comes at a time when India and china are locked in a face-off is likely to take place on September 10.

At the end of the bilateral summit meeting in Tokyo between the two leaders in 2018, both countries agreed to begin formal negotiations on the ACSA. This would allow the Indian military and the Japan Self Defence Force to use each other's bases for logistic support. "The two leaders welcomed the joint exercise between each of the three services and the commencement of negotiations on the Acquisition and Cross-Servicing Agreement (ACSA), which will enhance the strategic depth of bilateral security and defense cooperation," the joint statement read.

The ACSA would permit the Indian Navy access to a Japanese base in Djibouti. The Japan Maritime Self Defence Force would be permitted to use India's military installations on the Andaman and Nicobar Islands located in the Indian Ocean.

The ACSA was first discussed during the annual India-Japan Defence Ministerial Dialogue held at New Delhi in August 2018. It was also on the agenda of the Indian National Security Advisor, Ajit Doval and his Japanese counterpart, Shotaro Yachi held at New Delhi in September 2018.

The joint statement by the Prime Ministers also said, "recognizing that enhanced exchanges in expanding maritime domain awareness (MDA) in the Indo-Pacific region contributes to regional peace and stability, they welcomed the signing of the Implementing Arrangement for deeper cooperation between the Indian Navy and the Japan Maritime Self-Defense Force (JMSDF)."

The meeting of Modi and Abe is important also in the context with the tensions with China. The issue regarding the Chinese would figure in the talks. The expansion drive by China is not just limited to Ladakh. It has also caused concerns for Japan over the ownership of the Senaku Islands. Abe too is under pressure from his Cabinet to take a tough stance on China.

https://www.oneindia.com/india/amidst-tensions-with-china-why-the-indo-japan-acsa-agreement-is-important-3135678.html

The Indian EXPRESS

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Demystifying PLA and its long march

Two most powerful organs crucial for the survival of Chinese authoritarian regime are CPC and PLA. To comprehend the aggressive behaviour of Communist leadership, it is imperative to unravel the symbiotic relation between these two entities and discern the rationale behind generational transformation of Chinese military

By Maj Gen (retd) Prof GG Dwivedi

Chandigarh: It is customary for a nation to have an army but extremely rare for a political party to have one. People's Liberation Army (PLA) is an exception as it owes allegiance to the Communist Party of China (CPC). This arrangement was formalised in December 1929 during the ninth meeting of CPC at Gutian in Fujian Province when Mao Zedong said the military's role is "to chiefly serve the political ends". Here on, the Communist Party's control over the Red Army became entrenched. Interestingly, 85 years later, on December 30, 2014 President Xi Jinping during his address to 'Military Political Work Conference' at Gutian reiterated, "PLA remains Party's Army and must maintain absolute loyalty to political masters".

Two most powerful organs crucial for the survival of Chinese authoritarian regime are CPC and PLA. To comprehend the aggressive behaviour of Communist leadership, it is imperative to unravel the symbiotic relation between these two entities and discern the rationale behind generational transformation of Chinese military.

Maj Gen (Dr) G G Dwivedi

PLA-Party Symbiotic Relationship

PLA traces its roots to 'Nanchang Uprising' on August 1 1927; the day Communists led by stalwarts like Mao, Zhou Enlai and Zhu De rose against the Nationalist Forces. It played a key role in successful culmination of Communist revolution in 1949 and CPC coming to power. PLA's commanders Mao and Deng Xiaoping led People's Republic of China (PRC) for almost half century as the First and Second Generation leaders.

Given this relationship, PLA is well represented in the two apex governing bodies; Politburo (PLA has two members out of 25) and Central Committee (PLA accounts for 18-20 per cent of its 205 permanent and 171 alternate members). Central Committee elects the Politburo and Politburo Standing Committee (PSC); the highest political body currently composed of seven members. Till 1997, PLA even had representation in the PSC as well; General Liu Huaqing being the last one to hold that position.

Central Military Commission (CMC), the highest military body, is composed of PLA's top brass, appointed by the PSC. The chairman of CMC is the Commander-in-Chief (C-in-C) of PLA, usually the secretary general of the CPC, presently President Xi. Senior PLA officers are invariably members of the CPC. While commanders handle operational and training aspects, Political Commissars are responsible for personal matters, propaganda and indoctrination.

Barely a year after its creation, China jumped into the Korean War in 1950 to take on the US. Fighting the adversary to a stalemate, PLA suffered over half a million casualties, including Mao's son Capt Anying. In 1962, it defeated the Indian Army in a limited conflict. However, PLA performed poorly against the Vietnamese Army in 1979. Subsequently, it went through sustained restructuring and modernization.

In 1993, President Jiang Zemin directed PLA to prepare for 'local wars under modern conditions' on observing US military power in the 1991 Gulf War. This paved the way for major

doctrinal reforms in Chinese military. In 2004, President Hu Jintao laid down the revised mandate for PLA; "To win local wars under informationised conditions'.

PLA's Long March

On assuming power as the 'Fifth Generation' leader in 2012, President Xi laid down his China Dream (Chong Meng) wherein a 'powerful and prosperous' PRC would acquire 'great power status by 2049'. As per Xi Jinping, military reforms were critical for realisation of 'China Dream', besides achieving key national objectives, namely, stability, modernity, and integration of claimed territories with the motherland.

The strategic directions for military modernization have been spelled out in the white papers on national defence. The 2015 White Paper focussed on strategy of 'active defence' and that of 2019 delved into 'defence in the new era'. It was decided to achieve mechanisation by 2020, basic modernization, including informationisation, by 2035 and transformation into world class military force by mid of the century .

The main thrust of military reforms has been on revamping systems and structures across the board. At the macro level, the focus was on civil-military integration, jointness and optimisation. The CMC is now responsible for policy formulation, controlling all the military assets and higher direction of war through 15 offices and departments. Three additional headquarters—the Ground Forces, Rocket Force and Strategic Force—were created to ensure centralised control of these assets at the highest level. In the new command structure, the President as the C-in-C exercises direct operational control over the PLA.

The modernization process of PLA is doctrine driven — "winning local wars under informationised conditions". While 'local wars' envision short swift engagements in pursuit of larger political aim, 'informationised conditions' refer to technology predominance in war fighting. Salient facets of China's ways of war fighting are:-

- Adopt holistic approach to balance 'war preparation' and 'war prevention'.
- Respond to multi-dimensional security threats by concentrating superior forces, ensuring self-dependence.
- Employ integrated combat forces to prevail in system-vs-system operations, featuring information dominance, precision strikes and joint operations.
- Reorient from 'theatre' to 'trans-theatre operations', shift to 'off shore waters defence with open sea protection', transit from territorial air defence to building air space capabilities including outer space and strengthen strategic deterrence.
- Pursue 'Grey Zone Conflict' strategy alongside 'nibble and negotiate' tactics.
- Expand military cooperation to establish regional security network.

At the operational level, the erstwhile 17 l-odd Army, Air Force and Naval commands have been organised into five Theatre Commands (TCs); Eastern, Western, Central, Northern and Southern. While Eastern TC is responsible for Taiwan Strait, Western TC looks after the entire Indian border. All the war fighting resources in each TC under one commander ensures seamless synergy and optimisation. In addition, 84 corps size formations have been created, which include 13 operational corps and air borne corps, besides dedicated training facilities and logistics installations in each theatre.

While PLA is reasonably well equipped, it lacks combat experience. To overcome this handicap, it trains under realistic conditions in well-organized combined training facilities. To support capacity building, adequate budgetary support has been provided. The defence budget for the year 2020 was $179 bn (actual figures being much higher). However, its revenue expenditure is gradually rising due to the huge maintenance cost and provisioning for over 50 million veterans.

After claiming an elusive victory over Novel Coronavirus in April this year, Xi has gone on overdrive to consolidate his position at home and project a strongman image abroad, through aggressive posturing by PLA around the disputed territories in South China Sea and against India

in Ladakh. It is part of Xi's campaign to set the stage for 20th Party Congress due in 2022 during which there will reshuffle in leadership.

Western Theatre Command

PLA's aggression in Eastern Ladakh during May this year was well planned. Beijing's strategic aim apparently was to convey a strong message to Delhi to desist from building border infrastructure so as to maintain status quo. In tactical terms, twin objectives were to make territorial gains in the contested areas and seek to shift the 'Line of Actual Control' (LAC) Westwards.

These operations have been undertaken by Western Theatre Command (WTC), the most expansive of the five TCs with Tibet and Xinjiang regions under its area of responsibility.

The incursions were undertaken with clear objectives: In Pangong Tso area, to dominate the Chushul Bowl; in the Galwan Valley. to dominate Durbuk-DBO road, and in Depsang Plateau to pose a threat to Siachen and enhance security of the Western Highway. Although PLA gained initial advantage, it did not expect stiff opposition from the Indian Army. Given PLA's intent to hold onto the gains coupled with current level of build-up by both sides and military level talks yielding little results, the de-escalation process is in for long haul.

In Retrospect

On the eve of PLA's 93rd Anniversary on August 1, 2020, President Xi Jinping while presiding over the 'group study session' of CPC Central Committee stated: "To develop 'socialism with Chinese characteristics' and achieve national rejuvenation- efforts to make country prosperous and making military strong go hand in hand. Military capabilities must fit the national needs".

Calling for leapfrogging developments, Xi underscored the implementation of strategic guidelines in the 'new era', including drawing of scientific road map and cultivating high calibre military talent.

The on-going reforms in the PLA are well aligned with Xi's grand projects like the Belt-Road Initiative and 'Maritime Silk Route' to enlarge China's global footprint. The impact of rapid accretion in PLA's war waging potential is already being felt, given its growing aggressive behaviour.

China has ensured that border issue with India remains unresolved so as to retain the ability to mount tension on the LAC at will. Even the current aggression by PLA in Aksai Chin is part of grand design with multiple strategic and tactical objectives. The WTC is China's strategic theatre from the point of internal security and collusion with Pakistan against India.

To effectively cope with PRC's repeated misadventures, there is a requirement to reset our China Policy-from appeasement driven engagement to the one centred on our core interests. There is a need for realistic articulation of threat assessment and formulation of long term strategy to effectively safeguard national sovereignty and integrity. This demands transformational initiatives to restructure apex organizational frameworks. To this end, 'joint military doctrine' is sine qua non and 'integrated theatre commands' essential prerequisites. Border management needs immediate reconfiguration. In the current situation, India must stand its ground and seek restoration of status quo; even if it implies upping the ante.

PLA enjoys a unique position in Chinese system and its identity as the military of the party remains sacrosanct. Despite PLA's transformation being on fast track, it will take time before the Chinese Armed Forces can claim to be at a par with the Western Armies capable of undertaking extended global missions. But PLA is undoubtedly poised for a 'long march' and is bound to alter the existing 'balance of power' with serious ramifications.

(The Writer is Bangladesh War Veteran, commanded unit/formations in Ladakh- Siachen, Pangong Tso, Kashmir Valley and North East. Has served as Defence Attaché in China, North Korea and Mongolia, currently Professor-Strategic& International Relations, Management Studies)

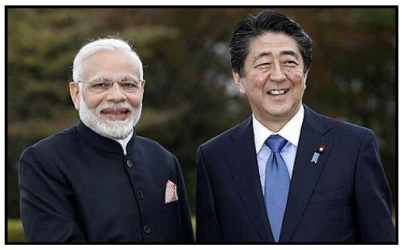
https://indianexpress.com/article/cities/chandigarh/demystifying-pla-chinese-regime-communist-leadership-6560494/

DefenceNews

Wed, 19 Aug 2020

At India-Japan Summit next month, Modi and Abe to sign off on key military pact

The India-Japan summit between Prime Minister Narendra Modi and Prime Minister Shinzo Abe is scheduled for early next month, people familiar with the development said. The two leaders are also expected to sign off on a key military logistic pact, Acquisition and Cross Servicing Agreement (ACSA), and discuss the possibility of some Japanese manufacturing units shifting to India.



According to South Block officials, the two countries were earlier looking at the possibility of holding the meeting in October. It has since then been advanced tentatively to 10 September. The summit, initially proposed to be held in Guwahati on December 15-17 2019, was postponed due to protests against the anti-Citizenship Amendment Act (CAA) in Assam.

The summit comes against the backdrop of aggressive moves by the Chinese People's Liberation Army (PLA) in India's East Ladakh sector and Japan's Senkaku Islands, respectively. Diplomats said the two leaders will not only discuss the Chinese aggression in Ladakh and the South China Sea but also cement the concept of Quad, the quadrilateral coalition of four countries - India, Japan, Australia and the US.

The four Quad countries have increasingly, focussed on countering Beijing's wolf-warrior diplomacy and keeping the sea lanes of communication open for freedom of navigation.

The ACSA, which is key to India and Japan extending support and logistics to each other's military, is expected to be initialled by the two leaders. New Delhi already has a similar agreement with other two Quad members, Australia and the US.

India's formal decision to invite Australia to the Malabar naval exercises later this year is expected soon but officials have made it clear that it is a formality. Australia's inclusion to the military drills that has in the past included the other three Quad members - India, Japan and the United States - would be the first time that the grouping will be engaged at a military level.

Officials said PM Modi and PM Abe will discuss at length the Indo-Pacific region and the challenges it faces from the Middle Kingdom.

According to senior government officials, the two leaders will further cement economic cooperation with India opening doors to Japanese manufacturing activity and perhaps, involve Tokyo in ramping up port infrastructure in the Andaman and Nicobar Islands.

While India has linked peace and tranquillity on its border with China to the bilateral ties, Prime Minister Shinzo Abe is also under pressure from his own Cabinet members to adopt a tough line with China.

The Beijing expansionist approach is not limited to Ladakh but has created security concerns with Japan over ownership of Senkaku Islands as China claims the same as Diaoyu Islands with any eye towards extending its exclusive economic zone and strengthening the hold beyond the South China Sea. The Japanese people are not only in favour of Chinese President Xi Jinping's visit to Tokyo being cancelled but also want the Abe government to be more critical of Beijing on the new Hong Kong security law.

https://www.defencenews.in/article/At-India-Japan-Summit-next-month,-Modi-and-Abe-to-sign-off-on-key-military-pact-932000

moderndiplomacy

Wed, 19 Aug 2020

Russo-Indian defence logistics sharing pact to be signed: Shaking the regional equilibrium

By Hananah Zarrar

Recently it has been circulated via Indian media that India and Russia are finally very close to their agreement on Defence Logistics Sharing Pact. The agreement is expected to be signed by the end of the year 2020 during President Putin's visit to India. Originally, the pact has been under consideration for two years already, yet the negotiations did not take formal shape earlier. This pact would enable both countries to access each other's military bases and support facilities. It provides interoperability and military support and stationing of warships and aircraft. Moreover, the pact ensures access to mutual ports and exclusive economic zones for refueling purposes. This pact would likely serve as a revival of Russia's status as a leading arms supplier to India. Evidence of which also comes from the recent official visit of Indian Defence Minister Mr. Rajnath Singh to Russia. Here quested for the supply of equipment like missiles, assault rifles, and significant ammunition as an emergency purchase, for which Russia has given assurance.

Russia aspires to reserve its permanent or long-term presence in the affairs of the Indo-pacific region. Under the possible clauses of the proposed agreement, Russia would gain access to key Indian ports like Mumbai and Visakhapatnam for refueling and other supplies. Russia seems to be following its strategic tradition to challenge the United States to retain its presence in every possible international affair. Since the US has India as its reliable regional ally against the Chinese rise and Russia's resurgence; it would be very unlikely for the US to lose its regional existence in near decades. For Russia, while the possible proposal of deploying a certain number of troops in each other's country, this pact would enable Russia to reserve its position at the door of the Indian Ocean. This would also pave the way for Russia to conduct exercises and use the exclusive economic zone of India in the coming years. Thus, for Russia, this agreement completely stands as a balancer for its regional existence vis-à-vis the US.

Besides military supplies and strengthening of the Russo-Indian defense partnership, the signing of the pact as early as by the end of this year can be seen as a major step for India towards enhancing its regional significance. In the same vein, as India aspires to become a dominant global power, such a pact would likely serve the purpose of India's enhanced footprint at the global level. The recent domestic and regional conflicts -precisely Indo-China Border dispute along LAC- have reasonably drawn India towards regional isolation. This agreement once materialized would provide India with a chance to reassure its regional significance vis-à-vis China and its reach as far as the Arctic. Indian Navy will be able to smoothly transit through for exercises while the Indian Air Force would find it easier to deploy its aircrafts for joint exercises. Furthermore, access to Russian airbases and ports would ensure India access to the Arctic, which would likely expand its political and strategic reach. For the same purpose, India has been an observing member of the Arctic Council since 2013. In this regard, the 'Indo-Arctic' initiative, would likely provide India with an opportunity to reserve its future hold of the polar region via Indo-Pacific coasts.

The above-debated agreement predicts regional security and stability implications in the coming years. More than the United States, this pact would alarm the Sino-Russia and Pak-Russia relations in the future. The Indo-US strategic partnership would not be affected as far as India does not roll back from the US under any political pressure posed by Russia to get the agreement signed.

Although, India already has similar logistics sharing pacts with the US, France, and Australia, yet the nature and timing of this agreement depict a strategic and defense support from Russia to India amid the latter's LAC skirmishes with China. Similarly, China might consider it as interference by Russia, which would likely provoke China to ensure the 'no-interference' vis-à-vis LAC's on-going conflict.

The United States aims to expand its collaboration with India as its forefront ally in the region to compete in China. Likewise, Russia also sees India as an equally strong market for its huge defense industry. Aspired to regional domination, India continues to expand its defence posture while following an offensive strategy. The Russo-Indian strategic relationship would likely put Pakistan in another dilemma for a competition of regional strategic relations with major powers vis-à-vis India. The United States and Russia, almost equally engaged with India in the defense sector while having bilateral disagreements on future arms control, are surely putting unintentional pressure on India to take either side in longer run while securing its defense modernization and regional hegemonic design. While Russia pretends to retain its neutrality approach towards China, India, and Pakistan to enhance its strong and unopposed regional presence; India would likely dismantle the regional peace with its offensive approach. Meanwhile, Pak-China strategic partnership is likely to strengthen with the passage of time and development in Indian strategy. Though the implications of this pact are yet to be analyzed once it is materialized South Asia would be pushed towards instability and conflicts. Such developments would likely challenge the threshold of provocative war in South Asia in the foreseeable future.

https://moderndiplomacy.eu/2020/08/18/russo-indian-defence-logistics-sharing-pact-to-be-signed-shaking-the-regional-equilibrium/

DECCAN HERALD

Wed, 19 Aug 2020

IAF team aims higher

Slated to perform in Bengaluru in February next year, Suryakiran pilots are preparing for their most dazzling display yet

By Nina C George

The Suryakiran aerobatic team of the Indian Air Force, known for its spectacular manoeuvres, is preparing for a nine-plane display early next year.

The team, which forms the 52nd squadron of the IAF, is the only current military nine-aircraft aerobatic team in Asia. With 12 pilots, it is led by Gp Capt Anoop Singh. All the pilots belong to the fighter stream of the IAF. The team has already carried out 600-plus displays all around the country and represented the country at aero shows in South East Asia and China.

As it prepares for the Bengaluru Aero India, slated for early next year, Anoop Singh speaks exclusively to Metrolife about his vision for the team.

How has the upgrade from a four-plane formation to a nine-plane composite formation helped enhance the manoeuvres?

Close Formation Aerobatics (CFA) is a complex and niche skill. Some call it an art. The team was resurrected on the Hawk aircraft in 2015 and it built and gained experience in an incremental manner. As you said, the first display was with four aircraft and the lessons learnt were applied and the team upgraded to six aircraft.

And then we became one of the few nine-aircraft teams in the world. With the increased number of aircraft, the number of formations also increases, not to mention the difficulty level.

We hear you have smoke pods this year. How is it going to add to the charm?

The smoke pods will definitely add to the charm, There's a threefold reason to that. Firstly, trailing the tricolour behind the formation will be a majestic and proud sight. Secondly, in poor

visibility conditions, the formation can be seen throughout the display due to the smoke trail. Lastly, more manoeuvres can be undertaken, including forming shapes like a heart in the sky.

What is the training that goes into performing stunts in the skies?

All pilots of the team are experienced fighter pilots.

While fighter pilots routinely do both aerobatics and close formation as a part of their training, they rarely do them together.

And even more rarely in larger formations. Which is why, despite their experience, the training is demanding, comprehensive and graduated. It involves a gruelling flying and ground-training syllabus, followed meticulously.

What is the kind of physical and mental preparedness required of a Suryakiran pilot?

Ask any team pilot and he will tell you that the sorties are among the most exhausting. To undertake this role, one must be physically fit and we place due importance on our fitness.

Are there any special exercises to build confidence, as trust is a huge thing?

Teamwork and team spirit are key to undertaking this role. Not just among the pilots, but also with the extremely talented and hard-working team on the ground who make it possible for us to form the 'nine diamond' in the sky. While there aren't any dedicated exercises to build this spirit, we are proud to be a really closely knit squad, probably because this kind of a role is by itself the best exercise in trust building.

How many displays till date? What are your signature moves right now?

We have done a little over 130 displays since our resurrection in 2015. We constantly strive for different formations and undertake new manoeuvres with each season.

What is your message to those aspiring to join the team?

We would love to have young, bright-eyed aspirants become a part of the team. But to do so: Join the Indian Air Force. It's an extremely professional and role- oriented organisation. Each one of us is proud to serve the country.

Since 1996

Suryakiran, meaning rays of the sun (in Sanskrit), is the formation aerobatic team of the IAF Airbase in Bidar, Karnataka. Raised in 1996 on the Kiran Mk II plane, the team had enthralled spectators in India and abroad till 2011. It didn't perform for three years after that. In 2015, the team was resurrected on the Hawk Mk 132 aircraft. Since then, it has built up from four planes to nine, and is now known for its heart-stopping synchro manoeuvres.

https://www.deccanherald.com/metrolife/metrolife-your-bond-with-bengaluru/iaf-team-aims-higher-874883.html

दैनिक भास्कर

Wed, 19 Aug 2020

Indian Airforce: हर साल करीब 80 पायलट छोड़ देते हैं भारतीय वायुसेना, जानें वजह

हाईलाइट

- ***2018 में ही वायुसेना 376 पायलटों की कमी का सामना कर रही थी***
- ***2016 में 100 पायलटों और 2017 में 114 ने भारतीय वायुसेना छोड़ी***

नई दिल्ली: लद्दाख में चीन और एलओसी पर पाकिस्तान के साथ जारी विवाद के बीच भारतीय वायुसेना (IAF) ने चौंकाने वाला खुलासा किया है। भारतीय वायुसेना ने एक सूचना के अधिकार (RTI) वाली याचिका के जवाब में बताया कि बीते 10 साल में 798 पायलटों ने इस्तीफा दिया। यानी हर साल औसतन 80 पायलट भारतीय वायुसेना छोड़ रहे हैं। यह RTI इंडिया टूडे की ओर दाखिल की गई थी।

वर्तमान में IAF पायलटों की भारी कमी का सामना कर रहा है। 1 फरवरी, 2018 को, सरकार ने राज्य सभा को सूचित किया कि भारतीय वायुसेना के पास 4,851 की स्वीकृत शक्ति के मुकाबले 3,855 पायलट ही थे। इसलिए 2018 में ही वायुसेना 376 पायलटों की कमी का सामना कर रहा था। ये स्थिति IAF की तैयारियों के अनुकूल नहीं है।

2016 में सबसे ज्यादा 100 पायलटों ने छोड़ी एयरफोर्स

2016 में 100 पायलटों और 2017 में 114 ने भारतीय वायुसेना छोड़ी। वहीं 2015 में 37 पायलटों ने सेवानिवृत्ति से पहले इस्तीफा दिया। 2015 वो साल रहा जिसमें बीते एक दशक के किसी भी साल की तुलना में सबसे कम पायलट भारतीय वायुसेना से अलग हुए। नहीं तो हर साल औसतन 80 पायलट इस्तीफे दे रहे हैं।

सेवानिवृत होने से पहले कई पायलटों ने छोड़ी नौकरी

सेवानिवृत्ति से पहले वायुसेना छोड़ने वालों में से कितने पायलट प्राइवेट एयरलाइंस में शामिल हुए? इस सवाल के जवाब में डायरेक्ट्रेट ऑफ पर्सनल सर्विस, एयर हेड क्वार्टर ने कहा कि प्राइवेट एयरलाइन में शामिल होने वाले अधिकारियों के बारे में जानकारी उपलब्ध नहीं कराई जा सकती, क्योंकि ऐसा कोई डेटा नहीं रखा जाता है। यह सार्वजनिक प्राधिकरण निजी एयरलाइन्स से जुड़ने के लिए एनओसी प्रदान करता है। यह स्पष्ट रूप से दिखाता है कि इस्तीफा देने वाले 798 पायलटों में से 289, को प्राइवेट एयरलाइंस की फ्लाइट्स के लिए नो ऑब्जेक्शन सर्टिफिकेट मिला। इसके सीधे मायने हैं बीते एक दशक में वायु सेना छोड़ने वाले पायलटों में से एक तिहाई से अधिक संभवत: कॉमर्शियल फ्लाइट्स उड़ा रहे हैं।

रिकॉर्ड के मुताबिक संख्या इस प्रकार हैं...

समाचार रिपोर्टों के मुताबिक, एक मध्य स्तर का IAF पायलट एक महीने में करीब 2 लाख कमाता है, लेकिन जब वह एक प्राइवेट एयरलाइंस में शामिल होता है तो उसकी आय चार गुना तक बढ़ सकती है। अधिकतर IAF पायलट 20 साल की सेवा पूरी करने के बाद वायुसेना छोड़ देते हैं, इससे वो पेंशन के हकदार रहते हैं।

https://www.bhaskarhindi.com/national/news/indian-airforce-every-year-about-80-pilots-leave-indian-air-force-know-the-reason-155837

THE NEW INDIAN EXPRESS

Wed, 19 Aug 2020

In a first, Chhattisgarh gets defence category industry to manufacture bulletproof jackets, helmets

The unit to come up at Birebhant village in Durg district, about 45-km from Raipur, will manufacture one lakh bulletproof jackets and helmets each during the first phase

By Ejaz Kaiser

Raipur: A Memorandum of Understanding (MoU) was signed between the Chhattisgarh government and the Atmastco Ltd on Monday for establishing the first unit of defence category industry that will produce bulletproof jackets and helmets in the state.

The unit to come up at Birebhant village in Durg district, about 45-km from Raipur, will manufacture one lakh bulletproof jackets and helmets each during the first phase.

According to the official statement, the agreement for setting up of the industry was inked between the state industry department and multidiscipline engineering company Atmastco Ltd, that earlier had entered into contract for defence technology, acquiring the permission, under the license and agreement with the government of India.

"The bulletproof jackets and helmets to be produced at the upcoming industry in Durg are meant for the Indian armed forces besides the paramilitary troopers and the state armed units", the statement added.

"Defence category has been enlisted as among the top-priority category in the new industrial policy of Chhattisgarh government", said principal secretary (industry) Manoj Kumar Pingua, who signed the MoU on behalf of the state government.

Atmastco Ltd will investment Rs 87.50 crore for the upcoming project that is expected to generate employment of around 150 people.

https://www.newindianexpress.com/nation/2020/aug/18/in-a-first-chhattisgarh-gets-defence-category-industry-to-manufacture-bulletproof-jackets-helmets-2184965.html

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Wed, 19 Aug 2020

Trace vapor generator for detecting explosives, narcotics

Trace vapor detection technologies are crucial for ensuring reliable and safe detection of explosives and illegal drugs. Researchers from the U.S. Naval Research Laboratory have developed a compact testing device called the Trace Vapor Generator for Explosives and Narcotics (TV-Gen), which is portable and can be used for non-contact sampling of these vapors.

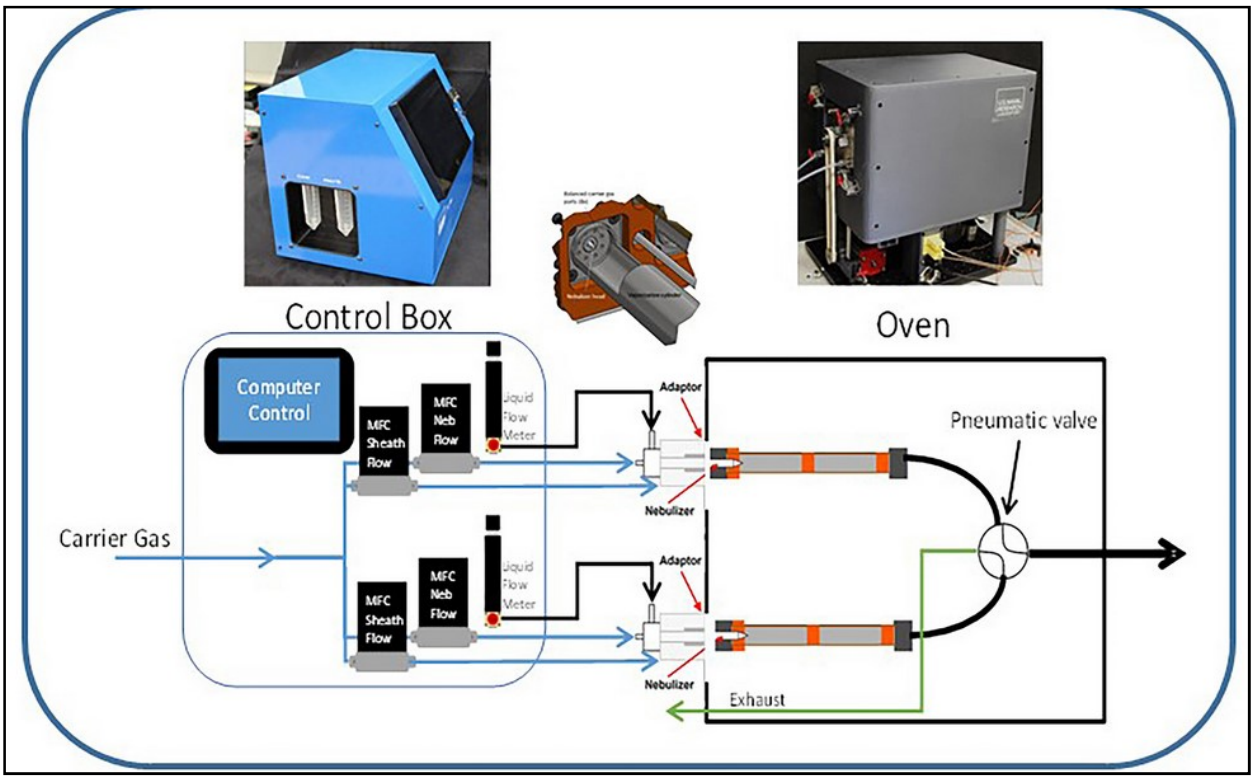

Diagram illustrating the flow path of the analyte in an aqueous solution as it moves from the sample introduction vessels on the Trace Vapor Generator for Explosives and Narcotics (TV-Gen) control box, through the nebulizer interface, where the analyte is vaporized and continues through the TV-Gen oven, dual manifold system. Credit: Diagram provided by U.S. Naval Research Laboratory

In the journal *Review of Scientific Instruments*, the team reports the TV-Gen can accurately generate trace vapors of low vapor pressure compounds, such as explosives or narcotics, and can produce vapors in complex backgrounds.

"We can use the TV-Gen in the early stages of sensor development, where the developer is just determining if their proposed sensing material responds to a target analyte, all the way to determining instrument and assay limits of detection for hand-held trace detectors and hyphenated instrumentation," said author Braden Giordano.

This device is the next generation of the Test Explosive Sensor (TESTbed) developed for the Department of Homeland Security, with advanced vapor mixing and a smaller footprint, making transport to other laboratories or into the field possible.

"The TV-Gen is significantly smaller than the TESTbed, and while providing only a single sample port for device evaluation, it maintains or improves upon the older systems' performance

metrics," said Giordano. "It can fit on a small cart, so you can bring the vapor source to your technology, not the technology to the vapor source."

The device can provide a stable vapor for several hours and can rapidly switch between a clean vapor stream and an analyte vapor stream while matching humidity.

"An interesting application that will be taking place this year is testing detector canines to get quantitative measurements of olfactory detection threshold and, potentially in the future, be able to compare canines directly to instrument for the first time," said Giordano.

The researchers hope to continue meeting the needs of the vapor detection community by expanding the library of vapors and exploring methods to maximize vapor generation efficacy at lower operating temperatures.

More information: "Trace Vapor Generator for Explosives and Narcotics (TV-Gen),"*Review of Scientific Instruments* (2020). aip.scitation.org/doi/10.1063/1.5142385

Journal information: *Review of Scientific Instruments*

https://phys.org/news/2020-08-vapor-explosives-narcotics.html

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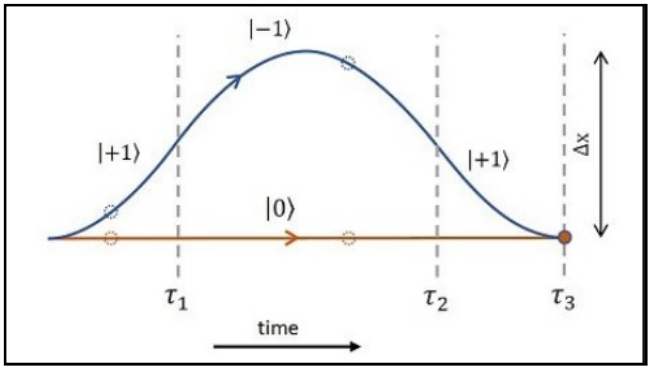
Wed, 19 Aug 2020

A stepping stone for measuring quantum gravity

A group of theoretical physicists, including two physicists from the University of Groningen, have proposed a 'table-top' device that could measure gravity waves. However, their actual aim is to answer one of the biggest questions in physics: is gravity a quantum phenomenon? The key element for the device is the quantum superposition of large objects. Their design was published in *New Journal of Physics* on 6 August.

Already in the preprint stage, the paper that was written by Ryan J. Marshman, Peter F. Barker and Sougato Bose (University College London, UK), Gavin W. Morley (University of Warwick, UK) and Anupam Mazumdar and Steven Hoekstra (University of Groningen, the Netherlands) was hailed as a new method to measure gravity waves. Instead of the current kilometers-sized LIGO and VIRGO detectors, the physicists working in the UK and in the Netherlands proposed a table-top detector. This device would be sensitive to lower frequencies than the current detectors and it would be easy to point them to specific parts of the sky—in contrast, the current detectors only see a fixed part.



Space-time diagram of quantum states interference. By reversing the non-zero internal spin state at times \tau_{1} and \tau_{2} the particle can be made to follow the blue (spin +/-1) and orange (spin 0) paths. In doing so they reach a maximum spatial superposition size \Delta x before being brought back to interfere at time \tau_{3} | Credit: R. Marshman *et al.*

Diamond

The key part of the device is a tiny diamond, just a few nanometres in size. "In this diamond, one of the carbons is replaced by a nitrogen atom," explains assistant professor Anupam Mazumdar. This atom introduces a free space in the valence band, which can be filled with an extra electron. Quantum theory says that when the electron is irradiated with laser light, it can either absorb or not absorb the photon energy. Absorbing the energy would alter the electron's spin, a magnetic moment that can be either up or down.

"Just like Schrödinger's cat, which is dead and alive at the same time, this electron spin does and does not absorb the photon energy, so that its spin is both up and down." This phenomenon is

called quantum superposition. Since the electron is part of the diamond, the entire object—with a mass of about 10^{-17} kilograms, which is huge for quantum phenomena—is in quantum superposition.

"We have a diamond that has up spin and down spin at the same time," explains Mazumdar. By applying a magnetic field, it is possible to separate the two quantum states. When these quantum states are brought together again by turning off the magnetic field, they will create an interference pattern. "The nature of this interference depends on the distance the two separate quantum states have traveled. And this can be used to measure gravity waves." These waves are contractions of space, so that their passing affects the distance between the two separated states and thus the interference pattern.

Missing link

The paper shows that this set-up could indeed detect gravity waves. But that is not what Mazumdar and his colleagues are really interested in. "A system in which we can obtain quantum superposition of a mesoscopic object such as the diamond, and for a reasonable length of time, would be a real breakthrough," Mazumdar says. "It would allow all kinds of measurements to be taken, and one of those could be used to determine whether gravity itself is a quantum phenomenon." Quantum gravity has been the 'missing link' in physics for nearly a century.

In a paper published in 2017, Mazumdar and his long-time collaborator Sougato Bose, together with several colleagues, suggested that entanglement between two mesoscopic objects could be used to find out whether gravity itself is a quantum phenomenon. Simply put: entanglement is a quantum phenomenon, so when two objects that interact only through gravity show entanglement, this proves that gravity is a quantum phenomenon.

Technology

"In our latest paper, we describe how to create mesoscopic quantum superposition. With two of these systems, we were able to show entanglement." However, as they noticed during their work, the single system would be sensitive to gravitational waves and this became the focus of the *New Journal of Physics* paper.

"The technology to build these systems could take a few decades to develop," Mazumdar acknowledges. A vacuum of 10^{-15} Pascal is required, while the operating temperature should be as low as possible, near absolute zero (-273 °C). "Technology to achieve either high vacuum or low temperature is available, but we need the technology to achieve both at the same time." Furthermore, the magnetic field must be constant. "Any fluctuation would collapse the quantum superposition."

Freefall

The reward for creating this kind of system would be great. "It could be used for all kinds of measurements in fields such as ultra-low energy physics or quantum computing, for example." And it could, of course, be used to determine whether gravity is a quantum phenomenon. Mazumdar, Bose and colleagues have just uploaded another preprint in which they describe how this experiment could be performed. "To ensure that the only interaction between the two entangled objects is the gravity between them, the experiment should be done in free fall," explains Mazumdar. With visible enthusiasm, he describes a one-kilometer long drop shaft in a deep mine, to reduce interference. Two entangled mesoscopic quantum systems should be dropped repeatedly to obtain a reliable measurement. "I think this can be done in my lifetime. And the result would finally resolve one of the biggest questions in physics."

More information: Ryan J Marshman et al, Mesoscopic interference for metric and curvature & gravitational wave detection, *New Journal of Physics* (2020). DOI: 10.1088/1367-2630/ab9f6c

Journal information: *New Journal of Physics*

https://phys.org/news/2020-08-stone-quantum-gravity.html

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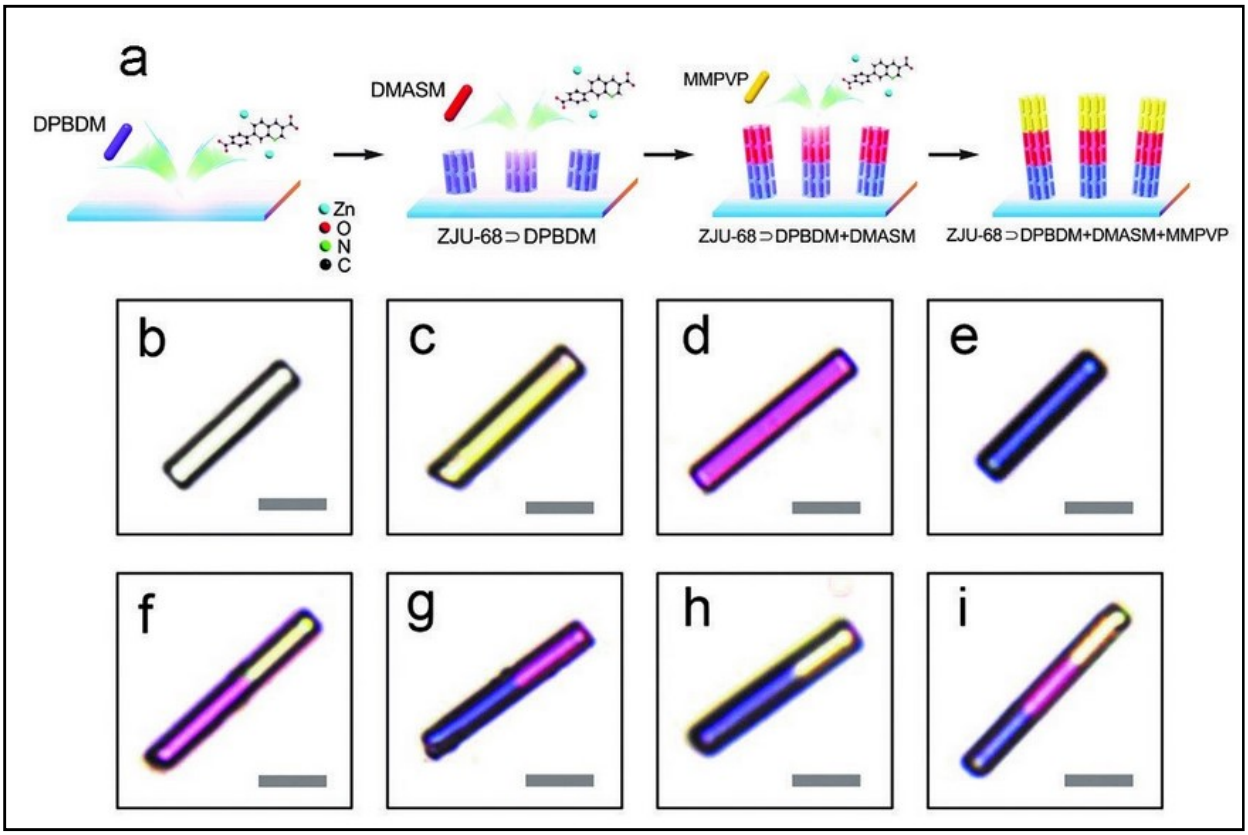
Wed, 19 Aug 2020

The MOF-based multicolor single-mode microlaser

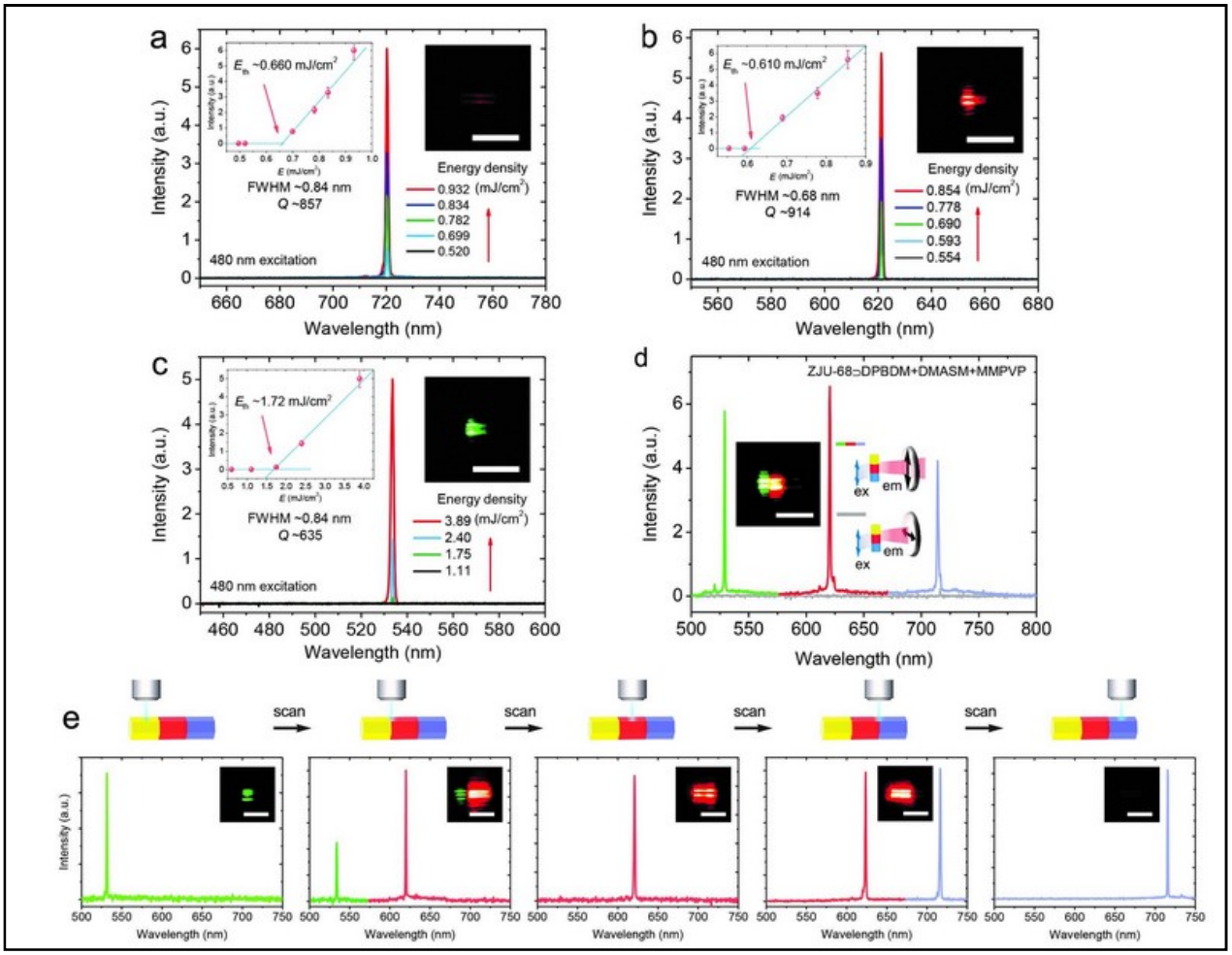
Since different tissues, cells or biochemicals have different (such as optical, thermal and acoustic) responses to different wavelengths of light, a light source with visible to near-infrared (NIR) multi-color output provides the fundamentals for multi-modal/multi-dimensional sensing/imaging. On the other hand, the polarization properties of light provide an opportunity for the analysis and processing of scattered light signals and can also help to obtain rich structural information in biological materials. In addition, single-mode micro-nano lasers meet the application requirements of miniaturized photonic devices with high information accuracy, avoiding false signals and overlapping interference of different optical signals, which have the potential to achieve targeted sensing/imaging of various cells and molecules when combined with multi-color output characteristics. If a material can combine the advantages of broadband multi-color output, polarization and single-mode micro-nano lasing, it is very useful for multi-mode miniaturized biochemical sensing or imaging, but there is no report of corresponding materials to date.



a, the schematic synthesis of hierarchically dye-assembled hybrid ZJU-68 microcrystals. b-i, the optical micrographs of ZJU-68 (b) and hierarchically dye-assembled ZJU-68 microcrystals (c-i), scale bar, 10 μm. Credit: Huajun He, Yuanjing Cui, Hongjun Li, Kai Shao, Banglin Chen and Guodong Qian

In a new paper published in *Light Science & Applications*, a research group led by Professor Guodong Qian from State Key Laboratory of Silicon Materials, Cyrus Tang Center for Sensor Materials and Applications, School of Materials Science and Engineering, Zhejiang University, China have reported the hierarchical assembly of different dye molecules based on a homoepitaxy process in a host-guest hybrid metal-organic framework (MOF) micro-resonator to achieve up to three-wavelength single-mode polarized lasing in green, red and NIR. The segmented and oriented

assembly of different dye molecules within the MOF microcrystal (named ZJU-68) acting as a shortened resonator, help to achieve dynamically controllable multi-color single-mode lasing with a low three-color-lasing threshold of ~1.72 mJ/cm^2 and degree of polarization > 99.9%. Furthermore, the resulting three-color single-mode lasing possesses the largest wavelength coverage of ~186 nm (range from ~534 nm to ~720 nm) ever reported. The researchers summarized their ideas:



a-c, the single-mode lasing spectra of different dye-loaded crystal-segment in a single hierarchically hybrid ZJU-68?dyes microcrystal. d, the anisotropic three-color single-mode lasing in the hybrid microcrystal. e, The scanning lasing performance in a single hierarchical hybrid microcrystal. Scale bar, 10 μm Credit: Huajun He, Yuanjing Cui, Hongjun Li, Kai Shao, Banglin Chen and Guodong Qian

"It is well known that the spatial confinement effect of the metal-organic framework can greatly reduce the aggregation-caused quenching (ACQ) of organic dye systems. However, when we need to load different dye molecules to broaden the emission band, how should we try to avoid their adverse energy transfer between each other, especially for the lasing system that requires extremely large optical gain? Fortunately, we found one of the solutions, that is the combination of in-situ assembly and epitaxial growth."

"Of course, the size matching between the host framework channels and the dye molecules is also an important factor for the final successful hierarchical assembly. Because we need the prepared dye-loaded crystal segments to not leak the previous dye molecules during the epitaxial growth process." they added.

"These MOF-based hybrid microcrystals can be selectively regionally excited to produce single-mode linearly polarized lasing in green, red, and near-infrared, which will be potential in multi-modal biochemical sensing/imaging and on-chip photon information processing," the researchers conclude.

More information: Huajun He et al, Controllable broadband multicolour single-mode polarized laser in a dye-assembled homoepitaxial MOF microcrystal, *Light: Science & Applications* (2020). DOI: 10.1038/s41377-020-00376-7

Journal information: *Light: Science & Applications*

https://phys.org/news/2020-08-mof-based-multicolor-single-mode-microlaser.html

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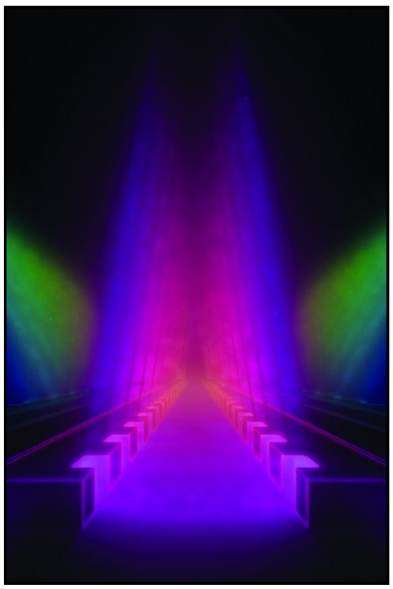
Wed, 19 Aug 2020

Scientists slow and steer light with resonant nanoantennas

Light is notoriously fast. Its speed is crucial for rapid information exchange, but as light zips through materials, its chances of interacting and exciting atoms and molecules can become very small. If scientists can put the brakes on light particles, or photons, it would open the door to a host of new technology applications.

Now, in a paper published on Aug. 17, in *Nature Nanotechnology*, Stanford scientists demonstrate a new approach to slow light significantly, much like an echo chamber holds onto sound, and to direct it at will. Researchers in the lab of Jennifer Dionne, associate professor of materials science and engineering at Stanford, structured ultrathin silicon chips into nanoscale bars to resonantly trap light and then release or redirect it later. These "high-quality-factor" or "high-Q" resonators could lead to novel ways of manipulating and using light, including new applications for quantum computing, virtual reality and augmented reality; light-based WiFi; and even the detection of viruses like SARS-CoV-2.



An artist rendering of a high-Q metasurface beamsplitter. These "high-quality-factor" or "high-Q" resonators could lead to novel ways of manipulating and using light. Credit: Riley A. Suhar

"We're essentially trying to trap light in a tiny box that still allows the light to come and go from many different directions," said postdoctoral fellow Mark Lawrence, who is also lead author of the paper. "It's easy to trap light in a box with many sides, but not so easy if the sides are transparent—as is the case with many Silicon-based applications."

Make and manufacture

Before they can manipulate light, the resonators need to be fabricated, and that poses a number of challenges.

A central component of the device is an extremely thin layer of silicon, which traps light very efficiently and has low absorption in the near-infrared, the spectrum of light the scientists want to control. The silicon rests atop a wafer of transparent material (sapphire, in this case) into which the researchers direct an electron microscope "pen" to etch their nanoantenna pattern. The pattern must be drawn as smoothly as possible, as these antennas serve as the walls in the echo-chamber analogy, and imperfections inhibit the light-trapping ability.

"High-Q resonances require the creation of extremely smooth sidewalls that don't allow the light to leak out," said Dionne, who is also Senior Associate Vice Provost of Research Platforms/Shared Facilities. "That can be achieved fairly routinely with larger micron-scale structures, but is very challenging with nanostructures which scatter light more."

Pattern design plays a key role in creating the high-Q nanostructures. "On a computer, I can draw ultra-smooth lines and blocks of any given geometry, but the fabrication is limited," said

Lawrence. "Ultimately, we had to find a design that gave good-light trapping performance but was within the realm of existing fabrication methods."

High quality (factor) applications

Tinkering with the design has resulted in what Dionne and Lawrence describe as an important platform technology with numerous practical applications.

The devices demonstrated so-called quality factors up to 2,500, which is two orders of magnitude (or 100 times) higher than any similar devices have previously achieved. Quality factors are a measure describing resonance behavior, which in this case is proportional to the lifetime of the light. "By achieving quality factors in the thousands, we're already in a nice sweet spot from some very exciting technological applications," said Dionne.

For example, biosensing. A single biomolecule is so small that it is essentially invisible. But passing light over a molecule hundreds or thousands of times can greatly increase the chance of creating a detectable scattering effect.

Dionne's lab is working on applying this technique to detecting COVID-19 antigens—molecules that trigger an immune response—and antibodies—proteins produced by the immune system in response. "Our technology would give an optical readout like the doctors and clinicians are used to seeing," said Dionne. "But we have the opportunity to detect a single virus or very low concentrations of a multitude of antibodies owing to the strong light-molecule interactions." The design of the high-Q nanoresonators also allows each antenna to operate independently to detect different types of antibodies simultaneously.

Though the pandemic spurred her interest in viral detection, Dionne is also excited about other applications, such as LIDAR—or Light Detection and Ranging, which is laser-based distance measuring technology often used in self-driving vehicles—that this new technology could contribute to. "A few years ago I couldn't have imagined the immense application spaces that this work would touch upon," said Dionne. "For me, this project has reinforced the importance of fundamental research—you can't always predict where fundamental science is going to go or what it's going to lead to, but it can provide critical solutions for future challenges."

This innovation could also be useful in quantum science. For example, splitting photons to create entangled photons that remain connected on a quantum level even when far apart would typically require large tabletop optical experiments with big expensive precisely polished crystals. "If we can do that, but use our nanostructures to control and shape that entangled light, maybe one day we will have an entanglement generator that you can hold in your hand," Lawrence said. "With our results, we are excited to look at the new science that's achievable now, but also trying to push the limits of what's possible."

More information: Mark Lawrence et al. High quality factor phase gradient metasurfaces, *Nature Nanotechnology* (2020). DOI: 10.1038/s41565-020-0754-x

Journal information: *Nature Nanotechnology*

https://phys.org/news/2020-08-scientists-resonant-nanoantennas.html

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Wed, 19 Aug 2020

New quantum paradox reveals contradiction between widely held beliefs

Quantum physicists at Griffith University have unveiled a new paradox that says, when it comes to certain long-held beliefs about nature, "something's gotta give."

Quantum theory is practically perfect at predicting the behavior we observe when we perform experiments on tiny objects like atoms. But applying quantum theory at scales much larger than atoms, in particular to observers who make the measurements, raises difficult conceptual issues.

In a paper published in *Nature Physics*, an international team led from Griffith University in Australia has sharpened those issues into a new paradox.

"The paradox means that if quantum theory works to describe observers, scientists would have to give up one of three cherished assumptions about the world," said Associate Professor Eric Cavalcanti, a senior theory author on the paper.

"The first assumption is that when a measurement is made, the observed outcome is a real, single event in the world. This assumption rules out, for example, the idea that the universe can split, with different outcomes being observed in different parallel universes."

"The second assumption is that experimental settings can be freely chosen, allowing us to perform randomized trials. And the third assumption is that once such a free choice is made, its influence cannot spread out into the universe faster than light," he said.

"Each of these fundamental assumptions seems entirely reasonable, and is widely believed. However, it is also widely believed that quantum experiments can be scaled up to larger systems, even to the level of observers. But we show that one of these widely held beliefs must be wrong! Giving up any one of them has far-reaching consequences for our understanding of the world."

The team has established the paradox by analyzing a scenario with well-separated entangled quantum particles combined with a quantum "observer"—a quantum system which can be manipulated and measured from the outside, but which can itself make measurements on a quantum particle.

"Based on the three fundamental assumptions, we have mathematically determined limits on what experimental results are possible in this scenario. But quantum theory, when applied to observers, predicts results which violate these limits. In fact, we have already performed a proof-of-principle experiment using entangled photons (particles of light)," said Dr. Nora Tischler, a senior experimental author. "And we found a violation just as quantum theory predicted."

"But our 'observer' had a very small brain, so to speak. It has just two memory states, which are realized as two different paths for a photon. That's why we call it a proof-of-principle experiment, not a conclusive demonstration that one of the three fundamental assumptions in our paradox must be wrong," she said.

"For a more definitive implementation of the paradox, our dream experiment is one where the quantum observer is a human-level artificial intelligence program running on a massive quantum computer," said Professor Howard Wiseman, the leader of the project and Director of Griffith's Center for Quantum Dynamics, where the theoretical and experimental teams are based.

"That would be a pretty convincing test of whether quantum theory fails for observers, or whether one of the three fundamental assumptions is false. But that's probably decades away."

The Center for Quantum Dynamics laboratory in which the experiment was performed is also part of the Center for Quantum Computation and Communication Technology, an Australian Research Council Center of Excellence.

"It has long been recognized that quantum computers will revolutionize our ability to solve hard computational problems," Professor Wiseman said.

"What we didn't realize until we started this research is that they may also help answer hard philosophical problems—the nature of the physical world, the mental world, and their relationship."

More information: Kok-Wei Bong et al. A strong no-go theorem on the Wigner's friend paradox, *Nature Physics* (2020). DOI: 10.1038/s41567-020-0990-x

Journal information: *Nature Physics*

https://phys.org/news/2020-08-quantum-paradox-reveals-contradiction-widely.html

PHYS.ORG

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Escape artists: How vibrio bacteria break out of cells

As soon as the foodborne pathogen *Vibrio parahaemolyticus* infects a human intestinal cell, the bacteria are already planning their escape. After all, once it is in and multiplies, the bacterium must find a way out to infect new cells.

Now, UT Southwestern scientists have discovered the surprising route that *V. parahaemolyticus* takes during this exit—or egress—from cells. The bacteria, they report in the journal *eLife*, gradually modify cholesterol found in a cell's plasma membrane, eventually weakening the membrane enough so that it can break through.

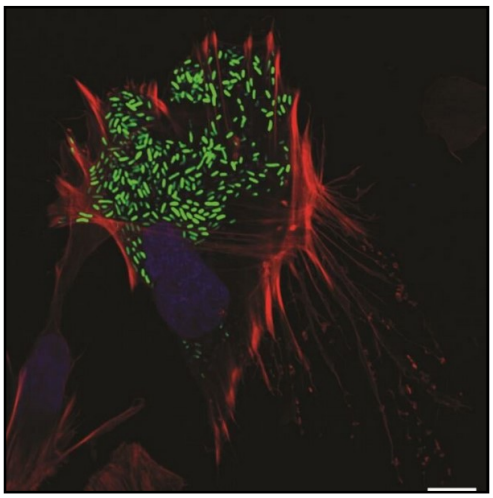

Image of Vibrio parahaemolyticus bacteria trapped in a host cell. A UTSW study found that this foodborne pathogen modifies cholesterol found in a cell's plasma membrane to exit and infect new cells. Credit: UT Southwestern Medical Center

"The more we understand how bacteria are manipulating host cells at a molecular level, the more we understand how they cause disease," says study leader Kim Orth, Ph.D., professor of molecular biology and biochemistry at UTSW and a Howard Hughes Medical Institute investigator. "Bacteria have many different mechanisms to escape, but this stood out because it's an especially novel one."

Vibrio bacteria are found in warm seawater and humans become infected by eating raw shellfish such as oysters. About a dozen different species of Vibrio can cause human illness; *V. parahaemolyticus* is the most common in the United States and leads to food poisoning symptoms—diarrhea, cramps, nausea, and vomiting.

About a decade ago, Orth's group first revealed how *V. parahaemolyticus* infects human intestinal cells. Vibrio, they showed, uses a common bacterial system known as the type 3 secretion system 2 (T3SS2) to invade cells and begin replicating. The T3SS2 is composed of a large complex of proteins that form a needle that can inject molecules into a human cell, coaxing the cell to take in the bacteria and blocking any potential immune response.

"We started to get a good understanding of how this pathogen gets inside cells and maintains an existence," says Orth. "We assumed that it was also using components of the T3SS2 to get out of cells again."

But when Orth and her colleagues started studying the egress of *V. parahaemolyticus* out of human cells, the T3SS2 didn't seem to play a role. Neither did a number of other known egress mechanisms that bacteria use. Finally, Marcela de Souza Santos—a former assistant professor of

molecular biology at UTSW and co-first author of the study—suggested they search *V. parahaemolyticus* genome for proteins known as lipases, which can break down the fatty molecules that make up cellular membranes.

Orth's team identified a lipase known as VPA0226 and thought they'd found their answer, assuming the lipase digested the membranes of human cells. But they were in for another surprise. When they tracked the activity of the lipase, they discovered that it instead headed for the mitochondria of cells, where it modified membrane cholesterol molecules. Over seven to eight hours, as these cholesterol molecules are modified, the cell membrane becomes weak. By this time, *V. parahaemolyticus* has multiplied—from one or two bacteria to about 500—and all the copies can escape through the weakened membrane.

"This is the only report we know of where a bacterium uses this kind of T2SS lipase to egress from a host cell that was invaded in a T3SS2 dependent way," says Suneeta Chimalapati, Ph.D., a research scientist in the Orth lab and co-first author of the study.

To confirm the role of VPA0226, de Souza Santos and Chimalapati tested what happened when *V. parahaemolyticus* completely lacked the lipase. Indeed, the bacteria successfully invaded human cells and began replicating, but remained stuck inside those initial cells. Eventually, the host cells—crammed full of bacteria—died along with all the *V. parahaemolyticus*.

The new observation likely won't have any immediate therapeutic implications, the researchers say; *V. parahaemolyticus* usually resolves on its own without treatment. But it helps shed light on how bacteria evolve egress mechanisms and the importance of looking beyond known secretion systems when thinking about the important molecules used by bacterial pathogens.

"We really had tunnel vision thinking the T3SS2 dominated everything Vibrio did, but this shows how many other tools it has on hand to use for its pathogenesis," says Orth, who holds the Earl A. Forsythe Chair in Biomedical Science and is a W.W. Caruth, Jr. Scholar in Biomedical Research. She was recently elected to the National Academy of Sciences.

More information: Suneeta Chimalapati et al. Vibrio deploys type 2 secreted lipase to esterify cholesterol with host fatty acids and mediate cell egress, *eLife* (2020). DOI: 10.7554/eLife.58057

Journal information: *eLife*

https://phys.org/news/2020-08-artists-vibrio-bacteria-cells.html

hindustantimes

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Latest on Covid-19 research: From immune response to psychiatric risk and plasma therapy

As the coronavirus pandemic has affected hundreds of countries across the world, researchers are trying to find more about the viral disease and how it affects the human body

Edited By Meenakshi Ray

New Delhi: The coronavirus disease (Covid-19) has infected more than 21 million people and killed 773,152 across the world till date even as scientists and researchers are trying to understand the viral illness and find treatments and vaccines.

Sars-Cov-2, the virus that causes the coronavirus disease, has affected more than 2.7 million and 51,797 have succumbed in India.

Here is the latest on effects of the coronavirus disease:

- According to researchers, immune responses last months and possibly longer in patients with mild Covid-19. Antibodies decrease and immunity wanes soon after recovery in mildly ill patients, early reports suggested.
- However, a Chinese study last month on 349 Covid-19 patients, which has not yet undergone peer review, found similar immune response patterns at six months regardless of symptom severity. And in a study published on Saturday ahead of peer review, US researchers performed blood tests in 15 patients after mild Covid-19, looking for three signs of lasting immune responses: antibodies, so-called memory B cells, and memory T cells.
- The study's co-author Lauren Rodda of the University of Washington School of Medicine told Reuters that patients still had "all three of these defense layers," reducing their risk of reinfection, three months after recovery. Rodda said that if they do become reinfected, they are less likely to become severely ill or be contagious. Test results at three months were unchanged from results at one month, so her team believes this is a lasting response.
- Rodda added, according to Reuters, they support US Centers for Disease Control and Prevention advice that patients need not be retested for COVID-19 within the first three months after an infection because the findings show immune responses last three months, if not longer.
- A study at University of Oxford of more than 62,000 Covid-19 survivors has found significant risks for mental health issues. Researchers found that one in 16 patients who never had a mental illness will be diagnosed with one within three months after infection. This risk is about twice as high as expected and is even higher among patients who were sick enough to be hospitalized, study leader Maxime Taquet told Reuters.
- Taquet said that most common are anxiety disorders, but depression, insomnia, and rarely, dementia, also occur. The study, reported on Sunday on the medRxiv website ahead of peer review, also found higher-than-average Covid-19 rates in people with a previous psychiatric diagnosis. "If you experience anxiety, low mood, insomnia or memory loss after COVID-19, you should see a medical professional as there might be ways to improve these symptoms," Taquet said to patients, according to Reuters.
- Researchers in Hong Kong, who expected viral load to correlate with smell and taste impairment, have found that viral load was not linked to the severity of these so-called olfactory and gustatory symptoms, nor with how long it takes for the sense of smell or taste to return to normal. The findings were reported in the journal Laryngoscope.

- The findings are based on data from 39 patients in Hong Kong who developed problems smelling or tasting - or both. On average, it took 10 days for these senses to return. Four to six weeks after becoming ill, 72% had completely recovered the ability to smell and 83% were able to taste again. But there was no statistically significant link between viral load and severity of these symptoms or the recovery time.
- New data from a nationwide study in the US may help fine-tune the use of convalescent plasma to treating seriously ill Covid-19 patients. The therapy involves transfusion of antibody-rich blood plasma from people who have recovered from the disease.
- At 2,807 hospitals between April 4 and July 4, more than 35,000 hospitalised patients with, or at risk of, life-threatening Covid-19 respiratory problems received a transfusion of at least one unit of Covid-19 convalescent plasma.
- Roughly half the patients were in intensive care units and roughly one-quarter needed mechanical ventilators. Mortality rates were lower when plasma was given within three days of diagnosis, rather than later, the researchers found. And the more antibodies in the plasma, the lower the recipients' risk of death.
- The research team concluded, in a report posted ahead of peer review on medRxiv, that while the study was not a gold-standard randomised trial, the findings added to evidence that "the quality and manner in which convalescent plasma is administered to patients hospitalized with COVID-19 may reduce mortality."

(With agency inputs)

https://www.hindustantimes.com/environment/latest-on-covid-19-research-from-immune-response-to-psychiatric-risk-and-plasma-therapy/story-tymhAm58lDdAeXKCmdKhfO.html

The Sentinel
of this land, for its people

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New research shows obesity can increase risk of death from COVID-19

research shows that obesity is associated with a substantial increased risk of death from COVID-19

New Delhi: New research shows that obesity is associated with a substantial increased risk of death from COVID-19.

However, it also found that the risk of death from coronavirus associated with obesity is not uniform among those who are obese, but instead disproportionately affects men and people under 60 years of age.

In a study, researchers looked at the electronic health records of 6,916 Kaiser Permanente Southern California members who tested positive for COVID-19 between February 13 and May 2. The mean patient age was 49 years and mean BMI was 30.5. A BMI of 30 to 39 is considered obese, 40 to 44 is severely obese, and 45 or higher is extremely obese.

The study found that patients who were severely obese had nearly 3 times the risk of death and those who were extremely obese had over 4 times the risk of death from COVID-19 compared to those of normal weight.

Severely and extremely obese people who were 60 years old and younger had a substantially higher risk of death than severely obese people over age 60. Severely and extremely obese men had a very high risk of death, while women had no increased risk of death associated with obesity.

Sameer B. Murali, MD, an internal medicine physician at Kaiser Permanente Fontana Medical Center and senior author on this study, noted that when physicians know more precisely who is at elevated risk of death, they can put in place treatment plans and interventions to modify that risk, rather than treating every patient the same.

"By viewing the risk posed by obesity through the prism of COVID-19, this study advances the characterisation of obesity as a disease that demands a public health and clinical response similar to that for diabetes or heart disease," he said.

Adding, "One pandemic is expanding our understanding of another, and we hope this work not only provides physicians and patients a better grasp of the risk obesity poses in the setting of COVID-19, but also to overall health." (IANS)

https://www.sentinelassam.com/topheadlines/assam-covid-cases-2792-more-people-test-covid-19-positive-total-cases-79667-495790?infinitescroll=1

PHYS.ORG

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New findings on SARS-CoV-2 protein shed light on virus's ability to infect cells

At the start of a COVID-19 infection, the coronavirus SARS-CoV-2 docks onto human cells using the spike-like proteins on its surface. The spike protein is at the centre of vaccine development because it triggers an immune response in humans. A group of German scientists, including members of the European Molecular Biology Laboratory (EMBL) in Heidelberg, the Max Planck Institute of Biophysics, the Paul-Ehrlich-Institut, and Goethe University Frankfurt have focused on the surface structure of the virus to gain insights they can use for the development of vaccines and of effective therapeutics to treat infected patients.

Credit: Pixabay/CC0 Public Domain

The team combined cryo-electron tomography, subtomogram averaging, and molecular dynamics simulations to analyze the molecular structure of the spike protein in its natural environment, on intact virions, and with near-atomic resolution. Using EMBL's state-of-the-art cryo-electron microscopy imaging facility, 266 cryotomograms of about 1000 different viruses were generated, each carrying an average of 40 spikes on its surface. Subtomogram averaging and image processing, combined with molecular dynamics simulations, finally provided the important and novel structural information on these spikes.

The results were surprising: the data showed that the globular portion of the spike protein, which contains the receptor-binding region and the machinery required for fusion with the target cell, is connected to a flexible stalk. "The upper spherical part of the spike has a structure that is well reproduced by recombinant proteins used for vaccine development," explains Martin Beck, EMBL group leader and a director of the Max Planck Institute (MPI) of Biophysics. "However, our findings about the stalk, which fixes the globular part of the spike protein to the virus surface, were new."

"The stalk was expected to be quite rigid," adds Gerhard Hummer, from the MPI of Biophysics and the Institute of Biophysics at Goethe University Frankfurt. "But in our computer models and in the actual images, we discovered that the stalks are extremely flexible." By combining molecular dynamics simulations and cryo-electron tomography, the team identified the three joints—hip, knee and ankle—that give the stalk its flexibility.

"Like a balloon on a string, the spikes appear to move on the surface of the virus and thus are able to search for the receptor for docking to the target cell," explains Jacomine Krijnse Locker, group leader at the Paul-Ehrlich-Institut. To prevent infection, these spikes are targeted by antibodies. However, the images and models also showed that the entire spike protein, including the stalk, is covered with chains of glycans—sugar-like molecules. These chains provide a kind of protective coat that hides the spikes from neutralizing antibodies: another important finding on the way to effective vaccines and medicines.

More information: Beata Turoňová et al. In situ structural analysis of SARS-CoV-2 spike reveals flexibility mediated by three hinges. *Science* 18 Aug 2020: DOI: 10.1126/science.abd5223, science.sciencemag.org/content … 8/17/science.abd5223

Journal information: *Science*

https://phys.org/news/2020-08-sars-cov-protein-virus-ability-infect.html

ET Healthworld.com
From The Economic Times

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Eight teams of scientists from India and US selected for pursuing research on Covid-19

The mission of the Indo-US Science and Technology Forum is to act as a catalyst to promote long-term scientific collaborations between India and the United States through partnerships amongst individual scientists, scientific institutions, and the scientific community at large, the DST statement said

New Delhi: Eight binational teams of researchers from India and the US have been selected for pursuing cutting-edge research in pathogenesis and disease management of Covid-19, according to an official statement on Tuesday.

The teams will pursue research in areas such as antiviral coatings, immune modulation, tracking SARS CoV-2 in wastewater, disease detection mechanisms, reverse genetics strategies and drug repurposing.

The research awards were announced by the Indo-US Science and Technology Forum (IUSSTF), an autonomous bilateral organisation jointly funded by the governments of India and the US, which promotes science, technology, engineering and innovation through substantive interaction among government, academia and industry.

The Department of Science and Technology (DST) under the Ministry of Science and Technology, and the US Department of States are respective nodal departments.

The mission of the Indo-US Science and Technology Forum is to act as a catalyst to promote long-term scientific collaborations between India and the United States through partnerships amongst individual scientists, scientific institutions, and the scientific community at large, the DST statement said.

"The eight teams are among the best few who had submitted proposals in response to an invitation of proposals to harness the combined expertise of the Indian and US Science & Technology communities, facilitate partnerships between teams of Indian and US scientists and

engineers currently engaged in Covid-related research, and leverage existing infrastructure from both countries to further advance the research and accelerate progress," the statement said.

Ashutosh Sharma, DST Secretary and IUSSTF India Co-Chair, said an overwhelming response in a short time to the special call on Covid-19 demonstrates a wide spectrum of cooperation between India and the US from the basic studies on the behaviour of SARS-Cov-2 virus to its transmission to diagnostics and therapeutic approaches.

"Our existing strong cooperation in S&T on health, energy, artificial intelligence and so on also continues to bring value and attests to the importance of Indo-US collaborations in providing compelling solutions," Sharma said.

Jonathan Margolis, Deputy Assistant Secretary for Science, Space and Health, Bureau of Oceans and International Environmental and Scientific Affairs, US Department of State, and IUSSTF US Co-Chair, said the United States and India were able to quickly mobilise, through IUSSTF, to support jointly developed innovations to fight Covid-19.

"Our people and economies both rely on science and technology to identify tools to address the pressing challenges of the current pandemic," the statement quoting Margolis said.

https://health.economictimes.indiatimes.com/news/industry/eight-teams-of-scientists-from-india-and-us-selected-for-pursuing-research-on-covid-19/77611935

ET Healthworld.com
From The Economic Times

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Vaccine candidate to enter phase-3 human trial: Health Ministry

The Ministry of Health and Family Welfare said on Tuesday that one of the three COVID-19 vaccine candidates would enter the third phase of the pre-clinical human trial by Wednesday

New Delhi: The Ministry of Health and Family Welfare said on Tuesday that one of the three COVID-19 vaccine candidates would enter the third phase of the pre-clinical human trial by Wednesday.

The information was shared by Dr V.K. Paul, head of the national task force on COVID-19, during a weekly press briefing.

The ministry officials said that the vaccine candidate entering the third phase has yielded encouraging results in the initial phases of its trial. Paul added that the other two vaccines are currently in phase-I or II of their pre-clinical trials. However, they did not reveal the names of the vaccines while sharing the status of their testing phase.

While the officials did not reveal the names of the vaccine candidates while speaking about their testing phase, it could be gathered that the vaccine entering the third phase is Bharat Biotech's Covaxin, jointly developed with the Indian Council of Medical Research (ICMR).

India has currently three vaccine candidates for COVID-19.

ChAdOx1, developed by Oxford University and manufactured jointly by the Serum Institute of India (SII), Pune and AstraZeneca, Bharat Biotech's Covaxin, jointly developed with the Indian Council of Medical Research and the third is ZycovD by Zydus Cadila.

The SII stated on Monday that it would start phase-2 trial of its COVID-19 vaccine this week. It added that it has shortlisted 10 centres across India to host phases-2 and 3 for human clinical trials. Meanwhile, Zydus Cadila administered the second dose of its COVID-19 vaccine a few days ago.

The developments on the vaccine came a day after the National Expert Group on Vaccine Administration met five domestic COVID vaccine manufacturers to review the clinical trial stages

of these vaccine candidates. The manufacturers included two whose products are not yet in the clinical trial stage in India.

Zydus Cadila had stated in the review meeting that it may be able to launch the vaccine by next year.

https://health.economictimes.indiatimes.com/news/industry/vaccine-candidate-to-enter-phase-3-human-trial-health-ministry/77616065

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Coronavirus D614G mutation: Will it impact COVID-19 vaccine's efficacy? Here's what experts say

Coronavirus genome is highly prone to mutations that lead to genetic drift and escape from immune recognition. Will the D614G mutation in the SARS-CoV-2 spike protein affect COVID-19 vaccine's efficacy?

By Salome Phelamei

Key Highlights

- ***A number of vaccines and treatments are being developed to combat the novel coronavirus pandemic***
- ***Researchers have found that the spike protein of SARS-CoV-2 has been undergoing mutations and is highly glycosylated***
- ***Scientists and health researchers are studying whether mutations in coronavirus can have impact on the efficacy of a potential vaccine***

New Delhi: Mutations in the spike protein of SARS-CoV-2, the novel coronavirus that causes COVID-19 disease, have triggered serious concerns about needing different vaccines and therapies for different variants. On Sunday, a mutation of coronavirus, dubbed D614G, that is 10 times more infectious than COVID-10 has been detected in Malaysia, media reported.

According to the World Health Organization (WHO), scientists detected the mutation as early as February 2020 and it has circulated in Europe and the Americas. WHO had said there's no evidence that the mutation can result in more severe illness.

The report cited Malaysia's Director-General of Health Noor Hisham Abdullah who urged greater public vigilance after authorities detected the new strain of coronavirus (D614G) in two recent clusters. Similar discoveries in other countries, including India and Japan, were reported amid the pandemic, triggering public concerns over the efficacy of experimental coronavirus vaccines. Noor Hisham also warned COVID-19 vaccines currently being developed may not be effective against the new coronavirus strain.

Will the D614G mutation in coronavirus affect vaccine development?

As the new coronavirus continues to reproduce and spread worldwide, researchers are tracking the mutations to ensure that changes in the virus do not make it more challenging to treat or develop a vaccine. Scientists and health researchers across the world are exploring different methods for investigation - including various small molecule approaches targeting RNA polymerase, 3C-like protease, and RNA endonuclease, as well as exploration of antibodies obtained from convalescent plasma from patients who have recovered from COVID-19.

Researchers studying the virus have found that the coronavirus genome is highly prone to mutations that lead to genetic drift and escape from immune recognition. Therefore, it is imperative that sub-strains with different mutations are also accounted for during vaccine development, noted

scientists at the IMB Cambridge Scientific Center. The scientists also noted that the emergence of drift variants may affect vaccine development and antibody treatment.

However, experts from China claimed that mutations in coronavirus would not change the efficacy of drugs.

“It is normal for a virus to mutate in different countries and even in different areas of one country, as a virus has to adapt to local people's DNA and the local environment,” Yang Zhanqiu, deputy director of the pathogen biology department at Wuhan University, told the *Global Times* on Monday.

According to the Chinese experts, a certain strain will form a new strain if more than 20 per cent of its genetic information mutates, which may cause current vaccines to lose effectiveness, but there is a low possibility. This is due to the fact that mutations do not necessarily affect the target site of the vaccine, added the report quoting the experts. Further, the vaccines being developed normally cover more than one target site to ensure efficacy, the experts noted.

The Chinese experts also added researchers could make changes to the existing vaccines for new strains - such as the human papilloma virus (HPV) vaccine at different valences to suit different types of HPV.

Also, a study of China WHO showed that the G614 variant remained susceptible to neutralisation by antibodies isolated from infected patients. “An amino acid change (D614G) outside the RBD was found to be more infectious, but no evidence of being resistant to neutralizing antibodies has been demonstrated,” they said.

A review published in *Cell* in July by Nathan D Grubaugh, an assistant professor of epidemiology of microbial diseases at Yale School of Public Health, and co-workers remarked antibodies built from natural D614 and G614 infections can cross-neutralise - which means that antibodies made against D614 could work for G614, and vice-versa.

“The D614G mutation is therefore unlikely to have a major impact on the efficacy of vaccines currently in the pipeline, some of which exclusively target the RBD,” Prof. Grubaugh et al. noted.

The Bottom Line

Experts also pointed out that there is really no reason for developing two vaccines as almost all circulating SARS-CoV-2 around the world is the G614 variant now.

Besides, Paul Tambyah, senior consultant at the National University of Singapore and president-elect of the US-based International Society of Infectious Diseases, told *Reuters* that the D614G mutation is not likely to impact the efficacy of a potential vaccine. According to Tambyah, the mutation may be, in fact, a ‘good thing’ as it appears less deadly although it has been found to be more infectious.

That said, it’s important to note that the SARS-CoV-2 is a new virus that’s evolving rapidly and scientists are still learning about it. Hence, more research is required to know the impact of the virus mutations on the disease, transmission, vaccine and other therapeutic development.

(The views expressed by the author are personal and do not in any way represent those of Times Network.)

https://www.timesnownews.com/health/article/coronavirus-d614g-mutation-will-it-impact-covid-19-vaccine-s-efficacy-here-s-what-experts-say/638732