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समाचार पत्रों से चयित अंश Newspapers Clippings

A Daily service to keep DRDO Fraternity abreast with DRDO Technologies, Defence Technologies, Defence Policies, International Relations and Science & Technology

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**Press Information Bureau
Government of India**

Ministry of Defence

Wed, 23 Dec 2020 8:14PM

Successful Maiden Launch of MRSAM

Defence Research and Development Organisation (DRDO) achieved a major milestone today with the maiden launch of Medium Range Surface to Air Missile (MRSAM), Army Version from Integrated Test Range, Chandipur, off the Coast of Odisha around 1600 hrs. The missile completely destroyed a high speed unmanned aerial target which was mimicking an aircraft with a direct hit.

Army version of MRSAM is a surface to Air Missile developed jointly by DRDO, India and IAI, Israel for use of the Indian Army. MRSAM Army weapon system comprises of Command post, Multi-Function Radar and Mobile Launcher system. The complete Fire Unit has been used during the launch in the deliverable configuration. The team from the users i.e. Indian Army also witnessed the launch. Number of range instruments such as Radar, Telemetry and Electro-Optical Tracking System were deployed and captured the complete mission data, validating the weapon system performance including the destruction of the target.

Raksha Mantri Shri Rajnath Singh lauded the efforts of DRDO and associated team members involved in the mission and said that India has attained a high level of capability in the indigenous design and development of advanced weapon systems.

Secretary Dept. of Defence R&D and Chairman, DRDO Dr G Satheesh Reddy congratulated the DRDO community for successfully demonstrating the performance of the MRSAM Army weapon system registering direct target hit in its maiden launch. He also lauded the efforts of the entire team in realizing the system within record time and meeting the committed schedule.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1683136>



India successfully test-fires Army version of medium-range surface-to-air missile

In April 2017, India had signed a contract with Israel for supply of the MRSAM, which is a land-based medium-range Air Defence surface-to-air missile system

Pune: India on Wednesday conducted the first launch of the Army version of the Medium Range Surface to Air Missile (MRSAM), which is an Air and Missile Defence system developed by the Defence Research and Development Organisation (DRDO) in collaboration with the Israel Aerospace Industry (IAI). The successful test was conducted off the coast of Odisha from the Integrated Test Range (ITR) around 4 pm, in which the missile hit an unmanned aerial target mimicking an aircraft.

In April 2017, India had signed a contract with Israel for supply of the MRSAM, which is a land-based medium-range Air Defence surface-to-air missile system. The MRSAM Army version consists of a command and control post, multi-function radar and mobile launcher system. The complete fire unit was used during the launch on Wednesday in the deliverable configuration. A team of the Indian Army also witnessed the launch.

“A number of range instruments such as radar, telemetry and electro-optical tracking system were deployed and captured the complete mission data, validating the weapon system performance, including the destruction of the target,” read a statement from the Ministry of Defence.

Posting the video of Wednesday’s MRSAM test, the office of Defence Minister Rajnath Singh tweeted, “Raksha Mantri Shri Rajnath Singh has congratulated Team DRDO for the successful maiden launch of the Army version of MRSAM missile off the coast of Odisha today. The MRSAM Army version is a Surface to Air Missile developed jointly by DRDO and IAI, Israel.”

The DRDO said in a tweet, “Maiden launch of Medium Range Surface to Air Missile (MRSAM) Army Version from Integrated Test Range, Chandipur, off the Coast of Odisha, was conducted at about 4 pm. The missile destroyed the high-speed unmanned aerial target, which was mimicking an aircraft, with a direct hit.”

The Defence Research and Development Laboratory, a Hyderabad-based facility of the DRDO Lab, has jointly developed this missile in collaboration with Israel Aerospace Industries. The MRSAM has been manufactured by Bharat Dynamics Limited, India.

In May 2019, Indian Navy, DRDO and Israel Aerospace Industries had conducted the maiden ‘co-operative engagement firing’ of the naval version of the MRSAM. The firing was undertaken on the Western seaboard by Indian Naval Ships Kochi and Chennai, wherein the missiles from both ships were controlled by one ship to intercept different aerial targets at extended ranges.

At the time of the May 2019 MRSAM naval version test, the Ministry of Defence had said, “These Surface to Air Missiles are fitted onboard the Kolkata Class Destroyers and would also be fitted on all future major warships of the Indian Navy. With the successful proving of this cooperative mode of engagement, the Indian Navy has become part of a select group of navies that have this niche capability. This capability significantly enhances the combat effectiveness of the Indian Navy, thereby providing an operational edge over potential adversaries.”

The MoD press statement read, “DRDO Chairman Dr G Satheesh Reddy congratulated the DRDO community for successfully demonstrating the performance of the MRSAM Army weapon system, registering direct target hit in its maiden launch. He also lauded the efforts of the entire team in realising the system within record time and meeting the committed schedule.”

<https://indianexpress.com/article/india/india-successfully-conducts-maiden-launch-of-the-army-version-of-medium-range-surface-to-air-missile-7117326/>

India successfully conducts maiden launch of the Army version of Medium Range Surface to Air Missile

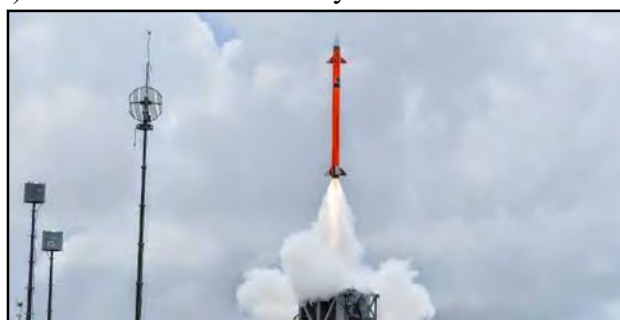
This most advanced sleek missile has been developed by India in a joint collaboration with Israel. The missile achieved a 'direct hit'

By Hemant Kumar Rout

Bhubaneswar: India successfully conducted the first Army version test of state-of-the-art Medium-Range Surface-to-Air Missile (MRSAM) from a defence facility off Odisha coast on Wednesday.

This most advanced sleek missile has been developed by India in a joint collaboration with Israel. The missile achieved a 'direct hit'.

Defence sources said the missile was flight tested in full operational configuration from the launching complex - III of the Integrated Test Range (ITR) at Chandipur-on-sea at about 4 pm. The missile targeted an unmanned aerial vehicle (UAV) Banshee, a British drone.



MRSAM being test-fired from ITR off Odisha coast. (File Photo | EPS)

Jointly developed by Defence Research and Development Organisation (DRDO) and Israel Aerospace Industries, the missile was tested in the presence of Army officials.

DRDO Chairman Dr G Satheesh Reddy said the first army version test of the missile was a roaring success as the missile intercepted a manoeuvring air-breathing target that mimicked an attacking combat aircraft. "All mission parameters were successfully met and Indian missile components validated," he told *The New Indian Express*.

Having a strike range of nearly 100 km, the 4.5-meter long nuclear-capable ballistic missile weighs around 2.7 tonne and can carry a payload of 60 kg. Apart from the missile, the launching platform includes a Multi-Functional Surveillance and Threat Alert Radar (MFSTAR) for detection, tracking, and guidance of the missile.

The new generation MRSAM has been developed to neutralise airborne threats like jets, missiles and rockets, including projectiles launched simultaneously. The missile has a speed of Mach 2 and possesses high degrees of maneuverability at the target interception range.

Earlier, three trials of the naval version of the missile were conducted from the same test facility in 2016 followed by a user trial from INS Kochi in 2017.

As a precautionary measure, Balasore district administration had shifted around 8,100 people residing within 2.5 km radius of the LC-III of the ITR. The residents were compensated as per the Ministry of Defence guidelines.

Fishermen of Balasore, Bhadrak and Kendrapara districts were also warned not to venture into the sea during the test. The DRDO is also readying for a second test of the missile on Thursday.

<https://www.newindianexpress.com/nation/2020/dec/23/india-successfully-test-fires-army-version-of-medium-range-surface-to-air-missile-2240165.html>

सेना के लिए 'एमआरसैम' मिसाइल का DRDO ने किया पहला सफल परीक्षण, इजरायल की मदद से किया गया है तैयार

ओडिशा के चांदीपुर आईटीआर रेंज से परीक्षण किया गया। आसमान में दुश्मन के फाइटर जेट, हेलीकॉप्टर और ड्रोन को मारने के लिए इसका इस्तेमाल किया जाता है। टेस्ट से पहले रेंज के आसपास से ओडिशा के तट से लोगों को दूसरी जगह पहुंचाया गया।

By नीरज राजपूत

नई दिल्ली: एलएसी पर चीन से चल रहे टकराव के बीच डीआरडीओ ने इजरायल की मदद से आसमान में दुश्मन के फाइटर जेट, हेलीकॉप्टर और ड्रोन को मारने के लिए एमआरसैम मिसाइल का पहला सफल परीक्षण किया। मध्यम दूरी की इस मिसाइल का परीक्षण बुधवार को ओडिशा के चांदीपुर में इंटीग्रेटेड टेस्ट रेंज (आईटीआर) में किया गया। ये मिसाइल डीआरडीओ ने थलसेना के लिए तैयार की है। इस मिसाइल का नेवल-वर्जन, बराक-8 पहले से ही भारतीय नौसेना इस्तेमाल कर रही है।

रक्षा मंत्रालय के मुताबिक, थलसेना के लिए मीडियम रेंज सर्फेस टू एयर मिसाइल (एमआरसैम) यानि जमीन से आसमान तक मार करने वाली मध्यम दूरी की मिसाइल का बुधवार शाम 4 बजे पहला सफल परीक्षण किया गया। मिसाइल ने इसके लिए एक मानव-रहित एरियल टारगेट को



डायरेक्ट-हिट से पूरी तरह से तबाह कर दिया। इस एरियर टारगेट को एक एयरक्राफ्ट की तरह इस्तेमाल किया गया था। इस दौरान थलसेना के वरिष्ठ सैन्य अधिकारी भी वहां मौजूद थे।

एमआरसैम को डीआरडीओ यानि डिफेंस रिसर्च एंड डेवलपमेंट ऑर्गेनाइजेशन ने इजरायल की आईएआई यानि इजरायली आर्म्स इंडस्ट्री की मदद से तैयार किया है। इसकी रेंज करीब 100 किलोमीटर है। इन एमआरसैम वैपन सिस्टम में कमांड-पोस्ट, मल्टी फंक्शन रडार और मोबाइल लॉन्चर सिस्टम है। परीक्षण के दौरान पूरे मिशन-डाटा को रिकॉर्ड किया गया। एमआरसैम का नेवल वर्जन यानि समुद्री-संस्करण, 'बराक-8' भारतीय नौसेना पहले से ही अपने युद्धपोतों में इस्तेमाल कर रही है। नौसेना इन बराक-8 मिसाइलों को एंटी-शिप मिसाइल की तरह भी इस्तेमाल करती है।

डीआरडीओ ने एमआरसैम का परीक्षण ऐसे समय में किया है जब एलएसी पर चीन के साथ जबरदस्त तनातनी चल रही है। इस टेस्ट के बाद माना जा रहा है कि इस मिसाइल को भारतीय सेना में जल्द शामिल कर लिया जाएगा। बुधवार को ही थलसेना प्रमुख ने लद्दाख के दौरान एलएसी के रेचिन-ला दर्रा का दौरा किया था और सेना की ऑपरेशनल तैयारियों का जायजा लिया था।

एमआरसैम के सफल परीक्षण पर रक्षा मंत्री राजनाथ सिंह और डीआरडीओ के चैयरमेन जी सथीश रेड्डी ने रिकॉर्ड समय में इस मिसाइल को तैयार करने के लिए बधाई दी। इस परीक्षण से पहले आईटीआर रेंज के आसपास रहने वाले लोगों को सुरक्षित स्थानों पर पहुंचा दिया गया था।

<https://www.abplive.com/news/india/drdo-today-successfully-carried-out-mrsam-missile-maiden-test-ann-1691794>

‘ATAGS howitzer best artillery gun in world’: All you need to know about this indigenously built weapon

The ATAGS program, which commenced eight years ago, is indisputably one of India's biggest success stories in its path to transform itself into a self-reliant nation in defence

Key Highlights

- *With 95 per cent indigenous content, the ATAGS is truly a 'Made in India' weapon*
- *Utilising a dual power system that integrates hydraulics for improved mobility and in/out action, the gun is effective in a whole range of terrains from roads, to cross country, to deserts and to high altitude areas*
- *According to the DRDO, it can fire three rounds in 15 seconds while in burst mode, and as many as 60 rounds in 60 minutes while in sustained mode*

Earlier this week, Advanced Towed Artillery Gun System (ATAGS) project director and senior Defence Research and Development Organisation (DRDO) scientist Shailendra V Gade made a bold claim when he said the indigenously-developed weapon was the 'best gun in the world' and may very well be able to independently meet the Indian Army's full requirement of 1800 artillery guns systems.

The Indian Army was, reportedly, initially looking at acquiring around 1600 artillery guns from the DRDO and an additional 400 Israeli-made ATHOS guns.

The ATAGS program, which commenced eight years ago, is indisputably one of India's biggest success stories in its path to transform itself into a self-reliant nation in defence. When the project first began, two strategic partners – Bharat Forge Limited and Tata Power SED – were roped in and within a period of just 30 months, the product was developed.

Over the last four years, the ATAGS howitzer has undergone extensive testing, is widely believed to be one of the most advanced guns in the world, and is, reportedly, the only one capable of firing Bi-Modular Charge System Zone 7 propellant. It is also the only gun in the 155m family that has achieved a firing range of 48km.

With 95 per cent indigenous content, the ATAGS is truly a 'Made in India' weapon. The gun system includes 7,463 components of which 4,877 are manufactured parts requiring roughly 30,000 manufacturing processes and over 2,00,000 inspection parameters. Utilising a dual power system that integrates hydraulics for improved mobility and in/out action, the gun is effective in a whole range of terrains from roads, to cross country, to deserts and to high altitude areas.

The howitzer is also integrated with advanced features like an auxiliary power mode, an automatic command and control system, a state-of-the-art communication system and night vision capabilities. According to the DRDO, it can fire three rounds in 15 seconds while in burst mode, and as many as 60 rounds in 60 minutes while in sustained mode. The 155m calibre weapon has a weight of 18 tonnes, with a barrel length of 6,875mm. It requires a crew of between 6 and 8 personnel to operate it.

Over the last five years, the ATAGS has undergone extensive trials completing each of them successfully. In October this year, the gun entered the final stage of trials – the Preliminary Staff Qualitative Requirements trial – required before it can be inducted into the Army. In the previous trials, the Bharat Forge Limited gun system had, reportedly, fired over 130 rounds, mostly in Zone



The ATAGS howitzer undergoing trials in Balasore, Odisha. | Photo Credit: ANI

7, successfully meeting all the parameters. The TATA Aerospace and Defence Limited gun has fired around 99 rounds.

The DRDO has previously noted that the ATAGS can perform “far better” than the BOFORS gun that came to be a crucial asset for the Indian Army during the 1999 Kargil War. The agency has also stated that it can compete with any imported gun including the Israeli Athos.

<https://www.timesnownews.com/india/article/atags-howitzer-best-artillery-gun-in-world-all-you-need-to-know-about-this-indigenously-built-weapon/698106>

अमर उजाला

Thu, 24 Dec 2020

डीआरडीओ के वरिष्ठ वैज्ञानिक डा.हेमंत को मिला साइंटिस्ट ऑफ द ईयर पुरस्कार

पिथौरागढ़: रक्षा जैव ऊर्जा अनुसंधान (डीआरडीओ) पंडा पिथौरागढ़ के वरिष्ठ वैज्ञानिक डॉ. हेमंत पांडेय को उनके विशिष्ट शोधों के लिए डीआरडीओ के प्रतिष्ठित पुरस्कार साइंटिस्ट ऑफ द ईयर से सम्मानित किया गया है। डॉ. पांडेय को 18 दिसंबर को डीआरडीओ मुख्यालय नई दिल्ली में रक्षामंत्री राजनाथ सिंह ने प्रशस्ति पत्र और दो लाख रुपये की राशि पुरस्कार स्वरूप प्रदान की।

डॉ. पांडेय को यह सम्मान उनके हिमालयी औषधीय पौधों पर पिछले 25 वर्षों से किए जा रहे शोध कार्यों और छह हर्बल उत्पादों के आविष्कार के लिए दिया गया। डॉ. पांडेय ने ल्यूकोडर्मा और एक्जिमा की हर्बल दवाओं के साथ ही दांत दर्द निवारक औषधि, एंटी अल्ट्रावायलट रेडिएशन क्रीम, हर्बल हेल्थ सप्लीमेंट और शरीर की रोग प्रतिरोधक क्षमता बढ़ाने वाले हर्बल उत्पादों का आविष्कार किया है। उन्होंने तीन औषधीय उत्पादों की तकनीक का हस्तांतरण प्रतिष्ठित हर्बल कंपनियों को किया। डॉ. पांडेय ने आठ पेटेंट भी फाइल किए हैं।

डॉ. पांडेय के एक उत्पाद ल्यूकोडर्मा रोधी ल्यूकोस्किन नामक औषधि से डीआरडीओ को 2.30 करोड़ से अधिक की रॉयल्टी मिल चुकी है। अन्य औषधीय उत्पादों के विभिन्न कंपनियों से किए गए हस्तांतरण से भी 50 लाख रुपये से अधिक की राशि डीआरडीओ को मिल चुकी है। डॉ. पांडेय ने ल्यूकोस्किन उत्पाद का उन्नत संस्करण भी तैयार किया है। वैज्ञानिक डॉ. पांडेय विभिन्न असाध्य रोगों की दवाएं तैयार करने के लिए शोध कर रहे हैं।

<https://www.amarujala.com/uttarakhand/pithoragarh/drdo-senior-scientist-dr-hemant-received-scientist-of-the-year-award-pithoragarh-news-hld408460277>



दिल्ली में रक्षामंत्री राजनाथ सिंह के हाथों साइंटिस्ट ऑफ द ईयर सम्मान प्राप्त करते डा.हेमंत पां? - फोटो : PITHORAGARH



Thu, 24 Dec 2020

Army Chief visits forward areas in eastern Ladakh to review situation along LAC

The Indian Army said that Naravane “visited forward areas of Fire and Fury Corps including Rechin La and undertook a first-hand assessment of the situation along the LAC”

By Krishn Kaushik

New Delhi: Army Chief General MM Naravane, who is on a one-day trip to eastern Ladakh on Wednesday, also visited the forward areas along the Line of Actual Control (LAC), where India and China are involved in an over seven-month-long military standoff.

The Indian Army said that Naravane “visited forward areas of Fire and Fury Corps including Rechin La and undertook a first-hand assessment of the situation along the LAC”. Fire and Fury Corps, or the XIV Corps is responsible for the LAC in eastern Ladakh. Army said that he “undertook on the spot inspection of the state of the habitat of troops on the forward line of defences at Rechin La”.

Rechin La is one of the several areas in the Chushul sub-sector, and the north bank of Pangong Tso, where Indian troops are sitting on positions higher than 14,000 feet. The altitude and the arid region, where temperatures can drop to minus 40 degrees Celsius, provide a very harsh climate for the soldiers.

The Army chief also “visited forward base Tara and interacted with the local commanders and troops”, Army mentioned.

In the pictures from the forward areas, Army tanks are visible behind Naravane.

As the trip comes just ahead of Christmas, Naravane “distributed sweets and cakes to soldiers”, Army said.

During his visit to the headquarters, the Army chief was given a detailed brief about the ground situation.

Nearly 50,000 soldiers each from India and China are stationed in eastern Ladakh, even as the ninth round of Corps Commander talks are awaited. It is for the first time that such a large number of troops are positioned in such a tough climate through the winters.

While India has sent a memo to China, a response for the next round of talks between the senior military commanders is awaited. As of now, there are no signs of disengagement and eventual de-escalation from either side.

India has been demanding status quo ante, or for the troops from the frontlines and from the depth areas, along with the additional artillery, tanks and air defence assets to be sent back to their April positions.



Army Chief General MM Naravane visited the forward areas along the Line of Actual Control (LAC) in eastern Ladakh. (Source: Indian Army)

However, China has been asking for Indian troops to first vacate the heights they occupied in August end in the Chushul sub-sector, including Mukhpari, Gurung Hill, Rezang La and Rechin La, as it provides India a direct view of China's Moldo Garrison and the strategically important Spanggur Gap, allowing the Indian troops to dominate the area. India has said that any disengagement will have to be across all friction points.

<https://indianexpress.com/article/india/army-chief-visits-forward-areas-in-eastern-ladakh-to-review-situation-along-the-lac-7116639/>

ThePrint

Thu, 24 Dec 2020

Army's proposed 'Tour of Duty' recruitment model could be expanded to Navy and IAF too

Three-year volunteer scheme is being designed to attract more youth to Army, fill up officers' vacancies, and reduce ballooning defence pensions

By Amrita Nayak Dutta

New Delhi: Months after it was first proposed by the Army, India's defence establishment is actively considering expanding the scope of the 'Tour of Duty' model of recruitment to the Air Force and Navy as well, ThePrint has learnt.

"We are planning to expand the scheme to bring all three services under its fold. Bringing the Central Armed Police Forces under the same scheme or a similar one is also under consideration," a defence official said, adding the finer details and calculations for the scheme are being worked out, so it can be implemented by the middle of next year.

Sources said India's political leadership is keen on the scheme, given its future potential to generate large-scale employment, and is pushing to working out its modalities. They added that there are plans to expand the scheme over the next few years to ensure that close to 40 per cent of the strength of the Army is recruited through it.

Army sources, however, told ThePrint that no concrete decision has yet been taken on the implementation of the scheme, and the idea is currently at the discussion stage.

Earlier this year, Chief of Defence Staff General Bipin Rawat had said the concept is at a nascent stage, and its viability needs to be studied.

What is the proposed model?

Currently, the only option apart from regular permanent commission into the armed forces is the Short Service Commission, in which officers are recruited for a period of 14 years. A large number of SSC officers eventually opt for permanent commission, subject to eligibility.

The Army had, in May, proposed the 'Tour of Duty' model of recruitment that would let young individuals voluntarily serve for a temporary period of three years. The idea is to attract more youth to join the Army, fill up officers' vacancies, and later, reduce burgeoning defence pensions, which make up nearly 30 per cent of the defence budget after ballooning when the 'One Rank One Pension' (OROP) scheme was implemented.



Representational image | Recruits to the J&K Light Infantry celebrate the end of their training | Photo: ANI

Defence sources told ThePrint that one of the names being considered for the scheme is 'Agnipath' (literally, the path of fire), with the volunteers set to be called 'Agniveers' (fire-warriors).

As reported by ThePrint, an initial pilot project is set to be tried out, with the first batch of recruits likely to include up to 100 officers and 1,000 personnel at other ranks. The model will be evaluated and assessed on the results of the pilot project.

'Close to 40 % of Army could be recruited through it'

To reduce the defence pension bill, the Department of Military Affairs (DMA) headed by CDS Rawat had proposed that those taking PMR (Pre-Mature Retirement) with 20-25 years of service will now be entitled to only 50 per cent of the current pension. As of now, rules state that officers will receive pension which is 50 per cent of their last drawn salary, for which they are eligible upon completing 20 years of service.

The original Tour of Duty proposal stated that the total amount spent on each officer recruited through the scheme would be Rs 80-85 lakh, including pre-commission training, pay, allowances, gratuity, proposed severance packages, leave encashment and other costs. Currently, an amount of Rs 5.12 crore is spent on an SSC officer who retires after 10 years, and Rs 6.83 crore on one who retires after 14 years. The savings on only 1,000 jawans could be Rs 11,000 crore, the proposal said, adding that this money could be put towards the modernisation of the Army.

A second defence official told ThePrint that to further reduce the pension bill, there are plans to expand the scheme over a few years to ensure that close to 40 per cent of Army personnel are recruited through it. The official used the Army as an example since it is the largest of the three services, with a strength of about 14 lakh.

"Around 65,000 personnel of the Army retire every year. The plan being considered is to recruit a certain number of personnel on this scheme, and keep increasing the number progressively every year, till they form a decided percentage of the armed forces," the official said.

The official said that such large-scale recruitment can come into effect only in about 15 years.

What the 'tour' will entail

While the final modalities of selection are yet to be worked out, sources said doing away with the written examination and fixing a cut-off percentage — in graduation for officers and class 12 for jawans — is being considered. But interviews will be part of the process.

Initial plans are to hold the training for the selected officers at the Officer Training Academy in Chennai, and for the jawans at the respective regimental centres. Selected regimental centres are to be nominated for the pilot project.

Once trained, these personnel would be sent to their respective units and field areas. The modalities for allotment of arms and services would be worked out separately, and would depend on the final figures or percentages approved.

"Eventually, it might be a move that will aim at generating large-scale employment in the country," a source said.

However, with the enhanced number of people being trained, the overall expenditure on the training will go up.

"While the nation as a whole will have certain trained, disciplined and motivated youth available for jobs, there will be a certain lack of continuity and lack of regimentation in the forces. It has to be seen how this can be checked," the second official quoted above said.

Another source said a similar scheme for CAPFs is also being considered. "We have sought comments from CAPFs on the move, which any further decision would be based on."

<https://theprint.in/defence/armys-proposed-tour-of-duty-recruitment-model-could-be-expanded-to-navy-and-iaf-too/571843/>

‘Third aircraft carrier is essential for India given China’s activities’

A third aircraft carrier is a necessity for India due to operational and tactical reasons, especially in the context of China’s growing imprint on the Indian Ocean, said a senior Navy officer

By Mayank Singh

New Delhi: A third aircraft carrier is a necessity for India due to operational and tactical reasons, especially in the context of China’s growing imprint on the Indian Ocean, said a senior Navy officer.

“Three aircraft carriers are tactically needed with one each on the Eastern and Western sea board at any given time while the third will be under refit,” the officer said.

“To deny it just for financial crunch is misplaced understanding. We require a third aircraft carrier for operational and tactical reasons.” India currently has one serving aircraft carrier, INS Vikramaditya, while another indigenously built INS Vikrant is scheduled to be commissioned by 2022. Earlier this month in Kolkata, Chief of Defence Staff General Bipin Rawat, had said that submarines and aircraft carriers “have their advantages and disadvantages.”

The officer said the Navy cannot lose a skill mastered in the last 60 years as it takes time to develop the skill-set in terms of operational design and development. An aircraft carrier, the officer asserted, adds to the “surge capability” as the fighter jets operating from land will always have their limitations.

Given the Chinese belligerence in the Indian Ocean, the officer said the country will have to extend air power into far-off areas like the Malacca Strait on one side and Gulf of Aden on the other. “Concentration of force is a principle of war. If you have two operationally ready carriers, you can be active in two areas. If needed, you can move it, bringing a different environment to the battle.”

<https://www.newindianexpress.com/nation/2020/dec/24/third-aircraft-carrier-is-essentialfor-india-given-chinas-activities-2240484.html>



This handout photograph taken and released by The Indian Navy shows aircraft carrier INS Vikrant - India's largest indigenously built warship. (Photo | AFP)

India's strategic defence: Theatre command and interoperability

In a planned manner the countries and armies developed strategic and tactical doctrines to derive synergy and use the smaller in number but technologically advanced weapon platforms in the air, sea and land

By Lt Col Manoj K Channan

The buzz words in the South Block in particular the CDS Secretariat and Army HQ are Theatre Commands and Interoperability. Let's step back and go to the era of the cold war, the US and its Western European created North Atlantic Treaty Organisation (NATO) and the Russians with their Eastern European countries created the Warsaw Pact organisation.

In a planned manner the countries and armies developed strategic and tactical doctrines to derive synergy and use the smaller in number but technologically advanced weapon platforms in the air, sea and land. The inventory control by using same calibre weapon systems and infrastructure development was done by NATO and WARSAW pact countries to be able to concentrate its combat power with shorter supply chains.

Looking at the strategic level, each side had satellites, AWACS, Reconnaissance by aerial and naval platforms and sum in the garb of fishing boats to eavesdrop on the communication and gather intelligence.

With technological developments; UAVs, nuclear submarines and multiple satellites' in various configurations monitor the targets 24×7, 365 days a year. This further got augmented by Artificial Intelligence, machine learning and the internet of things, in which the human interface gets reduced.

The question we need to ask is, "Are Indian Defence Forces really prepared?"

Yes, but not in all aspects as the Military grapples with many deficiencies both in equipment and technologies over years of neglect and in times of adversity looking for quick fix solutions.

Considering the fact that we have two belligerent neighbours who share an international boundary, line of control and line of actual control; from the Rann of Kutch to Arunachal Pradesh is a long boundary to defend.

Till March this year, it was not a major challenge; the Chinese PLA, having activated the LAC, has the Indian Defence Forces for a deployment that is not likely to end in the near future.

The Chinese cannot be trusted and the "Race to the Passes" has been in India's favour so far; is it worth the chance to withdraw and take a chance? The question must be a heavy load on the CDS's mind.

Fortunately LAC is quiet.

The LoC is better managed as it has been active over the last 50 years since the 1971 war, each side ratcheting up the heat with small arms weapons and artillery duels.

Coming back to theatre commands, it's not known what's the strategic aim and objectives that the Political Leadership has defined for India with respect to China and Pakistan in particular and its maritime territories.



Coastal and Maritime Protection : This should be the responsibility of the Indian Navy to include surface, sub-surface and aerial assets.

Based on the above, each theatre command would need to be equipped without getting into the “Guns versus Butter” debate.

The political leadership over the last 70 years has kept the military short of being ready for the next conflict, with an assumption personal rapport of the Leadership, trade and economy will be the deciding factors.

While the Indian Navy and Indian Air Force had no option but to be continuously engaged in keeping abreast with the latest technology for the naval platforms and air assets to survive the current threats. The sharp skirmish in the air on 27 February 2018, left the Indian Air Force to remain in standoff distance as its Air to Air Missiles were out gunned by the Pakistan Air Force Air to Air missiles, is just an example how tables can turn in a 5 minute engagement.

The Indian Army has been infantry-centric and all operations have been counter insurgency at company plus level operations. The force multiplier has been the small arms weapon and related to it the personal protection of the soldier.

The mind set of sending the foot soldier on a confirmatory patrol with a ‘feel and touch’ overriding factor has curtailed the use of technology in our operations.

One has to remember that the last synergised war was fought in 1971 and post that have been skirmishes at best.

The OP PRAKARAM deployment in 2002 and two decades later has our thought changed at the section platoon level? While battle and field craft will not change, the use of technology needs to be ingrained. The Special Forces have been quick to adapt to technologies; use them effectively in their operations.

What’s the malaise that prevents us from taking the leap of faith to change the way we fight?

Some of the answers are that the way we conduct operations given the threats we have, has held us in good stead, minimum casualties and the drills / standard operating procedures are well set, why upset the apple cart?

Same weapons and ammunition and joint logistics supply chain.

Intelligence Gathering : Intelligence gathering is a specialised job; the cold war days and romance of the James Bond movies is exciting but in the real world intelligence gathering is a painful, boring and seemingly a boring task. While specialised hit teams are being used, recently the killing of the Iranian scientist by smart weapons, the capability has to be developed and refined. No organisation is higher in the hierarchy; intelligence has to be credible and actionable. Reportedly and its assessments are not really helpful in an environment working on data.

Strategic Forces Command : This command has to start looking at areas of interest on land and sea but also in space too. The demonstration of a satellite kill weapon system is a key development to deny the target enemy state the use of its ‘eyes in the sky’; which means that the location of all the satellites’ at any given time has to be known. The nuclear submarines will gain more importance to have the given capability to strike with stealth and surprise, whenever required.

Perception Management : At the strategic level perception management and the use of social media is a soft approach to target the mind sets. Off-late Nation states have been calling the CEOs of these social media platforms to answer senate/parliamentary committees.

Cyber Warfare : The ability to hack into the adversaries networks, electoral process (setting up proxy regimes), industrial, power, water, flights, metros, trains, shipping, commerce are non-military targets, yet are effective in bringing a Nation state to the bargaining table without firing a shot.

Communication – Voice and Data: The diversity of the various assets and electromagnetic interference issues are things to be resolved. In the present environment keeping in mind the length and breadth, height and depth this remains a challenge and the vulnerability to electronic warfare as well as cyber- attacks and anti-radiation missiles needs to be thought through. Communication

has to be fool proof with built in redundancy. The services should be able to communicate across the spectrum.

Situational Awareness: The situational awareness for a section up to a subunit level for respective arm and service is of importance.

Training: Training needs to be revamped and has to be more professionally organised, yet ensuring the strength, stamina and tenacity required in the harsh battlefield environment.

Land: The basic training in each service is conducted by the respective services; is there a commonality in the basics of military training in point and area protection?

Air Defence This being the prime task of the Indian Air Force, the training and integration of assets need to be under the Indian Air Force.

Coastal and Maritime Protection: This should be the responsibility of the Indian Navy to include surface, sub-surface and aerial assets.

Does India have the capability to achieve this, to my mind, yes it does, if we have honesty of purpose and not use our weapons acquisition programs as an instrument of foreign policy; to keep our bilateral relationships on an even keel.

As one of the senior Naval Veterans very rightly advised, that given China is our major adversary, the answer doesn't lie in trying to play catch up with it. With a defence budget four times ours and a GDP five times ours it's a futile attempt, frittering away our scarce resources.

There is a need to do a SWOT analysis and our solutions have to be developed in house. We must learn to weave our own cloth and develop "electronic suites" that we need. We acquired the T 72s in the early 80s without ERA panels and frequency hopping sets and integrated fire control systems with TI sights. Recently the T 90s were acquired without an active protection system and air conditioning which has imposed a cost on its sighting systems due to extreme temperature conditions.

The Future Ready Combat Vehicle and the Modern Infantry Combat Vehicle have been ignored over the past decade. Likewise the capability of the Army Air Defence has been negated and the refurbishing of the out-dated equipment are some steps being taken to retain capability as the S 400 system comes in.

The Nagorno – Karabakh, the Armenia – Azerbaijan conflict brought out articles ringing the death knell for the main battle tank.

In complex modern day battlefields, lack of capability in any given area will be exploited hence the ability to orchestrate the battlefield to the plans is a capability that needs to be focused upon. The speed of operations with the ability to overthrow the enemies' decision making process is the key objective.

How soon can we start the process of inter-weaving the joint-ness from bottom-upwards; in the name of joint training, it's limited to National Defence Academy, Defence Services Staff College and thereafter NDC with the bureaucracy. If we can get our troops and their leaders on a common wavelength, the rest of the nitty gritty will be easy to iron out.

A thought needs to be given the Army Act, Air Force Act, Navy Act and the Defence Services Regulations need to be revised and have a common set of rules for the services. The history, ethos and élan of the fighting units must not be compromised in the eagerness for joint-ness.

The administrative requirements, perks and privileges must remain and none should be above the other, is the first step to bringing in joint-ness.

Time to think out of the box and build a strong Indian Defence Services self-reliant and self-contained. The military industrial growth has to be under the aegis of the PMO and needs to be headed by a maverick to deliver by yesterday.

(The author is an Indian Army Veteran. Views are personal.)

<https://www.financialexpress.com/defence/indias-strategic-defence-theatre-command-and-interoperability/2155816/>

India's New Maritime Theater Command: A Quantum Leap

*The new command will help India maintain a favorable
maritime balance of power when it comes to China*

By Shishir Upadhyaya

The latest announcement about the creation of India's first Maritime Theater Command by 2021 is a seminal development and part of the long overdue transformation of India's armed forces. Reportedly, the commander-in-chief of the new maritime theater command, who will be based at Karwar on the west coast of India, will exercise full operational control over extant western and eastern naval fleets, maritime strike fighter jets and transport aircraft from both the air force and the navy, and two amphibious infantry brigades and other assets under the Andaman and Nicobar Joint Command.

The maritime theater command will be the first new "geographical" theater command to be created, as part of the biggest-ever military restructuring plan since India's independence in 1947 when the Indian army, navy and air force were initially structured under separate operational commands. This arrangement impacted overall operational planning and efficiency, particularly in matters related to new acquisition, compatibility of equipment, drills/ procedures, training and logistics, leading to huge wastages.

Following the appointment of General Bipin Rawat as the country's first chief of defense staff, a slew of transformational changes — to be implemented on a war footing — have been announced. The country will now have a few and but geographically large theater commands, such as the maritime theater command, and joint functional commands such as the air defense command, and a joint logistics command.

The central location of the Indian peninsula thrusting out into the Indian Ocean and the Andaman Nicobar Islands, overlooking crucial shipping lanes and strategic choke points, has provided India with a huge geostrategic advantage over China, which is heavily dependent on shipping for its global trade and energy needs. Up to this point, this geographical advantage seems to have worked for India in maintaining a favorable balance of power with China. But the last decade has seen a rapid growth of Chinese maritime power and economic/political influence in the Indian Ocean region.

The PLA Navy's continued deployments and activities in the region since 2009, when Chinese naval ships first entered the Indian Ocean to participate in anti-piracy patrols off Somalia, has impinged on India's sphere of influence. In less than a decade China made quick gains in consolidating their position in the wider region by establishing its first naval base at Djibouti in 2017. Concurrently, strategic projects such as the Belt and Road Initiative have helped expand Chinese economic and political influence.

These developments have put pressure on the Indian navy and sometimes even also led to tensions. For instance, the increase in PLA Navy activities in the region including submarine deployments has forced the Indian navy to step up ship and air operations in the region. Also, in 2019, a Chinese naval vessel entered India's exclusive economic zone without approval and was asked to leave by the Indian navy.

On the whole, these advances in China's maritime powers have not only diluted India's geostrategic advantage, posing a challenge to India's leadership in the Indian Ocean region, but also emboldened China to engender a conflict situation along the Line of Actual Control (LAC), at Doklam in 2017 and later in the Ladakh region this year. Faced with an increasingly belligerent Chinese government, India has had to move closer to the United States, Japan and Australia to

counterbalance China. While, this seems to have had the desired effect in deterring the Chinese from embarking on any major “adventure” along the land border, the creation of new maritime theater command will further help India to consolidate and strengthen its maritime power in the Indian Ocean region.

Under the maritime theater command, the integration of air force and army elements with naval assets will act as a force multiplier. For instance, a recently established Sukhoi 30 fighter squadron — the “Tigersharks” – equipped with the Brahmos missile, currently based at Thanjavur under the Southern Air Command, will now be part of the maritime theater command. With INS Vikramaditya being the sole operational aircraft carrier in the Indian navy’s arsenal, sustaining credible surveillance and dominance in the region badly required an additional punch, and the Sukhoi squadron provides that much needed shot in the arm.

Over the next few years, it is likely that the air force could position additional aircraft at other locations such as the Andaman and Nicobar Islands, overlooking the strategic Strait of Malacca. This could boost India’s maritime and air surveillance and strike capability deep into the Indian Ocean. Similarly, integration of the army troops with amphibious elements of the navy will help to strengthen the country’s expeditionary capabilities. Of course, integrating tri-service elements seamlessly at various levels will require rigorous training and development of fresh joint doctrines and strategy, and these will probably be the next few steps in operationalizing the new command.

On balance, the maritime theater command will add a new dimension to India’s efforts to counter Chinese in the Indian Ocean and once operationalized, it could even help to restore normalcy along the India-China LAC.

(Dr. Shishir Upadhyaya is Associate Professor at the Jindal School for International Affairs and a former Indian naval intelligence officer.)

<https://thediplomat.com/2020/12/indias-new-maritime-theater-command-a-quantum-leap/>



Thu, 24 Dec 2020

Aero-India 2021: Get ready! Big flying machines from Russia are coming

This is important as more than 60 percent of the platforms and weapons being used by the Indian armed forces are from Russia, to ensure that there are no delays in getting the spares, the plan is to now manufacture it here with the help of Russia

By Huma Siddiqui

One of the biggest exhibitors during the forthcoming Aero-India 2021 is going to be Russia. In an interaction with the media earlier in the week, the ambassador of Russia in India Nikolay Kudashev announced the demonstration of “Su-57, Su-35 and MiG-35 fighter jets, helicopters Ka-52, Ka-226, Mi-17B-5, Mi-26, S-400 and the Buk systems.” Also many other new items and equipment are expected to be showcased.

Indo-Russian Defence Cooperation

India and Russia are working towards further deepening their defence ties and are planning to close contracts worth \$ 15 billion. The two sides are already in advanced stages of discussions for joint development and production of military platforms, weapons as well as manufacturing spare parts.



The agreement for mutual military and technical cooperation has been extended by another ten years and will now expire in 2030. (Credit: PTI image)

Spare Parts Manufacturing in India

This is important as more than 60 percent of the platforms and weapons being used by the Indian armed forces are from Russia, to ensure that there are no delays in getting the spares, the plan is to now manufacture it here with the help of Russia.

Countering the menace of terrorism is another step in the bilateral Defence cooperation between the two sides.

The agreement for mutual military and technical cooperation has been extended by another ten years and will now expire in 2030.

Deals with Russia

As has been reported earlier, there is a contract between the two countries for the S-400 Triumf 'SA-21 Growler' long-range surface-to-air missile (SAM) systems. This deal is worth around \$5.43 billion, and Indian Air Force (IAF) will get five Triumf regimental kits.

The upgraded Mikoyan-Gurevich MiG-29UPG 'Fulcrum-E' fighter aircraft.

Both India and Russia have created a joint venture to manufacture Kamov Ka-226T 'Hoodlum' light utility helicopters. Around 140 helicopters of the Russian origin are expected to be produced in India and will be in use as the main light utility helicopters for the Indian Armed Forces.

Four Project 11356 Grigorovich-class frigates for the Indian Navy. While two out of the four are being constructed at the Yantar Shipyard (a subsidiary of the United Shipbuilding Corporation), and are expected to be delivered by 2024.

The balance two will be assembled at the Goa Shipyard Limited, India, which is being upgraded to accommodate the new frigates. The Admiral Grigorovich-class ships are an upgraded variant of the six Talwar-class frigates the Indian Navy had in its fleet between 2003 and 2013. These new frigates are expected to have the Indo-Russian BrahMos cruise missile system which can be fired from an under-deck launcher.

As reported earlier by Financial Express Online, BrahMos Aerospace is already delivering ground- and sea-launched cruise missiles to the Indian Army, Navy & the Air Force.

The Indian Army is using 1,000 of T-90S Bhishma Main Battle Tanks. These tanks have been made in India under the ToT from Russia.

The 3VBM42 Mango 125 mm armour-piercing fin-stabilized discarding sabot (APFSDS) production is going on.

Talks are going on between the two countries for anti-tank technologies which would protect the troops.

Already, the Konkurs-M 'AT-5b Spandrel' anti-tank guided missiles (ATGMs), is under production / under license by Bharat Dynamics Limited (BDL).

A joint venture for the manufacturing of AK-203 7.62 mm Assault Rifles for the Indian Armed Forces is already in place. The plan is to manufacture Kalashnikov AK-203 7.62 mm Assault Rifles 200 series for the Indian Armed Forces.

What did the Russian envoy say about the defence Cooperation between the two countries?

"The Russia-India Defence Cooperation is based on exchange of technologies and joint ventures. This helps India to advance local production and expand its military export potential," Nikolay Kudashev said.

About the Ka-226 helicopters and AK-203 rifles — according to the envoy "Soon we will see good progress."

<https://www.financialexpress.com/defence/aero-india-2021-get-ready-big-flying-machines-from-russia-are-coming/2156048/>



Thu, 24 Dec 2020

ISRO आइआइटी बीएचयू में खोलेगा स्पेस सेंटर, रीजनल एकेडमिक सेंटर का छात्रों को मिलेगा फायदा

आइआइटी-बीएचयू में अब इसरो द्वारा अंतरिक्ष अनुसंधान पर भी अध्ययन व शोध कराया जाएगा। इसके लिए इसरो (भारतीय अंतरिक्ष अनुसंधान संगठन) आइआइटी-बीएचयू में अपना रीजनल एकेडमिक सेंटर फार स्पेस (आरएसी-एस) की स्थापना करेगा।

By Abhishek Sharma

वाराणसी: आइआइटी-बीएचयू में अब इसरो द्वारा अंतरिक्ष अनुसंधान पर भी अध्ययन व शोध कराया जाएगा। इसके लिए इसरो (भारतीय अंतरिक्ष अनुसंधान संगठन) आइआइटी-बीएचयू में अपना रीजनल एकेडमिक सेंटर फार स्पेस (आरएसी-एस) की स्थापना करेगा। सेंटर बनाने पर आइआइटी व इसरो के बीच बुधवार को समझौता जापन पर हस्ताक्षर भी हुआ। आनलाइन कार्यक्रम के तहत संस्थान की तरफ से निदेशक प्रोफेसर प्रमोद कुमार जैन और इसरो की तरफ से सीबीपीओ निदेशक डा. पी वी वेंकटकृष्णन ने इस समझौते पर मुहर लगाई।

शुरू होंगे बीटेक व एमटेक के कोर्स

इस समझौता के बाद संस्थान में बीटेक और एमटेक छात्रों के लिए शार्ट टर्म और एक वर्षीय प्रोजेक्ट भी शामिल किये जाएंगे। पीएचडी छात्रों को लांग टर्म आरएंडडी प्रोजेक्ट्स में वरीयता दी जाएगी। साथ ही अन्य कार्यक्रम जैसे सम्मेलन, प्रदर्शनी और लघु पाठ्यक्रम भी क्षेत्र में ज्ञान का आधार बनाने के लिए आयोजित किए जाएंगे

आइआइटी बीएचयू बनेगा इसरो का एंबेसडर

निदेशक प्रोफेसर जैन ने बताया कि इसरो का यह रीजनल एकेडमिक सेंटर उत्तर प्रदेश, मध्य प्रदेश, छत्तीसगढ़ आदि राज्यों में अंतरिक्ष प्रौद्योगिकी गतिविधियों को बढ़ावा देने के लिए एक प्रमुख फैसिलिटेटर के रूप में कार्य करेगा। आइआइटी-बीएचयू इसरो के लिए एंबेसडर के तौर पर कार्य करेगा, जिसके तहत क्षमता निर्माण, जागरूकता सृजन और शोध व अनुसंधान गतिविधियों के लिए विशेषज्ञों के अनुभवों का उपयोग किया जाएगा।

आरएसी-एस के अनुसंधान और विकास गतिविधियों में शामिल होने के लिए उत्तर प्रदेश, मध्य प्रदेश और छत्तीसगढ़ के विज्ञान और प्रौद्योगिकी के क्षेत्र में उत्कृष्टता के अन्य संस्थानों को भी शामिल किया जाएगा, जिसमें आइआइटी नेतृत्वकर्ता और प्रोजेक्ट मानीटर की भूमिका में होगा। वहीं आरएसी-एस के प्रतिदिन गतिविधियों और समग्र प्रबंधन की जिम्मेदारी भी निभाएगा। प्रोफेसर जैन ने आगे बताया कि इससे स्पेस साइंस और स्पेस टेक्नोलाजी के क्षेत्र में ही शोध नहीं बढ़ेगा, बल्कि उसके अंतर्गत होने वाले



शोधों से कृषि, दूरसंचार, मौसम विज्ञान, जल संसाधन आदि क्षेत्रों में पूर्वांचल और मध्य भारत को काफी लाभ होगा।

इस दौरान इसरो के साइंटिफिक सेक्रेटरी आर उमा महेश्वरन ने स्वागत भाषण दिया। अतिथियों का स्वागत एकेडमिक अफेयर्स के डीन प्रोफेसर एसबी द्विवेदी और धन्यवाद ज्ञापन डा. अनुराग ओहरी ने किया। इस अवसर पर डीन, रिसर्च एंड डेवलपमेंट प्रोफेसर राजीव प्रकाश, प्रोफेसर रजनीश त्यागी और प्रोफेसर पीकेएस दीक्षित उपस्थित रहे।

<https://www.jagran.com/news/state-isro-to-open-space-centre-at-iit-bhu-regional-academic-centre-to-benefit-students-21196747.html>



Thu, 24 Dec 2020

ISRO to open Regional Academic Center for Space (RAC-S) at IIT(BHU) Varanasi

Varanasi: A memorandum of understanding (MoU) was signed between the Indian Institute of Technology (BHU) Varanasi and the Indian Space Research Organization (ISRO) on Wednesday (23.12.2020) to pave the way for advanced research in the future technology of the Indian space program. Under this agreement ISRO-IIT (BHU) will open the Regional Academic Center for Space (RAC-S) in the Institute. The MoU was signed by Prof. Pramod Kumar Jain, Director, IIT(BHU) on behalf of the Institute and Dr. P.V. Venkatakrishnan, Director, CBPO, ISRO HQ on behalf of ISRO virtually on Wednesday. On this occasion, the inaugural address was given by the Scientific Secretary of ISRO, Shri R. Umamaheswaran. The guests were welcomed by Professor SB Dwivedi, Dean, Academic Affairs and a vote of thanks was given by Dr. Anurag Ohri. Professor Rajeev Prakash, Dean, Research and Development, Professor Rajnesh Tyagi, Dean, Faculty Affairs and Professor PKS Dixit, Head of Department, Civil Engineering were present on the occasion.

Space Research Program to get a boost by the MoU between IIT (BHU) Varanasi and ISRO.

In his briefing, Director of the Institute Professor Pramod Kumar Jain said that the Regional Academic Center for Space (RAC-S) of ISRO will act as a major facilitator for promoting space technology activities in the states of Uttar Pradesh, Madhya Pradesh, Chhattisgarh. He also said that IIT (BHU) Varanasi will act as a catalyst for capacity building, awareness creation and R & D activities of ISRO. The activities of RAC-S shall be directed to maximize the utilization of research potential, infrastructure, expertise available at ISRO and IIT(BHU) Varanasi.

IIT (BHU) Varanasi to lead Institutes of Excellence in Science and Technology from three states

IIT (BHU) Varanasi will be the leader and project monitor of RAC-S in which Institutes of Excellence in the field of science and technology in the states of Uttar Pradesh, Madhya Pradesh and Chhattisgarh will be roped into participate in various research and development activities. IIT(BHU) Varanasi will identify the Regional Coordinator of RAC-S who will be responsible for the overall management of the centre.

IIT (BHU) Varanasi to play a vital role in natural resource management

Director Professor Pramod Kumar Jain further said that with the help of the RAC-S at IIT (BHU) Varanasi will leverage research in space science and space technology, space application,



agriculture, telecommunications, meteorology, water resources to design developmental models for effective natural resource management. He iterated that such an initiative will greatly benefit the Purvanchal and Central regions of the country.

B-Tech, M-Tech and research students to benefit from RAC-S

The Centre will facilitate short- & long-term projects to propel the culture of research and development. Short-term projects for B-Tech and M-Tech students from the institute and associate institutes will also be included in this sequence. Long term R&D projects leading to the Ph.D. Programme will also be offered. Capacity building programmes like conferences, exhibitions and short courses will also be organized to strengthen the knowledge base in the field.

<https://indiaeducationdiary.in/isro-to-open-regional-academic-center-for-space-rac-s-at-iitbhu-varanasi/>



Thu, 24 Dec 2020

Quantum wave in helium dimer filmed for the first time

Anyone entering the world of quantum physics must prepare themselves for quite a few things unknown in the everyday world: Noble gases form compounds, atoms behave like particles and waves at the same time and events that in the macroscopic world exclude each other occur simultaneously.

In the world of quantum physics, Reinhard Dörner and his team are working with molecules which—in the sense of most textbooks—ought not to exist: Helium compounds with two atoms, known as helium dimers. Helium is called a noble gas precisely because it does not form any compounds. However, if the gas is cooled down to just 10 degrees above absolute zero (minus 273 °C) and then pumped through a small nozzle into a vacuum chamber, which makes it even colder, then—very rarely—such helium dimers form. These are unrivaledly the weakest bound stable molecules in the Universe, and the two atoms in the molecule are correspondingly extremely far apart from each other.



Professor Reinhard Dörner (left) and Dr Maksim Kunitzki in front of the COLTRIMS reaction microscope at Goethe University, which was used to observe the quantum wave. Credit: Goethe University Frankfurt

While a chemical compound of two atoms commonly measures about 1 angstrom (0.1 nanometres), helium dimers on average measure 50 times as much, i.e. 52 angstrom.

The scientists in Frankfurt irradiated such helium dimers with an extremely powerful laser flash, which slightly twisted the bond between the two helium atoms. This was enough to make the two atoms fly apart. They then saw—for the very first time—the helium atom flying away as a wave and record it on film.

According to quantum physics, objects behave like a particle and a wave at the same time, something that is best known from light particles (photons), which on the one hand superimpose like waves where they can pile up or extinguish each other (interference), but on the other hand as 'solar wind' can propel spacecraft via their solar sails, for example.

That the researchers were able to observe and film the helium atom flying away as a wave at all in their laser experiment was due to the fact that the helium atom only flew away with a certain probability: With 98 percent probability it was still bound to its second helium partner, with 2 percent probability it flew away. These two helium atom waves—Here it comes, quantum physics!—superimpose, and their interference could be measured.

The measurement of such 'quantum waves' can be extended to quantum systems with several partners, such as the helium trimer composed of three helium atoms. The helium trimer is interesting because it can form what is referred to as an 'exotic Efimov state,' says Maksim Kunitski, first author of the study: "Such three-particle systems were predicted by Russian theorist Vitaly Efimov in 1970 and first corroborated on caesium atoms. Five years ago, we discovered the Efimov state in the helium trimer. The laser pulse irradiation method we've now developed might allow us in future to observe the formation and decay of Efimov systems and thus better understand quantum physical systems that are difficult to access experimentally."

More information: Maksim Kunitski et al, Ultrafast manipulation of the weakly bound helium dimer, *Nature Physics* (2020). DOI: [10.1038/s41567-020-01081-3](https://doi.org/10.1038/s41567-020-01081-3)

Journal information: [Nature Physics](https://phys.org/news/2020-12-quantum-helium-dimer.html)
<https://phys.org/news/2020-12-quantum-helium-dimer.html>



Thu, 24 Dec 2020

Experiment takes 'snapshots' of light, stops light, uses light to change properties of matter

Light travels at a speed of about 300,000 meters per second as light particles, photons, or equivalently as electromagnetic field waves. Experiments led by Hrvoje Petek, an R.K. Mellon professor in the Department of Physics and Astronomy examined ideas surrounding the origins of light, taking snapshots of light, stopping light and using it to change properties of matter.

Petek worked with students and collaborators Prof. Chen-Bin (Robin) Huang of the National Tsing Hua University in Taiwan, and Atsushi Kubo of the Tsukuba University of Japan on the experiments. Their findings were reported in the paper, "Plasmonic topological quasiparticle on the nanometre and femtosecond scales," which was published in the Dec. 24 issue of *Nature* magazine.

Petek credited graduate student Yanan Dai for his foresight and work in the process.



Credit: Petr Kratochvil/public domain

"The denouement of the research, however, is that Yanan, who performed the experiments and provided the theoretical modeling, demonstrated that he was educated far beyond his Professor's level and could interpret incisively the nanofemto topological properties and interactions of optical fields," he said.

The team performed an ultrafast microscopy experiment, where they trapped green light pulses of 20 fs (2×10^{-14} s) duration as composite light-electron density fluctuation waves, known as surface plasmon polaritons, and imaged their propagation on a silver surface at the speed of light. But they did this with a twist so that the light waves came together from two sides to form a light vortex where light waves appear to circulate about a stationary common core as a whirlwind of waves. They could generate a movie of how light waves churn on their nanometer (10^{-9} m) wavelength scale by imaging electrons that two light photons coming together cause to emit from the surface.

Gathering all such electrons with an electron microscope forms images where the light had passed, thus enabling the researchers to take its snapshot. Of course, if nothing is faster than light, one cannot take its snapshot, but by sending in two light pulses with their time separation advanced in 10^{-16} s steps, they could image how light waves come together causing their joint amplitude to rise and fall at fixed points in space forming a light vortex on the nano (10^{-9} m)-femto (10^{-15} s) scale.

Such light vortices form when you shine your red or green laser pointer onto a rough surface and see a speckle reflection, but they also have a cosmological significance. The light vortex fields can potentially cause transitions in the quantum mechanical phase order in solid state materials, such that the transformed material structure and its mirror image cannot be superimposed. In other words, the sense of the vortex rotation generates two materials that are topologically distinct.

Petek said such topological phase transitions are at the vanguard of physics research because they are thought to be responsible for some aspects of the structure of the Universe.

"Even the forces of nature including light, are thought to have emerged as symmetry breaking transitions of a primordial field. Thus, the ability to record the optical fields and plasmonic vortices in the experiment opens the way to perform ultrafast microscopy studies of related light-initiated phase transitions in condensed matter materials at the laboratory scale," he said.

More information: Plasmonic topological quasiparticle on the nanometre and femtosecond scales, *Nature* (2020). DOI: [10.1038/s41586-020-3030-1](https://doi.org/10.1038/s41586-020-3030-1) , www.nature.com/articles/s41586-020-3030-1

Journal information: *Nature*
<https://phys.org/news/2020-12-snapshots-properties.html>



Thu, 24 Dec 2020

Making jet fuel out of carbon dioxide

A team of researchers affiliated with several institutions in the U.K. and one in Saudi Arabia has developed a way to produce jet fuel using carbon dioxide as a main ingredient. In their paper published in the journal *Nature Communications*, the group describes their process and its efficiency.

As scientists continue to look for ways to reduce the amount of carbon dioxide emitted into the atmosphere, they have increasingly focused on certain business sectors. One of those sectors is the aviation industry, which accounts for approximately 12% of transportation-related carbon dioxide emissions. Curbing carbon emissions in the aviation industry has proved to be challenging due to the difficulty of fitting heavy batteries inside of aircraft. In this new effort, the researchers have developed a chemical process that can be used to produce carbon-neutral jet fuel.



Credit: Unsplash/CC0 Public Domain

The researchers used a process called the organic combustion method to convert carbon dioxide in the air into jet fuel and other products. It involved using an iron catalyst (with added potassium and manganese) along with hydrogen, citric acid and carbon dioxide heated to 350 degrees C. The process forced the carbon atoms apart from the oxygen atoms in CO₂ molecules, which then bonded with hydrogen atoms, producing the kind of hydrocarbon molecules that comprise liquid jet fuel. The process also resulted in the creation of water molecules and other products.

Testing showed that over 20 hours, the process converted 38% of the carbon dioxide in a pressurized chamber into jet fuel and other products. The jet fuel made up 48% of the produced products—the others were water, propylene and ethylene. The researchers also note that using this fuel in aircraft would be carbon-neutral because burning it would release the same amount of carbon dioxide that was used to make it.

The researchers also claim their process is less expensive than other methods used to produce fuel for airplanes, such as those that convert hydrogen and water into fuel—primarily because it

uses less electricity. They also point out that conversion systems could be installed in plants that currently emit a lot of carbon dioxide, such as coal fired power plants.

More information: Benzhen Yao et al. Transforming carbon dioxide into jet fuel using an organic combustion-synthesized Fe-Mn-K catalyst, *Nature Communications* (2020). DOI: [10.1038/s41467-020-20214-z](https://doi.org/10.1038/s41467-020-20214-z)

Journal information: [Nature Communications](https://www.nature.com)
<https://phys.org/news/2020-12-jet-fuel-carbon-dioxide.html>



Thu, 24 Dec 2020

Perfect transmission through barrier using sound

The perfect transmission of sound through a barrier is difficult to achieve, if not impossible based on our existing knowledge. This is also true with other energy forms such as light and heat.

A research team led by Professor Xiang Zhang, President of the University of Hong Kong (HKU) when he was a professor at the University of California, Berkeley, (UC Berkeley) has for the first time experimentally proved a century old quantum theory that relativistic particles can pass through a barrier with 100% transmission. The research findings have been published in the top academic journal *Science*.

Just as it would be difficult for us to jump over a thick high wall without enough energy accumulated. In contrast, it is predicted that a microscopic particle in the quantum world can pass through a barrier well beyond its energy regardless of the height or width of the barrier, as if it is "transparent".

As early as 1929, theoretical physicist Oscar Klein proposed that a relativistic particle can penetrate a potential barrier with 100% transmission upon normal incidence on the barrier. Scientists called this exotic and counterintuitive phenomenon the "Klein tunneling" theory. In the following 100 odd years, scientists tried various approaches to experimentally test Klein tunneling, but the attempts were unsuccessful and direct experimental evidence is still lacking.

Professor Zhang's team conducted the experiment in artificially designed phononic crystals with triangular lattice. The lattice's linear dispersion properties make it possible to mimic the relativistic Dirac quasiparticle by sound excitation, which led to the successful experimental observation of Klein tunneling.

"This is an exciting discovery. Quantum physicists have always tried to observe Klein tunneling in elementary particle experiments, but it is a very difficult task. We designed a phononic crystal similar to graphene that can excite the relativistic quasiparticles, but unlike natural material of graphene, the geometry of the man-made phononic crystal can be adjusted freely to precisely achieve the ideal conditions that made it possible to the first direct observation of Klein tunneling," said Professor Zhang.

The achievement not only represents a breakthrough in fundamental physics, but also presents a new platform for exploring emerging macroscale systems to be used in applications such as on-chip logic devices for sound manipulation, acoustic signal processing, and sound energy harvesting.

"In current acoustic communications, the transmission loss of acoustic energy on the interface is unavoidable. If the transmittance on the interface can be increased to nearly 100%, the efficiency of acoustic communications can be greatly improved, thus opening up cutting-edge applications. This is especially important when the surface or the interface play a role in hindering the accuracy acoustic detection such as underwater exploration. The experimental measurement is also conducive to the future development of studying quasiparticles with topological property in phononic crystals which might be difficult to perform in other systems," said Dr. Xue Jiang, a

former member of Zhang's team and currently an Associate Researcher at the Department of Electronic Engineering at Fudan University.

Dr. Jiang pointed out that the research findings might also benefit the biomedical devices. It may help to improve the accuracy of ultrasound penetration through obstacles and reach designated targets such as tissues or organs, which could improve the ultrasound precision for better diagnosis and treatment.

On the basis of the current experiments, researchers can control the mass and dispersion of the quasiparticle by exciting the phononic crystals with different frequencies, thus achieving flexible experimental configuration and on/off control of Klein tunneling. This approach can be extended to other artificial structure for the study of optics and thermotics. It allows the unprecedented control of quasiparticle or wavefront, and contributes to the exploration on other complex quantum physical phenomena.

More information: Xue Jiang et al. Direct observation of Klein tunneling in phononic crystals. *Science* 18 Dec 2020: Vol. 370, Issue 6523, pp. 1447-1450. DOI: [10.1126/science.abe2011](https://doi.org/10.1126/science.abe2011) , science.sciencemag.org/content/370/6523/1447

Journal information: *Science*

<https://phys.org/news/2020-12-transmission-barrier.html>

COVID-19 Research News



Thu, 24 Dec 2020

Masks alone may not stop Covid-19 spread without physical distancing: Study

Simply wearing a face mask may not protect you from catching the novel coronavirus, that causes Covid-19, if you are not maintaining physical distancing, according to a study

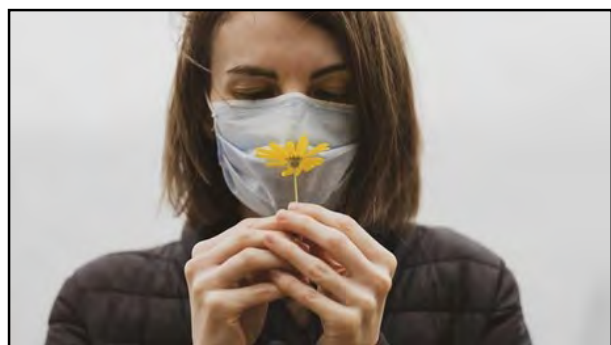
Washington: Simply wearing a face mask may not protect you from catching the novel coronavirus, that causes Covid-19, if you are not maintaining physical distancing, according to a study.

The research, published in the journal *Physics of Fluids*, tested how five different types of mask materials affected the spread of droplets that carry the SARS-CoV-2 virus, when we cough or sneeze.

All the material the researchers tested dramatically reduced the number of droplets that were transmitted.

However, enough droplets to potentially cause the viral illness still made it through several of the materials when physical distance was less than six feet, they said.

“A mask definitely helps, but if the people are very close to each other, there is still a chance of spreading or contracting the virus,” said Krishna Kota, an associate professor at New Mexico State University in the US.



The research, published in the journal *Physics of Fluids*, tested how five different types of mask materials affected the spread of droplets that carry the SARS-CoV-2 virus, when we cough or sneeze. (Pixabay)

“It’s not just masks that will help. It’s both the masks and distancing,” Kota added.

The researchers developed a machine that uses an air generator to mimic human coughs and sneezes.

The generator was used to blow tiny liquid particles, like the airborne droplets of sneezes and coughs, through laser sheets in an airtight square tube with a camera.

They blocked the flow of the droplets in the tube with five different types of materials -- a regular cloth, a two-layer cloth mask, a wet two-layer cloth, a surgical mask, and a medical-grade N-95 ventilator.

Each of the masks captured the vast majority of droplets, ranging from the regular cloth mask, which allowed about 3.6 per cent of the droplets to go through, to the N-95 mask, which statistically stopped 100 per cent of the droplets.

The researchers noted that at distances of less than six feet, even those small percentages of droplets can be enough to get someone sick, especially if a person with Covid-19 sneezes or coughs multiple times.

According to the researchers, a single sneeze can carry up to 200 million tiny virus particles, depending on how sick the carrier is.

They noted that even if a mask blocks a huge percentage of those particles, enough could escape to get someone sick if that person is close to the carrier.

“Without a face mask, it is almost certain that many foreign droplets will transfer to the susceptible person,” Kota said.

“Wearing a mask will offer substantial, but not complete, protection to a susceptible person by decreasing the number of foreign airborne sneeze and cough droplets that would otherwise enter the person without the mask,” he said.

Kota added that people should try to minimise or avoid close face-to-face or frontal human interactions.

(This story has been published from a wire agency feed without modifications to the text.)

<https://www.hindustantimes.com/health/masks-alone-may-not-stop-covid-19-spread-without-physical-distancing-study/story-vmdeJuE4UbZCRmakeEH53K.html>

