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DRDO Technology News

THE WEEK

Wed, 14 July 2021

DRDO teams up with AICTE to offer M.Tech in Defence Technologies

More than 100 institutes have shown their willingness to start the course

By Pradip R Sagar

With the intention to scout young talents, country's premier defence research agency, the DRDO, has collaborated with All India Council for Technical Education (AICTE) for conducting a regular M.Tech in Defence Technologies, with six specialised streams. This is for the first time that such a specialised course for various requirements related to defence and security applications is being offered in the country.

The DRDO believes that the move will eventually create a large pool of talented workforce for the defence sector.

While the objective of the course is to develop skilled human resource in the field of latest defence technologies, it also aims to enhance the interaction of students with the defence scientists and industry personnel to have real time experience in the technology development and technology deployment for defence systems.

The DRDO officials claim that the M.Tech in Defence Technology will provide employment opportunities in fast expanding defence research and manufacturing sector (DRDO, DPSUs, private industries, and ordnance factories) and other similar sectors. Besides, it will help in establishing start-ups and pursuing business opportunities in the defence sector. "This will also help industry to work on know-why approach in addition to know-how," a defence official said.

For the last six decades, the DRDO has been pursuing basic and applied research in collaboration with academia, and the latest move is towards expanding the research base for developing emerging and futuristic technologies to accelerate the technological self-reliance in defence and security of the nation, said a defence scientist.

Several countries offer such courses in collaboration with defence research establishments like Cranfield University in England and Naval Postgraduate School in California.

The M.Tech programme has six specialized streams—Combat Technology, Aero Technology, Naval Technology, Communication Systems & Sensors, Directed Energy Technology and High Energy Materials Technology.

M.Tech. Defence Technology programme can be conducted at any AICTE-affiliated institutes/universities, IITs, NITs or private engineering institutes. Institute of Defence Scientists & Technologists (IDST) will be the main coordinating agency for commencement of the programme. IDST will help in planning, coordinating, executing, reviewing and monitoring of the programme as per the schedule agreed by the academic institute. IDST will also coordinate the interaction between the DRDO laboratories, institutes and industries. It can prioritise academic institutes in the vicinity of large clusters of DRDO labs.

"It would infuse interest in students and motivate them to pursue their career in research and development for defence and security to join defence, PSUs and private defence industries," said a DRDO official, and added that students will also be provided opportunities to conduct their main thesis work in DRDO laboratories, defence PSUs and industries.

Dr. G. Satheesh Reddy, head of DRDO, said this course is important for the nation in the goal towards self-reliance. "Design and development of the system should be done in the country," Reddy said, while calling upon the industry leaders to extend their support for this programme and offer opportunities for the students.

Though there are no specialised courses related to defence and security in country, the Defence Institute of Advanced Technology (DIAT) Pune, CME Pune, selected institutes and industries have been providing required specialised knowledge related to defence to students and armed forces personnel. However, these institutes have limited number of seats, which are not sufficient to address the requirement of trained manpower for contributing in technology and product development related to defence, DRDO officials maintained.

The course has been designed to produce postgraduates who will have the necessary theoretical and experimental knowledge, skill and aptitude in various areas of defence technologies and inspire them to carry out R&D in defence. The students will be provided valuable exposure to various state of the art defence systems and contemporary technologies through classes, lectures and thesis work in DRDO labs, defence PSUs & private defence industries.

"This collaborative effort of DRDO, AICTE and industries will create jobs in the defence sector, and the academic-industry trained workforce will immensely contribute in realising the Prime Minister Narendra Modi's vision of Atmanirbhar Bharat," an official said.

The official further explained that in addition, abundant manpower, proficient in identification, investigation and analysis of complex problems associated with defence technologies will be readily available. "This will further help in laying the foundation of robust defence R&D and manufacturing ecosystem in the country."

Soon after launching the programme, DRDO headquarters and AICTE have been flooded with lot of queries from institutes and students. More than 100 institutes have given overwhelming response towards the course and shown their willingness to start the course in this academic year itself.

In addition to this, there are many private institutes/universities like Sharda University, GLA Mathura, and Amity University that have also shown their interest in commencing this course in this academic session (2021-22), another DRDO officials explained.

Since this programme is a multi-disciplinary post-graduation, a total of 48 disciplines of engineering have been selected as an eligibility criteria to get into the M.Tech programme.

AICTE chairman Anil Sahasrabudhe said the move will not only generate skilled manpower pool in defence technology but "will also create spin-off benefits in terms of new defence start-ups and entrepreneurs."

India has been talking about improving industry-academia connect and co-creation and promotion of specialised education and R&D efforts. In the last five years, DRDO has given impetus to create research eco-system for directed research by establishing the centres of excellence within premier institutes and universities. The DRDO has been funding the research projects through various mechanisms to engage academia under its Grant-in-Aid scheme.

https://www.theweek.in/news/india/2021/07/13/drdo-teams-up-with-aicte-to-offer-mtech-in-defence-technologies.html

COVID 19: DRDO's Contribution

The Tribune

Wed, 14 July 2021

Oxygen plant at Hoshiarpur Civil Hospital soon

Hoshiarpur: The Civil Hospital will soon have district's first state-of-the-art oxygen generation plant. Disclosing this here, Additional Deputy Commissioner (G) Vishesh Sarangal, who visited the plant site today, said the setting up of plant was guided by the Defence Research and Development Organisation and NHAI, which would have a capacity of 1000 LPM.

This plant will prove to be a boon during Covid crisis and other critical patients since the Civil Hospital is all set to become self-sufficient in oxygen generation.

Taking stock of the newly-constructed plant site and machinery being installed therein, ADC (G) pointed out that the district administration had ensured all requisite machinery and the backup support, including generators, which would maintain a constant supply of oxygen. He said the installation of machinery in the plant was on the advanced stage of completion. OC

https://www.tribuneindia.com/news/jalandhar/oxygen-plant-at-hoshiarpur-civil-hospital-soon-282505

Defence News

Defence Strategic: National/International

REPUBLICWORLD.COM

Wed, 14 July 2021

Eastern Army Commander visits Gajraj Corps to review security situation & monitor training

Eastern Army Commander visited the Gajraj Corps to monitor security situation and training activities. He even held a meeting with the Assam CM and Governor

By Aayush Anandan

The Eastern Army Commander Lieutenant General Manoj Pande paid a visit to the Gajraj Corps Headquarters on Monday to review the security situation and to monitor various training activities being carried out to enhance operational capabilities. Eastern Command of the Indian Army tweeted, "Lt Gen Manoj Pande visited HQ Gajraj Corps on 12 July, 21 and was briefed on operational situation and various training activities being carried out to enhance capabilities." The Gajraj Corps made the iconic charge towards Dhaka and also successfully participated in the Meghna Heli Bridge Operations during the Pakistan-Bangladesh liberation war.

Image: Twitter/@easterncomd

Eastern Army chief invited Assam Governor Prof Jagdish Mukhi at Raj Bhavan and asked him about the security situation and Army's presence in the Upper Assam districts viz, Tinsukia, Dibrugarh, Jorhat, Sivasagar, Golaghat and Charaideo. The Eastern Army Commander Lieutenant General Manoj Pande also had a meeting with Assam Chief Minister Himanta Biswa Sarma.

Assam Chief Minister Himanta Biswa Sarma tweeted, "Glad to have welcomed Lt Gen Manoj Pande, GOC-in-Chief of @easterncomd with Lt Gen Ravin Khosla, GOC @GajrajCorps_IA at my office this afternoon. I expressed our sincere gratitude to them for having played a sterling role in the Eastern sector."

Lieutenant General Manoj Pande was appointed the General Officer Commanding-in-Chief of the Eastern Command on June 1. Earlier, he was the Commander-in-Chief of Andaman and Nicobar Command, the only Tri-services Operational Command in India. In his 37 years of service, he was actively involved in Operation Vijay and Operation Parakram. General Pande is a graduate of the National Defence Academy (NDA) and he was the General Officer commissioned to the Corps of Engineers (The Bombay Sappers) in December 1982. He is also a graduate of Staff College, Camberley (UK) and was a part of the Higher Command Course at Army War College, Mhow and National Defence College (NDC) at Delhi. Gen Pande has accomplished important international tasks as well and he was posted as the Chief Engineer at the United Nations Mission in Ethiopia and Eritrea. He was the Director-General at Army Headquarters that handled the subjects of discipline, ceremonial and welfare, prior to assuming the present appointment.

https://www.republicworld.com/india-news/general-news/eastern-army-commander-visits-gajraj-corps-to-review-security-situation-and-monitor-training.html

Business Standard

Wed, 14 July 2021

IAF likely to operationalise second squadron of Rafale aircraft by July-end

IAF is likely to operationalise its second squadron of the Rafale combat aircraft by the end of July and it will be based in Hasimara air base in West Bengal, officials said on Tuesday

New Delhi: The Indian Air Force (IAF) is likely to operationalise its second squadron of the Rafale combat aircraft by the end of July and it will be based in Hasimara air base in West Bengal, officials said on Tuesday.

The first squadron of the Rafale jets is stationed at Ambala Air Force station in Haryana. The first batch of five Rafale jets arrived in India on July 29, 2020, nearly four years after India signed an inter-governmental agreement with France to procure 36 of the aircraft at a cost of around Rs 59,000 crore.

Currently, the IAF has around 25 Rafale jets and the remaining ordered aircraft are expected to be delivered by 2022.

The first squadron will look after Pakistan border on western frontier and the northern frontier. The second squadron will look after the eastern frontier of India, the officials mentioned.

The formal induction ceremony of the Rafale fleet had taken place at Ambala on September 10 last year. Later on, other batches of the fighter jet also arrived in India.

The IAF officials said the second Rafale squadron would be operationalised at the next main operating base at Hasimara by July-end.

A squadron comprises around 18 aircraft.

The Rafale jets are India's first major acquisition of fighter planes in 23 years after the Sukhoi jets were imported from Russia.

The Rafale jets are capable of carrying a range of potent weapons. European missile maker MBDA's Meteor beyond visual range air-to-air missile, Scalp cruise missile and MICA weapons system will be the mainstay of the weapons package of the Rafale jets.

The IAF is also procuring a new generation medium-range modular air-to-ground weapon system Hammer to integrate with the Rafale jets.

Hammer (Highly Agile Modular Munition Extended Range) is a precision-guided missile developed by French defence major Safran.

The missile was originally designed and manufactured for the French Air Force and Navy.

Meteor is the next generation of BVR air-to-air missile designed to revolutionise air-to-air combat. The weapon has been developed by MBDA to combat common threats facing the UK, Germany, Italy, France, Spain and Sweden.

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

https://www.business-standard.com/article/current-affairs/iaf-likely-to-operationalise-second-squadron-of-rafale-aircraft-by-july-end-121071301371_1.html

नवभारत टाइम्स

Wed, 14 July 2021

हैं तैयार हम... भारतीय वायुसेना की बढ़ेगी ताकत, दूसरा राफेल दस्ता 26 जुलाई से हो जाएगा शुरू

दूसरा राफेल फाइटर एयरक्राफ्ट स्क्वाड्रन चीन के साथ लगी सीमा पर भारतीय वायुसेना की ताकत बढ़ाएगा। इंडियन एयरफोर्स 114 मल्टीरोल फाइटर एयरक्राफ्ट खरीदने की तैयारी में भी है।

Edited by अमित शुक्ला

नई दिल्ली: भारतीय वायुसेना (IAF) की ताकत बढ़ने वाली है। पूर्वोत्तर में चीन सीमा पर उसकी मारक क्षमता में इजाफा होगा। 26 जुलाई से भारतीय वायुसेना के लड़ाकू विमानों का दूसरा राफेल दस्ता ऑपरेशनल हो जाएगा।

अंबाला में राफेल एयरक्राफ्ट पहले ही पहुंच चुके हैं। अगले कुछ दिनों में ये हासीमारा हवाई अड्डे पर पहुंच जाएंगे। सरकार के सूत्रों ने बताया है कि राफेल लड़ाकू विमानों का दस्ता (स्क्वाड्रन) 26 जुलाई से ऑपरेशनल हो जाएगा।

101 स्क्वाड्रन की मुख्य रूप से जिम्मेदारी पूर्वी सीमा को देखने की होगी। पश्चिम बंगाल के हासीमारा में यह सीमा चीन से लगी हुई है। वहीं, 17 स्क्वाड्रन का जिम्मा लद्दाख में चीन की उत्तरी सीमा और पाकिस्तान के साथ अन्य इलाकों की देखरेख करना होगा। एयर फोर्स को फ्रांस से करीब 25 एयरक्राफ्ट मिले हैं। अगले कुछ महीनों में और लड़ाकू विमानों की डिलीवरी होने की उम्मीद है। इन्हें चीन के साथ लगी पूर्वी सीमा में एयर पेट्रोल के लिए तैनात किया गया है। नया स्क्वाड्रन सू-30 विमानों के दस्ते के साथ काम करेगा। सू-30 स्क्वाड्रन बड़ी संख्या में पहले ही पूर्वी सेक्टर में तैनात है।

और विमानों को खरीदने की तैयारी

भारत अब 114 मल्टीरोल फाइटर एयरक्राफ्ट के लिए ऑर्डर देने की तैयारी में है। इनके साथ स्वदेश में निर्मित एडवांस्ड मीडियम कॉम्बैट एयरक्राफ्ट को तैनात किया जाएगा। देश में बने इन विमानों के सात दस्ते अगले 15-20 साल में भारतीय वायुसेना से जुड़ेंगे।

सितंबर में किया गया था राफेल को शामिल

सितंबर में औपचारिक रूप से राफेल विमानों को शामिल किया गया था। राफेल फाइटर जेट विमानों का दूसरा सेट नवंबर में पहुंचा था। ये लड़ाकू विमान ट्विन-इंजन से लैस हैं। ये जमीनी और समुद्री हमले करने में सक्षम हैं। इनमें और भी कई तरह की खूबियां हैं।

चीन से बढ़ते खतरे के लिए तैयारी जरूरी

भारत को चीन से बढ़ते खतरे के लिए तैयार रहना जरूरी है। पिछले कुल समय से चीन के साथ भारत के रिश्ते काफी तनावपूर्ण रहे हैं। चीन अपनी विस्तारवादी नीतियों पर खुलकर काम करने लगा है। ऐसे में भारत अपनी सुरक्षा को लेकर कोई समझौता नहीं कर सकता है। सैन्य क्षमता बढ़ाकर ही भारत ड्रैगन की चुनौती का सामना कर सकता है। हाल में ऐसे कई मौके आए हैं जब चीन और भारत आमने-सामने दिखे हैं।

https://navbharattimes.indiatimes.com/india/iafs-second-rafale-squadron-to-get-operational-by-july-26/articleshow/84384299.cms

FINANCIAL EXPRESS
Read to Lead

Wed, 14 July 2021

Another P8i from Boeing lands in Goa! Will boost Indian Navy's Maritime Reconnaissance Capabilities

This is the second aircraft which has been delivered under an option contract for four additional aircraft that the Ministry of Defence had awarded to the Company in 2016

By Huma Siddiqui

On Tuesday, US based Boeing Company delivered the 10th P8i long-range maritime reconnaissance aircraft with anti-submarine warfare capabilities. This is the second aircraft which has been delivered under an option contract for four additional aircraft that the Ministry of Defence had awarded to the Company in 2016. As has been reported earlier, when the company was awarded the initial contract, Indian Navy became its first international customer for P-8 and today it is operating the largest non-US fleet.

The P8i is specific to the Indian Navy requirement.

The tenth P8-I has already landed at INS Hansa, Goa. In November 2020, the Indian Navy had received the ninth P8I from the US based aerospace company. These aircraft are part of the 312A Naval Air Squadron and are based at Arakkonam, Tamil Nadu. The P8i is specific to the Indian Navy requirement.

Which other countries have P-8 in their fleet?

Besides the US Navy which operates P-8, other countries including the United Kingdom's Royal Air Force and Royal Australian Air Force fly these.

Importance for India

With one more in its fleet the Indian Navy's surveillance, reconnaissance, and electronic jamming capabilities are going to get further boost in the Indian Ocean Region (IOR).

Two more are expected later this year.

Any change in the configuration?

No. according to sources, there is no change in the configuration of the aircraft that arrived in India today afternoon. The configurations are the same as they are all from the same batch. There are plans to incorporate changes in the configuration like the encrypted communications.

Why is it important?

India and the US have already inked the Communications Compatibility and Security Agreement (COMCASA). This will help in achieving interoperability, especially in the defence equipment and platforms which have been supplied by the US. This will help when the Indian Navy goes for very complex bilateral or multilateral drills with the countries and the QUAD which have the same platforms – whether in air, land, sea or underwater.

The Indian Navy is in the process of receiving its first MH-60R Helicopters from the US as well as a process is underway for finalizing the deal for Sea Guardian drones from another US company. All these assets will then be in sync with the encrypted communications system on board.

Indian Navy operates the P8i and the US Navy flies P8A Poseidon aircraft and now during drills the two can share real time operational intelligence, this also includes a secure Common Tactical Picture.

When was the contract inked for the P8i?

In 2009, a contract for eight aircraft was inked between India and the US Boeing Company for USD 2.1 billion, these aircraft are coming through the Foreign Military sales route (FMS) Later in 2016, the Ministry of Defence placed a follow on order for four more P8i. The Defence Acquisition Council has also given approval for more of these aircraft.

What is onboard the P8i for the Indian Navy?

These aircraft have come to the Indian Navy equipped with the state of the art anti-submarine warfare (ASW) Technology.

Also, has on board Telephonics APS-143. The original P-8A Poseidon in the fleet of the USN does not have this.

There is OceanEye Aft Radar System; Magnetic anomaly detector.

The Weapons System includes Harpoon Block-II missiles and MK-54 lightweight torpedoes.

And, all the aircraft in the Indian fleet are data-linked with Indian submarines, thus giving them the capability of sharing critical information about the enemy vessels easily.

It can also carry 129 sonobuoys. These help in locating the enemy submarines and according to naval officers can be used for launching anti-ship missiles.

Chinese presence in IOR and South China Sea

Though these aircraft were ordered much before the ongoing standoff between the Indian Army and the Chinese troops along the Line of Actual Control (LAC), the P8i has been helping the Indian Navy in keeping a tight watch on the Chinese movement in the waters.

According to reports, China has already managed to acquire a string of ports in the region which includes –Pakistan (Gwadar port), Myanmar (Kyaukpyu port), Sri Lanka (Hambantota Port), and Iran (Port of Jask).

Boeing in India & P8i

According to an official statement issued on the arrival of the tenth P8i, the US based aerospace company says the "patrol aircraft is an integral part of the Indian Navy's fleet and since its induction in 2013 has since then crossed 30,000 flight hours."

Besides the maritime reconnaissance and anti-submarine warfare capabilities, the P8I have played a very important role during humanitarian missions and also in disaster relief.

The US Company under the contract is providing training of Indian Navy flight crews of P8i, spare parts, field service representative support and ground support equipment. And, "This integrated logistics support has enabled a high state of fleet readiness and this is possible due to the lowest cost," it adds.

The company is in the process of completing the construction of the Training Support & Data Handling Centre at INS Rajali, Arakkonam, Tamil Nadu. Also work is in progress on the secondary maintenance training centre at Naval Institute of Aeronautical Technology, Kochi, Kerala. This is part of a training and support package contract signed in 2019. According to Boeing, "This new indigenous, ground-based training will allow Indian Navy crew to extend mission proficiency and in a shorter time. It will help in reducing on-aircraft training time which results in increased aircraft availability."

https://www.financialexpress.com/defence/another-p8i-from-boeing-lands-in-goa-will-boost-indian-navys-maritime-reconnaissance-capabilities/2289220/

the pioneer

Wed, 14 July 2021

Maritime security coordinator likely soon to counter China influence

New Delhi: With the growing strategic importance of the Indian Ocean and China flexing its muscle in the region, the Government may clear a long pending proposal to have a National Maritime Security Coordinator.

A retired or serving naval officer of the rank of Vice Admiral will man the post and ensure seamless synergy between all stakeholders responsible for maritime security.

The need for having a Coordinator is all the more urgent in the aftermath of the Mumbai terror attacks in 2008 when the terrorists infiltrated into the city from sea routes.

The proposal for such a post was first mooted in 2000 by the Kargil Review Committee. However, it did not take off.

The defence ministry has now firmed up the proposal and will shortly seek the nod from the government, sources said here on Tuesday.

The security coordinator will head the National Maritime Commission (NMC) — which will

coordinate with all organisations such as the Indian Navy, the Indian Coast Guard (ICG), the ports and the shipping ministries — and is likely to report to the National Security Advisor (NSA), they said.

The Kargil Review Committee had recommended formation of an apex

body that would manage the country's maritime affairs by enforcing linkages between the Indian Navy, the ICG and other ministries and departments of the state governments or the central government.

The Indian Ocean, considered the backyard of the Indian Navy, is critical for India's strategic interests. China has been making concerted efforts to increase its presence in the region.

The Indian Navy has been ramping up its presence in the Indian Ocean to keep a hawk-eyed vigil over Chinese activities.

It established the Information Fusion

Centre-Indian Ocean Region (IFC-IOR) in 2018 to effectively keep track of the shipping traffic as well as other critical developments in the region under a collaborative framework with like-minded countries.

Besides this, security of the 7,000 km long coastline and more than two million kms of Exclusive Economic Zone (EEZ) is also crucial for the Indian security establishment.

Moreover, over 80 per cent of Indian trade comes through the sea and ensuring its security is vital.

https://www.dailypioneer.com/2021/india/maritime-security-coordinator-likely-soon-to-counter-china-influence.html

THE ECONOMIC TIMES

Wed, 14 July 2021

Indian Navy to take part in massive helicopter development project

By Manu Pubby

Synopsis

The next stage where the prototypes are to be built will require a fund infusion for the estimated `10,000 crore project that would replace all Russian origin Mi 8/17s currently in service.

The Navy has decided to come onboard for India's most ambitious indigenous helicopter development plan, giving a boost to the project that intends to save a Rs 2 lakh crore import bill for military platforms in the coming years.

Picture used for representational purpose only

The Air Force and Army have already committed to the project and with the Navy now agreeing as well, India could make hundreds of the indigenous medium-lift choppers to serve a variety of roles, from transporting troops to high altitude areas to anti-ship and submarine operations.

The Indian Multi Role Helicopter (IMRH) plan has been progressing on schedule, with scale model testing being completed successfully and the first test flight expected by 2025-26. The next stage where the prototypes are to be built will require a fund infusion for the estimated `10,000 crore project that would replace all Russian origin Mi 8/17s currently in service.

"We expect the helicopters to save a lot of money for the country as we have been relying on imports for such platforms in the past. It would also have export potential once in service with the armed forces," Hindustan Aeronautics Chairman R Madhavan told ET.

The chopper is being custom-built for the forces and the naval version is likely to have bespoke design elements as well. The Naval IMRH is likely to have longer range and payload capacity as it will not be required for high altitude operations.The chopper is likely to have two versions — an anti surface and submarine role and a mission role. It would also have specialised gear for marine operations, including a Sonar and Sea scanner radar. While the larger design will be similar to the Air Force and Army version, the Naval role chopper will see significant differences inside the cockpit.

As part of the plan, six prototypes of the IMRH are to be built to prove the concept and for testing by the armed forces. Based on the success of the tests, large service orders will be placed with HAL. The development and certification programme is expected to take seven years from the day work starts on the prototype.

The state-owned entity already has a successful Advanced Light Helicopter (ALH) programme in place and is also making a Light Combat Helicopter (LCH) and a Light Utility Helicopter (LUH). As per estimates, the requirement of the Indian armed forces for the IMRH type platform in the next 15 years is expected to cost Rs 2 lakh crore if the current set of choppers are bought again.

The IMRH will have several unique aspects, including a design that will allow it to operate with two different engines so that it does not remain dependent on any one source. The scale of initial investments needed is particularly high as the programme will include multiple destruction tests to prove the sturdiness of the design before it can be certified for military use.

https://economictimes.indiatimes.com/news/defence/navy-to-take-part-in-chopper-project/articleshow/84358072.cms

The Statesman

Wed, 14 July 2021

The saga of valiant air battle at Sea, and no impediments should be there to miss her

n general, these exercises are called 'PASSEX' or Passage Exercises are routinely conducted by the Navy as an endeavour to build interoperability and enhance levels of joint operations with friendly and like-minded navies of friendly nations

By Sayan Chatterjee

New Delhi: The Indian Navy and the IAF, lately announced exercises with a US Navy Carrier group transiting through the Indian Ocean. To a better recall, in which Indian Naval Ships (INS) Kochi and Teg along with P8i and MiG 29K aircrafts, were seen participating with US Navy Carrier Strike Group Ronald Reagan during its transit through Indian Ocean Region (Arabian Sea) on 23 and 24 Jun 2021. The IAF too participated with Jaguar and Su-30 fighter aircraft of their maritime squadrons.

(Visuals: Indian Navy)

In general, these exercises are called 'PASSEX' or Passage Exercises are routinely conducted by the Navy as an endeavor to build interoperability and enhance levels of joint operations with friendly and like-minded navies of friendly nations.

These exercises typically involve a rendezvous between participating forces at sea and a 24-72 hour long sail together with various drills that range from basic communication exercises to more complex operations such as boarding operations, cross-deck helicopter landings and sometimes even weapon firing drills. Indian Navy's lone aircraft carrier, Vikramaditya, currently undergoing a major refit and, therefore, was not available to participate in this PASSEX and, hence with only the IAF participating, as per the sources; required the exercise to be geographically shifted closer to the coast to involve Jaguar and Su 30 aircraft relevantly.

While this PASSEX concluded attaining its objectives pertinently, it was another stark reminder to the limitations posed by the lack of naval airpower at sea due to the absence of our valiant carrier – INS Vikramaditya. Her absence was felt immensely.

While this is a luxury that can be afforded in peacetime exercises such as this, it would surely not be possible in combat to any adverse situation or hours of concern in actuality. Regular exercises have been conducted by the Navy and Air Force to practice scenarios of the future Air Battle at sea. However, the battle at sea would be fought far away from any coast and would test the limitations in reach and poise of shore-based fighters.

In the present era, the Air Battle at sea would be fought in a dense EW environment, with networking and sound identification of friend or foe being the major criteria for the nation's success. Furthermore, combat air power would need to be available round the clock, here and now and any delays in application of air power would leave forces vulnerable.

The geographical expanse of this battle would also need combat air power to be spread across a large swath of the sea. Fighters would need to prowl the air for long periods of time and there is no more sure way of achieving this than the aircraft carriers, like our INS – Vikramaditya.

Shore-based fighters would find it an enormous task to meet the spread, 'here and now' and speed of application that would be needed for success.

The application of combat air power at sea would also require a nuanced understanding of the unique environment at sea and the challenges it poses. With the impending creation of Theatre Commands and foremost the Maritime Theatre Command (MTC), these exercises would have thrown up lessons already identified in the past of the need for shore-based fighters to operate

under the Navy or in this case the MTC, to be able to apply scarce resources, effectively in time and space, to achieve best results.

The recent PASSEX with the USN also brings to fore the severe limitations of the Navy that currently operates only with one aircraft carrier. With the second one a year away and the third yet to get nod, the Navy would continue to operate under these limitations for some coming years. However, that does not entail any dip to our Indian Navy's proven mettle over the years. It is better perceived as a challenge and not a lack.

It would be difficult for the Air Force to fill these gaps especially when an air battle rages over land and more so when the battle at sea is fought on the high seas. Peacetime exercises such as these PASSEX, may at times create a wrong and ill-informed sentiment that combat air power at sea could be filled in by shore-based fighters.

In fact, these are peacetime exercises theatrically enacted and undertaken close to the coast with strict timelines and planned engagements. An easy proposition for shore-based air power to meet.

However, the Air battle at Sea would require naval combat air power, currently the Mig-29Ks flying off the Navy's Carriers, and smaller elements of the IAF's shore-based fighters to operate together, when possible, geographically, under a unified commander to ensure synergistic application and exploitation.

The upcoming Theatre Commands would look at this aspect and the drive for integration must be focused on the eventual application of combat power. If one were to go by the recent spate of articles on the IAF's concerns on the loss of air power when spread thin, it would be right to believe that while this may hold good to a small extent for air power over land launched and recovered from fixed airfields, the same is not true of a geographically expansive and indefinable battle space at sea.

The Maritime Theatre would need air power to be spread across the battlespace in both time and geography. One can only hope that the thinking in ministry and the eventual shape and organization of the MTC meets the needs of today's battle at sea. Shano Varuna !

(The author is a Delhi-based, DCC qualified, defence beat writer and independent contributor to print and online publications)

https://www.thestatesman.com/features/saga-valiant-air-battle-sea-no-impediments-miss-1502981284.html

MENAFN

Wed, 14 July 2021

In blow to China, Maldives holds naval exercises with India

By Ateet Sharma

New Delhi: In yet another blow to China, navies from India and Maldives participated in the fourth edition of Ekatha exercise, with Male making a statement that it is India and not China which will serve as the net security provider of Maldives. A pivotal nation in the Indian Ocean Region (IOR), Maldives is strategically located close to key international shipping lanes.

In a meeting with Vice Admiral Anil Kumar Chawla, Flag Officer, Commanding in Chief, Southern Naval Command of the Indian Navy on Sunday, the Maldives Foreign Affairs minister Abdulla Shahid not only reflected on the "historically strong bilateral relations" between the two countries, particularly in the field of defence and security cooperation, but also discussed in detail the "emerging security threats" in the region.

Held at the Maldives' Ministry of Foreign Affairs, the meeting saw Shahid reaffirming his government's commitment to focus on strengthening maritime safety and security in the Indian Ocean and also acknowledging the "important role" played by the Indian Armed Forces in enhancing and developing the capacity of the Maldives National Defence Force.

"Delighted to meet with Vice Admiral A.K. Chawla, Flag Officer, C-in-C, Southern Naval Command of Indian Navy today. Discussed importance of cooperation between countries in maintaining peace & security in the Indian Ocean Region, especially in light of emerging security threats," the minister tweeted after the meeting.

Shahid was accompanied by the country's Foreign Secretary, Abdul Ghafoor Mohamed and Joint Secretary, India Division, Mariyam Midhfa Naeem at the meeting.

Building bridges of friendship, Indian Navy's elite marine commandos unit MARCOS have held joint training exercises with the strategically located neighbour since 2017, contributing to the capacity building of the Maldives National Defence Force (MNDF) Marines and enhancing the interoperability of the forces.

Vice Admiral Chawla also paid a courtesy call on Maldives Defence Minister Mariya Didi following the end of the Exercise Ekatha who appreciated the support provided by the Indian Navy during the Covid-19 pandemic, undertaking the Exclusive Economic Zone (EEZ) surveillance and towards training of the MNDF personnel.

Thanking the Indian Armed Forces for the continued support rendered to MNDF, Maldives' Chief of Defence Force, Major General Abdulla Shamaal also deliberated on enhancing maritime security cooperation and other key areas of military cooperation during his meeting with the top Indian Navy officer.

India leads maritime security efforts

A key maritime neighbour in the Indian Ocean Region, Maldives continues to occupy an important place in India's 'Neighbourhood First' policy and the 'SAGAR' (Security and Growth for All in the Region) vision of the Narendra Modi government.

In pursuit of its priority of growth and development, or 'sabka saath, sabka vikas', the Indian government is continuously working to increase the momentum and energy in the bilateral relationship which has "reached unprecedented levels" under the leadership of PM Modi and President Ibrahim Mohamed Solih.

In May, New Delhi announced the opening of a new Consulate General in Addu City to help augment India's diplomatic presence in Maldives and make it commensurate with the existing and aspired level of engagement.

A month before that, in the first meeting of the 'Joint Working Group on Counter Terrorism, Countering Violent Extremism and De-Radicalisation', both sides had reviewed threats posed by terrorist entities that are under UN sanctions and emphasised the need for concerted action against all terrorist networks.

India had also played a key role in the Maldives candidate, Foreign Minister Abdulla Shahid, winning the election to the post of the President of the 76th Session of the United Nations General Assembly, last month. The victory meant that the Maldives will be only the sixth President from a Small Island Developing State, presiding over the UN General Assembly in the history of the United Nations. With two-thirds of the world's oil shipments and half of all container ships passing through its waters, Maldives remains a geo-strategically important country, especially with the growing presence of China in the Indian Ocean Region.

With maritime security becoming the most pressing issue, India has not only conveyed its unwavering support and assistance to Maldives, but also led discussions on issues pertaining to cooperation among Indian Ocean countries at engagements like the 'Indian Ocean Region Defence Ministers Conclave 2021' held in Bengaluru earlier this year and the revived 'NSA-level Meeting on Trilateral Maritime Security Cooperation', organised after a gap of six years, in Colombo last November.

https://menafn.com/1102441037/In-blow-to-China-Maldives-holds-naval-exercises-with-India

PHYS.ORG

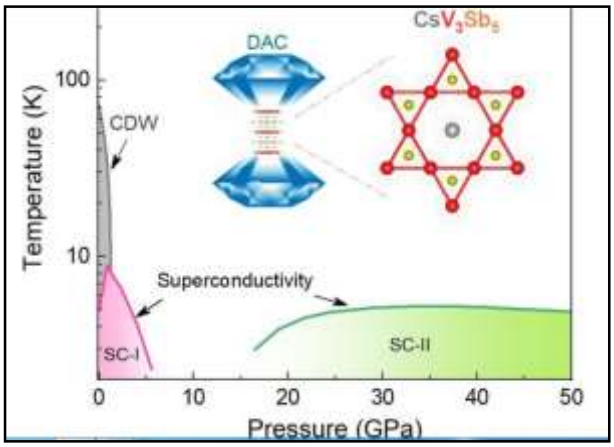
Wed, 14 July 2021

Two-dome superconductivity in a kagome superconductor discovered under high pressure

By Zhang Nannan

Recently, a research team led by Prof. Yang Zhaorong from the Hefei Institutes of Physical Science (HFIPS) of the Chinese Academy of Sciences (CAS), in collaboration with researchers from the Anhui University and other institutions, discovered pressure-induced two-dome superconductivity in the quasi-two-dimensional topological kagome superconductor CsV_3Sb_5. This work was published in *Physical Review B* and selected as Editors' Suggestion.

Owing to its unique geometry, kagome lattice intrinsically hosts electronic flat bands (strong correlations), Dirac band crossings like in graphene, and Van hove singularities, enabling realizations of quantum diversities. Recently, the kagome superconductors AV_3Sb_5 (A=K, Rb, Cs) have attracted much research interests due to discoveries of superconductivity, chiral charge effect, giant anomalous Hall effect and non-trivial topological electronic bands.



Temperature-pressure phase diagram of kagome superconductor CsV3Sb5. Credit: CHEN Xuliang

Pressure, as one of the three fundamental thermodynamic parameters, is known as a clean and powerful means to directly manipulate the lattice and further tune the electronic states. Naturally, one may ask how these phenomena interact with each other and what kind of exotic states may emerge for the systems under pressure.

In this research, the team chose CsV_3Sb_5 as an example since it has the highest superconducting transition temperature of about 5.0 K amongst the systems at ambient pressure. They used the so-called diamond anvil cell to generate high pressures up to 47.9 GPa. They found that the transition temperature first increases and then decreases rapidly under pressure, which is undetectable in the intermediate pressure range of 5–16 GPa.

Unexpectedly, superconductivity reemerges above 16 GPa, with transition temperature first increasing slightly and then almost leveling off.

Therefore, a two-dome superconducting phase diagram was revealed for CsV_3Sb_5 under high pressure. In terms of the high-pressure synchrotron X-ray diffraction measurements, they didn't find any structural transition but an anomaly in ratio of the lattice parameters just around the same critical pressure, indicating a Fermi surface reconstruction via Lifshitz transition that might be responsible for the reemergence of superconductivity.

Many experiments suggests that the ambient-pressure superconductivity in CsV_3Sb_5 should be unconventional. In this sense, this work evidences a two-dome superconductivity in the first V-based unconventional superconductor.

In addition to previous reports in tremendous unconventional superconductors like Cu-based, Fe-based and heavy-fermion systems, two-dome superconductivity seems to be a common feature

for these systems under external parameters, which may provide an important clue for understanding mechanisms of the unconventional superconductivity.

More information: Zhuyi Zhang et al, Pressure-induced reemergence of superconductivity in the topological kagome metal CsV3Sb5, *Physical Review B* (2021). DOI: 10.1103/PhysRevB.103.224513

Journal information: *Physical Review B*

https://phys.org/news/2021-07-two-dome-superconductivity-kagome-superconductor-high.html

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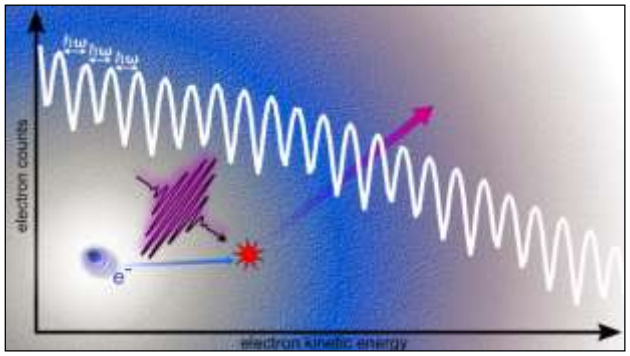
Wed, 14 July 2021

Electrons in quantum liquid gain energy from laser pulses

The absorption of energy from laser light by free electrons in a liquid has been demonstrated for the first time. Until now, this process was observed only in the gas phase. The findings, led by Graz University of Technology, open new doors for ultra-fast electron microscopy.

The investigation and development of materials crucially depends on the ability to observe smallest objects at fastest time scales. The necessary spatial resolution for investigations in the (sub-)atomic range can be achieved with electron microscopy. For the most rapid processes, however, proceeding within a few femtoseconds (quadrillionths of a second), the time resolution of conventional electron microscopes is insufficient. To improve the time duration of electron pulses, electrons would have to be selected within a shorter time window—in analogy to a camera shutter, which controls the exposure time in photography.



Schematic representation of a LAES process in superfluid helium: The electron collides with the material sample (red star), thereby absorbing energy from the light field and changing its direction. Credit: IEP – TU Graz

In principle, this temporal selection is possible with extremely short laser pulses through a process called laser-assisted electron scattering (LAES). In this process, electrons can absorb energy from the light field during collisions with atoms of the sample under investigation. "Structural information is provided by all electrons, but those that have a higher energy level can be assigned to the time window in which the light pulse was present. With this method, it is possible to select a short time window from the long electron pulse and thus improve the time resolution," explains Markus Koch, professor at the Institute of Experimental Physics at Graz University of Technology. So far, however, LAES processes have only been observed in the gas phase, despite their investigation for about 50 years.

Koch and his team, in collaboration with researchers from Photonics Institute at Vienna University of Technology and the Institute of Chemistry at Tokyo Metropolitan University, have now demonstrated for the first time that laser-assisted electron scattering can also be observed in condensed matter, specifically in superfluid helium.

Superfluid helium leading to success

The TU Graz researchers performed the experiment in a superfluid helium droplet of few nanometer diameter (3-30 nm), into which they loaded single atoms (indium or xenon) or molecules (acetone) that served as an electron source—a field of expertise at the institute. "The free electrons can move almost without friction within the droplet and absorb more energy in the light field than they lose in collisions with the helium atoms," says Leonhard Treiber, the Ph.D.

student in charge of the experiment. The resulting acceleration allows for the observation of much faster electrons.

The experiments could be interpreted in cooperation with Markus Kitzler-Zeiler, an expert for strong-field processes at TU Wien, and the LAES process was confirmed through simulations by Reika Kanya from Tokyo Metropolitan University. The results were published in *Nature Communications*.

In the future, the LAES process will be studied within thin films of various materials, also produced inside helium droplets, in order to determine important parameters such as the optimal film thickness or the favorable intensity of the laser pulses for application in an electron microscope.

More information: Leonhard Treiber et al, Observation of laser-assisted electron scattering in superfluid helium, *Nature Communications* (2021). DOI: 10.1038/s41467-021-24479-w

Journal information: *Nature Communications*

https://phys.org/news/2021-07-electrons-quantum-liquid-gain-energy.html

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Wed, 14 July 2021

Neutron-clustering effect in nuclear reactors demonstrated for first time

For the first time, the long-theorized neutron-clustering effect in nuclear reactors has been demonstrated, which could improve reactor safety and create more accurate simulations, according to a new study recently published in the journal *Nature Communications Physics*.

"The neutron-clustering phenomenon had been theorized for years, but it had never been analyzed in a working reactor," said Nicholas Thompson, an engineer with the Los Alamos Advanced Nuclear Technology Group. "The findings indicate that, as neutrons fission and create more neutrons, some go on to form large lineages of clusters while others quickly die off, resulting in so-called 'power tilts,' or asymmetrical energy production."

Reactor Operator Nicholas Thompson of Los Alamos National Laboratory helps to set up the neutron clustering measurements at the Walthousen Reactor Critical Facility at Rensselaer Polytechnic Institute in Schenectady, NY. Credit: Los Alamos National Laboratory

Understanding these clustering fluctuations is especially important for safety and simulation accuracy, particularly as nuclear reactors first begin to power up. The study was a collaboration with the Institute for Radiological Protection and Nuclear Safety (IRSN) and the Atomic Energy Commission (CEA), both located in France.

"We were able to model the life of each neutron in the nuclear reactor, basically building a family tree for each," said Thompson. "What we saw is that even if the reactor is perfectly critical, so the number of fissions from one generation to the next is even, there can be bursts of clusters that form and others that quickly die off."

This clustering phenomenon became important to understand because of a statistical concept known as the gambler's ruin, believed to have been derived by Blaise Pascal. In a betting analogy, the concept says that even if the chances of a gambler winning or losing each individual bet are 50 percent, over the course of enough bets the statistical certainty that the gambler will go bankrupt is 100 percent.

In nuclear reactors, from generation to generation, each neutron can be said to have a similar 50 percent chance of dying or fissioning to create more neutrons. According to the gambler's ruin concept, the neutrons in a reactor might then have a statistical chance of dying off completely at some future generation, even though the system is at critical.

This concept had been studied widely in other scientific fields, such as biology and epidemiology, where this generational clustering phenomenon is also present. By drawing on this related statistical math, the research team was able to analyze whether the gambler's ruin concept would hold true for neutrons in nuclear reactors.

"You would expect this theory to hold true," says Jesson Hutchinson, who works with the Laboratory's Advanced Nuclear Technology Group. "You should have a critical system that, while the neutron population is varying between generations, runs some chance of becoming subcritical and losing all neutrons. But that's not what happens."

To understand why the gambler's ruin concept didn't hold true, researchers used a low-power nuclear reactor located at the Walthousen Reactor Critical Facility in New York. A low-power reactor was essential for tracking the lifespans of individual neutrons because large-scale reactors can have trillions of interactions at any moment. The team used three different neutron detectors, including the Los Alamos-developed Neutron Multiplicity 3He Array Detector (NoMAD), to trace every interaction inside the reactor.

The team found that while generations of neutrons would cluster in large family trees and others died out, a complete die-off was avoided in the small reactor because of spontaneous fission, or the non-induced nuclear splitting of radioactive material inside reactors, which creates more neutrons. That balance of fission and spontaneous fission prevented the neutron population from dying out completely, and it also tended to smooth out the energy bursts created by clustering neutrons.

"Commercial-sized nuclear reactors don't depend on the neutron population alone to reach criticality, because they have other interventions like temperature and control rod settings," Hutchinson said. "But this test was interested in answering fundamental questions about neutron behavior in reactors, and the results will have an impact on the math we use to simulate reactors and could even affect future design and safety procedures."

More information: Eric Dumonteil et al, Patchy nuclear chain reactions, *Communications Physics* (2021). DOI: 10.1038/s42005-021-00654-9

Journal information: *Communications Physics*

https://phys.org/news/2021-07-neutron-clustering-effect-nuclear-reactors.html

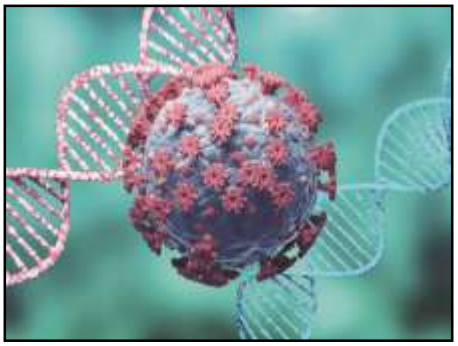
Business Standard

Wed, 14 July 2021

Synthetic SARS-CoV-2 could be used as antiviral therapy for Covid-19: Study

Researchers have designed a synthetic defective SARS-CoV-2 that can interfere with growth of real virus, potentially leading to the extinction of both Covid-19 causing pathogen and the artificial one

Washington: Researchers have designed a synthetic defective SARS-CoV-2 that can interfere with the growth of the real virus, potentially leading to the extinction of both the COVID-19 causing pathogen and the artificial one.



In the study published in the journal PeerJ, the researchers explained that when a virus attacks a cell, it attaches to the cell's surface and injects its genetic material into it.

The cell is then tricked into reproducing the virus's genetic material and packaging it into virions, particles which burst from the cell and go off to infect other cells.

"In our experiments, we show that the wild-type (disease-causing) SARS-CoV-2 virus actually enables the replication and spread of our synthetic virus, thereby effectively promoting its own decline," said Marco Archetti, associate professor at Pennsylvania State University in the US.

"A version of this synthetic construct could be used as a self-promoting antiviral therapy for COVID-19," Archetti said.

The researchers noted that defective interfering (DI) viruses, which are common in nature, contain large deletions in their genomes that often affect their ability to reproduce their genetic material and package it into virions.

However, DI genomes can perform these functions if the cell they have infected also harbours genetic material from a wild-type virus, they said.

In this case, the researchers said, a DI geneome can hijack a wild-type genome's replication and packaging machinery.

"These defective genomes are like parasites of the wild-type virus," said Archetti.

He explained that when a DI genome utilises a wild-type genome's machinery, it also can impair the growth of the wild-type genome.

"Given the shorter length of their genomes as a result of the deletions, DI genomes can replicate faster than wild-type genomes in coinfected cells and quickly outcompete the wild-type," Archetti said.

The team found that synthetic DI genome can replicate three times faster than the wild-type genome, resulting in a reduction of the wild-type viral load by half in 24 hours.

The researchers engineered short synthetic DI genomes from parts of the wild-type SARS-CoV-2 genome and introduced them into African green monkey cells that were already infected with the wild-type SARS-CoV-2 virus.

They then quantified the relative amounts of the DI and wild type genomes in the cells over time points, which gave an indication of the amount of interference of the DI genome with the wild-type.

The study found that within 24 hours of infection, the DI genome reduced the amount of SARS-CoV-2 by approximately half compared to the amount of wild-type virus in control experiments.

The researchers also found that the DI genome increases in quantity 3.3 times as fast than the wild-type virus.

Archetti said that the 50 per cent reduction in virus load that they observed over 24 hours may not be enough for therapeutic purposes as the DI genomes increase in frequency in the cell.

However, the decline in the amount of wild-type virus would lead to the demise of both the virus and the DI genome, as the DI genome cannot persist once it has driven the wild-type virus to extinction, he added.

The researchers said further experiments are needed to verify the potential of SARS-CoV-2 DIs as an antiviral treatment, suggesting that the experiments could be repeated in human lung cell lines, and against some of the newer variants of SARS-CoV-2.

In their follow-up research, that is still unpublished, the team has used nanoparticles as a delivery vector and observed that the virus declines by more than 95 per cent in 12 hours.

"With some additional research and fine-tuning, a version of this synthetic DI could be used as a self-sustaining therapeutic for COVID-19," Archetti added.

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

https://www.business-standard.com/article/current-affairs/synthetic-sars-cov-2-could-be-used-as-antiviral-therapy-for-covid-19-study-121071300426_1.html