

Sept
2020

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

Volume: 45 Issue: 217 16 September 2020



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**Press Information Bureau
Government of India**

Ministry of Defence

Tue, 16 Sept 2020 6:09PM

Postage Stamp released on A-SAT: India's first Anti Satellite Missile

A Customized My Stamp on India's First Anti Satellite Missile (A-SAT) launch was released by Department of Posts on the occasion of Engineers Day today in the august presence of Shri AjitDoval, National Security Advisor (NSA).

On the direction of Hon'ble Prime Minister Shri Narendra Modi, Defence Research and Development Organisation (DRDO) successfully conducted an Anti-Satellite (A-SAT) missile test 'Mission Shakti' from Dr APJ Abdul Kalam Island in Odisha on 27th March 2019. A DRDO developed A-SAT Missile successfully engaged an Indian orbiting target satellite in Low Earth Orbit (LEO) in a 'Hit to Kill' mode. The interceptor missile was a three-stage missile with two solid rocket boosters. Tracking data from range sensors had confirmed that the mission met all its objectives. The entire effort was indigenous which demonstrated the Nation's capability to develop such complex and critical missions. A number of industries also participated in the mission. With this success, India became fourth nation in the world to possess such capability.

Shri AjitDoval in his address stated that it was a very brave step on part of DRDO to go for Mission Shakti. He further stated that DRDO has plenty of achievements to be proud of; however the future is in space based technologies. Satellites are critical and with this capability India can defend it's assets in space. He appreciated the way in which the mission was kept a secret and complimented the whole DRDO fraternity for doing well in all other fields.

Speaking on the occasion, Dr G Satheesh Reddy, Secretary DDR&D& Chairman DRDO thanked Hon'ble Prime Minister and NSA for having confidence in DRDO and assigning such a critical and complex mission to DRDO. He further stated that A-SAT mission enabled development of many technologies and capabilities for precision kill at higher altitudes. He called upon DRDO fraternity to take up more such complex and critical projects.

The function was also attended by Shri Pradipta Kumar Bisoi, Secretary, Department of Posts and Senior Scientists of DRDO.

The release of Stamp reminds the nation about the technological achievement, which has made the nation proud.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1654607>

Wed, 16 Sept 2020

Postage stamp on India's first A-SAT released on Engineers' Day

New Delhi: On the occasion of Engineers' Day on Tuesday, the Department of Post launched a customized stamp on India's First Anti-Satellite Missile (A-SAT).

Defence Research and Development Organisation (DRDO) had successfully conducted an AntiSatellite (A-SAT) missile test 'Mission Shakti' from Dr APJ Abdul Kalam Island in Odisha on March 27, 2019.



[Postage stamp on India's first A-SAT released on Engineers' Day](#)

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The stamp launch was attended by National Security Advisor Ajit Doval who, in his address stated that it was a very "brave step" on part of DRDO to go for 'Mission Shakti (/topic/missionshakti)'. "DRDO has plenty of achievements to be proud of; however the future is in

space based technologies. Satellites are critical and with this capability India can defend its assets in space," Doval said.

He appreciated the way in which the mission was kept secret and lauded the whole DRDO fraternity for doing well in all other fields. The function was also attended by Pradipta Kumar Bisoi, Secretary, Department of Posts and Senior Scientists of DRDO. (ANI)

<https://www.aninews.in/news/national/general-news/postage-stamp-on-indias-first-a-sat-released-on-engineers-day20200915235042/>



Wed, 16 Sept 2020

Postage Stamp Released on A-SAT Missile System

New Delhi: The Department of Posts released a stamp on India's first Anti-Satellite (A-SAT) Missile System on the occasion of Engineers' Day on Tuesday in Delhi.

Defence Research and Development Organisation's (DRDO) A-SAT missile successfully engaged an Indian orbiting target satellite in Low Earth Orbit (LEO) in a 'Hit to Kill' mode from Dr A.P.J. Abdul Kalam Island in Odisha on March 27, 2019.

The interceptor missile was a three-stage missile with two solid rocket boosters. Tracking data from range sensors had confirmed that the mission met all its objectives. The entire effort was indigenous which demonstrated the nation's capability to develop such complex and critical missions.



A number of industries also participated in the mission. With this success, India became the fourth nation in the world to possess such capability.

National Security Advisor Ajit Doval in his address stated that it was a very brave step on part of DRDO to go for 'Mission Shakti'.

He further stated that DRDO has plenty of achievements to be proud of, however the future is in space-based technologies. Satellites are critical and with this capability India can defend its assets in space. He appreciated the way in which the mission was kept a secret and complimented the whole DRDO fraternity for doing well in all other fields.

DRDO Chairman Dr G. Satheesh Reddy stated that A-SAT mission enabled development of many technologies and capabilities for precision kill at higher altitudes. He called upon DRDO to take up more such complex and critical projects.

"The release of the stamp reminds the nation about the technological achievement which has made the nation proud," Pradipta Kumar Bisoi, Secretary, Department of Posts said. (IANS)

<https://ommcomnews.com/india-news/postage-stamp-released-on-a-sat-missile-system>

उपग्रह भेदी मिसाइल ए-सैट की याद में डाक टिकट जारी किया गया

नयी दिल्ली: देश की पहली उपग्रह भेदी मिसाइल ए-सैट के सफल परीक्षण की याद में मंगलवार को राष्ट्रीय सुरक्षा सलाहकार अजित डोभाल की उपस्थिति में एक डाक टिकट जारी किया गया। रक्षा मंत्रालय ने यह जानकारी दी। मंत्रालय की ओर से जारी वक्तव्य के अनुसार समारोह में दिए अपने संबोधन में डोभाल ने कहा कि रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) के नाम गर्व करने लायक कई उपलब्धियां दर्ज हैं लेकिन भविष्य अंतरिक्ष आधारित प्रौद्योगिकी पर निर्भर है।

डीआरडीओ ने पिछले साल 27 मार्च को ए-सैट का पहला सफल परीक्षण किया था। वक्तव्य में कहा गया कि ए-सैट मिसाइल को ओडिशा स्थित डॉ एपीजे अब्दुल कलाम द्वीप से छोड़ा गया था और उसने एक भारतीय उपग्रह को सफलतापूर्वक मार गिराया था। वक्तव्य के अनुसार, “डाक टिकट जारी होने से राष्ट्र इस उपलब्धि का स्मरण करेगा, जिसने देश को गौरवान्वित किया था।” गत वर्ष 27 मार्च को किए गए परीक्षण को “मिशन शक्ति” नाम दिया गया था।

वक्तव्य के अनुसार डोभाल ने कहा कि डीआरडीओ के लिए यह साहस भरा कदम था। डोभाल ने कहा, “गर्व का अनुभव करने के लिए डीआरडीओ के नाम कई उपलब्धियां हैं, हालांकि भविष्य अंतरिक्ष आधारित प्रौद्योगिकी पर निर्भर है।” वक्तव्य के अनुसार डोभाल ने अभियान को गोपनीय रखने की सराहना की और डीआरडीओ की प्रशंसा की। इस अवसर पर डीआरडीओ के अध्यक्ष जी सतीश रेड्डी भी उपस्थित थे।

(डिस्कलेमर: यह आर्टिकल एजेंसी फीड से ऑटो-अपलोड हुआ है। इसे नवभारतटाइम्स.कॉम की टीम ने एडिट नहीं किया है।)

<https://navbharattimes.indiatimes.com/india/postage-stamp-issued-in-memory-of-satellite-piercing-missile-asat/articleshow/78132080.cms>



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The release of Stamp reminds the nation about technological achievement, which has made the nation proud. (With Inputs from PIB)

<https://www.devdiscourse.com/article/headlines/1213143-customized-my-stamp-on-anti-satellite-missile-launch-released>



Wed, 16 Sept 2020

DRDO to build directed energy weapons for future combat

The Defence Research and Development Organisation (DRDO) is planning to develop directed energy weapons (DEWS) like high-energy lasers and high-powered microwaves. The DEWS will be a part of a national programme, which will have short, medium, and long-term goals, according to a Times of India report.

DRDO will develop different DEWS variants of up to 100-kilowatt power, in collaboration with the domestic industry. These will include 'chemical oxygen-iodine' and 'high-power fibre' lasers to a secretive 'Kali' particle-beam for 'soft-kills' against incoming missiles and aircraft, the report added. However, these DEWS are currently nowhere close to being operational.



The DRDO has developed two anti-drone DEW systems, which will now be manufactured in large numbers with the help of the domestic industry. While one is a trailer-mounted DEW, with a 10-kilowatt laser While one is a trailer-mounted DEW, with a 10-kilowatt laser to engage aerial targets at a 2-km range, the other is a compact tripod-mounted one with a 2-kilowatt laser for a 1-km range.

These DEWS have been demonstrated to the armed forces, intelligence agencies and field forces. The two systems can down micro drones by either jamming their command and control links or damaging their electronics through laser-based DEWS.

<https://www.defenceaviationpost.com/2020/09/drdo-to-build-directed-energy-weapons-for-future-combat/>

Tejas vs F-16: Why Lockheed Martin's F-16 Fighter Jets are a big threat to India's Indigenous HAL Tejas?

By Smiriti Chaudhary

The US F-16 multirole fighter is one of the most successful and widely operated in the world with 3,000 operational combat aircraft in service in over 25 countries. Experts believe that defence lobbyist want India to buy the F-16s or F-21s as they continue to undermine the indigenous – HAL Tejas.

In Asia, Singapore uses 62 F-16 jets, South Korea has 180 and Japan operates 76 aircraft made jointly by the US and Japanese companies based on F-16 technology. Thailand has 54, Indonesia has 33 and Pakistan has around 40 out of which 32 are believed to be operational. Taiwan operates 142 with another 66 due for shipment by 2026.

Lockheed Martin, the maker of the F-16 jets, has been vying hard to get a deal on fighters. Tata Advanced Systems Limited (TASL) has entered in an agreement with Lockheed Martin to join hands to produce the F-16 Block 70 in India.

This could be a big boost for the Modi administration promoting its 'Make in India' campaign. "Our partnership significantly strengthens the F-16 'Make in India' offer, creates and maintains numerous new job opportunities in India and the US, and brings the world's most combat-proven multi-role fighter aircraft to India," said Orlando Carvalho, executive vice president of Lockheed Martin Aeronautics.

Last year PTI reported that Lockheed Martin said that it won't sell its newly rolled out F-21 fighter jet to any other country if India places an order for 114 planes, in a move at pitching its specially configured variant of the US Air Force's upgraded F-16.

"The F-21 addresses the Indian Air Force's unique requirements and integrates India into the world's largest fighter aircraft ecosystem with the world's pre-eminent defence company. Lockheed Martin and Tata would produce the F-21 in India, for India," a Lockheed statement said.

This is seen as a danger that the defence import lobby will kill the indigenous Tejas. Rakesh Krishnan, a New Zealand-based defence and foreign affairs analyst, argued that if New Delhi finalises the order of 110 American fighters, with the limited share of the defence budget the IAF may not have the cash to splurge on two separate fighter programmes.

"As long as the air force brass are assured they'll get sufficient numbers of modern battle-tested F-16s – or any other modern foreign fighter – they may not care what happens to the Tejas."

Cherian Samuel, a Research Fellow in the Strategic Technologies Centre at the Manohar Parrikar Institute for Defence Studies and Analyses, noted that while these aircraft are cheaper than the other European manufactured aircraft in the fray, there are many limitations imposed by US laws and regulations governing the export of sensitive technologies that reduce the capabilities of the aircraft on offer.

"While these aircraft are cheaper than the other European manufactured aircraft, there are many limitations imposed by US laws and regulations governing the export of sensitive technologies that reduce the capabilities of the aircraft on offer," he added.

Another factor that experts believe has troubled New Delhi is the sale of F-16s to Pakistan. Samuel claimed that India has objected to the US funding weapons purchases by Pakistan, going up from \$700 million in 2010 to 1.5 billion in 2011, purportedly for its counter-insurgency efforts.

These could be well used against India. He further added that this helps Pakistan use its own funds to purchase US arms including F-16s fuelling an arms race in the subcontinent.

During the February 2019 aerial skirmish between India and Pakistan which was seen after the Balakot strike, it was reported that the Indian Air Force lacked an air-to-air missile that could match the AMRAAM, which is believed to have a range of around 100km.

This deficiency of the lack of an air to air missile has now been overcome with the freshly procured Rafale fighters which will be equipped with the deadly Meteor missile. It is believed that the Meteor's capability is linked to its long-range, which is estimated to be well over 120km. According to MBDA, the pan-European consortium that builds the Meteor, the missile has a large No Escape Zone.

According to the Quint, there is a planned vilification drive against the indigenous Tejas Light Combat Aircraft programme while praising Swedish Saab Gripen or the US Lockheed Martin F-16.

An old report in India Today quoting the Indian Air Force had written that HAL Tejas isn't enough to protect Indian skies. The response came after the South Block asked the IAF to scrap its plans of acquiring single-engine fighter jets.

The IAF said the Tejas is far behind its competitors like the JAS 39 Gripen manufactured by the Swedish aerospace company Saab and the US-made F-16 manufactured by Lockheed Martin, the site quoted its sources.

Earlier this year, the Defence Acquisition Council (DAC) had given its approval for the acquisition of 83 LCA 'Tejas'. "This is a critical step, as the deal has been getting delayed over price issues, as it was on the higher side, according to reports.

According to defence experts talking to EurAsian Times, India must aggressively continue to work on its indigenous Tejas jets, as Indian PM Narendra Modi has vowed and in less than a decade New Delhi might not have the need to import any jets from Russia or France. India must ensure that defence lobbyist pitching western fighters jets are identified, reported and blocked from undermining the Tejas.

<https://eurasianimes.com/tejas-vs-f-16-why-lockheed-martins-f-16-fighter-jets-are-a-big-threat-to-indias-indigenous-hal-tejas/>

The Tribune

Wed, 16 Sept 2020

LAC standoff: India blames China for breach of all agreements

Ready to deal with all contingencies, Rajnath tells Lok Sabha

By Ajay Banerjee

New Delhi: India on Tuesday blamed China for being in breach of all agreements and for causing the resultant military standoff along the Line of Actual Control (LAC) in Ladakh.

Defence Minister Rajnath Singh made a statement in Lok Sabha at 3 pm saying India was ready to resolve the issue through dialogue but added “the House can be assured that we remain prepared to deal with all contingencies... No one should doubt our determination to safeguard our borders”.

He referred to the Galwan incident of June 15 saying, “Our brave soldiers inflicted costs, including casualties on the Chinese side.”

Chinese actions reflect a disregard of our various bilateral agreements, said Rajnath Singh and apportioned blame on China. “The amassing of the troops by China goes against the 1993 and 1996 Agreements. Respecting and strictly observing the LAC is the basis for peace and tranquillity in the border areas and explicitly recognised in both 1993 and 1996 agreements.”

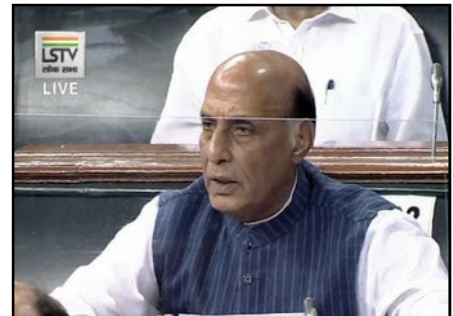
“Indian armed forces abide by it; this has not been reciprocated by the Chinese side. Their actions have led to face-offs and frictions from time to time along the LAC,” the Minister told the Lok Sabha.

The agreements have procedures and norms to deal with the situation of face-offs. However, in the recent incidents, this year, the violent conduct of Chinese forces has been in complete violation of all mutually agreed norms, he said.

As of now, the Chinese side has mobilised a large number of troops and armaments along the LAC as well as in the depth areas. There are several friction areas in Eastern Ladakh, including Gogra, Kongka La and North and South Banks of the Pangong Tso. In response to China’s actions, Indian armed forces have also made appropriate counter deployments, he said.

Referring to his meeting with his counterpart General Wei Fenghe in Moscow on September 4 and the subsequent meeting between the foreign Ministers of India and China, Rajnath Singh said “we want to resolve the current situation through dialogue, we have maintained diplomatic and military engagement with the Chinese side”.

In these discussions, India has maintained the three key principles that, determine our approach: Firstly, both sides should strictly respect and observe the LAC; secondly, neither side should attempt to alter the status quo of the LAC unilaterally; and thirdly, all agreements and understandings between the two sides must be fully abided by in their entirety.



Rajnath Singh in the Lok Sabha.

The Chinese side also conveyed that the issue be handled in a responsible manner to ensure peace and tranquillity as per bilateral agreements and protocol.

The two sides have reached an agreement that, if implemented sincerely and faithfully by the Chinese side, could lead to complete disengagement and restoration of peace and tranquillity in the border areas.

Referring to the recent incidents along the southern bank of the Pangong Tso, a 135 km glacial-melt lake, Rajnath Singh said the Chinese side engaged in provocative military manoeuvres on the night of August 29 and 30 in an attempt to change the status quo. "Timely and firm action by our armed forces along the LAC prevented such attempts from succeeding."

Our armed forces have maintained "restraint" in the face of provocative actions, they have also equally displayed "bravery" when required to.

Differentiating from past such stand-offs, Rajnath Singh said in the past too "we have had situations of prolonged stand-offs in our border areas with China which have been resolved peacefully. Even though the situation this year is very different both in terms of scale of troops involved and the number of friction points, we do remain committed to the peaceful resolution of the current situation".

<https://www.tribuneindia.com/news/nation/china-does-not-accept-customary-and-peripheral-alignment-of-sino-india-border-rajnath-tells-lok-sabha-141525>

THE ECONOMIC TIMES

Wed, 16 Sept 2020

Chinese movement in depth areas opposite Arunachal noticed, Army strengthens positions

Synopsis

"A strict vigil is being maintained in almost all the sectors with China from Ladakh to Arunachal Pradesh as the Chinese suffered a setback in the southern Pangong Tso area and may try to make fresh attempts to ingress into newer dormant areas," government sources told ANI.

New Delhi: After the Chinese Army's attempts to occupy dormant heights in Southern Pangong Tso area were foiled by the Indian security forces, Indian agencies are keeping a close watch on their movements opposite other sectors, especially Arunachal Pradesh, where the People's Liberation Army (PLA) has been moving troops in the depth areas.

"A strict vigil is being maintained in almost all the sectors with China from Ladakh to Arunachal Pradesh as the Chinese suffered a setback in the southern Pangong Tso area and may try to make fresh attempts to ingress into newer dormant areas," government sources told ANI.

In the Arunachal Pradesh sector, the Indian security forces have been keeping a close watch on Chinese military movements in the areas opposite the Asaphila area, and also opposite the Tuting axis and the Fish Tail-2 area, they said.

Sources said the movement of Chinese troops in their depth areas (around 20 kms from LAC) has been seen in the last few days using the roads built by them in the area where they have built infrastructure through glaciated areas as well.

Looking at the Chinese activities in the area, the Indian side has also strengthened its positions on the LAC in all the sectors.



A signboard is seen from the Indian side of the Indo-China border at Bumla, in the northeastern state of Arunachal Pradesh, November 11, 2009

The Chinese Army patrols are also being seen regularly and are coming very close to Indian areas.

Sources say the top security brass of the country have also held discussions on the situation in and around the Doklam area in Bhutan where the Chinese Army has built up significantly in the recent past.

Sources said even though the Chinese side had agreed to hold the next round of Corps Commander-level talks, they have not yet confirmed the time and date for the meet and there has been no change on the ground since the meeting between the foreign ministers of the two countries.

The two countries have been engaged in a standoff position since April-May timeframe and the Chinese have refused to vacate areas in the Finger area and other friction points in the Eastern Ladakh area.

Multiple rounds of talks have also failed to yield any significant result in defusing the tensions and now the Indian side has prepared itself for long term deployment in the high mountainous region.

<https://economictimes.indiatimes.com/news/defence/chinese-movement-in-depth-areas-opposite-arunachal-noticed-army-strengthens-positions/articleshow/78124607.cms>



Wed, 16 Sept 2020

अब अरुणाचल में एक्टिव चीनी सेना:पैंगॉन्ग में मात खाए चीन ने अरुणाचल में मूवमेंट बढ़ाया, बर्फीले इलाकों में सैन्य ठिकाने बनाए; निगरानी के लिए भारत ने भी जवान बढ़ाए

- अरुणाचल में एलएसी से 20 किलोमीटर दूर गहराई वाले इलाकों में चीनी सैनिकों का मूवमेंट बढ़ा, यहां सैन्य ठिकाने भी बनाए
- असाफिला एरिया, तूतिंग एक्सिस और फिश टेल से लगी सीमा के पार चीनी सेना के मूवमेंट पर भारतीय सेना की नजर

नई दिल्ली: लद्दाख में पैंगॉन्ग के आसपास भारत ने ना केवल चीन की घुसपैठ को नाकाम कर दिया है, बल्कि अहम चोटियों पर भी कब्जा कर लिया है। यहां मात खाने के बाद चीन की सेना लाइन ऑफ एक्चुअल कंट्रोल (एलएसी) के दूसरे इलाकों में अपना मूवमेंट बढ़ा रही है। चीन ने अरुणाचल में एलएसी से 20 किलोमीटर दूरी पर अपनी सेना का मूवमेंट बढ़ा दिया है। यहां के बर्फीले इलाकों में भी सैन्य ठिकाने बना लिए हैं।

भारतीय सुरक्षा और खुफिया एजेंसियां इस मूवमेंट पर करीब से नजर रख रही हैं। यहां पर सेना की तैनाती भी बढ़ा दी गई है। न्यूज एजेंसी ने सरकारी सूत्रों के हवाले से बताया कि लद्दाख में मात खाने के बाद चीनी सेना नए इलाकों में घुसपैठ की कोशिश कर सकती है इसलिए लद्दाख से लेकर अरुणाचल तक चीन के साथ लगे सभी सेक्टरों पर कड़ी निगरानी रखी जा रही है।

पेट्रोलिंग के दौरान भारतीय इलाकों के पास आ रहे चीनी सैनिक

सूत्रों के मुताबिक, अरुणाचल सेक्टर में भारतीय सेना असाफिला एरिया, तूतिंग एक्सिस और फिश टेल से लगी सीमा के पार चीनी सेना के मूवमेंट की कड़ी निगरानी कर रही है। पिछले कुछ दिनों से एलएसी से कुछ किलोमीटर दूर गहराई वाले इलाकों में चीनी सेना अपनी बनाई सड़कों पर ही मूवमेंट बढ़ा रही है। इसे देखते हुए भारतीय सेना भी एलएसी के सारे सेक्टर में खुद को मजबूत करने लगी हुई है। चीनी सेना को पेट्रोलिंग के दौरान भारतीय इलाकों के पास देखा जा रहा है।



चीनी सेना के मूवमेंट को देखते हुए भारतीय सेना भी एलएसी के सारे सेक्टर में खुद को मजबूत करने लगी हुई है। (फाइल फोटो)

कॉर्प्स कमांडर लेवल की बातचीत का दिन तय नहीं

सूत्रों के मुताबिक, टॉप सिक्योरिटी ऑफिसर्स ने डोकलाम के आसपास भूटान में पिछले दिनों चीनी सेना द्वारा बनाए गए सैन्य ठिकानों को लेकर भी चर्चा की। सूत्रों ने बताया कि चीन अगले राउंड की कॉर्प्स कमांडर लेवल की बातचीत के लिए तैयार हो गया है, लेकिन उसने अब तक इसके लिए समय और दिन तय नहीं किए हैं। हाल ही में दोनों देशों के विदेश मंत्रियों के बीच हुई बैठक के बाद ग्राउंड लेवल पर हालात में कोई सुधार नहीं हुआ है।

भारतीय इलाकों पर लगातार कब्जे की कोशिश रहा है चीन

29-30 अगस्त की रात चीनी सैनिकों ने पैंगॉन्ग झील के दक्षिणी छोर की पहाड़ी पर कब्जे की कोशिश की थी, लेकिन भारतीय जवानों ने नाकाम कर दी। तभी से दोनों के सैनिक आमने-सामने डटे हुए हैं। चीन 1 सितंबर को भी घुसपैठ की कोशिश कर चुका है।

7 सितंबर को दक्षिणी इलाके में चीनी सैनिकों ने भारतीय पोस्ट की तरफ बढ़ने की कोशिश की थी और चेतावनी के तौर पर फायरिंग की थी। यहां पर भारत के सैनिकों ने उन्हें रोक दिया था। इस घटना की तस्वीर भी सामने आई है, जिसमें चीन के सैनिक भाला, रॉड और धारदार हथियार लिए नजर आए।

<https://www.bhaskar.com/national/news/chinese-troops-movement-in-depth-areas-opposite-arunachal-noticed-indian-army-strengthens-positions-127721228.html>

Indian Army busts myth of Chinese PLA might: Experts

- *The armies of the two countries are in close proximity in some areas of eastern Ladakh*
- *Defence Minister Rajnath Singh has made it clear that India was ready to deal with 'any situation'*

New Delhi: The recent actions by Indian Army amid the border tension demonstrate India's determination to stand up to China's bullying and its efforts to use coercion to have its way, experts have said.

The armies of the two countries are in close proximity in some areas of eastern Ladakh.

The Chinese PLA, which has not fought a war since it got a bloody nose against Vietnam, might have underestimated India's resolve to defend its sovereignty and territorial integrity.

For all their famed strategic thinking and planning, they failed to take into account the bravery and courage of Indian soldiers.

Defence Minister Rajnath Singh has made it clear that India was ready to deal with "any situation".

"I want to assure you that we are ready to deal with any situation. I request this House to pass a resolution that we stand shoulder to shoulder with our armed forces who are guarding our borders to safeguard India's sovereignty and integrity," Singh said in the Lok Sabha on Tuesday.

"Violent conduct of Chinese troops is a violation of all past agreements. Our troops have done counter deployments in the area to safeguard our borders," he said.

Singh said that China has mobilised a huge number of Army battalions and armaments along LAC and inner areas.

"There are many friction points in eastern Ladakh, Gogra, Kongka La, Pangong Lake's north and south banks. Indian Army has made counter deployments in these areas," he said.

The two countries have been engaged in a standoff position since April-May and the Chinese have refused to vacate areas in the Finger area and other friction points in the Eastern Ladakh area.

In many ways, India has shattered the myth of Chinese indomitable military might. Strategic experts acknowledge that the recent developments at the India-China border have changed the so-called 'asymmetry in power' argument.

India holding on at the border 'head-on' for over four months in the face of China's much-vaunted military and economic might, a fact that the Chinese propaganda machinery never fails to highlight, has proved that the asymmetry of power argument does not hold water any more.

Indian force mobilisation has been effective and it has a competitive advantage in mountain warfare owing to the Indian Army's experience of being deployed at high altitudes.

The gallant action by Indian soldiers in Galwan clash in June was acknowledged the world over.

India capturing tactically important commanding heights on the top of the five posts to the south of Pangong Tso on August 29-30 tilted the balance in favour of India, experts said.

The operations to secure the heights on those features were undertaken by the Special Frontier Force (SFF) comprising Tibetans. Taking those heights could lead to interception of Chinese forces, giving India a tactical advantage.



File photo. Indian army soldiers walk along the line of control at the India-China border. (AP)

The experts said Indian troops can intercept Chinese moving from Chushul to Demchok through the valleys below.

In a bid to showcase its military might, the PLA has deployed 50,000 strong troops with modern weaponry ready to unleash their power against India. The Chinese have also made many diplomatic statements that were coercive.

These have come from their Ministry of Foreign Affairs, their Defence Ministry, their Western Theatre Command and from the Communist Party mouthpiece Global Times. The different Chinese statements have appeared interventionist, prescriptive and coercive, the experts said.

Consequently, China faced reverses on the Indian front.

After the Pentagon's annual report on China declared the People's Liberation Army Navy (PLAN) as "the largest navy in the world" and highlighted its increasing capabilities, the former Director of National Security Council Secretariat of India, Tara Kartha observed that such forecasts and warnings did not affect Indian decision to counter Chinese belligerence in Ladakh.

"For India, warnings of Chinese aggressiveness were 'superfluous' given the ongoing conflict. Forecasts of superior Chinese power did not affect Delhi's decision to meet the threat head-on, something that other countries need to acknowledge. China is certainly a power to reckon with, but it is not quite the dragon that the Pentagon or Beijing paints it to be," Kartha quipped.

"There was this argument that India being a \$2-trillion economy and China being five times that meant that China had a major advantage. They have a much stronger military force, much bigger economy, bigger military spending etc so India is no match for China - that myth has been busted. Concerted action on the part of India has yielded results," said Srikanth Kondapalli, Chinese affairs professor at Jawaharlal Nehru University.

A leading US publication Newsweek reported that the Chinese President Xi Jinping he has risked his future with the high profile incursions into Indian territory that 'unexpectedly flopped' in the face of a ferocious fightback by the Indian Army.

The Chinese army's failures on the Indian border will have consequences, it said, adding "you can say the Indians are more aggressive or more aggressively defensive, but they are in fact bolder and better. The setback in the Himalayas poses problems for Xi, which means it poses a problem for everyone else."

Now, the Chinese side seems to have climbed down and changed tack suddenly, the experts said.

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

<https://www.livemint.com/news/india/indian-army-busts-myth-of-chinese-pla-might-experts-11600213733886.html>

Amid tensions at LAC, Army prepares for long winter in Ladakh

Synopsis

From heating appliances and climate appropriate clothing to rations, fuel and tents that protect from the biting cold, all necessary supplies have reached the forward areas for the Army to gear up for the long, freezing winter in Ladakh region, officials asserted amid the tensions on the Line of Actual Control.

Leh: From heating appliances and climate appropriate clothing to rations, fuel and tents that protect from the biting cold, all necessary supplies have reached the forward areas for the Army to gear up for the long, freezing winter in Ladakh region, officials asserted amid the tensions on the Line of Actual Control.

The Ladakh region witnesses sub-zero temperatures and is mostly cut off from the rest of the country for months during the winters. As tensions between the armies of India and China at the LAC show no sign of ebbing, both sides have significantly ramped up the presence of their troops. Accordingly, India's Army has been beefing up its stocks of food, ammunition, fuel and more importantly the winter gear.

Major General Arvind Kapoor, Chief of Staff of the Fire and Fury Corps -- also known as the XIV Corps which has the mandate of securing the frontiers along the China and Pakistan borders from Kargil to Ladakh -- said the unit takes pride in its advance winter stocking. Our stocking levels, be it rations, fuel, oils and lubricants, tentage and heating appliances which includes bukhari (heaters) or kero-heaters, or be it ammunition, are in good numbers," Kapoor told reporters here.

Wherever these things need to be supplied, they have already been supplied. We are confident that the system has become so well-oiled that in the coming days, it will give an excellent result, he said. Kapoor said the entire Ladakh region has been connected to two main highways -- the Manali-Leh axis and the Jammu-Srinagar-Leh axis.

These axes are shut for nearly six months. But in the last few months, we have brought this down to 120 days. In the coming days, the Atal Tunnel will be inaugurated by Prime Minister Narendra Modi. Darcha-Nimu-Padam link is also ready and in the immediate future, the Ladakh region will get round-the-year connectivity, he said. Fuel also plays a critical role for the armed forces, especially in the Ladakh region where it is used by soldiers in forward areas to keep themselves warm in low temperature.

The corps also operates one of the highest altitude fuel, oil and lubricants depot. We supply fuel both for our vehicles as also for our men, for the bukharis to keep them warm in the bitterly cold weather on the frontline, said Brigadier Rakesh Manocha, in-charge of the logistics.

On tentage, officials said the indigenously developed Arctic tents can sustain temperatures up to minus 20 degrees, while the high-altitude tents have the capacity to sustain temperatures anywhere between minus 40 to minus 50 degrees. Both tentages and adequate winter clothing have also been supplied to the forward areas, an official said.

The ration too has been stocked adequately, ranging from pre-cooked, packaged and canned items to food grains, they added. Brigadier A S Rathore said, We hold complete requirements of supplies for all troops which are deployed in the Ladakh sector. All warehouses are completely full to the brim.

<https://economictimes.indiatimes.com/news/defence/amid-tensions-at-lac-army-prepares-for-long-winter-in-ladakh/articleshow/78130007.cms>

China places H-6 bombers near Ladakh

China appears to be sticking with its “Wolf Warrior” tactics of intimidation amid simmering tensions with India on its Himalayan border.

According to Military Watch Magazine, new images released by the Central Theatre Command of the Chinese People’s Liberation Army (PLA) show several H-6 bombers have been deployed near the disputed Line of Control (LOC).



China deploys over 270 H-6 bombers across the country, the bulk of them based near its east coast, which make up the largest bomber fleet in the world with much newer airframes available than those in the American or Russian fleets.

The H-6’s considerable firepower, deploying a wide range of standoff cruise missiles, can potentially provide the PLA with a major advantage in the event of a future clash in the Ladakh region, the report said.

Given the scarcity of airbases on both sides, the ability to strike Indian bases at long ranges could be enough to turn the balance in the air.

Most notably, the new CJ-20 cruise missile carries a 500kg warhead and has a 2,000 km range, while its lighter counterpart the YJ-63 has one tenth of the range but is considerably lighter, meaning more can be carried by a single bomber, the report said.

Their very high precision and manoeuvrability make them a very serious threat to Indian positions.

China’s H-6 fleet today is primarily oriented towards engaging ships and military bases in the Western Pacific region, with a number of bombers also having been converted for an electronic attack role.

Tensions with India, however, reveal that the aircraft still have a role to play in a conventional land attack role, the report said.

India for its part, was reportedly considering acquiring modern bombers from Russia, namely the Tu-22M, to serve as a maritime strike platform.

It currently deploys K-100 air to air missiles from its Su-30 MKI air superiority fighters which have a formidable range estimated at 300-400 km — with the missiles well optimized to engaging subsonic bombers, the report said.

The Indian Defence Ministry has also ordered S-400 missile batteries which will be deployed to the Ladakh region when they are received from Russia, with the platforms highly capable at intercepting cruise missile attacks as well as bombers at long ranges.

Although China currently holds an advantage in terms of aerial warfare and strike capabilities in the region, this could change as India moves to invest in more capable systems such as the S-400 and considers purchases of MiG-35 and Su-57 fighters to further modernize its combat fleet, the report said.

India also made headlines with the acquisition of the first batch French-made Rafale jet fighters, considered superior to anything in China’s current air fleet.

According to the Economic Times of India, the Indian Rafale is armed as follows:

SCALP: Precision long-range ground attack missile that can take out targets with extreme accuracy. Has a range of over 300 km, which means that for Balakot-type operation Indian jets would not need to cross the LOC (Line of Control) and could conduct the strike from within Indian airspace.

METEOR: Beyond visual range air-to-air missile that is possibly the best in its class. Can take out enemy aircraft at a range of over 100 km. Has no escape zone over 60 km and the missile easily outclasses the American origin.

India and Russia are also jointly developing a longer range and faster air launched missile to replace the K-100 — which will be able to pose a greater threat to Chinese bombers at range in future.

<https://www.defencenews.in/article/China-places-H-6-bombers-near-Ladakh-952302>

अमर उजाला

Wed, 16 Sept 2020

रुह कंपा देने वाली ट्रेनिंग से तैयार होते हैं तीनों सेनाओं के स्पेशल फोर्स के कमांडो

नई दिल्ली: किसी भी प्राकृतिक और आकस्मिक आपदा की स्थिति में आपने कई बार स्पेशल कमांडो को बड़ी संख्या में कार्रवाई करते हुए देखा होगा। दरअसल, ये कमांडोज देश की थलसेना, वायुसेना और नौसेना की स्पेशल फोर्स का हिस्सा होते हैं। देश की सेना विशेष परिस्थितियों में ही इनकी मदद लेती है।

हाल ही में मध्यप्रदेश में इन कमांडोज की वीरता को देखा गया। मध्यप्रदेश के बाढ़ग्रस्त इलाकों में फंसे हुए हजारों लोगों को बाहर निकालने और राहत बचाव कैंप्स में शिफ्त करने तक इन कमांडोज की मदद ली गई। इस रेस्क्यू मिशन में वायुसेना और उनके गरुड़ कमांडोज ने अहम भूमिका निभाई।



Garud Commando

वास्तव में देश की स्पेशल फोर्स सेना की पैरा स्पेशल फोर्स, एयर फोर्स की गरुड़ और नेवी की मार्कोस हैं। इनमें कमांडोज को सेना के जवानों में से ही चुना जाता है। आइए इन तीनों फोर्स के बारे में और उनकी विशेषताओं के बारे में विस्तृत से जानते हैं।

थलसेना की पैरा स्पेशल फोर्स

भारतीय थलसेना की एलीट कमांडो फोर्स पैरा रेजीमेंट की स्थापना आजादी से पहले साल 1941 में ही हो गई थी लेकिन 1965 में पाकिस्तान के साथ हुए युद्ध के बाद एक स्पेशल कमांडो यूनिट की जरूरत महसूस की गई। एक जुलाई 1966 को भारतीय सेना की पहली स्पेशल फोर्स 9 पैरा यूनिट की स्थापना की गई। इसका बेस ग्वालियर में बनाया गया।

पैरा कमांडो बनने के लिए 90 दिनों की कठिन ट्रेनिंग दी जाती है। इसकी कठिनाई का अंदाजा इसी बात से लगाया जा सकता है कि कुछ ही सैनिक इसे सफलतापूर्वक पूरा कर पाते हैं। इस प्रशिक्षण के दौरान जवानों के मानसिक, शारीरिक क्षमता और इच्छाशक्ति का जबरदस्त इम्तिहान लिया जाता है। इसके दौरान दिनभर में जवानों को पीठ पर 30 किलो सामान जिसमें हथियार व अन्य जरूरी साजो-सामान शामिल होते हैं उसे उठाकर 30 से 40 किमी की दौड़ लगाना होता है।

पहले कैडेट्स आईएमए और ओटीए से चुने जाते हैं और कमीशंड होने के बाद पांच सालों तक स्पेशल फोर्स के लिए वॉलेंटियर कर सकते हैं। प्रोबेशन पीरियड और पैराड्रूपर के बाद चयनित उम्मीदवार पैरा स्पेशल फोर्स के लिए आवेदन

कर सकते हैं। कठिन ट्रेनिंग के बाद एक साल तक हॉस्टाइल जोन में सेवा देनी होती है, जिसके बाद बलिदान बैज दिया जाता है।

नौसेना के मार्कोस कमांडो

थलसेना के पैरा और नौसेना के मार्कोस कमांडो तैरने में भी माहिर होते हैं। ट्रेनिंग के दौरान इनके हाथ-पैर बांधकर पानी में फेंक दिया जाता है। इसमें इन्हें पांच मिनट बिताना होता है। मार्कोस कमांडो का फिजिकल टेस्ट इतना कठिन होता है कि 80 फीसदी आवेदक शुरू के तीन दिन में ही इसे छोड़ देते हैं।

इस फोर्स का प्रशिक्षण दुनिया के बाकी प्रशिक्षणों में सबसे ज्यादा कठिन है। इसमें चयन प्रक्रिया के चार चरण होते हैं। प्री-सिलेक्शन चयन में तीन दिन की स्क्रीनिंग होती है, दूसरे चरण में पांच हफ्तों तक ट्रेनिंग दी जाती है। तीसरे चरण यानि बेसिक एसएफ ट्रेनिंग में दस हफ्तों तक आईएनएस अभिमन्यू पर अभ्यास करने के साथ ही उम्मीदवारों को तीन हफ्ते तक पैराशूट कोर्स भी करना होता है।

इसके बाद आखिरी चरण में मिजोरम से राजस्थान तक ट्रेनिंग के बाद उम्मीदवार ग्रेजुएट होते हैं।

वायुसेना के गरुड़

भारतीय वायुसेना की स्पेशल फोर्स गरुड़ कमांडो काउंटर इमरजेंसी और बचाव कार्यों में माहिर होते हैं। इनकी ट्रेनिंग इतनी मुश्किल होती है कि अधिकतर जवान ट्रेनिंग पूरा नहीं कर पाते। इन जवानों को तीन साल तक अलग-अलग तरह की ट्रेनिंग दी जाती है।

इसके तहत योग्य पाए गए कैंडिडेट्स को 52 हफ्तों तक बेसिक ट्रेनिंग दी जाती है। ट्रेनिंग के अलग-अलग फेजेज में उम्मीदवार को सेना, एनएसजी और पैरामिलिट्री फोर्स की सहायता से स्पेशल ऑपरेशन्स के बारे में पढ़ाया और सिखाया जाता है। इसमें जंगल वॉरफेयर और स्नो सर्वाइकल आदि शामिल हैं।

अगर आप वायुसेना की ग्राउंड इयूटी ब्रांच से हैं तो एक ऑफिसर के तौर पर वायुसेना की गरुड़ फोर्स में शामिल होने के लिए आवेदन कर सकते हैं। इसके अलावा एयरमैन का सिलेक्शन एयरमैन सिलेक्शन सेंटर्स से विज्ञापन के जरिए किया जाता है।

<https://www.amarujala.com/india-news/special-forces-of-indian-army-navy-and-air-force-here-you-know-how-these-soldiers-selected?pageId=3>

THE ECONOMIC TIMES

Wed, 16 Sept 2020

Laws being put in place to ease business environment for private sector in space segment: ISRO

Synopsis

The space agency said it is also looking at paving the way for the insurance sector to render services in the space domain.

Bengaluru: With the recent announcement of space sector reforms, the Indian Space Research Organisation on Tuesday said necessary legislations are being put in place to ease the business environment for private players.

The space agency said it is also looking at paving the way for the insurance sector to render services in the space domain.

"We need to do some of the activities to ensure that there is no hardship, so a comprehensive space act is required, as well as the different policies should be in place, and they are in the pipeline, with the opening of the space sector," ISRO Chairman K Sivan said.

Virtually addressing the International Space Conference, he said the existing space policies on SATCOM as well as the remote sensing data policies are being amended with "greater inclusivity and transparency."

"Also, we are going to add new policies like launch vehicle policy, space exploration policy.

We are going to cover the entire gamut of space activities through policies, also we are going to put in place the space act, which will ensure easy business for the private sector, that's our aim," he added.

The Union Cabinet on June 24 approved participation of the private sector in the entire range of space activities, including planetary exploration missions.

It had said, the newly-created Indian National Space Promotion and Authorisation Centre (IN-SPACE) will provide a level playing field for private companies to use Indian space infrastructure, by hand-holding industries in space activities through encouraging policies and a friendly regulatory environment.

The 'New Space India Limited (NSIL), a PSU under the Department of Space, will endeavour to re-orient space activities from a 'supply driven' model to a "demand driven model, thereby ensuring optimum utilisation of our space assets," it had said.

Sivan further said, "we should pave the way for the insurance sector to render services in the space domain, as this is absolutely essential for satellite and launch services."

Department of Space is also working towards creating a formal system to support space sector startups and MSMEs in taking up innovation, research, as well as product development, he said.

This programme is conceived as "Space Entrepreneurship & Enterprise Development (SEED)."

The International Space Conference on the topic 'Ushering the New Era for Indian Space Sector,' is organised by the Confederation of Indian Industry (CII) in collaboration with ISRO and ANTRIX.



Sivan pointed out that earlier there was no mechanism to share technical expertise or facilitate ISRO infrastructure usage by the private sector.

There was no regulatory body for private sector space activities, but now a formal mechanism has been put in place by unlocking the space sector.

There was no regulatory body for private sector space activities, but now a formal mechanism has been put in place by unlocking the space sector.

"We envisage a scenario, where private sector will be a co-traveller in ISRO's space mission, and private sector will also be empowered to carry out its own space missions."

"..I'm sure that it will enable the growth of India Space Industry revenues and also in the export of products and services out of our country.It's a very welcome change," he said.

Noting that the space industry, various stakeholders, entrepreneurs and investors are eagerly looking for new opportunities in space business, Sivan said till recently all space activities within India were carried out only by ISRO.

"We know that the global space economy is on a growth trajectory and our domestic requirements are also growing multifold," he said.

To meet these requirements it is essential that the private sector must contribute a bigger share in the national space programme and also must have its own programme catering to both national and global requirements.

This was easier said than done as the space activities require huge infrastructure investment as well as mandatory compliances to safety regulations, as the country is answerable for any safety lapses in the international forum, he added.

The chairman pointed out that the risks are huge and the return on investment happens over a long period- the main reason being that the space system development-testing and operation are highly capital intensive and requires long time and large human resource development initiative.

Sivan said very few private entities were actually involved in system development.

However, recently many are eager to take up such activities, and in fact many startups in the space sector in India are very keen to develop space systems and have already started development activities, he added.

NITI Ayog member V K Saraswat, Senior Director General Ministry of Transport, Czech Republic Vclav Kobera, CNES President Jean-Yves Le Gall and Australian Space Agency Deputy Head Anthony Murfett were among others present at the event.

Saraswat said "by 2030, the new space economy will find ways we can live sustainably beyond our planet, creating new jobs, companies and opportunities."

<https://economictimes.indiatimes.com/news/science/laws-being-put-in-place-to-ease-biz-environment-for-pvt-sector-in-space-segment-isro/articleshow/78128633.cms>

अंतरिक्ष क्षेत्र में निजी कंपनियों के लिए कारोबारी माहौल सुगम बनाने को बनाए जा रहे कानून: इसरो

बेंगलुरु: अंतरिक्ष क्षेत्र में सुधारों के लिए हाल में की गई घोषणाओं के बीच भारतीय अंतरिक्ष अनुसंधान संगठन (इसरो) ने मंगलवार को कहा कि निजी क्षेत्र के लिए कारोबार माहौल सुगम बनाने के लिए जरूरी कानून बनाए जा रहे हैं। अंतरिक्ष एजेंसी ने कहा कि वह बीमा कंपनियों के लिए अंतरिक्ष के क्षेत्र में सेवाएं मुहैया कराने की इजाजत देने पर भी विचार कर रही है। इसरो के अध्यक्ष के. सिवन ने कहा, “कोई कठिनाई न हो, यह सुनिश्चित करने के लिए हमें कुछ कदम उठाने की जरूरत है। इसलिए एक व्यापक अंतरिक्ष अधिनियम की आवश्यकता है। इसके साथ ही विभिन्न नीतियों की भी जरूरत है और अंतरिक्ष क्षेत्र को खोलने के साथ ही इस दिशा में काम चल रहा है।”

उन्होंने अंतरराष्ट्रीय अंतरिक्ष सम्मेलन को वीडियो कॉन्फ्रेंस के जरिए संबोधित करते हुए कि सैटकॉम पर मौजूदा अंतरिक्ष नीतियों के साथ ही दूरस्थ संवेदी डेटा नीतियों को अधिक समावेशी और पारदर्शी बनाया जा रहा है। उन्होंने कहा, “इसके अलावा हम प्रक्षेपण वाहन नीति, अंतरिक्ष अन्वेषण नीति जैसी नई नीतियों को शामिल करने जा रहे हैं।”

हम नीतियों के दायरे में सभी तरह की अंतरिक्ष गतिविधियों को शामिल करने जा रहे हैं। साथ ही अंतरिक्ष कानून को भी लागू करने जा रहे हैं, जो निजी क्षेत्र के लिए आसानी से कारोबार सुनिश्चित करेगा। यही हमारा मकसद है।” केंद्रीय मंत्रिमंडल ने 24 जून को ग्रहों की खोज मिशन सहित अंतरिक्ष गतिविधियों की पूरी श्रृंखला में निजी क्षेत्र की भागीदारी को मंजूरी दी थी।

(डिस्कलेमर: यह आर्टिकल एजेंसी फीड से ऑटो-अपलोड हुआ है। इसे नवभारतटाइम्स.कॉम की टीम ने एडिट नहीं किया है।)

<https://navbharattimes.indiatimes.com/business/business-news/laws-being-made-to-facilitate-business-environment-for-private-companies-in-space-sector/articleshow/78133628.cms>

#SWARAJYA

Wed, 16 Sept 2020

Learning from Chandrayaan-2 Mission, ISRO makes major design change to Chandrayaan-3 lander

After the Chandrayaan-2 lander's unsuccessful attempt to soft-land on Moon's surface, the Indian Space Research Organisation (ISRO) has decided to make a major design change in the lander of its next proposed lunar mission Chandrayaan-3, reports *Times of India*.

The Indian space agency is expected to launch its third mission to Moon in 2021.

The overseeing committee of the mission has reportedly finalised a design change after which the lander will have just four engines, as opposed to the five engines on Chandrayaan-2's Vikram lander.

The committee has decided to drop the fifth engine that was added last minute on Vikram lander and the lander for next moon mission will now have only four engines, a scientist was quoted in the report as saying.

The committee has also suggested a minor modification on the legs of the lander but it was yet to be approved, another scientist said.

It has also been decided to include the laser doppler velocimeter (LDV) for better measurement of speed during landing. Besides, improvement in power and communication systems, changes in software and algorithms have also been proposed for the upcoming mission.

According to the report, ISRO's move to drop the fifth/central engine is the latest on the mission and is significant as this additional engine was added to Vikram lander after simulations found it to be crucial for dealing with dust storms that could have been kicked up when the lander nears the lunar surface, affecting its stability.

ISRO chairman K Sivan was quoted in the report as saying that earlier analysis had estimated that the dusts would cause trouble but now the space agency's analysis has shown that it would not be a problem.

After the new analysis, it was decided to remove the fifth engine from the lander.

It should be noted that unlike the Chandrayaan-2, which carried an Orbiter, lander and rover, the Chandrayaan-3 will only carry a lander and rover.

<https://swarajyamag.com/insta/learning-from-chandrayaan-2-mission-isro-makes-major-design-change-to-chandrayaan-3-lander>



Wed, 16 Sept 2020

Missions to Venus: As signs of life found, ISRO's Shukrayaan-1 in race for next trip to hell-like planet

Astronomers on Monday reported the detection of a chemical in the acidic Venusian clouds, phosphine, which may be a possible sign of life

Carl Sagan once said that Venus is the planet in our solar system most like hell. So when are we going back Astronomers on Monday reported the detection of a chemical in the acidic Venusian clouds, phosphine, which may be a possible sign of life. That has some planetary scientists itching to return to the sun's second planet, especially those who feel Venus has long been overlooked in favor of Mars and other destinations.

"If this planet is active and is producing phosphine, and there is something that's making it in the Venus atmosphere, then by God almighty, forget this Mars nonsense," said Paul Byrne, a planetary scientist at North Carolina State University. "We need a lander, an orbiter, we need a program."

Venus is not easy to visit. Its carbon-dioxide-rich atmosphere is 90 times as dense as ours, and surface temperatures average 800 degrees Fahrenheit. Its surface pressure is intense enough to crush some submarines.

But that hasn't stopped human space programs from trying. About 40 robotic spacecraft launched by governments on Earth have tried to visit Venus in one way or another. Here are



In an undated image from NASA, a global view of the surface of Venus made mostly from data captured by the Magellan spacecraft in 1991. (Credit: NASA)

highlights from past journeys to Venus, as well as the prospects for a speedy return to the planet to find out what's going on in those clouds.

The Many Soviet Visitors to Venus

In 1961, the Soviet space program began trying to explore Venus. In the decades that followed, it shot dozens of spacecraft toward the world sometimes known as Earth's twin. While Soviet exploration of Venus started with many misfires, the country became the first to land a spacecraft on another world, and not long after, the first to take photos from the surface of another planet. Their engineering achievements were significant even by modern standards.

After seeing their first round of spacecraft sent into the atmosphere squashed like tin cans, the Soviets realized just how extreme the pressure on Venus was. This trial and error led to the construction of a 5-ton metal spacecraft built to withstand, even if for just an hour, the immense surface pressures.

Venera 4 in 1967 became the first spacecraft to measure the atmosphere of another planet, detecting large amounts of carbon dioxide that cause the ceaseless Venusian greenhouse effect.

Then in 1975, the country's Venera 9 probe became the first to take images from the surface of another planet. The world officially met Venus. The images it and later missions sent back revealed a planet that was truly like no other: cracked terrain beneath hazy, diluted neon green light. The planet we thought might have been covered in oceans and akin to our own was instead an alien world with poison rain.

Later missions in the Venera series into the 1980s gave scientists a better understanding of the planet's geological processes. Venera 11 and 12 both detected large amounts of lightning and thunder as they traveled to the surface. Venera 13 and 14 were both equipped with microphones that documented the sounds of their descent to the surface, making them the first spacecraft to record audio from another planet.

In 1985 the Soviet Union concluded its Venus encounters with the twin Vega spacecraft, which each released large balloons loaded with scientific instruments, demonstrating the potential for probes that could float in the planet's clouds.

The slowed pace of the Soviet space program toward the end of the Cold War halted launches to Venus. While the Russian space program has discussed future exploration of Venus, its concepts have not moved off the drawing board.

NASA Kept Its Sights on Venus, too

While Mars has always seemed like the apple of the eyes of American space planners, the Mariner and Pioneer programs of the 1960s and '70s made time for Venus. Mariner 2 was the first American spacecraft to make it to Venus, in 1962. It determined that temperatures were cooler higher in the clouds, but extremely hot on the surface.

In 1978, the Pioneer missions gave American researchers a closer look. The first of the pair orbited the planet for nearly 14 years, revealing much about the mysterious Venusian atmosphere. It also observed the surface was smoother than Earth's, and that Venus had very little or perhaps no magnetic field. A second Pioneer mission sent a number of probes into Venus' atmosphere, returning information on the structure of the clouds and radar readings of the surface.

NASA's Magellan entered into orbit in 1990 and spent four years mapping the surface and looking for evidence of plate tectonics. It discovered that nearly 85% of the surface was covered in old lava flows, hinting at significant past and possible present volcanic activity.

It was also the last of the American visitors, although a number of NASA spacecraft have used Venus as a slingshot as they set course for other destinations.

Other Visitors to Venus

Venus Express was launched by the European Space Agency in 2005. It orbited the planet for eight years and observed that it still may have been geologically active. The planet's only guest from Earth right now is Akatsuki, which was launched by Japan in 2010. The probe missed its meeting with Venus when its engine failed to fire as it headed into orbit. By 2015, the mission's managers had managed to steer it on a course to orbit and study the planet.

It has since transformed how scientists view our clouded twin. In its study of the physics of the dense cloud layers of Venus, the mission has revealed disturbances in the planet's winds known as gravity waves, as well as equatorial jet streams in its atmosphere.

Who's Next?

Many missions back to Venus have been proposed, and some space agencies have declared ambitions of visiting the planet. But it's hard to say whether any will make the trip.

India's space agency has proposed a mission called Shukrayaan-1, which will orbit the planet and primarily focus on the chemistry of the atmosphere.

Peter Beck, the founder of Rocket Lab, a private company started in New Zealand that has launched about a dozen rockets to space, has recently spoken of sending a small satellite to the planet. NASA has considered a number of Venus proposals in the past decade, including two in 2017 that were finalists of NASA's Discovery program, which has previously sent explorers to the moon, Mars, Mercury and other destinations. But the agency instead selected a pair of asteroid missions.

Also in 2017, for the larger, more expensive New Frontiers competition, NASA considered a Venus mission called Venus In situ Composition Investigations, or VICI, which sought to put two landers on the planet's surface. It was passed over for Dragonfly, which will send a plutonium-powered drone to fly on Titan, the largest moon of Saturn.

NASA, however, did provide money for some of the technologies that VICI would need. And Venus proponents may have a new advocate inside NASA. Lori S. Glaze, the principal investigator of VICI, is now the planetary science division director at NASA.

The agency will have another chance to pick a Venus mission for funding in the next round of its Discovery program.

Two Venus spacecraft, named DAVINCI+ and VERITAS, are competing against proposed missions to Neptune's moon Triton or Jupiter's volcanic moon Io. NASA may select two of the four finalists. And there could be other possibilities for visitors to Venus.

"We should also recognize that Venus is a planetary destination we can reach with smaller missions as well," said Thomas Zurbuchen, the head of NASA's science mission directorate.

(Shannon Stirone c.2020 The New York Times Company)

<https://www.news18.com/news/world/missions-to-venus-as-signs-of-life-found-isro-shukrayaan-1-in-race-for-next-trip-to-hell-like-planet-2877955.html>

Wed, 16 Sept 2020

ISRO'S next PSLV launch likely in November, to carry Kleos Space's satellites

Kleos Space, a Luxembourg-based company that provides radio frequency reconnaissance data-as-a-service (DaaS), on Monday said that the four-satellite Kleos Scouting Mission will be launched onboard a PSLV in the first half of November 2020.

In a release, the company said the satellites would be launched in Isro's PSLV-C49 mission from the Satish Dhawan Space Centre, Sriharikota.

The company is launching the scouting satellites under a rideshare contract with US-based Spaceflight Inc, with the launch managed by NewSpace India Limited (NSIL), the commercial arm of ISRO.

The release further said the four Kleos Scouting Mission satellites have been mission-ready since the middle of 2019. They were shipped to the launch site during February 2020, anticipating the launch during March 2020. But due to the prevailing Covid-19 pandemic situation, there has been a delay in the launch.

NSIL via Spaceflight Inc has informed the company that the launch of the four Kleos satellites planned on-board PSLV-C49 mission is being targeted during the first half of November 2020, based on the current status of planning of activities, it said.

This schedule is subject to change due to operational circumstances beyond NSIL control.

NSIL via Spaceflight Inc will confirm the exact launch date once the activities at the launch base progresses successfully.

<https://www.defencenews.in/article/Isros-next-PSLV-launch-likely-in-November,-to-carry-Kleos-Space%e2%80%99s-satellites-952297>



Wed, 16 Sept 2020

Reviewing the quantum anomalous Hall effect

A collaboration across three FLEET nodes has reviewed the fundamental theories underpinning the quantum anomalous Hall effect (QAHE).

QAHE is one of the most fascinating and important recent discoveries in condensed-matter physics.

It is key to the function of emerging quantum materials, which offer potential for ultra-low energy electronics.

QAHE causes the flow of zero-resistance electrical current along the edges of a material.

QAHE in topological materials: key to low-energy electronics

Topological insulators, recognized by the Nobel Prize in Physics in 2016, are based on a quantum effect known as the quantum anomalous Hall effect (QAHE).

"Topological insulators conduct electricity only along their edges, where one-way edge paths conduct electrons without the scattering that causes dissipation and heat in conventional materials," explains lead author Muhammad Nadeem.

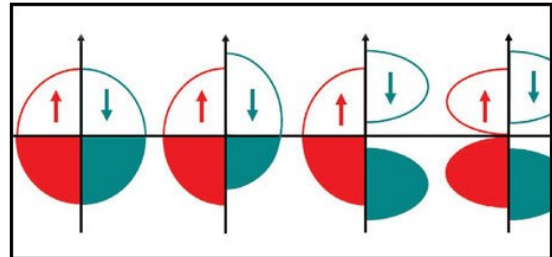
QAHE was first proposed by 2016 Nobel-recipient Prof Duncan Haldane (Manchester) in the 1980s, but it subsequently proved challenging to realize QAHE in real materials. Magnetic-doped topological insulators and spin-gapless semiconductors are the two best candidates for QAHE.

The quantum Hall effect (QHE) is a quantum-mechanical version of the Hall effect, in which a small voltage difference is created perpendicular to a current flow by an applied magnetic field.

The quantum Hall effect is observed in 2-D systems at low temperatures within very strong magnetic fields, in which the Hall resistance undergoes quantum transitions—i.e., it varies in discrete steps rather than smoothly.

QAHE describes an unexpected quantisation of the transverse Hall resistance, accompanied by a considerable drop in longitudinal resistance.

QAHE is referred to as anomalous because it occurs in the absence of any applied magnetic field, with the driving force instead provided by either a spin-orbit coupling or intrinsic magnetization.



Credit: FLEET

Researchers seek to enhance these two driving factors in order to strengthen QAHE, allowing for topological electronics that would be viable for room-temperature operation.

It's an area of great interest for technologists," explains Xiaolin Wang. "They are interested in using this significant reduction in resistance to significantly reduce the power consumption in electronic devices."

"We hope this study will shed light on the fundamental theoretical perspectives of quantum anomalous Hall materials," says co-author Prof Michael Fuhrer (Monash University), who is Director of FLEET.

The study

The collaborative, theoretical study concentrates on these two mechanisms:

- large spin-orbit coupling (interaction between electrons' movement and their spin)
- strong intrinsic magnetization (ferromagnetism)

Four models were reviewed that could enhance these two effects, and thus enhance QAHE, allowing topological insulators and spin fully-polarized zero-gap materials (spin gapless semiconductors) to function at higher temperatures.

"Among the various candidate materials for QAHE, spin-gapless semiconductors could be of potential interest for future topological electronics/spintronics applications," explains Muhammad Nadeem.

Quantum Anomalous Hall Effect in Magnetic Doped Topological Insulators and Ferromagnetic Spin-Gapless Semiconductors—A Perspective Review was published in the journal *Small* in September 2020.

More information: Quantum Anomalous Hall Effect in Magnetic Doped Topological Insulators and Ferromagnetic Spin-Gapless Semiconductors—A Perspective Review. *Small*. doi.org/10.1002/sml.201904322

Journal information: *Small*

<https://phys.org/news/2020-09-quantum-anomalous-hall-effect.html>

Ultra-fast magnetic switching with potential to transform fiber optical communications

Researchers at CRANN and Trinity's School of Physics have discovered that a new material can act as a super-fast magnetic switch.

When struck by successive ultra-short laser pulses it exhibits "toggle switching" that could increase the capacity of the global fiber optic cable network by an order of magnitude.

Expanding the capacity of the internet

Switching between two states—0 and 1—is the basis of digital technology and the backbone of the internet. The vast majority of all the data we download is stored magnetically in huge data centers across the world, linked by a network of optical fibers.

Obstacles to further progress with the internet are three-fold, specifically the speed and energy consumption of the semiconducting or magnetic switches that process and store our data and the capacity of the fiber optic network to handle it.

The new discovery of ultra-fast toggle switching using laser light on mirror-like films of an alloy of manganese, ruthenium and gallium known as MRG could help with all three problems.

Not only does light offer a great advantage when it comes to speed but magnetic switches need no power to maintain their state. More importantly, they now offer the prospect of rapid time-domain multiplexing of the existing fiber network, which could enable it to handle ten times as much data.

The science behind magnetic switching

Working in the photonics laboratory at CRANN, Trinity's nanoscience research center, Dr. Chandrima Banerjee and Dr. Jean Besbas used ultra-fast laser pulses lasting just a hundred femtoseconds (one ten thousand billionth of a second) to switch the magnetisation of thin films of MRG back and forth. The direction of magnetisation can point either in or out of the film.

With every successive laser pulse, it abruptly flips its direction. Each pulse is thought to momentarily heat the electrons in MRG by about 1,000 degrees, which leads to a flip of its magnetisation. The discovery of ultra-fast toggle switching of MRG has just been published in leading international journal, *Nature Communications*.

Dr. Karsten Rode, Senior Research Fellow in the "Magnetism and Spin Electronics Group" in Trinity's School of Physics, suggests that the discovery just marks the beginning of an exciting new research direction.

Dr. Rode said: "We have a lot of work to do to fully understand the behavior of the atoms and electrons in a solid that is far from equilibrium on a femtosecond timescale. In particular, how can magnetism change so quickly while obeying the fundamental law of physics that says that angular momentum must be conserved? In the spirit of our spintronics team, we will now gather data from new pulsed-laser experiments on MRG, and other materials, to better understand these dynamics and link the ultra-fast optical response with electronic transport. We plan experiments with ultra-fast electronic pulses to test the hypothesis that the origin of the toggle switching is purely thermal."

Next year, Chandrima will continue her work at the University of Haifa, Israel, with a group who can generate even shorter laser pulses. The Trinity researchers, led by Karsten, plan a new joint project with collaborators in the Netherlands, France, Norway and Switzerland, aimed at proving the concept of ultra-fast, time-domain multiplexing of fiber-optic channels.



Credit: Trinity College Dublin

More information: C. Banerjee et al. Single pulse all-optical toggle switching of magnetization without gadolinium in the ferrimagnet Mn₂RuGa, *Nature Communications* (2020). DOI: [10.1038/s41467-020-18340-9](https://doi.org/10.1038/s41467-020-18340-9)

Journal information: *Nature Communications*
<https://phys.org/news/2020-09-ultra-fast-magnetic-potential-fiber-optical.html>



Wed, 16 Sept 2020

Materials in lithium-ion batteries may be recycled for reuse

By Beth Miller

China expects to generate 2.5 billion end-of-life lithium-ion batteries from portable electronics such as smartphones and laptops in 2020, but very few are recycled. Although these batteries are discarded, the metals inside them are still valuable.

A team of researchers, led by Zhen (Jason) He at Washington University in St. Louis, is developing a method to recycle the batteries' materials to reuse their valuable compounds. He, professor of energy, environmental and chemical engineering in the McKelvey School of Engineering, and colleagues at Shanghai Jiao Tong University in China and at Virginia Polytechnic Institute and State University conducted a feasibility study for electrochemical "refilling" of lithium-ion batteries into the spent electrodes to regenerate useful compounds, such as lithium cobalt oxide.

Results were published as the supplementary cover story in the Aug. 10 issue of *ACS Sustainable Chemistry & Engineering*.

Spent lithium-ion batteries contain valuable metals, such as lithium, cobalt, nickel, copper, aluminum and iron, as well as toxic materials such as lithium hexafluorophosphate and polyvinylidene fluoride. Lithium is a critical mineral resource with a limited reserve, so recycling the material may address the shortage as well as minimize environmental pollution.

"Since 95% of the materials are still there and usable, we wanted to see if we could regenerate the complete lithium cobalt oxide compounds directly instead of recovering individual elements and then putting them together to be a useful compound," He said. "We used an electrodeposition process where we deposited the lithium ions on the waste electrodes driven by the electricity that creates the electric field to absorb the ion onto the electrode.

"We can add an additional amount of lithium-ion into the waste electrode, and you get a complete formula that allows you to reuse those materials."

Because the batteries are inexpensive, there is little incentive to recycle, so only about 5% of lithium-ion batteries are recycled, He said. However, recovering and recycling critical elements such as lithium will play a key role in the sustainability of resource use by society, He continued. Other researchers have tried various methods to recycle the materials, including extracting the materials separately through mechanical methods. But these methods require additional reagents and can generate secondary pollutants.

With the successful results of this feasibility study, He and the team plan to continue efforts to regenerate the materials in lithium-ion batteries and study its cost-effectiveness.



A team of researchers, led by Zhen (Jason) He, professor of energy, environmental and chemical engineering, is developing a method to recycle batteries' materials. Credit: Shutterstock

More information: Lingen Zhang et al. Electrochemical Relithiation for Direct Regeneration of LiCoO₂ Materials from Spent Lithium-Ion Battery Electrodes, *ACS Sustainable Chemistry & Engineering* (2020). DOI: [10.1021/acssuschemeng.0c02854](https://doi.org/10.1021/acssuschemeng.0c02854)
<https://phys.org/news/2020-09-materials-lithium-ion-batteries-recycled-reuse.html>



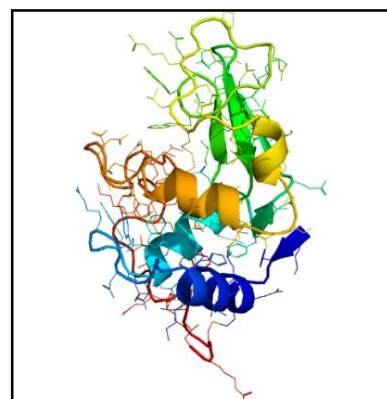
Wed, 16 Sept 2020

Shining a light on disordered and fractal systems

A University of Tsukuba research team uses terahertz-frequency light to probe the unusual behavior of disordered systems to discover that the anonymously large vibrations in lysozyme can be explained by its glassy and fractal nature

Tsukuba, Japan—Researchers led by the University of Tsukuba studied the vibrational modes of an intrinsically disordered protein to understand its anomalously strong response at low frequencies. This work may lead to improvements in our knowledge of materials that lack long-range order, which may influence industrial glass manufacturing.

Glassy materials have many surprising properties. Not quite a solid or a liquid, glasses are made of atoms that are frozen in a disordered, non-crystalline state. Over a century ago, physicist Peter Debye proposed a formula for understanding the possible vibrational modes of solids. While mostly successful, this theory does not explain the surprisingly universal vibrations that can be excited in disordered materials—like glass—by electromagnetic radiation in the terahertz range. This deviation has been seen often enough to get its own name, the "boson peak," but its origin remains unclear.



Credit: University of Tsukuba

Now, researchers at the University of Tsukuba have conducted a series of experiments to investigate the physics behind the boson peak using the protein lysozyme.

"This protein has an intrinsically disordered and fractal structure," first author of the study Professor Tatsuya Mori says. "We believe that it makes sense to consider the entire system as a single supramolecule."

Fractals, which are mathematical structures that exhibit self-similarity over a wide range of scales, are common in nature. Think of trees: they appear similar whether you zoom out to look at the branches, as well as when you come close to inspect the twigs. Fractals have the surprising ability to be described by a non-integer number of dimensions. That is, an object with a fractal dimension of 1.5 is halfway between a two-dimensional and a three-dimensional object, which means that its mass increases with its size to the 1.5 power.

On the basis of the results of terahertz spectroscopy, the mass fractal dimension of the lysozyme molecules was found to be around 2.75. This value was also determined to be related to the absorption coefficient of the material.

"The findings suggest that the fractal properties originate from the self-similarity of the structure of the amino acids of the lysozyme proteins," Professor Mori says. "This research may hold the key to resolving a long-standing puzzle regarding disordered and fractal materials, which can lead to more efficient production of glass or fractal structures."

The work is published in *Physical Review E* as "Detection of boson peak and fractal dynamics of disordered systems using terahertz spectroscopy."

More information: Tatsuya Mori et al. Detection of boson peak and fractal dynamics of disordered systems using terahertz spectroscopy, *Physical Review E* (2020). DOI: [10.1103/PhysRevE.102.022502](https://doi.org/10.1103/PhysRevE.102.022502)
<https://phys.org/news/2020-09-disordered-fractal.html>



Wed, 16 Sept 2020

Upgraded X-ray laser shows its soft side

By Ali Sundermier

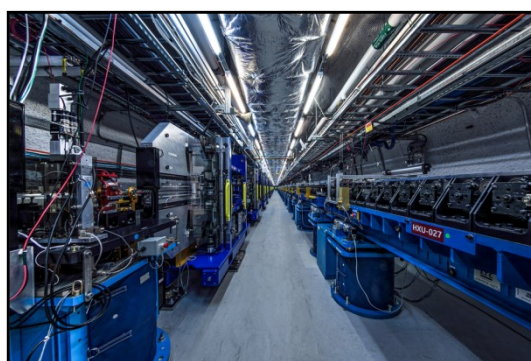
The second phase of a major upgrade project is now online at the Linac Coherent Light Source (LCLS), the pioneering X-ray free-electron laser at Department of Energy's SLAC National Accelerator Laboratory. On September 12, scientists ushered an electron beam through a new undulator to produce "soft" X-rays. This follows the upgraded facility's first light in July, produced with another undulator that generates "hard" X-rays.

Undulators, integral to X-ray free electron lasers like LCLS, use an intricately tuned series of magnets to convert electron energy into intense bursts of X-rays. Hard X-rays, which are more energetic, allow researchers to image materials and biological systems at the atomic level. Soft X-rays can capture how energy flows between atoms and molecules, tracking chemistry in action and offering insights into new energy technologies.

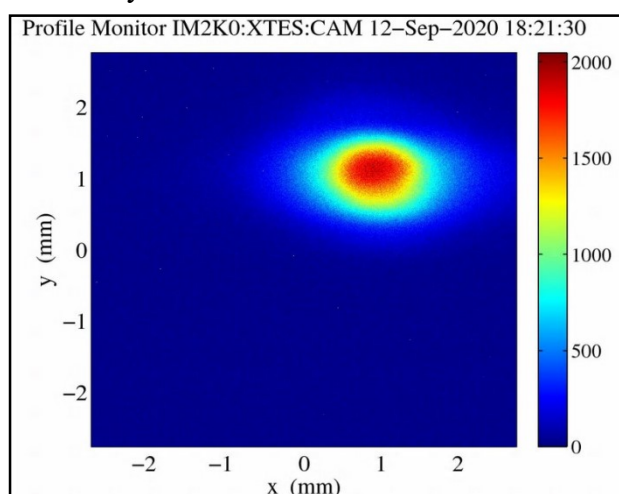
The new soft X-ray undulator, the second major piece of the LCLS-II upgrade project to fall into place, was designed and built by DOE's Lawrence Berkeley National Laboratory and installed at SLAC over the past 18 months. While LCLS isn't the first facility to house more than one undulator, it will be the only one capable of shining both beams on the same sample simultaneously, expanding the scientific reach of the X-ray laser.

The soft X-ray undulator will produce X-ray pulses that last for less than a millionth of a billionth of a second, allowing scientists to investigate quantum and chemical systems more directly than ever before. These ultrashort pulses will soon be put to work at the new Time-resolved atomic, Molecular and Optical Science (TMO) instrument, the first of the LCLS-II era. There, it will allow scientists to investigate—at the quantum level—fundamental phenomena central to complex processes such as photosynthesis, quantum computing, and the forming and breaking of bonds that govern all chemical reactions.

When LCLS-II is completed in the next two years, it will increase the X-ray laser's average power by thousands of times, producing up to



The Linac Coherent Light Source's new undulators each use an intricately tuned series of magnets to convert electron energy into intense bursts of X-rays. The "soft" X-ray undulator stretches for 100 meters on the left side of this hall, with the "hard" x-ray undulator on the right. Credit: Alberto Gamazo/SLAC National Accelerator Laboratory



A screenshot showcasing the X-ray beam produced with LCLS using the new soft X-ray undulator. Credit: SLAC National Accelerator Laboratory

a million pulses per second compared to 120 per

second today. The final step is currently being installed: a brand new accelerator that uses cryogenic superconducting technology to ramp up to these never-before-achieved repetition rates.

Provided by [SLAC National Accelerator Laboratory](https://slac.stanford.edu/news/2020-09-x-ray-laser-soft-side.html)

<https://phys.org/news/2020-09-x-ray-laser-soft-side.html>



Wed, 16 Sept 2020

New neutron source in Canada would spur innovation, medical treatments

By Drew Marquardt, Ming Pan, Zahra Yamani

Technological progress owes much to our scientific understanding of the materials we use to build the world around us, from longer-lasting cell-phone batteries to new medicines.

Scientists and engineers rely on a full suite of tools to understand the properties of materials at the atomic and molecular levels, and they use various probes such as visible light, lasers, ultrasound, X-rays, electrons and neutrons. Each tool reveals certain properties of materials, generating knowledge that guides to better understanding and improvements.

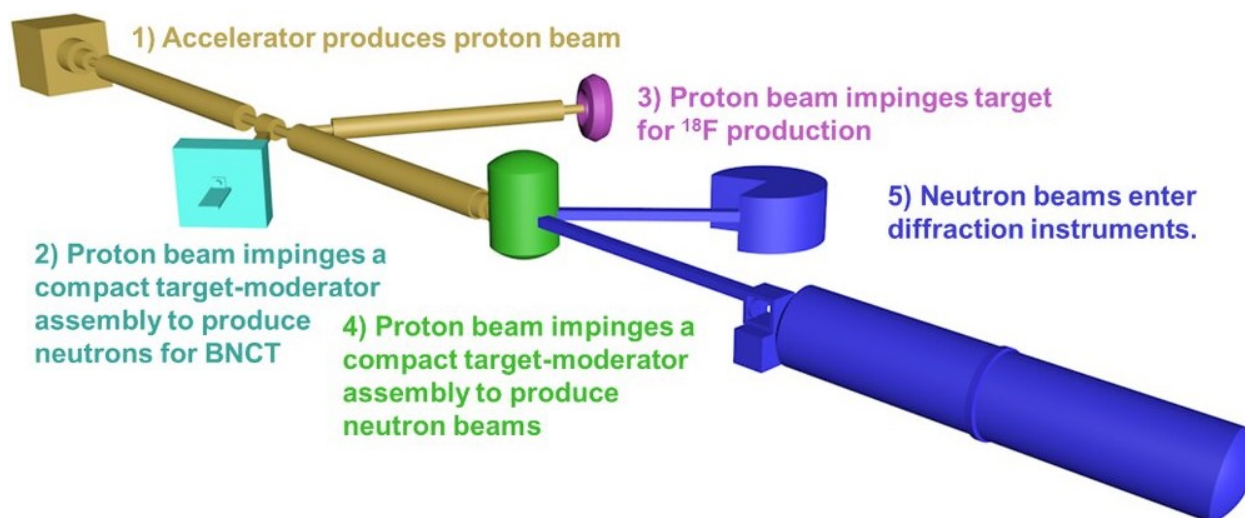


Neutrons have many applications in scientific and medical research. Credit: Shutterstock

Neutron beams are among the most unique, and are used to study materials and processes at the subatomic level. Neutrons are one of the constituent parts of all atoms and, together with protons, form an atom's nucleus. They offer unparalleled sensitivity to light elements and magnets and because of their unique penetrating properties they can provide clear images of the interior of objects without disturbing them.

Access to neutrons

Scientific study using neutrons requires a sufficient quantity to be produced by specialized, large-scale laboratories. Canada has been a pioneer in this field, and the majority of that research—more than 120 research papers per year involving 250 Canadian researchers—emerged from the National Research Universal Reactor (NRU) in Chalk River, Ont. However, the NRU was shutdown in 2018, bringing a lot of scientific progress to a halt.



A schematic for the proposed neutron production mechanism. Credit: Michael H.L. Nguyen, Author provided

Lack of access to neutrons is deeply felt by researchers in Canada, but this is not a unique problem. Globally, many neutron sources are at the end of their life cycles, and some have recently shut down. This resource vacuum presents a unique opportunity for Canada.

Canadian scientists are now carving out a new national neutron strategy to rebuild Canadian capacity for research with neutron beams. Immediate and short-term plans are currently underway, such as partnering with foreign neutron sources and using the McMaster Nuclear Reactor to its full potential.

Canadian leadership

New neutron sources will bolster Canada's leadership in nuclear science and technology in the long-term. Compact Accelerator Neutron Sources (CANS) are alternative neutron sources, and they are gaining traction in the global scientific community.

CANS can be built and operated at a lower cost and, since they do not use fission, there is less regulatory hassle. This facilitates the construction of CANS in locations such as a university campus, making neutron beams significantly more accessible to materials researchers and opening new frontiers for Canada such as using neutron radiation for cancer treatments.

As researchers, we have three very different uses for neutrons. Drew Marquardt, a biochemist, uses neutrons to investigate the structure-function of cell membranes. Zahra Yamani is a physics scientist who researches quantum and other emerging materials, those materials in innovative technologies. As a radiation oncologist, Ming Pan uses neutrons to treat cancer.

Our proposed CANS consists of three major components: a proton accelerator, a target-moderator assembly that makes the neutrons and neutron beamlines leading to instruments for research, industrial use or medical treatments.

Affordability and accessibility

The beauty of CANS technology lies both in its lower cost—compared to other types of neutron sources—and its versatility. Although highly promising in principle, there have been relatively few attempts to implement a multipurpose CANS on a useful, practical scale. Researchers in France, Germany and Japan are pursuing CANS technology for various applications.

Applications of CANS vary from the study of new materials to novel cancer treatments. This is where Canada can once again take the lead by developing a neutron source capable of enabling various activities in one facility: from teaching and faculty-led research to medicine.

Recently, we have initiated efforts to design such a CANS that can service the broad scope of applications required by Canadian researchers and physicians. Our initiative seeks to do something no CANS has done: we intend on servicing both medicine and innovative materials research with one state-of-the-art facility.

Medical applications

Boron Neutron Capture Therapy (BNCT) is a targeted radiation cancer therapy whereby the neutrons react with boron that has accumulated in tumors. The neutron-boron reaction produces a form of radiation within the tumors to the cancer cells from within. Having the ability to target and destroy cancer cells while leaving neighboring healthy cells intact, BNCT promises to be effective against many forms of cancer. The CANS being designed would facilitate the first national BNCT center in Canada, making it one of only a handful of such centers designed for patient treatment globally.

Beyond BNCT, the proton accelerator required for a CANS can also be used to produce certain medical isotopes. We will be able to produce diagnostic imaging isotopes for positron emission tomography (PET) scans to local medical diagnostic imaging centers.

Materials research

Our proposed CANS is intended to provide neutrons to Canadian researchers for their innovative materials research in addition to medicine. We will build instrumentation that will facilitate research of "soft materials" ranging from how bacteria become resistant to antibiotics and

how new anti-cancer agents' function to key questions from the food industry relating to the nanoscopic makeup of milk.

The neutron imaging instrument at our proposed CANS facility can serve a variety of applications, from investigating imperfections in engine blocks and turbines to studying water uptake in novel crop strains or the interior contents of archeological artifacts.

We are employing a new approach to deliver neutrons to investigators both in medicine to treat disease and in materials research all using the same facility in a cost-effective way. Our efforts are the first phase in a longer-range program to develop such a compact accelerator-based neutron source. It is time for Canada to—once again—demonstrate leadership in research.

Provided by [The Conversation](#)

<https://phys.org/news/2020-09-neutron-source-canada-spur-medical.html>

COVID-19 Research News

INDIA
TODAY

Wed, 16 Sept 2020

New study questions cytokine storm theory of Covid-19 fatality

Cytokine storm may not be associated with Covid-19 deaths, a new study has found. This is in contrast with earlier studies that suggested a strong link between overreaction of immune system -- cytokine storm -- and Covid-19 deaths

By Prabhash K Dutta

New Delhi: Cytokine storm has been blamed for a large number of Covid-19 deaths. Cytokines are special particles that modulate immune and inflammation responses in the body. But when the body releases far too many cytokines, they can cause a severe inflammatory reaction, which can prove fatal. This is called a cytokine storm, which earlier studies blamed for the large number of deaths in Covid-19 cases.

When some kind of agreement emerged among doctors and researchers over autoimmune responses such as cytokine storm, it was suggested that anti-cytokine treatments -- the ones that suppress the body's immune response -- could be beneficial in the treatment of severe cases of Covid-19.

It was hoped that "targeting cytokines during the management of Covid-19 patients could improve survival rates and reduce mortality". Doctors, though not 100 per cent certain, adopted this protocol in the treatment of severe cases of Covid-19 all over the world.

Now, a study conducted in the Netherlands on Covid-19 patients has thrown up contrasting findings. The study, published recently in the JAMA (Journal of the American Medical Association) Network, found that Covid-19 is not directly associated with cytokine storms as was previously suggested.



A new study has found that cytokine storms may not be linked to Covid-19 deaths, as perceived earlier. (Photo for representation: PTI)

The researchers compared the levels of inflammatory cytokines in Covid-19 patients with a group of other patients. They found no evidence of cytokine storms in patients with Covid-19 compared to others.

The researchers compared cytokine levels of seriously ill Covid-19 patients who were on mechanical ventilation. Their levels were compared with other seriously ill patients -- with comparable severity of illness -- with bacterial septic shock, cardiac arrest, and severe trauma. A total of 156 patients were in the two groups.

The study found significantly lower levels of cytokines in people with Covid-19 compared to those having septic shock, which is a condition known to cause a sudden surge in cytokine levels.

What surprised researchers is that cytokine levels recorded in Covid-19 patients were closer to those coming to intensive care units (ICUs) due to trauma or cardiac arrest. Trauma and cardiac arrest are not usually associated with cytokine storms.

This study may have implications for treatment of Covid-19 patients worldwide. The researchers have suggested that anti-cytokine therapies may not be beneficial in Covid-19 cases.

Treatment protocols in India too involve managing cytokine storm, which is believed to be an autoimmune trigger in severe cases of Covid-19, as reported by India Today Magazine earlier.

Covid-19 is still a new illness and its understanding has been evolving over the past several months. Doctors have till now attributed Covid-19 fatalities to cytokine storms to a great extent. However, if the findings of the new research are not aberrations, the Covid-19 treatment protocol may have to undergo another major overhaul.

<https://www.indiatoday.in/news-analysis/story/covid-19-research-cytokine-storm-1722036-2020-09-15>

Business Today

Wed, 16 Sept 2020

COVID-19 likely to become seasonal, but not yet, say Scientists

*According to the review research, published in the journal **Frontiers in Public Health**, when a significant section of the population becomes immune to the novel coronavirus, the effective transmission of the virus may drop substantially*

Once herd immunity is attained, the novel coronavirus may follow suit and become a seasonal virus in countries with temperate climates, but until that time, COVID-19 will continue to spread across the seasons, a new study says.

According to the review research, published in the journal **Frontiers in Public Health**, when a significant section of the population becomes immune to the novel coronavirus and achieves herd immunity, the effective transmission of the virus may drop substantially making it more prone to seasonal fluctuations.

"COVID-19 is here to stay and it will continue to cause outbreaks year-round until herd immunity is achieved," warned study senior author Hassan Zaraket from the American University of Beirut in Lebanon. "Therefore, the public will need to learn to live with it, and continue practising the best prevention measures, including wearing of masks, physical distancing, hand hygiene, and avoidance of gatherings," Zaraket added.

According to the scientists, there could be multiple waves of COVID-19 before herd immunity is achieved. Citing earlier research, they said other respiratory viruses similar to the novel coronavirus -- SARS-CoV-2 -- follow seasonal patterns, especially in temperate regions.



"COVID-19 is here to stay and it will continue to cause outbreaks year-round until herd immunity is achieved," warned study senior author Hassan Zaraket from the American University of Beirut in Lebanon

They said influenza and several types of coronaviruses that cause common cold are known to peak in winter in temperate regions but circulate year-round in tropical regions. In the research, the scientists reviewed these seasonal viruses, examining the viral and host factors that control their seasonality as well as the latest knowledge on the stability and transmission of SARS-CoV-2.

They explained that virus survival in the air and on surfaces, people's susceptibility to infections, and human behaviours, such as indoor crowding, differ across the seasons due to changes in temperature and humidity. These factors influence transmission of respiratory viruses at different times of the year, the study noted. However, in comparison to other respiratory viruses such as the flu, the scientists said COVID-19 has a higher rate of transmission -- at least partly due to circulation in a largely immunologically naive population.

So unlike the flu and other respiratory viruses, they said the factors governing seasonality of viruses cannot yet halt the spread of COVID-19 in the summer months. However, once herd immunity is attained through natural infections and vaccinations, they believe the transmission rate of COVID-19 should drop substantially, making the virus more susceptible to seasonal factors.

The researchers said such seasonality has been reported for other coronaviruses, including those that emerged more recently such as NL63 and HKU1, which follow the same circulation pattern like influenza. "This remains a novel virus and despite the fast-growing body of science about it there are still things that are unknown," Zaraket said. "Whether our predictions hold true or not remains to be seen in the future. But we think it's highly likely, given what we know so far, COVID-19 will eventually become seasonal, like other coronaviruses," he added.

The scientists noted that the highest global COVID-19 infection rate per capita was recorded in the Gulf states, regardless of the hot summer season. "Although this is majorly attributed to the rapid virus spread in closed communities, it affirms the need for rigorous control measures to limit virus spread, until herd immunity is achieved," Yassine said.

<https://www.businesstoday.in/current/economy-politics/covid-19-likely-to-become-seasonal-but-not-yet-say-scientists/story/416069.html>



Wed, 16 Sept 2020

Explained: Why do Covid-19 patients on ventilator face nerve damage?

Based on the number of Covid-19 patients worldwide, the researchers estimated thousands of patients have been impacted

New Delhi: Severely ill Covid-19 patients on ventilators are made to lie face down because it's easier for them to breathe. But that position can also cause permanent nerve damage, according to a new study.

The study from Northwestern University, US, is currently on a preprint server; the university said it has been accepted by the *British Journal of Anaesthesia*.

Scientists believe that nerve damage is the result of reduced blood flow and inflammation in Covid-19 patients.

When non-Covid-19 patients on ventilators are placed in this position, they rarely experience any nerve damage.

Based on this study and other research, Northwestern said 12 per cent to 15 per cent of the most severely ill Covid-19 patients have permanent nerve damage.

Based on the number of Covid-19 patients worldwide, the researchers estimated thousands of patients have been impacted.

The injury has been missed because critically ill people are expected to wake up with some weakness because they have been bedridden.

But the pattern of weakness in Covid-19 patients caught the researchers' attention during rehabilitation when they found that, quite often, an important joint (wrist, ankle or shoulder) would be completely paralysed on one side of the body.

The most common nerve injuries are wrist drops, foot drops, loss of hand function and frozen shoulder. Some patients had as many as four distinct nerve injury sites. Some people need assistance with walking such as a wheelchair, brace or cane.

<https://indianexpress.com/article/explained/why-do-covid-19-patients-on-ventilator-face-nerve-damage-6596490/>



Wed, 16 Sept 2020

3 vaccines at clinical trial stage in India, SII to begin Phase 3 trial soon: ICMR

The Pune-based Serum Institute will conduct the Phase 3 trial on 1,500 volunteers across 14 locations, Balram Bhargava, ICMR's director general has said

Edited By Kanishka Sarkar

New Delhi: The Indian Council of Medical Research (ICMR) said on Tuesday three vaccine candidates against the coronavirus disease (Covid-19) are in the clinical stage of trials in India and one of them will soon begin Phase 3 trials after getting clearances.

Covid-19 vaccine candidates being manufactured by Cadila Healthcare and Bharat Biotech have completed the first phase of the trial while the Serum Institute of India (SII) will begin with Phase 3 trial after getting the nod, Balram Bhargava, ICMR's director general, said during the health ministry's briefing.

The Pune-based Serum Institute will conduct the Phase 3 trial on 1,500 volunteers across 14 locations, Bhargava added.

ICMR's statement comes a day after SII said that there won't be enough vaccines to immunize everyone in the world by 2024. "It's going to take four to five years until everyone gets the vaccine on this planet," Adar Poonawalla, the CEO of Serum Institute of India, had told the Financial Times.

Earlier in the day, minister of state for health Ashwini Choubey had informed the Lok Sabha that Phase II clinical trials of Bharat Biotech and Cadila Healthcare are underway. He also informed the House that discussions on collaborations on the recombinant vaccine developed by Russia are ongoing. However, no formal studies have been initiated.

On SII and ICMR's partnership for the clinical development of two global vaccine candidates, Choubey said, the first is ChAdOx1-S, a non-replicating viral vector vaccine developed by University of Oxford and AstraZeneca. This vaccine is undergoing Phase 3 clinical trials in Brazil. He added that Phase 2/3 bridging studies have been initiated by ICMR at 14 clinical trial sites. The ICMR-National Institute for Research in Tuberculosis, Chennai is the lead institution.

He also told the lower house of Parliament that the trial of the second vaccine candidate being clinically developed by ICMR and SII will begin in the second half of October after the vaccine by



A test tube labelled with the vaccine is seen in front of Covid-19 and stock graph logo. (Reuters File Photo)

Novavax from the US is manufactured by the Pune-based company. The trial is led by ICMR-National AIDS Research Institute (NARI), Pune, he said.

Union health minister Harsh Vardhan had last week said that a vaccine might be ready by the first quarter of 2021. *(With agency inputs)*

<https://www.hindustantimes.com/india-news/3-vaccines-at-clinical-trial-stage-in-india-sii-to-begin-phase-3-trial-soon-icmr/story-IKlwBPvnWYivP5GIZvQOmL.html>



Wed, 16 Sept 2020

Aurobindo Pharma ties up with BIRAC to develop Covid-19 vaccine

Aurobindo Pharma said it is developing a vaccine for COVID-19 through its wholly-owned US subsidiary, Auro Vaccines. The vaccine candidate is based on a proprietary vaccine delivery platform of the company

Aurobindo Pharma on Tuesday announced collaboration with the Biotechnology Industry Research Assistance Council (BIRAC), set up by the Department of Biotechnology for the development of COVID-19 vaccine.

BIRAC has facilitated the establishment of 'the r-VSV vaccine' manufacturing platform for the first time in India by supporting Aurobindo Pharma's COVID-19 vaccine development, the company said in a regulatory filing.

Aurobindo Pharma said it is developing a vaccine for COVID-19 through its wholly-owned US subsidiary, Auro Vaccines. The vaccine candidate is based on a proprietary vaccine delivery platform of the company.

"Aurobindo is in the process of setting up a state-of-art manufacturing facility for viral vaccines which will be used to produce the COVID-19 vaccine and other viral vaccines. The plant will comply with global standards. The company's COVID-19 vaccine development is going as per plan," the filing added.

Commenting on the collaboration, Aurobindo Pharma Managing Director N Govindarajan said, "It is a matter of immense pride that BIRAC has placed its trust on our vaccine capabilities. The senior leadership of Aurobindo and Auro Vaccines has extensive experience in development, production and commercialization of several vaccines." Department of Biotechnology Secretary and BIRAC Chairperson Renu Swarup said the partnership with Aurobindo is to serve the country's need for a vaccine to fight this pandemic.

"The government is focussed on creating an ecosystem that nurtures and encourages new product innovation to address the most relevant issues to our society," Swarup added.

Bharat Biotech, Serum Institute, Zydus Cadila, Panacea Biotec, Indian Immunologicals, Mynvax and Biological E are among the pharma firms in India working on the coronavirus vaccine.

<https://www.hindustantimes.com/india-news/aurobindo-pharma-ties-up-with-birac-to-develop-covid-19-vaccine/story-pd9IvoeagYVLGR8xdjOFbM.html>



A health worker holds blood samples collected for coronavirus sero-survey in New Delhi in this file photo. (Sanchit Khanna/HT PHOTO)

