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समाचार पत्रों से चयित अंश Newspapers Clippings

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

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Press Information Bureau
Government of India

Ministry of Defence

Mon, 28 June 2021 12:21PM

DRDO successfully flight tests new generation Agni P Ballistic Missile

Defence Research and Development Organisation (DRDO) successfully flight tested a New Generation Nuclear Capable Ballistic Missile Agni P from Dr APJ Abdul Kalam island off the coast of Odisha, Balasore at 1055 hrs on June 28, 2021. Various telemetry and radar stations positioned along the eastern coast tracked and monitored the missile. The missile followed text book trajectory, meeting all mission objectives with high level of accuracy.

Agni P is a new generation advanced variant of Agni class of missiles. It is a canisterised missile with range capability between 1,000 and 2,000 kms.



<https://pib.gov.in/PressReleasePage.aspx?PRID=1730828>



पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Mon, 28 June 2021 12:21PM

रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) ने उन्नत अग्नि-पी बैलिस्टिक मिसाइल का सफलतापूर्वक परीक्षण किया

रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) ने 28 जून, 2021 को सुबह 10 बजकर 55 मिनट पर ओडिशा के बालेश्वर तट पर डॉ. एपीजे अब्दुल कलाम द्वीप से अत्याधुनिक नई पीढ़ी की परमाणु सक्षम बैलिस्टिक मिसाइल अग्नि पी का सफल परीक्षण किया। पूर्वी तट के किनारे तैनात विभिन्न टेलीमेट्री और रडार स्टेशनों ने मिसाइल को ट्रैक किया और उसकी निगरानी की। मिसाइल ने उच्च स्तरीय सटीकता के साथ सभी मिशन उद्देश्यों को पूरा करते हुए अपने लिए निर्धारित लक्ष्य को भेदने में सक्षम रही।

अग्नि-पी अग्नि श्रेणी की नई पीढ़ी की अत्याधुनिक उन्नत मिसाइल है। यह एक कनस्तरीकृत मिसाइल है जिसकी मारक क्षमता 1000 से 2000 किमी है।



<https://pib.gov.in/PressReleasePage.aspx?PRID=1731011>



అత్యాధునిక అగ్ని పైమ్ బాలిస్టిక్ క్షిపణిని విజయవంతంగా పరీక్షించిన డీఆర్డీఓ

రక్షణ పరిశోధన మరియు అభివృద్ధి సంస్థ (డీఆర్డీఓ) అత్యాధునికమైన కొత్త తరం అగ్ని పైమ్ బాలిస్టిక్ క్షిపణిని విజయవంతంగా పరీక్షించింది. ఒడిశా తీరంలో డాక్టర్ ఏపీజే అబ్దుల్ కలాం ద్వీపం నుండి జూన్ 28న ఉదయం 10.55 గంటలకు బాలాసోర్లోని దీనిని విజయవంతంగా పరీక్షించారు. తూర్పు తీరం వెంబడి ఉన్న వివిధ టెలిమెట్రీ మరియు రాడార్ స్టేషన్ల ద్వారా.. ఈ క్షిపణి ప్రయోగాన్ని లక్ష్య ఛేదనను పర్యవేక్షించారు. ఈ క్షిపణి టెక్స్టు బుక్ పథాన్ని.. అనుసరించింది. ఈ క్షిపణిమిషన్ లక్ష్యాలను అత్యధిక స్థాయి కచ్చితత్వంతో నిర్ధారిత లక్ష్యాలను చేరుకుంది. అగ్ని పీ క్షిపణుల అగ్ని తరగతి యొక్క కొత్త తరం అధునాతన వేరియంట్. ఇది 1,000 నుండి 2,000 కిలోమీటర్ల మధ్య శ్రేణి సామర్థ్యంతో కూడిన క్యాన్సిస్టరెట్ క్షిపణి.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1730901>

Business Standard

Tue, 29 June 2021

Pakistan-aimed Agni-P ballistic missile flight-tested successfully

Agni-5 to be mainstay of anti-China arsenal, Agni-P deterrent against Pakistan

By Ajai Shukla

New Delhi: The Defence Research and Development Organisation (DRDO) successfully flight-tested the Agni-P, India's most technologically advanced, nuclear-capable, ballistic missile from Balasore, Odisha, on Monday.

"Various telemetry and radar stations positioned along the eastern coast tracked and monitored the (Agni P) missile. The missile followed a textbook trajectory, meeting all mission objectives with a high level of accuracy," stated a Ministry of Defence (MoD) press release.

While the MoD was silent on this, the Agni-P has been developed specifically to strike targets in Pakistan. Its range of 1,000-2,000 kilometres (km) is too short to reach targets in the Chinese mainland, but can comfortably cover all of Pakistan's territory.

The Agni-P will replace the Prithvi, Agni-1 and Agni-2 missiles in India's arsenal — missiles that were built two



The Agni-P will replace the Prithvi, Agni-1 and Agni-2 missiles in India's arsenal

decades ago with technologies that are now considered outdated.

While the Agni-P will be the workhorse of the nuclear deterrent against Pakistan, the Agni-5 will be the mainstay of the anti-China nuclear arsenal.

“Agni-P is a new generation, advanced variant of the Agni class of missiles. It is a canisterised missile with range capability between 1,000 and 2,000 km,” said the MoD.

The Agni-P will enter service as a two-stage, solid propellant missile. Both stages will have composite rocket motors and guidance systems with electro-mechanical actuators. The missiles will be guided to their targets by inertial navigation systems (INS) that are based on advanced ring-laser gyroscopes.

The Agni-P and Agni-5 ballistic missiles trace their origins back to the Integrated Guided Missile Development Programme (IGMDP) that the then DRDO Chief, Dr APJ Abdul Kalam, launched in the early 1980s.

The first missile built under the IGMDP was the liquid fuelled, single-stage Prithvi, which could drop a nuclear bomb with moderate accuracy on a target 150-250 km away.

Next to come were the two-stage Agni-1 and Agni-2 missiles that had conventional “maraging steel” fuselages, older propellants, hydraulic actuation systems that were vulnerable to leaks and far less accurate navigation systems.

A major technology leap took place with the Agni-4 missile in 2011, in which the DRDO first tested technologies that were being developed for years. These included on-board computers based on the Power PC platform, and avionics changes involving integrated technologies. By combining several avionics packages into one, the designers improved reliability and saved space and weight by reducing cabling and harnesses.

The Agni-4 also incorporated composite rocket motors, high-energy propellants, electro-mechanical actuators and ring-laser gyro-based navigation systems that could guide a ballistic missile to a target thousands of miles away, striking it within a few hundred metres.

Increased accuracy in ballistic missiles allows them to deliver relatively lower-yield nuclear bombs, thereby reducing collateral damage. A former DRDO chief told Business Standard: “Megaton warheads were essential for destroying targets in the days when accuracies were low. Now we talk of accuracy of a few hundred metres. That allows a smaller warhead, perhaps 150-250 kilotons, to cause unacceptable damage.”

The DRDO believes that the cutting-edge technologies developed for the Agni-4 and Agni-5 missiles, which have now been reverse-engineered into the Agni-P, are as advanced as those in intermediate range ballistic missiles (IRBMs) anywhere.

Many of these systems were developed by the Research Centre Imarat, a DRDO laboratory that was headed for many years by Satheesh Reddy, now the DRDO Chief.

Being a canisterised missile, the Agni-P can be transported easily by road or railway and fired at very short notice.

https://www.business-standard.com/article/current-affairs/pakistan-aimed-agni-p-ballistic-missile-flight-tested-successfully-121062801469_1.html

Shot in the arm

▶ Agni-P's range of 1,000–2,000 km is too short to reach targets in China's mainland, but can cover all of Pakistan's territory

▶ Being a canisterised missile, it can be transported easily and fired at very short notice

▶ It will replace the Prithvi, Agni-1 and Agni-2 missiles in India's arsenal that were built two decades ago with tech now considered obsolete

▶ It will enter service as a two-stage, solid propellant missile. Both stages will have composite rocket motors and guidance systems with electro-mechanical actuators

▶ Agni-P and Agni-5 originate from the Integrated Guided Missile Development Programme launched by then DRDO chief Dr APJ Abdul Kalam in the early 1980s

India test fires new generation nuclear capable Agni-Prime missile off Odisha coast

The first test of the new generation nuclear capable ballistic missile Agni Prime was conducted from the launching complex IV of the Abdul Kalam Island at about 10.55 am

By Hemant Kumar Rout

Bhubaneswar: India on Monday successfully test fired a brand new missile in its most ambitious Agni series from a defence facility off Odisha coast.

The first test of the new generation nuclear capable ballistic missile Agni Prime was conducted from the launching complex IV of the Abdul Kalam Island at about 10.55 am.

Defence sources said indigenously developed by Defence Research and Development Organisation (DRDO), the missile met all mission objectives.

"Various telemetry and radar stations positioned along the eastern coast tracked and monitored the missile. The missile has followed textbook trajectory, meeting all mission objectives with high level of accuracy," stated a statement issued by DRDO.

Agni P is the latest and most advanced variant of the Agni class of missiles. It is a canisterised missile with range capability between 1000 km and 2000 km.

The new Agni missile has been developed with the cutting-edge technologies used in 4000-km range Agni-IV and 5000-km Agni-V missiles.

The two-stage and solid-fuelled weapon system is guided by inertial navigation systems based on advanced ring-laser gyroscopes. Both stages have composite rocket motors and guidance systems are equipped with electromechanical actuators, defence sources said.

This is the first test of a missile by DRDO amid the second wave of Covid-19 pandemic. The premier defence agency had left the world awestruck after launching 12 missiles within a span of six weeks in September and October last year.

The last missile technology tested from the Integrated Test Range (ITR) of Odisha coast on March 5 was Solid Fuel Ducted Ramjet (SFDR) that will help India develop long-range air-to-air missiles.

The first missile in the Agni series was test-fired in May 1989. Having a strike range of 700 km to 900 km, it was inducted in the armed forces in 2004. India already has five Agni class missiles in its arsenal.



India successfully test-fired the Agni-Prime missile today, off the coast of Odisha. (Photo | DRDO)

<https://www.newindianexpress.com/nation/2021/jun/28/india-test-fires-new-generation-nuclear-capable-agni-prime-missile-off-odisha-coast-2322550.html>

Big boost to Atmanirbhar Bharat as India successfully test fires nuclear-capable 'Agni-Prime'

In a statement, the DRDO said that the "canisterised" Agni-Prime, which is made up of composite material, is capable of carrying nuclear weapons and has a range between 1,000 and 2,000 kms

New Delhi: In a big boost to make the all crucial defence sector "Atmanirbhar", India on Monday successfully carried out the test firing of a new missile of the Agni series. The missile, which will be known as "Agni-Prime", was tested at around 10.55 am off the coast of Odisha.

In a statement, the Defence Research and Development Organisation (DRDO) said that the "canisterised" Agni-Prime, which is made up of composite material, is capable of carrying nuclear weapons and has a range between 1,000 and 2,000 kms.

"Various telemetry and radar stations positioned along the eastern coast tracked and monitored the missile. It has followed textbook trajectory, meeting all mission objectives with a high level of accuracy," news agency ANI quoted DRDO officials as saying.

The timing of the testing of Agni-Prime is significant as India maintains its vigilance at borders amid the consistent threats from Pakistan and China. In October and September last year, the DRDO had tested around 12 missile within six weeks, sending a strong message to China and Pakistan.

Talking about the Agni missiles, it is an intercontinental range ballistic missiles developed by the DRDO. The Agni-I was developed under the Integrated Guided Missile Development Program (IGMDP) and tested in 1989.

The Agni-II was developed by Advanced Systems Laboratory along with other DRDO laboratories and integrated by the Hyderabad-based Bharat Dynamics Limited.

The first testfiring of the proto type of Agni-II missile was carried out on April 11, 1999. On May 17 2010, the trial of nuclear-capable Agni-II ballistic missile with a range of 2,000 km was conducted by the Special Strategic Command Force (SSCF) from the ITR before it was made operational by the Indian Army.

Meanwhile, Agni-III has an operational range of 3,000 to 5,000 km while Agni-IV and Agni-V can hit targets between 3,500 to 4,000 km and 5,000 to 8,000 km respectively.

<https://english.jagran.com/india/big-boost-to-atmanirbhar-bharat-as-india-successfully-test-fires-nuclearcapable-agniprime-10028527>



(file picture used for representation)

Tue, 29 June 2021

Agni P: India successfully test-fires Agni series' new generation nuclear missile

The new generation nuclear-capable ballistic missile Agni P was successfully flight-tested by the Defence Research and Development Organisation (DRDO) off the coast of Balasore in Odisha

By Manjeet Negi

New Delhi: India on Monday successfully carried out the test-firing of a new missile in the Agni series known as the Agni-P. The test was conducted off the Odisha coast, officials informed.

"The new nuclear-capable Agni P is fully made up of composite material and it was a textbook launch," government sources said to India Today.

The new generation nuclear-capable ballistic missile Agni P was successfully flight-tested by the Defence Research and Development Organisation (DRDO) from Dr APJ Abdul Kalam island off the coast of Balasore in Odisha.

"Various telemetry and radar stations positioned along the eastern coast tracked and monitored the missile. The missile followed textbook trajectory, meeting all mission objectives with high level of accuracy," the DRDO said in a statement.



Agni P is a new generation advanced variant of the Agni class of missiles. (Photo: Twitter/DRDO)

Agni P is a new generation advanced variant of the Agni class of missiles. It is a canisterised missile that can be launched from rail and road and stored for a longer period. It can be transported across the length and breadth of the country, as per requirements.

The new ballistic missile, which has a range capability between 1,000 and 2,000 kilometres, weighs half of Agni III and has new kinds of propulsion and new guidance.

It also comes with the technologies found in the 4000-kilometre range Agni-IV and 5000-kilometre range Agni-V. The new Agni P can be used to target enemy warships in the Indo-Pacific.

Agni I, India's first intermediate-range ballistic missile, was successfully test-fired for the first time in May 1989. It was inducted into service in 2004. It has a range capability between 700 and 900 kilometres.

Meanwhile, the DRDO had conducted a successful test-fire of the Pinaka rockets last Friday. The indigenously-developed Enhances Pinaka rockets were tested at Integrated Test Range (ITR) in Chandipur off the Odisha coast.

<https://www.indiatoday.in/india/story/agni-p-india-successfully-test-fires-agni-series-new-generation-nuclear-missile-1820269-2021-06-28>

Agni P missile: DRDO successfully tests lighter, deadlier weapon

Agni P is a canisterised missile with a range between 1,000km and 2,000km

The DRDO on Monday successfully test-fired a 'new generation' member of the Agni family of ballistic missiles.

DRDO successfully tested the 'Agni P' missile from the Dr APJ Abdul Kalam Island off the coast of Odisha on Monday morning.

In a brief press statement, DRDO said the Agni P is a canisterised missile with a range between 1,000km and 2,000km. ANI quoted government sources as saying the "new nuclear-capable missile is fully made up of composite material and it was a textbook launch". ANI added the missile is "is very short and light in comparison with other missiles in this class. A lot of new technologies incorporated in the new missile".



The Agni P missile | PIB

Last week, *The New Indian Express* reported the Agni P was initially referred to the Agni Prime. *The New Indian Express* reported, "Unlike the single-stage Agni-I, the double-stage Agni Prime will have a canister version with the flexibility to be fired from both road and rail-mobile launchers. The sleek missile that weighs less than... the previous variant due to the integration of new technologies will be more lethal in terms of power and killing ability." A canister-launched missile has lower maintenance costs as the weapon is kept covered inside the canister and not exposed. Further, it is quicker to ready for launch unlike a weapon that has to be moved to a launch facility.

The publication said the Agni P would replace the Agni 1 missile once its tests were completed.

<https://www.theweek.in/news/india/2021/06/28/agni-p-missile-drdo-successfully-tests-lighter-deadlier-weapon.html>

India successfully test-fires Agni Prime off Odisha coast: Here's all you need to know about the new ballistic missile

India on Monday successfully test-fired its new generation nuclear-capable Agni Prime missile from a defence base off Odisha coast.

"Defence Research and Development Organisation (DRDO) successfully flight tested a New Generation Nuclear-Capable Ballistic Missile Agni P from Dr APJ Abdul Kalam island off the coast of Odisha, Balasore at 1055 hrs on June 28, 2021," a PIB release said.

As per Defence Research and Development Organisation (DRDO) officials, Agni-Prime is a new generation advanced variant of the Agni class of missiles. "It is a canisterised missile with a range capability between 1000 and 2000 kilometres. Various telemetry and radar stations positioned along the eastern coast tracked and monitored the missile. It has followed textbook trajectory, meeting all mission objectives with a high level of accuracy," the officials told ANI.

On July 25, DRDO had successfully test-fired enhanced range versions of indigenously developed 122mm Caliber Rocket from a Multi-Barrel Rocket Launcher (MBRL) at Integrated Test Range (ITR), Chandipur off the coast of Odisha.

On July 24 and July 25, DRDO had also successfully test-fired an extended range version of indigenously developed Pinaka rocket from MBRL at ITR Chandipur off the coast of Odisha.

Here's all you need to know about the Agni-Prime missile:

- The nuclear-capable missile has been designed and developed by the Defence Research and Development Organisation (DRDO).
- Agni-Prime is a new generation advanced variant of the Agni class of missiles.
- According to officials, it is a canisterised missile with a range capability between 1000 and 2000 km.
- According to DRDO, the missile can hit targets up to a range of 2000 km and is very short and light in comparison with other missiles in this class.
- The Agni Prime missile is a next-generation, nuclear-capable weapon made fully of a composite material.

(With inputs from ANI and PTI)

<https://www.freepressjournal.in/india/india-successfully-test-fires-agni-prime-off-odisha-coast-heres-all-you-need-to-know-about-the-new-ballistic-missile>

राजनाथ ने 'अग्नि पी' मिसाइल के सफल प्रायोगिक

परीक्षण के लिए डीआरडीओ को बधाई दी

नयी दिल्ली: रक्षा मंत्री राजनाथ सिंह ने नई पीढ़ी की 'अग्नि' श्रेणी की परमाणु हथियार ले जाने में सक्षम एक बैलिस्टिक मिसाइल के सफल प्रायोगिक परीक्षण के लिए रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) को सोमवार को बधाई दी।

सतह से सतह पर मार करने वाली इस बैलिस्टिक मिसाइल की मारक 2000 किलोमीटर तक है। डीआरडीओ ने ओडिशा के तट पर एपीजे अब्दुल कलाम द्वीप से 'अग्नि पी' का सफलतापूर्वक परीक्षण किया।

सिंह ने ट्वीट किया, "अग्नि श्रेणी की मिसाइलों के उन्नत संस्करण 'अग्नि पी' के पहले सफल परीक्षण के लिए डीआरडीओ को बधाई। मैं इस मिशन में शामिल टीम के प्रयासों की सराहना करता हूँ।" उन्होंने कहा कि मिसाइल में प्रणोदन प्रणाली, अभिनव मार्गदर्शन और नियंत्रण तंत्र और अत्याधुनिक नेविगेशन प्रणाली सहित कई उन्नत प्रौद्योगिकियां शामिल की गई हैं।

रक्षा मंत्रालय ने कहा कि मिसाइल ने उच्च स्तर की सटीकता के साथ सभी मिशन उद्देश्यों को पूरा किया। मंत्रालय ने कहा कि मिसाइल का परीक्षण सुबह दस बजकर 55 मिनट पर किया गया।

मंत्रालय ने एक बयान में कहा, "पूर्वी तट पर स्थित विभिन्न टेलीमेट्री और रडार स्टेशनों ने मिसाइल पर नजर रखी और निगरानी की।"

<https://navbharattimes.indiatimes.com/india/rajnath-congratulates-drdo-for-successful-pilot-test-of-agni-p-missile/articleshow/83921288.cms>

भारत ने अग्नि प्राइम मिसाइल का किया कामयाब परीक्षण, 2000 किमी तक दुश्मनों को भेदने की सलाहियत

नई दिल्ली: हिन्दुस्तान की ताकत में मजिद इजाफा करते हुए रक्षा अनुसंधान और विकास संगठन ने अग्नि सीरीज की नई मिसाइल अग्नि प्राइम का कामयाब टेस्ट किया है। सोमवार की सुबह ओडिशा के साहिल के पास डॉ. अब्दुल कलाम टापू पर इसका टेस्ट किया गया। डीआरडीओ जराया के मुताबिक, नई मिसाइल 1000-2000 किमी तक सटीक निशाना लगा सकती है। यह परमाणु हथियार ले जाने की भी सलाहियत रखता है और यह अग्नि-1 मिसाइल का एडवांस संस्करण है। भारत ने पहली बार साल 1989 में मध्यम दूरी की बैलिस्टिक मिसाइल अग्नि 1 का परीक्षण किया था। सूत्रों के अनुसार अब अग्नि-पी मिसाइल अग्नि 1 की जगह लेगा। मुल्क में अब तक अग्नि सीरीज की पांच मिसाइलों का सफलतापूर्वक विकास और परीक्षण किया जा चुका है।



नई मिसाइल 1000-2000 किमी तक सटीक निशाना लगा सकती है. यह परमाणु हथियार ले जाने की भी सलाहियत रखता है और यह अग्नि-1 मिसाइल का एडवांस संस्करण है.

हर चुनौती का मुंहतोड़ जवाब देने की क्षमता: राजनाथ सिंह

वहीं दूसरी जानिब रक्षा मंत्री राजनाथ सिंह ने पूर्वी लद्दाख से चीन को कड़ा संदेश देते हुए सोमवार को कहा कि भारत "गलवान वीरों" के कुर्बानी को कभी नहीं भूलेगा और देश के सशस्त्र बल हर चुनौती का मुंहतोड़ जवाब देने में सक्षम हैं। लद्दाख दौरे के दूसरे दिन सिंह ने कहा कि पड़ोसी देशों के साथ बातचीत के जरिए मुद्दों का समाधान तलाशने की कोशिश की जानी चाहिए, लेकिन साथ ही आगाह किया कि अगर कोई हमें धमकाने की कोशिश करेगा तो भारत इसे बर्दाशत नहीं करेगा। गलवान घाटी में चीनी सैनिकों के साथ पिछले साल 15 जून को भीषण झड़प में 20 भारतीय सैनिक शहीद हो गए थे। दोनों देशों के बीच पिछले कुछ दशकों में हुई यह सबसे भीषण झड़प थी।

<https://zeenews.india.com/hindi/zeesalaam/news/drdo-develops-and-successfully-tests-advance-version-of-ballistic-missile-agni-p-htzs/930460/amp>

अग्नि प्राइम: मोबाइल से लॉन्चिंग की क्षमता, 1500 किमी तक मार, डीआरडीओ ने किया सफल परीक्षण

सार: अग्नि सीरीज की सबसे आधुनिक मिसाइल अग्नि प्राइम का आज यानी सोमवार को सफल परीक्षण किया गया। इस अत्याधुनिक मिसाइल को 4,000 किलोमीटर की रेंज वाली अग्नि-4 और 5,000 किलोमीटर की अग्नि-5 मिसाइलों में इस्तेमाल होने वाली अत्याधुनिक तकनीकों को मिलाकर विकसित किया गया है।

विस्तार

नई दिल्ली: अग्नि सीरीज के सबसे अत्याधुनिक वर्जन अग्नि प्राइम नामक मिसाइल का आज यानी सोमवार सुबह 10:55 बजे सफल परीक्षण किया गया। रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) द्वारा विकसित इस मिसाइल का ओडिशा के तट पर सफल परीक्षण किया गया।



प्रतीकात्मक तस्वीर - फोटो : ANI

डीआरडीओ के अधिकारी ने बताया कि अग्नि प्राइम मिसाइल को डीआरडीओ ने विकसित किया है। अग्नि प्राइम मिसाइल को 4,000 किलोमीटर की रेंज वाली अग्नि-4 और 5,000 किलोमीटर की अग्नि-5 मिसाइलों में इस्तेमाल होने वाली अत्याधुनिक तकनीकी को मिलाकर तैयार किया गया है। अग्नि प्राइम मिसाइल की मारक क्षमता 1000 से 2000 किलोमीटर है, लेकिन यह मिसाइल अत्याधुनिक साजो सामान से सुसज्जित है। डीआरडीओ के अधिकारी ने बताया कि ओडिशा के पूर्वी तट के किनारे स्थित विभिन्न रडार व अन्य तकनीक के जरिये रडार को ट्रैक किया गया। इस मिसाइल ने उच्च स्तर की सटीकता के साथ मिशन के सभी उद्देश्यों को पूरा किया है।

मोबाइल लॉन्चर से भी कर सकेंगे फायर

अग्नि प्राइम मिसाइल दो स्टेज और सॉलिड फ्यूएल पर आधारित है। इसे एडवांस रिंग-लेजर गायरोस्कोप पर आधारित जड़त्वीय नेविगेशन सिस्टम द्वारा निर्देशित किया जाएगा। दोनों चरणों में समग्र रॉकेट मोटर्स हैं। इसका गाइडेंस सिस्टम इलेक्ट्रोमैकेनिकल एक्ट्यूएटर्स से लैस हैं। रक्षा विभाग से जुड़े सूत्रों ने बताया कि सिंगल स्टेज वाले अग्नि-1 के विपरीत, डबल स्टेज वाले अग्नि प्राइम फ्लैक्सिबिलिटी के साथ सड़क और मोबाइल लॉन्चर दोनों से फायर किया जा सकता है।

स्लीक डिजाइन, अधिक मारक क्षमता

सूत्रों के मुताबिक, अग्नि प्राइम में अत्याधुनिक तकनीक के प्रयोग के कारण यह पिछले संस्करण की तुलना में कम वजन वाली स्लीक मिसाइल शक्ति है। इससे इसकी मारक क्षमता पहले तुलना में अधिक घातक होगी। हालांकि, सूत्र ने ज्यादा जानकारी देने से साफ इनकार कर दिया।

1989 में हुआ था अग्नि-1 का परीक्षण

भारत ने मई, 1989 में पहली बार मध्यम दूरी की बैलेस्टिक मिसाइल अग्नि-1 का टेस्ट किया था। उस वक्त इसकी मारक क्षमता 700 से 900 किलोमीटर थी। वर्ष 2004 में सेना में शामिल किया गया था। यदि अग्नि प्राइम का टेस्ट सफल रहता है तो यह अग्नि-1 की जगह ले लेगी। भारत अब तक अग्नि सीरीज की पांच मिसाइल विकसित कर चुका है।

<https://www.amarujala.com/india-news/agni-prime-missile-test-drdo-set-to-back-in-action-with-agni-prime-test-scheduled-today-12-pm?pageId=1>

Airbases fortified as CDS Rawat warns of next-gen attacks

While the IAF is now certain that drones were used for the Jammu attack, it is still not clear as to how many drones were used, where they came from or which side they flew away after dropping the two improvised explosive devices, said a second official

By Rahul Singh

New Delhi: The Indian Air Force (IAF) has strengthened defence at its forward airbases in the western sector to pre-empt fresh drone attacks, a day after small drones were used to target the Jammu air force station, people familiar with the matter said on Monday.

Sunday's attack was the first-ever offensive use of drones to target an Indian military facility.

"Counter-measures have been put in place to pre-empt such drone attacks on forward bases. Snipers and jammers are in place, among other measures. Bases are on alert," said one of the officials cited above, speaking on condition of anonymity.

The drone attack is a watershed in asymmetric warfare and underlines the need for the armed forces to build capabilities to deter, detect and neutralise such aerial threats.

While the IAF is now certain that drones were used for the Jammu attack, it is still not clear as to how many drones were used, where they came from or which side they flew away after dropping the two improvised explosive devices, said a second official.

The attack on the Jammu air force station has lent fresh urgency to deploying anti-drone technology to tackle threats from small drones, he added. Drone activity was reported over Ratnuchak-Kaluchak military area in the Jammu region on Sunday night.

"Immediately, high alert was sounded, and quick reaction teams engaged them with firing. Both drones flew away. A major threat thwarted by the alertness and proactive approach of troops," said a government spokesperson in Jammu.

Chief of defence staff General Bipin Rawat on Monday told a TV channel that the three services, the Defence Research Development Organisation (DRDO), academia and other stakeholders were working together to develop technology to counter the threat from drones at the earliest.

He said DRDO has already achieved some success and even demonstrated its anti-drone technology. DRDO has developed anti-drone technology to disable or shoot down hostile drones. Its anti-drone system has a range of two to three kilometres with radar capability to pick up the drone and then use frequencies to jam the unmanned aerial vehicle.

A top government official said DRDO has transferred the technology for the production of its anti-drone system to Bharat Electronics Limited (BEL). "DRDO has written to the three services and informed them that the anti-drone system is available," he said.

DRDO is also ready to transfer technology to private industry to produce the anti-drone system, he added.

"We have to start preparing for future generation warfare. Drones, swarms and other such elements will change the nature and character of warfare. We are quite concerned about drones



CDS Rawat on Monday told a TV channel that the three services, the DRDO, academia and other stakeholders were working together to develop technology to counter the threat from drones at the earliest.(File photo)

being used in this domain and therefore we have been continuously working on anti-drone technology,” Rawat told CNN-News18.

He said that while the three services were working together on anti-drone technology, a call was taken that the IAF should become the lead agency for coordinating all efforts on how to counter drones in the future.

The Jammu attack marks a new chapter in Pakistan’s proxy war against India in Jammu and Kashmir, officials told Hindustan Times on Sunday.

“It appears to be a trial run by the adversary to gauge India’s capability to detect small targets that can fly across the border and target Indian installations. We need to beef up our surveillance capabilities, especially to pick up radar signatures of small drones that are capable of causing significant damage,” former assistant chief of air staff Air Vice Marshal Sunil Nanodkar (retd) said on Sunday.

Pakistan-backed terrorist groups and its Inter-Services Intelligence have been using drones to smuggle arms, ammunition and drugs across the border into J&K and Punjab, but never have drones been used before for attacking a military base.

The Jammu attack came four months after the Indian and Pakistani militaries announced on February 25 that they had begun observing a ceasefire along the Line of Control from the midnight of February 24.

<https://www.hindustantimes.com/india-news/airbases-fortified-as-cds-warns-of-next-gen-attacks-101624905913700.html>



Tue, 29 June 2021

Working to develop drone tech in light of recent events, DRDO on it, CDS Rawat Says

The CDS also warned that drones and swarms being used in warfare would be witnessed in large numbers in the future

India has to start preparing for the future generation of warfare, Chief of Defence Staff (CDS) General Bipin Rawat said on Monday, days after a drone, in a first-of-its-kind strike, dropped two bombs at Indian Air Force (IAF) station in Jammu.

Speaking on the need for acquiring anti-drone technology in an exclusive interview to CNN-News18, Gen Rawat said drones, swarms and other such elements “change the very nature and character of warfare”. He said the Indian Army is “quite concerned” and has been working on countering drone technology.

“The Defence Research and Development Organisation (DRDO) has made some success and has demonstrated their capability to counter drones,” he said.



File photo of Bipin Rawat

While the Indian Armed Forces is working in an integrated manner to counter drones, the Air Force will be leading the efforts. “Army, Navy and Air Force are working in a joint and integrated manner. However, we have taken the call that Air Force should become the lead agency on coordinating all efforts on how we evolve in countering drones in the future,” he said.

The CDS also warned that drones and swarms being used in warfare would be witnessed in large numbers in the future. “We have seen these capabilities in our adversaries and this is something that we are preparing for.”

“With how DRDO is now progressing, along with some civilian agencies, our academicians in IITs, we are all working together to ensure that we can counter this threat at the earliest,” he added.

On claims of India being late to acquiring and using drones and anti-drone technologies, Gen Rawat said India had acquired drone in large numbers. “We are also looking at acquiring a very modern sophisticated drone that is available in the world market, but at the same time, I think our drone technology is also evolving.”

“It is not an easy technology because we lack the technology to build the engine of our aircraft, but I think we are moving in the right direction.”

He emphasised that the IAF has been aware of drone technologies as they are the “future of warfare” now. “We must also acquire drones as combat systems. But at the same time, we also need to develop technologies for countering it. This technology is being worked upon across the world, and not everybody has this technology available.”

India’s focus has been on indigenisation, and “we have partially succeeded,” he said. “I’m sure this process will be hastened up, especially in the wake of the recent incident.”

On the question of the technology’s evolving nature and the “surprise” factor of using such weapons, Gen Rawat said all of these technologies that use the electromagnetic spectrum need to be countered in the same manner. “One is the physical destruction of drones which is not an easy solution since they are small and not easily detected by radars. So we need to have physical surveillance of the entire space, particularly in vulnerable spaces.”

Gen Rawat also emphasised it is more important to develop electronic technology to bring down these drones.

<https://www.news18.com/news/india/working-to-develop-drone-tech-in-light-of-recent-events-drdo-on-it-cds-rawat-says-3901091.html>

THE TIMES OF INDIA

Tue, 29 June 2021

Jammu Challenge: How to catch & destroy a terror drone

By Manmohan Bahadur

The drone attack on Air Force Station Jammu has focussed national attention. Drones have been a threat for a while but received little serious consideration. Hopefully, this will change now. Here’s a quick guide to terrorism’s latest tool and possible countermeasures.

Why are drones so dangerous?

Five reasons.

First, it is cheap and can be bought online by anyone. Checking who’s buying drones for what purpose is virtually impossible currently.

Second, related to the first point, anonymity is afforded to the user due to drones’ uncontrolled proliferation.

Third, drones do not require much technical expertise to configure them to navigate using GPS and carry a small payload. If they can deliver medicines and pizzas, they can carry a small explosive too.

Fourth, use of drones by terrorists causes a disproportionate psychological effect on people as well as on security personnel.

Fifth, and related to the fourth point, terrorist drones can be deployed anywhere in the country, not just security/military installations. The state’s expensive weapons system or massive deployment of troops are of little use.

So, what are the countermeasures?

Broadly and obviously, detection, engagement and neutralisation.

Why is detection difficult?

First, drones are battery powered, and hence relatively quiet, and can be manually controlled or programmed to fly low giving the defender very little warning time.

Second, detection by normal civil and military radars is difficult as their radar cross-section is very small; their small size makes visual acquisition problematic too.

How can detection be improved?

A combination of special millimetric wave radars, acoustic, electro-optic and infra-red sensors will be needed in a fused and networked architecture. This needs to be deployed.

How are drones neutralised?

Either kinetic means using guns or special net catchers etc and/or electronic measures that basically involve interfering with and/or destroying their guidance electronics. Physical destruction has also been demonstrated using high-powered lasers.

Why is neutralisation tough?

When a drone makes an approach at night or drones are used in a swarm to saturate defences, quick response can be difficult. This is not fiction, but reality, a trailer of which one saw at Jammu.

So, what should government do?

Five actions.

First, since it is impossible to address every vital installation, a graded list be made of those to be protected; unfortunately, this list would include personages too as the world has been witness to assassinations through unmanned systems, including drones.

Second, since R&D and manufacture of anti-drone systems is at a nascent stage in India, some numbers should be sourced through imports for certain vital areas.

Third, while DRDO has produced anti-drone systems that guard VIPs during national day celebrations, it is time that this premier research agency takes up the 'Jammu' challenge and accelerates R&D for systems that can be used in the field. This is a huge task for an organisation that has an elephantine pace.

Fourth, given DRDO's record, private industry should be involved. We have plenty of young and enthusiastic IT entrepreneurs whose startups need to be supported with finance for R&D.

The government's iDEX initiative must enable multiple players as there are many sub-parts in an anti-drone architecture. Expecting one or two companies to produce the system as a whole will only delay the end-product.

Fifth, a mechanism to monitor the proliferation of drones and anti-drone technology needs to be instituted quickly. The policy needs to legitimise legal players and prevent the technology from landing up in wrong hands.

<https://timesofindia.indiatimes.com/blogs/toi-edit-page/jammu-challenge-how-to-catch-destroy-a-terror-drone/>

रक्षा तैयारी: दुर्गा-2 के प्रहार से होगा ड्रोन हमलों का मुकाबला, डीआरडीओ तैयार कर रहा है कवच

By शशिधर पाठक

सार

चुनौतियों से निपटने में भारत कभी पीछे नहीं रहा है। देश की सेना व रक्षा वैज्ञानिकों ने विश्व स्तरीय संसाधनों का विकास किया है। दुर्गा-2 पलक झपकते ही ड्रोन का खात्मा कर देगा।

विस्तार

नई दिल्ली: आतंकी हों या देश के दुश्मन, उनके किसी हमले से क्या घबराना? भारत के रक्षा वैज्ञानिक हर चुनौती और खतरे को समझकर अनुसंधान में लगे हैं। रक्षा अनुसंधान एवं विकास संस्थान (डीआरडीओ) के वैज्ञानिक भी दुर्गा-2 की परियोजना में व्यस्त हैं। जल्द ही इसके ऑपरेशनल हो जाने की उम्मीद है।

रक्षा वैज्ञानिक बताते हैं कि दुर्गा-2 के ऑपरेशनल होने के बाद भारत किसी भी ड्रोन को पलक झपकते ही न केवल खोज लेगा, बल्कि मार गिराएगा। बताते हैं कि देश में प्रधानमंत्री और अन्य विशिष्ट वीआईपी को भी बहुत छोटे आकार के ड्रोन जैसे हमलों से बचाने की क्षमता भी विकसित की जा रही है।



विशिष्ट व्यक्तियों को ड्रोन से बचाने की क्षमता पहले से

सूत्रों के मुताबिक देश के विशिष्ट व्यक्तियों को ड्रोन या कम ऊंचाई से उड़ने वाली ऑब्जेक्ट से बचाने की क्षमता तो सुरक्षा बलों के पास है, लेकिन आने वाले समय में और मजबूत बनाए जाने की योजना है। विशिष्ट व्यक्तियों की सुरक्षा के लिए माइक्रोवेव या एक्स-रे तकनीक का इस्तेमाल किया जा सकता है।

काली परियोजना पर चल रहा काम, विकिरण से होगा सफाया

भारतीय वैज्ञानिक काली परियोजना पर भी काम कर रहे हैं। इस परियोजना पर भाभा परमाणु अनुसंधान केन्द्र और डीआरडीओ के वैज्ञानिक काम कर रहे हैं। यह एक एनर्जी वीपेन सिस्टम होगा जो माइक्रोवेव, एक्स-रे आदि जैसी विकिरणों के माध्यम से दुश्मन के लो फ्लाइंग ऑब्जेक्ट को पलक झपकते ही नष्ट कर देगा।

दुर्गा-2 के वार से ध्वस्त होंगे दुश्मन के ड्रोन

सीमा पार की गुस्ताख हरकतों को लेकर देश के वैज्ञानिक भी सतर्क हैं और उन्हें नेस्तनाबूद करने की प्रणाली विकसित की जा रही है। दुर्गा-2 परियोजना देश की एक विशिष्ट, गोपनीय योजना है। इसलिए इसके बारे में बहुत अधिक जानकारी नहीं मिल सकी है।

ऐसा करेगी प्रहार

लेकिन सूत्रों के हवाले से प्राप्त जानकारी के अनुसार यह लेजर तकनीक पर आधारित तंत्र होगा। 100 किलोवॉट की क्षमता वाली इस प्रणाली से लेजर बीम के जरिए किसी भी ड्रोन जैसे ऑब्जेक्ट को डेढ़ से दो किमी की ऊंचाई पर हवा में ही नष्ट किया जा सकेगा। प्राप्त जानकारी के अनुसार दुर्गा-2 में दुश्मन के

ड्रोन को खोजने, उसे पहचानने तथा लक्ष्य पर लेकर उसे कई हिस्सों में भेदने की भी क्षमता होगी। यह प्रणाली एक बार में कई लक्ष्यों को पहचान और उसे लेजर उर्जा के सहारे नष्ट कर सकेगी।

हर चुनौती का वैज्ञानिकों के पास जवाब

प्रधानमंत्री, राष्ट्रपति की सुरक्षा, 15 अगस्त तथा 26 जनवरी जैसे समारोहों की सुरक्षा को लेकर भी सुरक्षा एजेंसियां काफी गंभीर हैं। माना जा रहा है कि इसके लिए लेजर आधारित हथियारों की तकनीक अपनाई जा सकती है। हालांकि अभी यह नहीं कहा जा सकता है कि यह तकनीक और सुरक्षा प्रणाली पूरी तरह से देशी होगी या फिर इसे किसी सहयोगी देश की सहायता से तैयार किया जा रहा है। लेकिन इतना तय है कि इस तकनीक में आर्टिफिशियल इंटेलीजेंस की सहायता ली जाएगी।

<https://www.amarujala.com/india-news/defense-preparedness-drone-attacks-will-be-counter-ed-by-durga-2-attack-drdo-is-preparing-armor>

Business Standard

Tue, 29 June 2021

Need to invest more in research, tech to counter rogue drone ops: DFI

India needs to invest more in counter-drone research and technology and procure them in a planned manner to address the security concerns arising from rogue operations the unmanned aerial vehicles

New Delhi: India needs to invest more in counter-drone research and technology and procure them in a planned manner to address the security concerns arising from rogue operations the unmanned aerial vehicles, said a senior official of the Drone Federation of India (DFI) on Monday.

His comments come in the wake of the attack in which drones dropped two bombs at the IAF station at Jammu airport, injuring two air force personnel.

Alert Army troops on Monday fired at two drones found hovering over the Ratnuchak-Kaluchak military areas in Jammu.

Smit Shah, Director - Partnerships, Drone Federation of India (DFI) said no amount of strict regulations can address the security concerns from rogue drones.

"A person, if he or she wants to assemble a drone and fly it in any part of the country, has the physical capability to do so. To address this challenge (of rogue drones), we need to invest more counter-drone research and technology and build capacity in the same domain," he told PTI.

India has few companies doing indigenous research and a few companies partnering with foreign vendors but more focus need to be brought in this domain, he mentioned.

Counter-drone technology uses radars, radio-frequency devices, electro-optical methods, acoustic mechanisms or combined sensors technology to the unmanned aerial vehicles.

Shah said the existing laws of the country should primarily ensure that materials that can be used for causing harm and destruction should be tracked adequately and should not fall in the hands of people for whom it is not intended.

The DFI is an industry body that has companies like Asteria Aerospace, Quidich Innovation Labs, AutoMicroUAS, Aarav Unmanned Systems and Indrones as its members.



Shah said the government should take at least three steps to boost indigenous research and technology in counter-drone domain -- first is planned procurement approach that explains how much and how soon are those counter-drones needed.

"Second is the need to develop partnerships between counter-drone companies and public sector units (PSUs), government organisations like Defence Research and Development Organisation (DRDO) and other private organisations. The third step is to support these initiatives with focused funding programs," he said.

In October 2019, the Civil Aviation ministry had issued a policy document primarily to deal with possible security challenges from rogue drones to key installations like nuclear power plants and military bases.

Titled 'National Counter Rogue Drones Guidelines', the document said it was a matter of concern that small drones were proliferating at a rate that has alarmed battlefield commanders and planners alike.

"The utilisation of armed drones by extremist groups to carry out reconnaissance and targeting strategic Israeli installations during Israel-Lebanon war is an example of escalation of terrorist and insurgent drone capabilities," according to the document.

The policy document said multiple incidents of sightings of drones in the vicinity of commercial airliners and major airports like New Delhi and Mumbai have raised flight safety concerns.

"Further, the upsurge in drone use has also increased the threat quotient for VVIPs who can be targeted through the rogue drones," it said.

There is no official data about the number of civilian drones operating in India. However, it is estimated that there are about 4-6 lakh drones in the country. A significant number of parts -- which are used in manufacturing drones -- are imported from China and many other countries.

Shah said indigenous production of drones is important from a defence capability building perspective.

"To boost indigenous production of drones, the government needs to have liberalised drone policy wherein lesser number of permissions are needed to manufacture or operate drones," he said.

Moreover, the government has to create funding programs and streamline its drone procurement mechanism to boost their indigenous production in the country, he said.

Indian aviation regulator DGCA issued Unmanned Aircraft System (UAS) Rules, 2021, in March this year. These rules enforce the NPNT (no permission no takeoff) scheme that requires an operator to take permission from DGCA, using an app, before each drone flight. If this permission is not received, the drone itself will not function.

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

https://www.business-standard.com/article/companies/need-to-invest-more-in-research-tech-to-counter-rogue-drone-ops-dfi-121062801549_1.html

Dr Reddy's Labs announces commercial launch of 2-DG

MRP of each sachet fixed at ₹990; subsidised rate offered to government institutions

Dr Reddy's Laboratories has announced the commercial launch of 2-deoxy-D-glucose (2-DG), a drug for moderate to severe Covid-19 patients administered as an adjunct therapy to the existing standard care.

The emergency use approval for anti-Covid-19 therapeutic application of the drug was granted on May 1, 2021.

Dr Reddy's will supply to major government as well as private hospitals across India. In the initial weeks, the company will make the drug available in hospitals across metros and Tier 1 cities, and subsequently expand coverage to the rest of India.



2-DG manufactured by Dr Reddy's has a purity of 99.5 per cent and is being sold commercially under the brand name 2-DG. The maximum retail price (MRP) of each sachet has been fixed at ₹990, with a subsidised rate offered to government institutions.

2-DG was developed by the Institute of Nuclear Medicine & Allied Sciences (INMAS), a laboratory of the Defence Research and Development Organisation (DRDO), in collaboration with Dr. Reddy's Labs.

The oral drug can be administered only upon prescription and under the supervision of a qualified physician to hospitalised patients.

Dr G Satheesh Reddy, Secretary - Department of Defence (R&D) and Chairman, DRDO, in a statement said: "We are pleased to have worked closely with our long-term industry partner Dr Reddy's Laboratories, Hyderabad, for testing 2-DG as therapeutic application in treatment of Covid-19 patients. DRDO has been contributing in the fight against Covid-19 pandemic with its spin-off technologies."

Satish Reddy, Chairman, Dr Reddy's, said: "2-DG is yet another addition to our Covid-19 portfolio that already covers the full spectrum of mild to moderate and severe conditions and includes a vaccine. We are extremely pleased to have partnered with DRDO in our collective fight against the Covid-19 pandemic."

<https://www.thehindubusinessline.com/news/science/dr-reddys-labs-announces-commercial-launch-of-2-dg/article35010661.ece>

Dr Reddy's DRDO-produced drug 2DG launches commercially: Cost, production, efficacy

The drug comes in powder form in a sachet of 2.34 g and the MRP has been fixed at Rs 990

Hyderabad pharma company Dr Reddy's Laboratories (RDL) has announced that it will now commercially sell the 2-deoxy-D-glucose drug under the name of 2DG.

The drug was developed and tested by the Defence Research and Development Organisation's (DRDO) Institute of Nuclear Medicine & Allied Sciences (INMAS) in collaboration with Dr Reddy's.

The Drugs Controller General of India (DCGI) gave the drug its Emergency Use Approval (EUA) on 1 May and was officially launched on 8 May. On 17 May, Rajnath Singh, defence minister handed the first batch of drugs to the Union health minister Harsh Vardhan.

Dr Reddy's will supply the 2DG drug to major government and private hospitals in metros and Tier 1 cities. Gradually, the company will increase supply to the rest of the country.

Dr G Satheesh Reddy, Secretary Department of Defence (R&D) and Chairman, DRDO said in a press release, "We are pleased to have worked closely with our long-term industry partner Dr Reddy's Laboratories, Hyderabad, for testing 2DG as therapeutic application in treatment of COVID-19 patients. DRDO has been contributing in fight against COVID-19 pandemic with its spin off technologies."

The drug comes in a sachet, in the powder form of 2.34 g. It needs to be dissolved in water and taken orally. According to an RDL statement, the maximum retail price of each sachet has been fixed at Rs 990. A subsidised rate will be offered to government institutions.

It works by accumulating in the virus-infected cells and preventing growth by stopping viral synthesis and energy production. Its selective accumulation in virally infected cells makes this drug unique.

The drug is given to hospitalised COVID-19 patients with moderate to severe condition, under the prescription and supervision of a doctor. It is an adjunct or supplementary treatment to standard care and does not work independently.

Satish Reddy, Chairman, Dr Reddy's said, "2DG is yet another addition to our COVID-19 portfolio that already covers the full spectrum of mild to moderate and severe conditions and includes a vaccine. We are extremely pleased to have partnered with DRDO in our collective fight against the COVID-19 pandemic.

Clinical trials

According to a government press release, the phase 1 trials was a collaboration between INMAS-DRDO scientists along with the Centre for Cellular and Molecular Biology (CCMB), Hyderabad. Based on phase 1 results, the DCGI's Central Drugs Standard Control Organisation (CDSCO) permitted them to conduct phase 2 clinical trials in people in May 2020.

The trials were done to compare the efficacy and safety of the drug with SoC verse just standard care. Male, female and transgender patients between the ages of 18-90 years of age were accepted into the trials after they were tested positive for the virus.

Phase 2 was split into phase 2a and phase 2b in six hospitals and 11 hospitals respectively. There were 110 patients from all over the country and the trials were conducted during the months of May to October 2020. They found that the drug was safe and patients showed significant



improvement during their recovery. The drug was found to help patients get better faster by 2.5 days than Standard of Care (SoC).

Phase 3 trials were conducted from December 2020 to March 2021 in 220 patients at 27 different Indian hospitals. According to the press release, using the drug saw many patients improving and "became free from supplemental oxygen dependence by Day-3 in comparison to SoC, indicating an early relief from Oxygen therapy/dependence."

"The drug is expected to save precious lives due to the mechanism of operation of the drug in infected cells. This also reduces the hospital stay of COVID-19 patients," states the press release.

"During clinical trials, it has yielded an effective result in curing patients infected with COVID-19. The medicine has gone through clinical trials on around 110 patients in the second phase. In the third phase, it was tried on 220 patients. It has shown better efficacy in phase two itself as compared to the standard care," ANI quoted Dr Sudhir Chandna, INMAS.

"This data has indicated that oxygen dependence reduced in a better way when we use this medicine along with standard care," he added.

However, recently *The Wire* reported that the results of phase 2 and 3 trials haven't been published as yet. The only information we have comes from what was made known in a government press release and from the Clinical Trial Registry of India (CTRI). The company and the drug have received EUA despite not making the results public.

This is not the first time, during the coronavirus pandemic, that data of therapies to treat the virus hasn't been made public. Data of indigenously produced Bharat Biotech's COVAXIN vaccine has not yet been made public. It received the EUA based on interim results. The pharma company has also applied to get on the World Health Organisation's Emergency Use Listing (EUL) and recently had a meeting with the health agency.

Both Bharat Biotech and DRL have produced their therapies in collaboration with the government.

Production of the drug

The first batch of the 2DG drugs is already in circulation. Now the DRDO is looking for more partners to produce the anti-viral drug in both India and internationally. It issued an Expression of Interest (EoI) and is willing to transfer the technology to them in order to help them manufacture the drug. According to *The Hindu*, a transfer of technology (ToT) fee of Rs 25 lakh will have to be paid to DRDO at the time of signing of licensing agreement.

<https://www.firstpost.com/health/dr-reddys-drdo-produced-drug-2dg-launches-commercially-cost-production-efficacy-9760201.html>

Just 20 patients admitted in two DRDO COVID hospitals

‘Authorities must shift all Covid patients to DRDO hospitals to let other hospitals work freely’

Jammu Tawi: Despite that two DRDO hospitals in Jammu and Kashmir have been functioning now since last one month but as of now only 20 patients have been admitted to them.

Top health officials said that just 06 patients have been admitted at DRDO hospital Jammu while as 14 patients have been admitted at DRDO hospital Srinagar.

Senior medicos at different hospitals informed that the government must shift all the Covid positive patients admitted in different hospitals of Jammu and Kashmir to DRDO hospitals so that all hospitals will start functioning normally.

They said that two DRDO hospitals have 1000 bed capacity while as below 600 Covid positive patients are admitted in the UT.

Meanwhile, non- Covid patients have also demanded that as the positivity rate has decreased, the government must de-notify tertiary care hospital so that they won't suffer any more.

They said that non- Covid patients have been suffering since last two years as all main hospitals have been dedicated to Covid patients.

They requested the government to start all OPD services at the earliest so that non- Covid patients won't suffer anymore.

Principal Govt Medical College Jammu, Dr Shashi Sudan informed that Covid patients are preferring to remain admitted in their respective districts, however, all new patients from Jammu district and its outskirts are being admitted at DRDO hospital Jammu.

Top health officials said that more and more hospitals are being de-notified as Covid hospitals and new patients are taken to DRDO hospitals.

He said that there is adequate staff and other facilities available at the DRDO hospitals.

<https://www.thenorthlines.com/just-20-patients-admitted-in-two-drdo-covid-hospitals/>



Just 20 patients admitted in two DRDO COVID hospitals

DRDO on Twitter



Rajnath Singh ✓ @rajnathsingh · 20h

Congratulations to @DRDO_India for the maiden successful flight test of Agni P, advanced variant of Agni class of missiles. I compliment the efforts of the team behind this mission.



A. Bharat Bhushan Babu ✓ @SpokespersonMoD · 21h

@DRDO_India successfully flight-tested a New Generation #NuclearCapable #BallisticMissile Agni P from Dr APJ Abdul Kalam island off the coast of Odisha, Balasore, today. Press Release: pib.gov.in/PressReleasePa...



V Muraleedharan / വി മുരളീധരൻ ✓ @VMBJP · 19h

.@DRDO_India successfully flight tests New Generation Agni P Ballistic Missile.

Agni P is a new generation advanced variant of Agni class of missiles. It is a canisterised missile with range capability between 1,000 and 2,000 kms.

Kudos to @DRDO_India





PIB India @PIB_India · 21h

.@DRDO_India successfully flight tests New Generation Agni P Ballistic Missile.

Agni P is a new generation advanced variant of Agni class of missiles. It is a canisterised missile with range capability between 1,000 and 2,000 kms.

Read: pib.gov.in/PressReleasePa...



ANI @ANI · 21h

India successfully test-fired the Agni-Prime missile today, off the coast of Odisha.

It can hit targets up to a range of 2000 kms, & is very short & light in comparison with other missiles in this class. A lot of new technologies incorporated in the new missile: DRDO officials



Naveen Patnaik @Naveen_Odisha · 20h

Congratulate @DRDO_India on the successful flight testing of next generation Ballistic Missile Agni P from Dr APJ Abdul Kalam Island off the coast of #Odisha.

#DRDO
#AGNI

Defence Strategic: National/International



Press Information Bureau
Government of India

Ministry of Defence

Mon, 28 June 2021 5:25PM

Raksha Mantri Shri Rajnath Singh in Ladakh; Dedicates to the nation 63 bridges built by BRO in six States & two UTs

*Reaffirms Government's resolve to bolster border infrastructure
for the security & development of the nation*

Raksha Mantri Shri Rajnath Singh dedicated to the nation 63 bridges, built by Border Roads Organisation (BRO), in six States and two Union Territories (UTs), at an event held at Kyungam, 88 kms from Leh in the Union Territory of Ladakh on June 28, 2021. The bridges were inaugurated by the Raksha Mantri in the presence of Lt Governor of Ladakh Shri RK Mathur, Ladakh MP Shri Jamyang Tsering Namgyal, General Officer-Commanding-in-Chief, Northern Command Lt Gen YK Joshi, DG Border Roads Lt Gen Rajeev Chaudhry and other senior civil & military officials from Ministry of Defence, Indian Army, BRO and civil administration.

Arunachal Pradesh Chief Minister Shri Pema Khandu, Himachal Pradesh Chief Minister Shri Jairam Thakur, Uttarakhand Chief Minister Shri Tirath Singh Rawat, Sikkim Chief Minister Shri Prem Singh Tamang; Minister of State (Independent Charge) for Development of North Eastern Region & Minister of State, PMO, Dr Jitendra Singh; MP from Jammu & Kashmir Shri Jugal Kishore Sharma, MP from Uttarakhand Shri Ajay Tamta and MP from Mizoram Shri C Lalrosanga were among those who attended the event virtually.

From Kyungam, the Raksha Mantri inaugurated a 50-metre-long bridge constructed on the Leh-Loma Road in Ladakh. This single span steel super structure bridge, which replaces an existing bailey bridge, will ensure unhindered movement of heavy weapon systems, including guns, tanks and other specialised equipment. The Leh-Loma Road, which connects Leh with places such as Chumathang, Hanley and Tso Morori Lake, is vital for access to forward areas in Eastern Ladakh.

In addition, Shri Rajnath Singh virtually inaugurated 62 more bridges – 11 in Ladakh, four in Jammu & Kashmir, three in Himachal Pradesh, six in Uttarakhand, eight in Sikkim, one each in Nagaland and Manipur and 29 in Arunachal Pradesh. The combined cost of the projects is Rs 240 crores and they will provide a tremendous boost to connectivity in the border areas.

Speaking on the occasion, Shri Rajnath Singh lauded BRO's commitment towards establishing connectivity to far-flung areas, especially during the COVID-19 pandemic, saying that some of these bridges will become a lifeline for many villages located in remote inaccessible areas. Underlining the importance of connectivity, especially in border areas for the development of a nation, he reaffirmed the Government's resolve to ensure infrastructure development in far-flung border areas and added that today's inauguration of 63 bridges is an important step in that direction. He expressed confidence that the bridges will play a crucial role in strengthening security as well as promoting the economic development of the respective states through improved connectivity.

On the Government's decision to bifurcate Jammu & Kashmir and Ladakh as two separate UTs, the Raksha Mantri stated that the strong and visionary steps have bolstered national unity, led to major reduction in terrorist activities sponsored from outside and opened new avenues for the socio-economic development of the people. On the development of Ladakh, Shri Rajnath Singh said a number of welfare schemes are being implemented, including Pradhan Mantri Awas Yojana, National Rural Livelihood Mission, Pradhan Mantri Gram Sadak Yojana, Pradhan Mantri Kaushal Vikas Yojana and Pradhan Mantri Kisan Samman Nidhi, that shows the Government's resolve towards the welfare of the region. He also reaffirmed the Government's commitment to start the democratic process in the region.

Lauding the Indian Army for displaying exemplary courage during the Galwan Valley incident in 2020, the Raksha Mantri paid tributes to the bravehearts who laid down their lives in the line of duty. He called for dialogue with neighbouring countries to resolve disputes, maintaining that "India is a peace-loving nation which does not believe in aggression, however if provoked, we will give a befitting reply". He assured the nation that the Armed Forces are fully prepared to deal with any situation. Shri Rajnath Singh highlighted the reforms undertaken by the Government to strengthen the security at the borders, increase jointness among the Armed Forces and make them self-reliant. "We are moving fast towards building a safe, strong and prosperous nation in every way," he said.

In his address, DG Border Roads stated that the projects were completed despite the limited working window and COVID-19 pandemic. He said these bridges will assist in speedy mobilisation of the Armed Forces in strategically important sectors, further bolstering the security environment, as also contribute significantly towards the overall economic growth of remote border areas. He reiterated BRO's resolve in continuing to serve the nation despite challenges.

With the inauguration of 63 bridges in one go, BRO has surpassed its own record of 44 bridges launched in 2020. These 63 bridges, combined with 12 roads dedicated to the nation by Shri Rajnath Singh on June 17, 2021, form a bouquet of 75 infrastructure projects completed by BRO, when the nation is celebrating the 75th anniversary of its Independence.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1730936>



Press Information Bureau
Government of India

Ministry of Defence

Mon, 28 June 2021 2:40PM

Raksha Mantri Shri Rajnath Singh interacts with troops of Indian Army's 14 Corps in Ladakh

Says India believes in resolving disputes through dialogue with neighbouring countries, but is always prepared to give a befitting reply if provoked

Raksha Mantri Shri Rajnath Singh interacted with the officers and jawans of Indian Army's 14 Corps at Karu Military Station in Ladakh on June 28, 2021. In his address, Shri Rajnath Singh paid rich tributes to the brave jawans who laid down their lives in the service of the nation during the Galwan Valley incident in 2020, saying that the country will never forget their supreme sacrifice. He lauded the exemplary courage displayed by the Indian Army during the incident and stated that the nation is proud of its Armed Forces.

Shri Rajnath Singh stated that India is a peace-loving nation that never resorts to any kind of aggression, but at the same time, it is always prepared to give a befitting reply if provoked. He reiterated Government's stand of resolving disputes through dialogue with neighbouring countries, but assured the nation that safety and security of the nation will not be compromised at any cost. He assured all possible support to the Armed Forces, reaffirming the vision of the Government,

under the leadership of Prime Minister Shri Narendra Modi, of a strong military that is capable of dealing with every eventuality.

The Raksha Mantri also commended the 14th Corps for their invaluable contribution during the 1965 Indo-Pak War as well as the 1999 Kargil war.

General Officer-Commanding-in-Chief, Northern Command Lt Gen YK Joshi and General Officer Commanding of the 14 Corps Lt Gen PGK Menon were among those present on the occasion.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1730872>

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Ministry of Science & Technology

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Electrically configured nanochannels eliminating unwanted energy can revolutionize on-chip data communication and processing in future

Scientists have developed electrically configured nanochannels that can eliminate unwanted energy waste and promise wave-based computing. This can revolutionize on-chip data communication and processing in future.

Conventional electronics is composed of logic circuits having a large number of transistors interconnected by metallic wires. The data carried by electric charges suffer undesirable heating limiting its integration density.

Spintronics, also known as spin electronics, or the study of the intrinsic spin of the electron and its associated magnetic moment, in addition to its fundamental electronic charge, in solid-state devices offer to harness electron spins. Their collective precession can carry information encoded in its amplitude, phase, wavelength, and frequency without any physical motion of particles, eliminating unwanted energy waste and promising wave-based computing.

To this end, Professor Anjan Barman and coworkers from the S. N. Bose National Centre for Basic Sciences, an autonomous institute under the Department of Science and Technology (DST), Government of India, have developed electrically reconfigured parallel nanochannels that tune the behaviour of spin waves in nano-structure elements. They have done this by periodically tailoring the property that confers a preferred direction on the spin of a system, also called anisotropy using the electric field --- technically called the principles of voltage-controlled magnetic anisotropy. This work has been published in the journal 'Science Advances'.

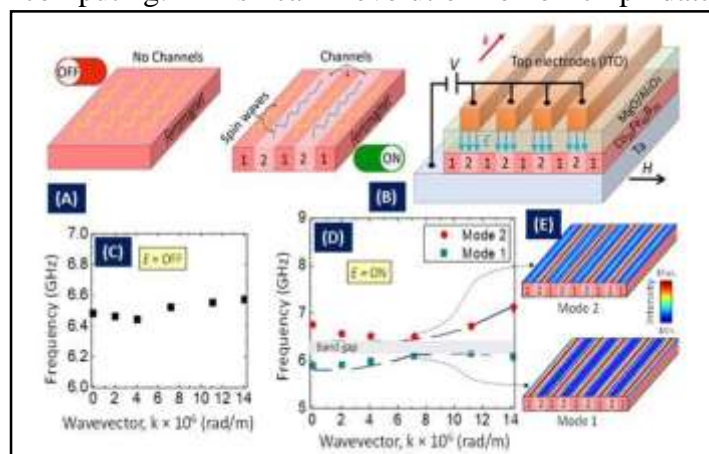


Figure: A. Schematic illustration shows the concept of spin-wave nanochannels. B. Schematic illustration shows the device structure and formation of nanochannels. Spin-wave frequencies versus wavevector when electric field, E is OFF (C) and ON (D). E. Heatmap plots show the spatial distribution of spin-wave intensity for spin-wave mode 2 and mode 1 at wavevector $k = 7.1 \times 10^6$ rad/m.

In the recent research, spin-waves were efficiently transferred through these nanochannels, and this could be switched 'ON' and 'OFF' and its magnitude altered by a meagre voltage of few volts. The team believes that in future, these nanochannels can be engineered further to transfer specific bands of frequencies through designed parallel channels towards development of on-chip multiplexing devices.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1730912>



Tue, 29 June 2021

Gaganyaan mission: As Covid-19 disrupted delivery schedules, ISRO racing against time to launch first uncrewed mission

ISRO: The agency is looking to send the first of the unmanned missions to space by December this year, but the two waves of the coronavirus pandemic have made it difficult for ISRO

ISRO Gaganyaan mission: India has been looking forward to its human spaceflight mission Gaganyaan for a few years now, and it is a race against time for the Indian Space Research Organisation (ISRO) to launch the first uncrewed mission in December amid disrupted hardware delivery schedules due to the coronavirus pandemic. Gaganyaan is a prestigious mission under which India would send astronauts to space on an indigenous launch vehicle and bring them back safely to Earth to demonstrate its capability to do so, and it would place India among a very elite group of countries as it would become the fourth country after the USSR/Russia, the US and China to launch a crewed mission.

However, before ISRO can launch the actual crewed mission to low Earth orbit, it needs to send two unmanned missions to test the end-to-end functioning of the mission and zero-in on any problem areas. The agency is looking to send the first of the unmanned missions to space by December this year, but the two waves of the coronavirus pandemic have made it difficult for ISRO.

According to a report by news agency PTI, ISRO officials said that the first as well as the second waves of COVID-19 have impacted the Gaganyaan programme severely, considering the fact that the agency is procuring hardware elements for the mission from the industry. The lockdowns imposed over the past year and a half across different parts of the country during different time periods impacted the delivery schedules of these elements, they said. ISRO is looking after the design, analysis and documentation of the mission, the report cited an official as saying.

Back in February, Union Minister of State with Independent Charge of Space Jitendra Singh said that the agency was targeting December 2021 for the launch of the first unmanned mission of Gaganyaan, while the second uncrewed test launch would take place in 2022-23, as per current timeline. After the completion of that, India would launch Gaganyaan for human spaceflight demonstration.

So far, four astronaut candidates from India have undergone generic training for spaceflight in Russia for the mission, and the agency has zeroed-in on GSLV Mk III as the launcher for Gaganyaan.

The mission had officially been announced for the first time on Independence Day in 2018 by PM Narendra Modi during his address, with the initial aim being the launch of the mission before India reached its 75th Independence anniversary in 2022. However, considering the fact that the pandemic has led to the loss of critical time for at least one year, the agency is now expecting some

delay in the actual launch, even as the agency personnel are putting in additional work and hours to carry out the mission as soon as possible.

However, a positive note for the agency is that most of the activities related to the mission are completed by now since the project was under works for a decade already by the time the formal announcement had been made. The agency has also sought the help of US, Russian and French space agencies, the report said. ISRO is also hopeful that due to these preparations, it would not lose out on too much time, with the delay mainly being due to the closure of the industries only, as per space agency Chairman K Sivan's statement earlier this month, when he added that he was not in a position to comment on whether the agency would be able to meet the target of August 2022 at the moment or not.

<https://www.financialexpress.com/lifestyle/science/gaganyaan-mission-as-covid-19-disrupted-delivery-schedules-isro-racing-against-time-to-launch-first-uncrewed-mission/2279927/>

अमरउजाला

Tue, 29 June 2021

गगनयान: इसरो का पहला मानव रहित मिशन दिसंबर में, कोरोना लॉकडाउन की वजह से हुई देरी

सार

- अंतरिक्ष एजेंसी का दावा, कोरोना लॉकडाउन की वजह से हार्डवेयर उत्पादन, आपूर्ति में हुई देरी
- कुछ अहम घटकों की आपूर्ति में फ्रांसीसी, रूसी और अमेरिकी अंतरिक्ष एजेंसियों की मदद भी ले रहा इसरो
- मानव रेटिंग प्रक्षेपण यान के लिए हार्डवेयर की 0.99 विश्वसनीयता जरूरी, मानव मिशन में एक साल की देरी

विस्तार

भारतीय अंतरिक्ष अनुसंधान संगठन का पहला मानव रहित गगनयान मिशन का प्रक्षेपण इस साल दिसंबर के अंत तक होने की संभावना है। कोरोना की वजह से यह मिशन एक साल की देरी से चल रही है। इसका प्रक्षेपण दिसंबर 2020 में होना था। लेकिन तय समय में हार्डवेयर की आपूर्ति में हुई देरी की वजह से इसे मानव रेटिंग बनाना संभव नहीं हो सका।

मानव रेटिंग प्रक्षेपण यान उसे माना जाता है, जिसके हार्डवेयर की विश्वसनीयता 0.99 होती है। गगनयान मिशन के हिस्से के रूप में एक के बाद एक दो मानव रहित यान के प्रक्षेपण की योजना है। बंगलूरु स्थित अंतरिक्ष एजेंसी मुख्यालय से आधिकारिक बयान में कहा गया कि कोरोना महामारी की पहले और दूसरी लहर ने गगनयान कार्यक्रम को गंभीर रूप से प्रभावित किया है।

इसरो के एक अधिकारी ने कहा, 'मिशन के लिए हार्डवेयर औद्योगिक कंपनियों द्वारा तैयार किए जा रहे हैं। लेकिन देश के विभिन्न हिस्सों में अलग-अलग अवधि में लॉकडाउन की वजह से समय पर इसकी आपूर्ति नहीं हो सकी। हार्डवेयर का डिजाइन, विश्लेषण और प्रलेखन इसरो द्वारा किया जाता है। जबकि गगनयान के लिए हार्डवेयर के निर्माण और आपूर्ति का काम देश के सैकड़ों औद्योगिक कंपनियों द्वारा किया जाता है।'

सूत्रों का कहना है कि इसरो कुछ महत्वपूर्ण गतिविधियों और घटकों की आपूर्ति में फ्रांसीसी, रूसी और अमेरिकी अंतरिक्ष एजेंसियों की मदद भी ले रहा है। गगनयान कार्यक्रम का उद्देश्य एक भारतीय प्रक्षेपण यान पर मनुष्यों को पृथ्वी की निचली कक्षा में भेजने और उन्हें सुरक्षित रूप से पृथ्वी पर वापस लाने की क्षमता प्रदर्शित करना है।

रूस में चार भारतीय अंतरिक्ष यात्री-उम्मीदवार पूरा कर चुके हैं प्रशिक्षण

केंद्रीय अंतरिक्ष राज्य मंत्री (स्वतंत्र प्रभार) जितेंद्र सिंह ने इस साल फरवरी में कहा था कि पहला मानव रहित मिशन दिसंबर 2021 में और दूसरा मानव रहित मिशन 2022-23 में, इसके बाद मानव अंतरिक्ष उड़ान प्रदर्शन की योजना है। गगनयान कार्यक्रम के हिस्से के तौर पर भारत के चार अंतरिक्ष यात्री-उम्मीदवार रूस में अंतरिक्ष उड़ान का प्रशिक्षण प्राप्त कर चुके हैं। मिशन के लिए इसरो के हेवी-लिफ्ट लांचर जीएसएलवी एमके-111 की पहचान की गई है।

2022 में मानव अंतरिक्ष यान लांच करना था प्रधानमंत्री मोदी का लक्ष्य

संनद रहे कि गगनयान कार्यक्रम की औपचारिक घोषणा प्रधानमंत्री नरेंद्र मोदी ने 15 अगस्त, 2018 को अपने स्वतंत्रता दिवस संबोधन के दौरान की थी। प्रारंभिक लक्ष्य 15 अगस्त, 2022 को भारत की स्वतंत्रता की 75वीं वर्षगांठ से पहले मानव अंतरिक्ष यान को लांच करना था।

इसरो के अध्यक्ष के सिवन ने कहा कि 'कोरोना की वजह से भारत में बंद पड़े उद्योगों की वजह से 'गगनयान मिशन' के लिए हार्डवेयर प्राप्ति में देरी हो रही है। लेकिन फिर भी हम भारत सरकार द्वारा निर्धारित मिशन के लक्ष्य को हासिल करने की कोशिश कर रहे हैं। अभी उन्हें यकीन नहीं है कि इसरो अगले साल अगस्त तक मानवयुक्त मिशन के लक्ष्य को पूरा कर पाएगा या नहीं। मेरे लिए प्रतिबद्ध होना बहुत जल्दी हो सकता है। लेकिन हम उस समय तक मिशन को लक्षित करने की कोशिश कर रहे हैं।'

<https://www.amarujala.com/india-news/indian-space-research-organization-isro-first-unmanned-gaganyaan-mission-is-likely-to-be-launched-by-end-of-december-this-yea>

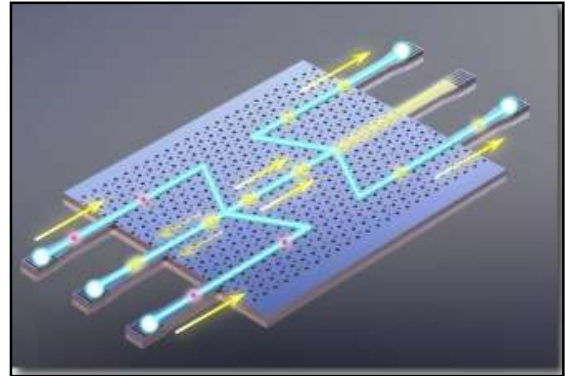
The first on-chip valley-dependent quantum interference

A research team led by academician Guo Guangcan from University of Science and Technology of China (USTC) of the Chinese Academy of Sciences (CAS), collaborating with researchers from Sun Yat-sen University and Zhejiang University, realized two-photon quantum interference in the structure of valley-dependent topological insulators based on the valley Hall effect.

The study was published in *Physical Review Letters* on June 11st, 2021.

Topological photonics has a practical application prospect in the research of photonic chips due to its robust energy transport prosperities. The key to topological phase transition is to generate an energy gap at certain degenerate points by breaking either the time-reversal symmetry (TRS) or inversion symmetry.

By breaking the spatial inversion symmetry of the system, the valley-dependent helical edge states travel in certain directions, which is known as Valley-Hall effect. Hexagonal lattice photonic crystals (PCs) with inequivalent sublattices can realize the valley-dependent topological insulators. More compact and sharp bending optical circuits can be realized, which contributes to device integration and robust energy.



In recent years, robust quantum state transfer in topology has been a hot research topic. Yet, as the core of photonic quantum information, quantum interference remains to be verified in topologically protected PCs chip.

Researchers designed and fabricated harpoon-shaped beam splitters (HSBSs) in silicon photonic crystals. The orientation of the electromagnetic phase vortex inside PCs with hexagonal lattice structure depends on lattice structure with different topological Chern numbers and its band position, thereby to form two topological edges of different structures.

Based on a 120-deg-bending interfaces, they realized on-chip Hong-Ou-Mandel (HOM) interference in one HSBS with a high visibility of 95.6%. Furthermore, the generation of path-entangled state in valley-dependent quantum circuits is demonstrated by cascading two HSBSs.

The study provides a novel method for topological photonics, especially topological insulators, to be applied in more complex quantum information processing. Reviewers agreed that the research is interesting and important, and highly praised that "This is an interesting and important work. I find the results interesting, in particular, the implementation of the Hong-Ou-Mande effect in this device, which may have implications in high fidelity on-chip quantum information processing."

More information: Yang Chen et al, Topologically Protected Valley-Dependent Quantum Photonic Circuits, *Physical Review Letters* (2021). DOI: [10.1103/PhysRevLett.126.230503](https://doi.org/10.1103/PhysRevLett.126.230503)

Journal information: [Physical Review Letters](https://phys.org/news/2021-06-on-chip-valley-dependent-quantum.html)
<https://phys.org/news/2021-06-on-chip-valley-dependent-quantum.html>

Multi-material, multi-photon 3D laser micro- and nanoprinting

Multi-photon approaches provide printing rates of up to about ten million voxels per second. Multi-photon-based 3D approaches structure matter with a resolution approaching sub-micrometer and nanometer feature sizes. Such spatial resolution is crucial for many applications in photonics and electronics and is inaccessible to most other 3D additive manufacturing approaches.

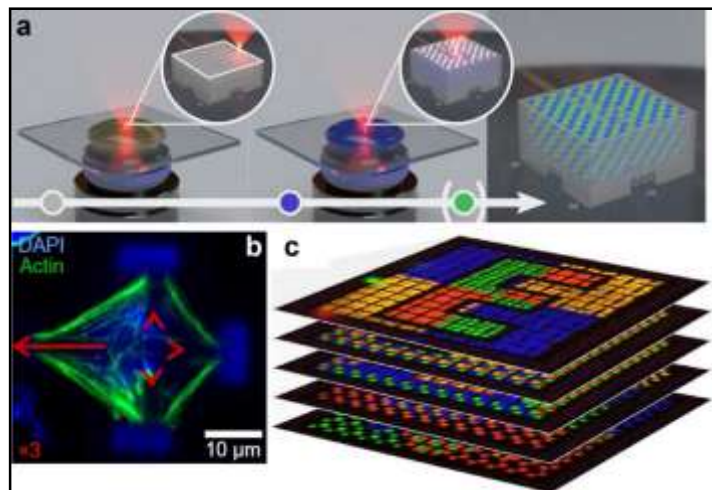
However, the vast majority of 3D printed objects and devices made along these lines have been composed of only a single polymeric material. Multi-material architectures are much less investigated than single-material architectures, yet, most real-life systems (microscopic and macroscopic, biological and artificial) contain a large number of different materials with vastly dissimilar optical, mechanical, thermal, and electronic properties.

In a new paper published in *Light: Advanced Manufacturing*, a team of scientists, led by Professor Martin Wegener from the Institute of Applied Physics, Karlsruhe Institute of Technology, Germany and co-workers have reviewed approaches and achievements on multi-material multi-photon micro/nano-printing. Existing materials that might serve as a working set of primary materials are concluded first. In the second step, processing dissimilar primary materials within 3D printed structures using a single machine tool is discussed. Corresponding literature is divided into two avenues.

In the first avenue, different photoresists—the counterparts of the colored inks—are combined to manufacture a targeted multi-material 3D structure. So far, this combination has been accomplished by intermediate manual processing steps, but automated multi-photon multi-material 3D printing systems are rapidly developing.

In the second avenue, a single photoresist delivers 3D printed material with different properties. There is no direct analog in graphical 2D printing. The underlying idea is to impose a stimulus during the 3D printing process of each voxel, influencing the photo-reaction of the ink, such that the emerging material properties can be varied locally and deterministically in 3D.

"Nature proceeds quite similarly. It achieves a vast variety of different effective material properties in animals and plants by architecting on a micrometer and nanometer scale by using only a limited number of building blocks, based on polysaccharides, proteins, and minerals.¹⁶ Printing tailored 3D microstructures results in artificial composites, with effective optical, mechanical, thermal, and electronic properties that can be qualitatively dramatically distinct from those of the



a, Approaches for manufacturing 3D multi-material microarchitectures using multi-photon 3D laser printing. After the exposure and development cycle of a first photoresist, a second photoresist is drop-casted manually, exposed, developed, etc. This approach can be realized by palette-based approach or microfluidic-chamber. Herein, all photoresists and developers are delivered to the printing region via a stage or microfluidic chamber. b, 3D stimulus-responsive multi-material based scaffold serving as a micro-stretch-bench for cells (green), specifically adhering to the red arrow area. The host-guest hydrogel in the middleswells reproducibly and thereby bends the elastic polymer lamellae. c, 3D deterministic fluorescent security feature containing four differently doped polymers emitting at four different wavelengths (red, blue, green, and yellow) and one non-fluorescent polymer component. Credit: Liang Yang, Frederik Mayer, Uwe H. F. Bunz, Eva Blasco and Martin Wegener

constituents. As for dithering in 2D, it is key that the characteristic feature sizes are sufficiently small such that the observer does not notice them and rather experiences an effective homogeneous continuum" the authors state.

"Concerning primary materials, the field still shows shortcomings concerning electrically conductive, semiconducting, metallic, and stimuli-responsive ingredients," the scientists explain.

More information: Liang Yang et al, Multi-material multi-photon 3D laser micro- and nanoprinting, *Light: Advanced Manufacturing* (2021) DOI: [10.37188/lam.2021.017](https://doi.org/10.37188/lam.2021.017)
<https://phys.org/news/2021-06-multi-material-multi-photon-3d-laser-micro-.html>



Tue, 29 June 2021

Researchers develop compact, intense XUV laser

An international team of researchers has demonstrated a new concept for the generation of intense extreme-ultraviolet (XUV) radiation by high-harmonic generation (HHG). Its advantage lies in the fact that its footprint is much smaller than currently existing intense XUV lasers. The new scheme is straightforward and could be implemented in many laboratories worldwide, which may boost the research field of ultrafast XUV science. The detailed experimental and theoretical results have been published in *Optica*.

The invention of the laser has opened the era of nonlinear optics, which today plays an important role in many scientific, industrial and medical applications. These applications all benefit from the availability of compact lasers in the visible range of the electromagnetic spectrum. The situation is different at XUV wavelengths, where very large facilities (so called free-electron lasers) have been built to generate intense XUV pulses. One example of these is FLASH in Hamburg that extends over several hundred meters. Smaller intense XUV sources based on HHG have also been developed. However, these sources still have a footprint of tens of meters, and have so far only been demonstrated at a few universities and research institutes worldwide.

A team of researchers from the Max Born Institute (Berlin, Germany), ELI-ALPS (Szeged, Hungary) and INCDTIM (Cluj-Napoca, Romania) has recently developed a new scheme for the generation of intense XUV pulses. Their concept is based on HHG, which relies on focusing a near-infrared (NIR) laser pulse into a gas target. As a result, very short light bursts with frequencies that are harmonics of the NIR driving laser are emitted, which thereby are typically in the XUV region. To be able to obtain intense XUV pulses, it is important to generate as much XUV light as possible. This is typically achieved by generating a very large focus of the NIR driving laser, which requires a large laboratory.

Scientists from the Max Born Institute have demonstrated that it is possible to shrink an intense XUV laser by using a setup which extends over a length of only two meters. To be able to do so, they used the following trick: Instead of generating XUV light at the focus of the NIR driving

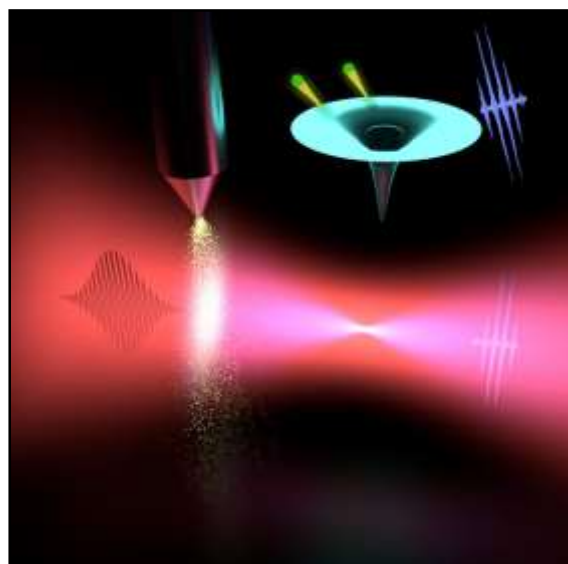


Fig. 1: Compact intense XUV source. An NIR pulse (red) is focused, and high harmonics are generated in a gas jet that is placed before or behind the NIR focus. In this way, the generated XUV light has a size and a divergence that is similar to that of the NIR beam. Due to the shorter wavelength, the focus of the XUV beam is then much smaller than the focus of the NIR beam. This allows the generation of intense XUV pulses which are used for XUV multi-photon ionization of atoms (see upper part). Credit: Balázs Major

laser, they placed a very dense jet of atoms relatively far away from the NIR laser focus, as shown in Fig. 1. This has two important advantages: (1) Since the NIR beam at the position of the jet is large, many XUV photons are generated. (2) The generated XUV beam is large and has a large divergence, and can therefore be focused to a small spot size. The large number of XUV photons in combination with the small XUV spot size makes it possible to generate intense XUV laser pulses. These results were confirmed by computer simulations that were carried out by a team of researchers from ELI-ALPS and INCDTIM.

To demonstrate that the generated XUV pulses are very intense, the scientists studied multi-photon ionization of argon atoms. They were able to multiply ionize these atoms, leading to ion charge states of Ar_2^+ and Ar_3^+ . This requires the absorption of at least two and four XUV photons, respectively. In spite of the small footprint of this intense XUV source, the obtained XUV intensity of $2 \times 10^{14} \text{ W/cm}^2$ exceeds that of many already existing intense XUV sources.

The new concept can be implemented in many laboratories worldwide, and various areas of research may benefit. This includes attosecond-pump attosecond-probe spectroscopy, which has so far been extremely difficult to do. The new compact intense XUV laser could overcome the stability limitations that exist within this technique, and could be used to observe electron dynamics on extremely short timescales. Another area that is expected to benefit is the imaging of nanoscale objects such as bio-molecules. This could improve the possibilities for making movies in the nano-cosmos on femtosecond or even attosecond timescales.

More information: B. Major et al, Compact intense extreme-ultraviolet source, *Optica* (2021). [DOI: 10.1364/OPTICA.421564](https://doi.org/10.1364/OPTICA.421564)

Journal information: [Optica](https://phys.org/news/2021-06-compact-intense-xuv-laser.html)
<https://phys.org/news/2021-06-compact-intense-xuv-laser.html>

Current vaccines less effective against Beta variant of Covid-19: Study

The study of the spike proteins of SARS-CoV-2 has suggested that all the existing vaccines would be less effective against the Beta variant, which was first found in South Africa

New Delhi: A study of the spike proteins of SARS-CoV-2, the virus which causes Covid-19, has suggested that the current batch of vaccines might be less effective against the Beta variant.

The study by researchers at Boston Children's Hospital in the US, which was published in the 'Science' journal on June 24, used cryo-electron microscopy (cryo-EM) to analyse the spike proteins, present on the surface of SARS-CoV-2.

The researchers compared the spike proteins from the original virus found in China in 2019, with that of the Beta and the Alpha variant, first identified in South Africa and in the UK respectively.

The results have reportedly indicated that the mutations in the Beta variant, also known as B.1.351, can change the shape of the spike surface at certain locations.

Since all current vaccines are directed against specific spike proteins, the Beta variant might not get neutralised by them. The vaccines would be less able to bind to the Beta virus, which may allow it to evade the immune system even when people are inoculated.

"The mutations make antibodies stimulated by the current vaccine less effective," said Bing Chen, from the division of Molecular Medicine at Boston Children's. "The Beta variant is somewhat resistant to the current vaccines, and we think a booster with the new genetic sequence can be beneficial for protecting against this variant," Chen added.

However, the existing vaccines can still be effective to some extent as testing indicated that the antibodies elicited by them can neutralize the Beta variant.

Beta variant less transmissible

The researchers have also discovered that mutations in the Beta variant make its spike proteins less effective in binding to ACE2. Thus, the new study has said, the Beta virus can be less transmissible than its Alpha counterpart (B.1.1.7)

The researchers also said that the Beta variant, and also the Alpha variant, might not pose greater threats than they already have. A SARS-CoV-2 variant would need to do three things: spread more easily, evade the immune system in vaccinated people or those previously exposed to COVID-19, and cause more severe disease.

The researchers said the two variants they analysed did not meet all these criteria together. "Our data suggest that the most problematic combination of such mutations is not yet present in the existing variants examined here," they added.

The research team is now analysing the structures of other variants of concern, including the Delta variant (B.1.617.2), first identified in India.

<https://www.indiatoday.in/coronavirus-outbreak/story/current-vaccines-less-effective-against-beta-variant-of-covid-19-1820326-2021-06-28>



