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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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Ministry of Defence

Mon, 27 Sept 2021 8:58PM

Successful maiden flight test of Akash Prime Missile

A new version of the Akash Missile – ‘Akash Prime’ has been successfully flight tested from Integrated Test Range (ITR), Chandipur, Odisha on 27 September 2021. The missile intercepted and destroyed an unmanned aerial target mimicking enemy aircrafts, in its maiden flight test after improvements.

In comparison to the existing Akash System, Akash Prime is equipped with an indigenous active Radio Frequency (RF) seeker for improved accuracy. Other improvements also ensure more reliable performance under low temperature environments at higher altitudes. Modified ground system of the existing Akash weapon system has been used for the current flight test. The range stations of ITR comprising Radars, Electro Optical Tracking System (EOTS) and Telemetry stations monitored the missile trajectory and flight parameters.



Raksha Mantri Shri Rajnath Singh has congratulated DRDO, Indian Army, Indian Air Force, Defence Public Sector Undertaking (DPSU) and industry for the successful trials of Akash Prime Missile. He stated that the successful flight test proves the competence of DRDO in design and development of world class Missile systems.

Secretary DDR&D and Chairman DRDO Dr G Satheesh Reddy congratulated the team for the successful flight trial of Akash Prime Missile. He said that the Akash Prime system will further boost the confidence of the users (Indian Army and Indian Air Force) as the Akash system is already inducted and now getting improved with more lethal missiles.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1758711>



पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Mon, 27 Sept 2021 8:58PM

आकाश प्राइम मिसाइल का सफल प्रथम फ्लाइट टेस्ट

आकाश मिसाइल के एक नए संस्करण-'आकाश प्राइम' का 27 सितंबर, 2021 को एकीकृत परीक्षण रेंज (आईटीआर), चांदीपुर, ओडिशा से सफलतापूर्वक उड़ान परीक्षण किया गया है। सुधार के बाद किए गए परीक्षण में इस मिसाइल ने अपनी पहली उड़ान में दुश्मन के विमानों की शकल में बनाए गए एक मानव रहित हवाई लक्ष्य को रोक कर नष्ट कर दिया।

मौजूदा आकाश प्रणाली की तुलना में आकाश प्राइम बेहतर सटीकता के लिए एक स्वदेशी सक्रिय रेडियो फ्रीक्वेंसी (आरएफ) सीकर से लैस है। मिसाइल में किए गए अन्य सुधार भी उच्च ऊंचाई पर कम तापमान वाले वातावरण में अधिक विश्वसनीय प्रदर्शन सुनिश्चित करते हैं। मौजूदा उड़ान परीक्षण के लिए वर्तमान आकाश हथियार प्रणाली की संशोधित जमीनी प्रणाली का इस्तेमाल किया गया है। आईटीआर के रेंज स्टेशनों में रडार, इलेक्ट्रो ऑप्टिकल ट्रैकिंग सिस्टम (ईओटीएस) और टेलीमेट्री स्टेशन शामिल हैं जिन्होंने मिसाइल के प्रक्षेपवक्र और उड़ान मापदंडों की निगरानी की।



रक्षा मंत्री श्री राजनाथ सिंह ने आकाश प्राइम मिसाइल के सफल परीक्षण के लिए डीआरडीओ, भारतीय सेना, भारतीय वायु सेना, रक्षा सार्वजनिक क्षेत्र के उपक्रम (डीपीएसयू) और उद्योग जगत को बधाई दी है। उन्होंने कहा कि सफल उड़ान परीक्षण विश्व स्तरीय मिसाइल प्रणालियों के डिजाइन और विकास में डीआरडीओ की क्षमता को साबित करता है।

रक्षा अनुसंधान एवं विकास विभाग के सचिव एवं डीआरडीओ के अध्यक्ष डॉ जी सतीश रेड्डी ने आकाश प्राइम मिसाइल के सफल उड़ान परीक्षण के लिए टीम को बधाई दी । उन्होंने कहा कि आकाश प्राइम प्रणाली उपयोगकर्ताओं (भारतीय सेना और भारतीय वायु सेना) के विश्वास को और बढ़ावा देगी क्योंकि आकाश मिसाइल प्रणाली पहले ही शामिल हो चुकी है और अब और अधिक घातक मिसाइलों के साथ इसमें सुधार हो रहा है।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1758758>

Akash Prime, new version of Akash Missile, successfully tested by DRDO

The missile intercepted and destroyed an unmanned aerial target mimicking enemy aircrafts, in its maiden flight test after improvements.

New Delhi: India's Defence Research and Development Organisation (DRDO) on Monday tested a new version of Akash Missile – 'Akash Prime'. The missile was successfully tested from Integrated Test Range (ITR), Chandipur, in Odisha.

It intercepted and destroyed an unmanned aerial target mimicking enemy aircrafts, in its maiden flight test after improvements.

"In comparison to the existing Akash system, Akash Prime is equipped with an indigenous active RF seeker for improved accuracy. Other improvements also ensure more reliable performance under a low-temperature environment at higher altitudes," said an official.



DRDO tests a new version of Akash Missile. Image Source : DRDO

The modified ground system of the existing Akash weapon system was for the flight test. Defence Minister Rajnath Singh has congratulated the Defence Research and Development Organisation (DRDO), Indian Army, Indian Air Force and other stakeholders on the successful trial of the Akash prime missile.

He said the successful flight test proves the competence of the DRDO in designing and developing world-class missile systems.

DRDO Chairman G Satheesh Reddy also congratulated the team involved in the successful flight trial of the missile.

He said Akash Prime system will further boost the confidence of the Indian Army and Indian Air Force as the Akash system is already inducted and now getting improved with more lethal missiles.

Earlier in an interaction, G Satheesh Reddy said it would fund upto Rs 10 crore for research projects to promote and develop innovative products.

"The DRDO has a scheme 'Technology Development Funding' to spend on young graduates, those who can join incubation centres and have an idea to convert into a design and a product and we'll support them with Rs 1 crore," he said.

Reddy was delivering the convocation address on Friday after handing over degrees to 293 students of the Indian Institute of Information Technology, Design and Manufacturing (IIITDM), Kancheepuram, through virtual platform.

Noting that the country was looking for innovation from the youngsters, he said it is technology that can make the country prosperous.

"Come out with new technologies, innovate first-of-its-kind products. Our products have to go all over the world. The world should be flooded with products from India," said Reddy, also the secretary of the Department of Defence (research and development).

Maintaining that the product developed in the country with innovation should be priced lower but offer reliability, he said the quality of the product should be good only then could the product be sold the world over.

"That is how we will earn a lot of foreign exchange. And that is how the country becomes prosperous," he said. A country to become prosperous, the seed is with the institutes like IIITDM where people learn about technology, science and come out with design and manufacturing, he said.

"I would like to say that DRDO supports these things in a big way," he said.

Appealing to the new graduands, he said through the website of DRDO, a student or an institute can look for options to use the funds from the DRDO.

<https://www.indiatvnews.com/news/india/akash-prime-new-version-of-akash-missile-successfully-tested-by-drdo-video-watch-736973>



Tue, 28 Sept 2021

Akash Prime range of missile test-fired successfully

The officials said that the Akash Prime is equipped with indigenous active RF seeker for improved accuracy, which makes sure that the target at which the missile is fired is hit

By Shankhyaneel Sarkar, Edited by Avik Roy

New Delhi: India successfully test-fired a new version of the Akash missile on Monday from the integrated test range at Odisha's Chandipur. The new missile named Akash Prime intercepted and destroyed an unmanned aerial target which mimicked an enemy aircraft during its maiden flight test, officials familiar with the developments told news agency PTI.

The test took place around 4:30pm.

The officials said that the Akash Prime is equipped with indigenous active RF seeker for improved accuracy, which makes sure that the target at which the missile is fired is hit. Other improvements were also incorporated in Akash Prime like ensuring reliable performance under a low-temperature environment at higher altitudes.

"In comparison to the existing Akash system, Akash Prime is equipped with an indigenous active RF seeker for improved accuracy. Other improvements also ensure more reliable performance under a low-temperature environment at higher altitudes," an official told news agency PTI. The modified ground system of the existing Akash weapon system was for the flight test.

Union defence minister Rajnath Singh congratulated the Defence Research and Development Organisation (DRDO), Indian Army, Indian Air Force and other stakeholders on the successful flight test of Akash Prime.

The defence minister said that the successful flight test proves the competence of the DRDO in designing and developing world-class missile systems.

DRDO chairman G Satheesh Reddy also congratulated the team involved for its successful flight test. He said that the Akash Prime system will further boost the confidence of the Indian Army and Indian Air Force. He said the Akash system will continue to develop more lethal missiles.

The DRDO earlier in March developed the Solid Fuel Ducted Ramjet (SFDR) technology which will give technological advantage in developing long-range air-to-air missiles.

<https://www.hindustantimes.com/india-news/akash-prime-range-of-missile-test-fired-successfully-101632760274970.html>



A new version of the Akash Missile – 'Akash Prime' has been successfully tested from Integrated Test Range (ITR), in Chandipur(ANI Photo)

India successfully tests 'Akash Prime' Missile; watch it intercept & destroy drone target

India on Monday successfully tested a new version of the Akash Missile – 'Akash Prime' from Integrated Test Range (ITR) in Odisha's Chandipur

By Kamal Joshi

In a major success, India on Monday, September 27, successfully tested a new version of the Akash Missile – 'Akash Prime' from Integrated Test Range (ITR) in Odisha's Chandipur. According to Defence Research and Development Organisation (DRDO), the missile in its maiden flight test after improvements intercepted and destroyed an unmanned aerial target mimicking enemy aircraft.

According to the video released by DRDO, the Akash Prime missile can be seen blasting off into the sky from the ground. After cruising in the sky for few seconds, the missile successfully detonates on contact with an unmanned aerial target.

"A new version of the Akash Missile – 'Akash Prime' has been successfully tested from Integrated Test Range (ITR), Chandipur, Odisha today. The missile intercepted and destroyed an unmanned aerial target mimicking enemy aircrafts, in its maiden flight test after improvements," DRDO said.

The DRDO informed that the latest Akash prime missile is equipped with an indigenous active RF seeker for improved accuracy. Other improvements also ensure more reliable performance under low-temperature environments at higher altitudes. "Modified ground system of the existing Akash weapon system has been used for the current flight test," the defence agency informed.

DRDO Chairman Dr G Satheesh Reddy said that the Akash Prime missile system will further boost the confidence of the Indian Army and Indian Air Force as the Akash system is already inducted and now getting improved with more lethal missiles.

In July, DRDO had successfully carried out test-firing of Agni-Prime missile off the coast of Odisha. DRDO had informed that 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," it had said.

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

About Akash Missile

Akash missile is a medium-range mobile SAM (Surface-to-air missile) system developed by DRDO (DRDO) and produced by Bharat Dynamics Limited. The Akash missile system can target up to 50-80 km away, at altitudes up to 18,000. The missile has the ability to neutralise aerial targets like fighter jets, air-to-surface missiles and cruise missiles.

<https://www.republicworld.com/india-news/general-news/india-successfully-tests-akash-prime-missile-watch-it-intercept-and-destroy-drone-target.html>

DRDO ने मिसाइल Akash Prime का किया सफल

परीक्षण- मानव रहित लक्ष्य को मार गिराया

रक्षा अनुसंधान एवं विकास संगठन यानी DRDO ने आकाश मिसाइल के एक नए संस्करण - 'आकाश प्राइम' का सोमवार को सफर परीक्षण किया। डीआरडीओ ने ओडिशा के चांदीपुर में एकीकृत परीक्षण रेंज (आईटीआर) में मिसाइल का परीक्षण किया

Edited By Mohit Sharma

नई दिल्ली: रक्षा अनुसंधान एवं विकास संगठन यानी DRDO ने आकाश मिसाइल के एक नए संस्करण - 'आकाश प्राइम' का सोमवार को सफर परीक्षण किया। डीआरडीओ ने ओडिशा के चांदीपुर में एकीकृत परीक्षण रेंज (आईटीआर) में मिसाइल का परीक्षण किया। मिसाइल ने सुधार के बाद अपने पहले उड़ान परीक्षण में मानवरहित मिमिकिंग एनिमी एयरक्राफ्ट को टारगेट कर रोका और उसे नष्ट कर दिया। आपको बता दें कि डीआरडीओ ने इससे पहले 21 जुलाई को ओडिशा के समेकित परीक्षण रेंज से जमीन से हवा में मारक क्षमता वाली मिसाइल प्रणाली आकाश के नए संस्करण का सफल परीक्षण किया था।



DRDO (Photo Credit: ANI)

जानकारी के अनुसार भारत ने नई पीढ़ी की सतह से हवा में मार करने वाली मिसाइल आकाश मिसाइल (आकाश-एनजी) का ओडिशा तट के एकीकृत परीक्षण रेंज (आईटीआर) से सफलतापूर्वक परीक्षण किया। उड़ान का परीक्षण भूमि आधारित प्लेटफॉर्म से दोपहर करीब 12:45 बजे किया गया, जिसमें मल्टीफंक्शन रडार, कमांड, कंट्रोल एंड कम्युनिकेशन सिस्टम और तैनाती विन्यास में भाग लेने वाले लांचर जैसी सभी हथियार प्रणालियां थीं। मिसाइल प्रणाली को रक्षा अनुसंधान एवं विकास प्रयोगशाला (डीआरडीएल), हैदराबाद द्वारा अन्य डीआरडीओ प्रयोगशालाओं के सहयोग से विकसित किया गया।

इस प्रक्षेपण को भारतीय वायु सेना के नुमाइंदों ने देखा। उड़ान डेटा को हासिल करने के लिए आईटीआर ने इलेक्ट्रो ऑप्टिकल ट्रैकिंग सिस्टम, रडार और टेलीमेट्री जैसे कई रेंज स्टेशनों को तैनात किया। इन प्रणालियों द्वारा कैचर किए गए संपूर्ण उड़ान डेटा से संपूर्ण हथियार प्रणाली के दोषरहित प्रदर्शन की पुष्टि की गई। डीआरडीओ ने एक बयान में कहा, परीक्षण के दौरान, मिसाइल ने तेज और फुतीले हवाई खतरों को बेअसर करने के लिए आवश्यक उच्चस्तरीय गतिशीलता का प्रदर्शन किया।

<https://www.newsnationtv.com/india/news/drdo-tested-new-version-of-akash-missile-akash-prime-successfully-214004.html>

बढ़ेगी ताकत: आकाश मिसाइल के प्राइम संस्करण का सफल परीक्षण, हवाई लक्ष्यों पर लगाया सटीक निशाना

सार

डीआरडीओ ने आकाश मिसाइल का एक नया संस्करण तैयार किया है। सोमवार को इस नई मिसाइल का सफल परीक्षण किया गया।

विस्तार

नई दिल्ली: सेना और वायुसेना की मारक क्षमता में और इजाफा हुआ है। पहले से सेना में शामिल आकाश मिसाइल के एक नए संस्करण मिसाइल 'आकाश प्राइम' का सोमवार को ओडिशा के चांदीपुर एकीकृत परीक्षण केंद्र में सफलतापूर्वक परीक्षण किया गया।

परीक्षण के दौरान मिसाइल ने मानव रहित डमी आकाशीय लक्ष्य को इंटरसेप्ट किया और सटीक निशाना साध कर उसे ध्वस्त कर दिया। अधिकारियों ने बताया कि मिसाइल का फ्लाइट टेस्ट शाम करीब 4:30 बजे किया गया।



आकाश प्राइम मिसाइल - फोटो: एएनआई

मौजूदा आकाश मिसाइल सिस्टम के मुकाबले आकाश प्राइम स्वदेशी उन्नत सटीकता वाले उपकरण से लैस है। इसके अलावा अधिक ऊंचाई पर कम तापमान में भी इसका प्रदर्शन भरोसेमंद है। मौजूदा आकाश मिसाइल के ग्राउंड सिस्टम में बदलाव कर इसका फ्लाइट टेस्ट किया गया है।

आकाश प्राइम मिसाइल के सफल परीक्षण के लिए रक्षामंत्री राजनाथ सिंह ने डीआरडीओ, सेना, वायुसेना सहित इससे जुड़े सभी लोगों को बधाई दी है। डीआरडीओ के चेयरमैन जी सतीश रेड्डी ने भी इस मिसाइल के सफल परीक्षण में जुटी टीम को बधाई दी है।

<https://www.amarujala.com/india-news/akash-prime-missile-new-version-successful-test-by-drdo-at-itr-chandipur-odisha-news-in-hindi>

यूपी: रुकेगी न फंसेगी, हर मिनट बरसाएगी 800 गोलियां, दुश्मन को 200 मीटर तक दूँढकर मारेगी जेवीपीसी

By भानु शुक्ल

सार

डीआरडीओ के आयुध अनुसंधान एवं विकास प्रतिष्ठान पुणे की ओर से डिजाइन व कानपुर की स्माल आर्म्स फैक्टरी में आयुध निर्माणी बोर्ड जेवीपीसी (सब मशीनगन) बनाई जा रही हैं। पूर्ण रूप से स्वदेशी इस कारबाइन का नाम मार्क अल्फा जेवीपीसी रखा गया है।

विस्तार

लखनऊ: यूपी पुलिस को आतंकियों व अपराधियों से लोहा लेने के लिए 5.56 एमएम की अत्याधुनिक ज्वॉइंट वेंचर प्रोटेक्टिव कारबाइन (जेवीपीसी) से लैस किया जा रहा है। 200 मीटर तक सटीक मार करने वाली इस कारबाइन से नाइट विजन कैमरे की मदद से रात में भी दुश्मन को दूँढकर मारा जा सकता है। पहले चरण में 105 कारबाइन की खेप टेस्टिंग के बाद सोमवार को कानपुर की स्माल आर्म्स फैक्टरी से सीतापुर स्थित यूपी पुलिस के आयुध भंडार पहुंच गई हैं। पुलिस मुख्यालय के निर्देश पर इन्हें विभिन्न जनपदों में भेजा जाएगा।



ज्वॉइंट वेंचर प्रोटेक्टिव कारबाइन - फोटो : अमर उजाला

डीआरडीओ के आयुध अनुसंधान एवं विकास प्रतिष्ठान पुणे की ओर से डिजाइन व कानपुर की स्माल आर्म्स फैक्टरी में आयुध निर्माणी बोर्ड जेवीपीसी (सब मशीनगन) बनाई जा रही हैं। पूर्ण रूप से स्वदेशी इस कारबाइन का नाम मार्क अल्फा जेवीपीसी रखा गया है। सटीक लक्ष्य देने वाली यह कारबाइन फायरिंग के समय न फंसेती है और न रुकती है। यह आधुनिकीकरण की दिशा में पुलिस के लिए एक महत्वपूर्ण कदम साबित होगा।

सीतापुर स्थित यूपी पुलिस के आयुध भंडार प्रभारी एसपी अजीजुल हक ने बताया कि रविवार को कई आर्म्स मोहररि की टीम कानपुर की स्माल आर्म्स फैक्टरी भेजी गई थी। वहां टीम ने टेक्निकल परीक्षण के साथ ही फायरिंग टेस्ट भी किया। मानकों पर खरी उतरने के बाद पहली खेप सीतापुर पहुंच गई है। एसपी ने बताया कि हेडक्वार्टर के निर्देश पर इसे विभिन्न जनपदों में भेजा जाएगा।

केंद्रीय बलों की पहली पसंद है जेवीपीसी

जेवीपीसी के पहले वर्जन को पैरा मिलिट्री फोर्स ने काफी उपयुक्त माना था। ऐसे में सीआरपीएफ, आईटीबीपी, सीआईएसएफ व बीएसएफ अब अपने जवानों को नई जेवीपीसी से लैस कर रहा है। साथ ही नक्सल प्रभावित छत्तीसगढ़ पुलिस को भी यही कारबाइन दी जा रही है।

खासियत

बिना मैगजीन के वजन सिर्फ तीन किलोग्राम।

बुलेट प्रूफ लक्ष्य व स्टील भी भेदने में सक्षम।

कारबाइन से 200 मीटर तक सटीक निशाना।

इसका फायरिंग मोड मैनुअल व आटोमैटिक।

कारबाइन में लोड होती 30 कारतूसों की मैगजीन।

स्प्रिंग मैकेनिज्म सिस्टम के चलते कारतूसों की बेल्ट से एक मिनट में आठ सौ फायर।

यह एक बार में सबसे अधिक फायर करने वाली कारबाइन

गैस ऑपरेटेड होने से फायरिंग के बाद काला नहीं पड़ता बैरल

नाइट विजन कैमरे से रात में भी सटीक निशाना

<https://www.amarujala.com/lucknow/uttar-pradesh-police-gets-105-joint-venture-protective-carbine?pageId=1>



Tue, 28 Sept 2021

Madhya Pradesh: Defence Research and Development Organisation Chairman G Satish Reddy in city on October 1

To hold workshop with MSMEs

Indore: The hub of MSMEs in the State, will also produce goods for Defence Research and Development Organisation (DRDO) and other defence equipment manufacturing units.

DRDO chairman G Satish Reddy is coming to the city on October 1, wherein he will speak on the type of goods the DRDO and other defence manufacturing units want. DRDO is now focusing on MSME units of the region to fulfil its requirement for products used by premier defence research and development organisations of the country.

Reddy will address a half-day workshop of MSME units and startups of the region. The event is being organised in association of MSME Department of the State and District Industrial Training Centre (DIC) of the district.



G Satish Reddy

Besides MSME minister OP Saklecha, some senior level secretaries of the State will also be present in the workshop. Sandhya Alawa, Manager of DIC Indore, informed on Monday that the half-day workshop is organised at Brilliant Convention Centre on the day, where MSME units and startups of the city, Ujjain, Ratlam, Pithampur and other nearby districts have also been invited to participate. Amit Chawala, vice-president of the city unit of Laghu Udyog Bharti, said that the workshop would give a new dimension to manufacturing by MSME units of the region.

For first time DRDO Chairman coming to city

Raddy is considered as one of top most scientist of the country. For the first time he is coming to the city. Besides to holing position of Chairman of DRDO, Reddy is also Secretary of Department of Defence Research and Development.

He guides development of Major programs on missiles and Strategic systems, fighter aircrafts and unmanned aerial defence systems, underwater systems, Radar systems, strategic materials, armaments and futuristic technologies. He is honoured from various prestigious awards and medals.

<https://www.freepressjournal.in/indore/madhya-pradesh-defence-research-and-development-organisation-chairman-g-satish-reddy-in-city-on-october-1>

Speciality materials vital for new missile systems: Expert

Need for right infrastructure to meet future needs underscored

Hyderabad: The country will need a large requirement of speciality materials as advancements in missiles progresses and high-performance high temperature materials will be necessary as the speed of the missiles increase from supersonic to hypersonic, said Director-General, Missiles and Strategic Systems, DRDO BHVS Narayana Murthy on Monday.

He emphasized the importance of strategic materials stating that they form the basis for any missile programme and hence, its timely availability will help complete projects within the scheduled time. He was participating in a panel discussion on ‘Building Resilience Together – Strategic Materials’ organised by MIDHANI (Misra Dhatu Nigam Limited).

Mr. Murthy said there has been significant improvement in material supply from indigenous sources like MIDHANI and there is need to extend all the support that is needed. The panel discussion was moderated by Project Director at Defence Research and Development Laboratory (DRDL) Dr. APJ Abdul Kalam Missile Complex, DRDO, Jaiteerth Raghavendra Joshi, DRDL Director Dasarath Ram, BDL Chairman and Managing Director Siddharth Mishra and other senior officials.

MIDHANI CMD Sanjay Kumar Jha elaborated about the strategic materials in the country and the necessity for right infrastructure and testing facilities to be augmented to meet the future growing demand of strategic materials like ferrous, non-ferrous metals and alloys, composites, and additive manufacturing, a press release said.

The discussions put forward several ideas and strategies that need to be adopted to bring about resiliency of supply chains, strengthening and supporting indigenisation of materials thereby reducing the dependence on ‘certain nations’ or ‘over reliance’ on a single nation, supplier, etc.

Mitigation strategies were put forward such as identifying alternative sources for these raw materials, entering strategic partnerships with suppliers, long term contracts, stock piling, etc were discussed. It was decided that each of the organisations should be proactive and address these risks at the earliest to build a robust resilient material supply chain for the Indian missile program.

<https://www.thehindu.com/news/cities/Hyderabad/speciality-materials-vital-for-new-missile-systems-expert/article36698598.ece>

Army working with OFB, DRDO on indigenous artillery gun programmes, says Lt. Gen. Chawla

Hand-holding to resolve issues with indigenous Dhanush, towed artillery guns, says Director General of Artillery

By Dinakar Peri

New Delhi: Improved roads in border areas and induction of Chinook heavy lift helicopters will enable the Army to quickly deploy artillery guns to forward areas, said Lt. Gen. T.K. Chawla, Director General of Artillery on Monday.

On artillery modernisation, he said the Army is working closely and doing “lot of hand holding” with Ordnance Factory Board (OFB) and Defence Research and Development Organisation (DRDO) to resolve issues with the indigenous Dhanush and towed artillery guns to turn them into “robust and reliable” systems.

“Since its design and development project it follows Preliminary Service Quality Requirements (PSQR) evolved by DRDO and Army. During the trials some parameters have been achieved and some which need further improvement. These concerns have been shared with DRDO,” Lt. Gen. Chawla said in an interaction with select journalists on the eve of Gunners Day, observed on September 28.



Lt. Gen. T.K. Chawla, Director General of Artillery

The Advanced Towed Array Gun System (ATAGS) is a 155mm, 52 calibre heavy artillery gun jointly developed by the DRDO in partnership with Bharat Forge and the Tata Group.

“Firing trials were held recently in July-August in Pokhran. DRDO is working with its development partners in order to achieve these firing and non-firing parameters,” he said while stating that a timeline cannot be given as it was a design and development project.

On the Dhanush artillery gun being developed by the OFB based on the original drawings of the Swedish Bofors guns, Lt. Gen. Chawla said there are few teething issues which they need to iron out but it is was good work in progress.

“We as the user are looking forward to it fructifying sooner than later. As long as they are able to iron out those issues, we can go down to so some confidence firing that is what has been agree to with OFB,” he stated. The Army has already given an indent for 114 Dhanush guns with the OFB.

A lot of hand holding has been done by the Army, both for ATAGS and Dhanush, he added.

In August 2018 the Defence Acquisition Council had accorded approval for the purchase of 150 of these guns at an approximate ₹3,365 crore which would be split between the two companies. There is an overall requirement of 1,580 of these guns.

“Border Roads [Organisation] is doing lot of effort to build the network in far flung areas. I think this effort will continue and we can get guns in more areas,” Lt. Gen. Chawla.

Robust equipment

Lt. Gen. Chawla was in Eastern Ladakh recently and visited the gun positions and interacted with the troops deployed there to motivate them in the backdrop of the standoff with China.

“The 105mm field guns are still very much robust with very high angle of firing which is so very essential in the mountains. Bulk of the deployment in Eastern Ladakh is largely of this calibre,” Lt. Gen. Chawla said, adding that as and when the other guns move in enough numbers, they will be replacing the 105mm guns.

The Army has also deployed its latest M777 Ultra Light Howitzers (ULH) along the Line of Actual Control (LAC) with China. The Army had contracted 145 M777 guns and so far three

regiments are operational. The fourth regiment is the process of acquiring equipment and under conversation, he stated.

Stating that the ULH give that extra advantage of mobility due to their lighter weight, Lt. Gen. Chawla said training is “going on in moving guns from one sector to another with the Chinook helicopters.”

In addition, the Army has also inducted 100 K9 Vajra self-propelled howitzers and Lt. Gen. Chawla said the Army is considering the procurement of some more. The Army has recently issued a tender for procurement of over 800 mounted gun systems, which he said, were especially suited for the mountains due to their mobility.

Under the Field Artillery Rationalisation Programme (FARP) promulgated after the Kargil conflict in 1999, the Army envisaged procuring close to 3,000 guns of various types. Under this the towed guns will be the mainstay of the Army and artillery is being standardised to 155mm standard.

<https://www.thehindu.com/news/national/army-working-with-ofb-drdo-on-indigenous-artillery-gun-programmes-says-lt-gen-chawla/article36698977.ece>



Tue, 28 Sept 2021

Army seeks mounted artillery guns for easy mobility in high-altitude terrain

Artillery DG says working with DRDO, OFB on gun systems

By Krishn Kaushik

New Delhi: The nearly 17-month standoff with China in eastern Ladakh has prompted the Army to look more intently for mounted artillery systems, which will be easier to manoeuvre in high-terrain areas.

Director-General of Artillery Lt Gen TK Chawla Monday said: “We are looking at mounted gun systems. Especially in mountain terrain, it will give advantage in getting in and out of action.”

In the case of towed guns, he said, “the train” to carry them “becomes very long”.

Mounted guns can be deployed in a variety of terrain — plains, mountains, high-altitude, desert and semi-desert regions. The Army had issued a Request for Information for more than 800 such guns earlier this year.

India had also ordered 145 ultra-light M777 howitzer towed guns for nearly \$750 million in 2016.

Chawla told reporters that these guns would be part of seven regiments, and three of them are already operational. More than half of the ordered guns have been delivered, he said, adding that a fourth regiment is being raised. The 155-mm artillery piece is being deployed along the Line of Actual Control.

“They give that extra advantage of mobility due to their weight,” Chawla said. He also added that “the training is going on in moving guns from one sector to another with the Chinook helicopters”.

On the .45 caliber Dhanush howitzer, being manufactured by the Ordnance Factory Board, Chawla said the Army has “already given an indent for 114 guns” in 2019. He said: “There are few



Mounted guns can be deployed in a variety of terrain — plains, mountains, high-altitude, desert and semi-desert regions. (File)

teething issues which they need to iron out. But it is good work in progress. As long as they are able to iron out those issues, we can go down to some confidence firing, that is what has been agreed to with OFB.”

He asserted that, “very recently had a very fruitful and constructive” discussions with OFB and mentioned that “we as the user are looking forward to it fructifying sooner than later”.

Chawla said that the DRDO-developed Advanced Towed Artillery Gun System (ATAGS) had firing trials in July and August in Pokhran. While “some parameters were achieved, some needed further improvement”. DRDO is working with its development partners, he said, in order to achieve these firing and non-firing parameters.

“We have informed the DRDO and they have agreed to work on it. We are looking at a robust gun, reliable gun which can fire accurately, consistently and reliably. I am very optimistic in the case of ATAGS. The DRDO will work towards overcoming what could not be achieved at Pokhran.”

Chawla said that in case of the artillery “a lot of handholding has been done by the Army, both for ATAGS and Dhanush”. He said, “I had a detailed discussion last week with the OFB and ARDE (Armament Research and Development Establishment)” of the DRDO.

Speaking about another indigenously designed system, the Pinaka multi-barrel rocket launcher, Chawla said four regiments have already been operationalised, and six more have been ordered.

A new version of the Akash Missile, Akash Prime, was successfully flight tested Monday from the Integrated Test Range, Chandipur, Odisha. The missile intercepted and destroyed an unmanned aerial target mimicking enemy aircraft in its maiden flight test after improvements.

DRDO said in a statement that Akash Prime is equipped with an indigenous active RF seeker for improved accuracy, and other improvements ensure more reliable performance under low-temperature environments at higher altitudes.

<https://indianexpress.com/article/india/army-seeks-mounted-artillery-guns-for-easy-mobility-in-high-altitude-terrain-7538294/>



Tue, 28 Sept 2021

सेना को एक मजबूत और विश्वसनीय तोप की जरूरत, लेकिन आ रहीं अड़चनें, बोले लेफ्टिनेंट चावला

टीके चावला ने प्रेस कॉन्फ्रेंस में कहा कि दो परियोजनाओं में से अधिक महत्वपूर्ण है ATAGS Howitzer, जिसे रक्षा अनुसंधान और विकास संगठन (DRDO) द्वारा निजी फर्मों Bharat Forge और TATA Power SED के साथ विकसित किया जा रहा है।

Edited By Nitu Pandey

नई दिल्ली: भारतीय सेना को मजबूत बनाने के लिए मजबूत और विश्वसनीय तोप की जरूरत है। दो प्रमुख स्वदेशी कार्यक्रम विफल होने की वजह से आधुनिकीकरण योजना को अड़चनों का सामना करना पड़ रहा है। यह कहना है लेफ्टिनेंट जनरल टी.के. चावला का। भारतीय सेना के डीजी आर्टिलरी लेफ्टिनेंट जनरल टी. के. चावला ने गनर्स डे के मौके पर मीडिया से बातचीत में ये बात कही। उन्होंने कहा कि सेना द्वारा फील्ड आर्टिलरी रेशनलाइज़ेशन प्रोग्राम (एफएआरपी) को अंतिम रूप देने के 22 साल बाद, जिसके तहत 2025-27 तक लगभग 3,000-3,600 हॉवित्ज़र की खरीद की जानी थी, आधुनिकीकरण योजना को अड़चनों का सामना करना पड़ रहा है क्योंकि दो प्रमुख स्वदेशी कार्यक्रम विफल हो गए हैं।

टीके चावला ने प्रेस कॉन्फ्रेंस में कहा कि दो परियोजनाओं में से अधिक महत्वपूर्ण है ATAGS Howitzer, जिसे रक्षा अनुसंधान और विकास संगठन (DRDO) द्वारा निजी फर्मों Bharat Forge और TATA Power SED के साथ विकसित किया जा रहा है।

सेना चाहती है दोनों कार्यक्रम सफल हो

लेफ्टिनेंट जनरल चावला ने कहा कि एटीएजीएस और धनुष दोनों के लिए सेना की ओर से बहुत अधिक हैंडहोल्डिंग की गई है। मैंने पिछले हफ्ते ओएफबी (आयुध निर्माणी बोर्ड) और एआरडीई (डीआरडीओ के आयुध अनुसंधान और विकास प्रतिष्ठान) के साथ विस्तृत चर्चा

की थी। जहां आवश्यकता है वहां हम पारस्परिक रूप से सहमत हुए हैं। सेना चाहती है कि दोनों कार्यक्रम सफल हों।



TAGS Howitzer (Photo Credit: Ministry of Defence)

एटीएजीएस पर काम अभी बाकी है

उन्होंने आगे बताया कि एटीएजीएस के इस गर्मी के मौसम में अग्नि परीक्षण कुछ मानकों में हासिल करने में सफल नहीं रहा। आगे इसे संशोधन से गुजरना होगा। कुछ पैरामीटर थे जिन्हें हासिल कर लिया गया है और कुछ पैरामीटर हैं जिन्हें फायरिंग और नॉन-फायरिंग दोनों मापदंडों में सुधार की आवश्यकता है। चावला ने आगे कहा कि एटीएजीएस को सेना में संभावित रूप से शामिल करने के लिए एक समयसीमा देना मुश्किल है।

ATAGS में कुछ खामियां जिसे दुरुस्त किया जा रहा है

लेफ्टिनेंट ने बताया कि हमने पोखरण की गर्मियों में उन्हें (ATAGS) आजमाया। कुछ खामियां हैं। हमने डीआरडीओ को सूचित कर दिया है और वे इस पर काम करने के लिए सहमत हो गए हैं। हम एक मजबूत बंदूक, विश्वसनीय तोप की तलाश कर रहे हैं जो सटीक और विश्वसनीय रूप से फायर कर सके।

माना जाता है कि सेना ने एटीएजीएस के वजन को लेकर चिंता व्यक्त की थी। एटीएजीएस हॉवित्जर बनाने की परियोजना साल 2012 में शुरू हुई थी। लेकिन कई महत्वपूर्ण मानकों को पूरा करने में अभी यह असफल साबित हुई है जो चिंता का विषय है। हालांकि लेफ्टिनेंट चावला ने कहा कि एटीएजीएस को लेकर आशावादी हूं और इसे जल्द ही हर पैमाने पर ठीक कर लिया जाएगा।

K9 वज्र हॉवित्जर के एक योजना को पूरा कर लिया गया है

इसके साथ ही जनरल चावला ने कहा कि दक्षिण कोरियाई फर्म के सहयोग से एलएंडटी की ओर से निर्मित K9 वज्र हॉवित्जर के लिए सभी योजनाओं में से एक को पूरा कर लिया गया है। एक अंग्रेजी मीडिया के मुताबिक सेना संभवतः अतिरिक्त ट्रैक की गई तोपों के लिए ऑर्डर कर रही है।

भारत के महिंद्रा डिफेंस द्वारा असंबल किए गए अमेरिकी एम-777 के बारे में बात करते हुए, महानिदेशक आर्टिलरी ने कहा कि ऑर्डर आधा सेना तक पहुंच गया है। लेकिन कोरोना महामारी की वजह से इसमें देरी हुई है।

हॉवित्जर की तीन रेजिमेंटों को तैनात किया गया है

उन्होंने सेना को और अधिक एम-777 का ऑर्डर देने से इनकार किया है। उन्होंने कहा है कि वास्तविक नियंत्रण रेखा (एलएसी) के साथ हॉवित्जर की तीन रेजिमेंटों को तैनात किया गया है।

<https://www.newsnationtv.com/india/news/need-a-robust-and-reliable-gun-says-lt-gen-t-k-chawla-214102.html>

Defence corridor: T.N. seeks Centre's support

'Funding could be shared between State and Centre in the ratio of 25:75'

Chennai: Industries Minister Thangam Thennarasu called on Union Defence Minister Rajnath Singh in Delhi on Monday and handed over to him a memorandum seeking the Centre's support for various proposals in the Tamil Nadu Defence Industrial Corridor.

Mr. Thennarasu proposed that the funding for the corridor may be shared between the State and the Centre in the ratio of 25:75. Tamil Nadu urged the Defence Ministry to sanction six major proposals. Under the Defence Testing Infrastructure Scheme, the State sought sanction for five proposals — communication systems & RF antenna in Chennai; testing infrastructure for unmanned aircraft systems in Ulundurpet/Sholavaram; a mechanical and material testing facility in Tiruchi; electromagnetic interference and electromagnetic compatibility tests in Chennai; and testing infrastructure for ammunitions in Tiruchi.



The Industries Minister with the Union Defence Minister

Pointing out that only one Defence Research and Development Organisation (DRDO) lab was located in Tamil Nadu, the State government requested the Centre to establish two such labs in the defence industrial corridor nodes in Coimbatore and Tiruchi.

It also sought the transfer of the Indian Air Force airstrip in Ulundurpet or Sholavaram on lease to it for setting up an aviation technology hub.

“Considering various factors like connectivity, availability of ground/air space, non-intrusion into existing ATS routes/terminal marshalling areas/local flying zones and proximity to industrial infrastructure, the Ulundurpet airstrip and the Sholavaram airstrip have been identified as suitable locations for hosting the proposed facilities,” the memorandum said.

Ulundurpet in Kallakurichi district houses a World War-II vintage airstrip with two runways measuring 1,405 metres and 1,770 metres in length and 40 metres in width. It was earlier owned by the Tamil Nadu government. The entire land parcel, including the runway, is spread over an area of 160 acres.

Similarly, the Sholavaram airstrip was not being utilised. “One of the air fields can be given on lease to TIDCO (Tamil Nadu Industrial Development Corporation) to develop the aviation technology hub in the Tamil Nadu Defence Industrial Corridor,” the memorandum said.

Though the Hindustan Aeronautics Limited (HAL) was sourcing a large number of components/equipment/sub-systems from Tamil Nadu, it had no facility in the State, the memorandum pointed out. It requested the Union Minister to set up HAL's Advanced Medium Combat Aircraft (AMCA) Final Assembly and Check-Out (FACO) unit at Suler in Coimbatore. The Indian Air Force has already allocated 20 acres for this purpose.

Tamil Nadu also sought the establishment of a joint venture between HAL and TIDCO for manufacturing AMCA and an Indian Multi Role Helicopter (IMRH) facility. The State had, in July, discussed with HAL the possibility of setting up a common facility for post-machining processing/coating in Hosur or Coimbatore. It had also discussed setting up a joint venture between HAL and TIDCO. The State government sought the early announcement of a Central scheme to support and promote investment in the defence industrial corridors. It proposed that funding may be shared between the State and Central governments in the ratio of 25:75 instead of 50:50. It also requested to increase the number of units (in both the Defence Industrial Corridors) for which the capital subsidy is to be sanctioned under this scheme.

As the Cabinet Committee on Security has approved a ₹10,990-crore programme to indigenously develop airborne early warning and control (AEW&C) systems for use by the Indian Air Force, it would be based on the existing Netra Mk-1 developed by the Centre for Airborne Systems, a DRDO lab, with active participation from the industry in Tamil Nadu. The CABS needed a development cum production partner from the industry that would produce five Netra 2. “The Tamil Nadu government is actively promoting the formation of a PPP consortium through TIDCO for development and commercial production of these systems,” the memorandum said. It requested the Government of India’s support for promoting the TIDCO-led industry consortium for the development and commercial production of AEW&C systems.

The Tamil Nadu government’s special representative in Delhi A.K.S. Vijayan and Industries Secretary N. Muruganandam were present during the meeting.

<https://www.thehindu.com/news/national/tamil-nadu/defence-corridor-tn-seeks-centres-support/article36704935.ece>

DRDO on Twitter





[#WATCH](#) | A new version of Akash Missile – 'Akash Prime' successfully tested from Integrated Test Range (ITR), Chandipur, Odisha today. It intercepted & destroyed an unmanned aerial target mimicking enemy aircrafts, in its maiden flight test after improvements

Video source: DRDO



7:47 PM · Sep 27, 2021



Defence Strategic: National/International



Press Information Bureau
Government of India
Ministry of Defence

Mon, 27 Sept 2021 5:16PM

Signing of MOU on white shipping information exchange between Indian Navy and Royal Navy of Oman

Rear Admiral Saif bin Nasser bin Mohsen Al-Rahbi, Commander of Royal Navy of Oman (CRNO) and Admiral Karambir Singh, Chief of the Naval Staff (CNS), Indian Navy signed an MoU for exchange of White Shipping Information on 27 September 2021. The MoU was signed at Maritime Security Center (MSC), Muscat during the ongoing visit of the CNS to Oman.



The signing of the MoU between Royal Navy of Oman and Indian Navy would facilitate information exchange on merchant shipping traffic, through IFC-IOR, India and MSC, Oman and contribute to enhanced maritime safety and security in the region.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1758612>



पत्र सूचना कार्यालय
भारत सरकार
रक्षा मंत्रालय

Mon, 27 Sept 2021 5:16PM

भारतीय नौसेना और ओमान की रॉयल नेवी के बीच व्हाइट शिपिंग सूचना आदान-प्रदान के लिए एमओयू पर हस्ताक्षर

रॉयल नेवी ऑफ ओमान (सीआरएनओ) के कमांडर रियर एडमिरल सैफ बिन नासिर बिन मोहसेन अल-रहबी और भारत के नौसेना प्रमुख एडमिरल करमबीर सिंह ने दिनांक 27 सितंबर 2021 को व्हाइट शिपिंग सूचना के आदान-प्रदान के लिए एक समझौता ज्ञापन पर हस्ताक्षर किए। नौसेना प्रमुख की ओमान की जारी यात्रा के दौरान मस्कट के समुद्री सुरक्षा केंद्र (एमएससी) में समझौता ज्ञापन पर हस्ताक्षर किए गए।

ओमान की रॉयल नेवी और भारतीय नौसेना के बीच समझौता ज्ञापन पर हस्ताक्षर से आईएफसी-आईओआर, भारत और एमएससी, ओमान के माध्यम से मर्चेंट शिपिंग ट्रैफिक पर सूचना के आदान-प्रदान की सुविधा होगी और इस क्षेत्र में समुद्री संरक्षा एवं सुरक्षा में वृद्धि होगी।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1758697>

THE TIMES OF INDIA

Tue, 28 Sept 2021

Gaganyaan: ISRO readies for Crew Escape System test vehicle flights

By Chethan Kumar

The Indian Space Research Organisation (Isro) is preparing for multiple flights of the specially designed test vehicle that will be used to test the Crew Escape System (CES), which will be a crucial element of India's first human space flight mission (Gaganyaan).

Being built at the Vikram Sarabhai Space Centre (VSSC), the vehicle is expected to be ready by the end of this year and Isro is planning at least one flight before the proposed uncrewed mission now scheduled for mid-2022.

VSSC director S Somnath told TOI: "...The design work on CES is done and all the reviews have been completed. Most of the systems of the Test vehicle have been realised and the vehicle is in the integration phase and should be ready by the end of this year. The whole CES has to be tested a few times before we put it in the unmanned flight."

ISRO chairman K Sivan said the new vehicle will be used to ensure that there's a flawless mechanism for crew escape, which is a very important aspect of Gaganyaan as it helps deal with any exigency during travel or stay of the astronauts.

As reported first by TOI last year, the vehicle is built for the in-flight escape of the crew. The propulsion will be on top of the crew module so that it is able to pull the crew away by lifting the module and take them to a safe place.

"We're looking at at least one test vehicle mission before the uncrewed mission. The vehicle is meant for testing an abort. During the flight, we may need to abort at different stages, like high dynamic pressure, critical flight events, etc. The test vehicle will be used to test abortions up to the first stage of the flight. It won't go to orbit," Sivan explained.

Crew Module & GSLV-Mk3

Aside from the CES and the test vehicle, VSSC is responsible for the GSLV-Mk3 — the launch vehicle to be used for Gaganyaan — and some elements of the crew module.

"All design work on the launch vehicle is complete and we have begun testing. The L110 and C25 engines have completed first-level testing and further testing will continue. The S-200 solid booster is being prepared for static tests and we should be ready for that soon. Overall qualification work is going on. There's a lot of activity: The entire electronics is being revised, we are adding higher levels of redundancies. Health management of the vehicle system design is complete. Prototyping and testing will begin soon," Somnath said.

Sivan, while pointing out that VSSC is also responsible for the structural design of the crew module, said all the systems inside the module — avionics, control systems, computers, sensors, etc — and the service module will be built by the UR Rao Satellite Centre (URSAC), while multiple centers will contribute to the Environmental Control and Life Support System (ECLSS). "For the ECLSS, which is a very important part of the crew module, LPSC (Liquid Propulsion Systems Centre) will have a major responsibility. They will build the pressure control system,



while VSSC will build the thermal control system and SAC (Space Applications Centre) will develop the crew display, instrumentation etc,” Sivan said.

He added that the design phase of the crew module has been completed and that various centers have already begun fabrication of the systems.

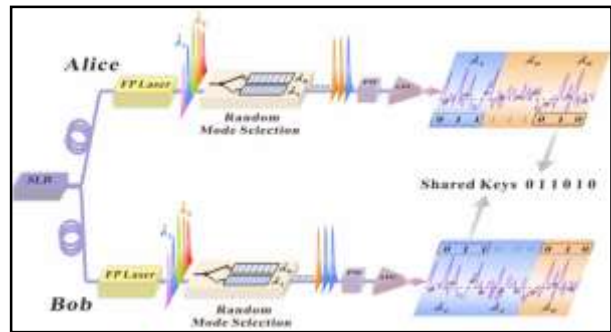
<https://timesofindia.indiatimes.com/home/science/gaganyaan-isro-readies-for-crew-escape-system-test-vehicle-flights/articleshow/86563182.cms>



Tue, 28 Sept 2021

0.75 Gbit/s key distribution with mode-shift keying chaos synchronization

Information encryption is one of the core technologies of cyberspace security. The algorithm encryption has a risk of exhaustive attack due to the algorithm determinacy. Quantum key distribution based on quantum no-cloning principle promises unconditional security and still has challenges: key rate is limited by the single-photon detector and distribution channel is hardly compatible with optical fiber communication link. For one of the classical physical methods, the rate of random-keying chaotic synchronization method is mainly limited by the tens of nanoseconds synchronization recovery time. Shortening the recovery time may pay a way for Gbit/s physical key distribution.



Credit: Hua Gao, Anbang Wang, Longsheng Wang, Zhiwei Jia, Yuanyuan Guo, Zhensen Gao, Lianshan Yan, Yuwen Qin, and Yuncai Wang

In a new paper published in *Light Science & Application*, a team of scientists, led by Professor Anbang Wang from Key Laboratory of Advanced Transducers and Intelligent Control System, Ministry of Education and Shanxi Province, China, College of Physics and Optoelectronics, Taiyuan University of Technology, China, and co-workers have proposed a novel key distribution scheme based on mode-shift keying chaos synchronization, avoiding the limitations of laser transition time on the chaos synchronization recovery time, and resultantly improving the rate of key distribution.

Two Fabry-Perot lasers with matched inner parameters are authorized to the legitimate users Alice and Bob. The two lasers are commonly injected by a random drive source which is a superluminescent diode in experiment and achieved chaos synchronization when the injection parameters are matched. Then, random mode selection is applied to the laser FP_A (FP_B) and the mode at wavelength λ_0 or λ_1 is randomly output as the entropy source. The chaotic waveforms are synchronized when the wavelengths are same and no synchronized when different. Thus, the mode-shift keying chaos synchronization is achieved. An analog-to-digital converter is used to sample the chaotic signal at a certain sampling rate to record the mode-shift keying chaotic waveforms which are then quantized to generate random bits by dual-threshold quantization. Alice and Bob sift the identical bits extracted during the time slots of the same wavelength, that is chaos synchronization, as shared keys.

The synchronization coefficient reaches around 0.93 when the selection modes are matched, but decreases to about 0.25 when the modes are different. As shown as the enlarged view of the transition process from non-synchronization to synchronization, the transition time is demonstrated to ~ 1 ns, which is determined by the rising time of the electrical codes rather than the laser transition response time, so the key distribution rate can be improved greatly.

Sampling multiple points during each keying period can increase the distribution rate. To ensure the security of the final keys, the number of keys extracted from synchronized chaos during one period should be less than 8 which forms a byte. A sample rate of 3.2 Gbit/s is employed to sample the mode-shift keying chaotic temporal waveforms and then dual-threshold quantization is used to extract random bits. Resultantly, the key rate reaches to 0.7503 Gbit/s when the BER is 3.8×10^{-3} (the HD-FEC threshold with 7% overhead). The generated secret keys successfully pass all the 15 statistical tests.

The scheme can realize the physical-layer security for three reasons: first, only the drive light transmitted in the fiber link and are low correlated to the outputs of the FP lasers. Second, it is hard for an attacker to obtain a third FP lasers having well-matched inner parameters with the legitimate users because of the fabrication error. Therefore, eavesdroppers cannot intercept the enough information of entropy source. Third, the random and private mode-shift keying provides an additional physical layer of security. Therefore, the security of this scheme can be ensured.

More information: Hua Gao et al, 0.75 Gbit/s high-speed classical key distribution with mode-shift keying chaos synchronization of Fabry–Perot lasers, *Light: Science & Applications* (2021). DOI: [10.1038/s41377-021-00610-w](https://doi.org/10.1038/s41377-021-00610-w)

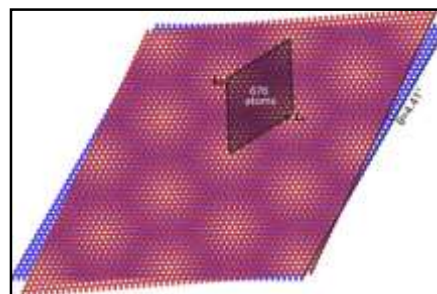
Journal information: [Light: Science & Applications](https://phys.org/news/2021-09-gbits-key-mode-shift-keying-chaos.html)
<https://phys.org/news/2021-09-gbits-key-mode-shift-keying-chaos.html>



Tue, 28 Sept 2021

Physicists demystify magic: bona fide topological Mott insulator discovered in twisted bilayer graphene model

Imagine stacking two sheets of graphene—the 2D form of graphite, or the pencil at your hand—in which the carbon atoms form a hexagonal lattice and twist the top sheet out of alignment with the sheet below, yielding a periodic arrangement of atoms named moiré pattern. Do you know that at a twisted angle of about 1° —people now call it the 'magic' angle—the system could exhibit very exotic behaviors such as becoming an insulator, a metal or even a superconductor? Can you imagine the same carbon atom in your pencil (graphite) becoming a superconductor when twisted to the magic angle? It indeed did as people discovered it in 2018, but why? A team of researchers from the Department of Physics at the University of Hong Kong (HKU) and their collaborators have succeeded in discovering a bona fide topological Mott insulator in twisted bilayer graphene model. The findings have been published in a renowned journal *Nature Communications*.



Moiré pattern in twisted bilayer graphene. The twisted angle $\theta=4.41$ degrees and there are 676 Carbon atoms in a moiré unit cell. Credit: Dr. Bin-Bin Chen

The reasons behind these exciting phenomena are the frontiers of condensed matter physics and quantum material research, both experimental, theoretical and computational, usually in combined form. The basic understanding up to now is that once the two graphene sheets form moiré patterns at the magic angles, the energy bands of electrons in the twisted bilayer graphene become almost flat, in other words, the velocity of the electrons on the lattice becomes considerably lower than usual (compared to that in single-layer graphene or graphite—our pencil), thus, the density of the electrons for this specific energy is tremendously large and the electrons can interact with each

other strongly, giving rise to many unexpected states, e.g., the super-conductor, quantum Hall effect.

As a result, the behavior of the electron is dominated by the mutual repulsive (Coulomb) interactions, which leads to the emergence of the exotic phases discussed above that do not exist in single layers of graphene or our pencil. At low temperatures (below 10 Kelvin), when the electron number is tuned to fill integer degrees of freedom of the flat bands, it means some of these bands are fully occupied while leaving the others fully empty, the system then would form an electrically insulating phase. Moreover, when the electron number deviates from the integer fillings, the system becomes either a metal (with low electrical resistivity) or a superconductor (zero resistance).

The phenomena of the magic angle twisted bilayer graphene are rich and profound, and physicists all over the world are now trying very hard to build proper microscopic models and find powerful computation methodologies to capture the mysterious properties of these models. Recently, Dr. BinBin Chen and Dr. Zi Yang Meng from the Department of Physics, HKU, in collaboration with institutions from China and the US, succeeded in doing so with substantial progress. They have demystified the phase diagram of a model with a specific density of electrons and have identified the experimentally observed quantum anomalous Hall state, which is a novel quantum state with dissipationless edge current and is promising to be used as a basic component of your daily electronic gadgets, e.g. computer, smartphone.

Quantum anomalous Hall effect in effective twisted bilayer graphene model

Researchers pay special attention to the $\nu=3$ integer filling of the magic angle twisted bilayer graphene, since at the same filling case, the experiment shows that in the alignment of hexagonal boron nitride substrate, the electrons exhibit quantised Hall conductance $\sigma_{xy}=e^2/h$ without exerting a magnetic field—the so-called the quantum anomalous Hall (QAH) state. The QAH state is an interesting topological state with the bulk remaining insulating and the edge conducting electric current without dissipation! Till now, the mechanism of such QAH state is still under debate. In the work, researchers show that such an effect can be realized in a lattice model of twisted bilayer graphene in the strong coupling limit, and interpret the results in terms of a topological Mott insulator phase.

Specifically, researchers present their theoretical study on the mechanism of QAH driven by projected Coulomb interactions. By employing extensive density-matrix renormalisation group simulations on the interacting lattice model, they identify a QAH phase with Hall conductance of $\sigma_{xy}=e^2/h$, which is separated from an insulating charge density wave (stripe) phase by a first-order quantum phase transition at $\alpha c \approx 0.12$. To calculate the Hall conductance in the QAH phase, they actually follow Laughlin's gedankenexperiment. That is, by inserting a flux ϕ slowly from 0 to 2π through the hole of the cylinder, we observe exactly one electron is pumped from the left edge to the right, corresponding to the quantized Hall conductance of $\sigma_{xy}=e^2/h$. This work addresses the currently popular question on the origin of QAH in twisted bilayer graphene at $\nu=3$ filling.

The first instance of topological Mott insulator

The QAH state discovered from model computation purely comes from the unique properties of the Coulomb interaction in the magic-angle twisted bilayer graphene system. And it is the first example of such an interaction-driven topological quantum state of matter that has been unambiguously discovered. The impact of such discovery is even beyond the area of magic-angle twisted bilayer graphene and have responded to a proposal in the generic topological state of matter a decade ago.

One of the reviewers, Dr. Nick Bultinck, a theoretical condensed matter theorist from the University of Oxford, gave a high rating of the work and said: "In his seminal paper, Haldane has shown that one does not need a magnetic field to have electrons occupy topologically non-trivial extended states which respond to Laughlin's adiabatic flux insertion by producing a quantised Hall current. The results in this work show that one does not even need a kinetic energy term in the Hamiltonian for this to occur."

Indeed, not limited to the twisted bilayer graphene system, our work, for the first time, provides a Mott-Hubbard perspective for the QAH state driven by interactions only. Consequently, we clarified the long-standing mystery of the possible existence of the topological Mott insulator (TMI), the building block of the so-called information highway due to its ability to transfer electricity and information without loss.

The famous Chinese-American physicist, Professor Shou-Cheng ZHANG (1963-2018) and his collaborators first proposed such a TMI state about a decade ago, and subsequently, various interaction models have been studied by many theorists. Among all the previous works, the kinetic terms play a crucial role in the emergence of the QAH, and therefore, the obtained state should not be dubbed as "TMI". However, our model completely turns off the kinetic part and contains only the interactions to produce the TMI state. In this regard, our work bridges the two essential fields in condensed matter physics: topology and the strong correlation. Further extension of our model construction and unbiased quantum many-body computations can be accessed from here.

Impact and future directions

As the number of transistors in the chips of our computer is doubled every 18 months, the heat they generated accompanied with the electricity transfer is gradually becoming a severe problem. The discovery of quantum anomalous Hall effect is of great significance, as no dissipation of energy and no heat is generated in the edge. In practice, such a state is the building block of the information highway and is promising to be applied in the next-generation chip.

The discovery of the QAH as the topological Mott insulator state in our model computation at filling $\nu=3$ sheds light on the phases that occur in magic-angle twisted bilayer graphene. Further careful modeling and computation on the lattice models of the system would reveal the mechanism of the superconductivity and provide better tunability of these exotic phenomena in this and other 2D quantum moiré material. The new findings also leave many open questions. For example, why is the topological Mott insulator state absent at other fillings of the band structure of the magic-angle twisted bilayer, how to properly study and compute the properties of the model away from integer fillings, etc? "The answers to these questions might help physicists to fully demystify the magic in this material and design more exciting phases of matter in this and other 2D quantum moiré materials currently being actively studied." Dr. Meng added, "And our research activity and expertise in 2D quantum materials can substantially boost this direction, which is the strategical research themes of HKU."

More information: Bin-Bin Chen et al, Realization of topological Mott insulator in a twisted bilayer graphene lattice model, *Nature Communications* (2021). DOI: [10.1038/s41467-021-25438-1](https://doi.org/10.1038/s41467-021-25438-1)

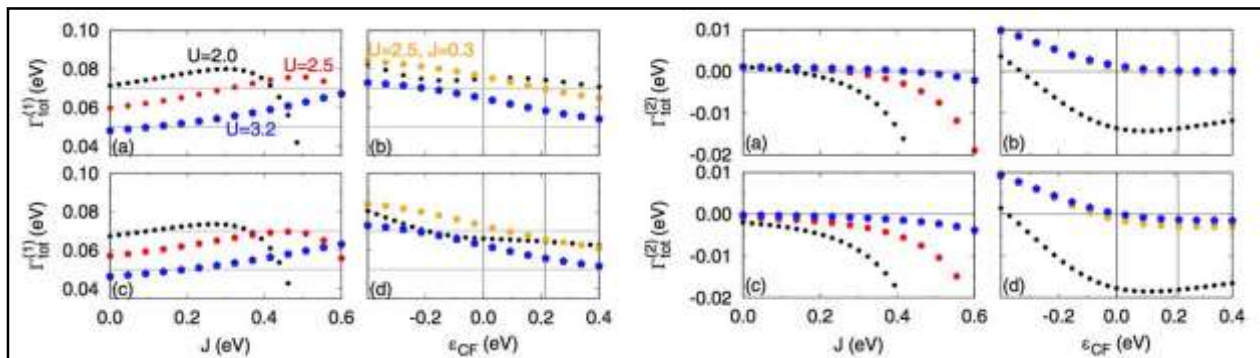
Journal information: [Nature Communications](https://www.nature.com/articles/s41467-021-25438-1)
<https://phys.org/news/2021-09-physicists-demystify-magic-bona-fide.html>

Researchers identified two possible Mott-insulating images in magnetic superexchange couplings in Sr₂IrO₄

Recently, a research team identified two possible magnetic interaction images in Sr₂IrO₄, which marked a new progress in the magnetic superexchange coupling study in Sr₂IrO₄ 5d associative system.

The team was led by Dr. Zhang Guoren from Institute of solid State Physics (ISSP), Hefei Institutes of Physical Science (HFIPS), Chinese Academy of Sciences, in collaboration with researchers from Jülich Research Centre, Germany.

"We studied the magnetic couplings in Sr₂IrO₄ in the Mott-insulating picture by combing different theories" said Zhang Guoren, "and identified two possible scenarios of them."



Total nearest- (left) and next-nearest- (right) neighbor couplings as a function of screened Coulomb interaction integrals crystal-field splitting. Credit: Zhu Damei

They studied the magnetic interactions in the strong-to-intermediate coupling regime. The superexchange pseudospin tensors was calculated up to fourth order, and their dependence on the screened Coulomb interaction integrals U and J and crystal-field splitting was analyzed. Due to term cancelations, the experimental nearest-neighbor coupling is reasonably well reproduced for a whole range of realistic values.

They identified a phenomenon. The increasing Hund's rule coupling J could lead to large fourth-order contributions. That's why the ferromagnetic next-nearest-neighbor coupling extracted from the spin-wave dispersion.

This regime is characterized by a sizable ring exchange K . For (U, J) values that yield a Mott insulator with a half-filled $jeff = 1/2$ state, but fourth-order terms remain minor even if the gap is small.

"The electronic properties of Sr₂IrO₄ and La₂CuO₄ are similar," said Zhang, "so it can help us to understand the mechanism for superconductivity in doped La₂CuO₄."

This work could also shed light on the correct modelization for other systems, such as the bilayer Sr₃Ir₂O₇.

The relevant findings were published in *Physical Review B*.

More information: Guoren Zhang et al, Magnetic superexchange couplings in Sr₂IrO₄, *Physical Review B* (2021). DOI: [10.1103/PhysRevB.104.125116](https://doi.org/10.1103/PhysRevB.104.125116)

Journal information: *Physical Review B*

<https://phys.org/news/2021-09-mott-insulating-images-magnetic-superexchange-couplings.html>

Drugs used by some Type 2 diabetics may lessen risk for severe COVID-19 outcomes, study suggests

Summary:

A type of drug already used to treat obesity and Type 2 diabetes, when taken six months prior to the diagnosis of COVID-19, was associated with a decreased risk of hospitalization, respiratory complications and death in COVID-19 patients with Type 2 diabetes, according to researchers.

A type of drug already used to treat obesity and Type 2 diabetes, when taken six months prior to the diagnosis of COVID-19, was associated with a decreased risk of hospitalization, respiratory complications and death in COVID-19 patients with Type 2 diabetes, according to researchers at Penn State College of Medicine. The team, which analyzed electronic medical records of patients with type 2 diabetes, concludes that the drugs, called glucagon-like peptide-1 receptor (GLP-1R) agonists, should be further evaluated for potential protective effects against COVID-19 complications.

"Our results are very promising as GLP-1R agonist treatment appears to be highly protective, but more research is needed to establish a causal relationship between the use of these drugs and decreased risk for severe COVID-19 outcomes in patients with Type 2 diabetes," said Patricia "Sue" Grigson, professor and chair of the Department of Neural and Behavioral Sciences.

According to the researchers, even though vaccines remain the most effective protection against hospitalization and death from COVID-19, additional effective therapies are needed to improve outcomes for patients with rare, severe breakthrough infections.

Patients living with pre-existing conditions like diabetes are at increased risk of severe COVID-19 complications, including death. A recent study from England reported that close to a third of COVID-19-related deaths in the country were among patients living with Type 2 diabetes.

"Vaccines have been shown to reduce hospitalization and death from COVID-19," said Jennifer Nyland, assistant professor of neural and behavioral sciences and co-author of the study. "But the scientific community continues to search for treatments that may complement vaccination by further reducing the risk of hospitalization, respiratory complications and death from COVID-19 in at-risk patients with pre-existing conditions like diabetes."

Nyland, Grigson and co-author Dr. Nazia Raja-Khan, associate professor of medicine and endocrinologist at Penn State Health Milton S. Hershey Medical Center, are studying how GLP-1R agonists could be used to treat substance use disorders. They hypothesized that patients with Type 2 diabetes who are taking these same medications, which they estimate to be less than 15% of Type 2 diabetes patients in the U.S., might have some level of protection from severe COVID-19 outcomes based on their anti-inflammatory properties. Patients with Type 2 diabetes often struggle with dysregulated inflammation, or swelling of body tissues. Overactive inflammatory responses have been implicated in severe COVID-19 cases and deaths.

The researchers analyzed electronic medical records of nearly 30,000 people with a positive laboratory test for SARS-CoV-2, the virus that causes COVID-19, between January and September 2020 who also had a diagnosis of Type 2 diabetes. The data for the study came from TriNetX, a

web-based tool that allows researchers to use de-identified patient data from multiple health care organizations for research studies.

The research team studied whether patients who were taking GLP-1R agonists and/or other diabetes medications within six months prior to their COVID-19 diagnosis had a 33.0% decreased risk of hospitalization, a 38.4% decreased risk of respiratory complications and a 42.1% decreased risk of death. More than 23,000 patients with Type 2 diabetes and a COVID-19 diagnosis who were not taking the drugs of interest were used as the control group for comparison.

The researchers found that patients with Type 2 diabetes who were taking GLP-1R agonists within six months prior to their COVID-19 diagnosis were significantly less likely to be hospitalized, have respiratory complications and die from the disease for 28 days following their diagnosis when compared to patients similar in age, sex, race, ethnicity, body mass index and pre-existing conditions. The results were published today, Sept. 27, in the journal *Diabetes*.

The researchers also studied two other drugs that are used as treatments for Type 2 diabetes and are known to have anti-inflammatory effects -- dipeptidyl peptidase-4 (DPP-4) inhibitors and pioglitazone. While the use of DPP-4 inhibitors showed a reduced risk of respiratory complications and pioglitazone showed a decreased risk of hospital admission, neither drug showed a decreased risk of death or as strong of trends as GLP-1R agonists in reducing COVID-19 complications across the board.

Because of these promising findings, the research team said randomized clinical trials are needed to determine if the association between use of GLP-1R agonists and reduced risk for severe COVID-19 outcomes suggested in this study are due to a cause-and-effect relationship. The team said there are also questions about the timing of administration of GLP-1R agonists in relation to its supposed protective effects and whether the protective effects could be applied to patients without Type 2 diabetes. They also caution that further study is needed to see if GLP-1R treatment can be done safely during acute COVID-19 infection.

"Further research is needed to confirm whether GLP-1R agonists can protect against severe COVID-19 complications," said Raja-Khan. "There is also a need to determine the conditions in which these drugs could be protective and how they could be used safely during COVID-19 hospitalization."

Kerstin Bettermann, Philippe Haouzi, Douglas Leslie, Jennifer Kraschnewski and Leslie Parent of Penn State College of Medicine also contributed to this research. The researchers declare no conflicts of interest.

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