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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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*Mon, 25 Jan 2021 3:52PM*

## **Vice President Shri M. Venkaiah Naidu visits Dr APJ Abdul Kalam Missile Complex**

### **“Multitude contributions of DRDO range from shielding the country from pandemic to strengthening the arsenal of Armed Forces”**

Shri M. Venkaiah Naidu, Hon'ble Vice President of India, visited DRDO's Dr APJ Abdul Kalam Missile Complex in Hyderabad on 25th January 2021. He inaugurated the Integrated Weapon System Design Centre in the complex. Hon'ble Vice President was briefed about the various ongoing projects and technological developments of missile complex laboratories namely Defence Research and Development Laboratory (DRDL), and Research Centre Imarat (RCI). He was also showcased a range of indigenously developed missile systems and avionics technologies.

Hon'ble Vice President evinced keen interest in DRDO technologies and various test facilities being used for advanced technology developments.

The Integrated Weapon System Design facility will enhance the capability in design and development of command & control systems for surface-to-air missile (SAM) systems and ballistic missile defence (BMD) systems. The centre will give thrust to the overall system design and evaluation methodology for state-of-the-art missile systems and will help in improving the performance of missiles. This will play a major role in the realization of highly complex futuristic aerospace & defence systems.

Extending new year wishes to the Scientists, Hon'ble Vice President said that year 2021 will open up new horizons, opportunities and also multiple new challenges. Addressing DRDO fraternity on the occasion, Shri Naidu complimented the scientists for their hard work and dedication even during the nationwide lockdown and stated that the efforts of DRDO have led to the phenomenal technological advancements in the form of series of successful missions such as HSTDV, SMART, ATGM, NGARM, HELINA, NAG, BRAHMOS etc. He mentioned that DRDO is an epitome and torchbearer of Scientific Social Responsibility and is a place of eternal learning. The role played by DRDO during the Covid Pandemic has set an example for others to emulate.

He further said that the development of a range of indigenous defence systems by DRDO has given confidence to government for banning import of 101 items.

Remembering Dr Kalam, Shri Naidu said that scientific institutions of the country should never work in the incremental mode rather they should continuously attempt to leapfrog in scientific endeavors. He praised the scientists for maintaining the legacy of Dr Kalam.

He said that Dr Kalam wanted India to become a superpower and mentioned that the scientists have the calibre to make Atmanirbhar Bharat. He pointed out that, it is important to hold hands of young techno-preneurs, industries, academia, guide them and move together to build a strong and technologically superior country. He stated that we have made commendable achievements in missiles, and hoped that by doing so we may become top exporter in the field of missiles.

Shri Naidu also inaugurated a new missile technology exposition and seminar hall in the same campus. The exposition will display missile technologies and weapon systems and the centre will be the backbone for outreach activities. This hall is a part of knowledge management initiatives taken up by the Missile Complex to provide an interactive platform for continuous learning and fostering technical excellence among the missile community. It will be a hub for organizing scientific expositions, structured training programmes on virtual platforms and technical lectures for the benefit of DRDO community.

He commended the work being done by DRDO under the dynamic leadership of Dr G Satheesh Reddy, Secretary, DD R&D & Chairman DRDO. Shri MSR Prasad, Director General, Missiles and Strategic Systems was also present during the visit and explained about the various missile technologies.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1692170>



**पत्र सूचना कार्यालय**  
**भारत सरकार**  
**रक्षा मंत्रालय**

*Mon, 25 Jan 2021 3:52PM*

## **उपराष्ट्रपति श्री एम. वेंकैया नायडू ने डॉ. एपीजे अब्दुल कलाम मिसाइल कॉम्प्लेक्स का दौरा किया**

### **“देश को महामारी से बचाने से लेकर सशस्त्र बलों के शस्त्रागार को मजबूत करने तक, डीआरडीओ का भारी योगदान है”**

भारत के माननीय उपराष्ट्रपति श्री एम. वेंकैया नायडू ने 25 जनवरी 2021 को हैदराबाद स्थित डीआरडीओ में डॉ. एपीजे अब्दुल कलाम मिसाइल कॉम्प्लेक्स का दौरा किया। उन्होंने कॉम्प्लेक्स में इंटीग्रेटेड वेपन सिस्टम डिजाइन सेंटर का उद्घाटन किया। इस दौरान माननीय उपराष्ट्रपति को मिसाइल कॉम्प्लेक्स प्रयोगशालाओं जैसे कि रक्षा अनुसंधान एवं विकास प्रयोगशाला (डीआरडीएल) और अनुसंधान केंद्र इमरत (आरसीआई) में चल रही विभिन्न परियोजनाओं और तकनीकी विकास के बारे में जानकारी दी गई। उन्हें स्वदेशी रूप से विकसित मिसाइल प्रणालियों और एवियोनिक्स प्रौद्योगिकियों की एक श्रृंखला भी दिखाई गई।

माननीय उपराष्ट्रपति ने उन्नत प्रौद्योगिकी विकास के लिए उपयोग की जा रही डीआरडीओ प्रौद्योगिकियों और विभिन्न परीक्षण सुविधाओं में गहरी रुचि दिखाई।

इंटीग्रेटेड वेपन सिस्टम डिजाइन सुविधा सतह से हवा में मार करने वाली मिसाइल (एसएमएम) सिस्टम और बैलिस्टिक मिसाइल रक्षा (बीएमडी) सिस्टम के लिए डिजाइन क्षमता और कमांड एंड कंट्रोल सिस्टम के विकास को और बढ़ाएगी। यह केंद्र अत्याधुनिक मिसाइल प्रणालियों के लिए समग्र सिस्टम डिजाइन और

मूल्यांकन पद्धति पर जोर देगा। साथ ही मिसाइलों के प्रदर्शन को बेहतर बनाने में मदद करेगा। यह भविष्य में अत्यधिक जटिल एयरोस्पेस और रक्षा प्रणालियों को प्राप्त करने की दिशा में एक प्रमुख भूमिका निभाएगा।

वैज्ञानिकों को नए साल की शुभकामनाएं देते हुए, माननीय उपराष्ट्रपति ने कहा कि वर्ष 2021 में नए क्षितिज, अवसर और कई नई चुनौतियां सामने आएंगी। इस अवसर पर डीआरडीओ के वैज्ञानिकों को संबोधित करते हुए श्री नायडू ने राष्ट्रव्यापी लॉकडाउन के दौरान भी वैज्ञानिकों को उनकी कड़ी मेहनत और समर्पण के लिए बधाई दी। साथ ही कहा कि डीआरडीओ के प्रयासों से सफल मिशनों की श्रृंखला जैसे कि एचएसटीडीवी, एसएमएआरटी, एटीजीएम, एनजीएआरएम, एचईएलआईएनए, एनएजी, ब्रह्मोस आदि के रूप में अभूतपूर्व तकनीकी प्रगति हुई है। उन्होंने उल्लेख किया कि डीआरडीओ वैज्ञानिक सामाजिक उत्तरदायित्व का एक प्रतीक और पथप्रदर्शक है और यह शाश्वत सीखने का स्थान है। कोविड महामारी के दौरान डीआरडीओ द्वारा निभाई गई भूमिका ने दूसरों के अनुकरण के लिए एक उदाहरण पेश किया है।

उन्होंने आगे कहा कि डीआरडीओ द्वारा स्वदेशी रक्षा प्रणालियों की एक श्रृंखला के विकास ने सरकार को 101 वस्तुओं के आयात पर प्रतिबंध लगाने के लिए आत्मविश्वास दिलाया।

डॉ. कलाम को याद करते हुए श्री नायडू ने कहा कि देश के वैज्ञानिक संस्थानों को क्रमिक विकास के मोड़ में कभी काम नहीं करना चाहिए, बल्कि उन्हें वैज्ञानिक प्रयासों में लगातार छलांग लगाने का प्रयास करना चाहिए। उन्होंने डॉ. कलाम की विरासत को बनाए रखने के लिए वैज्ञानिकों की प्रशंसा की।

उन्होंने कहा कि डॉ. कलाम चाहते थे कि भारत एक महाशक्ति बने। उन्होंने इस बात का उल्लेख किया कि वैज्ञानिकों के पास आत्मनिर्भर भारत बनाने के लिए अपार क्षमता है। उन्होंने कहा कि, युवा टेक्नो-प्रीनियर्स, उद्योगों, शिक्षाविदों का हाथ पकड़ना, उनका मार्गदर्शन करना और एक मजबूत और तकनीकी रूप से श्रेष्ठ देश बनाने के लिए एक साथ चलना महत्वपूर्ण है। उन्होंने कहा कि हमने मिसाइलों में सराहनीय उपलब्धियां हासिल की हैं, और उम्मीद की है कि ऐसा करने से हम मिसाइलों के क्षेत्र में शीर्ष निर्यातक बन सकते हैं। उन्होंने कहा कि, युवा टेक्नो-प्रीनियर्स, उद्योगों और शिक्षाविदों को प्रोत्साहित करना, उनका मार्गदर्शन करना और एक मजबूत व तकनीकी रूप से श्रेष्ठ देश बनाने के लिए एक साथ चलना महत्वपूर्ण है। उन्होंने कहा कि हमने मिसाइल क्षेत्र में सराहनीय उपलब्धियां हासिल की हैं और उम्मीद है कि ऐसा करने से हम मिसाइलों के क्षेत्र में शीर्ष निर्यातक बन सकते हैं।

श्री नायडू ने इसी परिसर में एक नई मिसाइल प्रौद्योगिकी प्रदर्शनी व संगोष्ठी हॉल का भी उद्घाटन किया। प्रदर्शनी में मिसाइल प्रौद्योगिकियों और हथियार प्रणालियों का प्रदर्शन किया जाएगा और यह केंद्र विकासात्मक गतिविधियों के लिए रीढ़ होगा। यह हॉल मिसाइल कॉम्प्लेक्स के नॉलेज मैनेजमेंट पहलों का एक हिस्सा है, जो कि मिसाइल समुदाय के बीच निरंतर सीखने और तकनीकी उत्कृष्टता को बढ़ावा देने के लिए एक मंच प्रदान करता है। यह डीआरडीओ समुदाय के लाभ के लिए वैज्ञानिक अभियानों, आभासी प्लेटफॉर्मों पर संरचित प्रशिक्षण कार्यक्रमों और तकनीकी व्याख्यानो के आयोजन का केंद्र होगा।

उन्होंने डीडी आरएंडडी के सचिव और डीआरडीओ के चेयरमैन डॉ. जी. सतीश रेड्डी के बेहतरीन नेतृत्व में डीआरडीओ द्वारा किए जा रहे कार्यों की सराहना की। इस दौरान मिसाइल और स्ट्रेटेजिक सिस्टम के डायरेक्टर जनरल श्री एमएसआर प्रसाद भी मौजूद थे और उन्होंने विभिन्न मिसाइल तकनीकों के बारे में विस्तार से बताया।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1692442>



## క్షిపణి సాంకేతికతలో ఆత్మనిర్భరత సాధించాం: ఉపరాష్ట్రపతి

- ఈ రంగంలో భారత్పై ఇతర దేశాలు ఆధారపడే స్థాయికి ఎదుగుతున్నాం.
- ఆయుధాల దిగుమతి నుంచి ఎగుమతివైపు పయనంలో డీఆర్డీవో కృషికి అభినందనలు
- భవిష్యత్ రక్షణ సాంకేతికతపై దృష్టిపెట్టాలని ఉపరాష్ట్రపతి శ్రీ ముప్పవరపు వెంకయ్యనాయుడు సూచన
- కరోనాపై పోరాటంలో భారత్ విజయాలు ప్రపంచానికే ఆదర్శంగా నిలిచాయని వెల్లడి
- కరోనా వైరస్కు రికార్డు సమయంలో టీకా తయారు చేయడం అభినందనీయం.. త్వరలోనే ప్రతి భారతీయుడికీ టీకా అందుబాటులోకి వస్తుందని ఆశాభావం
- మహమ్మారిపై పోరాటంలో డీఆర్డీవో చొరవపై ప్రశంస
- శాస్త్ర సాంకేతిక రంగాల్లో మహిళల పాత్ర మరింత పెరగాలని ఆకాంక్ష
- మాతృభాషలో ప్రజలకు విజ్ఞానాన్ని మరింత చేరువ చేయాలని సూచన

భారతదేశం క్షిపణి సాంకేతికత రంగంలో ఆత్మనిర్భరత సాధించిందని, ఈ రంగంలో భారత్పై ఇతర దేశాలు ఆధారపడే స్థితికి చేరుకున్నామని గౌరవ ఉపరాష్ట్రపతి శ్రీ ముప్పవరపు వెంకయ్యనాయుడు పేర్కొన్నారు. ఈ కీలక పరిణామంలో డీఆర్ డీవో (రక్షణ రంగ పరిశోధన, అభివృద్ధి సంస్థ) శాస్త్రవేత్తలు, ఇంజనీర్లు సాధించిన కృషిని ఆయన అభినందించారు. క్షిపణి రంగంలో ఆత్మనిర్భరత సాధించడం, దేశ రక్షణలో కీలక పాత్ర వహించడమే గాక, మన దేశానికి గర్వకారణంగా నిలిచిందని, స్వదేశీ సాంకేతికతతో ఇలా ముందుకెళ్లడం ప్రతి భారతీయుడికీ గర్వకారణమని ఉపరాష్ట్రపతి పేర్కొన్నారు.

సోమవారం హైదరాబాద్లోని డీఆర్డీఎల్లోని డాక్టర్ అబ్దుల్ కలాం క్షిపణి కేంద్రాన్ని ఉపరాష్ట్రపతి సందర్శించారు. ఈ సందర్భంగా ఈ ప్రాంగణంలో రెండు నూతన భవనాలను ఆయన ప్రారంభించారు. సంస్థ ఆధ్వర్యంలో ఏర్పాటుచేసిన ప్రదర్శన (ఎగ్జిబిషన్)ను తిలకించారు. అనంతరం ఏర్పాటుచేసిన కార్యక్రమంలో మాట్లాడిన ఆయన, ఈ ప్రాంగణాన్ని సందర్శించిన తర్వాత దేశ రక్షణకు సంబంధించి డీఆర్డీవో శాస్త్రవేత్తలు సాధించిన గణనీయమైన ప్రగతి, ఈ రంగంలో దేశం ఆత్మనిర్భరత సాధించేందుకు వారు రూపొందిస్తున్న క్షిపణి సాంకేతికత విషయంలో మరింత విశ్వాసం పెరిగిందని పేర్కొన్నారు. శాస్త్రవేత్తల కృషి కారణంగా గతంలో విదేశాలనుంచి దిగుమతి చేసుకునే రక్షణ రంగ ఉత్పత్తులు వీలైనంత ఎక్కువగా భారతదేశంలోనే తయారవడమే గాక, విదేశాలకు క్షిపణులను భారత్ ఎగుమతి చేస్తుండటం అభినందనీయమని తెలిపారు.

ఆత్మనిర్భర భారత్ కారణంగా స్వదేశీ సాంకేతికత ప్రదర్శనకు సరైన వేదిక లభించడంతోపాటు స్థానికంగా ఉపాధికల్పన, ఇతర అవకాశాలకు మార్గం సుగమం అవుతుందన్నారు. ఆకాశ్ క్షిపణులకు అవసరమైన ఉత్పత్తులను ఇకపై

విదేశాలనుంచి దిగుమతి చేసుకోవాల్సిన అవసరం లేదని ఇటీవల రక్షణ శాఖ తీసుకున్న నిర్ణయమే.. డీఆర్డీవో సాధిస్తున్న ప్రగతిపై విశ్వాసాన్ని వెల్లడిస్తోందన్నారు.

2018లో క్షిపణి సాంకేతికత నియంత్రణ (ఎంటీసీఆర్)పై సంతకానికి ముందు భారతదేశంలో అభివృద్ధి చెందిన దేశాల క్షిపణి సాంకేతికత సంబంధించిన వినియోగానికి సంబంధించి ఎన్నో పరిమితులుండేవని ఈ సందర్భంగా గుర్తు చేసిన ఉపరాష్ట్రపతి, ప్రస్తుత పరిస్థితులను అవకాశాలుగా మలచుకుని స్వదేశీ తయారీ క్షిపణులను రూపొందిస్తున్న డి.ఆర్.డి.వి. చోరవ అభినందనీయమని తెలిపారు.

రక్షణ రంగ ఉత్పత్తుల దిగుమతి దారు స్థాయి నుంచి, ఎగుమతి చేసే స్థాయికి ఎదగడంపై హార్షం వ్యక్తం చేసిన ఉపరాష్ట్రపతి, ఈ దిశగా భారతదేశం మరింత ప్రగతిని సాధించేందుకు, భవిష్యత్ రక్షణ అవసరాలకు అనుగుణంగా వ్యూహాత్మక రక్షణ సాంకేతికత అభివృద్ధిపై దృష్టిపెట్టాలని సూచించారు. ఇందుకు తగ్గట్టుగా వీలునుబట్టి ప్రైవేటు రంగానికి అవకాశాలు కల్పించాలన్నారు. భవిష్యత్ మిలటరీ అవసరాలను దృష్టిలో పెట్టుకుని డీఆర్డీవో 8 అడ్వాన్స్డ్ టెక్నాలజీ సెంటర్స్ ను స్థాపించడాన్ని ఆయన అభినందించారు.

ఇటీవల భారతదేశంలో మహిళలు అన్ని రంగాల్లో సత్తా చాటుతున్నారని ప్రశంసించిన ఉపరాష్ట్రపతి, రక్షణ, పరిశోధన రంగాల్లో వీరిని మరింతగా ప్రోత్సహించాలని సూచించారు. ఇటీవలి కాలంలో తాను పాల్గొంటున్న విశ్వవిద్యాలయాల స్నాతకోత్సవాల్లో ఎక్కువశాతం యువతులే బంగారు పతకాలు సాధిస్తున్న విషయాన్నీ ఈ సందర్భంగా ఉపరాష్ట్రపతి ప్రస్తావించారు.

కరోనా మహమ్మారి కారణంగా సమాజంలోని అన్ని వర్గాలూ ఇబ్బందులకు గురయ్యాయని.. ప్రభుత్వం కీలకమైన సమయంలో తీసుకున్న అత్యంత కీలకమైన నిర్ణయాల కారణంగానే కరోనా వ్యాప్తి మరింత విస్తరించకుండా అడ్డుకోగలిగామని ఉపరాష్ట్రపతి పేర్కొన్నారు. కరోనాకు ముందు పీపీఈ కిట్లు దిగుమతి చేసుకునే స్థితిలో ఉన్న భారతదేశం, ఇప్పుడు విదేశాలకు పీపీఈ కిట్లను, మాస్కులను ఎగుమతి చేసే స్థాయికి ఎదగడమే భారతదేశ ఆత్మనిర్భర భారత్ నినాదం కార్యక్షేత్రంలో చూపిస్తున్న ఫలితాలకు నిదర్శనమన్నారు.

కరోనాకు టీకా విషయంలో భారతదేశం అద్వితీయమైన ప్రగతిని సాధించిందన్న ఆయన, రికార్డు సమయంలో టీకా ఉత్పత్తితోపాటు, విదేశాలకు కూడా టీకా ఎగుమతి చేయడాన్ని ఆయన ప్రస్తావించారు. త్వరలోనే ప్రతి భారతీయుడికీ కరోనా టీకా అందుతుందని ఆయన ఆశాభావం వ్యక్తం చేశారు.

కరోనాను అరికట్టడంలో భారతదేశం విజయవంతం అయిందన్న ఉపరాష్ట్రపతి, ఈ ప్రయత్నంలో ముందువరసలో నిలిచి పోరాడిన పోలీసులు, రక్షణ బలగాలు, వైద్యులు, వైద్య సిబ్బంది, పారిశుధ్య సిబ్బంది, శాస్త్రవేత్తలతో పాటు రైతులు చూపించిన స్ఫూర్తిని దేశం ఎప్పటికీ గుర్తుంచుకుంటుందన్నారు. అన్నదాతలు కరోనా సమయంలో రికార్డు స్థాయిలో ఉత్పత్తిని పెంచారని ప్రశంసించారు.

పరిశోధనలు, ప్రయోగాల తుది లక్ష్యం ప్రజల జీవితాలను సౌకర్యవంతంగా మార్చడమేనన్న ఉపరాష్ట్రపతి, వాతావరణ మార్పులపైన మరిన్ని పరిశోధనలు జరగాలని సూచించారు. విజ్ఞాన శాస్త్రం సహా ప్రతి అంశం మాతృభాషలో ప్రజలకు మరింత చేరువ కావాలని సూచించారు. 12రోజుల వ్యవధిలో డీఆర్డీవో ఆధ్వర్యంలో యుద్ధప్రాతిపదికన డిల్లీలో కరోనా బాధితుల కోసం వెయ్యిపడకల ఆసుపత్రిని నిర్మించిన విషయాన్నీ ఈ సందర్భంగా ఆయన గుర్తుచేశారు.

దేశం క్షిపణి రంగంలో ఇంత ప్రగతిని సాధించడంలో మాజీ రాష్ట్రపతి, భారతరత్న శ్రీ అబ్దుల్ కలాం పాత్ర చిరస్మరణీయమన్న ఉపరాష్ట్రపతి, నిరాడంబరుడైన శ్రీ కలాం గారిని ఎప్పుడు కలిసినా ఒక కొత్తవిషయాన్ని తెలుసుకోగలిగానని, అందుకే తనకు వారంటే అమితమైన గౌరవమని పేర్కొన్నారు.



ఈ కార్యక్రమంలో తెలంగాణ హోంశాఖ మంత్రి శ్రీ మహ్మద్ మహమూద్ అలీ, డీఆర్డీవో చైర్మన్ శ్రీ జి.సతీష్ రెడ్డితోపాటు డీఆర్డీవో శాస్త్రవేత్తలు పాల్గొన్నారు.



**Press Information Bureau**

**Government of India**

**Ministry of Defence**

*Mon, 25 Jan 2021 6:47PM*

## **Successful maiden test launch of Akash-NG Missile**

DRDO conducted the successful maiden launch of Akash-NG (New Generation) Missile from Integrated Test Range off the coast of Odisha on 25 January 2021. Akash-NG is a new generation Surface to Air Missile meant for use by Indian Air Force with an aim of intercepting high maneuvering low RCS aerial threats.

The missile intercepted the target with text book precision. The launch met all the test objectives by performing high maneuvers during the trajectory. The performance of the Command and Control system, onboard avionics and aerodynamic configuration of the missile was



successfully validated during the trial. During the test launch, entire flight path of the missile was monitored and the flight data was captured by various Range instruments such as Radar, EOTS and Telemetry systems deployed by ITR, Chandipur. The Multi Function Radar was tested for its capability of integration with the system.

The Akash-NG system has been developed with better deployability compared to other similar systems with canisterized launcher and much smaller ground system footprint. The test launch was carried out by a combined team of DRDO, BDL & BEL in the presence of the representatives of Indian Airforce.

Raksha Mantri Shri Rajnath Singh congratulated the scientists from DRDO, BEL and team from Indian Air Force for this achievement. Secretary DD R&D and Chairman DRDO Dr. G Satheesh Reddy congratulated the team for the successful flight trial of Akash NG Missile.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1692258>



Mon, 25 Jan 2021 6:47PM

## आकाश-एनजी मिसाइल का सफल परीक्षण

रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) ने दिनांक 25 जनवरी, 2021 को ओडिशा के तट से दूर एकीकृत परीक्षण रेंज से आकाश-एनजी (नई पीढ़ी) मिसाइल का सफल पहला प्रक्षेपण किया। आकाश-एनजी एक नई पीढ़ी की सतह से हवा में मार करने वाली मिसाइल है जिसका उद्देश्य भारतीय वायु सेना द्वारा उपयोग के लिए उंचाई से हमला करने वाले कम आरसीएस हवाई खतरों को रोकना है।

मिसाइल ने टेक्स्ट बुक सटीकता के साथ लक्ष्य पर निशाना साधा। मिसाइल ने प्रक्षेपवक्र के दौरान उच्च स्तरीय क्षमता का प्रदर्शन करके सभी परीक्षण उद्देश्यों को पूरा किया। परीक्षण के दौरान कमांड एंड कंट्रोल सिस्टम, ऑनबोर्ड एवियोनिक्स और मिसाइल



के एयरोडायनामिक विन्यास का प्रदर्शन सफलतापूर्वक सत्यापित हुआ। परीक्षण प्रक्षेपण के दौरान मिसाइल के पूरे उड़ान पथ पर नजर रखी गई और उड़ान के आंकड़ों को आईटीआर, चांदीपुर द्वारा तैनात रडार, ईओटीओ और टेलीमेट्री सिस्टम जैसे विभिन्न रेंज उपकरणों द्वारा हासिल किया गया। प्रणाली के साथ एकीकृत करके मल्टी फंक्शन रडार का उसकी क्षमता के लिए परीक्षण किया गया।

आकाश-एनजी प्रणाली को कनस्तरीकृत लांचर और बहुत छोटे ग्राउंड सिस्टम फुटप्रिंट के साथ अन्य समान प्रणालियों की तुलना में बेहतर तैनाती के साथ विकसित किया गया है। यह परीक्षण भारतीय वायु सेना के प्रतिनिधियों की उपस्थिति में रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ), बीडीएल और बीईएल की संयुक्त टीम द्वारा किया गया था।

रक्षा मंत्री श्री राजनाथ सिंह ने इस उपलब्धि के लिए डीआरडीओ, बीईएल और भारतीय वायु सेना की टीम के वैज्ञानिकों को बधाई दी। सचिव डीडी आरएंडडी और डीआरडीओ के अध्यक्ष डॉ जी सतीश रेड्डी ने आकाश एनजी मिसाइल के सफल उड़ान परीक्षण के लिए टीम को बधाई दी।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1692341>

## Venkaiah praises DRDO Scientists, engineers

Hyderabad: Vice President M Venkaiah Naidu on Monday praised the DRDO scientists and Engineers for taking India very close to self-reliance in Missile Technology (MT) with their hard work, dedication and perseverance.

Attaining self-reliance in the Defence sector is not only of critical or strategic importance for the country, but is also essential in terms of National pride”, he said.

The Vice President made these remarks while addressing the scientific community after inaugurating two new facilities at Dr APJ Abdul Kalam Missile Complex here.

Mr Naidu also visited the Exposition of Technologies by Missile Complex Laboratories and said that he was elated to see the indigenous products.

“I felt reassured about the security and capability of the country given the tremendous progress made by DRDO scientists in developing self reliant missile technology”, he said.

Mr Venkaiah expressed confidence that Scientists and Technologists of DRDO with their caliber and commitment will make India so self-reliant that Atma Nirbhar Bharat will attain a position where the world will be Bharat Par Nirbhar (dependent on India).

Emphasising the importance of Atma Nirbhar Bharat, the Vice President said that self-reliant technologies give boost to the local industry, generate employment opportunities and earn valuable foreign exchange.

Noting that the Akash Missile system has recently been put into the negative list of items for import by the Ministry of Defence, he called it a commendable achievement by DRDO. “It means that India is now self-reliant in this kind of missile system and so the armed forces need not import similar missile systems”, Mr Naidu said.

Referring to the limitations faced by India in having access to high end missile technology of developed countries prior to the signing of Missile Technology Control Regime (MTCR) in 2018, he said that DRDO turned this crisis into an opportunity by developing a range of indigenous missile systems. (PTI)

The Vice President expressed his happiness over the fact that India is now trying to shift its status from being one of the largest importers of Defence products to one of the top exporters of Defence items.

Underlining that India’s defence exports still remains very low despite the recent increase by 7 times, he said that there is a lot of scope in developing defence technologies of export value. He asked the scientists and technologists to not only identify the futuristic defence needs of the country but also the technologies that can be exported.

Referring to the rapidly changing technological landscape, Mr Naidu asked DRDO to redefine its focus on strategic defence technologies and outsource activities which can be carried out by capable private sector participants.

‘I am happy that DRDO has set up 8 advanced technology centers to carry out research on futuristic military applications and wanted the women to be encouraged to participate in the field of science and technology,’ the Vice President said.

Noting that the unprecedented disruption caused by COVID-19 pandemic has affected the people from all sections, particularly the poor, Mr Naidu appreciated Indian government’s response in containing the spread of the virus.

He lauded the Scientists for coming up with the vaccine in a record time and hoped that very soon the vaccine will reach every citizen of India and the pandemic will end.

Recognising that the pandemic has severely affected the economy and livelihoods, the Vice President said that it has also offered us an opportunity to establish our own strength and capabilities.

Mr Venkaiah said that rapid production and export of indigenous vaccines, PPE kits and healthcare systems has demonstrated our strengths in building an Atma Nirbhar Bharat.

He praised DRDO for its wholehearted support in fight against Coronavirus by providing many innovative technology solutions.

“The establishment of a 1000-bed hospital in just 12 days illustrates the kind of capabilities DRDO has and how quickly it can respond in war-like situations”, Mr Naidu said.

On the occasion, the Vice President inaugurated two new facilities- a Missile System Review Hall and Air Commodore V Ganesan Integrated Weapon System Design & Development Center at Dr APJ Abdul Kalam Missile Complex.

Telangana Home Minister Mohammed Mahmood Ali, DRDO Chairman Dr G Satheesh Reddy, Director General (Missile & Strategic Systems), MSR Prasad, Scientists of DRDO were among those who were present. (UNI)

<https://www.dailyexcelsior.com/venkaiah-praises-drdo-scientists-engineers-2/>



Tue, 26 Jan 2021

## Next-generation surface-to-air Akash missile successfully test-fired

*The test assumes significance as it came a few days after the Union Cabinet chaired by PM Narendra Modi gave its go-ahead to the export of Akash missile systems to friendly countries*

*By Hemant Kumar Rout*

Bhubaneswar: Achieving a major milestone in the ongoing Surface to Air Missile (SAM) programme, India on Monday successfully conducted the first test of Akash-New Generation (NG) aiming to bolster country's air defence capabilities. The missile was launched from a mobile platform at the Launching Complex - III of the Integrated Test Range off Odisha coast at about 2.30 pm against an electronic target.

Defence sources said, the missile intercepted the target with text book precision having met all the test objectives by performing high manoeuvres during the trajectory. Performance of the command and control system, onboard avionics and aerodynamic configuration of the missile was successfully validated during the maiden trial. Akash-NG is a new generation SAM system meant for use by Indian Air Force to intercept high manoeuvring low radar cross section aerial threats.



The 'Akash-Next Generation' missile being test-fired from a defence facility off Odisha coast on Monday. (Photo | Special arrangement)

This advanced variant comes with Active Electronically Scanned Array (AESA) multi-function radar that features all three functions - search, track and fire control in one platform. The earlier version is guided by phased array fire control radar. The missile, with canisterised launcher and much smaller ground system footprint, has been developed with better deployability compared to other similar systems. The multi function radar was tested for its capability of integration with new missile system.

The successful maiden test comes close on the heels of the Union Cabinet chaired by Prime Minister Narendra Modi that gave a go ahead to export of Akash missile systems to friendly foreign countries. DRDO Chairman and Secretary, Department of Defence (Research and Development) G Satheesh Reddy termed the Akash-NG team's achievement as path-breaking which will pave way for completion of development of the system for engaging stealth air targets with ultra low radar observability.

The new Akash system can defend an area of at least 10 times better compared to any short range SAM and is capable of engaging up to 10 targets simultaneously. The earlier variant has a maximum range of 30 km, while Akash-NG can strike targets up to 70 km. Akash is India's first indigenously designed, developed and produced air defence system. It also is the cheapest surface to air missile ever produced in the world with supersonic powered intercept.

<b>THE NEW AKASH SYSTEM</b>		
<p>The two-stage new generation missile has a cylindrical body with four-cropped delta fins at mid-body and four tail fins</p>	<p>It possesses new propulsion system, active RF seeker, laser proximity fuse, electro-mechanical actuation and pre-fragmented warhead</p>	<p>For its multiple target handling features, automated air defence operations, Akash stands out unique amongst the available short / medium range SAMs</p>
<p>It is the cheapest surface to air missile ever produced in the world with supersonic powered intercept</p>	<p>WITH MID-COURSE COMMAND GUIDANCE AND TERMINAL ACTIVE GUIDANCE, IT IS DIFFICULT TO BE DETECTED AND JAMMED</p>	

The test launch was carried out by a combined team of DRDO, Bharat Dynamics Limited (BDL) and Bharat Electronics Limited (BEL) in the presence of IAF officials. Defence Minister Rajnath Singh congratulated the scientists and IAF for the maiden achievement. Development of the Akash-NG was approved in September 2016 with a funding support of around Rs 500 crore.

<https://www.newindianexpress.com/nation/2021/jan/25/next-generation-surface-to-air-akash-missile-successfully-test-fired-2254916.html>

## Business Standard

Wed, 27 Jan 2021

# Akash NG surface-to-air missile scores in maiden Republic Day eve test

*The new generation surface-to-air missile, engineered to shoot down high-performing fighter aircraft, was test launched at Balasore*

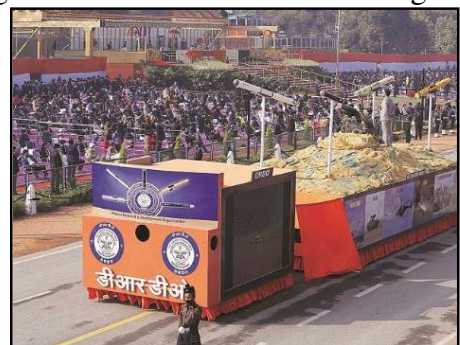
*By Ajai Shukla*

Prominent at the Republic Day parade on Tuesday was a tableaux depicting the missile programme of the Defence R&D Organisation (DRDO). But one of the missiles featured — the Akash New Generation (Akash NG) surface-to-air missile (SAM) — had already made a splash a day earlier, with its successful maiden test launch at Balasore, off the coast of Odisha.

The Indian Air Force (IAF) and the army already operate nine batteries of the venerable, but reliable, Akash missile. This is now being improved into the Akash-NG — a new generation SAM, engineered to shoot down extremely high-performing fighter aircraft — termed “high-maneuvring, low radar cross-section aerial threats” by the IAF.

The key advantage of the Akash NG is its brand-new rocket motor. Instead of the old ramjet that powered the legacy Akash missile, the new version has a two-pulse, solid rocket motor. This gives it a longer range of 30 km and the ability to generate a high terminal velocity, outperforming even the fastest and most agile enemy fighter.

“When the second pulse motor is fired, the Akash NG speeds up and no enemy aircraft can get away,” said a DRDO scientist involved in the development of the new missile.



The Indian Air Force (IAF) and the army already operate nine batteries of the venerable, but reliable, Akash missile

Making the Akash NG even more deadly is its entirely indigenous seeker head, which has been developed by the DRDO laboratory, Research Centre Imarat (RCI). This locks onto the enemy aircraft and continuously guides the Akash NG warhead to its impact point with the target.

The Akash NG detects enemy fighters at ranges out to 80 km. By the time the enemy aircraft is 50 km away, the Akash NG's computers have calculated the launch trajectory and impact point, and the missile is launched. In just over a minute, the Akash NG missile blazes its way to the impact point 30 km away and strikes the target.

Speed and precision		
▶ Akash NG detects enemy fighters up to 80 km away	▶ By the time the enemy aircraft is 50 km away, Akash NG's computers have calculated launch trajectory and impact point, and the missile is launched	▶ Missile blazes its way to the impact point 30 km away and strikes the target in just over a minute

The rocket itself has been re-engineered almost completely and has been brought down from the legacy Akash's weight of 700 kg to a sleek 350 kg. That allows the Akash NG launchers to carry more than the three missiles that the legacy Akash launcher carried.

The IAF has already inducted seven units of the Akash missile, while the army has inducted two units and has another two on order. Defence ministry sources said the army is likely to incorporate several features of the Akash NG in its current order.

The IAF has part-funded the development of the Akash NG. Costs are likely to reduce if interest from foreign buyers of the cheap, hardy missile translates into export orders.

In December, the Union Cabinet approved exporting the Akash missile system. The government has been pursuing sales to Southeast Asian countries that are wary of Chinese aggression, including Vietnam and the Philippines. There is also interest from several African countries.

The defence ministry has announced that indigenisation levels in the Akash are above 96 per cent. Bharat Electronics is the lead integrator for the IAF's Akash squadrons, while Bharat Dynamics is the lead integrator for the Army order. Many of the Akash's sub-systems have been outsourced to private industries.

"The Akash NG test on Monday validated the missile's propulsion, aerodynamics and control systems," said a DRDO scientist. "Two more series of tests will follow — first of its guidance system and seeker and then of its warhead. By the year-end, if all goes well, the Akash NG will be ready to enter manufacture."

[https://www.business-standard.com/article/current-affairs/akash-ng-surface-to-air-missile-scores-in-maiden-republic-day-eve-test-121012601130\\_1.html](https://www.business-standard.com/article/current-affairs/akash-ng-surface-to-air-missile-scores-in-maiden-republic-day-eve-test-121012601130_1.html)

## DRDO ने किया आकाश न्यू जेनरेशन मिसाइल का सफल परीक्षण, वायुसेना होगी और मजबूत

*डीआरडीओ ने सोमवार को ओडिशा के तट से इंटीग्रेटेड टेस्ट रेंज से आकाश एनजी (न्यू जेनरेशन) मिसाइल का सफल प्रक्षेपण किया। आकाश एनजी एक नई पीढ़ी का सरफेस-टू-एयर मिसाइल है जिसका उपयोग भारतीय वायुसेना द्वारा उच्च पेंतरेबाजी वाले हवाई खतरों को रोकने के उद्देश्य से किया जाता है।*

*By Arun Kumar Singh*

लावा पांडे, बालेश्वर: भारत द्वारा स्वदेश में निर्मित मध्यम दूरी की सतह से हवा में मार करने वाली आकाश प्रक्षेपास्त्र का सोमवार दोपहर को सफलतापूर्वक परीक्षण किया है यह परीक्षण चांदीपुर परीक्षण परिसर एलसी 3 से दोपहर करीब 2:40 पर किया गया है और यह परीक्षण पूरी तरह से सफल रहा। स्वदेशी निर्मित मध्यम दूरी की सतह से हवा में मार करने वाले प्रक्षेपास्त्र आकाश को रक्षा अनुसंधान और विकास संगठन डीआरडीओ द्वारा विकसित किया गया है। यह प्रक्षेपास्त्र विमान को 30 किलोमीटर दूर एवं 18000 मीटर ऊंचाई तक टारगेट कर सकता है। इसमें लड़ाकू जेट विमान क्रूज मिसाइलों और हवा से सतह वाली मिसाइलों के साथ-साथ बैलिस्टिक मिसाइलों जैसे हवाई लक्ष्यों को बेअसर करने की क्षमता है।



दुश्मन जब तक इसको रोकने का प्रयास करेगा तब तक यह उसे मार कर नेस्तनाबूद कर देगी। इसको एंटी मिसाइल के तौर पर भी उपयोग में लाया जा सकता है। यह भारतीय थल सेना और भारतीय वायु सेना के साथ परिचालन सेवा में है।

आकाश 30 किलोमीटर की एक अवरोधक सीमा के साथ सतह से हवा में मार करने वाली मिसाइल है इसका वजन 720 किलोग्राम व्यास 35 सेंटीमीटर और लंबाई 5.78 मीटर है आकाश सुपर सोनिक गति पर 2.5 मैक के आसपास पहुंचती है यह 18 किलोमीटर की ऊंचाई तक पहुंच सकती है और ट्रक और पहियेदार दोनों प्लेटफॉर्म से फायर किया जा सकता है। इस मिसाइल को चरण बद्ध सारिणी फायर कंट्रोल रडार द्वारा निर्देशित किया जाता है, जिसे राजेंद्र कहा जाता है। यह बैटरी स्तर रडार बीएलआर के रूप में लगभग 7 किलोमीटर तक के टारगेट की ट्रैकिंग कर सकता है। आज इसके परीक्षण के मौके पर रक्षा अनुसंधान और विकास संगठन तथा अंतरिम परीक्षण परिषद से जुड़े वरिष्ठ अधिकारी और वैज्ञानिक मौके पर मौजूद थे।

1990 में आकाश मिसाइल का पहला परीक्षण उड़ान आयोजित की गई थी और मार्च 1997 तक इसकी विकास की उड़ानें चली। दिसंबर 2007 में भारतीय वायु सेना ने इस मिसाइल के लिए उपयोगकर्ता परीक्षण पूरा किए। पिछले दिनों आकाश मिसाइल की खरीद में दक्षिण एशिया के नौ देशों एवं अफ्रीकी मित्र देशों ने रुचि दिखाई। कुछ मित्र देशों ने आकाश मिसाइल के अतिरिक्त तटीय निगरानी प्रणाली, रडार तथा एयर प्लेटफॉर्म को भी खरीदने में अपना रुझान दिखाया है।

रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) द्वारा विकसित आकाश मिसाइल की तकनीक एवं विकास 96 प्रतिशत स्वदेशी है। भारत ने यह भी स्पष्ट कर दिया है कि भारत आकाश मिसाइल केवल उन्हीं देशों को बेचेगा जिनसे उसके बेहतर एवं मैत्रीपूर्ण संबंध हैं।

<https://www.jagran.com/news/national-drdo-conducted-successful-maiden-launch-of-akash-ng-new-generation-missile-21307181.html>



Tue, 26 Jan 2021

## चीन के साथ तनाव के बीच भारत ने बढ़ाई इंडियन एयरफोर्स की ताकत, Akash-NG का किया सफल परीक्षण

*भारत ने Akash-NG मिसाइल का सफल परीक्षण कर लिया है। ये नए जेनरेशन की मिसाइल है जो हवा में ही दुश्मन का काम तमाम कर सकती है। इसका उपयोग हवाई खतरों को रोकने के लिए किया जाएगा।*

नई दिल्ली: लाइन ऑफ एक्चुअल कंट्रोल (LAC) पर चीन से जारी तनाव के बीच सोमवार को रक्षा अनुसंधान एवं विकास संगठन (DRDO) ने न्यू जेनरेशन आकाश-एनजी मिसाइल (Akash-NG) का सफल परीक्षण कर लिया है। यह परीक्षण ओडिशा के तट पर इंटीग्रेटेड टेस्ट रेंज से किया गया, जहां मिसाइल ने सफलतापूर्वक अपने टारगेट को ध्वस्त कर दिया।

### नई पीढ़ी की सरफेस-टू-एयर मिसाइल

बताते चलें कि आकाश-एनजी एक नई पीढ़ी की सरफेस-टू-एयर (surface-to-air) मिसाइल है, जिसका उपयोग इंडियन एयरफोर्स द्वारा उच्च पेंतरेबाजी वाले हवाई खतरों को रोकने के उद्देश्य से किया जाएगा। DRDO की ओर से जारी किए गए आधिकारिक



बयान में कहा गया है कि मिसाइल का परीक्षण सभी मानकों पर सफल रहा। इस मिसाइल का कमांड कंट्रोल सिस्टम, एवियोनिक्स, एरोडायनेमिक सिस्टम सभी ने ठीक ढंग से काम किया है।

### 4321 KM/h की रफ्तार से भरेगी उड़ान

जानकारी के अनुसार, इस मिसाइल का वजन करीब 720 किलोग्राम है और इसकी लंबाई 19 फीट है। डीआरडीओ के अनुसार, यह 60 किलोग्राम तक के भार वाले हथियारों के साथ 4321 किलोमीटर प्रति घंटे की रफ्तार से उड़ान भर सकती है। यानी पलक झपकने से भी कम समय में ये मिसाइल दुश्मन को मार कर नेस्तनाबूद कर देगी।

<https://zeenews.india.com/hindi/india/drdo-successfully-test-fired-next-generation-surface-to-air-akash-missile/835120>



## Work on twin engine deck based fighter for Indian Navy aircraft carriers on track, wind tunnel test soon

Work on India's twin-engine deck based fighter (TEDBF), which will operate from the Indian Navy's current and future aircraft carriers, is on track, Vinod Kumar, the project director for the programme, has said.

The TEDBF is being developed to replace Russian-origin MiG-29Ks.

In an interview to journalist Anantha Krishnan M, Kumar said the Aeronautical Development Agency (ADA) has received inputs from the Navy and worked out two configurations which satisfy most of the requirements.



India's twin-engine deck based fighter, being developed to replace Russian-origin MiG-29Ks, is likely to be ready by 2026

Kumar said that the ADA received "informal requirements" for the TEDBF from the navy "very early in 2020". The formal operational requirements were given by the Indian Navy in May, after which the ADA worked out two configurations for the TEDBF program — "Delta-Canard and Trapezoidal with Tail".

Both these configurations satisfy most of the requirements put forward by the Indian Navy for this program, the TEDBF project director added.

"We are confident about the configurations. We will go to the Indian Navy, the user, and then seek their view on what is the way ahead to freeze the configuration and fine tune all the requirements with the PSQR (Preliminary Staff Qualitative Requirements) that will be released by the Indian Navy," Kumar said.

Kumar revealed that the Delta-Canard configuration of the deck based fighter will undergo low-speed wind tunnel tests soon.

"Requirements that the navy has put in terms of carrier suitability and performance have been taken into consideration for this configuration," he said.

ADA started pursuing a twin-engine design (now TEDBF) after the Indian Navy made it clear that it was not interested in a single-engine fighter. This effectively killed the Mk.2 version of the single-engine naval TEJAS.

"The Indian Navy is looking for a twin-engine deck based fighter in lieu of the TEJAS Navy MK-2. With confidence generated from AMCA design, we have developed twin engine competence," the ADA has said in the past.

"We are not ditching the TEJAS Navy MK-2. The navy is adamant they do not want a single engine fighter. Hence we have to reconfigure. This decision has been forced on us. It involves a significant design effort which could be avoided if we continue with the single engine TEJAS Navy Mk.2," an ADA officer told Liveness.

Kumar said that the experience gained and technology developed by the ADA in the navalisation of the TEJAS will flow into the TEDBF programme. Naval version of the TEJAS made its first successful ski jump take-off and arrested landing from the INS Vikramaditya on 12 January last year.

The TEDBF, which will weigh around 23 tonnes, will be larger than the 13.5 tonne TEJAS MK-1 fighter and the 17.5 ton Mk-2 version of the fighter. The fighter would be in the same class as the MiG-29Ks, which the Indian Navy currently operates from its only operational aircraft carrier, the INS Vikramaditya.

Reports say the fighter, currently in the initial stages of design and development, would have the ability to carry a weapons payload of nine tons.

As a dedicated deck based fighter, it will feature folding wings to save space.

The TEDBF will be equipped with a large number of indigenous sensors and weapons. According to the ADA, the fighter will have an improved version of the home-grown Uttam active electronically scanned array radar developed by the Electronics and Radar Development Establishment of Defence Research and Development Organisation (DRDO). Advanced version of India's first air-to-air missile, Astra, will also be integrated on the TEDBF.

The TEDBF should be ready by 2026, Navy Chief Admiral Karambir Singh said at a presser ahead of the Navy Day in December 2020.

“The Qualitative Requirements [QR] are being made. They said they should be able to push it out by 2026. If it meets our time and QR requirements, we will definitely take it [fighter aircraft],” the Navy Chief was quoted as saying.

<http://www.indiandefensenews.in/2021/01/work-on-twin-engine-deck-based-fighter.html>



Tue, 26 Jan 2021

## DRDO subsidiary, DIAT launches first company through its IIC scheme

DIAT is the short form of Defence Institute of Advanced Technology is a deemed to be university under DRDO- Department of Defence Research and Development. The DRDO further comes under the Ministry of Defence, Government of India.

The Defence Institute of Advanced Technology, hereafter referred to as DIAT has recently launched its first on-campus company under its IIC – Innovation and Incubation Centre Scheme.

The government-owned deemed university under the Ministry of Defence has initiated its entrepreneurial and start-up programs through its Innovation and Incubation Centre policy, as mentioned in a report by The Indian Express.

As the Indian start-up ecosystem in on a boost from the past many months because of the ongoing COVID-19 pandemic and the rise of digitisation in India, the Indian government has

decided to give acknowledgement and support to this phenomenon by introducing schemes and initiatives to promote the country's start-up and entrepreneurial ecosystem.

According to several reports, DIAT is a deemed to be university which has not yet been affiliated. As mentioned, it has recently launched its first on-campus company called Navyukti Innovations Private Limited which is led by Professor Sangeeta Kale along with several other



experts including market experts, medical professionals and some institute alumni, according to The Indian Express.

The new on-campus company was inaugurated last week by Dr CP Ramanarayanan, Vice-Chancellor, DIAT who mentioned in his announcement that the company was launched under DIAT's IIC policy which promotes entrepreneurship and start-ups to be established in the field of Defence Technology along with future-oriented technologies. He further added that DIAT aims to engage students, faculties, scholars and alumni of the Institute in the activities of the Innovation and Incubation Centre activities.

Start-ups have become a major part of the Indian ecosystem with a boost from the Indian government. Yes, the government is promoting several initiatives to boost this start-up culture in the country which will give India, global recognition while strengthening its economy at large.

Under the leadership of Prime Minister Narendra Modi, the Indian government has launched its 'Atmanirbhar Bharat' initiative which means Self-reliant India. Under this scheme, the government is promoting start-ups and companies to begin manufacturing locally and not be completely dependent on international markets. The success of this initiative will boost the country's economy and make India a global exporter of products.

The idea behind DIAT supports this initiative where the institute is focussed on developing indigenous technologies that will contribute to the Government's initiative to become self-reliant. The success of such initiatives will surely put India in the position of a market leader in future technologies.

<https://techstory.in/drdo-subsiary-diat-launches-first-company-through-its-iic-scheme/>

## DRDO on Twitter





**Vice President of India** @VPSecretariat · Jan 25

The Vice President planting a sapling at the premises of DRDL Complex in Hyderabad today. #DRDO #DRDL



**Vice President of India** @VPSecretariat · Jan 25

The Vice President visiting the Exposition of Technologies by Missile Complex Laboratories after inaugurating it at the DRDL complex in Hyderabad today. #DRDO #DRDL



**Vice President of India** @VPSecretariat · Jan 25

India is now trying to shift its status from being one of the largest importers of defence products to one of the top exporters of defence items. @DRDO\_India #DRDL



**Vice President of India** @VPSecretariat · Jan 25

The Vice President inaugurating the Integrated Weapon System Design Centre at the Defence Research and Development Laboratory (DRDL) Complex in Hyderabad today. #DRDO #DRDL


 A photograph showing the Vice President of India, M. Venkaiah Naidu, in a white kurta, inaugurating a plaque. He is surrounded by other officials, including one in a dark suit. The plaque is framed by a red and gold floral garland. The plaque text includes 'DEFENCE RESEARCH & DEVELOPMENT LABORATORY', 'ABUL KASHIM KHAN & GUNESAN', and 'SRI A. BHARAT BHUSHAN BABU'.

**Vice President of India** @VPSecretariat · Jan 25

Interacting with @DRDO scientists today gave me confidence that we are quickly moving towards atma nirbharta. #DRDL

**Vice President of India** @VPSecretariat · Jan 25

Self-reliance in defence is not only of strategic importance for the country, but also a matter of our national pride. #DRDL #DRDO

**A. Bharat Bhushan Babu** @SpokespersonMoD · 22h

@DRDO\_India Conducts Successful Maiden Test Launch of Akash-NG Missile  
 Akash-NG is a new generation Surface to Air Missile meant for use by Indian Air Force with an aim of intercepting high maneuvering low RCS aerial threats. [pib.gov.in/PressReleasePa...](https://pib.gov.in/PressReleasePa...)


 Two side-by-side photographs showing the launch of an Akash-NG missile. The left photo shows the missile on the launch pad, and the right photo shows the missile in flight against a clear sky.

# Defence Strategic: National/International



Press Information Bureau  
Government of India

Ministry of Defence

Mon, 25 Jan 2021 3:56PM

## **Raksha Mantri Shri Rajnath Singh launches revamped Gallantry Awards Portal to honour the immortal contribution of the fearless Gallantry Awardees of India; Urges people to participate in ‘Gallantry Awards Quiz’ and ‘Selfie for Bravehearts’**

Raksha Mantri, Shri Rajnath Singh launched a revamped version of the Gallantry Awards Portal [www.gallantryawards.gov.in](http://www.gallantryawards.gov.in) today on the eve of the Republic Day 2021. This Portal will serve as a one-stop virtual platform to honour the immortal contribution of the fearless Gallantry Awardees of India. Nationwide Quiz and ‘Selfie for Bravehearts’ Initiatives were also launched on the portal.

Since our nation’s independence, our brave men and women have displayed exemplary courage and devotion for the nation. Under the visionary leadership of Prime Minister of India, Shri Narendra Modi, the Government of India has accorded topmost priority to honour the immortal contribution of its Bravehearts for protecting the unity and integrity of our nation. Launching of a revamped Gallantry Awards Portal is a key initiative undertaken in this regard.

Speaking during the launch program, Raksha Mantri hailed the significant role played by the Gallantry Awardees of India in not only securing our nation but also inspiring the future generations of the country to contribute for protecting our motherland. He further stated that in the coming years, the Gallantry Awards Portal shall transform as an interactive, participative and dynamic platform that shall instill a sense of patriotism and devotion among the citizens especially the Yuva Shakti of the nation. Recalling some of the initiatives like the implementation of OROP and building of National War Memorial, Shri Rajnath Singh said the government has been doing everything to acknowledge the contributions of our veterans and martyrs.

Defence Secretary Dr Ajay Kumar said that the revamped website has new enriched content, graphics and participative features aimed towards celebrating valour of Armed Forces in India, to provide a wholesome experience to the user and to develop an ecosystem for honouring the contribution of martyrs in nation-building.

On the occasion of the launch of the revamped Gallantry Awards Portal, a nationwide Gallantry Awards Quiz has also been initiated on the Portal platform. This quiz aims to provide an opportunity to the bright minds from across the nation to showcase their knowledge about the Gallantry Awardees of India. This program shall be organised from 26 January 2021 to 26 February 2021. Another initiative, ‘Selfie for Bravehearts’ was also launched which encourages and invites citizens to click their selfie images in front of war memorials and monuments across the

country and show their support for the Gallantry Awardees of the nation. Raksha Mantri urged people to participate in the Quiz competition and Selfie initiative.

Chief of Defence Staff General Bipin Rawat, Chief of Army Staff General Manoj Mukund Naravane, Chief of Naval Staff Admiral Karambir Singh, Chief of Air Staff Air Chief Marshal R K S Bhaduria and other senior officials from MoD were also present on the occasion.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1692171>



पत्र सूचना कार्यालय  
भारत सरकार

रक्षा मंत्रालय

Mon, 25 Jan 2021 3:56PM

## रक्षा मंत्री श्री राजनाथ सिंह ने भारत के साहसी वीरता पुरस्कार विजेताओं के अमर योगदान को सम्मानित करने के लिए नया वीरता पुरस्कार पोर्टल शुरू किया; लोगों से 'वीरता पुरस्कार प्रश्नोत्तरी' एवं 'सेल्फी फॉर ब्रेवहार्ट्स' में भाग लेने का आग्रह किया

रक्षा मंत्री श्री राजनाथ सिंह ने गणतंत्र दिवस 2021 की पूर्व संध्या पर आज [www.gallantryawards.gov.in](http://www.gallantryawards.gov.in) वीरता पुरस्कार पोर्टल का नया संस्करण लॉन्च किया। यह पोर्टल भारत के साहसी वीरता पुरस्कार विजेताओं के अमर योगदान को सम्मानित करने के लिए एक वन-स्टॉप वर्चुअल प्लेटफॉर्म के रूप में काम करेगा। पोर्टल पर राष्ट्रव्यापी प्रश्नोत्तरी और 'सेल्फी फॉर ब्रेवहार्ट्स' पहल भी शुरू की गई।

हमारे देश की आजादी के बाद से हमारे वीर पुरुषों और महिलाओं ने राष्ट्र के लिए अनुकरणीय साहस और निष्ठा का प्रदर्शन किया है। भारत के प्रधानमंत्री श्री नरेंद्र मोदी के दूरदर्शी नेतृत्व में भारत सरकार ने हमारे राष्ट्र की एकता और अखंडता की रक्षा के लिए अपने बहादुरों के अमर योगदान को सम्मानित करने को सर्वोच्च प्राथमिकता दी है। इस संबंध में एक नया वीरता पुरस्कार पोर्टल शुरू करना एक महत्वपूर्ण पहल है।

पोर्टल के शुभारंभ कार्यक्रम के दौरान रक्षा मंत्री ने भारत के वीरता पुरस्कार विजेताओं द्वारा न केवल हमारे राष्ट्र की सुरक्षा करने में महत्वपूर्ण भूमिका का स्वागत किया बल्कि देश की भावी पीढ़ियों को भी हमारी मातृभूमि की रक्षा के लिए योगदान देने के लिए प्रेरित किया। उन्होंने आगे कहा कि आने वाले वर्षों में वीरता पुरस्कार पोर्टल एक इंटरैक्टिव, सहभागी और गतिशील मंच के रूप में बदल जाएगा जो नागरिकों विशेषकर राष्ट्र की युवा शक्ति के बीच देशभक्ति और निष्ठा की भावना पैदा करेगा। ओआरओपी के कार्यान्वयन और राष्ट्रीय युद्ध स्मारक के निर्माण जैसी कुछ पहलों को याद करते हुए श्री राजनाथ सिंह ने कहा कि सरकार हमारे पूर्व सैनिकों और बलिदानियों के योगदान को मान्यता प्रदान करने के लिए सब कुछ कर रही है।

रक्षा सचिव डॉ अजय कुमार ने कहा कि संशोधित वेबसाइट में भारत में सशस्त्र बलों के पराक्रम का जश्न मनाने, उपयोगकर्ता को एक सम्पूर्ण अनुभव प्रदान करने और राष्ट्र निर्माण में बलिदानियों के योगदान को सम्मानित करने के लिए एक पारितंत्र विकसित करने के उद्देश्य से नई समृद्ध सामग्री, ग्राफिक्स और सहभागी विशेषताएं शामिल हैं।

नये वीरता पुरस्कार पोर्टल के शुभारंभ के अवसर पर पोर्टल मंच पर राष्ट्रव्यापी वीरता पुरस्कार प्रश्नोत्तरी भी शुरू की गई है। इस प्रश्नोत्तरी का उद्देश्य देश भर की उज्ज्वल प्रतिभाओं को भारत के वीरता पुरस्कार विजेताओं के बारे में अपने ज्ञान को प्रदर्शित करने का अवसर प्रदान करना है। यह कार्यक्रम दिनांक 26 जनवरी 2021 से 26 फरवरी 2021 तक आयोजित किया जाएगा। एक अन्य पहल, 'सेल्फी फॉर ब्रेवहार्ट्स' भी शुरू की गई जो देश भर में युद्ध स्मारकों और स्मारकों के समक्ष अपनी सेल्फियों पर क्लिक करने और राष्ट्र के वीरता पुरस्कार विजेताओं के प्रति अपना साथ दिखाने के लिए नागरिकों को प्रोत्साहित और आमंत्रित करती है। रक्षा मंत्री ने लोगों से प्रश्नोत्तरी प्रतियोगिता और सेल्फी पहल में भाग लेने का आग्रह किया।

इस अवसर पर चीफ ऑफ डिफेंस स्टाफ जनरल बिपिन रावत, सेना प्रमुख जनरल मनोज मुकुंद नरवणे, नौसेना प्रमुख एडमिरल करमबीर सिंह, वायुसेना प्रमुख एयर चीफ मार्शल आर के एस भदौरिया और रक्षा मंत्रालय के अन्य वरिष्ठ अधिकारी भी मौजूद थे।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1692245>



**Press Information Bureau**  
**Government of India**

**Ministry of Defence**

*Mon, 25 Jan 2021 12:48PM*

## **Indian Navy conducts joint exercise with Army and Air Force**

A large-scale tri-service joint amphibious exercise AMPHEX – 21 was conducted in Andaman & Nicobar group of islands from 21 – 25 Jan 2021. The exercise involved participation of Naval ships, amphibious troops of the Army and different types of aircraft from the Air force.

The exercise was aimed at validating India's capabilities to safeguard the territorial integrity of its island territories. It also sought to enhance operational synergy and joint warfighting capabilities amongst the three Services.

The exercise involved multi-faceted maritime operations by synergised employment of amphibious assault ships, surveillance platforms, execution of maritime air strikes and complex manoeuvres at sea. Airborne insertion of Marine Commandos of Navy and Special Forces of the Army, naval gunfire support, amphibious landing of forces and follow-on operations also formed part of the exercise.

Ex KAVACH for defence of Andaman & Nicobar Islands formed a part of AMPHEX – 21. A joint intelligence, surveillance and reconnaissance exercise under the aegis of HQ Integrated Defence Staff was also run concurrently to achieve Maritime Domain Awareness by employment of a multitude of sensors.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1692108>





*Mon, 25 Jan 2021 9:39AM*

## **Joint Military Exercise in Andaman Sea**

Towards enhancing joint operational readiness, Indian Armed Forces conducted a large-scale conjoint military training exercise “KAVACH” alongwith “AMPHEX-21” in the Andaman Sea and Bay of Bengal. The exercise was conducted under the aegis of Andaman and Nicobar Command (ANC) with participation of Eastern Naval Command (ENC) and Army Southern Command (SC) involving assets of Army, Navy, Air Force and Coast Guard. The exercise involved participation and deployment of all forces of ANC, elements of Amphibious Brigade of Army’s Southern Command along with corvettes, submarine and amphibious landing ships of Navy’s Eastern Fleet and Marine Commandos. Jaguar Maritime Strike and transport aircraft from Indian Air Force and assets of Coast Guard also participated.

The exercise commenced with maritime strikes by Jaguar aircraft, Para Commandos and Marine Commandos carrying out Combat Free Fall at Car Nicobar with an aim to validate air dominance and maritime strike capability within the area of interest in Indian Ocean Region (IOR). Prior to amphibious landing operations, troops of the Army, Navy and Air Force were mobilised and transported by sea and air in close coordination with all agencies.

As part of shaping the battle field, MARCOS along with their combat loads and Air Droppable Rigid Hull Inflatable Boats (ADR) were dropped over the Andaman Sea, enabling the Marine Commandos reach the target with stealth and speed. MI-17 V5 Armed Helicopters undertook precision targeting against designated enemy assets at sea and on land. The training exercise culminated with the beach landing operations by elements of Amphibious Brigade of Southern Command from INS Jalashwa, Airavat, Guldar and LCU MK-4 class of ships with 600 troops along with tanks, troop carrier vehicles and other heavy weapons. The logistic team demonstrated and validated the joint logistic system and its capabilities to respond to dynamic changes in operational situations and combat missions. The areas in which the exercise was conducted holds strategic significance for India.

The exercise also validated joint capabilities of intelligence gathering from space, air, land and sea based assets, its synthesis, analysis and near real time sharing to achieve battle field transparency for quick decision making. The joint force executed multi-domain, high intensity offensive and defensive manoeuvres in the Andaman Sea and Bay of Bengal. The tri-services exercise fine-tuned joint war fighting capabilities and Standard Operating Procedures towards enhancing operational synergy.

Commander-in-Chief Andaman and Nicobar Command visited the exercise area in the Southern Group of Islands to oversee the exercise and commended all Ranks for the high level of operational preparedness.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1692051>





## पत्र सूचना कार्यालय भारत सरकार

### रक्षा मंत्रालय

Mon, 25 Jan 2021 9:39AM

## अंडमान के समुद्र में संयुक्त सैनिक अभ्यास

संयुक्त परिचालन तत्परता को बढ़ाने के लिए, भारतीय सशस्त्र बलों ने अंडमान के समुद्र और बंगाल की खाड़ी में बड़े पैमाने पर "एमफैक्स-21" के साथ "कवच" संयुक्त सैन्य प्रशिक्षण अभ्यास किया। यह अभ्यास अंडमान और निकोबार कमान (एएनसी) के तत्वावधान में सेना, नौसेना, वायु सेना और तटरक्षक बल की पूर्वी नौसेना कमान (ईएनसी) और सेना की दक्षिणी कमान (एससी) की भागीदारी से आयोजित किया गया था। अभ्यास में एएनसी के सभी बलों की भागीदारी और तैनाती, सेना की दक्षिणी कमान की जल थल चर ब्रिगेड के साथ-साथ नौसेना के पूर्वी बेड़े और मरीन कमांडो के लड़ाकू जलपोत, पनडुब्बी और जल थल चर अवतरण जहाज शामिल हैं। संयुक्त अभ्यास में जगुआर मैरीटाइम स्ट्राइक और भारतीय वायु सेना के परिवहन विमान और तटरक्षक बल की संपत्ति ने भी भाग लिया।

संयुक्त अभ्यास की शुरुआत कार निकोबार में जगुआर विमान, पैरा कमांडो और समुद्री कमांडो के हमलों के साथ हुई जहां पैराड्रूपर ने ऊंचाई से जंप (कॉम्बैट फ्री फॉल) लगाए। इसका उद्देश्य हिन्द महासागर क्षेत्र (आईओआर) में सुविधा वाले क्षेत्र के भीतर हवाई प्रभुत्व और समुद्री हमले की क्षमता की पुष्टि करना है। जल थल चर परिचालन से पहले, सभी एजेंसियों के साथ निकट समन्वय में सेना, नौसेना और वायु सेना के सैनिकों को समुद्री और हवाई रास्ते से ले जाया गया।

युद्ध के मैदान को आकार देने के हिस्से के रूप में, मार्कोस ने अपने कॉम्बैट लोड और एयर ड्रॉपेबल रिजिड हल इन्फ्लेटेबल बोट्स (एडीआर) को अंडमान सागर पर गिरा दिया था, जिससे मरीन कमांडो चुपके से और गति के साथ लक्ष्य तक पहुंच सके। एमआई-17 वी5 सशस्त्र हेलीकॉप्टरों ने समुद्र और जमीन पर दुश्मन की निर्दिष्ट संपत्ति पर सटीक निशाना साधा। प्रशिक्षण अभ्यास का समापन टैंकों पर 600 सैनिकों, ट्रूप कैरियर व्हीकल और अन्य भारी हथियारों के साथ आईएनएस जलश्वा, ऐरावत, गुलदार और एनसीयू एमके-4 श्रेणी के जहाजों की दक्षिणी कमान की जल थल चर ब्रिगेड द्वारा समुद्र तट लैंडिंग संचालन के साथ किया गया। लॉजिस्टिक टीम ने परिचालन स्थितियों और लड़ाकू मिशनों में संयुक्त लॉजिस्टिक प्रणाली और गतिशील परिवर्तनों का जवाब देने के लिए अपनी क्षमताओं का प्रदर्शन किया। जिन क्षेत्रों में अभ्यास किया गया था, वे भारत के लिए रणनीतिक महत्व रखते हैं।



अभ्यास ने अंतरिक्ष, वायु, भूमि और समुद्र आधारित परिसंपत्तियों से खुफिया जानकारी एकत्र करने की संयुक्त क्षमताओं, इसके संश्लेषण, विश्लेषण और त्वरित निर्णय लेने के लिए युद्ध क्षेत्र की पारदर्शिता को प्राप्त करने के लिए वास्तविक समय साझा करने की भी पुष्टि की। संयुक्त बल ने अंडमान सागर और बंगाल की खाड़ी में मल्टी-डोमेन, उच्च तीव्रता वाले आक्रामक और रक्षात्मक युद्धाभ्यास को अंजाम दिया। तीनों सेवाओं में परिचालन तालमेल को बढ़ाने की दिशा में संयुक्त युद्ध लड़ने की क्षमताओं और मानक संचालन प्रक्रियाओं का अभ्यास किया जाता है।

कमांडर-इन-चीफ अंडमान और निकोबार कमान ने अभ्यास की निगरानी के लिए दक्षिणी द्वीप समूह में अभ्यास क्षेत्र का दौरा किया और उच्च स्तर की परिचालन तैयारियों के लिए सभी रैंकों की सराहना की।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1692127>



**पत्र सूचना कार्यालय**  
**भारत सरकार**

**रक्षा मंत्रालय**

*Mon, 25 Jan 2021 12:48PM*

## **भारतीय नौसेना ने थल सेना एवं वायु सेना के साथ संयुक्त युद्धाभ्यास किया**

दिनांक 21 जनवरी से 25 जनवरी 2021 तक अंडमान और निकोबार द्वीप समूह में बड़े पैमाने पर सेना के तीनों अंगों का संयुक्त जल-थल-नभ युद्धाभ्यास एम्फीमेक्स -21 का आयोजन किया गया था। इस अभ्यास में नौसेना के जहाजों, ज़मीन, हवा और पानी तीनों के युद्ध में प्रवीण सैनिकों और वायु सेना के विभिन्न प्रकार के विमानों की भागीदारी शामिल थी।

इस युद्धाभ्यास का उद्देश्य अपने द्वीप क्षेत्रों की क्षेत्रीय अखंडता की रक्षा के लिए भारत की क्षमताओं का सत्यापन करना था। इसमें सेना के तीनों अंगों के बीच परिचालन तालमेल और संयुक्त रूप से युद्ध लड़ने की क्षमताओं को बढ़ाने का उद्देश्य भी शामिल था।

इस अभ्यास में उभयचर लड़ाकू युद्धपोतों, निगरानी प्लेटफार्मों, समुद्र में हवाई हमले तथा जटिल युद्धाभ्यास द्वारा बहुआयामी सामुद्रिक ऑपरेशन शामिल थे। हवा से नौसेना के समुद्री कमांडोज़ का प्रवेश, सेना के विशेष बलों की हवाई प्रविष्टि, नौसेना का गनफायर सपोर्ट, ज़मीन, आकाश और जल से सैन्य बलों लैंडिंग एवं इसके बाद किए जाने वाले अनुवर्ती ऑपरेशन भी शामिल थे।

अंडमान और निकोबार द्वीप समूह की रक्षा के लिए कवच युद्धाभ्यास भी एम्फैक्स - 21 के भाग के रूप में आयोजित किया गया। एकीकृत मुख्यालय स्टाफ के तत्वावधान में एक संयुक्त आसूचना, निगरानी और टोही अभ्यास भी एक साथ चलाया गया ताकि कई संवेदकों का इस्तेमाल कर समुद्री डोमेन जागरूकता को प्राप्त किया जा सके।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1692166>



**Press Information Bureau  
Government of India**

**Ministry of Defence**

*Mon, 25 Jan 2021 7:00PM*

## **Joint press release of the 9th round of India-China military commander-level meeting**

On January 24, the 9th round of China-India Corps Commander Level Meeting was held on the Chinese side of the Moldo-Chushul border meeting point. The two sides had a candid and in-depth exchange of views on disengagement along the Line of Actual Control in the Western Sector of China-India border areas.

The two sides agreed that this round of meeting was positive, practical and constructive, which further enhanced mutual trust and understanding. The two sides agreed to push for an early disengagement of the frontline troops. They also agreed to follow the important consensus of their state leaders, maintain the good momentum of dialogue and negotiation, and hold the 10th round of the Corps Commander Level Meeting at an early date to jointly advance de-escalation.

The two sides agreed to continue their effective efforts in ensuring the restraint of the frontline troops, stabilize and control the situation along the LAC in the Western Sector of the China-India border, and jointly maintain peace and tranquility.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1692266>



**पत्र सूचना कार्यालय  
भारत सरकार**

**रक्षा मंत्रालय**

*Mon, 25 Jan 2021 7:00PM*

## **भारत-चीन के सैन्य कमांडर-स्तर की 9वें दौर की बैठक की संयुक्त प्रेस विज्ञप्ति**

24 जनवरी को, चीन-भारत के कोर कमांडर स्तर की बैठक का 9वां दौर मोल्डो-चुशुल सीमा के मिलन बिंदु के चीन वाले छोर में आयोजित किया गया था। दोनों पक्षों ने चीन-भारत सीमा क्षेत्रों के पश्चिमी सेक्टर में वास्तविक नियंत्रण रेखा (एलएसी) से संबंधित असहमति को लेकर विचारों को गहराई और स्पष्टता के साथ आदान-प्रदान किया।

दोनों पक्ष इस बात पर सहमत हुए कि बैठक का यह दौर सकारात्मक, व्यावहारिक और रचनात्मक था, जिसने आपसी विश्वास एवं समझ को और बढ़ाया। दोनों पक्ष अग्रिम पंक्तिके सैनिकों के शीघ्र वापसी पर जोर देने के लिए सहमत हुए। वे अपने - अपने देश के नेताओं की महत्वपूर्ण सर्वसम्मति का पालन करने, बातचीत और समझौता वार्ता की गति को अच्छी बनाए रखने और संयुक्त रूप से तनाव कम करने की प्रक्रिया को आगे बढ़ाने के लिए शीघ्र ही कोर कमांडर स्तर की बैठक के 10वें दौर का आयोजन करने के लिए भी सहमत हुए।

दोनों पक्ष अग्रिम पंक्ति के सैनिकों के संयम को सुनिश्चित करने, चीन-भारत सीमा के पश्चिमी सेक्टर में वास्तविक नियंत्रण रेखा (एलएसी) पर स्थिति को स्थिर एवं नियंत्रित रखने और संयुक्त रूप से शांति और सदभाव बनाए रखने में अपने प्रभावी प्रयासों को जारी रखने के लिए सहमत हुए।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1692360>

# THE ECONOMIC TIMES

Wed, 27 Jan 2021

## Indian forces to get local choppers even before formal contract

By Manu Pubby

### Synopsis

*As of now, the defence ministry has given approval for procurement of an initial batch of 15 LCHs (10 for Air Force and five for Army) but the numbers are expected to go up as the first ones enter service.*

New Delhi: Indian forces facing China's aggression in Ladakh will shortly receive indigenous attack helicopters which have proven their worth in high altitude areas during recent tests, adding muscle to the airborne fleet that currently consists of AH 64E Apache choppers.

Officials said the Army and Air Force will receive a light combat helicopter (LCH) each by March, even before formal orders have been placed, as the production programme is on and necessary certifications have been received. "In recent tests by the armed forces in high altitude areas of Ladakh, the helicopters demonstrated that they can operate with adequate payloads," Hindustan Aeronautics Limited Chairman R Madhavan told ET.

He said the helicopters can be produced in quantities required by the forces. The LCH will also be among the premium offerings by India at the upcoming AeroIndia show, where potential foreign customers are expected to go for test flights as well. Officials believe the LCH has good export potential in the region.



As of now, the defence ministry has given approval for procurement of an initial batch of 15 LCHs but the numbers are expected to go up as the first ones enter service.

### For Mountain Operations

**Army and Air Force** will receive a light combat helicopter each by March, even before formal orders have been placed

As of now, the defence ministry has given approval for procurement of an initial batch of 15 LCHs (10 for Air Force and five for Army)

It is also equipped with a 20mm Turret gun and 70 mm rockets, the firing trials of which have already been completed

**The helicopters have been specially designed for high-altitude ops**

**The 5.5-tonne class helicopter by HAL is the first of its kind to have landed at forward bases at Siachen at an altitude of 4,700 meters with a 500 kg load**

**In recent tests by the armed forces in high-altitude areas of Ladakh, the helicopters demonstrated that they can operate with adequate payloads**

**R Madhavan**  
Hindustan Aeronautics Limited chairman

**The LCH has successfully carried out a range of missions, including firing of an air-to-air missile – the first by a chopper developed in India**

As of now, the defence ministry has given approval for procurement of an initial batch of 15 LCHs (10 for Air Force and five for Army) but the numbers are expected to go up as the first ones enter service. The helicopters have been specially designed keeping the requirements of high altitude forces and the lessons learnt during the Kargil war, where such a capability was missed.

The 5.5-tonne class combat helicopter designed and developed by HAL is the first of its kind to have landed at forward bases at Siachen at an altitude of 4,700 meters with a 500 kg load. A production facility for the chopper has been established at Bengaluru and only orders are awaited from the armed forces for adequate numbers.

The new production hangar set up last year can reach a peak production of 30 helicopters per year. The LCH has successfully carried out a range of missions, including firing of an air-to-air missile – the first by a chopper developed in India. It is also equipped with a 20mm Turret gun and 70 mm rockets, the firing trials of which have already been completed.

<https://economictimes.indiatimes.com/news/defence/indian-forces-to-get-local-choppers-even-before-formal-contract/articleshow/80469643.cms>

INDIA  
TODAY

Tue, 26 Jan 2021

## Baby TAR: India's smallest assault rifle | India Today Insight

*Bulk orders for Indian-made AK-47s have stabilised the Atmanirbhar design plan, helping the Ordnance Factory Board innovate and create a compact version of the assault rifle*

*By Sandeep Unnithan*

Delhi: It's laptop-sized, can be carried inside a coat and can spit AK-47 bullets out at the rate of roughly 700 rounds per minute. Meet the 'Baby TAR', India's smallest assault rifle. Developed by the Indian Ordnance Factory Tiruchirappali, the weapon is a compact version of the legendary AK-47, which the factory has been mass-producing since 2017. This in-house OFB innovation comes soon after the Indian Army unveiled a 9x19mm carbine developed in-house.

The TAR-3, a compact, fully automatic version of the Trichy Assault Rifle (TAR), recently passed a series of trials at the Ordnance Factory Trichy (OF Trichy). A dozen prototypes have been produced during the lockdown. The weapon is currently undergoing 'unofficial trials' with the Indian Army, where three prototypes are believed to have fired over 2,000 rounds each without stoppages.

The 'Baby TAR' fires the same 7.62x39 mm cartridge as the AK-47—this ammunition is in widespread production and use, thereby easing logistics. It uses the AK-47's distinctive 30-round curved box magazine and features a commonality of parts with existing weapons. Its designers chopped down the AK-47's 16-inch barrel, producing a weapon with an 8.3-inch barrel and an effective range of 150 metres. The TAR-3 is 19.2 inches long with its stock folded, and at 2.7 kg (unloaded), is one kg lighter than the AK-47. It has a monoblock receiver, shockproof polymer lower parts and two Picatinny rails that can mount a variety of sights and scopes.



'Baby TAR', India's smallest assault rifle

Its designers say it is ideal for users like special forces and counter-terrorist operators who want compact, concealable weapons but with the firepower of a full-sized AK-47. The assault rifle is also suitable for aircraft, tank and vehicle crews. Significantly, the weapon was developed as an unsolicited design—without waiting for army General Staff Qualitative Requirements (GSQRs),

which usually is the start point for weapon development. To do so, the factory used the experience it gained from mass producing the Trichy Assault Rifle, a wholly indigenous copy of the AK-47.

Designers at OF Trichy appear to have solved a problem that stumped the gun designers of the DRDO's now-discarded INSAS carbine variant in the 1990s—how to reduce the barrel heating and the excessive sound and flash produced when an assault rifle bullet is fired from a short barrel. The DRDO did it by switching over to a smaller bullet, the 5.56x30 round used in the JVPC carbine. The Baby TAR designers solved the problem by used internal metal reflectors to insulate the foregrip from the barrel and by designing, in-house, a compact flash hider at the barrel muzzle. The gun can presently fire four full magazines—around 120 rounds—without the barrel heating. This development is noteworthy because it means Indian designers now understand the 'know-why', rather than just the 'know-how' that they would have gained from a licensed production.

### **Compacting the AK**

The Soviet Union began producing compact, stubbier versions of its AK-74 rifle (an AK-47 evolution firing the 5.45x39 mm cartridge) in the 1970s. Copies of this compact assault rifle have been famously attached to Osama bin Laden, ISIS chief Abu Bakr Al Baghdadi and more recently, Belarus President Alexander Lukashenko. Compact versions of the AK-47 believed to have been produced in the frontier regions of Pakistan, have been recovered by Indian security forces from terrorists in Jammu and Kashmir in recent months.

Trichy is one of two Indian ordnance factories already mass-producing Indian versions of the legendary Kalashnikov (the original weapon was never patented and is freely made by countries across the world). The 'Ghatak', a copy made by Rifle Factory Ishapore, did not find as much favour. The full-sized TAR is believed to be a copy of the Bulgarian AR-M1, itself a licensed copy of the Kalashnikov. Over 500,000 Bulgarian weapons have been imported by India's central, state and paramilitary forces over the past decade—the TAR, which began bulk production in 2017, has also helped reducing imports from that east European country. OF Trichy has developed four variants of the rifle, with fixed, side-folding, under-folding and telescoping butts. Nearly 20,000 weapons have been delivered to the Indian police, paramilitary and central armed police forces. Interestingly, each TAR costs around Rs 55,000—far less than the licensed AK-203 to be produced by Indo-Russian Rifles, which will cost upwards of Rs 75,000. And the compact version could cost less than the full-length TAR.

The compact TAR's arrival has added to growing numbers of indigenously designed small arms. From a virtual drought a few years back, there are now multiple indigenous designs available, chambered for various cartridges. Besides the Army's 9x19mm carbine, the DRDO has developed a variant firing a 5.56x45 mm cartridge, for a different Army requirement. The JVPC, a DRDO-OFB carbine, passed Army and MHA development trials last year. Bengaluru-based small arms start up SSS Defence has its own designs for weapons, chambered for 5.56x45 and 7.62x39 cartridges, and an upgrade kit for existing AK-47 variants. All these designs, of course, are at the prototype stage and will need to fire several thousand rounds before they are fit for mass-production and induction.

<https://www.indiatoday.in/india-today-insight/story/baby-tar-india-s-smallest-assault-rifle-1762654-2021-01-25>

# India starts licensing production of the Russian AK-203

*By Igor Rozin*

India is about to launch licensed production of Russian Kalashnikov's AK-203 assault rifles. The manufacturing process will be conducted at a plant in Korva (Uttar Pradesh).

General Manoj Naravane, Chief of Staff of the Army of the Indian Armed Forces, stated that negotiations with the Kalashnikov Concern are close to a deal and he's confident the agreement for the production of automatic weapons will be signed in the near future.

And according to the Russian side participating in the negotiations, the project for the licensed production of Russian AK-203 Kalashnikov assault rifles in India is indeed at the final stage of implementation. "The project is at the final stage. All technical and commercial issues have been agreed," a source said.

According to the deal, India will produce as many as 671,427 AK-203 assault rifles.

According to The Economic Times of India, the cost of one AK-203 produced in India under license will be 70 thousand Indian rupees (approx. \$958), which is significantly less than the cost of American-made assault rifles purchased under an accelerated procedure for 89 thousand rupees (approx. \$1,218) per unit.



*Evgeniy Buyatov/Sputnik*

## **What's an AK-203?**

The AK-203 is a 7,62x39 mm assault rifle created specially for the Indian military.

It has a number of ergonomic improvements compared to previous AK versions that are required in modern warfare. These include a new ergonomic handle that perfectly imitates the user's grip, a left-folding and retractable stock, the possibility for installation of modern sighting systems and accessories, such as optical and/or optoelectronic scopes, thermal imaging and collimator sights.

Now, Indians will also be able to mount infrared illuminators onto their AKs that allow to use them in conjunction with night vision devices, laser sight, weapon lights and others, both domestic and foreign production, with a universal Picatinny rail integrated in the receiver on top, bottom and both sides of the rifle.

What is extremely important is that the 200-series assault rifles have improved shooting accuracy. Sighting devices are mechanical, but as mentioned above, you can now mount all kinds of optic devices on an AK-203.

The barrel is equipped with a slit flame suppressor-compensator, also different from the 100 series. If necessary, the 200-series assault rifles can be equipped with quick-release tactical silencers.

The strength of the butt allows a person to use the weapon with an under-barrel grenade launcher or use it in hand-to-hand combat with a standard bayonet knife.

<https://www.rbth.com/science-and-tech/333314-india-starts-licensing-production-of-ak203>



## Elon Musk's SpaceX surpasses ISRO's record with launch of 143 satellites in one mission

Much like Uber Pool or Ola Share, Elon Musk-led SpaceX now offers a similar concept - for spacecrafts. On Sunday, a two-stage Falcon 9 rocket lifted off from the Cape Canaveral Space Force Station in Florida, launching a record-breaking 143 spacecrafts. The previous record had been held by ISRO's PSLV-C37.

"Rideshare customers' deployment confirmed," the SpaceX handle tweeted on Sunday night. The company posted pictures and videos from the launch noting that this was the highest number of spacecrafts ever deployed on a single mission. The launch also completed SpaceX's first dedicated SmallSat Rideshare Program mission.



Prior to Sunday's events, the record for most satellites launched at one go had been held by the Indian Space Research Organisation. In 2017, the organisation had launched the PSLV-C37 from Sriharikota in Andhra Pradesh. The rocket had carried a whopping 104 satellites into Sun-synchronous orbits. While both ISRO and SpaceX deployed over a 100 satellites, the record preceding them had been a 37 satellites - launched in 2014 by Russia's Dnepr rocket.

### Why did SpaceX launch 143 spacecraft to orbit?

According to SpaceX, the rideshare programme offers cheap access to space for small satellite companies, starting at \$1 million for a 200-kg satellite. Much like a "rideshare Uber", a company's small satellite can hitch a ride to space with this new mission.

The SpaceX's Falcon 9 rocket sent a mix of shoebox-sized CubeSats and much heavier micro-satellites to a 326-mile-high polar orbit. The 143 satellites include 48 Earth imaging satellites, 17 tiny communications satellites, and 30 small satellites for the US and Europe by Germany-based Exolaunch. The Falcon 9 also carried several satellites affiliated with SpaceX itself. 10 satellites for the Starlink telecommunications mega-constellation also took off on the rocket.

<https://www.freepressjournal.in/world/elon-musks-spacex-surpasses-isros-record-with-launch-of-143-satellites-in-one-mission>

# Long-distance and secure quantum key distribution (QKD) over a free-space channel

By Ingrid Fadelli

Quantum key distribution (QKD) is a technique that enables secure communications between devices using a cryptographic protocol that is partly based on quantum mechanics. This communication method ultimately allows two parties to encrypt and decrypt messages they send to each other using a unique key that is unknown to other parties.

Measurement-device-independent quantum key distribution (MDI-QKD) is a unique protocol that facilitates the creation of more secure QKD networks with untrusted devices. This protocol can enable QKD-based communication over longer distances, as well as higher key production rates and more reliable network verification.

So far, MDI-QKD has only been successfully implemented using fiber optics. Implementing the protocol across free-space channels, on the other hand, has proved significantly challenging.

A research group led by Jian-Wei Pan, from the University of Science and Technology in China, has recently demonstrated long-distance and secure MDI-QKD over a free-space channel for the very first time. Their paper, published in *Physical Review Letters*, could pave the way to satellite-based MDI-QKD implementations.

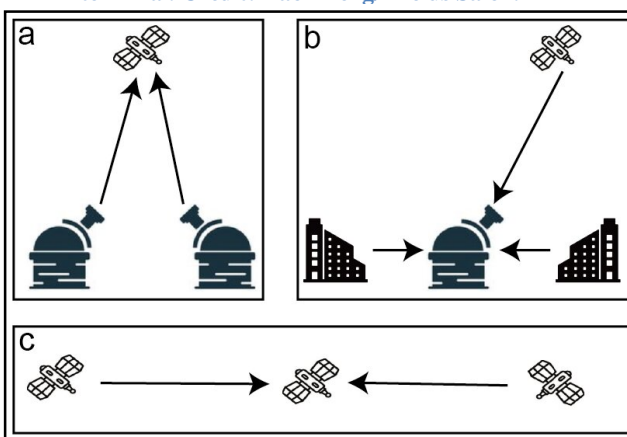
"The final goal of QKD is to realize a global-scale quantum secure communication network," Qiang Zhang, one of the researchers who carried out the study, told Phys.org. "In order to achieve this ambitious goal, two main challenges need to be addressed. One is to reduce the gap between theory and practice of QKD, and the other one is to extend the distance of QKD. The goal of our recent work was to solve these two difficulties."

Theoretically, QKD offers greater security in communications leveraging physics laws. However, imperfections and vulnerabilities of real devices could result in deviations from the models used to carry out security analyses. The MDI-QKD protocol can help to tackle this challenge by closing all loopholes on detection at once. Moreover, it can improve the performance and security of QKD implementations on real devices, by including decoy states.

Satellite-based QKD implementations could extend the distance across which this secure communication can take place, as they would enable lower transmission losses and negligible decoherence in space. By extending MDI-QKD from fiber to free-space channels, the work by Pan



A concept figure of the MDI-QKD experiment in a city. Telescopes are located in high-rise buildings for transmitting encoded photons. The turbulence of the atmosphere, which exists everywhere in the transmission channel, is the main challenge for the photons to maintain the spatial mode in the detection terminal. Credit: Yao Zheng/Micius Salon.



Possible configurations of satellite-based MDI-QKD. (a) the satellite plays the role of the detection terminal, while two ground stations send photons via the up-link to the satellite. (b) A ground station plays the role of the detection terminal. Users in the ground fiber-based network share secret keys with the satellite via the ground station. (c) MDI-QKD between three satellites. Credit: Cao et al.

and his colleagues could be a first step toward implementing MDI-QKD protocols on a large scale using satellites.

"Although several fiber-based MDI-QKD experiments have been performed before our study, none of them have demonstrated the feasibility of the protocol with a free-space channel," Zhang said. "The main reason is that the amplitude and phase fluctuation induced by atmospheric turbulence makes it difficult to maintain the indistinguishability in terms of spatial, timing and spectral modes between independent photons."

As atmospheric turbulence typically destroys the spatial mode between independent photons, MDI-QKD implementations typically require the use of single-mode fiber to perform spatial filtering before applying interferometry techniques. Using single-mode fiber to couple photons, however, generally leads to a low coupling efficiency and intensity fluctuation. To solve this problem, the researchers developed a new adaptive optics system that improves the channel's overall efficiency.

"As the rapid fluctuation of light intensity makes sharing the time-frequency reference difficult, we developed new technologies to achieve high-precision time synchronization and frequency locking between independent photon sources located far apart in order to maintain the indistinguishability of the timing and spectral modes," Zhang explained. "Thanks to these technical breakthroughs, we completed a task that seemed impossible to complete before."

The study is an important milestone in the path toward implementing QKD on a large scale and using it to secure communications over longer distances. Moreover, the researchers were the first to realize photon interference in long-distance atmospheric channels. This could open up exciting possibilities for the development of complex types of quantum information processing involving quantum interference, such as quantum entanglement swapping and quantum teleportation. It could also offer new ways of testing the interface of quantum mechanics and gravity.

The researchers' long-term goal is to demonstrate satellite-based MDI-QKD and eventually to build a global quantum network. To achieve this, however, they will first need to overcome a number of additional challenges.

"One of these challenges is the high loss mainly induced by the atmospheric fluctuation," Zhang explained. "In the most straightforward configuration of satellite-based MDI-QKD, a satellite plays the role of the detection terminal (i.e., two ground stations send photons via the 'up-link' to the satellite). The channel loss measured by the Micius satellite is about 41 ~ 52 dB from a ground station with altitude of 5,100 miles. The loss is likely to be much higher from ground stations at a lower altitude. The single mode fiber coupling efficiency is another source of loss, which is also very significant with existing MDI-QKD systems."

In order to enable effective satellite-based MDI-QKD implementations, therefore, the researchers will first need to advance existing methods to transit photons across free-space channels. To do this, they have so far developed an adaptive optics system and an algorithm that increases the efficiency of free-space channels. In their next studies, they plan to create other algorithms and techniques for improving the overall transmission channel.

"The second challenge we hope to overcome is associated with the motion of satellites," Zhang added. "Since the signal pulses are expected to be overlapped in the time domain at the detection terminal, a very accurate prediction of a satellite's orbit is required, and the emission time of each encoded pulse should also be accurately timed, so that they can finally overlap well in the detection terminal. The Doppler frequency shift, on the other hand, is an important source of frequency mismatch that is annoying for HOM interference. The frequency of each encoded pulse should also be accurately shifted for compensation. After solving all of these technical challenges, we believe that we will be able to realize satellite-based MDI-QKD."

**More information:** Long-distance free-space measurement-device-independent quantum key distribution. *Physical Review Letters*(2021). DOI: [10.1103/PhysRevLett.125.260503](https://doi.org/10.1103/PhysRevLett.125.260503).

**Journal information:** [Physical Review Letters](https://phys.org/news/2021-01-long-distance-quantum-key-qkd-free-space.html)  
<https://phys.org/news/2021-01-long-distance-quantum-key-qkd-free-space.html>

## Researchers achieve extreme-ultraviolet spectral compression by four-wave mixing

Researchers from the Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy (MBI) have developed a new method to modify the spectral width of extreme-ultraviolet (XUV) light. By employing a novel phase-matching scheme in four-wave mixing, they could compress the spectral width of the initial broadband light by more than hundred times. The detailed experimental and theoretical results have been published in *Nature Photonics*.

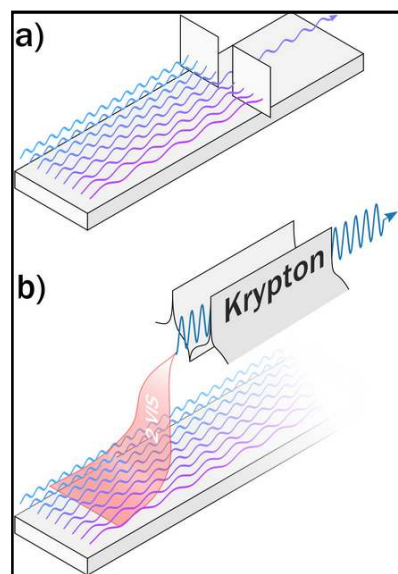
Light, as emitted by the sun, consists of many wavelengths and typically appears as white. Sometimes, however, only certain colors reach our eyes, leading to stunning phenomena like an afterglow. For technical or scientific applications that require a specific color, gratings and prisms can be used to extract this color from the white light. However, most of the incoming light is lost during this process, and the light intensity at the exit is very low.

Nonlinear optical techniques have made it possible to change the color of light and modify its spectral bandwidth without compromising the intensity. As illustrated in Fig. 1, this enables the generation of light with a specific color from broadband light (such as white light) or vice versa. These techniques are widely applied in spectroscopy, imaging, and for the generation of ultrashort laser pulses. However, nonlinear optical techniques are not readily available in the XUV region of the electromagnetic spectrum. This region is of increasing interest for various applications, including attosecond science and EUV lithography.

A team of researchers from the Max Born Institute has recently demonstrated a new concept to generate narrowband laser pulses in the XUV range. They combined broadband white light in the visible region with light having a broad spectrum in the vacuum-ultraviolet (VUV) region. After both of these light pulses simultaneously propagated through a dense jet of krypton atoms, a new laser pulse in the XUV range was generated. Remarkably, the spectral width of the new XUV pulse was more than hundred times narrower compared to the initial visible and VUV pulses.

The scientists employed a scheme known as four-wave mixing, where one krypton atom absorbs two visible photons and one VUV photon, leading to the emission of one XUV photon. Due to energy conservation, the emitted XUV photon must have a frequency equal to the sum of the frequencies of all three absorbed photons. At the same time, due to momentum conservation, the velocity of the incoming light wave has to match the velocity of the outgoing wave inside the mixing medium. This velocity changes very fast close to an atomic resonance.

To generate the narrowband XUV laser band, the researchers chose a VUV spectral range quite far away from any resonance and a target XUV range between two resonances. In doing so, they were able to match the velocities of a broad range of incoming wavelengths to a narrow region of outgoing wavelengths. In Fig. 2, on the left side, absorption in the VUV over a broad spectral range (blue area) is indicated. The red dashed curve indicates the frequency-dependent refractive index, which is a measure of the light velocity. On the right side, a narrow spectral region in the XUV range (violet area) is shown. In these regions, the light travels approximately at the same speed,



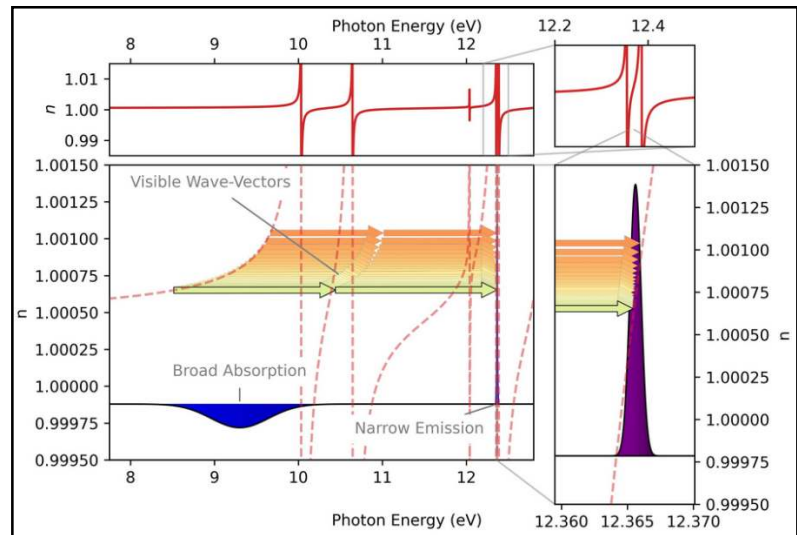
**Fig. 1:** (a) A specific color can be selected from a broadband light source using e.g. a prism or a grating. This comes, however, at the expense of losing most of the light. (b) By applying a nonlinear optical technique such as four-wave mixing in krypton, it is possible to generate a specific color using all the available light at different colors. Credit: Copyright: MBI

i.e., with a similar refractive index. These velocities can be matched by the near-horizontal arrows indicating the photons in the visible spectrum. The illustration shows that this allows converting a broadband VUV spectrum with a relatively flat wavelength-velocity dependence into a narrowband XUV pulse, where the wavelength-velocity dependence is near vertical.

The generation of narrowband XUV pulses is interesting for applications such as electron spectroscopy, the investigation of resonant transitions, and the coherent diffractive imaging of nanoscale structures. In the future, the new method could also be used in the opposite direction, i.e., to spectrally broaden XUV pulses, which may result in the generation of very short XUV pulses from sources such as free-electron lasers and soft- X-ray lasers.

**More information:** Extreme-ultraviolet spectral compression by four-wave mixing, *Nature Photonics* (2021). DOI: [10.1038/s41566-020-00758-8](https://doi.org/10.1038/s41566-020-00758-8) , [www.nature.com/articles/s41566-020-00758-8](https://www.nature.com/articles/s41566-020-00758-8)

**Journal information:** *Nature Photonics*  
<https://phys.org/news/2021-01-extreme-ultraviolet-spectral-compression-four-wave.html>



**Fig. 2: XUV spectral compression scheme:** The refractive index as a function of the photon energy is shown by the red dashed curve. In the region around 9.2 eV it changes comparably slowly (left side), whereas it changes very fast in the region around 12.365 eV. Therefore, a broadband absorption (blue area) can lead to a narrowband emission (violet area) with the help of two visible photons (shown by the blue arrows). Credit: Copyright: MBI

## Researchers guide a single ion through a Bose-Einstein condensate

Transport processes are ubiquitous in nature, but still raise many questions. The research team around Florian Meinert from the Fifth Institute of Physics at the University of Stuttgart has now developed a new method to observe a single charged particle on its path through a dense cloud of ultracold atoms. The results were published in *Physical Review Letters* and are further reported in a Viewpoint column in the journal *Physics*.

Meinert's team used a Bose-Einstein condensate (BEC) for their experiments. This exotic state of matter consists of a dense cloud of ultracold atoms. By means of sophisticated laser excitation, the researchers created a single Rydberg atom within the gas. In this giant atom, the electron is a thousand times further away from the nucleus than in the ground state and thus only very weakly bound to the core. With a specially designed sequence of electric field pulses, the researchers snatched the electron away from the atom. The formerly neutral atom turned into a positively charged ion that remained nearly at rest despite the process of detaching the electron.

In the next step, the researchers used precise electric fields to pull the ion in a controlled way through the dense cloud of atoms in the BEC. The ion picked up speed in the electric field, collided on its way with other atoms, slowed down and was accelerated again by the electric field. The interplay between acceleration and deceleration by collisions led to a constant motion of the ion through the BEC.

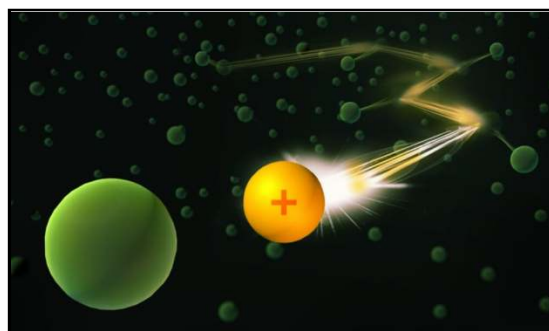
"This new approach allows us to measure the mobility of a single ion in a Bose-Einstein condensate for the very first time," says Thomas Dieterle, a Ph.D. student who participated in the experiment. The researchers' next goal is to observe collisions between a single ion and atoms at even lower temperatures, where quantum mechanics instead of classical mechanics dictates the processes. "In the future, our newly created model system—the transport of a single ion—will allow for a better understanding of more complex transport processes that are relevant in many-body systems, e.g., in certain solids or in superconductors," Meinert says. These measurements are also an important step on the way to investigate exotic quasi-particles, so-called polarons, which can arise through interaction between atoms and ions.

The neighboring lab at the institute is already working on an ion microscope that will allow researchers to observe collisions between atoms and ions directly. While an electron microscope uses negatively charged particles to create an image, this is what happens in an ion microscope with positively charged ions. Electrostatic lenses deflect ions similar to light rays in a classical optical microscope.

**More information:** T. Dieterle et al. Transport of a Single Cold Ion Immersed in a Bose-Einstein Condensate, *Physical Review Letters* (2021). DOI: [10.1103/PhysRevLett.126.033401](https://doi.org/10.1103/PhysRevLett.126.033401)

**Journal information:** *Physical Review Letters*

<https://phys.org/news/2021-01-ion-bose-einstein-condensate.html>

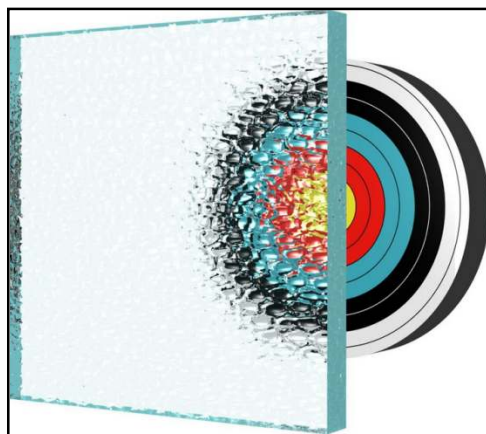


The path of the positively charged ion (yellow) through the BEC (green) can still only be depicted artistically. An ion microscope currently being developed at the Fifth Institute of Physics at the University of Stuttgart will make this path directly visible with a resolution of less than 200 nanometers. Credit: University of Stuttgart/PI5, Celina Brandes

## Optimal information about the invisible

Laser beams can be used to precisely measure an object's position or velocity. Normally, however, a clear, unobstructed view of this object is required—and this prerequisite is not always satisfied. In biomedicine, for example, structures are examined, which are embedded in an irregular, complicated environment. There, the laser beam is deflected, scattered and refracted, often making it impossible to obtain useful data from the measurement.

However, Utrecht University (Netherlands) and TU Wien (Vienna, Austria) have now been able to show that meaningful results can be obtained even in such complicated environments. Indeed, there is a way to specifically modify the laser beam so that it delivers exactly the desired information in the complex, disordered environment—and not just approximately, but in a physically optimal way: Nature does not allow for more precision with coherent laser light. The new technology can be used in very different fields of application, even with different types of waves, and has now been presented in the scientific journal *Nature Physics*.



When light gets deflected by a disordered structure it becomes difficult to estimate where the target is located. In this new study a procedure is presented that allows one to reach the optimal estimation precision in such challenging scenarios. Credit: Vienna University of Technology

### The vacuum and the bathroom window

"You always want to achieve the best possible measurement accuracy—that's a central element of all natural sciences," says Stefan Rotter from TU Wien. "Let's think, for example, of the huge LIGO facility, which is being used to detect gravitational waves: There, you send laser beams onto a mirror, and changes in the distance between the laser and the mirror are measured with extreme precision." This only works so well because the laser beam is sent through an ultra-high vacuum. Any disturbance, no matter how small, is to be avoided.

But what can you do when you are dealing with disturbances that cannot be removed? "Let's imagine a panel of glass that is not perfectly transparent, but rough and unpolished like a bathroom window" says Allard Mosk from Utrecht University. "Light can pass through, but not in a straight line. The light waves are altered and scattered, so we can't accurately see an object on the other side of the window with the naked eye." The situation is quite similar when you want to examine tiny objects inside biological tissue: the disordered environment disturbs the light beam. The simple, regular straight laser beam then becomes a complicated wave pattern that is deflected in all directions.

### The optimal wave

However, if you know exactly what the disturbing environment is doing to the light beam, you can reverse the situation: Then it is possible to create a complicated wave pattern instead of the simple, straight laser beam, which gets transformed into exactly the desired shape due to the disturbances and hits right where it can deliver the best result. "To achieve this, you don't even need to know exactly what the disturbances are," Dorian Bouchet, the first author of the study explains. "It's enough to first send a set of trial waves through the system to study how they are changed by the system."

The scientists involved in this work jointly developed a mathematical procedure that can then be used to calculate the optimal wave from this test data: "You can show that for various measurements there are certain waves that deliver a maximum of information as, e.g., on the spatial coordinates at which a certain object is located."

Take for example an object that is hidden behind a turbid pane of glass: there is an optimal light wave that can be used to obtain the maximum amount of information about whether the object has moved a little to the right or a little to the left. This wave looks complicated and disordered, but is then modified by the turbid pane in such a way that it arrives at the object in exactly the desired way and returns the greatest possible amount of information to the experimental measuring apparatus.

### **Laser experiments in Utrecht**

The fact that the method actually works was confirmed experimentally at Utrecht University: Laser beams were directed through a disordered medium in the form of a turbid plate. The scattering behavior of the medium was thereby characterized, then the optimal waves were calculated in order to analyze an object beyond the plate—and this succeeded, with a precision in the nano-meter range.

Then the team carried out further measurements to test the limits of their novel method: The number of photons in the laser beam was significantly reduced to see whether one then still gets a meaningful result. In this way, they were able to show that the method not only works, but is even optimal in a physical sense: "We see that the precision of our method is only limited by the so-called quantum noise," explains Allard Mosk. "This noise results from the fact that light consists of photons—nothing can be done about that. But within the limits of what quantum physics allows us to do for a coherent laser beam, we can actually calculate the optimal waves to measure different things. Not only the position, but also the movement or the direction of rotation of objects."

These results were obtained in the context of a program for nanometer-scale imaging of semiconductor structures, in which universities collaborate with industry. Indeed, possible areas of application for this new technology include microbiology but also the production of computer chips, where extremely precise measurements are indispensable.

**More information:** Dorian Bouchet et al. Maximum information states for coherent scattering measurements, *Nature Physics* (2021). DOI: [10.1038/s41567-020-01137-4](https://doi.org/10.1038/s41567-020-01137-4)

**Journal information:** *Nature Physics*

<https://phys.org/news/2021-01-optimal-invisible.html>



Wed, 27 Jan 2021

## Higher levels of omega-3 in blood may reduce risk of death due to Covid-19: Study

*The anti-inflammatory effects of EPA and DHA strongly suggest that these nutritionally available marine fatty acids may help reduce the risk for adverse outcomes*

*By Prashasti Awasthi*

Higher levels of omega-3 in the blood may reduce the risk of death from the coronavirus infection, according to the study conducted by the researchers at the Fatty Acid Research Institute (FARI) and collaborators at Cedars-Sinai Medical Center in Los Angeles in Orange County, CA.

The findings of the study were published in the journal *Prostaglandins, Leukotrienes, and Essential Fatty Acids*.

For the study, the researchers involved 100 hospitalised COVID-19 positive patients and accessed their blood samples. Clinical outcomes for these patients were obtained, and blood was analysed for the Omega-3 Index (O3I, red blood cell membrane EPA+DHA levels) at OmegaQuant Analytics (Sioux Falls, SD). Fourteen of the patients died during the examination.



The 100 patients were grouped into four quartiles, according to their O3I, with 25 per cent of the patients in each quartile. There was one death in the top quartile, with 13 deaths in the remaining patients.

In age-and-sex adjusted regression analyses, those in the highest quartile were 75 per cent less likely to die than those in the lower three quartiles. Notably, the relative risk for death was about four times higher in those with a lower O3I compared to those with higher levels.

Lead author Arash Asher, MD, said: “While not meeting standard statistical significance thresholds, this pilot study — along with multiple lines of evidence regarding the anti-inflammatory effects of EPA and DHA — strongly suggests that these nutritionally available marine fatty acids may help reduce the risk for adverse outcomes in COVID-19 patients. Larger studies are clearly needed to confirm these preliminary findings.”

The team is now seeking funding to expand their study and employ larger cohorts.

<https://www.thehindubusinessline.com/news/science/higher-levels-of-omega-3-in-blood-may-reduce-risk-of-covid-19-death-study/article33666887.ece>

