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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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CONTENTS

S. No.	TITLE	Page No.
DRDO News		1-12
DRDO Technology News		1-10
1.	Supersonic missile assisted torpedo system gets successfully launched from Wheeler Island in Odisha	1
2.	सुपरसोनिक मिसाइल असिस्टेड टॉरपीडो प्रणाली ओडिशा के व्हीलर द्वीप से सफलतापूर्वक लॉन्च की गई	2
3.	Successful flight test of supersonic missile-assisted torpedo release system conducted	3
4.	DRDO successfully tests Supersonic Missile Assisted Torpedo system	4
5.	DRDO successfully tests long-range 'Supersonic Missile Assisted Release of Torpedo'	5
6.	बालासोर में लांग रेंज सुपरसोनिक मिसाइल का परीक्षण, नेवी और DRDO ने मिलकर किया है इसे तैयार	6
7.	DRDO & IAF test anti-tank missile again	7
8.	DFRL food tech, defence life science expo begins	7
9.	Indian Navy's new gun to bust pirates, terrorists uses Israeli tech	9
DRDO on Twitter		11-12
Defence News		13-23
Defence Strategic: National/International		13-23
10.	Raksha Mantri Shri Rajnath Singh virtually inaugurates nation-wide events of Department of Defence Production as part of 'Azadi Ka Amrit Mahotsav'	13
11.	Defence Equipments and Make in India Scheme	15
12.	Status of Defence Exports	17
13.	Formation of Defence Corridors	19
14.	Technology Development Fund	19
15.	Manufacturing of Indigenous Defence Equipments	20
16.	IIT Delhi, Indian Air Force collaborates to improve indigenisation efforts	21
17.	भारतीय वायुसेना के लिए स्वदेशी उपकरण बनाएगा आइआइटी दिल्ली, समझौता जापान पर हुए हस्ताक्षर	22
18.	Defence Minister inaugurates HAL's Azadi Ka Amrit Mahotsav exhibitions	23
Science & Technology News		24-30
19.	Gaganyaan mission specific crew training begins: ISRO	24
20.	India to send manned deep sea mission to find hidden minerals in 2024	25
21.	Quantum algorithms bring ions to a standstill	26
22.	Phase transformation in titanium alloys observed at atomic scale	27
23.	Discovery of 'split' photon provides a new way to see light	28
COVID-19 Research News		30-30
24.	Patients with MS at increased risk for prolonged COVID-19 symptoms	30



Press Information Bureau
Government of India
Ministry of Defence

Mon, 13 Dec 2021 4:31PM

Supersonic missile assisted torpedo system gets successfully launched from Wheeler Island in Odisha

Defence Research and Development Organisation (DRDO) developed supersonic missile assisted torpedo system was successfully launched from Wheeler Island in Odisha on December 13, 2021. The system is a next generation missile-based standoff torpedo delivery system. During the mission, full range capability of the missile was successfully demonstrated. The system has been designed to enhance anti-submarine warfare capability far beyond the conventional range of the torpedo.

This was a text book launch, where the entire trajectory was monitored by the electro optic telemetry system, various range radars, including the down range instrumentation and down range ships. The missile carried a torpedo, parachute delivery system and release mechanisms.

This canister-based missile system consists of advanced technologies viz. two stage solid propulsion, electro-mechanical actuators and precision inertial navigation. The missile is launched from ground mobile launcher and it can cover a range of distances.

A number of DRDO laboratories developed various technologies for this advanced missile system. Industry participated in the development and production of various sub-systems.

Raksha Mantri Shri Rajnath Singh congratulated the teams involved in the successful test of the supersonic missile assisted torpedo system and said, the development of the system is a perfect example of building futuristic defence systems in the country.

Secretary, Department of Defence R&D & Chairman DRDO, Dr G Satheesh Reddy has congratulated all those involved in the successful test. He said, the system will further enhance the strength of our Navy and promote self-reliance in defence, harnessing of expertise and capabilities.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1780944>





पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Mon, 13 Dec 2021 4:31PM

सुपरसोनिक मिसाइल असिस्टेड टॉरपीडो प्रणाली ओडिशा के व्हीलर द्वीप से सफलतापूर्वक लॉन्च की गई

रक्षा अनुसंधान और विकास संगठन (डीआरडीओ) द्वारा विकसित सुपरसोनिक मिसाइल असिस्टेड टॉरपीडो सिस्टम 13 दिसम्बर, 2021 को ओडिशा के व्हीलर द्वीप से सफलतापूर्वक लॉन्च किया गया। यह प्रणाली अगली पीढ़ी की मिसाइल आधारित स्टैंडऑफ टॉरपीडो डिलीवरी प्रणाली है। मिशन के दौरान मिसाइल की पूरी रेंज क्षमता का सफलतापूर्वक प्रदर्शन किया गया। यह प्रणाली टॉरपीडो की पारंपरिक सीमा से कहीं अधिक एंटी-सबमरीन युद्ध क्षमता बढ़ाने के लिए डिजाइन की गई है।



इस नियोजित लॉन्च में सम्पूर्ण मार्ग की निगरानी इलैक्ट्रो ऑप्टिक टेलीमीटरी प्रणाली, विभिन्न रेंज के रडारों द्वारा की गई। इनमें डाउन रेंज उपकरण और डाउन रेंज जहाज शामिल हैं। मिसाइल में एक टॉरपीडो पैराशूट डिलीवरी प्रणाली तथा रिलीज तंत्र है।

यह मिसाइल प्रणाली उन्नत टेक्नोलॉजी की है, यानी इसमें टू-स्टेज सॉलिड प्रोपल्सन इलैक्ट्रो मैकेनिकल एक्चुएटर्स तथा प्रिसिजन इनर्शल नैवीगेशन हैं। यह मिसाइल ग्राउंड मोबाइल लॉन्चर से लॉन्च की गई और यह लंबी दूरी को कवर कर सकती है।

डीआरडीओ की अनेक प्रयोगशालाओं ने इस उन्नत मिसाइल के लिए विभिन्न तकनीकों का विकास किया। उद्योग द्वारा भी विभिन्न उप-प्रणालियों के विकास और उत्पादन में भाग लिया गया।

रक्षा मंत्री श्री राजनाथ सिंह ने सुपरसोनिक मिसाइल असिस्टेड टॉरपीडो सिस्टम के सफल प्रशिक्षण में शामिल दलों को बधाई दी और कहा कि इस प्रणाली का विकास देश में भविष्य की रक्षा प्रणालियों को तैयार करने का सबसे बढ़िया उदाहरण है।

रक्षा अनुसंधान और विकास विभाग के सचिव तथा डीआरडीओ के अध्यक्ष डॉ. जी. सतीश रेड्डी ने सफल प्रशिक्षण में शामिल सभी लोगों को बधाई दी है। उन्होंने कहा कि यह प्रणाली हमारी नौसेना की शक्ति को आगे बढ़ाएगी और विशेषज्ञता तथा क्षमताओं का उपयोग करते हुए रक्षा क्षेत्र में आत्म-निर्भरता को बढ़ावा देगी।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1781016>

Successful flight test of supersonic missile-assisted torpedo release system conducted

This is the second known successful test of the SMART system conducted by the DRDO after its maiden successful test in October last year.

By Sushant Kulkarni

Pune: A successful flight test of the Supersonic Missile Assisted Release of Torpedo (SMART), developed by the Defence Research and Development Organisation (DRDO), was conducted from Wheeler Island off the coast of Odisha on Monday.

This is the second known successful test of the SMART system conducted by the DRDO after its maiden successful test in October last year.

Calling the Monday test a ‘text book launch’, DRDO said the entire trajectory was monitored by the electro optic telemetry system, various range radars, including the down range instrumentation and down range ships deployed at various locations in Bay of Bengal. As part of the test, the missile carried a torpedo, parachute delivery system and various mechanisms required for release of the torpedo.

“This canister-based missile system consists of advanced technologies — two stage solid propulsion, electro-mechanical actuators and precision inertial navigation. The missile is launched from a ground mobile launcher and it can cover a range of distances.” said DRDO. Canister-based means it is stored and operated from specially designed compartments. In the canister, the inside environment is controlled, thus making its transport and storage easier, and improving the shelf life of weapons.

Torpedoes are self-propelled weapons that travel underwater to hit the target and can be fired from either above or under the water surface. The operations of torpedoes are limited by their range per se. In the mid 2010s, the DRDO launched an ambitious project to build capacity to launch torpedoes assisted by missiles. The first flight test of the system was conducted on October 5, 2020.

This SMART system comprises a mechanism by which the torpedo is launched from an existing supersonic missile system — by making complex modifications in it — which takes the torpedo to a much longer range than its own. For example, a torpedo which has a range of around 50 km can be taken to a distance of 1000 km by the missile system, from where the torpedo can be launched.

The system not only builds the capability to fire the torpedo beyond its range but also gives flexibility in terms of the launch platform that comes with the missile system, DRDO officials said. A number of DRDO laboratories including Defence Research and Development Laboratory (DRDL) and Research Centre Imarat (RCI) both located in Hyderabad, Aerial Delivery Research and Development Establishment (ADRDE) Agra and Naval Science and Technology Laboratory (NSTL) Visakhapatnam have developed technologies required for SMART system. After the test in October last year, DRDO Chairman Dr G Satheesh Reddy had said that SMART is a game changer technology demonstration in the Anti-Submarine Warfare.

Officials said that India’s capacity building in the area of anti-submarine warfare is crucial in the light of China’s aggressive deployment of naval assets in general and submarines in particular in the Indian Ocean Region. When the SMART system is deployed, it would give India the capability of firing torpedoes at adversary naval assets from far beyond the torpedo range. The anti submarine



In the mid 2010s, the DRDO launched an ambitious project to build capacity to launch torpedoes assisted by missiles. The first flight test of the system was conducted on October 5, 2020. (Twitter/@SpokespersonMoD)

warfare assets consist of deployment of submarines, specialised anti submarine ships, air assets and state of the art reconnaissance and detection mechanisms.

After the test of the SMART system on Monday, Defence Minister Rajnath Singh congratulated the teams involved and said that the development of the system is a perfect example of building futuristic defence systems in the country, a statement from Ministry of Defence said. It added that DRDO Chairman Dr G Satheesh Reddy congratulated all those involved in the successful test. Reddy said the system will enhance the strength of the navy and promote self-reliance in defence.

<https://indianexpress.com/article/cities/pune/successful-flight-test-of-supersonic-missile-assisted-torpedo-release-system-conducted-7671007/>

THE TIMES OF INDIA

Tue, 14 Dec 2021

DRDO successfully tests Supersonic Missile Assisted Torpedo system

New Delhi: India on Monday successfully tested a long-range Supersonic Missile Assisted Torpedo (SMART) system developed by Defence Research and Development Organization (DRDO).

As per an official release of DRDO, the missile aimed at enhancing the country's anti-submarine warfare capability was launched from Balasore in Odisha.

"The weapon system is being developed by DRDO for the Indian Navy," said a defence official.

Defence minister Rajnath Singh congratulated the teams involved in the successful test of the system and said that "the development of the system is a perfect example of building futuristic defence systems in the country."

"System will further enhance the strength of our Navy and promote self-reliance in defence, harnessing of expertise and capabilities," said Dr G Satheesh Reddy, chairman, DRDO.

As per the official statement, the system is a next-generation missile-based standoff torpedo delivery system. The full range capability of the missile was successfully demonstrated. The system has been designed to enhance anti-submarine warfare capability far beyond the conventional range of the torpedo.

"This was a textbook launch, where the entire trajectory was monitored by the electro-optic telemetry system, various range radars including the downrange instrumentation and downrange ships. The missile carried a torpedo, parachute delivery system and release mechanisms," reads the official statement.

The missile is launched from a ground mobile launcher and it can cover a range of distances, said DRDO, further adding that "This canister-based missile system consists of advanced technologies like two-stage solid propulsion, electro-mechanical actuators and precision inertial navigation."

"A number of DRDO laboratories developed various technologies for this advanced missile system. Industry participated in the development and production of various sub-systems," said the official release.

<https://timesofindia.indiatimes.com/india/drdo-successfully-tests-supersonic-missile-assisted-torpedo-system/articleshow/88257794.cms>



DRDO successfully tests long-range 'Supersonic Missile Assisted Release of Torpedo'

According to officials, the system is being developed to be used by the Indian Navy.

By Manjeet Negi

New Delhi: The Defence Research and Development Organisation (DRDO) on Monday tested a long-range Supersonic Missile Assisted Torpedo (SMART). The test was done from Wheeler Island in Odisha.

The system is a next-generation missile-based standoff torpedo delivery system. During the test, the full range capability of the missile was successfully demonstrated. The system has been designed to enhance anti-submarine warfare capability far beyond the conventional range of the torpedo.



SMART during its previous launch. (File Pic)

This was a textbook launch, where the entire trajectory was monitored by the electro-optic telemetry system, various range radars including the downrange instrumentation and downrange ships. The missile carried a torpedo, parachute delivery system and release mechanisms.

This canister-based missile system consists of advanced technologies like two-stage solid propulsion, electro-mechanical actuators and precision inertial navigation. The missile is launched from a ground mobile launcher and it can cover a range of distances.

A number of DRDO laboratories have developed various technologies for this advanced missile system.

According to officials, the system is being developed to be used by the Indian Navy.

DRDO, during the previous test, had said that the demonstration is significant in establishing anti-Submarine warfare capabilities.

The test comes just days after the DRDO and the Indian Air Force (IAF) successfully flight-tested the indigenously designed and developed helicopter launched Stand-off Anti-Tank (SANT) missile from Pokhran range.

This was the third in the series of indigenous stand-off weapons to be tested in recent times, after the Long-Range Bomb and Smart Anti-Airfield Weapon (SAAW), further strengthening the arsenal of the Indian Air Force.

The missile is equipped with a state-of-the-art millimetre wave (MMW) seeker which provides high precision strike capability from a safe distance.

<https://www.indiatoday.in/science/story/drdo-long-range-supersonic-missile-assisted-release-of-torpedo-test-navy-defence-1887232-2021-12-13>

बालासोर में लांग रेंज सुपरसोनिक मिसाइल का परीक्षण, नेवी और DRDO ने मिलकर किया है इसे तैयार

डीआरडीओ ने शनिवार को लांग रेंज सुपरसोनिक मिसाइल का परीक्षण किया है।
इसका निर्माण डीआरडीओ और नेवी ने मिलकर किया है।

Edited By शिशुपाल-कुमार

भुवनेश्वर: भारत ने सोमवार को उड़ीसा के बालासोर में लांग रेंज सुपरसोनिक मिसाइल का परीक्षण किया है। इस मिसाइल को डीआरडीओ और नेवी ने मिलकर तैयार किया है।

एक रक्षा अधिकारी ने इस परीक्षण की जानकारी देते हुए कहा कि भारतीय नौसेना के लिए रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) द्वारा हथियार प्रणाली विकसित की जा रही है। डीआरडीओ ने एक बयान में कहा, "इस प्रणाली को टारपीडो की पारंपरिक सीमा से कहीं अधिक उप-समुद्री युद्ध क्षमता को बढ़ाने के लिए डिजाइन किया गया है।"

यह प्रणाली अगली पीढ़ी की मिसाइल आधारित गतिरोध टारपीडो वितरण प्रणाली है। परीक्षण के दौरान मिसाइल की पूरी रेंज क्षमता का सफलतापूर्वक प्रदर्शन किया गया। इस प्रणाली को टारपीडो की पारंपरिक सीमा से कहीं अधिक पनडुब्बी रोधी युद्ध क्षमता बढ़ाने के लिए डिजाइन किया गया है।



डीआरडीओ ने किया मिसाइल टेस्ट (फोटो- वीडियो स्क्रीनशॉट-@ANI)

इसमें इलेक्ट्रो-ऑप्टिक टेलीमेट्री सिस्टम, डाउनरेंज इंस्ट्रुमेंटेशन और डाउनरेंज जहाजों सहित विभिन्न रेंज रडार द्वारा पूरे प्रक्षेपवक्र की निगरानी की गई थी। मिसाइल में एक टारपीडो, पैराशूट डिलीवरी सिस्टम और रिलीज मैकेनिज्म था। मिसाइल को एक ग्राउंड मोबाइल लॉन्चर से लॉन्च किया गया था।

डीआरडीओ की कई प्रयोगशालाओं ने इस उन्नत मिसाइल प्रणाली के लिए विभिन्न तकनीकों का विकास किया है। अधिकारियों के मुताबिक इस प्रणाली को भारतीय नौसेना के इस्तेमाल के लिए विकसित किया जा रहा है। इस बीच, केंद्रीय रक्षा मंत्री राजनाथ सिंह ने सुपरसोनिक मिसाइल असिस्टेड टारपीडो सिस्टम के सफल परीक्षण में लगी टीमों की सराहना करते हुए कहा कि इस सिस्टम का विकास देश की भविष्य की रक्षा क्षमताओं का एक अद्भुत उदाहरण है।

इससे पहले भारत ने शनिवार को राजस्थान के पोखरण फायरिंग रेंज में स्वदेशी रूप से विकसित हेलीकॉप्टर-लॉन्च स्टैंड-ऑफ एंटी टैंक (SANT) मिसाइल का सफलतापूर्वक परीक्षण किया था। रक्षा मंत्रालय ने कहा कि डीआरडीओ और भारतीय वायु सेना (आईएएफ) द्वारा किया गया उड़ान परीक्षण मिसाइल के सभी मिशन उद्देश्यों को पूरा करने में सफल था।

इसमें कहा गया है कि भारतीय वायुसेना के लिए विकसित किया गया यह हथियार 10 किमी तक की सीमा में लक्ष्य को बेअसर कर सकता है। मिसाइल अत्याधुनिक मिलीमीटर वेव सीकर से लैस है जो सुरक्षित दूरी से उच्च स्ट्राइक क्षमता प्रदान करता है।

<https://www.jansatta.com/national/drdo-successfully-tested-long-range-supersonic-missile-assisted-torpedo-smart-balasore-odisha-indian-navy/1957798/>

DRDO & IAF test anti-tank missile again

Jaisalmer: DRDO-developed Sant missile was test-fired again in Pokhran field firing range in Jaisalmer district on Monday. The Defence Research and Development Organisation (DRDO) and Indian Air Force (IAF) had flight-tested the indigenously designed and developed helicopter launched the Stand-off Anti-tank (SANT) Missile from Pokhran on December 11 for the first time.

The flight-test was successful in meeting all its mission objectives. The release mechanism, advanced guidance and tracking algorithms, all avionics with integrated software, performed satisfactorily and tracking systems monitored all mission events. The missile is equipped with a state-of-the-art MMW seeker which provides high precision strike capability from a safe distance. The weapon can neutralise targets in a range up to 10km.

Official sources said, "The Sant missile has been designed and developed by Research Centre Imarat (RCI), Hyderabad, in coordination with other DRDO labs and participation from industries. This is the third in the series of indigenous stand-off weapons to be tested in recent times after long range bomb and smart anti airfield weapon for strengthening the arsenal of IAF. The indigenous development of various configurations for different applications with advanced technologies is a firm march towards 'Aatmanirbharta' in defence.

<https://timesofindia.indiatimes.com/city/jaipur/drdo-iaf-test-anti-tank-missile-again/articleshow/88264965.cms>

STAR OF MYSORE

Tue, 14 Dec 2021

DFRL food tech, defence life science expo begins

Helicopter oxygen systems, underwater breathing apparatus, lightweight food products are a big draw at two-day event

Mysore/Mysuru: Youngsters, students and people interested in technology and food processing are making a beeline to the exhibition opposite the North Gate of Mysore Palace (Balarama Gate) to witness new technologies and products for the Armed Forces.

The two-day exhibition, organised by Defence Research and Development Organisation's (DRDO) Defence Food Research Laboratory (DFRL), Mysuru and Defence Bioengineering and Electro-Medical Laboratory (DEBEL), Bengaluru was thrown open to the public by City Police Commissioner Dr. Chandragupta this morning in the presence of dignitaries.



The exhibition has been organised to mark 'Azadi ka Amrit Mahotsav', commemorating 75 years of India's Independence and it gives a glimpse about the mega work done by DFRL and DEBEL for the Armed Forces to sustain in the battlefields, skies, underwater and at hostile borders.

The exhibition is open from 10 am to 5 pm today.

DFRL Director Dr. Anil Dutt Semwal, DEBEL Director Dr. Kotresh and DFRL Deputy Director Dr. R. Kumar were present.

The exhibition is making people aware about the latest know-how and the technologies being used by DRDO, DFRL and DEBEL in making the nation 'Atma Nirbhar', said Dr. Chandragupta.

He said that this is a good opportunity for the youth, common man and students to see the work of premier defence research institutions and their service-mindedness.

The exhibition showcases technologies and products that cater to strategic operational requirements of Armed Forces — Army, Navy and Air Force — and to provide logistical support to them in the area of food supplies. The lab has developed an array of food products and technologies that provide convenience, adequate nutrition apart from ensuring microbiological safety. Over the years more than 600 technology transfers have been carried out to about 320 different entrepreneurs.

Recently, DFRL has been focusing on degradable materials, rapid testing kits, besides diversification of convenient rations incorporating variety in it suiting to the requirements of service forces posted at different terrains and platforms.

Teams of DRDO scientists, researchers and staff were seen informing the gathering about the technologies developed by them for the Armed Forces and civilians.

Newer products such as degradable cutleries, photo degradable polymeric materials for secondary packaging, rapid test kit to check the quality of milk and frozen meat, lightweight energy-rich, convenient products like energy bars as well as mobile laboratory for microbiological testing are on display.

On-Board Oxygen Generating System (OBOGS)-Centric Integrated Life Support System for Tejas Aircraft, medical oxygen plants, helicopter oxygen systems, protective equipment, flying clothing, submarine escape system, individual underwater breathing apparatus, advanced micro-climate conditioning suit for battle tanks and submarines are on display.

Curious visitors were seen awestruck with the one-man High Altitude Pulmonary Oedema (HAPO) chamber with lightweight automation unit, rugged portable tele-medicine system, portable physiological vital parameter monitor, oxygen delivery system, mobile tele-diagnosis system and wearable physical efficiency test monitor. Along with these, limb function enhancement device, individual protective equipment, casualty evacuation bags, air sterilisation system for biological emergencies and prosthetic knee are on display.

<https://starofmysore.com/dfrl-food-tech-defence-life-science-expo-begins/>

Indian Navy's new gun to bust pirates, terrorists uses Israeli tech

Visakhapatnam is among the first newly inducted ships that comes with the SRCG

By Justin Paul George

Last month, the Indian Navy commissioned its most advanced destroyer, the INS Visakhapatnam.

One does not need to be a defence buff to be impressed by the scale and sleek lines of the Visakhapatnam and its menacing weapons like the 76mm main gun, anti-submarine rocket launchers and BrahMos missiles.

The INS Visakhapatnam gives the Indian Navy world-class air defence capabilities. This is due to the combination of its MF-STAR phased array radar—which can detect scores of enemy aircraft and missiles hundreds of kilometres away—and MR SAM (Medium Range Surface to Air Missile), which can shoot down airborne targets, including supersonic anti-ship missiles. The MF-STAR is a radar developed in Israel, while the MR SAM was developed jointly by DRDO and Israel Aerospace Industries.

The Visakhapatnam has another Israeli-origin weapon system that has not attracted much publicity. A video on the construction and layout of the Visakhapatnam, shared by the Indian Navy on November 21, showed that the ship had been fitted with an SRCG (Stabilised Remote Control Gun). To a layperson, the SRCG appears like an innocuous contraption—a gun fitted with an oversized CCTV camera!

The Ordnance Factory of Tiruchirappalli had handed over to the Indian Navy and Indian Coast Guard the first batch of 25 SRCG systems in June. The SRCG was built under a transfer-of-technology pact with Israeli company Elbit.

A source told *THE WEEK* that the first lot of SRCG systems had been distributed to various commands of the Navy and were being retrofitted to ships. The Visakhapatnam is among the first newly inducted ships that comes with the SRCG built in.

What exactly is the SRCG?

The SRCG is what experts refer to as a remote weapon system (RWS). In a maritime context, a remote weapon system is more than just a gun fired by remote control. Its computerised targeting system also factors in the roll and pitch of the ship and makes adjustments to its elevation and traverse settings to minimise errors in accuracy. A manually operated weapon cannot achieve minute adjustments on a moving ship.

Remote weapon systems are primarily designed to have high accuracy rather than fast firing rates. So systems like the SRCG can fire a few hundred rounds of ammunition every minute, unlike the Visakhapatnam's AK-630 guns. The AK-630 is a larger gun (with a calibre of 30mm) that can spew out up to 5,000 rounds a minute, enabling it to shoot down incoming anti-ship missiles.



Screengrab from an Indian Navy video showing the SRCG on the INS Visakhapatnam | Indian Navy



A MK 38 Mod 2 gun on a US Navy ship; the gun is a variant of the Israeli Typhoon RWS | Via Wikimedia Commons

The SRCG integrates a 12.7mm gun with a optronic camera and laser range finder. The sensors allow it to detect and track targets in any weather or at night. The SRCG is meant primarily to fire on small, fast-moving boats. Some navies are testing RWS with larger-calibre guns for use in anti-drone roles.

Why the remote revolution happened

Nearly all major navies have been inducting a large number of remote weapon systems in the past two decades. The US Navy in 2003 adopted a variant of the 'Typhoon' RWS, designed by Israel's Rafael, for deployment on its warships. The Typhoon system can use a variety of guns, ranging in calibre from 7.62mm to 12.7mm to 20mm to 25mm and 30mm weapons.

The US Navy's decision was prompted by an incident in 2000. In October that year, the USS Cole, an advanced destroyer, had pulled into Aden, Yemen, for refuelling. It was equipped with Tomahawk cruise missiles that could hit targets on land over 1,000km away and surface-to-air missiles to shoot down aircraft over 100km away. But the USS Cole was ill-equipped to take on a boat laden with explosives. The suicide bomb attack on the USS Cole by al Qaeda left 17 US Navy sailors dead. The incident also highlighted the threat that small craft posed to large warships, which were equipped primarily to fight other ships and submarines.

The Indian Navy has used RWS previously. The Super Dvora fast attack craft (FAC) India brought from Israel in the late 1990s were equipped with a variant of the Typhoon. The FAC class of ships, which displaced around 50 tonnes, were meant for operations in coastal waters. On the other hand, the SRCG is now being fitted to larger warships.

Remote is better than heavy, manual firing!

Sources told *THE WEEK* the SRCG was replacing the manually fired heavy machine guns on Indian Navy and Coast Guard ships. The SRCG would be primarily used in defending the ship when it was entering or leaving port and also operating in coastal regions (littorals).

The SRCG also has a role in open ocean for dealing with threats such as pirates. Sources said the pirate threat has existed in the past, "but just like they upgraded from swords to guns, pirates have now acquired weapons like heavy machine guns and rocket-propelled grenades".

The sources noted that manned machine guns or heavy-duty weapons like the 76mm main gun or the fast-firing AK-630 guns were not ideal for firing warning shots to stop pirates or smugglers.

The heavy-duty weapons carry a high risk of causing collateral damage while the manually fired heavy machine guns would have lower accuracy and range. The SRCG, with its computerised aiming, is optimal for firing both warning shots and also hitting high-value targets like individual gunmen or specific parts of a ship/boat, such as its propulsion system, to stop it, without destroying the entire vessel.

The Indian Navy is also worried about the threat posed by terrorist groups. During the Sri Lankan civil war, the LTTE used small boats, called skiffs, as kamikaze weapons loaded with explosives that could ram into navy ships. The skiffs were difficult to pick up on radar. New remote weapon systems like the SRCG are not reliant on radar; their optronic sensors are able to detect even small targets several kilometres away.

As the nature of warfare changes and the Indian Navy's area of responsibility increases, spanning waters from Africa to Southeast Asia, weapons like the SRCG will become as ubiquitous as the BrahMos.

An official declared the SRCG highlighted "Indian Navy's commitment to Atmanirbhar Bharat".
<https://www.theweek.in/news/india/2021/12/13/indian-navy-new-gun-to-bust-pirates-terrorists-uses-israeli-tech.html>

DRDO on Twitter

 **रक्षा मंत्री कार्यालय/ RMO India** @DefenceMinIndia · 16h

RM Shri @rajnathsingh congratulated the teams involved in the successful test of supersonic missile assisted torpedo system.


He has said that the development of the system is a perfect example of building futuristic defence systems in the country.

 **DRDO** @DRDO_India · 17h


Supersonic missile assisted torpedo system successfully tested from Dr APJ Abdul Kalam Island, Odisha
pib.gov.in/PressReleasePa...



0:17 44.9K views


 **रक्षा मंत्री कार्यालय/ RMO India** @DefenceMinIndia · 19h

DRDO ने 108 systems और subsystems को identify किया है जिनका design and development केवल इंडियन इंडस्ट्री में ही होगा। इसी तरह 'iDEX' और 'iDEX 4 fauji' जैसी पहलें भी सरकार द्वारा शुरू की गयीं, जो technology development करने का मार्ग प्रशस्त करेगी: रक्षा मंत्री

 **ANI** @ANI

#WATCH | India today successfully carried out a long-range Supersonic Missile Assisted Torpedo (SMART) off coast of Balasore in Odisha.

"The system has been designed to enhance Anti-sub marine warfare capability far beyond the conventional range of the torpedo," DRDO says



Watch on Twitter
ANI

3:10 PM · Dec 13, 2021



PRO, Hyderabad, Ministry of Defence
@dprohyd

Defence Research and Development Organisation (DRDO) developed supersonic missile assisted torpedo system was successfully launched from Wheeler Island in Odisha today. The system is a next generation missile-based standoff torpedo delivery system pib.gov.in/PressReleasePa...





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Government of India

Ministry of Defence

Mon, 13 Dec 2021 4:55PM

Raksha Mantri Shri Rajnath Singh virtually inaugurates nation-wide events of Department of Defence Production as part of ‘Azadi Ka Amrit Mahotsav’

Raksha Mantri Shri Rajnath Singh virtually inaugurates nation-wide events of Department of Defence Production as part of ‘Azadi Ka Amrit Mahotsav’

Key Highlights of RM’s speech:

- ***Events to raise awareness about progress made in defence sector, instill national spirit among people & further strengthen their trust in our defence preparedness***
- ***‘Aatmanirbharta’ must for a free & sovereign nation***
- ***Government does not shy away from taking bold decisions in national interest***
- ***Continued public-private partnership will help to soon achieve ‘Make in India, Make for the World’***
- ***It is our responsibility to work tirelessly to achieve late General Bipin Rawat’s vision of Armed Forces modernisation & complete self-reliance in defence***

Raksha Mantri Shri Rajnath Singh inaugurated several iconic events of Department of Defence Production (DDP), as part of Ministry of Defence dedicated week from December 13-19, 2021 to celebrate ‘Azadi Ka Amrit Mahotsav’ commemorating 75 years of Independence. A virtual exhibition, ‘Path to Pride’, public exhibitions, curated museums and a booklet showcasing 75 resolutions of DDP were inaugurated/launched by the Raksha Mantri. Congratulating DDP for organising the week-long nation-wide events, he said, it will be helpful in spreading information about the efforts towards making India a net defence exporter from a net defence importer.

In his address, Shri Rajnath Singh also paid rich tributes to country’s Chief of Defence Staff General Bipin Rawat and other Armed Forces personnel, who lost their lives in a helicopter crash in Tamil Nadu on December 08, 2021 and extended his condolences to the family members. “General Rawat still had a lot to do. Modernisation of our Armed Forces and complete self-reliance in the defence sector were subjects close to his heart. Now, it is our responsibility to work tirelessly to achieve the objective even sooner,” he added.

Sharing his insights on what freedom means to a Nation, the Raksha Mantri said, freedom is not just a thing to be attained or earned, it is also a thing to maintain, for which one has to strive continuously. “Freedom is not a goal, but a path. To a sovereign nation, freedom means the ability and capacity to take any decision related to defence and socio-economic development. In any situation, we can take a decision only when we are completely self-reliant,” he stressed.

Shri Rajnath Singh was of the view that while India attained freedom in the fields such as agriculture, education and health post-Independence, not much attention was paid towards the defence sector. He said, before the Government came to power in 2014, the defence sector lagged

behind due to lack of investment, innovation and research & development. This led to dependency on imports to meet the defence requirements of the country and affected the strategic autonomy, he added. The Raksha Mantri pointed out that the present government understood the importance of self-reliance in defence and has been making constant efforts to achieve 'Aatmanirbharta' in the sector. "The defence sector has entered into a new era due to the policies, vision and mindset of this Government," he added.

Saying that this government does not shy away from taking bold decisions in the interest of the Nation, the Raksha Mantri listed out a number of policy reforms aimed at promoting self-reliance in defence manufacturing. He made special mention of the corporatisation of Ordnance Factory Board (OFB), saying that the move will make OFB more effective & efficient and unleash its true potential. Other reforms mentioned by the Raksha Mantri include setting up of Defence Industrial Corridors in Uttar Pradesh & Tamil Nadu; increasing the FDI limit to 74 per cent through automatic route & 100 per cent through Government route under certain circumstances; unveiling of draft Defence Production and Export Promotion Policy 2020; notifying two positive indigenisation lists of over 200 items; earmarking of about 64 per cent of its modernisation funds under the capital acquisition budget for 2021-22 for procurement from domestic industries and launch of Innovations For Defence Excellence (iDEX) initiative.

Shri Rajnath Singh appreciated the fact that the private sector has contributed to about 90 per cent of country's defence exports. He exuded confidence this active and continued partnership between the Government and the private sector will help to soon achieve 'Make in India, Make for the World' as envisioned by Prime Minister Shri Narendra Modi. He hoped that the week-long events will generate awareness among people about the progress made in the defence sector, instill national spirit and further strengthen their trust in the country's defence preparedness.

Defence Secretary Dr Ajay Kumar said, the week-long events will make people aware of the achievements, resolve and vision of DDP. He reiterated the resolve to continue to move forward without any compromise to achieve 'Aatmanirbhar Bharat'.

As a run up to the DefExpo-2022 and with an aim to reach out to a larger audience in India and abroad, a Virtual Exhibition named 'Path to Pride' was launched to showcase the journey of 75 years for 'Aatmanirbhar' defence manufacturing through 75 stories of growth & evolution across the domains of land, naval, air, missile and electronic systems. This virtual interactive platform offers a repository of India's defence capabilities, indigenisation efforts, future readiness and policy reforms, augmenting India's emergence as the global defence manufacturing hub.

This exhibition has virtual events lined-up for seven days with seven Ps - *Pratigya, Prarambh, Pratishthan, Parivartan, Parakram, Protsahan & Prayas* - designed to engage respective stakeholders from the Government, manufacturers, innovators and masses.

Public exhibitions organised by Defence Public Sector Undertakings (DPSUs), Directorate General of Quality Assurance (DGQA) and Directorate General of Aeronautical Quality Assurance (DGAQA) at 75 locations across the country were also simultaneously inaugurated through virtual mode showcasing the journey of growth and development of defence manufacturing in the country. These exhibitions will be displaying an array of indigenous marquee defence products during the week. The exhibitions will offer a unique opportunity to the general public to have a look and feel of modern defence weapons, arms, ammunition & other equipment and on the top of it, a proud feeling of nationalism.

Curated museums at Bangalore, Mumbai, Kolkata, Pune, Avadi - Chennai and Goa were also inaugurated through virtual mode with a purpose to inform, educate, and inspire the masses. A booklet listing 75 commitments to the nation to be fulfilled by August 15, 2022 was also unveiled. The commitments aim to boost defence manufacturing, bring efficiency, facilitate Ease of Doing Business and reduce the regulatory compliance burden across the comprehensive defence production infrastructure.

Raksha Rajya Mantri Shri Ajay Bhatt, Chief of the Army Staff General MM Naravane, Chief of the Air Staff Air Chief Marshal VR Chaudhari, Chief of the Naval Staff Admiral R Hari Kumar,

Secretary (Ex-Servicemen Welfare) Shri B Anand, Financial Advisor (Defence Services) Shri Sanjiv Mittal and other senior officers of Ministry of Defence were among those present on the occasion. Officials from over 130 locations, including from various DPSUs, joined the event virtually.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1780962>



Press Information Bureau

Government of India

Ministry of Defence

Mon, 13 Dec 2021 2:59PM

Defence Equipments and Make in India Scheme

Many significant projects including 155mm Artillery Gun system 'Dhanush', Bridge Laying Tank, Light Combat Aircraft 'Tejas', 'Akash' Surface to Air Missile system, Submarine 'INS Kalvari', Inshore Patrol Vessel, Offshore Surveillance Ship, 'INS Chennai', Anti-Submarine Warfare Corvette (ASWC), Arjun Armoured Repair and Recovery Vehicle, Landing Craft Utility, Bridge Laying Tank, Bi-Modular Charge System (BMCS) for 155mm Ammunition, Thermal Imaging Sight Mark-II for T-72 tank, 25 T Tugs, Water Jet Fast Attack Craft, Offshore Patrol Vessel, Fast Interceptor Boat, INS Kalvari, INS Khanderi, Medium Bullet Proof Vehicle (MBPV), Lakshya Parachute for Pilotless Target Aircraft, etc. have been produced in the country under 'Make in India' initiative of the Government in last few years.

The Government has taken several policy initiatives and brought reforms to promote self-reliance in defence manufacturing. These policy initiatives are aimed at encouraging indigenous design, development and manufacture of defence equipment in the country, thereby reducing dependency on imports in long run. Important policy initiatives and reforms are as under:

- DPP-2016 has been revised as Defence Acquisition Procedure (DAP)- 2020, which is driven by the tenets of Defence Reforms announced as part of 'Aatmanirbhar Bharat Abhiyan'.
- In order to promote indigenous design and development of defence equipment 'Buy {Indian-IDDMM (Indigenously Designed, Developed and Manufactured)}' category has been accorded top most priority for procurement of capital equipment.
- Ministry of Defence has notified two 'Positive indigenisation lists' of total 209 items for which there would be an embargo on the import beyond the timeline indicated against them. This is a big step towards self-reliance in defence. This would offer a great opportunity to the Indian defence industry to manufacture these items using their own design and development capabilities to meet the requirements of the Armed Forces.
- The 'Make' Procedure of capital procurement has been simplified. There is a provision for funding upto 70% of development cost by the Government to Indian industry under Make-I category. In addition, there are specific reservations for MSMEs under the 'Make' procedure.
- Procedure for 'Make-II' category (Industry funded), introduced in DPP 2016 to encourage indigenous development and manufacture of defence equipment has number of industry friendly provisions such as relaxation of eligibility criterion, minimal documentation, provision for considering proposals suggested by industry/individual etc. So far, 60 projects relating to Army, Navy & Air Force, have been accorded 'Approval in Principle'.
- The Government has approved enhanced delegation of Financial Powers under Capital Procurement to levels below Vice-Chief of Armed Forces in February 2021. The Government has also approved enhanced delegation of Financial Powers in the Make-I category under which Government funding up to 70% of the prototype development cost is available for Design & Development of equipment, systems, major platforms or upgrades thereof.
- The Government of India has enhanced Foreign Direct Investment (FDI) in Defence Sector up to 74% through the Automatic Route for companies seeking new defence industrial license and

up to 100% by Government Route wherever it is likely to result in access to modern technology or for other reasons to be recorded.

- An innovation ecosystem for Defence titled Innovations for Defence Excellence (iDEX) has been launched in April 2018. iDEX is aimed at creation of an ecosystem to foster innovation and technology development in Defence and Aerospace by engaging Industries including MSMEs, Start-ups, Individual Innovators, R&D institutes and Academia and provide them grants/funding and other support to carry out R&D which has potential for future adoption for Indian defence and aerospace needs.
- An indigenization portal namely SRIJAN has been launched in August 2020 for DPSUs/Services with an industry interface to provide development support to MSMEs/Startups/Industry for import substitution. So far, 16445 Defence items, which were earlier imported, have been displayed on the portal. The Indian industry have shown their interest in 3559 items. Out of them, 342 have already been indigenized.
- “Offset portal” has been launched in May 2019 to ensure greater transparency, efficiency and accountability in the process. Reforms in Offset policy have been included in DAP-2020, with thrust on attracting investment and Transfer of Technology for Defence manufacturing, by assigning higher multipliers to them.
- Government has notified the ‘Strategic Partnership (SP)’ Model in May 2017, which envisages establishment of long-term strategic partnerships with Indian entities through a transparent and competitive process, wherein they would tie up with global Original Equipment Manufacturers (OEMs) to seek technology transfers to set up domestic manufacturing infrastructure and supply chains.
- Government has notified a ‘Policy for indigenisation of components and spares used in Defence Platforms’ in March 2019 with the objective to create an industry ecosystem which is able to indigenize the imported components (including alloys & special materials) and sub-assemblies for defence equipment and platform manufactured in India.
- Government has established two Defence Industrial Corridors, one each in Uttar Pradesh and Tamil Nadu to attract investments of Rs 20,000 crore. in the two Defence corridors by year 2024. So far, investment worth Rs 3,600 crore have been made in both the corridors by the public as well as private sector companies. Moreover, the respective State Governments have also published their Aerospace & Defence Policies to attract private players as well as foreign companies including Original Equipment Manufacturers (OEMs) in these two corridors.
- An Inter-Governmental Agreement (IGA) on “Mutual Cooperation in Joint Manufacturing of Spares, Components, Aggregates and other material related to Russian/Soviet Origin Arms and Defence Equipment” was signed in September, 2019. The objective of the IGA is to enhance the After Sales Support and operational availability of Russian origin equipment currently in service in Indian Armed Forces by organizing production of spares and components in the territory of India by Indian Industry by way of creation of Joint Ventures/Partnership with Russian Original Equipment Manufacturers (OEMs) under the framework of the “Make in India” initiative.
- Defence Products list requiring Industrial Licences has been rationalised and manufacture of most of parts or components does not require Industrial License. The initial validity of the Industrial Licence granted under the IDR Act has been increased from 03 years to 15 years with a provision to further extend it by 03 years on a case-to-case basis.
- Defence Investor Cell (DIC) has been created in February, 2018 the Ministry to provide all necessary information including addressing queries related to investment opportunities, procedures and regulatory requirements for investment in the sector. As on 31st October, 2021, 1,257 queries had been received and addressed by Defence Investor Cell.

This information was given by Raksha Rajya Mantri Shri Ajay Bhatt in a written reply to Shri Kumar Ketkarin Rajya Sabha today.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1780866>



Status of Defence Exports

The value of exports of defence items including major items in FY 2014-15 and 2020-21 was Rs 1,940.64 crore and Rs 8,434.84 crore respectively. Further, the names of the major defence items exported cannot be divulged due to strategic reasons.

Many reforms/steps have been taken to boost Defence exports and enhance ease of doing business during the last five years. There are as follows:

- Special Chemicals, Organisms, Materials, Equipment and Technologies (SCOMET) Category 6 titled “Munitions List” that was hitherto “Reserved” has been populated and Military Stores list notified vide Notification No.115(RE-2013)/2009-2014 dated 13th March 2015 stands rescinded.
- The Director General of Foreign Trade (DGFT) vide Public Notice No. 4/2015-20 dated 24th April, 2017 has delegated its authority and notified Department of Defence Production(DDP) as the Licensing Authority for export items in Category 6 of SCOMET. The export of items specified in Category 6 (Munitions List) except those covered under Notes 2 & 3 of Commodity Identification Note (CIN) of the SCOMET is now governed by the Standard Operating Procedure issued by the Department of Defence Production (DDP), Ministry of Defence.
- Standard Operating Procedure (SOP) for the export of munitions list items have been simplified and placed on the website of the DDP.
- A completely end-to-end online portal for receiving and processing export authorisation permission has been developed. The applications submitted on this portal are digitally signed and the authorisation are also issued digitally, at faster pace.
- In repeat orders of same product to the same entity, consultation process has been done away with and permission is issued immediately. For the repeat order of same product to different entity, the consultation earlier done with all stakeholders is now limited only with Ministry of External Affairs (MEA).
- In Intra-Company business (which is especially relevant for outsourcing of work by defence related parent company abroad to its subsidiary in India), the earlier requirement of getting End User Certificate (EUC) from the Government of importing country has been done away with and ‘Buying’ Company is authorized to issue the EUC.
- The requirement of Government signed EUC in cases of providing engineering services (ToT related to Munitions List) to Wassenaar Arrangement (WA) Countries has been dispensed with.
- Legitimate export of systems/platforms for civil end use to WA Member countries is considered subject to submission of EUC or import certificate or equivalent document issued by the Government of importing country.
- The legitimate export of the parts and components of small arms and body armour for civil use are now being permitted after prior consultation with MEA.
- For export of items for exhibition purposes, the requirement of consultation with stakeholders has been done away with (except for select countries).
- Powers have been delegated to DRDO and CMDs of DPSUs for exploring export opportunities and participation in global tenders.
- New simplified End User Certificate Format for Parts & Components has been provided in SOP.

- Validity of Export Authorization for export of parts & components has been increased from 02 years to date of completion of order/component whichever is later.
- A new provision for re-exporting parts and components for undertaking repair or rework to provide replacement for a component under warranty obligation is inserted in the SOP as a sub-classification of repeat orders.
- MHA vide Notification dated 1.11.2018 has delegated its powers to Department of Defence Production to issue export license under Arms Rules 2016 in Form X-A, for parts & components of small arms. With this the Department of Defence Production becomes the single point of contact for exporter for export of parts and components of Small Arms & Ammunitions.
- The Government has notified the Open General Export License (OGEL) - a one-time export license, which permits the industry to export specified items to specified destinations, enumerated in the OGEL, without seeking export authorisation during the validity of the OGEL. OGEL has been integrated with end-to-end online Portal.
- Scheme for Promotion of Defence Exports has been notified to provide an opportunity to the prospective exporters an option to get their product certified by the Government and provides access to the testing infrastructure of Ministry of Defence for initial validation of the product and its subsequent field trials. The certificate can be produced by the prospective exporter for marketing their products suitably in the global market.
- A separate Cell has been formed in the Department of Defence Production to co-ordinate and follow up on export related action including enquiries received from various countries, sharing the leads with private sector & public sector companies and facilitate exports.
- In order to boost defence exports, regular webinars are being organized with Friendly Foreign Countries (FFCs) under the aegis of DDP, MoD through Indian Missions abroad and Industry Associations with active participation from Indian Defence Industries.
- A Scheme to provide financial support to Defence Attaches for taking up actions for promoting exports of India made defence products both of public and private sector in the countries to which they are attached has been notified.
- To enhance functional autonomy, efficiency and unleash new growth potential and innovation in Ordnance Factories, the Government has converted 41 Ordnance Factories into seven Defence Public Sector Units (DPSUs), 100% Government owned corporate entity (ies).

This information was given by Raksha Rajya Mantri Shri Ajay Bhatt in a written reply to Shri Prakash Javadekar in Rajya Sabha today.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1780863>



Press Information Bureau
Government of India

Ministry of Defence

Mon, 13 Dec 2021 3:01PM

Formation of Defence Corridors

Uttar Pradesh Expressways Industrial Development Authority (UPEIDA) has signed Memorandum of Understandings (MoUs) with Indian Air Force (IAF), Defence PSUs-Bharat Earth Movers Limited (BEML), Hindustan Aeronautics Limited (HAL) and Naini Aerospace Ltd. during Aero India 2021. Details of these MoU are as under:

- IAF has signed MoU for indigenization programme.
- HAL & Naini Aerospace Ltd has signed MoU as Knowledge Partners and also help Defence Corridor in development of Aerospace Units and their supply chain through vendors.
- BEML has signed MoU with UPEIDA to establish an MRO facility for specialized vehicles.

During Def Expo-2020 held at Lucknow Uttar Pradesh, a total of 23 MoUs have been signed between UPEIDA and Private Companies. Out of these 23 MoUs, 6 companies namely Anchor Research Labs LLP, P2 Logitech Pvt Ltd., Allen & Alvan Pvt Ltd., Nitya Creations India, Syndicate Innovations International and PBM Insulations Pvt Ltd. have already been allotted and handed over land at Aligarh node.

The Government of Maharashtra forwarded a request letter for establishing a defence corridor in Maharashtra. It is, however, reiterated that the two defence corridors in Uttar Pradesh and Tamil Nadu are intended to provide a fillip to strengthening the defence manufacturing ecosystem in India including all States.

This information was given by Raksha Rajya Mantri Shri Ajay Bhatt in a written reply to Shri Sambhaji Chhatrapati in Rajya Sabha today.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1780869>



Press Information Bureau
Government of India

Ministry of Defence

Mon, 13 Dec 2021 3:01PM

Technology Development Fund

37 projects costing Rs191,19,28,932/- have been awarded to various industries specially MSMEs and start-ups under Technology Development Fund (TDF) scheme since its implementation. Total fund of Rs 28,51,45,680/- has been released to various Developing Agencies (DA) till date.

One product has been accepted by Indian Air Force and many other technologies are in advanced stages of acceptance by the Tri-Services & Users.

In 2021, Acceptance of Necessity (AoN) for 11 systems at a total cost of Rs 24,711 crore has been accorded for induction in the Services.

This information was given by Raksha Rajya Mantri Shri Ajay Bhatt in a written reply to Shri Naresh Bansal in Rajya Sabha today.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1780868>



Manufacturing of Indigenous Defence Equipments

The Government has taken several policy initiatives and brought in reforms to encourage indigenous design, development and manufacture of defence equipment in the country, thereby reducing dependence on imports in the coming years. These initiatives, inter-alia, include according priority to procurement of capital items from domestic sources under Defence Acquisition Procedure (DAP)-2020; Notification of two 'Positive Indigenisation Lists' of total 209 items for which there would be an embargo on the import beyond the timeline indicated against them; Simplification of Industrial licensing process with longer validity period; Liberalisation of FDI policy allowing 74 % FDI under automatic route; Simplification of Make Procedure; Launch of Innovations for Defence Excellence (iDEX) scheme involving startups & MSMEs; Implementation of "Public Procurement (Preference to Make to India), Order 2017; Launch of an indigenization portal namely SRIJAN to facilitate indigenization by Indian Industry including MSMEs; Reforms in Offset policy with thrust on attracting investment and Transfer of Technology for Defence manufacturing by assigning higher multipliers and Establishment of two Defence Industrial Corridors one each in Uttar Pradesh and Tamil Nadu.

In the last three years *i.e.*, 2018-19 to 2020-21, the Government has accorded Acceptance of Necessity (AoN) for 119 proposals worth Rs 214,255.65 crore approximately, under 'Buy (Indian-Indigenously Designed, Developed & Manufactured (IDDM)', 'Buy (Indian)', 'Buy and Make (Indian)', 'Make', 'SP Model', 'Buy & Make' categories of capital acquisition.

The capital expenditure on purchase of defence equipment from Indian and Foreign vendors for the Services during the last three years is as given below:

(Rs in crore)

	Total Procurement	Procurement from Foreign Vendors	Procurement from Indian Vendors	% of Procurement from Indian Vendors
2018-19	75913.06	36957.06	38956.00	51.32%
2019-20	91004.94	38156.83	52848.11	58.07%
2020-21	118860.52	42786.54	76073.98	64.00%

This information was given by Raksha Rajya Mantri Shri Ajay Bhatt in a written reply to Shri Harnath Singh Yadav and Shri Vijay Pal Singh Tomarin Rajya Sabha today.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1780867>

Tue, 14 Dec 2021

IIT Delhi, Indian Air Force collaborates to improve indigenisation efforts

Under the ambit of the agreement, an IIT Delhi statement added, the IAF has identified key focus areas involving technology development and finding indigenous solutions towards sustenance of various weapon systems.

Edited by Mridusmita Deka

New Delhi: The Indian Institute of Technology (IIT) Delhi and Indian Air Force (IAF) have signed an agreement for various developmental projects to support the requirements of the IAF. The joint partnership between the IAF and IIT Delhi seeks to accelerate IAF's indigenisation efforts for achieving self-reliance, an IIT Delhi statement said.

The agreement was signed by Air Vice Marshal Samir V Borade VSM, Deputy Senior Maintenance Staff Officer (Dy SMSO), Headquarters Maintenance Command, IAF and Prof. M R Ravi, Head, Department of Mechanical Engineering, IIT Delhi.

Under the ambit of the agreement, the statement added, the IAF has identified key focus areas involving technology development and finding indigenous solutions towards sustenance of various weapon systems.

IIT Delhi will provide cooperation and consultancy, duly supported by research, for feasibility studies and prototype development. The partnership between IAF and IIT Delhi will significantly boost the efforts by Base Repair Depots (BRDs) of Maintenance Command IAF, towards enhancing sustenance capability, obsolescence management, indigenisation and achieving self-reliance, the institute said.

IIT Delhi had also established a Joint Advanced Technology Center in the year 2017 with funding from the DRDO. Over 80 faculty members and close to 150 staff and PhD students are currently working on various defence related projects in the Institute. This agreement with the Indian Air Force is expected to give a further fillip to these ongoing projects, it added.

<https://www.ndtv.com/education/iit-delhi-indian-air-force-collaborates-improve-indigenisation-efforts>



IIT Delhi, IAF joins to develop indigenous projects

भारतीय वायुसेना के लिए स्वदेशी उपकरण बनाएगा आइआइटी दिल्ली, समझौता जापन पर हुए हस्ताक्षर

आइआइटी दिल्ली अब भारतीय वायुसेना के लिए स्वदेशी उपकरण बनाएगा। संस्थान वायुसेना के अत्याधुनिक हथियारों के रखरखाव के लिए स्वदेशी समाधान भी विकसित करेगा। इसके लिए भारतीय वायुसेना और आइआइटी दिल्ली ने एक समझौता जापन पर हस्ताक्षर किया है।

By Mangal Yadav, संजीव कुमार मिश्र

नई दिल्ली: आइआइटी दिल्ली अब भारतीय वायुसेना के लिए स्वदेशी उपकरण बनाएगा। संस्थान, वायुसेना के अत्याधुनिक हथियारों के रखरखाव के लिए स्वदेशी समाधान भी विकसित करेगा। इसके लिए भारतीय वायुसेना और आइआइटी दिल्ली ने एक समझौता जापन पर हस्ताक्षर किया है। इस दौरान एयर वाइस मार्शल समीर वी. बोराडे वीएसएम, डिप्टी सीनियर मेंटिनेंस स्टाफ आफिसर और आइआइटी यांत्रिक इंजीनियरिंग विभाग के प्रोफेसर एम. आर. रवि उपस्थित थे।

आइआइटी ने एक बयान जारी कर कहा कि इस संयुक्त साझेदारी का उद्देश्य आत्मनिर्भरता प्राप्त करने के लिए वायु सेना द्वारा किये जा रहे स्वदेशीकरण के प्रयासों में तेजी लाना है। प्रौद्योगिकी विकास और विभिन्न हथियार प्रणालियों के रखरखाव के स्वदेशी समाधान निकाले जाएंगे। वायुसेना और आइआइटी के विज्ञानी प्रोटोटाइप विकास के लिए संयुक्त शोध करेंगे। भारतीय वायुसेना के मेंटिनेंस कमांड के बेस रिपेयर डिपो (बीआरडी) के रखरखाव के प्रयासों, आत्मनिर्भरता, स्वदेशीकरण में तेजी आएगी।



आइआइटी दिल्ली ने रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) के वित्तीय सहयोग से 2017 में संयुक्त उन्नत प्रौद्योगिकी केंद्र की स्थापना की थी। इसके तहत 80 से अधिक संकाय सदस्य और 150 कर्मचारी और पीएचडी छात्र रक्षा से संबंधित विभिन्न परियोजनाओं पर काम कर रहे हैं। भारतीय वायु सेना के साथ हुए इस समझौता जापन से इन परियोजनाओं को और बढ़ावा मिलने की उम्मीद है।

<https://www.jagran.com/delhi/new-delhi-city-ncr-iit-delhi-to-make-indigenous-equipment-for-air-force-signed-an-agreement-22290716.html>

Tue, 14 Dec 2021

Defence Minister inaugurates HAL's Azadi Ka Amrit Mahotsav exhibitions

Bengaluru: Union Defence Minister Rajnath Singh virtually inaugurated week-long activities including exhibition of all activities of HAL related to AzadiKaAmritMahotsav (India @75) and other HAL focused events on Monday.

The exhibition sites at Bengaluru (including the Museum and Heritage Center), Nashik, Kanpur, Hyderabad, Koraput and Lucknow are now open to public with no entry fee till December 19 from 9 am to 5 pm.

After the inauguration, Dr C G Krishnadas Nair, Honorary President, SIATI and former Chairman, HAL unveiled the exhibition at HAL Heritage Centre and Aerospace Museum, Bengaluru in the presence of senior HAL officials.



HAL is showcasing its 80 years of heritage, current and futuristic products during the week beginning today.

HAL-produced aircraft, helicopters, aero engines, avionics systems, components and LRUs are on display at different exhibitions.

Visitors can view CATS WARRIOR UAV Mockup model, model of LCA Tejas, MiG 21 and MiG 27, Do-228 and HS-748, avionics systems, operational model of ALH transmission system, LRUs and aerospace components at different exhibitions.

Public entry to these exhibitions /museums will be with valid ID cards and students with their school/college ID cards with COVID protocols.

<https://www.daijiworld.com/news/newsDisplay?newsID=903923>

Tue, 14 Dec 2021

Gaganyaan mission specific crew training begins: ISRO

Chennai: The Indian Space Research Organisation (ISRO) announced that the specific crew training for the prestigious Gaganyaan mission, scheduled during the second half of next year, has commenced.

An Inter-Agency Task Team with members from DRDO, IAF and ISRO had generated the requirements for Crew Training Curriculum, which was approved by an apex committee comprising senior officials from ISRO and IAF, including Wg Cdr (Retd.) Rakesh Sharma and Air Cmde (Retd.) Ravish Malhotra.

The three-semester training curriculum will have courses on Human Rated Launch Vehicle, Orbital Module systems, Space Medicine, Launch Complex Procedures, Microgravity Familiarisation, Human Rating and Certification, Recovery Operations, Survival Training and related subjects.

Crew Safety in Gaganyaan mission is one of the important objectives of the training program.

Towards this, the crew will be thoroughly trained about the operating environment, risks, warning systems, procedures for nominal and off-nominal situations and emergency escape systems.

Modern training methods such as Virtual reality simulators, Static Mock-up simulators and health monitoring equipment will be employed during the training.

Experienced faculty from Indian Institute of Science, Institute of Aviation Medicine, DRDO and ISRO will be delivering lectures, ISRO said.

<https://newstodaynet.com/index.php/2021/12/13/gaganyaan-mission-specific-crew-training-begins-isro/>

India to send manned deep sea mission to find hidden minerals in 2024

- *Three scientists will be transported to a depth of 5,000 metres (5 kilometres) in the sea on Saturday, according to Minister of State for Science and Technology Jitendra Singh.*
- *The Samudrayan mission, as it is known, was started by the Centre in October of this year.*

New Delhi: India has announced the launch of Expedition Samudrayan, the country's first-ever manned deep-sea mission, in 2024. "Three scientists will be sent to a depth of five kilometres in the sea to find hidden mineral deposits," said Jitendra Singh, Union Minister of State for Science and Technology.

The Samudrayan mission, as it is known, was started by the Centre in October of this year.

"With the launch of this unique ocean mission, India joins the elite club of nations such as the USA, Russia, Japan, France, and China that have such underwater vehicles for carrying out subsea activities," Singh said on October 30 at the launch ceremony in Chennai.



The National Institute of Ocean Technology is working on Samudrayan (NIOT). It would be part of the Deep Ocean Mission, which will be implemented over five years with a total expenditure of Rs 4,077 crore.

The MATSYA 6000 deep-sea vehicle's preliminary design was completed earlier this year.

The MATSYA 6000 has a titanium alloy personnel sphere with a 2.1-meter diameter enclosed chamber that can transport three people for 12 hours and a further 96 hours in an emergency.

According to Union Minister Singh, sea trials of the 500-metre rated shallow water version of the manned submersible are anticipated to take place in the final quarter of 2022. According to the MATSYA 6000, it will be ready for testing by the second quarter of 2024.

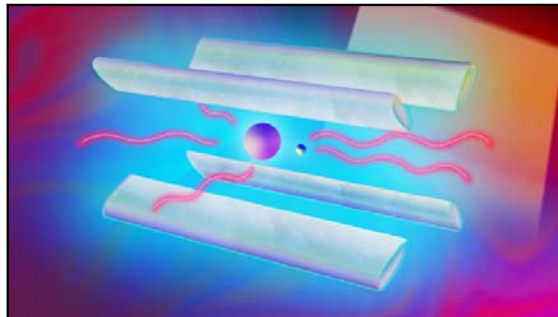
India will launch its first human space project, "Gaganyaan", in 2023, in addition to working on the first manned expedition to the ocean. After the United States, Russia, and China, India will be the fourth country to undertake a human spaceflight mission with Gaganyaan.

The goal of Gaganyaan, Singh told Parliament on Tuesday, is to show the capacity of sending humans to low earth orbit (LEO) onboard an Indian Launch Vehicle and safely returning them to Earth.

<https://english.sakshi.com/news/national/india-send-manned-deep-sea-mission-find-hidden-minerals-2024-148061>

Quantum algorithms bring ions to a standstill

Laser beams can do more than just heat things up; they can cool them down too. That is nothing new for physicists who have devoted themselves to precision spectroscopy and the development of optical atomic clocks. But what is new is the extremely low temperature that researchers at the QUEST Institute at the Physikalisch-Technische Bundesanstalt (PTB) have been able to reach with their highly charged ions—this type of ion has never been cooled down as far as 200 μK before. The team working on this succeeded by combining their established methods which include the laser cooling of coupled ions and methods from the field of quantum computing. The application of quantum algorithms ensured that ions that are too dissimilar for traditional laser cooling to work effectively could be cooled down together after all. This means that we are getting closer to an optical atomic clock with highly charged ions, and this clock might have the potential to be even more accurate than existing optical atomic clocks. The results have been published in the current issue of *Physical Review X*.



Mismatched partners are being cooled: A single beryllium ion (red, left) and a single highly charged argon ion (purple, right) are bombarded by lasers from various sides and are almost brought to a complete standstill. Credit: PTB

If you want to investigate particles—such as ions—extremely accurately (say, using precision spectroscopy or for measuring their frequency in an atomic clock), then you have to bring them as close as you can to a standstill. The most extreme standstill is the same as the lowest possible temperature—meaning you have to cool them down as efficiently as you can. One of the established high-tech cooling methods is so-called laser cooling. This method sees the particles being slowed down by lasers that have been skillfully arranged. Not every particle is suited to this method, however. That is why pairs of coupled ions have been used at the QUEST Institute for a long time in order to overcome this: One ion (called the "cooling ion" or the "logic ion") is cooled by lasers; simultaneously, its coupled partner ion is also cooled and can then be investigated spectroscopically (hence, it is called the "spectroscopy ion"). But this method has previously always reached its limits when the two ions have differed by too much in their charge-to-mass ratios—that is, when they have been very different in mass and very differently charged. "But it is now these very ions that are particularly interesting for our research, for instance, for developing novel optical clocks," explains QUEST physicist Steven King.

As he and his team are naturally very experienced in applying the laws of quantum mechanics (coupled cooling is, after all, based on quantum laws), they have made use of the toolkit of the quantum computing researcher. Quantum algorithms—i.e. computer operations that are based on manipulating individual quanta—cannot only be used to perform calculations faster than ever before with a quantum computer. They can also help to extract kinetic energy from the mismatched ion pair. During the process of so-called algorithmic cooling, quantum operations are used to do just that: to transfer the energy from the barely coolable motion of the spectroscopy ion to the easily coolable motion of the logic ion.

They managed to do this extremely well: "We were able to extract so much energy from the pair of ions—consisting of a singly charged beryllium ion and a highly charged argon ion—that their temperature finally dropped to only 200 μK ," said one of QUEST's Ph.D. students Lukas Spieß. Such an ensemble has never been so close to absolute zero (as in: so motionless). "What is more, we also observed an unprecedentedly low level of electric-field noise," he expanded. This noise normally leads to the ions being heated when the cooling stops, but this turns out to be particularly

low in their apparatus. Combining these two things means that the final major hurdle in their way has now been overcome, and an optical atomic clock that is based on highly charged ions can be built. This atomic clock could reach an uncertainty of less than 10^{-18} . Only the best optical atomic clocks in the world are currently able to reach this kind of performance. These findings are also of great significance for the development of quantum computers and for precision spectroscopy.

More information: Steven A. King et al, Algorithmic Ground-State Cooling of Weakly Coupled Oscillators Using Quantum Logic, *Physical Review X* (2021). DOI: [10.1103/PhysRevX.11.041049](https://doi.org/10.1103/PhysRevX.11.041049)

Journal information: [Physical Review X](https://phys.org/news/2021-12-quantum-algorithms-ions-standstill.html)
<https://phys.org/news/2021-12-quantum-algorithms-ions-standstill.html>

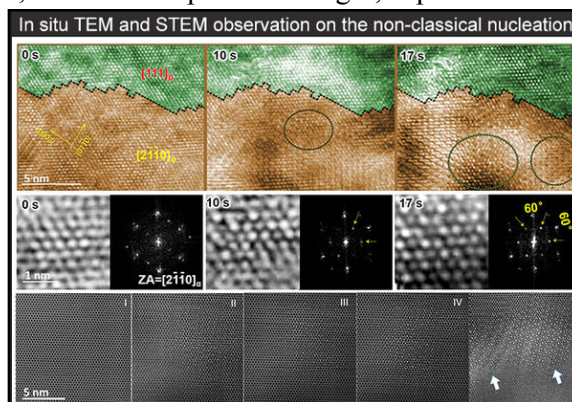


Tue, 14 Dec 2021

Phase transformation in titanium alloys observed at atomic scale

Titanium is an important structural metal. Titanium alloys are widely used in aerospace and biomedical applications, thanks to their light weight, remarkable specific strength, superb corrosion resistance and high heat resistance.

Recently, Prof. Yu Qian in Prof. Zhang Ze's group at the Center of Electron Microscopy in Zhejiang University led her team in collaboration with Prof. Ma En and Prof. Zhang Wei from Xi'an Jiaotong University and Prof. Long-qing Chen from the Pennsylvania State University to explore how titanium evolves in microstructure at a high temperature. By employing cutting-edge, in situ and multi-scale electron microscopy techniques as well as synchrotron radiation and computational simulations, the researchers together conducted an in-depth study into the α - β transformation mechanism in the titanium-molybdenum alloy. They discovered a significant distinction between this transformation process and what is described in classical nucleation theory. Their research findings appeared in the journal *Nature Materials* on November 26.



Credit: Zhe Jiang University

A phase in an alloy is usually a homogeneous component marked by the same aggregation state, crystal structure and property. Different phases have different features due to their difference in structure and composition. In materials' design, we can take full advantage of their complementary strengths so as to optimize the overall performance of the material.

Titanium-based alloys are usually the mixture of both the low-temperature hexagonal closed-packed (hcp) α -phase and the high-temperature body-centered cubic (bcc) β -phase. The combination of the dual phases is tuned by alloying of β -stabilizing (like Mo, Nb, Ta) and α -stabilizing (like O, Al, La) elements. The phase transformation can be plainly understood as the transition from one phase to another induced by external stimuli.

"To achieve the precise regulation of the phase structure, we need to know the real process of the phase transformation and its fundamental law," said Prof. Yu.

The classical nucleation and growth mechanism starts from the nucleation of a new phase, which assumes the same crystal structure and composition as the final equilibrium product phase. However, this simple picture fails to explain the phase transformation paths in many alloy systems.

Often, the evolution into the product phase is preceded by one or more intermediate states that are distinctly different from the product phase, in terms of composition, crystal structure and chemical order. The intermediate state is metastable and, as it evolves, its thermodynamic properties change as well, including its interfacial energy with the surroundings. There have been recent reports suggesting non-classical nucleation during the formation of inorganic nanoparticles from solutions, crystallization of proteins¹⁶ and nucleation of diamond crystals as well as crystallization of amorphous tungsten carbides, but the atomic details of complex reactions in metallurgic systems remain elusive.

Yu Qian et al. conducted a direct and time-resolved experimental observation of a non-classical nucleation-mediated phase transformation at sub-ångström resolution using a titanium-molybdenum alloy as a representative system. They discovered a nano-sized and chemically ordered superstructure in the α -phase matrix; its composition, chemical order and crystal structure were all found to be different from both the parent and the product phases, but triggered an increasingly low energy barrier for the transformation into the β -phase. This latter phase transition can proceed instantly via vibrational switching when the molybdenum concentration in the superstructure exceeds a critical value.

"It is the first time that such a non-classical solid-state phase transformation has been reported in titanium-based alloys," said Prof. Yu. "Our study can be held up as a prime example where in-situ and atomic-scale experiments are combined with computer simulations. Therefore, it opens the door to research into solid-state phase transformations in other alloys."

More information: Xiaoqian Fu et al, Atomic-scale observation of non-classical nucleation-mediated phase transformation in a titanium alloy, *Nature Materials* (2021). DOI: [10.1038/s41563-021-01144-7](https://doi.org/10.1038/s41563-021-01144-7)

Journal information: [Nature Materials](https://phys.org/news/2021-12-phase-titanium-alloys-atomic-scale.html)
<https://phys.org/news/2021-12-phase-titanium-alloys-atomic-scale.html>



Tue, 14 Dec 2021

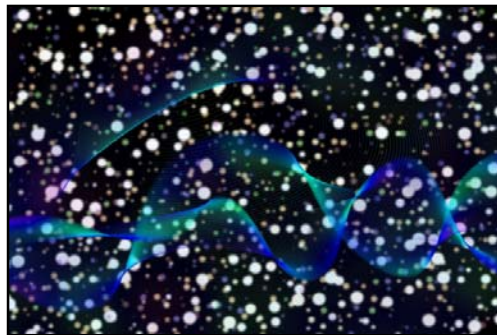
Discovery of 'split' photon provides a new way to see light

Nearly a century after Italian physicist Ettore Majorana laid the groundwork for the discovery that electrons could be divided into halves, researchers predict that split photons may also exist, according to a study from Dartmouth and SUNY Polytechnic Institute researchers.

The finding that the building blocks of light can exist in a previously-unimaginable split form advances the fundamental understanding of light and how it behaves. The theoretical discovery of the split photon—known as a "Majorana boson"—was published in *Physical Review Letters*.

"This is a major paradigm change of how we understand light in a way that was not believed to be possible," said Lorenza Viola, the James Frank Family Professor of Physics at Dartmouth and senior researcher on the study. "Not only did we find a new physical entity, but it was one that nobody believed could exist."

Similar to how liquid water can change into ice or vapor under specific conditions, the research indicates that light can also exist in a different phase—one where photons appear as two distinct halves.



Credit: CC0 Public Domain

"Water is water regardless of its liquid or solid form. It just behaves differently depending on physical conditions," said Viola. "This is how we need to approach our understanding of light—like matter, it can exist in different phases."

Rather than pieces that can be physically pulled apart, the photon halves serve similar to the different sides of a coin. The two distinct parts make up a whole, yet they can be described and function as separate units.

"Every photon can be thought of as the sum of two distinct halves," said Vincent Flynn, a Ph.D. candidate at Dartmouth and first author of the paper. "We were able to identify conditions for isolating these halves from one another."

The research is based on the fundamentals of physics.

Particles come in two different types: fermions and bosons. Fermions, such as electrons, tend to be solitary, avoiding each other at all costs. Bosons, such as photons, tend to bunch together. Thus, it was natural for researchers to assume that splitting bosons would be an insurmountable task.

The Dartmouth theory relies on energy-leaking, dissipating cavities that are coupled together and filled with quantum packets of light. The research predicts that particle halves appear at the edges of such a synthetic platform: The Majorana boson was discovered.

"Our discovery provides the first hint that a previously unknown, topological phase of light and matter which hosts Majorana bosons may exist," said Flynn.

The theoretical finding builds on the prediction in 1937 of the existence of neutral, electron-like particles known as Majorana fermions. In 2001, researchers suggested a specific process for how electrons could actually be halved in certain superconductors. But the photon had remained indivisible until now.

According to the research team, Majorana bosons can be viewed as distant relatives to Majorana fermions.

"Fermions and bosons are as different as two things can be in physics," said Emilio Cobanera, assistant professor of physics at SUNY Polytechnic Institute, and co-author of the study. "In effect, the particles are distorted images of each other. The existence of the Majorana fermions was our main clue that the Majorana boson was hiding somewhere in the funhouse mirror."

Confirmation of the Majorana boson would still require a laboratory experiment that observes the photon halves. Unlike the massive structures built to detect the renowned Higgs boson, an experiment to detect photon halves could be done on a tabletop. Such an experiment could utilize existing or near-term technologies.

The team found that Majorana bosons are robust against experimental imperfections and identifiable by distinct signatures. Although it is hard to predict how the findings may be applied, those characteristics could support the development of new types of quantum information processors, optical sensors, and light amplifiers. The research also points the way toward uncovering a new, exotic phase of matter and light.

"In order to make this discovery we had to challenge long-held beliefs and really think outside the box," said Viola. "We have split something previously thought to be unsplitable, and we'll never look at light the same way."

More information: Vincent P. Flynn et al, Topology by Dissipation: Majorana Bosons in Metastable Quadratic Markovian Dynamics, *Physical Review Letters* (2021). DOI: [10.1103/PhysRevLett.127.245701](https://doi.org/10.1103/PhysRevLett.127.245701)

Journal information: [Physical Review Letters](https://phys.org/news/2021-12-discovery-photon.html)
<https://phys.org/news/2021-12-discovery-photon.html>



Tue, 14 Dec 2021

Patients with MS at increased risk for prolonged COVID-19 symptoms

Post-acute sequelae of COVID-19 impacted nonhospitalized patients with MS, according to results of a prospective and longitudinal cohort study published in *Neurology: Neuroimmunology & Neuroinflammation*.

Those with preexisting severe neurological impairment or mental health problems appeared to have increased risk.

“Understanding the burden of [post-acute sequelae of COVID-19] among patients with MS and identifying its risk factors will inform MS rehabilitation services, which are going to deal with the emerging needs of patients with MS who had COVID-19,” Afagh

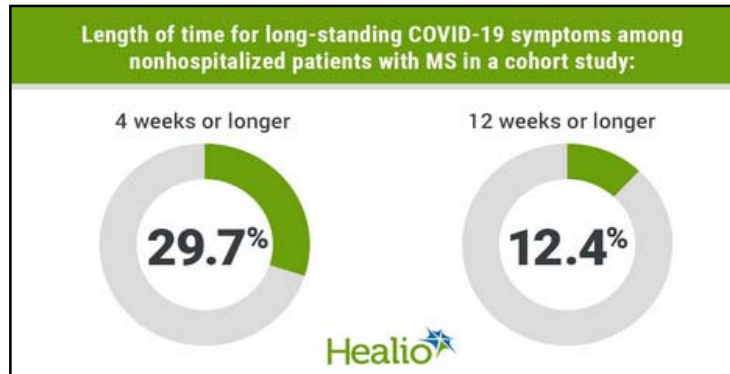
Garjani, MD, a neurology clinical research fellow at the University of Nottingham and Nottingham University Hospitals NHS Trust in the United Kingdom, and colleagues wrote. “In this study, we aim to understand the course of recovery from COVID-19 in MS and to determine its predictors.”

The researchers recruited 599 participants of the United Kingdom MS Register (UKMSR) COVID-19 study who reported COVID-19 between March 17, 2020, and March 19, 2021, and prospectively updated their recovery status via online questionnaires. According to Garjani and colleagues, the UKMSR contains participants’ demographic and up-to-date clinical data, as well as their web-based Expanded Disability Status Scale (web-EDSS) and Hospital Anxiety and Depression Scales (HADS) scores. They used multivariable Cox regression analysis to examine the link between these factors and COVID-19 recovery. They excluded 28 hospitalized participants.

Results showed at least 29.7% (n = 165) of participants had long-standing COVID-19 symptoms for 4 weeks or longer and 12.4% (n = 69) for 12 weeks or longer. Those with web-EDSS scores of 7 or higher before COVID-19, those with probable anxiety and/or depression before COVID-19 onset (HADS score of 11 or higher) and women had a lower likelihood of reporting COVID-19 recovery.

“These findings will inform MS and post-COVID-19 rehabilitation services in developing individualized pathways for patients with MS, helping to reduce the burden on these health systems in the COVID-19 era,” Garjani and colleagues wrote. “They also highlight the importance of vaccination against COVID-19 in the MS population who appear to be vulnerable to the long-term effects of infection.”

<https://www.healio.com/news/neurology/20211213/patients-with-ms-at-increased-risk-for-prolonged-covid19-symptoms>



Infographic data derived from: Garjani A, et al. *Neurol Neuroimmunol Neuroinflamm*. 2021;doi:10.1212/NXI.0000000000001118.

