

Apr
2021

समाचार पत्रों से चयित अंश Newspapers Clippings

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खंड : 46 अंक : 83 29 अप्रैल 2021
Vol.: 46 Issue : 83 29 April 2021



रक्षा विज्ञान पुस्तकालय
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Press Information Bureau
Government of India

Ministry of Defence

Wed, 28 April 2021 1:18PM

DRDO conducts maiden trial of Python-5 Air to Air Missile

Tejas, India's indigenous Light Combat Aircraft, added the 5th generation Python-5 Air-to-Air Missile (AAM) in its air-to-air weapons capability on April 27, 2021. Trials were also aimed to validate enhanced capability of already integrated Derby Beyond Visual Range (BVR) AAM on Tejas. The test firing at Goa completed a series of missile trials to validate its performance under extremely challenging scenarios. Derby missile achieved direct hit on a high-speed maneuvering aerial target and the Python missiles also achieved 100% hits, thereby validating their complete capability. The trials met all their planned objectives.

Prior to these trials, extensive missile carriage flight tests were conducted at Bengaluru to assess integration of the missile with aircraft systems on board the Tejas, like Avionics, Fire-control radar, Missile Weapon Delivery System and the Flight Control System. At Goa, after successful separation trials, live launch of the missile on a Banshee target was carried out. Python-5 missile live firing was conducted to validate target engagement from all aspects as well as beyond visual ranges. In all the live firings, missile hit the aerial target.



The missiles were fired from Tejas aircraft of Aeronautical Development Agency (ADA) flown by Indian Air Force (IAF) Test pilots belonging to National Flight Test Centre (NFTC). The successful conduct was made possible with years of hard work by the team of scientists, engineers and technicians from ADA and HAL-ARDC along with admirable support from CEMILAC, DG-AQA, IAF PMT, NPO (LCA Navy) and INS HANSA.

Raksha Mantri Shri Rajnath Singh has congratulated the teams of DRDO, ADA, Indian Air Force, HAL and all involved in the trial. Secretary Department of Defence R&D and Chairman DRDO Dr G Satheesh Reddy appreciated the efforts of scientists, engineers and technicians from various organisations and industry.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1714563>



पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Wed, 28 April 2021 1:18PM

डीआरडीओ ने हवा से हवामें मार करने वाली मिसाइल पाइथन-5 का पहला परीक्षण किया

भारत के स्वदेशी लाइट कॉम्बैट एयरक्राफ्ट तेजस ने 27 अप्रैल, 2021 को सफल परीक्षणों के बाद 5वीं पीढ़ी की पाइथन-5 एयर-टू-एयर मिसाइल (एएएम) को हवा से हवा (एयर-टू-एयर) में मार कर सकने वाले हथियारों के अपने बेड़े में शामिल कर लिया। इन परीक्षणों का उद्देश्य तेजस में पहले से ही समन्वित डर्बी बियाँन्ड विजुअल रेंज (बीवीआर) एयर-टू-एयर मिसाइल (एएएम) की बढ़ी हुई क्षमता का आकलन करना भी था। गोवा में किये गये इस निशानेबाजी परीक्षण (टेस्ट फायरिंग) ने बेहद चुनौतीपूर्ण परिदृश्यों में इस मिसाइल के प्रदर्शन को सत्यापित करने के लिए उससे जुड़ी परीक्षणों की एक श्रृंखला को अंजाम दिया। डर्बी मिसाइल द्वारा तेज गति के साथ पेंतरेबाजी करने वाले एक हवाई लक्ष्य पर सीधा प्रहार करने में सफल रहने और पाइथन मिसाइलों द्वारा भी निशानेबाजी का शत-प्रतिशत लक्ष्य हासिल करने के साथ उनकी संपूर्ण क्षमता का सत्यापन हुआ। इन परीक्षणों ने अपने सभी नियोजित उद्देश्यों को पूरा किया।

इन परीक्षणों से पहले, तेजस में लगी एवियोनिक्स, फायर-कंट्रोल रडार, मिसाइल वेपन डिलीवरी सिस्टम और फ्लाइट कंट्रोल सिस्टम जैसे विमान प्रणालियों के साथ इस मिसाइल के समन्वय का आकलन करने के लिए बेंगलुरु में मिसाइल टुलाई में सक्षम उड़ानों का व्यापक परीक्षण किया गया था। गोवा में, पृथक्करण के सफल परीक्षणों के बाद,



काल्पनिक लक्ष्य पर मिसाइल का लाइव प्रक्षेपण किया गया। सभी पहलुओं के साथ-साथ दृश्य सीमाओं से परे लक्ष्य को निशाना बनाने की क्षमता का आकलन करने के लिए पाइथन-5 मिसाइल के लाइव फायरिंग का आयोजन किया गया था। सभी लाइव फायरिंग में, इस मिसाइल ने अपने हवाई लक्ष्यों को मार गिराया।

इन मिसाइलों को नेशनल फ्लाइट टेस्ट सेंटर (एनएफटीसी) से संबद्ध भारतीय वायु सेना (आईएएफ) के टेस्ट पायलटों द्वारा उड़ाए गए एयरोनॉटिकल डेवलपमेंट एजेंसी (एडीए) के तेजस विमान से दागा गया था। यह सफल आयोजन सीईएमआईएलएसी, डीजी - एक्यूए, आईएएफ पीएमटी, एनपीओ (एलसीए नेवी) और आईएनएस हंसा के सराहनीय सहयोग के साथ-साथ एडीए और एचएएल-एआरडीसी के वैज्ञानिकों, इंजीनियरों और तकनीशियनों की टीम के वर्षों की कड़ी मेहनत की वजह से संभव हुआ।

रक्षा मंत्री श्री राजनाथ सिंह ने डीआरडीओ, एडीए, भारतीय वायु सेना, एचएएल की टीमों और इस परीक्षण में शामिल सभी लोगों को इस उपलब्धि के लिए बधाई दी है। रक्षा अनुसंधान एवं विकास विभाग के सचिव और डीआरडीओ के अध्यक्ष डॉ. जी. सतीश रेड्डी ने विभिन्न संगठनों और उद्योग के वैज्ञानिकों, इंजीनियरों और तकनीशियनों के प्रयासों की सराहना की।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1714625>

'New' Israeli missile for IAF: How Python-5 missile gives Tejas more teeth

The Python-5 is 2nd air-to-air missile of Israeli origin to be integrated on Tejas

The DRDO announced on Wednesday that the indigenous Tejas fighter has been cleared to carry the Python-5 short-range air-to-air missile.

The Python-5 is the second air-to-air missile of Israeli origin to be integrated on the Tejas fighter. The first was the Derby medium-range air-to-air missile. Both weapons are made by the Israeli defence company Rafael. While the Derby is a radar-guided weapon thought to have a range of over 50km, the Python-5 is an infra-red guided missile that 'homes in' on the heat signature of a target. The Python-5 is believed to have a range of at least 20km.



The Tejas firing the Python-5 missile | [Twitter handle of DRDO](#)

"Tejas added the 5th generation Python-5 air-to-air missile in its air-to-air weapons capability on Tuesday. Trials were also aimed to validate enhanced capability of already integrated Derby beyond-visual-range AAM on Tejas," said an official. He said the test-firing at Goa completed a series of missile trials to validate performance of the aircraft under extremely challenging scenarios.

"Derby missile achieved direct hit on a high-speed manoeuvring aerial target, and the Python missiles also achieved 100 per cent hits, thereby validating their complete capability. The trials met all their planned objectives," the official said.

Wednesday's announcement by the DRDO is believed to be the first acknowledgement of the integration of the Python-5 missile on an Indian Air Force fighter. Talk of the Python-5 being offered to the Indian Air Force had been going for several years.

Interestingly, both the Derby and Python-5 missile already serve the Indian Air Force in a different role—as surface-launched air defence missiles on the SPYDER system.

Illustrious family of missiles

The Python-5 is the newest member of the Israeli Python family of short-range air-to-air missiles. While the number designation suggests there were five different generations of missiles bearing the name 'Python', in reality, there are only three: Python-3, Python-4 and Python-5.

The first two generations of Israeli short-range missiles were called 'Shafrir'. The missiles were distinguished by advances in propulsion and sophistication of their homing seekers. The Shafrir-2 missile is credited with shooting down dozens of aircraft in the 1970s, particularly in the 1973 Yom Kippur war.

The Python-3 missile is credited with shooting down at least 35 Syrian aircraft in the war between the two nations over the Bekaa valley in 1982.

How Python-5 is different

The Python-5 was unveiled by Rafael in 2003 at the Paris Air Show. The Israeli Air Force has used the missile to shoot down UAVs used by Iranian proxies such as Hezbollah.

Like most short-range air-to-air missiles produced since the late 1990s, the Python-5 is a 'high off-boresight' weapon. High off-boresight (HOBS) missiles can be fired at extreme angles from a

pilot's line of sight. HOBBS capability enables the pilot to effectively aim at a target by looking at it, instead of turning his aircraft towards it.

The Python-5 retains the same airframe, warhead and rocket motor of the Python-4 missile. Where it differs is in its advanced seeker.

Writing in *Indian Defence Review* in 2012, air commodore K.B. Menon of the Indian Air Force explained fifth-generation air-to-air missiles, such as the Python-5, "have far better seekers that allow the missile to 'see' images rather than detect points of infra-red radiation". Such 'imaging infrared' seekers enable a missile to detect and avoid infra-red countermeasures such as flares launched by an enemy aircraft and even target particular parts of an enemy aircraft, instead of merely focusing on heat emanating from the engine.

According to Rafael, the combination of the Python-5 missile's imaging infrared seeker and sophisticated algorithms enables the missile to acquire small and low-signature targets. These could include stealth aircraft, cruise missiles and UAVs, all of which are proliferating in India's neighbourhood.

Better than existing Russian missile

The Indian Air Force has been operating the Russian-origin R-73 heat-seeking missile for decades. The R-73 has already been test-fired on the Tejas.

Wing Commander Abhinandan Varthaman is believed to have shot down an F-16 with an R-73 missile fired from his MiG-21 fighter during the aerial skirmish with Pakistan in April 2019. While the R-73 was considered a marvel in the early 1990s, the weapon is showing its age now. Writing in *The Print* in February this year, former Indian Air Force pilot Sameer Joshi noted the R-73 missile lacks an IIR seeker, making it "it very vulnerable to modern countermeasures".

The integration of the Python-5 thus would give the Indian Air Force's fleet of Tejas jets a timely boost.

<https://www.theweek.in/news/india/2021/04/28/new-israeli-missile-for-iaf-how-python-4-missile-gives-tejas-more-teeth.html>

TIMESNOWNEWS.COM

Thu, 29 April 2021

Tejas aircraft cleared to carry Python-5 air-to-air missile: All you need to know about Israeli-made weapon

The Israeli-origin Python-5, manufactured by the defence outfit, Rafael, is an infra-red guided missile that, reportedly, 'homes in' on its target using its heat signature

Key Highlights

- *While today's announcement marks the first time that the Python-5 will be carried on an Indian aircraft, it, like the Derby missile also manufactured by Rafael, is already in use by the Indian Air Force as a surface-to-air missile on the SPYDER system*
- *Its advanced seeker distinguishes the missile from its predecessors in that, it enables the missile to form images of its target besides detecting the infra-red radiation emitted by it*
- *The high off-boresight (HOBBS) capability allows the missile to be fired from extreme angles to the pilot's line of sight*

India's indigenously-made Light Combat Aircraft, Tejas, on Wednesday, added more teeth to its arsenal with the addition of the 5th generation Python-5 Air-to-Air Missile (AAM). A DRDO statement confirmed the same, adding that trials were also conducted to validate the enhanced capability of the Derby Beyond Visual Range (BVR) AAM – already a fixture on the Tejas aircraft.

“Derby missile achieved direct hit on a high-speed manoeuvring aerial target and the Python missiles also achieved 100 per cent hits, thereby validating their complete capability. The trials met all their planned objects,” the DRDO statement read.

The Israeli-origin Python-5, manufactured by the defence outfit, Rafael, is an infra-red guided missile that, reportedly, 'homes in' on its target using its heat signature. With a length of 3.1 metres, a wingspan of 64 cm and a diameter of 16cm, it weighs 105 kg and is capable of carrying an 11kg high explosive fragmentation warhead equipped with an active laser proximity fuse.



India's indigenous Tejas Light Combat Aircraft. | Photo Credit: Twitter

While today's announcement marks the first time that the Python-5 will be carried on an Indian aircraft, it, like the Derby missile also manufactured by Rafael, is already in use by the Indian Air Force as a surface-to-air missile on the SPYDER system.

Although its name suggests that there were five generations of these short-range air-to-air missiles, there are actually just three, with the Python-5 the latest and most advanced of the lot. The first two generations – Python-3 and Python-4, were called 'Shafrir.' The Python family of missiles stand out for their advanced propulsion technology and homing seekers.

But the Python-5, with its new electro-optical infrared seeker and high off-boresight capability, is particularly special.

The seeker distinguishes the missile from its predecessors in that, it enables the missile to form images of its target besides detecting the infra-red radiation emitted by it. This capability allows it to avoid infra-red countermeasures like flares launched by enemy aircraft giving it an edge over previous versions. The seeker is so sophisticated that it can even allow the missile to target specific parts of an enemy aircraft.

Secondly, the high off-boresight (HOBS) capability allows the missile to be fired from extreme angles to the pilot's line of sight. What this effectively means is that the pilot can aim at a target without having to actually turn the aircraft towards it.

The latest development couldn't have come any sooner especially amid reports that the Russian-origin R-73 heat-seeking missile currently equipped on India's jets is now losing its edge.

The R-73 was considered among the finest missiles in the world in the early 1990s, but the weapon, as detailed by Air Force pilot Sameer Joshi in February this year, lacks an infra-red radiation seeker, making it “very vulnerable to modern countermeasures.”

<https://www.timesnownews.com/india/article/tejas-aircraft-cleared-to-carry-python-5-air-to-air-missile-all-you-need-to-know-about-israeli-made-weapon/750586>

DRDO conducts maiden trial of Python-5 Air to Air Missile in Goa

The missiles were fired from Tejas aircraft of Aeronautical Development Agency (ADA) flown by Indian Air Force (IAF) Test pilots belonging to National Flight Test Centre (NFTC)

Edited By Priyanka

Bengaluru: India's indigenous Light Combat Aircraft, Tejas, has added the 5th generation Python-5 Air-to-Air Missile (AAM) to its air-to-air weapons capability. Trials were also aimed to validate enhanced capability of already integrated Derby Beyond Visual Range (BVR) AAM on Tejas, a DRDO statement said on Wednesday. The test firing in Goa on Tuesday completed a series of missile trials to validate its performance under extremely challenging scenarios, it said.

"Derby missile achieved direct hit on a high speed manoeuvring aerial target and the Python missiles also achieved 100 per cent hits, thereby validating their complete capability. The trials met all their planned objectives," the statement said.

Prior to these trials, extensive missile carriage flight tests were conducted in Bengaluru to assess integration of the missile with aircraft systems on board the Tejas, like Avionics, Fire-control radar, Missile Weapon Delivery System and the Flight Control System.

In Goa, after successful separation trials, live launch of the missile on a 'Banshee' target was carried out. Python-5 missile live firing was conducted to validate target engagement from all aspects as well as beyond visual ranges. In all the live firings, missile hit the aerial target. The missiles were fired from Tejas aircraft of Aeronautical Development Agency (ADA) flown by Indian Air Force (IAF) Test pilots belonging to National Flight Test Centre (NFTC).



Tejas, India's indigenous Light Combat Aircraft, added the 5th generation Python-5 Air-to-Air Missile (AAM) in its weapons capability. (Image tweeted by DRDO_India)

The successful conduct was made possible with years of hard work by the team of scientists, engineers and technicians from ADA and HAL-ARDC along with admirable support from CEMILAC, DG-AQA, IAF PMT, NPO (LCA Navy) and INS HANSA, DRDO said.

Defence Minister Rajnath Singh congratulated the teams of DRDO, ADA, Indian Air Force, HAL and all those involved in the trial, the statement said. Secretary DD R&D and Chairman DRDO, G Satheesh Reddy appreciated the efforts of scientists, engineers and technicians from various organisations and industry, it was stated.

<https://www.india.com/news/india/drdo-conducts-maiden-trial-of-python-5-air-to-air-missile-in-go-4621907/>

India conducts maiden trial of Python-5 air-to-air missiles

The Python-5 missile live launch was conducted to validate target engagement from all aspects as well as beyond visual ranges. The missiles hit the aerial target in all the live launches

By Sangeeta Nair

India's indigenous Light Combat Aircraft, Tejas has added 5th generation Python-5 Air-to-Air Missile (AAM) in its air-to-air weapons capability. The maiden trial of the Python-5 missile was conducted by DRDO on April 27, 2021.

Trials aim to enhance the capability of already integrated Derby Beyond Visual Range (BVR) AAM on Tejas. The missiles were test-fired at Goa and the successful completion of the mission trials validate its performance under extremely challenging scenarios.

Python missiles were able to hit the target with 100 percent accuracy. Derby missile also achieved a direct hit on a high-speed maneuvering aerial target thereby validating their complete capability. The missile trials met all their planned objectives.



Python 5 Missiles, Source: PIB

Key Highlights

- Extensive missile carriage flight tests were conducted at Bengaluru prior to these trials to assess the integration of the missile with aircraft systems onboard the Tejas such as Missile Weapon Delivery System, Avionics, Fire-control radar and the Flight Control System.
- The live launch of the missile on a Banshee target was carried at Goa, after successful separation trials.
- The Python-5 missile live launch was conducted to validate target engagement from all aspects as well as beyond visual ranges.
- The missiles hit the aerial target in all the live launches.
- The missiles were fired from Tejas aircraft flown by Indian Air Force (IAF) Test pilots belonging to National Flight Test Centre (NFTC).
- Union Defence Minister Rajnath Singh congratulated all the teams including from DRDO, ADA, Indian Air Force, HAL and all the others involved in the trial.

<https://www.jagranjosh.com/current-affairs/india-conducts-maiden-trial-of-python5-airtoair-missiles-1619623512-1>

तेजस ने हवा में ऐसे दागी पाइथन-5 मिसाइल, दुश्मनों के उड़ेंगे होश

Python-5 missile: इस परीक्षणों से पहले बंगलुरु में तेजस में लगी विमानन प्रणाली के साथ प्रक्षेपास्त्र के एकीकृत होने के आकलन के लिये व्यापक हवाई परीक्षण किये गए

बंगलुरु: भारत के स्वदेश में बने हल्के लड़ाकू विमान तेजस की हवा से हवा में मार करने की हथियार क्षमता में पांचवीं पीढ़ी का पाइथन-5 प्रक्षेपास्त्र (Python-5 missile) जुड़ गया है। रक्षा अनुसंधान विकास संस्थान (Defense research development institute) (डीआरडीओ) ने बुधवार को एक बयान में कहा कि इस परीक्षण का लक्ष्य तेजस (Tejas) पर पहले से ही एकीकृत डर्बी बियाँन्ड विजुअल रेंड (बीवीआर) एएएम की बढ़ी हुई क्षमता को सत्यापित करना था।

उसने कहा कि मंगलवार को गोवा में किये गए इस परीक्षण प्रक्षेपण से विभिन्न चुनौतीपूर्ण परिदृश्यों में इसके प्रदर्शन के प्रमाणन के लिये प्रक्षेपास्त्र परीक्षणों की श्रृंखला पूरी हुई।

बयान में कहा गया, “डर्बी प्रक्षेपास्त्र ने तेज गति से हवा में करतब दिखा रहे लक्ष्य पर सीधा प्रहार किया और पाइथन प्रक्षेपास्त्र ने भी 100 प्रतिशत लक्ष्य पर वार किया, इस तरह अपनी पूर्ण क्षमताओं को प्रमाणित किया। इन परीक्षणों ने अपने सभी लक्षित उद्देश्यों की प्राप्ति की।”

व्यापक हवाई परीक्षण किये गए

इस परीक्षणों से पहले बंगलुरु में तेजस में लगी विमानन प्रणाली के साथ प्रक्षेपास्त्र के एकीकृत होने के आकलन के लिये व्यापक हवाई परीक्षण किये गए। इनमें लड़ाकू विमान की वैमानिकी, फायर-नियंत्रण रडार, प्रक्षेपास्त्र आयुध आपूर्ति प्रणाली, विमान नियंत्रण प्रणाली शामिल हैं। विमान से प्रक्षेपास्त्र के सफलतापूर्वक अलग होने संबंधी परीक्षणों के बाद गोवा में ‘दुश्मन’ के लक्ष्य को भेदने के लिये परीक्षण किया गया। बयान में कहा गया कि रक्षा मंत्री राजनाथ सिंह ने डीआरडीओ और परीक्षण से जुड़े सभी लोगों को बधाई दी है।

रक्षा मंत्री राजनाथ सिंह दी बधाई

रक्षा मंत्री राजनाथ सिंह ने दी बधाई (Defense Minister Rajnath Singh congratulated)

विमान से प्रक्षेपास्त्र के सफलतापूर्वक अलग होने संबंधी परीक्षणों के बाद गोवा में ‘दुश्मन’ के लक्ष्य को भेदने के लिए परीक्षण किया गया। बयान में कहा गया कि रक्षा मंत्री राजनाथ सिंह ने डीआरडीओ और परीक्षण से जुड़े सभी लोगों को बधाई दी है।

<https://hindi.news18.com/news/nation/drdo-successfully-tests-python-5-missile-will-make-enemies-in-the-air-3572345.html>



रक्षा मंत्री राजनाथ सिंह ने डीआरडीओ और परीक्षण से जुड़े सभी लोगों को बधाई दी है।

COVID 19: DRDO's Contribution



Press Information Bureau
Government of India

Ministry of Defence

Wed, 28 April 2021 1:05PM

DRDO to set up 500 Medical Oxygen Plants within three months under PM CARES Fund

The Medical Oxygen Plant (MOP) technology, developed by DRDO for On-Board Oxygen Generation for LCA, Tejas by DEBEL, DRDO will now help in fighting the current crisis of oxygen for COVID-19 patients. The oxygen plant is designed for a capacity of 1,000 litres per minute (LPM). The system can cater to 190 patients at a flow rate of 5 LPM and charge 195 cylinders per day. Transfer of Technology has been done to M/s Tata Advanced Systems Limited, Bengaluru and M/s Trident Pneumatics Pvt. Ltd., Coimbatore, who will be producing 380 plants for installation across various hospitals in the country. 120 plants of 500 LPM capacity will be produced by industries working with Indian Institute of Petroleum, Dehradun, belonging to CSIR.

Oxygen is a very important clinical gas in health care centres and hospitals for treatment of COVID-19 Patients. Medical Oxygen Plant (MOP) technology is capable of generating oxygen with $93\pm 3\%$ concentration which can be directly supplied to hospital beds or can be used to fill medical oxygen cylinders. It utilizes Pressure Swing Adsorption (PSA) technique and Molecular Sieve (Zeolite) technology to generate oxygen directly from atmospheric air.

The MOP technology will be useful to provide oxygen supply during Corona Pandemic in hospitals in urban and rural areas. Hospitals will be able to generate on site medical oxygen, in a cost-effective manner with this oxygen plant rather than depending upon sourcing it from other places.

The installation of this plant helps in avoiding hospital dependency on scarce oxygen cylinders especially at high altitude and inaccessible remote areas. MOP has already been installed at some of the Army sites in North East and Leh-Ladakh region. The plant complies with International Standards like ISO 1008, European, US and Indian Pharmacopeia. Site preparation for 5 plants to be installed in Delhi/NCR region has already been initiated.

The DRDO has initiated fabrication of 380 numbers of Medical Oxygen Plants with release of Supply Orders for 332 numbers on M/s Tata Advanced Systems Limited, Bengaluru and 48 numbers on M/s Trident Pneumatics Pvt. Ltd., Coimbatore with a target of producing 125 plants per month under PM CARES Fund. With this it is expected that 500 Medical Oxygen Plants will be installed within three months.

Raksha Mantri Shri Rajnath Singh has appreciated DRDO for using the MOP technology to generate much needed oxygen for COVID-19 patients which will help in overcoming the present crisis. Secretary Department of Defence R&D & Chairman DRDO Dr G Satheesh Reddy has assured the support of DRDO for use of the technology by hospitals and other health agencies.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1714552>





पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Wed, 28 April 2021 1:05PM

पीएम केयर्स फंड के तहत तीन महीने में 500 मेडिकल ऑक्सीजन संयंत्र लगाएगा डीआरडीओ

रक्षा अनुसंधान विकास संगठन (डीआरडीओ) द्वारा एलसीए, तेजस में ऑन बोर्ड ऑक्सीजन जनरेशन के लिए विकसित की गयी मेडिकल ऑक्सीजन प्लांट (एमओपी) तकनीक अबकोविड-19 रोगियों के लिए ऑक्सीजन से जुड़े वर्तमान संकट से लड़ने में मदद करेगी। ऑक्सीजन संयंत्र 1,000 लीटर प्रति मिनट (एलपीएम) की क्षमता के लिए बनाया गया है। प्रणाली पांच एलपीएम की प्रवाह दर पर 190 रोगियों की जरूरत को पूरा कर सकती है और प्रति दिन 195 सिलेंडर चार्ज कर सकती है। मैसर्स टाटा एडवांस्ड सिस्टम्स लिमिटेड, बेंगलुरु और मैसर्स ट्राइडेंट न्यूमेटिक्स प्राइवेट लिमिटेड, कोयंबटूर को प्रौद्योगिकी का हस्तांतरण किया गया है, दोनों देश के विभिन्न अस्पतालों में स्थापना के लिए 380 संयंत्रों का उत्पादन करेंगे। सीएसआईआर से संबंधित भारतीय पेट्रोलियम संस्थान, देहरादून के साथ काम करने वाले उद्योग 500 एलपीएम क्षमता के 120 संयंत्रों का उत्पादन करेंगे।

कोविड-19 मरीजों के उपचार के लिए स्वास्थ्य देखभाल केंद्रों और अस्पतालों में ऑक्सीजन एक बहुत महत्वपूर्ण क्लीनिकल गैस है। मेडिकल ऑक्सीजन प्लांट (एमओपी) तकनीक 93 ± 3 प्रतिशतसांद्रता के साथ ऑक्सीजन उत्पन्न करने में सक्षम है जिसकी सीधे अस्पताल के बेड पर आपूर्ति की जा सकती है या जिसका उपयोग मेडिकल ऑक्सीजन सिलेंडर भरने के लिए किया जा सकता है। यह वायुमंडलीय वायु से सीधे ऑक्सीजन उत्पन्न करने के लिए प्रेशर स्विंग ऐडसॉर्प्शन (पीएसए) तकनीक और मोलेकुलर सिएव (जोलाइट) तकनीक का उपयोग करता है।

शहरी और ग्रामीण क्षेत्रों के अस्पतालों में कोरोना महामारी के दौरान ऑक्सीजन की आपूर्ति प्रदान करने के लिए एमओपी तकनीक उपयोगी होगी। अस्पताल दूसरी जगहों से ऑक्सीजन मंगाने पर निर्भर होने के बजाए लागत प्रभावी तरीके से इस ऑक्सीजन संयंत्र के माध्यम से अपने परिसर में ही मेडिकल ऑक्सीजन पैदा करने में सक्षम होंगे।

इस संयंत्र की स्थापना विशेष रूप से ऊंचाई वाले और दुर्गम दूरस्थ क्षेत्रों में दुर्लभ ऑक्सीजन सिलेंडर पर अस्पताल की निर्भरता से बचने में मदद करती है। पूर्वोत्तर और लेह-लद्दाख क्षेत्र में सेना के कुछ स्थलों पर एमओपी पहले ही स्थापित किया जा चुका है। संयंत्र आईएसओ 1008, यूरोपीय, अमेरिका और भारतीय फार्माकोपिया जैसे अंतर्राष्ट्रीय मानकों का अनुपालन करता है। दिल्ली/राष्ट्रीय राजधानी क्षेत्र में लगाए जाने वाले पांच संयंत्रों के लिए स्थल तैयार करने की पहल की जा चुकी है।

डीआरडीओ ने मैसर्स टाटा एडवांस्ड सिस्टम्स लिमिटेड, बेंगलुरु में 332 एमओपी और मैसर्स ट्राइडेंट न्यूमेटिक्स प्राइवेट लिमिटेड, कोयंबटूर में 48 संयंत्रों के लिए आपूर्ति के आदेश जारी करने के साथ 380 एमओपी के निर्माण की प्रक्रिया शुरू कर दी है और पीएम केयर्स फंड के तहत प्रति माह 125 संयंत्रों के उत्पादन का लक्ष्य रखा है। इसके साथ ही यह उम्मीद की जा रही है कि तीन महीनों के भीतर 500 मेडिकल ऑक्सीजन संयंत्र लगाए जाएंगे।

रक्षा मंत्री श्री राजनाथ सिंह ने कोविड-19 रोगियों के लिए बेहद जरूरी ऑक्सीजन उत्पन्न करने की खातिर एमओपी तकनीक का उपयोग करने के लिए डीआरडीओकी सराहना की है, डीआरडीओ की इस पहल से वर्तमान संकट से निपटने में मदद मिलेगी। रक्षा अनुसंधान एवं विकास विभाग के सचिव और डीआरडीओ के अध्यक्ष डॉ. जी सतीश रेड्डी ने अस्पतालों और अन्य स्वास्थ्य एजेंसियों द्वारा प्रौद्योगिकी के उपयोग के लिए डीआरडीओ की मदद का आश्वासन दिया है।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1714638>

ThePrint

Thu, 29 April 2021

Tejas aircraft tech comes in aid of oxygen-starved Indian cities. This is how it works

The tech is an offshoot of On-Board Oxygen Generation System project for medical grade oxygen generation on board Tejas. India is the 4th country to develop this

By Snehesh Alex Philip

New Delhi: As the national capital region and other cities across the country face oxygen shortage amid the massive Covid-19 wave, a technology used in the indigenously-developed light combat aircraft Tejas has come to the rescue.

Referred to as the Medical Oxygen Plant (MOP), the technology has been developed by the Defence Research and Development Organisation (DRDO) for on-board oxygen generation for Tejas.

Under the PM CARES Fund initiative, the DRDO will set up 500 medical oxygen plants within three months across the country, the defence body said in a statement Wednesday.

DRDO sources told ThePrint that at least five such plants will come up in the NCR by 10 May.

The MOP technology is an offshoot of the On-Board Oxygen Generation System (OBOGS) project for medical grade oxygen generation on board Tejas. India is the 4th country in the world to develop this technology.

It utilises Pressure Swing Adsorption (PSA) technique and molecular sieve to generate oxygen directly from atmospheric air.

Amid the Covid crisis, the DRDO has transferred this technology to private companies Tata Advanced Systems Ltd, Bengaluru and Trident Pneumatics Pvt. Ltd, Coimbatore, which will produce 380 plants of 1000 litres-per-minute (LPM) for installation across various hospitals in the country, the statement said.

While Tata Advanced Systems will supply 332 orders, Trident will produce 48.

Moreover, 120 plants of 500 LPM capacity will be produced by industries working with the Indian Institute of Petroleum, Dehradun, under the Council of Scientific and Industrial Research.

These systems can cater to 190 patients at a flow rate of 5 LPM and can charge 195 cylinders per day, the statement said.

The MOP technology is capable of generating oxygen with 93 ± 3 per cent concentration which can be directly supplied to hospital beds or can be used to fill medical oxygen cylinders.



The Medical Oxygen Plant developed by DRDO. | Photo: DRDO

These have already been installed at some of the Army sites in the Northeast and Leh-Ladakh regions.

How does it work

The MOP utilises an air compressor to provide input air supply to the oxygen plant which is filtered and dried by an air dryer and filtration system before the air is admitted to oxygen generator.

The oxygen generator removes the nitrogen from the air by adsorbing it in the molecular sieves and produces an output with 93 ± 3 per cent oxygen, the balance being argon which is not adsorbed.

For separating oxygen from air, the MOP employs PSA technique. Nitrogen is preferentially adsorbed in molecular sieves at higher pressures, thereby concentrating oxygen, DRDO sources said. The adsorbed nitrogen is released at low pressure (usually atmospheric pressure).

This technique is employed by alternating the pressurisation of the two adsorbent beds.

“While one bed is pressurised, the opposite bed is depressurised and exhausts previously adsorbed gases to the surrounding atmosphere. However, the inability of current zeolite molecular sieves to discriminate between oxygen and argon results in oxygen purity of 93 ± 3 per cent. Both oxygen and argon concentrate in the oxygen generators,” a source explained.

The concentrator system is fitted with a filter to remove particulate material, if any.

The output is stored in a storage tank.

An oxygen compressor/booster is connected to the system to fill cylinders which can be transported to nearby areas for use.

The system is designed for a capacity to cater 5 LPM per person for up to 200 individuals amounting to total capacity of 960 LPM (57.6 M3/hour).

<https://theprint.in/defence/tejas-aircraft-tech-comes-in-aid-of-oxygen-starved-indian-cities-this-is-how-it-works/647571/>

3 माह के भीतर 500 मेडिकल ऑक्सीजन प्लांट लगाएगा DRDO, PM केयर्स फंड से मिलेगी मदद

PM केयर्स फंड से मदद लेकर देश में 500 मेडिकल ऑक्सीजन प्लांट का निर्माण DRDO की ओर से किया जाएगा। हर रोज देश में कोरोना संक्रमण के मामले 3 लाख से अधिक आ रहे हैं। महामारी की इस दूसरी लहर ने देश की कमर तोड़ दी है।

By Monika Minal

नई दिल्ली: महामारी कोविड-19 की दूसरी लहर ने देश की व्यवस्था को चरमरा दिया है। अस्पतालों में बेड और दवाईयों की कमी के साथ ऑक्सीजन की भारी किल्लत है। इस क्रम में आज रक्षा मंत्रालय की ओर से दी गई जानकारी के अनुसार, देश में 500 मेडिकल ऑक्सीजन प्लांट का निर्माण रक्षा अनुसंधान एवं विकास संगठन (DRDO) की ओर से पीएम केयर्स फंड के तहत किया जाएगा। यह जानकारी रक्षा मंत्री राजनाथ सिंह (Defence Minister Rajnath Singh) ने दी। रक्षा मंत्री ने ट्वीट में कहा, 'DRDO द्वारा LCA तेजस के लिए विकसित मेडिकल ऑक्सीजन प्लांट (MOP) टेक्नोलॉजी से वर्तमान में कोविड-19 मरीजों के लिए हुई ऑक्सीजन की किल्लत से निपटने में मदद मिलेगी।' बता दें कि DRDO द्वारा विकसित किए जाने वाले मेडिकल ऑक्सीजन प्लांट टेक्नोलॉजी LCA, Tejas के ऑन-बोर्ड ऑक्सीजन जनरेशन का काम करती है।



Mediacl Oxygen Plant

भारत में कोविड-19 मामलों में तेजी के कारण अनेक राज्यों में मेडिकल ऑक्सीजन व हॉस्पिटल बेड की भारी किल्लत है। DRDO ने एक बयान में बताया कि MOP टेक्नोलॉजी का ट्रांसफर बंगलुरु के टाटा एडवांस सिस्टम लिमिटेड व कोयंबटूर के ट्राइडेंड न्यूमैटिक्स को किया जाएगा। इसके बाद ये दोनों कंपनियां मेडिकल ऑक्सीजन प्लांट की स्थापना करेंगी। इन प्लांटों से प्रति मिनट 1000 लीटर ऑक्सीजन का उत्पादन हो सकेगा।

बता दें कि अमेरिका समेत दुनिया के अन्य देशों से भारत को ऑक्सीजन सिलेंडर समेत तमाम आवश्यक चीजों की आपूर्ति की जा रही है। इसके अलावा DRDO की ओर से हरियाणा के हिसार और पानीपत में 500-500 बिस्तरों के दो कोविड अस्पताल स्थापित किए जाएंगे। हरियाणा के स्वास्थ्य मंत्री अनिल विज ने इस बारे में जानकारी देते हुए बताया कि सेना की पश्चिमी कमान को इन अस्पतालों के लिए डॉक्टर और अन्य चिकित्सा कर्मी उपलब्ध कराने को कहा गया है।

<https://www.jagran.com/news/national-drdo-india-is-going-to-set-up-500-medical-oxygen-plants-within-3-months-under-pm-cares-fund-21598393.html>

Coronavirus | DRDO to build two 500-bed COVID hospitals in Jammu and Srinagar

Union Home Secretary Ajay Bhalla has asked the Jammu and Kashmir administration to immediately identify suitable locations for constructing the hospitals

Jammu: The Defence Research and Development Organisation (DRDO) will set up two 500-bed COVID hospitals in Jammu and Srinagar, officials said on Wednesday.

Union Home Secretary Ajay Bhalla, while chairing a high-level meeting, reviewed the proposal to set up the hospitals, they added.

Mr. Bhalla asked the Jammu and Kashmir administration to immediately identify suitable locations for constructing the hospitals. He also asked the DRDO to evaluate and submit the corresponding proposal estimates through a team of experts.

The meeting was informed that the administration has identified two patches of land in Jammu and Srinagar for the purpose.

Jammu and Kashmir Chief Secretary B.V.R. Subrahmanyam, Financial Commissioner, Health Atal Dulloo, the Union secretaries of the departments concerned and officers from the DRDO, the Indo-Tibetan Border Police (ITBP) and the AFMS Institute participated in the meeting.

The chief secretary informed the meeting that the Union Territory has witnessed a consistent surge in the number of COVID-19 patients over the last few days.

The existing healthcare facilities are adequately catering to the needs of the patients, he said, adding that however, a continuation of this upward trend may lead to a shortage of COVID beds. To successfully mitigate the shortages in medical facilities, it was requested that the temporary DRDO COVID hospitals be constructed well in time, an official spokesperson said.

He further requested that the upcoming hospitals must be equipped with isolation beds having oxygen support and 125 fully-equipped ICU beds.

In the past, the DRDO built 1,000-bed temporary COVID hospitals across the country in approximately 12 days each.

<https://www.thehindu.com/news/national/other-states/coronavirus-drdo-to-build-two-500-bed-covid-hospitals-in-jammu-and-srinagar/article34431369.ece>



Rows of beds placed inside an indoor sports stadium turned COVID-19 isolation center in Srinagar on April 28. | Photo Credit: Nissar Ahmed

DRDO starts building hospital in Panipat

The Defence Research and Development Organisation on Wednesday started constructing a 500-bed hospital in Panipat's Bal Jatan village.

The hospital will be constructed in two phases. The first phase is expected to be completed in 10 days.

It is one of the two hospitals the DRDO has proposed in the state. The other one will be in Hiasr district.

"The Public Works Department has assigned the construction to an agency, which will build makeshift structures," said Panipat DC Dharmendra Singh.

The DC said the work to lay the oxygen pipeline would be started on Friday and it would be complete within a week.

Chief Minister Manohar Lal Khattar had visited the Panipat site two days ago and took stock of construction.

<https://www.tribuneindia.com/news/haryana/drdo-starts-building-hospital-in-panipat-245538>



Officials inspect the hospital site in Panipat's Bal Jatan village on Wednesday. Tribune Photo

DRDO on Twitter

 **रक्षा मंत्री कार्यालय/ RMO India** ✓ @DefenceMinIndia · 21h ...

The @DRDO_India is going to set up 500 Medical Oxygen Plants within 3 months under PM CARES Fund.


The Medical Oxygen Plant technology developed by DRDO for On-Board Oxygen Generation for LCA, Tejas will now help in fighting the current crisis of Oxygen for the COVID-19 patients.



Medical Oxygen Plant

 **रक्षा मंत्री कार्यालय/ RMO India** ✓ @DefenceMinIndia · 21h ...

Raksha Mantri Shri @rajnathsingh has appreciated the DRDO for using the MOP technology to generate much needed oxygen for COVID-19 patients which will help in overcoming the present crisis.

 **Office of Amit Shah** ✓ @AmitShahOffice · 16h ...

Key decisions taken by Modi government 👉

- 1 Lakh Portable Oxygen Concentrators to be procured from PM CARES fund.
- 500 more PSA oxygen plants, based on technology developed by DRDO, sanctioned under PM CARES



A. Bharat Bhushan Babu ✓ @SpokespersonMoD · 14h

...

डीआरडीओ ने हवा से हवामें मार करने वाली मिसाइल पाइथन-5 का पहला परीक्षण किया
pib.gov.in/PressReleasePa...



PIB India ✓ @PIB_India · 20h

...

.@DRDO_India to set up 500 Medical Oxygen Plants within three months under #PMCARESFund

Details: pib.gov.in/PressReleasePa...



Defence Strategic: National/International



Press Information Bureau
Government of India

Ministry of Defence

Wed, 28 April 2021 7:52PM

Indian Coast Guard locates missing fishing boat mercedes at high seas

The Indian Coast Guard, in yet another successful Search and Rescue operation at Sea, has located missing Tamil Nadu fishing boat Mercedes in a massive search operation launched since 24 Apr 21 at a distance of about 1100 KMs (590 miles) from Goa. The fishing boat had sailed for Deep Sea fishing on 06 Apr 21 with 11 crew onboard West of Kerala for a 30 days voyage from Thengapatnam Fishing harbour in Tamil Nadu. The Tamil Nadu Fisheries authorities on 24 Apr 21 intimated regarding sighting of debris by other fishing boats operating in the area presuming the fishing boat Mercedes to be sunk.

The Maritime Rescue Co-ordination Center (MRCC) of Indian Coast Guard at Mumbai activated International Safety Net to alert merchant vessels transiting near reported position to look out for the missing boat. Simultaneously, ICGS Samudra Prahari on Concurrent Deployment was diverted for search. MRCC (Mumbai) coordinated with merchant vessel Maersk Horsburgh to join the search operation alongwith fishing boats operating in the area. As the reported position was located in Pakistan Search and Rescue Region, MRCC Karachi was also requested for assistance as per IMO norms in vogue. Considering the distance from mainland, Indian Navy was requested for launch of Long Range Maritime Patrol aircraft. It was learnt that the fishing boat was not carrying AIS or any other transponder which could have assisted in early locating of the boat by the search units.

After four days of continuous search amidst challenges of distance from mainland and weather, the missing boat was located around 200 miles (around 370 kilometers) from Lakshadweep Islands. ICG Dornier located and corroborated the presence of the fishing boat today morning. MRCC (Mumbai) established communication with the fishing boat on satellite phone held by the boat and ascertained the crew to be safe. In the interim, information was also received from TN fisheries authorities that the crew of IFB Mercedes had called up home through Satellite phone to indicate that they are safe. ICG ship on deployment off Lakshadweep was diverted to render



logistic and medical assistance to the crew. The fishing boat is returning to its base port under escort of ICG ship and would reach around 03 May 21.

The Indian Coast Guard as the National Maritime Search and Rescue Coordinator has saved around 10,000 lives over 3400 missions averaging almost one life saved per two days. The Indian Coast Guard has been advocating fitment of AIS, Distress Alert Transponders and Long Range two way Communication mechanisms for enhancing safety of fishers proceeding for Deep Sea Fishing.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1714707>



Press Information Bureau
Government of India

Ministry of Defence

Wed, 28 April 2021 8:00AM

Indian Army steps up hospital facilities at Delhi cantonment to fight covid surge

In keeping with its ethos of selfless service to the Nation, the Indian Army has created a number of COVID facilities on a war footing in order to provide extensive medical assistance to veterans and their dependents at a number of places. One such facility has been created at Base Hospital Delhi Cantonment (BHDC) where the entire hospital has been converted into a Covid hospital with comprehensive arrangements for providing critical care to all incoming patients.

At the start of the current COVID wave, the Base Hospital catered for 340 COVID beds of which just 250 beds were oxygenated. This resource was being severely stretched for additional capacities due to exponential rise in COVID cases. Despite the beds being filled to their capacity, patients over and above this capacity are being treated in the Trauma Centre after obtaining their willingness to wait for beds. A plan was quickly put in place to expand the capacity to 650 COVID beds of which 450 beds will be oxygenated by 30 April 2021. The Intensive Care Unit (ICU) is also being enhanced from 12 beds 35 ICU beds by 29 April 2021. Next phase of expansion will see the present capacity being augmented to 900 oxygenated beds by the second week of June 2021.

For efficient patient management, a new COVID OPD under a specialist medical team is functioning round the clock for screening positive patients for home isolation, investigation, treatment advice and admission under a single roof. This team clinically examines approximately 500 patients on a daily basis and appropriate medical advice is rendered. The endeavor is to ensure that all critical cases are provided appropriate treatment.

In another initiative, a COVID tele-consultancy & Information Management Cell under a senior officer is functioning 24 x 7 rendering medical advice as well as information about admitted patients with due sensitivity. On an average, 1200-1300 calls are handled by this cell suggesting that the facility is well subscribed. Some of the functions being performed by the Cell include:-

- Telephonic consultation including provision of expert medical advice.
- Updates regarding admitted patients to relatives.
- Guidance regarding bed availability/admissions.
- COVID test reports.
- Coordination of personal requests from patients/ relatives.
- Information regarding COVID vaccination.

Citizens can make use of the following numbers to avail this facility:-

- 011-25683580
- 011-25683585
- 011-25683581

- 37176 (through Army Line)

Indian Army will spare no efforts to augment medical capacities to match the expanding requirements caused by the exponential rise in daily cases. In the current crisis, when all available medical resources are being marshalled to the best of our ability, veterans are requested to extend full support and encourage military medical professionals who are performing their duties with utmost dedication and sincerity.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1714467>



पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Wed, 28 April 2021 8:00AM

बढ़ते कोरोना मामलों से जंग लड़ने के लिए भारतीय सेना ने दिल्ली छावनी में चिकित्सालय सुविधाएं बढ़ाई

राष्ट्र की निस्वार्थ सेवा की अपनी विशेषता को बनाए रखते हुए भारतीय सेना ने युद्ध स्तर पर कई कोविड सुविधाओं की स्थापना की है ताकि विभिन्न स्थानों पर पूर्व सैनिकों और उनके आश्रितों (परिवारों) को व्यापक चिकित्सा सुविधाएं दी जा सकें। ऐसी ही एक सुविधा बेस चिकित्सालय दिल्ली छावनी (कैंटोनमेंट) में तैयार की गई है जहां पूरे अस्पताल को ऐसे कोविड चिकित्सालय में बदल दिया गया है जहां आने वाले सभी रोगियों की अत्यावश्यक महत्वपूर्ण देखरेख के लिए व्यापक प्रबंध किए गए हैं।

वर्तमान कोविड लहर शुरू होते समय बेस चिकित्सालय में 340 कोविड बेड थे जिनमें ऑक्सीजन युक्त बेड्स की संख्या मात्र 250 थी। कोविड मामलों की संख्या में अचानक हुई भारी बढ़ोतरी के कारण इस सुविधा पर अतिरिक्त क्षमता बनाने का अत्यधिक दबाव आ गया था। सभी बेड्स की क्षमता पूरी हो जाने के बावजूद बड़ी संख्या में आने वाले रोगियों का उपचार ट्रॉमा सेंटर्स में इस शर्त पर किया जा रहा है कि ऐसे रोगी बेड्स के लिए प्रतीक्षा करने हेतु अपनी सहमति देंगे। इस क्षमता को 30 अप्रैल 2021 तक बढ़ाकर 650 बेड्स करने के लिए तुरंत एक योजना बनाई गयी, इनमें से 450 बेड्स ऑक्सीजन युक्त होंगे। गहन चिकित्सा कक्ष (आईसीयू) की क्षमता को 29 अप्रैल 2021 तक 12 बेड्स से बढ़ा कर 35 बेड्स कर दिया जाएगा। क्षमता विस्तार के अगले चरण में जून 2021 के दूसरे सप्ताह तक वर्तमान क्षमता को बढ़ाकर 900 ऑक्सीजन युक्त बेड्स का कर दिया जाएगा।

प्रभावपूर्ण रोगी प्रबन्धन के लिए एक विशेषज्ञ चिकित्सा दल के अधीन एक नया कोविड (ओपीडी) 24 घंटे दिनरात काम कर रहा है जहां एक ही स्थान पर घर में ही होम आइसोलेशन, जांच, उपचार परामर्श इत्यादि के लिए संक्रमित (पॉजिटिव) रोगियों की निरंतर जांच की जा रही है। यह दल दैनिक आधार पर औसतन 500 रोगियों की जांच करके उन्हें उचित चिकित्सीय परामर्श देता है। सभी गम्भीर रोगियों को पर्याप्त एवं उचित उपचार मिले यह सुनिश्चित करने के लिए ही ऐसा प्रयास किया जा रहा है।

एक अन्य पहल के अंतर्गत एक वरिष्ठ अधिकारी के अधीन फोन पर परामर्श और सूचना प्रबन्धन केंद्र दिनरात (24 घंटे सातों दिन) चल रहा है जिसके द्वारा पूरी गम्भीरता के साथ चिकित्सकीय सलाह के अलावा भर्ती रोगियों के बारे में सूचना दी जा रही है। यह केंद्र औसतन 1200-1300 टेलीफोन कॉल ले रहा

है जिससे इस केंद्र की लोकप्रियता का पता चलता है। इस प्रकोष्ठ द्वारा दी जाने वाली सेवाओं में निम्नलिखित शामिल हैं:

- टेलीफोन पर परामर्श जिसमें विशेषज्ञ चिकित्सीय परामर्श शामिल है ।
- निकट सम्बन्धियों को भर्ती रोगियों के बारे में नवीनतम जानकारी ।
- बेड्स की उपलब्धता/ भर्ती करने के बारे में दिशा निर्देश ।
- कोविड जांच रिपोर्ट ।
- रोगियों/निकट सम्बन्धियों के अनुरोधों का समन्वयन ।
- कोविड टीकाकरण के बारे में सूचना ।

यह सुविधा प्राप्त करने के लिए नागरिक निम्नलिखित टेलीफोन नम्बरों पर सम्पर्क कर सकते हैं :

- 011 -25683580
- 011- 25683585
- 011- 25683581
- 37176 (सेना लाइन के माध्यम से)

दैनिक मामलों में हो रही अप्रत्याशित वृद्धि के कारण बड़ी हुई आवश्यकताओं की पूर्ति के लिए चिकित्सा सुविधाएं बढ़ाने के काम में भारतीय सेना कोई कसर नहीं छोड़ेगी । इस समय आए संकट की घड़ी में सभी चिकित्सीय सुविधाओं का हमारी सर्वश्रेष्ठ क्षमता के अनुरूप उपयोग किया जा रहा है । ऐसे में सभी पूर्व सैनिकों से अनुरोध है कि अपनी ओर से भी पूरा सहयोग करें और सेना चिकित्सा सेवा के उन सभी कर्मियों का उत्साहवर्धन करें जो पूरी निष्ठा और जिम्मेदारी के साथ अपना कर्तव्य निर्वहन कर रहे हैं।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1714593>



Exercise VARUNA – 2021 concluded

Exercise VARUNA has been a key enabler in building interoperability and strengthening the coordination between the two navies. This exercise has matured over the years with increase in scope, complexity of operations and level of participation. Conducted from 25-27 Apr 2021 in the Arabian Sea, the exercise witnessed high tempo-naval operations at sea, including advanced air defence and anti-submarine exercises, intense fixed and rotary wing flying operations including cross deck helicopter landings, tactical manoeuvres, surface and anti-air weapon firings, underway replenishment and other maritime security operations. Units of both navies honed and enhanced their war-fighting skills to demonstrate their ability as an integrated force to promote peace, security and stability in the maritime domain.



The common understanding of the two navies in executing maritime operations was evident right from the start of the exercise wherein the entire planning was carried out through virtual meeting and the exercises were conducted completely in the non-contact format.

The seamless coordination, precise execution of manoeuvres, and accuracy in complex exercises characterized the conduct of Varuna-2021 and has helped further strengthen mutual confidence, inter-operability and sharing of best practices between both Navies.

Indian Navy's guided missile frigate *Tarkash* will continue to exercise with the French Navy's Carrier Strike Group (CSG) from 28th April to 1st May 2021 participating in advanced surface, anti-submarine and air-defence operations with the French CSG.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1714547>



पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Wed, 28 April 2021 12:52PM

युद्धाभ्यास वरुण- 2021 संपन्न

भारतीय और फ्रांसीसी नौसेना के बीच द्विपक्षीय अभ्यास 'वरुण-2021' का 19वां संस्करण दिनांक 27 अप्रैल 2021 को संपन्न हुआ।

युद्धाभ्यास वरुण उच्च स्तर का संचालन कायम करने और दोनों नौसेनाओं के बीच समन्वय मजबूत करने में महत्वपूर्ण रहा है। पिछले कुछ वर्षों में यह अभ्यास स्कोप में वृद्धि, भागीदारी के स्तर एवं सैन्य ऑपरेशन की जटिलता के मामले में परिपक्व हो गया है। अरब सागर में दिनांक 25 से 27 अप्रैल 2021 के बीच आयोजित इस अभ्यास में समुद्र में उच्च गति वाले नौसैनिक अभियानों का



संचालन किया गया, जिसमें उन्नत वायु रक्षा और पनडुब्बी रोधी अभ्यास, क्रॉस डेक हेलीकॉप्टर लैंडिंग समेत तीव्र गति वाले फिक्स्ड एवं रोटरी विंग युद्धाभ्यास, सामरिक युद्धाभ्यास, सतह और हवाई हथियार विरोधी फायरिंग, अंडरवे रेपलेनिशमेन्ट एवं अन्य समुद्री सुरक्षा अभियान शामिल हैं। दोनों नौसेनाओं की इकाइयों ने समुद्री क्षेत्र में शांति, सुरक्षा और स्थिरता को बढ़ावा देने के लिए एक एकीकृत बल के रूप में अपनी क्षमता प्रदर्शित करते हुए युद्ध-लड़ने के कौशल को धार दी एवं बेहतर बनाया।

समुद्री अभियानों को क्रियान्वित करने में दोनों नौसेनाओं की आम समझ अभ्यास की शुरुआत से ही स्पष्ट थी जिसमें पूरी योजना वर्चुअल मीटिंग के माध्यम से की गई थी और अभ्यास पूरी तरह से गैर-संपर्क प्रारूप में आयोजित किए गए थे।

जटिल अभ्यासों में निर्बाध समन्वय, युद्धाभ्यास का सटीक निष्पादन और सटीकता वरुण-2021 के संचालन की विशेषता है और इससे आपसी विश्वास, अंतर-संचालनीयता और दोनों नौसेनाओं के बीच सर्वश्रेष्ठ परिपाटियों को साझा करने एवं अधिक मजबूत बनाने में मदद मिली है।

भारतीय नौसेना का गाइडेड मिसाइल फ्रिगेट तरकश दिनांक 28 अप्रैल से 1 मई 2021 तक फ्रांसीसी नौसेना के कैरियर स्ट्राइक ग्रुप (सीएसजी) के साथ उन्नत सतह, पनडुब्बी रोधी और वायु रक्षा अभियानों में भाग लेना जारी रखेगा।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1714720>



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Ministry of Science & Technology

Wed, 28 April 2021 3:23PM

Study by Indian Astronomers provides clues to explosion mechanism of supernovae that are key measure of cosmological distances

In 2011, the Nobel Prize was awarded to three scientists for discovering that the Universe is expanding at an ever-accelerating rate *through observations of distant supernovae*. Now a team of Indian astronomers observing such distant supernovae have narrowed down the possible mechanisms of explosion of such supernovae which provide key measures of cosmological distances.

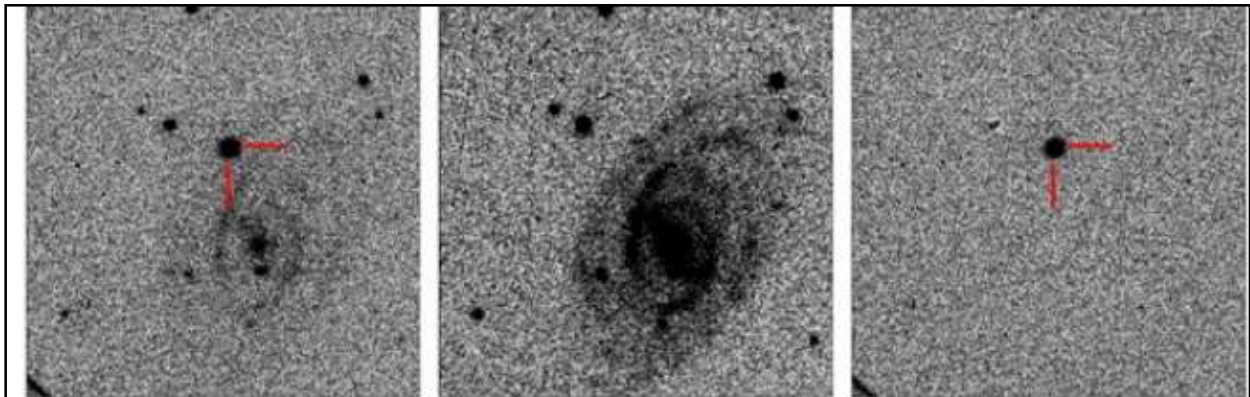


Fig 1. Left: SN 2017hpa in the spiral arms of its host galaxy UGC 3122. Middle: An image of the host galaxy after ~ 2 years from the explosion. Right: The SN after removing the light from the host galaxy.

Their detailed study of a supernova called SN 2017hpa, a particular type of supernovae called I a supernova, which exploded in 2017 helped narrow down the explosion mechanism of the supernovae by observations of unburned carbon in the early phase spectra.

The explosive death of a star as a supernova is one of the most spectacular and catastrophic events in the Universe. Type Ia supernovae are the result of explosions of white dwarfs that exceed their mass beyond the Chandrasekhar limit through accretion of matter. Their homogeneous nature makes them extremely good standardizable candles to measure cosmological distances. However, the explosion mechanisms which create these supernovae (SNe), and the exact nature of their progenitor systems (star which is at the origin of a supernova phenomenon) are still not yet clearly understood. While most SNeIa are homogeneous, a good fraction of these events show diversity in both their light curve as well as spectral properties.

The study by Anirban Dutta, PhD student at Indian Institute of Astrophysics an autonomous institute under the Department of Science & Technology, Government of India along with collaborators which has been published recently in the journal '*Monthly Notices of the Royal Astronomical Society (MNRAS)*' will help in understanding the diversity as a function of the progenitor as well as its properties and the explosion mechanism of such supernovae.

The burning front in the white dwarf moves or propagates at speeds less than speed of sound which leaves behind unburned material. The expansion velocity calculated using these unburned features can provide an essential hint towards the velocity structure of the ejected material. It is generally expected that the unburned material will be present in the outermost layers of the ejecta and expand with velocity higher than velocity of the outer most layer of the star called photospheric velocity. In this study, the authors have shown that the unburned layer is moving with photospheric velocity indicating that mixing of the explosion materials is dominant within the ejected material.

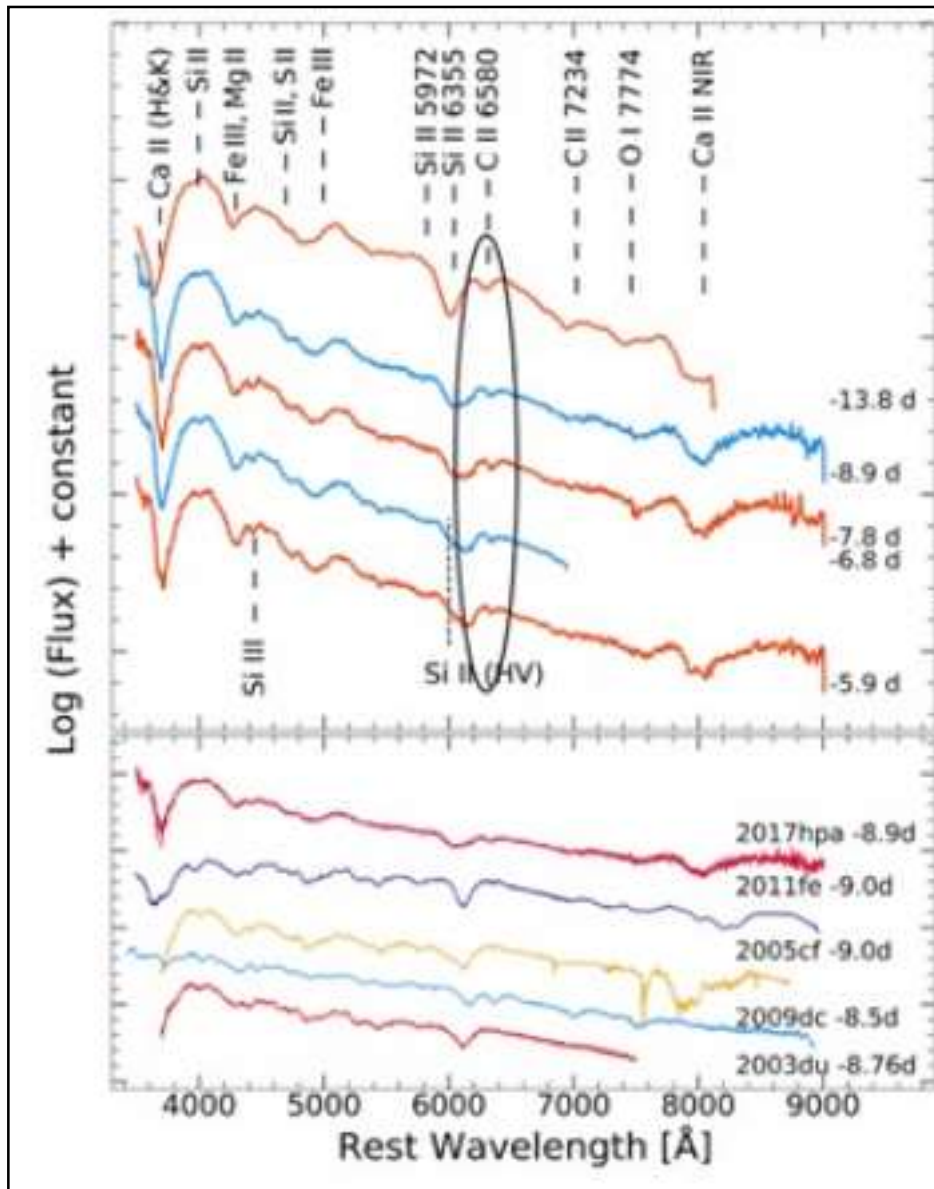


Fig.2 Early (pre-maximum) phase spectra of supernova SN 2017hpa obtained using the 2m Himalayan Chandra Telescope, IAO, Hanle. The spectral feature at 6580 Å due to unburned carbon is marked in the spectrum.

“It is very important to study more such exotic objects from the very early hours of explosion to very late phase to place tighter constraints on the explosion mechanism as well as the progenitor system,” said Anirban Dutta one of the researchers.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1714607>



पत्र सूचना कार्यालय
भारत सरकार

विज्ञान एवं प्रौद्योगिकी मंत्रालय

Wed, 28 April 2021 3:23PM

भारतीय खगोलविदों द्वारा किए गए अध्ययन से सुपरनोवा के विस्फोट तंत्र, जोकि ब्रह्मांड संबंधी दूरियों की प्रमुख माप हैं, के बारे में संकेत मिले है

वर्ष 2011 में, सुदूर स्थित सुपरनोवा के अवलोकनों के जरिए ब्रह्मांड के अभूतपूर्व तेज गति से फैलने के बारे में पता लगाने के लिए तीन वैज्ञानिकों को नोबेल पुरस्कार प्रदान किया गया था। लेकिन अब भारतीय खगोलविदों की एक टीम ने इस तरह के सुपरनोवा का अवलोकन करके ऐसे सुपरनोवा के विस्फोट के संभावित तंत्र के बारे में पता लगाया है, जोकि ब्रह्मांड संबंधी दूरियों की प्रमुख माप की जानकारी प्रदान करते हैं।

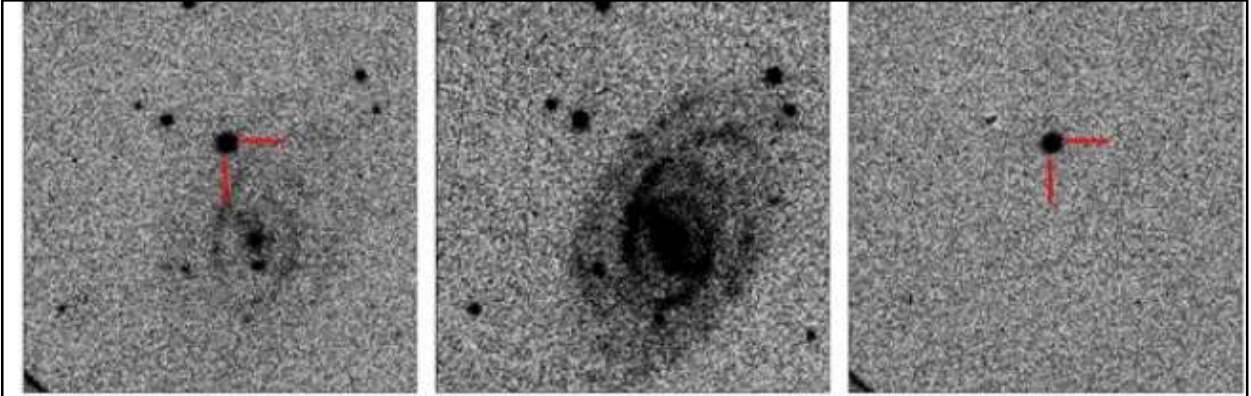
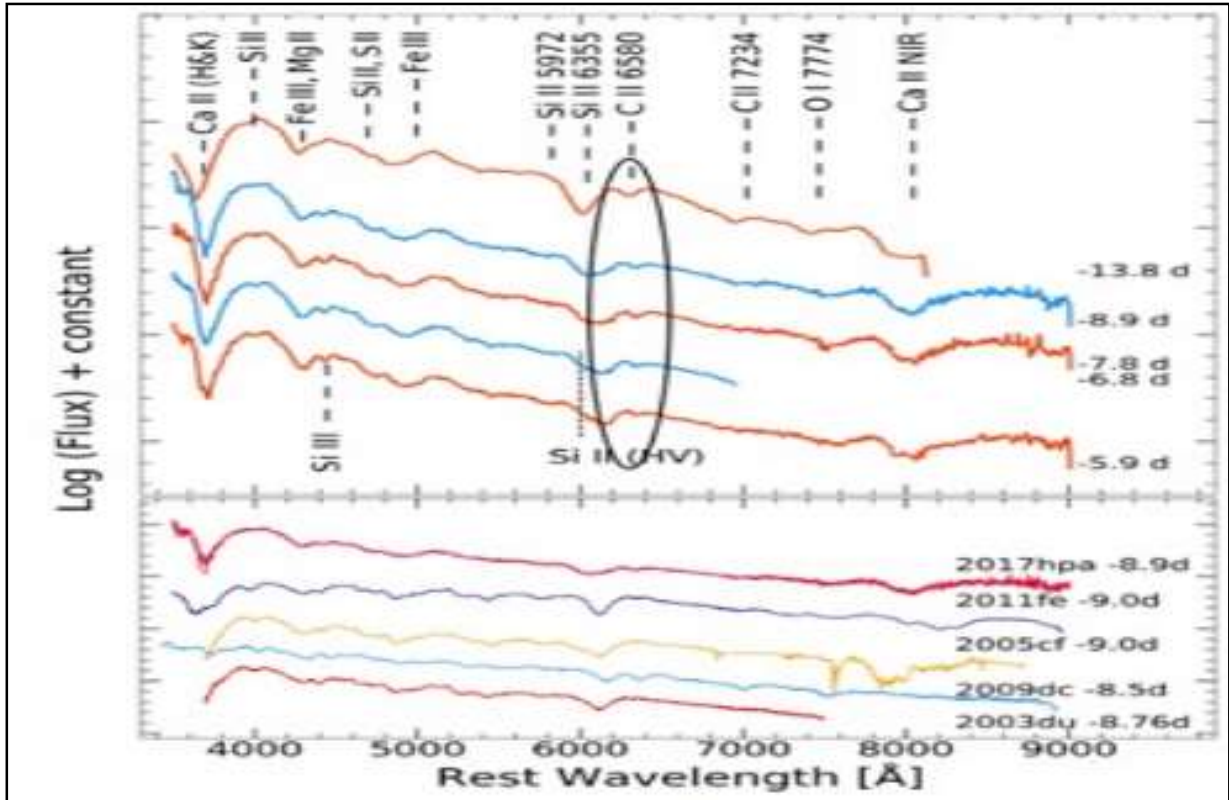


Fig 1. Left: SN 2017hpa in the spiral arms of its host galaxy UGC 3122. Middle: An image of the host galaxy after ~ 2 years from the explosion. Right: The SN after removing the light from the host galaxy.

एसएन 2017एचपीए नाम के एक सुपरनोवा, जोकि एक विशेष प्रकार का सुपरनोवा है और जिसे आई ए सुपरनोवा कहा जाता है और जिसमें 2017 में विस्फोट हो गया, के बारे में इन खगोलविदों के विस्तृत अध्ययन ने शुरुआती चरण के स्पेक्ट्रा में बिना जले हुए कार्बन के अवलोकनों के जरिए सुपरनोवा के विस्फोट तंत्र के बारे में पता लगाने में मदद की।

सुपरनोवा के रूप में एक तारे की विस्फोटक अंत ब्रह्मांड की सबसे विलक्षण और भयावह घटनाओं में से एक है। टाइप आई ए सुपरनोवा उन व्हाइट ड्वार्फ के विस्फोटों का नतीजा हैं जो अपना द्रव्यमान पदार्थ के उपचय के जरिए चंद्रशेखर सीमा से अधिक कर लेते हैं। उनकी समांगी प्रकृति उन्हें ब्रह्मांड की दूरी को मापने का उत्कृष्ट मानक कैंडल बनाती है। हालांकि विस्फोट तंत्र, जो इन सुपरनोवा (एसएनई) का निर्माण करते हैं, और उनके पूर्वज प्रणाली (तारे जो सुपरनोवा परिघटना के मूल में हैं) की सटीक प्रकृति को अभी भी स्पष्ट रूप से समझा नहीं जा सका है। यों तो ज्यादातर एसएनईआईए समांगी हैं, इन परिघटनाओं का एक खासा अंश उनके प्रकाश वक्र के साथ - साथ उनके वर्णक्रमीय गुणों, दोनों, में विविधता दिखाते हैं।

भारत सरकार के विज्ञान एवं प्रौद्योगिकी विभाग के तहत एक स्वायत्त संस्थान इंडियन इंस्टीट्यूट ऑफ एस्ट्रोफिजिक्स में पीएचडी के छात्र अनिर्बन दत्ता द्वारा अपने सहयोगियों के साथ इस संबंध में किया गया शोध हाल ही में 'मंथली नोटिसेस ऑफ द रॉयल एस्ट्रोनॉमिकल सोसायटी (एमएनआरएस)' नाम की पत्रिका में प्रकाशित हुआ है। यह शोध सुपरनोवा की पूर्वज प्रणाली के एक कार्य के साथ-साथ इसके गुणों और इस तरह के सुपरनोवा के विस्फोट तंत्र के रूप में इस विविधता को समझने में मदद करेगा।



चित्र.2 दो (2) मीटर वाले हिमालयन चंद्र टेलीस्कोप, आईएओ, हानले का उपयोग करके प्राप्त किया गया सुपरनोवा एसएन 2017एचपीए के प्रारंभिक (पूर्व-अधिकतम) चरण का स्पेक्ट्र। इस स्पेक्ट्रम में बिना जले हुए कार्बन के कारण वर्णक्रमीय विशेषता 6580 Å पर अंकित है।

व्हाइट ड्वार्फ में जलने वाला भाग, जोकि ध्वनि की गति से कम गति से आगे बढ़ता है या फैलता है, बिना जली हुई सामग्री को पीछे छोड़ देता है। इन बिना जले हुई अवयवों का उपयोग करके गणना किया गया विस्तार वेग उत्सर्जित सामग्री की वेग संरचना के बारे में एक जरूरी संकेत प्रदान कर सकता है। आम तौर पर यह उम्मीद की जाती है कि यह बिना जली हुई सामग्री इजेक्टा की सबसे बाहरी परतों में मौजूद होगी और तारे की सबसे बाहरी परत की गति, जिसे फोटोफेरिक वेलोसिटी कहा जाता है, की तुलना में अधिक गति के साथ विस्तारित होगी। इस शोध में, लेखकों ने दिखाया है कि बिना जली हुई परत फोटोफेरिक वेलोसिटी के साथ घूम रही है, जोकि यह दर्शाता है कि विस्फोट सामग्री का मिश्रण उत्सर्जित सामग्री के भीतर प्रबल है।

शोधकर्ताओं में से एक अनिर्बन दत्ता का कहना है कि "विस्फोट के तंत्र के साथ ही पूर्वज प्रणाली पर सख्त बंधनों को रखने के लिए ऐसे और अधिक वस्तुओं का विस्फोट के शुरुआती घंटों से लेकर विस्फोट के बिल्कुल अंतिम चरण तक अध्ययन करना बेहद महत्वपूर्ण है।"

<https://pib.gov.in/PressReleasePage.aspx?PRID=1714708>

Team makes single photon switch advance

The ability to turn on and off a physical process with just one photon is a fundamental building block for quantum photonic technologies. Realizing this in a chip-scale architecture is important for scalability, which amplifies a breakthrough by City College of New York researchers led by physicist Vinod Menon. They've demonstrated for the first time the use of "Rydberg states" in solid state materials (previously shown in cold atom gases) to enhance nonlinear optical interactions to unprecedented levels in solid state systems. This feat is a first step towards realizing chip-scale scalable single photon switches.

In solid state systems, exciton-polaritons, half-light half-matter quasiparticles, which result from the hybridization of electronic excitations (excitons) and photons, are an attractive candidate to realize nonlinearities at the quantum limit. "Here we realize these quasiparticles with Rydberg excitons (excited states of excitons) in atomically thin semiconductors (2D materials)," said Menon, chair of physics in City College's Division of Science. "Excited states of excitons owing to their larger size, show enhanced interactions and therefore hold promise for accessing the quantum domain of single-photon nonlinearities, as demonstrated previously with Rydberg states in atomic systems."

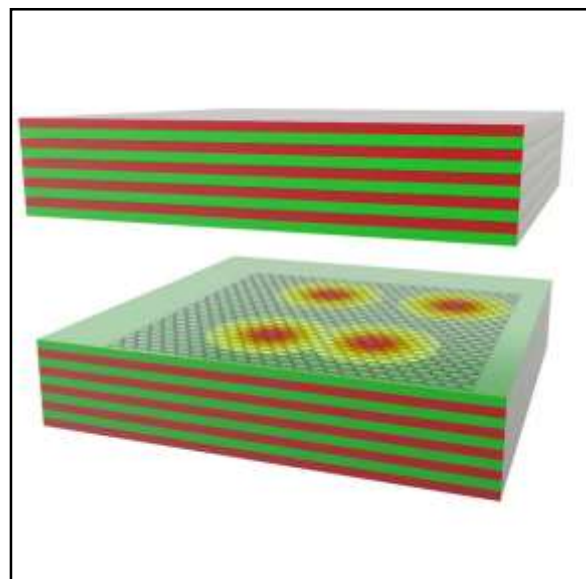
According to Menon, the demonstration of Rydberg exciton-polaritons in two-dimensional semiconductors and their enhanced nonlinear response presents the first step towards the generation of strong photon interactions in solid state systems, a necessary building block for quantum photonic technologies.

Jie Gu, a graduate student working under Menon's supervision, was the first author of the study entitled "Enhanced nonlinear interaction of polaritons via excitonic Rydberg states in monolayer WSe₂," which appears in *Nature Communications*. The team also included scientists from Stanford, Columbia, Aarhus and Montreal Polytechnic universities.

"The research of Professor Menon and his co-workers could have a tremendous impact on Army goals for ultra-low energy information processing and computing for mobile Army platforms such as unmanned systems," said Dr. Michael Gerhold, program manager at the U.S. Army Combat Capabilities Development Command, known as DEVCOM, Army Research Laboratory. "Optical switching and nonlinearities used in future computing paradigms that use photonics would benefit from this advancement. Such strong coupling effects would reduce energy consumption and possibly aid computing performance."

More information: Jie Gu et al. Enhanced nonlinear interaction of polaritons via excitonic Rydberg states in monolayer WSe₂, *Nature Communications* (2021). DOI: [10.1038/s41467-021-22537-x](https://doi.org/10.1038/s41467-021-22537-x)

Journal information: [Nature Communications](https://phys.org/news/2021-04-team-photon-advance.html)
<https://phys.org/news/2021-04-team-photon-advance.html>

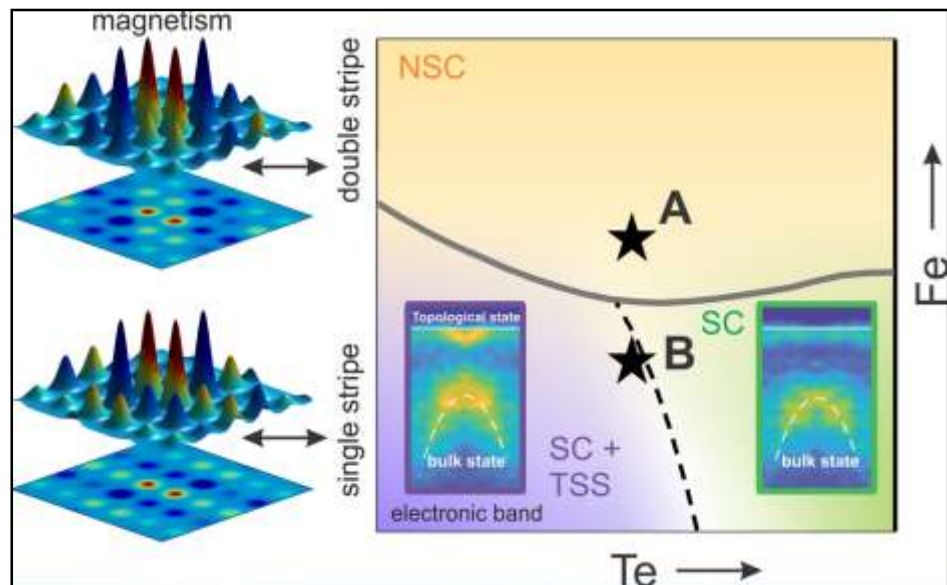


Schematic of the optical microcavity with 2D semiconductor. The nonlinear optical response arises from the larger Bohr radii Rydberg excitons allowing to push the limit to few photon nonlinear limit. Image credit: Rezlind Bushati.

Mapping the electronic states in an exotic superconductor

Scientists characterized how the electronic states in a compound containing iron, tellurium, and selenium depend on local chemical concentrations. They discovered that superconductivity (conducting electricity without resistance), along with distinct magnetic correlations, appears when the local concentration of iron is sufficiently low; a coexisting electronic state existing only at the surface (topological surface state) arises when the concentration of tellurium is sufficiently high. Reported in *Nature Materials*, their findings point to the composition range necessary for topological superconductivity. Topological superconductivity could enable more robust quantum computing, which promises to deliver exponential increases in processing power.

"Quantum computing is still in its infancy, and one of the key challenges is reducing the error rate of the computations," said first author Yangmu Li, a postdoc in the Neutron Scattering Group of the Condensed Matter Physics and Materials Science (CMPMS) Division at the U.S. Department of Energy's (DOE) Brookhaven National Laboratory. "Errors arise as qubits, or quantum information bits, interact with their environment. However, unlike trapped ions or solid-state qubits such as point defects in diamond, topological superconducting qubits are intrinsically protected from part of the noise. Therefore, they could support computation less prone to errors. The question is, where can we find topological superconductivity?"



(Left) Through neutron scattering experiments, scientists observed distinct patterns of magnetic correlations in superconducting ("single-stripe magnetism") and nonsuperconducting ("double-stripe magnetism") samples of a compound containing iron (Fe), tellurium (Te), and selenium (Se). (Right) A material phase diagram showing where the superconducting state (SC), nonsuperconducting state (NSC), and topological superconducting state (SC + TSS) appear as a function of Fe and Te concentrations. The starred A refers to the nonsuperconducting sample and the starred B to the superconducting sample. Overlaid on the phase diagram are photoemission spectra showing the emergence (left) and absence (right) of the topological state. Topological superconductivity is an electronic state that could be harnessed for more robust quantum computing. Credit: Brookhaven National Laboratory

In this study, the scientists narrowed the search in one compound known to host topological surface states and part of the family of iron-based superconductors. In this compound, topological and superconducting states are not distributed uniformly across the surface. Understanding what's behind these variations in electronic states and how to control them is key to enabling practical applications like topologically protected quantum computing.

From previous research, the team knew modifying the amount of iron could switch the material from a superconducting to nonsuperconducting state. For this study, physicist Gendu Gu of the CMPMS Division grew two types of large single crystals, one with slightly more iron relative to

the other. The sample with the higher iron content is nonsuperconducting; the other sample is superconducting.

To understand whether the arrangement of electrons in the bulk of the material varied between the superconducting and nonsuperconducting samples, the team turned to spin-polarized neutron scattering. The Spallation Neutron Source (SNS), located at DOE's Oak Ridge National Laboratory, is home to a one-of-a-kind instrument for performing this technique.

"Neutron scattering can tell us the magnetic moments, or spins, of electrons and the atomic structure of a material," explained corresponding author, Igor Zaliznyak, a physicist in the CMPMS Division Neutron Scattering Group who led the Brookhaven team that helped design and install the instrument with collaborators at Oak Ridge. "In order to single out the magnetic properties of electrons, we polarize the neutrons using a mirror that reflects only one specific spin direction."

To their surprise, the scientists observed drastically different patterns of electron magnetic moments in the two samples. Therefore, the slight alteration in the amount of iron caused a change in electronic state.

"After seeing this dramatic change, we figured we should look at the distribution of electronic states as a function of local chemical composition," said Zaliznyak.

At Brookhaven's Center for Functional Nanomaterials (CFN), Li, with support from CFN staff members Fernando Camino and Gwen Wright, determined the chemical composition across representative smaller pieces of both sample types through energy-dispersive X-ray spectroscopy. In this technique, a sample is bombarded with electrons, and the emitted x-rays characteristic of different elements are detected. They also measured the local electrical resistance—which indicates how coherently electrons can transport charge—with microscale electrical probes. For each crystal, Li defined a small square grid (100 by 100 microns). In total, the team mapped the local composition and resistance at more than 2,000 different locations.

"Through the experiments at the CFN, we characterized the chemistry and overall conduction properties of the electrons," said Zaliznyak. "But we also need to characterize the microscopic electronic properties, or how electrons propagate in the material, whether in the bulk or on the surface. Superconductivity induced in electrons propagating on the surface can host topological objects called Majorana modes, which are in theory one of the best ways to perform quantum computations. Information on bulk and surface electronic properties can be obtained through photoemission spectroscopy."

For the photoemission spectroscopy experiments, Zaliznyak and Li reached out to Peter Johnson, leader of the CMPMS Division Electron Spectroscopy Group, and Nader Zaki, a scientific associate in Johnson's group. By measuring the energy and momentum of electrons ejected from the samples (using the same spatial grid) in response to light, they quantified the strengths of the electronic states propagating on the surface, in the bulk, and forming the superconducting state. They quantitatively fit the photoemission spectra to a model that characterizes the strengths of these states.

Then, the team mapped the electronic state strengths as a function of local composition, essentially building a phase diagram.

"This phase diagram includes the superconducting and topological phase transitions and points to where we could find a useful chemical composition for quantum computation materials," said Li. "For certain compositions, no coherent electronic states exist to develop topological superconductivity. In previous studies, people thought instrument failure or measurement error were why they weren't seeing features of topological superconductivity. Here we show that it's due to the electronic states themselves."

"When the material is close to the transition between the topological and nontopological state, you can expect fluctuations," added Zaliznyak. "For topology to arise, the electronic states need to be well-developed and coherent. So, from a technological perspective, we need to synthesize materials away from the transition line."

Next, the scientists will expand the phase diagram to explore the compositional range in the topological direction, focusing on samples with less selenium and more tellurium. They are also considering applying neutron scattering to understand an unexpected energy gap (an energy range where no electrons are allowed) opening in the topological surface state of the same compound. Johnson's group recently discovered this gap and hypothesized it was caused by surface magnetism.

More information: Yangmu Li et al, Electronic properties of the bulk and surface states of $\text{Fe}^{1+y}\text{Te}^{1-x}\text{Se}_x$, *Nature Materials* (2021). DOI: [10.1038/s41563-021-00984-7](https://doi.org/10.1038/s41563-021-00984-7)

Journal information: [Nature Materials](#)

<https://phys.org/news/2021-04-electronic-states-exotic-superconductor.html>

COVID-19 Research News

healthline

Thu, 29 April 2021

Look for these symptoms in the months after COVID-19 recovery

- *The findings of a new study suggest that even people with mild COVID-19 may develop long-term health complications that go well beyond the lungs.*
- *Experts say there are clear signs of kidney and heart disease that people should be aware of.*
- *Getting vaccinated is the best way to avoid developing COVID-19 and the potential for long-term side effects.*

As more people are vaccinated, many of us are increasingly looking toward a future at the end of the pandemic.

But for some people, the long-term complications of the virus will last after the pandemic ends.

Now over a year from the start of the pandemic, the scientific community is learning more about the long-term complications and effects of COVID-19.

In a recent study published in the journal *Nature* Trusted Source, researchers found that individuals with more severe disease at the start of their illness have a greater risk of long-term complications such as heart and kidney disease secondary to COVID-19.

Through analysis of the U.S. Department of Veterans Affairs database, Dr. Ziyad Al-Aly, an assistant professor in the school of medicine at Washington University in Saint Louis, examined the health outcomes of individuals 6 months after having COVID-19.

They found that those who had the virus had a higher risk of several conditions, including heart disease, diabetes, and kidney complications.

Globally there have been more than 149 million cases of COVID-19, and research Trusted Source suggests that approximately 10 percent — or 14.9 million people — will be considered “long-haulers,” those who experience symptoms more than 4 weeks after the onset of COVID-19.

Effects of long-haul COVID-19

Some people who've had COVID-19 may experience multiple conditions such as heart disease, diabetes, and kidney disorders, long into the future.

While the exact cause and link between COVID-19 and long-term complications isn't currently known, some experts suggest it could be a result of inflammation from the virus, or possibly a revelation of an underlying condition.

“There are several ways to interpret these findings,” said Dr. Michael Goyfman, director of clinical cardiology at Long Island Jewish Forest Hills in Queens, New York.

“One is that COVID-19 directly resulted in these various health consequences due to either the inflammation caused by the virus, the body’s response to the infection via the immune system, etc.,” Goyfman explained.

“Another view is that these patients were somewhat sicker to begin with, so people who had a worse outcome with COVID were those who already had these conditions, and perhaps their hospitalization with COVID was merely the first sign of their underlying issues,” Goyfman said.

Although COVID-19 largely affects the lungs, with the interconnected nature of the body, it’s not unreasonable to see metabolic, cardiovascular, musculoskeletal, and neurological complications secondary to the disease.

Symptoms to look for

While there are a number of symptoms to look out for with heart disease, kidney disease, and diabetes, here are a few of the important ones to be aware of:

Heart disease

- chest discomfort
- pain or pressure that spreads to your arm (right or left)
- sweating for no obvious reason
- sensation of an irregular heartbeat
- exhaustion that comes on easily

Kidney disease

- frequent need to urinate
- urine that’s foamy or bloody
- swollen ankles and feet
- dry and itchy skin
- weight loss or poor appetite

Diabetes

- extreme thirst without reason
- numbness or tingling in your hands or feet
- intense hunger
- continued fatigue
- frequent urination

Who’s at risk?

At this point, health experts aren’t sure who’s going to have long-haul symptoms and who will not.

Some people who only had mild disease will still have a risk of developing long-term side effects.

At this point, the best bet to protect yourself is to get vaccinated — even if you’ve already had COVID-19.

A vaccine will likely protect you from reinfection with a potentially more dangerous strain or variant of the virus.

“The best practice for prevention of having COVID complications remains vaccination. Vaccines have shown to prevent severe COVID illness and protect people that may have had the infection previously from getting sick from a newer variant of the virus,” said Dr. Thomas Gut, associate chair of medicine and director of ambulatory care services at Staten Island University Hospital in New York.

The bottom line

This new study's findings don't suggest that everyone will experience long-term COVID-19 side effects, but that even people with only mild disease may develop lasting consequences that go beyond the lungs.

Heart disease, diabetes, and kidney complications are all possible for those who've had COVID-19.

According to Gut, "Although much about the long-term COVID complications is still poorly understood, I'm confident as time passes, we will come up with more effective strategies and treatments for those suffering from lingering health problems."

<https://www.healthline.com/health-news/look-for-these-symptoms-in-the-months-after-covid-19-recovery#Symptoms-to-look-for->

