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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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*Tue, 07 Dec 2021*

## **Pune: DIAT gets Advanced Laser Laboratory and High Power CO2 Laser Facility**

Khadakwasla: Defence Institute of Advanced Technology Pune, a Deemed to be University of Dept. of Defence R&D, MoD, Govt of India has set-up two labs “Advanced Laser Laboratory” and “High Power CO2 Laser Facility” will be one of the futuristic and strategic interdisciplinary set up for optics, laser, Quantum and surface engineering.

These laboratories were inaugurated by Shri Hari Babu Srivastava, Director General, Technology Management, DRDO, and Dr Sudhir Kamath, Director General, MED & CoS (Microelectronic Device & Computational and Cyber system) DRDO on 6th December 2021.



The Advanced Laser Laboratory comprises of six state-of-the-art research facilities with the themes: Photonics Modeling, Fiber & Solid-State Laser, Optical Communication, Laser Spectroscopy, Wafer scribe, wire bonder facility, and Quantum Cascade Laser characterization. These facilities are one of its kind that shall be the forerunner in supporting various research institutes and labs for Atmanirbar Bharat.

In each research facility, state-of-the-art tools are installed in the newly constructed class 10000 cleanroom. New laboratories can meet the future research challenges in the area of Laser and photonics that include Quantum Cascade Laser, Quantum Dot Laser, Interband Laser, Fiber Laser & Amplifier, Mode-locked Lasers, optical communication, Fiber optics-based sensors, laser Spectroscopy, integrated optics & Si-Photonics, IR Thermography, etc.

The quantum cascade laser characterization facility is unique in the nation equipped with a FTIR and other advanced tools capable of characterizing lasers from 200 nm to 1THz wavelength. Photonics modeling facility is equipped with high-performance computing with Nextnano. NGF, Lumerical Device Suits, RSOFTE BPM & Fullwave, L-Edit, and personal version of Optics Studio software. These software tools are capable to design and model almost any semiconductor laser, optical system, and integrated optics & photonics device that shall support various SME's and LE's semiconductor industries.

The High Power CO2 Laser facility is equipped with a 1 kW Diamond E-Series Industrial CO2 Laser. This facility will soon be equipped with a 2-D scanner for material processing and other directed energy-related applications. Laser Spectroscopy Research and High Power CO2 Laser facilities were created with the support of Laser Science and Technology Center, LASTEC, DRDO, Delhi. These facilities are open for academics/ industries and R&D labs for developing futuristic technologies for the Atmanirbar Bharat.

All above facilities will be technically managed by the Laser and Photonics Research Group, Department of Applied Physics. Currently, the group is having two flagship research projects on the design & development of Mid-IR and THz quantum cascade laser technology sponsored by DRDO.

On this occasion Dr. C. P. Ramanarayanan, Vice Chancellor DIAT stated that the set-up of these two advanced futuristic laboratories will be more beneficial to the M.Tech/ PhD scholars in the research area as well as for the sponsored research projects.

<https://www.punekarnews.in/pune-diat-gets-advanced-laser-laboratory-and-high-power-co2-laser-facility/>

DAILYEXCELSIOR.COM

Tue, 07 Dec 2021

## Centre's major multi-crore initiative to install anti-drone technology all along IB in Jammu

*MHA to fund entire project, multiple agencies on job*

Jammu: In a significant decision to curb smuggling of arms and narcotics from Pakistan through drones along the International Border (IB) in Jammu and Punjab, the BSF, NSG and DRDO with the assistance of certain foreign companies and Start Ups in the country are in the process of developing anti-drone technology which will be installed along the borders amid reports that drone activities have been reported from Amritsar, Abohar Fazilka, Hiranagar and Akhnoor sectors.



“The Ministry of Home Affairs (MHA) will be funding entire multi-crore project for developing anti-drone technology for installation along the International Border with instructions that it should be developed at the earliest to completely plug drone activities which have the potential to give boost to militancy and narco-terror activities,” official sources told the Excelsior.

They said initially the anti-drone technology will be installed along the International Border in Jammu sector which shares almost 198 kilometers long boundary with Pakistan spread over three districts of Jammu, Samba and Kathua and Punjab which has 553 kilometers long IB with Pakistan comprising Gurdaspur, Taran Taran, Amritsar and Ferozepur districts. However, gradually it will cover Rajasthan border and Rann of Kutch in Gujarat even though there has been no drone activities in these States presently.

As far as the Line of Control (LoC) in Jammu and Kashmir is concerned, sources pointed out, the Army has installed certain equipments to check movement of drones.

Asserting that it is not possible for security forces to physically keep watch on every drone movement along the borders as there are many gaps in the form of Nullahs, mountains, forest cover etc, sources said the installation of anti-drone technology which will spot drones and bring them down will be the ultimate solution to curb rising smuggling of arms, ammunition and explosives and narcotics from Pakistan using flying machines.

“As far as the International Borders are concerned, the BSF, NSG and DRDO have tied-up to develop anti-drone technology,” sources said, adding they have been taking assistance from certain foreign companies as well as Start Ups from India and there has been very encouraging results. They said the way the work is going on, the installation of anti-drone technology along the International Borders is not far but it will be initially installed on trial basis in certain areas. “Only after the trials are successful, the technology will be installed in rest of the areas,” they added. As per the sources, it could be multi-crore project going by the long International Border

(nearly 750 kilometers) in Jammu and Punjab. However, as per the sources, the Union Ministry of Home Affairs has decided to fund entire project of developing anti-drone technology along the International Border.

Pointing out that the International Border as well as the Line of Control are peaceful in Jammu and Kashmir after fresh ceasefire agreement between Indo-Pak troops on February 26 this year, sources, however, said that though there has been no major ceasefire violations, the infiltration attempts do take place sometimes but the drone activities remained a major challenge. Sources said it wasn't possible for the militants to send drones into Jammu and Kashmir carrying consignment of weapons and narcotics without active support of Pakistan army and Rangers. Army and BSF have spotted and shot down many drones along the borders carrying weapons etc. However, there have been reports that some drones might have successfully offloaded consignments of weapons and narcotics and returned to Pakistan. The consignments are later picked up by Over Ground Workers (OGWs) of the militants.

Terror activities through drones mainly came into picture after June 27 twin terror attacks using flying machines on the Indian Air Force (IAF) Station in Jammu in which two IAF personnel were injured and minor damage was caused to the building. Subsequently, security forces and police recovered number of consignments of explosives and narcotics which had been sent from across the border to Jammu and Kashmir using drones.

<https://www.dailyexcelsior.com/centres-major-multi-crore-initiative-to-install-anti-drone-technology-all-along-ib-in-jammu/>

## इजरायल जैसे देशों को पसंद आई ग्वालियर के डीआरडीई की तकनीक

देश के लिए यह गर्व की बात है रक्षा अनुसंधान एवं विकास संगठन  
की रक्षा तकनीक और उत्पादों को विकसित देशों में भी पसंद किया गया है।

By वरुण शर्मा

- इजिप्ट डिफेंस एक्सपो
- डीआरडीई में बने रक्षा उत्पाद किए गए प्रदर्शित, तकनीक में भारत की बढ़ती निर्यात क्षमता

ग्वालियर: देश के लिए यह गर्व की बात है कि रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) की रक्षा तकनीक और उत्पादों को विकसित देशों में भी काफी पसंद किया गया है। इससे न केवल विश्व में भारत का कद बढ़ेगा बल्कि रक्षा तकनीक व उत्पादों में देश की निर्यात क्षमता में वृद्धि होगी। इजिप्ट (मिस्र) की राजधानी काहिरा में आयोजित इजिप्ट डिफेंस एक्सपो- 2021 में भारत समेत 42 देशों ने भाग लिया। इसमें जल, थल और नभ के रक्षा उत्पाद व तकनीकों को एक छत के नीचे दिखाया गया। भारत के प्रमुख रक्षा संगठन डीआरडीओ ने भी इसमें भाग लिया। इस संगठन द्वारा विकसित रक्षा तकनीकों के साथ इसी की इकाई रक्षा अनुसंधान एवं विकास स्थापना (डीआरडीई) ग्वालियर की प्रयोगशाला में तैयार किए गए न्यूक्लियर, बायोलॉजिकल और केमिकल एजेंटों (एनबीसी) से सुरक्षित रखने वाला सूट, जहरीली गैसों से बचाने वाले कैनिस्टर और फिल्टर को इजरायल सहित दूसरे देशों ने सराहा। 29 नवंबर से दो दिसंबर तक आयोजित एक्सपो में डीआरडीओ और डीआरडीई, ग्वालियर की ओर से कई उच्च अधिकारी और विज्ञानी शामिल हुए। स्वदेश लौटे अधिकारियों के मुताबिक देश में निर्मित रडार, ब्रिज लेयर टैंक, एनबीसी उपकरण और फिल्टर कार्टिजेस तकनीक को इसमें प्रदर्शित किया गया था।



डीआरडीई की इन रक्षा तकनीकों को बेहतर प्रतिसाद एनबीसी सूट: सेना के जवानों को रासायनिक-जैविक हमलों से बचाने डीआरडीई प्रयोगशाला में एनबीसी सूट मार्क-5 तैयार किया गया है। इस अत्याधुनिक सूट निर्माण तकनीक को भारतीय मानक ब्यूरो (बीआइएस) ने भी मान्यता दी है। रासायनिक-जैविक हमलों से बचाव की मानक तकनीक अब अन्य देश भारत से ले सकेंगे।

डीआरडीई की इन रक्षा तकनीकों को बेहतर प्रतिसाद

एनबीसी सूट: सेना के जवानों को रासायनिक-जैविक हमलों से बचाने डीआरडीई प्रयोगशाला में एनबीसी सूट मार्क-5 तैयार किया गया है। इस अत्याधुनिक सूट निर्माण तकनीक को भारतीय मानक ब्यूरो (बीआइएस) ने भी मान्यता दी है। रासायनिक-जैविक हमलों से बचाव की मानक तकनीक अब अन्य देश भारत से ले सकेंगे।

एनबीसी कैनिस्टर: डीआरडीई में ही एनबीसी कैनिस्टर नीलकंठ-पी (गैस मास्क में उपयोग किया जाने वाला फिल्टरनुमा उपकरण) तैयार किया है। कैनिस्टर का यह विकसित वर्जन सेना के जवानों को बायोलॉजिकल-केमिकल एजेंटों से सुरक्षित रख लंबे समय तक आक्सीजन लेने में मदद करता है।

फिल्टर: डीआरडीई ने जहरीली गैसों से बचाव के लिए फिल्टर भी तैयार किए हैं। ये सैन्य जहाजों व विमानों में उपयोग किए जाते हैं। जहरीली गैसों से बचाव में फिल्टर काफी कारगर साबित होता है।

<https://www.naidunia.com/madhya-pradesh/gwalior-countries-like-israel-liked-the-technology-of-gwalior-s-drde-7165444>



## Explained | The arms race towards hypersonic weapons

*How are hypersonic weapons different from traditional weaponry?*

*Where does India stand vis-a-vis the technology?*

*By Dinakar Peri*

The story so far: In October, *The Financial Times* had reported that China tested a nuclear-capable hypersonic missile in August that circled the globe before speeding towards its target, demonstrating an advanced space capability that caught U.S. intelligence by surprise. This was later confirmed by U.S. military officer Gen Mark Milley, Chairman of the joint Chiefs of Staff. However, China has denied that it was nuclear capable. This and other recent developments have put the spotlight on hypersonic weapons development, especially the advancements made by China and Russia.

### What are hypersonic weapons?

They are manoeuvrable weapons that can fly at speeds in excess of Mach 5, five times the speed of sound. The speed of sound is Mach 1, and speeds upto Mach 5 are supersonic and speeds above Mach 5 are hypersonic. Ballistic missiles, though much faster, follow a fixed trajectory and travel outside the atmosphere to re-enter only near impact. On the contrary, hypersonic weapons travel within the atmosphere and can manoeuvre midway which combined with their high speeds makes their detection and interception extremely difficult. This means that radars and air defences cannot detect them till they are very close and little time to react.

According to the latest memo of the Congressional Research Service (CRS), ‘Hypersonic Weapons: Background and Issues for Congress’ of October 2021, there are two classes of hypersonic weapons, hypersonic glide vehicles (HGV) and hypersonic cruise missiles (HCM). HGVs are launched from a rocket before gliding to a target while HCMs are powered by high-speed, air-breathing engines, or scramjets, after acquiring their target.



Take-off: The Defence Research and Development Organisation (DRDO) successfully demonstrated the hypersonic air-breathing scramjet technology with the flight test of Hypersonic Technology Demonstration Vehicle (HSTDV) from Dr APJ Abdul Kalam Launch Complex in Odisha on September 7, 2020. | Photo Credit: PTI

Hypersonic missiles are a new class of threat because they are capable both of manoeuvring and of flying faster than

5,000 kms per hour, which would enable such missiles to penetrate most missile defences and to further compress the timelines for response by a nation under attack, says a 2017 book *Hypersonic Missile Nonproliferation* published by the RAND Corporation.

### What is the status of Chinese and Russian programmes and where does the U.S. stand?

In addition to the Chinese test, early October, Russia announced that it had successfully test launched a Tsirkon hypersonic cruise missile from a Severodvinsk submarine deployed in the Barents Sea which hit a target 350 kms away.

Talking of the test in November, Russian President Vladimir Putin declared that the tests were almost complete and the Russian Navy would start receiving them in 2022. “Now, it is especially important to develop and implement the technologies necessary to create new hypersonic weapons systems, high-powered lasers and robotic systems that will be able to effectively counter potential military threats,” he said.

While the U.S. has active hypersonic development programmes, the CRS memo said it was lagging behind China and Russia because “most U.S. hypersonic weapons, in contrast to those in Russia and China, are not being designed for use with a nuclear warhead.” “As a result, U.S.

hypersonic weapons will likely require greater accuracy and will be more technically challenging to develop than nuclear-armed Chinese and Russian systems,” it stated.

The U.S. is now looking to accelerate its own programmes, though it is unlikely to field an operational system before 2023. The Pentagon’s budget request for hypersonic research for financial year 2022 is \$3.8 billion, up from the \$3.2 billion it requested a year earlier. The Missile Defence Agency additionally requested \$247.9 million for hypersonic defence.

However, as stated by the U.S. Principal Director for Hypersonics Mike White, the Department of Defence has not yet made a decision to acquire hypersonic weapons and is instead developing prototypes to assist in the evaluation of potential weapon system concepts and mission sets.

Debunking some of the claims surrounding hypersonic weapons, Physicists David Wright and Cameron Tracy wrote in the *Scientific American* dated August 1, 2021 that their studies indicate that hypersonic weapons “may have advantages in certain scenarios, but by no means do they constitute a revolution.” “Many of the claims about them are exaggerated or simply false. And yet the widespread perception that hypersonic weapons are a game-changer has increased tensions among the U.S., Russia and China, driving a new arms race and escalating the chances of conflict,” they wrote in the article ‘The Physics and Hype of Hypersonic Weapons’.

### **What is the status of development by other countries?**

The CRS Memo noted that a number of other countries - including Australia, India, France, Germany, and Japan—are also developing hypersonic weapons technology.

India operates approximately 12 hypersonic wind tunnels and is capable of testing speeds of up to Mach 13, according to CRS.

“Reportedly, India is also developing an indigenous, dual-capable hypersonic cruise missile as part of its Hypersonic Technology Demonstrator Vehicle (HSTDV) program and successfully tested a Mach 6 scramjet in June 2019 and September 2020,” the memo stated.

This test was carried out by the Defence Research and Development Organisation (DRDO) and demonstrated the scramjet engine technology, a major breakthrough. In a scramjet engine, air goes inside the engine at supersonic speed and comes out at hypersonic speeds.

DRDO had said after the test in 2020, many critical technologies such as aerodynamic configuration for hypersonic manoeuvres, use of scramjet propulsion for ignition and sustained combustion at hypersonic flow, thermo-structural characterisation of high temperature materials, separation mechanism at hypersonic velocities have been validated.

Given the rising tensions between the U.S., China and Russia as also the worsening geopolitical situation worldwide, the focus for hypersonic weapons is only set to accelerate more countries to invest significant resources in their design and development.

<https://www.thehindu.com/sci-tech/technology/explained-the-arms-race-towards-hypersonic-weapons/article37874968.ece>



## Russia, India sign military cooperation agreement for next decade

Tehran (Tasnim) – The Russian Defense Ministry said on Monday that Moscow and New Delhi have signed an agreement on military and technical cooperation for 2021-2030.

The deal envisages cooperation between units of the countries' armed forces, as well as the supply and development of weapons and military equipment, Sputnik reported.

The signing ceremony was attended by Russian Defense Minister Sergei Shoigu and his Indian counterpart Rajnath Singh.



The Indian defense minister, for his part, wrote on his Twitter page that he is "glad" that a number of "(bilateral) agreements, contracts, and protocols were signed pertaining to small arms and military cooperation".

Singh also tweeted that he had "fruitful" discussions on bilateral defense collaboration with Sergei Shoigu, adding, "India values its special and privileged strategic partnership with Russia".

Singh was echoed by the Russian defense minister who touted bilateral dialogue as something that contributes significantly to ensuring global and regional security.

Russian Foreign Minister Sergei Lavrov, in turn, expressed hope that Monday's talks would add to bolstering the nations' bilateral strategic partnership.

Right now, Russia and India are involved in the implementation of several bilateral projects, including those pertaining to the BrahMos missile system, a fifth-generation fighter jet (FGFA), licensed production of the Su-30 warplane, and the T-90 battle tank.

According to expert estimates, Russia has provided India with military equipment worth more than \$65 billion over the entire period of military-technical cooperation between the two countries.

In October 2018, Moscow and New Delhi inked a \$5 billion contract for the supply of five batteries of the S-400 missile systems to India. Other hefty agreements include a deal on India purchasing four Russian-made Project 11356 frigates and an accord on Moscow supplying Iglu portable anti-aircraft missile systems to the South Asian nation.

<https://www.tasnimnews.com/en/news/2021/12/06/2621187/russia-india-sign-military-cooperation-agreement-for-next-decade>

# COVID 19: DRDO's Contribution



Press Information Bureau  
Government of India

Ministry of Defence

Mon, 06 Dec 2021 3:42PM

## Installation of Oxygen Plants by DRDO

A total of 931 PSA plants have been installed by DRDO under PM Cares Fund at 869 sites during COVID-19 pandemic. The state-wise details of the number of oxygen plants installed during COVID-19 pandemic period between 2019-2021 by DRDO are given below:

States/ UTs	No. of plants Installed
A&N Island	2
Andhra Pradesh	19
Arunachal Pradesh	20
Assam	31
Bihar	45
Chandigarh	2
Chhattisgarh	43
Dadra and Nagar Haveli + Daman and Diu	4
Delhi	16
Goa	5
Gujarat	45
Haryana	28
Himachal Pradesh	13
J&K	28
Jharkhand	29
Karnataka	36
Kerala	19
Ladakh	4
Lakshadweep	Nil

Madhya Pradesh	56
Maharashtra	36
Manipur	14
Meghalaya	11
Mizoram	13
Nagaland	12
Odisha	36
Puducherry	1
Punjab	29
Rajasthan	48
Sikkim	3
Tamil Nadu	62
Telangana	37
Tripura	13
Uttar Pradesh	103
Uttarakhand	19
West Bengal	49
<b>Grand Total</b>	<b>931</b>

This information was given by Raksha Rajya Mantri Shri Ajay Bhatt in a written reply to Shri Satish Chandra Dubey in Rajya Sabha today.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1778464>

## कोरोना महामारी के दौरान पीएम केयर्स निधि से डीआरडीओ ने 931 पीएसए संयंत्र स्थापित किए

नयी दिल्ली: केंद्र सरकार ने सोमवार को संसद में बताया कि कोविड-19 महामारी के दौरान प्रधानमंत्री नागरिक सहायता और राहत कोष (पीएम केयर्स फंड) से रक्षा अनुसंधान और विकास संगठन (डीआरडीओ) ने देश के 869 स्थानों पर 631 प्रेशर स्विंग एडजॉर्प्शन (पीएसए) ऑक्सीजन संयंत्र स्थापित किए गए हैं।

रक्षा राज्यमंत्री अजय भट्ट ने राज्यसभा में एक सवाल के लिखित जवाब में यह जानकारी दी।

उन्होंने कहा, “कोविड-19 महामारी के दौरान प्रधानमंत्री केयर्स निधि के तहत डीआरडीओ द्वारा 869 स्थानों पर कुल 931 पीएसए संयंत्र स्थापित किए गए हैं।”

उनके मुताबिक उत्तर प्रदेश में सर्वाधिक 103 पीएसए ऑक्सीजन संयंत्र स्थापित किए गए हैं जबकि तमिलनाडु में 62, मध्य प्रदेश में 56, पश्चिम बंगाल में 49, राजस्थान में 48, तेलंगाना में 37, गुजरात और बिहार में 45-45 जबकि कर्नाटक, महाराष्ट्र, ओडिशा में 36-36 संयंत्रों की स्थापना की गई।

ज्ञात हो कि कोविड-19 की दूसरी लहर में देश के विभिन्न इलाकों में ऑक्सीजन की मांग बेहद बढ़ गई थी और अस्पतालों में इसकी कमी भी हो गई थी।

सरकार द्वारा कोविड-19 महामारी जैसी किसी भी तरह की आपातकालीन या संकट की स्थिति से निपटने के प्राथमिक उद्देश्य के साथ एक समर्पित राष्ट्रीय निधि की आवश्यकता को ध्यान में रखते हुए और उससे प्रभावित लोगों को राहत प्रदान करने के लिए पीएम केयर्स फंड के नाम से एक सार्वजनिक धर्मार्थ ट्रस्ट बनाया गया है।

<https://navbharattimes.indiatimes.com/india/drdo-sets-up-931-psa-plants-from-pm-cares-fund-during-corona-pandemic/articleshow/88121438.cms>

## DRDO on Twitter



Prasar Bharati News Services पी.बी.एन.एस. 

@PBNS\_India



A total of 931 Pressure Swing Adsorption PSA plants have been installed at 869 sites during COVID-19 pandemic by Defence Research and Development Organization (DRDO) under Prime Minister Cares Fund: Minister of State for Defence Ajay Bhatt in Rajya Sabha

8:41 PM · Dec 6, 2021



## Defence Strategic: National/International



Press Information Bureau  
Government of India

Ministry of Defence

Mon, 06 Dec 2021 3:47PM

### Steps taken to increase indigenous Defence Production

The value of indigenous defence production, which includes the value of production as obtained from DPSUs, erstwhile OFB, other PSUs manufacturing defence products and Private Industries, for the last two years is as follows:

Sl. No.	Financial Year	DPSUs	Erstwhile OFB	Other PSUs	Private Industries	Total value (Rs in Crores)
1	2019-2020	47,168.00	9,213.00	6,294.58	15,893.70	78,569.28
2	2020-2021	46,711.19	14,635.00	6,029.06	17,291.59	84,666.84

Further, employment data is not maintained in the Ministry of Defence.

In the General Budget 2018-19, Central Government announced setting up of 02 (two) Defence Industrial Corridors (DICs) in the country. In pursuance of the said announcement, it was further decided to set up one of these Corridors in Uttar Pradesh (UP) and another in Tamil Nadu (TN). Subsequently, six nodes, namely Aligarh, Agra, Chitrakoot, Jhansi, Kanpur and Lucknow were identified for Uttar Pradesh Defence Industrial Corridor (UPDIC) and five nodes namely Chennai, Coimbatore, Hosur, Salem and Tiruchirappalli for Tamil Nadu Defence Industrial Corridor (TNDIC). Defence Industrial Corridors (DICs) are aimed at providing fillip to the defence manufacturing ecosystem in both the States and attract investment worth Rs 10,000 crore in each of the DICs by the year 2024-25. The respective State Governments have taken action for acquisition of land and development of necessary infrastructure like road connectivity, basic amenities and security.

To enhance functional autonomy, efficiency and unleash new growth potential and innovation in Ordnance Factories, the production units of Ordnance Factory Board have been converted and corporatized into 7 new Defence Companies. This restructuring has been aimed at transforming the Ordnance Factories into Productive and profitable assets; deepen specialization in the product range; enhance competitiveness; and improving quality and cost-efficiency. The new structure enables the companies to become competitive and explore new opportunities in the market including exports. These new Defence Companies have the potential to grow in the domestic market through product diversification and import substitution, in addition to growth in exports. The government has decided to grandfather the indents/orders worth more than Rs 62,000 crore



pending with OFB post corporatization, to ensure continuity in supply of strategic arms and ammunition to the Services.

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

<https://pib.gov.in/PressReleasePage.aspx?PRID=1778468>



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

**Ministry of Defence**

*Mon, 06 Dec 2021 3:37PM*

## **Defence Industrial Corridors in Tamil Nadu**

As per information received from Government of Tamil Nadu, three proposals have been sent to Government of India concerning Tamil Nadu Defence Industrial Corridor (TNDIC). The details and status of these proposals are as follows:

(i) Establishment of testing facilities under Defence Testing Infrastructure Scheme (DTIS) of Ministry of Defence (MoD). The State Government has been directed to participate in the tender process and follow the procedure/ scheme guidelines in this regard.

(ii) Leasing of about 160 acres of defence land in taluka Ulundurpettai, Viluppuram district of Tamil Nadu for creation of Aviation Technology Hub. This proposal is outside the identified nodes of TNDIC.

(iii) A proposal has been submitted to Airport Authority of India (AAI) for establishment of Aircraft MRO Complex in 50 acres of land at Chennai Airport.

The Defence Industrial Corridors including TNDIC have been established to attract investments from public / private industries to develop defence manufacturing ecosystem. As per information received from Government of Tamil Nadu, action has been taken to develop TNDIC and an Aerospace & Defence (A&D) policy for incentivizing investments by the industries in the TNDIC has been notified. They have started land acquisition and taken action to develop defence industrial parks, aerospace parks etc. and signed Memorandum of Understanding (MoUs) with 39 (thirtynine) private/public industries. Against the projected investments worth Rs. 12226.00 Crore as per MoUs with various private/public industries in the TNDIC, investment of more than Rs 2,200 crore have already been made in the last three years. Further, the State Government of Tamil Nadu has also spent Rs. 30 Crore for development of Aerospace park.

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

<https://pib.gov.in/PressReleasePage.aspx?PRID=1778461>

## Army Chief Naravane speaks on advances in warfare at Punjabi University

*Chief of Army Staff General MM Naravane was at the university on Monday to attend a national seminar commemorating 50 years of the 1971 Indo-Pak war*

Patiala: Chief of Army Staff General MM Naravane visited Punjabi University on Monday to attend a national seminar commemorating 50 years of the 1971 Indo-Pak war.

Addressing the seminar, organised by the department of defence and strategic studies, General Naravane spoke about the changed course of warfare due to developments in strategy, structure and defence technology.

He motivated young officers and students to take up active leadership roles while being innovative in their approach, and adopt an adaptive and versatile outlook to achieve cognitive dominance.

Lt Gen HS Panag (retd) lauded the sacrifice of Indian defence personnel, who laid down their lives in the 1971 Indo-Pak war, which also saw the liberation of Bangladesh.

Stating that the country was indebted to the martyrs, he asked students to further contribute by taking up academic research for better evaluation of the 1971 war.

Another key speaker, Lt Gen JS Cheema (retd) gave a detailed account of the strategic and tactical developments along the Eastern Theatre during the course of war, and critically examined the Shimla Agreement that took place in the aftermath of the war.

Lt Gen BS Grewal discussed with students the ground developments that took along the western border as well as the naval and air operations undertaken by Indian forces to neutralise the Pakistani offence.

He gave first-hand information about the incidents that took place along the Poonch and Chamb areas of Jammu and Kashmir, and discussed the strategic significance of the Shakargarh Bulge and how India managed to tackle the area diligently.

Vice-chancellor Dr Arvind highlighted the role of emerging technologies in relation to warfare and security.

Meanwhile, head of the department Umrao Singh shared that the university was proud that the Chief of Army Staff was pursuing a PhD from it in defence studies.

<https://www.hindustantimes.com/cities/chandigarh-news/army-chief-naravane-speaks-on-advances-in-warfare-at-punjabi-university-101638819174229.html>



Chief of Army Staff General MM Naravane at Punjabi University in Patiala on Monday. (HT Photo)

## 3 Indian defence manufacturers make it to top 100

*China second only to US in terms of arms manufacturing*

New Delhi: Three Indian defence manufacturers have made it to the list of top 100 global companies making arms, planes and other military equipment. The details were released on Monday morning by Swedish think-tank Stockholm International Peace Research Institute (SIPRI) in its report 'Top 100 arms-producing and military services companies, 2020'.

The sales of Hindustan Aeronautics Limited (ranked 42nd) and Bharat Electronics (66th) rose by 1.5 per cent and 4 per cent, respectively, during 2020. The sales of Indian Ordnance Factories (60th) saw a marginal rise of 0.2 per cent. All three are owned by the Ministry of Defence. "Their aggregated arms sales



Three Indian defence manufacturers have made it to the list of top 100 global companies making arms, planes and other military equipment. - File photo

of \$6.5 billion (approx Rs 48,750 crore, accounting for 1.2% of the top 100's total) were 1.7% higher in 2020 than in 2019," said the report. Domestic procurement has helped shield Indian companies against the negative economic consequences of the pandemic, the report said.

It also mentions that China is now second only to the US in terms of arms manufacturing. The combined sales of five Chinese companies figuring in top 100 stood at an estimated \$66.8 billion in 2020—1.5% more than in 2019. "With a 13% share of the total top 100, Chinese companies had the second highest volume of aggregated arms sales in 2020, which is just behind US firms and ahead of UK companies," the report said. The five Chinese companies figure in top 20 while three of them are in top 10, it said. All the Chinese companies in the top 100 are state-owned, producing military and civilian products. Most of the revenue generated by these firms is derived from civilian sales. — TNS

<https://www.tribuneindia.com/news/nation/3-indian-defence-manufacturers-make-it-to-top-100-347220>

## India, Russia sign AK-203 rifle deal, military logistics pact is ‘put off’

*In New Delhi for a bilateral meeting with Prime Minister Narendra Modi, Putin said: “We continue to cooperate jointly on global agenda... our positions are quite similar...in the fight against terrorism, also fighting drug trafficking and organised crime.”*

*By Shubhajit Roy, Krishn Kaushik*

New Delhi: Visiting Russian President Vladimir Putin expressed “concern” Monday over the situation in Afghanistan and flagged the “fight against terrorism, drug trafficking and organised crime” as key challenges for which Russia and India will have to cooperate.

The two countries signed a contract for the manufacture of nearly 6 lakh AK-203 rifles, but “put off” a reciprocal military logistics support agreement (RELOS).

In New Delhi for a bilateral meeting with Prime Minister Narendra Modi, Putin said: “We continue to cooperate jointly on global agenda... our positions are quite similar...in the fight against terrorism, also fighting drug trafficking and organised crime.”

“It is natural we are concerned about the development of the situation in Afghanistan,” he said in his opening remarks. He called India a “great power”, a “friendly” country and a “time-tested friend”.

Modi said, “Despite the challenges posed by Covid, the pace of relations between India and Russia has not changed. Our Special and Privileged Strategic Partnership has been continuously strengthening.”

“There have been many fundamental changes at the global level in the last several decades.

A lot of geo-political equations have emerged. But India-Russia friendship has been a constant among all these variables. Both the countries have not only cooperated with each other without any hesitation but have also taken special care of each other’s sensitivities. It is truly a unique and reliable model of inter-State friendship,” he said.

Putin met Modi at Hyderabad House, hours after the first India-Russia 2+2 ministerial meeting between Defence Minister Rajnath Singh and External Affairs Minister S Jaishankar with their counterparts Defence Minister Sergey Shoigu and Foreign Minister.

At the 2+2 summit, the two sides signed two contracts for manufacture of nearly 6 lakh AK-203 rifles under a joint venture in Amethi, Uttar Pradesh, which was cleared by the government just days ago. The deal is worth over Rs 5,000 crore.

Singh also brought up the issue of China’s aggressive posture along the Line of Actual Control. He said “the pandemic, the extraordinary militarisation and expansion of armament in our neighbourhood and the completely unprovoked aggression on our northern border since early summer of 2020 have thrown in several challenges” and that India is “confident of overcoming these challenges with its strong political will and inherent capability of its people”.

Apart from the agreement for the Kalashnikov rifles, the two countries also signed an agreement for military technology cooperation for the next decade — from 2021 to 2031.

On the issue of Afghanistan, the joint statement said they discussed the “evolving situation in Afghanistan, especially the security situation and its implications in the region, the current political situation, issues related to terrorism, radicalisation and drug trafficking etc.” They outlined



Defence Minister Rajnath Singh with his Russian counterpart Sergey Shoigu (Twitter/Rajnath Singh)

priorities which include ensuring formation of a truly inclusive and representative government in Afghanistan, combating terrorism and drug trafficking, providing immediate humanitarian assistance and preserving the rights of women, children and minorities.

“They also discussed the current humanitarian situation and decided to provide immediate humanitarian assistance to the Afghan people,” it said.

Importantly, the leaders emphasised that “Afghanistan’s territory should not be used for sheltering, training, planning or financing any terrorist groups including ISIS, Al Qaeda, LeT etc”.

On defence, both sides agreed to take forward ongoing engagements to encourage “joint manufacturing in India of spare parts, components, aggregates and other products for maintenance of Russian-origin arms and defence equipment under Make-in-India program through transfer of technology and setting up of joint ventures for meeting the needs of the Indian Armed Forces as well as subsequent export to mutually friendly third countries.”

On the S-400 deal and the US threat of sanctions, Lavrov said the deal does not only have “symbolic meaning”, but is a “very important practical, meaningful” addition to “Indian defence capability”.

“The deal is being implemented. We witness attempts on the part of the United States to undermine this cooperation and to make India obey the American orders to follow the American vision of how this region should be developed. And now Indian friends clearly and firmly explained that they are a sovereign country and they will decide on whose weapons to buy and who is going to be a partner of India in this and other areas,” he said.

India and Russia signed 28 agreements, including 9 government-to-government agreements and those that spanned areas of defence, space, finance, power, culture, scientific research, education and health among others.

The two sides could not conclude the reciprocal logistics support agreement (RELOS). Foreign Secretary Harsh Vardhan Shringla said it was being “put off” for the time being since there were some issues pending.

“The Sides recognized the requirement of an institutional arrangement for reciprocal provision of logistic support and services for the Armed Forces,” the joint statement said.

While there was a discussion on the eastern Ladakh border situation at the 2+2 meeting, the Russian side briefed India on developments pertaining to the Ukrainian situation, Shringla said.

The two sides also discussed the Indo-Pacific strategy and Delhi conveyed its security concerns in the region.

<https://indianexpress.com/article/india/india-russia-defence-deals-rajnath-singh-sergey-shoigu-7658525/>





Tue, 07 Dec 2021

## Optimized method to detect high-dimensional entanglement

By Liu Jia

In a study published in *Physical Review Letters*, the team led by Academician Guo Guangcan from the University of Science and Technology of China of the Chinese Academy of Sciences (CAS), collaborating with Prof. Wang Zizhu from the University of Electronic Science and Technology of China, proposed an optimized detection method for high-dimensional entanglement for the first time.

Preparing and detecting quantum entanglement is the key to quantum information processing. With the increase of dimensions and particles, the higher-dimensional system brings about both the sheer detection difficulty in computation and the excess costs in resources. Apparently, the traditional detection methods barely work.

Confronted with the challenges in high-dimensional entanglement detection, researchers adopted fidelity-based entanglement witnesses to detect a 32-dimensional entanglement state with its fidelity reaching the highest level in the world. However, for common non-maximally high-dimensional entanglement detection, conventional fidelity-based witnesses were not applicable.

To remove this barrier, researchers need to supplement fidelity-based witnesses with experiment-friendly protocols that can detect unfaithful entanglement. Following this path, they designed a method to automatically search for optimal protocols for certifying high-dimensional bipartite entanglement.

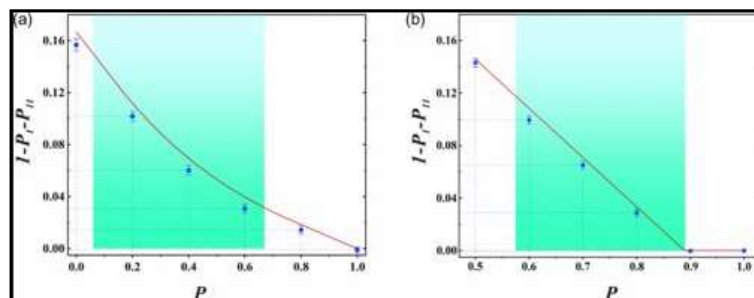
They first experimentally prepared a series of high-dimensional bipartite target states in an innovative way. And then they implemented a few local measurements to achieve the optimal quantum entanglement detection. To certify the entanglement in four-dimensional photonic states, only some three-setting protocols were adopted.

This study solves the problem of detecting high-dimensional bipartite entangled states. It lays a foundation for realizing multiple high-dimensional quantum information processing and promotes the research of quantum physics in high-dimensional systems.

**More information:** Xiao-Min Hu et al, Optimized Detection of High-Dimensional Entanglement, *Physical Review Letters* (2021). DOI: [10.1103/PhysRevLett.127.220501](https://doi.org/10.1103/PhysRevLett.127.220501)

**Journal information:** [Physical Review Letters](https://phys.org/news/2021-12-optimized-method-high-dimensional-entanglement.html)

<https://phys.org/news/2021-12-optimized-method-high-dimensional-entanglement.html>

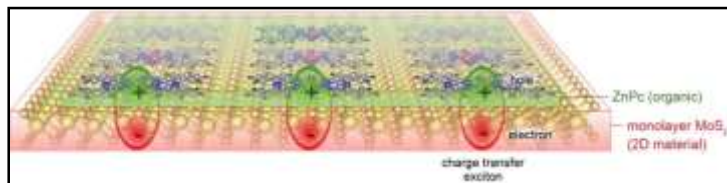


Experimental results of the optimal  $1-pI-pII$  for states. Experimental values for  $p=0, 0.2, 0.4, 0.6, 0.8, 1$  of state ppUNF in (a) and  $p=0.5, 0.6, 0.7, 0.8, 0.9, 1$  of state ppISO in (b) are shown in blue. The solid red lines represent optimal values computed by the SDP solver. States in the green regions are three unfaithful in (a) and two unfaithful in (b). The entanglement dimension is certified when  $1-pI-pII > 0$ . Credit: DOI: [10.1103/PhysRevLett.127.220501](https://doi.org/10.1103/PhysRevLett.127.220501)



# Predicting high temperature Bose-Einstein condensation of excitons

National University of Singapore researchers have predicted that an exotic state of matter known as a Bose-Einstein condensate can exist at relatively high temperatures (around 50 K to 100 K) in systems comprising organic molecules on two-dimensional (2D) semiconducting materials.



A Bose-Einstein condensate is a state of matter in which all particles have the same energy and are completely coordinated. From a physical viewpoint, these particles clump together and start to behave as though they are part of a single larger particle. The 2001 Nobel Prize in Physics was awarded for the realization of Bose-Einstein condensation. This phenomenal breakthrough was first achieved in a collection of rubidium atoms at an ultra-low temperature of 20 nK. This control of the state of matter is expected to lead to technological breakthroughs, and also enables the realization of superfluidity.

**Charge transfer excitons in organic-2D heterostructure: Schematic figure showing charge-transfer excitons in the ZnPc-MoS<sub>2</sub> organic-2D heterostructure. The lowest energy charge transfer excitons in ZnPc/MoS<sub>2</sub> heterostructure are predicted to undergo Bose-Einstein condensation at around 50 K to 100 K. Credit: National University of Singapore**

In this work, Prof Quek Su Ying from the Department of Physics, National University of Singapore, and her postdoctoral fellow, Dr. Ulman Kanchan, predicted that Bose-Einstein condensation (BEC) can take place at around 50 K to 100 K in organic 2D material systems (see Figure) through their computation. This BEC temperature is orders of magnitude higher than that previously achieved using atoms. The particles that condense in the organic-2D material systems are bound electron-hole pairs (excitons) that are induced in the system through irradiation with light. The electron resides in the 2D semiconductor (molybdenum disulphide, MoS<sub>2</sub>) and the hole in the organic molecule (zinc phthalocyanine, ZnPc), in what is called a "charge transfer exciton." The spatial separation between the electron and hole, together with the strongly bound nature of the excitons in these low dimensional materials, results in long exciton lifetimes, which are critical for BEC to take place. Crucially, the predicted BEC temperature is much higher than that in atoms. This is because the BEC temperature is inversely proportional to the particle mass, and the [exciton](#) mass is much smaller than typical atomic masses.

Prior to this prediction, BEC of charge transfer excitons was observed at around 100 K in bilayers of 2D materials. However, one practical difficulty in the realization of BEC in these systems was the need for careful alignment of the two layers of material. Misaligned bilayers host excitons with large momentum, which hinder the formation of the condensate. In the case of organic-2D material systems, the narrow bandwidth of the molecular states imply that the charge transfer excitons have very small momentum, thus favoring BEC formation.

Prof Quek said, "Organic molecules such as transition metal phthalocyanines readily form ordered, self-assembled monolayers on 2D materials. The prediction of high temperature BEC of excitons in organic-2D material systems is expected to lead to more practical realizations of this exotic state of matter, and paves the way for the study of intriguing applications related to Bose-Einstein condensates."

**More information:** Kanchan Ulman et al, Organic-2D Material Heterostructures: A Promising Platform for Exciton Condensation and Multiplication, *Nano Letters* (2021). [DOI: 10.1021/acs.nanolett.1c03435](https://doi.org/10.1021/acs.nanolett.1c03435)

**Journal information:** [Nano Letters](#)

<https://phys.org/news/2021-12-high-temperature-bose-einstein-condensation-excitons.html>

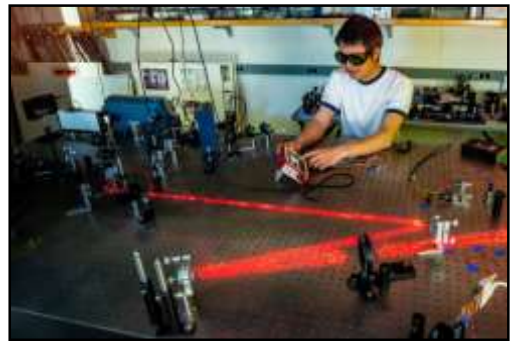
# Fiber lasers poised to advance lab's development of practical laser-plasma accelerators

By William Schul

The next phase in the development of laser-plasma particle accelerators (LPAs)—potentially game-changing tools for research and practical applications—is underway at the Department of Energy's Lawrence Berkeley National Laboratory (Berkeley Lab). A new approach to high-power lasers—combining the pulses from many fast-acting but lower-energy optical fiber lasers—will energize these super-compact accelerators.

Berkeley Lab researchers have zeroed in on the limitations of LPA development efforts and believe they have found a new path forward with optical fiber lasers.

Cameron Geddes, director of Berkeley Lab's Accelerator Technology and Applied Physics (ATAP) Division, said, "With all the recent technological breakthroughs in fiber lasers and laser-plasma accelerators, it's time to bring them together—to develop a next generation of compact and precision-controllable accelerators that can be used in a wide range of applications."



Berkeley Lab scientist Tong Zhou conducting fiber laser combination experiments. An ongoing multi-institutional project to coherently combine the output of fast-pulsing but low-energy fiber lasers could be the secret to having both high energy and high repetition rate—key to the next steps in laser-plasma accelerators. Credit: Marilyn Sargent/Berkeley Lab

## LPAs: Small is the new big

LPAs, in which the Berkeley Lab Laser Accelerator (BELLA) Center is among the leaders, are a radically compact approach to particle acceleration, notable for achieving particle energies in centimeters that would require tens of meters with conventional technologies.

Conventional accelerators use microwaves in resonant metallic cavities to impart high energies to beams of subatomic particles. This mature technology, which can take several circular or linear forms, makes accelerators powerful engines of scientific discovery, in addition to numerous practical applications in medicine, industrial processing, and national security. Many of them are, however, large and costly.

LPAs offer an alternative way to accelerate and boost the energies of the particles. Rather than using microwaves, an intense beam of laser light fired through a gas will generate a plasma wave that charged particles can ride like a surfer.

Radically smaller than present-day means of achieving the same beam energy, LPAs would be attractive in many applications, ranging from biomedical treatment to free-electron-lasers research centers to nuclear nonproliferation. Ultimately they might even be the basis for a new generation of colliders, orders of magnitude smaller than today's, for high-energy physics.

LPAs have been successfully demonstrated (BELLA Center holds the record, having accelerated electrons to an energy of 7.8 billion electron-volts in just 20 cm), but they require high laser power. A laser like the BELLA Petawatt produces output comparable to the entire output of the world's electrical grid for an extremely brief instant, focused into a pulse the diameter of a human hair. However, it can only muster a pulse every second or so. Useful applications will require high laser power delivered in much more frequent pulses. That's where the new fiber laser project comes in.

## Laser teamwork means powerful pulses

Fiber lasers (based on optical fibers that are like those familiar from telecommunications and computer networking, but designed for optimal laser emission) are fast, but small. Each optical

fiber provides a channel no wider than a human hair, and can only emit so much power. The project now getting underway—building upon several years of groundwork at Berkeley Lab, the University of Michigan, and Lawrence Livermore National Laboratory—will further develop a scheme called "coherent beam combining." The goal is pulses energetic enough to drive an LPA, but delivered a thousand times a second.

The new project is led by Berkeley Lab researcher Tong Zhou. Berkeley Lab team members working on fiber laser development also include Russell Wilcox, Qiang Du, Thorsten Stezelberger, and Jeroen van Tilborg. Almantas Galvanauskas and his students at the University of Michigan and Leily Kiani at Lawrence Livermore National Laboratory also play important roles in the program.

The overall effort, continuing to build upon several years of progress, involves spatial, temporal, and spectral combining in a way that preserves "coherence" (a distinctive quality of laser beams, necessary for LPAs). It aims to bundle the relatively low-powered pulses from many fibers into 30-50 femtosecond long, 200-millijoule pulses with peak power much greater than one terawatt. This would be the highest energy and peak power ever obtained from a fiber laser, and more than sufficient for demonstrations of laser-plasma acceleration.

"Their power consumption would be improved compared to conventional lasers, and their ability to dissipate heat is excellent, addressing other challenges in building high-power lasers," Zhou said.

The long-term goal is a collider for high-energy physics. For those purposes, an LPA would need laser energy on the order of 10 joules in short pulses (30 to 100 femtoseconds each), with a repetition rate greater than 10,000 pulses per second—specifications far beyond existing laser technology. Fiber lasers are a promising candidate for solving this problem, and could in the meanwhile power the many spinoff applications of LPAs.

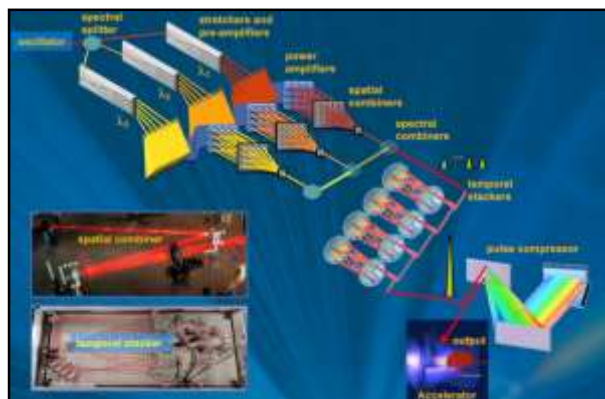
Power isn't the only important thing in a system that has to deliver a hair-thin beam into a capillary with an inside diameter just a few times larger than that. Measurement and active feedback for precision control of such attributes as pointing angle and position are the subjects of complementary work at BELLA Center. Machine learning is emerging as an important control technique.

"We want to not only build a laser system that sets power and energy records, but also state-of-the-art controls, then use it to realize the first high-average-power, high-repetition-rate, laser-driven accelerator in the world," Geddes said.

Such a system, coherently combining ultrashort pulses from many fiber lasers at a kilohertz repetition rate, is a frontrunner for the laser technology of kBELLA, the proposed next generation of the Berkeley Lab Laser Accelerator (BELLA) Center's LPA drivers.

Provided by [Lawrence Berkeley National Laboratory](https://phys.org/news/2021-12-fiber-lasers-poised-advance-lab.html)

<https://phys.org/news/2021-12-fiber-lasers-poised-advance-lab.html>



Combining laser beams so that they truly resemble one powerful beam is challenging. The next steps being taken by the project that recently commenced, headed by Zhou, a scientist in Berkeley Lab's ATAP Division, and supported in part by the Gordon and Betty Moore Foundation, will build upon existing work on spatial combining, as well as amplification in doped fibers. Spectral beam combining (the subject of Zhou's prestigious Early Career Research Program award from the Department of Energy's Office of High Energy Physics) and temporal stacking are other ongoing aspects of the overall effort to produce a high-power kilohertz beam from fiber lasers. Credit: Russell Wilcox, Tong Zhou, Almantas Galvanauskas, Cameron Geddes

### Asthma, allergies may reduce COVID-19 risk

- *Scientists have identified several risk factors for developing severe COVID-19. These include Trusted Source older age, male sex, and certain underlying health conditions.*
- *The results of a newly published study suggest that the risk factors for developing COVID-19 are different from the risk factors for experiencing severe disease.*
- *The scientists found that Asian or Asian British ethnicity and higher body mass index (BMI) are risk factors for severe disease.*
- *Surprisingly, atopic conditions such as asthma were linked to a lower likelihood of developing COVID-19.*

A large, population-based study from the United Kingdom suggests that there is limited overlap between the risk factors for developing COVID-19 and those for developing severe disease.

The findings appear in the respiratory journal *Thorax*.

After the researchers adjusted for factors that could influence exposure to SARS-CoV-2, Asian or Asian British ethnicity and high BMI were associated with a higher risk of developing COVID-19. They also found that atopic conditions — such as asthma, eczema, and hay fever — were associated with a decreased risk of developing COVID-19. Atopic conditions are allergic diseases. For example, atopic asthma is asthma that is triggered by an allergen.

#### Valuable information

Although much is known about severe COVID-19, researchers have not studied risk factors for milder COVID-19 in as much detail.

However, understanding what makes people more susceptible to infection can provide valuable information about how COVID-19 develops and spreads. This knowledge could help protect those at risk of severe disease.

The researchers, who are from institutions across the U.K. but primarily based at Queen Mary University London (QMUL), carried out a population-based study to find out more. The study followed 15,227 participants from May 2020 to February 2021.

The participants completed a baseline questionnaire on potential symptoms of COVID-19 and the results of any COVID-19 tests they had taken.

The team also collected details of potential risk factors, including information on:

- sociodemographic factors
- occupation
- lifestyle
- weight
- height
- medication use
- vaccination status
- diet and supplementation
- long-term medical conditions

Monthly follow-up questionnaires captured test-confirmed SARS-CoV-2 infection along with potential COVID-19 symptoms.

<https://www.medicalnewstoday.com/articles/asthma-allergies-may-reduce-covid-19-risk>

