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समाचार पत्रों से चयित अंश
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DRDO News

DRDO Technology News

Hindustan Times

Wed, 10 Feb 2021

Astronauts on Gaganyaan mission to carry biryani, khichdi, pickle

The menu will offer Indian astronauts – hand-picked fighter pilots from the Indian Air Force who are undergoing training in Russia – a variety of options to suit their palate during the seven-day mission

By Rahul Singh

When India's first crewed spaceflight, Gaganyaan, lifts off next year kicking off a new era of space exploration, the astronauts onboard will carry a selection of special foods developed by a military laboratory after experimenting with ingredients for almost two years, people familiar with the development said.

DFRL displayed its space menu for the Gaganyaan mission at Aero India-2021, which was held at the Yelahanka air base last week. (HT Photo)

The menu will offer Indian astronauts – hand-picked fighter pilots from the Indian Air Force who are undergoing training in Russia – a variety of options to suit their palate during the seven-day mission: Chicken biryani, chicken korma, shahi paneer, dal-chawal, aloo paratha, preserved chapatis, dal makhni, khichdi and beans in sauce.

Even the humble mango pickle figures on the menu prepared by Mysuru-based Defence Food Research Laboratory (DFRL) that comes under the Defence Research and Development Organisation.

The DFRL's Space Food and Logistics wing, which showcased its products at Aero India-2021 held at Yelahanka air base last week, has catered to the sweet tooth too with offerings such as moong dal halwa, sooji halwa, dried apricot and a range of flavoured energy bars, the people said.

"We have focused on nutrient adequacy and wholesomeness. Low fragmentation is equally critical in the zero-gravity environment. The astronauts will eat three meals a day, with the diet adding up to 2,500 calories," said a senior scientist with the DFRL.

The laboratory has prepared the menu in collaboration with the Indian Space Research Organisation (ISRO) that is conducting the crewed mission to space. "American astronauts carry food that suits their taste. So do the Russians. We Indians like saying 'it tastes just like home food.' And home food is what our astronauts will carry," said a second scientist.

The foods (essentially paste products) carried by Indian astronauts will be packed in 100gm/200 packets. The contents of the food kits for the spaceflight will vary with the individual preferences of the astronauts.

"The final composition of the spaceflight is not known yet but four Indian astronauts are being trained in Russia. The idea is to give them balanced meals that are lightweight, low volume and easy to consume. The packaging aspect is quite technical as liquids can't be used," said the first scientist.

The kits carried by the astronauts will include special straws (or what the DFRL calls liquid delivery system) for drinking water and instant coffee/tea, food warmers and waste restraining bags.

The pilots from the IAF are being trained at the Yuri Gagarin Research and Test Cosmonaut Training Center at Star City near Moscow. They began their training in Russia in February 2020 but some activities at the Russian facility were temporarily suspended last year due to the Covid-19 pandemic. The Indians have made good progress in the training so far and cleared some crucial tests, as previously reported by Hindustan Times.

The training programme for the Indian pilots, who were chosen from among hundreds of applicants, will conclude this year. It focuses on both basic astronaut training and issues specific to the Gaganyaan mission.

The Human Space Flight Centre of ISRO and Russia's state-run Glavkosmos signed a contract for the training programme in 2019.

https://www.hindustantimes.com/india-news/astronauts-on-gaganyaan-mission-to-carry-biryani-khichdi-pickle-101612880038344.html

ThePrint

Wed, 10 Feb 2021

Biryani, upma and halwa — Gaganyaan menu made by DRDO lab will offer touch of home in space

Defence Food Research Laboratory, a pioneer in developing food products for soldiers at the border, and scientists onboard Antarctic expedition, has finalised menu for Gaganyaan

By Rohini Swamy

Bengaluru: Idli, upma or poha for breakfast, biryani or vegetable pulao for lunch, and korma and chapatis for dinner — when Indian astronauts take off for the country's first human spaceflight aboard the Gaganyaan, they will have a diverse menu to choose from during their stint in space.

Mysuru-based Defence Food Research Laboratory (DFRL), a pioneer in developing food products for Indian soldiers posted at the border, and scientists onboard the Antarctic expedition, has finalised the menu for Gaganyaan.

Credit: ThePrint

Apart from the main course, the menu will offer a portion of *sooji halwa* or another alternative for dessert, besides many beverages, including an array of fruit juices apart from tea and coffee.

Delayed by Covid-19 pandemic, Gaganyaan is likely to take off in 2022, with a final date yet to be announced. Four IAF officers are currently in Russia undergoing training for the programme.

"It was not easy to compile a list of food that includes cuisines from across India, but DFRL is ready," said A.D. Semwal, Director of DFRL, a lab under the Defence Research and Development Organisation (DRDO). "The nature of the food would include mildly spicy meals with an extra sachet of spices for those who have a spicier palate.

"The food will be dehydrated. In a zero-gravity environment, the astronauts will have to add water in a confined space to the food packet to ensure the water droplets don't float away and spread around the spaceship," he added. "Since it's a short flight of a week, the food could be semi-hydrated."

While bread can be dehydrated, it has been kept off the menu as it tends to crumble, he added.

Special straws

The DFRL also developed mango bars for the first Indian in space, Rakesh Sharma, who travelled aboard Russia's Soyuz T-11 in 1984.

Dr Rudra Gowda, a senior scientist at DRDO, said they have also developed specialised straws for the astronauts to drink water or other liquids. The straws, Gowda said, pull back the droplets of the liquid after a sip or "else it will float away".

https://theprint.in/science/biryani-upma-and-halwa-gaganyaan-menu-made-by-drdo-lab-will-offer-touch-of-home-in-space/601301/

दिप्रिंट

Wed, 10 Feb 2021

बिरयानी, उपमा और हलवा- DRDO लैब द्वारा गगनयान के लिए बनाया गया मैन्यू घर जैसा स्वाद देगा

सीमा पर तैनात सैनिकों और अंटार्कटिक अभियान में शामिल वैज्ञानिकों के लिए खाद्य उत्पादों को विकसित करने में अग्रणी रक्षा खाद्य अनुसंधान प्रयोगशाला ने गगनयान के लिए मेन्यू को अंतिम रूप दे दिया है।

रोहिनी स्वामी

बेंगलुरू: नाश्ते के लिए इडली, उपमा या पोहा, लंच के लिए बिरयानी या वेज पुलाव और रात के खाने में कोरमा और चपातियां— देश के पहले मानव अंतरिक्ष अभियान गगनयान में सवार होकर भारतीय अंतरिक्ष यात्री जब उड़ान भरेंगे तो उनके पास अंतरिक्ष में रहने के दौरान अपने खाने के लिए एक अच्छा-खासा मेन्यू होगा।

सीमा पर तैनात सैनिकों और अंटार्कटिक अभियान में शामिल वैज्ञानिकों के लिए खाद्य उत्पादों को विकसित करने में अग्रणी मैसूरू स्थित रक्षा खाद्य अनुसंधान प्रयोगशाला (डीएफआरएल) ने गगनयान के लिए मेन्यू को अंतिम रूप दे दिया है।

क्रेडिट: दिप्रिंट

खाने के मेन्यू में मेन कोर्स के अलावा डेजर्ट के तौर पर सूजी हलवा या अन्य विकल्प भी होंगे। चाय, कॉफी, कई तरह के फलों के रस जैसे कई पेय पदार्थ भी इसमें शामिल होंगे।

कोविड-19 महामारी के कारण अभियान में देरी के बाद गगनयान के 2022 में अंतरिक्ष रवाना होने की संभावना है। हालांकि, अंतिम तिथि अभी घोषित की जानी बाकी है। इस अभियान के लिए अभी चार वायुसेना अधिकारी रूस में प्रशिक्षण हासिल कर रहे हैं।

रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) के तहत चलने वाली लैब डीएफआरएल के निदेशक ए.डी. सेमवाल ने कहा, 'देशभर के व्यंजनों को शामिल करके खाने का मेन्यू तैयार करना आसान नहीं था। लेकिन डीएफआरएल इसके साथ तैयार है। भोजन में हल्के मसालों का इस्तेमाल किया जाएगा और साथ में उन लोगों के लिए मसालों के पाउच भी उपलब्ध कराए जाएंगे जो चटपटा खाना पसंद करते हैं।'

उन्होंने आगे बताया, 'भोजन डिहाईड्रेटेड होगा। जीरो-ग्रेविटी वाले वातावरण में अंतरिक्ष यात्रियों को एक निर्धारित स्थान पर भोजन के पैकेट में पानी डालना होगा ताकि यह सुनिश्चित हो सके कि पानी की बूंदें तैरकर दूर तक न जाएं और अंतरिक्ष यान में हर तरफ न फैलें। चूंकि यह एक सप्ताह की छोटी उड़ान है इसलिए भोजन को सेमी-हाईड्रेटेड रखा जा सकता है।'

हालांकि, ब्रेड को डिहाईड्रेटेड किया जा सकता है लेकिन इसे मेन्यू से अलग रखा गया है क्योंकि यह चूरा हो जाती है।

स्पेशल स्ट्रॉ

डीएफआरएल ने 1984 में रूस के सोयुज टी-11 में जाने वाले भारत के पहले अंतरिक्ष यात्री भारतीय राकेश शर्मा के लिए मैंगो बार भी विकसित की थी।

डीआरडीओ के एक वरिष्ठ वैज्ञानिक डॉ. रुद्र गौड़ा ने बताया कि उसने अंतरिक्ष यात्रियों के पानी या अन्य तरल पदार्थ पीने के लिए विशेष स्ट्रॉ विकसित किए हैं। गौड़ा ने बताया कि ये स्ट्रॉ एक घूंट पीने बाद ही तरल पेय की बूंदों को वापस खींच लेता है नहीं तो 'यह फैलकर दूर तक फ्लोट करने लगेंगी।'

https://hindi.theprint.in/india/science-and-technology/biryani-upma-and-halwa-gaganyaan-menu-made-by-drdo-lab-will-offer-touch-of-home-in-space/199802/

THE FEDERAL

Wed, 10 Feb 2021

Breach in temporary lake may have caused Uttarakhand flash flood

Satellite images show the flash flood could be a result of snow fall on a mountain nearby. The snow may have resulted in an avalanche that flooded the rivers with 3-4 million cubic metres of water

Latest evidence in Uttarakhand flash floods suggests the incident could be a result of breaking away of a temporary lake, formed due to landslides or avalanches. Scientists define it as Landslide Lake Outburst Flood (LLOF).

The DRDO probe team has yet to provide conclusive evidence to back its claims. The team may reach the exact location only by next Monday.

Satellite images show the flash flood could be a result of snowfall on a mountain nearby. The snow may have resulted in an avalanche that flooded the rivers with 3-4 million cubic metres of water.

Santosh Rai, head of the Glaciology and Hydrology division at the Dehradun-based Wadia Institute of Himalayan Geology, told *Indian Express*, "Satellite images show there was no snow on February 2 in the valley, but very heavy snowfall was witnessed on February 5 and 6. This fresh snow started melting on February 7, which led to the slumping of the snow bank, and a subsequent avalanche. As the snow bank travelled down the valley, it gained momentum and kinetic energy, thus increasing the amount of water and soil on the way."

"A landslide or snow avalanche can create obstructions in the normal path of a flowing river or stream, which results in the formation of a temporary pool, or a dam-like situation. When this obstruction finally gives way to the force of accumulating water, it creates a situation similar to a lake burst. In the case of an avalanche, snow adds to the volume of water," a member of the DRDO team investigating the natural calamity told *IE*.

At first it looked like the flash flood was a result of a Glacial Lake Outburst Flood, which is mainly attributed to climate change.

The DRDO probe team has yet to provide conclusive evidence to back its claims. The team may reach the exact location only by next Monday.

https://thefederal.com/states/north/uttarakhand/latest-evidence-in-uttarakhand-flash-floods-suggests-the-incident-could-be-a-result-of-breaking-away-of-a-temporary-lake/

Wed, 10 Feb 2021

Domestic industry to benefit from Rs 1000 cr contract awarded by MoD to BEL

New Delhi**:** Ministry of Defence (MoD) has signed a contract with Defence Public Sector Undertaking (DPSU) Bharat Electronics Limited (BEL) for procurement of Software Defined Radio Tactical (SDR-Tac) worth over Rs 1,000 crore in New Delhi on February 08, 2021.

The SDR-Tac, jointly designed and developed by Defence Electronics Applications Laboratory (DEAL) of Defence Research & Development Organisation (DRDO) through a consortium of domestic agencies and industry, comprising Weapons and Electronics Systems Engineering Establishment (WESEE), BEL, Centre for Artificial Intelligence & Robotics (CAIR) and Indian Navy will bring strategic depth to the Armed Forces.

The delivery will take place within three years. The BEL is already supplying SDR-Naval Combat (NC) and SDR-Air are under user evaluation trial. The DRDO and BEL are planning to provide the latest SDR with security grading to the Armed Forces.

Domestic industry to benefit from Rs 1000 cr contract awarded by MoD to BEL

The SDR-Tac is a four Channel Multi-mode, Multi-Band, 19'' Rack-mountable, shipborne Software Defined Radio system. It is intended to serve ship-to-ship, ship-to-shore and ship-to-air voice and data communication for network-centric operations.

It supports simultaneous operation of all the four channels covering V/UHF and L Band. This SDR system houses multiple types of waveforms for narrowband and wideband applications. The MANET waveforms are available in UHF and L-Band to support adhoc networking feature for net-centric operations. User evaluation trials covering exhaustive harbour phase and sea phase trials were completed successfully during May to June 2018 at Visakhapatnam for all waveforms including V/UHF and L-Band MANET waveforms under different network configurations.

Interoperability trials were also successfully carried out with all other form factors covering Airborne SDR-AR onboard Dornier Aircraft, SDR-Tac onboard INS Kirch in sailing mode, SDR-Manpack and SDR-Handheld. All the aspects were evaluated successfully by all user agencies of the Navy and clearance was accorded for procurement.

The Armed forces are in need of transition from the single purpose radio of the past to more flexible Software Defined Radios (SDRs) to serve most of their wireless communication needs. These SDRs will be backward compatible with existing Indian radios. Different Service groups require different form factor radios for specific platforms and waveforms/applications.

The SDRs allow the use of common waveform/application implementation methods for different form factors. They also allow the implementation of futuristic waveforms on the same hardware using software programmability, thus ensuring longer life and savings on cost.

A key factor in SDRs is that software program ability allows easy changes of the radio's fundamental characteristics such as modulation types, operating frequencies, bandwidths, multiple access schemes, source and channel coding/decoding methods, spreading/de-spreading techniques and encryption/decryption algorithms. Traditional hardware-centric radios require hardware changes to modify these fundamental characteristics. Multiple types of radio equipment can be replaced with the multi-mode, multi-band, multi-role SDR's of suitable form factors.

https://knnindia.co.in/news/newsdetails/sectors/domestic-industry-to-benefit-from-rs-1000-cr-contract-awarded-by-mod-to-bel

THE TIMES OF INDIA

Wed, 10 Feb 2021

Bengaluru: IISc to get new centre for futuristic strategic tech

Defence Food Research Laboratory, a pioneer in developing food products for soldiers at the border, and scientists onboard Antarctic expedition, has finalised menu for Gaganyaan

By Rohini Swamy

Bengaluru: The Indian Institute of Science will get a new centre of excellence to focus on research of indigenous technologies in critical areas.

Indian Institute of Science, Bengaluru:

The Defence Research and Development Organisation and IISc signed an MoU for establishing a joint advanced technology programme-centre of excellence at the science institute to expand the scope and objective of the existing JATP. "The JATP-CoE will enable directed basic and applied research and engage with premier research institutes through multidisciplinary and multi-institutional collaborations," DRDO said. DRDO will help the CoE in equipping with advanced and unique research facilities that will enable faculty and scholars to conduct advanced research.

DRDO's scientists and engineers will work with the research faculty and scholars in addressing scientific challenges to find innovative solutions.

https://timesofindia.indiatimes.com/city/bengaluru/iisc-to-get-new-centre-for-futuristic-strategic-tech/articleshow/80774700.cms

THE HINDU

Wed, 10 Feb 2021

Air Chief sees need to develop asymmetric capabilities against China

ACM Bhadauria stresses on indigenous technological developments

By Dinakar Peri

In the long run, the ability to develop and maintain technological edge or develop asymmetric capability, particularly against China, should be the focus area, said Chief of the Air Staff Air Chief Marshal (ACM) R.K.S. Bhadauria on Tuesday, stressing that this was only possible when the nation had indigenous equipment and home-grown technology in the long run.

"With our northern and western borders being volatile and active, the possibility of a full-fledged war always exists. And as a nation, we must be prepared, and as an Air Force, we must be prepared and capable of handling any form of conflict," said ACM Bhadauria speaking at a webinar by the Centre for Air Power Studies.

Chief of the Air Staff Air Chief Marshal R.K.S. Bhadauria. File | Photo Credit: AFP

With the reduced U.S. forces' footprint in Afghanistan, an increased Chinese push into Indo-Pacific and a realignment of West Asia, the security situation for India was becoming increasingly complex, he pointed out.

Stressing on indigenous technological developments, ACM Bhadauria said that because of the extended timelines in procurement of imported technology or systems, by the time they fructified,

"our adversaries who have heavily invested into Research and Development (R&D) and indigenous technologies would have raced ahead."

"So the most important and crucial aspect for future capability-building for us is indigenous R&D and indigenous development be it platforms, weapons and sensors," he urged.

Last week, the IAF awarded a contract to Hindustan Aeronautics Limited (HAL) for 83 Light Combat Aircraft (LCA) Tejas fighters, taking the total number of these indigenous fighters to 123. The IAF has also fully endorsed the LCA-MK2 and the fifth generation Advanced Medium Combat Aircraft (AMCA) under development by the Defence Research and Development Organisation (DRDO).

The Air Chief said the IAF was supporting development of futuristic technologies such as swarm drones and flying wingman concepts while supporting other technological advancements.

Importance of air power

Underscoring the importance of air power as a primary responder in case of crisis, ACM Bhadauria stated that in the past, the rise and fall of nations was dictated by the size and prowess of their armies and navies. "However, conflicts in the last few decades have clearly established, without doubt, the pre-eminence of air power for almost all operational contingencies," he observed.

"The contours of recent conflicts and attacks reflect future wars and bring out the biggest lesson that the military strategy of today cannot be based on the erstwhile theories of mass manoeuvre and holding ground," he said.

"Air power allows us to maintain balance of power and when required alter it quickly to our advantage. Air power provides a degree of assurance in strengthening regional peace and security initiatives, he asserted.

https://www.thehindu.com/news/national/air-chief-sees-need-to-develop-asymmetric-capabilities-against-china/article33792682.ece

DRDO on Twitter

Defence News

Defence Strategic: National/International

ZEENEWS

Wed, 10 Feb 2021

2022 में ऐसी होगी Indian Air Force, 36 Rafale Fighter Jets की इन जगहों पर होगी तैनाती

मौजूदा समय में लद्दाख के पूर्वी ओर मजबूती से चीन खड़ा है। लेकिन राफेल के आते ही चीन को अपने फाइटर जेट्स को दूर तैनात करना पड़ा। राफेल के जवाब में चीन ने अपने जे-20 विमानों को तैनात किया है।

अप्रैल 2022 तक आ जाएंगे सभी 36 राफेल

भारतीय वायु सेना में आक्रमण की रीढ़ बनने जा रहे राफेल फाइटर जेट अप्रैल 2022 को पूरी तरह से भारत में आ जाएंगे। भारत-फ्रांस में हुए इस सबसे बड़ी डिफेंस डील के तहत अगले महीने यानि मार्च में 6 राफेल भारत पहुंच रहे हैं। अभी 11 राफेल भारत में हैं और लद्दाख सीमा से लेकर पश्चिमी सीमा तक उड़ान भरकर अपनी ताकत दिखा रहे हैं। लेकिन अप्रैल 2022 तक भारत के पास सभी 36 राफेल पहुंच चुके होंगे और ये चीन-पाकिस्तान की साझा चुनौती से निपटने में सफल होंगे।

साल 2016 में हुई थी सबसे बड़ी डिफेंस डील

भारत ने साल 2016 में फ्रांस के साथ 36 राफेल विमानों (Rafale Deal) का सौदा किया था। जो 59 हजार करोड़ का था। शुरुआती पांच विमान 10 सितंबर 2020 को भारतीय वायुसेना में शामिल हुए थे। इन्हें अंबाला एयरबेस पर तैनात किया गया था। जहां से लद्दाख से लेकर पूरा कश्मीर और राजस्थान से लगती भारतीय सीमा भी उसकी जद में है।

रक्षा मंत्री ने दी जानकारी

राज्य सभा में रक्षा मंत्री राजनाथ सिंह (Rajnath Singh) ने एक सवाल के जवाब में कहा। भारत को अप्रैल 2022 तक सभी राफेल मिल जाएंगे। जो पूर्वी सीमा पर ताकत का समीकरण ही बदलकर रख देंगे। इस दौरान उन्होंने कहा कि भारत सरकार मेक इन इंडिया हथियारों पर जोर दे रही है। जिसके लिए 101 सामानों-हथियारों की लिस्ट बनाकर उनका आयात प्रतिबंधित कर दिया गया है। ये सभी सामान हिंदुस्तान की सरजमीं पर ही बनाए जाएंगे।

23 साल बाद लड़ाकू विमान आए भारत

भारत सरकार ने ढाई दशक के बाद किसी लड़ाकू विमान को खरीदने का सौदा किया था। आखिरी बार रूस से सुखोई विमान भारत आए थे। लेकिन राफेल के आने से भारतीय वायुसेना को नई ताकत मिली है। अब भारत सरकार ने 83 तेजस विमानों को भी खरीदने का ऑर्डर दे दिया है।

लद्दाख में ताकत का समीकरण बदलेगा

मौजूदा समय में लद्दाख के पूर्वी ओर मजबूती से चीन खड़ा है। लेकिन राफेल के आते ही चीन को अपने फाइटर जेट्स को दूर तैनात करना पड़ा। राफेल के जवाब में चीन ने अपने जे-20 विमानों को तैनात किया है। भारतीय वायुसेना

(Indian Air Force) के चीफ आरकेएस भदौरिया ने कहा कि राफेल चीन के किसी भी विमान पर भारी पड़ेगा। हमारे पास चीन से बेहतर परिस्थितियां हैं। राफेल की तैनाती से पाकिस्तान में भी खौफ है।

https://zeenews.india.com/hindi/india/photo-gallery-indian-air-force-will-get-all-36-rafale-fighter-jets-up-to-april-2022-they-will-change-power-scenario-in-eastern-ladakh-zone/845326

Outlook

Wed, 10 Feb 2021

HAL, Wipro3D collaborate to manufacture metal 3D printed aircraft engine component

Bengaluru: Wipro 3D and Engine Division of Hindustan Aeronautics Ltd (HAL) have collaborated for the development, manufacturing and air worthiness certification of acritical aero-engine component operating in the hot zone, using metal 3D printing.

The Nozzle Guide Vane (also called the Inner Ring), 3D printed in a high temperature resilient steel A286, has been awarded Airworthiness certification by Centre for Military Airworthiness and Certification (CEMILAC), the regulatory body of Defence Research and Development Organization (DRDO), a Wipro 3D statement said on Tuesday.

Wipro 3D is the metal Additive Manufacturing (AM) business of Wipro Infrastructure Engineering (WIN).

"The Wipro3D manufactured components shall be installed in HAL manufactured helicopter engines", the statement said.

CEO of Bangalore Complex, HAL, Amitabh Bhatt said Additive Manufacturing is a disruptive technology and is going to play a big role in the manufacture of components used in the Aerospace and Defence Industry in the future.

Complimenting Wipro 3D and HAL Engine Division for successfully developing a 3D component for use in the hot section of an aero engine, Bhatt said it is indeed a significant achievement towards "Aatmanirbhar Bharat Policy of Government of India."

(Disclaimer: This story has not been edited by Outlook staff and is auto-generated from news agency feeds. Source: PTI)

https://www.outlookindia.com/newsscroll/hal-wipro3d-collaborate-to-manufacture-metal-3d-printed-aircraft-engine-component/2026286

ThePrint

Wed, 10 Feb 2021

Indian Army trains indigenous dog breed chippiparai, cocker spaniels to detect Covid-19

The dogs are being trained to sniff out coronavirus by identifying unique metabolic biomarkers in sweat and urine samples of individuals

By Shubhangi Misra

New Delhi: Jaya, Casper and Mani are among India's first military dogs to assist the country's Covid-19 frontline team. The dogs are being trained to detect coronavirus on the basis of urine and sweat samples of individuals.

While Casper is a cocker spaniel, Jaya and Mani belong to the indigenous chippiparai breed from Tamil Nadu that have lean bodies and long legs.

The dogs are being trained on specific biomarkers emanating from urine and sweat samples of Covid-19 positive patients. The Indian Army said Jaya and Casper have been fully trained and Mani is still undergoing training. The two trained canines (Jaya and Casper) were deployed at a transit camp in Delhi where they screened 806 transient samples, of which 18 were detected as Covid-19 positive.

Chippaparai Jaya and Mani, and the cocker spaniel named Casper demonstrate their skills to correctly detect Covid-19 at the 48 Military Veterinary Hospital, Delhi Cantonment | Shubhangi Misra | ThePrint

In a live demonstration Monday, the dogs were seen sitting quietly beside the samples that were detected positive for coronavirus.

Seven more dogs are currently being trained by the Army. On completion of training, all dogs will be deployed at transient camps to screen troops moving towards forward areas.

The Army also said it has trained its canines by taking a leaf out of global trends to use medical detection dogs for diseases such as cancer, malaria and Parkinson's.

"It has been inferred that Covid-19 volatile metabolic biomarkers are within the threshold limit of olfactory detection capability of trained dog (sic) and can help in quick and real time detection of disease," the statement read.

"Worldwide medical detection dogs are in vogue. Many countries use dogs for the detection of diseases like cancer, malaria, diabetes etc. The research is ongoing and they can help in real time detection of any disease, wherever there's a metabolic biomarker and we can imprint the dog on it, we can get excellent results," Lt Colonel Surinder Saini, instructor at the RVC Center in Meerut, told ThePrint.

Saini also said the samples are safe since these don't carry the virus but its biomarkers that only have characteristics or fingerprints of the disease. He explained, "Whenever any tissue gets infected by a pathogen it releases a volatile metabolic biomarker, which are signatures, characteristics or fingerprints of the disease. Here, the olfactory equity is also more."

Several countries such as France, Germany, the UAE, UK, Russia, Finland, Lebanon, Australia, Argentina, Belgium and Chile have also started training dogs for Covid-19 detection, especially to screen passengers at airports and railway stations.

How the dogs were trained

The Indian Army's statement also said that it undertook trials for Covid-19 detection by military dogs in controlled conditions. Positive and suspected samples were obtained from the Military Hospital in Meerut Cantonment and the Netaji Subhash Chandra Bose Subharti Medical College, Meerut.

The force also noted that it had made a "concerted" effort to train an indigenous breed — the chippiparai — under Prime Minister's Atmanirbhar Bharat initiative. Other than that, cocker spaniels and labradors are also being trained.

"Olfactory senses of dogs are good in general. While the ability of cocker spaniels and labradors are already tried and tested, we wanted to test the indigenous chippiparai and are extremely happy with the results," Saini said.

The sensitivity and specificity of cocker spaniels and chippiparais to urine and sweat samples was found to be very high in the initial trial, where 279 urine and 267 sweat samples were used.

While the chippiparai has been trained to sniff urine samples, cocker spaniels are being trained on sweat samples, though there's no specific reason for this distinction.

"The success rate is extremely good, at 95 per cent, for both dogs," Saini added.

https://theprint.in/india/indian-army-trains-indigenous-dog-breed-chippiparai-cocker-spaniels-to-detect-covid-19/601738/

Hindustan Times

Wed, 10 Feb 2021

Has China bitten off more than it can chew?

What China did not expect was that India would not confine its response to managing the border dispute but would extend it to attacking Chinese commercial interests in India and aligning itself more closely with its Quad partners. The Indian side has upped the ante by taking two steps, one military and one economic — occupying the heights in south Pangong and by permanently banning 59 Chinese apps

By Shyam Saran

I have argued before that in advancing its territorial claims, China uses carefully calibrated tactics. Each move it makes may not be threatening enough to invite a significant military response, but several incremental actions cumulatively lead to a material change in the situation. Small nibbles lead to a giant bite.

China India national flag cloth fabric waving on the sky with beautiful sun light - Image (Shutterstock)

We have seen this unfold on our borders. It has been practised with success in the South China Sea (SCS). In earlier track-2 meetings, Chinese interlocutors would say that they did not claim the whole of SCS but only the various islands and waters around them. When asked about the nine-dash line, they said that it was a legacy of the Guomindang government. It will be recalled that when Prime Minister Jawaharlal Nehru had pointed out to Chinese premier Zhou Enlai that Chinese maps were showing large chunks of Indian territory as part of China, Zhou explained that these were old Guomindang maps that had not yet been revised. Sounds familiar?

Chinese interlocutors later began to assert that SCS were "historic waters" where China had certain legacy rights, but did not explain what these were. They still maintained that China was not claiming the entire stretch of waters as sovereign territory. Once formal submission to this effect was made to the United Nations, the obfuscation could no longer stand. The process of actual occupation, dredging and militarisation then began in earnest and still continues. At each step of this creeping process of occupation, neither the Association of South East Asian Nations (Asean) nor the United States (US) felt threatened enough to take countermeasures. Reversing the changed facts on the ground will require large-scale military action, which is not realistic.

The lesson to be drawn is that the counter must come swiftly and at an early stage before the map has been redrawn through such tactics. India changed its pattern of response to Chinese

nibbling with the Doklam operation in 2017. There is no doubt that this came as a rude surprise to the Chinese side. The sharp and aggressive official reaction and the flood of vituperative Chinese media commentary reflected that. Here was a nibble that had invited an unexpected and out-of-character "disproportionate" response. The impasse lasted for over two months, but was eventually resolved. The Brazil-Russia-India-China-South Africa (BRICS) summit hosted by President Xi Jinping at that time was an important reason for the resolution.

In contrast to Doklam, the operations in eastern Ladakh were not the usual nibbling kind, but backed by deployment of a large number of troops and weaponry. The aim would have been to substantially change the alignment of the Line of Actual Control (LAC) to China's advantage, making any Indian effort to reverse the gain a risky and costly affair. The skirmish at Galwan with unprecedented loss of life may have been unexpected and not necessarily part of the original script. This is why the rhetoric on the Chinese side, compared to a smaller incident at Doklam, was much more muted and remains so.

The plan would have been to occupy territory falling within the category of "differing perceptions" of LAC and prevent any Indian presence and patrols in these areas. Another aim would have been to neutralise any Indian advantage from improved border infrastructure such as the Darbuk-Daulat Beg Oldi (DBO) road and revived Advance Landing Grounds (ALG) at DBO, Fukche, Chushul and Demchok.

What China did not expect was that India would not confine its response to managing the border dispute but would extend it to attacking Chinese commercial interests in India and aligning itself more closely with its Quad partners. The Indian side has upped the ante by taking two steps, one military and one economic — occupying the heights in south Pangong and by permanently banning 59 Chinese apps. Earlier, the signal given was that these commercial actions could be reversed if relations came back on an even keel. The onus is now on China to escalate both on the border, but importantly in other dimensions of the relations. Should China seek to push India out of the Shanghai Cooperation Organisation? What about India's membership of the Asia Infrastructure Investment Bank or the BRICS Development Bank? Should it lead in disbanding BRICS which may bring it into conflict with Russia and other members? Should it retaliate commercially, which it has not done so far?

There have been multiple rounds of talks at the military-to-military level, which have not registered any progress towards disengagement of troops. External affairs minister S Jaishankar acknowledged as much in a recent statement.

The fact that both sides find continuation of talks useful is positive, but it appears that the initiative is no longer on China's side. Jaishankar has stated quite unambiguously that other aspects of India-China relations could not be insulated from the disturbance to peace and tranquillity on the border. The reaction from the Chinese foreign ministry spokesman was to urge that the border situation should be delinked from other aspects of bilateral relations, knowing full well that this is no longer possible. China has miscalculated and does not know how to extricate itself. Has it, for a change, bitten off more than it can chew?

(Shyam Saran is a former foreign secretary and senior fellow, Centre for Policy Research. The views expressed are personal)

https://www.hindustantimes.com/opinion/has-china-bitten-off-more-than-it-can-chew-101612878357695.html

Science & Technology News

Wed, 10 Feb 2021

Indian start-up Agnikul successfully test-fires fully 3-D printed semi-cryo rocket engine

The company's maiden rocket Agnibaan is a two-stage launch vehicle. A typical rocket consists of two or more stages, each of which would have its own engines (either single or packed in a cluster). Simply put, a rocket is a combination of multiple engines (stages) that are vertically stacked

By Sidharth MP, Edited By Ananya Das

Highlights

1. ***According to the company, Agnilet was designed to encapsulate all of these into just one piece of hardware. So, this automates the making of an entire engine.***
2. ***Rocket engines are usually comprised of hundreds of parts that serve various purposes.***

Chennai: Indian Space start-up Agnikul Cosmos has announced the successful test-firing of their semi-cryogenic rocket engine, which has been fully manufactured, as a single piece, using 3-D printing technology. Agnikul's semi-cryogenic engine, called Agnilet, would be fulled by rocket-grade kerosene and uses liquid oxygen (stored at -183 degrees celsius) as an oxidizer.

Rocket engines are usually comprised of hundreds of parts that serve various purposes, but according to the company, Agnilet was designed to encapsulate all of these into just one piece of hardware. So, this automates the making of an entire engine.

The company's maiden rocket Agnibaan is a two-stage launch vehicle. A typical rocket consists of two or more stages, each of which would have its own engines (either single or packed in a cluster). Simply put, a rocket is a combination of multiple engines (stages) that are vertically stacked.

Agnibaan is being designed and developed to lift up to 100kgs to 700kms Low Earth orbit. So far, the team has test-fired its second engine - Agnilet, (1.2kN thrust) while the first stage engine - Agnite (25kN thrust) is expected to be test-fired later this year.

When Zee media asked about the significance of the 3-D printing technology and the advantages, Srinath Ravichandran, CEO and co-founder of Agnikul Cosmos said that it was quick, cost-effective and had no room for errors. "In the conventional process, it could take longer than a month to fabricate the very same engine. With 3-D printing, we can realize light-weight engines despite their complex geometry. Our single-piece 3-D printed engine requires no assembly, it can pretty much be directly fitted into the rocket" he told Zee Media.

"Since our inception, we have always been a huge believer of the "Make in India" ideals and more recently of the AatmaNirbharBharat vision of our Honourable Prime Minister. True to that spirit, everything about this engine is Indian," said Moin SPM, Cofounder and COO of the company. Team Agnikul are aiming for their maiden orbital launch by 2022 and company officials said they have signed Memoranda of Understanding with a few customers for offering their launch services.

https://zeenews.india.com/science/indian-start-up-agnikul-successfully-test-fires-fully-3-d-printed-semi-cryo-rocket-engine-2340690.html

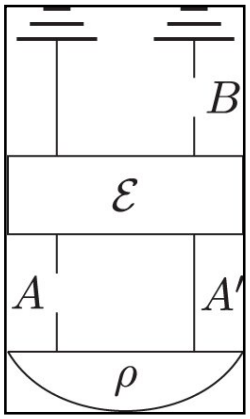
PHYS.ORG

Wed, 10 Feb 2021

Quantum causal loops

Normally, causal influence is assumed to go only one way—from cause to effect—and never back from the effect to the cause—the ringing of a bell does not cause the pressing of the button that triggered it. Now, researchers from the University of Oxford and the Université libre de Bruxelles have developed a theory of causality in quantum theory, according to which cause-effect relations can sometimes form cycles. This theory offers a novel understanding of exotic processes in which events do not have a definite causal order. The study has been published in *Nature Communications*.

One of the ways in which quantum theory defies classical intuitions is by challenging our ideas of causality. Quantum entanglement can be used to produce correlations between distant experiments that are known to evade satisfactory causal explanations within the framework of classical causal models. Furthermore, a unification of quantum theory and gravity is expected to allow situations in which the causal structure of spacetime is subject to quantum indefiniteness, suggesting that events need not be causally ordered at all.



For any state ρ and any CPTP map EE this defines a process operator over A and B. Credit: Nature Communications. DOI: 10.1038/s41467-020-20456-x

Recently, a team of researchers from Oxford and Brussels has developed a theory of causality in quantum theory, in which causal concepts are defined in intrinsically quantum terms rather than pertaining to an emergent classical level of measurement outcomes. This has offered a causal understanding of the correlations produced by entangled states. Now, they have generalized the theory to allow causal influence to go in cycles, providing a causal understanding of processes with events in indefinite causal order.

"The key idea behind our proposal is that causal relations in quantum theory correspond to influence through so-called unitary transformations—these are the types of transformations that describe the evolutions of isolated quantum systems. This is closely analogous to an approach to classical causal models that assumes underlying determinism and situates causal relations in functional dependences between variables," says Jonathan Barrett from the University of Oxford. The main idea of the new study is to apply the same principle to processes in which the order of operations can be dynamical or even indefinite, as a large class of these processes can be understood as arising from unitary transformations, too, just not ones that unfold in an ordinary sequence.

"Previously, processes with indefinite causal order were typically regarded as simply incompatible with any causal account. Our work shows that a major class of them—those that can be understood as arising from unitary processes and which are believed to be the ones that could have a physical realization in nature—could, in fact, be seen as having a definite causal structure, albeit one involving cycles," says Robin Lorenz, a corresponding author of the study. "The idea of cyclic causal structures may seem counterintuitive, but the quantum process framework within which it is formulated guarantees that it is free of logical paradoxes, such as the possibility of going back in time and killing your younger self," explains Ognyan Oreshkov from the Université libre de Bruxelles. "Exotic as they appear, some of these scenarios are actually known to have experimental realizations in which the variables of interest are delocalized in time."

Does this mean that spacetime does not have the acyclic causal structure it is normally assumed to have? Not exactly, since in the mentioned experiments the events that are causally related in a cyclic fashion are not local in spacetime. However, the researchers believe that the causal structure of spacetime itself could become cyclic in this quantum way at the intersection of quantum theory

and general relativity, where analogous processes to those realizable in the lab are expected, but with the events being local in their respective spacetime reference frames.

More information: Cyclic quantum causal models, *Nature Communications*. DOI: 10.1038/s41467-020-20456-x , www.nature.com/articles/s41467-020-20456-x

Journal information: *Nature Communications*

https://phys.org/news/2021-02-quantum-causal-loops.html

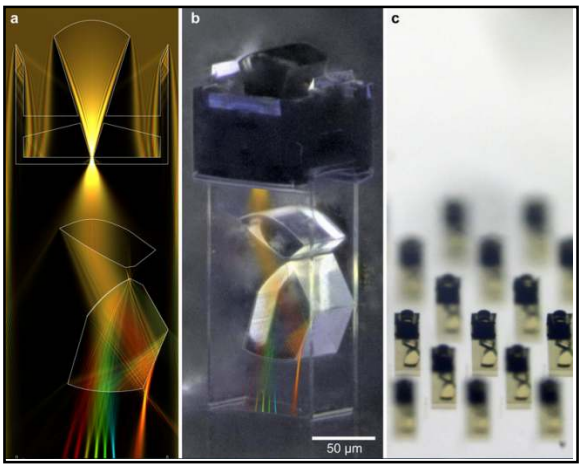
Wed, 10 Feb 2021

Engineers 3-D-print a miniaturized spectrometer

The miniaturization of spectroscopic measurement devices opens novel information channels in medical science and consumer electronics. Scientists of the University of Stuttgart, Germany, developed a 3-D-printed miniature spectrometer with a volume of 100 by 100 by 300 µm^3 and a spectral resolution of up to 10 nm in the visible range. This spectrometer can be manufactured directly onto camera sensors, and a parallel arrangement allows for quick ("snapshot") and low-profile, highly customizable hyperspectral cameras.

Femtosecond direct-laser writing as a 3-D printing technology has been one of the key building blocks for miniaturization in recent years. It has transformed the field of complex micro-optics since the early 2000s. Medical engineering and consumer electronics benefit from these developments. It is now possible to create robust, monolithic and nearly perfectly aligned freeform optical systems on almost arbitrary substrates such as image sensors or optical fibers.

Simultaneously, the miniaturization of spectroscopic measurement devices has been advanced with quantum dot and nanowire technology. These are based on computational approaches, which have the drawback of being calibration-sensitive and require complex reconstruction algorithms.

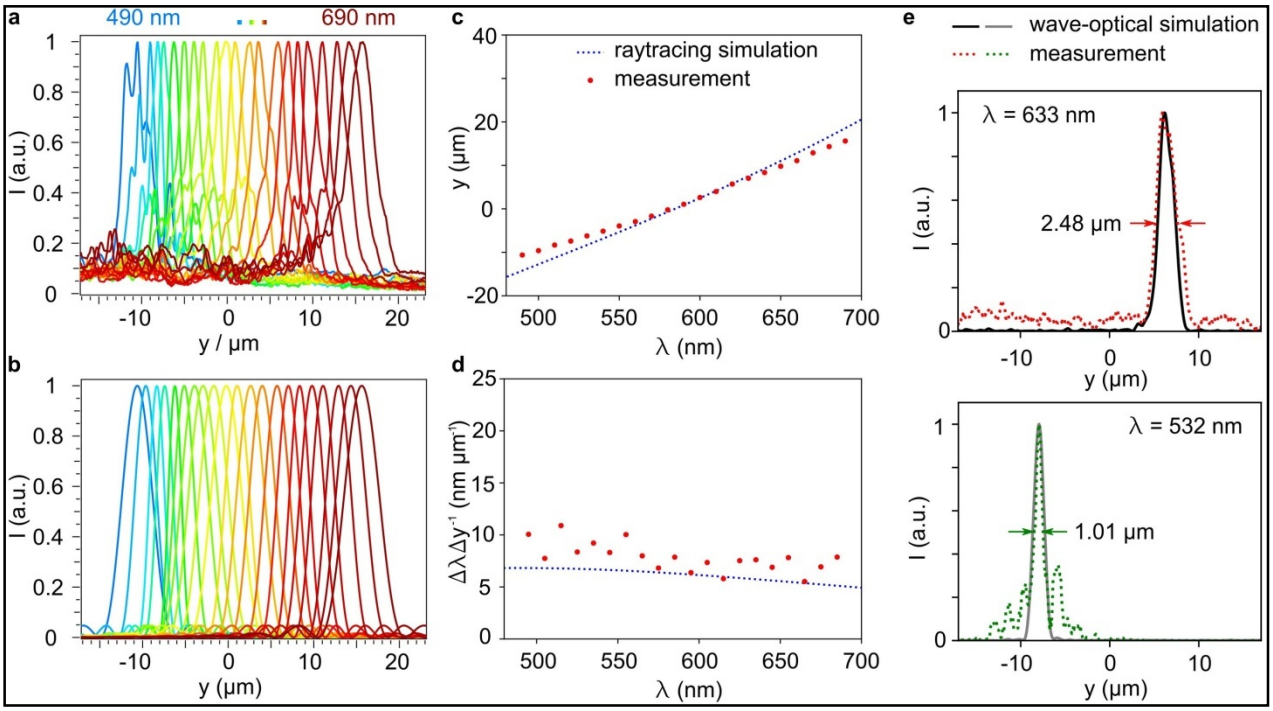


3D-printed miniature spectrometer. a, wave-optical simulation of the spectrometer. b, microscope image of the fabricated spectrometer overlayed with the intensity distribution from a. c, array of fabricated spectrometers. Credit: Andrea Toulouse, Johannes Drozella, Simon Thiele, Harald Giessen, and Alois Herkommer

In a new paper published in *Light: Advanced Manufacturing*, a team of scientists, led by Professor Alois Herkommer from the Institute of Applied Optics and Professor Giessen from the 4th Physics Institute, University of Stuttgart, Germany, have demonstrated an angle-insensitive 3-D-printed miniature spectrometer with a direct separated spatial-spectral response. It has a volume of less than 100 by 100 by 300 µm^3.

The design is based on a classical grating spectrometer and was fabricated via two-photon direct laser writing combined with a super-fine inkjet process. Its tailored and chirped high-frequency grating enables strongly dispersive behavior. The miniature spectrometer features a wavelength range in the visible from 490 nm to 690 nm. It has a spectral resolution of 9.2 ± 1.1 nm at 532 nm and 17.8 nm ± 1.7 nm at a wavelength of 633 nm.

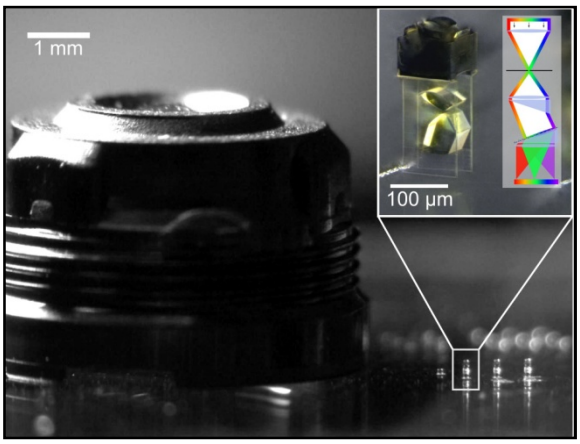
Leading author Andrea Toulouse says, "With its volume of less than 100 by 100 by 300 µm^3 we explore a whole new size range for direct spectrometers. An order of magnitude this small could only be realized by computational approaches until now. In contrast, we translate the spectrum directly into a spatially encoded intensity signal which can be read out with a commercial monochromatic image sensor."



a Measured normalised intensity profiles at the image plane of the spectrometer for illumination wavelengths ranging from 490 nm to 690 nm in 10 nm steps (monochromator, profile position is indicated in Fig. 3b). b Sinc² fits of the intensity profiles from a. c Centre positions of the sinc² fits per wavelength. d Wavelength shift per micrometre deduced from c. e Linewidth simulation and measurement with a red or green laser, respectively. The measured full width at half maximum is indicated with a pair of arrows. The combination of measurements d and e yield a spectral resolution of 9.2 ± 1.1 nm at 532 nm and 17.8 ± 1.7 nm at 633 nm wavelength. Credit: Andrea Toulouse, Johannes Drozella, Simon Thiele, Harald Giessen, and Alois Herkommer

"For 3-D-printed microoptics, the complexity of the optical design marks an innovation. Refractive, diffractive and spatially filtering elements have never been combined in such a small volume to create a complex and monolithic measurement system."

"Our spectrometer could be fabricated directly on a miniature image sensor as the tip of a distal chip endoscope. This way, regions in the human body could be examined with extremely high bending radii that were not accessible before" the scientists forecast. "It could also be an interesting approach for hyperspectral imaging where the spectrometer would be used as a unit cell (macro pixel). The redistribution of spectral energy instead of high-loss Fabry-Perot-filtering could thus enable highly efficient hyperspectral imaging sensors. The ever-growing world population could benefit from such a camera if it was used for spectral mapping in precision farming, for instance."



The inset (white box) shows a microscope image of the fabricated spectrometer (left) and its optical design principle (right). Credit: Andrea Toulouse, Johannes Drozella, Simon Thiele, Harald Giessen, and Alois Herkommer

More information: Andrea Toulouse et al, 3D-printed miniature spectrometer for the visible range with a 100 × 100 µm^2 footprint, *Light: Advanced Manufacturing* (2021). DOI: 10.37188/lam.2021.002

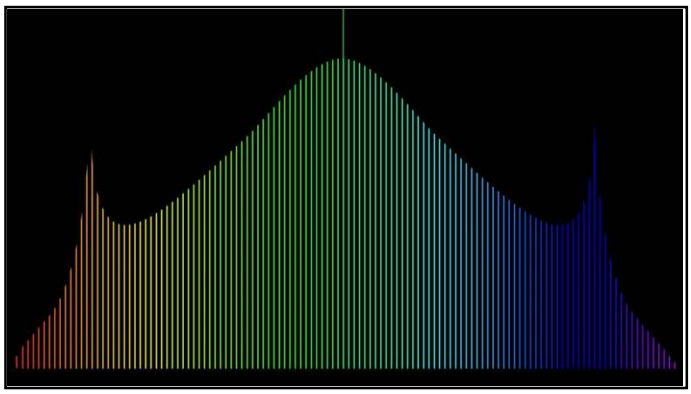
https://phys.org/news/2021-02-d-print-miniaturized-spectrometer.html

PHYS.ORG

Wed, 10 Feb 2021

Physicists finesse the storing of light to create rainbows of color

In nature, as in everyday life, we are surrounded by resonance—the phenomenon that describes how each object has a frequency that it prefers to vibrate at. The note of a guitar string and the sound of Big Ben chiming are examples of resonance.



Comb of Light Credit: University of Bath

Vibrations near resonance cause strong impacts. Bridges collapse if soldiers march in unison; a kid can 'push' themselves on a swing by moving their legs at the correct rate, and two pendulum clocks on the same table will synchronize. These examples show the enhanced sensitivity given to an object when it is provided with energy at a specific (that is, resonant) frequency. It's no wonder then that physicists and engineers are always looking for ways to use resonance to trigger useful effects and strong responses by applying the smallest amount of energy.

Now, a team of physicists from the University of Bath has found a way to use resonance to harness the energy of light more effectively inside structures called microresonators. For light, microresonators act as miniature racetracks, with photons zipping around the circle in loops. Light consists of photons of different colors, with each color corresponding to waves oscillating at specific wavelengths and frequencies. If the peaks of these waves reach the same point after a full loop is made around the resonator, then the energy storage capacity of the resonator hits a maximum when measured against frequency. In other words, the resonator and the light inside come to resonance.

The ability of a resonator to store energy is characterized by the sharpness of the resonance, also called finesse.

Physicists are caught in a race to maximize the finesses of resonators, so as to store as much energy as possible in a single resonator. The reason for this is not just bragging rights. When high light energy is circulating in a resonator, it starts to reveal interesting properties. For instance, the resonator begins to produce photons of light with new frequencies and therefore of different colors.

A newly created rainbow of colors is known as a frequency comb. A comb's many useful properties led to researchers working on 'the optical frequency comb technique' winning the 2005 Nobel Prize in Physics. Unlike a sky rainbow, the one created in a resonator doesn't display a continuous spectrum of colors. Instead, it contains a regular and equally spaced pattern of colors, similar to the teeth on a comb. The regularity of these teeth allows these combs to be used for ultra-precise measurements—for instance, of distances and time.

The University of Bath study has found that boosting the strength of light matter interactions to make frequency combs is not the only reasons high-finesse microresonators are important. If finesse is relatively small, then tuning a laser around one of the resonances causes a given comb tooth to adjust its color continuously. Reaching finesses of several thousands and into tens of thousands, however, starts to break this continuity.

When the continuity is broken, a laser tuned to generate a pair of photons with two specific colors will need to pass through the 'idle interval' before the next color becomes ignited. During this interval, there can be no conversion into new colors.

In the language of resonance theory, the interval creation is called Arnold tongues. Arnold tongues is a phenomenon often found in networks of oscillators. The neurons in our brains work according to the rules of Arnold tongues to synchronize the transmission of signals.

The microresonator tongues reported in the Bath study represent a map of the narrow tongue-like structures that shows how laser parameters should be tuned to either generate or not generate new colors.

The photon pair generation process is a key phenomenon underpinning the development of tunable light sources for various applications, and in particular for optical data processing and transmission. Discovering the connection between photon-pair generation and Arnold tongues is expected to boost the efficiency of this process. Further increasing of finesses is possible by freezing the microresonators to a temperature where the molecules it is made from stop vibrating. This is expected to trigger new ways to manipulate photons, and the Bath team plans to study these next.

Professor Dmitry Skryabin from Bath's Centre for Photonics and Photonic Materials, and lead researcher on this study, said, "Since the 2005 Nobel Prize, the comb technology has rapidly downscaled to the size of computer chips. This means miniaturized frequency comb generators can have myriads of diverse applications in for example pollution monitoring, radar technology, and discovering of new planets."

More information: D. N. Puzyrev et al, Finesse and four-wave mixing in microresonators, *Physical Review A* (2021). DOI: 10.1103/PhysRevA.103.013508

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https://phys.org/news/2021-02-physicists-finesse-rainbows.html

THE HINDU BusinessLine

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People with Down syndrome prone to Covid-19 due to genetic susceptibility

Earlier studies have shown a tenfold mortality risk for people with Down syndrome if they contract coronavirus

By Prashasti Awasthi

Mumbai: A new study aims to understand the genetic factors present in people with Down syndrome, making them susceptible to the coronavirus.

Earlier studies have shown a tenfold mortality risk for people with Down syndrome if they contract coronavirus.

Now, the new study, published in the journal Scientific Reports, noted that TMPRSS2, a gene that codes for an enzyme critical for aiding the entry of SARS-CoV-2 in human cells, had 60 per cent higher levels of expression in Down syndrome.

The gene is located on chromosome 21, which people with Down syndrome have three copies of.

The researchers also found higher expression levels for CXCL10, a gene that can trigger a cascade of events. This results in unchecked inflammation -- cytokine storms -- where the body's immune system attacks its own lung cells.

The authors speculated that this might lead individuals with Down syndrome to be more susceptible to late-onset complications such as lung fibrosis.

Furthermore, Down syndrome individuals may also be susceptible to subsequent bacterial infections following Covid-19.

However, the researchers also observed that people with Down syndrome have an overactivated interferon response, an important innate defence that shuts down viral replication within cells. Two of the genes linked to an interferon response - IFNAR1 and IFNAR2 - are found on chromosome 21.

This study can be corroborated by another research recently published study in the Annals of Internal Medicine. The research reported that people with Down syndrome affected by Covid-19 in the United Kingdom are five times more likely to be hospitalized and ten times more likely to die.

https://www.thehindubusinessline.com/news/science/people-with-down-syndrome-prone-to-covid-19-due-to-genetic-susceptibility/article33791449.ece