

Dec
2021

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

खंड : 46 अंक : 246 10 दिसंबर 2021
Vol.: 46 Issue : 246 10 December 2021



रक्षा विज्ञान पुस्तकालय
Defence Science Library
रक्षा वैज्ञानिक सूचना एवं प्रलेखन केंद्र
Defence Scientific Information & Documentation Centre
मेटकॉफ हाउस, दिल्ली - 110 054
Metcalf House, Delhi - 110 054

CONTENTS

S. No.	TITLE	Page No.
DRDO News		1-5
DRDO Technology News		1-5
1.	Deadly Combo: Why Su-30MKI Jets Armed with Supersonic BrahMos Missiles is bad news for China & Pakistan?	1
2.	Big breakthrough for IAF; LCA Tejas to get indigenous tech that can scan, target & even deflect threats	3
3.	Tech enables watching of 3D displays without 3D glasses	5
Defence News		6-11
Defence Strategic: National/International		6-11
4.	भास्कर एक्सप्लेनर: एटम बम दागने की सलाह हो या तीनों सेनाओं का साझा इस्तेमाल, जानिए कौन से अहम फैसले लेते हैं CDS	6
5.	General Bipin Rawat wanted India to be Atma Nirbhar in defence production: CM	8
6.	Editorial: An enduring partnership	9
7.	Tata, Lockheed Martin to build F-21 Fighter Wings in India	10
8.	Indian Navy Training Ship: INS सुदर्शिनी की ताकत देखकर चकित हुआ ये खाड़ी देश	11
Science & Technology News		12-18
9.	Union Minister Dr Jitendra Singh says, India's maiden human space mission "Gaganyaan" will be launched in 2023	12
10.	मिशन आदित्य 1 को अगले साल लांच करेगा इसरो : डॉ. बनर्जी	13
11.	Precision sieving of gases through atomic pores in graphene	14
12.	Towards quantum states of sound	15
13.	Crucial leap in error mitigation for quantum computers	16
COVID-19 Research News		18-18
14.	Coronavirus attacks fat tissue, study says	18



Fri, 10 Dec 2021

Deadly Combo: Why Su-30MKI Jets Armed with Supersonic BrahMos Missiles is bad news for China & Pakistan?

By Nitin J Ticku

India has successfully tested BrahMos supersonic cruise missile from its Sukhoi Su-30MKI fighter jet. Experts have hailed this as a major milestone as the deadly duo of BrahMos and Sukhoi can incapacitate enemy offensive capabilities, once for all.

“The missile launched from the aircraft followed the pre-planned trajectory and met all mission objectives,” according to a press release from the Ministry of Defense.

The launch, which was hailed as a “major milestone” in the development of the BrahMos, took place over the Integrated Test Range, Chandipur, off the coast of Odisha on December 8.

On the successful test-firing, India’s Defense Minister Rajnath Singh commended the Defense Research and Development Organization (DRDO), the Indian Air Force, and the other stakeholders.

G Satheesh Reddy, secretary in the Department of Defense Research and Development and chairman of DRDO, congratulated the teams involved in the flight test, saying that various laboratories at the premier agency, academic institutions, public sector undertakings, and IAF participated in the testing, production, and induction of this complex missile system.

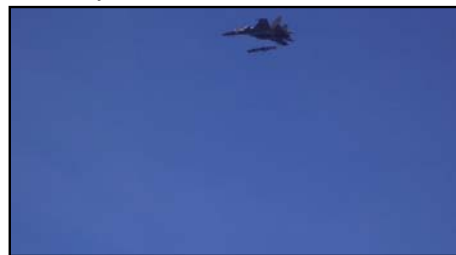
BrahMos + Su-30 MKI – Why This Test Is Significant?

The missile has been developed by BrahMos Aerospace, a joint venture between the DRDO and Russia’s NPO Mashinostroyeniya. The missile gets its name from two rivers: India’s Brahmaputra and Russia’s Moskva.

Called the world’s fastest supersonic cruise missile, BrahMos has already been inducted into the Indian armed forces.

The 8.4-meter BrahMos has a range of roughly around 400 kilometers (increased from 290 kilometers following India’s entrance into the Missile Technology Control Regime) and can carry a conventional payload weighing up to 300 kilograms. It can cruise at Mach 2.8 supersonic speed owing to its high precision and destructive power.

Since the missile will be fired from a moving platform, unlike the land and navy variants, BrahMos Aerospace had to lower the weight of the air version to 2.5 tones. The missile’s land and naval versions each weigh 2.9 tones. Its design was also tweaked to make it easier to integrate into the Sukhoi Su-30MKI aircraft.



An IAF Sukhoi Su-30MKI launches a BrahMos missile on December 8. (DRDO image)

Major airframe assemblies, which are an integral part of the missile's Ramjet engine, were developed in-house by the Indian defense industry. Non-metallic airframe sections, such as the Ramjet fuel tank and pneumatic fuel supply system, are among them.

The structural integrity and functional capability of the device were demonstrated during the test. The launch marks a significant step forward in the BrahMos development process. It paves the way for the serial production of air-version BrahMos missiles within the country.

On December 7, India also successfully test-fired the VL-SRSAM (Vertically Launched Short Range Surface to Air Missile) from the Chandipur-based ITR. The Indian Navy will use the DRDO-designed system, which can engage targets at roughly 15 kilometers.

Su-30 and BrahMos: A Lethal Combo?

The inclusion of the BrahMos Air Launched Cruise Missile (ALCM) will significantly improve the Indian Air Force's capacity to strike heavily defended targets deep inside enemy territory.

Even if the BrahMos is launched from a Su-30 MKI within Indian territory, they now have a large strike range. For any future battles, this will entail a turning point. The first objective in active battles is to attack important enemy installations and defense assets.

Moreover, the missile is equipped with an inertial navigation system and a global positioning system and can engage ground targets from as low as 10 meters, especially for precision strikes on "terror training camps".

The air version of BrahMos was last flight tested in July 2021. The 2.5-tonne air-launched missile has a range of 300 km and a maximum speed of 2.8 Mach.

The most important factor is that the BrahMos fired from the air will be less vulnerable to interception than land-based systems, which, despite their mobility, can be counter-attacked by opposing fighter jets if discovered.

Land-based systems must be positioned close to the border, whilst air-launched versions installed on Su-30MKIs can be deployed far from the enemy's sight.

The IAF commissioned the 222 'Tiger Sharks' squadron in Thanjavur in January 2020, consisting of modified Sukhoi Su-30 MKI fighter jets armed with the missiles. The armed forces' offensive strike range has greatly increased massively.

Should Pakistan Worry?

Su-30 MKI and BrahMos supersonic missile are a lethal combination together, writes R Krishnan a New Zealand based defense analyst. But when one of the most supermanoeuvrable fighters jets in the world is equipped with a supersonic, super destructive cruise missile-like BrahMos, it's bad news for enemies.

As Brahmos Corp General Manager P. Pathak had told Defense IQ in an interview – The accuracy of BrahMos makes it especially advantageous in bombing military targets in urban areas where collateral damage needs to be limited.

India was earlier tied by Missile Technology Control Regime (MTCR) restrictions that limited the range of the operational missile to less than 300km. We had already experimented with the range from 290km to 400km and then successfully test-fired the missile in March 2017. But, expanding the missile's range from 400km to a further 800km is now possible after India's induction into the MTCR.

Krishnan writes with the integration of BrahMos with Su-30MKI, a two-squadron attack can incapacitate Pakistan's nerve centers including nuclear power plants, the Sargodha Central Ammunition Depot west of Lahore; ballistic missile bases in Gujranwala, Okara, Multan, Jhang and Dera Nawab Shah; Pakistani Army Corp headquarters in Rawalpindi; Pakistan's only major harbor and its Naval HQ in Karachi; and ordinance factories that manufacture tanks and fighter warplanes.

Against China, the lethal combo may not have the same impact as Chinese targets are located deep inside the country. However, PLA military infrastructure near the LAC besides its strategic

railway line and airfields can easily be destroyed. Beijing has already expressed its reservations against BrahMos missiles.

With the deadly combo of Sukhoi with the BrahMos, Pakistan can expect a lot of damage to its key infrastructure including dams, power stations, strategic bridges besides command, control & communication centers of the military.

And not to forget, the BrahMos is also nuclear-tipped. A full-throttle pre-emptive nuclear strike can guarantee their offensive capability is completely destroyed and it is never again a threat to India, Krishnan concludes.

<https://eurasianimes.com/deadly-combo-su-30mki-jets-brahmos-missiles-is-bad-news-for-pakistan/>



Fri, 10 Dec 2021

Big breakthrough for IAF; LCA Tejas to get indigenous tech that can scan, target & even deflect threats

By Sakshi Tiwari

India is making efforts to produce an array of indigenous technology and weapon systems so as to boost self-reliance in the defense sector. A major breakthrough has been achieved in the form of home-grown AESA radar, which is set to be integrated into the indigenous Tejas light combat aircraft (LCA).

This announcement comes a few months after the Defence Research and Development Organisation (DRDO) announced the development of chaff technology aimed at defending fighter jets of the Indian Air Force (IAF).

The IAF is reportedly set to demonstrate the use of Active Electronically Scanned Array (AESA) radar developed in-house later this month, making India one of the few countries with an indigenous force multiplier that is used in electronic warfare, long-range missiles, and long-range precision-guided ammunition, reported Hindustan Times.



Active Electronically Scanned Array (AESA) radar (via DRDO)

D. Seshagiri, Head of the Electronics and Radar Development Establishment (LRDE) of the DRDO, corroborated this, claiming that the produced AESA radar is 95 percent indigenous, with only one imported subsystem. It can track 50 targets in the sky at a range of more than 100 kilometers and engage about four of them at the same time.

The 95% indigenous component in the radar system is in consonance with the government's 'Make in India' initiative. Apart from India, "only the US, the EU, Israel, and China have AESA radar capability", Seshagiri told Hindustan Times.

This also allows India to create a balance of power in the region with China which has been showcasing its stealth fighter J-20 as a means of achieving air superiority.

AESA employs an electronically controlled array antenna, which allows a beam of radio waves to be electronically guided in multiple directions without moving the antenna. It is primarily used in radar systems and allows the radar to have resistance to anti-jamming, low interception, multi-mode capability and high reliability because each of these modes functions independently.

Thus, India possessing the AESA Radar will protect its fighter aircraft that are already far short in number against the sanctioned strength, from enemy radars. This will achieve a dual purpose of early interception and attack. Given India's geography and two-front war threats from China and Pakistan, it will function as a force multiplier for the IAF.

Similarly, the chaff technology which was unveiled earlier this year by DRDO aims to safeguard India's fighter jets against enemy radar threats. DRDO had also revealed that this technology, too, could be installed in the LCA Tejas.

Uttam AESA Radar

This radar will be installed on all 83 Tejas Mark-1A aircraft in the Indian Air Force over the next five years, as well as the future twin-engine AMCA fighter designed by the Aeronautical Development Agency (ADA).

According to Seshagiri, the AESA radar will be installed on the radar cone of the Su-30 MKI aircraft as well as carrier-based MiG-29K fighters. "The LRDE has already signed an MoU with Hindustan Aeronautics Limited for Hindustan Aeronautics Limited to be the lead integrator of the radar on the Tejas Mk I A, with four recognized vendors, including BEL, as essential sub-system suppliers," he said.

The first prototype of the radar was developed in 2012, and a full-scale model was shown during the 2017 Aero India aviation exhibition. At Aero India 2019, a fully functional AESA radar prototype was unveiled, placed inside the glass nose of a HAL Tejas fighter.

Earlier this year, Seshagiri had said, "On the LCAs, testing is currently focused on the air-to-air mode. The radar's range should be about equal to that required to launch a BVR (beyond visual range) weapon. However, we're getting a better range than that. We're about to start a joint review after a few sorties. Following that, it will be ready for user testing."

The first 16 Tejas MK-1A aircraft would be equipped with Israeli ELM 2052 AESA radars, while the rest will be equipped with the indigenous Uttam radar. "The radar has already been tested for over 250 hours on two Tejas fighters and a Hawker Siddeley 800 executive jet."

It is believed Astra Mark-2 air-to-air missile, developed by DRDO, is also equipped with an AESA active seeker, to improve the performance of the missile and replace the Russian radio frequency seeker used in the Astra Mk I, according to The New Indian Express. The air advantage China has achieved with its fifth-generation J-20 stealth fighters may be nullified by this radar, analysts believe.

Chaff Technology To Defend Indian Fighters

DRDO developed Advanced Chaff Technology earlier this year to protect IAF fighter aircraft from hostile radar threats. Defense Laboratory Jodhpur, a DRDO laboratory, collaborated with High Energy Materials Research Laboratory (HEMRL), a DRDO laboratory in Pune, to create the improved chaff material and chaff cartridge-118/I, which met the IAF's qualitative requirements.

Following successful user testing, the Indian Air Force has begun the process of inducting this technology.

"Chaff is the electronic counterpart of smoke and reflects electromagnetic energy to mislead or deceive an enemy system," an aerospace analyst had told The EurAsian Times. The opponent is confused by chaff materials of varying sizes packed into a container that is released by the aircraft to generate an electronic cloud.

"Chaff is like the name says, very tiny filaments of a certain form and length that reflect radar waves," a retired IAF fighter pilot told the EurAsian Times on condition of anonymity. It's loaded into canisters and launched from a plane. It blossoms behind the airplane when it's deployed."

Electronic countermeasures have been employed by militaries all around the world to protect important assets such as aircraft and warships. They are protected from both radar and radio frequencies by chaff technology.

<https://eurasianimes.com/lca-tejas-to-get-indigenous-tech-that-can-scan-target-even-deflect-threats/>

Tech enables watching of 3D displays without 3D glasses

Cusat hosts showcasing of the technology by Japan's Sony Group

Kochi: The department of Electronics at the Cochin University of Science and Technology (Cusat) played host to the showcasing of an advanced technology that enables one to watch 3D displays without 3D glasses here on Thursday.

The 3D sensing and spatial display by Japan's Sony Group was presented as part of an international symposium organised by the department in association with the Defence Research Development Organisation and the Council of Scientific and Industrial Research. The Electronics department at the varsity had earlier joined hands with the company to develop an intelligence sensor network for mitigating the impact of noise pollution on marine habitat.



Students of Cusat watching a 3D display without 3D glasses during an international symposium on Thursday. | Photo Credit: H. VIBHU

“3D glasses are going to be a thing of the past with the launch of the latest 3D sensing and spatial display that allows it to be adjusted on the display itself without glasses. By sensing the movements that occur in us while viewing the display, the visuals are constructed accordingly. The direction of the scenes is adjusted in the same direction, as our eyes move,” said Supriya M.H., professor and head of the department of Electronics.

“The system allows you to view products in three dimensions during online purchase, thereby enhancing the selection process. In addition, the new system will be able to display visuals as seen directly while designing large buildings,” she added.

The organisers said Sony was presenting the technology before the public for the first time in the country. The 3D display stalls will be open till Friday for all those who are curious to experience the technology.

<https://www.thehindu.com/news/cities/Kochi/tech-enables-watching-of-3d-displays-without-3d-glasses/article37918942.ece>



Fri, 10 Dec 2021

भास्कर एक्सप्लेनर: एटम बम दागने की सलाह हो या तीनों सेनाओं का साझा इस्तेमाल, जानिए कौन से अहम फैसले लेते हैं CDS

लेखक: अभिषेक पाण्डेय

देश के पहले चीफ ऑफ डिफेंस स्टाफ जनरल बिपिन रावत की 8 दिसंबर 2021 को तमिलनाडु के कुन्नूर में हुए हेलिकॉप्टर क्रैश में मौत हो गई। इस घटना में रावत की पत्नी समेत हेलिकॉप्टर में सवार 14 में से 13 लोगों की मौत हो गई। इस दुर्घटना में केवल केवल ग्रुप कैप्टन वरुण सिंह जीवित बचे हैं, जिनका इलाज चल रहा है।

आइए जानते हैं कि क्या होता है चीफ ऑफ डिफेंस स्टाफ (CDS), क्यों पड़ी इस पद की जरूरत? सेना और सरकार के बीच क्या है इसकी भूमिका?



क्या होता है चीफ ऑफ डिफेंस स्टाफ या CDS?

- देश का चीफ ऑफ डिफेंस स्टाफ, इंडियन आर्म्ड फोर्सज का मिलिट्री प्रमुख और इंडियन आर्म्ड फोर्सज की चीफ ऑफ स्टाफ कमिटी का चेयरमैन होता है।
- चीफ ऑफ डिफेंस एक चार-स्टार जनरल होता है। CDS रक्षा मंत्रालय द्वारा बनाए गए नए विभाग डिपार्टमेंट ऑफ मिलिट्री अफेयर्स का प्रमुख होता है।
- रक्षा मंत्रालय में पहले से ही चार विभाग थे- डिपार्टमेंट ऑफ डिफेंस, डिपार्टमेंट ऑफ डिफेंस प्रोडक्शन, डिपार्टमेंट ऑफ एक्स सर्विसमेन वेलफेयर और डीआरडीओ, अब पांचवें नए विभाग, डिपार्टमेंट ऑफ मिलिट्री अफेयर्स का प्रमुख चीफ ऑफ डिफेंस स्टाफ को बनाया गया है।
- सीडीएस की नियुक्ति आर्म्ड फोर्सज के बीच आवश्यक तालमेल लाने के लिए हुई है। इसका उद्देश्य सेना में जॉइंटमैनशिप को बढ़ाना है, जिससे संसाधनों की बर्बादी और निर्णय लेने में होने वाली देरी को रोका जा सके।
- दिसंबर 2019 में जनरल बिपिन रावत देश के पहले चीफ ऑफ डिफेंस स्टाफ नियुक्त हुए थे।

क्या होती है चीफ ऑफ डिफेंस स्टाफ की भूमिका?

- चीफ ऑफ डिफेंस स्टाफ तीनों सेनाओं से जुड़े मामलों में प्रमुख सैन्य सलाहकार के रूप में काम करता है। CDS भले ही तीनों सेनाओं से जुड़े मामलों में रक्षा मंत्रालय को सलाह देता है, लेकिन अब भी तीनों सेनाओं-आर्मी, नेवी और एयरफोर्स-के प्रमुख ही उनकी संबंधित सेवाओं से जुड़े मामलों में सलाह देते हैं।

- मतलब, CDS, तीनों सेनाओं से जुड़े मामलों में रक्षा मंत्रालय के सलाहकार के तौर पर काम करता है, लेकिन वह तीनों में से किसी सेना का प्रमुख नहीं होता है, बल्कि इसके लिए इन तीनों सेनाओं के प्रमुख ही अपनी-अपनी सेना की कमान संभालते हैं।
- भारत एक न्यूक्लियर वेपन से संपन्न देश है, ऐसे में CDS न्यूक्लियर कमांड अथॉरिटी के लिए सैन्य सलाहकार के तौर पर भी काम करता है, इस कमांड का अध्यक्ष प्रधानमंत्री होता है।
- भारत ने 2008 में सेना, अंतरिक्ष विभाग और अंतरिक्ष अनुसंधान संगठन (ISRO) के बीच बेहतर तालमेल के लिए अपने एयरोस्पेस कमांड (द इंटीग्रेटेड स्पेस सेल) का गठन किया था। CDS के पास इस साइबर वारफेयर डिविजन का भी चार्ज है।
- CDS का काम अनुमानित बजट के आधार पर तीनों सेवाओं की लॉजिस्टिक्स के साथ-साथ कैपिटल एक्विजिशन की जरूरतों को सुव्यवस्थित करने में मदद करना है।
- पहले के चीफ ऑफ स्टाफ कमिटी (COSC), (जोकि तीनों सेना प्रमुखों में से सबसे सीनियर बनता था) के उलट CDS के पास शासनात्मक शक्तियां हैं।

चीफ ऑफ डिफेंस स्टाफ और तीनों सेना प्रमुखों की भूमिकाओं में अंतर?

अक्सर लोगों को यह गलतफहमी हो जाती है कि चीफ ऑफ डिफेंस स्टाफ ही तीनों सेनाओं का भी प्रमुख होता है, लेकिन ऐसा नहीं है। इन दोनों की भूमिकाओं में अंतर है-

- CDS किसी भी तरह का ऑपरेशनल या मिलिट्री कमांड नहीं दे सकता। यानी वह तीनों सेनाओं के प्रमुखों के ऊपर कोई भी सैन्य आदेश जारी नहीं कर सकता है।
- CDS का काम सैन्य आदेश जारी करने के बजाय तीनों सेनाओं से जुड़े मामलों में सरकार को निष्पक्ष सलाह देना है।
- आर्मी, नेवी या एयरफोर्स को सैन्य कमांड देने का काम कैबिनेट कमेटी ऑन सिक्योरिटी (CCS) की सलाह पर उनके प्रमुख ही करते हैं, न कि चीफ ऑफ डिफेंस स्टाफ।
- डिपार्टमेंट ऑफ मिलिट्री अफेयर्स का नेतृत्व करने के अलावा, सीडीएस चीफ्स ऑफ स्टाफ कमेटी (CoSC) के स्थायी चेयरमैन का भी पद संभालता है। अब तक, CoSC की अध्यक्षता सबसे सीनियर सर्विस चीफ द्वारा छोटी अवधि के लिए रोटेशन में की जाती थी लेकिन यह व्यवस्था असंतोषजनक पाई गई थी।
- तीनों सेनाओं के प्रमुखों की तरह ही चीफ ऑफ डिफेंस स्टाफ भी एक चार स्टार जनरल होता है।
- चीफ ऑफ डिफेंस स्टाफ के पद पर चार स्टार जनरलों में से सबसे सीनियर अधिकारी की नियुक्ति की जाती है।
- चीफ ऑफ डिफेंस स्टाफ की सैलरी, भत्ते और योग्यताएं भी तीनों सेना प्रमुखों के बराबर ही होते हैं।

क्यों पड़ी चीफ ऑफ डिफेंस स्टाफ की जरूरत?

चीफ ऑफ डिफेंस स्टाफ की कमी देश को सबसे पहले 1962 के भारत-चीन युद्ध के दौरान खली थी। उस समय अगर आर्मी और एयरफोर्स ने समन्वित हमला किया होता तो इस युद्ध का फैसला कुछ और हो सकता था। उस समय चीनी सेनाओं के पास एयर सपोर्ट नहीं था।

सेना के तीनों अंगों के बीच कोऑर्डिनेशन की कमी 1987-89 के दौरान भारतीय शांति सेना (IPKF) द्वारा श्रीलंका में LTTE के खिलाफ चलाए गए ऑपरेशन के दौरान भी देखी गई। उस ऑपरेशन में नेवी और एयर फोर्स के कमांडर्स ओवरऑल फोर्स कमांडर (OFC) के अंडर में थे, लेकिन कहा जाता है कि OFC संपर्क अधिकारी से ज्यादा कुछ नहीं थे।

चीफ ऑफ डिफेंस स्टाफ की सबसे अधिक जरूरत 1999 में कारगिल युद्ध के दौरान महसूस की गई थी, जिसमें आर्मी के एयर सपोर्ट के निवेदन को शुरुआत में सुरक्षा मामलों की समिति (CCS) ने अस्वीकार कर दिया था, जिससे आर्मी को एयर फोर्स के हवाई हमले की मदद मिलने में कई हफ्तों की देरी हो गई थी। ये सभी घटनाएं 1947-48 में पाकिस्तान के खिलाफ लड़ाई और 1971 में पाकिस्तान के खिलाफ युद्धों के उदाहरणों से अलग हैं, जिनमें सेनाओं के जॉइंट ऑपरेशन ने भारत को जीत दिलाई थी।

कैसे हुआ चीफ ऑफ डिफेंस स्टाफ का गठन?

1999 में कारगिल युद्ध के तुरंत बाद इस बात की समीक्षा के लिए कृष्णास्वामी सुब्रह्मण्यम (Krishnaswami Subrahmanyam) के नेतृत्व में कारगिल रिव्यू कमिटी (KRC) का गठन किया गया था कि वे कौन सी कमियां थी जिनकी वजह से पाकिस्तानी सेना को रणनीतिक महत्व वाली जगहों पर कब्जा करने का मौका मिला। कारगिल रिव्यू कमिटी की रिपोर्ट फरवरी 2020 में संसद में पेश की गई थी। इसमें कारगिल युद्ध के दौरान शुरुआत में सुस्त भारतीय प्रतिक्रिया, और राष्ट्रीय सुरक्षा को मजबूत करने के उपायों का सुझाव दिया था।

इस कमिटी की सिफारिशों के बाद 2001 में गृह मंत्री लाल कृष्ण आडवाणी के नेतृत्व में मंत्रियों के समूह (GoM) ने प्रधानमंत्री अटल बिहारी वाजपेयी को सौंपी अपनी रिपोर्ट में चीफ ऑफ डिफेंस स्टाफ (CSS) की नियुक्ति की सिफारिश की थी।

लेकिन चीफ ऑफ डिफेंस स्टाफ की नियुक्ति अगले दो दशक तक अलग-अलग वजहों से नहीं हो सकी। आखिरकार 15 अगस्त 2019 को स्वतंत्रता दिवस भाषण के दौरान प्रधानमंत्री नरेंद्र मोदी ने चीफ ऑफ डिफेंस स्टाफ का पद बनाए जाने की घोषणा की।

<https://www.bhaskar.com/db-original/explainer/news/bipin-rawat-what-is-cds-chief-of-defence-staff-of-the-indian-armed-forces-role-explained-129194286.html>



Fri, 10 Dec 2021

General Bipin Rawat wanted India to be Atma Nirbhar in defence production: CM

Karnataka Chief Minister Basavaraj Bommai pays tribute to late Chief of Defence Staff

Bengaluru: Chief of Defence Staff Gen. Bipin Rawat was a strong votary of Atma Nirbhar (self-reliance) in defence production and was instrumental in starting indigenous production of many arms and equipment within India, Karnataka Chief Minister Basavaraj Bommai said in Bengaluru on December 9.

He inaugurated an exhibition on logistics organised by DRDO and DFRL in the banquet hall of the State secretariat.

The Chief Minister said Gen. Rawat had a big role in encouraging DRDO and other organisations to excel in defence production. Apart from innovation and development of modern weapon systems and equipment, he pushed for transfer of technology to encourage participation of private sector in defence production.

“The nation is shocked by the tragic accident that snatched the life of Gen. Rawat who was the head of the



Karnataka Chief Minister Basavaraj Bommai offers a tribute to Chief of Defence Staff General Bipin Rawat who perished, along with 12 others, when an Indian Air Force helicopter carrying them crashed in a heavily wooded area of the Coonoor ghat in the Nil

three wings of the armed forces. IAF is conducting an inquiry into the mishap. Gen. Rawat always led from the front,” Mr. Bommai said.

Gen. Rawat had taken an unprecedented tough stand on many issues related to India's security. His strong posture against China during the recent border stand-off had compelled Chinese troops to retreat. “The nation needed his leadership in the years to come,” the Chief Minister said.

Recognising his service and dedication, Prime Minister Narendra Modi had appointed Gen. Rawat the Chief of Defence Staff. It was not just the defence forces, the entire country has lost a great leader. His life story is inspirational. “Our children should be taught about his patriotism and sacrifices,” Mr. Bommai said. Gen. Rawat had a close association with Karnataka, especially Kodagu. He was all praise for Gen. Cariappa and Gen. Thimmaiah, Mr. Bommai said.

<https://www.thehindu.com/news/cities/bangalore/gen-bipin-rawat-wanted-india-to-be-atma-nirbhar-in-defence-production-cm/article37909664.ece>

Telangana Today

Fri, 10 Dec 2021

Editorial: An enduring partnership

The story of India-Russia relationship is all about keeping an old romance alive despite the lure of more attractive partners coming along. What makes the bilateral ties more fascinating is that both countries have remained friendly and cordial despite the growing pressure on them due to the rapidly changing global geopolitical scenario. In fact, on several international issues, they are not on the same page. But the relationship has withstood the test of time, weathered many a storm and remained robust in an otherwise uncertain and unforgiving world. The terms of engagement may have changed over the years, but the India-Russia ties have largely remained strong and formidable. The flurry of activity that marked the just-concluded visit of Russian President Vladimir Putin — his cordial meeting with Prime Minister Narendra Modi and a string of agreements signed between the two countries — had an air of reassurance about the long-term partnership. This is despite the pulls and pressures on both countries due to the rapidly shifting global power dynamics. Developments like Russia’s growing dependency on China due to sanctions from the Western nations and India’s increasing convergence with the United States and its inclusion in Quad (Quadrilateral Security Dialogue comprising US, India, Japan and Australia) have not hampered the efforts to deepen the bilateral relations. During Putin’s visit, the two countries cemented a pact on military cooperation for a ten-year period and signed 28 agreements covering defence, science and technology, higher education, commerce and industry, the key among them being the deal for joint production of over six lakh AK-203 assault rifles at a manufacturing facility in Uttar Pradesh’s Amethi.

The defence ties between the two nations have been consistently strong, with India being heavily dependent on Russian technology, maintenance, procurement of hardware and spares. For many decades, Russians have been collaborating with India in its indigenous manufacturing programmes and were amenable to transfer of technology, which India was finding difficult to get from others. It includes some major systems like nuclear-powered submarines, warships, nuclear reactors, space programmes and flagship projects like Brahmos. Russia has reportedly shipped the first deliveries of the S-400 long-range air defence systems, the agreement for which was signed in 2018, and India is determined not to back off from it despite the possibility of sanctions by the United States. It is to the credit of Indian diplomacy that concerted efforts are being made to deepen the bilateral ties with Russia, thereby sending an important message to China and Pakistan. The two sides want to see bilateral trade, stagnating at under \$10 billion, hit a target of \$30 billion by 2025, and bilateral investment to \$50 billion. Putin’s visit is expected to help in laying a clear path for expansive economic cooperation, and generating a better understanding of each other’s imperatives on global issues.

<https://telanganatoday.com/editorial-an-enduring-partnership>

Tata, Lockheed Martin to build F-21 Fighter Wings in India

By Joe Saballa

Lockheed Martin has established a joint venture with Tata Advanced Systems to manufacture F-21 fighter wings at a production facility in India.

The partnership comes after Tata manufactured parts for a fighter aircraft wing prototype to support a campaign to sell 114 F-21 fighters to the Indian Air Force.



According to Lockheed, the successful development of a prototype wing for the combat aircraft proves that Tata can be one of its potential future co-producers of aerospace equipment. It also helps both companies demonstrate to the Indian military that they can establish a production ecosystem in India.

“Lockheed Martin partnered with [Tata Advanced Systems] to build one of the most technologically complex aerostructures — a fuel-carrying 9G, 12,000 hour, interchangeable/replaceable fighter wing,” Lockheed vice president of strategy and business development Aimee Burnett said at a ceremony in Hyderabad.

She further stated that the newly established partnership reflects Lockheed’s “degree of confidence” in its relationship with other Indian defense manufacturers.

‘New Benchmark’

Lockheed continues to cement its name as one of few aerospace and defense companies with the “complex aerostructure capability” needed for advanced fighters.

In 2019, the company secured separate contracts from the US and Slovakia to supply F-35 and F-16 fighter aircraft. Lockheed has also recently unveiled a new F-35 simulator that utilizes advanced mission training technologies to support the training of military pilots in various environments.

Meanwhile, Tata is still fresh from the success of a \$2.9 billion deal to supply 56 Airbus C-295 medium transport aircraft to the Indian Air Force. Forty of these aircraft will reportedly be built by Tata on India’s first private sector aircraft assembly line.

Tata managing director Sukaran Singh said that the successful completion of the fighter wing shipset prototype is another achievement for both defense firms. He also stated that Lockheed and Tata are setting “a new benchmark” for complex defense manufacturing in India that demands high precision and quality.

<https://www.thedefensepost.com/2021/12/09/tata-lockheed-f21-wings-india/>

Indian Navy Training Ship: INS सुदर्शिनी की ताकत देखकर चकित हुआ ये खाड़ी देश

नई दिल्ली: भारतीय नौसेना के सेल ट्रेनिंग शिप आईएनएस सुदर्शिनी ने तीन दिवसीय ऑपरेशनल टर्न राउंड (ओटीआर) के लिए 5 दिसंबर को पोर्ट सुल्तान काबूस, मस्कट, ओमान का दौरा किया। इसकी जानकारी इंडियन नेवी ने शेयर की। यह जहाज कोच्चि स्थित पहले प्रशिक्षण स्क्वाड्रन का हिस्सा है, जो भारतीय नौसेना के समुद्री प्रशिक्षुओं को शुरुआती समुद्री अनुभव प्रदान करता है। जहाज मध्य पूर्व में तैनाती पर है, जिसका उद्देश्य क्षेत्र में मित्रवत विदेशी देशों के साथ 'दोस्ती के पुल' को मजबूत करना है और साथ ही खाड़ी में बसे भारतीय प्रवासियों तक पहुंचना है।

मस्कट में अपने प्रवास के दौरान जहाज के चालक दल ने ओमान की रॉयल नेवी के साथ बड़े पैमाने पर काम किया। कमांडिंग ऑफिसर कमांडर श्रीकांत वेणुगोपाल ने रॉयल नेवी ऑफ ओमान (आरएनओ) मुख्यालय का आधिकारिक दौरा किया और आरएनओ के मानव संसाधन महानिदेशक कैप्टन अली अल होसिनी के साथ बातचीत की।

इस विजिट में नौसेना सहयोग, युवा अधिकारियों का प्रशिक्षण और सेल प्रशिक्षण के आयाम जैसे विषय शामिल थे। जहाज ने आरएनओ के सेल ट्रेनिंग शिप शबाब ओमान II और वुधम नेवल बेस के दौरे के रूप में ऑपरेशनल आदान-प्रदान भी किया, और समुद्र संबंधी अनुभव के लिए पांच सी राइडर्स को भी शामिल किया।

कमांडिंग ऑफिसर ने ओमान, मस्कट में भारत के राजदूत अमित नारंग से भी मुलाकात की। भारतीय दूतावास के कर्मचारियों के साथ राजदूत ने भी जहाज का दौरा किया और जहाज पर एक मेल मिलाप दौरा आयोजित किया गया।

आईएनएस सुदर्शिनी गोवा शिपयार्ड लिमिटेड द्वारा निर्मित और भारतीय नौसेना की दक्षिणी नौसेना कमान के तहत कोच्चि, केरल में स्थित एक स्वदेशी निर्मित सेल ट्रेनिंग शिप (एसटीएस) है।

यह अपने अपने सहयोगी पोत आईएनएस तरंगिनी के साथ यह फर्स्ट ट्रेनिंग स्क्वाड्रन में सेल प्रशिक्षण का कार्य करता है और भारतीय नौसेना के साथ साथ मित्र देशों की नौसेना के कनिष्ठ अधिकारियों को सेल प्रशिक्षण प्रदान कर रहा है।

<https://hindi.asianetnews.com/gallery/national-news/indian-navy-training-ship-ins-sudarshini-visits-port-sultan-qaboos-muscat-oman-kps-r3u9ek#image4>



Press Information Bureau
Government of India

Ministry of Science & Technology

Thu, 09 Dec 2021 1:43PM

Union Minister Dr Jitendra Singh says, India's maiden human space mission "Gaganyaan" will be launched in 2023

Minister says, with this launch, India will become the fourth nation in the world to launch a Human Spaceflight Mission after USA, Russia and China

More than 500 Industries are involved in the launch of Gaganyaan with several research modules including indigenous health research module: Dr Jitendra Singh

Union Minister of State (Independent Charge) Science & Technology; Minister of State (Independent Charge) Earth Sciences; MoS PMO, Personnel, Public Grievances, Pensions, Atomic Energy and Space, Dr Jitendra Singh said that the India's maiden human space mission "Gaganyaan" will be launched in 2023.

In reply to a question in the Rajya Sabha today, the Minister said, with this launch, India will become the fourth nation in the world to launch a Human Spaceflight Mission after USA, Russia and China.

Dr Jitendra Singh said that the major missions viz., Test vehicle flight for the validation of Crew Escape System performance and the 1st Uncrewed mission of Gaganyaan (G1) are scheduled during the beginning of 2nd half of 2022. This will be followed by second uncrewed mission at the end of 2022 carrying "Vyommitra" a spacefaring human robot developed by ISRO and finally the first crewed Gaganyaan mission in 2023.

Referring to the Prime Minister Narendra Modi's Independence Day address in 2018, wherein he said that an Indian astronaut, be it a man or a woman, will go on a space odyssey by 2022 on board 'Gaganyaan', Dr Jitendra Singh said that the program got slightly delayed due to COVID restrictions, but preparations are now in full swing to achieve the mission by 2023. He said, the objective of Gaganyaan programme is to demonstrate the capability to send humans to low earth orbit (LEO) onboard on Indian Launch Vehicle and bring them back to earth safely.

Dr Jitendra Singh said that more than 500 Industries are involved in the launch of Gaganyaan with several research modules including indigenous health research module. He said, this was made possible as for the first time in 70 years, the sector has been unlocked for private participation to make India a competitive Space market. The Minister informed that this is the most ambitious space programme undertaken by ISRO till date and it will give a big boost to the Science and Technology development within the country, besides inspiring the Youth and Satrtr-ups to take up bigger challenges and enhance the prestige of the country.

The current status of Gaganyaan programme is as follows:

- i. The astronaut training facility is getting established at Bengaluru and in advanced stage of completion. Basic Aeromedical training and flying practice completed as part of Indian leg of training.

- ii. The design of all systems of Gaganyaan has been completed. Realisation of various systems are in different stages of progress. Ground qualification tests of human rated launch vehicle propulsion stages have been already commenced and successfully progressing.
- iii. The configuration and design of ground infrastructure has been completed and modifications needed are being implemented.
- iv. The MoU, contracts and Implementation arrangement (IA) related activities with both national and international agencies are progressing well. Receipt of deliverables has commenced against contracts with M/s Glavkosmos (Russian Space Agency) for space suit, crew seat and View port. Also receipt of deliverables under various work packages of CNES (French Space Agency) IA has commenced.
- v. The activities related to development of microgravity experiments have commenced, the conceptual design for experiments is under review.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1779647>

अमर उजाला

Fri, 10 Dec 2021

मिशन आदित्य 1 को अगले साल लांच करेगा इसरो : डॉ. बनर्जी

भीमताल (नैनीताल): आर्यभट्ट प्रेक्षण विज्ञान शोध संस्थान (एरीज) के निदेशक प्रो. डॉ. दीपांकर बनर्जी ने कहा कि इसरो की ओर से आदित्य 1 मिशन को 2022 में लांच किया जाएगा। आदित्य 1 मिशन सूर्य का अध्ययन करने वाला भारत का पहला समर्पित वैज्ञानिक मिशन है।

ग्राफिक एरा हिल यूनिवर्सिटी भीमताल परिसर में आयोजित सेमिनार में पहुंचे प्रो. डॉ. दीपांकर बनर्जी ने विद्यार्थियों को एरीज में स्थापित विभिन्न प्रकार की दूरबीनों के बारे में बताया। डॉ. दीपांकर बनर्जी इसरो के सोलर मिशन आदित्य 1 के सह अध्यक्ष भी हैं इसलिए उन्होंने इस मिशन के बारे में विस्तार से जानकारी दी। परिसर के निदेशक प्रो. डॉ. एमसी लोहनी, प्रो. आरएस रावत, डॉ. पुष्पा नेगी ने भी अपनी विचार रखे। सर्वश्रेष्ठ आलेखन पर बीटेक के सिवांश दुबे, कार्तिक नगरकोटी, मेहुल बसेरा, सजल प्रजापति को भी पुरस्कृत किया। सेमिनार का संचालन डॉ. पुष्पा नेगी ने किया। इस मौके पर डॉ. मेहुल मानु, राजेंद्र सिंह बिष्ट, डॉ. अमित मित्तल, डॉ. नवनीत जोशी, डॉ. मदन मोहन सती, किरन जोशी आदि मौजूद रहे।

ग्राफिक एरा हिल यूनिवर्सिटी और एरीज में करार

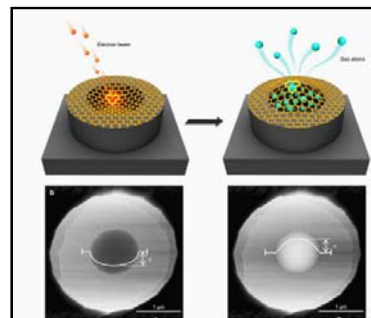
हल्द्वानी। इस मौके पर एरीज और ग्राफिक एरा हिल यूनिवर्सिटी के बीच करार भी किया गया। इसमें दोनों संस्थानों के बीच संयुक्त शोध, सेमिनार, कार्यशाला, विद्यार्थियों के प्रोजेक्ट साझा करने पर सहमति बनी। करार में एरीज निदेशक प्रो. डॉ. दीपांकर बनर्जी, डॉ. नरेंद्र सिंह और ग्राफिक एरा के निदेशक प्रो. डॉ. एमसी लोहनी, डॉ. पुष्पा नेगी ने संयुक्त रूप से हस्ताक्षर किए।

<https://www.amarujala.com/uttarakhand/nainital/isro-will-launch-mission-aditya-1-next-year-dr-banerjee-bhimtal-news-hld447141354>

Precision sieving of gases through atomic pores in graphene

By crafting atomic-scale holes in atomically thin membranes, it should be possible to create molecular sieves for precise and efficient gas separation, including extraction of carbon dioxide from air, University of Manchester researchers have found.

If a pore size in a membrane is comparable to the size of atoms and molecules, they can either pass through the membrane or be rejected, allowing separation of gases according to their molecular diameters. Industrial gas separation technologies widely use this principle, often relying on polymer membranes with different porosity. There is always a trade-off between the accuracy of separation and its efficiency: the finer you adjust the pore sizes, the less gas flow such sieves allow.



Credit: University of Manchester

It has long been speculated that, using two-dimensional membranes similar in thickness to graphene, one can reach much better trade-offs than currently achievable because, unlike conventional membranes, atomically thin ones should allow easier gas flows for the same selectivity. Now a research team led by Professor Sir Andre Geim at The University of Manchester, in collaboration with scientists from Belgium and China, have used low-energy electrons to punch individual atomic-scale holes in suspended graphene. The holes came in sizes down to about two angstroms, smaller than even the smallest atoms such as helium and hydrogen.

In December's issue of *Nature Communications*, the researchers report that they achieved practically perfect selectivity (better than 99.9%) for such gases as helium or hydrogen with respect to nitrogen, methane or xenon. Also, air molecules (oxygen and nitrogen) pass through the pores easily relative to carbon dioxide, which is >95% captured.

The scientists point out that to make two-dimensional membranes practical, it is essential to find atomically thin materials with intrinsic pores, that is, pores within the crystal lattice itself.

"Precision sieves for gases are certainly possible and, in fact, they are conceptually not dissimilar to those used to sieve sand and granular materials. However, to make this technology industrially relevant, we need membranes with densely spaced pores, not individual holes created in our study to prove the concept for the first time. Only then are the high flows required for industrial gas separation achievable," says Dr. Pengzhan Sun, a lead author of the paper.

The research team now plans to search for such two-dimensional materials with large intrinsic pores to find those most promising for future gas separation technologies. Such materials do exist. For example, there are various graphynes, which are also atomically thin allotropes of carbon but not yet manufactured at scale. These look like graphene but have larger carbon rings, similar in size to the individual defects created and studied by the Manchester researchers. The right size may make graphynes perfectly suited for gas separation.

More information: P. Z. Sun et al, Exponentially selective molecular sieving through angstrom pores, *Nature Communications* (2021). DOI: [10.1038/s41467-021-27347-9](https://doi.org/10.1038/s41467-021-27347-9)

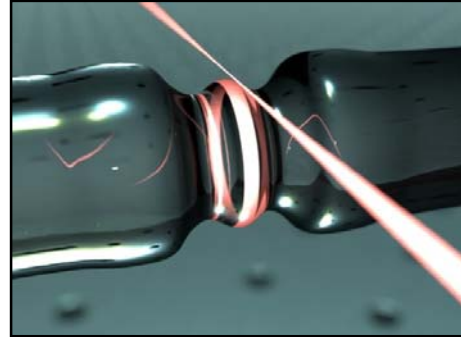
Journal information: [Nature Communications](https://www.nature.com)
<https://phys.org/news/2021-12-precision-sieving-gases-atomic-pores.html>

Towards quantum states of sound

By Hayley Dunning

Researchers make key steps towards generating quantum states of sound inside a microscopic device using laser light and single-photon measurements.

Across the globe, researchers can now generate and control quantum states in a wide variety of different physical systems spanning individual particles of light to complex molecules comprising thousands of atoms. This control is enabling powerful new quantum technologies to be developed, such as quantum computing and quantum communications, and also offers exciting paths to test the foundations of quantum physics. In particular, a key current challenge is how to create quantum states on a larger scale, which will enable the technological potential of quantum physics to be established and the boundary of quantum physics to be explored.



Laser light (red) propagates in a tapered optical fiber and is coupled into a whispering-gallery-mode microresonator where it circulates up to a million times. As the light circulates it interacts with high-frequency acoustic waves. Credit: Jack Clarke

A team of researchers at Imperial College London, together with the University of Oxford, the Niels Bohr Institute, the Max Planck Institute for the Science of Light, and Australian National University have generated and observed non-Gaussian states of high-frequency sound waves comprising more than a trillion atoms. More specifically, the team transform a randomly fluctuating sound field in thermal equilibrium to a pattern thrumming with a more specific magnitude.

This research makes important strides towards generating more macroscopic quantum states that will enable future quantum internet components to be developed and the limits of quantum mechanics itself to be tested. The details of the team's research are published today in the journal *Physical Review Letters*.

"To perform this research we confine laser light to circulate inside a micro-scale resonator. Impressively, the light can circulate up to a million times around the edge of this tiny structure in what's called a whispering-gallery mode," explains co-first author of the project John Price from Imperial.

"As the light circulates, it interacts with high-frequency sound waves, and we can use the laser light to both generate and characterize interesting states of the acoustic field," continues co-first author Andreas Svela from Imperial.

"Then, when we observe a single photon that has been created by this light-sound interaction, the detection event gives us the signal that we've created our target state," describes co-first author Lars Freisem from Imperial.

When a single photon is detected it means that a single phonon—a quantum of sound energy—has been subtracted from the initial state of the acoustic field. The team has explored single-phonon addition and subtraction previously to observe a counterintuitive doubling of the average number of sound quanta, and the present work makes a significant advancement by precisely characterizing the fluctuations of the sound wave generated and observing the resulting non-Gaussian pattern.

"Generating non-Gaussian quantum states is important for research in quantum information and the foundations of physics, and excitingly, this research brings us closer to generating such states at a macroscopic scale using sound fields," says co-first author GeorgENZIAN, now pursuing research at the Niels Bohr Institute, Copenhagen.

"Future work using this approach offers a practical route to coherently store and retrieve quantum information. That is, make a quantum RAM for a quantum computer. Moreover, this type of research can shed much needed light on the different mechanisms that cause fragile quantum phenomena to decay and become classical," highlights Imperial's Quantum Measurement Lab principal investigator Michael Vanner.

More information: G. Enzian et al, Non-Gaussian Mechanical Motion via Single and Multiphonon Subtraction from a Thermal State, *Physical Review Letters* (2021). DOI: [10.1103/PhysRevLett.127.243601](https://doi.org/10.1103/PhysRevLett.127.243601)

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



Fri, 10 Dec 2021

Crucial leap in error mitigation for quantum computers

By *Monica Hernandez, William Schulz*

Researchers at Lawrence Berkeley National Laboratory's Advanced Quantum Testbed (AQT) demonstrated that an experimental method known as randomized compiling (RC) can dramatically reduce error rates in quantum algorithms and lead to more accurate and stable quantum computations. No longer just a theoretical concept for quantum computing, the multidisciplinary team's breakthrough experimental results are published in *Physical Review X*.

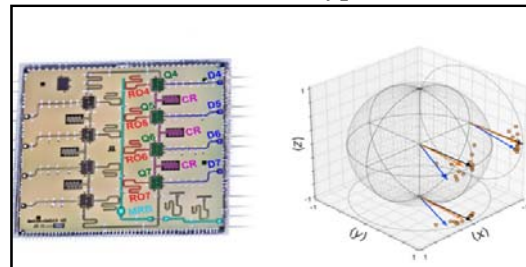
The experiments at AQT were performed on a four-qubit superconducting quantum processor. The researchers demonstrated that RC can suppress one of the most severe types of errors in quantum computers: coherent errors.

Akel Hashim, AQT researcher, involved in the experimental breakthrough and a graduate student at the University of California, Berkeley explained: "We can perform quantum computations in this era of noisy intermediate-scale quantum (NISQ) computing, but these are very noisy, prone to errors from many different sources, and don't last very long due to the decoherence—that is, information loss—of our qubits."

Coherent errors have no classical computing analog. These types of errors are systematic and result from imperfect control of the qubits on a quantum processor, and can interfere constructively or destructively during a quantum algorithm. As a result, it is extremely difficult to predict their final impact on the performance of an algorithm.

Although, in theory, coherent errors can be corrected or avoided through perfect analog control, they tend to worsen as more qubits are added to a quantum processor due to "crosstalk" among signals meant to control neighboring qubits.

First conceptualized in 2016, the RC protocol does not try to fix or correct coherent errors. Instead, RC mitigates the problem by randomizing the direction in which coherent errors impact qubits, such that they behave as if they are a form of stochastic noise. RC achieves this goal by creating, measuring, and combining the results of many logically-equivalent quantum circuits, thus averaging out the impact that coherent errors can have on any single quantum circuit.



Experimental demonstration of error mitigation through randomized compiling. Left: Eight-qubit superconducting quantum processor. Right: Quantum state tomography of a single qubit with (orange) and without (blue) randomized compiling compared to the ideal (black) state. Credit: Akel Hashim/Berkeley Lab

"We know that, on average, stochastic noise will occur consistently at the same average error rate, so we can reliably predict what the results will be from the average error rates. Stochastic noise will never impact our system worse than the average error rate—something that is not true for coherent errors, whose impact on algorithm performance can be orders of magnitude worse than their average error rates would suggest."

Hashim used the analogy of the signal-to-noise ratio in astronomy to compare the impact of coherent errors versus stochastic noise in quantum computing. The longer a telescope operates, the more the signal will grow with respect to the noise, because the signal will coherently build upon itself, whereas the noise—being incoherent and uncorrelated—will grow much more slowly.

Coherent errors in quantum algorithms can build upon themselves through constructive interference and often grow faster than stochastic noise. However, the experimental demonstration of RC showed that coherent errors in quantum algorithms can be controlled to grow at a much slower rate.

The AQT team collaborated closely with the original creators of the protocol, Joseph Emerson and Joel Wallman, who co-founded the company Quantum Benchmark, Inc. (recently acquired by Keysight Technologies) to tackle the problem of benchmarking and mitigating errors in quantum computing systems.

"Not having to design the software ourselves to perform the RC protocol ultimately saved us a lot of time and resources and freed us to focus on the experimental work," Hashim said.

By bringing in researchers and partners from across the quantum information science community in the United States and the world, AQT enables the exploration and development of quantum computing based on one of the leading technologies, superconducting circuits.

"RC is a universal protocol for gate-based quantum computing, which is agnostic to specific error models and hardware platforms," Hashim described. "There are many applications and classes of algorithms out there that may benefit from the RC. Our collaborative research demonstrated that RC works to improve algorithms in the NISQ era, and we expect it will continue to be a useful protocol beyond NISQ. It is important to have this successful demonstration in our toolbox at AQT. We can now deploy it on other testbed user projects."

More information: Akel Hashim et al, Randomized Compiling for Scalable Quantum Computing on a Noisy Superconducting Quantum Processor, *Physical Review X* (2021). [DOI: 10.1103/PhysRevX.11.041039](https://doi.org/10.1103/PhysRevX.11.041039)

Journal information: [Physical Review X](https://phys.org/news/2021-12-crucial-error-mitigation-quantum.html)
<https://phys.org/news/2021-12-crucial-error-mitigation-quantum.html>



Fri, 10 Dec 2021

Coronavirus attacks fat tissue, study says

By Carolyn Crist

The coronavirus infects fat cells and certain immune cells within body fat, creating an immune response that could lead to major damage, according to a recent preprint study.

The finding could explain why those who are overweight or obese face higher risks for severe illness and death from COVID-19. The study hasn't yet been peer-reviewed or published in a journal, but it offers insight into why some patients are vulnerable, even if they don't have any other risks or conditions.

"The bottom line is, 'Oh my God, indeed, the virus can infect fat cells directly,'" Philipp Scherer, PhD, a scientist who studies fat cells at UT Southwestern Medical Center in Dallas, told *The News York Times*.

"Whatever happens in fat doesn't stay in fat," he said. "It affects the neighboring tissues as well."

In the study, researchers from the Stanford University School of Medicine tested fat tissue from bariatric surgery patients to understand whether they could become infected with the coronavirus. They looked at different types of cells -- adipocytes, or fat cells, as well as pre-adipocytes that become fat cells and immune cells called adipose tissue macrophages.

The research team found that the adipocytes could become infected, though they didn't become overly inflamed. But certain immune cell macrophages could be infected and have a major inflammatory response. Beyond that, the pre-adipocytes weren't infected, but they added to the inflammatory response. The researchers also looked at fat tissue from the bodies of European patients who died from COVID-19 and found the coronavirus in fat around various organs, including the heart and intestines. That could be linked with the organ damage seen in severe COVID-19 patients, they wrote. The coronavirus appears to evade the body's immune defenses and "hang out" in fat tissue, which allows it to replicate and trigger a severe immune response, David Kass, MD, a professor of cardiology at Johns Hopkins Medicine, told the *Times*.

"If you really are very obese, fat is the biggest single organ in your body," he said.

The coronavirus "can infect that tissue and actually reside there," he continued. "Whether it hurts it, kills it, or at best, it's a place to amplify it -- it doesn't matter. It becomes kind of a reservoir."

The infected body fat could contribute to "long COVID," which has led to symptoms that last for weeks or months after someone has recovered from a coronavirus infection, the study authors wrote. The findings could open avenues for new COVID-19 treatments that target body fat, they said. Drugs that ease inflammation of the adipose tissue in obese patients could help COVID-19 patients, they wrote. What's more, the study may show that health care professionals should consider a patient's weight and body fat when giving COVID-19 vaccines and treatments, the *Times* reported.

"This paper is another wake-up call for the medical profession and public health to look more deeply into the issues of overweight and obese individuals, and the treatments and vaccines we're giving them," Barry Popkin, PhD, an obesity researcher at the University of North Carolina at Chapel Hill who has studied COVID-19 risks for overweight and obese patients, told the newspaper. "We keep documenting the risk that they have, but we still aren't addressing it," he said. <https://www.webmd.com/lung/news/20211209/coronavirus-attacks-fat-tissue>

