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# समाचार पत्रों से चयित अंश Newspapers Clippings

A Daily service to keep DRDO Fraternity abreast with DRDO Technologies, Defence Technologies, Defence Policies, International Relations and Science & Technology

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THE TIMES OF INDIA

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## **DRDO successfully test-fires Pinaka missile system at Pokhran**

Jaisalmer: DRDO on Thursday conducted testing of indigenous multi barrel rocket launcher (MBRL) system developed Pinaka missile at Pokhran field firing range amid the present challenges from Pakistan and China.

This artillery rocket system hit and demolished the targets. Earlier, the guided system was not there in Pinaka and now it has been equipped with it. One more testing was done on Wednesday. For the first time advance navigation and control system has been put in Pinaka, with which the missile has become efficient to identify its target and hit it. In the trials, the rocket proved itself in both standards. With this, the firepower of Indian Army will increase. The weapon has a state-of-the-art guidance kit bolstered by an advanced navigation and control system. It is a major boost to Make In India, in which the rocket has been fully manufactured by a private company on which dependency of Ordnance Factory Board will not be any more and decision can be taken quickly.

Few officers of DRDO and artillery were present. According to reliable sources, the firepower is being strengthened looking to the present challenges that India is getting from China and Pakistan. At present, trials are being conducted to increase its range. Earlier, this missile could hit a target at a distance of 40-75km and now efforts are being made to increase its range to 120km. Pinaka missile on Thursday was fired from Pinaka launcher system. The indigenous Pinaka that has the capacity to fire 12 guided rockets in 44 seconds was tested at Pokhran firing range and testing was successful. Sources said six Pinaka trials were fired as part of final development trials. The rockets are manufactured by Economic Explosives Ltd. (EEL) and this is 1st munition of its kind made by the private sector in India. Earlier, these types of munitions are imported and manufactured by the public sector with repeated complaints of failure by the armed forces. Now as a part of Make in India drive and push for the private sector in defence manufacturing, this is going to be a game changer. An order of 2 additional Pinaka regiments has been under process since 2017, which will be made by L&T and Tata Aerospace and Defence for an estimated Rs 4,500 Crore.

Sources said that in Thursday's testing Pinaka rocket according to its prescribed standard hit and demolished the target. Complete watch was kept on the rocket through telemetry system. The route, speed and turn were tested and it proved as per its standards.

<https://timesofindia.indiatimes.com/city/jaipur/drdo-successfully-test-fires-pinaka-missile-system-at-pokhran/articleshow/77684236.cms>



*Sat, 22 Aug 2020*

## **Bharat Forge from India conducts final trials of Bharat 52 Advanced Towed Artillery Gun System**

According to a Tweet released by Indian Defense News on August 20, 2020, the Indian company Bharat Forge, part of Kalyani Group, has conducted final trials of its Advanced Towed Artillery Gun System Bharat 52 before the delivery to the Indian army.

The Advanced Towed Artillery Gun System (ATAGS) project was started in 2013 by Indian DRDO (Defence Research and Development Organisation) to replace older guns in service in the Indian Army with a modern 155mm artillery gun. DRDO laboratory Armament Research and Development Establishment (ARDE) partnered with private players Bharat Forge Limited, Mahindra Defense Naval System, Tata Power Strategic Engineering Division and public sector unit Ordnance Factory Board (OFB) for this purpose.

In July 2016, DRDO has conducted the proof firing of armament for the 155/52 caliber Advanced Towed Artillery Gun System. During trials in 2017, ATAGS broke the world record for a 155 mm gun by firing the round to a distance of 47.2 kilometers. It again registered a maximum distance of 48.074 kilometers with high explosive–base bleed (HE–BB) ammunition, surpassing the maximum ranges fired by any artillery gun system in this category.

According to Indian military sources, in August 2018, Defence Acquisition Council approved the procurement of 150 ATAGS with an estimated cost of US\$470 million.

Citing Indian defense magazine, the gun of the Bharat 52 consists of a barrel, breech mechanism, muzzle brake and recoil mechanism to fire 155 mm caliber ammunition with a firing range of 40 km. It has an all-electric drive to ensure reliability and minimum maintenance over a long period of time. It has advanced features like high mobility, quick deployability, auxiliary power mode, advanced communication system, automatic command and control system with night capability in direct fire mode. The gun is two-ton lighter than guns in the same category and is designed to provide better accuracy and range and is capable of firing five successive rounds in a short duration. It is also compatible with ACCCS-Shakti command and control network of the Indian Army.

The Bharat-52 can be easily deployed with a team of six crew members in one minute during day time and 1.5 minutes during night time. It has a total weight of 15 tons, elevation angle from -3° to +72° with a speed of 5° per second. The Bharat 52 is equipped with a fully Load Assist System (LAS) with a manual backup arrangement offering a burst rate of fire of 3 rounds in 30 seconds, 16 rounds in 3 minutes in the intense rate of fire, and 42 rounds in one hour in sustained rate of fire.

[https://www.armyrecognition.com/defense\\_news\\_august\\_2020\\_global\\_security\\_army\\_industry/bharat\\_forge\\_from\\_india\\_conducts\\_final\\_trials\\_of\\_bharat\\_52\\_advanced\\_towed\\_artillery\\_gun\\_system.html](https://www.armyrecognition.com/defense_news_august_2020_global_security_army_industry/bharat_forge_from_india_conducts_final_trials_of_bharat_52_advanced_towed_artillery_gun_system.html)



**DRDO 155mm Advanced Towed Artillery Gun System. (Picture source Army Recognition)**

# Indian Air Force Deployed Indigenous LCA Tejas Fighters to Pakistan Border

*And that is history—for a number of reasons*

*By Peter Suci*

This week the Indian Air Force deployed its Light Combat Aircraft Tejas on its western border with Pakistan as tensions with China continue to simmer in the Ladakh valley in the east. The Tejas is India's first domestically-produced fighter aircraft, and it has been deployed to forward airbases to reportedly take care of situations along the western and northern fronts.

"The LCA Tejas was deployed by the Indian Air Force on the Pakistan border to thwart any possible misadventure," a government source told *India Today*.

The *Times of India* also reported that the first Light Combat Aircraft (LCA) Tejas squadron, 45 Squadron (Flying Daggers) based out of Sulur under the Southern Air Command, was deployed in an operational role to the border region.



This marks a significant milestone for the indigenous fighter aircraft, which has not been without problems during its long development program.

The single-engine, fourth-generation, multi-role light fighter was designed by the Aeronautical Development Agency with collaboration from the Aircraft Research and Design Centre (ARCD) of the Hindustan Aeronautics Limited for the Indian Air Force (IAF) and Indian Navy. Development began in the 1980s as part of the LCA program to replace the aging MiG-21 fighters, but it wasn't until early 2001 that the aircraft took its first flight.

It took another fifteen years, July 2016, for the Tejas to finally enter service with the IAF, while the Indian Navy rejected the aircraft because it weighed too much and produced insufficient thrust for takeoff from the ski-jump ramp of its then in development carrier. Moreover, with a top speed of Mach 1.6 to 1.8, a maximum external load of 7,700 pounds and a service ceiling of fifty-two thousand feet, the Tejas remains unexceptional compared to top-performing fourth-generation light fighters such as the F-16.

To date a total of thirty-three have been produced, but the Indian government has proposed to export the Tejas fighter to Asian nations—highlighting that its simple design and potentially low maintenance cost would be a major selling point.

Despite the problems, Indian prime minister Narendra Modi has praised the aircraft and during an Independence Day speech this year noted that a deal to buy the upgraded Mark1A version of the Tejas could be completed soon. The deal, expected to be worth over Rs 40,000 crore, will likely be the largest-ever deal for an indigenous equipment in the country.

However, the fact that the Tejas has been deployed to the border with Pakistan and not China could be telling. Does this suggest that the IAF has concerns that its fighter couldn't take on China's J-20 fighter jet? In May, during tensions near the India-China Line of Actual Control (LAC), the demarcation line that separates Indian-controlled territory from Chinese-controlled territory in the former princely state of Jammu and Kashmir, the IAF deployed to Russian-built Sukhoi-30MKI jets.

This doesn't build confidence—or likely is a good marketing ploy—for the abilities of the LCA Tejas if it isn't deployed to the LAC.

*(Peter Suci is a Michigan-based writer who has contributed to more than four dozen magazines, newspapers and websites. He is the author of several books on military headgear including A Gallery of Military Headdress, which is available on Amazon.com.)*

<https://nationalinterest.org/blog/buzz/indian-air-force-deployed-indigenous-lca-tejas-fighters-pakistan-border-167529>

## Defence News

## Defence Strategic: National/International



Sat, 22 Aug 2020

# India's first Indigenous Aircraft Carrier 'ready' for basin trials in September

*Basin trials are conducted for proving of the propulsion, transmission and shafting systems which can be tested only out of waters*

*By Mayank Singh*

New Delhi: Major endeavour to manufacture Aircraft Carrier is heading for an important phase as the first Indigenous Aircraft Carrier (IAC), INS Vikrant, is set to begin testing in waters (Basin Test) with its systems and equipment fitted.

Sources in Navy confirmed to *The New Indian Express* that, “Harbour Trials have finished. The Basin Trials are planned for September.”

Basin trials are conducted for proving of the propulsion (move), transmission (electricity) and shafting systems which can be tested only out of waters.

It will be followed with sea trials by end of this year and IAC is expected to be inducted in Navy by end of 2021 as the Indian Naval Ship Vikrant.

INS Vikrant will be weighing around 40,000 tonnes its fighters (MiG-29K) will operate on Short Take-Off But Arrested Recovery (STOBAR) mechanism similar to the present carrier INS Vikramaditya with an angular ski-jump. Helicopters will also be part of its aviation complement.

By normal time line by now sea trials would be in process but it had to be delayed due to lockdown imposed against the COVID-19 scare. For a ship of this size, the presence of OEM is required to monitor all the parameters and specifications.



Basin Trials will be followed by the Sea Trials by end 2020, as per the sources. (File Photo | AFP)

In January 2020 the progress of Indigenous Aircraft Carrier (IAC-P71) project was reviewed by the Empowered Apex Committee (EAC) headed by Ajay Kumar, Defence Secretary at Cochin Shipyard Limited. Basin Trials will be followed by the Sea Trials by end 2020, as per the sources.

Major structural and outfitting work of Indigenous Aircraft Carrier (IAC) was completed by February including the major milestone activities like starting of Main Propulsion machinery and trials of Power Generation machinery.

All four Gas Turbines, main engines were started, Power Generation Systems comprising of eight Diesel Alternators ready and trials of ship's major systems and auxiliary equipment (pumps, motors, filters, AC, etc) in progress. IAC had successfully completed the Pre-Contractors Sea Trials dry dock work package in Dec 2019.

Indian Navy plans to operate three carrier battle groups (CBG) with one each on the Eastern and Western sea boards and third one under the maintenance (refit/repair).

Indian Navy acquires various ships/weapons/equipment including the carrier-based Aircraft in accordance with the Maritime Capability Perspective Plan (MCP) and Long Term Integrated Perspective Plan (LTIPP).

<https://www.newindianexpress.com/nation/2020/aug/21/indias-first-indigenous-aircraft-carrier-ready-for-basin-trials-in-september-2186478.html>

## THE TIMES OF INDIA

Sun, 23 Aug 2020

# Forces: May have to seek waiver on imports bar if our cos fail to deliver

By Rajat Pandit

New Delhi: The armed forces say they will be forced to seek waivers for certain products in the recently-announced negative arms import list if the domestic defence production industry fails to deliver in terms of quality standards and specified timelines.

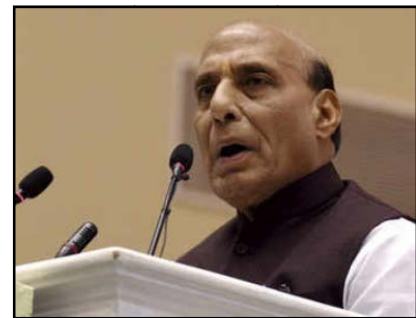
A cross-section of senior officers from the Army, Navy and IAF told TOI the negative list was “a welcome step” to boost the indigenous defence-industrial base (DIB) but is fraught with “a number of uncertainties” for the armed forces.

“Implementation of the list will have to be contingent on the success of the indigenization and production process for the specified weapons and ammunition. Operational military readiness cannot be sacrificed, or compromised, at the altar of indigenization,” said a senior officer.

The over 15-lakh strong armed forces are also in the process of “seeking clarifications” about the negative arms imports list because it broad-brushes certain categories of items. The policy, however, has been recently announced and its effects are yet to be fully evaluated in terms of what production capacities will be.

It was on August 9 that defence minister Rajnath Singh announced the acquisition of 101 weapon systems and platforms from abroad will be progressively banned from December 2020 to December 2025. The negative list ranges from some types of ammunition, sonars, radars, artillery guns and assault rifles to missile destroyers, transport aircraft, light combat helicopters, wheeled armoured fighting vehicles and conventional diesel-electric submarines.

It does mark a significant step towards eventually getting India out of its strategically-vulnerable position of being among the world's top two arms importers. “Yes, foreign arms supplies can be choked in times of emergencies. They are also very expensive. But then, the Indian defence industry has a long track record of dismal performance,” said another officer.



Defence Minister Rajnath Singh

Army vice chief Lt-General S K Saini, just a few days ago, had said his force was more than ready and willing to fight with indigenous weapon systems but they must pass stringent quality checks and adhere to delivery timelines.

Experts say it is critical to systematically augment the domestic DIB, with a sustained R&D thrust on cutting-edge weapon technologies. For one, DRDO and its 50 labs, Ordnance Factory Board (OFB) and its 41 factories, the four defence shipyards and five defence PSUs have to be drastically overhauled. For another, the private sector has to be incentivized to jump into defence production in a big way. “Otherwise, whenever there is a national security crisis, like after the 2016 Uri terror attack or the 2019 Balakot air strikes, the armed forces have to inevitably go for emergency and fast-track imports to plug operational voids,” he added.

Contracts worth around Rs 24,000 crore were inked with countries like Russia, Israel and France after the Uri attack to build reserves for “10 days of intense fighting” with Pakistan.

The ongoing military confrontation with China in eastern Ladakh has led to yet another similar scramble. The acquisitions in the pipeline range from Spice-2000 precision-guided bombs, Spike Firefly loitering munitions, Excalibur and APFSDS (armour piercing fin stabilized discarding sabot) ammunition to Spike anti-tank guided missiles, SiG Sauer assault rifles, man-portable air defence systems and different types of drones, as was reported by TOI earlier.

The Army is particularly worried about ammunition. TOI in May last year had reported that the force had sounded the red-alert over the unacceptably high number of accidents and casualties taking place in the field due to the poor and defective quality of ammunition being supplied for tanks, artillery, air defence and other guns by the OFB.

The government, on its part, is firmly pushing ahead with the “corporatization” of the OFB, which includes converting it into one or more 100% government-owned public sector corporate entities, to improve its functional autonomy, public accountability and efficiency as the main supplier of arms, ammunition and clothing to the Army.

<https://timesofindia.indiatimes.com/india/forces-mayve-to-see-waiver-on-imports-bar-if-our-cos-fail-to-deliver/articleshow/77698894.cms>



## Chinese Ladakh misadventure catalyses plans for strategic roads, tunnels and bridges

*The officials informed that there has been a major surge in outcomes in the last few years seeing which government has confirmed all financial support*

*By Mayank Singh*

New Delhi: The strategic infrastructure along the Line of Actual Control is ready for a major push with the government setting ambitious plans for the years 2020 and 2021 in motion.

“We have planned to complete 15 Strategic Roads in FY 2020-21. Also, two Strategic Roads are planned to be fully connected in 2020-21,” a senior officer said.

According to the source, Nimu-Padam-Darcha Road providing connectivity between Manali and Leh through Padam and Niraq is likely to be established by September 2020. In 2019-20 five Strategic Roads have been completed and connectivity on two Strategic Roads has been done and it is fast-moving towards the completion.

Another ambitious strategic infrastructure is the underwater Tunnel across Brahmaputra. The tender for DPR preparation for construction of two underwater road tubes and one rail tube across the Brahmaputra River is in advance stages, told the source. The tunnel made at a cost of Rs 6000 crore will connect Gohpur (NH-54) with Numaligarh (NH-37) in Assam.

The Atal Tunnel is likely to be constructed by September this year. The work on Se-La tunnel is moving fast as the aim is to make it ready in two working seasons, the officer added.

The Atal tunnel runs 8.8 km long below the Rohtang Pass which will open an all-weather road for people and will give advantage to the security forces. The tunnel is likely to reduce the distance between Manali and Leh by 46 Km. The Manali-Sarchu-Leh road is shut down for a period of six months (between November and May) every year due to heavy snowfall.

The strategic Sela Tunnel, length of Twin Tunnels - 475 m and 1790 is planned to be completed by March 2022. The tunnel's foundation stone was laid by Prime Minister Narendra Modi in February 2019.

The tunnel, pegged to cost Rs. 687 crore, will provide all-weather connectivity to Tawang and forward areas reducing the travelling time from Tezpur to Tawang by more than one hour.

The Tawang town inhabited by more than 50,000 people, called as the little Tibet by China, is one of the contentious areas which China claims as its own. Border Roads Organisation (BRO) is entrusted with the responsibility of creating and maintaining the entire military-related strategic infrastructure including the roads and the airstrips.

The officials informed that there has been a major surge in outcomes in the last few years seeing which government has confirmed all financial support.

BRO has executed about 30% more works in FY 2019-20 as compared to FY 2018-19. “We have executed 1273 Km Formation Cutting, 2214 Km of Surfacing, Rs 1715 crores of Permanent Works, 2979 Km of Major Bridges, Rs 689 crores of Tunnel Works and 2498 Km of Re-surfacing in FY 2019-20.” added the source.

The overall expenditure for FY 2019-20 was Rs 7867 crores as compared to Rs 5458 crores in FY 2017-18 and Rs 6859 crores in FY 2018- 19. In the process to provide last-mile connectivity in the hilly areas connecting deep gorges and mountains BRO completed 28 major bridges in 2019-20 with a total span of 3534 m.

A Bailey Bridge of 430 ft span was constructed over the Subansiri River at Daporijo in Arunachal Pradesh not only meet strategic requirements but also to ensure connectivity to 451

villages in upper Subansiri District bordering China. The bridge is a lifeline for this region of the country.

These works are primarily taking place in the mountain regions of the Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Sikkim and Arunachal Pradesh which are along the 3488 km Line of Actual Control with China.

<https://www.newindianexpress.com/theSundayStandard/2020/aug/22/chinese-ladakh-misadventure-catalyses-plans-for-strategic-roads-tunnels-and-bridges-2187012.html>



Sat, 22 Aug 2020

## How many does IAF need?

*By Wg Cdr (Retd) K T Sebastian*

The Indian Air Force's (IAF) acquisition of five new Rafale fighter aircraft from France attracted media attention like never before in the backdrop of the border clashes with China. Earlier fighter aircraft inductions into the IAF, like that of the Russian Sukhoi-30 MKI fighter aircraft in the late 1990s, the British Jaguar and the Soviet-era MiG-29 fighters in the early 1980s, never made newspaper headlines. Today, television channels bombard Indian society with details about fighter aircraft capabilities like avionics, stealth, weapon payload, flying range, mid-air refueller and manoeuvrability.

The IAF has 33 fighter aircraft squadrons. Each squadron has 16 aircraft plus two trainer aircraft, which are two-seaters. This amounts to over 500 fighter aircraft, which is adequate strength to ensure the air defence of Indian airspace against both Pakistan and China. The IAF's sanctioned strength is a force level of 42 fighter squadrons to fight a two-front war, with Pakistan and China simultaneously. But how logical is the rationale for a 42-squadron fighter aircraft fleet today in the context of aircraft mid-life upgrades, attack helicopters, airborne warning and control system platforms?



In this May 11, 2013 file photo, the newly commissioned MiG-29 K fighter plane at the Naval Base INS Hansa in Goa.

The industry icon and Indian aviation pioneer JRD Tata, who held the honorary two-star general IAF rank of Air Vice Marshal, headed a committee in the early 1960s to study the requirements for a fighter aircraft fleet. Its recommendations made the government authorise a force level of 42 fighter squadrons to counter threats from erstwhile West Pakistan, East Pakistan and China. At that time, the IAF flew World War II vintage US-built Liberator bombers, among others, and the MiG-21, the workhorse of the fighter fleet, was yet to join service.

Subsequently, the mainstay of the IAF's 42 squadron strength was the Soviet-era MiG-21 aircraft and its variants with different weapon payloads or armament carrying capacities. These aircraft were used for air defence as well as strike and air-to-ground missions. Now, almost all of them have been retired from IAF squadron service, except three modified MiG-21 BIS (Bison) squadrons. These aircraft, too, will exit the IAF over the next few years.

The IAF's fighter fleet now consists of the MiG-21 BIS, the Jaguar, the French Mirage 2000, MiG-29, Sukhoi-30 MKI and the indigenous Tejas light combat aircraft, the last in squadron service since 2018, besides the British Hawk, inducted in 2004.

The MiG-21 BIS, Jaguar, Mirage 2000 and MiG-29 have all undergone mid-life upgrades, which involved embedding their avionics with superior hardware and software to improve weapon

payload, navigation and radar capabilities. These provided the aircraft with superior firepower, accurate weapon delivery, modern avionics for pilot-friendly navigation and better communication with ground and other flying platforms. It categorises them as fourth-generation or fourth-plus generation fighters. The Rafale, with superior armament and avionics capability, is a fourth-plus-generation fighter aircraft.

Except the three MiG-21 BIS squadrons, all these aircraft have mid-air refuelling capability — a tanker aircraft can refuel them in air to enhance their flying range, aimed at long-range strike against enemy targets. The induction of the Russian Illushin-78 mid-air refueller tanker aircraft in 2003 added to the force's combat capability in terms of long-range strike.

The IAF's 12 squadrons of Sukhoi-30 MKI have gradually replaced the MiG-21 BIS. The Sukhoi-30 MKI aircraft is superior to the MiG-21 in all aspects – weapon payload, fuel storage capacity and mission capabilities. The Sukhoi-30 MKI aircraft can carry a 8.5-ton weapon payload, while the MiG-21 BIS carries only two tons of armament. Therefore, in terms of firepower or weapon payload alone, a Sukhoi-30 MKI is as good as four MiG-21 BIS aircraft.

In terms of range of operation, the Sukhoi-30 MKI has a much longer range than the MiG -21 BIS, to fly from airbases well within Indian territory (Defence in Depth) and attack targets deep inside enemy territory. Its mid-air refuelling capability enhances the Sukhoi-30 MKI's longer flying range and greater 'loiter' time in the air. It can undertake both air defence and ground attack missions. Therefore, 12 Sukhoi-30 MKI aircraft squadrons are equivalent to 24 MiG-21 BIS aircraft squadrons.

In 2009, the IAF acquired AWACS (Airborne Warning and Control System) aircraft equipped with radars, sensors and computers. These ensure optimum employment of air defence aircraft to engage intruding enemy fighters, freeing up many aircraft for other missions. The AWACS are thus effective 'force multipliers' that strengthen aerial combat capability.

Today, the IAF's air defence role can be supplemented with air-to-surface missiles like the S-400, which India has contracted from Russia, besides the ongoing Indo-Israeli joint missile development. Missile systems are more agile and transportable. For instance, air-to-ground missions are also supplemented with surface-to-surface missiles. Hence, the need for more aircraft to perform these roles should diminish accordingly.

Also, attack helicopters contribute to combat capability. The IAF has US-built Apache helicopters, besides the Soviet-era Mi-25/35, and the HAL-made advanced light helicopter adds to air-to-ground capability. The helicopters supplement the ground attack aircraft, especially in the forward edge of a battle area.

Pakistan, with 450 fighter aircraft, has only 18 F-16 fighters with contemporary technology. The rest of its fighter fleet has obsolescent technology. China has 2,100 fighter aircraft, but it also needs to deploy them elsewhere for national air defence management. Therefore, Beijing cannot employ its entire fighter strength against India.

Clearly, the Rafale enhances the IAF's combat capability and ensures air superiority, long-range strike and air defence against the Pakistani and Chinese air forces. Today, the concept of airpower need not be measured in terms of numerical superiority. For any air force, it undergoes transformation with advanced aeronautics technologies and aircraft mid-life upgrades. Therefore, with a 33-squadron fighter fleet, the IAF leadership should be able to "Touch the Skies with Glory".

*(The writer is a former fighter/test pilot who directed air operations in the Kargil conflict of 1999)*

<https://www.deccanherald.com/opinion/main-article/how-many-does-iaf-need-876291.html>

## CAG drops audit of Rafale offset deal: Source

By Pradeep Thakur

New Delhi: Eight months after the Comptroller and Auditor General (CAG) submitted its performance audit on defence offset contracts to the government, a top source in the federal auditor has revealed that the report has no mention of any offset deals related to Rafale aircraft purchased from French company Dassault Aviation. The government is yet to table the report before Parliament.

The Ministry of Defence (MoD) has denied any information related to the Rafale offset deals to the auditor. According to people involved with the audit, the MoD has informed the federal auditor that Dassault Aviation, the French manufacturer of Rafale, has said that it will share any details of its offset partners only after three years of the contract.



India received the first set of five Rafale fighters last month from France. In the 36 aircraft deal, signed for Rs 59,000 crore, Dassault Aviation has agreed to provide all fighters in a fly away condition between 36 to 67 months from the date of signing of the Inter-governmental agreement in 2016.

It has emerged that the CAG has reviewed only 12 defence offset contracts in its performance audit report submitted to the government in December 2019. “We have been told by the MoD that the French manufacturer of Rafale has not shared any details on the offset deals so far,” sources said.

In the run-up to the 2019 General Elections, the Rafale deal had caused a lot of controversy with the main opposition party, Congress, demanding a CBI inquiry on the terms of the Dassault Aviation appointing Reliance defence of Anil Ambani group as its partner for the offset contract. However, the government had not made any statement on who had bagged the offset contracts, saying it was the sole discretion of the French manufacturer.

According to sources, the federal auditor had initially picked up 32 defence offset contracts, related to IAF, Navy and Army, including the Rafale deal, early last year for evaluation pertaining to period 2012-13 to 2017-18. It has now emerged that the auditor later curtailed its audit plan to 12 offset contracts and dropped the much-awaited Rafale offset deal after MoD informed that it has no related information.

As per convention, soon after a CAG report is submitted to the government, it is tabled in the first available session of Parliament and immediately referred to the Public Accounts Committee, led by the Opposition leader, for its scrutiny.

<https://timesofindia.indiatimes.com/india/cag-drops-audit-of-rafale-offset-deal/articleshow/77678787.cms>

# China desecrates religious sites near Mt Kailash to deploy surface-to-air missiles

*The heavy militarisation of the religious site comes amid Indo-China tussle in Ladakh and coincides with India's road construction to Lipulekh at the India-China-Nepal tri-junction that sparked a diplomatic row between New Delhi and Kathmandu*

*By Col Vinayak Bhat*

New Delhi: China's enhancement of military facilities near Mt Kailash includes deployment of surface-to-air missiles (SAM) with fresh constructions that started in April this year being completed now, satellite images show.

Not being spared are religious sites, as satellite images show how Kailash Manasarovar, a place of religious importance to Hindus who travel for pilgrimage, now resembles a battle zone with heavy military presence.

The heavy militarisation of the religious site comes amid Indo-China tussle in Ladakh and coincides with India's road construction to Lipulekh at the India-China-Nepal tri-junction that sparked a diplomatic row between New Delhi and Kathmandu. Nepal claimed that India's road construction was in disputed territory between the two countries.



Mt Kailash and many areas along Manasarovar, including Rakshastal and Gauri Kund, are revered places in Hinduism and Buddhism. (File photo: Reuters)



The 80-km strategic road at 17,000 ft would make the journey to Kailash Manasarovar shorter and smoother. Mt Kailash and many areas along Manasarovar, including Rakshastal and Gauri Kund, are revered places in Hinduism and Buddhism.

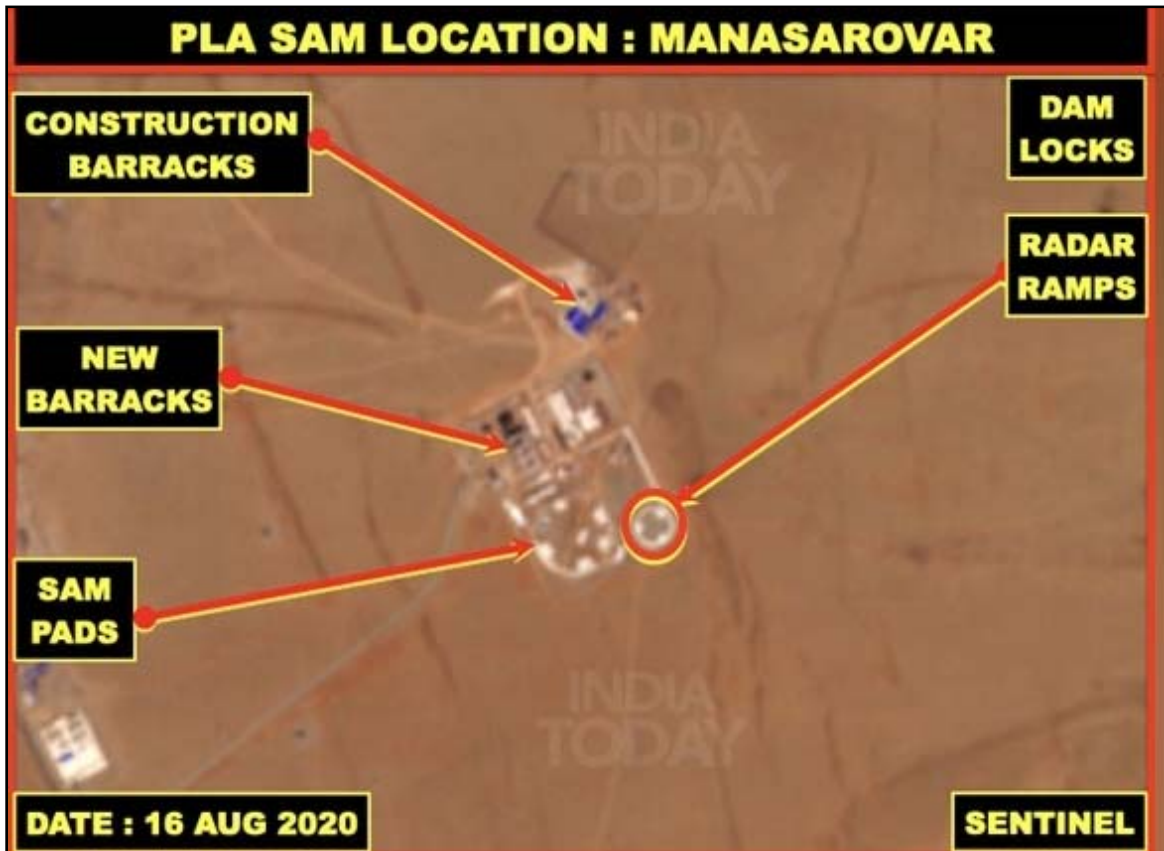


### Construction of SAM site

Latest satellite images from August 16 indicate that it is a surface-to-air missile site with possible HQ-9 SAM system under tarpaulin covers. The deployment pattern shows four platforms for either four or eight SAM transporter erector launchers (TELs) with three radar ramps.



There is a separate place in this facility for deployment of three more radars. The raised ramps clearly indicate their purpose for deployment of vehicle-based radars. The HQ-9 system depends on HT-233 radar for fire control, and on Type 305B, Type 120, Type 305A, YLC-20 and DWL-002 radars to search and track targets.



The entire facility suggests PLAAF's heavy dependence on radars for search and tracking aerial threats.

This SAM location is exactly 90 kms from Indian borders, suggesting that medium-range SAMs could also be deployed there, if required. PLA had a small detachment earlier supposedly prepared for the convenience and security of pilgrims visiting Mt Kailash.



It used to be manned by a section of People's Armed Police but now turned into a garrison with many hotels and houses built around it, and manned by the PLA. In the name of infrastructure

development, houses of Tibetans are being taken over, razed to ground and new hotels are being constructed.

The last three months have seen new constructions coming up about a kilometre east of the highway. The construction at this site started on April 11 and has been completed this week.

### **Controlling Kailash Manasarovar**

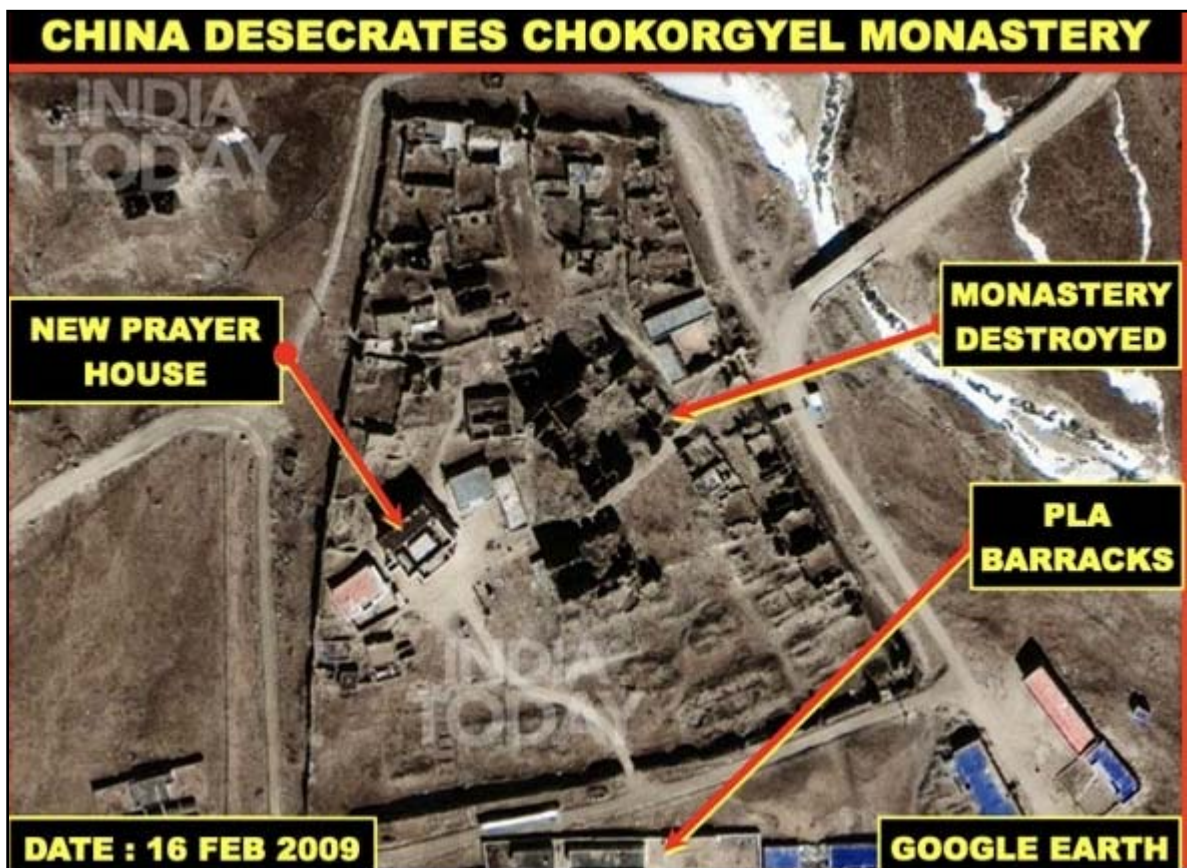
India has controlled these areas and collected taxes from villages here till the late 1950s. During the campaign in Tibet, China also grabbed the areas of Mt Kailash, Manasarovar and Eastern Ladakh.

China has been trying to control the access of Indians to Mt Kailash and Manasarovar since a long time by opening and closing various routes under different reasons. The easiest access from Nathula and Demchok were always stopped whereas the most difficult route via Pithoragarh in Uttarakhand was kept open most of the year.

### **Desecration of Manasarovar**

The Manasarovar and Rakshastal are part of the parikrama of Mt Kailash.

China released two videos of tanks rolling over the road near Manasarovar in the month of May and June to show their deployment in occupied territories of Tibet and India. The most surprising element in this facility is that it does not have facility that it can defend.



The obvious answer that comes to mind is that PLAAF might be trying to cover a particular path that it expects the Indian Air Force (IAF) to take during hostilities.

The IAF certainly would have taken note of this facility much before.

India should take up the matter of desecration of our religious sites so blatantly by China with her and rest of the world community.

<https://www.indiatoday.in/india/story/china-desecrates-religious-sites-near-mt-kailash-to-deploy-surface-to-air-missiles-1714018-2020-08-22>



## China must restore status quo ante in eastern Ladakh to resolve border standoff: Sources

### Story Highlights

*The Indian Army has clearly stated to China's People's Liberation Army (PLA) that 'shifting' of the Line of Actual Control(LAC) is not acceptable to it, the sources said, adding the Chinese military is now desperately attempting to give 'ex post facto strategic meaning' to its actions in eastern Ladakh.*

The Chinese military is not serious about resolution of the border standoff in eastern Ladakh and it is faced with an "unanticipated" consequence for its "misadventure" due to a strong response by the Indian Army, government sources said on Friday.

The sources said there has been a stalemate in the military talks as the Indian Army was strongly insisting that the Chinese PLA must restore status quo ante of April this year to resolve the over three-month-old border standoff.

The Indian Army has clearly stated to China's People's Liberation Army (PLA) that "shifting" of the Line of Actual Control(LAC) is not acceptable to it, the sources said, adding the Chinese military is now desperately attempting to give "ex post facto strategic meaning" to its actions in eastern Ladakh.



Ladakh drill Photograph:( Agencies )

"Due to the strong response of Indian Army, the PLA is faced with unanticipated and unintended consequences of its misadventure," said a source, adding it is looking for a "face-saving exit strategy". Another source said the Chinese side is resorting to a strategy of "back and forth" and not showing any interest in finding a solution to the border standoff.

India and China on Thursday agreed to resolve outstanding issues in an "expeditious manner" and in accordance with the existing agreements and protocols, the Ministry of External Affairs (MEA) said after the two sides held a fresh round of diplomatic talks to resolve the border row in eastern Ladakh.

India and China have held several rounds of military and diplomatic talks in the last two-and-half months but no significant headway has been made for a resolution to the border row in eastern Ladakh. On Thursday, the two sides held another round of diplomatic talks following which the Ministry of External Affairs (MEA) said they had agreed to resolve outstanding issues in an "expeditious manner" and in accordance with the existing agreements and protocols.

However, sources said the meeting could not produce any significant outcome.

The formal process of disengagement of troops began on July 6, a day after a nearly two-hour telephonic conversation between National Security Advisor Ajit Doval and Chinese Foreign Minister Wang Yi on ways to bring down tensions in the area. However, the process has not moved forward since mid-July.

The PLA has pulled back from Galwan Valley and certain other friction points but the withdrawal of troops has not moved forward in Pangong Tso, Depsang and a couple of other areas, sources said.

In the five rounds of Corps commander-level talks, the Indian side has been insisting on complete disengagement of Chinese troops at the earliest, and immediate restoration of status quo ante in all areas of eastern Ladakh prior to April.

<https://www.wionews.com/india-news/china-must-restore-status-quo-ante-in-eastern-ladakh-to-resolve-border-standoff-sources-322262>

## China using scholars, businessmen, journalists for spying in India: Book

*Yadav writes R&AW had warned the govt in 2018 of risk of Chinese aggression*

*By Pradip R Sagar*

Indian spies had warned top decisionmakers about growing Chinese footprints in India and emerging threats at the border, according to a new book by investigative journalist Yatish Yadav. The book reveals the Chinese military is using academics, scholars, businessmen, professionals and even journalists to mount intelligence operations in India.

The warnings came after the 73-day-long Doklam standoff between India and China in 2017 and also dwelled on the boundary issues, China's sinister expansionist policy and the efforts to protect India's sovereignty from the incidents like the recent bloody clash between troops of the two countries at Galwan valley on June 15.

The book *RAW: A History of India's Covert Operations*, published by Westland Publications and released earlier this month, provides an inside look at India's external spy agency's mission of hunting adversaries and neutralising threats to national security. The vivid account on China reveals that the top echelon in the corridors of power were informed in a January 2018 meeting that India needs to brace for aggressive operations from China, especially in the light of China's geopolitical ambition to become the preeminent power in Asia and a global power by 2050 and its ambitious projects, such as the Belt and Road Initiative (BRI).

Citing exclusive access, the book claims there are several contentious issues between the two nations that the R&AW is particularly worried about and it was reflected in the presentation in the meeting. The presentation, Yadav wrote, focused on the unresolved issue of the delineation of the India-China boundary area, lack of progress in clarifying the Line of Actual Control (LAC), China's concern about the presence of the Dalai Lama in India and India's concerns regarding a post-Dalai Lama scenario. The spies were of the view that all these issues remain a headache for Indian decisionmakers.

The spies, present in the meeting, were also worried about Chinese support to certain northeast groups, increased Chinese interests in the Indian Ocean Region, the China-Pakistan Economic Corridor (CPEC, a part of BRI) that passes through Pakistan-occupied Kashmir, the encirclement of India through China's string of pearls project and growing Chinese influence in India's neighbourhood, especially in Nepal, Pakistan, Bangladesh, Sri Lanka and the Maldives.

In the book, Yadav describes an undeniable fact that China is the most active nation in the world with regard to cyber espionage, with formidable capabilities aimed at economic sabotage. The book alleges two other modus operandi adopted by China are to exploit business and cultural exchanges to harvest intelligence in India.

"In fact, the government's top decisionmakers were given a list of institutes that are suspected of being used by China to gather intelligence in India. A classified note was also given to top officials about a Chinese institute planning to open branches in Tamil Nadu and West Bengal. China also exploits the legitimate cover of business in sectors like telecom, engineering and manufacturing," Yadav wrote, painting the most intense portrait of the closed-door meeting between spies and the top decisionmakers of the country.

A seasoned spy quoted in the book said, "China is replicating the espionage method of using soft power under the cover of legitimate activities, which had earlier been patented by the US and Russia. The Chinese are using academics, scholars, businessmen, professionals and even journalists to mount INT gathering operations in India."

Yadav wrote that the counterintelligence team in recent years has noticed that Chinese firms have emerged as the lowest bidders in many infrastructure projects in India, with the active support of the Chinese government. Such Chinese footprints are increasingly being noticed in states like Maharashtra, Chhattisgarh and Haryana. They are also targeting strategic locations. For example, a Chinese business delegation went to Betul Island in Goa, near INS Kadamba. Espionage threats are also emanating from non-Chinese firms, which employ Chinese persons as happened with the Dhamara Port Company in Odisha, which is strategically located near Dr Abdul Kalam Island, earlier known as 'Wheeler Island', which is a missile test facility.

The book claims since that meeting, the government has begun examining business proposals from Chinese companies from the espionage angle. However, the threats have not disappeared.

For Indian spymasters, countering China, which has forged a deep nexus with Pakistan, is a formidable task. It is obvious that countries must spy on each other to remain a step ahead. China has mastered that art. The Indian spy agency believes China is terrified by India's growing clout in Asia and always willing to engineer clumsy provocations.

Yadav wrote that the Chinese expansionist policy now ensures that India will be riddled with more spies and one warning, which will be acted upon in the coming years, is increasing surveillance on Chinese firms and individuals as methods of espionage and means of penetration to steal secrets and engineer subversion will be more refined in the coming years.

Espionage is a ruthless world. While spies may die, the craft lives on—that's the common thread in the chapters that offer an intense narrative of the world of intelligence.

<https://www.theweek.in/news/india/2020/08/21/china-using-scholars-businessmen-journalists-for-spying-in-india-book.html>

THE ECONOMIC TIMES

Sat, 22 Aug 2020

## India, Russia plan to build maritime partnership including ship-building industry

By Dipanjan Roy Chaudhury

### Synopsis

*The two sides eyeing to firm up their maritime partnership discussed avenues of bilateral collaboration in ship design and building, repair, logistics, MRO, inland waterways and ports sectors during a webinar held on Thursday. Russian Deputy Minister Industry and Trade Oleg Ryazantsev and Indian Minister of State for Shipping and Chemical and Fertilizers Mansukh Mandaviya chaired that webinar.*

New Delhi: India and Russia riding on goodwill of their partnership in building naval ships are exploring joint efforts in creating civilian shipbuilding industry here including repair facilities besides expediting maritime links through International North South Transport Corridor (INSTC) and Vladivostok-Chennai shipping links.

The two sides eyeing to firm up their maritime partnership discussed avenues of bilateral collaboration in ship design and building, repair, logistics, MRO, inland waterways and ports sectors during a webinar held on Thursday. Russian Deputy Minister Industry and Trade Oleg Ryazantsev and Indian Minister of State for Shipping and Chemical and Fertilizers Mansukh Mandaviya chaired that webinar.

"Hon'ble MoS @mansukhmandviya and Dy Minister Industry & Trade Oleg Ryazantsev chaired a special webinar on Shipping Sector today, discussing avenues of collaboration in ship design & building, repair, logistics, MRO, inland waterways, ports sectors between India and Russia," Indian Embassy in Russia tweeted.

Indian Ambassador to Russia D.B. Venkatesh Varma who also addressed the webinar stressed on immense opportunities for bilateral cooperation. The participants of the webinar included the Chairpersons of Chennai Port Trust and IWAI, Secretary Shipping, Trade Commissioner of Russia to India.

The Indo-Russian MRO partnership in the shipping sector will be a win-win proposition with 30,000 ships visiting Indian ports annually, a source pointed out.

The Indo-Russian maritime partnership got a boost with the last annual summit held in Vladivostok. Besides, expediting INSTC that aims to connect Mumbai with St Petersburg via Indian Ocean and then via Iran and Azerbaijan, revival of Chennai-Vladivostok shipping link is also on the cards. While Delhi seeks an inclusive Indo-Pacific region with participation of Russia, Moscow is exploring to increase its presence in the region which currently remains limited in scope.

This shipping link that existed during the Soviet Union period would enable to transfer cargo between Chennai and Vladivostok in 24 days compared to over 40 days currently taken to transport goods from India to Far East Russia via Europe. This shipping link will also help India to expand its footprints in Far East Russia based on Act Far East policy.

Far East Russia has a wealth of natural resources such as land, timber, mineral and other resources like tin, gold, diamonds and oil and natural gas. The Russian government has announced several initiatives to attract investments in the region, including an agricultural SEZ, the Vladivostok Free Port Project and also invites participation in the timber industry, mining of the huge mineral resources (coal & diamonds) and precious metal deposits (gold, platinum, tin and tungsten).

India also plans to explore connectivity corridor between resource rich Arctic Region and INSTC. India is interested in development of infrastructure, shipping route and harnessing of minerals in Arctic region in a sustainable manner.

Delhi has been in dialogue with Russia cooperation in connectivity via the Northern Sea Route and joint energy projects in Arctic region.

The Arctic contains a wealth of petroleum and mineral resources. Currently, the region produces about one tenth of the world's oil and a quarter of its natural gas. The Russian Arctic is the source for about 80 percent of this oil and virtually all of the natural gas. The most developed sector of the region, the Russian Arctic also holds abundant deposits of nickel, copper, coal, gold, uranium, tungsten, and diamonds.

The Northern Sea Route - is the main sea route in the Russian Arctic. The Route crosses seas of the Arctic Ocean (Kara, Laptev, East Siberian and Chukotka) and partially the Pacific Ocean (the Bering Sea). The Northern Sea Route from the Kara Gate to the Providence Bay is about 5,600km long. The distance between St. Petersburg to Vladivostok along the Northern Sea Route is more than 14,000 km, while the distance vessels have to cover by the Suez Canal is more than 23,000 km.

<https://economictimes.indiatimes.com/news/defence/india-russia-plan-to-build-maritime-partnership-including-ship-building-industry/articleshow/77676733.cms>

## China's People Liberation Army to introduce robot cooks, prevent food waste by troops

*By Simran Kashyap*

Beijing: Chinese military plans to introduce robot cooks and high-efficiency energy-saving stoves to reduce labour intensity even as it launched campaign to stop food waste and cultivate thrifty habits in the military under the "clean plate" campaign launched by President Xi Jinping.

The two-million strong People's Liberation Army (PLA), the world's largest, would actively promote the application of new technologies including advanced cooking equipment such as high-efficiency energy-saving stoves, multipurpose steaming ovens and cooking robots, the PLA Daily reported on Thursday.

The above measures were aimed at improving the mechanisation and intelligence of meal making, reduce the labour intensity and energy consumption of cooking, it said.

"We should improve the cooking and processing methods, making coarse dishes fine, fine dishes exquisite and make one dish in multiple ways (not sure), eliminate over-processing and luxurious cooking, increase the number of steamed dishes, reduce the variety of deep-fried dishes and reduce the consumption of cooking oil", it said.

Also the Logistic Support Department of China's Central Military Commission (CMC), the overall high command of the PLA, has recently made arrangements to stop food waste and cultivate thrifty habits in the military by promoting several reform measures to improve the troops' food management and production, and strengthened corresponding supervisions and inspections at the same time.

China last week officially launched a new version of "Clean Your Plate Campaign" flagged by President Xi, sparking speculation that the world's most populous country faces food crisis following COVID-19 pandemic.

"Different from the previous campaign, which was aimed at putting an end to officials' extravagant feasts and receptions, the 2.0 version calls for the public to stop wasting food," official media reported last week.

Under this campaign all PLA units at all levels to accelerate the pace of unified purchasing and delivering system of non-staple food, realizing the direct delivery of non-staple food to the greatest extent, and gradually expand the supply proportion of semi-finished non-staple food products.

As for troops in field training exercise or military tasks, military food supply should be the main source in form of fast-food support, to achieve the goal of reducing food loss and waste and improving support quality and efficiency at the same time, the report said. Units at all levels should promote the standardization of daily menus, fully implement the individual serving system, it said.

<https://www.oneindia.com/international/china-s-people-liberation-army-to-introduce-robot-cooks-prevent-food-waste-by-troops-3137272.html>

## Pakistan military to use Chinese navigation system BeiDou to improve interoperability

### Synopsis

*It is part of Pakistan and China's defence and strategic cooperation. Sources said that China wants to end the US-based GPS hegemony and push for its own developed navigation system first in the Asian region.*

New Delhi: Pakistan is all set to use Chinese homegrown navigation system BeiDou for both military and civil purpose, ending their dependence on the US-based Global Positioning System (GPS), sources in Indian security establishments stated.

It is part of Pakistan and China's defence and strategic cooperation. Sources said that China wants to end the US-based GPS hegemony and push for its own developed navigation system first in the Asian region.

Chinese Satellite Navigation Office (CSNO) has agreed to establish BeiDou enabled Continuously Operating Radar Station (CORS) network in Pakistan.

It will help Pakistan in getting precise geospatial application particularly in the field of surveying and mapping, construction and scientific studies.

China has established a monitoring station at its Space and Upper Atmosphere Research Commission (SUPARCO) for monitoring and assessing the BeiDou Global Navigation Satellite System (GNSS). The system was completed on August 3.

"China announced the completion of its navigation system project on August 3," said a source adding that China is now looking at expanding the network first in the Asia region.

An agreement on the cooperation in the field of satellite navigation between CSNO and SUPARCO was signed in May 2013.

The final launch of the system was done on June 23 after finally ending a project that went on for two decades. China began to develop the system in the 1990s and the first satellite was launched in 2000 kick starting the journey.

As Pakistan is buying Chinese defence equipment, it would be shifting to and be fully integrated into BeiDou.

Gradually, Pakistan Armed Forces will completely switch to the BeiDou navigation system for all its critical military platforms, source said.

Pakistan is on a defence equipment buying spree from China to deploy it along the Line of Control in Jammu and Kashmir region. Be it armour, air defence, artillery, UAVs, ships, submarines or fighter aircraft, Pakistan is buying it all from China.

<https://economictimes.indiatimes.com/news/defence/pakistan-military-to-use-chinese-navigation-system-beidou-to-improve-interoperability/articleshow/77675471.cms>



In this Nov. 7, 2018, file photo, a model of Chinese BeiDou Navigation Satellite System is displayed during the 12th China International Aviation and Aerospace Exhibition, also known as Airshow China 2018, in Zhuhai city, south China's Guangdong province

## **An AI just beat a human F-16 Pilot in a Dogfight**

The never-ending saga of machines outperforming humans has a new chapter. An AI algorithm has again beaten a human fighter pilot in a virtual dogfight. The contest was the finale of the U.S. military's AlphaDogfight challenge, an effort to "demonstrate the feasibility of developing effective, intelligent autonomous agents capable of defeating adversary aircraft in a dogfight. "

Last August, Defense Advanced Research Project Agency, or DARPA, selected eight teams ranging from large, traditional defense contractors like Lockheed Martin to small groups like Heron Systems to compete in a series of trials in November and January. In the final, on Thursday, Heron Systems emerged as the victor against the seven other teams after two days of old school dogfights, going after each other using nose-aimed guns only. Heron then faced off against a human fighter pilot sitting in a simulator and wearing a virtual reality helmet, and won five rounds to zero.

The other winner in Thursday's event was deep reinforcement learning, wherein artificial intelligence algorithms get to try out a task in a virtual environment over and over again, sometimes very quickly, until they develop something like understanding. Deep reinforcement played a key role in Heron System's agent, as well as Lockheed Martin's, the second runner up.

Matt Tarascio, vice president of artificial intelligence, and Lee Ritholtz, director and chief architect of artificial intelligence, from Lockheed Martin told Defense One that trying to get an algorithm to perform well in air combat is very different than teaching software simply "to fly," or maintain a particular direction, altitude, and speed. Software will begin with a complete lack of understanding about even very basic flight tasks, explained Ritholtz, putting it at a disadvantage against any human, at first. "You don't have to teach a human [that] it shouldn't crash into the ground... They have basic instincts that the algorithm doesn't have," in terms of training. "That means dying a lot. Hitting the ground, a lot," said Ritholtz.

Tarascio likened it to "putting a baby in a cockpit."

Overcoming that ignorance requires teaching the algorithm that there's a cost to every error but those costs aren't equal. The reinforcement comes into play when the algorithm, based on simulation after simulation, assigns weights [costs] to each maneuver, and then re-assigns those weights as experiences are updated.

Here, too, the process varies greatly depending on the inputs, including the conscious and unconscious biases of the programmers in terms of how to structure simulations. "Do you write a software rule based on human knowledge to constrain the AI or do you let the AI learn by trial-and-error? That was a big debate internally. When you provide rules of thumb, you limit its performance. They need to learn by trial-and-error," said Ritholtz.

Ultimately, it's no contest how quickly an AI can learn — within a defined area of effort — because it can repeat the lesson anew over and over, on multiple machines.

Lockheed, like several other teams, had a fighter pilot advising the effort. They also were able to run training sets on up to 25 DGx1 servers at a time. But what they ultimately produced could run a single GPU chip.

In comparison, after the victory, Ben Bell, the senior machine learning engineer at Heron Systems, said that their agent had been through at least 4 billion simulations and had acquired at least "12 years of experiences."

It's not the first time that an AI has bested a human fighter pilot in a contest. A 2016 demonstration showed that an AI-agent dubbed Alpha could beat an experienced human combat flight instructor. But the DARPA simulation on Thursday was arguably more significant as it pitched a variety of AI agents against one another and then against a human in a highly structured framework.

The AIs weren't allowed to learn from their experiences during the actual trials, which Bell said was "a little bit unfair." The actual contest did bear that out. By the fifth and final round of the matchup, the anonymous human pilot, call-sign Banger, was able to significantly shift his tactics and last much longer. "The standard things that we do as fighter pilots aren't working," he said. It didn't matter in the end. He hadn't learned fast enough and was defeated.

There-in lies a big future choice that the military will have to make. Allowing AI to learn more in actual combat, rather than between missions and thus under direct human supervision, would probably speed up learning and help unmanned fighters compete even better against human pilots or other AIs. But that would take human decision, making out of the process at a critical point. Ritholtz said that the approach he would advocate, right now at least, would be to train the algorithm, deploy it, then "bring the data back, learn off it, train again, redeploy," rather than have the agent learning in the air.

Timothy Grayson, director of the Strategic Technology Office at DARPA, described the trial as a victory for better human and machine teaming in combat, which was the real point. The contest was part of a broader DARPA effort called Air Combat Evolution, or ACE, which doesn't necessarily seek to replace pilots with unmanned systems, but does seek to automate a lot of pilot tasks.

"I think what we're seeing today is the beginning of something I'm going to call human-machine symbiosis... Let's think about the human sitting in the cockpit, being flown by one of these AI algorithms as truly being one weapon system, where the human is focusing on what the human does best [like higher order strategic thinking] and the AI is doing what the AI does best," Grayson said.

<https://www.defencenews.in/article/An-AI-Just-Beat-a-Human-F-16-Pilot-In-a-Dogfight-932036>



## नवभारत टाइम्स

Sat, 22 Aug 2020

### चंद्रयान-2 ने पूरे साल लगाए चांद के चक्कर, जानिए अब तक क्या हुआ हासिल

*Chandrayaan 2 mission news: चंद्रयान-2 के ऑर्बिटर ने चांद के 4,400 से ज्यादा चक्कर लगाए हैं और वह बहुत सही तरीके से काम कर रहा है। ISRO के मुताबिक,  
By Deepak Verma*

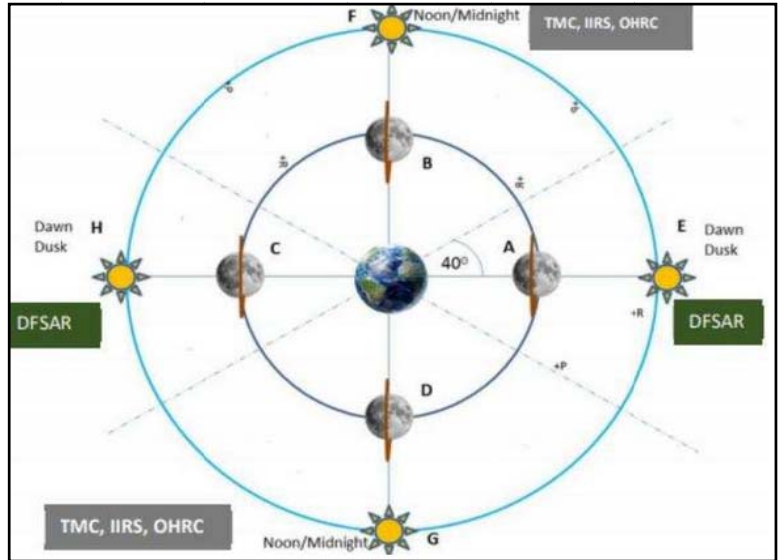
#### हाइलाइट्स:

- 22 जुलाई 2019 को लॉन्च किया गया था चंद्रयान-2 मिशन
- ऑर्बिटर ने चांद के चक्कर लगाते-लगाते एक साल पूरा किया
- सारे सिस्टम्स ठीक काम कर रहे, अभी 7 साल का ईंधन बाकी
- सॉफ्ट लैंडिंग नहीं कर पाया था चंद्रयान-2, लैंड विक्रम खो गया था

**नई दिल्ली:** भारत के चंद्रयान-2 को चांद को निहारते सालभर से ज्यादा हो चुके हैं। उसकी तबीयत बिलकुल ठीक है और अभी सात साल का ईंधन उसके भीतर मौजूद है। इंडियन स्पेस रिसर्च ऑर्गनाइजेशन (ISRO) का कहना है कि ऑर्बिटर अबतक 4,400 से ज्यादा चक्कर लगा चुका है। उसके सारे इंस्ट्रुमेंट्स दुरुस्त हैं और सही से काम कर रहे हैं। यानी स्प्रेसक्राफ्ट की सेहत बढ़िया है और वह 7 साल और चलेगा। ISRO ने कहा कि चंद्रयान-2 के ऑर्बिटर को चांद की ध्रुवीय कक्षा के 100 +/- 25 किलोमीटर के दायरे में रखा गया है।

#### अबतक 17 बार मॅटेनेंस मैनुवर्स

22 जुलाई 2019 को लॉन्च किए गए चंद्रयान-2 के रोवर की चंद्रमा पर सॉफ्ट लैंडिंग नहीं हो सकी थी। मगर उसके साथ गए ऑर्बिटर को सफलतापूर्वक चांद की कक्षा में स्थापित किया गया था। ISRO के मुताबिक, ऑर्बिटर से अबतक 17 बार पारिरीयॉडिक ऑर्बिट मॅटेनेंस मैनुवर्स हो चुके हैं। चंद्रयान-2 मिशन भारत की पहली कोशिश थी कि दक्षिणी ध्रुव जहां अबतक कोई स्प्रेसक्राफ्ट नहीं गया है, वहां सॉफ्ट लैंडिंग की जाए। लेकिन लैंडर विक्रम इसमें सफल नहीं हुआ। उससे संपर्क टूट गया। बाद में उसे एक भारतीय छात्र ने ढूंढा।



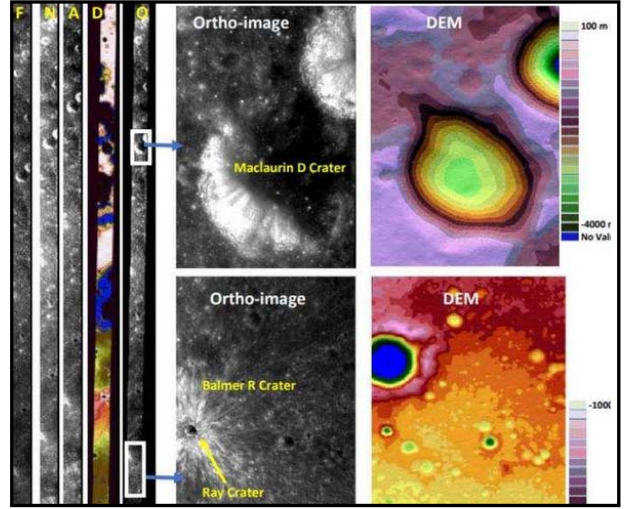
चांद का यूँ चक्कर लगाता है ऑर्बिटर

## ऑर्बिटर की लंबी उम्र से क्या फायदे

ऑर्बिटर ने जो डेटा कलेक्ट किया है, ISRO उसे पीयर रिव्यू के बाद पब्लिश करेगा। चंद्रयान-2 के ऑर्बिटर ने अच्छा-खासा डेटा भेजा है। उसमें हाई-रेजोल्यूशन कैमरे लगे हैं जो चांद की सतह और बाहरी वातावरण के अध्ययन में बहुत मदद करते हैं। ऑर्बिटर की लंबी उम्र होने से दुनियाभर में चांद पर मौजूदगी की जो रेस लगी है, उसमें भारत लगातार बना रहेगा। ISRO ने यह स्पेसक्राफ्ट चांद के बारे में भौगोलिक जानकारी हासिल करने के लिए लॉन्च किया था।

## ऑर्बिटर ने भेजी हैं सतह की तस्वीरें

ऑर्बिटर हाई रिजोल्यूशन कैमरा (OHRC) ने चंद्रमा की सतह की तस्वीरें ली हैं। चंद्रमा की सतह से 100 किलोमीटर की ऊंचाई से ली गई ये तस्वीरें चंद्रमा के दक्षिणी ध्रुवीय क्षेत्र में स्थित बोगस्लावस्की ई क्रेटर और उसके आस-पास की हैं। इसका व्यास 14 किलोमीटर और गहराई तीन किलोमीटर है। इसरो ने कहा कि तस्वीरों में चंद्रमा पर बड़े पत्थर और छोटे गड्ढे दिख रहे हैं।



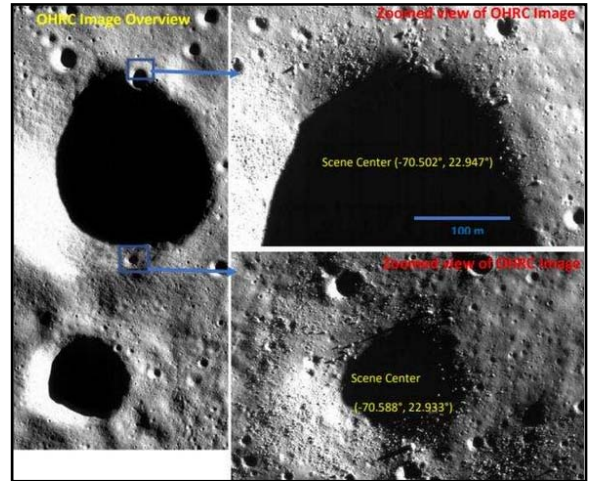
## 98% सफल रहा था चंद्रयान-2 मिशन

ISRO चीफ ने पिछले साल कहा था कि यह मिशन 98 प्रतिशत सफल रहा है। उन्होंने कहा था, "प्रॉजेक्ट को दो भागों में विकसित किया गया है- विज्ञान एवं प्रौद्योगिकी प्रदर्शन। हमने विज्ञान उद्देश्य में पूरी सफलता अर्जित कर ली है, जबकि प्रौद्योगिकी प्रदर्शन में सफलता का प्रतिशत लगभग पूरा हो गया है। इसलिए परियोजना को 98 प्रतिशत सफल बताया जा सकता है।"

**तो क्या Chandrayaan-2 के रोवर प्रज्ञान ने चांद की सतह पर सही-सलामत रखा था कदम?**

NASA के LRO (Lunar Reconnaissance Orbiter) ने पिछले साल तीन बार उस जगह की तस्वीर ली जहां लैंडर और उसका मलबा पाया गया। LRO से 17 सितंबर, 14 अक्टूबर और 11 नवंबर को ली गई तस्वीरों में लैंडिंग साइट पर जो निशान मिले, माना जा रहा था कि वे उस मलबे के ही थे। शान ने खुद को LRO की तस्वीरों में विक्रम लैंडर को स्पॉट किया था जिसकी पुष्टि NASA ने की थी और उन्हें धन्यवाद भी दिया था।

## ऑर्बिटर से ली गई चांद की सतह की तस्वीर



ऐसी है चांद की सतह

<https://navbharattimes.indiatimes.com/india/isro-chandrayaan-2-completes-one-year-in-orbit-around-the-moon-still-left-with-enough-fuel/articleshow/77668238.cms>

## चांद की कक्षा में Chandrayaan-2 के नाम एक और बड़ी कामयाबी, ISRO ने जारी किया बयान

चंद्रयान-2 (Chandrayaan-2) ने चांद की कक्षा में परिक्रमा लगाते हुए एक साल पूरा कर लिया है।

सिद्धार्थ एमपी

### खास बातें

- इसरो ने कहा कि चंद्रयान-2 ने चंद्रमा के चारों ओर 4400 परिक्रमाएं पूरी कर ली हैं
- यान के सभी आठ ऑन-बोर्ड उपकरण भी अच्छा प्रदर्शन कर रहे हैं
- चंद्रयान-2 का प्रक्षेपण 22 जुलाई 2019 को किया गया था

**नई दिल्ली:** चंद्रयान-2 (Chandrayaan-2) ने चांद की कक्षा में परिक्रमा लगाते हुए एक साल पूरा कर लिया है। इस मौके पर अंतरिक्ष एजेंसी इसरो (ISRO) ने मिशन से जुड़ा प्रारंभिक डेटा सेट जारी करते हुए बताया कि भले ही विक्रम लैंडर सॉफ्ट लैंडिंग में असफल रहा, लेकिन ऑर्बिटर ने चंद्रमा के चारों ओर 4400 परिक्रमाएं पूरी कर ली हैं और सभी आठ ऑन-बोर्ड उपकरण अच्छा प्रदर्शन कर रहे हैं। ऑर्बिटर में उच्च तकनीक वाले कैमरे लगे हैं, ताकि वह चांद के बाहरी वातावरण और उसकी सतह के बारे में जानकारी जुटा सके।

इसरो ने कहा कि सात और वर्षों के संचालन के लिए चंद्रयान-2 के पास पर्याप्त ईंधन है। अंतरिक्ष यान पूरी तरह ठीक है और उसकी सभी उप-प्रणालियों का प्रदर्शन सामान्य है। ऑर्बिटर को आवधिक कक्षा रखरखाव (ओएम) मैन्योवर के साथ 100 +/- 25 किमी ध्रुवीय कक्षा (ध्रुवों के साथ चंद्रमा की परिक्रमा) में बनाए रखा जा रहा है। अंतरिक्ष एजेंसी के मुताबिक, जब कोई भी उपग्रह या अंतरिक्ष यान किसी निश्चित कक्षा में अंतरिक्ष में होता है तो वह एक निश्चित सतह पर जोर-जोर से हिलता है और निर्धारित रास्ते से कुछ सौ मीटर या कुछ किलोमीटर आगे बढ़ जाता है।

इसरो ने बताया है कि ऑन-बोर्ड आठ वैज्ञानिक पेलोड का बेहतर इस्तेमाल किया जा रहा है। सीधे शब्दों में इसका मतलब है कि सूर्य की स्थिति के आधार पर, चंद्रमा की सतह पर रोशनी पूरे वर्ष अलग-अलग होगी। इसलिए जब पारंपरिक इमेजिंग कैमरे खराब रोशनी के कारण तस्वीर नहीं ले पाते, तब इसरो चांद की तस्वीरें लेने और अध्ययन के लिए कई उपकरणों का इस्तेमाल करता है। इसरो के अनुसार, पिछले वर्ष की तुलना में टेर्रेन मैपिंग कैमरा 2 (Terrain Mapping Camera-TMC 2) 220 कक्षाओं के दौरान, चंद्रमा क्षेत्र के लगभग 4 मिलियन वर्ग किमी की तस्वीरें लेने में सक्षम रहा है। TMC-2 को उच्चतम रिज़ॉल्यूशन वाला कैमरा कहा जाता है, जो वर्तमान में चंद्रमा के चारों ओर कक्षा में है। इन तस्वीरों से वैज्ञानिकों को चांद का अध्ययन करने में काफी सहायता मिलेगी।

भारत के दूसरे चंद्र अभियान चंद्रयान-2 का प्रक्षेपण 22 जुलाई 2019 को किया गया था और एक साल पहले यानी 20 अगस्त को इसने चंद्रमा की कक्षा में प्रवेश किया था। 7 सितंबर को चंद्रमा पर लैंडिंग के दौरान लैंडर विक्रम का इसरो से संपर्क टूट गया था। हालांकि, बाद में पता चला कि विक्रम ने चांद पर हार्ड लैंडिंग की है। इस मिशन को भौगोलिक स्थिति, खनिज विज्ञान, सतह रासायनिक संरचना, थर्मो-भौतिक विशेषताओं और लूनर एक्सोस्फीयर पर विस्तृत जानकारी प्राप्त करने के उद्देश्यों के साथ लॉन्च किया गया था।

भारत के पहले चंद्र मिशन चंद्रयान-1 को चंद्रमा की सतह पर बड़ी मात्रा में पानी और उप-सतह ध्रुवीय पानी-बर्फ के संकेत खोजने का श्रेय जाता है। इसरो चंद्रयान-3 पर भी काम कर रहा है और इसके 2021 या उसके बाद लॉन्च होने की संभावना है।

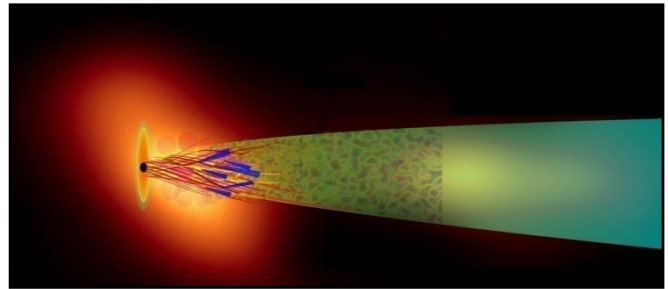
<https://zeenews.india.com/hindi/science/chandrayaan-2-orbiter-completes-4400-orbits-around-moon-isro-says-it-will-function-for-7-yrs/732384>

# Spinning black hole powers jet by magnetic flux

By Julius-Maximilians

Black holes are at the center of almost all galaxies that have been studied so far. They have an unimaginably large mass and therefore attract matter, gas and even light. But they can also emit matter in the form of plasma jets—a kind of plasma beam that is ejected from the center of the galaxy with tremendous energy. A plasma jet can extend several hundred thousand light years far into space.

When this intense radiation is emitted, the black hole remains hidden because the light rays near it are strongly bent leading to the appearance of a shadow. This was recently reported by researchers of the Event Horizon Telescope (EHT) collaboration for the massive black hole in the giant ellipse galaxy M87.



The centre of quasar 3C279 emits flickering gamma radiation, which is characteristic of the phenomenon of magnetic reconnection. Credit: Amit Shukla

In quasar 3C279—also a black hole—the EHT team found another phenomenon: At a

distance of more than a thousand times the shadow of the black hole, the core of a plasma jet suddenly lit up. How the energy for this jet could get there as if through an invisible chimney was not yet known.

## Extremely flickering gamma radiation detected

This quasar has now been observed with the NASA space telescope Fermi-LAT by the astrophysicist Amit Shukla, who until 2018 did research at Julius-Maximilians-Universität (JMU) Würzburg in Bavaria, Germany. He now is working at the Indian Institute of Technology in Indore. Shukla discovered that the core of the jet, which was found in the millimeter wavelength range, also emits high-energy gamma radiation, but with an extremely flickering brightness. This brightness can double within a few minutes, as reported in the journal *Nature Communications*.

The special pattern of the sequence of brightness changes is characteristic of a universal process called magnetic reconnection, which occurs in many astrophysical objects with strong magnetic fields. Solar activity also has to do with the dynamics of magnetic fields and reconnection. This was recently demonstrated by observing 'campfires' in the solar atmosphere with the Solar Orbiter mission of the European Space Agency ESA.

## Invisibly stored energy is suddenly released

But back to the quasar 3C279: "I saw how the analysis of the data revealed the special pattern of magnetic reconnection in the light curve. It felt as if I had suddenly deciphered a hieroglyph in the black hole alphabet," says Amit Shukla.

During reconnection, energy that is initially stored invisibly in the magnetic field is suddenly released in numerous "mini-jets." In these jets, particles are accelerated, which then produce the observed gamma radiation. Magnetic reconnection would explain how the energy reaches the jet's core from the black hole and where it ultimately comes from.

## Energy from the spinning black hole

Professor Karl Mannheim, head of the JMU Chair of Astronomy and co-author of the publication, explains "Spacetime near the black hole in the quasar 3C279 is forced to swirl around in corotation. Magnetic fields anchored to the plasma around the black hole expel the jet slowing down the black hole's rotation and converting part of its rotational energy into radiation."

**More information:** A. Shukla et al. Gamma-ray flares from relativistic magnetic reconnection in the jet of the quasar 3C 279, *Nature Communications* (2020). DOI: [10.1038/s41467-020-17912-z](https://doi.org/10.1038/s41467-020-17912-z)

**Journal information:** [Nature Communications](https://www.nature.com)  
<https://phys.org/news/2020-08-black-hole-powers-jet-magnetic.html>



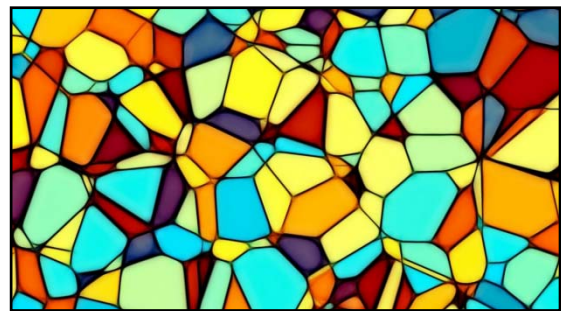
Sat, 22 Aug 2020

## Quantum computers do the (instantaneous) twist

By Chris Cesare

Regardless of what makes up the innards of a quantum computer, its speedy calculations all boil down to sequences of simple instructions applied to qubits—the basic units of information inside a quantum computer.

Whether that computer is built from chains of ions, junctions of superconductors, or silicon chips, it turns out that a handful of simple operations, which affect only one or two qubits at a time, can mix and match to create any quantum computer program—a feature that makes a particular handful 'universal.' Scientists call these simple operations quantum gates, and they have spent years optimizing the way that gates fit together. They've slashed the number of gates (and qubits) required for a given computation and discovered how to do it all while ensuring that errors don't creep in and cause a failure.



Unlike other kinds of quantum computers, quantum computers built atop topological error correction smear a single qubit's worth of information out among a network of many qubits. Credit: Gerd Altmann/Pixabay

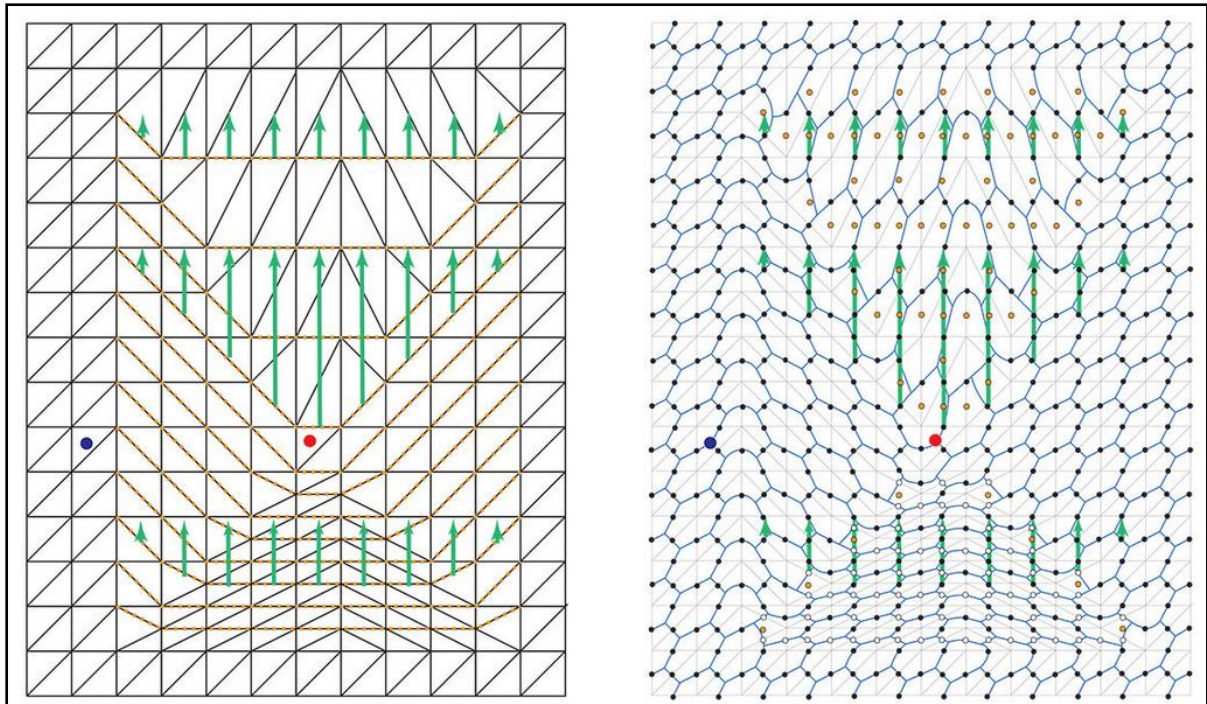
Now, researchers at JQI have discovered ways to implement robust, error-resistant gates using just a constant number of simple building blocks—achieving essentially the best reduction possible in a parameter called circuit depth. Their findings, which apply to quantum computers based on topological quantum error correcting codes, were reported in two papers published recently in the journals *Physical Review Letters* and *Physical Review B*, and expanded on in a third paper published earlier in the journal *Quantum*.

Circuit depth counts the number of gates that affect each qubit, and a constant depth means that the number of gates needed for a given operation won't increase as the computer grows—a necessity if errors are to be kept at bay. This is a promising feature for robust and universal quantum computers, says Maissam Barkeshli, a JQI Fellow and an associate professor of physics at the University of Maryland (UMD).

"We have discovered that a huge class of operations in topological states of matter and topological error correcting codes can be implemented via constant depth unitary circuits," says Barkeshli, who is also a member of the Condensed Matter Theory Center at UMD.

Unlike other kinds of quantum computers, quantum computers built atop topological error correction—which so far have only been studied theoretically—don't store information in individual physical qubits. Instead, they smear a single qubit's worth of information out among a network of many qubits—or, more exotically, across special topological materials.

This information smearing provides resilience against stray bits of light or tiny vibrations—quantum disturbances that may cause errors—and it allows small errors to be detected and then actively corrected during a computation. It's one of the main advantages that quantum computers based on topological error correction offer. But the advantage comes at a cost: If noise can't get to the information easily, neither can you.



Networks of qubits (represented by black dots in the image on the right) are deformed in order to braid two regions (represented by red and blue dots) around each other. These images show two intermediate stages of the process. Credit: Images provided courtesy of the authors.

Until now it seemed that operating such a quantum computer required small, sequential changes to the network that stores the information—often depicted as a grid or lattice in two dimensions. In time, these small changes add up and effectively move one region of the lattice in a loop around another region, leaving the network looking the same as when it started.

These transformations of the network are known as braids because the patterns they trace out in space and time look like braided hair or a plaited loaf of bread. If you imagine stacking snapshots of the network up like pancakes, they will form—step by step—an abstract braid. Depending on the underlying physics of the network—including the kinds of particles, called anyons, that can hop around on it—these braids can be enough to run any quantum program.

In the new work, the authors showed that braiding can be accomplished almost instantaneously. Gone are the knotted diagrams, replaced by in-situ rearrangements of the network.

"It was kind of a textbook dogma that these braids can only be done adiabatically or very slowly so as to avoid creating errors in the process," says Guanyu Zhu, a former JQI postdoctoral researcher who is currently a research staff member at the IBM Thomas J. Watson Research Center. "However, in this work, we realized that instead of slowly moving regions with anyons around each other, we could just stretch or squeeze the space between them in a constant number of steps."

The new recipe requires two ingredients. One is the ability to make local modifications that reconfigure the interactions between the physical qubits that make up the network. This part isn't too different from what ordinary braiding requires, but it is assumed to happen in parallel across the region being braided. The second ingredient is the ability to swap the information on physical qubits that are not close to each other—potentially even at opposite corners of the braiding region.

This second requirement is a big ask for some quantum computing hardware, but the authors say that there are systems that could naturally support it.

"A variety of experimental platforms with long-range connectivity could support our scheme, including ion traps, circuit QED systems with long transmission-line resonators, modular architectures with superconducting cavities, and silicon photonic devices," says Zhu. "Or you could imagine using platforms with movable qubits. One can think of such platforms as fluid quantum computers, where qubits can freely flow around via classical motion."

In the paper in *Physical Review Letters*, the authors provided explicit instructions for how to achieve their instantaneous braids in a particular class of topological quantum codes. In the *Physical Review B* and *Quantum* papers, they extended this result to a more general setting and even examined how it would apply to a topological code in hyperbolic space (where, additionally, adding a new smeared out qubit requires adding only a constant number of physical qubits to the network).

The authors haven't yet worked out how their new braiding techniques will mesh with the additional goals of detecting and correcting errors; that remains an open problem for future research.

"We hope our results may ultimately be useful for establishing the possibility of fault-tolerant quantum computation with constant space-time overhead," says Barkeshli.

**More information:** Guanyu Zhu et al. Universal Logical Gates on Topologically Encoded Qubits via Constant-Depth Unitary Circuits, *Physical Review Letters* (2020). DOI: [10.1103/PhysRevLett.125.050502](https://doi.org/10.1103/PhysRevLett.125.050502)

Guanyu Zhu et al. Instantaneous braids and Dehn twists in topologically ordered states, *Physical Review B* (2020). DOI: [10.1103/PhysRevB.102.075105](https://doi.org/10.1103/PhysRevB.102.075105)

Ali Lavasani et al. Universal logical gates with constant overhead: instantaneous Dehn twists for hyperbolic quantum codes, *Quantum* (2019). DOI: [10.22331/q-2019-08-26-180](https://doi.org/10.22331/q-2019-08-26-180)

**Journal information:** [Physical Review Letters](#) , [Physical Review B](#)  
<https://phys.org/news/2020-08-quantum-instantaneous.html>



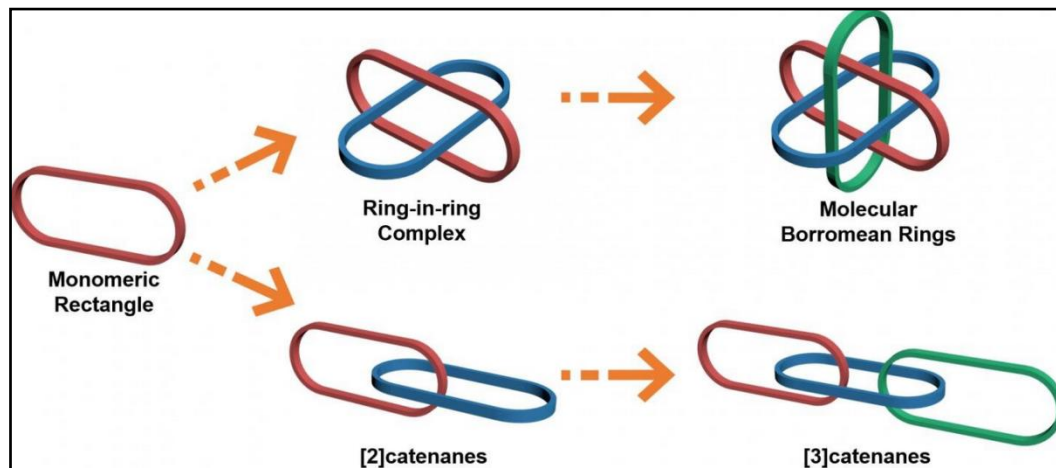
Sat, 22 Aug 2020

## 'All-in-one' strategy for metalla[3]catenanes, Borromean rings and ring-in-ring complex

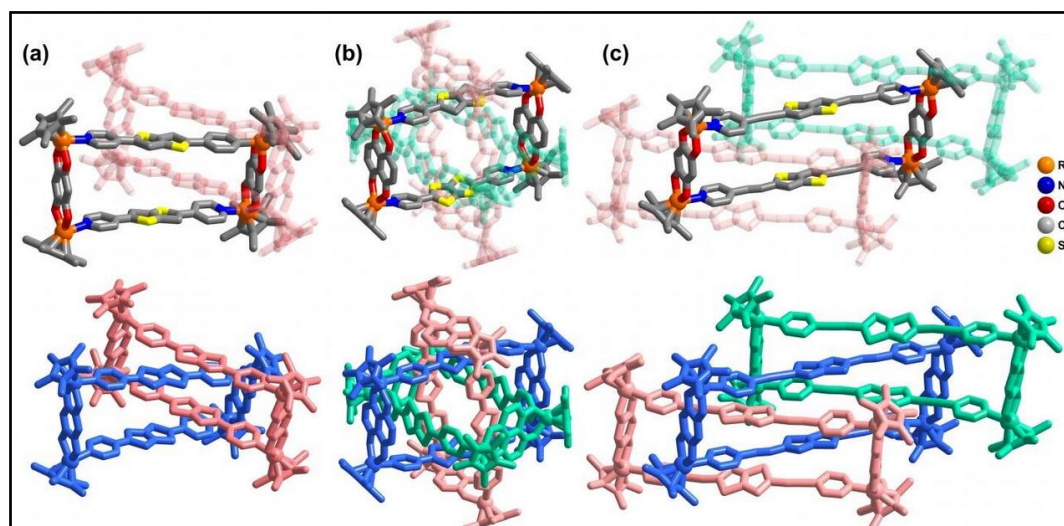
Interlocked molecular species have received considerable attention recently, not only because of their intriguing structures and topological importance, but also because of their important applications as molecular machines and nanoscale devices. Benefiting from the reversible coordination bond, some complicated interlocked structure could be realized by high-yield, one-step processes, for example, [2]catenanes and Solomon knot. Molecular Borromean rings (BRs) are [3]catenanes topoisomers in which none of the component rings is linked, but also cannot be separated without breaking one of the rings (Fig. 1). Linear [3]catenanes are another fascinating interlocked three-ring motif. Several effective methods for the construction of organic linear [3]catenanes have been presented. However, the feasible strategies for the synthesis of organometallic linear metalla[3]catenanes based on coordination-driven self-assembly are still very rare. Beyond linear [3]catenanes, ring-in-ring complex are also a very rare structural motif, which can be considered as substructures of BRs and key intermediates for the preparation of BRs. Recently, Ye Lu, Dong Liu, Yue-Jian Lin, Zhen-Hua Li and Guo-Xin Jin from Fudan University (Shanghai, China) made exciting progress and developed self-assembly of metalla[3]catenanes, Borromean rings and ring-in-ring complex using a simple  $\pi$ -donor unit.

Due to the large electron cloud of the sulfur atom, S-containing heterocyclic compounds usually present stronger stacking interactions than polycyclic aromatic compounds under similar conditions. In order to enhance the stacking interactions, bithiophenyl groups were used as building blocks to replace the widely used phenylene or polycyclic aromatic groups. Meantime, electrostatic interactions between electron-rich ( $\pi$ -donor, D) and electron-deficient ( $\pi$ -acceptor, A) aromatic groups are important driving forces in host-guest chemistry. Metallarectangles or cages based on coordination self-assembly commonly bear several positive charges. Due to Coulombic repulsion, this type of metallarectangles or cages is more suitable for combination with electroneutral or electron-rich guests than with electron-poor cations, and overcoming the Coulombic repulsion

between a cationic guest and a cationic host is still a challenge. Bithiophenyl groups are strong D units, thus their introduction into metallarectangles could lead to strong interactions between D units and A units, which is a promising strategy to overcome the Coulombic repulsion and potentially allow introduction of a positively-charged cation inside a positively-charged cationic metallarectangle. Following this logic, if an electron-deficient cation could be introduced into a cationic metallarectangle by taking advantage of strong D-A interactions, it could also be possible to thread a cationic metallarectangle based on A units inside a metallarectangle based on D units, to obtain a heterogeneous D-A ring-in-ring complex.



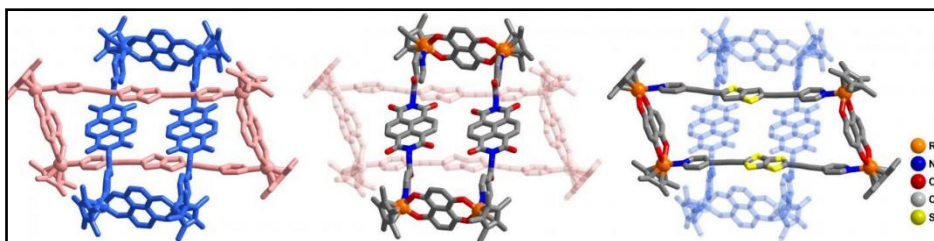
Various interlocked structures: monomeric rectangle; ring-in-ring complex; Borromean rings; [2] catenanes; linear [3] catenanes. Credit: Science China Press



Single-crystal X-ray structures of [2] catenanes (a), molecular Borromean rings (b) and [3] catenanes (c). Credit: Science China Press

In this work, a series of Cp\*Rh-based (Cp\* = pentamethylcyclopentadienyl) homogeneous metalla[2]catenanes, as well as linear metalla[3]catenanes and BRs structure were realized through the use of building blocks based on bithiophenyl groups, a simple  $\pi$ -donor unit. Bithiophenyl groups play a crucial role in the formation of the homogeneous interlocked structures, namely enhancing the strength of the inter-ring interactions. By taking advantage of strong electrostatic interactions between D and A units, the electron-deficient methylviologen cation was used as a guest molecule to realize reversible conversion between a [2]catenanes and a monomeric rectangle. Furthermore, a cationic metallarectangle based on A units was threaded inside a metallarectangle based on bithiophenyl groups, leading to a heterogeneous ring-in-ring complex. This method for forming ring-in-ring complex was extended by use of a metallarectangle based on pyrenyl group.





Single-crystal X-ray structures of ring-in-ring complex. Credit: Science China Press

These findings will help the understanding of coordination self-assembly and advance the field of organometallic assemblies.

**More information:** Ye Lu et al, Self-assembly of metalla[3]catenanes, borromean rings and ring-in-ring complex using a simple  $\pi$ -donor unit, *National Science Review* (2020). DOI: [10.1093/nsr/nwaa164](https://doi.org/10.1093/nsr/nwaa164)  
<https://phys.org/news/2020-08-all-in-one-strategy-metalla3catenanes-borromean-ring-in-ring.html>



Sat, 22 Aug 2020

## Researchers discover superconductor with unexpected lattice configuration

An international team has discovered that compressing monocrystalline  $(\text{TaSe}_4)_2\text{I}$  can create a system where the constituent  $\text{TaSe}_4\text{Q1-D}$  atomic chains are in amorphous state without breaking the orientational and periodic translation symmetries of the chain lattice. Moreover, they found that along with the amorphization of the atomic chains, the insulating  $(\text{TaSe}_4)_2\text{I}$  becomes a superconductor.

The team is led by Prof. Yang Zhaorong from the High Magnetic Field Laboratory, Hefei Institutes of Physical Science and Prof. Zhang Gufei from University of Southern Denmark.

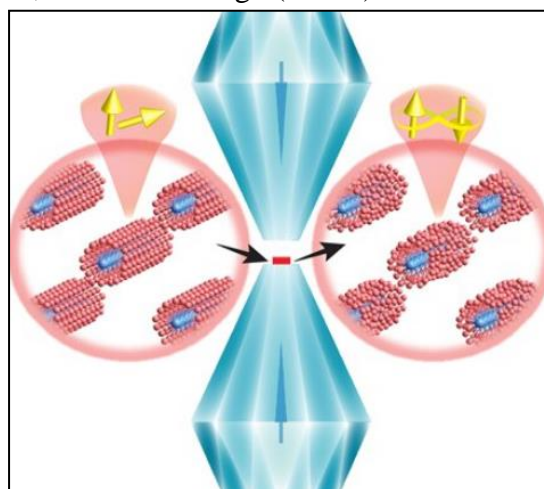
In this study, they used monocrystalline  $(\text{TaSe}_4)_2\text{I}$  as the starting material for the realization of a new quasi-1-D phase with advanced electronic properties.

When increasing the applied pressure up to ca. 20 GPa, they realized the amorphization of the constituent atomic chains of  $(\text{TaSe}_4)_2\text{I}$  without breaking the long-range order of the chain lattice.

Crystalline and amorphous structures are two of the most common solid-state phases. Crystals having orientational and periodic translation symmetries are usually both short-range and long-range ordered, while amorphous materials have no long-range order. Short-range ordered but long-range disordered materials are generally categorized into amorphous phases.

In contrast to the extensively studied crystalline and amorphous phases, the combination of short-range disordered and long-range ordered structures at the atomic level is extremely rare and so far has only been reported for solvated fullerenes under compression.

The as-prepared material with a combination of short-range disorder and long-range order demonstrates a new solid-state phase other than conventional crystalline or amorphous structures.



Combination of long-range ordered and short-range disordered structures at the atomic level is demonstrated in pressurized Q1D  $(\text{TaSe}_4)_2\text{I}$ , where a condensation of Cooper pairs is also observed. Credit: ZHANG Gufei

Furthermore, upon the amorphization of the atomic chains, superconductivity emerges in the newly created system. This counterintuitive phenomenon brings attention to the Cooper pairing in quasi-1-D materials disordered at the atomic level.

The study provides critical insight into a new phase of solid-state materials. In addition, the present findings demonstrate a first ever case where superconductivity is hosted by a lattice with periodic but amorphous constituent atomic chains.

**More information:** Chao An et al. Long-Range Ordered Amorphous Atomic Chains as Building Blocks of a Superconducting Quasi-One-Dimensional Crystal, *Advanced Materials* (2020). DOI: [10.1002/adma.202002352](https://doi.org/10.1002/adma.202002352)

**Journal information:** [Advanced Materials](https://phys.org/news/2020-08-superconductor-unexpected-lattice-configuration.html)  
<https://phys.org/news/2020-08-superconductor-unexpected-lattice-configuration.html>



Sat, 22 Aug 2020

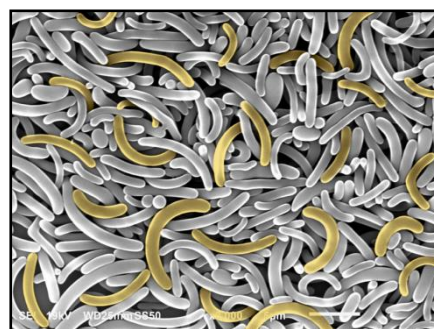
## A way to intentionally change the curvature of bent molecules using a polymer and ultraviolet light

By Bob Yirka

A novel machine learning model developed by researchers at Michigan State University suggests that mutations to the SARS-CoV-2 genome have made the virus more infectious.

A team of researchers from the University of Oxford and Utrecht University has developed a way to change the curvature of bent molecules using a polymer and ultraviolet light. In their paper published in the journal *Science*, the group describes their process and possible uses for it. Maria Helena Godinho, with University NOVA of Lisbon, has published a Perspective piece in the same journal issue outlining the benefits of using curved elongated rods (molecules), also referred to as bent-core or banana-shaped molecules, when making chiral liquid crystalline phases—and also outlines the work done by the team in this new effort.

As the researchers note, molecular chirality (when a molecule cannot be superimposed on its mirror image) is generally needed when making chiral liquid crystalline phases—but sometimes, another approach is possible—using curved, elongated molecules that resemble a banana or that have a bent core shape. In this new effort, the researchers have come up with a way to control the degree of bentness in such molecules using a photoresponsive polymer and ultraviolet light. They also found that understanding the building blocks of materials that led to curvature during self-assembly of the molecules was key to learning how to make them bend in desired ways.



Scanning electron microscopy image of the colloidal bananas. Note the false coloring emphasizes the shape of the particles. The scale bar is 5 micrometers. Credit: Carla Fernandez-Rico

The work involved starting with molecules of SU-8 photoresist with no curvature, and then using the heat generated from an ultraviolet lamp to incite bending due to buckling. In so doing, they found that they could intentionally change the curvature of the rods by monitoring their progress with confocal microscopy. As part of their work, they found that they were able to induce a wide range of phase behavior in the rods, such as smectic-like phases (both polar and antipolar) and biaxial nematic phases. They also found that they were able to incite a splay-bend-type nematic phase, a rare accomplishment in the lab. The net result, as Godinho notes, is that the work has opened the door to the production of a new range of nematic

colloidal liquid crystals, which are, of course, used in a wide variety of displays in electronic devices.

**More information:** Fernández-Rico et al., Shaping colloidal bananas to reveal biaxial, splay-bend nematic and smectic phases. *Science* (2020). [science.sciencemag.org/cgi/doi ... 1126/science.abb4536](https://science.sciencemag.org/cgi/doi/10.1126/science.abb4536)

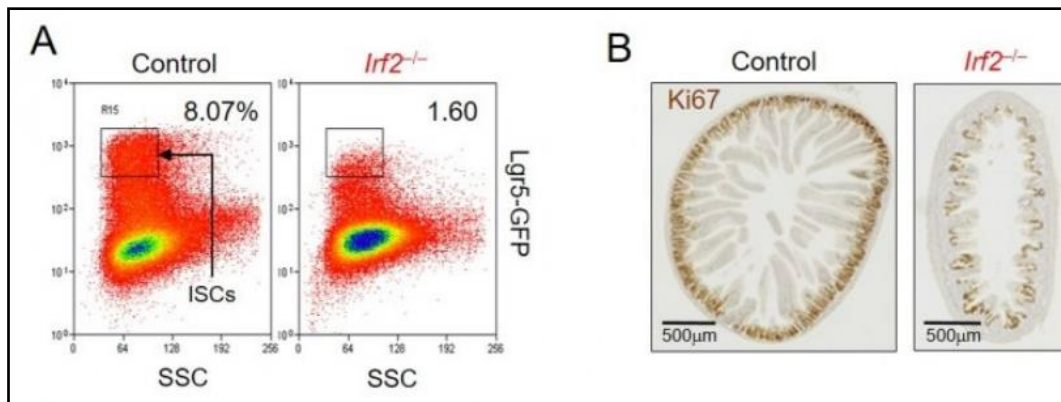
**Journal information:** *Science*  
<https://phys.org/news/2020-08-intentionally-curvature-bent-molecules-polymer.html>



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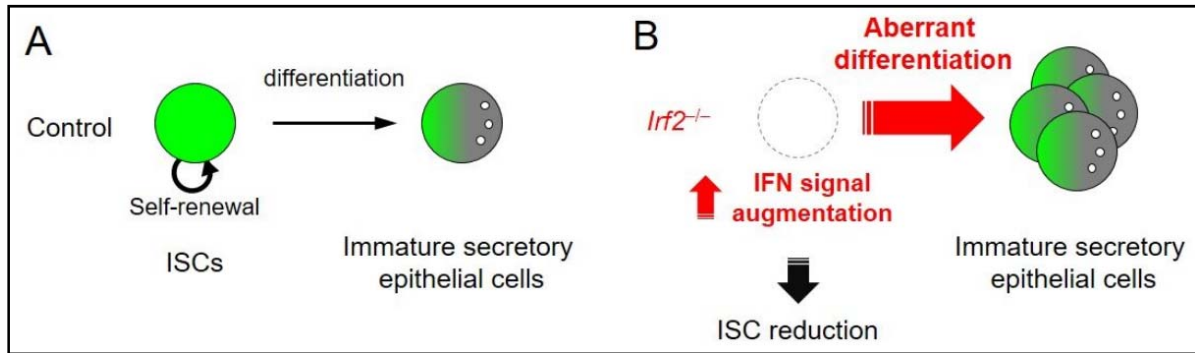
## A new molecular guardian of intestinal stem cells

Intestinal stem cells hold a fine balance between two potential forms: remaining as stem cells, or developing into intestinal epithelial cells. In a new study, researchers from Tokyo Medical and Dental University (TMDU) discovered a novel molecular mechanism that regulates this balance and preserves the stemness of intestinal stem cells—that is, their ability to develop into any intestinal epithelial cell type.



An IRF2 deficiency reduces intestinal stem cells (ISCs) and attenuates crypt regeneration after injury. **A.** Flow cytometric analysis revealed that the number of ISCs was reduced in *Irf2*<sup>-/-</sup> mice compared with control mice. Lgr5-GFP: reporter fluorescence of ISCs. **B.** Sections of the jejunum from control (left) and *Irf2*<sup>-/-</sup> (right) mice, 6 days after the induction of epithelial injury by 5-fluorouracil administration, were stained with Ki67. The number of Ki67-stained regenerated crypts were substantially reduced in *Irf2*<sup>-/-</sup> mice compared with control mice.

The inner lining of intestines, the intestinal epithelium, ensures adequate digestion and adsorption of nutrients. It is made up of several different cell types, all of which fulfill a specific function. Intestinal stem cells ensure proper functioning of the intestines, which requires constantly replacing old and damaged cells with young cells, by developing, or differentiating, into one of the different intestinal epithelial cell types when needed. Because there is a constant demand for new cells, intestinal stem cells have the ability to self-renew, thereby providing a constant supply of stem cells as well. However, little is known about the mechanisms that regulate this balance between self-renewal and differentiation.



A. ISCs undergo self-renewal and have the capacity to produce more differentiated epithelial cells, such as immature secretory epithelial cells. The balance between self-renewal and differentiation is strictly maintained in ISCs. B. In *Irf2*<sup>-/-</sup> mice, augmented IFN signaling causes aberrant differentiation of ISCs into immature secretory epithelial cells, that causes ISC reduction. Credit: Department of Biodefense Research, TMDU

"Just like any other type of stem cell, intestinal stem cells have the ability to differentiate into any cell within their lineage," says corresponding author of the study Professor Toshiaki Ohteki. "But they have to do it in a regulated manner, only differentiating when needed. The goal of our study was to understand the regulatory mechanism that preserves the stemness of intestinal stem cells."

To achieve their goal, Taku Sato, a main contributor of this project, and collaborators focused on a molecular signaling pathway that they had previously shown to preserve the stemness of hematopoietic stem cells (HSCs) that give rise to blood cells. Interferons are molecules that are produced especially during viral and bacterial infections, but more recently it was also shown that they are present even in the absence of infections to regulate various biological processes. In either case, interferons induce the expression of certain genes, a process that is regulated by the protein interferon regulatory factor-2 (IRF2) to ensure that the actions of interferons are balanced. In the case of HSCs, IRF2 turned out to be a critical factor for their stemness.

In the current study, the researchers found that IRF2 is produced throughout the intestinal epithelium and that IRF2-deficient mice had normal anatomical structure during homeostasis (the absence of an infection or any other damaging factor). However, in the presence of 5-fluorouracil, which is known to damage the intestinal epithelium, normal mice were able to regenerate completely, but IRF2-deficient mice showed a blunted regenerative response, indicating that intestinal stem cells were not able to function properly in the absence of IRF2. Interestingly, immature Paneth cells, which are specialized secretory cells, were highly abundant in IRF2-deficient mice. The researchers had the same finding in normal mice exposed to lymphocytic choriomeningitis virus (LCMV), which causes chronic infection.

"These are striking results that show how excess interferon signaling in the absence of IRF2 impairs the ability to self-renew and directs intestinal stem cells towards the secretory cell lineage. Our findings provide new insight into the biology of intestinal stem cells and show that regulated interferon signaling is a means to preserve the stemness of intestinal stem cells," says Professor Ohteki.

**More information:** Taku Sato et al, Regulated IFN signalling preserves the stemness of intestinal stem cells by restricting differentiation into secretory-cell lineages, *Nature Cell Biology* (2020). DOI: [10.1038/s41556-020-0545-5](https://doi.org/10.1038/s41556-020-0545-5)

**Journal information:** [Nature Cell Biology](https://www.nature.com/news/2020-08-molecular-guardian-intestinal-stem-cells.html)  
<https://phys.org/news/2020-08-molecular-guardian-intestinal-stem-cells.html>

## India has "best" COVID-19 recovery rate, lowest mortality rate: Harsh Vardhan

New Delhi: India has the "best" COVID-19 recovery rate of about 75 per cent, which is improving every day, and the "lowest" mortality rate of 1.87 per cent in the world, Union Health Minister Harsh Vardhan said on Saturday.

After inaugurating a 10-bed make-shift hospital of the National Disaster Response Force (NDRF) in Ghaziabad near Delhi, he said India began formulating its strategy against coronavirus from January 8 as soon as the world came to know about the outbreak of the disease.

Vardhan said "many intelligent people, scientists and naysayers" had estimated that India, with a population of about 135 crore, will see 300 million COVID-19 cases and about 5-6 million people will die by July-August, and the country's healthcare system was "incapable" to combat the disease.

"However, I am happy to say that in the eighth month of the battle, India has the best recovery rate of 75 per cent and against an estimate of 300 million affected we have not even reached 3 million cases."

"In fact, 2.2 million patients have recovered and gone home and another seven lakh are going to be cured very soon," he said.

The minister said these successes were achieved due to the "coordinated" efforts with the participation of everyone -- the government and the people.

India has the lowest mortality rate of 1.87 per cent in the world, he said, adding the recovery rate was improved every day.

"We started with only one testing laboratory in Pune but we scaled up our diagnostic capabilities and strengthened our testing capacity.

"Today, India has 1,511 testing labs for COVID-19 and on Friday we tested over one million samples... that was about 10.23 lakh samples," the minister said.

In such a little time, 15,000 dedicated COVID care hospitals with 15 lakh beds were set up across the country and if the quarantine facilities are added to it there are 25 lakh beds, Vardhan said.

The minister congratulated the NDRF for its contribution in the COVID-19 battle as well as in disaster management.

In a statement, the NDRF said the hospital inaugurated by the minister is located at its eighth battalion camp in Ghaziabad and has been developed in collaboration with CSIR's constituent laboratory called the Central Building Research Institute (CSIR-CBRI), Roorkee.

"The makeshift hospital is designed to provide a primary health facility with safety, security and a comfortable living environment."

"This fully air-conditioned pre-fabricated makeshift hospital is equipped with various modern facilities like paramonitors, defibrillators and ECG machines," the NDRF said.

The hospital is planned to serve in disaster stage including for use in a long pandemic or emergency situations, it said.

NDRF Director General SN Pradhan said the force is planning "to procure all its disaster response equipment and tools from the DRDO and CSIR to promote the Make in India campaign."

The force was raised in 2006 and has its 12 battalions, comprising about 13,000 personnel, based at various locations in the country.

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

<https://www.outlookindia.com/newscroll/india-has-best-covid19-recovery-rate-lowest-mortality-rate-harsh-varadhan/1920927>

# hindustantimes

Sun, 23 Aug 2020

## Bharat Biotech gets nod to conduct Covaxin trial through skin

*Currently, the vaccine was being tested through intramuscular route, where it is injected directly into the muscle. The trial is being run on 1,125 patients at 12 hospitals across the country including All India Institute of Medical Sciences*

*Edited By Shivani Kumar*

New Delhi: Hyderabad-based Bharat Biotech International Limited got approval from the Central Drugs Standard Control Organisation (CDSCO) to conduct a separate clinical trial of their Covid-19 vaccine 'Covaxin' through the skin. Currently, the vaccine was being tested through intramuscular route, where it is injected directly into the muscle.

The CDSCO is a pharmaceutical regulatory body under the health ministry. It regulates the quality of drugs and vaccines in the country.

The trial is being conducted on 1,125 patients at 12 hospitals across the country including All India Institute of Medical Sciences.

The Bharat Biotech is working on the Covid-19 vaccine project call "Covaxin". Indian Council for Medical Research (ICMR) has also partnered with the company on the trials.

As per the report, the findings of the intradermal route will be analysed separately along with the current intramuscular trial. If the result proves to be successful, the vaccine could be made cheaper as the vaccine would be injected in the dermis, one of the layers of the skin. Lesser dosage is required in this method which can then help in more people getting vaccinated.

However, the committee's approval is subjected to two conditions that the company is required to follow— following up on participants for six months to check how much antibodies have been developed along with general health assessment.

The sites for the study should be different from the sites of the intramuscular study, according to the second condition.

<https://www.hindustantimes.com/india-news/bharat-biotech-gets-nod-to-conduct-covaxin-trial-through-skin/story-slISz7aHe425LEjqm3xnAM.html>



The CDSCO is a pharmaceutical regulatory body under the health ministry. It regulates the quality of drugs and vaccines in the country.(Reuters file photo for representation)

## Covid-19 vaccine: Experimental nasal vaccine proves effective in mice, says study

By Himani Sheth

A new vaccine that targets the novel coronavirus, which can be delivered through the nose, has been proven effective in preventing infection in mice susceptible to the virus, according to a new study published in the journal *Cell*.

Researchers at the Washington University School of Medicine in St. Louis have developed a vaccine that targets the SARS-CoV-2 virus. Unlike other vaccines, this vaccine can be delivered in one dose via the nose.



“We were happily surprised to see a strong immune response in the cells of the inner lining of the nose and upper airway — and a profound protection from infection with this virus,” said senior author Michael S Diamond, MD, PhD, the Herbert S Gasser, Professor of Medicine and a professor of molecular microbiology, and of pathology and immunology. “These mice were well protected from disease. And in some of the mice, we saw evidence of sterilizing immunity, where there is no sign of infection whatsoever after the mouse is challenged with the virus.”

According to the new study on mice, researchers discovered that the vaccine was more effective in preventing the infection from taking over the body as it was particularly effective in generating an immune response in the nose and respiratory tract.

The vaccine has been developed by inserting a spike protein used by coronaviruses, inside another virus – called an adenovirus – that causes the common cold.

### ‘Promising results’

“Adenoviruses are the basis for many investigational vaccines for Covid-19 and other infectious diseases, such as Ebola virus and tuberculosis, and they have good safety and efficacy records, but not much research has been done with nasal delivery of these vaccines,” said co-senior author David T Curiel, MD, PhD, the Distinguished Professor of Radiation Oncology.

“All of the other adenovirus vaccines in development for Covid-19 are delivered by injection into the arm or thigh muscle. The nose is a novel route, so our results are surprising and promising. It’s also important that a single dose produced such a robust immune response. Vaccines that require two doses for full protection are less effective because some people, for various reasons, never receive the second dose.”

This vaccine does not use live virus that can replicate itself making it safer according to the researchers. However, it has only been studied in mice so far.

“The investigators next plan to test the vaccine in non-human primates and humans to see if it is safe and effective in preventing Covid-19 infection,” according to an official release by the University.

<https://www.thehindubusinessline.com/news/science/covid-19-vaccine-experimental-nasal-vaccine-proves-effective-in-mice-says-study/article32419491.ece>

## Pfizer-BioNTech COVID-19 vaccine shows positive results, may get approved by October

*Pfizer and BioNTech said the Covid-19 vaccine they are jointly developing is on track to be submitted for regulatory review as early as October, as they released additional data from an early-stage study*

US pharmaceutical company Pfizer and German biotech firm BioNTech released the safety and immunogenicity data from the phase 1 trial of their second and lead mRNA-based vaccine candidate against coronavirus. Pfizer and BioNTech said the Covid-19 vaccine they are jointly developing is on track to be submitted for regulatory review as early as October.

The companies said the vaccine was well tolerated with mild to moderate fever in fewer than 20% of the participants. The companies are continuing to analyze data from the Phase 1 trials in the U.S. and Germany, they were quoted as saying in a statement by Bloomberg.

The BNT162b2 vaccine seemed to generate a similar immune response, but fewer side effects than the other vaccine BNT162b1. Systemic events after administration of BNT162b2 were milder than those with BNT162b1, they said in the release.

“The totality of the clinical and preclinical data informed Pfizer and BioNTech’s decision to select BNT162b2 as the lead candidate to advance into pivotal trials. We are proud to share our findings with the scientific community as we continue our work to deliver a safe and effective vaccine to combat this devastating virus,” said Kathrin U Jansen, Ph.D, Senior Vice President and Head of Vaccine Research & Development, Pfizer.

“We are especially pleased to offer these early data showing our vaccine candidate’s promising safety and immunogenicity profile from the US trial and we look forward to sharing T cell immune response data from the German trial in the near future.”

The confirmation of their October goal, first announced last month, would make the vaccine one of the fastest-moving in the world. Some analysts expect a vaccine to be approved for use by November in the U.S., a move which may give President Donald Trump a new foothold in the election.

If trials succeed and regulatory authorization or approval is obtained, the companies plan to supply up to 100 million doses worldwide by the end of 2020 and approximately 1.3 billion doses by the end of 2021.

Pfizer and BioNTech last month clinched a \$2 billion deal to supply an initial 100 million doses of the vaccine to the U.S. Governments around the world are looking to lock up supplies of still-experimental candidates in hope of stabilizing local economies and stopping spread of the virus that’s taken almost 800,000 lives globally.

<https://www.indiatvnews.com/news/good-news/pfizer-biontech-covid19-vaccine-shows-positive-results-on-track-for-regulatory-review-in-october-643887>



**Pfizer-BioNTech COVID-19 vaccine shows positive results, on track for regulatory review in October**



## Self-collected saliva and deep nasal swabs are equally effective for diagnosing COVID-19, study finds

### *Summary:*

***Self-collected saliva and deep nasal swabs collected by healthcare providers are equally effective for detecting SARS-CoV-2, the virus that causes COVID-19, according to a new study.***

Self-collected saliva and deep nasal swabs collected by healthcare providers are equally effective for detecting SARS-CoV-2, the virus that causes COVID-19, according to a new study conducted by ARUP Laboratories and University of Utah (U of U) Health.

The study, published in the *Journal of Clinical Microbiology*, represents one of the largest prospective specimen type comparisons to date, said Julio Delgado, MD, MS, ARUP chief medical officer. Other studies, including one from the Yale School of Public Health, have reached similar conclusions but with markedly fewer patients and specimens.

Researchers also found that specimens self-collected from the front of the nose are less effective than deep nasal swabs for virus detection. This finding prompted a subsequent study that has not yet been published in which researchers learned they could improve the sensitivity of anterior nasal swab testing to 98% by combining an anterior nasal swab with a swab collected from the back of the throat.

The results have important implications for patients and providers. The collection process for saliva and anterior nasal specimens is less invasive than the deep nasal, or nasopharyngeal, swab. In addition, both specimen types can be self-collected, reducing the risk of exposure for healthcare workers who collect nasopharyngeal specimens, said Kimberly Hanson, MD, MPH, section chief of clinical microbiology at ARUP and the primary author of the study.

"Saliva and nasal swab self-collection can resolve many of the resource and safety issues involved in SARS-CoV-2 diagnostic testing," Delgado said.

ARUP and U of U Health anticipate being able to start offering testing on saliva in some U of U Health clinical settings in early September. They already are using anterior nasal swabs in combination with throat swabs to test some asymptomatic individuals.

COVID-19 testing on these alternatives to nasopharyngeal swabs will increase with time, Delgado said. "From the start of the COVID-19 pandemic, ARUP has worked to build capacity for high-quality COVID-19 testing," he said. "Our goal is to make this testing available to hospitals and healthcare systems nationwide."

Hanson and her colleagues analyzed more than 1,100 specimens from 368 volunteers at the U of U Health Redwood Health Center drive-through testing site from late May through June. Volunteers self-collected saliva that they spit into a tube and swabbed from the front of both nostrils to produce specimens for testing. The researchers compared test results from these specimen types with test results from nasopharyngeal swabs healthcare providers collected from the volunteers. Discrepant results across specimens collected from the same patient triggered repeat testing using a second polymerase chain reaction (PCR)-based platform.

The study showed that SARS-CoV-2 was detected in at least two specimen types in 90% of the patients who tested positive for the virus.

As a standalone alternative specimen to nasopharyngeal swabs, saliva proved to be an excellent option, Hanson said. Positivity rates for saliva specimens were nearly the same as those for nasopharyngeal specimens.

The research showed that self-collected nasal swabs, when used alone, can miss nearly 15% of infections, which prompted researchers' further study combining them with oropharyngeal, or throat swabs.

The research is an example of how ARUP and U of U Health continue to explore new methods to serve patients and the community as well as keep healthcare workers safe, said Richard Orlandi, MD, chief medical officer for ambulatory health at U of U Health. "We appreciate the researchers at ARUP, as well as the staff and patients at our Redwood testing center who have participated in this discovery," he said. "This exciting advance reflects ARUP's and U of U Health's innovative spirit and the benefits of our partnership."

**Journal Reference:**

1. K. E. Hanson, A. P. Barker, D. R. Hillyard, N Gilmore, J. W. Barrett, R. R. Orlandi, S. M. Shakir. **Self-Collected Anterior Nasal and Saliva Specimens versus Healthcare Worker-Collected Nasopharyngeal Swabs for the Molecular Detection of SARS-CoV-2.** *Journal of Clinical Microbiology*, 2020; DOI: [10.1128/JCM.01824-20](https://doi.org/10.1128/JCM.01824-20)  
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## Gargled water may be used as alternative to swabs for Covid-19 sample: ICMR

*According to ICMR, swab collection has several drawbacks also as it requires training, exposes the healthcare workers (HCWs) to the virus-containing aerosols and has poor patient acceptability and is resource-intensive*

New Delhi: A study published by the Indian Council of Medical Research (ICMR) has revealed that gargle lavage may be a feasible alternative to swabs for sample collection for the detection of SARS-CoV-2.

The primary objective of this study was to assess agreement between gargle lavage and swab as an appropriate respiratory sample for the detection of SARS-CoV-2, said ICMR. The secondary objective was to assess the patient acceptability of the two sampling methods.

The top researchers at ICMR conducted a cross-sectional study at AIIMS hospital in Delhi from May-June on 50 Covid-19 patients.

The ICMR study pointed out that whether the risk of aerosol generation was similar to swab collection (commonly leads to coughing and sneezing) or higher was not clear.

"To minimize the risk of transmission due to aerosols and to maximize the benefits of this method of collection, it would be best to employ it for home collection. Furthermore, it cannot be used in patients who are critically ill as well as in young children/patients who may not be able to follow instructions/perform gargle," it said.

"Preliminary results of the study show that the gargle lavage may be a viable alternative to swabs for sample collection for the detection of SARS-CoV-2. Adoption of gargle lavage for sample collection will have a significant impact as it will enable easy self-collection, relieve healthcare workers and also lead to substantial cost savings by reducing the need for swabs and personal protective equipment," concluded the findings of the study.



The ICMR study pointed out that whether the risk of aerosol generation was similar to swab collection. (Representational Image) (Unsplash)

According to the study, all gargle samples were positive and comparable to their corresponding swab samples irrespective of the symptoms and duration of illness.

“The cycle threshold (C ) values for gargle samples were slightly higher but comparable to those of swabs. The majority (72%) of the patients reported moderate to severe discomfort with swab collection in comparison to 24 per cent reporting only mild discomfort with gargle collection,” it said adding that bland-altman plot showed good agreement between the two methods.

According to ICMR, swab collection has several drawbacks also as it requires training, exposes the healthcare workers (HCWs) to the virus-containing aerosols and has poor patient acceptability and is resource-intensive.

“An alternative sample collection method that could overcome most of these limitations without compromising the yield of the test is the need of the hour. One such method is the collection of gargle lavage. Although the use of gargle specimens is not new, at present, there is little published information on the suitability of gargle specimens to diagnose SARS- CoV-2 infection,” the study highlighted.

“Paired Nasopharyngeal and oropharyngeal swab (NPS and OPS) and gargle samples were taken within 72 hours of their diagnosis. Samples were processed by reverse transcription-polymerase chain reaction (RT-PCR) for detection of SARS-CoV-2. Post-sample collection, a 10-point scale was administered to assess the level of discomfort with either of the collection methods,” stated the study published in the Indian Journal of Medical Research (IJMR).

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<https://www.hindustantimes.com/health/gargled-water-may-be-used-as-alternative-to-swabs-for-covid-19-sample-icmr/story-cNMua5aAaNr0CFvAwMHdyI.html>

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## Contact tracing apps likely to be ineffective for reducing Covid-19 transmission, says study

*The research suggests that large-scale manual contact tracing alongside other public health control measures -- such as physical distancing and closure of indoor spaces such as pubs -- is likely to be required in conjunction with automated approaches*

Contact tracing apps are unlikely to contain the spread of Covid-19 without proper public health control measures such as physical distancing and closure of indoor spaces, according to a review of studies.

The systematic review, published in the journal Lancet Digital Health on Thursday, shows that evidence around the effectiveness of automated contact tracing systems is currently very limited.

The research suggests that large-scale manual contact tracing alongside other public health control measures -- such as physical distancing and closure of indoor spaces such as pubs -- is likely to be required in conjunction with automated approaches.

The researchers from University College London (UCL) in the UK found 15 relevant studies by reviewing more than 4,000 papers on automated and partially-automated contact tracing.



Analysis of automated contact tracing apps generally suggested that high population uptake of relevant apps is required alongside other control measures. (Representational Image) (Unsplash)

They analysed these to understand the potential impact these tools could have in controlling the Covid-19 pandemic.

“Across a number of modelling studies, we found a consistent picture that although automated contact tracing could support manual contact tracing, the systems will require large-scale uptake by the population and strict adherence to quarantine advice by contacts notified to have a significant impact on reducing transmission,” said lead author Isobel Braithwaite from UCL.

In total, 4,033 papers published between January, 2000 and April, 2020 were reviewed, which allowed researchers to identify 15 papers with useful data.

The seven studies that addressed automated contact tracing directly were modelling studies that all focused on Covid-19.

Partially-automated systems may have some automated processes, for instance in determining the duration of follow-up of contacts required, but do not use proximity of smartphones as a proxy for contact with an infected person.

Analysis of automated contact tracing apps generally suggested that high population uptake of relevant apps is required alongside other control measures, while partially-automated systems often had better follow-up and slightly more timely intervention.

“Although automated contact tracing shows some promise in helping reduce transmission of Covid-19 within communities, our research highlighted the urgent need for further evaluation of these apps within public health practice,” said Braithwaite.

“None of the studies we found provided real-world evidence of their effectiveness, and to improve our understanding of how they could support manual contact tracing systems,” Braithwaite said.

The review shows that, at present, there is insufficient evidence to justify reliance on automated contact tracing approaches without additional extensive public health control measures.

“We currently do not have good evidence about whether a notification from a smartphone app is as effective in breaking chains of transmission by giving advice to isolate due to contact with a case of Covid-19 when compared to advice provided by a public health contact tracer,” said Robert Aldridge from UCL Institute of Health Informatics.

“We urgently need to study this evidence gap and examine how automated approaches can be integrated with existing contact tracing and disease control strategies, and generate evidence on whether these new digital approaches are cost-effective and equitable,” Aldridge said.

If implemented effectively and quarantine advice is adhered to appropriately, automated contact tracing may offer benefits such as reducing reliance on human recall of close contacts, which could enable identification of additional at-risk individuals, informing potentially affected people in real-time, and saving on resources, the researchers said.

“We should be mindful that automated approaches raise potential privacy and ethics concerns, and also rely on high smartphone ownership, so they may be of very limited value in some countries,” Braithwaite said.

“Too much reliance on automated contact tracing apps may also increase the risk of Covid-19 for vulnerable and digitally-excluded groups such as older people and people experiencing homelessness,” Braithwaite added.

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<https://www.hindustantimes.com/health/contact-tracing-apps-likely-to-be-ineffective-for-reducing-covid-19-transmission-says-study/story-rdGxOtPwsqHnZo7nwzLUSP.html>

