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Security agencies to identify most vulnerable installations

By Sanjeev Pargal

- *Anti-drone tech almost ready with DRDO*
- *Buildings between 15-20 kms from border to get preference*

Jammu: Security agencies are in the process of identification of strategically important sites within the distance of 15 to 20 kilometers from the Line of Control (LoC) and International Border (IB) for installation of anti-drone technology developed by the Defence and Research Development Organization (DRDO) to thwart June 27 like terror attacks using drones on the Indian Air Force (IAF) base at Satwari here.

“Initially, the technology is likely to be installed at selective security installations which are strategically more significant and are located within 15 to 20 kilometers from LoC and IB in Jammu and Kashmir,” sources told the Excelsior.

They said the DRDO has demonstrated anti-drone technology to top Army Commanders and apparently it seems successful as it can hit the approaching drones nearly three to four kilometers away from the target.

However, they added, the system is quite expensive and would cost around Rs 22 crore per equipment.

There are a number of military installations in Jammu and Kashmir which are located between 15 to 20 kilometers from the Line of Control and International Border. If the new technology is approved by the Military Commanders, initially the security agencies might go for installation of new equipments in very limited manner.

For the purpose, sources said, the security agencies are in the process of identification of strategically important installations which will require anti-drone technology immediately and the buildings where it can be installed at a later stage.

“Gradually, majority of sensitive installations might require installation of anti-drone technology but to begin with the security agencies want to protect the sensitive installations which are located close to the Line of Control and International Border with Pakistan,” sources pointed out.

The Indian Air Force base at Satwari which was targeted by twin drone strikes in the wee hours of June 27 was about 14 kilometers from Makwal along Niki Tawi International Border and around 20 to 22 kilometers from RS Pura. Sources, however, believed that if the drones were launched from Pakistan, they took Makwal route as there have been no indications to suggest that it was localized attack.



Though a fortnight has passed after first-ever sensational drone attacks on the Indian Air Force base, investigating agencies haven't come out with any specific statement so far to indicate whether the drones carrying explosives were launched from Pakistan or within the Indian territory though majority of security agencies believed that the attack was handiwork of Lashkar-e-Toiba (LeT) outfit and was carried out from across the border.

"Chances of localized attack are negligible," they asserted and said the investigating agencies are working on route taken by the drones.

As reported, the drones were fitted with RDX-laden compact devices which exploded with pressure fuse. The drones dropped two bombs-one each at building of the Indian Air Force and another at lawn causing minor damage and injuries to two IAF personnel before returning. It is also not clear whether the drones returned to Pakistan or were diverted to isolated areas.

Sources said the drones had capability to cover 15 kilometers distance. Earlier, twice drones had flown 10 kilometers in Rajouri district to drop consignment of arms and ammunition and then returned. In Akhnoor also, a drone was reported to have covered nearly 12 kilometers distance from across the border.

"It was in view of the distance covered by drones in Jammu, Rajouri and Akhnoor that security agencies planned to cover strategic installations within 15-20 kilometers from Line of Control and International Border with anti-drone technology," sources pointed out.

Only yesterday, Lieutenant Governor Manoj Sinha, in an interview with national news channel, had stated that the country was in advanced stage of developing technology to counter drone attacks.

He had stated that all security installations in Jammu and Kashmir are fully safe. Worthwhile to mention here that after drone attacks at the Indian Air Force base in Satwari, for next three days, drones had been spotted over military installations at Kaluchak, Ratnuchak and Kunjwani. Since then, no movement of drones has been observed.

However, a Jaish-e-Mohammed (JeM) militant arrested yesterday by Jammu Police at Gangyal revealed that he was taking consignment of arms and grenades to Kashmir in a truck which he had picked up from the International Border between Jammu and Samba sector. The consignment had been dropped from Pakistan using drone. He also confessed that he had shifted similar consignment in May to Kashmir from the same sector which had also been dropped through drone.

<https://www.dailyexcelsior.com/security-agencies-to-identify-most-vulnerable-installations/>

RudraM-II: India's first ALBM taking shape for trial

India's DRDO for the first time had partially shown RudraM-II ALBM when M Venkaiah Naidu, Vice President of India, visited DRDO's Dr. APJ Abdul Kalam Missile Complex in Hyderabad. RudraM-II is India's first Air-launched ballistic missile or ALBM that is now taking shape to begin its developmental trials as per the information that is coming in after it completed its captive flight and release flight trials from Sukhoi-30MKI fighter aircraft successfully.

RudraM-II ALBM has a range of 350km that can travel at Mach 4 speeds with a 200kg warhead towards the ground or sea-based target. RudraM-II has been seen weapons package of upcoming Tejas Mk2 and TEDBF fighter programs, but some reports suggest that RudraM-IIA is a spinoff of RudraM-II which is under development for the Indian Navy with additional sea-skimming features and enhanced sensors to locate moving targets in the sea.

DRDO is also working on the development of RudraM-III ALBM that will be twice the weight of the RudraM-II and will have a range above 600km.

<https://www.eletimes.com/rudram-ii-indias-first-albm-taking-shape-for-trial>



Frshr Technologies emerges as National level Winner of DRDO's Dare to Dream 2.0 contest

Bengaluru (Karnataka) [India], July 12 (ANI/ThePRTree): Bengaluru based startup, Frshr Technologies, specializing in Software Product Development has recently become the National Level Winner at DRDO's Dare to Dream 2.0 Contest.

The startup achieved the first position nationally by showcasing their innovative 'AIRecognize' Product, detecting persons based on the physiological parameters.

DRDO's (Defence Research and Development Organization) Dare to Dream contest was launched on the 5th Death Anniversary of former Prime Minister, APJ Abdul Kalam, to promote India's prominent Innovators and Startups in the field of defense and aerospace technologies with the objective of 'Atma Nirbhar Bharat'.



Naren Lokwani

Defense installations and VIP areas spread across thousands of kilometers across India are prone to unauthorized access by suspicious people and there have been several instances where security camps have been attacked in the past. AIRecognize product identifies unusual person movement styles and body structures to identify suspicious persons. E.g. Person carrying a hidden weapon which is 5-6 kgs will have an abnormal gait. Person trying to hide his face and moving forward will have an abnormal posture.

Realizing the deep impact of AIRecognize application and its innovative AI technology, DRDO has Frshr Technologies has emerged as the winner in this All India contest for innovative startups with products in defense and national security.

Naren Lokwani, CEO of Frshr Technologies said, "We are thankful to DRDO for this recognition and this is a testament to talent and hard work of our team. Security and Defense is an under-served sector today when it comes to Software innovations. We at Frshr Tech believe that our product AIRecognize can strengthen country's security and defense by identifying, blocking and proactively minimizing unauthorized access to security installations."

Frshr Technologies designs and develops Software Products based on AI, ML and Mobile Technologies for the hi-tech sector. Frshr Technologies is also a "Startup for Startups" and provides Software Product Development, AI and ML, Mobile App Development, and Web App Development services for other startups and companies in India and across the globe.

CEO of Frshr Technologies, Naren Lokwani is a veteran executive in Software and IT sector. He has launched several product startups, raised VC funds and managed profitable exits for his companies.

At Frshr Technologies, Naren Lokwani has built a team of 40 software engineers who build innovative software products and provide Software Product Engineering Services to companies in India and across the globe.

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https://www.business-standard.com/content/press-releases-ani/frshr-technologies-emerges-as-national-level-winner-of-drdo-s-dare-to-dream-2-0-contest-121071200862_1.html

Tue, 13 July 2021

Indigenous Light Combat Helicopters from HAL for IAF and the Army

In anticipation of orders from the two services, the HAL had already initiated the production of Limited Series Production (LSP) helicopters

By Huma Siddiqui

The Indian Air Force (IAF) and the Indian Army are both set to get the indigenous Light Combat Helicopters from the state owned Hindustan Aeronautics Limited (HAL), pending contract finalization of 15 Limited Series Production (LSP) of LCH. Confirming this to Financial Express Online, source said “HAL has received Letter of Intent (LoI) for 5 LCH for IAF and 5 for the Indian Army. The company has produced and signaled out 3 LSP Light Combat Helicopters for the IAF. Same is going to be subjected to customer acceptance and training shortly. In the current year we are producing 4 LCH for the Army and 2 for IAF. Remaining 6 LCH will be produced next year. The training for the first batch of IAF personnel has commenced at Helicopter Division (Bengaluru).”



The IAF had issued a Request for Proposal (RFP) for 15 LSP helicopters .(Image Credits: HAL)

As has been reported by Financial Express Online earlier, IAF and the Indian Army together have a requirement of around 160 LCHs – in this 65 will be for IAF and the balance for the Army. In 2020, the Defence Acquisition Council (DAC) had put its stamp of approval over the proposal for an initial batch of 15 LCHs.

In anticipation of orders from the two services, the HAL had already initiated the production of Limited Series Production (LSP) helicopters. The IAF had issued a Request for Proposal (RFP) for 15 LSP helicopters which included 10 for IAF and for the Indian Army 5. Based on the RFP, the cost negotiations and technical evaluations were carried out.

In August 2020, during the ongoing standoff with China along the Line of Actual Control in eastern Ladakh, the IAF had decided to deploy two LCH for operations at high altitude. These helicopters are expected to meet the demands of the armed forces and to support the IAF in missions at short notice. Last year, the helicopters had successfully displayed their quick deployment prowess to forward locations in extreme temperatures and treacherous terrains.

Need for LCH Helicopters

There are around 90 Advanced Light Helicopters (ALH) and 75 Rudra, weaponized ALH, helicopters in service with the Indian Army. All these helicopters have not only been designed but developed too by HAL. There are 160 Cheetah and Chetak Utility Helicopters which need to be replaced urgently.

The Indian Army has pitched for attack helicopters of its own to operate with its strike Corps. Presently, the IAF provides close air support to the Indian Army. As has been reported earlier, soon the Indian Army will get its own Apache attack helicopters from the US based Boeing Company in 2023. The Army will get six helicopters, the deal for which was firmed up last year for USD 800 million.

The IAF is already flying 22 AH-64E Apache attack helicopters from the US, and also has Mi-25 and Mi-35 Russian attack helicopters. These two are in the process of being phased out gradually.

<https://www.financialexpress.com/defence/indigenous-light-combat-helicopters-from-hal-for-iaf-and-the-army/2288578/>



Tue, 13 July 2021

Eyes in the sky: Exploring India's evolving drone ecosystem

India is among the largest importers of military drones in the world, according to SIPRI. The commercial and social uses of these UAVs in the country are no less important

By Chaitanya Mallapur

On June 27 last month, India unexpectedly woke up to a technological and cultural phenomenon, which has existed in the country for more than two decades - drones or unmanned aerial vehicles (UAVs). Security agencies reported the first ever drone attack, carrying out two low intensity explosions in the technical area of the Jammu Air Force station.

The drones used in the Jammu attack are expected to be low cost, modified commercial drones, experts suggest. The attack has raised concerns over the advanced warfare means used by terror outfits and their operators across the border.

With investigation still underway, the role and involvement of the drone operators involved in the attack are yet to be established. However, preliminary findings reveal that the use of explosives in the attack are likely to have had their origins in Pakistan, as per media reports.

“Even though there is no evidence so far on where the drones took off from or returned to, a Jammu Kashmir Police officer said multiple past investigations have suggested that similar drones used to drop weapons in earlier cases, were flown from locations across the border,”

Moneycontrol reported on July 4. The report also suggests several instances of drone sightings in the last one month along the border region in Jammu.

Regulation and control over domestic use of UAVs

Unmanned aerial vehicles or drones come in various sizes with different functionalities like video/photography, mapping, surveillance, deliveries, making announcements and spraying insecticides on farms, among other activities. Why, drones are being used in places as diverse as weddings and public events!

With such large-scale – nay abundant - use, drones are perfectly handy in the possession of rogue elements.



Rustom 2 (Source: DRDO)

To regulate the use of drones, the government has issued guidelines under the Unmanned Aircraft System Rules, 2021. Under this, those who intend to operate drones will need to seek a permit and a license for using it, based on the categorisation of UAVs.



Likewise, those who intend to import such systems in India must obtain approval and permits from the government.

Says Ankit Mehta, Co-Founder & CEO of ideaForge, one of the largest private manufacturers of drones for defence, homeland security and industrial applications: “Drones used in public events need to have a UIN (Unique Identification Number) or permit from the government and should only take off when given permission from the Digital Sky Platform.”

About 42 drones have been issued a UIN on the Digital Sky Platform, as of July 12.

“More people need to be brought under the fold of regulation so that very few are left out and can be traced through their license (number) in case of an untoward incident. Similarly, it is important to deploy counter drone solutions to detect the threat and ensure safety of our own systems used for ISR (intelligence, surveillance, and reconnaissance) purposes at the same time,” he adds.

India's drone market on the rise

India is said to be the fastest growing drone market in the world. It is predicted to mushroom to \$885 million by 2021, according to a January 2020 PwC report, and is expected to reach \$1,810 million by FY 2026, growing at a CAGR (compound annual growth rate) of 14.61 percent.

The global drone market is to scale over \$43 billion in 2024 from \$14 billion in 2018 at a CAGR of 20.5 percent.

Adds Mehta: “The drone market in India and worldwide is evolving and exploding, and we should let it happen in terms of technological and economic advancements for the right purposes. At the same time, it should be ensured that these advancements take place in a controlled manner.”

To be sure, there are benefits galore. Last month it was reported that ANRA Technologies, a global drone services provider, will hold experimental deliveries of medicines in collaboration with the Indian Institute of Technology (IIT) Ropar and with Swiggy for food deliveries.

Likewise, Throttle Aerospace and Daksha Unmanned Systems in collaboration with Narayana Healthcare will conduct deliveries of medicines in Gauribidanur in Karnataka and Thiruvalluvar outside Chennai.

In addition to commercial utilisation, UAVs have been increasingly used for defence and military purposes globally for surveillance, reconnaissance, and warfare.

Third largest importer

India is the third largest importer of (military grade) UAVs, with 6.8 percent share of the total UAV transfers or deliveries reported across the globe ending 2020, according to Stockholm International Peace Research Institute’s (SIPRI) Arms Transfers database, analysed by *Moneycontrol*.

Since the 1960’s, an estimated 2,892 orders for UAVs have been recorded with the supplier countries, of which over 2,600 transfers or deliveries have taken place, SIPRI data show.

Of the estimated 2,612 UAVs delivered to countries, 11 percent are armed UAVs while others are mostly surveillance and reconnaissance drones.

Experts point out that the drones that India imports are mostly for military or defence purposes and larger in size, not the ones visible at public events.

Among the types of weapons covered under SIPRI’s database, UAVs fall under the aircraft systems category. The aircraft segment covers all fixed-wing aircraft and helicopters, including unmanned reconnaissance/surveillance aircraft with a minimum loaded weight of 20 kg, except microlight aircraft, powered and unpowered gliders and target drones.

SIPRI maintains data of deals between arms suppliers and recipients over a specific time. Transfers also include licensed production of weapon systems, components, or assembly under the deal by the recipient countries, in some cases.

The trade registry records orders placed to the supplier nations and deliveries are received by the recipients. In cases where a delivery has been identified but either the supplier or the recipient is not recognized with certainty, the transfers are registered as ‘unknown’ suppliers or recipients.

The United Kingdom is the largest recipient or importer of UAVs (195) ending 2020, followed by France (187), India (178), Egypt (144) and Italy (141). These countries account for 32 percent share of total UAVs delivered or received worldwide.

India’s western neighbour, Pakistan is the seventh largest importer with 128 UAVs, according to SIPRI. Pakistan’s official UAV imports come majorly from Italy, Germany, China, and the United States.

On the other hand, Israel is the largest supplier of UAVs in the world, having transferred 810 UAVs ending 2020, followed by the United States (625), Canada (450), China (240) and Austria (112).

Japan was the first country to import or receive (armed) UAVs in 1968-69 from the USA, as per records maintained by the Swedish think tank.

India’s Israel imports

India’s first UAV import was reported in 1998 from Israel, as per SIPRI’s records. Most of the country’s imported drones are surveillance and reconnaissance types.

The drones or UAVs that India imports can be largely categorised under MALE (medium-altitude, long endurance), HALE (high-altitude, long endurance) and Tactical (having a fairly long

flight time and range) systems, largely used for defence purposes, says Mehta. “We are now also importing some of the smaller systems from Israel,” he adds.

Say Sameer Patil, Fellow, International Security Studies Programme, Gateway House and former Assistant Director at the National Security Council Secretariat in Prime Minister’s Office, New Delhi: "Surveillance drones imported from Israel have proved to be of great help to the Indian security forces, as they are capable of flying higher with longer endurance, which has helped reduce the burden on the security forces in manning the borders to some extent."

For a long time, we have been using these systems for surveillance and reconnaissance purposes along both our borders with China and Pakistan, he points out.

“India is now planning to get drones from the USA, which are capable of carrying weapons, based on their performance in the Khyber Pakhtunkhwa region and in Syria. However, funding has been an issue in procuring these drones as they are expensive,” Patil notes.

India is in the process of acquiring 30 armed MQ-9 Reaper drones from the US at an estimated \$3 billion deal. However, there is some delay due to high costs, reports suggest.

The Indian Navy is using two MQ-9B Sea Guardian drones for surveillance over the Indian Ocean, taken on lease from a US firm since November last year.

Currently, all the unmanned vehicles deployed by the Indian armed forces are ISR drones. India also does have some loitering munitions (also known as a suicide drones) imported from Israel, Mehta points out.

UAVs are also used in keeping watch on mass gatherings/protestors, counter insurgency operations as well as in maritime security, adds Patil.

Made in India

In addition to imports, India has also developed its own UAVs through public sector units and private companies. Some of these listed include Rustom, Nishant, Panchi and Netra, while micro and mini UAVs are registered as Black Kite, Golden Hawk, Pushpak, Imperial Eagle and Sly Bird.

There are more than 150 drone start-ups mushrooming in India, indicating the wide scope of evolution of the drone and UAV ecosystem, going forward.

In January, ideaForge received one of the largest small drone contracts worth \$20 million for SWITCH 1.0 UAVs, which will be inducted in the Indian armed forces. These UAVs are capable of long duration operations, long endurance surveillance and security inspection.

With domestically manufactured drones getting inducted in defence and other public services, India’s UAV industry is looking ahead. Given the security perception and their multifarious commercial and social uses, that appears to be the way ahead.

(Chaitanya Mallapur is a Research Analyst at Moneycontrol)

<https://www.google.com/search?q=indian+army+news&ie=utf-8&oe=utf-8&client=firefox-b-ab>

India's push for self-reliance brings public-private rift to a head

By Vivek Raghuvanshi

New Delhi — India's push to achieve industrial self-reliance has resulted in the government approving \$51.71 billion worth of new defense projects and twice implementing arms embargoes.

The new defense projects falls under the country's Make in India economic scheme, according to the Ministry of Defence, which has also passed two "positive indigenisation" lists totaling 209 items (the first list had 101, and the second had 108).

The first list of 101 defense items was released by the MoD in August 2020. It included several types of armaments such as artillery guns, assault rifles, corvettes, sonar systems, transport aircraft, ammunition, sonars, radars, conventional diesel-electric submarines, communication satellites and shipborne cruise missiles.



An Indian worker cleans an installation of the "Make In India" logo at the 35th India International Trade Fair in New Delhi on Nov. 17, 2015. (Money Sharma/AFP via Getty Images)

This second list is to be progressively implemented from December 2021 to December 2025. It calls for a number of weapons and platforms to be manufactured in India, including next-generation corvettes; single-engine light helicopters; airborne early warning and control systems; medium-power radars for mountainous terrain; land-based, medium-range surface-to-air missile systems; fixed-wing mini-UAVs; helicopter-launched, anti-tank guided missiles; battlefield surveillance radars; anti-materiel rifles; and mine-protected combat vehicles for infantry units.

The majority of items in the second list are subsystems or accessories for weapons and platforms already manufactured in India, and are not big-ticket defense products. They include instant fire detection and suppression systems; individual underwater breathing apparatuses; main switchboard and power distribution systems for ships; steering gear for destroyers and frigates; high-altitude water purification systems; and drop tanks for Jaguar and Mirage 2000 fighters.

Also among the several domestic defense industry-boosting initiatives are the Strategic Partnership model as well as the corporatization of the Ordnance Factory Board and its 41 ordnance factories. The move saw the group split into seven corporate entities.

"Development in silos and innovation in isolation are outdated ideas," said Baba Kalyani, chairman of Indian firm Bharat Forge Limited. An alternative path involves public-private partnerships, wherein private industry, public sector enterprises, and the government's Defence Research and Development Organisation work together to complement each other's capabilities, Kalyani added.

However, other industry leaders and defense analysts don't believe India's defense industry is mature enough to benefit from that approach; public sector enterprises are thriving, but the private sector is struggling. And there has been little structural change in regard to the Indian defense industry in the last few years, despite the "self-reliance" rhetoric.

The public sector secures most defense contracts, and India is the top arms importer in the world, according to the Stockholm International Peace Research Institute.

"These are the two key objective parameters against which performance of the Indian defense ecosystem needs to be measured," said Vivek Rae, the former chief of defense procurement for the MoD.

But since the government opened defense business to private companies in 2002, there has been steady progress toward self-reliance, especially in the past seven to eight years, according to the Society of Indian Defence Manufacturers, a local industry association.

Private companies that matured and grew by participating in developmental programs of indigenous systems and weapons have built successful track records in IDDM (Indigenously Designed and Developed and Manufactured) products, said SIDM chief Jayant Damodar Patil.

Patil, who is also the senior executive vice president for Larsen & Toubro's defense unit, said private defense firms are also creating success stories in the indigenous production of complex systems in partnership with foreign original equipment manufacturers.

Kalyani said the private sector adapts itself better to rapidly changing technology, and that with continued government support, India will realize its dream of becoming self-reliant and a competent exporter of defense and aerospace products.

"It will take some time, but we will surely be there as a net exporter of defense in the next 10 years," Kalyani predicted.

India plans to spend about \$150 billion on defense modernization to accomplish a target of 70 percent self-reliance in armament production by 2027. Additionally, the MoD has set out a domestic defense production target of \$25 billion by 2025, including \$5 billion of defense exports.

The ministry also reserved \$10 billion from the capital procurement budget for the purchase of weapons and platforms solely from domestic companies. This effort falls under the current 2021-2022 defense budget. Last year, the ministry spent \$7.28 billion on the purchase of weapons from domestic companies, out of which nearly 80 percent of the contracts were given to public sector enterprises.

The Indian defense industry is currently made up of nine public sector enterprises and 41 government-controlled ordnance factories; the private sector is made up of two dozen large firms, more than 100 medium-size companies, and about 6,000 small and micro enterprises. However, average annual domestic defense production amounts to \$10 billion in business. Out of this, about \$4.5 billion is spent on sourcing defense technologies from overseas in the form of subassemblies and subsystems.

Essentially, the private sector finds itself relegated to the role of subcontractor to the public sector — a mind set that must change before India can realize a self-sustainable defense and aerospace manufacturing industry, said Rajiv Chib, CEO of Insighteon Consulting.

Patil added that the MoD needs to create a level playing field, partly by funding private sector research and development programs.

For Rae, the former ministry official, the government should create the position of an acquisition czar, with a similar mandate and authority to that of the undersecretary for acquisition and sustainment at the U.S. Defense Department. This would improve the coordination and management of all aspects of defense acquisition, he added.

Chib noted that India's heavy use of government-managed laboratories for defense and its preference for public sector manufacturing are based on an old Soviet model — something it must discard if it's to keep with the large Western defense firms.

<https://www.defensenews.com/top-100/2021/07/12/indias-push-for-self-reliance-brings-public-private-rift-to-a-head/>

LAC: China builds concrete towers with CCTV cameras to watch India

The Indian Army has in a 'tit for tat' put up wooden poles fitted with digital cameras to watch Chinese movements, said sources

By Imran Ahmed Siddiqui

China has erected concrete watchtowers with CCTV cameras atop them inside India-claimed lines in Ladakh to monitor Indian troop deployment, sources in the security establishment told The Telegraph on Monday.

The Indian Army has in a “tit for tat” put up wooden poles fitted with digital cameras to watch Chinese movements, the sources added.

The episode comes at a time military veterans have been saying the Indian government’s serial capitulations on the talks table have emboldened the Chinese to get more aggressive by the day instead of adhering to the terms of the disengagement agreements.



The sources said the Chinese observational posts were among various military structures, including camps, that the People’s Liberation Army was continuing to build at the remaining friction points of Depsang Plains, Hot Springs and Gogra besides deploying more soldiers and tanks.

“The watchtowers and posts erected by the Chinese overlook areas held by the Indian Army. It’s a matter of extreme concern,” a security official attached to the Union home ministry said.

He said Chinese deployment of men and machines too was continuing along the Line of Actual Control between altitudes of 14,000 and 15,000 feet.

“The Indian patrols at these friction points are outnumbered by the Chinese,” an Intelligence Bureau official said.

He said there had been an unwritten understanding over decades that the two armies would not build permanent (concrete) or semi-permanent (makeshift) structures within 10-15km of the LAC on either side. However, the Chinese watchtowers — manned by armed guards — clearly count as permanent structures, he said.

“In a tit for tat, the Indian Army too is erecting poles fitted out with digital cameras to monitor Chinese movements inside their occupied zones,” the IB official said.

Military veterans have attributed China’s aggressive strategies amid the disengagement talks to what they see as India’s unwarranted concessions.

The retired generals have in particular questioned New Delhi’s agreement to having “buffer zones” in the Galwan Valley and the Pangong Lake where there has been partial disengagement.

Under the formula, troops of both sides moved back by an equal distance, meaning the Chinese still remained within India-claimed lines while the Indian Army stepped back further. To the veterans, this amounts to “ceding further Indian territory” to the Chinese.

They have also criticised India’s failure to push for the restoration of status quo ante instead of continuing to negotiate only piecemeal matters.

It’s these shows of “softness” that the veterans believe have encouraged China to go back on assurances given at previous disengagement talks.

“The disengagement process agreed upon between the two sides seems to have hit a dead end now. The Chinese are in no mood to retreat from India-claimed lines,” a former lieutenant general said.

Another veteran said: “The problem is also that the Indian government has so far been very economical with the truth on the Chinese incursions on multiple fronts. The government talks about disengagement of the Chinese but has not revealed officially how far they have entered inside Indian territory.”

On June 19 last year, Prime Minister Narendra Modi had said that no one had entered Indian territory or occupied Indian posts, prompting Beijing to immediately claim ownership of all the areas it held.

Defence ministry sources said the political leadership had been informed about the ground situation.

“Recently, the military brass apprised the political leadership on the ground situation at the China frontier,” a defence ministry official said.

The Chinese army is said to be entrenched 18km inside India-claimed lines on the strategically crucial Depsang Plains. It has cut off the Indian Army’s access to five traditional patrolling points — PPs 10, 11, 11A, 12 and 13 — since the border standoff began in May last year.

China had agreed to disengage from Hot Springs and Gogra in July last year but continues to hold its positions inside India-claimed lines. Eleven rounds of military talks have taken place without any breakthrough since June last year.

<https://www.telegraphindia.com/india/lac-china-builds-concrete-towers-with-cctv-cameras-to-watch-india/cid/1822226>

Quantum phase transition discovered in a quasi-2D system consisting purely of spins

By José Tadeu Arantes

Pure quantum systems can undergo phase transitions analogous to the classical phase transition between the liquid and gaseous states of water. At the quantum level, however, the particle spins in states that emerge from phase transitions display collective entangled behavior. This unexpected observation offers a new avenue for the production of materials with topological properties that are useful in spintronics applications and quantum computing.

The discovery was made by an international collaboration led by Julio Larrea, a professor at the University of São Paulo's Physics Institute (IF-USP) in Brazil. Larrea is first author of an article on the study published in *Nature*.

"We obtained the first experimental evidence of a first-order quantum phase transition in a quasi-two-dimensional system consisting entirely of spins. It was a groundbreaking study in terms of both experimental development and theoretical interpretation," Larrea said.

To understand the significance of this discovery, it will help to examine the classical phase transition, which can be exemplified by the change in the state of water, and its quantum analog, exemplified by the Mott metal-insulator transition.

"The change in the state of water, which occurs at 100 °C under standard atmospheric pressure, is what we call a first-order transition. It is characterized by a discontinuous jump in molecule density. In other words, the number of water molecules per unit volume varies drastically between one state and the other," Larrea said. "This first-order discontinuous transition evolves in accordance with pressure and temperature until it is fully suppressed at the so-called critical point of water, which occurs at 374 °C and 221 bar. At the critical point, the transition is second-order, i.e. continuous."

In the vicinity of the critical point, the properties of water behave anomalously, because the density fluctuations are infinitely correlated on the atomic length scale. As a result, the material manifests a unique state that differs both from a gas and a liquid (see Figure 1).

"In quantum matter, the Mott metal-insulator transition is a rare example of a first-order transition. Unlike ordinary metals and insulators, which have free electrons that don't interact, a Mott state involves strong interaction between electron charges, configuring collective behavior," Larrea explained. "The energy scales of these interactions are very low, so a first-order quantum phase transition between a metal and an insulator can happen at absolute zero, which is the lowest possible temperature. The interaction between charges varies with temperature and pressure until it is suppressed at the critical point. As the critical point approaches, volume charge density, which is the quantity of charge per unit volume, undergoes such an abrupt change that it can induce new states of matter such as superconductivity."

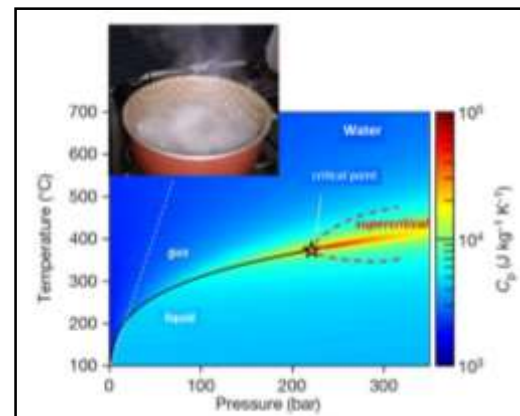


Figure 1: Water phase diagram, showing start of first-order transition and coexistence of liquid and gaseous states along the black line. The transition ends at the critical point, marked with a star. Credit: Julio Larrea, adapted from image published in *Nature*

In the two examples mentioned, the phenomena involve massive particles such as water molecules and electrons. The question posed by the researchers was whether the concept of phase transition could be extended to massless quantum systems, such as a system made up solely of spins (understood as a quantum manifestation of matter associated with magnetic states). A situation of this kind had never been observed before.

"The material we used was a frustrated quantum antiferromagnet $\text{SrCu}_2(\text{BO}_3)_2$," Larrea said. "We measured the specific heat of small samples under simultaneously extreme conditions of temperature [to 0.1 kelvin], pressure [to 27 kilobar] and magnetic field [to 9 tesla]. Specific heat is a physical property that gives us a measure of the internal energy in the system, and from this, we can infer different types of orderly or disorderly quantum state, and possible electronic states or entangled spin states."

Obtaining these measurements with the precision required to reveal correlated quantum states, using samples submitted to extremely low temperatures, high pressures and strong magnetic fields, was a formidable experimental challenge, according to Larrea. The experiments were performed in Lausanne, Switzerland, at the Laboratory for Quantum Magnetism of the Federal Polytechnic School of Lausanne (LQM-EPFL), headed by Henrik Rønnow. The precision of the measurements motivated the theoretical collaborators, led by Frédéric Mila (EPFL) and Philippe Corboz (University of Amsterdam), to develop state-of-the-art computational methods with which to interpret the different anomalies observed.

"Our results showed unexpected manifestations of quantum phase transitions in pure spin systems," Larrea said. "First, we observed a quantum phase transition between two different kinds of entangled spin state, the dimer state [spins correlated at two atomic sites] and the plaquette state [spins correlated at four atomic sites]. This first-order transition ends at the critical point, at a temperature of 3.3 kelvin and pressure of 20 kilobar. Although the critical points of water and the $\text{SrCu}_2(\text{BO}_3)_2$ spin system have similar characteristics, the states that emerge near the critical point of the spin system comply with a different description of physics, of the Ising type." The term Ising refers to a model of statistical mechanics named for German physicist Ernst Ising (1900-98).

"We also observed that this critical point has a discontinuity in magnetic particle density, with triplets or states correlated in different configurations of spin orientation, leading to the emergence of a purely quantum antiferromagnetic state," Larrea said (see Figure 2).

The next step for Larrea is to find out more about the criticality and entangled spin states that emerge in the vicinity of the critical point, the nature of the discontinuous and continuous quantum phase transitions, and the energy scales that represent the interactions and correlations between electron spins and charges leading to quantum states such as superconductivity. "To this end, we plan to conduct a study with pressures around the critical point and higher pressures," he said. A new facility, the Laboratory for Quantum Matter under Extreme Conditions (LQMEC), is being set up for this purpose in collaboration with Valentina Martelli, a professor in IF-USP's Department of Experimental Physics.

More information: J. Larrea Jiménez et al, A quantum magnetic analogue to the critical point of water, *Nature* (2021). DOI: [10.1038/s41586-021-03411-8](https://doi.org/10.1038/s41586-021-03411-8)

Journal information: *Nature*
<https://phys.org/news/2021-07-quantum-phase-transition-quasi-2d-purely.html>

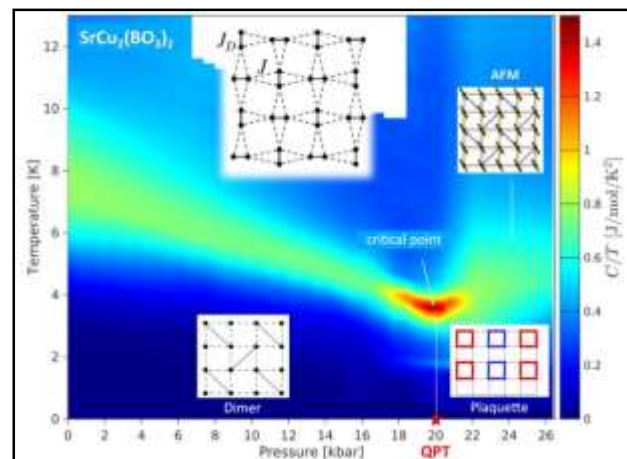


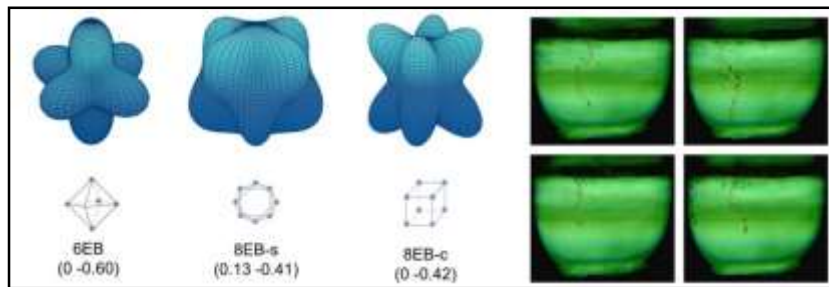
Figure 2: $\text{SrCu}_2(\text{BO}_3)_2$ spin system phase diagram, showing start of first-order transition at absolute zero. The first-order transition ends at the critical point, analogously to the water diagram. However, unlike what happens with water, in the spin system a new orderly state emerges that is purely quantum and strongly correlated: The antiferromagnetic state. Credit: Julio Larrea, adapted from image published in *Nature*

Scientists discover two species of few-electron bubbles in superfluid helium

By Joel P Joseph

In a new study, scientists at the Indian Institute of Science (IISc) have experimentally shown the existence of two species of few electron bubbles (FEBs) in superfluid helium for the first time. These FEBs can serve as a useful model to study how the energy states of electrons and interactions between them in a material influence its properties.

The team included Neha Yadav, a former Ph.D. student at the Department of Physics, Prosenjit Sen, Associate Professor at the Centre for Nano Science and Engineering (CeNSE) and Ambarish Ghosh, Professor at CeNSE. The study was published in *Science Advances*.



Theoretically calculated shapes (not to scale) and spatial arrangement of the electrons for FEBs. Also shown is the range of pressures where the respective FEBs are stable against small fluctuations. Image showing FEBs trapped on the vortex line and exploding. Credit: Neha Yadav

An electron injected into a superfluid form of helium creates a single electron bubble (SEB) – a cavity that is free of helium atoms and contains only the electron. The shape of the bubble depends on the energy state of the electron. For instance, the bubble is spherical when the electron is in the ground state (1S). There are also MEBs—multiple electron bubbles that contain thousands of electrons.

FEBs, on the other hand, are nanometre-sized cavities in liquid helium containing just a handful of free electrons. The number, state and interactions between free electrons dictate the physical and chemical properties of materials. Studying FEBs, therefore, could help scientists better understand how some of these properties emerge when a few electrons present in a material interact with each other. According to the authors, understanding how FEBs are formed can also provide insights into the self-assembly of soft materials, which can be important for developing next-generation quantum materials. However, scientists have only theoretically predicted the existence of FEBs so far. "We have now experimentally observed FEBs for the first time and understood how they are created," Yadav says. "These are nice new objects with great implications if we can create and trap them."

Yadav and colleagues were studying the stability of MEBs at nanometre sizes when they serendipitously observed FEBs. Initially, they were both elated and skeptical. "It took a large number of experiments before we became sure that these objects were indeed FEBs. Then it was certainly a tremendously exciting moment," says Ghosh.

The researchers first applied a voltage pulse to a tungsten tip on the surface of liquid helium. Then they generated a pressure wave on the charged surface using an ultrasonic transducer. This allowed them to create 8EBs and 6EBs, two species of FEBs containing eight and six electrons respectively. These FEBs were found to be stable for at least 15 milliseconds (quantum changes typically happen at much shorter time scales) which would enable researchers to trap and study them. "FEBs form an interesting system that has both electron-electron interaction and electron-surface interaction," Yadav explains.

There are several phenomena that FEBs can help scientists decipher, such as turbulent flows in superfluids and viscous fluids, or the flow of heat in superfluid helium. Just like how current flows without resistance in superconducting materials at very low temperatures, superfluid helium also

conducts heat efficiently at very low temperatures. But defects in the system, called vortices, can lower its thermal conductivity. Since FEBs are present at the core of such vortices—as the authors have found in this study—they can help in studying how the vortices interact with each other as well as heat flowing through the superfluid helium.

"In the immediate future, we would like to know if there are any other species of FEBs, and understand the mechanisms by which some are more stable than the others," Ghosh says. "In the long term, we would like to use these FEBs as quantum simulators, for which one needs to develop new types of measurement schemes."

More information: Neha Yadav et al, Bubbles in superfluid helium containing six and eight electrons: Soft, quantum nanomaterial, *Science Advances* (2021). [DOI: 10.1126/sciadv.abi7128](https://doi.org/10.1126/sciadv.abi7128)

Journal information: [Science Advances](https://phys.org/news/2021-07-scientists-species-few-electron-superfluid-helium.html)
<https://phys.org/news/2021-07-scientists-species-few-electron-superfluid-helium.html>



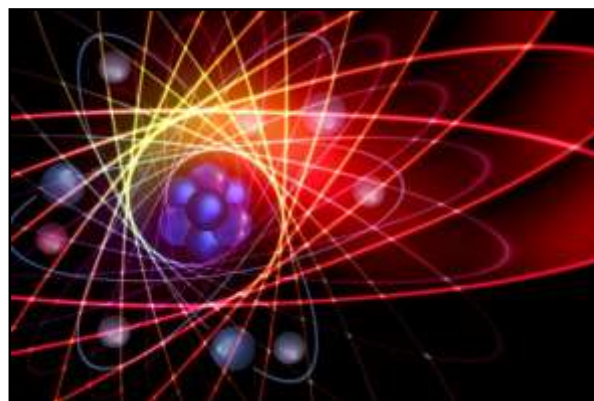
Tue, 13 July 2021

Chinese achieve new milestone with 56 qubit computer

By Bob Yirka

A team of researchers affiliated with multiple institutions in China, working at the University of Science and Technology of China, has achieved another milestone in the development of a usable quantum computer. The group has written a paper describing its latest efforts and have uploaded it to the arXiv preprint server.

Back in 2019, a team at Google announced that they had achieved "quantum supremacy" with their Sycamore machine—a 54 qubit processor that carried out a calculation that would have taken a traditional computer approximately 10,000 years to complete. But that achievement was soon surpassed by other teams from Honeywell and a team in China. The team in China used a different technique, one that involved the use of photonic qubits—but it was also a one-trick pony. In this new effort, the new team in China, which has been led by Jian-Wei Pan, who also led the prior team at the University of Science and Technology has achieved another milestone.



Credit: Pixabay/CC0 Public Domain

The new effort was conducted with a 2D programmable computer called Zuchongzhi—one equipped to run with 66 qubits. In their demonstration, the researchers used only 56 of those qubits to tackle a well-known computer problem—sampling the output distribution of random quantum circuits. The task requires a variety of computer abilities that involve mathematical analysis, matrix theory, the complexity of certain computations and probability theory—a task approximately 100 times more challenging than the one carried out by Sycamore just two years ago. Prior research has suggested the task set before the Chinese machine would take a conventional computer approximately eight years to complete. Zuchongzhi completed the task in less than an hour and a half. The achievement by the team showed that the Zuchongzhi machine is capable of tackling more than just one kind of task. It also showed that adding just two more qubits than that used by Sycamore could increase the power of a quantum computer exponentially. But perhaps more importantly, it demonstrates that computer scientists are moving ever closer to the real prize—the

development of a generalized quantum computer that can be used for a host of real-world applications that traditional computers will never be able to handle.

More information: Strong quantum computational advantage using a superconducting quantum processor, arXiv:2106.14734 [quant-ph] arxiv.org/abs/2106.14734
<https://phys.org/news/2021-07-chinese-milestone-qubit.html>

COVID-19 Research News

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Tue, 13 July 2021

Flu vaccine protects against severe effects of Covid-19: Study

An analysis of nearly 75,000 Covid-19 patients from around the world strongly suggests that the annual flu shot reduces the risk of stroke, sepsis and deep vein thrombosis (DVT) in them

People who are vaccinated against influenza may be partially protected against many severe effects of COVID-19, and are less likely to need emergency care, according to a large-scale study.

An analysis of nearly 75,000 COVID-19 patients from around the world strongly suggests that the annual flu shot reduces the risk of stroke, sepsis and deep vein thrombosis (DVT) in patients with COVID-19.

Patients with COVID-19 who had been vaccinated against flu were also less likely to visit the emergency department and be admitted to the intensive care unit (ICU), the researchers said.

"This finding is particularly significant because the pandemic is straining resources in many parts of the world," said Devinder Singh, a professor at the University of Miami Miller School of Medicine in the US.

"Therefore, our research -- if validated by prospective randomised clinical trials -- has the potential to reduce the worldwide burden of disease," Singh, the study's senior author, said.

Several recent studies have suggested that the flu vaccine may provide protection against COVID-19 -- meaning it could be a valuable weapon in the fight to halt the pandemic.

In the largest study of its kind, the researchers screened de-identified electronic health records held on the TriNetX research database of over 70 million patients to identify two groups of 37,377 patients.

The two groups were matched for factors that could affect their risk of severe COVID-19, including age, gender, ethnicity, smoking and health problems such as diabetes, obesity and chronic obstructive pulmonary disease.

Members of the first group had received the flu vaccine between two weeks and six months before being diagnosed with COVID-19.

Those in the second group also had COVID-19 but were not vaccinated against flu.

The study was conducted using patients from countries including the US, UK, Germany, Italy, Israel and Singapore.



Covid patients already vaccinated against flu were less likely to visit the emergency department

The research was presented at the European Congress of Clinical Microbiology & Infectious Diseases (ECCMID), held online.

The incidence of 15 adverse outcomes, including sepsis, strokes, DVT, and acute respiratory failure, within 120 days of testing positive for COVID-19 was then compared between the two groups.

The analysis revealed that those who had not had the flu jab were up to 20 per cent more likely to have been admitted to ICU.

They were also up to 58 per cent more likely to visit the Emergency Department, up to 45 per cent more likely to develop sepsis, up to 58 per cent more likely to have a stroke, and up to 40 per cent more likely to have DVT.

The risk of death was not reduced, the researchers said.

However, the researchers said it is not known exactly how the flu jab provides protection against COVID-19.

Most theories centre around the influenza vaccine boosting the innate immune system -- general defences we are born with that are not tailored to any particular illness, they said.

The researchers said their results strongly suggest that the flu vaccine protects against several severe effects of COVID-19.

They noted that more research is needed to prove and better understand the possible link but, in the future, the flu shot could be used to help provide increased protection in countries where the COVID-19 vaccine is in short supply.

"Influenza vaccination may even benefit individuals hesitant to receive a COVID-19 vaccine due to the newness of the technology," said Susan Taghioff, of the University of Miami Miller School of Medicine.

"Despite this, the influenza vaccine is by no means a replacement for the COVID-19 vaccine and we advocate for everyone to receive their COVID-19 vaccine if able to," Taghioff added.

(This story has been published from a wire agency feed without modifications to the text.)

<https://www.livemint.com/science/health/flu-vaccine-protects-against-severe-effects-of-covid-19-study-11626081933845.html>

