Apr
2021

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खंड : 46 अंक : 74 14-15 अप्रैल 2021

Vol.: 46 Issue : 74 14-15 April 2021

रक्षा विज्ञान पुस्तकालय
Defence Science Library
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THE NATIONAL INTEREST

Wed, 14 April 2021

India wants a crack at building its very own 'F-35' Fighter

India's Defence Research and Development Organisation continues to express interest in procuring a homegrown next-generation fighter jet

By Mark Episkopos

The Advanced Medium Combat Aircraft (AMCA) program has its roots in an Indian effort to modernize the Indian Air Force's (IAF) stock of older fighters, including the SEPECAT Jaguar and Dassault Mirage 2000. The AMCA project has undergone multiple iterations, but the core requirement is for a stealth, single-seat multi-role multirole fighter.

In 2018, India withdrew from the joint Russian-Indian Fifth Generation Fighter Aircraft (FGFA) program to manufacture a new fighter based on Russia's Su-57 fighter jet. Though the IAF had its share of concrete technical reservations with the FGFA-- centered mainly on the Su-57's stealth performance and the production challenges facing its bespoke Izdeliye 30 engine—New Delhi's decision to withdraw from the FGFA program was not without its political context. Namely, the FGFA partnership gradually became a liability in light of India's goal to build up its domestic defense industry as part of the government's 2014 Make in India initiative.

The AMCA, then, is as much a technical project as it is part of New Delhi's broader policy effort to reinvest in India's defense sector. The effort is being led by India's Defence Research and Development Organisation and Hindustan Aeronautics Limited and is likewise slated to involve efforts from local contractors.

The details have shifted somewhat in the past decade, but here is where the AMCA project currently stands. As a fifth-generation fighter with "sixth-generation characteristics," the AMCA will boast a very low radar cross-section for superior stealth performance, integration of certain AI-based systems for streamlined operation, and an advanced cockpit display with a touch screen interface. The AMCA's avionics suite will be headlined by a large suite of advanced radars and electronic warfare systems.

The AMCA will also reportedly feature thrust-vectoring engines for superior maneuverability, an impressive feat considering all the other advanced technologies being packed into it. Little is known about the AMCA's armaments, which reportedly will be carried entirely in an internal weapons bay configuration to maximize stealth performance and deep penetration capability. The fighter will feature Beyond-Visual Range missile targeting capability. In addition to the usual crop of air-to-air missiles, standoff weapons, and guided bombs, the fighter will also reportedly support

directed-energy weapon (DEW) systems; it is unknown precisely what form the fighter's rumored DEW capability will take.

The AMCA seems more similar to Lockheed Martin's F-35 jet than to Russia's Su-57 jet or China's J-20 jet, in that it's designed as a role-flexible fighter capable of executing a wide range of missions depending on loadout. The AMCA appears to be a complement rather than a replacement, for the IAF's air superiority fighters, serving as a flexible force multiplier with superior penetration capabilities.

The IAF's delivery timeline is liable to change in the coming years as the project moves further along, but the AMCA is currently expected to make its maiden flight by 2025, with serial production to begin by 2028.

https://nationalinterest.org/blog/buzz/india-wants-wants-crack-building-its-very-own-f-35-fighter-182616

Thu, 15 April 2021

DRDO ने नौसैनिक पोतों को मिसाइल हमले से बचाने के लिए एडवांस्ड चैफ़ प्रौद्योगिकी विकसित की है? चैफ़ टेक्नोलॉजी क्या है?

रक्षा अनुसंधान एवं विकास संगठन (DRDO) ने दुश्मन के मिसाइल हमले के खिलाफ नौसैनिक पोतों की सुरक्षा के लिए एक एडवांस्ड चैफ़ प्रौद्योगिकी (Advance Chaff Technology) विकसित की है और इसे आत्मनिर्भर भारत की दिशा में एक महत्वपूर्ण कदम बताया गया है। आइये इस लेख के माध्यम से चैफ टेक्नोलॉजी के बारे में विस्तार से अध्ययन करते हैं।

By Shikha Goyal

DRDO ने प्रतिकूलताओं से भविष्य के खतरों से बचने के लिए विशेषज्ञता प्राप्त की है। उद्योग को बड़ी मात्रा में उत्पादन के लिए प्रौद्योगिकी दी जा रही है। हाल ही में रक्षा अनुसंधान एवं विकास संगठन (DRDO) ने दुश्मन के मिसाइल हमले के खिलाफ या मिसाइल हमले से बचने के लिए नौसैनिक पोतों की सुरक्षा के लिए एक एडवांस्ड चैफ़ प्रौद्योगिकी (Advance Chaff Technology) विकसित की है। या यू कहें कि एक प्रकार का कवच तैयार किया है।

यह कवच एडवांस्ड चाफ टेक्नोलॉजी पर आधारित है। यह दुश्मन के रडार को भ्रमित करेगा और मिसाइलें जो जहाज की ओर बढ़ रही होंगी उनकी दिशा बदलने में मदद करेगा। DRDO द्वारा लिया गया यह कदम आत्मनिर्भर भारत की दिशा में एक महत्वपूर्ण कदम बताया गया है।

What is Chaff technology?

इस प्रौद्योगिकी को कहां विकसित किया गया है?

DRDO प्रयोगशाला, डिफेंस लेबोरेटरी जोधपुर (DLJ) ने इस महत्वपूर्ण प्रौद्योगिकी के तीन प्रकारों को विकसित किया है, जिसका नाम है कम दूरी की मारक क्षमता वाला चैफ़ रॉकेट (Short Range Chaff Rocket, SRCR), मध्यम रेंज चैफ़ रॉकेट (Medium Range Chaff Rocket, MRCR) और लम्बी दूरी की मारक क्षमता वाला चैफ़ रॉकेट (Long Range Chaff Rocket, LRCR) । यह भारतीय नौसेना की गुणात्मक आवश्यकताओं को पूरा करते हैं। हाल ही में, भारतीय नौसेना ने अपने जहाज पर अरब सागर में तीनों वेरिएंट का परीक्षण किया और प्रदर्शन संतोषजनक पाया।

आइये अब चैफ़ प्रौद्योगिकी (Chaff Technology) के बारे में जानते हैं

चैफ़ एक अप्रतिरोधी विस्तार योग्य इलेक्ट्रॉनिक जवाबी प्रौद्योगिकी (Passive expendable electronic countermeasure technology) है जिसका उपयोग दुश्मन के रडार और रेडियो फ्रीक्वेंसी (RF) मिसाइल सीकर से नौसेना के जहाजों की रक्षा के लिए किया जाता है।

इस टेक्नोलॉजी के बारे में महत्वपूर्ण तथ्य यह है कि यह दुश्मन की मिसाइलों को डिफ्लेक्ट करने के लिए या मिसाइल हमले से बचाने के लिए हवा में छोड़ा जाता है और यह बहुत कम चैफ़ मैटेरियल का उपयोग करती है।

यह टेक्नोलॉजी अब बड़े पैमाने पर उत्पादन के लिए तैयार है। DRDO की इस उपलब्धि के लिए रक्षामंत्री राजनाथ सिंह ने भारतीय नौसेना और उद्योगों को बधाई दी।

चैफ़ (Chaff) में एल्युमिनियम (Aluminum) या ज़िंक (Zinc) की छोटी स्ट्रिप्स का इस्तेमाल किया जाता है। ये धातु के बादल मिसाइल के रडार के लिए अलग लक्ष्य के रूप में दिखाई देते हैं और आदर्श रूप से मिसाइल को भ्रमित करते हैं, इस प्रकार विमान को भागने की अनुमति देते हैं। यानी आसानी से दुश्मन की मिसाइल को इसकी सहायता से रास्ते से भटकाया जा सकता है।

चैफ़ प्रौद्योगिकी का महत्व क्या है?

DRDO के अनुसार, बहुत कम मात्रा में चैफ़ सामग्री को हवा में छोड़ा जाएगा। यह हमारे जहाजों की सुरक्षा के लिए हमलावर मिसाइलों को विक्षेपित करने के लिए एक क्षय के रूप में कार्य करेगा।

DRDO ने इस पर अब विशेषज्ञता प्राप्त कर ली है जो दुश्मनों से भविष्य के खतरों को बचाने में मदद करेगा।

रक्षा अनुसंधान एवं विकास विभाग के सचिव और DRDO के अध्यक्ष डॉक्टर जी। सतीश रेड्डी ने भारतीय नौसैनिक पोतों की सुरक्षा के लिए अति महत्वपूर्ण इस प्रौद्योगिकी के स्वदेश में विकास से जुड़े समूहों के प्रयासों की प्रशंसा भी की है।

https://www.jagranjosh.com/general-knowledge/what-is-chaff-technology-in-hindi-1618401772-2

INDIA TODAY

Wed, 14 April 2021

Gujarat govt to set up 900-bed Covid care facility in collaboration with DRDO

In collaboration with the Defense Research & Development Organization (DRDO), the Gujarat governmnet is setting up a 900-bed dedicated Covid-19 care hospital at the Gujarat University Convention Centre

By Gopi Maniyar Ghanghar

Amid a surge in Covid-19 cases, the Gujarat government on Tuesday is setting up a 900-bed full facility dedicated Covid care hospital in collaboration with the Defense Research & Development Organization (DRDO).

Gujarat Chief Minister Vijay Rupani speaks with doctors and other medical personnel via video conference (Picture Credits: Twitter/@CMOGuj)

The hospital will have 150 ICU beds and will open in two weeks at the Gujarat University Convention Centre on the GMDC ground.

Gujarat Chief Minister Vijay Rupani and Deputy Chief Minister Nitin Patel reviewed the project in the core committee meeting in Gandhinagar.

The 900-bed dedicated Covid-19 care hospital will have 150 ICU beds and 150 ventilators. All 900 beds will be equipped with an oxygen facility. If necessary, 500 additional beds will be added later, with advance planning. The hospital will also have a portable X-ray machine facility, a state government release said.

In addition, the hospital will also include intensive and critical care units (ICUs and CCUs). Patients will have access to toilets and bathrooms. It will have a help desk as well as food facilities for patients, doctors, and paramedics. There will also be restrooms for doctors and other medical staffs.

Anju Sharma, the principal secretary of the Higher and Technical Education Department, has been entrusted with running this hospital. The vice-chancellor of Gujarat University, Dr Himanshu Pandya, and Colonel B Chaube of the DRDO among other government officials will lend their support to the service of this hospital, the press note added.

https://www.indiatoday.in/coronavirus-outbreak/story/gujarat-govt-to-set-up-900-bed-covid-care-facility-in-collaboration-with-drdo-1790637-2021-04-14

Hindustan Times

Thu, 15 April 2021

Covid-19: DRDO team visits to reactivate Bihta facility

A two-member team from the Defence Research Development Organisation (DRDO) was here on Wednesday to assess the state's preparedness to fully operationalise the Employees State Insurance (ESI) hospital at Bihta in Patna for treatment of Covid-19 patients, as Bihar reported 21 deaths with 4,786 new cases — the highest in a single day so far

By Ruchir Kumar

A two-member team from the Defence Research Development Organisation (DRDO) was here on Wednesday to assess the state's preparedness to fully operationalise the Employees State Insurance (ESI) hospital at Bihta in Patna for treatment of Covid-19 patients, as Bihar reported 21 deaths with 4,786 new cases — the highest in a single day so far. Patna accounted for 1,483 cases and four deaths.

Among those infected were three senior IAS officers, including an officer in the rank of chief secretary, other of the home department and an IPS officer. A minister in the Nitish Kumar cabinet had also tested positive. Several senior officers in the home department, public health and engineering department, finance and the Information and Public Relations Department had also gone in home isolation. A senior officer of the home department was admitted to the AIIMS-Patna on Wednesday.

The DRDO team has agreed to extend help to the state government by providing 50 doctors to fully operationalise the 500-bed ESI hospital, said top sources in the state health department.

The Bihar government had on Tuesday sought assistance from the army in providing doctors to fully operationalise the ESI hospital.

In a letter to defence secretary, Bihar's principal secretary Pratyaya Amrit requested the defence secretary to send 50 doctors from the Armed Forces Medical Corps (AFMC) so that the ESI hospital could be utilised properly.

"We will depute requisite number of nurses and other para-medical staff and have requested the defence ministry to send 50 doctors from the armed forces so that the 500-bed hospital can be utilised properly like last year," said Amrit.

"Presently, the facilities exist but in light of the surge in Covid-19 cases in Bihar, particularly in Patna, it is of urgent necessity to utilise the existing facilities of ESI hospital, Bihta. At present, we are using only 50 beds in this hospital with the services of a few doctors and other support from the state government," Amrit added.

Executive director, State Health Society, Manoj Kumar, said, "We will work on a warfooting to operationalsie the facility after a team from the DRDO visited Bihta today and later held discussions with our principal secretary."

The 500-bed Covid care facility at ESI Bihta was set up last year under the PM Care Fund.

Meanwhile, the Indira Gandhi Institute of Medical Sciences (IGIMS) will operationalise 100 IU beds for Covid-19 patients on Thursday, said Kumar.

The Patna district administration had on Wednesday earmarked 14 more private hospitals in Patna for treatment of Covid-19 patients, increasing the bed strength by 199, said Patna district magistrate Chandrashekhar Singh. With this altogether 47 private facilities, having cumulative 985 beds, had been identified in the district for treatment of Covid-19 cases, he added.

The health department was also keeping tabs on oxygen generation plants in the state to ensure there was no hoarding or blackmarketing.

https://www.hindustantimes.com/cities/patna-news/covid19drdoteam-visits-to-reactivate-bihta-facility-101618419532710.html

THE ECONOMIC TIMES

Thu, 15 April 2021

Indian Navy destroyer, INS Ranvijay, pays goodwill visit to Sri Lanka

Synopsis

INS Ranvijay, the fifth of the Rajput Class Destroyer, is the Anti Submarine Warfare capable Guided Missile Destroyer is equipped with the state-of-the-art indigenous Bramhos supersonic missile, according to a statement.

INS Ranvijay, an Indian Navy destroyer arrived in Sri Lanka on Wednesday on a three-day goodwill visit to the island nation as part of the efforts to develop close maritime and security cooperation between the two friendly and close neighbours.

The arrival of the Indian Naval ship to Colombo brings in the message of solidarity and harmony for the people of Sri Lanka on the auspicious occasion of 'Avurudu', the Sinhala and Tamil New Year, the Indian High Commission said.

"India and Sri Lanka have traditionally shared close cooperation in defence and security. Their Navies have been actively engaged in mutually beneficial cooperation in training and capacity building. The visit of the Ship is another step in developing close maritime and security cooperation between the two friendly & close neighbours," the High Commission said.

The arrival of the Indian Naval ship to Colombo brings in the message of solidarity and harmony for the people of Sri Lanka on the auspicious occasion of 'Avurudu', the Sinhala and Tamil New Year, the Indian High Commission said (Representative image)

INS Ranvijay, the fifth of the Rajput Class Destroyer, is the Anti Submarine Warfare capable Guided Missile Destroyer is equipped with the state-of-the-art indigenous Bramhos supersonic missile, according to a statement. The Ship is commanded by Captain Narayanan Hariharan, who would call on the area Commander Western Naval Area, Rear Admiral WDEM Sudarshana and pay his respects at the Indian Peace Keeping Force (IPKF) memorial on Thursday, Colombo Gazette reported.

The IPKF served in Sri Lanka's war torn north and east between 1987-1990 as part of the Indo-Lanka Accord. India and Sri Lanka have traditionally shared close cooperation in defence and security. Their Navies have been actively engaged in mutually beneficial cooperation in training and capacity building, the newspaper report said.

https://economictimes.indiatimes.com/news/defence/indian-navy-destroyer-ins-ranvijay-pays-goodwill-visit-to-sri-lanka/articleshow/82063306.cms

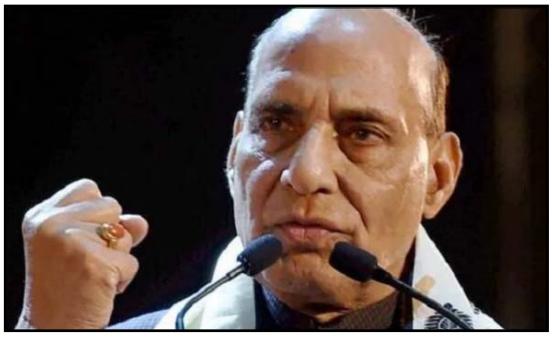
TIMESNOWNEWS.COM

Thu, 15 April 2021

LAC, capability development on cards as three-day IAF commanders' conference kickstarts today

The conference comes at a time when Indian and Chinese armies have already held the 11th round of talks over the LAC matter. The deadlock, however, remains unresolved in certain parts along the LAC

New Delhi: Defence Minister Rajnath Singh will inaugurate the Commanders' conference of the Indian Air Force (IAF) in New Delhi on Thursday. Security challenges of the country, including the standoff along the Line of Actual Control (LAC), are expected to be discussed during the three-day bi-annual conference.



Defence Minister Rajnath Singh will inaugurate the conference on Thursday | Photo Credit: PTI

"A series of discussions would be conducted over a period of three days to address strategies and policies related to capabilities that would give the IAF a significant edge over its adversaries," the Ministry of Defence (MoD) said in a statement. "Various welfare and human resource measures to improve HR and administrative efficiency will also be discussed," the MoD statement further said.

According to official sources, cited by news agencies, the situation in eastern Ladakh, the site of the Sino-India border standoff, will also be discussed during the conference besides the overall capabilities of the IAF to deal with situations along the de-facto boundary between the two countries.

Deadlock continues in certain parts along the LAC

Being held during pandemic times, the conference will be attended by Air Officers Commanding-in-Chief (AOC-in-Cs) of all the commands of the IAF. The conference comes on the backdrop of the ongoing standoff between Indian and Chinese armies along the LAC. On April 9, the two sides held the 11th round of Corps commander-level talks but failed to reach a consensus on the disengagement along the remaining areas along the LAC.

While China has disengaged from the areas along the north and south banks of Pangong Tso, the People's Liberation Army (PLA) is unwilling to withdraw troops from other areas such as Demchok, Gogra and Hot Springs along the Depsang plains. In fact, Chinese airbases adjacent to the LAC also continue to have a stepped-up deployment of fighter jets and other aircraft.

The Indian armed forces, in response, have maintained a vigilant posture in light of the Chinese aggression along the LAC. The IAF, for instance, has deployed frontline Sukhoi-30 MKI fighters along the LAC besides MiG-29, Mirage-2000, Chinook heavy-lift choppers as well as Apache attack helicopters.

https://www.timesnownews.com/india/article/rajnath-singh-inaugurate-iaf-commander-conference-15-april/745246

Hindustan Times

Thu, 15 April 2021

‘Flag follows trade,’ Navy Chief on China operating in Indian Ocean

India is keeping tabs on China’s aggressive moves in the South China Sea and taking steps to ensure that the Chinese navy doesn’t muscle its way into the Indian Ocean where combat-ready Indian warships are carrying out round-the-clock surveillance for any unusual activity

By Rahul Singh

With China making efforts to strengthen its presence in the strategic Indian Ocean Region (IOR), Indian Navy chief Admiral Karambir Singh on Wednesday said it was hardly surprising that China’s navy was coming and operating in the IOR as Beijing’s energy sources, markets and resources are located to the west.

Indian Navy chief Admiral Karambir Singh on Wednesday said the Quad had started as a consultative grouping and has evolved and grown organically. (PTI PHOTO.)

“As they say, flag follows trade,” Singh said during a discussion on challenges in the Indo-Pacific region at the Raisina Dialogue.

“China’s navy has the wherewithal and intent, and I envisage a continued focus on their growth in the near future. They want to replicate US Navy carrier battle groups but developing carrier air wing will take time,” Singh said, responding to a question on China deploying aircraft carriers.

China currently operates two aircraft carriers --- CV-16 Liaoning and CV-17 Shandong. It is building a third carrier. The US believes that the Chinese footprint in the IOR will grow in the coming years. China is building a third aircraft carrier with a flat deck and its navy will be operating in the Indian Ocean in the coming years, said Admiral Phil Davidson, commander of the US Indo-Pacific Command.

India is keeping tabs on China’s aggressive moves in the South China Sea and taking steps to ensure that the Chinese navy doesn’t muscle its way into the Indian Ocean where combat-ready Indian warships are carrying out round-the-clock surveillance for any unusual activity.

The Chinese are undoubtedly in the IOR already, said maritime affairs expert Rear Admiral Sudarshan Shrikhande (retd).

“They have come here (IOR) to stay, play and have a say. Through sustained and overlapping deployments, potentially more bases and partners; China’s multi- dimensional military power with sea power in the lead is something to think about carefully,” Shrikhande said.

Aggressive Chinese naval actions and asymmetric activities undermine the rules- based order and constitute a major challenge, Davidson said. “The Indo-Pacific region is in competition between a closed and authoritarian Beijing vision and the idea of a free and open Indo-Pacific,” the US commander said.

Davidson said China sought to exploit the current pandemic with increased military aggression throughout the Indo-Pacific and its intent was to undermine international law and norms.

From carrying out naval drills with like-minded countries to reaching out to states in the IOR, the Indian Navy is focusing on checking China’s rising ambitions in the region and sending out a strong message that Beijing’s power play in South China Sea cannot be replicated in the Indian Ocean.

The navies of India and the US recently concluded multilateral drills in the eastern IOR. France along with the Quad navies of India, the US, Japan and Australia carried out complex maritime drills to enhance interoperability among their navies from April 5 to April 7.

Singh said the Quad started as a consultative grouping and has evolved and grown organically. He said India has a high degree of engagement and interoperability with the navies of the Quad countries.

https://www.hindustantimes.com/india-news/flag-follows-trade-navy-chief-on-china-operating-in-indian-ocean-101618406205791.html

INDIA TODAY

Thu, 15 April 2021

Quad navies have capability to come together if needed: Indian Navy Chief

Indian Navy Chief Admiral Karambir Singh has said that if an opportunity arises, the Quad navies have the capability and capacity to come together in an almost plug and play manner

By Abhishek Bhalla

New Delhi: Quad navies have the ability to come together if an opportunity arises, Indian Navy Chief Admiral Karambir Singh said also pointing out that China is making attempts to replicate the US Navy carrier battle groups as they expand.

Indian Navy chief Admiral Karambir Singh. (Photo: Vikram Sharma/India Today)

"If an opportunity arises, we have the capability and capacity to come together in an almost plug and play manner," Admiral Singh said at a discussion during the ongoing Raisina Dialogue where he was also joined by Admiral Scot Davidson, Commander of US Navy's Indo-Pacific Command.

"China's intention is to replicate carrier battle groups like the United States Navy by adding more aircraft carriers and accompanying by fleet support ships and destroyers. The most important capability they have to develop is the competence of their carrier air wing which takes time. US operating aircraft since the world war, but I think the Chinese are moving quickly," said Indian Navy chief Admiral Karambir Singh.

He said there has been a regular Chinese naval presence in the Indian Ocean Region for over a decade now.

"If the Chinese look west from where they are, their energy, markets and resources are located to their West. So, it won't be surprising that soon they would be coming into the Indian Ocean, as there is a saying that the flag follows the trade."

He was part of the discussion 'Samudra Manthan': The Indo-Pacific in Churn'.

Admiral Davidson spoke of China being the greatest threat strategic threat to international order and the importance of Quad nations coming together.

India, US, Japan and Australia form the Quad aimed at military and diplomatic cooperation. The four nations last year got together for the first of its kinds naval war games involving their navies.

Currently, China is building its third and largest aircraft carrier as part of its navy's expansion plans.

For the future, the PLA Navy is looking at six aircraft carriers.

Indian Navy Chief said that in the Indian Ocean region, the Indian Navy's aim is to be a Preferred Security Partner. "Be credible and forward-leaning in our engagements, be first responders," said the Indian Navy chief.

Indian Navy chief talked about the need to shun the transactional nature of engagements, work with regional navies to build their capacities to secure their interests, as also work with like-minded navies to build interoperability and trust.

Talking about military cooperation, Admiral Singh said that as far as the military part is concerned, navies of Australia, Japan, the US and India already enjoy a high degree of interoperability.

On Indo-Pacific, the Indian Navy Chief said, “Given the expanse of Indo-Pacific, no one can do it alone. Expanse is an incentive for nations to work together. Indian Navy is ready to do its bit to contribute to security and stability. We can build collective maritime competence, and learn from each other.”

He said there is a natural desire among most nations in the region to cooperate and collaborate for greater prosperity. “Indo-Pacific provides tremendous opportunities for ‘issue-based convergences’. Convergence, as you know, can lead to cohesion.”

Indian navy chief said akin to the mythological ‘Samudra Manthan’, “we can work together, extract many treasures and ultimately the ‘Amrit’ Heavenly Nectar”. “There exist many avenues for maritime nations in the Indo-Pacific to come together and ensure that the ocean churn should be to the benefit of all,” he said.

“So I remain positive of what the churn in the Indo-Pacific would bring to the region, and to the world at large,” said Indian Chief adding, “When we look at the Indo-Pacific, what stands out, is its predominant maritime character and we know that Oceans Connect, they don’t Divide.”

https://www.indiatoday.in/india/story/quad-navies-have-capability-to-come-together-if-needed-indian-navy-chief-1790986-2021-04-14

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Thu, 15 April 2021

China's intention is to replicate carrier battle groups like US Navy: Indian Navy Chief

New Delhi: China's intention is to replicate carrier battle groups like the US Navy with the addition of more aircraft carriers and accompanying them with a fleet of support ships and destroyers, Indian Navy chief, Admiral Karambir Singh, said on Wednesday, pointing out the rapid expansion of naval power by Beijing.

Replying to a query during the Raisina Dialogue 2021 on China adding more aircraft carriers to its fleet and its plans to deploy them in the Indian Ocean Region, Admiral Singh said, "We have seen regular naval Chinese presence in the Indian Ocean Region for over a decade now. If China looks West from where it is, its energy, markets and resources are located to the West. So, it won't be surprising if it soon comes into the Indian Ocean, as there is a saying that the flag follows the trade."

The Navy chief was speaking on the topic 'Samudra Manthan: The Indo-Pacific in Churn'.

Currently, China is building its third and largest aircraft carrier to take forward military modernisation plans amid a number of territorial and maritime disputes. In 2019, China had launched its second aircraft carrier, the Shandong, the first to be built at home. It joined the Liaoning, which was developed by retrofitting a Soviet-era cruiser commissioned in 2012.

The PLA Navy is working towards six aircraft carriers, with two likely to be deployed in China's near seas, including for the Taiwan Straits and the South China Sea, two for the Western Pacific and two for the Indian Ocean.

The Navy chief said that in the Indian Ocean Region, Indian Navy's aim is to be a 'Preferred Security Partner'. "Be credible and forward-leaning in our engagements, be first responders," he said.

Admiral Singh also talked about shunning transactional nature of engagements, working with regional navies to build their capacities to secure their interests, as also working with like-minded navies to build interoperability and trust.

Talking about Quad, an informal security forum comprising India, the US, Japan and Australia, Admiral Singh said that as far as the military part is concerned, navies of Australia, Japan, the US and India already enjoy a high degree of interoperability.

"If an opportunity arises, we have the capability and capacity to come together in an almost plug and play mechanism," he said.

On Indo-Pacific, the Navy chief said: "Given the expanse of the Indo-Pacific, no one can do it alone. Expanse is an incentive for nations to work together. Indian Navy is ready to do its bit to contribute to security and stability. We can build collective maritime competence, and learn from each other."

He said that there is also a natural desire among most nations in the region to cooperate and collaborate for greater prosperity. "Indo-Pacific provides tremendous opportunities for issue based convergences. Convergence, as you know, can lead to cohesion," he said.

The Navy chief said akin to the mythological 'Samudra Manthan', "we can work together and extract many treasures and ultimately extract the 'Amrit' (heavenly nectar)".

"There exist many avenues for maritime nations in the Indo-Pacific to come together and ensure that the ocean churn should benefit all," he said.

"So I remain positive of what the churn in the Indo-Pacific would bring to the region, and to the world at large," said the Navy chief, adding, "When we look at the Indo-Pacific, what stands out is its predominant maritime character, and we know that oceans connect, they don't divide."

"And, therefore, the opportunities for cooperation, to my mind, can outweigh the challenges that we face. There is also a natural desire among most nations in the region to cooperate and collaborate for greater prosperitya," he concluded.

https://www.daijiworld.com/news/newsDisplay?newsID=823883

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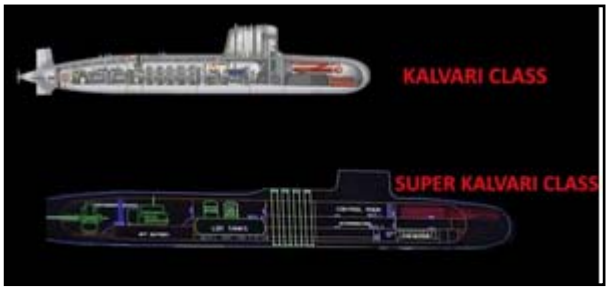
Thu, 15 April 2021

Super Kalvari 3000: Indian Navy's Plans for Bigger Conventional Submarine

Last year, the Indian Navy released a video displaying its capabilities in designing and manufacturing Naval assets and in a split second clip showcased a submarine design that is similar to the present diesel-electric attack Kalvari Class submarine that is based on the Scorpène-class submarine's design of French and Spanish origin but at a closer look it has two important modular sections that are not part of the Kalvari Class design.



Often called Super Kalvari, diesel-electric attack submarines showcased showed the addition of the Fuel Cell-based Air Independent Propulsion (AIP) System module and addition of 8 missiles in each 4-cell Vertical Launch module that will house BrahMos SLCM or the Nirbhay Sub-sonic cruise missile. In the cutout comparison above even Internals of both the submarines have been redone showing new design changes in the bigger Super Kalvari class that seems to be on the design board.

Kalvari class has an overall length of 66.4m but with the addition of two modules, Super Kalvari will have an estimated overall length of 100m+ that will make it have a submerged displacement of over 3000 tons that will be nearly twice that than the presently submerged displacement of the Kalvari class submarine.

Brazil has used baseline Scorpène-class submarine design and used it to develop a Nuclear attack submarine that will have a submerged displacement of over 8000 tons that confirms that Scorpène-class submarine design is scalable and can be developed into a bigger submarine. France had proposed Scorpène+ class submarine design initially under Indian Navy's Project-75I but later offered SMX 3.0 concept that has a displacement of 3,000 tons.

Indian Navy will be issuing a Request for Proposal (RFP) for six advanced submarines for the Indian Navy under Project-75I in the next few weeks and it will be interesting to see what kind of submarines vendors will be invited to send their proposals. Coming back to Super Kalvari, the Navy has not confirmed about the program nor has given out details if it will become under Project-75I or Project-76, but recent push to locally develop Lithium-Ion battery system, 5MW Electric Propulsion motor and with successfully trial of the air-independent propulsion (AIP), India is advancing its capabilities to manufacture its own diesel-electric in near future.

https://www.eletimes.com/super-kalvari-3000-indian-navys-plans-for-bigger-conventional-submarine

Thu, 15 April 2021

Indian Air Force inducts bullet-proof vehicles for security against terror attacks

With a 40-mm windshield and a 6-mm thick armoured protection, these vehicles can withstand bullets from sniper rifles and attacks from AK-47

The Indian Air Force (IAF) has inducted the Light Bullet Proof Vehicles (LBPVs) that would be deployed during any terrorist attack. These vehicles can withstand any grenade or bullet attacks.

Nearly six years after it came under a terrorist attack in 2016, the Pathankot Airbase will now have enhanced security and increased capability to tackle terrorist attacks with the latest induction of cutting-edge specialist vehicles by the Indian Air Force (IAF).

Key highlights of the Light Bullet Proof Vehicles (LBPVs)

Light Bullet Proof Vehicles (LBPVs) are 6-tonne vehicles that have been designed and developed in a way that keeps their engine out of sight from the front as well as the rear side. This blocks the enemies from targeting it easily.

With a 40-mm windshield and a 6-mm thick armoured protection, these vehicles can withstand bullets from sniper rifles and attacks from AK-47.

Additionally, these vehicles will have a canopy protected or covered by armour that will allow the gunner to aim fire easily at its target.

The vehicles can run on flat tyres and run at a high speed up to 100 to 120 km.

Six fully geared Quick Reaction Team members or Garud commandos can fit into these vehicles. The open space in the rear can accommodate more men.

The Light Bullet Proof Vehicles (LBPVs), Image courtesy: Source/ ANI

How will the Light Bullet Proof Vehicles (LBPVs) help the Indian Air Force?

In 2016, the Pathankot Airbase had come under a terrorist attack. Four terrorists intruded the airbase.

Though the force was able to neutralize the terrorists,the instance threw light on the security shortcomings of the airbase to tackle such terrorist attacks.

With these vehicles and their cutting-edge features, the IAF will finally be able to strengthen its capability to tackle such terrorist attacks and enhance its security.

https://www.jagranjosh.com/current-affairs/indian-air-force-inducts-bullet-proofvehicles-for-security-against-terror-attacks-1618392106-1

जागरण

Wed, 14 April 2021

भारतीय वायुसेना अड्डों के सुरक्षा कवच को मजबूत करेंगे बुलेटप्रूफ वाहन, आतंकी हमला होने की स्थिति में संभालेंगे मोर्चा

यह किसी आतंकी हमले का भी मुकाबला करने में सक्षम होंगे। यह छह गरुड़ कमांडो या क्विक रिएक्शन टीम के सदस्यों को एक साथ ले जा सकेंगे। वायुसेना के सर्वोच्च कमांडरों के सुरक्षा चुनौतियों की समीक्षा करने के बाद इन वाहनों को मंजूरी मिली है

By Dhyanendra Singh Chauhan

नई दिल्ली: भारतीय वायुसेना ने अपने सभी एयरबेस की सुरक्षा को चाकचौबंद करने के लिए सुरक्षा दस्ते में विशेष बुलेटप्रूफ वाहन शामिल किए हैं। ये वाहन पठानकोट एयरबेस पर हुए आतंकी हमले जैसी स्थिति में गोलियों और हथगोलों की मार का सामना करने में सक्षम होंगे। भारतीय वायु सेना के अधिकारियों ने बताया कि इन वाहनों को लाइट बुलेट प्रूफ व्हेकिल (एलबीपीवी) कहा जाता है। इनका इस्तेमाल एयरबेस पर किसी आतंकी हमले के दौरान किया जाएगा।

छह टन के इस वाहन को इस तरह से डिजाइन और विकसित किया गया है कि इसका इंजन आगे और पीछे दोनों तरफ से छिपा रहता है। इंजन को आसानी से निशाना नहीं बनाया जा सकता।

अधिकारियों ने कहा कि वाहन को **6** मिमी मोटी बख्तरबंद सुरक्षा दी गई है। इसकी विंडशील्ड **40** मिमी मोटी है जो जो एके**-47** और स्नाइपर राइफल की गोलियों का सामना कर सकती है।

चारो तरफ निशाना साधकर गोलियां बरसा सकता है गनर

इस गाड़ी में चौतरफा सुरक्षित कैनोपी है जिससे गनर चारो तरफ निशाना साधकर गोलियां बरसा सकता है। इसे **100** से **120** किमी प्रति घंटे की रफ्तार से चलाया जा सकता है। टायर पंचर होने की स्थिति में भी इसे चलाया जा सकता है।

इस वाहन के बंद हिस्से में पूरी तरह सुसज्जित छह गरुड़ कमांडो या क्विक रिएक्शन टीम (क्यूआरटी) के सदस्य बैठ सकते हैं। वाहन के पीछे खुले स्थान में और अधिक सुरक्षा जवान सवार हो सकते हैं।

उल्लेखनीय है **2015-16** को नए साल की पूर्व संध्या पर चार आतंकियों ने पठानकोट एयरबेस पर घुसपैठ कर लड़ाकू विमानों और हेलीकॉप्टर सहित अन्य संपत्तियों पर हमला करने की कोशिश की थी। जवाबी कार्रवाई में आतंकियों को ढेर कर दिया गया था। इस घटना से वायु सेना की तैयारी में कुछ कमियों की बात सामने आई थी। उसके बाद वायु सेना ने न केवल अपने जवानों को विशेष रूप से प्रशिक्षित किया बल्कि साजोसामान जुटाने में भी पूरी गंभीरता बरत रही है।

https://www.jagran.com/news/national-and-strengthened-indian-air-force-6-tons-of-light-bullet-proof-vehicles-included-in-airbase-21554779.html

THE HINDU

Thu, 15 April 2021

Meet the Chennai boys building UGVs for the Indian Army

Chennai-based start-up Torus Robotics is manufacturing Unmanned Ground Vehicles to help ferry heavy loads for the Indian Army

By Sweta Akundi

"You think of 'unmanned', and you think of drones, in the sky," says 25-year-old Vibhakar Senthil. In Ambattur — widely regarded as the Detroit of India — his start-up Torus Robotics is set to change that, by making Unmanned Ground Vehicles (UGV) for the Indian Army.

At the Aero India 2021 in Bengaluru, attended by Defence Minister Rajnath Singh, Torus Robotics signed an MOU with the Government, on the joint development of UGVs for the armed forces with BEML Limited.

The Torus Robotics team with their UGV prototype | Photo Credit: Special Arrangement

"With BEML, we are now developing a high-altitude Logistics UGV with 750 kilograms payload. It will be an all-terrain vehicle to supply to and from bases [without the need of human presence] in bad weather conditions, for the Northern Command," says Vibhakar.

Defence Minister Rajnath Singh at the Aero India 2021 in Bengaluru, with Torus Robotics

At university in SRM, Kattankulathur, Chennai, Vibhakar, with his classmates, M Vignesh and K Abbhi Vignesh, spent time researching the robotics industry in India. A combination of patriotism — Vibhakar says he had hoped to join the Indian Army once — and passion for robotics, led them to focus on the defence sector.

"We researched the issues our *jawans* faced during border patrol because of infiltration, heavy burden, high altitudes and lack of oxygen, and the corresponding mental health issues. We were wondering if robotics could solve that issue of logistics," says Vibhakar, adding, "The idea is not to replace *jawans*, but to aid them."

When Torus Robotics was officially established in 2019, it was with the help of someone who knew the in and out of the armed forces. Lieutenant General CA Krishnan (retired) mentored the three on the needs of the sector. "He was in the Army Design Bureau [that helps research

organisations and start-ups, address the unique issues faced by front-line forces in the Indian Arm], and we will be officially incorporating him in the company in June," Vibhakar adds.

Why the focus on UGVs

UGVs in the defence sector are mainly used for surveillance (border patrol), reconnaissance (scouting and collecting information), combat (like tanks, but smaller), and logistics (ferrying supplies from one base to another, where regular vehicles have trouble going) — the fourth is currently their highest priority. "You can also adapt UGVs for supplementary activities by making them amphibious or nocturnal and so on," says Vibhakar.

In July 2019, Torus Robotics finished its first project for Defence Research and Development Organisation (DRDO), manufacturing and assembling a UGV. It has been put to use by the Indian Army, which had further tests and research done on it. The product is under a two-year warranty.

Working on all-terrain UGVs, they understood that whatever motors and controllers are needed in making them, are imported from China and other countries. This would be an issue if they wanted to manufacture more for the Indian Army, which is why they decided to fabricate their own.

"We also won the Low Carbon innovation grant from the United Nations last year to develop solar-powered low-cost and high-efficiency motors (that use 30% of the energy required by regular induction motors), which could finance water supply in drought-hit areas," says Vibhakar.

After their first project for DRDO, the trio had shifted base to Pune, as its manufacturing and supply was being done out of a factory in Turbhe. However, they soon moved back to Chennai — for the convenience of Ambattur.

"We came back because we missed our great network with supply vendors in Chennai. Manufacturing electric vehicles is much easier in Chennai, here you can find products of defence grade quality at relatively cheap rates," he says.

Torus is looking forward to setting up a small facility in Ambattur, where UGV research and the small-scale production of motors takes place alongside. "This is our comfort zone," he says.

https://www.thehindu.com/news/cities/chennai/chennai-torus-robotics-making-ugv-for-indian-army/article34316829.ece

mint

Wed, 14 April 2021

India, France pledge to deepen strategic partnership

By Elizabeth Roche

New Delhi: India and France on Tuesday pledged to deepen their strategic partnership besides trade and investment ties as the foreign ministers of the two countries held extensive talks that also covered regional and global challenges.

External Affairs Minister S Jaishankar meets France's Minister for Europe and Foreign Affairs Jean-Yves Le Drian, in New Delhi on Tuesday. (ANI Photo)

The French minister Jean-Yves Le Drian who arrived in New Delhi on Monday, the third high profile visitor from France to India this year, also discussed cooperation in the Indo-Pacific region with his Indian host, Foreign Minister S Jaishankar.

The Indian foreign ministry in a statement said "in the context of the changes in a covid-impacted world, both Ministers recognised the immense opportunities for greater collaboration in diverse sectors such as trade and investments, defence and security, health, education, research and innovation, energy and climate change."

"Bilateral trade with France has witnessed a steady rise in the last decade reaching $ 10.75 billion in 2020. To tap the full potential of bilateral trade and economic relations, both sides recognised the importance of fast tracking the discussions on an India-EU trade and investment agreement," it said.

Jaishankar and Le Drian also reiterated their "shared commitment to a multipolar world and faith in multilateralism," it said.

"They explored ways to strengthen cooperation in the Indo-Pacific, including the India-France-Australia Trilateral mechanism, addressing emerging challenges in the maritime and space domains and working together in the area of climate action and biodiversity protection. In this regard, India welcomes France's decision to take up the 'Maritime Resources' pillar of India's Indo-Pacific Oceans Initiative (IPOI)," it said.

The defence and security ties between India and France have been on an upswing in recent years with the two countries signing a logistics support pact ie the agreement for the Provision of Reciprocal Logistics Support between the Armed Forces in March 2018.

Indian warships took part in the recently concluded French multinational Naval exercise "La Perouse." The two countries are also expected to hold their customary naval exercise "Varuna" in scheduled in the Western Indian Ocean with the United Arab Emirates also expected to participate this year.

India is also a buyer of French military hardware. The latest acquisition is that of 36 Rafale multi-role fighter aircraft under an agreement signed in 2016 that cost about ₹58,000 crore. Dassault Aviation, the manufacturer of Rafale jets, has delivered 14 aircraft to the Indian Air Force so far.

At a separate event in New Delhi, Le Drian said France had set a target of having 20,000 Indian students in his country by 2025. In 2019, there were 10,000 Indian students studying in France, according to officials at the French Embassy.

"We have set a target -- it is to have 20,000 Indian students in France by 2025, and we will make it. We want to bring French and Indian youth even closer," Le Drian said was quoted as saying by PTI.He was speaking at an event hosted by the French Embassy where he appointed 15 Alumni

Ambassadors chosen from the students' network to boost student mobility between the two countries.

"We will support the students during their stay in France... Living in France is quite something," he said.

During his three day visit, Le Drian is also to meet Environment Minister Prakash Javadekar and the two will take part in a panel discussion at the French Embassy on boosting global action against climate change in view of COP26 ie the UN change event hosted by the UK in November.

https://www.livemint.com/news/world/india-france-pledge-to-deepen-strategic-partnership-11618322351425.html

THE HINDU

Thu, 15 April 2021

Delivery of S-400 missile systems to begin by November

Officials say efforts were made to speed up deal; dismiss CAATSA concerns

By Dinakar Peri

The delivery schedule for the S-400 long range air defence systems was on track for the end of 2021 despite the COVID-19 pandemic, a senior defence official said.

"The deal is on track and deliveries are expected to begin by November this year," the official said.

Two officials independently stated that efforts were made to speed up the deal but the Russian side had conveyed this was not possible.

Two official sources, also speaking independently, dismissed concerns over possible U.S. sanctions on the deal under the Countering America's Adversaries through Sanctions Act (CAATSA), stating this deal met national security considerations.

A view of the new S-400 surface-to-air missile system. Photo used for representation purpose only. File | Photo Credit: Reuters

In October 2018, India had signed a $5.43 billion deal with Russia for five S-400 regiments despite objections from the U.S., with deliveries scheduled to begin end 2021.

U.S. officials on several occasions raised concerns over the deal as India deepened its defence cooperation with the U.S. and acquired several frontline military platforms like transport aircraft, helicopters, artillery and drones.

Indian officials had reiterated that all payment-related issues had been resolved and the deal was well underway.

Responding to questions on the issue at a press conference during his visit to India in February, U.S. Secretary of Defence Lloyd Austin had said that there had been no delivery of an S-400 system, and "the issues of sanctions is not one that's been discussed". He had also stated, "But we did address with the Minister of Defence the issue of the S-400."

For the Indian Air Force (IAF), the high-end technology S-400 would give a fillip and make up for its falling fighter aircraft squadrons in the medium-term. Former IAF Chief Air Chief Marshal B.S. Dhanoa has on several occasions termed the S-400 air defence systems and Rafale fighter jets "game changers" and "booster dose" for the IAF.

https://www.thehindu.com/news/national/delivery-of-s-400-missile-systems-to-begin-by-november/article34312445.ece

THE IRISH Sun

Thu, 15 April 2021

Star Wars: China militarizing space by building ‘destructive missiles & lasers’ to ‘blind US spacecraft sensors,’ intel report says

China is currently working on building "counterspace weapons" that would act in direct opposition to US-owned aircraft by possibly "blinding" their sensors

By Catherina Gioino

The Office of the Director of National Intelligence has released a report detailing efforts made by the Chinese military that would match if not exceed current US technology in the upcoming years.

The Global Risk Assessment report, released by the director's office, states that China's military, the People’s Liberation Army, is expanding its ambitious space goals and reaping major economic benefits in the meantime.

Beijing "has counterspaceweapons capabilities" that will allow the country "to gain the military, economic, and prestige benefits that Washington has accrued from space leadership."

“Beijing continues to train its military space elements and field new destructive and nondestructive ground- and space-based anti-satellite weapons," the report continues.

China, which already has ground-based anti-satellite missiles and lasers, "probably intended to blind or damage sensitive space-based optical sensors," the report hypothesized.

The National Intelligence report predicted that China will be able to have its own operational space station in low Earth orbit between 2022 and 2024.

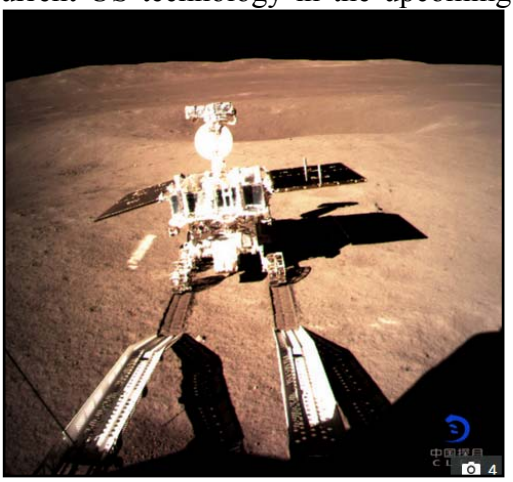
After that's up, the report theorizes the country will conduct exploratory missions to the moon, with aims of establishing a robotic research station on the lunar surface.

The country "will continue its whole-of-government efforts to spread China’s influence, undercut that of the United States," the report states.

It will "drive wedges between Washington and its allies and partners, and foster new international norms that favor the authoritarian Chinese system."

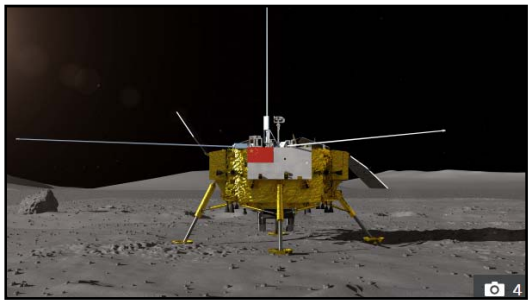
"Chinese leaders probably will, however, seek tactical opportunities to reduce tensions with Washington when such opportunities suit their interests," the report continued.

The risk report also puts forth that China will maintain its "major innovation and industrial policies" in an effort to upgrade its military and provide economic



China is upping its space program that will likely exceed the US's by 2022 Credit: AP:Associated Press

China "has counterspaceweapons capabilities" that could potentially "blind" US-aircraft sensorsCredit: AFP



The National Intelligence report predicts China will be able to have an operational space station as soon as 2022Credit: EPA

growth.

"Beijing sees increasingly competitive US-China relations as part of an epochal geopolitical shift and views Washington's economic measures against Beijing since 2018 as part of a broader US effort to contain China's rise."

Overall, the report alleges China is strengthening its military, economic, technological and diplomatic efforts to "secure what it views as its territory and regional preeminence, and pursue international cooperation at Washington's expense."

Most troubling, the report claims China plans to "at least double the size of its nuclear stockpile."

"China is building a larger and increasingly capable nuclear missile force that is more survivable, more diverse, and on higher alert than in the past," the report ended.

This includes "nuclear missile systems designed to manage regional escalation and ensure an intercontinental second-strike capability."

https://www.thesun.ie/news/6846139/china-militarizing-space-building-destructive-missiles-lasers-blind/

Science & Technology News

Press Information Bureau
Government of India

Ministry of Science & Technology

Tue, 13 April 2021 12:32PM

Scientists discover the farthest Gamma-ray emitting active galaxy with narrow emission lines

Astronomers have discovered a new active galaxy identified as the farthest gamma-ray emitting galaxy that has so far been stumbled upon. This active galaxy called the Narrow-Line Seyfert 1 (NLS1) galaxy, which is about 31 billion light-years away, opens up avenues to explore more such gamma-ray emitting galaxies that wait to meet us.

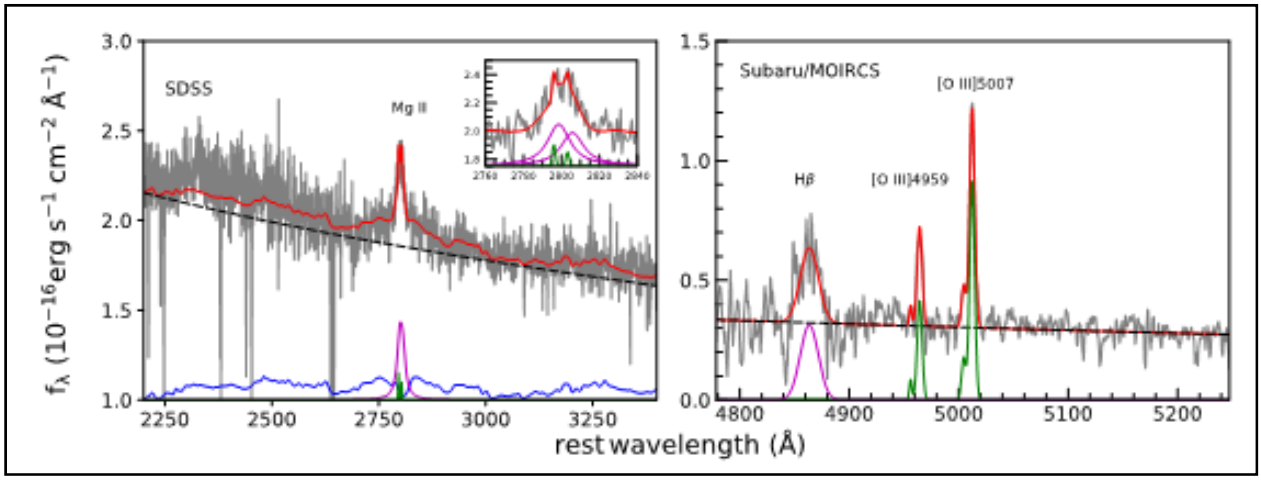


Figure 1. The spectrum of TXS 1206+549. Left panel: Mg II line fit of the SDSS spectrum with an inset plot showing the zoomed version of Mg II line fitting. Right panel: Hβ model fit to the Subaru spectrum.

Ever since 1929, when Edwin Hubble discovered that the Universe is expanding, it has been known that most other galaxies are moving away from us. Light from these galaxies is shifted to

longer (and this means redder) wavelengths - in other words, it is red-shifted. Scientists have been trying to trace such red-shifted galaxies to understand the early Universe.

Scientists from ARIES, an autonomous institute of the Department of Science & Technology (DST), Government of India, in collaboration with researchers from other institutions, studied around 25,000 luminous Active galactic nuclei (AGN) from the Sloan Digital Sky Survey (SDSS), a major optical imaging and spectroscopic survey of astronomical objects in-operation for the last 20 years and found a unique object that emits high-energy gamma rays located at a high redshift (more than 1). They identified it as a gamma-ray emitting NLS1 galaxy, which is a rare entity in space.

Powerful relativistic jets, or sources of particles in the Universe traveling nearly at speed to light, are usually produced by AGN powered by large black holes and hosted in a giant elliptical galaxy. However, detection of gamma-ray emission from NLS1 challenges the idea of how relativistic jets are formed because NLS1s are a unique class of AGN that are powered by black hole of low mass and hosted in spiral galaxy. As of today, gamma-ray emission has been detected in about a dozen NLS1 galaxies, which are a separate class of AGN identified four decades ago. All of them are at redshifts lesser than one, and no method was present till date to find NLS1 at redshifts larger than one. This discovery opens up a new way to find gamma-ray emitting NLS1 galaxies in the early Universe.

For the research, the scientists used one of the largest ground-based telescopes in the world, the 8.2 m Subaru Telescope located at Hawaii, USA. They helped establish a new method to find high redshift NLS1 galaxies that were not known previously by comparing different emission lines in their spectra. The new gamma-ray emitting NLS1 was formed when the Universe was only about 4.7 billion years old as compared to its current age of about 13.8 billion years.

The research led by Dr. Suvendu Rakshit, Scientist, ARIES, in collaboration with various scientists Malte Schramm (Japan), C. S. Stalin (IIA, India), I. Tanaka (USA), Vaidehi S. Paliya (ARIES), Indrani Pal (IIA, India), Jari Kotilainen (Finland) and Jaejin Shin (South Korea) has recently been accepted for publication in the journal Monthly Notices of Royal Astronomical Society. Motivated by this finding, Dr. Rakshit and his collaborators are keen to exploit the capabilities offered by the TIFR-ARIES Near-Infrared Spectrometer on the recently commissioned 3.6 m Devasthal Optical Telescope (DOT) at ARIES to find more such gamma-ray emitting NLS1 galaxies at much larger redshifts.

https://pib.gov.in/PressReleasePage.aspx?PRID=1711362

पत्र सूचना कार्यालय
भारत सरकार

विज्ञान एवं प्रौद्योगिकी मंत्रालय

Tue, 13 April 2021 12:32PM

वैज्ञानिकों ने सबसे दूर गामा रे उत्सर्जक आकाश गंगा की खोज की

खगोल वैज्ञानिकों ने एक नई सक्रिय आकाशगंगा का पता लगाया है। इसकी पहचान सुदूर गामा रे उत्सर्जक आकाशगंगा के रूप में की गई है। इस सक्रिय आकाशगंगा को नेरो लाइन सीफर्ट-1 (एनएलएस-1) गैलेक्सी कहा जाता है। यह लगभग 31 बिलियन प्रकाश वर्ग पीछे है। इस खोज से आगे की खोज का मार्ग प्रशस्त होता है।

1929 में एडमिन हब्बल ने खोज की थी कि ब्रह्मांड का विस्तार हो रहा है। तब से यह ज्ञात है कि अधिकतर आकाशगंगा हमसे दूर हो रही हैं। इन आकाशगंगाओं से प्रकाश लम्बे रेडियो तरंग की ओर मुड़ जाते हैं। इसे रेड शिफ्ट कहा जाता है। वैज्ञानिक आकाशगंगाओं के इस मोड़ की खोज कर रहे हैं ताकि ब्रह्मांड को समझा जा सके।

विज्ञान और टेक्नोलॉजी विभाग के स्वायत्त संस्थान एआरआईईएस के वैज्ञानिकों ने अन्य संस्थानों के शोधकर्ताओं के सहयोग से लगभग 25,000 चमकीला सक्रिय ग्लैक्टिकन्यूकली (एजीएन) का अध्ययन स्लोन डिजिटल स्काई सर्वे (एसडीएसएस) से किया और पाया कि एक विचित्र पींड ऊंचे रेड शिफ्ट पर (एक से अधिक) उच्च ऊर्जा गामा किरण उत्सर्जन कर रहा है। एसडीएसस एक प्रमुख ऑप्टिकल तथा स्पेक्ट्रोस्कोपिक सर्वे है जिसका इस्तेमाल पिछले 20 वर्षों में खगोलीय पींड को देखने के लिए किया जाता है। वैज्ञानिकों ने इसकी पहचान गामा किरण उत्सर्जक एनएलएस-1 ग्लैक्सी के रूप में की है। यह अंतरिक्ष में दुर्लभ है। ब्रह्मांड में कणों के स्रोत प्रकाश की गति से यात्रा करते हैं। ये स्रोत बड़े ब्लैकहोल की ऊर्जा से प्रेरित एजीएन द्वारा संचालित किए जाते हैं और इसे विशाल अंडाकार आकाशगंगा में होस्ट किया जाता है। लेकिन एनएलएस-1 से गामा किरण का उत्सर्जन इस बात को चुनौती देता है कि कैसे सापेक्षवादी कणों के स्रोत बनते हैं क्योंकि एनएलएस-1 एजीएन का अनूठा वर्ग है जिसे कम द्रव्यमान ब्लैकहोल से ऊर्जा मिलती है और इसे घुमावदार आकाशगंगा में होस्ट किया जाता है। अभी तक गामा किरण उत्सर्जन का पता लगभग एक दर्ज एनएलएस-1 आकाशगंगा में लगा है। ये 4 दशक पहले चिन्हित एजीएन के अलग वर्ग हैं। सभी लम्बे रेडियो तरंगों की ओर मुड़े हैं। सब एक दूसरे से छोटे हैं और अभी तक रेड शिफ्ट पर एक दूसरे से बड़े एनएलएस-1 का पता लगाने का तरीका नहीं निकला है। इस खोज से ब्रह्मांड में गामा रे उत्सर्जक एनएलएस-1 आकाशगंगाओं के पता लगाने का मार्ग प्रशस्त होगा।

शोध के लिए वैज्ञानिकों ने विश्व का सबसे बड़ा जमीनी टेलीस्कोप अमेरिका के हवाई स्थित 8.2एम सुबारू टेलीस्कोप का इस्तेमाल किया। इससे ऊंचे रेड शिफ्ट की एनएलएस-1 का पता लगाने की नई पद्धति में मदद की। इससे पहले इन आकाशगंगाओं की जानकारी नहीं थी। नई गामा रे उत्सर्जक एनएलएस-1 तब बनता है जब वर्तमान 13.8 बिलियन पुराने ब्रह्मांड की तुलना में ब्रह्मांड 4.7 अरब वर्ष पुराना होता है।

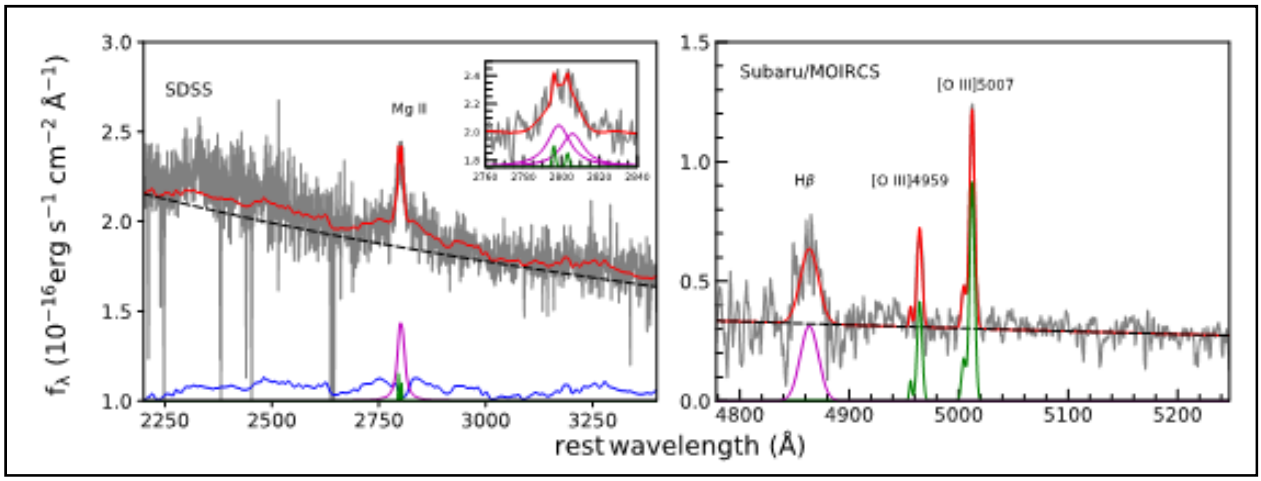


Figure 1. The spectrum of TXS 1206+549. Left panel: Mg II line fit of the SDSS spectrum with an inset plot showing the zoomed version of Mg II line fitting. Right panel: Hβ model fit to the Subaru spectrum.

शोध का नेतृत्व एआरआईईएस के वैज्ञानिक डॉ. शुभेन्दु रक्षित ने किया। इसमें माल्टे श्रेम (जापान), सीएस स्टालिन (आईआईए इंडिया), आई तनाका (अमेरिका), वैदेही एस पालिया (एआरआईईएस), इंद्राणी पाल (आईआईए इंडिया), जरी कोटीलेनेन (फिनलैंड) तथा जायजिंग शिन (दक्षिण कोरिया) ने सहयोग दिया। इस शोध को मंथली नोटिसेज ऑफ रॉयल स्ट्रोनॉमिकल सोसाएटी जर्नल में प्रकाशन के लिए स्वीकार किया गया है। इस खोज से प्रेरित डॉक्टर रक्षित और उनके सहयोग एआरआईईएस के 3.6 एम देवस्थल ऑप्टिकल टेलीस्कोप (डीओटी) पर टीआईएफआर- एआरआईईएस नियर इन्फ्रा रेड स्पेक्ट्रो मीटर की क्षमताओं का पता लगाने में दिलचस्पी रखते हैं ताकि बड़े रेड शिप पर गामा रे उत्सर्जन करने वाली एनएलएस-1 आकाशगंगाओं का पता लगाया जा सके।

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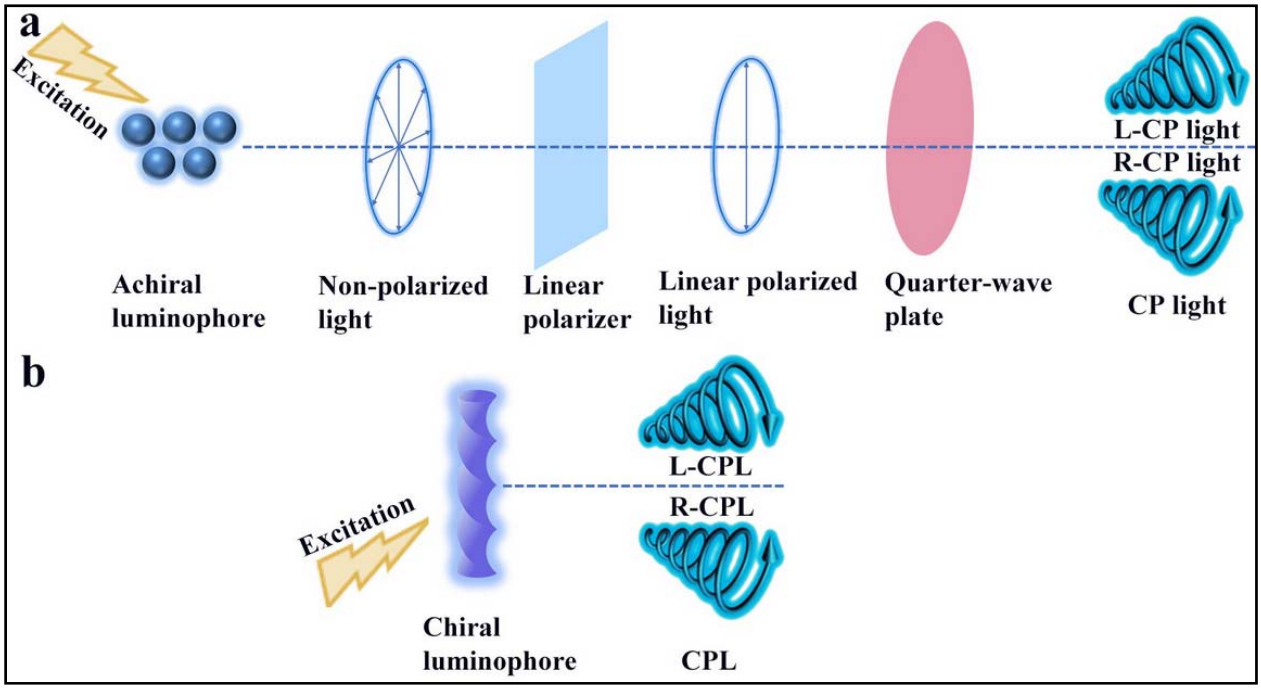
Wed, 14 April 2021

Circularly polarized luminescence from organic micro-/nano-structures

Circularly polarized light exhibits promising applications in future displays and photonic technologies. Traditionally, circularly polarized light is converted from unpolarized light by the linear polarizer and the quarter-wave plate. During this indirectly physical process, at least 50% of energy will be lost. Circularly polarized luminescence (CPL) from chiral luminophores provides an ideal approach to directly generate circularly polarized light, in which the energy loss induced by a polarized filter can be reduced. Among various chiral luminophores, organic micro-/nano-structures have attracted increasing attention owing to the high quantum efficiency and luminescence dissymmetry factor (glum).

In a new paper published in *Light: Science & Applications*, Chinese scientists from Nanjing University of Posts and Telecommunications (NUPT) have summarized the latest progress of CPL-active organic micro-/nano-structures.



a) Physical method. b) Circularly polarized luminescence. Credit: Yongjing Deng, Mengzhu Wang, Yanling Zhuang, Shujuan Liu, Wei Huang, Qiang Zhao

This review expounded the design principles of CPL-active organic micro-/nano-structures from the aspect of the construction of micro-/nano-structure and the introduction of chirality, and some typical organic micro-/nano-structures with CPL activity were introduced in detail, including self-assembly of small molecules and π-conjugated polymers, and self-assembly on micro-/nanoscale architectures.

The formation of organic micro-/nano-structures is driven by intermolecular non-covalent interactions, which is dynamic and sensitive to external stimuli. In this review, they discussed the external stimuli that can regulate CPL performance, including solvents, pH value, metal ions, mechanical force, and temperature.

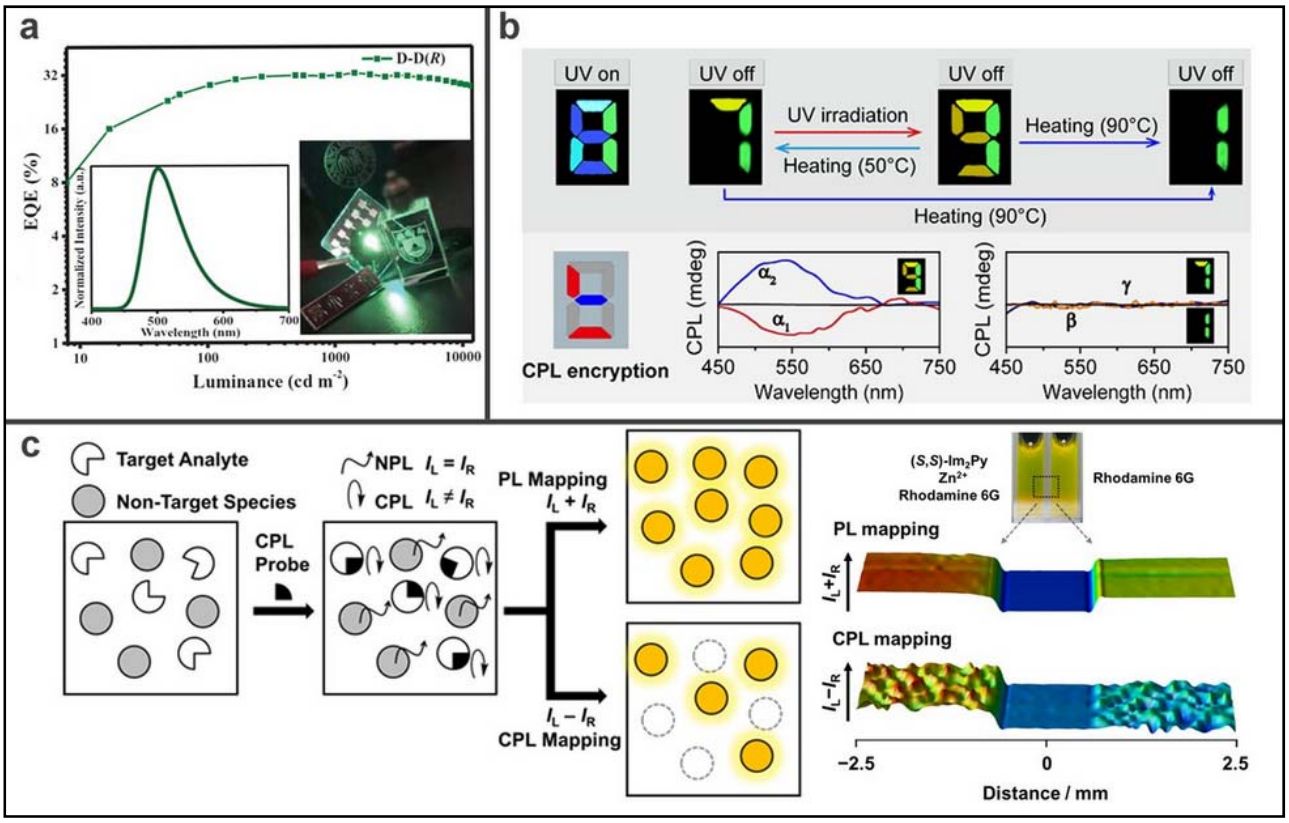
The potential applications were also discussed:

1. In a conventional organic light-emitting diode (OLED), it is usually necessary to use a circular polarizer to reduce the reflectivity of the surrounding environment. Thus, only half of the

emitted light can reach the eyes, causing great loss of brightness and energy efficiency. The OLED based on CPL-active materials can directly emit circularly polarized light with the same handedness as the circular polarizer, reducing the energy loss.

2. In the fields of optical information recording and encryption, materials with CPL activity can achieve higher storage density and security through both optical signals and chiral signals.

3. Compared with other optical sensing technologies, sensing based on CPL-active materials can eliminate the interference of background fluorescence and unpolarized light, providing higher sensitivity and resolution.



a) Circularly polarized organic light-emitting diodes. b) Optical information processing. c) Chemical and biological sensing. Credit: Yongjing Deng, Mengzhu Wang, Yanling Zhuang, Shujuan Liu, Wei Huang, Qiang Zhao

Furthermore, asymmetric quantum efficiency (φa), a new indicator, was proposed to evaluate the comprehensive performance of CPL-active materials, which was defined as the ratio of left- or right-CPL light intensity to incident light intensity. The φa can intuitively reflect the degree of energy loss, and the larger φa represents the lower energy loss.

This review provides an understanding of the relationship among molecular designs, assembly structures, and chiroptical properties, and will provide a guide for the design of excellent CPL-active materials. It is hoped that this review will encourage more researchers to explore this emerging and rapidly developing research area.

More information: Yongjing Deng et al, Circularly polarized luminescence from organic micro-/nano-structures, *Light: Science & Applications* (2021). DOI: 10.1038/s41377-021-00516-7

Journal information: *Light: Science & Applications*

https://phys.org/news/2021-04-circularly-polarized-luminescence-micro-nano-structures.html

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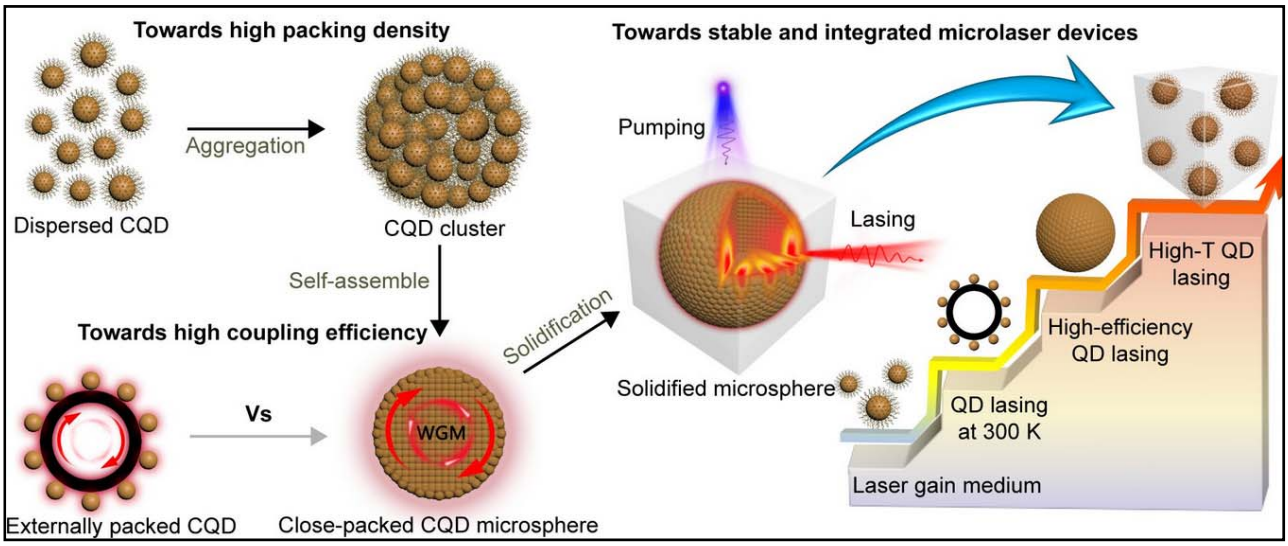
Wed, 14 April 2021

Ultrastable low-cost colloidal quantum dot microlasers of operative temperature up to 450 K

High-performance micro-/nanostructure lasers, as multifunctional optical source components, are of great importance for optoelectronic devices. Towards this goal, scientists in China invented a high-efficiency ultrastable low-cost quantum dot microlaser, which can be operated even at 450 K, the highest operational temperature for quantum dot lasers. The innovative technique substantively promotes its development from the basal performance study to the senior practical compatibility for high-temperature low-cost microlasers and predictable commercialization.



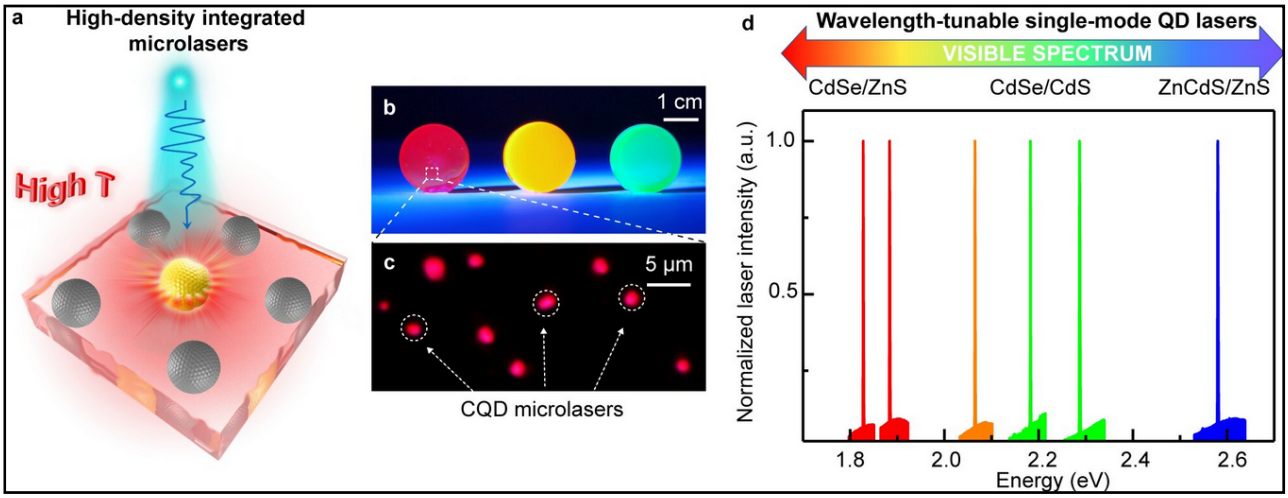
Dispersed CQD self-assembling into close-packed CQD cluster to achieve high packing density, then to the CQD-assembly microsphere to achieve high coupling efficiency, finally to the solidified microsphere to achieve stable and integrated high-T laser. The CQD-assembly microsphere can serve as both gain medium and microcavity. Lights travel inside the WGM microcavity due to the total internal reflection at the resonator boundary to achieve high coupling efficiency. CQDAMs are solidified in silica matrix through sol-gel method to ensure stable working at high temperature. Credit: Hongxing Dong, Wei Xie, Long Zhang

Low-dimensional colloidal quantum dots (CQD) have attracted significant attention because of their unique structures, extraordinary optical properties, and low-cost preparation processes. Since their first synthesis in the 1990s, motivation to realize high-performance low-cost CQD micro-/nanolasers have been a driving force for more than three decades. However, the low packing density, inefficient coupling of CQD with optical cavities, and the poor thermal stability of miniaturized complex systems make it challenging to achieve practical CQD micro-/nanolasers, especially to combine the continuous working ability at high temperatures and the low-cost potential with mass-produced synthesis technologies. Hence, solving the above key problems efficiently requires new ideas different from traditional CQD laser research.

In a new paper published in *Light Science & Applications*, a team of scientists, led by Professor Hongxing Dong and Professor Long Zhang from Key Laboratory of Materials for High-Power Laser, Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, China, and co-workers have developed a novel assembly technique combined with the sol-gel method to fabricate CQD-assembled microspheres (CQDAMs) solidified in a silica matrix, which not only guarantees that the CQDAMs work stably at high temperatures but also solves the problems of gain packing density and coupling efficiency.

Researchers first achieved single-mode lasing based on solidified CQDAMs with operative temperatures up to 450 K. So far, this is the highest operational temperature for CQD microlasers. Even if they continuously work in such a high-temperature environment, the stable output of lasing

pulses can be maintained for 40 min. By changing the composition and/or size of CQD, single-mode lasing can be extended to the entire visible spectral range. Moreover, the solution-processable method has the advantages of low cost and potential for mass-production. It does not require complex optical cavity processing, which means no expensive equipment or extremely complex processing is required. Meanwhile, these CQDAMs lasers can be highly integrated in a micro-substrate, and also applicable to other kinds of semiconductor nanoparticles, which promote predictable commercial application value in high-temperature low-cost micro-integrated optoelectronic devices.



a, Schematic diagram of the mass-produced integrated CQD microlasers working at high temperature. b, Real-color image of the different CQD-based silica matrix samples excited by ultraviolet light. c, Corresponding internal enlarged microscopic image under high excitation condition. The red dots are the lasing CQDAMs at 400 K. d, Multicolor single-mode lasers coming from CQDAMs of different compositions and/or sizes, the lasing energies of which cover the entire visible range. Credit: Hongxing Dong, Wei Xie, Long Zhang

In the research field of micro-/nanolasers devices, high-performance low-cost CQD laser is an important hot topic. Unfortunately, the development is obviously hysteretic considering the coexistence of the multi-level challenges, that is, (1) the basal requirement of excellent lasing performance; (2) the promotional ability to meet the application conditions such as continuous working with high stability, applicability in high-temperature environments; (3) the combination of low-cost production advantage and the merits in previous points (1), (2). These scientists summarize the original design ideas of their microlasers:

"From the point view of gain medium, the self-assembled CQDs almost reach the high limit of packing density, ensuring sufficient optical gain. From the point view of light-matter coupling, such CQDAM samples are used both as gain materials and as optical microcavities, fully improving the light-matter coupling efficiency. From the point view of optical cavity performance, the spherical WGM microcavity can effectively improve the confinement ability of cavity photons. For a CQDAM sample of volume of about 1 μm^{-3}, there could be only a single resonant mode effected in the emission wavelength range. However, the Q factor of operative mode could be 10^4. Most importantly, we combine these three advantages of different aspects together into the CQDAM sample."

"Besides the above laser parameters, the lasing stability at high temperature is also an important aspect related with commercialization potential. The heat dissipation problem is an intrinsic and inevitable difficulty for the next generation of microchip-integrated lasing devices. In this work, the operative temperature of CQD microlaser is demonstrated to 450 K. Moreover, the CQDs microlaser can be high-density integrated with excellent working ability even at such a high temperature. In addition, our unique but generic CQD microlasers fabrication method is very attractive and promising from a commercial standpoint where it can greatly reduce manufacturing cost and simplify the manufacturing process, thereby benefiting their large-scale industrial production. In other words, this highly efficient solution-preparation processes do not need complex processing techniques and expensive processing equipment, the costs are mainly the low-

priced materials. This cost-effective manufacturability and the flexible integration capability pave a new route and promise a great potential in the advancement of CQD microlasers from laboratory to industrialization," they added.

"In addition, ever since the first demonstration of stimulated emission from CQD, the pursuit of electrically pumped CQD lasing has become the subject of intense research. Interestingly, our CQDAMs can serve as both a gain medium and an optical cavity, which can be readily incorporated into the electroluminescent architecture as an emitting layer to enable electrically pumped nanolasers. In fact, the realization of an electro induced micro laser is a great challenge, and more complex problems need to be solved, which is also an important part of our future research," the scientists forecast.

More information: Hao Chang et al, Ultrastable low-cost colloidal quantum dot microlasers of operative temperature up to 450 K, *Light: Science & Applications* (2021). DOI: 10.1038/s41377-021-00508-7

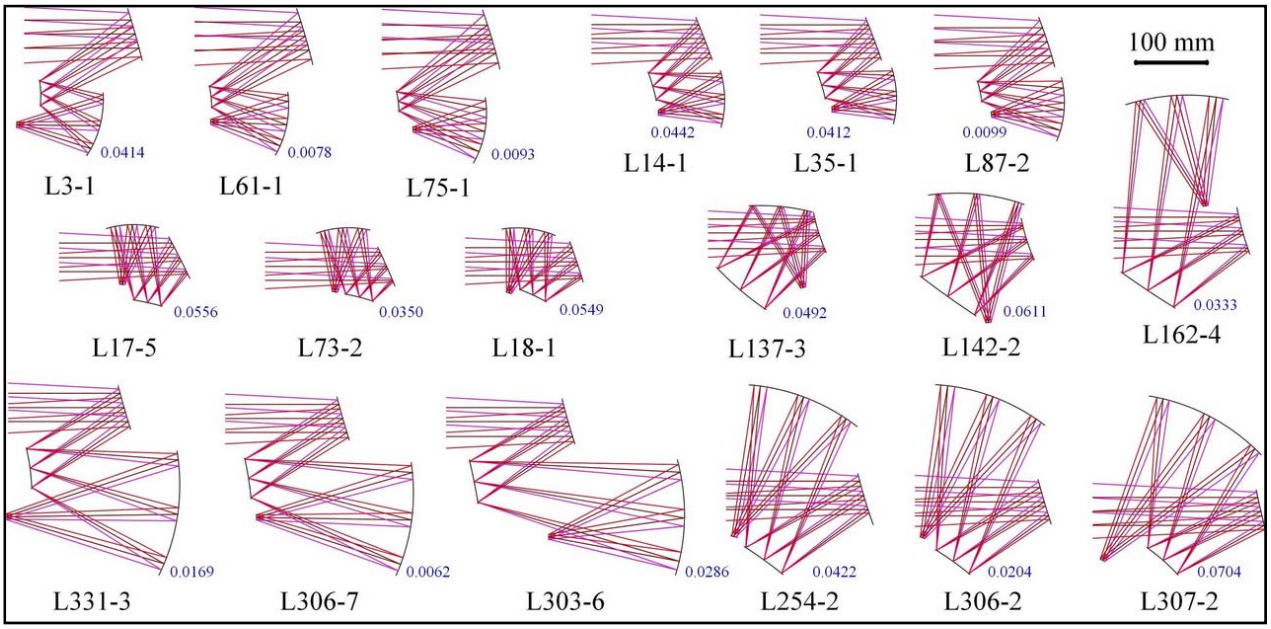
Journal information: *Light: Science & Applications*

https://phys.org/news/2021-04-ultrastable-low-cost-colloidal-quantum-dot.html

Wed, 14 April 2021

Towards automatic design for freeform optics

Designing an optical system requires of the designer significant effort, knowledge, skills and experience. In this work, an automatic design method is proposed for freeform optics, in which specifications and constraints are the only inputs required, and a variety of results can be obtained automatically. The output results have various structures and optical power distributions with high imaging qualities. By implementing this method, designers can realize an overview of the solution space and also focus on specific designs.



The first design example is a three-mirror freeform imaging system that has a field-of-view of 8°×6°, a focal length of 50 mm and a F-number of 1.8, which works in the LWIR band. The computing task is deployed on the high-performance computing platform in Tsinghua University. Through 41.8 hours of automatic computation, 127 systems are obtained, all of which have the average RMS wavefront error (AVG WFE RMS) smaller than 0.075λ (λ = 10 μm). The imaging quality is considered to be diffraction-limited or near-diffraction-limited. Credit: Benqi Zhang, Guofan Jin and Jun Zhu

In the early days of optical design, people had to be proficient in aberration theory and perform a huge amount of numerical calculations, and thus mathematical skills and talents are very important. The emergence of electronic computers has freed people from heavy calculation tasks, and realized fast real ray tracing and been able to solve complex aberration equations. Since then, the application and development of optimization algorithms and optical design software have greatly improved the speed and effect of optical design. However, optical design still requires solving or finding an initial solution as the starting point of optimization, which will greatly determine the final result of optimization. Moreover, optimization is essentially a process of trial-and-error, and the effect of optimization is closely related to the experience of the designer. Therefore, optical design is both an art and a science.

Although there are more and more automated tools, optical design without human guidance is generally considered impossible. The future optical design we look forward to will be: input the system's specifications and constraints at the beginning of the design, and then a large number of high-quality design results with various structures can be automatically outputted. The main job of the designers will be to comprehensively consider factors such as manufacturability, system structure, etc., and select the final design from the output results.

Towards this ultimate goal of optical design, in a new paper published in *Light Science & Application*, a team of scientists, led by Professor Jun Zhu from State Key Laboratory of Precision Measurement Technology and Instruments, Department of Precision Instrument, Tsinghua University, China, have developed a result-diversified automatic design method for freeform optics. With the system's specifications (field-of-view, focal length, entrance pupil diameter) as the only input, a variety of three-mirror freeform imaging systems are obtained automatically, which have various structures and diffraction-limited high imaging qualities. This function is realized for the first time in the field of optical design.

The proposed method is able to perform a coarse search of the solution space of three-mirror freeform systems to obtain a wide variety of high-quality systems, so that one can have an overview of the solutions. This method is also feasible to let one focus on specific designs and conduct fine searches to obtain more similar designs or designs with higher imaging qualities. Through different levels of coarse and fine searching, more and better freeform designs could emerge.

The result-diversified automatic design method proposed in this research provides a brand new appraoch for the realization of fully automatic optical design. It enables people to obtain a variety of high-quality designs with only basic knowledge of optical design. In the field of scientific research, people can explore the solution space of optical systems and the boundaries of system's performance based on the massive results obtained, or conduct research on the disciplines of optical design. In the field of engineering applications, optical design tools based on the proposed method are expected to change the working mode and core content of optical design. Designers can focus on system specification, manufacturability, and cost, etc.

More information: Benqi Zhang et al, Towards automatic freeform optics design: coarse and fine search of the three-mirror solution space, *Light: Science & Applications* (2021). DOI: 10.1038/s41377-021-00510-z

https://phys.org/news/2021-04-automatic-freeform-optics.html

Wed, 14 April 2021

Covid vaccines are disease-modifying, reduce chances of severe infection, mortality: Medical Body Chief

"The COVID-19 vaccines reduce the chances of developing severe infection and death due to the disease," the ICMR Director General said

New Delhi: COVID-19 vaccines reduce the chances of developing severe infection and mortality, ICMR Chief Balram Bhargava said on Tuesday.

After two vaccine doses are administered, the antibodies develop: Balram Bhargava (File)

Responding to a question about people contracting the coronavirus infection even after taking both doses of COVID vaccine, he said these are "disease-modifying" vaccines and there is an 85 per cent reduction in hospitalisation after vaccination which is well established internationally.

"These vaccines are disease-modifying. After two doses are administered, the antibodies develop. The COVID-19 vaccines reduce the chances of developing severe infection and death due to the disease," the ICMR Director General said.

The Indian Council of Medical Research (ICMR) is the country's top health research body.

Currently, two vaccines -- Covaxin by Bharat Biotech and Oxford-AstraZeneca's Covishield manufactured by Serum Institute of India (SII) -- are being used for inoculation in India.

India's drug regulator has also granted permission for the restricted emergency use of the Russian COVID-19 vaccine Sputnik V with certain conditions.

https://www.ndtv.com/india-news/indian-council-of-medical-research-chief-balram-bhargava-covid-vaccines-are-disease-modifying-reduce-chances-of-severe-infection-mortality-2413042

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