Mar
2021

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खंड : 46 अंक : 65 31 मार्च 2021

Vol.: 46 Issue : 65 31 March 2021

रक्षा विज्ञान पुस्तकालय
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Tue, 30 March 2021 3:32PM

GRSE pays interim dividend cheque of Rs 32.85 crore for FY 2020-21 to Raksha Mantri Shri Rajnath Singh

Defence Public Sector Undertaking (DPSU) Mini Ratna shipyard, Garden Reach Shipbuilders & Engineers Limited (GRSE), has paid interim dividend of Rs 44.10 crore for Financial Year (FY) 2020-2021 to its shareholders. Interim dividend cheque of Rs 32,85,63,774/- as the share of Government was handed over to Raksha Mantri Shri Rajnath Singh by Chairman & Managing Director of GRSE, Kolkata Rear Admiral V K Saxena, IN (Retd) in New Delhi on March 30, 2021. Secretary (Defence Production) Shri Raj Kumar was also present on the occasion.

Notwithstanding the impact of COVID-19 pandemic, the GRSE has declared an interim dividend of Rs. 3.85 per equity share of Rs.10 for FY 2020-2021. The DPSU has been consistent in paying dividend to the shareholders and has done so every year for the last 27 years.

Since its inception in 1960, the GRSE has the distinction of being the only defence shipyard to have delivered more than 100 warships (107 warships as on date). The shipyard has an order book position which stands at Rs 25887/- Crore as on December 31, 2020.

https://www.pib.gov.in/PressReleasePage.aspx?PRID=1708465

पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Tue, 30 March 2021 3:32PM

जीआरएसई ने रक्षा मंत्री श्री राजनाथ सिंह को वित्त वर्ष 2020-21 के लिए 32.85 करोड़ रुपये का अंतरिम लाभांश चेक दिया

रक्षा में सार्वजनिक क्षेत्र के उपक्रम (डीपीएसयू) मिनी रत्न शिपयार्ड, गार्डन रीच शिपबिल्डर्स एंड इंजीनियर्स लिमिटेड (जीआरएसई) ने अपने शेयरधारकों को वित्त वर्ष **2020-2021** के लिए **44.10** करोड़ रुपये का अंतरिम लाभांश दिया है । सरकार के हिस्से के रूप में **32,85,63,774** रुपये का अंतरिम लाभांश चेक रक्षा मंत्री श्री राजनाथ सिंह को जीआरएसई, कोलकाता के अध्यक्ष और प्रबंध निदेशक रीयर एडमिरल वी के सक्सेना, भारतीय नौसेना (सेवानिवृत्त) ने दिनांक **30** मार्च, **2021** को नई दिल्ली में सौंपा।

इस अवसर पर सचिव रक्षा उत्पादन श्री राज कुमार भी उपस्थित थे।

कोविड**-19** महामारी के प्रभाव के बावजूद जीआरएसई ने वित्त वर्ष **2020-2021** के लिए **10** रुपये के **3.85** रुपये प्रति इक्विटी शेयर का अंतरिम लाभांश घोषित किया है । डीपीएसयू शेयरधारकों को लगातार लाभांश देता रहा है और पिछले **27** वर्षों से हर साल इस उपक्रम ने ऐसा किया है।

1960 में अपनी स्थापना के बाद से जीआरएसई को एकमात्र रक्षा शिपयार्ड होने का गौरव प्राप्त है जिस ने **100** से अधिक युद्धपोतों (आज तक **107** युद्धपोत) की आपूर्ति की है । शिपयार्ड में ऑर्डर बुक की स्थिति दिनांक **31** दिसंबर, **2020** तक **25887/-** रुपये है।

https://pib.gov.in/PressReleasePage.aspx?PRID=1708580

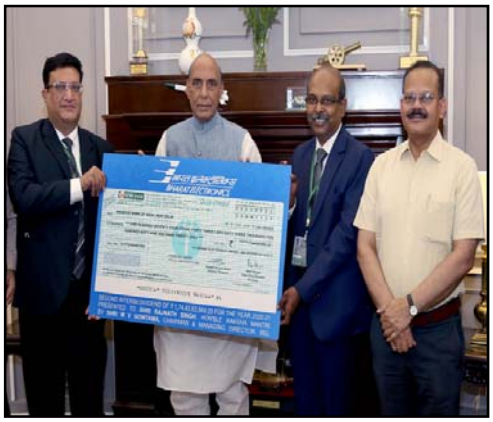
Press Information Bureau
Government of India

Ministry of Defence

Tue, 30 March 2021 5:19PM

BEL hands over second interim dividend cheque of Rs. 174.43 Crore for FY 2020-21 to Raksha Mantri Shri Rajnath Singh

Bharat Electronics Ltd (BEL), a Navratna Defence PSU, has paid second interim dividend of 140% on its paid-up capital to the Government of India for financial year 2020 – 21.



Chairman & Managing Director of BEL Shri M V Gowtama, presented the second interim dividend cheque of Rs.174,43,63,569.20/- (Rupees One Hundred Seventy-four Crore Forty-Three Lakh Sixty-three Thousand Five Hundred Sixty-nine and Twenty Paise only), payable on the shares held by the President of India, to Raksha Minister, Shri Rajnath Singh, at New Delhi on March 30, 2021. Secretary (Defence Production) Shri Raj Kumar was also present on the occasion.

BEL has declared 140% percent as second interim dividend (Rs. 1.40/- per share) to its shareholders for the financial year 2020 – 21.This is the 18th consecutive year that BEL is paying Interim Dividend. BEL has paid a total dividend of 280% on its paid-up capital for the financial year 2019 – 20.

https://www.pib.gov.in/PressReleasePage.aspx?PRID=1708504

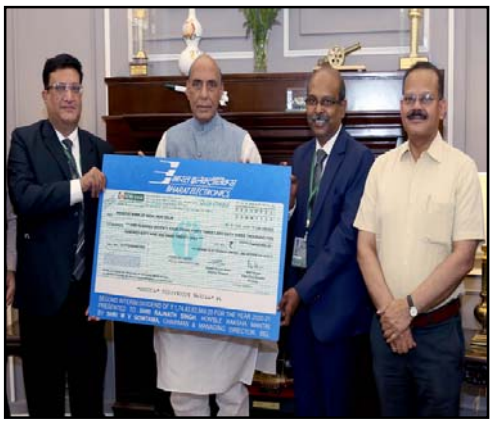
पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Tue, 30 March 2021 5:19PM

बीईएल ने रक्षा मंत्री श्री राजनाथ सिंह को वित्त वर्ष 2020-21 के लिए 174.43 करोड़ रुपये का दूसरा अंतरिम लाभांश चेक सौंपा

रक्षा में सार्वजनिक क्षेत्र के नवरत्न उपक्रम भारत इलेक्ट्रॉनिक्स लिमिटेड (बीईएल) ने वित्त वर्ष 2020-21 के लिए भारत सरकार को अपनी पेड-अप पूंजी पर 140% का दूसरा अंतरिम लाभांश दिया है।



बीईएल के अध्यक्ष एवं प्रबंध निदेशक श्री एम वी गौतम ने 30 मार्च 2011 को नई दिल्ली में रक्षा मंत्री श्री राजनाथ सिंह को 174,43,63,569.20 रुपये (एक सौ चौहत्तर करोड़ तैंतालीस लाख तिरसठ हजार पांच सौ उनहत्तर रुपये एवं बीस पैसे) का दूसरा अंतरिम लाभांश चेक भेंट किया।
इस अवसर पर सचिव रक्षा उत्पादन श्री राज कुमार भी उपस्थित थे।

बीईएल ने वित्त वर्ष 2020-21 के लिए 140% के रूप में अपने शेयरधारकों को दूसरे अंतरिम लाभांश (1.40 रुपये प्रति शेयर) की घोषणा की है। बीईएल ने वित्त वर्ष 2019-20 के लिए अपनी पेड-अप पूंजी पर कुल 280% का लाभांश दिया है ।

https://pib.gov.in/PressReleasePage.aspx?PRID=1708575

Press Information Bureau
Government of India

Ministry of Defence

Tue, 30 March 2021 8:03PM

Indian and US Special Forces conclude joint training exercise

The 11th edition of Indo-US Joint Special Forces Exercise VAJRA PRAHAR 2021 was conducted at Special Forces Training School located at Bakloh, HP in March 2021. The joint exercise by the Special Forces of both the countries is conducted alternatively between India and the United States to share the best practices and experiences in areas such as joint mission planning and operational tactics as also to improve interoperability between the Special Forces of both nations.

Bilateral military exercises and defence exchanges are an important facet of deepening bilateral defence cooperation between friendly countries. During such events, the armies of participating nations jointly train, plan and execute a series of operations for neutralisation of threats of varied nature with a common aim of countering threats of international terrorism through mutual training and jointness.

https://www.pib.gov.in/PressReleasePage.aspx?PRID=1708581

mint

Wed, 31 March 2021

Indian Army Chief claims no territory lost in months-long military standoff with China

On the disengagement plan, Naravane said that after the ninth round of Corps Commander level talks in early February, an agreement was reached to move away from the friction areas in a phased manner

By Elizabeth Roche

New Delhi: Indian Army chief General Manoj Mukund Naravane hs said that India has “not lost out on any territory" in the months-long military standoff with China in eastern Ladakh.

“We are where we were," he said, after the worst border conflict between the two giant neighbours in decades that began in May 2020.

Army Chief Manoj Mukund Naravane speaks to media, in New Delhi on Monday. (ANI Photo)

Naravane made the remarks to ANI news agency in an interview on Tuesday.

“I think that firstly we have not lost out on any territory, we are where we were before this whole thing started. As a result of this agreement, which has been reached on the principle of mutual and equal security, I think that’s how we should look at this whole disengagement process that it serves the interest of both the countries to have a very stable LAC (Line of Actual Control), with less chances of any confrontation taking place. That should be the larger viewpoint," Naravane said. The agreement referred to was one reached last month under which India and China moved back troops from one of the most contentious friction points in eastern Ladakh – ie Pangong Tso lake.

“Not an inch (of territory) has been lost, that’s right," Naravane said echoing a statement by Defence Minister Rajnath Singh to Parliament. The comments come against the backdrop of the opposition frequently attacking the Modi government for “letting China acquire Indian territory."

On the disengagement plan, Naravane said that after the ninth round of Corps Commander level talks in early February, an agreement was reached to move away from the friction areas in a phased manner.

“Tenth February onwards, the disengagement started and went as per plan. From the north and south banks of the Pangong Tso and Kailash range, people have gone to their nearest permanent locations," he said. This had reduced the chances of miscalculation which could have taken place due to face-to-face deployment of the Indian and Chinese troops.

“Now there is relative peace and tranquility along the LAC," he said.

While the two countries have moved their troops back from the banks of Pangong Tso lake disagreement persists over the pull back of troops from other friction areas like Depsang Plains, Hot Springs and Gogra Post. India has said that only a complete withdrawal of Chinese troops from all points of conflict would be acceptable.

The face-off, which began in late April-May May last year, led to a bloody clash in the Galwan Valley on the night of 15 June, that resulted in casualties on both sides. This was the first time in more than four decades that lives had been lost along the India-China border.

https://www.livemint.com/news/india/indian-army-chief-claims-no-territory-lost-in-months-long-military-standoff-with-china-11617124335867.html

NEWS 18

Wed, 31 March 2021

India likely to get Air Defence Command, Maritime Command by August 15

Theatre Commands are a long delayed step in reorganising India's military and bringing jointness in the three services to increase efficiency

When Prime Minister Narendra Modi addresses the nation from the ramparts of the Red Fort this August 15, a big announcement on restructuring India’s defence forces is likely.

Top sources, in the know of things, say that two theatre commands — the Maritime Command and the Air Defence Command — will be operational by August 15.

The Air Defence Command will be based out of Allahabad and will control air assets of the Indian Air Force (IAF), Army and Navy. It will be responsible for protecting military assets from airborne enemies and will be commanded by a three-star officer of the IAF.

The Maritime Command will be based out of Karwar and will be responsible for the security of the Indian Ocean region. It will be commanded by a three-star officer of the Indian Navy.

Apart from these two theatre commands, India will get three or four integrated commands to secure the Pakistan and China fronts. Sources said there could be two theatre commands on the China front which in turn will report to a higher command.

Indian Air Force (IAF) soldiers march as advanced light helicopters fly during the Indian Air Force Day celebrations at the Hindon Air Force Station on the outskirts of New Delhi, India, October 8, 2019. (Reuters)

On the Pakistan front, there will be one theatre command for Jammu and Kashmir which will include the Line of Control and the International Border.

Theatre Commands are a long delayed step in reorganising India's military and bringing jointness in the three services to increase efficiency. Essentially it is a compact unit that will control all military assets in a theatre of war and report to a single commander. General Bipin Rawat, India's first Chief of Defence Staff, is mandated with wrapping up the project by the end of 2022.

Thirty-two countries around the world including the US and China have structures similar to theatre commands. China has reorganised itself into give theatre commands. Its Western Theatre Command is responsible for the border with India. India on the other hand has 17 commands between the Army, Navy and Air Force with complex geographical overlaps. Seven come into play if a conflict with China breaks out.

https://www.news18.com/news/india/25-indian-crew-members-on-suez-canal-cargo-vessel-in-good-health-will-sail-to-rotterdam-3590819.html

THE TIMES OF INDIA

Wed, 31 March 2021

Project to build N-powered attack subs set to get CCS nod

By Rajat Pandit

New Delhi: India is set to clear a mega indigenous project to build three nuclear-powered attack submarines, which will be followed by approval for another three at a later stage, as part of the long-term plan to counter China's expanding naval footprint in the Indian Ocean Region (IOR) and beyond.

The Cabinet Committee on Security (CCS) is likely to give the final nod "within a month or two" to the submarine project, which has been hanging fire for over a year now, say top government sources.

The overall project is for the construction of six nuclear-powered attack submarines (called SSNs in naval parlance), each weighing over 6,000-tonne, at the ship-building center (SBC) at Vizag.

But only three will be approved by the CCS in the first go, with the first indigenous SSN slated to roll out by around 2032 or so. Though each will cost around Rs 15,000 crore, the funding will not be a major problem because it will be spread over several years, said the sources.

India will also commission its second nuclear-powered submarine armed with nuclear ballistic missiles (called SSBN), INS Arighat, this year. The first, INS Arihant, became fully operational with "a successful deterrence patrol" in late-2018. This somewhat completed India's long-awaited "nuclear triad" after the land-based Agni missiles and fighter jets like Mirage-2000s jury-rigged to deliver nuclear bombs.

A SSN does not have "a strategic role" like a SSBN. Instead, it's a deadly "hunter-killer" of enemy warships and submarines, while also being equipped with long-range cruise missiles to hit land targets. It can quietly track an enemy target for extended ranges, and take it out as and when when required.

India currently operates a solitary SSN, INS Chakra, the Akula-class submarine taken on an initial 10-year lease from Russia in April 2012. In March 2019, an over $3 billion (Rs 21,000 crore) deal was inked with Russia to lease a more advanced SSN to eventually replace INS Chakra.

India, of course, needs to build its own SSNs because they will not only prove cheaper but also give a major boost to the local economy. Nuclear submarines can operate at high speeds for long distances as well as remain submerged for months at end, without having to surface or "snorkel" every few days to get oxygen to recharge their batteries like conventional diesel-electric submarines.

TOI was the first to report that the Modi government had rejigged the 30-year submarine building plan, which was first approved by the CCS in 1999, to include construction of 18 diesel-electric boats and six SSNs.

The construction of SSBNs is a separate project under the PMO. The 6,000-tonne INS Arihant and INS Arighat, currently armed with 750-km range K-15 nuclear missiles, will be followed by two 7,000-tonne SSBNs. Moreover, an even bigger 13,500-tonne SSBN is also being planned, while the new K-4 missiles, with a strike range of 3,500-km, are now virtually ready, as was earlier reported by TOI.

Apart from two nuclear submarines, India currently has only 12 ageing diesel-electric boats and three new Scorpenes. China already has the world's largest Navy with 350 warships, including 50 conventional and 10 nuclear submarines.

https://timesofindia.indiatimes.com/india/project-to-build-n-powered-attack-subs-set-to-get-ccs-nod/articleshow/81770216.cms

Hindustan Times

Wed, 31 March 2021

It is time to reimagine the Indian Ocean

India must stop seeing the Indian Ocean in silos and the defence establishment must step up its engagement in the wider region

By Darshana M Baruah

The United States (US) secretary of defence, Lloyd Austin's recent visit to India underlined the strategic importance of Delhi in Washington's Indo-Pacific engagements. Although the US and India did not sign any specific agreements during the visit, defence minister Rajnath Singh and Austin provided, with their brief statements, a glimpse into the areas of collaboration that lie ahead.

For the maritime domain, the interesting takeaway was the specific mention in Singh's remarks to "pursue enhanced cooperation between the Indian military and the US Indo-Pacific Command, Central Command and Africa Command". On Twitter, Austin mentioned the western Indian Ocean as a region for collaboration (in addition to the Indo-Pacific) after his meeting with external affairs minister, S Jaishankar. Underlining the need to work with the three US combatant commands, and referring to the western Indian Ocean, is an acknowledgement of the bureaucratic division of the ocean and the need to work through its imaginary divisions. It is also a nod toward the importance of the African coast within the Indian Ocean framework, a geographic reality often lost amid South Asia and West Asia's geopolitics.

If China indeed is emerging as the key competitor to India's interests in the Indian Ocean Region, there is a need to reframe our mental maps and view the Indian Ocean as one space, and better understand regional dynamics (PTI)

Washington is not alone in engaging the Indian Ocean in silos; Delhi's political class, too, has divided the ocean into many sub-regions. Traditionally, India draws a line with Mauritius and

Seychelles as its areas of strategic collaboration in the Indian Ocean. In terms of sub-regions, the priority is in the northern (Arabian Sea and Bay of Bengal), and eastern Indian Ocean (Andaman Sea and Straits of Malacca). The Indian Navy, on the other hand, defines the region in its entirety as its area of responsibility from the coast of Malacca to the eastern coast of Africa. While India has begun to rectify this division of the Indian Ocean, especially with the establishment of the Indian Ocean division in the ministry of external affairs (MEA) in 2016, the western Indian Ocean and the eastern coast of Africa still continue to be in the maritime periphery in Delhi's official worldview.

To place this in context, Beijing's first overseas military base was set up in the western Indian Ocean, in Djibouti in the Horn of Africa. Russia too recently acquired a base in Sudan, on the Red Sea coast, between the Suez Canal and Bab-el-Mandeb — a strategic chokepoint in the Indian Ocean. Beyond the anti-piracy mission, India's presence and maritime engagements with the African coast, however, have been largely ad hoc. Since Independence, India has enjoyed an advantageous position in the Indian Ocean, primarily accorded through its geography. The lack of direct competition after the end of the Cold War allowed India to continue with its limited maritime approach while retaining the role of a key "Indian Ocean player". In reality, Delhi ignored and misunderstood the geographic importance of its maritime environment.

In comparison, Beijing has consistently aimed to improve its diplomatic, political and military engagements in the region from Sri Lanka to the Comoros, spanning the Indian Ocean in its entirety. Through the Maritime Silk Road, part of China's Belt and Road initiative, Beijing engages with littorals and islands across the Ocean. Over the years, Beijing has undertaken missions and activities to show both its interest and ability to emerge as a key player in the Indian Ocean — from the 2014 submarine docking in Colombo and assisting Maldives in its 2016 water crisis to establishing its military base in Djibouti in 2017.

Prime Minister Narendra Modi's visit to Indian Ocean islands (Sri Lanka, Mauritius and Seychelles) in 2015 was the first visit by an Indian leader in over three decades in an attempt to re-engage with the Indian Ocean. While the current government has adopted a more active outlook toward the maritime domain — encouraged by China's increasing presence — there are challenges in fully understanding and leveraging India's potential in the Indian Ocean.

India's reorientation toward the maritime domain has been not been easy, with generations of foreign and defence service officials focusing and training on continental issues. That the Indian Navy is allotted approximately 14% of the defence budget speaks clearly to the defence establishment's priorities. While this is not to discount Delhi's continental troubles, seen in recent crises such as Doklam and Ladakh, there is a need to understand the importance of maritime geography and its link to India's strategic interests and growing competition in the region. While MEA appears to be undertaking a more active approach in correcting this negligence, the defence establishment too has to match foreign policy engagements.

The Navy's priority is maritime domain awareness, which translates into being aware of all movements, under, on and over, the sea. In order to prepare for emerging new threats, being aware is the first step in formulating policies. However, Delhi continues to struggle in working with the Indian Ocean as one region. For example, Madagascar and the Comoros were excluded from MEA's Indian Ocean division until December 2019. India continues to exclude the two countries from its Indian Ocean Coastal Surveillance Radar Network — aimed at increasing collaborations and information-sharing with the region. There is also no defence attache in either of the countries or accredited from neighbouring islands covering military developments around those waters. With a limited footprint on the African coast, the western Indian Ocean remains a blind spot in Delhi's Indian Ocean engagements. If China indeed is emerging as the key competitor to India's interests in the Indian Ocean Region, there is a need to reframe our mental maps and view the Indian Ocean as one continuous space, and understand regional dynamics better.

Darshana M Baruah is an associate fellow at the Carnegie Endowment for International Peace in Washington DC, where she leads the Indian Ocean initiative. *(The views expressed are personal)*

https://www.hindustantimes.com/opinion/it-is-time-to-reimagine-the-indian-ocean-101617111891839.html

THE TIMES OF INDIA

Wed, 31 March 2021

Army to get 1st batch of women in its rank-and-file this year

By Chethan kumar

The Indian army will be inducting women in its rank-and-file for the first time in the coming weeks with the training of the first batch of women cadets in the Corps of Military Police (CMP) scheduled for completion in the next few weeks in Bengaluru.

The cadets began their 61-week training on January 6, 2020. And, even as the passing out parade of the first batch is yet to be held, more than 4,000 women had applied to be part of the CMP in the recently held rally by the Indian army. Those selected from this rally would be part of the second batch of women in CMP.

So far, the army had only women officers in certain streams and this is the first time that women will be inducted in the non-officer category.

These cadets, once they complete their training, could be posted in any one of the army's divisions, including the ones in the forward areas.

According to the ministry of defence (MoD), a total of 1,700 women military police will be inducted over a period of 17 years, and the first batch of 99 women military police trainees had reported to the CMP Centre and School in Bengaluru in January 2020.

The training of the first batch of women soldiers comprised basic military and advanced provost training.

"Adequate training and administrative infrastructure have been put in place and due diligence was used while developing administrative infrastructure for women recruits' accommodation based on interactions with the Officers Training Academy in Chennai, Assam Rifles and National Cadet Corps and the Officers Training Academy in Gwalior," an earlier statement by the CMP read. The women soldiers have had the same terms and conditions as applicable to their male counterparts. On completion of training, the women military police will perform similar duties as the male military police personnel.

"The women military police, besides being employed on mandatory operational and peacetime duties, will be an asset for investigation of gender-specific crimes," the CMP statement reads.

Further, as reported by TOI earlier, the army's first major recruitment rally (Dec 2020) since the Covid-19 pandemic hit the country had participation from more than 4,000 women, aspiring to join the CMP. An officer from the Karnataka and Kerala sub-area who oversaw the rally had told TOI: "We've received applications from around 4,000 women and 10,000 men."

In the recently concluded Parliament session, MoS Shripad Naik told the Rajya Sabha that in addition to the provision of Permanent Commission to Women Officers in Judge Advocate General and Army Education Corps, the Centre has recently announced a grant of Permanent Commission to Women Officers in all other arms/services in which they are eligible for commission.

"Further, the government has sanctioned 1,700 women in the CMP in a phased manner," he had said, adding that there are 6,796 women in the army as of date.

Recently, the army and the government had come under criticism from the Supreme Court, which had termed some of the selection criteria for women to get the permanent commission, as arbitrary and irrational.

https://timesofindia.indiatimes.com/india/army-to-get-1st-batch-of-women-in-its-rank-and-file-this-year/articleshow/81770555.cms

FRONTLINE
INDIA'S NATIONAL MAGAZINE

Wed, 31 March 2021

French warships arrive in Kochi ahead of joint naval exercise with Quad member countries in the Bay of Bengal from April 5 to 7

By Ravi Sharma

The French Navy's amphibious assault helicopter carrier Tonnerre and the La Royale's escort frigate Surcouf arrived on the morning of March 30 at the Kochi port in Kerala ahead of a joint naval exercise that the French navy is taking part in along with the navies of the Quadrilateral Security Dialogue (Quad) member countries —Australia, India, Japan, and the United States.

Called 'La Perouse', after the well-known French navigator Jean-François de Galaup, comte de Lapérouse (1741–88), the naval exercise will be led by the French Navy and is scheduled to be held in the Bay of Bengal from April 5 to 7. The 2021 edition of 'La Perouse', will witness for the first time all four Quad members taking part in it. The first 'La Perouse' exercise took place in 2019. This is the first time that the Indian Navy will be taking part in the France-led war game.

Welcomed into port by the famous Indian Navy Band, with senior officers of the Indian Navy present, the two French naval vessels will make the port call at Kochi for three days until April 1. On a five-month-long deployment throughout the Indo-Pacific region, which started in February, Tonnerre and Surcouf will head for Japan after 'La Perouse'. The Tonnerre carries more than 600 officers and cadets, including 150 freshly inducted young cadets who will be participating in the exercise as the final phase of their training.

France has been engaging with Quad member countries in various formats. In January, the India-France-Australia trilateral senior officials' meeting took place, while last September the first Foreign Secretary-level trilateral dialogue was between the same three countries.

April will witness the Indo-France bilateral 'Varuna' naval exercises, which will see the participation of a La Royale aircraft carrier. The last edition of the 'Varuna' war games, the 17th overall, took place off the Goa coast in May 2019.

In February 2020, the French and Indian navies, for the first time, conducted joint patrols from the Indian Ocean island of Reunion Island. The week-long surveillance patrol was conducted in the Southern Indian Ocean off Mauritius using an Indian Navy's Boeing P-8I maritime patrol aircraft. French personnel were also present aboard the P-8I. The joint patrol indicated India's readiness to engage with friendly foreign partners in expanding its footprint in the Indian Ocean, focusing on the stretch between the East African coastline and the Malacca straits.

India along with the U.S., Japan and Australia conducted the latest edition of the annual 'Malabar' naval exercises in the Bay of Bengal in November 2020. Navies of all four countries carried out anti-submarine warfare operations and naval manoeuvres at sea.

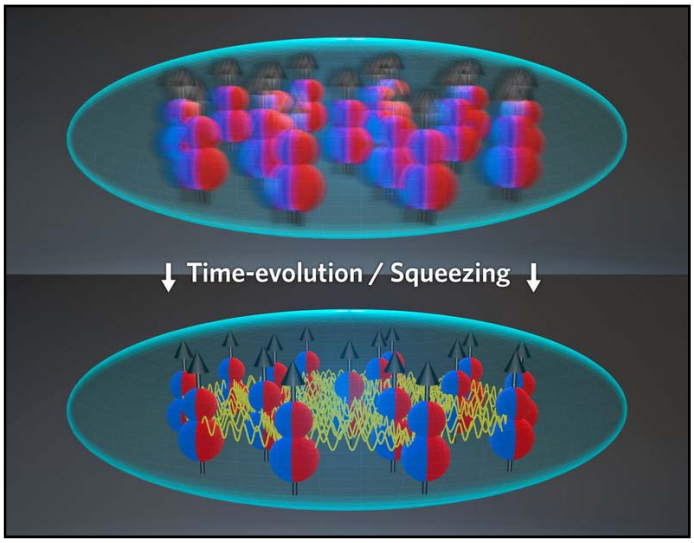
https://frontline.thehindu.com/dispatches/french-warships-arrive-in-kochi-ahead-of-joint-naval-exercise-with-quad-member-countries-in-the-bay-of-bengal-from-april-5-to-7/article34199906.ece

Wed, 31 March 2021

Theoretical physicists predict quantum interactions within 3D molecules

By Kenna Castleberry

Within the realm of quantum mechanics, the generation of quantum entanglement remains one of the most challenging goals. Entanglement, simply put, is when the quantum state of each particle or a group of particles is not independent of the quantum states of other particles or groups, even over long distances. Entangled particles have always fascinated physicists, as measuring one entangled particle can result in a change in another entangled particle, famously dismissed as "spooky action at a distance" by Einstein. By now, physicists understand this strange effect and how to make use of it, for example to increase the sensitivity of measurements. However, entangled states are very fragile, as they can be easily disrupted by decoherence. Researchers have already created entangled states in atoms, photons, electrons and ions, but only recently have studies begun to explore entanglement in gases of polar molecules.



Credit: Steven Burrows/The Rey Lab

"Molecules are very appealing for quantum simulation, quantum information, and precision measurements," explained Dr. Ana Maria Rey, a University of Colorado Boulder Adjoint Professor of Physics and JILA Fellow. The reason is that molecules have a large number of internal degrees of freedom that can be a useful resource for quantum sensing and fundamental physics tests. Another benefit of using molecules in quantum experiments is that molecules also have long-range dipolar interactions: in contrast to atoms which have to bump into each other to interact, molecules can interact at a distance. "Molecules offer really great advantages compared to atoms, but at the same time, they are really hard to cool down. In fact, cooling molecules to quantum degeneracy (condition reached when they are cold enough to make quantum effects dominate) has been one of the most sought-after outstanding goals for many years. The progress has been very slow, but it's happening now."

In 2019 JILA Fellow and Adjoint professor for University of Colorado, Boulder, Jun Ye, finally achieved this important milestone. Ye's lab managed to cool down molecules consisting of one rubidium and one potassium atom down to quantum degeneracy and observe their quantum nature. More recently, he has been compressing this molecular gas into a stack of pancake shaped arrays. The work by the Rey's and Ye's groups investigates the exciting new physics that emerges due to dipolar interactions in such pancake shaped arrays.

The Importance of Pancake Geometry

Chemical reactions are one of the most detrimental enemies to cooling molecules. A few years ago, the Ye lab was able to avoid chemical reactions while allowing molecules to interact with

each other via dipolar interactions by loading the molecules in a 3D lattice. A 3D lattice can be imagined as a perfect crystal of light. In a 3D lattice molecules are pinned at individual lattice sites without moving. The molecules then interact via dipolar interactions in the same way that magnets interact: when they are placed side by side they repel and when they are placed head to tail they attract. In a 3D lattice, molecules experience both attractive and repulsive interactions and as a consequence on average the interactions between molecules cancel each other out. Moreover, in the 3D lattice experiment the molecular filling fraction was very low, which is to say that the molecules were mostly quite far apart and interacted only very weakly.

In a recent experiment, however, the Ye group was able to increase the density by compressing a 3D quantum degenerate gas into a few pancakes, each one with a flat 2D shape. Within a pancake the Ye group found it is possible to suppress undesirable chemical reactions and in addition make dipole interactions stronger. This is because in a 2D configuration all molecules repel and the interactions do not average out. The exciting observation made by the investigators is that the strong dipolar interactions in the pancake can also make the gas robust to undesirable dephasing effects and chemical reactions. Bilitewski stated: In studying this shape, "conceptually, and this is at the heart of this work, the interactions between the molecules depend on the quantum states they are in, and thus on this confinement. So, you first have to figure out the interactions in this new geometry. It turns out these actually have very beneficial properties for generating the collective dynamics we are after." But the even better news is that interactions not only protect the state by forcing the molecular dipoles to be all aligned, but also naturally create entanglement. In Bilitewski' words: "the benefit to this collective synchronization is that the entanglement we generate becomes robust to certain effects that would usually destroy is." Such entangled arrays of molecules could have applications for future measurements of various quantities, such as electric fields, with sensitivity enhanced by the entanglement.

The work done by the Rey group illustrates the importance of geometrical effects in dipolar gases and the exciting many-body phenomena yet to be explored once molecules are brought to quantum degeneracy. In theorizing about the importance of this 2D shape, Rey said: "thanks to the amazing work done by Thomas Bilitewski, we have been able to model their quantum dynamics and show it should be possible to entangle them, he computed all the integrals needed to write an effective model, solved the equations of motion and showed everything can be made to work out to generate entanglement through flip-flop processes induced by dipolar interactions."

The production of ultracold molecular gases in controllable geometries hints at new discoveries and predictions within the field of quantum mechanics. "This observation was a demonstration that molecules can explore quantum magnetism," Rey added, "In other words, the molecules can behave as quantum magnets and emulate the behavior of electrons in solids, for example. In our recent work, we have made a step forward toward this direction." The proposal put forth by the Rey and Ye groups is only the beginning of all the great science yet to be studied with entanglement arrays of molecules. According to Bilitewski: "this is all really exciting in the sense that we are exploring a novel regime that has only now become available in the lab."

More information: Thomas Bilitewski et al. Dynamical Generation of Spin Squeezing in Ultracold Dipolar Molecules, *Physical Review Letters* (2021). DOI: 10.1103/PhysRevLett.126.113401

Journal information: *Physical Review Letters*

https://phys.org/news/2021-03-theoretical-physicists-quantum-interactions-3d.html

PHYS.ORG

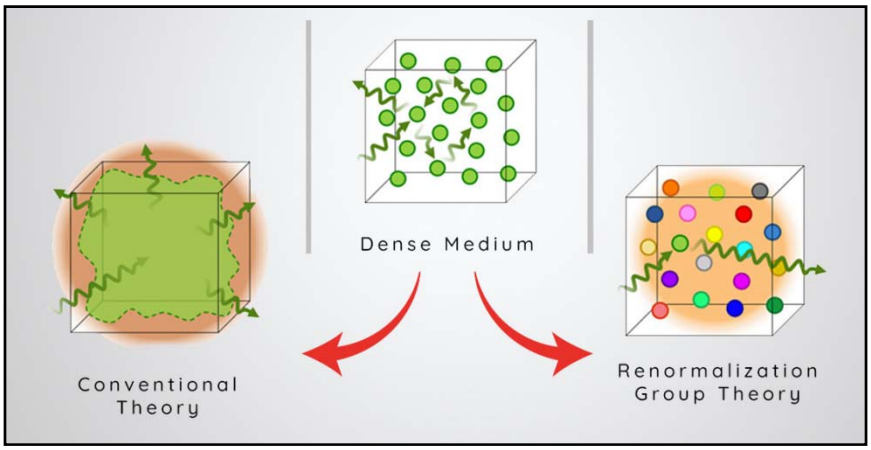
Wed, 31 March 2021

Why are optical refractive indices so small?

Pink Floyd's Dark Side of the Moon cover, voted the greatest classical rock album of all time, intended to portray the prism and dispersion of light into a rainbow as a certain metaphorical symbolism and a light show that was never celebrated. However, they really were not aware of the fact that this image would be used by many to help illustrate the concept of refractive index and how light changes speed and direction when it encounters a different medium.

Although conceptually the drawing was not accurate, it conveyed the message that light changes its speed when it moves into another medium, and that the different speeds of different colors causes white light to disperse into its different components. This change in speed is related to the refractive index, a unitless number that represents the ratio of the speed of light in vacuum and the speed of light in a medium.

In general, all materials with positive refractive indices have values close to 1 for visible light. Whether this is just a coincidence or reflects some deeper physics has never been explained.



Schematic illustration of the optical response of a dense atomic medium seen by traditional theories vs. the RG theory. Credit: ICFO

Now, in a recent study published in *Physical Review X* and highlighted by the editors, ICFO researchers Francesco Andreoli and ICREA Prof. at ICFO Darrick Chang, in collaboration with researchers from Princeton University, University of Chicago and Institut d'Optique, have investigated and explained why the refractive index of a dilute atomic gas can only reach a maximum value of 1.7, regardless of how high the density of atoms becomes.

This result is in contrast with conventional textbook theories, which predict that the more material there is, the larger the optical response and refractive index can be. The challenge in properly understanding the problem has to deal with multiple scattering of light—all the complex paths that light can traverse inside a medium—and the resulting interference. This can cause each individual atom to see a local intensity of light that is very different than the intensity sent in, and which varies depending on the geometry of the atoms surrounding it. Instead of dealing with the complex microscopic details of this granularity, textbooks often assume in some way that this granularity and its effects on light can be smoothed out.

In contrast, the teams make use of a theory, called strong-disorder renormalization group (RG), which enables them to capture granularity and multiple scattering effects in a simple way. This theory shows that the optical response of any given atom is disproportionately affected by its single nearest neighbor because of near-field interactions, which is why typical smoothing theories fail. The physical effect of the near-field interactions is to produce an inhomogeneous broadening of atomic resonance frequencies, where the amount of broadening grows with density. Thus, no matter how high the physical density of atoms is, incoming light of any frequency will only see about 1 near-resonant atom per cubic wavelength to efficiently scatter off, which limits the refractive index to its maximum value of 1.7.

More broadly, this study suggests that the RG theory could constitute a new versatile tool for understanding the challenging problem of multiple scattering of light in near-resonant disordered media, including in the nonlinear and quantum regimes. It also shows the promise of trying to

understand the limits of refractive index of real materials, starting bottom-up from the individual atoms of which they are composed.

More information: Francesco Andreoli et al, Maximum Refractive Index of an Atomic Medium, *Physical Review X* (2021). DOI: 10.1103/PhysRevX.11.011026

Journal information: *Physical Review X*

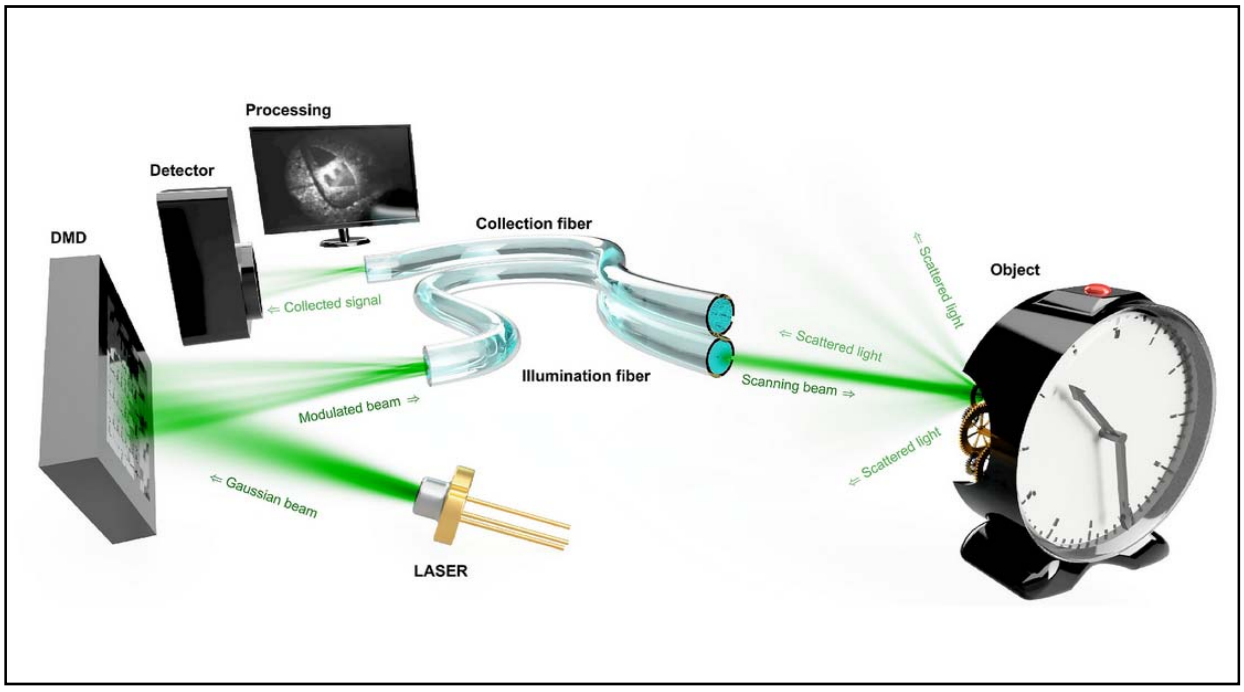
https://phys.org/news/2021-03-optical-refractive-indices-small.html

Wed, 31 March 2021

Using holographic endoscopes to observe distant objects

Scientists are developing tools to observe the biological machinery in in vivo animal models to be able to understand and better treat severe brain diseases like Alzheimer's disease and many other conditions. Holographic endoscopes attracted researchers' interest because of their potential to conduct minimally invasive observations inside the human body.

These tools can shed light on the biological processes occurring at the macromolecular and subcellular levels, which usually remain hidden from sight as most tissue is opaque to visible radiation. In *APL Photonics*, researchers from the Leibniz Institute of Photonic Technology in Germany created a particularly narrow endoscope made of single hair-thin optical fibers that uses holographic methods to reconstruct images of macroscopic objects placed in front of the far end of the endoscope.



A sequence of holograms displayed by a digital micromirror device spatially shapes the wavefronts coupled into a multimode optical fiber in such a way that a far-field focus scans the distal field of view. Credit: Tomas Cizmar

"We were positively surprised that the imaging quality was well-maintained at larger imaging distances, even for objects placed at a half meter from the endoscope," said author Ivo Leite. "We expected that the low number of photons collected in this range would give rise to much higher detection noise."

Efforts in imaging through multimode-fiber endoscopes previously focused on working distances typically smaller than 20 micrometers to resolve micrometer-scale details. This limits the field of view to the size of the fiber core.

The researchers brought the imaging operation to the observation of macroscopic objects, which can be placed far away from the endoscope. Researchers increased the imaging performance in terms of image definition to 100,000 pixels per image frame, an order of magnitude larger than previous holographic endoscopes and reaching the definition of modern video endoscopes.

Their efforts pave the way for bringing this class of minimally invasive endoscopes to clinical applications. The macroscopic imaging modality shown in this study will be essential to analyze biological samples at the tissue scale—just as conventional clinical endoscopes do—as well as to guide the instrument insertion.

Once a region of interest is identified, the hologram sequence displayed by the spatial light modulator can be updated to switch the imaging modality and perform observations at the cellular and subcellular levels.

"The potential for such flexibility in imaging operation through the same unmodified endoscope is a unique feature that, we believe, holographic endoscopes could soon offer," said author Tomas Cizmar.

The researchers' light control methods could be used to deliver practically any type of photonics tool through a hair-thin endoscope, which could have applications in a range of areas, such as optical transfection, subcellular laser surgery, and laser-assisted microfabrication.

More information: "Observing distant objects with a multimode fiber-based holographic endoscope" *APL Photonics*, aip.scitation.org/doi/10.1063/5.0038367

https://phys.org/news/2021-03-holographic-endoscopes-distant.html

The Indian EXPRESS

Wed, 31 March 2021

New research: Risk of Covid-19 infection after vaccination is low, but not zero

Increased rates of infection have been strongly linked to behaviours that heighten risk of exposure, such as attending social gatherings in restaurants and bars without adequate masking and physical distancing

In a letter to The New England Journal of Medicine, published online on March 23, a group of researchers have reported Covid-19 infection rates for a cohort of healthcare workers previously vaccinated for the novel coronavirus.

An elderly recipient waits to receive a shot of Covid-19 vaccine at a nursing home in Spain last week. (Source: The New York Times)

The authors looked at pooled data from University of California—San Diego and University of California—Los Angeles healthcare workers who received either the Pfizer or Moderna vaccines between December 16 and February 9 (36,659 first doses, 28,184 second doses), a time period that coincided with a significant surge in COVID-19 infections in the region.

Within this group, 379 individuals tested positive for SARS-CoV-2 at least one day following vaccination, with the majority (71%) testing positive within the first two weeks after the first dose. Thirty-seven health care workers tested positive after receiving two doses, which is when maximum immune protection is expected to be achieved with both vaccines.

The authors estimated that absolute risk of testing positive for SARS-CoV-2 following vaccination was 1.19% for healthcare workers at UC San Diego Health and 0.97% at UCLA Health, both higher than the risk identified in the Moderna and Pfizer clinical trials, which were not limited to healthcare workers.

"There are several possible explanations for this elevated risk," UC San Diego quoted co-author Lucy E Horton as saying. "First, the health care workers surveyed have access to regular asymptomatic and symptomatic testing. Second, there was a regional surge in infections overlapping with vaccination campaigns during this time period. And third, there are differences in the demographics of health care workers compared to participants in the vaccine clinical trials. Health care workers tend to be younger and have a greater overall risk of exposure to SARS-CoV-2 in the community."

Increased rates of infection have been strongly linked to behaviours that heighten risk of exposure, such as attending social gatherings in restaurants and bars without adequate masking and physical distancing. This connection is more strongly associated with younger age demographics.

The authors found that risk of infection 14 days after second dose, when maximum immunity is expected to be reached, was rare. "It suggests the efficacy of these vaccines is maintained outside of the trial setting," they wrote.

https://indianexpress.com/article/explained/risk-of-covid-19-infection-after-vaccination-is-low-but-not-zero-new-analysis-7249751/