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NEWS SERVICES DIVISION
ALL INDIA RADIO

Thu, 09 Jan 2020

Avalanche warning issued for Leh, Ladhak; Parts of North India in grip of coldwave

Snow and Avalanche Study Establishment (SASE), a laboratory of the Defence Research and Development Organization (DRDO) has issued an Avalanche warning to Leh in Ladakh region. Along with several other districts, the establishment in a communication to the Leh District Administration issued a warning of low-level avalanche between 7th and 8th of January.

AIR Correspondent reports that the avalanche meant for Leh in Ladakh is important as it has two passes namely Chang La and Khardung La with world's highest motorable roads through them with several avalanche-prone zones.

The also meant for the soldiers in the world's highest battle filed Siachen, in the region. Responding to the warning, Leh District Administration directed all the concerned agencies and departments to be in state of readiness with men and machinery to meet any eventuality.

The District Administration also advised the general public to avoid venturing avalanche prone areas during the period.

Meanwhile, several parts of the national capital witnessed light rain last night leading to fall in temperature.

The weatherman has predicted light rain and thunderstorm in Delhi today as well.

The maximum temperature is expected to hover around 17 degrees Celsius while minimum at 12 degrees Celsius.

Yesterday, the city's maximum temperature was recorded at 19 degrees Celsius, while the minimum temperature was 11.6 degrees Celsius.

In Himachal Pradesh, the mid and higher reaches and tribal regions of the state continued to reel under intense cold as the region received moderate to heavy snowfall for the third day today.

Most of the higher reaches of the state including Shimla, Manali, Kufri and Dalhousie are experiencing fresh snowfall since last night.

In Uttar Pradesh, rain accompanied with thunderstorms at some places has intensified cold wave in the entire state.

Cloudy conditions are likely to prevail today also in state.

http://www.newsonair.com/News?title=Avalanche-warning-issued-for-Leh%2C-Ladhak%3B-Parts-of-North-India-in-grip-of-Coldwave&id=377370

THE WEEK

Thu, 09 Jan 2020

Make in India: DRDO's foray into hearing implants, exoskeletons and prosthetics

These are some of the items DRDO is making for civilians and the military

By Prathima Nandakumar

If you think DRDO is all about defence technology, think again: The country's premier military research organisation has its ears to the ground too. Be it a cochlear implant for the hearing-impaired, a stent, or an artificial limb—DRDO has plans to make advanced technology affordable and indigenously-developed.

A dream of late President A.P.J. Abdul Kalam was to share the know-how of defence innovations for the benefit of the civil society. Launched on June 27, 1993, the Society for Biomedical Technology (SBMT) under DRDO, has been focussing on developing indigenous technology to tackle the healthcare challenges of the society. After the huge success of the Kalam Raju Coronary Stent, which brought down the exorbitant cost of stents to Rs 15,000 per units (against the market price of Rs 60,000 for imported stents), SBMT has now developed an indigenous multi-electrode cochlear prothesis for the benefit of profoundly deaf people, to be made available in the next 100 days.

The high cost of imported implants inspired DRDO to set out on this societal mission.

"The human trial for the cochlear implants is underway. In November 2019, the first surgery was performed. Once 50 surgeries are through, it will be made commercially available. The transfer of technology will be followed by commercialisation of the product," said Dr Aparna Shastry, scientist, DRDO.

"We have tied up with leading hospitals, and the transplant will cost less than Rs one lakh, while the imported ones cost more than Rs 25-30 lakh. This will be available in the market within 100 days. The cochlear implant is compatible as it is customised to suit even a four-month-old infant. The earlier it is implanted the better as it will function like a normal ear. A team of doctors, biomedical engineers and mechanical engineers have worked to develop this implant," adds Shastry.

The Make in India initiative of SBMT also includes the Above Knee Prosthesis (AKP). The prototype of an artificial limb for those who have suffered amputation of the leg, has been developed and it is undergoing evaluation. "AKP will be available for as less as Rs 5,000. Unlike the Jaipur foot, this one weighs less than a kilo and can provide better gait as it can turn up to three degrees in all directions. It is stable on uneven terrain too," explains Shastry.

Another innovation is the 'Exoskeleton'—a wearable orthotic device that enhances endurance and strength. A useful device for soldiers carrying payloads of up to 30kgs, it is battery-powered and can help soldiers walk and climb in tough terrains without getting tired, as the device prevents pressure from being exerted on the limbs. "This prototype will take three years to provide the needed efficiency and functionality. The project is being monitored by the PMO," says Shastry.

A submarine escape set for Indian Navy, a bio-vest to monitor the physiological parameters for Gaganyaan astronauts and underwater breathing apparatus are some of the other innovations aimed at equipping the Indian armed forces with the best of technology to assist them in escape and survival.

"If the submarine gets stuck underwater, the 60-65 crew members are under very high pressure and the oxygen they breathe becomes poisonous. So the hydro-suit and the breather system will give protection until the rescue team arrives. It has a cylinder with a gas mixture of Helium, Nitrogen and Oxygen, with a reducer. All inert gases are flushed out once you reach the surface and in the closed circuit, carbon-dioxide will be converted into oxygen in a separate chamber [at a rate of] 4 litres/minute. It gives a window of two and a half hours for rescue. The system weighs 24.5 kilos as it should control the rate of ascent, so the blood flow is not obstructed," explains Arun Kumar, a scientist from DEBEL-DRDO.

https://www.theweek.in/news/sci-tech/2020/01/08/make-in-india-drdos-foray-into-hearing-implants-exoskeletons-and-prosthetics.html

THE ECONOMIC TIMES
WWW.ECONOMICTIMES.COM

Thu, 09 Jan 2020

IAF to add clause on local engines for AMCA fighters

The assessment within the Indian establishment is that engine technologies needed for future aircraft are available with nations like France, UK and the US. The Indian side is also keen not to repeat a deficiency in the Chinese weapons development programme where the lack of a reliable aero engine programme is seen as an impediment

By Manu Pubby

New Delhi: The air force is likely to insist on a clause for development of an indigenous aero engine when it clears a multi-billion dollar programme to go ahead with the next generation Advanced Multirole Combat Aircraft (AMCA) by the Defence Research and Development Organisation (DRDO).

The fighters – expected to take to the skies by 2026 as per current projects – are being planned to substitute costly imports of combat aircraft in the future, with the air force keen that a home grown engine be developed for true self dependence.

Sources said that while the first two squadrons of the AMCA will be powered by a variant of American origin GE 414 engine, the project will be clearing in the coming months on the condition that a parallel process be initiated by DRDO to develop a aero engine plant with foreign collaboration. "A clear path towards developing our own aero engine is essential and should be done along the AMCA programme which is being supported. If needed, foreign collaboration from western nations that have advanced technologies can be sought," senior officials told ET.

The assessment within the Indian establishment is that engine technologies needed for future aircraft are available with nations like France, UK and the US while traditional ally Russia has lagged behind in the field. The Indian side is also keen not to repeat a deficiency in the Chinese weapons development programme where the lack of a reliable aero engine programme is seen as an impediment.

As reported by ET, the DRDO has carried out preliminary designs for the AMCA and is confident that it will be in a position to roll out the first test fighter within five years of the project receiving the next stage of financial sanction that is pegged around $ 1billion. The air force has put its weight behind the project as well, along with the Light Combat Aircraft. In comments preceding the air force day, Air Chief Marshal RKS Bhadauria had said that “on the fifth generation (requirement), the AMCA has been given a go ahead and we have given it our whole support and are putting in our energies there” and that no imports were planned in the foreseeable future.

Plans to develop the indigenous Kaveri fighter jet engine as part of the Rafale offsets deal have not taken off, even though presentations have been made by the French side on creating an aircraft engine ecosystem in India. Similarly, a plan to share jet engine technology under the US-India Defense Technology and Trade Initiative (DTTI) has been suspended last year after little progress was made by the two sides after detailed discussions.

https://economictimes.indiatimes.com/news/defence/iaf-to-add-clause-on-local-engines-for-amca-fighters/articleshow/73162616.cms

Thu, 09 Jan 2020

India seeks local production of 'Total Kill' ammunition for Russian-origin T-72, T-90 battle tanks

Kinetic energy penetrator Armour-Piercing Fin-Stabilised Discarding Sabot (APFSDS) is the primary ammunition of any armoured regiment. It can effectively engage targets at ranges even beyond 2,000 metres.

India has moved to produce the primary ammunition for its Russian-made T-72 and T-90 tanks at local factories. Issuing an Expression of Interest (EoI) to local vendors, the Indian Army aims to purchase 85,000 rounds of 125mm ammunition in a bid to expedite the supply of the ammunition that it has been importing from Russia. EoI is the first step in the procurement procedure.

“The armour protection on the adversary’s tanks is gradually increasing, which requires higher penetration capability to defeat. There is a requirement to indigenously develop an improved 125mm APFSDS ammunition for tanks T-72/T-90", the EoI document reads.

The current T-72 and T-90 tank barrels are incapable of firing high penetration APFSDS rounds due to a limitation of safety margins of 600 Mega Pascals. Therefore, the Indian Army has put up a requirement to domestically develop ammunition with a minimum depth of penetration of 530mm in order to enhance the lethality of the armament, within the existing “safety”, “consistency”, and “shelf life” criteria.

The Indian Army expects the supply of the ammunition by the end of this year.

In September 2019, maintaining focus on the "Make in India" initiative, the defence acquisition council - the Indian defence ministry's apex procurement body - accorded approval for the domestic development and production of the main gun to provide more lethality to its armoured regiment.

India imports such kinetic energy penetrators for approximately 3,500 T-90 and T-72 tanks, worth over $70 million annually.

Since 2012, the Indian Army has been relying on Russia for such critical ammunition, following the blacklisting of the Israeli military Industry by the Indian government for alleged wrongdoing in military purchases.

https://www.defencenews.in/article/India-Seeks-Local-Production-of-Total-Kill-Ammunition-for-Russian-Origin-T-72,-T-90-Battle-Tanks-808763

The Tribune
VOICE OF THE PEOPLE

Thu, 09 Jan 2020

Navy's R-Day tableau to showcase warships, jets

Will feature aircraft carrier Vikrant

New Delhi: The Indian Navy will showcase its might at sea through models of state-of-the-art assets like Boeing P8I maritime patrol aircraft with harpoon missiles, Kolkata class stealth destroyer displaying a BrahMos launch and Kalvari class submarine launching the Exocet missile.

On the trailer, the tableau showcases indigenous aircraft carrier Vikrant under construction at Cochin Shipyard Limited, along with its complement of MiG 29K fighter aircraft. This not only depicts the strength of the Navy but is representative of its total commitment to the 'Make in India' initiative of the government.

The tableau of the Indian Navy, to be showcased at the Republic Day Parade on January 26 at Rajpath, was unveiled here today. The tableau is in pursuance of the Navy Week theme 'Indian Navy — Silent, Strong, and Swift'. The forward part of the tableau showcases the might and fire power of Navy in all three dimensions — surface, sub-surface and air.

Navy's role in safeguarding offshore economic assets as well as rendering humanitarian assistance is portrayed through the murals on the sides. These include flood relief operation on Mahalaxmi Express (Op Varsha Rahat) in July 2019, escort operations in Persian Gulf (Op Sankalp) and defence of platforms by Fast Attack Craft. — TNS

https://m.tribuneindia.com/news/navy%E2%80%99s-r-day-tableau-to-showcase-warships-jets-23396

नवभारत टाइम्स

Thu, 09 Jan 2020

भारतीय नौसेना ने खाड़ी में तैनात किए युद्धपोत

■ **भाषा, नई दिल्ली :** भारतीय नौसेना ने भारत के समुद्री व्यापार की सुरक्षा सुनिश्चित करने के लिए और अमेरिका एवं ईरान के बीच बढ़ते हुए तनाव को देखते हुए किसी भी संभावित स्थिति में प्रभावी रूप से प्रतिक्रिया देने के उद्देश्य से खाड़ी क्षेत्र में अपने युद्धपोत तैनात कर दिए हैं। अधिकारियों ने यह जानकारी दी। भारतीय नौसेना ने कहा कि क्षेत्र में अपनी उपस्थिति दर्ज कराने, भारतीय व्यापारियों को आश्वासन देने, वर्तमान स्थिति पर निगरानी रखने और किसी भी संभावित खतरे पर प्रतिक्रिया देने के लिए युद्धपोत और युद्धक विमान तैनात किए गए हैं।

वहीं भारतीय नागरिकों को इराक की गैर जरूरी यात्रा से बचने का सुझाव दिया है। विदेश मंत्रालय ने कहा है कि इराक में रहने वाले भारतीय नागरिकों को सतर्क रहने और इराक में यात्रा करने से बचने का सुझाव दिया जाता है।

the pioneer

Thu, 09 Jan 2020

Need for multilateralism

The Indo-Pacific region and the Indian Ocean in particular have become the epicentre of geopolitics and India has emerged as a key player

By Vikas Kalyani

In recent days, Australia's Foreign Minister Marise Payne announced efforts to strengthen Australia's involvement in the Indian Ocean Region (IOR) and the importance of working with India in defence and other activities. Speaking at the 2019, Raisina Dialogue in Delhi — a geopolitical conference co-hosted by the India — Payne said: "Our respective futures are intertwined and heavily dependent on how well we cooperate on the challenges and opportunities in the Indian Ocean in the decades ahead."

In terms of global political significance, the Atlantic Ocean can be viewed as the ocean of our grandparents and parents; the Pacific Ocean as our ocean and that of our children; and the Indian Ocean as the ocean of our children and grandchildren. There is an obvious sense in which the region is the future. The average age of people in the region's countries is under 30, compared to 38 in the US and 46 in Japan. The countries bordering the Indian Ocean are home to 2.5 billion people, which is one-third of the world's population.

Having heard the Australian Minister and read a few expert comments from Australian scholars of international affairs, it becomes clear that Indo-Pacific in general and the Indian Ocean in particular is being viewed as the epicentre of geopolitics and India as the key player in this region. The need of economic partnership among the littorals is of utmost importance while having a collaborated approach to address geopolitical risks. India, being the largest country, has a logical role to play as a leader bringing the nations of IOR on multilateral platforms.

Multi-nation platforms: There are multi-nation platforms existing, which have mutual growth as their aim but their effectiveness is questionable when compared to other oceanic platforms. For example, the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) was established by nations bordering the Bay of Bengal in 1997. In more than two decades, it is still gaining momentum but cannot be compared with the Association of South East Asian Nations (ASEAN).

Australia, along with 21 other border states, is a member of the Indian Ocean Rim Association (IORA) which seeks to promote sustainable economic growth, trade liberalisation and security. Australia's 2017 Foreign Policy White Paper seeks to support IORA in areas such as maritime security and international law. It also aims at strengthening its ties in the region such as with India and Indonesia —and also build new connections, particularly in Africa.

It brings out the Australian perspective which is outreaching and focusses on multilateral cooperation with the stakeholders. The Indian perspective becomes clear from the Foreign Secretary's words: "The challenges we all face today, and all of us know this, whether they be the traditional security issues such as nuclear proliferation, armed conflict and so on, or newer non-traditional issues such as terrorism, migration and refugee flows and environmental degradation — all of these, in our view, require more, and not less, multilateralism. India's vision of engagement in the Indo-Pacific region will be based on the values of peace, stability and prosperity on a free, open, prosperous and inclusive Indo-Pacific with the ASEAN regional bloc central to the concept, which serves the long-term interests of all countries in the region and of the world at large. Our Prime Minister's articulation

of the vision of SAGAR — 'Security and Growth for All in the Region' will continue to provide the basis for our maritime engagement."

Cooperation is key to maritime security: Maritime security is a major challenge for the poorer coastal and island countries of the IOR. In particular those that have large zones of maritime jurisdiction. There are 48 independent countries in the region, including hinterland and landlocked states of East Africa and South Asia. There are 18 in Africa, 11 in the Middle East, seven in South Asia, six in Southeast Asia, five island states and Australia. Managing maritime security is a challenging endeavour. It requires cooperation between regional countries and between those with a stake in regional security. Maritime security is no longer the sole prerogative of navies with more non-military agencies now involved.

Maritime security is a priority for the IORA, currently the main regional organisation for economic and security cooperation. It recently committed its members to working on increasing cooperation among navies and other maritime security forces in the region. The plan is to do this collaboratively with the Indian Ocean Naval Symposium (IONS), a voluntary initiative by India to address shared maritime security challenges and threats.

However IONS' main focus has been on naval cooperation and it has been successful in terms of bringing navies and coastal security forces together in the form of joint exercises. There is some scepticism about the symposium's ability to make a broader contribution to maritime security.

Defence cooperation: The Foreign Minister of Australia also pointed to increasing defence activities in the Indian Ocean, noting that in 2014, Australia and India had conducted 11 defence activities together, with the figure reaching 38 in 2018. This shows the positive approach from Australian counterparts to build a strong security-oriented partnership with India.

In 2018, the Indian Air Force (IAF), for the first time, participated with fighter aircraft in Exercise Pitch Black that was conducted in Australia. During the transit to Australia, the IAF contingent also had constructive engagement with Indonesian and Malaysian air forces. In recent times the IAF has shown its capabilities of reaching anywhere within the IOR at an unimaginable short notice and also has undertaken exercises across the bays around, so as to make itself familiar with the region. In its pan-India exercise Gagan Shakti-2018, special attention was given to maritime air operations. The operation was the largest-ever series of air exercises conducted by the IAF. It crucially demonstrated an air operational range with the help of air-to-air refuelling by the IL-78 Flight Refuelling Aircraft (FRA). The Su-30s, airborne from a base on the eastern coast, engaged multiple targets towards the western seaboard of India at distances beyond 2,500 km and landed at a southern base, thus covering a total distance of 4,000 km in a single mission, which is less than average distance between India and many IOR countries.

Among other defence cooperations, the air forces of two nations can work together by using the respective island territories as regular refuelling halts during ferries or conduct joint exercises with navies of friendly countries around. For example the Cocos Keeling Island and Christmas Island (Australian external territory) have 8,000 and 7,000 feet runways respectively which are fit for operations by all kind of aircraft.

They are located south of Indonesia and almost midway between India and Australia. The distance between Port Blair and these islands is 2,675 km and 2,833 km respectively. Similarly, Andaman and Nicobar Islands can be used by the Australian Air Force for the same purpose. With these kinds of practices of using island runways and conducting joint exercises, the Humanitarian Assistance and Disaster Relief (HADR) operations in actual contingencies will be conducted more efficiently when time is a critical factor and decision-making delays cannot be afforded. The same is applicable for any other contingency which imposes challenge to safety and security of IOR countries.

Security and growth for all through multilateralism is the only viable solution against problems arising in today's geostrategic scenario because of unilateralism and trade wars. India's active and frequent friendly engagements with IOR countries' armed forces will boost the confidence of all the

participants as well as the littoral countries and will give stability to the maritime security of the IOR. The IAF thus can prove itself to be an important tool in furthering the vision of SAGAR.

(The writer is a senior research fellow at the India Foundation)

https://www.dailypioneer.com/2020/columnists/need-for-multilateralism.html

Business Standard

Thu, 09 Jan 2020

China, Pak Navies deploy submarines in strategic Arabian Sea drills

The joint maritime exercises began on Monday in the North Arabian Sea, regarded strategically significant for China which is now developing Pakistan's deep water Gwadar port there

Beijing: Navies of China and Pakistan, holding nine-day exercises in the Arabian Sea to enhance their all-weather strategic partnership, have for the first-time deployed submarines, providing a rare major exposure to the Chinese navy in the region.

The Arabian Sea region is strategically important for India as major ports including Kandla, Okha , Mumbai, Nhava Sheva (Navi Mumbai), Mormugo, New Mangalore, and Kochi are located there.

The joint maritime exercises began on Monday in the North Arabian Sea, regarded strategically significant for China which is now developing Pakistan's deep water Gwadar port there.

Gwadar is being connected through the over USD 60 billion China Pakistan Economic Corridor (CPEC) to China's Xinjiang province, providing a key land route to China to access the warm waters of Arabian Sea. India has objected to China over the CPEC as it is being laid through the Pakistan-occupied Kashmir (PoK).

The Gwadar is also located close to Iran's Chabahar Port being jointly developed by Iran, India and Afghanistan to ensure a trade corridor for Indian exports to Afghanistan.

The Arabian Sea provides entry to the Indian Ocean where China currently has built a logistics base at Djibouti in the Horn of Africa.

The joint exercises are expected to be the first of many to come, as China and Pakistan have now developed a series of joint exercises covering the navy, army and air force, the PLA (People's Liberation Army) Daily, the official newspaper of the Chinese military, reported.

The report said that this joint exercise is not related to ongoing regional affairs and is not aimed at any third party.

The exercise is also the first between China and Pakistan that will feature anti-submarine and submarine rescue training, indicating a high-level of strategic mutual trust, state-run Global Times quoted experts as saying.

The exercise started on Monday in the port city of Karachi, Pakistan, and will be held in the North Arabian Sea until January 14, the PLA Daily reported on Tuesday.

This is the sixth joint naval exercise between China and Pakistan, the report said, but it is the first time the exercise was named "Sea Guardians."

"Sea Guardians" is expected to become a series of naval exercises with Pakistan, similar to the "Warrior" series of joint land exercises and the "Shaheen" series of joint air exercises, the report said.

Zhang Junshe, a senior research fellow at the PLA Naval Military Studies Research Institute, told the Global Times that serialising the drills and making them a routine will further enhance China and Pakistan's friendship and cooperation.

The Chinese troops mainly come from the People's Liberation Army (PLA) Southern Theater Command Navy, including the guided missile destroyer Yinchuan, guided missile frigate Yuncheng, comprehensive supply ship Weishanhu, submarine rescue ship Liugongdao, two ship-based helicopters and some 60 Chinese Marines, the PLA Daily reported.

Pakistan deployed two frigates, two missile boats, a fixed-wing anti-submarine aircraft, two vessel-based helicopters and about 60 members of special forces participating in the drills.

The drills would focus on joint cruising, air defence, maritime interception, anti-submarine and live-fire exercises at sea.

Zhou Hanwen, an executive director of the exercise, said that previous China-Pakistan joint naval exercises did not feature anti-submarine and submarine rescue training, and the exercise this time will enhance the two countries' capability of dealing with underwater threats, China Central Television reported.

Zhang said that the training involving submarine will boost the two navies' combat capabilities and show a high level of strategic mutual trust.

The goal of the Sea Guardians-2020 drills is to boost the two countries' military cooperation, enhance their all-weather strategic cooperative partnership, build a safe maritime environment and enhance the two navies' capability to deal with maritime terrorism and crime, the PLA Daily report said.

https://www.business-standard.com/article/pti-stories/in-a-first-china-pak-navies-deploy-submarines-in-strategic-arabian-sea-drills-120010800943_1.html

THE ECONOMIC TIMES
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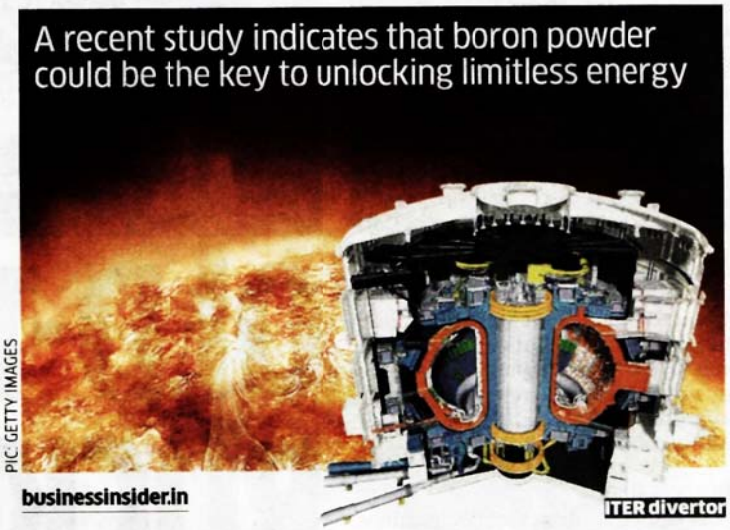
Thu, 09 Jan 2020

Scientists have a new way to create a star on Earth

A recent study indicates that boron powder could be the key to unlocking limitless energy



PIC: GETTY IMAGES

businessinsider.in

ITER divertor

From Earth, the Sun looks like an innocent light bulb in the sky. It's a gaseous giant with powerful nuclear explosions at its heart — the holy grail of clean, limitless energy. So far, no nuclear fusion reactor on the planet has been able to match the power of the Sun.

But that may no longer be true. Scientists from the Princeton Plasma Physics Laboratory (PPPL) think that they've cracked the code with a simple solution — boron powder. Using the powder could present a way to create the heat required for electricity without producing greenhouse gases or long-term radioactive waste.

Projects that have been trying to recreate nuclear fusion here on Earth, use ring-shaped fusion facilities called tokamaks. The only issue is that the main ingredient, plasma, is never completely free of impurities. The impurities make the reaction less efficient, which means less energy.

Adding boron powder, on the other hand, not only makes the process more efficient — but it also makes it safer and more sustainable.

In contrast to its gaseous counterpart, diborane, boron powder is less explosive and doesn't send physicists running from the room

Nuclear explosions that are 'safe'

Boron's gaseous form, diborane, is already being used as a part of nuclear fusion. But it's extremely explosive.

"Diborane gas is explosive, so everybody has to leave the building housing the tokamak during the process," said the lead author of the study, Robert Lunsford. Using boron, on the other hand, is much safer. Where diborane gas is explosive and toxic, boron powder is inert.

Uninterrupted supply of energy

With diborane gas, the energy creation process is repeatedly interrupted because of its explosive nature (to allow physicists to enter and exit the chamber). Since boron powder isn't explosive — it may be able to overcome that obstacle as well.

"This is one way to get to a steady-state fusion machine. You can add more Boron without having to completely shut down the machine," Lunsford said.

Thu, 09 Jan 2020

Vast 'star nursery' region found in our galaxy

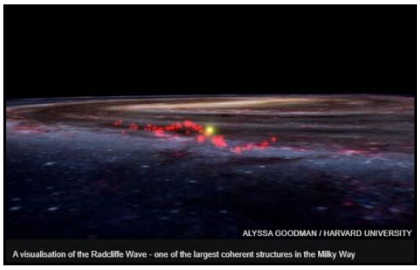
Astronomers have discovered a vast structure in our galaxy, made up of many interconnected "nurseries" where stars are born

By Paul Rincon

The long, thin filament of gas is a whopping 9,000 light-years long and 400 light-years wide.

It lies around 500 light-years from our Sun, which is relatively close by in astronomical distances.

The discovery, outlined in the journal Nature, came from work to assemble a new map of the Milky Way.



A visualisation of the Radcliffe Wave - one of the largest coherent structures in the Milky Way

An international team analysed data from the European Gaia space telescope, which was launched in 2013.

The monolithic structure has been dubbed the Radcliffe Wave, in honour of Harvard University's Radcliffe Institute for Advanced Study in Cambridge, Massachusetts.

"What we've observed is the largest coherent gas structure we know of in the galaxy, organized not in a ring but in a massive, undulating filament," said co-author Joao Alves, from the University of Vienna, Austria, and Harvard.

It is in the spiral arm (the long thin extensions of spiral galaxies that give them their name) located closest to our Solar System.

Gaia was launched with the intention of precisely measuring the position, distance and motion of stars in our galaxy.

Team members used data from the European Space Agency telescope, along with other measurements, to construct a detailed, 3D map of interstellar matter in the Milky Way.

The results correct a previous view of this region of the Milky Way.

Many of the star-forming regions found in the Radcliffe Wave were previously thought to be part of a structure called Gould's Belt that was around 3,000 light-years (20 quadrillion km) wide.

Small, or far away?

First described in 1879, Gould's Belt was thought to be comprised of star-forming regions, believed to be oriented around the Sun in a ring.

The new study in Nature transforms that picture into one of a 90 quadrillion-kilometre-long, four quadrillion-kilometre-wide star-forming filament.

Co-author Prof Alyssa Goodman, from Harvard, commented: "We were completely shocked when we first realised how long and straight the Radcliffe Wave is, looking down on it from above in 3D."

She added: "The wave's very existence is forcing us to rethink our understanding of the Milky Way's 3D structure." All of the stars in the Universe, including our Sun, are formed when clouds of gas and dust undergo a gravitational collapse.

But working out how much mass the clouds have and how large they are has been difficult, because these things depend on how far away the clouds are.

Co-author Douglas Finkbeiner said: "Studying stellar births is complicated by imperfect data. We risk getting the details wrong, because if you're confused about distance, you're confused about size."

The results are being presented at the 235th meeting of the American Astronomical Society in Honolulu, Hawaii.

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