दिसंबर
Dec
2025

खंड/Vol. : 50 अंक/Issue : 228

13-15/12/2025

समाचार पत्रों से चयनित अंश

Newspapers Clippings

डीआरडीओ समुदाय को डीआरडीओ प्रौद्योगिकियों, रक्षा प्रौद्योगिकियों, रक्षा नीतियों, अंतर्राष्ट्रीय संबंधों और विज्ञान एवं प्रौद्योगिकी की नूतन जानकारी से अवगत कराने हेतु दैनिक सेवा

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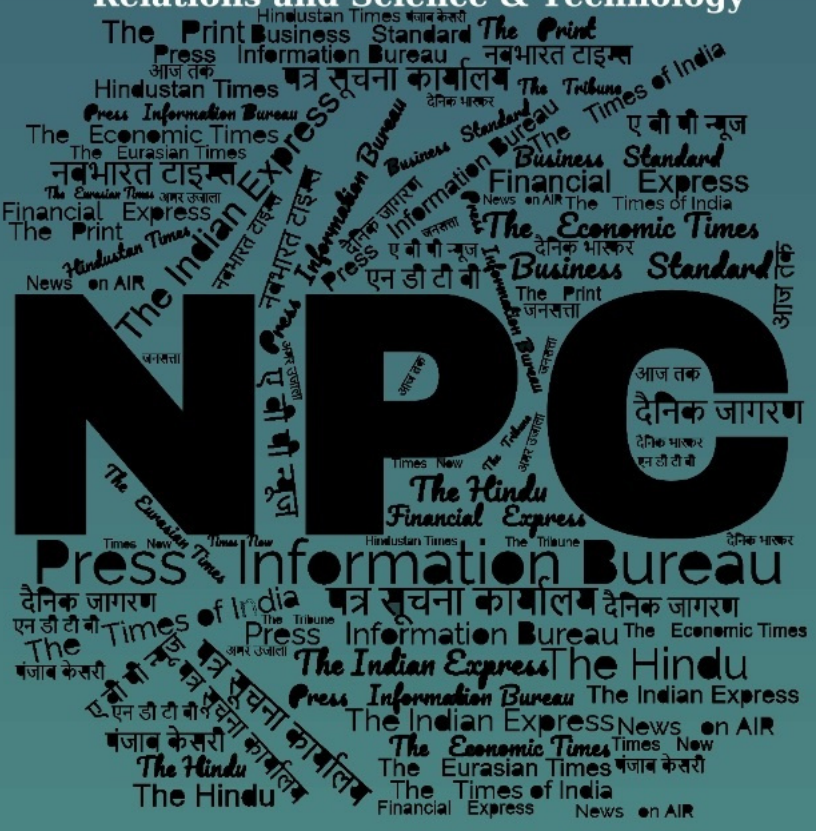

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CONTENTS

Defence News

Army chief reviews artillery modernisation at conference

Source: The Hindu, Dt. 13 Dec 2025

Army Chief General Upendra Dwivedi presided over the Biennial Artillery Conference 2025 held at the School of Artillery in Devlali, where senior leadership undertook a comprehensive review of the Regiment of Artillery's operational, modernisation, and transformational priorities.

The two-day hybrid conference that concluded on Friday (December 12, 2025) featured detailed discussions on operational lessons from Operation Sindoor, along with deliberations on modernisation, technology infusion, and force restructuring. Key focus areas included the reorganisation and raising of Shaktibaan Regiments and Divaystra Batteries, marking a significant step in strengthening future artillery capabilities.

Director General of Artillery Lt. Gen. Adosh Kumar, along with senior officers, presented an extensive roadmap covering modernisation initiatives, training improvements, and human resource development, outlining the trajectory for ongoing transformation within the Arm. Participation from 25 outstation locations through video conferencing ensured wider engagement and collective assessment.

During his visit, General Dwivedi reviewed advanced training and operational facilities at the Drone Experience Centre, where he was briefed on simulator labs, the incubation hub, and the drone manoeuvre arena used for mission planning, surveillance, and targeting drills. Demonstrations of drone operations, loiter munition training, and mini-RPAS modules highlighted the Army's growing focus on precision and technology-driven preparedness.

The Army Chief later visited the Combat Army Aviation Training School in Nashik to assess its operational readiness. Before concluding, General Dwivedi interacted with veterans from the Nashik and Devlali military stations, acknowledging their service and presenting the Veteran Achievers Award to five veterans for their contributions.

https://www.thehindu.com/news/national/army-chief-reviews-artillery-modernisation-at-biennial-artillery-conference-2025/article70389235.ece

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Aatmanirbharta means indigenous design & development of equipment, possessing the upgradation ability, and maintaining full control: Secretary (DP)

Source: Press Information Bureau, Dt. 12 Dec 2025

Secretary (Defence Production) Shri Sanjeev Kumar has stressed on the need to achieve self-reliance in defence manufacturing to deal with conventional and unconventional challenges of today. Delivering a lecture organised by the Comptroller and Auditor General of India on 'Aatmanirbhar Bharat in Defence Sector and Various Government Initiatives' in New Delhi on December 12, 2025, he defined self-reliance as not being dependent on others, designing &

developing equipment indigenously, possessing the ability to upgrade, and maintaining full control over these products.

The Secretary (Defence Production) highlighted the impact of the Srijan Scheme, Positive Indigenisation Lists, Make Procedures, and iDEX scheme in creating a robust defence ecosystem in the country. He emphasised the crucial role of audit agencies in ensuring transparency within procedural frameworks.

https://www.pib.gov.in/PressReleasePage.aspx?PRID=2203379&reg=3&lang=1

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भारत की भविष्य की युद्ध शक्ति आत्मनिर्भरता और नवाचार से संचालित होगी: सीडीएस

Source: Dainik Jagran, Dt. 14 Dec 2025

हैदराबाद, प्रेट्र : सीडीएस जनरल अनिल चौहान ने शनिवार को कहा कि देश की भविष्य की युद्ध शक्ति तीन स्तंभों-संयुक्तता, आत्मनिर्भरता और नवाचार द्वारा संचालित होगी। उन्होंने इसे जय हिंद के पहले शब्द "जय" के रूप में वर्णित किया। उन्होंने कहा कि संयुक्तता एक राष्ट्र और एक बल के रूप में लड़ने का संकेत देती है। आत्मनिर्भरता उन विश्वसनीय प्लेटफार्मों और प्रणालियों को इंगित करती है जो केवल भारत के लिए

सीडीएस अनिल चौहान ● फाइल

नहीं, बल्कि दुनिया के लिए बनाई गई हैं। नवाचार का अर्थ है आगे सोचने और आगे रहने की हिम्मत रखना। उन्होंने कहा कि आपरेशन की तीव्रता कम हो सकती है, लेकिन यह अभी जारी है।

जनरल चौहान ने डुंडिगल में वायु सेना अकादमी में संयुक्त स्नातक परेड की समीक्षा करते हुए कहा कि भारत की ताकत मजबूत संस्थानों, लोकतांत्रिक स्थिरता और हमारे सशस्त्र बलों की अडिग पेशेवरता पर निर्भर करती है। सीडीएस ने नए कमीशन किए गए अधिकारियों को बताया कि वे भारतीय वायु सेना में एक गहन परिवर्तन के चरण में प्रवेश कर रहे हैं। युद्ध केवल शब्दों से नहीं जीते जा सकते, बल्कि उद्देश्यपूर्ण कार्रवाई से जीते जाते हैं।

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Op Sindoor testimony to India's resolve, say Army chief

Source: The Times of India, Dt. 14 Dec 2025

Chief of Army Staff Gen Upendra Dwivedi on Saturday said that the "neighbourhood has created a contested environment in which we are fighting the adversary with our resources stretched at all fronts" — an indirect reference to the country's western neighbour — while addressing cadets at the 157th Passing Out Parade of the Indian Military Academy at Chetwode Drill Square in Dehradun."

Operation Sindoor was a testimony to the challenge and showcased India's resolve in countering it by synchronising diplomacy, deterrence, and decisive application of force," Gen Dwivedi, who attended the event as the reviewing officer, said. A total of 525 officer cadets from the 157th Regular Course, 46th Technical Entry Scheme Course, 140th Technical Graduate Course, 55th Special Commissioned Officers Course and the Territorial Army Online Entrance Exam 2023 Course were commissioned at the ceremony, including 34 officer cadets from 14 friendly foreign countries.

Congratulating the newly commissioned officers, the Army chief told them they were entering "a constantly changing world of intense international competition", where conflicts would no longer remain confined to the military domain but extend to society, industry and technology.

He said the Indian Army was evolving rapidly through modernisation and innovation, and that young officers would play a pivotal role in this transformation. Emphasising leadership under uncertainty, Gen Dwivedi noted that future challenges would not always present clear answers and would test officers on adaptability, judgement and integrity.

At the pipping ceremony, Gen Dwivedi surprised the newly commissioned officers by doing push-ups with them after pipping stars on their shoulders, drawing applause from family members and senior Army officers present. Earlier, officer cadet (OC) Nishkal Dwivedi of Bhopal was awarded the Sword of Honour and the gold medal for securing first place during training. The silver medal was awarded to OC Badal Yadav, while the bronze medal went to Kamaljeet Singh.

Jadhav Sujeet Sampat received the silver medal for securing first place in the Technical Graduate Course, while Abhinav Mehrotra was awarded the silver medal for first position in the Technical Entry Scheme–46. Sunil Kumar Chhetri received the silver medal for the Special Commissioned Officers Course. Mohammad Safin Ashraf of Bangladesh was adjudged the best foreign cadet and awarded the corresponding medal.

https://timesofindia.indiatimes.com/city/dehradun/neighbourhood-created-contested-environment-op-sindoor-testimony-to-indias-resolve/articleshow/125952472.cms

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Army to get 3 Apache attack copters, Navy to induct Seahawks

Source: The Times of India, Dt. 15 Dec 2025

In a boost to India's rotary wing combat capabilities, the Army is now finally set to get delivery of its three remaining Apache AH-64 attack helicopters from the US, while the Navy will also commission its second squadron of MH-60R Seahawk submarine-hunting choppers this week.

The induction of these much-delayed American helicopters will plug existing operational gaps but the real punch will come when the Army and IAF hopefully begin getting 156 indigenous `Prachand' light combat helicopters from 2028 onwards.

Overall, the armed forces want over 1,000 new helicopters of different types in the next 10-15 years to make up for major deficiencies as well as replace obsolete Cheetah and Chetak fleets. They include 484 light utility helicopters in the 3.5-tonne class and 419 Indian multi-role helicopters in the 10-15-tonne class, but there have been huge delays in these projects being executed by Hindustan Aeronautics (HAL).

The three Apache gunships, dubbed “tanks in the air” since they are armed with Stinger air-to-air missiles, Hellfire Longbow air-to-ground missiles, guns and rockets, will touch down in India “within a couple of days”, defence officials told TOI.

India had ordered six heavy-duty Apaches for the Army in a Rs 5,691 crore deal with the US in Feb 2020, under which the first three were delivered in July after a huge delay due to supply chain problems faced by Boeing.

These six Apaches will add to the 22 such choppers inducted by IAF in 2019-2020 under a Rs 13,952 crore deal with the US in Sept 2015. The Army Apaches will be deployed at Jodhpur, where a squadron was raised in March last year to cater for the western front with Pakistan.

Navy chief Admiral Dinesh K Tripathi, in turn, will commission the second squadron of Seahawks, armed with Hellfire missiles, MK-54 torpedoes and precision-kill rockets as well as advanced sensors, at INS Hansa in Goa on Dec 17. The first squadron was raised at INS Garuda in Kochi in March 2024.

The US has so far delivered 15 of the 24 Seahawks, which are manufactured by Sikorsky-Lockheed Martin, under a Rs 15,157 crore contract in Feb 2020. Incidentally, the defence ministry

last month inked another Rs 7,955 crore contract with the US for follow-on support and spares for the multi-mission helicopters.

While quite expensive, the Seahawks are crucial because the 140-warship Navy is currently grappling with just a handful of old Sea King and Kamov-28 anti-submarine warfare helicopters at a time when the presence of Chinese submarines is only going to further increase in the Indian Ocean Region.

HAL has to deliver the Prachand light combat helicopters -- 90 for Army and 66 for IAF -- in the 2028-2033 timeframe under the mega Rs 62,700 crore contract inked in March this year. The Prachand helicopters will be armed with 20mm turret guns, 70mm rocket systems and air-to-air missiles for offensive operations and precision-strikes in high-altitude areas like eastern Ladakh and Siachen Glacier on the borders with China and Pakistan.

The 156 highly-agile Prachand helicopters, each weighing 5.8 tonne, will add to the 15 such choppers (10 IAF and 5 Army) already inducted under a Rs 3,887 crore contract in 2022.

https://timesofindia.indiatimes.com/india/army-to-get-3-apache-attack-copters-navy-to-induct-seahawks/articleshow/125968313.cms

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नौसेना में शामिल होगी मल्टी-रोल हेलीकॉप्टर की दूसरी स्क्वाड्रन

Source: Punjab Kesari, Dt. 15 Dec 2025

नई दिल्ली, (पंजाब केसरी): भारतीय नौसेना के बेड़े में अत्याधुनिक एमएच-60आर मल्टी-रोल हेलीकॉप्टर की एक नई स्क्वाड्रन शामिल होने जा रही है। यह हेलीकॉप्टर पारंपरिक युद्ध खतरों से निपटने में सक्षम है। इसके अलावा, यह विशेष हेलीकॉप्टर अनेक समुद्री चुनौतियों से निपटने में भी भारतीय नौसेना की क्षमता को कई गुना बढ़ाएगा। आधुनिक क्षमताओं से लैस एमएच-60आर हेलीकॉप्टर को विश्व के सबसे उन्नत नौसैनिक हेलीकॉप्टरों में गिना जाता है। इसमें लगे आधुनिक हथियार, उन्नत सेंसर और अत्याधुनिक एवियोनिक्स सिस्टम इसे एक बहुउद्देश्यीय और अत्यंत सक्षम प्लेटफॉर्म बनाते हैं। इस स्क्वाड्रन के साथ ही भारतीय नौसेना अपनी आधुनिकीकरण और परिचालन क्षमता में वृद्धि की दिशा में एक और महत्वपूर्ण कदम उठाने जा रही है।

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Indian Navy to commission second MH-60R helicopter squadron at Goa

Source: The Hindu, Dt. 15 Dec 2025

The Indian Navy will commission its second MH-60R helicopter squadron, INAS 335 (Ospreys), on December 17 at INS Hansa in Goa, in the presence of the Chief of the Naval Staff, Admiral Dinesh K. Tripathi. The event will mark a significant milestone in the Navy's ongoing drive towards modernisation and capability enhancement.

The Indian Navy said that equipped with advanced weapons, sensors, and a state-of-the-art avionics suite, the MH-60R is a versatile multi-role platform capable of effectively addressing both conventional and asymmetric threats. The helicopter has been fully integrated with fleet operations and has already demonstrated its operational effectiveness on several occasions.

The commissioning of INAS 335 will provide a major boost to the Indian Navy's integral aviation capabilities, significantly enhancing its operational readiness. The induction of the MH-60R will further strengthen India's blue-water capabilities by extending the Navy's operational reach and enabling sustained naval operations across the full spectrum over vast maritime domains.

Deployment of the Seahawk helicopters in the Indian Ocean Region will reinforce the Indian Navy's maritime presence, deter potential threats, and contribute to maintaining a secure and stable environment in this strategically vital region.

The Indian Navy had commissioned its first squadron of the multi-role MH-60R helicopters on March 6 last year at Kochi, marking the beginning of a new chapter in its maritime aviation capability.

https://www.thehindu.com/news/national/indian-navy-to-commission-second-mh-60r-helicopter-squadron-at-goa/article70396027.ece

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US-India defence cooperation remains steady amid turmoil

Source: Hindustan Times, Dt. 15 Dec 2025

HT Correspondent
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NEW DELHI: Despite a year marked by tariff battles, confusion over Washington's China policy, and the shock of the recent India-Pakistan war, one pillar of the US-India relationship has held firm: defence cooperation. The two governments recently unveiled a new defence framework, are deepening private-sector linkages, and continue to expand military-to-military ties.

Political scientist Sameer Lalwani surveyed the state of the defence relationship on last week's episode of Grand Tamasha, the weekly podcast on Indian politics and policy co-produced by Hindustan Times and the Carnegie Endowment for International Peace. Lalwani is a senior advisor with the Special Competitive Studies Project and a non-resident senior fellow with the German Marshall Fund. He previously served as a senior expert at the US Institute of Peace and directed the South Asia Program at the Stimson Center.

In conversation with host Milan Vaishnav, Lalwani assessed the significance of the newly signed US-India defence framework, the future of co-production and co-development, India's lessons from Operation Sindoor, and the perennial question of whether the United States and India might ever conduct joint combat operations.

LALWANI SAID THAT THE DEFENCE SPHERE HAS BEEN SOMEWHAT INSULATED FROM THE TURBULENCE CAUSED BY THE BREAKDOWN IN TRUST BETWEEN THE U.S. AND INDIA

GRAND TAMASHA

On the latter, Lalwani argued that India could play a meaningful role in a future Taiwan contingency if China were to attempt a forcible takeover. "[India] wouldn't ever have to cross the Malacca Strait or deploy troops anywhere. It could simply stay in its own territory, protecting US assets that operate in the Indian Ocean, tracking Chinese submarines, and allowing for overflight," he said.

If such a conflict were to drag on — as the Russia-Ukraine war has — industrial capacity becomes decisive. "In this case, India would become even more essential to any major power conflict in the Indo-Pacific because India has that swing industrial capacity to scale up and tip one side or the other," Lalwani noted. When it comes to US-India collaboration, he added, "merging our defence industrial capabilities will be an essential part of demonstrating our ability to compete and fight in a protracted conflict".

Turning to the broader breakdown in trust between Washington and New Delhi, Lalwani observed that the defence sphere has been somewhat insulated from the turbulence. "Many areas of cooperation have been protected and have continued, perhaps because they are somewhat shielded from political choices, or because defence-exercise planning takes place a year in advance, meaning much of the activity was already locked in and allowed to proceed," he explained. "But, continuing or expanding this pace will require more active support from policy and political leadership."

Lalwani also emphasised that the US-India partnership has often advanced in moments of crisis — as with China's incursions across the Line of Actual Control (LAC) in 2020. "Trust is forged in crisis — it's a form of costly signalling. When you are facing a serious challenge and someone comes through for you, it demonstrates commitment not only when things are easy, but when they are hard," he said. "So, the United States has to be attentive to those opportunities when they arise and be prepared to seize them."

LISTEN: Scan the QR code to listen to the full episode

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Science & Technology News

Ramanujan's old formulae for pi echo in modern cosmology

Source: The Hindu, Dt. 14 Dec 2025

Earlier this month, Indian Institute of Science, Bengaluru, professor Aninda Sinha and his former doctoral student Faizan Bhat linked the esoteric mathematics of Srinivasa Ramanujan with the principles underlying the physics of turbulent fluids and the expansion of the universe. The bridge they laid was π (pi) — not the humble one but the transcendental one school students know to be the ratio of any circle's circumference to its diameter. Their paper appeared in Physical Review Letters.

Bridge of wonder

Ramanujan's equations appear to be analogous to those in certain kinds of conformal field theories

- IISc researchers have found similarities between Ramanujan's speedy methods to estimate pi (π) with advanced theories describing critical phenomena
- While reworking string theory problems, they unexpectedly discovered infinitely many new formulae for computing π
- They noticed Ramanujan's mathematics shared the same hidden patterns as equations used to describe turbulent fluids
- The same mathematical pattern also appeared in simple models of an expanding universe, deepening the connection
- Thus far, the work offers a striking bridge between pure number theory and modern physics, rather than solves problems
- Past examples like Riemannian geometry and Fourier transforms show today's abstract maths can transform future technologies

More than a century ago Srinivasa Ramanujan, an accountant in Chennai yet to be admitted to the pantheon of mathematical greats, discovered a set of astonishingly fast-converging formulae to calculate 1/π. ASHLIN (CC BY-SA)

Recipe for pi

While π is central to computing the volume and areas of objects, it is itself interminable and thus irrational. Its value is 3.14159265… There is no known pattern to the infinite avalanche of digits after the decimal point. Even today, professional mathematicians are developing formulae that rapidly and reliably predict this sequence. For rough-ready use the ratio 22/7, first discovered by the Greek mathematician Archimedes 1500 years ago gives a series of numbers which is considered a coarse approximation to pi. There have been several improvements through the years, employing different branches of mathematics to compute pi, usually involving several terms and laborious substitutions.

More than a century ago Srinivasa Ramanujan, an accountant in Chennai and yet to be admitted to the pantheon of mathematical greats, discovered a set of astonishingly fast-converging formulas

for 1/π. He discovered at least 17 distinct infinite series for 1/π. Each of them acts like a special "recipe": add the first term, you get a rough value; add a second, it becomes dramatically more accurate; continue a bit more, and the approximation converges very quickly to π. Some of these formulae are so efficient that they underpin the Chudnovsky algorithm, which scientists have used to compute π to over 200 trillion digits on modern supercomputers.

Like a rubber band

But Dr. Sinha wasn't interested in merely adding to the pi. "We were interested in the maths behind Ramanujan's thinking," he said over the phone. The trail began unexpectedly in string theory — a grand theory of theoretical physics that seeks to explain how all the fundamental particles of matter, electrons, neutrinos, quarks, gravitons, etc., could have emerged from the vibrations of invisible little coils of energy called 'strings'. Last year, Dr. Sinha and a collaborator were studying certain string-theoretic calculations and realised some of the existing answers in the literature were incomplete or incorrectly quoted.

"In the process of finding new representations of those string answers, we found a new formula for π," he recalled. "In fact, an infinite number of new formulae." A string, Dr. Sinha explained, can be thought of like a rubber band: you can stretch it in many ways and its elasticity can take many values.

"If π is somehow hidden in the string answer, it should have an infinite number of different ways of looking at it. That is what we found." "That's what pushed me to go back and look more carefully at Ramanujan's formulae," he continued. "Once I looked at the modern presentation, something jumped out. Because of my training, I immediately recognised structures I had seen before in conformal field theories."

At a critical point

Conformal field theories (CFT) are the mathematical language of critical phenomena, those special points where systems are on the edge of change. For instance, when water boils at 100°C and room pressure, you can clearly distinguish the liquid and vapour. But at a much higher temperature and pressure of 374°C and 221 atm, it reaches a critical point where that distinction vanishes: the fluid becomes 'superfluid' and is neither clearly liquid nor clearly gas, no matter how closely you zoom in.

"At the critical point, you cannot actually say which is liquid and which is vapour," Dr. Sinha said. "That is the point where CFTs enter: they are used to explain what happens in this kind of critical phenomena." The Ramanujan equations, particularly the terms that are used, appeared to be analogous to those in certain kinds of CFTs. The mathematical engine Ramanujan intuitively deployed to find pi — involving modular equations, elliptic integrals and special functions — exactly matched the structure of correlation functions in the CFTs (specifically logarithmic CFTs). As of now, their work doesn't yet settle any grand conjecture in number theory or cosmology. Instead it stands as an intriguing bridge between two distant regions of thought: Ramanujan's intuitive modular equations and modern CFT.

New line of inquiry

"[In] any piece of beautiful mathematics, you almost always find that there is a physical system which actually mirrors the mathematics," Mr. Bhat in a press statement. "Ramanujan's motivation might have been very mathematical, but without his knowledge, he was also studying black holes, turbulence, percolation, all sorts of things." This said, history is replete with examples of

mathematical ideas developed in isolation, sometimes even as pure flights of fancy, eventually resonating with the physics of the real world decades later.

“Riemannian geometry (or the geometry of curved spaces) was being developed in the 19th century as pure mathematics. Much later, Einstein’s general theory of relativity showed that the geometry of spacetime itself is Riemannian (because of gravity’s impact on space-time). Today, we even use it with GPS,” Dr. Sinha said.

Napoleon Bonaparte’s mathematical advisor Joseph Fourier developed Fourier transforms as a mathematical tool to analyse heat flow. Today it underlines digital image and music compression. For now, the Ramanujan-CFT connection has already spawned a new line of inquiry in Dr. Sinha’s group: the mathematical structure they identified appears again, he said, in models of an expanding universe. On the mathematical side, the work hints that other transcendental numbers — of which π is just one example — could admit similarly efficient representations rooted in physics.

https://www.thehindu.com/sci-tech/science/ramanujan-century-old-pi-formulae-conformal-field-theory/article70380138.ece

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Could milky Way’s older twin hold life?

Indian Astronomers discovers an ancient spiral galaxt with arms that could cradle worlds like ours

Source: The Times of India, Dt. 15 Dec 2025

Earlier this month, scientists Rashi Jain and Yogesh Wadadekar, from National Centre for Radio Astrophysics in Pune, announced an extraordinary discovery, of a galaxy 12 billion light years away with the perfect grand spiral design — a bulge in the middle, at least two visible arms and massive in size, nearly 30,000 light years in diameter.

The shape has sparked a mystery as according to most scientific models, such a galaxy should not exist, not that far back in time.

Alaknanda was found using the James Webb Space Telescope (JWST), stationed 1.5 million kilometres away in an orbit around the Sun. All telescopes are like time machines, but Webb has the largest mirror ever launched into space. It collects enough light for its cameras to “see” nearly 13 billion years into the past, back to the “early Universe”, when the first structures such as galaxies began to form and emit light *(see box)*.

“That’s how we know Alaknanda’s age,” says Jain. “Its light began to travel 12 billion years ago, which means it existed when the Universe was at just 10% of its current age.”

But scientific models state galaxies that formed so soon after the Big Bang should be unstable structures, too turbulent to settle into stable, rotating discs, which take about 3 billion years to form.

“Alaknanda though,” says Wadadekar, “formed in half that time. So it does not match our theoretical models.”

There was another surprise. Alaknanda was found forming stars 20-30 times faster than the Milky Way today. In fact, nearly half of its 10 billion stars appear to have formed within the first 200 million years — its spiral arms revealing a “beads-on-a-string pattern”, an indication

HOW ALAKNANDA MAY HAVE FORMED

THIS GALAXY GAINED A STELLAR MASS OF 10 BILLION SUNS WITHIN A FEW HUNDRED MILLION YEARS. TWO THEORIES ATTEMPT TO EXPLAIN HOW...

AI rendering of Alaknanda

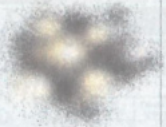
*The arms are rich in interstellar gas, dust and heavy elements ejected by supernovae, all of which help form stars and rocky planets. In the Milky Way, for example, we exist in its Orion arm, 27,000 light years from the centre

1 **It pulled streams of cold gas,** allowing density waves to form spiral patterns. Imagine slow, heavy vehicles stuck in a traffic jam (high-density zone). The waves act on these regions and compress gas to convert some of it into stars

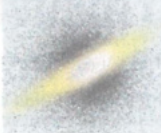
2 **A gravitational encounter** with a smaller companion galaxy that stretched out the arms. But spiral arms forced by such forces tend to fade quickly

THREE MAIN GALAXY TYPES

Spiral



Irregular



Elliptical

Bright centres of galaxies signal high star formation. Ellipticals have little to no gas left to form new stars and irregulars aren't stable enough to hold spiral arms, which allow planets to exist away from chaotic centres

HOW JAMES WEBB SPACE TELESCOPE (JWST) LOOKS INTO THE PAST

- This $10 billion-dollar space telescope has a gold-coated mirror that lets us see faint light from galaxies as they were over 13 billion years ago, the dawn of time
- Astronomers use light to 'look back in time'. For instance, the **Moon we see now is what it was 1.8 seconds ago**, the time it took for its light to reach planet Earth
- JWST sees in infrared, which means it detects light from so early in time, it has been **stretched by Universe's expansion, an effect called 'redshift'.** It's similar to how a line drawn on the surface of a balloon would stretch if the balloon were to be inflated
- JWST recently imaged a supernova that occurred just 700 million years after Big Bang

JWST DETECTS LIGHT FROM 13 BILLION YEARS AGO IN INFRARED SPECTRUM

WHY IT WAS NAMED 'ALAKNANDA'

Mandar Deshpande

- Thousands of celestial objects were analysed frame-by-frame by **Rashi Jain** and **Yogesh Wadadekar** as they searched deep space for 'high-redshift' structures
- Incidentally, both are trained metallurgists who shifted fields to astronomy. Alaknanda is now one of the most significant detections ever made by JWST
- Alaknanda is the sister river of Mandakini, the Hindi name for Milky Way (aka Akash Ganga). So their name for this galaxy was fitting, the researchers said

of active star formation. All these properties then take us to a tantalising question: Can a galaxy this ancient, so similar to ours, with arms that carry millions of stars, hold life?

For years, scientists have debated over what type of galaxies are ideal for complex life. In 2015, astronomer Pratika Dayal, from University of Durham, wrote giant elliptical galaxies could hold 10,000 times more habitable worlds than spirals, because elliptical structures had trillions more stars and saw fewer destructive supernovae.

But the paper was countered by University of Arkansas astrophysicist Daniel Whitmire who said it contradicted the 'Principle of Mediocrity', the notion that Earth, the humans on it and our solar system are not special and that if life exists in a spiral Milky Way, it could thrive in another similar spiral structure. "Why do we not find ourselves located in a large elliptical galaxy?" wrote Whitmire in 2020.

He said elliptical structures, early in their formation, were also filled with so much radiation from violent explosions that no habitable planet would've survived.

"If habitable planets hosting intelligent life are unlikely in large elliptical galaxies, where most stars and planets reside, then by default galaxies such as the Milky Way will be the primary sites of these civilizations, as expected by the Principle of Mediocrity," Whitmire concluded.

But spiral galaxies can be hazardous places too. Many form stars at a rapid rate, which means every once in a while, they're likely to see cosmic explosions ejecting radiation strong enough to scorch any lifeform more complex than a microbe.

So, given its shocking rate of star formation, is Alaknanda too violent to host life?

Early observations offer yet another twist. "The low contribution of light from its central bulge suggests Alaknanda grew mainly through smooth gas accretion rather than through major collisions," says Wadadekar.

"However, such a process should take about a billion years to create spiral arms, longer than the 600 million years in which Alaknanda formed most of its stars." These puzzling properties do call for investigations, he says.

"People often ask if spiral galaxies are necessary for life," he adds.

"We don't know for sure, but if such galaxies existed earlier than expected, maybe conditions suitable for life also began earlier. These are the questions discoveries like this open up. I have written over a hundred papers, but this object is truly unusual."

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