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All We Imagine As Light nominated for Best non-English language film award at BAFTA

Press Trust of India
LONDON

Payal Kapadia's *All We Imagine As Light* on Wednesday bagged a nomination for the Best Film Not in English Language at the 2025 BAFTA Film Awards.

The British Academy unveiled the list of nominees across 25 categories for its upcoming awards gala.

Kapadia's Malayalam-Hindi movie is pitted against *Kneecap* (Ireland), *The Seed of the Sacred Fig* (Germany), *Emilia Perez* (France) and *I'm Still Here* (Brazil) in the category.

Besides *All We Imagine As Light*, Sandhya Suri's *Santosh* and Karan Kandhari's *Sister Midnight* are nominated for Outstanding Debut by a British Writer, Director or Producer.

Indian-origin British actor Dev Patel has also



All We Imagine As Light has been on a winning streak since securing the Grand Prix trophy at the Cannes Film Festival last year. AP

found a mention in the list for his directorial debut *Monkey Man*.

The other two nominees are Luna Carmoon for *Hoard* and Rich Peppiatt for *Kneecap*.

All We Imagine As Light has been on a winning streak at international platforms since it scripted history by becoming the first film from India to win the

Grand Prix trophy at the Cannes Film Festival last year.

Starring Kani Kusruti, Divya Prabha and Chhaya Kadam, the film explores love, longing and loneliness in the bustling city of Mumbai through three women, two Malayali nurses – Prabha and Anu – and their friend Parvati, a cook.

The movie won the Best

International Film at the Gotham Awards recently and claimed the top spot at the Sight and Sound magazine's annual list of 50 best movies of the year.

Suri's Uttar Pradesh-set police thriller *Santosh*, starring Shahana Goswami and Sunita Rajwar, revolves around a newly widowed housewife as she inherits her late husband's job as a police constable and becomes embroiled in the investigation of a young girl's murder.

Kandhari's *Sister Midnight* is a "dark physical comedy" with Radhika Apte playing the lead role.

Ralph Fiennes-starring drama "Conclave" leads the nominations at the BAFTAs, followed by "Emilia Perez" and "The Brutalist", headlined by Adrien Brody. The 2025 BAFTA Film Awards will be held on February 16.



Singapore President confers highest honour on former CII DG Tarun Das

Kallol Bhattacharjee

NEW DELHI

President of Singapore Tharman Shanmugaratnam bestowed the highest honour of the city-state on Tarun Das, former director general of Confederation of Indian Industry (CII).

Mr. Das was bestowed the Honorary Citizen Award by the President who will start official leg of his India tour on Thursday.

The award is given for “outstanding contribution by a non-Singaporean to the country’s growth and development,” a press note released by the Ministry of Foreign Affairs (MoFA) of Singapore declared.

Mr. Das is the second Indian to receive the honour



Mr. Shanmugaratnam with Tarun Das (left).

with the late Ratan Tata being the only other Indian recipient earlier

The Foreign Minister termed Mr. Das as “one of Singapore’s strongest advocates in India” and recollected he led a delegation of Indian industrialists to Singapore in 1993 as part of India’s “Look East” policy.

“It is conferred on those

who have made a significant impact in the areas of business, science and technology, information communications, education, health, arts and culture, sports, tourism, community services or security,” said the MoFA.

President Shanmugaratnam will receive official welcome on Thursday at the Rashtrapati Bhavan and meet President Droupadi Murmu. There will be call-ons by PM Narendra Modi and Ministers of the Union Cabinet.

Finance Minister Nirmala Sitharaman, Commerce and Industry Minister Piyush Goyal and Minister of Health and Family Welfare J.P. Nadda are among those who will call

on President Shanmugaratnam. President Murmu is scheduled to host a State Banquet for the visiting dignitary at the Rashtrapati Bhavan in the evening.

President Shanmugaratnam is slated to leave on January 17 for Odisha which has acquired greater profile within Singapore’s plans for India.

After reaching Bhubaneswar, Odisha CM Mohan Charan Majhi will call on the visiting dignitary. He will also visit the World Skills Centre, set up by Singapore’s ITE Education Services with funding from the Asian Development Bank. He will visit a vaccine manufacturing unit of Bharat Biotech.



Infrastructure in govt. schools catching up with private ones in 2024

The latest UDISE+ report shows that infrastructure in rural schools is on a par with urban schools, compared to a decade ago

DATA POINT

Sambavi Parthasarathy
Nitika Francis

Government schools have notably improved in the provision of basic infrastructure facilities to students over the past 10 years, and are almost on a par with private schools, data show. More than 80% of government schools in India are equipped with functional electricity, ramps, boys' and girls' toilets, handwash, and libraries.

Table 1 shows the shares of government and private schools that provide various infrastructural amenities as mentioned in the latest data released by the Unified District Information System for Education (UDISE+), maintained by the Ministry of Education.

Compared to 2013-14, the share of government schools providing functional electricity has doubled from 45% to 90% in 2023-24, while the share of those equipped with computers has tripled from 15% to 51% in the same period. The share of government schools having libraries and ramps, and conducting medical checkups, has surpassed that of private schools equipped with the same in 2024.

Table 2 shows the share of rural and urban schools equipped with various infrastructure facilities in 2014 and 2024. Facilities such as drinking water, electricity, functional toilets, libraries, ramps, and playgrounds are available in more than 75% of rural schools across India in 2024.

The latest report shows the gap between the share of rural and urban schools in select infrastructure facilities has narrowed. The share of rural schools with ramps and regular medical checkups has surpassed the share of urban schools with the same. Drinking water, toilets, libraries, and playgrounds were provided in almost the same share of rural and urban schools. However, schools in rural

areas continue to lag in the availability of computers, rainwater harvesting systems, and internet connection.

Table 3 compares the availability of select infrastructure facilities in 2013-14 and 2023-24. The data is provided for all major States across government and private schools. The greener the cell, the greater the percentage of schools (by management) with the facility and vice versa.

Data show that the share of schools with a functional toilet facility has increased and is at least 90% across all States in the latest year. While States such as Kerala, Tamil Nadu, Punjab, and Delhi have sustained their values, there has been a considerable improvement in government and private schools in Bihar, Odisha, and West Bengal.

Compared to 2013-14, more schools have equipped themselves with functional electricity. A decade ago, the share of government schools with functional electricity was less than 50% in States such as Bihar, Madhya Pradesh, Odisha, Uttar Pradesh, and West Bengal. The share has increased close to 80% and above in all these States.

However, the availability of computers is higher among private schools compared to government schools. Except for Kerala whose figures have always been above 90%, the share of government schools having computers is above 80% only in six other States.

The share of government schools equipped with computers is still as low as 12% in Bihar, 19% in West Bengal, and 29% in Uttar Pradesh. However, Chhattisgarh, Jharkhand, Haryana, and Odisha have shown considerable improvement compared to 2013-14.

Interestingly, the tables turn when we look at the share of schools with the availability of ramps. More government schools are equipped with ramps compared to private schools. The trend has been true in 2013-14 as well, not just in the latest year.

Report card

The data for the charts were sourced from Unified District Information System for Education Plus (UDISE+) Reports of 2013-14 and 2023-24, released by the Ministry of Education

Acting all tests: Students in a public school at Laggere in Bengaluru in May 2024.



Table 1

The table shows the shares of government and private schools that provide various infrastructural amenities (in %)

	Government		Private	
	14'	24'	14'	24'
Functional electricity	44	90	80	92
Functional toilet	86	96	91	96
Functional boys' toilets	77	90	88	96
Functional girls' toilets	81	93	90	95
Availability of ramps	65	85	35	59
Availability of computer	15	51	51	76
Rainwater harvesting	2	26	10	34
Internet	3	46	19	74
Medical checkup	66	81	57	59
Handwash	39	95	55	96
Library	78	93	72	82

Table 2

The table shows the share of rural and urban schools equipped with various infrastructure facilities in 2014 and 2024 (in %)

	Rural		Urban	
	14'	24'	14'	24'
Functional electricity	47	88	85	96
Availability of computer	19	53	52	77
Functional toilet facility	86	95	91	97
Functional boys' toilet	78	89	80	91
Functional girls' toilet	81	93	85	94
Internet	5	50	21	73
Medical checkup	63	76	64	71
Playground	66	81	73	87
Rainwater harvesting	3	27	10	36
Library	76	89	81	89
Availability of ramps	59	78	45	71

Table 3: The greener the cell, the greater the % of schools with the facility. In contrast, cells coloured red indicate lesser % of schools with the facility

The table compares the availability of select infrastructure facilities in 2013-14 and 2023-24. The data is provided for all major States across government and private schools (in %)

Location	Functional toilet facility				Functional electricity				Availability of computers				Availability of ramps			
	Govt		Private		Govt		Private		Govt		Private		Govt		Private	
	14'	24'	14'	24'	14'	24'	14'	24'	14'	24'	14'	24'	14'	24'	14'	24'
Andhra Pradesh*	61	95	68	100	87	95	94	100	17	80	66	96	30	48	18	90
Bihar	65	94	79	96	4	77	58	87	3	12	36	68	60	55	33	35
Chhattisgarh	90	96	90	99	48	90	81	94	5	67	39	73	66	83	27	50
Delhi	100	100	100	100	100	100	100	100	76	100	91	100	91	100	64	100
Gujarat	100	99	100	100	100	100	100	100	69	98	87	97	96	96	40	52
Haryana	97	100	100	100	97	99	100	100	27	98	84	95	73	84	47	56
Himachal	97	100	96	100	85	95	98	100	13	40	78	94	68	94	16	27
Jharkhand	81	98	88	99	6	93	70	96	4	77	66	90	45	77	16	40
Karnataka	100	99	99	100	97	98	93	99	19	38	68	85	79	88	39	52
Kerala	98	100	97	100	91	100	97	100	92	100	91	99	77	95	72	51
Madhya Pradesh	90	92	97	95	11	82	81	95	5	41	49	78	62	99	46	80
Maharashtra	98	94	99	99	82	81	97	99	37	73	85	97	92	97	42	86
Odisha	70	100	70	99	23	96	57	98	9	56	31	81	66	97	13	89
Punjab	99	99	98	99	100	100	100	100	39	100	87	97	84	89	25	56
Rajasthan	94	89	97	80	36	89	83	94	13	38	47	80	51	76	31	56
Tamil Nadu	97	97	99	96	97	100	99	96	49	72	86	88	77	100	22	96
Uttar Pradesh	96	97	98	95	28	89	61	81	6	29	30	56	84	90	54	52
Uttarakhand	93	93	92	93	61	88	79	96	22	87	62	88	59	85	14	53
West Bengal	83	100	62	100	38	98	62	93	9	19	23	49	58	85	8	32

*2024 data includes numbers for Andhra Pradesh and Telangana for the sake of comparison



Burrow tragedy

India must learn from its mining disasters and enforce regulations

With four deaths so far, the coal mining tragedy in Assam's Dima Hasao district has revived a long-standing debate on the hazardous nature of rat-hole coal mining in India. As opposed to modern coal mining, which is mechanised, the 'rat-hole' points to the crude and antiquated technique of employing people, and even children, to burrow into the ground to scoop out the underground coal. Depending on the depths that they plumb, the odds are high that their pickaxes will often unleash a torrent of water from a hidden aquifer that can suddenly inundate the excavated tunnel – as it is suspected to have happened at Dima Hasao. Because such accidents have recurred over the decades, along with the attendant health and environmental hazards, this mode of mining was banned by the National Green Tribunal (NGT) in 2014. The use of proper geological surveys and appropriate machinery would have made the mine economically unviable. The Assam Chief Minister has stated that the mine appeared to be “prime facie... illegal” and one abandoned by the State's Mines and Minerals Department. If that is the case, it reflects poorly on the State administration that such mines can be exploited by unscrupulous elements with such ease, despite the ban. Surely, this is only a fraction of the unregulated mining that actually goes on.

The Supreme Court of India, in 2019, had asked whether it was possible for such mining to continue without the “connivance” of officials, when it was examining the rescue of 15 miners trapped in a rat-hole mine in the East Jaintia Hills in December 2018. A report submitted by a monitoring committee set up by the NGT observed that despite the ban, the demand for coal to power cement manufacturing and thermal power plants in the northeast had sustained and supported rat-hole coal mining. On the other hand, when convenient, State authorities have sought out and even felicitated rat-hole miners, some from Assam, as in 2023, when they were called in as a last resort after advanced machinery and the expertise of professional geologists and earth scientists had failed to rescue 41 construction workers trapped in the large, over-ground Silkiyara tunnel in Uttarkashi. The Dima Hasao operation too, like others, will end and the net success or failure of saving those trapped will induce a familiar amnesia that will be broken only by the next accident. Until decisive action to puncture the economics of rat-hole mining is taken, India is only burrowing the way to another tragedy.



Social justice and a lost chance by a Prime Minister

At the first official state dinner of his presidency, on November 24, 2009, Barack Obama, the first non-white President of the United States, hosted Manmohan Singh, the first non-Hindu Prime Minister of India. In the oldest and the biggest democracies of the world, that era was a high noon of liberalism. A coalition of minorities appeared ascendant, in both countries. Though Manmohan Singh would not be counted as a political leader like Mr. Obama, he too represented a political process that was common to both India and the U.S. – the climax and then the crisis of liberalism, on the social, economic and international affairs fronts. Mr. Obama and Manmohan Singh understood each other better than they both would the politics of their own countries. Manmohan Singh had a keen sense of global developmental challenges – he championed the India-U.S. civil nuclear deal, economic liberalisation and also amended New Delhi's position in climate change negotiations. As a child of Partition and as a Nehruvian, Manmohan Singh understood the necessity of religious harmony. His presence, decisions and indecisions would transform Indian politics. It is essential to take note of it in order to understand the present-day politics of India.

The 2004 vote

There were two paradoxes in Manmohan Singh's rise as Prime Minister in 2004, both of which speak to the vibrancy of Indian democracy. The anti-Sikh riots of 1984 marked a low point in Indian pluralism. Sikhs made up about 1.72% of India's population, and the fact that one of them could become the Prime Minister 20 years later, marked a high point. The majority Hindus did not find anything problematic.

The second paradox is that the vote in 2004 was one against the celebration of the market. Manmohan Singh who became Prime Minister, was a votary of the market. He would reluctantly follow a welfarist agenda dictated by democratic politics.

Now, to his presence, decisions and indecisions. The United Progressive Alliance-1 was a coalition of religious and linguistic minorities and subaltern social groups. But when it was reconstituted following the 2009 elections, subaltern representatives from the Hindi belt were left out. The Left was replaced with Trinamool Congress (TMC); the Dravida Munnetra Kazhagam continued. Political power in India between 2004 and 2014 was controlled, along with Manmohan Singh, by Sonia Gandhi, Ahmed Patel, Pranab Mukherjee and A.K. Antony. The coalition elected two Presidents of India, Pratibha Patil and Pranab Mukherjee, and Hamid Ansari as Vice President of India. Religious and linguistic minorities were represented for all 10 years, but subaltern castes were pointedly expelled in 2009 by Congress managers. Nobody in the above list, save perhaps Sonia Gandhi, had any capacity to get an extra vote for the Congress in the Hindi heartland. In fact, the very optics of



Varghese K. George

As Prime Minister, Manmohan Singh's decisions and indecisions caused a rift between subaltern Hindus and Muslims in the Hindi heartland

the overwhelming presence of religious minorities and upper caste Hindus at the top turned out to be one of the causes of the shift by the Other Backward Classes (OBC) and Dalits in favour of the Bharatiya Janata Party in 2014. This has parallels with what would happen in the U.S. in 2016.

Manmohan Singh was indecisive on many issues, but there was one question – apart from the India-U.S. nuclear deal – that he put his foot down for. This was to veto the social justice agenda pushed by cabinet colleagues Arjun Singh and Meira Kumar, Minister of Human Resource Development and Social Justice Minister, respectively, in UPA-1. There cannot be a reasonable explanation for the surprise surge of the Congress in 2009 in the heartland – it won 21 of the 80 Lok Sabha seats in Uttar Pradesh, for instance – without taking into account the OBC quota in higher educational institutions driven by Arjun Singh and OBC parties in UPA-1. The battle of wits between the two Singhs on the quota question is instructive of the imbalance between secularism and socialism justice that made the UPA's promise of progress short-lived. Manmohan Singh owned it.

Singh vs Singh

Manmohan Singh resisted Arjun Singh's plans for expanding quotas. It all started with a Supreme Court judgment in 2005, which brought into dispute the power of the state to enforce the reservation policy in admissions to private educational institutions. Many States had quotas in unaided institutions, which were questionable after the Court decision. Arjun Singh championed it and Parliament amended the Constitution to insert a clause to Article 15, which specifically enabled reservations in "admission to educational institutions including private educational institutions, whether aided or unaided by the State, other than the minority educational institutions".

A new anti-reservation movement erupted in upper India while peninsular India remained calm. The then Human Resources Development Ministry under Arjun Singh drafted a Bill that proposed OBC quotas in all government institutions of higher education which already had Scheduled Caste and Scheduled Tribe quotas; and for all three categories in private ones. The Manmohan Singh-led Prime Minister's Office instructed Arjun Singh to bifurcate the Bill – one for aided, and a second for unaided ones. Arjun Singh got both drafts ready. Late evening on a day before they were to be taken up by the Union Cabinet, Manmohan Singh instructed that the Bill for private ones be kept aside. Though the move for caste quotas in private institutions was halted, quota in government institutions of higher education rallied OBC communities in the heartland behind the Congress party in 2009.

Manmohan Singh and the technocratic, Delhi-based Congress managers interpreted the 2009 results as an endorsement of the employment guarantee scheme, or even the U.S.

nuclear deal. Arjun Singh was denied a berth in the new Council. Meira Kumar was restrained as Lok Sabha Speaker. Ms. Kumar had tried to implement an item in the National Common Minimum Programme (NCMP). It had said: "The UPA government is very sensitive to the issue of affirmative action, including reservations in the private sector. It will immediately initiate a national dialogue with all political parties, industry and other organizations to see how best the private sector can fulfill the aspirations of Scheduled Caste and Scheduled Tribe youth." Ms. Kumar convened a meeting of industry leaders to open a dialogue, inviting the ire of Manmohan Singh, who instructed her to cancel it. Nobody in the National Advisory Council, whose mandate was to implement the NCMP, said anything. Meanwhile, OBC MPs were pointing out in 2006 that not a single Governor in the country was from among their communities. On this question, Manmohan Singh remained silent – indecision.

The parallel line

This hostility towards social justice politics was happening alongside a discussion on the welfare of Muslims, Dalits, and OBC Christians. The Court's Inamdar judgment on reservations in private educational institutions and the appointment of the Sachar Committee to study the condition of Muslims happened months apart in 2005, triggering fresh debates on communal and caste questions. The Congress, partly by intention, pitched the Muslims against subaltern Hindus, thinking that this could break the OBC-Muslim social coalition that had emaciated the party in the Hindi heartland. But the consequences were unintended. OBC/Dalit segments of the heartland became the most fertile ground for Hindutva subsequently, as they came to believe that non-BJP parties were trying to provide quotas for Muslims at their cost. It is not a coincidence that the badly drafted line by Manmohan Singh about minorities having the first claim over national resources continues to haunt the Congress.

In fairness, Manmohan Singh was following a traditional Congress line of ignoring the OBCs and focusing on the rest. Arjun Singh sensed the ground had shifted and that the OBCs counted. The other politician who sensed that by 2009 was Narendra Modi, who addressed subaltern Hindus. Arjun Singh crossed swords with two Congress Prime Ministers – once on secularism and then on social justice. In 1992, he resigned from the P.V. Narasimha Rao Government for its failure to protect the Babri Masjid. In 2009 he was denied a cabinet berth by Manmohan Singh. The Congress party included in its 2024 election manifesto a promise of OBC/SC/ST reservation in private educational institutions – an idea stalled by Manmohan Singh. Rahul Gandhi today wants to rebuild the Congress on the twin plank of secularism and social justice. Manmohan Singh had an opportunity.

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A SpaceX Falcon 9 rocket launches with the Blue Ghost lunar lander and ispace's Resilience lander from the Kennedy Space Center, Florida, U.S., on Wednesday. REUTERS

U.S., Japan moon landers launch on single rocket

Agence France Presse

One rocket, two missions: lunar landers built by U.S. and Japanese companies launched their "rideshare" to the moon on Wednesday, showcasing the private sector's growing role in space exploration.

On board the SpaceX Falcon 9 rocket that took off from the Kennedy Space Center in Florida were Firefly Aerospace's Blue Ghost and ispace's Resilience from Japan, which will also deploy a micro rover.

Both uncrewed missions aim to build on the success of Texas-based Intuitive Machines, which last year became the first company to successfully touch down on the Earth's celestial neighbour.

Until recently, soft landings on the moon were achieved only by a handful of well-funded national space agencies, starting with the Soviet Union in 1966.

Now, however, several emerging U.S. companies are attempting to replicate this feat under NASA's experimental Commercial Lunar Payload Services (CLPS) programme, designed to cut costs and stimulate a lunar economy.

The U.S. plans to establish a sustained human presence on the moon later this decade under the Artemis programme, leveraging commercial partners to deliver critical hardware at a fraction of the cost of government-led missions.

On the Japanese side, Tokyo-based ispace's first attempt to land on the moon ended in an unsalvageable "hard landing" in April 2023.

Blue Ghost is stacked atop Resilience inside the Falcon 9, SpaceX executive

The U.S. plans to establish a sustained human presence on the moon under the Artemis programme, leveraging commercial partners to deliver hardware at a fraction of the cost

Juliana Scheiman said, and will be deployed first, followed by Resilience nearly 30 minutes later.

The two spacecraft have different timelines for reaching the moon. Blue Ghost aims to complete its journey in 45 days, gradually lifting its orbit around the Earth before entering lunar orbit and touching down near Mons Latreille, a volcanic feature on the moon's northeast near side.

"With 10 NASA instruments on this flight, we're conducting scientific investigations... from characterising the earth's magnetosphere to understanding lunar dust and the moon's interior structure and thermal properties," NASA scientist Mark Banks said.

Blue Ghost also carries technology demonstrations focused on navigation and computing in the moon's harsh radiation environment.

Meanwhile, Resilience will take four to five months to reach its destination in Mare Frigoris, on the moon's far north.

Its payloads include scientific instruments, but the centrepiece is "Tenacious", a micro rover developed by ispace-Europe, a Luxembourg-based subsidiary.

The four-wheeled robot features a high-definition camera and will attempt to scoop up regolith, the moon's loose surface material.

These ambitious goals hinge on achieving a successful soft landing – a task fraught with challenges. Spacecraft must navigate treacherous boulders and craters and, in the absence of an atmosphere to support parachutes, rely entirely on thrusters for a controlled descent.



'Strange' particle possesses mass when moving in one direction, not another

Physicists stress subatomic particles to enable discovery. The CERN supercollider smashes billions of protons head on with as much energy as at the dawn of the universe. Recently, researchers used a magnetic field 27 lakh times stronger than the Earth's to discover semi-Dirac fermions

Vasudevan Mukunth

Since the start of the 20th century, physicists have discovered a veritable zoo of subatomic particles. Matter can be both wave and particle. If you take the particle route, these subatomic particles are what you could say the universe and everything in it is made of. There are many ways to further categorise them.

A common one is as fermions and bosons: fermions make up matter and bosons mediate the forces between matter. For example, electrons and protons are fermions whereas photons are bosons.

Fermions can be further classified as Dirac or Majorana fermions. Dirac fermions are fermions that may or may not have mass but are always different from their anti-particles. Majorana fermions are fermions that are also their own antiparticles (neutrinos are suspected to be Majorana fermions).

The zoo smells funny

Even if these distinctions seem too fine, they're of considerable interest to physicists. They know something's up in the subatomic zoo. Some animals that should obviously be there are missing, like the particle for the force of gravity. Some animals are much heavier than they should be (Higgs bosons and neutrinos). One enclosure, dark matter, remains empty even though physicists have been looking for it under every rock and leaf. Their knowledge of quite a few animals is just incomplete or at odds with what they studied in school. There's a lot of work left if the zoo is to be a fully understood place without any surprises.

To simplify this task, physicists have developed a common theory that collects all these animals under a single, unified description, called the Standard Model (SM) of particle physics. Physicists can explore 'new physics' in terms of whether it agrees or disagrees with the SM. Right now it's like a big jigsaw puzzle with a few important pieces missing. If physicists find a new piece in their calculations or their particle collider experiments, they can check if it fits into the puzzle. If it doesn't, maybe the puzzle itself needs to be changed.

In a sense, grouping fermions into fine categories is an exercise in meticulously cataloguing the exact shapes of the puzzle's pieces.

This way, if physicists find a piece whose shape is new even in a very small way, they stand to make a big update.

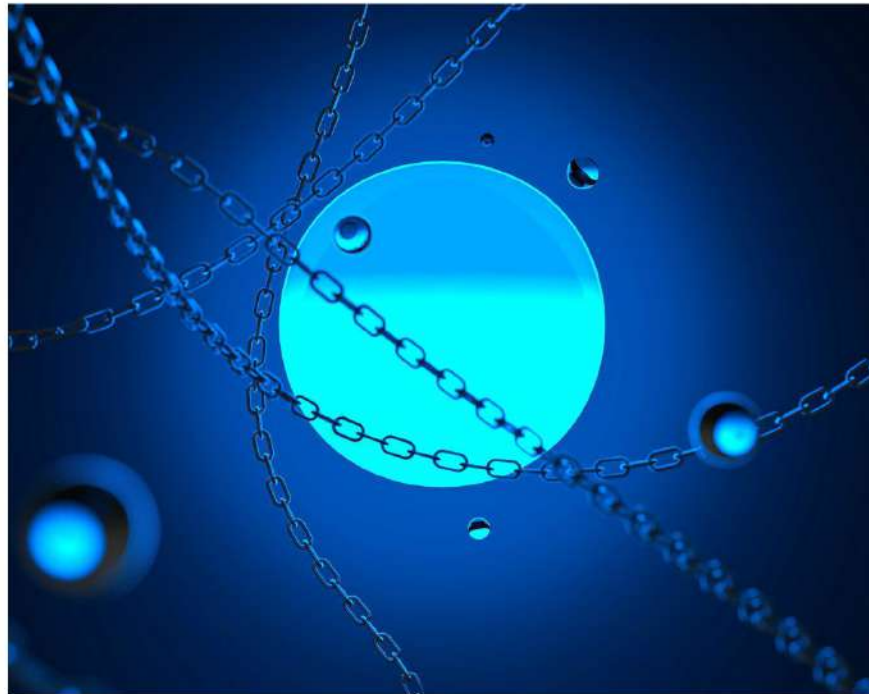
Something strange comes this way

A particle as it exists in the wilderness of space is slightly different from a particle that exists inside solids and liquids. "In condensed-matter physics, every material can behave like a new universe," IIT Kanpur assistant professor Adhip Agarwala said.

"Here strange particles can arise and be experimentally detectable, which are otherwise not usually seen in three dimensions."

For example, two-dimensional materials can host particles called anyons whose properties lie somewhere between those of fermions and bosons.

Recently, researchers at Columbia University and Pennsylvania State University reported finding another



Representative illustration. A semi-Dirac fermion has mass when it's moving in one particular direction but not in a perpendicular direction. DIMA SOLOMIN

strange particle called a semi-Dirac fermion.

Dirac fermions have mass and aren't their own anti-particles. A semi-Dirac fermion has mass when it's moving in one particular direction but not in a perpendicular direction. This unusual characteristic, which makes semi-Dirac fermions very exotic, is the result of the fermion's interaction with the electric and magnetic forces acting on it in certain materials.

The semi-Dirac fermion reported in the experiment is technically a quasiparticle. A quasiparticle is a clump of particles or energy-packets that, in some given conditions, behaves like a single particle. Protons are quasiparticles, for example: each proton is made of three quarks and the gluons holding them together. In most settings, what separates particles from quasiparticles is a distinction without a difference. If a quasiparticle is a fermion, it's a fermion in the same way an electron is a fermion.

Location, location, location

When trying to find puzzle pieces with new shapes, physicists need to know exactly which material to look in or they could be searching forever. This is much like in life sciences research. By studying the 1-mm-long roundworm *Caenorhabditis elegans*, for example, scientists have discovered many fundamental principles of biology and have won four Nobel Prizes so far. The locale of choice in the new study was a layered crystalline material called zirconium silicon sulphide (ZrSiS).

When a magnetic field is applied to a metal, the electrons inside are accelerated along a curved path. (The protons are

confined to the atomic nuclei.) The energy of these electrons is called cyclotron energy.

In the metal, the cyclotron energy increases linearly with the strength of the magnetic field. This relationship can be denoted as B^1 , where B is the strength of the magnetic field and 1 is the exponent to which it is raised. In graphene, which is a single-layer sheet of carbon atoms linked together, the cyclotron energy increases in step with the square-root of the magnetic field strength. The relationship is thus $B^{0.5}$. In ZrSiS, the researchers found the cyclotron energy to increase as $B^{0.5}$. Previous theoretical research has found that this scaling factor is a unique signature of semi-Dirac fermions.

'The same laws of nature'

The researchers didn't land up at ZrSiS by accident; the locale is crucial, after all. Physicists in general knew for some time that there could be semi-Dirac fermions in graphene. But to reveal the quasiparticles' presence, they had to first stretch graphene to such a degree that they often ended up tearing it apart. An older study also revealed some unusual electronic properties in zirconium silicon selenide (ZrSiSe), which has a similar structure, in the presence of a magnetic field.

The authors of the present study put these and other indications together and decided to look for semi-Dirac fermions in ZrSiS – and voila.

"This shows the magic of condensed matter physics, where every material, be it graphene or ZrSiS, can host exotic particles that one can discover in table-top experiments – whereas to discover subatomic particles we often

Physicists have developed a common theory that collects subatomic particles under a unified description, called the Standard Model. Physicists can explore 'new physics' in terms of whether it agrees or disagrees with the SM

need huge colliders," professor Agarwala said. "It is the same laws of nature that guide them all."

The zoo expands

Physicists regularly subject subatomic particles to extreme conditions to elucidate the laws of nature at the edge of reality. The Large Hadron Collider in CERN in Europe smashes billions of protons head on with as much energy as there was just 0.000000000000004 seconds after the Big Bang. Even in the present study, the researchers subjected ZrSiS crystals to a magnetic field of up to 17.5 tesla – about 270,000-times stronger than the earth's magnetic field.

The researchers have said they plan to continue their studies calculations to understand more about ZrSiS and try to explain some other unusual electronic behaviour they observed in their study.

The finding is a new animal in the particle zoo. As one more enclosure awaits its occupant and zoo authorities fill out the paperwork, the question arises: how will it change the zoo?

(The author thanks IISc assistant professor Nirmal Raj for feedback. mukunth.v@thehindu.co.in)

Agasthyar's legacy to be the focus of Kashi Tamil Sangamam 3.0

The Hindu Bureau
NEW DELHI

Announcing that the theme of the third edition of Kashi Tamil Sangamam will be the legacy and philosophy of Maharishi Agasthyar, Union Education Minister Dharmendra Pradhan said here on Wednesday that the intellectual brilliance of Agasthyar was the bedrock of the Tamil language and literature as well as the shared values, knowledge traditions and heritage of the country.

The event, to be held at the Namo Ghat in Varanasi, will begin on February 15 and will conclude on February 24.

The Minister also inaugurated the registration process for the Sangamam, and said the Centre expected 1,200 delegates from Tamil Nadu this time. The Sangamam will be held against the backdrop of the Kumbh Mela, Mr. Pradhan said.

The Union Education Ministry is the key organiser of the event. A document on Agasthyar temples in Tamil Nadu and another one on Siddha medicine will be released during the event, Mr. Pradhan said.

The last date of registration for the event is Febru-

The event, to be held at the Namo Ghat in Varanasi, will be held from Feb. 15 to 24

ary 1. The participants will be selected after a Tamil quiz on February 2. The portal, kashitamil.iitm.ac.in, is hosted by the Indian Institute of Technology, Madras.

Responding to questions, Mr. Pradhan said the Centre had not used the Sangamam for any political purposes and the intention was cultural integration and upholding of the inseparable and timeless bonds between Tamil Nadu and Kashi.

The participants will be from five categories – students, teachers, and writers; farmers and artisans; professionals and small entrepreneurs; women from various sectors; and those involved in start-ups, innovation, edu-tech and research. “This year, an additional group of around 200 students of Tamil origin studying in various Central universities will be a part of this event to enliven the bond between Kashi and Tamil Nadu. Participation of youth in all categories will be encouraged this year,” Mr. Pradhan said.



Red-letter day for the Navy, declare Captains of 3 platforms

Vinaya Deshpande Pandit
MUMBAI

"It is a red-letter day for the Navy, for the country, and for everyone. I can't express my joy. I can't tell you how proud I feel," said Captain Nitin Kapoor, Commanding Officer of *INS Nilgiri*, one of the three frontline platforms commissioned in the Indian Navy on Wednesday.

"This tri-commissioning is key to showcase our growing aspirations, a testament to our effort to become a \$5 trillion economy. The firepower of *INS Nilgiri* and its range of attack have increased. The deck rail system has been introduced for the first time in the country. Her heat signature has reduced considerably. The reflecting surfaces have come down. Due to the concealed deck, her stability has increased," elaborated



Security boost: Crew members aboard *INS Nilgiri* attending a briefing on the warship's deck at the Naval Dockyard in Mumbai. AFP

Captain Kapoor, explaining the features of the stealth frigate. "We are the first of the class of P-17A. We have a unique and new

design, a stealthier platform. This is for the future. It will showcase Indian shipbuilding to the world. We have new concepts

such as the SRGM [Super Rapid Gunmount], we have a concealed deck. It is a very strategic platform for our country," he added.

In a long-awaited move, this is the first time that structural changes have been made during the design and construction stage of the shipbuilding to accommodate women officers and sailors.

Women onboard

Both *INS Surat* and *INS Nilgiri* have made these changes. The development comes at a time when women officers are being inducted in frontline roles. The women sailors are mostly Agniveers. "It is a great feeling to rub shoulders with the best in the Navy. The experience has been extremely rewarding. To be here on this day, to serve with the finest officers of the Indian Navy, is an honour," said Lt. Aastha Kamboj, Deputy Logistics Officer of *INS Surat*, who is a part of the commissioning crew.

When asked about her

role on the destroyer, she said, "Look after inventory management, its forecast. The galley is also looked after by the logistics department. It serves 350 meals thrice a day. Apart from that, we take care of the clothing of the personnel on board. In short, the morale-building of the ship lies in the hands of the women officers."

Speaking of the fourth and last destroyer of Project 15B, *INS Surat*, Captain Sandeep Shourie said, "This is the last and the best. Both the design and the construction have matured. Even the time taken for construction has come down. From launch to commissioning, we have received her in 31 months. The first ship had taken 54 months. So now, ships are becoming available to the Navy before the contractual time. We are combat-ready and ready to roar.

She is the best in class for air, surface, underwater capabilities. She caters to optimum operations. We have twin hangars, so we can operate two multi-role helicopters, which extends the reach of the ship. It is a very capable ship. The endurance of the ship is truly unlimited."

Long endurance

Captain Vineet Sharma, Commanding Officer of *INS Vaghsheer*, said, "With this, Project 75 culminates. The old *Vaghsheer* was commissioned 50 years ago. The new *Vaghsheer* is the stealthiest and most advanced submarine in the world. It is a conventional diesel electric submarine. She is a greater threat to the adversary due to her long endurance. *INS Vagir* had covered a distance of 9,000 kilometres to reach the Australian coast. We intend to beat that record."



Three Indian nuclear entities no more on U.S. restrictions list

Press Trust of India

NEW DELHI

The United States on Wednesday removed restrictions on three Indian nuclear entities, over a week after National Security Adviser Jake Sullivan announced that Washington was finalising steps to “remove” hurdles for civil nuclear partnership between Indian and American firms.

The three entities are Bhabha Atomic Research Centre (BARC), Indira Gandhi Atomic Research Centre (IGCAR) and the Indian Rare Earths (IRE), according to the U.S. Bureau of Industry and Security (BIS). In an address at the IIT-Delhi last week, Mr. Sullivan said the U.S. will remove regulations that have prevented cooperation between Indian nuclear entities and American companies.

By outgoing Biden team

The removal of the three Indian entities is being seen as an attempt by the outgoing Biden administration to facilitate the implementation of the landmark India-U.S. civil nuclear pact sealed 16 years back.

The move comes five days ahead of Donald

Trump's inauguration as the 47th President of the U.S. India and the U.S. signed a historic civil nuclear agreement in 2008. It was expected to pave the way for allowing the US to share civilian nuclear technology with India.

“The removal of the three Indian entities will enable closer cooperation between the U.S. and India to secure more resilient critical minerals and clean energy supply chains,” said Principal Deputy Assistant Secretary of Commerce for Export Administration Matthew Borman.

“This action aligns with and supports the overall ambition and strategic direction of the US-India partnership,” he said.

In a statement, the BIS said it “modified one existing entry on the Entity List, under the destination of India, by removing three entities within the entry” following an inter-agency review. “The removal of Indian entities... will support U.S. foreign policy objectives by reducing barriers to advanced energy cooperation, including joint research and development and science and technology cooperation, towards shared energy security needs and goals,” it said.



Submarine, 2 warships commissioned in one go

Vinaya Deshpande Pandit
MUMBAI

In a first, three frontline platforms – *INS Nilgiri*, *INS Vaghsheer*, and *INS Surat* – were commissioned on the same day in the Navy on Wednesday.

Hailing the first tri-commissioning as a significant leap towards *Atmanirbhar Bharat*, Prime Minister Narendra Modi dedicated the naval platforms – two warships and a submarine – to the nation.

INS Nilgiri is the lead ship of Project 17A frigates, *INS Vaghsheer* is the sixth and the final submarine of Project 75 Kalvari class, and *INS Surat* is the fourth and final ship of Project 15B destroyers.

“We are becoming a major maritime power by taking inspiration from our rich naval history. *INS Nilgiri* is dedicated to the naval empire of the Cholas. *INS Surat* is dedicated to India’s ancient connection to West Asia through Gujarat. I was there for the commissioning of the first Kalvari submarine. I am blessed to commission the sixth one - *INS Vaghsheer*,” the Prime Minister said at the event held at the Naval dockyard on Wednesday morning.

‘Not expansionist’

Outlining India’s vision as a global power, Mr. Modi said, “India’s position is not expansionist, but development-oriented. We are



Major boost: *INS Surat*, *INS Nilgiri* and *INS Vaghsheer* being commissioned at an event in Mumbai on Wednesday. ANI

recognised as a reliable and responsible partner globally, especially in the Global South.”

On the importance of *Atmanirbhar Bharat* abhiyan or indigenisation, he said the country’s depen-

dence on other countries at the time of any tension should be minimum. “Today, there are 5,000-plus equipment, which our defence personnel will not buy from other countries.” He highlighted that of the

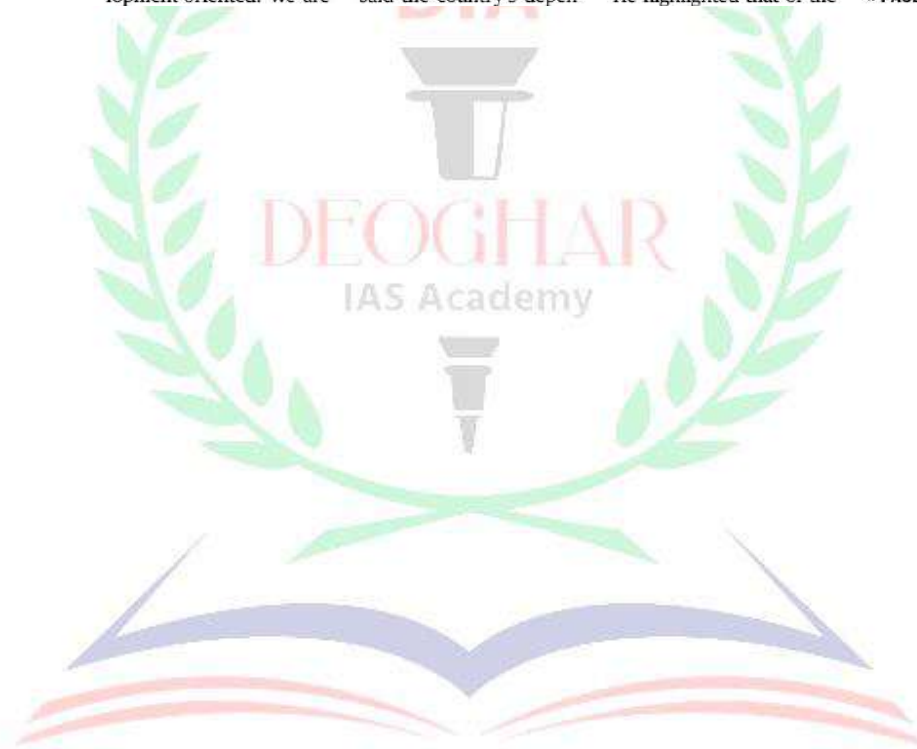
40 platforms commissioned in the Navy in the last few years, 39 were made in India.

Defence Minister Rajnath Singh said the “historic commissioning showcases India’s growing prowess in the Indian Ocean region”.

Chief of Naval Staff Admiral Dinesh Tripathi, Chief of Defence Staff Anil Chauhan, Maharashtra Governor C.P. Radhakrishnan, Minister of State for Defence Sanjay Seth, Maharashtra Chief Minister Devendra Fadnavis, Deputy Chief Ministers Eknath Shinde and Ajit Pawar were present at the event.

RED-LETTER DAY

» PAGE 4



Gaza ceasefire agreement ready: U.S. and Hamas

Israeli Prime Minister Netanyahu says final details of the deal are still being ironed out

Deal expected to deliver an initial six-week halt to fighting accompanied by talks on ending the war

Deal promises the release of dozens of hostages held by both Hamas and Israel

Associated Press
DOHA

Israel and Hamas agreed to a ceasefire deal to pause the devastating war in the Gaza Strip, multiple officials announced on Wednesday, raising the possibility of winding down the deadliest and most destructive fighting between the bitter enemies.

The deal, coming after weeks of painstaking negotiations in the Qatari capital, promises the release of dozens of hostages held by Hamas in phases, the release of hundreds of Palestinian prisoners in Israel, and would allow hundreds of thousands of people displaced in Gaza to return to what remains of their homes. It also would flood badly needed humanitarian aid into a territory ravaged by 15 months of war.

Three officials from the U.S. and one from Hamas

confirmed that a deal had been reached, while the office of Israeli Prime Minister Benjamin Netanyahu said final details were still being ironed out.

All three U.S. officials and the Hamas official requested anonymity to discuss the contours of the deal before the official announcement by mediators in Doha.

Mr. Netanyahu's office said in a statement that it hoped "details will be finalised tonight." Any agreement needs to be approved by Mr. Netanyahu's Cabinet.

Once official, the deal is expected to deliver an initial six-week halt to fighting that is to be accompanied by the opening of negotiations on ending the war altogether.

Over six weeks, 33 of the nearly 100 hostages are to be reunited with their loved ones after months in captivity.



Hopes up: Israelis react to reports on ceasefire deal in Tel Aviv on Wednesday. REUTERS

It remained unclear exactly when and how many displaced Palestinians would be able to return to what remains of their homes and whether the agreement would lead to a complete end to the war and the full withdrawal of

Israeli troops from Gaza — key Hamas demands for releasing the remaining captives.

Many longer-term questions about postwar Gaza remain, including who will rule the territory or oversee the daunting task of re-

construction after a brutal conflict that has destabilised the broader West Asia and sparked worldwide protests.

Hamas triggered the war with its October 7, 2023, cross-border attack, which killed some 1,200 Is-

raelis and took 250 others hostage.

Israel responded with a fierce offensive that has killed over 46,000 Palestinians, according to local health officials, displaced an estimated 90% of Gaza's population and sparked a humanitarian crisis. More than 100 hostages were freed from Gaza in a week-long truce in November 2023.

Months of talks

The U.S., along with Egypt and Qatar, have brokered months of indirect talks between the bitter enemies that finally culminated in this latest deal.

It comes after Israel and Lebanese militant group Hezbollah agreed to a ceasefire in November, after more than a year of conflict linked to the war in Gaza.

Israel responded with a brutal air and ground offensive that has killed over

46,000 Palestinians, according to local health officials. They do not distinguish between civilians and militants but say women and children make up more than half of those killed.

UN and international relief organisations estimate that some 90% of Gaza's 2.3 million people have been displaced, often multiple times. They say tens of thousands of homes have been destroyed and hospitals are barely functioning.

U.S. President Joe Biden, who has provided crucial military aid to Israel but expressed exasperation over civilian deaths, announced the outline of the three-phase ceasefire agreement on May 31.

With Mr. Biden's days in office numbered and President-elect Donald Trump set to take over, both sides had been under heavy pressure to agree to a deal.

