

DAILY CURRENT AFFAIRS (30 September 2024)

TOPICS COVERED

1. 92% of workers cleaning urban sewers, septic tanks from SC, ST, OBC groups: survey (GS Paper-II: Society: Social Justice)
2. 5 suspended over wall collapse deaths near Mahakal Temple (GS Paper-I: Art & Culture)
3. Glaciologist digs deep into permafrost to gauge future climate change disasters (GS Paper-I: Geography)
4. Jobs, development high on wish list in Ahirwal belt of Haryana
5. At Ambala Cantonment, BJP's Vij faces farmers' fury, but all is not well for Congress too (GS Paper-II: Polity)
6. Not just nothing, dark matter quests close in on dire 'neutrino fog' (GS Paper-III: Basic Science)
7. Pollen: a mammoth killer? (GS Paper-III: Basic Science)
8. Mad doctrine (GS Paper-II: IR)
9. Why are law students at RGNUL protesting?
10. The Mullenweg-WP Engine dispute and how WordPress users are affected (GS Paper-III: S&T)

92% of workers cleaning urban sewers, septic tanks from SC, ST, OBC groups: survey

GS Paper II:
Society: Social
Justice

In a first-of-its-kind attempt to enumerate people engaged in the hazardous cleaning of sewers and septic tanks in India's cities and towns, government data gathered from over 3,000 urban local bodies in 29 States and Union Territories shows that 91.9% of the 38,000 workers profiled so far belong to Scheduled Caste (SC), Scheduled Tribe (ST), or other backward class (OBC) communities.

Of the profiled workers, 68.9% were SC, 14.7% were OBC, 8.3% were ST, and 8% were from the general category.

Between 2019 and 2023, at least 377 people across the country have died from hazardous cleaning of sew-

ers and septic tanks, according to government data tabled in Parliament.

Hazardous cleaning

The profiling of sewer and septic tank workers (SSWs) is being carried out by the Ministry of Social Justice and Empowerment as part of its NAMASTE programme, a scheme to mechanise all sewer work and prevent deaths due to hazardous cleaning work. In 2023-24, this scheme was brought in to replace the Self-Employment Scheme for Rehabilitation of Manual Scavengers (SRMS).

The Union government's rationale is that manual scavenging as a practice has ended across the country and what needs to be fixed now is the hazardous cleaning of sewers and septic tanks. It draws

this distinction based on a technical difference in how manual scavenging and hazardous cleaning are defined in the Prohibition of Employment as Manual Scavengers and their Rehabilitation Act.

The NAMASTE programme targets "workers directly associated with sewer and septic tank cleaning including drivers of desludging vehicles, helpers, machine operators and cleaners", the Ministry says.

Its goal is to profile such workers in a nationwide enumeration exercise, give them safety training and equipment, and offer capital subsidies that could turn sewer and septic tank workers into "sanipreneurs", or sanitation entrepreneurs.

Since the scheme began

Skewed shares

The caste-wise share (in %) of the workers engaged in cleaning of sewers and septic tanks across the country



a year ago, 3,326 urban local bodies (ULBs) have begun the process and profiled around 38,000 SSWs. So far, 283 ULBs have reported zero SSWs, and 2,364 ULBs have reported less than 10 SSWs each.

The Ministry of Housing and Urban Affairs estimates that there are 100 core sanitation workers for an urban population of five

lakh. Based on this, the government used decadal growth rates to estimate that as of 2021, there are likely to be one lakh SSWs employed by India's 4,800 ULBs. The NAMASTE programme intends to profile all SSWs across the country to create a central database.

Twelve States and UTs, including Kerala, Rajas-

than, and Jammu and Kashmir, have completed the profiling process, while the exercise is still under way in 17 States, including Andhra Pradesh, Bihar, Gujarat, Uttar Pradesh, Madhya Pradesh, and Maharashtra. Chhattisgarh, Meghalaya, and West Bengal are among the States that have yet to begin the profiling process. Tamil Nadu and Odisha are running their own programmes for SSWs, and are not reporting data to the Centre under this programme.

State efforts

States such as Kerala and Karnataka are holding information, education, and communication (IEC) campaigns to profile workers at special camps. In Andhra Pradesh, ULBs are visiting

workers' homes and workplaces to profile them, with State data showing that around 30% of their profiling was done this way.

By the end of the 2023-24 financial year, 31,999 SSWs had been validated, the Ministry's annual report said. Capital subsidies amounting to ₹2.26 crore have been given to 191 beneficiaries and their dependants for alternative self-employment projects, while 413 sanitation workers and dependants have received capital subsidies of ₹10.6 crore for sanitation-related projects, the report said.

Under the previous SRMS scheme, the government had identified 58,098 manual scavengers till 2018. Since then, it has insisted that no other ma-

nual scavengers have been identified, claiming that none of the 6,500-plus complaints reporting manual scavenging could be verified.

Of the identified manual scavengers, the government said it had data on the social categories of 43,797, showing that 97.2% of them were from SC communities. The share of STs, OBCs, and others were each around 1%.

Ministry records showed that all the 58,098 people identified as manual scavengers till 2018 had been given a one-time cash transfer of ₹40,000. While 18,880 of them had opted for skills training in alternative occupations, 2,051 had opted for loans under the scheme's subsidies to start alternative businesses as of 2022.

92% of workers cleaning urban sewers, septic tanks from SC, ST, OBC groups: survey (30 September)

- The government has conducted the first-ever attempt to count people involved in hazardous cleaning of sewers and septic tanks in India's cities and towns.
- Data was gathered from over 3,000 urban local bodies across 29 States and Union Territories.
- Of the 38,000 workers identified so far, 91.9% belong to Scheduled Caste (SC), Scheduled Tribe (ST), or Other Backward Class (OBC) communities.
- 68.9% of the workers are from SC communities, 14.7% from OBC communities, 8.3% from ST communities, and 8% from the general category.
- Between 2019 and 2023, at least 377 people have died from hazardous cleaning of sewers and septic tanks, according to government data presented in Parliament.
- The profiling of sewer and septic tank workers (SSWs) is part of the Ministry of Social Justice and Empowerment's NAMASTE programme.

- NAMASTE is a scheme aimed at mechanising sewer work and preventing deaths from hazardous cleaning. It replaced the earlier Self-Employment Scheme for Rehabilitation of Manual Scavengers (SRMS) in 2023-24.
- The government considers manual scavenging as ended and now focuses on hazardous cleaning of sewers and septic tanks, drawing a distinction based on technical definitions under the Prohibition of Employment as Manual Scavengers and their Rehabilitation Act.
- The NAMASTE programme targets workers involved in sewer and septic tank cleaning, including drivers, helpers, machine operators, and cleaners.
- The programme aims to profile workers, provide them safety training and equipment, and offer capital subsidies to help them become sanitation entrepreneurs, or "sanipreneurs."
- Since the scheme started a year ago, 3,326 urban local bodies have begun profiling workers, with around 38,000 SSWs identified.
- Out of these, 283 urban local bodies reported having no SSWs, and 2,364 reported fewer than 10 SSWs each.
- The Ministry of Housing and Urban Affairs estimates there are around 100 core sanitation workers for every 500,000 urban residents.
- Using this estimate, the government projected that as of 2021, there are about 1 lakh sewer and septic tank workers (SSWs) employed by 4,800 urban local bodies (ULBs) in India.
- The NAMASTE programme aims to profile all SSWs across the country to create a central database.
- Twelve states and Union Territories, including Kerala, Rajasthan, and Jammu and Kashmir, have completed the profiling process.
- Seventeen states, including Andhra Pradesh, Bihar, Gujarat, Uttar Pradesh, Madhya Pradesh, and Maharashtra, are still working on profiling their SSWs.
- Some states like Chhattisgarh, Meghalaya, and West Bengal have yet to begin the profiling process.
- Tamil Nadu and Odisha are running their own programmes for SSWs and are not reporting data to the central government.
- State efforts like Kerala and Karnataka are organizing special camps to educate and profile SSWs.
- By the end of the 2023-24 financial year, 31,999 SSWs had been validated under the NAMASTE programme.
- Capital subsidies amounting to ₹2.26 crore have been given to 191 beneficiaries for self-employment projects, while ₹10.6 crore has been given to 413 sanitation workers and their dependents for sanitation-related projects.
- The government had identified 58,098 manual scavengers by 2018 and provided them with a one-time cash transfer of ₹40,000.
- Among those identified, 18,880 opted for skills training in alternative occupations, and 2,051 applied for loans to start their own businesses by 2022.
- The government has insisted that no other manual scavengers have been identified since then, despite over 6,500 complaints, claiming none could be verified.
- Of the 43,797 manual scavengers for whom social category data was available, 97.2% belonged to SC communities, with small percentages from ST, OBC, and other categories.
- Andhra Pradesh urban local bodies are visiting workers' homes and workplaces to profile them, with about 30% of profiling done through this method.

GS Paper I: Art and Culture



5 suspended over wall collapse deaths near Mahakal Temple

Five officials, including two police officers, were suspended on Sunday for lapses in connection with the collapse of a wall near Mahakal Temple in Madhya Pradesh's Ujjain. Collector Neeraj Kumar Singh told *The Hindu* that action has been taken against the officials who were responsible for clearing the encroachment in the area but did not perform their duties properly. Two street vendors, Ajay Yogi, 27, and Farheen, 23, had died and two others, including a three-year-old girl had been injured after a boundary wall of a government school-turned heritage hotel near the temple's gate collapsed following incessant rain on Friday evening.

5 suspended over wall collapse deaths near Mahakal Temple (30 September)

- Five officials, including two police officers, were suspended due to lapses related to a wall collapse near the Mahakal Temple in Ujjain, Madhya Pradesh.
- The Ujjain Collector, Neeraj Kumar Singh, said the action was taken against those responsible for clearing encroachments in the area, but they failed to perform their duties properly.
- The wall collapse happened on Friday evening after heavy rain, causing the deaths of two street vendors, Ajay Yogi (27) and Farheen (23).
- Two others, including a three-year-old girl, were injured in the incident.
- The collapsed wall was part of a government school that had been turned into a heritage hotel near the temple's gate.

The Mahakaleshwar Temple Ujjain

- The **Mahakaleshwar Temple**, located in **Ujjain, Madhya Pradesh**, is dedicated to Lord Shiva and is one of the twelve **Jyotirlingas**, making it a prominent pilgrimage site.
- The temple is situated on the banks of the **Kshipra River**, a place mentioned in several ancient texts and Puranas.

Historical Background and Significance

- **Ancient History:** The Mahakaleshwar temple is believed to date back to the **6th century BCE** during the rule of King Chandragupta Maurya.
- According to historical accounts, the temple was built in its present form by the **Paramara dynasty** in the 11th century CE, and later renovated by several rulers.
- **Mythological Importance:** According to Hindu mythology, Lord Shiva appeared in his fierce Mahakal form to destroy a **demon named Dushana**, who was tormenting the citizens of Ujjain.
- **Literary References:** Ujjain is also referred to in several ancient scriptures, including the **Skanda Purana** and the **Shiva Purana**, which describe the Mahakaleshwar Jyotirlinga as a source of immense power and divinity.

Jyotirlinga Status:

- **Jyotirlingas** are considered to be self-manifested (Swayambhu) representations of Lord Shiva.
- **The Mahakaleshwar Jyotirlinga is unique because it faces southward (Dakshinamurti), a rare form associated with Lord Shiva's manifestation as a destroyer of evil.**

Three-Tier Structure:

- The temple has a three-tiered structure. The **Mahakaleshwar Lingam** is installed on the ground floor, the **Omkareshwar Lingam** is housed in the middle floor, and the **Nagchandreshwar Lingam** resides on the top floor.
- Only on **Nag Panchami** day is the top floor open to devotees.

Bhasma Aarti:

- The temple is famous for its unique **Bhasma Aarti**, a ritual where the deity is worshiped with ash from the cremation grounds. This ritual symbolizes the cycle of life and death, central to Shaivism.
- Thousands of devotees gather early in the morning to witness this aarti, making it one of the most sacred and rare rituals in the world.
- The **Kshipra River**, which flows near the Mahakaleshwar Temple, is central to the religious rituals performed at the temple. The **Madhya Pradesh government** has launched a plan to revive and rejuvenate the river, including cleaning projects, to ensure the uninterrupted flow of holy water for temple rituals.



Glaciologist digs deep into permafrost to gauge future climate change disasters

GS Paper I: Geography

Possible collapse of permafrost, which are permanently frozen rock or soil formations, is an emerging climate change-induced issue in the upper reaches of the Himalayas. Glaciologist S.N. Remya from Kerala, who is part of this year India's Arctic Expedition, currently based at the Himadri research station in Norway, says that her work is aimed at identifying the probability of disasters due to the collapse and help provide early warnings to local communities. "Soil or rock that remains frozen for at least two consecutive years is considered as permafrost. Underneath the surface, there would be regions of ice. Due to global warm-



Understanding nature: Glaciologist S.N. Remya during her research as part of India's Arctic Expedition. SPECIAL ARRANGEMENT

ing, this layer of ice will melt leading to a permafrost thaw, causing fluctuations or collapse of the ground. There have been cases in Canada and other places where buildings or other infrastructure have collapsed. We still do not have proof whether permafrost had a role to play in some of the disasters in the Himalayas and it is so-

omething that has to be studied," says Remya, from the Himadri station, hosted by the National Centre for Polar and Ocean Research (NCPOR) at the International Arctic Research base in Ny-Alesund.

Data gaps

"I have conducted studies in a rock glacier located closer to our station. We

still don't have much knowledge about permafrost in the Indian Himalayas. One of the reasons for the bursting of the South Lhonak glacial lake and flooding in Sikkim could have been this. There are a lot of data gaps, which have to be addressed. Once the study here is complete, we can use satellite imagery to map areas of similar topography in the Himalayas. The aim is to use the knowledge to create awareness among the local communities for early warnings and long-term infrastructure planning," she says.

One of the issues she faced during the research in the Arctic was the presence of polar bears. Due to this, she went to the field in the company of a guard with a gun.

Glaciologist digs deep into permafrost to gauge future climate change disasters (30 September)

- The potential collapse of permafrost, which is permanently frozen soil or rock, is becoming a climate change issue in the upper Himalayas.
- Glaciologist S.N. Remya from Kerala is part of India's Arctic Expedition, working at the Himadri research station in Norway.
- Her research focuses on identifying possible disasters due

to permafrost collapse and providing early warnings to local communities.

- Permafrost is soil or rock that stays frozen for at least two years, and ice beneath the surface may melt due to global warming, leading to ground collapse.
- In places like Canada, buildings and infrastructure have collapsed due to permafrost thaw, but it's still unclear if permafrost has caused disasters in the Himalayas.

- Remya has studied a rock glacier near the research station, but there is limited knowledge about permafrost in the Indian Himalayas.
- The recent bursting of the South Lhonak glacial lake in Sikkim might be related to permafrost thaw, but more research is needed to fill data gaps.
- After the study in the Arctic, satellite imagery will help map similar regions in the Himalayas to provide early warnings and assist in planning infrastructure.
- While conducting research in the Arctic, Remya faced challenges due to polar bears, and had to be accompanied by a guard with a gun for safety.

Permafrost

- **Permafrost** refers to any ground that remains completely frozen for at least two consecutive years.
- It consists of soil, rock, and sand bound together by ice and can be found in polar regions as well as at high altitudes in other parts of the world.
- Permafrost covers about **24% of the Earth's land area**.
- The term "permafrost" comes from the words "permanent" and "frost." It was first coined by **S.W. Muller** in **1947** to describe frozen ground that remains at or below the freezing point of water for long periods.
- Permafrost is largely found in **Siberia, Alaska, northern Canada, and Greenland**.
- Permafrost is composed of **frozen soil, rocks, and water** in various proportions.
- The surface layer, which thaws during the summer and freezes in the winter, is called the **active layer**. Beneath the active layer lies **permafrost**, which may be several feet to hundreds of meters deep.

Global Distribution

- **Russia**: Contains the world's largest permafrost region, particularly in Siberia, which accounts for around **60%** of the total global permafrost area.
- **Canada**: Permafrost covers around **50%** of the country's landmass, including parts of **Nunavut, the Yukon, and the Northwest Territories**.
- **Alaska**: Nearly **85%** of Alaska is underlain by permafrost.
- **China and Mongolia**: Permafrost regions are also found in these areas, particularly on the Tibetan Plateau.
- **Himalayas**: High-altitude regions like the Himalayas have isolated patches of permafrost.

Cantonment

- A **cantonment** is a permanent military station in India where troops are stationed for the purpose of **training, administration, and accommodation**.
- It typically includes military housing, offices, hospitals, schools, and recreational facilities, but also provides services and infrastructure for civilian populations who may live in the area.
- Some of the earliest cantonments include **Barrackpore (West Bengal)** and **Secunderabad (Telangana)**, established around **1800**.

Governance and Structure

- **Cantonments in India** are governed by the **Cantonments Act, 2006**, which lays down the administrative framework for the operation and governance of these military stations.

Cantonment Board:

- Each cantonment is managed by a **Cantonment Board**, a local municipal body that provides public services like water supply, sanitation, education, and healthcare for both the military personnel and the civilian population living in the area.
- The Cantonment Board falls under the **Ministry of Defence**.
- It is a **self-governing** body with elected and nominated members, including both military and civilian representatives.

Ministry of Defence's Role:

- The Cantonment Boards operate under the purview of the **Directorate General of Defence Estates (DGDE)**, which is a part of the **Ministry of Defence, Government of India**.
- The DGDE is responsible for managing the lands and properties under its jurisdiction, including **land records, leasing, and acquisition** processes within cantonment areas.

Key Data and Facts

- **Number of Cantonments**: India has **62 cantonments**, spread across **19 states**.
- **Largest Cantonment**: **Secunderabad Cantonment** is the largest in India in terms of both area and population.
- **State with Most Cantonments**: **Uttar Pradesh** has the largest number of cantonments, totaling **13**.

Functions and Responsibilities of Cantonment Boards

1. Public Health and Sanitation:

- The Cantonment Boards are responsible for maintaining **public health, sanitation, and solid waste management** within their jurisdiction.
- Many cantonment areas have well-maintained parks, gardens, and open spaces for the military and civilian population.

2. Education:

- Schools and colleges, both military and civilian, are established within the cantonment areas. **Kendriya Vidyalayas** and **Army Public Schools** are often part of the educational infrastructure within these zones.

3. Civic Amenities:

- The Cantonment Boards provide basic civic amenities like **water supply, electricity, road maintenance, and street lighting** for both military personnel and civilians.

4. Revenue Collection:

- The Boards also have powers to **levy taxes**, including **property tax, conservancy tax, and water tax**, to maintain services and infrastructure.

Recent Developments and Updates

1. Smart Cantonments:

- Some cantonments are being developed under the **Smart City Initiative** of the Government of India, introducing modern technologies for **waste management, traffic control, smart lighting, and surveillance systems**.
- **Delhi Cantonment** is one of the prominent areas undergoing modernization with the integration of **smart city features**.

Cantonment and Civil-Military Relations

- Cantonments are unique because they often represent a **blending of military and civilian populations**.
- Civil-military interactions within these areas are governed by specific rules to ensure that both military and civilian interests are balanced.

Important Cantonments and Their Significance

1. Delhi Cantonment:

- Located in the capital city, Delhi Cantonment is one of the most important military stations in India. It is home to several critical **military establishments** including the **Indian Army headquarters**, and numerous regimental centers.

2. Secunderabad Cantonment:

- Established in 1806, it is the largest cantonment in India. It houses important military units and offices and is significant for its role in training and logistics for the Indian Army's Southern Command.

3. Pune Cantonment:

- Known for its **military history**, Pune Cantonment is the base for the **Southern Command** of the Indian Army. It also plays an essential role in training officers at the **National Defence Academy (NDA)** and **Armed Forces Medical College (AFMC)**.

4. Meerut Cantonment:

- One of the oldest cantonments in India, established in 1803, it is located in **Uttar Pradesh** and is famous for its role in the **Indian Rebellion of 1857**

Not just nothing, dark matter quests close in on dire 'neutrino fog'

Scientists have placed the tightest restrictions yet on the identity of the particles that make up dark matter. It was a null result: it didn't say what the particle's identity was but suggested which identities the particle couldn't have. It prompted a sense of resignation. Similar experiments have been turning up empty-handed for decades

Nirmal Raj

GS Paper III: Basic Science

In August 28, two members of an experiment at conferences in Chicago and São Paulo had an announcement to make.

They were representing about 200 of their colleagues involved in the design, building, and operation of the LUX-ZEPLIN (LZ) experiment located 1.5km below the earth's surface at the Sanford Underground Research Facility in South Dakota, U.S. Their news: their band of scientists had placed the tightest restrictions yet on the identity of the particles that made up dark matter.

It was a null result: it didn't say what the particle's identity was but suggested which identities the particle couldn't have. And it didn't prompt disappointment from the physics community. Instead, it prompted resignation.

Experiments similar to LZ – such as XENON-nT in Italy, PandaX-4T in China, and dozens of others around the world – have been turning up empty-handed for decades now despite heroic efforts.

Dark matter and its handshake

Dark matter is the invisible stuff making up most of the mass in the universe, responsible for giving the cosmos its current looks. Stars, gas, and planets contribute only 15% to the universe's mass.

The simplest contender for the make-up of dark matter is a previously unknown type of particle that doesn't interact with photons and lives – i.e. without disintegrating, unlike most particles – for at least the age of the universe, about 14 billion years.

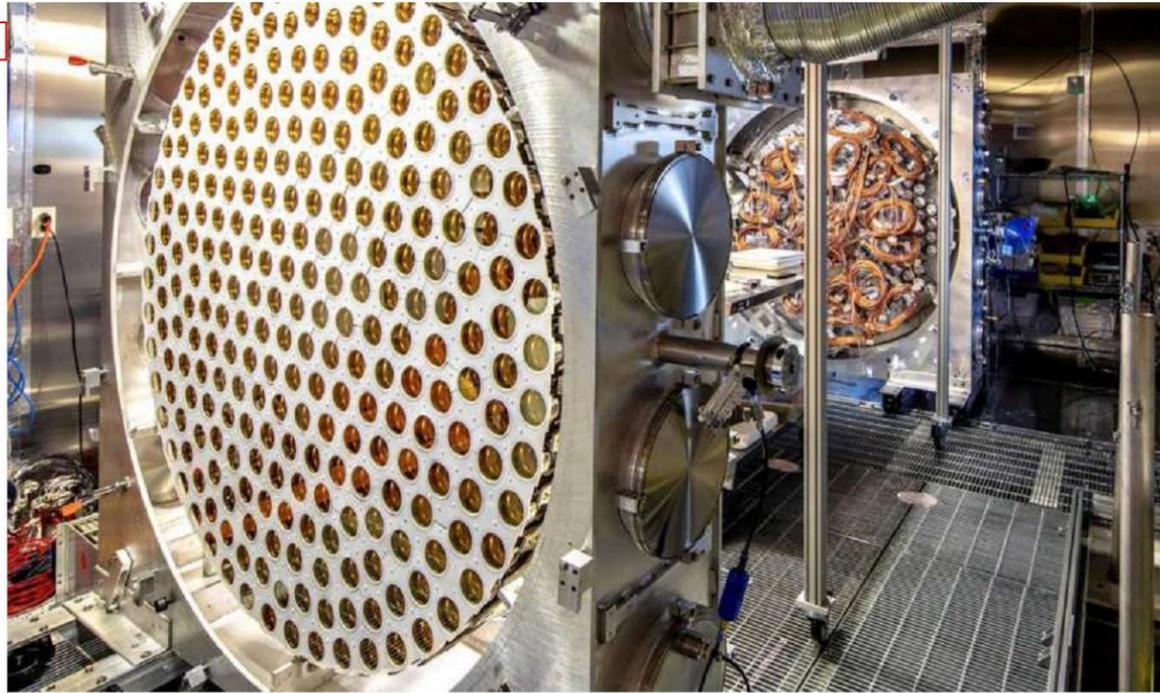
This raises a question: does dark matter ever touch us? More precisely, can atomic nuclei and electrons scatter dark matter particles when they come close?

Several theories of dark matter indeed predict this handshake between the visible and invisible. The issue is how we can detect it.

A sail to catch the wind

In 1985, physicists Mark Goodman and Ed Witten proposed a new strategy that has since mushroomed into an entire sub-field of experimental physics. (This is the same Witten of string theory fame. Thus the most theoretical of physicists has spawned an industry of experiments, proving the artificiality of divisions within physics. It is ironic that if dark matter is discovered in an underground laboratory, Witten will be awarded the Nobel Prize for something he has spent the least time on.)

We are all familiar with the pancake shape of the Milky Way galaxy. This disk



An array of photomultiplier tubes assembled for the LUX-ZEPLIN experiment. LZ DARK MATTER EXPERIMENT, LZ.LBL.GOV

of stars is embedded in a ball of dark matter about 100,000 lightyears across. In the Solar System, every teaspoon of space contains about two protons' weight of dark particles. These particles blow as a wind into us from all directions at one-thousandth the speed of light.

Goodman's and Witten's (GW) idea was to catch this wind in a "sail" – a chunk of metal placed deep underground to shield against other radiation from space. If a nucleus in the metal were seen to recoil spontaneously, it must be the invisible bump of dark matter.

In Ernest Rutherford's gold foil experiment, his team shone a well-understood beam at a mysterious target. GW's idea was the reverse: an enigmatic beam on a familiar target. The goal of the experiment is to measure two quantities: the unknown mass of the dark particle and the unknown rate at which atomic nuclei scatter dark matter particles. Physicists track this rate using a variable called the cross-section.

Consider the passage of light in a vacuum, in glass, and in a piece of rock. In the first case, a photon travels unimpeded; in the second, it travels a good distance before being scattered by an atom; and in the third, it is immediately stopped. We then say, for these three cases respectively, that the scattering cross-section is zero, small, and enormous.

Transparency needn't apply to light alone: any medium can be quantifiably

Scientists are actively pursuing other avenues of research, too. One is to detect dark particles that are lighter than atomic nuclei, for these would scatter feebly off the target nucleus

transparent or opaque to any particle type. GW's proposal would have measured the cross section for dark matter to scatter on nuclei down to 10^{-38} cm², already a staggeringly tiny quantity. It would imply that dark matter would have to traverse 10 billion km of rock before being stopped.

'The neutrino fog'

These mousetraps for dark matter have since come a long way. Where GW proposed the use of a kilogramme of metal for a day, today scientists expose tonnes of liquid xenon and argon to the dark-matter wind for years. The advantage of going bigger and running longer is that one can catch dark matter that is ghostlier, i.e., with a smaller cross section. As a result, we can now say with a straight face that we have ruled out dark matter-nucleus cross sections of 10^{-44} cm², a million times smaller than the GW limit.

This is just the announcement LZ made in August.

Could we go on making our detectors bigger and probe arbitrarily smaller cross sections? Not quite. Future detectors that will weigh tens to hundreds of tonnes will

also register much more noise from the scatters of other ghostly particles, especially neutrinos forged in the Sun's interior and in the earth's atmosphere. In fact, PandaX-4T and XENONnT are already reporting this issue. The resignation following LZ's announcement is partly for this reason: scientists had hoped to reveal dark matter's identity before facing this "neutrino fog." Telling dark matter and neutrino signals apart in future searches is a challenge that drives a great deal of research.

Every last drop

Scientists are actively pursuing other avenues of research, too. One is to detect dark particles that are lighter than atomic nuclei, for these would scatter feebly off the target nucleus.

Picture a bug hitting a truck, which would hardly move the vehicle. The goal is to develop technology to perceive the slightest of energy transfers, which involves building detectors using special materials that are currently restricted to the realm of condensed matter physics.

Thus the hunt for dark matter, like that of the Calydonian boar, unites many talents. That is not surprising: the effort to decipher the natural world has always drawn every last drop of human ingenuity.

(Nirmal Raj is an assistant professor of theoretical physics at the Centre for High Energy Physics in the Indian Institute of Science, Bengaluru. nraj@iisc.ac.in)

THE GIST

Dark matter is the invisible stuff making up most of the mass in the universe, responsible for giving the cosmos its current looks. Stars, gas, and planets contribute only 15% to the universe's mass

The simplest contender for the make-up of dark matter is a previously unknown type of particle that doesn't interact with photons and lives for at least the age of the universe, about 14 billion years

The researchers' plan is to catch the dark matter in a 'sail' – a detector placed deep underground to shield against other radiation from space. If a nucleus in the detector were seen to recoil, it must be the invisible bump of dark matter

The goal is to measure the unknown mass of the dark particle and the unknown rate at which atomic nuclei scatter dark matter particles. Physicists track this rate using a variable called the cross-section

Not just nothing, dark matter quests close in on dire 'neutrino fog' (30 September)

Scientists have placed the tightest restrictions yet on the identity of the particles that make up dark matter. It was a null result: it didn't say what the particle's identity was but suggested which identities the particle couldn't have. It prompted a sense of resignation. Similar experiments have been turning up empty-handed for decades.

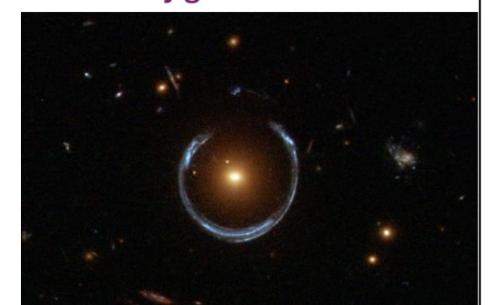
- On August 28, two members of an experiment at conferences in Chicago and São Paulo made an announcement regarding dark matter.
- They represented about 200 colleagues involved in the LUX-ZEPLIN (LZ) experiment, located 1.5km underground at the Sanford Underground Research Facility in South Dakota, U.S.
- Their news: they had placed the tightest restrictions yet on the identity of dark matter particles.
- It was a null result, indicating what the particle couldn't be, but not identifying what it is.

- The physics community reacted with resignation, not disappointment, as similar experiments worldwide have also yielded null results for decades.
- Other experiments, such as XENON-nT in Italy, PandaX-4T in China, and dozens of others, have also failed to detect dark matter despite significant efforts.
- Dark matter makes up most of the universe's mass, contributing to the cosmos' structure, while stars, gas, and planets contribute only 15% of the total mass.
- The simplest theory suggests that dark matter is a type of particle that doesn't interact with photons and has existed for at least 14 billion years, the age of the universe.
- The key question is whether dark matter can interact with atomic nuclei and electrons, which is predicted by some dark matter theories.
- Physicists Mark Goodman and Ed Witten proposed a new detection strategy in 1985, which has since evolved into a sub-field of experimental physics.
- Witten, known for string theory, has unexpectedly influenced dark matter research, and if dark matter is discovered, he may win a Nobel Prize for work unrelated to his primary focus.
- The Milky Way galaxy, shaped like a pancake, is embedded in a ball of dark matter about 100,000 lightyears wide.
- In the Solar System, every teaspoon of space contains about the weight of two protons worth of dark matter particles.
- These dark matter particles move at one-thousandth the speed of light and are present in all directions like a wind.
- Goodman and Witten's idea was to detect this "dark matter wind" using a "sail" — a chunk of metal placed deep underground to shield it from other cosmic radiation.
- If a nucleus in the metal recoils spontaneously, it could be the result of an invisible interaction with dark matter.
- Ernest Rutherford's gold foil experiment involved a well-understood beam aimed at a mysterious target; Goodman and Witten's (GW) idea was the reverse: an enigmatic beam on a familiar target.
- The goal of GW's experiment was to measure two unknowns: the mass of dark matter particles and the rate at which atomic nuclei scatter these particles, tracked by a variable called the cross-section.
- Example of cross-section: In a vacuum, light (a photon) passes unimpeded (cross-section = 0), in glass it is scattered after some distance (small cross-section), and in rock it is immediately stopped (enormous cross-section).
- GW's proposal would have measured the cross-section for dark matter scattering on nuclei down to 10^{-38} cm^2 , suggesting dark matter would need to traverse 10 billion km of rock before being stopped.
- Modern experiments use larger scales: scientists expose tonnes of liquid xenon and argon to the dark-matter wind for years to catch smaller cross-section interactions.
- Currently, dark matter-nucleus cross-sections down to 10^{-44} cm^2 have been ruled out, which is a million times smaller than the limit proposed by GW.
- This was the announcement LUX-ZEPLIN (LZ) made in August.
- As detectors become larger, they encounter more noise from other particles, especially neutrinos from the Sun and Earth's atmosphere.
- Experiments like PandaX-4T and XENONnT are already facing this issue, and scientists were hoping to discover dark matter before encountering the "neutrino fog."
- Distinguishing between dark matter and neutrino signals in future experiments is a major research challenge.
- Scientists are also exploring other avenues, such as detecting dark particles lighter than atomic nuclei, which would scatter weakly off target nuclei.
- Detecting such faint energy transfers requires developing new technology, involving detectors made from special materials often used in condensed matter physics.
- The hunt for dark matter unites many fields of expertise, similar to the effort to decipher the natural world throughout human history.

DARK MATTER AND DARK ENERGY

Dark Matter

- **Dark matter** refers to a form of matter that does not emit, absorb, or reflect light, and hence cannot be detected using electromagnetic radiation. However, it has **mass** and exerts **gravitational force**.
- The visible matter in galaxies, such as stars and gas, **does not have enough gravitational pull** to hold these galaxies together.
- This suggests that there is an unseen component—**dark matter**—that provides the necessary **gravitational strength**.
- **Evidence:**
 - The **rotation curves of galaxies**: Stars at the outer edges of galaxies move faster than expected, indicating the presence of unseen mass.
 - **Gravitational lensing**: Light from distant galaxies is bent more than expected as it passes near massive objects, implying the existence of additional mass in the form of dark matter.
- Scientists estimate that dark matter makes up about **27%** of the universe's total mass-energy content.



Dark Energy

- **Dark energy** is an unknown form of energy that is driving the accelerated expansion of the universe.

- **Universe Expansion:** Since the **Big Bang**, the universe has been expanding. This expansion was confirmed through the observation of the **Redshift** in light from distant galaxies, indicating that galaxies are moving away from each other.
- **Cosmic Microwave Background (CMB):** The faint glow of radiation known as the **cosmic microwave background radiation** is a remnant of the intense heat from the early universe, providing further evidence for the Big Bang theory.
- **Accelerated Expansion:** Contrary to the expectation that the expansion of the universe would slow down due to the gravitational pull between galaxies, observations show that the universe's expansion is actually accelerating. This unexpected acceleration is attributed to dark energy.
- Dark energy is believed to constitute approximately **68%** of the total mass-energy content of the universe, yet its nature remains one of the biggest mysteries in physics.

Composition of the Universe

- **Dark Energy:** ~68%
- **Dark Matter:** ~27%
- **Visible Matter:** ~5%
- **Dark matter** and **dark energy** together make up about **95%** of the universe, while the **visible matter** we can detect forms only a small fraction of the total composition.
- These two unseen components hold the key to understanding the ultimate fate and behavior of the cosmos, though their precise nature is still unknown.

Redshift

- **Redshift** refers to the phenomenon where the **wavelength of light or other electromagnetic radiation from an object is stretched, shifting it toward the red end of the spectrum.**
- This shift occurs because the object emitting the light is moving away from the observer.
- Redshift is crucial for understanding the expansion of the universe and has implications for cosmology, astrophysics, and our understanding of distant celestial objects.



Pollen: a mammoth killer?

GS Paper III: Basic Science

Pollen is an important substance many plants use to reproduce. It is a gametophyte, a multicellular organism of sorts that delivers the male gamete of a seed-producing plant to the stigma of another such plant.

Each pollen particle consists of reproductive and non-reproductive cells. When the pollen lands on a compatible plant, the non-reproductive cells produce the pollen tube while the reproductive cells multiply to produce the nuclei of sperm cells. The **sperm travels through the tube to the base of the pistil, starting the process that eventually produces fruits filled with seeds.** When many pollen particles are collected together, they resemble a powder. A natural polymer called sporopollenin surrounds the pollen cells to protect them during their journey through the air and from inclement elements.

Many people are allergic to pollen — this pollen usually comes from anemophilous plants (including birch and hickory); **an allergic reaction from grass pollen is called hay fever.** The study of pollen is called **palynology**. A study published in the September 2024 issue of *Earth History and*



Pollen may have played a part in the extinction of mammoths. The emergence of plants towards the end of the last ice age could have disrupted their sense of smell. GETTY IMAGES/ISTOCKPHOTO

Biodiversity reported that **pollen may have played a part in pushing the mammoths to extinction.** Based on genetic analyses, they said the emergence of plants towards the end of the last ice age could have **disrupted the megafauna's sense of smell and signalling pathways based on their olfactory system, including locating their group-mates and food sources.** However, independent researchers have asked for more proof of the idea before they say it can be accepted.

For feedback and suggestions for 'Science', please write to **science@thehindu.co.in** with the subject 'Daily page'

Pollen: a mammoth killer? (30 September)

- Pollen is used by many plants to reproduce.
- Pollen is a **gametophyte, a multicellular organism** that delivers the male gamete of a seed-producing plant to the stigma of another plant.
- Each pollen particle contains reproductive and non-reproductive cells.
- When pollen lands on a compatible plant, the non-reproductive cells produce the pollen tube, while the reproductive cells multiply to produce the nuclei of sperm cells.
- The sperm travels through the pollen tube to the base of the pistil, starting the process that eventually produces fruits filled with seeds.
- When many pollen particles are collected together, they resemble a powder.
- Pollen is protected during its journey by a natural polymer called sporopollenin.
- Many people are allergic to pollen, especially from anemophilous plants like birch and hickory.
- An allergic reaction caused by grass pollen is commonly referred to as hay fever.
- The study of pollen is called palynology.
- A study published in the September 2024 issue of *Earth History and Biodiversity* suggested that pollen may have contributed to the extinction of mammoths.

- Based on genetic analyses, researchers propose that the emergence of plants at the end of the last ice age could have disrupted the megafauna's olfactory system, affecting their ability to locate group-mates and food sources.
- Independent researchers have requested more evidence before accepting this theory.

Plain-speak on the AKD phenomenon in Sri Lanka (30 September)

- Anura Kumar Dissanayake (AKD) of the JVP-led NPP has been elected as Sri Lanka's President at the age of 55, marking a surprise victory.

AKD is described as "relatively unknown" in multiple ways:

- He has been a part of Sri Lankan politics for decades as a Marxist politician from the Janatha Vimukthi Peramuna (JVP).
- He served as a Cabinet Minister in Chandrika Bandaranaike Kumaratunga's coalition government from 2004-05.
- He is "unknown" in the sense that he does not belong to a political family, unlike many previous leaders in South Asia and Sri Lanka.

One insightful early analysis of AKD's victory comes from Sivanandini Duraiswamy, a Jaffna-based observer, who summarized the election results as:

- A reaction to IMF austerity measures and the extravagance of the Colombo elite.
- A paradigm shift, with AKD, an outsider from a monolingual background and non-dominant caste, leading the nation.
- AKD comes from outside the dominant Sinhalese Govigama caste, which had dominated Sri Lankan politics post-independence, making this a significant achievement.
- AKD is seen as likeable, self-made, and charismatic.

AKD faces several challenges, primarily political:

- Though he won 42% of the vote, 58% voted for other candidates, meaning a large chunk of the electorate voted against him.
- His opposition includes a significant portion of Sinhala voters who supported former UNPers Sajith Premadasa and Ranil Wickremesinghe.
- The Tamil electorate in non-Sinhala majority districts (north, east, and central highlands) also largely voted against AKD.
- To form a stable government, AKD needs to consolidate his Left-inclined Sinhala base and seek broader support from non-Left Sinhala and Tamil communities.
- AKD's path to forming a stable government might involve building coalitions or seeking outside support, though such support is often tenuous in Sri Lankan politics.
- AKD faces a major financial challenge in balancing past ideological positions with the reality of Sri Lanka's dependence on IMF funding.
- AKD must convince his support base of the need for austerity measures as a condition for IMF assistance.
- AKD's timeline for addressing economic issues is shorter compared to his predecessor, Ranil Wickremesinghe, who was judged out within two years.
- Early reports suggest that AKD plans to negotiate, not cancel, the previous government's agreements with the IMF.
- Consulting the outgoing President's economic team could lead to incremental decisions in addressing the country's economic challenges.
- Ranil Wickremesinghe's economic expertise, though politically unpopular, could still be a valuable resource for AKD.
- A significant challenge for AKD, from India's perspective, is the ideological influence from China. Concerns persist about China's leverage over Sri Lanka, especially given Sri Lanka's proximity to India and distance from China.
- IMF support may bring short-term austerity, while Chinese assistance could carry long-term risks.
- AKD must navigate the country's language and religious divisions, a task that could determine the success and legitimacy of his leadership.
- The experience of Chandrika Bandaranaike Kumaratunga's federal and devolution efforts with the LTTE and other Tamil formations could provide lessons for AKD.
- AKD's inauguration speech expressed a commitment to gaining the trust of those who did not vote for him.
- On September 24, 2024, AKD visited a Hindu Temple in Kandy, receiving a warm welcome, seen as a positive step towards reconciliation.
- Ramu Damodaran referenced a play by Lankan playwright S. Shakthidharan, highlighting the importance of listening to diverse voices and agreeing to disagree in strengthening democracy.
- India's general approach to its neighbors is marked by skepticism, but it should view AKD's leadership with faith in the self-renewing power of democracy.
- AKD's government will need to balance ideological internal stability with practical, empirical external relations.
- The link between Sri Lanka and India, which has internal and external dimensions, remains strong and is characterized as "umbilical."

Common Practice Standards must have India outlook (30 September)

- India has significant potential in the agroforestry sector, offering a unique opportunity to integrate with carbon finance projects through Afforestation, Reforestation, and Revegetation (ARR) initiatives.
- The area under agroforestry in India can potentially be expanded from the current 28.4 million hectares to 53 million hectares by 2050.
- Agroforestry covers 8.65% of India's total land area and contributes 19.3% of the country's carbon stocks, playing a crucial role in environmental sustainability and economic development.
- Recent research indicates that, with the right policies, financial support, and incentives, the agroforestry sector could contribute an additional carbon sink of over 2.5 billion tons of CO₂ equivalent by 2030.
- In the context of carbon finance, the criterion of "common practice" is used to determine if a project is additional, meaning it goes beyond typical practices in a given region.
- For ARR projects, this involves assessing whether similar activities are commonly practiced without the financial incentives provided by carbon credits.
- According to carbon standards such as Verra's Verified Carbon Standard (VCS) or the Gold Standard, activities deemed "common practice" may not qualify for carbon credits, as they are not seen as providing additional environmental benefits.
- The current definition of "common practice" in global carbon standards is based on large-scale agricultural practices common in regions such as Latin America, Africa, or the United States, where landholdings are extensive and contiguous.
- In contrast, India is characterized by small and fragmented landholdings, with 86.1% of Indian farmers being small and marginal, possessing less than two hectares of land.
- These farmers often engage in agroforestry in a non-systematic manner, planting trees alongside crops or on small patches of fallow land.
- While these agroforestry practices are beneficial, they may not meet the additionality criteria of current carbon standards, as they are perceived as "common" within the Indian context.
- This presents a challenge, as many Indian farmers are effectively excluded from participating in ARR carbon finance projects, denying them the opportunity to earn additional income from carbon credits.

Need for India-centric approaches

- India's unique agricultural landscape requires redefining the "common practice" criterion to reflect the specific challenges and opportunities within the agroforestry sector.
- An India-centric approach should recognize that small, incremental changes in land management practices, such as adopting systematic agroforestry or utilizing carbon finance to maintain tree cover, can be transformative.
- Revising the common practice standards to accommodate the fragmented, small-holder model prevalent in India would unlock vast potential for carbon sequestration.
- Such revisions would enable more farmers to participate in carbon finance projects, providing additional income streams while contributing to India's climate goals.
- Recognizing the fragmented nature of Indian agriculture, carbon credit platforms could design incentives to encourage systematic agroforestry, enhancing environmental sustainability and rural livelihoods.
- Agroforestry, when integrated with ARR initiatives, offers a solution to the challenges faced by India's agricultural sector, promoting alternative livelihoods and addressing issues like low productivity, dependence on monsoons, and environmental degradation.
- Carbon finance from ARR projects enables a systematic and sustained approach to agroforestry, which is difficult to achieve given the financial pressures and market constraints faced by Indian farmers.
- Participating in ARR projects presents small farmers with a pathway to income diversification by integrating trees into their agricultural landscapes or restoring degraded forest areas, tapping into additional revenue streams through carbon sequestration.
- ARR projects offer environmental benefits such as enhancing soil fertility, improving water retention, and mitigating erosion, bolstering agricultural productivity and ensuring long-term sustainability.
- Research institutes like TERI have demonstrated the potential of ARR projects in India, with 19 projects across seven states benefiting over 56,600 farmers.
- Scaling such initiatives requires international carbon finance platforms to revise their standards to better align with the realities of Indian agriculture.
- As India expands its agroforestry sector and leverages carbon finance, it is crucial for international standards to evolve to reflect the specific conditions of the Indian subcontinent.
- Revising the "Common Practice" guidelines to be more inclusive of Indian agroforestry practices will allow millions of small and marginal farmers to participate in ARR projects.
- Such revisions would drive sustainable development, provide a much-needed boost to rural incomes, and contribute to India's overall economic and environmental resilience.

Mad doctrine

Any threat of use of nuclear weapons must be viewed seriously

Russian President Vladimir Putin's revision of Russia's nuclear doctrine announced last week is a worrying increase in the war rhetoric surrounding the Russia-Ukraine conflict. It would once have been considered unthinkable for permanent members of the UN Security Council to behave in this manner. His announcement was that in the event of a conventional attack on Russia by any country that is supported by a nuclear power, Russia would consider that a "joint attack" and presumably, deal with the threat accordingly. He added that Russia could use nuclear weapons in response to a conventional attack posing a "critical threat to [its] sovereignty", a threat that was repeated by Russian Foreign Minister Sergey Lavrov at the UN General Assembly meet over the weekend, when he said the idea of defeating Russia on the battlefield is "senseless" and a "suicidal escapade" given that Moscow has nuclear weapons. Clearly, the context of Mr. Putin's nuclear doctrine revision and the comments is Ukraine President Volodymyr Zelenskyy's visit to the United States, where he attempted to present a new "victory plan" for Ukraine. Mr. Zelenskyy wants the permission of the U.S. and other western countries to use missiles and other heavy weaponry procured from them for attacks deep inside Russia. Thus far, the weaponry, including Storm Shadow and ATACMS missiles, can only be used for Ukraine's defence, although western capitals turned a blind eye when Ukrainian forces invaded the Russian Oblast of Kursk in August with tanks and weaponry, allowing Mr. Zelenskyy to rack up a symbolic win and possibly some leverage in future negotiations for peace. However, much of the euphoria in Kyiv has since dissipated with Russia hitting back anew, sending in troops to Kursk, and also opening a new front around Ukraine's Pokrovsk, and western countries remaining loathe to enter the theatre of war. To that end, U.S. President Joseph Biden has now announced nearly \$8 billion in additional military aid for Ukraine, but made no reference to the demand for its utilisation inside Russia.

It remains to be seen whether Mr. Putin will be assuaged, or if concerns about the war reaching a "nuclear threshold" will grow from this point on, and it is hoped countries, including India, that have committed to finding a path to dialogue and peace, redouble their efforts to prevent such a catastrophe. New Delhi has said that it "conveyed messages" to Moscow when safety concerns grew over the Zaporizhzhia nuclear plant. Prime Minister Narendra Modi may be called on to do the same when he visits Russia in October for the BRICS summit. As the world grapples with the spectre of escalation in West Asia, the last thing it needs is a reversion to chilling cold war scenarios in Eurasia, of mutually assured destruction.

- It is essential for carbon credit platforms like Verra and Gold Standard to recognize the need for India-centric standards to unlock the full potential of agroforestry and ARR initiatives.
- Revising these standards will pave the way for a greener, more sustainable, and economically prosperous future for India's farmers.

Demand flux (30 September)

Growth dynamics may falter with waning urban consumption

- India's GDP growth in 2023-24 was 8.2%, but there were concerns about the farm sector slowing due to a poor monsoon and weak private consumption.
- Private final consumption expenditure (PFCE) grew at only 4%, the weakest since 2002-03 (excluding 2020-21 due to the pandemic).
- The weak PFCE growth is partly due to rural demand being affected by the farm sector's struggles with an unfavorable monsoon.
- Economists flagged a K-shaped consumption pattern, where higher-end goods and services saw more demand compared to lower-end ones.
- Hopes were pinned on a normal monsoon this year to help the farm sector and rural demand recover, boosting overall consumption and industrial capacity utilization.
- Higher consumption and capacity utilization are essential to trigger more private investment, which can lead to more jobs and a growth-driven virtuous cycle.
- In the first quarter, PFCE rose by 7.4%, outpacing GDP growth of 6.8%, with signs of rural demand recovering, such as an increase in two-wheeler sales.
- India Ratings noted that real rural wage growth turned positive in July and is expected to remain positive, supported by easing inflation.
- Despite rural demand picking up, urban demand is showing signs of fatigue, with high interest rates tempering consumption.
- S&P Global Ratings projects India's growth at 6.8%, lower than the RBI's forecast of 7.2%, with urban demand flagged as a concern.
- The RBI's July consumer confidence survey shows declining confidence levels among urban buyers for both current and future consumption.
- The Finance Ministry highlighted a dip in passenger vehicle sales from April to August, signaling weakening urban demand.
- The ministry remains hopeful that the festive season could reverse this trend and stimulate urban demand.
- Persistently high food inflation, which could delay rate cuts, is limiting urban consumers' ability to increase discretionary spending.
- With global oil prices dropping, the government is urged to pass on cost reductions to consumers by cutting taxes on retail fuel prices.
- A significant fuel price cut, rather than the small reduction of ₹2 per litre in March, could help stimulate demand in the economy.

Mad doctrine (30 September)

Any threat of use of nuclear weapons must be viewed seriously

- **Russian President Vladimir Putin revised Russia's nuclear doctrine**, escalating war rhetoric in the Russia-Ukraine conflict.
- The revision suggests that **a conventional attack on Russia by any country supported by a nuclear power would be considered a "joint attack."**
- Putin added that Russia could use nuclear weapons in response to a conventional attack that poses a “critical threat” to its sovereignty.
- **Russian Foreign Minister Sergey Lavrov** reiterated this stance at the UN General Assembly, stating that defeating Russia on the battlefield is "senseless" and a "suicidal escapade" given Russia's nuclear arsenal.
- The context of Putin's nuclear doctrine revision is **Ukraine President Volodymyr Zelenskyy's visit to the U.S., where he presented a "victory plan" for Ukraine.**
- Zelenskyy seeks **permission from the U.S. and western countries to use heavy weaponry obtained from them for attacks inside Russia.**
- Currently, the weaponry provided to Ukraine, including **Storm Shadow and ATACMS missiles**, is meant for defensive purposes.
- Western countries allowed Ukraine to use weapons in their defense but turned a blind eye when Ukrainian forces invaded Russia's Kursk Oblast in August, leading to symbolic victories for Zelenskyy.
- Russia responded by sending troops to Kursk and opening a new front around Ukraine's Pokrovsk.
- Western countries remain reluctant to enter the war directly, although U.S. President Joseph Biden announced nearly **\$8 billion in additional military aid for Ukraine.**
- However, Biden made no reference to allowing the use of these weapons inside Russia.
- It remains unclear if Putin will be appeased or if fears of crossing the "nuclear threshold" will increase.
- Countries committed to dialogue and peace, including India, are urged to intensify efforts to prevent escalation.
- India previously conveyed safety concerns to Moscow over the **Zaporizhzhia nuclear plant**, and Prime Minister Narendra Modi may need to engage Russia on this issue during his visit for the BRICS summit in October.
- As the world faces the possibility of escalation in West Asia, a reversion to Cold War scenarios of mutually assured destruction in Eurasia is the last thing needed.

Why are law students at RGNUL protesting?

Is this the first such students' protest at the Rajiv Gandhi National University of Law? What are the various allegations against the Vice-Chancellor Professor Jai Shankar Singh? Where do talks between the administration and students stand?

EXPLAINER

Aaratrika Bhaumik

The story so far:

Student-led protests have marred activity at the Rajiv Gandhi National University of Law (RGNUL) after Vice-Chancellor (VC) Professor Jai Shankar Singh allegedly entered the girls' hostel without prior notice, violating their privacy. Students regard this incident as the last straw in a series of grievances that, in their view, have caused the VC to lose "their mandate" – leading to an indefinite sit-in protest that began on September 22, 2024. Their demands include strengthened campus security, the establishment of a students' association for improved representation, and the implementation of comprehensive academic reforms.

What happened?

Denying the allegations, Mr. Singh told *The Hindu* that his visit to the first-year female students' rooms was "at their invitation." He claimed that an influx of female students this academic year had led to overcrowding in the girls' hostel, with first-year students being placed in double-occupancy rooms. "These are baseless accusations. I visited the first-year students' rooms only after they repeatedly complained about the shortage of space. I was accompanied by the chief warden and a female security guard," he said.

Refuting Mr. Singh's claim, a fourth-year female student told *The Hindu* that Mr. Singh failed to give either the students or the hostel warden any prior notice of his visit. "According to hostel regulations, access to the girls' hostel is restricted for male members of the university, and even parents are denied entry unless explicitly authorised. This unannounced visit constitutes a grave breach of our privacy, especially since this is our personal space," she said.

Students further claimed that the chief warden and a female security guard only arrived to accompany Mr. Singh only after being summoned by the students. "The VC didn't just visit the first-year students; he also entered the rooms of third-year students. If his intention was solely to address the space issues affecting first-year students, why did he feel the need to enter the rooms of third-year students, who reside in an entirely separate block?" a third-year female student questioned.

However, this is purportedly not the first instance of inappropriate behaviour exhibited by Mr. Singh.

Several students, speaking on the condition of anonymity, alleged that since his appointment in March, he has made sexist and insensitive remarks on multiple occasions. A written representation submitted by the students to the Chief Justice of the Punjab and Haryana High Court – who also serves as the ex-officio Chancellor of the University – attributes numerous instances of moral policing to the VC.

"Ladki ho, domestic violence ya marriage jaisa Act uthao aur aaram se ghar par course karo. Kyu itna complicated aur naya topic leti ho (You are a girl, pick a law like domestic violence or marriage and stay back at home and pursue the course. Why do you opt for new and complicated topics)," Mr. Singh allegedly told some female students, as per the representation accessed by *The Hindu*. Additionally, he reportedly questioned the attire of some female students on one occasion.



In rage: A group of students protesting at the Rajiv Gandhi National University in Patiala, Punjab on September 29. SUNDAR SHARMA

Are dialogues underway?

Negotiations between the protesting students and the University administration have repeatedly failed to reach a consensus. Moreover, three faculty members of the nine-member committee constituted to facilitate discussions with the students have resigned without explanation.

Several students reported to *The Hindu* that they have been protesting in sweltering heat and adverse weather conditions, with some even losing consciousness and requiring medical attention. "We tried to arrange for tents, but the university administration intervened and directed suppliers not to honour our requests," claimed a third-year student.

Students also claimed that the administration contacted their parents to stifle the protests, warning them that their children could face expulsion if they continued to agitate. Mr. Singh, however, denied the allegations and told *The Hindu*, "No calls were made. These are just lies and false accusations."

Are there other grievances?

This is not the first student-led protest that RGNUL has witnessed. In 2019, approximately 400 students agreed to end a five-day indefinite sit-in only after the administration committed to revoking the suspension of six students who had advocated for improved hostel food, enhanced library access for women, and the removal of discriminatory curfew restrictions in the girls' hostel. "Our

seniors had protested for the establishment of an official students' association nearly four years ago, yet no progress has been made on that front. It is incredibly difficult to voice our grievances without an official representative body," a fourth-year student said.

Female students have also voiced concerns regarding inadequate security measures. "Since the university is located on the outskirts of Patiala, the road in front of the campus remains deserted. We have repeatedly urged the administration to install street lights, CCTV cameras, and set up a police outpost near the main gate. But our grievances have been dismissed citing a lack of requisite funds," a student told *The Hindu*.

In recent times, NLU – once hailed as "islands of excellence" by former Prime Minister Dr. Manmohan Singh – have witnessed a wave of student protests fuelled by a range of factors such as exorbitant fees, inadequate infrastructure, and administrative apathy. According to Prof. (Dr.) Faizan Mustafa, noted academic and VC of Chanakya National Law University (CNLU), Patna, NLU witness significantly fewer student protests compared to other universities. "Students in NLU generally exhibit far greater restraint and refrain from engaging in any form of violence. They exercise their right to protest peacefully without arms. I do not see any problem with it," he told *The Hindu*.

Dr. Mustafa further opined that students, as primary stakeholders, should play an active role in administrative

decision-making. "When it comes to conflict resolution, I believe the responsibility lies with the head of the institution to take the initiative. Throughout my 15-year tenure as the VC of various NLUs, I have never subscribed to the 'control model' of university administration. Involving students meaningfully in administrative decisions fosters trust between them and the administration. Ultimately, universities are better run from classrooms than from the VC's office," he added.

What happens next?

Raj Lali Gill, the Chairperson of the Punjab State Women Commission, has written to President Droupadi Murmu and Prime Minister Narendra Modi recommending the "immediate removal" of Mr. Singh "to restore a safe and respectful environment on the university campus." The recommendation follows her visit to the university, where she met with protesting students and instructed the administration to form a "neutral committee" with student representatives to engage in dialogue.

Additionally, Punjab Chief Minister Bhagwant Mann has reportedly taken cognisance of the students' grievances and assured them of prompt action. Despite Dr. Naresh Vats, the Officiating Registrar of the varsity, announcing that classes would resume on September 27, 2024, students have so far unanimously boycotted them. The University was earlier shut down on account of the ongoing protests.

THE GIST

Student-led protests have marred activity at the Rajiv Gandhi National University of Law (RGNUL) after Vice-Chancellor (VC) Professor Jai Shankar Singh allegedly entered the girls' hostel without prior notice, violating their privacy.

Denying the allegations, Mr. Singh told *The Hindu* that his visit to the first-year female students' rooms was "at their invitation."

Raj Lali Gill, the Chairperson of the Punjab State Women Commission, has written to President Droupadi Murmu and Prime Minister Narendra Modi recommending the "immediate removal" of Mr. Singh "to restore a safe and respectful environment on the university campus."

Why are law students at RGNUL protesting? (30 September)

Is this the first such students' protest at the Rajiv Gandhi National University of Law? What are the various allegations against the Vice-Chancellor Professor Jai Shankar Singh? Where do talks between the administration and students stand?

- Student-led protests have disrupted activities at the Rajiv Gandhi National University of Law (RGNUL) following an incident involving Vice-Chancellor Professor Jai Shankar Singh.
- The VC allegedly entered the girls' hostel without prior notice, which students view as a violation of their privacy.
- This incident is seen as the culmination of ongoing grievances, leading to an indefinite sit-in protest that began on September 22, 2024.
- Student demands include improved campus security, the establishment of a students' association for better representation, and comprehensive academic reforms.
- Mr. Singh denied the allegations, stating that his visit was "at their invitation" due to overcrowding in the girls' hostel.

- He claimed first-year female students had complained about the space shortage and that he was accompanied by the chief warden and a female security guard.
- A fourth-year female student refuted Mr. Singh's claims, stating he did not give prior notice of his visit and that male members are generally restricted from entering the girls' hostel.
- Students reported that the chief warden and security guard arrived only after the students summoned them, questioning the VC's intentions for entering third-year students' rooms as well.
- There have been allegations of Mr. Singh's inappropriate behavior since his appointment in March, including sexist and insensitive remarks.
- Students submitted a written representation to the Chief Justice of the Punjab and Haryana High Court, detailing instances of moral policing by the VC.
- Allegations include remarks such as advising female students to choose easier law topics and questioning their attire.
- Negotiations between protesting students and the University administration have repeatedly failed.
- Three faculty members from a nine-member committee tasked with facilitating discussions have resigned without explanation.
- Protesting students have endured harsh weather conditions, with reports of some losing consciousness and needing medical attention.
- Students attempted to arrange for tents but were reportedly obstructed by the university administration.
- Allegations surfaced that the administration contacted students' parents to discourage protests, warning of potential expulsion for continued agitation.
- Mr. Singh denied these claims, calling them lies and false accusations.

Are there other grievances?

- This is not the first student-led protest at RGNUL; in 2019, around 400 students ended a five-day indefinite sit-in after the administration agreed to revoke the suspension of six students advocating for better hostel food, enhanced library access for women, and the removal of discriminatory curfew restrictions in the girls' hostel.
- A fourth-year student highlighted the lack of progress on establishing an official students' association, making it difficult to voice grievances without representation.
- Female students expressed concerns over inadequate security measures, citing the university's location on the outskirts of Patiala and the need for street lights, CCTV cameras, and a police outpost near the main gate.
- The administration dismissed these security concerns, citing a lack of necessary funds.
- National Law Universities (NLUs), once praised as "islands of excellence," have seen a rise in student protests due to high fees, inadequate infrastructure, and administrative apathy.
- Prof. (Dr.) Faizan Mustafa, VC of Chanakya National Law University (CNLU), noted that NLUs generally experience fewer student protests compared to other universities and that students tend to protest peacefully.
- Dr. Mustafa emphasized the importance of student involvement in administrative decision-making and conflict resolution, advocating for trust-building between students and the administration.
- Raj Lali Gill, Chairperson of the Punjab State Women Commission, recommended the "immediate removal" of Mr. Singh to restore a safe environment at the university after meeting with protesting students.
- Gill instructed the administration to form a "neutral committee" with student representatives for dialogue.
- Punjab Chief Minister Bhagwant Mann has acknowledged the students' grievances and assured them of prompt action.
- Despite Dr. Naresh Vats, the officiating Registrar, announcing the resumption of classes on September 27, 2024, students have unanimously boycotted them.
- The university was previously shut down due to ongoing protests.



GETTY IMAGES

The Mullenweg-WP Engine dispute and how WordPress users are affected

WordPress is software that people can use to build a website, blog or e-commerce portal on the internet. While WP Engine is a company that offers managed hosting services for WordPress websites, Matt Mullenweg is the founder and CEO of Automattic, the company that owns WordPress.com

GS Paper III: S&T

Since September 21, a dispute between Matt Mullenweg, the technologist at the centre of the WordPress community, and a company called WP Engine has snowballed rapidly into a crisis for lakhs of WordPress users around the world. WordPress reputedly powers more than 40% of all websites on the internet, so policies that affect users' ability to access the software's features could have a wide-ranging impact.

WordPress and Mullenweg

WordPress is a piece of software people can use to build a website, blog or e-commerce portal on the internet. As open-source software, it's built, tested, deployed, and popularised by a community of thousands of volunteer developers located around the world. It is available under a GPL licence, which allows others to modify the software while obligating them to distribute the new version under the same licence.

A WordPress website can be self-hosted: you can download a copy of WordPress for free from WordPress.org to use for websites hosted on your own server. In the hosted version, you pay a fee to a third party to manage your website's WordPress setup and infrastructure. WP Engine is one such third party.

Matt Mullenweg is the founder and CEO of Automattic, a for-profit company that owns many digital products. One of them is WordPress.com, a hosted WordPress offering. Mullenweg also personally owns WordPress.org, which dispenses the open-source WordPress for

download. This said, Automattic isn't directly affiliated with WordPress.org or the WordPress Foundation. It contributes nearly 3,988 hours per week towards WordPress development, however.

The trademark dispute

On September 21, Mullenweg accused WP Engine of being a "cancer" to the WordPress community. His ire was directed at WP Engine's decision to disable the ability of WordPress installed on sites it hosts to record changes made to content composed using the system. WP Engine's stated reason was that this feature led to bloated databases that eventually slowed websites. Mullenweg also alleged WP Engine was profiting from free access to WordPress without itself contributing to WordPress's development.

After the post appeared, WP Engine shot off a cease-and-desist (C&D) letter to Automattic on September 23 asking Mullenweg to stop disparaging WP Engine. Automattic's lawyers responded with a C&D letter to WP Engine alleging the latter had violated a trademark.

According to Automattic's letter, WP Engine's use of the label "WP" in its name has confused consumers into equating WP Engine with WordPress itself. WP Engine rebutted by quoting a line from the WordPress Foundation website's page on "Trademark Policy": "The abbreviation 'WP' is not covered by the WordPress trademarks and you are free to use it in any way you see fit." But at some point after September 21 the line was edited to: "The abbreviation 'WP' is not covered by the WordPress trademarks, but please don't use it in a way that confuses people."

WP Engine also said it had been using

the label "WP" for "more than a decade". Trademark law in the U.S. expects trademark owners to act to sanction potentially infringing uses. If they don't, they are liable to lose the trademark. WP Engine's argument is thus that it has been able to use the "WP" label for many years without inviting punitive action.

An unprecedented ban

On September 24, Mullenweg wrote in a Reddit post that WP Engine "had the option to license the WordPress trademark for 8% of their revenue, which could be delivered either as payments, people ... or any combination of the above." The 8% figure, which would have amounted to \$40 million a year from WP Engine, has not been specified anywhere else. The next day, Mullenweg banned WP Engine from directly accessing updates and plug-ins hosted on WordPress.org, abruptly breaking the normal function of several lakh WordPress websites (the updates are essential for WordPress websites to remain secure). This action greatly exacerbated negative sentiments towards Mullenweg in the WordPress community that had erupted after his "cancer" comment.

One point of contention among community members centred on WP Engine's decision to disable revision control, which Mullenweg had translated to WP Engine's private equity ownership "butchering" WordPress in order to cut costs. Members also highlighted the confusion surrounding Mullenweg's role vis-à-vis WordPress. According to the WordPress Foundation, Automattic has a licence to use the "WP" for commercial activities.

Should WP Engine be liable to pay a

trademark licence fee, it will be to the Foundation – yet the C&D letter alleging trademark misuse came from Automattic, not the Foundation.

Many developers have also construed Mullenweg's decision to ban WP Engine's access to WordPress.org to be a subversion of the WordPress open-source community's equal-opportunity structure in favour of an Automattic CEO's bid to resolve a dispute driven by himself. They have also alleged Mullenweg has a conflict of interest since WP Engine competes directly with Automattic's WordPress.com.

An uncertain future

Despite WP Engine not being obligated to contribute to WordPress development, Mullenweg has maintained it isn't entitled to access WordPress.org because such access is vouchsafed for services that benefit the WordPress community. He told *The Verge* his actions erect "an expectation that any business making hundreds of millions of dollars off of an open source project ought to give back".

On September 27, Mullenweg temporarily restored WP Engine's access to resources on WordPress.org until October 1 while asking stakeholders to blame WP Engine's leaders, not him, for the disruption.

The WordPress Foundation filed an application in July with the U.S. Patent and Trademark Office to trademark the terms "Managed WordPress" and "Hosted WordPress".

In the present context, this has sowed more uncertainty amid independent hosting providers, who are seeking clarity from Automattic and keep legal action against their businesses at bay.

The Mullenweg-WP Engine dispute and how WordPress users are affected (30 September)

WordPress is software that people can use to build a website, blog or e-commerce portal on the internet. While WP Engine is a company that offers managed hosting services for WordPress websites, Matt Mullenweg is the founder and CEO of Automattic, the company that owns WordPress.com.

- Since September 21, a dispute between **Matt Mullenweg, a key figure in the WordPress community, and WP Engine** has escalated into a crisis for millions of WordPress users globally.
- **WordPress powers over 40% of all websites**, meaning that changes in policies affecting user access to features can have significant implications.
- **WordPress is software used for building websites, blogs, or e-commerce portals** and is maintained by a community of thousands of volunteer developers worldwide.
- **It is open-source software available under a GPL license**, allowing modification and redistribution under the same license.
- Users can self-host WordPress by downloading it for free from WordPress.org or use a hosted version by paying a third party, such as WP Engine, to manage the website.
- **Matt Mullenweg is the founder and CEO of Automattic, which owns various digital products, including WordPress.com, a hosted WordPress service.**
- Mullenweg also owns WordPress.org, which provides the open-source version of WordPress, although Automattic is not directly affiliated with WordPress.org or the WordPress Foundation.
- Automattic contributes approximately 3,988 hours per week to WordPress development.
- On September 21, Mullenweg accused WP Engine of being a “cancer” to the WordPress community, criticizing its decision to **disable the ability of WordPress sites to record content changes.**
- **WP Engine claimed that this feature caused bloated databases, slowing down websites.**
- **Mullenweg alleged that WP Engine profited from WordPress without contributing to its development.**
- After Mullenweg’s post, WP Engine issued a cease-and-desist letter to Automattic on September 23, requesting that Mullenweg cease disparaging remarks.
- **Automattic’s legal team responded with a cease-and-desist letter to WP Engine, claiming it had violated a trademark.**
- Automattic argued that WP Engine’s use of “WP” confused consumers into thinking WP Engine was affiliated with WordPress.
- WP Engine countered that the abbreviation “WP” is not covered by WordPress trademarks, as stated on the WordPress Foundation's trademark policy page.
- WP Engine noted that it had been using the “WP” label for over a decade.
- U.S. trademark law requires trademark owners to act against potentially infringing uses, or they risk losing their trademark.
- **WP Engine’s argument is based on its long-term use of the “WP” label without facing punitive action.**

An unprecedented ban

- On September 24, Mullenweg stated in a Reddit post that WP Engine had the option to license the WordPress trademark for 8% of their revenue, which could be paid in various forms.
- The 8% figure, amounting to approximately \$40 million a year from WP Engine, has not been documented elsewhere.
- The following day, **Mullenweg banned WP Engine from directly accessing updates and plug-ins hosted on WordPress.org, disrupting the normal functioning of several lakh WordPress websites and compromising their security.**
- This action intensified negative sentiments toward Mullenweg in the WordPress community, especially after his “cancer” remark.
- A key point of contention among community members was WP Engine’s decision to disable revision control, which Mullenweg criticized as WP Engine’s private equity ownership “butchering” WordPress for cost-cutting.
- Community members also expressed confusion regarding Mullenweg’s role in relation to WordPress; Automattic has a license to use the “WP” for commercial purposes according to the WordPress Foundation.
- If WP Engine were liable for a trademark license fee, it would be payable to the Foundation, but the cease-and-desist letter regarding trademark misuse came from Automattic, not the Foundation.
- Many developers viewed Mullenweg’s decision to ban WP Engine’s access to WordPress.org as undermining the equal-opportunity structure of the open-source community in favor of resolving a personal dispute.
- Allegations arose regarding Mullenweg’s conflict of interest, as WP Engine competes directly with Automattic’s WordPress.com.
- Despite WP Engine not being obligated to contribute to WordPress development, Mullenweg insisted it should not have access to WordPress.org because such access is reserved for services that benefit the WordPress community.
- Mullenweg told The Verge that businesses making substantial profits from an open-source project should contribute back to the community.
- On September 27, Mullenweg temporarily restored WP Engine’s access to WordPress.org resources until October 1, while advising stakeholders to hold WP Engine’s leaders responsible for the disruption.
- The WordPress Foundation filed an application with the U.S. Patent and Trademark Office in July to trademark the terms “Managed WordPress” and “Hosted WordPress.”
- This situation has created further uncertainty among independent hosting providers, who are seeking clarity from Automattic to avoid potential legal action against their businesses.

General Public License (GPL)

- The **General Public License (GPL)** is one of the most widely used free software licenses, which guarantees end users the freedom to run, study, share, and modify the software.
- It was originally created by **Richard Stallman** for the **GNU Project** in 1989, and it is often associated with the **Free Software Foundation (FSF)**.
- The GPL is the cornerstone of free software philosophy, ensuring that software remains free for all users.

Features of the GPL:

- **Copyleft:** One of the defining features of the GPL is its **copyleft** principle. This means that any software derived from GPL-licensed software must also be distributed under the same GPL license. It prevents proprietary use of open-source code.
- **Freedom to Modify:** The GPL allows users to freely modify the software as long as the changes are made publicly available under the same GPL license.
- **Redistribution:** Users are free to distribute copies of the original software or their modified versions, ensuring that the software remains free for future users.
- **Source Code Access:** The GPL ensures that the source code of the software is always available to users, fostering transparency and innovation in software development.

There are different versions of the GPL:

- **GPL v1 (1989):** The original version created for the GNU project.
- **GPL v2 (1991):** Introduced due to concerns about patent rights and distribution restrictions.
- **GPL v3 (2007):** Updated to address issues related to digital rights management (DRM), software patents, and compatibility with other open-source licenses.

