

EDITORIAL HIGHLIGHTS

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India and New Zealand set trade goal, elevate ties

Press Trust of India
AUCKLAND

Vowing to work towards a peaceful Indo-Pacific, India and New Zealand on Saturday elevated ties to a strategic partnership and decided to ramp up maritime security while setting a target of doubling annual bilateral trade to ₹35,000 crore by 2030.

"We have decided to elevate our ties to a strategic partnership. We will move forward across every sector with clear goals and concrete outcomes," Prime Minister Narendra Modi said after talks with his New Zealand counterpart Christopher Luxon.

The talks between the two leaders yielded 18 concrete outcomes, including 10 agreements. Key among them were a four-year road map to expand overall relations alongside three crucial pacts aimed at boosting hydrographic data sharing, facilitating mutual naval logistics, and framing enhanced maritime engagement in the Indo-Pacific. Expanding bilateral trade through the early implementation of the free trade deal was also a key focus of the talks, underscored by Wellington's commitment to invest USD 20 billion in India over the next 15 years.

A joint statement noted that Mr. Modi and Mr. Luxon reaffirmed their shared commitment to a free, open, and prosperous Indo-Pacific. They also emphasised the importance of safeguarding sovereignty, territorial integrity and the rules-based international order.

The resolve by the two countries to work jointly



Prime Minister Narendra Modi with his New Zealand counterpart, Christopher Luxon, at an event in Auckland on Saturday. PTI

for a peaceful Indo-Pacific comes amid growing global concerns over China's increasing military muscle-flexing in the region, including apprehensions over its test of a submarine-launched, long-range ballistic missile earlier this week.

Joint action plan

In line with the focus on boosting Indo-Pacific cooperation, the two sides also agreed to establish a maritime security dialogue, besides a joint working group on counter-terrorism.

An India-New Zealand joint action plan on sport was also firmed up. It provides for collaboration in high-performance sports, sports science, sports medicine and athlete development.

Mr. Modi landed in Auckland last night to a warm welcome in the final leg of his three-nation tour – after visiting Indonesia and Australia – that largely focused on ramping up cooperation in the Indo-Pacific.

The visit came following the recent signing of the India-New Zealand Free Trade Agreement.

The two Prime Ministers called for freedom of navi-

gation and overflight, and other lawful uses of the seas, in accordance with international law, particularly the 1982 United Nations Convention on the Law of the Sea, the joint statement noted.

In his remarks at the meeting, Mr. Modi said deeper cooperation between India and New Zealand, both maritime nations, will inject new strength into the Indo-Pacific.

Regarding the West Asia conflict, the two leaders expressed concern over renewed escalation of tensions and called upon all parties to exercise restraint, de-escalate tensions and ensure protection of civilians, the joint statement said.

"They called for full restoration of freedom of navigation and the global flow of commerce through the Strait of Hormuz, while opposing any constraints on shipping," it said.

The two Prime Ministers called for a "zero-tolerance" approach to terrorism, and underlined the need for disrupting terror financing networks and safe havens.

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GS 2: POLITY

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What are the changes proposed to U.S. H-1B programme?

EXPLAINER

T.C.A. Sharad Raghavan

The story so far: The U.S. government is all set to introduce wide-ranging changes to the rules regarding the manner in which it allows foreigners to work and study in the U.S. – including its H-1B work visa programme, Optional Practical Training (OPT) system, and employment-based Green Cards. These changes are part of recommendations made by three core Departments in the U.S. government – Homeland Security, Labor, and State – under the Unified Regulatory Agendas that they periodically release.

What are the proposed changes to the H-1B system?

The rules are expected to come into effect in August

this year. One such rule, by the Department of Homeland Security (DHS), would reduce the exemptions granted to universities and some research organisations from the cap on H-1B visa issued.

The proposals will also bring in stricter requirements for employers that want to send H-1B workers to third-party client sites. This is of particular importance to Indians since it is a model widely used by Indian IT and consulting firms.

Basically, companies that want to place workers with an H-1B visa in third-party clients will not only need to show that there exists a genuine employer-employee relationship, but also provide evidence that the worker will perform specialised work at the third-party client site. The process will also require more detailed documentation, and companies that



Indians account for 71-74% of approved applications for H-1B visas, capped at 85,000 per year.

have violated the H-1B visa programme's rules in the past would face greater scrutiny.

All of this has major implications for India and Indians. The U.S. has an annual H-1B visa cap of 85,000. Of this, Indians account for about 71-74% of the approved applications.

What changes has the Department of Labor suggested?

According to its proposed changes, the entry-level wage benchmark for the H-1B and Program Electronic Review Management (PERM) system – the first regulatory step for employment-based Green Cards – would be increased from the 17th percentile to the 34th percentile.

Basically, this will hike the higher minimum salary thresholds for employers sponsoring foreign workers, which then would make Green Cards more expensive to pursue.

What changes will students face?

The DHS currently has a visa system for international students based on the 'duration of stay' principle, which means students can stay in the U.S. as long as they keep meeting their

programme's requirements. Now, however, students will be assigned fixed periods of stay, after which they would have to apply for extensions to continue studying or remain in the U.S.

This, again, is a big deal for India and, within that, to two States in particular. According to the latest data, pertaining to 2023-24, India accounted for the largest share of international students in the U.S., having sent about 3.3 lakh students that year. Further, according to the U.S. consular officials, Telangana and Andhra Pradesh accounted for 50% of the students from India.

Apart from this, a separate proposal that is set to come into effect in February 2027 would see tighter rules around the OPT system, including changes to the two-year STEM OPT extension and Curricular Practical Training (CPT)

system. These are two highly popular paths through which Indian students get U.S. work experience after they are done with their degrees.

Are there any other changes on the cards?

A final rule change could increase the paperwork and tension for spouses of H-1B workers who are in the U.S. under the H-4 visa programme. So far, these people could stay and work in the U.S. under the Employment Authorisation Documents (EADs) system, with extensions to this period of stay being granted automatically.

Now, a new change expected this month will see these automatic extensions being stopped. Those holding such visas can of course apply for an extension, but if their renewal is delayed for whatever reason, they could lose their work permit.

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Towards a more European alliance

NATO

Faced with external security challenges and internal divisions, especially under a sceptical Donald Trump administration, European members are preparing to play a larger role in keeping the alliance united and functional

G. Sampath

For more than seven decades, the North Atlantic Treaty Organisation (NATO) has been the cornerstone of Western security architecture. Founded in 1949 as a bulwark against Soviet expansion into capitalist Europe, the 32-member military alliance outlived its original purpose by morphing into a vehicle for American power projection not just in Europe but across the globe.

In the post-Cold War era, challenges to NATO have come from within and without. The most obvious external threat has been Russia, which sought to check its continued eastward expansion by invading Ukraine. Today, the Russia-Ukraine war, in its fifth year, remains NATO's foremost priority in the context of its foundational mandate of European security. The threat from within, however, has been more insidious. It can be summed up in three words: the Trump Presidency.

Both in his first and current term, President Donald Trump has questioned NATO's utility for the U.S., and even threatened to exit the alliance. He believes that while NATO's capabilities, funds, leadership and infrastructure were overwhelmingly American, the U.S. gets out of the alliance far less than it puts into it, in contrast to its European allies, who got to reap its benefits while paying a fraction of the costs.

Mr. Trump's simmering resentment appeared to reach a boiling point in April, when his NATO allies ignored his call to join the U.S. in its war of choice against Iran. Notably, Spain and the U.K. (initially) refused access to their military bases for U.S. warplanes, while France refused over-flight rights. Mr. Trump lashed out, calling NATO a "paper tiger" without the U.S. He saw it as NATO's betrayal of the U.S., stating: "We've been there automatically, including Ukraine. Ukraine wasn't our problem. It was a test, and we were there for them, and we would always have been there for them. They weren't there for us."



Joint family: Leaders including NATO Secretary-General Mark Rutte, U.S. President Donald Trump, and Turkish President Recep Tayyip Erdogan pose for a photo during the NATO summit in Ankara, Turkey on July 8. AP

U.S. Secretary of State Marco Rubio went further: "If NATO is just about us defending Europe if they're attacked but then denying us basing rights when we need them, that's not a very good arrangement."

U.S. drawdown

This was followed, in June, by a New York Times story based on a leaked communication, which laid out plans for a significant drawdown of U.S. commitments in NATO's Europe operations. According to the report, the Trump administration planned to "pull a third of the fighter jets it provides NATO for Europe", along with "reallocating a missile-launching submarine and an aircraft carrier, along with several warships". These developments set alarm bells ringing in Europe's strategic corridors, as they seemed to erode the lynchpin of their collective security – the pledge of mutual defence under Article 5. Could they still rely on the U.S. to rescue them in the face of an attack?

The U.S. has also scaled down its assistance to the Ukraine war effort, making European allies the principal financier. At the same time, Mr. Trump

has been pushing NATO's European members to spend 5% of their GDP on defence (3.5% on core military requirements plus 1.5% on critical infrastructure). But only five of NATO's 32 members are on track to meet this target in 2026.

Other sources of intra-NATO tensions include Mr. Trump's obsession with annexing Greenland, a sovereign territory of fellow NATO member Denmark. Mr. Trump also feels frustrated that European security considerations are coming in the way of his developing a more congenial relationship with Russian President Vladimir Putin. Tensions on this front came to the fore in early 2025 when he tried to broker an end to the Ukraine war by directly speaking to Mr. Putin.

For their part, NATO's European members have tried to play a balancing act. There is now a clear-eyed recognition that the U.S. can no longer be expected to continue as the sole pillar of NATO. The constitutive principle of NATO is the unconditional security guarantee. But Mr. Trump's repeated attempts to make it conditional – linking it to members "paying up", or to their

'loyalty' – has cast a pall of uncertainty on that guarantee, prompting European nations to consider autonomy and self-reliance. But those are expensive propositions that need time, and vast investments, to fructify. In the interim, the European allies cannot do without continued U.S. engagement in NATO operations which, to their mind, calls for a strategy of placating Mr. Trump selectively and flattering him indiscriminately.

Interim strategy

This strategy, which was on full display at the NATO summit that unfolded in Ankara, Turkey, on July 7-8, appears to have worked rather well. European leaders, led by NATO Secretary-General Mark Rutte, a canny Dutch politician, showcased their plans to ramp up spending on military hardware and investments in expanding their defence industrial base. While sticking to their decision not to get their hands dirty in the Strait of Hormuz, they ensured that the summit declaration reiterated Mr. Trump's stated goals in the Iran war: Iran must never acquire nuclear

weapons, and freedom of navigation must be restored in the Strait of Hormuz. For good measure, they also pledged \$50 billion in new defence procurements – a bonanza for America's military-industrial complex – and €70 billion worth of military assistance to Ukraine. In return, they got Mr. Trump to undersign an "ironclad commitment" to Article 5.

But the tensions, though papered over in Ankara, haven't gone away. The European allies' reluctance to join U.S. military operations against Iran points to a fundamental divergence in how the two see NATO. While Europeans view NATO as a "defensive" force that is region-specific (trans-Atlantic), Mr. Trump sees it more broadly as an extension of U.S. military capabilities that should be deployable globally.

To be fair, NATO has never been a one-way street as Mr. Trump seems to believe. For nearly eight decades, the U.S. has enjoyed unfettered access to air bases, military networks, infrastructure and logistical support across Europe, without which its various campaigns in West Asia and elsewhere over this period would have been impossible. It has also enjoyed the support of its European allies on most foreign policy issues, including when they have been controversial, and the military leadership of most nations in the continent. But with the U.S. increasingly prioritising the Pacific theatre, a greater European role in NATO was inevitable.

For the medium-term, in the words of the Ankara declaration, "a stronger Europe within a stronger NATO", is the stated objective, wherein European allies and Canada would be "assuming greater responsibility for the Alliance's defence". But over the long-run, Europe would want to develop its military capabilities to a level where, firstly, it provides credible deterrence against Russia even in a scenario of strategic ambiguity on the matter of American intervention in the face of a credible threat, and second, secures the autonomy necessary to safeguard its own political interests when they come up against American coercion.

THE GIST

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GS 2: HEALTH

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Deadly bird virus PaBV-4 identified for first time in India

Rahul Karmakar

A team of scientists has, for the first time in India, identified and genetically characterised a virus that often causes rapid death in captive psittacine birds, raising concerns about the health of exotic pets and conservation of threatened parrot species.

Psittacine, which means relating to or resembling a parrot, describes the bird family *Psittacidae* and order *Psittaciformes*. It includes budgerigars, cockatiels, cockatoos, lovebirds, macaws, and parakeets.

The team, led by Pankaj Deka and Sangeeta Das of the Assam Veterinary and Fishery University in Guwahati, found and characterised parrot bornavirus 4 (PaBV-4) circulating among captive psittacine birds in India. Their study was published in *Scientific Reports*.

The other members of the team represent institutions in Assam and Gujarat.

They tested 83 psittacine birds from 13 species in aviaries in Assam, Karnataka, and West Bengal in 2020-2024. The birds in-

cluded the African grey parrot, ochre-marked parakeet, yellow-collared macaw, eastern rosella, blue-crowned hanging parrot, rainbow lorikeet, and scarlet-chested parrot.

Three groups

They divided the birds into three groups: those showing clinical signs of proventricular dilatation disease (PDD), clinically healthy cage mates of suspected cases, and birds that had died of suspected PDD. Caused by avian bornavirus, PDD is a largely fatal viral condition affecting

the digestive and nervous systems of birds.

"Amongst the avian bornaviruses discovered, PaBV belonging to species *Orthobornavirus alphapsittaciforme* possess the highest veterinary relevance and are considered to be a major threat to psittacine aviculture," the researchers said.

"Since the discovery of PaBV in psittacine birds suffering from PDD in 2008, PaBV infections have been reported worldwide."

Upon testing cloacal swabs from live birds and

brain and proventriculus tissue in dead ones, the team found 44 of the 83 birds tested were infected. Infection was detected in almost 88% of the dead birds and 19% of the apparently healthy cage mates, underlining how the virus can lurk without showing outward symptoms. The infected birds belonged to nine species whose conservation status ranged from near-threatened to endangered.

Potential risk

The scientists also found that brain tissue and clo-

cal swabs yielded higher detection rates in dead and live birds, respectively. Genetic analysis confirmed all positive samples had PaBV-4, a strain previously reported in Canada, Israel, Japan, South Korea, and the U.S.

The team found no patterns linking genetic clusters to host species, geography or timing. Suggesting this may reflect the global trade in psittacine birds, the researchers said their findings highlight risks to conservation based on breeding captive birds.

GS 3: SCIENCE AND TECHNOLOGY

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Indian lab designs quantum algorithm to beat computers

Working with IBM Quantum, BITS scientists simulated the behaviour of subatomic particles on 120 qubits of an IBM processor; in a first for Indian labs, the Quantum Advantage Tracker has deemed the result 'active'

Jacob Koshy
NEW DELHI

Ask Indrakshi Raychowdhury what a quantum computer is bad at and she points to arithmetic.

"If you try to add two numbers, a classical calculator does it easily, whereas doing it on a quantum computer is incredibly difficult," she said in a conversation with The Hindu. "But simulating a highly complex interacting quantum system, where particles mutually influence each other, is relatively easy for a quantum computer. That is highly counterintuitive, but it is where quantum advantage lies."

"Understanding exactly where quantum computers can provide this advantage is currently the biggest challenge, and it is why governments and companies are investing heavily in this space," Dr Raychowdhury, an associate professor in the physics department at BITS Pilani, added.

The problem her team solved a few weeks ago is of the useful kind. Per one expert assessment, it is only one of three problems useful to physicists that has also been so far impervious to the muscle of classical computers. That is, it demonstrates 'quantum advantage'.

Working with scientists from IBM Quantum, Dr. Raychowdhury and team simulated the behaviour of subatomic particles on 120

Vault ahead

The team's algorithm showed quantum advantage by cracking a problem of real-world relevance

■ Quantum computers excel at simulating complex interacting systems rather than at simple arithmetic like classical calculators do

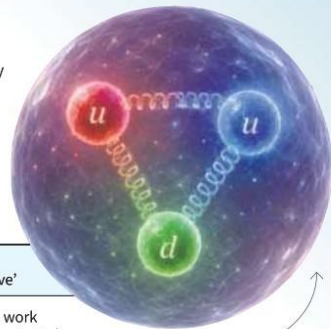
■ A team from BITS Pilani (Goa campus) has successfully simulated subatomic particle behavior on 120 qubits using an IBM quantum processor

■ The feat is the first from an Indian laboratory to be verified by the Quantum Advantage Tracker; it is still 'active'

■ The team modelled how quarks and gluons evolve in real time, a task considered extremely difficult for classical methods

■ Novel encoding methods and noise-mitigation techniques allowed the team's simulation to scale effectively across numerous qubits

■ The work demonstrated a useful quantum advantage by solving a real-world physics problem faster than classical machines



The quarks inside a proton, and the gluons that bind them, are governed by nature's strongest force
IMAGE CREATED WITH AI

qubits – the computing currency of quantum computers – of an IBM processor. The calculation took the machine 20 seconds and a classical computer two hours.

The Quantum Advantage Tracker (QAT) exists to police that claim. Launched in November 2025 by IBM, with the Flatiron Institute, the startups BlueQubit and Algorithmiq, and a widening cast of academic reviewers, it is a kind of live peer review where a researcher submits a result and a committee checks it on both classical and quantum machines. The bar is high. Of some 220 items logged on its GitHub page, only around a dozen have been accepted, and just a handful survive as active claims.

"It is more thorough than a standard academic journal," Dr. Raychowdhury said. It is here that her group's entry now sits,

marked 'active' – the first such from an Indian laboratory. Were the problem to be solvable by a classical machine, it would be considered 'superseded'. Since May, the result hasn't been superseded.

For all the money and noise around quantum computing, the machines have yet to solve a genuinely useful problem faster than an ordinary computer. The best-known demonstrations have been contrived. When Google reported in 2019 that its processor had finished in minutes a task a supercomputer would need 10,000 years to match, the task had no practical use and was chosen only because it suited quantum hardware.

Breaking modern encryption or simulating a large molecule from scratch, remains years away. So the field has begun to chase a narrower prize: "useful" advantage,

a quantum win on a real problem whose answer can be independently checked.

"While the media often highlights quantum applications in drug discovery or materials science, those fields are at a much more primitive stage computationally than high-energy physics," Dr. Raychowdhury said.

The team's problem of choice lies at the foundations of physics. The quarks inside a proton, and the gluons that bind them, are governed by the strong nuclear force, and working out how they move and rearrange in real time is among the toughest problems in the field. Classical methods can pin down a proton's mass with great accuracy but watching the particles evolve, frame by frame, is "exponentially hard to calculate classically," she said. A quantum computer can

however be coaxing into imitating the system directly, like replacing a still photograph with a film.

"I am actually visiting CERN (Switzerland) next month," she said, where the world's most powerful particle smasher pulverises protons to physically trace how the simplest particles may evolve into weightier, more complicated ones. CERN researchers, limited by classical methods, have invited her, she said, to know whether her approach can carry their simulations further.

The model her team used was a simplified stand-in for the full theory of the strong force, which is nature's most powerful force. The team's encoding stripped away mathematical redundancy so the simulation could scale: a task others had run on at most 27 qubits was pushed to 120. "If someone gave me a 1,000-qubit computer today, our algorithm would scale to it seamlessly," she reckoned.

India is only beginning to build towards this. Its National Quantum Mission, the ₹6,003-crore programme approved in 2023, is funding quantum algorithms and runs a computing hub in Bengaluru, but the country has no high-end quantum hardware of its own, and researchers here lean on machines abroad. "Without algorithms, the hardware is useless; you can't just sit in front of a quantum computer and get an answer," she said.

GS 3: SCIENCE AND TECHNOLOGY

THE HINDU PAGE: 10

How amino acid leucine helps our cells produce energy



**SPEAKING OF
SCIENCE**

D. Balasubramanian

Proteins in the cells in our body perform functions of value to the sustenance and growth of organs. There are more than 20 amino acids, which are the building blocks of proteins, and the sequence of these amino acid chains generates the structure and function of each protein in the cells.

Several of these amino acids play vital roles in specific functions. For example, an amino acid called glycine is vital for blood cells. Leucine is an essential amino acid involved in muscle growth, tissue repair, and energy production. The body has eight other essential amino

acids that the body cannot produce on its own. They need to be supplied to the organs from outside for them to function.

The energy for each organ is generated by cellular components called the mitochondria (in Ancient Greek, 'mito' means thread-like and 'chondrion' means granule). These are unique, thread-like organelles present in the thousands per cell. They are the gatekeepers of energy in most organs in our body.

Mitochondria are responsible for maintaining the cell's supply of energy, by producing the molecule adenosine triphosphate (ATP), which is the energy currency of the cell. Mitochondria are thus the battery of the cell, charging it using ATP. The connection between the mitochondrion and the parent cell is vital, since during oxida-



Mitochondria are responsible for maintaining the cell's supply of energy. IMAGE CREATED WITH AI

tion and respiration, the membrane of this cellular organelle can be degraded, causing a loss in cellular function.

For example, the adult human heart has more than 2 billion muscle cells that work non-stop, and each of these cells has 5,000-8,000 mitochondria. Most of the energy required for the pumping of the heart comes from these mitochondria.

Every organ in the body

needs adequate energy to function normally. When an organ needs more energy, new mitochondria are made, while at the same time increased wear and tear necessitates the degradation of some mitochondria.

The proteins that make up mitochondria are degraded during the process. Critically, the outer mitochondrial membrane proteins should not be lost, and methods should be

found to prevent excessive degradation. Scientists have been searching for ways to prevent these outer walls from breaking down completely under stress, as this can lead to metabolic and age-related diseases.

Role of leucine

It is here that the essential amino acid leucine becomes valuable. It belongs to the family of branched chain amino acids (BCAA) such as isoleucine and valine, which are needed for the growth and functioning of organs such as muscles, nervous system, the heart, and the brain.

BCAAs are not made in the body and need to be supplied from our diet. Without them, the outer membrane of the mitochondrion cannot be properly constructed or maintained. A study last year (*Nature Cell Biology*, 1889-

1901, November 27, 2025) by a group from the University of Cologne Centre for Excellence Cluster on Aging and Aging-Associated Diseases, Germany, used the small roundworm *Caenorhabditis elegans* as the model organism to work with. Their results showed that the BCAA leucine acts like a protective shield and inhibits the premature degradation of outer mitochondrial membrane proteins. This is done by leucine interacting with a protein called SELIL, which has a role in recognising and pulling out damaged or misfolded proteins.

Thus, leucine offers both protection and more energy to cells and organs. Whether other BCAAs also play such valuable roles in cell protection will be worth studying.

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