

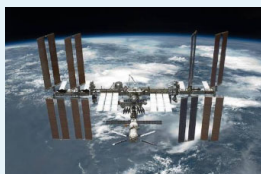


Science Diplomacy Alert

A Monthly Newsletter on S&T, Science Policy and Diplomacy

Focus

Space Cooperation as a Bridge for Science Diplomacy and Sustainable Development



Space research profoundly impacts human society by driving critical technological advancements, fostering international diplomacy, and inspiring the next generation of STEM professionals. Space exploration generates significant public interest and inspires young people to pursue careers in science, technology, engineering, and mathematics, contributing to broader economic growth. S. K. Varshney writes.

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SCIENCE POLICY & DIPLOMACY

International S&T Cooperation

INSA Convenes First BRICS Science Academies Forum

The Indian National Science Academy convened the first BRICS Science Academies Forum 2026, bringing together science academies from ten nations to discuss responsible and inclusive AI development. The meeting focused on strengthening Global South cooperation through shared AI infrastructure, open data platforms, and collaborative research.

France Becomes Member of Square Kilometre Array Observatory

France has officially joined the Square Kilometre Array Observatory as its 14th member state, expanding international participation in the world's largest radio telescope project. The move strengthens collaboration in radio astronomy, high-performance computing, and big-data science, with France contributing expertise in exascale computing and advanced scientific infrastructure.

India-Myanmar to Strengthen Cooperation in Clean Energy

The joint statement highlights cooperation in science and technology through engagement in clean energy research, innovation, information technology, and technical capacity building. It also reflects interest in strengthening collaboration in technology-driven sectors and supporting human resource development through expanded educational opportunities.

India-Germany Cooperation in Quantum Technologies, Photonics and Deep-Tech Innovation

India and Germany discussed expanding cooperation in frontier technologies, particularly quantum communication, photonics, quantum satellite communication, optical ground stations, and space technologies. Both sides also emphasized researcher exchanges, deep-tech innovation, startup collaboration, and stronger research–industry partnerships to accelerate technology development and commercialization.

India–South Africa to Deepen Cooperation in AI, Digital Infrastructure and Emerging Technologies

India and South Africa agreed to strengthen cooperation in emerging technologies, especially Artificial Intelligence, digital infrastructure, advanced manufacturing, biotechnology, and hydrogen energy. Both sides emphasized moving from traditional research ties to innovation-driven partnerships involving startups, industry, and real-world technology deployment.

India–Slovakia Comprehensive Partnership Strengthens Cooperation in Science, Technology and Innovation

The India–Slovakia Joint Statement elevates bilateral ties to a Comprehensive Partnership, with a strong emphasis on science, technology and innovation. Key areas include artificial intelligence, semiconductors, quantum-safe cryptography, 5G/6G, IoT, space technology, clean energy, research and higher education, supported by new MoUs on Digital Technologies, Critical Infrastructure Protection and Post-Quantum Cryptography, and Higher Education and Research.

India and France Adopt Innovation Roadmap 2030

India and France adopted the Innovation Roadmap 2030 to advance collaboration in trusted AI, critical and emerging technologies, research, startups, space, and academic mobility. The roadmap also launched the India–France Innovation Network (IFIN), strengthened industry-academia partnerships, and announced multiple institutional agreements to accelerate co-development, innovation, and technology transfer.

Emerging Tech & Governance

IEA Releases Two Reports on Clean Energy Transition and Global Hydrogen Developments

The IEA's Breakthrough Agenda Report 2026 and Global Hydrogen Review 2026 examine global progress in clean-energy transitions and the development of low-emissions hydrogen. Together, the reports highlight the importance of international cooperation, supportive policies, investment and innovation in accelerating the global shift towards cleaner energy systems.

AI-Designed Universal Coronavirus Vaccine Enters Human Trials

Researchers have developed an AI-designed vaccine aimed at providing broad protection against multiple coronaviruses. The first human trial found the vaccine to be safe and capable of generating promising immune responses. The breakthrough could strengthen global pandemic preparedness and help address future coronavirus outbreaks.

Programmable Control of Bacterial Operons with a Single Cas13 RNA Effector

A new study introduces SONAR, a CRISPR-Cas13-based system that enables programmable control of bacterial gene expression at the RNA level. By simply redesigning the guide RNA, the system can trigger RNA degradation, translation inhibition, or translation activation, offering a versatile tool for synthetic biology and precise genetic engineering.

New AI Agent Demonstrates Autonomous Clinical Reasoning and Decision-Making

Researchers developed MIRA (Medical Intelligence for Reasoning and Action), an autonomous AI agent that operates in a sandboxed electronic health record (EHR). In simulations involving more than 500 real patient cases, it could take histories, order and interpret tests, diagnose conditions, and formulate treatment plans. It reportedly performed at or above physician level on diagnostic and treatment-quality measures, though the researchers stress that real-world validation, safety, and governance studies are still needed.

Quantinuum Demonstrates 98-Qubit Trapped-Ion Quantum Computer with All-to-All Connectivity

Researchers have reported Quantinuum Helios, a 98-qubit trapped-ion quantum processor featuring all-to-all connectivity and high-fidelity operations. The advance addresses key challenges in scaling quantum computers while maintaining performance, marking progress towards more powerful and practical quantum computing systems.

Modular Synthetic Gene Circuits Enable Complex Functions in Human Cells

Researchers have developed a modular framework for engineering synthetic gene circuits that can perform complex functions in human cells using fewer computational layers. The approach could advance applications in biomedicine, biotechnology and fundamental biology, including the development of sophisticated cell-based therapies.

Events & Meetings

Bharat Innovates 2026 Held in Nice, France

Bharat Innovates 2026, held from 14–16 June in Nice, France, brought together 120 Indian deep-tech startups, over 15 higher education and research institutions, and more than 500 global investors and industry leaders across 13 frontier technology sectors. Jointly inaugurated by Prime Minister Narendra Modi and French President Emmanuel Macron, the event showcased India's deep-tech capabilities, facilitated innovation partnerships, funding and MoU announcements, and strengthened India–France collaboration in research, technology, and entrepreneurship.

International Summer School on Science Diplomacy for Outer Space and the Arctic

Held from 22–26 June 2026, the first International Summer School of the Global Science Diplomacy Hub brought together experts and participants to explore the role of science and technology diplomacy in addressing challenges related to outer space and the Arctic. The programme was co-organised by Université Paris-Saclay, Polytechnique Montréal, the Science Diplomacy Center and UNU-INWEH.

INDIAN SCIENCE NEWS

Sound Waves Enable Energy-Efficient Spin Currents for Next-Generation Computing

Researchers at the Institute of Nano Science and Technology have discovered a way to generate and control spin currents using sound waves, offering a low-energy alternative to conventional electronics. The breakthrough could support energy-efficient computing, quantum technologies, and advanced communication systems by harnessing magnon-based information transfer.

New Targeted Nanomedicine to Silence Cancer Genes

Scientists from Agharkar Research Institute have developed a biodegradable nanocarrier that delivers siRNA to silence key cancer-driving genes (MCL-1 and Survivin) in breast cancer cells. The MUC1-targeted system enables precise tumor delivery, strong gene knockdown, and reduced side effects, showing significant tumor inhibition in preclinical studies.

Catalyst Reconstruction Enhances Green Hydrogen Production

Scientists from Centre for Nano and Soft Matter Sciences uncovered that molybdenum carbide (Mo_2C) catalysts dynamically transform during water electrolysis, forming active oxygen-deficient species that enhance hydrogen evolution. This in-situ structural reconstruction improves catalytic efficiency and stability, offering key insights for designing next-generation, low-cost green hydrogen electrocatalysts.

ANRF and Ministry of Jal Shakti, Government of India Launch MAHA Water Programme

The Anusandhan National Research Foundation (ANRF), in collaboration with the Ministry of Jal Shakti, has launched the MAHA Water Programme and invited pre-proposals. The initiative aims to support research and innovation in water sustainability, management, and related technologies to address India's critical water challenges.

DST Launches Advanced Research Infrastructure and Industry-Linked Research Clusters at IIT Gandhinagar

Dr. Jitendra Singh inaugurated the DST-funded Central Instrumentation Facility and three research clusters in Advanced Materials, Energy, and Healthcare & MedTech at IIT Gandhinagar. Supported by nearly 70 industry partners, the initiative aims to strengthen translational research, industry-academia collaboration, and innovation for national priorities.

Electrolyte Additive for Safer and Longer-Lasting Zinc-Ion Batteries Developed

Scientists at the Institute of Nano Science and Technology (INST), Mohali, have developed a novel electrolyte additive (BDIM) that suppresses corrosion, hydrogen evolution, and dendrite formation in aqueous zinc-ion batteries. The breakthrough improves battery safety, durability, and affordability, offering a scalable solution for renewable energy storage, backup power, and grid-scale applications.

First Nuclear Heat-Based Hydrogen Production Facility

DAE has inaugurated the world's first hydrogen production facility using the Copper-Chlorine thermochemical cycle powered by nuclear heat from the Fast Breeder Test Reactor at IGCAR, Kalpakkam. The technology demonstrates India's advances in clean hydrogen production and the use of nuclear energy beyond electricity generation.

Battery-Free Artificial Photosynthesis Could Simplify Solar Fuel Production

The Problem: Artificial photosynthesis systems use sunlight to convert water and carbon dioxide into energy-rich fuels such as formic acid. However, fluctuating sunlight makes it difficult to maintain stable fuel production, with existing systems often requiring batteries and complex electronic controls that add to cost and system complexity.



The Method: Researchers at Osaka Metropolitan University developed a self-regulating electrolyzer with a specially designed solid electrolyte. As sunlight increases, the electrolyzer heats up and its electrical resistance decreases, allowing the system to automatically adjust to changing solar conditions without relying on batteries or external control equipment.

Future Prospects: The system successfully produced formic acid under real outdoor conditions despite fluctuations in sunlight. The innovation could reduce the cost and complexity of artificial photosynthesis, paving the way for more practical and scalable solar fuel technologies and contributing to the development of cleaner energy solutions.

Layered Material ZnPS₃ Emits Single Photons, Advancing Quantum Chip Technology



The Problem: Scalable quantum technologies require reliable sources of single photons—the fundamental particles of light used in quantum communication, cryptography and information processing. Existing single-photon emitters can be difficult to integrate into compact, scalable photonic circuits.

The Method: Researchers from the University of Warsaw, in collaboration with teams in Singapore and the Netherlands, observed single-photon emission from thin layers of the two-dimensional material zinc phosphorus trisulfide (ZnPS₃). The emission is believed to originate from defects in the crystal lattice, potentially single phosphorus vacancies. The emitted photons also showed a high degree of polarization.

Future Prospects: Because 2D layered materials can be transferred and integrated onto different substrates, photonic circuits and silicon chips, ZnPS₃ could offer a versatile platform for developing compact and scalable quantum technologies. Its polarized single photons may also have applications in quantum cryptography and future integrated quantum processors.

INSIGHTS & RESOURCES

Quantum-Safe Ecosystem in India: Strategic Priorities and Recommendations

Published under the National Quantum Mission (NQM), the Quantum-Safe Ecosystem in India report is India's first comprehensive strategic roadmap for building quantum resilience. Prepared by a Department of Science and Technology (DST) Task Force with contributions from government, industry, academia, and standards bodies, the report provides a phased national framework for migrating to post-quantum cryptography (PQC), strengthening crypto-

agility, developing indigenous quantum-safe technologies, and ensuring interoperability with global standards. It establishes clear implementation milestones to safeguard India's digital economy and critical information infrastructure against emerging quantum threats.

Key findings include:

- **Time-bound national roadmap:** Establishes a phased migration strategy with quantum resilience for Critical Information Infrastructure (CII) by 2029 and enterprise-wide adoption of post-quantum cryptography (PQC) by 2033.
- **Urgent response to the 'Harvest Now, Decrypt Later' threat:** Recognises that adversaries are already collecting encrypted data today for decryption once sufficiently capable quantum computers become available, necessitating immediate migration planning.
- **Adoption of Post-Quantum Cryptography (PQC):** Recommends migration to quantum-resistant cryptographic algorithms while promoting hybrid cryptographic deployments during the transition period to maintain interoperability and security.
- **Crypto-agility as a national priority:** Calls for organisations to build cryptographic agility by maintaining cryptographic inventories, enabling algorithm replacement, and modernising Public Key Infrastructure (PKI) for future upgrades.
- **National testing and certification ecosystem:** Proposes accredited laboratories, validation frameworks, and certification mechanisms to evaluate quantum-safe products, implementations, and compliance across sectors.
- **Composite PQC-QKD architecture:** Recommends national testbeds combining Post-Quantum Cryptography (PQC) and Quantum Key Distribution (QKD) to support high-assurance applications where appropriate.
- **Sector-specific migration planning:** Prioritises banking, telecommunications, defence, energy, healthcare, transport, and government digital services, recognising differing risk profiles and implementation timelines.
- **Governance and institutional coordination:** Advocates coordinated action among central ministries, sectoral regulators, standards organisations, industry, and research institutions through a structured national governance framework.
- **Indigenous capability development:** Emphasises developing domestic expertise in quantum-safe hardware, software, standards, testing infrastructure, skilled workforce, and research while maintaining compatibility with international standards.
- **Strategic vision:** Positions quantum-safe migration as a long-term national cybersecurity and digital sovereignty initiative that will protect India's expanding digital economy while strengthening resilience against future quantum-enabled cyber threats.

World Economic Forum's Top 10 Emerging Technologies of 2026 Released

The World Economic Forum, in collaboration with Frontiers, has identified 10 emerging technologies with the potential to transform industries and address global challenges. The

report highlights advances across energy, materials, health and computing, while emphasising the importance of responsible development, investment and supportive policy frameworks.

Key Highlights include:

- Everything-to-grid energy: Integrating electric vehicles, batteries and distributed energy resources into power grids could improve flexibility and resilience.
- Direct lithium extraction: Faster and potentially more resource-efficient methods could strengthen lithium supply for the clean-energy transition.
- Passive radiative cooling: Advanced materials can cool buildings and surfaces without electricity, supporting energy efficiency and climate adaptation.
- PFAS destruction: New technologies aim to break down persistent "forever chemicals" in water and industrial waste.
- Precision fermentation: Biotechnology enables microorganisms to produce targeted proteins and compounds for food, pharmaceuticals and biomaterials.
- AI-enabled drug discovery: AI is accelerating the identification and development of potential new medicines.
- Collaborative sensing: Connected sensors can combine data to improve environmental monitoring and infrastructure management.
- Lattice-based cryptography: New encryption methods could help protect digital systems against future quantum-computing threats.
- AI-powered scientific discovery: AI is helping researchers analyse complex data and accelerate discoveries across scientific fields.
- Living therapeutics: Engineered biological systems offer new possibilities for targeted and personalised medical treatments.

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