

# News in focus



INDIAN SPACE RESEARCH ORGANISATION VIA AP/ALAMY

India's Aditya-L1 spacecraft launched in 2023. This year, it will observe the Sun during its peak activity phase.

## SCIENCE IN 2026: THE EVENTS TO WATCH FOR THIS YEAR

The rise of AI scientists, missions to explore the moons of Earth and Mars and a massive ocean-floor drill are among the developments set to shape research in 2026.

By Miryam Naddaf

### AI for science

Research powered by artificial intelligence made leaps last year, and it is here to stay. AI 'agents' that integrate several large language models (LLMs) to carry out complex, multi-step processes are likely to be used more widely, some with little human oversight. This year might even bring the first consequential scientific advances made by AI. But heavier use could also expose serious failures in some systems. Researchers have already reported errors that AI agents are prone to, such as the deletion of data.

This year will also bring techniques that move beyond LLMs, which are expensive to train. Newer approaches focus on designing small-scale AI models that learn from a limited pool of data and can specialize in solving specific reasoning puzzles. These systems do not generate text, but process mathematical representations of information. In 2025, one such tiny AI model beat massive LLMs at a logic test.

### Massive trial

A UK clinical trial of a single blood test that detects around 50 types of cancer before symptoms begin is expected to report results this year. The test screens for bits of DNA that

cancer cells release into the blood, and can home in on the tissue type or organ that the signal comes from. The trial involved more than 140,000 participants, and if the results are promising, UK health authorities plan to roll out the tool across hospitals.

In April, the biggest regulatory update to clinical trials in the United Kingdom in two decades will come into force. Under the new rules, researchers can seek ethics and regulatory approval in one application. But the law also mandates that all trials involving medicines be publicly registered before recruiting their first participant and that a summary of results be published within 12 months of the end of the



Artemis II crew members with the Orion crew module.

trial. The goal is to speed up research, boost the diversity of trial participants and reduce the time it takes for promising treatments to reach the people who need them.

Meanwhile, changes proposed by the US Food and Drug Administration (FDA) in December that would require a single clinical trial, rather than two, for new drugs to be approved will continue to unfold in 2026.

### Gene-editing momentum

This year could see the launch of two clinical trials to develop personalized gene therapies for children with rare genetic disorders. The efforts expand on the treatment of KJ Muldoon, a baby boy with a rare metabolic disorder who received a CRISPR therapy tailored to correct his specific disease-causing mutation.

The team that treated Muldoon plans to seek approval from the FDA to run a clinical trial in Philadelphia, Pennsylvania, that will test gene-editing therapies in more children with rare metabolic disorders. These conditions are caused by variants in seven genes that can be addressed with the same type of gene editing as was used in Muldoon's therapy. Another team hopes to begin a similar trial for genetic disorders of the immune system this year.

### Heavy lunar traffic

This year is set to be another busy one for Moon missions. NASA's Artemis II will send four astronauts to fly around the Moon aboard the Orion spacecraft. The ten-day flight is the first crewed lunar mission since the 1970s and will help to prepare for subsequent missions to land on the Moon.

China is also preparing to launch the next in its series of lunar probes, Chang'e-7, in August. The mission will use a hopper spacecraft with shock-absorbing capabilities. It aims to arrive

near the south pole – a rock- and crater-strewn region known for being challenging to land on. In 2023, India's Chandrayaan-3 was the first spacecraft to successfully touch down near the lunar south pole. If it achieves a successful landing, Chang'e-7 will hunt for water ice and study moonquakes.

### Martian moons and beyond

Researchers are also turning their eyes to Mars, with Japan planning to launch its Martian Moons Exploration (MMX) mission to visit the red planet's two moons, Phobos and Deimos. The spaceship will collect samples of Phobos's surface and return them to Earth in 2031, which has never been done before.

The European Space Agency is planning to launch its planet-hunting satellite PLATO towards the end of the year. Equipped with 26 cameras, PLATO will monitor more than 200,000 bright stars and identify 'Earth twin' planets with temperatures that allow liquid water to form.

India's first solar mission, Aditya-L1, will observe the Sun during solar maximum, the peak of a roughly 11-year activity cycle, marked by the highest rates of sunspots, flares and solar storms. The satellite has been sitting in a halo orbit, which allows continuous observation of the Sun, about 1.5 million kilometres from Earth, since 2024. Its data will help researchers to build a better picture of the Sun's surface during the solar maximum.

### Drill, baby, drill

This year, China's ocean-drilling ship *Meng Xiang* is expected to embark on its first scientific expedition. The vessel is designed to drill up to 11 kilometres through oceanic crust into Earth's mantle and collect samples. The work will help researchers to learn about how the ocean floor forms and what drives its tectonic activity.

In an exciting development for physicists, the Large Hadron Collider (LHC) at CERN, Europe's particle-physics laboratory near Geneva, Switzerland, is due to get a massive upgrade in 2026. The LHC will collide its last particles for three years before it shuts down to install a machine of monster intensity, known as the high-luminosity LHC, which will begin operating in 2030.

Meanwhile, the Fermi National Accelerator Laboratory (Fermilab) in Batavia, Illinois, hopes to finish building the Mu2e detector in April. The experiment will test whether the muon, a mysterious and extremely short-lived



The *Meng Xiang*, China's deep-ocean drilling vessel, is designed to drill through Earth's crust.

subatomic particle, can convert into an electron without extra particles being formed. Once construction is complete, the Fermilab team will have to spend time tuning up the magnets. Data collection is expected to begin in 2027.

### Trump's second year

The shockwaves from US President Donald Trump's return to office will continue in 2026. His first year brought sweeping policy changes that will continue to affect US science this year.

Battles between the White House and the Congress over cuts to science funding look set to rumble on. Changes to public-health policy that have drawn criticism from researchers – including rolling back vaccine

recommendations, promoting unproven medical claims, cuts to international aid and reduced participation in global health schemes – will have broad consequences, and the country's climate policy could be watered down.

US universities must grapple with immigration restrictions that could limit the movement of international students and scientists. Institutions will deal with continued court battles over terminated federal grants and jobs.

The Trump administration has moved to refocus national research priorities on AI and quantum technologies. Although some researchers welcome this, others are concerned that it will draw resources away from other fields.

The results reflect a drastic reversal. At the beginning of this century, the United States led more than 90% of the assessed technologies, whereas China led less than 5% of them, according to the 2024 edition of the tracker.

"China has made incredible progress on science and technology that is reflected in research and development, as well as in publications," says Ilaria Mazzocco, who researches China's industrial policy at the Center for Strategic and International Studies, a non-profit research organization in Washington DC.

Mazzocco says the general trend identified by the ASPI is not a surprise, but it is "remarkable" to see that China is so dominant and advanced in so many fields compared with the United States.

This might have something to do with the types of technology that are tracked, says Wang Yanbo, a science-policy researcher at the University of Hong Kong. The country is more likely to be a research leader in new technologies, where it has focused its efforts, than in established fields, such as semiconductor chips, where other countries lead, he notes.

### Tracking high-impact research

The ASPI team based its analysis on a database that contains more than nine million publications from all around the world. It ranked nations in each technology by identifying the top 10% of the most-cited papers produced by researchers in a country over a five-year period, between 2020 and 2024, and calculated that country's global share.

One noteworthy finding is that China is outpacing the United States in cloud and edge computing, according to David Lin, a national security and technology strategist at the Special Competitive Studies Project, a non-profit organization based in Arlington, Virginia. Cloud computing enables artificial-intelligence companies to train models and process data without the need for physical infrastructure, whereas edge computing processes data locally. China's research intensity in these fields "probably reflects the urgency with which Beijing is moving AI from the lab into deployment", Lin says.

The analysis should not be interpreted as "a collapse of American power", says Steven Hai, a political economist focusing on technology innovation at Xi'an Jiaotong-Liverpool University in Suzhou, China. In general, the United States is still an important player globally in these technologies, Hai says.

Jenny Wong-Leung, a data scientist at ASPI who participated in the study, warns that the findings show democratic nations risk losing "hard-won, long-term advantages in cutting-edge science and research" in a range of essential sectors, which is crucial for the development and advancement of the world's most important technologies.

Although the ASPI's tracker is good for



China produces the largest share of high-quality research for 66 technologies.

# CHINA LEADS RESEARCH IN 90% OF CRUCIAL TECHNOLOGIES

The United States tops the remaining areas in an assessment of 74 technologies.

By Xiaoying You

**C**hina is leading research in nearly 90% of the crucial technologies that "significantly enhance, or pose risks to, a country's national interests", according to a technology tracker run by the Australian Strategic Policy Institute (ASPI) – an independent think tank.

The ASPI's Critical Technology Tracker evaluated high-quality research on 74 current and emerging technologies in 2025, up from the 64 technologies it analysed in 2024. China is ranked number one for research on 66 of the technologies, including nuclear energy, synthetic biology and small satellites, and the United States topped the remaining 8, including quantum computing and geoengineering.