科技日報

Science and Technology Daily

VOL.6-NO.247 JULY 4-5, 2026

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A Strong Country in Sci-tech Construction Enters Fast Lane

By Staff Reporters

Since the national sci-tech conference in June 2024 underscored the importance of sci-tech modernization and innovation in pursuing Chinese modernization and high-quality development, China has entered the fast lane in building a strong country in science and technology. Its sci-tech strength has achieved overall improvement, and its innovation momentum has shifted from scaling up to a leap in quality and efficiency. The overall efficiency of the national innovation system continues to rise.

Original breakthroughs

Basic research funding rose from about 250.1 billion RMB in 2024 to 277.8 billion RMB in 2025, exceeding 7 percent of total R&D expenditure for the first time. This marks a steady increase in upstream investment, shifting the focus from quantity to quality in foundational science.

The CO_2-to-starch synthesis developed by the Tianjin Institute of Industrial Biotechnology, Chinese Academy of Sciences, has moved from the laboratory toward industrialization — a "0-to-1" breakthrough in synthetic biology and a clear case of basic research translating into industrial applications.

In computing, Jiuzhang-4 runs 1,054 times faster than the world's fastest supercomputer on specific mathematical problems. The Jiangmen Underground Neutrino Observatory has improved measurement precision for two neutrino oscillation parameters by over 1.5 times compared to previous international best levels. Chang'e-6 has decoded the moon's far-side evolutionary history, reshaping the framework of solar system evolution research.

These achievements demonstrate that basic research is no longer confined to academic inquiry but is increasingly serving as a solid foundation for fostering new quality productive forces.

Breakthroughs in core tech

The China National Nuclear Corporation has achieved independent mass production of the silicon-28 isotope with an abundance exceeding 99.99 percent. This breakthrough will facilitate independent development of core materials for silicon-based quantum computing in China. Stable isotopes also hold strategic value in precision radiotherapy, nuclear security traceability, and fundamental physics research.

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New Graphic

WECHAT ACCOUNT E-PAPER

A Long March-4B rocket carrying the Haiyang-2E satellite blasts off from the Jiuquan Satellite Launch Center in northwest China, July 2, 2026. (PHOTO: XINHUA)

STI Frontier

How to Bring Organoid Cultivation into Industrial Era

By Staff Reporters

Organoids are mini lab-grown organs that help test drugs without human trials. But their cultivation has long been a gamble — poor consistency and lack of standards have blocked their clinical use.

Now, a five-year effort by Professor Gao Huijun's team at Harbin Institute of Technology, working with Chinese biotech firm BGI Genomics, has produced an intelligent manufacturing system that grows highly consistent "blood island organoids." This turns guesstimated manual work into a standardized, automated production line, bringing organoid manufacturing into the industrial age.

Conquering cell clustering

The team's first major technical battle was eliminating randomness during cell seeding. In manual operations, cells clumped together or left empty spots, causing organoids to grow with huge shape and function differences. The team initially assumed the 100-micron needle's inner wall was the culprit, so they spent a full year testing various hydrophilic and hydrophobic coatings. Nothing worked — cells still aggregated chaotically.

Realizing the issue was control, not materials, they developed a single-cell compliant visual servo control method. Their first iteration focused solely on density control: A camera recognized cell counts and adjusted fluid pressure accordingly. This pushed the self-assembly success rate to 72 percent — but there it stubbornly stalled.

Through deeper observation, they discovered cells naturally migrate toward the center. So they added boundary constraint algorithms to let the machine detect edges and confine cells within defined zones. Yet results remained unstable.

The breakthrough came in 2023 when they integrated density, boundary and spatial distribution into a single closed-loop feedback system. Instead of squeezing cells, the AI gently guides each cell to its optimal position using real-time visual feedback. This triple-parameter control finally achieved 98 percent uniformity.

Cell consumption dropped from millions to just a few hundred per batch, and the system now produces 1,000 identical organoids simultaneously — a four-fold increase in efficiency and 7.3 times better biological consistency than human hands.

Seeing inside without destroying

With uniform organoids in hand, the next hurdle was quality assessment. Traditional methods required destroying the organoid to measure drug response — a one-time snapshot that couldn't track changes over days.

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World's Highest Plateau Railway, 20 Years On

By Staff Reporters

The Qinghai-Xizang Railway, a 1,956-km steel artery traversing the world's highest plateau, has handled 104 million passenger trips and over 824 million tonnes of cargo since its inauguration. Twenty years ago, it ended the assertion that "the railway would never reach Lhasa." Today, a revisit to the route uncovers the technological safeguards behind this "Sky Road."

The line runs from Xining in Qinghai province in the east to Lhasa in Xizang autonomous region in the west. The section between Golmud and Lhasa, with an average elevation of 4,440 meters, opened on July 1, 2006. Since then, it has maintained safe and stable operations while expanding its transport capacity.

Digitally linking 51 unattended stations

The 1,142-km Golmud-Lhasa section has 58 stations, of which 51 are remotely controlled and unattended. The key to the railway's smooth operation over the past two decades lies in the train's control system, says Zhang Huxiong, head of safety and quality inspection at the Golmud Electric Depot of the Qinghai-Xizang Railway.

Originally, the system used satellite-based positioning for trains to operate without ground signals across uninhabited areas. "Wherever the train goes, you can see it from the sky," Zhang said.

To improve operational reliability and reduce maintenance costs, China State Railway Group Co., Ltd. supported research to adapt the domestically developed train monitoring system for plateau conditions. Modifications focused on enhancing the weather resistance of electrical components, such as resistors and capacitors, and improving system stability in low temperatures and low oxygen environments.

After years of intensive research and development, a plateau-adapted version of the system was successfully deployed.

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International Cooperation

Chinese Solutions Empower Malaysia's Rehabilitation System

By LI Linxu

With the rapid development of China's embodied AI industry, its technological dividends are increasingly being shared with the world.

On June 16, Malaysia's National Neuro-Robotic and Cybernics Rehabilitation Centre in the state of Perak was officially opened.

The centre, built by the Social Security Organisation of Malaysia (PERKESO), is one of the most advanced rehabilitation facilities in Southeast Asia.

As a key partner of PERKESO, Chinese robotics company Fourier was invited to showcase its GRx humanoid robot series at the opening event, highlighting the vast potential of embodied AI in clinical rehabilitation and patient care.

"Our partnership with PERKESO was not built overnight. Rather, it has been a gradual journey of building trust since 2022, evolving from product application and research collaboration to joint project development," said Gu Jie, founder and CEO of Fourier. Today, the partnership enters a new chapter with the launch of one of the region's most cutting-edge rehabilitation facilities.

Designed to accommodate up to 700 patients at a time, the centre is built for scale and impact. Besides serving local patients, it will also serve as a global centre of excellence for PERKESO's Rehabilitation and Return to Work programs, setting a new international benchmark for technology-enabled recovery and workforce reintegration.

It features an expanded suite of Fourier's intelligent rehabilitation solutions, including its Galileo system — an advanced biomechanics analysis and rehabilitation platform — and its RehabHub devices, both deployed to support research and rehabilitation applications. The Galileo system commenced trial operations at the centre in October 2025 and has since benefited over 1,000 patients.

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WEEKLY REVIEW

CSP Breakthrough in High-latitude & Extremely Cold Regions Made

On June 29, the 100,000-kilowatt concentrated solar power (CSP) plant at China General Nuclear Power Corporation's Jixi Base began operation in Da'an city, Jilin province. As China's northernmost CSP plant, this project marks a major breakthrough in the application of CSP technology in high-latitude, extremely cold regions, providing a replicable model for similar projects in comparable areas.

1st Radio Pulses Detected from Central Compact Object

A joint research team from the National Astronomical Observatories of the Chinese Academy of Sciences and Tsinghua University has, for the first time, detected radio pulses from a Central Compact Object, a class of young neutron stars long believed to be radio silent. The finding marks the first successful detection after decades of searches and provides key evidence for understanding the formation and evolution of these stars.

Graphene Can Host Multiple Superconducting States

A research team from the Massachusetts Institute of Technology found multiple superconducting states in rhombohedral graphene, a natural structure within graphite. Several of the newly discovered superconducting states remain stable even in the presence of a magnetic field, which would normally suppress superconductivity.

IBM Debuts World's First Sub-1 Nanometer Chip Technology

International Business Machines Corporation (IBM) on June 25 unveiled a major semiconductor breakthrough with the introduction of the world's first sub-1 nanometer (nm) chip technology, featuring a transistor architecture at the 0.7 nm, or 7 angstrom node. The achievement marks a landmark moment for an industry facing the physical limits of traditional chip scaling.

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