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Innovation Pathway

Hainan Special Customs Operations to Boost Trade

Edited by WANG Xiaoxia

The Hainan Free Trade Port (FTP) in southern China officially launched island-wide special customs operations on December 18, a milestone in China's effort to expand high-level opening up and promote an open world economy.

The island-wide special customs operations aim to eliminate barriers with a two-tiered customs system, described as "freer access at the first line, regulated access at the second line and free flow within the island."

The "first line" is between Hainan and overseas markets, and the freer access allows overseas goods to enter the island more conveniently, with most of them benefiting from zero tariffs and faster clearance.

The "second line" defines the customs boundary between Hainan and the mainland, where goods will undergo standard customs oversight to ensure fairness and prevent smuggling.

After the special operations, zero-tariff products in the FTP will increase from 21 percent to 74 percent, while the number of tariff-free items in Hainan rises to around 6,600, covering nearly all production equipment and raw materials.

The Hainan FTP will implement more favorable zero-tariff policies, more lenient trade management measures, more simplified customs clearance procedures and more efficient and precise supervision, according to a Hainan provincial government official.

At a recent investment promotion event, Liu Xiaoming, the governor of Hainan, pointed out that choosing Hainan means choosing opportunities, and investing in Hainan means investing in the future.

Hainan's unique conditions, combined with open policies, are bolstering multiple industrial upgrades. The secure and orderly flow of data is helping develop digital industries, and the existing petrochemical industrial chain can be extended to develop high-end new materials and green chemical industries.

Hainan's Nanfan breeding base is a vital hub for research, testing, and producing new crop varieties and seeds. Its resources are expanding the modern seed industry.

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A view of the Yangpu Economic Development Zone at the Hainan Free Trade Port. (PHOTO: XINHUA)

STI Frontier

Tianquan Solver: Smart Brain for Major Grid System

By LU Zijian & ZHANG Jiaying

Dubbed as the "core of industrial software," solvers are a key tool for finding solutions to complex mathematical programming problems. They are essential for deriving optimal operation solutions in sectors like energy, finance and logistics, according to Peng Chaoyi, technical lead of Tianquan at the Electric Power Dispatching and Control Center, China Southern Power Grid Co., Ltd. (CSG).

Developed by CSG, the Tianquan Solver is 14 percent faster than imported solvers in terms of computing performance. It has, to date, supported efficient computation for over 7,000 model nodes and more than two million clearing variables within the southern China regional electricity market (Guangdong, Guangxi, Yunnan, Guizhou and Hainan provinces and regions) since the market initiated continuous settlement.

Laying the foundation

An electricity pricing reform took place in 2015, and solvers became key to

finding the most reasonable solution. Domestic solvers lagged behind at that time, and CSG decided to catch up.

Many domestic solvers used open source underlying codes that were not optimized, Peng said, adding that this was the biggest reason for the lagging performance.

To tackle this problem, the research team consulted experts from dozens of institutions in mathematics, computer science and electricity. They compiled vast experience, then abstracted these operational insights and physical principles into mathematical models, generating languages that solvers can understand.

In Peng's opinion, the biggest challenge was to find the balancing point and enhance the precision of "translating" the dispatching and operation experience. "Some of the experience was accumulated for years, and the decision needed to be split into different models without being too complicated," he said.

Based on comprehensively understanding the experience and back-and-

forth discussions, Tianquan achieved the integration of power system expertise into the solution calculation process for the first time.

Practical test

However, getting the codes right was only the first step before Tianquan could make its mark in the power market. It took over 20,000 seconds (over five hours) for the solver to process its first case, and that was 11 times as long as imported solvers took, Zhou Huafeng, senior manager at the automation department of Electric Power Dispatching and Control Center, CSG, said.

To optimize Tianquan, the researchers first went through mountains of research papers and materials, but the approaches they found could only achieve small-scale optimization, which was almost ineffective for industrial-level applications.

They went back to the prototype of Tianquan, and made it do a large amount of case calculating.

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International Cooperation

Sino-Thai Joint Lab for Quantum Tech Launched

Edited by WANG Xiaoxia

This year marks the 50th anniversary of China-Thailand diplomatic relations, and the long friendship has seen an increasing level of sci-tech cooperation and exchanges between the two countries.

China and Thailand launched a joint lab for quantum science and technology during the recent Sino-Thai Symposium on Quantum Science and Technology in Bangkok, which was attended by nearly 100 experts from the University of Science and Technology of China (USTC), Thailand's Chulalongkorn University (Chula) and 10 other universities.

The USTC-Chula Joint Lab for Quantum Science and Technology was officially inaugurated, and the two universities signed a memorandum of understanding, reaching consensus on jointly promoting cooperation in quantum technology, AI chemistry and other areas.

Zhang Jianwei, Chinese ambassador to Thailand, said China is willing to enhance exchanges and cooperation with Thailand under the framework of the Belt and Road Initiative, jointly promote the development of quantum technology and industry, and bring more benefits to the people of both countries.

The cooperation on quantum technology between Thailand and China is crucial to improving the sci-tech strength of both countries, which is also in line with Thailand's economic development strategy with innovation as the main driver, said Supachai Pathumnakul, deputy permanent secretary for the Ministry of Higher Education, Science, Research and Innovation of Thailand.

WEEKLY REVIEW

Farthest Offshore Wind Farm Gets Full Grid Connection

China's most offshore wind project — the Three Gorges Jiangsu Dafeng 800 MW offshore wind farm — achieved full grid connection on December 15. The project comprises four sites with the farthest point extending 85.5 kilometers offshore. It is expected to generate over 2.8 billion kW of electricity annually, which equates to saving approximately 860,000 tonnes of standard coal and reducing carbon dioxide emissions by about 2.37 million tonnes.

First Level-3 Autonomous Driving Permits Issued

The Ministry of Industry and Information Technology released China's first Level-3 autonomous driving vehicle permits for two models that will conduct pilot operation on designated areas in Beijing and Chongqing. The approvals were given to Changan Automobile and BAIC Motor's Arcfox. The highest speed for their autonomous driving could reach 50 km/h and 80 km/h respectively.

World's First Human Heart-like Organoids Developed

Using donated human stem cells, a research team at Michigan State University has successfully developed the world's first human heart-like organoids to study atrial fibrillation (A-fib). These organoids exhibit A-fib characteristics when exposed to inflammatory environments. This breakthrough provides an unprecedented living human tissue model for studying arrhythmias, potentially breaking the 30-year impasse in new treatment development for this field.

Miniature New Device for High-precision Laser Manipulation

A joint research team from the University of Colorado Boulder and Sandia National Laboratories has developed an ultra-miniature optical phase modulator. Measuring one-hundredth the diameter of a human hair, this device manipulates laser frequencies with exceptional precision and minimal power consumption, laying a crucial foundation for future large-scale quantum computers.

New Graphic

THE RAPID GROWTH OF CHINA'S CORE AI INDUSTRY

IN 2024

Industry's scale exceeded
900 billion RMB

24% y-o-y

FORECAST BY 2025

To exceed

1.2 trillion RMB

Source: China's Ministry of Industry and Information Technology
Designed by SONG Ziyan / Science and Technology Daily

WECHAT ACCOUNT



E-PAPER



By Staff Reporters

The 2025 Enterprise Science and Technology Innovation Development Forum, jointly held by *Science and Technology Daily* (S&T Daily) and the Federation of Guangdong Academicians (FGA), in Shenzhen, Guangdong province in south China, discussed how to tackle barriers in integrating sci-tech innovation and industrial innovation.

"Only when research and industry join hands can innovation truly thrive," Guo Renzhong, academician of the Chinese Academy of Engineering and president of FGA, said, adding that the FGA has compiled a total of 345 industrialization requirements from academician

teams, and served nearly 1,000 enterprises and public institutions.

Commercialization of sci-tech achievements is a key factor to promote the integrated development of sci-tech innovation and industrial innovation. Shenzhen has pioneered a system to serve the commercialization process.

Wang Hui, director of the Shenzhen Technology Promotion Center for New Quality Productive Forces, said the city has taken the lead nationwide in certifying senior professional technical managers, with 302 individuals currently holding the designation.

These technical managers are not only well-versed in cutting-edge science

and technology, but are also familiar with industries and capital. They connect different stakeholders and provide comprehensive and professional support for technology commercialization in terms of early-stage startup service, scenario exploration and financing.

The attendees reiterated the principal role of enterprises in promoting the integration of sci-tech and industrial innovation.

Enterprises span both technological innovation and industrial innovation phases, so an outstanding enterprise must effectively manage the integration of both dimensions, according to Lin Xiaodong, vice president of ZTE.

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From Frontier Technologies to Development Engines

Observer

By Staff Reporters

From the innovation of humanoid robots to the rise of intelligent connected vehicles, and the establishment of a commercial spaceflight ecosystem, a series of practices are transforming cutting-edge technologies into productive forces all over China.

A crucial step for the industrialization of science and technology is its entry into real application scenarios. Some 300 robot ecosystem enterprises in the Beijing Economic-Technological Development Area vividly demonstrate how this works.

The Beijing Innovation Center of Humanoid Robotics in the development area collected data from real scenarios like supermarkets and talent apartments, and achieved rapid technology iteration via dedicated pilot factories, establishing a closed-loop "scenario-data-computing power" system, Wei Jiaxing, brand and public relations lead at the Center, said.

Qingdao in Shandong province in east China conducted a sci-tech innovation project with 10 demonstration projects, building 100 innovation platforms, tackling 1,000 technological barriers, and fostering 10,000 sci-tech enterprises.

During the 14th Five-Year Plan (2021- 2025) period, Qingdao's smart home appliances, rail transit equipment, instruments and meters, and marine engineering equipment industries were selected as national advanced manufacturing clusters.

To truly translate into productive capacity, technological innovation must



An AI workshop in Nanjing, Jiangsu province, demonstrates various robots. (PHOTO: XINHUA)

seamlessly integrate multiple stages — from R&D and pilot testing to industrialization — ensuring technologies smoothly enter the market.

The Xiang'an Biomedicine Laboratory in Xiamen in southeast China, established in 2021, harnessing the biomedicine research team of Xiamen University, has been granted full autonomy to build platforms, assemble teams and innovate mechanisms to overcome bottlenecks in commercialization. This will drive the commercialization of biomedicine innovation achievements.

The efficient coordination mechanism between research institutions and enterprises has a huge contribution in the successful launch of products, Wang

Danang, R&D director at Xiamen Inovax Biotech Co., said.

The research teams in universities focus on "zero to one" fundamental research, conducting mechanism research, technological path exploration and concept verification during the lab phase, while enterprises undertake the "one to 100" industrialization, rapidly advancing process development, enlarging commercial scale, and quality control to ensure stable and efficient production of products, Wang added.

The automotive supply chain has also achieved critical linkages across multiple cities. Chongqing in southwest China has accelerated the development of intelligent connected new

energy vehicles by increasing R&D investment and launching multiple industrial innovation initiatives.

In Heihe in Heilongjiang province in northeast China, the world's largest year-round low-temperature testing facility enables winter testing throughout the year. Previously, they had to be done overseas. This has halved the time taken by corporate R&D cycles and enhanced the automotive supply chain.

In addition, localized innovation ecosystems also play a key role in promoting new quality productive forces.

Previously known for its coal industry, Hebi in central China's Henan province has been transformed into a hub for commercial spaceflight, gathering nearly 40 upstream and downstream enterprises. The city also set up the first batch of satellite industry fund worth 400 million RMB and leveraged nearly four billion RMB in social investment. The fund primarily supports the development of satellite manufacturing, launch, application and related industries.

Jilin province in northeast China cultivates new quality productive forces in agriculture tailored to local conditions and has established a number of high-level breeding innovation platforms.

Jiang Hongwei, director of the institute of soybeans at the Jilin Academy of Agricultural Sciences, said the Academy has established five demonstration bases for soybean yield enhancement across eastern, central and western parts of the province, showcasing over 20 new varieties to advance crop improvement.

Concurrently, Jilin's laboratory system development has reached a new height, establishing a multi-tiered, high-level innovation platform matrix.

For drones already sold and in use, the standard for operational identification requires manufacturers to retrofit operational identification modules within 12 months of the standards' publication. Once upgraded, these drones will be given a 36-month transition period. After that transition period expires, all civilian drones must fully comply with the new standards before they are permitted to operate.

According to the administration, the new technical standards address safety questions of "who is allowed to fly" and "who is flying," which will ensure the safe and orderly development of China's rapidly expanding drone industry.



Policy Express

China Releases Mandatory Drone Standards

By Staff Reporters

China has introduced two mandatory national standards to strengthen the management of civilian unmanned aircraft systems (UAS), according to the State Administration for Market Regulation (SAMR). One is the *Regulations on Real-name Registration of Civil Unmanned Aircraft Systems* and the other is for the operational identification of relevant systems. They will both take effect on May 1, 2026.

'Real-name registration'

The measures are designed to implement requirements laid out in the Interim Regulations on Unmanned Aircraft Flight Management, particularly those covering real-name registration, activation procedures, and identity reporting

for civilian drones. SAMR and the Civil Aviation Administration of China jointly led the drafting process.

Under the Regulations on Real-name Registration, manufacturers, operators, and management authorities must follow a standardized workflow for registering and activating drones. The standard clarifies registration responsibilities, information management and inquiry rules, deregistration procedures, and data-exchange interfaces. It explicitly requires that drones remain incapable of flight both before activation and after deactivation, ensuring that unregistered or inactive devices cannot take off.

Tracking drone movements

The second standard requires drones to automatically transmit their identity, location, speed, and status

information to regulators from the moment they are powered on, and throughout the entire flight. This allows authorities to maintain real-time oversight of all airborne drones.

According to the requirements, civilian drones must support both broadcast-based and network-based operational identification. They must also be able to receive network-based identification information transmitted via cellular networks, wired ground networks, and satellite communication links. The update and transmission interval for this data must not exceed one second.

Transition period for existing drones

The standards include a transition period for manufacturers to upgrade existing models.

New Finance Policy to Boost Green Factory Growth

By LIN Yuchen

In a major push for sustainable manufacturing, the Ministry of Industry and Information Technology (MIIT) and the People's Bank of China (PBOC) have jointly issued a new notice to support green factory construction with green finance policies, aimed at accelerating the development of green factories.

This strategic initiative is a key part of China's efforts to achieve its "dual carbon" goal — carbon peaking and carbon neutrality — by 2030.

Green factories are critical to the nation's green manufacturing efforts, representing over 20 percent of total industrial output. With China's ongoing industrial transformation, the

establishment and expansion of green factories is a pivotal component of reaching environmental targets. The country has already nurtured 6,430 green factories, and this new policy is expected to enhance their development.

The notice outlines three key areas of focus for financial support.

- It encourages backing transformative innovations in traditional industries, such as major technological breakthroughs in low-carbon processes and the development of critical technologies.
- It promotes the financing of green upgrades, including energy-saving, water-conservation, pollution reduction, and resource recycling projects.
- It supports zero-carbon factory initiatives and identifies carbon reduc-

tion potential in existing green factories.

A cornerstone of this initiative is the role of financial innovation. The PBOC has already committed 800 billion RMB through carbon reduction support tools, enabling financial institutions to increase investment in clean energy, energy efficiency, and carbon reduction technologies.

This policy aims to expand financial products tailored to green manufacturing, such as long-term loans, renewable debt financing, and green bonds, which will directly support factory construction and technological upgrades.

The policy also sets ambitious goals for the future. By 2030, the proportion of green factory output is expected to reach 40 percent of total industrial

output. To achieve this, MIIT plans to refine the green factory evaluation system and introduce a multi-level cultivation management approach.

The notice also emphasizes expanding direct financing channels, including the issuance of green and transition bonds, and strengthening risk-sharing mechanisms.

In recent years, MIIT and PBOC have pioneered industry-finance collaborations, utilizing platforms and pilot programs to match green factory financing needs. More than 130 billion RMB in green financing has already been allocated, with a focus on developing financial products for industrial green upgrades.



Case Study

Tech Empowers Agriculture in Shandong

By Staff Reporters

At the Agricultural High-tech Industrial Demonstration Area of the Yellow River Delta of Shandong province, the area of cultivated land has seen a net increase for four consecutive years, with a successive series of new saline tolerant crops being introduced. Saline-alkali land has been transformed into fertile soil, vividly demonstrating how technological innovation boosts agricultural output in the province.

High-yield, high-quality

In the breeding industry, it is almost impossible to breed a crop species that can guarantee high yield and high quality simultaneously, yet Cao Xinyou, director of Crop Research Institute, Shandong Academy of Agricultural Sciences, and his team managed to do just that.

To breed a new wheat species, selection of at least six generations is needed, said Cao, adding that they had to experiment with the best combination from thousands of hybrid combinations balancing multiple characters like yield, quality, disease resistance and lodging resistance.

The species Jimai 44, developed by Cao's team, was approved in 2018. Its highest yield per mu (one mu equals 666.7 square meters) has reached 808.6 kilograms to date, breaking the record for super high-gluten wheat across the country. Jimai 44 has been planted in 42.51 million mu of land.

The success of Jimai 44 was no accident in the laboratory, as the researchers focused on the actual needs and fit for production ideas. Having bred 15 new species of wheat, Cao said the key to breeding lies in the field, and agricultural researchers can achieve actual results only when they truly immerse themselves in grassroots work.

At the Industrial Demonstration Area, 46 innovation teams from across China have now converged to tackle key core technologies, aiming to breed varieties suitable for saline-alkaline land.

Tian Zhixi, a researcher at the Institute of Genetics and Developmental Biology, Chinese Academy of Sciences, has rooted himself in this saline-alkaline area. Challenges have been constant companions on his research journey. During the first year of trial

planting, nearly none of the seedlings survived.

"What to do? If it fails, we try again!" said Tian. For four consecutive years, his team battled with field tests, experimentation, elimination and selection. After screening over 8,000 soybean samples, they ultimately identified 56 that had significant salt-tolerant germplasm, 18 that had outstanding potential, with two soybean varieties that practically performed particularly well.

In 2023, Tian's team demonstrated the cultivation of Keduo 35 on 600 mu of saline-alkali land in Dongying, Shandong. This saline-tolerant soybean achieved an average yield exceeding 300 kilograms per mu — far surpassing China's national average of 132 kilograms and the U.S. average of 225 kilograms.

Last year, Keduo 35 was planted over 4,000 mu in Dongying, and holds the potential to provide high-quality seed sources for 200,000 mu of saline tolerant soybeans in the future.

Soaring value of smart agriculture

Today, pomegranate cultivation in Zaozhuang covers over 120,000 mu, and the adoption of modern technologies like smart greenhouses and integrated water-fertilizer systems has ushered pomegranate farming into a new smart era.

"In the past, pomegranate yields were low and techniques were rudimentary," said Liu Yuan, a villager from Liuyuan town in Zaozhuang.

By adopting insect-trapping sticky tape technology and water-saving irrigation techniques, Liu has boosted his annual pomegranate profits from 20,000 RMB to nearly 100,000 RMB.

Zaozhuang pooled scientific research resources to introduce facility agriculture into the pomegranate industry, and built a modern pomegranate deep-processing industrial park, achieving multiple value leaps along the industrial chain.

Advanced technologies like the Internet of Things, big data and AI have propelled local specialty produce in Shandong — such as Shouguang vegetables, Jinxiang garlic, Zhangqiu scallions, and Zhanhua winter jujubes — toward intelligent and precision production, expanding the value-added potential of the agricultural industry.



A farmer picks strawberries in a greenhouse in Liutong village, Binzhou city, Shandong province. (PHOTO: XINHUA)

Hainan Special Customs Operations to Boost Trade

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The island's ocean resources can be leveraged to cultivate deep-sea technology and industry. The Wenchang Commercial Space Launch Site will attract more aerospace-related enterprises.

Supportive policies and regulation measures are adding to the boost. For example, the new regulations on tax-related professional services in the Hainan FTP allow overseas personnel to take

the certified tax agent examination and support cooperation with overseas institutions to better serve cross-border business.

According to the Overall Plan for the Construction of the Hainan FTP, the island will see liberalization and facilitation "basically established" by 2025, become "more mature" by 2035, and develop into a globally influential duty-free trading center by 2050.

U.S. Agency Hypes Security to Jeopardize Cross-Border Communication



By LIANG Yilian & HU Dingkun

The U.S. Federal Communications Commission (FCC) has issued an order requiring three major Chinese telecom operators — China Mobile, China Telecom, and China Unicom — to resolve what it called "certification issues" in the U.S. Robocall Mitigation Database (RMD) within 14 days.

The RMD's function is to minimize unwanted calls, including illegal and spoofed robocalls. The FCC also demanded that the three Chinese operators demonstrate that their presence in the database poses no threat to U.S. national security and serves the public interest.

It warned that if the companies fail to respond in time, it will remove them from the RMD, and U.S. carriers will stop accepting direct calls from Chinese operators.

According to foreign media reports, this would prevent Chinese operators from connecting to the U.S. telecommunications network — meaning voice calls originating from China and routed through Chinese operators to the U.S. would be blocked. Clearly, such a move would seriously disrupt normal communication between users in both countries.

Cracking down on robocalls is a shared responsibility of telecom operators and regulatory agencies in both China and the U.S. Differences in technology and regulatory rules are normal and can be resolved through dialogue and consultation.

However, the U.S. side is not only demanding that Chinese operators



PHOTO: VCG

complete certification according to its rules, but also requires them to "prove their innocence" on national security concerns. The essence of this approach is to turn the issue of robocall prevention into a national security matter.

Regardless of whether Chinese operators meet the certification requirements, the FCC can remove them from the database in the name of security, thereby cutting off their direct connection to the U.S. call network and further pushing U.S.-China telecommunications networks and technologies toward decoupling.

In recent years, the FCC has repeatedly invoked national security to elevate its presence in China – U.S. relations, positioning itself as a frontline actor in Washington's efforts to contain China's technology sector.

Between 2019 and 2022, it rejected China Mobile's application to operate in the U.S. and revoked the operating licenses of China Unicom and China Telecom. In 2020, it placed Huawei and ZTE on its "national security threat list," barring

their equipment from the U.S. market. In 2022, it again cited security risks to prohibit the sale of products from Huawei, ZTE, Hikvision, and other Chinese companies.

This year, FCC actions have intensified. In March, it established a "Council for National Security" that explicitly aims to respond to what it calls "the threats posed by China," and launched a sweeping investigation into nine Chinese communications technology firms.

In May, it barred laboratories deemed security risks — including Chinese labs — from testing electronic devices for export to the U.S., and subsequently blacklisted 11 Chinese labs in September.

In October, the FCC ordered e-commerce platforms to remove millions of Chinese electronic products on what it claimed were safety grounds, and announced its intention to block Hong Kong Telecom from operating in the U.S.

However, past revelations point to a different reality. The "PRISM"

surveillance program exposed by whistleblower Edward Snowden, as well as media reports detailing the CIA's decades-long control of a Swiss encryption-equipment manufacturer used to spy on over 100 countries demonstrate that the U.S. — not China — is the biggest threat to global telecommunications security.

The FCC's portrayal of Chinese telecom firms and products as security risks and its escalating restrictions and sanctions show a classic example of projection.

The consequences of these policies extend beyond geopolitics. Banning Chinese telecom equipment and electronic products has significantly increased the operating costs of U.S. networks and raised expenses for American consumers. Blocking Chinese laboratories has disrupted global electronics supply chains, with additional testing and procurement costs ultimately borne by U.S. buyers.

If the FCC proceeds to restrict Chinese operators' access to the U.S. voice network, it will inevitably obstruct normal communication between users in both countries — creating daily inconveniences and hindering cultural, economic, and business exchanges.

In an era defined by deep globalization and the rapid growth of the digital economy, interconnected telecommunications networks and technologies are an irreversible trend. The FCC should abandon its tendency to over-secure technical issues, return to its role as a professional regulator, and contribute to the healthy development of telecommunications technologies and industries in the U.S. and worldwide — rather than acting as an obstacle to international cooperation.

6th China-Russia Media Forum Eyes Supporting Development of Both Countries

The sixth China-Russia Media Forum, which was held in Beijing on Tuesday, discussed promoting friendship between and supporting development of the two countries through media cooperation.

Li Shulei, who is a member of the Political Bureau of the Communist Party of China (CPC) Central Committee and head of the Publicity Department of the CPC Central Committee, attended the forum and delivered a keynote speech.

Attendees said that under the strategic guidance of heads of the two countries, China-Russia relations have maintained stable, healthy and high-level development, creating a model for a new type of international relations and relations between neighboring major countries.

In May this year, the heads of state of the two countries signed and issued a joint statement on further deepening the China-Russia comprehensive strategic partnership of coordination for a new era, explicitly proposing deepened cooperation in the media sector between the two countries.

The media sectors of China and Russia should fully implement the important consensus reached between the heads of state, adhere consistently to the general direction of the China-Russia

friendship, and foster a positive public opinion atmosphere for the common development of China and Russia, attendees said.

They also said that the media of the two countries should focus on major issues such as the alignment of China's 15th Five-Year Plan with Russia's economic and social development strategies, and report in depth on achievements of mutually beneficial cooperation in various fields.

They noted that the media should build bridges of people-to-people connectivity, promote exchange and mutual learning between the Chinese and Russian civilizations, join hands to address the challenges of digital and intelligent transformation, and work together to enhance the influence of the media.

The forum was hosted by the Publicity Department of the CPC Central Committee and the Russian Presidential Executive Office, and organized by China's Xinhua News Agency and Russia's TASS News Agency.

Approximately 140 officials and media representatives from both countries attended the forum. During the event, the two sides signed 11 documents on deepening media cooperation between China and Russia.

Source: Xinhua



Last year, a Russian media delegation visited the Science and Technology Daily office in Beijing for an exchange, during which both sides discussed international science communication practices. (PHOTO: Hong Xing / Science and Technology Daily)

Experts Laud China's Role in Inclusive Global Growth

Voice of the World

Edited by QI Liming

As China held its Central Economic Work Conference in Beijing, international experts said China's high-quality economic development had steadily advanced in 2024, demonstrating strong resilience and vitality. The stability of China's policies, economic growth and development expectations will continue to give more certainty to an unstable world.

Pivot for global development

Many international institutions have raised their expectations for China's economic growth rate in 2025, with growing optimism about China.

"China views difficulties with a rational and pragmatic attitude and responds to challenges with institutional advantages and policy tools," Thai think tank scholar Tharakorn Wusatirakul said. "This is an important manifestation of China's economic resilience."

Farhana Paruk, senior executive at the Gordon Institute of Business Science at the University of Pretoria in South Africa, said she can feel the changes every time she comes to China:

"The continuous construction of China's free trade zones, the constant innovation of industrial forms, and the successive introduction of new measures to expand opening up all demonstrate the resilience and vitality of the Chinese economy. China will remain a leading engine for global development."

Park Seung-chan, dean of the International Exchange Institute of Yongin University in South Korea, said China is promoting the liberalization and facilitation of trade and investment, playing a significant role in maintaining the stability of the global industrial and supply chains. The sustained and stable growth of the Chinese economy will have positive impacts on global economic development.

Marta Montoro, manager and institutional relations director at Catedra China, a think tank in Spain, spoke about her recent visit to Beijing and Hangzhou in east China: "During my visit, I felt China's firm determination to promote sci-tech innovation and sustainable development. The new development philosophy is driving China's high-quality development to achieve continuous results."

Contributor to global transformation

Montoro added that China has been making great efforts to consolidate

the foundation of innovation, enhance total factor productivity, and optimize and upgrade its economic structure. China is also advancing its "dual carbon" goal, accelerating the transformation of its energy structure, and promoting green travel. She called China a model in advancing sustainable development.

Tharakorn said China's "AI Plus" initiative — a national strategy to deeply integrate AI across six key areas of science and technology, industry, consumption, people's wellbeing, governance, and global cooperation, as well as high-quality development of key manufacturing industrial chains provide policy support for the growth of new economic drivers such as the digital economy and green technology.

The accelerated green transformation of the entire process of industrial upgrading is not only enhancing China's international competitiveness but also contributing to global economic transformation and sustainable development, he added.

Paruk said China's innovation-driven development strategy is providing an ideal testing ground for sci-tech innovation. In the development of electric vehicles and new energy, China's technologies and concepts are driving the growth of related industries worldwide.

Creating more opportunities for others

Park commented on China strengthening cooperation with other countries through multilateral trading platforms. Beijing has improved the negative list management system for cross-border trade in services and the Hainan Free Trade Port, with its launch of island-wide special customs operations, is enabling easier goods and personnel access to the island.

Tharakorn said by promoting trade and investment liberalization and facilitation, and developing digital trade and green trade, China has not only expanded its own development space, but also provided critical opportunities for all countries to deeply participate in regional industrial and supply chains.

"China's economy has been growing steadily and its opening up to the outside world has been continuously expanded, adding more impetus to further promoting South-South cooperation. Chinese technologies, solutions and experiences have been increasingly promoted and applied in more and more developing countries," Paruk said.

Montoro called China a "vital partner for all countries to jointly address global challenges and build a prosperous and stable future."

Forum Assists Integration of Sci-tech & Industrial Innovation

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Lin called innovation more of an investment behavior from the angle of enterprises, with the core goal being to achieve business success through delivering values to customers. So enterprises' management of the innovation process is of great importance.

Bai Jie, director-general of the high-tech innovation department of the Ministry of Industry and Information Tech-

nology, said the ministry will further encourage enterprises to increase R&D investment and support eligible enterprises to establish research centers.

It will also support enterprises in leading or forming consortiums to apply for national sci-tech projects, thus elevating their competitiveness through scientific research and technological innovation.

At the forum, *S&T Daily* launched a

case library of hardcore sci-tech achievements during the 14th Five-Year Plan period (2021-2025). It aims to promote the transformation of scientific and technological achievements into tangible productive forces, fully unleashing society's creative potential.

The initiative features 35 high-quality achievements in its first batch of cases, serving as a cornerstone for establishing a high-level industry-academia-

research collaborative innovation platform.

Wu Jing, member of the Communist Party of China Leading Group of the Ministry of Science and Technology and president of *S&T Daily*, said with the grand blueprint for the 15th Five-Year Plan (2026-2030) drawn, the journey of scientific and technological innovation is now filled with vigorous competition.

She called for all innovators to work together to promote future sci-tech development.

Tianquan Solver: Smart Brain for Major Grid System

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The researchers then broke down and analyzed the entire calculating process, looked for the reason of slow operation in the codes line by line, and cobbled together the answers.

In addition, each member of the research team contributed personal dispatching operation experience and specific expertise into the algorithms of Tianquan, deepening the optimization of its underlying codes.

After countless simulations, Tianquan's calculating speed became 14 times faster than that of imported solvers, when they solved the same case.

For general solvers, there is certain room for error in their application fields. However, the reliability of Tianquan directly impacts grid security, affecting numerous operational units and power consumers, with virtually zero margin for error, according to Liang Yanjie, technical expert at the Electric Power Dispatching and Control Center, CSG.

To ensure accuracy, the team formed cases by collecting real data from a lot of power plants and transformer substations of each level of power grid within CSG. These cases were used by Tianquan for practice during its "internship," and each case contained hundreds of thousands of clearing variables.

After the "internship," Tianquan advanced to the frontline. It dealt with real-time data and continuously optimized each parameter setting, however its calculation results were not adopted.

Undertaking key tasks

With more real practices, the processing efficiency of Tianquan began to

rival that of imported solvers, and its results continue to be optimized.

In 2022, as Tianquan began to be dispatched in parallel with imported solvers, questions soon emerged from various departments.

The team, however, was unfazed. "Every step of Tianquan's algorithm is well-founded, and we can clearly explain each computational process to the executing units," Peng said, adding that the self-developed solver can demonstrate the underlying logic for each problem.

The electricity market never sleeps, and Peng and colleagues stayed ready to answer any question, and continuously optimized Tianquan based on real situations. Finally, Tianquan's calculation results were recognized by the organizations using the solver.

After nearly two years of parallel operation with imported solvers, Tianquan has officially transitioned to independent operation as the primary solver. Its operational support expanded from two days to the entire month, and its coverage extended from traditional energy to new energy sources.

Following 35 months of preparation and 12 rounds of internal testing, Tianquan ultimately achieved independent support for continuous settlement in the southern China regional electricity market.

Ge Dongdong, professor at the Institute for Intelligent Computing at Shanghai Jiao Tong University, believes this achievement resolves the technical challenges of clearing optimization in ultra-large-scale electricity markets, reaching internationally leading standards.

4

LIFE IN CHINA

Mathematics Not Only for Geniuses, but for Everyone

Dialogue

By LONG Yun & ZHANG Gailun

At the age of 70, renowned mathematician Professor Efim Zelmanov remains deeply passionate about teaching undergraduate students in Shenzhen in south China. Before class, he makes tea and answers questions. When he speaks about mathematics, he treats it not as a subject meant for geniuses, but as something deeply woven into everyday life.

Zelmanov received the Fields Medal for solving a century-old problem on symmetry when he was only 39. The Fields Medal is the highest honor in mathematics, presented every four years at the International Congress of Mathematicians.

Since moving to China in mid-2022, he has helped establish the Shenzhen International Center for Mathematics at the Southern University of Science and Technology (SUSTech). His goal is not only to train future medalists but to build an environment where mathematical thinking can flourish at all levels of society.

Math part of daily life
When asked how the public should understand mathematics, Zelmanov pointed to ordinary experiences. "Each time you talk on your iPhone, withdraw money from an ATM, or log in with a username, some very nontrivial mathematics is involved."

During the 2008 economic crisis in the United States, the number of mathematics majors at the University of California, San Diego, increased fivefold in a single year. "People started to think about jobs. They knew that in mathematics, they would get a job."



Professor Efim Zelmanov. (COURTESY PHOTO)

Over his 30 years in the U.S., he said he has never met an unemployed mathematician. "Maybe they do not exist."

He noted that AI is accelerating this trend. "AI grew out of mathematics. It operates mathematical algorithms." Computer science emerged from mathematics departments before becoming a separate discipline. "It's like a family house. When children grow, they move to their own homes."

Zelmanov expressed admiration for China's commitment to science. "I was really amazed at the level of support for mathematics and all sciences at all levels of government. People really understand it. You don't need to tell them."

Persistence defines great mathematicians

Zelmanov rejected the myth that mathematics is the realm of geniuses. While talent helps, what truly sets great mathematicians apart is endurance. "Mathematical ability is the ability to

think for a very long time about some problems," he said. "The most important qualities are independence, and then they have to be very persistent, very determined in their work, because 99.9 percent of the time when a mathematician works, they don't get a result."

He cautioned against overemphasizing competitions like the International Mathematical Olympiad. Though Olympiad winners often possess talent, "Olympiad is a sport. Mathematics is partially a sport, but not entirely." Real research problems cannot be solved in a few hours. "If you can solve a problem in five hours, it doesn't mean that you will be able to solve problems that take 10 years."

Still, he acknowledged that many Olympiad participants go on to have successful careers in technology or finance. "They won't necessarily become mathematicians, but they will find their place."

He spoke warmly of his Chinese

students. "The young students with whom I've had a chance to work are hardworking and full of energy. And it's pleasant to work with them."

China's rise in mathematics
Asked to assess China's progress in mathematics, Zelmanov praised the country's deep-rooted respect for education, which "goes back thousands of years." He added, "I've been in China for three and a half years, and I'm very impressed by the support that mathematics and other sciences receive from society as a whole and from all levels of government. The support is amazing."

"And China's progress has been very strong. Let's tell the truth: China has changed well. Mathematics in China is extremely strong. I'm sure that there will be Chinese Fields Medalists."

But he stressed that individual awards matter less than building a strong foundation. "It's much more important to have, in general, a high level of mathematical development in the country: top universities, top high schools, top IT companies."

He noted a significant shift: While many top Chinese students once went abroad for graduate study, "right now, top Chinese universities are very strong. And more and more young international talents are coming to China for postdoctoral training. Now that's normal."

He praised Shenzhen's ambitions. "We are right at the beginning. We are making the rules." University leaders, he said, respond quickly to suggestions, and the university president, a respected scientist, understands researchers' needs.

Looking ahead, Zelmanov hopes the Shenzhen International Center for Mathematics will become a global hub for mathematical talent. "We are trying to put the center on the world map of mathematics."

My China Story

One Mission: Education Through Storytelling

By LONG Yun & ZHONG Jianli

In 2009, Alex Rivera arrived in Mianyang, Sichuan province, to teach Spanish at Southwest University of Science and Technology (SWUST). He carried little more than curiosity and a willingness to embrace the unknown. 16 years later, he is a deeply rooted member of the community, an educator, a cultural bridge-builder and a storyteller committed to fostering mutual understanding between China and his native Chile.

From his early days as a language instructor in Mianyang, Rivera expanded his role organically. He taught Latin American anthropology, led the Spanish program, and by 2018 had become the university's coordinator for all foreign faculties. His impact extends far beyond the classroom. He played an important role in establishing a sister-city relationship between Anzhou District in Mianyang and Caldera, Chile, a partnership grounded in shared values, educational exchange, and people-to-people ties. For this quiet diplomacy, he was awarded the Sichuan Friendship Award in recognition of his contribution to promoting international exchanges in 2025.

"I received this important award for helping bring countries together through diplomacy, collaboration, and genuine friendship," he told *Science and Technology Daily*. To him, this award is not just a recognition, it will encourage him to keep doing the same work.

As a teacher, Rivera has gained great popularity among students. Central to his philosophy is the belief that education must prepare students not only academically, but for the realities of life. He challenges conventional teaching methods by replacing rote group assignments with dynamic team projects that mirror professional environments. "In the real world," he tells his students, "you don't just split tasks equally. You collaborate with people based on strengths. That's the essence of teamwork." His courses emphasize 21st-century skills: cross-cultural communication, creativity, leadership, and adaptability, qualities, all essential for students who may one day teach Chinese abroad or work in international settings.

What surprises many students is that English is not Rivera's first language. "My native language is Spanish," he reveals on the first day of class. By sharing his own journey as a lifelong language learner, he empowers students to see challenges as part of growth, not failure.

Beyond academia, in 2023, Rivera co-founded Geeksy Studio, a bilingual platform dedicated to telling nuanced Chinese stories to global audiences. As the platform's creative director, he rejects the instant gratification of viral trends, insisting every production carries educational value. "I'm an educator. There must be components, such as historical context, cultural insight, or lessons in cross-cultural understanding," he said. Whether documenting intangible heritage fairs or exploring local landmarks like the Yuewang Tower, his content always asks: What 21st-century skill does this convey?

His decision to remain in Sichuan province was never premeditated. Initially motivated by a sense of adventure and planning to return to Chile after just one year, he hesitated before accepting the offer. "China felt so distant — both culturally and geographically," he recalls. "But my curiosity won out. I thought, 'Let's try it for a year.'" That year became two, then three and then he was in it for life. The university supported his growth, offering roles that mirrored his past leadership in Chile.

"The university's commitment to international faculty development is unparalleled." Rivera said. SWUST has established a comprehensive ecosystem to empower international faculty. Strong institutional support in administration and integration has allowed him to focus on education, research, and cross-cultural work, transforming his expertise into practical international collaboration.

Over 16 years, he has witnessed China's transformation firsthand. When he arrived, cash was king; today, even street vendors display QR codes. "The pace of development is staggering," he notes, "but what matters most is how technology serves daily life, making it easier, safer, more connected."

Now, as he plans eight new video series through 2026, covering science, heritage, and everyday life across China, Rivera has not lost sight of his core mission: education through authentic storytelling.

In an era when cross-cultural ties can feel fragile, Rivera's story reminds us that real connection takes time and effort. He often says China has always welcomed him with open arms. But he also believes that being the recipient of that kindness isn't enough. "If a country opens its doors to you," he says, "the least you can do is walk through them with an open heart and an open mind."

Photo News

Dongzhi literally means "Winter's Arrival" — one of the 24 solar terms of China's traditional solar calendar. It has long been celebrated on China's Winter Solstice when the night is longest, and the day is shortest in the Northern Hemisphere. It falls on December 21 this year. Dongzhi became an imperially recognized traditional festival during the

Han Dynasty era (206 BC-220 AD). Chinese people celebrate Dongzhi Festival in many ways. The most popular ones are worshipping heaven and ancestors, counting the Nines of Winter (which separates winter into nine intervals of nine days), making rice wine, and eating dumplings and ginger rice.



Visitors take part in a traditional activity — touhu (a Chinese game of arrow throwing) — at an exhibition, spanning Dongzhi to the Lantern Festival, in Beijing. (PHOTO: XINHUA)

How Does Influenza Virus Invade Our Body?

Science Outreach

By ZHANG Jiaxin & BI Weizi

Every winter, these unwelcome symptoms — fever, aches and runny noses — make their appearance.

The influenza virus, which floats in the air, is the culprit behind all this. It hitchhikes a ride on airborne droplets, entering the human body and launching a carefully orchestrated "invasion" of human cells.

In the past, scientists were unable to observe this process in detail because the viruses are too minute and too fast, and most microscopic techniques require the destruction of cells

in order to magnify the image.

However, a team of scientists led by the Swiss Federal Institute of Technology Zurich has now used high-resolution microscopy to capture the entire process of the influenza virus entering living cells for the first time.

They were surprised to discover that this invasion is not simply "breaking and entering," but rather a complex and dynamic "dance" between the cell and the virus. Rather than being passive victims, the cells even "actively cooperate" with the virus's entry.

This may sound counterintuitive. However, it turns out that the cells "cooperate" because the cunning influenza virus "hijacks" a crucial everyday transport system within the cell. This system is the cell's lifeline and is responsible for transporting essential

substances, such as hormones, cholesterol and iron, from outside the cell to inside it.

The influenza viruses then travel along the cell surface until they find an area with a high density of receptors — their ideal entrance.

When the receptors detect the virus attachment, a precise process of cellular engineering begins. The cell membrane at the point of attachment then starts to invaginate, forming a small pit. Clathrin proteins then arrive and deepen the pit, completely enclosing the virus in a vesicle. The cell's transport system then carries this vesicle, containing the "dangerous package," to the interior. Finally, the vesicle membrane dissolves and the virus is officially established inside the cell.

Surprisingly, cells also actively

participate in this process. Not only do they rapidly mobilize clathrin proteins to the site of the virus to "construct" a structure, but their cell membranes also actively deform, undulating like waves in an attempt to "retain" viruses that are trying to leave, ensuring they are captured and brought inside.

These images had never been seen before. Thanks to a technology that combines atomic force microscopy and fluorescence microscopy, scientists can now finally track the detailed dynamic process of viruses entering cells.

This technology is not only applicable to influenza viruses, but is also expected to help people understand the invasion tactics of other viruses and observe how vaccines "train" immune cells in advance to prepare them for battle.

Traditional Eastern Wisdom

Yongle Dadian: Largest Encyclopedia in World History

By BI Weizi

Yongle Dadian, a Chinese compilation, is the world's largest known encyclopaedia. It was compiled during the Ming dynasty (1368-1644) by thousands of Chinese scholars under the direction of Emperor Yongle (reigned: 1402-1424) and was completed in 1408. Containing 22,937 "juan" or sections (including the index), in 11,095 volumes, the work was designed to include everything ever written at that time on the Confucian canon, history, philosophy, and

the arts and sciences.

In effect, it was a vast collection of excerpts and entire works from Chinese literature. However, fewer than 400 volumes of the three manuscript copies survive today. Around 800 rolls have been published as photo-offset copies.

The encyclopedia's physical appearance differed from that of any other Chinese encyclopedia of the time. It was larger in size, made of special paper and bound in a "wrapped-back" style. The use of red ink for titles and

authors — a mark of imperial commission — confirmed that the volumes were of royal origin.

Each volume was protected by a hard cover wrapped in yellow silk. Unlike other encyclopaedias, this one was not arranged by subject, but by *Hongwu Zhengyun*, a system in which characters are ordered phonetically or rhythmically. This system helped readers to find specific entries with ease.

Although printing had already been invented long before the Ming dynasty, *Yongle Dadian* was written entirely by

hand. Each entry was a compilation of existing literature, some of which was derived from rare and fragile texts. The compilation's importance lay in preserving such texts and covering such a vast range of subjects.

Yongle Dadian represents the accumulated knowledge of the Chinese nation over thousands of years. In its entry on "Encyclopedias," the Encyclopedia Britannica calls it "the largest encyclopedia in world history," and it has become an important symbol of Chinese culture.