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Innovation Pathway

China's Innovation Centers Enter New Phase

Edited by SUN Jin

China's efforts to develop international technological innovation centers in Beijing (Beijing- Tianjin- Hebei region), Shanghai (Yangtze River Delta), and the Guangdong- Hong Kong-Macao Greater Bay Area have entered a new phase of expansion, following new arrangements announced at the Central Economic Work Conference.

By accelerating the cultivation of new growth drivers, the three centers have made a series of groundbreaking achievements. In the WIPO's Innovation Cluster Ranking 2025, the Shenzhen- Hong Kong- Guangzhou cluster ranked first, Beijing fourth, and Shanghai- Suzhou sixth. China's sci-tech innovation system is stepping into a higher level and a broader range of fields.

Evolution of China's innovation centers

Behind the achievements are the years of efforts across the whole nation.

In 2013, Beijing was chosen to be built into a global innovation hub. Three years later, national plans were issued to strengthen the capital city's role as a core innovation center and to position Shanghai as a major science and technology innovation center.

In 2017, formal agreements were signed to develop the Guangdong-Hong Kong-Macao Greater Bay Area into an international innovation center.

In the report to the 20th National Congress of the Communist Party of China, to "coordinate the development of international and regional centers for scientific and technological innovation" was highlighted. This marks the transition of international science and technology innovation center development from isolated breakthroughs to a new stage of integrated, regionally coordinated growth.

Progress across three innovation centers

For 12 years, continuous investment and policy support has helped the innovation centers make remarkable achievement in science research and cultivate advanced manufacturing clusters.

During the 14th Five-Year Plan period (2021-2025), Beijing's R&D spending consistently exceeded six percent. It also introduced more than 40 industrial policies supporting key areas such as AI and commercial spaceflight.

In Shanghai, R&D spending accounted for about 4.4 percent of the city's GDP during the same period. The scale of Shanghai's three leading industries — integrated circuits, biomedicine and AI — exceeded 1.8 trillion RMB, and attracted 635 foreign-funded R&D centers.

In the Greater Bay Area, Guangdong has seen a surge in startup projects led by entrepreneurs from Hong Kong and Macao. *See page 3*



A freight train loaded with Chongqing-manufactured new energy vehicles departs from Yuzui Station at Guoyuan Port in Chongqing, southwest China, January 7, 2026. This freight train is expected to be transferred to a vessel bound for the Middle East via the Nansha Port in south China's Guangzhou city. With the rail-sea intermodal train service, the entire transport process is completed under a single declaration, a single inspection and a single release. (PHOTO: XINHUA)

STI Frontier

Intelligent Mining of Super Thin Coal Seams

Edited by WANG Xiaoxia

In China, thin coal seams account for 20 percent of the total reserves, but their output only makes up about 10 percent of the total coal production, due to the extreme mining difficulties. However, the industrial fine powder contained within the seams — coking coal, known as the "rare earth" of coal, is an indispensable and important raw material for steel enterprises.

To conquer the challenge of mining coal seams with a thickness of less than 1.3 meters, an R&D team led by Heilongjiang University of Science and Technology (USTH) has developed an intelligent mining system of extremely thin coal seams at a depth of over a kilometer underground.

This has led to the remote control and real-time monitoring of the mining of extremely thin coal seams.

Smaller machine

In thin coal seam mining, the major challenge is to integrate the small size and high power of the coal shearer machine, according to USTH Professor Wu Weidong.

Usually, the thinner the coal seam, the harder it is. To mine a coal seam over two meters thick usually requires a machine powered by 200 kilowatts. However, an installed power of 500 to 900 kilowatts is required for mining extremely thin coal seams.

The key is innovation in building the machine material and structure. By using high-performance material, the rigidity, wear resistance, and load-bearing capacity increase. Through structural reconstruction, the equipment's lifespan is prolonged, and the overall height is also reduced.

To further reduce the size of the machine's motor, the team decided to in-

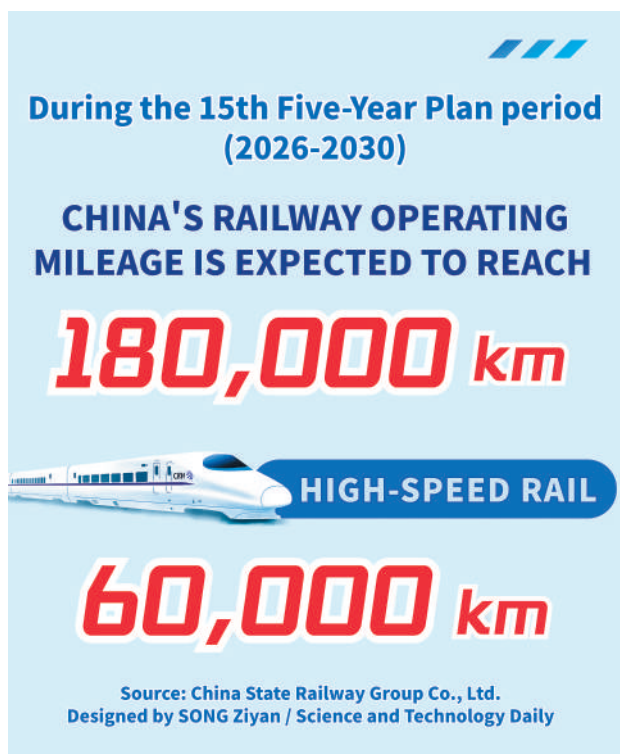
crease the voltage from 1,140 volts to 3,300 volts, which meant that all electrical components had to be reconfigured. It took four months to adjust and testify parameters, finally reducing the height of the equipment from 630 mm to 588 mm, and even leaving 20 mm of extra space for the machine to pass through.

In October 2022, the sample machine was sent into the mine for testing, nimbly shuttling through the extremely thin coal seam. After its application, the mining efficiency of extremely thin coal seams was raised from 15,000 to 20,000 tonnes per month to 40,000 to 50,000 tonnes, while the number of workers has been reduced from around 20 to just five or six.

5G remote control

In extremely thin coal seams, the narrow space and strong electromagnetic interference make it impossible to deploy conventional 5G equipment. *See page 2*

New Graphic



By LU Zijian & MA Aiping

In 2025, China made great strides in transforming agricultural innovation to actual productive forces, with sci-tech innovation in agriculture becoming a crucial support system for rural revitalization.

The country unveiled its "No. 1 central document" for 2025 in February last year, outlining priorities to deepen rural reforms further and specific steps to advance all-around rural revitalization. China plans to support the development of smart agriculture and expand the application scenarios of technologies such as AI, big data and low-altitude systems, according to the document.

In March 2025, a "100 counties, 10,000 hectares" technology integration demonstration project was initiated. The

year-end data shows that this led to the increase of yield and income with less usage of fertilizer and pesticide in over 50 kinds of crops planted in 61 counties across 18 provinces.

The field crops witnessed an average yield growth of five to eight percent, and the figure for cash crops is 10 to 15 percent.

An interest sharing mechanism was also established among governments, enterprises, research institutes and farmers during the project, to ensure maximized value for each party, according to Mei Xurong, project leader and researcher at the Chinese Academy of Agricultural Sciences.

Through clear obligation and benefit distribution agreements, the four parties united and achieved a win-win situation where governments get grain, enter-

prises get access to market, experts get data, and farmers get income.

In May 2025, seven departments, including the Ministry of Agriculture and Rural Affairs and the Ministry of Science and Technology, jointly released guidelines on accelerating the overall efficiency of the agricultural science and technology innovation system.

Substantial achievements were made throughout the year. One example is unmanned aerial vehicles (UAVs), which have become a new type of farm tool in Gansu province, driven by the "low-altitude economy + rural revitalization" practices spearheaded and promoted by the provincial science and technology department. This has seen the development of a new generation of tech-savvy rural UAV pilots.

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International Cooperation

China-BRICS New Quality Productive Forces Research Center Opens

The China- BRICS New Quality Productive Forces Research Center has opened in Beijing recently, according to the Ministry of Science and Technology.

Speaking at the center's opening ceremony, China's Vice Minister of Science and Technology Chen Jiachang stated that the BRICS cooperation mechanism is the most influential platform for cooperation among emerging markets and developing countries today.

The center will be an international platform for research exchange and cooperation within the BRICS cooperation framework.

The center will operate under a "physical + digital" model, building an international platform for research, exchanges, and cooperation under the BRICS cooperation mechanism.

It will focus on joint theoretical and applied studies on new quality productive forces, cooperation on sci-tech innovation, the exchange of personnel and professional training programs to foster interdisciplinary talent with a global outlook, and the development of a collaborative research network that provides intellectual and decision-making support for policy formulation and shared prosperity among BRICS member states and partner countries.

For BRICS countries, the joint development of new quality productive forces is a key arena to deepen mutually beneficial cooperation, a powerful engine for inclusive and shared development, and an effective step toward building a community with a shared future for humanity, said Chen.

During the center's opening ceremony, topics such as strengthening BRICS cooperation in new quality productive forces and promoting the transnational optimization of innovation resources were discussed among experts.

Source: Xinhua

WEEKLY REVIEW

Breakthrough in Flexible Solar Cells Made

Chinese researchers, led by Soochow University in east China, have resolved key challenges in maintaining efficiency and stability in flexible tandem solar cells. This is a milestone breakthrough in silicon-based flexible photovoltaics. The study was published in *Nature*.

Lithium-ion Battery Experiment in Space Station

The Shenzhou-21 crew has conducted a novel experiment on the fundamental science of lithium-ion batteries aboard China's Tiangong space station to uncover the mechanisms behind battery performance by leveraging the unique conditions of space.

Robots Smaller Than Salt Grain Can Think

Researchers at the University of Pennsylvania and the University of Michigan have built the smallest fully programmable autonomous robots ever created. They are barely visible and smaller than a grain of salt (around 200x300x50 micrometers), yet smart enough to sense, decide and move completely on their own.

New Viruses Found in Whales and Orcas

An international research team has discovered two previously unknown viruses in short-finned pilot whales and orcas from the Caribbean region of the North Atlantic Ocean. This is the first time circoviruses have been detected in cetaceans from this region and adds to the growing list of viruses known to infect marine vertebrates.

WECHAT ACCOUNT



E-PAPER



First Workday Events Set Positive Tone for 2026

Policy Express

By LIN Yuchen

As China's economy and society hit the ground running on the first working day of 2026, January 4, a series of major achievements and strategic initiatives across trade, business environment reform, industrial innovation, and regional development signaled strong momentum for the year ahead.

Qingdao's new shipping route
On January 4, the Qingdao Port in Shandong province in east China inaugurated its first direct foreign trade shipping route to Australia, linking China's key ports with Brisbane and Sydney.

The new service, with voyages taking about 20 days to Brisbane and 25 days to Sydney, significantly shortens transit times compared with traditional transshipment routes, which could take up to 30 days or even longer, enhancing logistics efficiency and strengthening direct maritime connectivity between China and a major Pacific trading partner.

The Qingdao Port now operates nearly 240 foreign trade routes, connecting more than 700 ports in over 180 countries and regions.

Shanghai's 26 new policies
Also on January 4, Shanghai held its annual business environment conference and released the *2026 Action Plan for Accelerating the Construction of a World-Class Business Environment*.



Vehicles are carried along the production line by robotic transporters at a factory of FAW Jiefang, January 4, 2026. (PHOTO: XINHUA)

The plan introduces 26 targeted measures across four pillars: government services, market competition, industrial ecosystem, and social co-governance. Officials say the reforms aim to make regulatory improvements more inclusive, fair and tangible for enterprises, reinforcing confidence in the city's economic prospects amid global uncertainties.

Shanghai has consistently ranked at the top of global business environment indicators, outperforming major international cities. Moreover, Shanghai Customs has rolled out the country's

first "low-risk special item intelligent auxiliary approval model," which compresses average approval times by roughly 70 percent while maintaining biosecurity standards.

Nanjing's AI integration
In Nanjing in east China, new industrial directives have been introduced to bolster AI integration across sectors. The city's initiatives prioritize the establishment of interdisciplinary innovation platforms and employ competitive mechanisms such as "challenge-led breakthroughs" to address core algorithm development and large-

scale deployment challenges.
Local leaders emphasize building AI ecological districts, deploying "compute power vouchers," and strengthening foundational support so that enterprises can pursue innovation with confidence.

Hainan's gateway role
In southern China, Hainan province held a high-profile New Year economic work meeting on advancing the high-standard construction of the Hainan Free Trade Port. The meeting underscored the urgency of deepening reform and opening up policies to attract investment and expand international cooperation.

Analysts observed that since the full implementation of free trade port operations, Hainan has enhanced market access and institutional innovation, reinforcing its role as a gateway for high-level opening up.

Nationally, upbeat tourism and consumption data from the New Year holiday further buoyed economic confidence. In Hainan, duty-free sales rose sharply, and transport and cultural markets saw strong activity, reflecting robust domestic demand and consumer enthusiasm at the start of 2026.

Taken together, these developments underscore China's proactive approach to economic governance in early 2026, combining infrastructure expansion, regulatory reform, industrial innovation, and regional openness to lay a solid foundation for sustained high-quality development throughout the year.

challenges in the sector.
The document also highlights the importance of strengthening foundational support for data science innovation. This includes accelerating the development of a national integrated computing power network, and pooling and intelligently scheduling diverse computing resources to support data science research and testing.

Moreover, a robust standards system in key data fields would be developed, ensuring that data infrastructure, service capabilities, and high-quality data sets are aligned with technological advancements and industry promotion.

The National Data Administration will establish a coordination mechanism to coordinate technological breakthroughs and resource allocation. It will also formulate an evaluation system for data sector achievements and regularly assess outstanding outcomes from academia, research and application to incentivize innovation and progress in the field.

This strategic move underscores China's commitment to advancing data-driven innovation not only for its own digital transformation but also to contribute to global digital governance, interoperable data ecosystems, and inclusive technological progress.



Case Study

Dujiangyan Irrigation System Nurtures Sichuan's Granary

By LI Linxu

The Dujiangyan irrigation system, located in the western part of the Chengdu Plain in southwest China, is an ecological engineering feat originally constructed around 256 BC.

As the only remaining grand water conservancy project in the world, it has withstood natural disasters such as floods and earthquakes, and is still in use today.

Characterized by dam-free water diversion, it has tamed floods, nourished farmlands, and sustained the prosperity of Sichuan province for over 2,000 years.

The system comprises two parts: the Weir Works, located at an altitude of 726 meters, the highest point of the Chengdu Plain, and the irrigated area.

Thanks to digital and intelligent transformation of the Dujiangyan irrigation system, such as digital twin reality modeling and automated water metering facilities, the management of the irrigated area has entered a new phase of "intelligent-driven and precise decision-making."

"The irrigated area of the Dujiangyan irrigation system is continuously expanding," Li Yanfu, deputy secretary of the Party committee of the Sichuan Dujiangyan Water Conservancy Development Center, said.

Its effective irrigated area has increased from 2.86 million mu (1 mu

equals 666.7 m²) in the early years of the People's Republic of China to 11.65 million mu in 2025, serving a population of more than 30 million across eight cities and 41 counties (county-level cities, districts) in Sichuan, according to Li.

Zizhong, a county in the central Sichuan Basin, is one of the beneficiaries of such an increase. Agriculture in the county's towns such as Falun and Qiuxi was long dependent on rainfall. But the arrival of water from the Minjiang River changed the situation.

In October 2025, the nearly 30-kilometer-long Sanhuang branch canal officially started operation, delivering water from the Minjiang River via the Dujiangyan irrigation system to the Dongfeng reservoir in Zizhong. This injects vital hydraulic power for developing high-quality grain, oil, fruit and vegetable industries in the area.

"Now that water is easily accessible, I feel much more confident about a bumper harvest!" Lv Desheng, a farmer from Qiuxi town, said.

At present, the annual water supply of the irrigated area is stabilized at over seven billion cubic meters.

"The irrigated area is a veritable grain barn and wealth reservoir," Li said. "With less than one-twentieth of Sichuan province's land area, it now produces nearly one-quarter of the province's grain output and contributes almost half of its regional GDP."



Baopingkou, an artificially excavated water inlet, at the Dujiangyan scenic area in Chengdu, southwest China's Sichuan province. (PHOTO: XINHUA)

New Policy to Propel Data Innovation

By LIN Yuchen

On December 27, 2025, the National Data Administration of China released a policy document for strengthening sci-tech innovation on data. The primary objective of this policy is to enhance the development of data-driven technologies, fortify data resource systems, and unlock the multiplier effect of data elements.

China aims to achieve significant progress in its digital transformation by focusing on high-level technology breakthroughs and fostering a thriving data innovation ecosystem.



A staff member operates a robot to collect data in a coffee shop scenario at a humanoid robot innovation center in the Wuhan East Lake High-tech Development Zone in Wuhan, central China's Hubei province. (PHOTO: XINHUA)

It is a clear vision for the next decade, aiming to build a series of supportive data science and technology innovation platforms by 2027. These platforms will foster deep integration of industry, academia, research and application, creating an efficient innovation mechanism for establishing a data-driven industrial innovation system.

Technological breakthroughs will be sought in data supply, circulation, utilization and security. By 2030, China expects its core data technologies to reach advanced international levels, while its data science innovation and industrial ecosystem will see a comprehensive upgrade.

This will provide support for building the data element market system and demonstrate the power of data elements in driving high-quality economic and social development.

Critical technological challenges will be addressed and high-level applications fostered. Research and breakthroughs will be strengthened in key data technologies, incorporating data science and technology research into the national science and technology planning system.

The development of key technologies will be accelerated in areas such as data supply, circulation, utilization and security, and domestic capabilities in critical data infrastructure will be strengthened.

Additionally, efforts will be increased to scale up data science innovation, promoting the efficient conversion of research outcomes into practical applications.

To nurture a robust data science innovation ecosystem, a comprehensive innovation platform system would be established in the data field. The policy encourages the formation of innovation consortia led by national laboratories, enterprises, universities and research institutes. These consortia will take the lead in national data science research tasks and the construction of major innovation platforms, tackling the key

China Accelerates Smart Grid Development

By SUN Jin

China's National Development and Reform Commission and the National Energy Administration jointly issued a policy roadmap recently, with the goal of developing an integrated smart power grid by 2030.

The next-generation system will combine main transmission grids and distribution networks as its core infrastructure, supplemented by smart microgrids.

There are clear targets for 2030: expanding the west-to-east power transmission network capacity exceeding 420 GW, boosting cross-provincial power sharing by 40 GW, raising renewable energy's share to 30 percent of total generation, and accommodating 900 GW of distributed new energy.

The guideline also outlines measures in seven aspects, including defining functional architecture for the smart grid platform, establishing modernized dispatch systems, and implementing

technology-driven infrastructure upgrades. It proposes to develop smart microgrids tailored to local conditions, and increase investment in power grids.

"The collaboration between main grids, distribution networks, and microgrids enables the development of new power grid forms," said Zhang Lin, director of the Department of Planning and Development at the China Electricity Council.

As diverse new energy forms connect at different voltage levels, the grid

is evolving from a traditional one-way hierarchical structure into a more flexible, multi-directional and bidirectional hybrid system.

To support the development of the new power grid forms, it's necessary to enhance the interaction capability between the main grid, distribution networks and microgrids, strengthen grid security and backup capacity, and accelerate intelligent upgrades.



Intelligent Mining of Super Thin Coal Seams

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"Just like putting a base station in a matchbox, it needs to be both compact and have a full signal," said Yang Qingjiang, professor at USTH, who is in charge of communication technology.

After numerous failed attempts, the team came to a deadlock. USTH Professor Liu Fugang suggested using leaky-wave antennas, which can reduce the volume without affecting the signal.

The team integrated multiple previously used devices into a single unit, significantly reducing its volume and weight. They replaced traditional antennas with leaky-wave antennas and laid them along the gaps of the brackets to achieve uniform signal coverage in the operation area.

After three months of installation and commissioning, data showed that key technical indicators such as the uplink and downlink rates and latency of 5G signals in extremely thin coal seam working faces all meet the national standards. This is the first successful deployment of 5G in extremely thin coal seam working faces in China.

Real-time scenes and equipment status can all be transmitted to the surface without any delay, laying a solid foundation for remote intelligent control, said Yang.

Precise mining

The occurrence of extremely thin coal seams (referring to their existing state and distribution characteristics in the stratum) is unstable, so a slight

mistake can lead to the shearer cutting into the rock, which not only easily damages the equipment but also may cause accidents.

Therefore, building a high-precision geological model is the prerequisite for intelligent mining, said USTH Professor Liu Yongli, who is in charge of geological modeling for this project.

Within a space of 0.7 to one meter high, technicians could only crawl forward. Every time they went down the mine, they had to carry over 10 pounds of detection instruments, self-rescuers and miners' lamps.

During the crawling exploration, the team accumulated a vast amount of geological data and integrated drilling and geophysical exploration data to build a three-dimensional geological model of the extremely thin coal seam, with an accuracy of 0.1 meter. It was akin to giving the coal seam a "CT scan," which made all details clearly visible.

With the 3D built precise model, the coal shearer can plan the path in advance, automatically adjust the height and reduce risks, realizing precise mining in the thin coal seams.

To date, this technology has been promoted in Heilongjiang, Yunnan, Shaanxi and other provinces. The mining efficiency of extremely thin coal seams has increased by 200 percent, with an additional production capacity of over 1.5 million tonnes, and an additional revenue of over 600 million RMB.

FSR Damages China-EU Economic Ties



By SUN Jin & HU Dingkun

Dawn raids on a Chinese digital platform and frequent probes into Chinese enterprises are some of the measures taken by the European Commission (EC) under the new EU Foreign Subsidies Regulation (FSR), China's Ministry of Commerce said.

The targeted companies include CRRC, leading Chinese locomotive manufacturer, and advanced security & inspection solution supplier Nuctech, which were subjected to an in-depth investigation.

These actions are egregious and discriminatory in nature, evidently targeting Chinese companies.

China is closely monitoring these moves by the EU and will take necessary measures to safeguard the legitimate rights and interests of Chinese enterprises.

The FSR, which took effect in July 2023, requires enterprises participating in EU public tenders or merger and acquisition transactions exceeding certain thresholds to notify the EC about any foreign subsidies they receive. The EC can launch in-depth investigations based on notifications or initiate ex-officio investigations independently.

Although the FSR claims to be country-neutral, its enforcement has shown strong targeting and discriminatory bias.

In-depth investigations primarily target Chinese enterprises, with very few cases involving companies from other countries.



A view of the container terminal of Zhoushan Port in Ningbo, east China's Zhejiang province. (PHOTO: XINHUA)

According to Dutch law firm Houthoff, during the two-year implementation of the FSR, the EC received over 2,100 public procurement notifications, but initiated only three in-depth investigations based on these notifications.

All three were Chinese technology companies in new energy, transportation equipment and related fields, and were forced to withdraw from tenders post-investigation.

In addition, the EC launched two ex-officio investigations targeting Chinese wind turbine and security scanner suppliers.

In December, the EC conducted a foreign subsidies investigation into a Chinese e-commerce platform and conducted dawn raids at the enterprise's European headquarters in Ireland.

Reports also indicate that the EU is conducting similar investigations into

Chinese electric vehicle manufacturers.

Additionally, the FSR does not clearly define which foreign subsidies would distort competition in the EU market.

In October 2024, the global law firm Hogan Lovells released a report stating that the breadth of the FSR, lack of transparency, and the EC's wide discretion mean there is significant uncertainty in terms of the EC's objectives and how the relationship between subsidies and the market is defined.

The FSR has severely damaged the EU business environment and significantly disrupted the normal operations of multinational enterprises, particularly Chinese enterprises within the EU.

China's Ministry of Commerce estimates that FSR enforcement has already led to direct and indirect losses valued at approximately 2.1 billion EUR. A 2025 survey by the EU's China Chamber of Commerce found that over 63 percent of

its members have been directly or indirectly impacted by FSR procedures, with half citing concerns over reputational risk.

In addition to the targeted suppression of Chinese enterprises, the implementation of the FSR has put significant administrative pressure on companies from other countries operating in the EU as well.

In July last year, the international law firm White & Case stated that the FSR compliance places a heavy burden on internal corporate resources and constitutes a burdensome compliance obligation on these enterprises.

Even when a subsidiary has no connection to its EU transaction in question, the notified enterprise must disclose all foreign subsidies received by all subsidiaries. The data collection process is complex, time-consuming, and requires substantial work.

In December 2024, the Washington, D.C.-based law firm Crowell and Moring pointed out that the FSR's notification requirements encompass not only foreign subsidies, but also include loans, capital injections, debt relief, tax breaks and more, making it a daunting task for any company engaged in international operations.

As a major global economy, the EU should uphold fair and open trade, but has instead built discriminatory barriers against Chinese enterprises. Cooperation with China is vital for the EU's energy transition and supply chain security. Excluding Chinese enterprises harms mutual interests.

The EU should ensure a just, equal, and transparent business environment, avoiding damage to China-EU economic relations through regulations like the FSR.

Washington has imposed sweeping export controls aimed at slowing China's progress in semiconductors, artificial intelligence, and related industries.

In June 2025, the Federation of American Scientists published an analysis stating that the goal of restricting China's exports is to "reduce China's access to global markets and starve their industrial machine."

The article argued that tariffs represent the most direct approach for curbing China's semiconductor exports and can be implemented under a variety of forms and justifications.

Thus, while export controls are used to impede China's advanced chip development, tariffs are now being prepared to undermine China's mature-process manufacturing capacity. Taken together, these measures suggest an attempt to construct a comprehensive containment strategy aimed at constraining China's semiconductor industry across the board.

Yet experience has already shown that sustained pressure and containment will not halt China's technological progress. Tariffs on Chinese chips will not stall the development of China's semiconductor sector. Instead, they are more likely to exacerbate global supply chain disruptions and impose higher costs on U.S. industries and consumers alike.

ended to a county-level government, where he served as deputy magistrate in charge of science and technology of Boxing county, Binzhou city, and also worked as a science and technology matchmaker.

"To understand the needs [of the area], I visited every town, street and enterprise in Boxing," Sun said, adding that he also learned about the good crop species and technologies of SAAS, so that they can be connected. "The team is here, the project is here, and technology becomes tangible productivity."

Voice of the World

Global Tourists Praise China's Openness, Culture and Convenience

Edited by QI Liming

During the New Year's Day holiday this year, a popular travel option for foreign tourists was coming to China to ring in the new year. Booking data indicates that from January 1 to 3, over 320,000 inbound flight tickets were booked, growing by approximately 11 percent year on year.

Policies such as extending visa-free periods, expanding visa-free coverage, and optimizing entry services have facilitated travel for foreigners. Several foreign media reported the sustained strong growth momentum of China's tourism industry and China's important position in the global tourism market.

Destination of appeal and opportunities

According to the U.S. magazine *Travel And Tour World*, visa-free entry and the ability to make card payments have ushered in a new era in Chinese tourism.

In the first three quarters of 2025, the number of foreigners entering China on a visa-free basis reached 20.89 million, an increase of over 50 percent compared to the previous year.

Sales eligible for tax refunds on departure also grew by about 98.8 percent year on year. "Going to China with an empty suitcase" has become a new trend on overseas social media platforms.

Gloria Guevara, CEO of the World Travel & Tourism Council (WTTC), said at the 2025 Global Tourism Economy Forum, "China plays a significant role in the global tourism economy." With the implementation of the visa-free policy, the inbound tourism market in China is gearing up for growth. Emerging tourist destinations have become a new driving force, and China's appeal as a business travel and leisure vacation destination is increasing.

The long-term forecast by the WTTC indicates that thanks to its rapid

development, China is expected to become the world's largest tourism market within the next few years.

Brazilian news and political analysis website Brasil 247 reported that from cutting-edge trends to intelligent technologies, the shopping experience in China is resonating in sync with the global travel boom.

Rising forms of culture + technology

Home to two UNESCO World Heritage Sites, Huangshan city in Anhui province in eastern China has introduced two measures: the "Digital Hui-zhou" project and the "time-slotted reservation + carbon credit" ecological management model. The latter promotes the diversion of tourists through digital platforms, reducing the pressure on the capacity of popular scenic spots to receive visitors.

Vedomosti, a Russian-language business daily newspaper published in Moscow, said this marks a shift in Huangshan's two World Heritage Sites from mass tourism to a new paradigm where culture, technology and sustainable development operate in a coordinated manner.

In *Vedomosti's* report, Svetlana Batanova, senior lecturer of the Financial University in Russia, said immersive interaction transforms tourists from passive observers into active participants, which is particularly important for attracting youngsters and preserving traditional culture.

The Russian website Kam24 reported that China's innovative technologies, unique culture and impressive infrastructure projects are transforming the traditional way of leisure and vacation, offering tourists distinctive experiences.

Today, "technology + tourism" not only represents China's competitive edge but also has become a trend, setting new standards for the tourism industry and shaping China's image as a tourist destination.



Foreign tourists experience local culture during their travels in China. (PHOTO: XINHUA)

China's Innovation Centers Enter New Phase

From page 1

More than 250 Guangdong-based companies are now listed in Hong Kong markets, with a combined market value of over 11 trillion RMB.

The success of three international science and innovation centers stems from cross-regional collaboration supported by coordination between the central and local governments.

Take the Beijing-Tianjin-Hebei region as an example. The three places are collaborating on industrial development, jointly mapping out six key industrial chains, including hydrogen energy and biopharmaceuticals.

At the Tianjin Municipal Industry and Information Technology Bureau, *Science and Technology Daily* reporter saw the map for Tianjin's productivity (2025), where the "Beijing-Tianjin high-tech industrial belt" was highlighted, offering a clear, at-a-glance view of the industrial chain layout.

Future plans for expansion

China plans to further expand its science and technology innovation hubs by strengthening connections between Beijing, Shanghai and a wider group of

innovation-oriented cities and areas.

These include Tianjin, Nanjing, Hangzhou, Hefei, Suzhou, Ningbo and the Xiong'an New Area in Hebei.

The goal is to make it easier for resources, talent and research platforms to move across regions and improve the overall effectiveness of regional innovation systems.

A series of practical supporting measures, such as strategic planning for scientific and technological development and policies to foster industrial clusters, are expected in the coming days.

In the Beijing-Tianjin-Hebei region and the Yangtze River Delta, preparations are underway to take on these expanded roles.

Beijing will deepen its role as a regional innovation leader, leveraging its integrated education, science and technology mechanisms to strengthen collaborative research.

Shanghai also announced new measures in 2025 to enhance linkages with the Yangtze River Delta and accelerate the growth of national-level advanced manufacturing clusters.

U.S. Probe on China's Chips Exposes Double Standard

Comment

By LIANG Yilian & HU Dingkun

The Office of the U.S. Trade Representative (USTR) has released the findings of an investigation targeting China's semiconductor industry, which allege that China's efforts to strengthen its position in the sector are "unreasonable" and impose burdens or restrictions on U.S. commerce.

The USTR also announced that from June 2027, additional tariffs will be levied on semiconductor products imported from China, with specific rates to be disclosed at least one month in advance.

The investigation was carried out under Section 301 of the U.S. Trade Act, which gives the USTR authority to take unilateral action against foreign trade practices it finds unfair. Section 301 has been frequently used against China.

At the core of Washington's accusation is the claim that China relies on industrial planning, subsidies, and other so-called "market-distorting policies" to promote semiconductor development.

This charge, however, is a textbook case of projection. In reality, the U.S. is the most aggressive practitioner of

"market-distorting policies" in the global semiconductor industry and not in a position to criticize others.

In August 2022, then U.S. President Joe Biden signed the CHIPS and Science Act, authorizing 52.7 billion USD in direct subsidies for the U.S. semiconductor industry. The legislation also provides a 25 percent investment tax credit for chip manufacturing facilities and related equipment, while imposing strict restrictions on recipients, including a ban on significant expansion of advanced chip production in China for a decade.

Following Donald Trump's return to office, the U.S. government repeatedly threatened to impose tariffs on imported semiconductor chips, using trade pressure to compel global chipmakers to build manufacturing plants in the U.S.

In this sense, the U.S. semiconductor policy has merely shifted from carrots to sticks. The Biden administration favored financial incentives, while the Trump administration leans on coercive measures.

Yet despite their different approaches, the objective remains the same: bolstering U.S. semiconductor capabilities through state intervention and securing a competitive edge through policies that depart sharply from free-market principles.

The USTR's assertion that China seeks semiconductor dominance in order

to increase U.S. dependence and vulnerability is even less convincing. China's semiconductor industry remains primarily focused on meeting domestic demand rather than exporting aggressively to foreign markets, let alone engineering U.S. reliance on Chinese supply.

China's chip production capacity is concentrated largely on mature-process nodes of 28 nanometers and above. According to a memorandum released in 2024 by the French Institute of International Relations, approximately 80 percent of China's mature-process chips are sold within the domestic market.

The report also notes that China places greater emphasis on investment in technological research and development than on unchecked capacity expansion.

As domestic demand for mature-process chips has grown at roughly the same pace as production capacity, the likelihood of Chinese chips flooding Western markets remains low.

A similar conclusion was reached in April 2024 by the U.S.-based Center for Strategic and International Studies, which found that even by 2030, the bulk of China's semiconductor output will be absorbed by strong domestic demand.

Ironically, it is the U.S. — not China — that has openly weaponized semiconductors. Leveraging its technological dominance in advanced chips,

Innovation Fast-tracks Agricultural Renewal

From page 1

They are driving prosperity, helping solve challenges in mountainous agricultural development, and injecting vitality into rural revitalization.

In Yuanmou county, Yunnan province, examples of smart agriculture can be seen everywhere. The breeding time for highland barley has been cut by half and 26 new tomato species have been

bred via molecular breeding. Crop planting and management are now using the Internet of Things, via over 3,700 sensors, while an intelligent water-fertilizer integration system enables remote operation, with comprehensive coverage of technologies, including factory-based seedling cultivation and efficient water-saving irrigation.

Many innovation modes, such as

"Science and Technology Matchmakers," "Science and Technology Commissioners," and "Science and Technology Backyards," were adopted by local governments and research institutes to promote the deep integration of science, technology and industries.

Sun Jiabo, leader of the urban agriculture team at Shandong Academy of Agricultural Sciences (SAAS), was sec-

Success Stems from Chance, Patience and Collaboration

Dialogue

By LONG Yun & CHEN Xi

For Professor Pierre Agostini, science first appeared as a man running back and forth across a classroom. It was during high school when his chemistry teacher, demonstrating how atoms bond, dashed from the blackboard to the wall and back again, shouting out element symbols and mimicking reaction pathways.

The other person responsible for his taste for science was his professor of electronics at the university, who showed him his first laser, a modest He-Ne.

"I'm very grateful to both of them," he said.

Agostini received the 2023 Nobel Prize in physics for "experimental methods that generate attosecond pulses of light for the study of electron dynamics in matter." In 2025, he was elected a foreign member of the Chinese Academy of Sciences (CAS).

In a recent interview with *Science and Technology Daily*, Agostini spoke about his scientific journey with humility, acknowledging the roles of chance, patience and collaboration.

A 'little peak' appears!

In 1979, working under Gérard Mainfray at CEA Paris-Saclay, a national research center of the French Alternative Energies and Atomic Energy Commission, Agostini and his colleague Guillaume Petite built a basic retarding voltage electron spectrometer and did their first experiment with their "one-shot-per-minute" laser.

Their laser fired only once per minute, making the experiment painstakingly slow. But one day, "a small, unexpected peak" appeared on screen.



Professor Pierre Agostini. (COURTESY PHOTO)

"We thought it was interesting, so we quickly wrote a paper," Agostini recalled. "But honestly, none of us realized this would become the starting point of Above-Threshold Ionization, or ATI. At the time, we still interpreted it as a higher-order perturbative effect. And we didn't yet grasp that electrons were absorbing many more photons than needed for ionization."

Ironically, after upgrading their equipment, they spent months failing to reproduce their own result. "I couldn't sleep well for weeks," he said.

In 2001, Agostini succeeded in producing and investigating a series of consecutive light pulses, in which each pulse lasted just 250 attoseconds. Potential applications of attosecond pulses include ultrafast electronics and medical diagnostics.

Discussing his Nobel Prize, he remained humble. "It did not change the trajectory of my research. With my colleague Louis DiMauro at the Ohio State University, we had been working on atto-

second physics since 2005. The prize in 2023 was surely an encouragement to continue."

Science across borders

Over decades, he has collaborated across Italy, Canada, the Netherlands, Germany, the United States, and now China. What makes international collaboration work? "I believe the human factor is key, nationally or internationally. Science is by nature international, but a successful collaboration begins with a good personal connection. That's my experience."

He first visited China around 40 years ago at the invitation of CAS. Today, touring advanced labs at Nankai University, Peking University and ShanghaiTech, he sees dramatic progress.

"My recent visits have shown me the incredible advancement of Chinese research compared to my first visit to the Institutes of Optics in Xi'an and Shanghai as a guest of CAS decades ago. It makes me regret not having been more involved with the Chinese

scientific community over those years."

In 2024, he was appointed honorary professor at Nankai University, where he established the International Joint Research Center for Ultrafast Optics and Applications to foster global cooperation in attosecond science.

'Don't fear the unexpected'

Young researchers often ask him for career advice. His response reflects his own winding path. "It is hard to guess where science will go, and there is certainly a part of chance in making a good career choice. Astronomy is a good candidate with the huge amount of new data now available. Applications of atomic physics, from atomic clocks and frequency combs to attophysics, are attracting many groups around the world. X-ray Free-Electron Lasers (XFELs) are also on the rise."

Looking ahead, attosecond science is pushing toward shorter wavelengths and higher intensities.

"One of the remaining challenges is to increase the intensity of attosecond pulses and push them deeper into the X-ray regime. The Linac Coherent Light Source, or LCLS, has already shown several orders of magnitude higher photon flux compared to high-harmonic generation, and more progress is likely at the growing number of XFEL facilities in Europe, China, Japan and (South) Korea."

And further into the future? "The light pulses on the zeptosecond timescale have yet to be demonstrated," he said. Generating a true one-attosecond pulse would require a bandwidth of hundreds of electronvolts and a carrier wavelength shorter than two nanometers, deep in the X-ray range, a regime already beyond the reach of current high-harmonic generation techniques.

Nankai University also contributed to this article.

Traditional Eastern Wisdom

Tian Yuan Shu: Early Symbolic Algebra

By BI Weizi

Tian yuan shu, a method of algebraic computation using counting rods to solve problems, translates as "method of the heavenly element." The "heavenly element" refers to the unknown variable, which is usually represented by the letter x in modern algebra. As a positional system it makes use of the rod numerals to express polynomial (two or more algebraic terms) equations.

For example, $2x^2 + 18x - 316 = 0$ is represented as in *Figure 1*, and in Arabic

	2
— Ⅲ 元	1 8 元
≡ — 𠂇	- 3 1 6
Figure 1	Figure 2

numerals in *Figure 2*.

The 元 (yuan) represents the variable x , meaning the numbers in that line equate to $18x$. The row underneath indicates the constant term (-316), while the row above represents the coefficient for the quadratic (x^2) term. This framework can include arbitrarily high powers of the variable by adding more lines above, and negative powers by adding more lines below the constant term. Decimal values can also be expressed.

The theoretical origins of Tian yuan shu can be traced back to the mathematical treatise *Jigu Suanjing* by the early Tang Dynasty mathematician Wang Xiaotong. This book, completed around 626 AD, is the only mathematical classic among the Ten Mathematical Classics in-

dependently written by a Tang Dynasty scholar. In one volume, it contains 20 mathematical problems, covering astronomical calculations, calculations of solid volumes in civil engineering and hydraulic projects, and methods for solving cubic equations.

The *Jigu Suanjing* was the first text to systematically propose the "method of extracting roots with auxiliary terms (a numerical method for solving cubic equations with positive coefficients)." This method was later used by Jia Xian of the Northern Song Dynasty in his *Diagram of the Origin of Root Extraction Methods* for solving higher-order equations.

In modern times, Tian yuan shu's historical and cultural significance has

become more evident. Academically, it is one of the world's earliest examples of symbolic algebra, predating the work of European mathematicians, such as François Viète, by more than 300 years.

Furthermore, its algorithmic thinking exemplifies the highly procedural and mechanized nature of ancient Chinese mathematics. Its attempts at symbolization demonstrate that across different civilizations, humanity has been exploring the use of abstract algebraic methods involving the replacement of specific numbers with symbols. In mathematics education, Tian yuan shu is often used to demonstrate the various ways in which equations can be developed, and to help students understand symbolic language.

Hi-tech Revitalizes Hezhen People's Yimakan Storytelling

Tech+Culture

By ZHU Hong & BI Weizi

"There is a great river flowing eastward towards the sun, all the way to the sea. This dark river is called the Heilongjiang..."

On a freezing day in late December 2025, the intangible cultural heritage digital experience hall in Tongjiang city in Heilongjiang province resounded with this profound song, *The Tribe of the Rising Sun*.

The singer was no mortal but the digital avatar of Wu Baochen, a renowned artist recognized as a national-

level inheritor of Yimakan, a time-honored oral art of storytelling in the form of singing and speaking.

Yimakan has been described as the "soul" of the Hezhen people, the smallest ethnic group in China living primarily in Heilongjiang in northeast China.

Using digital facial reconstruction, 3D scanning and a digital human driving system, the veteran artist's facial features and skin texture were reproduced in such detail that it seemed the man himself was performing face-to-face.

On that day, the "Hezhen Ethnic Style Yimakan Appreciation" exchange and exhibition event opened in the hall, celebrating the ascent of Yimakan to the UNESCO Representative List of the Intangible Cultural Heritage of Humanity

from the List of Intangible Cultural Heritage in Need of Urgent Safeguarding.

As the Hezhen group has no written language, their historical memory is passed down entirely orally. In the exhibition hall, the digital Wu told the audience: "I learned to sing from my ancestors when I was young. Back then, on fishing boats and by the riverbanks, the elders would sing a section during a break from their work. These songs were about heroic feats, fishing and hunting, and the ethics of the Hezhen people."

Since its opening in August 2025, the sprawling digital experience hall has become a base for keeping Yimakan alive. Its comprehensive Yimakan database collects classic songs from numerous inheritors and uses holographic

projection to recreate the performances of veteran artists.

Virtual reality (VR) / augmented reality technology is used to create an immersive experience area showcasing the wisdom and artistry of the Hezhen.

"With VR glasses, you feel you are standing on a snow-covered plain from a hundred years ago, watching the hero Morrigan conquer all directions," a visitor to the exhibition told *Science and Technology Daily*.

In the virtual scene, snowflakes fell in a soft patter and horse hooves left tracks in the snow. Holographic images of Wu and other ancient storytellers blended into the scene, creating a wonderful fusion of ancient storytelling and modern technology.

My China Story

A Window for Mutual Understanding

By Staff Reporters

Three international students from Tianjin University (TJU) recently completed a one-week volunteer teaching program at the Nanyang middle school in Tanchang, a county in Gansu province in northwest China. Their visit was part of a broader educational support initiative designed to strengthen rural English education and promote cultural exchange.

The volunteers, Imad Alam and Ibrahim Nayab from Pakistan, and Tan Lak Hon from Malaysia, taught English to more than 200 students in the seventh to ninth grades, using storytelling, role-playing and mind mapping.

"Many students were too shy to speak," said Alam, a third-year PhD candidate in electrical engineering. "We focused on building their confidence through games, competitions and interactive activities."

At first, they had planned to have two students per class. "But almost everyone wanted to join. It was a wonderful surprise," Alam said.

A speech competition initially planned for a small group ignited widespread enthusiasm, with nearly all students eager to participate.

For Nayab, a second-year PhD student in emergency medicine previously involved in a secondary school in Pakistan, the experience was both professional and personal.

"Teaching in Tanchang allowed me to compare educational approaches and see how Chinese students are learning English," she said. "The students were curious and asked about my culture, university life, and even traditional food from my country."

Tan, who taught eighth graders, focused on helping the students express themselves in English by incorporating local elements such as food, landmarks, and traditional customs into his lessons.

"The students had a lot of enthusiasm once they felt the class was connected to their lives," he said. "They were proud to talk about their hometown in English."

Beyond the classroom, the volunteers were warmly welcomed by the local teachers and community members, who took them to scenic sites like snow-capped mountains with modern ski lifts installed. They also introduced them to regional cuisine and local customs.

"The teachers treated us like family," Alam said. "Their warmth made the experience even more unforgettable. I told the students I would always be available to guide them as a mentor and supporter."

This program is part of a long-term partnership between the School of International Education of TJU and the Nanyang middle school. The two institutions are exploring sustainable cooperation models such as hybrid teaching,



Ibrahim Nayab and Chinese students in Nanyang middle school. (COURTESY PHOTO)

teacher training and curriculum sharing.

"This was not just about teaching English," Tan said. "It was about showing the students that they are part of a larger world — and that they can reach it."

The experience changed the volunteers' perspectives as well. For Tan, engaging with students in a rural setting offered insights beyond language instruction. During his second lesson, he taught the students how to use mind maps to organize their thoughts while learning about local culture.

When he played the Chinese song Rubia in class, many students were visibly moved by the line, "Life blooms like a flower."

"I thought I was going to open a window for the students," Tan said. "But in many ways, they opened one for me. I saw a different side of China, one that's hardworking, resilient, and rich in culture and warmth."

The experience also shaped Nayab's understanding of rural education in China.

"I was impressed by the discipline and structure here," she said. "Even during lunch breaks, students queued up in an orderly fashion, and their respect for teachers was evident. It gave me a deeper appreciation of how seriously China takes education, even in the most remote places."

Alam agreed, saying the students' dedication stood out. One ninth-grade student even asked to stay in touch via WeChat to practice English after school hours.

"Their motivation and curiosity reminded me why education matters," Alam said. "It's not just about books — it's about opening minds and building futures."

As China continues its efforts in rural revitalization and promoting international exchanges, such international cooperation projects are helping ensure that students can pursue opportunities and dream big regardless of location.

"These young people are the future leaders of China," Nayab added. "They just need the right support."

Photo News



A contestant works on a snow sculpture at the compound for the Sun Island International Snow Sculpture Art Expo in Harbin, northeast China's Heilongjiang province, January 7, 2026. (PHOTO: XINHUA)