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WEEKLY EDITION

Open Innovation Ecosystem Pushes Sci-tech Progress

Edited by WANG Xiaoxia

Scientific and technological innovation is an important force for humankind to jointly address risks and challenges and promote peace and development, said Chinese President Xi Jinping in a congratulatory letter to the 2023 Pujiang Innovation Forum which opened in Shanghai on September 10.

China will firmly pursue a mutually beneficial and win-win strategy of opening up, continue to expand high-level opening up, continue to promote international scientific and technological exchanges and cooperation with a more open mindset and a broader range of measures, build a globally competitive open innovation ecosystem, and work with other countries to create an open, fair, just and non-discriminatory environment for scientific and technological development, Xi said.

The letter shows the importance attached to sci-tech innovation and international cooperation, said Wu Zhengxing, a researcher at the Institute of Automation, Chinese Academy of Sciences.

Brazil, the guest country of honor at this year's forum, sent delegates from the government, industry, academia and research institutions to exchange views on the latest sci-tech developments and future trends.

Celso Pansera, president of the Brazilian Innovation Research Agency, said the two countries will usher in more results in the field of scientific innovation to benefit both.

"We will build the Pujiang Innovation Forum into an important platform for global sci-tech innovation exchanges to advance international sci-tech cooperation and enhance the common wellbeing of mankind," said Xu Jie, deputy director of the department of international cooperation, China's Ministry of Science and Technology (MOST).

Themed "Open Innovation Ecosystem: Innovation for Global Connectivity," this year's forum was sponsored by MOST and the Shanghai municipal government.

The topics under discussion included brain science, frontier physics, life sciences, low-carbon tech, nanotechnology and robotics. Six relevant reports were published on sci-tech development.



An aerial view of the scenery of the Xiling Gorge, one of the Three Gorges on the Yangtze River in central China's Hubei province. (PHOTO: XINHUA)

Editor's Pick

Scientific Management Guarding Yangtze River

By LU Zijian

The Yangtze River is regarded as China's mother river, and much effort has been made in the past to protect its ecology, with a particular focus on its water quality. That effort has led to good results.

According to the Ministry of Ecology and Environment (MEE), from January to May, 94 percent of the water quality at the monitored sections along the Yangtze River Economic Belt reached Grade III or above in China's five-tier system, and the water quality of all the main streams of the Yangtze River remained Grade II for three consecutive years.

Such achievements wouldn't have been possible without the collected efforts from different aspects.

Technical treatment of waste water

To keep the Yangtze River clear and clean, an unavoidable challenge is waste water treatment. There are many treatment plants along the Yangtze River Economic Belt, including in towns and villages.

Of all the plants, a waste water treatment concept plant in Yixing, east China's Jiangsu province, stands out

with its advanced technologies and rapid processing time.

Compared with traditional plants which tend to use conventional activated sludge, this concept plant adopted highly advanced techniques such as an autotrophic denitrification process utilizing a membrane bioreactor, which can effectively remove organic materials, nutrients containing nitrogen and phosphorus, as well as emerging pollutants that are difficult to degrade.

Supported by such high-tech measures, the content of nitrogen can reach less than 3 mg and orthophosphate less than 0.1 mg per liter in the treated water, and 80 percent of the emerging pollutants will be removed.

Part of the treated water will be processed further to reach the national standard for drinking water, realizing the "re-birth" of clear water. People can drink the purified water directly, and use it to make coffee or even brew wine, according to the concept plant.

In addition, with a capacity of treating 20,000 tons of waste water, the concept plant is also highly efficient by adopting a relatively short process with-

out compromising the quality.

Smart management of water in cities

Previously, waste water treatment operated independently from water supply and discharge, which made the water management expensive and ineffective.

The China Three Gorges Corporation (CTG), a pioneer in conserving the ecology of the Yangtze River, developed a smart regulating and control system that incorporates the entire water ecology of a city, including water supply, discharge and waste water treatment.

This kind of smart system is nicknamed the "water butler," and well practiced in Lu'an, Anhui province. The key part of the system lies in managing every drop of city water on the cloud. In Lu'an, all rivers, pipe networks, water purification plants, sluices and pumping stations are connected via a smart mode.

Thus, the system can adjust the waste water treatment tasks based on the capacities of different regions to avoid direct discharge of waste water. Remote control for any valve in the biochemical treatment facilities of the water purification plant in the northern part of the city is also just a click away. See page 3

Hi-tech Asian Games

Torch Relay Ignites Sports Passion

By QI Liming

The final countdown to the opening of the 19th Asian Games, which will kick off in Hangzhou, capital of Zhejiang province in east China, has begun.

The torch (named the Eternal Flame) relay of the Asian Games, started its travels on September 8, passing through 11 cities before concluding on September 20.

Offline, there are more than 2,000 torchbearers of Hangzhou Asian Games,

including badminton Olympic champions Chen Yufei and Wang Yilu, swimming Olympic champions Wang Shun and Ye Shiwen, table tennis Olympic champion Fan Zhendong, as well as representatives from all walks of life.

Online, anyone can become a digital torchbearer for the Hangzhou Asian Games through the smart platform SmartHangzhou2022 accessed via the Alipay app, the first one-stop digital watching platform with augmented reality, launched by the committee of the Games.

On September 23, thousands of digital torchbearers can also participate in the digital lighting of the opening ceremony of the Hangzhou Asian Games.

Meanwhile, audience could improve their spectator experience with the help of SmartHangzhou2022. They can get venue navigation information, watch the welcoming show by the mascots, check the tickets and transportation information, and interact virtually with the mascots for photos at five countdown devices setting places in Hangzhou.

International Cooperation

ILRS Welcomes New Member

By LI Linxu

South Africa has formally joined the China-led International Lunar Research Station (ILRS) project, marking a new milestone in space cooperation between the two countries.

The space agencies of China and South Africa signed a memorandum of understanding (MOU) on cooperation at the ILRS on September 1, according to the China National Space Administration.

Under the MOU, the two sides will cooperate extensively in the demonstration, engineering implementation, operation and application of ILRS, as well as the education, training and other areas.

On the 25th anniversary of diplomatic relations establishment between China and South Africa, South Africa's formal entry of ILRS indicates that China-South Africa cooperation has been extended from near-earth space to the moon and deep space beyond, said South African National Space Agency (SANSA), adding that it plays a significant role in boosting technology advances and building a high-standard community with a shared future for China and South Africa.

ILRS, formally announced in 2021, is a comprehensive scientific experiment base with the capability of long-term autonomous operation, built on the lunar surface and/or on the lunar orbit that will carry out multi-disciplinary and multi-objective scientific research activities.

The project includes three development phases, that is, reconnaissance, construction and utilization, as per the ILRS Roadmap.

From 2021 to 2025, it will focus on lunar reconnaissance, ILRS design and site selection, and technology verification for a secure high-precision soft landing.

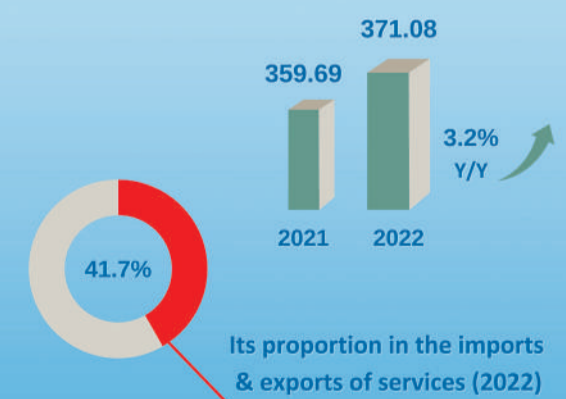
The construction of ILRS is expected to be completed by 2035, and from 2036, it will become operational, providing a range of scientific facilities and equipment to conduct lunar scientific research exploration and experiments. It will also likely support human lunar landings in the future.

ILRS welcomes international partners to participate in the research and construction of the station at any stage and level of the mission, according to *China's Space Program: A 2021 Perspective*, released last year. See page 2

New Graphic

CHINA'S DIGITAL TRADE IN SERVICES

Total value of imports & exports
of digital services (billion USD)



Source: Digital Trade: Development and Cooperation
Designed by SONG Ziyang/S&T Daily

WECHAT ACCOUNT



E-PAPER



Prioritizing Role of Young Experts in Research

Policy

By Staff Reporters

In recent years, the number of young sci-tech experts in China has expanded, becoming the new driver of the country's sci-tech innovation and development.

According to the *China Scientific and Technological Human Resources Development Research Report (2020)*, by the end of 2019, among the vast majority of sci-tech experts who have received higher education in science and technology, the proportion of those aged 39 and below accounted for 73.89 percent, while those aged 50 or above accounted for only 9.94 percent.

To further strengthen support for the development of young scientists, China has recently unveiled a set of new measures, including prioritizing their role in undertaking major R&D projects and tasks.

The new measures, in principle, said the proportion of young sci-tech talent under the age of 40 posted as project leaders and core personnel should not be less than 50 percent.

Actually, young scientists have already played an important role in some major sci-tech projects, such as the development of the BeiDou navigation system and lunar exploration.



Two young engineers work at a rocket assembly factory in Tianjin city. (PHOTO: XINHUA)

For example, in the field of lunar exploration, Sun Zezhou was appointed deputy chief designer of the Chang'e 1 satellite at the age of 34, and was appointed as the chief designer of the Chang'e 3 probe system at the age of 38. In manned spaceflight, Wang Xiang, 39 years old, was appointed commander of the space laboratory system and the space station system, becoming the youngest leader at that time.

With the release of the new measures, more young scientists are expected to take more important posts.

The new policy also called for providing stable funding support for young professionals in the early stage of their career. Basic research expenses should be mainly used to support young sci-tech talent under the age of 35 to carry out independent research, and the proportion of support for them should be gradually raised to no less than 50 percent of the annual budget.

In this aspect, the National Natural Science Foundation of China has continued to increase the support for projects targeting young talent. Compared with

2018, the scale of the 2022 Youth Science Fund, Outstanding Young Science Fund and National Outstanding Young Science Fund projects has increased by 26 percent, 58 percent and 109 percent, respectively.

A researcher with the Institutes of Science and Development, Chinese Academy of Sciences, said the release of the new measures is a systematic reform of the work related to young sci-tech talent, and a milestone in the future development of young scientists in the country.

Private Economy Development Further Supported

By ZONG Shihan

Following the release of the 31 measures for enhancing the development of the private economy on July 19, a new significant decision made in early September is to establish a private economy development bureau under the National Development and Reform Commission (NDRC).

Coordinating development

Developing the private economy is a systematic project that involves a wide scope, a long policy chain, and various work nodes, said Cong Liang, vice chairman of NDRC.

The bureau will be responsible for analyzing the development of the private economy, coordinating measures to promote its development, and formulating policies to promote the growth of private investment.

It will also establish a regular communication mechanism with private enterprises, coordinate efforts to solve major problems, and support the private economy to enhance its international competitiveness.

The bureau can strengthen face-to-face communication with private enterprises and meet their real needs, said Dong Yu, executive vice president of the China Institute for Development Planning at Tsinghua University.

Forming resultant force

Zhang Shixin, deputy secretary-general of NDRC, noted that the work concerning the private economy involves a

wide range of areas and requires close cooperation between various departments.

Recently, various departments have taken relevant measures to further promote the development of the private economy.

The Ministry of Science and Technology will establish an exchange mechanism between innovation entities such as scientific research institutes and private enterprises, and implement financial measures to support scientific and technological innovation, said Wu Jiayi, deputy director-general of the ministry's department of research commercialization and regional innovation.

Meanwhile, the Ministry of Industry and Information Technology (MIIT) will carry out a nationwide comprehensive inspection to reduce the burden on enterprises and promote the development of small and medium-sized enterprises, said Xu Xiaolan, vice minister of MIIT.

To optimize the business environment for private companies, the State Administration for Market Regulation (SAMR) will continue to strengthen supervision and law enforcement, standardize the market order, and further shore up the protection of intellectual property rights, said Liu Jun, deputy commissioner of SAMR.

With the implementation of such policies and the establishment of the specialized bureau, the development of the private economy will usher in a brighter future, Cong said.

Innovation and Development Marks Shaanxi Blueprint

High-quality Growth

By ZHONG Jianli

Shaanxi province in northwest China is pursuing high-quality development and outlining a modern industrial blueprint characterized by its unique strengths, and according to the achievements so far, it's going full steam ahead.

The province has successfully cultivated four industrial clusters, valued at one trillion RMB, in advanced manufacturing, modern energy, cultural tourism, and strategic emerging industries. Indus-

tries such as new materials, new energy vehicles, integrated circuits, and semiconductor devices are experiencing remarkable growth.

Tongchuan city in central Shaanxi is actively promoting the expansion of the new material industry, particularly in fields like magnesium, asphalt and ceramics. Several related projects are already operational, and others, such as high-end carbon-based new materials sourced from coal and recycling rare and precious metals, are accelerating development.

Huang Yong, the executive vice mayor of Tongchuan, said, "We have planned and established an optoelectronic industrial park, established two provincial research (innovation) centers, introduced two academician workstations, and attracted 36 optoelectronic enterprises. The park is now equipped with design, development, testing, packaging, and integrated applica-

tion capabilities for optoelectronic products, and has been recognized as a specialized park within the province."

Shaanxi places great emphasis on innovation as the fundamental driving force behind its high-quality industrial development.

In this vein, it has actively facilitated the growth of small and medium-sized enterprises (SMEs) that employ specialized and sophisticated technologies to produce novel and unique products.

In addition, the province has nurtured a total of 188 national "little giant" enterprises and identified 24 enterprises as national manufacturing champions, ranking first in western China.

Capitalizing on the Qinchuangyuan innovation platform, Shaanxi has made dedicated efforts to industrialize sci-tech achievements. It has established a state-level manufacturing innovation center and 41 state-level enterprise technology centers. Furthermore, through open bidding, the province has allocated 418 million RMB to support 182 projects aimed at achieving crucial technological breakthroughs.

These combined efforts have yielded significant results in terms of enterprise innovation. Longi Green, for

instance, has achieved a global record with its solar cells boasting a conversion efficiency of 26.81 percent. Moreover, TELD's electric vehicle charging network technology leads the nation in the new energy vehicle charging industry.

As an integral node along the Belt and Road Initiative and a crucial transportation hub for the Eurasian land bridge, Shaanxi is investing in the development of convenient transportation infrastructure to facilitate high-quality growth.

The construction of the high-speed rail network is another area that has been fast tracked. Meanwhile, the province's highway network is well-linked with other provinces, and the Xi'an Xianyang International Airport aims to become an international aviation hub, capable of serving 83 million passengers and handling one million tons of cargo each year.

The China-Europe Railway "Chang'an" has opened 17 international routes that connect 45 countries and regions. This extensive transportation network positions Shaanxi as a key trade source for Central Asia, South Asia, West Asia and Europe.

Photo News



The construction of the Xiang'an International Airport on Dadeng Island in Xiamen, Fujian province, is progressing, with the main concrete structure of the terminal and the corridor completed on August 31 by China Construction Third Engineering Bureau Group. (PHOTO: LIN Hang)



The researchers from the South China Botanical Garden, Chinese Academy of Sciences, figured out that protecting and restoring coastal blue carbon ecosystems (BCEs) can be a key strategy for carbon reduction, according to a research article recently published in the journal *Innovation*. Photo shows a mangrove forest on Jinniu Island, Zhanjiang city, south China's Guangdong province. (PHOTO: XINHUA)

Digital Nomads Contribute to Rural Development

Case Study

By YAO Jianhua

In the wake of rapid technological advancement, a new cohort known as the digital nomads is rising. These people not only have professional knowledge in different fields, but can use Internet expertly and work remotely. Breaking free from the bustling urban grind, these digital nomads opt to embrace a novel mobile office lifestyle.

Xilong, a township of Anji county in east China's Zhejiang province, is a haven for digital nomads. In 2021, its abandoned factory buildings were turned into a community designed for digital nomads, the Digital Nomad Anji (DNA), with residential living areas,

shared workspaces, conference facilities and other facilities.

Since its trial launched in December 2021, DNA has attracted over 700 people to live and work, with an average tenure of three months. Their average age is 31, and nearly 40 percent of them have a master degree or higher educational qualifications.

This diverse community encompasses professionals from a wide range of fields, including programmers, self-media practitioners, illustrators, online tutors and e-commerce specialists. With its core principles of "openness, co-construction and sharing," DNA encourages digital nomads to collaborate and contribute to the sustainable development of rural areas.

With the active engagement of digital nomads, DNA has transformed into a dynamic and creative hub, infusing a

fresh cultural ambiance and developmental opportunities into the countryside.

Rural revitalization hinges on talent infusion and the digital nomads are bringing in fresh creativity. Within Anji, an increasing number of small-scale studios are producing a variety of cultural and creative content, such as the inheritance and propagation of the white tea culture.

The digital nomads also participate in events like the Baichayuan Art Market and Pet Carnival, and are involved development and operation of DNA and the local Baichayuan Creative Industrial Park.

Some become entrepreneurs with their independent business ventures, while others, through sharing personal experiences on social platforms, inspire more creative-minded individuals to come to Baichayuan and Anji.

Since many digital nomads know

how to access capital, technology and market resources, the locals are tapping them for rural development through projects such as the renovation of tea drinking areas and upgrading of agrotourism industries.

Official statistics showed that in 2022, the digital nomads who are active on different platforms have collectively created more than 200 jobs for neighboring villagers.

Li Yanyi, head of the Baichayuan Creative Industrial Park, said it's important to introduce more digital nomads and involve them in the development of rural cultural industries.

Yao Jianhua is a professor at the School of Journalism, Fudan University, and researcher at the Institute of Global Communication and Multi-media Studies, Fudan University.

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Guided by the principle of extensive consultation, joint contribution and shared benefits, China will carry out broad cooperation in the ILRS, bolster sci-

entific research and exchanges and contribute more to science and technology advancement and human progress, said Wang Wenbin, Chinese foreign ministry spokesperson.

ILRS Welcomes New Member

INSIGHTS

China-ASEAN Bond Flourishes

Voice of the World

Edited by GONG Qian

The past decade has witnessed China-ASEAN deepening their cooperation and benefiting both.

Addressing the 26th ASEAN-China Summit, Chinese Premier Li Qiang said China and ASEAN are good neighbors, good brothers and good partners, and will remain so.

Malaysian Prime Minister Anwar Ibrahim called China a "good neighbor and great friend" in terms of trade, investment and security arrangements, according to *The Nation*, a daily newspaper based in Pakistan.

Mutual benefits in regional economy

According to the ASEAN Secretariat, China has been ASEAN's largest trading partner for 13 consecutive years while ASEAN has been China's largest trading partner for three consecutive years.

Their bilateral trade reached 975.3 billion USD in 2022, more than double of what it was 10 years ago, according to the National Bureau of Statistics of China.

China and ASEAN are also important mutual investment sources and destinations. By July this year, the cumulative two-way investment between them exceeded 380 billion USD. More than 6,500 Chinese enterprises with direct investment are operating in ASEAN countries, according to China's Ministry of Commerce (MOFCOM).

China has proposed to accelerate



The 20th China-ASEAN Expo will be held from September 16 to 19 in Nanning, southern China's Guangxi Zhuang autonomous region. (PHOTO: XINHUA)

ASEAN-China Free Trade Area 3.0 Upgrade negotiation and strives to conclude the negotiation in 2024. The new agreement will enhance institutional opening-ups in China-ASEAN trade and economic cooperation while expanding cooperation in other fields such as the digital economy.

BRI infrastructure links

An important basis for China to help ASEAN's development is to enhance infrastructure connectivity.

According to MOFCOM, by July this year, the cumulative turnover of Chinese enterprises' contracted projects in

ASEAN countries had exceeded 380 billion USD and Southeast Asia absorbed the largest number of contracted projects from China to countries along the Belt and Road Initiative (BRI).

The major projects include the China-Laos Railway, which started operation at the end of 2021. It has transported about 21 million passengers and more than 25 million tons of cargo, helping transform Laos from a "land-locked country" to a "land-linked country", stimulating the economic growth of the country.

The Jakarta-Bandung High-Speed

Railway, connecting two of Indonesia's largest cities, is a flagship project under the BRI and is expected to begin commercial operations in October. The 142.3-km railway will be the fastest in Southeast Asia, running at up to 350 km per hour, cutting travel time between the two cities from the current three hours to about 40 minutes.

"This is clear proof of modern, high-quality cooperation between the two countries," Luhut Binsar Pandjaitan, Indonesia's Coordinating Minister for Maritime and Investment, was quoted as saying by the *Associated Press*.

E-commerce Mushrooming in China

Edited by QI Liming

China is to retain its dominant position in the global e-commerce landscape. On August 29, GlobalData, a leading data and analytics company, forecasts that the Chinese e-commerce market is anticipated to surge to 15.2 trillion RMB in 2023, driven by the ongoing shift of consumer preferences from offline to online shopping.

Dominant position in the global e-commerce

According to GlobalData, e-commerce sales in China grew at a CAGR (compound annual growth rate) of 11.2

percent between 2018 and 2022, reaching a value of 13.8 trillion RMB in 2022. China accounted for a 33.9 percent share of the global e-commerce market in terms of payment value in 2022. The global e-commerce landscape is unlikely to change in 2023 with China expected to retain its position at the top.

"The Chinese e-commerce market evolved rapidly during the last five years, supported by the rapid adoption of smartphones, growing internet penetration, increasing number of online shoppers, and the availability of alternative payment solutions such as Alipay and WeChat Pay," said Ravi Sharma, lead banking

and payments analyst at GlobalData.

Livestream shopping to attract more attention

GlobalData's analysis showed that the growth in the e-commerce market is also supported by the improving e-commerce activities in rural areas. Livestream shopping has been a trend in the country.

Livestream shopping allows customers to view and buy products via online video streams hosted on e-commerce platforms. In addition, social commerce is growing in popularity thanks to the efforts of messaging platforms such as WeChat. Sub-apps offered by WeChat run within the WeChat app, allowing users to buy products without having to download other mobile apps or be redirected to other websites.

"The Chinese e-commerce market will continue to grow supported by the rise in consumer preference for online shopping, improved payment infrastructure, and proliferation of payment tools. The e-commerce market is expected to grow at a robust CAGR of 11.6 percent between 2023 and 2027 to reach 23.5 trillion RMB in 2027," said Sharma.

Transformation of customers' psychology

According to BeautyMatter, the highly competitive Chinese mid-year e-commerce shopping festival known as "618" showed strong and increasing signals.

According to Syntun Data, gross merchandise value of "618" in 2023 reached an astonishing 798.7 billion RMB, rising 14.7 percent year-over-year. Many market watchers interpret the result as a signal of rapid spending recovery in China.

Rational consumption has witnessed a notable surge, replacing impulsive buying behaviors, within the Chinese market. The growing middle-class consumers have shifted their priorities from mere price considerations to focusing on product quality and unique attributes.

The younger generation, particularly Gen Z, stands out as a remarkable consumer group. They possess a strong affinity for personalized and customized products, thereby creating significant opportunities for niche brands. Furthermore, they place immense value on self-expression and seek out social experiences through their consumption choices.

This move in consumer behavior, driven by rationality and a desire for personalization, has been reshaping Chinese market. Products and Brands that can effectively tap into these trends, offer unique experiences, and align their storytelling with the values and aspirations of consumers, especially the younger generation, are well-positioned to thrive in the future.



Farmers sell sweet potatoes on livestreaming platform. (PHOTO: VCG)

Scientific Management Guarding Yangtze River

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With the help of the system, the centralized collection rate of urban domestic sewage increased from 44.8 percent to 67.72 percent for the past three years, and the waste water treatment capacity soared from 185,000 tons to 415,000 tons per day.

A combination of collective effort

To protect the Yangtze River, relying on a single city or even province is never enough, and joint efforts from the Yangtze River Economic Belt, which covers nine provinces and two municipalities and the country as a whole, are ab-

solutely essential.

Expanding the application of the "water butler" system is a good example. The Yangtze Ecology and Environment Co., Ltd. (YEEC), a subsidiary of CTG, has signed cooperation agreements of the system with over 20 cities and counties along the Yangtze River.

Exploring the marketization of waste water treatment is another important approach. YEEC introduced different business models accordingly in cities along the Yangtze River Economic Belt, based on the guideline issued by the National Development and Reform

Commission (NDRC) and other departments in 2020.

For example, in Yichang, central China's Hubei province, the payment for waste water treatment is made based on the assessment of the total amount of pollutants treated, and a portion of the payment will be used for the construction of pipe network.

A specific law on Yangtze River protection took effect on March 1, 2021, providing the overall planning and coordination of the Yangtze River protection with a legal base.

Last September, an action plan on

strengthening the conservation of the Yangtze River was jointly issued by 17 government bodies, including MEE and NDRC, which offered more guidance and support to pollution control of the river.

Liu Youbin, spokesperson of MEE, said at a press conference in June, that MEE will steadily conduct the pilot for water ecology assessment along the Yangtze River basin, guide the local governments to fulfill their responsibilities of protecting the water ecology, and promote the continuous improvement of the aquatic ecological environment along the Yangtze River basin.

Opinion

AIPP Acknowledges China's Scientific Contributions

By BI Weizi

"We firmly believe that science is inherently cooperative. Scientific collaboration is a very peaceful and positive exercise that creates mutual understanding," Alexandra Vance, CEO of the American Institute of Physics Publishing (AIPP), told *Science and Technology Daily* on September 7.

AIPP publishes current advanced and foundational research covering the breadth and depth of the physical sciences, whose mission is to promote and serve the physical sciences for the benefit of humankind.

"Academic publishing plays a pivotal role in fostering robust scientific communication between China and the world. It truly serves as a bridge through which valuable research findings, innovative ideas and intellectual achievements can be shared, disseminated and accessed by global audience," said Vance, noting that the world benefits from access to China's rapidly advancing research landscape, which covers an ever-widening range of disciplines, particularly in the physical sciences.

The compound annual growth rate for physical science publications worldwide from 2013 to 2022 was 8.3 percent, while the rate in China was an impressive 15 percent. In the AIP Publishing portfolio, a remarkable 35 percent increase in publications authored by Chinese researchers has been observed over the past decade. "This rise is a testament to China's commitment to research and development, increased funding and the expansion of research infrastructure," she said.

According to the Nature Index data recorded since 2014, China has become the largest contributor of research in major science journals, replacing the U.S. as the top contributor for the first time in 2022.

In addition to quantitative growth, the overall quality of research from China has improved. More papers are appearing in prestigious international journals, with increased citations, higher impact factors and greater recognition within the scientific community. "This increase in quality is critical to establishing China's position as a hub for cutting-edge research, fostering international collaboration and driving innovation," said Vance.

Hi! Tech

New Material Produces 5 Times Insulation

By TANG Zhexiao

Beijing MatrixTech has developed a new thermal insulation material with an extremely low thermal conductivity, which can be used within -50 to 150 °C environment.

The material, Y-Warm, though very thin, can block the conduction and exchange heat with a thermal conductivity of 0.00824w/mK.

According to Yao Sheng, assistant

"In the past seven years, China has accelerated its research in fluid mechanics. And it's been in the last seven years that I've watched Chinese scientists become the leading contributors to *Physics of Fluids*, a highly cited, well-known journal in the field of fluid mechanics. The quality of their research has improved our journal from an impact factor of 2.0 to over 4, which is just one indicator of the increasing quality of Chinese research," said Professor Alan Jeffrey Giacomini, Editor-in-Chief of *Physics of Fluids* since 2016.

He also noted that China is contributing to every section of the journal, and its contributions are as strong in fundamental fluid mechanics as they are in applied fluid mechanics. "China is firing on all cylinders, to use an engine analogy, when it comes to physics research today," he said.

In addition to the rapidly increasing number of publications by Chinese scientists, another factor contributing to China's emergence as an academic powerhouse is the increase in Chinese editors and editors-in-chief at top international journals.

According to Vance, from 2021 to 2022, the number of Chinese researchers on AIP Publishing's editorial team increased from 64 to 86. "Last year, we appointed an editor-in-chief from China, Bo Wang from the Beijing Institute of Technology, to APL Materials, which is very important because it was the first such appointment in AIP Publishing's 90-year history," she said.

The expertise of Chinese researchers is being highlighted and the impact of the Chinese scientific community as part of the global scientific community is being continuously expanded. The central role of international cooperation, bringing different perspectives, methods and insights into the scientific arena, is becoming more evident.

"International cooperation reflects real friendships that are formed across international boundaries. There are interesting stories behind these papers. When I see Chinese names in parentheses beside English names for international cooperation, I see something far more beautiful underneath the paper," said Giacomini, expressing strong confidence in the research community to continue the spirit of collaboration.



The Y-Warm coat is displayed in the 2023 CIFTIS. (PHOTO: TANG Zhexiao/S&T Daily)

Navigating the Future of EVs

Dialogue

By LONG Yun & BI Weizi

The automotive industry is currently undergoing a transformation as it steers toward widespread adoption of electric vehicles (EVs). One key figure at the forefront of this change is Helmut Stettner, the CEO of Audi FAW NEV Company, which is located in Changchun, northeast China's Jilin province. This German expert is leading the setup of a groundbreaking new production site for fully electric models in Changchun.

Recently, he shared his views on the future of the automotive industry and the rapidly evolving Chinese market with *Science and Technology Daily*.

Key career steps

In 1999, Stettner took the position of head of production at quattro GmbH, Audi Group and was responsible for the start of production of the iconic Audi R8 high-performance sports car at the Audi plant in Neckarsulm, Germany. It was his first experience in challenging the increase of small series production, which set the stage for his future career.

The next important chapter in Stettner's career saw him take on the role of plant and production director at FAW-VW Automotive Company in Changchun. "I have been responsible for [this company's] production for five years and gained a lot of experiences in this international environment," he said.

Returning to Neckarsulm, Stettner assumed the role of plant manager at the Audi plant, where he oversaw the entire production site. He said that "the responsibility for a complete production site is very special," adding that managing a plant renowned for its extensive variety of models within the Volkswagen

Chinese people are curious and open-minded in relation to the future, with a high flexibility to react to change. That also explains the strong and quick development of the Chinese [auto] industry, especially regarding new technologies.

Group was no small feat.

These key steps shaped Stettner's perception on the automotive industry.

A great opportunity

In 2011, Stettner became the plant and production director at FAW-VW Automotive in Changchun. With the support of a strong team at this company, he quickly adapted to his new role, immersing himself in the Chinese market.

Establishing a new production plant for EVs until 2024 presents unique challenges and opportunities, he said, adding that "This is a great opportunity and one of the most beautiful challenges I can have as an automotive production expert." Stettner views this endeavor as an extraordinary opportunity, as it involves not only building a new production plant from scratch but also establishing an entirely new company.

According to Stettner, with decades-long expertise within the Volkswagen Group, the new plant in Changchun will also introduce innovative elements, including the adoption of a single IT infra-



Mr. Helmut Stettner. (COURTESY PHOTO)

structure and the implementation of the "Mission: Zero" environmental program for CO₂-neutral production. The company aims to set new standards in sustainability, efficiency and digitalization.

A promising market

When talking about the future of the new energy vehicle (NEV) industry, Stettner emphasized that, "The future of mobility is electric." He pointed out that NEVs already held a substantial market share in China in 2022, and predicted that they would surpass traditional internal combustion engine (ICE) vehicles, even sooner than expected.

The Audi FAW NEV Company plays a pivotal role in Audi's global electrification strategy, with plans to produce EVs based on the Premium Platform Electric (PPE) specifically tailored to the Chinese market.

"The Chinese market has enormous potential and is growing rapidly in the field of NEVs," said Stettner. According to the German expert, several factors attributed to China's rapid development in

the NEV sector. Supportive government policies, robust charging infrastructure and a focus on automated driving have served as an important role in contributing to this growth.

At the same time, Chinese customers' openness to new technologies and innovations, particularly in connectivity, has also been a driving force.

As a result, Audi aims to leverage these factors by expanding its local research and development efforts, also with the Audi FAW NEV Company, and offering products and services designed specifically for Chinese customers.

As the automotive industry transitions to EVs, Stettner emphasized the importance of understanding the customer needs and delivering the right offerings. He expressed confidence in the "rapid pace of change towards e-mobility in China" and Audi's ability to meet these evolving demands.

"Changchun, my second home"

In 2022, Stettner was presented with the Chinese Government Friendship Award for his tremendous contribution to promoting international cooperation.

"Changchun has become a second home for me. Since my first day here, I really enjoy working in this promising city," said Stettner. He shared his deep appreciation for Chinese culture, of which he says Chinese people are the most appealing part.

He described the Chinese people as friendly, focused, and future-oriented based on his experiences and observations in Changchun.

"Chinese people are curious and open-minded in relation to the future, with a high flexibility to react to change. That also explains the strong and quick development of the Chinese [auto] industry, especially regarding new technologies," he said.

My China Story

Meaningful Scientific Journey in China

By LONG Yun & BI Weizi

Big fan of Sci-fi movies

A young Finnish scientist, Dr. Roope Halonen, is one of those who came to Zibo which draws visitors from all over the world this summer for a mouth-watering distinctive barbecue-style cuisine.

"I liked the friendliness and openness of people not only in my university but in every place in China. And the food is good both in Zibo and Tianjin, the city I live in now," he told *Science and Technology Daily*.

Rewarding experiences

Halonen is currently a special associate researcher at the Center for Joint Quantum Studies and the Department of Physics at Tianjin University (TJU), which he joined two years ago.

According to Halonen, it has been a rewarding experience at TJU, offering him a wealth of opportunities in research and personal growth.

TJU has provided Halonen with a supportive and conducive environment for his scientific pursuits. He enjoys total freedom in his research, allowing him to explore the ideas he is passionate about. Furthermore, he has found the lifestyle in China appealing, and the university's facilities and academic community align with his goals.

Halonen sees his study as an important role in atmospheric science. "The significant improvements have been observed in air quality in China's mega-cities over the past decade," he noted, adding that this positive change proves to be the power of science and technology to address pressing environmental issues. "Science is a team sport," he said, noting that international sci-tech cooperation in the future will pave the way for "a sustainable and healthier planet."

Halonen stands as an example of a young and passionate researcher who has dedicated his career to exploring the mysteries of the physical world.

However, his story is not limited to a laboratory. Halonen's interests extend to the fields of science fiction, where he not only gets research inspiration, but also finds relevance in the ever-evolving relationship between science and society.

He used Christopher Nolan's movie *Interstellar* as a vivid example. What attracts him about the movie is how it portrays science and physics, especially in the context of space travel. He appreciates that this movie's willingness to explore the unknown reflects the essence of scientific discovery. Halonen believes that scientists should embrace the passion of discovering the impossible, as it is often through such exploration that groundbreaking breakthroughs occur.

"Many futuristic ideas from sci-fi literature and films have inspired real-world innovations, from self-driving cars to the Internet," he noted, adding that progress often occurs and can be influenced by creative visions of the future, despite some predictions that may seem remote.

In terms of the public's understanding of science, he highlights the importance of trust because science is not infallible and must be open to mistakes and uncertainties, while trust is essential when complex scientific findings to be communicated to the public. Halonen believes that scientists actively engaging in improving their communication skills is vital.

This article was also contributed by TJU.



Dr. Roope Halonen. (COURTESY PHOTO)

Traditional Eastern Wisdom

Louche: Ancestor of Modern Seed Drill

By BI Weizi

The Louche, also known as a drill sowing vehicle, was a mobile animal-powered agricultural sowing machine invented by Zhao Guo, a Chinese agronomist and official in charge of agricultural production during the Han Dynasty (202 BC - 220 AC).

According to the records of the *Political Commentator* written by Cui Shi in the Eastern Han Dynasty, the Louche was composed of a plow rod, a plow bucket, a plow leg and a plow share, and all parts are cleverly connected with each other. The plow share, made of iron, could automatically dig the ridges while pulled by an animal in the field.

Other parts were made of wood. The seeds flow from the bucket into the hollow plow feet and then into the field for sowing.

Due to the different widths of sowing and the number of rows, during the reign of Emperor Wu of the Han Dynas-

ty, Zhao Guo invented a three-legged Louche, which could sow three rows at the same time. The leg of the Louche could directly dig a trench in the flattened soil, sow the seeds, cover the seeds, and flatten the land all at the same time.

The machine was known for its utility and efficiency in performing several agricultural tasks at once, saving time and labour. One person led the cow in front and pulled the Louche, and the other held it at the back and sowed the seeds.

At that time, the efficiency of China's sowing system was at least 10 times that of the European system, and when converted into harvest volume, it was 30 times that of Europe.

The Louche has been called the ancestor of the modern seed drill and also inspired the invention of the first seed drill in the West, which relieved farmers from tedious work in the field.

How Taikonauts Exercise in Space

Science Outreach

By Staff Reporters

When the China Manned Space Engineering Office recently released an exercise video of the three Chinese astronauts in space station Tiangong following their arrival via the Shenzhou-16 aircraft in May, their specialized biomimetic adhesive shoes fascinated the viewers.

The footwear, which at first

glance look like ordinary, are a key part of the space exercise gear of astronauts, known as taikonauts in China.

Speaking to *Science and Technology Daily*, Pang Zhihao, an expert on space exploration technology and a renowned writer, explained how the shoes work.

According to Pang, when astronauts wear these shoes and step onto specially designed pedals, adhesion makes the shoes stick to the pedals. To lift their feet, the astronauts have to make considerable efforts, thus creating a workout effect.

Also, the muscle sensors embedded in the shoes enable quantitative

monitoring of muscle and bone stimulation during physical activity.

For astronauts, maintaining a regular exercise regime is very important as they have to stay for long periods in space where they become weightless due to the absence of the gravitational force. When astronauts aged between 30 and 50 stay in space for long without any exercise, their muscles atrophy severely.

Besides, the reduced pressure on bones in microgravity sends misleading signals to the body, leading to excess calcium excretion through urine and feces, resulting in bone demineralization. This increases the risk of kidney stone

formation and vascular calcification.

Research has shown that after a year in space, astronauts upon returning to Earth require approximately one month to recover the lost muscle mass. Additionally, they may lose up to 25 percent of their total body calcium, which may take two to three years to replenish fully.

To mitigate these challenges, China's space missions typically last for around six months to minimize the impact on astronauts' health. Various exercise facilities are available inside space stations to enable astronauts to target different muscle groups for physical training.

Guangxi Meets Expats' Financial Service Needs

Expats Activity

By DENG Zhuoyuan & LONG Yun

A seminar on financial service policies was conducted to facilitate foreign experts living in Guangxi Zhuang autonomous region on September 2, to gain a comprehensive understanding of policies. Nearly 20 foreign experts from 13 countries actively participated in the event.

Based on information from pre-event surveys, the Guangxi branch of the Bank of China presented an in-depth explanation of financial service policies for participants. This encompassed a range of topics, including opening a domestic account, buying financial products, and how to trade Forex.

Furthermore, the participants had an opportunity to engage in interactive

Q&A sessions, where their queries concerning routine banking operations were effectively addressed.

This seminar is part of a series of initiatives organized by the Department of Science and Technology of Guangxi. In recent years, the department has been dedicated to facilitating the involvement of foreign experts in policy seminars and cultural experiences. This concerted effort has resulted in the establishment of a platform for consultation and services, aimed at helping foreign experts to integrate into Guangxi and fostering a favorable working and living environment. These events have garnered applause from foreign experts.

According to Egyptian expert Ahmed Zaki Amin, an associate researcher in cell biology at the Guangxi Buffalo Research Institute, this event was excellent and effectively addressed the needs of foreign experts.

"This event holds significant mean-

ing. In addressing our concerns, the organizers have provided us with numerous solutions," echoed Carole Lelievre, a French teacher at Guangxi Minzu Uni-



Foreign experts interact during the Q&A session of the seminar. (PHOTO: the Science and Technology Department of Guangxi Zhuang autonomous region)

versity.

This article was sourced from the *Science and Technology Department of Guangxi Zhuang autonomous region*.