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WEEKLY EDITION

Int'l Cooperation Essential to Developing Digital Economy

By Staff Reporters

Chinese President Xi Jinping announced China's decision to apply to join the Digital Economy Partnership Agreement on October 30 while addressing the 16th Group of 20 Leaders' Summit via video link in Beijing.

Xi said that China attaches great importance to international cooperation on digital economy and stands ready to work with all parties for the healthy and orderly development of digital economy.

China has put forth the Global Initiative on Data Security, said Xi, calling for joint efforts to discuss and develop international rules for digital governance that reflect the will and respect the interests of all sides, and actively foster an open, fair, just and non-discriminatory environment for digital development.

China has already made great efforts to develop digital economy and witnessed rapid growth in this area.

In recent years, scientific and technological achievements have been made in multiple areas, such as the Internet of Things, 5G communication, big data, artificial intelligence and block chain, to support the growth of the country's digital economy.

For example, as one of the four Global Navigation Satellite Systems certified by the UN, China's self-developed BeiDou Navigation Satellite System is trying to be more inclusive, providing services for more countries and regions.

According to the *China Internet Development Report* released by the Chinese Academy of Cyberspace Studies during the 2021 World Internet Conference Wuzhen Summit, the country's digital economy grew 9.7 percent year on year to 39.2 trillion RMB (about 6.07 tril-

lion USD) in 2020, accounting for 38.6 percent of the country's total GDP.

The digital economy has unleashed the vibrancy of businesses in China. Both traditional and digital industries are prospering. New forms of business based on the Internet, such as the platform economy and sharing economy, are booming.

The application of digital technology is fast expanding in government, the rural areas and society at large, in forms of smart cities and Internet-based government services, etc. For example, the application of QR codes plays a vital role in COVID-19 prevention and control measures.

Life has changed significantly, as more people turn to online education, shopping, food ordering, mobile payments, ride hailing, bike sharing, telecommuting, remote medical care, and smart homes.

However, there are still significant divides, within and among countries, in terms of capacities to connect to and use the Internet. Addressing these inequalities in the digital economy is key for development, according to the *Digital Economy Report 2021* released by the UN. Thus, there is a growing need for cooperation among countries to arrive to equitable development outcomes for the benefit of people and the planet.

China shows its commitment to international cooperation by building exchange platforms, including the Digital Belt and Road Program and cross-border e-commerce. All these efforts help facilitate and regulate cross-border data flows.

For example, at the newly concluded World Internet Conference Wuzhen Summit, 40 projects on digital economic cooperation were signed, with total investment of over 60 billion RMB.



Visitors watching an intelligent robot at the 2021 China International Digital Economy Expo. (PHOTO: XINHUA)

China, ASEAN to Boost Digital Economy

By TANG Zhexiao

The 38th and 39th ASEAN Summits and related meetings were held from October 26 to 28 via video conferences, focusing on the fight against the COVID-19 pandemic and promoting economic recovery.

With the theme "We care, we prepare, we prosper," the ASEAN meetings were joined by leaders from ASEAN's dialogue partners, including China, Japan, South Korea, India, the United States, Australia and Russia, and representatives of other countries.

The summits covered a number of issues including further strengthening the capacity of the ASEAN Community towards post-COVID-19 economic recovery and enhancing ASEAN's readiness to tackle common challenges, while seizing new opportunities to pursue shared prosperity.

The significance of the digital economy was highlighted as a driver of economic recovery. "We need to promote the digital economy in East Asia. China will host the APT Young Scientists Forum and other activities to help regional countries bridge the digital divide," said Chinese Premier Li Keqiang at the 24th China-ASEAN leaders' meeting via video link. See page 3

Editor's Pick

Innovative Technique Brings Life to Saline-alkali Soil

BY WANG Xiaoxia
TANG Zhexiao

Can you imagine transforming barren, salty soil into arable land in a month? This is not fantasy, but the actual result of research by Chinese scientists from China Agricultural University (CAU).

Hu Shuwen, professor at the College of Resources and Environmental Science of CAU, has developed a technique for rapid desalination and ecological treatment of saline-alkali soil by improving the soil structure.

During an exclusive interview with *Science and Technology Daily*, Hu said that his technique can desalinate soil in only one month, which has been demonstrated in many areas of China.

Major global challenge
Soil salinization is a global major challenge. According to the *Global Map of Salt-affected Soils* released by the Food and Agriculture Organization of the United Nations, more than 424 million hectares of topsoil (0-30 cm) and 833 million hectares of subsoil (30-100 cm) are salt-affected.

It is also a crucial issue in China. According to the data from the Chinese government, China has about 35 million hectares of saline-alkali land, of which about 14 million hectares have the potential for agricultural activities, accounting for more than 10 percent of the country's arable land.

Sustainable soil management practices shall be adopted to halt salinization and sodification.

Chinese President Xi Jinping said the comprehensive use of saline-alkali soil is of strategic importance to national food security. Xi made the remarks when visiting the Agricultural High-tech Industrial Demonstration Area of the

Yellow River Delta on October 21.

In fact, China has long been committed to the restoration of saline-alkali soil. However, hardly any groundbreaking progress has been made until Hu and his team developed an innovative management system for saline-alkali soil.

Systematic soil improvement
Hu joined CAU in 2006, returning from the University of California, Irvine, where he worked as a researcher. He said that he wanted to share his knowledge and to do something for the motherland.

To solve the problem, one must figure out the cause of it, said Hu. So he promptly set about studying saline-alkali soil in the field.

During the study, he found that the particles of this kind of soil are so fine and closely attached that there is no room for water to permeate.

It's just like the water-proof cloth, said Hu, so the salt cannot leach out and is left in the plough layer of soil.

With an academic background in polymer science, Hu applied advanced polymeric materials to soil improvement. He and his team invented a natural polymeric soil conditioner that improves soil structure.

The soil conditioner transforms the fine particles into clots, between which there are channels for rainfall to soak into the ground and leach out the salt through underground drainage.

Besides, the research team also invented a controlled-release material to protect seeds from salt damage. Organic fertilizer, bacterial and fungal communities are applied to create a healthier soil environment. Supporting facilities are built near the fields to keep groundwater at a lower level, so as to prevent the reoccurrence of soil salinization. All

these make up the systematic soil improvement technique, said Hu.

Compared with the traditional desalination methods via irrigation, the new technique is more efficient and sustainable, said Hu. It only takes one-third of the water compared to the previous method and remains long-term valid after improvement.

True knowledge comes from practice. Hu said that his team preferred to work in the field for eight months every year rather than staying in the lab. Seeing the crops grow from seedlings to harvest was a source of fulfillment, Hu.

Working toward a better future
Since 2013, Hu's saline-alkali soil improvement technique has been promoted and demonstrated on a large scale in the Songnen Plain, coastal area and inland arid area.

With the technique, more than 7,000 hectares of saline-alkali land have been restored and utilized, and the benefited area has exceeded 70,000 hectares, with an annual increase in grain production of more than 300 million tons, said Hu.

Soil salinization is closely connected with drought. More than two-thirds of global salt-affected soils are found in arid and semi-arid climatic zones. Countries in Africa, central Asia and the Middle East are also facing the severe problem of soil salinization, said Hu, so the technique can benefit more countries and regions through international cooperation.

Through ecological restoration of newly added arable land in salt-affected areas and improvement of soil quality in poor land, it is not only conducive to increasing food production and safeguarding global food security, but also of great significance to enhancing biodiversity and achieving carbon neutrality.

WEEKLY REVIEW

COP26 Begins as Countries Jointly Tackle Climate Challenge

The 26th United Nations Conference of Parties on Climate Change kicked off on October 31 in Glasgow, expecting to review overall progress and plan future actions on climate change.

Real-time Glacier Monitoring System Put into Use

A real-time glacier monitoring system which can update online every five minutes has been officially put into use in the Yulong Snow Mountain in southwest China's Yunnan Province, according to the Chinese Academy of Sciences.

China's First Hydrogen Locomotive Starts Trial Run

The first China-developed hydrogen fuel cell hybrid locomotive started a trial run on October 29 on a railway line for coal transport in north China's Inner Mongolia Autonomous Region.

Remote Sensing Satellite Jilin-1 Gaofen 02F Launched

The Jilin-1 Gaofen 02F satellite, an optical remote sensing satellite that can provide high resolution images and high-speed data transmission, was launched by a Kuaizhou-1A carrier rocket on October 27 from the Jiuquan Satellite Launch Center.

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Sino-German Auto Bond: From 1.0 to 3.0

By LU Zijian

The 2021 Sino-German Automobile Congress kicked off in Changchun, northeast China's Jilin Province on October 19. Key issues concerning the future of the automobile industry and cooperation between China and Germany were the main point of discussion.

While this is only a microcosm of the two country's links in this field, which began more than 30 years ago, the evolution of the auto industry means cooperation is being ramped up.

Era 1.0: Fossil-fuel cars
The cooperation between China and Germany in the car industry began just after China's reform and opening up. Volkswagen was the first German

company that established a joint venture car company in China in 1985.

In the following years, well known German brands like Mercedes Benz, Audi and BMW became household names in China.

Apart from cooperation in the industry, there was also cooperation concerning research and development (R&D) between universities, research institutes and enterprises.

On April 21 this year, a Sino-German joint automobile R&D center began operation at Tongji University in Shanghai. Long before the establishment of the center, Tongji University already had deep ties with German universities in the field of automobiles and engineering.

Era 2.0: Electric vehicles
China has made massive efforts to reduce carbon emissions through various approaches, such as promoting the use of New Energy Vehicles (NEV).

The cooperation in this field between China and Germany began as early as 2010, when the two countries issued a joint communiqué, strengthening the cooperation in the electric car field. About one year later, the two countries signed the Sino-German Joint Statement on Establishing a Strategic Partnership for Electric Vehicles.

See page 3



A worker is assembling a car in the workshop of FAW-Volkswagen Automobile in Changchun, Jilin Province, northeast China, April 2, 2021. (PHOTO: XINHUA)

Ten Major Actions Rolled Out for Carbon Peaking by 2030

By LI Linxu

Soon after unveiling the top-level design to achieve carbon peaking and carbon neutrality, China has rolled out an action plan to peak its carbon dioxide emissions before 2030.

The document, titled *Action Plan For Carbon Dioxide Peaking Before 2030*, details the country's main objectives

and major actions towards carbon peaking.

Carbon peaking is considered as a hallmark event in an economy's green and low-carbon transformation, said an official from the National Development and Reform Commission in response to media queries, adding China's carbon peaking and neutrality goals are fully in line with the goals and requirements of

the *Paris Agreement*.

The plan, released by the State Council, focuses on the 14th Five-Year Plan period and the 15th Five-Year Plan period, which are two crucial periods for carbon peaking.

Over the 14th Five-Year Plan period, notable progress will be made in adjustment and optimization of the industrial structure and the energy mix, according

to the plan.

During the 15th Five-Year Plan period, major progress will be made in adjustment of the industrial structure, and a clean, safe, efficient and low-carbon energy system will be preliminary established, says the plan.

To ensure carbon peaking by 2030, the plan puts forwards ten major actions, including the action for green and

low-carbon energy transition, the action for energy saving, carbon emission mitigation and efficiency improvement, and the action for promoting green and low-carbon transportation.

The plan also calls for the action for advancing green and low-carbon technology. The country will promote the supporting and guiding role of sci-tech innovation and improve the rele-

vant mechanisms and systems, so as to accelerate the revolution in green and low-carbon science and technology.

"A national green technology trade center will be set up to accelerate the commercialization of innovations," says the plan, adding that the intellectual property right protection for green and low-carbon technologies and products will be strengthened.

Guangdong Eyes Innovation Talent Hub Status

The 40 years of reform and opening up has highlighted Guangdong province's role as a hub for China's opening-up to the outside world. Today, Guangdong has embraced the potent innovative unifying force of the Guangdong-Hong Kong-Macao Greater Bay Area and Shenzhen pilot demonstration zone, as it strives to become a nucleus for global talent.

Attracting global talents

Building a high-end innovation platform with international influence has become an important vehicle for Guangdong to gather and cultivate high-level talent.

This April, the 19th Conference on International Exchange of Professionals was held in Shenzhen, attracting more than 10,000 people from home and abroad, including government representatives, experts and scholars.

Another talent exchange event, the 2021 Convention on Exchange of Overseas Talents and the 23rd Guangzhou Convention of Overseas Chinese Scholars in Science and Technology, will be held this December. Until now, the con-

ventions have attracted a taken pool of about 50,000 people from more than 140 countries and regions. Nearly 50,000 projects were born in these conventions.

The Overseas Experts' Visit to Guangdong is also an important brand activity to promote exchanges and cooperation among international sci-tech talent, and to coordinate the development and use of high-end talent resources at home and abroad. Since 2009, more than 70 activities have been held, with in excess of 5000 experts from around the globe invited to network and establish connections.

In addition, building a high-level research and development institute and introducing a high-level team of experts is also an important measure for Guangdong to accumulate high-end innovation resources. A typical example is the Institute for Advanced and Applied Chemical Synthesis of Jinan University, which is jointly established by Jinan University and internationally renowned scientists.

Implementing talent programs

In 2020, the Senior Talents Pro-

gram was first proposed for retired researchers. Thanks to this policy, more than 140 high-end experts from over 20 countries and regions took up work opportunities in Guangdong. Horace Loh, a world-renowned pharmacologist, who retired from University of Minnesota in 2019, was enrolled into the program. When speaking of China's talent search, he said, "China has introduced many policies for foreign experts, and there are different projects for different ages. China's policy for overseas experts has reached an unprecedented level, and the most telling evidence is their increasing number coming to work in China."

This August, the notice on the application of high-end talent exchange program in the year 2021 and 2022 was released, in which differentiated projects have been set up for retired experts, foreign experts, and young foreign researchers. This aims to further promote the exchange of talent from international destinations, Hong Kong, Macao and Taiwan to Guangdong, and boost its desire to become a global hub for sci-tech innovation talent.

Guangdong has also introduced a group of international scientists and researchers, to teach, to cultivate talents, and to carry out discipline construction, making positive contributions to Guangdong's sci-tech innovation.

Fostering an environment for talent development

Matthias Thurer, production management expert from Germany, applied for the Foreign Permanent Resident ID Card for himself and his family members last year. "In 2019, I received the Guangdong Superior Talent Card. Now with this talent card I've applied for the Permanent Resident ID Card in the hope of having a more convenient work and social life in China," said Thurer.

The implementation of the Guangdong Superior Talent Card system was initiated in December 2018. More than 3,000 talent cards had been issued by this June, providing experts with 14 benefits, including medical treatment, children's schooling, long-term residence and entry and exit.

Guangdong always puts forward new measures to optimize talent benefits. In 2019, twelve measures were issued to promote sci-tech innovation, including adjusting and optimizing major talent projects, taking the lead in implementing a better residence policy, improving expert's visa system, and simplifying visa application procedures for those who work for a short time in the province.

For example, the time limit for approving a foreigner's work permit and residence permit in Shenzhen has been reduced to 7 working days. The introduction of one-stop service greatly improves the approval efficiency.

With innovative mechanisms, simplified procedures and unimpeded channels, Guangdong, an open and diverse province, is sparing no effort to create greater convenience, more security and a better development environment for foreigners to work and live in the province.

Source: Division of Foreign Expert Services, Department of Science and Technology of Guangdong Province; Guangdong Science & Technology Cooperation Center

Column



Canton Tower, at the south bank of the Pearl River, is the landmark of Guangzhou city. (PHOTO: VCG)

Innovation Drives Guangdong's High-quality Development

By GONG Guoping

As the south gate of China and the starting point of Maritime Silk Road, Guangdong has long been one of the most open, dynamic and innovative regions in China.

The province has actively participated in international cooperation and competition over the past 40-plus years of reform and opening up, and its GDP has ranked No.1 among China's provinces for 32 consecutive years.

Driven by sci-tech innovation, the province has topped *China's Regional Innovation Capability Rank* for four consecutive years. Innovation has become the primary driving force for Guangdong's high-quality development.

During the 14th Five-Year Plan period (2021-2025), Guangdong is going to embrace the building of Guangdong-Hong Kong-Macao Greater Bay Area (GBA) and make sci-tech self-reliance and self-strengthening as a strategic support, in order to be an international sci-tech and industrial innovation center. By 2025, it will have initially established a technological and industrial innovation highland with global influence.

To play good the first move of sci-tech innovation for Guangdong, one of the important focuses is to strengthen the layout of strategic sci-tech power, and to develop an elite force of science and technology capabilities.

In recent years, 10 provincial laboratories have been built in batches in Guangdong. Up to date, it has 30 state key labs, 430 provincial key labs, 21 high-level innovation institutes, and 20 Guangdong-Hong Kong-Macao joint labs.

Behind these numbers are the province's optimized lab building system and talent introduction system, as well as the continuous system and mechanism innovation.

To make the most of the siphon effect of talent introduction and talent accumulation from major innovation platforms, Guangdong is accelerating the layout of major sci-tech infrastructure clusters and is building an array of national major innovation platforms.

It is also accelerating the construction of big-science facilities, such as Phase II of China Spallation Neutron Source project in Dongguan, Jiangmen Underground Neutrino Observatory, and High Intensity Heavy-ion Accelerator Facility in Huizhou.

To play good the first move, another important focus is to explore Guangdong's path to achieving breakthroughs of key core technologies. Focusing on

the bottlenecks, it has continuously implemented research and development plans in key fields of the province.

By March this year, Guangdong's financial expenditure on "First Move" projects, such as quantum communication, core chips, and 5G, has amounted to 7.1 billion RMB, driving social investment of more than 15 billion RMB.

Next, Guangdong is to carry out a new round of Three-Year R&D planning in key fields of the province, and to implement national key R&D projects, such as the project of novel display and strategic electronic materials.

Meanwhile, the province attaches great importance to the role of enterprises as the main body of innovation, promoting high tech enterprises to improve development quality and supporting various sized enterprises to integrate and innovate.

To create a favorable ecological environment for innovation, Guangdong is doing its utmost to satisfy talents near and far, win their hearts and minds, and retain their valuable skills.

Talent is the first resource for Guangdong's high-quality development. Striving to build an international sci-tech innovation hub, the province will implement a more open talent policy to attract talents, encourage innovation, and incubate a comprehensive talent pool.

Aiming to create a virtuous cycle between industries and talents, Guangdong will focus on industrial chains to build talent chains, specifically in ten pillar industry clusters and ten emerging industry clusters.

At the starting point of a new era, Guangdong will take the building of GBA into an international sci-tech innovation center as the key link, continue to improve sci-tech innovation systems and mechanisms, strive to make breakthroughs in key core technologies, and leverage the strength of sci-tech innovation and institutional innovation, so as to provide strategic support for the province's social and economic high-quality development.

Foreign experts and talents have always been an important part of Guangdong's innovation system. We sincerely welcome talents from home and abroad to Guangdong for innovation and entrepreneurship to build a better future together.

Gong Guoping is Secretary of the Leading Party Group and Director of Department of Science and Technology of Guangdong Province.

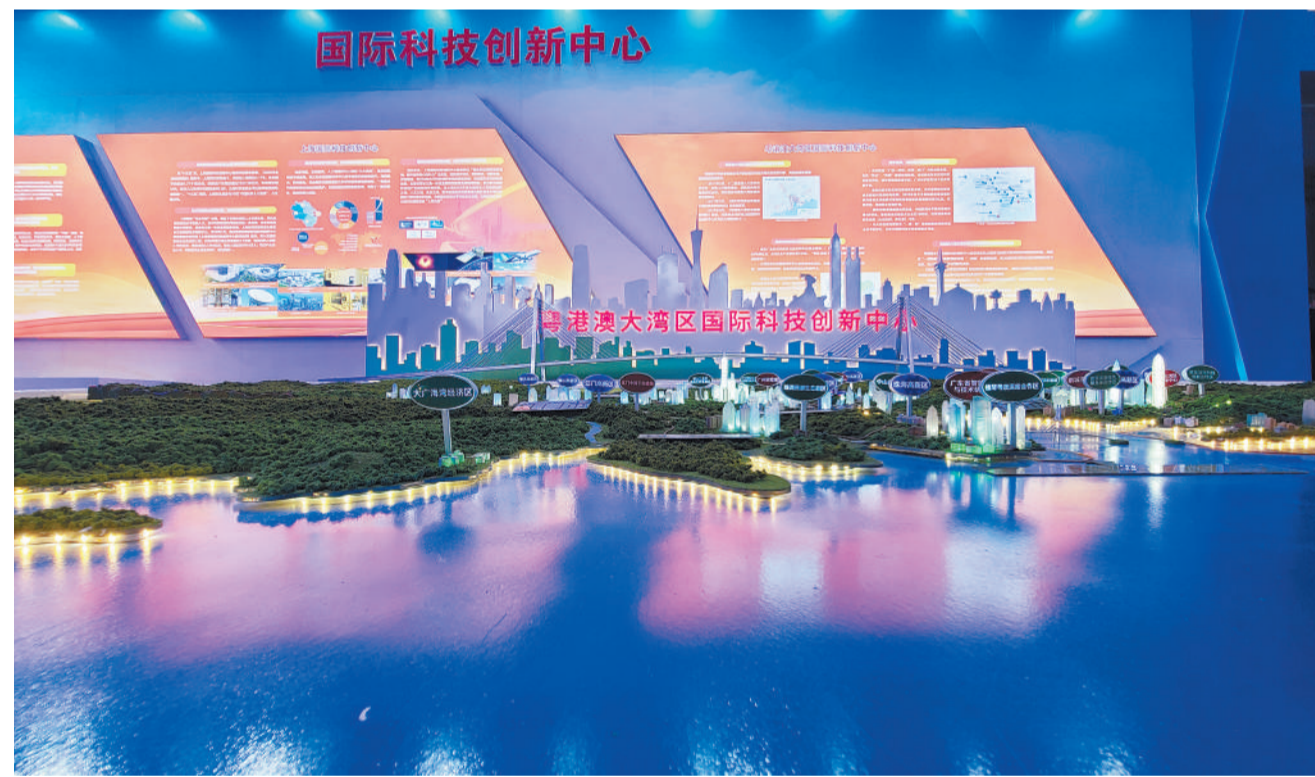


Photo taken on Oct. 27 shows the international sci-tech innovation centers featuring GBA at an exhibition on China's major sci-tech accomplishments during the 13th Five-Year Plan period in Beijing. (PHOTO: Li Linxu)

Chengdu-Chongqing Economic Circle: A New Growth Driver in Western China

By CHEN Chunyou

China released its master plan for the construction of the Chengdu-Chongqing economic circle in the southwest of the country on October 20.

The Chengdu-Chongqing economic circle is another important regional development strategy, following the Beijing-Tianjin-Hebei region, the Yangtze River Delta region, and the Guangdong-Hong Kong-Macao Greater Bay Area.

The plan proposes nine key tasks, including building a new pattern for the economic development of the two cities, jointly building a modern infrastructure network, a modern industrial system, a sci-tech innovation center with international influence, an ecological protective fence, a new base for reform and opening-up in the inland regions, and promoting integrated urban-

rural development.

Covering about 185,000 square kilometers, the Chengdu-Chongqing economic circle had a permanent population of about 96 million and a GDP of nearly 6.3 trillion RMB in 2019, accounting for 6.9 percent and 6.3 percent of the national total respectively.

According to the plan, all urban areas will be covered by the 5G network, and the economic circle will see a marked improvement in new infrastructure and stronger capabilities in safeguarding energy security by 2025.

Besides, universities in the region are encouraged to enroll students from all over the world and introduce respected postdoctoral researchers and young scholars. The joint construction of institutes, and R&D centers by top universities and research institutes at home and abroad is supported, which

will offer long-term, flexible and attractive research positions.

In the future, the Chengdu-Chongqing region will promote construction of the Chengdu-Chongqing comprehensive science center, said the plan. In addition, it will optimize the layout of innovation space, improve the ability of collaborative innovation and create an innovation-encouraging policy environment, which jointly serves to build higher-level sci-tech innovation platforms and promote a higher-level collaborative innovation.

The region will also focus on developing strategic products in the fields of nuclear energy, aerospace, smart manufacturing and electronic information. A number of major sci-tech infrastructures will be appropriately equipped in the Sichuan Tianfu New Area and the Chongqing Hi-tech Indus-

trial Development Zone, jointly building a hub for sci-tech innovation, said the plan.

A regional collaborative innovation system will be basically completed in the region, with the investment in R&D reaching about 2.5 percent of its GDP, and the contribution rate of sci-tech progress reaching 63 percent by 2025.

In the next five years, the Chengdu-Chongqing economic circle will witness great progress in economic strength, development vitality and international influence. The region's role of supporting the country's high-quality development will be significantly enhanced.

By 2035, the economic circle will develop into an active growth pole and a powerful driver with international influence, said the plan.

Quantum Computational Advantage Enhanced with New Study

Voice of world

Edited by QI Liming

A research team has successfully designed a 66-qubit programmable superconducting quantum computing system named Zuchongzhi 2.1, significantly enhancing the quantum computational advantage.

The study is led by renowned Chinese quantum physicist Pan Jianwei of the University of Science and Technology of China, and was published online on 25 October in the journal *Physical Review Letters* and *Science Bulletin* respectively.

Chinese research teams have made marked progress in superconducting quantum computing (Zuchongzhi 2.1)

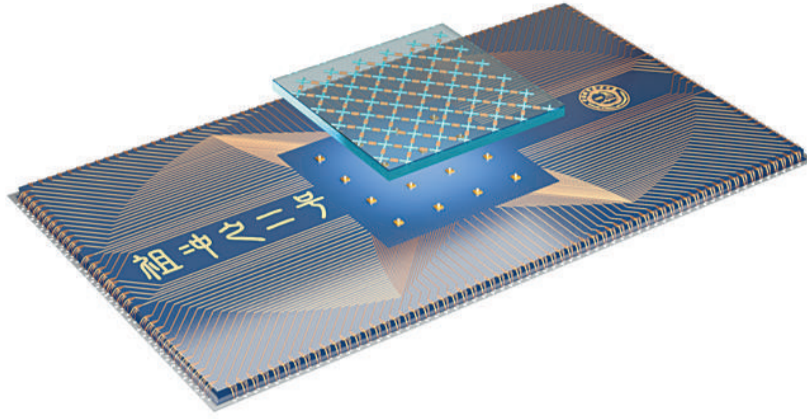
and photonics quantum computing technology (Jiuzhang 2.0), making China the only country to achieve quantum computational advantage in two mainstream technical routes, analysts said on authoritative physics websites.

Jiuzhang 2.0 is faster than the world's fastest existing supercomputer

According to the essay released in *Physical Review Letters*, Jiuzhang 2.0, with 113 detected photons, has made a major breakthrough in quantum computational speedup.

In the study, Gaussian boson sampling (GBS) was used to provide a highly efficient way of demonstrating quantum computational speedup in solving some well-defined tasks.

With 113 detected photons, Jiuzhang 2.0 can implement large-scale GBS septillion times faster than the world's fastest existing supercomputer.



Superconducting quantum computing "Zuchongzhi 2.1". (PHOTO: the research team)

Zuchongzhi 2.1 performs large-scale random quantum circuits sampling

Zuchongzhi 2.1 is a 66-qubit pro-

grammable superconducting quantum computing system, which significantly enhances the quantum computational advantage.

With an improved average readout fidelity of 97.74 percent, Zuchongzhi 2.1 can perform large-scale random quantum circuits, sampling about 10 million times faster than the fastest existing supercomputer.

"This indicates that our research has entered its second stage to start realizing fault-tolerating quantum computing and near-term applications, such as quantum machine learning and quantum chemistry," said Zhu Xiaobo, a member of the research team.

Comments from the authoritative physics website

Physics World said that the computational goal is to work out the probability that a certain input configuration would lead to a certain output configuration. It turns out that this task is exceedingly difficult for a conventional computer if the quantum circuits have more than a few tens of inputs and outputs.

A quantum computer, however, can use quantum sampling techniques to calculate random instances of the probability distribution in much less time than a classical computer. As a result, sampling experiments are a way to demonstrate quantum advantage, and the idea that quantum computers are much better than their classical counterparts at solving certain problems.

In the first paper, Pan and his colleagues explain how they used a technique called Gaussian boson sampling to analyze the output of a 144-mode optical interferometer.

The team says that their system has

10^{10} possible outcomes and that their implementation can sample the output 10^{10} times faster than a classical supercomputer. This quantum speedup is a huge increase over the team's previous result of 10^4 times, which they reported in December 2020. The result makes it extremely unlikely that a specialized classical algorithm can be devised to match this performance, thereby establishing quantum advantage.

In the second paper, another team led by Pan used a quantum computer that comprised 66 transmon superconducting qubits that are connected via 100 tuneable couplers. Their sampling experiment involved using 56 of the qubits, and the system was put through 20 quantum logic cycles.

Barry C. Sanders, director of the Institute for Quantum Science and Technology at the University of Calgary in Canada, released an article on American *Physical Society* website, saying that, "The two experimental quantum computers tackle the most complex problems yet, suggesting an end to the debate on whether quantum 'primacy'—the point at which a quantum computer outperforms the best possible classical computer—can be reached."

American Physical Society commented that these two experiments represent the rapid advancement in experimental quantum sampling, establishing more firmly that we are in an age of quantum primacy for computing, thus further motivating efforts to put quantum sampling to practical use.

The Digital Economy at a Glance

By Safder Nazir

Digital technologies have transformed society on an unprecedented scale over the last two decades. They have changed the way we live, work, play, commute, and interact.

It is digital technology that now has the potential to usher in widespread social changes and economic advancement. Accordingly, to prosper in the digital age, it has become crucial for nations to understand and cater for the digitally-based economic construct also known as the digital economy.

Definition of the digital economy

The digital economy has been defined in different ways, primarily based on scope. According to the latest definition from the Organization for Economic Cooperation and Development, it encompasses all economic activities reliant on, or significantly enhanced by, the use of digital inputs, including digital technologies, digital infrastructure, digital services, and data.

This broader scope refers to all producers and consumers, including governments that use digital inputs in their economic activities.

The four key enablers of the digital economy

The global economy is well on its way to fulfilling its digital destiny. More than 65 percent of GDP is predicted to be digitalized as early as 2022.

Accelerated investment in digital transformation will further spur the creation of digitally-enabled products, services, and experiences across all industries, significantly impacting economic development, particularly as nations across the world move away from resource-based economic models.

To facilitate this transition, national authorities and policymakers should focus their efforts and investments on the critical enablers of the digital economy, which are foundational to its evolution, namely digital strategies and regulations, digital infrastructure, data-driven economy and digital skills.

Economic prosperity, wealth creation, and the improvement of citizens' lives are priorities for every nation. As digital technologies are steadily intertwined with the way products and services are created and consumed, the digital economy is becoming a critical component of national transformation.

National digital transformation

By 2023, digitally transformed en-

terprises will account for more than half of global GDP. Two overarching factors will drive this trend: the proliferation of digital devices and the rising prominence of the millennial and zoomer (Generation Z) user base.

These digital-savvy generations account for 75 percent of the population in the Middle East today. By 2025, the number of connected devices globally is predicted to reach 100 billion, more than 12 times the number of people in this world.

These shifts have significant implications for the evolution of Smart Cities towards Cognitive Cities and the future of national digital transformation.

Trends and concerns on digital economy

The emergence and evolution of the digital economy is characterized by key trends. The primary driver of these trends is technological innovation, namely the advent and widespread use of social media and smartphones, as well as advanced broadband networks and technologies such as the Internet of Things, Big Data Analytics, robotics, Artificial Intelligence and Machine Learning.

The digital economy is primarily a data-driven economy. However, fully ex-

ploiting data remains a significant challenge for organizations. It is estimated that less than three percent of existing data is analyzed with the aim of improving enterprise intelligence. National governments and policymakers that focus on developing the digital economy should strive to create an open data economy, where data is shared widely, creating value, albeit supported with strong data privacy and protection laws to counter potential threats.

The increasing role of digital technologies in the workplace requires a range of new digital skills. This falls into two categories: core Information and Communications Technology (ICT) skills, such as programming, applications, infrastructure, cybersecurity and data analytics, and generic ICT skills required by all employees to work in a digitalized environment.

However, as organizations often point out, it is tough to find core ICT skills. Moreover, with rapid technological evolution, the skills learned at educational institutions often fall short and quickly become outdated.

(Safder Nazir is the head of Huawei's Digital Industry Center of Excellence, prior to which he has held various leadership roles in global "blue chip" companies. The opinions in this article are the author's and do not represent S&T Daily.)

Advanced Kindling Lamp Keeps the Flame Burning

By Staff Reporters

In mid-October, the Olympic flame was successfully brought from Greece to Beijing, which marks that it is officially entering Winter Olympics time. In order to keep this procedure on track, a wide range of technology has been used.

Li Jianye, the Beijing Winter Olympics torch designer, said that the kindling lamp is the first piece of equipment used during the torch relay. Its function is to ensure the flame would not be extinguished whilst being transported.

"We did a lot of structural innovations on this lamp. For example, the glass of the lamp is a double-layer structure, which ensures not only the air intake flow of the lamp, but also the moderate height and full combustion of the flame without producing any smoke and peculiar smell, so as to keep the appearance of the fire lamp clean and bright," said Li.

Hong Wenming, a fire lamp design team member, explained the preconditions for designing the torch equipment. "For example, a diversion channel is designed between the inside and outside of the lampshade. Its purpose is to relieve pressure effectively when the wind produces positive and negative pressure. This reduces the influence of wind, which affects the lamp, and finally ensures the flame will not be extinguished when the Beaufort Wind Scale reached five or six," he said.

According to the designers, this is

the first time a double-layer structure has been used in the kindling lamp. But there were still challenges for the design team. For example, exhaust gas may occur and rise at the start of the flame, and if the wind blows from top to bottom, carbon dioxide will be deposited in the chamber, causing the flame to be deprived of oxygen and be extinguished.

In order to solve these problems, team members utilized the double-layer structure and opened up space from top to bottom entirely so that when there is air pressure on the top of the lamp, the carbon dioxide exhaust in the chamber can be smoothly discharged from the sidewall space.



The kindling lamp of the Beijing 2022 Winter Olympics adopts the appearance of the Gilt Bronze Human-Shaped Lamp. (PHOTO: XINHUA)

'Smart' Winter Olympic Uniform, a Winner

By Staff Reporters

Uniforms, shoes and accessories for staff, volunteers and technical officials were unveiled on October 27, the 100-day countdown to the Beijing 2022 Winter Olympic Games.

The range of high-tech items have their own characteristics to make the wear comfortable, protected and fashionable.

A Chinese homemade multi-layer

structural cotton filler with patented technology was chosen as the wadding, which will be tailored to meet the needs of the cold environment. Meanwhile, the waterproof film used for moon boots is 100 percent waterproof, windproof, breathable and recyclable. The sole was made of anti-skid material providing grip on wet and icy ground.

Moreover, the laminated composite fabric used in the uniform is com-

bined with high-performance membrane material, which is light, elastic and fits well, along with having waterproof, air permeability and anti-condensation properties.

In terms of the outfit design, based on winter sports professional equipment and ergonomics theories, the design team used functional fabric and a 3D tailoring method. As a result, the outfits can meet the requirements of both in-

door and outdoor daily activities.

To combat the cold, outer fabric has excellent windproof, waterproof, and leakproof velvet characteristics. Fleece fabric has undergone post-processing to be antistatic and improved the overall wear comfort. The functional outfit has also increased the night reflective safety design and is waterproof, non-slip, breathable in parts such as cuff, collar, and zipper.

Meanwhile, the underwear uses a one-way moisture-transferring fabric to provide skin-friendly, quick-drying material in areas where the body sweats.

and building a digitally inclusive society.

Wang Ruijie, Singapore's Deputy Prime Minister and Minister of Economic Policy Coordination and Finance, said that looking ahead, with rapid growth of the digital economy, the closer economic coordination between ASEAN and China will "benefit both parties more."

guard to automated and connected driving.

In response to the declaration, a road test area for intelligent connected vehicles (ICVs) was launched in Chengdu, capital of Sichuan province. This was also the first cooperation project in terms of ICVs between China and Germany.

A Sino-German center on ICVs promotion and application was also established in Shanghai in 2020 to promote deeper bilateral cooperation in this field.

The cooperation in application of ICVs went deeper when the Chinese Academy of Information and Communications Technology and German Association of the Automotive Industry jointly started a cooperation project on ICVs and smart cities on July 2.

Supported by both governments and the automobile industry, the bilateral cooperation yielded a win-win result. The continuous evolution of the automobile industry is going to bring more opportunities for cooperation between the two countries.

From page 1

Five joint meetings on electric vehicles strategic partnership have been held, setting up a platform for coordination between the involved departments from both countries, strengthening the communication and cooperation in terms of the standards and regulations, encouraging policies, scientific research and application of electric vehicles.

In the past ten years, the in-depth cooperation in the electric vehicles industry between the two countries achieved fruitful results. Several Ger-

digital economy is expected to grow significantly, adding an estimated 1 trillion USD to regional GDP over the next ten years, according to the World Economic Forum.

In January 2021, the first ASEAN Digital Ministers Meeting approved the ASEAN Digital Master Plan 2025, to support the region's recovery from COVID-19 through facilitating cross-border trade

Sino-German Auto Bond: From 1.0 to 3.0

man car companies have established joint ventures with their Chinese counterparts.

There has been cooperation among universities and research institutes as well. In 2010, Chinese Ministry of Science and Technology and German Federal Ministry of Education and Research jointly launched a joint R&D center on electric vehicles. Together with 19 enterprises, 15 top universities and research

institutes from both countries like Tongji University and Technical University of Munich achieved good results from projects concerning new lightweight electric vehicles.

Era 3.0: Intelligent connected vehicles

Roads of more than 3,500 kilometers have been intelligently upgraded, and there have been more than five million cars carrying Internet connected ter-

minals, according to Xiao Yaqing, minister of Information and Technology, at the 2021 World Intelligent Connected Vehicles Conference.

Actually, China and Germany already signed a joint declaration of intent on cooperation in the area of automated and connected driving in 2018, focusing on several aspects, including coordination and promotion of (on-going) international standardization processes with re-

LIFE IN CHINA

'Coming to China, Best Decision in My Life'

By BI Weizi

A foreign cardiologist made a life-changing decision after receiving his undergraduate degree in 2008, opting to travel to China to further his studies.

Eight years later, he became the first Bangladeshi cardiologist to earn a doctor's degree from the prestigious Shandong University and then joined Beijing Fuwai Hospital, a preeminent institution in the field of cardiovascular disease treatment. Doctor Misbahul Ferdous is also the vice president of the Asian Pacific Society of Cardiology and has long promoted exchanges and cooperation between China and other countries in the Belt and Road Initiative.

Science and Technology Daily recently interviewed Ferdous to find out more about his "love affair" with China via on-line video.

The best decision in his life

"I remember it was in the late afternoon one day in September 2009 when my flight landed at Jinan Yaoqiang International Airport. I didn't speak Chinese at the time, and the new environment was totally unfamiliar to me," recalls Ferdous of his arrival in China.

"Almost 99 percent of the people around me didn't understand [why I had chosen to come to China] and not [chosen] another country." In hindsight, he said that decision changed the trajectory of his life. "I can say that coming to China is the best decision I've ever made in my life, and China has brought me education, work, friends, pretty much everything I have at the moment."

Cardiology knowledge exchanges

Ferdous has been active in promot-



Doctor Misbahul Ferdous is holding a trophy and certificate awarded by Global Health for his excellence in cardiovascular care in 2020. (COURTESY PHOTO)

ing cooperation in the field of cardiology between China and countries along the Belt and Road Initiative, all in the name of the Chinese Society of Cardiology and Fuwai Hospital.

Under the guidance of his mentor, Doctor Wu Yongjian, director of the Department of Cardiology, Fuwai Hospital, Ferdous often travels to Bangladesh, Nepal, Thailand, Malaysia, Indonesia and other countries for medical exchanges with his colleagues.

"Even during the pandemic, we still maintain very close and frequent exchanges. The Belt and Road Initiative

has opened the door for us to learn from each other," he said.

The Initiative also focuses on training young doctors. According to Ferdous, doctors from countries in the Belt and Road Initiative have opportunities to travel to China every year for a three-month or six-month training program.

A friend in need is a friend indeed

When COVID-19 struck, Ferdous and Doctor Wu were attending conferences in Saudi Arabia. Then, faced with countless unknowns and discouragement from his family and friends to remain in China, Ferdous returned to the

country more determined than ever to help.

"At that time I said to myself, whether as a doctor or as a foreigner who has lived in China for many years, if I don't go back when China needs help, I will feel ashamed for the rest of my life. I thought it was my responsibility to step up and do something for China," he said.

The long-term cooperation between Ferdous and his team and the countries in the Belt and Road Initiative has not only facilitated medical exchanges, but also helped each side to overcome difficulties during the tough times of the pandemic.

Ferdous recalls that in January 2020, he and Doctor Wu wrote to cardiologists in countries in the Belt and Road Initiative to seek help due to a shortage of face masks and other personal protective equipment (PPE). "Everything was unknown at that time, and many flights to China were canceled, but they still did their best to help, and we later received more than 60,000 face masks from countries such as Nepal, Bangladesh and Indonesia."

And in March of 2020, when COVID-19 in China was brought under control, he and Doctor Wu returned the favor, donating large amounts of PPE to those countries. "They reached out when we were in trouble, and we helped when they were in trouble, and the pandemic brought us closer to these countries," said Ferdous.

"China always opens its doors. During the pandemic, even though we are far apart, our hearts are always connected," he said.

Letter to the Editor

My Thoughts on China's Development

By Asad Khalil

Self-reliance and maintaining the world peace are the pillars of Chinese development philosophy. This philosophy has evolved around featuring innovative, coordinated, green and open development for all, and building a beautiful China. To realize and attain these development goals, China primarily relies on its national capabilities as well as innovation and continuum reform process.

In the international arena, the Chinese Dream has positioned China as a modernized and developed country that strives to improve the welfare of its citizens, spread peace and stability as well as promoting interconnectivity among countries and nations.

After a decade of experience in China as a foreign expert, I can describe China in three words: comfortable, developed and safe. To convey my opinions about China, I may need to write a book, but if it comes to an article, I can highlight a few things that impressed the most.

The Belt and Road Initiative

The Belt and Road Initiative constituted a strategic shift at the level of international relations in the world as it relies on partnership and common interests instead of the hegemonic attempts pursued by other great powers in the world.

China relies on friendship, harmonious and peaceful coexistence and serving the common interests which resulted in a giant leap into improving the socioeconomic conditions and national security of all countries participating in this initiative and enhancing stability and prosperity worldwide. That reflects the deep-rooted values of Chinese culture and heritage. In addition to its significant role in promoting economic growth, this initiative creates opportunities for coordinating the development strategies and infrastructure interconnectivity between China and countries along the Belt and Road routes.

Strong economy

China's transformation into one of the world's greatest economic powers took less than seventy years. That is due to a series of economic reforms that have significantly improved the life of the Chinese people and lifted millions out of poverty by opening trade routes and attracting investment.

China has been striving to strengthen partnerships and promote the connectivity among countries by promoting policies and regulations that foster a sustainable business environment and continuous cooperation through all platforms. This strong economy supports great career prospects for expats through creating more job opportunities and increasing the demand for competitive talents and entrepreneurs. Consequently, I believe that China is the new land of opportunities and a great destination. And that is not because of the increasing growth rate of its GDP but be-



Dr. Asad Khalil (PHOTO provided by the author)

cause the human capital that China is possessing and investing in.

Innovation

Innovation is an essential element of China's 2049 vision, i.e., building a knowledge-based, diversified and flexible economy which is reinforced by the best expertise to ensure the long-term prosperity of China and Chinese people. Accordingly, China is keen to create a creativity-conducive environment.

The vigorous innovation policy, dynamic management, and increased spending on education, science and technology in China are key factors that led the country to embrace its current role as a global innovation leader.

Poverty alleviation

Volunteering in development projects and poverty alleviation programs in remote rural areas in China, enabled me to witness inspiring and successful stories of poverty alleviation. Huge and collective efforts have been put together to empower poor communities. These efforts aimed at laying the foundation for future development, creating job opportunities and increasing the employment rate in these communities, supporting the resumption of local industries and enterprises. As a result, living standards have been improved and the overall well-being of societies has been boosted.

Green life (Think green)

China is now the world leader in energy conservation and new energy usage. Individuals and local governments all over China are taking the responsibility in creating a new "green life."

"Achieving progress in building ecological civilization" became one of the main goals of China's development goals.

With the increased awareness of "green development" concept, and the implementation of strict policies and laws to promote green development in recent years, the number of blue-sky days has dramatically increased, and the ecological environment has significantly improved. As a law professor, I believe all success is a result of the Chinese law and policy that can predict a better future by making it today.

(Asad Khalil is a law and international relations professor at Southwest University of Political Science and Law.)

Top 10 Most Attractive Chinese Cities for Expats in 2020

By Staff Reporters

The annual survey, titled *Amazing China - the Most Attractive Chinese Cities for Expats 2020*, was unveiled at the 2021 Euro-Asia Economic Forum.

Beijing, Shanghai, Hangzhou, Guangzhou, Xi'an, Chengdu, Ningbo, Suzhou, Shenzhen and Qingdao are the top 10 most attractive Chinese cities in the eyes of foreign talents in 2020.

In addition to the 10 most attractive cities that are on the list, the survey also lists cities with the most potential

to attract expats, namely Nanjing, Wuxi, Wuhan, Tianjin, Kunming, Dongguan, Changsha, Quanzhou, Hefei and Yantai.

The annual survey has been hosted by the Foreign Talent Research Center, the Ministry of Science and Technology since 2010.

Between May and August of 2020, foreign judges, including Nobel Prize winners, Chinese Government Friendship Award-winning experts and other experts living in China, voted online and chose among the 45 candidate cities. Results were analyzed from 3876 signed

votes from the senior foreign experts as well as other foreign participants.

This year's foreign expert panel consists of fourteen Nobel Prize winners, one Turing Award winner, sixteen academicians and forty-seven Government Friendship Award-winning experts.

The annual survey's goal is to promote "Opening up at City Level and Bringing in Talents from Overseas." The evaluation is based on each city's ability to attract foreign talents, related services for these talents, and to what extent they can contribute their services to public.

With continued improvement of China's comprehensive national strength, an increasing number of foreign experts choose to work and start businesses in China. In recent years, China has implemented the work permit system for foreigners and a visa system for expats. This has promoted the implementation of government affairs and the relevant policies as well as work and living conditions of Chinese cities, allowing more expats to fully enjoy better employment and lifestyle opportunities in China.

National Parks Safeguarding Ecological Diversity

By Staff Reporters

China is home to a variety of natural wonders. In an effort to protect these diverse landscapes, along with the rich biodiversity, China announced it would formally establish its first batch of five national parks on October 12, including the Sanjiangyuan (the Three-River-

Source) National Park, the Wuyi Mountain National Park, the Giant Panda National Park, the Northeast China Tiger and Leopard National Park and the Hainan Tropical Rainforest National Park.

The parks are among the 10 pilot national parks which have been reviewed by the country's authorities for national park status.

One of the most important parks, because of its location, is the Sanjiangyuan National Park in Northwest China.

In 2016, the Sanjiangyuan (the Three-River-Source) National Park became the first of the country's 10 pilot national parks after China began to explore new ways of park management.

Located in the hinterland of the Qinghai-Tibet Plateau, the scenic and mysterious area is the birthplace of the Yangtze, Yellow and Lancang Rivers, and is known as the Water Tower of China.

Renowned for its natural significance, this area serves as a strong protective shelter to safeguard ecological diversity.

Traditional Eastern Wisdom

Shennong: A Legendary Divine Farmer

By LONG Yun

Shennong, or "Divine Farmer," is a legendary cultural hero of China, believed to have taught the ancient Chinese people how to use agricultural tools and herbal medicine.

The earliest written record connecting Shennong to the practice of Chinese herbal medicines is found in *Huai Nanzi*, the Chinese philosophical classic from the Han dynasty around 122 BC.

Almost 5,000 years ago, ancient people suffered from hunger and numerous diseases. Shennong was said to feel great pity for them. Determined to find safe food and remedies for his people, he started to hike among the mountains,

sampling hundreds of herbs to test their medicinal value. The valuable work and knowledge gained by Shennong was handed down to generations, becoming the oldest book about Chinese traditional medicine, known as *Shennong Ben Cao Jing* or *The Classic of Herbal Medicine*, and Shennong is often referred to as "the God of Chinese herbal medicine."

The book contains information on 365 species of herbs and medicinal plants divided into three volumes. The first volume consists of a collection of "upper herbs," which includes 120 harmless plants with "nourishing properties," such as ginseng and goji berries.

The second volume includes 120 therapeutic substances intended to treat

the sick, but have a little toxic, or potentially toxic properties of varying degrees. This category includes female ginseng and peonies. The substances of this group are described as "middle herbs."

In the last volume, there are 125 substances which cause strong reaction and are often poisonous. Peach kernels and Chinese elder herbs are among those depicted. These herbs are referred to as "low herbs."

Over the centuries, there have been many versions of the story of Shennong. However, by all accounts, because of his efforts, countless herbs are now used in traditional Chinese medicine and the importance of traditional herbs are now widely accepted.



A creative picture of a legendary divine farmer: Shennong (PHOTO: VCG)



Aerial photo taken on May 25, 2021 shows a view of Noring Lake in the Sanjiangyuan National Park in Golog Tibetan Autonomous Prefecture of northwest China's Qinghai Province. The ecological system has been steadily improving in recent years in the Sanjiangyuan National Park, making it a habitat of an increasing number of wild animals. (PHOTO: XINHUA)