

Exploring the Potential of Quantum World

Dialogue

By LONG Yun & BI Weizi

Japanese scientist Katsumi Tanigaki has forged a deep bond with China for two decades, starting from his position as a physics professor at Tohoku University in Sendai, Japan. During that period, he mentored many Chinese graduate students and postdoctoral researchers. Seeing these students return to China and assume significant roles in the academic community filled him with pride and joy.

Before visiting China in 2007, Tanigaki's knowledge of the country was limited to books and introductions shared by his Chinese students. As the years passed, Tanigaki made subsequent visits to China, and he observed China's remarkable progress as it transformed its ambitious modernization vision into a tangible reality.

Exploring the unknown world
Currently, Tanigaki serves as the chief scientist at the Beijing Academy of Quantum and Information Sciences (BAQIS).

This Japanese scholar points out that humans have developed ideas and concepts throughout the history of science and technology. Yet, there is still so much that remains unknown. "This essential understanding is what fascinates us as scientists," he said in a recent interview with *Science and Technology Daily*.

In 2022, the Nobel Prize in Physics was awarded to three physicists in recognition of their groundbreaking experiments using entangled quantum states. "Entangled state" is the most mysterious and attractive feature derived from the theory of quantum mechanics. Despite the complexity of quantum mechanics and the intricate nature of quantum entanglement, Tanigaki and a group of scientists at BAQIS have similar pursuits and aspirations, targeting the revolution-



Professor Katsumi Tanigaki. (PHOTO: S&T Daily)

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ary field.

He enjoys the journey of exploring the unknown and mysterious field. "Although our understanding of quantum entanglement remains incomplete, it holds tremendous potential as a key technology in the future," he noted. From his perspective, quantum technology represents the cutting-edge research of the future, even if their implications may not be fully comprehended at present.

Tanigaki also provides an example of how quantum technology can enhance communication efficiency. In our fast-paced world, mistakes can hinder meaningful conversations, especially when crossing international and cultural boundaries. Present technology faces limitations in rapidly and accurately handling data for effective communication. Quantum technology shows great promise in overcoming these challenges, offering more efficient communication,

transcending language barriers and cultural differences.

Science makes life convenient
Science seems to be mysterious and distant, but its ultimate goal is to empower human life. Tanigaki is good at explaining the charm of science and technology in a more approachable way.

In the past, televisions used to be bulky and had large vacuum tubes, however, with technological advancements, televisions have become smaller, thinner and more efficient, he said.

Another example is the evolution of payment systems, he said, explaining that compared to the past, payment experiences have become more accessible and more convenient with the advent of mobile payment platforms like WeChat.

Communication is another area where he sees great development. Initially, he struggled to understand the language when he came to China. However, with time and the help of language-

learning and translation apps, he can now communicate with others through translation tools that can instantly convert Chinese to different languages like Greek and Japanese.

"These examples demonstrate how technological advancements have improved our lives by making things more accessible, convenient and efficient," said Tanigaki, adding that it is important to continue promoting scientific understanding and delivering the benefits of these advancements to the general public.

Diversity drives progress
In recent years, China has achieved great progress in quantum technology. Tanigaki attributed these achievements to China's vast land and diversity.

He further explains that the country spans from north to south, encompassing different regions with diverse populations, traditions and cultures. This diversity of perspectives and ways of thinking are highly significant. He applauded that scholars in China were not afraid to challenge existing ideas or propose alternative viewpoints.

"In China, there is more room for diverse ideas to flourish, which generate inherent diversity within the country and can foster innovation and progress," he said, believing that embracing a diversity of ideas and thinking patterns can lead to even greater advancements in a country as vast as China.

While China has made notable advancements in quantum technology due to its strong economic growth and focus, it still remains uncertain to what extent these advancements can be sustained according to Tanigaki. As a result, international collaborations are essential for the development of quantum technology and materials. He noted that although international political challenges may arise, it is crucial to foster global partnerships in order to advance in this field.

This article is also contributed by BAQIS.

Traditional Eastern Wisdom

Extracting Copper from Water: The Earliest Hydrometallurgy

By ZONG Shihan

Legend has it that there was a spring in the present day Yanshan county, Jiangxi province, where the water was not sweet but bitter. Local villagers discovered that through boiling this spring water, they could extract gleaming yellow copper. Intrigued, Shen Kuo (1031-1095) traveled to witness this process and documented it in his book *Dream Pool Essays*.

Yanshan county is blessed with abundant copper mines containing sulfur-rich ore. Through a combination of chemical and physical reactions like oxidation and weathering, copper sulfate is formed and seeps into the spring water, causing it to become bitter. By introducing iron pieces into the bitter spring water, the reactive iron displaces the copper, resulting in pure copper precipitation. This ancient method is known as copper hydrometallurgy.

This method boasts several advantages. It can be performed on-site with minimal equipment, straightforward procedures, and low costs. Copper can be extracted at room temperature, saving fuel. Additionally, it accommodates both low-grade and high-grade copper ores.

However, copper hydrometallurgy has limitations. It depends on the abundant bitter spring water in the spring and summer seasons, making it vulnerable to fluctuating climates. Insufficient rainfall diminishes the volume of bitter spring water, hampering large-scale copper production. With the development of modern smelting technology, copper pyrometallurgy has been rapidly developed to become the preferred method of smelting copper.

Despite this, as the earliest known method of hydrometallurgy originated in China, it holds a significant place in the history of the world metallurgy.



Trucks mine and transport ore at the Dexing Copper Mine in Jiangxi province, the largest open-pit copper mine in Asia. During the Tang (618-907) and Song (960-1279) Dynasties, copper hydrometallurgy was employed at this mine. (PHOTO: VCG)

Service Info

New Visa Process to Facilitate Foreigners Doing Business in China

By Staff Reporters

On August 3, the Ministry of Public Security of PRC held a press conference to announce 26 measures aimed at providing services and support to ensure high-quality development. Among these measures, there were specific provisions related to foreign nationals.

For foreign business and trade personnel visiting China, the process of obtaining port visas will be streamlined,

and multiple-entry visas will be made more accessible.

Foreigners visiting China for business negotiations, trade exchanges, installation and maintenance, exhibitions and conferences, who are unable to obtain a visa outside of China in advance, can now apply for port visas upon presenting an invitation letter from a Chinese company and relevant documentation. Additionally, those engaged in frequent business and requir-

ing multiple trips to China can obtain multiple-entry valid business visas within a three-year period.

Foreign nationals applying for residence permits will no longer be required to leave their passports with the authorities. After verifying the validity of their passports, foreign applicants are now allowed to keep their passports to handle other relevant matters during their stay in China.

These new measures are aimed at

promoting convenience and efficiency for foreign individuals engaged in business and trade activities in China, fostering a more welcoming environment for international cooperation and investment. According to National Immigration Administration, these new measures are expected to benefit at least 700,000 individuals annually and play a crucial role in cultivating a vibrant and dynamic market atmosphere.

TCM Becoming a Bridge of Communication

Expats Activity

By Staff Reporters

Traditional Chinese medicine (TCM) is gradually going global.

On July 25, the opening ceremony of the International Workshop for Young S&T Talent from BRI Countries was held in Xining, capital of Qinghai province. The training program aims to further promote scientific cooperation in Qinghai and facilitate exchanges and collaboration among young talent in the sci-tech community from countries along the Belt and Road (BRI). This year's theme is to spread TCM culture and enhance the global influence of

TCM technology.

According to the organizer, compared to previous workshops, this year's program primarily focuses on international exchanges, emphasizing cross-cultural exchanges between Chinese and foreign youth. The goal is to encourage young talent around the globe to play a more significant role in inheriting and disseminating the ancient science of TCM, contributing their wisdom to building a community with a shared future for mankind.

TCM is a crucial aspect of communication and cooperation among countries along the ancient Silk Road. Its exchange and cooperation have become a shining example of the high-quality development of the BRI.

Safety Driving Tips for Summer

Science Outreach

By Staff Reporters

Snow, rain and ice are common cold-weather threats to driver safety, but summer brings its own set of dangers.

For drivers, the added traffic of summer vacationers is just part of the increased risk. Construction, sun glare and unpredictable weather patterns all add to the danger. Drivers are under increased physiological and psychological stress during the hotter days and

are apt to become irritable, therefore losing focus on the road. Meanwhile in summer, the days are longer, the nights are shorter, and the temperature is high, thus many drivers do not get enough rest, resulting in lack of energy, fatigue and drowsiness while driving. According to the Insurance Institute for Highway Safety in the U.S., summer is the season with a relatively high incidence of car accidents. So, what should you take when driving in summer?

Pay attention to heat-related problems

Heat can cause damage to your vehicle. It can cause flat tires and affect the vehicle's braking ability. It can cause the engine to overheat more easi-

ly and put more stress on almost all of the vehicle's mechanical functions. Paying extra attention to tire pressure and tread, checking your brakes often, and making sure your vehicle's cooling system has the proper fluids and can help prevent your vehicle from breaking down in summer are all important to remember.

Moreover, it's important to be aware of how solar rays affect drivers and vehicles. Heat exhaustion can make drivers drowsy, and an overheated vehicle can leave them stranded. You can combat fatigue by taking frequent breaks, and paying attention to your vehicle's warning signs can help prevent vehicle breakdowns and malfunctions.

Watch out for sun and fire

It is not advisable to wear sunglasses that are too dark or too heavy. According to research, the dark color of the sunglasses can delay the time it takes for the eyes to send images to the brain, and this visual delay will cause the perception of speed to be distorted, causing the driver to make incorrect judgments.

What's more, it's not safe to leave gas lighters in a car, especially during hot weather. Some drivers have a habit of smoking to fight against fatigue. After lighting a cigarette, they may leave the lighter in the car, which is very dangerous. Extreme heat in the car can cause gas lighters to explode, resulting in potential fires.

The Last Days of Summer

Photo News

By ZONG Shihan

Sanfu refers to a period of intense summer heat, lasting around 40 days. It has three phases: the first 10 days is called *Toufu*, *Zhongfu* for the middle 20 days, and the last 10 days is *Mofu*. *Mofu* begins on August 10 this year. During this time, sunlight remains strong, but mornings and evenings are cooler, marking the approaching end of summer.

The saying during *Sanfu* says, "Dumplings for the first 10 days, noodles for the second, and pancakes with fried

eggs for the last." Due to *Toufu* and *Zhongfu* bringing hot, sweaty days, it becomes important to replenish lost nutrients during *Mofu*. Eggs, being a common and convenient source of nutrition historically, are enjoyed in the form of pancakes with fried eggs to boost nutrient levels.



Pancake with fried eggs is a special snack during Mofu in China. (PHOTO: VCG)