

China's first space lab

China's Space Station Opens for Scientific Experiments

Edited by QI Liming

When the Shenzhou-14 astronauts opened the hatch door of Wentian on July 25, the first lab module of China's space station was shown to the world. It is the first time the Chinese astronauts had entered the lab module in orbit. They will conduct in-orbit work such as the attitude control of the combination of the space station, small mechanical arm crawling and test the complex of big and small arms. They will also use the airlock cabin and the small mechanical arm of Wentian to carry out extravehicular activities.

As an important part of the national space laboratory, Wentian is able to support space science experiments of single or multi-disciplines. It is an "all-rounder" that integrates platform functions and tests payload functions.

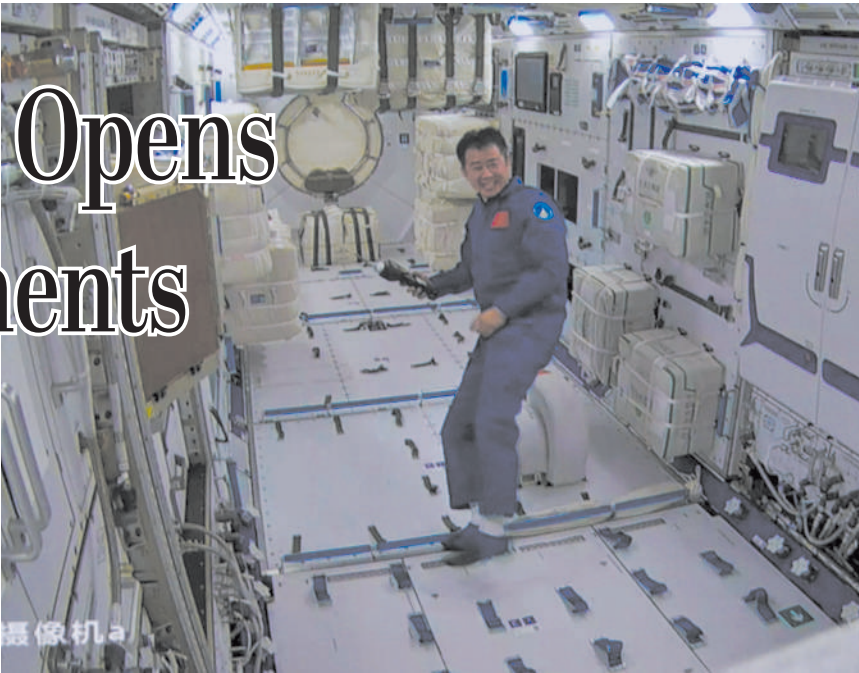
Space life science is one of the important fields of space science research.

On the one hand, the special environment of space can be used to study the mystery of life. On the other hand, it is also an important support base for scientific research for humans to leave the earth and go into space.

The Wentian module is equipped with a space life science laboratory, providing China with the basic conditions to explore the frontier of life science. Therefore, China has become one of only two countries in the world with the basic conditions for space life science research.

Canadian cancer scientist Tricia Larose, a medical researcher based at the University of Oslo in Norway, posted on Twitter that she would "happily" take part in a mission following the launch of the Wentian laboratory module.

Three years ago, Larose's project of "tumors in space" was chosen as one of nine projects to be carried out



Shenzhou-14 crew Chen Dong enters the space lab. (PHOTO: VCG)

on board the vessel. It was selected by the United Nations Office for Outer Space Affairs and the China Manned Space Agency from 42 applicants from 27 countries.

Her project aims to investigate if tumors will slow or stop growing in weightless conditions and how cosmic radiation affects the DNA of healthy organoids, a type of 3-D tissue culture derived from stem cells.

She is the only female scientist to lead one of the nine selected projects

and expected to travel to the Tiangong space station in 2025 or 2026.

China is going to finish building the space station later this year. Apart from the nine research projects selected in 2019, more than 1,000 experiments are expected to be carried out in China's space station.

Some of the experiments conducted on board will focus on the growth of plants, animals and microorganisms under space conditions, while others will focus on cell experiments.

Wentian Lab Module Focuses on Life Science

By Staff Reporters

Equipped with eight experimental cabinets and multiple extravehicular load adapters, China's newly launched Wentian space lab module is designed to explore the origins of life and the universe.

The experimental cabinets will focus on space life science and biotechnology research, as well as research of microgravity fluid physics, space material science and new space application technologies.

A glove box in life ecology experiment cabinet provides a closed and clean operating space for scientific experiments in the lab. There, the light

and wind can be adjusted automatically, with temperature controlled accuracy of 0.5°C and micro-manipulation accuracy of five micrometers.

The micro-operating system and a robotic arm system are equipped within the box, assisting astronauts to carry out precise operations such as gene injections, nuclear extractions and chromosome cutting, etc. Once the operation is completed, the robotic arm will automatically clean the glove box.

To meet the requirements of continuous upgrading of scientific experiments in-orbit in the future, the glove box is also equipped with a variety of scalable coherent interfaces.

After using glove boxes to collect

the samples, astronauts will store them in a refrigerator cabinet at -80 °C so that samples can be brought back to the Earth for further research.

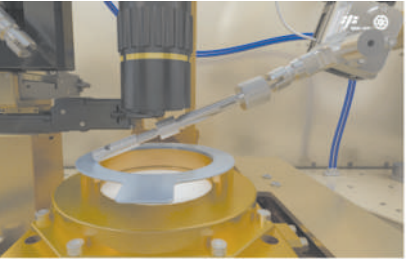
The space refrigerator, which can set three temperatures of -80°C, -20°C, and 4°C at the same time, is an indispensable cryogenic storage device in life science labs.

In addition, innovative combinations of the stirling engine and semiconductor chilling plate cut the energy consumption of the refrigerators to half that of other similar equipment.

Another experimental cabinet in the centrifugal module of the lab is to provide a variable gravity simulation environment, to support the comparative

study of the biological growth mechanisms under different gravity conditions.

This experimental cabinet has been equipped with two centrifuges with the largest diameter of 900 mm.



Taikonauts use glove boxes to collect samples in the Wentian lab module. (PHOTO: CAS)

Opinion

Stability of China-EU Cooperation vs Uncertainty of Global Economy

Edited by TANG Zhexiao

Loaded with 100 TEUs of electronics, mechanical parts, and groceries, the 10,000th China-Europe freight train from southwest China's Chongqing headed west on June 23 and arrived in Germany's Duisburg on July 11.

It is the first China-Europe freight train route, which began operations in 2011. The rail route connects 59 railway stations and 29 ports across the country, linking about 100 Asian and European cities

The China-Europe freight train ini-

tiative has kept growing for years. From 2016 to 2021, the annual number of China-Europe freight trains increased from 1,702 to 15,183, an average annual growth rate of 55 percent. And the value of goods transported by the cargo service skyrocketed from 8 billion USD to 74.9 billion USD during the same period.

"After years of development, during which the cargo service has withstood the test of COVID-19 and the changing international situation, the value and economic role of China-Europe freight trains have been widely recog-

nized by countries and regions along the rail routes," said Li Dawei, a researcher with the Institute of International Economic Research at the Chinese Academy of Macroeconomic Research.

On July 19, China and EU held the 9th High-Level Economic and Trade Dialogue, to discuss topics on the macroeconomy, industrial and supply chains, bilateral trade and investment, and financial cooperation.

The two sides agreed to jointly promote practical cooperation in the field of economy and trade, and to deal with the challenges of the global economy.

"EU and China are key trading partners," said Valdis Dombrovskis, EU's Executive Vice-President and Commissioner for Trade, noting that, "The importance of our economies comes with a responsibility to shape joint responses to global economic and trade challenges, such as disruptions in supply chains, global food insecurity, debt relief for the most vulnerable countries and reform of the World Trade Organization."

The dialogue, sending a positive signal, also marked a joint effort made by the two sides to revitalize the global economy.

Since the establishment of China-EU diplomatic relations in 1975, the two sides have maintained continued cooperation and stable development through



The 10,000th China-Europe freight train (Chongqing) at Tuanjiecun Railway Station in southwest China's Chongqing. (PHOTO: XINHUA)

Comment

Major Concerns About Japan's Wastewater Discharge

By QI Liming

In July, Japan's nuclear regulator approved a detailed plan for the release of treated radioactive wastewater from the Fukushima Daiichi Nuclear Power Plant into the Pacific.

This detailed discharging plan brings three serious concerns, namely dramatic damage to ocean ecology, the construction and re-leakage problems of the discharging pipes, and setting a bad precedent for nuclear wastewater disposal. These concerns from stakeholders and neighboring countries should not be ignored.

Purchasing domestic catches as compensation, ignoring other countries' loss

The fishing industry around Japan's Fukushima coast expressed disappointment and resignation over the decision, as the plan to begin releasing treated wastewater into the ocean moved one step closer to reality.

After years of painstaking efforts to convince the Japanese public and the rest of the world that their seafood is safe, the local fishing industry fears the ocean release will once again tarnish their reputation.

As if to appease critics, Tokyo has promised to buy fish catches as compensation if the industry suffers reputational damage. But what about other countries' fisheries?

According to Tokyo Electric Power Company (TEPCO) and Japanese government officials, the potential health hazards from the radioactive wastewater will be treated to levels far below releasable standards, and impacts on environment and health will be negligible.

However, even after removing about 60 radioactive isotopes from the wastewater, tritium can't be extracted through using existing technology.

It's not a good idea to discharge wastewater far away from the coastline

In the release plan, TEPCO is going to transport the treated and releasable wastewater through pipelines from storage tanks to a coastal facility, where it will be diluted with seawater.

Then, an undersea tunnel with an outlet about one kilometer (0.6 miles) away will be used for discharge to minimize impacts on local fishing. It is clear that Japan is trying to minimize the damage on local fishing and the environment, regardless of the damage to its neighbors.

Before the construction of the undersea tunnel can even begin, however,

TEPCO's proposal must win the backing of the local government in Fukushima prefecture and the two affected towns of Okuma and Futaba.

In addition, there is another big potential threat in the plan: the re-leakage of the wastewater in the tunnel can spread nuclear wastewater to residential living areas and seriously contaminate groundwater.

Japan's regulators solicited public comment and said they had received more than 1,200 responses. People voiced concern over whether the undersea tunnel would be earthquake-safe, and what was being done to protect workers.

Setting the wrong example of nuclear wastewater disposing

A Greenpeace report castigated the Japanese government for misrepresenting some safety aspects of the wastewater release.

"Not only is ocean discharge the cheapest option, it helps the government create the impression that substantial progress is being made in the early decommissioning of the Fukushima reactors," said Shaun Bernie, a senior nuclear specialist for Greenpeace East Asia.

Some experts have called for greater transparency, fearing unintended consequences of the operation. There is also concern about whether the discharge of enormous amounts of wastewater could set a bad precedent for dealing with future nuclear accidents.

Japan should seek neighbors' consent before releasing Fukushima wastewater

According to *The Korea Herald*, on July 26, South Korean President Yoon Suk-yeol said that Japan should seek the consent of neighboring countries, before moving ahead with its plan to discharge treated radioactive wastewater from the crippled Fukushima nuclear plant into the ocean.

China and Pacific Island nations have also voiced concerns over possible nuclear pollution in the Pacific many times.



The full view of Fukushima Daiichi nuclear power plant. (PHOTO: VCG)

Digi-tech, Better Village Life

From page 1

Rural tourism also benefited from digital technologies. The Huacheng town in south China's Guangdong province has successfully grown its advantages in culture and history, and boosted the local tourism industry via digital technologies.

With the mini program "Digital Huacheng" on Wechat, tourists can learn about the Li Weiguang, who lived in the area and was a champion of civil service examinations in the Qing Dynasty, via virtual reality. They can also buy tickets, check available parking lots and search for restaurants through the mini program.

Making rural life more convenient

Digital technologies also make daily life in rural areas more convenient.

"Previously, I had to commute back and forth to the office building of the village committee to get things done, but now I only need to scan the QR code on the online service platform via smart phone. It is much more convenient," said a villager in Yangquan, north China's Shanxi province.

Developed by China Telecom, the

platform is a comprehensive information service system, integrating multiple scenarios, including village governance and villager services. The platform has to date been adopted in more than 48,000 villages of 28 provinces all over the country.

Such convenience cannot be realized without the greatly improved digital infrastructure in rural areas. By the end of November 2021, all administrative villages in China had been connected to broadband Internet services. Through an optical fiber network, the average download rate in rural areas exceeds 100Mb per second, almost on par with urban areas.

IoT sensors were also installed in demonstration zones in rural areas to offer warning information, so as to timely respond to natural disasters, accidents, and public health and security emergencies.

Together with nine other departments, in January the Cyberspace Administration of China issued an action plan for the development of digital villages between 2022 and 2025. Even greater progress in digital village development is yet expected.