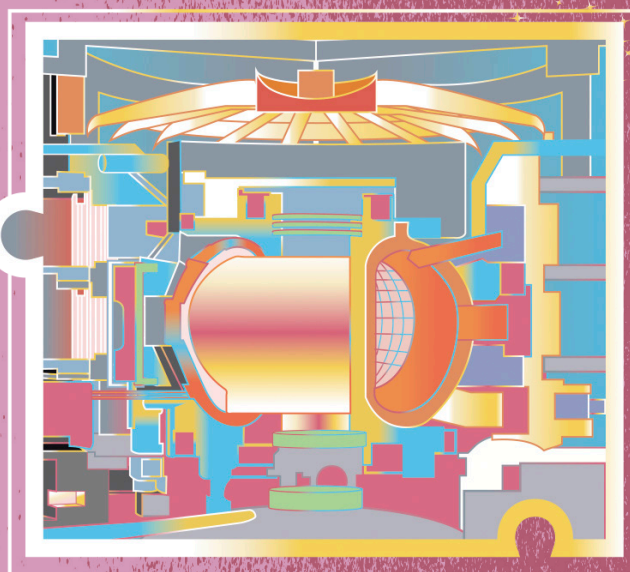




中国科学院
CHINESE ACADEMY OF SCIENCES

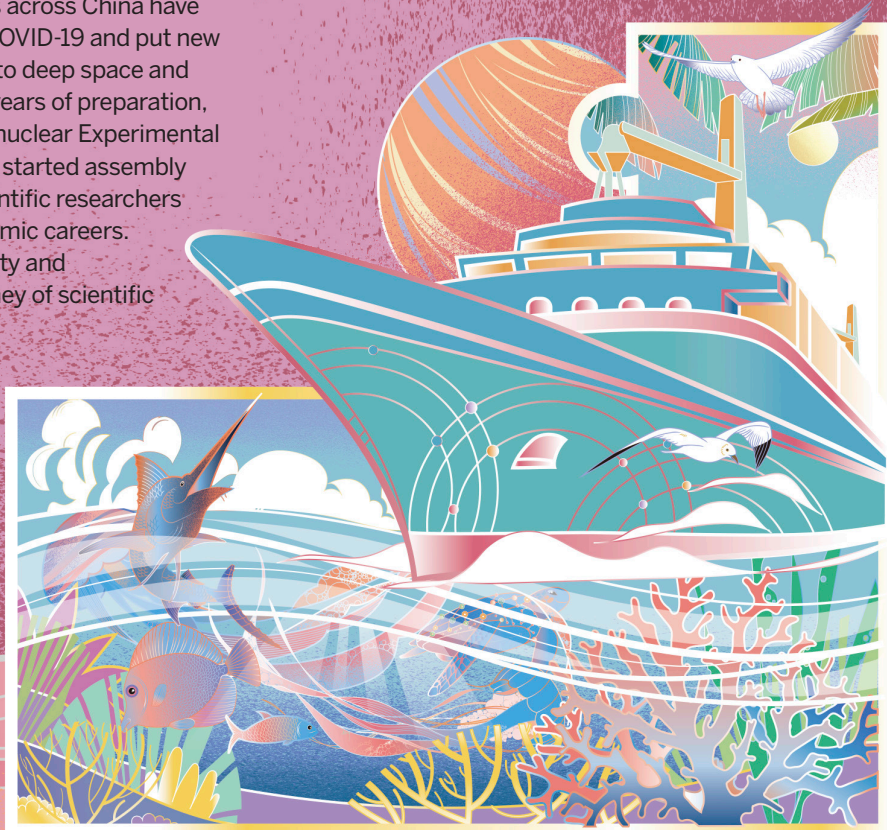
CAS Newsletter

NO. 166 • August 2020



A NEW JOURNEY

With the second half of 2020 well underway, CAS research institutions and universities across China have dealt with the impact of COVID-19 and put new exploratory equipment into deep space and the deep seas. And after years of preparation, the International Thermonuclear Experimental Reactor (ITER) has finally started assembly and a group of future scientific researchers have launched new academic careers. CAS is radiating new vitality and embarking on a new journey of scientific research and innovation.



Edited by Bureau of International Co-operation, Chinese Academy of Sciences

CAS Newsletter – Monthly – Editorial Board: 52, Sanlihe Road, Beijing, 100864, China



LEAD ARTICLE

Explore the universe

· China's Mars probe, Tianwen-1, blasted off on a Long March-5 rocket at 12:41 p.m. on July 23 from the Wenchang Space Launch Center.

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· Tianwen-1 is equipped with the Mars rover subsurface detection radar developed by CAS's Aerospace Information Research Institute (AIR).

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SCIENCE STORY

Seeds of hope

· During the 2020 graduation season, these future science and technology stars participated in various forms of special and unique graduation ceremonies from which they are setting out on their own paths of science, taking with them CAS's sincere blessings.

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· On August 10, the first admission letter from the University of Chinese Academy of Sciences arrived, along with a vinyl containing sounds from the distant universe as the university's special gift for freshmen.

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HOT ISSUE

Explore the sea

· Shiyun-6, China's first medium-sized geophysical comprehensive scientific research ship, was successfully launched by our South China Sea Institute of Oceanology recently.

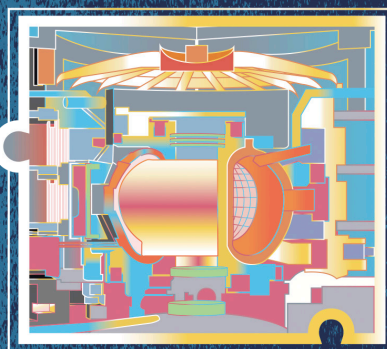
>>PAGE 5

· Meet these big guys from the South China Sea! Chinese researchers have spotted 11 whale species in the South China Sea during a deep-sea scientific expedition.

>>PAGE 6

· Tansuo-2, the mother ship of China's manned submersible that is capable of diving to depths of 10,000 meters, has returned to Sanya in South China's Hainan Province after an 18-month renovation project.

>>PAGE 7



INTERNATIONAL COOPERATION

Promising future

· ITER PF6, manufactured and delivered by our Hefei Institutes of Physical Science (HFIPS), is recognized as the heaviest and most sophisticated superconducting magnet manufactured so far in the world.

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· The International Thermonuclear Experimental Reactor (ITER), the world's largest fusion device, is being assembled to replicate the fusion power of the sun, which provides light and warmth and enables life on Earth.

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Coordinator: Peng Ying
Executive Editor: Zhang Ningning
Designer: Tian Chi
Illustrator: Wu Heping

2 | Lead Article -Explore the Universe



China's unmanned Mars probe, Tianwen-1, blasts off on a Long March 5 rocket in Hainan, July 23, 2020. [IMAGE: CHINA DAILY]

CAS contributes to successful launch of Tianwen-1 Mars probe

The Chinese Academy of Sciences (CAS) has contributed great efforts to the successful launch of a Mars probe, which was carried aloft by a Long March-5 Y4 rocket from the Wenchang Spacecraft Launch Site in South China's Hainan Province at 12:41 p.m. on July 23.

About 36 minutes after launch, the spacecraft, including an orbiter and a rover, was sent into the Earth-Mars

transfer orbit, embarking on an almost seven-month journey to the red planet, according to the China National Space Administration (CNSA).

China's first Mars mission is named Tianwen-1, which means Questions to Heaven.

Participating in the research tasks, CAS played a leading role in demonstrating and putting forward scientific goals and payload configuration plans

for the mission. It worked on the development of the ground application system, the payload subsystem, and the very long baseline interferometry (VLBI) orbit measurement subsystem as well as a number of key engineering key products. The academy will also work with the CNSA on scientific data application research.

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3 | Lead Article -Explore the Universe

>> PAGE 2

As many as 13 institutions of CAS undertook scientific research tasks of the Mars mission, including the National Astronomical Observatories, National Space Science Center, Shanghai Astronomical Observatory, Yunnan Observatory, Xinjiang Astronomical Observatory, the Changchun Institute of Optics, Fine Mechanics and Physics, the Xi'an Institute of Optics and Precision Mechanics, the Aerospace Information Research Institute, the Institute of Optics and Electronics, the Shanghai Institute of Technical Physics, the Institute of Geology and Geophysics, the University of Science and Technology of China, and the Institute of Solid State Physics.

The institutions have made breakthroughs in the research of large-range data transmission between the Earth and Mars, high-precision, low-delay and multi-target interferometry and orbit determination prediction, key payload development and data processing technology, and special aerospace material development.

With successful experience in China's lunar missions Chang'e 1, 2, 3, and 4, CAS has trained a team of qualified, experienced engineering management and technology development professionals in the fields of lunar and deep space exploration data reception and processing, VLBI, light and miniaturized payload development, and key aerospace materials.

In addition, a group of outstanding young and middle-aged scientists at CAS have been working in planetary science and other emerging research fields, and are expected to make original scientific achievements in life information on Mars, the local structure of Mars, the Martian magnetic field and its formation and evolution, the geological characteristics and evolution of Mars, and other Mars-related areas.

Source: Chinese Academy of Sciences

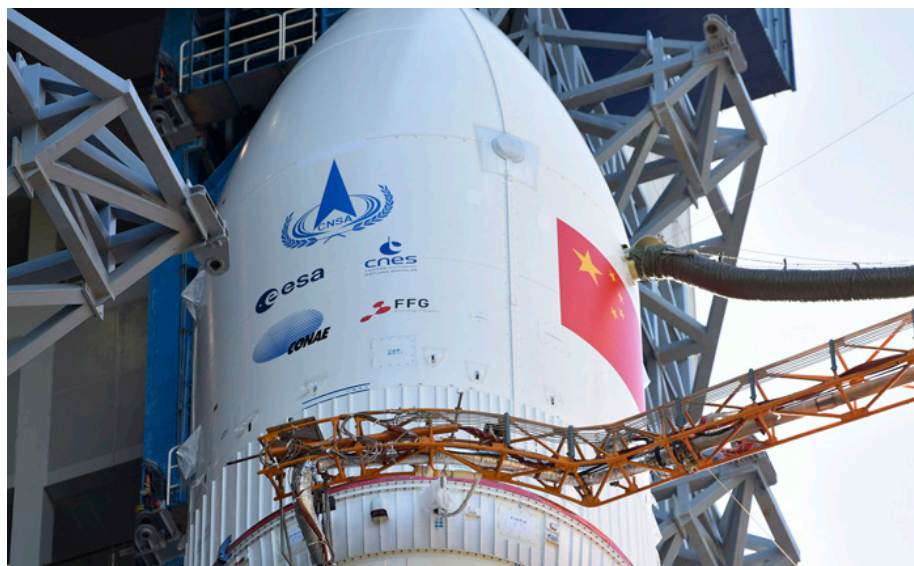


Photo taken on July 17, 2020 shows the Long March-5 rocket at the Wenchang Space Launch Center in South China's Hainan Province. [IMAGE: CHINA NATIONAL SPACE ADMINISTRATION]



[IMAGE: CHINA NATIONAL SPACE ADMINISTRATION]



China's probe to use radar to explore internal structure of Mars

After landing on Mars, China's Tianwen-1 probe will detect the surface and internal structure of the red planet by using its onboard radar equipment.

Ground-penetrating radar, a key probe instrument, was developed by the Aerospace Information Research Institute of the Chinese Academy of Sciences. It is expected to survey the Martian soil and ice, and to collect data about the structure beneath the planet's surface at depths of between 10 and 100 meters.

China launched its first Mars probe, Tianwen-1, on July 23, kicking off the country's independent exploration mission of our planetary neighbor.

According to scientists, the probe will take about seven months on its journey to Mars.

Source: Xinhua





China launches new-type geophysical comprehensive scientific research vessel Shiyan-6

The new-type geophysical comprehensive scientific research vessel of the South China Sea Institute of Oceanology of the Chinese Academy of Sciences took on its official name, Shiyan-6, at the vessel's launching ceremony held in Guangzhou, South China's Guangdong Province.

The new vessel is expected to be put into use next year as an important offshore scientific platform for the development of China's marine industry. The launch of the new ocean vessel will greatly improve the country's deep sea scientific research capabilities.

Marine scientific research ships are one of the important ways people gain a deeper understanding of the ocean, and are the most important and effective platform, tool, and carrier for exploring and studying the ocean.

Shiyan-6 will enhance China's exploration and basic data acquisition capabilities in the South China Sea and in deep oceans.

In addition, the vessel will play an active role in helping countries along the Maritime Silk Road improve ocean exploration capabilities and observation methods, conduct ocean surveys, marine environmental monitoring and protection as well as marine ecological protection and restoration, carry out marine disaster early warning and forecasting and disaster prevention and mitigation, train marine observers and improve marine scientific and technological levels.

After launching, outfitting and interior decoration will begin and a mooring test is expected to be completed after cabin decoration ends in December.

Source: South China Sea Institute of Oceanology, Chinese Academy of Sciences





Fraser's dolphins in the South China Sea, July 20, 2020 [IMAGE: XINHUA]

Chinese researchers spotted 11 whale species in the South China Sea during a deep-sea scientific expedition, the Chinese Academy of Sciences said on July 28.

The 21-day expedition wrapped up on July 28 in Sanya, Hainan Province, having covered over 3,000 km. It was launched to conduct research on the diversity, population levels and distribution patterns of whales near the Xisha Islands and Zhongsha Islands in the South China Sea. A similar expedition to study whales was launched in 2019.

Researchers on this year's expedition spotted four whale species that were not seen last year: the pygmy killer whale, the false killer whale, the melon-headed whale and the long-snouted spinner dolphin.

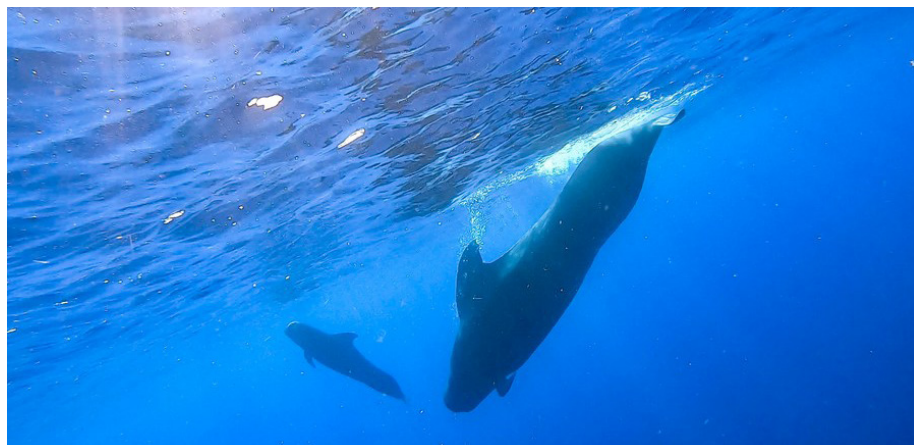
According to researchers, historical records show that over 30 whale species have been recorded in the South China Sea, indicating that the area has the country's greatest diversity of whale species.



Researchers make observations during an expedition in the South China Sea, July 24, 2020. [IMAGE: XINHUA]



A short-finned pilot whale in the South China Sea, July 20, 2020 [IMAGE: XINHUA]



Short-finned pilot whales in the South China Sea, July 20, 2020 [IMAGE: XINHUA]

Source: Xinhua





China completes renovation of deep-sea manned submersible mother ship

Tansuo-2, the mother ship of China's manned submersible that is capable of diving to depths of 10,000 meters, has returned to Sanya in South China's Hainan Province after an 18-month renovation project.

The ship, colored mainly white and green, left Fuzhou Port in the eastern province of Fujian on June 25 before arriving in Sanya on June 28.

Owned by the Chinese Academy of Sciences, Tansuo-2 features an ad-

vanced electric propulsion and positioning system, which can provide sufficient power and automatic cruise capabilities for deep-sea explorations.

It can carry 60 researchers and serves as the mother ship for China's new manned submersible Fendouzhe (Striver) and the older Shenhai Yongshi (Deep Sea Warrior), which are capable of reaching depths of 10,000 meters and 4,500 meters, respectively.

The ship is 87.2 meters long and 18.8 meters wide, with a full-load displace-

ment of 6,800 tonnes. It has a maximum speed of 14.2 knots and a cruising range of 15,000 nautical miles, further than that of the previous-generation Tansuo-1.

The renovation project started in December 2018 at Fujian Mawei Shipbuilding Co., Ltd. Engineers have upgraded the ship with more labs and increased cabin comforts for researchers.

Source: Xinhua



[IMAGE: INSTITUTE OF DEEP-SEA SCIENCE AND ENGINEERING, CHINESE ACADEMY OF SCIENCES]



8 | International Cooperation - Promising Future

ITER PF6 coil arrives on site

Finally!

Around 11:00 a.m., June 26, PF6, the 400-ton superconducting magnet coil with an 11.2m external diameter, rolled into Cadarache, France, the ITER site, on a 342-wheel flat-bed trailer, after a more than three months sea journey that started in March this year.

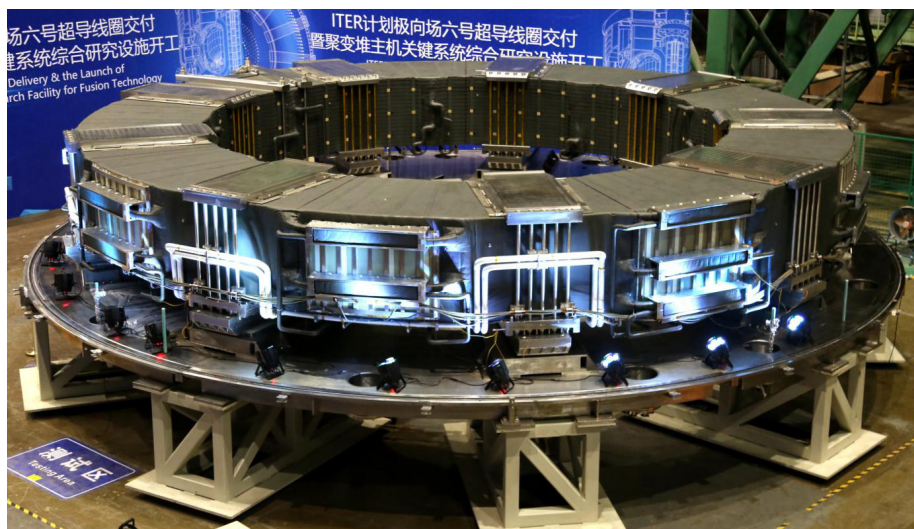
A takeover ceremony was held that morning in which Bernard Bigot, Director-General of the International Thermonuclear Experimental Reactor (ITER) Organization and other staff welcomed the giant guest.

Actually, the giant guest is the key component of ITER that was manufactured and delivered by the Institute of Plasma Physics (ASIPP) of the Hefei Institutes of Physical Science (HFIPS). It's about to be installed at the bottom of the cryostat, the culmination of six years of tough work.

Its arrival marked a milestone in ITER assembly, and paved the way for the planned first plasma in 2025.

Lots of work had been done ahead of time to guarantee safe land transport from Marseille to the Cadarache ITER site. Bridges on the way were reinforced, roads were broadened, a new bridge was constructed and a mountain peak was even removed.

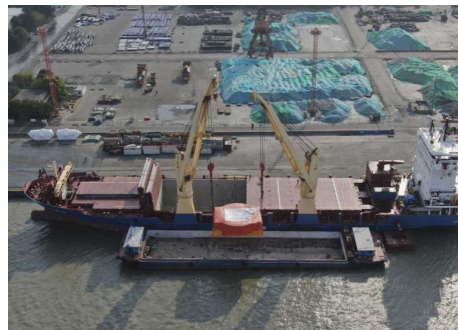
ITER PF6 is recognized as the heaviest and most difficult superconducting magnet manufactured so far in the world. The F4E ITER procurement package and ASSIP team won the bid in 2013. Due to its technical complexity, it cost them enormous effort to complete the manufacturing. Even its delivery, spread over three months, was not that easy because of difficulties caused by the COVID-19 epidemic.



A ceremony at ITER site welcomes PF6's arrival. [IMAGE: HEFEI INSTITUTES OF PHYSICAL SCIENCE, CHINESE ACADEMY OF SCIENCES]



A ceremony at ITER site welcomes PF6's arrival. [IMAGE: ITER ORGANIZATION]



"Boarding" to start its sea transportation
[IMAGE: BLOOMBERG NEWS SERVICE]

At the welcoming ceremony, Bigot highlighted the great effort and contribution made by the Chinese team to ensure timely delivery and arrival of PF6. At the same, he also showed his thanks to more than 100 Chinese engineers and technicians who are now working at the ITER site implementing ITER Tokamak Assembly Contract NO.1 (or TAC-1). Johannes Schewmer, Director of Fusion for Energy (F4E), said that fulfillment of TAC-1 is considered a "great connection" in the fu-

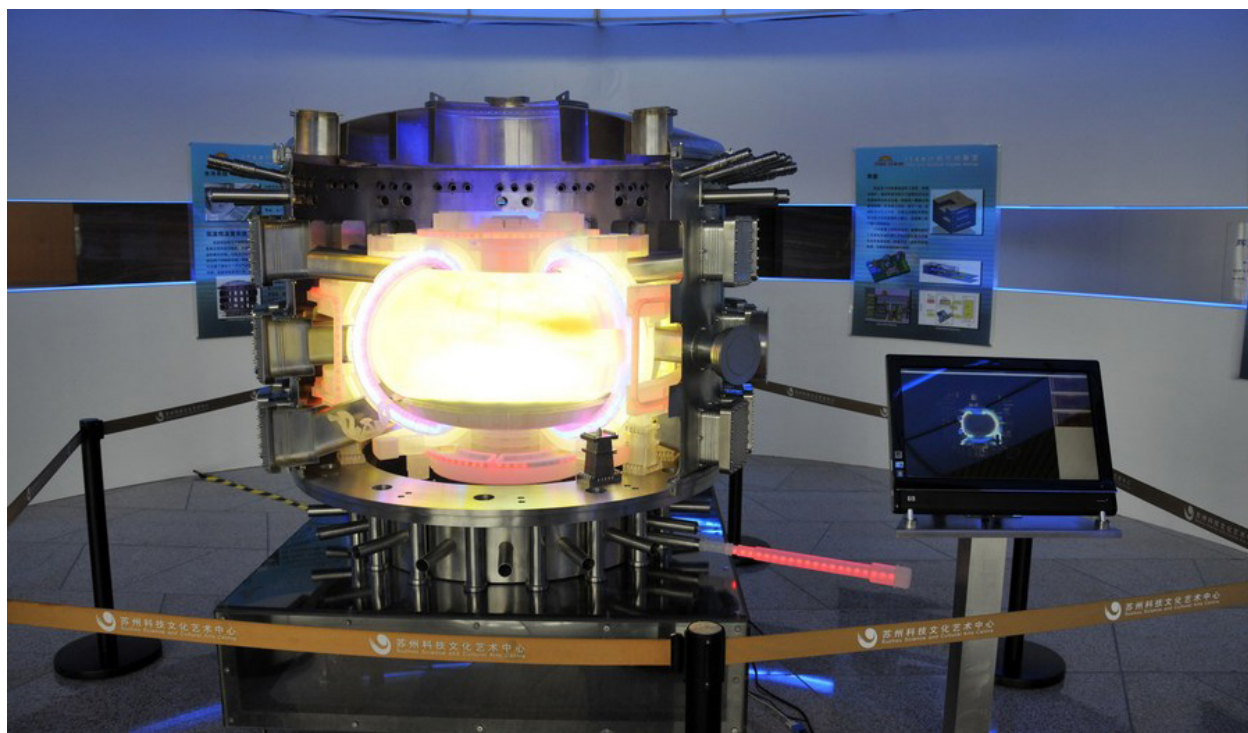
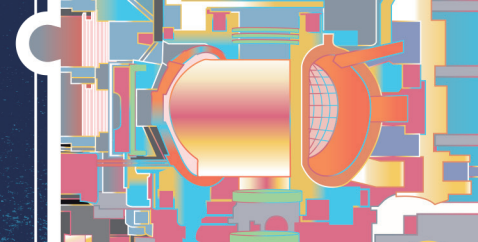
sion community.

"Our team is honored by the trust from the ITER Organization and Fusion for Energy to undertake the PF6 coil task," said Song Yuntao, Vice President of HFIPS and Director of ASIPP by remote connection to the ceremony. Song added that the project's implementation has built "mutual trust" between China and Europe.

*Source: Hefei Institutes of Physical Science,
Chinese Academy of Sciences*



9 | International Cooperation - Promising Future



A 1/20 scale model of the ITER tokamak [IMAGE: XINHUA]

Global leaders celebrate start of assembly of ITER fusion energy-producing device

On July 28, leaders from the European Union (EU), China, France, India, Japan, South Korea, Russia and the United States declared the official start of the assembly of the world's largest nuclear fusion device at the International Thermonuclear Experimental Reactor (ITER) in southern France.

Under construction in Saint-Paul-lez-Durance, in recent months the ITER site has been receiving gigantic first-of-a-kind components — in many cases weighing several hundred tons and measuring more than 15 meters in length — produced by ITER consortium members. Assembling

the ITER machine will take 4.5 years, according to a press release from the ITER project.

When ITER is finished, it is expected that it will demonstrate that fusion power can be generated sustainably on a commercial scale, it added.

Unlike existing fission reactors, which extract energy by splitting atoms, ITER would generate power by fusion, a process similar to that which produces the sun's energy.

Described as an “Artificial Sun,” the ITER program is one of the largest and most important international scientific research projects in the world. China of-

ficially joined the program in 2006.

In late May, the 1,250-ton, soup-bowl-shaped cryostat base — the heaviest single piece of the ITER — was positioned in the so-called tokamak pit near Cadarache in southern France. This marked the official start of the main equipment installation of the largest international scientific research cooperation project in the world, a Chinese group participating in the project said.

The tokamak is an experimental machine designed to harness the energy of fusion.

Source: Xinhua





Some graduates take part in the commencement ceremony on-site in Beijing, July 2, 2020. Other students joined in the ceremony online because of the COVID-19 pandemic, with UCAS promising they could join a commencement ceremony on-site in the following years. [IMAGE: CHINA DAILY]

Graduation and degree awarding ceremony held for class of 2020

“No matter where you are, today, please enjoy your moment of accomplishment!” said Bai Chunli, President of the Chinese Academy of Sciences at the graduation and degree-awarding ceremony of the University of Chinese Academy of Sciences (UCAS) for the class of 2020 held in Beijing on July 2, 2020.

A total of 9,415 students graduated from UCAS this year: 4,465 with doctorates, 4,601 with master’s degrees and 349 with bachelor’s degrees.



Bai Chunli, President of the Chinese Academy of Sciences, delivers a speech at a commencement ceremony in Beijing, July 2, 2020.

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Some graduates took part in the commencement ceremony on-site in Beijing, but the vast majority of students joined in the ceremony online because of the COVID-19 pandemic, with UCAS promising they could join a commencement ceremony on-site in the following years.

According to incomplete statistics, among the academic papers written by the 4,465 Ph.D. recipients as first author during their studies, 45 were published in journals such as *Science*, *Nature*, and *Cell*, 8,130 were included on the SCI (Science Ci-

tation Index) journal list, and 1,529 appeared on the EI (Engineering Citation Index) journal list.

Fifty-five of the master's degree graduates are from the UCAS School of Artificial Intelligence, the first university institute established in China focused on artificial intelligence. Eighteen of them have accepted job offers from leading Internet companies such as Huawei, Tencent, and Alibaba. Thirteen chose to further their studies at home and abroad, and one was selected under Huawei's "Top Minds" recruitment program.

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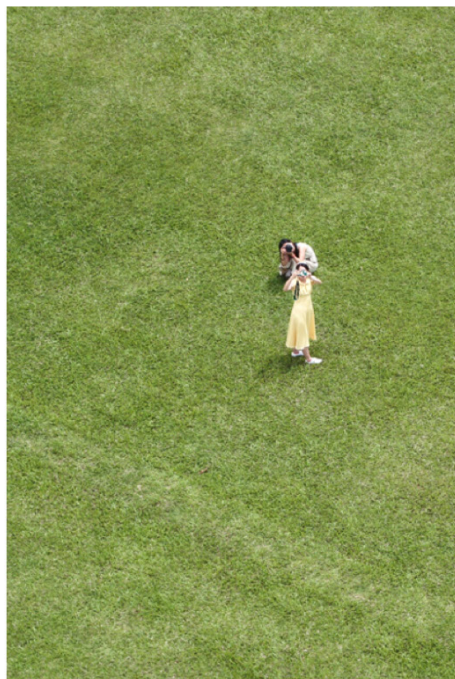
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In addition, as of June 28, 324 of the bachelor's degree graduates in the class of 2020 had decided to continue their studies for a master's or doctor's degree. Two hundred and fifty-seven, 68.9 percent of the total number, will do so on the Chinese mainland or in Hong Kong Special Administrative Region and 67 will go abroad for further studies. Twenty have been admitted by Harvard and other top-ten universities around the world.

More than 20,000 graduates participated in the virtual graduation and degree-awarding ceremony through live streaming and social media platforms, according to incomplete data.



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Acceptance letter of UCAS brings sound of the universe

Nie Jiahui, a high school graduate from Beijing who received his acceptance letter on August 10 to become a physics major freshman at the University of Chinese Academy of Sciences (UCAS), said he was thrilled to receive a special message from space.

As one of the students accepted for enrolment as undergraduates by UCAS, Nie was lucky to receive the first offer package sent by the university, which includes a vinyl disk containing the sounds of 15 pulsars.

The signals were recorded using the Five-hundred-meter Aperture Spherical Telescope in Guizhou Province, the world's largest single-dish radio telescope. Thirteen of them were released publicly for the first time.

Nan Rendong, chief scientist and engineer of the telescope, is a 1978 alumnus of the university and also an outstanding

representative of the Chinese Academy of Sciences.

"The mysterious and wonderful sound seems to have taken my thoughts to outer space. This is the most advanced gift I have received and I will treasure this package for the rest of my life," Nie said.

In 2019, Nie participated in the university's summer camp for high school students, and then made up his mind that UCAS would be the ideal university where he could realize his scientific dreams.

Li Shushen, the university's president, said in a letter to prospective undergraduate freshmen that the 150-second-long "echoes of the universe" were meant to let them physically experience the scientific progress the nation has made, and encourage them to answer the call of duty to remain curious and eager as they learn and explore science and innovation.

Talented young people should under-



take the major historical mission in the new round of technological revolution and industrial transformation, matching their pursuit of personal ideals with the call of the new era, Li said.

The university also made headlines with its acceptance package last year, which included the Chinese-made Loongson 3 computer chip with the aim of reminding talented young people that a small and unassuming gadget can change the world.

Source: University of Chinese Academy of Sciences

