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CAST Newsletter

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Headlines

CAST President Wan Gang attends the Ninth Kubuqi International Desert Forum

Opening ceremony of the Ninth Kubuqi International Desert Forum
Photo credit: *China Youth Daily*

On August 26, 2023, the Ninth Kubuqi International Desert Forum opened in the city of Ordos in China's Inner Mongolia Autonomous Region. Themed "Technology-Empowered Desert Control for the Benefit of Mankind," the forum facilitated exchange of innovative ideas and technologies in the global fight against desertification and played a vital role in addressing desert challenges worldwide and promoting environmentally sustainable development. It brought over 300 political leaders, business professionals, and scholars from various countries and regions together. CAST President Wan Gang attended the opening ceremony and delivered an address.

The forum featured four keynote sessions themed "Desert Biodiversity Conservation and Sustainable Resource Utilization," "Sandstorm Prevention and Control & Science and Technology-Empowered Desert Control," "Integrated Management of Mountain, River, Forest, Farmland, Lake, Grassland, and Desert Ecosystems," and "Knowledge Sharing and Technology Innovation and Transfer for Land," respectively.

(Source: Official website of CAST)

World Robot Conference 2023 kicks off in Beijing

On August 16, 2023, the World Robot Conference 2023 (WRC 2023) kicked off in Beijing under the theme "Spurring Innovation for the Future." Jointly hosted by the Beijing Municipal Government, the Ministry of Industry and Information Technology, and CAST, the conference presented a rich agenda of keynote addresses and in-depth discussions focused on open collaboration in robotics, the latest technological trends, industrial applications, and ecosystem development. CAST President Wan Gang attended the opening ceremony and participated in the conference launch event.

A notable highlight of this year's conference

Launch ceremony of the WRC 2023
Photo credit: Official website of CAST

was the segmentation of the exhibition hall into ten distinct application domains to showcase the integration of the "Robotics+" concept in the diverse fields of manufacturing, agriculture, trade, logistics, and healthcare. A special zone of pivotal components was also arranged to present a multi-faceted display of the industry's cutting-edge technologies and applications. Drawing participation from 160 global robotics firms, the event displayed close to 600 exhibits including 60 world debuts.

(Source: Official website of CAST)

CAST and the Institution of Engineers, Singapore discuss opportunities for collaboration

On August 11, 2023, He Junke, CAST Vice President in charge of daily work and Chief Executive Secretary of the CAST Secretariat, met with a delegation from the Institution of Engineers, Singapore (IES) during their visit to Beijing.

He highlighted the enduring partnership that CAST has maintained with IES over the years. Building on the foundation laid by the previous Memorandum of Understanding (MoU) between CAST and IES, he expressed a keen interest in fostering comprehensive and multi-level exchange across the scientific and engineering communities of China and Singapore and fondness for initiatives that encourage young engineers from both countries to collaborate.

IES President Dalson Chung stressed the value of cooperation with both CAST and the Chinese Society of Engineers (CSE). Looking ahead, he identified several potential areas of stronger cooperation including sustainable development, green and low-carbon technologies, and development of young engineering and technical talent.

(Source: Official website of CAST)

CAST announces top 15 photonics challenges for 2023

CAST unveils the top 15 photonics challenges for 2023
Photo credit: cnr.cn

On July 29, the 2023 China (Changchun) Aerospace and Optoelectronic Industry Innovation Conference opened under the theme "Charting a New Course in Aerospace and Optoelectronics." Jointly organized by the Chinese Society for Optical Engineering (CSOE) and the Changchun Municipal Government, the conference gathered experts to examine various facets of the optoelectronic industry including laser technology, optical imaging, semiconductor advancements, and optoelectronic displays. Participants seized the chance to explore innovative ideas and models to fuel the growth of China's aerospace sector.

During the conference, CAST unveiled 15 significant technological challenges for the photonics field in 2023. They were:

Top five engineering challenges

●Advance ultra-powerful EW Lasers

●Build large space optical devices

●Revolutionize data processing with high-density storage and computing using integrated photonic chips

●Achieve atomic-scale real-space imaging at the atomic and electronic level

●Enhance gravity gradient measurement at high spatiotemporal resolution.

Top five frontier scientific questions

●Explore breakthroughs in ultra-fast, high-resolution imaging beyond spatial and temporal limitations

●Investigate the manipulation of light through multiple degrees of freedom

●Determine the minimal size achievable for optical systems

●Realize the potential of integrated optoelectronic chips

●Work towards comprehensive optical comput-

ing

Top five industrial technology challenges

●Establish a mature platform for silicon-based optoelectronic heterogeneous integration

●Resolve bottlenecks in the precise testing and measurement of laser spatiotemporal characteristics

● Achieve autonomous control in mid-to-high-end sensors

●Develop intelligent connected vehicles tailored for China

●Reduce loss and facilitate large-scale production in anti-resonant hollow-core optical fibers

(Source: Official WeChat account of Voice of CAST)

China celebrates its first National Ecology Day

Aerial view of the Three-River-Source National Park, also known as "China's water tower," in Qinghai Province
Photo credit: Official website of the Three-River-Source National Park

On August 15, 2023, China celebrated its first National Ecology Day with the theme "lucid waters and lush mountains are invaluable assets." The festivities encompassed a range of events including a grand opening ceremony, the unveiling of significant achievements in ecological civilization, an exchange of experiences in building ecological civilization, and a conference focused on green low-carbon innovations.

The decision to establish August 15 as National Ecology Day was made on June 28, 2023, by the Third Session of the Standing Committee of the Fourteenth National

People's Congress. The goal was to raise awareness of ecological civilization in Chinese society and foster a heightened sense of responsibility to protect the environment.

In recent years, China has taken proactive steps in global environmental governance. It proposed an initiative to build a community for all life on Earth, championed the signing and implementation of the *Paris Agreement*, made pivotal decisions regarding carbon peak and carbon neutrality, and advanced the development of an environmentally friendly "Belt and Road Initiative." China has also successfully hosted the 15th Meeting of the Conference of the Parties to the *Convention on Biological Diversity* (COP15) and the 14th Meeting of the Conference of the Contracting Parties to the *Ramsar Convention on Wetlands* (COP14).

2023 Green Low-Carbon Innovation Conference held

Opening ceremony of the 2023 Green Low-Carbon Innovation Conference
Photo credit: gmw.cn

On August 15, the 2023 Green Low-Carbon Innovation Conference (GLCC) took place in Huzhou City, Zhejiang Province. The event was jointly organized by CAST, the Ministry of Housing and Urban-Rural Development, and the Zhejiang Provincial Government under the theme "Low-Carbon Innovation and Global Ecological Civilization." He Junke, CAST Vice President in charge of daily work and Chief Executive Secretary of the CAST Secretariat, attended the opening ceremony and delivered an address.

The conference featured several significant highlights including the inauguration of the Ecological Civilization (Huzhou) Science Popularization Center and the official launch of the Low-Carbon Innovation Development Fund. Simultaneously, the 2023 International Low-Carbon Technology Exhibition was in full swing, accompanied by nine low-carbon innovation sub-forums and a series of science and industry matchmaking activities. These multifaceted events played a crucial role in advancing the development of a sustainable green ecosystem, driving research and development of green technologies, fostering growth of green industries, and

bringing the world's brightest minds in the realm of low-carbon innovation together.

(Sources: *People's Daily* and the Official WeChat account of JINRIKEXIE)

Academic Exchange

CAAI Vice President Zhou Zhihua elected President of the IJCAI Trustee

Zhou Zhihua, Vice President of CAAI
Photo credit: Official WeChat account of CAAI

On August 21, 2023, the 32nd International Joint Conference on Artificial Intelligence (IJCAI) was held in Macao, China. During the conference, Zhou Zhihua, Vice President of the China Association of Artificial Intelligence (CAAI), was elected the new President of the IJCAI Trustee, highlighting IJCAI's recognition of his academic excellence, influence, and leadership in the field. Notably, Zhou became the second Chinese scholar to hold the position globally. He expressed dedication to his two-year term and pledged to make significant contributions to the advancement of Chinese scientists in the artificial intelligence field through concrete action.

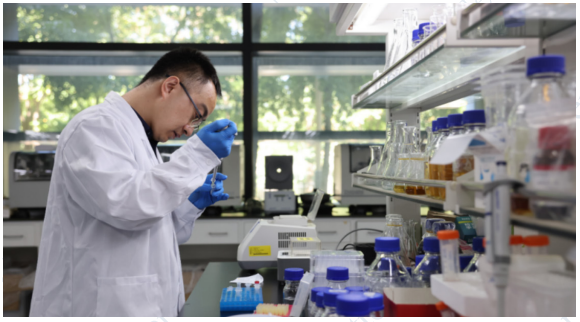
Established in 1969, IJCAI is one of the oldest, most respected, and most influential international academic conferences in the realm of artificial intelligence. Its core mission is to promote research, development, and application across all facets of artificial intelligence while fostering international exchange and collaboration. IJCAI also publishes the esteemed academic journal *Artificial Intelligence* (AIJ), which has solidified its status as a prominent platform for research in this field.

(Source: Official WeChat account of CAAI)

Chinese scientists successfully create sugar from carbon dioxide

A group of Chinese researchers has pioneered a method to create sugar from carbon dioxide. They detailed their findings in *Chinese Science Bulletin* published on August 15, 2023. This

two-year research project represents a groundbreaking achievement in artificial saccharide synthesis.



Yang Jiangang in his lab at the Tianjin Institute of Industrial Biotechnology of the Chinese Academy of Sciences
Photo credit: Xinhua News Agency

The study's principal investigator, Yang Jiangang, explained the team's approach. They mixed high levels of carbon dioxide with other foundational materials, maintaining exact proportions within a specialized reaction solution. By using a blend of chemical and enzyme catalysts, they were able to yield four hexoses: glucose, allulose, tagatose, and mannose. Remarkably, the entire process took merely 17 hours to complete, reducing a timeline that formerly spanned years. The procedure achieved a production rate of 0.67 grams per liter per hour, exceeding the previous benchmark more than ten times over.

The research grants unparalleled precision in artificial sugar synthesis, according to Yang. The strategy of manipulating the catalytic impacts of various enzymes potentially paves the way for crafting nearly any sugar variety. Manfred Reetz, a member of the German National Academy of Sciences Leopoldina, praised the milestone as transforming sugar synthesis technology that could propel the field into a new frontier of green chemistry.

(Source: Xinhua News Agency)

International Awards

Chinese scientist Fu Qiaomei awarded the Sir Nicholas Shackleton Medal

From July 14 to 20, 2023, the 21st International Union for Quaternary Research (INQUA) Congress took place in Rome, Italy. During the event, Dr. Fu Qiaomei from the Institute of Vertebrate Paleontology and Paleoanthropology (IVPP) of the Chinese Academy of Sciences (CAS) became the first Chinese scientist to be honored with the prestigious Sir Nicholas Shackleton Medal.

Established in 2007, the Sir Nicholas Shackleton Medal recognizes young scientists who have made pioneering contributions to Quaternary research. The medal is granted biennially to

a single recipient. Nominations are submitted by INQUA member countries and rigorously evaluated by an award review committee. Since its inception, it has been awarded to eight young scientists from various countries.

Fu Qiaomei receives the Sir Nicholas Shackleton Medal
Photo credit: Official WeChat account of the China Centre for International Science and Technology Exchange

(Source: Official WeChat account of the China Centre for International Science and Technology Exchange)

Chinese scientist E Weinan awarded the ICIAM Maxwell Prize

E Weinan receives the ICIAM Maxwell Prize
Photo credit: Official WeChat account of NTCAST

On August 21, 2023 the 10th International Congress on Industrial and Applied Mathematics (ICIAM 2023) was held at Waseda University in Tokyo, Japan. All six ICIAM prizes were awarded at the opening ceremony,

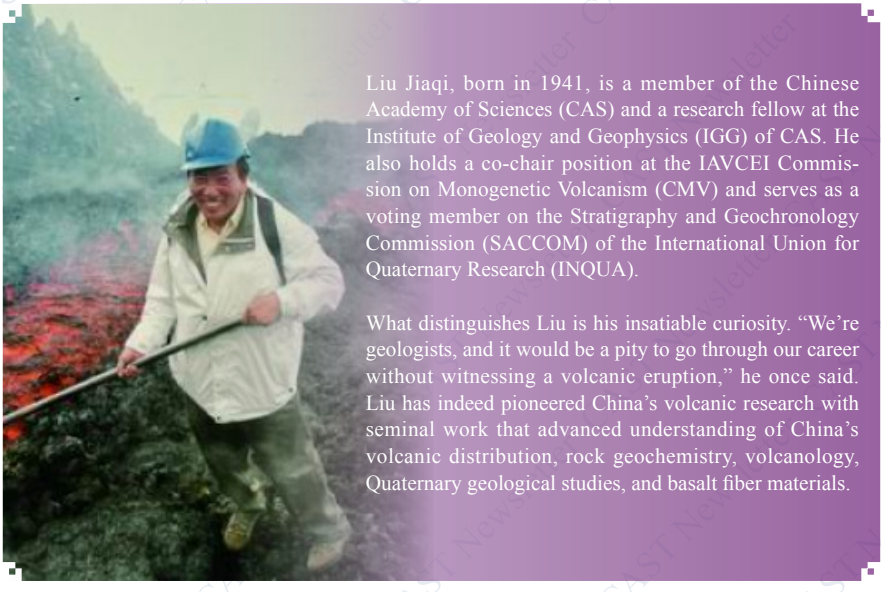
Dr. E Weinan, an advisory committee member of the China Society for Industrial and Applied Mathematics (CSIAM), a member of the Chinese Academy of Sciences (CAS), and a professor at Peking University, was awarded the ICIAM Maxwell Prize for his seminal contributions to applied mathematics and in particular on analysis and application of machine learning algorithms, multi-scale modeling, modeling of rare events, and stochastic partial differential equations. E Weinan had previously been honored with the ICIAM Collatz Prize in 2003, making him the first mathematician worldwide to receive two ICIAM prizes.

The Maxwell Prize, established in 1999, is conferred every four years to celebrate the achievements of mathematicians who have displayed originality and made significant contributions to the field of applied mathematics.

(Source: Official WeChat account of NTCAST)

Scientist Profile

Liu Jiaqi: Digging into volcanic mysteries at the "gates of hell"



Liu Jiaqi, born in 1941, is a member of the Chinese Academy of Sciences (CAS) and a research fellow at the Institute of Geology and Geophysics (IGG) of CAS. He also holds a co-chair position at the IAVCEI Commission on Monogenetic Volcanism (CMV) and serves as a voting member on the Stratigraphy and Geochronology Commission (SACCOM) of the International Union for Quaternary Research (INQUA).

What distinguishes Liu is his insatiable curiosity. "We're geologists, and it would be a pity to go through our career without witnessing a volcanic eruption," he once said. Liu has indeed pioneered China's volcanic research with seminal work that advanced understanding of China's volcanic distribution, rock geochemistry, volcanology, Quaternary geological studies, and basalt fiber materials.

Liu Jiaqi measures the lava temperature of the Piton de la Fournaise volcano on Reunion Island in January 1998
Photo credit: Official WeChat account of Voice of CAST

Across almost six decades, Liu has climbed the peaks of Changbai Mountain ten times and explored the Qinghai-Tibet Plateau seven times. He has also led three Arctic expeditions and two missions to Antarctica. His journeys span across all seven continents and five oceans, covering more than 50 countries and regions. He has traversed mountains, rivers, lakes, seas, deserts, and plateaus, all in a quest to uncover the

hidden secrets of nature.

The mysteries of Chinese volcanoes

In the 1980s, there was a widespread international belief that China had no volcanic activity. Even renowned scholars like Joseph Needham, deeply versed in Chinese science and technology history, asserted in his work *Science and Civilisation in China* that "there are no volcanoes within Chinese borders." Liu Jiaqi undertook a revolutionary journey to alter this perception.

His investigation led to the Western Kunlun Mountains in Xinjiang. There, he unearthed evidence of a volcanic eruption occurring in 1951. He documented the discovery as the most recent volcanic eruption on the Chinese mainland and named it the Ashi Volcano. He then explored the two distinct volcanic zones in China—the Circum-Pacific Belt and the Qinghai-Tibet Plateau Volcanic Belt—even deeper and studied their geological features, ages of formation, and dynamics. His extensive research culminated in the publication of a book, *Volcanoes in China*, which offered a comprehensive account of the distribution and geological features of Chinese volcanoes.

Through a series of studies, Liu established the correlation between Chinese volcanoes and global volcanic activity. He confirmed that the volcanic rocks in eastern China are intimately linked to the East Asian tectonic plate system and revealed the close relationship between volcanic activity in the Qinghai-Tibet Plateau and the plateau's elevation.

Conducting perilous research

Liu Jiaqi has ventured to many of Earth's known "gates of hell" to witness volcanoes erupt in all their fury and even measure the temperature of freshly erupted lava firsthand.

In 2000, Liu ventured to investigate the Krakatoa volcano in Indonesia alongside a team of international colleagues. As they ascended towards its summit, they were caught off guard by a sudden earthquake. They hurriedly descended the mountain, only to witness the volcano's eruption moments later. In another expedition to the Ashikule volcano cluster in Western Kunlun, Liu followed a path along the Keriya River Valley, braving the glacier's icy waters flowing downstream. After an unfortunate slip, he might have been swept away in the freezing waters without the timely help of passersby.

Not every researcher who ventures into the depths of volcanoes emerges unscathed. Liu has sadly lost three inter-

national colleagues in the line of duty. Yet, he views volcanoes as the vibrant life force on our planet and a spectacle surpassing any fireworks display.

(Sources: Official WeChat account of Voice of CAST and the official website of CAST)

Upcoming Conferences

Energy Materials 2023

Dates: October 10-13, 2023

Location: Huzhou, Zhejiang Province, China

Hosts: The Chinese Society for Metals (CSM) and the Minerals, Metals & Materials Society (TMS)

Energy Materials 2023 will feature presentations by renowned experts and scholars from both China and around the world. It will serve as a platform to showcase the latest technological advancements and research experience in the field of energy materials. Discussion topics will encompass high-temperature materials for ultra-supercritical power plants, materials for nuclear energy and new energy sources, gas turbine materials, materials for oil and gas drilling, collection, transportation and chemical industries, innovations in energy storage and power batteries, hydrogen energy and fuel cell materials, and renewable energy structural materials and their manufacturing technologies.

For more information, check out: www.energymaterials2023.com

SPIE/COS Photonics Asia 2023

Dates: October 14-16, 2023

Location: Beijing, China

Hosts: The Chinese Optical Society (COS) and the International Society for Optics and Photonics (SPIE)

The SPIE/COS Photonics Asia 2023 will spotlight the latest breakthroughs in advanced optics and photonics technologies. Offering an international stage for groundbreaking research, the conference will host 17 sessions covering almost 100 research areas within the field of optics and optical engineering.

For more information, check out: https://spie.org/PhotonicsAsia-WeChat

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