



中国科学技术协会  
China Association for Science and Technology

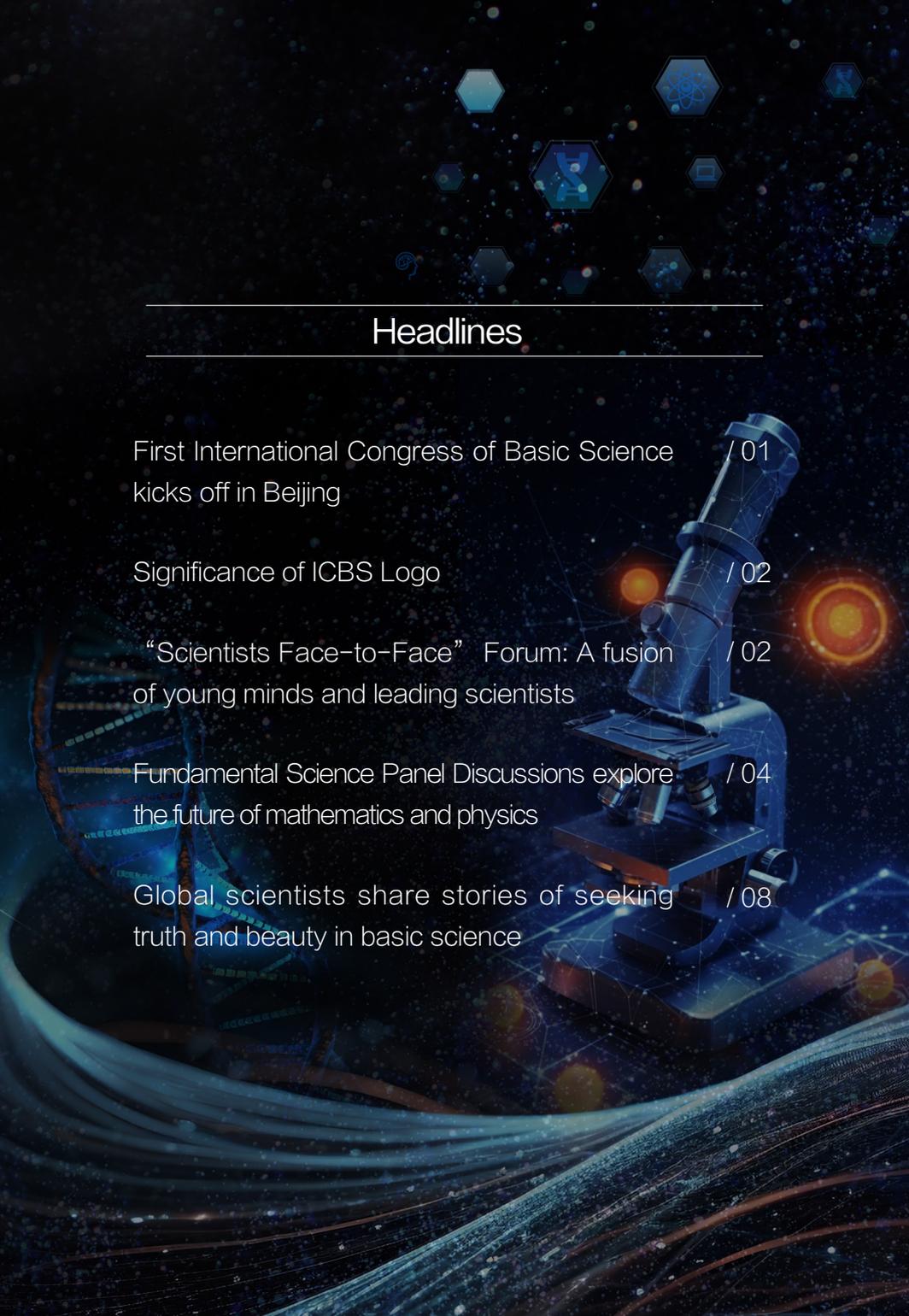
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# CAST Newsletter

**First International Congress of  
Basic Science (ICBS) held in  
Beijing**

First International Congress of Basic Science  
kicks off in Beijing





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## Cover Story

# First International Congress of Basic Science kicks off in Beijing



Opening ceremony of ICBS  
Photo credit: Official WeChat account of ICBS

From July 16 to 28, 2023, the first International Congress of Basic Science (ICBS) was held in Beijing. A collaborative effort by the Beijing Municipal Government, the Ministry of Science and Technology of China, the China Association for Science and Technology (CAST), and the International Consortium of Chinese Mathematicians (ICCM), the congress was organized under the theme “Advancing Science for Humanity.” It brought over 300 scientists from more than 40 countries and regions together including 80 of the world’s leading scientists holding accolades such as the Nobel Prize, the Fields Medal, the ACM A. M. Turing Award, the Wolf Prize, the Shaw Prize, and the Breakthrough Prize. Many participants were members of various science academies and representatives from prominent international academic organizations.

The congress was dedicated to three main branches of basic science: mathematics, theoretical physics, and theoretical computer and information sciences.

Alongside high-level academic presentations, the event featured several themed activities such as the “Exhibition of Contemporary Mathematics in China,” “Evening of Theoretical Physics,” “Evening of Mathematics,” “Evening of Computer Science,” “Fundamental Science Panel Discussions,” “Scientists Face-to-Face,” and “College Student Poster Exhibition.” These activities attracted more than 400 young researchers and students, offering valuable opportunities to engage in dialogue with renowned scientists and scholars from across the world.

With an emphasis on openness, trust, and collaboration, the inaugural ICBS successfully established a new platform for academic exchange and promoted openness and collaboration within the realm of basic science in China.

(Sources: Xinhua News Agency and people.com.cn)

## Significance of the ICBS Logo



Photo credit: Official WeChat account of ICBS

The design of the ICBS logo was inspired by the term “Xuanji Yuheng,” found in the ancient Chinese book known as “Shangshu Shundian.” Since the Han Dynasty, this concept has been associated with two distinct yet related themes. First, it has been linked to the Big Dipper, a constellation in the night sky composed of seven bright stars. Second, it relates to an astronomical tool used to study celestial events and phenomena.

These two interpretations of “Xuanji Yuheng,” whether focused on the bright stars of the Big Dipper or the intricacies

of the celestial observation tool, together symbolize humanity’s unending curiosity and desire to unlock the mysteries of the universe.

(Source: Official WeChat account of ICBS)

### *Events in Focus*

#### **“Scientists Face-to-Face” Forum: A fusion of young minds and leading scientists**



ICBS President Shing-Tung Yau addressing the forum

Photo credit: Official WeChat account of the Beijing Association for Science and Technology

On July 22, 2023, Tsinghua University hosted a special ICBS forum titled “Scientists Face-to-Face” for young students. The event brought about 200 teachers and students together with 9 world-renowned experts in mathematics and physics. The purpose was to foster significant dialogue between young minds and prominent scientific leaders.

The event began with a speech by Shing-Tung Yau, ICBS President and a Fields Medal laureate. He articulated the conviction that open conversation and mutual interaction would foster an appreciation for the beauty and truth found in science. His words resonated with students, strengthening their resolve to explore basic science and chase scientific dreams.

### Student researchers present findings at “Scientists Face-to-Face” Forum

Seven students presented

research findings to experts at the forum.



Student presentations and Q&A at the forum

Photo credit: Official WeChat account of the Beijing Association for Science and Technology

Wang Haolin from the High School Affiliated to the Renmin University of China spoke about assessing intermolecular forces through quantum mechanics, which could lead to the development of more effective antiviral drugs. Yang Nuofan, from the same school, started a discussion on theoretical mathematics as a bedrock of science, intertwining it with the potential of AI technology and the future of theoretical mathematics. Han Shaolun from Beijing No. 4 High School examined the evolution of calculus and normal distribution and discussed trending topics in mathematics with experts.

Throughout the forum, students enjoyed meaningful interactions with renowned scientists and solicited their advice. The collaboration not only united the students with the scientific community but also enriched their comprehension of the importance of scientific research. It fostered thrills for scientific investigation, fueling enthusiasm for basic disciplines.



Student presentations and Q&A at the forum

Photo credit: Official WeChat account of the Beijing Association for Science and Technology

Organized as part of a series of events for young people, the forum was co-hosted by the Children and Youth Science Center of CAST (CYSCC), the Yau Mathematical Sciences Center (YMSC) of Tsinghua University, and the Beijing Association for Science and Technology. The aim was to provide a platform

for young people to engage with scientists, experience the captivating world of scientific research, and gain confidence and motivation for future endeavors.

(Sources: Official WeChat account of the Beijing Association for Science and Technology and thepaper.cn)

### **Fundamental Science Panel Discussions explore the future of mathematics and physics**

On July 22, 2023, Tsinghua University hosted a special ICBS event titled “Fundamental Science Panel Discussions,” also known as “Top Talk,” in its auditorium. At the event, 11 internationally acclaimed experts shared insights on two main topics: “next frontier in mathematics” and “five basic problems yet to be solved before we can claim, at least in principle, to have an essentially complete understanding of the real world.”



Panelists at the Fundamental Science Panel Discussions on Physics  
Photo credit: Official WeChat account of ICBS

## Anticipating mathematical challenges coming in the next two decades

Peering into the future mathematical landscape, Professor Shing-Tung Yau, President of ICBS and a Fields Medal winner, advocated exploring basic geometric models connecting quantum mechanics with general relativity. He foresaw young scholars integrating diverse areas of mathematics. Russian mathematician Andrei Okounkov, also a Fields Medal winner, emphasized the importance of demystifying mathematical concepts through accessible popular science communication. Caucher Birkar, a Fields Medal winner and Tsinghua University professor on the congress's scientific committee, stressed reforming often-dull mathematics education. Nicolai Reshetikhin, a pioneer in quantum group theory and a Weyl-Wigner Award recipient, noted the potential for unexpected challenges in future geometric fields like infinite dimensional algebraic geometry and quantum field theory.

## The next major physics advances

Francesco Sannino, Director of the Danish Institute

for Advanced Study (DIAS), expressed enthusiasm for discovering entirely new fundamental building blocks of nature. He was optimistic about exploring beyond the Higgs particle, possibly revealing a range of undiscovered particles and new forces to aid our understanding of dark matter. Wang Yifang, a member of the Chinese Academy of Sciences (CAS), outlined three pivotal questions for the coming decades: the enigmatic CP phase of neutrinos, which could be understood within the next 20 years; the mysterious Higgs particle that could lead to further exploration; and the verification of the universe's expansion, with ongoing experiments that could bolster our understanding within the next 20 to 30 years.

“Top Talk” is an international forum launched and hosted by the Graduate Union of Tsinghua University since 2013. It invites winners of the

Nobel Prize or other prestigious prizes to engage with students to foster an environment for dialogue with preeminent scientific experts. The forum's aim is to encourage students to challenge established authorities and cultivate innovative thinking. To date, the forum has hosted dialogues with 36 Nobel Prize laureates, six ACM A. M. Turing Award winners, and nine Fields Medalists.

(Source: Official WeChat account of ICBS)

## Basic Science and Artificial Intelligence Forum

On July 23, 2023, the ICBS Basic Science and Artificial Intelligence Forum was held at the National Communication Center for Science and Technology. The event was jointly hosted by the China Communication Center for Science and Technology (CCCST) and Qizhen College of Tsinghua

University. It attracted numerous representatives from the technology and industry sectors including Baidu, Intel, Microsoft Research Asia (MSR Asia), JD.com, Meituan, the Beijing Academy of Artificial Intelligence (BAAI), and student representatives from Qizhen College and more than ten secondary schools in Beijing for a total of over 600 participants.

### Roundtable panelists explore problems and challenges of large AI models and artificial general intelligence

During the forum's roundtable session, three experts delivered keynote presentations on the theme "Large AI Models and Artificial General Intelligence: Problems and Challenges" and engaged in detailed discussions.

Harry Heung-Yeung Shum, a member of the US National Academy of

Engineering (NAE) and the UK Royal Academy of Engineering (RAEng), posed five important questions on the link between intelligence and model size, the stages of intelligence development in big model training, the influence of data on intelligence creation, mechanisms driving intelligence emergence, and effective usage of mathematical tools. He elaborated on the questions in his speech.

Zhang Jianwei, a member of the National Academy of Science and Engineering (acatech) of Germany and a professor at the University of Hamburg, shared insights from a robotics research perspective. He stressed the need to enhance research on embodied intelligence, multimodal AI, and general-purpose robotics and argued that a multidisciplinary approach combining physics, physiology, models, and big data is crucial for achieving robotic intelligence.

Zhou Ming, founder and CEO of Langboat Technology and Vice President of China Computer Federation (CCF), spoke on the topic of “Creating value with large AI models: Tailoring models from general to specific industry and use case applications.” He emphasized the importance of fostering a strong feedback loop between practical application and academic research.

Following the presentations, the experts engaged in in-depth discussions on frontier topics including the potential limits of large models, datasets and training sets, and advances in computer vision.

### Roundtable panelists address audience questions on challenges facing AI development



Panelists during the Q&A  
Photo credit: Official WeChat account of the China Centre for International Science and Technology Exchange

The panelists also answered questions on model training, disciplinary barriers, and technological ethics.

On the topic of model training, Greg Yang, a found-

ing member of xAI, noted a need for better and more diverse training sets as model sizes increase. Instead of relying mainly on open data, he suggested focusing on training data rooted in mathematical sciences with stronger logical reasoning and inference. Regarding disciplinary barriers, Shum mentioned that choosing and using the right mathematical tools can effectively address challenges of AI development. On technological ethics, Zhang emphasized that as new formats and situations evolve quickly, finding ways to advance robot development while staying within the bounds of ethical considerations and allowing for creative freedom in AI is a valuable pursuit in AI development.

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

## Voice of Scientists

### Global top scientists expound on the profound importance of basic science

At the ICBS opening ceremony on July 16, 2023, two distinguished scientists, David J. Gross, a Nobel laureate in physics and a member of the US National Academy of Sciences (NAS), and Shing-Tung Yau, President of ICBS and a Fields Medal winner, shared insights on the importance of exploring basic science.

Professor Gross talked about how basic scientific research is driven by human curiosity about the essence of matter, the structure of the universe, and history. However, it also transcends curiosity to foster groundbreaking discoveries and advance knowledge, leading to new technologies. Given the pressing challenges of climate change and environmental pollution, strengthening international collaboration in basic science has become an urgent need.



ICBS President Shing-Tung Yau addressing the opening ceremony  
Photo credit: Xinhua News Agency

In his speech, Professor Yau emphasized that basic science is the foundation of human knowledge. It plays a vital role in how we understand mathematics, explain the natural world, explore the universe, and drive technological progress. Spanning disciplines like physics, chemistry, biology, and mathematics, research on basic science is continuously unraveling

the mysteries of nature, guiding mankind towards greater knowledge and pushing the boundaries of the unknown. Realizing that basic science holds significant power in shaping our future and advancing society is crucial.

(Sources: Official WeChat account of ICBS and Xinhua News Agency)

### Global scientists share stories of seeking truth and beauty in basic science

During ICBS, many scientists took the stage to share personal stories of their journeys through basic science, offering insight into a pursuit defined by a drive for truth and the beauty of discovery.

Nobel laureate David J. Gross suggested that with time, humanity might become capable of constructing what's often called the ultimate theory. However, the more we learn, the more the unknown unfolds

before us. As our comprehension grows, so does our well of wisdom.

Fields Medalist Hugo Duminil-Copin offered a unique perspective on the intrinsic beauty of mathematics. He likened mathematical research to an artistic journey, emphasizing that the process of exploration often outweighs the importance of reaching a destination.



David J. Gross making a keynote presentation  
Photo credit: Official WeChat account of ICBS

Fields Medalist Alessio Figalli emphasized that the charm and challenges of mathematics coexist, explaining that the frustrations and obstacles that arise during the problem-solving process are integral to these challenges. Yet the sense of fulfillment and pride that comes with finding a solution makes the struggle worthwhile.

Hiraku Nakajima, President of the International Mathematical Union (IMU), reflected on his own research journey: “I am drawn to problems that intrigue me and that defy the solutions of others.” His aspirations extend beyond immediate results to encompass a longer-term perspective, reflecting a trait deeply ingrained in basic science.

The impact of ICBS is deeply rooted in these scien-

tists’ exploration of the universe’s mysteries, their fearless journeys into uncharted territories, and their unyielding pursuit of scientific discovery.

(Source: Official WeChat account of ICBS)

## First International Congress of Basic Science inspires a new vision for scientific advancement

After two weeks filled with engaging events, the first International Congress of Basic Science (ICBS) officially concluded in Beijing on July 28, 2023. The congress served as a worldwide academic forum, bringing together eminent scientists from various fields to discuss the future paths of basic science and explore technological innovations. Participating scientists united in the belief that the congress would promote interdisciplinary collaboration, leading to significant explorations to

tackle complex scientific issues.

Caucher Birkar, a member of the congress's academic committee, a Fields Medal winner, and a professor at Tsinghua University, viewed the congress as a means to unify scientists worldwide and raise awareness about the significance of basic science in today's world.

Hiraku Nakajima, President of the International Mathematical Union (IMU), shared his excitement

at the opportunity to discuss the growth and evolution of mathematics and other disciplines with fellow participants. He emphasized the congress's role as a platform for exploring the cutting edge of scientific research and urged young scholars to maintain their dedication to mathematics and contribute positively to humanity through scientific endeavors.

Li Lianpeng, an associate professor at the School of Automation

at Beijing Information Science and Technology University, praised the congress's essential role in giving young science and technology workers a chance to connect with international scholars and researchers. Through face-to-face dialogue with world-renowned scholars, the event greatly expanded their academic vision, sparking new insights, reflections, and ambitions into basic science.

(Source: Official WeChat account of ICBS)

## Upcoming Conferences



### The 14th Asian Congress of Nutrition (ACN 2023)



**Theme:** Feeding the Future by Sustainable Nutrition



**Location:** Chengdu, Sichuan Province, China



**Dates:** September 14-17, 2023



**Host:** Federation of Asian Nutrition Societies (FANS)



**Organizer:** Chinese Nutrition Society (CNS)



The Asia Nutrition Congress (ACN 2023) is a significant platform for sharing the latest research advancements in the field of nutrition on a global scale. It showcases the latest scientific research achievements in areas of nutrition science and public health. This conference will focus on current hot topics in nutrition such as nutrition

and sustainable development, research methods in the era of big data, precision and personalized nutrition, and more. It will delve deep into the intersection of academic research and industry practices, providing nutritional insights for the development of the international food industry.

For more information, check out <http://www.acn2023.org/>



### **The Carbon Peak and Carbon Neutrality International Forum (CPCNIF 2023)**



**Theme:** Carbon Peak, Carbon Neutrality and Energy Revolution



**Location:** Haikou, Hainan Province, China



**Dates:** September 19-21, 2023



**Organizer:** China Energy Research Society (CERS)



The Carbon Peak and Carbon Neutrality International Forum (CPCNIF 2023) aims to create a global platform for cooperation on carbon peak and carbon neutrality. It invites leaders and officials from diverse countries, Nobel laureates, members of the Chinese Academy of Sciences (CAS) and of the Chinese Academy of Engineering (CAE), heads of international organizations, and distinguished experts from both Chinese and international backgrounds to engage in in-depth academic and technical exchange. The conference will focus on strategies and paths to accomplish carbon peak and carbon neutrality and facilitate exchange of cutting-edge technologies and solutions to promote collaboration in green and low-carbon development.

For more information, check out <https://www.cers.org.cn/site/content/89fec9d5b-950c68878f83e696d5826a0.html>

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CAST is the largest non-governmental organization of scientific and technological professionals in the world. Through its 215 member societies and local branches all over the country, CAST maintains close ties with millions of Chinese scientists, engineers, and other professionals working in fields of science and technology.

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