

# CONNECTION

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*Seeking Truth  
Pursuing Innovation*

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The world's first  
mammalian cell atlas *P. 04*

Development in understanding the  
mechanism of depression *P. 05*

University Dragon Boat  
Championships *P. 10*

Epidemics prevention:  
ZJU approach

*P. 08~09*



# CONTENTS

ZJU NEWSROOM 03

RESEARCH HIGHLIGHTS 07

CLEAN ENERGY

DIGITAL PRINTING

EPIDEMICS PREVENTION

SPOTLIGHT ON 11

STUDENTS

FACULTY

## Editorial office :

Global Communications  
Office of International Relations, Zhejiang University  
866 Yuhangtang Road, Hangzhou, P.R. China 310058  
Phone: +86 571 88981259  
Fax: +86 571 87951315  
Email: newsletter@zju.edu.cn

## Edited by :

CHEN Weiyang, AI Ni, YE Ying, TONG Jun, HE Jiawen

## Designed by :

YING Xiayin

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## MESSAGE FROM THE EDITOR-IN-CHIEF

Moving towards better human life and sustainability of the world is a challenge that entails innovation and concerted efforts. The past few months have witnessed a large number of achievements in both basic and applied research made by ZJU scholars, in the fields of medicine, life sciences, environmental sciences, energy engineering, etc. Also our commitment to international engagements infuses new energy to the campus.

In this fourth issue of *Connection*, we are therefore very pleased to present you some of the most exciting and promising studies, and the most brilliant moments on campus.

Please continue to watch for new developments as our students and faculty endeavor to make a difference in the world. There is always a lot to look forward to from ZJU.

I would love to hear your thoughts.



LI Min, Editor-in-Chief  
Director, Office of International Relations



# ZJU NEWSROOM

Professor LUO Jianhong is discussing with his team

## RESEARCH

### High-speed train in the lab: ZJU research among top 10 scientific advances of China

The Commission for Science and Technology of the Chinese Ministry of Education announced the *Top 10 Scientific Advances of 2017 in China's Universities* on December 26, 2017.

The project "Model Testing of the Dynamic Behaviors of High-speed Trains", conducted by a research team led by Professor CHEN Yunmin and Professor BIAN Xuecheng with ZJU's College of Civil Engineering and Architecture, has won this highly-acclaimed title.

The team has pioneered the invention of a testing device for the dynamic behaviors of high-speed trains all over the globe. Their device can measure track vibration and soil response of a ballastless high-speed railway from a full-scale model testing with simulated train moving loads at various speeds.

### ZJU leads in building of world's most powerful hyper- gravity centrifuges

The National Development and Reform Commission has given its seal of approval to ZJU for leading the construction of Centrifugal Hyper-gravity and Interdisciplinary Experiment Facility (CHIEF) as part of China's key sci-tech infrastructure recently. CHIEF—a comprehensive hyper-gravity and interdisciplinary experiment facility with the largest capacity and the most extensive application worldwide—is expected to be completed in five years, with funding of more than two billion yuan.

### Research into autism may give birth to a therapeutic revolution

A research team headed by Prof. LUO Jianhong, vice president of ZJU, published an article entitled "Gamma Oscillation Dysfunction in mPFC Leads to Social Deficits in Neuroigin 3 R451C Knockin Mice" in the March

1 issue of *Neuron*, a top journal in neuroscience.

Their research findings suggest that gamma oscillation dysfunction in the mPFC leads to social deficits in autism, and manipulating mPFC interneurons may reverse the deficits in adulthood. This may open up a new vehicle for the treatment of autism.

Through a series of experiments, their work demonstrates the pivotal role of gamma oscillations in the mPFC in controlling the preference for social novelty. A single mutation in neuroigin 3 causes defects in regional oscillations and information encoding, and finally in social behaviors. In addition to revealing the role of PV neuron-driven oscillations in social novelty deficits in the mouse model of autism spectrum disorder (ASD), their research indicates that manipulating the oscillations reverses the phenotype, pointing out potential treatments for the social deficits of ASD patients, even in adulthood.



### Scientist develops new fabric inspired by polar bear hair

The thick pelt that helps polar bears to survive frigid Arctic winters has inspired a warm, sturdy fiber. Inspired by the microstructure and thermal insulation function of the polar bear hair, a research team led by Professor BAI Hao with ZJU's College of Chemical and Biological Engineering has used a freeze-spinning technique to continuously fabricate silk fibroin solution into a fiber with aligned porous microstructure.

The textile woven with the biomimetic fibers has a remarkable thermal insulation, active electroheating capacity when doped with carbon nanotubes (CNTs), good wearability and breathability, making it a promising material for thermal insulation and personal thermal management.

This work was published in the February 14 issue of *Advanced*

*Materials* ("A Thermally Insulating Textile Inspired by Polar Bear Hair") and has been reported in *Nature*, *New Scientist* and *Journal of the American Chemical Society*.

### Ecologists comment on interaction between soil and global warming

In recent years, a research team led by CHENG Lei, a professor of ecology at Zhejiang University, has been dedicated to research into the impact of microbes on the soil system and the response of the carbon cycle to climate change. However, relevant studies are theoretically and experimentally challenging. Hicks Pries *et al.* (*Reports*, 31 March 2017, p. 1420) show that 4°C warming enhanced soil CO<sub>2</sub> production in the 1-meter soil profile, with all soil depths displaying similar temperature sensitivity (Q10).

Cheng Lei *et al.* (*Science* 359:

eaao0218) comment on "The whole-soil carbon flux in response to warming" and argue that some caveats can be identified in their experimental approach and analysis, and that these critically undermine their conclusions and hence their claim that the strength of feedback between the whole-soil carbon and climate has been underestimated in terrestrial models.

## INTERNATIONAL

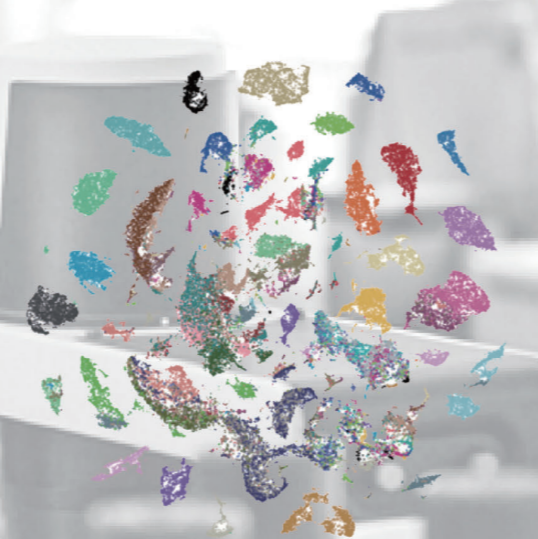
### What's happening

- ZJU-Yale Collaborative Research Center for Environment-related Diseases was officially launched on January 12.
- A delegation of McGill University visited ZJU to explore further collaboration in the fields of management, business and architecture.
- Northwestern University delegation,

## The world's first mammalian cell atlas born at ZJU

A research team led by Professor GUO Guoji with ZJU's Center for Stem Cell and Regenerative Medicine published their research findings in the February 22 issue of *Cell*. The team developed Microwell-seq, a high-throughput and low-cost scRNA-seq platform using simple, inexpensive devices. Using Microwell-seq, they analyzed more than 400,000 single cells covering all of the major mouse organs and constructed a basic scheme for a mouse cell atlas (MCA)—the world's first mammalian cell atlas.

Single-cell RNA sequencing (scRNA-seq) technologies examines the sequence information from individual cells with optimized next generation sequencing (NGS) technologies, providing a higher resolution of cellular differences and a better understanding of the function of an individual cell in the context of its microenvironment. They are poised to reshape the current cell-type classification system and promote the cognition of the secret of life.



Credit: Qianjiang Evening News

## ZJU professor makes breakthrough in depression research

Professor of Neurobiology HU Hailan has been doing impactful research into how emotional and social behaviors are encoded and regulated in the brain. On February 15, her team made a new breakthrough with two articles published on *Nature* under the titles "Ketamine blocks bursting in the lateral habenula to rapidly relieve depression" and "Astroglial Kir4.1 in the lateral habenula drives neuronal bursts in depression".

The two articles, with one addressing how LHb neurons increase burst firing in depression and the other revealing this burst firing to be a prominent target of rapid antidepressant ketamine, make a strong case that the firing mode of LHb neurons is critical in depression.

Together, they provide a new framework for understanding the molecular, cellular and circuit mechanism of depression and shed important light on developing new rapid-acting antidepressants.

led by Vice President Jay Walsh, met with President WU Zhaohui and several schools.

- Hokkaido University Day at ZJU was held on March 27. Professors from both universities exchanged ideas through workshops in different schools.

### ZJU hosts International Youth Forum on Belt and Road

The International Youth Forum on the Belt and Road was held at ZJU's Zhijiang campus on December 28-29, 2017. The forum aims to inspire innovative ideas among global youth regarding the Belt and Road Initiative. The event attracted more than 80 international students, entrepreneurs and professors from over 20 countries, representing such renowned universities as the University of Oxford, Tulane University, UCLA, Tsinghua University and Korea University.

The forum was jointly organized by the Academy of International Strategy and Law (AISL) at ZJU and

the International Academy of the Belt and Road (IABR) in Hong Kong. Other co-organizers include ZJU's Guanghua Law School, the Research Center of Regional Coordinated Development and Zhejiang University Press.

As a major highlight of the forum, a new book titled "The Belt and Road Initiative and its Opportunities for the Youth" was launched.

### ZJU and Harvard launch China's first academic mapping platform

Jointly established by ZJU's Academy of Humanities and Social Sciences and the Harvard Center for Geographic Analysis, a comprehensive academic mapping platform was officially brought into operation on March 19.

The platform aims at providing users with the release of research results about geographic information, visual analysis, and multi-functional query services. Data produced by the platform will greatly enhance future

scientific research, government decision-making, and social services.

### School holds graduation: 63 intn'l students receive MBBS degrees



On March 21, Zhejiang University School of Medicine celebrated the Graduation Ceremony for 63 MBBS international students in the Class of 2018.

### ZJU-UCLA joint degree student tackles vaccine challenge

Miss DU Yushen, an MD candidate from Zhejiang University, has published a research article on *Science* tackling vaccine challenge. In the article, the authors presented



a systematic approach for vaccine development that eliminates interferon (IFN)-modulating functions genome-wide while maintaining virus replication fitness.

Supervised by Dr. Ren Sun, a renowned professor of molecular & medical pharmacology at UCLA, Du is the first student participating in the Joint Program.

## PUBLIC ENGAGEMENT

### ZJU and Alibaba host joint forum to highlight the future of New Retail

The future of New Retail was the

focus of a joint forum co-hosted by Zhejiang University and Chinese e-commerce giant Alibaba Group on January 28.

A term coined in 2016 by Alibaba Founder Jack Ma, "New Retail" refers to the integration of online, offline logistics and data across a single value chain. According to Ma, pure e-commerce will be reduced to a traditional business and replaced by the concept of New Retail, which will provide integrated service with the consumer at its core.

"This forum represents a stride in deepening the collaboration between the University and Alibaba since the signing of a strategic partnership last May," said ZJU President WU Zhaohui in his opening address to

over 1500 participants from the academia and industry.

### ZJU joins hands with Alibaba Cloud to establish "SmartCloud Laboratory"

On April 3, 2018, the "SmartCloud Laboratory", jointly initiated by the Information Technology Center of Zhejiang University and Alibaba Cloud, was officially inaugurated.

The lab will be committed to research into technologies and theories concerning cloud computing, artificial intelligence, the 5<sup>th</sup> generation wireless system (5G), future networks and the Internet of Things (IoT) and introducing cutting-edge technologies into institutions of higher learning.



## IN THE MEDIA

### Gene discovery could help repair DNA 'mistakes'

Scientists from Britain and China have made a discovery that might lead to the ability to repair mutations in genes that cause harmful disorders, such as cystic fibrosis and certain cancers.

Geneticists at the United Kingdom's Oxford University and Zhejiang University in China have discovered that cells rank genes by importance, and give certain regions of our genetic make-up special treatment when repairing mutations. (China Daily)

### Chinese, French institutions strengthen cooperation in AI

An alliance between Chinese and

French universities and institutions to promote artificial intelligence (AI) was established Tuesday.

Eight education institutions from China and France, including Tsinghua University, Zhejiang University and Sorbonne University, established the France China AI Consortium Tuesday in Beijing. (Xinhua)

### Global media reports on dragon boat race

Global media outlets including Agence France-Presse, Xinhua, and Associated Press reported on the 2018 International Elite Universities Dragon Boat Race held in Hangzhou on March 27-28. Jointly hosted by ZJU and Zhejiang Satellite TV, the event attracted teams from 15 universities from around the world. (See P. 10)

### High-tech dining debuts in university canteen

A canteen in east China's Zhejiang Province has become popular online for offering high-tech dining experiences. The newly-opened dining hall in Zhejiang University offers a cardless dining experience.

Students and teachers at ZJU can register online with their personal information, mobile phone number, and a campus card used for payment. Using a facial recognition scanner in the canteen, a diner is paired with a chip-embedded food tray and can start taking food from the buffet. (Xinhua)



Credit: Xinhua

## CLEAN ENERGY

### Ultra-low emission of coal-fired units

A research team led by Professor GAO Xiang has made a series of breakthroughs in ultra-low emission and effective removal of multiple pollutants, multiple-site catalysts and technologies concerning the removal of particular matter and SO<sub>3</sub>. They cracked a string of key technological challenges such as high efficiency, exceptional adaptation, remarkable reliability and low costs, thus pioneering in achieving the ultra-low emission of multiple pollutants.



## DIGITAL PRINTING

Professor CHEN Yaowu and his fellow researchers in this project have created three key technologies, including the real-time and parallel processing engine for super-large printing data, and have developed a super-fast digital printer. Establishing a lead globally, these technologies have been exported to 20-plus countries and regions and successfully applied in over 200 printing enterprises.

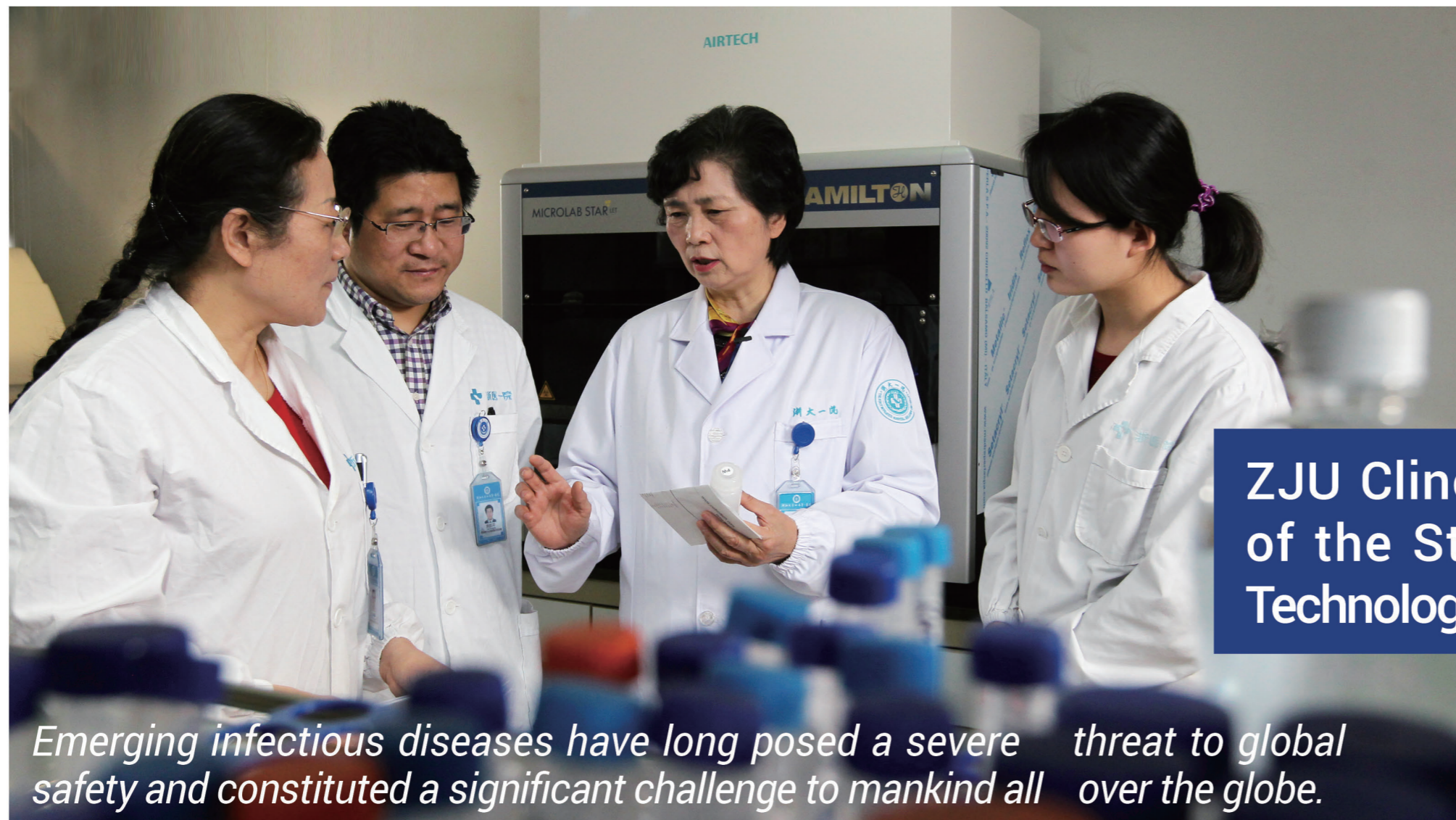


### Synergic control over rotary pyrolysis of hazardous waste and pollutants

With 14-year concerted efforts, a research team led by Professor YAN Jianhua has developed ground-breaking technologies for self-melting incineration of hazardous waste based on rotary pyrolysis, synergic control over rotary pyrolysis of hazardous waste. They proposed an innovative self-adapted optimal method for controlling pyrolysis of hazardous waste in complicated situations and a state-of-the-art strategy for integrated purification of pollutants. The team pioneered in the establishment of a database of pyrolysis features regarding typical hazardous waste.







## ZJU Clinches Grand Prize of the State Science and Technology Progress Award

*Emerging infectious diseases have long posed a severe threat to global safety and constituted a significant challenge to mankind all over the globe.*

### ZJU APPROACH TO EPIDEMICS PREVENTION

Led by LI Lanjuan, member of Chinese Academy of Science, "Major innovations and technological breakthroughs in the prevention and treatment system of emerging infectious diseases: Prevention of human infection with H7N9" won the grand prize of the State Science & Technology Progress Award.

The team developed a fast detection system for early pathogens of emerging infectious diseases, at the core of which are deep sequencing and high-throughput data analysis, created a prediction and pre-warning system and a prevention and control model for emerging infectious diseases, established a new and precise etiological research system for emerging infectious diseases on the basis of the protein structure and the mammal model, pioneered in the development of the "Chinese technology" in treating patients diagnosed with severe emerging infectious diseases, devised a technological system for fast development of flu vaccines, and set up an effective research and

development platform for diagnostic agents of emerging infectious diseases.

This research team achieved six major innovations and technological breakthroughs in discovery of new pathogens, detection of infectious sources, identification of the etiological mechanism, clinical therapy, development of new vaccines and diagnostic technologies.

### IMPLICATIONS

The team offered the "Chinese approach" and the "Chinese technology" in regard to prevention and treatment of emerging infectious diseases. They shared the "Chinese experience" for the world and showcased our strength in this important clinical area.

The Chinese prevention and control system for infectious diseases has been lauded as an international paradigm by the World Health Organization.



# SPOTLIGHT ON: STUDENTS

## University dragon boat race kicks off in Hangzhou

The inaugural International Elite Universities Dragon Boat Race kicked off in east Hangzhou's Jinsha Lake on March 27, with 15 college teams vying for the top honors.

The 2018 dragon boat race was jointly held by Zhejiang University and Zhejiang Satellite Television, and has drawn student-athletes from 15 renowned universities, including Harvard University, Massachusetts Institute of Technology, Stanford University, the University of Oxford, China's C9 League Universities, Tongji University and the University of Macau.

On the afternoon of March 24, over 50 foreign student-athletes had an impressive tour around ZJU's Zijingang Campus. In the company



of student volunteers, the student-athletes had lunch in one of the campus cafeterias and visited an innovation exhibition featuring creative designs. Afterwards they were shown around the Qiushi Great Hall, a beautiful piece of traditional Chinese architecture, where they learned about the history of and fun

facts about ZJU.

After the tour, the group was warmly welcomed by Ms. XU Yaping, world champion in women's canoe and full-time coach at ZJU. In a training session, XU and her colleagues shared their understanding of the essentials of dragon boat racing, followed by an enthusiastic warm-up in Qizhen Lake on campus.

The competition on March 27-28 consisted of heats, repechages, semifinals and finals. Each team was allowed to have at most 14 members, including a team leader, a coach, a drummer, a steersperson and 10 paddlers. The final race took place on the afternoon of March 28, when the ZJU team clinched two golds and one silver.

As a joint host of this event, ZJU has a large student body taking interest in water sports. XU Yaping, world champion in women's canoe and full-time coach at the University, has helped to bring to a new level the popularity of canoe and kayak on campus.



# FACULTY

## ZJU mathematics professor's book wins national award

A book written by ZJU professor CAI Tianxin has won the second prize of China's National Science and Technology Progress Award for 2017.

The book, titled "Legends of Mathematics: Those Great Mathematicians", rewrites about some representative figures in the history of mathematics, including their inner world, life experiences and growth environment, as well as their contributions, thoughts, personalities and concepts of life.

The book also has an in-depth discussion of the relationship between math and literature, poetry, and politics.

"Mathematics is such a thing that reminds us of her invisible soul, endows the truth that she finds with life, arouses our enthusiasm, adds color to our inner thinking and eradicates our illiteracy and ignorance," Cai wrote in the book.

Apart from being a mathematician, CAI is also known as a poet, traveler and photographer. His previous works have been translated into more than 20 languages.



CAI Tianxin, a professor in ZJU's School of Mathematical Sciences, has won a national award for his book Legends of Mathematics: Those Great Mathematicians.

## The magic way to understand mechanics

On the podium, Professor ZHUANG Biao Zhong shakes a rectangular plastic box which contains six dice. When he opens the box, all the six dice are arranged in order showing the same faces. He then goes on to perform a magic trick with a steel ring and a chain. After the steel ring passes through the chain, a knot is tied on the ring by the chain.

"That reflects the 'Moment of Momentum' principle, essentially an application of mechanics," ZHUANG explains.

ZHUANG Biao Zhong, an 84-year-old professor of mechanics in ZJU's School of Aeronautics and Astronautics, shows off creative thinking in a magical manner.

Every time ZHUANG gives a lecture, he will bring with him some props. "Magic tricks can not only enliven a class but be used to impart knowledge concerning mechanics tangibly. Students are able to learn various theories in a concrete and impressive way," ZHUANG says.



ZHUANG Biao Zhong, a professor of mechanics in ZJU's School of Aeronautics and Astronautics