

TSINGHUA NEWSLETTER



2024 ISSUE **2**



P01 Xi replies to Tsinghua professor, urging more contributions to education, science

P02 Tsinghua Professor Xue Qikun receives China's top sci-tech award

P03 Striving to Compose a Chapter of High-Quality Development for Tsinghua

P06 Tsinghua celebrates 113th anniversary



CONTENTS

FOCUS

- P01 Xi replies to Tsinghua professor, urging more contributions to education, science
- P02 Tsinghua Professor Xue Qikun receives China's top sci-tech award
- P03 Striving to Compose a Chapter of High-Quality Development for Tsinghua
- P06 Tsinghua celebrates 113th anniversary
- P08 Tsinghua University Inaugurates New College of AI
- P09 Tsinghua University establishes Mechano-X Institute
- P11 Tsinghua establishes the Department of Psychological and Cognitive Sciences
- P14 Thai Princess Sirindhorn visits Tsinghua, appointed Honorary Professor
- P16 4th Latin-American, Caribbean ambassadors convention held at Tsinghua University

GLOBAL ENGAGEMENT

- P19 2024 World Digital Health Forum: AI at the Forefront of Healthcare Innovation
- P21 "80 Years after Bretton Woods: Building an International Monetary and Financial System for All & 2024 Tsinghua PBCSF Global Finance Forum" Kicks off in Hangzhou
- P22 Tsinghua VSPH hosts GHF Satellite Symposium

SCIENTIFIC INNOVATION

- P25 Tsinghua University Retains Global Top Spot in IO500 Supercomputing Storage Ranking
- P26 Tsinghua's Cutting-Edge Vision Chip Brings Human Eye-Like Perception to Machines
- P28 Prof. Luming Duan's group achieves largest-scale ion trap quantum simulation
- P30 Breakthrough Study in Nature Sheds Light on Opioid Receptor Dynamics, Aiming to Improve Pain Management
- P33 3D Architected E-Skin mimics human touch
- P35 Research teams discover Pro-CRISPR factors and establish evolution model of Cas9 nucleases for the first time

TSINGHUA COMMUNITY

- P38 Tsinghua University triumphs at ISC 2024 Student Cluster Competition
- P39 Tsinghua Team claims their 15th consecutive championship title
- P40 Tsinghua Department of Automation shines at 2024 ICRA
- P41 Professor Zhu Wenwu from the Department of Computer Science and Technology Receives IEEE Circuits and Systems Society Charles A. Desoer Technical Achievement Award
- P42 Tsinghua Qiuzhen College students win medal haul at S.-T. Yau College Student Mathematics Contest

DIVERSE CAMPUS

- P43 International cultural festival held in Tsinghua
- P44 Harvard student group visits Tsinghua for exchanges
- P46 Exhibition showcases 42nd "Challenge Cup" Student Extracurricular Academic Science and Technology Works
- P47 Tsinghua celebrates centenary of Tagore's visit
- P48 Fifth Tsinghua-PKU Low-carbon Campus Design Friendly Competition Held



FOCUS

Xi replies to Tsinghua professor, urging more contributions to education, science

BEIJING, June 12 (Xinhua) — Chinese President Xi Jinping has encouraged Andrew Chi-Chih Yao, a professor of Tsinghua University, to further contribute to the nation's talent development and sci-tech innovation.

Xi, also general secretary of the Communist Party of China Central Committee and chairman of the Central Military Commission, made the remarks in a reply letter recently sent to Yao, an academican of the Chinese Academy of Sciences who returned to China and commenced his teaching career at Tsinghua 20 years ago.

In the reply letter, Xi conveyed greetings to Yao, acknowledging his unwavering dedication and remarkable achievements in the realms of teaching and scientific innovation over the past two decades, during which Yao channeled his love for the nation into a commitment to serve it.

Xi expressed the hope that Yao could adhere to his original aspiration and leverage his strengths to further explore approaches to the cultivation of innovative talent, and foster interdisciplinary integration and frontier innovation, in order to make more contributions to achieving high-level self-reliance and strength in science and technology and the building of a strong nation in both education and science and technology.

Yao, who taught at U.S. universities for a long time, returned to China in 2004 to join the faculty at Tsinghua. In a recent letter addressed to Xi, he detailed his work in talent cultivation and scientific innovation during his two-decade tenure, and expressed his determination to contribute to the great rejuvenation of the Chinese nation.

Yao, 78, is dean of College of AI and also dean of the Institute for Interdisciplinary Information Sciences under Tsinghua University.

Tsinghua Professor Xue Qikun receives China's top sci-tech award

The 2023 State Preeminent Science and Technology Award, China's top scientific honor, was granted to academican Xue Qikun for his outstanding contribution to scientific and technological innovation.

The award was presented at a meeting combining the national sci-tech conference, the national science and technology award conference, and the general assemblies of the members of the Chinese Academy of Sciences and the Chinese Academy of Engineering held in Beijing on June 24th.

Tsinghua University won nine awards in the 2023 National Science and Technology Awards, including two first prizes and seven second prizes, ranking first among universities in China in terms of the number of awards received.

Born in 1963, Xue, an internationally renowned experimental physicist, once earned the State Natural Science Award in 2018, China's highest accolade for basic research, for his experimental discovery of the quantum anomalous Hall effect. He is dedicated to research in the fields of scanning tunneling microscopy, molecular beam epitaxy, topological insulator quantum matter, and high-temperature superconductivity.

Xue is a professor of Tsinghua's Department of Physics, president of the Southern University of Science and Technology, and a member of the Chinese Academy of Sciences. He is the first Chinese national to win the Fritz London Memorial Prize and the first Chinese national to win the Oliver E. Buckley Condensed Matter Physics Prize.

Professor Xue joined Tsinghua from 2005, going on to serve as the dean of the School of Sciences, director of the State Key Laboratory of Low-Dimensional Quantum Physics, director of the Research & Development Affairs Office, and Tsinghua vice president. He was appointed president of the Southern University of Science and Technology in 2020.

Since 2008, Xue has led a team composed of researchers from Tsinghua's Department of Physics



and the Institute of Physics, Chinese Academy of Sciences, achieving a series of significant advancements in the experimental research of topological insulators and superconductors.

At the award ceremony, nine research achievements of Tsinghua University also won other prestigious national awards.

Of all the awards Tsinghua received, four are the State Natural Science Award, four are the State Technological Invention Award, and one is the State Scientific and Technological Progress Award.

The research project "Key Technologies and Equipment of Chemical Mechanical Planarization for Integrated Circuits", led by Professor Lu Xinchun from the Department of Mechanical Engineering obtained the first prize of the State Technological Invention Award.

The research project "Source Address Validation Architecture (SAVA) for Next-Generation Internet: Key Technologies and Applications," led by Academican Wu Jianping from the Department of Computer Science and Technology and the Institute for Network Sciences and Cyberspace obtained the first prize of the State Scientific and Technological Progress Award.



The following research projects received second prize of the State Natural Science Award:

- "Synthesis and Properties of Sub-1 nm One-Dimensional Nanomaterials" (The Department of Chemistry);
- "Drivers, environmental impacts, and health effects of atmospheric composition change in China" (The Department of Earth System Science);
- "Theory and Method of Cross-media Big Data Graph Representation Learning" (The Department of Computer Science and Technology);
- "Order parameter manipulation and device design in ferroic materials" (The School of Materials Science and Engineering).

The following research projects received second prize of the State Technological Invention Award:

- "Inorganic non-metallic wastewater treatment and resource recovery technologies and their applications" (The School of Environment);
- "Semiconductor Devices, Key Technologies, and Series DC Circuit Breakers for High Voltage and Large Capacity DC Breaking" (The Department of Electrical Engineering);
- "Key Technologies and Applications of Visual Spatial Computing" (The Department of Automation).

Striving to Compose a Chapter of High-Quality Development for Tsinghua

Message for the 113th Anniversary of Tsinghua University

Qiu Yong, Secretary of the CPC Tsinghua University Committee and Li Luming, President of Tsinghua University

As spring returns, Tsinghua University is poised to celebrate its 113th anniversary in April. On behalf of the University, we extend the warmest greetings and best wishes to all alumni, students, faculty, and staff at home and abroad. We express our heartfelt gratitude to all who have shown care and support for the development of the University over the years.

2023 marked the beginning of the full implementation of the guiding principles of the 20th CPC National Congress on all fronts. With a pragmatic approach and strict standards, we have carried out the thematic education campaign to study and implement Xi Jinping Thought on

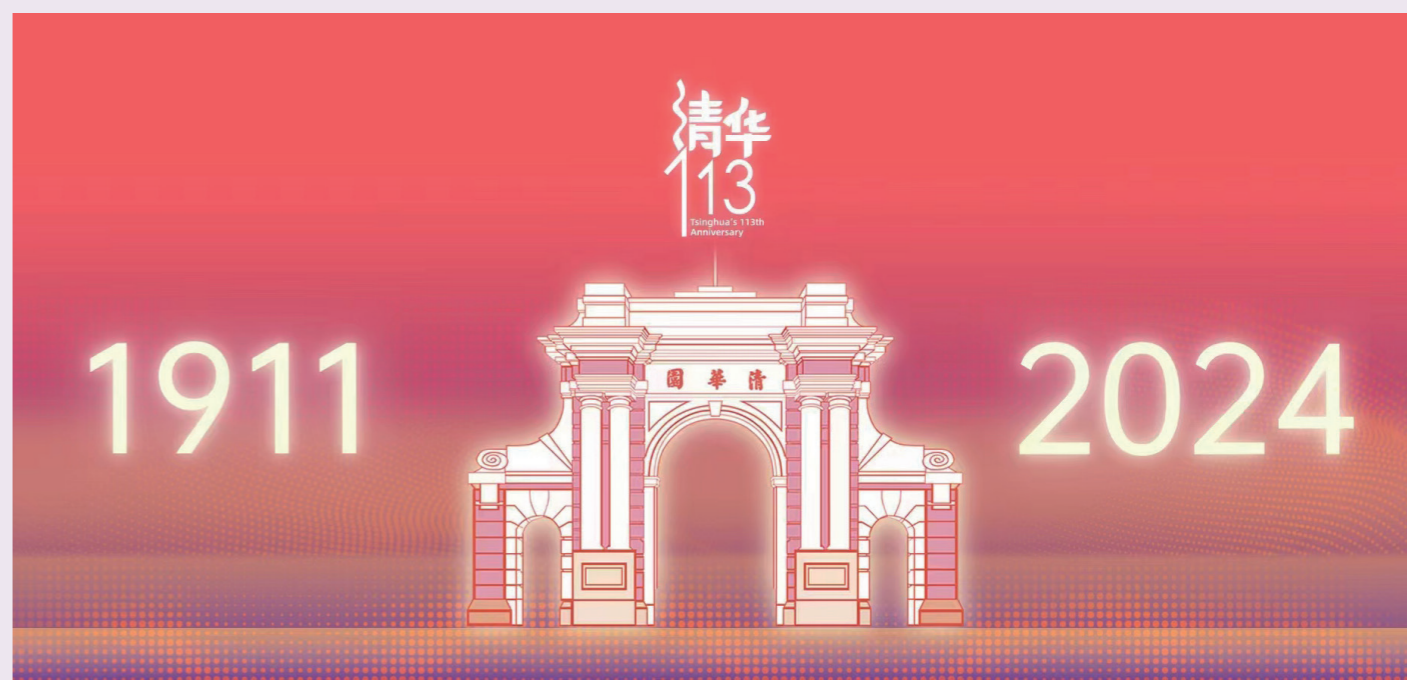
Socialism with Chinese Characteristics for a New Era. We formulated the *Action Plan of Tsinghua University for Fully Implementing the Spirit of the 20th National Congress of the CPC*. Focusing on the theme of high-quality development, the University has charted a new course for becoming a leading world-class university.

Over the past year, we have cultivated talents with even greater confidence than ever before. We were honored to receive the National Teaching Achievement Award for Implementing the "Three-Pronged Approach", *Cultivating Mission-Driven and Excellence-Pursuing Innovative Talents*. We established the National Graduate College for Engineers to cultivate high-level engineering talents. We founded Xiuzhong College to nurture future leaders in global green development. We initiated the "Pan Deng Project," a new model for nurturing innovative, first-class talents in physics. We fully implemented the Physical Education Program, the Aesthetic Education Program, and

the Labor Education Program. We also reformed and innovated courses, such as *Situation and Policy*. Over one million college students completed this course online. We developed the first batch of pilot courses incorporating AI to empower education. The student team of the GRID collaboration also announced the first scientific data release from their NanoSat instruments for gamma-ray burst monitoring. The original drama *Ma Lan Hua Kai*, performed by a Tsinghua troupe, was staged in Hong Kong and Macao for the first time. Tsinghua athletes achieved excellence at the FISU Summer World University Games in Chengdu. The "Hai-Qing" volunteer team, a joint initiative between Tsinghua University and Beijing's Haidian district, actively participated in local community services. After four years of renovation, the Old Library reopened. The North Gymnasium of Tsinghua University, the largest indoor sports facility at the University, is now in full use. For the class of 2023, 83% of the graduates found employment in key sectors important to the economy and society as a whole.

Over the past year, we have gone even further in serving the country's major strategic needs. We led the development of the world's first modular high temperature gas-cooled reactor nuclear power

plant, which has started commercial operation. We also developed the world's first fully system-integrated memristor computing-in-memory chip. The two achievements were nominated for China's top 10 science advances in 2023. We contributed to the scientific operation of the National Major Science and Technology Infrastructure -- Deep Underground and Ultra-low Radiation Background Facility for Frontier Physics Experiments (DURF). We led the development and launch of the world's first ultra-high-speed next-generation Internet backbone with a bandwidth of 1,200G bits per second (1.2T). We have developed ChatGLM, a 100-billion-scale large language model and achieved competitive performance with GPT-4. Our research teams also discovered the immune recognition mechanism of $\gamma\delta T$ cells and obtained the first direct imaging of recycling inflow of the galaxy in the early universe. We designed the China National Archives of Publications and Culture in Beijing. We also published the first volume of the series *The Tsinghua University Warring States Bamboo Manuscripts: Studies and Translations* and the first 30 volumes of the series *General Textual Research on the Worldwide Dissemination of Editions of Marxist Classical Works*. We implemented the core strategy



of strengthening our university through talents. Academician Gao Huajian, a world-renowned scientist in mechanics, materials, and engineering science, joined Tsinghua University as a chair professor. Six faculty members were elected as academicians of the Chinese Academy of Sciences and the Chinese Academy of Engineering. Two professors were awarded the title of "Distinguished Professor of Arts, Humanities, and Social Sciences at Tsinghua University." We attracted and gathered more top-notch talents to accelerate the building of a global talents center and an innovation hub.

Over the past year, we have made remarkable progress in terms of international exchange and cooperation. In 2023, more than 8,000 Tsinghua students participated in academic and cultural exchanges abroad, surpassing pre-pandemic levels. We hosted the first International Academic Forum on "Paleography and Chinese Civilization" and the 11th World Peace Forum. We further expanded our high-level research cooperation network with other universities and deepened our collaborative efforts with leading international companies in technology research. We launched the International Joint Mission on Climate Change and Carbon Neutrality and initiated the "Carbon Neutrality and Energy System Transformation" multilateral joint research project. We actively explored cooperation opportunities with countries along the Belt and Road Initiative and further strengthened exchanges and cooperation with key countries and regions. We also played a unique role in promoting people-to-people exchanges and enhancing mutual understanding.

Over the past year, we strived to lead high-quality development through high-quality Party building. We conducted the thematic education campaign for studying and implementing Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, and implemented the *Action Plan of Tsinghua University for Fully Implementing the Spirit of the 20th National Congress of the CPC*. The plan is comprised of six tasks, 23 actions, and 50 duties. We also established a regular mechanism to consolidate and expand the outcomes of thematic education. We strengthened the construction of the leadership team and rallied all forces to strive towards our shared vision. We offered centralized training and inspirational Party lectures to the nearly 30,000 party members of the University.

To maintain and promote the fine traditions of Tsinghua University, we held a symposium to commemorate the 110th anniversary of the birth of former Tsinghua president Jiang Nanxiang, who is forever respected in the hearts of those affiliated with Tsinghua. We proudly share inspiring stories of Tsinghua's community members making significant contributions to society and national development, which have garnered widespread acclaim.

2024 marks the 75th anniversary of the founding of the People's Republic of China, and it is also a crucial year for implementing the strategy of building a leading country in education and promoting the high-quality development of the University. We must unite more closely around the CPC Central Committee with Comrade Xi Jinping at its core, keep in mind his earnest instructions, and continuously deepen reform. We will focus on promoting new productive forces, contributing to the building of China into a great modern socialist country in all respects, and advancing the great rejuvenation of the Chinese nation on all fronts through a Chinese path to modernization. Together, let's compose a chapter of high-quality development for Tsinghua University.

Our anniversary is a festival celebrated by all the people of Tsinghua, and our alma mater will always be a warm home for alumni. In this joyful and harmonious moment of spring, welcome home!



Tsinghua celebrates 113th anniversary

Tsinghua University celebrated its 113th anniversary on April 28, hosting alumni from around the world for a weekend of reunions and many festivities.

The celebrations will feature a series of academic forums and seminars where insights and advances from various fields will be shared. Departments will

host their own commemorative assemblies. The celebration will also include artistic experiences, photography displays, and arts and historical exhibitions. Alumni and guests will enjoy musical concerts, garden fairs, dance events, and an anniversary carnival, creating a vibrant atmosphere for reconnection and celebration.





One of the events during the weekend was the 113-lap relay race, a unique tradition that celebrates Tsinghua's spirit of endurance and teamwork, aligned with the slogan 'No Sports, No Tsinghua.' Additionally, friendly sports matches among alumni will foster camaraderie and competitive spirit.

The weekend will also see the opening of the 'Ma Yuehan Cup' student track and field matches, a highlight of Tsinghua's sporting calendar. Facilities such as the gymnasiums, laboratories, the School of Life Sciences' Specimen Museum, the Old Library and more will be open to visitors.



Tsinghua University Inaugurates New College of AI



Tsinghua University, on its 113th anniversary, announced the establishment of its new College of AI.

The College is dedicated to both advancing the "core foundational theories and architectures of AI" and fostering the integration of AI with various disciplines, or "AI + X".

The announcement was followed by the Tsinghua University AI Summit, which gathered preeminent

experts for in-depth discussions on interdisciplinary research, talent development, and the deep integration of academia and industry in AI.

The Summit also featured an exhibition of Tsinghua's achievements in AI, not only showcasing significant accomplishments in fundamental AI theories and their applications, but also giving a special focus to "AI+", illustrating the impact of AI on digital transformations in various industries.

Tsinghua University establishes Mechano-X Institute



Guests unveil a THUM plaque

Tsinghua University established the Mechano-X Institute (THUM) on April 26. This marks a significant initiative to serve the country's major strategic needs and to promote in-depth interdisciplinary integration.

Li Luming, Tsinghua president and academican of the Chinese Academy of Sciences; Yang Wei, former director of the National Natural Science Foundation of China and academican of the Chinese Academy of Sciences; He Yongjiang, deputy director of the Beijing Talent Work Bureau; Zheng Xiaojing, chairperson of the Chinese Society of Theoretical and Applied Mechanics and academican of the Chinese Academy of Sciences, attended the ceremony. Jiang Peixue, Tsinghua vice president and academican of the Chinese Academy of Sciences, presided over the event.

Li Luming, Yang Wei, Gao Huajian, director of the THUM and foreign member of the Chinese Academy of Sciences, Zheng Xiaojing, Jiang Peixue, and Cao Bingyang, dean of the School of Aerospace Engineering, jointly unveiled a THUM plaque.

In his address, Li Luming, on behalf of the university,

extended a warm welcome to attendees and thanked various sectors of society for their long-term support and care for the school's development. He noted that the establishment of the THUM at Tsinghua University aims to fully leverage the role of mechanics as the support and driving force behind fundamental science, and inject new vitality into the development of engineering science and technology. With the leadership of Academican Gao Huajian, a world-renowned expert in international mechanics, materials, and engineering sciences, it is believed that the THUM will achieve a series of major original achievements, promoting new breakthroughs in the development of mechanics and engineering disciplines at the University.

Li reviewed the development process of mechanics discipline at Tsinghua and stated that the University is deeply carrying out the Action Plan of Tsinghua University for Fully Implementing the Spirit of the 20th National Congress of the CPC, planning and deploying a series of major initiatives, enhancing the support system for high-level fundamental research, and continuing to promote interdisciplinary construction. He hopes that the THUM would

adhere to serving the country as its highest pursuit, strengthen the deep integration and paradigm innovation of mechanics and engineering sciences; actively explore more open mechanisms for talent cultivation, increase efforts to attract top scholars and young talents from around the world, and improve the quality of talent training in engineering basic disciplines; promote international exchanges and cooperation with more open thinking and measures, and strive to build a research hub and international center for mechanical research and exchange. He also hopes that experts and scholars attending the ceremony will continue to support and care about the development of the THUM, strengthen close exchanges and cooperation, and jointly contribute wisdom and strength to promoting scientific and technological innovation and advancing human civilization to new heights.

In his speech, Yang congratulated Tsinghua on the establishment of the THUM. He said that Tsinghua's influence in the field of mechanics is profound, and the University possesses a strong research tradition and extensive practical experience in interdisciplinary studies. He hopes that the THUM will further leverage Tsinghua's multidisciplinary advantages in engineering science, generate more breakthrough and innovative research outcomes, and contribute to the country's major strategic needs and advance the development of the mechanics discipline with the strength of Tsinghua.

He extended congratulations on the establishment of the THUM. He stated that Tsinghua has long collaborated closely with Beijing Municipality, providing strong talent support for accelerating the construction of a high-level talent hub, creating an original innovation source, a preferred location for major scientific research, and a high-end industry carrier in Beijing. He believes that the THUM will undoubtedly promote the emergence of more original and leading breakthroughs in the field of mechanics and engineering cross-research.

Zheng said that Tsinghua has abundant experience in interdisciplinary studies, especially in the intersection of mechanics and engineering disciplines. The establishment of the THUM will inject new vitality into the development of the mechanics discipline. She looks forward to the THUM becoming a new banner showcasing the service of the mechanics discipline to national needs, leading scientific frontiers, and cultivating high-level talents.



Li Luming, Yang Wei, He Yongjiang and Zheng Xiaojing delivered speeches respectively, and Gao Huajian introduced the THUM (from left to right, from top to bottom)

In Gao's introduction of the THUM, he presented the institute's aims to establish a more proactive research paradigm by promoting deep integration between mechanics and engineering disciplines such as materials science, advanced manufacturing, and biomedical engineering. The institute expects to actively explore the forefront of mechanics, enrich the theoretical framework of mechanics, attract and cultivate talents with international academic influence, serve the country's major strategic needs, generate original and breakthrough innovations, promote international exchanges and cooperation, and establish an international center for mechanics exchange.

A mechanics and interdisciplinary seminar was held to coincide with the establishment event. Yang Wei, President of Eastern Institute for Advanced Study, and Academican of the Chinese Academy of Sciences Chen Shiyi, along with Professor Feng Xiqiao from Tsinghua's School of Aerospace Engineering, delivered keynote reports.

Going forward, the THUM aims to make breakthroughs in frontier areas, address national issues, exert international influence, and uphold outstanding educational principles. Leveraging Tsinghua's engineering strengths, it will focus on emerging interdisciplinary fields like mechanomaterials, biomechanics and medical engineering, and mechanics and advanced manufacturing. The goal of the institute is to become a top-tier research center, academic exchange platform, and talent hub.

Tsinghua establishes the Department of Psychological and Cognitive Sciences

On April 18, Tsinghua established the Department of Psychological and Cognitive Sciences, coinciding with the University's upcoming 113th anniversary. This initiative represents a pivotal move in Tsinghua's disciplinary enhancement efforts, aligning with national strategies and human development imperatives.

Qiu Yong, secretary of the CPC Tsinghua University Committee; He Zhimin, member of the Standing Committee, deputy secretary-general of the CPPCC National Committee and vice-chairman of the Central Committee of the China Democratic National Construction Association; Yao Hongwen, Party chief and director of the National Center for Mental Health; Lin Chongde, a senior professor at Beijing Normal University; Su Yanjie, chairman of the Chinese Psychological Society; Zhou Wenye, the son of Professor Zhou Xiangeng, who made pioneering contributions to the Department of Psychology at Tsinghua; and Yan Wangjia, chairman of Venustech, attended the event. Yang Bin, Tsinghua vice president, presided over the ceremony.



Qiu Yong addresses the ceremony

During the event, Qiu Yong, He Zhimin, Yao Hongwen, Lin Chongde, Yang Bin, Su Yanjie, Liu Jia, dean of the Department of Psychological and Cognitive Sciences, and Peng Kaiping, a professor of the Department of Psychological and Cognitive Sciences, unveiled a department plaque.

In his speech, Qiu stated that General Secretary Xi Jinping emphasized at the National Health Conference the need to intensify fundamental research on mental health issues and strengthen the training of professionals in this field. The establishment of the Department of Psychological and Cognitive Sciences at Tsinghua aims to promote interdisciplinary integration, enhance research on the origins of consciousness, the essence of intelligence, and other fundamental aspects, construct and improve the theoretical framework of mental health, actively serve the construction of a healthy China, and strive to promote the development of human psychological health undertakings. The establishment of the Department of Psychological and Cognitive Sciences demonstrates the courage and commitment of Tsinghua people to proactively serve the country's major strategic needs.

Qiu emphasized that this is a mission that delves into the human psyche and strides towards the future. In such a pursuit, universities cannot be absent, and Tsinghua must not be absent. We must forever regard taking part in world affairs as our own duty and maintain a united and progressive attitude, contributing wisdom and strength to creating a better future for humanity. From the perspective of this new starting point, he hopes that the Department of Psychological and

Cognitive Sciences will uphold and strengthen the Party's overall leadership. It should focus on the main responsibility of moral education and talent cultivation, lead high-quality development through high-quality Party building. As the nation strives for progress in education, science and technology, talent cultivation, the construction of a healthy China, and as the University is firmly marching towards becoming a leading world-class university, it should forge new glory for Tsinghua's psychology discipline.



He Zhimin delivers a speech

He Zhimin hopes that the Department will inherit and carry forward Tsinghua's fine traditions. He expects it to actively lead at the forefront of academia, and make greater contributions to safeguarding public mental health and mental hygiene. This includes serving the needs of the country and society, promoting social stability and harmonious interpersonal relationships, enhancing public happiness, and effectively promoting the implementation of the Healthy China strategy.

Yao Hongwen, Lin Chongde, Su Yanjie, Zhou Wenye, and Yan Wangjia delivered speeches consecutively, congratulating the establishment of the Department. Liu Jia presented the development plan and future prospects of the discipline.

To coincide with the founding ceremony, Tsinghua held a seminar on the development of psychology, where experts and scholars gathered to delve into topics such as talent cultivation, theoretical innovation, cutting-edge research, and practical applications in the field of psychology.



Yao Hongwen, Lin Chongde, Su Yanjie, Zhou Wenye, and Yan Wangjia deliver speeches successively, while Liu Jia provides an introduction (from left to right, top to bottom).



Guests unveil a plaque

Hundreds of attendees, including officials from relevant departments and sister universities, experts and scholars in the field of psychology, representatives from the business community and school-related units, as well as faculty and student representatives, participated in the founding ceremony.

Tsinghua set up the Department of Psychology in 1926, making it one of the earliest universities in China to offer a psychology major. During the nationwide restructuring of colleges and departments in 1952, the Department of Psychology at Tsinghua was incorporated into another university alongside the School of Sciences. After the reform and opening-up, Tsinghua gradually resumed research and teaching in psychology. In 2008, the university rebuilt the Department within the School of Social Sciences. Over the past decade, it has continuously elevated its level of disciplinary construction and social service capabilities, cultivating a group of high-level talents in psychology and producing a series

of high-level research results in areas such as the study of the essential characteristics of human and machine intelligence and the development of psychological measurement methods based on brain-computer interface technology. The department has also been deeply involved in psychological crisis intervention in several major public emergencies.

Going forward, Tsinghua will develop the field of psychology according to two major research directions: cognition and computation, social psychology and mental health. By integrating psychology with disciplines such as cognitive science, neuroscience, and artificial intelligence, the university will primarily establish secondary disciplines such as general psychology and cognitive psychology. Furthermore, through the integration of psychology with traditional Chinese culture, the focus will be on constructing secondary disciplines such as social psychology and clinical and counseling psychology.



On-site of the founding ceremony

Thai Princess Sirindhorn visits Tsinghua, appointed Honorary Professor

Her Royal Highness Princess Maha Chakri Sirindhorn of the Kingdom of Thailand visited Tsinghua University on April 6. During her visit, a meeting was held with Secretary of the CPC Tsinghua University Committee Qiu Yong. Princess Sirindhorn was appointed as an honorary professor of Tsinghua on the same day and engaged in discussions with representatives of Tsinghua students.

During the meeting, Qiu extended a warm welcome to Princess Sirindhorn on her visit to Tsinghua. Qiu remarked that Princess Sirindhorn has made significant contributions over the years to promoting exchanges and interactions between the people of China and Thailand. With her appointment as an Honorary Professor at Tsinghua, it is believed that further advancements will be made in cooperation between Tsinghua and Thailand in education, technology, humanities, agriculture, and other fields. It is anticipated that more outstanding Thai students will come to Tsinghua for study and exchange in the future, injecting new vitality into the development of bilateral relations.

Princess Sirindhorn expressed her interest in Tsinghua's work in the field of agricultural and

rural development. She noted that Tsinghua has collaborated with Thai enterprises on anti-poverty projects and hoped to learn more about the relevant initiatives during her visit.

Subsequently, Tsinghua held a ceremony to confer the title of Honorary Professor upon Princess Sirindhorn. Wang Hongwei introduced Princess Sirindhorn's achievements and announced the University's decision.

Given Princess Sirindhorn's accomplishments in academia and education, particularly her contributions to bilateral education, cultural, and economic cooperation between China and Thailand, Tsinghua has decided to confer upon her the title of Honorary Professor.

Lyu Jian, former Chinese ambassador to Thailand; Tsinghua Vice President Wang Hongwei; Dean of the School of Economics and Management, Bai Chong-En; and Director of the Office of International Affairs, Li Jinliang attended the meeting.

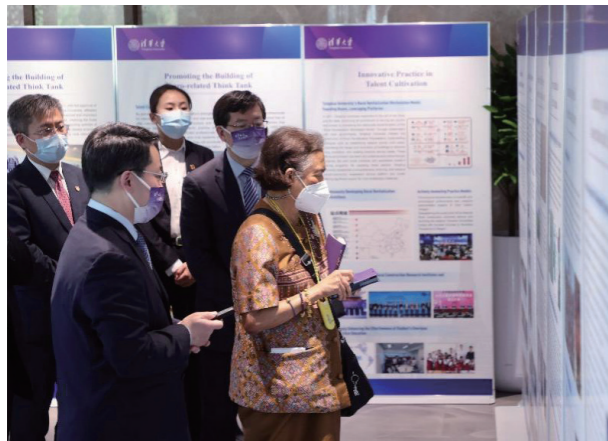
Princess Sirindhorn also visited the thematic exhibition of Tsinghua University's Achievements Serving Agricultural and Rural Development. Associate Dean of the School of Public Policy



Qiu Yong (right second) meets with Princess Sirindhorn



Qiu Yong (right) confers Princess Sirindhorn with an honorary professorship appointment letter



Princess Sirindhorn (right first) visits the thematic exhibition of Tsinghua University's Achievements Serving Agricultural and Rural Development

& Management and Executive Dean of China Institute for Rural Studies, Wang Yahua, provided an introduction. The exhibition is focused on Tsinghua's initiatives including overall plan to support rural revitalization strategies, agro-related think tank building, rural revitalization workstations, innovative talent cultivation, tele-education supporting rural development, targeted assistance in Nanjian county, agricultural technological progress, rural studies outcomes, and international agro-related cooperation and exchange.

Following the ceremony, Princess Sirindhorn attended a sharing session among Tsinghua students and engaged in discussions with them. Five students, namely Zhang Wenzhe, an

undergraduate from the School of Architecture; Su Rui, an undergraduate from the School of Humanities, Liao Yang, a doctoral student from the School of Environment, Jarin Wu, a Thai undergraduate student from the Department of Chemical Engineering, and Chayanis Sutcharitchan, a Thai doctoral student from the Department of Automation, each delivered speeches.

They shared their experiences and feelings in various aspects including their involvement in Tsinghua's rural revitalization workstations, relevant social practices and voluntary work, Tsinghua Global Youth Dialogue on addressing global challenges, and cross-cultural communication.



Princess Sirindhorn addresses the sharing session

Princess Sirindhorn expressed her delight in hearing the stories of Tsinghua students' involvement in rural development. She commended the students for their efforts and practical work in rural development, while also sharing her own experiences and sentiments in contributing to rural development projects. Princess Sirindhorn remarked that all of their endeavors are worthwhile and emphasized that they will encounter even more new friends in the future.

Princess Sirindhorn has previously visited Tsinghua on three occasions. Tsinghua has signed university-level cooperation agreements and student exchange agreements with Thailand's Chulalongkorn University, as well as cooperation agreements with Thammasat University.

Sharing session among Tsinghua students (From left to right, top to bottom: Zhang Wenzhe, Su Rui, Liao Yang, Jarin Wu, Chayanis Sutcharitchan)



4th Latin-American, Caribbean ambassadors convention held at Tsinghua University



Li Luming delivers a speech



Fernando Lugris delivers a speech

Ambassadors of Latin America and the Caribbean (LAC) to China convened on June 18 at Tsinghua University's Jianhua Building of the School of Economics and Management to discuss "China's Investments and the Development of LAC Countries."

Over 30 diplomatic envoys and representatives from 17 LAC countries attended the event. Opening remarks were given by Li Luming, president of Tsinghua University, Fernando Lugris, Uruguayan ambassador to China, and Cai Wei, director general of the Department of Latin American and Caribbean Affairs of the Ministry of Foreign Affairs. Closing remarks were delivered by Yang Bin, vice president of Tsinghua University.

Li Luming welcomed and thanked the guests. He said this year marks the 10th anniversary of the establishment of the China-CELAC Forum. Over the past decade, the friendly cooperation between China and the region has seen fruitful development across various fields, particularly in new infrastructure investments, reflecting a shared commitment to quality and sustainable development, and addressing global challenges such as climate change, he noted.

Li highlighted that 2024 is a significant year as it marks the 75th anniversary of the founding of the People's Republic of China, and a crucial year

for implementing the strategy to build a leading country in education, and promote the high-quality development of the University.

He said the University supports this strategy through talent, technology, and innovation services, and advocates for open education.

The University has launched the International Joint Mission on Climate Change and Carbon Neutrality, and have cooperated with global partners on public health, AI governance, digital transformation of education, and other areas of common challenges and interests.

Leveraging the Latin America Center, Tsinghua has deepened its exchanges with LAC countries. He said he hopes that the dialogue would enable participants to share their wisdom and experiences, enhance understanding, broaden consensus, and promote China-LAC friendship and cooperation, contributing to the building of a community with a shared future for mankind.

Fernando Lugris thanked Tsinghua University for hosting the event, calling it "timely" and "meaningful." He discussed China's pivotal role in the sustainable development of the LAC region, noting China as a key partner in trade, financing, and investment. Coinciding with the 10th anniversary of the China-CELAC Forum, he called



Cai Wei
delivers a speech



Liao Ying
speaks at the event



Chen Taotao
speaks at the event

for increased high-quality Chinese investments in sectors like science, technology, and innovation.

Cai Wei emphasized the importance of openness and cooperation in China-LAC relations. He highlighted that China's investment and development initiatives in the LAC region are driven by principles of equality, mutual benefit, and cultural inclusivity. He also looks forward to continued openness and collaboration.

Professor Chen Taotao, director of Tsinghua University's Latin American Center, discussed

China's current and future investments in the LAC region. Liao Ying, director of the Center for Global Competence Development at Tsinghua University, shared initiatives to enhance Tsinghua students' global competence and overseas experiences.

During the roundtable discussion, ambassadors from LAC countries engaged in in-depth exchanges on the event's theme. They agreed on the significance of the event in fostering mutual understanding and expressed hopes to strengthen exchanges and cooperation with Tsinghua University.



In his closing remarks, Yang Bin highlighted the strong, growing relationship between China and LAC countries, built on mutual understanding and cooperation despite geographical distances. He emphasized Tsinghua University's commitment to fostering openness, integration, and resilience, cultivating globally competent individuals, and enhancing international engagement through alliances and multilateral cooperation. Yang said he is confident that the event will pave the way for more cooperation in areas such as economic development, youth empowerment, artificial intelligence, and online education.

Guests attending the event also included Briunny Garavito, ambassador of the Dominican Republic to China; Hallam Henry, ambassador of Barbados to China; Marcos Galvão, ambassador of Brazil to China; Mauricio Hurtado, ambassador of Chile to China; Michael Campbell, ambassador of Nicaragua to China; María Soledad Córdova, ambassador of Ecuador to China; Arthur Williams, ambassador of Jamaica to China; Marcelo Suarez Salvia, ambassador of Argentina to China; Dwinel Bélizaire, permanent representative of Commercial Development Office of Haiti, and representatives



Yang Bin
delivers a speech

from Guyana, Cuba, Panama, Colombia, Mexico, Suriname, and Antigua and Barbuda.

The event was hosted by Tsinghua University and co-organized by the University's Latin America Center, the Institute for Global Development, the Center for Global Competence Development, and the Center for China-Latin America Management Studies of the School of Economics and Management. Nearly 100 faculty and students from the University participated in the event.



GLOBAL ENGAGEMENT

2024 World Digital Health Forum: AI at the Forefront of Healthcare Innovation

Beijing, China, April 29, 2024 – Hosted by Tsinghua University and its partners, the 2024 World Digital Health Forum emerged as a cornerstone of the ZGC Forum's AI Theme Day. Held in Beijing's tech-centric Haidian District, this event attracted over 700,000 online attendees from around the globe. The forum was a collaboration with the Haidian District People's Government, the Chinese Institute of Electronics, Tsinghua University School of Clinical Medicine, and the China Association for the Promotion of Science and Technology Industrialization, highlighting pioneering innovations and fostering global partnerships to enhance patient well-being.

The Forum showcased an impressive lineup of speakers, each contributing unique insights into the evolving digital health landscape. Notable among them were Dong Jiahong, President of the Academic Committee at Tsinghua University School of Clinical Medicine, and Andrew Chi-Chih Yao, Dean of the Institute for Interdisciplinary Information Sciences at Tsinghua University and the recipient of the 2000 Turing Award. Speeches from Mustafa Shehu, President of the World Federation of Engineering Organizations, and Martin Taylor, WHO Representative in China, enriched the overall perspectives presented at the Forum. Attended by 19 academicians and 70

deans, the event spurred extensive discussions on the future of healthcare in an era increasingly shaped by AI.

A highlight of the Forum was the release of the "Tsinghua Urban Health Index," which provides a comprehensive assessment of health services across 296 Chinese cities, establishing a new benchmark in health metrics to aid governmental and regional health planning. In addition, the "World Digital Health Forum Declaration" was ratified, laying down a robust framework for universal access to healthcare, and underscoring the importance of collaboration, ethical standards, and innovation-driven changes in global healthcare practices.

The Principal's Dialogue, a pivotal segment of the Forum, brought together leaders from premier universities to discuss advancing new productive forces and constructing a robust medical talent-cultivating system. During this session, Tsinghua University highlighted its plans to develop an integrated education system connecting hospitals, medical schools, and research institutions. This innovative approach aims to nurture students who are not only skilled in interdisciplinary collaboration but also deeply grounded in humanistic values. The dialogue explored the transformative impact of AI and digital technologies in enhancing diagnostic accuracy and treatment efficacy. They particularly noted the potential for these technologies to enable real-time, remote medical guidance in regions with limited medical resources, enhancing a balanced healthcare delivery nationwide. Additionally, panelists stressed the importance



of maintaining an ethical and patient-centric approach in the development and adoption of digital health technologies. They advocated for dynamic systems that can adapt to the evolving needs of patients throughout their lifetimes.

The 2024 World Digital Health Forum facilitated high-level discussions and catalyzed future innovations in the digital health sphere. It aims to accelerate the development of the digital health industry, foster the integration of digital technologies with health and life sciences, and support the creation of new paradigms in digital science and health careers. By doing so, it seeks to enhance global health outcomes and contribute to the collective well-being of communities worldwide.



“80 Years after Bretton Woods: Building an International Monetary and Financial System for All & 2024 Tsinghua PBCSF Global Finance Forum” Kicks off in Hangzhou

On the morning of May 27th, the “80 Years after Bretton Woods: Building an International Monetary and Financial System for All & 2024 Tsinghua PBCSF Global Finance Forum” made opened in Hangzhou.

At the opening ceremony, Lu Shan, vice governor of Zhejiang Province; Yang Bin, vice president of Tsinghua University; Jiao Jie, dean of Tsinghua PBCSF; Zhu Min, founder of the Global Economic Governance 50 Forum, former deputy governor of the People’s Bank of China(PBC), and former deputy managing director of IMF; and Marc Uzan, executive director of the Reinventing Bretton Woods Committee, made opening addresses. Xuan Changneng, deputy governor of PBC; and Liao Min, vice minister of Ministry of Finance made the opening keynote speeches. Gu Liangfei, chairperson of school council at Tsinghua PBCSF presided over the opening ceremony.

The 2024 Tsinghua PBCSF Global Finance Forum, jointly held with the “80 Years after Bretton Woods: Building an International Monetary and Financial System for All” international Conference, consists of eight themed panels and four parallel sessions. The 2-day Forum invites leaders, and renowned experts from home and abroad to gather at West Lake, and join the discussions around global issues including global macroeconomy shifts, resilience of emerging markets, prospects of global climate finance, finance assisting sci-tech innovation, etc.

The Tsinghua PBCSF Global Finance Forum was initiated by Tsinghua University in 2014. Focusing on the new thinking, new trends, new practices, and new dynamics of China’s financial reforms, it provides insights and suggestions to contribute to the world and national high-quality financial development. After a decade of development, the forum has established itself as one of the most influential financial forums in China.



Tsinghua VSPH hosts GHF Satellite Symposium

Safeguarding Health from Climate Change: Uniting for Resilience and Action

Climate change is the biggest global health threat of the 21st century. It transcends environmental paradigms, encompassing vital public health dimensions. The escalation of extreme weather phenomena—heatwaves, floods, droughts, and wildfires—ushers in substantial health risks to humanity. These climatic adversities disproportionately burden vulnerable communities and amplify existing health disparities.



The Satellite Symposium of Geneva Health Forum 2024 under the theme “Safeguarding Health from Climate Change: Uniting for Resilience and Action” was hosted by Tsinghua University Vanke School of Public Health (Tsinghua VSPH) on May 28. This symposium convenes an alliance of global stakeholders: environmental health experts, climate scientists, public health leaders, government officials, and young scholars, to share the latest knowledge and experiences.

Dr. Margaret CHAN, dean of Tsinghua VSPH and Antoine Flahault, founding director of the Global

Health Institute, University of Geneva, extended a warm welcome to attendees.

“The problem is that the lack of time of mitigation action really puts health at risk.” Andy Haines, a professor of London School of Health and Tropical Medicine, highlighted the extensive health impacts of climate change. He called for governments and major emitters to lead with proactive measures, including early warning systems and healthcare system strengthening.





"We need to ensure that the health argument accelerates action on climate change and gives more urgency and ambition to our efforts," said Maria Neira, director of the Department of Environment, Climate Change, and Health at WHO. "So, what do we need? Health systems that are better prepared and more climate-resilient."



Jan-Willem Scheijgrond, vice-president of Royal Philips, argued with transformation, the healthcare sector reduces its own carbon footprint. He proposed three key areas for achieving this transformation: adopting circular economy models to minimize carbon impact, improving procurement practices to prioritize sustainability, and shifting towards primary care to enhance preventive measures and reduce hospital admissions.



Nature Medicine's Senior Editor, Ming Yang, emphasized the essential role of researching the adverse health effects of climate change to support and shape future policy initiatives. He pointed out a significant gap and geographical limitations in research on health outcomes such as non-communicable diseases, child health, mental health, and food security. Ming Yang advocates for a shift in focus towards implementation studies on the effectiveness of intervention measures, economic assessments, and decision-support tools.



Over the past two years, our faculty at VSPH have published at least 30 scientific papers in the field of climate change and human health, Cunrui Huang, vice dean of Tsinghua VSPH, said that climate change is forcing people to rethink their consumption patterns, energy choices, and lifestyles. This presents an important opportunity for public health, as many actions to combat climate change could yield substantial health co-benefits.



John S. Ji, an associate professor at VSPH, moderated the panel discussion.

Tamara Lucas, a member of the WHO Ethics and Climate Health Expert Group, pointed out that discussions on the role of food systems in climate change and health research are not as prominent as other areas within climate change research. As an editor of *The Lancet*, she handled the EAT-Lancet Commission, which is popularizing the concept of a "planetary health diet" to shift this focus, with a second report that considers cultural specificity.

Health has gradually become an area of discussion in climate change negotiations through advocacy. "Health considerations are now entering the core of climate actions and negotiations," said Jian Zhang, vice dean of the Institute of Climate Change and

Sustainable Development, Tsinghua University. He suggested more interdisciplinary collaboration and research in areas such as water, air, food, and ecosystems to enhance global adaptation efforts. Zhenyu Zhang estimated that the health sector comprises a significant portion of carbon emissions.



Liang Wannian, executive vice dean of Tsinghua VSPH, called for enhanced in-depth cooperation and exchange. He emphasized that climate change is a major health problem. It affects everyone, and we need to promote health for all.

SCIENTIFIC INNOVATION

Tsinghua University Retains Global Top Spot in IO500 Supercomputing Storage Ranking

Tsinghua University's Department of Computer Science and Technology has once again clinched the top spot in the IO500 world ranking on supercomputing storage, as announced at the International Supercomputing Conference (ISC24) on May 15. The department's Storage Research Group is recognized for its application of the SuperFS file system on the "Pengcheng Cloudbrain-II," which led to their repeated success on the IO500 list.

The achievement is attributed to the outstanding work of the core team members, including Associate Professor Youyou Lu, Professor Jiwu Shu, and doctoral students Shaoxun Zeng, Hao Guo, and Yitian Yang. Their contributions were complemented by the guidance and support of Academician

Weimin Zheng and Professor Wenguang Chen, along with the Pengcheng Laboratory.

The IO500 stands as a globally recognized benchmark for storage system performance in the field of high-performance computing (HPC). Esteemed as one of the premier indices within the HPC community, it underscores the critical importance of computational prowess, and efficiency of storage access and data transfer mechanisms. Since its establishment in November 2017, the IO500 list has been unveiled annually at leading HPC conferences, namely SC in the United States and the ISC Conference in Europe, reflecting the latest advancements in supercomputing storage solutions.



Tsinghua's Cutting-Edge Vision Chip Brings Human Eye-Like Perception to Machines

With the rapid advancement of artificial intelligence, unmanned systems such as autonomous driving and embodied intelligence are continuously being promoted and applied in real-world scenarios, leading to a new wave of technological revolution and industrial transformation. Visual perception, a core means of information acquisition, plays a crucial role in these intelligent systems. However, achieving efficient, precise, and robust visual perception in dynamic, diverse, and unpredictable environments remains an open challenge.

In open-world scenarios, intelligent systems must not only process vast amounts of data but also handle various extreme events, such as sudden dangers, drastic light environment changes at tunnel entrances, and strong flash interference at night in driving scenarios. Traditional visual sensing chips, constrained by the "power wall" and "bandwidth wall," often face issues of distortion, failure, or high latency when dealing with these scenarios, severely impacting the stability and safety of the system.

To address these challenges, the Center for Brain Inspired Computing Research (CBICR) at Tsinghua University has focused on brain-inspired vision sensing technologies, and proposed an innovative complementary sensing paradigm comprising a primitive-based representation and two complementary visual pathways. Inspired by the fundamental principles of the human visual system, this approach decomposes visual information into primitive-based visual representations. By combining these primitives, it mimics the features of the human visual system,

forming two complementary and information-complete visual perception pathways.

Based on this new paradigm, CBICR has developed the world's first brain-inspired complementary vision chip, "Tianmouc". This chip achieves high-speed visual information acquisition at 10,000 frames per second, 10-bit precision, and a high dynamic range of 130 dB, all while reducing bandwidth by 90% and maintaining low power consumption. It not only overcomes the

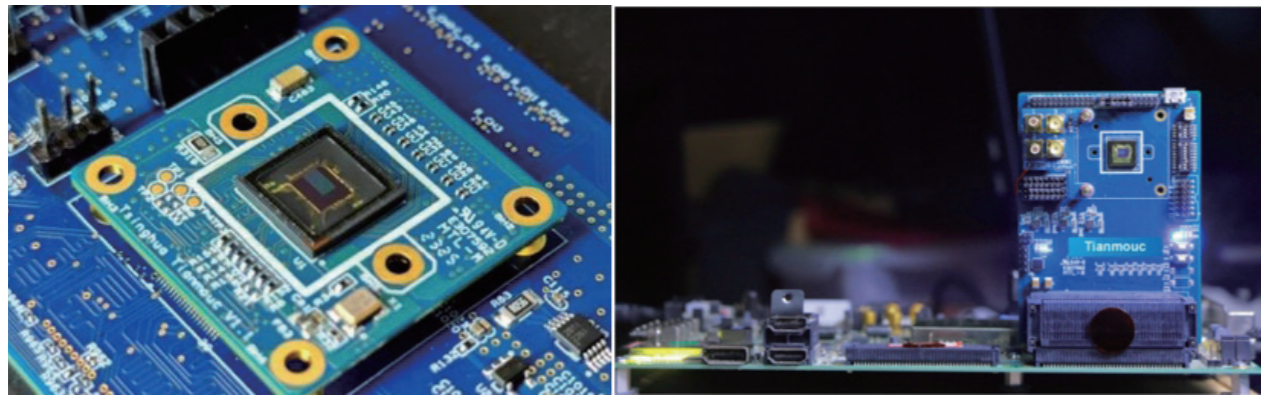
performance bottlenecks of traditional visual sensing paradigms but also efficiently handles various extreme scenarios, ensuring system stability and safety.

Leveraging the Tianmouc chip, the team has developed high-performance software and algorithms, and validated their performance on a vehicle-mounted perception platform running in open environments. In various extreme scenarios, the system demonstrated low-latency, high-performance real-time perception, showcasing its immense potential for applications in the field of intelligent unmanned systems.

The successful development of Tianmouc is a significant breakthrough in the field of visual sensing chips. It not only provides strong technological support for the advancement of intelligent revolution but also opens new avenues for crucial applications such as autonomous driving and embodied intelligence. Combined with CBICR's established technological foundation in brain-inspired computing chips like "Tianjic", toolchains, and brain-inspired robotics,



The cover image of the May 30, 2024 issue of Nature



A Tianmouc chip (left) and a perception system (right)

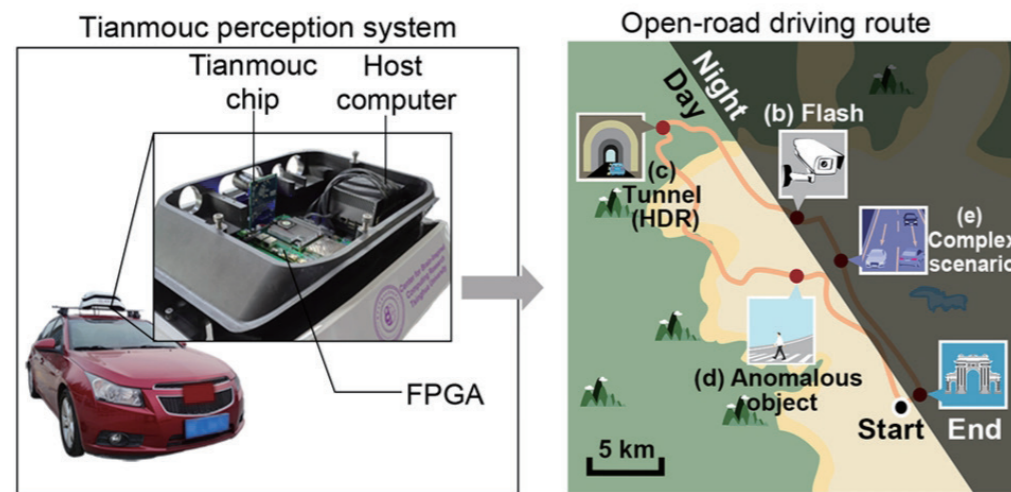
the addition of Tianmouc will further enhance the brain-inspired intelligence ecosystem, powerfully driving the progress of artificial general intelligence.

The research paper based on these results, "A Vision Chip with Complementary Pathways for Open-world Sensing," was featured as the cover article of Nature in the May 30, 2024 issue. This marks the second time the team has been featured on the cover of Nature, following their earlier work on the hybrid-paradigm brain-inspired computing chip "Tianjic." This achievement signifies foundational breakthroughs in both brain-inspired computing and brain-inspired sensing.

The corresponding authors are Professors Luping Shi and Rong Zhao from the Department of

Precision Instruments, Tsinghua University. The co-first authors are Dr. Zheyu Yang (graduated Ph.D. from the Department of Precision Instruments, Tsinghua University; currently Research and Development Manager at Beijing Lynxi Technology Co., Ltd.), Taoyi Wang and Yihan Lin (Ph.D. candidates from the Department of Precision Instruments, Tsinghua University). The first affiliation is Tsinghua University, and the collaborative affiliations include Beijing Lynxi Technology Co., Ltd.

This research was supported by the STI 2030—Major Projects, National Nature Science Foundation of China, and the IDG/McGovern Institute for Brain Research at Tsinghua University.



The demo platform for autonomous driving perception

Prof. Luming Duan's group achieves largest-scale ion trap quantum simulation

The research group led by Prof. Luming Duan at Tsinghua University has recently achieved a significant breakthrough in the field of quantum simulation. For the first time, they realized the stable trapping and cooling of a two-dimensional crystal of up to 512 ions and performed a quantum simulation with 300 ion qubits. This work marks the world's largest-scale multi-ion quantum simulation with single-qubit resolution, significantly advancing the previous world record of 61 ion qubits. The research findings, detailed in the paper "A site-resolved two-dimensional quantum simulator with hundreds of trapped ions," were recently published in Nature. One reviewer of Nature evaluated this accomplishment as a *dramatic advance over 1D*

geometries where the largest ion number was 61. Another reviewer praised the research as the largest quantum simulation or computation performed to date in a trapped ion system; a milestone to be recognized.

Trapped ions are considered one of the most promising physical platforms for achieving large-scale quantum simulation and quantum computation. Numerous experiments have demonstrated high-precision coherent quantum control of ion qubits, while scalability still remains a primary challenge for this system. Previously, researchers achieved quantum simulations with up to 61 ions in a one-dimensional crystal using a Paul trap. While a Penning trap allows for quantum

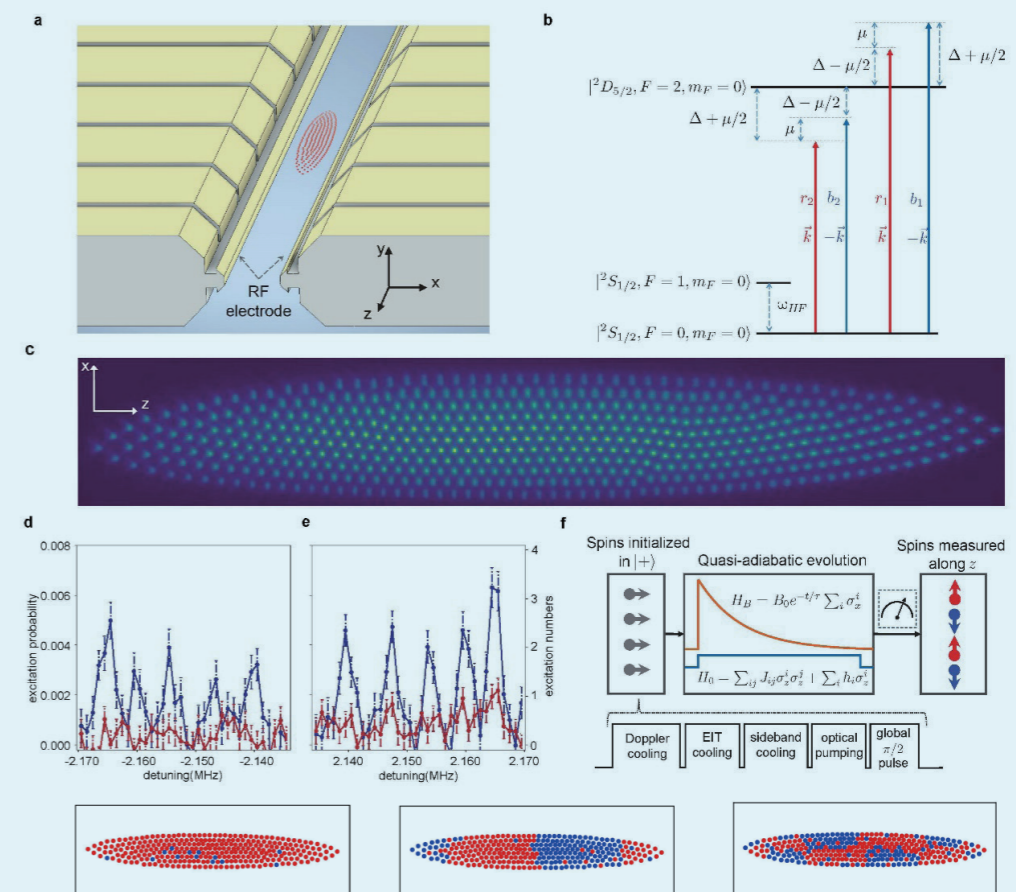


Fig. 1 Experimental image of the two-dimensional crystal of 512 ions and typical single-qubit-resolved single-shot measurement outcomes for 300 ion qubits.

simulations with around 200 ions, the lack of single-qubit resolution capability in qubit state detection makes it difficult to extract crucial information such as spatial correlations of the qubits, rendering it unsuitable for quantum computation or complicated quantum simulation tasks.

In this work, Prof. Luming Duan's team employed cryogenic monolithic ion trap technology and a two-dimensional ion crystal scheme to significantly expand the number of ion qubits and to enhance the stability of the ion crystal. They successfully achieved the stable trapping and sideband cooling of 512 ions and performed quantum state measurements with single-qubit resolution for 300 ions for the first time.

Researchers further utilized 300 ion qubits to realize the quantum simulation of a long-range transverse-field Ising model with tunable coupling. On the one hand, they prepared the ground state of the frustrated Ising model through quasi-adiabatic evolution and measured the spatial correlations of the qubits. They extracted information about the collective vibrational modes of the ions and compared them with theoretical results for validation. On the other hand, the

researchers performed quantum simulation on the dynamics of the model and conducted quantum sampling from the final states. Through coarse-grained analysis, they verified the non-trivial probability distributions of the obtained samples, which were challenging to directly sample using classical computers. This experimental system provides a powerful tool for further research into the important challenge of understanding many-body non-equilibrium quantum dynamics.

The corresponding author of the paper is IIIS Professor Luming Duan, and the first author is IIIS PhD student Shian Guo. Other co-authors include IIIS Assistant Professor Yukai Wu, IIIS PhD students Jing Ye, Lin Zhang, Ye Wang, Ruoyu Yan, Yujin Yi, Yulin Xu, Yunhan Hou, IIIS postdoc Yuzi Xu, Chi Zhang, IIIS Assistant Researcher Binxiang Qi and Associate Researcher Zichao Zhou, Li He, and HYQ Co. members Wenqian Lian, Rui Yao, Bowen Li, and Weixuan Guo. This work was supported by the Innovation Program for Quantum Science and Technology (2021ZD0301601, 2021ZD0301605), Tsinghua University Initiative Scientific Research Program, the Ministry of Education of China, the New Cornerstone Investigator Program, Tsinghua University Dushi program, and the start-up fund.

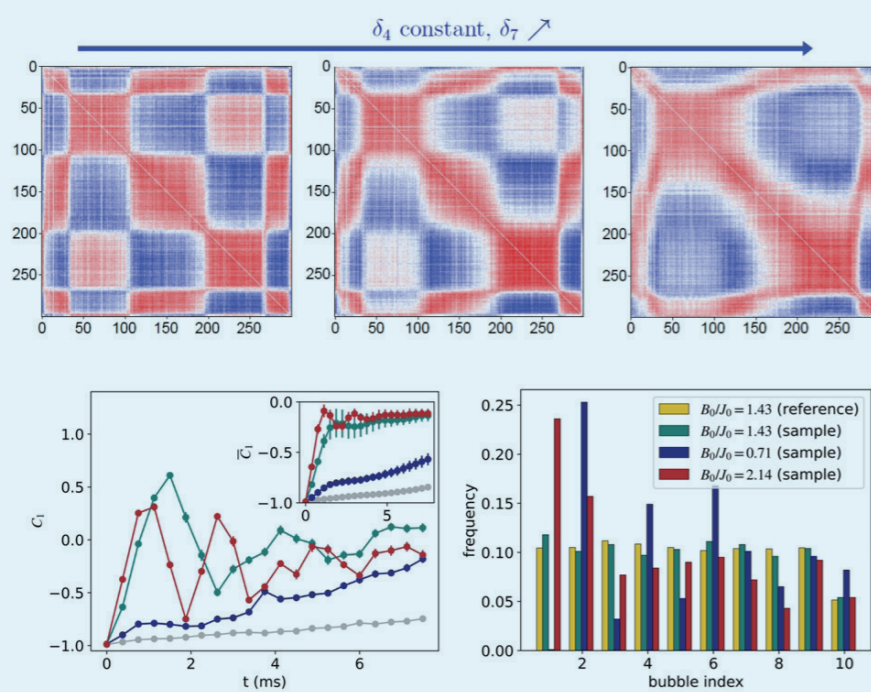


Fig. 2 Typical Quantum simulation results of the 300-ion long-range transverse-field Ising model.

Breakthrough Study in Nature Sheds Light on Opioid Receptor Dynamics, Aiming to Improve Pain Management

Opioids such as morphine and fentanyl are potent analgesics widely used in clinical practice. They alleviate pain by activating the μ -opioid receptor (μ OR) in the brain. With a history dating back over 5,000 years to ancient Sumerian civilization, opioids have long been valued for their pain-relieving properties. However, the long-term use of opioids can lead to dependence, increased tolerance, and severe side effects, including constipation and potentially fatal respiratory depression. Since 2000, opioid overdoses have resulted in approximately 400,000 deaths. In 2018 alone, the opioid crisis cost the U.S. around \$700 billion, about 3.4% of its GDP. Understanding the activation mechanism of μ OR and its interactions with different drugs is crucial for developing novel analgesics with fewer side effects.

On April 10th, a landmark paper titled "Ligand Efficacy Modulates Conformational Dynamics of the μ -Opioid Receptor" was published in the journal *Nature*. This research, led by Dr. Chunlai Chen from Tsinghua University, Dr. Brian Kobilka from Stanford University, and Dr. Wayne Hubbell from the University of California, combined Double Electron-Electron Resonance (DEER) and Single-Molecule Fluorescence Resonance Energy Transfer (smFRET) methods to explore the molecular basis of μ OR activation and signal transduction.

The μ -opioid receptor (μ OR) belongs to the G protein-coupled receptor (GPCR) family, a group of membrane proteins crucial for receiving external signals and initiating cellular responses. GPCRs play essential roles in various physiological processes, making them prime targets for drug development. GPCRs are known for their complex and dynamic nature, capable of adopting multiple conformations in response to ligands, which in turn activate downstream G proteins or β -arrestin pathways (Figure 1).

Traditional structural biology techniques like X-ray crystallography and cryo-electron microscopy (cryo-EM) typically capture only the most stable GPCR conformations. However, DEER can reveal different conformations and their populations with sub-angstrom resolution, while smFRET provides real-time conformational dynamics.

Using DEER (Figure 2), the researchers identified four distinct μ OR conformations: two inactive states (R1 and R2) and two active states (R3 and R4). Previous structural studies had only identified one inactive and one active conformation. High-efficacy ligands, such as lofentanil, significantly increased the proportion of μ OR in active conformations, even in the absence of downstream G-protein binding. In contrast, low-efficacy ligands, like TRV130, had a lesser effect.

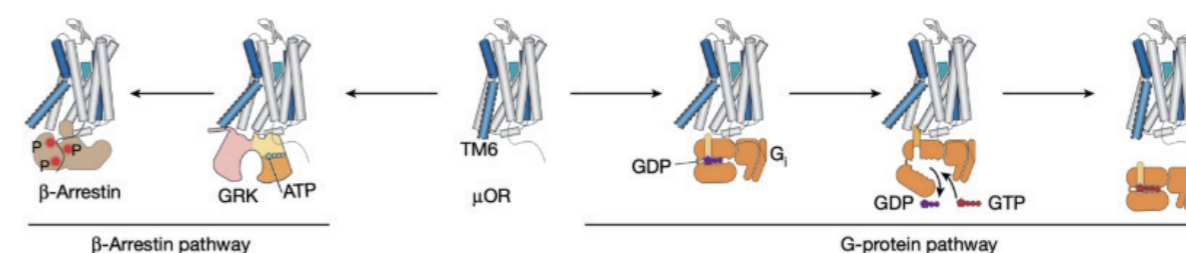


Figure 1 Two downstream signalling pathways of μ OR.

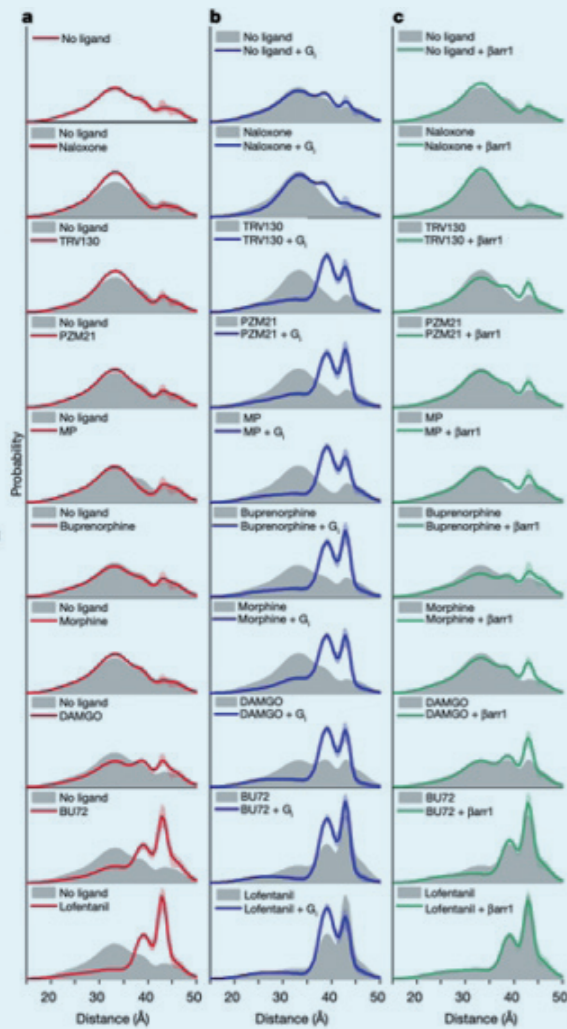


Figure 2. Conformations of μ OR revealed by DEER.

When G proteins were present, all ligands, regardless of efficacy, stabilized the R3 and R4 active conformations, with R3 being predominant. This suggests that ligand efficacy correlates with the ability to stabilize active conformations when alone. Moreover, β -arrestin predominantly bound to the R4 conformation, suggesting different binding conformations of μ OR for G-protein and β -arrestin.

SmFRET experiments corroborated the DEER findings (Figure 3). μ OR favored inactive conformations with low-efficacy ligands and active conformations with high-efficacy ligands. Labeling the intracellular loop 2 (ICL2) instead of TM4, smFRET detected two high-FRET states in the presence of antagonists or low-efficacy ligands, indicating conformational changes related to ligand efficacy. Additionally, smFRET observed μ OR conformational transitions between active and inactive states in the presence of G protein and varying GDP concentrations (Figure 4), revealing two G protein-bound states: GDP-bound (EFRET = 0.6) and GDP-free (EFRET = 0.5). High-efficacy ligands accelerated G protein binding and GDP release, enhancing GTP binding and downstream signaling.

This study not only advances our understanding of μ OR activation mechanisms but also provides a molecular foundation for developing novel analgesic drugs with reduced side effects. Further insights into GPCR dynamics and activation will guide the creation of safer and more effective pain management therapies.

Drs. Chunlai Chen, Brian Kobilka, and Matthias Elgeti are co-corresponding authors, and Drs. Jiawei Zhao and Matthias Elgeti are co-first authors. The study was supported by several funding sources, including the National Natural Science Foundation of China, Beijing Frontier Research Center for Biological Structure, Beijing Advanced Innovation Center for Structural Biology, State Key Laboratory of Membrane Biology, and Tsinghua-Peking Joint Center for Life Sciences.

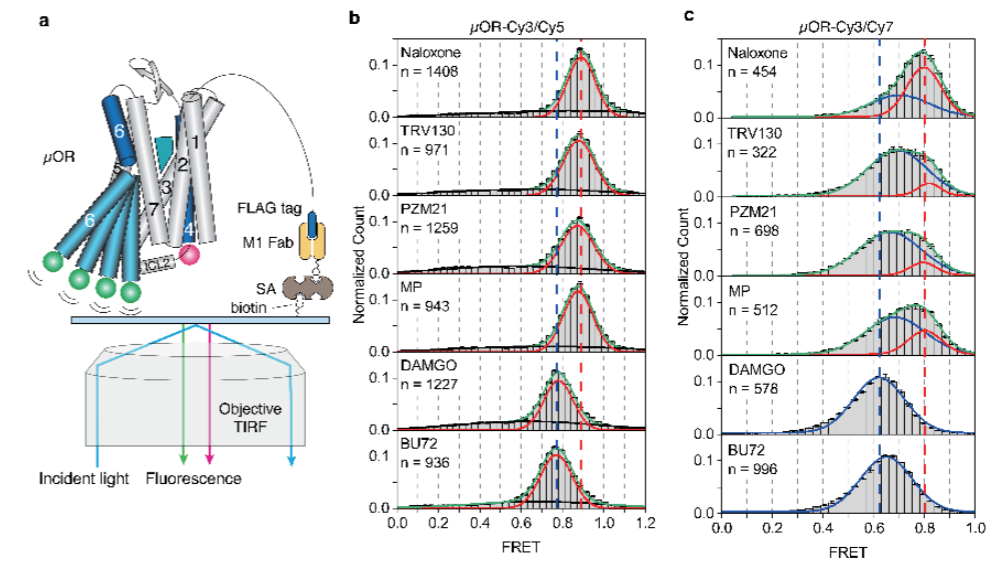


Figure 3. SmFRET distributions of μ OR-Cy3/Cy5 (b) and μ OR-Cy3/Cy7 (c) in the presence of different ligands.

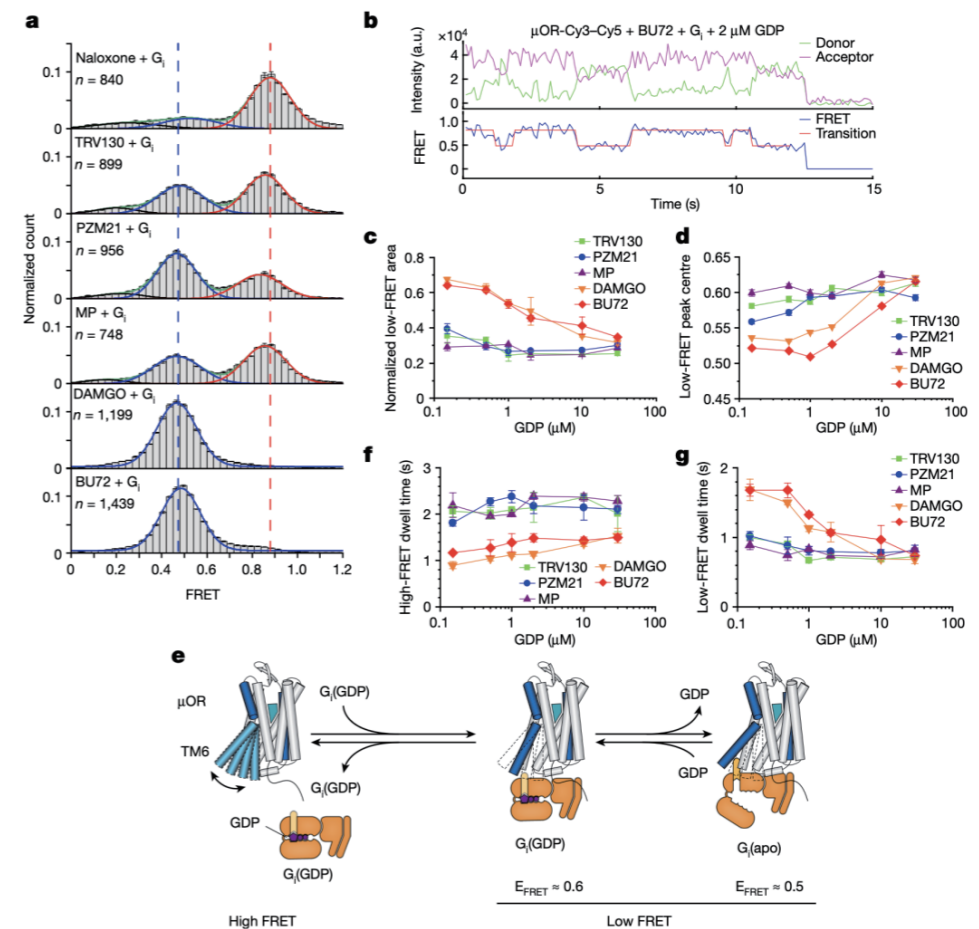


Figure 4. Structural dynamics of the μ OR revealed by smFRET.

3D Architected E-Skin mimics human touch

An innovative three-dimensional architected electronic skin that mimics human mechanosensation.

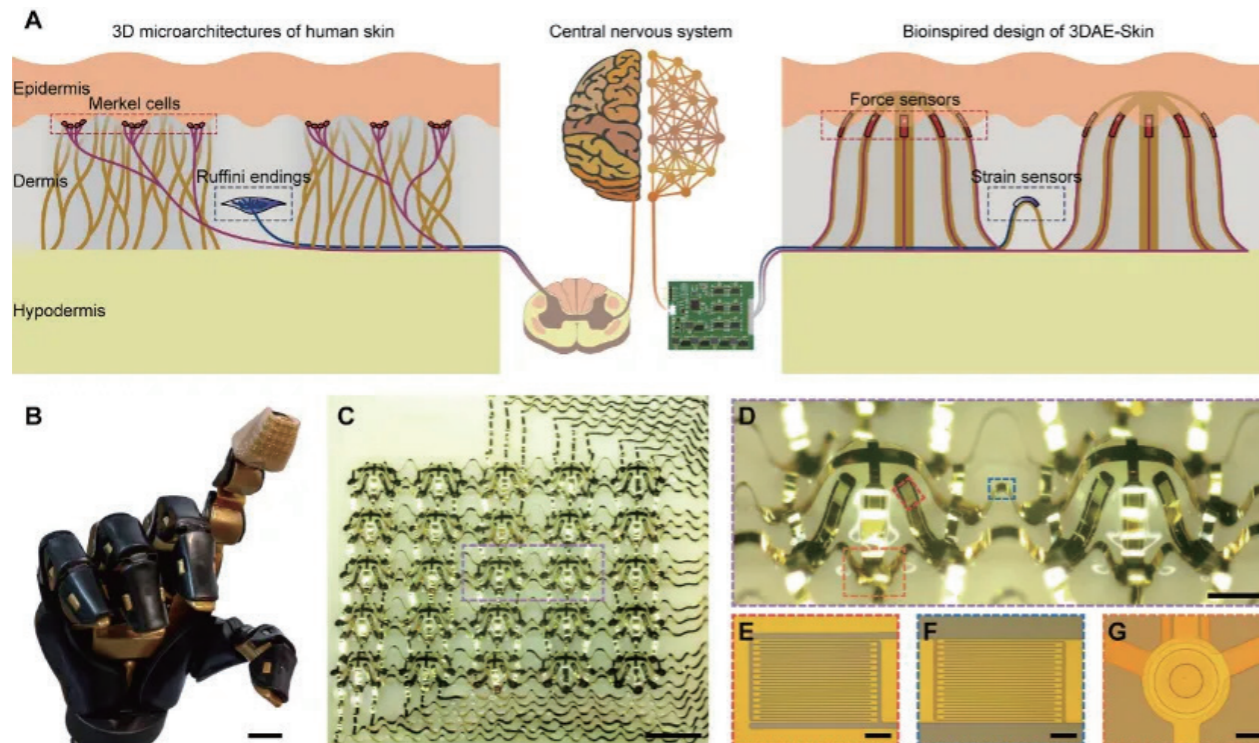
Created by nature, the human skin shows powerful sensing capabilities that have been pursued by scientists for a very long time. However, it is challenging for today's technologies to replicate the spatial arrangement of the complex 3D microstructure of human skin, but also its beauty of sensation.

A research team led by Professor Yihui Zhang from Tsinghua University has developed a three-dimensional architected electronic skin that mimics human mechanosensation for fully-decoupled sensing of normal force, shear force and strain.

Their findings were recently published in the prestigious journal Science.

Taught by nature

Inspired by human skin, they created a three-dimensional architected electronic skin with force and strain sensing components arranged in a 3D layout that mimics that of Merkel cells and Ruffini endings in human skin. This 3DAE-Skin shows excellent decoupled sensing performances of normal force, shear force, and strain. It is the first of its kind with force and strain sensing components arranged in a 3D layout that mimics that of slowly adapting mechanoreceptors in human skin.



(A) Bio-inspired design of the 3D architected electronic skin (3DAE-skin). (B) 3DAE-skin attached to the finger tip of a robot hand. (C-G) Optical and microscope images of the 3DAE-skin.

Enchanted by artificial intelligence

With the assistance of artificial intelligence, they developed a tactile system for simultaneous modulus/curvature measurements of an object through touch. Demonstrations include rapid modulus measurements of fruits, bread, and cake with various shapes and degrees of freshness.

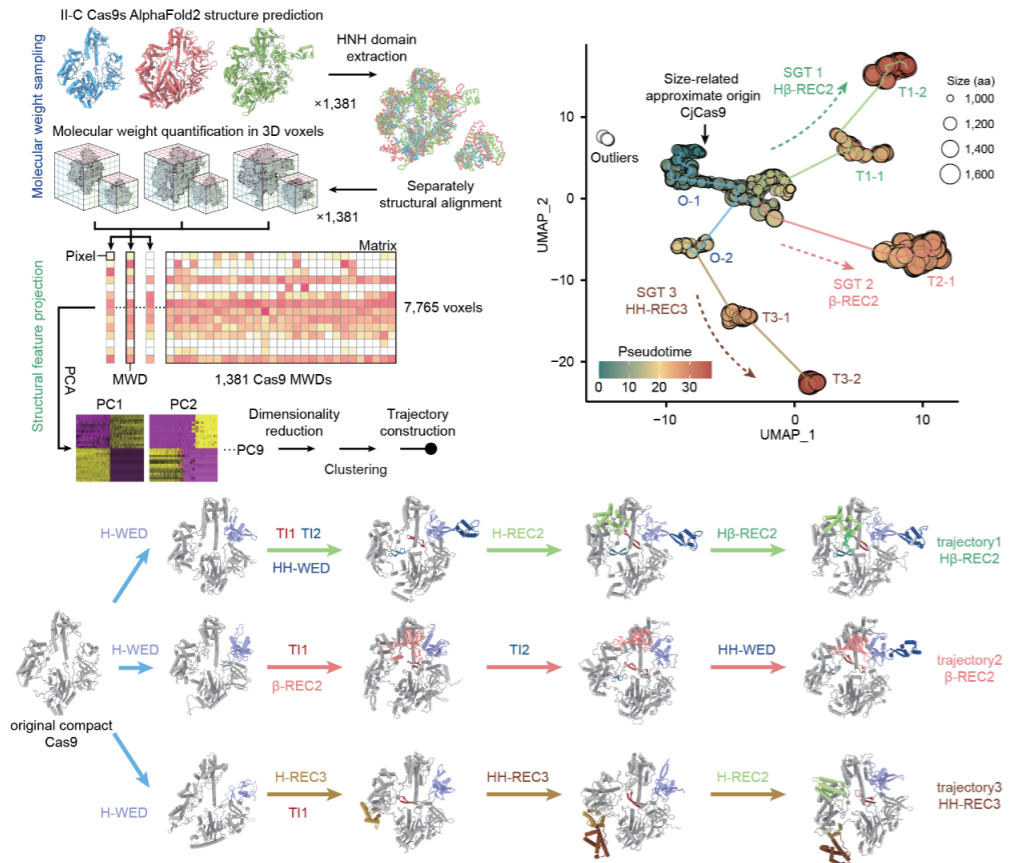
The resulting technology provides rapid measurement capabilities of the friction coefficient

and the modulus of an object with diverse shapes, with potential applications in freshness assessment, biomedical diagnosis, humanoid robots, and prosthetic systems, among others.

Zhang's study was done with colleagues from Tsinghua University's Applied Mechanics Laboratory, Department of Engineering Mechanics and Laboratory of Flexible Electronics Technology.



Research teams discover Pro-CRISPR factors and establish evolution model of Cas9 nucleases for the first time



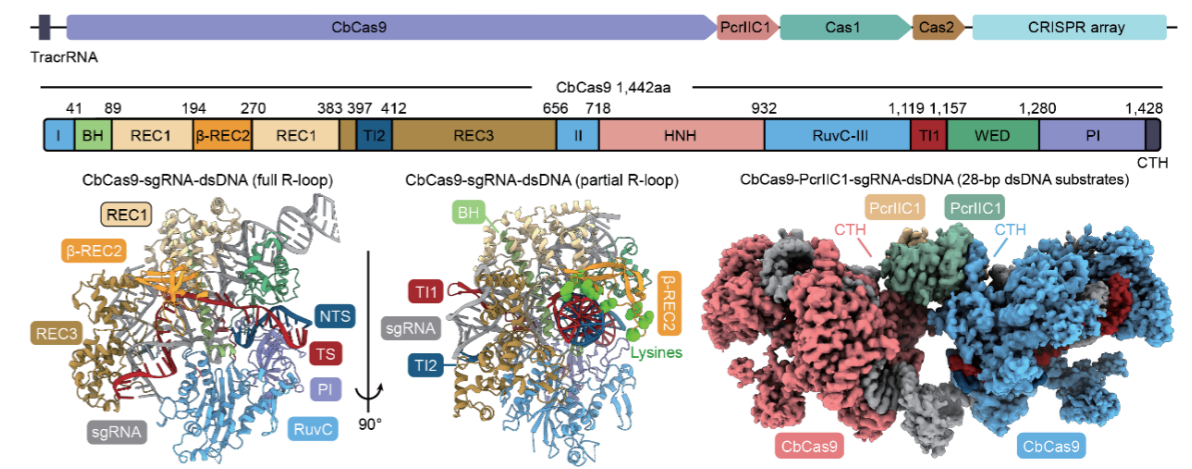
Structural growth trajectory analysis method (left) and growth trajectory diagram of II-C subtype Cas9 (right)

On May 29, a research paper titled "Pro-CRISPR PcrIIIC1-associated Cas9 system for enhanced bacterial immunity" was published online in the journal Nature. The study was conducted by the research team led by associate professor Jun-Jie Gogo Liu from the School of Life Sciences at Tsinghua University, in collaboration with the teams of associate professor Chunlai Chen from Tsinghua University and investigator Yang Bai from Peking University.

The CRISPR system is an adaptive immune system in prokaryotes that protects against foreign DNA

invasion. Among its various types, Cas9 has been extensively studied and applied in genome editing due to its mechanism of RNA-guided DNA-nuclease. The II-C subtype of Cas9 exhibits high diversity, yet whether there are additional mechanisms in the CRISPR-Cas9 system to counteract viral immune evasion remains unclear.

By utilizing bioinformatics analysis, the researchers identified novel-associated genes (NAGs) enriched in the gene clusters of larger II-C type Cas9 proteins, suggesting their involvement in bacterial immunity mediated by Cas9. To further



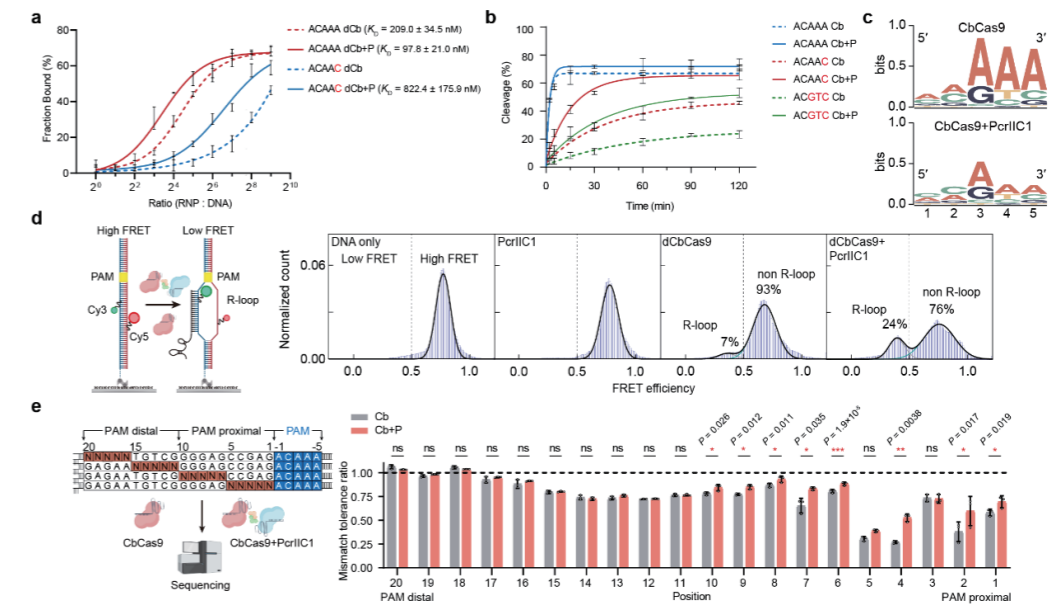
CbCas9 locus (top), CbCas9 effector protein structure (bottom left), and CbCas9-PcrIIIC1 complex structure (bottom right)

explore this relationship, the team developed a structural growth trajectory analysis (SGT analysis), which enabled them to predict and analyze the structures of 1,381 II-C type Cas9 proteins. They discovered that larger II-C Cas9 proteins show a trend of evolving through new functional domains acquisitions, with NAGs enriched at the endpoints of these growth trajectories.

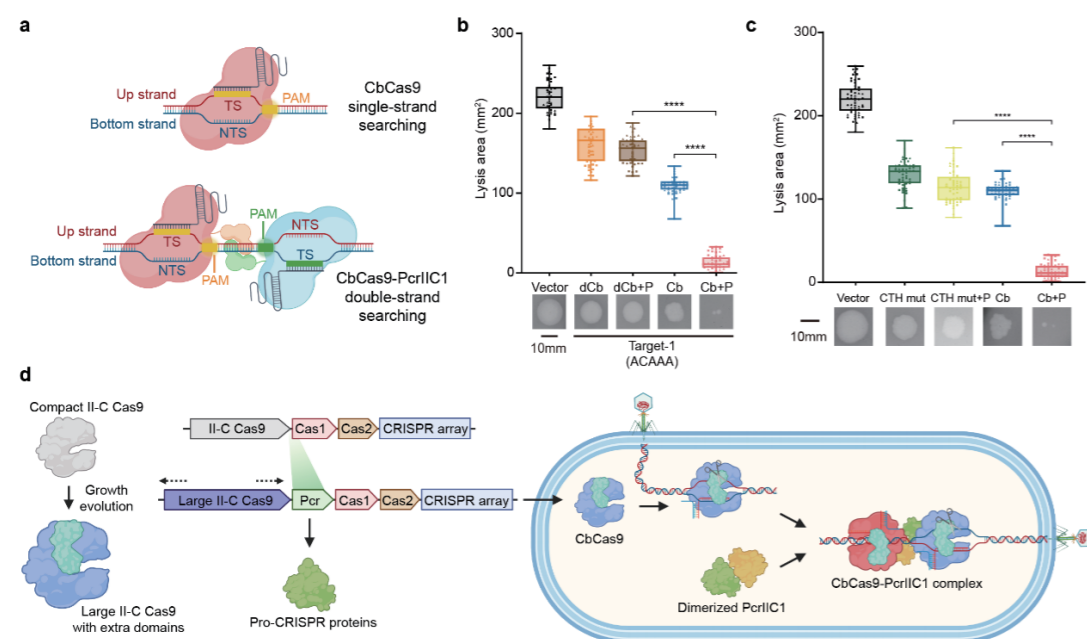
Biochemical experiments and cryo-electron microscopy revealed that the Cas9 protein from

Chryseobacterium sp. (CbCas9) has developed a new β-REC2 domain that enhances Cas9 activity and a CTH domain that interacts with its associated gene-encoded PcrIIIC1. The CTH domain allows the formation of a heterotetramer complex of two CbCas9 and two PcrIIIC1 proteins.

The study demonstrated that the PcrIIIC1 protein acts as a pro-CRISPR factor, significantly boosting the activity of the CbCas9 effectors. The CbCas9-PcrIIIC1 complex exhibited enhanced DNA binding



PcrIIIC1 enhances CbCas9's DNA-binding (a), cleavage (b), PAM compatibility (c), DNA unwinding (d), and mismatch tolerance (e)



PcrIIIC1 significantly enhanced the bacterial immune activity of CbCas9 system

and cleavage activity, broader protospacer adjacent motif (PAM) compatibility, stronger DNA unwinding capability, and increased tolerance of target sequence mismatches.

Structural analysis revealed that the enhanced activity of the CbCas9-PcrIIIC1 complex is due to the stronger electrostatic interactions and the cooperative action of the two CbCas9 proteins binding to the same long-chain DNA. This synergistic effect facilitates DNA distortion and allosteric changes, enhancing the DNA interference capability of the complex. Additionally, the two CbCas9 proteins can symmetrically target sequences on both strands of one DNA target, improving the efficiency of genomic target search.

To validate the impact of PcrIIIC1 on the anti-phage immunity of the CbCas9 system, the research teams performed the phage plaque assay in *E. coli*. The results showed that PcrIIIC1 significantly enhances the phage resistance of the CbCas9 system. Disrupting the interaction between CbCas9 and PcrIIIC1 led to the loss of enhanced immunity, indicating the critical role of the CbCas9-PcrIIIC1 complex in boosting the CRISPR-Cas system's immune function.

This study not only provides insights into the evolutionary trajectory of II-C subtype Cas9 but also identifies a novel pro-CRISPR factor that improves Cas9 activity through dimerization. These findings pave the way for developing more efficient gene editing tools based on pro-CRISPR factors.

Associate professor Jun-Jie Liu, investigator Yang Bai, and associate professor Chunlai Chen are the corresponding authors of this paper. Postdoctoral researcher Dr. Shouyue Zhang, PhD student Ao Sun, and PhD student Shuo Lin from the School of Life Sciences at Tsinghua University and PhD student Jingmei Qian from the Chinese Academy of Sciences are the co-first authors. In addition, the research was supported by Dr. Caixia Gao, Institute of Genetics and Developmental Biology, Chinese Academy of Sciences, and Dr. Mengqiu Dong, Beijing Institute of Life Sciences. The study received substantial support from the National Key Research and Development Program, the National Natural Science Foundation of China, the Ministry of Agriculture, the Scientific Exploration Award, and funding from Tsinghua University and Peking University.

TSINGHUA COMMUNITY

Tsinghua University triumphs at ISC 2024 Student Cluster Competition

The student supercomputing team from Tsinghua University showcased exceptional computing skills to win the overall championship at the ISC 2024 Student Cluster Competition. The finals, which concluded in the afternoon of May 15 in Hamburg, Germany, saw Tsinghua's team also achieve the *Highest LINPACK Benchmark Score* award.

The victory marks Tsinghua University's 17th win across the three major international student supercomputing competitions, solidifying its reputation in the field. Notably, this is the 7th time Tsinghua has emerged victorious since the inception of the ISC Student Cluster Competition in 2012.

Under the constraints of a 6-kilowatt power limit, each team was tasked with constructing their own server cluster. The rigorous competition tested their systems across various representative benchmarks (including LINPACK, HPCG, HPCC) and scientific computing applications such as Neko, Conquest, and RegCM. A mystery application, the lattice Boltzmann method simulation OpenLB, was also part of the challenge.

Affected by the pandemic, this year's competition marked the first in-person participation for the team since 2019. The members dedicated their time since winter vacation to preparation, honing their skills for the event. Their efforts paid off as they navigated through jet lag, power consumption limit, and technical challenges to secure the top spot with a comprehensive skill set and stable performance.

In a standout achievement, Tsinghua University achieved first place in the LINPACK benchmark with an impressive score of 337 TFLOPS.



The ISC24 Student Cluster Competition, hosted by the HPC-AI Advisory Council, is one of the three most prestigious international student supercomputing contests, along with the ASC Student Supercomputer Challenge and the SC Student Cluster Competition. This year's live final featured eight teams from seven countries. The winning Tsinghua team comprised six undergraduates: Runqing Zhang, Jingbo Shan, Xingye Yuan, and Kai Yang from Zhili College, Zhiyu Xue from the Department of Computer Science and Technology, and Jiaqi Pan from the Institute for Interdisciplinary Information Sciences. The instructors are lecturer Wentao Han, professor Jidong Zhai, and postdoctoral fellow Yuyang Jin of the Department of Computer Science and Technology. Ph.D. students Shengqi Chen and Mingshu Zhai from the Institute of High Performance Computing of the Department of Computer Science and Technology provided technical support for the training.

Tsinghua Team claims their 15th consecutive championship title



The Tsinghua Track and Field Team won its 15th consecutive crown in the 62nd Capital Universities Track and Field Games held at Peking University on May 11 and from May 16 to 19.

After five days of fierce competition, they won 25 gold, 20 silver, and nine bronze medals, securing the top positions on the men's team with 232 points, on the women's team with 275 points,

and clinching the group championship with total points of 507. The team was also granted the honor of the Sportsmanship Award.

The Capital Universities Track and Field Games is the largest student sports event in Beijing. The Tsinghua Track and Field Team has topped the group points standings 41 times, notably clinching the Group A overall team championship 29 times in the past 30 competitions.



Tsinghua Department of Automation shines at 2024 ICRA

Tsinghua University excelled at the 2024 IEEE International Conference on Robotics and Automation (ICRA) which took place in Yokohama, Japan in May.

The XL-Team, led by Associate Professor Li Xiang from the Department of Automation at Tsinghua University, won first place in the Robotic Grasping and Manipulation Challenge (RGMC) In-Hand Manipulation Track. Meanwhile, the undergraduate team THUDA won third place in the RGMC Picking in Clutter Track.

The PhD student Jia Yongyi, the first author of the paper entitled *Efficient Model Learning and Adaptive Tracking Control of Magnetic Micro-Robots for Non-Contact Manipulation*, received the Best Medical Robotics Paper Award Finalist. Additionally, the PhD student Yu Mingrui was recognized as an Outstanding Reviewer for *IEEE Robotics and Automation Letters*.

ICRA is the flagship conference in the field of robotics, with more than 6,000 participants this year.

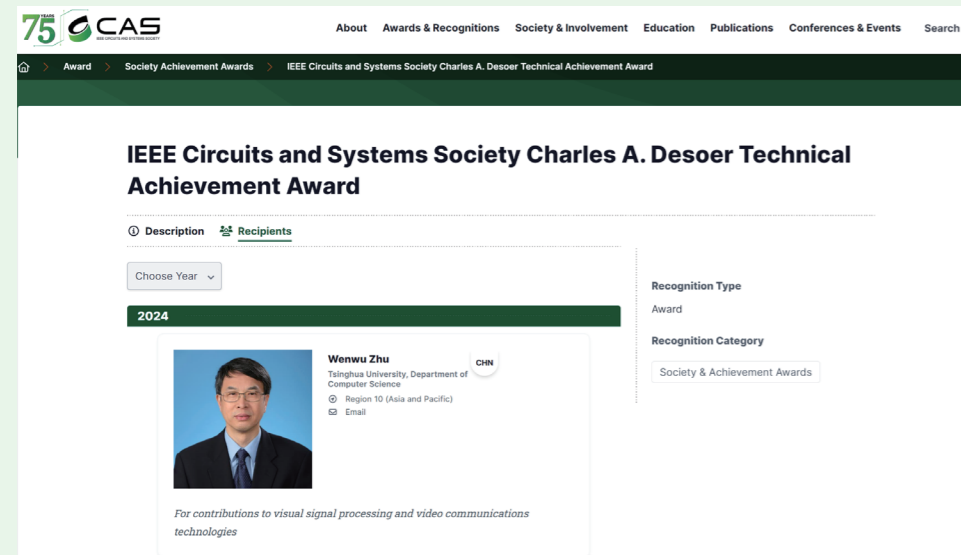


A group photo of the THUDA undergraduate team



XL-Team poses for a photo with their award

Professor Zhu Wenwu from the Department of Computer Science and Technology Receives IEEE Circuits and Systems Society Charles A. Desoer Technical Achievement Award



Recently, the Institute of Electrical and Electronics Engineers (IEEE) announced that Professor Zhu Wenwu from the Department of Computer Science and Technology has been awarded the 2024 IEEE Circuits and Systems Society Charles A. Desoer Technical Achievement Award for his outstanding contributions to the field of visual information processing and communications. Professor Zhu is the first scholar from the Chinese mainland to receive this prestigious honor. The award recognizes his pioneering research in visual information processing and communications, as well as his exceptional achievements in advancing the application of related technologies.

The IEEE Circuits and Systems Society Charles A. Desoer Technical Achievement Award was established in 2000. Each year, one individual

is selected worldwide for this award, which is granted to scientists who have made significant and lasting contributions in the field. It is one of the highest honors in the international academic community for recognizing outstanding technical achievements in the circuits and systems domain.

Professor Zhu Wenwu is currently a professor in the Department of Computer Science and Technology. He serves as the Editor-in-Chief of IEEE TCSVT (IEEE Transactions on Circuits and Systems for Video Technology), a leading journal in the multimedia video field. He has previously served as the Editor-in-Chief of IEEE TMM (IEEE Transactions on Multimedia) and as the Chair of the IEEE TMM Steering Committee. In 2023, he was awarded the ACM SIGMM Technical Achievement Award.

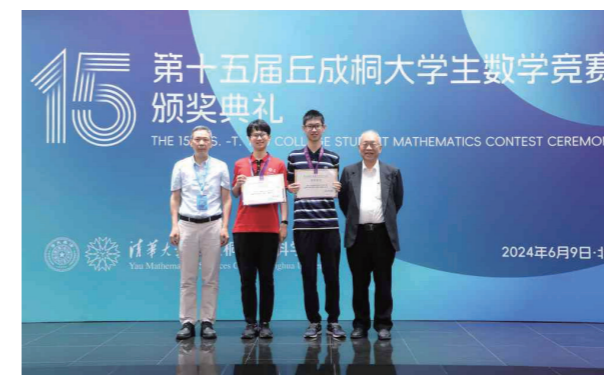
Tsinghua Qiuzhen College students win medal haul at S.-T. Yau College Student Mathematics Contest



On June 9, the award ceremony for the 15th S.-T. Yau College Student Mathematics Contest was held at Tsinghua University. Tsinghua students excelled in the contest, securing the Individual Overall Award gold and silver medals, as well as six gold, nine silver and 14 bronze medals, totaling 29 awards.

Tsinghua University President Li Luming, Chief Chair of the competition, Director of Tsinghua's

Yau Mathematical Sciences Center, and Dean of Qiuzhen College Shing-Tung Yau, President of the Chinese Mathematical Society and Vice-President of ShanghaiTech University Xi Nanhua, Vice-President of the China Association of Higher Education Jiang Enlai, and Fields Medalist and Tsinghua University Professor Caucher Birkar, attended the award ceremony.



Wang Zichang (second from right) and Yang Yicheng (third from right) receive their awards

Tsinghua Qiuzhen College students won 25 Individual Awards. Wang Zichang and Yang Yicheng, undergraduates who enrolled in 2021 both won the Individual Overall Award gold medal "Shing-Tung Yau Award" and the Individual Award gold medal "Shiing-Shen Chern Award". Zuo Junchi, an undergraduate who enrolled in 2021, won the Individual Overall Award silver medal "Shing-Tung Yau Award" and the Individual Award gold medal "Hua Luogeng Award". Cai Ziyue, an undergraduate who enrolled in 2022, won the Individual Award gold medal "Chia-Chiao Lin Award".

This year's competition saw over 3,000 students from more than 500 universities registering for the individual events, while 43 teams registered for the team competition. A total of 103 individual contestants and nine teams made it to the finals.

DIVERSE CAMPUS

International cultural festival held in Tsinghua



The 12th International Cultural Festival of Tsinghua University took place on May 18. One of its most beloved annual events, the Global Village-World Expo, was a testament to the rich diversity of students from around the world.

booths arranged by students from different countries, watch live performances, and sample local cuisine, embarking on an immersive journey rich with cultural exploration.

This international cultural expo allows participants to “travel” through a series of unique exhibition

“Unity in Diversity” is this year’s culture festival theme. Through dialogue and exchange, students from all over the world showcase the harmonious coexistence and integration of different cultures.



Harvard student group visits Tsinghua for exchanges

Tsinghua University recently hosted 120 MBA students from Harvard Business School’s class of 2024 for insightful and in-depth exchanges with teachers and students from the Tsinghua University School of Economics and Management (Tsinghua SEM), Tsinghua University’s Vice President Yang Bin attended the event and delivered a speech.

and the progress of its global strategy. He expressed hope that this exchange would foster mutual understanding, build friendships, and contribute to the vision established during the summit between Chinese President Xi and US President Joe Biden in San Francisco.

Yang discussed the history and culture of Tsinghua University, its current educational achievements,

Tsinghua SEM’s Dean Bai Chong-En shared his past experiences from studying abroad and reflected on working at Tsinghua University after returning to China.



Yang Bin speaks to Harvard students



Bai Chong-En speaks at the event



Teachers and students from Tsinghua and Harvard pose for a group photo



Wei Hong-chen speaks at the event

associate dean of Tsinghua SEM; and He Ping, deputy dean of Tsinghua SEM. They spoke with students on topics such as China's economic development, rapid technological advancements, the future prospects of China's economy, and business school education. The panelists also answered students' questions.

During the visit, faculty and students from Harvard Business School also toured the Tsinghua University campus, experiencing its rich history and vibrant academic atmosphere.



Wei Hong-chen, Chairman of KSF Beverage Holding, who is an honorary trustee of Tsinghua University and a member of the Board of Dean's Advisors at Harvard Business School, shared his educational experiences at Harvard Business School. He expressed hope for more in-depth exchanges between students from both schools in the future.

The roundtable panel discussion was co-hosted by He Zhaodong, a student from Tsinghua SEM's Global MBA program, and Violeta Ivanovska, a student from Harvard Business School. Panelists included BAI Chong-En; Wei Hong-chen; Xu Xin,



Participants pose for a group photo

Exhibition showcases 42nd "Challenge Cup" Student Extracurricular Academic Science and Technology Works



winning works were selected, with two first prizes, two second prizes, and three third prizes awarded. Weiyang College emerged as the champion of this year's "Challenge Cup" thanks to its exceptional performance.

The Challenge Cup Technological Innovation Competition, a comprehensive contest for student technological innovation, has been a seminal event at Tsinghua University since its inception in 1983. It continues to play a crucial role in fostering scientific and technological innovation and nurturing talent within the University community.

From April 27 to 28, the 42nd "Challenge Cup" Student Extracurricular Academic Science and Technology Works Exhibition was held at Tsinghua University, where nearly 300 innovative works by students were showcased. The exhibition featured over 80 physical exhibits and included three on-site events, garnering significant attention from both within and beyond the university.

This year, a total of 109 winning works were chosen, comprising six special prizes, ten first prizes, 30 second prizes, and 63 third prizes. Moreover, in the specialized Livelihood Track competition, seven



Tsinghua celebrates centenary of Tagore's visit



Yang extended a warm welcome to attendees and applauded the successful hosting of the event. He said that the series of activities are not just about reflecting on history and celebrating the achievements of predecessors, but also about inheriting and enhancing Tsinghua's traditions, inspiring us to further cultural exchanges with countries around the world and contribute to civilization.

He noted that Tsinghua will take a more proactive stance in leading international cooperation and fully leverage the important role of universities in people-to-people diplomacy.

Following the launch event, a roundtable meeting was held which attracted over 70 scholars. Topics of discussion included the history and contemporary significance of Tagore's visit to China, the influence of Tagore's thought on the modern world, cultural exchanges, and mutual learning between China and South Asia, new perspectives and approaches in Tagore studies, and new interpretations of Tagore's literature.

The series of activities was initiated by the Department of Foreign Languages and Literature and jointly organized by the Department of Foreign Languages and Literature, the University History Museum, archives and the library.

Tsinghua launched a series of activities to celebrate the centennial commemoration of Tagore's visit to Tsinghua University.

The series features activities including an exhibition, a roundtable meeting, a recitation event, special bookshelves, and other commemorative activities.

Yang Bin, Tsinghua vice president, and Hu Dongcheng, former Tsinghua vice president and deputy director of the University History Editorial Committee, attended the launch event. The event was chaired by Fan Baolong, head of the Tsinghua History Museum and Tsinghua University Archives.



Fifth Tsinghua-PKU Low-carbon Campus Design Friendly Competition Held

The 5th Tsinghua-Peking University Low-carbon Campus Design Friendly Competition was held on June 6th. The exchange meeting showcasing the outcomes of the "Handmade Innovation Practice" course from Tsinghua University and the "Sustainable Campus Practice" course from Peking University was held the same day.

Throughout this semester, ten groups of students from over 20 schools of both Tsinghua and Peking University collaborated on the theme of "Urban Biodiversity". They transformed Tsinghua's iGarden, a horticultural education base, and Peking University's Weixiu Garden into habitat gardens. These endeavors were a testament to their understanding and desire for a low-carbon and sustainable lifestyle. During the competition, students explained the objectives behind their creations and the underlying principles guiding their renovations. At the event, Zheng Zhihong, a researcher at Tsinghua University's Future Laboratory, gave a keynote speech titled "Interactivity and Inclusivity of Gardens."

Going forward, both universities will use these courses as a platform to guide research and space design practices. Through the courses, the universities will also collaboratively organize a series of long-term low-carbon and sustainable activities.



The competition gets underway



Group photos of students and faculty at Tsinghua's iGarden and Peking University's Weixiu Garden



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