

My Astrophysics Research 'Grew Up' Here

Dialogue

By Staff Reporters

At Fudan University's Jiangwan Campus in Shanghai, Cosimo Bambi is often seen jogging around the physics building. He runs without headphones, keeps a steady pace, and sometimes waves to students. Some say he resembles Sheldon from the American sitcom *The Big Bang Theory*, not because of eccentric habits, but because of his sharp eyes and quiet focus. In reality, he is grounded and has spent the last 13 years helping build a research field that barely existed in China when he arrived.

In 2025, Bambi received the Chinese Government Friendship Award, the highest honor for foreign experts. He noted that many recipients are senior scholars who came to China after long careers abroad. "But my experience is a bit different; I 'grew up' here in China," he said.

Starting from zero

Bambi earned his PhD in 2007 from the University of Ferrara in Italy under Alexander Dolgov, a leading figure in cosmology. He then worked as a post-doctoral researcher at Wayne State University in the United States, the University of Tokyo's Institute for the Physics and Mathematics of the Universe, and Ludwig Maximilian University in Munich.

During his time in Tokyo, he first considered moving to China. He learned from Chinese colleagues that the country was investing heavily in scientific research and offering real opportunities for young researchers. Knowing that Fudan is one of China's top universities, he decided to give it a try.

He joined Fudan as a full-time faculty member in late 2012. At the time, the physics department had strong programs in condensed matter physics but



Professor Cosimo Bambi. (PHOTO: Fudan University)

no active research in high-energy astrophysics, gravitation, or cosmology. Bambi stepped into that gap.

He introduced Fudan's first courses in astrophysics and cosmology for both undergraduate and graduate students. To support teaching, he wrote *Introduction to Particle Cosmology: The Standard Model of Cosmology and its Open Problems*, which became the only Chinese-language university textbook in particle cosmology in the country. Later, he published an updated *Introduction to General Relativity* that included modern topics such as gravitational waves and cosmological models, subjects rarely covered in Chinese academic materials at the time.

His research focuses on using X-ray observations to probe the extreme gravitational fields around black holes, a key testing ground for Einstein's theory of General Relativity. He and his team analyze data from China's Hard X-ray Modulation Telescope and provide theoretical frameworks for interpreting signals from

black hole systems. He says today's technology is advanced enough to treat the entire universe as a laboratory, something that was impossible in the past due to limited measurement precision.

A global team in Shanghai

Under Bambi's guidance, undergraduates in his department regularly publish first-author papers in peer-reviewed journals, typically no fewer than six each year.

He finds Chinese students highly self-motivated and hardworking. Even when facing language barriers, they ask questions and take the initiative.

His core research group includes two postdocs and seven PhD students from the United States, India, Pakistan, Colombia, and Uzbekistan. He believes scientific progress requires collaboration, as different backgrounds bring different ways of thinking and help avoid blind spots.

As a mentor, he avoids micromanaging. He encourages students to find their own motivation, emphasizing that

what matters is not how they get results but that they choose to pursue them.

Outside the lab, Bambi enjoys running. He is often seen jogging around the campus. His office shelves display medals from marathons and university races. He once won Fudan's 10-kilometer faculty event. A sports bag and towel sit ready by the door. He says running clears his mind and sometimes sparks new ideas.

He also works to strengthen academic ties between China and Italy. In 2015, he co-founded the Association of Italian Scholars in China to promote cooperation in science and education. He has organized workshops and helped arrange exchanges between Fudan and overseas institutions.

In 2021, he obtained permanent residency in China. "I really enjoy life here," he said.

His academic record includes over 210 papers as first or corresponding author, more than 14,000 citations, 13 academic books, and one popular science book. He received the Shanghai Magnolia Memorial Award in 2018, the Magnolia Honor Award in 2022, and the Xu Guangqi Prize from the Italian Embassy in Beijing.

Bambi acknowledges that his field deals with questions that may not yield practical applications for decades. But he sees value in the pursuit itself. People naturally wonder where the universe came from and how it works, and that curiosity drives science forward.

He remains focused on training students, analyzing data, and testing theories. While he does not predict breakthroughs, he stays open to them. Tomorrow will surprise everyone, he says, and maybe some of those surprises will come from their little corner in Shanghai.

This article was edited and translated based on the Chinese version by Fudan University.

Reading China initiative at the London Book Fair is a recurrent exhibition, highlighting the country's development, economic growth, culture and the Chinese perspective.

At the Frankfurt Book Fair in Germany, the biggest in the world, China is a regular. Last year, the Beijing in Translation stand at the fair was a hit with adults, the original Chinese-style comic *Gang Lan Jue* drew in youngsters, and the Hong Kong Pavilion highlighted a modern field China reigns over: "Publishing 3.0+" and the integration of AI in publishing.

The Beijing International Book Fair and Shanghai International Children's Book Fair are among the major book fairs China hosts in two of its mega cities, supplemented by several more smaller ones.

According to the *China Publishers Special Report 2025*, China's digital reading market is growing. Audio books, e-books, web novel platforms, radio dramas, study courses on e-platforms and other innovations drove nearly 17 percent growth in 2024, with the revenue crossing 66 billion RMB.

charcoal for further use, keeping the area clean and tidy.

Bronze sieve: A "charcoal selection device," its body is covered with holes to sift out broken charcoal and impurities, ensuring the best charcoal burns more fully for better heating.

Experts believe that the logic behind this heating combination is similar to that of the wine vessels used by Shang Dynasty nobles. It takes into consideration the practical function of daily heating, while also demonstrating the owner's identity and status through the specifications of the complete set.

Tech+Culture

Digital Protection for Xi'an City Wall

By Staff Reporters

The Xi'an City Wall, initially built around 1,400 years ago in 582 AD during the Sui dynasty, now extends 13.74 kilometers, surrounding the ancient city of Xi'an in Shaanxi province, northwest China. As one of the oldest, largest and best-maintained ancient city fortifications in China, the wall has faced significant preservation and protection challenges. This is because its inner structure, primarily made of tamped earth, has eroded over time due to the elements.

However, AI has come to the rescue, solving this problem by creating a digital twin model of the wall with centimeter-level accuracy. This model utilizes over 3,000 monitoring points and more than 1,300 visual sensors placed along the entire wall. Along with additional data, restoration logs and visitor operation details, this system is currently overseen by a digital comprehensive management platform, or "super brain," which monitors slight indicators of structural stress to forecast possible risks.

"This platform, which makes full use of current facilities and resources,

was ultimately achieved with the help of experts, researchers and 14 laboratories specializing in wall preservation," said Zhao Bin, director of the Xi'an City Wall Digital Industry Innovation Center.

"Cultural heritage is not merely a relic to be exhibited; it must be brought to life using digital technology," he said. To effectively create the platform took a collaboration of digital technology with cultural heritage, resource integration, innovative ideas and experimentation.

According to Zhao, the digital platform has been significantly improved thanks to the alliance of experts and researchers from various disciplines. Not only does it play a vital role in overseeing the preservation of cultural heritage and offering early alerts, but it is also useful in managing cultural tourism, ensuring emergency safety and controlling floods.

Zhao said that the digital transformation of cultural heritage will transition from isolated innovations to a holistic system enhancement in the future. He believes that this Chinese solution could be adopted globally, enabling cultural heritage sites worldwide to benefit from China's digital technology.



The Yongning Gate of the city wall in Xi'an, the capital of Shaanxi province. (PHOTO: XINHUA)

China Shines at Int'l Book Fairs

By Sudeshna SARKAR

If 2026 is remembered as the year when the U.S. pulled out of nearly 70 international organizations and pacts, it will also be remembered as the year when China stepped in to fill the gap.

The recently concluded 49th International Kolkata Book Fair in Kolkata, India, also indicated this shift in soft cultural power.

When the fair, one of the largest in Asia, opened on January 22, the headlines were dominated by China's return after 15 years and the U.S. skipping it after two decades of attendance.

With China-India relations improving and developing in recent years, Xu Wei, the Chinese consul general in Kolkata, said the consulate general is "committed to enhancing friendly exchanges between the two peoples, and cultural exchange is an important aspect of this." Since there was not enough time to

organize Chinese publishers, the consulate chose to display books and photographs from its own collection, showcasing Chinese culture, history and development.

Visitors to the China Books stall, especially students, looked for books to learn Chinese. "Today, more and more foreigners are studying Chinese and like to know [about] Chinese culture. We are pleased to see that some schools in India, in Kolkata, have opened Chinese language classes. I believe that our participation in this year's book fair will attract more people to learn Chinese and Chinese culture, and strengthen the cultural bond between our two great nations," Wei told the media.

Aisee Chattopadhyay, the college student volunteering at the stall, was a case in point. She began to learn Chinese in her school, where it was taught as an extracurricular activity. Hooked, she continued learning it to clear Level 3 of the

Chinese Proficiency Test conducted by the China-based Center for Language Education and Cooperation.

The keen-eyed Aisee spotted a trend among young visitors. "Kids between seven and 10 are visibly excited when they see the stall and pull their parents in. They are familiar with many Chinese things, thanks to video games and animation films, and some even know Chinese phrases."

If Bruce Lee and kung fu created an unforgettable image of China abroad in the past, today, new blockbuster films like the *Ne Zha* series are not only reinforcing it but also enhancing it. While the kung fu films celebrated an ancient martial art, the new ones, some of which are available on Netflix, highlight China's remarkable progress in technology, special effects and digitalization.

The presence at international book fairs is a boost for both China's publishing industry and cultural influence. The

Traditional Eastern Wisdom

Ancient Bronze Set Warms Homes in Winter

By BI Weizi

In modern life, people rely on heating or air conditioning to keep warm in the bitter cold of winter — but what did the ancients use?

During the Warring States period, people actually had a "three-piece set" for winter heating: a bronze charcoal brazier, a bronze shovel and a bronze sieve.

The bronze charcoal brazier is

quite different from modern stoves. With its shallow, flat-bottomed design, it resembles a "bronze frying pan" at first glance. The bottom is fitted with three short, animal-shaped legs, which support the main body of the brazier and keep it a safe distance from the ground to prevent the floor from being scorched.

The neck and belly of the brazier are adorned with exquisite red copper patterns, while symmetrical double-ring

handles balance both sides, each fitted with a carrying chain. These allow the brazier to be easily lifted and moved, providing "mobile heating."

But how exactly were these "three pieces" used?

Bronze charcoal brazier: The "heating core" of the trio, used for burning charcoal to provide heat.

Bronze shovel: A "charcoal ash collection tool," used to clean up the ash produced by the brazier and also to hold

the leakage of sCO₂ through the gaps between the compressor and turbine motor, so as to reduce the energy loss of the unit.

At that time, there were already some successful cases abroad. Huang consulted foreign experts, who told him not to build units with a capacity of over 100 kilowatts. When they heard that Huang was going to build a megawatt unit, they saw it as mission impossible.

But Huang didn't give up and led the team to carefully analyze the materials and structures of multiple sealing techniques, and they finally decided to apply dry gas seals.

Although the dry gas sealing technology is stable, it cannot be directly adopted due to the high temperature and high pressure of the sCO₂ unit, said R&D team member Chen Yaoxing.

The team went back to the drawing board, from static to dynamic, from low temperature to high temperature, and from low pressure to high pressure. In the laboratory, team members kept a close eye on the experimental status on the monitoring screen.

Huang's team eventually achieved success in the dry gas sealing for megawatt-level ultra-carbon turbines, which is a world first. Subsequently, the sCO₂ unit was verified in lab in 2019, the Chatan One project was inaugurated in 2023 and began commercial operation at the end of 2025.

Electricity Generated from Carbon Dioxide

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Vacuum diffusion welding

Microchannel processing was only the first step. The plates need to be stacked with the grooves facing each other, so that the flow channels could be formed. However, even the most experienced welders found it difficult to stack hundreds of plates precisely.

Huang carried out extensive research and turned his attention to vacuum diffusion welding technology. "Stack the plates one by one like pages of a book, apply vacuum, high temperature and high pressure, and the metal atoms will diffuse and bond tightly together," he explained.

However, China had no experience in this field, and countries who do, have included the technology in the commercial control list, with strict restrictions on its export. Huang was therefore determined to develop the technology with his team.

Over a period of 829 days, the team underwent 27 rounds of technical optimization and adjustment, along with 218 different welding parameters tested, leading to scrapped test samples filling half of the warehouse.

It was not until the early morning of a cold winter day in 2021 when the monitoring screen of the 49th process test suddenly showed a stable green curve that Liu repeatedly checked the flashing data and excitedly announced: "The welding was successful!"

No leakage

The next challenge was to prevent