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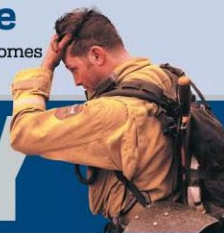
[CHINA, PAGE 6](#)

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[BUSINESS, PAGE 14](#)

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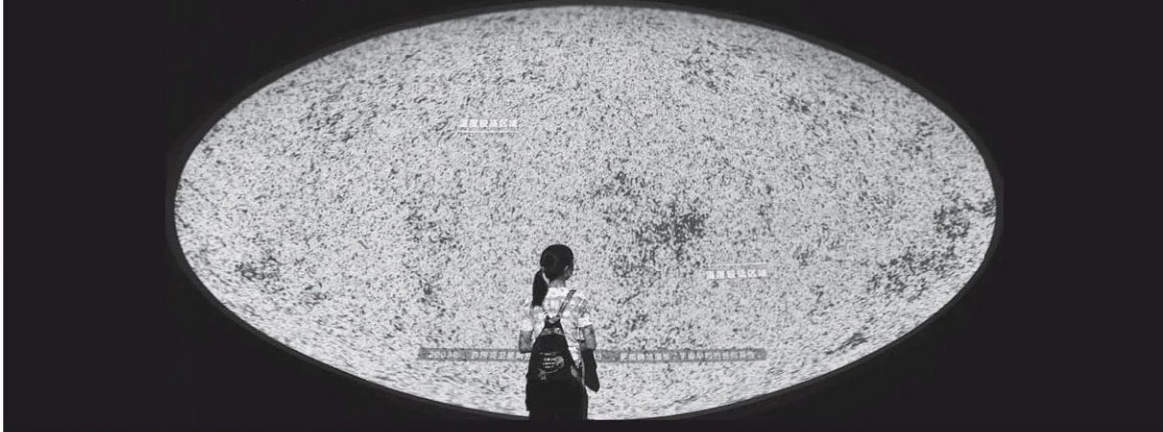
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PAGE TWO

New Shanghai museum looks to the heavens



A visitor learns about the cosmos at the Shanghai Astronomy Museum, which opened on July 18 and attracted nearly 6,000 visitors. LONG WEI / FOR CHINA DAILY

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For thousands of years, people have been gazing at the stars, awed by the vastness of the universe.

There has always been the desire to observe and explore the cosmos, and the recent opening of a new astronomy museum in Shanghai has triggered even more curiosity among enthusiastic visitors about the unknown.

On July 18, when it opened to the public, nearly 6,000 people crowded into the 38,000-square-meter Shanghai Astronomy Museum, located beside Dishui Lake in the city's east-coastal area of Lingang.

Housing exhibits and interactive displays from the history of the creation of the universe to China's latest efforts in space exploration, the new branch of the Shanghai Science and Technology Museum is the largest of its kind in the world dedicated solely to the study of astronomy.

Zhouyong Songlan, a teacher in her 20s who got up at 3 am a week ago to book an opening-day ticket to visit the museum, was among the first to arrive. "I was so excited when I got the ticket, as they were all snapped up in just a few minutes," she said.

Like many people eager to learn about the stars, her love of astronomy was cultivated in childhood when her father read her bedtime stories about the heavenly bodies.

"Back then in Shanghai, there were no astronomy museums and few resources to acquire such knowledge. I think the popularization of astronomy is very important, and this new museum is definitely a good start," she said.

Wang Lianhua, who is in charge of the Shanghai Science and Technology Museum, said the opening of the new institution marks a milestone for the efforts to promote science, as Shanghai now has museums for nature, modern technology and astronomy.

Built on a 36,800-square-meter site, the museum's main building has no straight lines or right angles, a concept inspired by the orbits of celestial bodies and the geometry of the cosmos. Instead, it features three circles — an oculus hole, a spherical theater and an inverted dome, which also function as astronomical instruments, tracking the sun, moon and stars.

The oculus, suspended above the main entrance to the museum, marks the passage of time by tracking a circle of sunlight on the ground across the entry plaza and a reflecting pool. At noon during the summer solstice, a full circle of sunlight aligns with a circular platform in the entry plaza.

The half-sunken theater is located in one wing of the museum with minimal visible support, giving an impression of weightlessness or zero-gravity when visitors approach it.

The inverted glass dome, situated in the central atrium of the other wing, is accessed through a spiral ramp. When visitors reach the center of the glass dish, they have an unimpeded view of the sky.

Thomas Wong, lead designer for the museum and a partner with Ennead Architects, a United States company, said in an interview with CNN that the design also was influenced by the "three-body problem" — the unsolved question of how to calculate the motion of three celestial entities based on their gravitational relationships to one another.

"We thought this problem was interesting because it involves a complex set of orbits," Wong said. "These are relationships that are dynamic, opposed to a simple circle around the center, and that was part of the (designer's) intent — to capture that complexity."

According to the Ennead Architects website, the museum is a celebration of "the continuum of time and space." It is also "modern

and forward-looking while at same time presenting a link to the past, mirroring both the rich history of Chinese astronomy and the future ambitions of China's space exploration program."

Three displays

Touring the main building, visitors can gain a thorough understanding of the universe through three main exhibitions — *Home*, *Cosmos* and *Odyssey*. They can learn about ancient Chinese astronomy at a themed display, theories about the heavens, reports of comets being sighted, and observation instruments.

A 17-meter-diameter model of Earth beaming out a pale blue light attracts visitors entering the *Home* exhibition through a dark tunnel. Alongside this, a model of the moon floats in the air. The dim light in the exhibition hall also gives visitors the impression that they are viewing Earth from space.

Inside "Earth" is a planetarium decorated as a lawn on a summer night, visitors lie down to enjoy views of the starry night sky projected on the dome.

Exhibits near "Earth" inform visitors about other planets in the solar system. The meteorite section deserves special mention, as it features 70 meteorites collected from around the world, including a 214-kilogram specimen of the only one witnessed in Shanghai's history, which fell on Changping Island in 1964.

The *Cosmos* exhibition is reached by leaving the *Home* display and walking through a long "interstellar" passage featuring an immersive and interactive art projection of a river of stars that flows with people's movements.

Lin Qing, director of the museum's research center and the main curator of the exhibitions, said the *Cosmos* display was the hardest to present, as much in the universe is

still unknown, even among scientists.

"After numerous discussions and brainstorming sessions, we decided to explain the basic concept of time and space and the fundamental theories about the universe to visitors, and also tell them that one day a visitor could have the answers to unsolved questions," Lin said.

Instead of highlighting straight facts, this exhibition poses a number of questions, such as What is the universe? How big is it? What is the essence of gravity? How is distance between stars measured? What is dark matter? The answers are presented through interactive exhibits to make it easier for people to understand them.

A short time travel drama featuring British astronomer Isaac Newton meeting Albert Einstein, the German-born theoretical physicist, is performed live by actors to tell visitors about the differing views of classical physics and the theory of relativity on the universe. A

generator creates a whirlpool to imitate a black hole, while rays of projected light, which bend when visitors approach them, show the effects of gravity.

Odyssey, the third exhibition, features a historical narrative to guide visitors through the advancement of knowledge about the universe and efforts in space exploration. The exhibits include publications by Claudius Ptolemy, the Egyptian astronomer, mathematician and geographer of Greek descent, Johannes Kepler, the German astronomer, mathematician and astrologer, and Newton.

The exhibition culminates in a section on China's most recent space projects, featuring full-scale models of the Yutu (Jade Rabbit) lunar rover, Tianhe (Harmony of the Heavens) core module and the Chang'e-5 spacecraft, along with a 9-milligram lunar sample brought back by the Chang'e-5 mission.

Xin Ge, deputy director of the museum, said: "We don't want our exhibitions to be like dull textbooks. We have focused on creating an exciting experience for visitors so that they'll leave the museum with more curious minds about space and a love for astronomy."

Summit staged

On July 17, the day before it opened to the public, the museum held a summit titled "Flying Into the Infinity of the Universe". The event included talks by a Chinese academician, the director of the Shanghai Astronomical Observatory, the chief scientist of China's Hard X-ray Modulation Telescope, and the chief scientist for the nation's Five-hundred-meter Aperture Spherical Radio Telescope, or FAST. There were also speeches by two Nobel laureates delivered via video link.

During a roundtable discussion, Shen Zhiqiang, director of the Shanghai Astronomical Observatory, said: "I am very impressed by the overall exhibitions at the museum, especially the presentation of the country's space projects. Modern astronomy in China is still a young discipline, and this museum will fuel interest in studying the universe among the younger generation."

Two towers, one housing a 1-meter telescope and the other a 65-centimeter solar telescope, stand next to the museum. Both will be open to the public for star-gazing activities and scientific research projects for students.

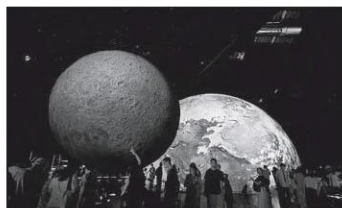
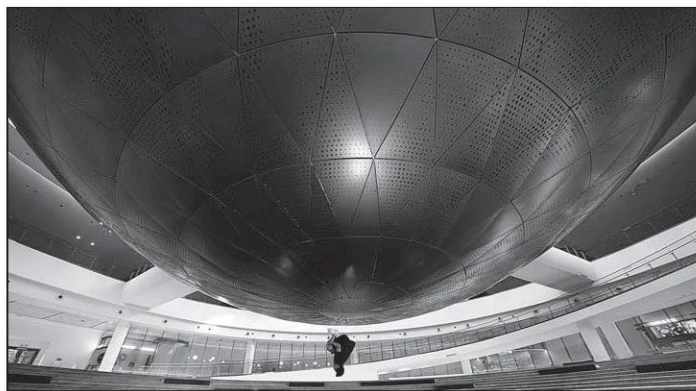
Li Di, chief scientist for FAST, said: "The universe has never let us down. We have never been able to imagine what we could discover if we look just a little deeper into the universe. It's always full of surprises."

For 94-year-old Ye Shunzhi, astronomer and academician at the Chinese Academy of Sciences, the opening of the museum is a dream come true, as for a long time there was only one museum dedicated to astronomy in China — the Beijing Planetarium, which was built in 1957 and expanded in 2004.

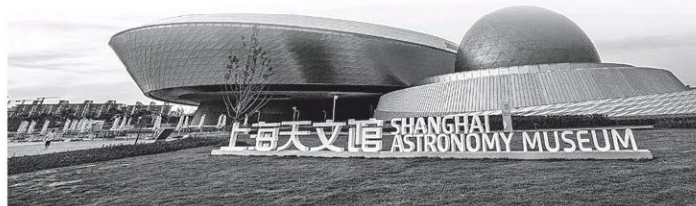
"A long time ago, I suggested that a new astronomy museum should be built in Shanghai," said Ye, who started her career in 1961 at the Shanghai Xujiahui Observatory, one of the earliest modern observatories in China.

"Seeing things in person is far different from reading about them in books, and as sciences advance, the public is not content with solely knowing things about Earth," said Ye, who put forward her suggestion in 2010 and took part in planning for the new museum since the project was launched in 2016.

"I hope people acquire knowledge here about how immense the universe is, where we come from and where we are heading to ... Those are all important questions and will perhaps help humans build new homes on other planets one day in the future," she said.



Top: Dong Shuchang, a photographer, performs a somersault under the theater dome on July 17 after one of his astronomy photos was displayed at the museum. GAO ERQIANG / CHINA DAILY. Left: Models of the moon and Earth attract visitors. LONG WEI / FOR CHINA DAILY. Right: Visitors take photographs of the "sun". LONG WEI / FOR CHINA DAILY.



The Shanghai Astronomy Museum, covering an area of 38,000 square meters, sits beside Dishui Lake in the city's eastern coastal area of Lingang. GAO ERQIANG / CHINA DAILY