

核科研基础设施全球共享 共创可持续未来



International Nuclear Research Infrastructure Organization

Initiated by the Chinese Nuclear Society with partners in research, higher education and industry, INRIO is being developed as a non-profit international organization. It aims to connect facilities and researchers through shared infrastructure and joint experiments.



## FEATURED IN THIS EXHIBITION

## 23 Facilities

## 14 Institutions

## 4 Facility categories

## PEACEFUL USES

Peaceful nuclear innovation for energy, health and the environment.

## OPEN ACCESS & SHARING

Accessible facilities, shared resources and integrated research.

## TALENT & CAPACITY BUILDING

International exchange, training and capacity building.

## MULTILATERAL COOPERATION

Advancing standards, pooling expertise and facilitating data sharing.

## SCIENCE FOR SUSTAINABLE DEVELOPMENT



**Help shape the next chapter  
of nuclear science.**

Facility operators, institutions, universities, companies and researchers: explore participation and future collaboration.

**Explore. Connect. Collaborate.**



**inrio.net**



# ATOMS FOR SDGs

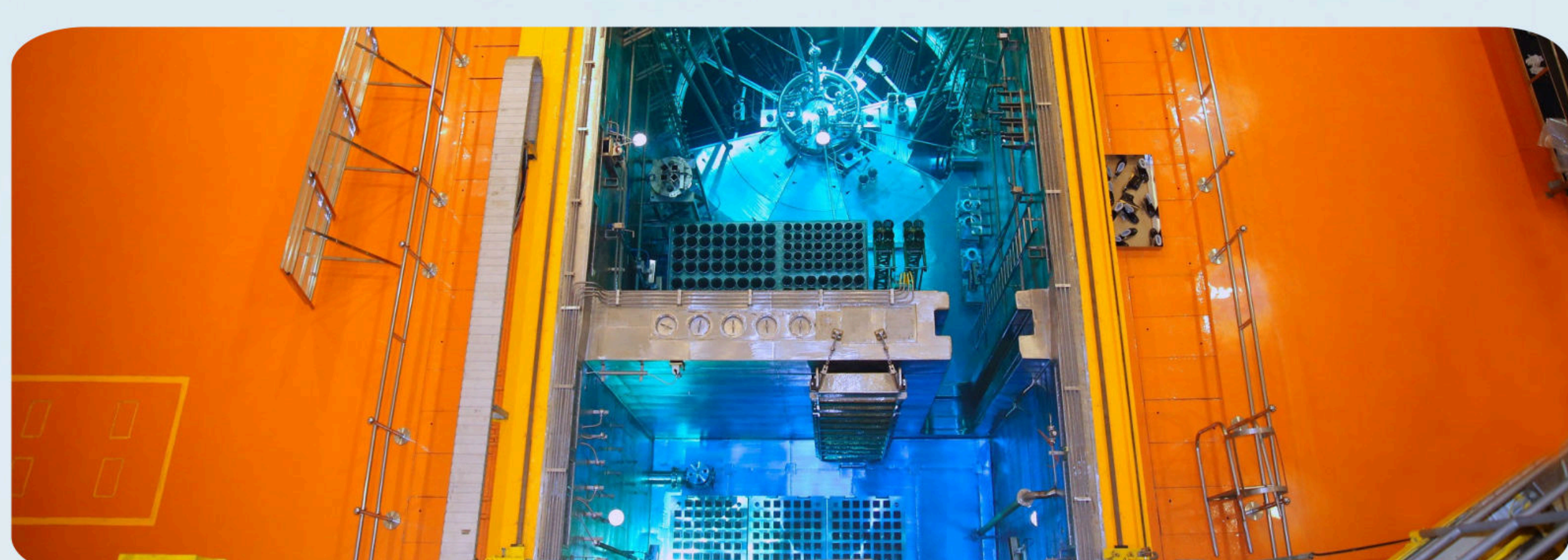
## Global Sharing of Nuclear Research Infrastructure

### 核科研基础设施全球共享 共创可持续未来

## China Institute of Atomic Energy (CIAE)

### China Advanced Research Reactor (CARR)

The China Advanced Research Reactor (CARR) is a 60 MW tank-in-pool research reactor with a peak thermal neutron flux of  $1 \times 10^{15} \text{ n} \cdot \text{cm}^{-2} \cdot \text{s}^{-1}$ . It provides nine horizontal and 26 vertical experimental channels for fuel and material irradiation, neutron scattering and imaging, activation analysis, nuclear instrument testing and radioisotope research.



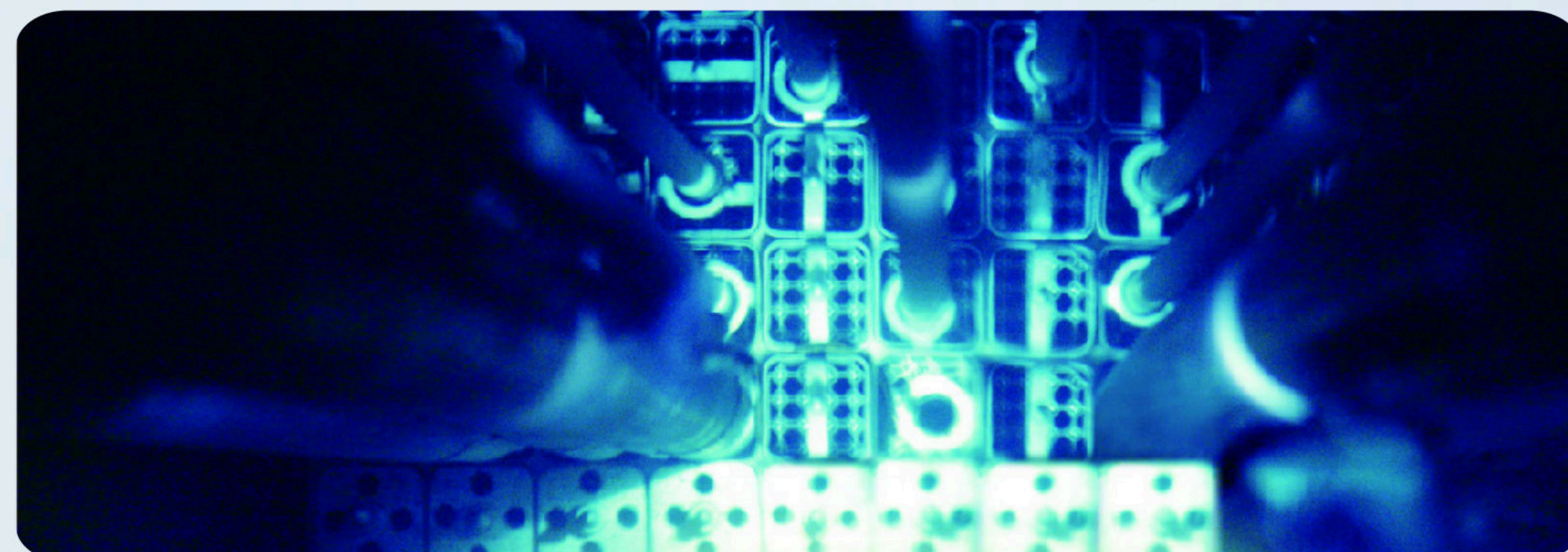
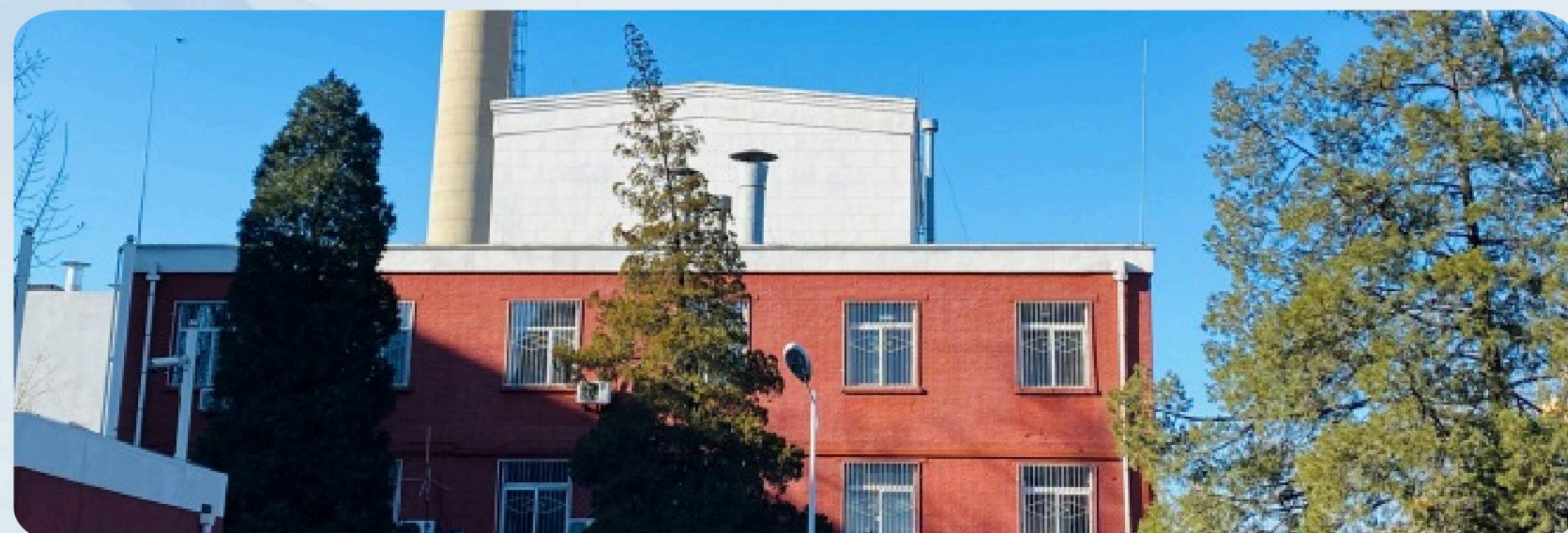
### Miniature Neutron Source Reactor (MNSR)

The Miniature Neutron Source Reactor uses low-enriched uranium fuel and operates at 30 kW thermal power. It has a beryllium reflector, light-water coolant and moderator, and a core life of more than 20 years. The facility supports neutron activation analysis, education and training, instrument and detector testing, neutron imaging and research related to boron neutron capture therapy.



### 49-2 Swimming Pool Reactor (49-2 SPR)

The 49-2 Swimming Pool Reactor operates at 3.5 MW with a peak thermal neutron flux of  $5.2 \times 10^{13} \text{ n} \cdot \text{cm}^{-2} \cdot \text{s}^{-1}$ . Its broad neutron and gamma fields, straightforward operation and diverse irradiation channels support fuel and material irradiation, nuclear instrument testing, isotope irradiation, low-temperature heating studies and personnel training.



## Tsinghua University

### Tsinghua High Flux Reactor (THFR)

The Tsinghua High Flux Reactor (THFR) is a major national research infrastructure project in Rongcheng, Shandong. Its water-cooled reactor is designed to provide average thermal and fast neutron fluxes of  $2 \times 10^{15} \text{ n} \cdot \text{cm}^{-2} \cdot \text{s}^{-1}$  at irradiation positions. The facility will support advanced nuclear fuel and material testing, radioisotope production and neutron science, including the production of high-specific-activity radionuclides.



## Institute of Modern Physics, Chinese Academy of Sciences

### China Initiative Accelerator Driven System (CiADS)

CiADS integrates a superconducting linear accelerator, a high-power spallation target and a lead-bismuth-cooled fast-neutron subcritical reactor. Its accelerator is designed to deliver a 500 MeV, 2.5 MW proton beam to generate spallation neutrons that drive the reactor. The facility will investigate the transmutation of long-lived radionuclides and provide experimental support for advanced nuclear energy systems and a closed nuclear fuel cycle.



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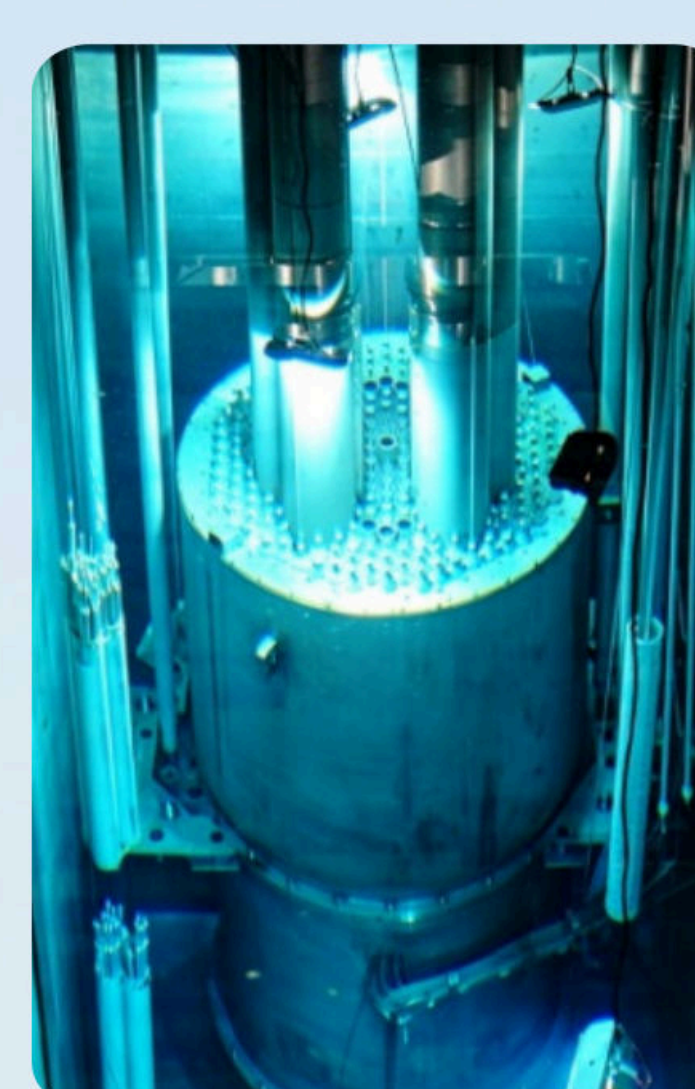
## Global Sharing of Nuclear Research Infrastructure

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## Nuclear Power Institute of China (NPIC)

### Minjiang Test Reactor (MJTR)

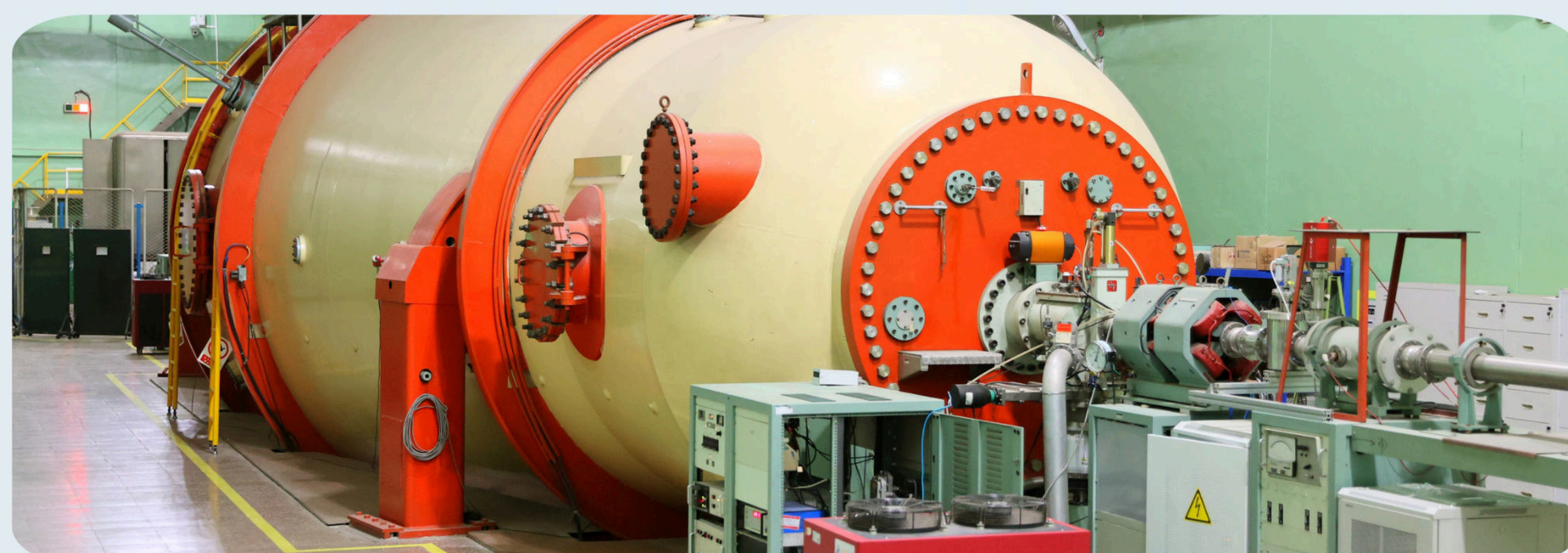
Completed in 1992, the Minjiang Test Reactor is a 5 MW pool-type research reactor with flexible start-up and shutdown and a high level of safety. Its irradiation and experimental positions support fuel testing, shielding studies, isotope production, neutron-transmutation doping of single-crystal silicon and instrument performance testing.



## China Institute of Atomic Energy (CIAE)

### Beijing Radioactive Ion-beam Facility (BRIF)

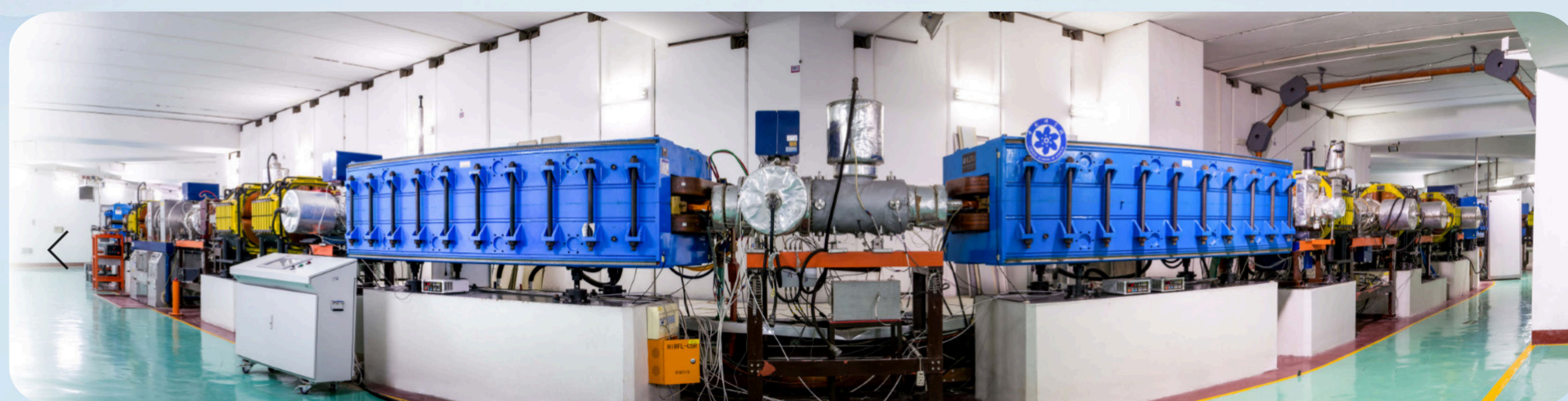
BRIF is an isotope-separation-on-line radioactive ion beam facility at the China Institute of Atomic Energy. Its accelerator systems include a 100 MeV proton cyclotron, the HI-13 tandem accelerator and a superconducting linear accelerator. The facility can provide more than 50 radioactive ion beams, with intensities from  $10^2$  to  $10^{10}$  particles per second, supporting fundamental and applied nuclear physics, nuclear data measurements and international collaboration.



## Institute of Modern Physics, Chinese Academy of Sciences

### Heavy Ion Research Facility in Lanzhou (HIRFL)

HIRFL accelerates ions from hydrogen to uranium for nuclear physics, atomic physics, heavy-ion applications and interdisciplinary research. Its accelerator complex comprises electron cyclotron resonance ion sources, the Sector Focusing Cyclotron, the Separated Sector Cyclotron, the Radioactive Ion Beam Line in Lanzhou and the Cooler Storage Ring, together with experimental instruments. The facility serves domestic and international scientific users.



## Institute of Modern Physics, Chinese Academy of Sciences

### High Intensity Heavy-ion Accelerator Facility (HIAF)

HIAF provides high-intensity heavy-ion beams across a broad range of energies for nuclear science research. Its capabilities support the discovery of new nuclides, studies of the structure and reaction mechanisms of weakly bound nuclei, and precision mass measurements of short-lived nuclei far from stability. The facility combines advanced heavy-ion acceleration with high-precision nuclear mass spectrometry.



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## Global Sharing of Nuclear Research Infrastructure

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## Institute of Modern Physics, Chinese Academy of Sciences

### Accelerator-based Isotope Production System for Advanced Medical Equipment (IP-SAFE)

IP-SAFE is designed for large-scale production of scarce medical alpha-emitting radioisotopes, particularly actinium-225 and radium-223. Its core component is a high-intensity superconducting linear accelerator. Initial beam commissioning was completed on 18 August 2026, establishing basic production capability and providing a platform for the development of accelerator-based medical isotope production.



### Heavy Ion Medical Machine (HIMM)

HIMM is a heavy-ion therapy system that uses a cyclotron as the injector for a synchrotron. The system comprises an ion source, accelerator and beam transport systems, and treatment terminals. Carbon ions are pre-accelerated to approximately 6.2 MeV per nucleon before acceleration to therapeutic energies of 120–400 MeV per nucleon. The treatment terminals deliver carbon-ion beams with an effective range of up to 270 mm in human tissue.



## East China University of Technology (ECUT)

### East China Accelerator Neutron Source (ECANS)

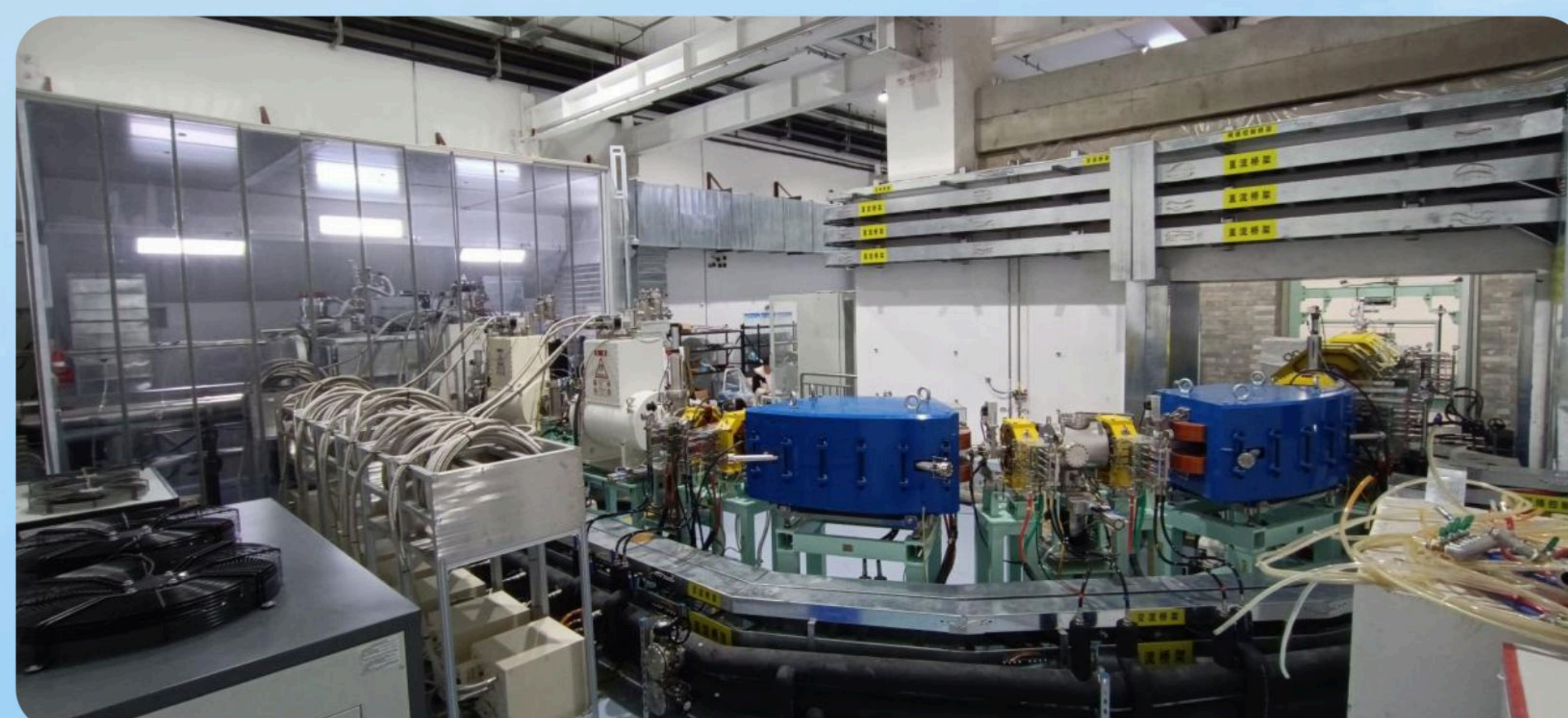
ECANS comprises a linear electron accelerator, an accelerator-driven white neutron source and auxiliary systems. It is designed to host seven experimental platforms for isotope production, nuclear data measurement, electron source characterization, material analysis, irradiation and radiation imaging. The facility supports scientific experiments and irradiation applications, with long-pulse and short-pulse options for research and a design power of 70 kW.



## Beijing Laser Acceleration Innovation Center (BLAIC)

### Compact LAser Plasma Accelerator-II (CLAPA-II)

CLAPA-II is a petawatt laser-driven proton accelerator developed under the leadership of Peking University at the Beijing Laser Acceleration Innovation Center. It accelerates protons through interactions between ultra-intense laser pulses and target materials, supporting compact high-gradient acceleration, next-generation proton radiotherapy systems and interdisciplinary research.



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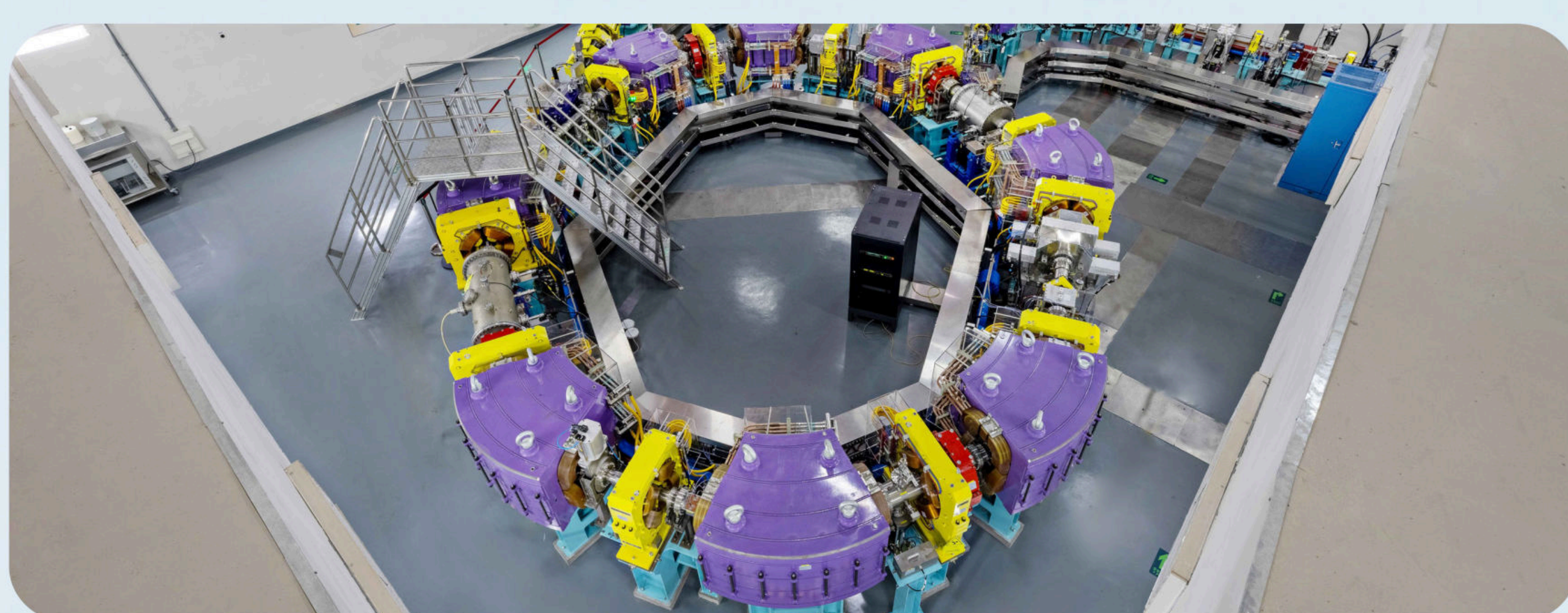
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## Shanghai ATRACTON Particle Equipment Co., Ltd.

### Prolancet Synchrotron-based Proton Accelerator Facility

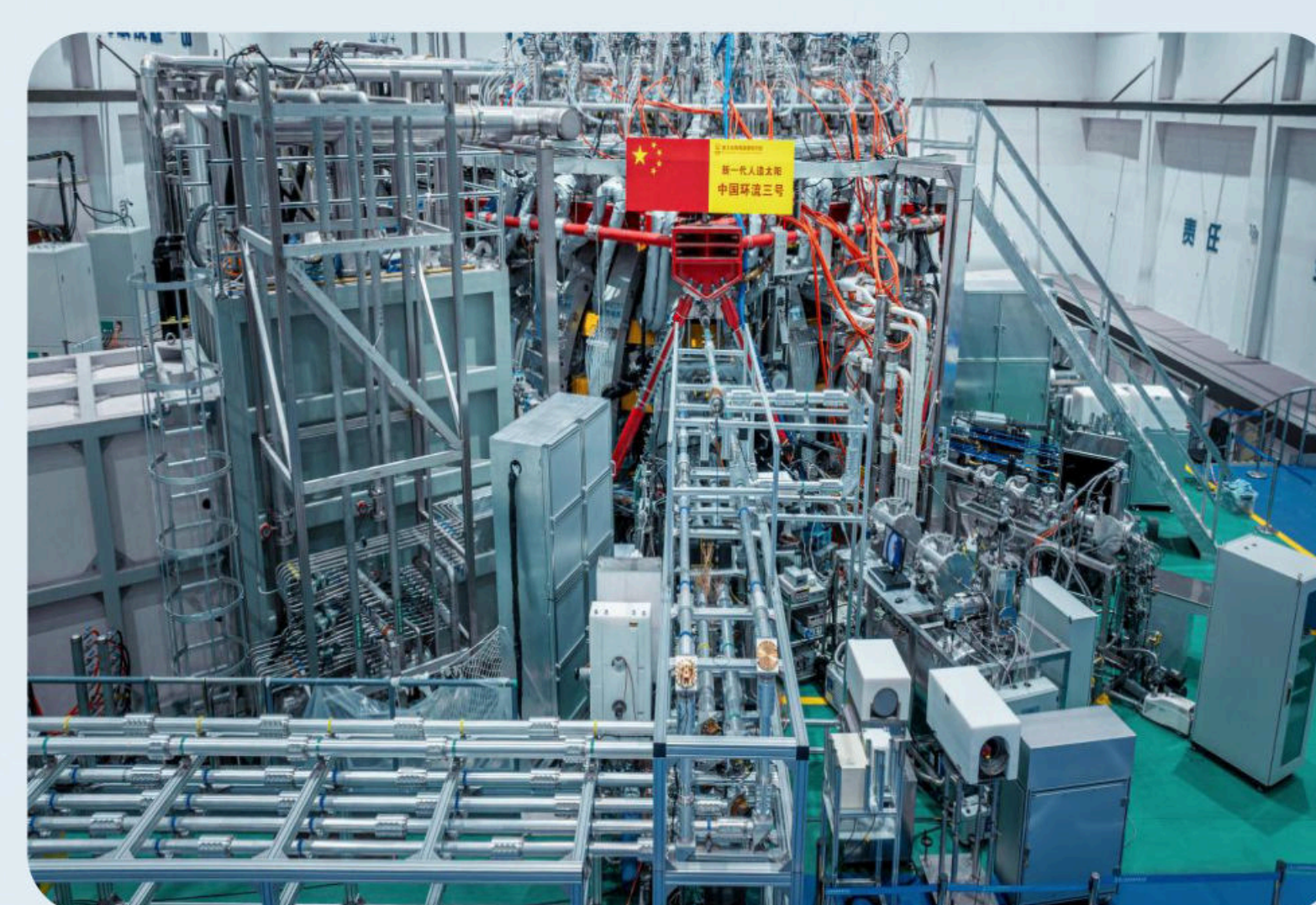
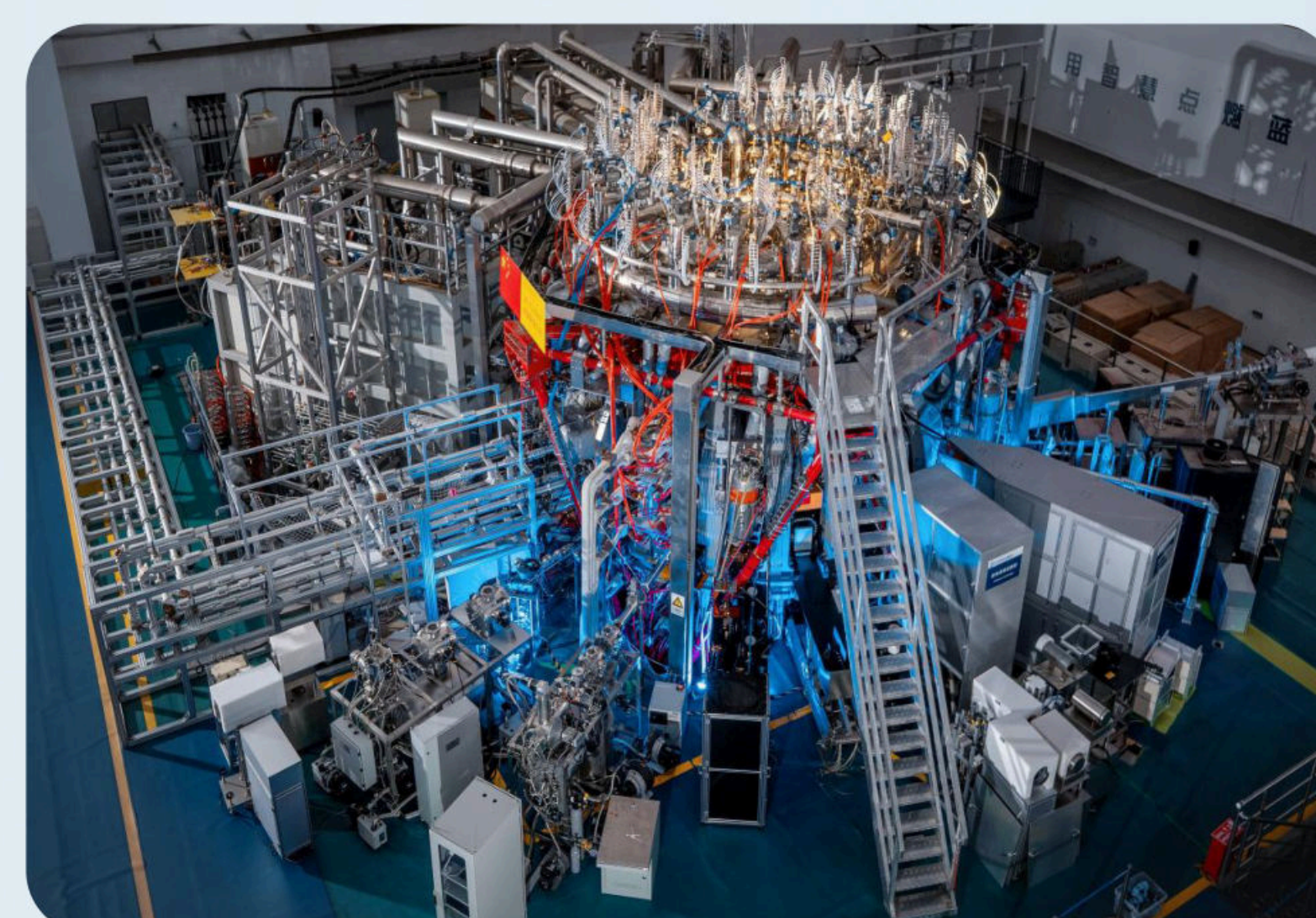
The Prolancet proton accelerator facility supports product development and scientific collaboration. Its energy range is 70.6–250 MeV, with beam intensity spanning ultra-low levels, conventional therapeutic levels and FLASH research above tens of nA. It supports pencil beam scanning and includes X-ray image guidance.



## Southwestern Institute of Physics (SWIP)

### HL-3 Tokamak

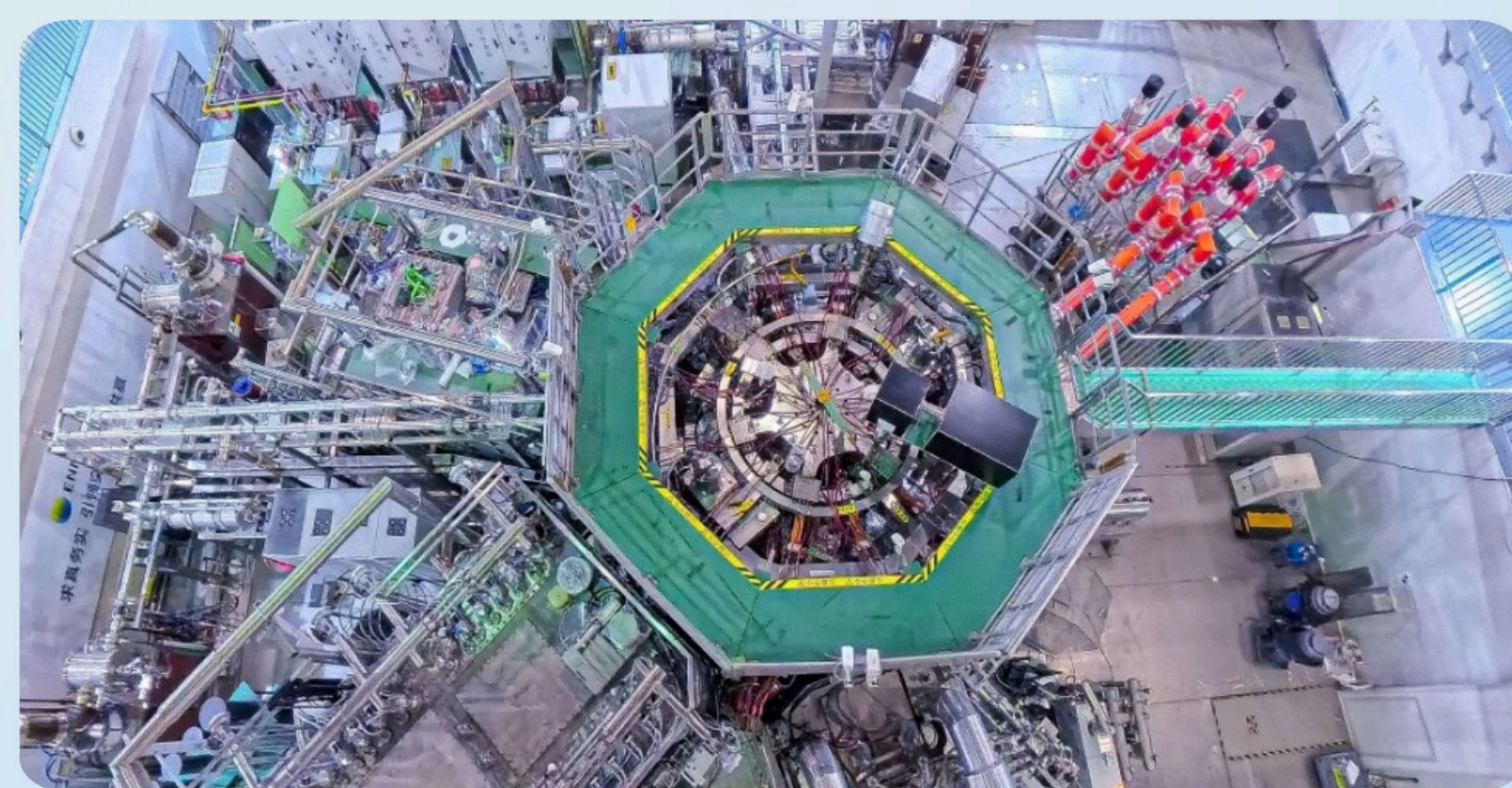
The new-generation "artificial sun" - HL-3 tokamak, is China's self-developed, largest-scale and highest-parameter fusion reactor domestically, it features plasma volume doubling that of other China's fusion devices while achieving core ion temperatures of 150 million degrees and plasma currents up to 3 MA, being China's only large tokamak device equipped with core-level plasma operation capabilities, and serving as the ITER Organization's first satellite device in China. In May 2025, HL-3 tokamak achieved a fusion triple product exceeding  $10^{20} \text{ m}^{-3} \cdot \text{s} \cdot \text{keV}$ . HL-3 tokamak is currently undergoing upgrades, with plans to conduct China's first burning plasma experiment by 2027.



## Beijing ENN Fusion Energy Science and Technology Co., Ltd.

### EXL-50U

EXL-50U is a spherical-torus facility for proton-boron fusion research. Since experimental operations began in January 2024, it has demonstrated mega-ampere-class proton-boron plasma discharges, electron temperatures of 120 million °C and ion temperatures of 60 million °C. Its reported capabilities include a central magnetic field of 1.2 T sustained for seconds and 7 MW of heating power. It supports joint experiments, data sharing, collaborative analysis and facility testing.



## China Institute of Atomic Energy (CIAE)

### Jinping Underground Nuclear Astrophysics (JUNA)

JUNA is a deep-underground accelerator facility dedicated to direct measurements of key nuclear reactions in astrophysical environments. Located at the China Jinping Underground Laboratory, it combines a very low cosmic-ray background with intense proton and helium ion beams. The facility supports studies of stellar burning, nucleosynthesis, novae and supernovae, as well as detector development and international collaboration in experimental nuclear astrophysics.



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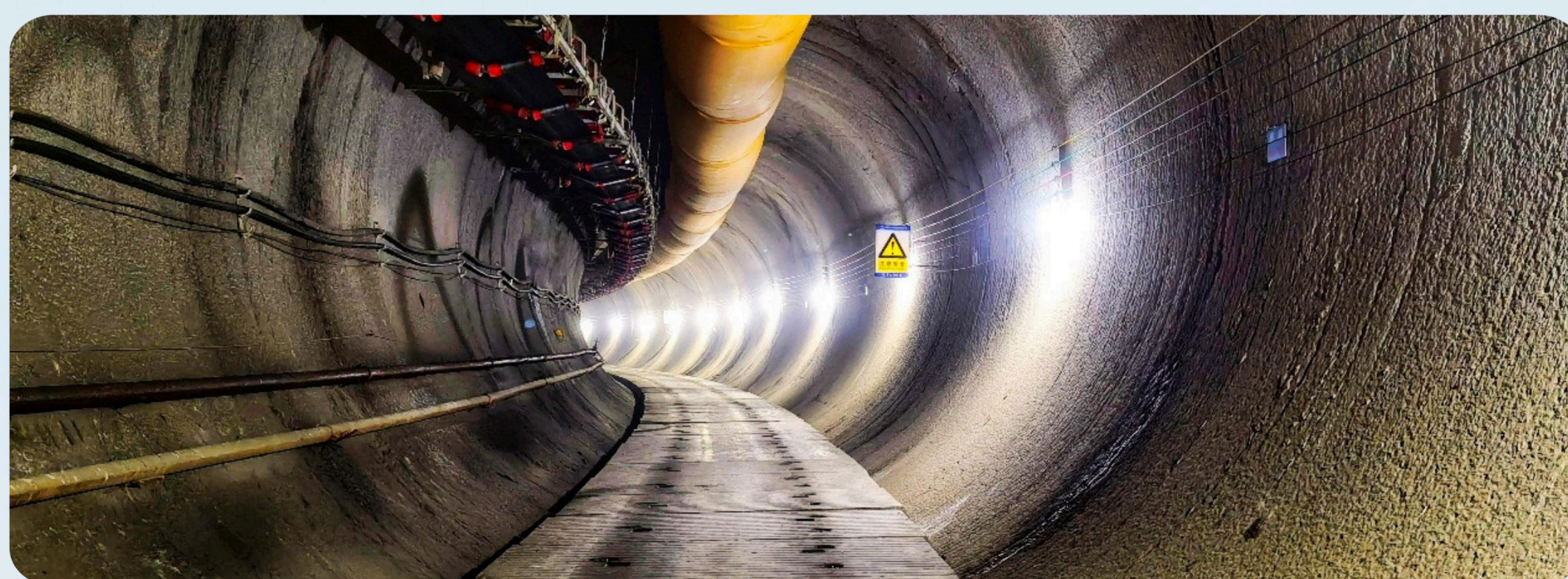
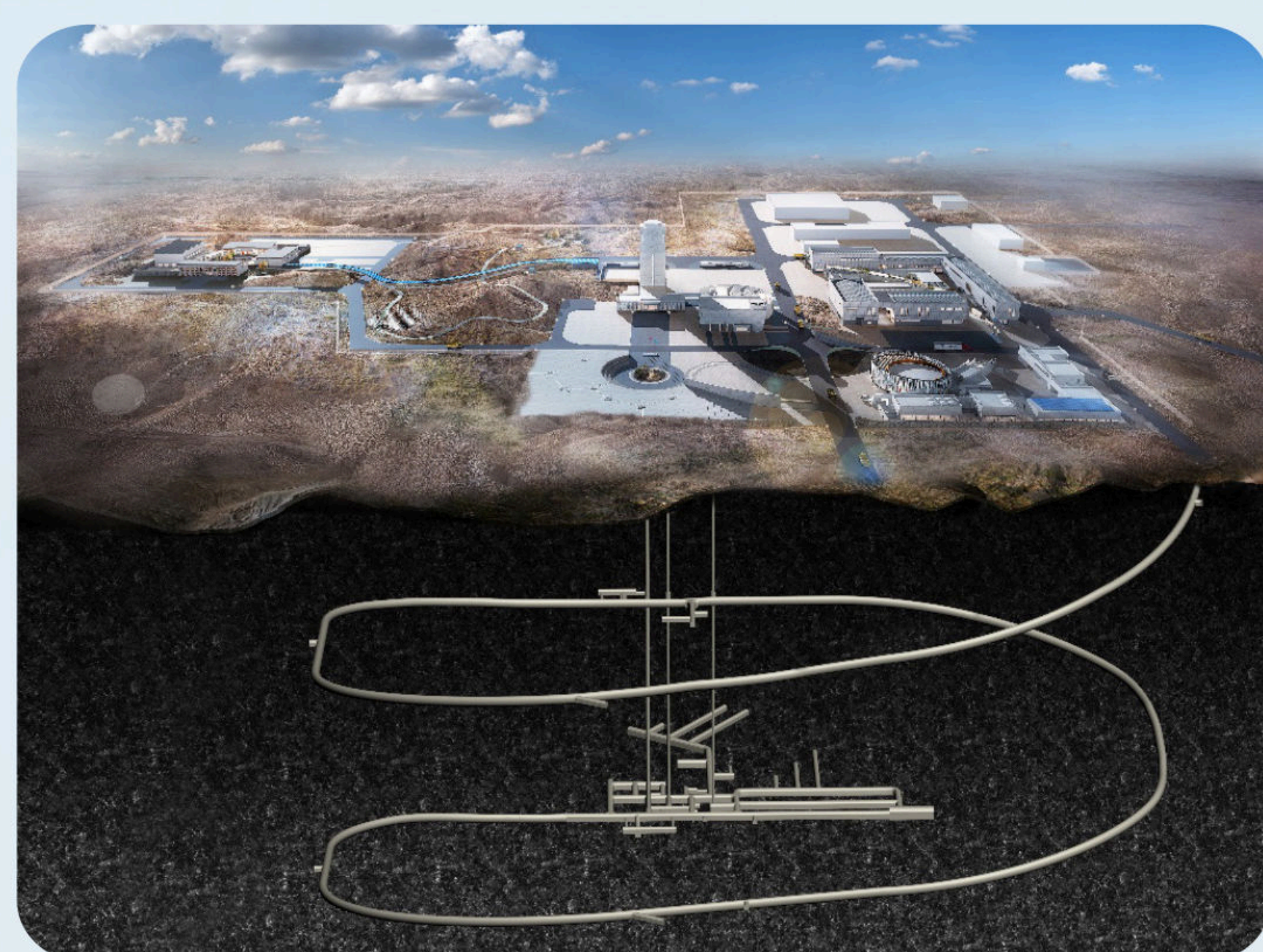
## Global Sharing of Nuclear Research Infrastructure

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## Beijing Research Institute of Uranium Geology

### Beishan Underground Research Laboratory (Beishan URL)

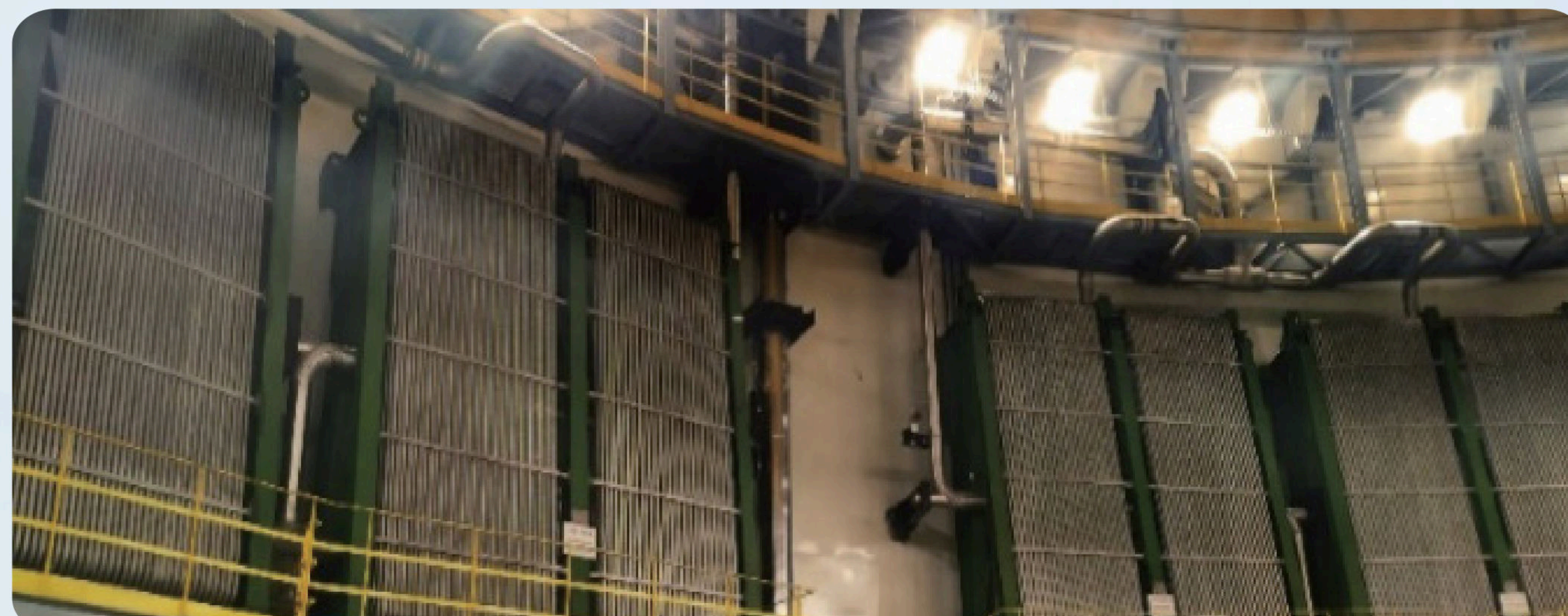
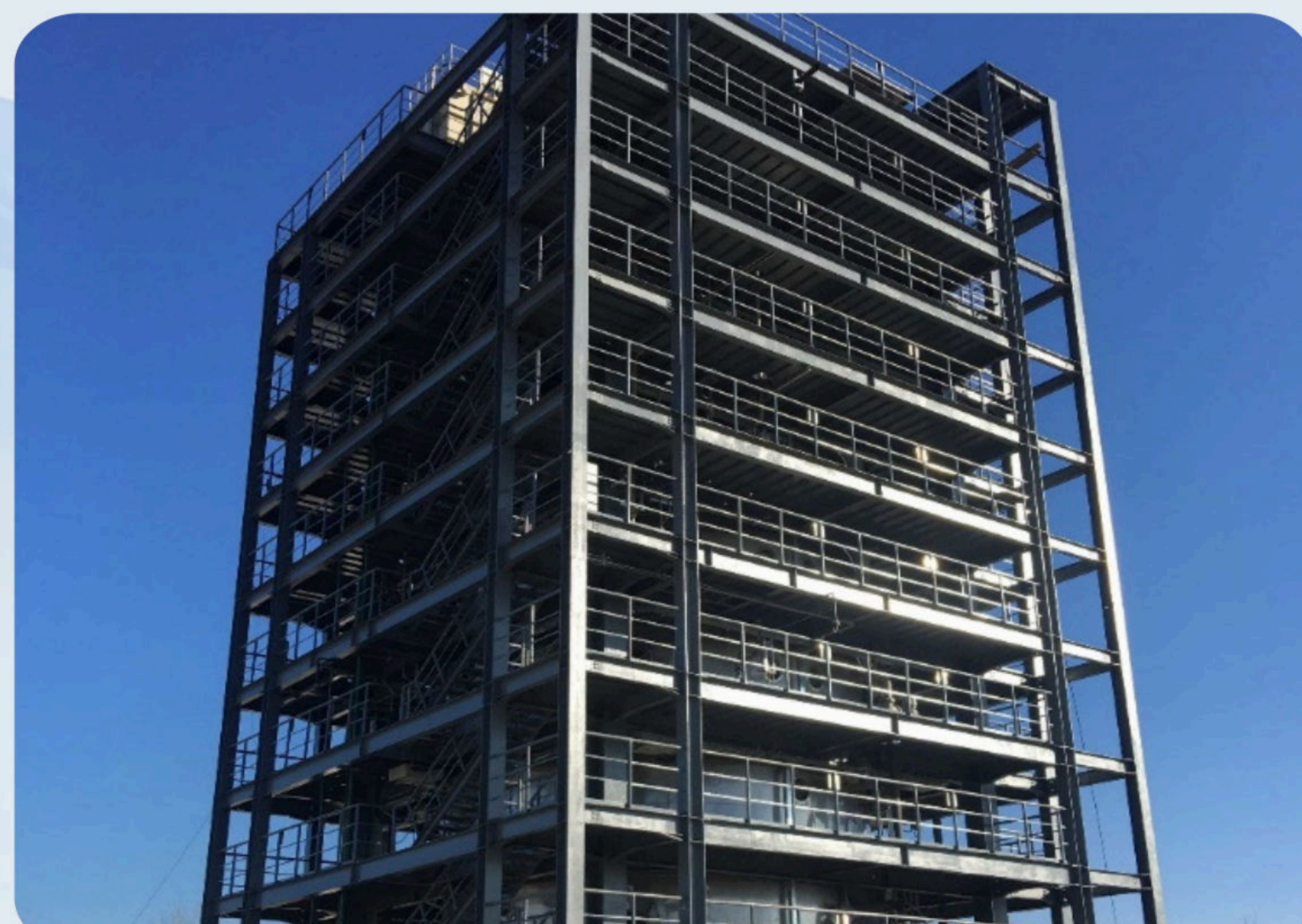
Beishan URL is an underground research facility supporting the development of China's high-level radioactive waste repository. Located in the Gobi Desert of Gansu Province, its design features three shafts, one ramp and two experimental levels, with a maximum depth of 560 m. The facility provides a platform for research and international cooperation on the safe geological disposal of high-level radioactive waste.



## China Nuclear Power Engineering Co., Ltd. (CNPE)

### Platform for Integral Thermal-hydraulic Behaviour of Containment (PANGU)

Built in 2017, PANGU investigates containment thermal-hydraulic behaviour and verifies passive cooling systems. The facility has a free internal volume of 1,000 m<sup>3</sup>, a height of 19.8 m and a diameter of 8.5 m. Research includes passive heat removal, non-condensable gases and thermal stratification. It supports experimental studies, system development and validation, joint projects and technical training.



### Containment Mockup for Performance Test (XUANWU)

XUANWU combines a prestressed reinforced-concrete containment mockup, a coupled temperature-pressure loading system and intelligent monitoring. The 25 m-high facility represents a typical PWR containment at a scale of 1:3.2. It can simulate severe-accident loading up to 1.6 MPa and 160 °C, with more than 1,400 measurement points supporting structural performance, load-bearing capacity, monitoring technology and ageing management research.



## Harbin Engineering University (HEU)

### Full-scope Simulation Platform for a PWR Nuclear Power Plant

Developed for a 300 MWe pressurized water reactor plant, this platform integrates full-scope models of reactor physics, thermal hydraulics, coolant systems, electrical systems, auxiliary systems and engineered safety features. It simulates normal operation, start-up, shutdown, power regulation and design-basis accidents. Detailed three-dimensional equipment models provide high-fidelity visualization for teaching, operator training and research on nuclear power plant operational safety.

