INRIO | International Nuclear Research Infrastructure Organization

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中国国家原子能机构 China Atomic Energy Authority

中国核学会 Chinese Nuclear Society

70 GENERAL CONFERENCE

INRIO | International Nuclear Research Infrastructure Organization

Open-Access Nuclear Research Infrastructure Handbook

国际核科研基础设施开放共享手册

IAEA 70th General Conference Side Event

14 September 2026 · Vienna International Centre, CR3

International Cooperation Initiative on Nuclear Research Infrastructure

To be launched in Vienna on 14 September 2026, the Initiative calls on research institutions, universities and enterprises around the world to advance global research collaboration through facility sharing. Its main commitments:

1. Commit to peaceful uses

Joint research through shared facilities supporting clean energy, human health and ecological protection, in service of the UN Sustainable Development Goals.

2. Promote open sharing of facilities

Encouraging institutions holding major nuclear research infrastructure to open their facilities and provide joint experiment channels for researchers from all countries.

3. Enhance talent exchange and cultivation

Researcher exchanges, joint practical training and international training programmes, helping developing countries build nuclear talent.

4. Improve collaborative mechanisms

On the basis of compliance, safety, security, non-proliferation and IP protection, promote interoperability of technical standards and explore mutual sharing of research data.

INRIO

International Nuclear Research Infrastructure Organization

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About INRIO

An international, non-profit membership organization for the open sharing of nuclear research infrastructure—initiated by the Chinese Nuclear Society, open to the world.

Background

Nuclear research infrastructure is a strategic resource for nuclear innovation, the peaceful use of nuclear technology, and the achievement of the UN Sustainable Development Goals. Yet research resources remain unevenly distributed: many countries still lack access to large experimental platforms, and duplicated investment slows progress for everyone.

In September 2024, at the 68th IAEA General Conference, China announced that 12 of its major nuclear research facilities would be open to users worldwide—from research reactors and rare-isotope beams to a deep geological disposal laboratory. Building on this foundation, the Chinese Nuclear Society joined with research institutions, universities, academic societies and enterprises to initiate the International Nuclear Research Infrastructure Organization (INRIO).

Mission and scope

As defined in its draft Statute, INRIO promotes international academic exchange and cooperation in nuclear research infrastructure, advances open access and shared use of large-scale facilities, and supports innovation and human-resource development worldwide. The Organization performs no regulatory functions.

- Joint research and user programmes—facility user programmes, cross-facility experiments, exchange of results and capacity building among members.
- Academic exchange—international conferences, seminars, summer schools, young-scientist exchanges and expert visits.
- International standards—developing international standards through multilateral cooperation, promoting their application, and sharing expertise and good practices in facility design, operation, management and user services.
- Advisory and training—non-regulatory advisory, training and capacity-building services for institutions planning or operating research infrastructure.
- Data and integrity—exchange and institutional studies on research data management, intellectual property, research integrity and radiation protection.
- Publications and platform—journals, reports and popular-science materials; an international expert roster and a needs-matching cooperation platform.

Membership

Membership is voluntary and open to research institutions, universities, academic societies, NGOs, corporate research institutes and individual experts worldwide. As a general rule, foreign members account for no less than one third of the total. Three participation categories are defined:

I.Institutional members—operators of research reactors, neutron sources, accelerators, underground laboratories, irradiation and thermal-hydraulic platforms, plus universities, societies and companies in the field.

II.Individual members—experts, scholars, engineers and young researchers participating in expert rosters, working groups, training and exchange activities.

III.Observers—international and regional organizations, projects under construction and enterprises engaged by invitation in meetings, training and selected projects.

Side Event

Atoms for SDGs: Global Sharing of Nuclear Research Infrastructure

Date & time: Monday, 14 September 2026, 11:00–12:30 (Vienna local time, CEST)
Venue: CR3 Meeting Room, Vienna International Centre, Wagramer Str. 5, 1400 Vienna, Austria
With the support of: China Atomic Energy Authority (CAEA)
Hosted by: Chinese Nuclear Society (CNS)
On site: Simultaneous interpretation · refreshments · commemorative gifts

Atoms for SDGs: Global Sharing of Nuclear Research Infrastructure

Time	Agenda	Chair/Speaker
11:00-11:05	Opening and introduction of participants	Prof. Li Jinying, Director General, Institute of Applied Technology, Chinese Nuclear Society
11:05-11:20	Opening remarks	Invited representatives
11:20-11:31	China Advanced Research Reactor (CARR) Miniature Neutron Source Reactor (MNSR) Swimming Pool Reactor (49-2 SPR) Beijing Rare Isotope-beam Facility (BRIF) Jinping Underground Nuclear Astrophysics Experiment (JUNA)	Prof. Chen Dongfeng, CNNC Chief Scientist
11:31-11:39	Tsinghua High Flux Reactor (THFR)	Mr. Li Jian, Research Associate Professor, Institute of Nuclear and New Energy Technology, Tsinghua University
11:39-11:47	Platform for integral Thermal -hydraulic Behavior of Containment & Containment Mockup for Performance Test	Ms. Yu Fangxioazhi, Senior Engineer, China Nuclear Power Engineering Co., Ltd.
11:47-11:55	Nuclear Science and Technology Virtual Simulation Experimental Center	Prof. Gao Puzhen, Deputy Dean of the Department of Nuclear Science and Technology, Harbin Engineering University
11:55-12:05	Launch the Initiative on International Cooperation for Nuclear Research Infrastructure	Mr Gao Keli, Deputy Secretary-General of Chinese Nuclear Society
12:05-12:25	Discussion	Invited representatives
12:25-12:30	Closing remarks	Invited representatives

Open-Access Nuclear Research Infrastructures

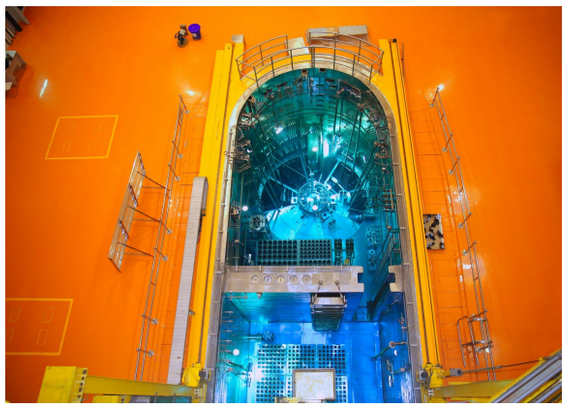
In September 2024, at the 68th IAEA General Conference, China announced that 12 major nuclear research facilities would be open to users worldwide. INRIO brings participating facilities — together with those of international partners — into one open-sharing platform. Twenty-one facilities are presented here in four categories.

Research Reactors

China Institute of Atomic Energy (CIAE)

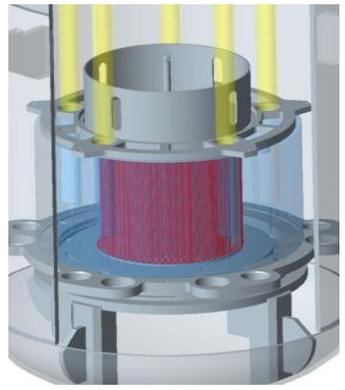
China Advanced Research Reactor (CARR)

The China Advanced Research Reactor (CARR) is a 60 MW tank-in-pool research reactor with a peak thermal neutron flux of 1×10^{15} $n\cdot cm^{-2}\cdot s^{-1}$. 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.



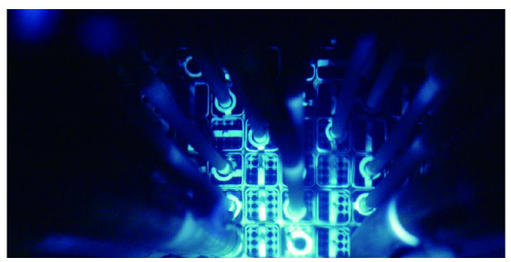
Miniature Neutron Source Reactor (MNSR)

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 5.2×10^{13} $n\cdot cm^{-2}\cdot s^{-1}$. 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 2×10^{15} $n \cdot cm^{-2} \cdot s^{-1}$ 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.

Nuclear Power Institute of China (NPIC)

Minjiang Test Reactor (MJTR)

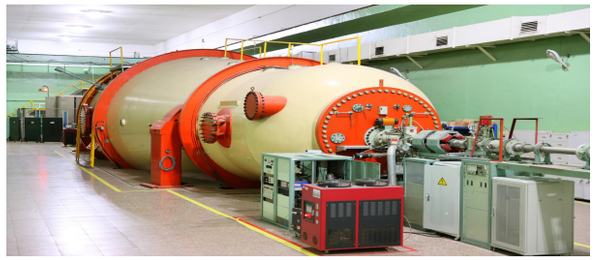
Completed in 1992, the Minjiang Test Reactor is a 5 MW pool-type research reactor with flexible start-up and shutdown and a high level of safety. Its irradiation and experimental positions support fuel testing, shielding studies, isotope production, neutron-transmutation doping of single-crystal silicon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

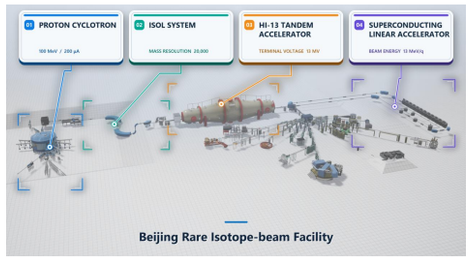
Accelerator & Neutron Source Facilities

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.

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.

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.

Shanghai APACTRON Particle Equipment Co., Ltd.

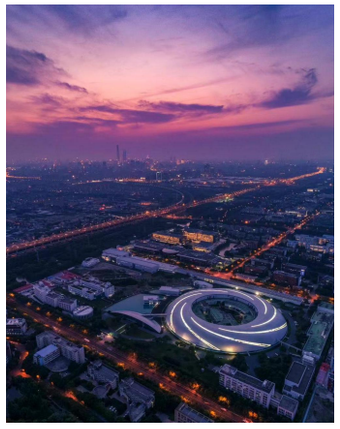
Prolancet Synchrotron-based Proton Accelerator Facility

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.

Shanghai Advanced Research Institute, Chinese Academy of Sciences (SARI, CAS)

Shanghai Synchrotron Radiation Facility (SSRF)

The Shanghai Synchrotron Radiation Facility (SSRF), operated by the Shanghai Advanced Research Institute, Chinese Academy of Sciences, is a third-generation medium-energy synchrotron light source located in Zhangjiang, Shanghai. It comprises a 150 MeV electron linear accelerator, a full-energy booster and a 3.5 GeV electron storage ring. Open to users since 2009, SSRF now provides 34 beamlines and 46 experimental stations. Its high-brightness, highly collimated and stable synchrotron radiation supports advanced research in life sciences, materials science, chemistry, condensed matter physics, energy and environmental science, as well as high-tech applications. The facility provides up to 5,000 user hours annually.

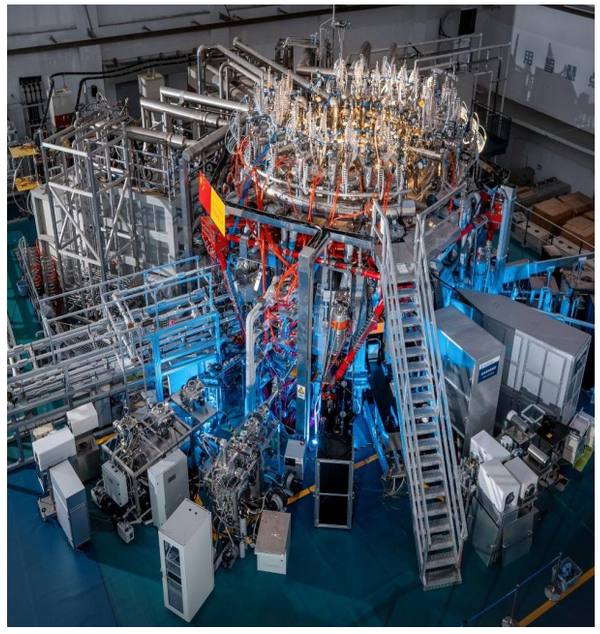


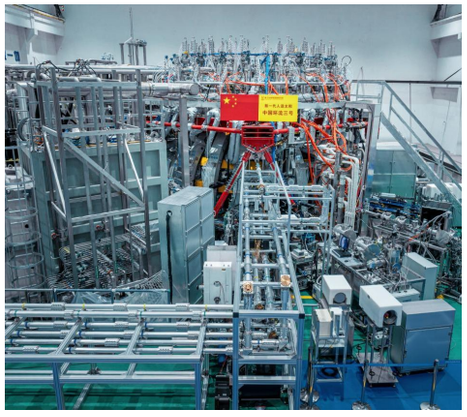
Fusion Facilities

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} m^{-3}·s·keV. HL-3 tokamak is currently undergoing upgrades, with plans to conduct China's first burning plasma experiment by 2027.

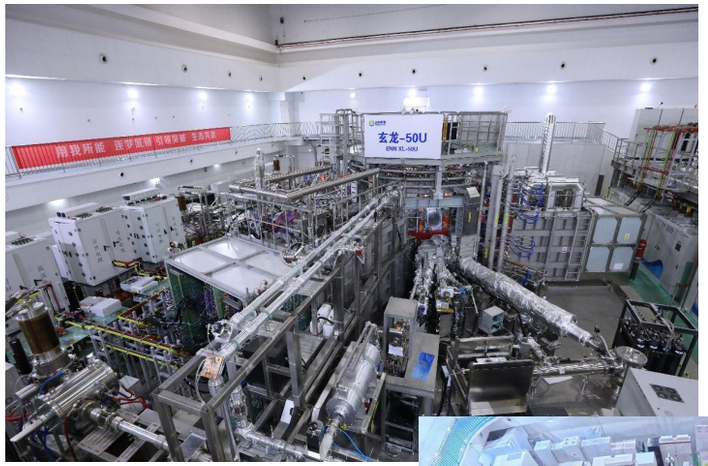


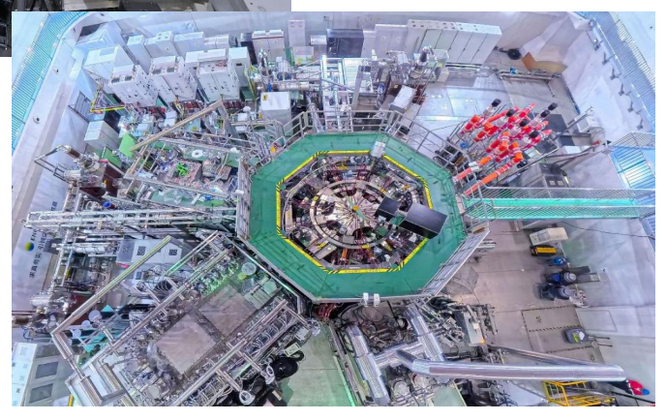


Beijing ENN Fusion Energy Science and Technology Co., Ltd.

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.





Nuclear Science and Safety Facilities

China Institute of Atomic Energy (CIAE)

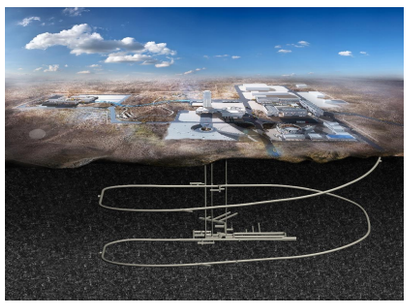
Jinping Underground Nuclear Astrophysics (JUNA)

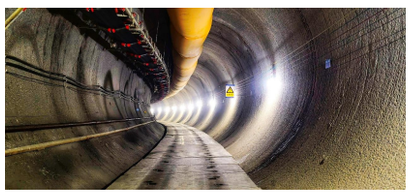
JUNA is a deep-underground accelerator facility dedicated to direct measurements of key nuclear reactions in astrophysical environments. Located at the China Jinping Underground Laboratory, it combines a very low cosmic-ray background with intense proton and helium ion beams. The facility supports studies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

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.

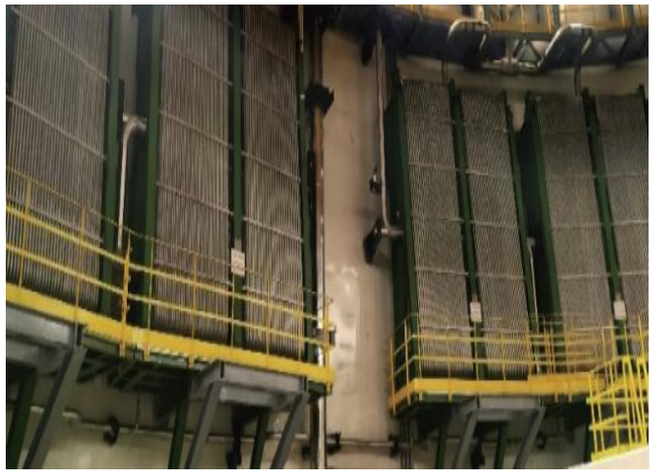




China Nuclear Power Engineering Co., Ltd. (CNPE)

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 m³, 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)

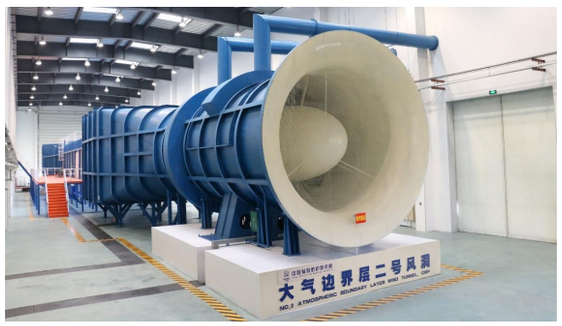
Full-scope Simulation Platform for a PWR Nuclear Power Plant

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.

China Institute for Radiation Protection

Wind Tunnel Featured Nuclear Environment Simulation Facilities

The wind tunnel featured nuclear environment simulation facilities include the atmospheric boundary layer wind tunnel, the surface water laboratory, the groundwater laboratory, the field in-situ tracer experimental platform for radionuclides, the radioactive aerosol deposition simulation laboratory, the radioactive high-illumination artificial climate laboratory, and the radioactive and non-radioactive aquatic ecology laboratories, supporting comprehensive research means and facilitates the migration simulation of radioactive substances released under normal operation and accident conditions of nuclear facilities. Simulation capability and measurement technology of the facilities are comparable to the international standard.



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Institutions interested in joining the preparatory process, or in opening their facilities through the INRIO platform, are welcome to reach out at any time.