United States and Ukraine COLLABORATION on a New Neutron Source Facility

Supported by the U.S. Department of Energy's
GLOBAL THREAT REDUCTION INITIATIVE
Russian Research Reactor Fuel Return (RRRFR) Program

The U.S. Department of Energy's (DOE) Global Threat Reduction Initiative and Ukraine Kharkov Institute of Physics and Technology are collaborating on the development and construction of a new neutron source that will open up exciting new opportunities for research in peaceful applications of nuclear technology in Ukraine.

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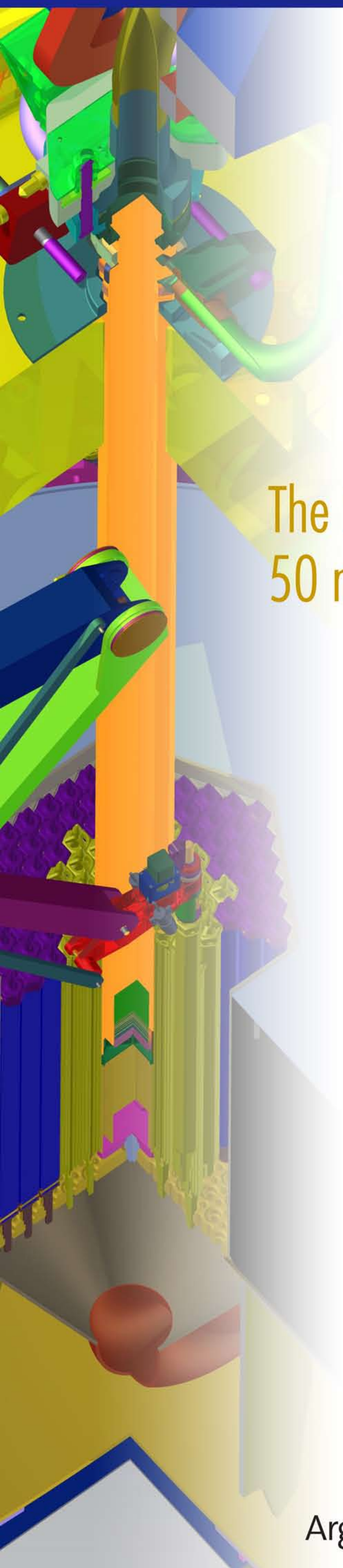
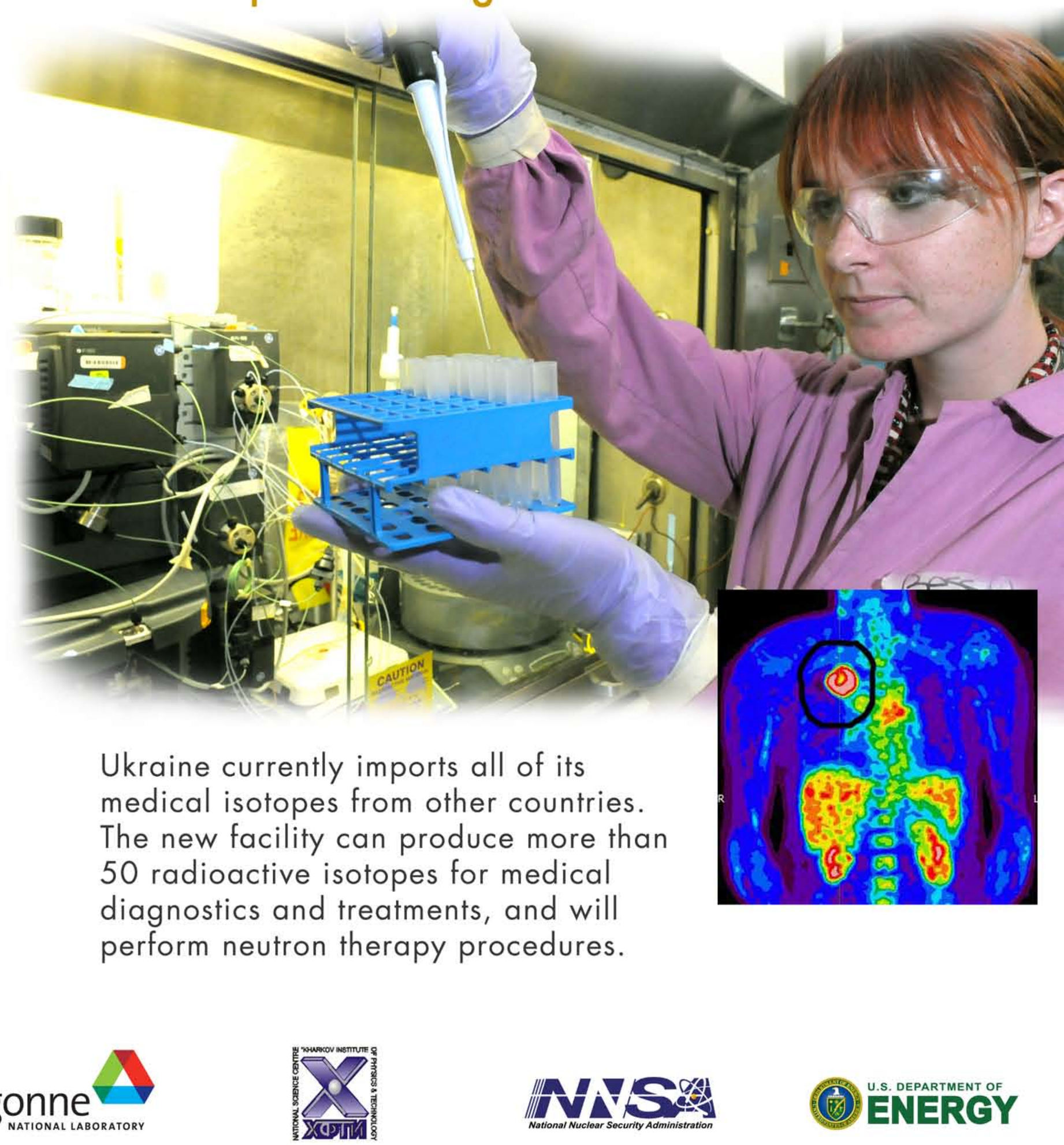


Advanced Medical Capabilities

The Neutron Source Facility will produce over 50 medical isotopes for diagnosis and treatment



Ukraine currently imports all of its medical isotopes from other countries. The new facility can produce more than 50 radioactive isotopes for medical diagnostics and treatments, and will perform neutron therapy procedures.

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Enhanced Nuclear Expertise

The Neutron Source Facility will train young nuclear specialists to support the Ukraine power industry

Education will go hand-in-hand with research as the next generation of professional scientists and engineers are inspired to learn at the Neutron Source Facility.

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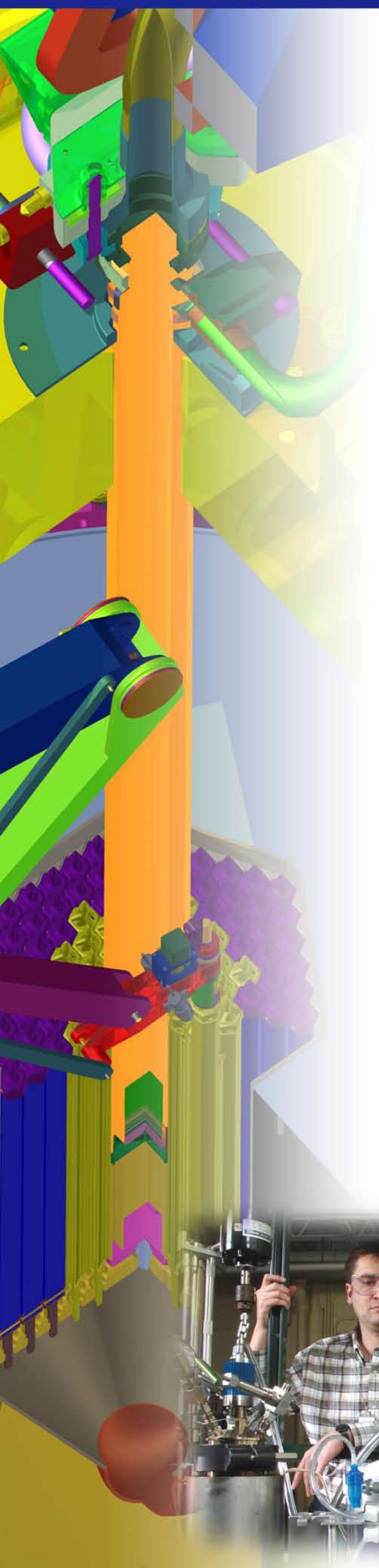

Advanced Research Capabilities

The Neutron Source Facility will create new opportunities for basic and applied research

Because of the unique features of the new facility, it will attract the best and brightest scientists and engineers from around the world to collaborate with Ukrainians, thereby enhancing the technical expertise in the nation. Researchers will perform solid-state physics and materials research inside the subcritical assembly, and neutron scattering research using the radial neutron beam ports of the facility.

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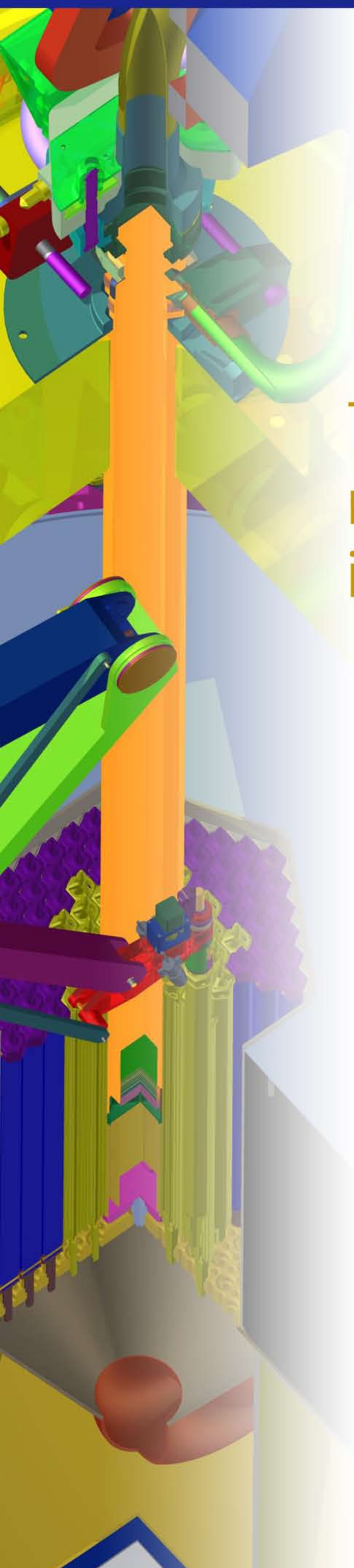

Environmentally Friendly Design

The Neutron Source Facility will be one of the most advanced and safest nuclear installations in the world

The facility design is configured to use simple and efficient procedures that maximize safety and minimize environmental impacts. The newest technologies will be implemented to ensure that operations remain smooth, clean and reliable.

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Main Facility Components

The design of the Neutron Source Facility is highly flexible, allowing for accommodation of future functions

Electron Accelerator (100 kW beam power and 100 MeV electrons)

The Neutron Source Facility consists of several components, which are integrated for steady-state operation. The facility design is optimized to maximize neutron production from the existing KIPT electron accelerator to satisfy the differing engineering design requirements. It employs an accelerator-driven subcritical assembly using low enriched uranium as the fuel material because it enhances the neutron source performance.

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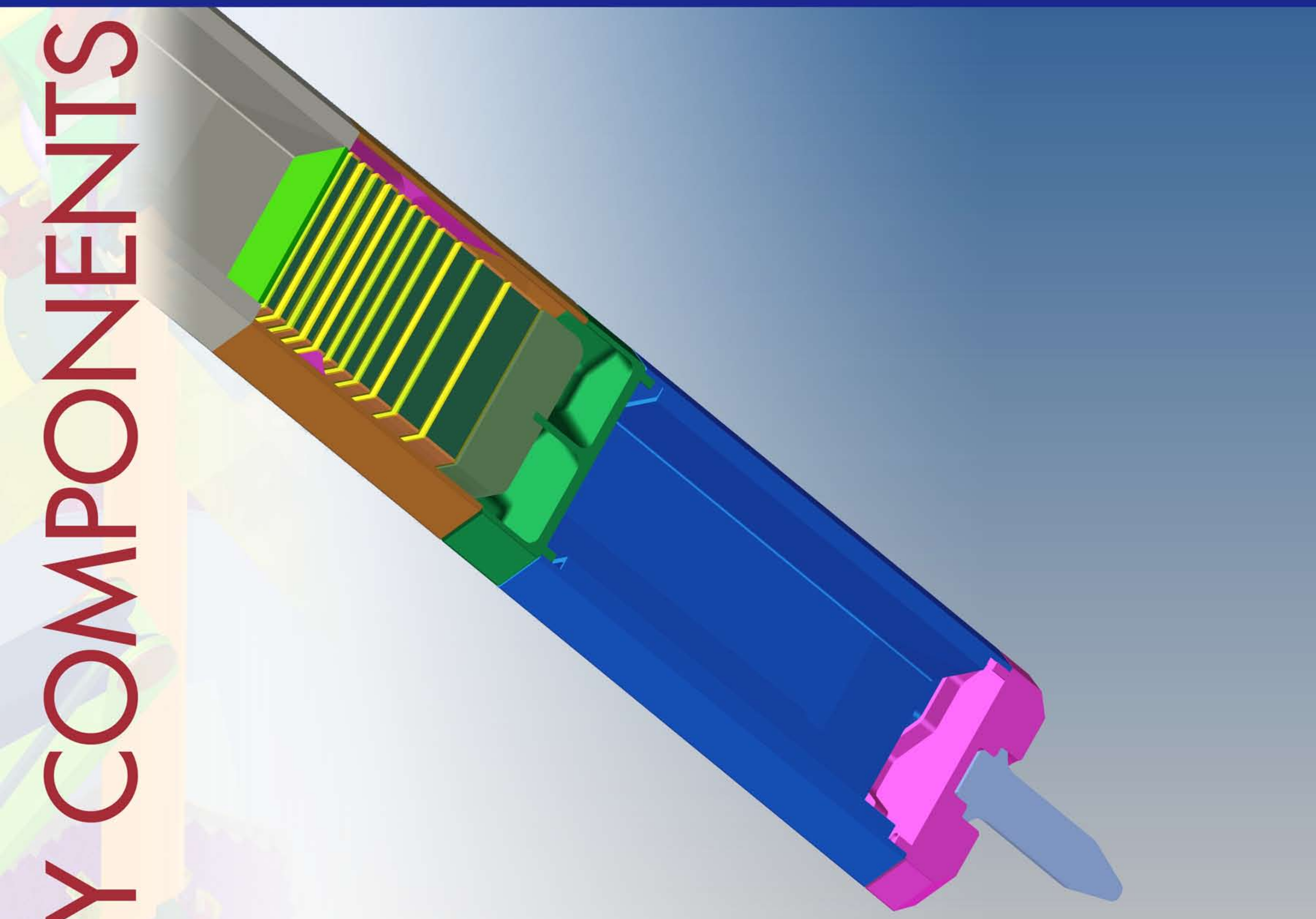
MAIN FACILITY COMPONENTS



Tungsten and Uranium Target Assemblies

The target assembly generates neutrons to operate the subcritical assembly. It uses tungsten or uranium for neutron production through photonuclear reactions with the 100-kW of electron beam power. The target design is based on research results and engineering practices in nuclear physics, heat transfer, thermal hydraulics, structure, fabrication, and material requirements. Its geometrical configuration has been designed to maximize use of neutrons in the subcritical assembly and to match the geometry of the fuel assemblies.

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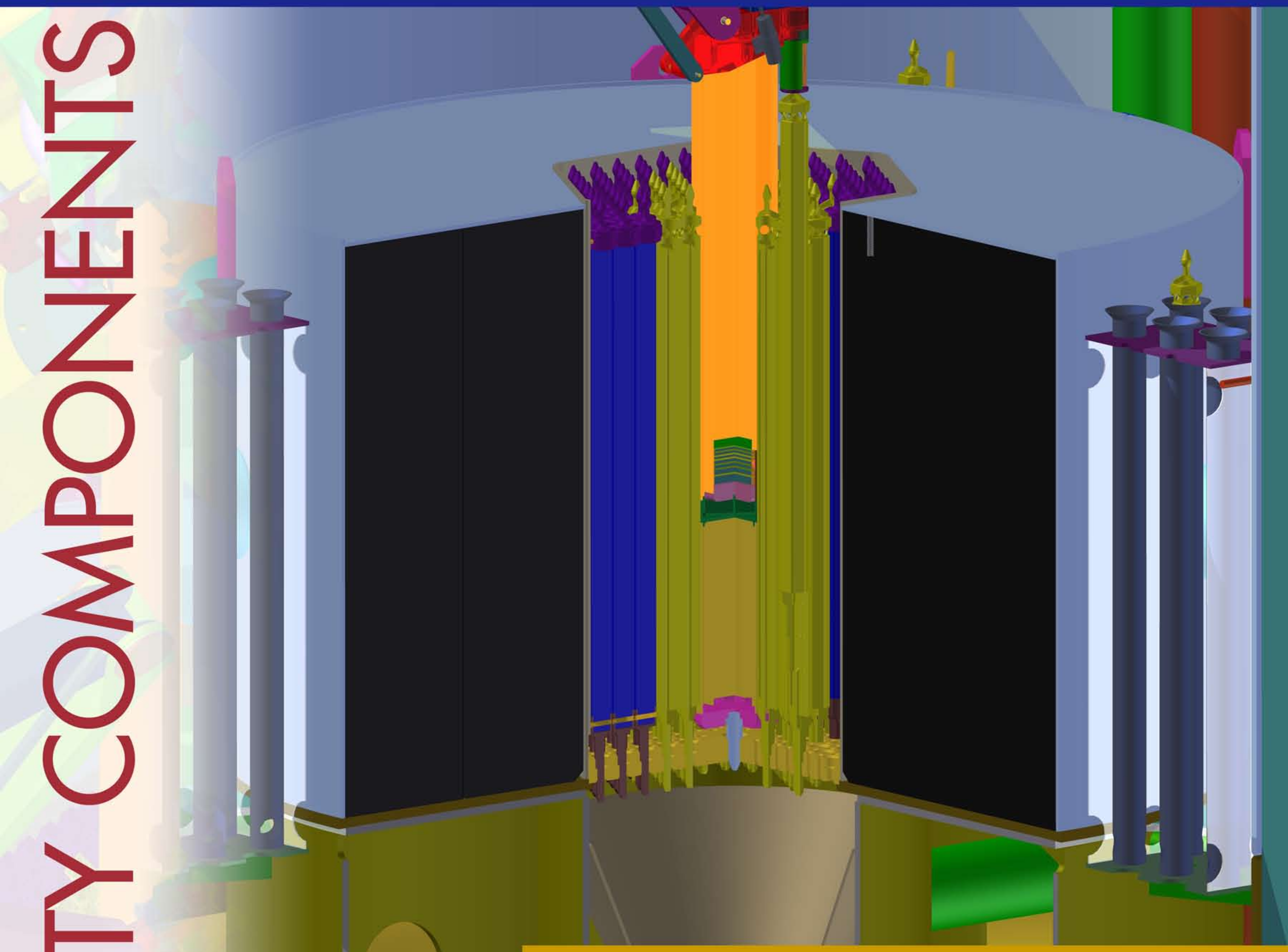
MAIN COMPONENTS OF THE NEUTRON SOURCE FACILITY



Subcritical Assembly

The subcritical assembly is designed to obtain the highest possible neutron flux intensity with a subcriticality level of less than 0.98. The assembly uses low enriched uranium fuel, a beryllium-carbon reflector and water as a coolant.

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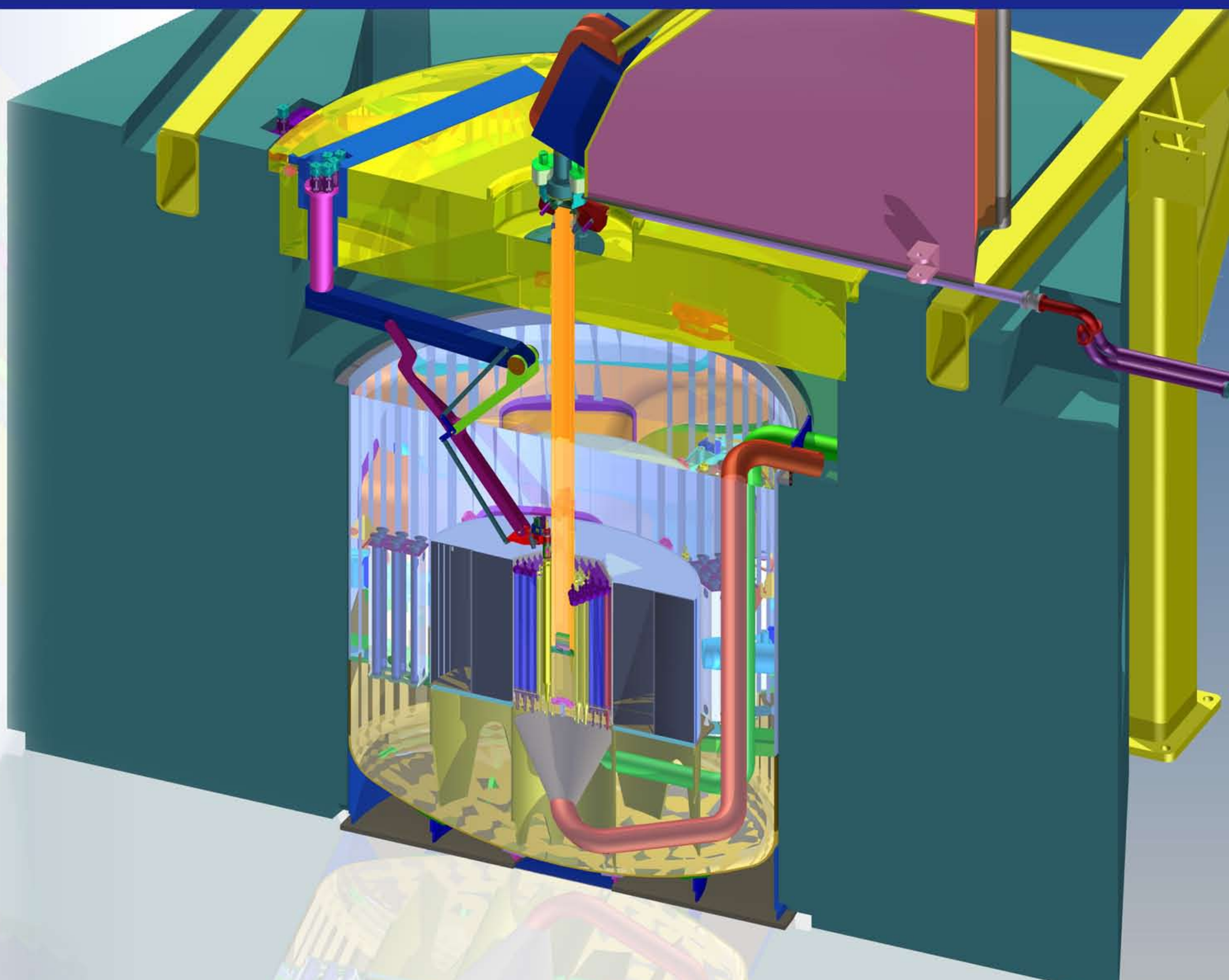

Heavy Concrete Biological Shield

Biological shield permits safe personnel access around the subcritical assembly during operation. The shield has been designed to protect workers from exceeding the allowable international exposure limit for radiation.

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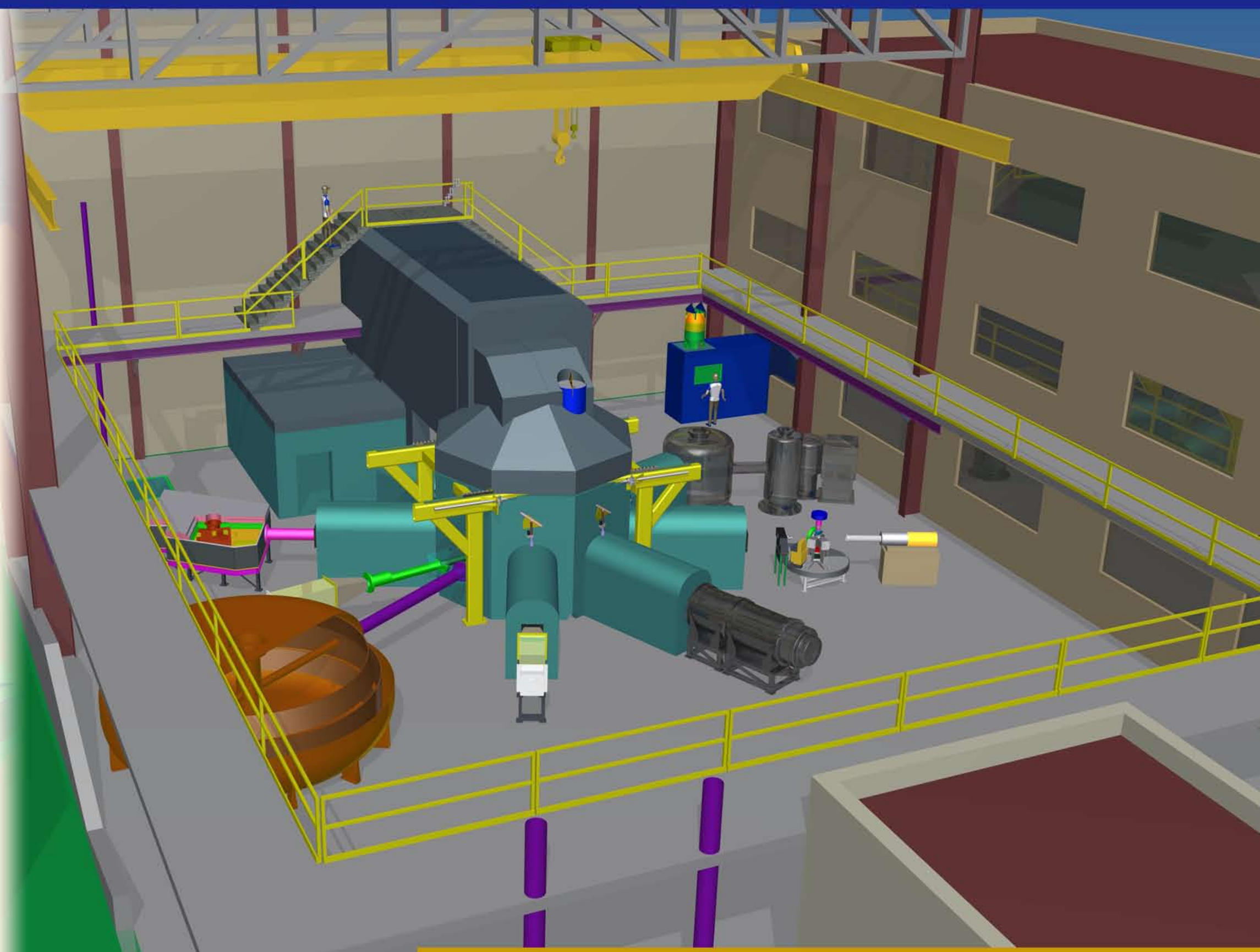

Auxiliary Equipment

Auxiliary equipment in the facility includes the large, subcritical assembly coolant loops and the medical isotope preparation facility, one of the main functions for the facility. A comprehensive study during the design phase for the facility determined the production rates and the irradiation locations to optimize sample sizes for more than 50 radioactive isotopes.

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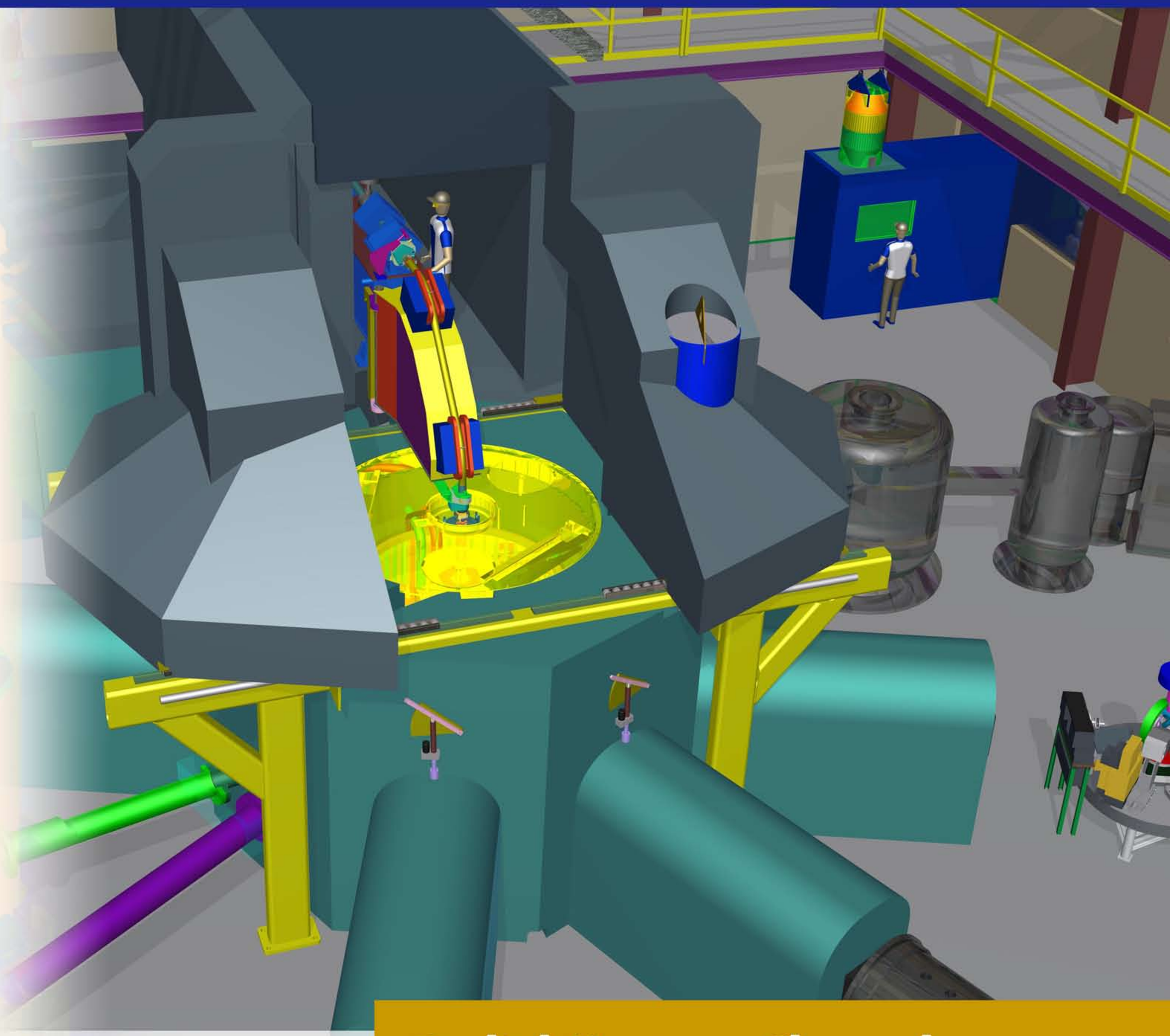

Radial Neutron Channels

Radial neutron channels including those for cold neutrons for basic and applied neutron research.

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