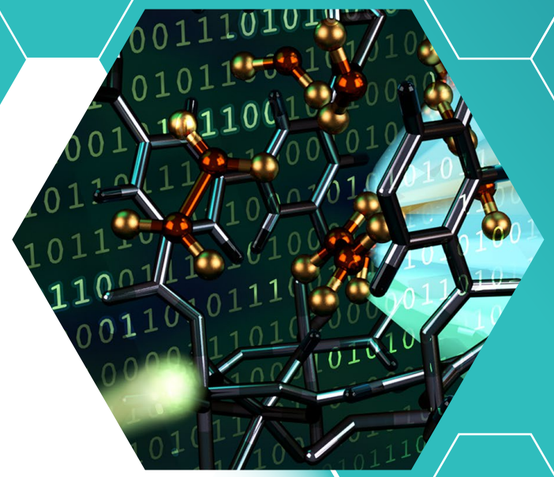
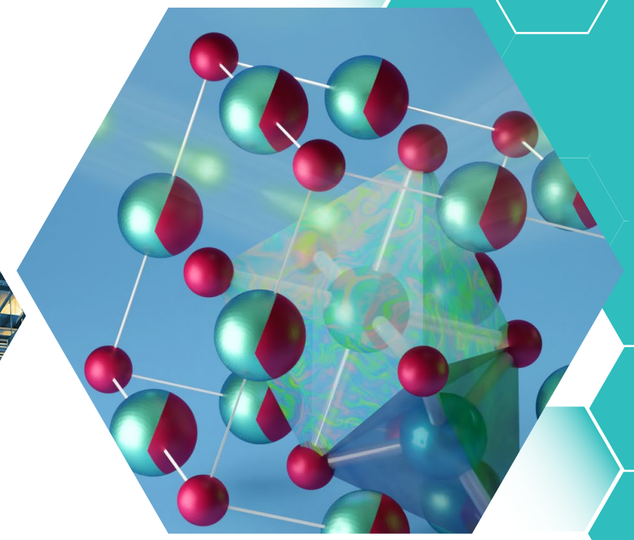
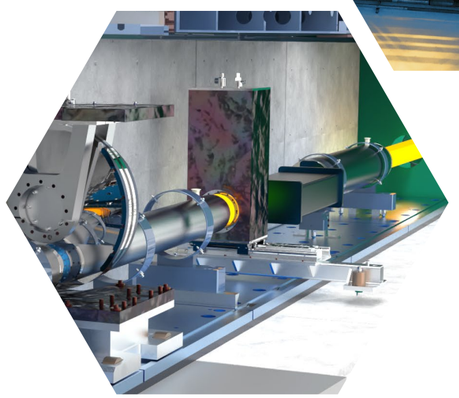
2022

Scientific Advancement

Neutron scattering research is key to scientific advancement in several critical areas, including quantum materials, catalysis, polymers, and the energy materials needed to deliver the carbon-free economy of the future. The Spallation Neutron Source (SNS) and High Flux Isotope Reactor (HFIR) user facilities at Oak Ridge National Laboratory (ORNL) enable scientists to employ the unique properties of neutrons to enable scientific discovery and address some of the most pressing challenges of our time. Despite hurdles created by the pandemic in 2020 and 2021, ORNL staff continued delivering cutting-edge science and staying on track with the Proton Power Upgrade (PPU) and Second Target Station (STS) construction projects, essential to fulfilling the laboratory's 3-source strategy for neutron production.







Improvements to Benefit User Community

To maximize the value of neutron scattering to our vast and important user community, ORNL is: improving software for data reduction and analysis; developing and deploying cutting-edge sample environments; enabling remote experiments, as became necessary with the COVID-19 pandemic but will enhance user access into the future; using real-time feedback to guide increasingly autonomous experimentation; and closely coupling neutron scattering data to computational results and results from complementary experimental methods.

january

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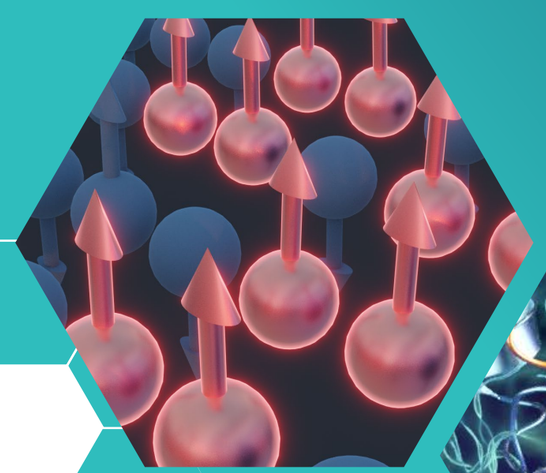
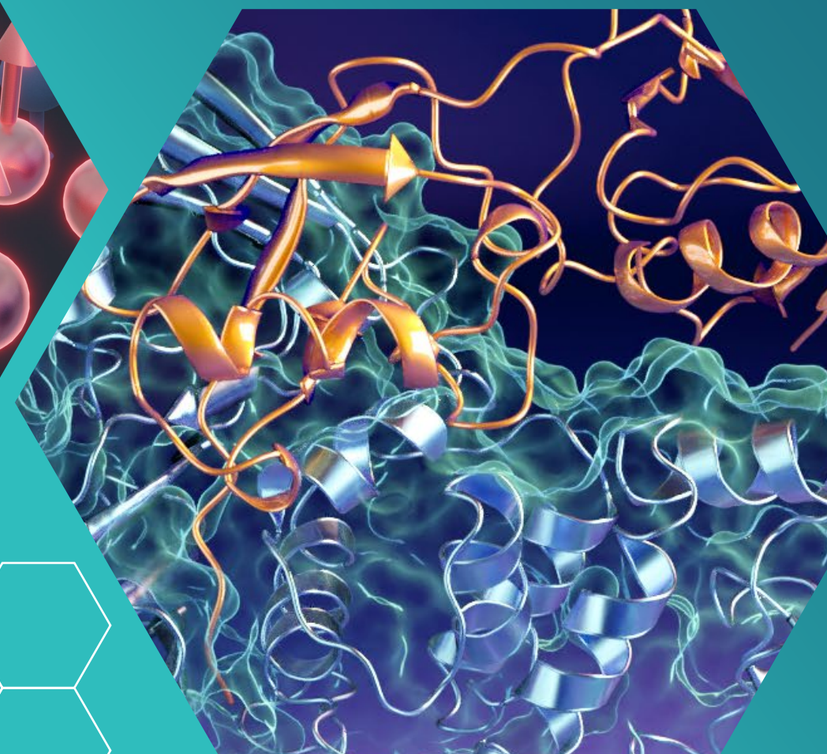
■ Proposal Call 2022-B closes at noon on March 23.





OAK RIDGE National Laboratory | HIGH FLUX ISOTOPE REACTOR | SPALLATION NEUTRON SOURCE

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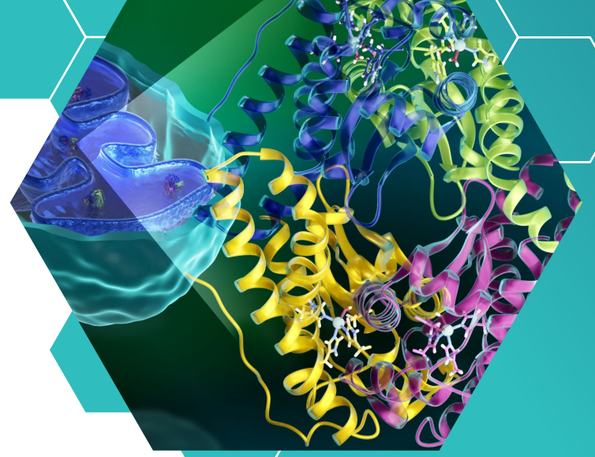
Big Projects for Big Science

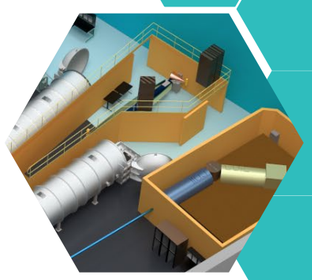
Proton Power Upgrade (PPU) and Second Target Station (STS)

The PPU project will double the power capability of the SNS linear accelerator, from 1.4 to 2.8 megawatts, to facilitate new types of experiments and discoveries and allow the STS to be built. PPU early completion is planned for 2025. The STS reached a major milestone in November 2020 when the US Department of Energy (DOE) officially gave the project Critical Decision 1 (CD-1) approval. CD-1 status affirms the project's conceptual designs, cost and schedule range, and general acquisition plans, and allows the team to pursue preliminary design and development. Working closely with the scientific community, ORNL will continue to refine the design, including the proton transport line, target system, instruments and associated buildings. The project is targeting a combined CD-2/3 approval by the end of 2024 to enable the start of construction, with early completion in 2032.



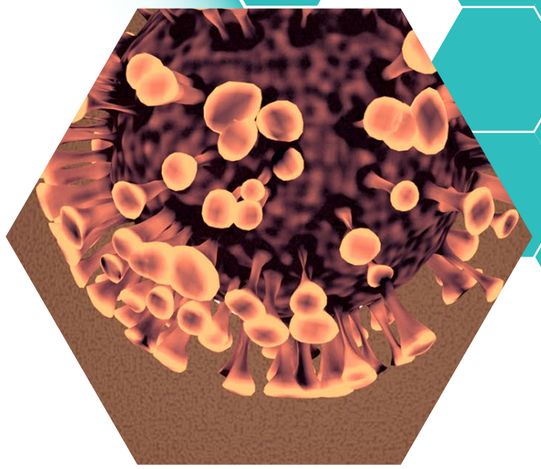
VENUS

The VENUS instrument is currently under construction at the SNS. Planned for completion in a few years, VENUS will be a state-of-the-art beamline for neutron imaging that will enable exciting new ways of studying a wide range of diverse materials currently not possible for open research programs in the US. Neutron imaging is a powerful technique used to understand the internal structure of materials.



HFIR Beryllium Reflector Replacement (HBRR) and Cold Guide Hall upgrades

ORNL is preparing to replace HFIR's permanent beryllium reflector and other key reactor components. The current reflector was installed in the early 2000s at the same time as the construction of the cold source and the cold neutron guide hall, greatly extending the HFIR instrument suite and scientific capabilities. After more than 20 years of successful operation, the reflector is approaching end of life. The HFIR Beryllium Reflector Replacement (HBRR) is planned to begin in the next few years. The beryllium reflector helps drive neutron production by reflecting stray neutrons back into the core as they are generated. The process will include a redesign of the cold guide hall network; plans are also under way to extend HFIR's cold guide hall by more than 4,000 square feet. The cold guide hall features instruments that use cold neutrons with lower energies to unlock information about complex soft matter, such as proteins and polymers, and analyze materials with magnetic properties. The extension will allow reconfiguring and optimizing of the facility's cold neutron instruments to significantly improve their performance, develop new capabilities, and provide space to build new instruments.



2022

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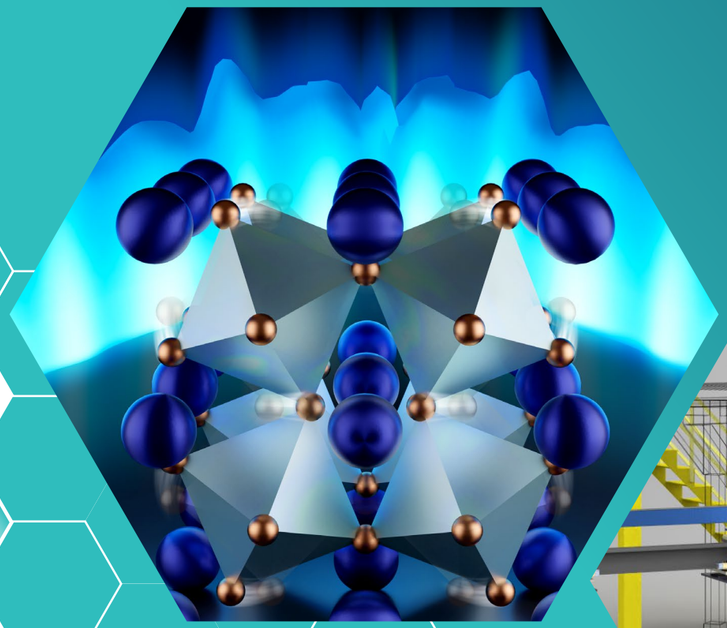
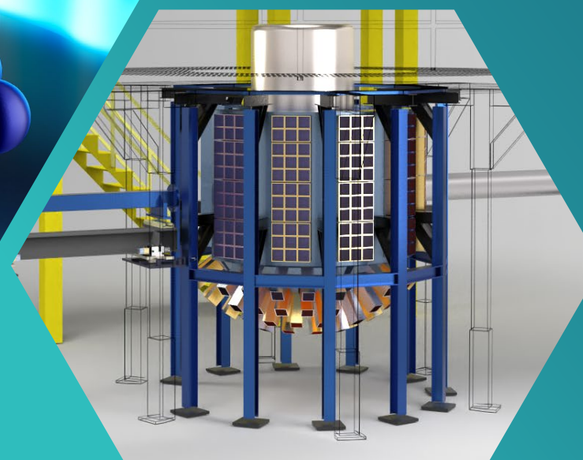
■ Proposal Call 2023-A closes at noon on September 21.





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