HFIR Guide Hall Extension Critical to US Scientific Advancement

The High Flux Isotope Reactor (HFIR) and Spallation Neutron Source (SNS) facilities at Oak Ridge National Laboratory (ORNL) enable researchers from around the globe to use the unique properties of neutrons to advance scientific discovery and address some of the most pressing challenges of our time.

Operating at 85 MW, HFIR is the most powerful reactor-based source of neutrons for research in the US. Built in the 1960s to fulfill the need for producing "heavy" elements such as plutonium and curium, HFIR today has four primary missions: neutron scattering, isotope production, irradiation materials testing and neutron activation analysis.

HFIR's neutron scattering research facilities boast a world-class collection of instruments used for fundamental and applied science in materials research. Matching capacity and capability with science requirements is a dynamic process critical to keeping HFIR and SNS at the forefront nationally and internationally in materials science and technology.

The research community has identified instrument upgrade priorities. Expansion of HFIR's guide hall is needed to allow reconfiguration and optimization of the instrument suite to support the cutting-edge research mandates of US science and technology.

Here's why it matters:

- **MORE EFFECTIVE DRUGS:** Space will be available to build a new Neutron Spin Echo (NSE) spectrometer. Experiments on this instrument examining biomembranes and proteins can lead to breakthroughs in biosynthesis, biochemistry and medicine including immune therapy, Alzheimer's and Multiple Sclerosis treatment and new drugs and drug delivery systems.
- **BETTER BATTERIES, FUEL INJECTION:** The Imaging beamline will have a dedicated location. Researchers have used this instrument to study materials used in lithium batteries that could be the key to safer, more reliable energy storage. HFIR also was used to make the first neutron images of cavitation (gas bubble formation) inside an operating gasoline fuel injector, enabling improvements in injector design.
- **IMPROVED COMPUTER MEMORY, DATA TRANSMISSION:** The existing Cold Triple Axis (CTAX) spectrometer will be relocated to provide significant performance gains, including the ability to collect data faster and to use smaller samples. Materials studied on this instrument facilitate power and data transmission in computers, cell phones, and power lines, augment computer memory (hard disk) capacity, improve efficiency of electric devices and power plants, and are vital to the eventual development of a quantum computer.

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