High Flux Isotope Reactor

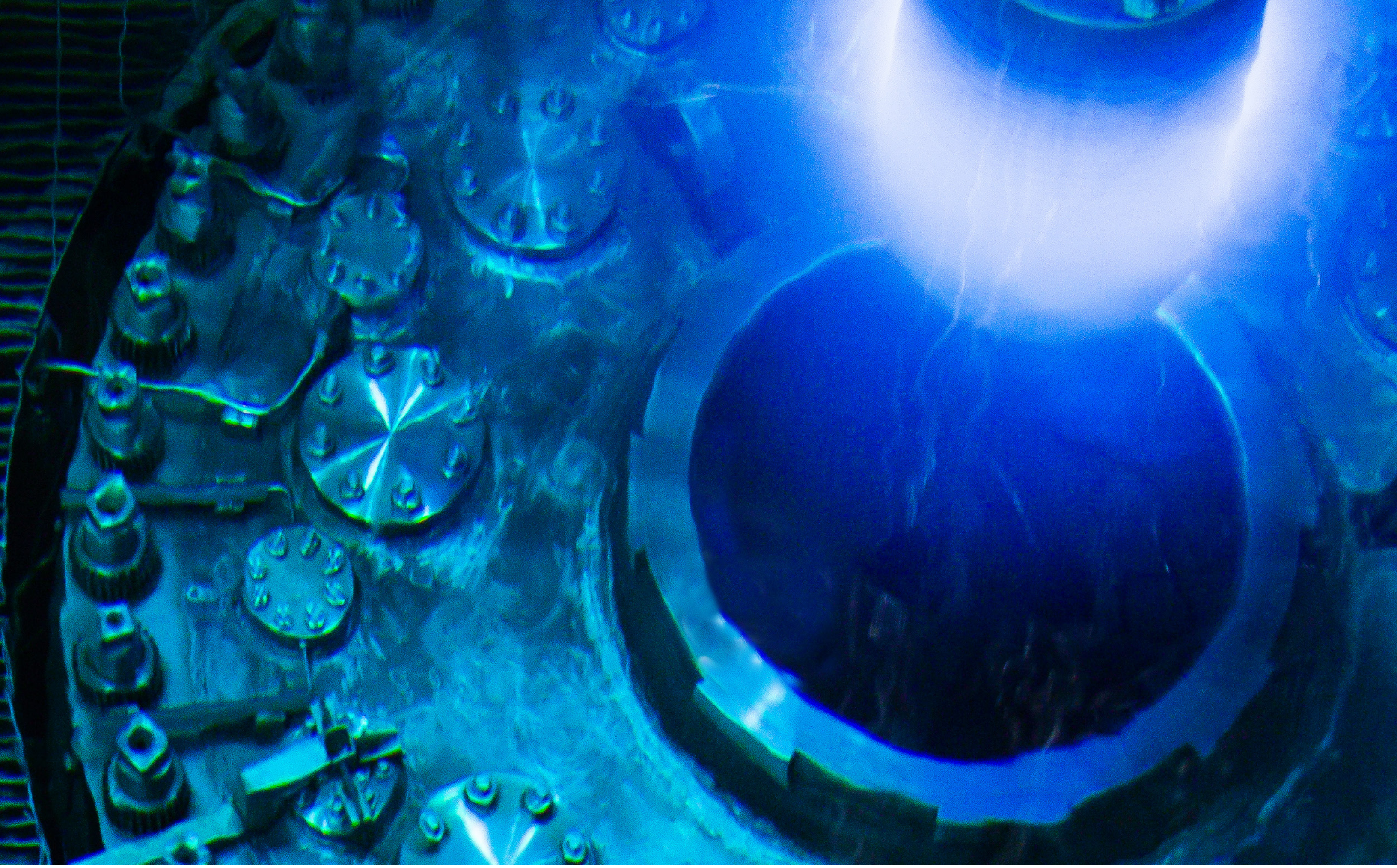
Celebrating over a half-century of Big Science

A little history on a big deal

First achieving criticality in 1965, the reactor was originally constructed to fulfill the need for producing "heavy" elements such as plutonium and curium.

Today, HFIR has four primary missions:

- Neutron scattering
- Isotope production
- Irradiation materials testing
- Neutron activation analysis



The HFIR reactor during a routine refueling. While submerged, the spent fuel emits a blue glow known as Cherenkov radiation.

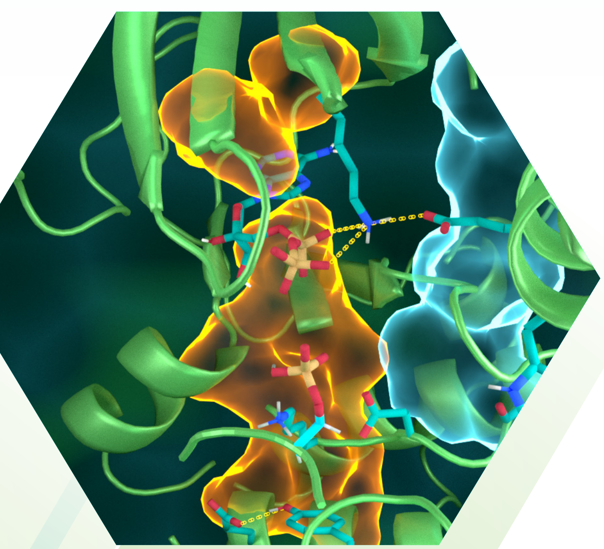
OAK RIDGE National Laboratory | HIGH FLUX ISOTOPE REACTOR

What's the High Flux Isotope Reactor (HFIR) at Oak Ridge National Laboratory (ORNL)?

It's a pretty big deal.

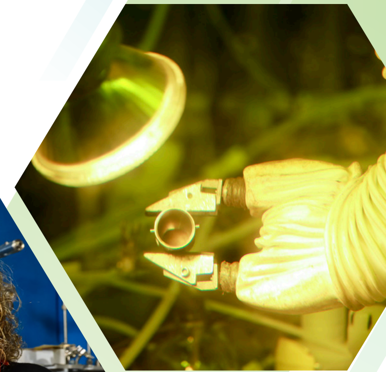
It is:

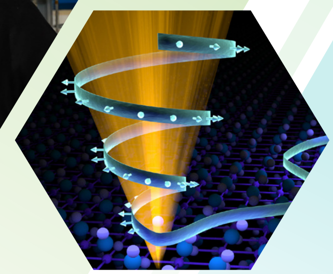
- the most powerful reactor-based source of neutrons in the United States
- one of the nation's top facilities in producing medical- and industry-grade isotopes
- a large facility with a small core (2 feet tall and 15 inches in diameter)
- a swimming pool reactor, which is under tens of feet of water to provide cover from the neutrons and gamma rays
- the western world's only supplier of Californium-252, an isotope used for well-logging and industrial scanning, as well as a neutron source for starting up reactors
- used to produce actinium-227 for treating cancer, and nickel-63 for detecting explosives
- a producer of plutonium-238, an isotope used to power NASA space missions, used most recently in the MARS Rover

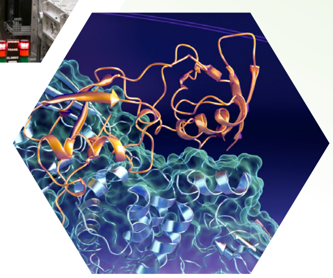


HFIR operates with high predictability

HFIR runs seven 24-day cycles of neutron production, and the intense neutron flux and constant power density are used by more than 500 researchers each year.







User program

It has a user program, with two annual calls for proposals.

Submissions are peer-reviewed by external panels, with recommendations based on scientific and technological impact, feasibility, and safety.

HFIR's neutron scattering research facilities contain a world-class collection of instruments used for fundamental and applied research on the structure and dynamics of matter.

The thermal and cold neutrons produced by HFIR are used to study physics, chemistry, materials science, engineering, and biology.

Its capabilities enable the exploration of the molecular and magnetic structures and behaviors of materials including high-temperature superconductors, polymers, metals, and biological samples.

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