High Flux Isotope Reactor

Description

The High Flux Isotope Reactor (HFIR) first achieved criticality on August 25, 1965, and achieved full power in August 1966. It is a versatile 85-MW isotope production, research, and test reactor with the capability and facilities for performing a wide variety of irradiation experiments and a world-class neutron scattering science program. HFIR is a beryllium-reflected, light water-cooled and moderated flux-trap type swimming pool reactor that uses highly enriched uranium-235 as fuel. HFIR typically operates seven 23-to-27 day cycles per year. Irradiation facility capabilities include:

- Flux trap positions: Peak thermal flux of $2.5X10^{15}$ n/cm^2/s with similar epithermal and fast fluxes (Highest thermal flux available in the western world.)
- Reflector positions: Thermal fluxes of $1.0X10^{15}$ n/cm^2/s ranging down to $1.0X10^{14}$ n/cm^2/s in the outermost positions
- Two complimentary pneumatic tubes that shuttle samples from the core to the HFIR Neutron Activation Analysis (NAA) Laboratory
  - PT-1: $2.8X10^{14}$ n/cm^2/s (Thermal/Epithermal = 40)
  - PT-2: $5.9X10^{13}$ n/cm^2/s (Thermal/Epithermal = 200)
- Gamma irradiation Facility maximum does rate: $1.0X10^{8}$ R/hr

Applications

- Thermal and cold neutron scattering science
- Isotope production
  - Californium-252
  - Other transcurium isotopes for R&D
  - Lighter isotopes that require high flux for production
- Fission and fusion reactor materials irradiation studies
- Advanced reactor fuels irradiation studies

Specifications	
Reactor type	Beryllium reflected, light water cooled and moderated, flux-trap type reactor
Fuel	Highly Enriched Uranium-235
Thermal neutron scattering instruments	3 horizontal beam tubes serving 7 instruments
Cold neutron scattering instruments	1 horizontal beam tube serving 5 instruments
Flux trap region irradiation positions	30 target positions, 6 peripheral target positions 1 hydraulic rabbit facility position
Reflector region irradiation positions	42 vertical irradiation positions 2 slant positions on reflector periphery
Materials Irradiation Facility	This facility supports instrumented and/or gas cooled experiments -2 flux trap positions ($2.5X10^{15}$ n/cm^2/s) -8 reflector positions ($1.0X10^{15}$ n/cm^2/s)
Neutron Activation Analysis	2 pneumatic tubes shuttle samples from the NAA Lab to the reflector region
Gamma Irradiation Facility	In spent fuel flux trap

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